Willow Lakes

A.P. 16, Lot 3
New London Turnpike
Coventry, Rhode Island

Project Narrative and Drainage Analysis

Prepared for:

Willow Lake Properties, LLC
53 Greenwood Ave
Darien, CT 06820

Prepared by:

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3/2/21
REGISTERED
PROFESSIONAL ENGINEER

Project Number: 17.276.403

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Folder at the end of the report holds the full-size Project Watershed Maps (24x36)

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I. INTRODUCTION

This Stormwater Management Plan is prepared in support of a proposed assisted living, memory care, and independent living complex located on Coventry's Tax Assessor's Plat 16, Lot 3. The project sits on approximately 12.4 acres and is zoned R-20. Most recently, the property was utilized as a commercial gravel pit.

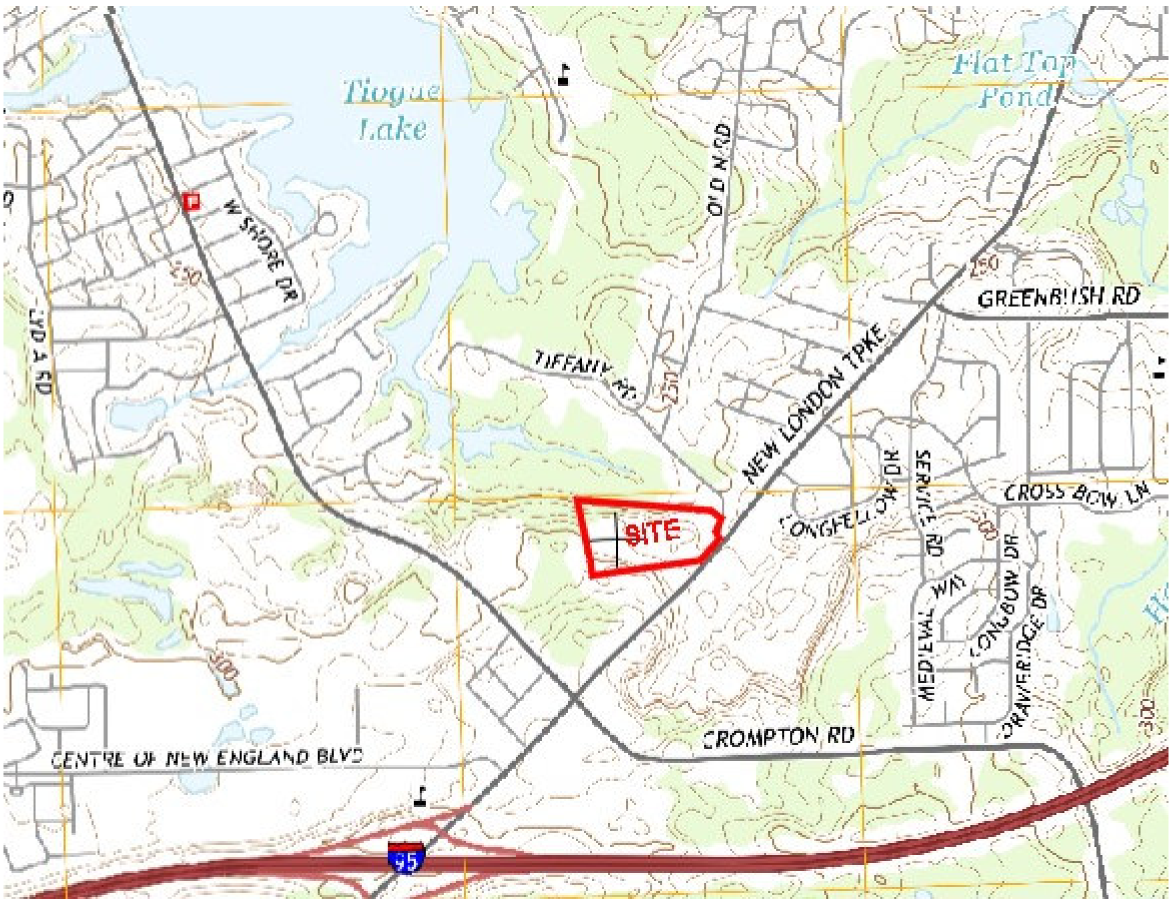

Figure 1: Site Locus
Reference: Google Maps

The current ground cover consists mostly of hardpacked gravel, sparse brush, and woods. There are no existing buildings on the site. The existing terrain slopes generally to the east, although there are substantial variations in the topography due to the previous gravel operations. While there are marked wetlands to the north of the site, no work has been proposed near the wetland or near the jurisdictional   According to RIDEM mapping, the site does not lie within any natural heritage areas or groundwater protection areas. The site does not lie within any of the town historic districts.

Soils and Rainfall

The soils within the subject project are defined by the Soil Survey of Rhode Island and comprised of HkC, Hinckley gravelly sandy loam with a hydrologic soil group (HSG) rating of A, HnC, Hinckley-Enfield complex with an HSG of A , and Udorthents, urban land complex with an HSG of A. Sub-classifications of these soils are considered suitable for community development. No water table or flooding problems are expected within the development area.

Figure 2: Soils Map

Reference: Soil Survey of Rhode Island United States Department of Agriculture Soil Conservation Service in cooperation with Rhode Island Agricultural Experiment Station, Issued July 1981

For this study, the storm events utilize the NRCS Type III precipitation distribution for a 24-hour duration storm (see Table 1). Additional information about the soils and rainfall can be found in Appendix I.

Storm Frequency	1-yr	10-yr	25-yr	100-yr
Rainfall Amount (in)	2.70	4.80	6.20	8.70

Table 1. Rainfall Amounts

Test Holes

Six test holes were prepared and analyzed throughout the site. The seasonable high groundwater was estimated to be at between 5 and 9 feet below the original grade. The soils were established to be mostly sand, loamy sand, and sandy loam. Ledge was not encountered in any of the test holes. Detailed results of the test holes are in Appendix I.

Flood Zone

The entire site is located within a Zone X flood zone, which is an area considered to be outside the 0.2% annual chance floodplain. (Figure 3: The National Flood Insurance Program Flood Insurance Rate Map (FIRM), Map Number 44003C0116H, effective date October 2, 2015.)

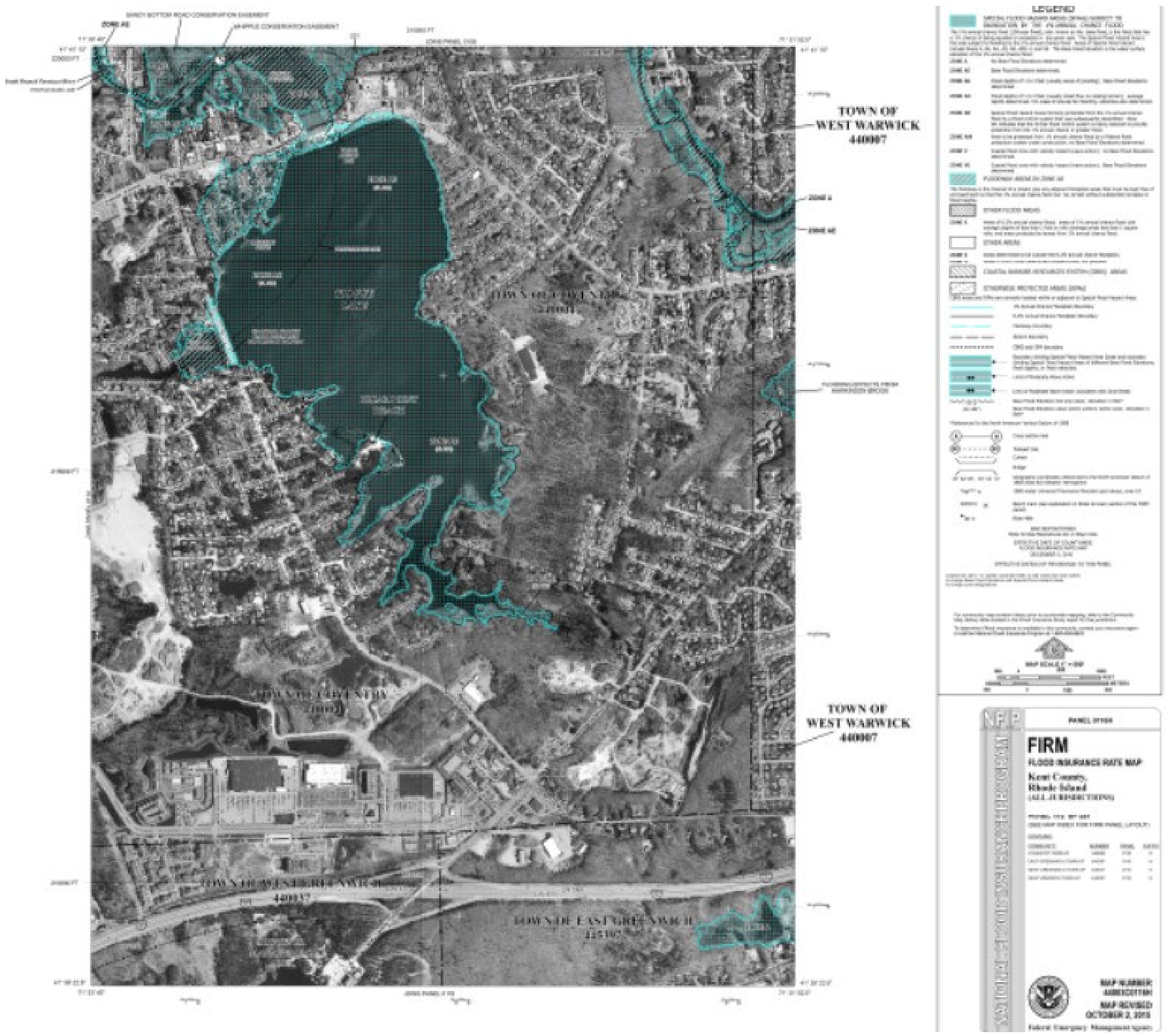

Figure 3: FEMA Firmette

II. PRE-DEVELOPMENT HYDROLOGIC CONDITIONS

Under existing conditions, the site was divided two watersheds (EX-A and EX-B). Each of the watersheds drain to a point of study (POS-A and POS-B). Watershed maps are provided in Appendix B.

Watershed EX-A consists of the southern portion of the site. Stormwater within the watershed flows in an easterly direction to an existing depression, which outlets via a pipe into an existing catch basin (POS-A). In addition, overflow from the depression and the surrounding areas drain into an existing catch basin (POS-A), located off-property, which is connected to the town drainage system. The predeveloped conditions of watershed EX-A consist of:

- Predominantly hardpacked gravel, which is the remnants of a former gravel operation on the site,
- existing dwellings, sheds, garages and associated driveways off the southeastern corner of the property (this area will not be altered in the proposed development)

- and wooded areas on the western and southern borders of the site.

Watershed EX-B covers the northern portion of the site. Stormwater within the watershed flows in a northerly direction toward a wetland, which is located offsite. The predeveloped conditions of watershed EX-B contain:

- the remaining hardpacked gravel area
- and the wooded area along the northern border of the property.

Existing Runoff Curve Number Data (CN) and Hydrologic Calculations

Hydraflow Hydrograph Extension for AutoCAD 2019, a TR-55 stormwater-based analysis for AutoCAD software was used to demonstrate existing peak runoff flows and volumes at the subject points of study using the Runoff Curve Numbers (CN), times of concentration (Tc), watershed areas and rainfall distribution. For this analysis, existing cover was considered woods, grass/woods combination in "good" condition or impervious. The details are provided in Appendix C and a brief summary is provided below.

<table>
<tr><th>Watershed ID</th><th>Land Cover</th><th>Area (ac)</th><th>CN</th></tr>
<tr><td rowspan="5">EX-A</td><td>Woods</td><td>2.00</td><td>30</td></tr>
<tr><td>Grass</td><td>0.72</td><td>39</td></tr>
<tr><td>Impervious
(including gravel)</td><td>9.78</td><td>98</td></tr>
<tr><td>Total / Composite CN</td><td>12.50</td><td>84</td></tr>
<tr><td>Tc (min)</td><td colspan="2">16.6</td></tr>
<tr><td rowspan="4">EX-B</td><td>Woods</td><td>1.93</td><td>30</td></tr>
<tr><td>Impervious
(including gravel)</td><td>1.05</td><td>98</td></tr>
<tr><td>Total / Composite CN</td><td>2.98</td><td>54</td></tr>
<tr><td>Tc (min)</td><td colspan="2">14.8</td></tr>
</table>

Table 2. Existing Watershed Descriptions

<table>
<tr><th colspan="5">Peak Flow (cfs)</th></tr>
<tr><th>Storm Frequency</th><th>1-year</th><th>10-year</th><th>25-year</th><th>100-year</th></tr>
<tr><td>EX-A (before it routes through existing depression)</td><td>13.72</td><td>33.45</td><td>47.04</td><td>71.30</td></tr>
<tr><td>EX-B</td><td>0.05</td><td>1.61</td><td>3.57</td><td>7.90</td></tr>
</table>

Table 3. Existing Runoff Summary

III. POST-DEVELOPMENT HYDROLOGIC CONDITIONS

The proposed project consists of two buildings that are attached, housing independent living, assisted living and memory care living facilities, a roadway, parking areas, utilities, and stormwater structures consistent with a residential development. Access to the site will be via a 30-foot wide road off New London Turnpike.

The site incorporates the use of underground infiltration chambers, sediment forebays, sand filters, and a detention/infiltration basin to provide stormwater quality treatment and to mitigate the increase in stormwater flow due to the development.

For this study, the proposed site was divided into seven watersheds (PR-A1a, PR-A1b, PR-A2a, PR-A2b, PR-A3, PR-A4, PR-B) and six roof subwatersheds (PR-R1a, PR-R1b, PR-R2a, PR-R2b, PR-R2c, and PR-R2d) and analyzed at two points of study, POS-A and POS-B.

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Watershed PR-A1a consists of some of the building, associated parking and surrounding wooded and grassed areas. The stormwater flows through the parking lots and is collected in catch basins and pipes and eventually drains into a diversion structure (DS-1). The diversion structure is designed to allow the water quality volume to flow into the sediment forebay and then into a sand filter (SF-A1). These drainage structures provide water quality treatment and recharge. Additional flow from the diversion structure and overflow from the sand filter drains into the detention/infiltration basin (Basin-A). The basin provides detention and recharge and slowly releases the stormwater via a connection to the existing town catch basin (POS-A). The roof areas (PR-R1a and PR-R1b) are collected in a downspout, which is connected to an underground storage and infiltration system. The system is designed to hold and infiltrate the water quality volume of the roof. The roof downspout system will be fitted with an overflow, which allows additional stormwater to be collected in the catch basins in the parking areas.

Watershed PR-A1b consists of the grassed areas that drain directly into the sediment forebay and sand filter (SF-1).

Watershed PR-A2a consists of the rest of the building, associated parking and surrounding wooded and grassed areas. The stormwater flows through the parking lots and is collected in catch basins and pipes and eventually drains into a diversion structure (DS-2). The diversion structure is designed to allow the water quality volume to flow into the sediment forebay and then into a sand filter (SF-A2). These drainage structures provide water quality treatment and recharge. Additional flow from the diversion structure and overflow from the sand filter drains into the detention/infiltration basin (Basin-A). The basin provides detention and recharge and slowly releases the stormwater via a connection to the existing town catch basin (POS-A). The roof areas (PR-R2a, PR-R2b, PR-R2c, and PR-R2d) are collected in a downspout, which is connected to an underground storage and infiltration system. The system is designed to hold and infiltrate the water quality volume of the roof. The roof downspout system will be fitted with an overflow, which allows additional stormwater to be collected in the catch basins in the parking areas.

Watershed PR-A2b consists of the grassed areas that drain directly into the sediment forebay and sand filter (SF-A2).

Watershed PR-A3 consists of the grassed areas that drain directly into the detention/infiltration basin.

Watershed PR-A4 consists of the existing developed, grassed, and woods area in the southeastern corner of the site. The existing impervious in this area will not change in the proposed development. The only modifications will be made to some grading in the grassed areas to allow for the access road to connect to New London Turnpike. This area will maintain the same stormwater flow patterns under proposed conditions as it does in existing. It will flow along New London Turnpike and be collected in the existing catch basin at the southeast corner of the site.

Watershed PR-B consists of the northern portion of the site. Most of the pre-existing conditions in the watershed will be maintained in the proposed development. Some grading and a wall are proposed in the watershed to allow for the proposed development. Stormwater will continue to flow in a northerly direction in the watershed to the existing wetland on the adjacent property (POS-B).

Proposed Runoff Curve Number Data (CN) and Hydrologic Calculations

Hydraflow Hydrograph Extension for AutoCAD 2019, a TR-55 stormwater based analysis for AutoCAD software was used to demonstrate the proposed peak runoff flows and volumes at the subject points of study using the Runoff Curve Numbers (CN), times of concentration (Tc), watershed areas and rainfall distribution. The details for the analysis are provided in Appendix D and a summary is provided below.

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Watershed ID	Land Cover	Area (ac)	CN
PR-A1a (to DS-1)	Woods	0.33	30
	Grass	0.59	39
	Impervious	1.75	98
	Total / Composite CN	2.67	77
	Tc (min)	17.6	
PR-R1a	Total / Composite CN	0.25	98
	Tc (min)	5.0	
PR-R1b	Total / Composite CN	0.34	98
	Tc (min)	5.0	
PR-A1b (to SF-A1)	Grass	0.17	39
	Total / Composite CN	0.17	39
	Tc (min)	6.0	
PR-A2a (to DS-2)	Woods	1.39	30
	Grass	2.10	39
	Impervious	1.60	98
	Total / Composite CN	5.09	55
	Tc (min)	21.0	
PR-R2a	Total / Composite CN	0.52	98
	Tc (min)	5.0	
PR-R2b	Total / Composite CN	0.23	98
	Tc (min)	5.0	
PR-R2c	Total / Composite CN	0.28	98
	Tc (min)	5.0	
PR-R2d	Total / Composite CN	0.45	98
	Tc (min)	5.0	
PR-A2b (to SF-A2)	Grass	0.33	39
	Total / Composite CN	0.33	39
	Tc (min)	13.1	
PR-A3 (to Basin-A)	Grass	0.95	39
	Total / Composite CN	0.95	39
	Tc (min)	9.2	
PR-A4 (to POS-A)	Woods	0.30	30
	Grass	1.01	39
	Impervious	0.95	98
	Total / Composite CN	2.26	63
	Tc (min)	14.1	
PR-B (to POS-B)	Woods	1.33	30
	Grass	0.61	39
	Total / Composite CN	1.94	33
	Tc (min)	10.8	

Table 4. Proposed Watershed Descriptions

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Peak Flow (cfs)				
Storm Frequency	**1-year**	**10-year**	**25-year**	**100-year**
PR-A1a	1.80	5.39	8.01	12.88
PR-R1a	0.63	1.13	1.46	2.06
PR-R1b	0.86	1.54	1.99	2.80
PR-A1b	0.00	0.00	0.03	0.21
PR-A2a	0.12	2.78	5.84	12.59
PR-R2a	1.31	2.35	3.05	4.28
PR-R2b	0.58	1.04	1.35	1.89
PR-R2c	0.70	1.27	1.64	2.31
PR-R2d	1.13	2.04	2.64	3.71
PR-A2b	0.00	0.01	0.07	0.35
PR-A3	0.00	0.02	0.20	1.09
PR-A4	0.37	2.51	4.42	8.25
PR-B	0.00	0.01	0.06	0.83

Table 5. Proposed Runoff Summary

IV. EXISTING / PROPOSED PEAK RUNOFF COMPARISON

Storm Frequency	**1-yr**		**10-yr**		**25-yr**		**100-yr**	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
POS-A	4.52	0.38	31.00	2.65	45.28	5.79	69.38	10.79
Difference (cfs)	-4.15		-28.35		-39.49		-58.59	
% Reduction	-92%		-91%		-87%		-84%	
POS-B	0.05	0.00	1.61	0.01	3.57	0.06	7.90	0.83
Difference (cfs)	-0.05		-1.61		-3.51		-7.07	
% Reduction	-100%		-100%		-98%		-90%	

Table 6. Existing vs. Proposed Runoff Summary

Storm Frequency	**1-yr**		**10-yr**		**25-yr**		**100-yr**	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
POS-A	38,495	6,968	110,474	44,386	163,556	79,329	262,187	155,896
Difference (cf)	-31,527		-66,088		-84,227		-106,291	
% Reduction	-82%		-60%		-51%		-41%	
POS-B	1,100	0	8,705	189	16,383	1,481	33,275	6,267
Difference (cf)	-1,100		-8,516		-14,902		-27,008	
% Reduction	-100%		-98%		-91%		-81%	

Table 7. Existing vs. Proposed Volume Summary

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V. STORMWATER QUALITY AND BMPS

The proposed development incorporates several BMPs throughout the site to maximize water quality and infiltration. Stormwater from the roof is collected in underground storage and infiltration chambers. Stormwater from the paved surfaces is collected in catch basins and piped into sediment forebays and sand filters, providing water quality treatment and infiltration. The final BMP is a proposed detention / infiltration basin, which provides even more infiltration and peak attenuation of the stormwater (an additional 2,365 cf of recharge volume is provided in Basin-A during the water quality storm).

