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To: Lee's Summit Senior Community, LLC
5051 S. National Avenue, Ste. 4-110
Springfield, Missouri 65810

From: Anderson Engineering, Inc.
941 W 141st Terrace
Kansas City, MO 64145

Date: March 10, 2023

Subject: The Princeton Senior Living Revised Drainage Memo

The purpose of this memorandum is to determine the impacts of converting the existing extended dry detention basin to a wet bottom detention basin on the analyzed drainage area. Reference *Appendix A* for an exhibit of proposed improvements.

Per the approved stormwater report, dated July 19th, 2019, 2 drainage areas DEV 10 (2.94 Ac.) and DEV 20 (2.40 Ac.) flow to Bioretention Facilities #1 and #2, respectively, then to the extended dry detention basin. Drainage area, DEV 30 (4.08 Ac.) flows through an underground stormwater system directly to the existing extended dry detention basin. The extended dry detention basin, along with drainage areas DEV12 and OUT11, discharge to Point of Interest #1. The approved stormwater report shows that the discharge from the site is within acceptable levels. Reference *Appendix B* for pages from the approved drainage report.

The proposed wet bottom detention basin was designed minimizing impacts to the approved drainage analysis and extended dry detention basin design. The wet bottom detention pond is proposed to be 5 ft deep with a 3:1 side slope. The existing extended dry detention basin outfall structure's elevation is 1013.19 and the permanent pool elevation of the wet bottom detention basin will be maintained at that elevation. No modifications to the primary outlet works are proposed. The permanent pool elevation will be at or below all receiving and discharge elevations and thus, in the event that the permanent pool needs to be drained, a pump will be utilized. By maintaining the existing outfall elevation and excavating the current bottom basin slope to the existing outlet, the overall volume for the detention will be increased. Reference *Table 1* below for an existing vs. proposed stage-storage curve comparison. Reference *Table 2* for revised outflow data. Reference *Appendix C* for revised detention calculation reports.

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Table 1: Existing vs. Proposed Stage-Storage

Stage (ft)	Elevation (ft)	Ex. Contour Area (sf)	Prop. Contour Area (sf)	Ex. Total Storage (ft^3)	Prop. Total Storage (ft^3)	Total Volume Difference (cf)
0.00	1013.00	0	6,640	0	0	0
1.00	1014.00	4,594	8,130	1,531	7,372	+5,841
2.00	1015.00	11,499	10,733	9,317	16,772	+7,455
3.00	1016.00	15,079	15,079	22,565	29,615	+7,050
4.00	1017.00	17,882	17,882	39,024	46,074	+7,050
5.00	1018.00	20,841	20,841	58,364	65,415	+7,051
6.00	1019.00	24,958	24,958	80,744	88,281	+7,537
7.00	1020.00	27,232	27,232	106,319	114,366	+8,047
8.00	1021.00	30,663	30,663	135,246	143,293	+8,047
9.00	1022.00	34,251	34,251	167,683	175,730	+8,047

Table 2: Developed Condition Summary*

	$Q_{2\text{-yr}}$ (cfs)	$Q_{10\text{-yr}}$ (cfs)	$Q100_{\text{-yr}}$ (cfs)	100-yr WSE (ft)
Allowable	4.71	18.84	28.26	1020.80
Ex. Dry Det. Discharge	1.24	5.91	15.89	1020.77
Pro. Det. Discharge	0.97	3.93	15.78	1020.59
Ex. Vs Pro. Difference	-0.27	-1.98	-0.11	-0.19

*Reference approved drainage study Table 4A, pg. 8 of 99 for developed conditions analysis summary point of interest #1.

Conclusions and Recommendations

The impacts of converting the existing extended dry detention basin to a wet bottom detention basin has been analyzed for this memorandum. It has been determined that by maintaining the existing outfall elevation the detention basin volume has increased and the overall water surface elevation has decreased. The proposed detention basin improvements have also been shown to decrease the overall 100-yr water surface elevation.

Please feel free to contact me with any additional questions or comments.
Thank you,

Trevor Fox, PE
Anderson Engineering, Inc.

AndersonEngineeringInc.com
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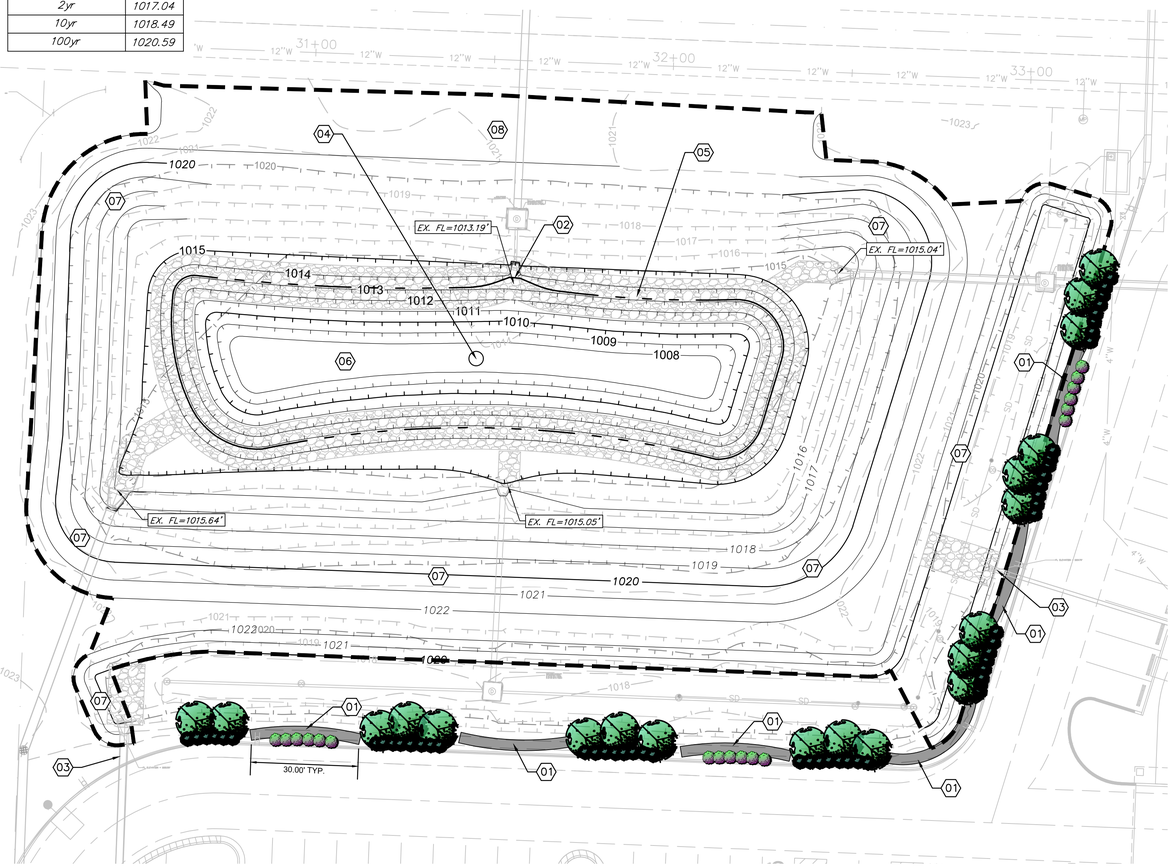
APPENDIX A
Proposed Improvements

RETURN PERIOD	M.W.S.E.
2yr	1017.04
10yr	1018.49
100yr	1020.59



LEGEND

- 850 — FINISH GRADE 5' CONTOUR
- 849 — FINISH GRADE 1' CONTOUR
- 850 — EXISTING GRADE 5' CONTOUR
- 849 — EXISTING GRADE 1' CONTOUR
- STONE EDGE TREATMENT
- STACKED LEDGESTONE
- DISTURBED AREA
- PERMANENT POOL ELEVATION (1013.19)

BASE BID INCLUDES A NATURAL CLAY BOTTOM BASIN WITH RIPRAP EDGE TREATMENT.NOTE BID ALTERNATES ON SHEET C100 AND C101

DISTURBED AREA: 0.99 AC

HORIZONTAL
20' 0 20' 40'
SCALE IN FEET SCALE: 1" = 20'

GENERAL NOTES

1. ALL TOPSOIL, VEGETATION, ROOT STRUCTURES, AND DELETERIOUS MATERIALS SHALL BE STRIPPED FROM THE GROUND SURFACE PRIOR TO THE PLACEMENT OF EMBANKMENTS.
2. ALL DISTURBED AREAS THAT ARE NOT TO BE PAVED (GREEN SPACES) SHALL BE FINISH GRADED WITH A MINIMUM OF SIX INCHES OF TOPSOIL.
3. FINISHED GRADES SHALL NOT BE STEEPER THAN 3:1.
4. EXISTING GRADE CONTOURS SHOWN AT 1 FOOT INTERVALS. PROPOSED GRADE CONTOURS SHOWN AT 1 FOOT INTERVALS.
5. HAUL OFF AND MATERIAL IMPORT SHALL NOT BE AN EXCLUDED ITEM IN THE BASE BID. ALL EXCAVATION SHALL BE CONSIDERED NON-CLASSIFIED. NO ADDITIONAL PAYMENT WILL BE MADE FOR ROCK EXCAVATION OR BLASTING.
6. ALL DISTURBED AREAS ARE TO RECEIVE TOPSOIL (6"), SEED/SOD, MULCH AND WATER UNTIL A HEALTHY STAND OF GRASS IS ESTABLISHED. RE-SEEDING SHALL BE REQUIRED.
7. WITHIN FORTY-EIGHT HOURS PRIOR TO ANY ASPHALT OR CONCRETE PAVING, THE SUBGRADE SHALL BE PROOF-ROLLED WITH A FULLY LOADED TANDEM WHEEL DUMP TRUCK AND OBSERVED BY THE ON-SITE GEOTECHNICAL ENGINEER. AREAS OF THE SUBGRADE WITH EXCESSIVE RUTTING AND/OR PUMPING SHALL BE RE-WORKED OR REMOVED IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS. FLY ASH OR GRANULAR MATERIAL MAY BE ADDED BY THE CONTRACTOR (AS APPROVED BY THE ON-SITE GEOTECHNICAL ENGINEER) TO STABILIZE THE SUBGRADE.
8. REFERENCE GEOTECHNICAL REPORT FOR BUILDING PAD PREPARATION.
9. CONTRACTOR SHALL OPERATE UNDER THE TERMS AND PERMITS INCLUDED IN THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) PREPARED FOR THIS PROJECT AND PERMITTED THROUGH THE STATE OF MISSOURI. CONTRACTOR SHALL EMPLOY A QUALIFIED PERSON TO CONDUCT REGULAR INSPECTIONS OF THE SITE EROSION CONTROL MEASURES AND DOCUMENT SUCH INSPECTIONS IN THE SWPPP DOCUMENT MAINTAINED BY THE CONTRACTOR.
10. THE CONTRACTOR SHALL ADHERE TO ALL TERMS & CONDITIONS AS OUTLINED IN THE PERMIT FOR STORMWATER DISCHARGE ASSOCIATED WITH THE CONSTRUCTION ACTIVITIES AS ISSUED BY THE CITY OF LEE'S SUMMIT, MO.
11. REFERENCE OLSSON GEOTECHNICAL REPORT, DATED FEBRUARY 15, 2019, FOR BORING LOGS EXPLORATION RESULTS

KEYED NOTES

(01) BID ALTERNATE: INSTALL STACKED LEDGESTONE IN ARC AS SHOWN. CONTRACTOR TO STACK STONE AS NECESSARY UNTIL 24" MIN. ABOVE EXISTING FLUSH CURB IS EXPOSED. CONTRACTOR TO COORDINATE COLOR WITH OWNER.

(02) EXISTING CONCRETE HEADWALL W/ FLOW CONTROL ASSEMBLY TO REMAIN. CONTRACTOR SHALL NOT DISTURB EXISTING CONCRETE HEADWALL.

(03) EXISTING STORM SEWER TO REMAIN. CONTRACTOR SHALL NOT DISTURB EXISTING STORM SEWER.

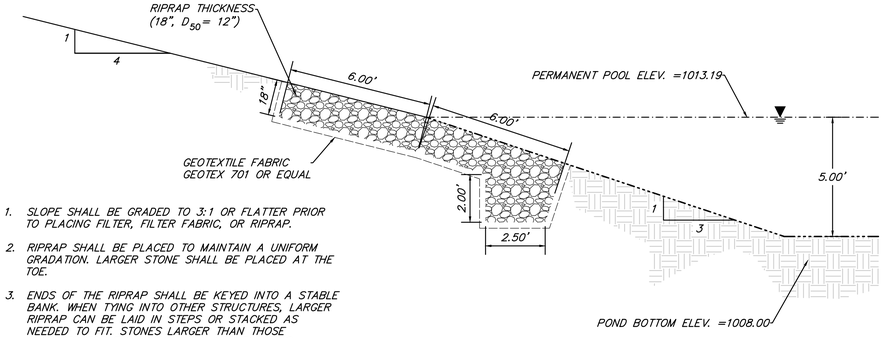
(04) INSTALL SCOTT AERATOR (DA-20) WITH SCOTT NIGHT GLO LED LIGHTING KIT, OR APPROVED EQUAL, AS SHOWN ON PLANS. REFERENCE MEP PLANS FOR ELECTRICAL ROUTING AND POWER REQUIREMENTS. CONTRACTOR TO COORDINATE WITH OWNER ON HORSEPOWER REQUIREMENT FOR DESIRED SPRAY HEIGHT AND DIAMETER

(05) INSTALL RIPRAP EDGE TREATMENT PER POND EDGE TREATMENT DETAIL ON THIS SHEET.
BID ALTERNATE: INSTALL CONCRETE WALL EDGE TREATMENT. GRADING AND DETAIL PER SHEET C101.

(06) WET BOTTOM RETENTION BASIN. CONTRACTOR TO PROVIDE THE FOLLOWING BID ALTERNATES FOR POND BOTTOM LINING.
1. 18" BENTONITE CLAY LINER TO PERMANENT POOL ELEVATION
2. 45 MIL. EPDM POND LINER INSTALLATION.

(07) CONTRACTOR TO REESTABLISH EXISTING CONTOURS AS SHOWN ON PLAN TO PROVIDED MIN. REQUIRED DETENTION VOLUME.

(08) CONTRACTOR TO VERIFY EMERGENCY SPILLWAY ELEVATIONS.



1. SLOPE SHALL BE GRADED TO 3:1 OR FLATTER PRIOR TO PLACING FILTER, FILTER FABRIC, OR RIPRAP.
2. RIPRAP SHALL BE PLACED TO MAINTAIN A UNIFORM GRADATION. LARGER STONE SHALL BE PLACED AT THE TOE.
3. ENDS OF THE RIPRAP SHALL BE KEYED INTO A STABLE BANK. WHEN TYING INTO OTHER STRUCTURES, LARGER RIPRAP CAN BE LAID IN STEPS OR STACKED AS NEEDED TO FIT. STONES LARGER THAN THOSE DESIGNED FOR FLOW SHALL BE USED FOR THIS PURPOSE.
4. REMAINING DISTURBED AREAS SHALL BE GRADED AND PERMANENTLY SEEDED AND MULCHED.
5. RIPRAP SHALL BE GREY LIMESTONE, OR APPROVED EQUAL, AND SHALL MEET MODOT STANDARDS FOR SOUNDNESS, ABRASION, AND DURABILITY

POND EDGE TREATMENT DETAIL

SCALE: N.T.S.

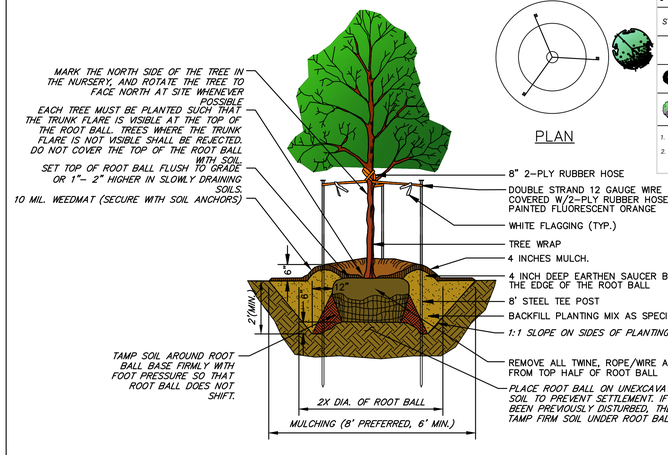
1. CONTRACTOR TO CUT INTO EXISTING SLOPE AND PLACE STONE ON A STABLE SHELF LEAVING 24" OF STONE EXPOSED AT CURB EDGE.
2. CONTRACTOR TO COORDINATE WITH OWNER ON STONE COLOR FROM SUPPLIER. PHOTOS PROVIDED AS REFERENCE ONLY.

STACKED LEDGESTONE LANDSCAPING (BID ALTERNATE)

PLANT SCHEDULE

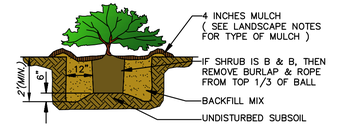
SYM.	KEY	QTY	COMMON NAME / Botanical Name	SIZE / SPACING / COMMENTS
	ST	20	RIVER BIRCH / Betula nigra	B&B, 2" CAL, SPACED AS SHOWN ON PLAN
	KF	54	KARL FOERSTER GRASS / Calamagrostis acutiflora	2 GAL, MIN. 2' TALL AT PLANTING, SPACED 1' O.C.
	GS	18	GRO-LOW SUMAC / Rhus aromatica	2 GAL., SPACED 3.5' O.C.

1. H: HEIGHT, CP: CALIPER, C: CONTAINER, MT: MULTI-TRUNK, B&B: BALLED & BURLAPPED ROOT BALL
2. O.C.: INDICATES APPROXIMATE SPACING. SHALL BE CONSIDERED GENERAL GUIDELINE ONLY AND MAY BE MODIFIED TO SUIT ON-SITE CONDITIONS.



NOTES:
1. DO NOT HEAVILY PRUNE TREE AT PLANTING. PRUNE ONLY CROSSOVER LIMBS, CO-DOMINANT LEADERS, AND BROKEN OR DEAD BRANCHES. SOME INTERIOR TWIGS AND LATERAL BRANCHES MAY BE PRUNED; HOWEVER, DO NOT REMOVE THE TERMINAL BUDS OF BRANCHES THAT EXTEND TO THE EDGE OF THE CROWN.
2. STAKE AND/OR WRAP TREES ONLY UPON THE APPROVAL OF THE LANDSCAPE ARCHITECT.
3. BACKFILL WITH EXISTING SOIL IN SANDY LOAM SOILS. ADD 20% MAX. BY VOLUME COMPOSTED ORGANIC MATERIAL TO THE EXISTING SOIL.
4. SEE LANDSCAPE PLAN NOTES FOR TYPE OF MULCH TO BE USED.
5. REMOVE TEE POSTS, WIRE WRAPPED IN RUBBER HOSE AND FLAGGING AFTER ONE COMPLETE GROWING SEASON (MARCH-OCTOBER).

TREE PLANTING DETAIL AE-L1
N.T.S.



SHRUB PLANTING AE-L2
N.T.S.

LANDSCAPE DETAILS (BID ALTERNATE)

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PRINCETON DETENTION BASIN

GRADING PLAN

1701 S.E. OLDHAM PARKWAY, LEE'S SUMMIT, MO

STATE OF MISSOURI
TREVOR A. FOX
NUMBER PE-2021009513
PROFESSIONAL ENGINEER

SHEET NUMBER
C100
2 OF 6

Feb 17, 2023 - 8:22am Plotted By: KC Eng 6 G:\Shared drives\KC10 - Land Development\Projects\2023\23KC10002-Princeton Detention Basin\01 CIVIL\03-DWG\Sheet\PRINCETON DETENTION BASIN\23KC10002-SHT-GRAD.dwg Layout: GRADING PLAN-OPT 1

APPENDIX B
Approved Drainage Report

FINAL STORMWATER DRAINAGE STUDY FOR LEE'S SUMMIT SENIOR LIVING COMMUNITY

SE Oldham Parkway
Lee Summit, Missouri

South Prairie Lee Watershed

Prepared for:

Lee's Summit Senior Community, LLC
5051 S. National Avenue, Ste. 4-110
Springfield, Missouri
Phone: 417-893-6006

2nd Submittal
July 2019

Prepared By: Trevor Drake
Reviewed By: Ryan Jeppson, P.E.
Olsson, Inc.
550 St. Louis St.
Springfield, MO 65806
Missouri Engineering Certificate of Authority #001592
Olsson Project No. 018-1450

olsson

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FEMA Firmette

APPENDIX C
APWA \ MARC BMP Level of Service & Water Quality Calculations

1. GENERAL INFORMATION

The following stormwater report is for the Lee's Summit Senior Living Community located near the southern boundary of the South Prairie Lee Watershed on the south side of Oldham Parkway approximately 0.4 miles east of Todd George Parkway. The proposed 157,515-sqft facility will be on a 10.45 acre± site that is currently vacant pasture land. In the existing condition the site generally flows from south to the north towards Oldham Parkway. A subtle ridge line splits the site into two sub-drainage areas. The western onsite drainage area discharges to the Oldham Parkway drainage swale at the northwest corner of the site (POI #1). The swale drains to a 5'x5' RCB culvert that flows north underneath the Oldham Parkway, US Route 50, and Blue Parkway to the E. Fork Little Blue River through an unnamed tributary. The eastern onsite drainage area intercepts offsite runoff from approximately 5-acres of agricultural land from the east. Runoff continues to flow north and northeast to an existing 30" RCP culvert (POI #2) that discharges north underneath Oldham Parkway, US Route 50, and Blue Parkway. Storm water continues north to an existing wet detention facility located south of Shenandoah Drive.

Stormwater runoff from the proposed Lee's Summit Senior Living Community will be collected and conveyed through onsite storm sewer, that is routed to proposed bioretention and extended dry detention facilities. These facilities will discharge the water in compliance with the KC APWA "Comprehensive Control Strategy" to the proposed public storm sewer that will be installed with the Oldham Parkway street improvements.

According the FEMA Flood Map Service Center the site is not located in a flood hazard area per map #29095C049G dated 01/20/2017. The FEMA FIRMette has been included in Appendix B.

Per the National Wetlands Inventory, the site has no "blue line" streams or wetlands are located on site.

Soil data was taken from the USDA Natural Resources Conservation Service – Web Soil Survey of Jackson, County Missouri. The Web soil survey categorize soils on the proposed Lee's Summit Senior Living Community as:

TABLE 1. SITE SOIL CLASSIFICATION

Map Unit	Map Unit Name	Percent Slopes	Rating	Area in AOI (acres)	Percent of AOI
10000	**Arisburg Silt Loam**	1 to 5	C	15.9	85.9%
10082	**Arisburg-Urban land complex**	1 to 5	C	2.6	14.1%

*see Web Soil Survey pdf located in Appendix A

2. METHODOLOGY

This Stormwater Drainage Study has been prepared to evaluate the hydrologic impact generated by the development of the Lee's Summit Senior Living Community and adjacent public street improvements. The base data for models prepared for this report have been obtained through topographic surveys, online maps, and aerial imagery.

The following method was used to study and model existing and proposed conditions for stormwater runoff:

- TR-55 Unit Hydrograph Method
  - 2-year, 10-year, 100-year Return Frequency Storms
  - 24-Hour SCS Type II Rainfall Distribution
  - SCS Runoff Curve Numbers Per SCS TR-55
  - SCS TR-55 Methods for determining Time of Concentration and Travel Time

Rainfall depth & duration data were taken from the National Oceanic and Atmospheric Administration (NOAA). A summary of the rainfall data used in the calculations are presented in Table 2.

TABLE 2. RAINFALL PRECIPITATION

Annual Exceedance Probability (AEP)	**Rainfall Depth** (inches)
1-year	3.71
10-year	5.66
100-year	9.25

*Hydraflow reports have been provided in Appendix A

3. EXISTING CONDITIONS ANALYSIS

Existing conditions where modeled assuming pasture in good condition. This assumption was used to calculate existing condition flow rates and the level service required for proposed BMP

implementation. Discharge from the proposed development will adhere to APWA and Lee's Summit discharge requirements. Refer to Figure 1 for existing condition sub-drainage area locations, runoff curve numbers, and sub-drainage area acreage.

In the existing condition, the site generally flows from south to the north towards Oldham Parkway. A subtle ridge line splits the site into two sub-drainage areas. The western onsite drainage area (EX10) discharges to the Oldham Parkway drainage swale at the northwest corner of the site (POI #1). The swale drains to a 5'x5' RCB culvert that flows north underneath the Oldham Parkway, US Route 50, and Blue Parkway to the E. Fork Little Blue River through an unnamed tributary.

The eastern onsite drainage area (EX20) intercepts offsite runoff from approximately 5-acres of pasture land from the east (OFF20). Runoff continues to flow north and northeast to an existing 30" RCP culvert (POI #2) that discharges north underneath Oldham Parkway, US Route 50, and Blue Parkway. Storm water continues north to an existing wet detention facility located south of Shenandoah Drive.

The following table(s), Table 3A & 3B, summarizes the results of the existing conditions analysis:

TABLE 3A. EXISTING CONDITIONS ANALYSIS SUMMARY POINT OF INTEREST #1

Subarea	Existing $Q_{2\text{-year}}$ (cfs)	Existing $Q_{10\text{-year}}$ (cfs)	Existing $Q_{100\text{-year}}$ (cfs)
EX POI #1	16.24	34.88	72.52

TABLE 3B. EXISTING CONDITIONS ANALYSIS SUMMARY POINT OF INTEREST #2

Subarea	Existing $Q_{2\text{-year}}$ (cfs)	Existing $Q_{10\text{-year}}$ (cfs)	Existing $Q_{100\text{-year}}$ (cfs)
EX PO1 #2	16.94	36.47	75.73

4. PROPOSED CONDITIONS ANALYSIS

The proposed conditions section of this analysis assumes completion of the Lee's Summit Senior Living Community and adjacent public street improvements. A CN value of 98 was used for all building and pavement surfaces. A CN values of 80 was used for all developed open space. As in the existing conditions, the proposed conditions stormwater runoff model was created and ran for the 2, 10, and 100-year storm events. The complete output for the Hydraflow model has been included in Appendix A. Refer to Figure 2 for developed sub-drainage area locations, runoff curve numbers, and sub-drainage area acreage.

In the developed condition drainage area DEV 10 flows into Bio Detention Facility #1 before flowing into the proposed dry detention basin. Drainage area DEV 20 is routed through Bio Detention Facility #2 before it is discharged to the dry detention basin. Drainage area DEV 30 is conveyed into the dry detention basin through an underground storm sewer system. The detention facility discharges to Point of Interest #1, Discharge from the detention basin will be less than allowable flow rates established using the "Comprehensive Control Strategy". Additionally, the dry detention will provide a 40-hour minimum extended drainage time of the 90% storm runoff volume. Stormwater flow from the detention facility, DA12 and OFF11 combine at Point of Interest #1 located immediately upstream of the existing 5'x5' box culvert to flows north beneath Oldham Parkway.

Point of Interest #2 accepts the accumulation of flow from OFF 20, DA 21, and DA 22. Offsite and public right-of-way stormwater runoff is collected in an underground storm sewer system and conveyed to the 30-inch concrete pipe that flows north beneath Oldham Parkway.

The following tables contain input data and summarize the computed results of the developed conditions analysis:

TABLE 4A. DEVELOPED CONDITIONS ANALYSIS SUMMARY POINT OF INTEREST #1

Subarea	Drainage Area (acres)	Curve Number	Tc (Minutes)	Developed $Q_{2\text{-year}}$ (cfs)	Developed $Q_{10\text{-year}}$ (cfs)	Developed $Q_{100\text{-year}}$ (cfs)
DEV 10	2.94	92	5	13.29	21.46	36.24
BIO #1				12.54	20.61	35.10
DEV 20	2.40	89	5	10.01	16.75	28.97
BIO #2				8.13	15.53	25.01
DEV 30	4.08	89	5	17.02	28.48	49.26
DRY DET. DISCHARGE	**9.42**			**1.24**	**5.91**	**15.89**
ALLOWABLE				**4.71**	**18.84**	**28.26**
DA 12 (R/W)	1.21	87	5	4.75	8.15	14.36
OFF 11	8.28	74	25.6	10.78	23.30	48.68

TABLE 4B. DEVELOPED CONDITIONS ANALYSIS SUMMARY POINT OF INTEREST #2

Subarea	Drainage Area (acres)	Curve Number	Tc (Minutes)	Developed $Q_{2\text{-year}}$ (cfs)	Developed $Q_{10\text{-year}}$ (cfs)	Developed $Q_{100\text{-year}}$ (cfs)
DA 21 (R/W)	1.5	88	5	6.07	10.29	17.96
DA 22 (R/W)	0.54	85	5	1.98	3.50	6.28
OFF 20	5.39	75	32.7	6.44	13.67	28.27

TABLE 5A. DRY DETENTION FACILITY SUMMARY

Return Frequency	Developed Q_{DEV} (cfs)	Detention Volume (cf)	WSE (ft)
2	1.24	43,010	1017.21
10	5.91	72,321	1018.62
100	15.89	128,492	1020.77

TABLE 5B. BIO DETENTION #1 FACILITY SUMMARY

Return Frequency	Developed Q_{DEV} (cfs)	Detention Volume (cf)	WSE (ft)
2	12.54	8,754	1021.24
10	20.61	9,607	1021.33
100	35.10	10,893	1021.48

TABLE 5C. BIO DETENTION #2 FACILITY SUMMARY

Return Frequency	Developed Q_{DEV} (cfs)	Detention Volume (cf)	WSE (ft)
2	8.13	8,037	1022.79
10	15.53	9,138	1022.94
100	25.10	10,956	1023.15

TABLE 6A. POINT OF INTEREST #1 SUMMARY

Return Frequency	Existing Q_{pre} (cfs)	Developed Q_{DEV} (cfs)
2	**16.24**	**11.96**
10	**34.88**	**28.37**
100	**72.52**	**66.43**

TABLE 6B. POINT OF INTEREST #2 SUMMARY

Return Frequency	Existing Q_{pre} (cfs)	Developed Q_{DEV} (cfs)
2	**16.94**	10.95
10	**36.47**	20.60
100	**75.73**	39.30

5. POST CONSTRUCTION WATER QUALITY

Water quality volume treatment calculations were determined using the 2012 APWA/MARC BMP manual level of surface calculations. The level of surface calculation considered all onsite development. Existing offsite right-of-way and proposed public right-of-way will not be conveyed through onsite BMPs. Water quality level of service and water quality volume calculations are provided in Appendix C.

