



EDEN & ASSOCIATES
engineering • planning • development

Berewick

Date: July 1, 2020

Berewick Stormwater Management, Floodplain Routing and Sewer Calculations

Located in the Northern Quadrant of Tom's Creek Road and Redbud Road,
In the Town of Blacksburg, Virginia

Owner:

Lucas TCR, LLC
1999 South Main Street #500
Blacksburg, VA 24060

Submitted on behalf of Owner by the Applicant:

Meredith Jones, P.E.
Eden & Associates, P.C.
1800 Kraft Dr. Suite 111
Blacksburg, VA 24060



Table of Contents:

Page

Narrative	3
○ Introduction	3
○ Stormwater Quantity	3
○ Stormwater Quality	5
○ Floodplain	
Appendix	13
○ Stormwater Quality	14
○ Stormwater Quantity	48
○ 1-year energy balance supporting calculations	59
○ 10-year Flooding Calculations	123
○ 100-year routing	187
○ HEC-RAS Floodplain Results	251
○ STEP/STEG Sewer Calculations	258

Stormwater Introduction:

The main feature for the development is the confluence of two major tributaries of Tom's Creek. The development will protect and, over time, enhance this feature by conserving this area in permanent open space. Currently, cattle graze over the land and are permitted to access the creek. Therefore, a large part of the property remains denuded and the creek condition is poor. Currently, the site receives nearly 2000 cubic feet per second of flow from upstream runoff in the 100-year storm. This has left the creek with deep gulleys and eroded banks as the urban runoff has increased over the years as the Town has developed. The removal of cows from the creek with this development will help to repair the creek from unwanted erosion on its banks. We propose to safely pass the current flows through our site without impacting the existing floodplains adversely, nor increasing flows to Tom's Creek road at the bottom of the site.

To further protect this area from our own development impacts, the applicant will provide stormwater best management practices to achieve the Town's regulatory requirements for stormwater. A stormwater concept plan and narrative with calculations has been submitted with the application that shows the development can address the stormwater quantity and quality requirements and are detailed further below. Jurisdictional waters/wetland delineation has received preliminary approval from the Corps of Engineers and our crossing will conform to DEQ's permit requirements by disturbing less than 300' of creek length. To reduce overall imperviousness in the community and to keep disturbance of the creek length to this maximum limit, only one crossing has been proposed for the road. All springs are identified and protected inside conserved open space. The following details the requirements that will be met by the development.

Storm Water Quantity:

- **Channel Protection:** Stormwater management basins are located on the "stormwater management concept plan" shown below. These will detain the 1-year storm, as required by the State and Town regulations, back to an acceptable level using the energy balance equation. This ensures that small, frequent storms, do not negatively affect downstream creeks and channels. Two points of analysis were individually considered. Pt of Analysis A at the top of the property draining an intermittent stream, and Pt. of Analysis B at Tom's Creek Road.
 - Point of Analysis A in the Pre-Development case releases in a forested area to the property downstream. To keep comparison with post-development flows, pre development curve numbers were created using the RRM TR-55 values for each soil type. Time of concentration lines are shown on the maps contained herein. Hydrographs for each of the areas are included in the appendix. In the post developed case, we capture existing upland areas and include them with the post developed site in the stormwater basin labeled 4. It may be possible in design to provide diversions for some of the offsite flow to provide for a smaller detention facility on-site. At this point, a portion of the developed site is released directly from our property (A4-2) without going through the detention, so that the detention facility "overdetains" the remainder of flow.
 - Point of Analysis B contains four detention areas available for design purposes. However, only Ponds 1, 2 and 5 are being utilized at this time. Pond 3 may be able to be eliminated in design depending upon the viability of the construction of the conservation area filter strips contained in its area. Flows from Upland areas (Tributary A and Tributary B of Tom's Creek) are routed through the site and included in the total energy balance, though the site impact is first calculated to determine the reduction required. All BMP's are located outside of the Creek Valley overlay with the exception of the conservation area filter strips that are outside of the 10-year floodplain. The level spreader, however, will be located between the 25-year and 100-year limits to reduce it from being washed away on a short term basis. Both conservation area filter strips are

not needed, only one. The location of it depends upon design constraints that are currently unknown which is why two locations are shown. To keep comparison with the RRM effects of runoff reduction, post-development curve numbers were created using the RRM TR-55 values for each soil type. Time of concentration lines are shown on the maps contained herein. Hydrographs for each of the areas are included in the appendix.

Results show that the energy balance is achieved.

Energy Balance Calculations			
Pt. of Analysis A			
Pre-Developed Site Breakdown:			
Hydrograph 4			
Pre 1-Yr Rate:	3.98	cfs	
Pre 1-Yr Volume:	15,524	cf	
Post-Developed Site Breakdown:			
Hydrograph 46			
Post 1-Yr Rate:	7.18	cfs	
Post 1-Yr Volume:	22,106	cf	
Q1 Energy Balance: $Q_{allow} = 0.8 * \text{Pre 1-Yr Rate} * (\text{Pre 1-Yr Vol} / \text{Post 1-Yr Vol})$			
Q1 Energy Balance Site Flow:	2.24	cfs	
Uncontrolled Post B4-1:	1.70	cfs	
Uncontrolled Post B5	0.06	cfs	
Pond 4 allowable release for on-site 1-year	0.48	cfs	
Reduction in Q1 storm to meet Energy Balance:	3.50	cfs reduction on actual 1-year to Pond A including offsite areas	
Total Post Developed flow to Pond	7.25	cfs on site + offsite areas	
Must reduce to	3.75	max cfs release from Pond 4	
Pond 4 Release	2.8	cfs	

Energy Balance Calculations: Channel Erosion Regulation			
Point of Analysis B Flow to Toms Creek Rd			
Pre-Developed Site Breakdown:			
Hydrograph 12			
Pre 1-Yr Rate:	3.87	cfs	
Pre 1-Yr Volume:	20,705	cf	
Post-Developed Site Breakdown:			
Hydrograph 49			
Post 1-Yr Rate:	16.16	cfs	
Post 1-Yr Volume:	54,286	cf	
Q1 Energy Balance: $Q_{allow} = 0.8 * \text{Pre 1-Yr Rate} * (\text{Pre 1-Yr Vol} / \text{Post 1-Yr Vol})$			
Q1 Energy Balance Site Flow:	1.18	cfs	
Reduction in Q1 storm to meet Energy Balance:	2.69	cfs reduction	
Pre-Developed 1-Yr/24-Hr Total Flow to Toms Creek Road:	187.05	cfs	
Hydrograph 11	-2.69	cfs	
Allowable Post Dev Total Flow to Achieve Energy Balance:	184.36	cfs	
Hydrograph 44	*184.34	cfs	
* model 1-yr post with routing to Pts analysis A and B Toms Creek 2020-06-29			

- **Flood Protection:** The stormwater management basins are located strategically to adequately capture runoff and reduce flows to pre-development levels for the 10-year storm. This will keep our community amenities, infrastructure, and downstream creek areas from seeing any increase in flows and erosion associated with the larger less frequent storms.

Results show the Flood Protection Requirement is achieved

Flood Protection Requirement:

10-year calculations

Point of Analysis B Flow to Tom's Creek Rd.		
Pre-Development of Site		
hydrograph 12	36.67 cfs	
Pre-Development of Site and Offsite Flows	841.89 cfs	
Hydrograph 11		
Post-Development of Site	818.24 cfs	
Hydrograph 44		
Point of Analysis A		
Pre-Development of Site		
hydrograph 42	29.04 cfs	
Post Development flow from Pond 4:	16.93 cfs	hydrograph 45
Post Development flow from B4-1	<u>5.75</u> cfs	hydrograph 19
Total Post Dev flow at Pt A	22.68 cfs	

100-year calculations

Point of Analysis B Flow to Tom's Creek Rd.		
Pre-Development of Site		
hydrograph 12	94.64 cfs	
Pre-Development of Site and Offsite Flows	1940.23 cfs	
Hydrograph 11		
Post-Development of Site	1731.81 cfs	
Hydrograph 44		
Point of Analysis A		
Pre-Development of Site		
hydrograph 42	69.75 cfs	
Post Development flow from Pond 4:	40.79 cfs	hydrograph 45
Post Development flow from B4-1	<u>11.96</u> cfs	hydrograph 19
Total Post Dev flow at Pt A	52.75 cfs	

- **Creek Valley Overlay:** Largely remains undisturbed. The road crossing and sewer lift station/access road fall within this area, as utilities are permitted in the creek valley overlay.

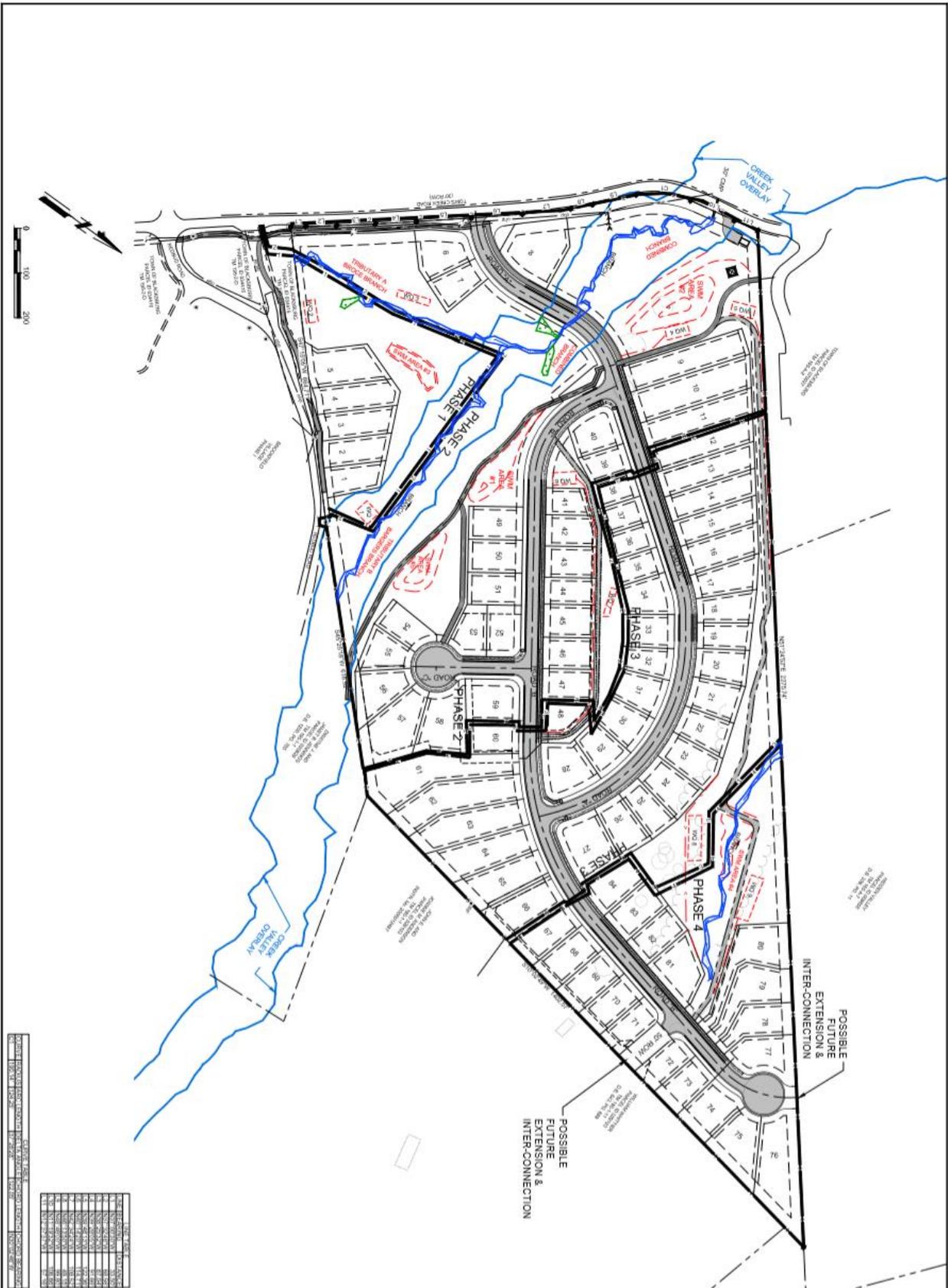
Storm Water Quality: The development will meet its water quality requirements by providing BMP's for 75-100% of the pollutant loading reduction required. Based on specific design requirements, this amount can vary, but a minimum of onsite treatment for 75% of the pollutant reduction required will be achieved while the remainder would be purchased in credits. Potential water quality areas have been identified both upstream and downstream of detention areas as shown on the "Stormwater Management Concept Plan". This will ensure that Tom's Creek and its tributaries will not receive any unwanted pollutants from our development.

Calculations Below include Site Results for the Water Quality on the Property. While the goal is to achieve 75%, the strategies shown at this time achieve 95% of the pollutant reduction. The remainder will be achieved through nutrient credit purchase. This, however, allows room for the development to reduce a BMP or two in design.

Site Results (Water Quality Compliance)						
Area Checks	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
FOREST/OPEN SPACE (ac)	2.53	1.22	1.52	0.61	1.92	OK.
IMPERVIOUS COVER (ac)	0.41	0.31	2.33	1.41	2.35	OK.
IMPERVIOUS COVER TREATED (ac)	0.41	0.17	2.33	1.35	1.40	OK.
MANAGED TURF AREA (ac)	0.85	0.45	2.98	2.20	3.41	OK.
MANAGED TURF AREA TREATED (ac)	0.51	0.38	2.98	1.98	1.80	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	
Site Treatment Volume (ft³)	47,866					
Runoff Reduction Volume and TP By Drainage Area						
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	TOTAL
RUNOFF REDUCTION VOLUME ACHIEVED (ft ³)	1,326	345	8,175	2,796	5,006	17,648
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	1.26	0.88	6.53	4.12	6.81	19.60
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.83	0.28	5.88	2.33	3.53	12.87
TP LOAD REMAINING (lb/yr)	0.43	0.60	0.65	1.79	3.27	6.74
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	5.95	2.13	42.66	18.99	25.84	95.57
Total Phosphorus						
FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	30.07					
TP LOAD REDUCTION REQUIRED (lb/yr)	13.54					
TP LOAD REDUCTION ACHIEVED (lb/yr)	12.87					
TP LOAD REMAINING (lb/yr)	17.21					
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.67					
Total Nitrogen (For Information Purposes)						
POST-DEVELOPMENT LOAD (lb/yr)	215.14					
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	95.57					
REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr)	119.58					

A water quality BMP summary is included below which correlates with the “Stormwater Management Exhibit”. These calculations demonstrate that the Berewick development can meet its requirements; however, there appears to be enough pollutant removal to eliminate some of these in design. Calculations contained in the Appendix will show that the curve numbers were established using the Runoff Reduction method and input into a Hydra-flow model for the post-developed quantity calculations. Individual pollutant removals by Drainage area are also included in the appendix.

Water Quality BMP's		
Item	Phase	Description
Water quality BMP #1		1 Conservation Area Filter Strip
Water quality BMP #2		1 Conservation Area Filter Strip
Stormwater Management Area 3		1 Detention, above ground
Water quality BMP #3		2 Dry Swale/Bioretenention
Water quality BMP #4		2 Dry Swale/Bioretenention
Water quality BMP #5		2 Dry Swale/Bioretenention
Water quality BMP #6		2 Dry Swale/Bioretenention
Water quality BMP #7		2 Dry Swale/Bioretenention
Stormwater Management Area 2		2 Detention, Extended Detention
Stormwater Management Area 1		2 Detention
Stormwater Management Area 5		2 Detention
Water quality BMP #8		3 Dry Swale/Bioretenention
Water quality BMP #9		4 Dry Swale/Bioretenention
Stormwater Management Area 4		4 Detention



GENERAL NOTES:

1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.
2. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.
3. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.
4. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.
5. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.
6. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.
7. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.
8. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.
9. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.
10. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE VIRGINIA CONSTRUCTION CODES AND SPECIFICATIONS.

PROPOSED DEVELOPMENT FOR
 LUCAS CONSTRUCTION AND DEVELOPMENT, INC.
BEREWICK
 PROPERTY OF LUCAS TOR, LLC
 PARCEL ID 006160; TMB# 195-A-5; 40.345 ACRES
 PRICES FORK MAGISTERIAL DISTRICT
 TOWN OF BLACKSBURG, MONTGOMERY COUNTY, VA

**STORMWATER
 MANAGEMENT
 EXHIBIT**

EDEN & ASSOCIATES
 engineering • planning • assessment
 1800 KRAFT DRIVE, SUITE 111
 BLACKSBURG, VIRGINIA 24060
 VOICE: 274-632-6231
 FAX: 274-632-3648

Floodplain:

Calculations contained herein show that the road adequately passes the 100-year flood. A culvert has been designed to pass flood rates, as required by Town code. The nature of installing a culvert in an embankment will create some backwater thus reducing the flow rate of the 100-year storm at Tom's Creek Road. A reduction in flows for the 1-year, 10-year, and other storms are also seen at Tom's Creek Road because of the crossing and site detention. One hundred-year flood elevations to the property and on the property were modelled for the pre and post development cases. While the floodplain elevations increased slightly onsite, infrastructure is placed outside of these areas. No surrounding properties are negatively affected. Elevations and calculations are contained in the Stormwater Narrative.

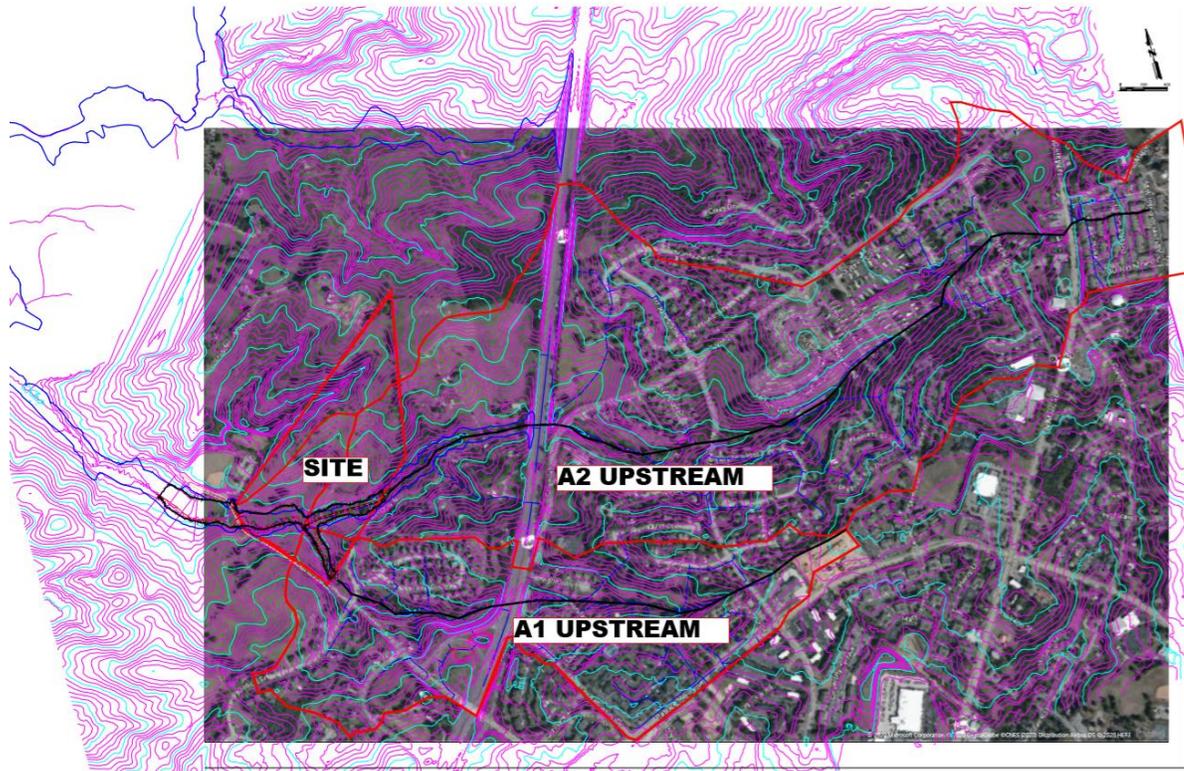
Existing flooding: While the applicant recognizes the Town's downstream situation with flooding on Tom's creek road, attempts to reduce the flooding problem were futile as the DEQ and Corps of Engineers would not allow in-stream detention. Town staff representatives along with the developer's engineer met on-site to examine the areas and participated in an online meeting to this end.

Because of the large amount of water draining from upstream development through this property, it is impractical to detain any of it out of the stream and make a big enough difference. Regardless, we have maximized detention from our site to reduce what floodwaters we can at Tom's Creek Rd. In the absence of being able to provide significant flood reduction with the project, it has remained a project goal not to exacerbate the problem where floodwaters cross Tom's Creek Road currently. The project design does not propose to additional infrastructure in this area nor wants to encourage an increase in traffic tot this location: automobiles, pedestrians, or bicyclists.

Calculations explanation:

This tract of land encompasses two major tributaries of Tom's Creek. For the purposes of this development we have identified these as Tributary A and Tributary B. Tributary A conveys approximately 133 acres of drainage, while Tributary B, being the larger of the two, conveys approximately 347 acres. They come together approximately halfway through the site giving a combined drainage area of 480 acres. Therefore, in accordance with Division 24 of the Zoning Ordinance: FHO Floodplain Overlay District, a 100 yr floodplain boundary was delineated, using HEC-RAS, for the pre-development condition and the post development condition.

Upstream Drainage areas



Pre-Development Delineation:

The existing watercourse currently drains through the property and under Toms Creek Road through a 30-inch CMP culvert. Due to years of upstream development, the banks of this watercourse have become eroded with deep gullies. Furthermore, the amount of drainage through the watercourse is not able to be contained within the culvert that drains under Toms Creek Road, causing flooding of the roadway, even on much smaller storm events.

The Anderson Method was used to determine a time of concentration for each drainage area which was then entered into Hydra-flow Hydrographs to determine an existing flow through these tributaries. It was determined that for the 100-year storm, 757 cfs is draining through Tributary A, while 1291 cfs is draining through Tributary B. Those flows combined with the runoff from the existing site give a total 100-year flow rate at Toms Creek Road of 2111 cfs. This flow information was then entered into the HEC-RAS routing program in order to delineate the existing 100-year floodplain boundaries.

Post-Development Delineation:

The Development will be accessed off Toms Creek Road and the new access road will cross the watercourse just downstream of the location where the two tributaries combine. This crossing location was reviewed by DEQ and been giving preliminary approval. A double 8ft X 8ft box culvert is proposed in order to pass the floodwaters safely under the new roadway. Similar to the pre-development approach, flow rates for the development of the site were determined using Hydra-flow Hydrographs. However, because of the proposed stormwater management on-site the post development flows are less than that predevelopment flows with Tributary A receiving 725 cfs and Tributary B receiving 1170 cfs. Furthermore, when looking at the point where the tributaries combine, along with additional flow from the site, the new roadway 8 ft X 8 ft box culverts will be passing 1928.68 cfs.

The construction of this crossing will impact the 100-year flood water elevations, but only within the project boundaries. The 100-year floodplain elevations at the property lines, including Toms Creek Road, remain essentially the same from pre to post development. A summary of the cross-sectional comparison has been provided showing the affect within the site.

Date: 6-30-2020

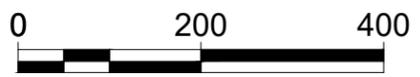
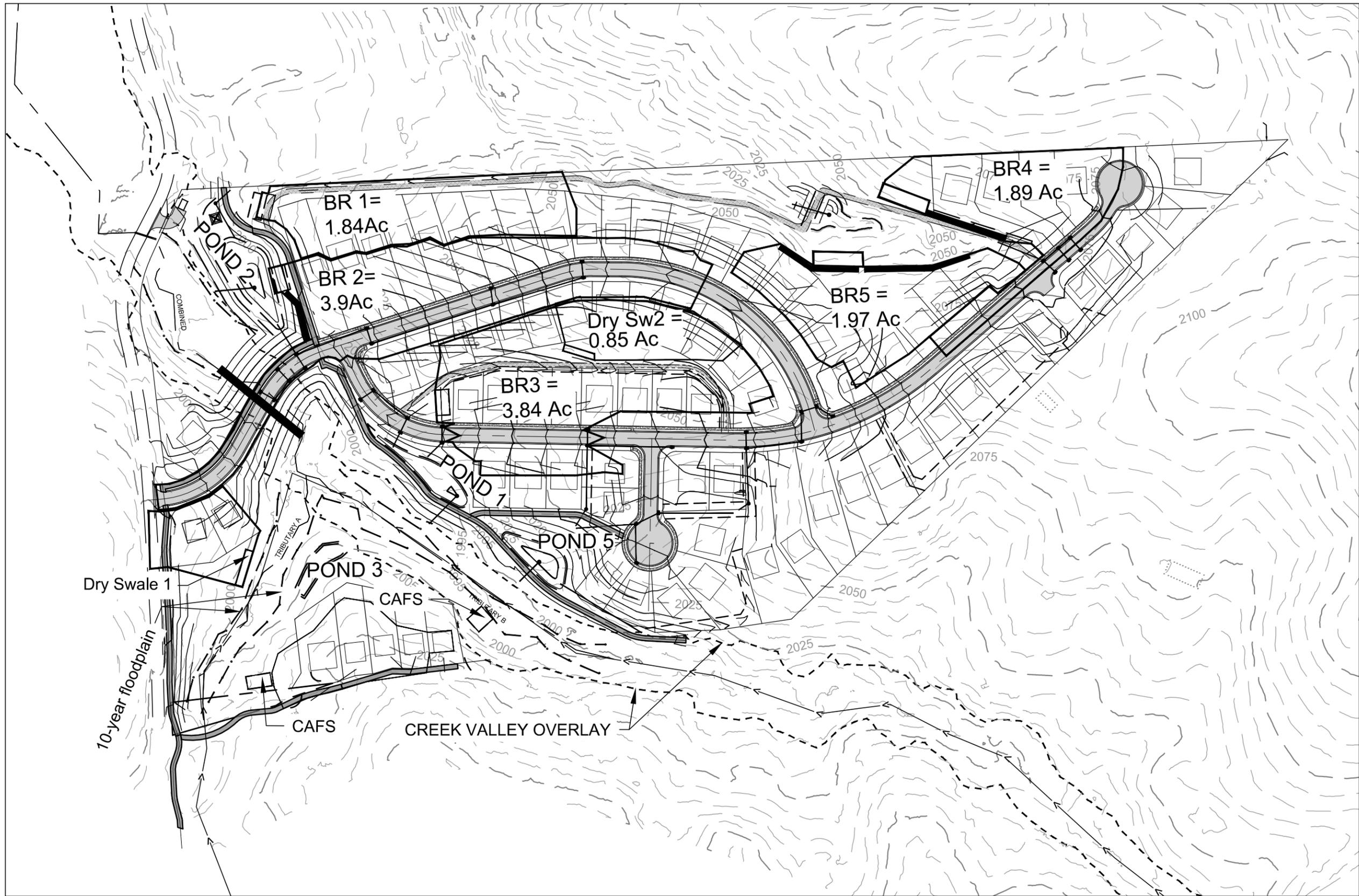
HEC RAS files:		Toms Creek Post Deve 6-30-2020, Plan 01					
		Pre Developed Water Surface Elevation (WSE)		Post Developed Water Surface Elevation (WSE)		100-YR ELEVATION RISE	
Cross Section	Stream Station	10 Yr Elevation	100 Yr Elevation	10 Yr Elevation	100 Yr Elevation		Notes
Combined							
SL-11	+19.37	1967.59	1968.54	1967.45	1968.41	-0.13	
SL-10	1+32.43	1969.14	1970.24	1968.98	1970.09	-0.15	
SL-9	2+59.42	1970.06	1970.98	1969.93	1970.85	-0.13	
SL-8	4+00.17	1971.75	1972.41	1971.64	1972.31	-0.10	
SL-7	5+28.62	1973.8	1974.51	1973.72	1974.4	-0.11	
SL-12	6+33.79	1975.69	1976.37	1975.55	1976.29	-0.08	
SL-13	7+97.76	1980.47	1981.31	1980.34	1981.22	-0.09	Toms Creek Road
SL-46	8+31.17	1981.04	1982.49	1980.99	1982.48	-0.01	Toms Creek Road
SL-14	8+50.73	1981.04	1982.49	1980.99	1982.48	-0.01	
SL-15	8+79.14	1981.1	1982.57	1981.04	1982.53	-0.04	
SL-16	9+54.32	1981.34	1982.82	1981.22	1982.74	-0.08	
SL-17	9+93.52	1981.54	1983.03	1981.38	1982.89	-0.14	<i>Pre Interpolated</i>
<i>Pre SL-17</i>	<i>10+27.71</i>	1981.72	1983.21	1981.55	1983.06	-0.15	<i>Interpolated</i>
SL-18	10+58.7	1981.88	1983.32	1981.70	1983.21	-0.11	<i>Pre Interpolated</i>
<i>Pre SL-18</i>	<i>10+85.39</i>	1982.01	1983.41	1981.93	1983.29	-0.12	<i>Interpolated</i>
SL-19	11+61.72	1982.83	1983.83	1982.60	1983.52	-0.31	
SL-20	11+90.48	1983.34	1984.58	1983.26	1984.43	-0.15	<i>Pre Interpolated - Countersunk Culvert</i>
<i>Pre SL-20</i>	<i>12+37.17</i>	1984.16	1985.81	1982.92	1984.34	-1.47	<i>Interpolated</i>
SL-21	12+94.27	1984.93	1985.75	1982.51	1984.24	-1.51	Proposed Road Top
SL-22	13+38.85	1985.78	1986.60	1987.35	1997.70	11.10	<i>Pre Interpolated - Proposed Road Top</i>
<i>Pre SL-22</i>	<i>13+94.96</i>	1986.84	1987.66	1989.28	1997.70	10.04	<i>Interpolated</i>

HEC RAS files:		Toms Creek Post Deve 6-30-2020, Plan 01					
		Pre Developed Water Surface Elevation (WSE)		Post Developed Water Surface Elevation (WSE)		100-YR ELEVATION RISE	
Cross Section	Stream Station	10 Yr Elevation	100 Yr Elevation	10 Yr Elevation	100 Yr Elevation		Notes
SL-23A	14+27.3	1987.44	1988.41	1990.40	1997.70	9.29	Countersunk Culvert
SL-23B	14+65.6	1988.15	1989.30	1990.30	1997.70	8.40	<i>Pre Interpolated</i>
<i>Pre SL-23</i>	14+91.21	1988.63	1989.89	1998.02	1997.71	7.82	<i>Interpolated</i>
SL-23C	14+95.67	1988.71	1989.99	1999.37	1997.71	7.72	26' Downstream of Stream Junction
<i>Tributary B</i>							
<i>Pre SL-35</i>	+35.74	1990.22	1991.41	1992.25	1997.72	6.31	<i>Interpolated</i>
SL-35	+45.14	1990.51	1991.60	1990.38	1997.72	6.12	<i>Pre Interpolated</i>
SL-36	+62.12	1991.18	1992.2	1990.99	1997.69	5.49	
<i>Pre SL-47</i>	1+22.16	1992.32	1993.15	1992.15	1997.74	4.59	<i>Interpolated</i>
SL-47	1+28.13	1992.38	1993.23	1992.27	1997.74	4.51	<i>Pre Interpolated</i>
SL-37	1+59.56	1992.68	1993.64	1992.58	1997.75	4.10	
SL-38	2+59.56	1994.12	1994.98	1993.98	1997.69	2.71	
SL-39	3+59.57	1996.08	1996.87	1995.99	1997.70	0.83	
SL-40	4+59.58	1997.74	1998.7	1997.57	1998.30	-0.40	
SL-41	5+21.36	1998.65	1999.4	1998.54	1999.35	-0.05	
SL-42	5+79.02	2000.29	2001.28	2000.11	2001.15	-0.13	
SL-45	6+09.62	2001.06	2002.04	2000.90	2001.91	-0.13	
SL-43	6+59.54	2001.69	2002.55	2001.56	2002.42	-0.13	
SL-44	7+13.27	2002.51	2003.62	2002.35	2003.47	-0.15	Jennings Property Line
<i>Tributary A</i>							
SL-25	0+32.07 / 0+34.74	1991.03	1991.62	1990.91	1997.72	6.10	
SL-24	+60.93	1991.97	1992.43	1991.93	1997.72	5.29	
SL-26	1+20.52	1993.33	1993.8	1993.30	1997.73	3.93	

HEC RAS files:		Toms Creek Post Deve 6-30-2020, Plan 01					
		Pre Developed Water Surface Elevation (WSE)		Post Developed Water Surface Elevation (WSE)		100-YR ELEVATION RISE	
Cross Section	Stream Station	10 Yr Elevation	100 Yr Elevation	10 Yr Elevation	100 Yr Elevation		Notes
SL-27	1+60.95	1994.02	1994.56	1994.32	1997.75	3.19	
SL-28	2+16.1	1995.04	1995.63	1995.00	1997.72	2.09	
SL-29	2+74.71	1996.41	1996.97	1996.37	1997.69	0.72	
SL-30	3+26.38	1997.35	1997.92	1997.30	1997.89	-0.03	
SL-31	3+89.19	1999.42	2000.22	1999.31	2000.15	-0.07	
SL-32	4+32.85	2000.97	2001.71	2000.88	2001.66	-0.05	
SL-33	4+91.41	2003.1	2003.74	2003.03	2003.69	-0.05	
SL-34	5+41.41	2004.75	2005.33	2004.71	2005.3	-0.03	TOB Property Line

Appendix

Stormwater Quality

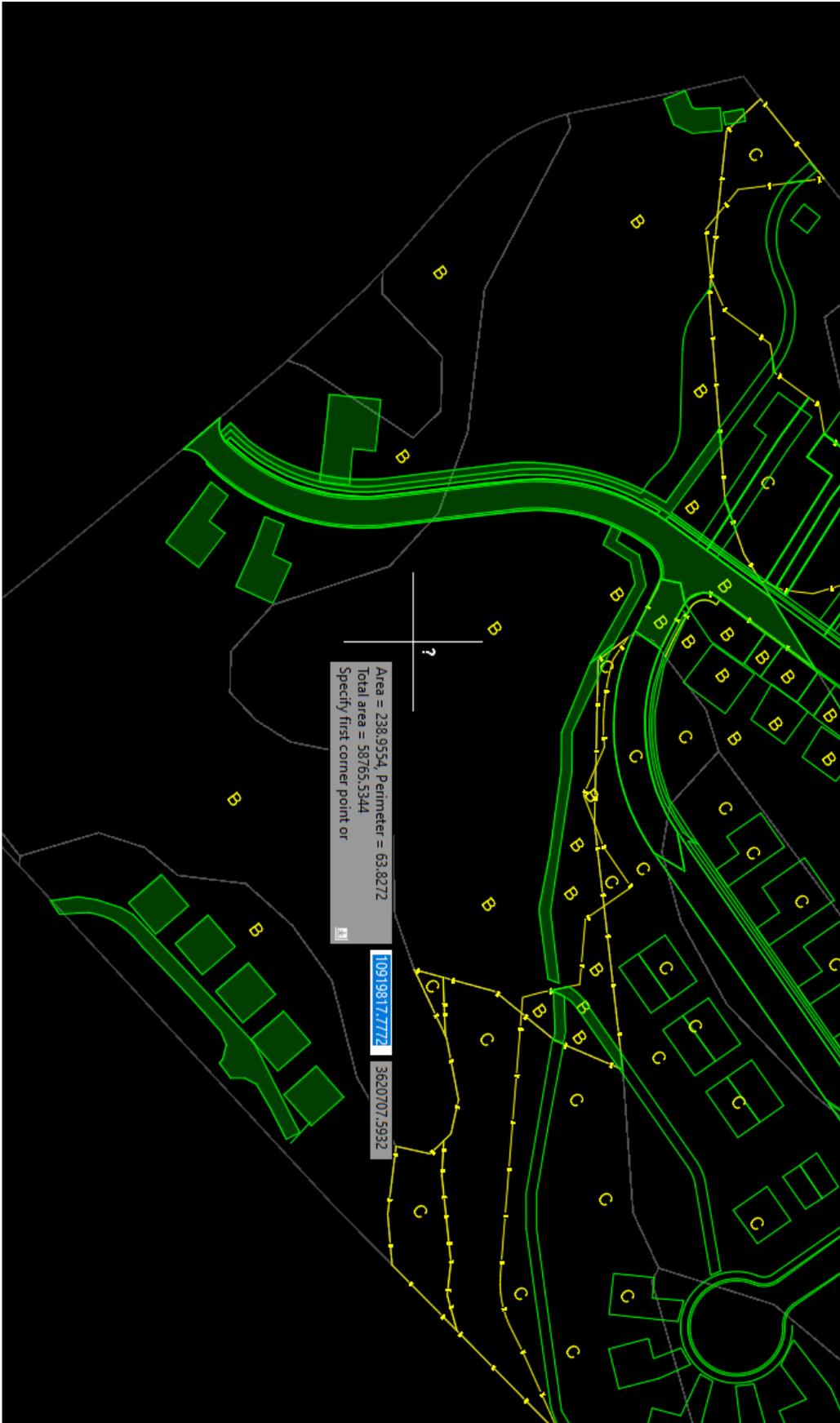


POST DEVELOPED WATER QUALITY DRAINAGE MAP

Site Impervious by Soil Type:



Impervious B Soils: 1.35 ac

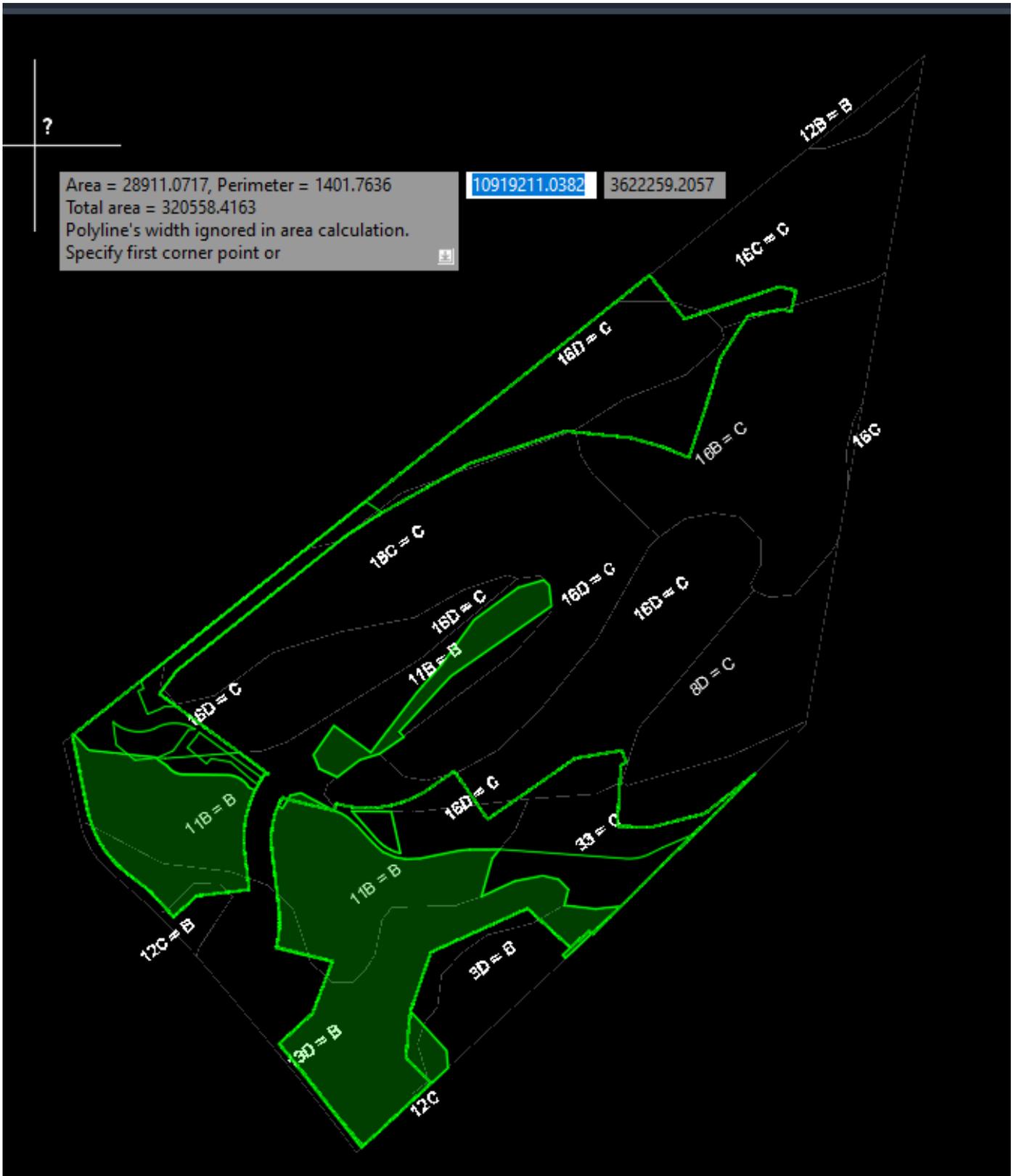




Open Space: C soils: 6.956 ac



B soil Impervious Open Space: 7.3579 ac



Total B Soils onsite: 12.606 ac.

B Turf = Total B – Bimp- Bopen = 12.606-7.358-1.35= 3.899 ac



DEQ Virginia Runoff Reduction Method New Development Compliance Spreadsheet - Version 3.0

BMP Design Specifications List: 2013 Draft Stds & Specs

Site Summary

Project Title: Tom's Creek

Date: 43969

Total Rainfall = 43 inches

Site Land Cover Summary

	A soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	7.36	6.96	0.00	14.31	35
Managed Turf (acres)	0.00	3.90	12.48	0.00	16.38	41
Impervious Cover (acres)	0.00	1.35	8.29	0.00	9.64	24
					40.34	100

Site Tv and Land Cover Nutrient Loads

Site Rv	0.33
Treatment Volume (ft ³)	47,866
TP Load (lb/yr)	30.07
TN Load (lb/yr)	215.14

Total TP Load Reduction Required (lb/yr)	13.54
--	-------

Site Compliance Summary

Total Runoff Volume Reduction (ft ³)	17,648
Total TP Load Reduction Achieved (lb/yr)	12.87
Total TN Load Reduction Achieved (lb/yr)	95.57
Remaining Post Development TP Load (lb/yr)	17.21
Remaining TP Load Reduction (lb/yr) Required	0.67

 Drainage Area Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest/Open (acres)	2.53	1.22	1.52	0.61	1.92	7.80
Managed Turf (acres)	0.85	0.45	2.98	2.20	3.41	9.89
Impervious Cover (acres)	0.41	0.31	2.33	1.41	2.35	6.81
Total Area (acres)	3.78	1.98	6.83	4.22	7.69	24.50

Drainage Area Compliance Summary

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Reduced (lb/yr)	0.83	0.28	5.88	2.33	3.53	12.87

TN Load Reduced (lb/yr)	5.95	2.13	42.66	18.99	25.84	95.57
-------------------------	------	------	-------	-------	-------	-------

Drainage Area A Summary

Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	2.53	0.00	0.00	2.53	67
Managed Turf (acres)	0.00	0.85	0.00	0.00	0.85	22
Impervious Cover (acres)	0.00	0.41	0.00	0.00	0.41	11
					3.78	

BMP Selections

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft ³)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
----------	----------------------------------	--------------------------------------	---	---------------------------------------	-------------------------------------	--------------------	----------------------	-------------------------------------

Total Impervious Cover Treated (acres)	0.41
Total Turf Area Treated (acres)	0.51
Total TP Load Reduction Achieved in D.A. (lb/yr)	0.83
Total TN Load Reduction Achieved in D.A. (lb/yr)	5.95

Drainage Area B Summary

Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	1.22	0.00	0.00	1.22	62
Managed Turf (acres)	0.00	0.45	0.00	0.00	0.45	23
Impervious Cover (acres)	0.00	0.31	0.00	0.00	0.31	16
					1.98	

BMP Selections

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft ³)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
----------	----------------------------------	--------------------------------------	---	---------------------------------------	-------------------------------------	--------------------	----------------------	-------------------------------------

Total Impervious Cover Treated (acres)	0.17
Total Turf Area Treated (acres)	0.38
Total TP Load Reduction Achieved in D.A. (lb/yr)	0.28
Total TN Load Reduction Achieved in D.A. (lb/yr)	2.13

Drainage Area C Summary

Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.58	0.94	0.00	1.52	22
Managed Turf (acres)	0.00	0.22	2.76	0.00	2.98	44
Impervious Cover (acres)	0.00	0.67	1.66	0.00	2.33	34
					6.83	

BMP Selections

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft ³)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
----------	----------------------------------	--------------------------------------	---	---------------------------------------	-------------------------------------	--------------------	----------------------	-------------------------------------

Total Impervious Cover Treated (acres)	2.33
Total Turf Area Treated (acres)	2.98
Total TP Load Reduction Achieved in D.A. (lb/yr)	5.88
Total TN Load Reduction Achieved in D.A. (lb/yr)	42.66

Drainage Area D Summary

Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.46	0.16	0.00	0.61	15
Managed Turf (acres)	0.00	0.69	1.51	0.00	2.20	52
Impervious Cover (acres)	0.00	0.16	1.25	0.00	1.41	33
					4.22	

BMP Selections

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft ³)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
----------	----------------------------------	--------------------------------------	---	---------------------------------------	-------------------------------------	--------------------	----------------------	-------------------------------------

Total Impervious Cover Treated (acres)	1.35
Total Turf Area Treated (acres)	1.98
Total TP Load Reduction Achieved in D.A. (lb/yr)	2.33
Total TN Load Reduction Achieved in D.A. (lb/yr)	18.99

Drainage Area E Summary

Land Cover Summary

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.00	1.92	0.00	1.92	25
Managed Turf (acres)	0.00	0.16	3.26	0.00	3.41	44
Impervious Cover (acres)	0.00	0.00	2.35	0.00	2.35	31
					7.69	

BMP Selections

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft ³)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
----------	----------------------------------	--------------------------------------	---	---------------------------------------	-------------------------------------	--------------------	----------------------	-------------------------------------

Total Impervious Cover Treated (acres)	1.40
Total Turf Area Treated (acres)	1.80
Total TP Load Reduction Achieved in D.A. (lb/yr)	3.53
Total TN Load Reduction Achieved in D.A. (lb/yr)	25.84

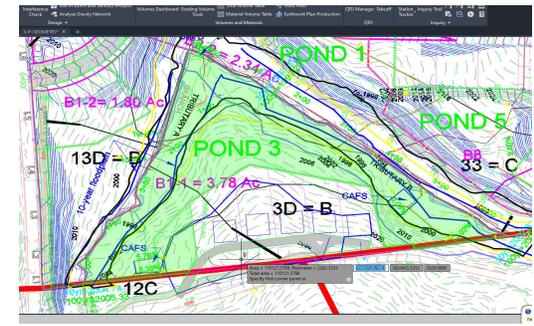
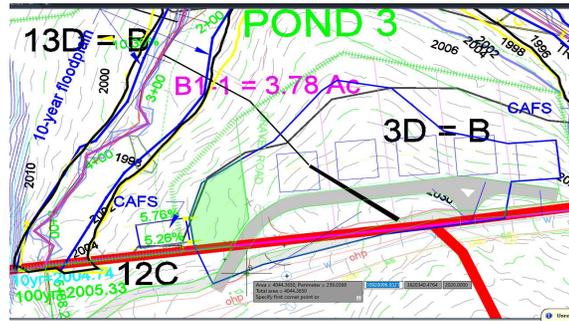
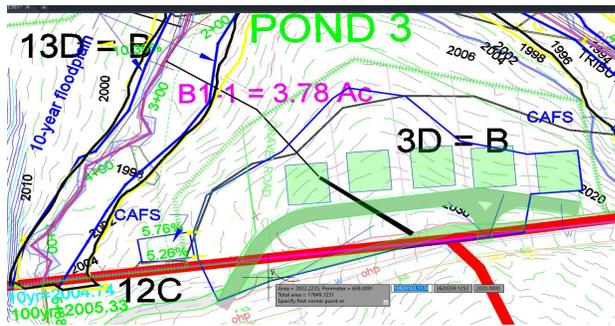
Runoff Volume and CN Calculations

	1-year storm	2-year storm	10-year storm
Target Rainfall Event (in)	2.28	2.76	4.11

Drainage Areas	RV & CN	Drainage Area A	Drainage Area B	Drainage Area C	Drainage Area D	Drainage Area E
CN		61	63	80	78	80
RR (ft ³)		1,326	345	8,175	2,796	5,006
1-year return period	RV wo RR (ws-in)	0.14	0.18	0.74	0.65	0.74
	RV w RR (ws-in)	0.04	0.13	0.41	0.47	0.56
	CN adjusted	54	61	72	73	76
2-year return period	RV wo RR (ws-in)	0.28	0.34	1.07	0.96	1.07
	RV w RR (ws-in)	0.18	0.29	0.74	0.78	0.89
	CN adjusted	57	61	74	74	77
10-year return period	RV wo RR (ws-in)	0.87	0.98	2.13	1.97	2.13
	RV w RR (ws-in)	0.77	0.93	1.80	1.79	1.95
	CN adjusted	59	62	76	75	78

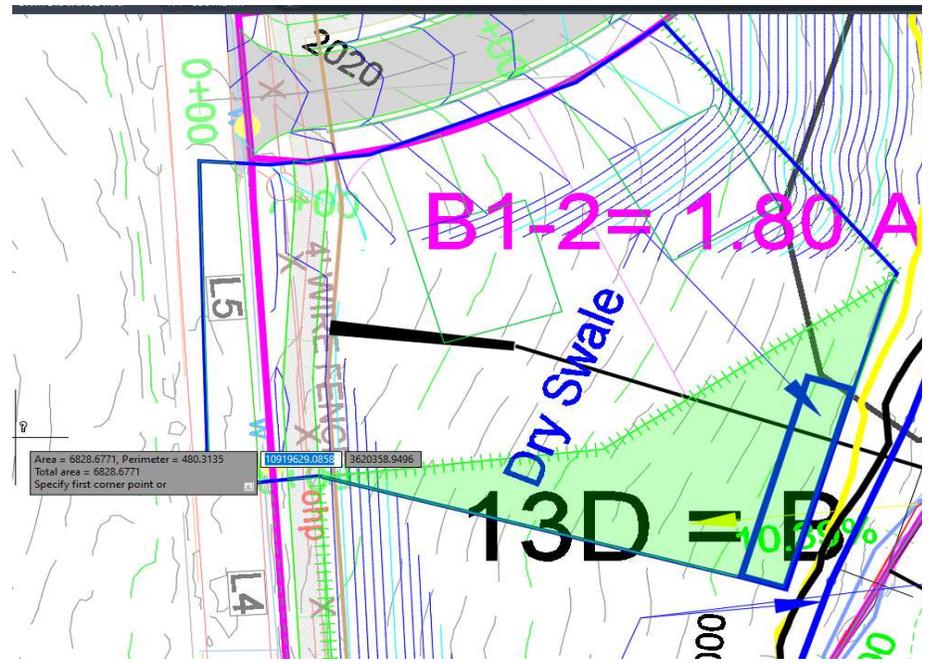
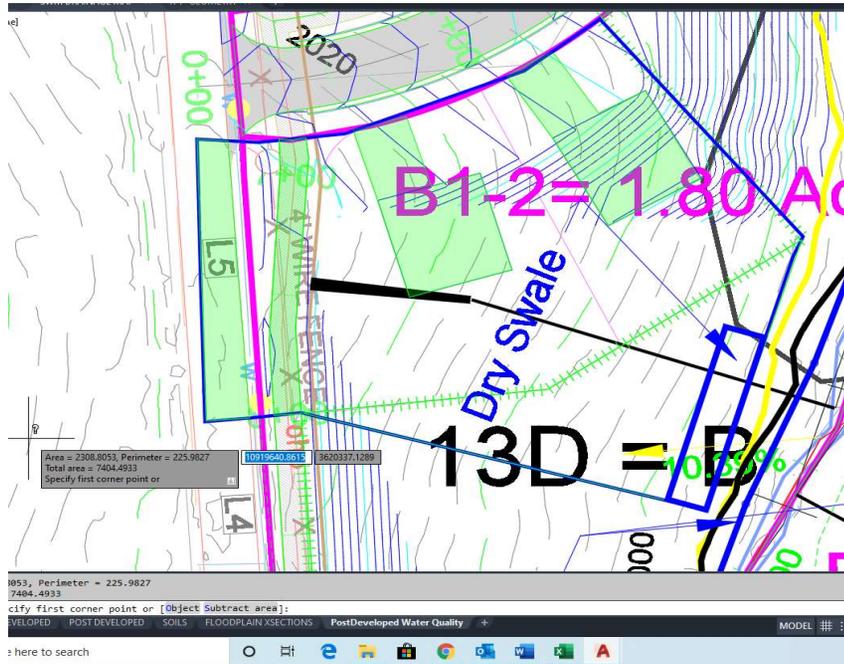
Water Quality Data and resulting CN's

B1-1	WQ area to BMP(ac)	Soil B			Soil C			post CN: 1-year before treatment	CN in whole DA: 1-year after BMP (Runoff reduction)	2-year CN RR	10-year CN RR	approx Cfs	counting offsite imp trails to be conservative	
		Imp ac	turf	open	imp	turf	open							
Conservation area filter strip(max 2cfs)	1.01	0.405	0.512	0.093				75				0.6	CAFS 13' DA imp/open graphic	
Total area	3.78	0.405	0.847	2.528				61	54	57	59	counting offsite imp trails to be conservative	Total B1 DA imp/open graphic	

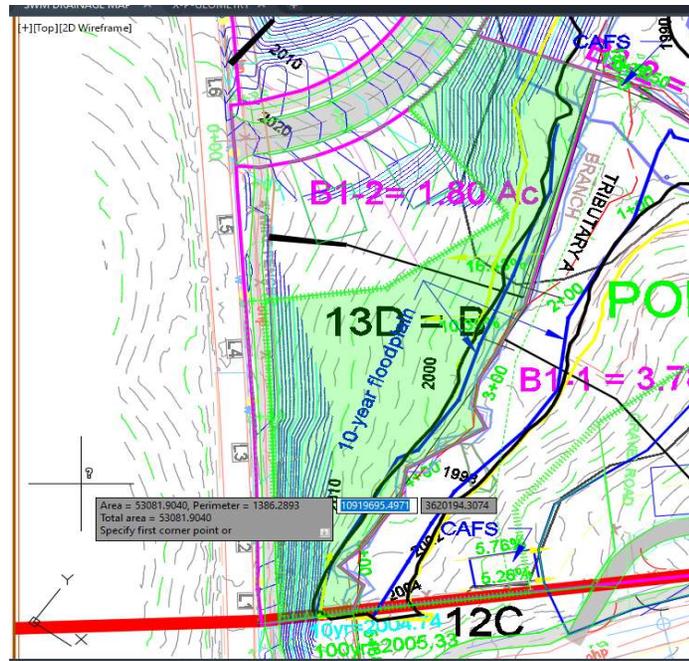
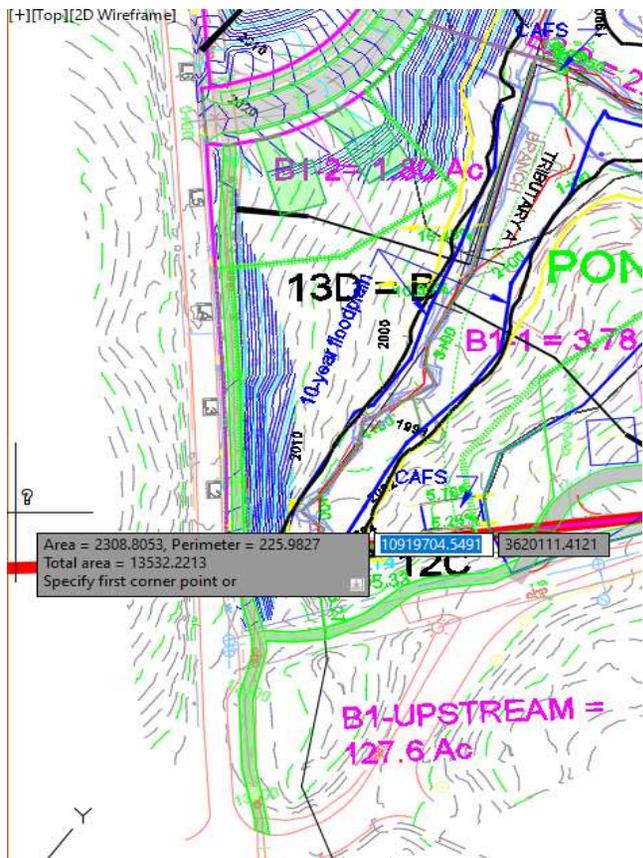


Water Quality Data and resulting CN's

B1-2	CN							post CN: 1-year before treatment	CN in whole DA: 1-year after BMP (Runoff reduction)	2-year CN RR	10-year CN RR	approx Cfs		
	98				61		55							
	WQ area to BMP(ac)	Soil B			Soil C									
	Imp ac	turf	open	imp	turf	open								
Dry Swale 1	0.704	0.17	0.378	0.156				69						dry swale
Total area	1.98	0.31	0.452	1.218		0		63	61	61	62		counting offsite road to be conservative	

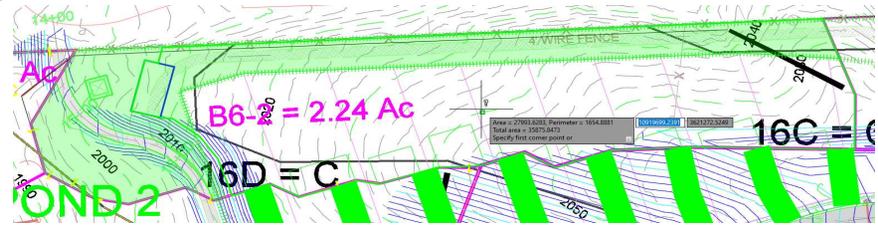
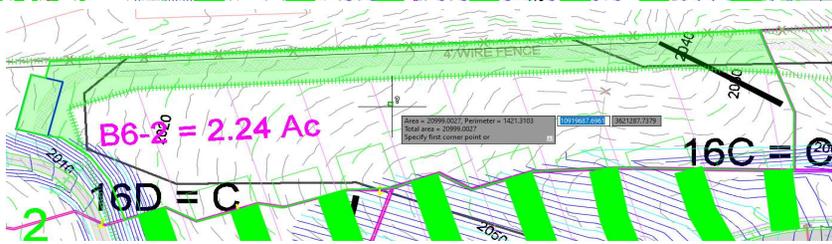
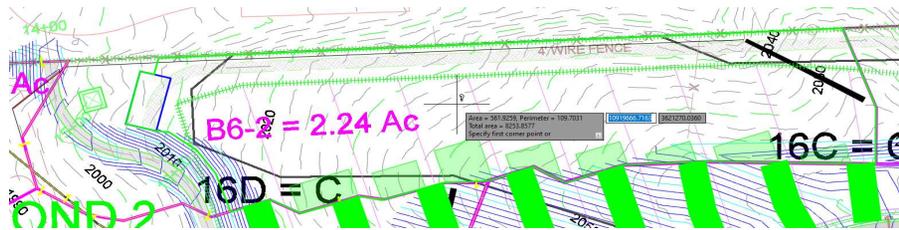




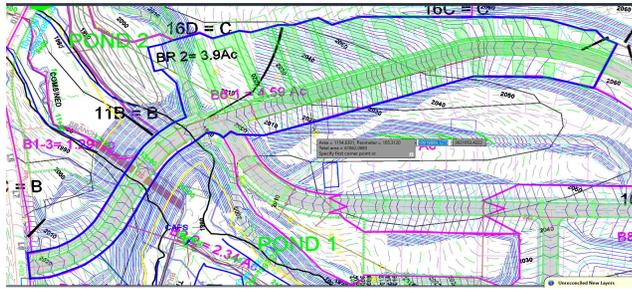


Water Quality Data and resulting CN's

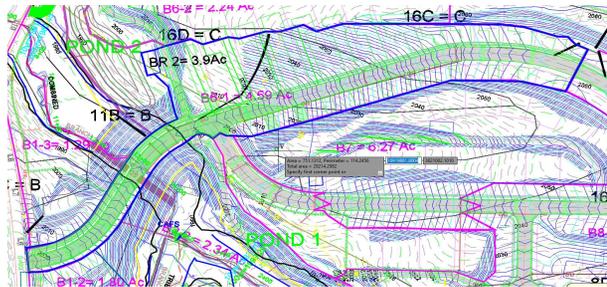
		98 CN 61 55						post CN: 1-year before treatment	CN in whole DA: 1-year after BMP (Runoff reduction)	2-year CN RR	10-year CN RR	approx Cfs	
B6-2		Soil B			Soil C								
	WQ area to BMP(ac)	imp ac	turf	open	imp	turf	open						
Bioretention (BR1) lev 2	1.839				0.189	1.168	0.482	0					level 2 bioretention w/gravel flow spreader, pretreat
Total area	2.24				0.241	1.176	0.823						
B6-1													
Area other than to BR2	0.69	0	0	0.576	0	0	0.114						
Bioretention (BR2) lev 2	3.901	0.67	0.216	0.0045	1.42	1.5859	0.0046						level 2 bioretention w/gravel flow spreader, pretreat
Sum B6 totals (to ext det)	6.831	0.67	0.216	0.5805	1.661	2.7619	0.9416	80	72	74	76		ext det
B6 totals bioret (B+C soils)	5.74	2.28	2.97	0.49									BR1 & BR2 into Ext Det as downstream practice
remainder to Ext Det (B+C soils)	1.09	0.05	0.01	1.03									enter directly into ext det



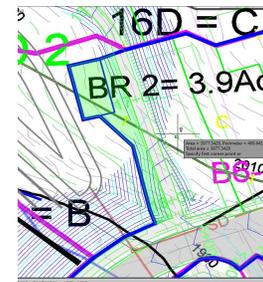
imp C soils in BR2=1.42



imp B soils in BR2=.67



Open Space in BR2= .0091 (1/2 B and 1/2 C soils)

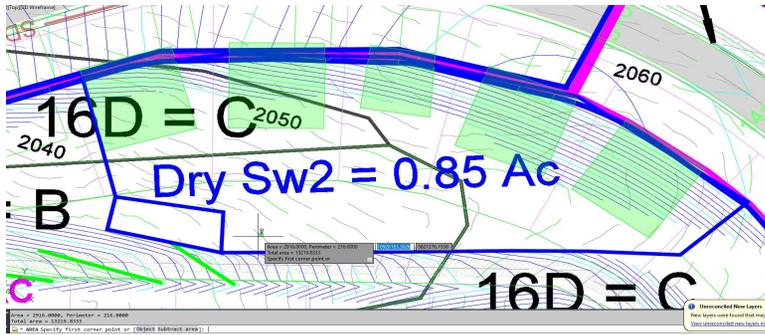


Water Quality Data and resulting CN's

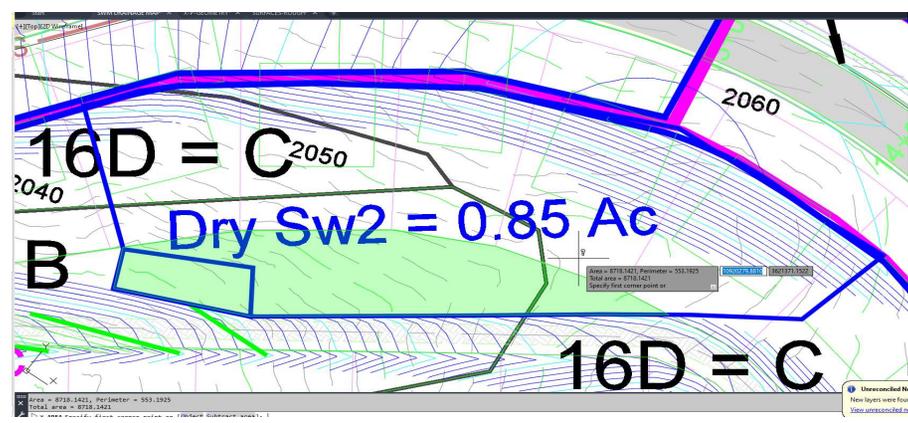
CN
98 61 55

B-7	WQ area to BMP(ac)	Soil B			Soil C			post CN: 1-year before treatment	CN in whole DA: 1-year after BMP (Runoff reduction)	2-year CN RR	10-year CN RR	approx Cfs	
		imp ac	turf	open	imp	turf	open						
Dry Swale	0.851	0.303	0.348	0.2									Dry swale lev 1
Bioretention 3	3.84	0.067	0.574	0.451	1.286	1.406	0.056						Bioretention lev 1
Total area	4.22	0.159	0.689	0.458	1.248	1.51	0.156	78	74	75	76		

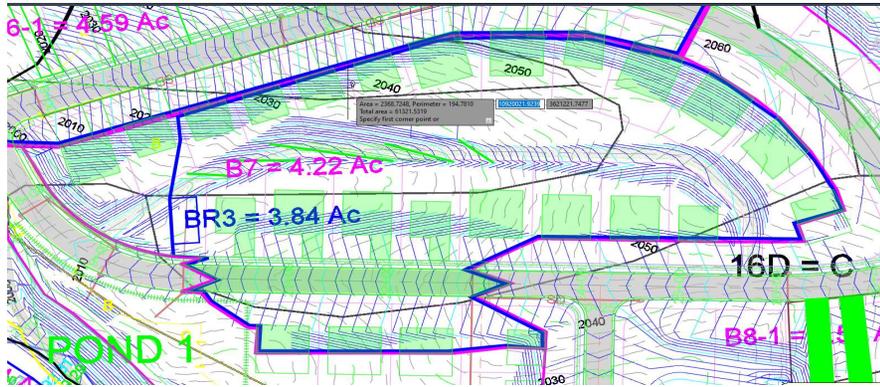
Dry Swale imp=.303



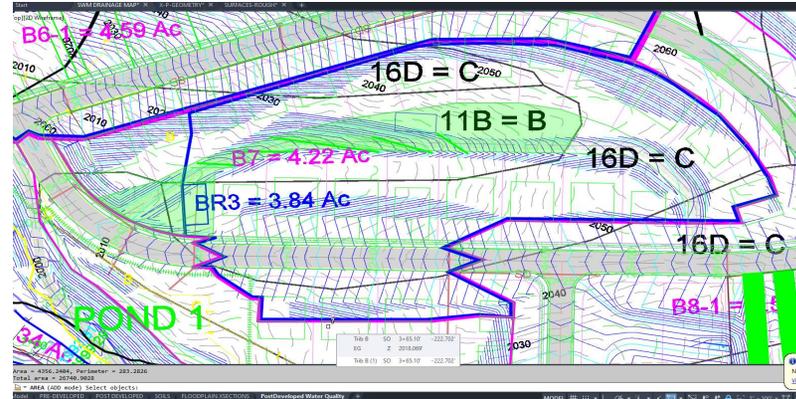
Dry Swale open =0.2



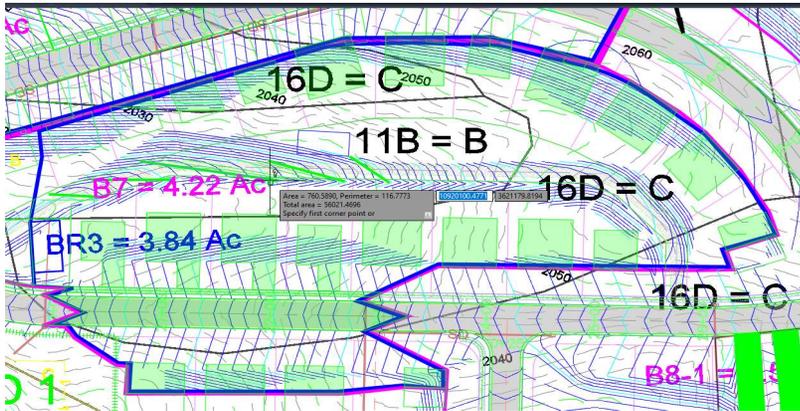
B-7 imp= 1.407



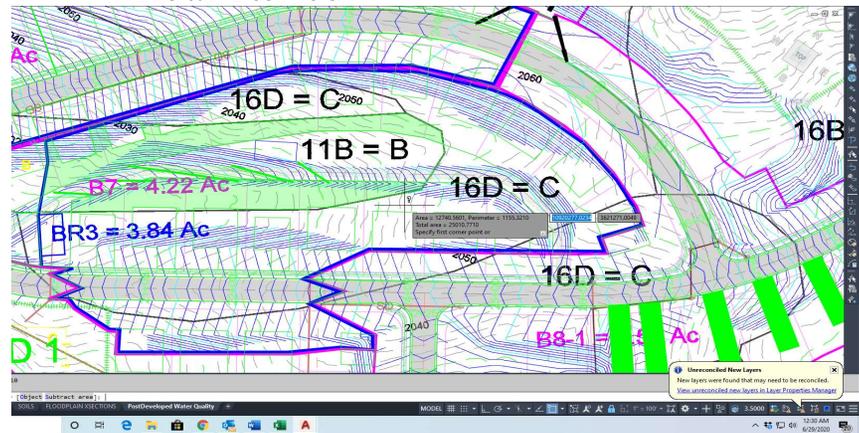
B-7 Open space= 0.613



B3 imp Csoil = 1.286



BR3 turf B soil= 0.574

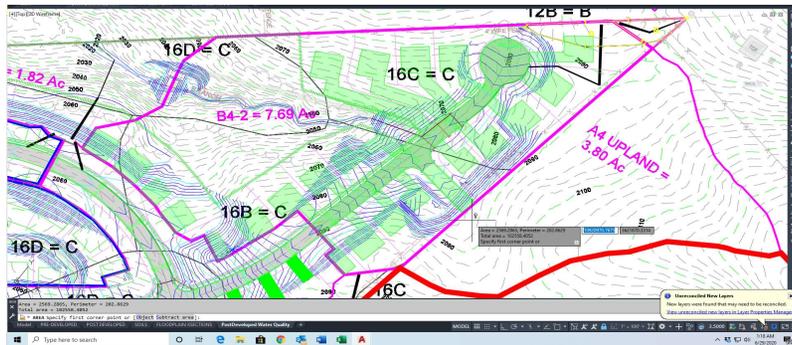


Water Quality Data and resulting CN's

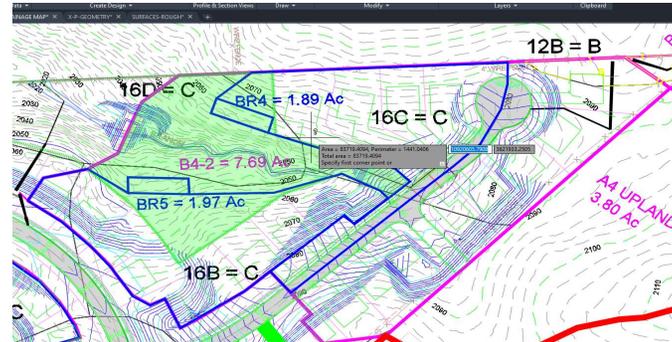
CN
98 61 55

B4-2	WQ area to BMP(ac)	Soil B			Soil C			post CN: 1-year before treatment	CN in whole DA: 1-year after BMP (Runoff reduction)	2-year CN RR	10-year CN RR	approx Cfs	
		Imp ac	turf	open	imp	turf	open						
Bioretention 4 lev 2 w/grass sw	1.89				0.834	0.875	0.181						Bioretention lev 2
Bioretention 5 lev 2 w/grass sw	1.97				0.566	0.922	0.482						Bioretention lev2
Bior 4+ Bior5	3.86				1.4	1.797	0.663						
Total area	7.69	0	0.156	0	2.354	3.258	1.922	80	78	78	79		

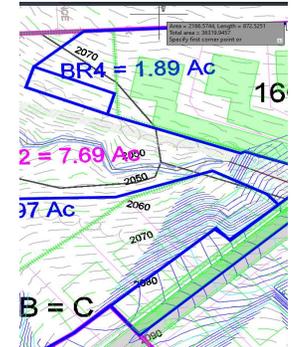
B4-2 Impervious C soils



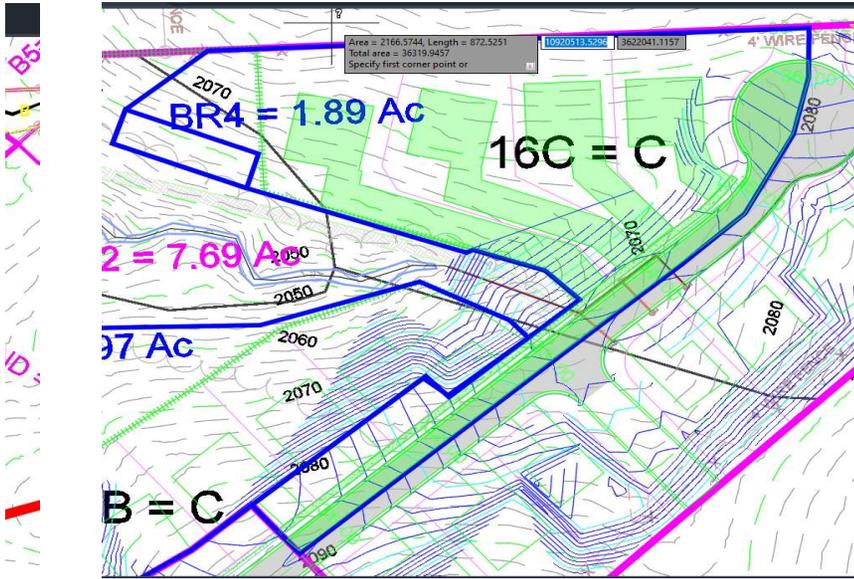
B4-2 open space C soil



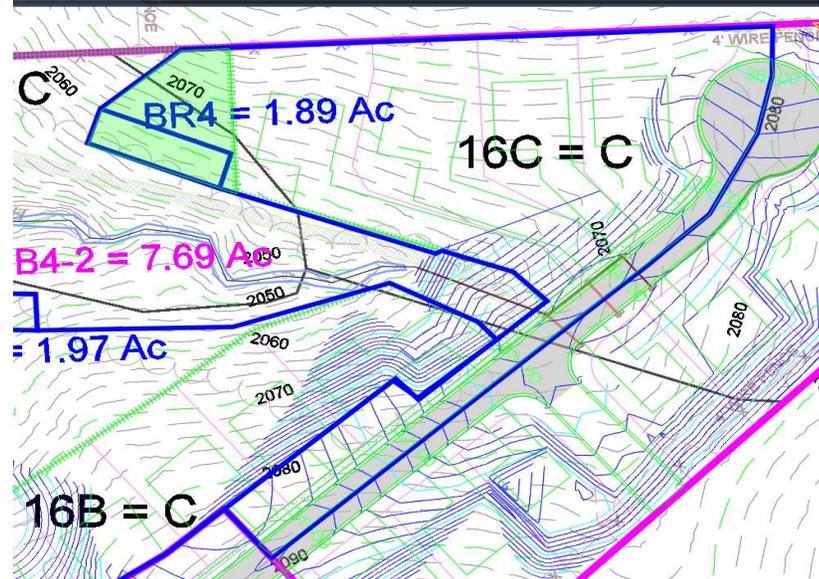
BR4 imp .834



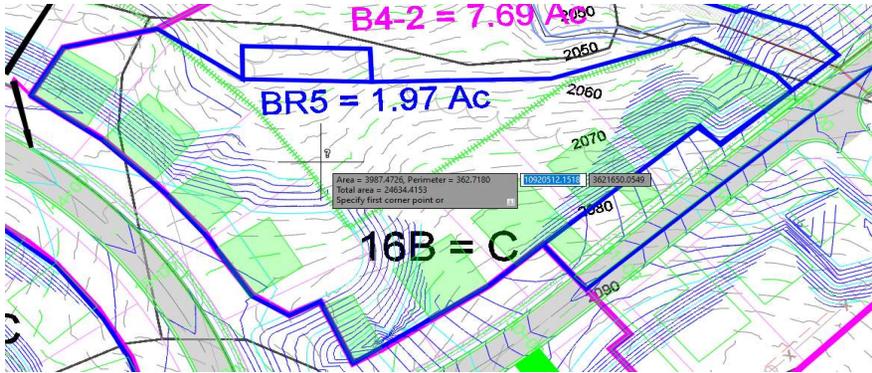
BR4 imp .834



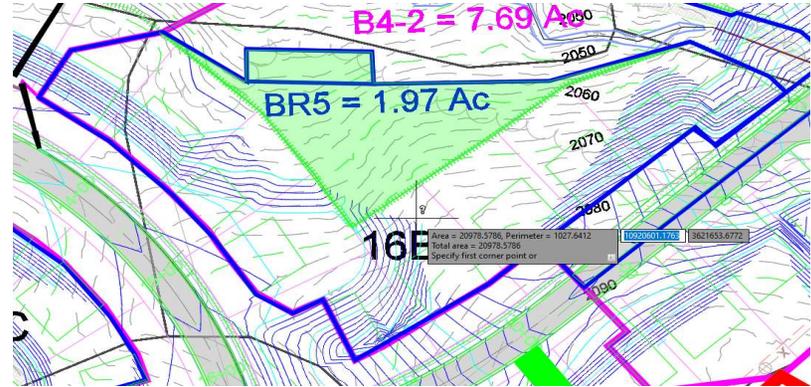
BR4 open



BR5 imp = 0.566



BR5 open = 0.482



Runoff Volume and Curve Number Calculations

Enter design storm rainfall depths (in):

1-year storm	2-year storm	10-year storm
2.28	2.76	4.11

Use NOAA Atlas 14 (<http://hdsc.nws.noaa.gov/hdsc/pfds/>)

***Notes (see below):**

- [1] The curve numbers and runoff volumes computed in this spreadsheet for each drainage area are limited in their applicability for determining and demonstrating compliance with water quantity requirements. See VRRM User's Guide and Documentation for additional information.
- [2] Runoff Volume (RV) for pre- and post-development drainage areas must be in volumetric units (e.g., acre-feet or cubic feet) when using the Energy Balance Equation. Runoff measured in watershed-inches and shown in the spreadsheet as RV(watershed-inch) can only be used in the Energy Balance Equation when the pre- and post-development drainage areas are equal. Otherwise RV(watershed-inch) must be multiplied by the drainage area.
- [3] Adjusted CNs are based on runoff reduction volumes as calculated in D.A. tabs. An alternative CN adjustment calculation for Vegetated Roofs is included in BMP specification No. 5.

Drainage Area Curve Numbers and Runoff Depths*

Curve numbers (CN, CNadj) and runoff depths (RV_{Developed}) are computed with and without reduction practices.

Drainage Area A		A Soils	B Soils	C Soils	D Soils	Total Area (acres):	3.78
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	2.53	0.00	0.00	Runoff Reduction	Volume (ft ³):
	CN	30	55	70	77		
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.85	0.00	0.00		
	CN	39	61	74	80		
Impervious Cover	Area (acres)	0.00	0.41	0.00	0.00		
	CN	98	98	98	98		
					CN _(D.A.A)		
					61		
		1-year storm	2-year storm	10-year storm			
RV _{Developed} (watershed-inch) with no Runoff Reduction*		0.14	0.28	0.87			
RV _{Developed} (watershed-inch) with Runoff Reduction*		0.04	0.18	0.77			
Adjusted CN*		54	57	59			

*See Notes above

Drainage Area B		A Soils	B Soils	C Soils	D Soils	Total Area (acres):	1.98
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	1.22	0.00	0.00	Runoff Reduction	Volume (ft ³):
	CN	30	55	70	77		
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.45	0.00	0.00		
	CN	39	61	74	80		
Impervious Cover	Area (acres)	0.00	0.31	0.00	0.00		
	CN	98	98	98	98		
					CN _(D.A.B)		
					63		
		1-year storm	2-year storm	10-year storm			
RV _{Developed} (watershed-inch) with no Runoff Reduction*		0.18	0.34	0.98			
RV _{Developed} (watershed-inch) with Runoff Reduction*		0.13	0.29	0.93			
Adjusted CN*		61	61	62			

*See Notes above

Drainage Area C		A Soils	B Soils	C Soils	D Soils	Total Area (acres):	6.83
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	0.58	0.94	0.00	Runoff Reduction	Volume (ft ³):
	CN	30	55	70	77		
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.22	2.76	0.00		
	CN	39	61	74	80		
Impervious Cover	Area (acres)	0.00	0.67	1.66	0.00		
	CN	98	98	98	98		
					CN _(D.A.C)		
					80		
		1-year storm	2-year storm	10-year storm			
RV _{Developed} (watershed-inch) with no Runoff Reduction*		0.74	1.07	2.13			
RV _{Developed} (watershed-inch) with Runoff Reduction*		0.41	0.74	1.80			
Adjusted CN*		72	74	76			

*See Notes above

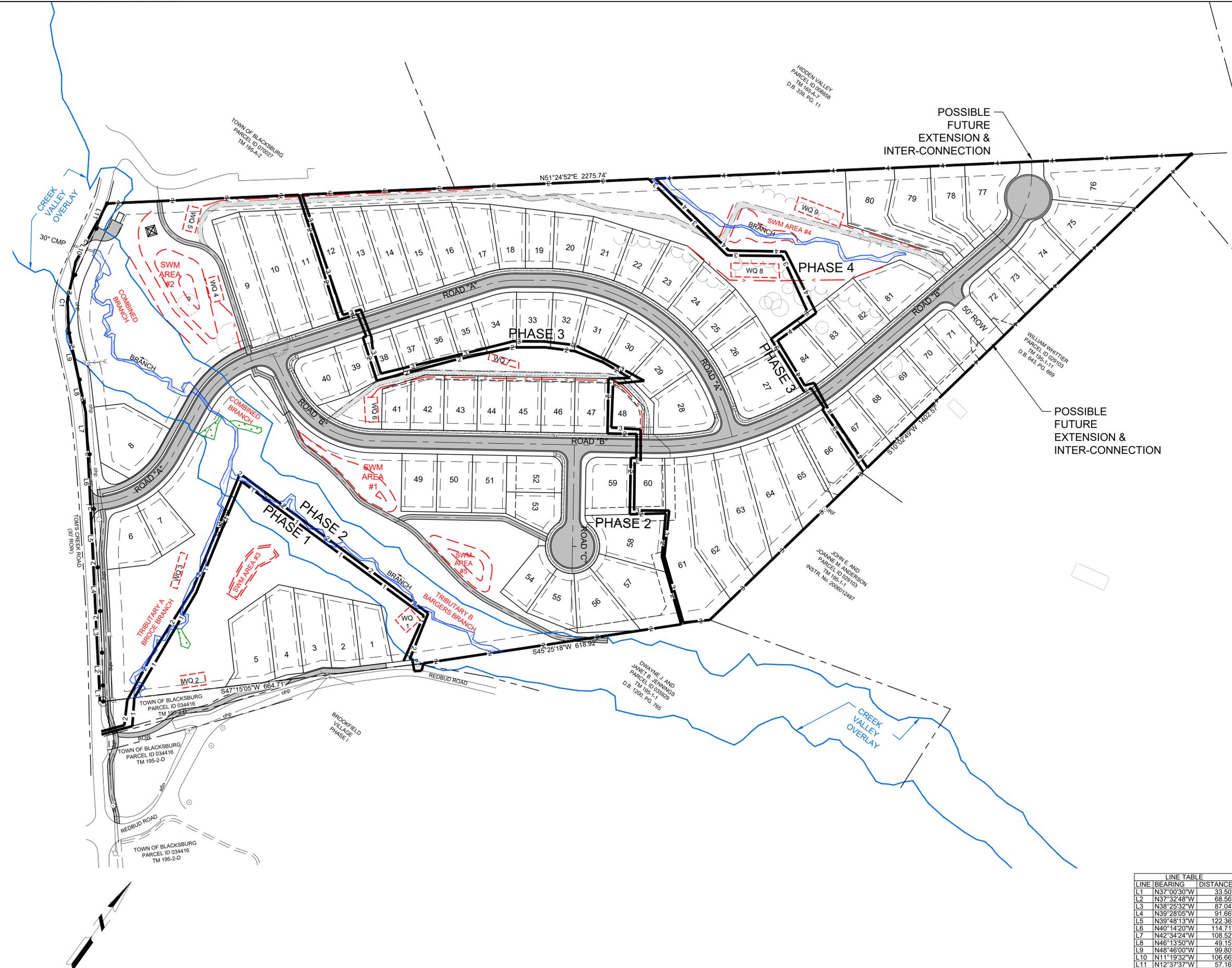
Drainage Area D		A Soils	B Soils	C Soils	D Soils	Total Area (acres):	4.22
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	0.46	0.16	0.00	Runoff Reduction	Volume (ft ³):
	CN	30	55	70	77		
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.69	1.51	0.00		
	CN	39	61	74	80		
Impervious Cover	Area (acres)	0.00	0.16	1.25	0.00		
	CN	98	98	98	98		
					CN _(D.A.D)		
					78		
		1-year storm	2-year storm	10-year storm			
RV _{Developed} (watershed-inch) with no Runoff Reduction*		0.65	0.96	1.97			
RV _{Developed} (watershed-inch) with Runoff Reduction*		0.47	0.78	1.79			

		Adjusted CN*	73	74	75		
		<i>*See Notes above</i>					
Drainage Area E			A Soils	B Soils	C Soils	D Soils	Total Area (acres): 7.69
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	0.00	1.92	0.00		Runoff Reduction Volume (ft³): 5,006
	CN	30	55	70	77		
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.16	3.26	0.00		
	CN	39	61	74	80		
Impervious Cover	Area (acres)	0.00	0.00	2.35	0.00		
	CN	98	98	98	98		
						CN_(D.A. E)	
						80	
			1-year storm	2-year storm	10-year storm		
RV_{Developed} (watershed-inch) with no Runoff Reduction*		0.74	1.07	2.13			
RV_{Developed} (watershed-inch) with Runoff Reduction*		0.56	0.89	1.95			
Adjusted CN*		76	77	78			
		<i>*See Notes above</i>					

Site Results (Water Quality Compliance)

Area Checks	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
FOREST/OPEN SPACE (ac)	2.53	1.22	1.52	0.61	1.92	OK.
IMPERVIOUS COVER (ac)	0.41	0.31	2.33	1.41	2.35	OK.
IMPERVIOUS COVER TREATED (ac)	0.41	0.17	2.33	1.35	1.40	OK.
MANAGED TURF AREA (ac)	0.85	0.45	2.98	2.20	3.41	OK.
MANAGED TURF AREA TREATED (ac)	0.51	0.38	2.98	1.98	1.80	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	
Site Treatment Volume (ft³)	47,866					
Runoff Reduction Volume and TP By Drainage Area						
	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	TOTAL
RUNOFF REDUCTION VOLUME ACHIEVED (ft ³)	1,326	345	8,175	2,796	5,006	17,648
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	1.26	0.88	6.53	4.12	6.81	19.60
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.83	0.28	5.88	2.33	3.53	12.87
TP LOAD REMAINING (lb/yr)	0.43	0.60	0.65	1.79	3.27	6.74
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	5.95	2.13	42.66	18.99	25.84	95.57
Total Phosphorus						
FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	30.07					
TP LOAD REDUCTION REQUIRED (lb/yr)	13.54					
TP LOAD REDUCTION ACHIEVED (lb/yr)	12.87					
TP LOAD REMAINING (lb/yr):	17.21					
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.67					
Total Nitrogen (For Information Purposes)						
POST-DEVELOPMENT LOAD (lb/yr)	215.14					
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	95.57					
REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr)	119.58					

Water Quality BMP's Item	Phase	Description
Water quality BMP #1		1 Conservation Area Filter Strip
Water quality BMP #2		1 Conservation Area Filter Strip
Stormwater Management Area 3		1 Detention, above ground
Water quality BMP #3		2 Dry Swale/Bioretenion
Water quality BMP #4		2 Dry Swale/Bioretenion
Water quality BMP #5		2 Dry Swale/Bioretenion
Water quality BMP #6		2 Dry Swale/Bioretenion
Water quality BMP #7		2 Dry Swale/Bioretenion
Stormwater Management Area 2		2 Detention, Extended Detention
Stormwater Management Area 1		2 Detention
Stormwater Management Area 5		2 Detention
Water quality BMP #8		3 Dry Swale/Bioretenion
Water quality BMP #9		4 Dry Swale/Bioretenion
Stormwater Management Area 4		4 Detention



C:\DROPOUT\EA\JIM LUCAS PROJECT\TOWNS CREEK\CAD\PRELIMINARY PLAT.DWG



LINE TABLE		
LINE	BEARING	DISTANCE
L1	N37°00'30"W	33.50'
L2	N37°32'48"W	68.56'
L3	N38°25'32"W	87.04'
L4	N39°28'05"W	91.66'
L5	N39°48'13"W	122.36'
L6	N40°14'20"W	114.71'
L7	N42°34'24"W	108.52'
L8	N46°13'50"W	49.15'
L9	N48°46'00"W	99.80'
L10	N11°19'32"W	106.66'
L11	N12°37'37"W	57.16'

CURVE TABLE				
CURVE	RADIUS	ARC LENGTH	DELTA ANGLE	CHORD BEARING
C1	190.14'	124.25'	37°26'28"	N30°02'46"W

EDEN & ASSOCIATES
engineering • planning • development
1800 KRAFT DRIVE, SUITE 111
BLACKSBURG, VIRGINIA 24060
VOICE: 276-632-6231
FAX: 276-632-3648

No.	Revision / Issue	Date

STORMWATER MANAGEMENT EXHIBIT

PROPOSED DEVELOPMENT FOR
LUCAS CONSTRUCTION AND DEVELOPMENT, INC.
BEREWICK
PROPERTY OF LUCAS TCR, LLC
PARCEL ID 006160; TM# 195-A-5; 40.345 ACRES
PRICES FORK MAGISTERIAL DISTRICT
TOWN OF BLACKSBURG, MONTGOMERY COUNTY, VA

Drawn By: PJB

Checked By: MTJ

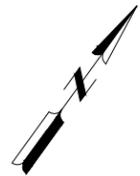
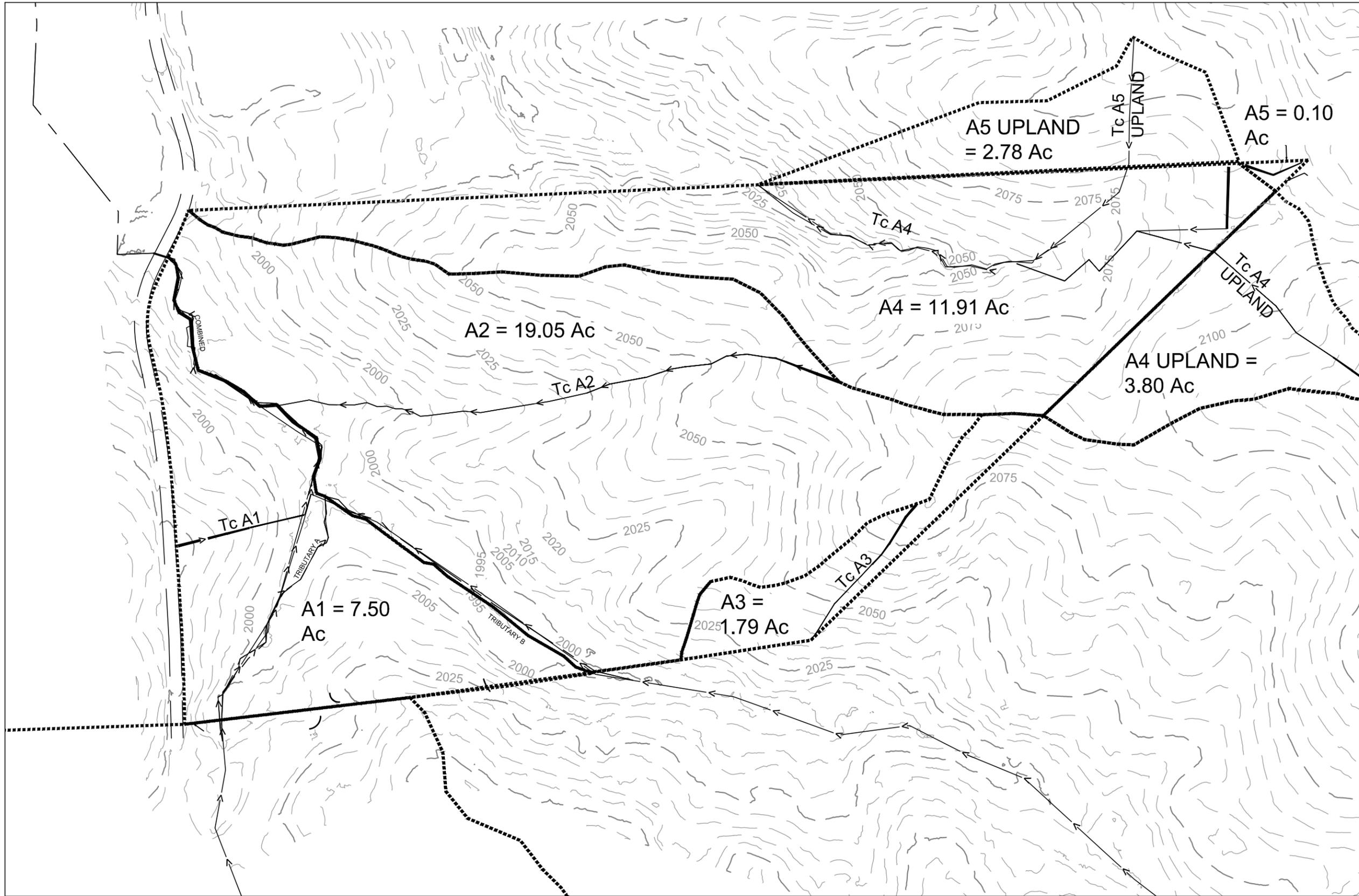
Sheet No. 1 of 1

Scale: AS SHOWN

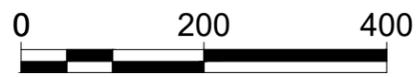
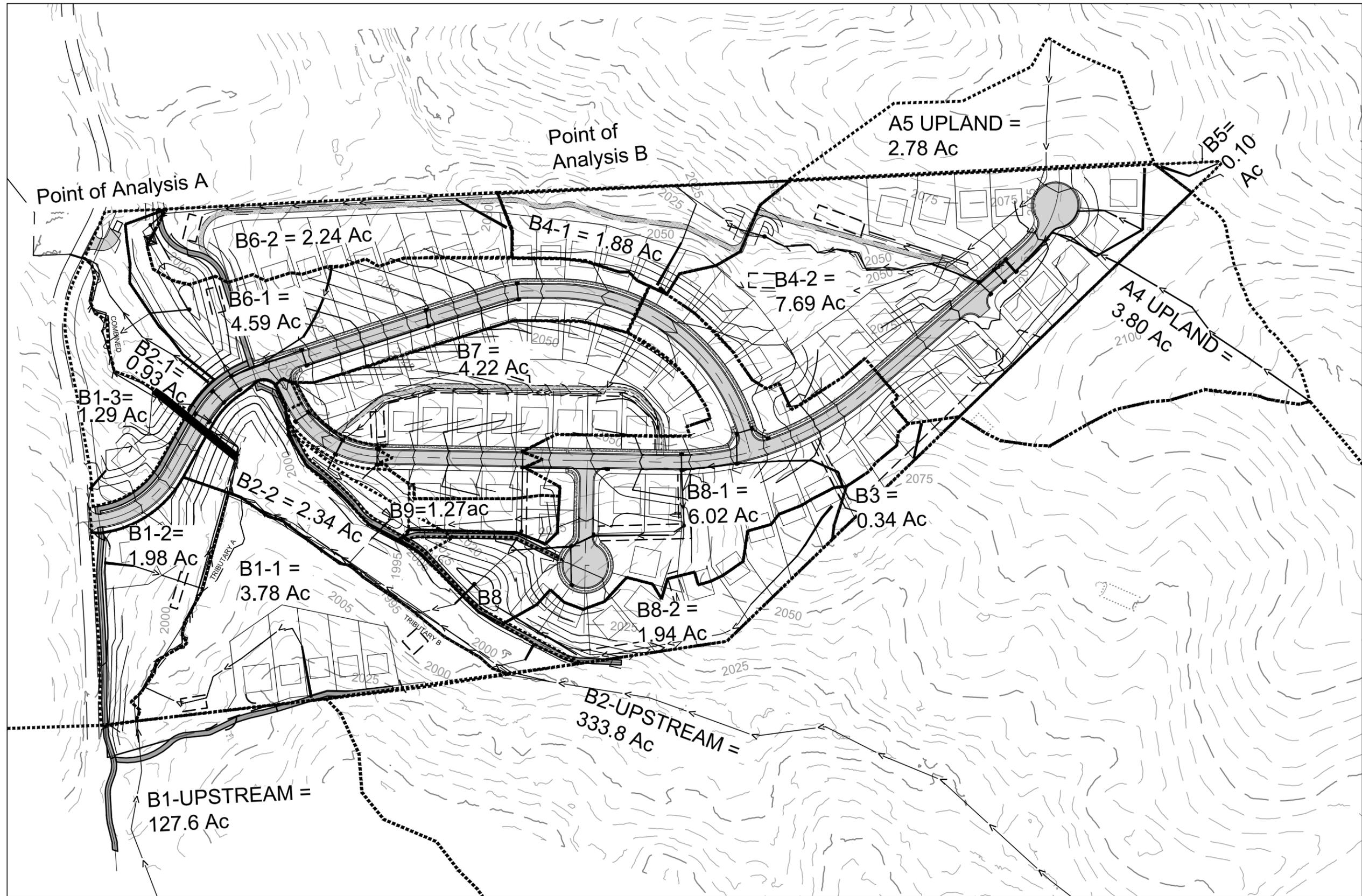
Date: 07-01-2020

SWM

Stormwater Quantity



**PRE-DEVELOPED
DRAINAGE MAP
OVERALL**

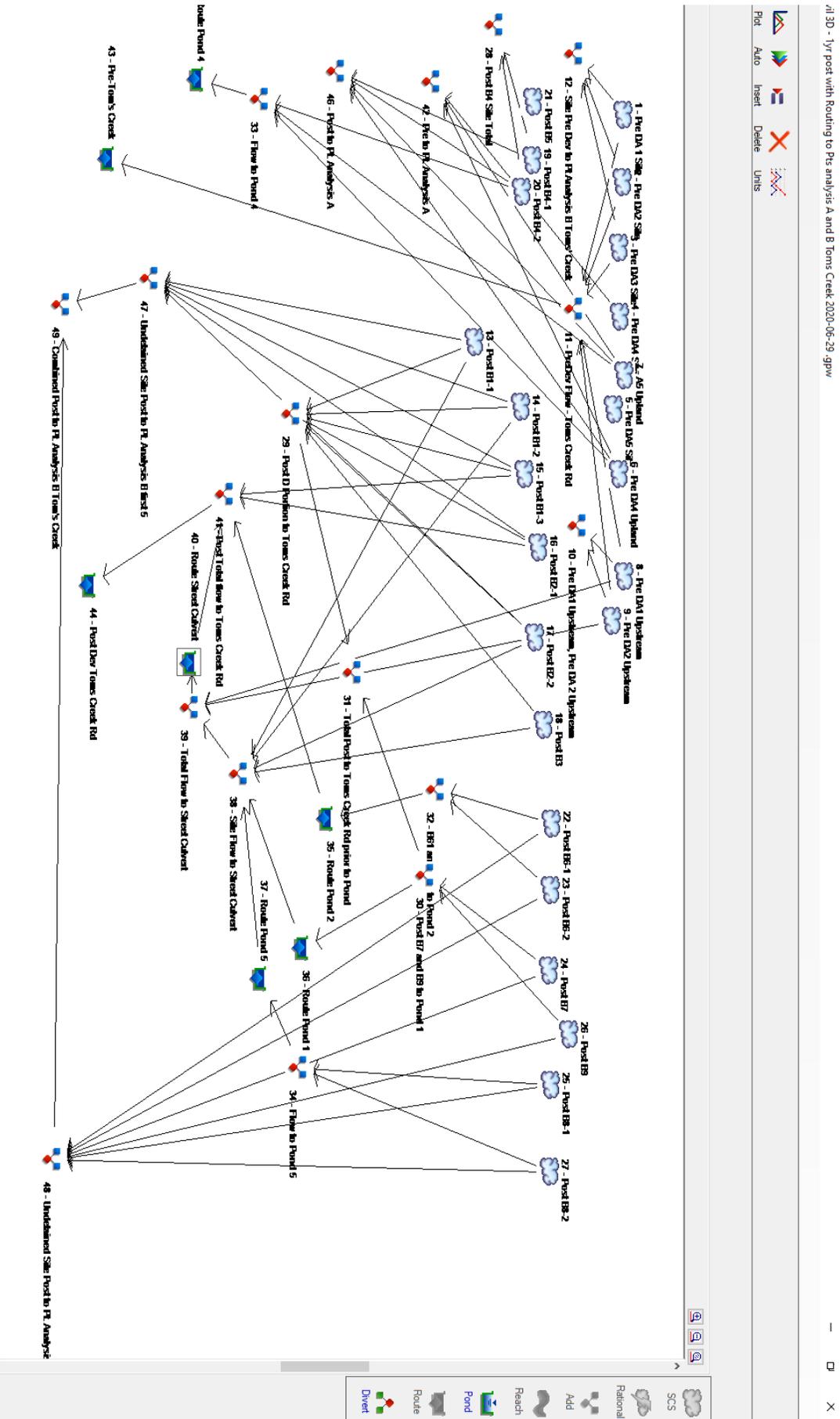


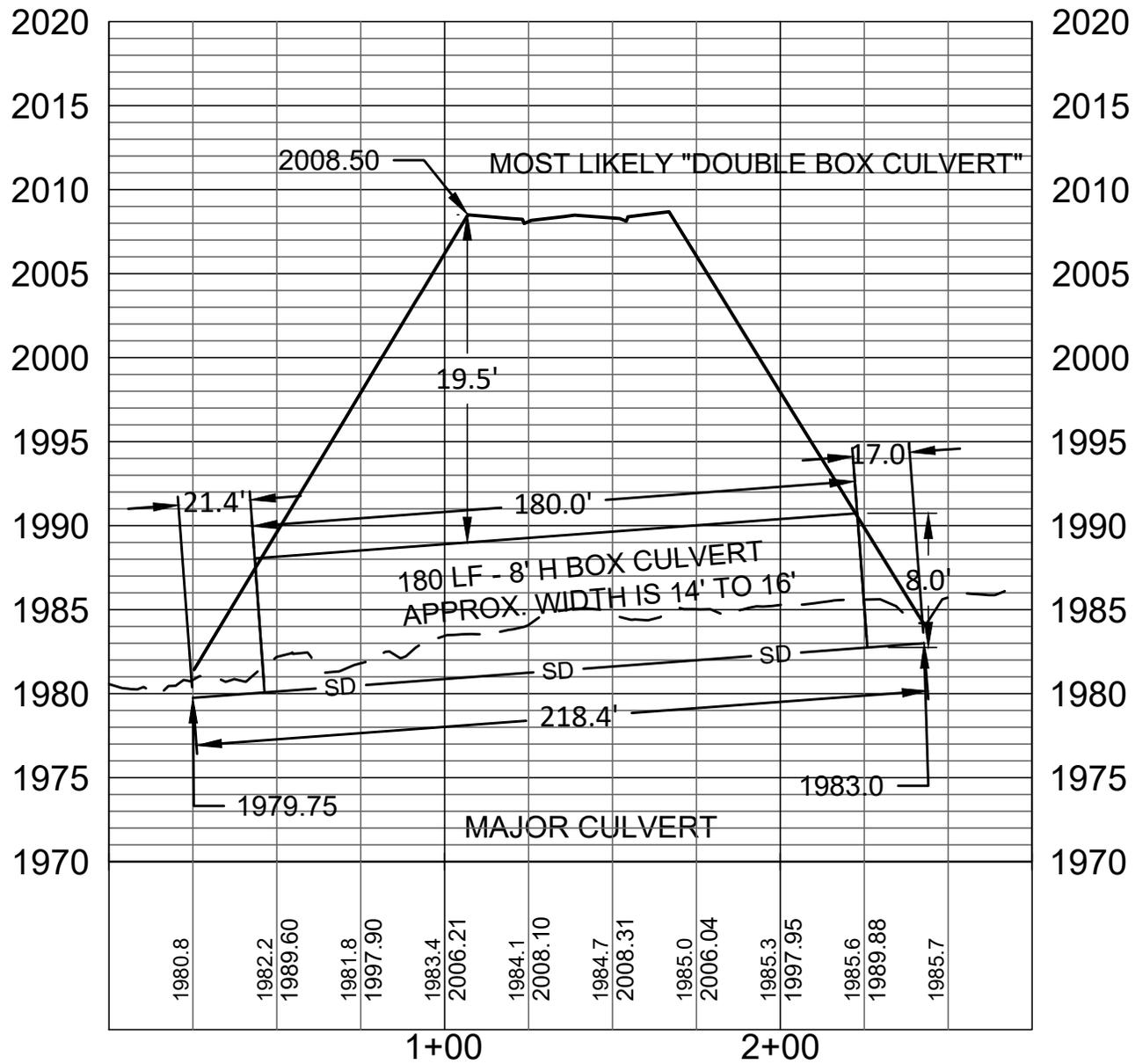
**POST DEVELOPED
DRAINAGE MAP
OVERALL**

Curve numbers used for Pre/Post Development from RRM to accurately be able to incorporate runoff reduction (example is from DA A, but the numbers below are the basic values RRM uses)