The RISDISM classifies stormwater infiltration practices (underground storage and infiltration basins) as BMPs that are "good" for removal of phosphorus, metals, and pathogen pollutants. The manual classifies these BMPs as "fair" for nitrogen removal.

The RISDISM classifies filtering systems (sand filters) as BMPs that are "good" for removal of nitrogen, metals, and pathogen pollutants. The manual classifies these BMPs as "fair" for phosphorus removal.

Additional information about the BMPs and where each structure is used can be found in Section III of this report.

Recharge Volume (cf)			Water Quality Volume (cf)	
Watershed ID	**Required**	**Provided**	**Required**	**Provided**
PR-A1a & PR-A1b	3,813	4,890	4,767	4,933
PR-R1a	553	839	922	980
PR-R1b	730	1,140	1,217	1,226
TOTAL	**5,096**	**6,869**	**6,905**	**7,138**
PR-A2a & PR-A2b	3,487	4,586	4,359	4,615
PR-R2a	1,138	1,744	1,896	1,961
PR-R2b	497	771	829	899
PR-R2c	610	939	1,016	1,026
PR-R2d	978	1,509	1,630	1,634
TOTAL	**6,710**	**9,549**	**9,731**	**10,134**

Table 8. Recharge & Water Quality Volumes

VI. MINIMUM STORMWATER MANAGEMENT STANDARDS

The Rhode Island Stormwater Design and Installation Standards Manual (RISDISM) defines eleven (11) minimum design standards for stormwater management. Please refer to Appendix A for the completed Stormwater Management Checklist. Below is a summary of how this project addresses each of the design standards.

Standard 1: LID Site Planning and Design Strategies

The site utilizes sediment forebays, sand filters, a detention/infiltration basin, and roof underground storage/infiltration for stormwater quality and quantity management.

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Standard 2: Groundwater Recharge

Wherever possible on the site, the project has been designed to allow for groundwater recharge. The groundwater recharge requirements for the site have been exceeded using sand filters, a detention/infiltration basin, and roof underground storage/infiltration. The recharge calculations can be found in Appendix E and the modeling in Appendix F.

Standard 3: Water Quality

The stormwater quality for the site is achieved using sediment forebays, sand filters, a detention/infiltration basin, and roof underground storage/infiltration. The provided volume exceeds the required water quality volume for the site (Appendix F).

Standard 4: Conveyance and Natural Channel Protection

This standard requires that open drainage and pipe conveyance systems provide for at least the peak flow from the 10-year, 24-hour storm. For this project, the system has been designed for the peak 100-year storm. In addition, the basins have been fitted with low flow orifices to provide for the 24-hour extended detention.

Proposed Detention/Infiltration Basin A contributes to a cold water fishery and has been designed to infiltrate a portion of the Channel Protection Volume, while outletting a portion of the CPv through a stone trench. The channel protection volume calculations can be found in Appendix E.

Standard 5: Overbank Flood Protection

The detention/infiltration basin was designed to significantly decrease the 1- through 100-year peak discharge rates. Please refer to Section IV of this report.

Standard 6: Redevelopment and Infill Projects

This standard is not applicable to this project.

Standard 7: Pollution Prevention

A Pollution Prevention Plan has been provided as part of the Operation and Maintenance Plan (Appendix H).

Standard 8: LUHPPLs

This standard is not applicable to this project.

Standard 9: Illicit Discharges

No illicit discharges exist or are proposed.

Standard 10: Construction Erosion and Sediment Control

Please refer to the site plans for the short and long term SESC maintenance requirements. A stand-alone Soil Erosion and Sediment Control Plan is also provided.

Standard 11: Stormwater Management Operation and Maintenance

Please refer to Appendix H for the Stormwater Management Operation and Maintenance Plan.

VII. PIPE SIZING CALCULATIONS

As indicated previously in this report, the drainage pipes in the project were sized for the 100-year storm. Please refer to the Grading and Drainage Plan for detailed information about the drainage pipes throughout the site.

VIII. GROUNDWATER MOUNDING ANALYSIS

The Hantush method was used to perform a groundwater mounding analysis for each of the proposed infiltration systems. A water quality storm groundwater mounding analysis was prepared for the sand filters (A1 and A2) and the rooftop infiltration chambers. A 100-year storm analysis was prepared for Basin A to ensure the use of infiltration in this basin will not have any adverse effects on nearby structures or adverse hydraulic impact on the groundwater. Please refer to Appendix H for the groundwater mounding calculations.

IX. CONCLUSION

The stormwater design proposed for this development is in conformance with the Rhode Island Stormwater Design and Installation Standards Manual. Stormwater runoff will be significantly reduced as a result of the proposed development, greatly reducing any impacts to neighboring properties. The BMPs throughout the site provide the required recharge and stormwater quality requirements. This development provides a sound and safe stormwater design.

X. APPENDICES

Appendix A – Stormwater Management Checklist

Appendix B – Reduced Project Watershed Maps (8.5x11)

Appendix C – Pre-Development Hydraflow Stormwater Modeling Printouts

Appendix D – Post-Development Stormwater Modeling Printouts

Appendix E – BMP Sizing Calculation Worksheets

Appendix F – Hydraflow Water Quality Modeling Printouts

Appendix G – Pipe Sizing Calculations

Appendix H – Groundwater Mounding Analysis Calculations

Appendix I – Stormwater Management Operation and Maintenance Plan

Appendix J – Supporting Documentation
- Rainfall Data
- Soils Data & Evaluation Forms

Folder at rear holds the full-size Project Watershed Maps (24x36)

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Appendix A

Stormwater Management Checklist

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APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST AND LID PLANNING REPORT – STORMWATER DESIGN SUMMARY

PROJECT NAME **Willow Lakes**	**(RIDEM USE ONLY)** **STW/WQC File #:** **Date Received:**
TOWN **Coventry**	
BRIEF PROJECT DESCRIPTION: Development of 124 independent living units, a 48-bed assisted living facility and a 30-bed memory care unit with the associated driveway, sidewalks, and parking areas.	

Stormwater Management Plan (SMP) Elements – Minimum Standards

Submit four separately bound documents: Appendix A Checklist; Stormwater Site Planning, Analysis and Design Report with Plan Set/Drawings; Soil Erosion and Sediment Control (SESC) Plan, and Post Construction Operations and Maintenance (O&M) Plan. Please refer to Suggestions to Promote Brevity.

Note: **All stormwater construction projects must submit a Stormwater Management Plan (SMP). However, not every element listed below is required per the** RIDEM Stormwater Rules **and the** RIPDES Construction General Permit (CGP)**. This checklist will help identify the required elements to be submitted with an Application for Stormwater Construction Permit & Water Quality Certification.**

PART 1. PROJECT AND SITE INFORMATION

PROJECT TYPE (Check all that apply)				
☒ Residential	☐ Commercial	☐ Federal	☐ Retrofit	☐ Restoration
☒ Road	☐ Utility	☐ Fill	☐ Dredge	☐ Mine
☐ Other (specify):				

SITE INFORMATION
☒ Vicinity Map

INITIAL DISCHARGE LOCATION(S): The WQv discharges to: (You may choose more than one answer if several discharge points are associated with the project.) See Guidance to identify receiving waters.

☒ **Groundwater**	☐ **Surface Water**	☐ **MS4**
☐ GAA	☐ Isolated Wetland	☐ RIDOT
☒ GA	☐ Named Waterbody	☐ RIDOT Alteration Permit is Approved
☐ GB	☐ Unnamed Waterbody Connected to Named Waterbody	☒ Town
		☐ Other (specify):

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQ_v and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.

☒ Groundwater or Disconnected Wetland	☐ SRWP		
☐ Waterbody Name:	☐ Coldwater	☐ Warmwater	☐ Unassessed
☐ Waterbody ID:	☐ 4th order stream of pond 50 acres or more		
☐ TMDL for:	☐ Watershed of flood prone river (e.g., Pocasset River)		
☐ Contributes to a priority outfall listed in the TMDL	☐ Contributes stormwater to a public beach		
☐ 303(d) list – Impairment(s) for:	☐ Contributes to shellfishing grounds		

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQ_v and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.			
☐ Groundwater or Disconnected Wetland	☐ SRWP		
☒ Waterbody Name: Hawkinson Brook / Flat Top Pond	☒ Coldwater	☐ Warmwater	☐ Unassessed
☒ Waterbody ID: RI0006014R-01	☐ 4th order stream of pond 50 acres or more		
☒ TMDL for: Enterococcus Bacteria	☐ Watershed of flood prone river (e.g., Pocasset River)		
☐ Contributes to a priority outfall listed in the TMDL	☐ Contributes stormwater to a public beach		
☐ 303(d) list – Impairment(s) for:	☐ Contributes to shellfishing grounds		

PROJECT HISTORY		
☐ RIDEM Pre- Application Meeting	Meeting Date:	☐ Minutes Attached
☒ Municipal Master Plan Approval	Approval Date: 09/04/2019	☐ Minutes Attached
☐ Subdivision Suitability Required	Approval #:	
☐ Previous Enforcement Action has been taken on the property	Enforcement #:	
FLOODPLAIN & FLOODWAY See Guidance Pertaining to Floodplain and Floodways		
☐ Riverine 100-year floodplain: **FEMA FLOODPLAIN FIRMETTE** has been reviewed and the 100-year floodplain is on site		
☐ Delineated from FEMA Maps		
NOTE: Per Rule 250-RICR-150-10-8-1.1(B)(5)(d)(3), provide volumetric floodplain compensation calculations for cut and fill/displacement calculated by qualified professional		
☐ Calculated by Professional Engineer		
☐ Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY): Amount of Cut (CY):	
☐ Restrictions or modifications are proposed to the flow path or velocities in a floodway		
☐ Floodplain storage capacity is impacted		
☒ Project area is not within 100-year floodplain as defined by RIDEM		

CRMC JURISDICTION
☐ CRMC Assent required
☐ Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP:
☐ Sea level rise mitigation has been designed into this project

LUHPPL IDENTIFICATION - MINIMUM STANDARD 8:
1. OFFICE OF WASTE MANAGEMENT (OWM)

	☐ Known or suspected releases of HAZARDOUS MATERIAL are present at the site (Hazardous Material is defined in Rule 1.4(A)(33) of 250-140-30-1 of the RIDEM Rules and Regulations for Investigation and Remediation of Hazardous Materials (the Remediation Regulations))		**RIDEM CONTACT:**
	☐ Known or suspected releases of PETROLEUM PRODUCT are present at the site (Petroleum Product as defined in Rule 1.5(A)(84) of 250-140-25-1 of the RIDEM Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials)		
	☐ This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities		**SITE ID#:**
		☐ CERCLIS/Superfund (NPL)	
		☐ State Hazardous Waste Site (SHWS)	
		☐ Environmental Land Usage Restriction (ELUR)	
		☐ Leaking Underground Storage Tank (LUST)	
		☐ Closed Landfill	

Note: If any boxes in 1 above are checked, the applicant must contact the RIDEM OWM Project Manager associated with the Site to determine if subsurface infiltration of stormwater is allowable for the project. Indicate if the infiltration corresponds to "Red," "Yellow" or "Green" as described in Section 3.2.8 of the RISDISM Guidance (Subsurface Contamination Guidance). Also, note and reference approval in PART 3, Minimum Standard 2: Groundwater Recharge/Infiltration.

2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 "LUHPPLS," THE SITE IS/HAS:

	☐ Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php	
	☐ Auto Fueling Facility (e.g., gas station)	
	☐ Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area	
	☐ Road Salt Storage and Loading Areas (exposed to rainwater)	
	☐ Outdoor Storage and Loading/Unloading of Hazardous Substances	

3. STORMWATER INDUSTRIAL PERMITTING

	☐ The site is associated with existing or proposed activities that are considered Land Uses with Higher Potential Pollutant Loads (LUHPPLS) (see RICR 8.14.C)	Activities: Sector:
	☐ Construction is proposed on a site that is subject to THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.	MSGP permit #
	☐ Additional stormwater treatment is required by the MSGP Explain:	

REDEVELOPMENT STANDARD – MINIMUM STANDARD 6		
☒ Pre-Construction Impervious Area		
10.83 ac	☒ Total Pre-Construction Impervious Area (**TIA**)	
15.48 ac	☒ Total Site Area (**TSA**)	
	☐ Jurisdictional Wetlands (**JW**)	
	☐ Conservation Land (**CL**)	
☒ Calculate the Site Size (defined as contiguous properties under same ownership)		
15.48 ac	☒ Site Size (**SS**) = (**TSA**) – (**JW**) – (**CL**)	
	☐ (**TIA**) / (**SS**) = 10.83/15.48 = 0.70	☒ (**TIA**) / (**SS**) >**0.4**?
☐ YES, Redevelopment (Existing surface is Gravel, Not a Redevelopment)		

PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1
(NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS)

This section may be deleted if not required.	
Note: A written description must be provided specifying why each method is not being used or is not applicable at the Site. Appropriate answers may include: • Town requires … (state the specific local requirement) • Meets Town's dimensional requirement of … • Not practical for site because … • Applying for waiver/variance to achieve this (pending/approved/denied) • Applying for wavier/variance to seek relief from this (pending/approved/denied)	
A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS ☒ Sensitive resource areas and site constraints are identified (required) ☒ Local development regulations have been reviewed (required) ☒ All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction ☐ Conservation Development or another site design technique has been incorporated to protect open space and pre-development hydrology. **Note:** If Conservation Development has been used, check box and skip to Subpart C ☒ As much natural vegetation and pre-development hydrology as possible has been maintained	**IF NOT IMPLEMENTED, EXPLAIN HERE**

B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS ☒ Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies ☒ Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B) ☒ Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA's) ☒ Development sites and building envelopes have been positioned outside of floodplains ☒ Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features ☒ Development sites and building envelopes have been located to minimize impacts to steep slopes (≥15%) ☐ Other (describe):	There are wetlands adjacent, but not within, the property. The development has been proposed to be outside of the 50-foot buffer.
C) MINIMIZE CLEARING AND GRADING ☒ Site clearing has been restricted to <u>minimum area needed</u> for building footprints, development activities, construction access, and safety. ☒ Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities) ☐ Protection for stands of trees and individual trees and their root zones to be preserved has been specified, and such protection extends at least to the tree canopy drip line(s) ☐ Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent	Site does not disturb any public trees
D) REDUCE IMPERVIOUS COVER ☐ Reduced roadway widths (≤22 feet for ADT ≤ 400; ≤ 26 feet for ADT 400 - 2,000) ☐ Reduced driveway areas (length minimized via reduced ROW width (≤ 45 ft.) and/or reduced (or absolute minimum) front yard setback; width minimized to ≤ 9 ft. wide one lane; ≤ 18 ft. wide two lanes; shared driveways; pervious surface) ☐ Reduced building footprint: Explain approach: ☐ Reduced sidewalk area (≤ 4 ft. wide; one side of the street; unpaved path; pervious surface) ☐ Reduced cul-de-sacs (radius < 45 ft; vegetated island; alternative turn-around) ☐ Reduced parking lot area: Explain approach ☐ Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc. ☐ Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance) ☐ Other (describe):	The roadway width has been set in accordance with town standards. Sidewalks are proposed as appropriate to promote a safe development. Islands within parking areas are to be landscaped.
E) DISCONNECT IMPERVIOUS AREA ☐ Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible ☐ Residential street edges allow side-of-the-road drainage into vegetated open swales ☐ Parking lot landscaping breaks up impervious expanse AND accepts runoff ☐ Other (describe):	Rooftop runoff is directed into underground infiltration / storage areas. All other impervious surfaces (roadways and parking lots) are directed into sediment forebays and sand filters.
F) MITIGATE RUNOFF AT THE POINT OF GENERATION ☒ Small-scale BMPs have been designated to treat runoff as close as possible to the source	All rooftop runoff is directed into underground storage/infiltration. There are several proposed around the building to collect rooftop runoff closest to the source.

G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION ☐ Low-maintenance landscaping has been proposed using native species and cultivars ☐ Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan ☐ Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots	Landscape plan to provide native vegetation.
H) RESTORE STREAMS/WETLANDS ☐ Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands ☐ Removal of invasive species ☐ Other	N/A

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2		
YES	**NO**	
☒	☐	The project has been designed to meet the groundwater recharge standard.
☐	☐	If “No,” the justification for groundwater recharge criterion waiver has been explained in the Narrative (e.g., threat of groundwater contamination or physical limitation), if applicable (see RICR 8.8.D);
☐	☐	Your waiver request has been explained in the Narrative, if applicable.
☐	☒	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
☐	☐	If “Yes,” has approval for infiltration by the Office of Waste Management Site Project Manager, per Part 1, Minimum Standard 8, been requested?

TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2)
(Add or Subtract Rows as Necessary)

Design Point	Impervious Area Treated (sq ft)	Total Re_v Required (cu ft)	LID Stormwater Credits (see RISDISM Section 4.6.1) Portion of Re_v directed to a QPA (cu ft)	Recharge Required by Remaining BMPs (cu ft)	Recharge Provided by BMPs (cu ft)
POS-A	246,120	11,806		11,806	16,418
POS-B	0	N/A			
TOTALS:					

Notes:
1. Only BMPs listed in RISDISM Table 3-5 “List of BMPs Acceptable for Recharge” may be used to meet the recharge requirement.
2. Recharge requirement must be satisfied for each waterbody ID.

☒ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):

Willow Lakes Project Narrative and Drainage Analysis, Appendix E

WATER QUALITY – MINIMUM STANDARD 3		
YES	**NO**	
☒	☐	Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
☐	☐	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
☒	☐	If "Yes," either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
☐	☐	If "Yes," either TR-55 or TR-20 was used to calculate WQv; and,
☐	☐	If "No," the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
☐	☐	Not Applicable
☒	☐	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
☐	☒	Does this project propose an increase of impervious cover to a receiving water body with impairments? If "Yes," please indicate below the method that was used to address the water quality requirements of no further degradation to a low-quality water.
☐	☒	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
☒	☐	The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
☐	☒	BMPs are proposed that are on the approved technology list . If "Yes," please provide all required worksheets from the manufacturer.
☐	☒	Additional pollutant-specific requirements and/or pollutant removal efficiencies are applicable to the site as the result of a TMDL, SAMP, or other watershed-specific requirements. If "Yes," please describe:

TABLE 3-1: Summary of Water Quality (see RICR 8.9)					
Design Point and WB ID	**Impervious area treated (sq ft)**	**Total WQ$_v$ Required (cu ft)**	**LID Stormwater Credits** (see RICR 8.18) **WQv directed to a QPA (cu ft)**	**Water Quality Treatment Remaining (cu ft)**	**Water Quality Provided by BMPs (cu ft)**
PR-A1a & PR-A1b	76,264	4,767			4,933
PR-A2a & PR-A2b	69,745	4,359			4,615
Roof Areas	90,120	7,510			7,726
TOTALS:	236,129	16,636			17,294

Notes:
1. Only BMPs listed in RICR 8.20 and 8.25 or the Approved Technologies List of BMPs is Acceptable for Water Quality treatment.
2. For each Design Point, the Water Quality Volume Standard must be met for each Waterbody ID.

☒ YES ☐ NO	This project has met the setback requirements for each BMP. If "No," please explain:

☒ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):
See Willow Lakes Project Narrative and Drainage Analysis, Section V., Appendix E, Appendix F

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4			
YES	**NO**		
☒	☐	Is this standard waived? If "Yes," please indicate one or more of the reasons below:	
		☐	The project directs discharge to a large river (i.e., 4th-order stream or larger. See RISDISM Appendix I for State-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
		☐	The project directs is a small facility with impervious cover of less than or equal to 1 acre.
		☒	The project has a post-development peak discharge rate from the facility that is less than 2 cfs for the 1-year, 24-hour Type III design storm event (prior to any attenuation). (Note: LID design strategies can greatly reduce the peak discharge rate).
☒	☐	Conveyance and natural channel protection for the site have been met. If "No,' explain why:	

TABLE 4-1: Summary of Channel Protection Volumes (see RICR 8.10)					
Design Point	**Receiving Water Body Name**	**Coldwater Fishery? (Y/N)**	**Total CPv Required (cu ft)**	**Total CPv Provided (cu ft)**	**Average Release Rate Modeled in the 1-yr storm (cfs)**
POS-A	Hawkinson Brook / Flat Top Pond Note 2,989.9 cf of the CPv is infiltrated through Basin A. 4,452 cf is routed through a stone trench to an outlet control structure.	Y	7,441.9	7,441.9	0.05
TOTALS:					

Note: The Channel Protection Volume Standard must be met in each waterbody ID.

☒ YES ☐ NO	The CPv is released at roughly a uniform rate over a 24-hour duration (see examples of sizing calculations in Appendix D of the RISDISM).
☐ YES ☒ NO	Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If "Yes," please indicate restrictions and solutions below.

☒ Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).