6. CONCLUSIONS & RECOMMENDATIONS

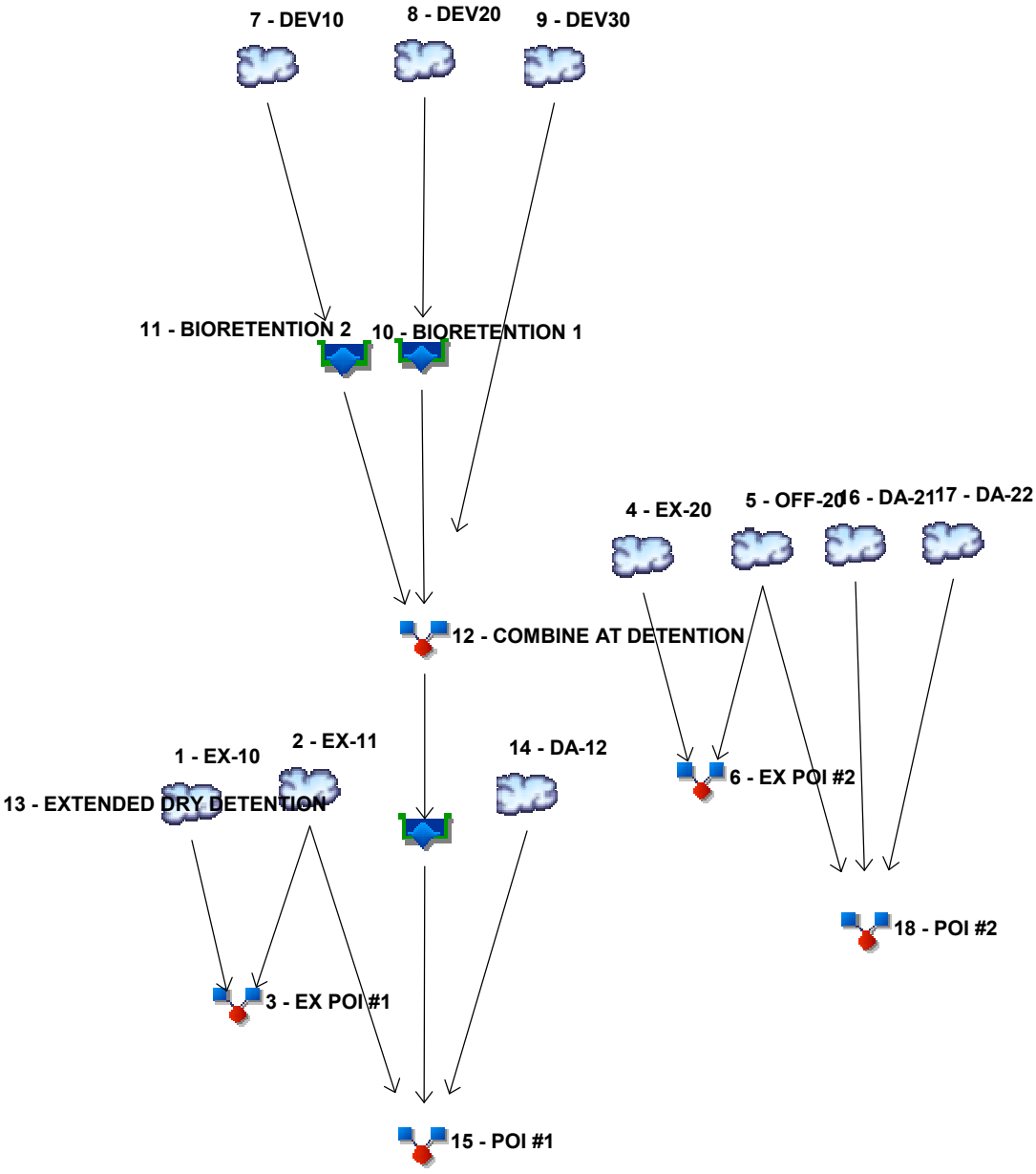
The Lee's Summit Senior Living Community has been evaluated in this report to show that the stormwater discharge from the site will remain within the acceptable levels. A new detention basin and two new biodetention basins are to be constructed to handle the increased runoff created from the development.

In conclusion, all peak discharges at the points of interest for all events are below the pre-development flow rates. Additionally, post construction storm water BMPs will be provided to meet the required level of service for this development. See Appendix F for City of Lee's Summit BMP Level of Service Worksheet.

It is therefore requested that Lee's Summit, Missouri approve this "Lee's Summit Senior Living Community Final Stormwater Drainage Study." This study will be verified with the final construction documents for the construction with the development.

APPENDIX C
Revised Calculation Report

Watershed Model Schematic



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.462	2	730	20,656	------	------	------	EX-10
2	SCS Runoff	10.78	2	730	41,034	------	------	------	EX-11
3	Combine	16.24	2	730	61,691	1, 2	------	------	EX POI #1
4	SCS Runoff	10.77	2	730	40,985	------	------	------	EX-20
5	SCS Runoff	6.443	2	734	28,774	------	------	------	OFF-20
6	Combine	16.94	2	730	69,759	4, 5	------	------	EX POI #2
7	SCS Runoff	13.29	2	716	28,396	------	------	------	DEV10
8	SCS Runoff	10.01	2	716	20,843	------	------	------	DEV20
9	SCS Runoff	17.02	2	716	35,433	------	------	------	DEV30
10	Reservoir	12.54	2	718	21,778	7	1021.24	8,754	BIORETENTION 1
11	Reservoir	8.128	2	720	14,839	8	1022.78	8,038	BIORETENTION 2
12	Combine	36.65	2	718	72,051	9, 10, 11	------	------	COMBINE AT DETENTION
13	Reservoir	0.974	2	890	68,048	12	1017.04	46,809	EXTENDED DRY DETENTION
14	SCS Runoff	4.750	2	716	9,768	------	------	------	DA-12
15	Combine	11.64	2	730	118,850	2, 13, 14	------	------	POI #1
16	SCS Runoff	6.074	2	716	12,562	------	------	------	DA-21
17	SCS Runoff	1.984	2	716	4,044	------	------	------	DA-22
18	Combine	10.95	2	718	45,380	5, 16, 17	------	------	POI #2

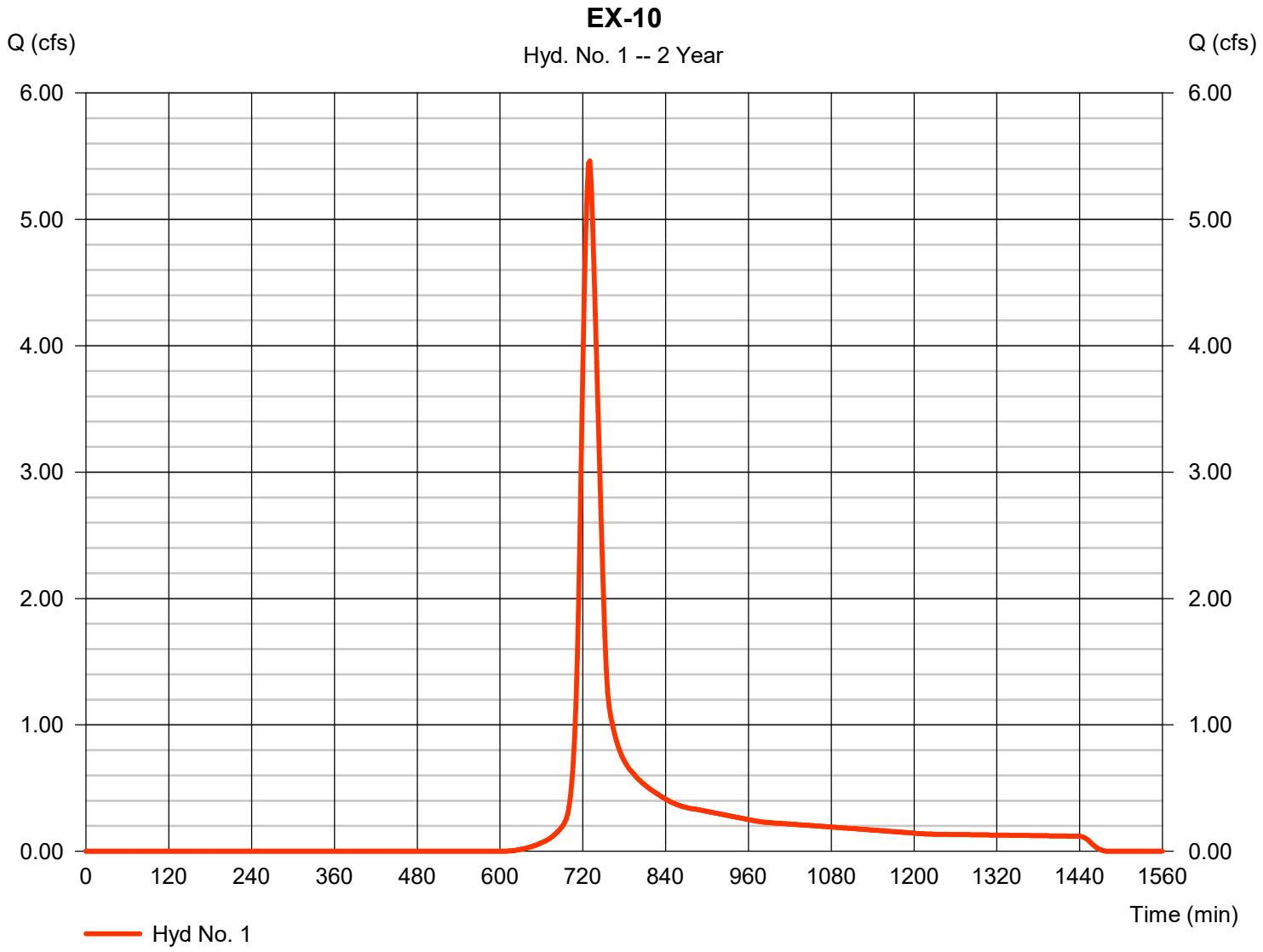
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 1

EX-10

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.462 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	20,656 cuft
Drainage area	=	3.980 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	26.30 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



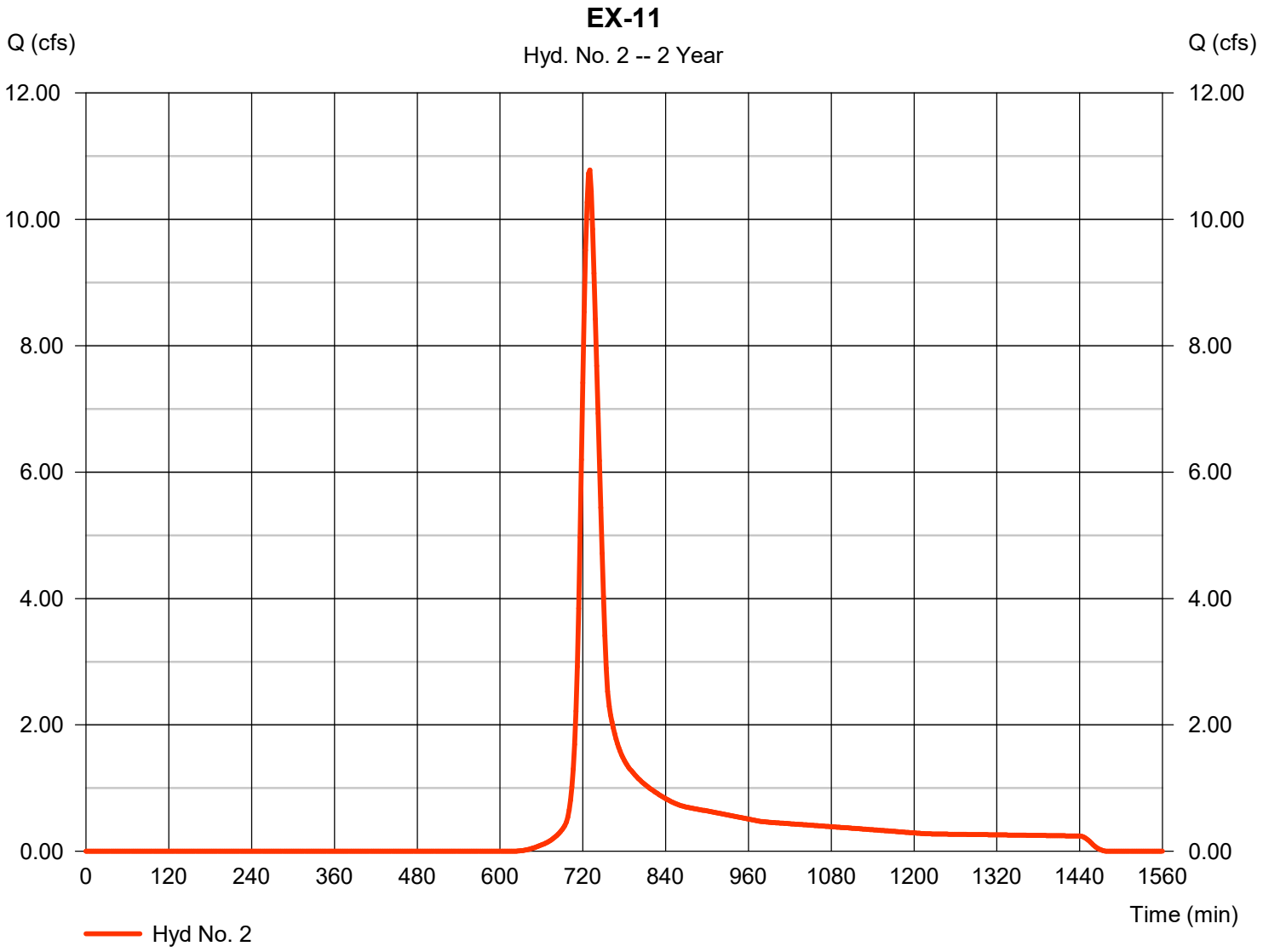
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 2

EX-11

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.78 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	41,034 cuft
Drainage area	=	8.280 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	25.60 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



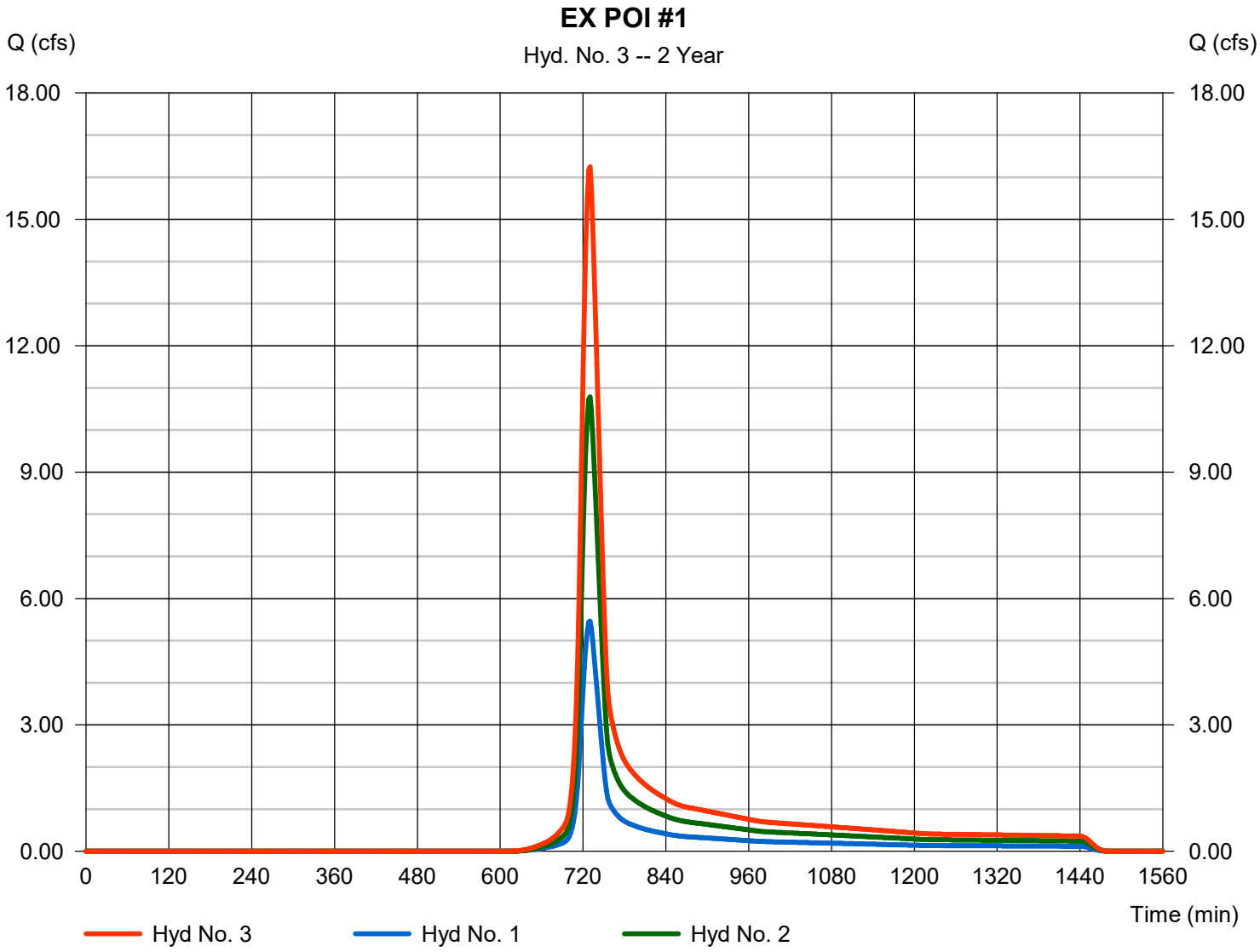
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 3

EX POI #1

Hydrograph type	= Combine	Peak discharge	= 16.24 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 61,691 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 12.260 ac



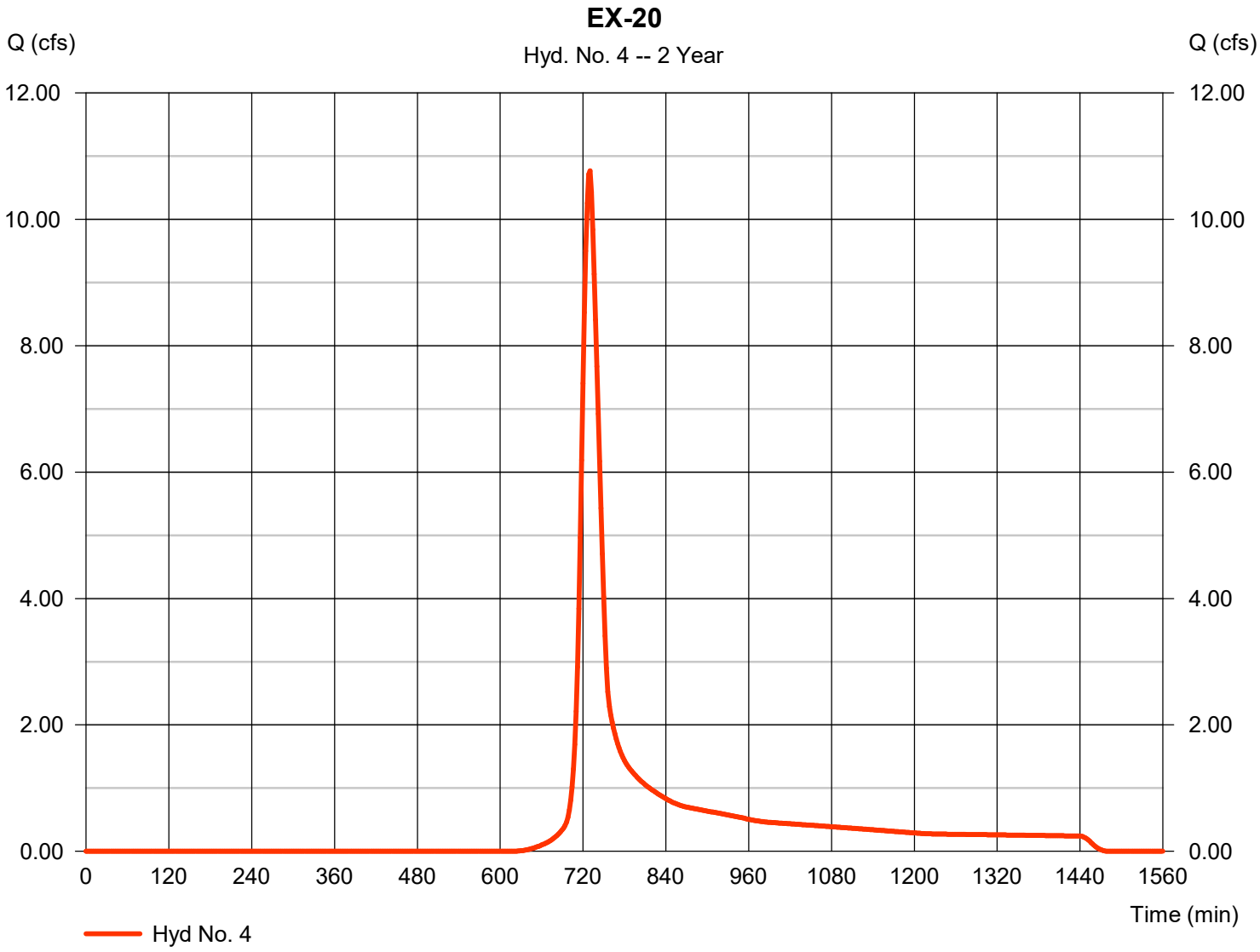
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 4

EX-20

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.77 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	2 min	Hyd. volume	=	40,985 cuft
Drainage area	=	8.270 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	25.10 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



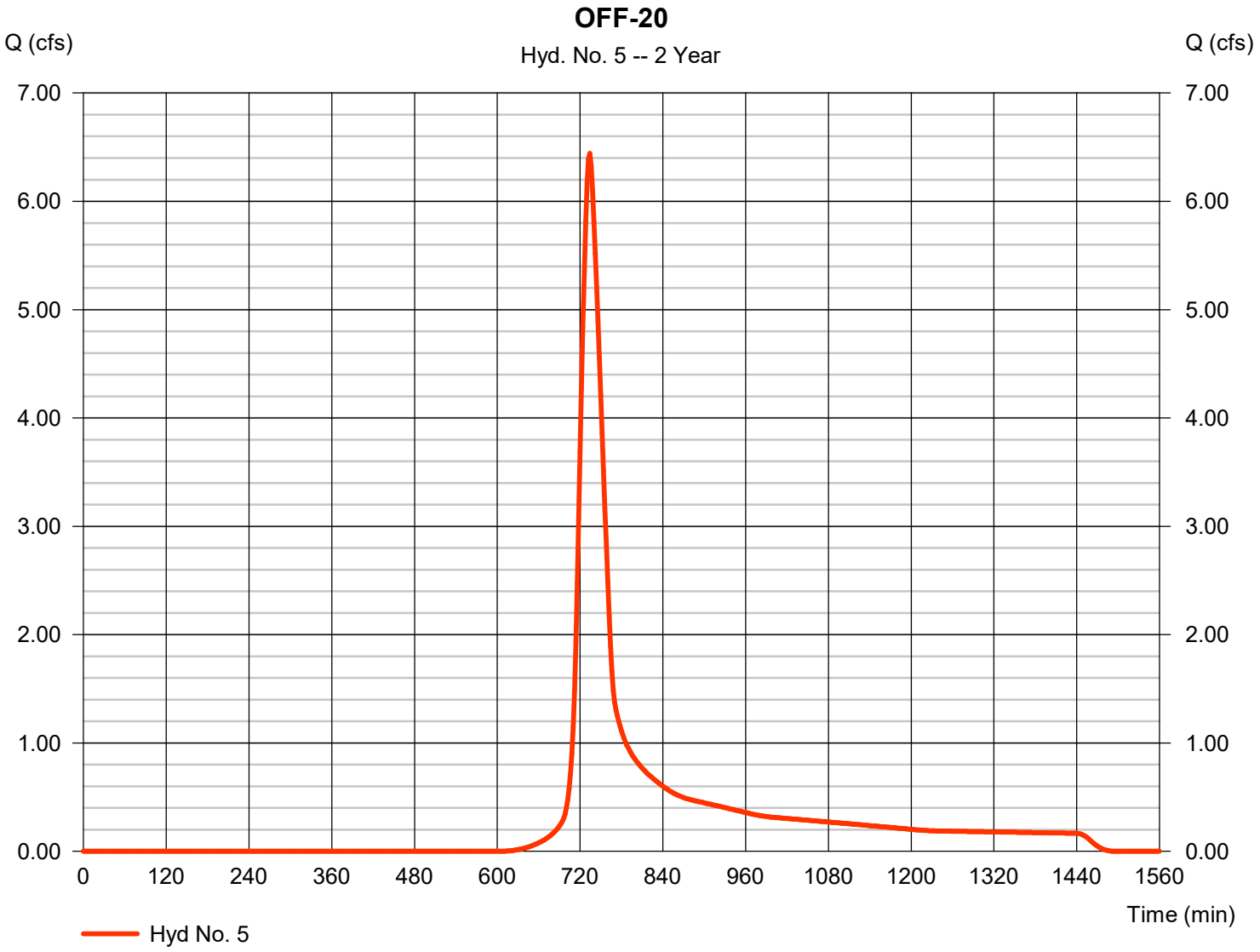
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 5

OFF-20

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.443 cfs
Storm frequency	=	2 yrs	Time to peak	=	734 min
Time interval	=	2 min	Hyd. volume	=	28,774 cuft
Drainage area	=	5.390 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	32.70 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



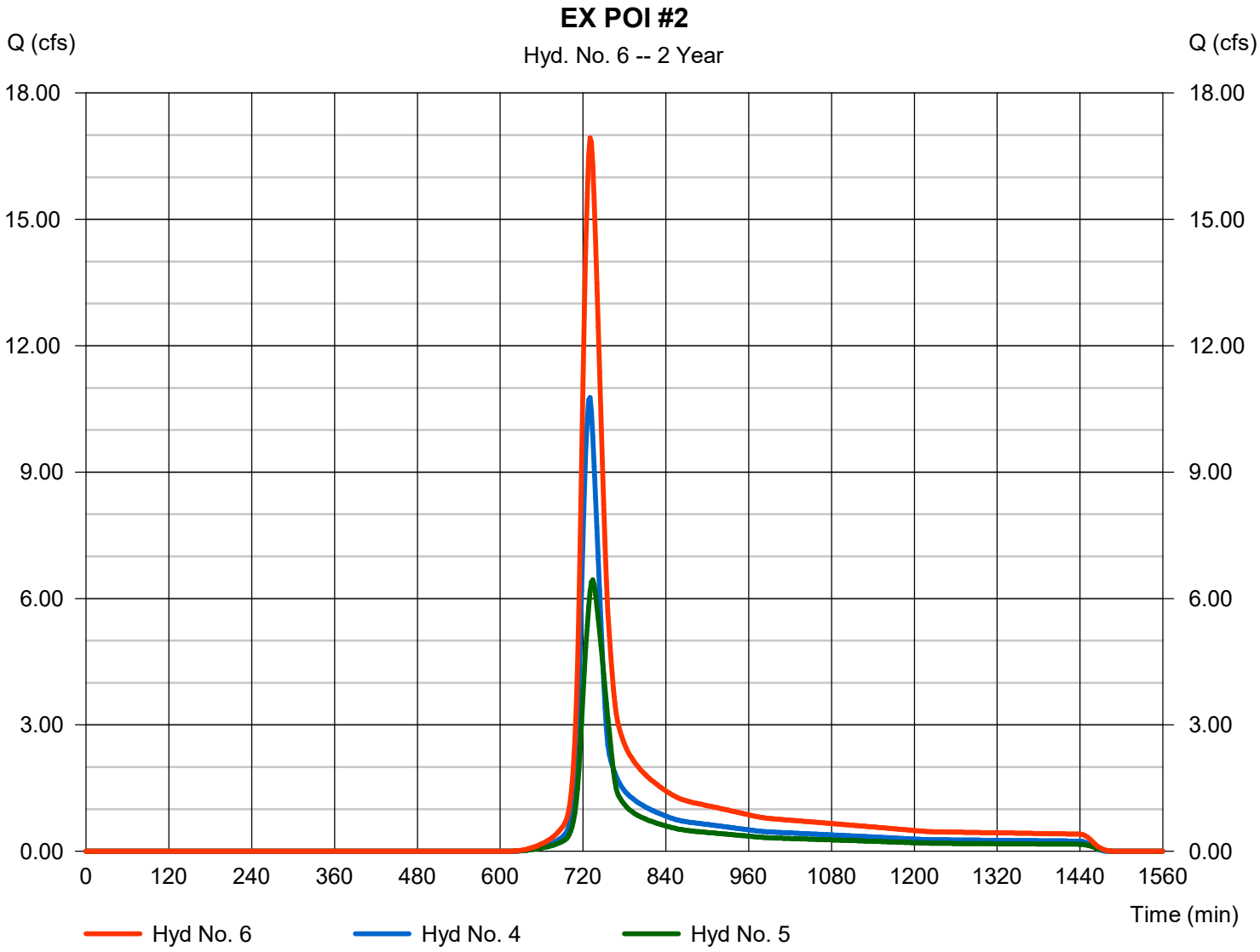
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 6

EX POI #2

Hydrograph type	= Combine	Peak discharge	= 16.94 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 69,759 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 13.660 ac



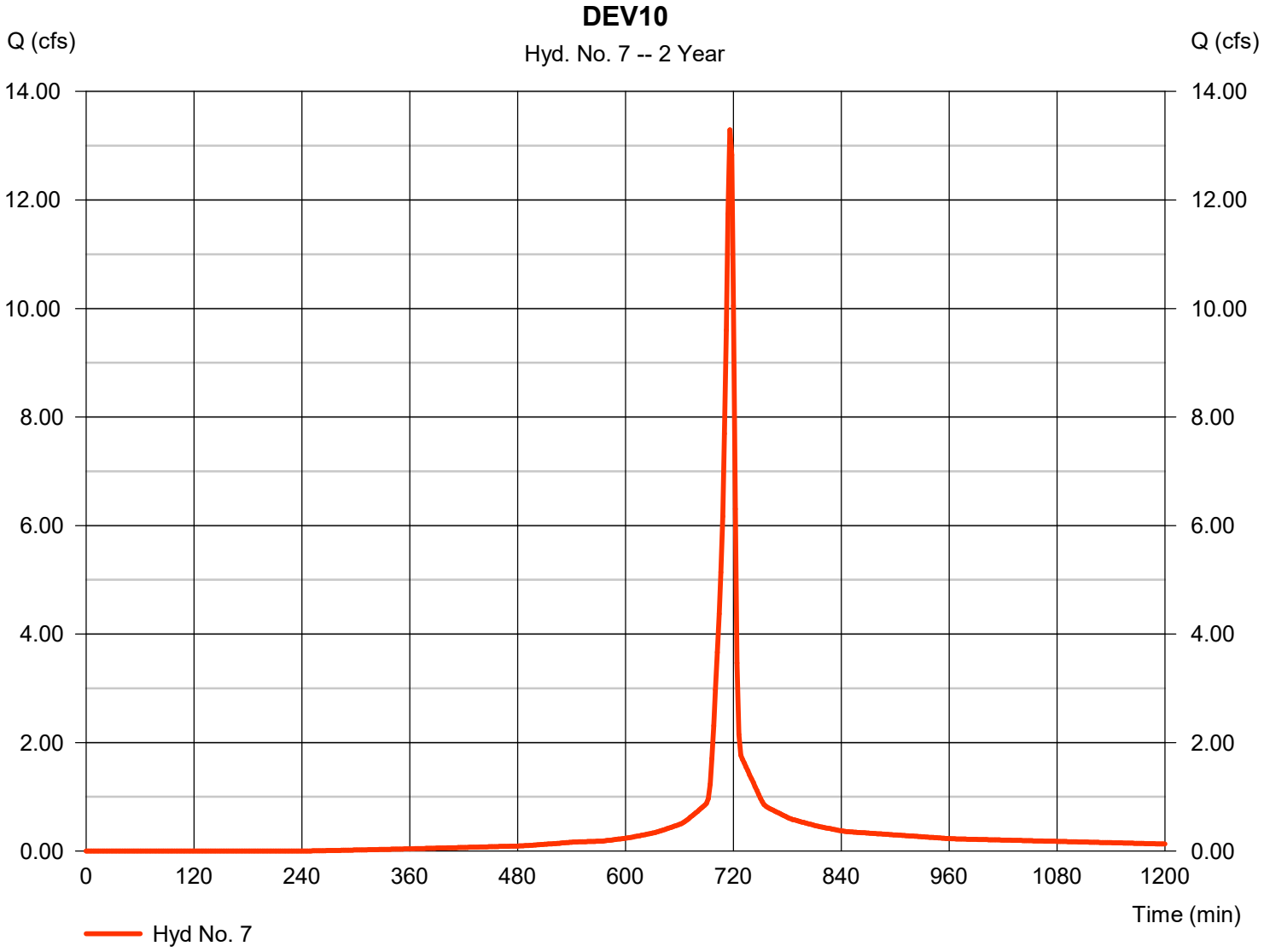
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 7

DEV10

Hydrograph type	= SCS Runoff	Peak discharge	= 13.29 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 28,396 cuft
Drainage area	= 2.940 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