Drainage Area A		A Soils	B Soils	C Soils	D Soils
Forest/Open Space – undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	2.53	0.00	0.00
	CN	30	55	70	77
Managed Turf – disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.85	0.00	0.00
	CN	39	61	74	80
Impervious Cover	Area (acres)	0.00	0.41	0.00	0.00
	CN	98	98	98	98

Hydraflow Routing





Watershed Model Schematic

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

Legend

Hyd. Origin

Description

1	SCS Runoff	Pre DA 1 Site
2	SCS Runoff	Pre DA2 Site
3	SCS Runoff	Pre DA3 Site
4	SCS Runoff	Pre DA4 Site
5	SCS Runoff	Pre DA5 Site
6	SCS Runoff	Pre DA4 Upland
7	SCS Runoff	A5 Upland
8	SCS Runoff	Pre DA1 Upstream
9	SCS Runoff	Pre DA2 Upstream
10	Combine	Pre DA1 Upstream, Pre DA 2 Upstream
11	Combine	PreDev Flow - Toms Creek Rd
12	Combine	Site Pre Dev to Pt Analysis B Toms Creek
13	SCS Runoff	Post B1-1
14	SCS Runoff	Post B1-2
15	SCS Runoff	Post B1-3
16	SCS Runoff	Post B2-1
17	SCS Runoff	Post B2-2
18	SCS Runoff	Post B3
19	SCS Runoff	Post B4-1
20	SCS Runoff	Post B4-2
21	SCS Runoff	Post B5
22	SCS Runoff	Post B6-1
23	SCS Runoff	Post B6-2
24	SCS Runoff	Post B7
25	SCS Runoff	Post B8-1
26	SCS Runoff	Post B9
27	SCS Runoff	Post B8-2
28	Combine	Post B4 Site Total
29	Combine	Post D Portion to Toms Creek Rd
30	Combine	Post B7 and B9 to Pond 1
31	Combine	Total Post to Toms Creek Rd prior to Pond
32	Combine	B61 and B62 to Pond 2
33	Combine	Flow to Pond 4
34	Combine	Flow to Pond 5
35	Reservoir	Route Pond 2
36	Reservoir	Route Pond 1
37	Reservoir	Route Pond 5
38	Combine	Site Flow to Street Culvert
39	Combine	Total Flow to Street Culvert
40	Reservoir	Route Street Culvert
41	Combine	Post Total flow to Toms Creek Rd
42	Combine	Pre to Pt. Analysis A
43	Reservoir	Pre-Tom's Creek
44	Reservoir	Post Dev Toms Creek Rd
45	Reservoir	Route Pond 4
46	Combine	Post to Pt. Analysis A
47	Combine	Undetained Site Post to Pt. Analysis B first 5
48	Combine	Undetained Site Post to Pt. Analysis B last 6
49	Combine	Combined Post to Pt. Analysis B Tom's Creek

1-year Pre and Post Development Analysis

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.037	1	901	1,278	----	----	----	Pre DA 1 Site
2	SCS Runoff	3.266	1	727	17,082	----	----	----	Pre DA2 Site
3	SCS Runoff	0.753	1	722	2,346	----	----	----	Pre DA3 Site
4	SCS Runoff	3.975	1	725	15,524	----	----	----	Pre DA4 Site
5	SCS Runoff	0.042	1	722	131	----	----	----	Pre DA5 Site
6	SCS Runoff	0.955	1	731	4,892	----	----	----	Pre DA4 Upland
7	SCS Runoff	0.732	1	730	3,547	----	----	----	A5 Upland
8	SCS Runoff	123.03	1	723	342,889	----	----	----	Pre DA1 Upstream
9	SCS Runoff	72.40	1	728	359,228	----	----	----	Pre DA2 Upstream
10	Combine	240.99	1	725	856,382	8, 9	----	----	Pre DA1 Upstream, Pre DA 2 Upstrea
11	Combine	187.05	1	725	722,822	1, 2, 3, 8, 9,	----	----	PreDev Flow - Toms Creek Rd
12	Combine	3.872	1	726	20,705	1, 2, 3,	----	----	Site Pre Dev to Pt Analysis B Toms'
13	SCS Runoff	0.014	1	922	502	----	----	----	Post B1-1
14	SCS Runoff	0.144	1	721	1,005	----	----	----	Post B1-2
15	SCS Runoff	0.166	1	722	799	----	----	----	Post B1-3
16	SCS Runoff	0.068	1	721	472	----	----	----	Post B2-1
17	SCS Runoff	0.325	1	724	1,701	----	----	----	Post B2-2
18	SCS Runoff	0.235	1	718	533	----	----	----	Post B3
19	SCS Runoff	1.704	1	719	3,762	----	----	----	Post B4-1
20	SCS Runoff	6.353	1	723	18,118	----	----	----	Post B4-2
21	SCS Runoff	0.005	1	725	50	----	----	----	Post B5
22	SCS Runoff	2.650	1	720	6,974	----	----	----	Post B6-1
23	SCS Runoff	1.384	1	719	3,318	----	----	----	Post B6-2
24	SCS Runoff	1.816	1	729	7,419	----	----	----	Post B7
25	SCS Runoff	7.433	1	725	23,340	----	----	----	Post B8-1
26	SCS Runoff	2.104	1	716	3,658	----	----	----	Post B9
27	SCS Runoff	1.763	1	722	4,685	----	----	----	Post B8-2
28	Combine	7.184	1	722	22,106	19, 20,	----	----	Post B4 Site Total
29	Combine	5.444	1	720	14,796	13, 14, 15, 16, 17, 18,	----	----	Post D Portion to Toms Creek Rd
30	Combine	2.691	1	716	11,077	24, 26,	----	----	Post B7 and B9 to Pond 1
31	Combine	38.60	1	719	88,260	29, 30	----	----	Total Post to Toms Creek Rd prior to
32	Combine	4.022	1	720	10,293	22, 23,	----	----	B61 and B62 to Pond 2
33	Combine	7.533	1	724	26,557	6, 7, 20,	----	----	Flow to Pond 4
34	Combine	9.018	1	724	28,024	25, 27,	----	----	Flow to Pond 5
1yr post with Routing to Pts analysis A and B					Toms Creek 20200629.gpw			Monday, 06 / 29 / 2020	

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
35	Reservoir	0.161	1	952	10,289	32	1986.51	4,892	Route Pond 2	
36	Reservoir	0.419	1	775	11,077	30	2002.40	3,719	Route Pond 1	
37	Reservoir	0.249	1	1077	27,303	34	2004.60	18,225	Route Pond 5	
38	Combine	1.150	1	722	42,121	13, 14, 17, 18, 36, 37	-----	-----	Site Flow to Street Culvert	
39	Combine	184.25	1	725	744,238	8, 9, 38	-----	-----	Total Flow to Street Culvert	
40	Reservoir	184.27	1	725	744,238	39	1985.27	471	Route Street Culvert	
41	Combine	184.58	1	725	755,798	15, 16, 35, 40	-----	-----	Post Total flow to Toms Creek Rd	
42	Combine	5.376	1	727	24,001	4, 6, 7,	-----	-----	Pre to Pt. Analysis A	
43	Reservoir	186.84	1	725	722,822	11	1978.65	8,428	Pre-Tom's Creek	
44	Reservoir	184.34	1	725	755,795	41	1978.64	8,352	Post Dev Toms Creek Rd	
45	Reservoir	2.806	1	740	26,553	33	2028.98	5,500	Route Pond 4	
46	Combine	8.247	1	723	30,583	6, 7, 19, 20,	-----	-----	Post to Pt. Analysis A	
47	Combine	0.654	1	723	4,441	13, 14, 15, 16, 17,	-----	-----	Undetained Site Post to Pt. Analysis	
48	Combine	15.59	1	720	49,845	22, 23, 24, 25, 26, 27,	-----	-----	Undetained Site Post to Pt. Analysis	
49	Combine	16.16	1	721	54,286	47, 48	-----	-----	Combined Post to Pt. Analysis B Tom	
1yr post with Routing to Pts analysis A and B					Toms Creek 20200629 .gpw			Monday, 06 / 29 / 2020		

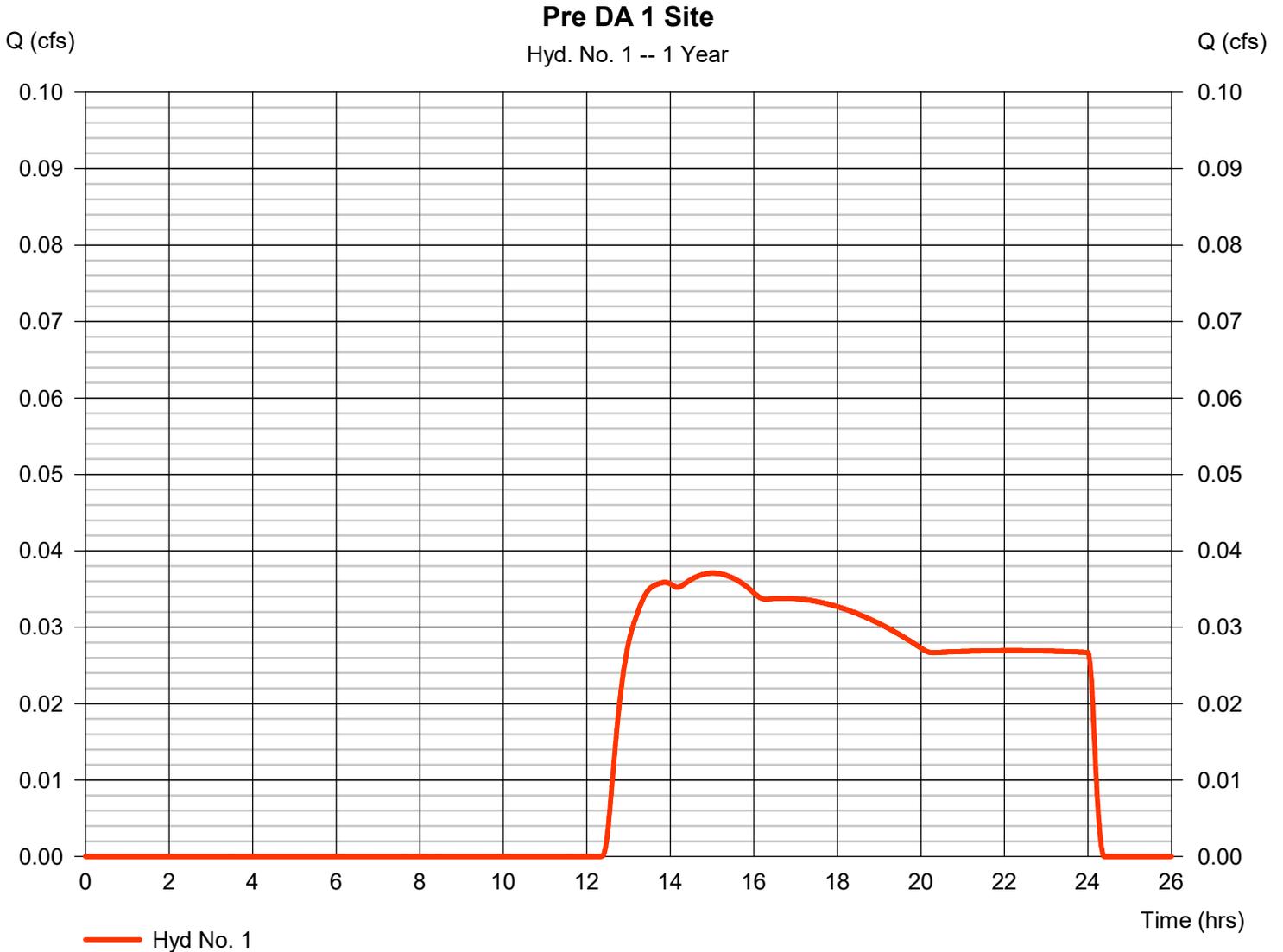
Hydrograph Report

Hyd. No. 1

Pre DA 1 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.037 cfs
Storm frequency	= 1 yrs	Time to peak	= 15.02 hrs
Time interval	= 1 min	Hyd. volume	= 1,278 cuft
Drainage area	= 7.500 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.10 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 70) + (7.330 x 55)] / 7.500



Hydrograph Report

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

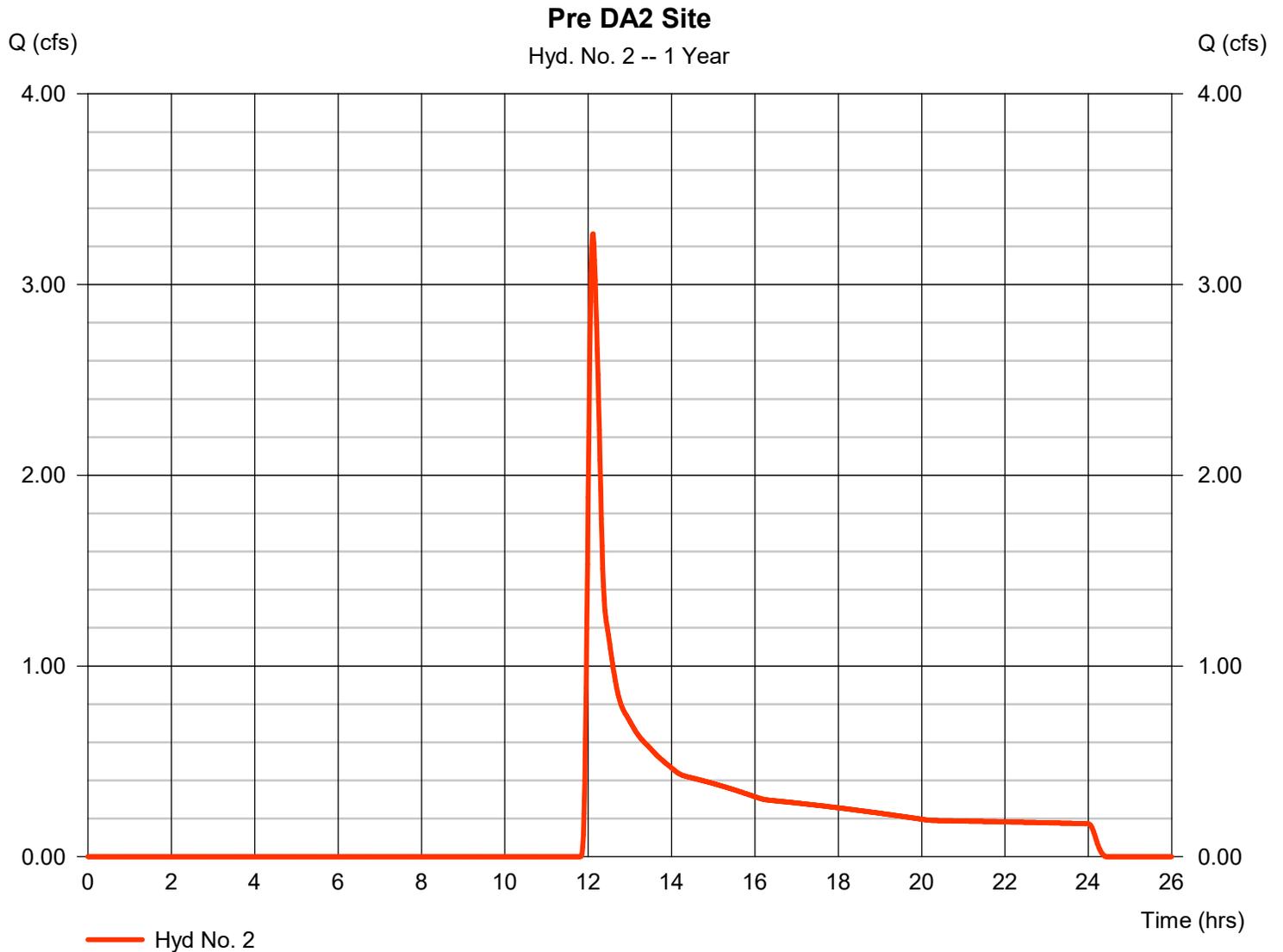
Monday, 06 / 29 / 2020

Hyd. No. 2

Pre DA2 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 3.266 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 17,082 cuft
Drainage area	= 19.050 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.40 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.200 x 55) + (13.850 x 70)] / 19.050

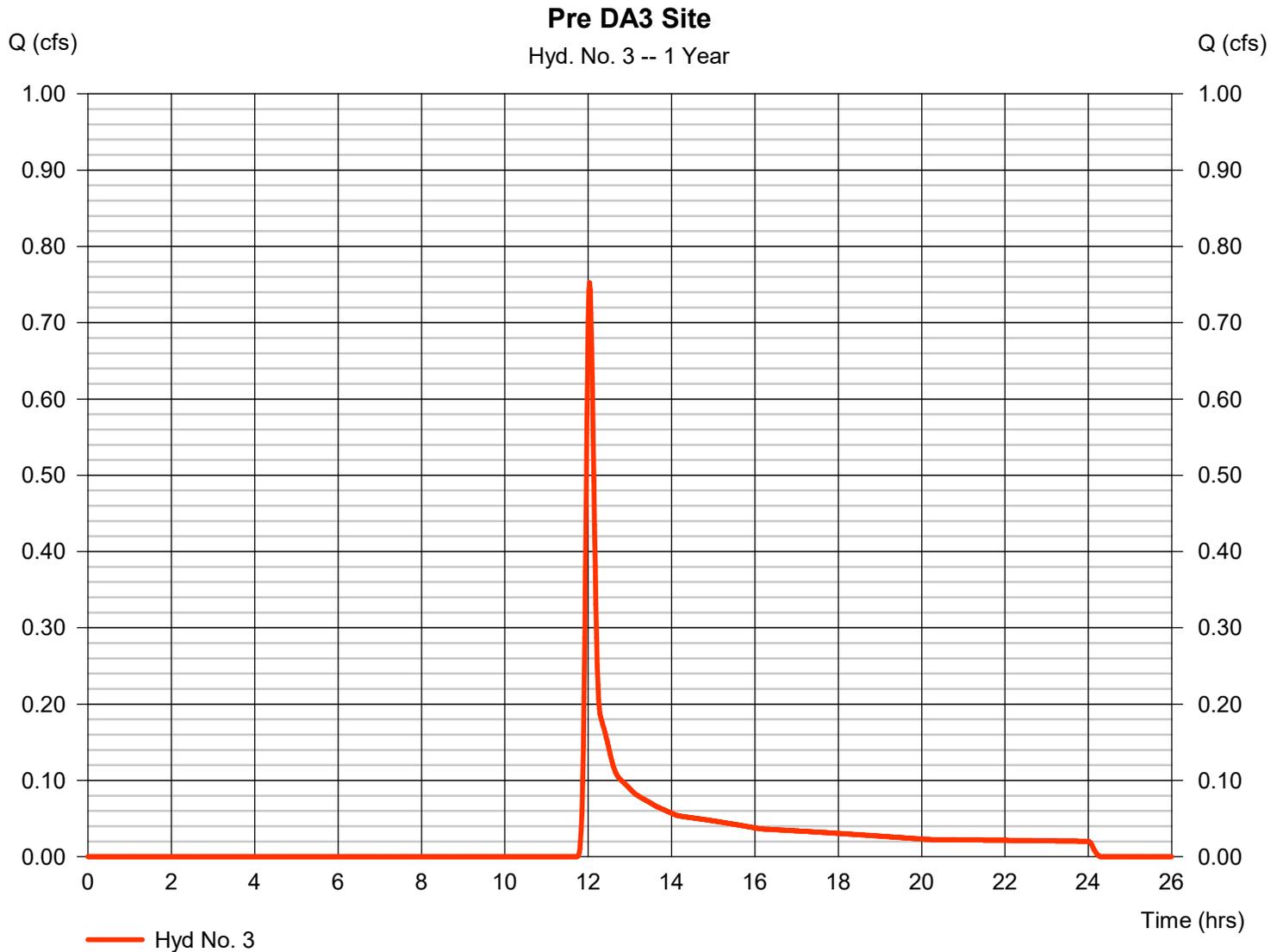


Hydrograph Report

Hyd. No. 3

Pre DA3 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.753 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 2,346 cuft
Drainage area	= 1.790 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.70 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



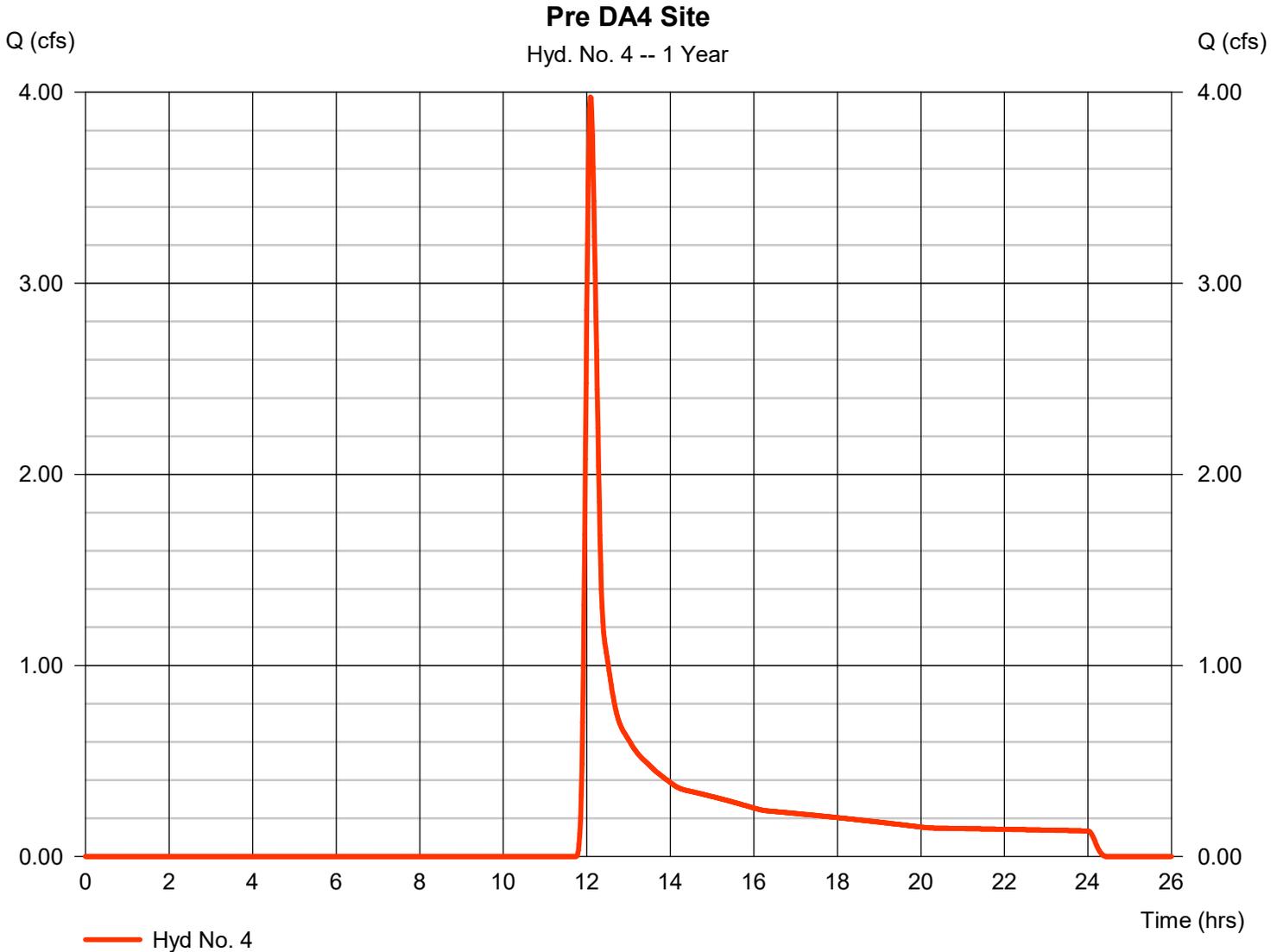
Hydrograph Report

Hyd. No. 4

Pre DA4 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 3.975 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 15,524 cuft
Drainage area	= 11.910 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.50 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.540 x 74) + (9.190 x 74) + (0.180 x 61)] / 11.910

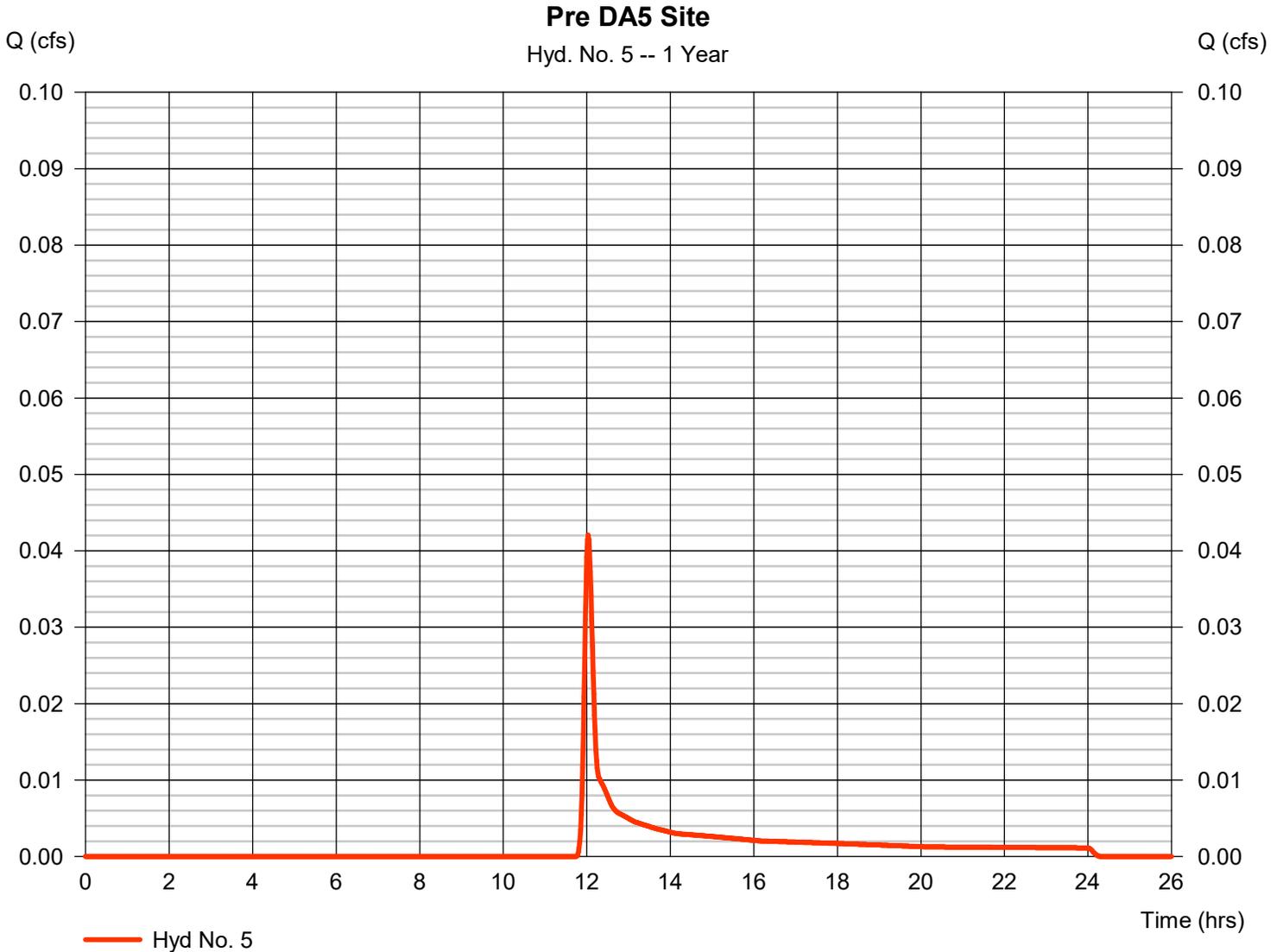


Hydrograph Report

Hyd. No. 5

Pre DA5 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.042 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 131 cuft
Drainage area	= 0.100 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.70 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

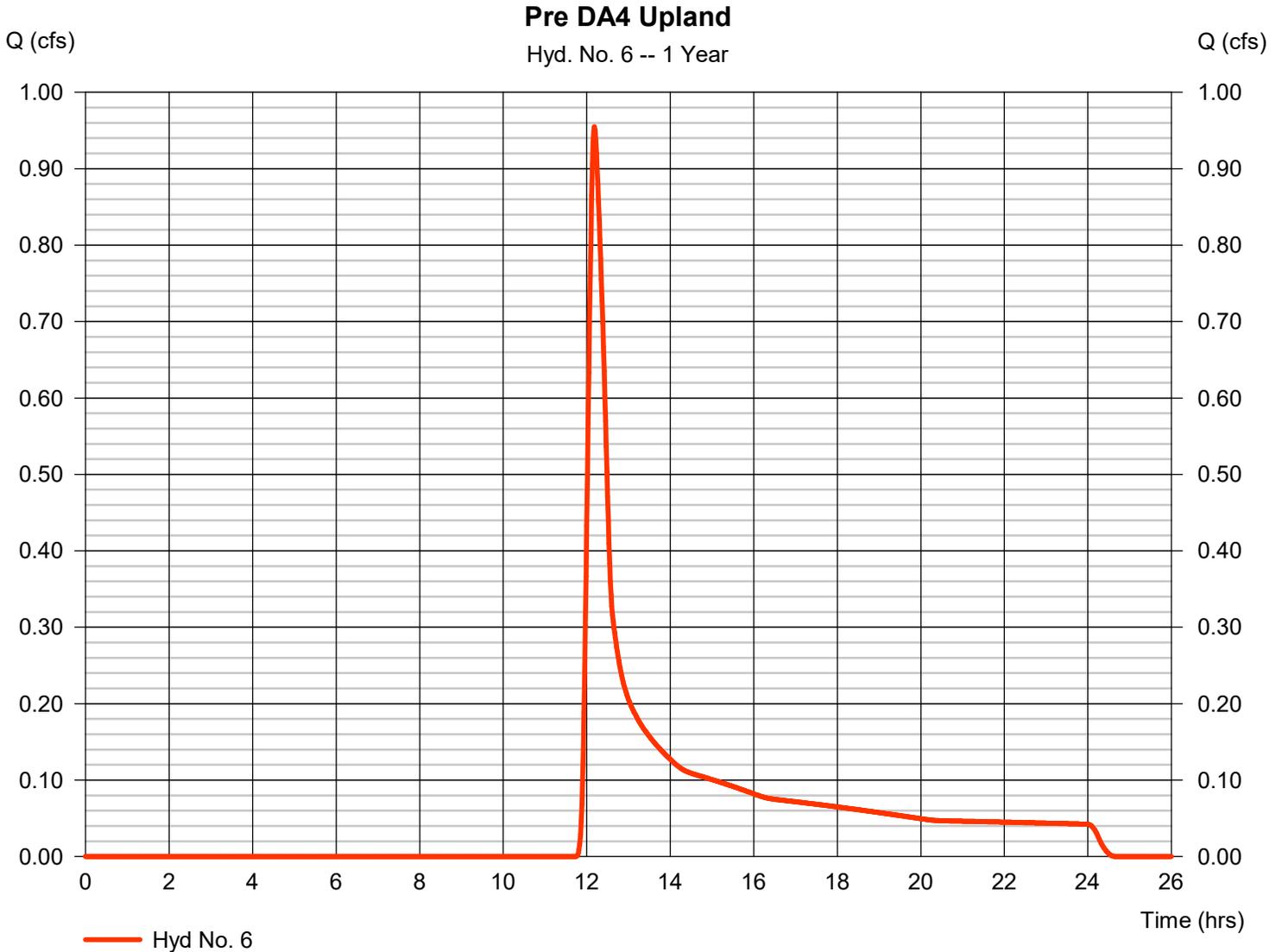
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 6

Pre DA4 Upland

Hydrograph type	= SCS Runoff	Peak discharge	= 0.955 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.18 hrs
Time interval	= 1 min	Hyd. volume	= 4,892 cuft
Drainage area	= 3.800 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.60 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

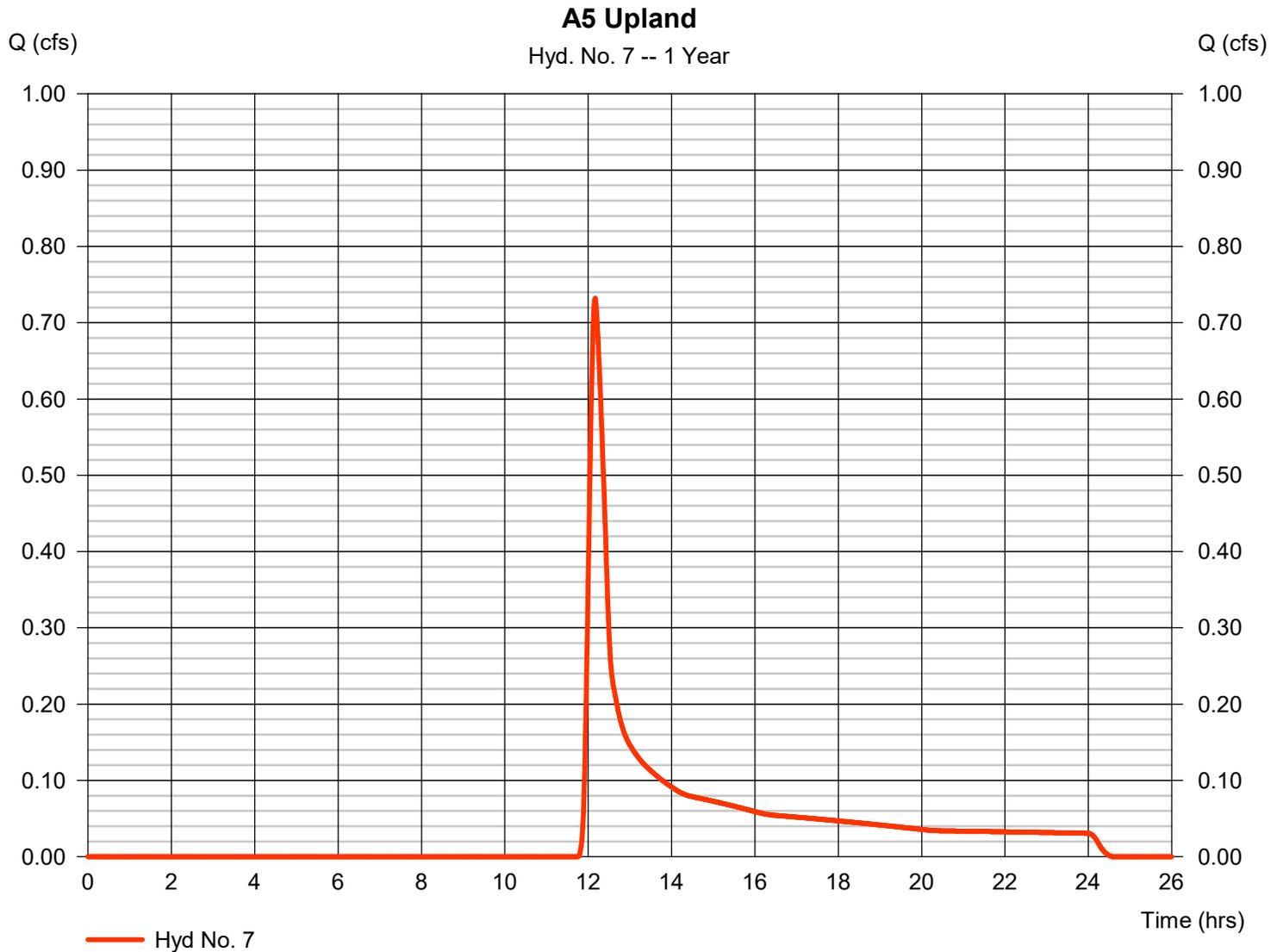
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 7

A5 Upland

Hydrograph type	= SCS Runoff	Peak discharge	= 0.732 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 3,547 cuft
Drainage area	= 2.780 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.20 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

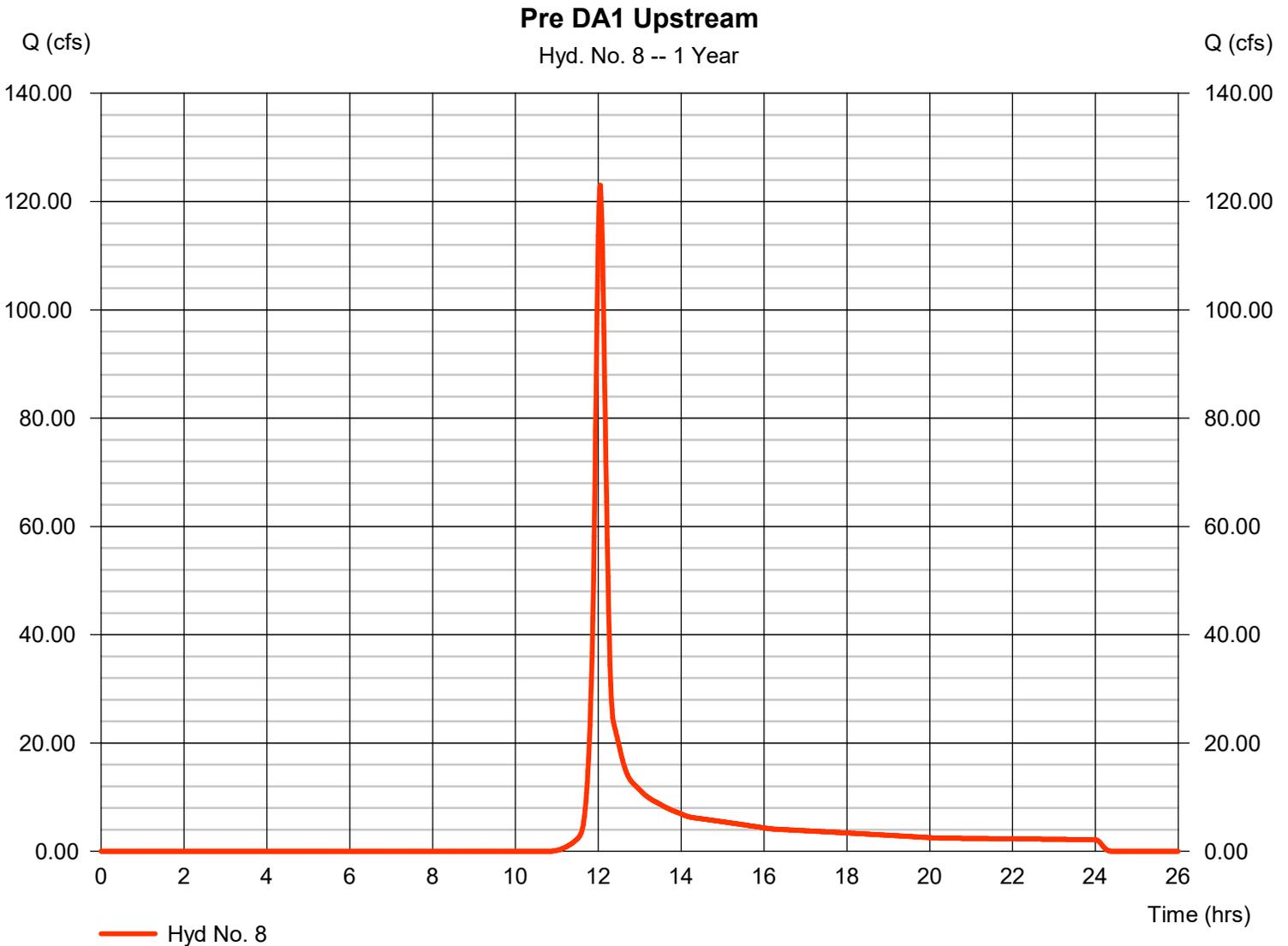
Monday, 06 / 29 / 2020

Hyd. No. 8

Pre DA1 Upstream

Hydrograph type	= SCS Runoff	Peak discharge	= 123.03 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 342,889 cuft
Drainage area	= 127.600 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.40 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(56.000 x 98) + (36.000 x 72) + (35.600 x 58)] / 127.600



Hydrograph Report

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

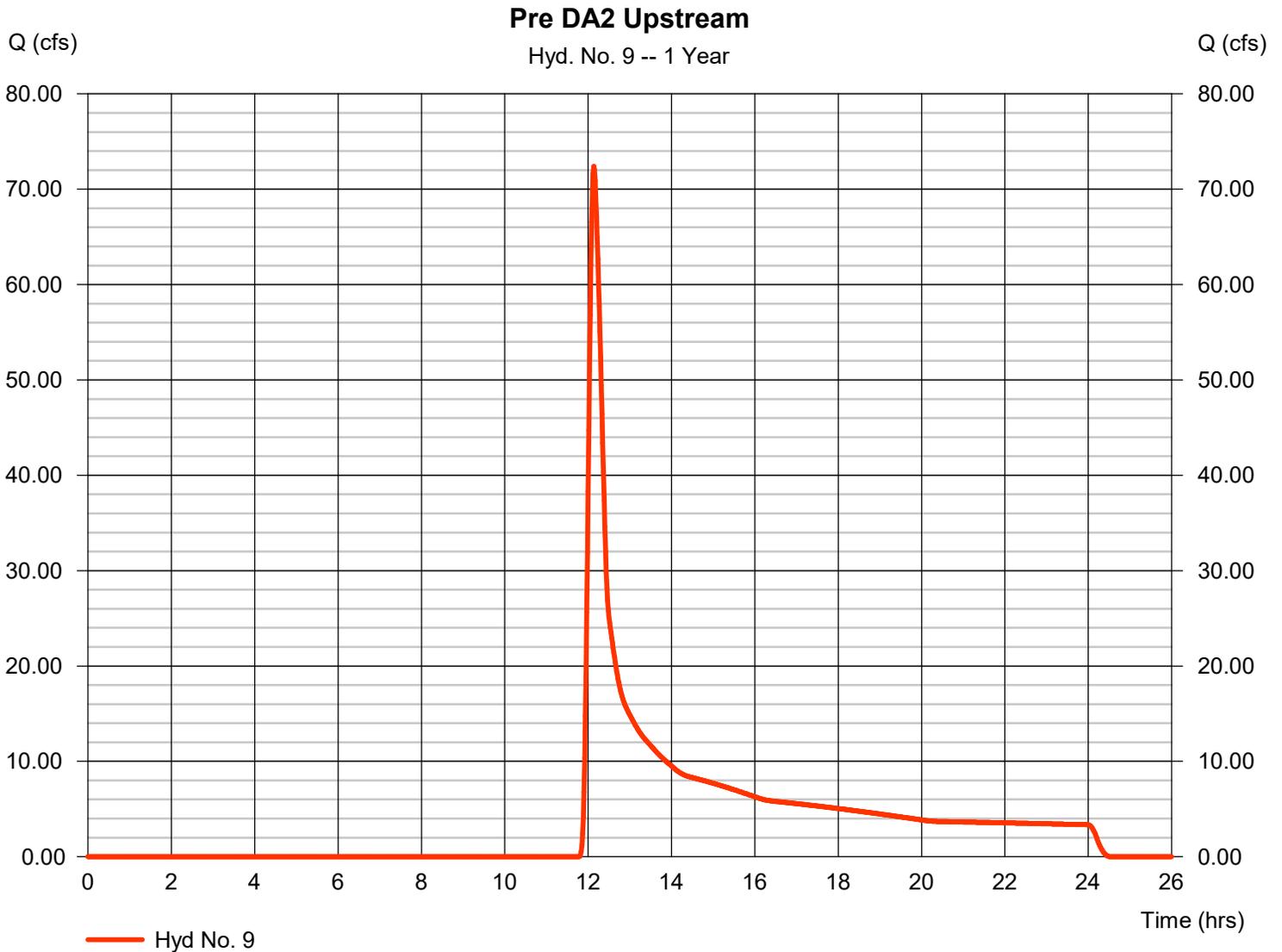
Monday, 06 / 29 / 2020

Hyd. No. 9

Pre DA2 Upstream

Hydrograph type	= SCS Runoff	Peak discharge	= 72.40 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 359,228 cuft
Drainage area	= 333.730 ac	Curve number	= 68*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.60 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(76.200 x 98) + (30.000 x 72) + (227.530 x 58)] / 333.730



Hydrograph Report

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

Monday, 06 / 29 / 2020

Hyd. No. 10

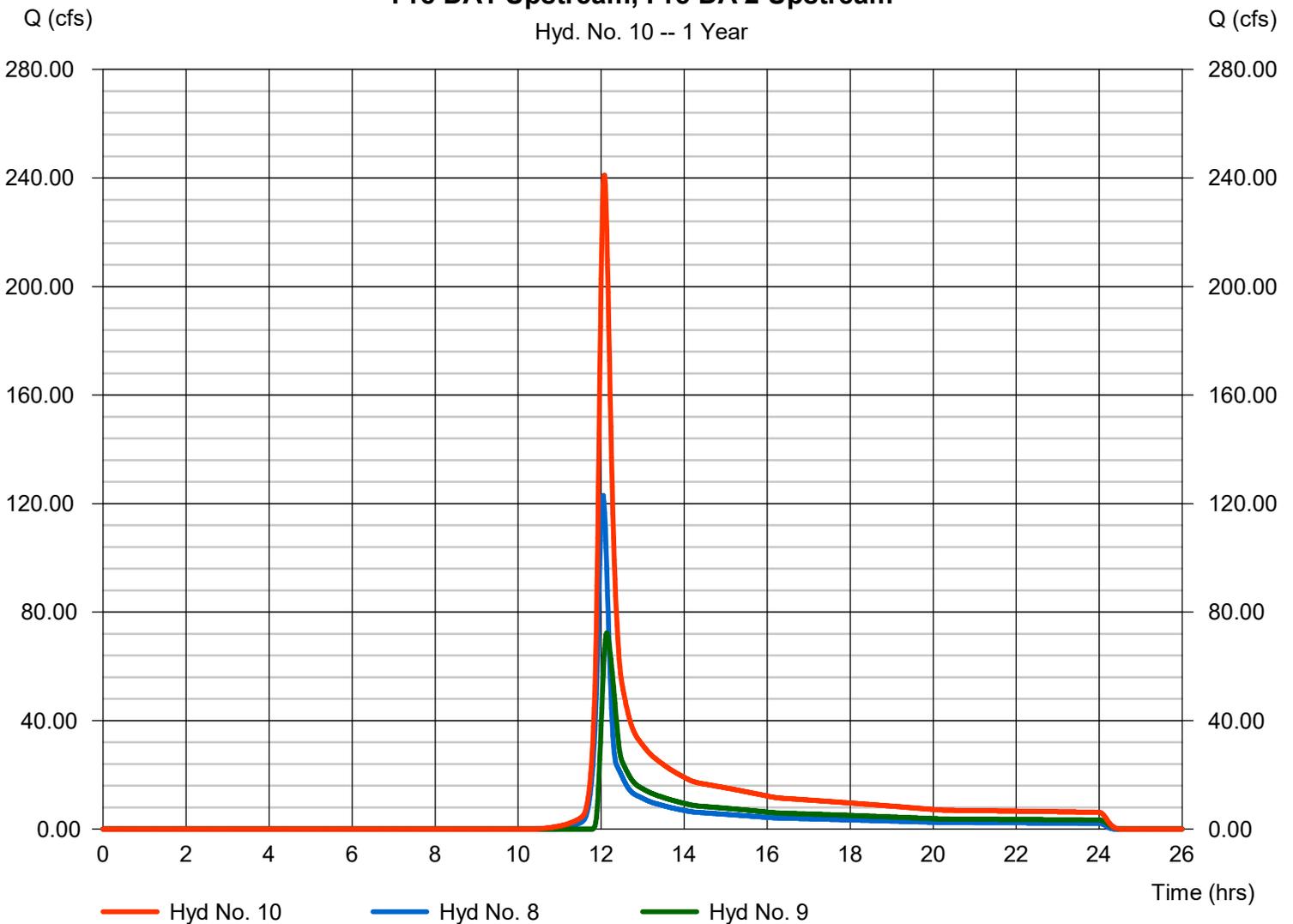
Pre DA1 Upstream, Pre DA 2 Upstream

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

Peak discharge = 240.99 cfs
Time to peak = 12.08 hrs
Hyd. volume = 856,382 cuft
Contrib. drain. area = 461.330 ac

Pre DA1 Upstream, Pre DA 2 Upstream

Hyd. No. 10 -- 1 Year



Hydrograph Report

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

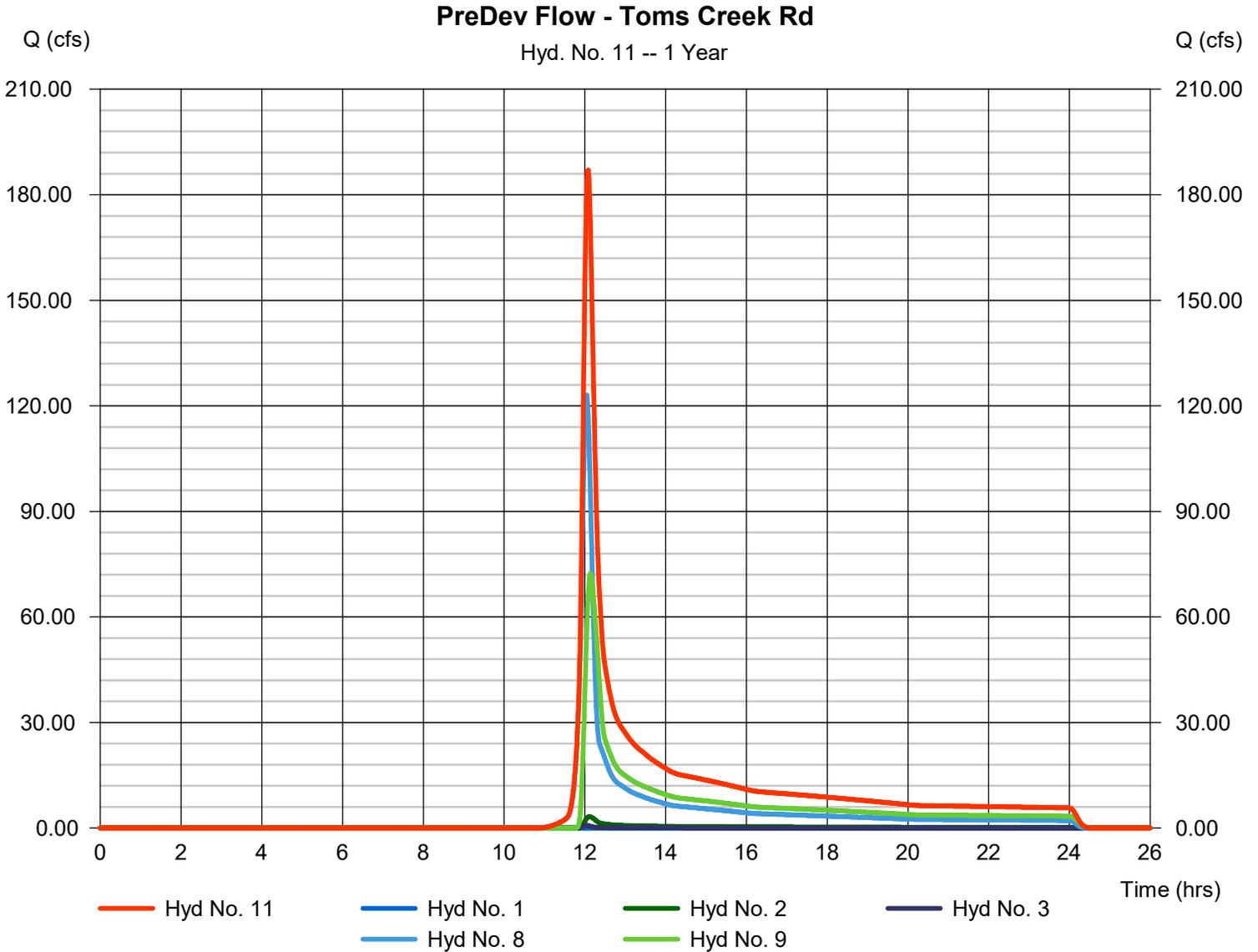
Monday, 06 / 29 / 2020

Hyd. No. 11

PreDev Flow - Toms Creek Rd

Hydrograph type = Combine
 Storm frequency = 1 yrs
 Time interval = 1 min
 Inflow hyds. = 1, 2, 3, 8, 9

Peak discharge = 187.05 cfs
 Time to peak = 12.08 hrs
 Hyd. volume = 722,822 cuft
 Contrib. drain. area = 489.670 ac



Hydrograph Report

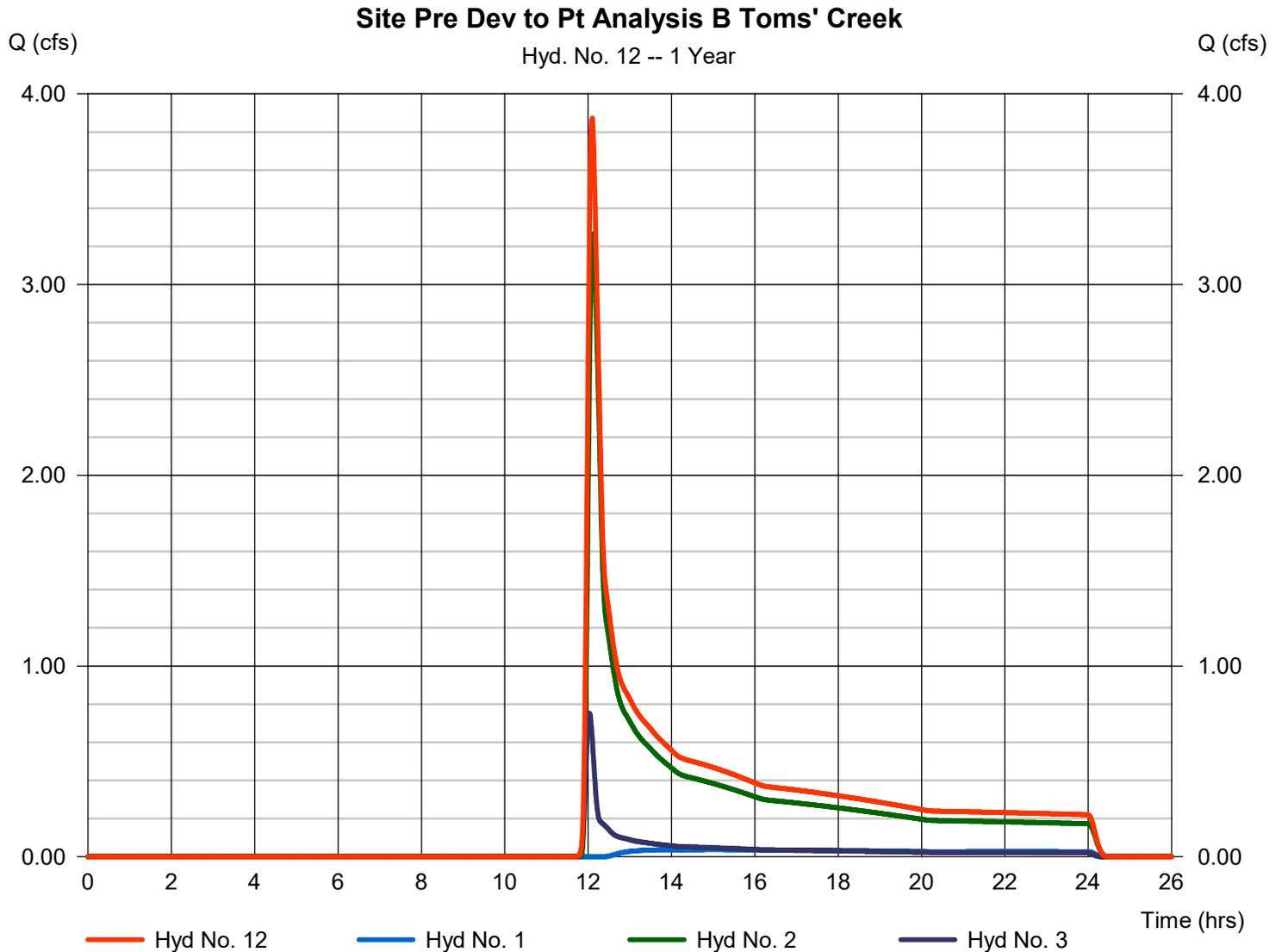
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 12

Site Pre Dev to Pt Analysis B Toms' Creek

Hydrograph type	= Combine	Peak discharge	= 3.872 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 20,705 cuft
Inflow hyds.	= 1, 2, 3	Contrib. drain. area	= 28.340 ac



Hydrograph Report

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

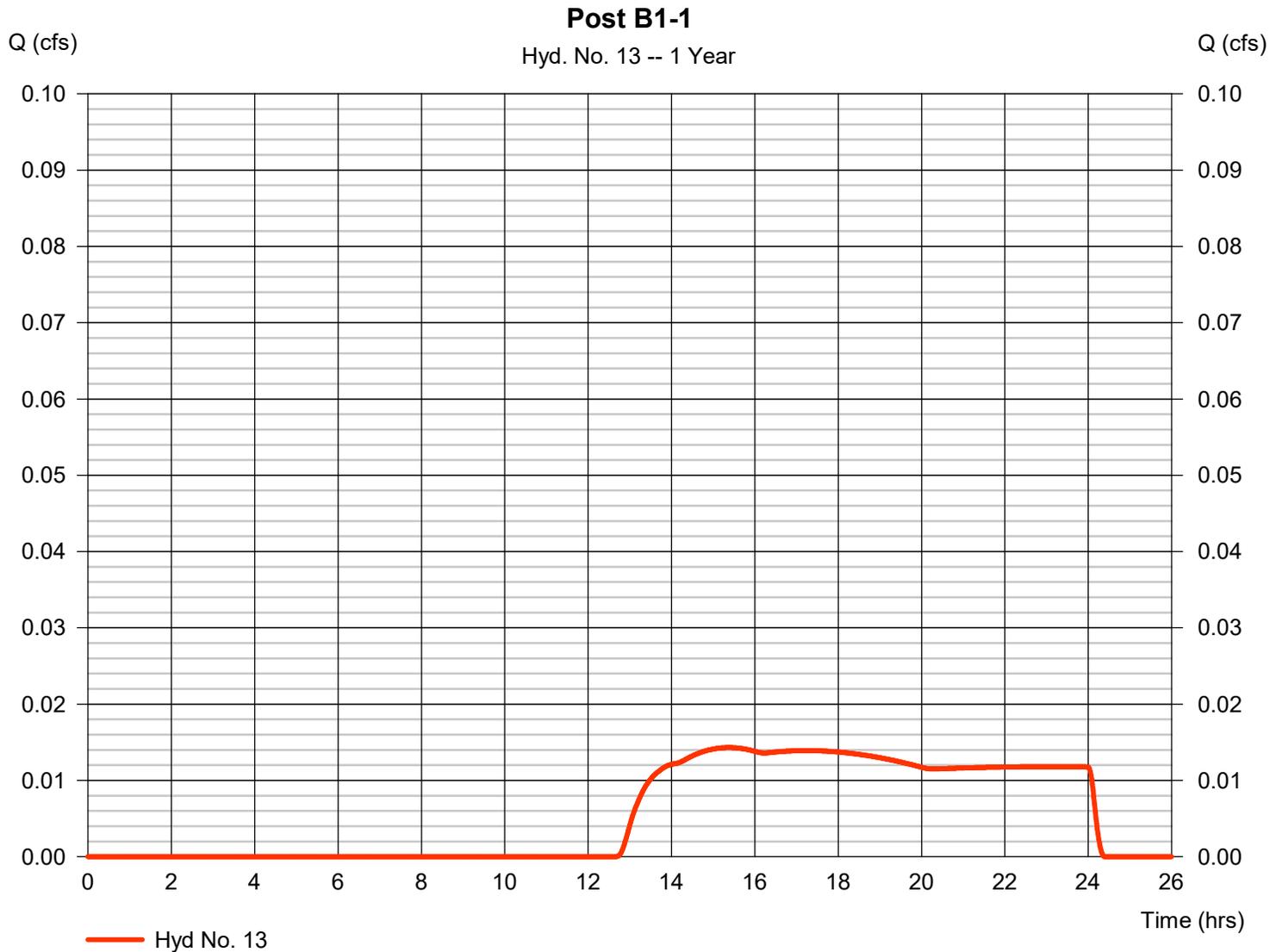
Monday, 06 / 29 / 2020

Hyd. No. 13

Post B1-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.014 cfs
Storm frequency	= 1 yrs	Time to peak	= 15.37 hrs
Time interval	= 1 min	Hyd. volume	= 502 cuft
Drainage area	= 3.790 ac	Curve number	= 54*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.80 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.780 x 98) + (1.510 x 69) + (1.310 x 61) + (0.190 x 74)] / 3.790



Hydrograph Report

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

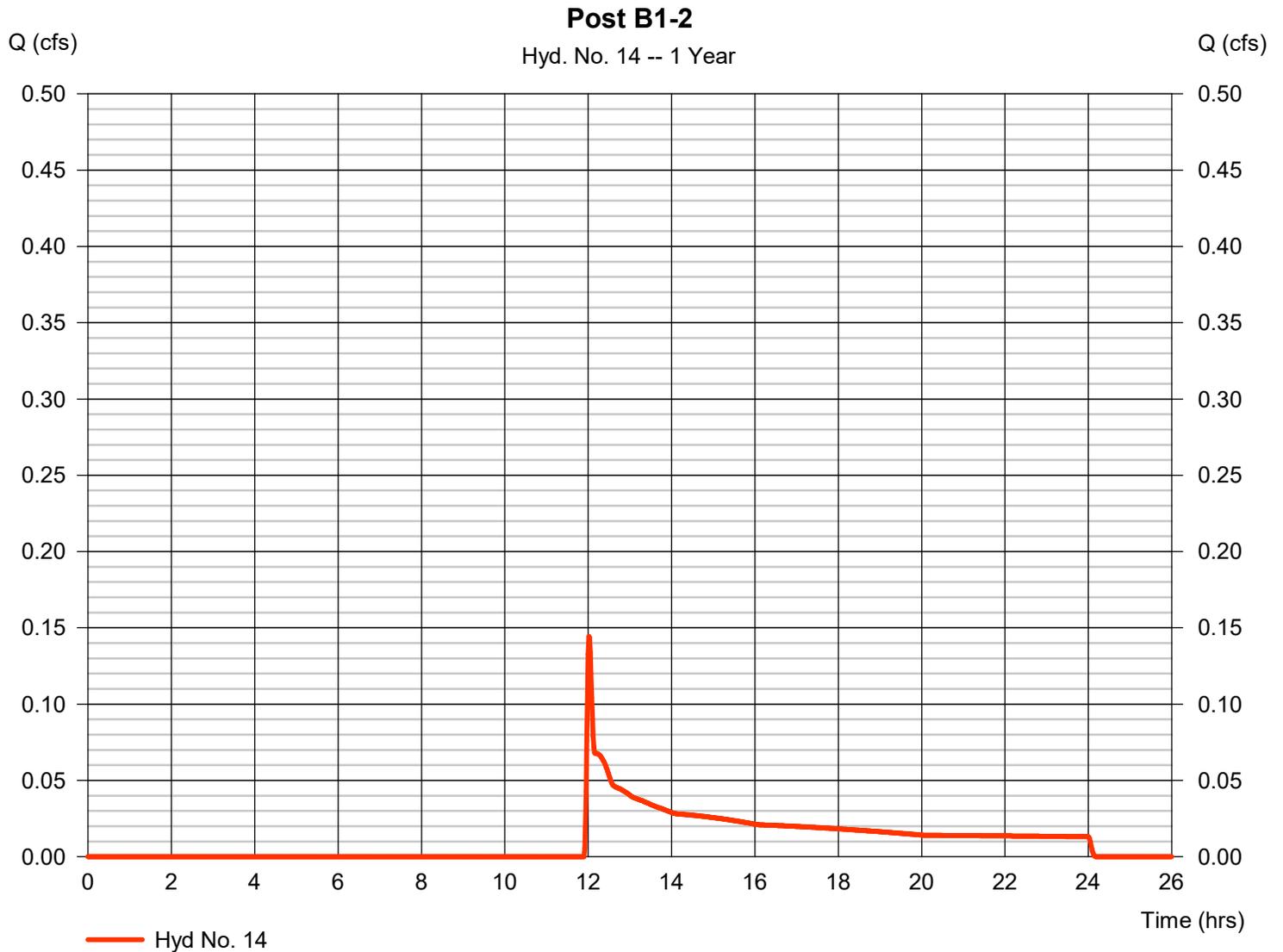
Monday, 06 / 29 / 2020

Hyd. No. 14

Post B1-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.144 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 1,005 cuft
Drainage area	= 1.980 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.80 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (0.560 x 69) + (0.840 x 61)] / 1.980



Hydrograph Report

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

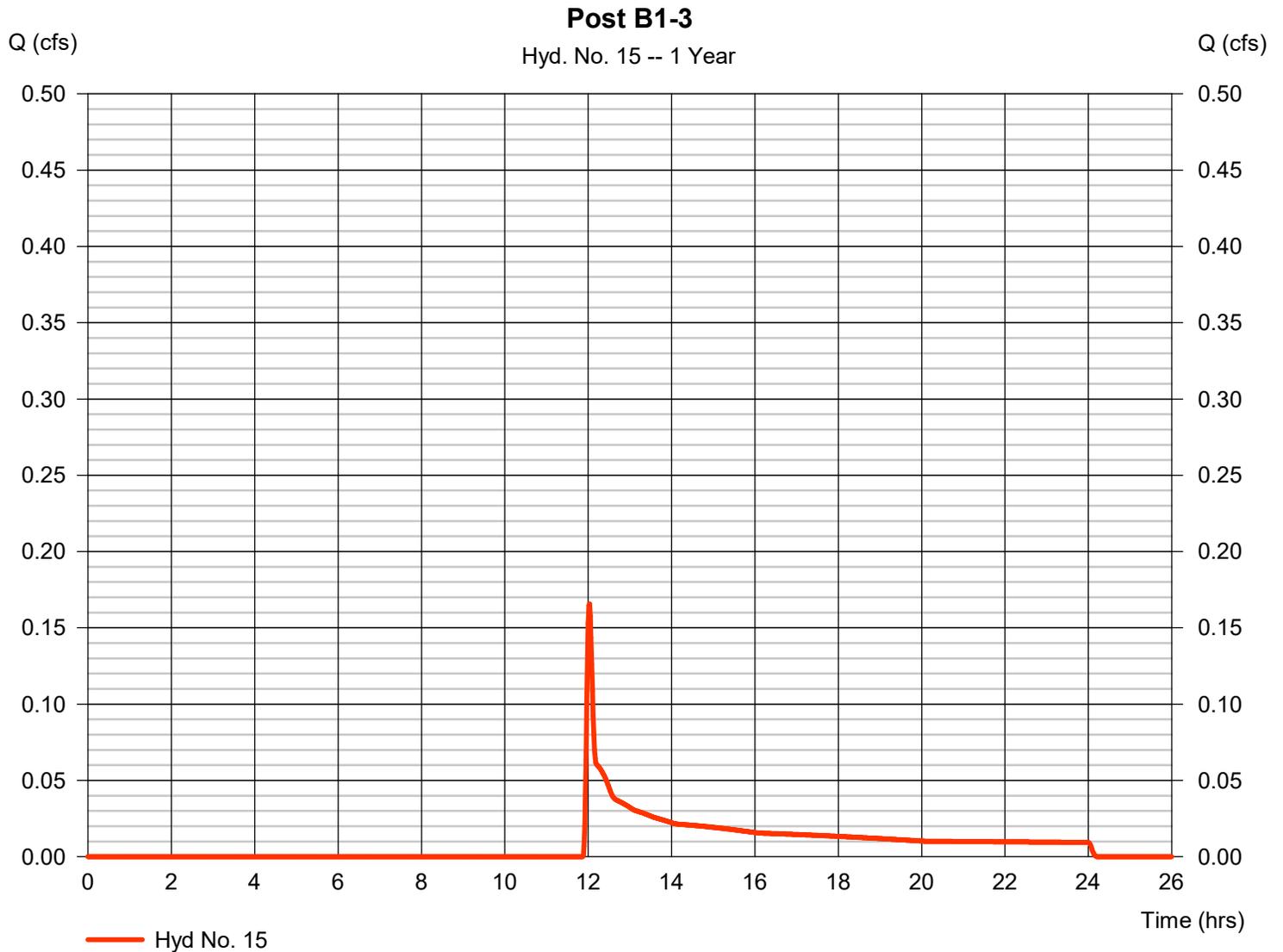
Monday, 06 / 29 / 2020

Hyd. No. 15

Post B1-3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.166 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 799 cuft
Drainage area	= 1.290 ac	Curve number	= 63*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.19 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 98) + (0.450 x 61) + (0.670 x 55)] / 1.290



Hydrograph Report

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

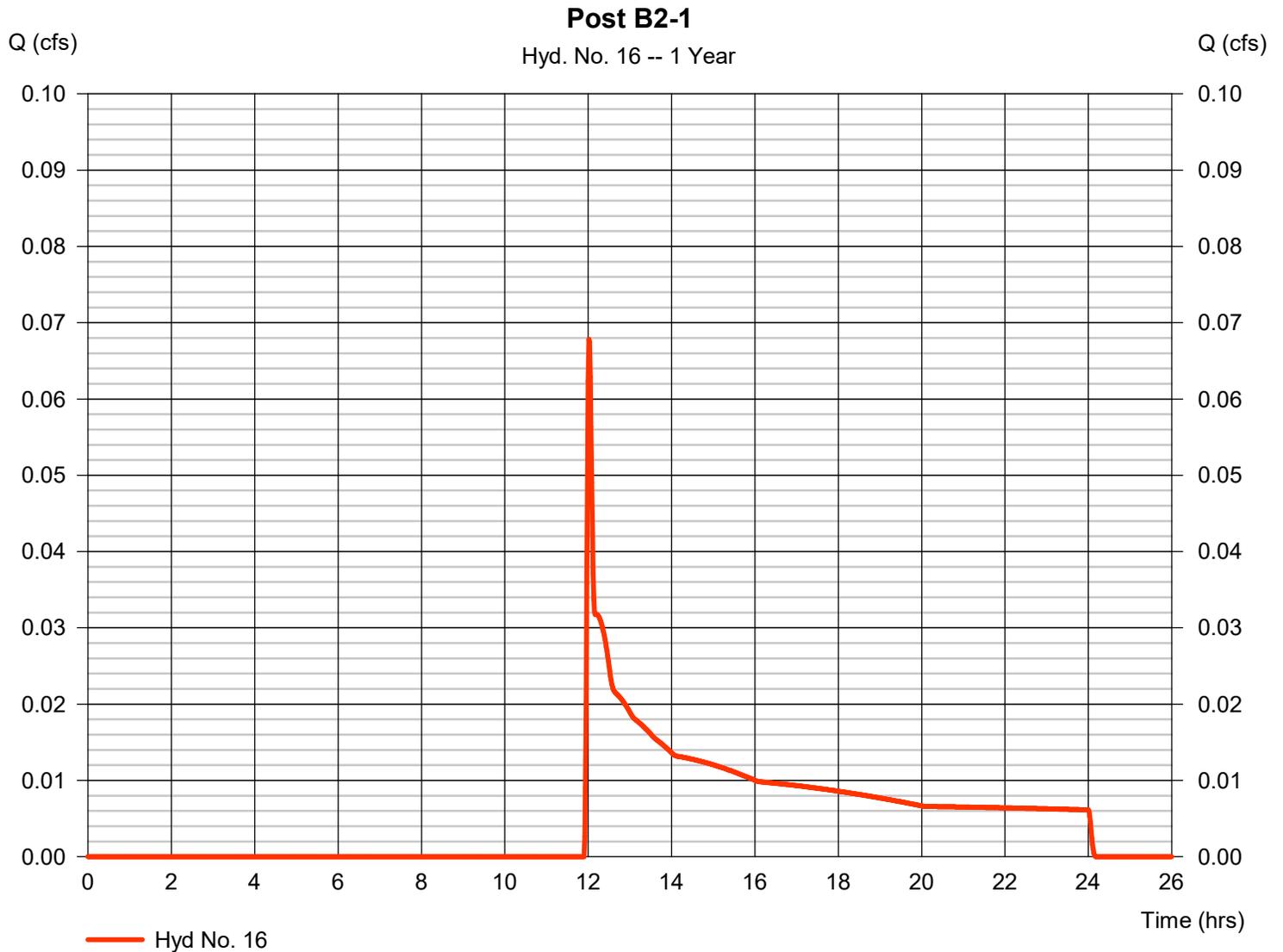
Monday, 06 / 29 / 2020

Hyd. No. 16

Post B2-1

Hydrograph type	= SCS Runoff	Peak discharge	= 0.068 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 472 cuft
Drainage area	= 0.930 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.30 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 98) + (0.300 x 55) + (0.020 x 55) + (0.650 x 61) + (0.090 x 74)] / 0.930



Hydrograph Report

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

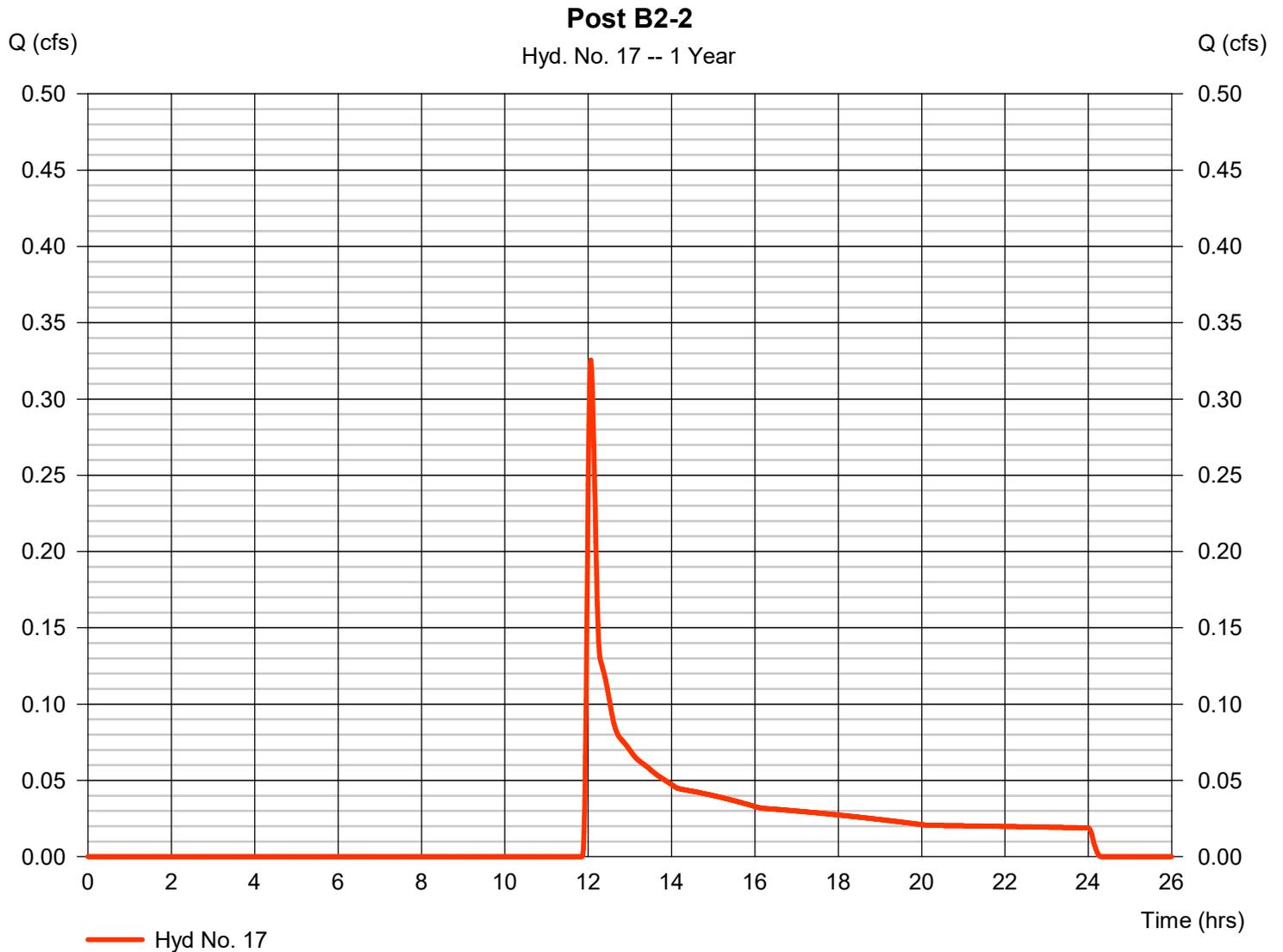
Monday, 06 / 29 / 2020

Hyd. No. 17

Post B2-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.325 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 1,701 cuft
Drainage area	= 2.340 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.30 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.210 x 98) + (0.630 x 61) + (0.300 x 74) + (1.030 x 55) + (0.170 x 70)] / 2.340



Hydrograph Report

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

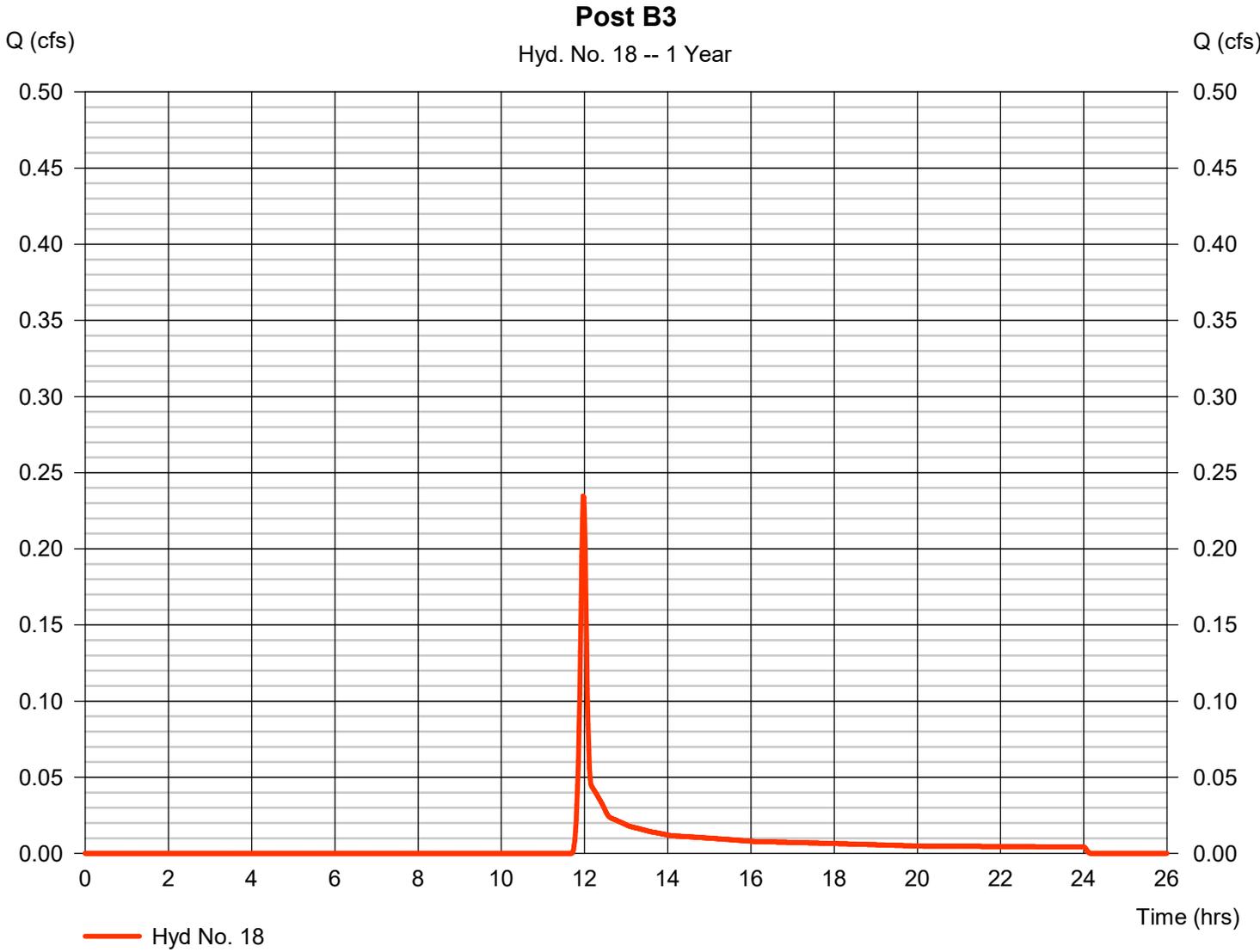
Monday, 06 / 29 / 2020

Hyd. No. 18

Post B3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.235 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 533 cuft
Drainage area	= 0.340 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.20 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.180 x 74) + (0.160 x 70)] / 0.340



Hydrograph Report

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

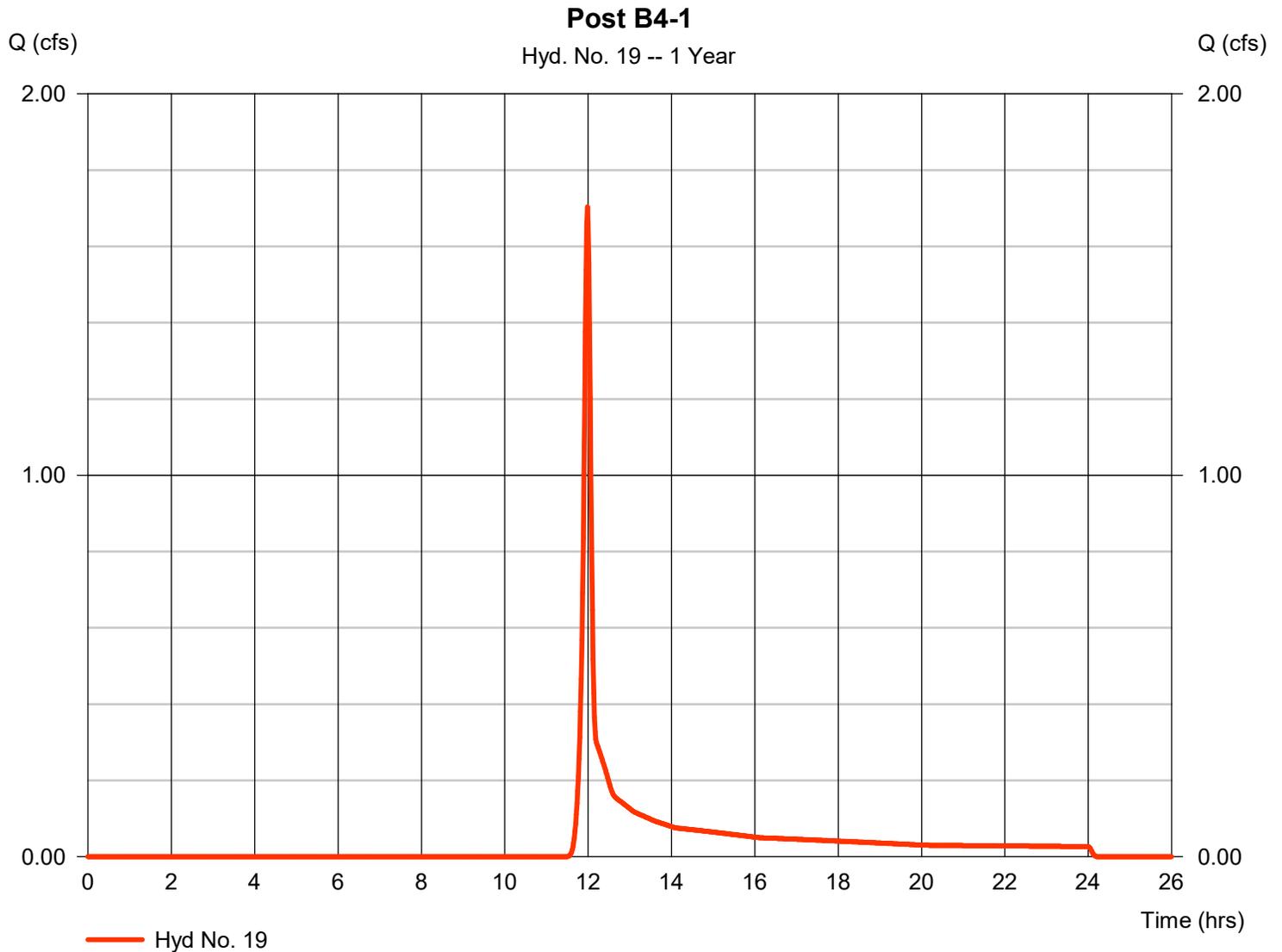
Monday, 06 / 29 / 2020

Hyd. No. 19

Post B4-1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.704 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 3,762 cuft
Drainage area	= 1.880 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.60 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 98) + (0.610 x 74) + (0.910 x 70)] / 1.880



Hydrograph Report

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

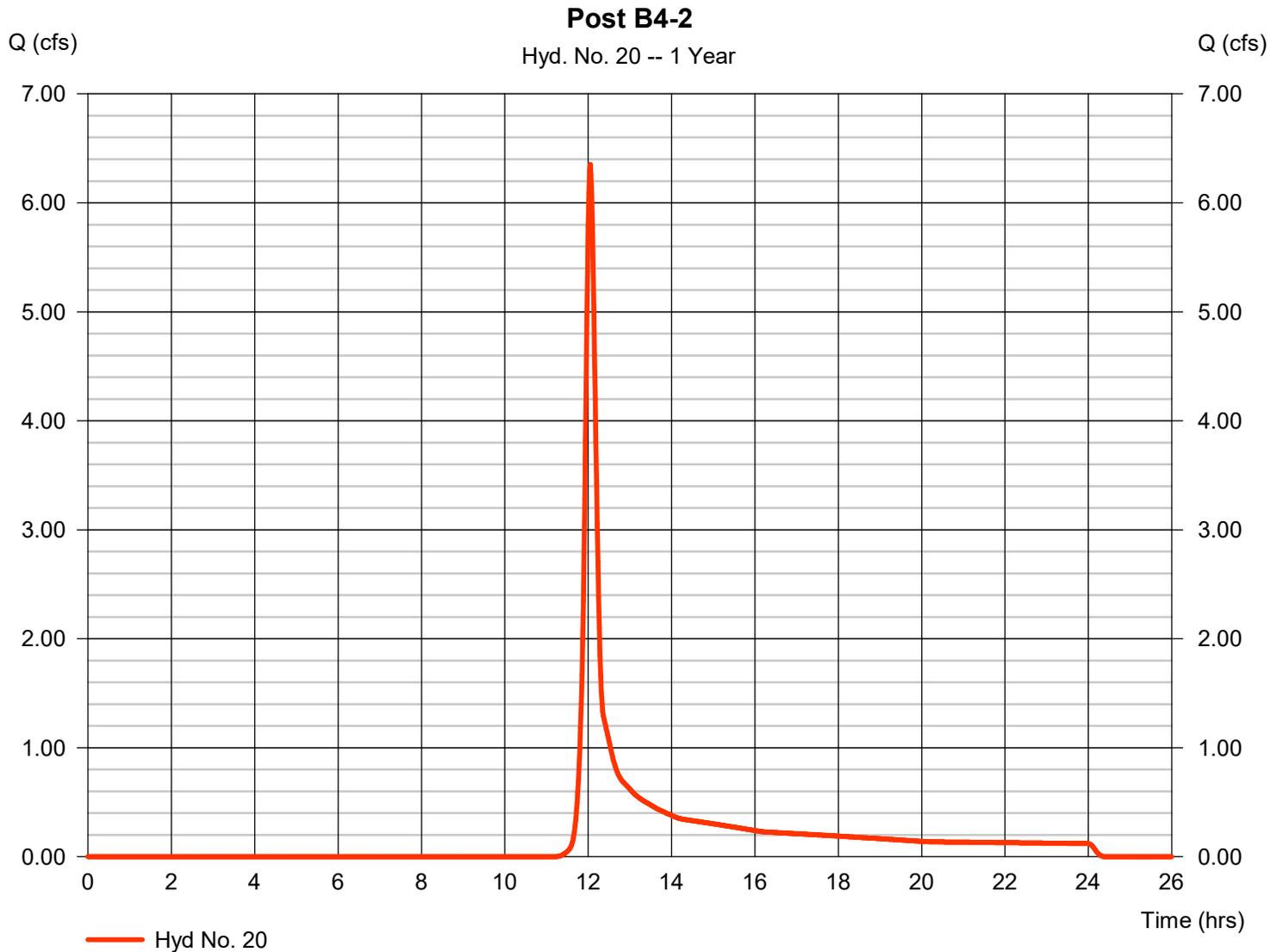
Monday, 06 / 29 / 2020

Hyd. No. 20

Post B4-2

Hydrograph type	= SCS Runoff	Peak discharge	= 6.353 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 18,118 cuft
Drainage area	= 7.690 ac	Curve number	= 78*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.10 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.500 x 98) + (0.130 x 69) + (2.460 x 79) + (0.030 x 61) + (2.550 x 74)] / 7.690



Hydrograph Report

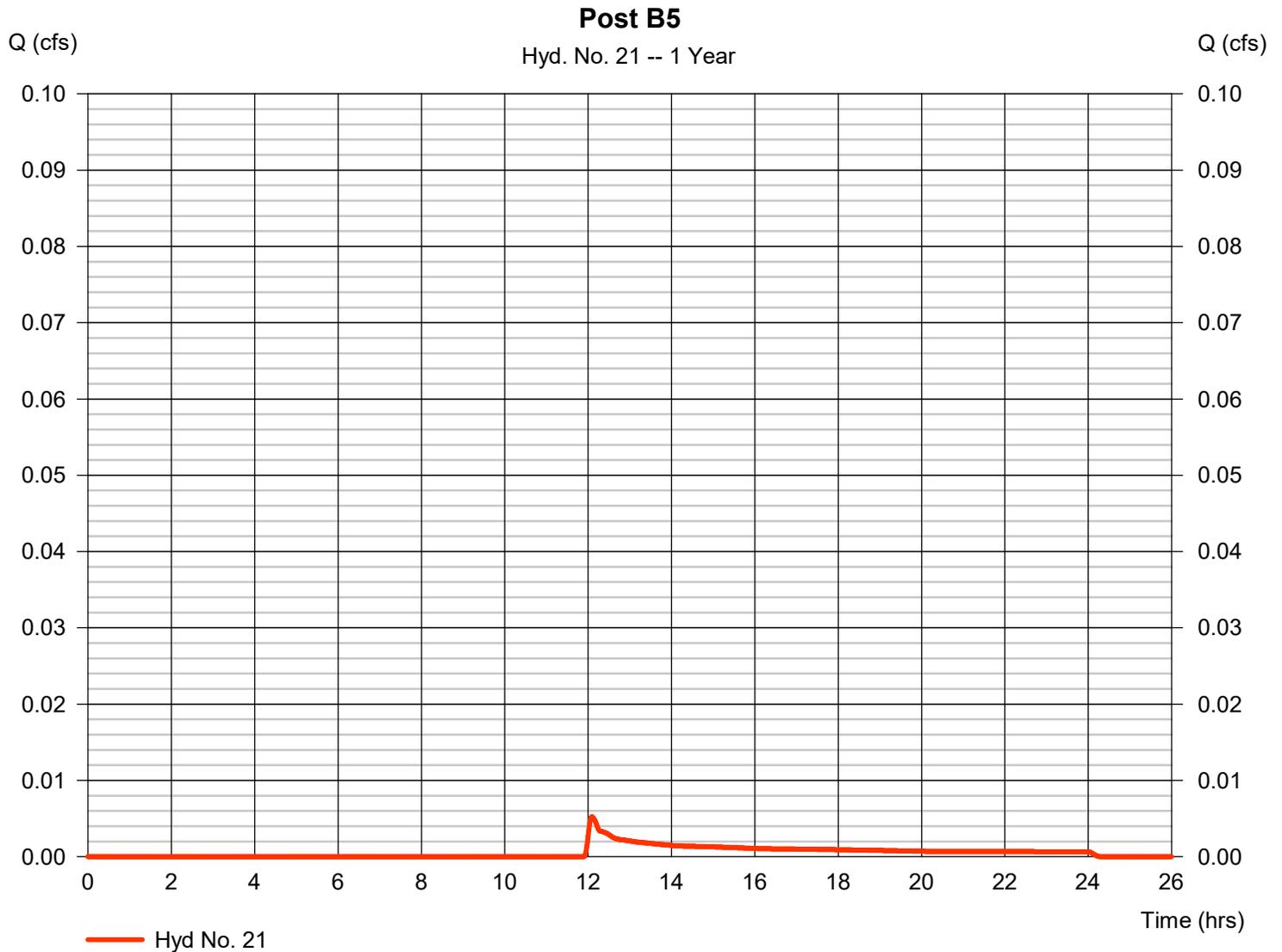
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 21

Post B5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 50 cuft
Drainage area	= 0.100 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.70 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

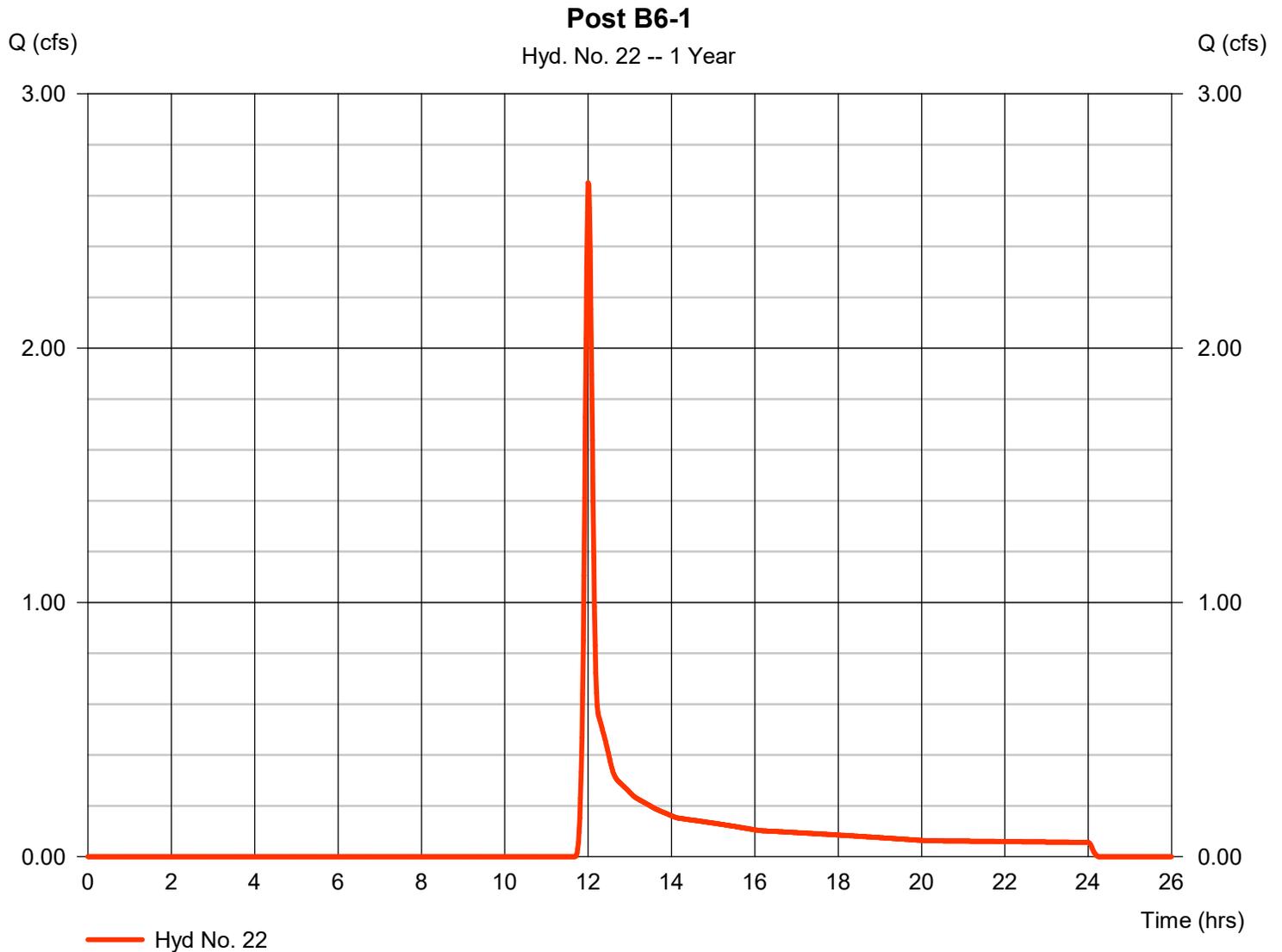
Monday, 06 / 29 / 2020

Hyd. No. 22

Post B6-1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.650 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 6,974 cuft
Drainage area	= 4.590 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.880 x 98) + (0.690 x 69) + (0.500 x 79)] / 4.590



Hydrograph Report

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

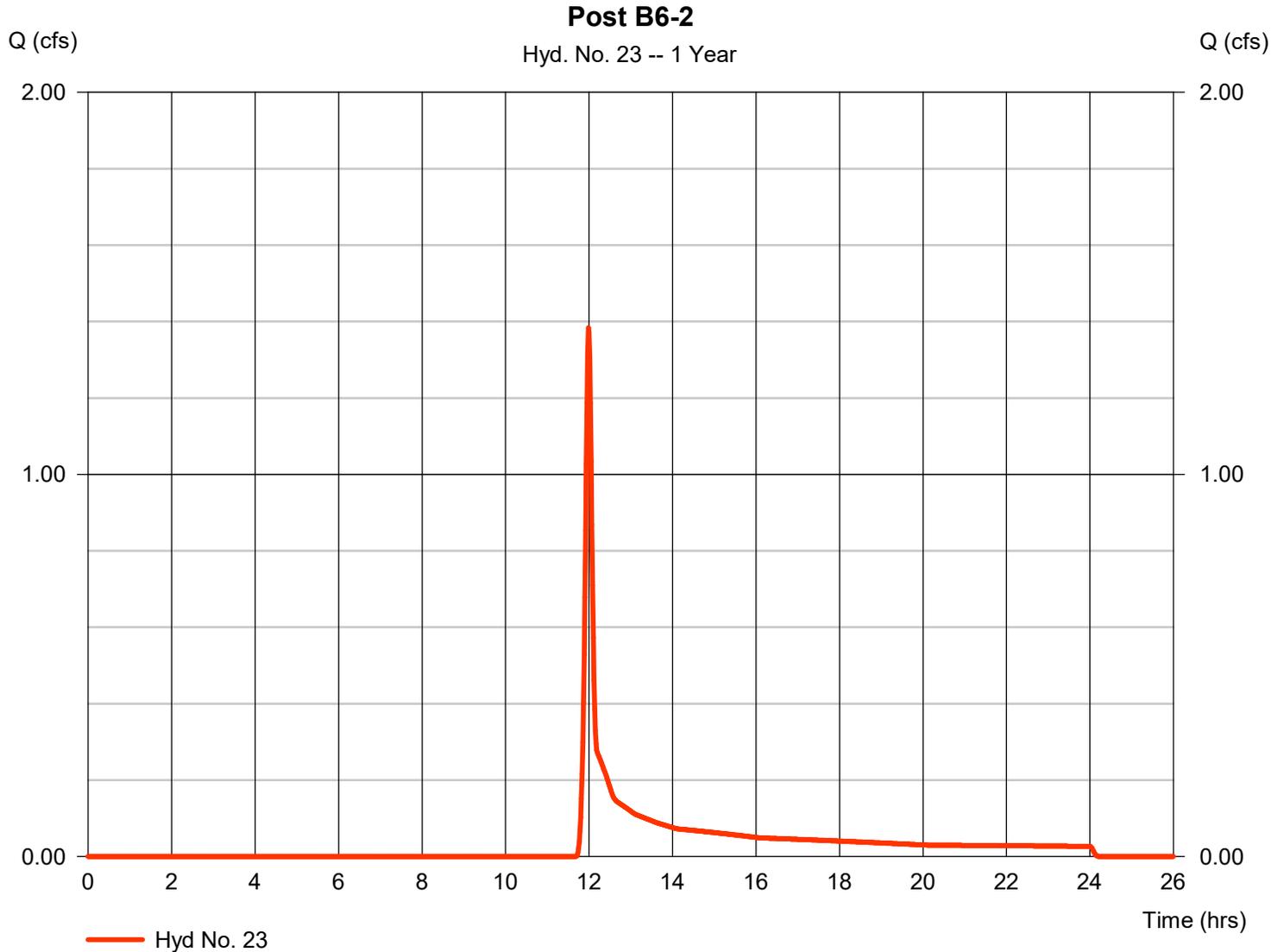
Monday, 06 / 29 / 2020

Hyd. No. 23

Post B6-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.384 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 3,318 cuft
Drainage area	= 2.240 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.36 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.630 x 98) + (0.960 x 79) + (0.650 x 74)] / 2.240



Hydrograph Report

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

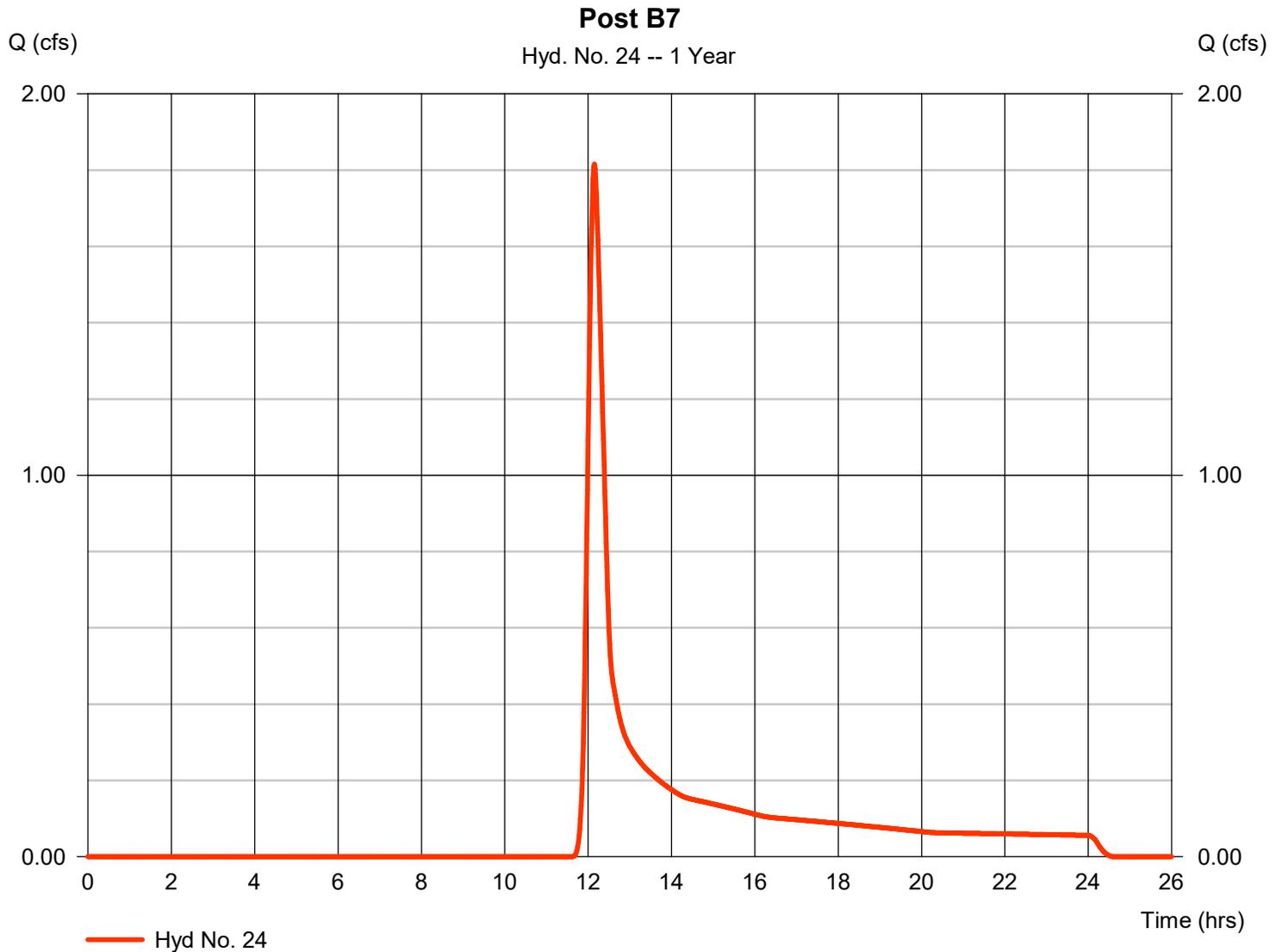
Monday, 06 / 29 / 2020

Hyd. No. 24

Post B7

Hydrograph type	= SCS Runoff	Peak discharge	= 1.816 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 7,419 cuft
Drainage area	= 4.220 ac	Curve number	= 74*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 23.30 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.700 x 98) + (1.290 x 69) + (2.270 x 79)] / 4.220