Willow Lakes Project Narrative and Drainage Analysis, Appendix E

OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5			
YES	**NO**		
☐	☒	Is this standard waived? If yes, please indicate one or more of the reasons below:	
		☐	The project directs discharge to a large river (i.e., 4th-order stream or larger. See Appendix I for state-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
		☐	A Downstream Analysis (see RICR 8.11.D and E) indicates that peak discharge control would not be beneficial or would exacerbate peak flows in a downstream tributary of a particular site (e.g., through coincident peaks).
☐	☒	Does the project flow to an MS4 system or subject to other stormwater requirements? If "Yes," indicate as follows:	
		☐	RIDOT
		☒	Other (specify): Town of Coventry
Note: The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT's regulations indicate that post-volumes must be **less** than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.			
		Indicate below which model was used for your analysis. ☒ TR-55 ☐ TR-20 ☐ HydroCAD ☐ Bentley/Haestad ☐ Intellisolve ☒ Other (Specify): Hydraflow Hydrograph Extension for AutoCAD	
YES	**NO**		
☒	☐	Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If "No," please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):	
☐	☒	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"	
☐	☐	Are the areas modeled as "present condition" for both pre- and post-development analysis?	
☐	☐	Are the off-site areas shown on the subwatershed maps?	
☒	☐	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?	
☐	☒	Is a Downstream Analysis required (see RICR 8.11.E.1)?	
☐	☐	Calculate the following:	
455,309 cf		☒	Area of disturbance within the sub-watershed (areas)
54%		☐	Impervious cover (%)
☐	☒	Is a dam breach analysis required (earthen embankments over six (6) feet in height, or a capacity of 15 acre-feet or more, and contributes to a significant or high hazard dam)?	
☒	☐	Does this project meet the overbank flood protection standard?	

Table 5-1 Hydraulic Analysis Summary								
Subwatershed (Design Point)	**1.2" Peak Flow** (cfs) **		**1-yr Peak Flow** (cfs)		**10-yr Peak Flow** (cfs)		**100-yr Peak Flow** (cfs)	
	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
POS-A	2.21	0.00	4.52	0.38	31.00	2.65	69.38	10.79
POS-B	0.0	0.00	0.05	0.00	1.61	0.01	7.90	0.83
TOTALS:	2.21	0.00	4.57	0.38	32.61	2.66	77.28	11.62

** Utilize modified curve number method or split pervious /impervious method in HydroCAD.

Note: The hydraulic analysis must demonstrate no impact to each individual subwatershed DP unless each DP discharges to the same wetland or water resource.

Indicate as follows where the pertinent calculations and/or information for the items above are provided	**Name of report/document, page numbers, appendices, etc.**
Existing conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, and water surface elevations showing methodologies used and supporting calculations.	Willow Lakes Project Narrative and Drainage Analysis, Section IV and Appendix C
Proposed conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, water surface elevations, and routing showing the methodologies used and supporting calculations.	Willow Lakes Project Narrative and Drainage Analysis, Section IV and Appendix D
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	Willow Lakes Project Narrative and Drainage Analysis, Section IV and Appendix E, Appendix F
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	Willow Lakes Project Narrative and Drainage Analysis, Section IV and Appendix D

Table 5-2 Summary of Best Management Practices											
BMP ID	**DP #**	**BMP Type** (e.g., bioretention, tree filter)	**BMP Functions**					**Bypass Type**	**Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4**		
			Pre-Treatment (Y/N/ NA)	Re_v (cf)	WQ_v (cf)	CP_v (Y/N/ NA)	Overbank Flood Reduction (Y/N/NA)	External (E) Internal (I) or NA	Yes/ No	Technical Justification (Design Report page number)	Distance Provided
SF-A1	POS-A	Sediment forebay / sand filter	Y	5,097	5,141	NA	Y	E	Y	Down-gradient from building structure	231 ft
SF-A2	POS-A	Sediment forebay / sand filter	Y	4,780	4,812	NA	Y	E	Y	Down-gradient from building structure	251 ft
UG-R1a	POS-A	Underground storage / detention / infiltration	NA	839	980	NA	N	E	Y	Down-gradient from building structure	20 ft

Table 5-2 Summary of Best Management Practices											
BMP ID	**DP #**	**BMP Type** (e.g., bioretention, tree filter)	**BMP Functions**					**Bypass Type**	**Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4**		
			Pre-Treatment (Y/N/NA)	Re_v (cf)	WQ_v (cf)	CP_v (Y/N/NA)	Overbank Flood Reduction (Y/N/NA)	External (E) Internal (I) or NA	Yes/No	Technical Justification (Design Report page number)	Distance Provided
UG-R1b	POS-A	Underground storage / detention / infiltration	NA	1,140	1,226	NA	N	E	Y	Down-gradient from building structure	16 ft
UG-R2a	POS-A	Underground storage / detention / infiltration	NA	1,744	1,961	NA	N	E	Y	Down-gradient from building structure	16 ft
UG-R2b	POS-A	Underground storage / detention / infiltration	NA	771	899	NA	N	E	Y	Down-gradient from building structure	16 ft
UG-R2c	POS-A	Underground storage / detention / infiltration	NA	939	1,026	NA	N	E	Y	Down-gradient from building structure	21 ft
UG-R2d	POS-A	Underground storage / detention / infiltration	NA	1,509	1,634	NA	N	E	Y	Down-gradient from building structure	47 ft
Basin-A	POS-A	Detention / infiltration basin	NA	2,365	NA	Y	Y	NA	Y	Down-gradient from building structure	300 ft
		TOTALS:		19,184	17,679						

Table 5.3 Summary of Soils to Evaluate Each BMP									
			Soils Analysis for Each BMP						
DP #	BMP ID	BMP Type (e.g., bioretention, tree filter)	Test Pit ID# and Ground Elevation		SHWT Elevation (ft)	Bottom of Practice Elevation* (ft)	Separation Distance Provided (ft)	Hydrologic Soil Group (A, B, C, D)	Exfiltration Rate Applied (in/hr)
			Primary	Secondary					
POS-A	SF-A1	Sediment forebay / sand filter	2014		258.9	267.50	8.60	A	2.41
POS-A	SF-A2	Sediment forebay / sand filter	2013		260.0	267.50	7.50	A	2.41
POS-A	UG-R1a	Underground storage / detention / infiltration	2007		271.2	276.12	4.92	A	8.27
POS-A	UG-R1b	Underground storage / detention / infiltration	2008		264.1	275.93	11.83	A	8.27
POS-A	UG-R2a	Underground storage / detention / infiltration	2009		270.8	276.06	5.26	A	8.27
POS-A	UG-R2b	Underground storage / detention / infiltration	2010		270.9	276.30	5.40	A	8.27
POS-A	UG-R2c	Underground storage / detention / infiltration	2011		271.8	277.17	5.37	A	2.41
POS-A	UG-R2d	Underground storage / detention / infiltration	2012		270.7	274.82	4.12	A	2.41
POS-A	Basin-A	Detention / infiltration basin	2005		260.2	266.00	5.80	A	2.41
		TOTALS:							

* For underground infiltration systems (UICs) bottom equals bottom of stone, for surface infiltration basins bottom equals bottom of basin, for filters bottom equals interface of storage and top of filter layer

LAND USES WITH HIGHER POTENTIAL POLLUTANTS LOADS (LUHPPLs) – MINIMUM STANDARD 8			
YES	**NO**	**N/A**	
☐	☒	☒	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.

☐	☐	☐	Are these activities already covered under an MSGP? If "No," please explain if you have applied for an MSGP or intend to do so?
☐	☐	☐	List the specific BMPs that are proposed for this project that receive stormwater from LUHPPL drainage areas. These BMP types must be listed in RISDISM Table 3-3, "Acceptable BMPs for Use at LUHPPLs." Please list BMPs:
☐	☐	☐	Additional BMPs, or additional pretreatment BMP's if any, that meet RIPDES MSGP requirements; Please list BMPs:
			Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).

ILLICIT DISCHARGES – MINIMUM STANDARD 9			
Illicit discharges are defined as unpermitted discharges to Waters of the State that do not consist entirely of stormwater or uncontaminated groundwater, except for certain discharges identified in the RIPDES Phase II Stormwater General Permit.			
YES	**NO**	**N/A**	
☐	☐	☒	Have you checked for illicit discharges?
☐	☐	☒	Have any been found and/or corrected? If "Yes," please identify.
☐	☐	☒	Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10				
YES	**NO**	**N/A**		
☒	☐	☐	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?	
☒	☐	☐	Have you provided a **separately-bound** document based upon the SESC Template? If yes, proceed to Minimum Standard 11 (the following items can be assumed to be addressed).	
			If "No," include a document with your submittal that addresses the following elements of an SESC Plan:	
			☐	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
			☐	Provide Natural Buffers and Maintain Existing Vegetation
			☐	Minimize Area of Disturbance
			☐	Minimize the Disturbance of Steep Slopes
			☐	Preserve Topsoil
			☐	Stabilize Soils
			☐	Protect Storm Drain Inlets
			☐	Protect Storm Drain Outlets
			☐	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
			☐	Establish Perimeter Controls and Sediment Barriers
			☐	Divert or Manage Run-On from Up-Gradient Areas
			☐	Properly Design Constructed Stormwater Conveyance Channels
			☐	Retain Sediment On-Site
			☐	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
			☐	Apply Construction Activity Pollution Prevention Control Measures
			☐	Install, Inspect, and Maintain Control Measures and Take Corrective Actions

	☐	Qualified SESC Plan Preparer's Information and Certification
	☐	Operator's Information and Certification; if not known at the time of application, the Operator must certify the SESC Plan upon selection and prior to initiating site activities
	☐	Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required

STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9		
Operation and Maintenance Section		
YES	**NO**	
☒	☐	Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?
☒	☐	Have you provided a **separately-bound** Operation and Maintenance Plan for the site and for all of the BMPs, and does it address each element of RICR 8.17 and RISDISM Appendix C and E?
☒	☐	Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If "No," why not?
☒	☐	Is the property owner or homeowner's association responsible for the stormwater maintenance of all BMP's? If "No," you must provide a legally binding and enforceable maintenance agreement (see RISDISM Appendix E, page 26) that identifies the entity that will be responsible for maintenance of the stormwater. Indicate where this agreement can be found in your report (i.e., name of report/document, page numbers, appendices, etc.).
☒	☐	Do you anticipate that you will need legal agreements related to the stormwater structures? (e.g. off-site easements, deed restrictions, covenants, or ELUR per the Remediation Regulations). If "Yes," have you obtained them? Or please explain your plan to obtain them:
☒	☐	Is stormwater being directed from public areas to private property? If "Yes," note the following: <u>Note</u>: This is not allowed unless a funding mechanism is in place to provide the finances for the long-term maintenance of the BMP and drainage, or a funding mechanism is demonstrated that can guarantee the long-term maintenance of a stormwater BMP by an individual homeowner.
Pollution Prevention Section		
☐	☒	Designated snow stockpile locations?
☒	☐	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
☒	☐	Asphalt-only based sealants?
☒	☐	Pet waste stations? (<u>Note</u>: If a receiving water has a bacterial impairment, and the project involves housing units, then this could be an important part of your pollution prevention plan).
☒	☐	Regular sweeping? Please describe: Annual
☒	☐	De-icing specifications, in accordance with RISDISM Appendix G. (NOTE: If the groundwater is GAA, or this area contributes to a drinking water supply, then this could be an important part of your pollution prevention plan).
☐	☒	A prohibition of phosphate-based fertilizers? (<u>Note</u>: If the site discharges to a phosphorus impaired waterbody, then this could be an important part of your pollution prevention plan).

PART 4. SUBWATERSHED MAPPING AND SITE-PLAN DETAILS

Existing and Proposed Subwatershed Mapping (REQUIRED)		
YES	**NO**	
☒	☐	Existing and proposed drainage area delineations

☒	☐	Locations of all streams and drainage swales
☒	☐	Drainage flow paths, mapped according to the DEM *Guidance for Preparation of Drainage Area Maps* (included in RISDISM Appendix K)
☒	☐	Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
☒	☐	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
☒	☐	Mapped seasonal high-water-table test pit locations
☒	☐	Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs
☒	☐	Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans
☒	☐	Mapped bedrock outcrops adjacent to any infiltration BMP
☒	☐	Soils were logged by a:
	☒	DEM-licensed Class IV soil evaluator Name: Kevin Fetzer
	☐	RI-registered P.E. Name:

Subwatershed and Impervious Area Summary

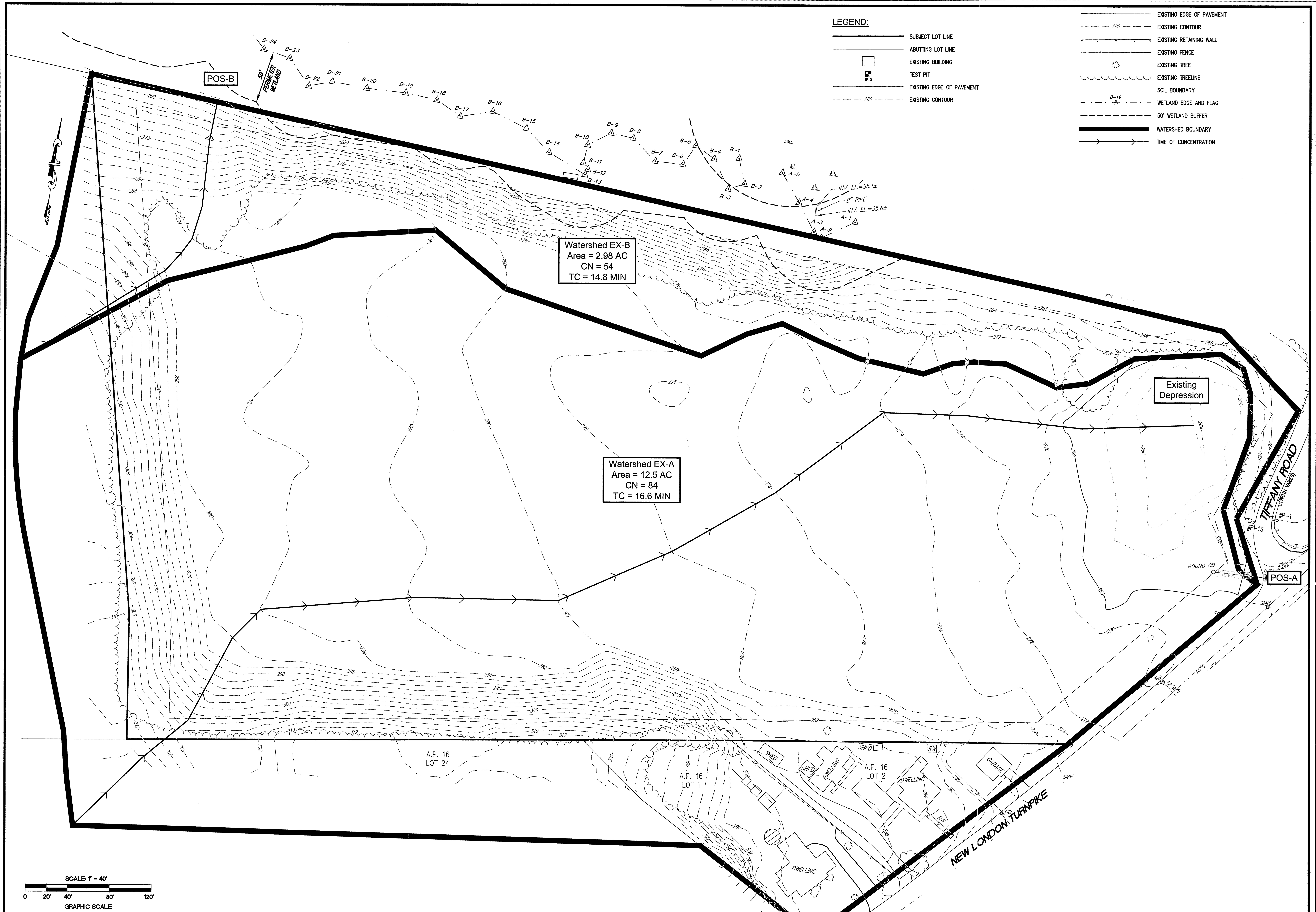
Subwatershed (area to each design point)	First Receiving Water ID or MS4	Area Disturbed (units)	Existing Impervious (units)	Proposed Impervious (units)
PR-A1a	Groundwater	2.24 ac	1.80 ac	1.75 ac
PR-R1a	Groundwater	0.25 ac	0.25 ac	0.25 ac
PR-R1b	Groundwater	0.34 ac	0.34 ac	0.34 ac
PR-A1b	Groundwater	0.17 ac	0	0
PR-A2a	Groundwater	4.82 ac	3.69 ac	1.60 ac
PR-R2a	Groundwater	0.52 ac	0.52 ac	0.52 ac
PR-R2b	Groundwater	0.23 ac	0.23 ac	0.23 ac
PR-R2c	Groundwater	0.28 ac	0.28 ac	0.28 ac
PR-R2d	Groundwater	0.45 ac	0.45 ac	0.45 ac
PR-A2b	Groundwater	0.32 ac	0	0
PR-A3	Groundwater	0.96 ac	0	0
PR-A4	Groundwater	2.26 ac	0.23 ac	0
PR-B	Groundwater	0.48 ac	0	0
TOTALS:		13.32 ac	7.79 ac	5.42 ac

Site Construction Plans (Indicate that the following applicable specifications are provided)		
YES	**NO**	
☒	☐	Existing and proposed plans (scale not greater than 1" = 40') with North arrow
☒	☐	Existing and proposed site topography (with 1 or 2-foot contours); 10-foot contours accepted for off-site areas
☒	☐	Boundaries of existing predominant vegetation and proposed limits of clearing
☒	☐	Site Location clarification
☒	☐	Location and field-verified boundaries of resource protection areas such as: ► freshwater and coastal wetlands, including lakes and ponds ► coastal shoreline features Perennial and intermittent streams, in addition to Areas Subject to Storm Flowage (ASSFs)
☒	☐	All required setbacks (e.g., buffers, water-supply wells, septic systems)
☐	☐	Representative cross-section and profile drawings, and notes and details of structural stormwater management practices and conveyances (i.e., storm drains, open channels, swales, etc.), which include: ► Location and size of the stormwater treatment practices (type of practice, depth, area). Stormwater treatment practices (BMPs) must have labels that correspond to RISDISM Table 5-2; ► Design water surface elevations (applicable storms); ► Structural details of outlet structures, embankments, spillways, stilling basins, grade-control structures, conveyance channels, etc.; ► Existing and proposed structural elevations (e.g., inverts of pipes, manholes, etc.); ► Location of floodplain and, if applicable, floodway limits and relationship of site to upstream and downstream properties or drainage that could be affected by work in the floodplain; ► Planting plans for structural stormwater BMPs, including species, size, planting methods, and maintenance requirements of proposed planting
☒	☐	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report and corresponding water tables
☒	☐	Mapping of any OWM-approved remedial actions/systems (including ELURs)
☒	☐	Location of existing and proposed roads, buildings, and other structures including limits of disturbance; ► Existing and proposed utilities (e.g., water, sewer, gas, electric) and easements; ► Location of existing and proposed conveyance systems, such as grass channels, swales, and storm drains, and location(s) of final discharge point(s) (wetland, waterbody, etc.); ► Cross sections of roadways, with edge details such as curbs and sidewalks; ► Location and dimensions of channel modifications, such as bridge or culvert crossings
☒	☐	Locations, cross sections, and profiles of all stream or wetland crossings and their method of stabilization

Appendix B

Reduced Project Watershed Maps

250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
p. (401) 921-3344 f. (401) 921-3303 www.MillstoneEng.com



NO.	DATE	REVISION

MILLSTONE ENGINEERING, P.C.
CIVIL ENGINEERING • LAND PLANNING
250 Centerville Road, Building E-12
Warwick, Rhode Island 02886
790 Aquidneck Avenue, Building B
Middletown, Rhode Island 02842
www.MillstoneEng.com
p. (401) 921-3344 f. (401) 921-3303

EXISTING WATERSHED PLAN

WILLOW LAKES

A.P. 16, LOT 3
NEW LONDON TURNPIKE
COVENTRY, RI

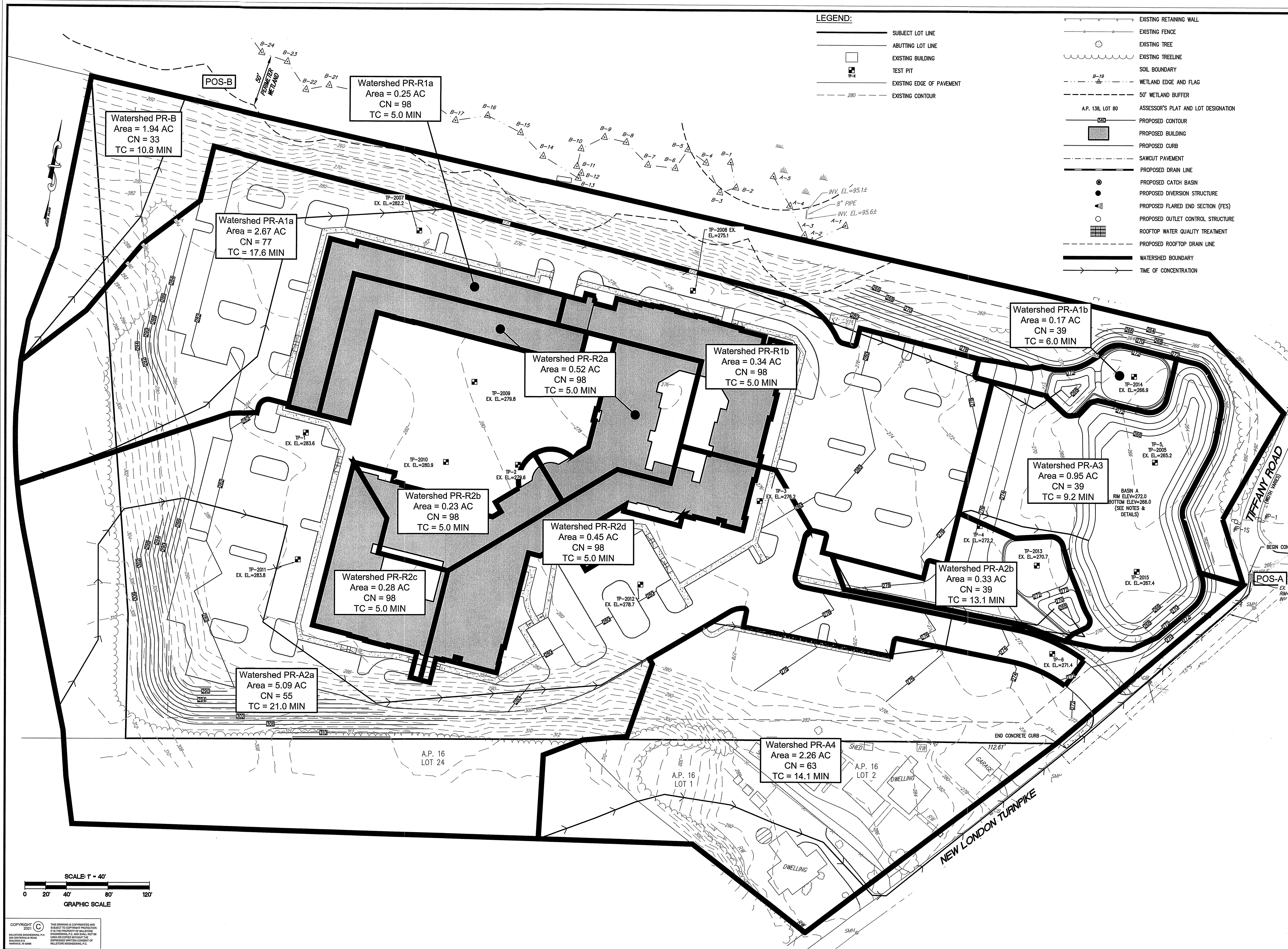
PREPARED FOR:
WILLOW LAKE PROPERTIES, LLC

1" = 40'
FEBRUARY 2021

Drawn By: J.S.C.
Checked By: J.C.H.