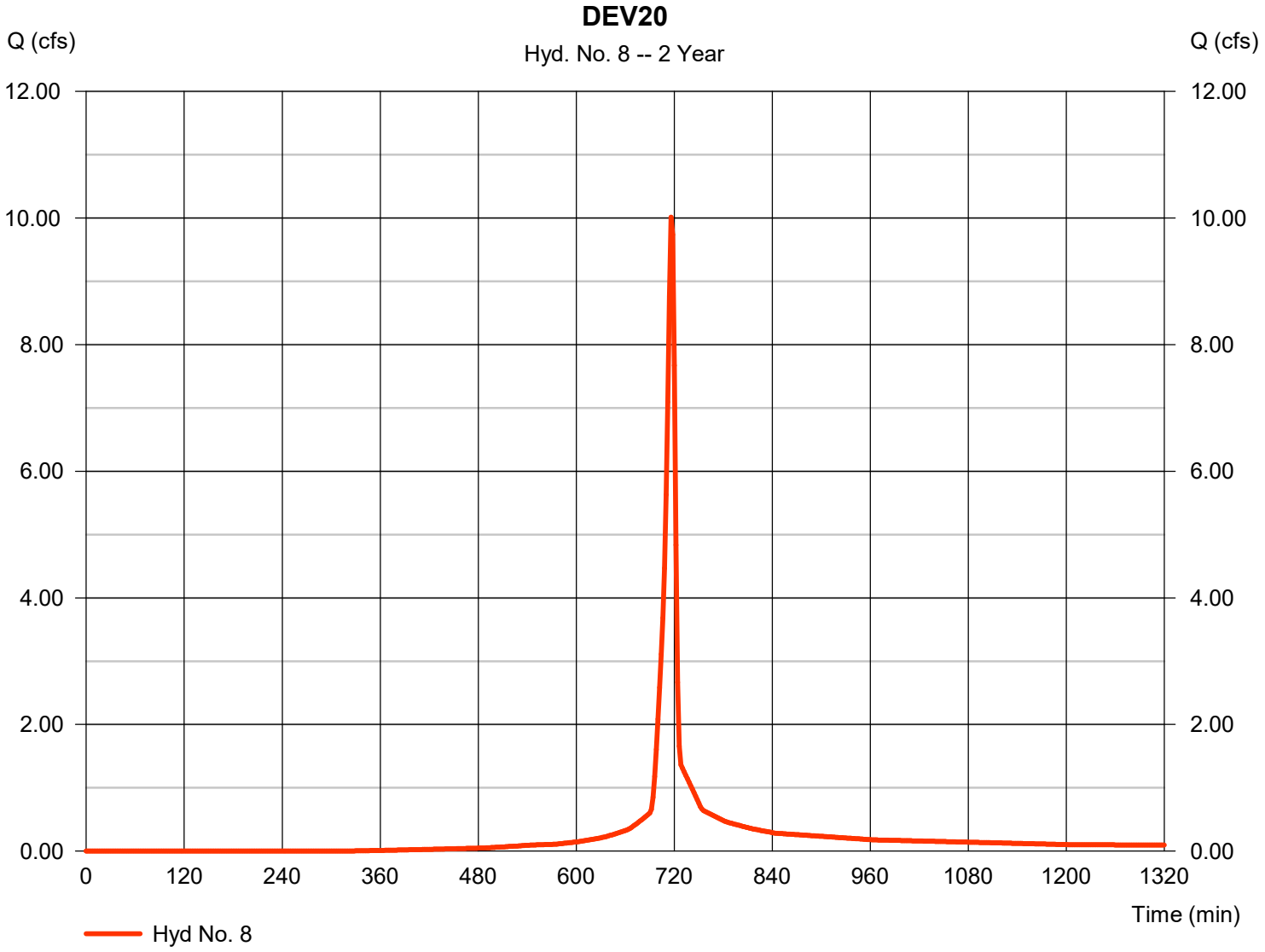
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 8

DEV20

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.01 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	20,843 cuft
Drainage area	=	2.400 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



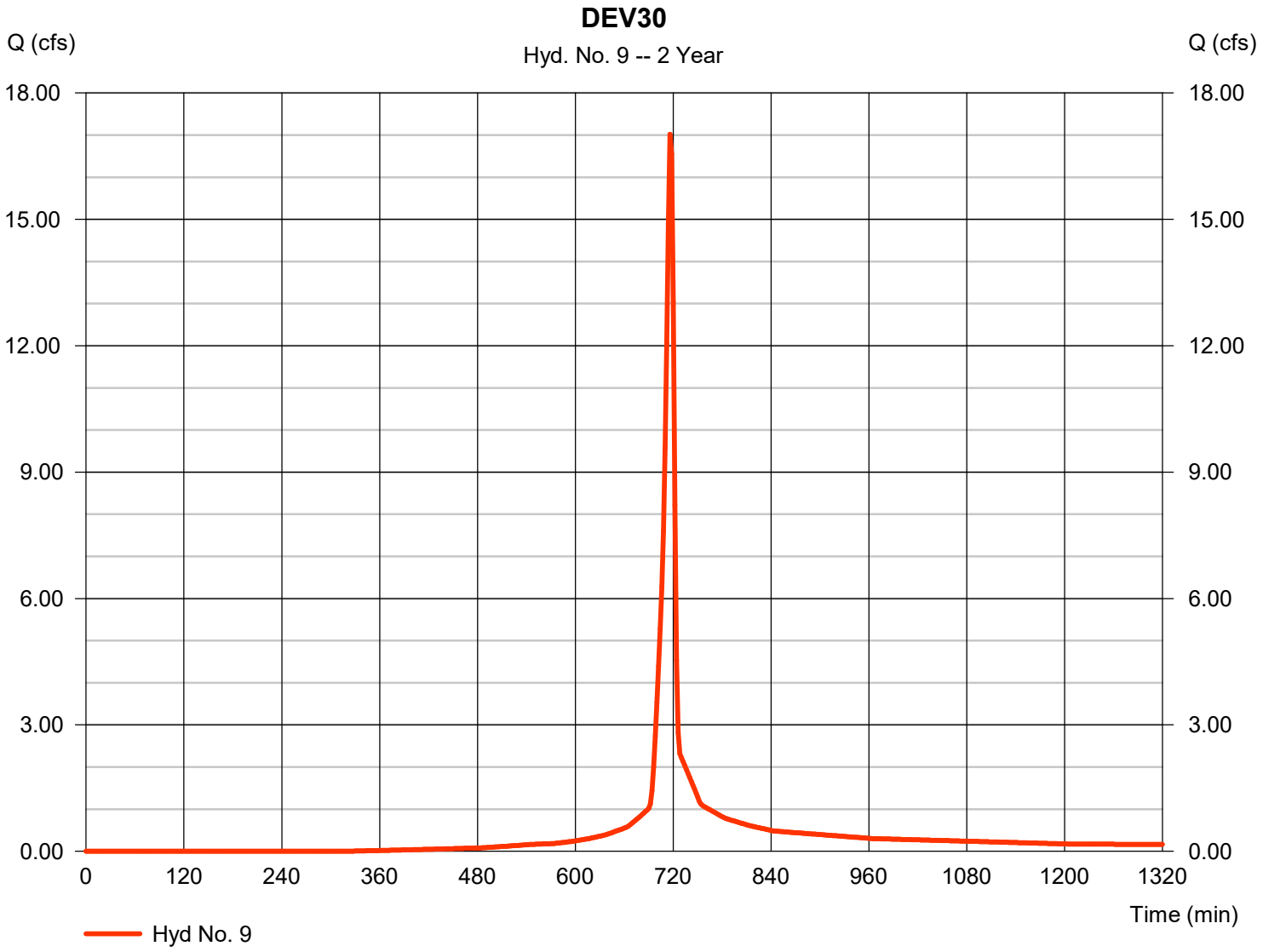
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 9

DEV30

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.02 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	35,433 cuft
Drainage area	=	4.080 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

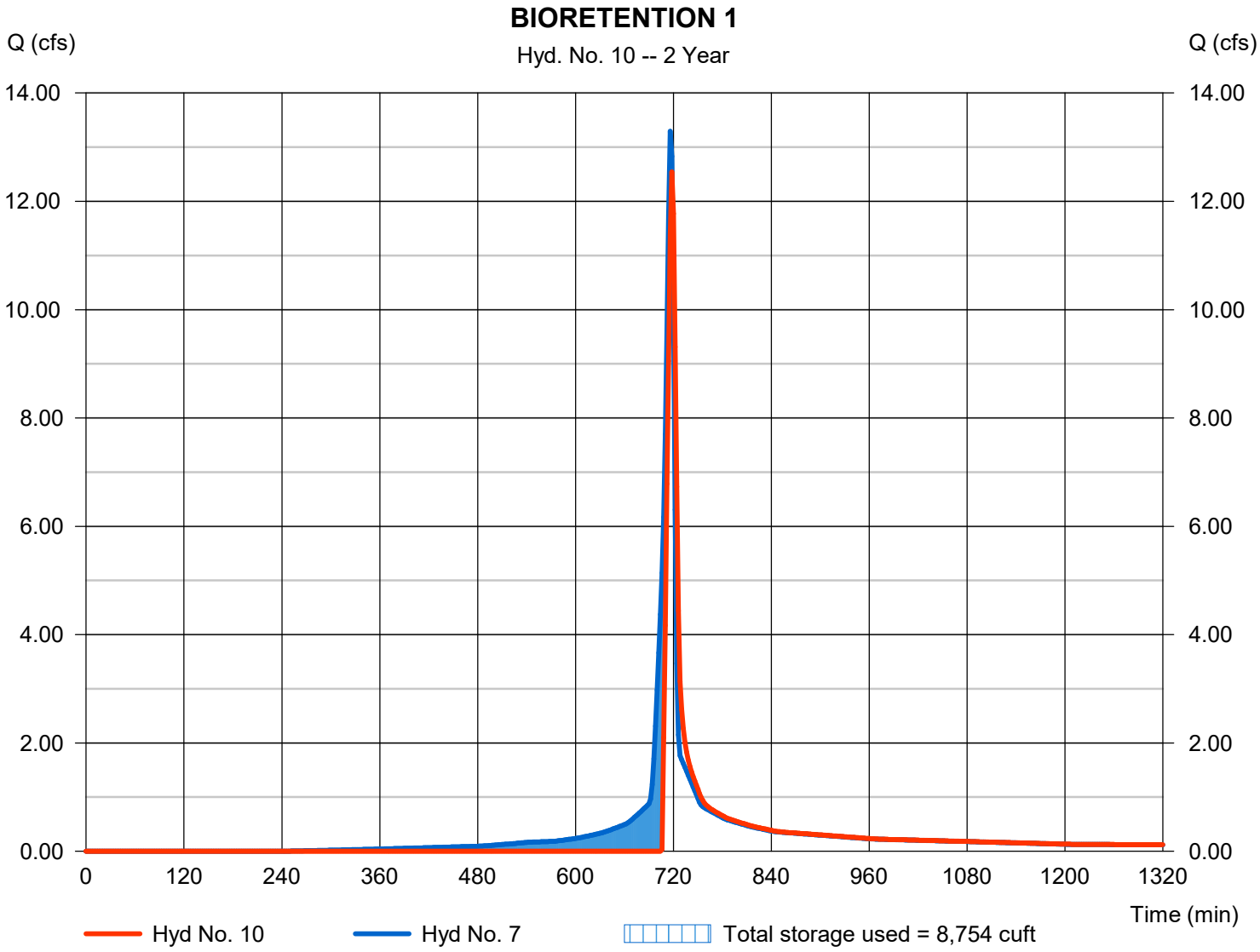
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 10

BIORETENTION 1

Hydrograph type	= Reservoir	Peak discharge	= 12.54 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 21,778 cuft
Inflow hyd. No.	= 7 - DEV10	Max. Elevation	= 1021.24 ft
Reservoir name	= BIORETENTION 1	Max. Storage	= 8,754 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - BIORETENTION 1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1020.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1020.00	5,489	0	0
1.00	1021.00	7,817	6,618	6,618
2.00	1022.00	10,202	8,982	15,600
3.00	1023.00	12,644	11,400	27,000

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	Inactive	Inactive	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 2	1	1	0
Invert El. (ft)	= 1015.29	0.00	0.00	0.00
Length (ft)	= 58.56	0.00	0.00	0.00
Slope (%)	= 0.50	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)	= 32.00	100.00	Inactive	0.00
Crest El. (ft)	= 1021.00	1022.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1020.00	0.00	---	---	---	0.00	0.00	---	---	---	---	0.000
1.00	6,618	1021.00	58.27 ic	---	---	---	0.00	0.00	---	---	---	---	0.000
2.00	15,600	1022.00	70.71 ic	---	---	---	70.71 s	0.00	---	---	---	---	70.71
3.00	27,000	1023.00	78.12 ic	---	---	---	78.08 s	333.00	---	---	---	---	411.08

Hydrograph Report

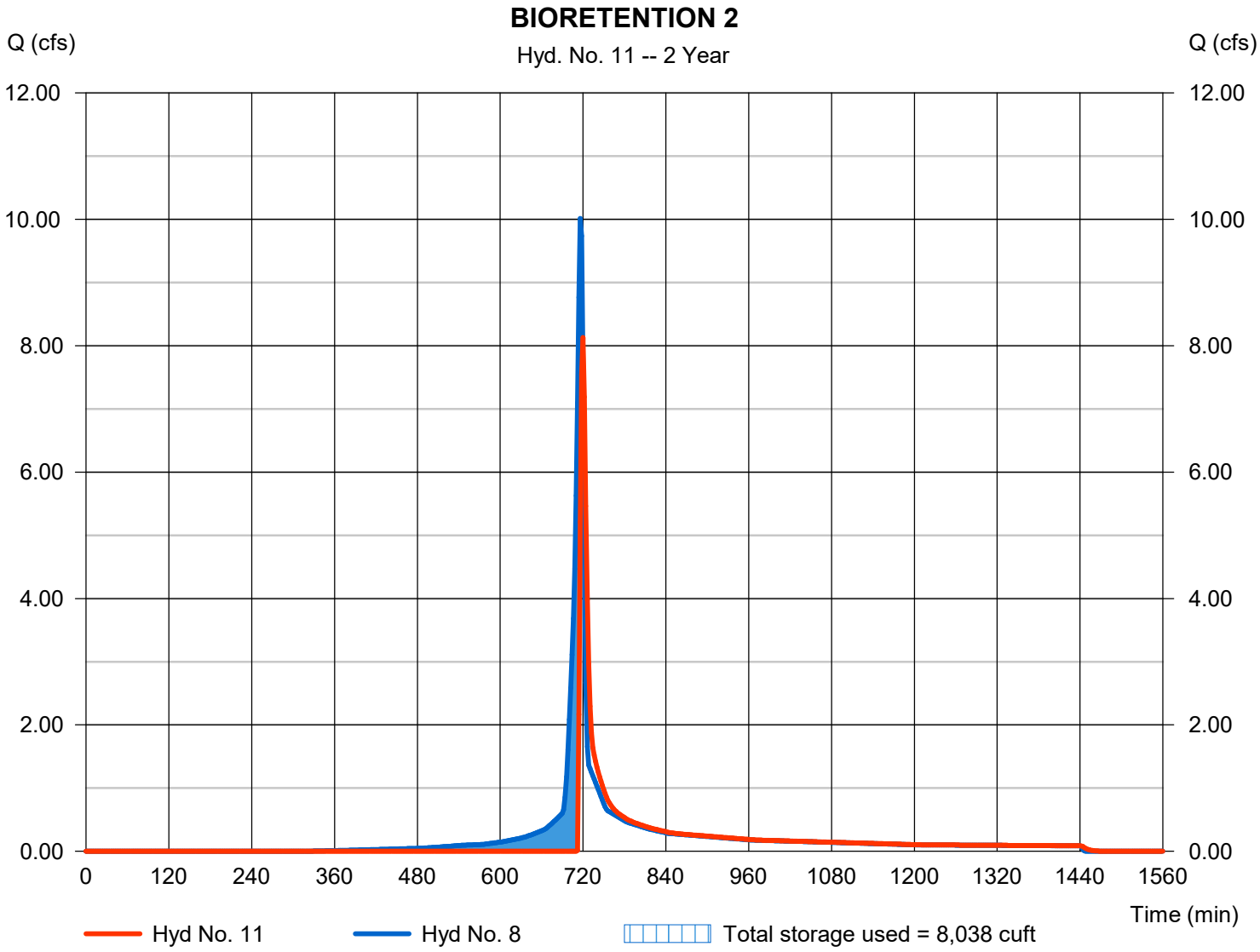
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 11

BIORETENTION 2

Hydrograph type	= Reservoir	Peak discharge	= 8.128 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 2 min	Hyd. volume	= 14,839 cuft
Inflow hyd. No.	= 8 - DEV20	Max. Elevation	= 1022.78 ft
Reservoir name	= BIORETENTION #2	Max. Storage	= 8,038 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Pond No. 2 - BIORETENTION #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1021.50 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1021.50	4,007	0	0
0.50	1022.00	5,756	2,427	2,427
1.50	1023.00	8,647	7,152	9,579
2.50	1024.00	11,639	10,105	19,684

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 24.00	Inactive	Inactive	Inactive
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 1017.01	0.00	0.00	0.00
Length (ft)	= 303.54	0.00	0.00	0.00
Slope (%)	= 0.50	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)	= 16.00	Inactive	Inactive	0.00
Crest El. (ft)	= 1022.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Broad	Broad	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1021.50	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.50	2,427	1022.00	22.04 oc	---	---	---	0.00	---	---	---	---	---	0.000
1.50	9,579	1023.00	22.04 oc	---	---	---	18.84	---	---	---	---	---	18.84
2.50	19,684	1024.00	28.01 oc	---	---	---	27.98 s	---	---	---	---	---	27.98

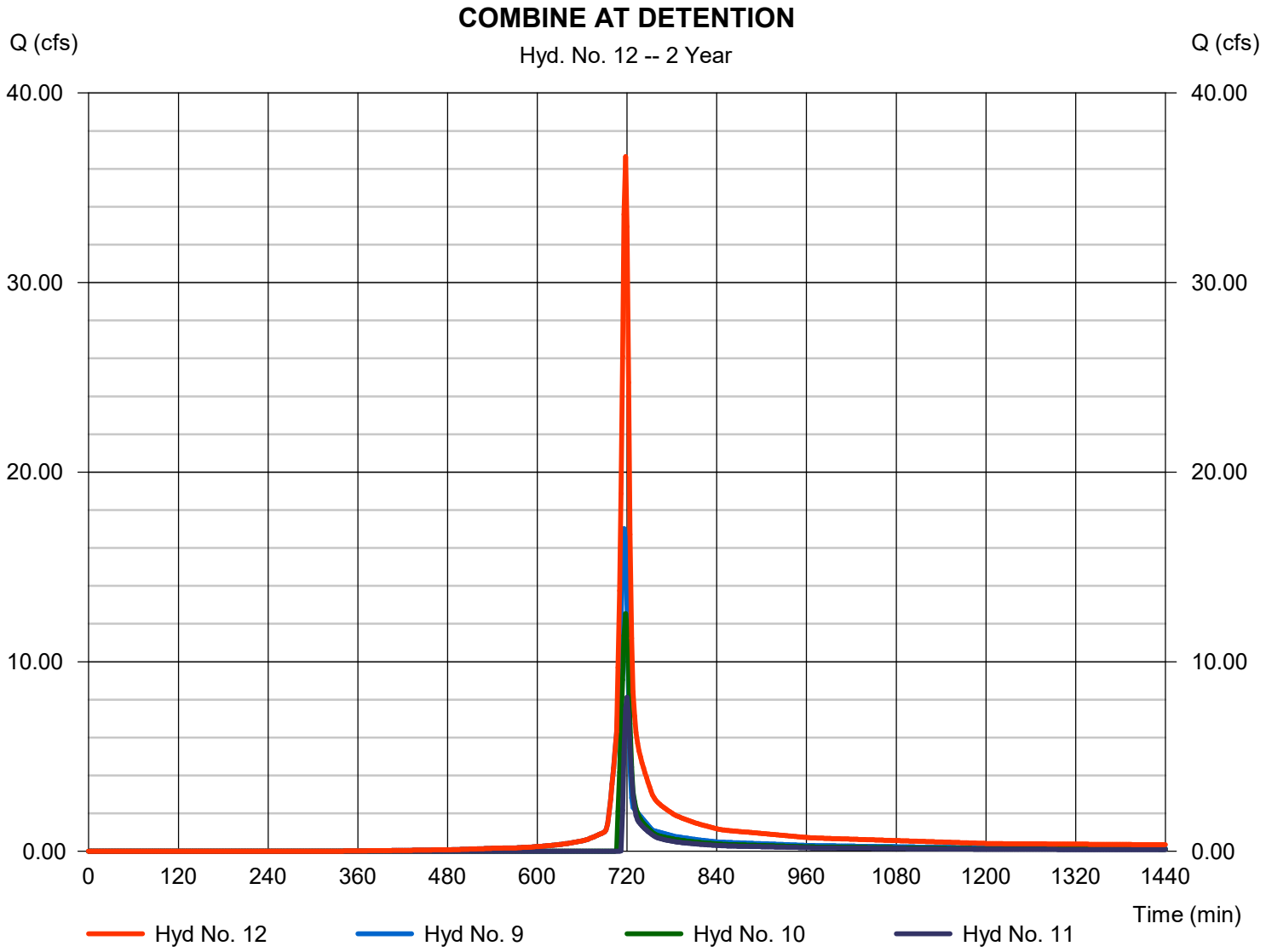
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 12

COMBINE AT DETENTION

Hydrograph type	= Combine	Peak discharge	= 36.65 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 72,051 cuft
Inflow hyds.	= 9, 10, 11	Contrib. drain. area	= 4.080 ac



Hydrograph Report

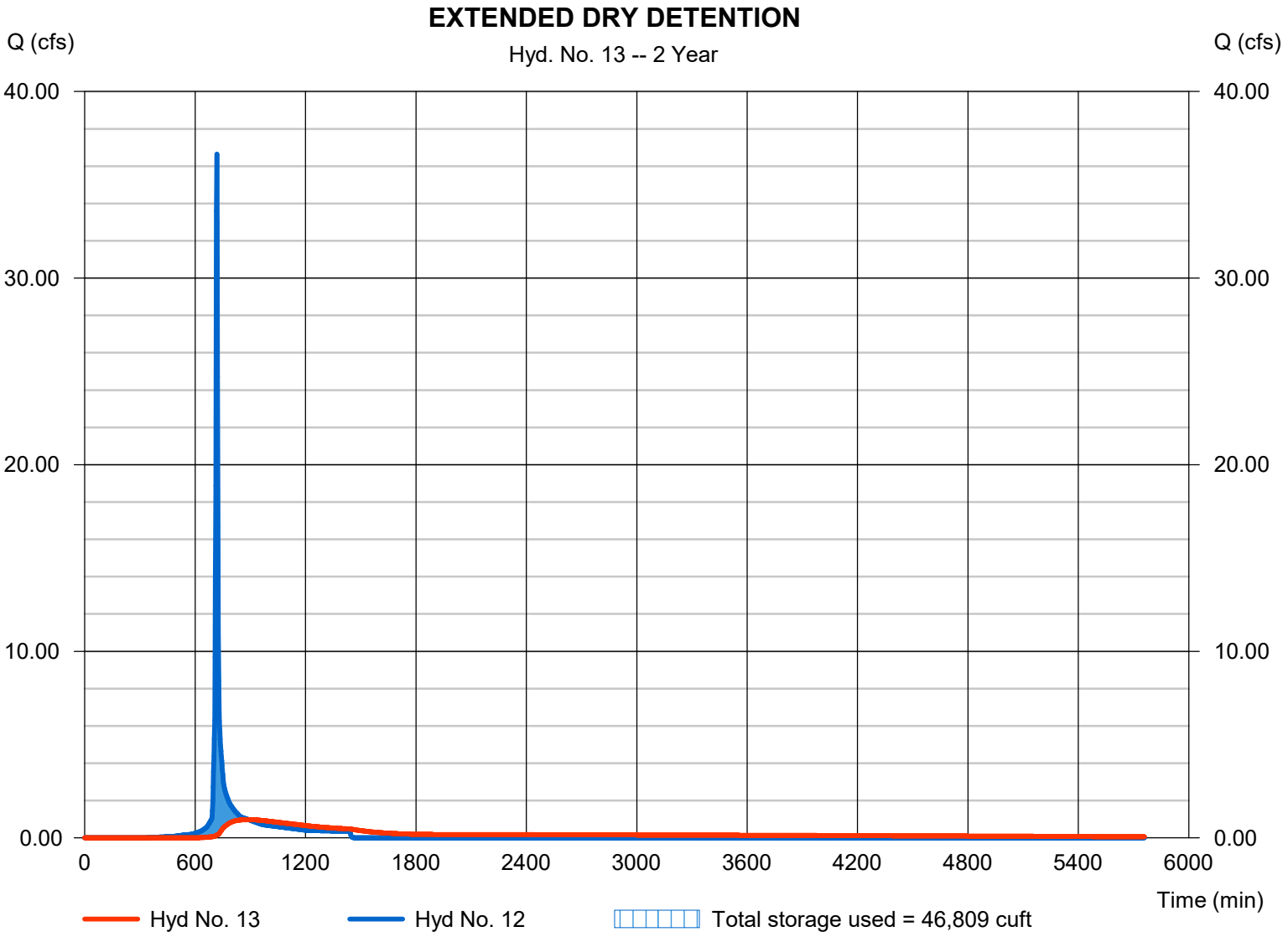
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 13

EXTENDED DRY DETENTION

Hydrograph type	=	Reservoir	Peak discharge	=	0.974 cfs
Storm frequency	=	2 yrs	Time to peak	=	890 min
Time interval	=	2 min	Hyd. volume	=	68,048 cuft
Inflow hyd. No.	=	12 - COMBINE AT DETENTION	Max. Elevation	=	1017.04 ft
Reservoir name	=	EXTENDED DRY DETENTION	Max. Storage	=	46,809 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - EXTENDED DRY DETENTION

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1013.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1013.00	6,640	0	0
1.00	1014.00	8,130	7,372	7,372
2.00	1015.00	10,733	9,400	16,772
3.00	1016.00	15,079	12,843	29,615
4.00	1017.00	17,882	16,459	46,074
5.00	1018.00	20,841	19,341	65,415
6.00	1019.00	24,958	22,866	88,281
7.00	1020.00	27,232	26,084	114,366
8.00	1021.00	30,663	28,928	143,293
9.00	1022.00	34,251	32,437	175,730

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.00	Inactive	0.00
Span (in)	= 15.00	2.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1011.71	1013.19	0.00	0.00
Length (ft)	= 69.50	0.50	0.00	0.00
Slope (%)	= 0.50	0.50	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)	= 0.33	11.00	Inactive	0.00
Crest El. (ft)	= 1016.25	1018.50	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	Rect	---	---
Multi-Stage	= Yes	Yes	No	No

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

TW Elev. (ft) = 0.00

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

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	1013.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	7,372	1014.00	3.48 oc	0.09 ic	---	---	0.00	0.00	---	---	---	---	0.090
2.00	16,772	1015.00	3.48 oc	0.14 ic	---	---	0.00	0.00	---	---	---	---	0.138
3.00	29,615	1016.00	3.48 oc	0.17 ic	---	---	0.00	0.00	---	---	---	---	0.173
4.00	46,074	1017.00	3.48 oc	0.20 ic	---	---	0.71	0.00	---	---	---	---	0.917
5.00	65,415	1018.00	3.48 oc	0.23 ic	---	---	2.54	0.00	---	---	---	---	2.772
6.00	88,281	1019.00	13.82 oc	0.06 ic	---	---	2.41 s	11.35 s	---	---	---	---	13.82
7.00	114,366	1020.00	15.18 oc	0.01 ic	---	---	1.17 s	13.99 s	---	---	---	---	15.17
8.00	143,293	1021.00	16.19 oc	0.01 ic	---	---	0.93 s	15.22 s	---	---	---	---	16.16
9.00	175,730	1022.00	17.13 oc	0.00 ic	---	---	0.84 s	16.14 s	---	---	---	---	16.99

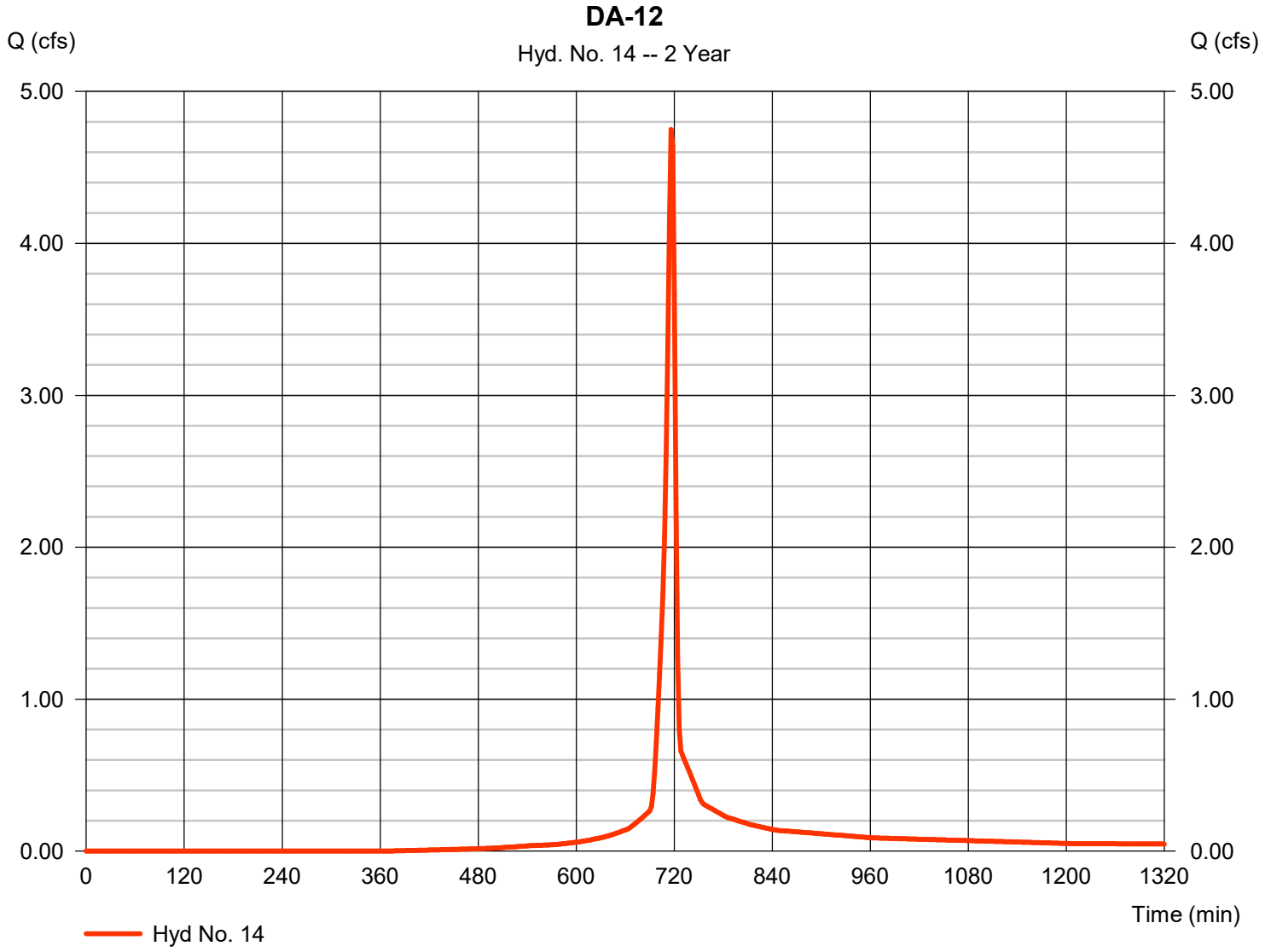
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 14

DA-12

Hydrograph type	= SCS Runoff	Peak discharge	= 4.750 cfs
Storm frequency	= 2 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 9,768 cuft
Drainage area	= 1.210 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