Hydrograph Report

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

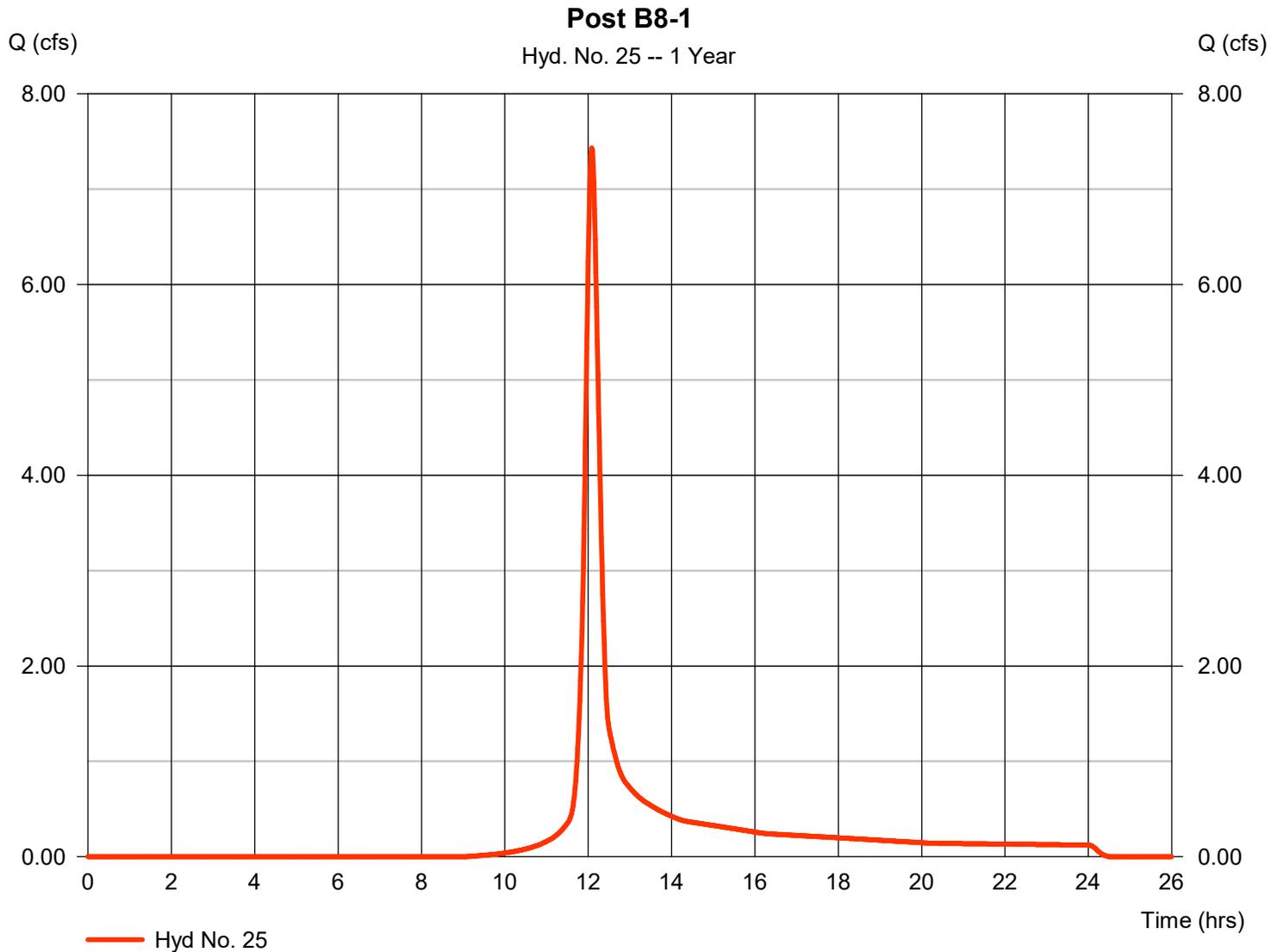
Monday, 06 / 29 / 2020

Hyd. No. 25

Post B8-1

Hydrograph type	= SCS Runoff	Peak discharge	= 7.433 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 23,340 cuft
Drainage area	= 6.030 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.40 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.010 x 98) + (0.060 x 61) + (2.850 x 74) + (0.110 x 70)] / 6.030



Hydrograph Report

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

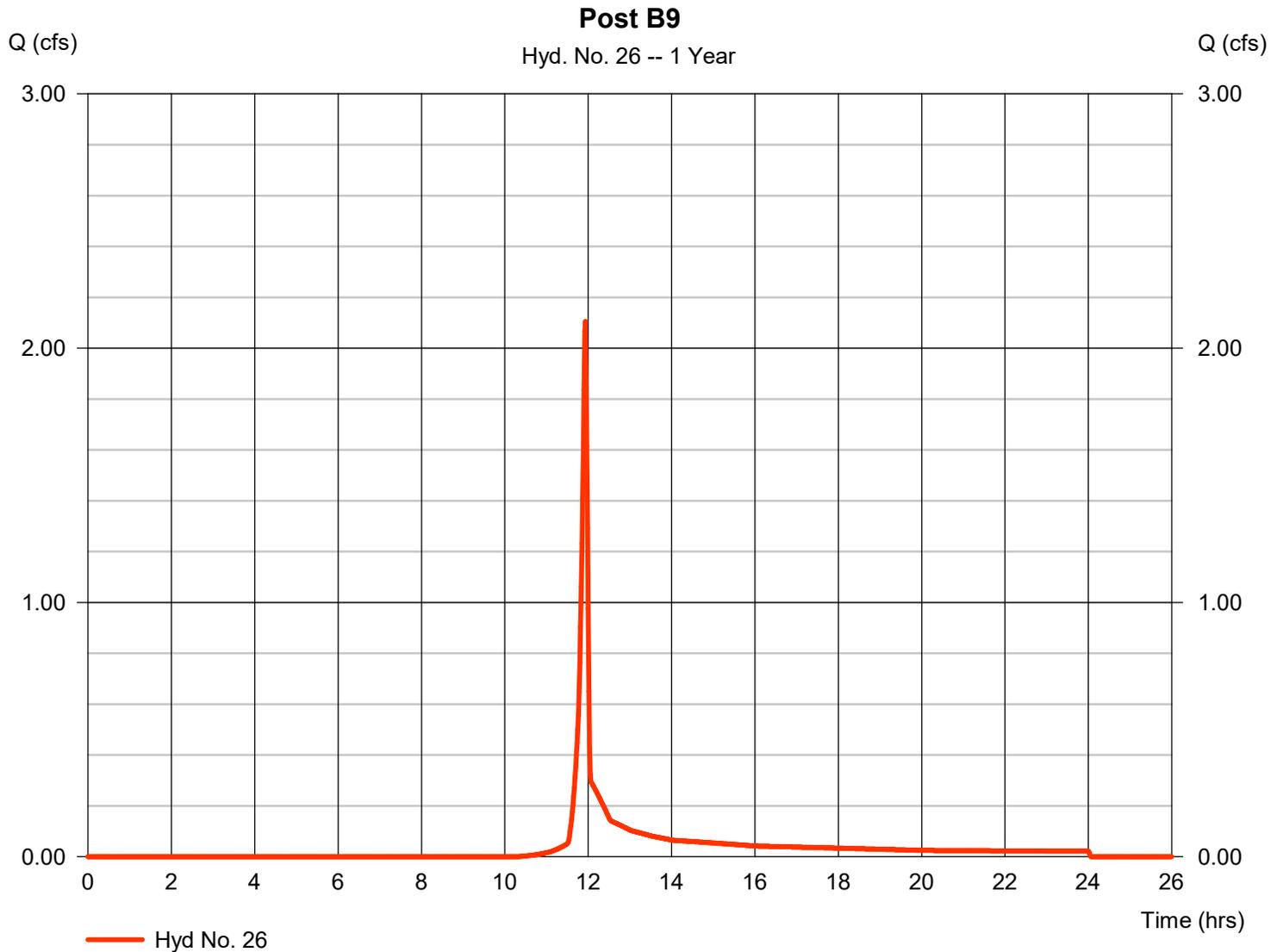
Monday, 06 / 29 / 2020

Hyd. No. 26

Post B9

Hydrograph type	= SCS Runoff	Peak discharge	= 2.104 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.93 hrs
Time interval	= 1 min	Hyd. volume	= 3,658 cuft
Drainage area	= 1.280 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 1.90 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.640 x 98) + (0.130 x 61) + (0.190 x 55) + (0.250 x 74) + (0.070 x 70)] / 1.280



Hydrograph Report

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

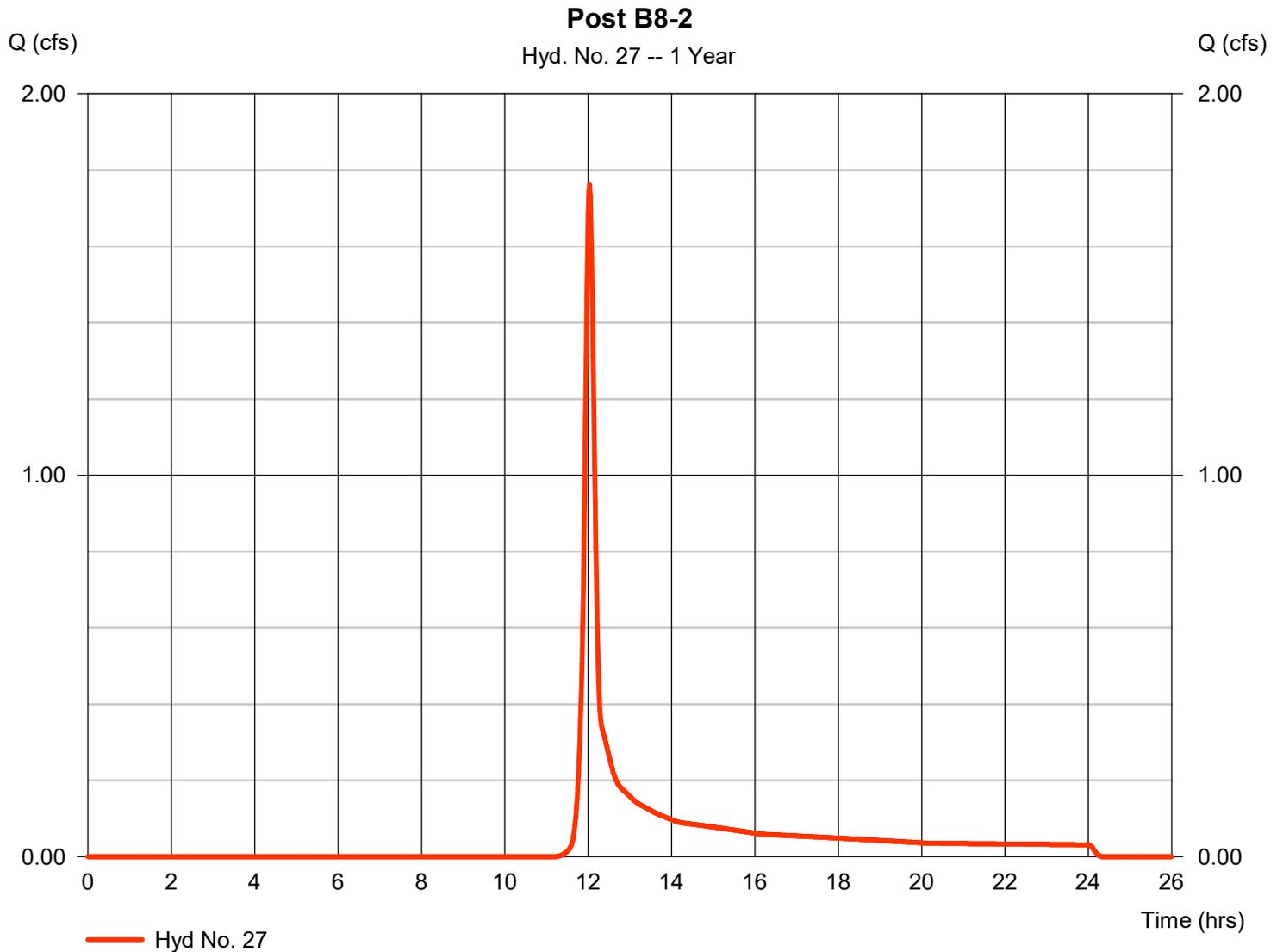
Monday, 06 / 29 / 2020

Hyd. No. 27

Post B8-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1.763 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 4,685 cuft
Drainage area	= 2.020 ac	Curve number	= 78*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.80 min
Total precip.	= 2.28 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 98) + (1.480 x 74) + (0.160 x 70)] / 2.020



Hydrograph Report

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

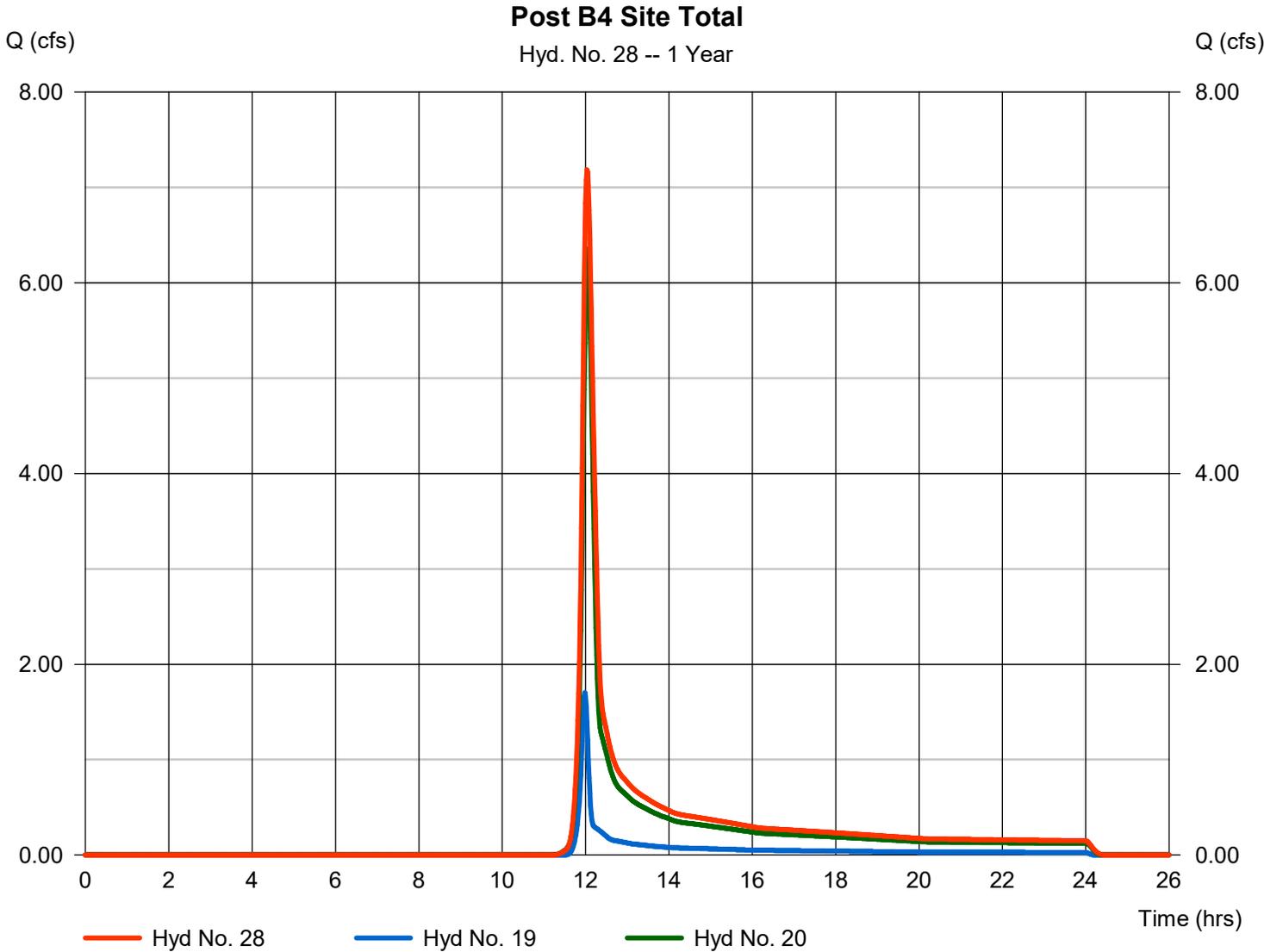
Monday, 06 / 29 / 2020

Hyd. No. 28

Post B4 Site Total

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 19, 20

Peak discharge = 7.184 cfs
Time to peak = 12.03 hrs
Hyd. volume = 22,106 cuft
Contrib. drain. area = 9.570 ac



Hydrograph Report

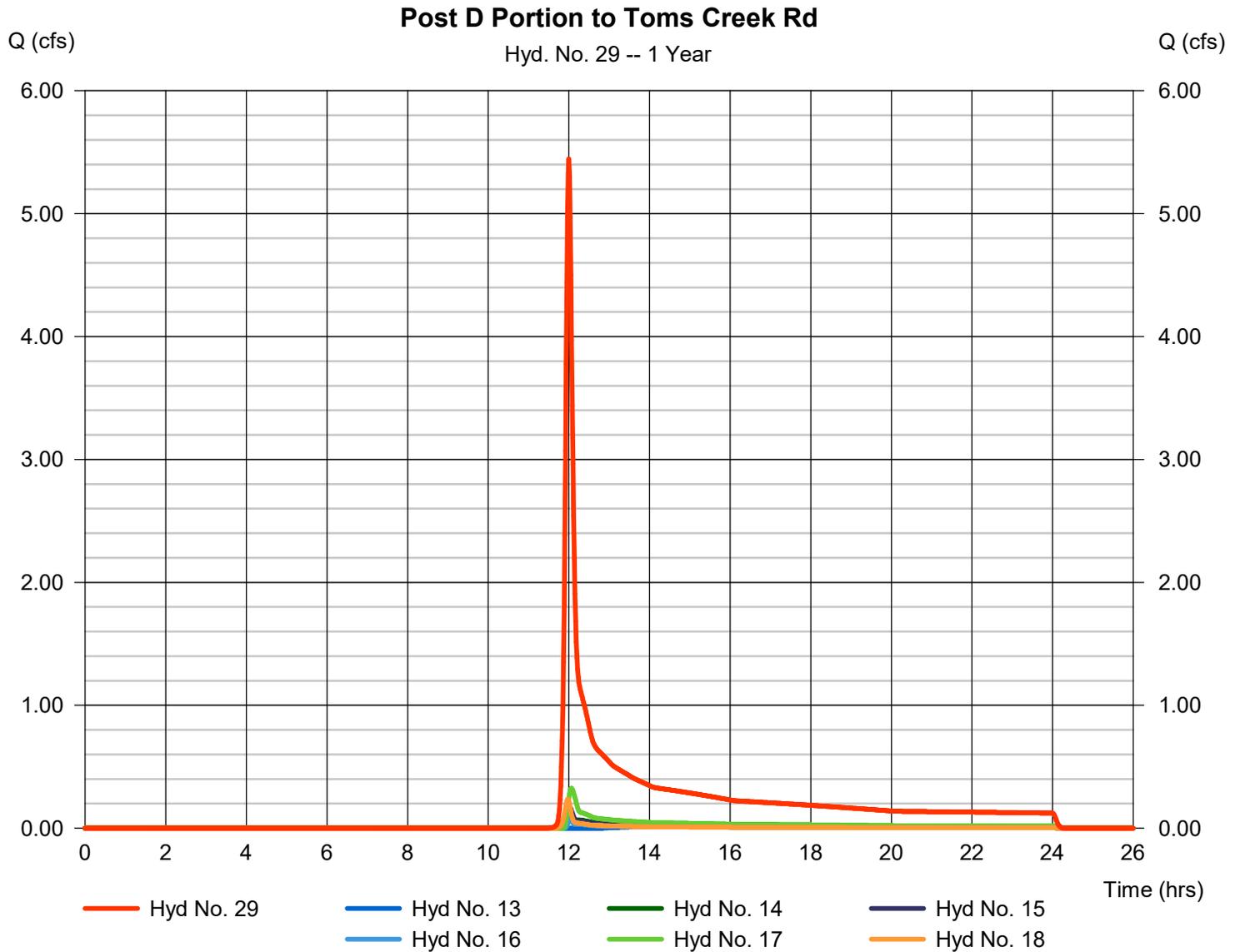
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 29

Post D Portion to Toms Creek Rd

Hydrograph type	= Combine	Peak discharge	= 5.444 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 14,796 cuft
Inflow hyds.	= 13, 14, 15, 16, 17, 18	Contrib. drain. area	= 10.670 ac



Hydrograph Report

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

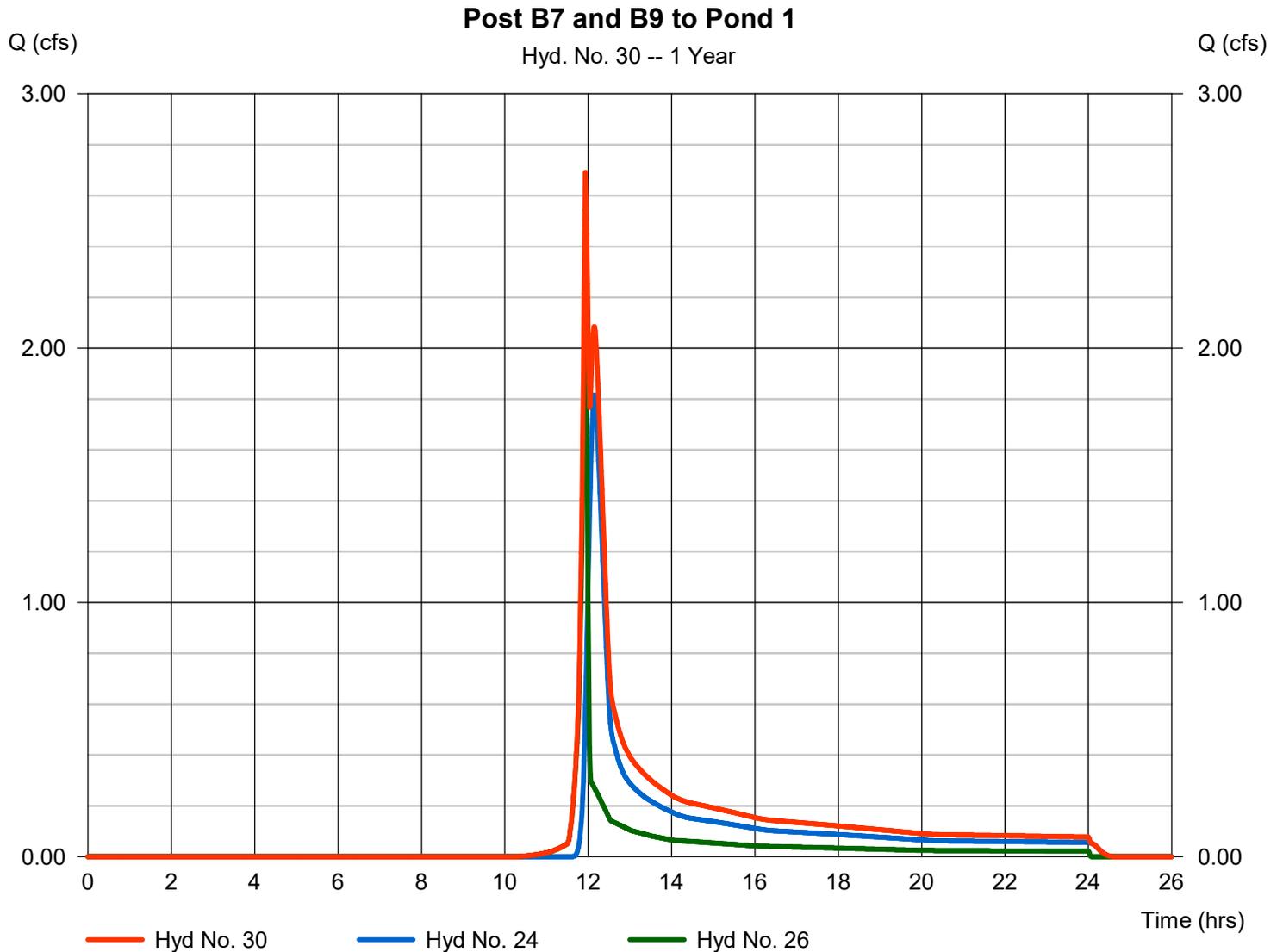
Monday, 06 / 29 / 2020

Hyd. No. 30

Post B7 and B9 to Pond 1

Hydrograph type = Combine
 Storm frequency = 1 yrs
 Time interval = 1 min
 Inflow hyds. = 24, 26

Peak discharge = 2.691 cfs
 Time to peak = 11.93 hrs
 Hyd. volume = 11,077 cuft
 Contrib. drain. area = 5.500 ac



Hydrograph Report

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

Monday, 06 / 29 / 2020

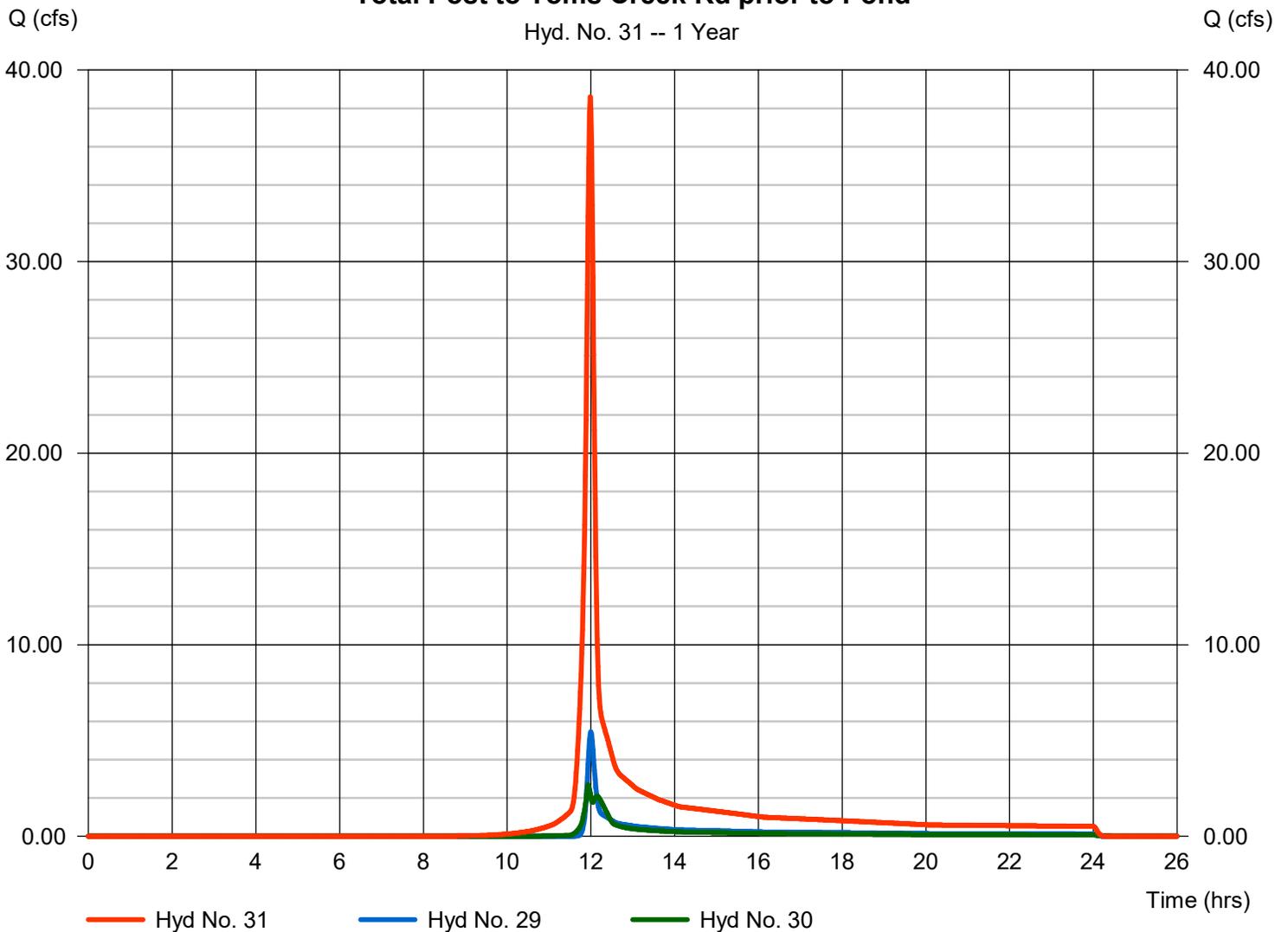
Hyd. No. 31

Total Post to Toms Creek Rd prior to Pond

Hydrograph type	= Combine	Peak discharge	= 38.60 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 88,260 cuft
Inflow hyds.	= 29, 30	Contrib. drain. area	= 0.000 ac

Total Post to Toms Creek Rd prior to Pond

Hyd. No. 31 -- 1 Year



Hydrograph Report

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

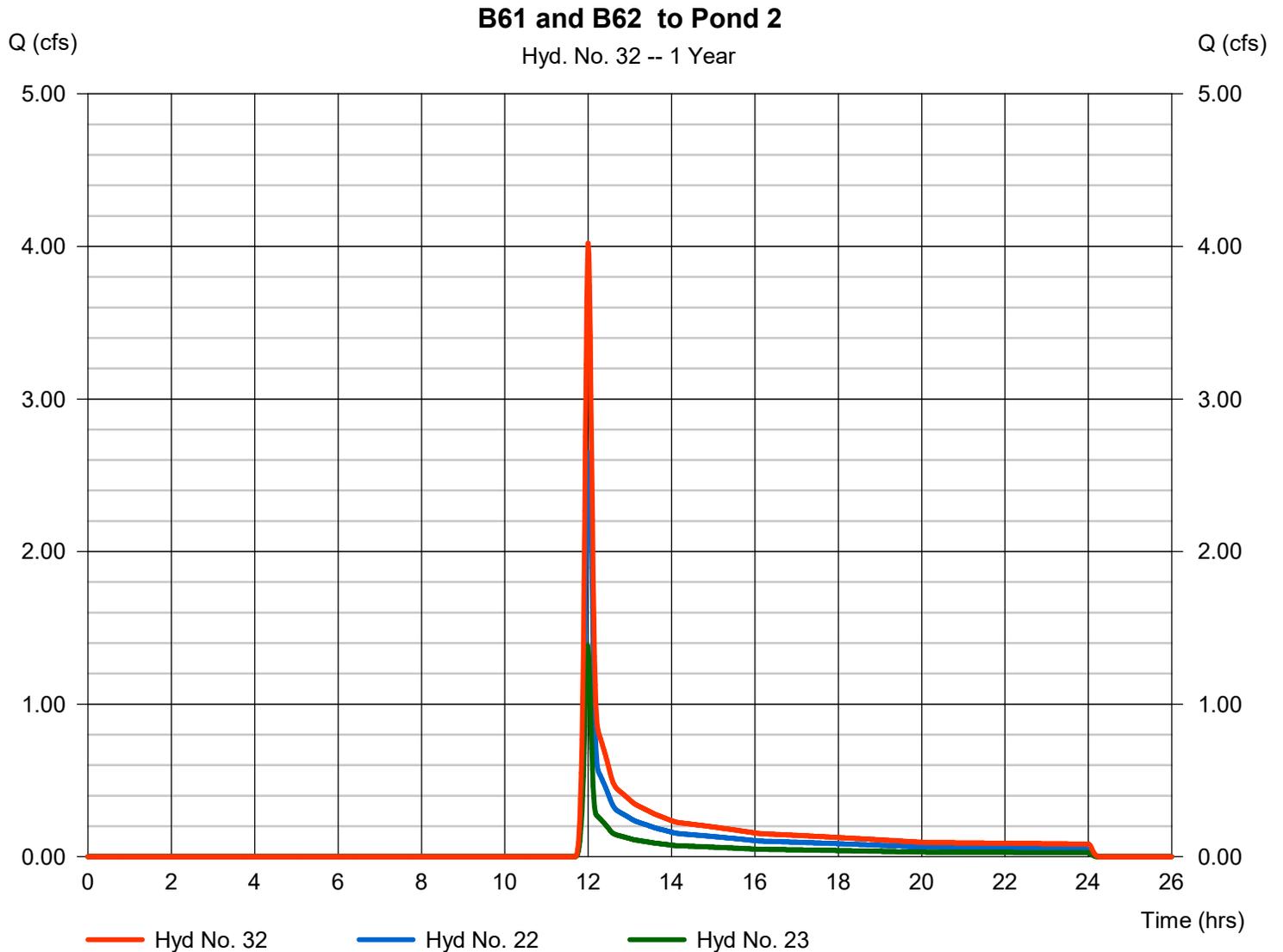
Monday, 06 / 29 / 2020

Hyd. No. 32

B61 and B62 to Pond 2

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 22, 23

Peak discharge = 4.022 cfs
Time to peak = 12.00 hrs
Hyd. volume = 10,293 cuft
Contrib. drain. area = 6.830 ac



Hydrograph Report

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

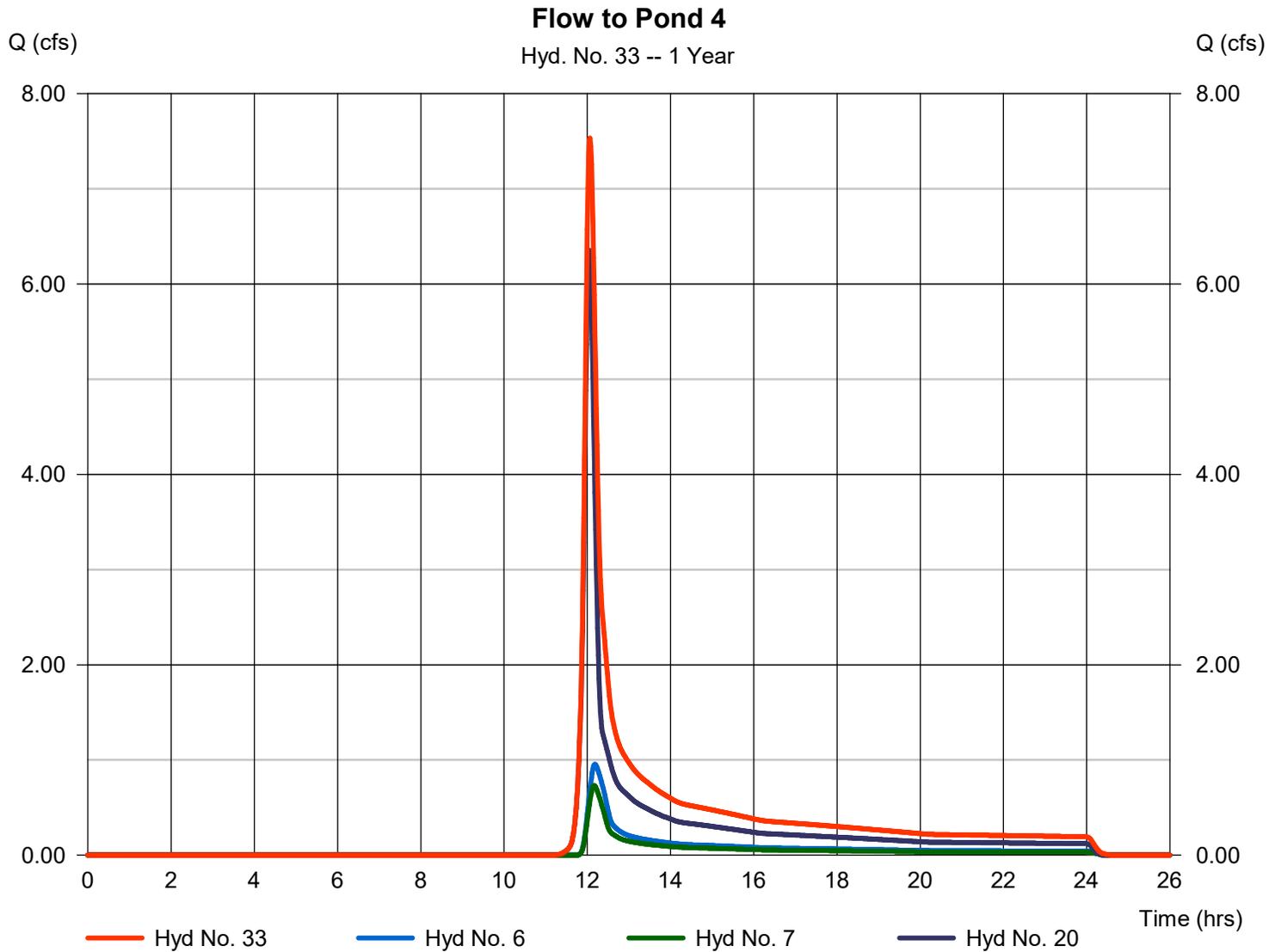
Monday, 06 / 29 / 2020

Hyd. No. 33

Flow to Pond 4

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 6, 7, 20

Peak discharge = 7.533 cfs
Time to peak = 12.07 hrs
Hyd. volume = 26,557 cuft
Contrib. drain. area = 14.270 ac



Hydrograph Report

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

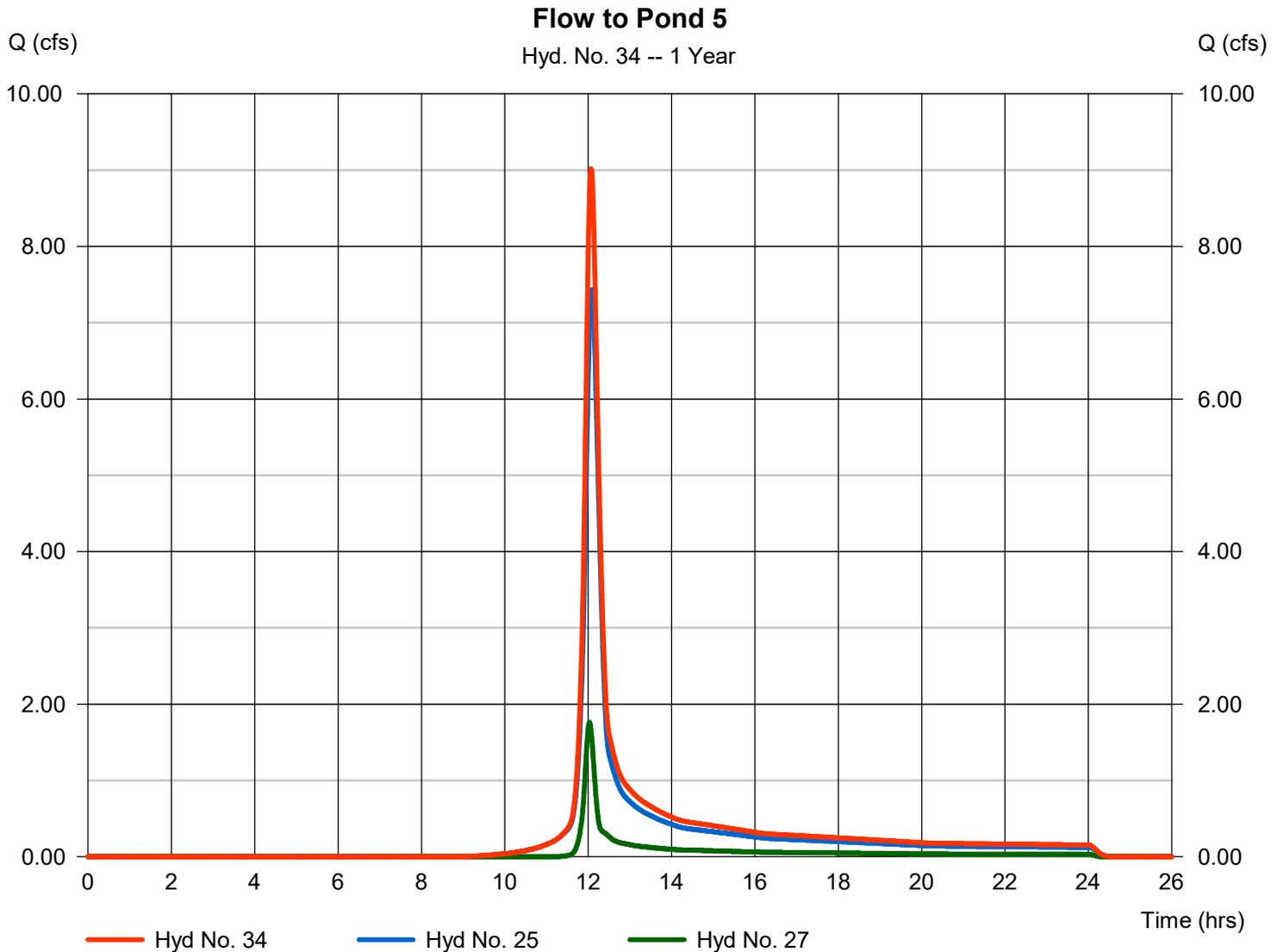
Monday, 06 / 29 / 2020

Hyd. No. 34

Flow to Pond 5

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 25, 27

Peak discharge = 9.018 cfs
Time to peak = 12.07 hrs
Hyd. volume = 28,024 cuft
Contrib. drain. area = 8.050 ac



Hydrograph Report

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

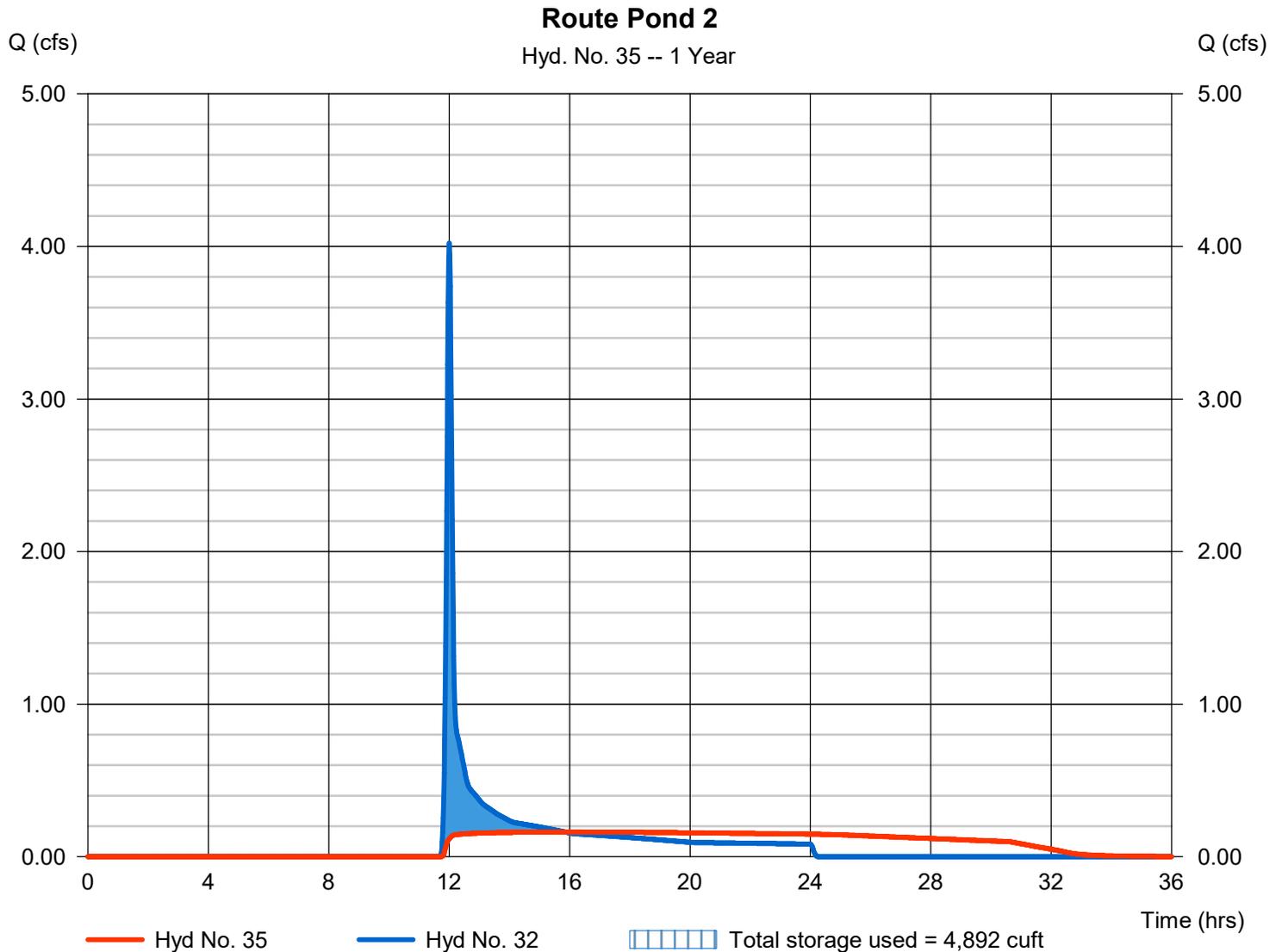
Monday, 06 / 29 / 2020

Hyd. No. 35

Route Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 0.161 cfs
Storm frequency	= 1 yrs	Time to peak	= 15.87 hrs
Time interval	= 1 min	Hyd. volume	= 10,289 cuft
Inflow hyd. No.	= 32 - B61 and B62 to Pond 2	Max. Elevation	= 1986.51 ft
Reservoir name	= Pond 2	Max. Storage	= 4,892 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Pond 2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1984.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1984.00	00	0	0
1.00	1985.00	1,575	525	525
2.00	1986.00	3,350	2,407	2,932
3.00	1987.00	4,300	3,815	6,747
4.00	1988.00	5,375	4,827	11,574
5.00	1989.00	6,500	5,928	17,502
6.00	1990.00	7,800	7,139	24,641
7.00	1991.00	9,100	8,441	33,082
8.00	1992.00	10,500	9,791	42,873
9.00	1993.00	11,900	11,192	54,064

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	Inactive	0.00
Span (in)	= 24.00	2.00	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 1984.00	1984.00	1988.00	0.00
Length (ft)	= 80.00	0.50	0.50	0.00
Slope (%)	= 1.88	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	0.00	0.00	0.00
Crest El. (ft)	= 1989.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
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	Civ A cfs	Civ B cfs	Civ 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	1984.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.00	525	1985.00	0.11 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.098
2.00	2,932	1986.00	0.15 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.143
3.00	6,747	1987.00	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.177
4.00	11,574	1988.00	0.21 ic	0.21 ic	0.00	---	0.00	---	---	---	---	---	0.205
5.00	17,502	1989.00	0.24 ic	0.23 ic	0.00	---	0.00	---	---	---	---	---	0.230
6.00	24,641	1990.00	18.68 ic	0.20 ic	0.00	---	18.48	---	---	---	---	---	18.68
7.00	33,082	1991.00	36.79 ic	0.03 ic	0.00	---	36.76 s	---	---	---	---	---	36.79
8.00	42,873	1992.00	39.95 ic	0.02 ic	0.00	---	39.92 s	---	---	---	---	---	39.94
9.00	54,064	1993.00	42.75 ic	0.01 ic	0.00	---	42.61 s	---	---	---	---	---	42.62

Hydrograph Report

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

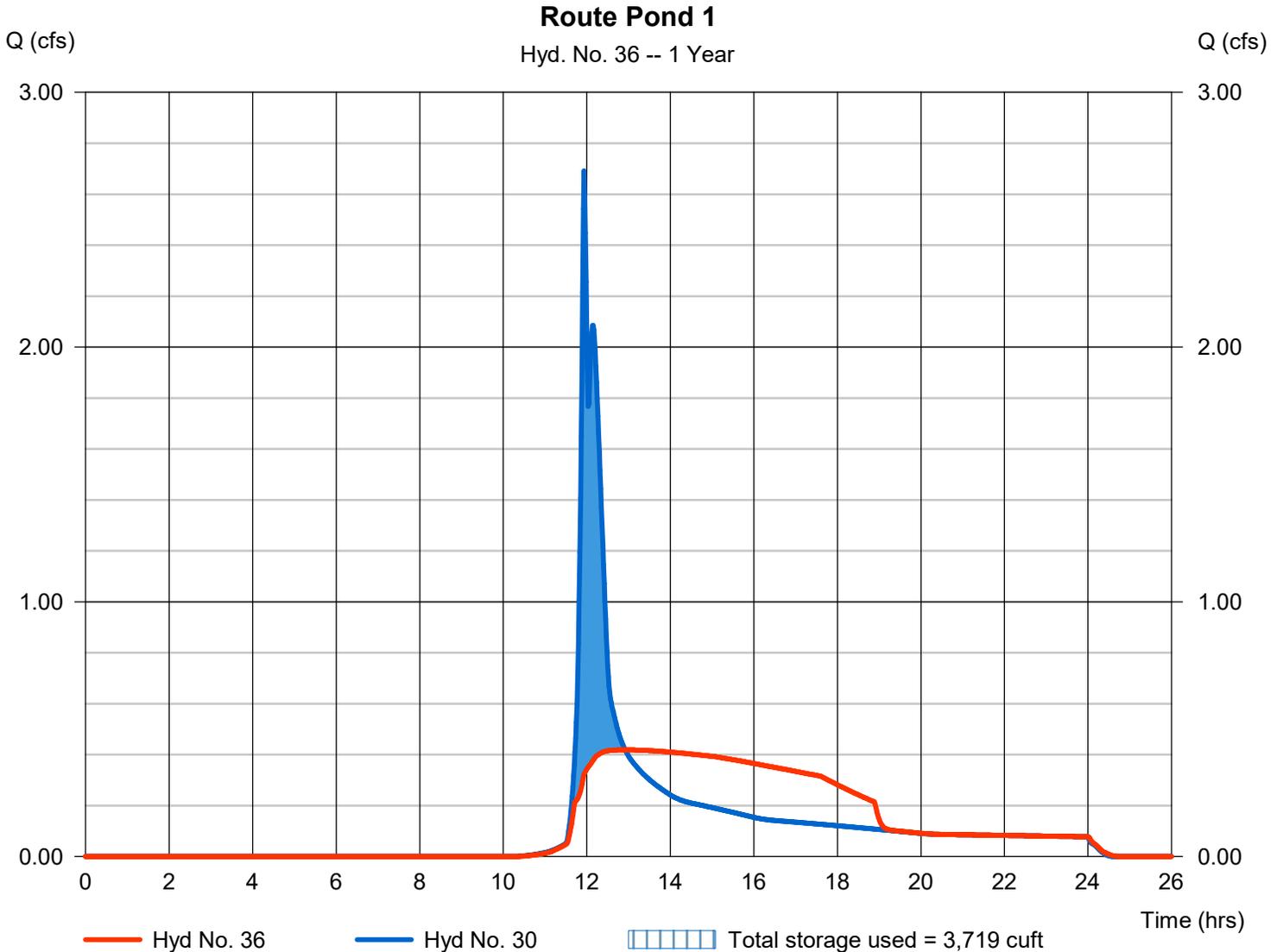
Monday, 06 / 29 / 2020

Hyd. No. 36

Route Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 0.419 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.92 hrs
Time interval	= 1 min	Hyd. volume	= 11,077 cuft
Inflow hyd. No.	= 30 - Post B7 and B9 to Pond 1	Max. Elevation	= 2002.40 ft
Reservoir name	= Pond 1	Max. Storage	= 3,719 cuft

Storage Indication method used.



Pond No. 1 - Pond 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1999.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1999.00	00	0	0
1.00	2000.00	167	56	56
2.00	2001.00	1,380	676	731
3.00	2002.00	2,375	1,855	2,586
4.00	2003.00	3,350	2,848	5,435
5.00	2004.00	4,500	3,910	9,345
6.00	2005.00	5,900	5,184	14,529
7.00	2006.00	7,600	6,731	21,260

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	3.00	0.00	0.00
Span (in)	= 24.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1999.00	1999.00	0.00	0.00
Length (ft)	= 80.00	0.50	0.00	0.00
Slope (%)	= 6.88	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	Inactive	0.00	0.00
Crest El. (ft)	= 2003.50	2006.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
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	Civ A cfs	Civ B cfs	Civ 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	1999.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	56	2000.00	0.22 ic	0.21 ic	---	---	0.00	0.00	---	---	---	---	0.214
2.00	731	2001.00	0.32 ic	0.32 ic	---	---	0.00	0.00	---	---	---	---	0.315
3.00	2,586	2002.00	0.41 ic	0.39 ic	---	---	0.00	0.00	---	---	---	---	0.392
4.00	5,435	2003.00	0.48 ic	0.46 ic	---	---	0.00	0.00	---	---	---	---	0.456
5.00	9,345	2004.00	18.85 ic	0.37 ic	---	---	18.48	0.00	---	---	---	---	18.85
6.00	14,529	2005.00	33.60 ic	0.06 ic	---	---	33.53 s	0.00	---	---	---	---	33.59
7.00	21,260	2006.00	36.99 ic	0.03 ic	---	---	36.88 s	0.00	---	---	---	---	36.92

Hydrograph Report

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

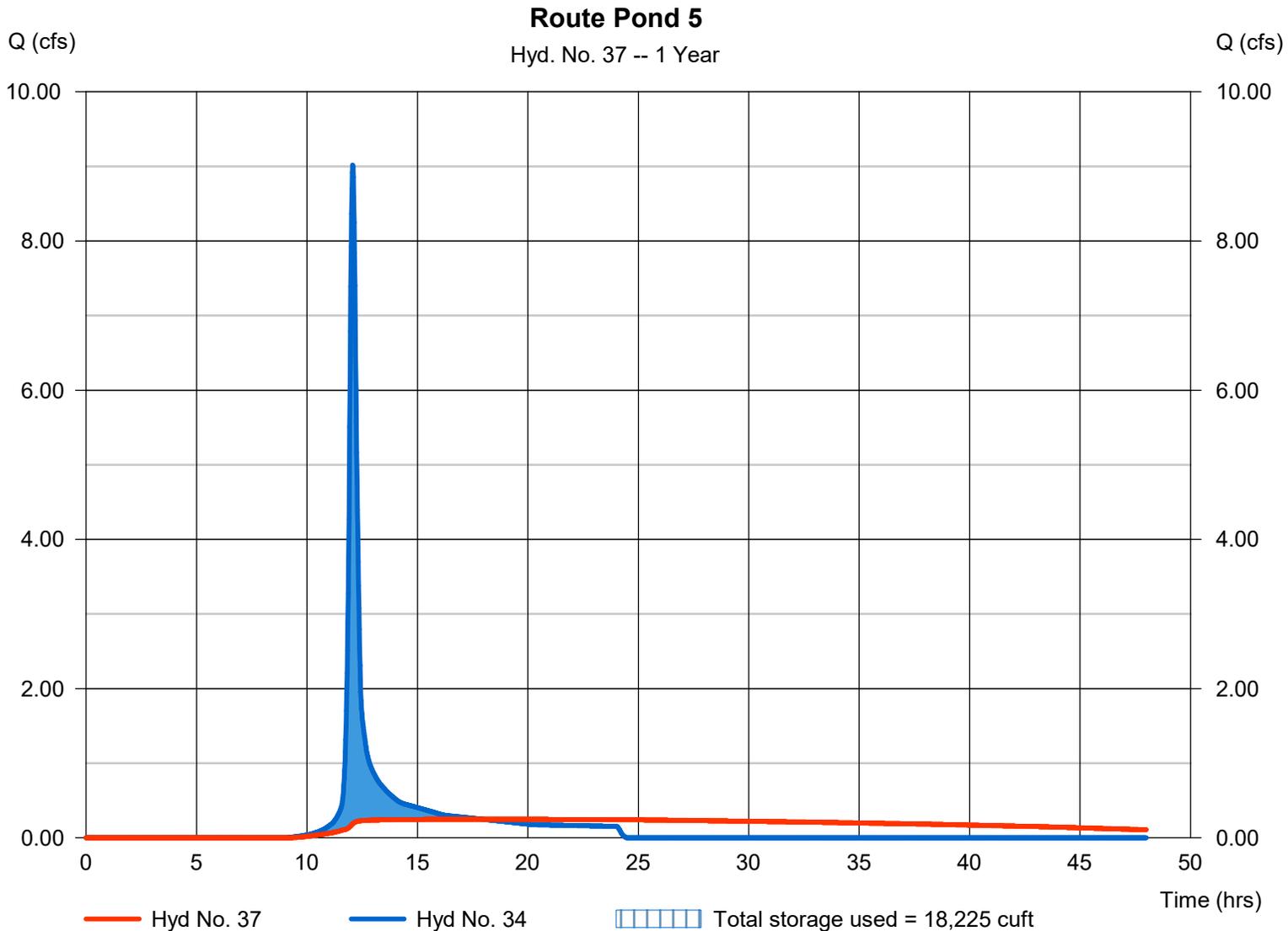
Monday, 06 / 29 / 2020

Hyd. No. 37

Route Pond 5

Hydrograph type	= Reservoir	Peak discharge	= 0.249 cfs
Storm frequency	= 1 yrs	Time to peak	= 17.95 hrs
Time interval	= 1 min	Hyd. volume	= 27,303 cuft
Inflow hyd. No.	= 34 - Flow to Pond 5	Max. Elevation	= 2004.60 ft
Reservoir name	= Pond 5	Max. Storage	= 18,225 cuft

Storage Indication method used.



Pond No. 5 - Pond 5

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1999.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1999.00	00	0	0
1.00	2000.00	1,900	633	633
2.00	2001.00	2,600	2,241	2,874
3.00	2002.00	3,400	2,991	5,865
4.00	2003.00	4,400	3,889	9,754
5.00	2004.00	5,400	4,891	14,645
6.00	2005.00	6,500	5,941	20,585
7.00	2006.00	7,600	7,042	27,628

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	0.00	0.00
Span (in)	= 24.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1997.00	1997.00	0.00	0.00
Length (ft)	= 88.00	0.50	0.00	0.00
Slope (%)	= 1.70	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	Inactive	0.00	0.00
Crest El. (ft)	= 2005.00	2006.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
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	Civ A cfs	Civ B cfs	Civ 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	1999.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	633	2000.00	15.12 ic	0.11 ic	---	---	0.00	0.00	---	---	---	---	0.105
2.00	2,874	2001.00	15.12 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.149
3.00	5,865	2002.00	15.12 ic	0.18 ic	---	---	0.00	0.00	---	---	---	---	0.182
4.00	9,754	2003.00	15.12 ic	0.21 ic	---	---	0.00	0.00	---	---	---	---	0.210
5.00	14,645	2004.00	15.12 ic	0.23 ic	---	---	0.00	0.00	---	---	---	---	0.235
6.00	20,585	2005.00	15.12 ic	0.26 ic	---	---	0.00	0.00	---	---	---	---	0.257
7.00	27,628	2006.00	41.66 ic	0.07 ic	---	---	41.59 s	0.00	---	---	---	---	41.66

Hydrograph Report

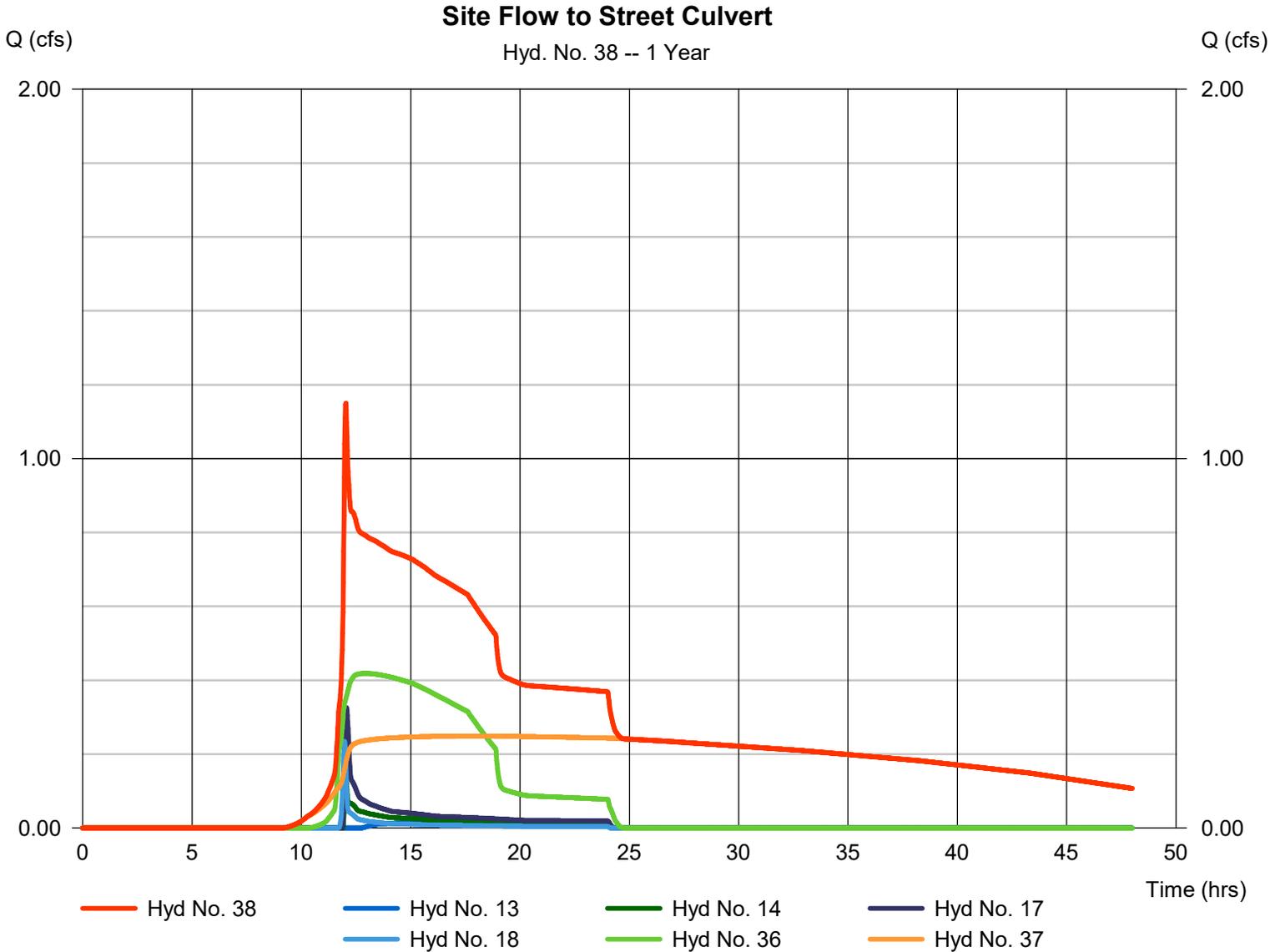
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 38

Site Flow to Street Culvert

Hydrograph type	= Combine	Peak discharge	= 1.150 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 42,121 cuft
Inflow hyds.	= 13, 14, 17, 18, 36, 37	Contrib. drain. area	= 8.450 ac



Hydrograph Report

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

Monday, 06 / 29 / 2020

Hyd. No. 39

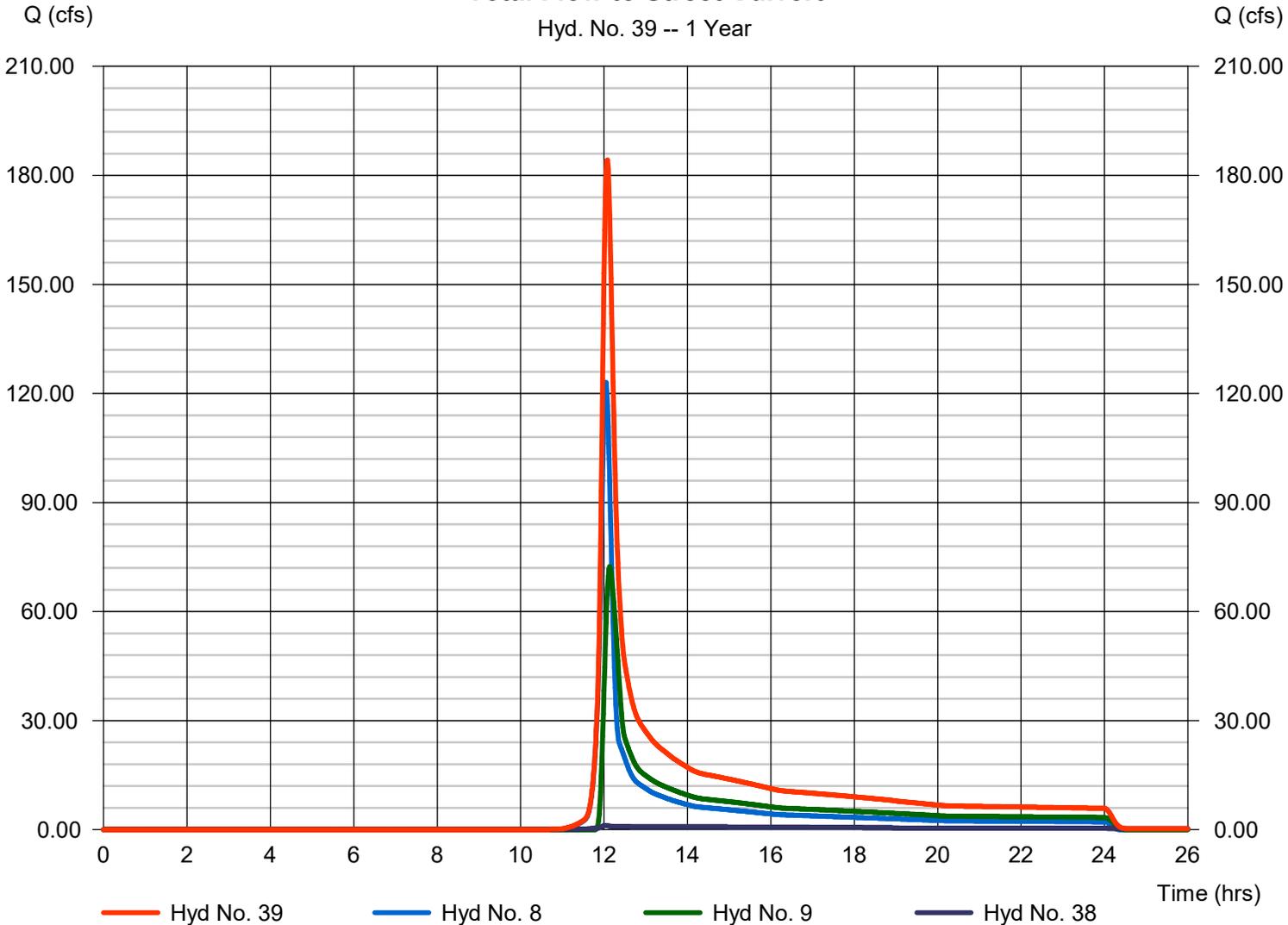
Total Flow to Street Culvert

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 8, 9, 38

Peak discharge = 184.25 cfs
Time to peak = 12.08 hrs
Hyd. volume = 744,238 cuft
Contrib. drain. area = 461.330 ac

Total Flow to Street Culvert

Hyd. No. 39 -- 1 Year



Hydrograph Report

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

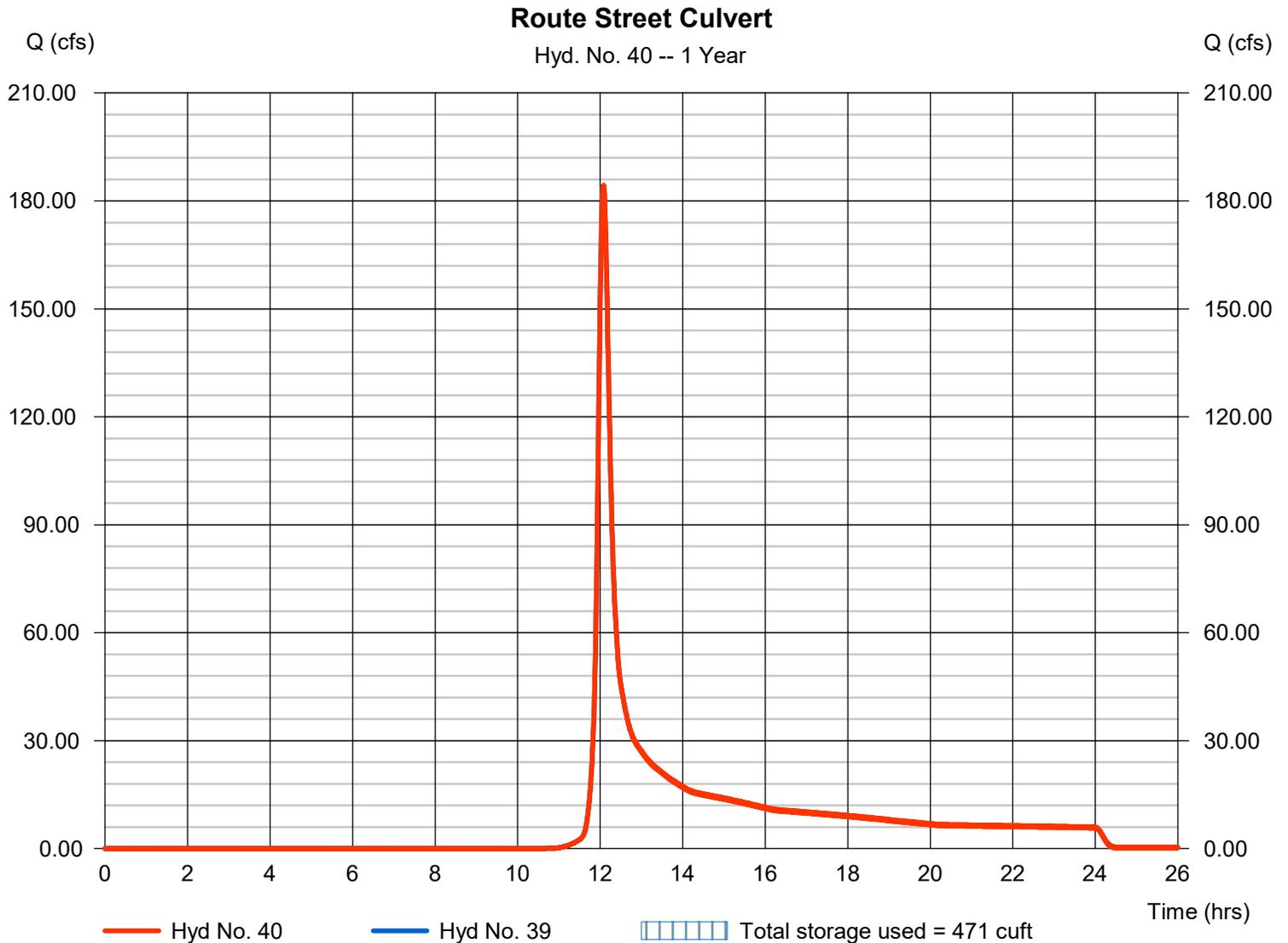
Monday, 06 / 29 / 2020

Hyd. No. 40

Route Street Culvert

Hydrograph type	= Reservoir	Peak discharge	= 184.27 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 744,238 cuft
Inflow hyd. No.	= 39 - Total Flow to Street Culvert	Max. Elevation	= 1985.27 ft
Reservoir name	= Street Culvert Pond	Max. Storage	= 471 cuft

Storage Indication method used.



Pond No. 6 - Street Culvert Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1983.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1983.00	00	0	0
1.00	1984.00	01	0	0
2.00	1985.00	405	142	142
3.00	1986.00	2,300	1,223	1,366
4.00	1987.00	4,630	3,397	4,763
5.00	1988.00	7,275	5,902	10,665
6.00	1989.00	10,469	8,823	19,488
7.00	1990.00	14,950	12,642	32,130
8.00	1991.00	22,760	18,717	50,847
9.00	1992.00	31,310	26,919	77,766
10.00	1993.00	42,750	36,878	114,644
11.00	1994.00	54,625	48,562	163,206
12.00	1995.00	63,675	59,086	222,292
13.00	1996.00	75,690	69,589	291,881
14.00	1997.00	91,375	83,401	375,282
15.00	1998.00	104,570	97,889	473,171
16.00	1999.00	117,250	110,838	584,009
17.00	2000.00	134,055	125,546	709,555
18.00	2001.00	145,000	139,478	849,033

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 96.00	0.00	0.00	0.00
Span (in)	= 95.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 1983.00	0.00	0.00	0.00
Length (ft)	= 218.40	0.00	0.00	0.00
Slope (%)	= 1.49	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	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 100.00	0.00	0.00	0.00
Crest El. (ft)	= 2007.78	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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	1983.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.00	0	1984.00	53.91 ic	---	---	---	0.00	---	---	---	---	---	53.91
2.00	142	1985.00	152.47 ic	---	---	---	0.00	---	---	---	---	---	152.47
3.00	1,366	1986.00	280.11 ic	---	---	---	0.00	---	---	---	---	---	280.11
4.00	4,763	1987.00	431.26 ic	---	---	---	0.00	---	---	---	---	---	431.26
5.00	10,665	1988.00	602.71 ic	---	---	---	0.00	---	---	---	---	---	602.71
6.00	19,488	1989.00	792.28 ic	---	---	---	0.00	---	---	---	---	---	792.28
7.00	32,130	1990.00	998.39 ic	---	---	---	0.00	---	---	---	---	---	998.39
8.00	50,847	1991.00	1219.79 ic	---	---	---	0.00	---	---	---	---	---	1219.79
9.00	77,766	1992.00	1363.77 ic	---	---	---	0.00	---	---	---	---	---	1363.77
10.00	114,644	1993.00	1493.94 ic	---	---	---	0.00	---	---	---	---	---	1493.94
11.00	163,206	1994.00	1613.64 ic	---	---	---	0.00	---	---	---	---	---	1613.64
12.00	222,292	1995.00	1725.05 ic	---	---	---	0.00	---	---	---	---	---	1725.05
13.00	291,881	1996.00	1829.69 ic	---	---	---	0.00	---	---	---	---	---	1829.69
14.00	375,282	1997.00	1928.66 ic	---	---	---	0.00	---	---	---	---	---	1928.66
15.00	473,171	1998.00	2022.80 ic	---	---	---	0.00	---	---	---	---	---	2022.80
16.00	584,009	1999.00	2112.75 ic	---	---	---	0.00	---	---	---	---	---	2112.75
17.00	709,555	2000.00	2199.01 ic	---	---	---	0.00	---	---	---	---	---	2199.01
18.00	849,033	2001.00	2282.03 ic	---	---	---	0.00	---	---	---	---	---	2282.03

Hydrograph Report

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

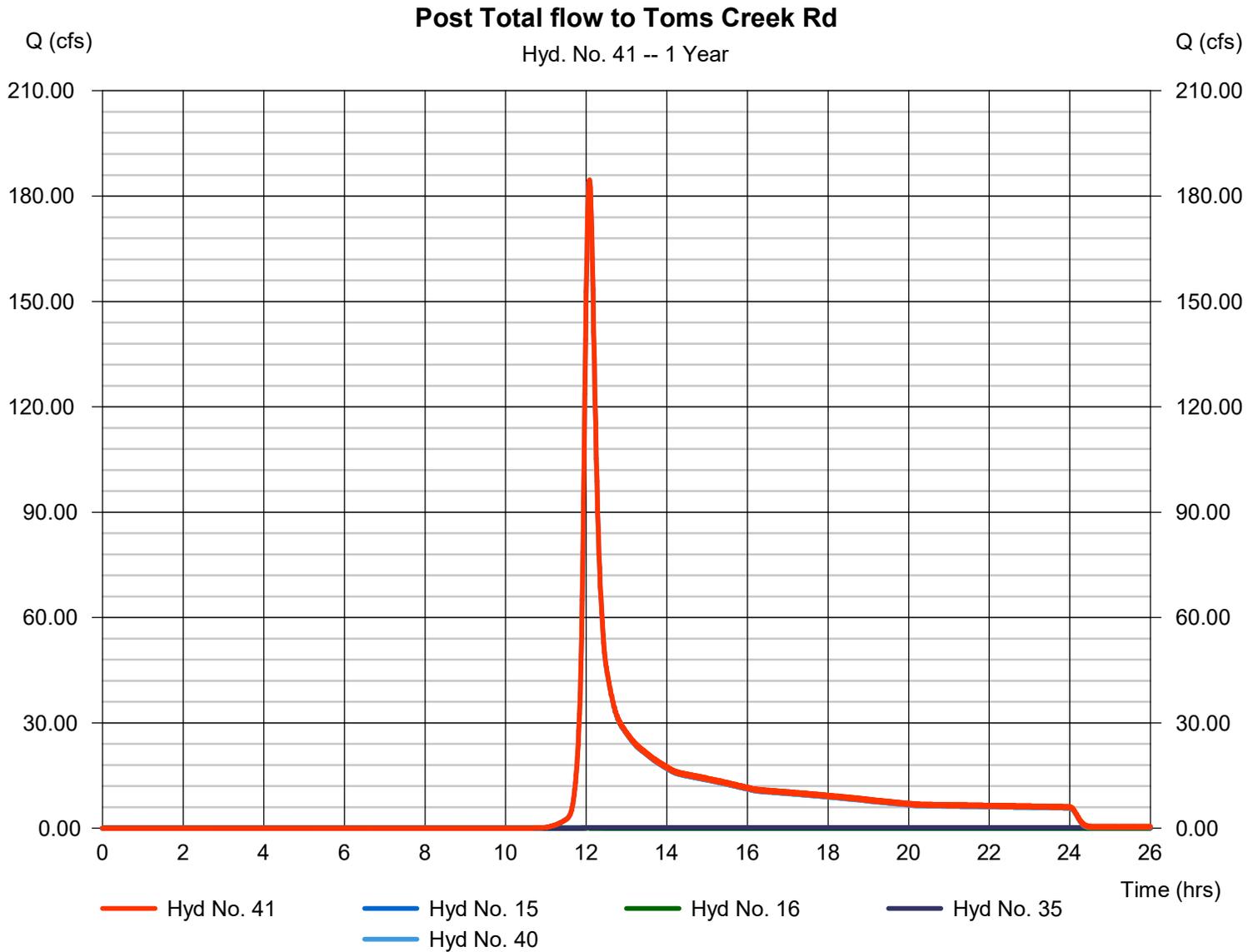
Monday, 06 / 29 / 2020

Hyd. No. 41

Post Total flow to Toms Creek Rd

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 15, 16, 35, 40

Peak discharge = 184.58 cfs
Time to peak = 12.08 hrs
Hyd. volume = 755,798 cuft
Contrib. drain. area = 2.220 ac



Hydrograph Report

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

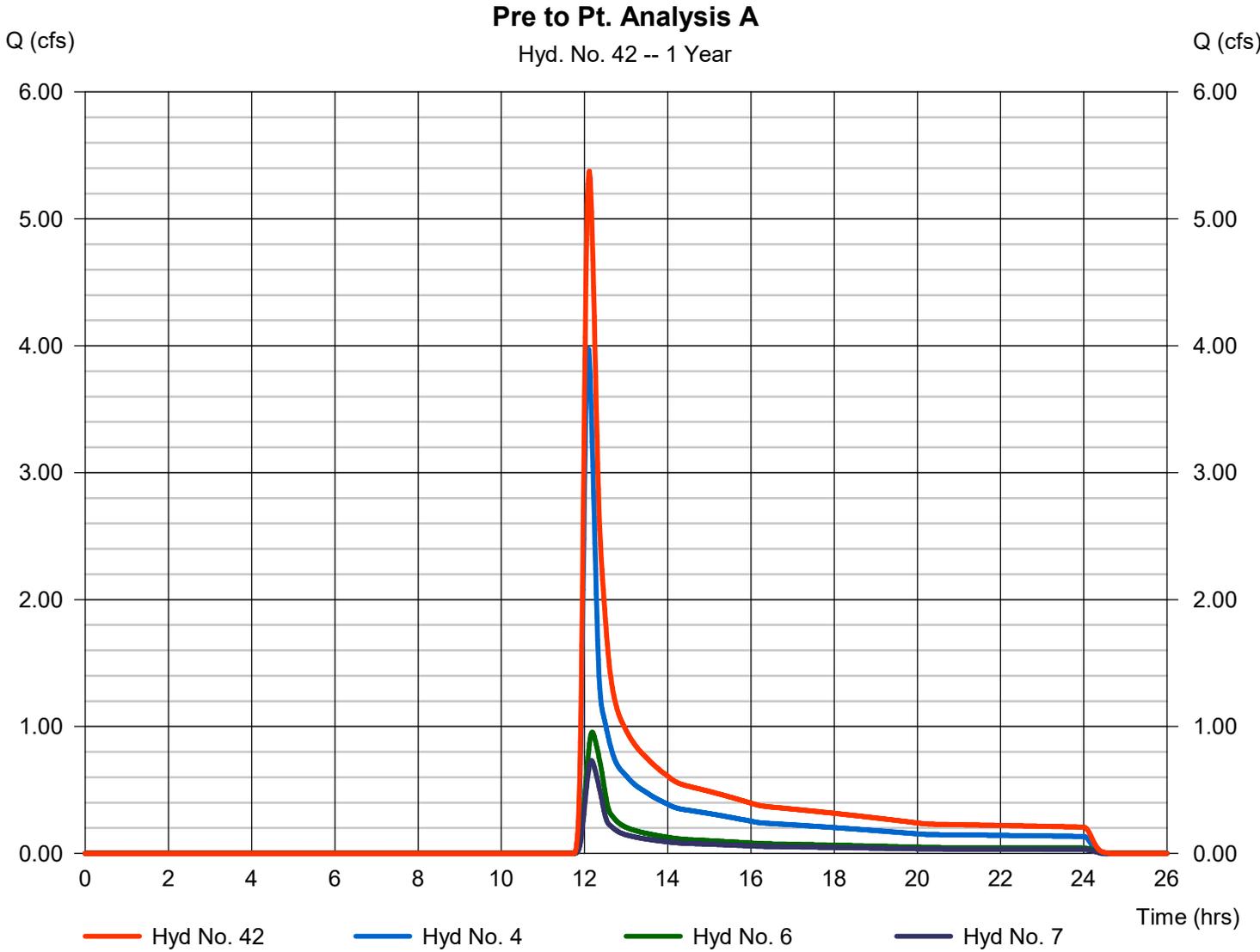
Monday, 06 / 29 / 2020

Hyd. No. 42

Pre to Pt. Analysis A

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 4, 6, 7

Peak discharge = 5.376 cfs
Time to peak = 12.12 hrs
Hyd. volume = 24,001 cuft
Contrib. drain. area = 18.490 ac



Hydrograph Report

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

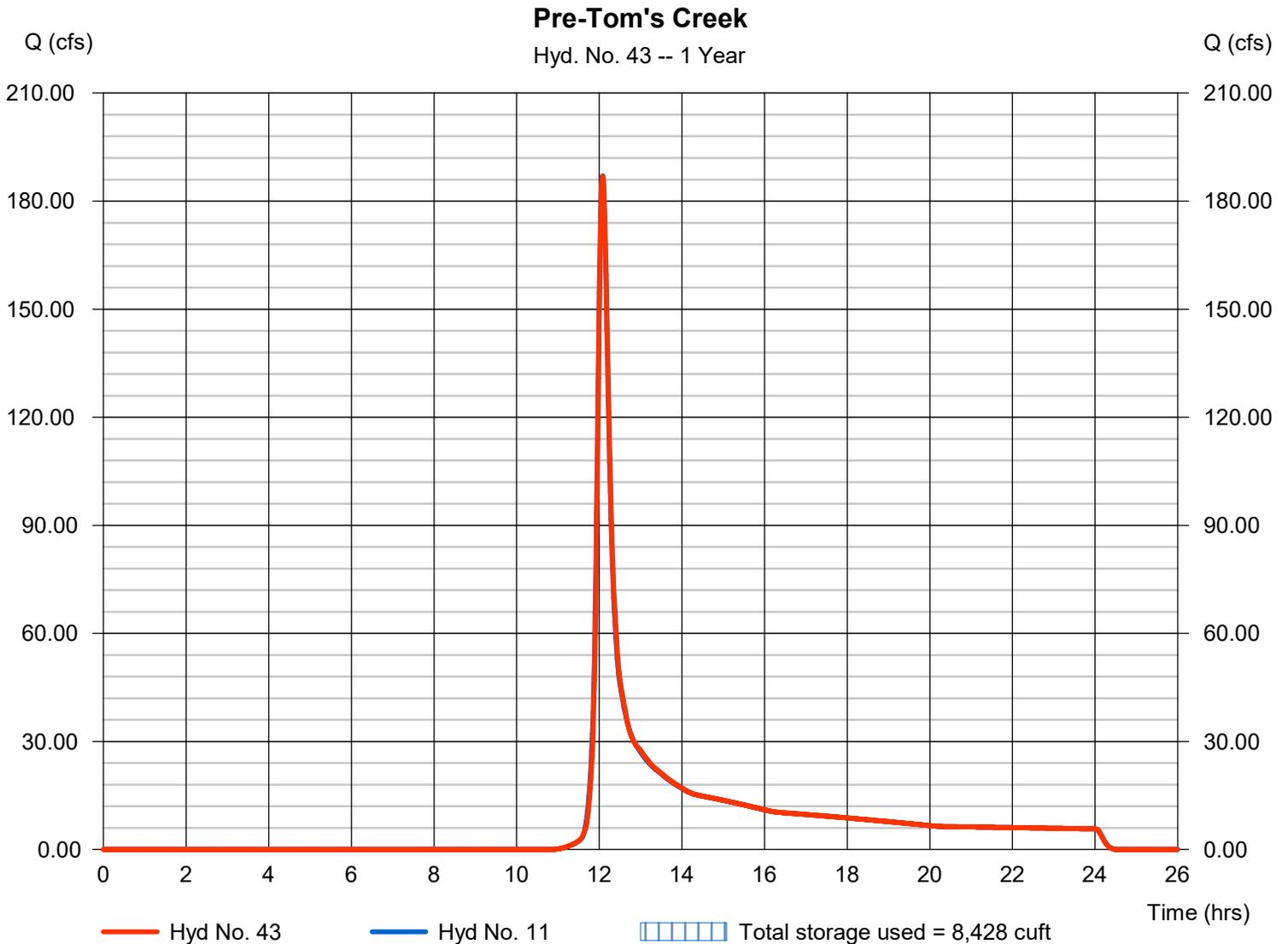
Monday, 06 / 29 / 2020

Hyd. No. 43

Pre-Tom's Creek

Hydrograph type	= Reservoir	Peak discharge	= 186.84 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 722,822 cuft
Inflow hyd. No.	= 11 - PreDev Flow - Toms Creek	Max Elevation	= 1978.65 ft
Reservoir name	= PreDevCondition	Max. Storage	= 8,428 cuft

Storage Indication method used.



Pond No. 11 - PreDevCondition

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1975.10 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1975.10	00	0	0
0.90	1976.00	83	25	25
2.90	1978.00	2,686	2,161	2,185
4.90	1980.00	19,181	19,361	21,547
6.90	1982.00	36,979	55,190	76,736
8.90	1984.00	57,331	93,560	170,296
10.90	1986.00	78,620	135,378	305,675
12.90	1988.00	97,681	175,939	481,613
14.90	1990.00	115,925	213,324	694,938

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1975.10	0.00	0.00	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 4.78	0.00	0.00	n/a
N-Value	= .020	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 90.00	0.00	0.00	0.00
Crest El. (ft)	= 1977.90	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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	Civ A cfs	Civ B cfs	Civ 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	1975.10	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.90	25	1976.00	5.15 ic	---	---	---	0.00	---	---	---	---	---	5.149
2.90	2,185	1978.00	30.36 ic	---	---	---	7.40	---	---	---	---	---	37.75
4.90	21,547	1980.00	45.15 ic	---	---	---	712.09	---	---	---	---	---	757.24
6.90	76,736	1982.00	56.17 ic	---	---	---	1942.62	---	---	---	---	---	1998.79
8.90	170,296	1984.00	65.36 ic	---	---	---	3525.40	---	---	---	---	---	3590.76
10.90	305,675	1986.00	73.41 ic	---	---	---	5394.38	---	---	---	---	---	5467.79
12.90	481,613	1988.00	80.66 ic	---	---	---	7510.98	---	---	---	---	---	7591.64
14.90	694,938	1990.00	87.31 ic	---	---	---	9849.01	---	---	---	---	---	9936.32

Hydrograph Report

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

Monday, 06 / 29 / 2020

Hyd. No. 44

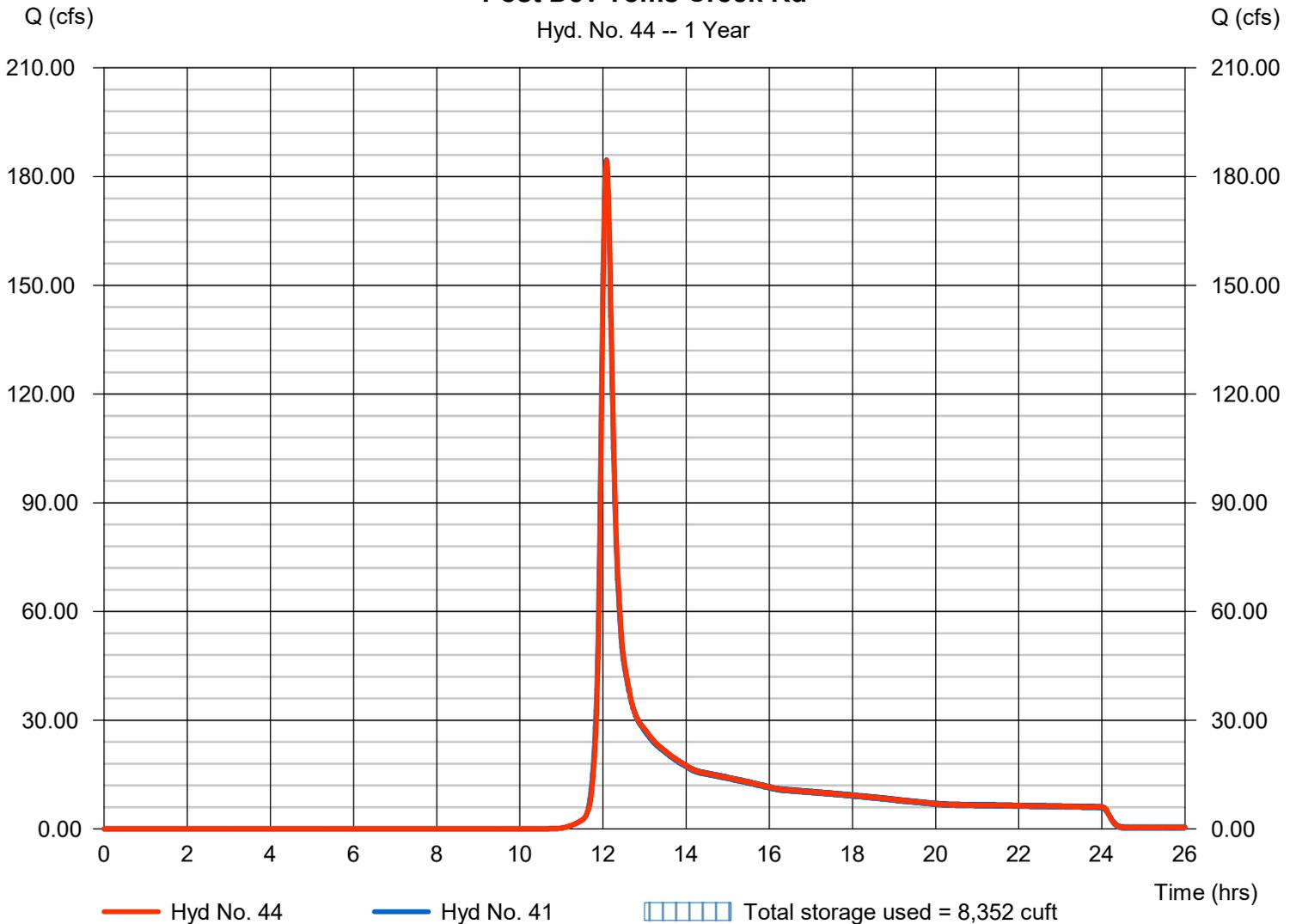
Post Dev Toms Creek Rd

Hydrograph type	= Reservoir	Peak discharge	= 184.34 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 755,795 cuft
Inflow hyd. No.	= 41 - Post Total flow to Toms Creek Rd	Max. Elevation	= 1978.64 ft
Reservoir name	= PreDevCondition	Max. Storage	= 8,352 cuft

Storage Indication method used.

Post Dev Toms Creek Rd

Hyd. No. 44 -- 1 Year



Pond No. 11 - PreDevCondition

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1975.10 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1975.10	00	0	0
0.90	1976.00	83	25	25
2.90	1978.00	2,686	2,161	2,185
4.90	1980.00	19,181	19,361	21,547
6.90	1982.00	36,979	55,190	76,736
8.90	1984.00	57,331	93,560	170,296
10.90	1986.00	78,620	135,378	305,675
12.90	1988.00	97,681	175,939	481,613
14.90	1990.00	115,925	213,324	694,938

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1975.10	0.00	0.00	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 4.78	0.00	0.00	n/a
N-Value	= .020	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 90.00	0.00	0.00	0.00
Crest El. (ft)	= 1977.90	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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	Civ A cfs	Civ B cfs	Civ 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	1975.10	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.90	25	1976.00	5.15 ic	---	---	---	0.00	---	---	---	---	---	5.149
2.90	2,185	1978.00	30.36 ic	---	---	---	7.40	---	---	---	---	---	37.75
4.90	21,547	1980.00	45.15 ic	---	---	---	712.09	---	---	---	---	---	757.24
6.90	76,736	1982.00	56.17 ic	---	---	---	1942.62	---	---	---	---	---	1998.79
8.90	170,296	1984.00	65.36 ic	---	---	---	3525.40	---	---	---	---	---	3590.76
10.90	305,675	1986.00	73.41 ic	---	---	---	5394.38	---	---	---	---	---	5467.79
12.90	481,613	1988.00	80.66 ic	---	---	---	7510.98	---	---	---	---	---	7591.64
14.90	694,938	1990.00	87.31 ic	---	---	---	9849.01	---	---	---	---	---	9936.32

Hydrograph Report

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

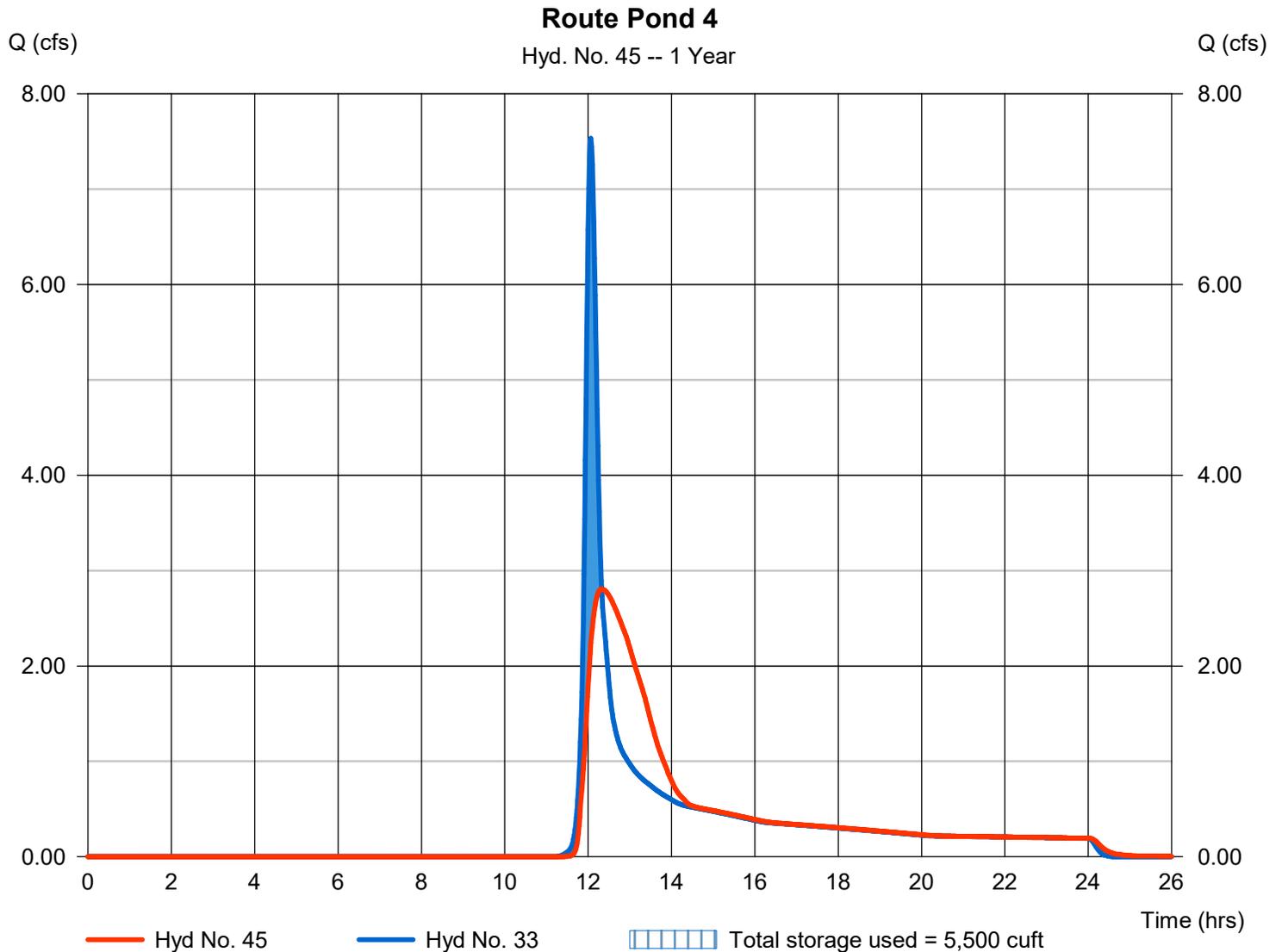
Monday, 06 / 29 / 2020

Hyd. No. 45

Route Pond 4

Hydrograph type	= Reservoir	Peak discharge	= 2.806 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.33 hrs
Time interval	= 1 min	Hyd. volume	= 26,553 cuft
Inflow hyd. No.	= 33 - Flow to Pond 4	Max. Elevation	= 2028.98 ft
Reservoir name	= Pond 4	Max. Storage	= 5,500 cuft

Storage Indication method used.