Sheet
1
of 3

FILE NO.: 17.276.403



NO.	DATE	REVISION

MILLSTONE ENGINEERING, P.C.
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250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
790 Aquidneck Avenue, Building B, Middletown, Rhode Island 02842
www.MillstoneEng.com
p. (401) 921-3344 f. (401) 921-3303

PROPOSED WATERSHED PLAN

WILLOW LAKES

A.P. 16, LOT 3
NEW LONDON TURNPIKE
COVENTRY, RI

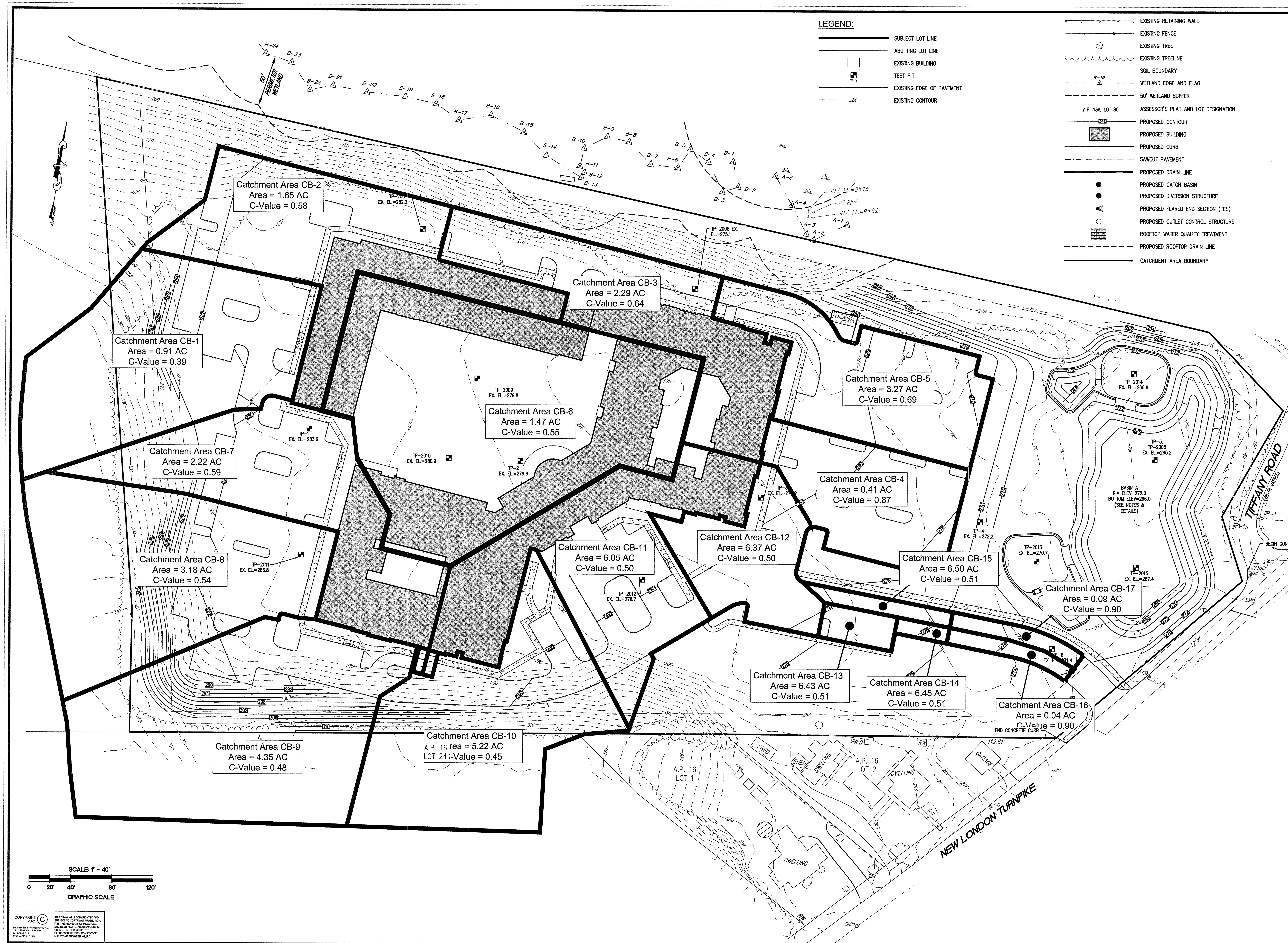
PREPARED FOR:
WILLOW LAKE PROPERTIES, LLC

1" = 40'
FEBRUARY 2021

Drawn By: J.S.C.
Checked By: J.C.H.

Sheet 2 of 3

FILE NO.: 17.276.403



NO.	DATE	REVISION

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250 Centerville Road, Building E-12 Warwick, Rhode Island 02886
790 Aquidneck Avenue, Building B Middletown, Rhode Island 02842
www.MillstoneEng.com
p. (401) 921-3344 f. (401) 921-3303

CATCHMENT AREA PLAN

WILLOW LAKES

A.P. 16, LOT 3
NEW LONDON TURNPIKE
COVENTRY, RI

PREPARED FOR:
WILLOW LAKE PROPERTIES, LLC

FEBRUARY 2021

Drawn By: J.S.C.
Checked By: J.C.H.
Sheet 3 of 3

FILE NO.: 17.276.403

Appendix C

Pre-Development Hydraflow Stormwater Modeling Printouts

250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
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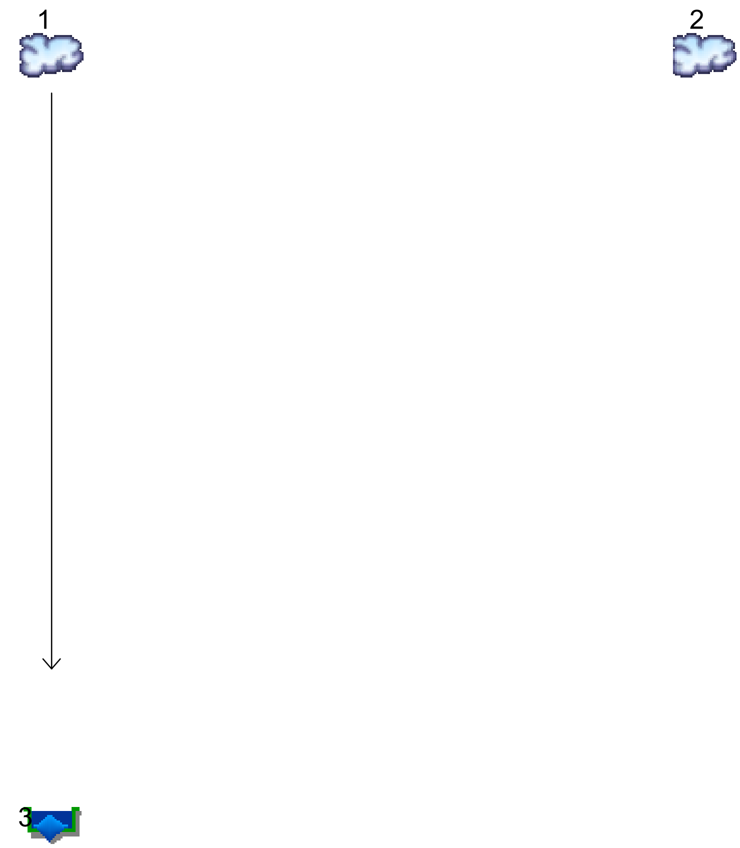
Hydraflow Table of Contents

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	EX-A
2	SCS Runoff	EX-B
3	Reservoir	POS-A

Project: 17.276.403 Willow Lakes Existing.gpw

Wednesday, 03 / 3 / 2021

Hydrograph Return Period Recap

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

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	13.72	19.18	-------	-------	33.45	47.04	-------	71.30	EX-A
2	SCS Runoff	------	0.047	0.281	-------	-------	1.613	3.569	-------	7.900	EX-B
3	Reservoir	1	4.523	9.249	-------	-------	31.00	45.28	-------	69.38	POS-A

Proj. file: 17.276.403 Willow Lakes Existing.gpw

Wednesday, 03 / 3 / 2021

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	13.72	2	732	56,330	------	------	------	EX-A
2	SCS Runoff	0.047	2	758	1,100	------	------	------	EX-B
3	Reservoir	4.523	2	752	38,495	1	266.60	16,648	POS-A

Hydrograph Report

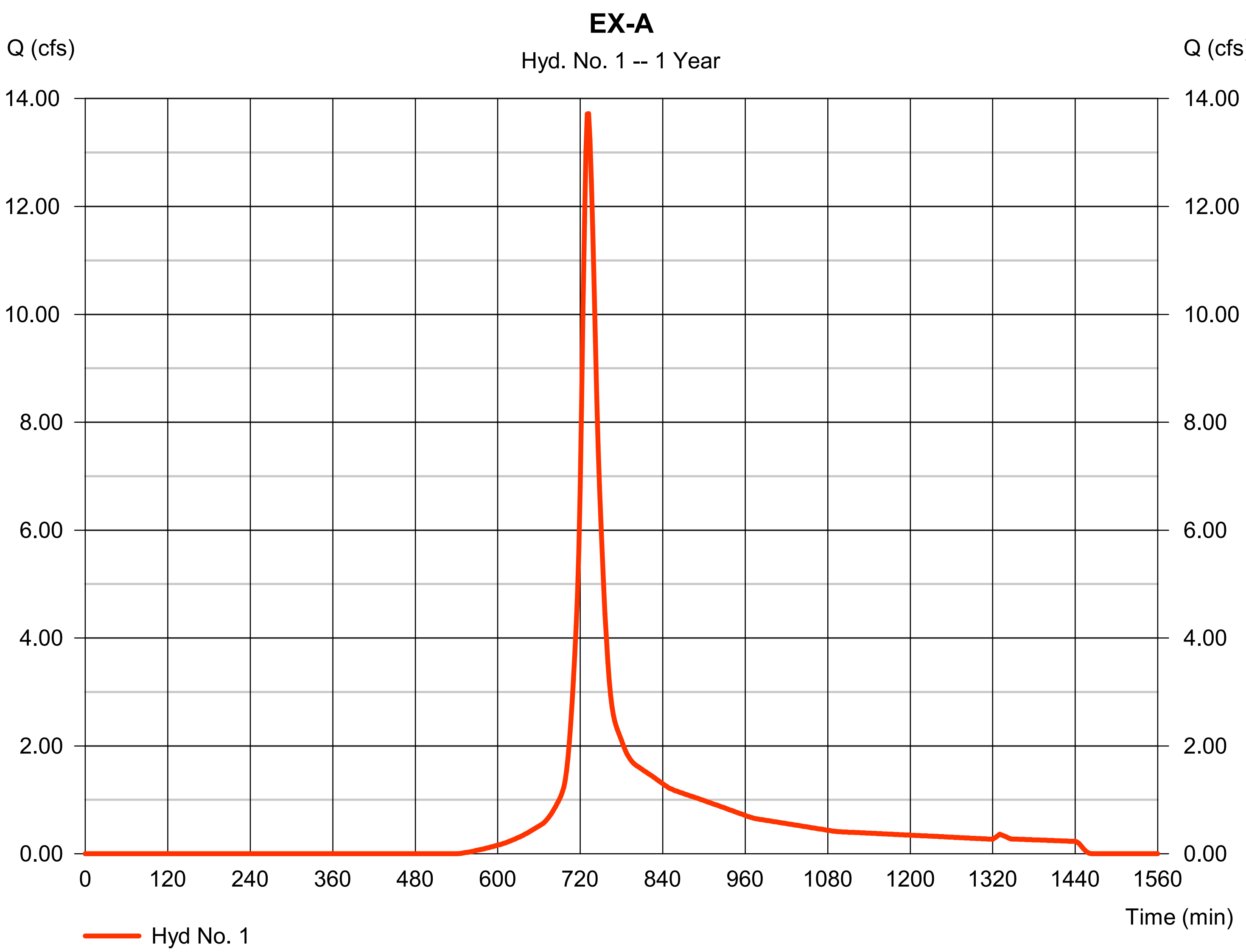
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 1

EX-A

Hydrograph type	= SCS Runoff	Peak discharge	= 13.72 cfs
Storm frequency	= 1 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 56,330 cuft
Drainage area	= 12.500 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.60 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.000 x 30) + (0.720 x 39) + (9.780 x 98)] / 12.500



TR55 Tc Worksheet

Hyd. No. 1

EX-A

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	131.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.30		0.00		0.00		
Land slope (%)	=	16.80		0.00		0.00		
Travel Time (min)	**=**	**11.20**	**+**	**0.00**	**+**	**0.00**	**=**	**11.20**
Shallow Concentrated Flow								
Flow length (ft)	=	85.00		1002.00		0.00		
Watercourse slope (%)	=	23.50		2.40		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	9.85		3.15		0.00		
Travel Time (min)	**=**	**0.14**	**+**	**5.30**	**+**	**0.00**	**=**	**5.45**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=	0.00		0.00		0.00		
Flow length (ft)	({0})	0.0		0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 16.60 min

Hydrograph Report

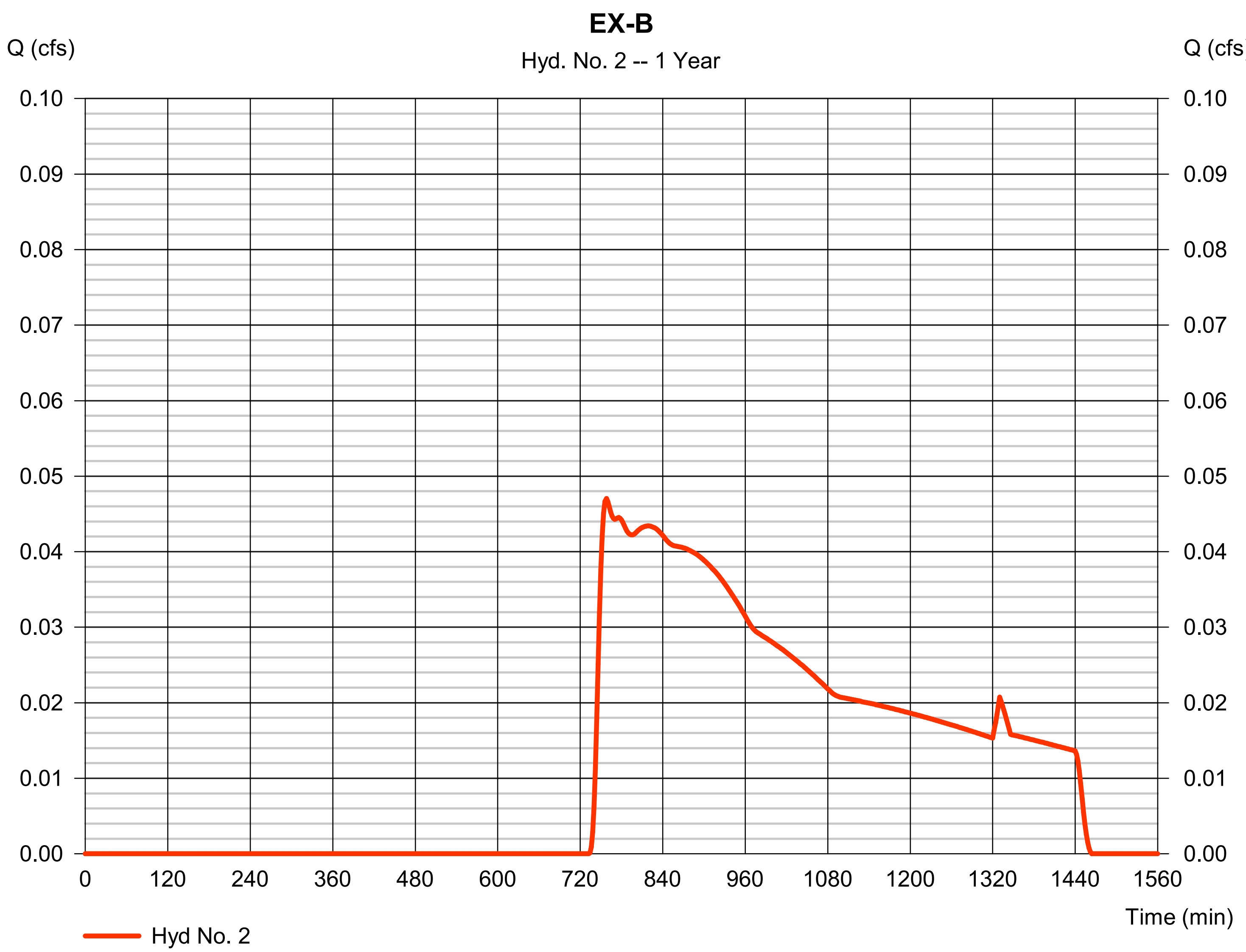
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 2

EX-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.047 cfs
Storm frequency	= 1 yrs	Time to peak	= 758 min
Time interval	= 2 min	Hyd. volume	= 1,100 cuft
Drainage area	= 2.980 ac	Curve number	= 54*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.80 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.930 x 30) + (1.050 x 98)] / 2.980



TR55 Tc Worksheet

Hyd. No. 2

EX-B

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	150.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.30		0.00		0.00		
Land slope (%)	=	12.00		0.00		0.00		
Travel Time (min)	**=**	**14.28**	**+**	**0.00**	**+**	**0.00**	**=**	**14.28**
Shallow Concentrated Flow								
Flow length (ft)	=	59.00		126.00		0.00		
Watercourse slope (%)	=	6.30		22.50		0.00		
Surface description	=	Paved		Unpaved		Paved		
Average velocity (ft/s)	=5.10			7.65		0.00		
Travel Time (min)	**=**	**0.19**	**+**	**0.27**	**+**	**0.00**	**=**	**0.47**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.015		0.015		0.015		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Total Travel Time, Tc								**14.80 min**