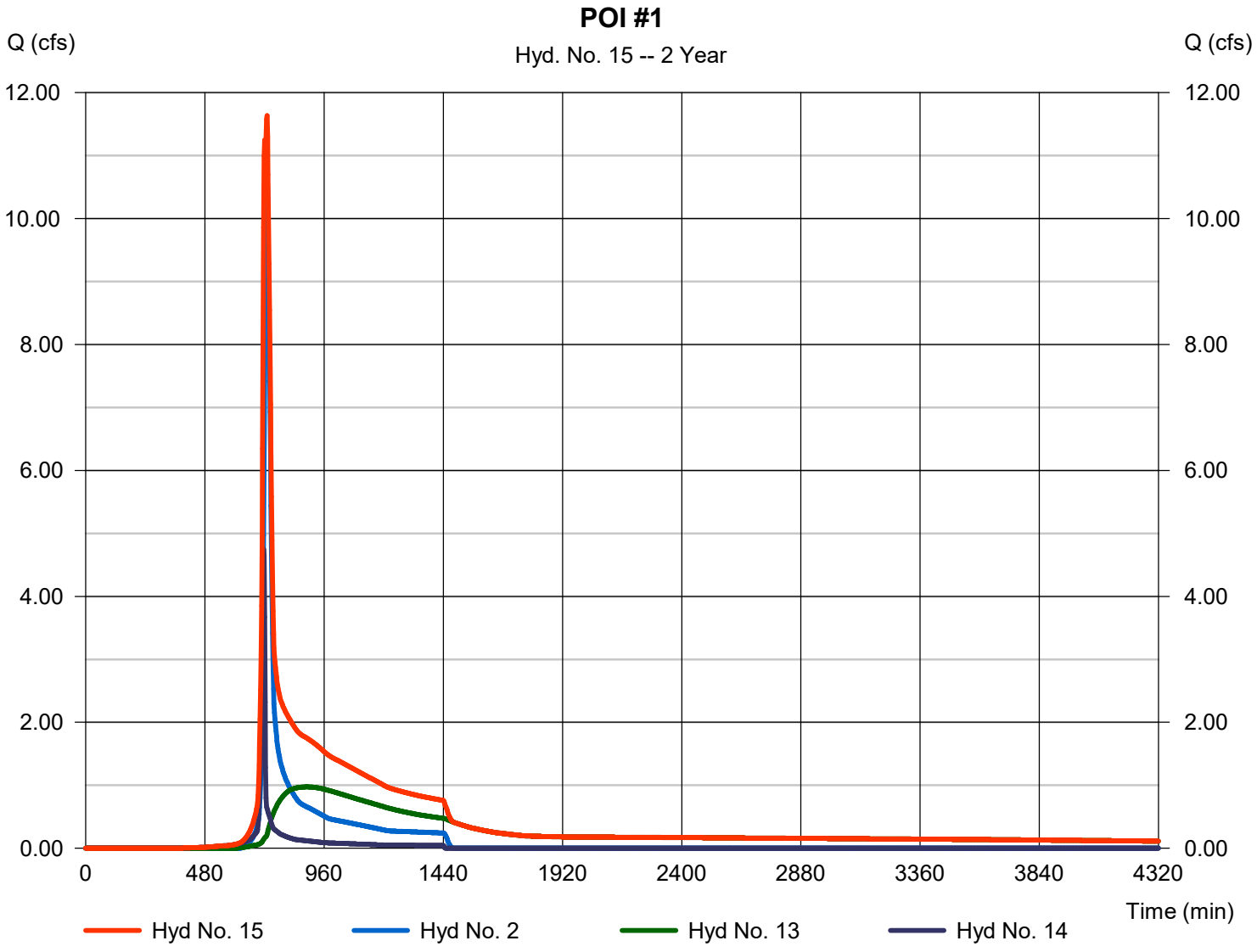
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 15

POI #1

Hydrograph type	= Combine	Peak discharge	= 11.64 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 118,850 cuft
Inflow hyds.	= 2, 13, 14	Contrib. drain. area	= 9.490 ac



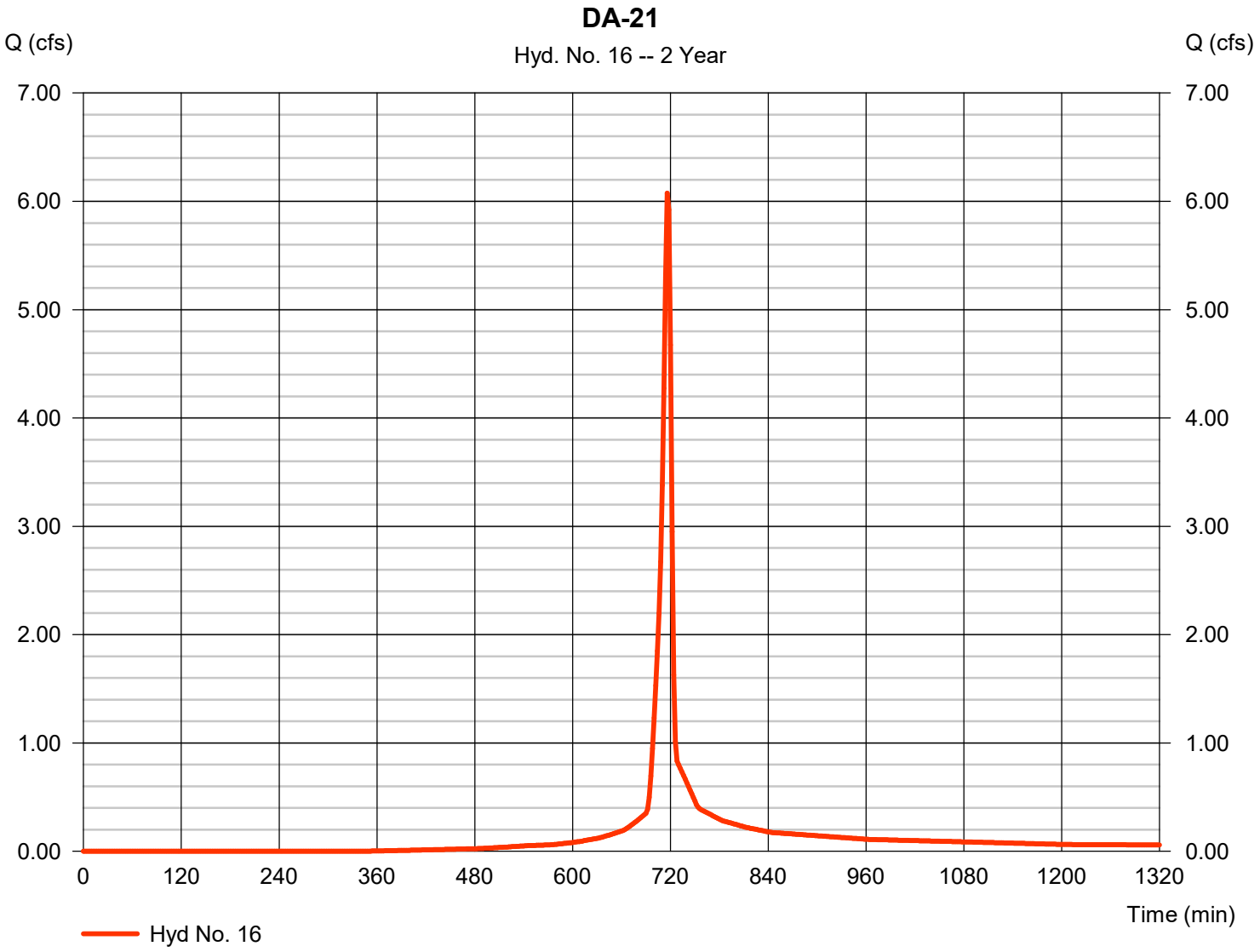
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 16

DA-21

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.074 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	12,562 cuft
Drainage area	=	1.500 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



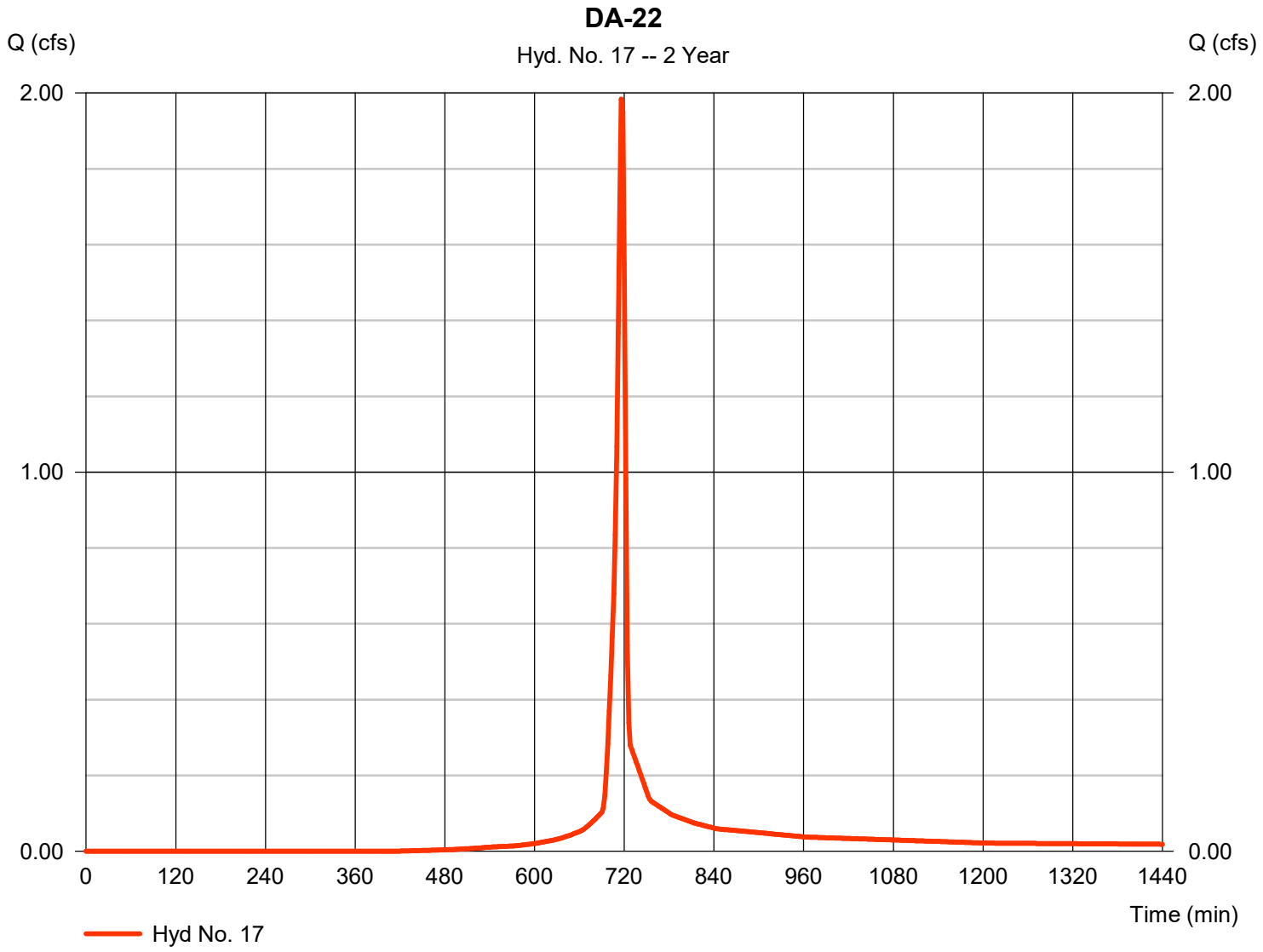
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 17

DA-22

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.984 cfs
Storm frequency	=	2 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	4,044 cuft
Drainage area	=	0.540 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



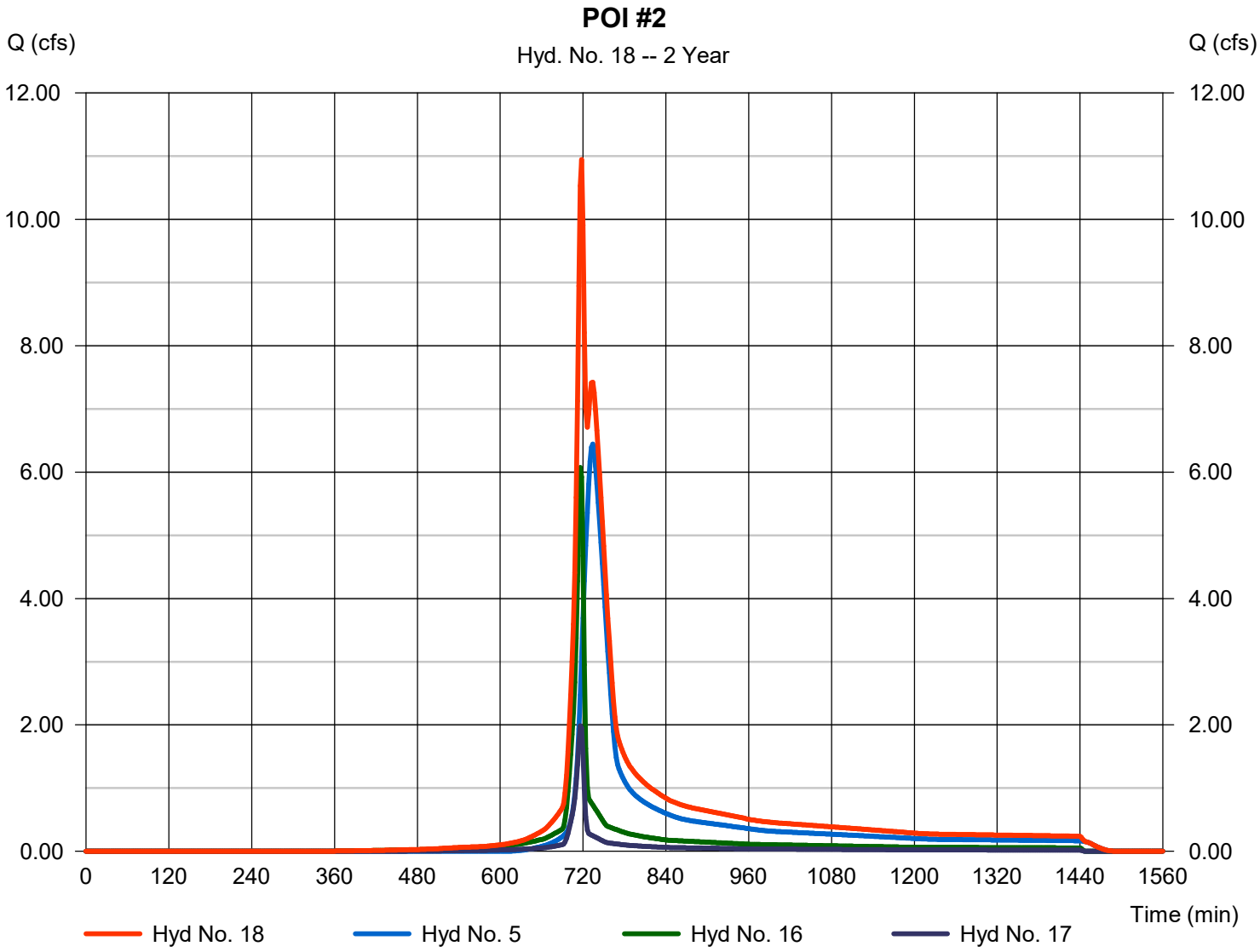
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 18

POI #2

Hydrograph type	= Combine	Peak discharge	= 10.95 cfs
Storm frequency	= 2 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 45,380 cuft
Inflow hyds.	= 5, 16, 17	Contrib. drain. area	= 7.430 ac



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	11.58	2	728	42,585	------	------	------	EX-10
2	SCS Runoff	23.30	2	728	85,835	------	------	------	EX-11
3	Combine	34.88	2	728	128,420	1, 2	------	------	EX POI #1
4	SCS Runoff	23.27	2	728	85,731	------	------	------	EX-20
5	SCS Runoff	13.67	2	732	59,320	------	------	------	OFF-20
6	Combine	36.47	2	730	145,051	4, 5	------	------	EX POI #2
7	SCS Runoff	21.46	2	716	47,379	------	------	------	DEV10
8	SCS Runoff	16.75	2	716	35,991	------	------	------	DEV20
9	SCS Runoff	28.48	2	716	61,185	------	------	------	DEV30
10	Reservoir	20.60	2	718	40,761	7	1021.33	9,608	BIORETENTION 1
11	Reservoir	15.54	2	718	29,987	8	1022.94	9,139	BIORETENTION 2
12	Combine	63.60	2	718	131,933	9, 10, 11	------	------	COMBINE AT DETENTION
13	Reservoir	3.932	2	764	127,545	12	1018.49	76,695	EXTENDED DRY DETENTION
14	SCS Runoff	8.155	2	716	17,264	------	------	------	DA-12
15	Combine	27.70	2	728	230,644	2, 13, 14	------	------	POI #1
16	SCS Runoff	10.29	2	716	21,945	------	------	------	DA-21
17	SCS Runoff	3.500	2	716	7,319	------	------	------	DA-22
18	Combine	20.60	2	718	88,584	5, 16, 17	------	------	POI #2

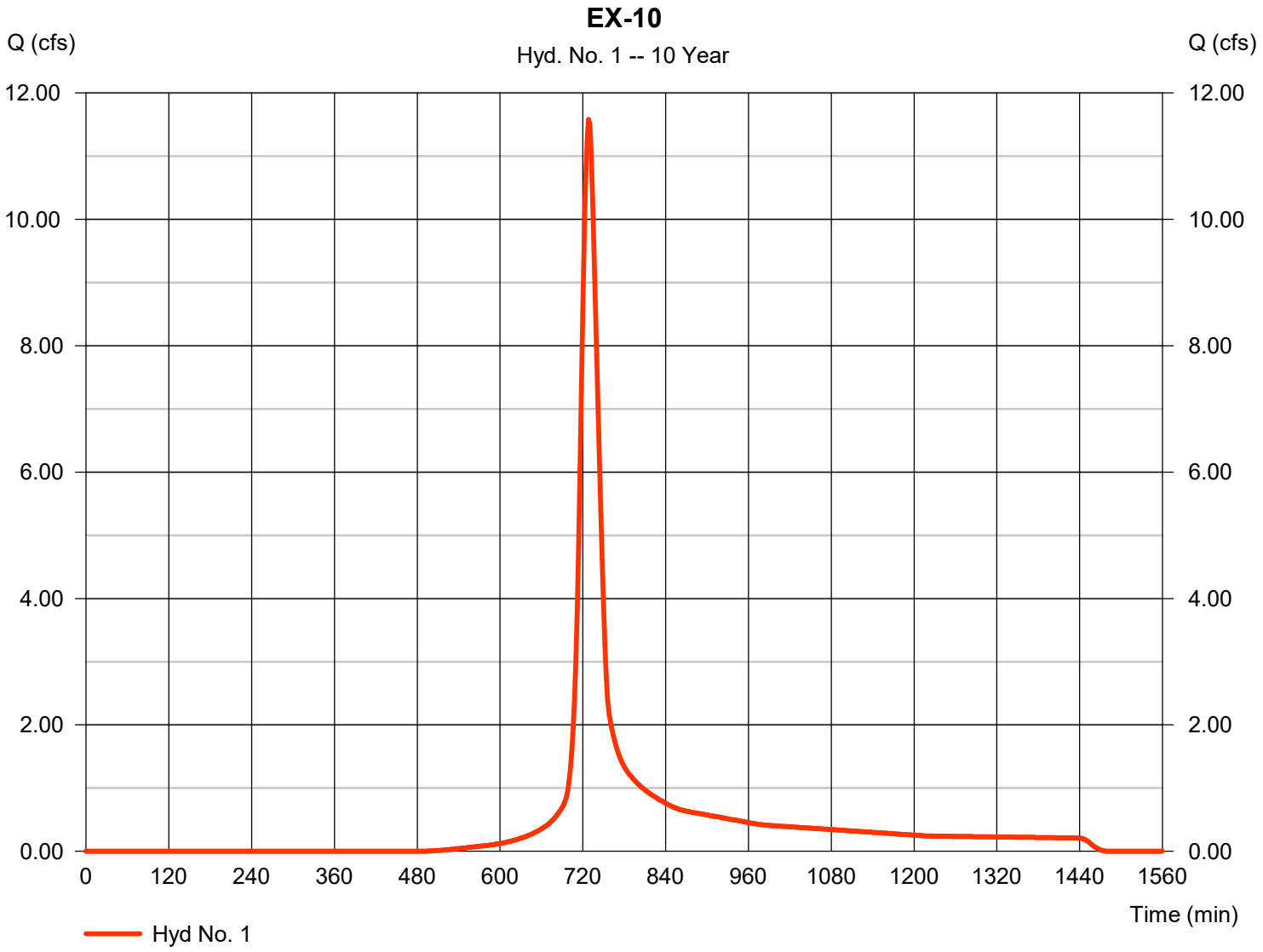
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 1

EX-10

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.58 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	42,585 cuft
Drainage area	=	3.980 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	26.30 min
Total precip.	=	5.66 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



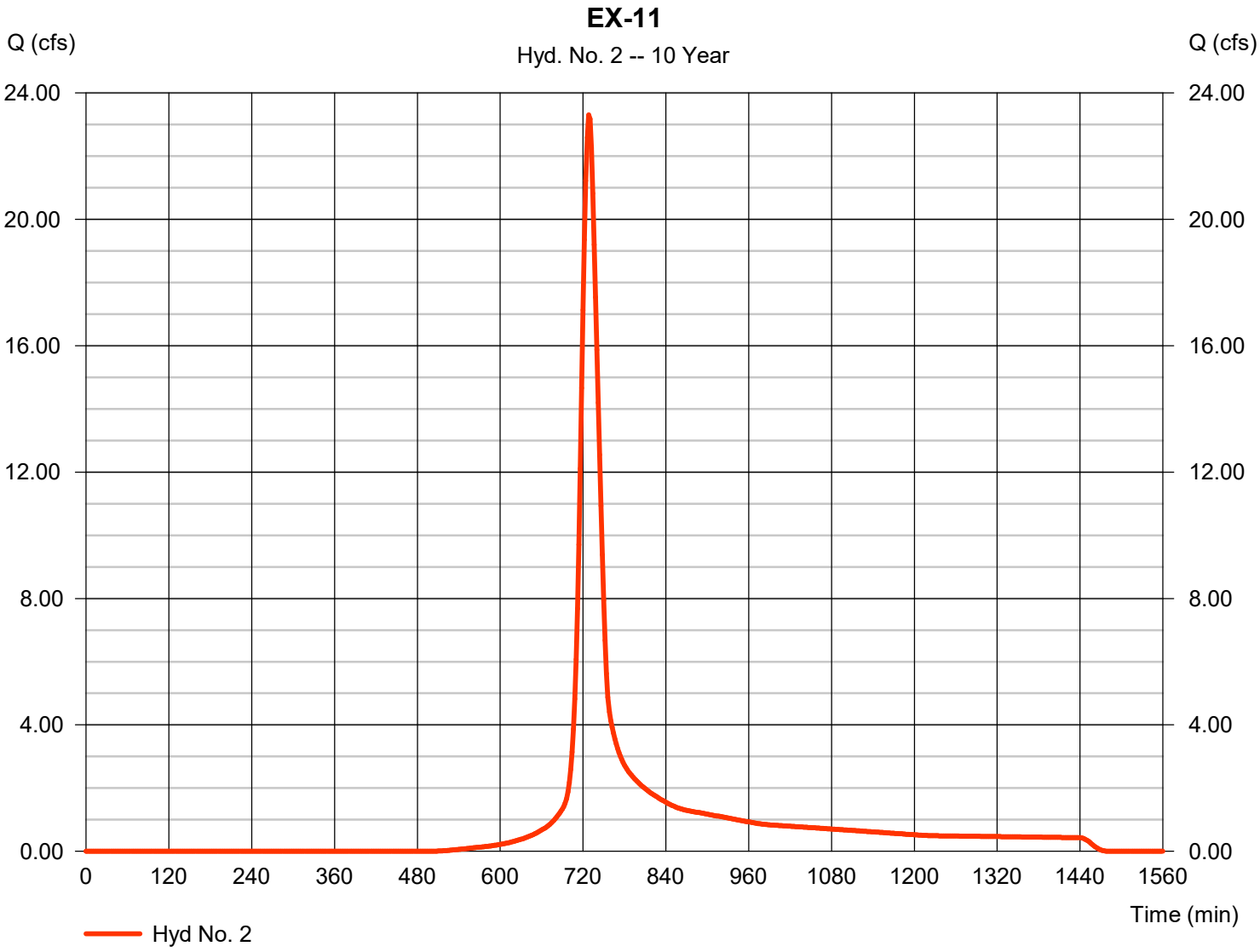
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 2

EX-11

Hydrograph type	=	SCS Runoff	Peak discharge	=	23.30 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	85,835 cuft
Drainage area	=	8.280 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	25.60 min
Total precip.	=	5.66 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



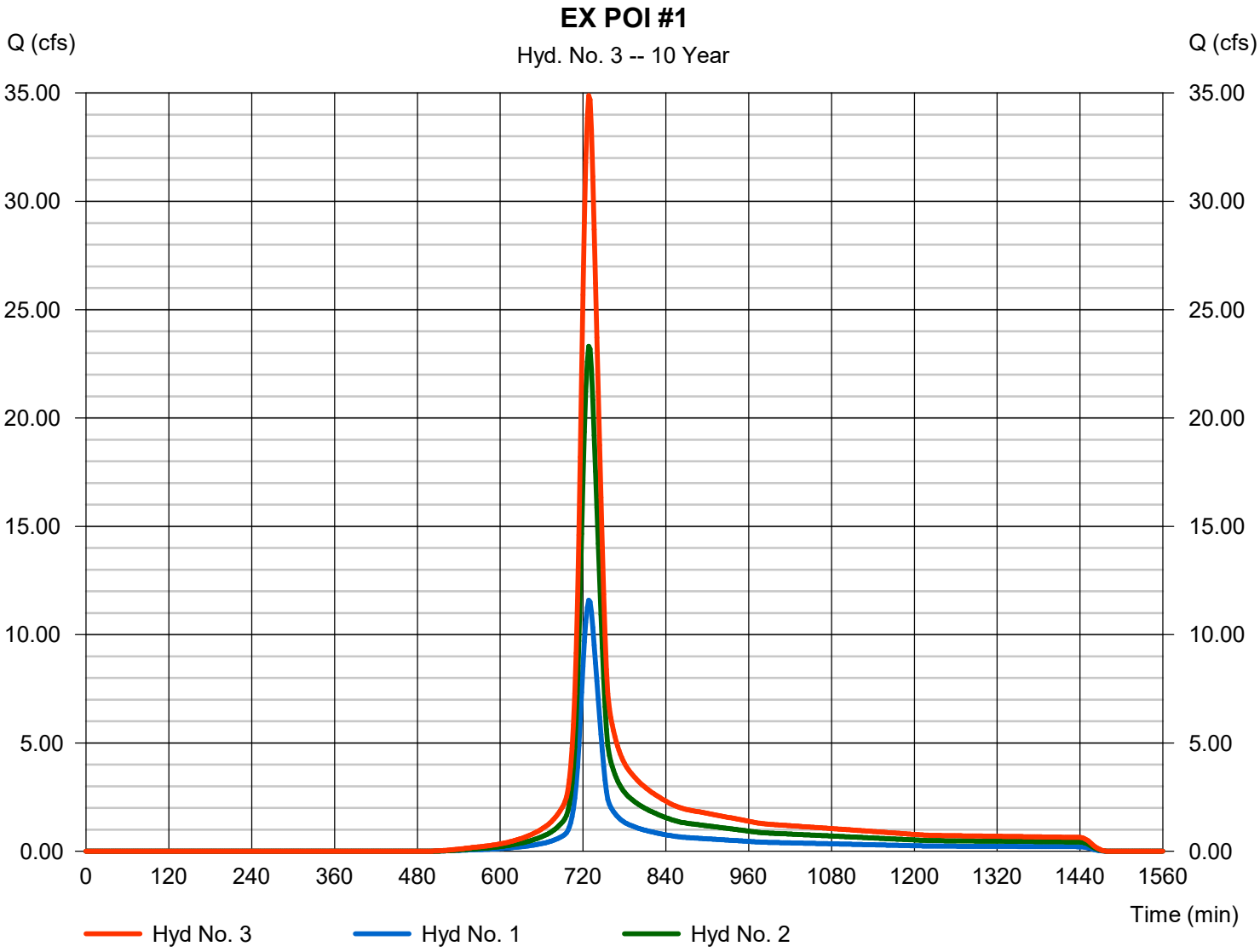
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 3

EX POI #1

Hydrograph type	=	Combine	Peak discharge	=	34.88 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	128,420 cuft
Inflow hyds.	=	1, 2	Contrib. drain. area	=	12.260 ac



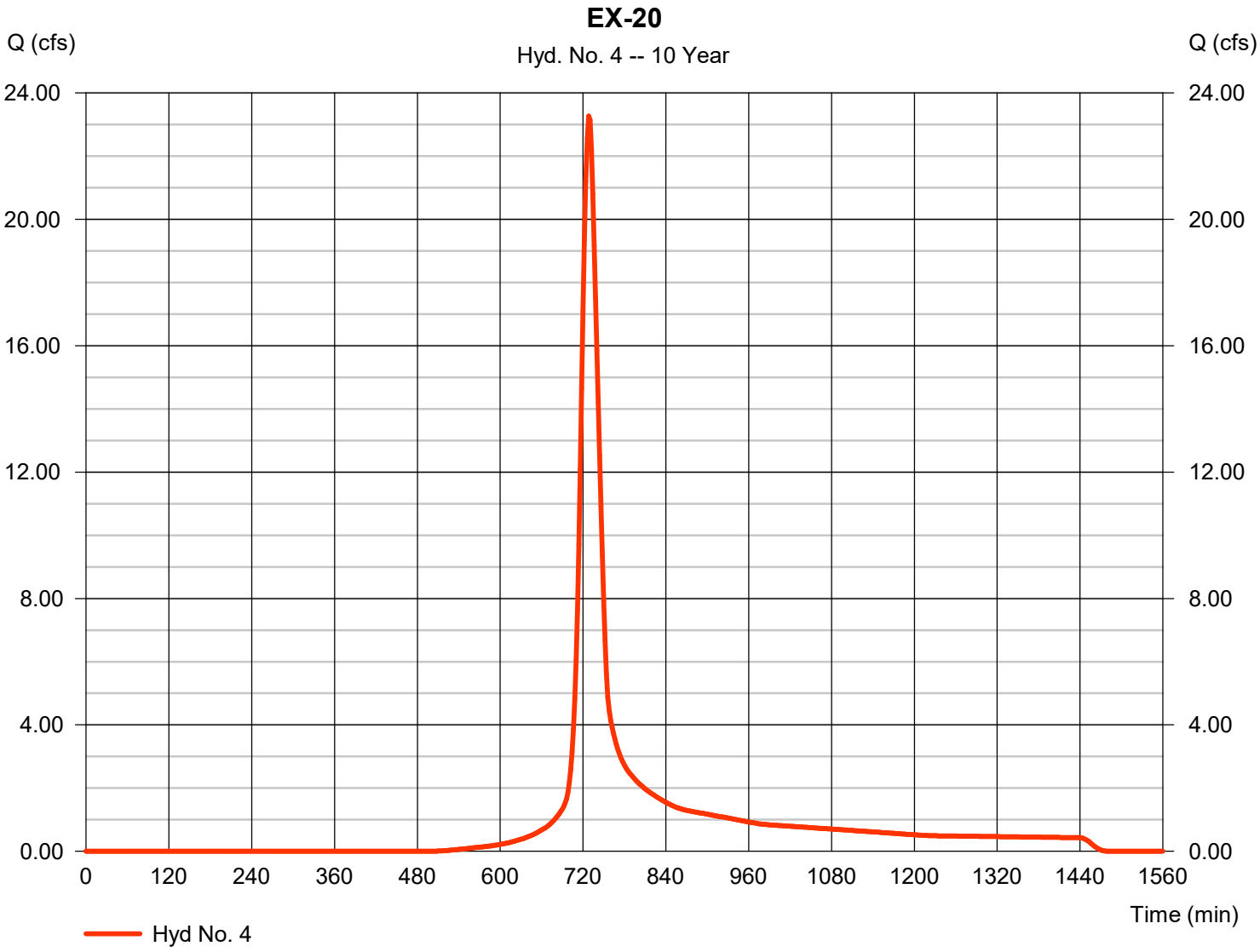
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 4

EX-20

Hydrograph type	=	SCS Runoff	Peak discharge	=	23.27 cfs
Storm frequency	=	10 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	85,731 cuft
Drainage area	=	8.270 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	25.10 min
Total precip.	=	5.66 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