Pond No. 4 - Pond 4

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2025.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2025.50	300	0	0
0.50	2026.00	1,000	308	308
1.50	2027.00	1,500	1,241	1,549
2.50	2028.00	2,000	1,744	3,293
3.50	2029.00	2,500	2,245	5,538
4.50	2030.00	3,800	3,127	8,665
5.50	2031.00	4,500	4,145	12,810
6.50	2032.00	5,000	4,747	17,557
7.50	2033.00	6,500	5,733	23,290
8.50	2034.00	8,000	7,236	30,527

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	8.00	Inactive	0.00
Span (in)	= 24.00	8.00	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 2025.50	2025.50	2029.00	0.00
Length (ft)	= 60.00	0.50	0.50	0.00
Slope (%)	= 3.75	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	10.00	0.00	0.00
Crest El. (ft)	= 2030.50	2032.50	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	Yes	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	Civ A cfs	Civ B cfs	Civ 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	2025.50	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.50	308	2026.00	0.60 ic	0.60 ic	0.00	---	0.00	0.00	---	---	---	---	0.599
1.50	1,549	2027.00	1.66 ic	1.66 ic	0.00	---	0.00	0.00	---	---	---	---	1.657
2.50	3,293	2028.00	2.30 ic	2.30 ic	0.00	---	0.00	0.00	---	---	---	---	2.299
3.50	5,538	2029.00	2.81 ic	2.81 ic	0.00	---	0.00	0.00	---	---	---	---	2.814
4.50	8,665	2030.00	3.27 ic	3.25 ic	0.00	---	0.00	0.00	---	---	---	---	3.254
5.50	12,810	2031.00	21.16 ic	2.68 ic	0.00	---	18.48	0.00	---	---	---	---	21.16
6.50	17,557	2032.00	35.24 ic	0.45 ic	0.00	---	34.78 s	0.00	---	---	---	---	35.23
7.50	23,290	2033.00	38.51 ic	0.22 ic	0.00	---	35.37 s	2.92 s	---	---	---	---	38.50
8.50	30,527	2034.00	41.40 ic	0.13 ic	0.00	---	34.54 s	6.68 s	---	---	---	---	41.34

Hydrograph Report

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

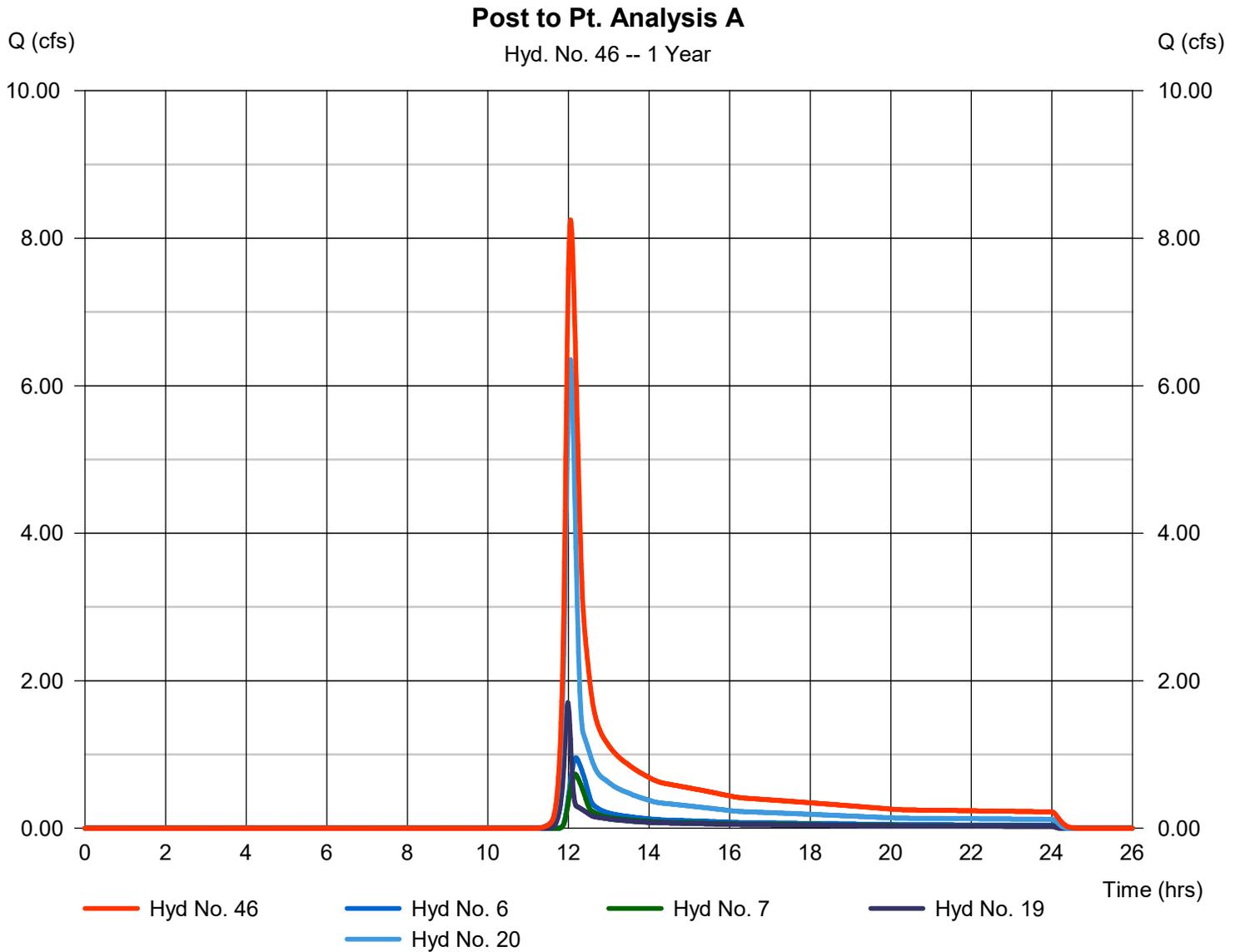
Monday, 06 / 29 / 2020

Hyd. No. 46

Post to Pt. Analysis A

Hydrograph type = Combine
Storm frequency = 1 yrs
Time interval = 1 min
Inflow hyds. = 6, 7, 19, 20

Peak discharge = 8.247 cfs
Time to peak = 12.05 hrs
Hyd. volume = 30,583 cuft
Contrib. drain. area = 16.150 ac



Hydrograph Report

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

Monday, 06 / 29 / 2020

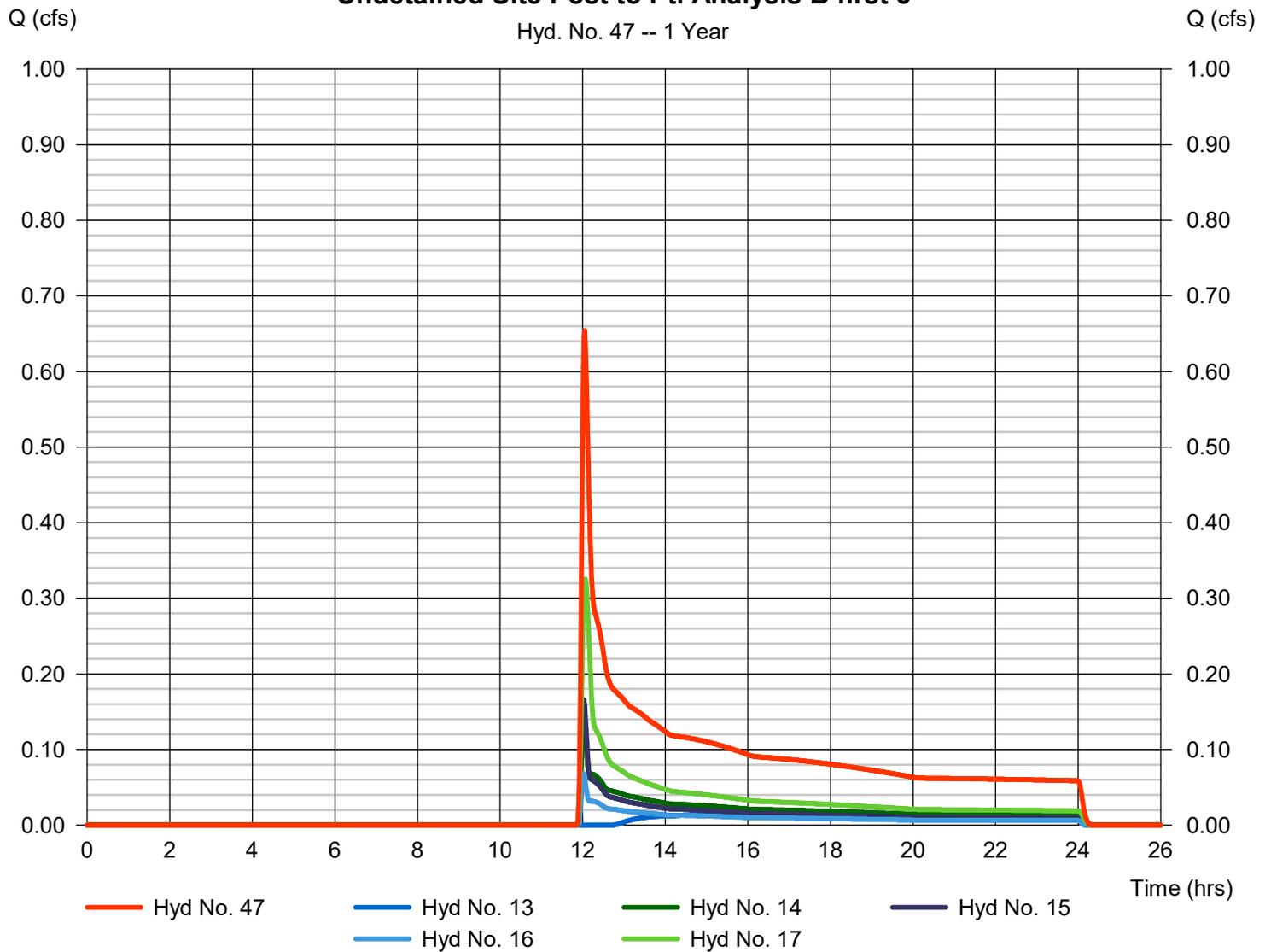
Hyd. No. 47

Undetained Site Post to Pt. Analysis B first 5

Hydrograph type	= Combine	Peak discharge	= 0.654 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 4,441 cuft
Inflow hyds.	= 13, 14, 15, 16, 17	Contrib. drain. area	= 10.330 ac

Undetained Site Post to Pt. Analysis B first 5

Hyd. No. 47 -- 1 Year



Hydrograph Report

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

Monday, 06 / 29 / 2020

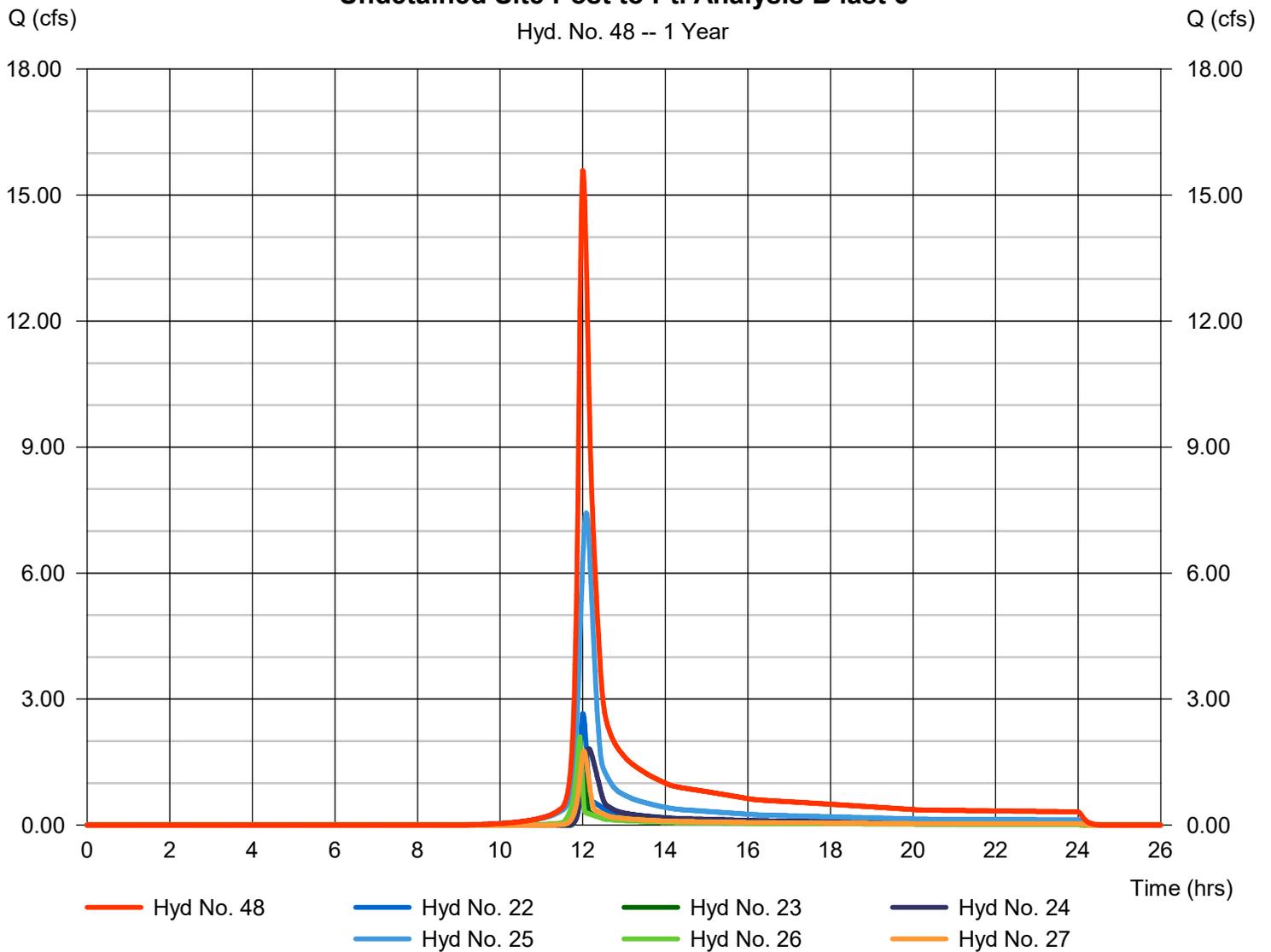
Hyd. No. 48

Undetained Site Post to Pt. Analysis B last 6

Hydrograph type	= Combine	Peak discharge	= 15.59 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 49,845 cuft
Inflow hyds.	= 22, 23, 24, 25, 26, 27	Contrib. drain. area	= 20.380 ac

Undetained Site Post to Pt. Analysis B last 6

Hyd. No. 48 -- 1 Year



Hydrograph Report

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

Monday, 06 / 29 / 2020

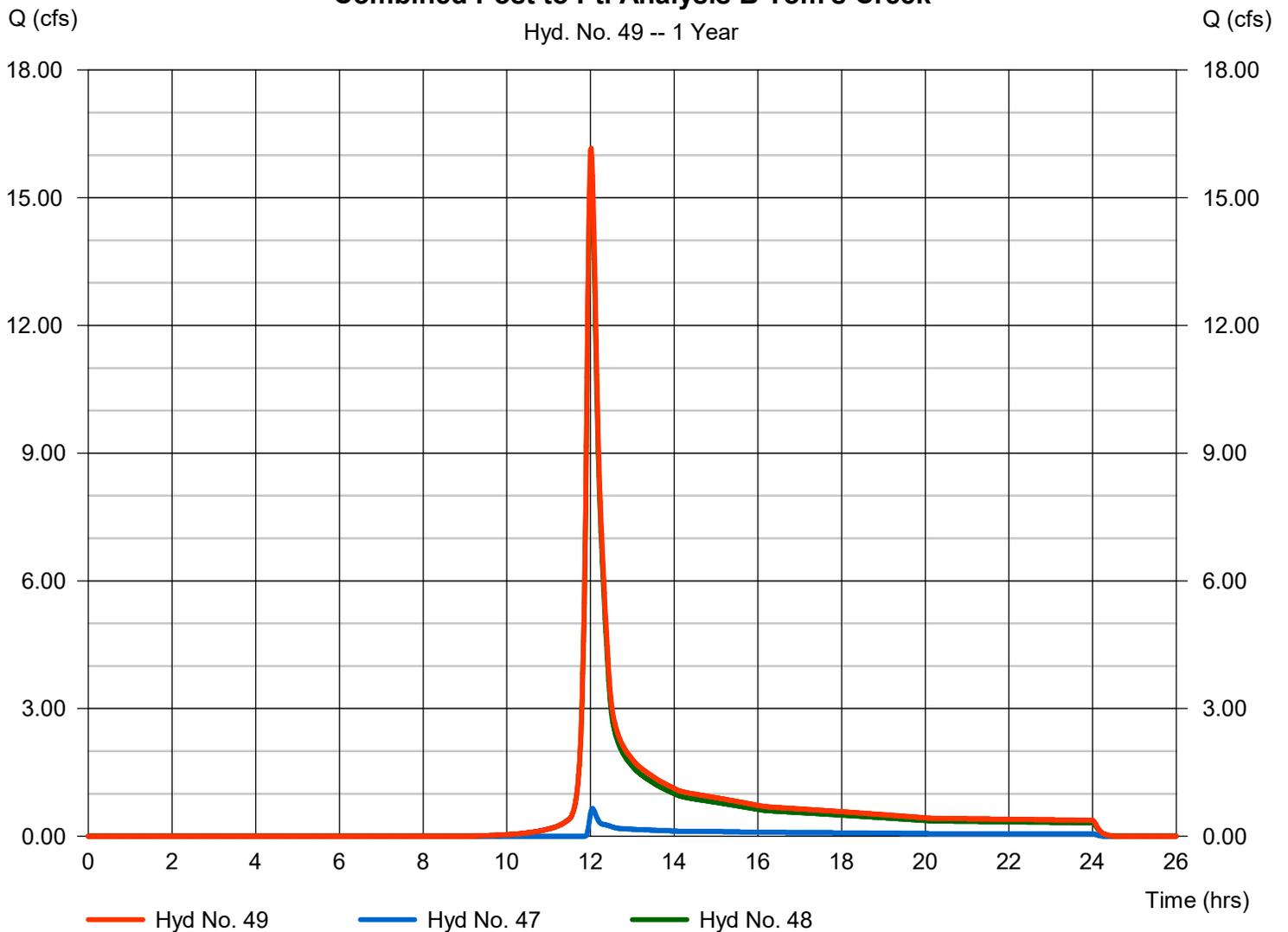
Hyd. No. 49

Combined Post to Pt. Analysis B Tom's Creek

Hydrograph type	= Combine	Peak discharge	= 16.16 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 54,286 cuft
Inflow hyds.	= 47, 48	Contrib. drain. area	= 0.000 ac

Combined Post to Pt. Analysis B Tom's Creek

Hyd. No. 49 -- 1 Year



Hydraflow Rainfall Report

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

Monday, 06 / 29 / 2020

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	0.0000	0.0000	0.0000	-----
3	0.0000	0.0000	0.0000	-----
5	0.0000	0.0000	0.0000	-----
10	0.0000	0.0000	0.0000	-----
25	0.0000	0.0000	0.0000	-----
50	0.0000	0.0000	0.0000	-----
100	0.0000	0.0000	0.0000	-----

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)												
	5 min	10	15	20	25	30	35	40	45	50	55	60	
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Tc = time in minutes. Values may exceed 60.

File name: C:\Users\DanielleBishop\Dropbox\E&A\Jim Lucas Projects\Toms Creek\Design\Stormwater\Precipitation Data.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.28	2.76	0.00	3.51	4.11	4.99	5.73	6.53
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	118.00	0.00	0.00

Watershed Model Schematic..... 1

1 - Year

Summary Report.....	2
Hydrograph Reports.....	4
Hydrograph No. 1, SCS Runoff, Pre DA 1 Site.....	4
Hydrograph No. 2, SCS Runoff, Pre DA2 Site.....	5
Hydrograph No. 3, SCS Runoff, Pre DA3 Site.....	6
Hydrograph No. 4, SCS Runoff, Pre DA4 Site.....	7
Hydrograph No. 5, SCS Runoff, Pre DA5 Site.....	8
Hydrograph No. 6, SCS Runoff, Pre DA4 Upland.....	9
Hydrograph No. 7, SCS Runoff, A5 Upland.....	10
Hydrograph No. 8, SCS Runoff, Pre DA1 Upstream.....	11
Hydrograph No. 9, SCS Runoff, Pre DA2 Upstream.....	12
Hydrograph No. 10, Combine, Pre DA1 Upstream, Pre DA 2 Upstream.....	13
Hydrograph No. 11, Combine, PreDev Flow - Toms Creek Rd.....	14
Hydrograph No. 12, Combine, Site Pre Dev to Pt Analysis B Toms' Creek.....	15
Hydrograph No. 13, SCS Runoff, Post B1-1.....	16
Hydrograph No. 14, SCS Runoff, Post B1-2.....	17
Hydrograph No. 15, SCS Runoff, Post B1-3.....	18
Hydrograph No. 16, SCS Runoff, Post B2-1.....	19
Hydrograph No. 17, SCS Runoff, Post B2-2.....	20
Hydrograph No. 18, SCS Runoff, Post B3.....	21
Hydrograph No. 19, SCS Runoff, Post B4-1.....	22
Hydrograph No. 20, SCS Runoff, Post B4-2.....	23
Hydrograph No. 21, SCS Runoff, Post B5.....	24
Hydrograph No. 22, SCS Runoff, Post B6-1.....	25
Hydrograph No. 23, SCS Runoff, Post B6-2.....	26
Hydrograph No. 24, SCS Runoff, Post B7.....	27
Hydrograph No. 25, SCS Runoff, Post B8-1.....	28
Hydrograph No. 26, SCS Runoff, Post B9.....	29
Hydrograph No. 27, SCS Runoff, Post B8-2.....	30
Hydrograph No. 28, Combine, Post B4 Site Total.....	31
Hydrograph No. 29, Combine, Post D Portion to Toms Creek Rd.....	32
Hydrograph No. 30, Combine, Post B7 and B9 to Pond 1.....	33
Hydrograph No. 31, Combine, Total Post to Toms Creek Rd prior to Pond.....	34
Hydrograph No. 32, Combine, B61 and B62 to Pond 2.....	35
Hydrograph No. 33, Combine, Flow to Pond 4.....	36
Hydrograph No. 34, Combine, Flow to Pond 5.....	37
Hydrograph No. 35, Reservoir, Route Pond 2.....	38
Pond Report - Pond 2.....	39
Hydrograph No. 36, Reservoir, Route Pond 1.....	40
Pond Report - Pond 1.....	41
Hydrograph No. 37, Reservoir, Route Pond 5.....	42
Pond Report - Pond 5.....	43
Hydrograph No. 38, Combine, Site Flow to Street Culvert.....	44
Hydrograph No. 39, Combine, Total Flow to Street Culvert.....	45
Hydrograph No. 40, Reservoir, Route Street Culvert.....	46
Pond Report - Street Culvert Pond.....	47

Hydrograph No. 41, Combine, Post Total flow to Toms Creek Rd.....	48
Hydrograph No. 42, Combine, Pre to Pt. Analysis A.....	49
Hydrograph No. 43, Reservoir, Pre-Tom's Creek.....	50
Pond Report - PreDevCondition.....	51
Hydrograph No. 44, Reservoir, Post Dev Toms Creek Rd.....	52
Pond Report - PreDevCondition.....	53
Hydrograph No. 45, Reservoir, Route Pond 4.....	54
Pond Report - Pond 4.....	55
Hydrograph No. 46, Combine, Post to Pt. Analysis A.....	56
Hydrograph No. 47, Combine, Undetained Site Post to Pt. Analysis B first 5.....	57
Hydrograph No. 48, Combine, Undetained Site Post to Pt. Analysis B last 6.....	58
Hydrograph No. 49, Combine, Combined Post to Pt. Analysis B Tom's Creek.....	59
IDF Report.....	60

Energy Balance Calculations				
Pt. of Analysis A				
Pre-Developed Site Breakdown:				
Hydrograph 4				
	Pre 1-Yr Rate:	3.98	cfs	
	Pre 1-Yr Volume:	15,524	cf	
Post-Developed Site Breakdown:				
Hydrograph 46				
	Post 1-Yr Rate:	7.18	cfs	
	Post 1-Yr Volume:	22,106	cf	
Q1 Energy Balance: $Q_{allow} = 0.8 * \text{Pre 1-Yr Rate} * (\text{Pre 1-Yr Vol} / \text{Post 1-Yr Vol})$				
	Q1 Energy Balance Site Flow:	2.24	cfs	
	Uncontrolled Post B4-1:	1.70	cfs	
	Uncontrolled Post B5	0.06	cfs	
	Pond 4 allowable release for on-site 1-year	0.48	cfs	
	Reduction in Q1 storm to meet Energy Balance:	3.50	cfs reduction on actual 1-year to Pond A including offsite areas	
	Total Post Developed flow to Pond	7.25	cfs on site + offsite areas	
	Must reduce to	3.75	max cfs release from Pond 4	
	Pond 4 Release	2.8	cfs	

Energy Balance Calculations: Channel Erosion Regulation				
Point of Analysis B Flow to Toms Creek Rd				
Pre-Developed Site Breakdown:				
Hydrograph 12				
	Pre 1-Yr Rate:	3.87	cfs	
	Pre 1-Yr Volume:	20,705	cf	
Post-Developed Site Breakdown:				
Hydrograph 49				
	Post 1-Yr Rate:	16.16	cfs	
	Post 1-Yr Volume:	54,286	cf	
Q1 Energy Balance: $Q_{allow} = 0.8 * \text{Pre 1-Yr Rate} * (\text{Pre 1-Yr Vol} / \text{Post 1-Yr Vol})$				
	Q1 Energy Balance Site Flow:	1.18	cfs	
	Reduction in Q1 storm to meet Energy Balance:	2.69	cfs reduction	
Pre-Developed 1-Yr/24-Hr Total Flow to Toms Creek Road: 187.05 cfs				
Hydrograph 11 <u>-2.69</u> cfs				
Allowable Post Dev Total Flow to Achieve Energy Balance: 184.36 cfs				
Hydrograph 44 *184.34 cfs				
* model 1-yr post with routing to Pts analysis A and B Toms Creek 2020-06-29				

10-year Pre and Post Development Analysis

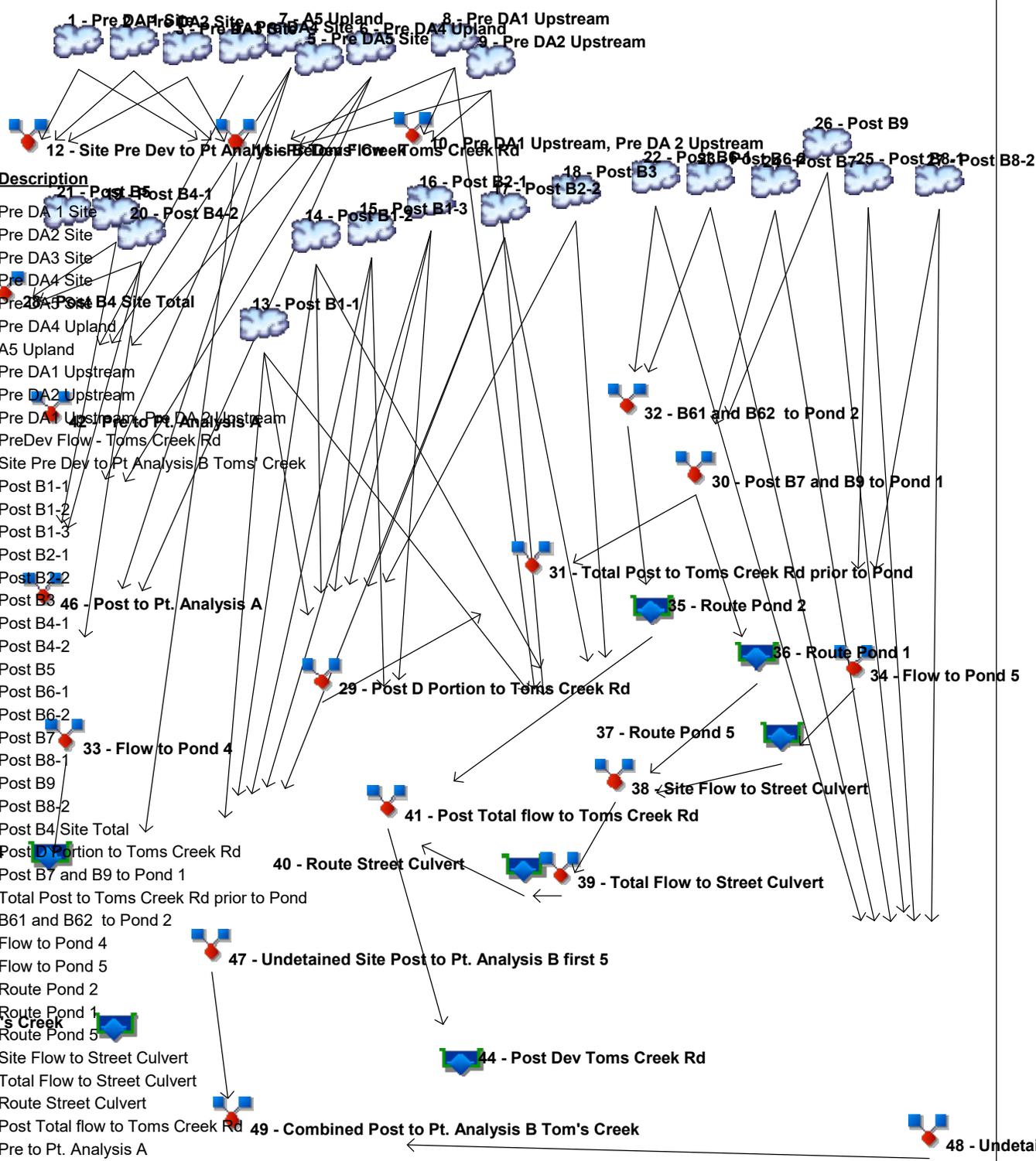
Watershed Model Schematic

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

Legend

Hyd. Origin

Hyd. Origin	Description
1	SCS Runoff Pre DA 1 Site
2	SCS Runoff Pre DA2 Site
3	SCS Runoff Pre DA3 Site
4	SCS Runoff Pre DA4 Site
5	SCS Runoff Pre DA5 Site
6	SCS Runoff Pre DA4 Upland
7	SCS Runoff A5 Upland
8	SCS Runoff Pre DA1 Upstream
9	SCS Runoff Pre DA2 Upstream
10	Combine Pre DA1 Upstream, Pre DA2 Upstream
11	Combine PreDev Flow - Toms Creek Rd
12	Combine Site Pre Dev to Pt Analysis B Toms Creek
13	SCS Runoff Post B1-1
14	SCS Runoff Post B1-2
15	SCS Runoff Post B1-3
16	SCS Runoff Post B2-1
17	SCS Runoff Post B2-2
18	SCS Runoff Post B3
19	SCS Runoff Post B4-1
20	SCS Runoff Post B4-2
21	SCS Runoff Post B5
22	SCS Runoff Post B6-1
23	SCS Runoff Post B6-2
24	SCS Runoff Post B7
25	SCS Runoff Post B8-1
26	SCS Runoff Post B9
27	SCS Runoff Post B8-2
28	Combine Post B4 Site Total
29	Combine Post D Portion to Toms Creek Rd
30	Combine Post B7 and B9 to Pond 1
31	Combine Total Post to Toms Creek Rd prior to Pond
32	Combine B61 and B62 to Pond 2
33	Combine Flow to Pond 4
34	Combine Flow to Pond 5
35	Reservoir Route Pond 2
36	Reservoir Route Pond 1
37	Reservoir Route Pond 5
38	Combine Site Flow to Street Culvert
39	Combine Total Flow to Street Culvert
40	Reservoir Route Street Culvert
41	Combine Post Total flow to Toms Creek Rd
42	Combine Pre to Pt. Analysis A
43	Reservoir Pre-Tom's Creek
44	Reservoir Post Dev Toms Creek Rd
45	Reservoir Route Pond 4
46	Combine Post to Pt. Analysis A
47	Combine Undetained Site Post to Pt. Analysis B first 5
48	Combine Undetained Site Post to Pt. Analysis B last 6
49	Combine Combined Post to Pt. Analysis B Tom's Creek



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.037	1	725	15,634	-----	-----	-----	Pre DA 1 Site
2	SCS Runoff	26.37	1	724	80,677	-----	-----	-----	Pre DA2 Site
3	SCS Runoff	3.769	1	721	9,283	-----	-----	-----	Pre DA3 Site
4	SCS Runoff	20.83	1	724	61,440	-----	-----	-----	Pre DA4 Site
5	SCS Runoff	0.211	1	721	519	-----	-----	-----	Pre DA5 Site
6	SCS Runoff	5.179	1	729	19,361	-----	-----	-----	Pre DA4 Upland
7	SCS Runoff	3.947	1	728	14,038	-----	-----	-----	A5 Upland
8	SCS Runoff	367.54	1	722	987,940	-----	-----	-----	Pre DA1 Upstream
9	SCS Runoff	466.48	1	726	1,544,768	-----	-----	-----	Pre DA2 Upstream
10	Combine	920.46	1	724	2,844,795	8, 9	-----	-----	Pre DA1 Upstream, Pre DA 2 Upstrea
11	Combine	841.89	1	724	2,638,303	1, 2, 3, 8, 9,	-----	-----	PreDev Flow - Toms Creek Rd
12	Combine	33.67	1	724	105,594	1, 2, 3,	-----	-----	Site Pre Dev to Pt Analysis B Toms'
13	SCS Runoff	3.214	1	724	10,528	-----	-----	-----	Post B1-1
14	SCS Runoff	3.198	1	718	6,841	-----	-----	-----	Post B1-2
15	SCS Runoff	2.006	1	719	4,466	-----	-----	-----	Post B1-3
16	SCS Runoff	1.393	1	718	3,025	-----	-----	-----	Post B2-1
17	SCS Runoff	3.454	1	721	8,947	-----	-----	-----	Post B2-2
18	SCS Runoff	0.973	1	718	1,957	-----	-----	-----	Post B3
19	SCS Runoff	5.750	1	719	12,131	-----	-----	-----	Post B4-1
20	SCS Runoff	21.31	1	722	57,313	-----	-----	-----	Post B4-2
21	SCS Runoff	0.118	1	721	321	-----	-----	-----	Post B5
22	SCS Runoff	13.43	1	720	30,378	-----	-----	-----	Post B6-1
23	SCS Runoff	6.553	1	720	14,825	-----	-----	-----	Post B6-2
24	SCS Runoff	8.057	1	727	27,680	-----	-----	-----	Post B7
25	SCS Runoff	18.44	1	725	57,921	-----	-----	-----	Post B8-1
26	SCS Runoff	5.595	1	715	10,007	-----	-----	-----	Post B9
27	SCS Runoff	5.642	1	721	14,255	-----	-----	-----	Post B8-2
28	Combine	26.06	1	721	69,444	19, 20,	-----	-----	Post B4 Site Total
29	Combine	24.99	1	719	56,614	13, 14, 15, 16, 17, 18,	-----	-----	Post D Portion to Toms Creek Rd
30	Combine	9.276	1	716	35,474	24, 26,	-----	-----	Post B7 and B9 to Pond 1
31	Combine	33.34	1	718	92,089	29, 30	-----	-----	Total Post to Toms Creek Rd prior to
32	Combine	16.96	1	719	37,811	22, 23,	-----	-----	B61 and B62 to Pond 2
33	Combine	28.98	1	723	90,712	6, 7, 20,	-----	-----	Flow to Pond 4
34	Combine	23.52	1	724	72,177	25, 27,	-----	-----	Flow to Pond 5
C:\Dropbox\E&A\Jim Lucas Projects\Toms Creek Design\Sub 10 Water Hydraflow					10 on day 06/17/2020	To Pts analysis A and B Toms			

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
35	Reservoir	0.917	1	805	34,152	32	1989.54	21,364	Route Pond 2
36	Reservoir	7.807	1	730	35,474	30	2003.77	8,441	Route Pond 1
37	Reservoir	19.39	1	729	69,507	34	2005.51	24,185	Route Pond 5
38	Combine	31.12	1	729	129,619	13, 14, 17, 18, 36, 37	-----	-----	Site Flow to Street Culvert
39	Combine	824.58	1	725	2,662,328	8, 9, 38	-----	-----	Total Flow to Street Culvert
40	Reservoir	819.44	1	725	2,662,327	39	1989.14	21,211	Route Street Culvert
41	Combine	821.10	1	725	2,703,973	15, 16, 35, 40	-----	-----	Post Total flow to Toms Creek Rd
42	Combine	29.04	1	725	94,839	4, 6, 7,	-----	-----	Pre to Pt. Analysis A
43	Reservoir	837.34	1	725	2,638,303	11	1980.15	25,744	Pre-Tom's Creek
44	Reservoir	818.24	1	726	2,703,967	41	1980.12	24,744	Post Dev Toms Creek Rd
45	Reservoir	16.93	1	733	90,702	33	2031.30	25,446	Route Pond 4
46	Combine	30.75	1	723	101,501	6, 7, 19, 20,	-----	-----	Post to Pt. Analysis A
47	Combine	10.70	1	720	29,862	13, 14, 15, 16, 17,	-----	-----	Undetained Site Post to Pt. Analysis
48	Combine	51.52	1	720	146,733	22, 23, 24, 25, 26, 27,	-----	-----	Undetained Site Post to Pt. Analysis
49	Combine	62.21	1	720	176,596	47, 48	-----	-----	Combined Post to Pt. Analysis B Tom

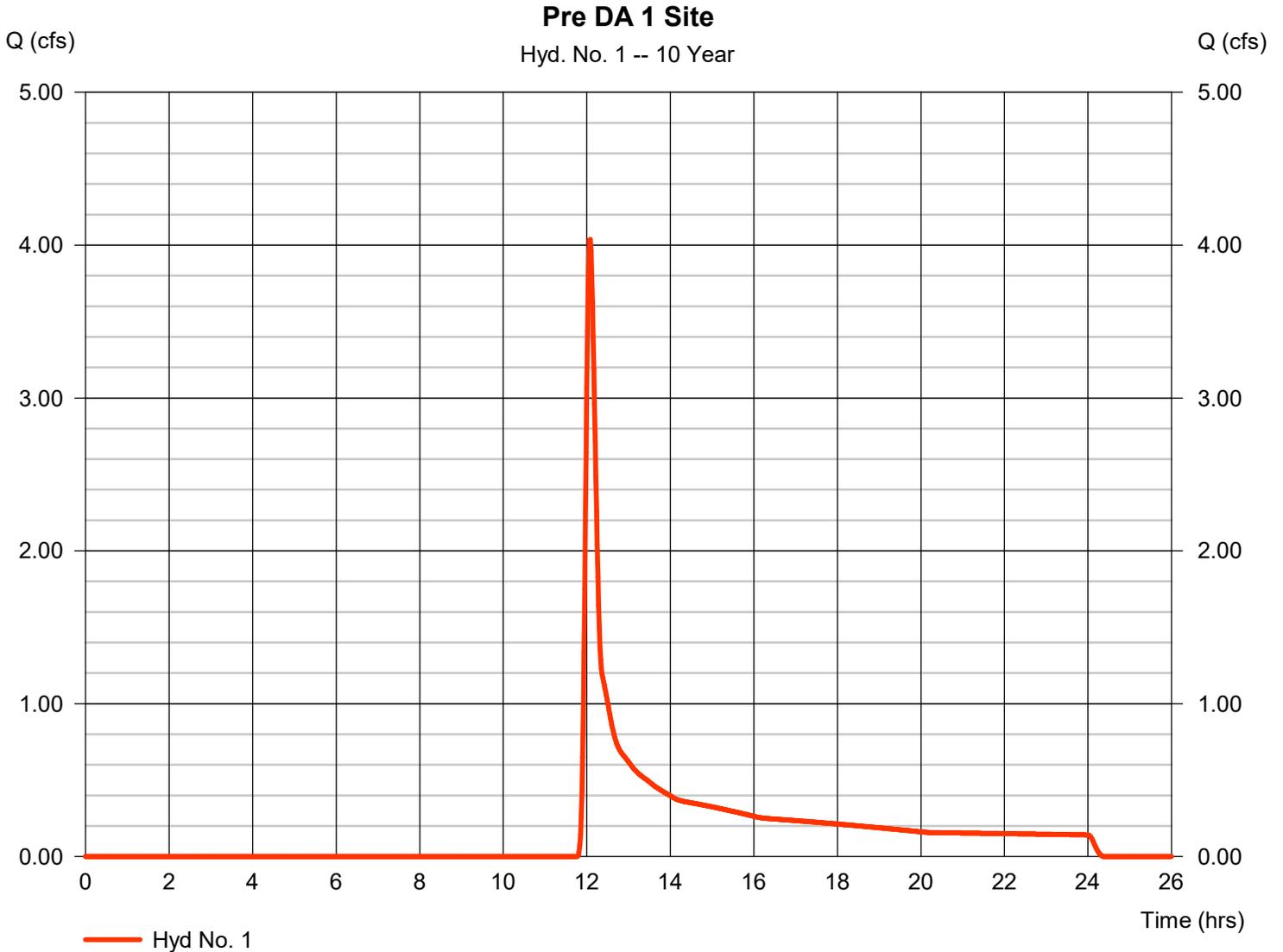
Hydrograph Report

Hyd. No. 1

Pre DA 1 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 4.037 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 15,634 cuft
Drainage area	= 7.500 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.10 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 70) + (7.330 x 55)] / 7.500



Hydrograph Report

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

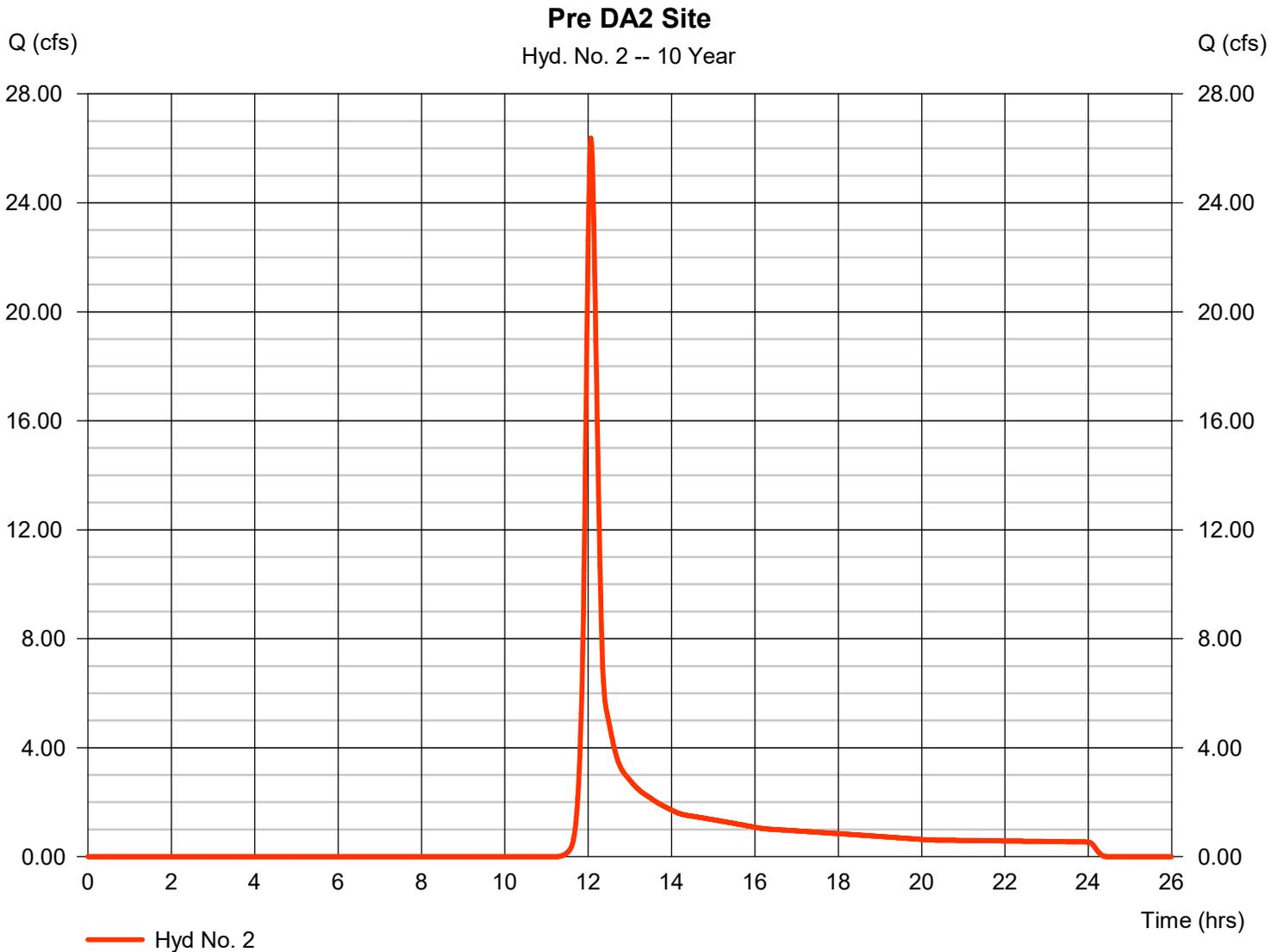
Monday, 06 / 29 / 2020

Hyd. No. 2

Pre DA2 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 26.37 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 80,677 cuft
Drainage area	= 19.050 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.40 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.200 x 55) + (13.850 x 70)] / 19.050



Hydrograph Report

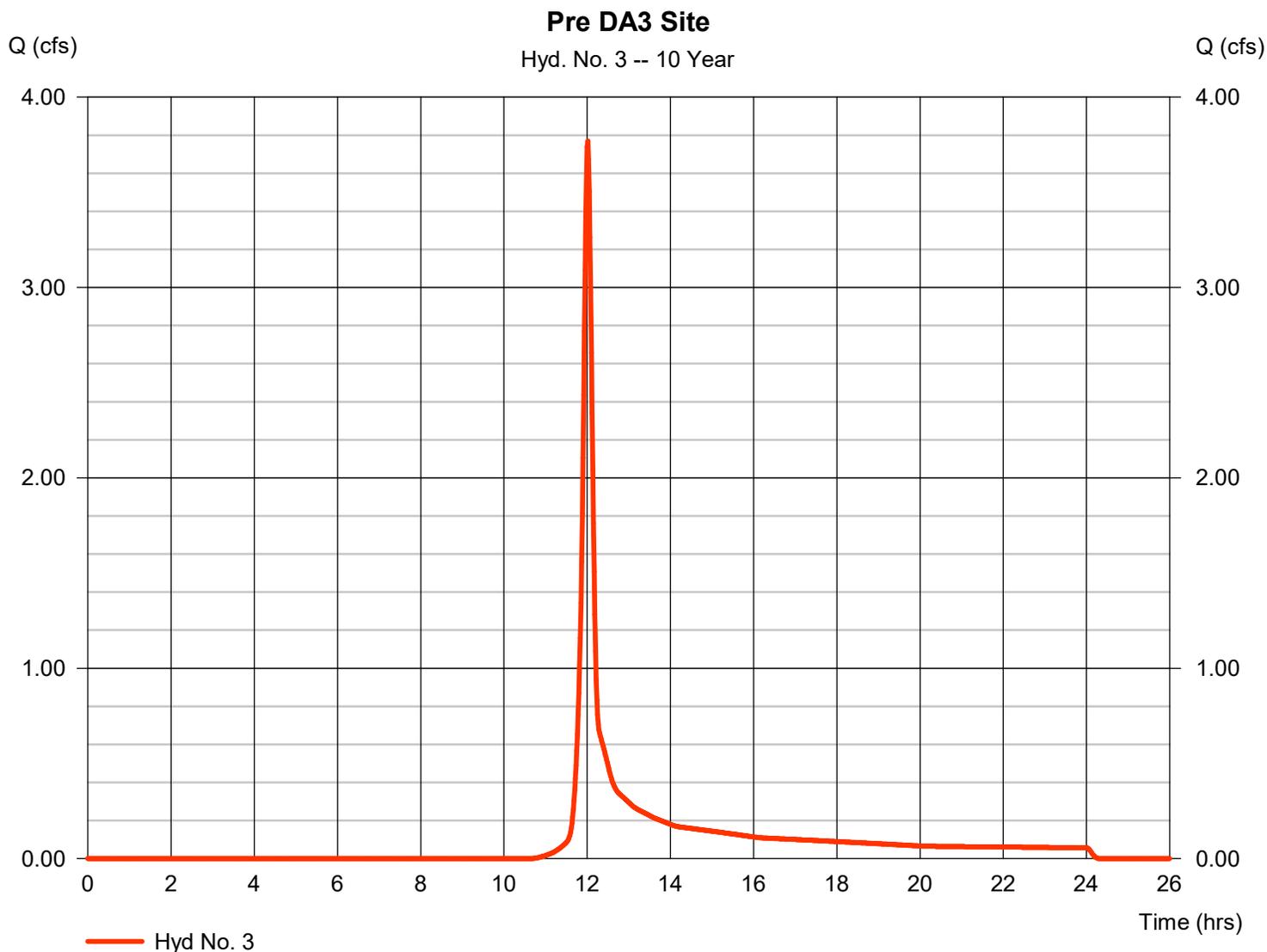
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 3

Pre DA3 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 3.769 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 9,283 cuft
Drainage area	= 1.790 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.70 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

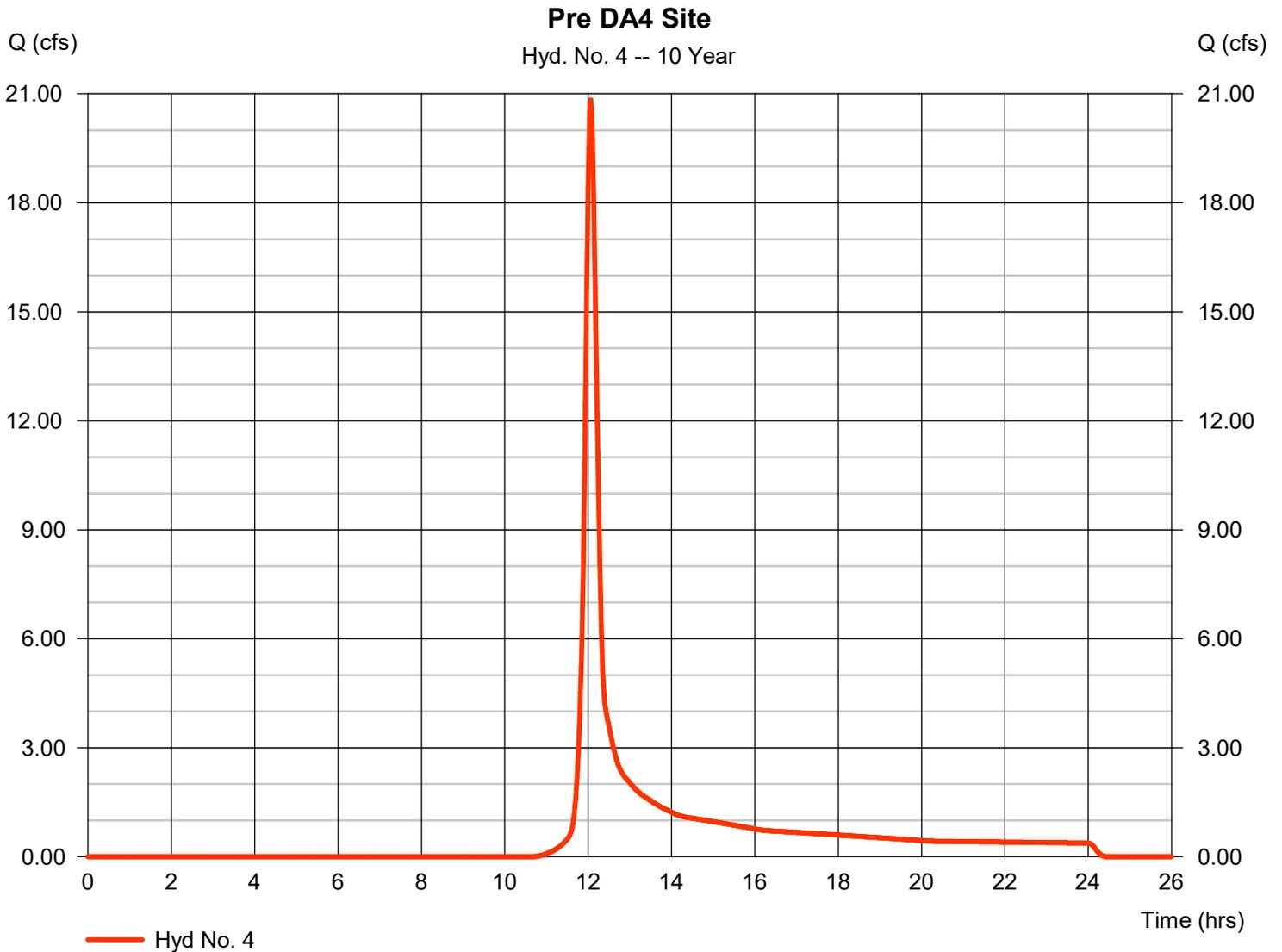
Monday, 06 / 29 / 2020

Hyd. No. 4

Pre DA4 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 20.83 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 61,440 cuft
Drainage area	= 11.910 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.50 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = $[(2.540 \times 74) + (9.190 \times 74) + (0.180 \times 61)] / 11.910$



Hydrograph Report

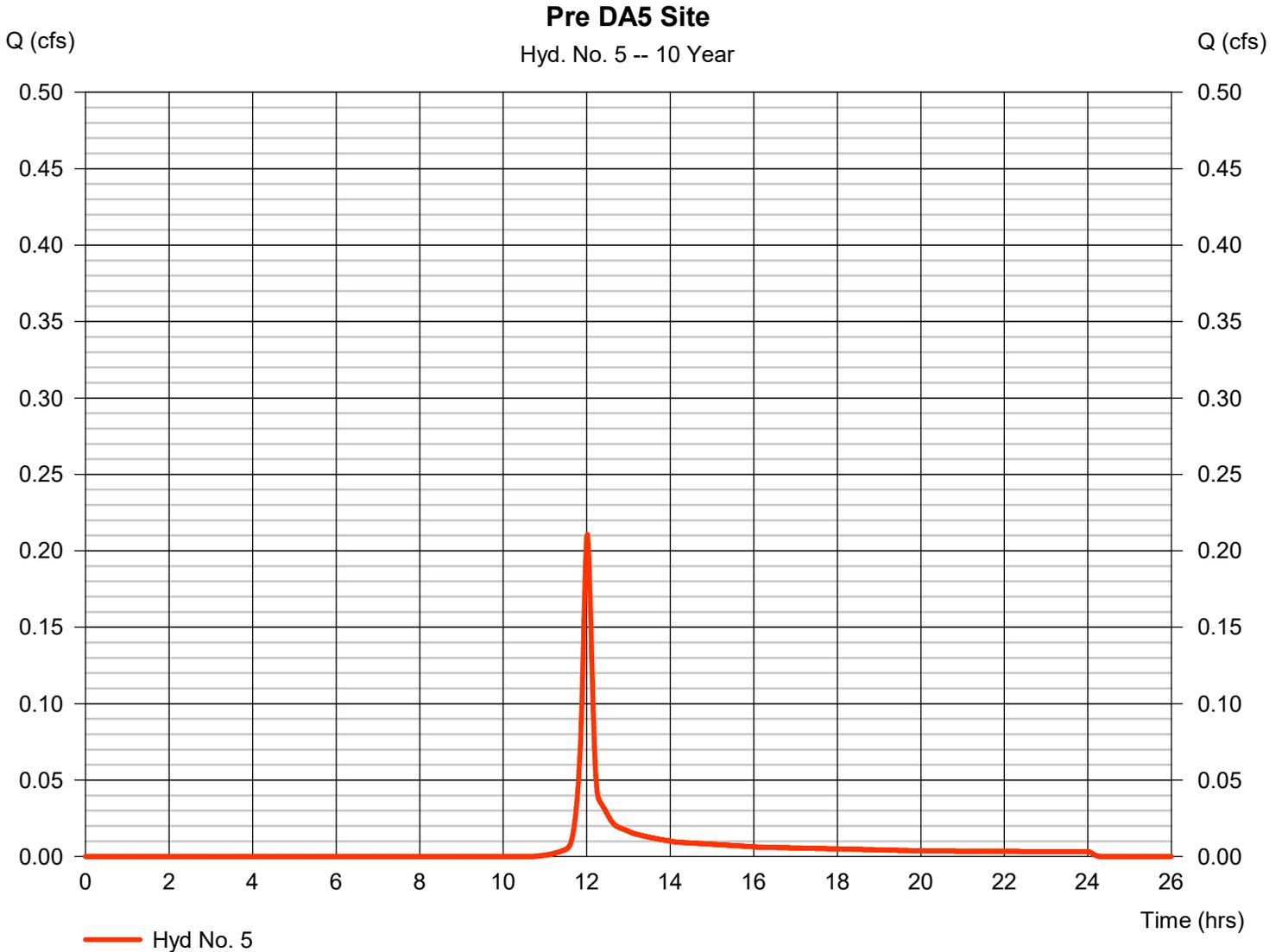
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 5

Pre DA5 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.211 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 519 cuft
Drainage area	= 0.100 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.70 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

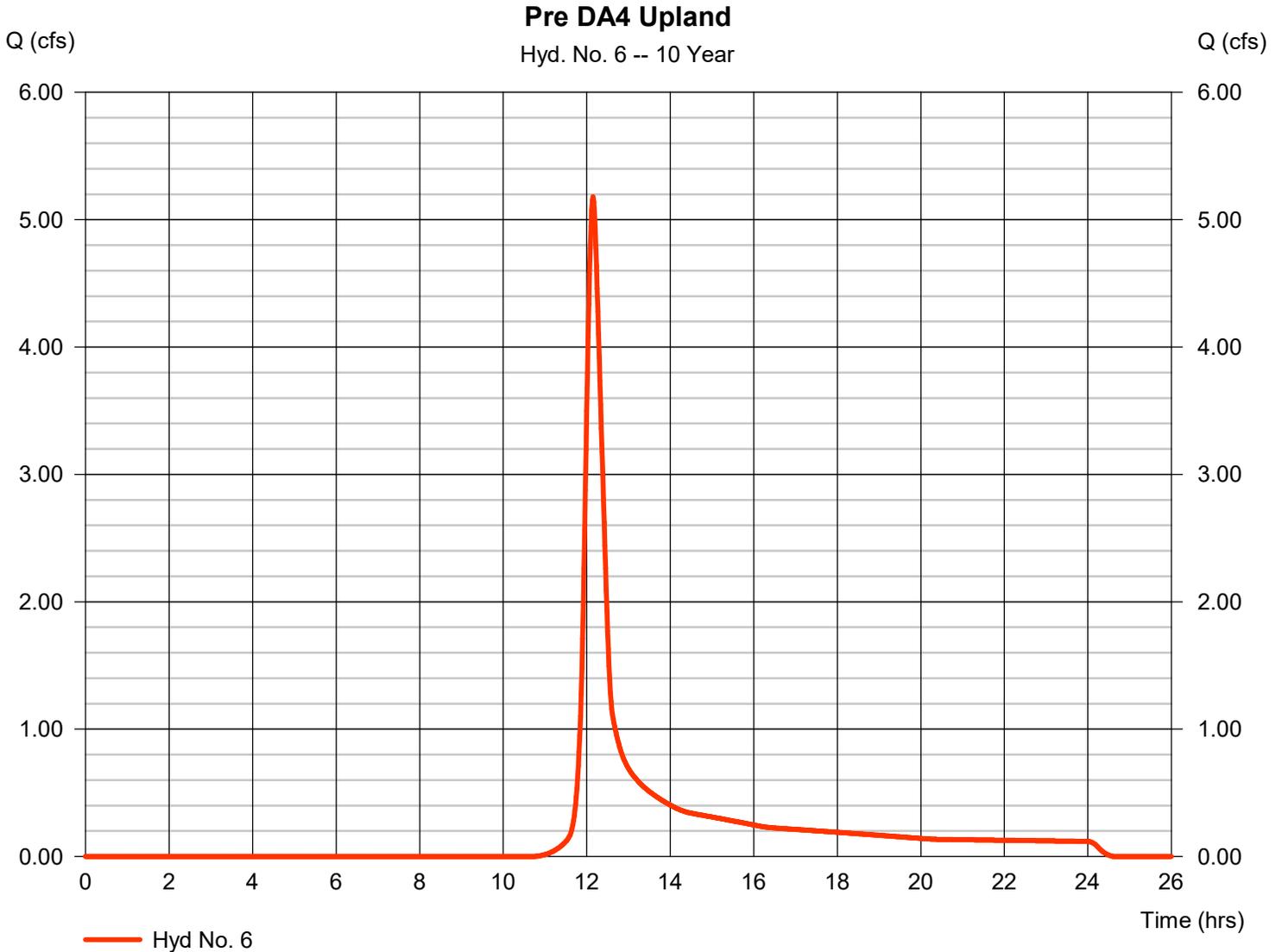


Hydrograph Report

Hyd. No. 6

Pre DA4 Upland

Hydrograph type	= SCS Runoff	Peak discharge	= 5.179 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 19,361 cuft
Drainage area	= 3.800 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.60 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

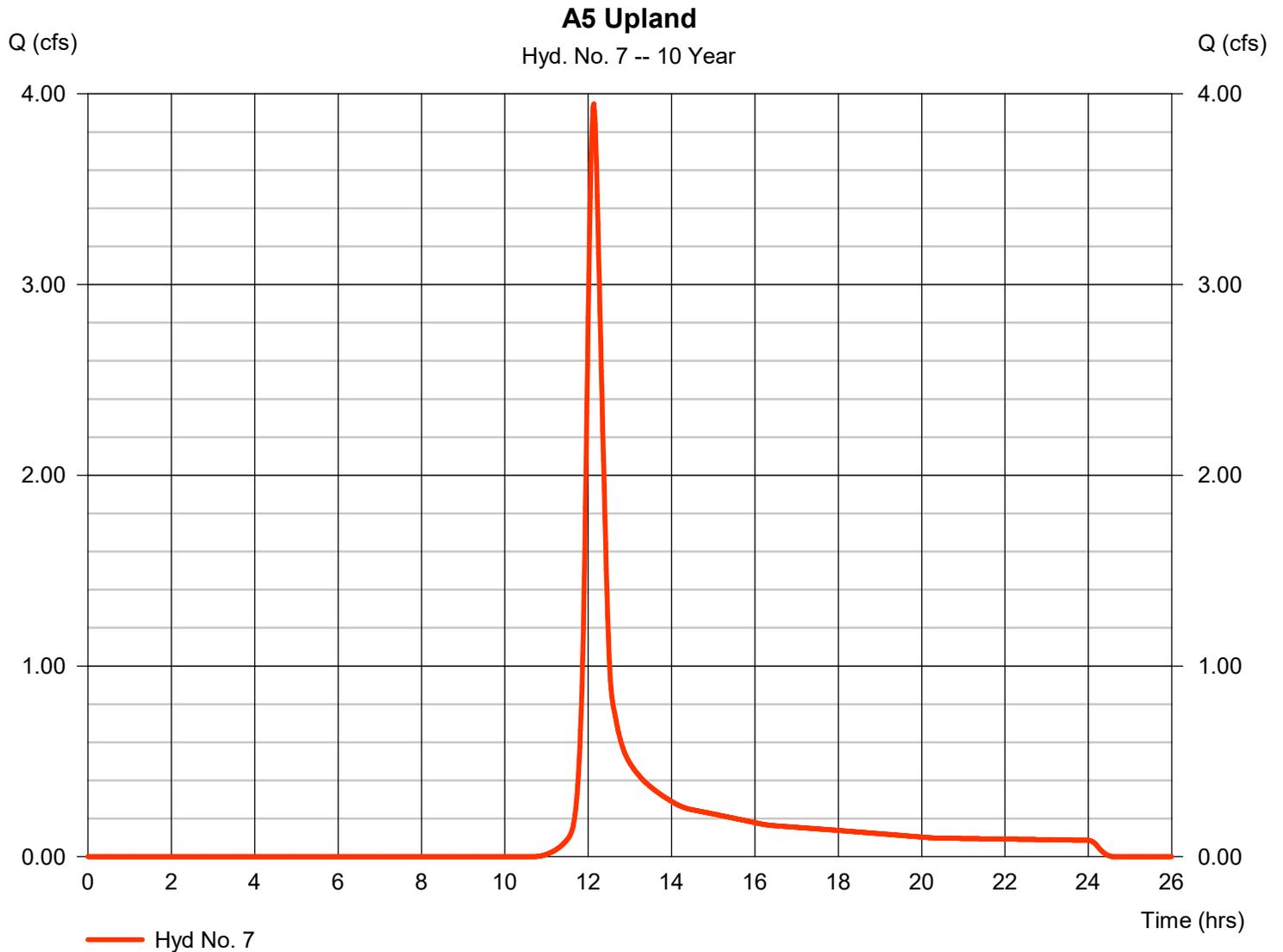
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 7

A5 Upland

Hydrograph type	= SCS Runoff	Peak discharge	= 3.947 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 14,038 cuft
Drainage area	= 2.780 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.20 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

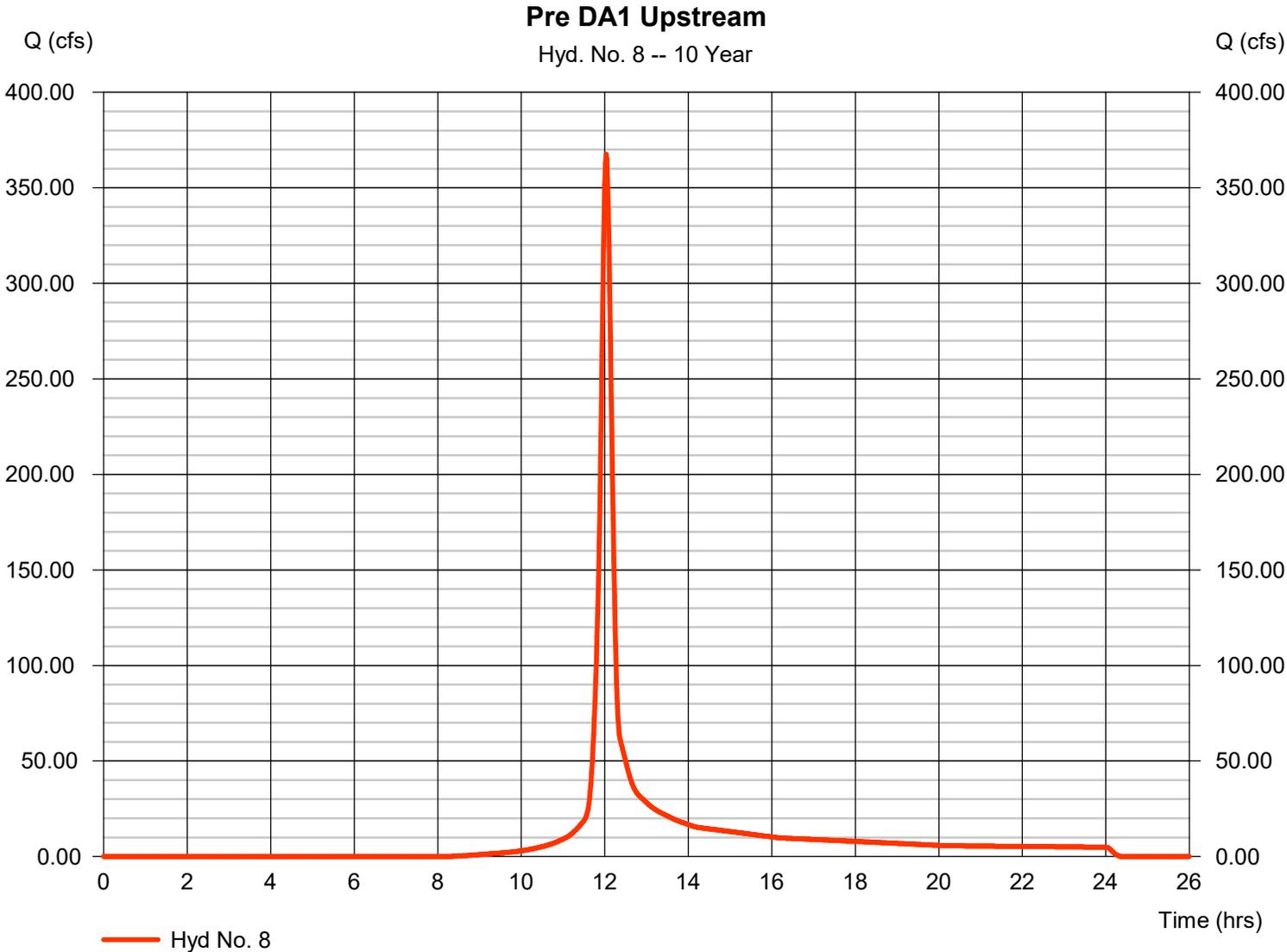
Monday, 06 / 29 / 2020

Hyd. No. 8

Pre DA1 Upstream

Hydrograph type	= SCS Runoff	Peak discharge	= 367.54 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 987,940 cuft
Drainage area	= 127.600 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.40 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(56.000 x 98) + (36.000 x 72) + (35.600 x 58)] / 127.600



Hydrograph Report

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

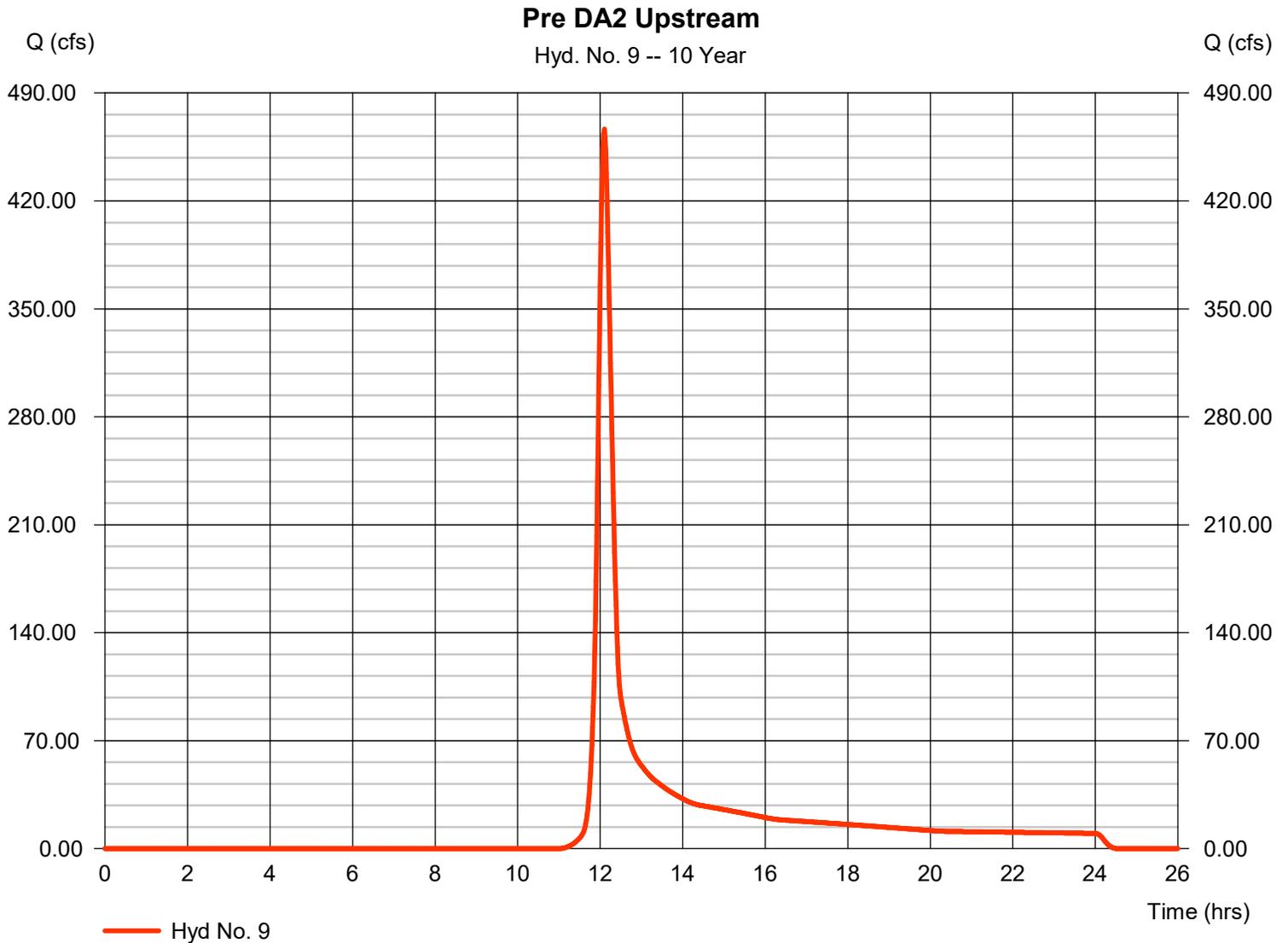
Monday, 06 / 29 / 2020

Hyd. No. 9

Pre DA2 Upstream

Hydrograph type	= SCS Runoff	Peak discharge	= 466.48 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 1,544,768 cuft
Drainage area	= 333.730 ac	Curve number	= 68*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.60 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(76.200 x 98) + (30.000 x 72) + (227.530 x 58)] / 333.730



Hydrograph Report

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

Monday, 06 / 29 / 2020

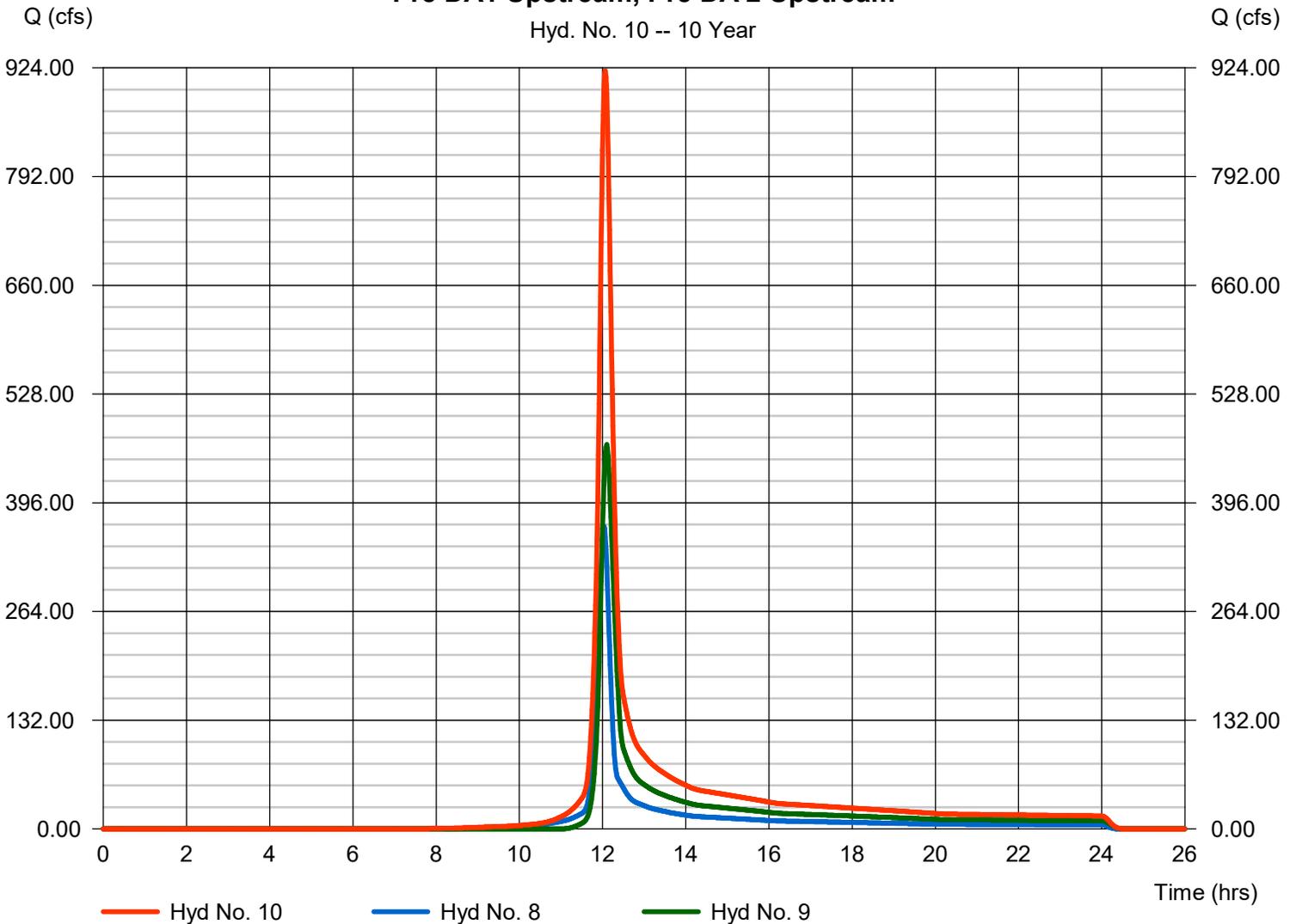
Hyd. No. 10

Pre DA1 Upstream, Pre DA 2 Upstream

Hydrograph type	= Combine	Peak discharge	= 920.46 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 2,844,795 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 461.330 ac

Pre DA1 Upstream, Pre DA 2 Upstream

Hyd. No. 10 -- 10 Year



Hydrograph Report

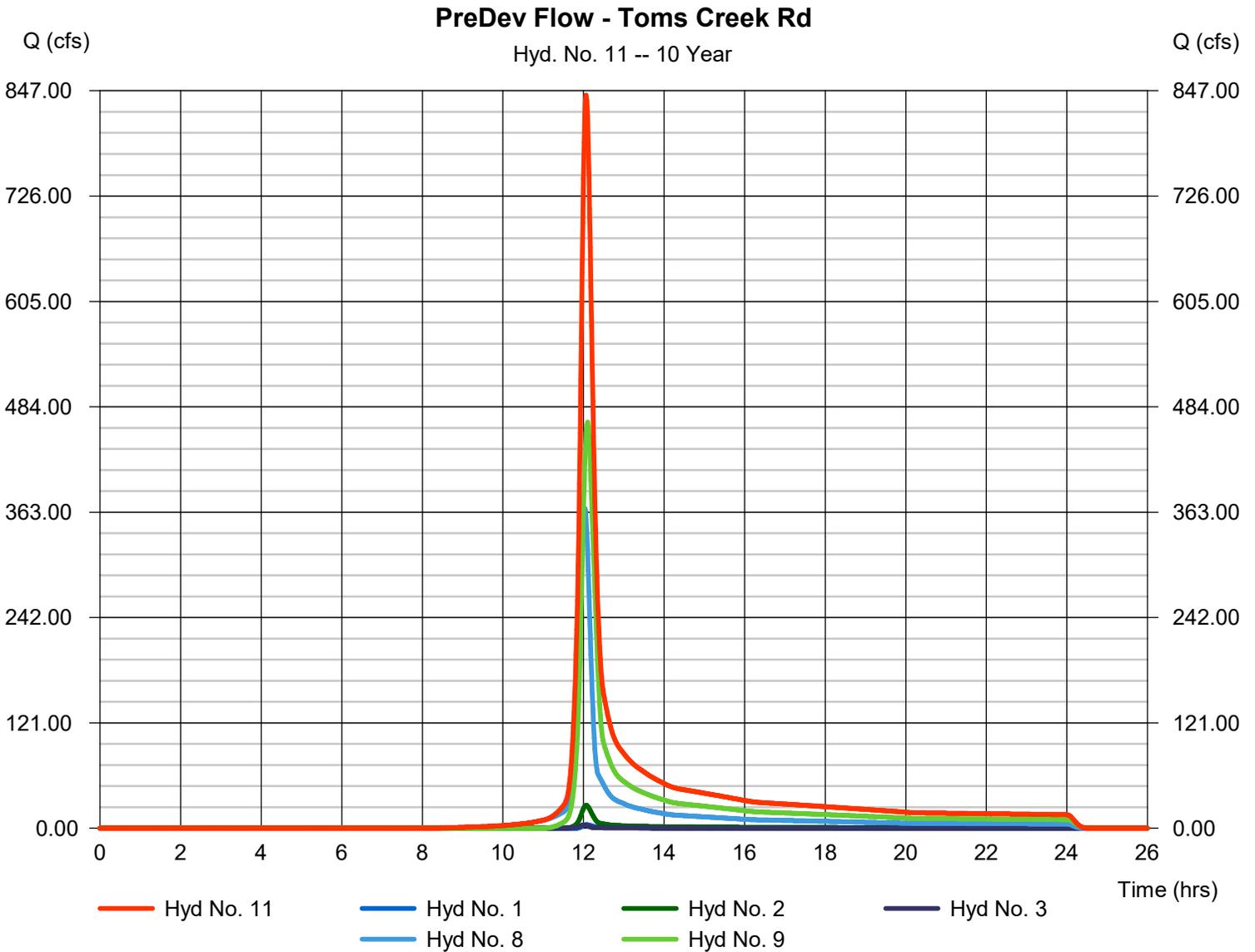
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 11

PreDev Flow - Toms Creek Rd

Hydrograph type	= Combine	Peak discharge	= 841.89 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 2,638,303 cuft
Inflow hyds.	= 1, 2, 3, 8, 9	Contrib. drain. area	= 489.670 ac



Hydrograph Report

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

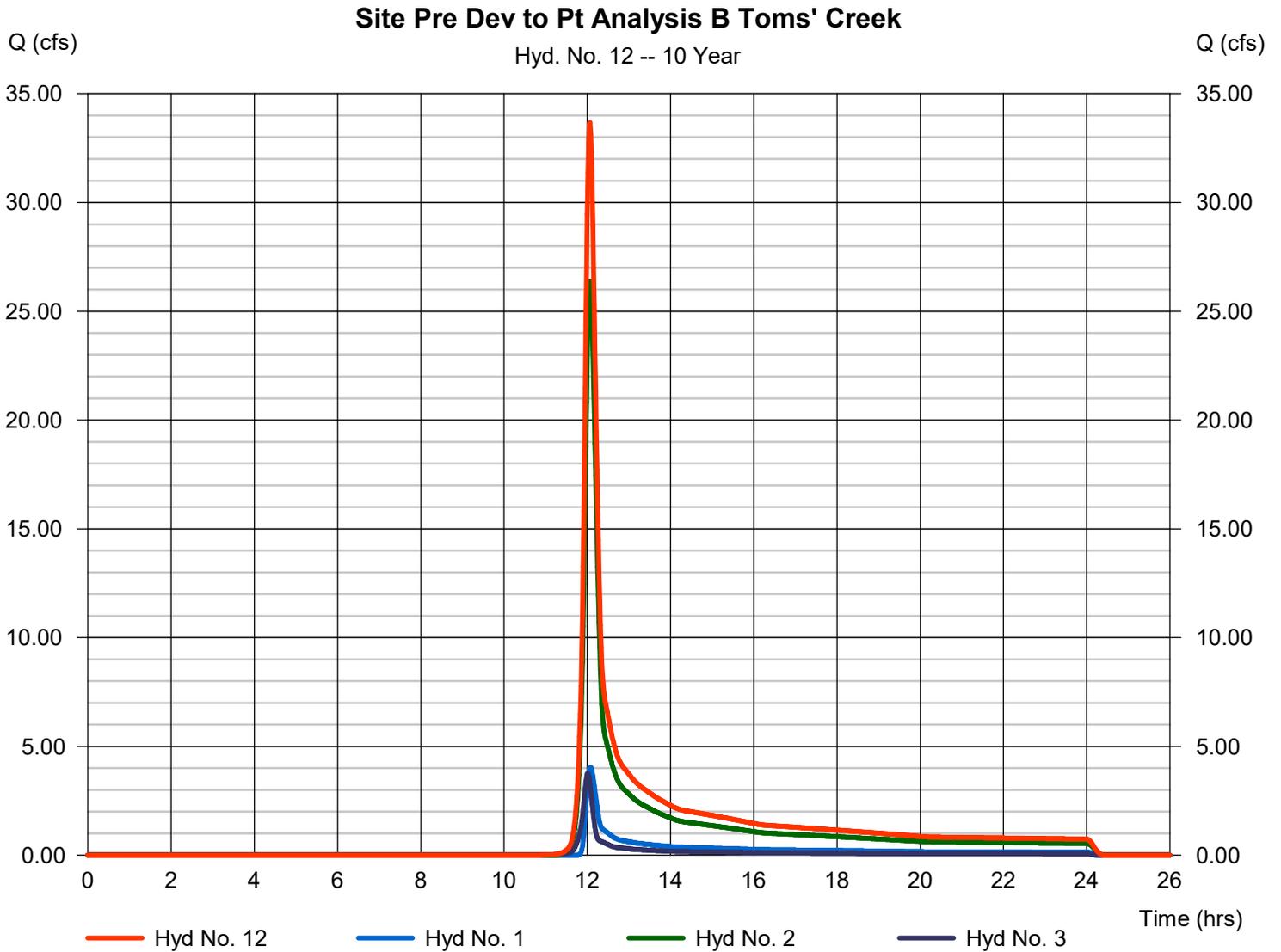
Monday, 06 / 29 / 2020

Hyd. No. 12

Site Pre Dev to Pt Analysis B Toms' Creek

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 1, 2, 3

Peak discharge = 33.67 cfs
Time to peak = 12.07 hrs
Hyd. volume = 105,594 cuft
Contrib. drain. area = 28.340 ac



Hydrograph Report

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

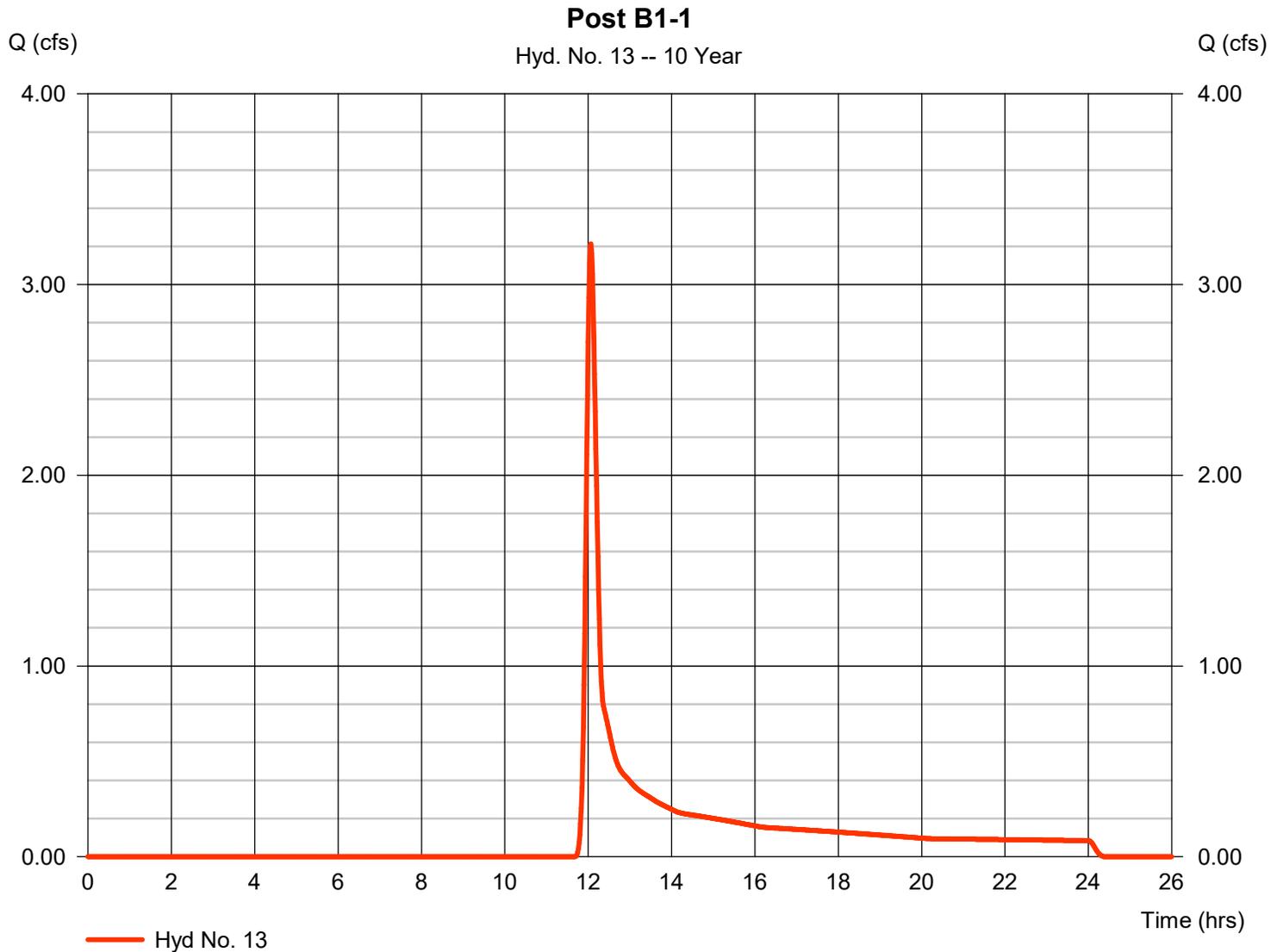
Monday, 06 / 29 / 2020

Hyd. No. 13

Post B1-1

Hydrograph type	= SCS Runoff	Peak discharge	= 3.214 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 10,528 cuft
Drainage area	= 3.790 ac	Curve number	= 59*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.80 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.780 x 98) + (1.510 x 69) + (1.310 x 61) + (0.190 x 74)] / 3.790



Hydrograph Report

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

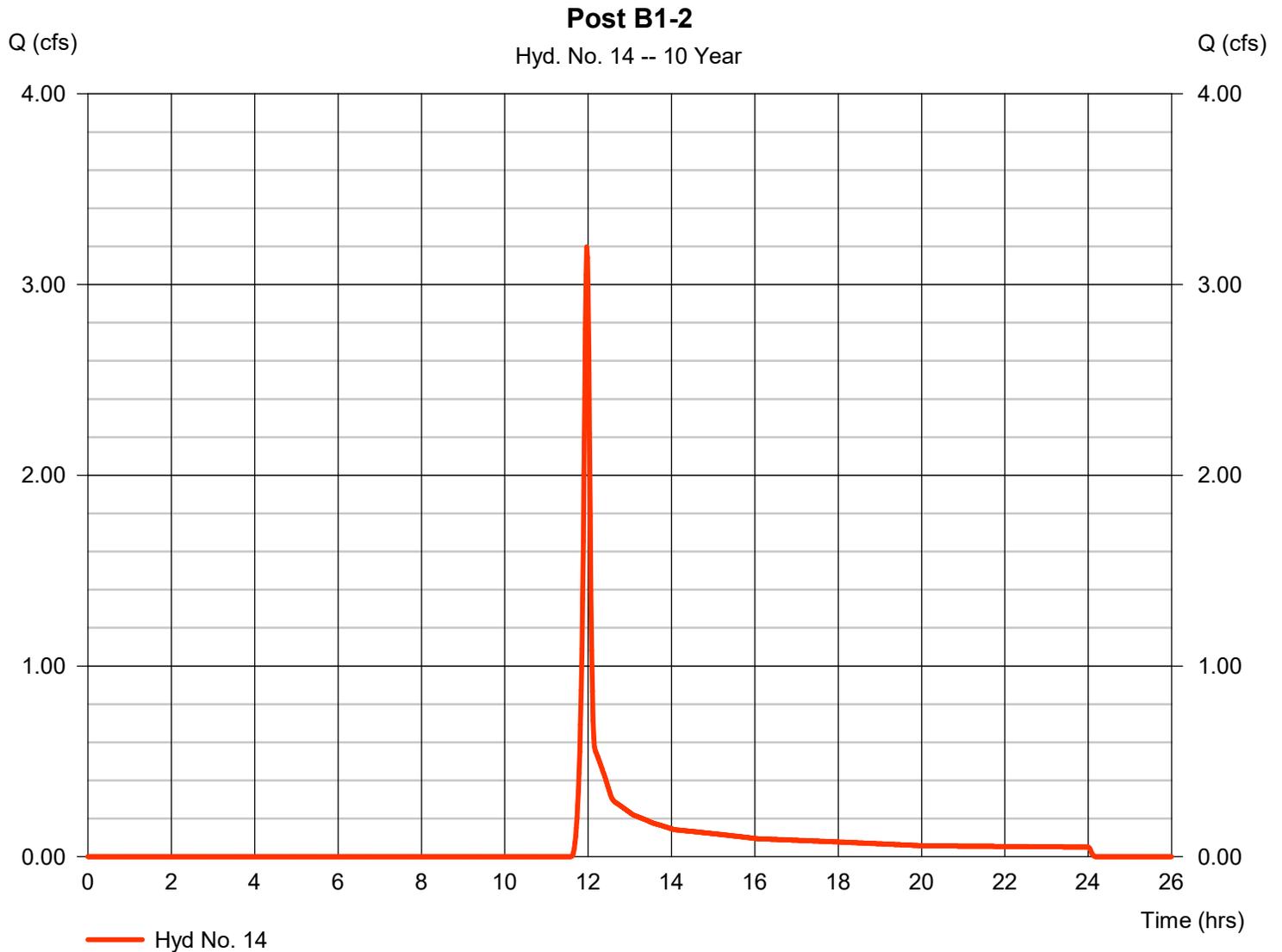
Monday, 06 / 29 / 2020

Hyd. No. 14

Post B1-2

Hydrograph type	= SCS Runoff	Peak discharge	= 3.198 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 6,841 cuft
Drainage area	= 1.980 ac	Curve number	= 62*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.80 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (0.560 x 69) + (0.840 x 61)] / 1.980



Hydrograph Report

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

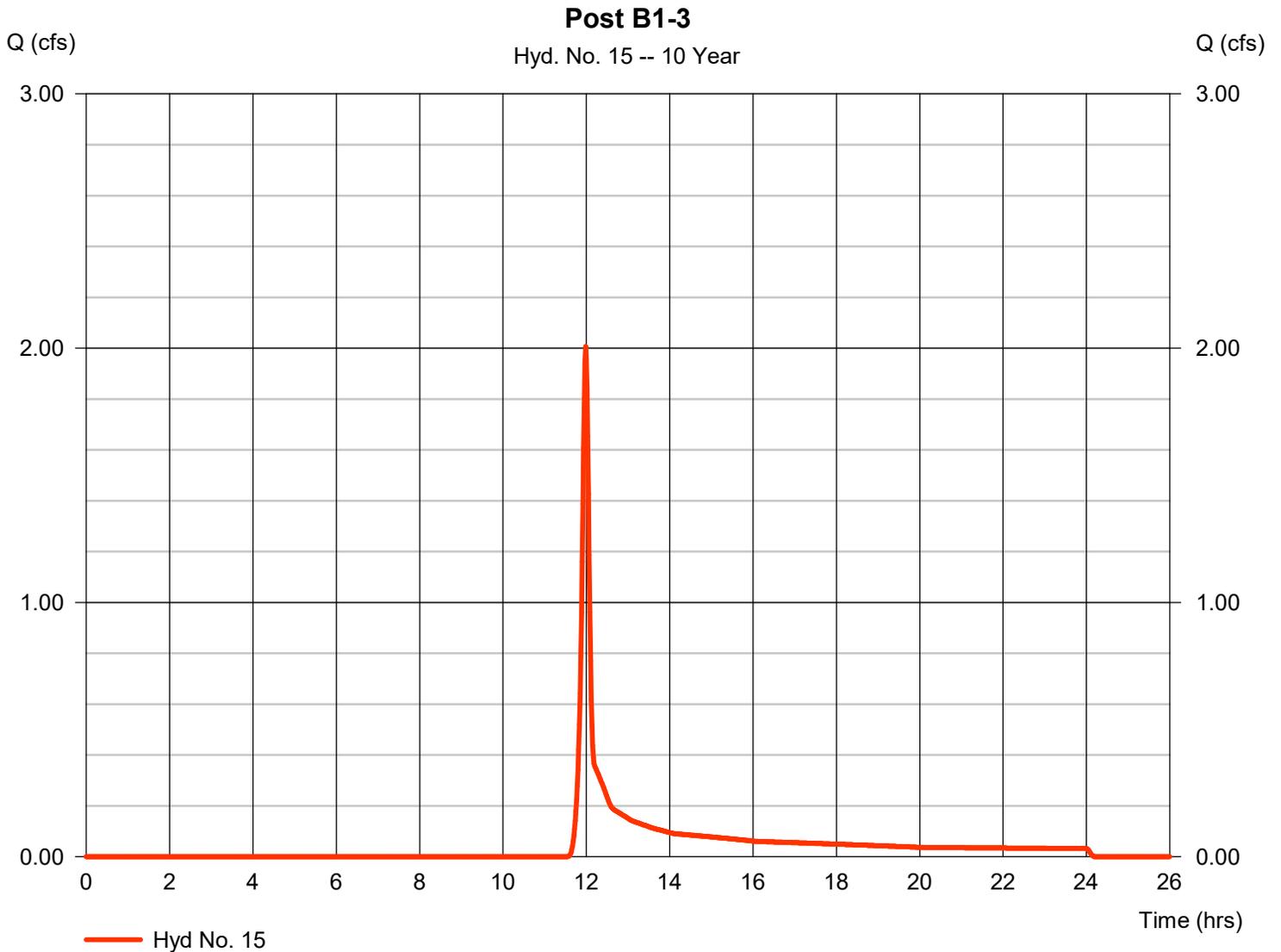
Monday, 06 / 29 / 2020

Hyd. No. 15

Post B1-3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.006 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 4,466 cuft
Drainage area	= 1.290 ac	Curve number	= 63*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.20 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 98) + (0.450 x 61) + (0.670 x 55)] / 1.290



Hydrograph Report

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

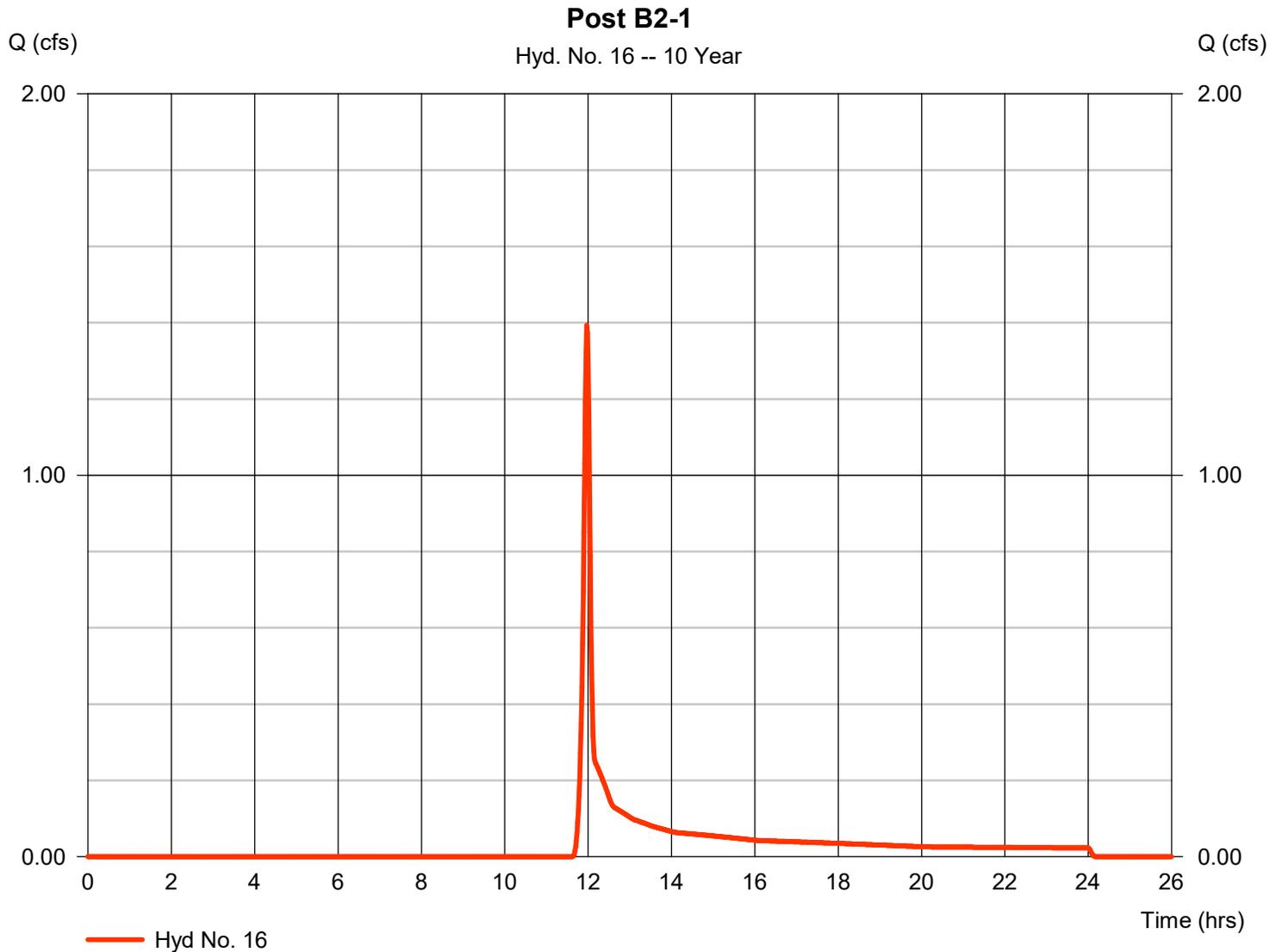
Monday, 06 / 29 / 2020

Hyd. No. 16

Post B2-1

Hydrograph type	= SCS Runoff	Peak discharge	= 1.393 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 3,025 cuft
Drainage area	= 0.930 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.30 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 98) + (0.300 x 55) + (0.020 x 55) + (0.650 x 61) + (0.090 x 74)] / 0.930



Hydrograph Report

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

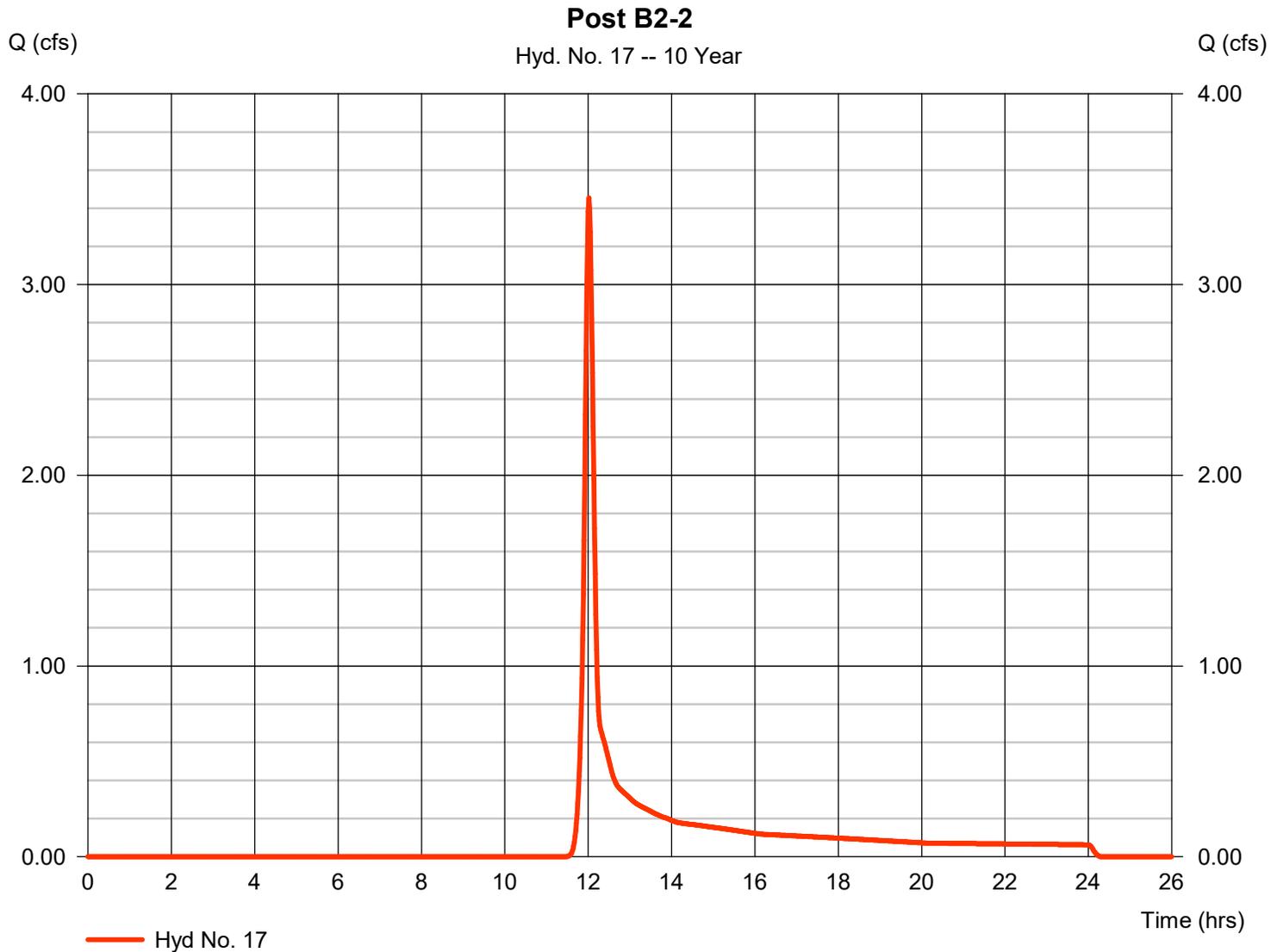
Monday, 06 / 29 / 2020

Hyd. No. 17

Post B2-2

Hydrograph type	= SCS Runoff	Peak discharge	= 3.454 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 8,947 cuft
Drainage area	= 2.340 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.30 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.210 x 98) + (0.630 x 61) + (0.300 x 74) + (1.030 x 55) + (0.170 x 70)] / 2.340



Hydrograph Report

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

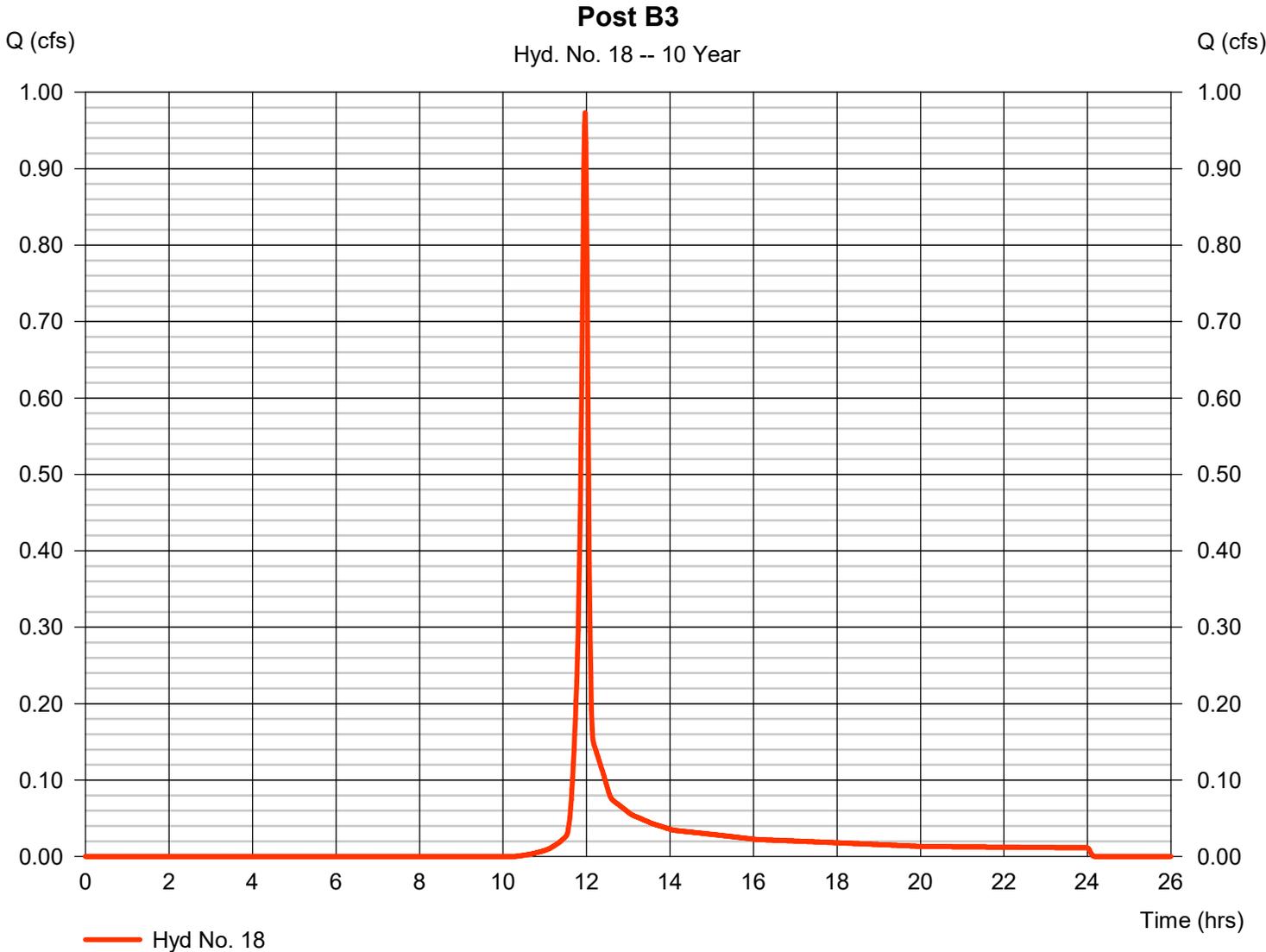
Monday, 06 / 29 / 2020

Hyd. No. 18

Post B3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.973 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 1,957 cuft
Drainage area	= 0.340 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.20 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.180 x 74) + (0.160 x 70)] / 0.340



Hydrograph Report

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

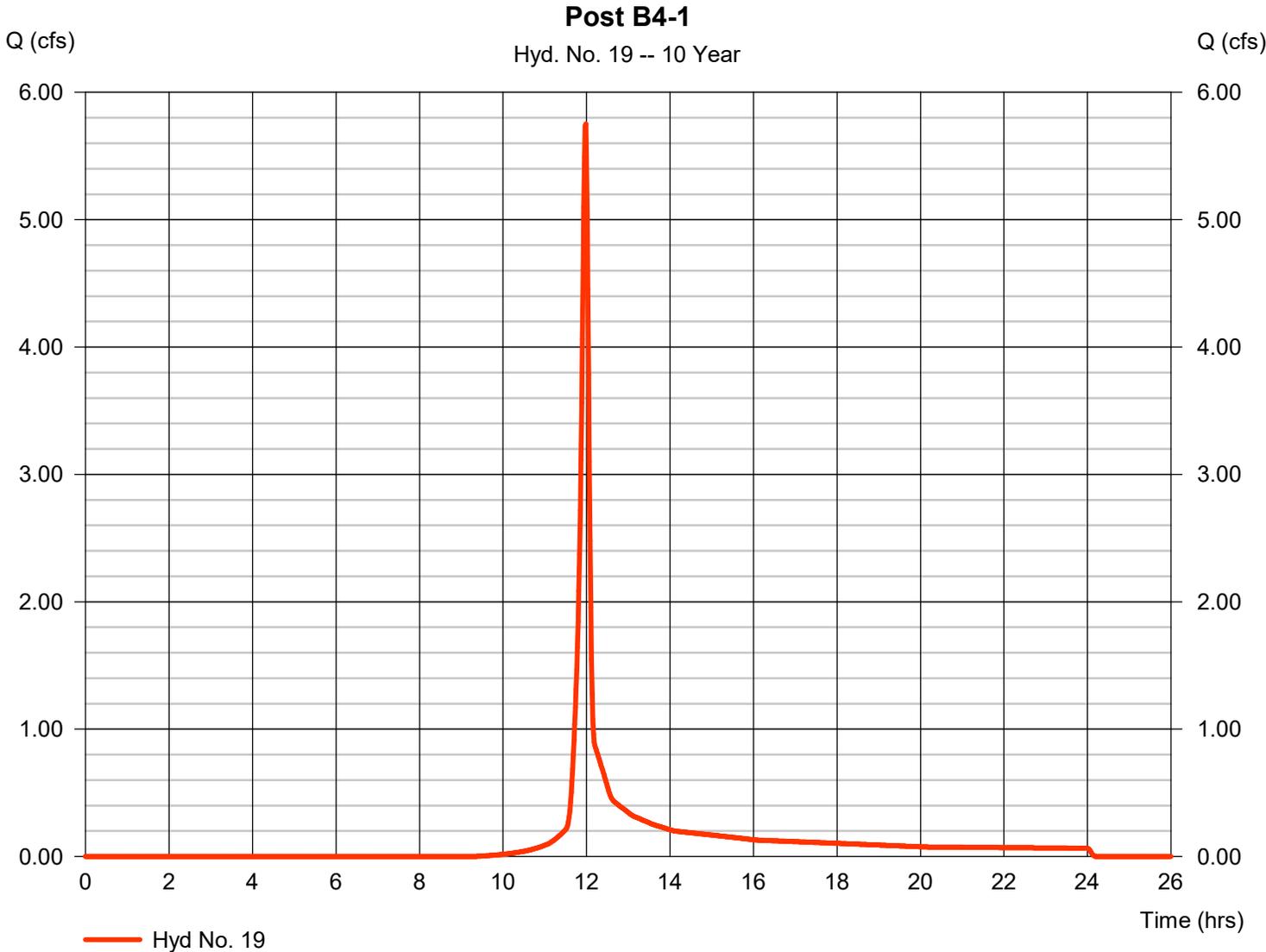
Monday, 06 / 29 / 2020

Hyd. No. 19

Post B4-1

Hydrograph type	= SCS Runoff	Peak discharge	= 5.750 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 12,131 cuft
Drainage area	= 1.880 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.60 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 98) + (0.610 x 74) + (0.910 x 70)] / 1.880