Hydrograph Report

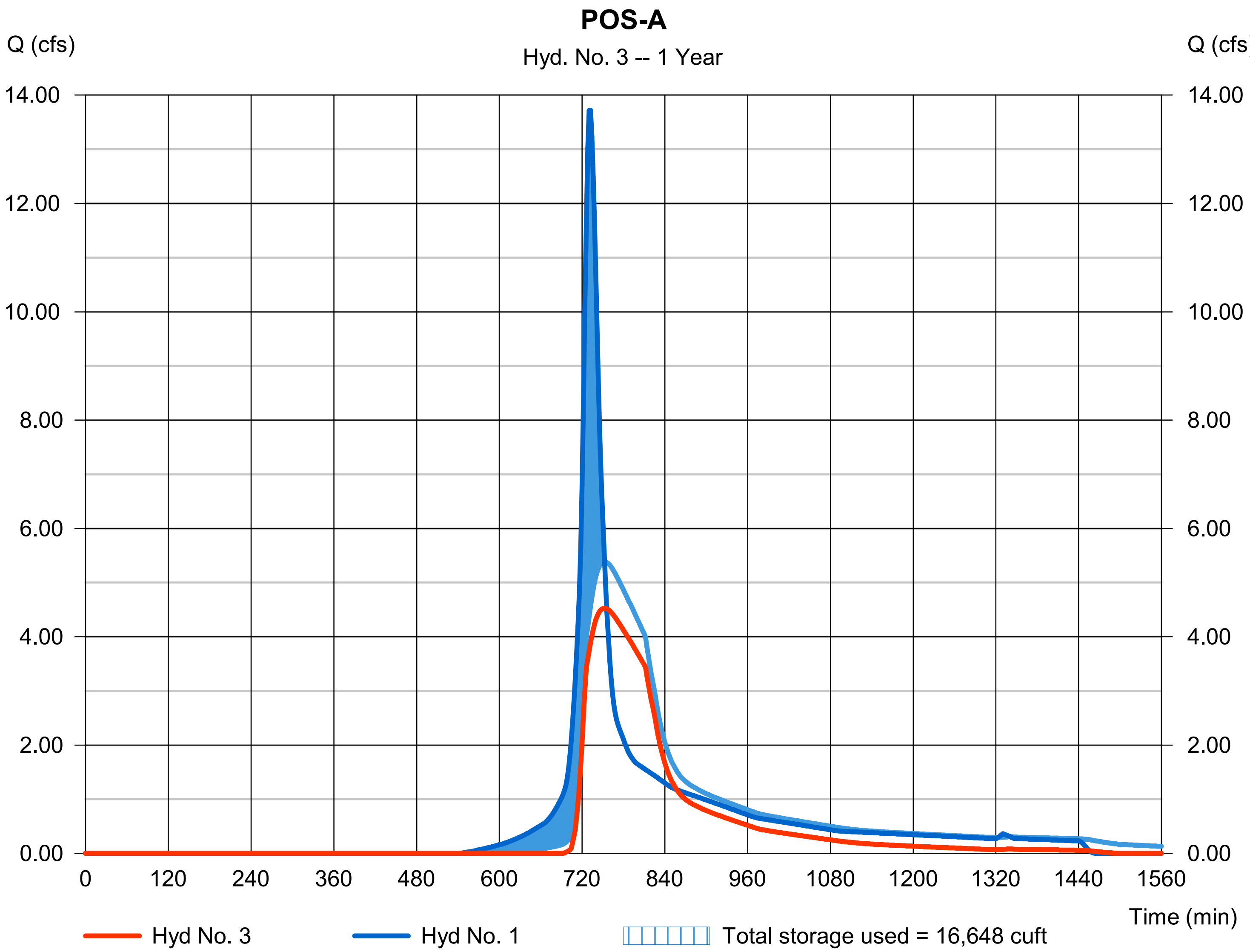
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 3

POS-A

Hydrograph type	= Reservoir	Peak discharge	= 4.523 cfs
Storm frequency	= 1 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 38,495 cuft
Inflow hyd. No.	= 1 - EX-A	Max. Elevation	= 266.60 ft
Reservoir name	= Existing Depression	Max. Storage	= 16,648 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 1 - Existing Depression

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 264.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	264.00	300	0	0
2.00	266.00	10,050	8,057	8,057
3.00	267.00	19,010	14,293	22,349
4.00	268.00	32,868	25,622	47,972

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 264.67	0.00	0.00	0.00
Length (ft)	= 46.00	0.00	0.00	0.00
Slope (%)	= 2.54	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

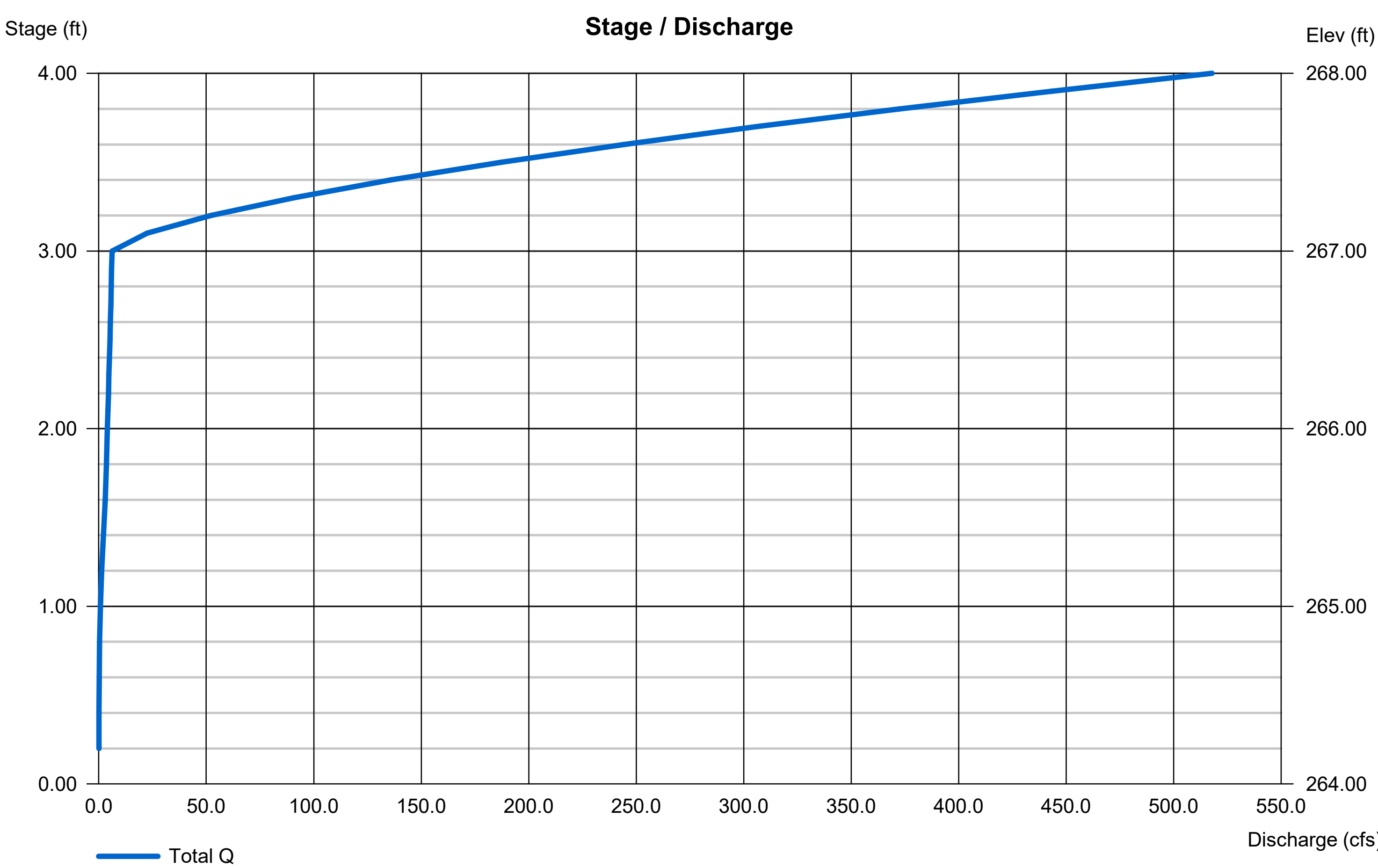
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	196.00	0.00	0.00
Crest El. (ft)	= 266.92	267.00	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) = 2.410 (by Contour)

TW Elev. (ft) = 0.00

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



Hydrograph 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	19.18	2	730	78,147	------	------	------	EX-A
2	SCS Runoff	0.281	2	746	2,653	------	------	------	EX-B
3	Reservoir	9.249	2	746	57,043	1	267.03	23,001	POS-A

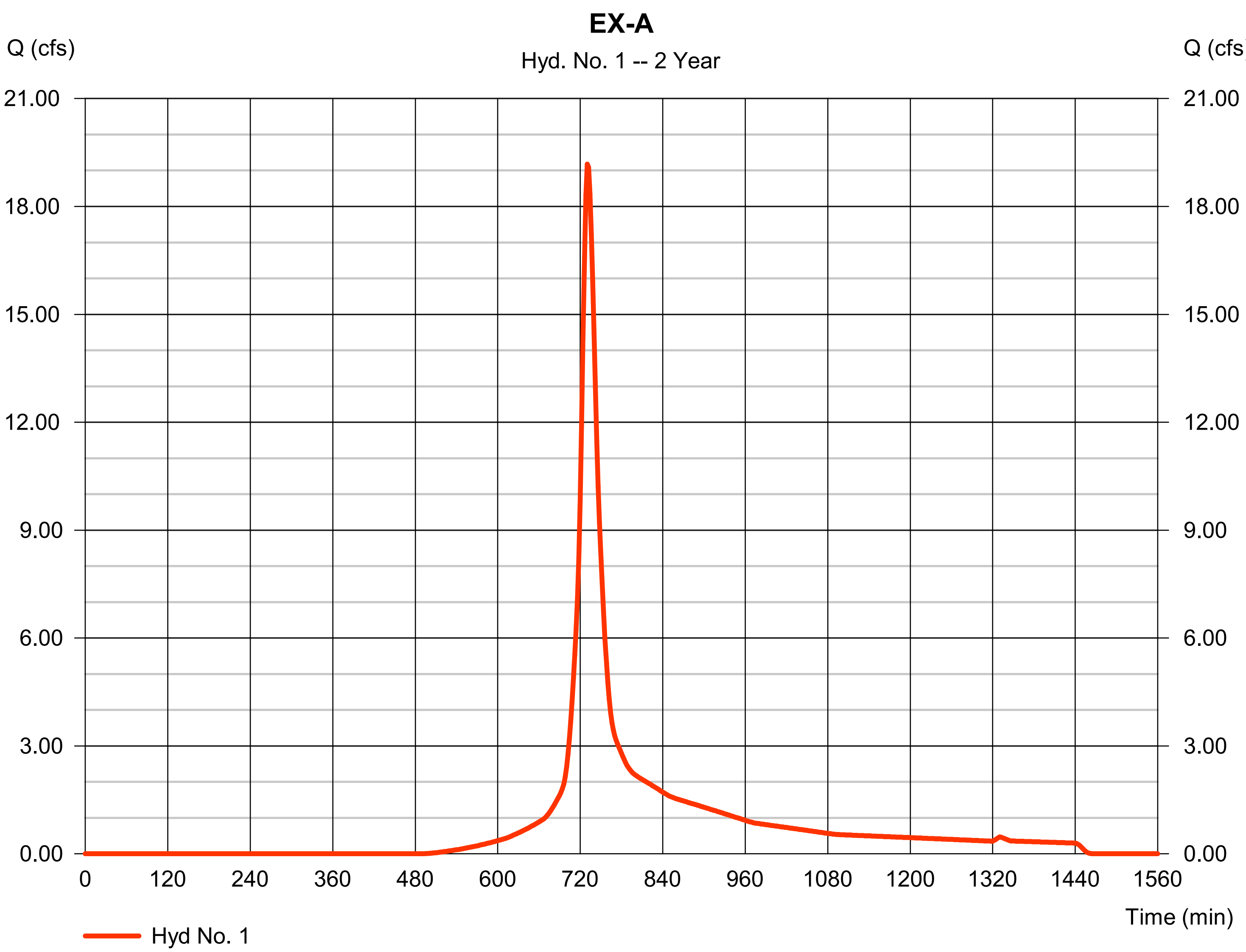
Hydrograph Report

Hyd. No. 1

EX-A

Hydrograph type	= SCS Runoff	Peak discharge	= 19.18 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 78,147 cuft
Drainage area	= 12.500 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.60 min
Total precip.	= 3.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.000 x 30) + (0.720 x 39) + (9.780 x 98)] / 12.500



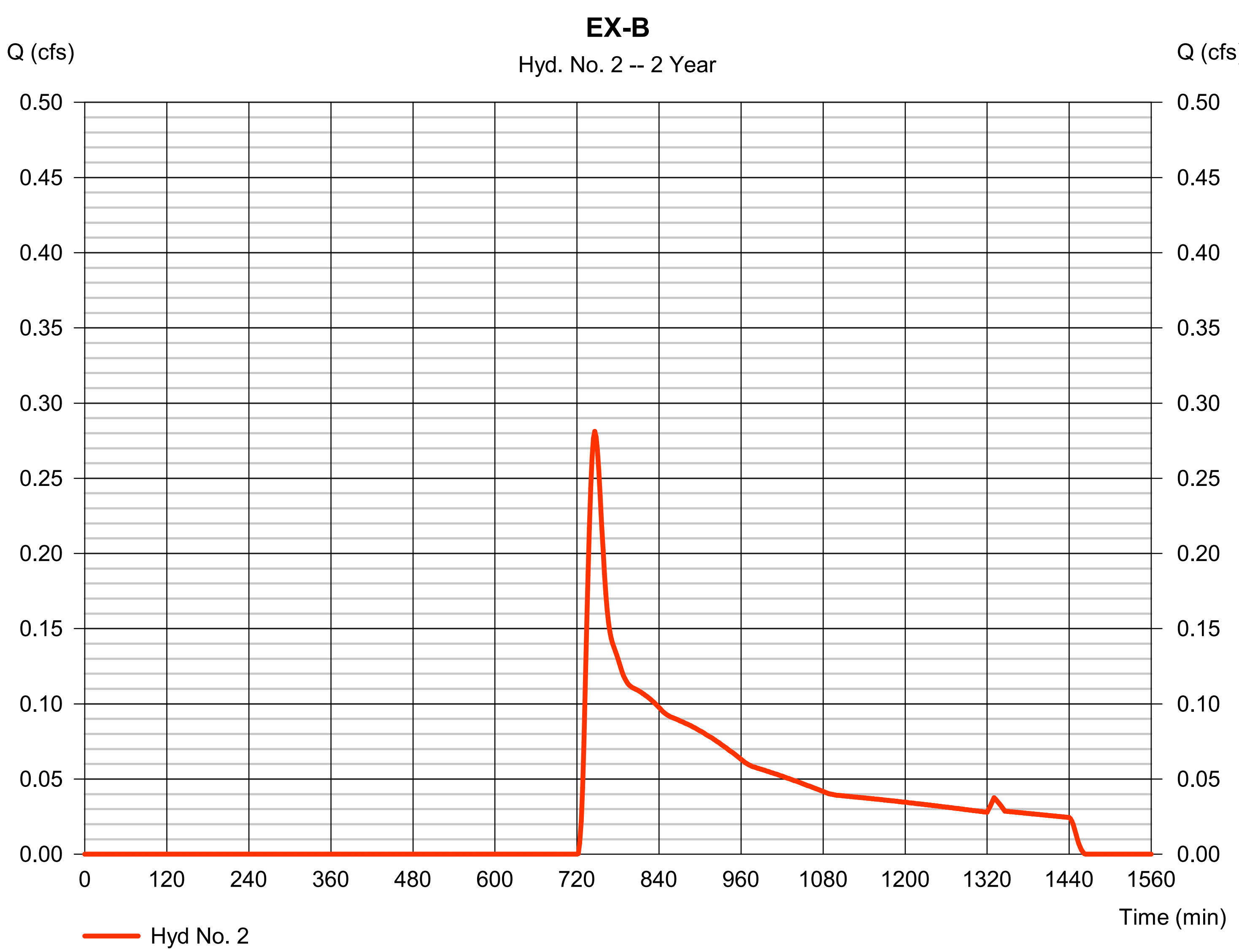
Hydrograph Report

Hyd. No. 2

EX-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.281 cfs
Storm frequency	= 2 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 2,653 cuft
Drainage area	= 2.980 ac	Curve number	= 54*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.80 min
Total precip.	= 3.30 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.930 x 30) + (1.050 x 98)] / 2.980



Hydrograph Report

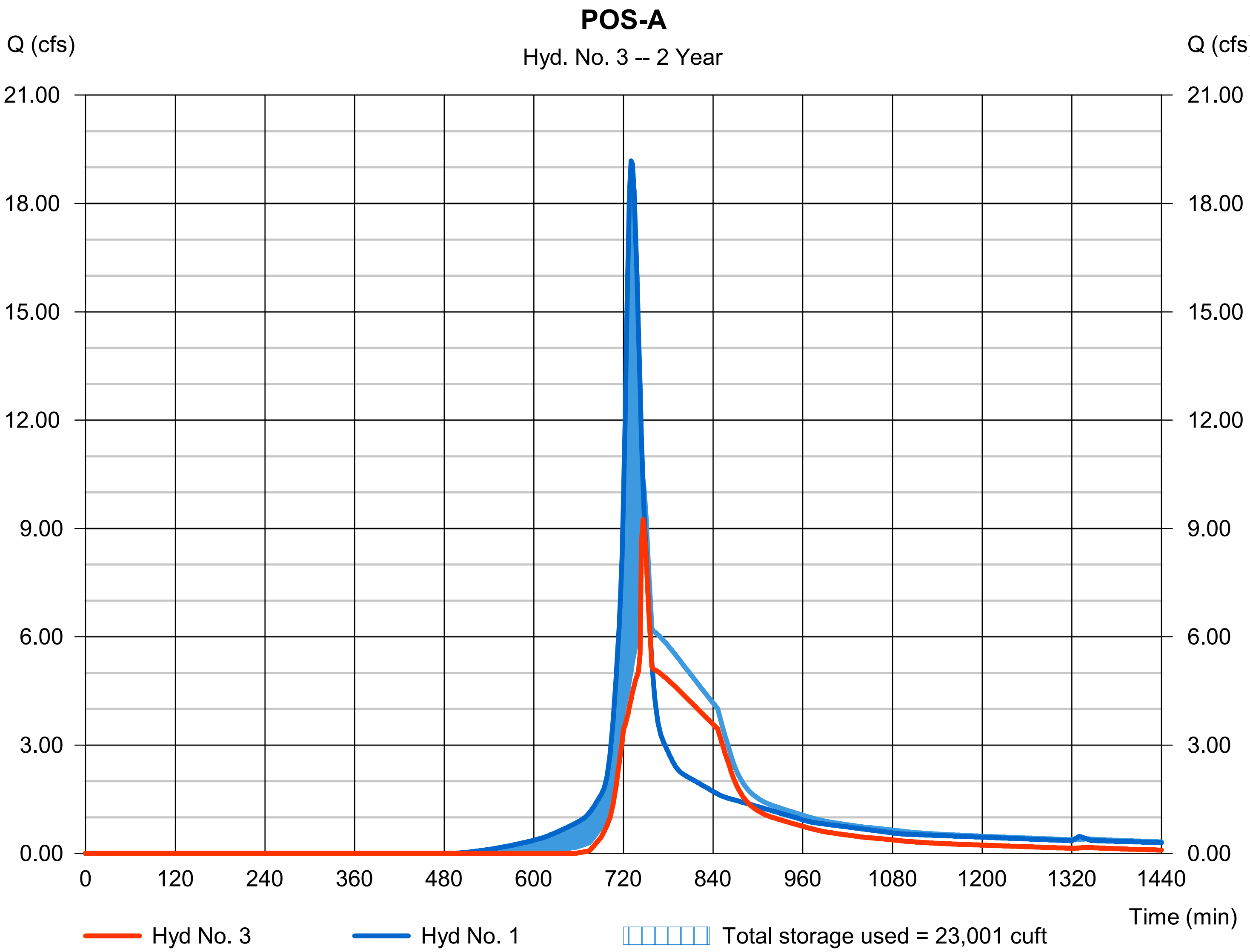
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 3

POS-A

Hydrograph type	= Reservoir	Peak discharge	= 9.249 cfs
Storm frequency	= 2 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 57,043 cuft
Inflow hyd. No.	= 1 - EX-A	Max. Elevation	= 267.03 ft
Reservoir name	= Existing Depression	Max. Storage	= 23,001 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



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	33.45	2	730	136,615	------	------	------	EX-A
2	SCS Runoff	1.613	2	734	8,705	------	------	------	EX-B
3	Reservoir	31.00	2	734	110,474	1	267.13	25,745	POS-A