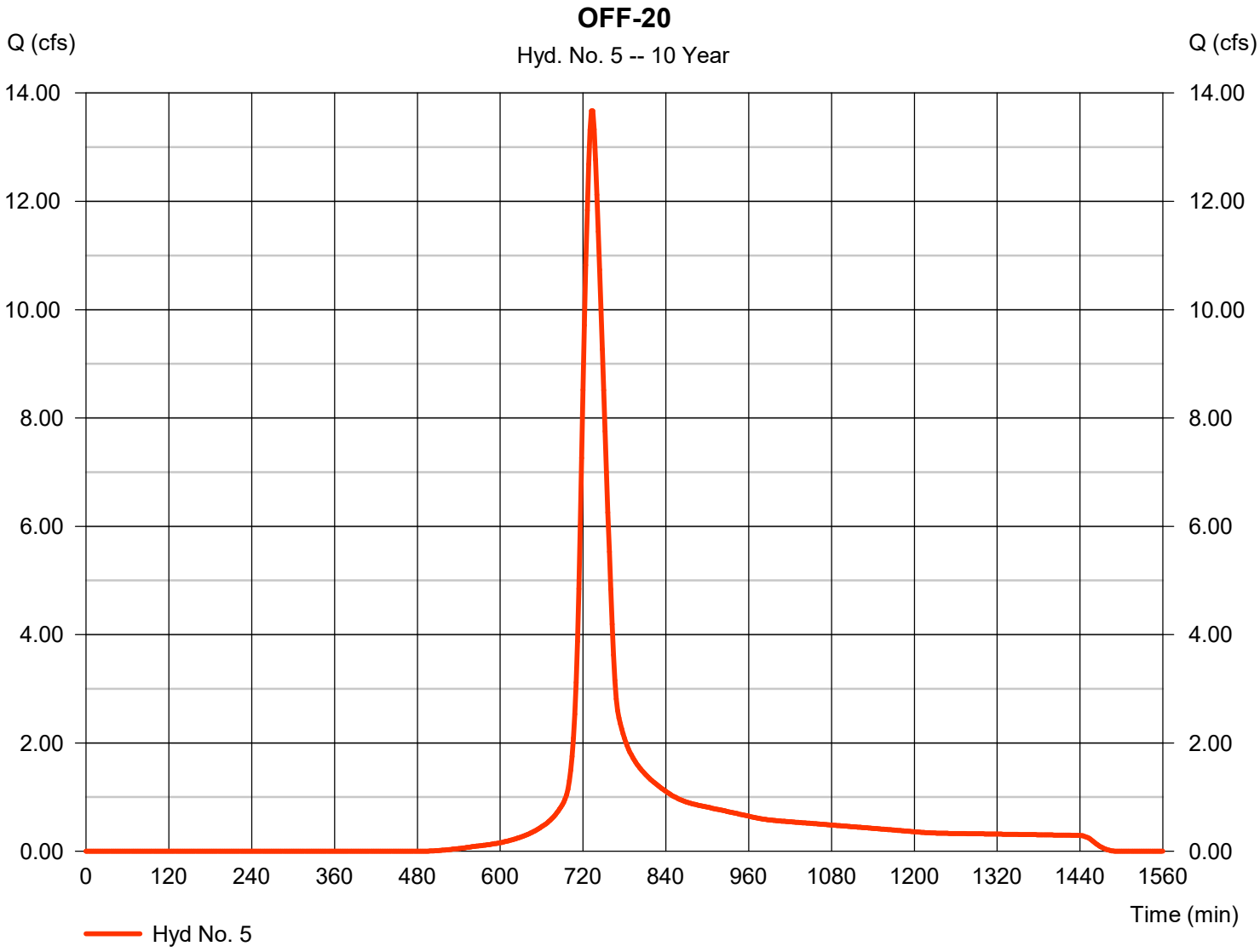
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 5

OFF-20

Hydrograph type	=	SCS Runoff	Peak discharge	=	13.67 cfs
Storm frequency	=	10 yrs	Time to peak	=	732 min
Time interval	=	2 min	Hyd. volume	=	59,320 cuft
Drainage area	=	5.390 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	32.70 min
Total precip.	=	5.66 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



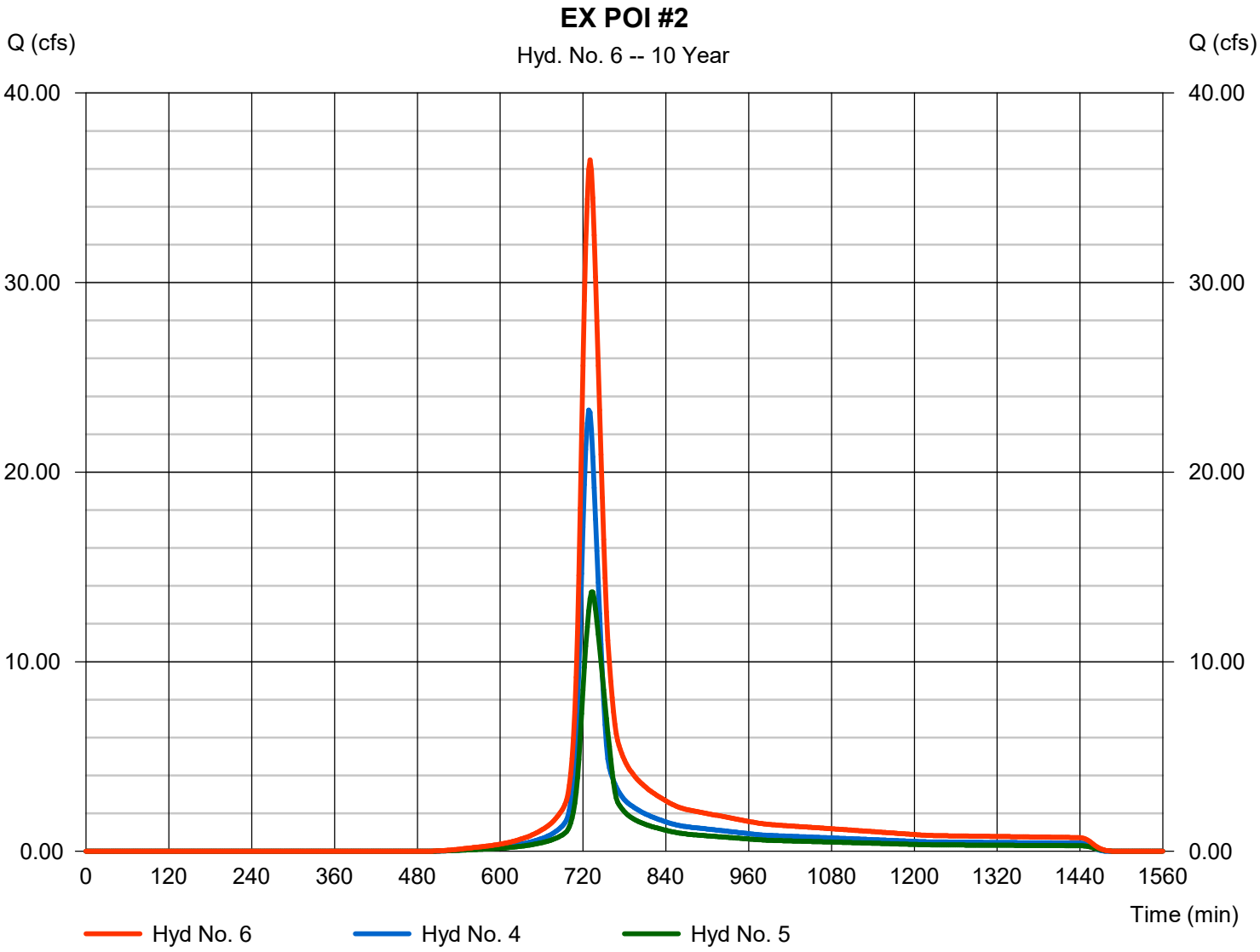
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 6

EX POI #2

Hydrograph type	= Combine	Peak discharge	= 36.47 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 145,051 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 13.660 ac



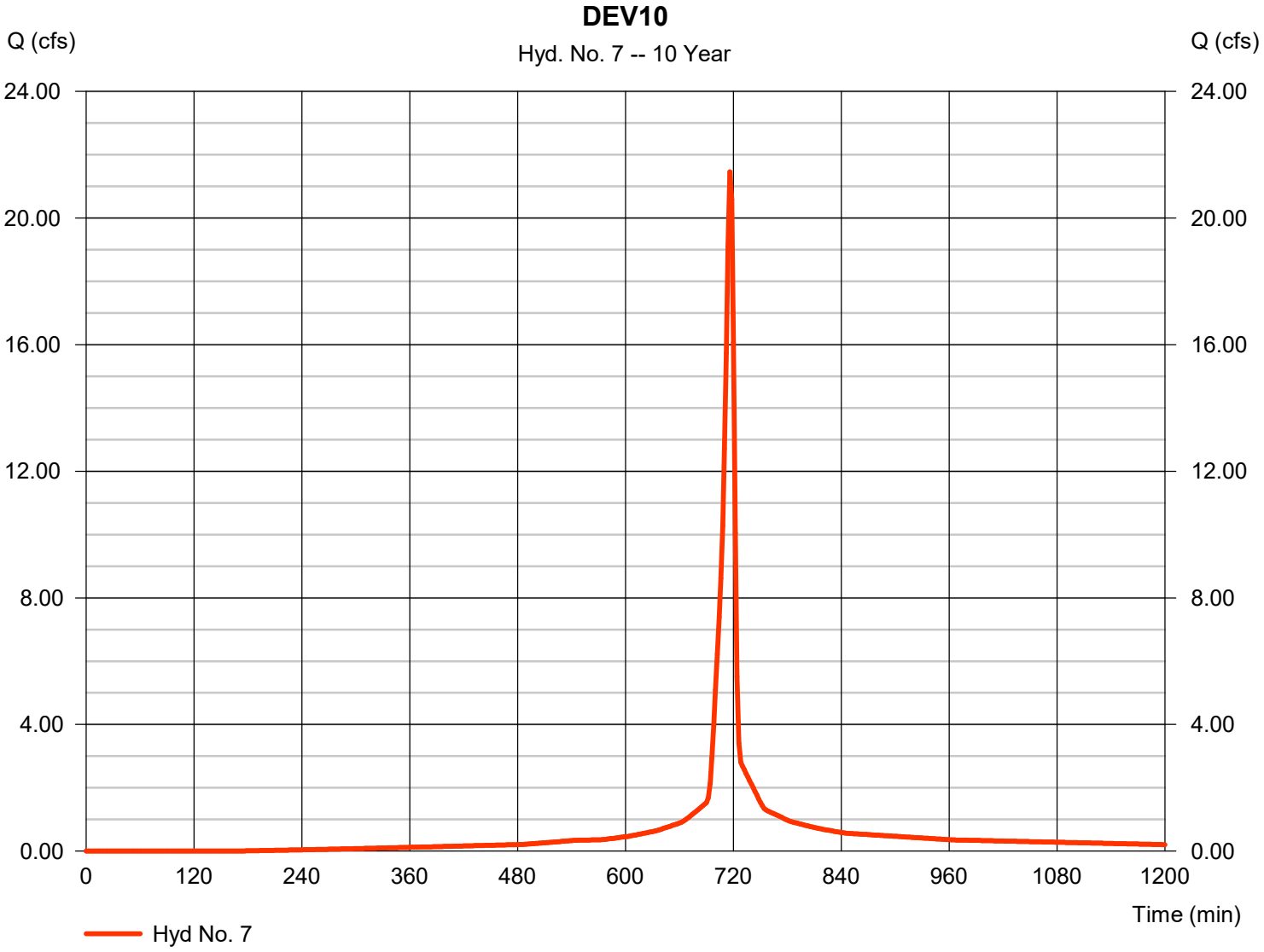
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 7

DEV10

Hydrograph type	= SCS Runoff	Peak discharge	= 21.46 cfs
Storm frequency	= 10 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 47,379 cuft
Drainage area	= 2.940 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.66 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



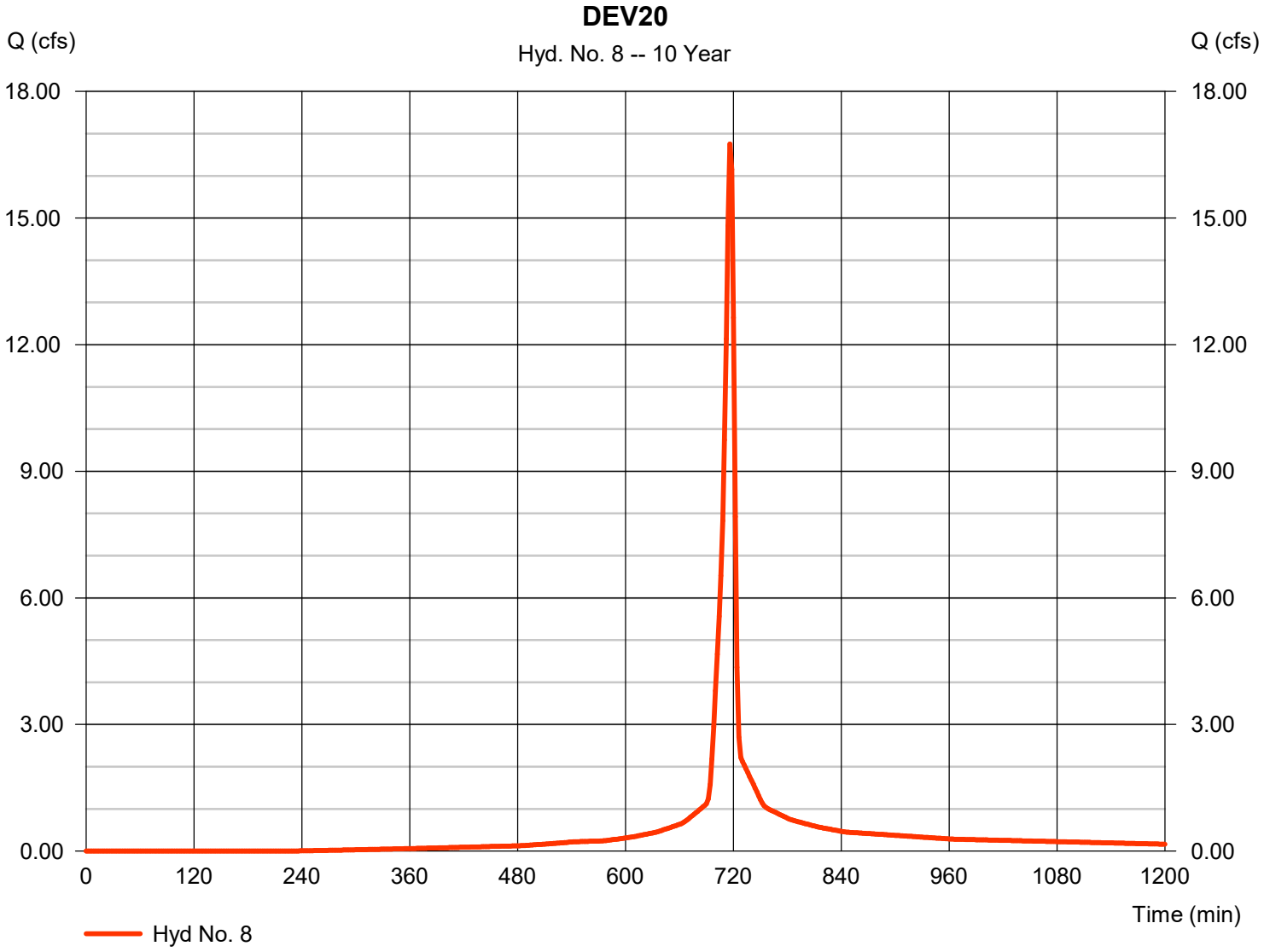
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 8

DEV20

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.75 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	35,991 cuft
Drainage area	=	2.400 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.66 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



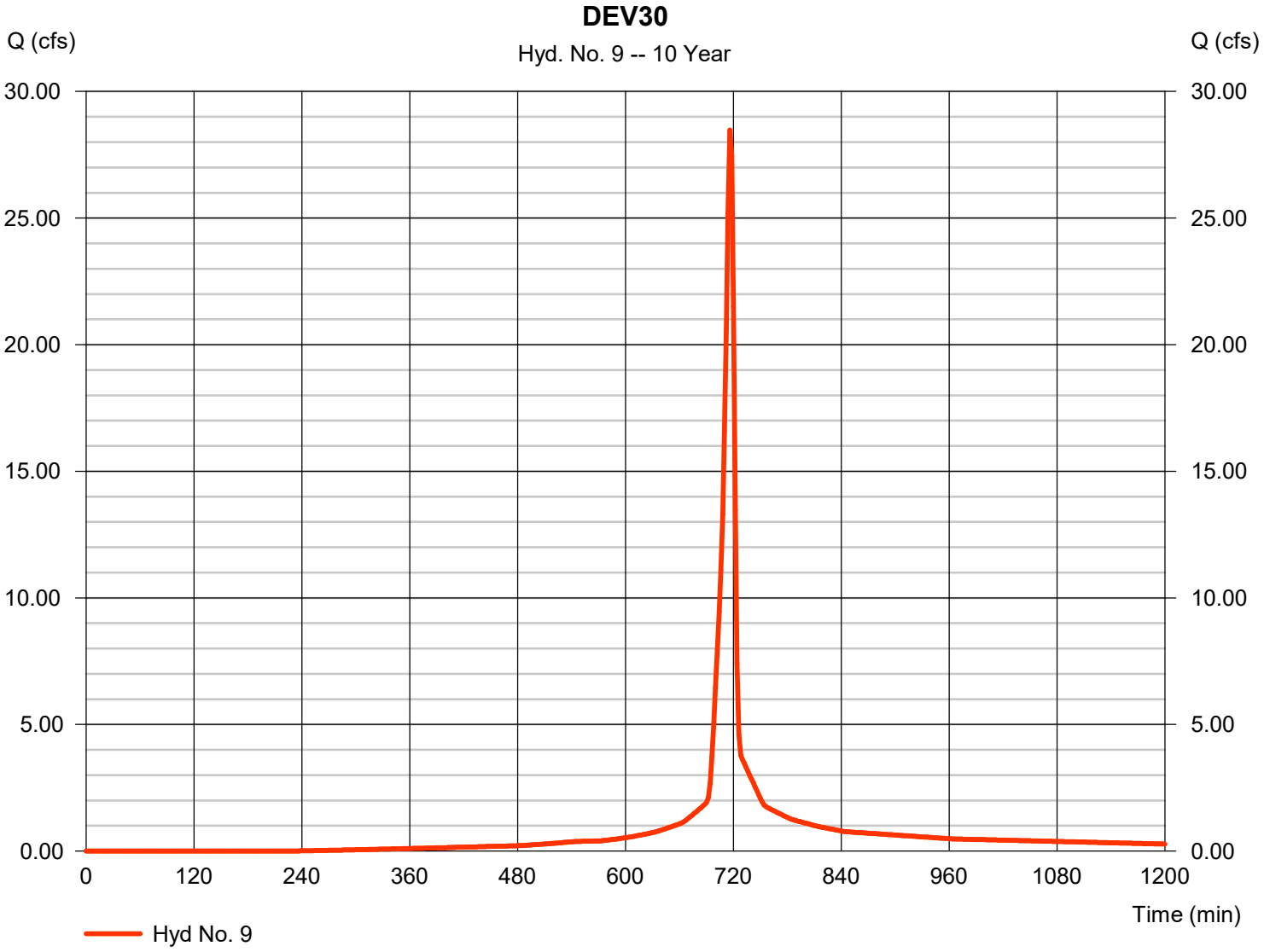
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 9

DEV30

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.48 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	61,185 cuft
Drainage area	=	4.080 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.66 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

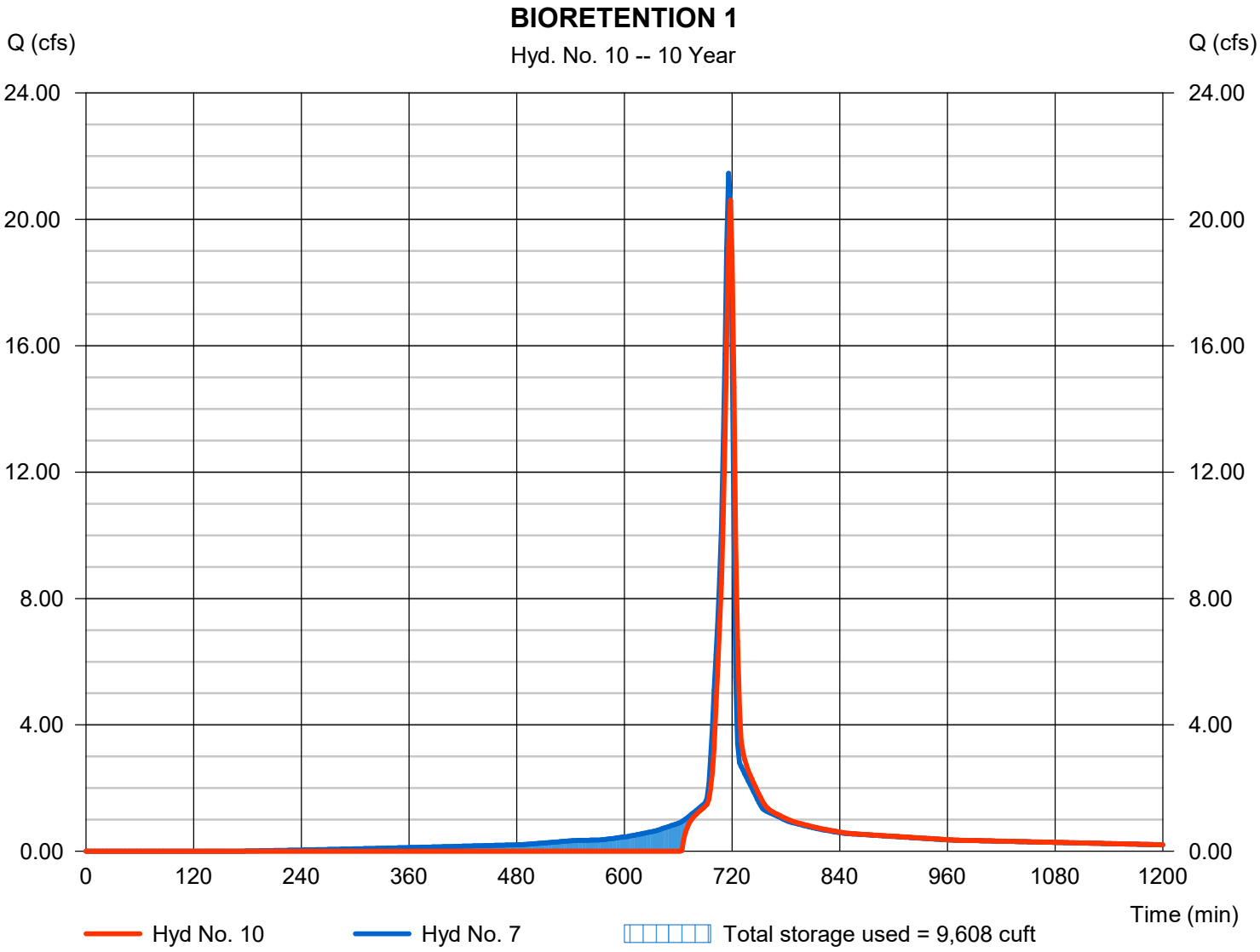
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 10

BIORETENTION 1

Hydrograph type	= Reservoir	Peak discharge	= 20.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 40,761 cuft
Inflow hyd. No.	= 7 - DEV10	Max. Elevation	= 1021.33 ft
Reservoir name	= BIORETENTION 1	Max. Storage	= 9,608 cuft

Storage Indication method used.



Hydrograph Report

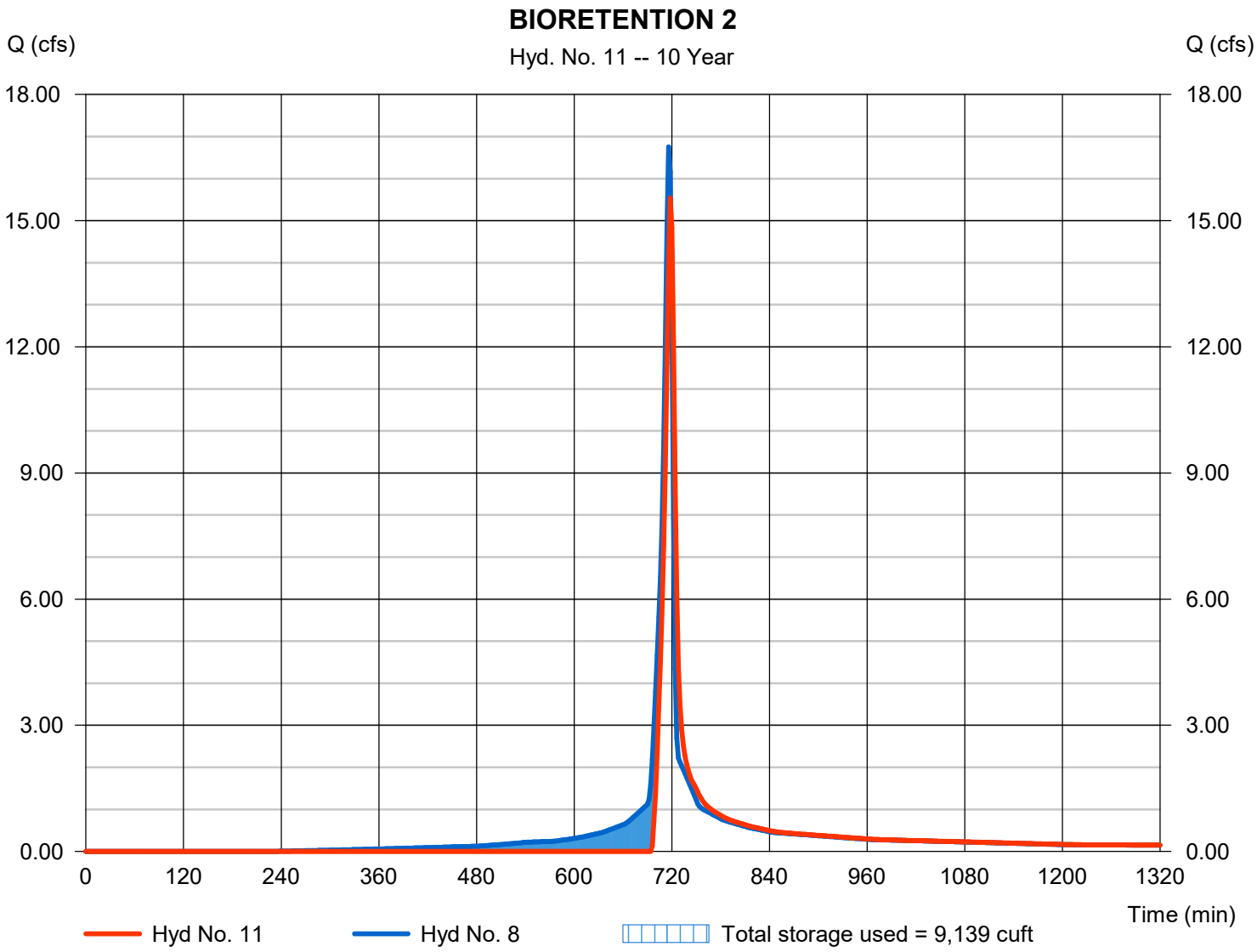
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 11

BIORETENTION 2

Hydrograph type	= Reservoir	Peak discharge	= 15.54 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 29,987 cuft
Inflow hyd. No.	= 8 - DEV20	Max. Elevation	= 1022.94 ft
Reservoir name	= BIORETENTION #2	Max. Storage	= 9,139 cuft

Storage Indication method used.



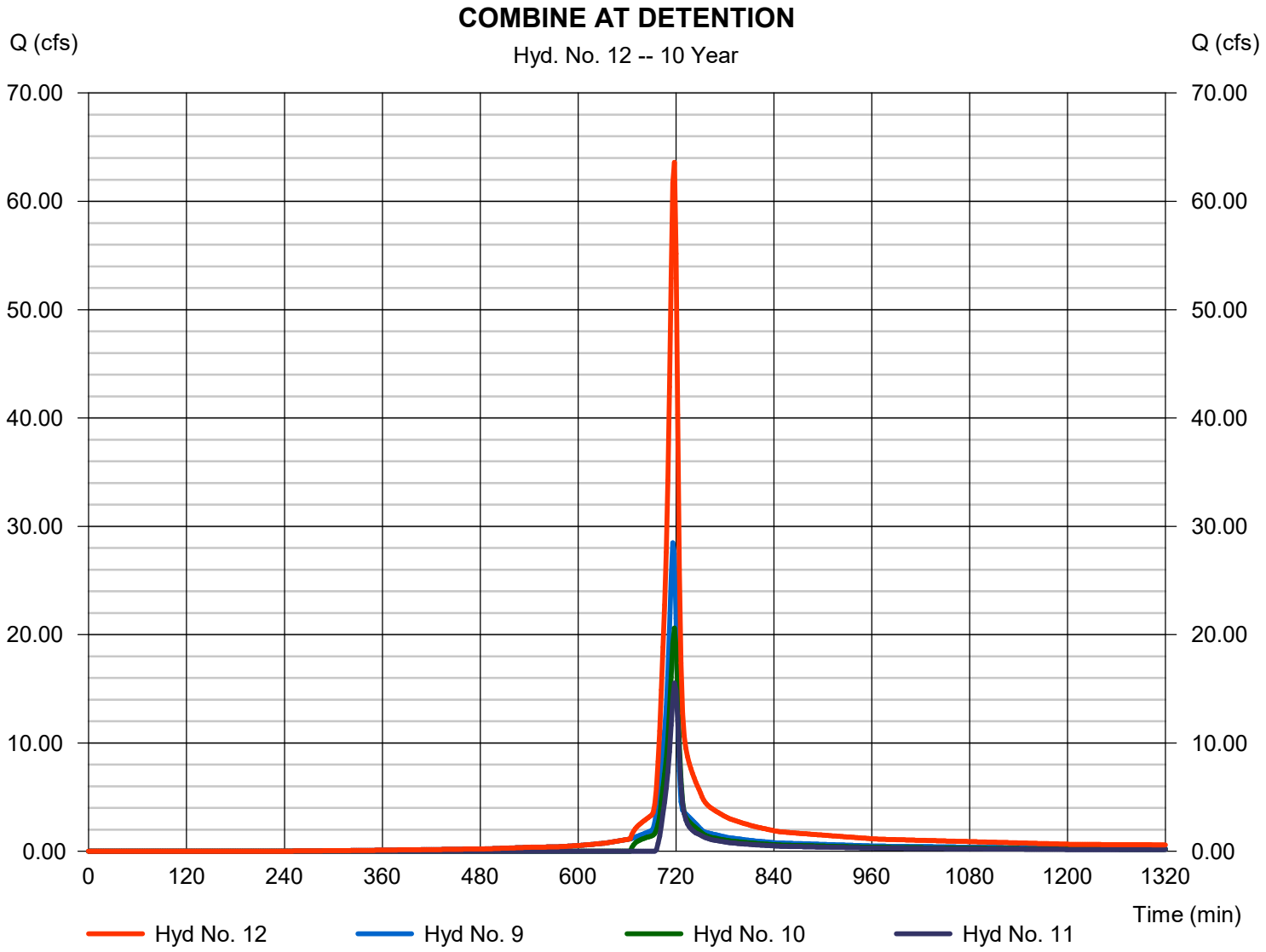
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 12

COMBINE AT DETENTION

Hydrograph type	= Combine	Peak discharge	= 63.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 131,933 cuft
Inflow hyds.	= 9, 10, 11	Contrib. drain. area	= 4.080 ac



Hydrograph Report

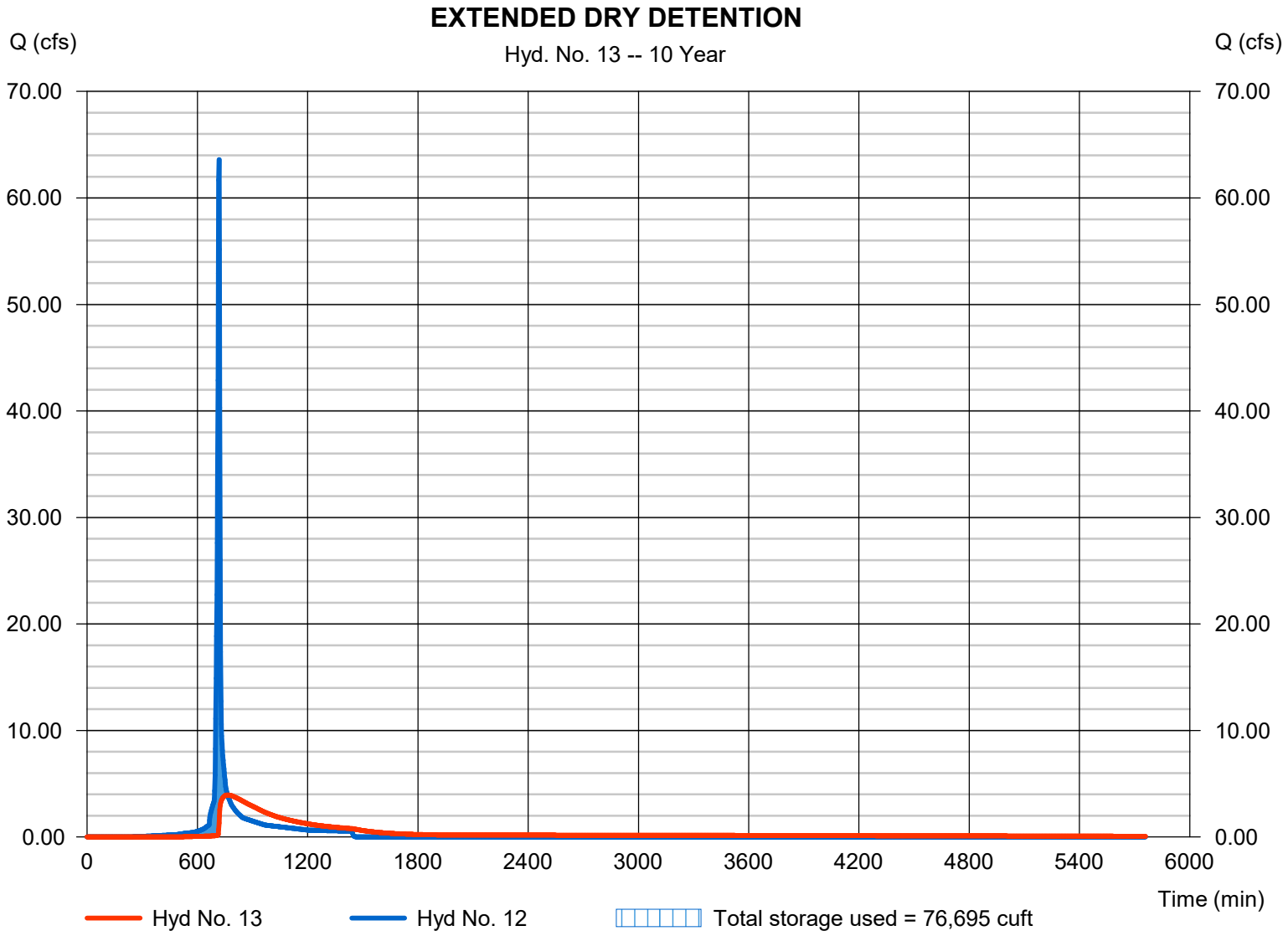
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 13

EXTENDED DRY DETENTION

Hydrograph type	=	Reservoir	Peak discharge	=	3.932 cfs
Storm frequency	=	10 yrs	Time to peak	=	764 min
Time interval	=	2 min	Hyd. volume	=	127,545 cuft
Inflow hyd. No.	=	12 - COMBINE AT DETENTION	Max. Elevation	=	1018.49 ft
Reservoir name	=	EXTENDED DRY DETENTION	Max. Storage	=	76,695 cuft

Storage Indication method used.