Hydrograph Report

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

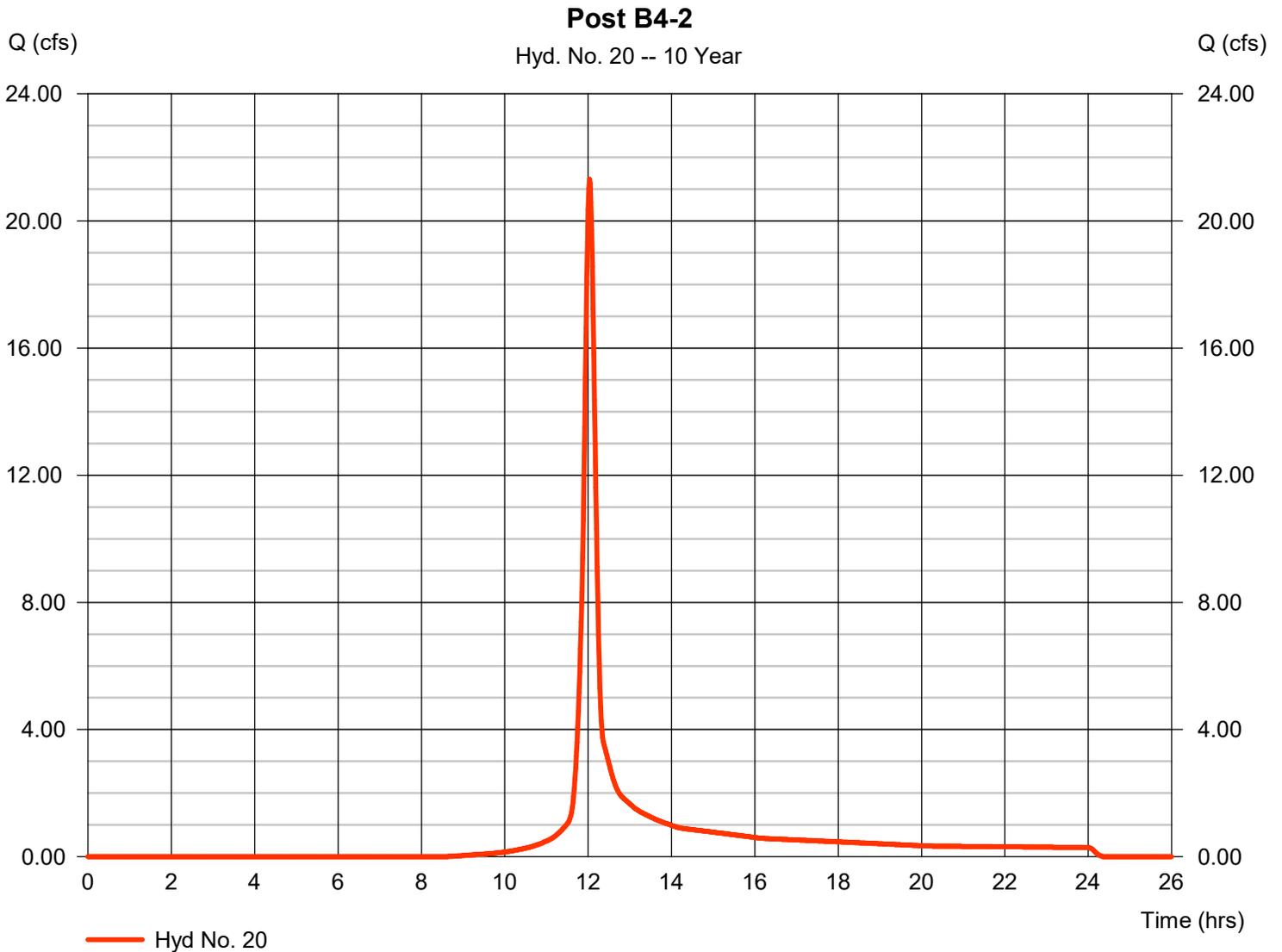
Monday, 06 / 29 / 2020

Hyd. No. 20

Post B4-2

Hydrograph type	= SCS Runoff	Peak discharge	= 21.31 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 57,313 cuft
Drainage area	= 7.690 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.10 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.500 x 98) + (0.130 x 69) + (2.460 x 79) + (0.030 x 61) + (2.550 x 74)] / 7.690



Hydrograph Report

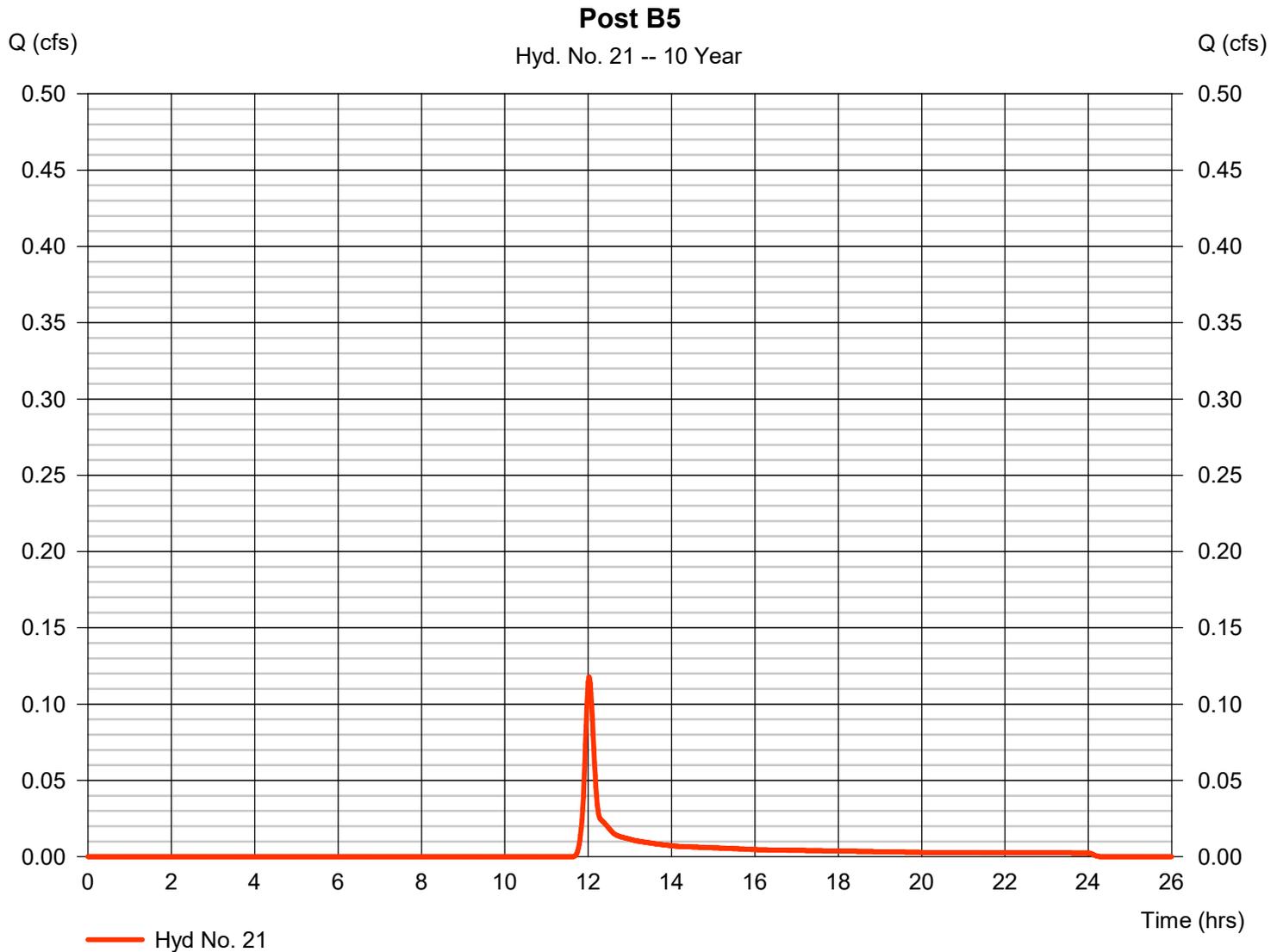
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 21

Post B5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.118 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 321 cuft
Drainage area	= 0.100 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.70 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

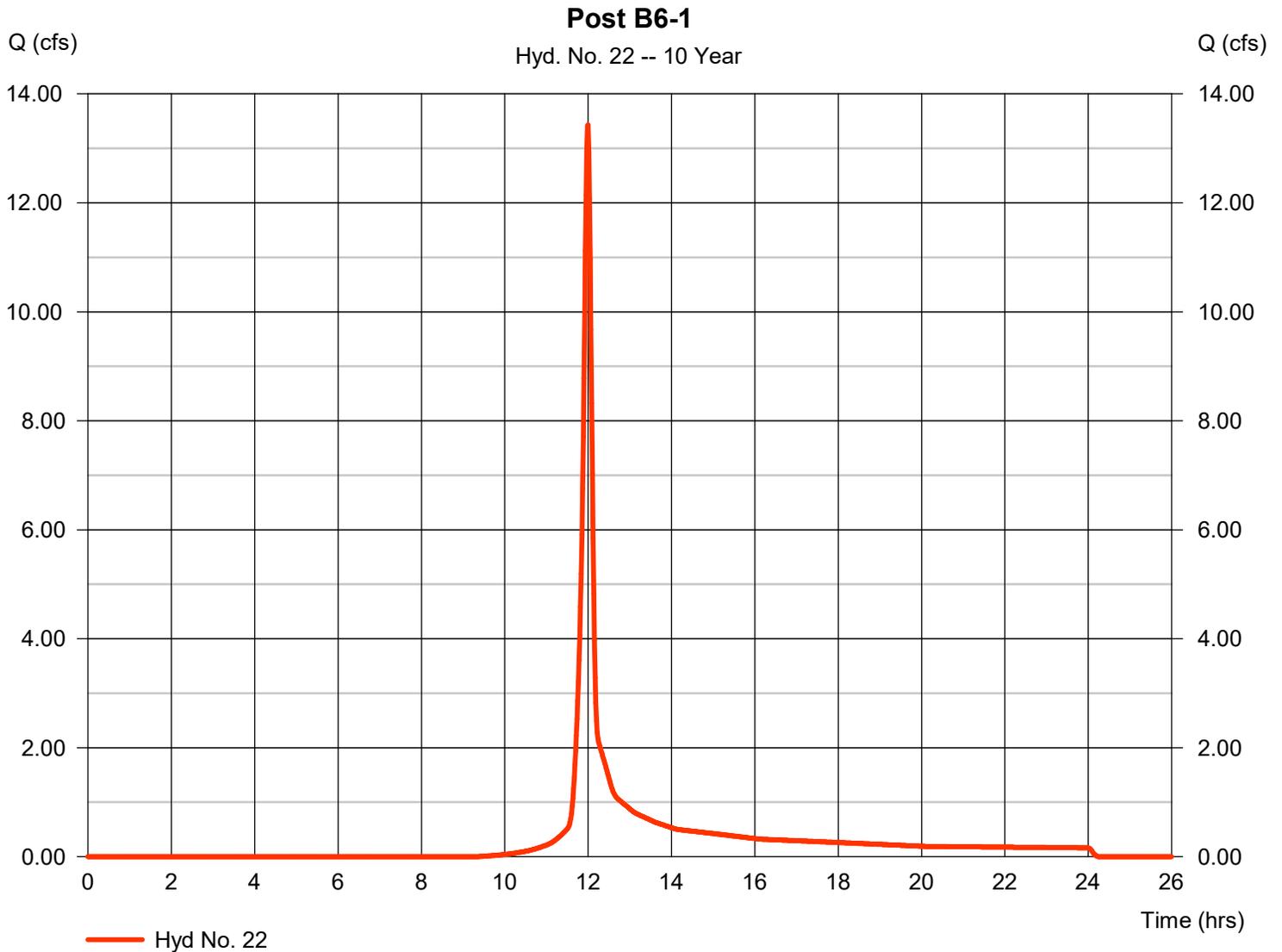
Monday, 06 / 29 / 2020

Hyd. No. 22

Post B6-1

Hydrograph type	= SCS Runoff	Peak discharge	= 13.43 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 30,378 cuft
Drainage area	= 4.590 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.880 x 98) + (0.690 x 69) + (0.500 x 79)] / 4.590



Hydrograph Report

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

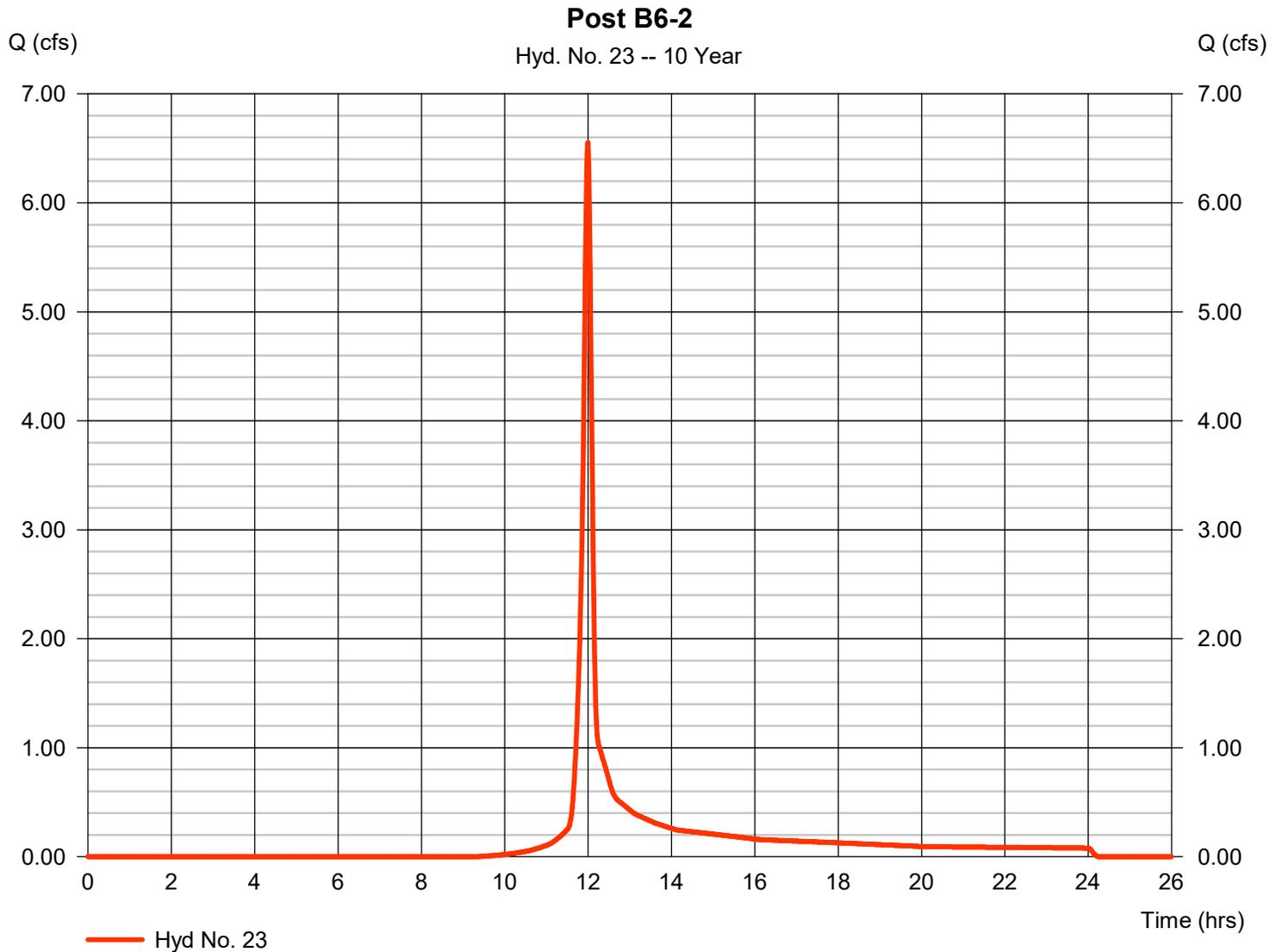
Monday, 06 / 29 / 2020

Hyd. No. 23

Post B6-2

Hydrograph type	= SCS Runoff	Peak discharge	= 6.553 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 14,825 cuft
Drainage area	= 2.240 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.40 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.630 x 98) + (0.960 x 79) + (0.650 x 74)] / 2.240



Hydrograph Report

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

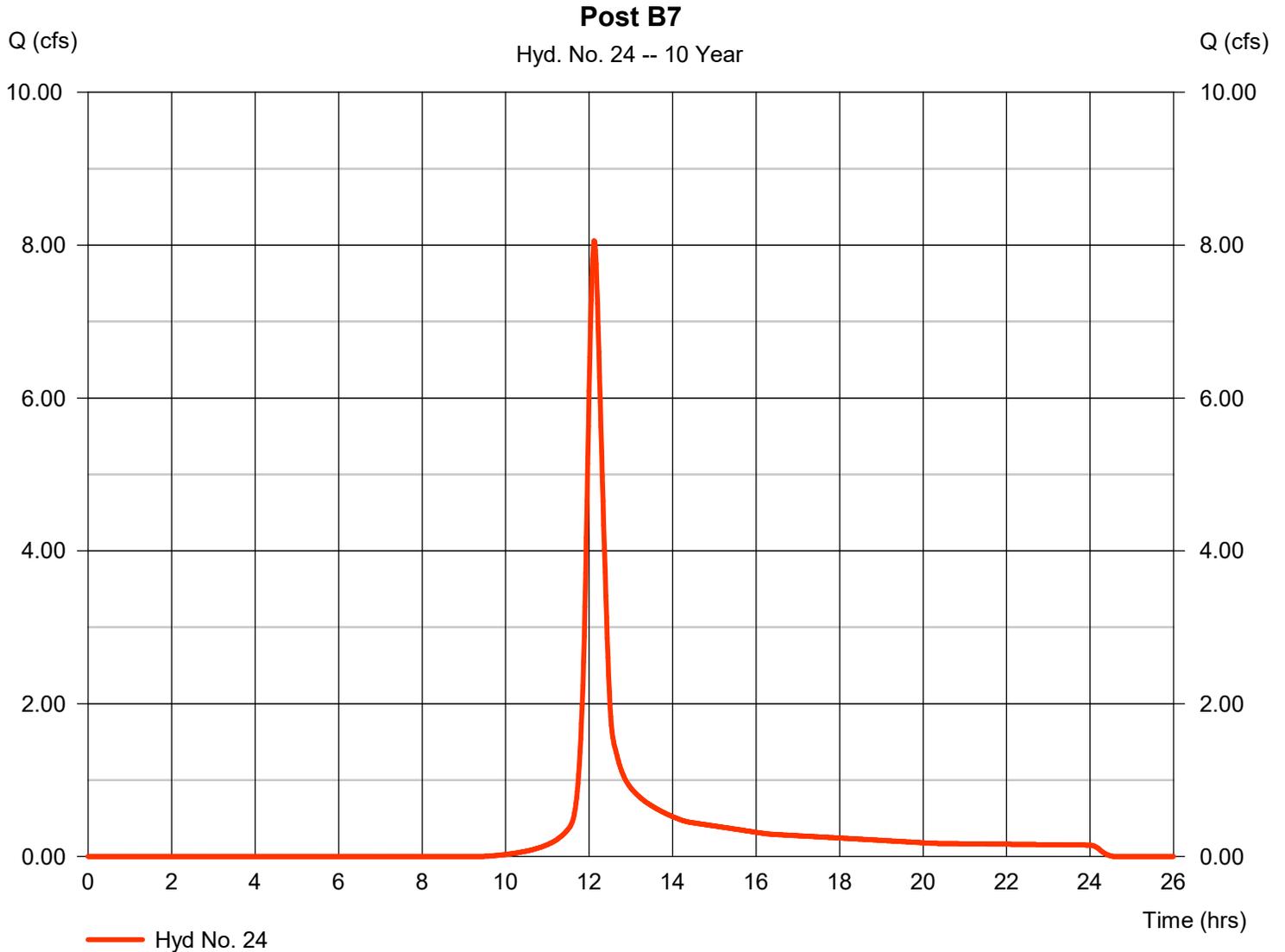
Monday, 06 / 29 / 2020

Hyd. No. 24

Post B7

Hydrograph type	= SCS Runoff	Peak discharge	= 8.057 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 27,680 cuft
Drainage area	= 4.220 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 23.30 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.700 x 98) + (1.290 x 69) + (2.270 x 79)] / 4.220



Hydrograph Report

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

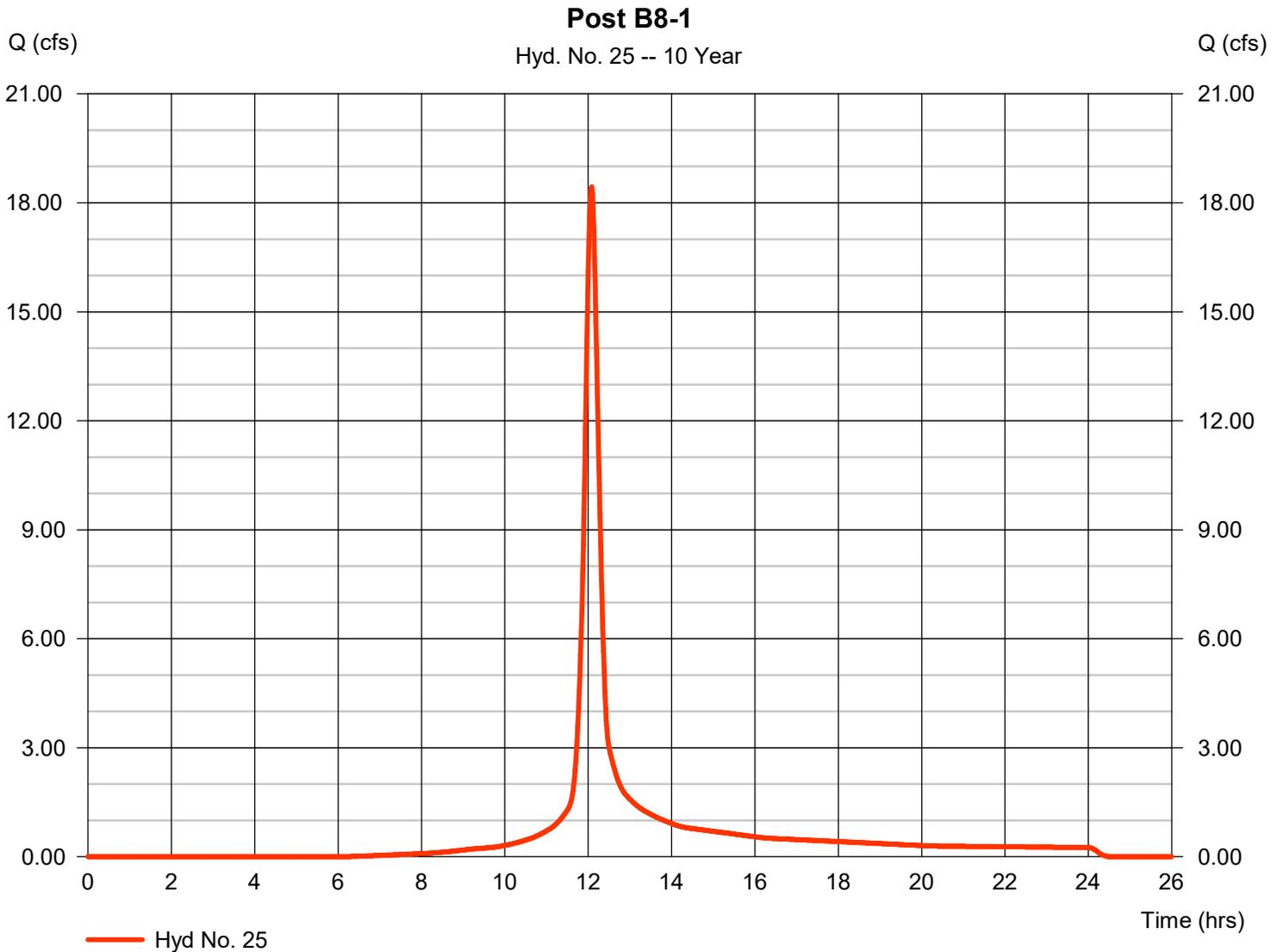
Monday, 06 / 29 / 2020

Hyd. No. 25

Post B8-1

Hydrograph type	= SCS Runoff	Peak discharge	= 18.44 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 57,921 cuft
Drainage area	= 6.030 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.40 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.010 x 98) + (0.060 x 61) + (2.850 x 74) + (0.110 x 70)] / 6.030



Hydrograph Report

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

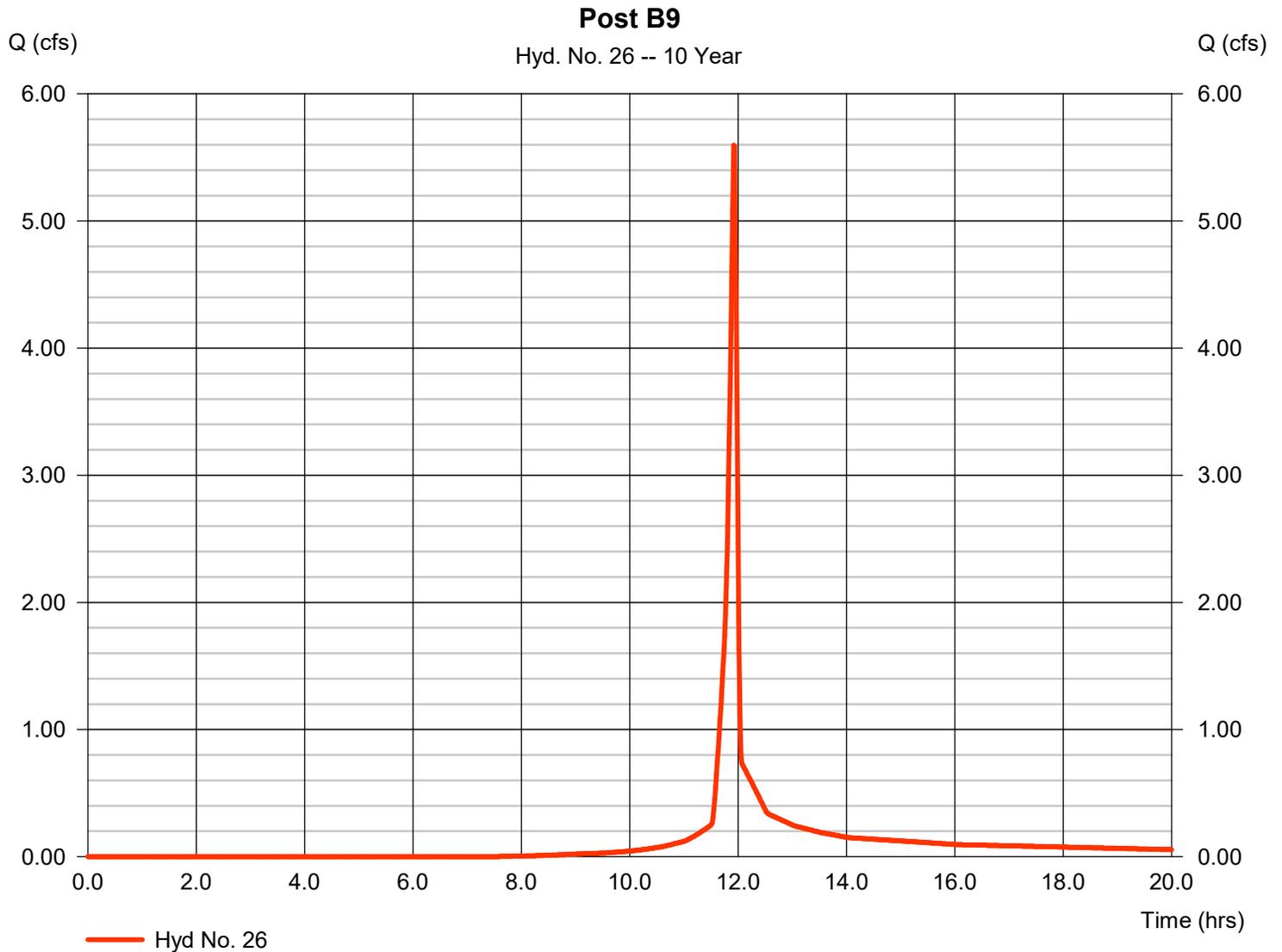
Monday, 06 / 29 / 2020

Hyd. No. 26

Post B9

Hydrograph type	= SCS Runoff	Peak discharge	= 5.595 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.92 hrs
Time interval	= 1 min	Hyd. volume	= 10,007 cuft
Drainage area	= 1.280 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 1.90 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.640 x 98) + (0.130 x 61) + (0.190 x 55) + (0.250 x 74) + (0.070 x 70)] / 1.280



Hydrograph Report

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

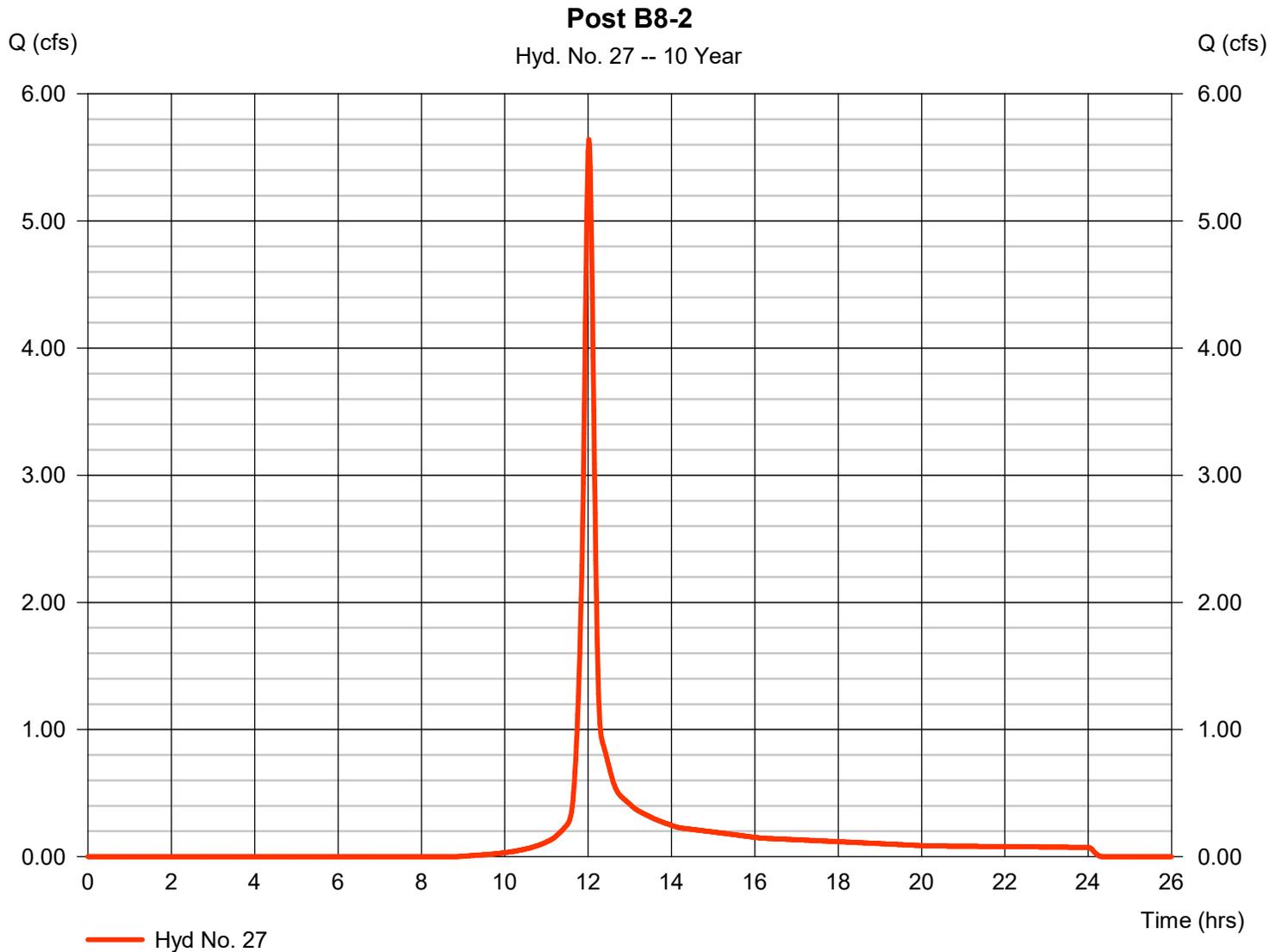
Monday, 06 / 29 / 2020

Hyd. No. 27

Post B8-2

Hydrograph type	= SCS Runoff	Peak discharge	= 5.642 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 14,255 cuft
Drainage area	= 2.020 ac	Curve number	= 78*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.80 min
Total precip.	= 4.11 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 98) + (1.480 x 74) + (0.160 x 70)] / 2.020



Hydrograph Report

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

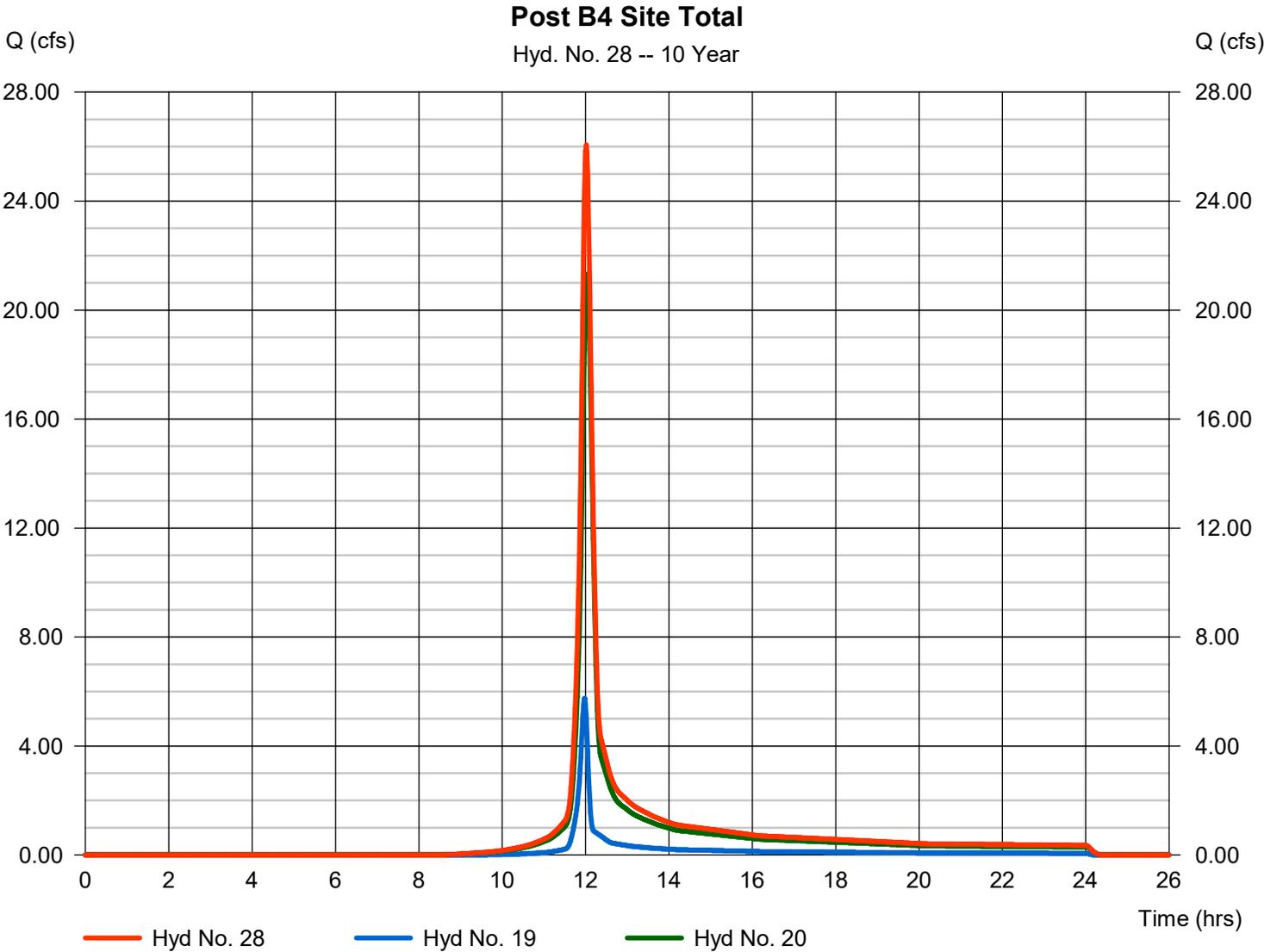
Monday, 06 / 29 / 2020

Hyd. No. 28

Post B4 Site Total

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 19, 20

Peak discharge = 26.06 cfs
Time to peak = 12.02 hrs
Hyd. volume = 69,444 cuft
Contrib. drain. area = 9.570 ac



Hydrograph Report

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

Monday, 06 / 29 / 2020

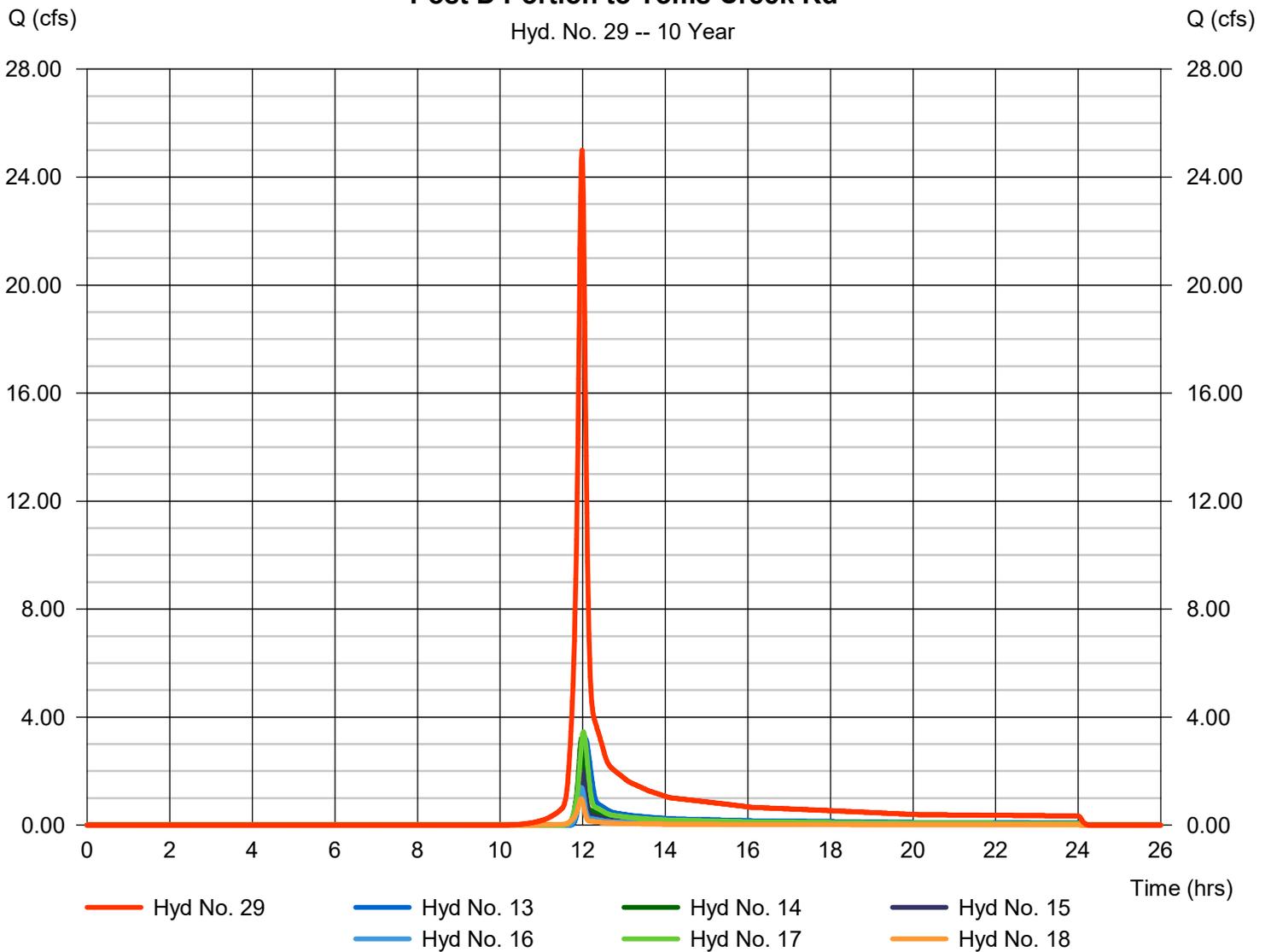
Hyd. No. 29

Post D Portion to Toms Creek Rd

Hydrograph type	= Combine	Peak discharge	= 24.99 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 56,614 cuft
Inflow hyds.	= 13, 14, 15, 16, 17, 18	Contrib. drain. area	= 10.670 ac

Post D Portion to Toms Creek Rd

Hyd. No. 29 -- 10 Year



Hydrograph Report

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

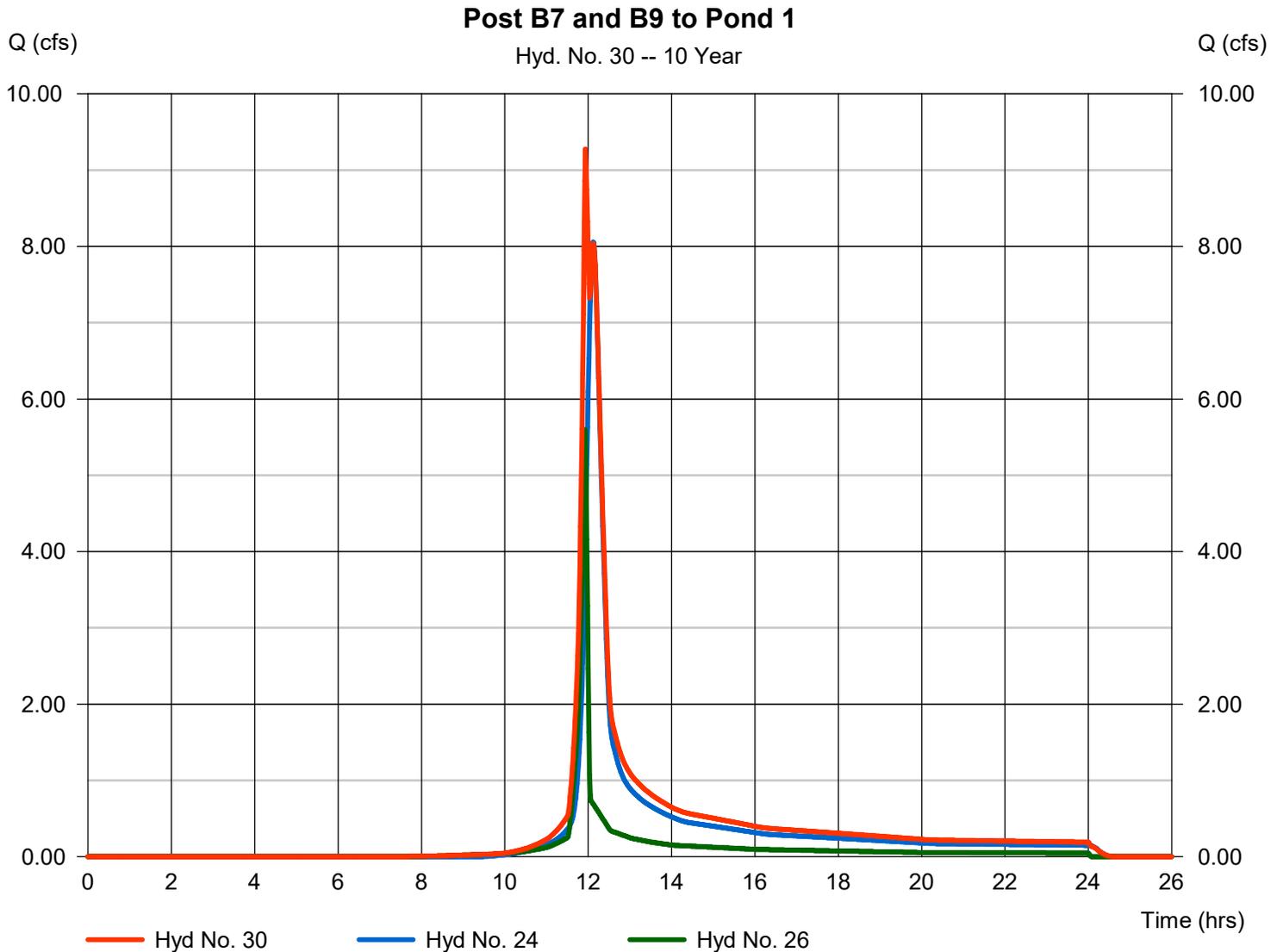
Monday, 06 / 29 / 2020

Hyd. No. 30

Post B7 and B9 to Pond 1

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 24, 26

Peak discharge = 9.276 cfs
 Time to peak = 11.93 hrs
 Hyd. volume = 35,474 cuft
 Contrib. drain. area = 5.500 ac



Hydrograph Report

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

Monday, 06 / 29 / 2020

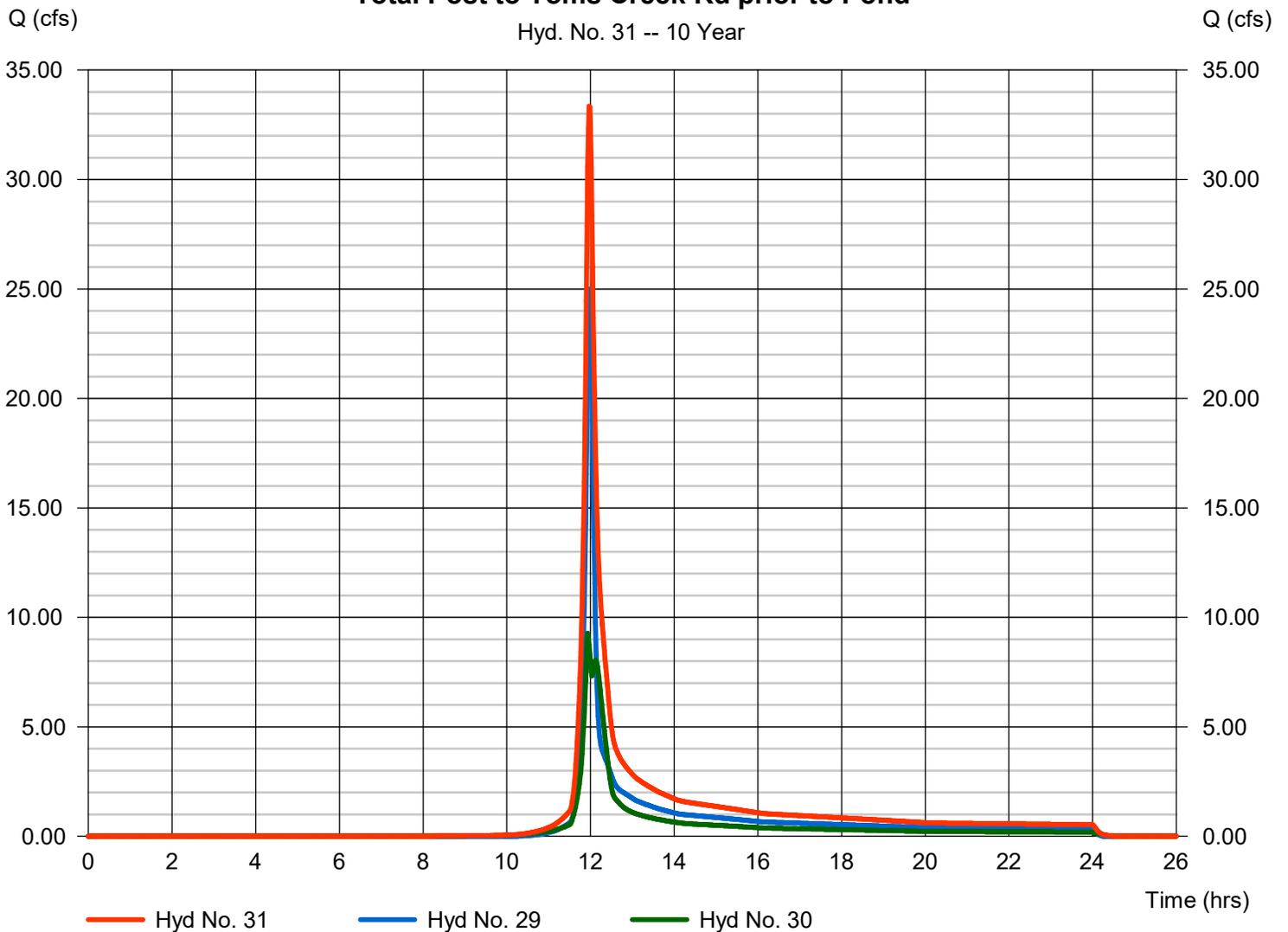
Hyd. No. 31

Total Post to Toms Creek Rd prior to Pond

Hydrograph type	= Combine	Peak discharge	= 33.34 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 92,089 cuft
Inflow hyds.	= 29, 30	Contrib. drain. area	= 0.000 ac

Total Post to Toms Creek Rd prior to Pond

Hyd. No. 31 -- 10 Year



Hydrograph Report

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

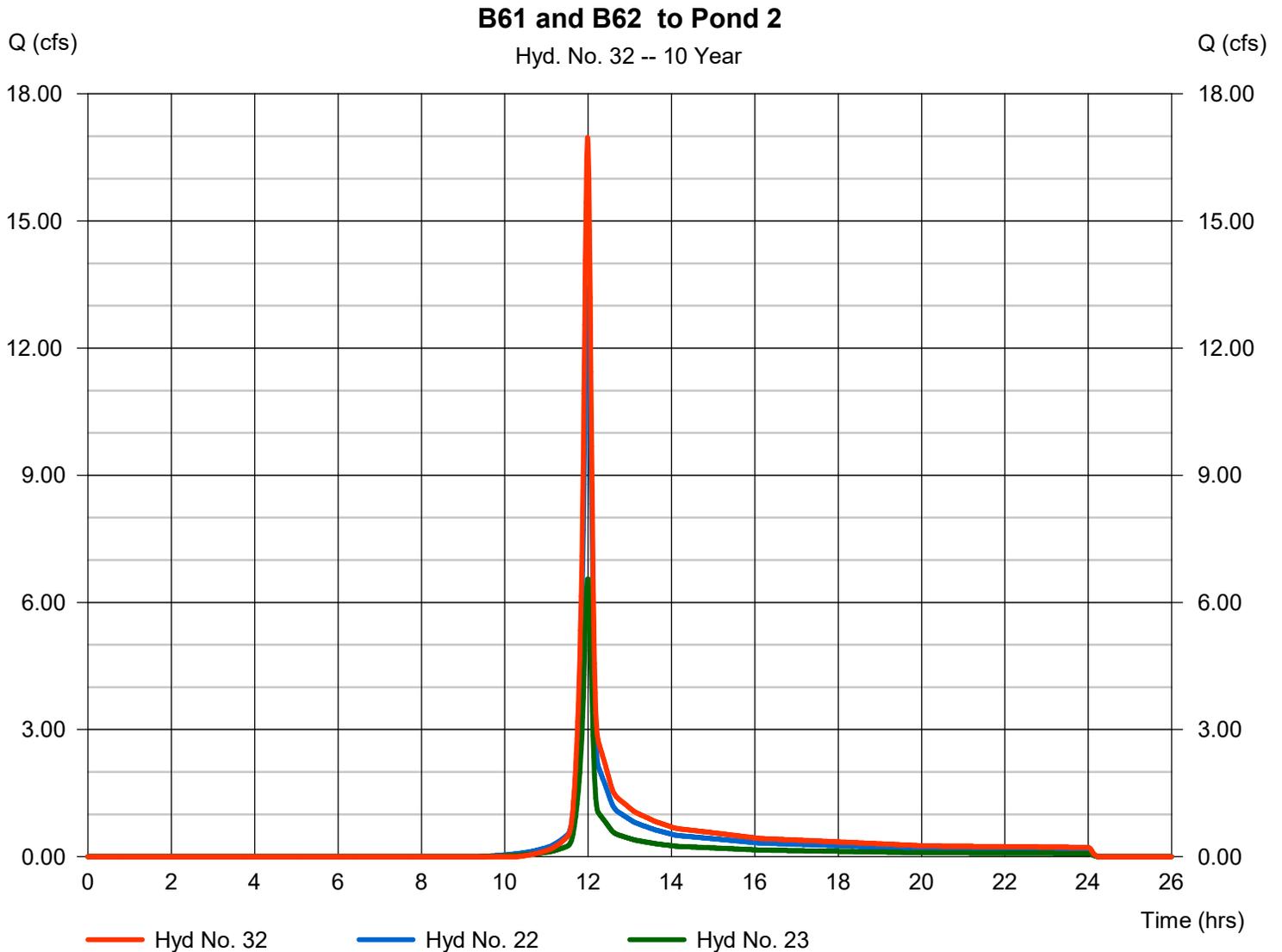
Monday, 06 / 29 / 2020

Hyd. No. 32

B61 and B62 to Pond 2

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 22, 23

Peak discharge = 16.96 cfs
Time to peak = 11.98 hrs
Hyd. volume = 37,811 cuft
Contrib. drain. area = 6.830 ac



Hydrograph Report

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

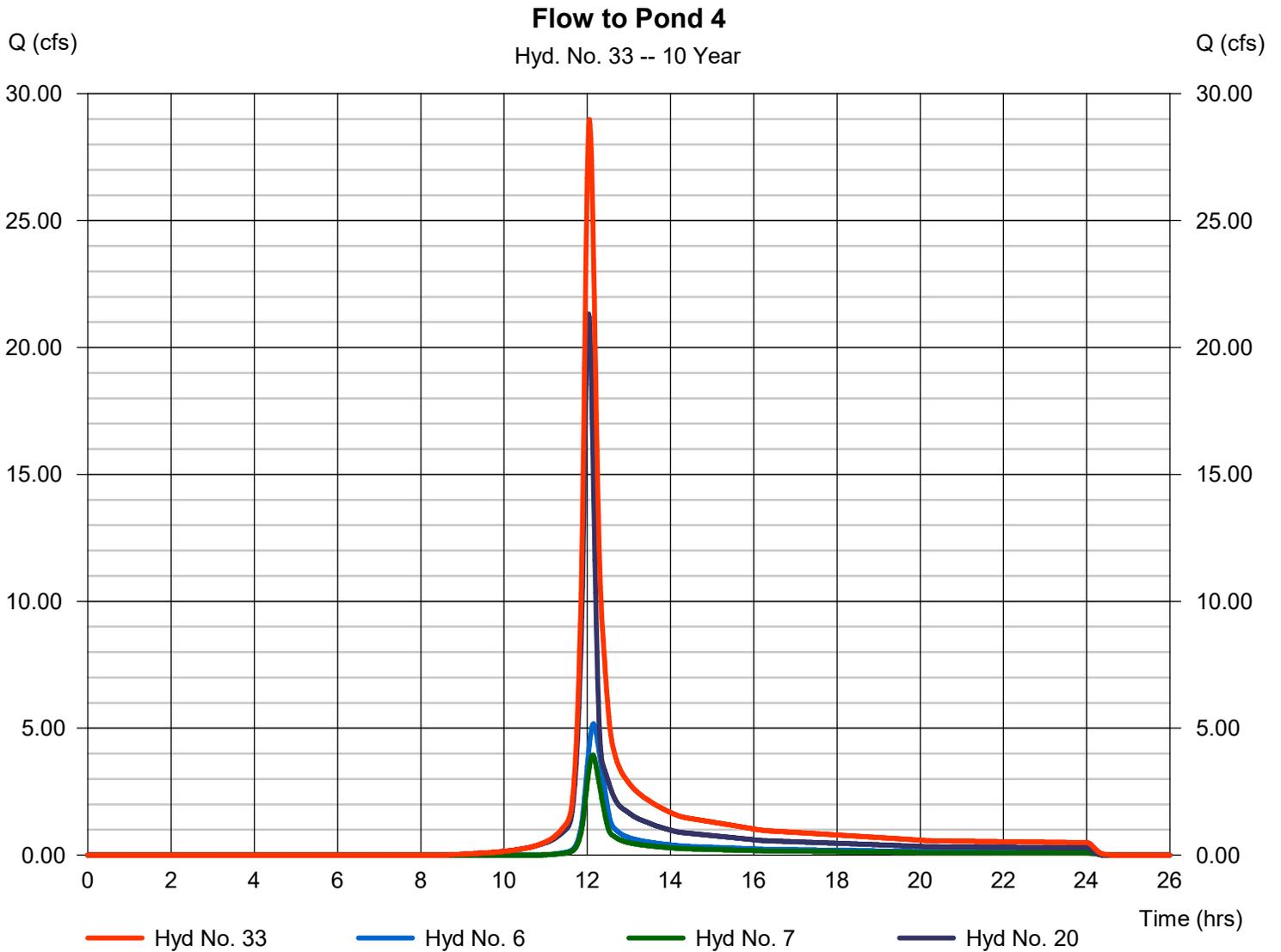
Monday, 06 / 29 / 2020

Hyd. No. 33

Flow to Pond 4

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 6, 7, 20

Peak discharge = 28.98 cfs
Time to peak = 12.05 hrs
Hyd. volume = 90,712 cuft
Contrib. drain. area = 14.270 ac



Hydrograph Report

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

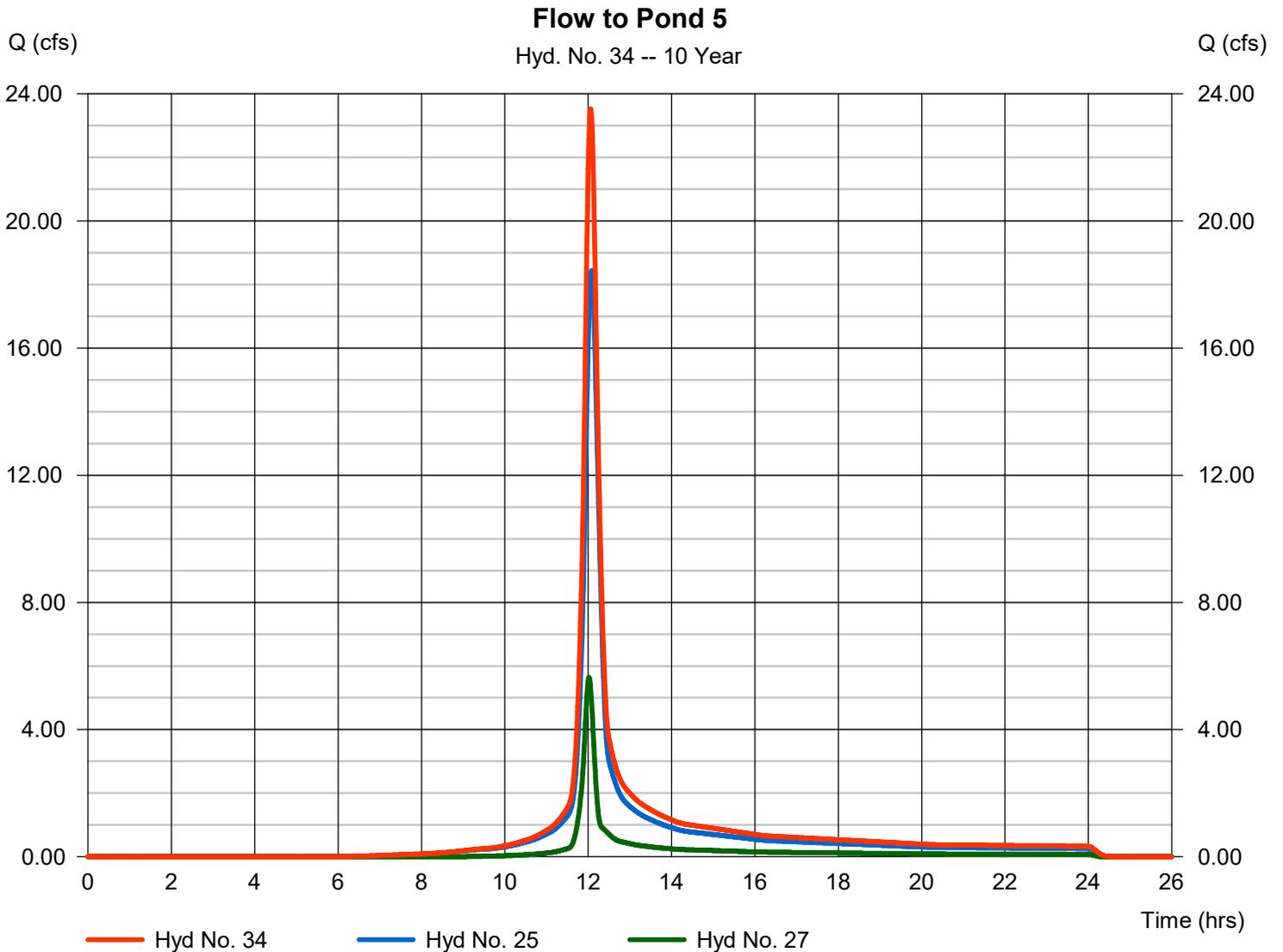
Monday, 06 / 29 / 2020

Hyd. No. 34

Flow to Pond 5

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 25, 27

Peak discharge = 23.52 cfs
Time to peak = 12.07 hrs
Hyd. volume = 72,177 cuft
Contrib. drain. area = 8.050 ac



Hydrograph Report

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

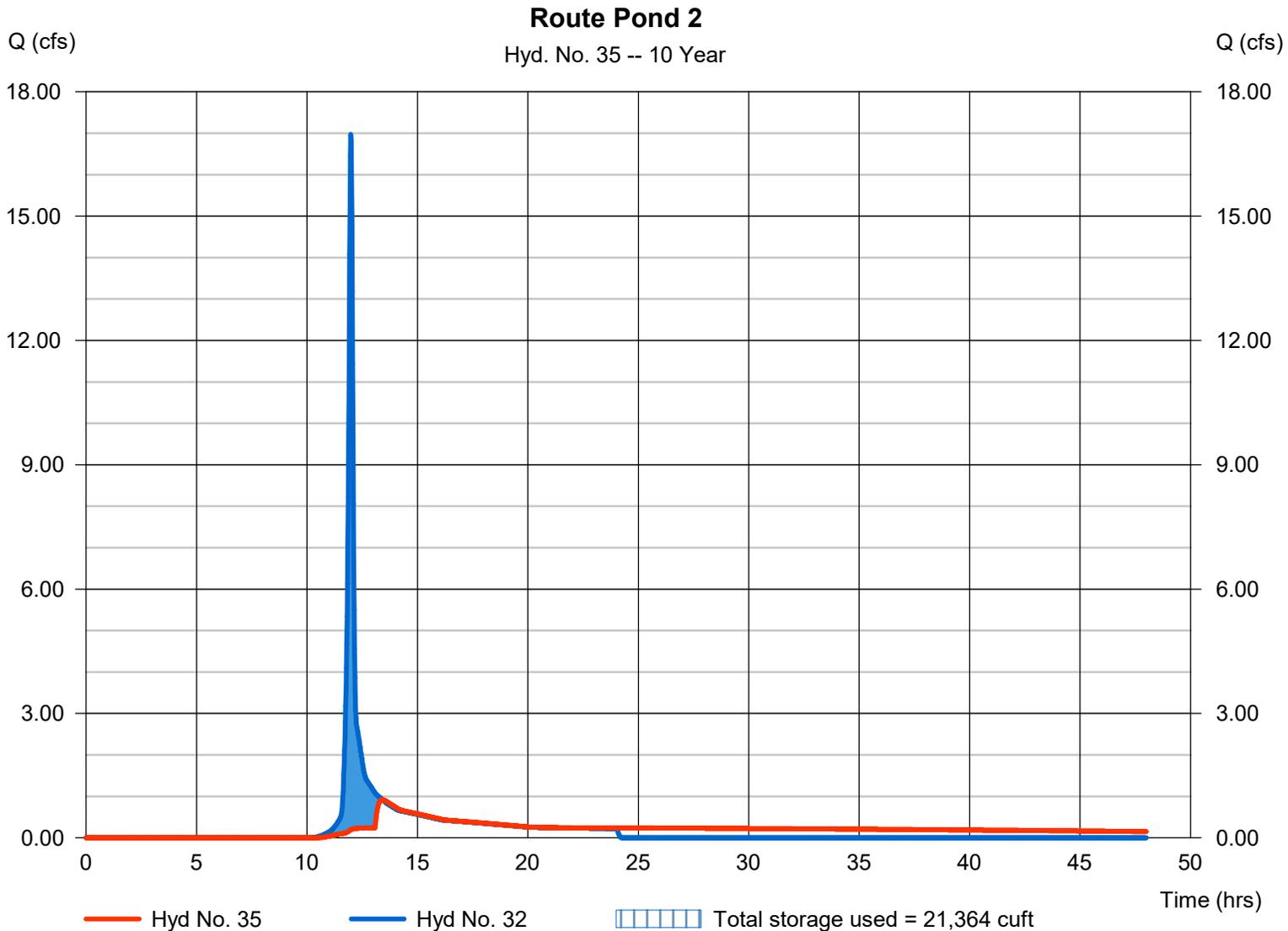
Monday, 06 / 29 / 2020

Hyd. No. 35

Route Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 0.917 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.42 hrs
Time interval	= 1 min	Hyd. volume	= 34,152 cuft
Inflow hyd. No.	= 32 - B61 and B62 to Pond 2	Max. Elevation	= 1989.54 ft
Reservoir name	= Pond 2	Max. Storage	= 21,364 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Pond 2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1984.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1984.00	00	0	0
1.00	1985.00	1,575	525	525
2.00	1986.00	3,350	2,407	2,932
3.00	1987.00	4,300	3,815	6,747
4.00	1988.00	5,375	4,827	11,574
5.00	1989.00	6,500	5,928	17,502
6.00	1990.00	7,800	7,139	24,641
7.00	1991.00	9,100	8,441	33,082
8.00	1992.00	10,500	9,791	42,873
9.00	1993.00	11,900	11,192	54,064

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	Inactive	0.00
Span (in)	= 24.00	2.00	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 1984.00	1984.00	1988.00	0.00
Length (ft)	= 80.00	0.50	0.50	0.00
Slope (%)	= 1.88	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	0.00	0.00	0.00
Crest El. (ft)	= 1989.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
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	Civ A cfs	Civ B cfs	Civ 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	1984.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.00	525	1985.00	0.11 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.098
2.00	2,932	1986.00	0.15 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.143
3.00	6,747	1987.00	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.177
4.00	11,574	1988.00	0.21 ic	0.21 ic	0.00	---	0.00	---	---	---	---	---	0.205
5.00	17,502	1989.00	0.24 ic	0.23 ic	0.00	---	0.00	---	---	---	---	---	0.230
6.00	24,641	1990.00	18.68 ic	0.20 ic	0.00	---	18.48	---	---	---	---	---	18.68
7.00	33,082	1991.00	36.79 ic	0.03 ic	0.00	---	36.76 s	---	---	---	---	---	36.79
8.00	42,873	1992.00	39.95 ic	0.02 ic	0.00	---	39.92 s	---	---	---	---	---	39.94
9.00	54,064	1993.00	42.75 ic	0.01 ic	0.00	---	42.61 s	---	---	---	---	---	42.62

Hydrograph Report

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

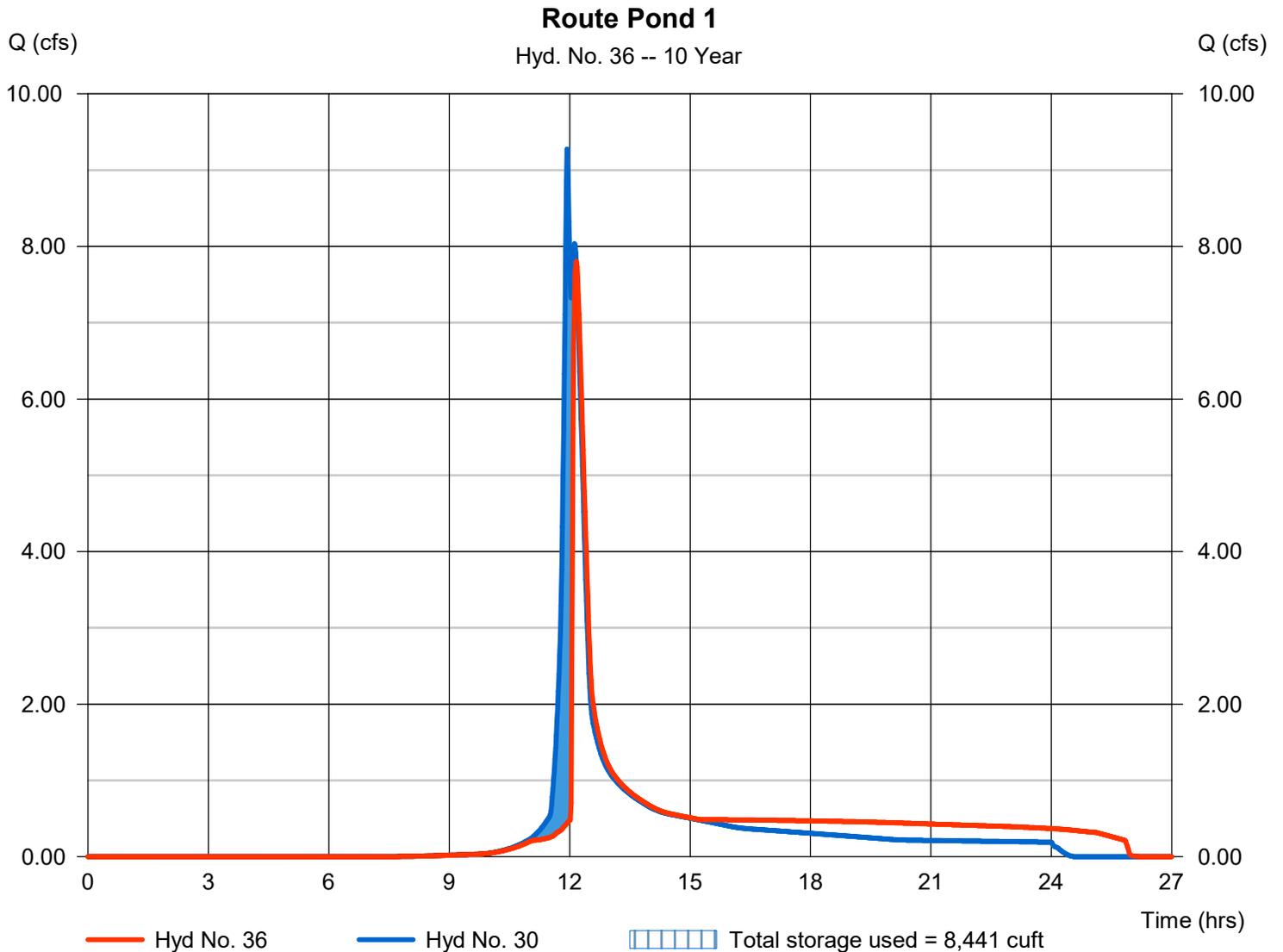
Monday, 06 / 29 / 2020

Hyd. No. 36

Route Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 7.807 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 1 min	Hyd. volume	= 35,474 cuft
Inflow hyd. No.	= 30 - Post B7 and B9 to Pond 1	Max. Elevation	= 2003.77 ft
Reservoir name	= Pond 1	Max. Storage	= 8,441 cuft

Storage Indication method used.



Pond No. 1 - Pond 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1999.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1999.00	00	0	0
1.00	2000.00	167	56	56
2.00	2001.00	1,380	676	731
3.00	2002.00	2,375	1,855	2,586
4.00	2003.00	3,350	2,848	5,435
5.00	2004.00	4,500	3,910	9,345
6.00	2005.00	5,900	5,184	14,529
7.00	2006.00	7,600	6,731	21,260

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	3.00	0.00	0.00
Span (in)	= 24.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1999.00	1999.00	0.00	0.00
Length (ft)	= 80.00	0.50	0.00	0.00
Slope (%)	= 6.88	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	Inactive	0.00	0.00
Crest El. (ft)	= 2003.50	2006.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
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	Civ A cfs	Civ B cfs	Civ 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	1999.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	56	2000.00	0.22 ic	0.21 ic	---	---	0.00	0.00	---	---	---	---	0.214
2.00	731	2001.00	0.32 ic	0.32 ic	---	---	0.00	0.00	---	---	---	---	0.315
3.00	2,586	2002.00	0.41 ic	0.39 ic	---	---	0.00	0.00	---	---	---	---	0.392
4.00	5,435	2003.00	0.48 ic	0.46 ic	---	---	0.00	0.00	---	---	---	---	0.456
5.00	9,345	2004.00	18.85 ic	0.37 ic	---	---	18.48	0.00	---	---	---	---	18.85
6.00	14,529	2005.00	33.60 ic	0.06 ic	---	---	33.53 s	0.00	---	---	---	---	33.59
7.00	21,260	2006.00	36.99 ic	0.03 ic	---	---	36.88 s	0.00	---	---	---	---	36.92

Hydrograph Report

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

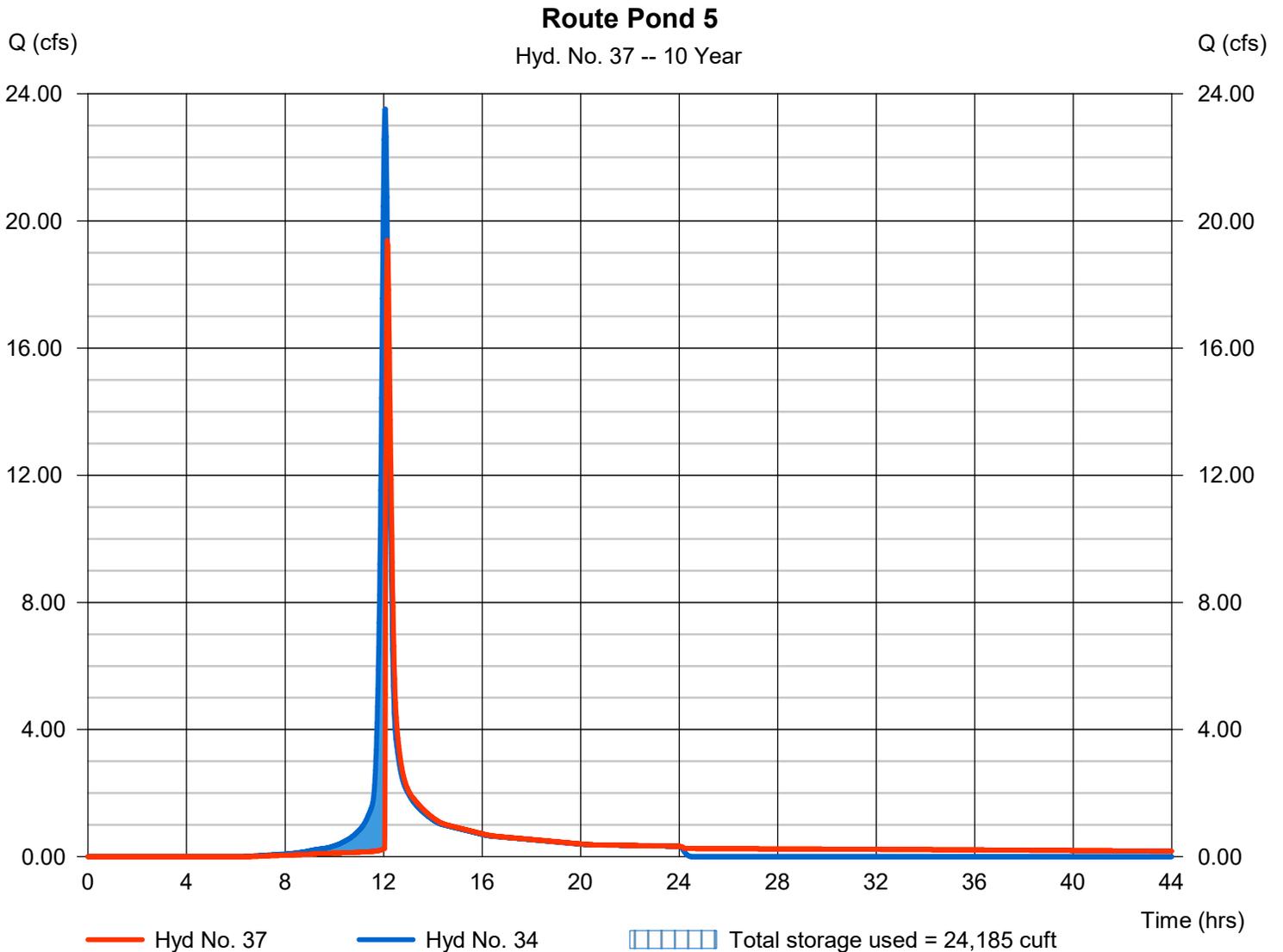
Monday, 06 / 29 / 2020

Hyd. No. 37

Route Pond 5

Hydrograph type	= Reservoir	Peak discharge	= 19.39 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 69,507 cuft
Inflow hyd. No.	= 34 - Flow to Pond 5	Max. Elevation	= 2005.51 ft
Reservoir name	= Pond 5	Max. Storage	= 24,185 cuft

Storage Indication method used.



Pond No. 5 - Pond 5

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1999.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1999.00	00	0	0
1.00	2000.00	1,900	633	633
2.00	2001.00	2,600	2,241	2,874
3.00	2002.00	3,400	2,991	5,865
4.00	2003.00	4,400	3,889	9,754
5.00	2004.00	5,400	4,891	14,645
6.00	2005.00	6,500	5,941	20,585
7.00	2006.00	7,600	7,042	27,628

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	0.00	0.00
Span (in)	= 24.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1997.00	1997.00	0.00	0.00
Length (ft)	= 88.00	0.50	0.00	0.00
Slope (%)	= 1.70	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	Inactive	0.00	0.00
Crest El. (ft)	= 2005.00	2006.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
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	Civ A cfs	Civ B cfs	Civ 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	1999.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	633	2000.00	15.12 ic	0.11 ic	---	---	0.00	0.00	---	---	---	---	0.105
2.00	2,874	2001.00	15.12 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.149
3.00	5,865	2002.00	15.12 ic	0.18 ic	---	---	0.00	0.00	---	---	---	---	0.182
4.00	9,754	2003.00	15.12 ic	0.21 ic	---	---	0.00	0.00	---	---	---	---	0.210
5.00	14,645	2004.00	15.12 ic	0.23 ic	---	---	0.00	0.00	---	---	---	---	0.235
6.00	20,585	2005.00	15.12 ic	0.26 ic	---	---	0.00	0.00	---	---	---	---	0.257
7.00	27,628	2006.00	41.66 ic	0.07 ic	---	---	41.59 s	0.00	---	---	---	---	41.66

Hydrograph Report

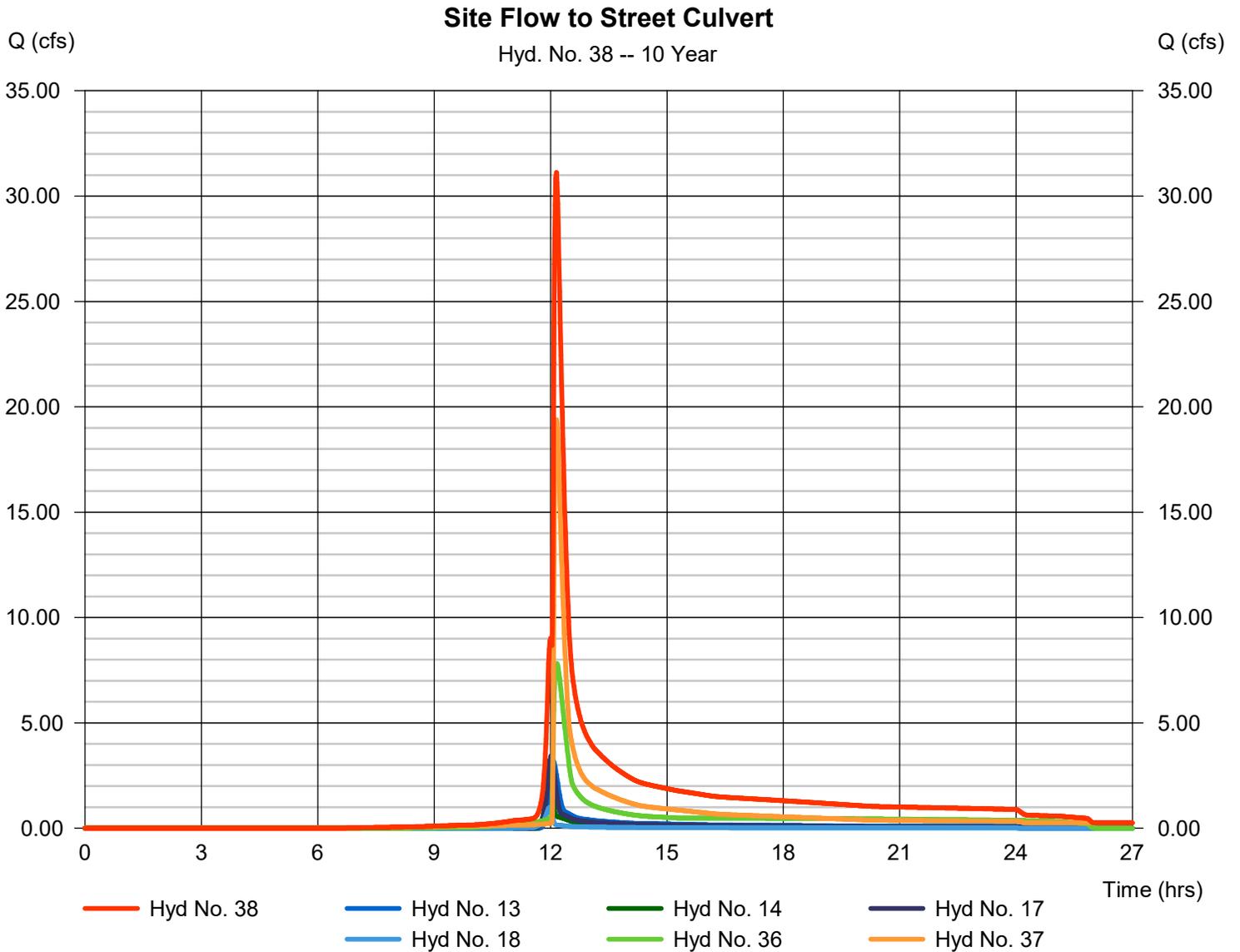
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 38

Site Flow to Street Culvert

Hydrograph type	= Combine	Peak discharge	= 31.12 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 129,619 cuft
Inflow hyds.	= 13, 14, 17, 18, 36, 37	Contrib. drain. area	= 8.450 ac



Hydrograph Report

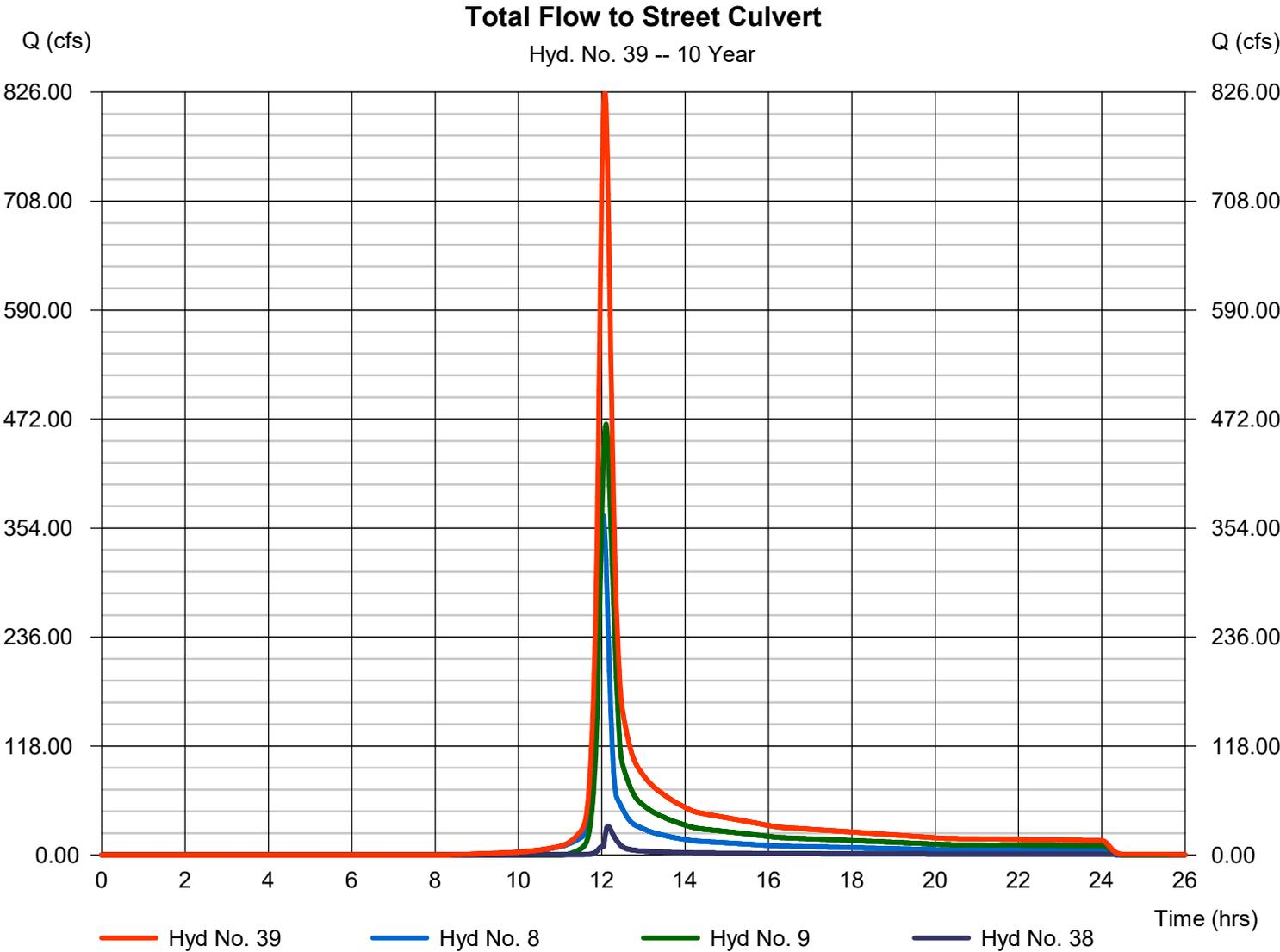
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Monday, 06 / 29 / 2020

Hyd. No. 39

Total Flow to Street Culvert

Hydrograph type	= Combine	Peak discharge	= 824.58 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 2,662,328 cuft
Inflow hyds.	= 8, 9, 38	Contrib. drain. area	= 461.330 ac



Hydrograph Report

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

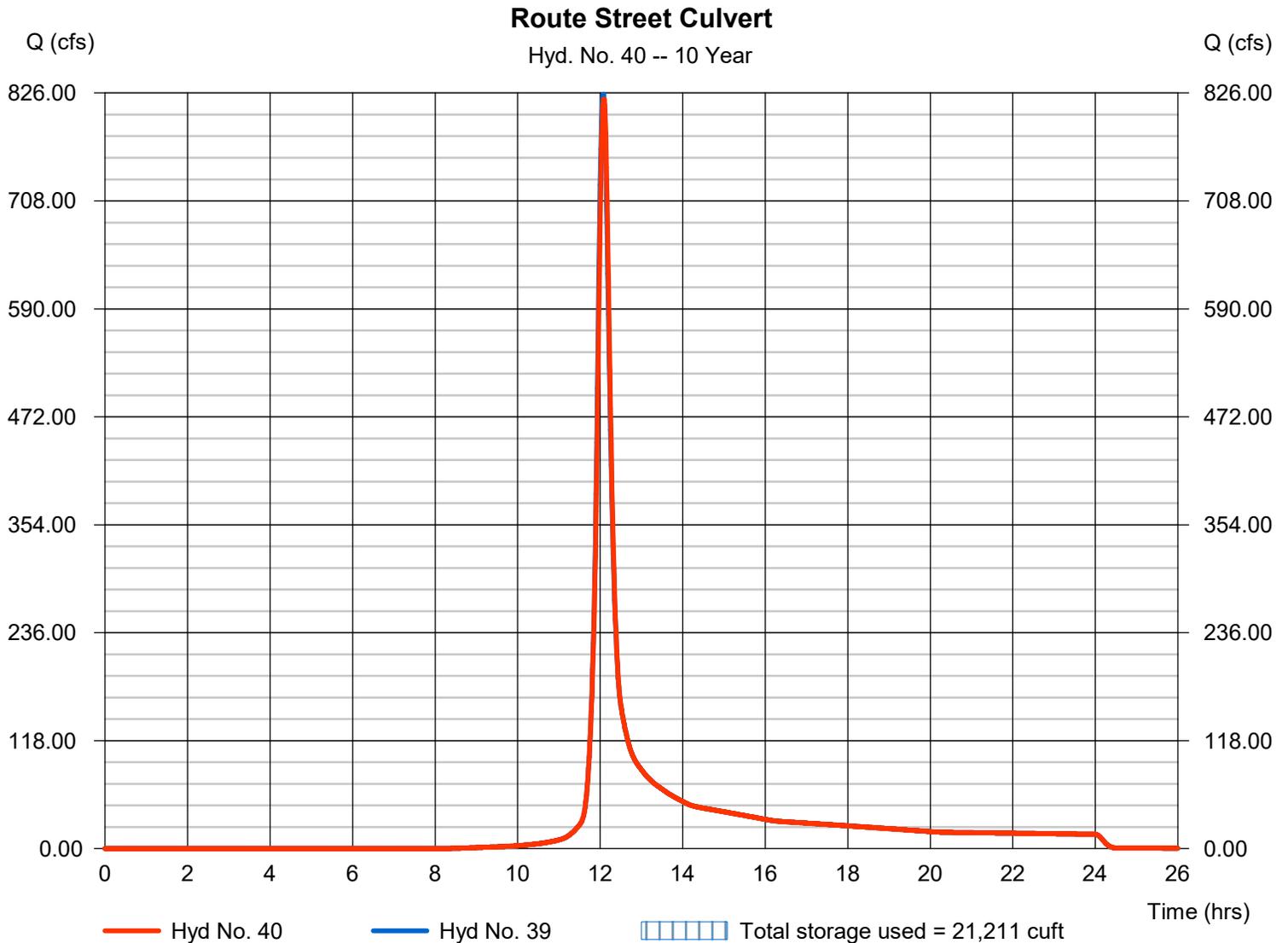
Monday, 06 / 29 / 2020

Hyd. No. 40

Route Street Culvert

Hydrograph type	= Reservoir	Peak discharge	= 819.44 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 2,662,327 cuft
Inflow hyd. No.	= 39 - Total Flow to Street Culvert	Max. Elevation	= 1989.14 ft
Reservoir name	= Street Culvert Pond	Max. Storage	= 21,211 cuft

Storage Indication method used.



Pond Report

Pond No. 6 - Street Culvert Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1983.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1983.00	00	0	0
1.00	1984.00	01	0	0
2.00	1985.00	405	142	142
3.00	1986.00	2,300	1,223	1,366
4.00	1987.00	4,630	3,397	4,763
5.00	1988.00	7,275	5,902	10,665
6.00	1989.00	10,469	8,823	19,488
7.00	1990.00	14,950	12,642	32,130
8.00	1991.00	22,760	18,717	50,847
9.00	1992.00	31,310	26,919	77,766
10.00	1993.00	42,750	36,878	114,644
11.00	1994.00	54,625	48,562	163,206
12.00	1995.00	63,675	59,086	222,292
13.00	1996.00	75,690	69,589	291,881
14.00	1997.00	91,375	83,401	375,282
15.00	1998.00	104,570	97,889	473,171
16.00	1999.00	117,250	110,838	584,009
17.00	2000.00	134,055	125,546	709,555
18.00	2001.00	145,000	139,478	849,033

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 96.00	0.00	0.00	0.00
Span (in)	= 95.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 1983.00	0.00	0.00	0.00
Length (ft)	= 218.40	0.00	0.00	0.00
Slope (%)	= 1.49	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	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 100.00	0.00	0.00	0.00
Crest El. (ft)	= 2007.78	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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	1983.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.00	0	1984.00	53.91 ic	---	---	---	0.00	---	---	---	---	---	53.91
2.00	142	1985.00	152.47 ic	---	---	---	0.00	---	---	---	---	---	152.47
3.00	1,366	1986.00	280.11 ic	---	---	---	0.00	---	---	---	---	---	280.11
4.00	4,763	1987.00	431.26 ic	---	---	---	0.00	---	---	---	---	---	431.26
5.00	10,665	1988.00	602.71 ic	---	---	---	0.00	---	---	---	---	---	602.71
6.00	19,488	1989.00	792.28 ic	---	---	---	0.00	---	---	---	---	---	792.28
7.00	32,130	1990.00	998.39 ic	---	---	---	0.00	---	---	---	---	---	998.39
8.00	50,847	1991.00	1219.79 ic	---	---	---	0.00	---	---	---	---	---	1219.79
9.00	77,766	1992.00	1363.77 ic	---	---	---	0.00	---	---	---	---	---	1363.77
10.00	114,644	1993.00	1493.94 ic	---	---	---	0.00	---	---	---	---	---	1493.94
11.00	163,206	1994.00	1613.64 ic	---	---	---	0.00	---	---	---	---	---	1613.64
12.00	222,292	1995.00	1725.05 ic	---	---	---	0.00	---	---	---	---	---	1725.05
13.00	291,881	1996.00	1829.69 ic	---	---	---	0.00	---	---	---	---	---	1829.69
14.00	375,282	1997.00	1928.66 ic	---	---	---	0.00	---	---	---	---	---	1928.66
15.00	473,171	1998.00	2022.80 ic	---	---	---	0.00	---	---	---	---	---	2022.80
16.00	584,009	1999.00	2112.75 ic	---	---	---	0.00	---	---	---	---	---	2112.75
17.00	709,555	2000.00	2199.01 ic	---	---	---	0.00	---	---	---	---	---	2199.01
18.00	849,033	2001.00	2282.03 ic	---	---	---	0.00	---	---	---	---	---	2282.03

Hydrograph Report

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

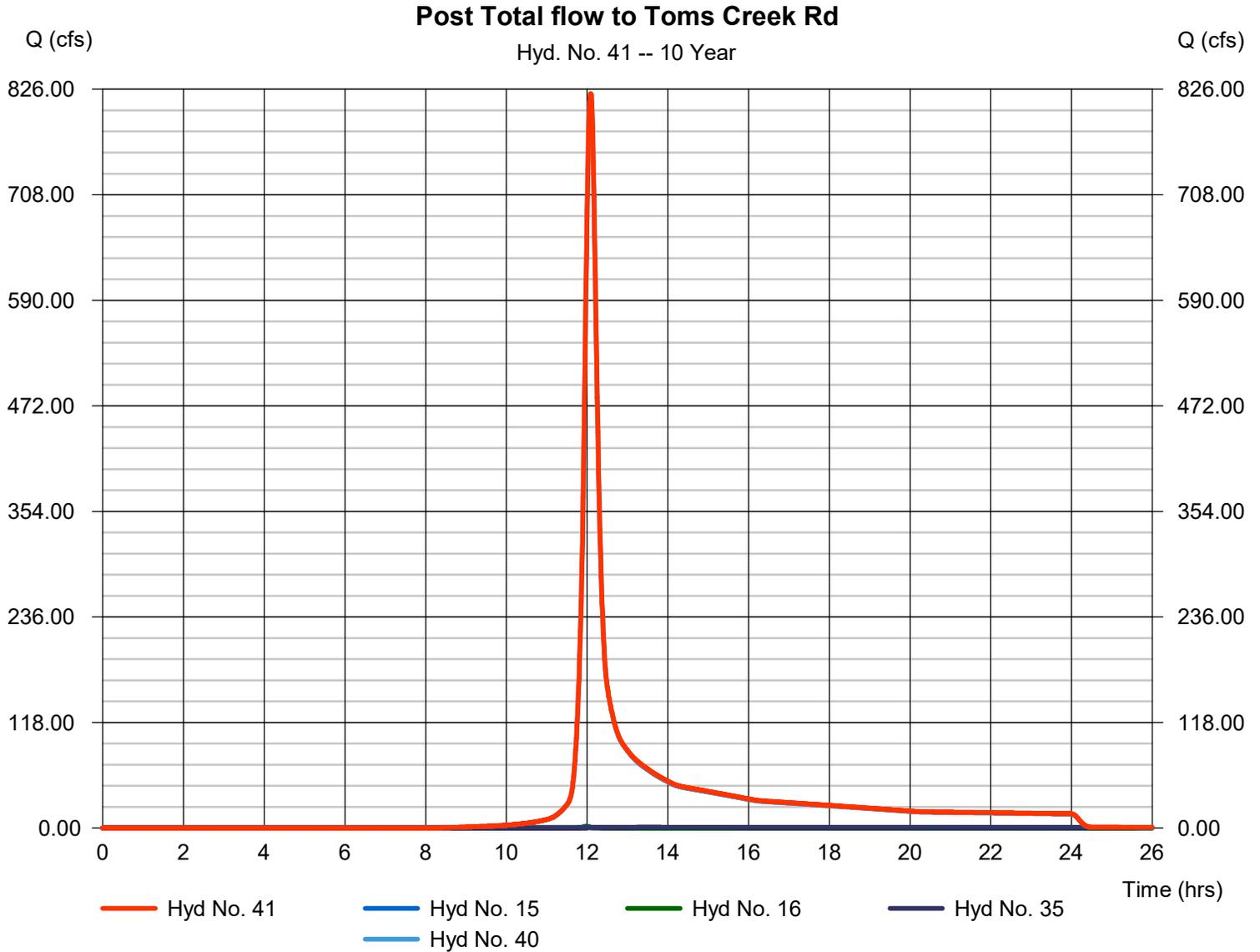
Monday, 06 / 29 / 2020

Hyd. No. 41

Post Total flow to Toms Creek Rd

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 15, 16, 35, 40

Peak discharge = 821.10 cfs
 Time to peak = 12.08 hrs
 Hyd. volume = 2,703,973 cuft
 Contrib. drain. area = 2.220 ac



Hydrograph Report

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

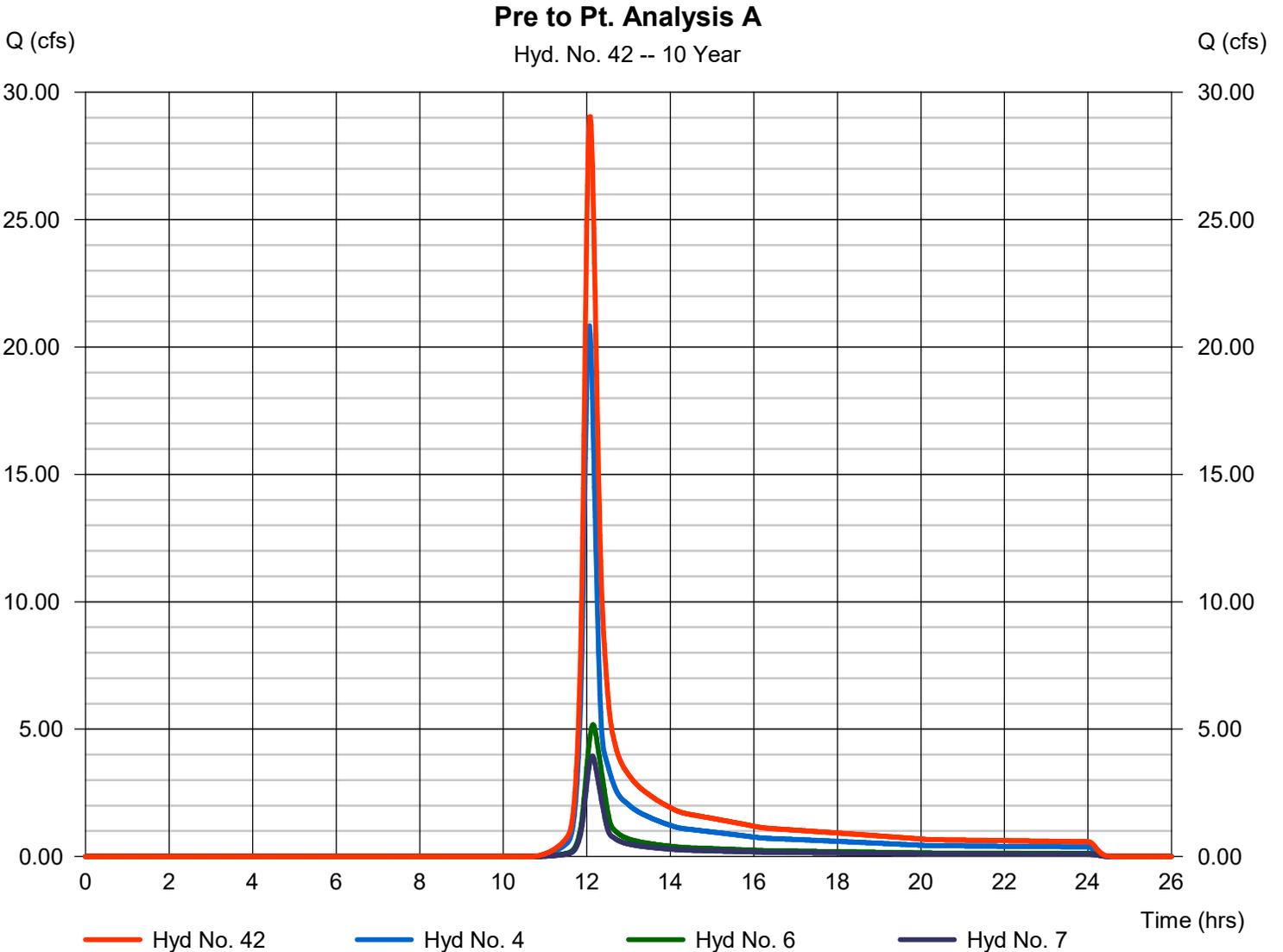
Monday, 06 / 29 / 2020

Hyd. No. 42

Pre to Pt. Analysis A

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 4, 6, 7

Peak discharge = 29.04 cfs
Time to peak = 12.08 hrs
Hyd. volume = 94,839 cuft
Contrib. drain. area = 18.490 ac



Hydrograph Report

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

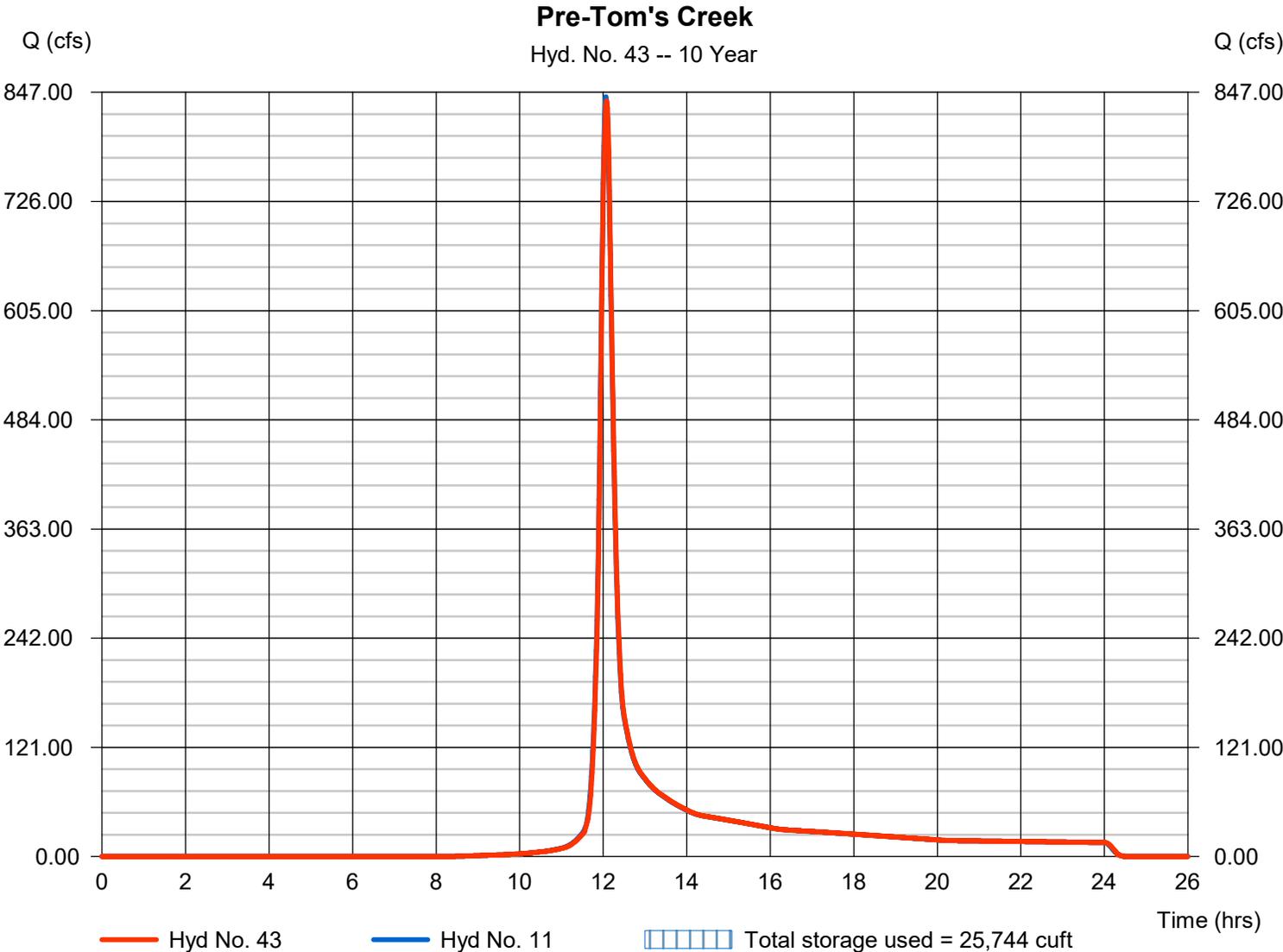
Monday, 06 / 29 / 2020

Hyd. No. 43

Pre-Tom's Creek

Hydrograph type	= Reservoir	Peak discharge	= 837.34 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 2,638,303 cuft
Inflow hyd. No.	= 11 - PreDev Flow - Toms Creek	Max. Elevation	= 1980.15 ft
Reservoir name	= PreDevCondition	Max. Storage	= 25,744 cuft

Storage Indication method used.