Hydrograph Report

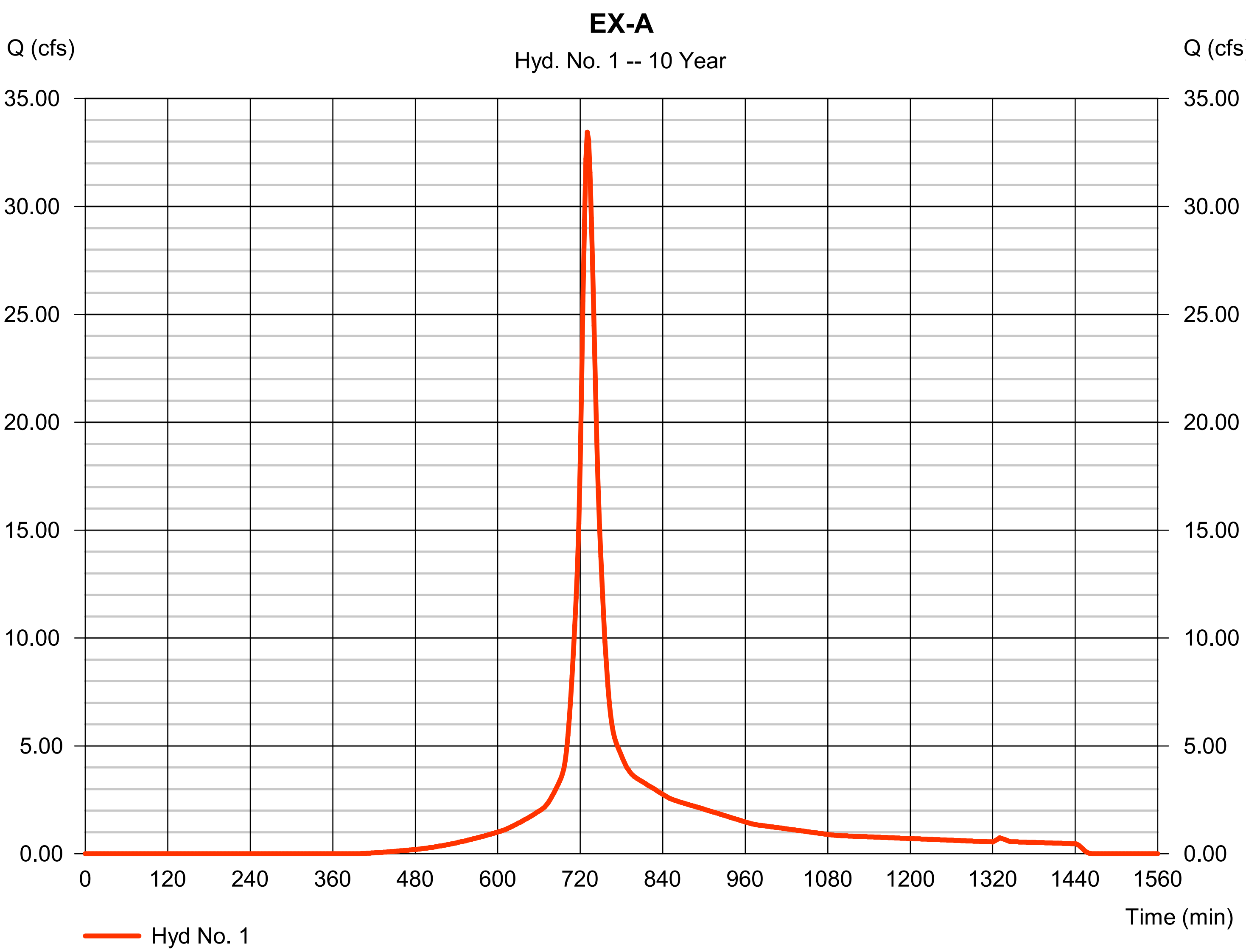
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 1

EX-A

Hydrograph type	= SCS Runoff	Peak discharge	= 33.45 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 136,615 cuft
Drainage area	= 12.500 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.60 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.000 x 30) + (0.720 x 39) + (9.780 x 98)] / 12.500



Hydrograph Report

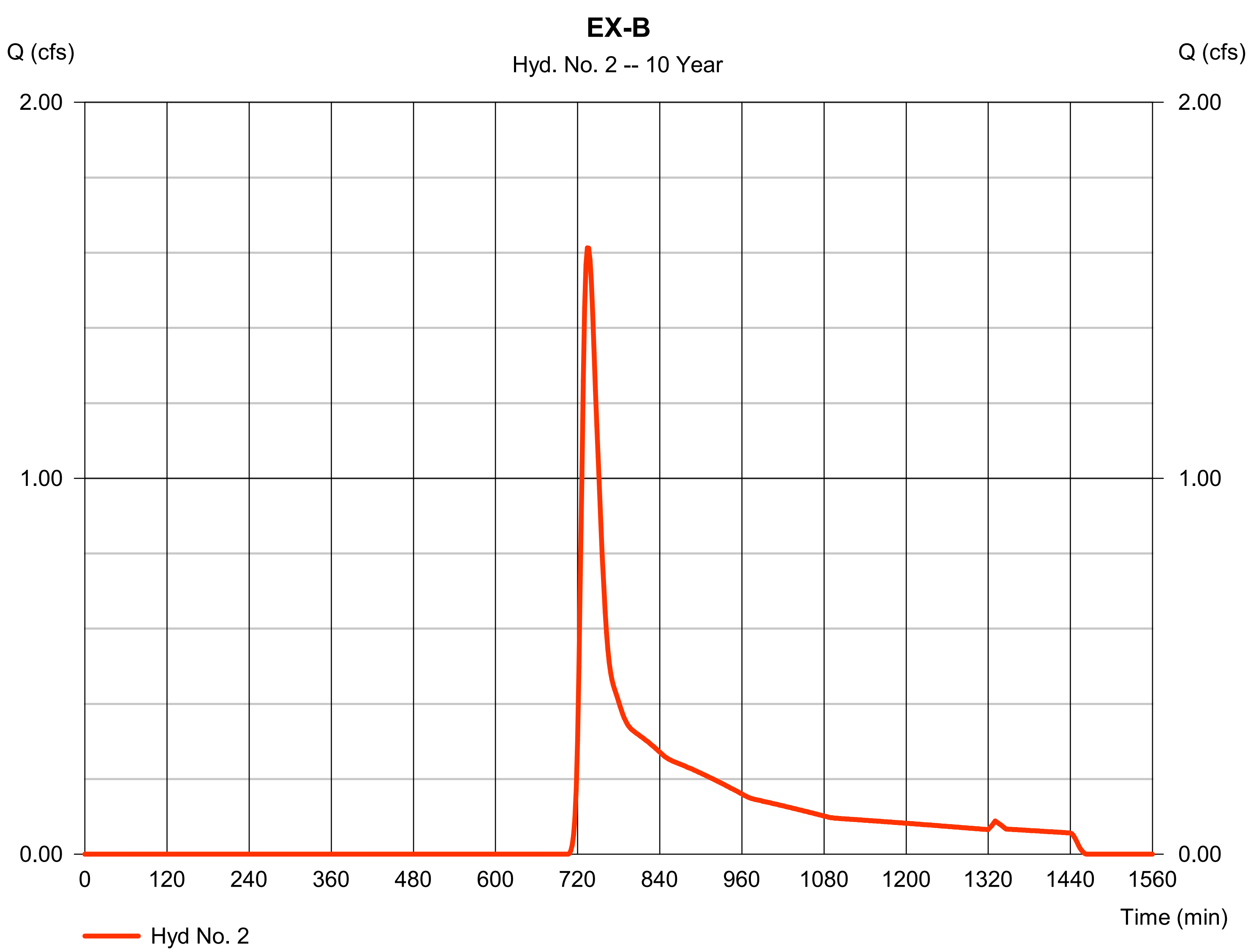
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 2

EX-B

Hydrograph type	= SCS Runoff	Peak discharge	= 1.613 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 8,705 cuft
Drainage area	= 2.980 ac	Curve number	= 54*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.80 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.930 x 30) + (1.050 x 98)] / 2.980



Hydrograph Report

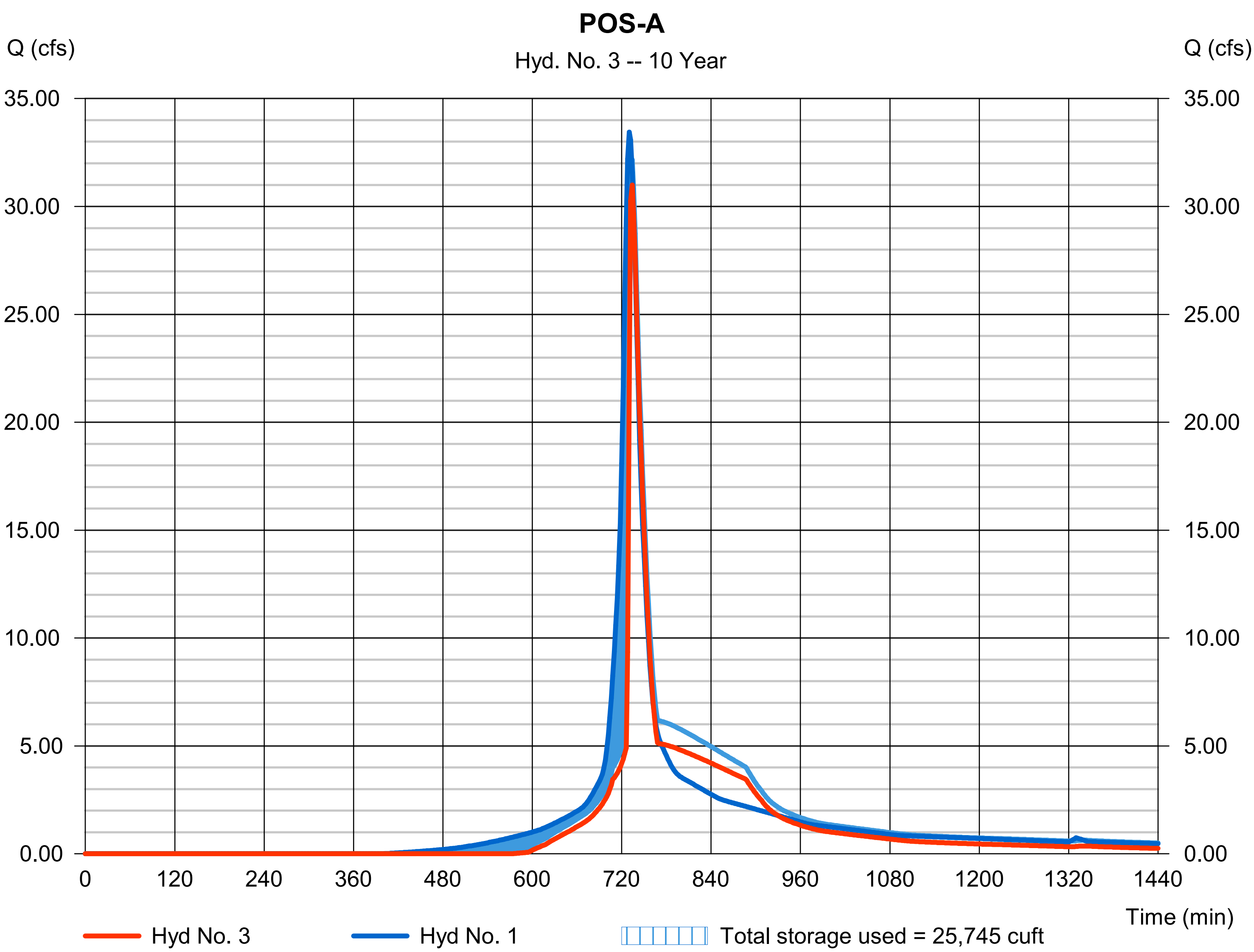
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 3

POS-A

Hydrograph type	= Reservoir	Peak discharge	= 31.00 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 110,474 cuft
Inflow hyd. No.	= 1 - EX-A	Max. Elevation	= 267.13 ft
Reservoir name	= Existing Depression	Max. Storage	= 25,745 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



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	47.04	2	730	193,952	------	------	------	EX-A
2	SCS Runoff	3.569	2	732	16,383	------	------	------	EX-B
3	Reservoir	45.28	2	732	163,556	1	267.18	26,981	POS-A

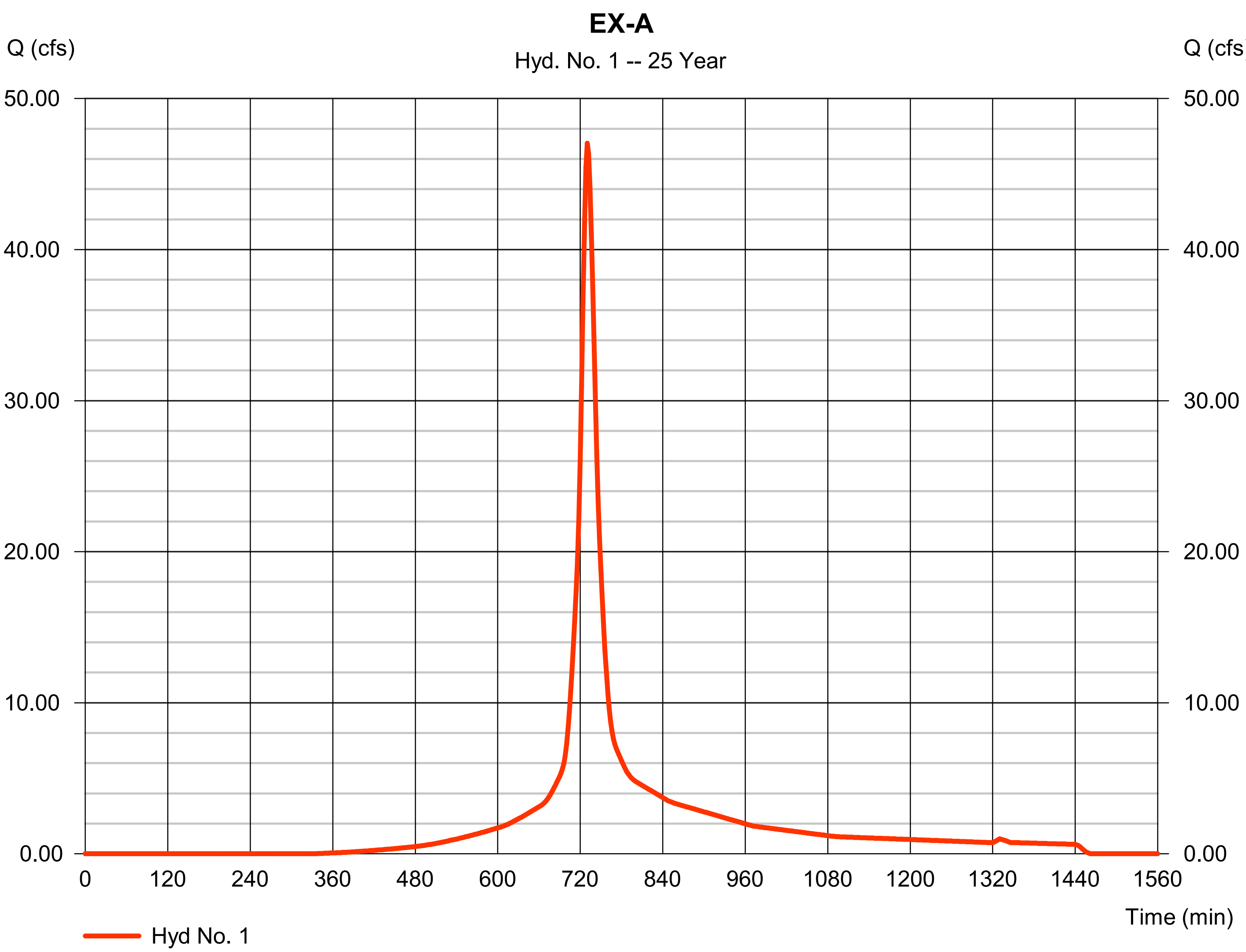
Hydrograph Report

Hyd. No. 1

EX-A

Hydrograph type	= SCS Runoff	Peak discharge	= 47.04 cfs
Storm frequency	= 25 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 193,952 cuft
Drainage area	= 12.500 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.60 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.000 x 30) + (0.720 x 39) + (9.780 x 98)] / 12.500



Hydrograph Report

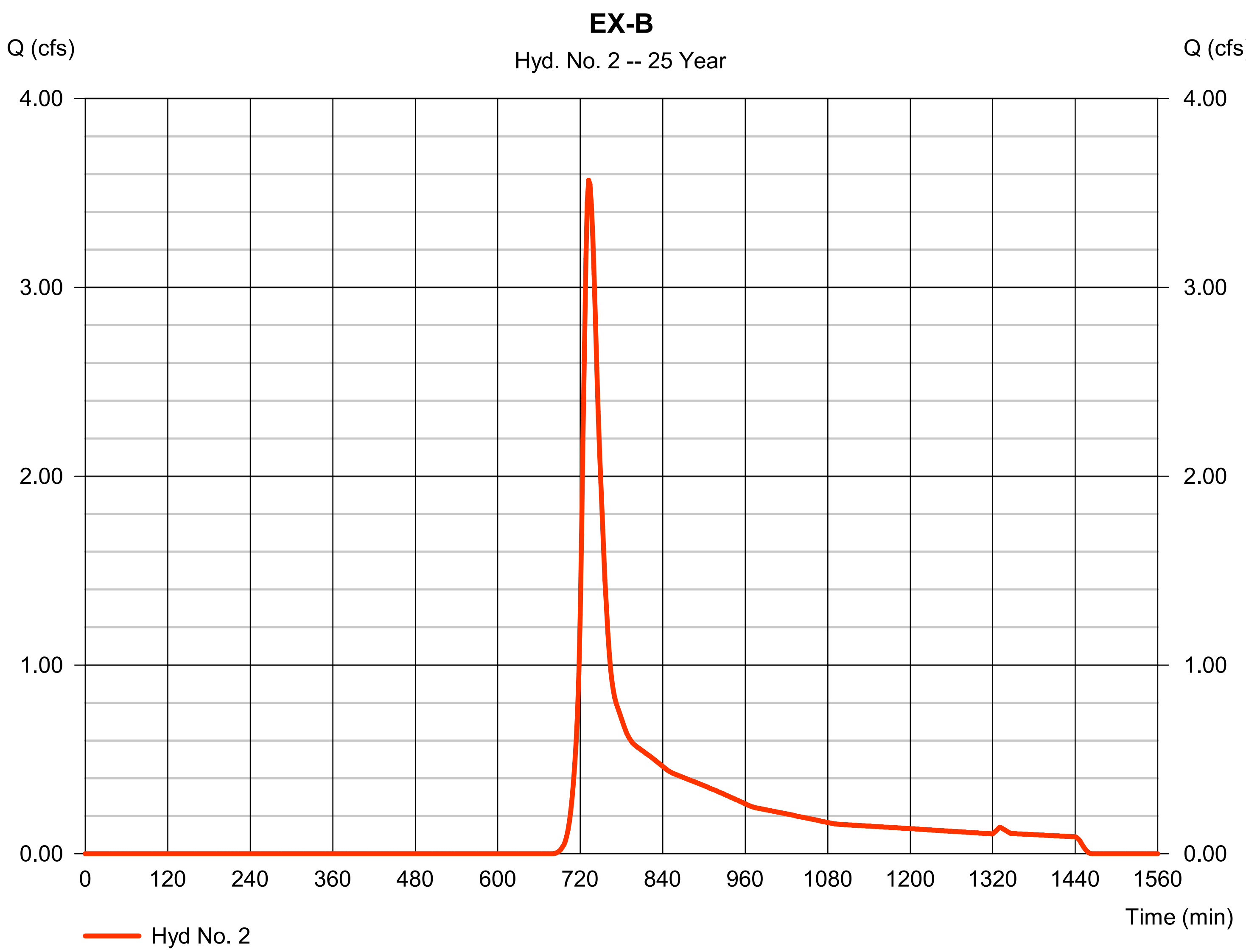
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 2

EX-B

Hydrograph type	= SCS Runoff	Peak discharge	= 3.569 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 16,383 cuft
Drainage area	= 2.980 ac	Curve number	= 54*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.80 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.930 x 30) + (1.050 x 98)] / 2.980



Hydrograph Report

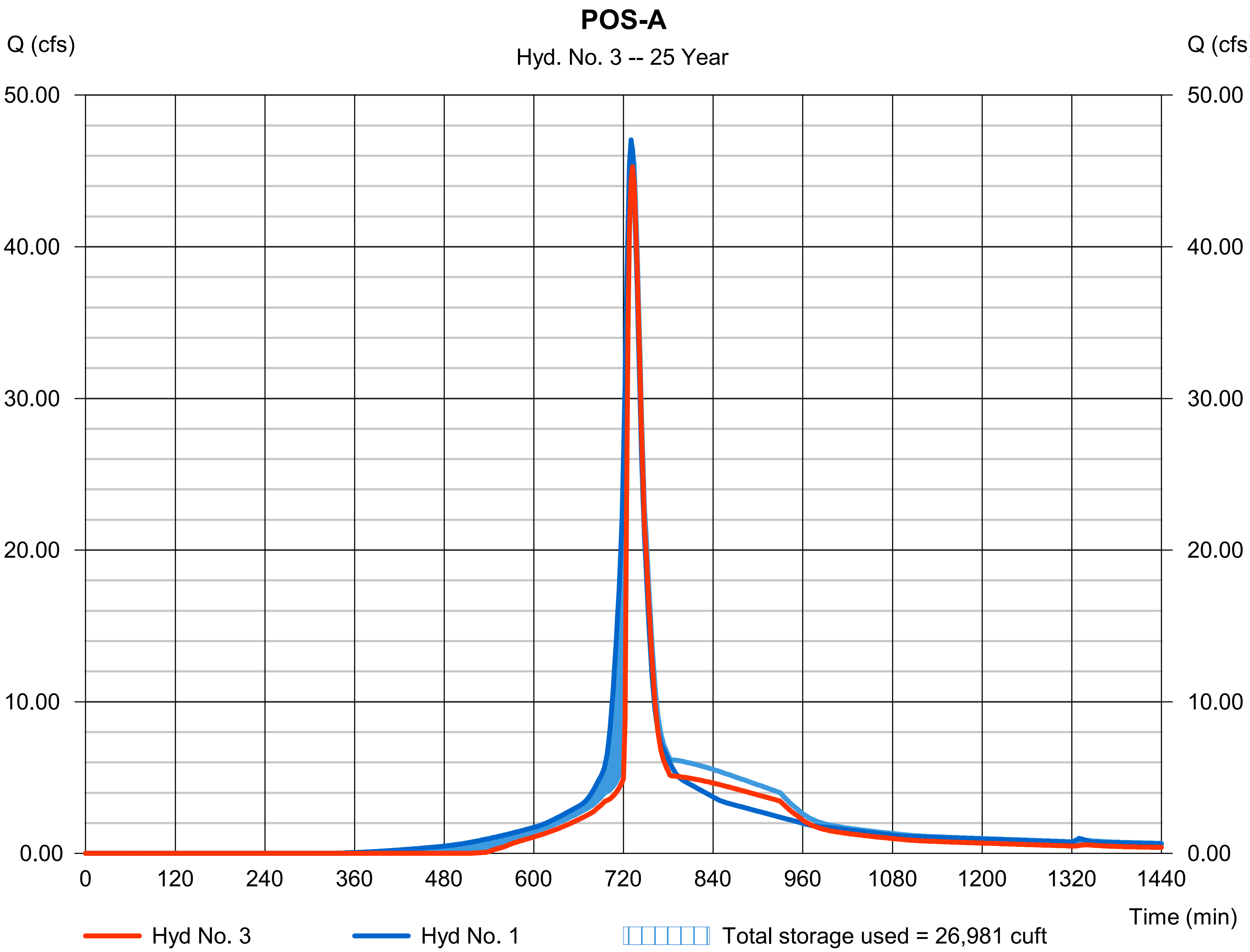
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 3