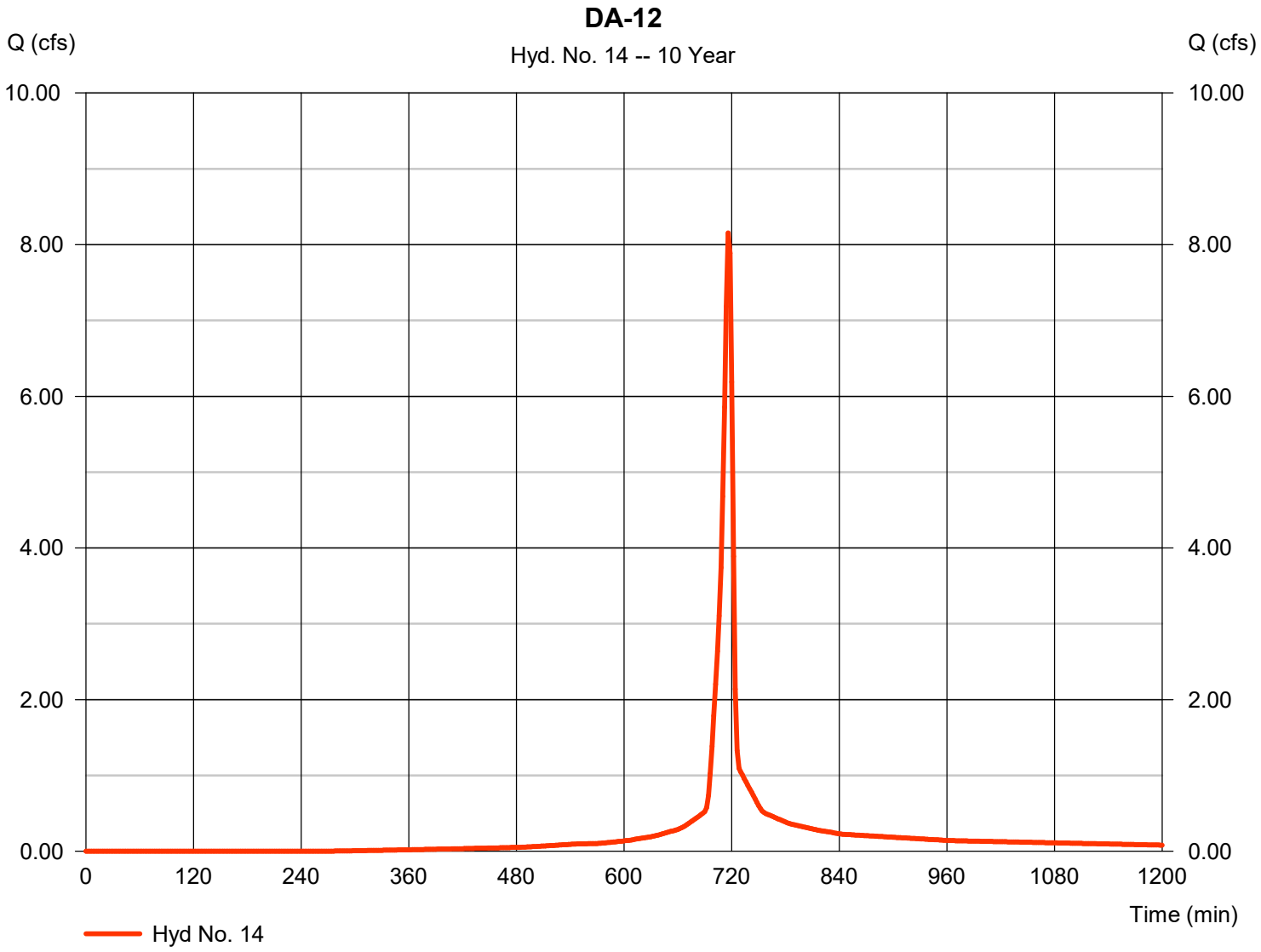
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 14

DA-12

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.155 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	17,264 cuft
Drainage area	=	1.210 ac	Curve number	=	87
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.66 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



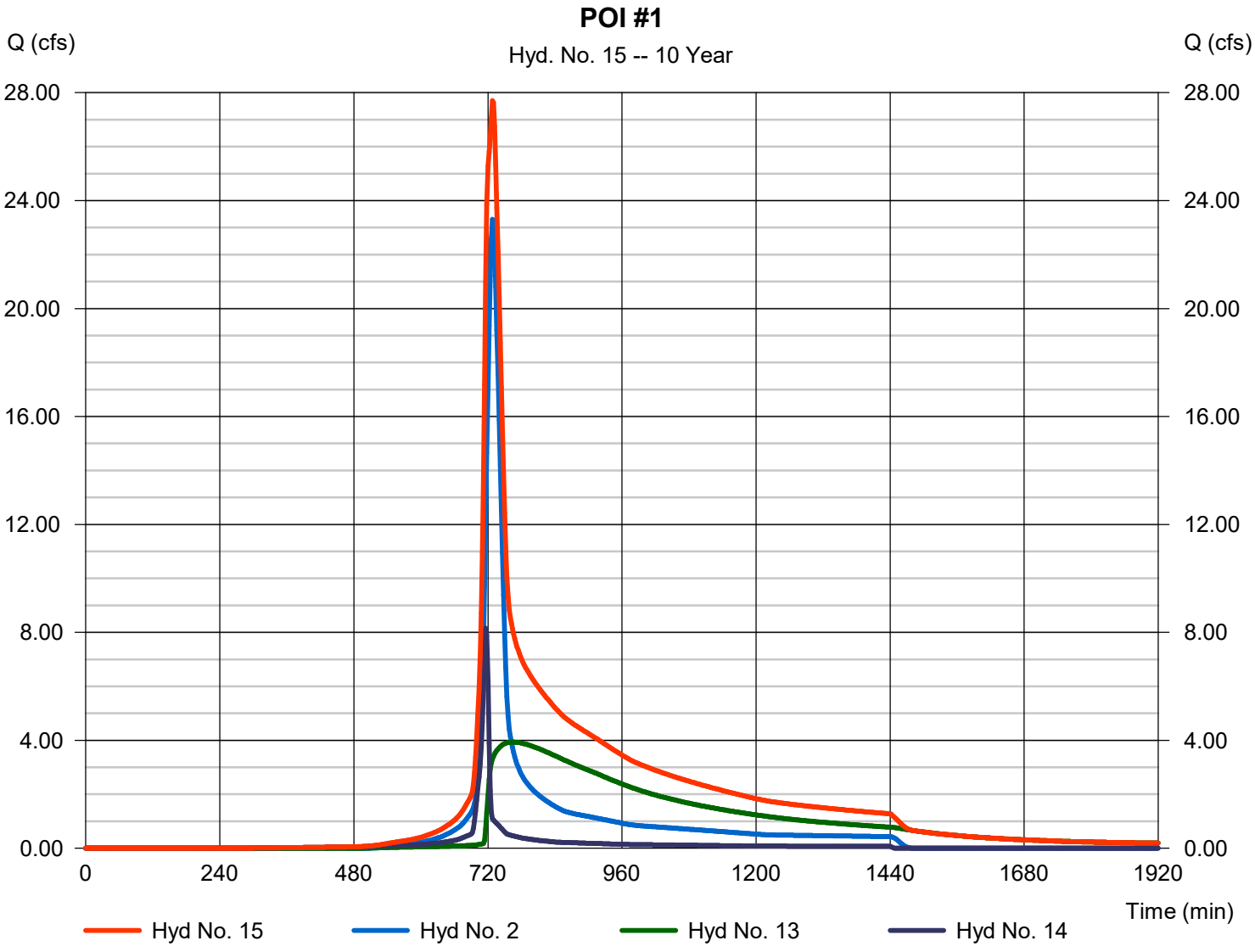
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 15

POI #1

Hydrograph type	= Combine	Peak discharge	= 27.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 230,644 cuft
Inflow hyds.	= 2, 13, 14	Contrib. drain. area	= 9.490 ac



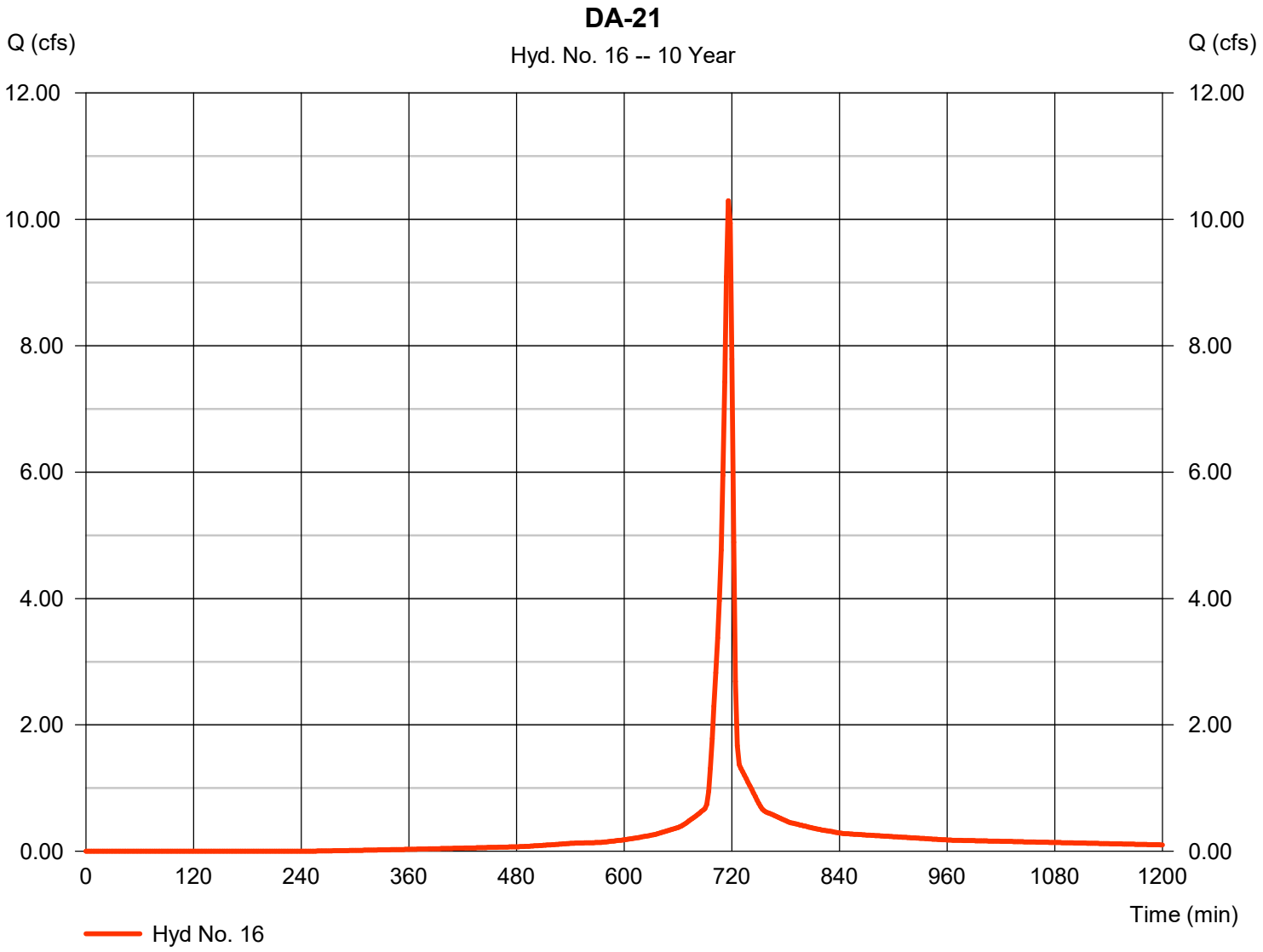
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 16

DA-21

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.29 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	21,945 cuft
Drainage area	=	1.500 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.66 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



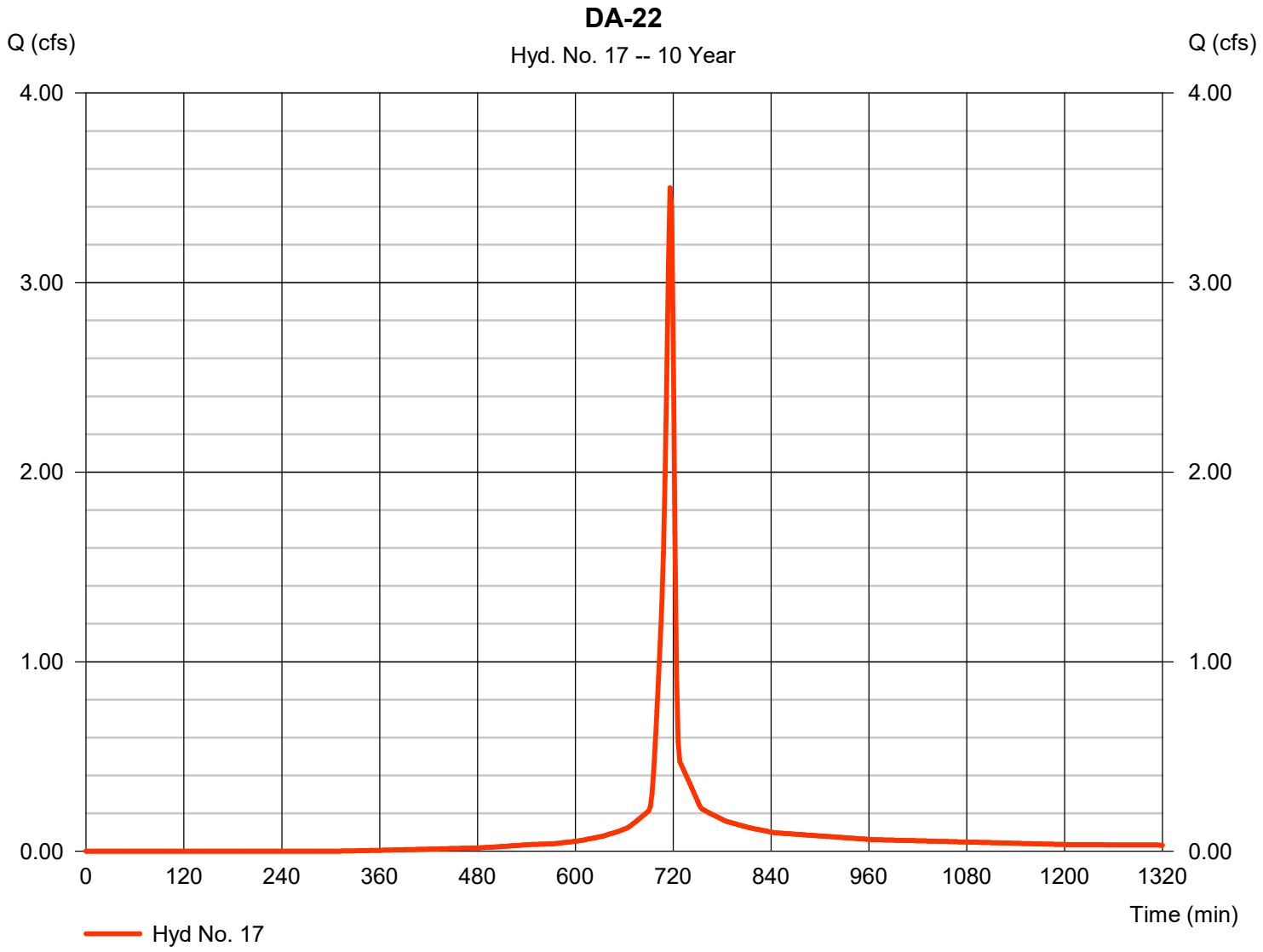
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 17

DA-22

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.500 cfs
Storm frequency	=	10 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	7,319 cuft
Drainage area	=	0.540 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	5.66 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



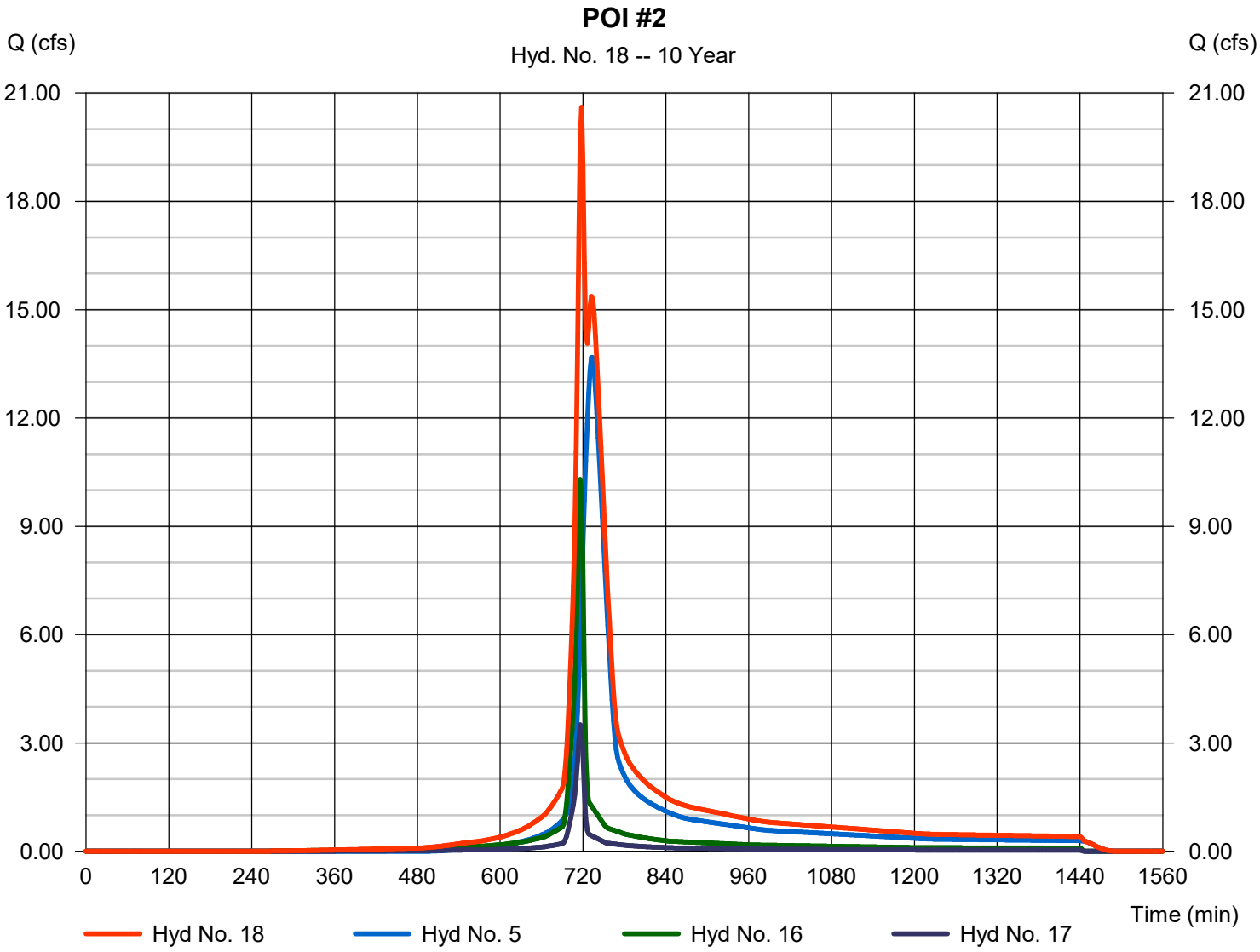
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 18

POI #2

Hydrograph type	= Combine	Peak discharge	= 20.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 88,584 cuft
Inflow hyds.	= 5, 16, 17	Contrib. drain. area	= 7.430 ac



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	23.85	2	728	87,924	------	------	------	EX-10
2	SCS Runoff	48.68	2	728	179,217	------	------	------	EX-11
3	Combine	72.52	2	728	267,141	1, 2	------	------	EX POI #1
4	SCS Runoff	48.62	2	728	179,000	------	------	------	EX-20
5	SCS Runoff	28.27	2	732	122,475	------	------	------	OFF-20
6	Combine	75.73	2	730	301,476	4, 5	------	------	EX POI #2
7	SCS Runoff	36.24	2	716	82,868	------	------	------	DEV10
8	SCS Runoff	28.97	2	716	64,654	------	------	------	DEV20
9	SCS Runoff	49.26	2	716	109,912	------	------	------	DEV30
10	Reservoir	35.10	2	718	76,250	7	1021.48	10,894	BIORETENTION 1
11	Reservoir	25.01	2	718	58,651	8	1023.14	10,956	BIORETENTION 2
12	Combine	107.32	2	718	244,813	9, 10, 11	------	------	COMBINE AT DETENTION
13	Reservoir	15.78	2	732	240,103	12	1020.59	131,403	EXTENDED DRY DETENTION
14	SCS Runoff	14.36	2	716	31,586	------	------	------	DA-12
15	Combine	66.32	2	728	450,905	2, 13, 14	------	------	POI #1
16	SCS Runoff	17.96	2	716	39,783	------	------	------	DA-21
17	SCS Runoff	6.284	2	716	13,644	------	------	------	DA-22
18	Combine	39.30	2	718	175,902	5, 16, 17	------	------	POI #2

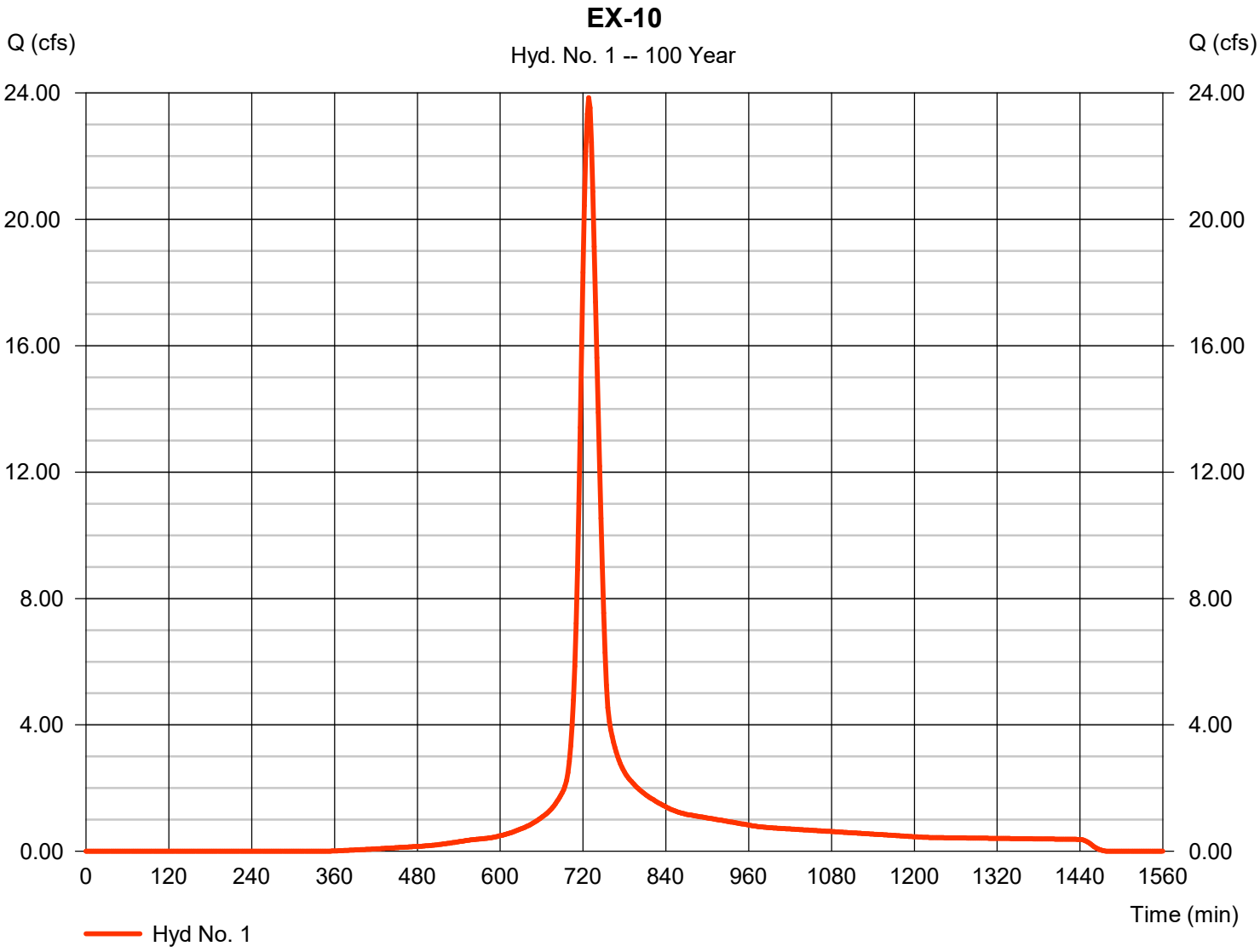
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 1

EX-10

Hydrograph type	=	SCS Runoff	Peak discharge	=	23.85 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	87,924 cuft
Drainage area	=	3.980 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	26.30 min
Total precip.	=	9.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



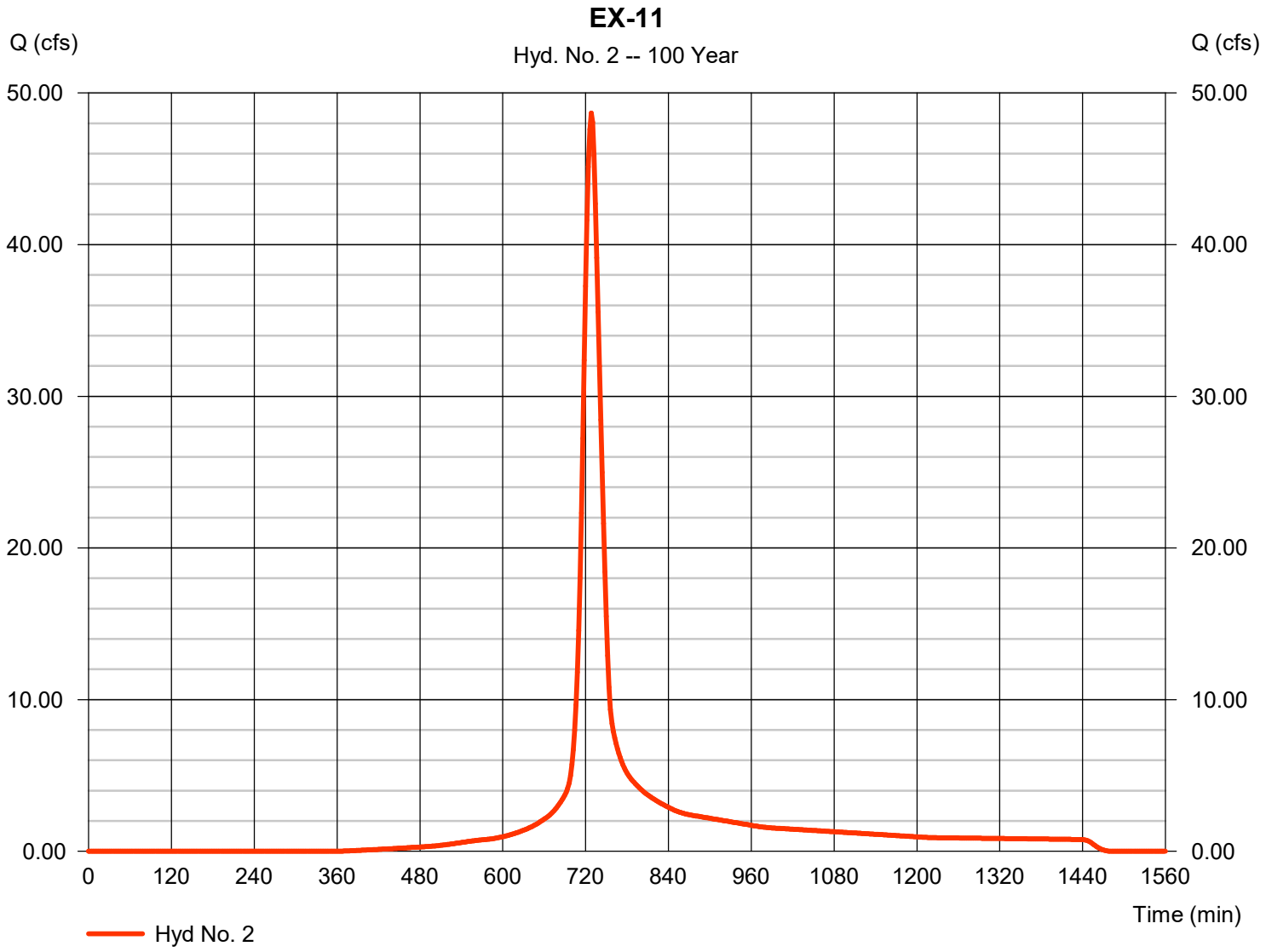
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 2

EX-11

Hydrograph type	=	SCS Runoff	Peak discharge	=	48.68 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	179,217 cuft
Drainage area	=	8.280 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	25.60 min
Total precip.	=	9.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