Pond No. 11 - PreDevCondition

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1975.10 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1975.10	00	0	0
0.90	1976.00	83	25	25
2.90	1978.00	2,686	2,161	2,185
4.90	1980.00	19,181	19,361	21,547
6.90	1982.00	36,979	55,190	76,736
8.90	1984.00	57,331	93,560	170,296
10.90	1986.00	78,620	135,378	305,675
12.90	1988.00	97,681	175,939	481,613
14.90	1990.00	115,925	213,324	694,938

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1975.10	0.00	0.00	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 4.78	0.00	0.00	n/a
N-Value	= .020	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 90.00	0.00	0.00	0.00
Crest El. (ft)	= 1977.90	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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	Civ A cfs	Civ B cfs	Civ 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	1975.10	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.90	25	1976.00	5.15 ic	---	---	---	0.00	---	---	---	---	---	5.149
2.90	2,185	1978.00	30.36 ic	---	---	---	7.40	---	---	---	---	---	37.75
4.90	21,547	1980.00	45.15 ic	---	---	---	712.09	---	---	---	---	---	757.24
6.90	76,736	1982.00	56.17 ic	---	---	---	1942.62	---	---	---	---	---	1998.79
8.90	170,296	1984.00	65.36 ic	---	---	---	3525.40	---	---	---	---	---	3590.76
10.90	305,675	1986.00	73.41 ic	---	---	---	5394.38	---	---	---	---	---	5467.79
12.90	481,613	1988.00	80.66 ic	---	---	---	7510.98	---	---	---	---	---	7591.64
14.90	694,938	1990.00	87.31 ic	---	---	---	9849.01	---	---	---	---	---	9936.32

Hydrograph Report

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

Monday, 06 / 29 / 2020

Hyd. No. 44

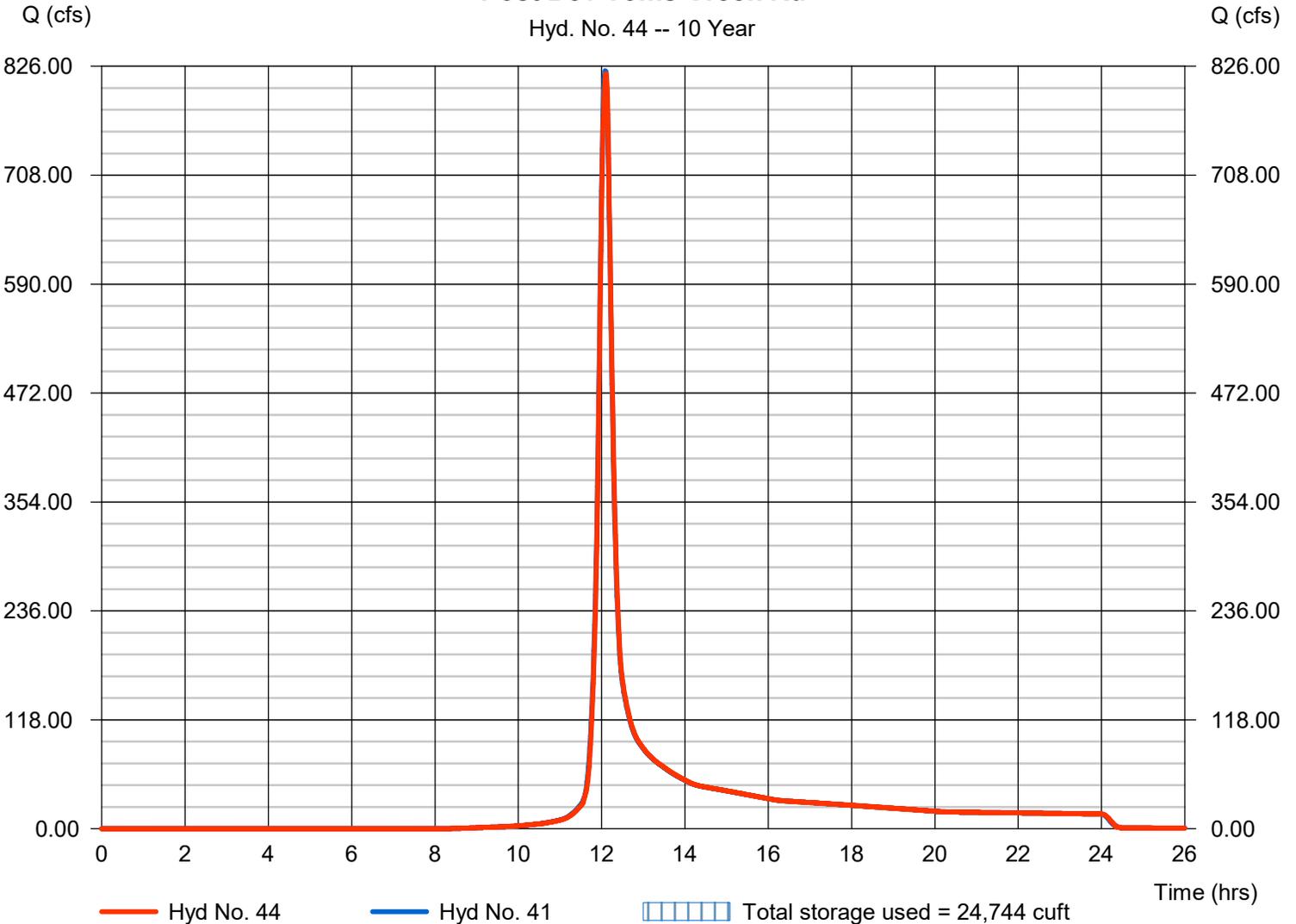
Post Dev Toms Creek Rd

Hydrograph type	= Reservoir	Peak discharge	= 818.24 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 2,703,967 cuft
Inflow hyd. No.	= 41 - Post Total flow to Toms Creek Rd	Max. Elevation	= 1980.12 ft
Reservoir name	= PreDevCondition	Max. Storage	= 24,744 cuft

Storage Indication method used.

Post Dev Toms Creek Rd

Hyd. No. 44 -- 10 Year



Pond No. 11 - PreDevCondition

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1975.10 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1975.10	00	0	0
0.90	1976.00	83	25	25
2.90	1978.00	2,686	2,161	2,185
4.90	1980.00	19,181	19,361	21,547
6.90	1982.00	36,979	55,190	76,736
8.90	1984.00	57,331	93,560	170,296
10.90	1986.00	78,620	135,378	305,675
12.90	1988.00	97,681	175,939	481,613
14.90	1990.00	115,925	213,324	694,938

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1975.10	0.00	0.00	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 4.78	0.00	0.00	n/a
N-Value	= .020	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 90.00	0.00	0.00	0.00
Crest El. (ft)	= 1977.90	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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	Civ A cfs	Civ B cfs	Civ 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	1975.10	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.90	25	1976.00	5.15 ic	---	---	---	0.00	---	---	---	---	---	5.149
2.90	2,185	1978.00	30.36 ic	---	---	---	7.40	---	---	---	---	---	37.75
4.90	21,547	1980.00	45.15 ic	---	---	---	712.09	---	---	---	---	---	757.24
6.90	76,736	1982.00	56.17 ic	---	---	---	1942.62	---	---	---	---	---	1998.79
8.90	170,296	1984.00	65.36 ic	---	---	---	3525.40	---	---	---	---	---	3590.76
10.90	305,675	1986.00	73.41 ic	---	---	---	5394.38	---	---	---	---	---	5467.79
12.90	481,613	1988.00	80.66 ic	---	---	---	7510.98	---	---	---	---	---	7591.64
14.90	694,938	1990.00	87.31 ic	---	---	---	9849.01	---	---	---	---	---	9936.32

Hydrograph Report

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

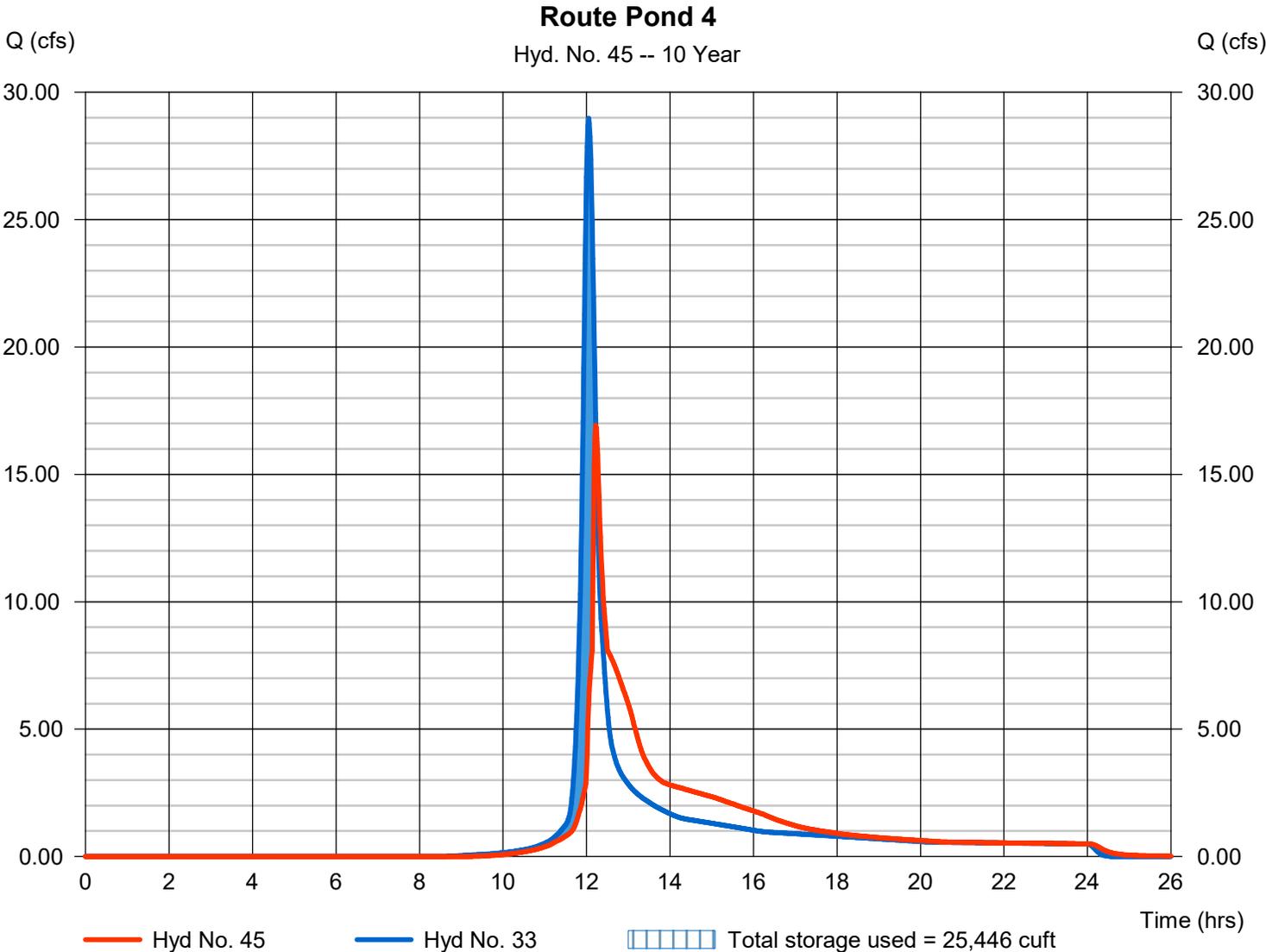
Monday, 06 / 29 / 2020

Hyd. No. 45

Route Pond 4

Hydrograph type	= Reservoir	Peak discharge	= 16.93 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.22 hrs
Time interval	= 1 min	Hyd. volume	= 90,702 cuft
Inflow hyd. No.	= 33 - Flow to Pond 4	Max. Elevation	= 2031.30 ft
Reservoir name	= Pond 4	Max. Storage	= 25,446 cuft

Storage Indication method used.



Pond No. 4 - Pond 4

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2025.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2025.50	1,000	0	0
0.50	2026.00	2,000	736	736
1.50	2027.00	3,000	2,483	3,219
2.50	2028.00	4,000	3,488	6,706
3.50	2029.00	5,000	4,490	11,196
4.50	2030.00	6,000	5,492	16,688
5.50	2031.00	7,000	6,493	23,181
6.50	2032.00	8,000	7,494	30,675
7.50	2033.00	9,000	8,494	39,169
8.50	2034.00	1,000	4,333	43,502

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	8.00	12.00	0.00
Span (in)	= 24.00	8.00	12.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 2025.50	2025.50	2029.00	0.00
Length (ft)	= 60.00	0.50	0.50	0.00
Slope (%)	= 3.75	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	10.00	0.00	0.00
Crest El. (ft)	= 2031.00	2033.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	Yes	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	Civ A cfs	Civ B cfs	Civ 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	2025.50	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.50	736	2026.00	0.60 ic	0.60 ic	0.00	---	0.00	0.00	---	---	---	---	0.599
1.50	3,219	2027.00	1.66 ic	1.66 ic	0.00	---	0.00	0.00	---	---	---	---	1.657
2.50	6,706	2028.00	2.30 ic	2.30 ic	0.00	---	0.00	0.00	---	---	---	---	2.299
3.50	11,196	2029.00	2.81 ic	2.81 ic	0.00	---	0.00	0.00	---	---	---	---	2.814
4.50	16,688	2030.00	5.80 ic	3.12 ic	2.67 ic	---	0.00	0.00	---	---	---	---	5.797
5.50	23,181	2031.00	8.12 ic	3.46 ic	4.63 ic	---	0.00	0.00	---	---	---	---	8.090
6.50	30,675	2032.00	34.81 ic	0.76 ic	1.70 ic	---	32.35 s	0.00	---	---	---	---	34.81
7.50	39,169	2033.00	38.45 ic	0.33 ic	0.73 ic	---	37.36 s	0.00	---	---	---	---	38.42
8.50	43,502	2034.00	41.39 ic	0.17 ic	0.38 ic	---	35.56 s	5.19 s	---	---	---	---	41.30

Hydrograph Report

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

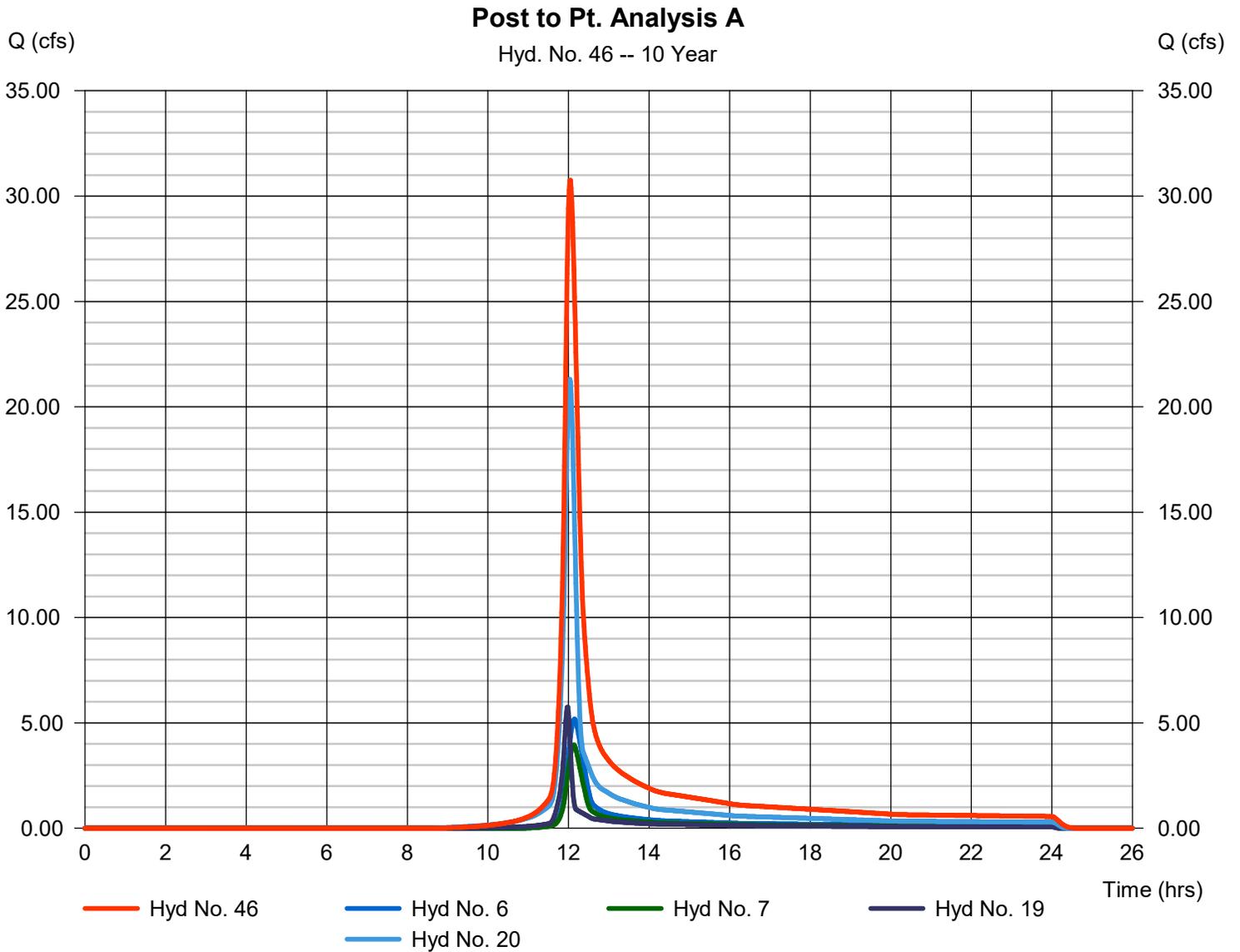
Monday, 06 / 29 / 2020

Hyd. No. 46

Post to Pt. Analysis A

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 6, 7, 19, 20

Peak discharge = 30.75 cfs
 Time to peak = 12.05 hrs
 Hyd. volume = 101,501 cuft
 Contrib. drain. area = 16.150 ac



Hydrograph Report

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

Monday, 06 / 29 / 2020

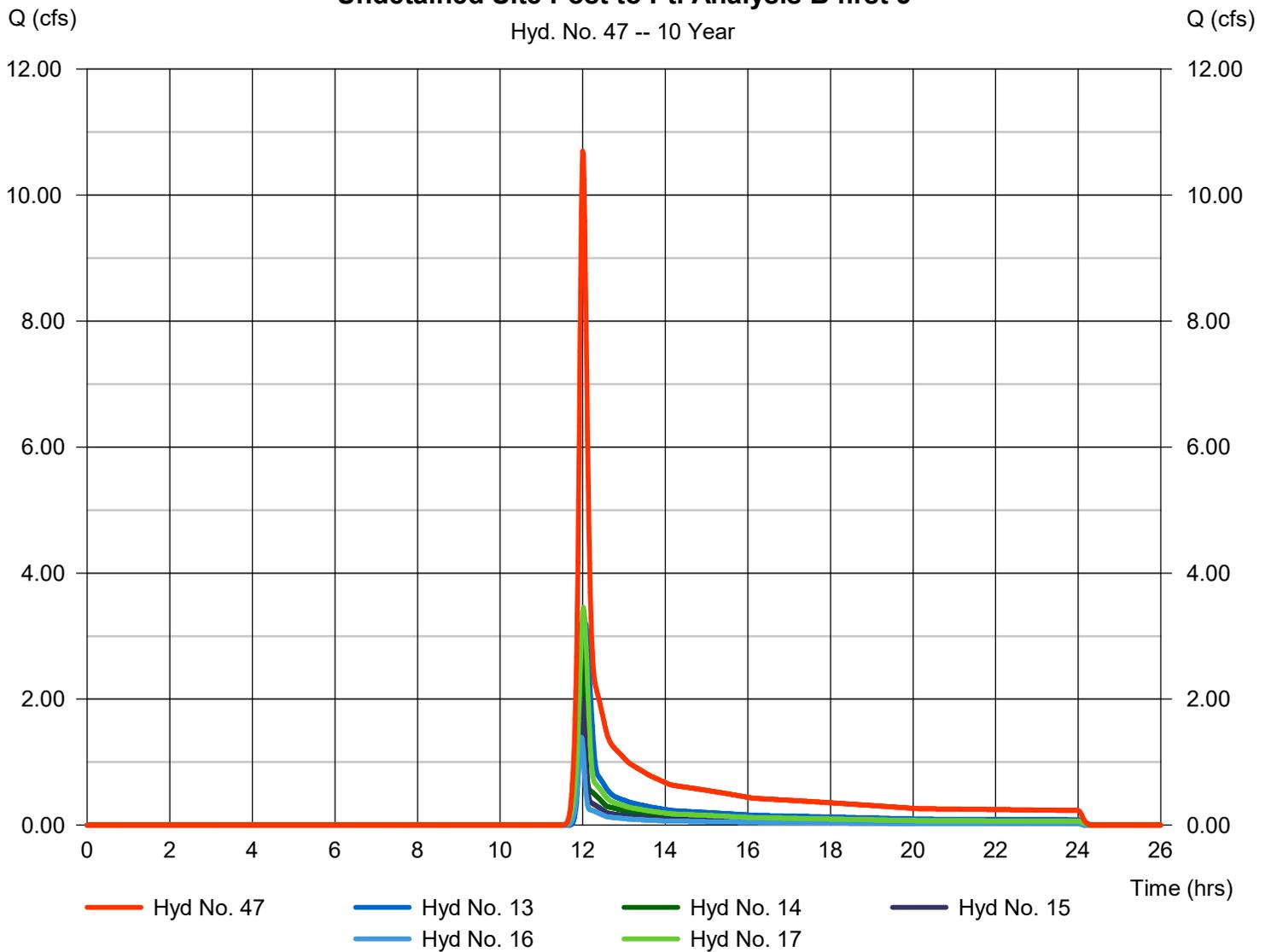
Hyd. No. 47

Undetained Site Post to Pt. Analysis B first 5

Hydrograph type	= Combine	Peak discharge	= 10.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 29,862 cuft
Inflow hyds.	= 13, 14, 15, 16, 17	Contrib. drain. area	= 10.330 ac

Undetained Site Post to Pt. Analysis B first 5

Hyd. No. 47 -- 10 Year



Hydrograph Report

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

Monday, 06 / 29 / 2020

Hyd. No. 48

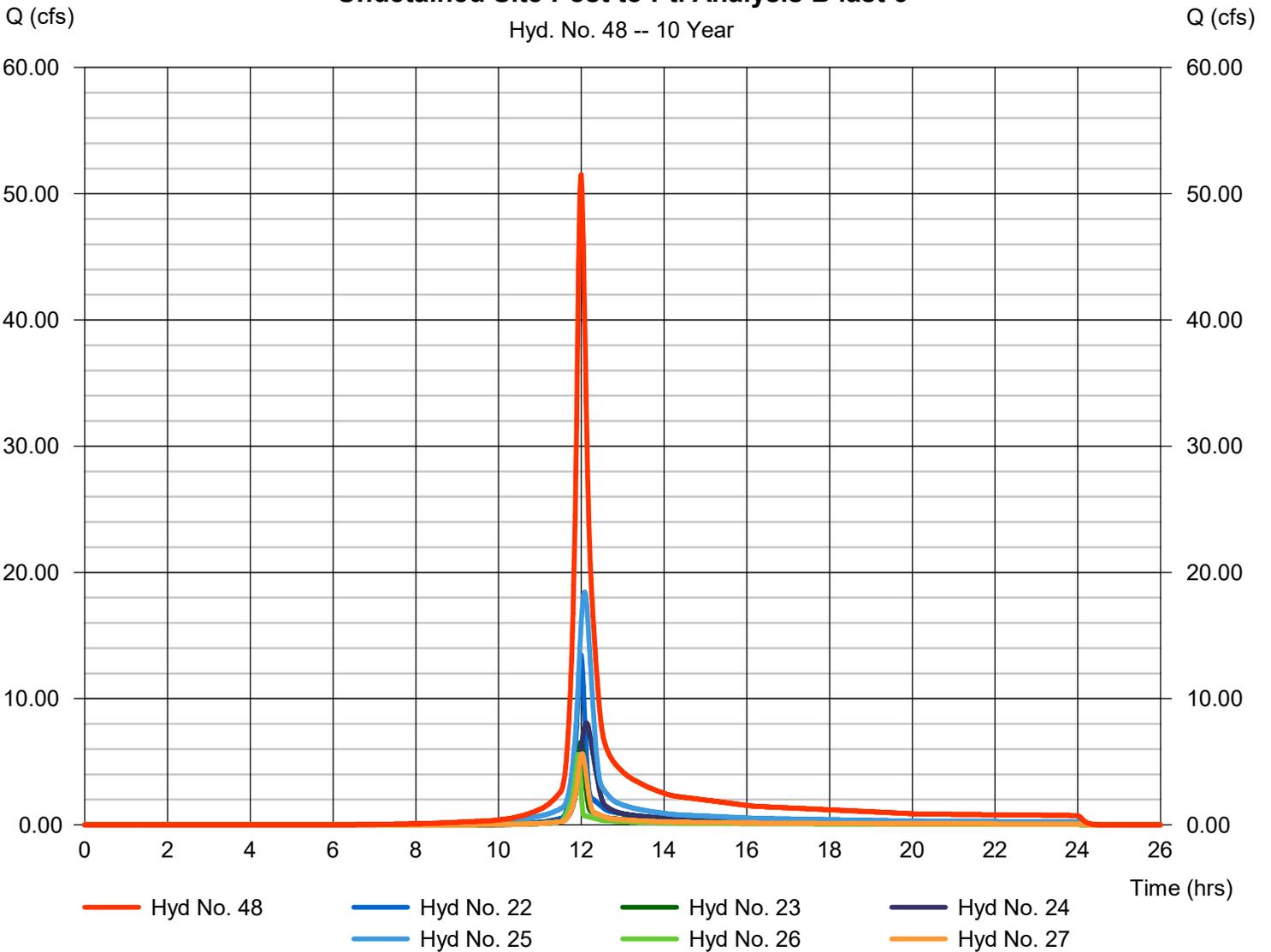
Undetained Site Post to Pt. Analysis B last 6

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 22, 23, 24, 25, 26, 27

Peak discharge = 51.52 cfs
 Time to peak = 12.00 hrs
 Hyd. volume = 146,733 cuft
 Contrib. drain. area = 20.380 ac

Undetained Site Post to Pt. Analysis B last 6

Hyd. No. 48 -- 10 Year



Hydrograph Report

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

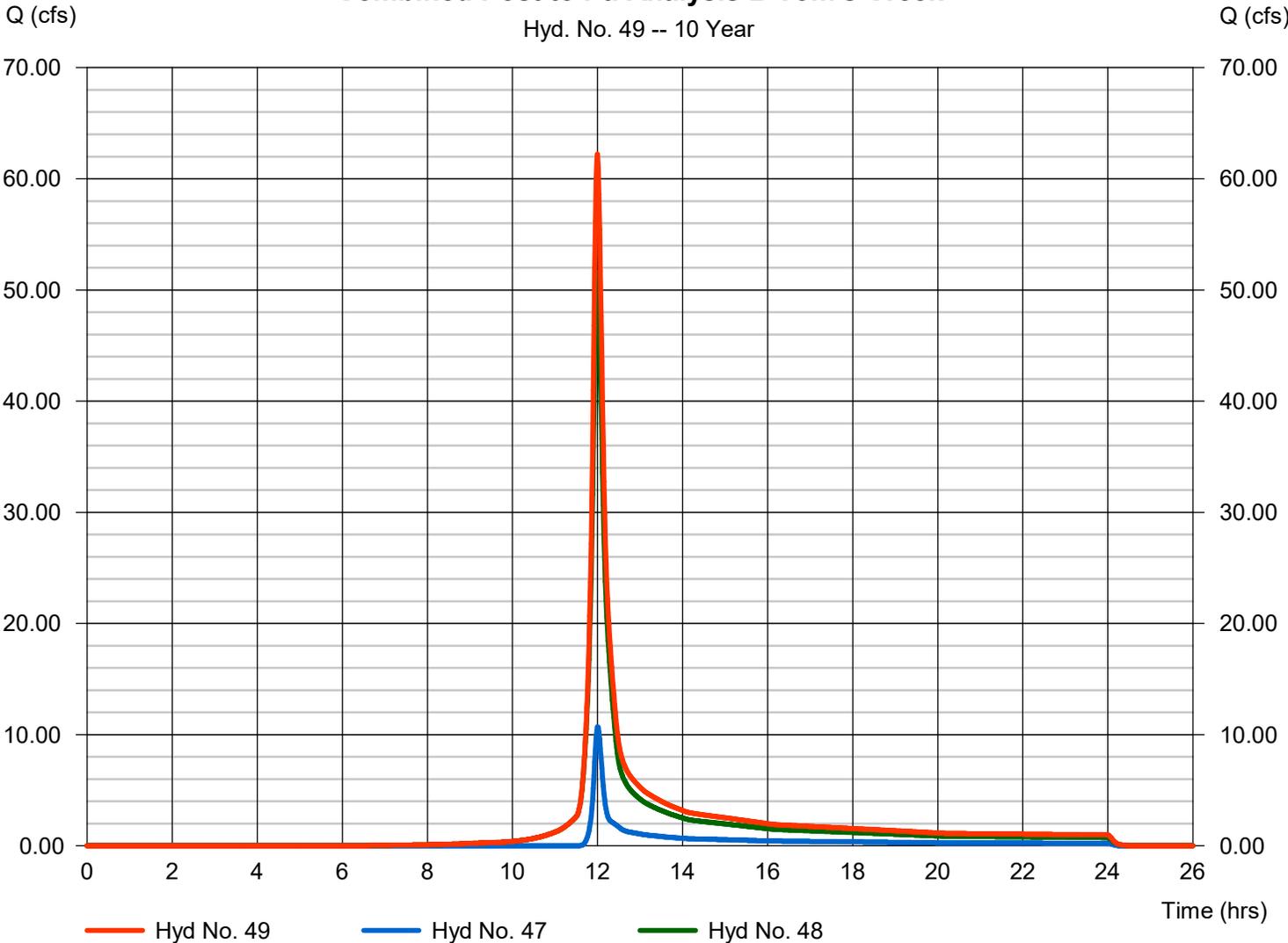
Monday, 06 / 29 / 2020

Hyd. No. 49

Combined Post to Pt. Analysis B Tom's Creek

Hydrograph type	= Combine	Peak discharge	= 62.21 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 176,596 cuft
Inflow hyds.	= 47, 48	Contrib. drain. area	= 0.000 ac

Combined Post to Pt. Analysis B Tom's Creek



Hydraflow Rainfall Report

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

Monday, 06 / 29 / 2020

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	0.0000	0.0000	0.0000	-----
3	0.0000	0.0000	0.0000	-----
5	0.0000	0.0000	0.0000	-----
10	0.0000	0.0000	0.0000	-----
25	0.0000	0.0000	0.0000	-----
50	0.0000	0.0000	0.0000	-----
100	0.0000	0.0000	0.0000	-----

File name: SampleFHA.idf

$$\text{Intensity} = B / (T_c + D)^E$$

Return Period (Yrs)	Intensity Values (in/hr)												
	5 min	10	15	20	25	30	35	40	45	50	55	60	
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

T_c = time in minutes. Values may exceed 60.

Name: C:\Users\DanielleBishop\Dropbox\E&A\Jim Lucas Projects\Toms Creek\Design\Stormwater\Precipitation Data.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.28	2.76	0.00	3.51	4.11	4.99	5.73	6.53
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	183 0.00	0.00	0.00

Watershed Model Schematic..... 1

10 - Year

Summary Report..... 2

Hydrograph Reports..... 4

Hydrograph No. 1, SCS Runoff, Pre DA 1 Site..... 4

Hydrograph No. 2, SCS Runoff, Pre DA2 Site..... 5

Hydrograph No. 3, SCS Runoff, Pre DA3 Site..... 6

Hydrograph No. 4, SCS Runoff, Pre DA4 Site..... 7

Hydrograph No. 5, SCS Runoff, Pre DA5 Site..... 8

Hydrograph No. 6, SCS Runoff, Pre DA4 Upland..... 9

Hydrograph No. 7, SCS Runoff, A5 Upland..... 10

Hydrograph No. 8, SCS Runoff, Pre DA1 Upstream..... 11

Hydrograph No. 9, SCS Runoff, Pre DA2 Upstream..... 12

Hydrograph No. 10, Combine, Pre DA1 Upstream, Pre DA 2 Upstream..... 13

Hydrograph No. 11, Combine, PreDev Flow - Toms Creek Rd..... 14

Hydrograph No. 12, Combine, Site Pre Dev to Pt Analysis B Toms' Creek..... 15

Hydrograph No. 13, SCS Runoff, Post B1-1..... 16

Hydrograph No. 14, SCS Runoff, Post B1-2..... 17

Hydrograph No. 15, SCS Runoff, Post B1-3..... 18

Hydrograph No. 16, SCS Runoff, Post B2-1..... 19

Hydrograph No. 17, SCS Runoff, Post B2-2..... 20

Hydrograph No. 18, SCS Runoff, Post B3..... 21

Hydrograph No. 19, SCS Runoff, Post B4-1..... 22

Hydrograph No. 20, SCS Runoff, Post B4-2..... 23

Hydrograph No. 21, SCS Runoff, Post B5..... 24

Hydrograph No. 22, SCS Runoff, Post B6-1..... 25

Hydrograph No. 23, SCS Runoff, Post B6-2..... 26

Hydrograph No. 24, SCS Runoff, Post B7..... 27

Hydrograph No. 25, SCS Runoff, Post B8-1..... 28

Hydrograph No. 26, SCS Runoff, Post B9..... 29

Hydrograph No. 27, SCS Runoff, Post B8-2..... 30

Hydrograph No. 28, Combine, Post B4 Site Total..... 31

Hydrograph No. 29, Combine, Post D Portion to Toms Creek Rd..... 32

Hydrograph No. 30, Combine, Post B7 and B9 to Pond 1..... 33

Hydrograph No. 31, Combine, Total Post to Toms Creek Rd prior to Pond..... 34

Hydrograph No. 32, Combine, B61 and B62 to Pond 2..... 35

Hydrograph No. 33, Combine, Flow to Pond 4..... 36

Hydrograph No. 34, Combine, Flow to Pond 5..... 37

Hydrograph No. 35, Reservoir, Route Pond 2..... 38

 Pond Report - Pond 2..... 39

Hydrograph No. 36, Reservoir, Route Pond 1..... 40

 Pond Report - Pond 1..... 41

Hydrograph No. 37, Reservoir, Route Pond 5..... 42

 Pond Report - Pond 5..... 43

Hydrograph No. 38, Combine, Site Flow to Street Culvert..... 44

Hydrograph No. 39, Combine, Total Flow to Street Culvert..... 45

Hydrograph No. 40, Reservoir, Route Street Culvert..... 46

 Pond Report - Street Culvert Pond.....184..... 47

Contents continued

Hydrograph No. 41, Combine, Post Total flow to Toms Creek Rd.....	48
Hydrograph No. 42, Combine, Pre to Pt. Analysis A.....	49
Hydrograph No. 43, Reservoir, Pre-Tom's Creek.....	50
Pond Report - PreDevCondition.....	51
Hydrograph No. 44, Reservoir, Post Dev Toms Creek Rd.....	52
Pond Report - PreDevCondition.....	53
Hydrograph No. 45, Reservoir, Route Pond 4.....	54
Pond Report - Pond 4.....	55
Hydrograph No. 46, Combine, Post to Pt. Analysis A.....	56
Hydrograph No. 47, Combine, Undetained Site Post to Pt. Analysis B first 5.....	57
Hydrograph No. 48, Combine, Undetained Site Post to Pt. Analysis B last 6.....	58
Hydrograph No. 49, Combine, Combined Post to Pt. Analysis B Tom's Creek.....	59
IDF Report.....	60

Flood Protection Requirement:

10-year calculations

Point of Analysis B Flow to Tom's Creek Rd.

Pre-Development of Site

hydrograph 12 36.67 cfs

Pre-Development of Site and Offsite Flows **841.89** cfs

Hydrograph 11

Post-Development of Site **818.24** cfs

Hydrograph 44

Point of Analysis A

Pre-Development of Site **29.04** cfs

hydrograph 42

Post Development flow from Pond 4: 16.93 cfs

hydrograph 45

Post Development flow from B4-1 5.75 cfs

hydrograph 19

Total Post Dev flow at Pt A **22.68** cfs

100-year calculations

Point of Analysis B Flow to Tom's Creek Rd.

Pre-Development of Site

hydrograph 12 94.64 cfs

Pre-Development of Site and Offsite Flows **1940.23** cfs

Hydrograph 11

Post-Development of Site **1731.81** cfs

Hydrograph 44

Point of Analysis A

Pre-Development of Site **69.75** cfs

hydrograph 42

Post Development flow from Pond 4: 40.79 cfs

hydrograph 45

Post Development flow from B4-1 11.96 cfs

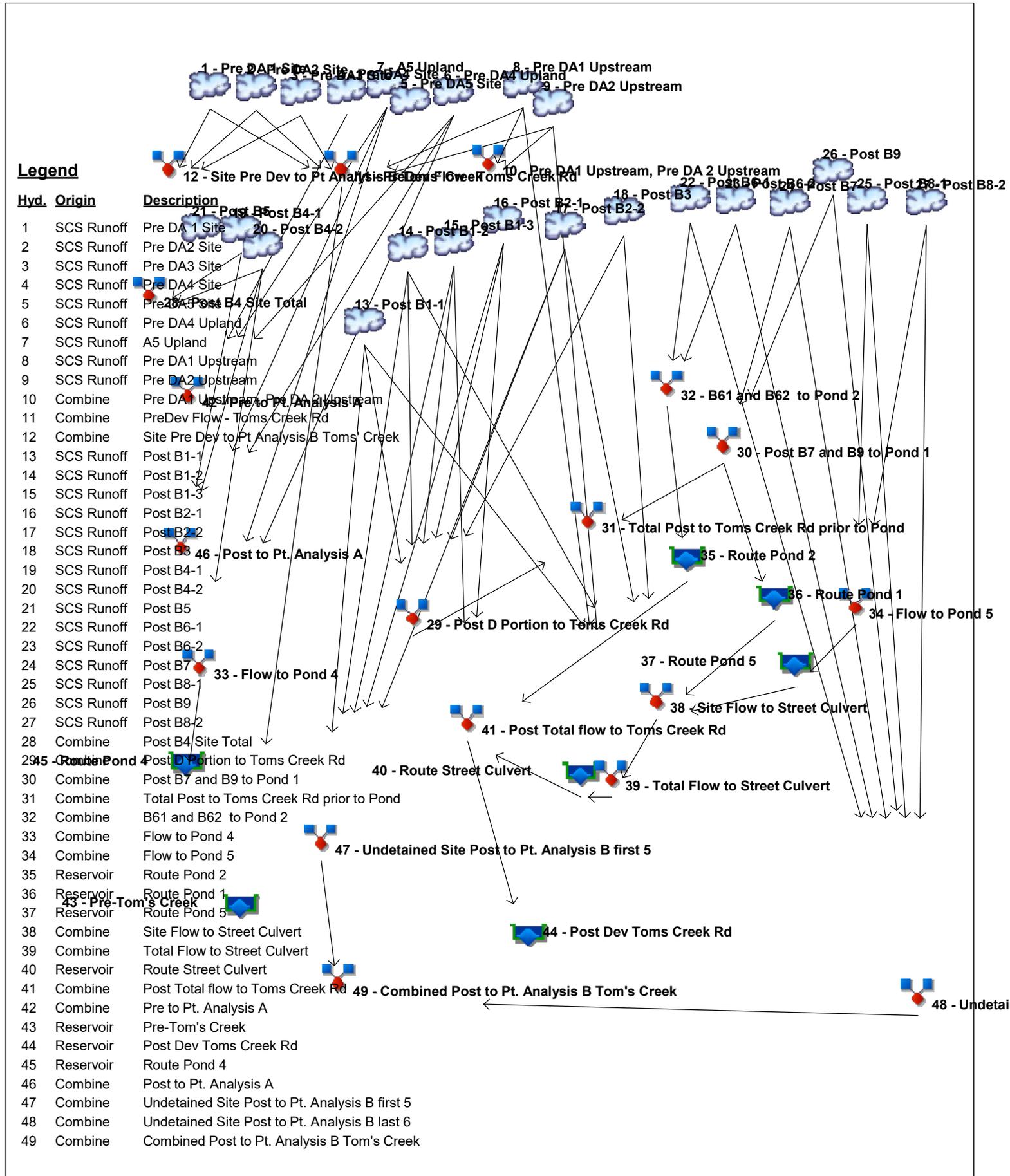
hydrograph 19

Total Post Dev flow at Pt A **52.75** cfs

100-year Routing

Watershed Model Schematic

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



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	17.43	1	723	49,862	----	----	----	Pre DA 1 Site
2	SCS Runoff	69.17	1	723	198,827	----	----	----	Pre DA2 Site
3	SCS Runoff	8.839	1	720	21,372	----	----	----	Pre DA3 Site
4	SCS Runoff	49.56	1	723	141,456	----	----	----	Pre DA4 Site
5	SCS Runoff	0.494	1	720	1,194	----	----	----	Pre DA5 Site
6	SCS Runoff	12.47	1	728	44,576	----	----	----	Pre DA4 Upland
7	SCS Runoff	9.487	1	727	32,319	----	----	----	A5 Upland
8	SCS Runoff	725.69	1	722	1,974,436	----	----	----	Pre DA1 Upstream
9	SCS Runoff	1170.03	1	725	3,675,606	----	----	----	Pre DA2 Upstream
10	Combine	2001.19	1	724	6,109,630	8, 9	----	----	Pre DA1 Upstream, Pre DA 2 Upstrea
11	Combine	1944.16	1	724	5,920,104	1, 2, 3, 8, 9,	----	----	PreDev Flow - Toms Creek Rd
12	Combine	94.64	1	723	270,062	1, 2, 3,	----	----	Site Pre Dev to Pt Analysis B Toms'
13	SCS Runoff	10.83	1	723	30,068	----	----	----	Post B1-1
14	SCS Runoff	9.072	1	718	18,239	----	----	----	Post B1-2
15	SCS Runoff	5.527	1	719	11,662	----	----	----	Post B1-3
16	SCS Runoff	4.095	1	718	8,244	----	----	----	Post B2-1
17	SCS Runoff	9.416	1	721	22,899	----	----	----	Post B2-2
18	SCS Runoff	2.154	1	718	4,368	----	----	----	Post B3
19	SCS Runoff	11.96	1	718	25,562	----	----	----	Post B4-1
20	SCS Runoff	42.76	1	722	116,025	----	----	----	Post B4-2
21	SCS Runoff	0.357	1	721	875	----	----	----	Post B5
22	SCS Runoff	28.08	1	719	64,009	----	----	----	Post B6-1
23	SCS Runoff	13.70	1	719	31,237	----	----	----	Post B6-2
24	SCS Runoff	17.18	1	727	58,324	----	----	----	Post B7
25	SCS Runoff	33.48	1	725	107,581	----	----	----	Post B8-1
26	SCS Runoff	10.55	1	715	19,503	----	----	----	Post B9
27	SCS Runoff	11.47	1	721	29,239	----	----	----	Post B8-2
28	Combine	52.69	1	721	141,586	19, 20,	----	----	Post B4 Site Total
29	Combine	57.30	1	719	128,723	13, 14, 15, 16, 17, 18,	----	----	Post D Portion to Toms Creek Rd
30	Combine	19.50	1	716	74,695	24, 26,	----	----	Post B7 and B9 to Pond 1
31	Combine	75.73	1	718	203,418	29, 30	----	----	Total Post to Toms Creek Rd prior to
32	Combine	38.04	1	719	84,391	22, 23,	----	----	B61 and B62 to Pond 2
33	Combine	61.88	1	723	192,920	6, 7, 20,	----	----	Flow to Pond 4
34	Combine	43.94	1	723	136,820	25, 27,	----	----	Flow to Pond 5
C:\Dropbox\E&A\Jim Lucas Projects\Toms Creek Design\Sub 100 Area					Hydraflow	10/25/2020 10:54:00 AM			

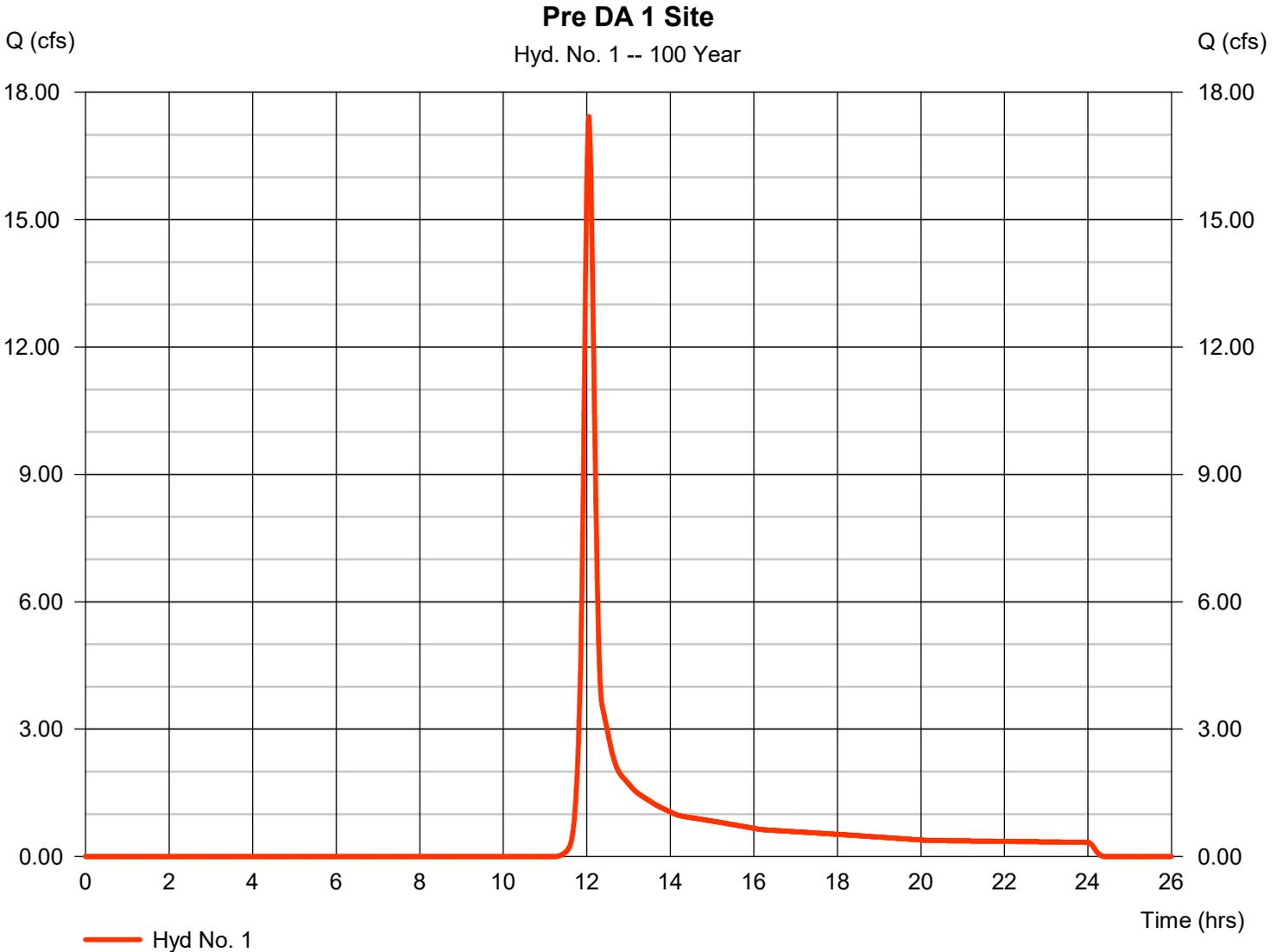
Hydrograph Report

Hyd. No. 1

Pre DA 1 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 17.43 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 49,862 cuft
Drainage area	= 7.500 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.10 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 70) + (7.330 x 55)] / 7.500



Hydrograph Report

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

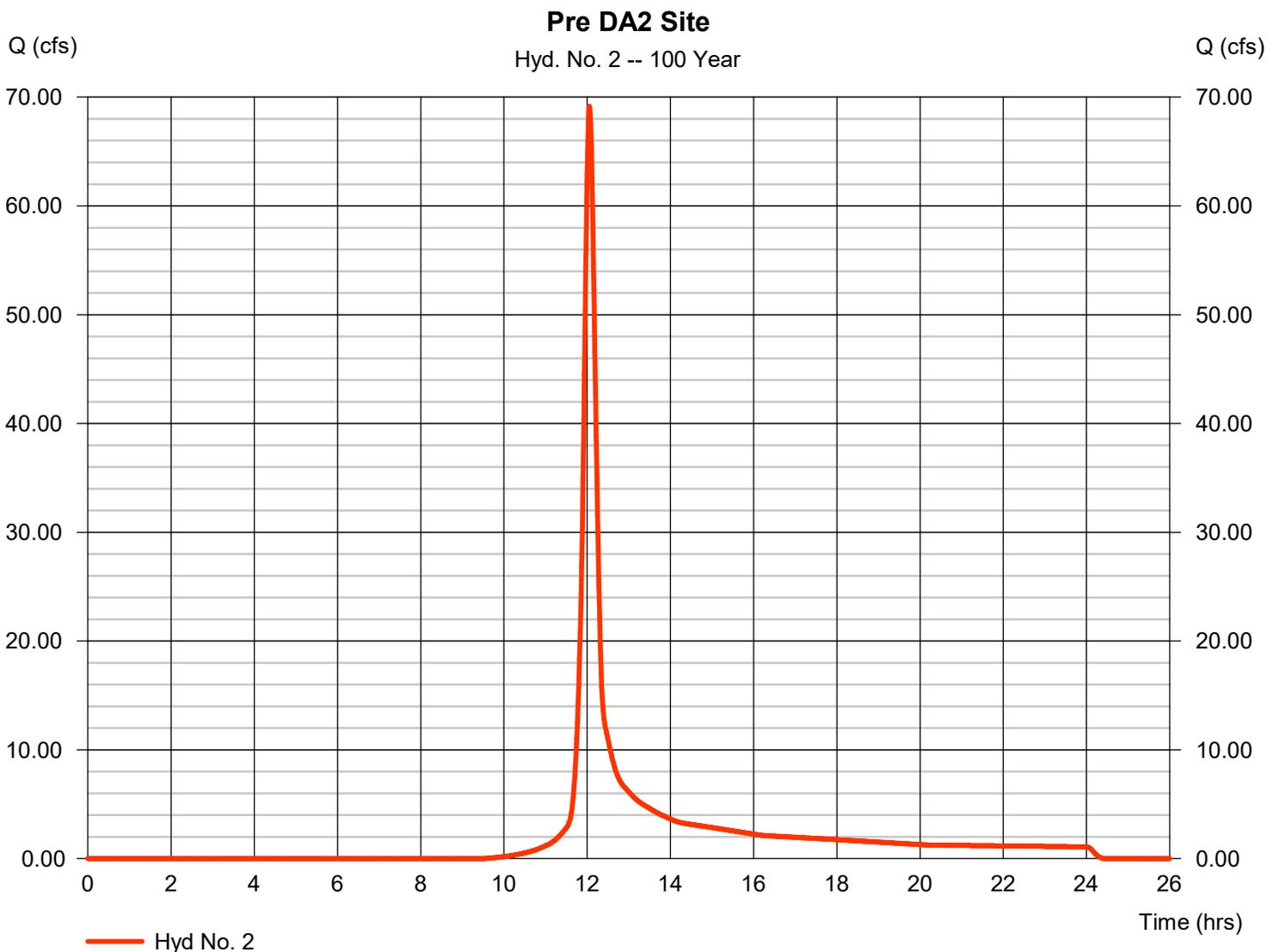
Tuesday, 06 / 30 / 2020

Hyd. No. 2

Pre DA2 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 69.17 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 198,827 cuft
Drainage area	= 19.050 ac	Curve number	= 66*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.40 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(5.200 x 55) + (13.850 x 70)] / 19.050



Hydrograph Report

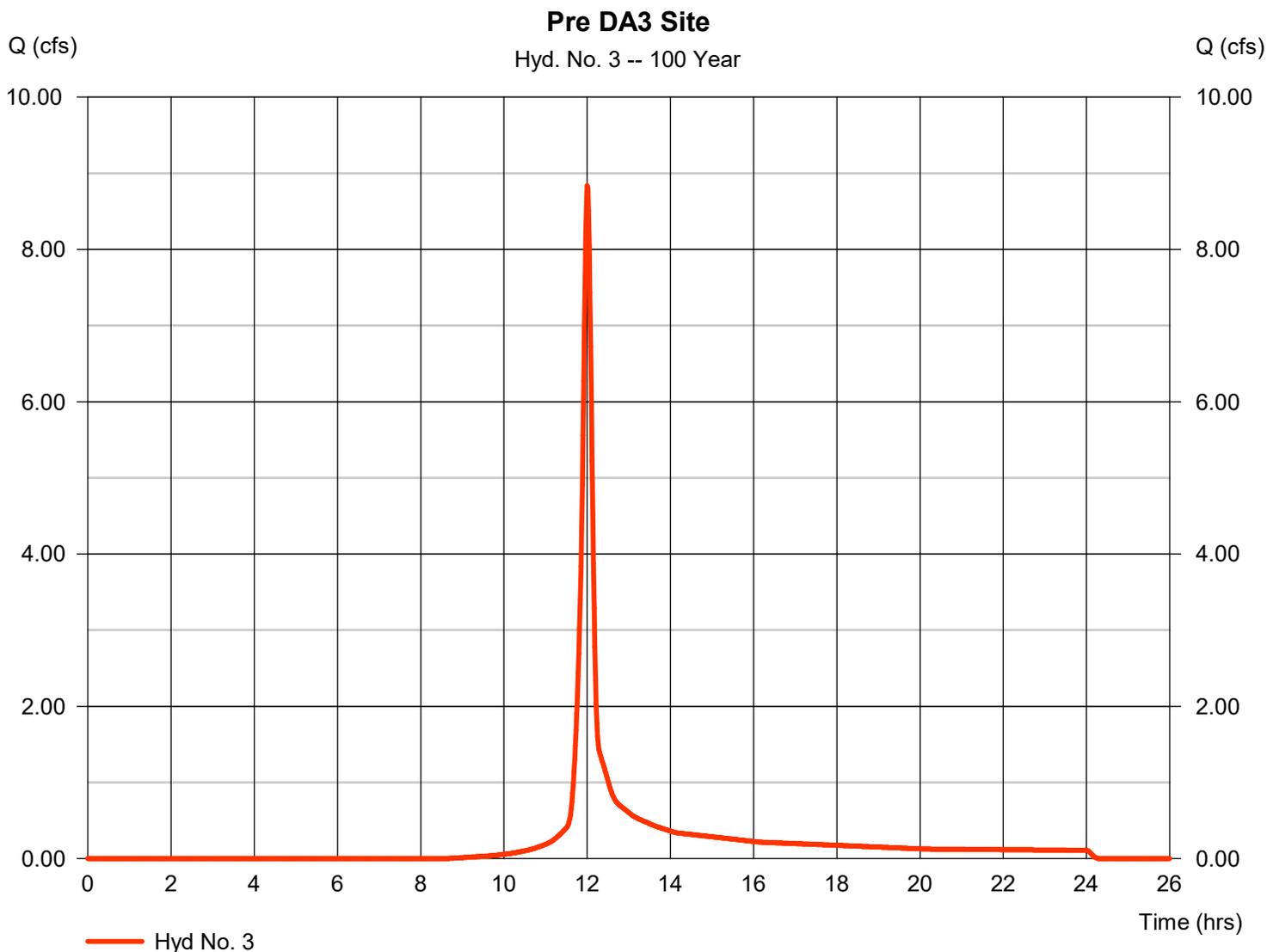
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 06 / 30 / 2020

Hyd. No. 3

Pre DA3 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 8.839 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 21,372 cuft
Drainage area	= 1.790 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.70 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

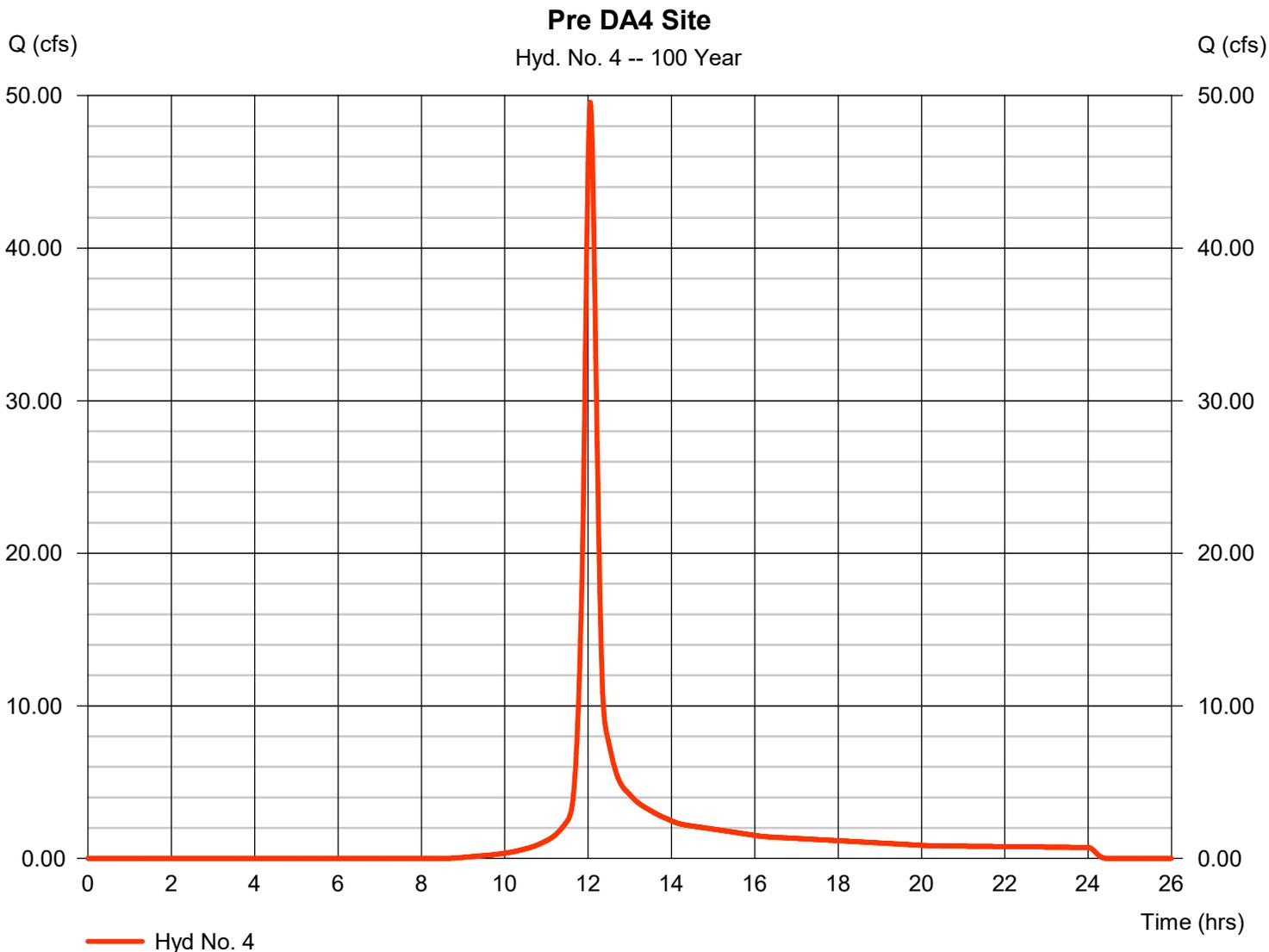
Tuesday, 06 / 30 / 2020

Hyd. No. 4

Pre DA4 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 49.56 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 141,456 cuft
Drainage area	= 11.910 ac	Curve number	= 70*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.50 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.540 x 74) + (9.190 x 74) + (0.180 x 61)] / 11.910

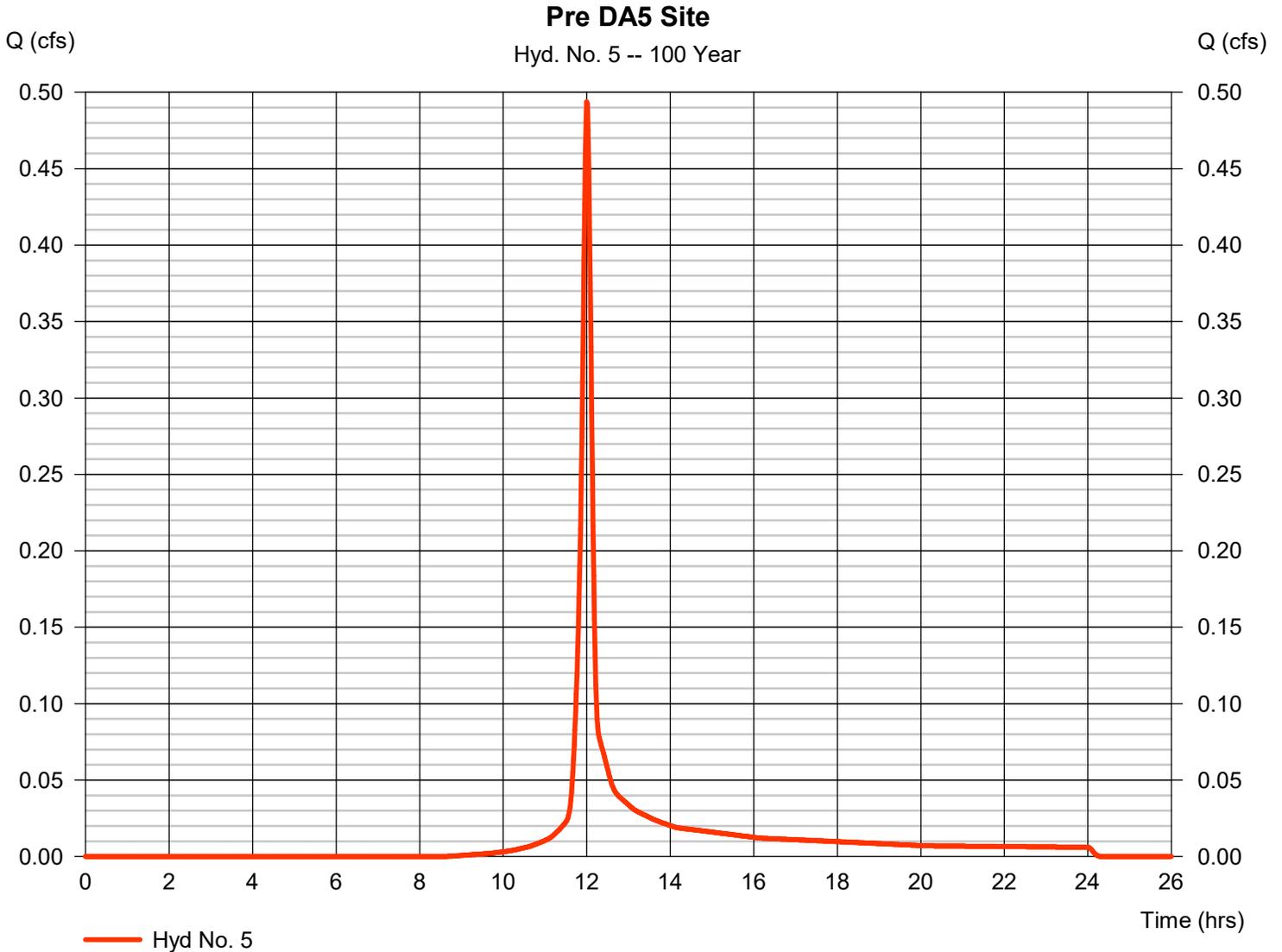


Hydrograph Report

Hyd. No. 5

Pre DA5 Site

Hydrograph type	= SCS Runoff	Peak discharge	= 0.494 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.00 hrs
Time interval	= 1 min	Hyd. volume	= 1,194 cuft
Drainage area	= 0.100 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.70 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

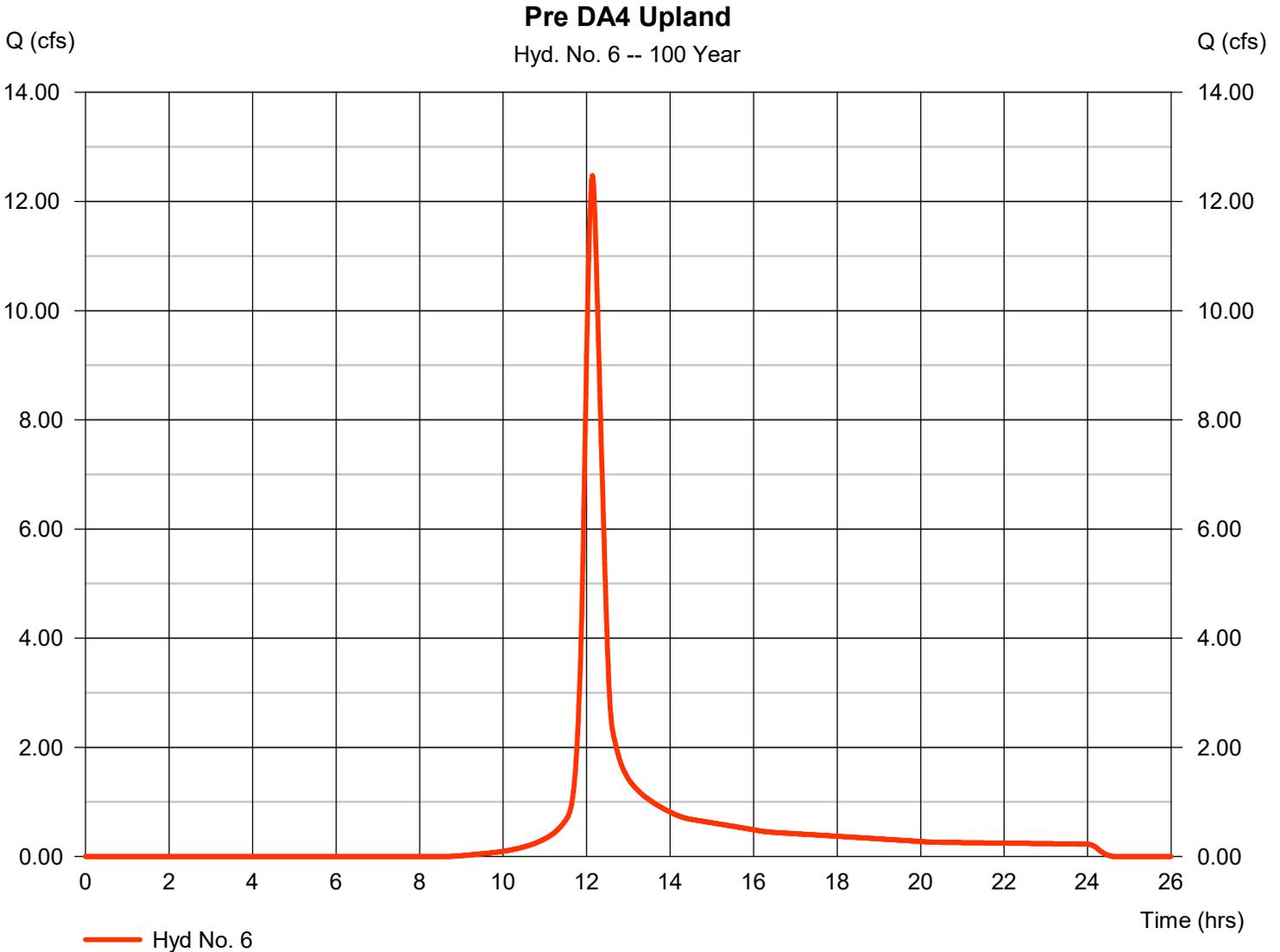


Hydrograph Report

Hyd. No. 6

Pre DA4 Upland

Hydrograph type	= SCS Runoff	Peak discharge	= 12.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 44,576 cuft
Drainage area	= 3.800 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 24.60 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

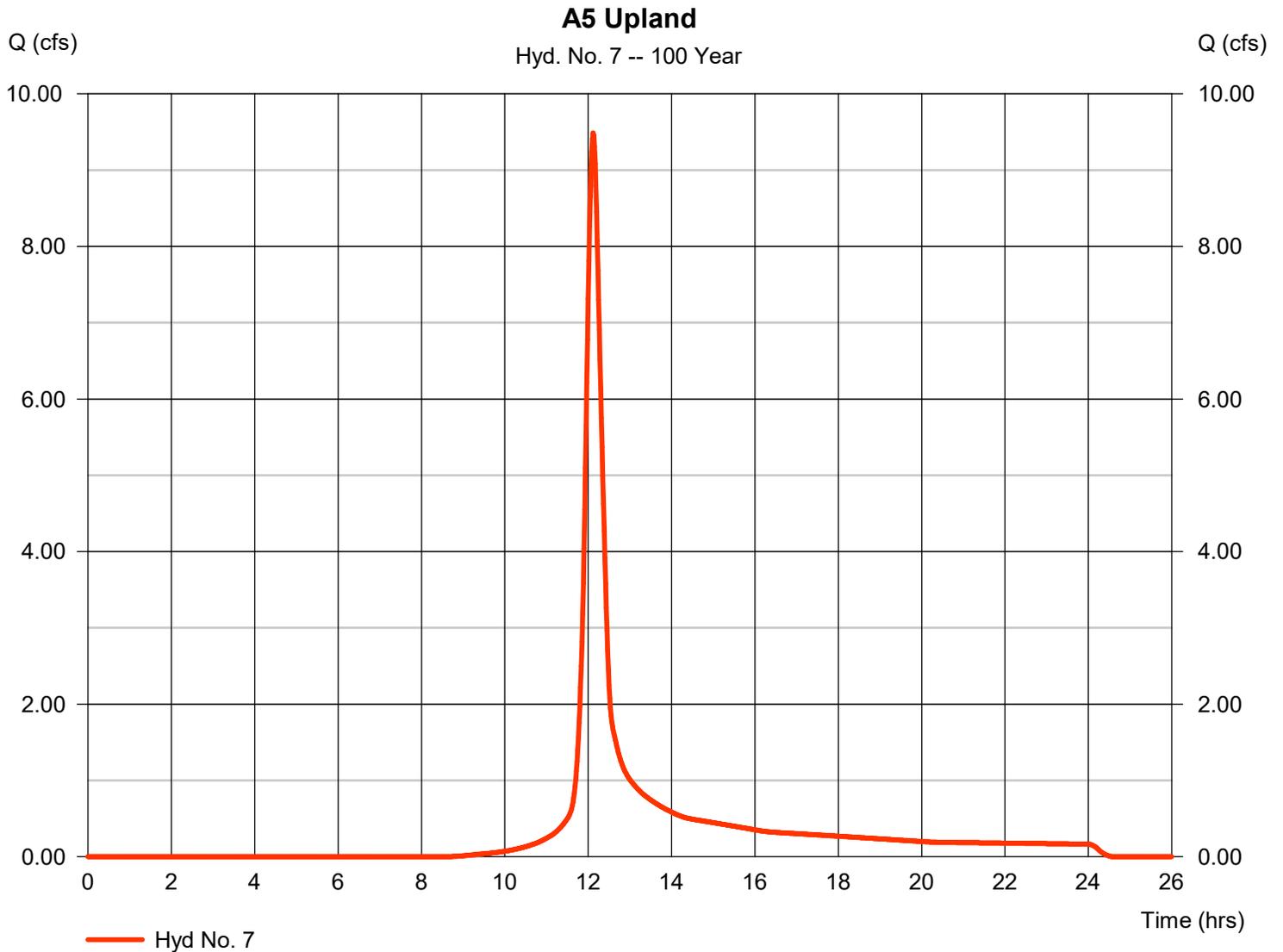
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 06 / 30 / 2020

Hyd. No. 7

A5 Upland

Hydrograph type	= SCS Runoff	Peak discharge	= 9.487 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 32,319 cuft
Drainage area	= 2.780 ac	Curve number	= 70
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 22.20 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

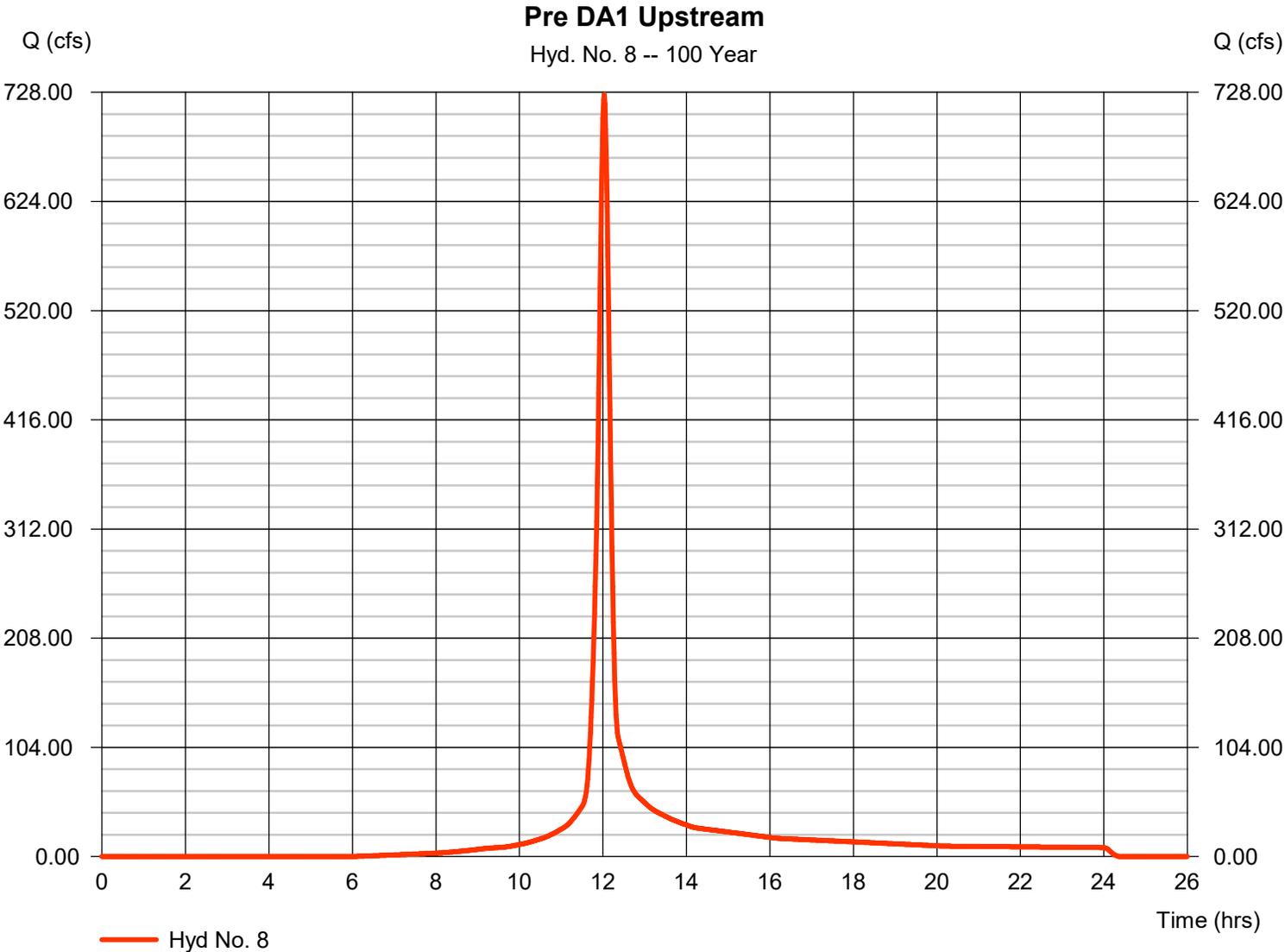
Tuesday, 06 / 30 / 2020

Hyd. No. 8

Pre DA1 Upstream

Hydrograph type	= SCS Runoff	Peak discharge	= 725.69 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 1,974,436 cuft
Drainage area	= 127.600 ac	Curve number	= 80*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.40 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(56.000 x 98) + (36.000 x 72) + (35.600 x 58)] / 127.600



Hydrograph Report

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

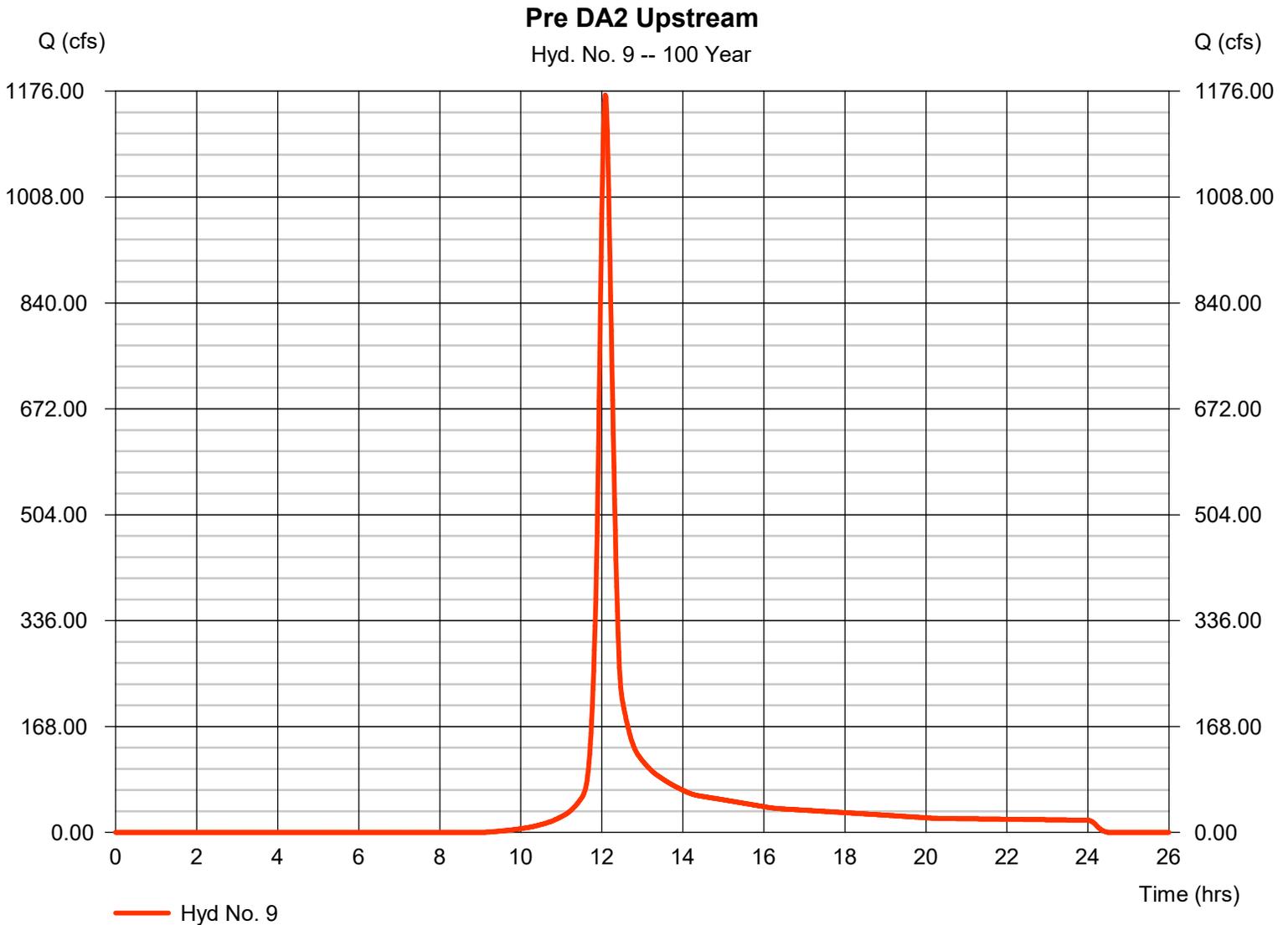
Tuesday, 06 / 30 / 2020

Hyd. No. 9

Pre DA2 Upstream

Hydrograph type	= SCS Runoff	Peak discharge	= 1170.03 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 3,675,606 cuft
Drainage area	= 333.730 ac	Curve number	= 68*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 18.60 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(76.200 x 98) + (30.000 x 72) + (227.530 x 58)] / 333.730



Hydrograph Report

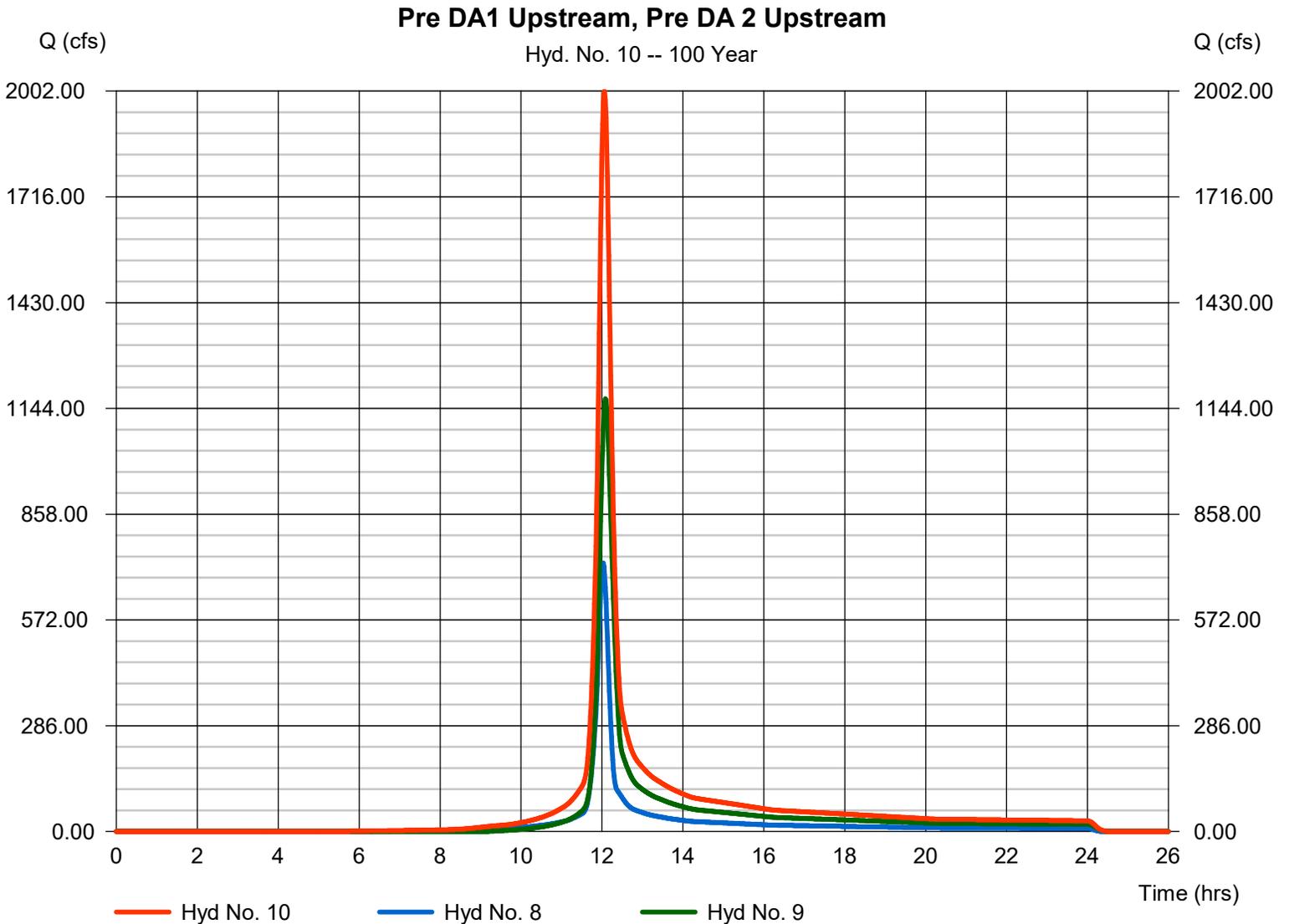
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 06 / 30 / 2020

Hyd. No. 10

Pre DA1 Upstream, Pre DA 2 Upstream

Hydrograph type	= Combine	Peak discharge	= 2001.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 6,109,630 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 461.330 ac



Hydrograph Report

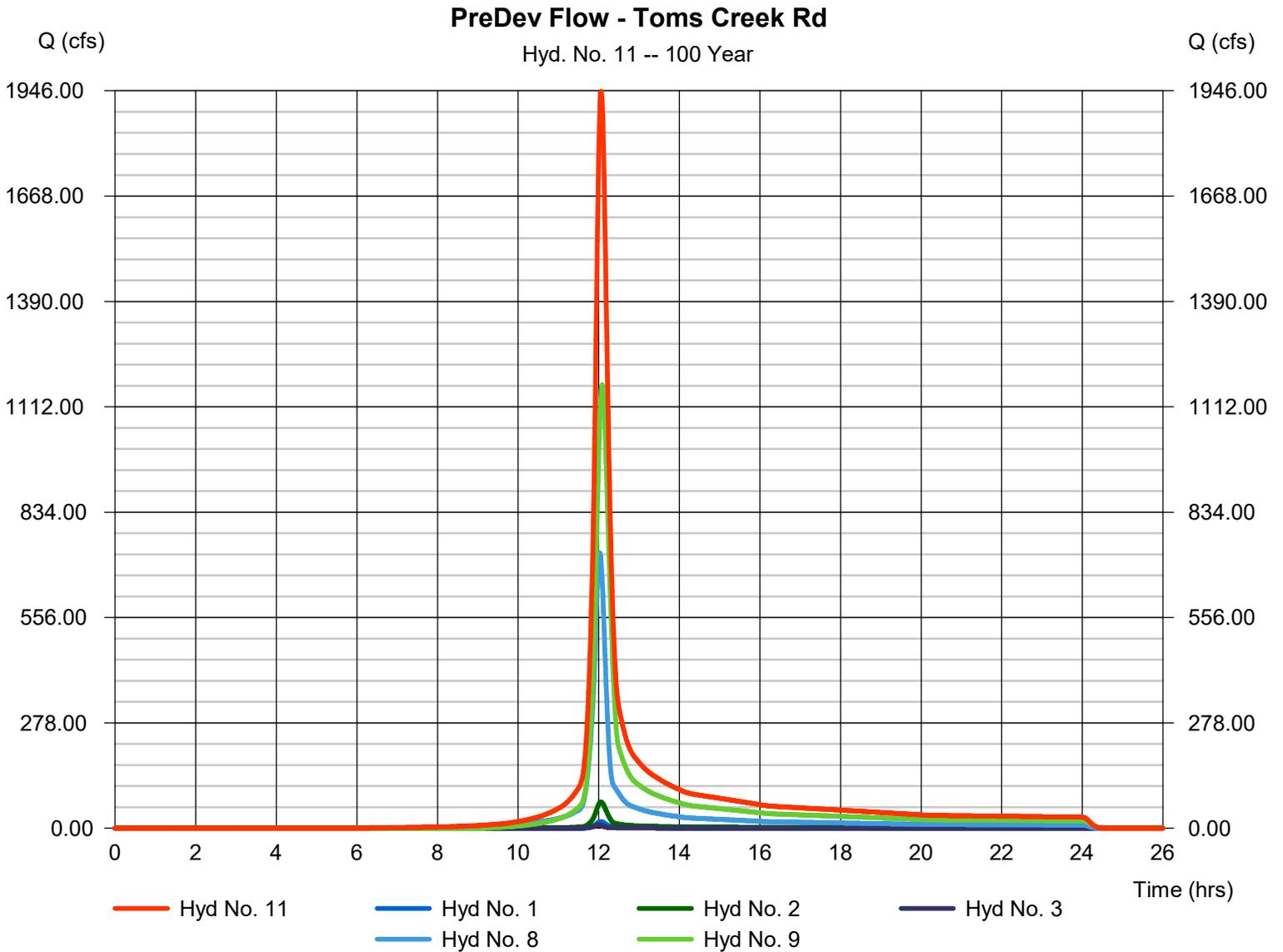
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 06 / 30 / 2020

Hyd. No. 11

PreDev Flow - Toms Creek Rd

Hydrograph type	= Combine	Peak discharge	= 1944.16 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 5,920,104 cuft
Inflow hyds.	= 1, 2, 3, 8, 9	Contrib. drain. area	= 489.670 ac



Hydrograph Report

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

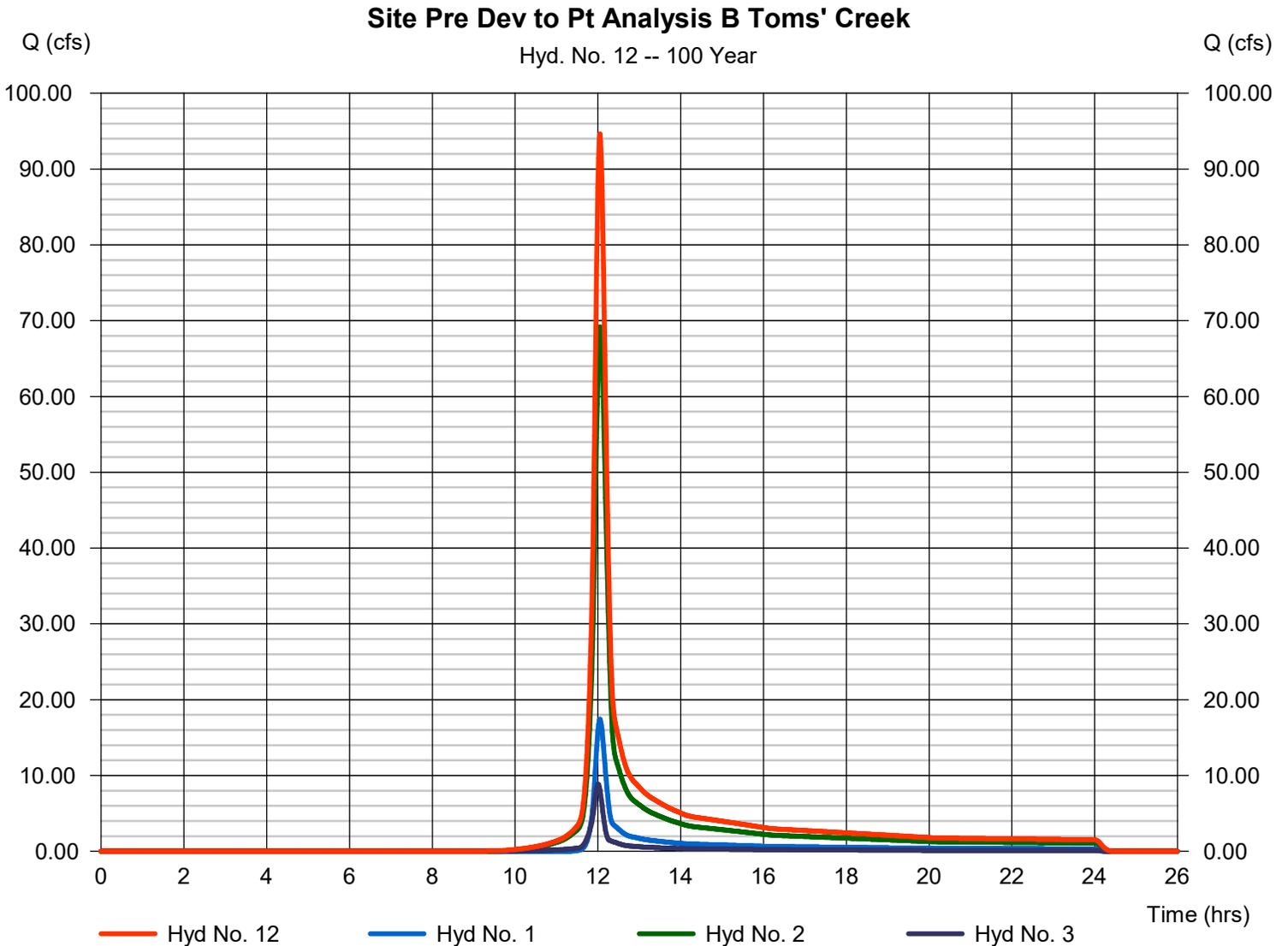
Tuesday, 06 / 30 / 2020

Hyd. No. 12

Site Pre Dev to Pt Analysis B Toms' Creek

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 1, 2, 3

Peak discharge = 94.64 cfs
 Time to peak = 12.05 hrs
 Hyd. volume = 270,062 cuft
 Contrib. drain. area = 28.340 ac



Hydrograph Report

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

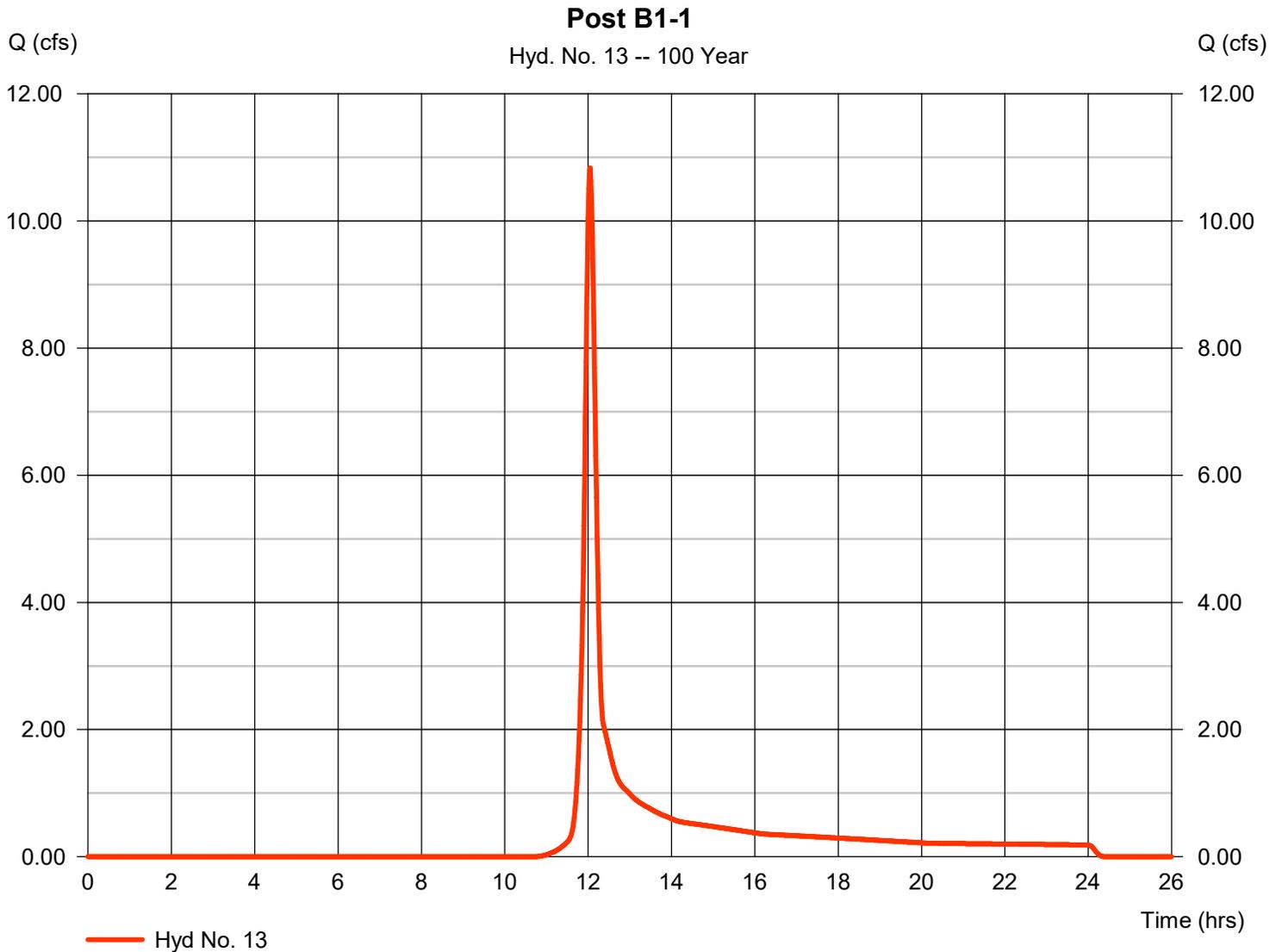
Tuesday, 06 / 30 / 2020

Hyd. No. 13

Post B1-1

Hydrograph type	= SCS Runoff	Peak discharge	= 10.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 1 min	Hyd. volume	= 30,068 cuft
Drainage area	= 3.790 ac	Curve number	= 59*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.80 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.780 x 98) + (1.510 x 69) + (1.310 x 61) + (0.190 x 74)] / 3.790



Hydrograph Report

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

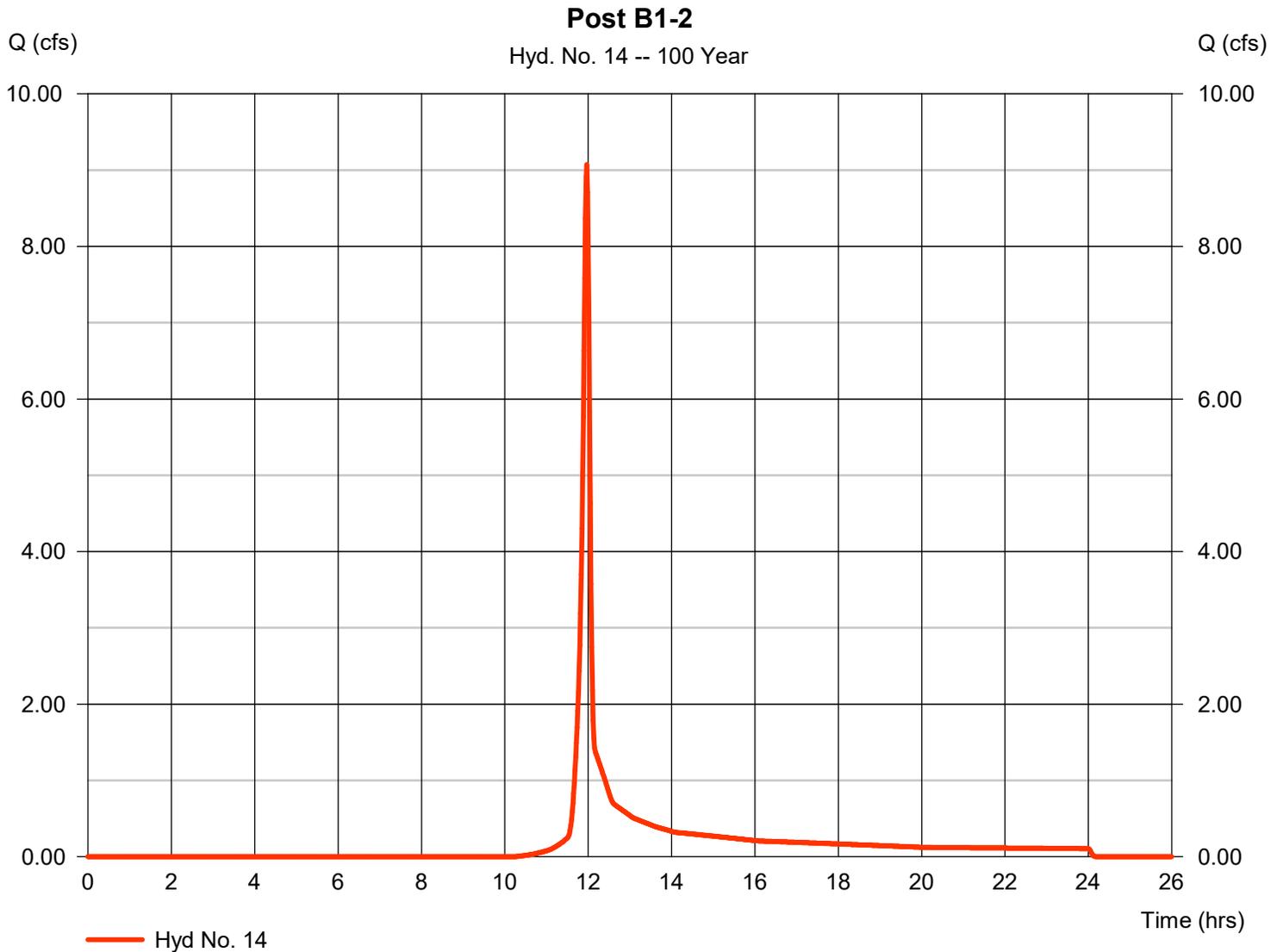
Tuesday, 06 / 30 / 2020

Hyd. No. 14

Post B1-2

Hydrograph type	= SCS Runoff	Peak discharge	= 9.072 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 18,239 cuft
Drainage area	= 1.980 ac	Curve number	= 62*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.80 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.410 x 98) + (0.560 x 69) + (0.840 x 61)] / 1.980



Hydrograph Report

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

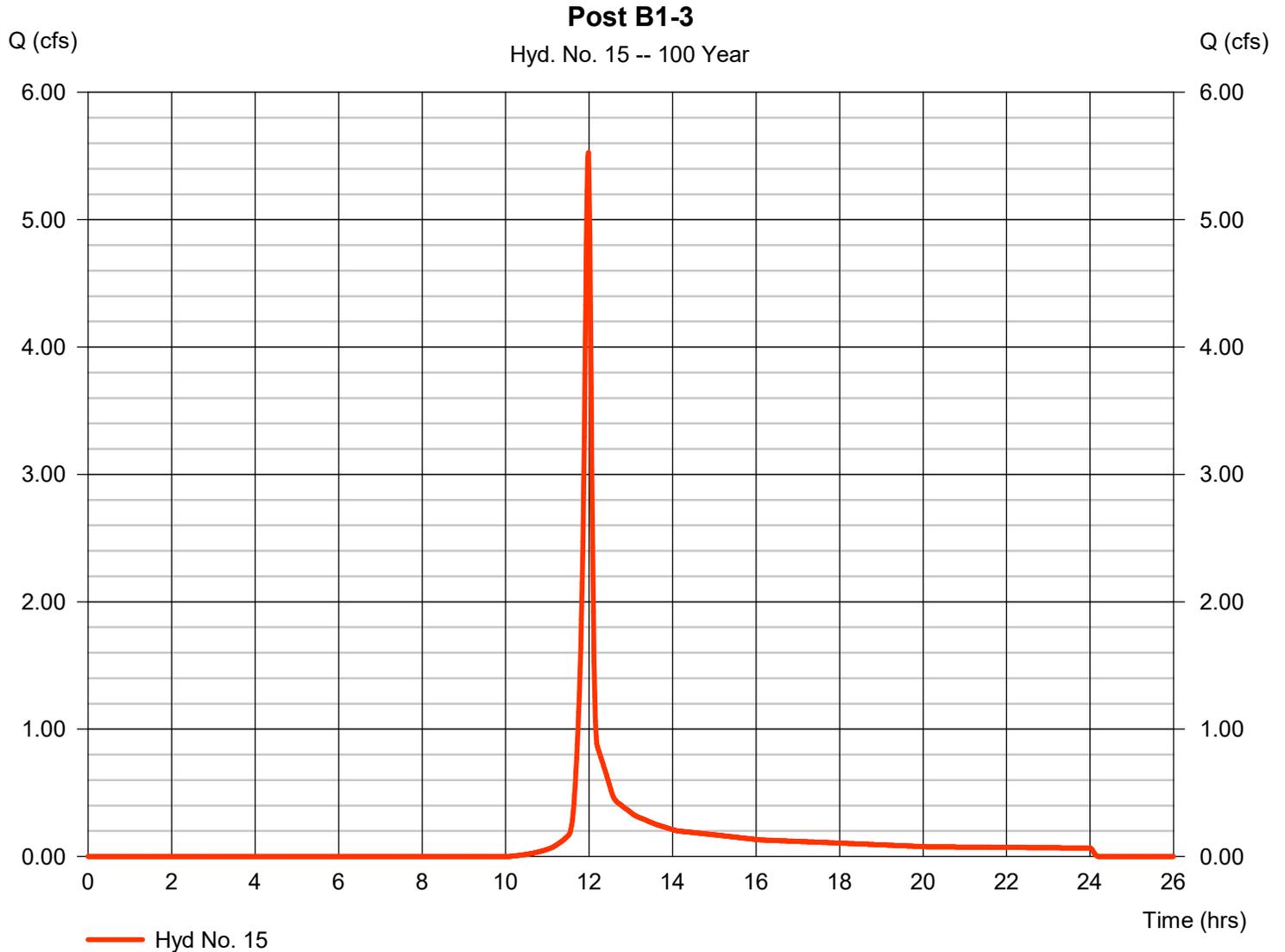
Tuesday, 06 / 30 / 2020

Hyd. No. 15

Post B1-3

Hydrograph type	= SCS Runoff	Peak discharge	= 5.527 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 11,662 cuft
Drainage area	= 1.290 ac	Curve number	= 63*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.20 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 98) + (0.450 x 61) + (0.670 x 55)] / 1.290