POS-A

Hydrograph type	= Reservoir	Peak discharge	= 45.28 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 163,556 cuft
Inflow hyd. No.	= 1 - EX-A	Max. Elevation	= 267.18 ft
Reservoir name	= Existing Depression	Max. Storage	= 26,981 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



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	71.30	2	730	299,472	------	------	------	EX-A
2	SCS Runoff	7.900	2	732	33,275	------	------	------	EX-B
3	Reservoir	69.38	2	732	262,187	1	267.25	28,706	POS-A

Hydrograph Report

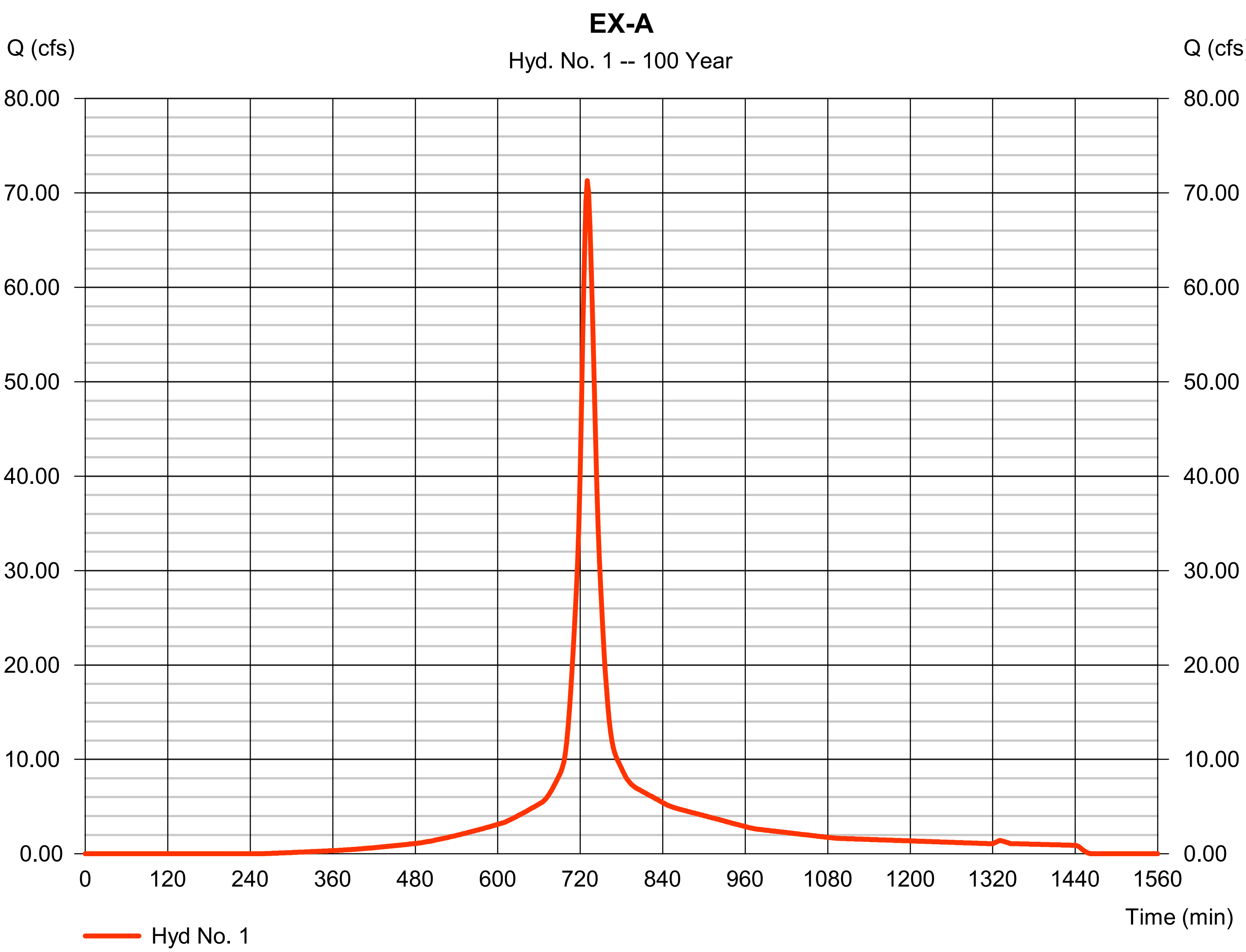
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 1

EX-A

Hydrograph type	= SCS Runoff	Peak discharge	= 71.30 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 299,472 cuft
Drainage area	= 12.500 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 16.60 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(2.000 x 30) + (0.720 x 39) + (9.780 x 98)] / 12.500



Hydrograph Report

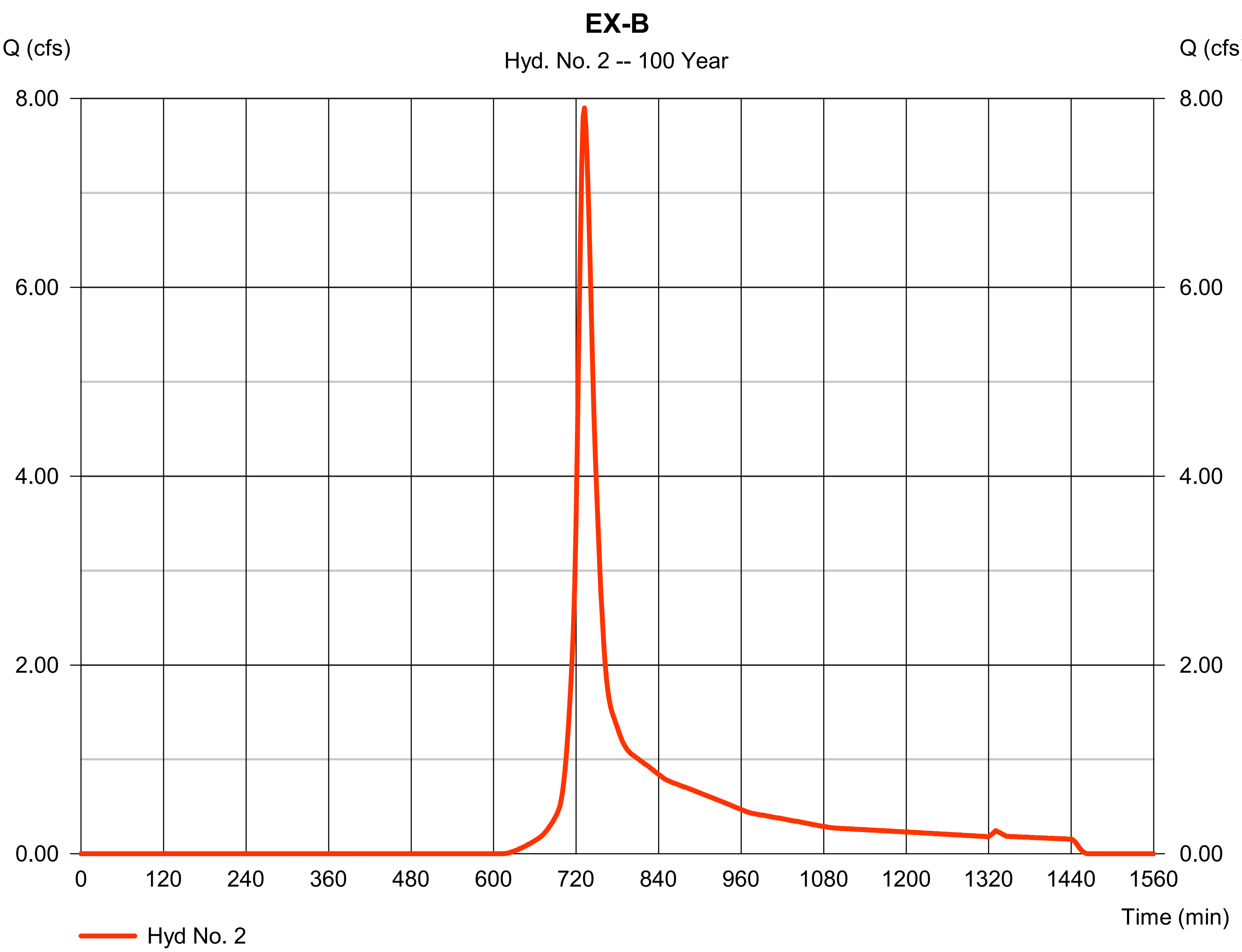
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 2

EX-B

Hydrograph type	= SCS Runoff	Peak discharge	= 7.900 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 33,275 cuft
Drainage area	= 2.980 ac	Curve number	= 54*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.80 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.930 x 30) + (1.050 x 98)] / 2.980



Hydrograph Report

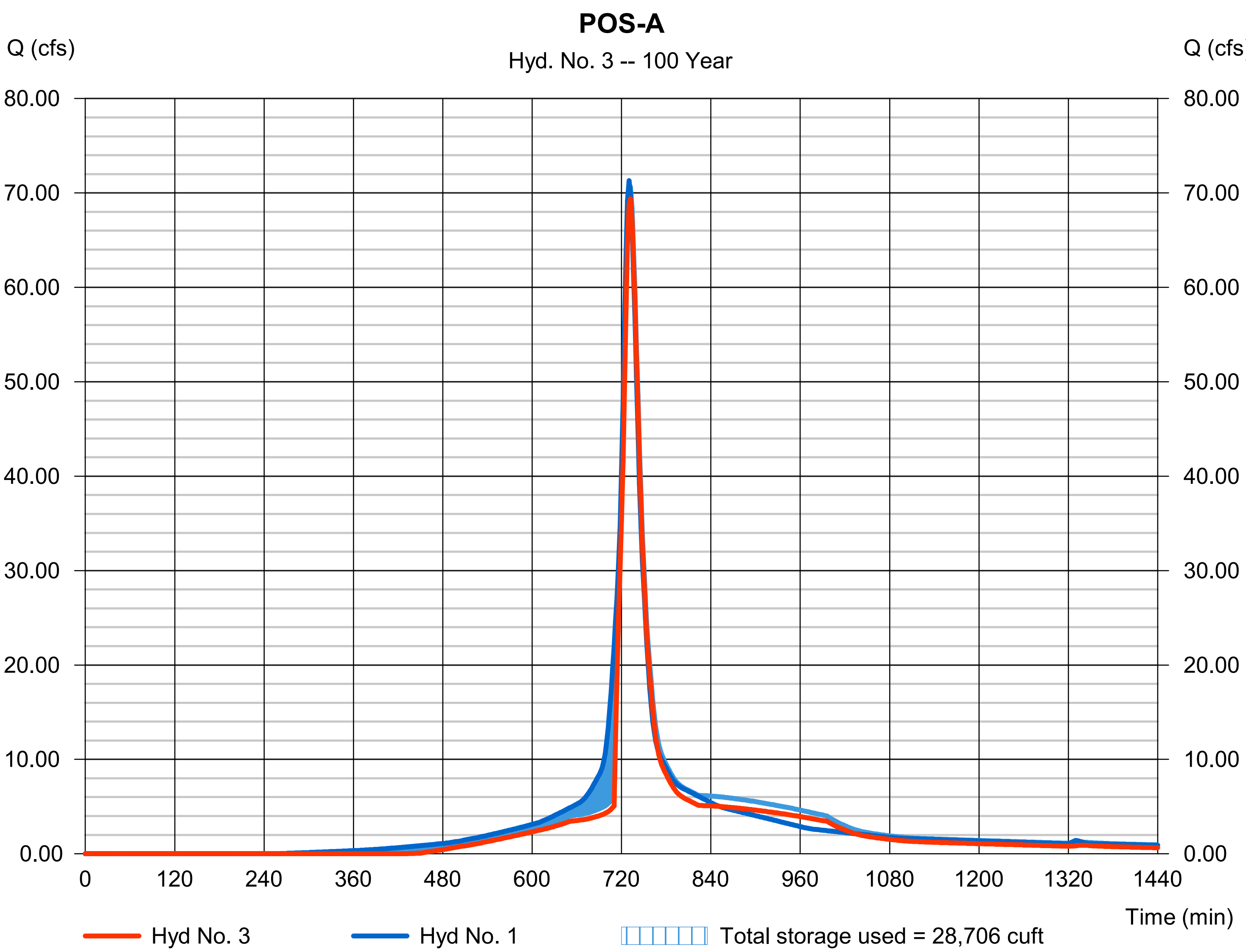
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 3

POS-A

Hydrograph type	= Reservoir	Peak discharge	= 69.38 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 262,187 cuft
Inflow hyd. No.	= 1 - EX-A	Max. Elevation	= 267.25 ft
Reservoir name	= Existing Depression	Max. Storage	= 28,706 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



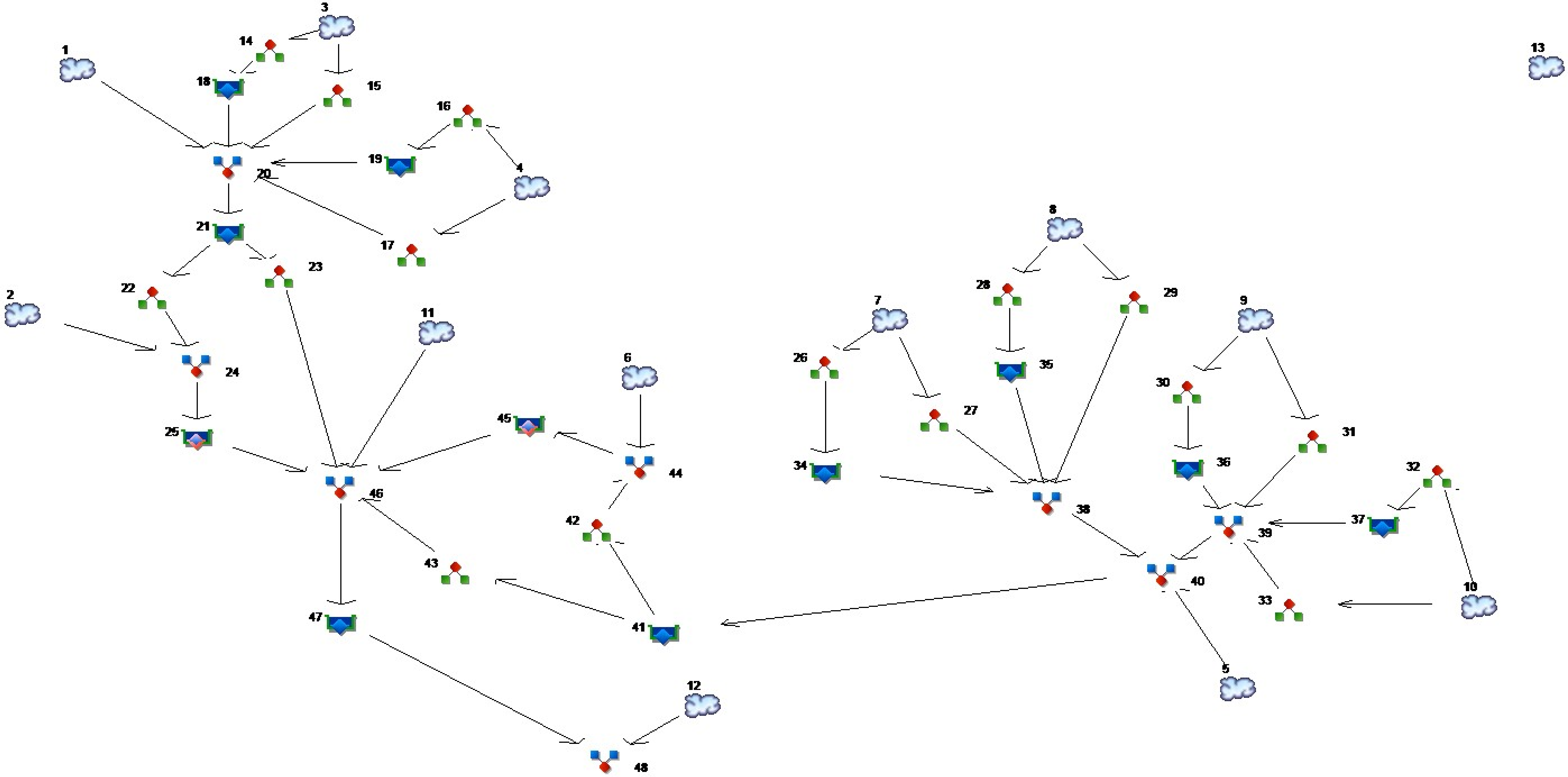
Appendix D

Post-Development Stormwater Modeling Printouts

250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
p. (401) 921-3344 f. (401) 921-3303 www.MillstoneEng.com

Hydraflow Table of Contents

25 - Year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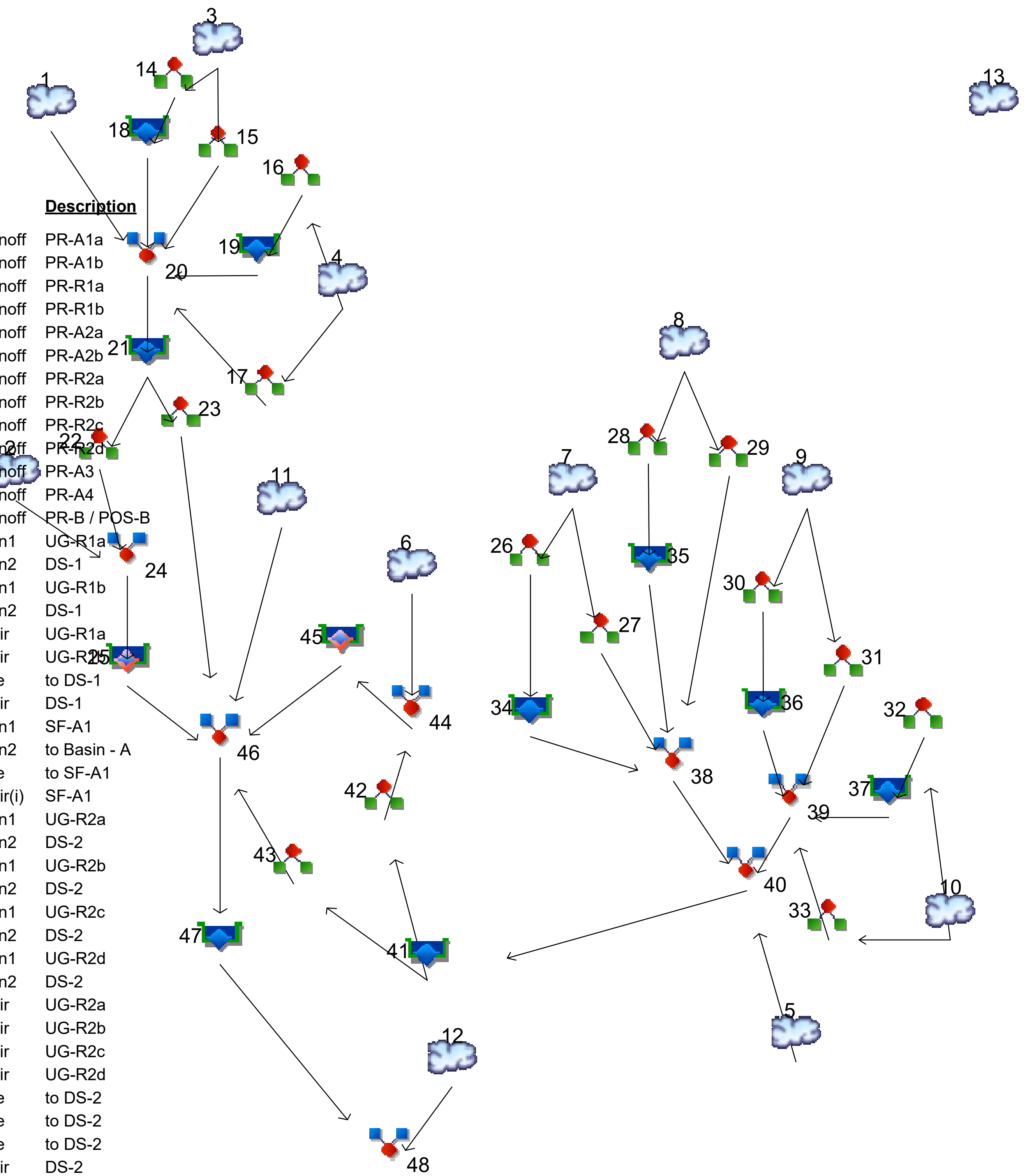
Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	PR-A1a
2	SCS Runoff	PR-A1b
3	SCS Runoff	PR-R1a
4	SCS Runoff	PR-R1b
5	SCS Runoff	PR-A2a
6	SCS Runoff	PR-A2b
7	SCS Runoff	PR-R2a
8	SCS Runoff	PR-R2b
9	SCS Runoff	PR-R2c
10	SCS Runoff	PR-R2d
11	SCS Runoff	PR-A3
12	SCS Runoff	PR-A4
13	SCS Runoff	PR-B / POS-B
14	Diversion1	UG-R1a
15	Diversion2	DS-1
16	Diversion1	UG-R1b
17	Diversion2	DS-1
18	Reservoir	UG-R1a
19	Reservoir	UG-R1b
20	Combine	to DS-1
21	Reservoir	DS-1
22	Diversion1	SF-A1
23	Diversion2	to Basin - A
24	Combine	to SF-A1
25	Reservoir(i)	SF-A1
26	Diversion1	UG-R2a
27	Diversion2	DS-2
28	Diversion1	UG-R2b
29	Diversion2	DS-2
30	Diversion1	UG-R2c
31	Diversion2	DS-2
32	Diversion1	UG-R2d
33	Diversion2	DS-2
34	Reservoir	UG-R2a
35	Reservoir	UG-R2b
36	Reservoir	UG-R2c
37	Reservoir	UG-R2d
38	Combine	to DS-2
39	Combine	to DS-2
40	Combine	to DS-2
41	Reservoir	DS-2
42	Diversion1	SF-A2
43	Diversion2	to Basin - A
44	Combine	to SF-A2
45	Reservoir(i)	SF-A2
46	Combine	to Basin - A
47	Reservoir	Basin - A
48	Combine	POS-A