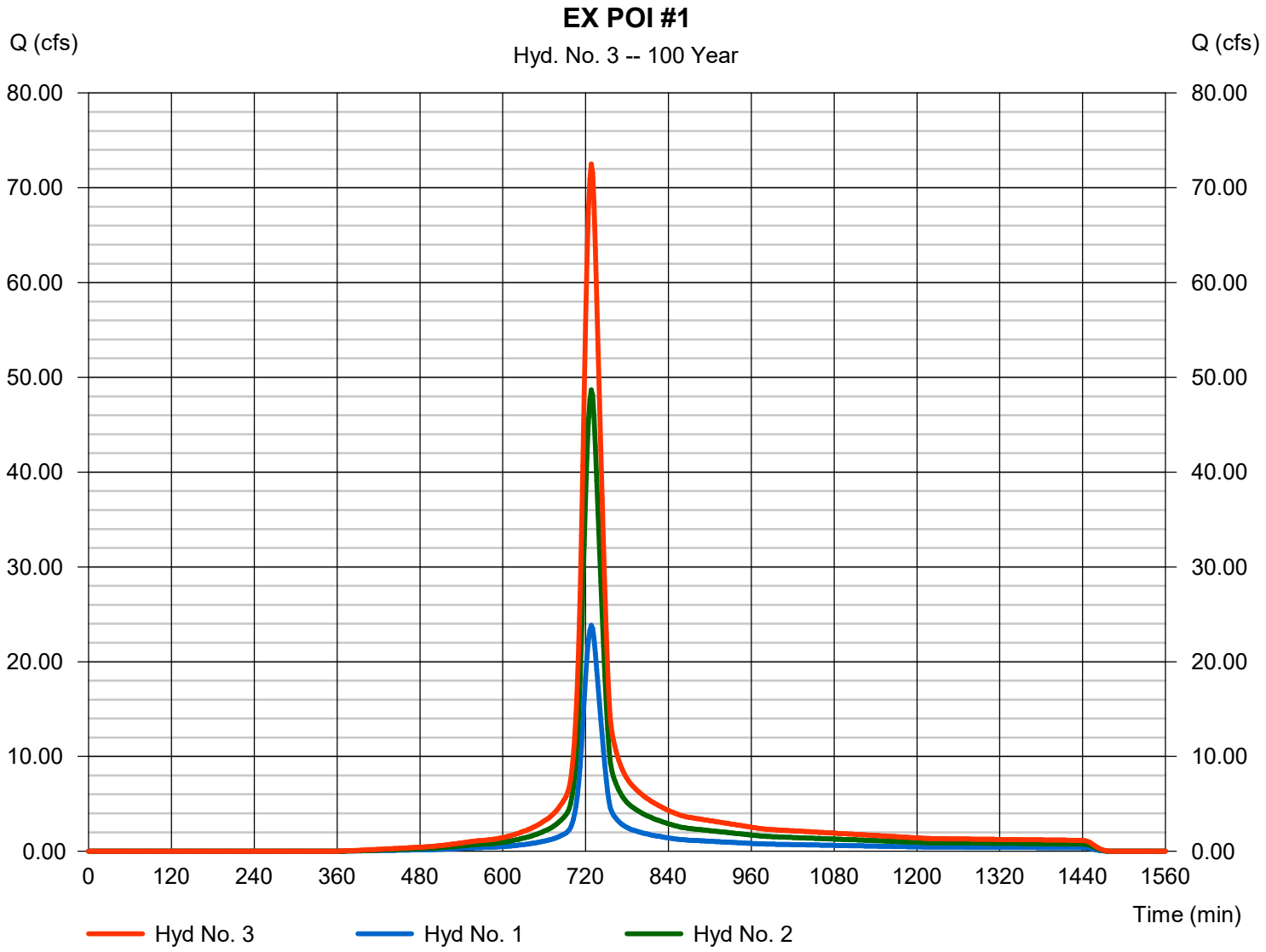
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 3

EX POI #1

Hydrograph type	=	Combine	Peak discharge	=	72.52 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	267,141 cuft
Inflow hyds.	=	1, 2	Contrib. drain. area	=	12.260 ac



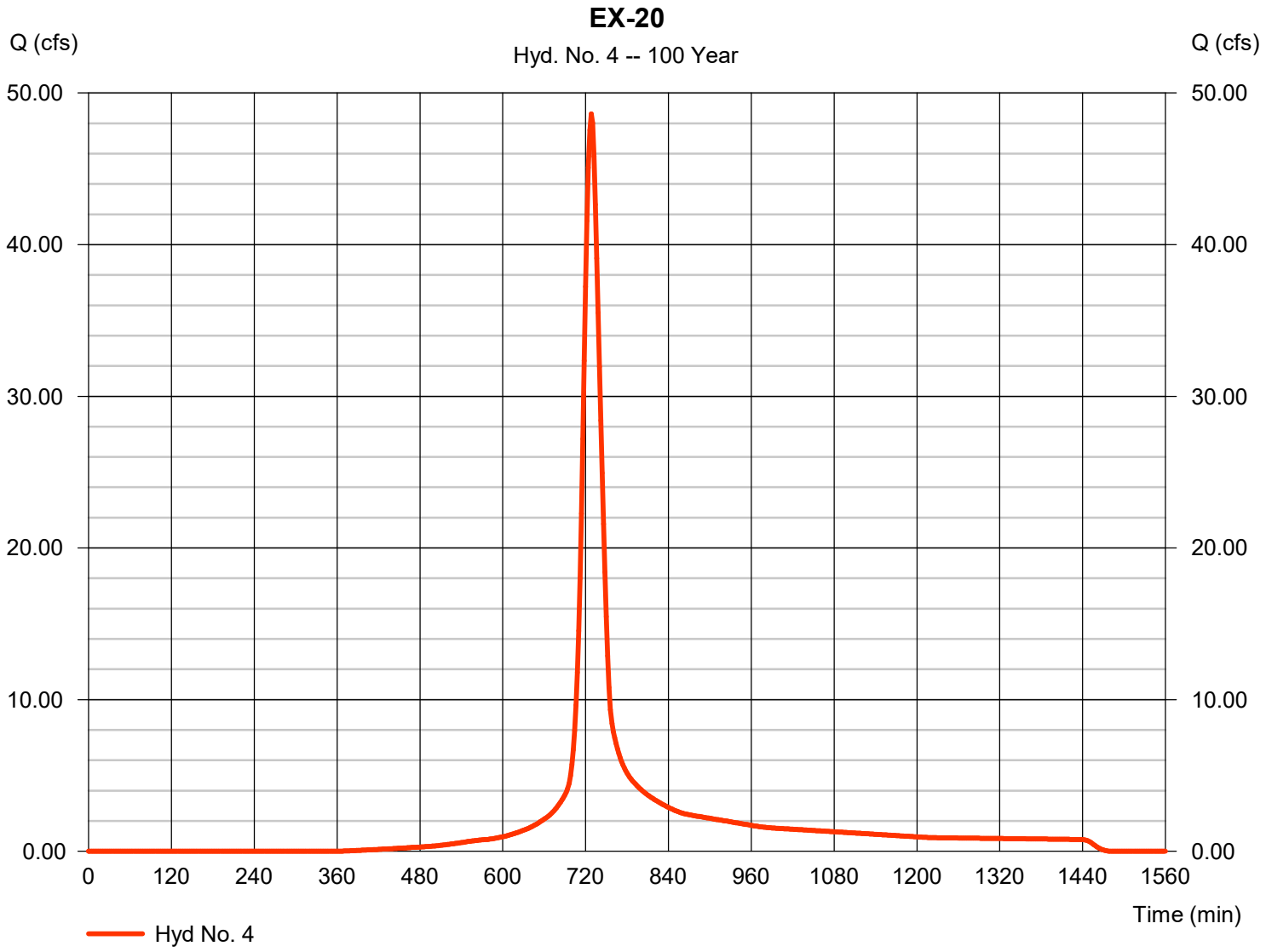
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 4

EX-20

Hydrograph type	=	SCS Runoff	Peak discharge	=	48.62 cfs
Storm frequency	=	100 yrs	Time to peak	=	728 min
Time interval	=	2 min	Hyd. volume	=	179,000 cuft
Drainage area	=	8.270 ac	Curve number	=	74
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	25.10 min
Total precip.	=	9.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



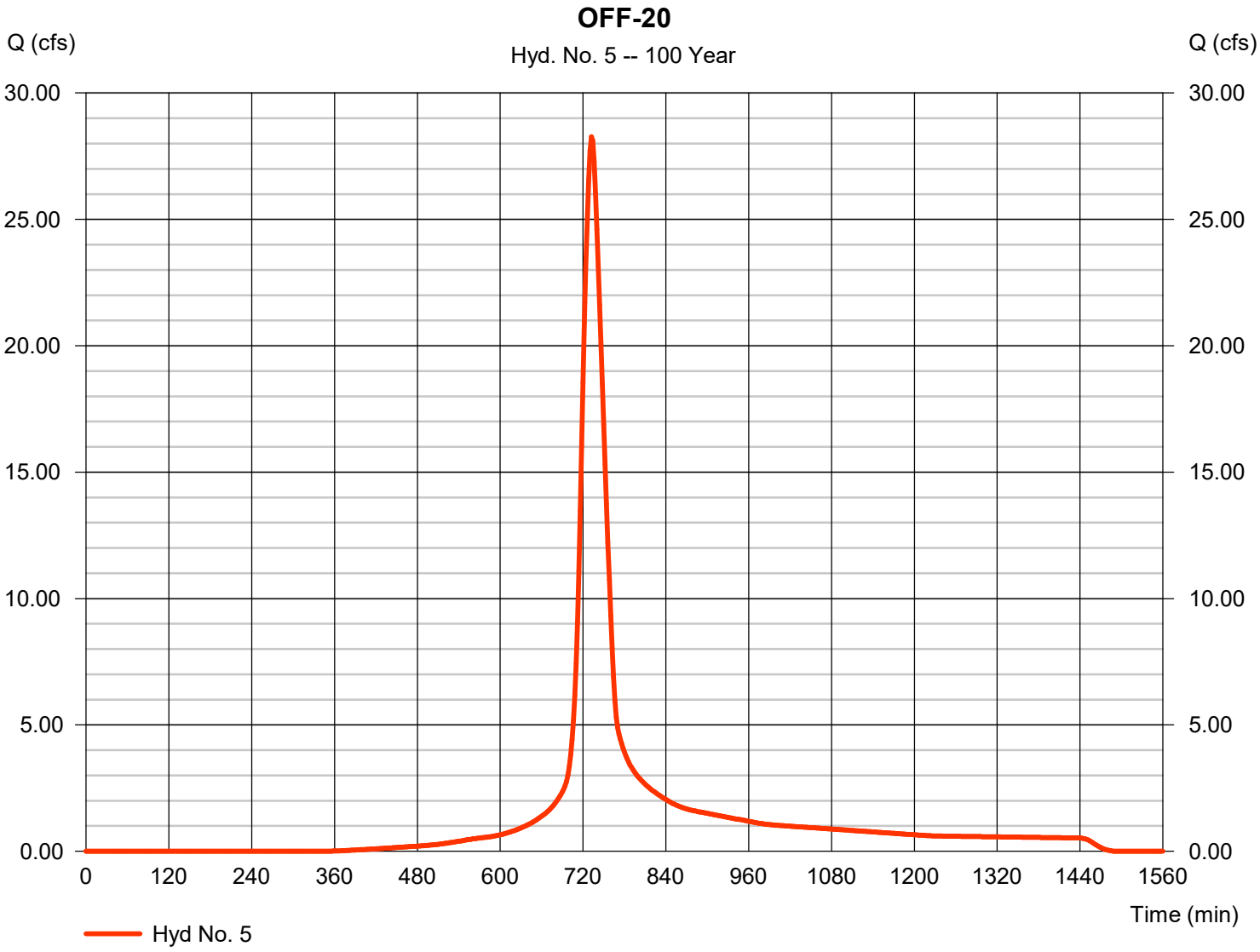
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 5

OFF-20

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.27 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	2 min	Hyd. volume	=	122,475 cuft
Drainage area	=	5.390 ac	Curve number	=	75
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	32.70 min
Total precip.	=	9.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



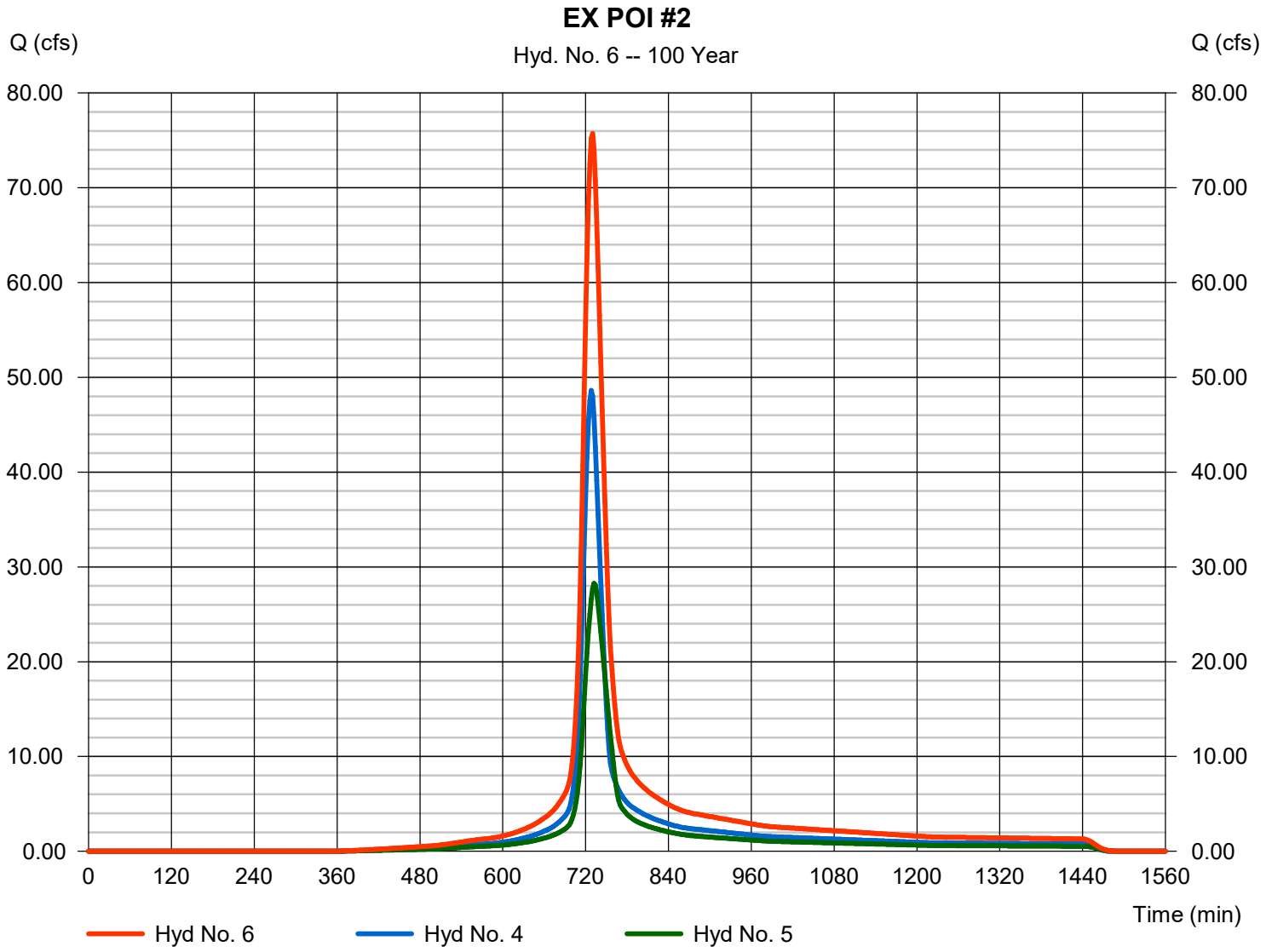
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 6

EX POI #2

Hydrograph type	= Combine	Peak discharge	= 75.73 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 301,476 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 13.660 ac



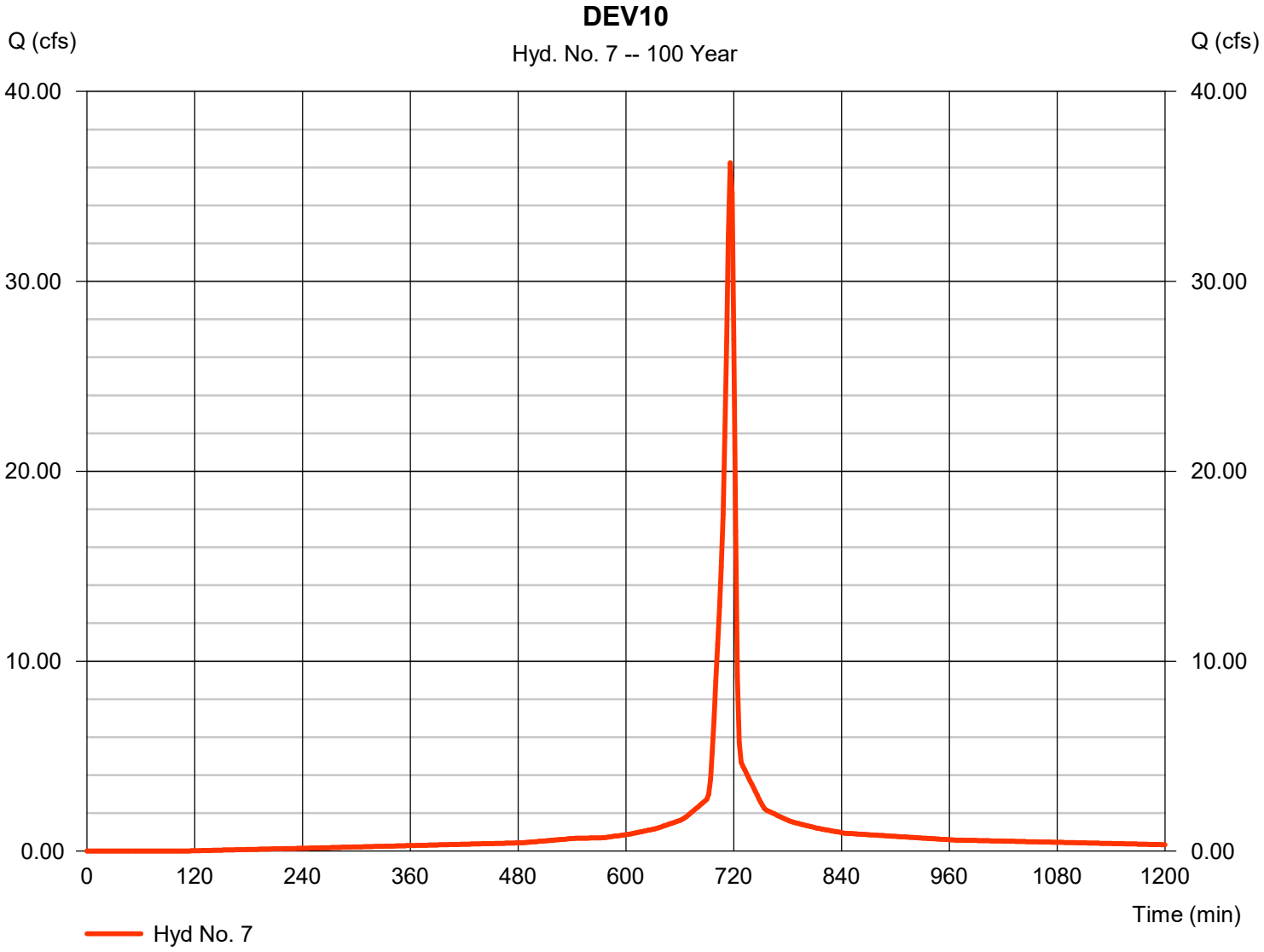
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 7

DEV10

Hydrograph type	= SCS Runoff	Peak discharge	= 36.24 cfs
Storm frequency	= 100 yrs	Time to peak	= 716 min
Time interval	= 2 min	Hyd. volume	= 82,868 cuft
Drainage area	= 2.940 ac	Curve number	= 92
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 9.25 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

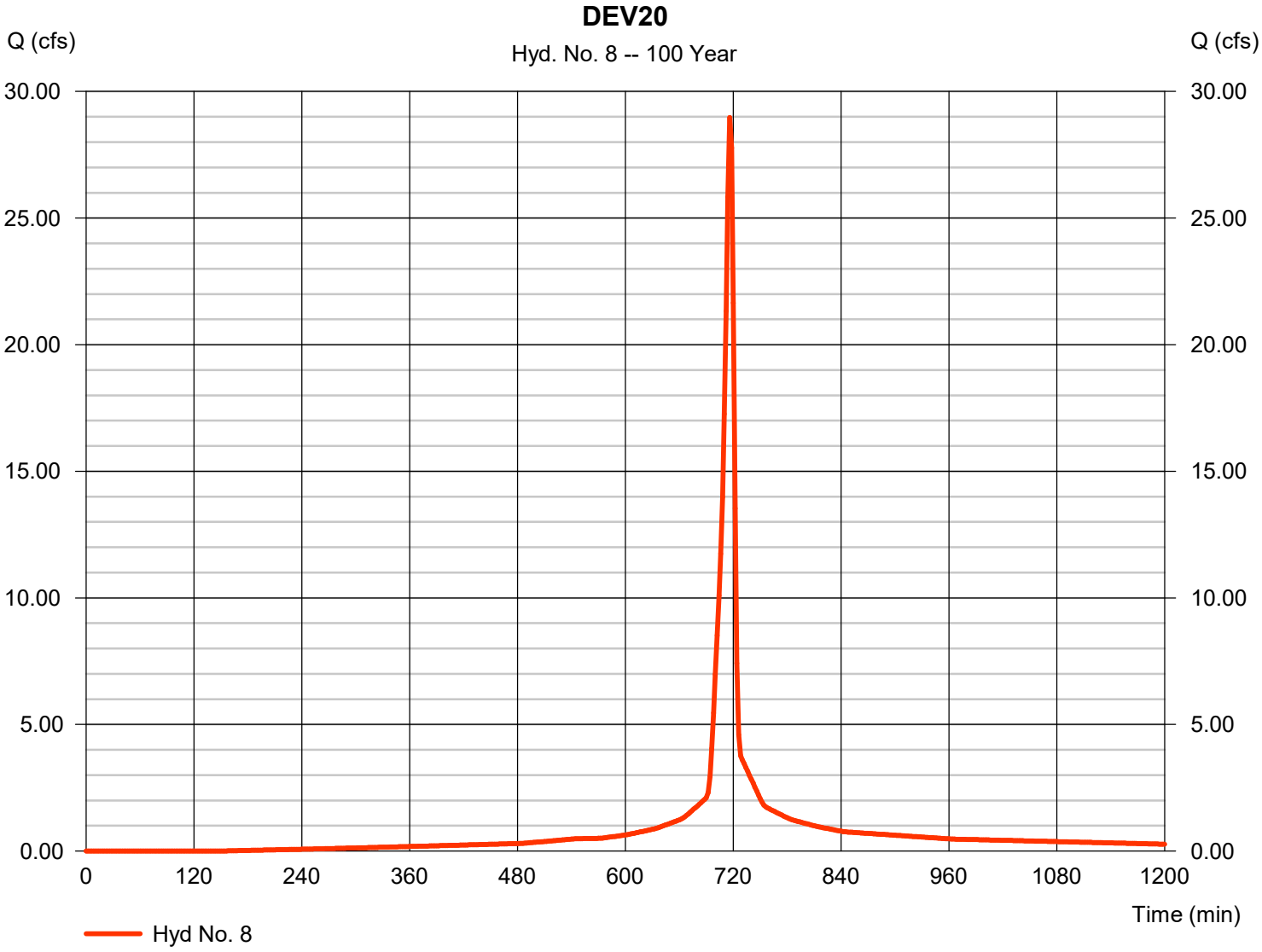


Hydrograph Report

Hyd. No. 8

DEV20

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.97 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	64,654 cuft
Drainage area	=	2.400 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	9.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



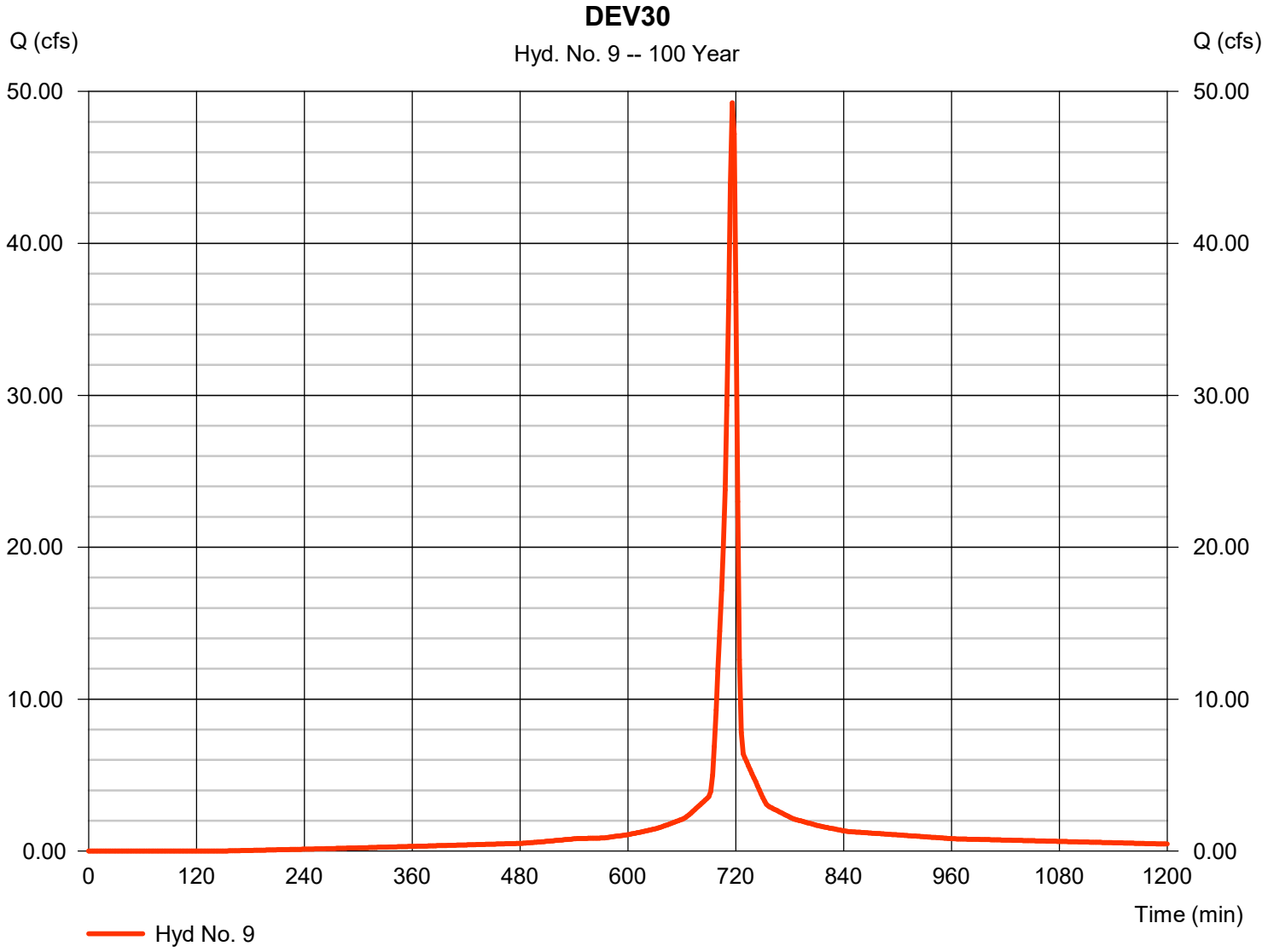
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 9

DEV30

Hydrograph type	=	SCS Runoff	Peak discharge	=	49.26 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	109,912 cuft
Drainage area	=	4.080 ac	Curve number	=	89
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	9.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



Hydrograph Report

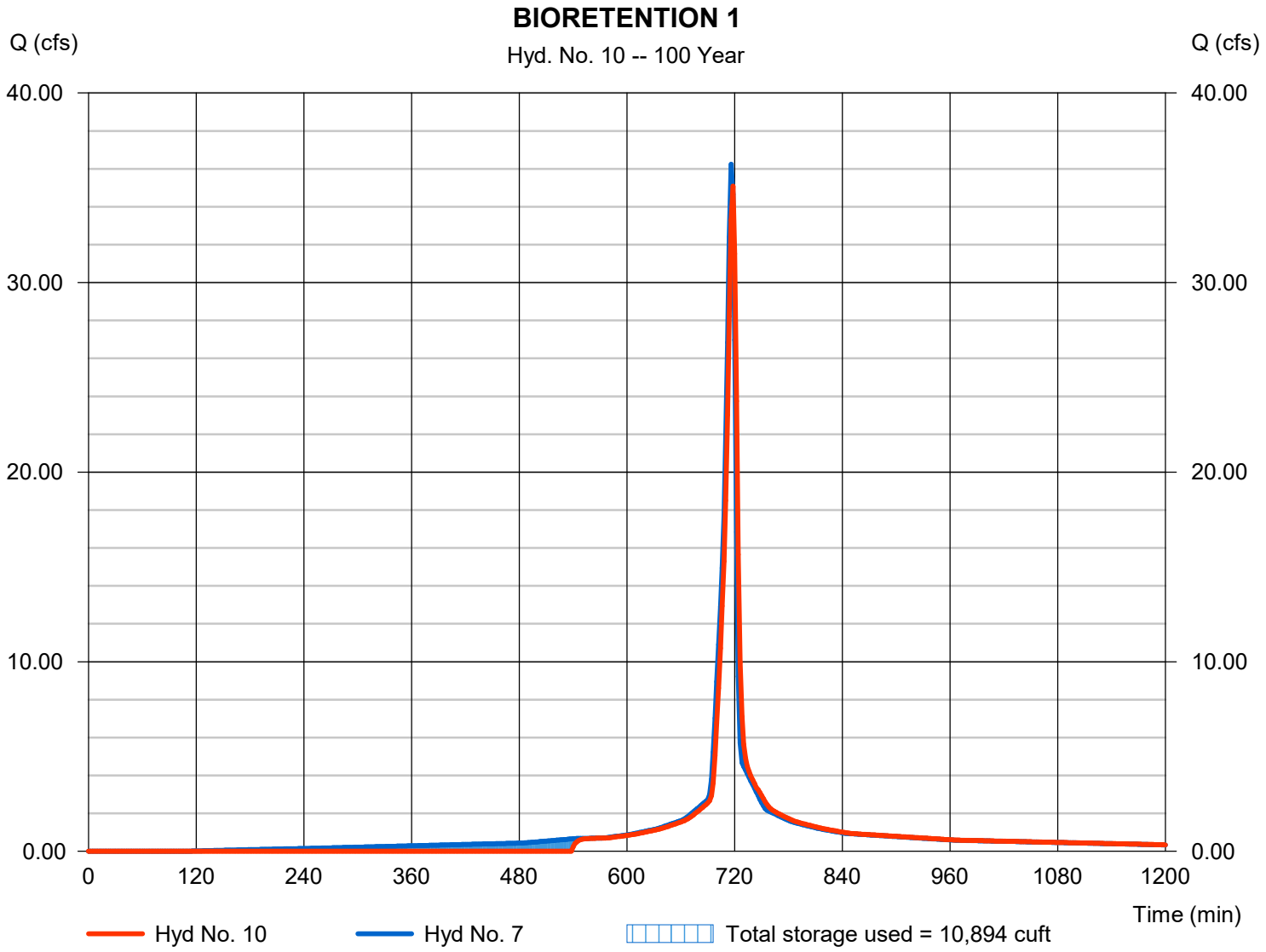
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 10

BIORETENTION 1

Hydrograph type	=	Reservoir	Peak discharge	=	35.10 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	76,250 cuft
Inflow hyd. No.	=	7 - DEV10	Max. Elevation	=	1021.48 ft
Reservoir name	=	BIORETENTION 1	Max. Storage	=	10,894 cuft

Storage Indication method used.