Hydrograph Report

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

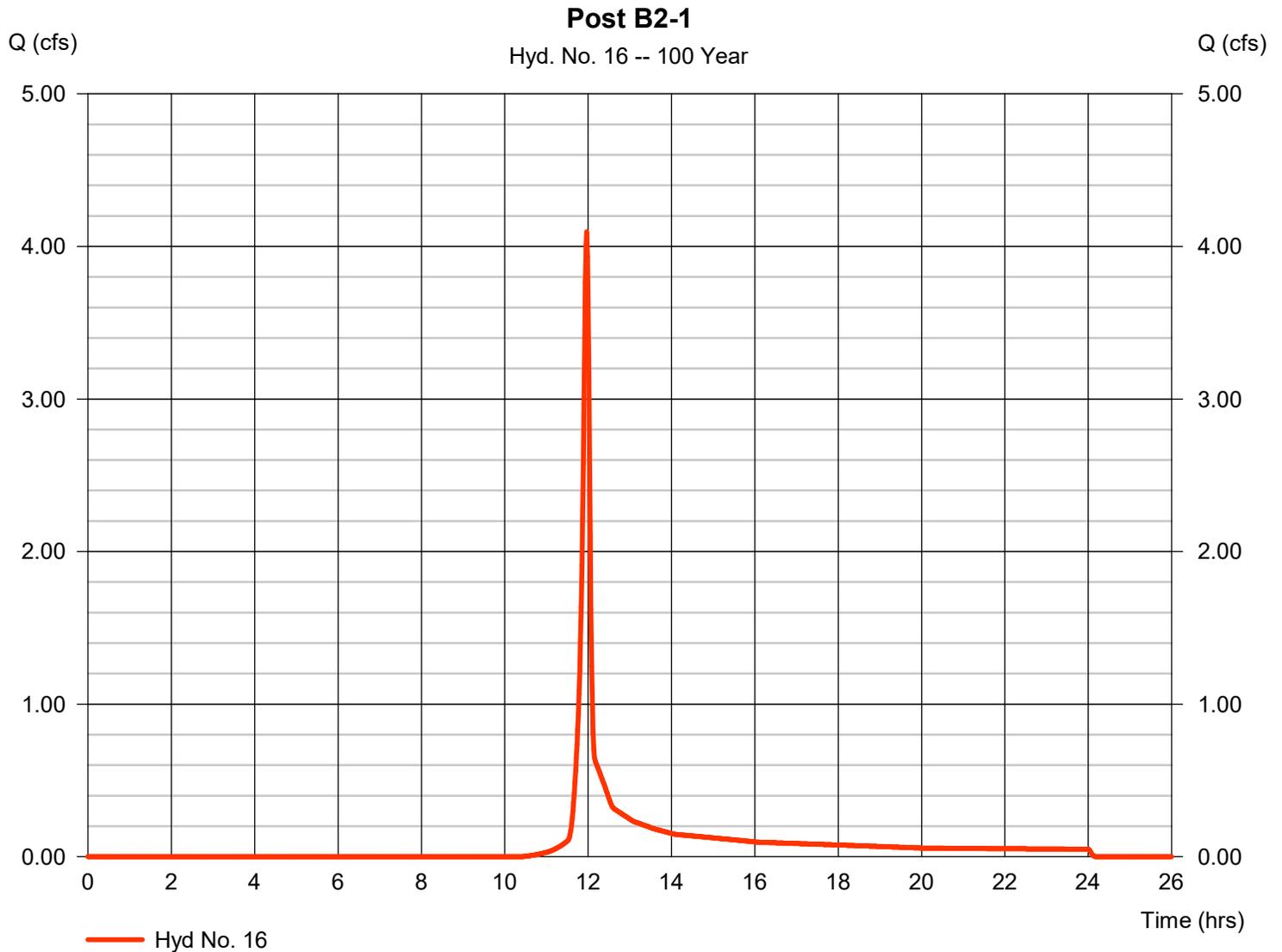
Tuesday, 06 / 30 / 2020

Hyd. No. 16

Post B2-1

Hydrograph type	= SCS Runoff	Peak discharge	= 4.095 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 8,244 cuft
Drainage area	= 0.930 ac	Curve number	= 61*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.30 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.010 x 98) + (0.300 x 55) + (0.020 x 55) + (0.650 x 61) + (0.090 x 74)] / 0.930



Hydrograph Report

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

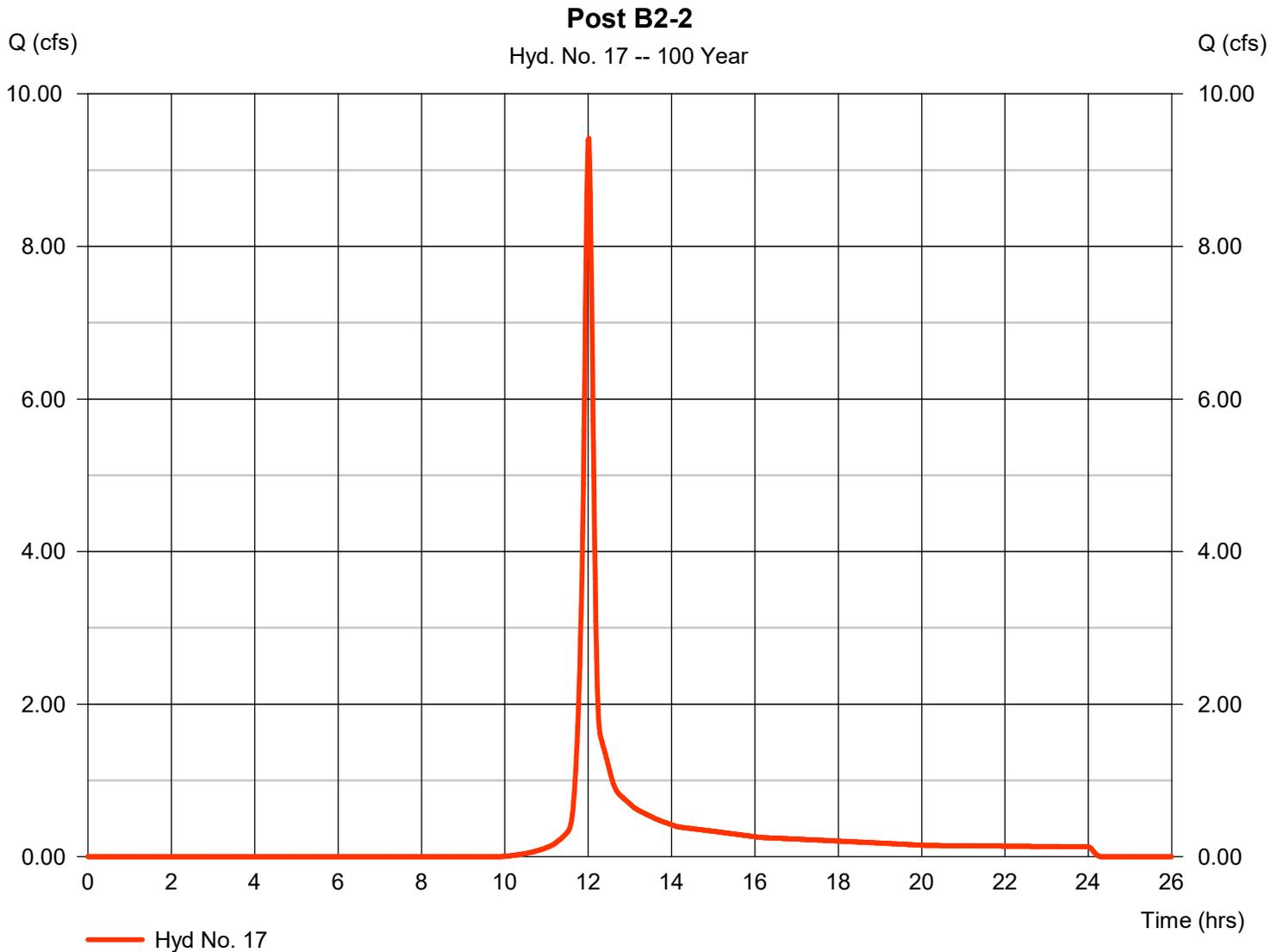
Tuesday, 06 / 30 / 2020

Hyd. No. 17

Post B2-2

Hydrograph type	= SCS Runoff	Peak discharge	= 9.416 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 22,899 cuft
Drainage area	= 2.340 ac	Curve number	= 64*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.30 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.210 x 98) + (0.630 x 61) + (0.300 x 74) + (1.030 x 55) + (0.170 x 70)] / 2.340



Hydrograph Report

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

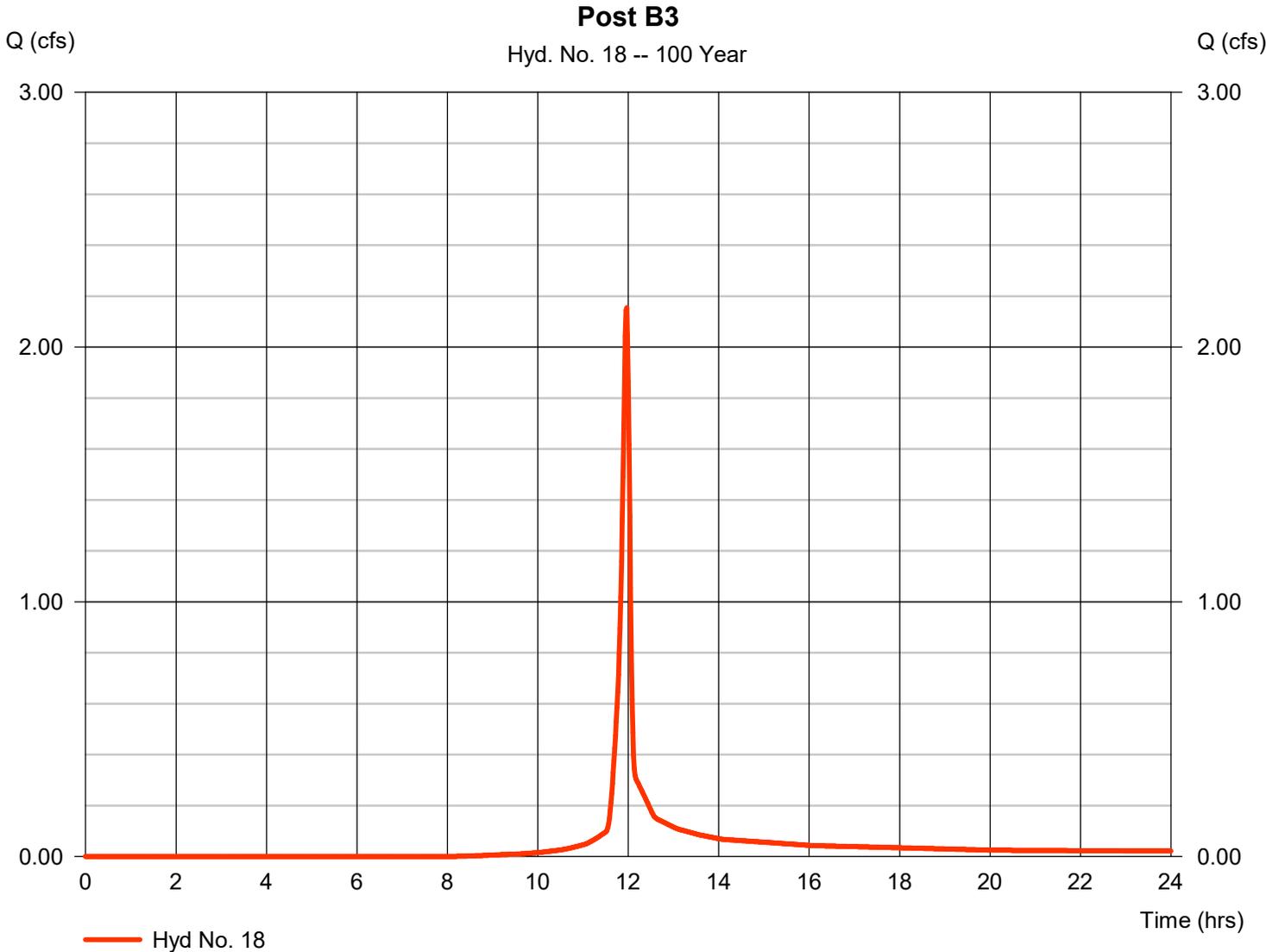
Tuesday, 06 / 30 / 2020

Hyd. No. 18

Post B3

Hydrograph type	= SCS Runoff	Peak discharge	= 2.154 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 4,368 cuft
Drainage area	= 0.340 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 5.20 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.180 x 74) + (0.160 x 70)] / 0.340



Hydrograph Report

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

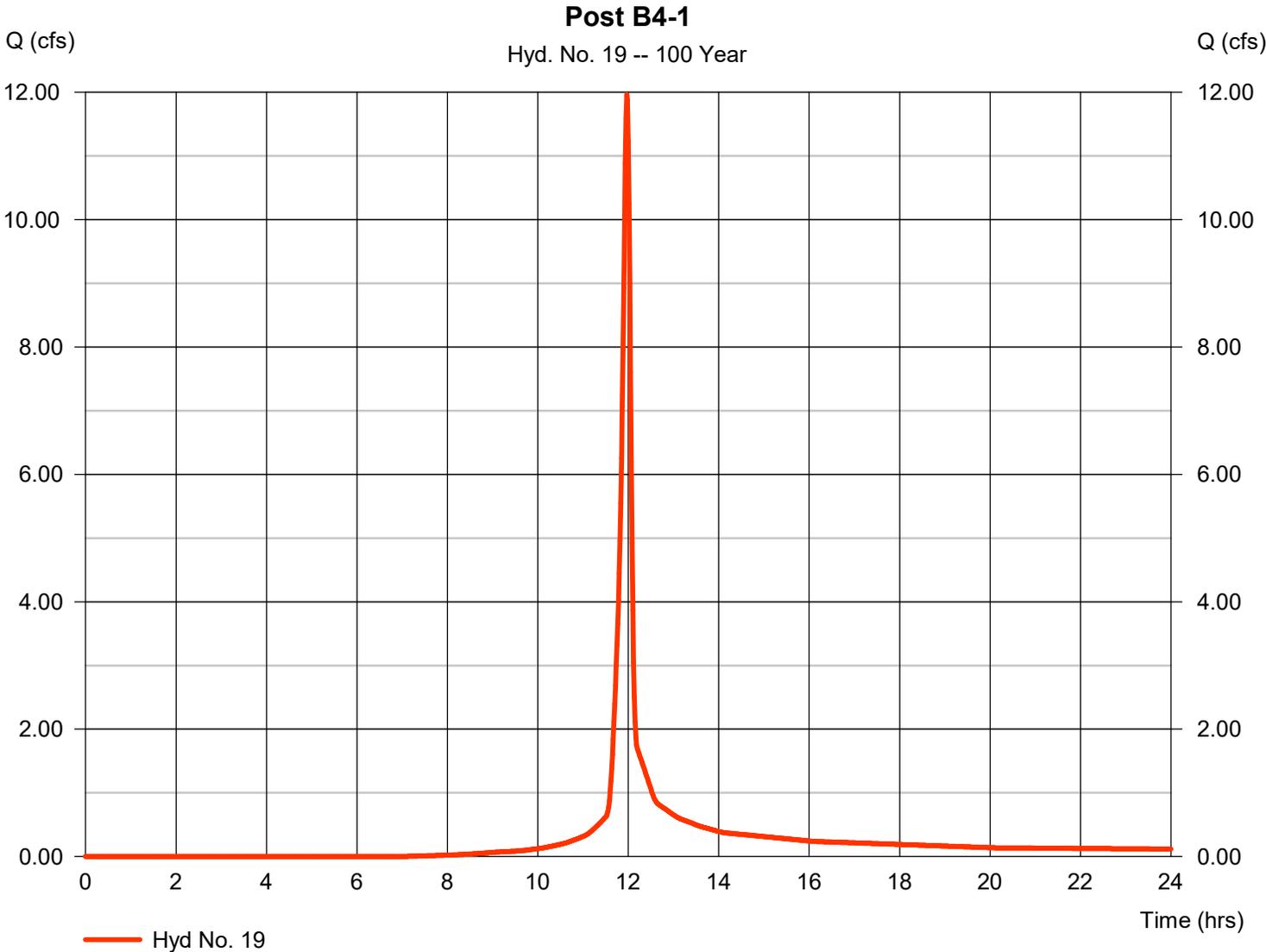
Tuesday, 06 / 30 / 2020

Hyd. No. 19

Post B4-1

Hydrograph type	= SCS Runoff	Peak discharge	= 11.96 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 25,562 cuft
Drainage area	= 1.880 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 7.60 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 98) + (0.610 x 74) + (0.910 x 70)] / 1.880



Hydrograph Report

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

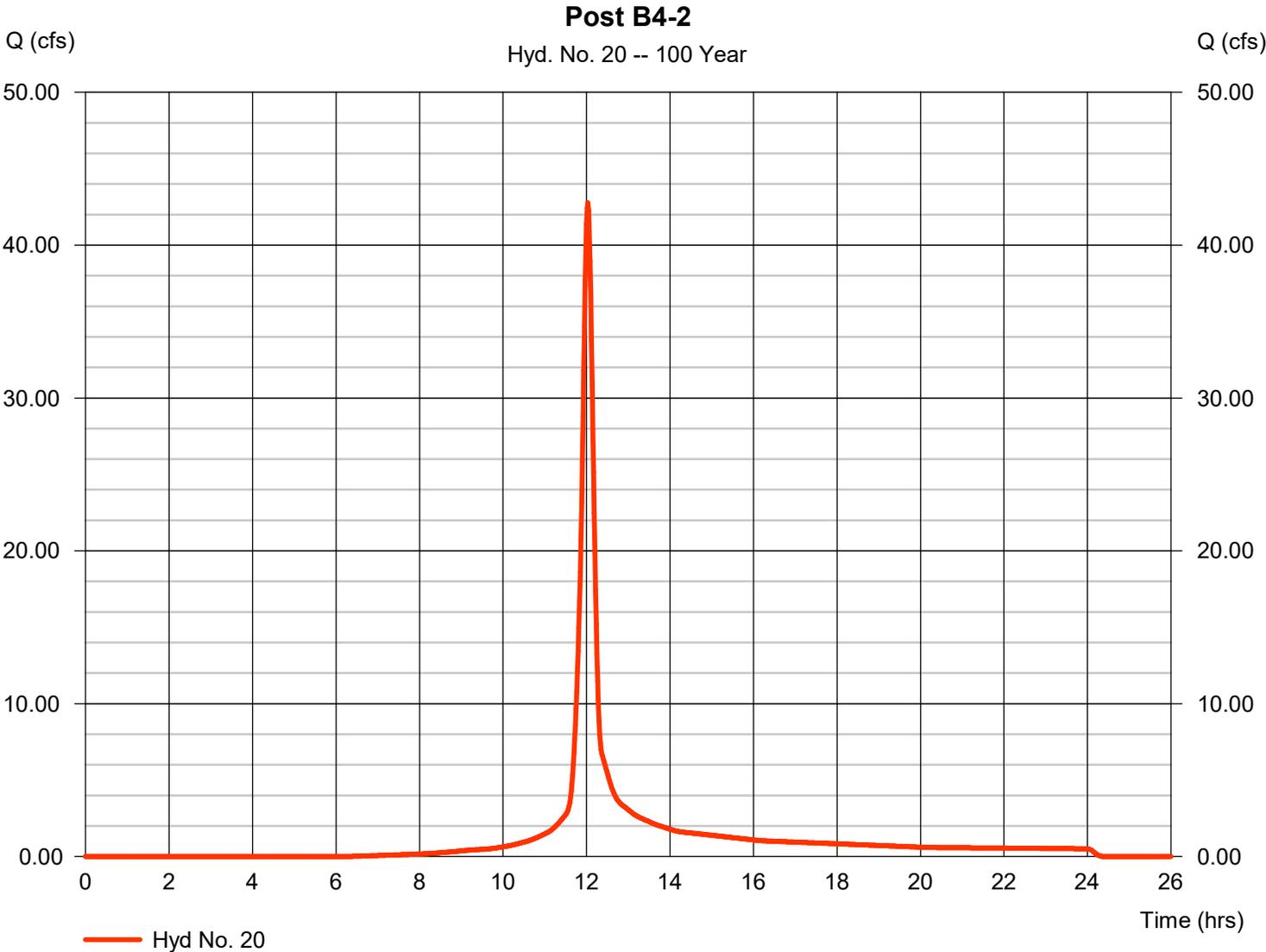
Tuesday, 06 / 30 / 2020

Hyd. No. 20

Post B4-2

Hydrograph type	= SCS Runoff	Peak discharge	= 42.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 116,025 cuft
Drainage area	= 7.690 ac	Curve number	= 79*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 15.10 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.500 x 98) + (0.130 x 69) + (2.460 x 79) + (0.030 x 61) + (2.550 x 74)] / 7.690



Hydrograph Report

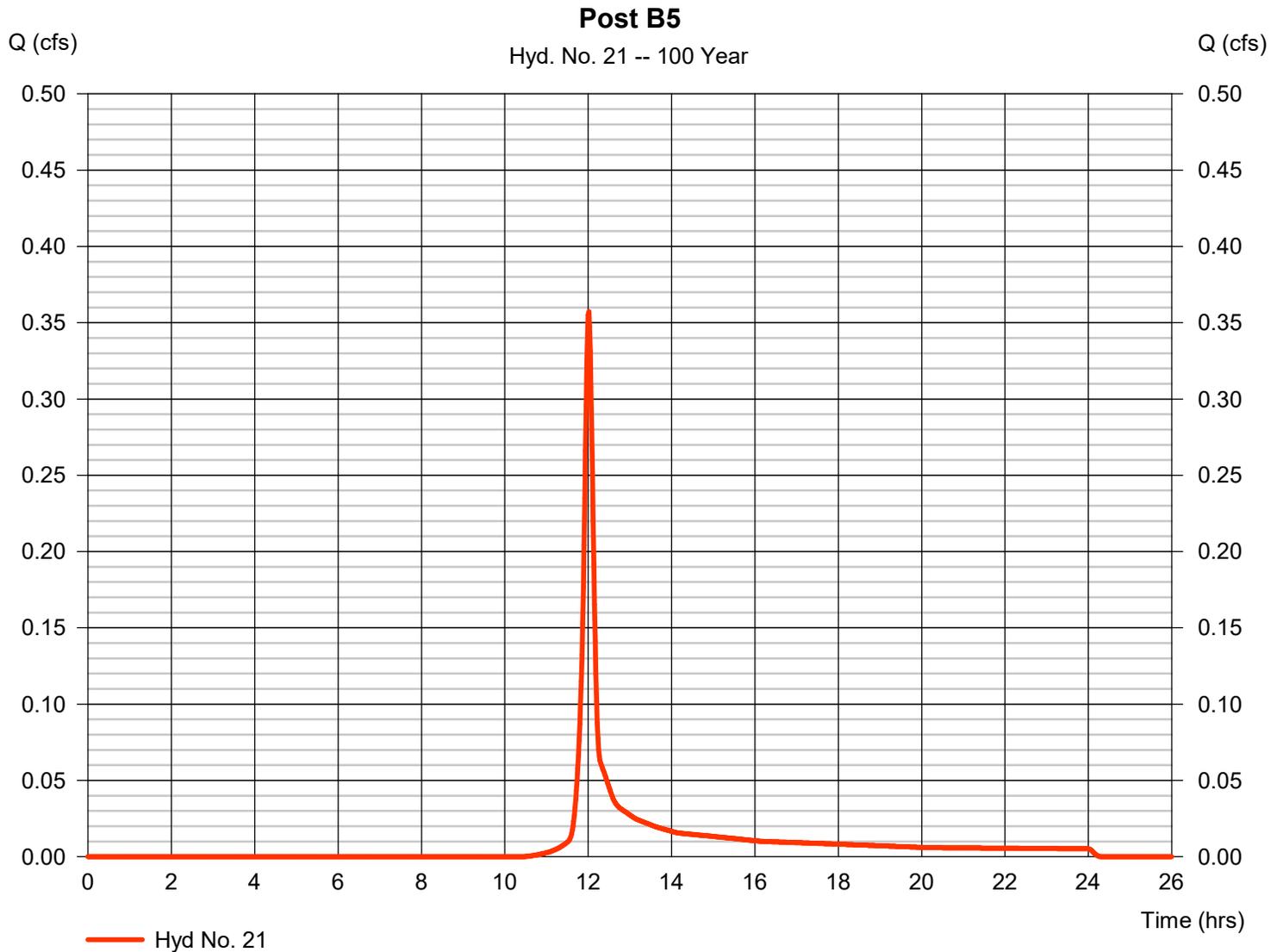
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 06 / 30 / 2020

Hyd. No. 21

Post B5

Hydrograph type	= SCS Runoff	Peak discharge	= 0.357 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 875 cuft
Drainage area	= 0.100 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.70 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

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

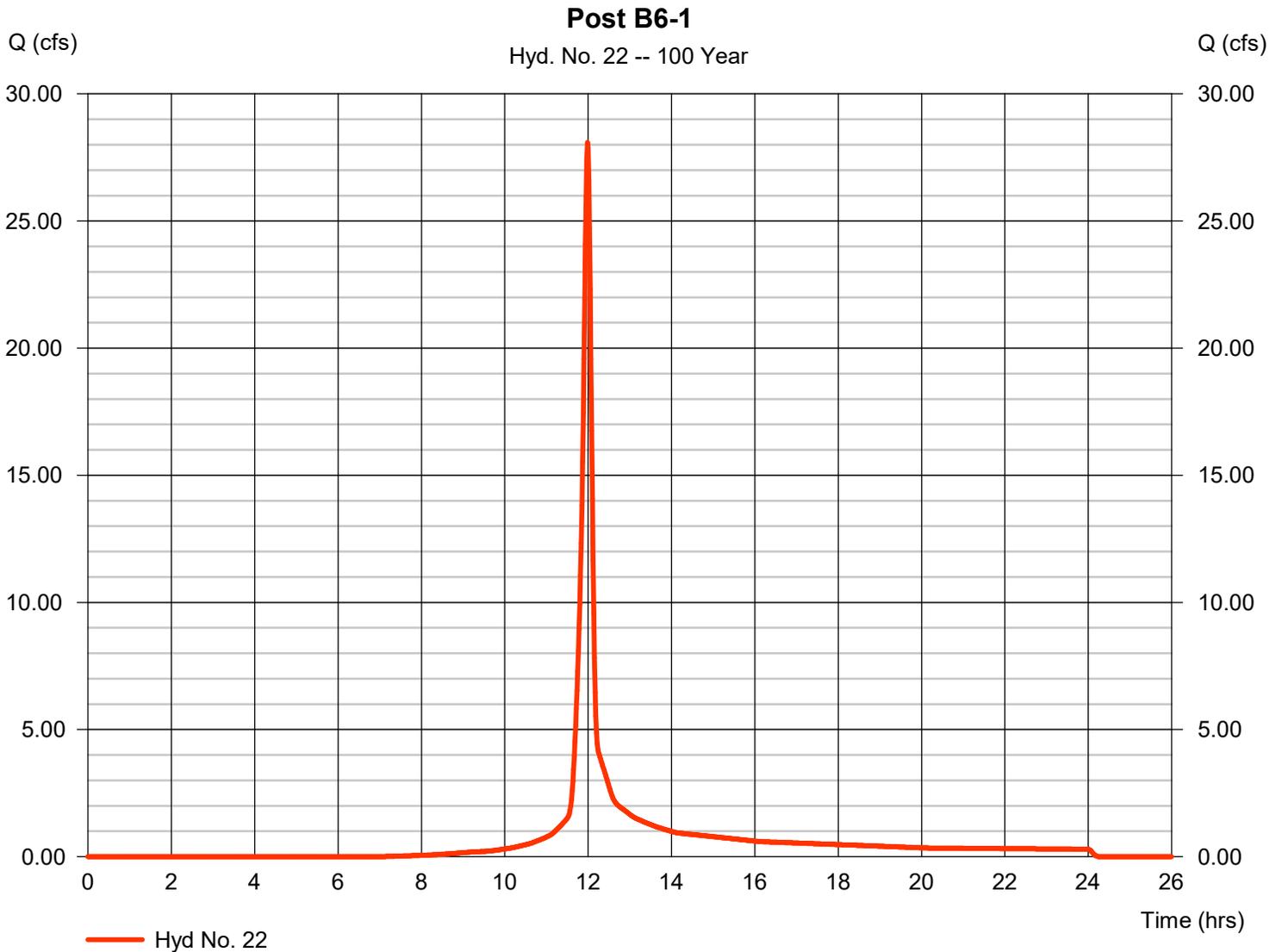
Tuesday, 06 / 30 / 2020

Hyd. No. 22

Post B6-1

Hydrograph type	= SCS Runoff	Peak discharge	= 28.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 64,009 cuft
Drainage area	= 4.590 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.90 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.880 x 98) + (0.690 x 69) + (0.500 x 79)] / 4.590



Hydrograph Report

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

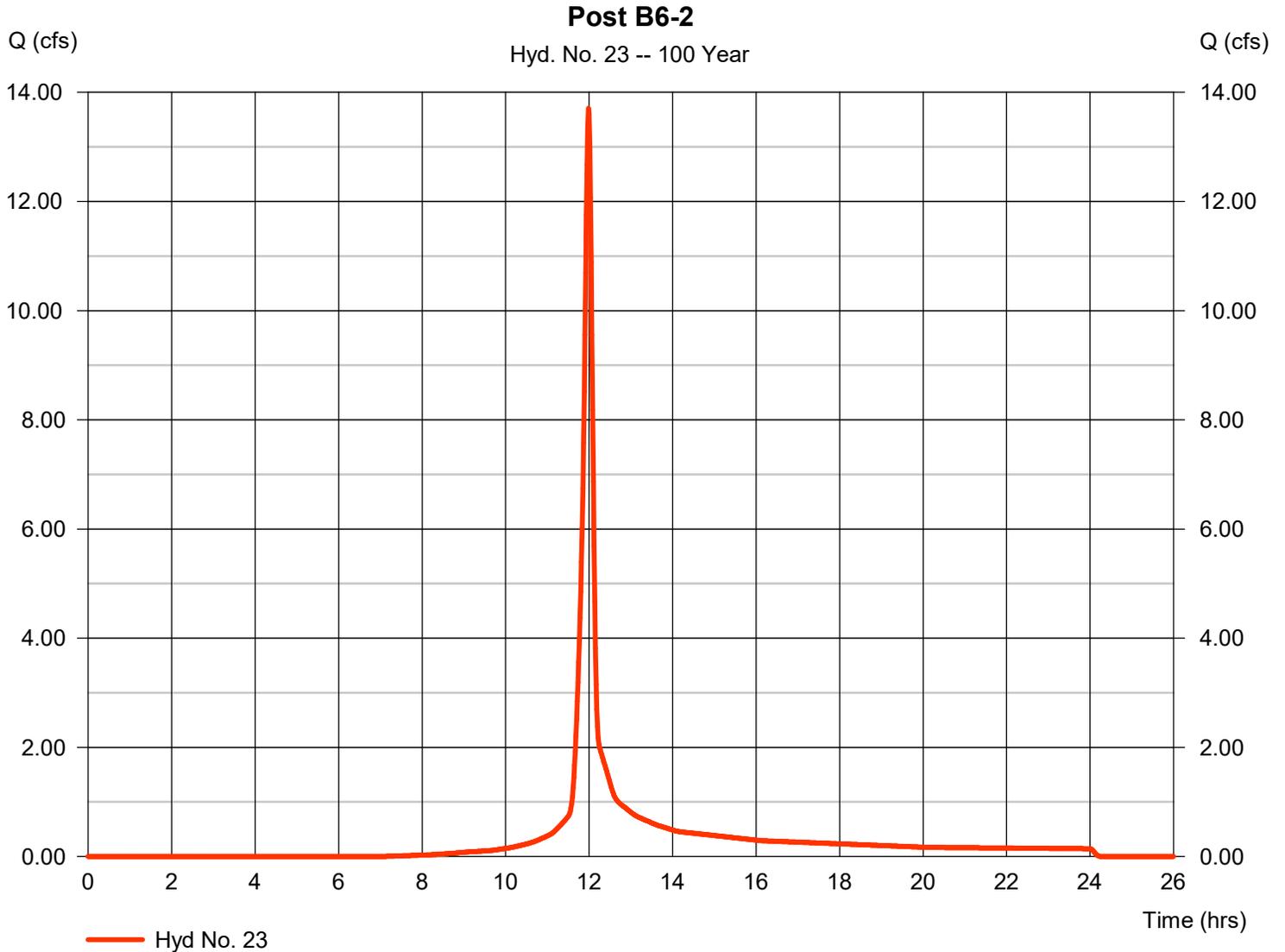
Tuesday, 06 / 30 / 2020

Hyd. No. 23

Post B6-2

Hydrograph type	= SCS Runoff	Peak discharge	= 13.70 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 31,237 cuft
Drainage area	= 2.240 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 8.40 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.630 x 98) + (0.960 x 79) + (0.650 x 74)] / 2.240



Hydrograph Report

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

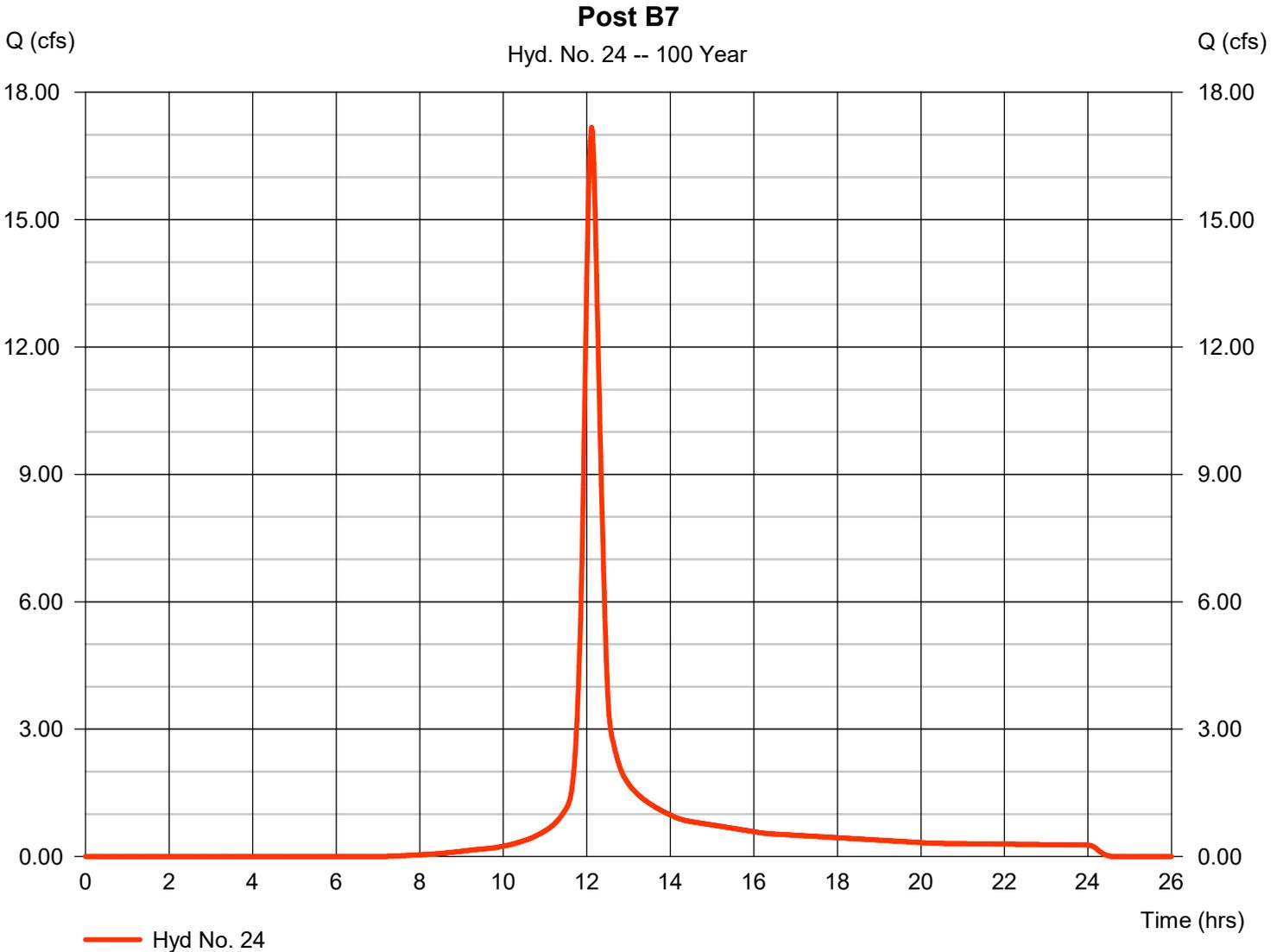
Tuesday, 06 / 30 / 2020

Hyd. No. 24

Post B7

Hydrograph type	= SCS Runoff	Peak discharge	= 17.18 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.12 hrs
Time interval	= 1 min	Hyd. volume	= 58,324 cuft
Drainage area	= 4.220 ac	Curve number	= 76*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 23.30 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.700 x 98) + (1.290 x 69) + (2.270 x 79)] / 4.220



Hydrograph Report

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

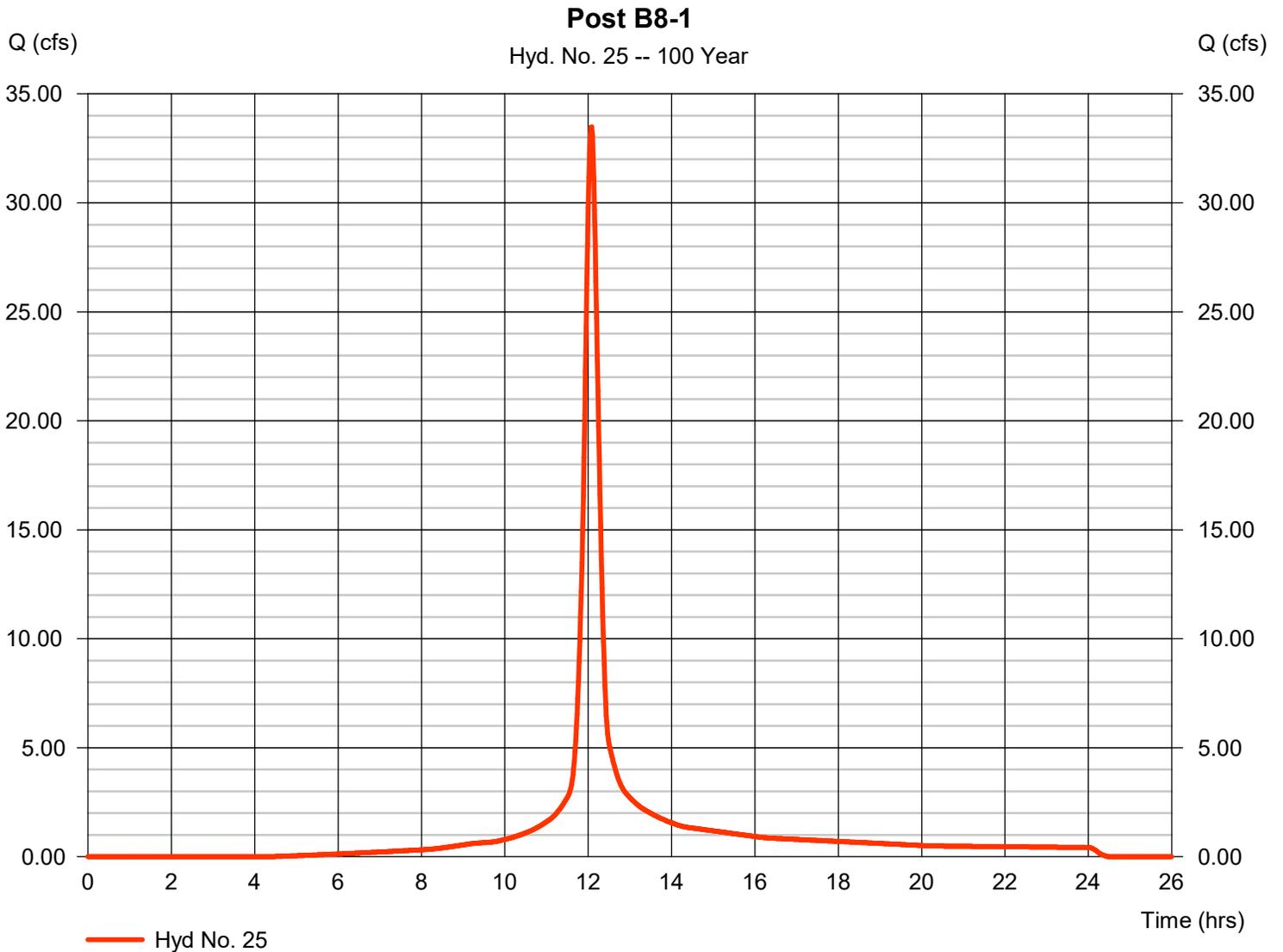
Tuesday, 06 / 30 / 2020

Hyd. No. 25

Post B8-1

Hydrograph type	= SCS Runoff	Peak discharge	= 33.48 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.08 hrs
Time interval	= 1 min	Hyd. volume	= 107,581 cuft
Drainage area	= 6.030 ac	Curve number	= 86*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 19.40 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.010 x 98) + (0.060 x 61) + (2.850 x 74) + (0.110 x 70)] / 6.030



Hydrograph Report

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

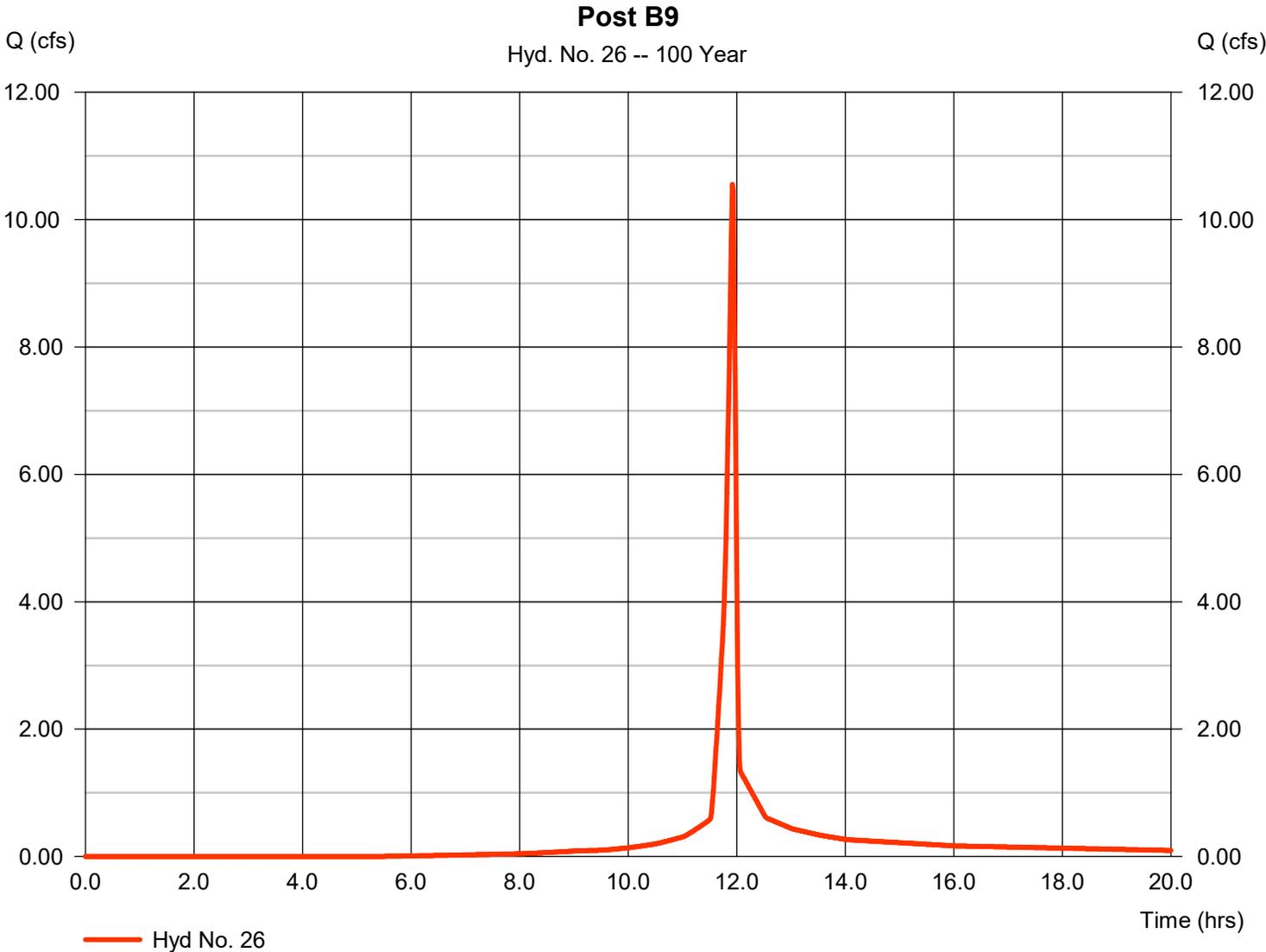
Tuesday, 06 / 30 / 2020

Hyd. No. 26

Post B9

Hydrograph type	= SCS Runoff	Peak discharge	= 10.55 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.92 hrs
Time interval	= 1 min	Hyd. volume	= 19,503 cuft
Drainage area	= 1.280 ac	Curve number	= 82*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 1.90 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.640 x 98) + (0.130 x 61) + (0.190 x 55) + (0.250 x 74) + (0.070 x 70)] / 1.280



Hydrograph Report

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

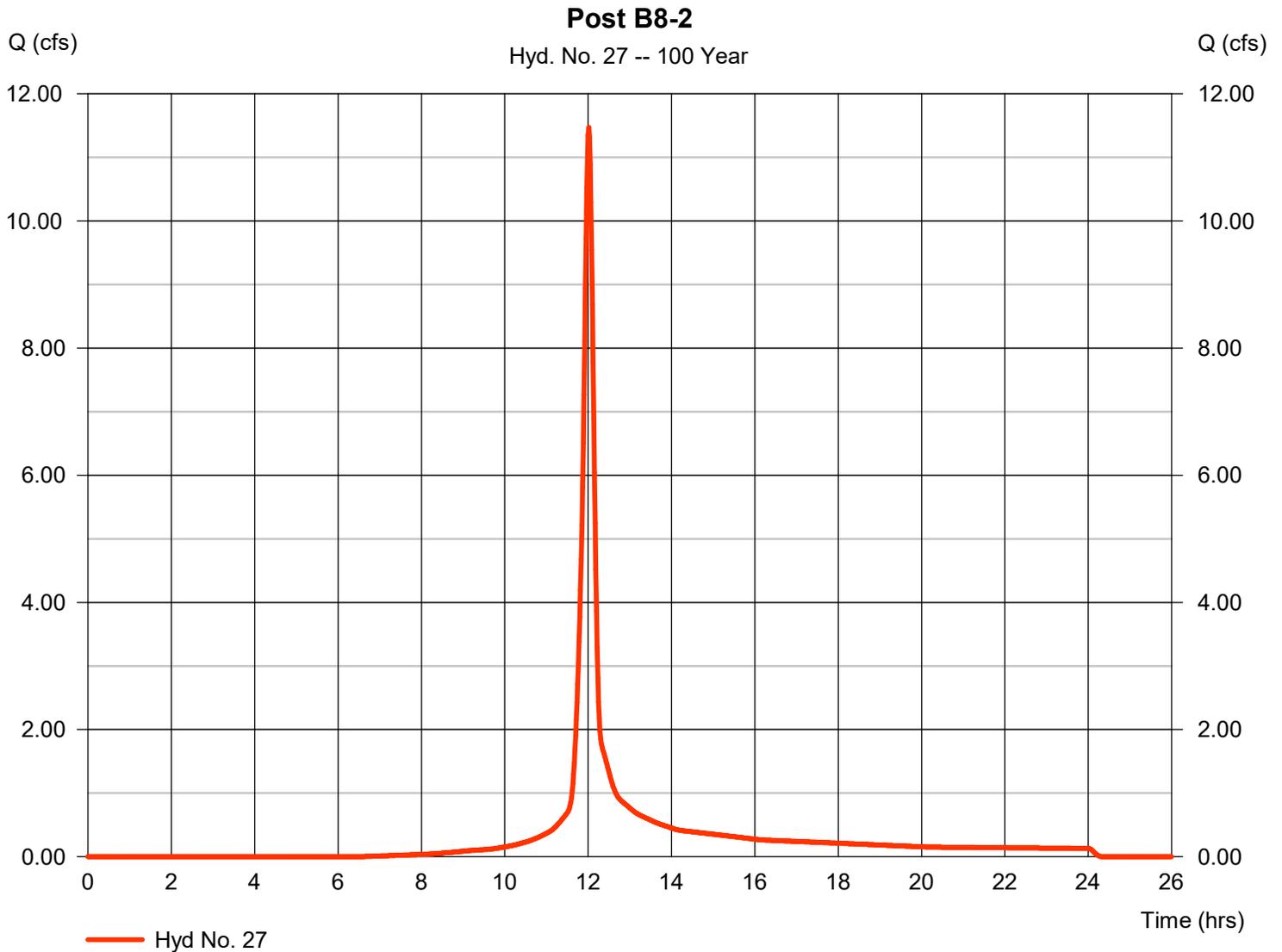
Tuesday, 06 / 30 / 2020

Hyd. No. 27

Post B8-2

Hydrograph type	= SCS Runoff	Peak discharge	= 11.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 29,239 cuft
Drainage area	= 2.020 ac	Curve number	= 78*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 11.80 min
Total precip.	= 6.53 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.380 x 98) + (1.480 x 74) + (0.160 x 70)] / 2.020



Hydrograph Report

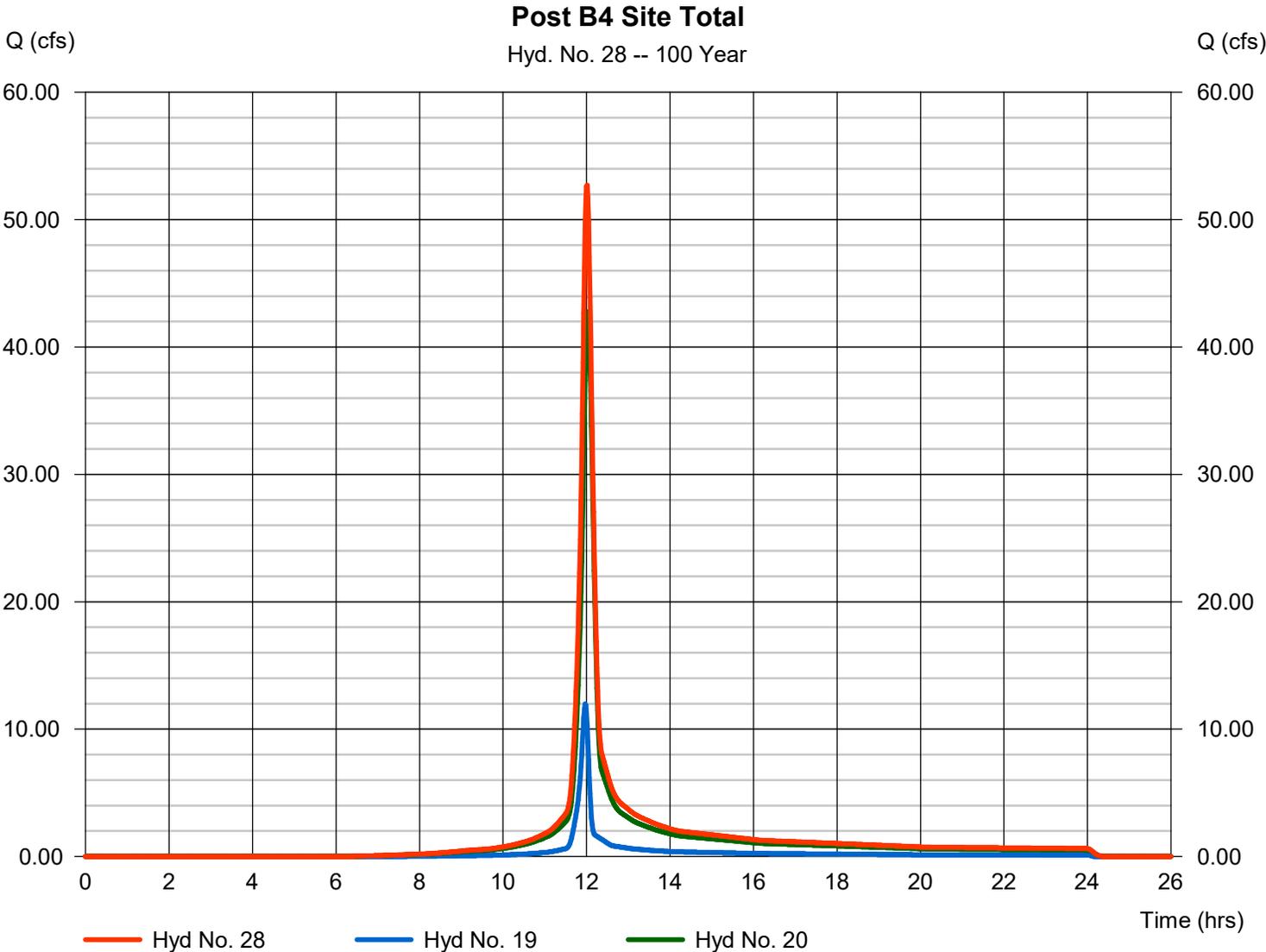
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 06 / 30 / 2020

Hyd. No. 28

Post B4 Site Total

Hydrograph type	= Combine	Peak discharge	= 52.69 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 141,586 cuft
Inflow hyds.	= 19, 20	Contrib. drain. area	= 9.570 ac



Hydrograph Report

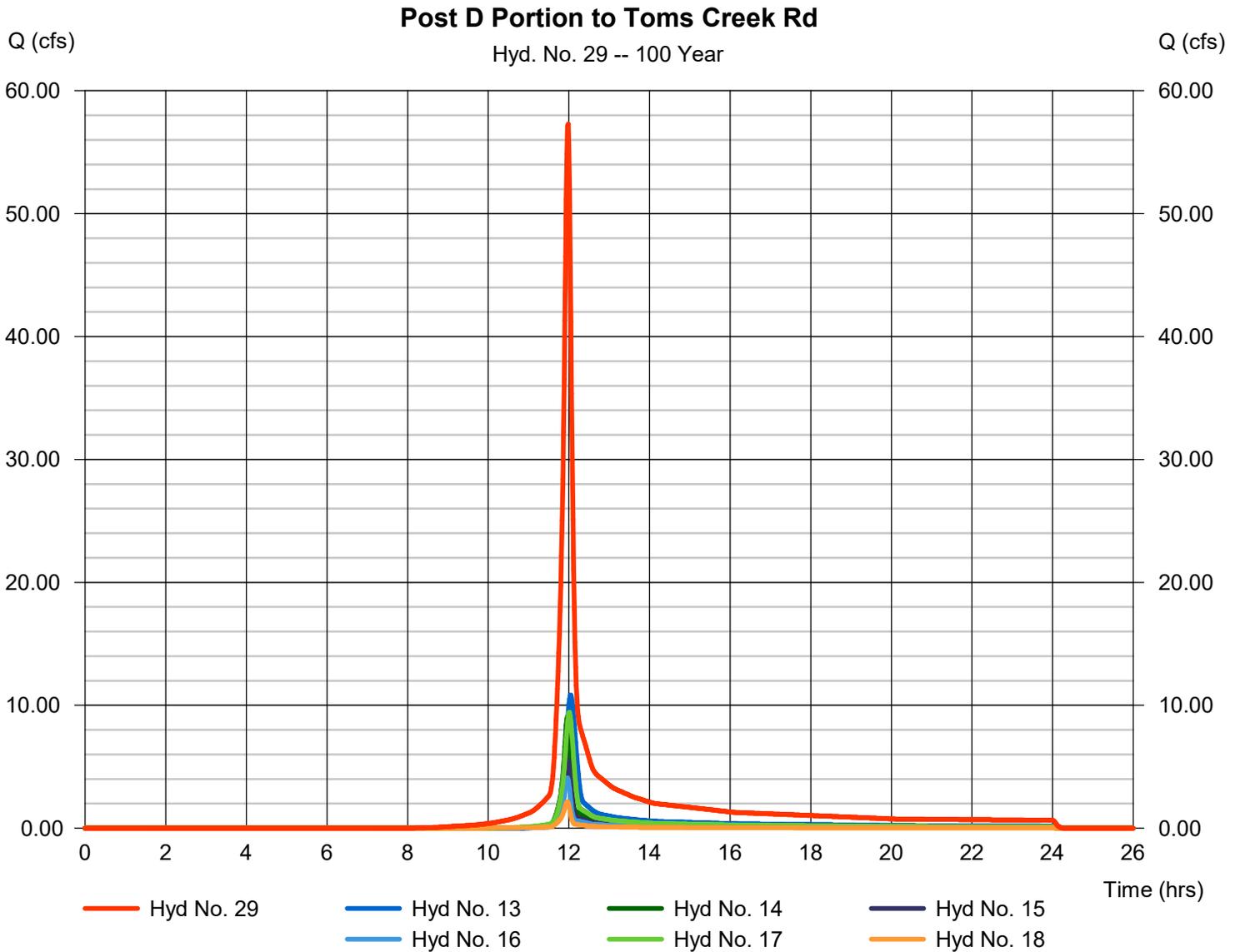
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 06 / 30 / 2020

Hyd. No. 29

Post D Portion to Toms Creek Rd

Hydrograph type	= Combine	Peak discharge	= 57.30 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 128,723 cuft
Inflow hyds.	= 13, 14, 15, 16, 17, 18	Contrib. drain. area	= 10.670 ac



Hydrograph Report

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

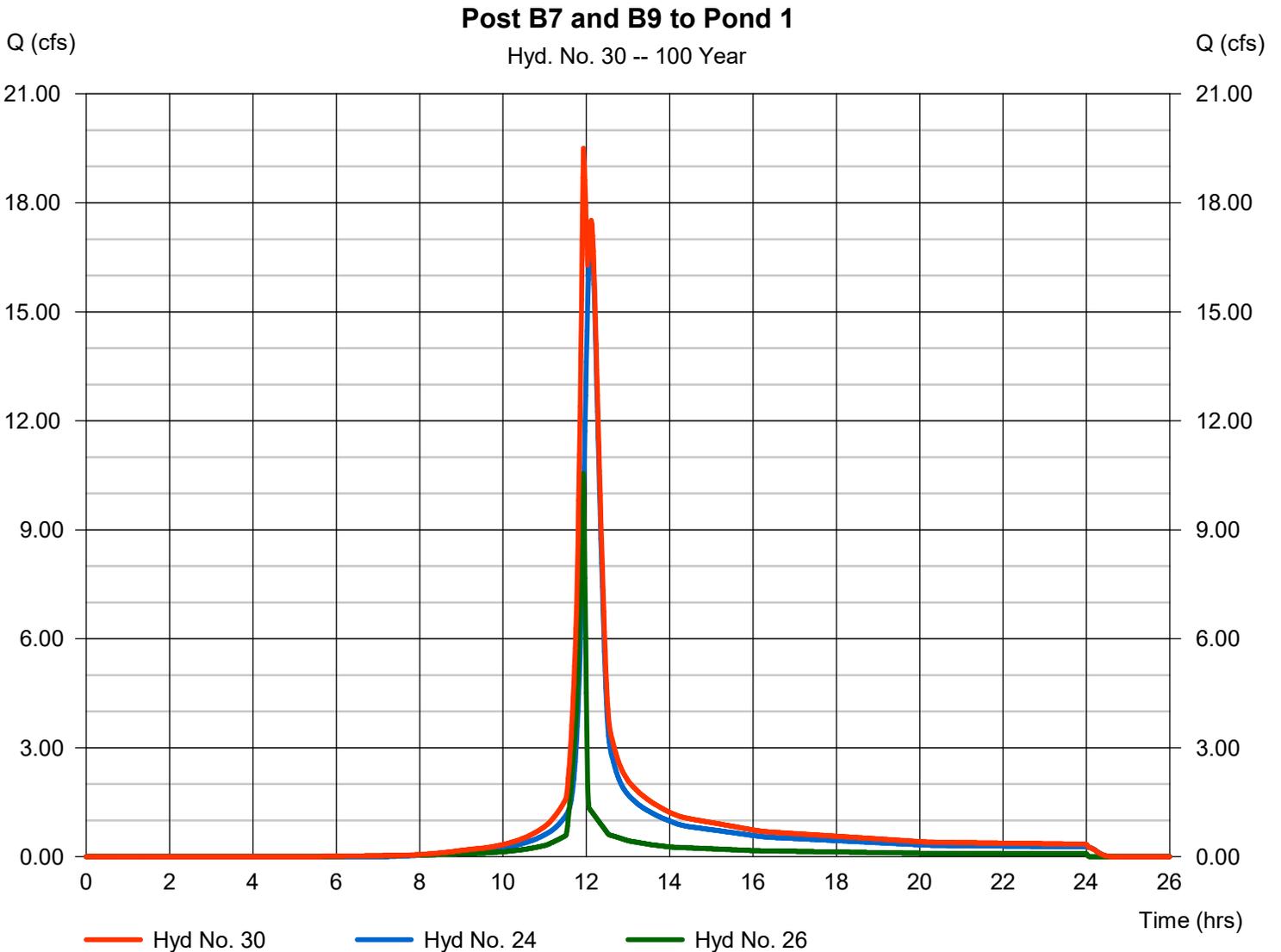
Tuesday, 06 / 30 / 2020

Hyd. No. 30

Post B7 and B9 to Pond 1

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 24, 26

Peak discharge = 19.50 cfs
 Time to peak = 11.93 hrs
 Hyd. volume = 74,695 cuft
 Contrib. drain. area = 5.500 ac



Hydrograph Report

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

Tuesday, 06 / 30 / 2020

Hyd. No. 31

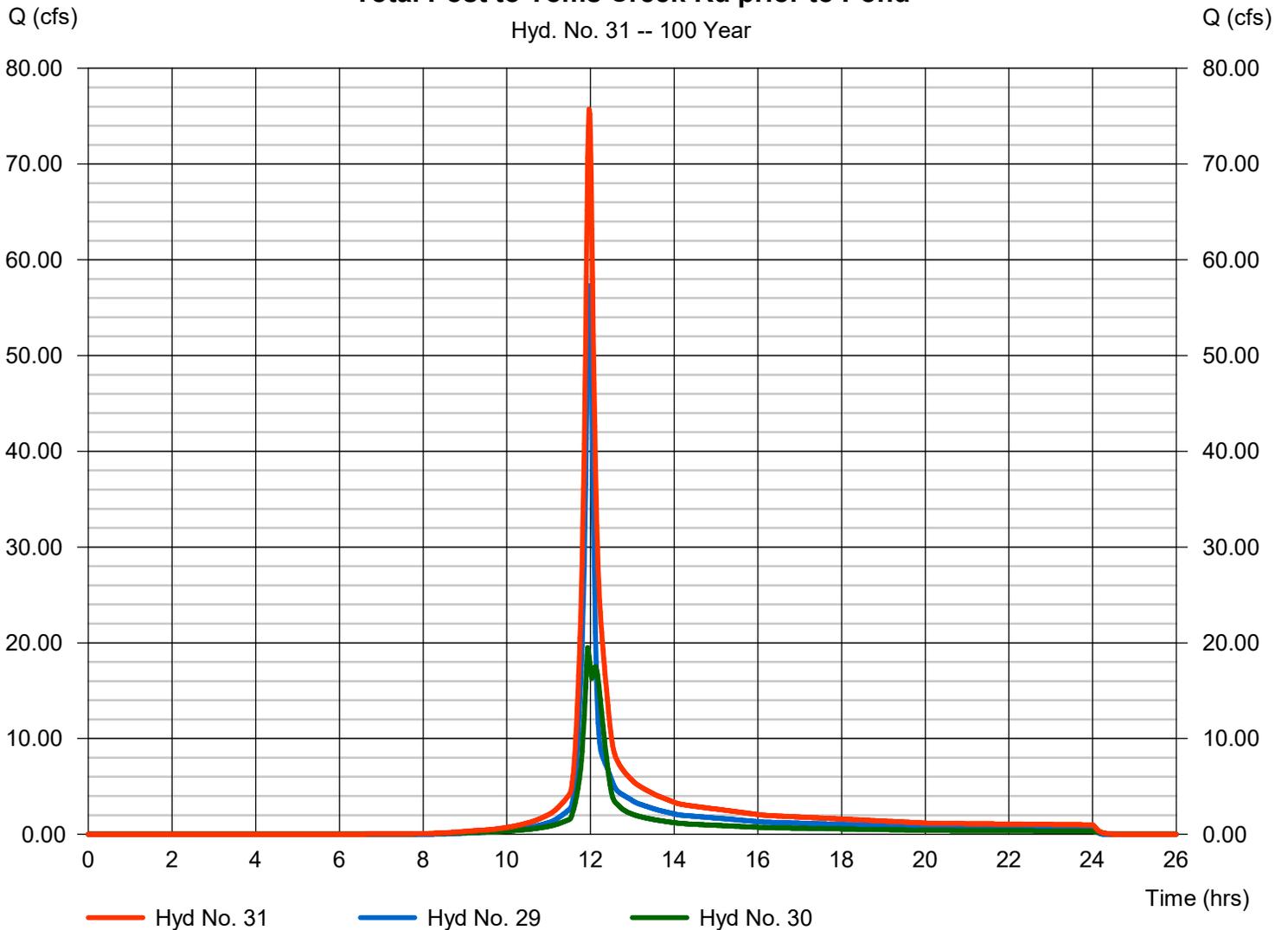
Total Post to Toms Creek Rd prior to Pond

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 29, 30

Peak discharge = 75.73 cfs
 Time to peak = 11.97 hrs
 Hyd. volume = 203,418 cuft
 Contrib. drain. area = 0.000 ac

Total Post to Toms Creek Rd prior to Pond

Hyd. No. 31 -- 100 Year



Hydrograph Report

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

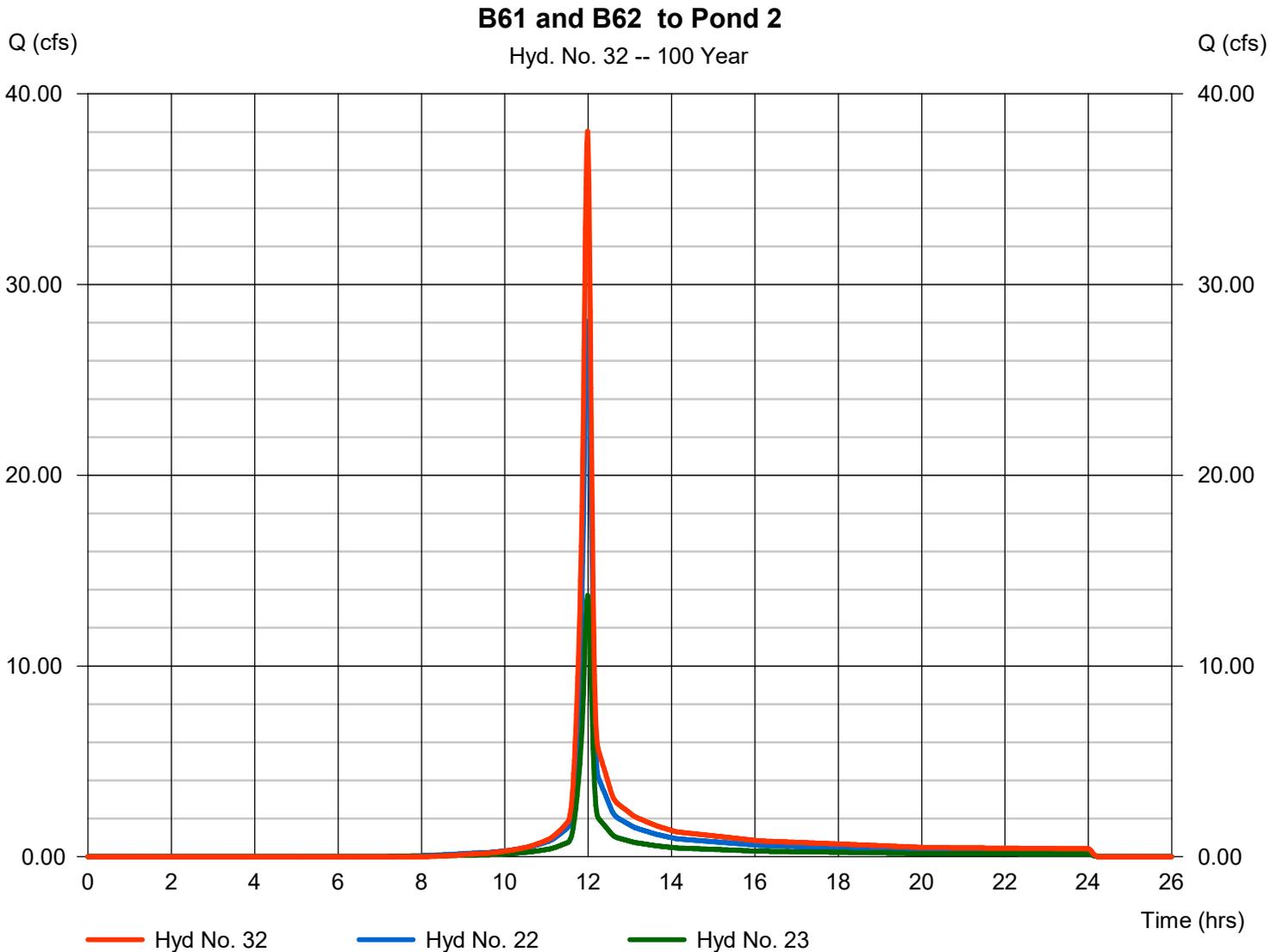
Tuesday, 06 / 30 / 2020

Hyd. No. 32

B61 and B62 to Pond 2

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 22, 23

Peak discharge = 38.04 cfs
 Time to peak = 11.98 hrs
 Hyd. volume = 84,391 cuft
 Contrib. drain. area = 6.830 ac



Hydrograph Report

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

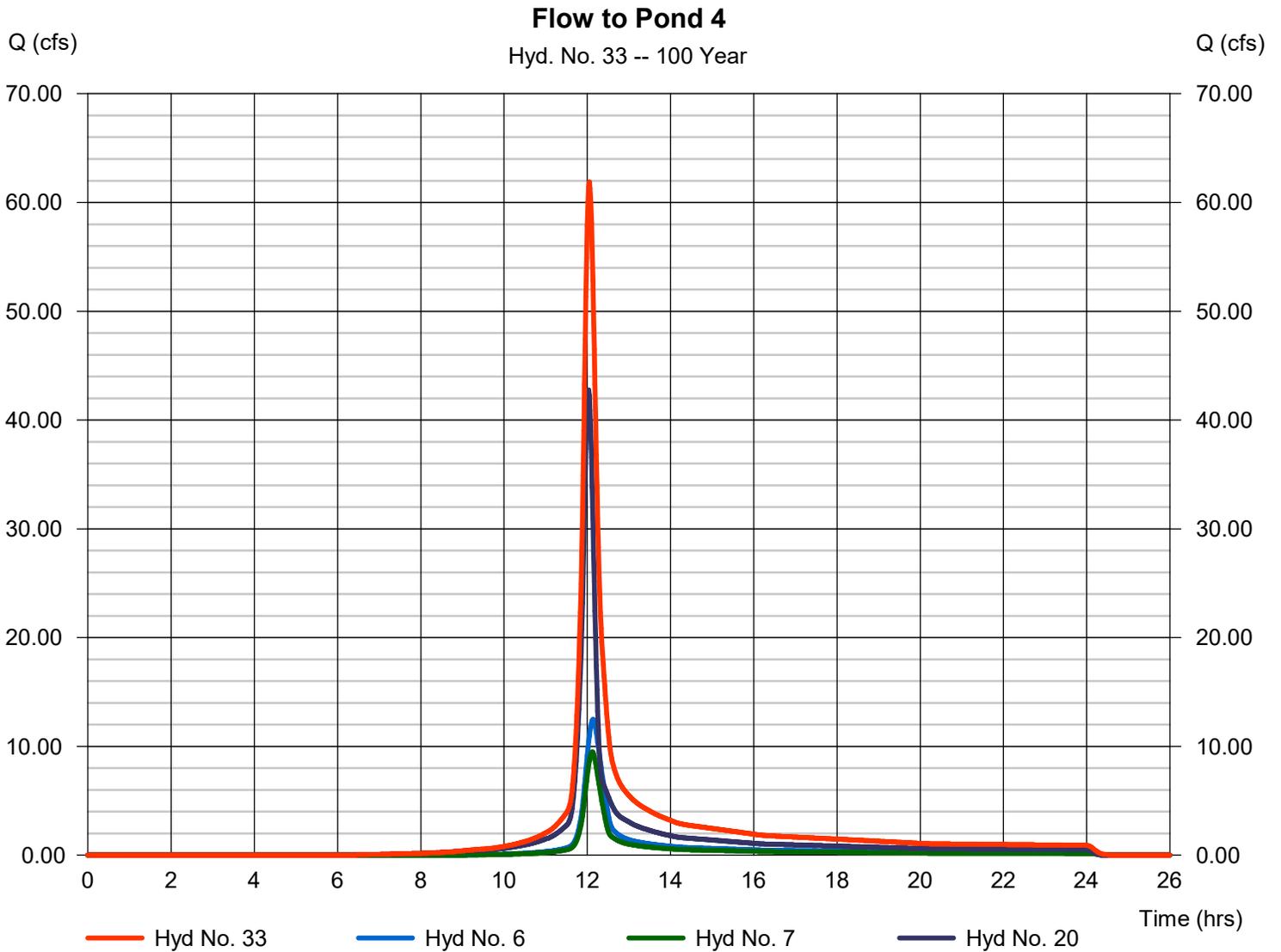
Tuesday, 06 / 30 / 2020

Hyd. No. 33

Flow to Pond 4

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 6, 7, 20

Peak discharge = 61.88 cfs
 Time to peak = 12.05 hrs
 Hyd. volume = 192,920 cuft
 Contrib. drain. area = 14.270 ac



Hydrograph Report

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

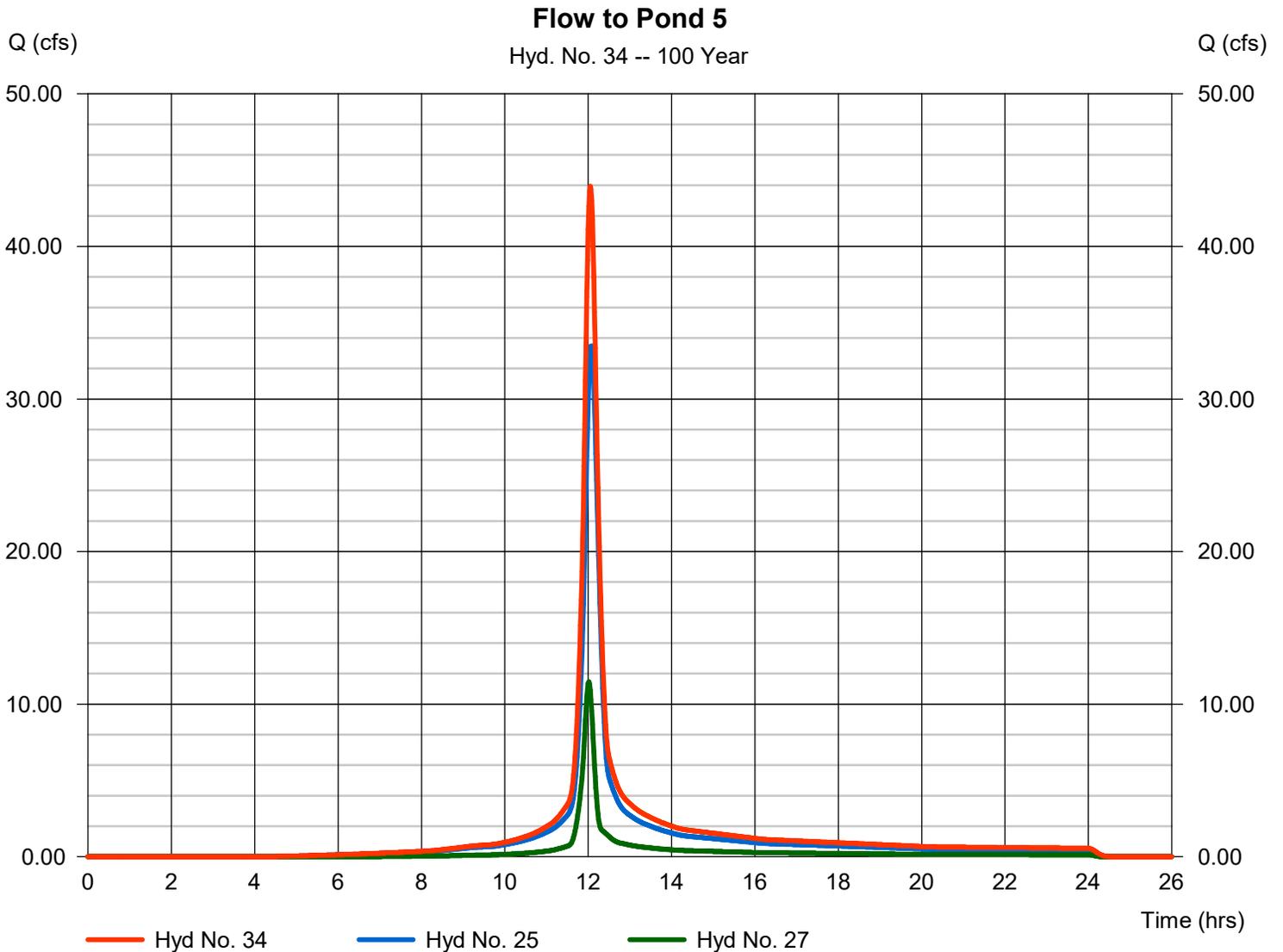
Tuesday, 06 / 30 / 2020

Hyd. No. 34

Flow to Pond 5

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 25, 27

Peak discharge = 43.94 cfs
 Time to peak = 12.05 hrs
 Hyd. volume = 136,820 cuft
 Contrib. drain. area = 8.050 ac



Hydrograph Report

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

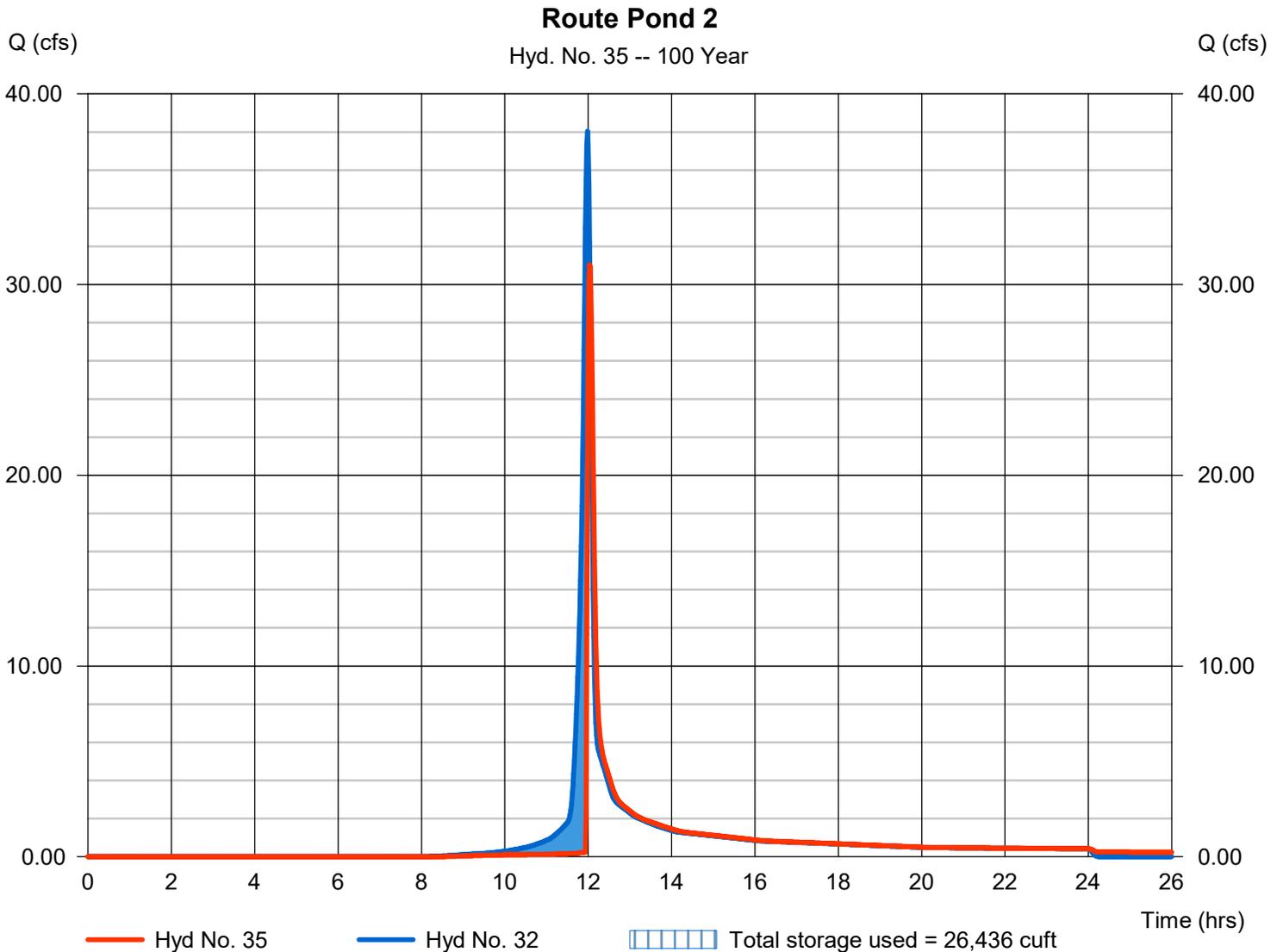
Tuesday, 06 / 30 / 2020

Hyd. No. 35

Route Pond 2

Hydrograph type	= Reservoir	Peak discharge	= 31.04 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 1 min	Hyd. volume	= 80,625 cuft
Inflow hyd. No.	= 32 - B61 and B62 to Pond 2	Max. Elevation	= 1990.21 ft
Reservoir name	= Pond 2	Max. Storage	= 26,436 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - Pond 2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1984.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1984.00	00	0	0
1.00	1985.00	1,575	525	525
2.00	1986.00	3,350	2,407	2,932
3.00	1987.00	4,300	3,815	6,747
4.00	1988.00	5,375	4,827	11,574
5.00	1989.00	6,500	5,928	17,502
6.00	1990.00	7,800	7,139	24,641
7.00	1991.00	9,100	8,441	33,082
8.00	1992.00	10,500	9,791	42,873
9.00	1993.00	11,900	11,192	54,064

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	Inactive	0.00
Span (in)	= 24.00	2.00	8.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 1984.00	1984.00	1988.00	0.00
Length (ft)	= 80.00	0.50	0.50	0.00
Slope (%)	= 1.88	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	0.00	0.00	0.00
Crest El. (ft)	= 1989.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
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	Civ A cfs	Civ B cfs	Civ 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	1984.00	0.00	0.00	0.00	---	0.00	---	---	---	---	---	0.000
1.00	525	1985.00	0.11 ic	0.10 ic	0.00	---	0.00	---	---	---	---	---	0.098
2.00	2,932	1986.00	0.15 ic	0.14 ic	0.00	---	0.00	---	---	---	---	---	0.143
3.00	6,747	1987.00	0.18 ic	0.18 ic	0.00	---	0.00	---	---	---	---	---	0.177
4.00	11,574	1988.00	0.21 ic	0.21 ic	0.00	---	0.00	---	---	---	---	---	0.205
5.00	17,502	1989.00	0.24 ic	0.23 ic	0.00	---	0.00	---	---	---	---	---	0.230
6.00	24,641	1990.00	18.68 ic	0.20 ic	0.00	---	18.48	---	---	---	---	---	18.68
7.00	33,082	1991.00	36.79 ic	0.03 ic	0.00	---	36.76 s	---	---	---	---	---	36.79
8.00	42,873	1992.00	39.95 ic	0.02 ic	0.00	---	39.92 s	---	---	---	---	---	39.94
9.00	54,064	1993.00	42.75 ic	0.01 ic	0.00	---	42.61 s	---	---	---	---	---	42.62

Hydrograph Report

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

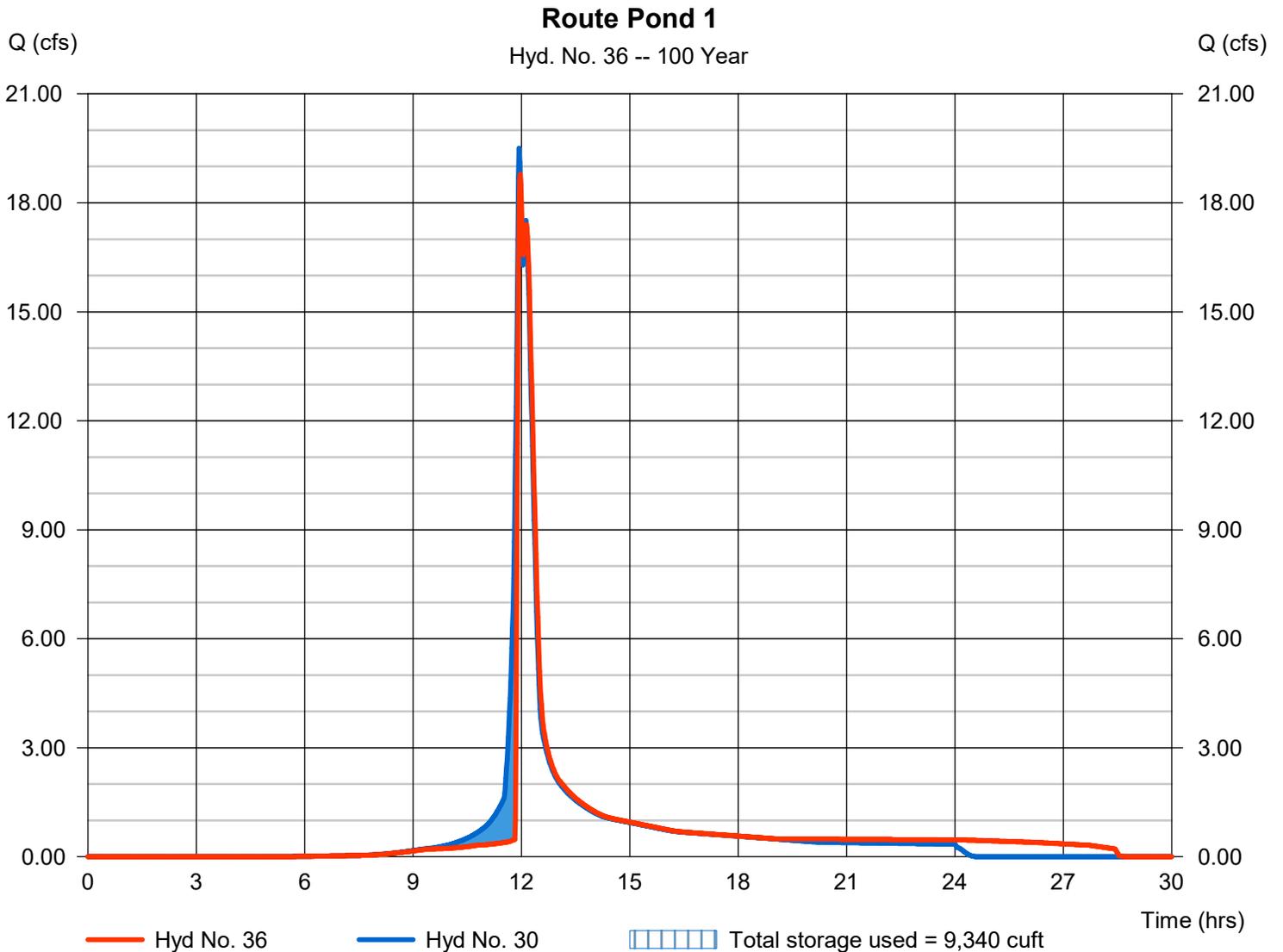
Tuesday, 06 / 30 / 2020

Hyd. No. 36

Route Pond 1

Hydrograph type	= Reservoir	Peak discharge	= 18.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 74,695 cuft
Inflow hyd. No.	= 30 - Post B7 and B9 to Pond 1	Max. Elevation	= 2004.00 ft
Reservoir name	= Pond 1	Max. Storage	= 9,340 cuft

Storage Indication method used.



Pond No. 1 - Pond 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1999.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1999.00	00	0	0
1.00	2000.00	167	56	56
2.00	2001.00	1,380	676	731
3.00	2002.00	2,375	1,855	2,586
4.00	2003.00	3,350	2,848	5,435
5.00	2004.00	4,500	3,910	9,345
6.00	2005.00	5,900	5,184	14,529
7.00	2006.00	7,600	6,731	21,260

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	3.00	0.00	0.00
Span (in)	= 24.00	3.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1999.00	1999.00	0.00	0.00
Length (ft)	= 80.00	0.50	0.00	0.00
Slope (%)	= 6.88	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	Inactive	0.00	0.00
Crest El. (ft)	= 2003.50	2006.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
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	Civ A cfs	Civ B cfs	Civ 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	1999.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	56	2000.00	0.22 ic	0.21 ic	---	---	0.00	0.00	---	---	---	---	0.214
2.00	731	2001.00	0.32 ic	0.32 ic	---	---	0.00	0.00	---	---	---	---	0.315
3.00	2,586	2002.00	0.41 ic	0.39 ic	---	---	0.00	0.00	---	---	---	---	0.392
4.00	5,435	2003.00	0.48 ic	0.46 ic	---	---	0.00	0.00	---	---	---	---	0.456
5.00	9,345	2004.00	18.85 ic	0.37 ic	---	---	18.48	0.00	---	---	---	---	18.85
6.00	14,529	2005.00	33.60 ic	0.06 ic	---	---	33.53 s	0.00	---	---	---	---	33.59
7.00	21,260	2006.00	36.99 ic	0.03 ic	---	---	36.88 s	0.00	---	---	---	---	36.92

Hydrograph Report

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

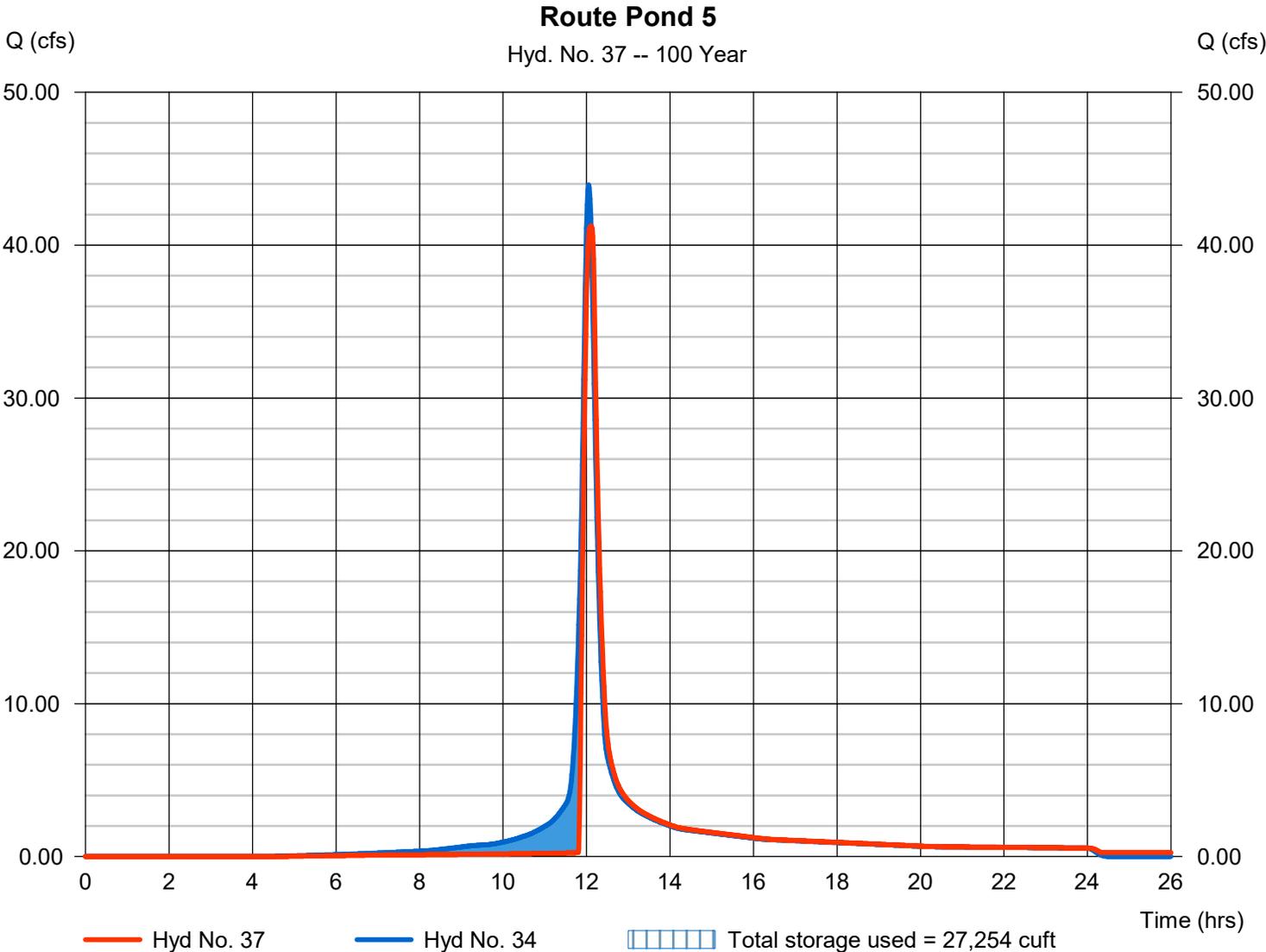
Tuesday, 06 / 30 / 2020

Hyd. No. 37

Route Pond 5

Hydrograph type	= Reservoir	Peak discharge	= 41.26 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 1 min	Hyd. volume	= 134,107 cuft
Inflow hyd. No.	= 34 - Flow to Pond 5	Max. Elevation	= 2005.95 ft
Reservoir name	= Pond 5	Max. Storage	= 27,254 cuft

Storage Indication method used.



Pond No. 5 - Pond 5

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1999.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1999.00	00	0	0
1.00	2000.00	1,900	633	633
2.00	2001.00	2,600	2,241	2,874
3.00	2002.00	3,400	2,991	5,865
4.00	2003.00	4,400	3,889	9,754
5.00	2004.00	5,400	4,891	14,645
6.00	2005.00	6,500	5,941	20,585
7.00	2006.00	7,600	7,042	27,628

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	2.00	0.00	0.00
Span (in)	= 24.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1997.00	1997.00	0.00	0.00
Length (ft)	= 88.00	0.50	0.00	0.00
Slope (%)	= 1.70	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	Inactive	0.00	0.00
Crest El. (ft)	= 2005.00	2006.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
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	Civ A cfs	Civ B cfs	Civ 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	1999.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	633	2000.00	15.12 ic	0.11 ic	---	---	0.00	0.00	---	---	---	---	0.105
2.00	2,874	2001.00	15.12 ic	0.15 ic	---	---	0.00	0.00	---	---	---	---	0.149
3.00	5,865	2002.00	15.12 ic	0.18 ic	---	---	0.00	0.00	---	---	---	---	0.182
4.00	9,754	2003.00	15.12 ic	0.21 ic	---	---	0.00	0.00	---	---	---	---	0.210
5.00	14,645	2004.00	15.12 ic	0.23 ic	---	---	0.00	0.00	---	---	---	---	0.235
6.00	20,585	2005.00	15.12 ic	0.26 ic	---	---	0.00	0.00	---	---	---	---	0.257
7.00	27,628	2006.00	41.66 ic	0.07 ic	---	---	41.59 s	0.00	---	---	---	---	41.66

Hydrograph Report

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

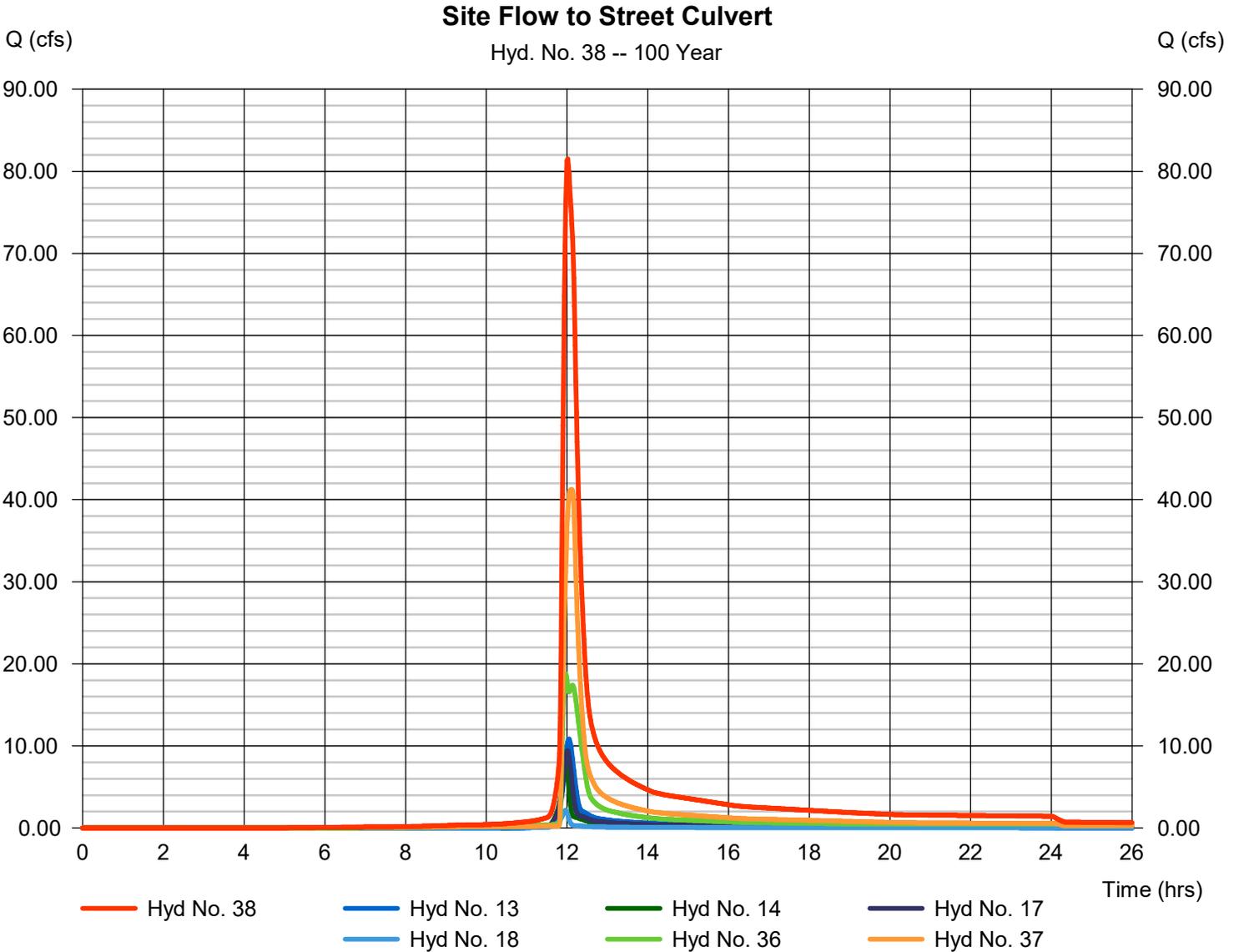
Tuesday, 06 / 30 / 2020

Hyd. No. 38

Site Flow to Street Culvert

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 13, 14, 17, 18, 36, 37

Peak discharge = 81.51 cfs
Time to peak = 12.02 hrs
Hyd. volume = 277,636 cuft
Contrib. drain. area = 8.450 ac



Hydrograph Report

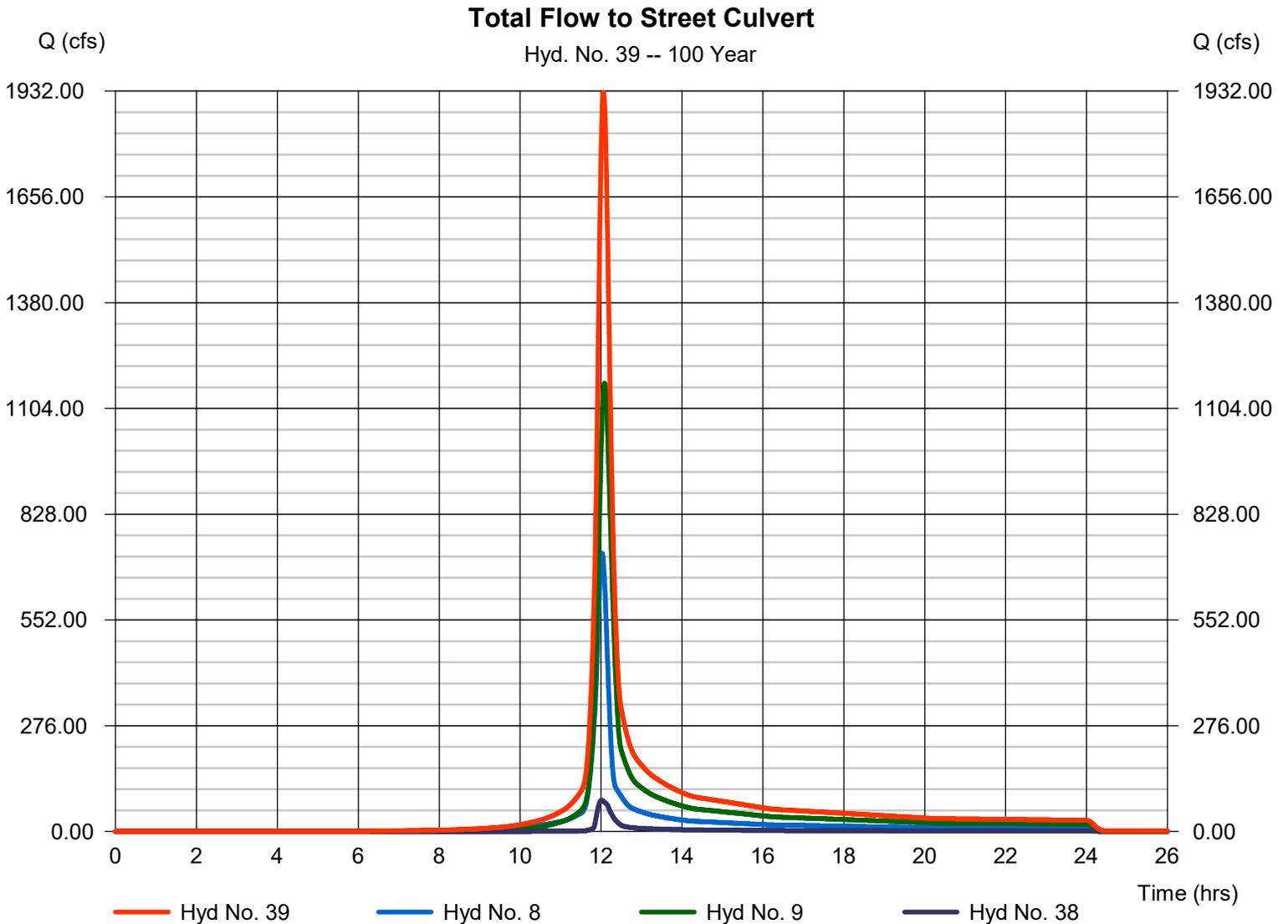
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 06 / 30 / 2020

Hyd. No. 39

Total Flow to Street Culvert

Hydrograph type	= Combine	Peak discharge	= 1928.68 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 5,927,681 cuft
Inflow hyds.	= 8, 9, 38	Contrib. drain. area	= 461.330 ac



Hydrograph Report

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

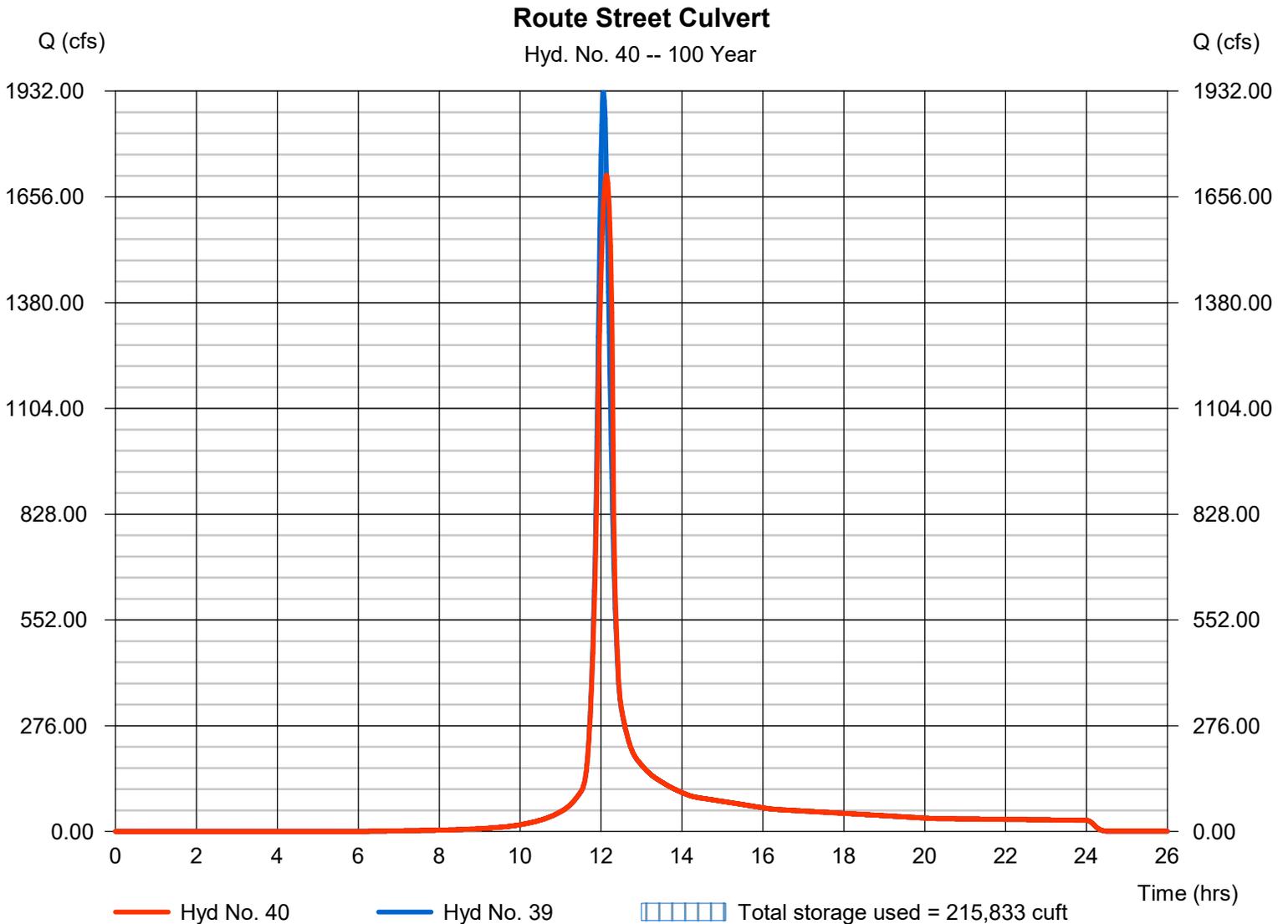
Tuesday, 06 / 30 / 2020

Hyd. No. 40

Route Street Culvert

Hydrograph type	= Reservoir	Peak discharge	= 1713.22 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 5,927,676 cuft
Inflow hyd. No.	= 39 - Total Flow to Street Culvert	Max. Elevation	= 1994.89 ft
Reservoir name	= Street Culvert Pond	Max. Storage	= 215,833 cuft

Storage Indication method used.