Hydrograph Report

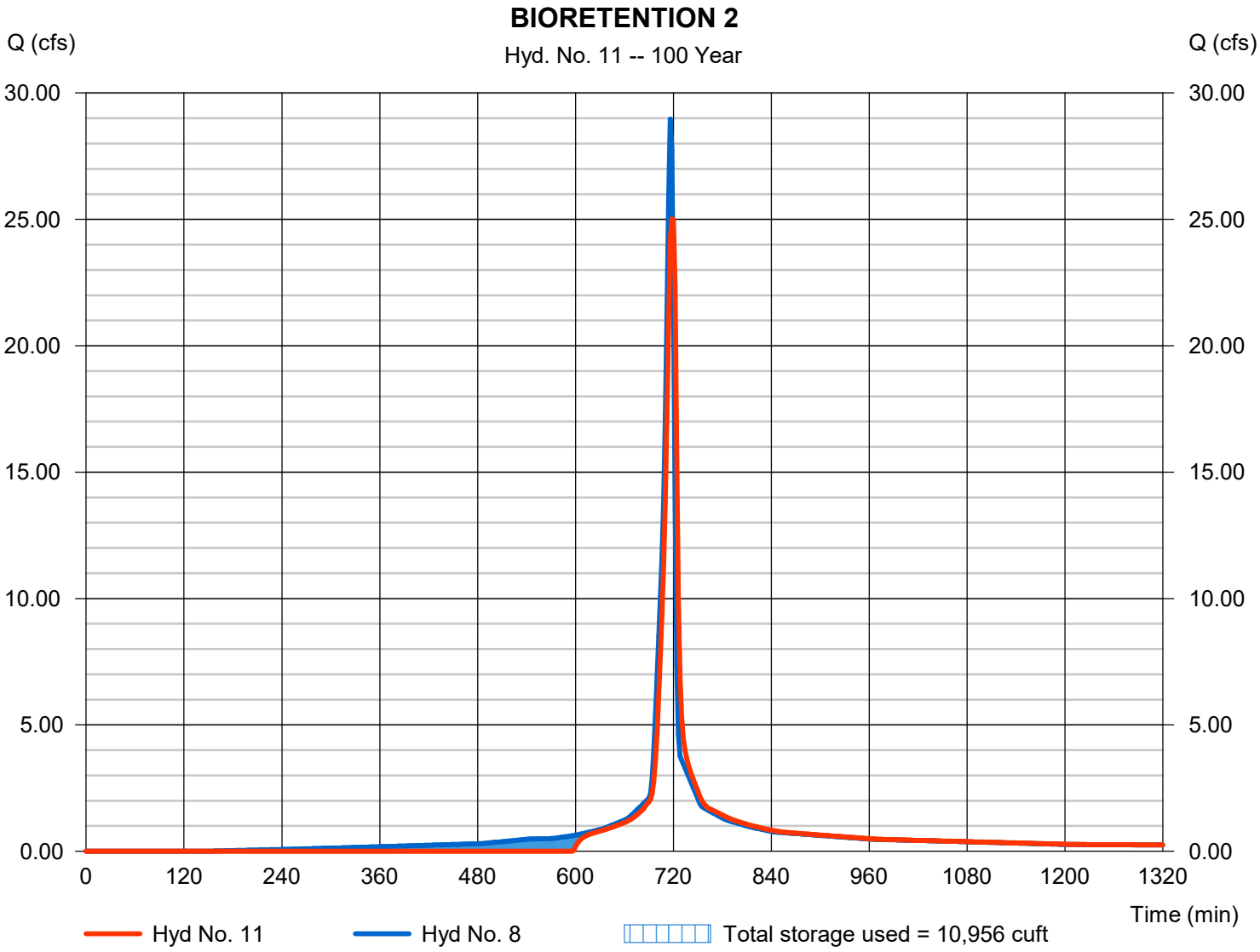
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 11

BIORETENTION 2

Hydrograph type	=	Reservoir	Peak discharge	=	25.01 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	58,651 cuft
Inflow hyd. No.	=	8 - DEV20	Max. Elevation	=	1023.14 ft
Reservoir name	=	BIORETENTION #2	Max. Storage	=	10,956 cuft

Storage Indication method used.

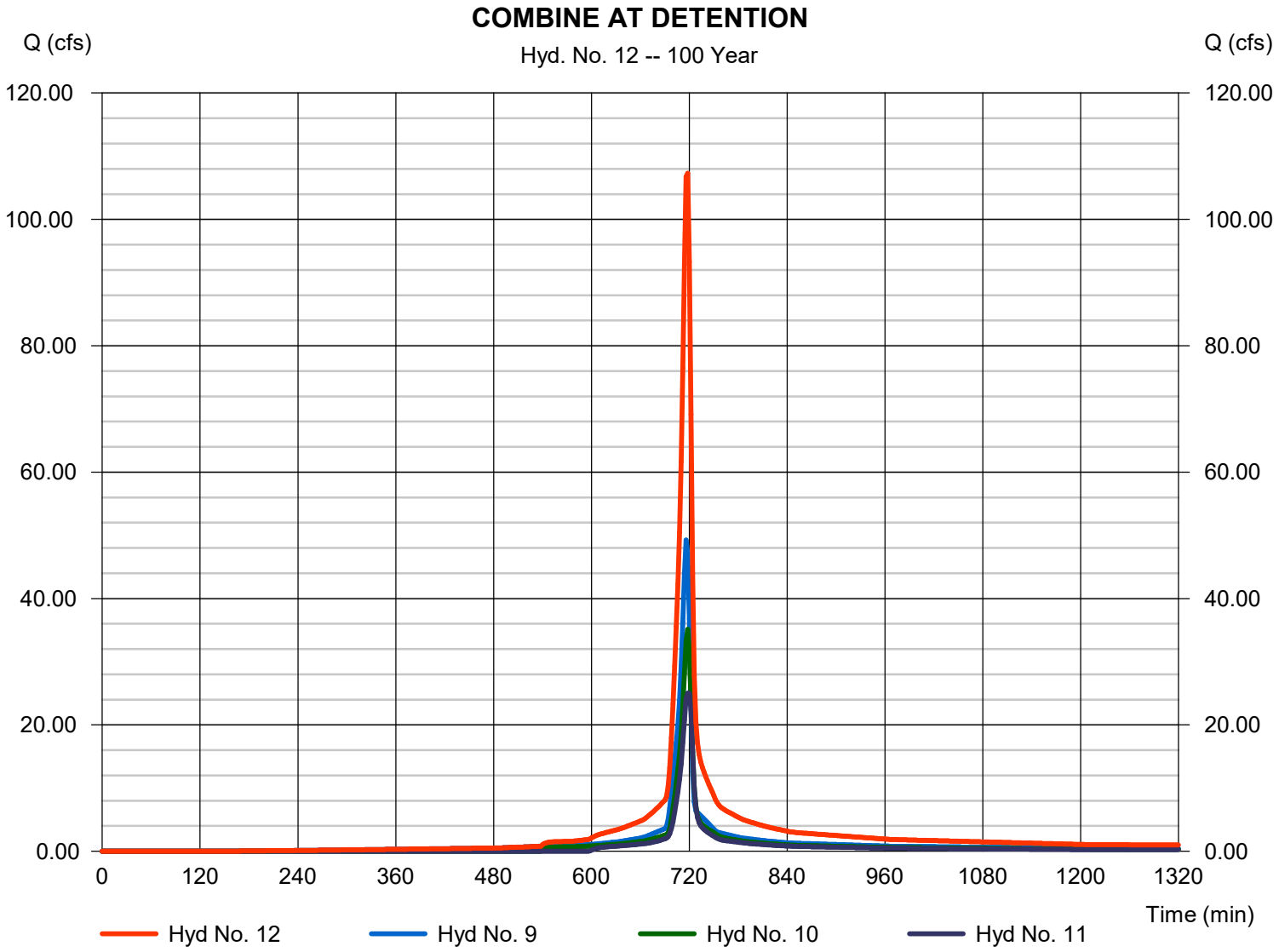


Hydrograph Report

Hyd. No. 12

COMBINE AT DETENTION

Hydrograph type	=	Combine	Peak discharge	=	107.32 cfs
Storm frequency	=	100 yrs	Time to peak	=	718 min
Time interval	=	2 min	Hyd. volume	=	244,813 cuft
Inflow hyds.	=	9, 10, 11	Contrib. drain. area	=	4.080 ac



Hydrograph Report

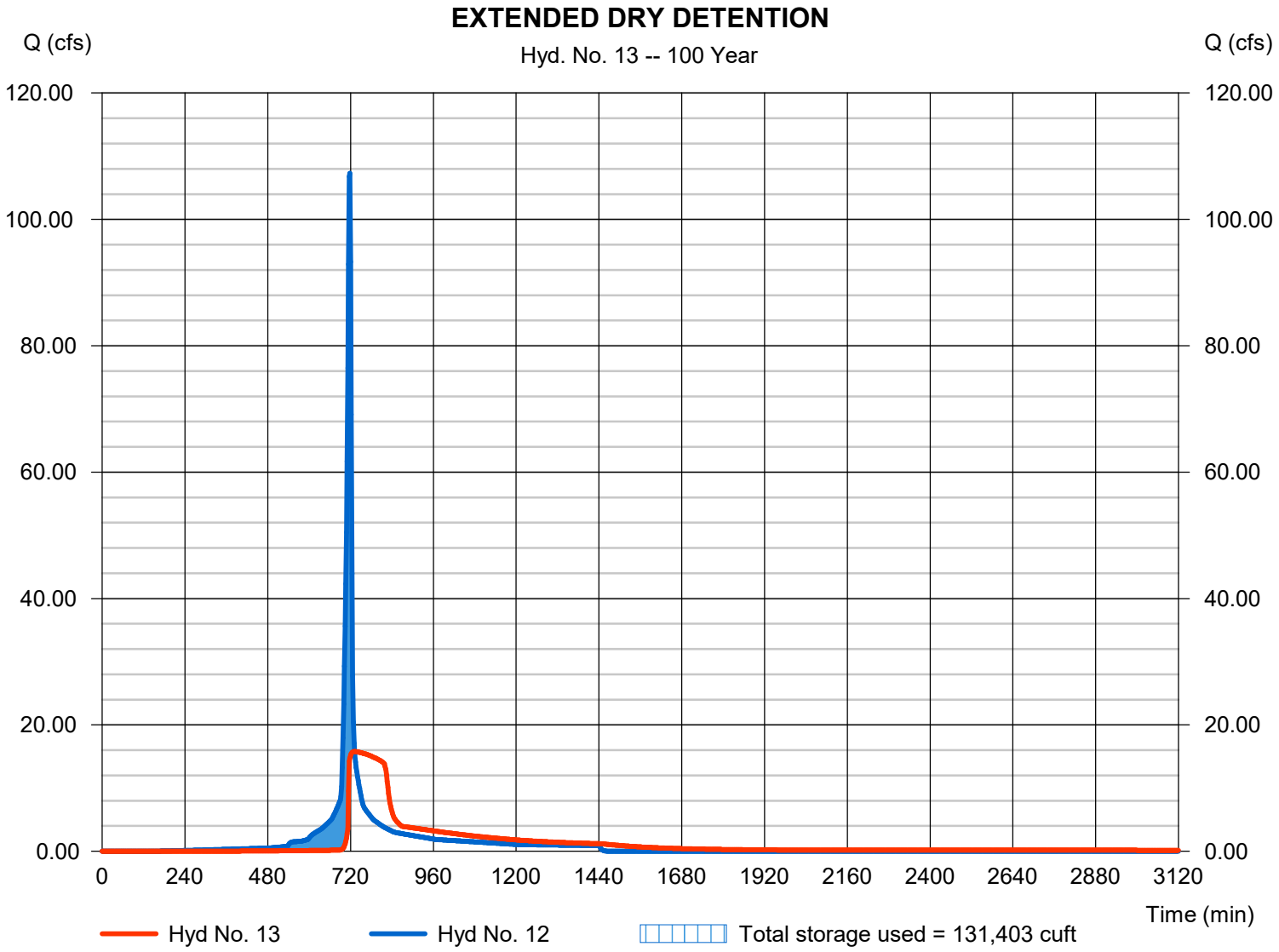
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 13

EXTENDED DRY DETENTION

Hydrograph type	=	Reservoir	Peak discharge	=	15.78 cfs
Storm frequency	=	100 yrs	Time to peak	=	732 min
Time interval	=	2 min	Hyd. volume	=	240,103 cuft
Inflow hyd. No.	=	12 - COMBINE AT DETENTION	Max. Elevation	=	1020.59 ft
Reservoir name	=	EXTENDED DRY DETENTION	Max. Storage	=	131,403 cuft

Storage Indication method used.



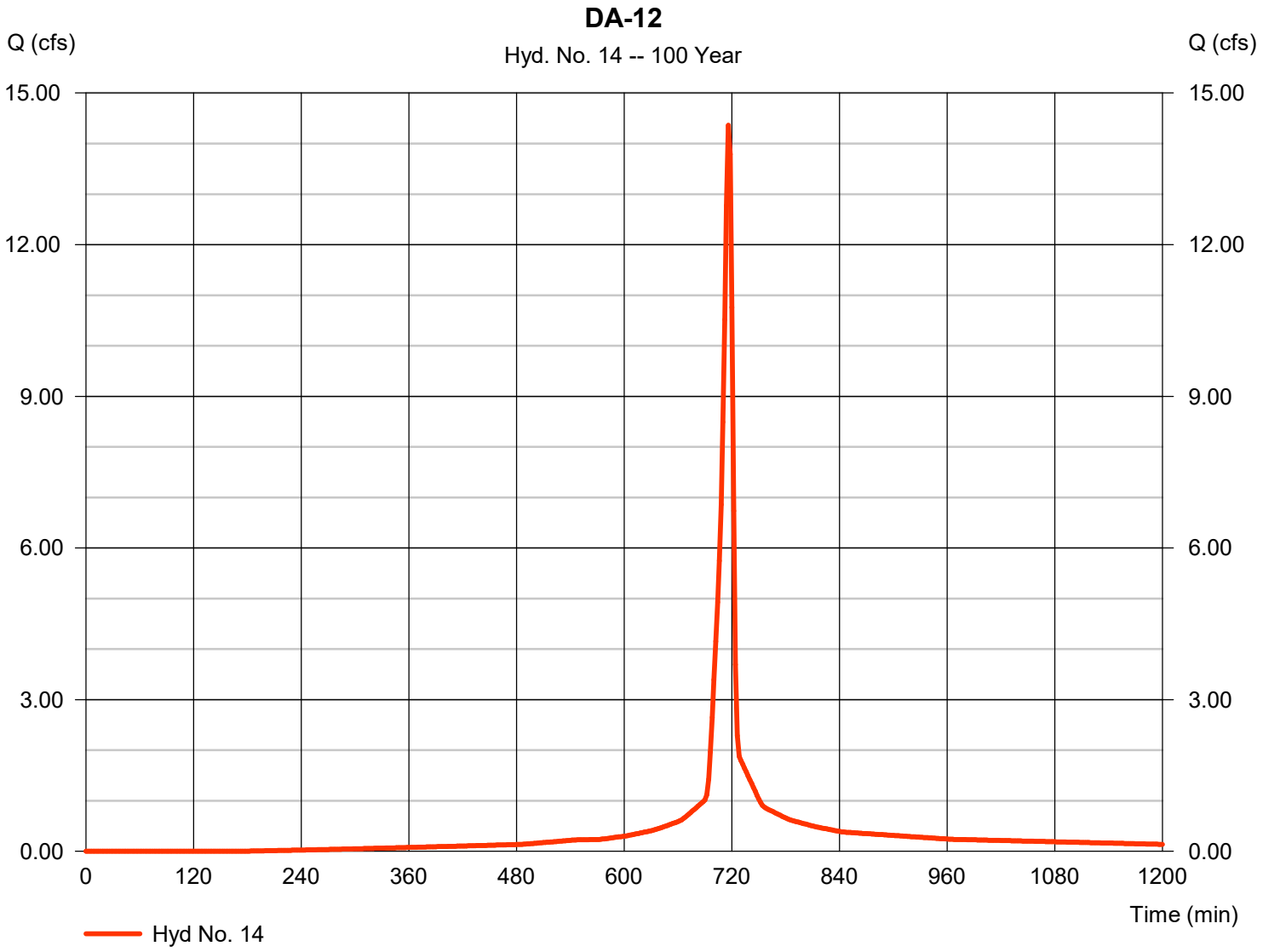
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 14

DA-12

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.36 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	31,586 cuft
Drainage area	=	1.210 ac	Curve number	=	87
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	9.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



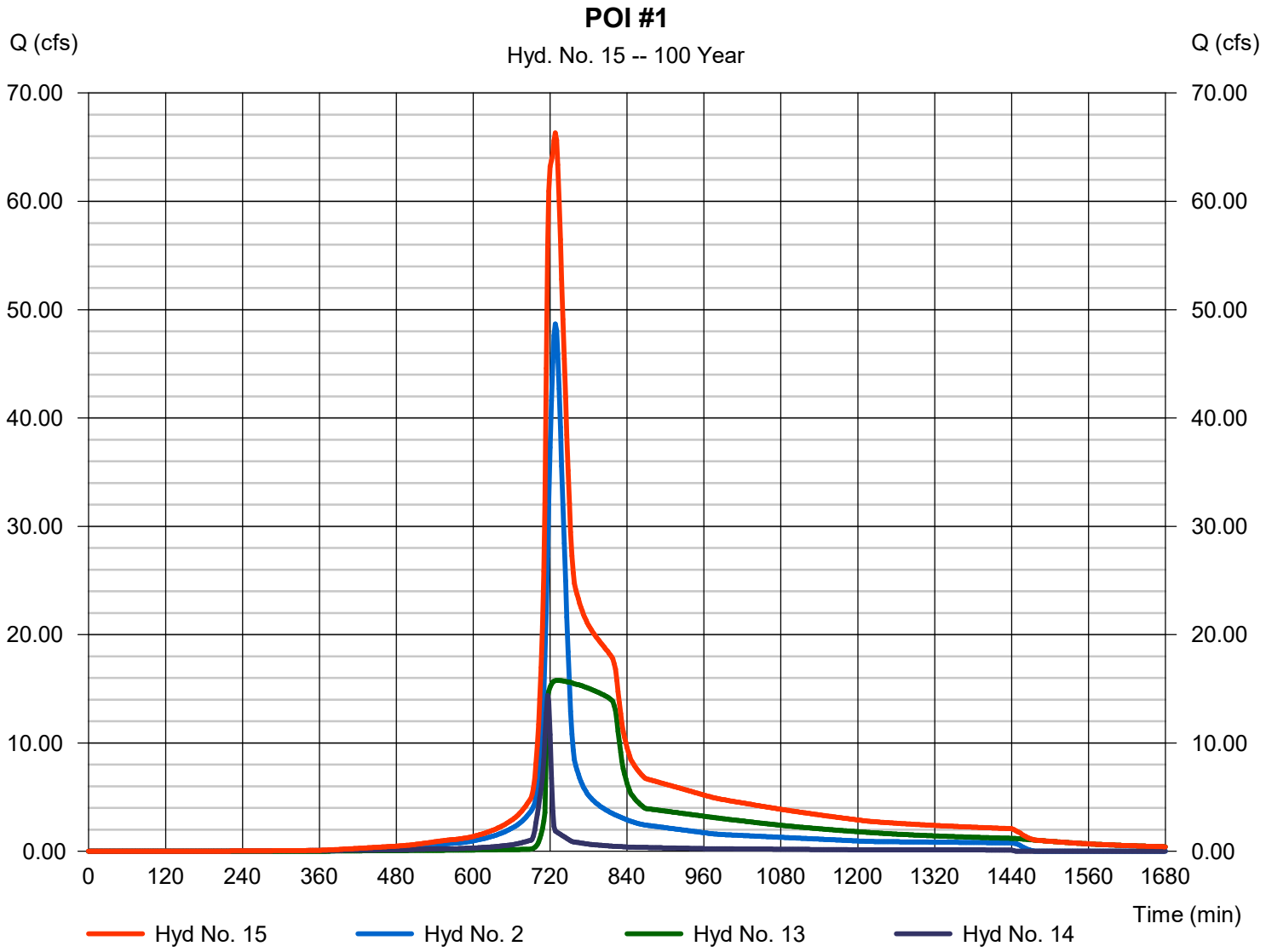
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 15

POI #1

Hydrograph type	= Combine	Peak discharge	= 66.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 728 min
Time interval	= 2 min	Hyd. volume	= 450,905 cuft
Inflow hyds.	= 2, 13, 14	Contrib. drain. area	= 9.490 ac



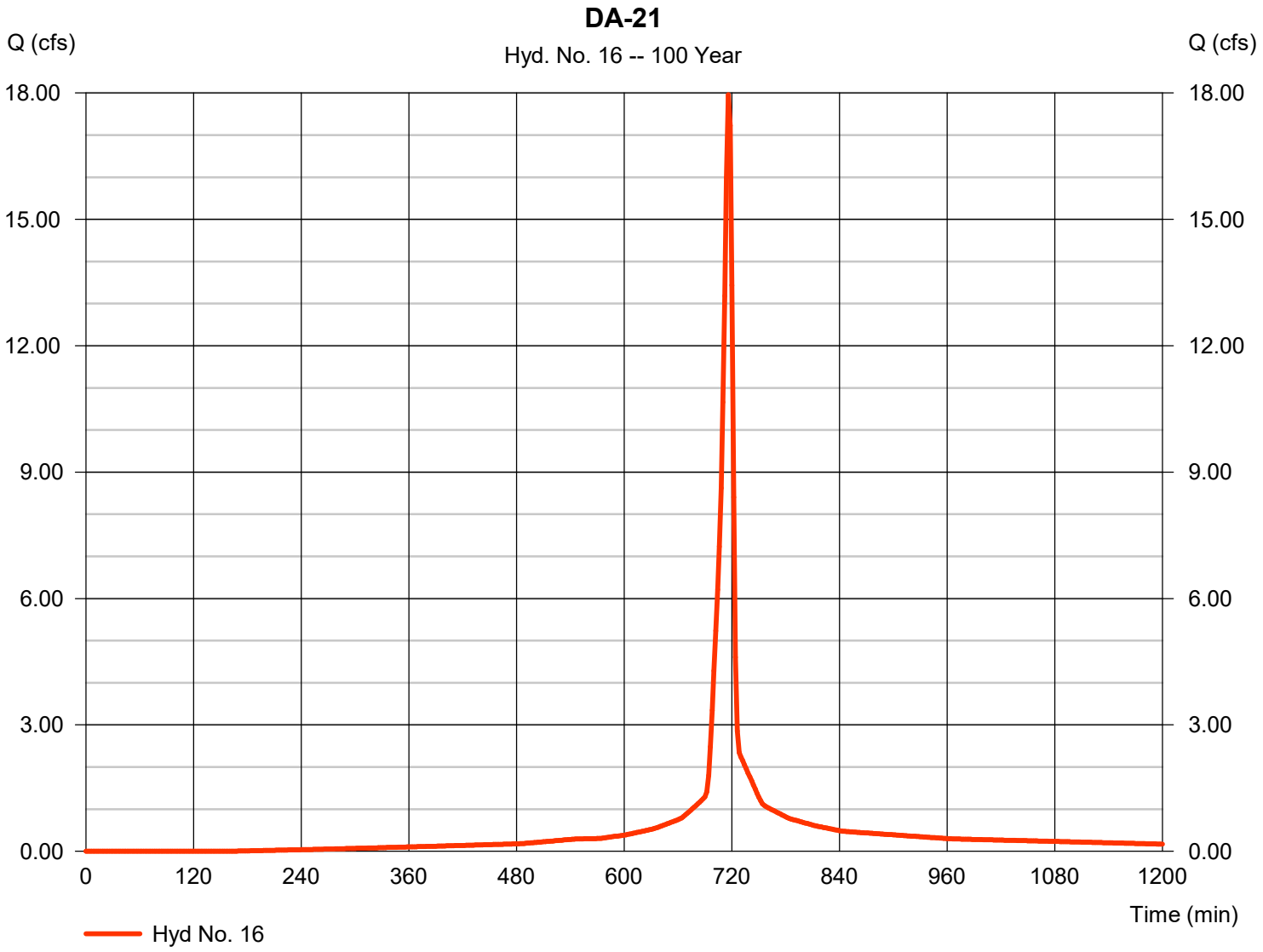
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 16

DA-21

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.96 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	39,783 cuft
Drainage area	=	1.500 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	9.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



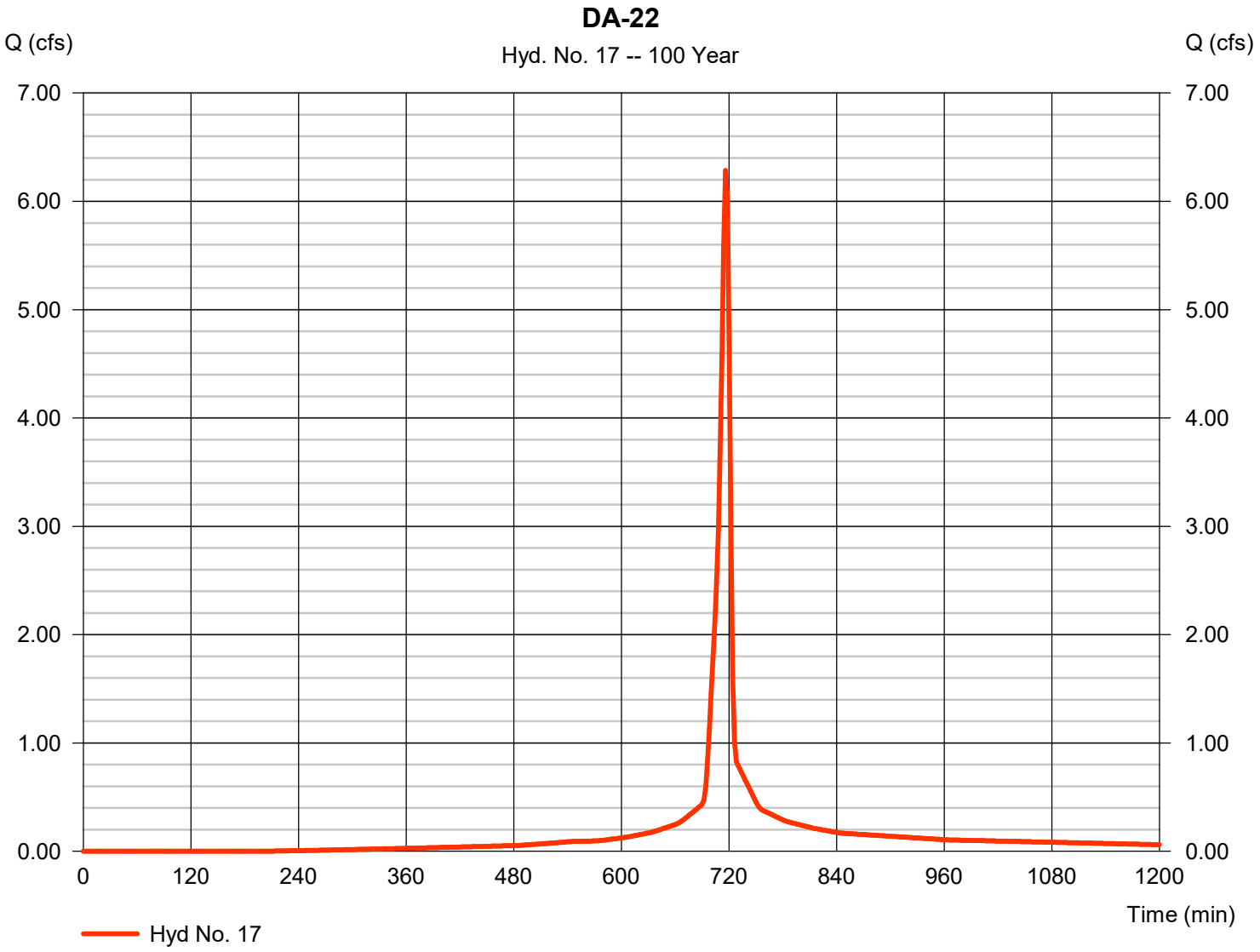
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 17

DA-22

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.284 cfs
Storm frequency	=	100 yrs	Time to peak	=	716 min
Time interval	=	2 min	Hyd. volume	=	13,644 cuft
Drainage area	=	0.540 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	5.00 min
Total precip.	=	9.25 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



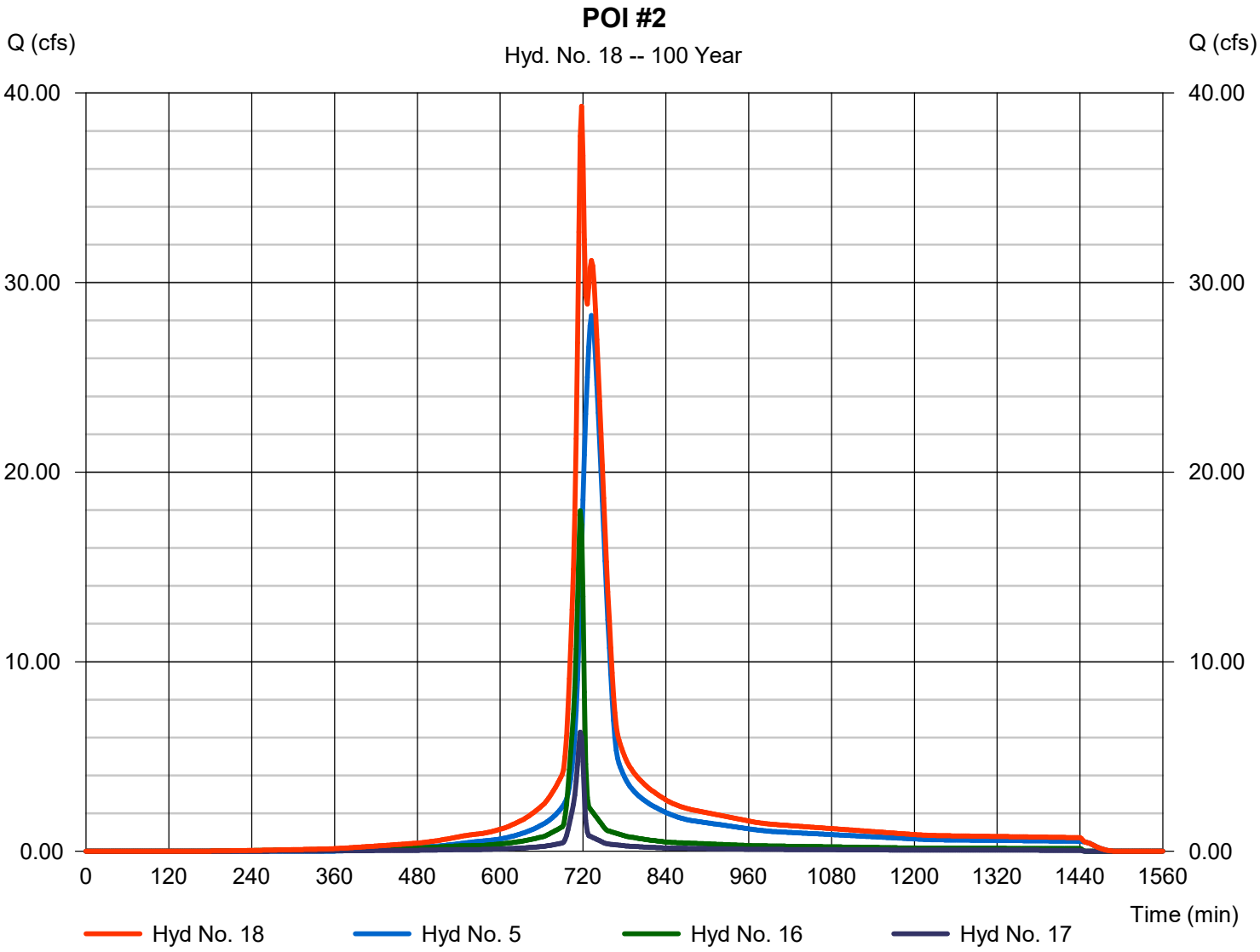
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Hyd. No. 18

POI #2

Hydrograph type	= Combine	Peak discharge	= 39.30 cfs
Storm frequency	= 100 yrs	Time to peak	= 718 min
Time interval	= 2 min	Hyd. volume	= 175,902 cuft
Inflow hyds.	= 5, 16, 17	Contrib. drain. area	= 7.430 ac



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Friday, 01 / 27 / 2023

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	69.8703	13.1000	0.8658	--------
3	0.0000	0.0000	0.0000	--------
5	79.2597	14.6000	0.8369	--------
10	88.2351	15.5000	0.8279	--------
25	102.6072	16.5000	0.8217	--------
50	114.8193	17.2000	0.8199	--------
100	127.1596	17.8000	0.8186	--------

File name: Grandview, MO.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
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	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: C:\Users\AE\Desktop\LEES SUMMIT PRINCETON DB.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	0.00	3.71	0.00	0.00	5.66	0.00	0.00	9.25
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	0.00	0.00	0.00