Pond Report

Pond No. 6 - Street Culvert Pond

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1983.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1983.00	00	0	0
1.00	1984.00	01	0	0
2.00	1985.00	405	142	142
3.00	1986.00	2,300	1,223	1,366
4.00	1987.00	4,630	3,397	4,763
5.00	1988.00	7,275	5,902	10,665
6.00	1989.00	10,469	8,823	19,488
7.00	1990.00	14,950	12,642	32,130
8.00	1991.00	22,760	18,717	50,847
9.00	1992.00	31,310	26,919	77,766
10.00	1993.00	42,750	36,878	114,644
11.00	1994.00	54,625	48,562	163,206
12.00	1995.00	63,675	59,086	222,292
13.00	1996.00	75,690	69,589	291,881
14.00	1997.00	91,375	83,401	375,282
15.00	1998.00	104,570	97,889	473,171
16.00	1999.00	117,250	110,838	584,009
17.00	2000.00	134,055	125,546	709,555
18.00	2001.00	145,000	139,478	849,033

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 96.00	0.00	0.00	0.00
Span (in)	= 95.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 1983.00	0.00	0.00	0.00
Length (ft)	= 218.40	0.00	0.00	0.00
Slope (%)	= 1.49	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	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 100.00	0.00	0.00	0.00
Crest El. (ft)	= 2007.78	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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	1983.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.00	0	1984.00	53.91 ic	---	---	---	0.00	---	---	---	---	---	53.91
2.00	142	1985.00	152.47 ic	---	---	---	0.00	---	---	---	---	---	152.47
3.00	1,366	1986.00	280.11 ic	---	---	---	0.00	---	---	---	---	---	280.11
4.00	4,763	1987.00	431.26 ic	---	---	---	0.00	---	---	---	---	---	431.26
5.00	10,665	1988.00	602.71 ic	---	---	---	0.00	---	---	---	---	---	602.71
6.00	19,488	1989.00	792.28 ic	---	---	---	0.00	---	---	---	---	---	792.28
7.00	32,130	1990.00	998.39 ic	---	---	---	0.00	---	---	---	---	---	998.39
8.00	50,847	1991.00	1219.79 ic	---	---	---	0.00	---	---	---	---	---	1219.79
9.00	77,766	1992.00	1363.77 ic	---	---	---	0.00	---	---	---	---	---	1363.77
10.00	114,644	1993.00	1493.94 ic	---	---	---	0.00	---	---	---	---	---	1493.94
11.00	163,206	1994.00	1613.64 ic	---	---	---	0.00	---	---	---	---	---	1613.64
12.00	222,292	1995.00	1725.05 ic	---	---	---	0.00	---	---	---	---	---	1725.05
13.00	291,881	1996.00	1829.69 ic	---	---	---	0.00	---	---	---	---	---	1829.69
14.00	375,282	1997.00	1928.66 ic	---	---	---	0.00	---	---	---	---	---	1928.66
15.00	473,171	1998.00	2022.80 ic	---	---	---	0.00	---	---	---	---	---	2022.80
16.00	584,009	1999.00	2112.75 ic	---	---	---	0.00	---	---	---	---	---	2112.75
17.00	709,555	2000.00	2199.01 ic	---	---	---	0.00	---	---	---	---	---	2199.01
18.00	849,033	2001.00	2282.03 ic	---	---	---	0.00	---	---	---	---	---	2282.03

Hydrograph Report

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

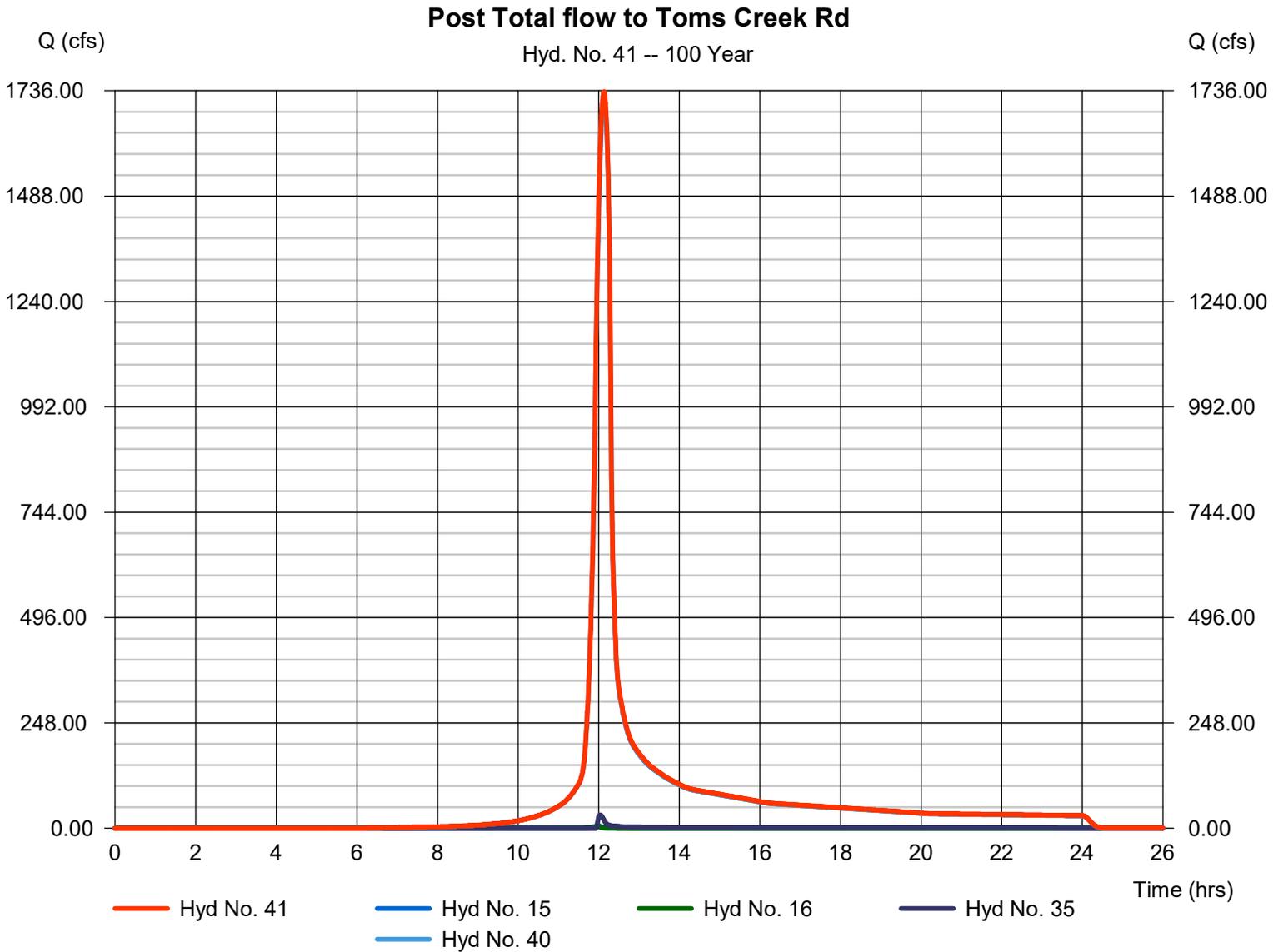
Tuesday, 06 / 30 / 2020

Hyd. No. 41

Post Total flow to Toms Creek Rd

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 15, 16, 35, 40

Peak discharge = 1733.50 cfs
Time to peak = 12.13 hrs
Hyd. volume = 6,028,208 cuft
Contrib. drain. area = 2.220 ac



Hydrograph Report

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

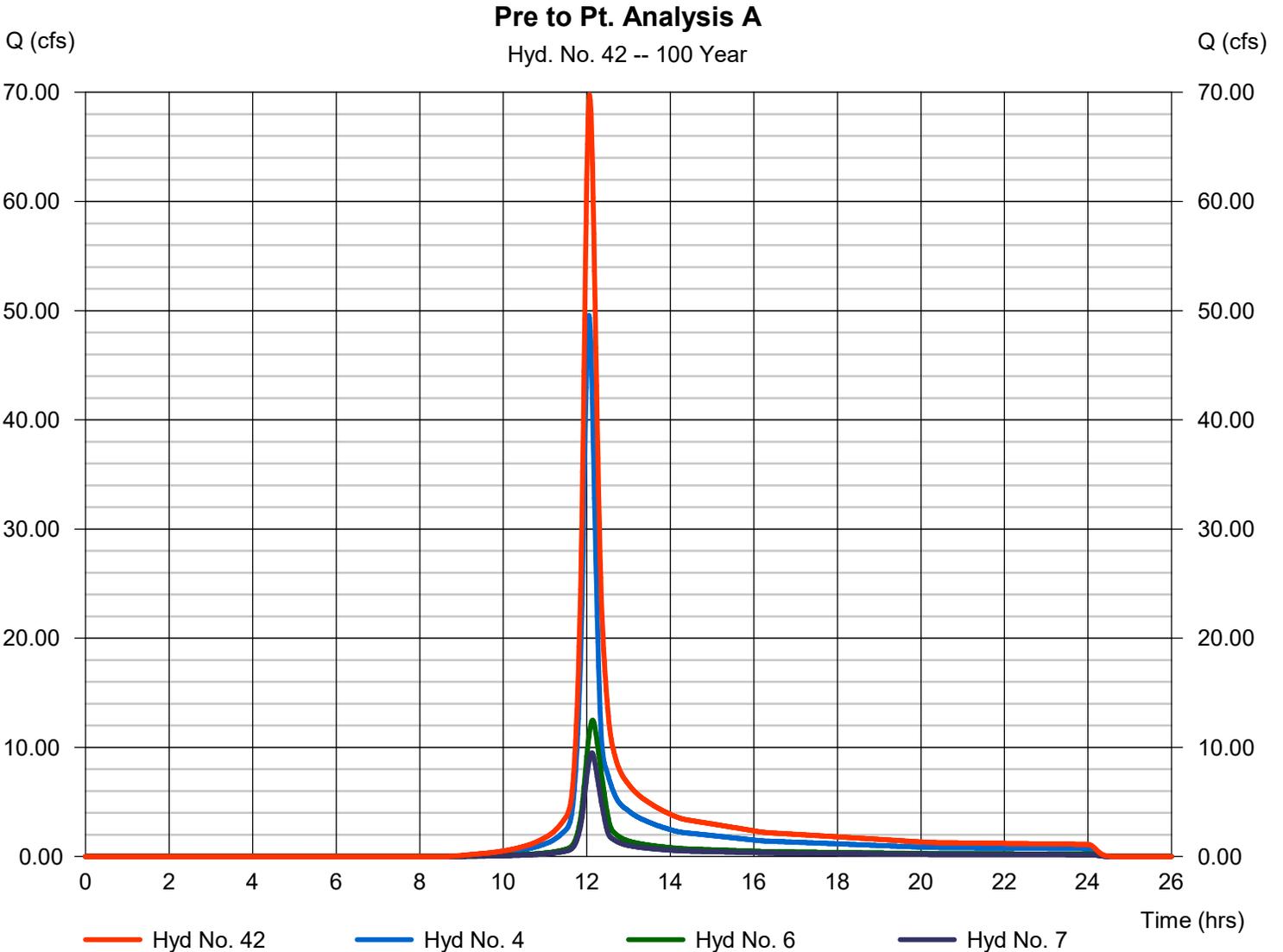
Tuesday, 06 / 30 / 2020

Hyd. No. 42

Pre to Pt. Analysis A

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 4, 6, 7

Peak discharge = 69.75 cfs
Time to peak = 12.07 hrs
Hyd. volume = 218,351 cuft
Contrib. drain. area = 18.490 ac



Hydrograph Report

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

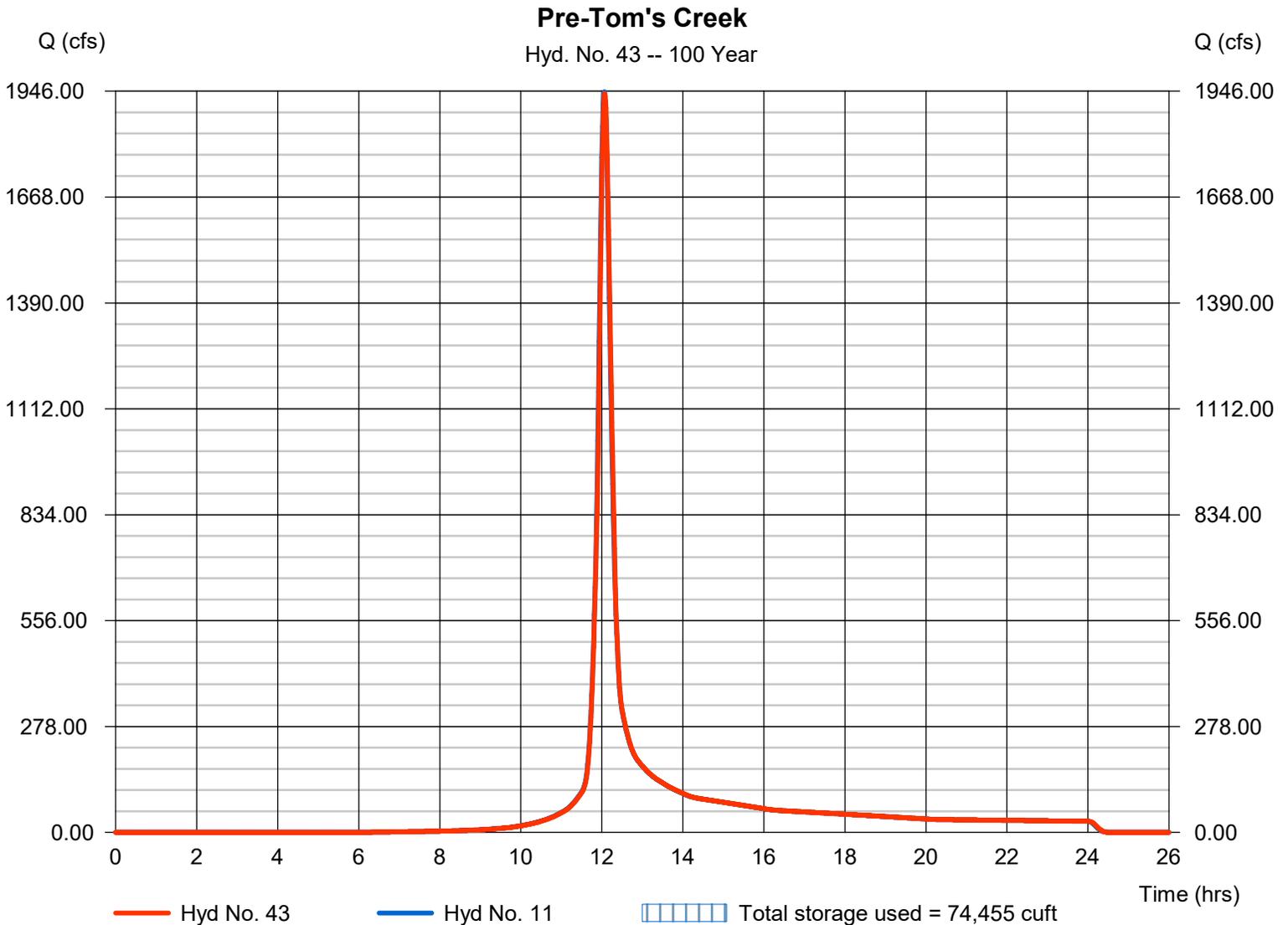
Tuesday, 06 / 30 / 2020

Hyd. No. 43

Pre-Tom's Creek

Hydrograph type	= Reservoir	Peak discharge	= 1940.23 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 1 min	Hyd. volume	= 5,920,096 cuft
Inflow hyd. No.	= 11 - PreDev Flow - Toms Creek	Max Elevation	= 1981.92 ft
Reservoir name	= PreDevCondition	Max. Storage	= 74,455 cuft

Storage Indication method used.



Pond No. 11 - PreDevCondition

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1975.10 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1975.10	00	0	0
0.90	1976.00	83	25	25
2.90	1978.00	2,686	2,161	2,185
4.90	1980.00	19,181	19,361	21,547
6.90	1982.00	36,979	55,190	76,736
8.90	1984.00	57,331	93,560	170,296
10.90	1986.00	78,620	135,378	305,675
12.90	1988.00	97,681	175,939	481,613
14.90	1990.00	115,925	213,324	694,938

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1975.10	0.00	0.00	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 4.78	0.00	0.00	n/a
N-Value	= .020	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 90.00	0.00	0.00	0.00
Crest El. (ft)	= 1977.90	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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	Civ A cfs	Civ B cfs	Civ 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	1975.10	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.90	25	1976.00	5.15 ic	---	---	---	0.00	---	---	---	---	---	5.149
2.90	2,185	1978.00	30.36 ic	---	---	---	7.40	---	---	---	---	---	37.75
4.90	21,547	1980.00	45.15 ic	---	---	---	712.09	---	---	---	---	---	757.24
6.90	76,736	1982.00	56.17 ic	---	---	---	1942.62	---	---	---	---	---	1998.79
8.90	170,296	1984.00	65.36 ic	---	---	---	3525.40	---	---	---	---	---	3590.76
10.90	305,675	1986.00	73.41 ic	---	---	---	5394.38	---	---	---	---	---	5467.79
12.90	481,613	1988.00	80.66 ic	---	---	---	7510.98	---	---	---	---	---	7591.64
14.90	694,938	1990.00	87.31 ic	---	---	---	9849.01	---	---	---	---	---	9936.32

Hydrograph Report

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

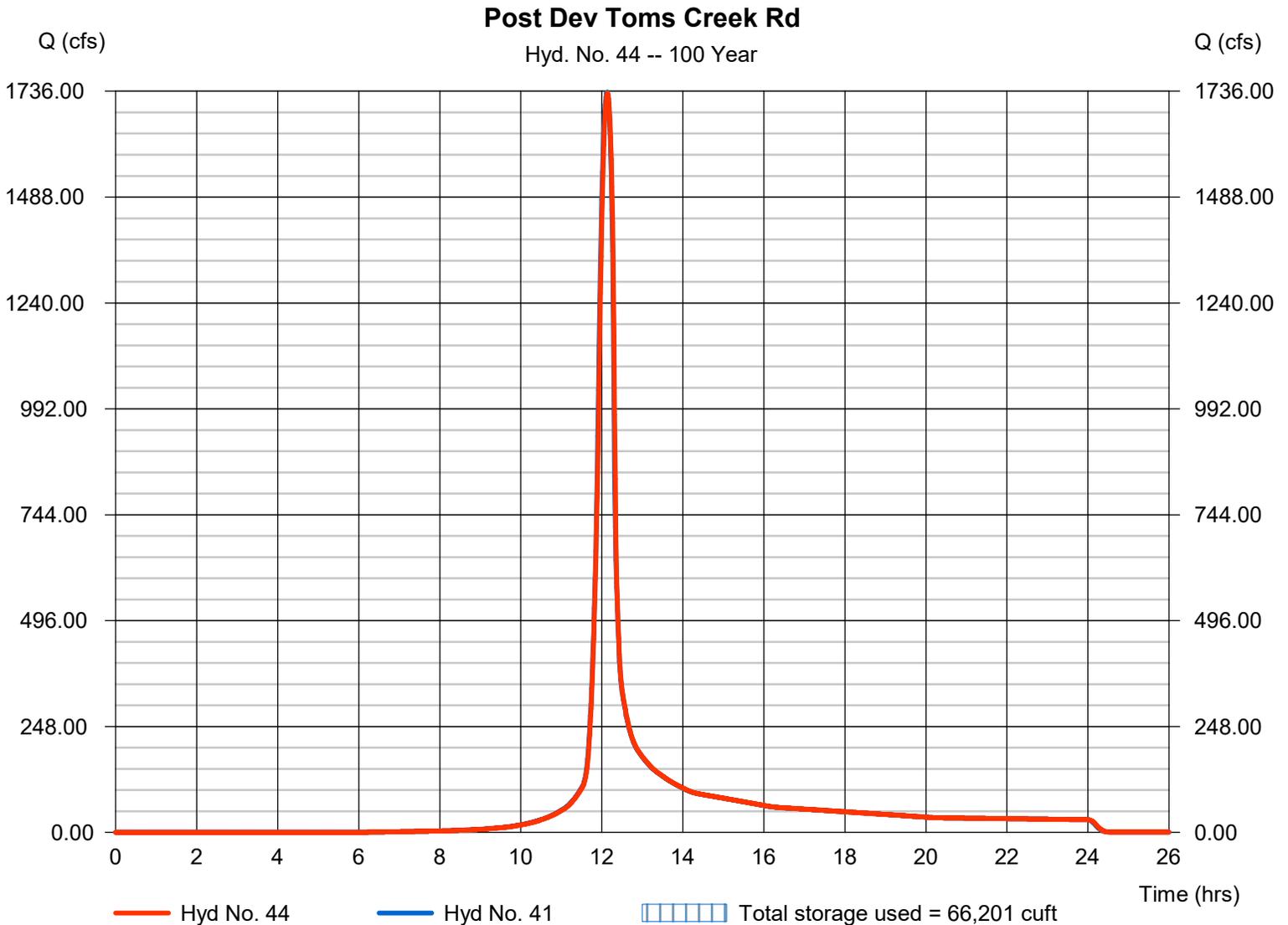
Tuesday, 06 / 30 / 2020

Hyd. No. 44

Post Dev Toms Creek Rd

Hydrograph type	= Reservoir	Peak discharge	= 1731.81 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 6,028,198 cuft
Inflow hyd. No.	= 41 - Post Total flow to Toms Creek Rd	Max. Elevation	= 1981.62 ft
Reservoir name	= PreDevCondition	Max. Storage	= 66,201 cuft

Storage Indication method used.



Pond No. 11 - PreDevCondition

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1975.10 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1975.10	00	0	0
0.90	1976.00	83	25	25
2.90	1978.00	2,686	2,161	2,185
4.90	1980.00	19,181	19,361	21,547
6.90	1982.00	36,979	55,190	76,736
8.90	1984.00	57,331	93,560	170,296
10.90	1986.00	78,620	135,378	305,675
12.90	1988.00	97,681	175,939	481,613
14.90	1990.00	115,925	213,324	694,938

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1975.10	0.00	0.00	0.00
Length (ft)	= 45.00	0.00	0.00	0.00
Slope (%)	= 4.78	0.00	0.00	n/a
N-Value	= .020	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 90.00	0.00	0.00	0.00
Crest El. (ft)	= 1977.90	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	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	Civ A cfs	Civ B cfs	Civ 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	1975.10	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.90	25	1976.00	5.15 ic	---	---	---	0.00	---	---	---	---	---	5.149
2.90	2,185	1978.00	30.36 ic	---	---	---	7.40	---	---	---	---	---	37.75
4.90	21,547	1980.00	45.15 ic	---	---	---	712.09	---	---	---	---	---	757.24
6.90	76,736	1982.00	56.17 ic	---	---	---	1942.62	---	---	---	---	---	1998.79
8.90	170,296	1984.00	65.36 ic	---	---	---	3525.40	---	---	---	---	---	3590.76
10.90	305,675	1986.00	73.41 ic	---	---	---	5394.38	---	---	---	---	---	5467.79
12.90	481,613	1988.00	80.66 ic	---	---	---	7510.98	---	---	---	---	---	7591.64
14.90	694,938	1990.00	87.31 ic	---	---	---	9849.01	---	---	---	---	---	9936.32

Hydrograph Report

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

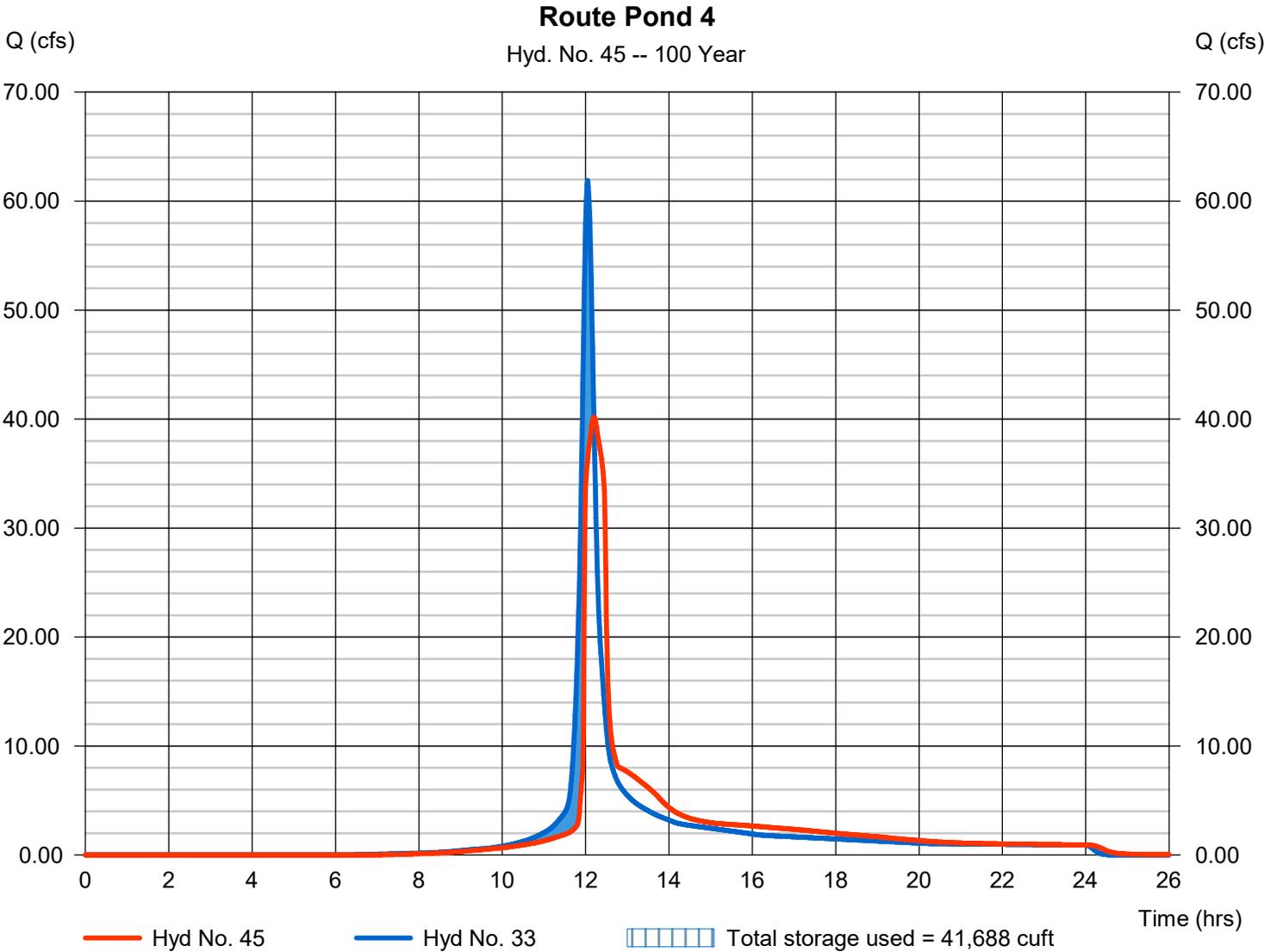
Tuesday, 06 / 30 / 2020

Hyd. No. 45

Route Pond 4

Hydrograph type	= Reservoir	Peak discharge	= 40.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 1 min	Hyd. volume	= 192,910 cuft
Inflow hyd. No.	= 33 - Flow to Pond 4	Max. Elevation	= 2033.58 ft
Reservoir name	= Pond 4	Max. Storage	= 41,688 cuft

Storage Indication method used.



Pond No. 4 - Pond 4

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 2025.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	2025.50	1,000	0	0
0.50	2026.00	2,000	736	736
1.50	2027.00	3,000	2,483	3,219
2.50	2028.00	4,000	3,488	6,706
3.50	2029.00	5,000	4,490	11,196
4.50	2030.00	6,000	5,492	16,688
5.50	2031.00	7,000	6,493	23,181
6.50	2032.00	8,000	7,494	30,675
7.50	2033.00	9,000	8,494	39,169
8.50	2034.00	1,000	4,333	43,502

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	8.00	12.00	0.00
Span (in)	= 24.00	8.00	12.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 2025.50	2025.50	2029.00	0.00
Length (ft)	= 60.00	0.50	0.50	0.00
Slope (%)	= 3.75	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.70	10.00	0.00	0.00
Crest El. (ft)	= 2031.00	2033.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= 1	Broad	---	---
Multi-Stage	= Yes	Yes	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	Civ A cfs	Civ B cfs	Civ 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	2025.50	0.00	0.00	0.00	---	0.00	0.00	---	---	---	---	0.000
0.50	736	2026.00	0.60 ic	0.60 ic	0.00	---	0.00	0.00	---	---	---	---	0.599
1.50	3,219	2027.00	1.66 ic	1.66 ic	0.00	---	0.00	0.00	---	---	---	---	1.657
2.50	6,706	2028.00	2.30 ic	2.30 ic	0.00	---	0.00	0.00	---	---	---	---	2.299
3.50	11,196	2029.00	2.81 ic	2.81 ic	0.00	---	0.00	0.00	---	---	---	---	2.814
4.50	16,688	2030.00	5.80 ic	3.12 ic	2.67 ic	---	0.00	0.00	---	---	---	---	5.797
5.50	23,181	2031.00	8.12 ic	3.46 ic	4.63 ic	---	0.00	0.00	---	---	---	---	8.090
6.50	30,675	2032.00	34.81 ic	0.76 ic	1.70 ic	---	32.35 s	0.00	---	---	---	---	34.81
7.50	39,169	2033.00	38.45 ic	0.33 ic	0.73 ic	---	37.36 s	0.00	---	---	---	---	38.42
8.50	43,502	2034.00	41.39 ic	0.17 ic	0.38 ic	---	35.56 s	5.19 s	---	---	---	---	41.30

Hydrograph Report

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

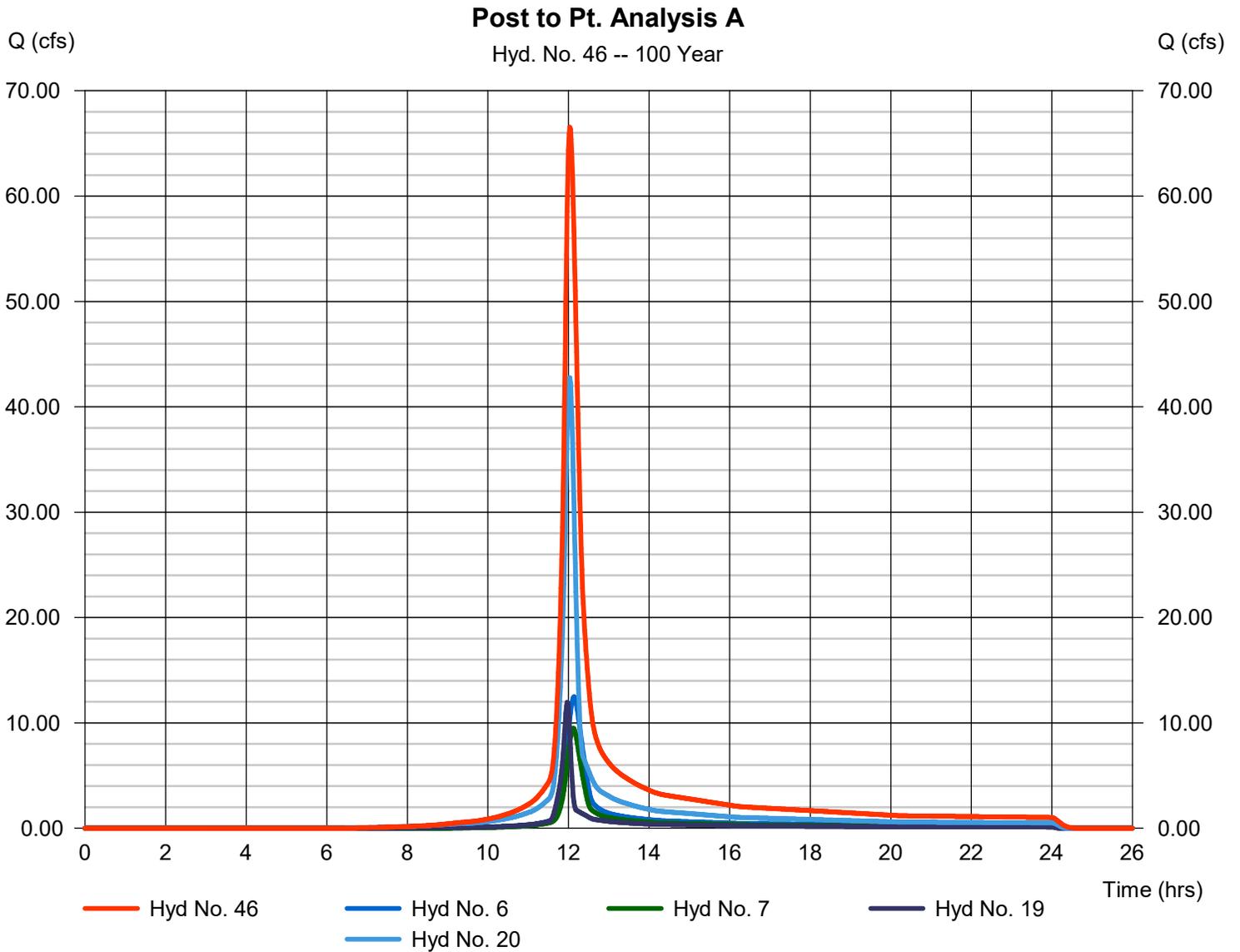
Tuesday, 06 / 30 / 2020

Hyd. No. 46

Post to Pt. Analysis A

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 6, 7, 19, 20

Peak discharge = 66.55 cfs
 Time to peak = 12.03 hrs
 Hyd. volume = 217,295 cuft
 Contrib. drain. area = 16.150 ac



Hydrograph Report

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

Tuesday, 06 / 30 / 2020

Hyd. No. 47

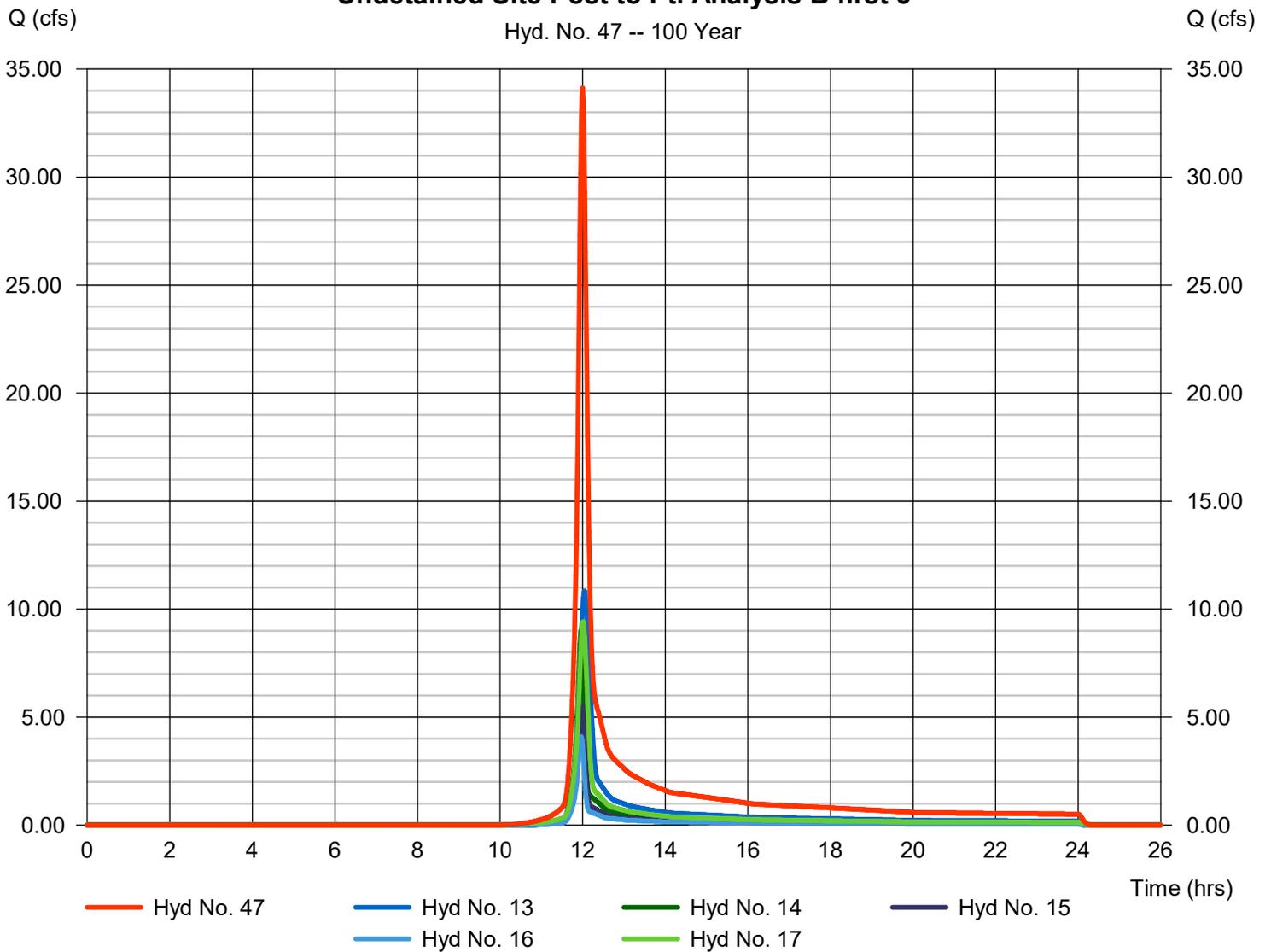
Undetained Site Post to Pt. Analysis B first 5

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 13, 14, 15, 16, 17

Peak discharge = 34.13 cfs
 Time to peak = 12.00 hrs
 Hyd. volume = 83,465 cuft
 Contrib. drain. area = 10.330 ac

Undetained Site Post to Pt. Analysis B first 5

Hyd. No. 47 -- 100 Year



Hydrograph Report

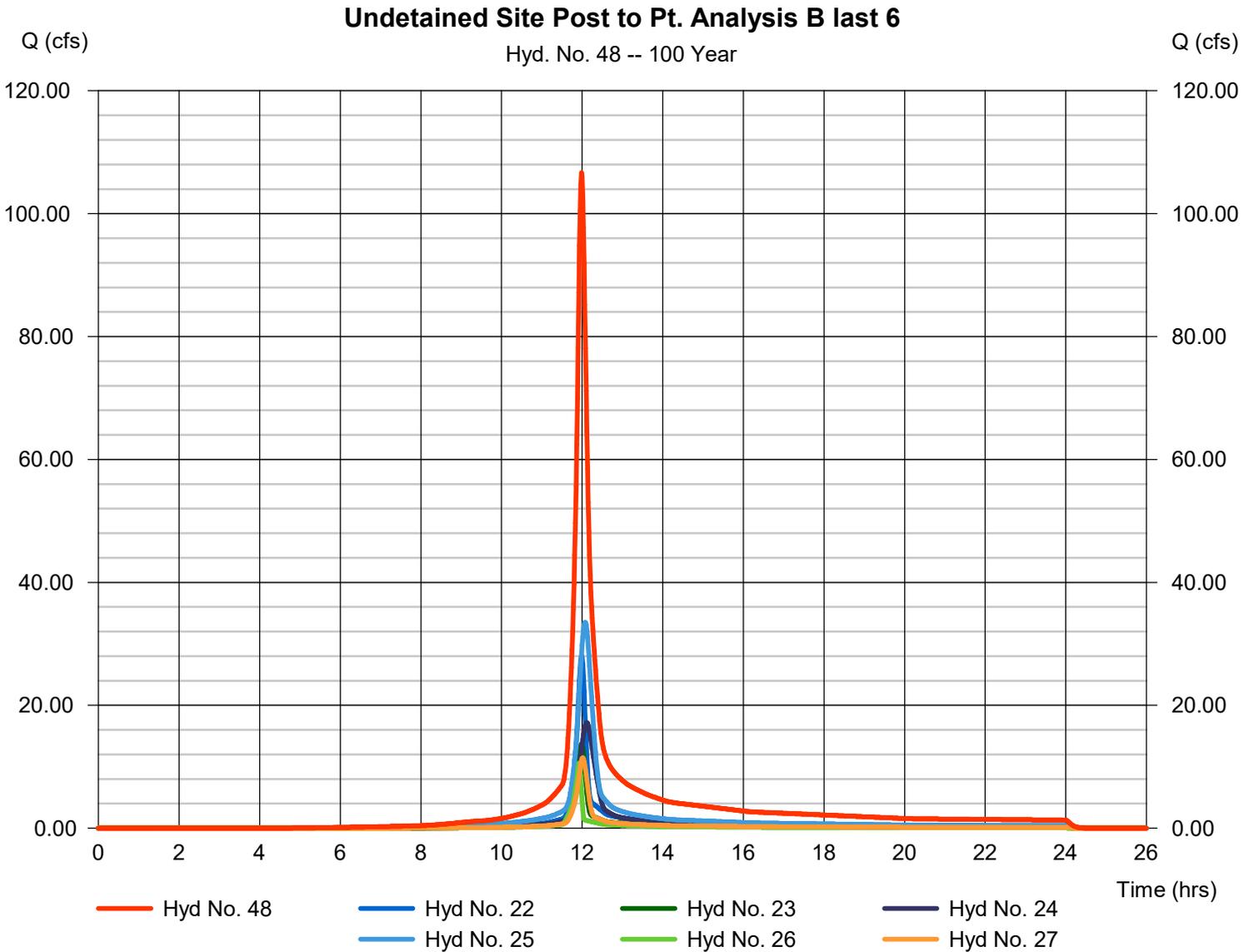
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

Tuesday, 06 / 30 / 2020

Hyd. No. 48

Undetained Site Post to Pt. Analysis B last 6

Hydrograph type	= Combine	Peak discharge	= 106.64 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 298,432 cuft
Inflow hyds.	= 22, 23, 24, 25, 26, 27	Contrib. drain. area	= 20.380 ac



Hydrograph Report

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

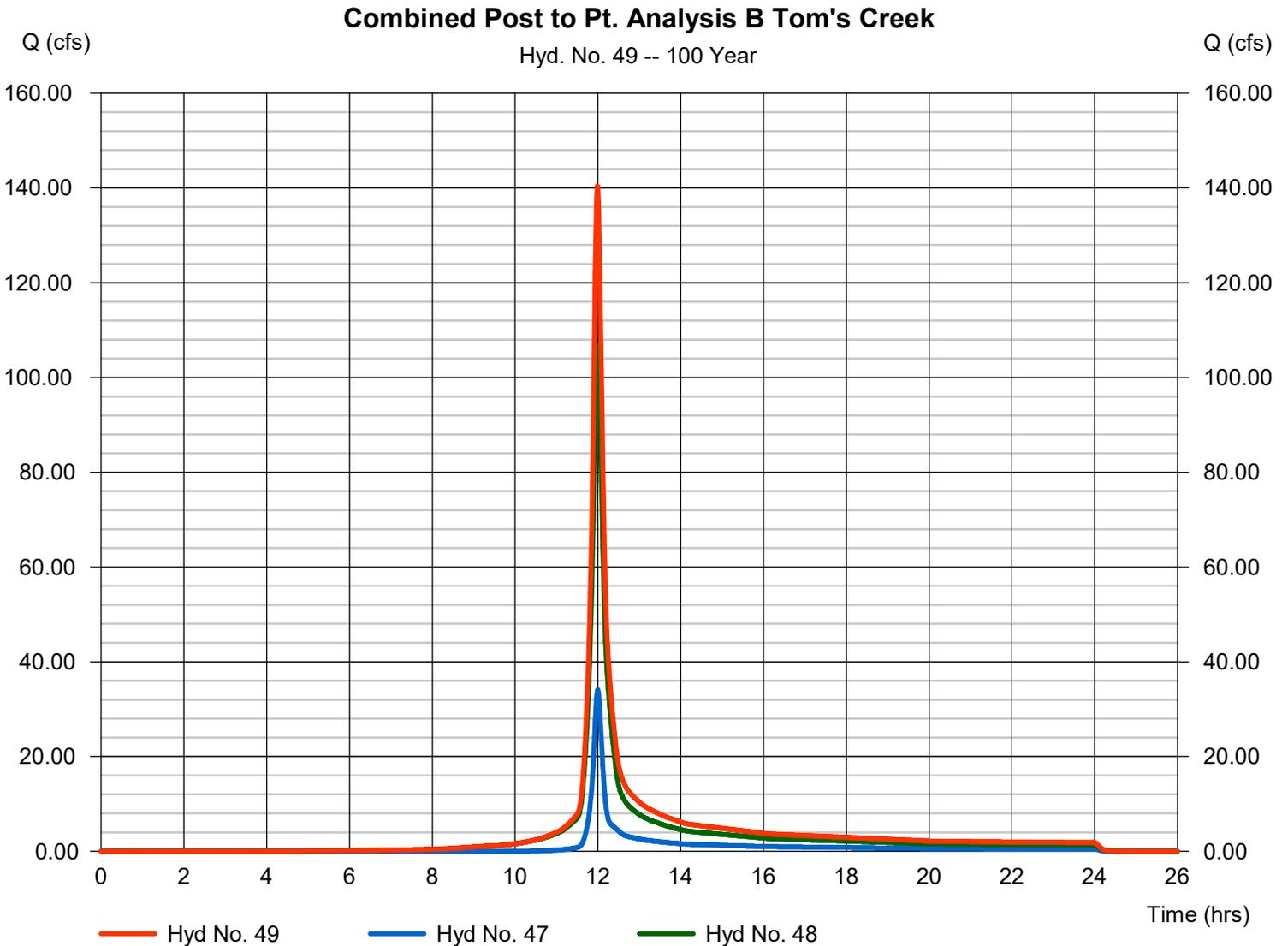
Tuesday, 06 / 30 / 2020

Hyd. No. 49

Combined Post to Pt. Analysis B Tom's Creek

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 1 min
 Inflow hyds. = 47, 48

Peak discharge = 140.45 cfs
 Time to peak = 11.98 hrs
 Hyd. volume = 381,897 cuft
 Contrib. drain. area = 0.000 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	-----
2	0.0000	0.0000	0.0000	-----
3	0.0000	0.0000	0.0000	-----
5	0.0000	0.0000	0.0000	-----
10	0.0000	0.0000	0.0000	-----
25	0.0000	0.0000	0.0000	-----
50	0.0000	0.0000	0.0000	-----
100	0.0000	0.0000	0.0000	-----

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Tc = time in minutes. Values may exceed 60.

File name: C:\Users\DanielleBishop\Dropbox\E&A\Jim Lucas Projects\Toms Creek\Design\Stormwater\Precipitation Data.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	2.28	2.76	0.00	3.51	4.11	4.99	5.73	6.53
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	0.00	0.00	247 0.00	0.00	0.00

Watershed Model Schematic..... 1

100 - Year

Summary Report..... 2

Hydrograph Reports..... 4

Hydrograph No. 1, SCS Runoff, Pre DA 1 Site..... 4

Hydrograph No. 2, SCS Runoff, Pre DA2 Site..... 5

Hydrograph No. 3, SCS Runoff, Pre DA3 Site..... 6

Hydrograph No. 4, SCS Runoff, Pre DA4 Site..... 7

Hydrograph No. 5, SCS Runoff, Pre DA5 Site..... 8

Hydrograph No. 6, SCS Runoff, Pre DA4 Upland..... 9

Hydrograph No. 7, SCS Runoff, A5 Upland..... 10

Hydrograph No. 8, SCS Runoff, Pre DA1 Upstream..... 11

Hydrograph No. 9, SCS Runoff, Pre DA2 Upstream..... 12

Hydrograph No. 10, Combine, Pre DA1 Upstream, Pre DA 2 Upstream..... 13

Hydrograph No. 11, Combine, PreDev Flow - Toms Creek Rd..... 14

Hydrograph No. 12, Combine, Site Pre Dev to Pt Analysis B Toms' Creek..... 15

Hydrograph No. 13, SCS Runoff, Post B1-1..... 16

Hydrograph No. 14, SCS Runoff, Post B1-2..... 17

Hydrograph No. 15, SCS Runoff, Post B1-3..... 18

Hydrograph No. 16, SCS Runoff, Post B2-1..... 19

Hydrograph No. 17, SCS Runoff, Post B2-2..... 20

Hydrograph No. 18, SCS Runoff, Post B3..... 21

Hydrograph No. 19, SCS Runoff, Post B4-1..... 22

Hydrograph No. 20, SCS Runoff, Post B4-2..... 23

Hydrograph No. 21, SCS Runoff, Post B5..... 24

Hydrograph No. 22, SCS Runoff, Post B6-1..... 25

Hydrograph No. 23, SCS Runoff, Post B6-2..... 26

Hydrograph No. 24, SCS Runoff, Post B7..... 27

Hydrograph No. 25, SCS Runoff, Post B8-1..... 28

Hydrograph No. 26, SCS Runoff, Post B9..... 29

Hydrograph No. 27, SCS Runoff, Post B8-2..... 30

Hydrograph No. 28, Combine, Post B4 Site Total..... 31

Hydrograph No. 29, Combine, Post D Portion to Toms Creek Rd..... 32

Hydrograph No. 30, Combine, Post B7 and B9 to Pond 1..... 33

Hydrograph No. 31, Combine, Total Post to Toms Creek Rd prior to Pond..... 34

Hydrograph No. 32, Combine, B61 and B62 to Pond 2..... 35

Hydrograph No. 33, Combine, Flow to Pond 4..... 36

Hydrograph No. 34, Combine, Flow to Pond 5..... 37

Hydrograph No. 35, Reservoir, Route Pond 2..... 38

 Pond Report - Pond 2..... 39

Hydrograph No. 36, Reservoir, Route Pond 1..... 40

 Pond Report - Pond 1..... 41

Hydrograph No. 37, Reservoir, Route Pond 5..... 42

 Pond Report - Pond 5..... 43

Hydrograph No. 38, Combine, Site Flow to Street Culvert..... 44

Hydrograph No. 39, Combine, Total Flow to Street Culvert..... 45

Hydrograph No. 40, Reservoir, Route Street Culvert..... 46

 Pond Report - Street Culvert Pond..... 248..... 47

Contents continued

Hydrograph No. 41, Combine, Post Total flow to Toms Creek Rd.....	48
Hydrograph No. 42, Combine, Pre to Pt. Analysis A.....	49
Hydrograph No. 43, Reservoir, Pre-Tom's Creek.....	50
Pond Report - PreDevCondition.....	51
Hydrograph No. 44, Reservoir, Post Dev Toms Creek Rd.....	52
Pond Report - PreDevCondition.....	53
Hydrograph No. 45, Reservoir, Route Pond 4.....	54
Pond Report - Pond 4.....	55
Hydrograph No. 46, Combine, Post to Pt. Analysis A.....	56
Hydrograph No. 47, Combine, Undetained Site Post to Pt. Analysis B first 5.....	57
Hydrograph No. 48, Combine, Undetained Site Post to Pt. Analysis B last 6.....	58
Hydrograph No. 49, Combine, Combined Post to Pt. Analysis B Tom's Creek.....	59
IDF Report.....	60

Flood Protection Requirement:

10-year calculations

Point of Analysis B Flow to Tom's Creek Rd.

Pre-Development of Site

hydrograph 12 36.67 cfs

Pre-Development of Site and Offsite Flows **841.89** cfs

Hydrograph 11

Post-Development of Site **818.24** cfs

Hydrograph 44

Point of Analysis A

Pre-Development of Site **29.04** cfs

hydrograph 42

Post Development flow from Pond 4: 16.93 cfs

hydrograph 45

Post Development flow from B4-1 5.75 cfs

hydrograph 19

Total Post Dev flow at Pt A **22.68** cfs

100-year calculations

Point of Analysis B Flow to Tom's Creek Rd.

Pre-Development of Site

hydrograph 12 94.64 cfs

Pre-Development of Site and Offsite Flows **1940.23** cfs

Hydrograph 11

Post-Development of Site **1731.81** cfs

Hydrograph 44

Point of Analysis A

Pre-Development of Site **69.75** cfs

hydrograph 42

Post Development flow from Pond 4: 40.79 cfs

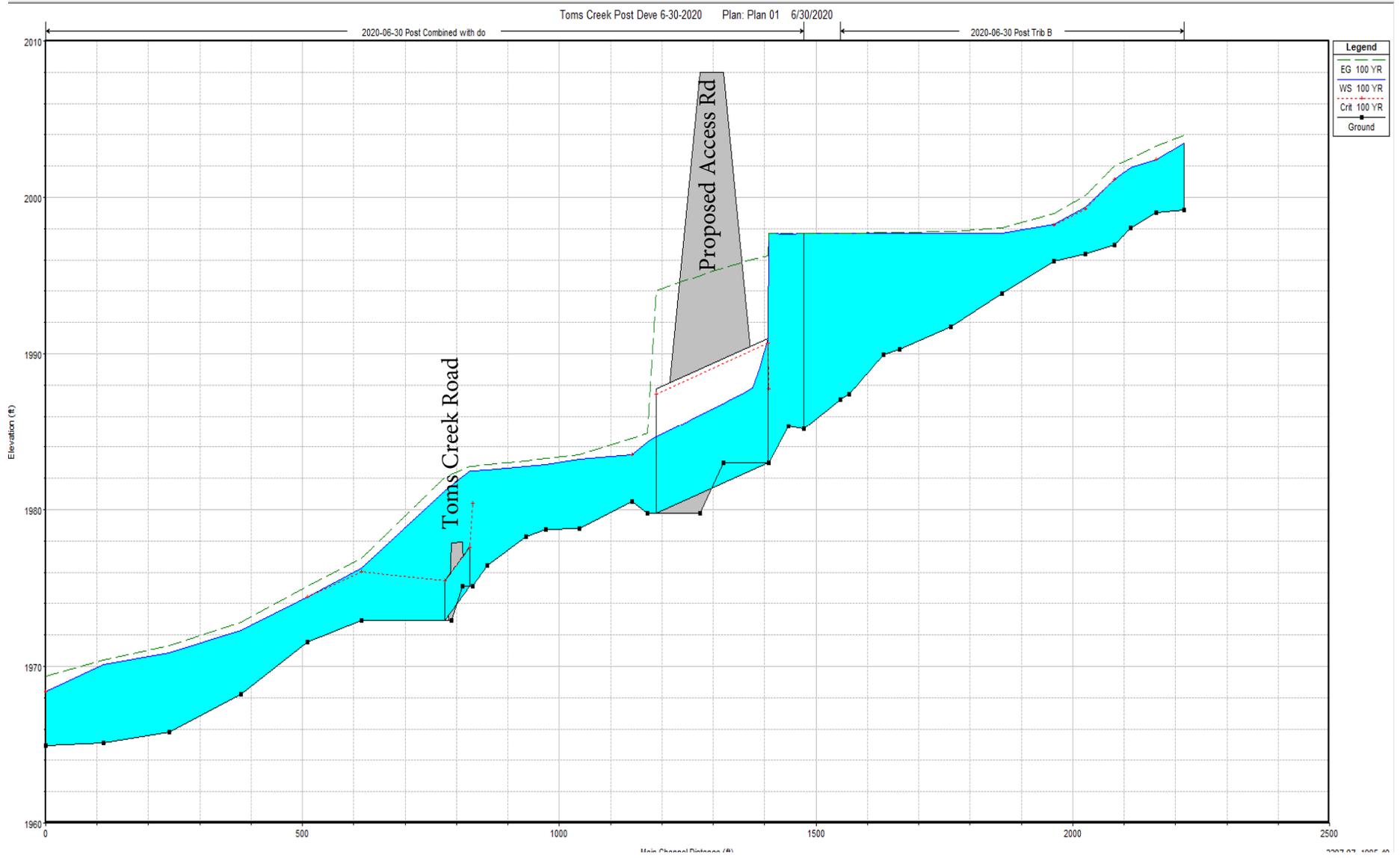
hydrograph 45

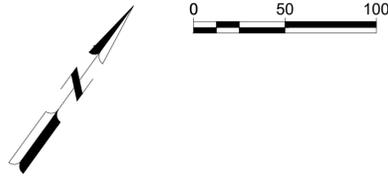
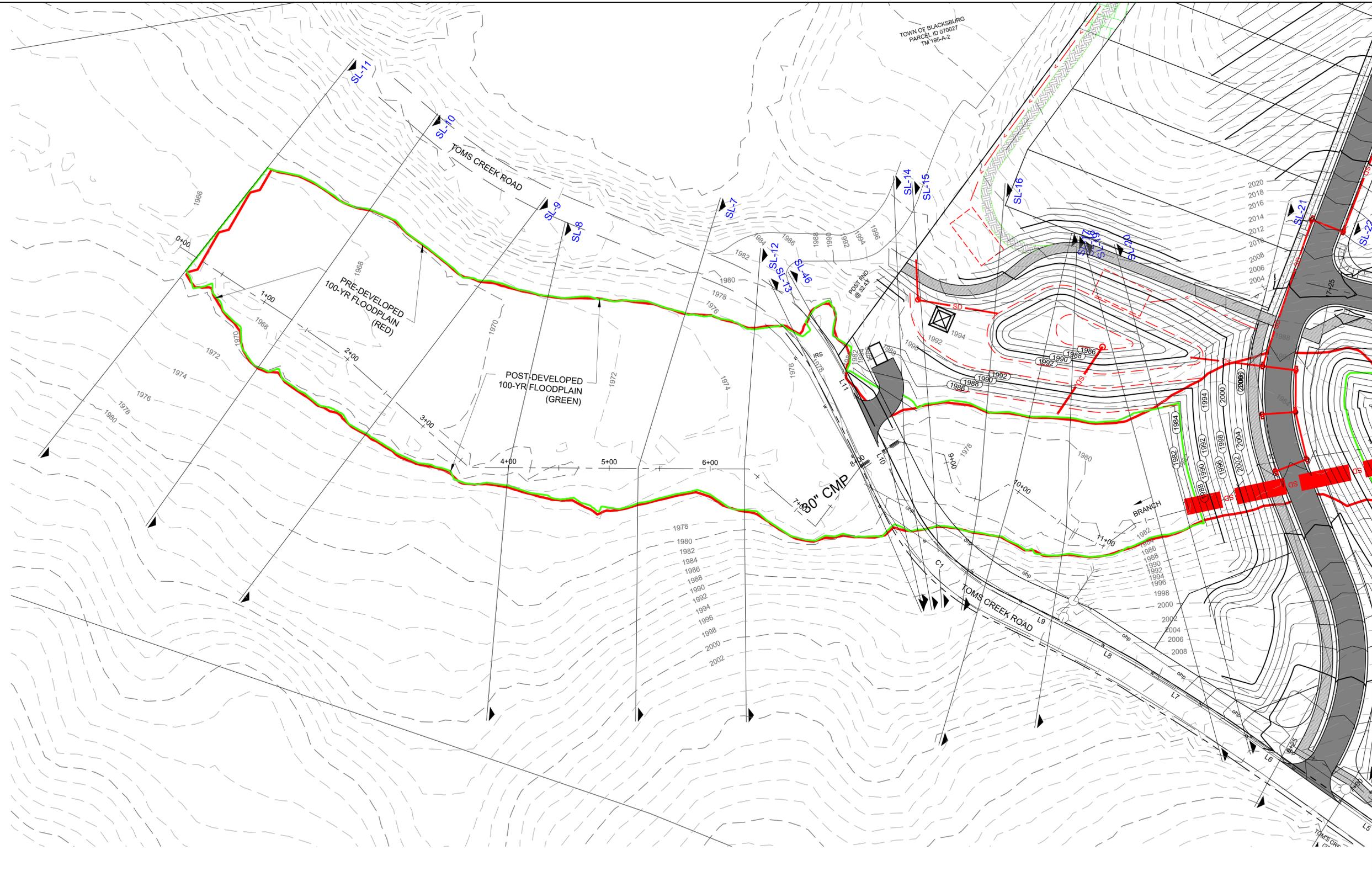
Post Development flow from B4-1 11.96 cfs

hydrograph 19

Total Post Dev flow at Pt A **52.75** cfs

HEC-RAS FLOODPLAIN RESULTS



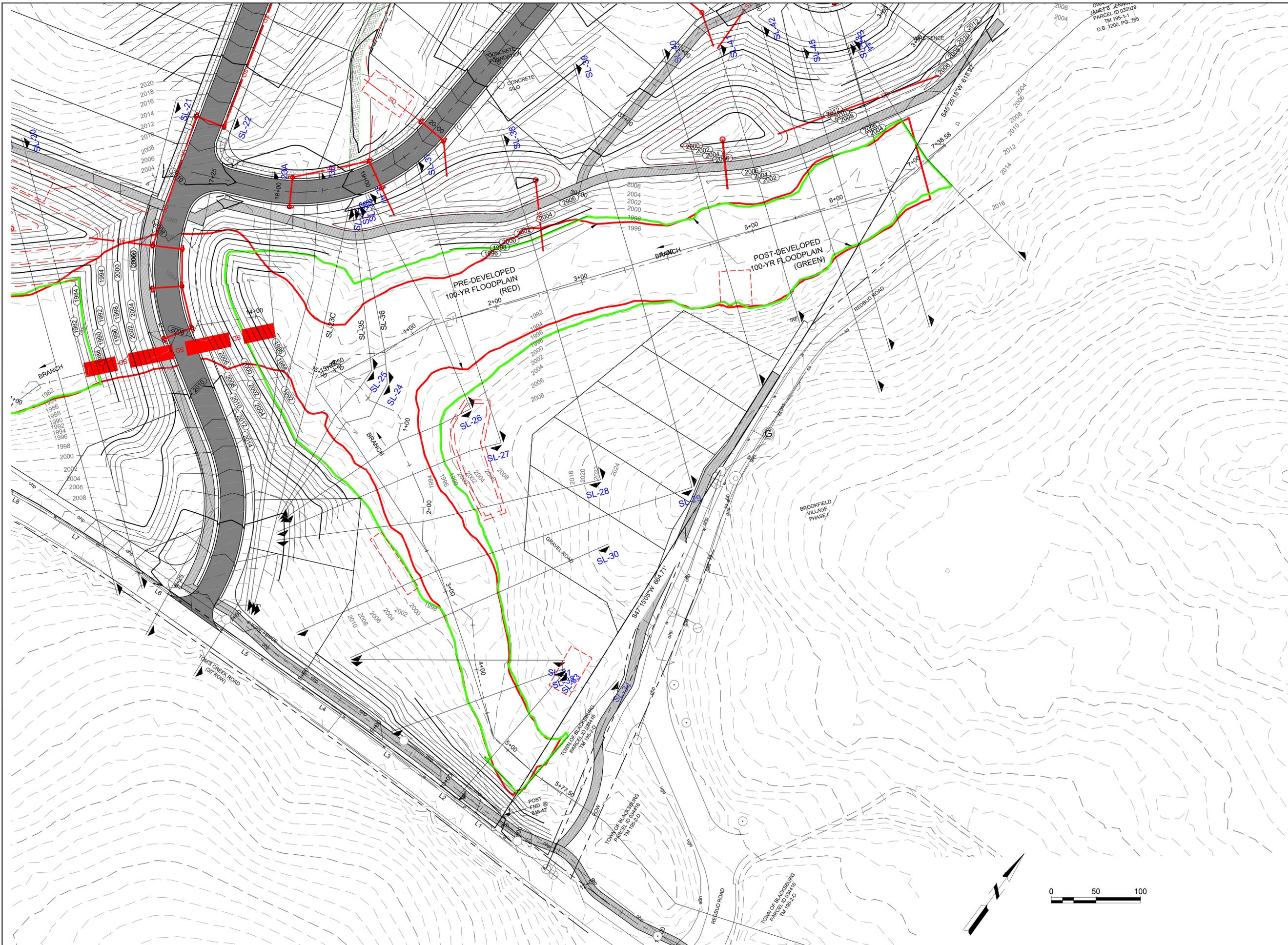


No.	Revision / Issue	Date

**POST DEVELOPED
 FLOODPLAIN
 EXHIBIT**

PROPOSED DEVELOPMENT FOR
 LUCAS CONSTRUCTION AND DEVELOPMENT, INC.
BEREWICK
 PROPERTY OF LUCAS TCR, LLC
 PARCEL ID 006160; TM# 195-A-5; 40.345 ACRES
 PRICES FORK MAGISTERIAL DISTRICT
 TOWN OF BLACKSBURG, MONTGOMERY COUNTY, VA

Drawn By:	Scale:
PJB	AS SHOWN
Checked By:	Date:
MTJ	07-01-2020
Sheet No.	FLOOD
1 of 2	



No.	Revision / Issue	Date



**POST DEVELOPED
 FLOODPLAIN
 EXHIBIT**

PROPOSED DEVELOPMENT FOR
 LUCAS CONSTRUCTION AND DEVELOPMENT, INC.
BEREWICK
 PROPERTY OF LUCAS TCR, LLC
 PARCEL ID 006160; TM# 195-A-5; 40.345 ACRES
 PRICES FORK MAGISTERIAL DISTRICT
 TOWN OF BLACKSBURG, MONTGOMERY COUNTY, VA

Drawn By: PJB	Scale: AS SHOWN
Checked By: MTJ	Date: 07-01-2020
Sheet No. 2 of 2	FLOOD

Date: 6-30-2020

HEC RAS files:		Toms Creek Post Deve 6-30-2020, Plan 01					
		Pre Developed Water Surface Elevation (WSE)		Post Developed Water Surface Elevation (WSE)		100-YR ELEVATION RISE	
Cross Section	Stream Station	10 Yr Elevation	100 Yr Elevation	10 Yr Elevation	100 Yr Elevation		Notes
Combined							
SL-11	+19.37	1967.59	1968.54	1967.45	1968.41	-0.13	
SL-10	1+32.43	1969.14	1970.24	1968.98	1970.09	-0.15	
SL-9	2+59.42	1970.06	1970.98	1969.93	1970.85	-0.13	
SL-8	4+00.17	1971.75	1972.41	1971.64	1972.31	-0.10	
SL-7	5+28.62	1973.8	1974.51	1973.72	1974.4	-0.11	
SL-12	6+33.79	1975.69	1976.37	1975.55	1976.29	-0.08	
SL-13	7+97.76	1980.47	1981.31	1980.34	1981.22	-0.09	Toms Creek Road
SL-46	8+31.17	1981.04	1982.49	1980.99	1982.48	-0.01	Toms Creek Road
SL-14	8+50.73	1981.04	1982.49	1980.99	1982.48	-0.01	
SL-15	8+79.14	1981.1	1982.57	1981.04	1982.53	-0.04	
SL-16	9+54.32	1981.34	1982.82	1981.22	1982.74	-0.08	
SL-17	9+93.52	1981.54	1983.03	1981.38	1982.89	-0.14	Pre Interpolated
Pre SL-17	10+27.71	1981.72	1983.21	1981.55	1983.06	-0.15	Interpolated
SL-18	10+58.7	1981.88	1983.32	1981.70	1983.21	-0.11	Pre Interpolated
Pre SL-18	10+85.39	1982.01	1983.41	1981.93	1983.29	-0.12	Interpolated
SL-19	11+61.72	1982.83	1983.83	1982.60	1983.52	-0.31	
SL-20	11+90.48	1983.34	1984.58	1983.26	1984.43	-0.15	Pre Interpolated - Countersunk Culvert
Pre SL-20	12+37.17	1984.16	1985.81	1982.92	1984.34	-1.47	Interpolated
SL-21	12+94.27	1984.93	1985.75	1982.51	1984.24	-1.51	Proposed Road Top
SL-22	13+38.85	1985.78	1986.60	1987.35	1997.70	11.10	Pre Interpolated - Proposed Road Top
Pre SL-22	13+94.96	1986.84	1987.66	1989.28	1997.70	10.04	Interpolated

HEC RAS files:				Toms Creek Post Deve 6-30-2020, Plan 01			
		Pre Developed Water Surface Elevation (WSE)		Post Developed Water Surface Elevation (WSE)		100-YR ELEVATION RISE	
Cross Section	Stream Station	10 Yr Elevation	100 Yr Elevation	10 Yr Elevation	100 Yr Elevation		Notes
SL-23A	14+27.3	1987.44	1988.41	1990.40	1997.70	9.29	Countersunk Culvert
SL-23B	14+65.6	1988.15	1989.30	1990.30	1997.70	8.40	<i>Pre Interpolated</i>
<i>Pre SL-23</i>	<i>14+91.21</i>	1988.63	1989.89	<i>1998.02</i>	<i>1997.71</i>	7.82	<i>Interpolated</i>
SL-23C	14+95.67	1988.71	1989.99	1999.37	1997.71	7.72	26' Downstream of Stream Junction
<i>Tributary B</i>							
<i>Pre SL-35</i>	<i>+35.74</i>	1990.22	1991.41	<i>1992.25</i>	<i>1997.72</i>	6.31	<i>Interpolated</i>
SL-35	+45.14	1990.51	1991.60	1990.38	1997.72	6.12	<i>Pre Interpolated</i>
SL-36	+62.12	1991.18	1992.2	1990.99	1997.69	5.49	
<i>Pre SL-47</i>	<i>1+22.16</i>	1992.32	1993.15	<i>1992.15</i>	<i>1997.74</i>	4.59	<i>Interpolated</i>
SL-47	1+28.13	1992.38	1993.23	1992.27	1997.74	4.51	<i>Pre Interpolated</i>
SL-37	1+59.56	1992.68	1993.64	1992.58	1997.75	4.10	
SL-38	2+59.56	1994.12	1994.98	1993.98	1997.69	2.71	
SL-39	3+59.57	1996.08	1996.87	1995.99	1997.70	0.83	
SL-40	4+59.58	1997.74	1998.7	1997.57	1998.30	-0.40	
SL-41	5+21.36	1998.65	1999.4	1998.54	1999.35	-0.05	
SL-42	5+79.02	2000.29	2001.28	2000.11	2001.15	-0.13	
SL-45	6+09.62	2001.06	2002.04	2000.90	2001.91	-0.13	
SL-43	6+59.54	2001.69	2002.55	2001.56	2002.42	-0.13	
SL-44	7+13.27	2002.51	2003.62	2002.35	2003.47	-0.15	Jennings Property Line
<i>Tributary A</i>							
SL-25	0+32.07 / 0+34.74	1991.03	1991.62	1990.91	1997.72	6.10	
SL-24	+60.93	1991.97	1992.43	1991.93	1997.72	5.29	
SL-26	1+20.52	1993.33	1993.8	1993.30	1997.73	3.93	

HEC RAS files:		Toms Creek Post Deve 6-30-2020, Plan 01					
		Pre Developed Water Surface Elevation (WSE)		Post Developed Water Surface Elevation (WSE)		100-YR ELEVATION RISE	
Cross Section	Stream Station	10 Yr Elevation	100 Yr Elevation	10 Yr Elevation	100 Yr Elevation		Notes
SL-27	1+60.95	1994.02	1994.56	1994.32	1997.75	3.19	
SL-28	2+16.1	1995.04	1995.63	1995.00	1997.72	2.09	
SL-29	2+74.71	1996.41	1996.97	1996.37	1997.69	0.72	
SL-30	3+26.38	1997.35	1997.92	1997.30	1997.89	-0.03	
SL-31	3+89.19	1999.42	2000.22	1999.31	2000.15	-0.07	
SL-32	4+32.85	2000.97	2001.71	2000.88	2001.66	-0.05	
SL-33	4+91.41	2003.1	2003.74	2003.03	2003.69	-0.05	
SL-34	5+41.41	2004.75	2005.33	2004.71	2005.3	-0.03	TOB Property Line

STEP/STEG Sewer Calculations

Tom's Creek Subdivision Sewer: Force Main sizing

	# customers	*Design Flow rate (gpm)
STEP MAIN FLOW	100	70

Force Main: Headloss calculation to new lift station

Line	# connections	Q (gpm)	Length pipe	Minor losses (equivalent length)						Total: (ft)	
				2" check valve (L _e =1.5)	2" 45 deg elbow (L _e =2.6)	2" 90 deg elbow (L _e =8.6)	2" Tee (branch) (L _e =12.0)	2" Tee (run) (L _e =4.3)	3" 45 deg elbow (L _e =4.0)		3" Tee (run) (L _e =6.2)
SS-1	34	37	2033		28.6		12	8.6		49.2	
SS-2 (STA0+00 to 4+50)	50	45	450						8	6.2	14.2
SS-2 (STA4+50 to end)	50	45	841.3		5.2		12	4.3			21.5
SS-3	30	35	1044.6		5.2			12.9			18.1
SS-4	3	21.5	366.9				12	4.3			16.3
SS-5	1	20.5	117		2.6		12				14.6
SS-6	5	22.5	365.4		5.2		12	4.3			21.5
SS-7	2	21	157.5				12				12
SS-8	18	29	1161.1			8.6	24				32.6
SS-9	1	20.5	62.9		2.6			4.3			6.9
SS-10	4	22	157.2				12				12
SS-11	3	21.5	131.4				12				12
SS-12	2	21	61.6				12				12

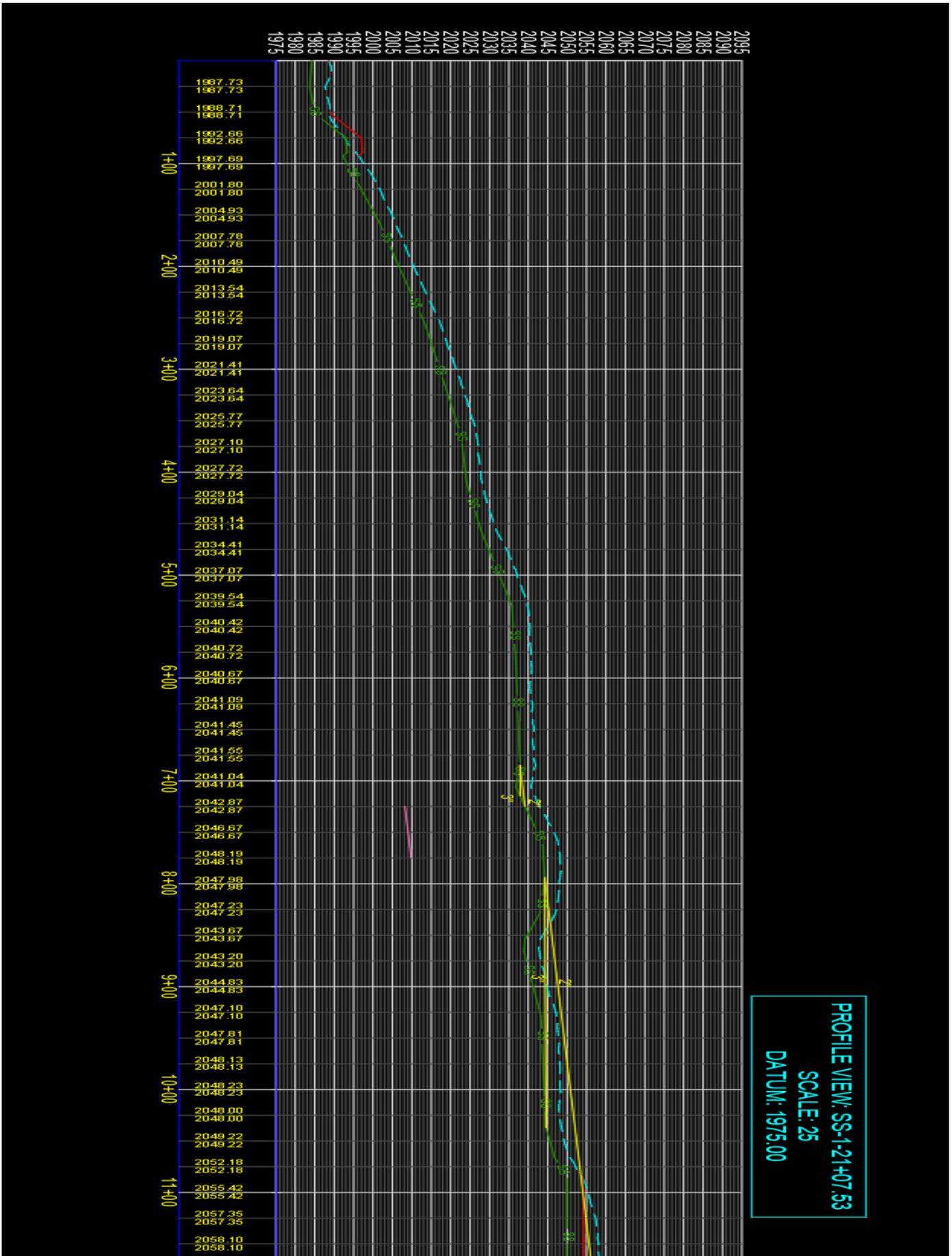
* $h_f = (10.44 * (L_e) * Q^{1.85}) / ((130^{1.85}) * (1.939^{4.8655}))$

* from Sewer Specifications 3.03 h.6. $Q = 0.5 \text{ gpm} * (\# \text{ customers}) + 20$

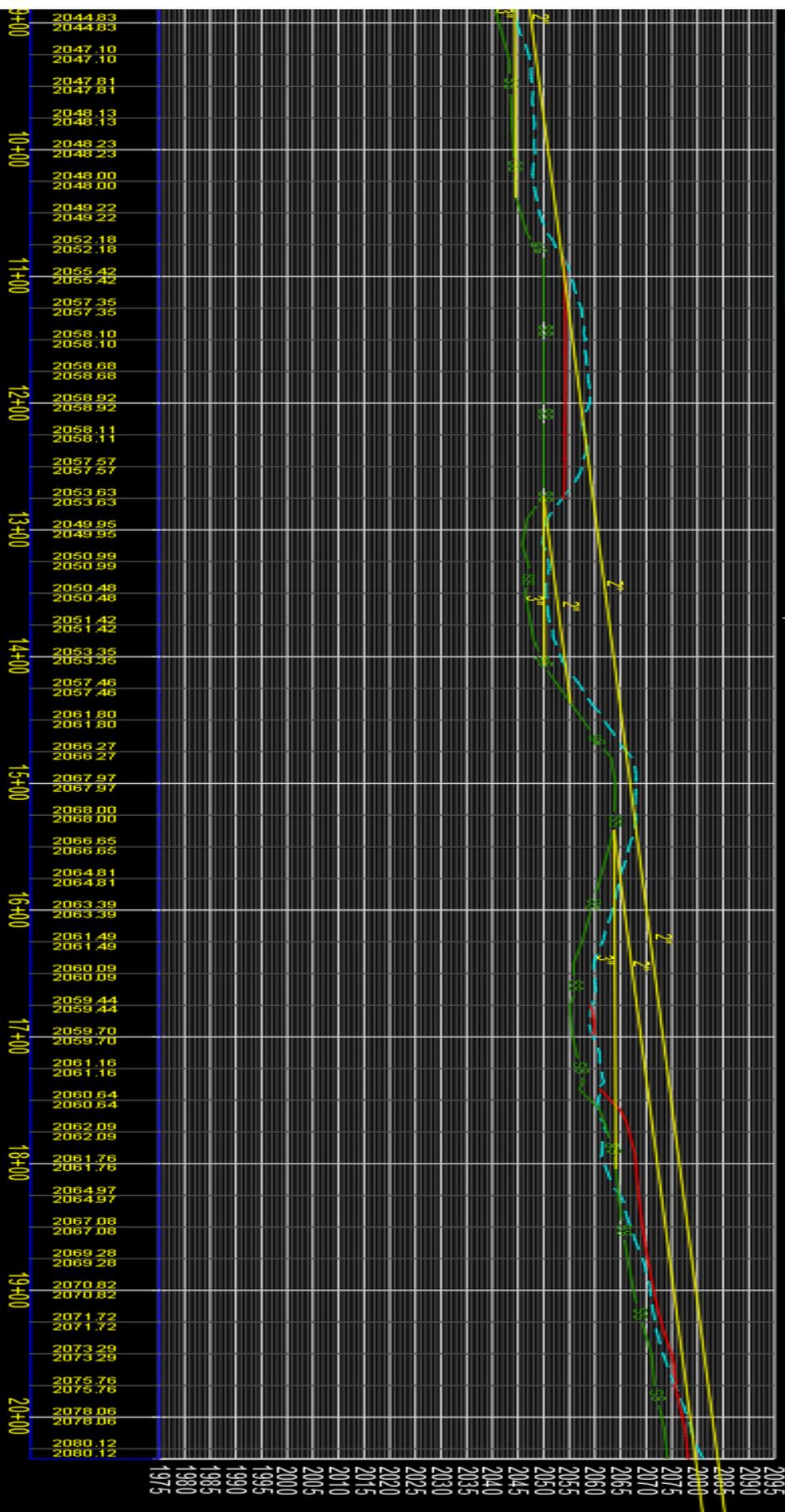
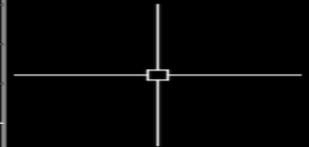
Tom's Creek Subdivision Sewer: Force Main sizing/HGL calculation

L _e	C	D (inches)	*h _f (ft)	Main elev	Main elev	TDH (feet)	Line Start	Line End	HGL (ft/ft)	HGL End	Line	Contributi			
				top	low tank							ng lines	Direct conr	Contributir	Total
2082.2	130	2.047	65.14		65.14		1985		0.032042	2050.14	SS-1	10, 12	28	6	34
464.2	130	3	3.25		3.25		1984		0.007218	1987.25	SS-2	3	20	30	50
862.8	130	2.047	38.77		38.77		1987.25		0.046085	2026.02					
1062.7	130	2.047	30.00		30.00		1980		0.028718	2010.00	SS-3	4, 6, 8	4	26	30
383.2	130	2.047	4.39		4.39		1985		0.011969	1989.39	SS-4	5	2	1	3
131.6	130	2.047	1.38		1.38		1992		0.011803	1993.38	SS-5	NA	1	0	1
386.9	130	2.047	4.82		4.82		1987		0.013199	1991.82	SS-6	7	3	2	5
169.5	130	2.047	1.86		1.86		1996		0.011807	1997.86	SS-7	NA	2	0	2
1193.7	130	2.047	23.80		23.80		1999		0.020494	2022.80	SS-8	9	17	1	18
69.8	130	2.047	0.73		0.73		2050.5		0.011644	2051.23	SS-9	NA	1	0	1
169.2	130	2.047	2.02		2.02		2059.5		0.01287	2061.52	SS-10	11	1	3	4
143.4	130	2.047	1.64		1.64		2070		0.012506	2071.64	SS-11	NA	3	0	3
73.6	130	2.047	0.81		0.81		2068.5		0.013109	2069.31	SS-12	NA	2	0	2

STEP/STEG Profiles/HGL analysis of 2 and 3" lines.

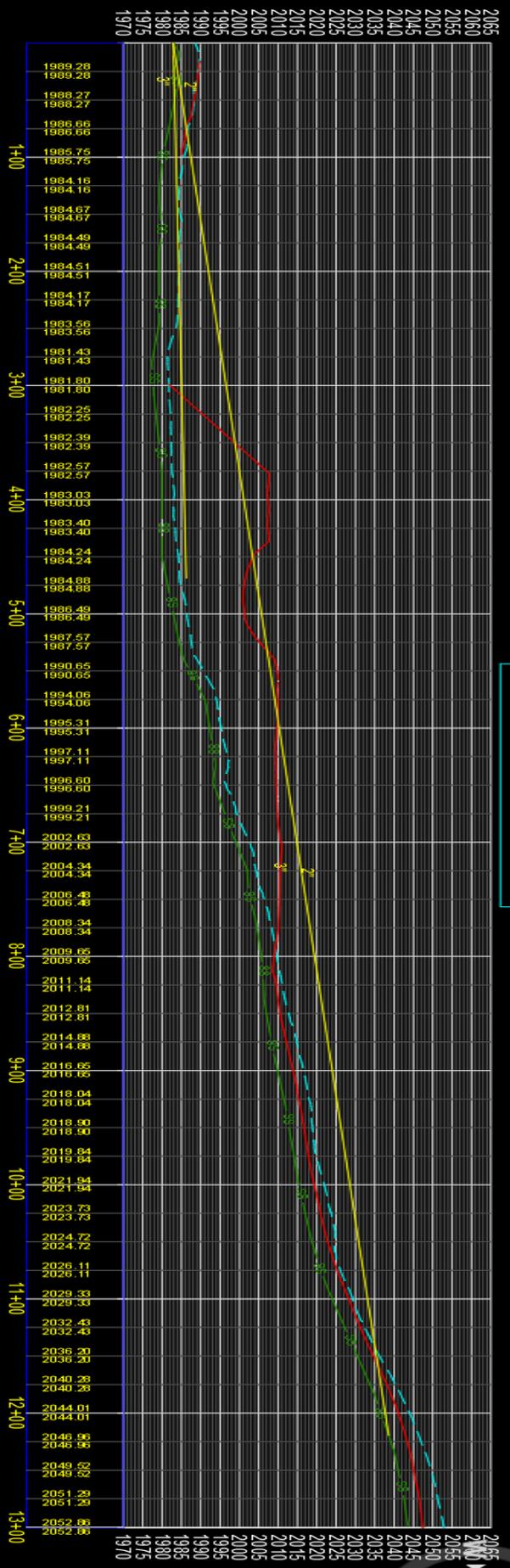


PROFILE VIEW: SS-1-21+07.53
 SCALE: 25
 DATUM: 1975.00

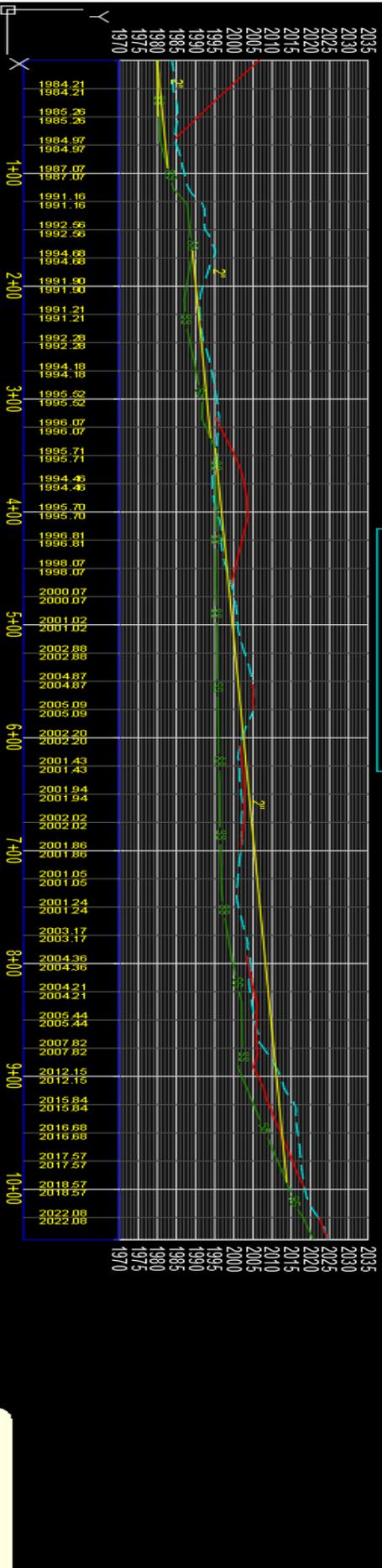




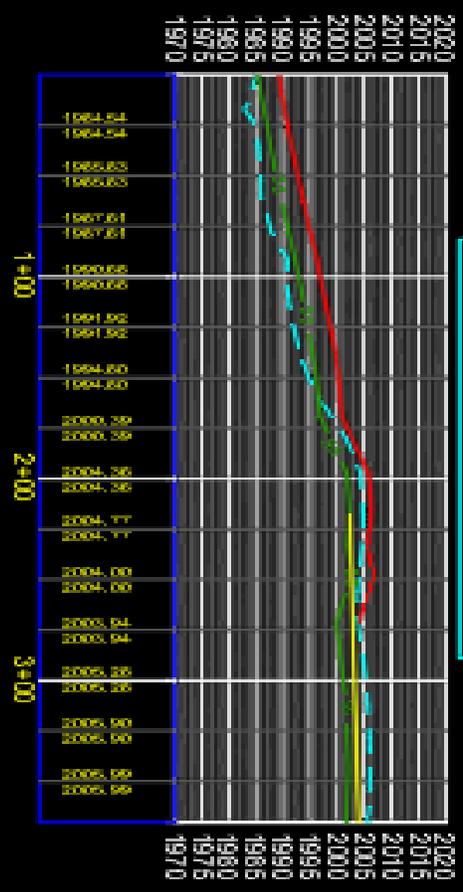
PROFILE VIEW: SS-2-11+43.71
SCALE: 25
DATUM: 1970.00



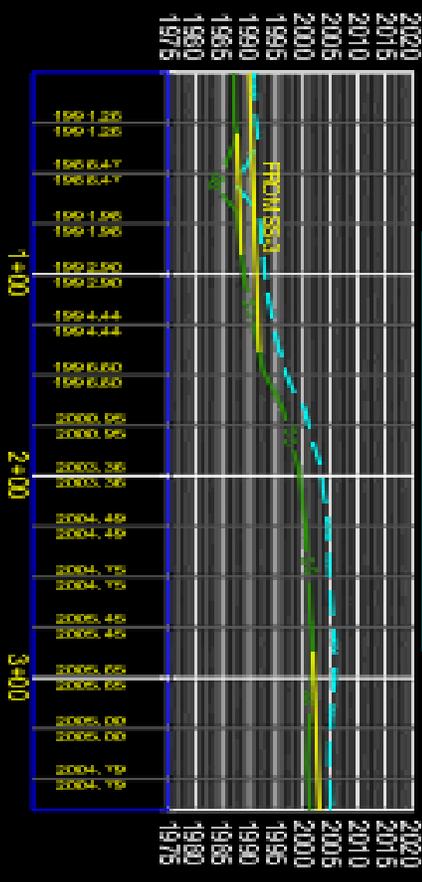
PROFILE VIEW: SS-3-10+46.55
SCALE: 25
DATUM: 1970.00



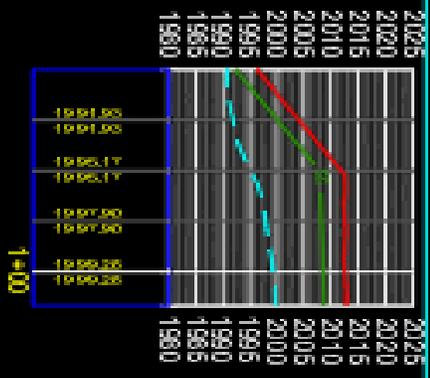
PROFILE VIEW: SS-4-3+66.88
SCALE: 25
DATUM: 1970.00



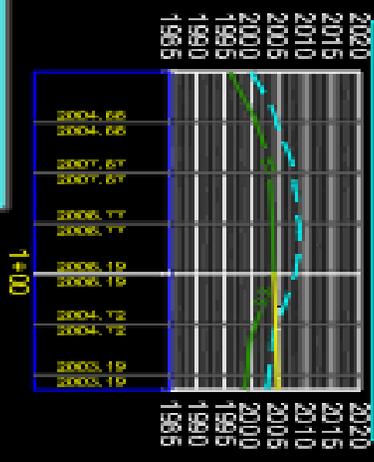
PROFILE VIEW: SS-6-3+65.36
SCALE: 25
DATUM: 1975.00



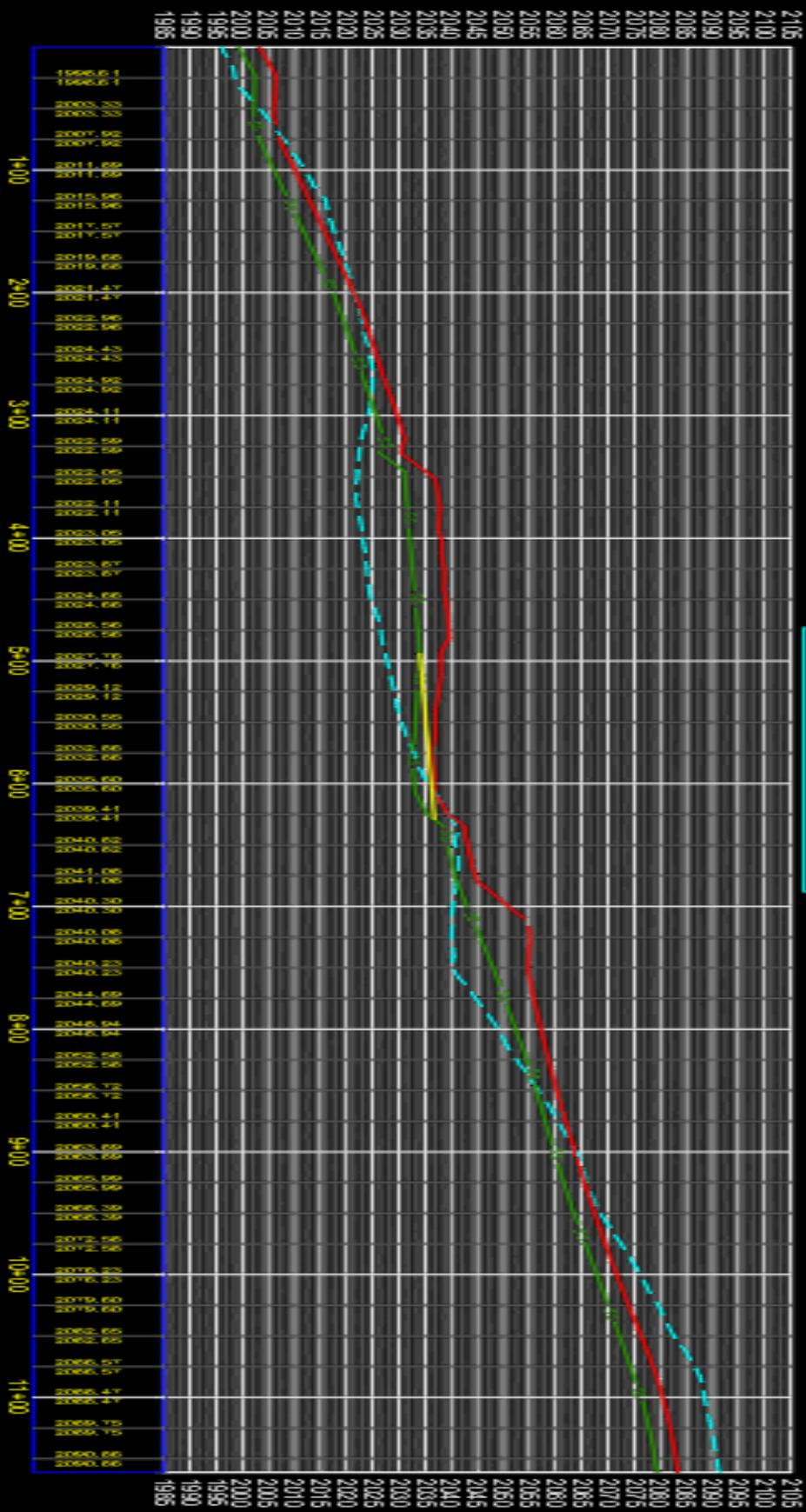
PROFILE VIEW: SS-5-1+17.00
SCALE: 25
DATUM: 1980.00



PROFILE VIEW: SS-7-1+57.45
SCALE: 25
DATUM: 1985.00

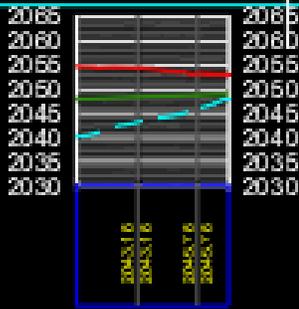


PROFILE VIEW: SS-8-11+69.94
 SCALE: 25
 DATUM: 1985.00

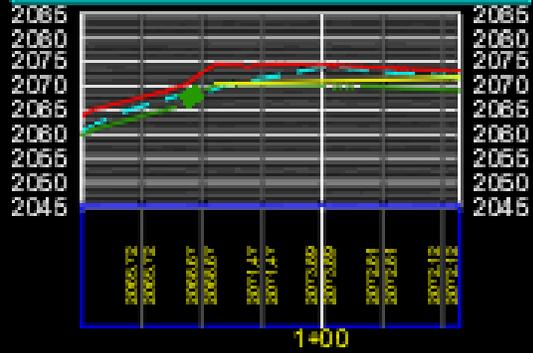


1+00

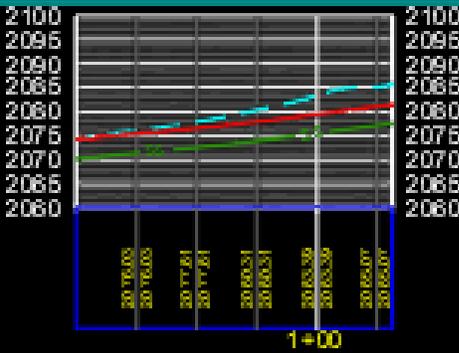
PROFILE VIEW: SS-9-0+59.02
SCALE: 25
DATUM: 2030.00



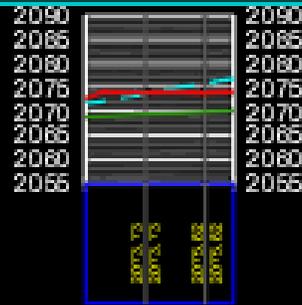
PROFILE VIEW: SS-10-1+57.25
SCALE: 25
DATUM: 2045.00



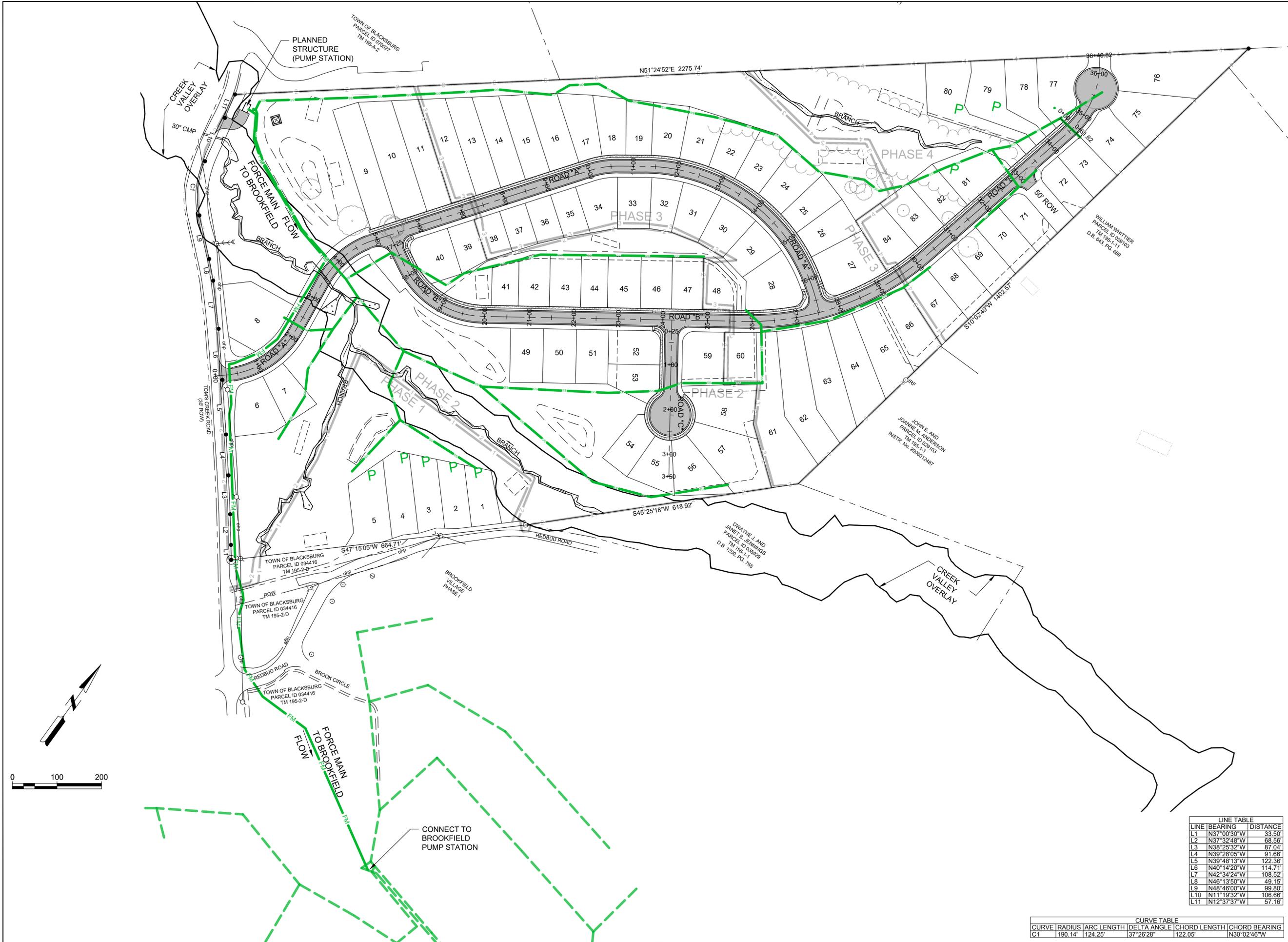
PROFILE VIEW: SS-11-1+31.37
SCALE: 25
DATUM: 2060.00



PROFILE VIEW: SS-12-0+61.62
SCALE: 25
DATUM: 2055.00



C:\DROPO\EA\JIM LUCAS PROJECT\TOWNS CREEK\CAD\PRELIMINARY PLAT.DWG



LINE TABLE		
LINE	BEARING	DISTANCE
L1	N37°00'30"W	33.50'
L2	N37°32'48"W	68.56'
L3	N38°25'32"W	87.04'
L4	N39°28'05"W	91.66'
L5	N39°48'13"W	122.36'
L6	N40°14'20"W	114.71'
L7	N42°34'24"W	108.52'
L8	N46°13'50"W	49.15'
L9	N48°46'00"W	99.80'
L10	N11°19'32"W	106.66'
L11	N12°37'37"W	57.16'

CURVE TABLE					
CURVE	RADIUS	ARC LENGTH	DELTA ANGLE	CHORD LENGTH	CHORD BEARING
C1	190.14'	124.25'	37°26'28"	122.05'	N30°02'46"W

EDEN & ASSOCIATES
 engineering • planning • development
 1800 KRAFT DRIVE, SUITE 111
 BLACKSBURG, VIRGINIA 24060
 VOICE 276-632-6231
 FAX 276-632-3648

No.	Revision / Issue	Date

SANITARY SEWER SYSTEM EXHIBIT

PROPOSED DEVELOPMENT FOR
 LUCAS CONSTRUCTION AND DEVELOPMENT, INC.
BEREWICK
 PROPERTY OF LUCAS TCR, LLC
 PARCEL ID 006160; TM# 195-A-5; 40.345 ACRES
 PRICES FORK MAGISTERIAL DISTRICT
 TOWN OF BLACKSBURG, MONTGOMERY COUNTY, VA

Drawn By:	Scale:
PJB	AS SHOWN
Checked By:	Date:
MTJ	07-01-2020
Sheet No.	SS
1 of 1	