Hydrograph Return Period Recap

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

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	1.801	-------	-------	-------	5.385	8.008	-------	12.88	PR-A1a
2	SCS Runoff	------	0.000	-------	-------	-------	0.004	0.034	-------	0.207	PR-A1b
3	SCS Runoff	------	0.629	-------	-------	-------	1.131	1.464	-------	2.059	PR-R1a
4	SCS Runoff	------	0.855	-------	-------	-------	1.538	1.992	-------	2.800	PR-R1b
5	SCS Runoff	------	0.118	-------	-------	-------	2.780	5.839	-------	12.59	PR-A2a
6	SCS Runoff	------	0.000	-------	-------	-------	0.008	0.071	-------	0.349	PR-A2b
7	SCS Runoff	------	1.308	-------	-------	-------	2.352	3.046	-------	4.282	PR-R2a
8	SCS Runoff	------	0.578	-------	-------	-------	1.040	1.347	-------	1.894	PR-R2b
9	SCS Runoff	------	0.704	-------	-------	-------	1.267	1.640	-------	2.306	PR-R2c
10	SCS Runoff	------	1.132	-------	-------	-------	2.036	2.636	-------	3.706	PR-R2d
11	SCS Runoff	------	0.000	-------	-------	-------	0.021	0.201	-------	1.085	PR-A3
12	SCS Runoff	------	0.366	-------	-------	-------	2.512	4.419	-------	8.252	PR-A4
13	SCS Runoff	------	0.000	-------	-------	-------	0.008	0.057	-------	0.829	PR-B / POS-B
14	Diversion1	3	0.482	-------	-------	-------	0.082	0.074	-------	0.070	UG-R1a
15	Diversion2	3	0.629	-------	-------	-------	1.131	1.464	-------	2.059	DS-1
16	Diversion1	4	0.656	-------	-------	-------	0.112	0.100	-------	0.095	UG-R1b
17	Diversion2	4	0.855	-------	-------	-------	1.538	1.992	-------	2.800	DS-1
18	Reservoir	14	0.000	-------	-------	-------	0.000	0.000	-------	0.000	UG-R1a
19	Reservoir	16	0.230	-------	-------	-------	0.002	0.003	-------	0.009	UG-R1b
20	Combine	1, 15, 17, 18, 19	2.670	-------	-------	-------	6.561	9.560	-------	15.07	to DS-1
21	Reservoir	20	2.748	-------	-------	-------	6.565	9.558	-------	15.07	DS-1
22	Diversion1	21	2.378	-------	-------	-------	4.027	4.691	-------	5.854	SF-A1
23	Diversion2	21	0.370	-------	-------	-------	2.538	4.867	-------	9.218	to Basin - A
24	Combine	2, 22,	2.378	-------	-------	-------	4.027	4.723	-------	6.008	to SF-A1
25	Reservoir(i)	24	0.444	-------	-------	-------	4.016	4.717	-------	6.002	SF-A1
26	Diversion1	7	1.003	-------	-------	-------	0.171	0.154	-------	0.146	UG-R2a
27	Diversion2	7	1.308	-------	-------	-------	2.352	3.046	-------	4.282	DS-2
28	Diversion1	8	0.444	-------	-------	-------	0.076	0.067	-------	0.064	UG-R2b
29	Diversion2	8	0.578	-------	-------	-------	1.040	1.347	-------	1.894	DS-2
30	Diversion1	9	0.540	-------	-------	-------	0.092	0.083	-------	0.079	UG-R2c
31	Diversion2	9	0.704	-------	-------	-------	1.267	1.640	-------	2.306	DS-2
32	Diversion1	10	0.868	-------	-------	-------	0.148	0.133	-------	0.126	UG-R2d
33	Diversion2	10	1.132	-------	-------	-------	2.036	2.636	-------	3.706	DS-2
34	Reservoir	26	0.000	-------	-------	-------	0.000	0.000	-------	0.000	UG-R2a

Proj. file: 17.276.403 Willow Lakes Proposed.gpw	Wednesday, 03 / 3 / 2021

Hydrograph Return Period Recap

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

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
35	Reservoir	28	0.000	-------	-------	-------	0.000	0.000	-------	0.000	UG-R2b
36	Reservoir	30	0.000	-------	-------	-------	0.000	0.000	-------	0.000	UG-R2c
37	Reservoir	32	0.000	-------	-------	-------	0.000	0.000	-------	0.000	UG-R2d
38	Combine	27, 29, 34, 35,	1.886	-------	-------	-------	3.393	4.393	-------	6.176	to DS-2
39	Combine	31, 33, 36, 37,	1.836	-------	-------	-------	3.302	4.276	-------	6.011	to DS-2
40	Combine	5, 38, 39	3.722	-------	-------	-------	7.564	11.38	-------	19.16	to DS-2
41	Reservoir	40	4.778	-------	-------	-------	7.544	11.37	-------	19.11	DS-2
42	Diversion1	41	4.174	-------	-------	-------	5.414	6.907	-------	9.245	SF-A2
43	Diversion2	41	0.604	-------	-------	-------	2.130	4.463	-------	9.861	to Basin - A
44	Combine	6, 42,	4.174	-------	-------	-------	5.414	6.913	-------	9.502	to SF-A2
45	Reservoir(i)	44	0.287	-------	-------	-------	5.021	6.828	-------	9.419	SF-A2
46	Combine	11, 23, 25, 43, 45	0.974	-------	-------	-------	12.57	20.42	-------	34.98	to Basin - A
47	Reservoir	46	0.089	-------	-------	-------	1.543	2.460	-------	7.037	Basin - A
48	Combine	12, 47	0.375	-------	-------	-------	2.653	5.786	-------	10.79	POS-A

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	1.801	2	734	8,419	------	------	------	PR-A1a
2	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-A1b
3	SCS Runoff	0.629	2	724	2,101	------	------	------	PR-R1a
4	SCS Runoff	0.855	2	724	2,858	------	------	------	PR-R1b
5	SCS Runoff	0.118	2	764	2,300	------	------	------	PR-A2a
6	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-A2b
7	SCS Runoff	1.308	2	724	4,370	------	------	------	PR-R2a
8	SCS Runoff	0.578	2	724	1,933	------	------	------	PR-R2b
9	SCS Runoff	0.704	2	724	2,353	------	------	------	PR-R2c
10	SCS Runoff	1.132	2	724	3,782	------	------	------	PR-R2d
11	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-A3
12	SCS Runoff	0.366	2	740	2,516	------	------	------	PR-A4
13	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-B / POS-B
14	Diversion1	0.482	2	720	867	3	------	------	UG-R1a
15	Diversion2	0.629	2	724	1,234	3	------	------	DS-1
16	Diversion1	0.656	2	720	1,180	4	------	------	UG-R1b
17	Diversion2	0.855	2	724	1,678	4	------	------	DS-1
18	Reservoir	0.000	2	686	0	14	277.23	204	UG-R1a
19	Reservoir	0.230	2	722	96	16	278.20	764	UG-R1b
20	Combine	2.670	2	724	11,427	1, 15, 17, 18, 19	------	------	to DS-1
21	Reservoir	2.748	2	724	11,389	20	269.67	51.6	DS-1
22	Diversion1	2.378	2	724	11,002	21	------	------	SF-A1
23	Diversion2	0.370	2	724	387	21	------	------	to Basin - A
24	Combine	2.378	2	724	11,002	2, 22,	------	------	to SF-A1
25	Reservoir(i)	0.444	2	788	6,117	24	271.65	5,588	SF-A1
26	Diversion1	1.003	2	720	1,804	7	------	------	UG-R2a
27	Diversion2	1.308	2	724	2,566	7	------	------	DS-2
28	Diversion1	0.444	2	720	798	8	------	------	UG-R2b
29	Diversion2	0.578	2	724	1,135	8	------	------	DS-2
30	Diversion1	0.540	2	720	971	9	------	------	UG-R2c
31	Diversion2	0.704	2	724	1,382	9	------	------	DS-2
32	Diversion1	0.868	2	720	1,561	10	------	------	UG-R2d
33	Diversion2	1.132	2	724	2,221	10	------	------	DS-2
34	Reservoir	0.000	2	n/a	0	26	277.21	433	UG-R2a

17.276.403 Willow Lakes Proposed.gpw	Return Period: 1 Year	Wednesday, 03 / 3 / 2021

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	0.000	2	n/a	0	28	277.42	188	UG-R2b
36	Reservoir	0.000	2	n/a	0	30	278.46	413	UG-R2c
37	Reservoir	0.000	2	524	0	32	276.63	758	UG-R2d
38	Combine	1.886	2	724	3,701	27, 29, 34, 35,	------	------	to DS-2
39	Combine	1.836	2	724	3,603	31, 33, 36, 37,	------	------	to DS-2
40	Combine	3.722	2	724	9,605	5, 38, 39	------	------	to DS-2
41	Reservoir	4.778	2	724	9,548	40	269.56	92.0	DS-2
42	Diversion1	4.174	2	724	9,405	41	------	------	SF-A2
43	Diversion2	0.604	2	724	143	41	------	------	to Basin - A
44	Combine	4.174	2	724	9,405	6, 42,	------	------	to SF-A2
45	Reservoir(i)	0.287	2	836	4,801	44	271.63	4,951	SF-A2
46	Combine	0.974	2	724	11,449	11, 23, 25, 43, 45	------	------	to Basin - A
47	Reservoir	0.089	2	1068	4,452	46	266.31	4,486	Basin - A
48	Combine	0.375	2	740	6,968	12, 47	------	------	POS-A

Hydrograph Report

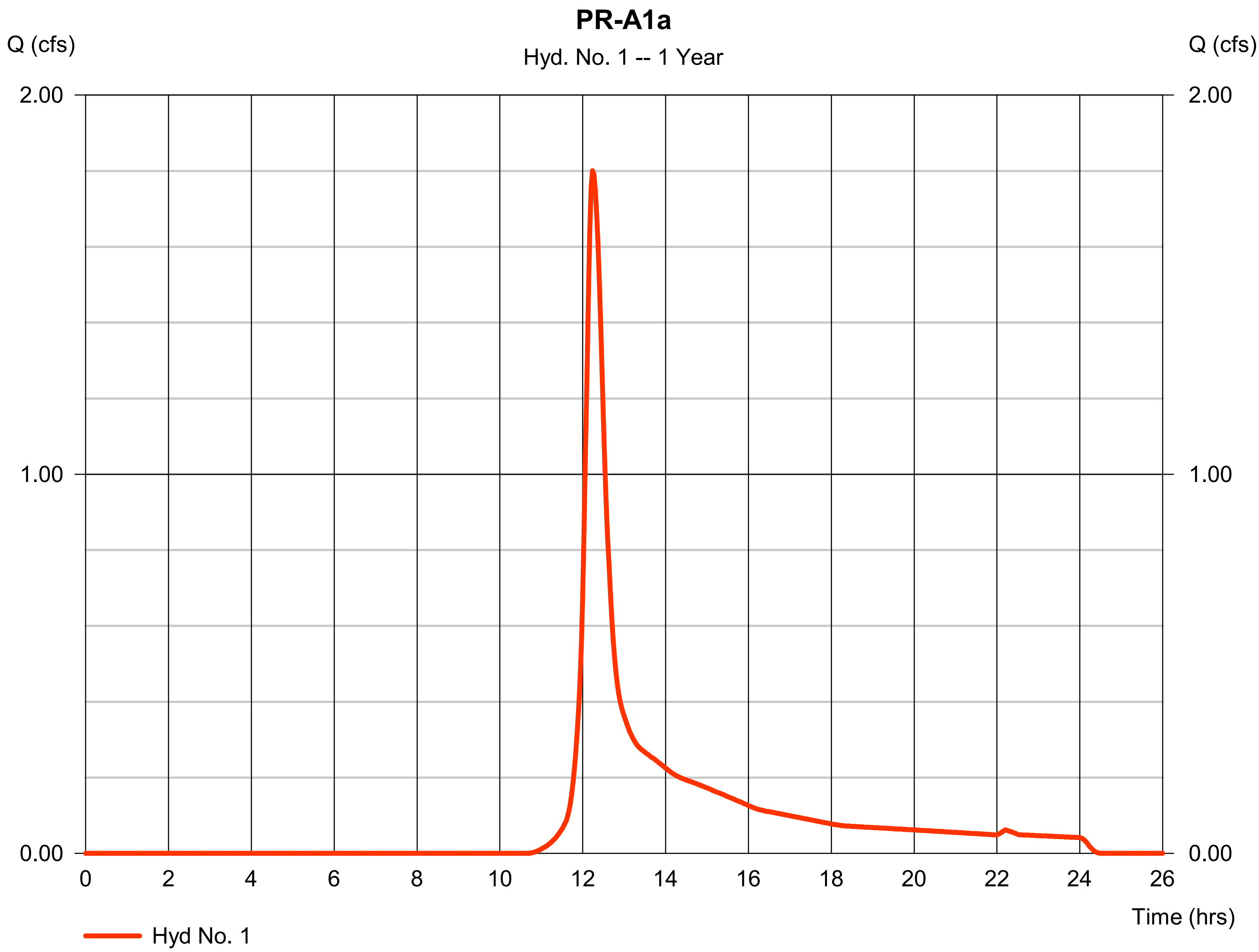
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 1

PR-A1a

Hydrograph type	= SCS Runoff	Peak discharge	= 1.801 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 8,419 cuft
Drainage area	= 2.670 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.60 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.330 x 30) + (0.590 x 39) + (1.750 x 98)] / 2.670



TR55 Tc Worksheet

Hyd. No. 1

PR-A1a

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.30		0.00		0.00		
Land slope (%)	=	5.50		0.00		0.00		
Travel Time (min)	**=**	**14.11**	**+**	**0.00**	**+**	**0.00**	**=**	**14.11**
Shallow Concentrated Flow								
Flow length (ft)	=	144.00		96.00		0.00		
Watercourse slope (%)	=	14.20		1.40		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=	6.08		2.41		0.00		
Travel Time (min)	**=**	**0.39**	**+**	**0.67**	**+**	**0.00**	**=**	**1.06**
Channel Flow								
X sectional flow area (sqft)	=	0.79		1.77		0.79		
Wetted perimeter (ft)	=	3.14		4.71		3.14		
Channel slope (%)	=	0.50		1.20		2.30		
Manning's n-value	=	0.012		0.012		0.012		
Velocity (ft/s)	=	3.48		7.06		7.47		
Flow length (ft)		({0})202.0		587.0		30.0		
Travel Time (min)	**=**	**0.97**	**+**	**1.39**	**+**	**0.07**	**=**	**2.42**

Total Travel Time, Tc .... 17.60 min

Hydrograph Report

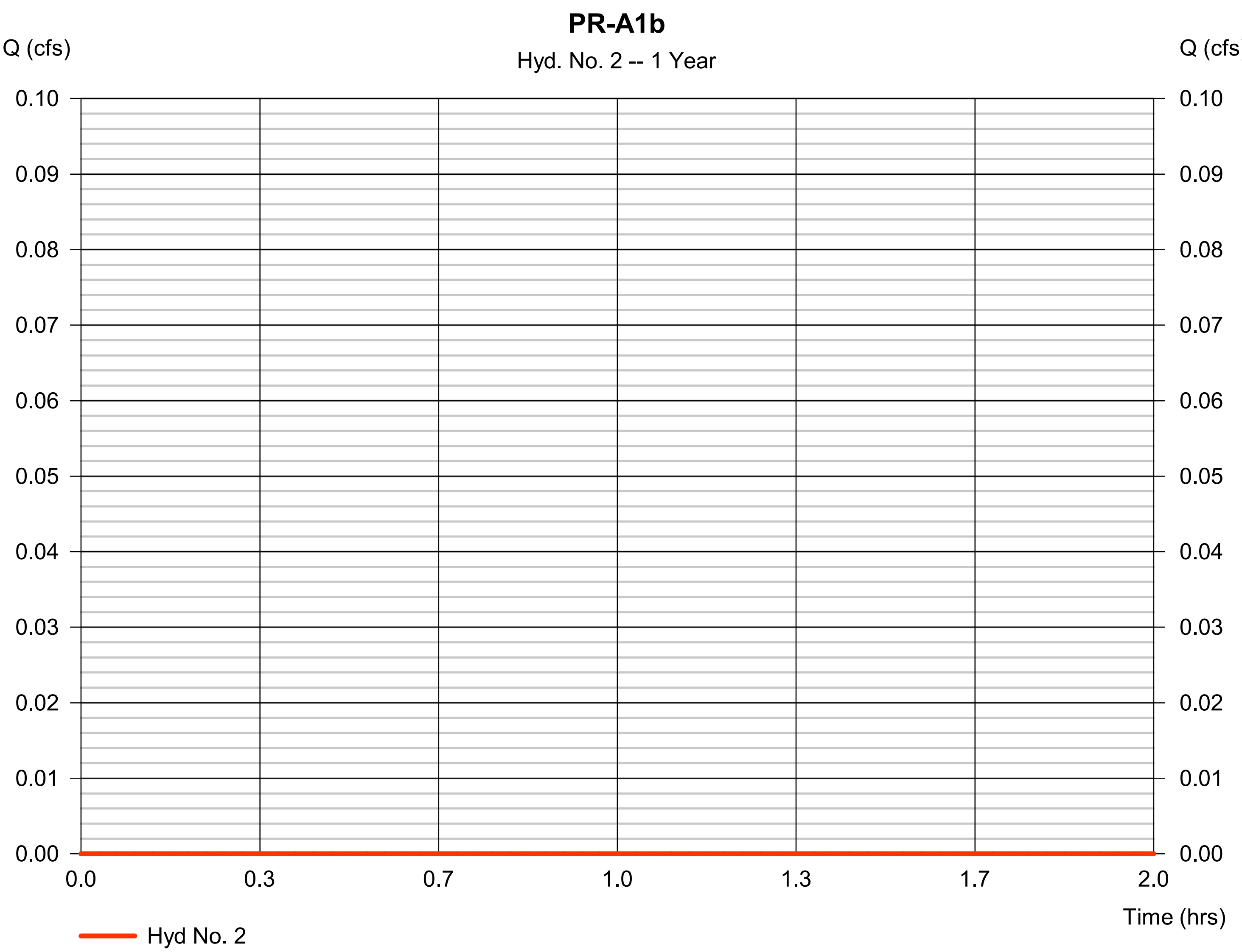
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 2

PR-A1b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.170 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 39)] / 0.170



TR55 Tc Worksheet

Hyd. No. 2

PR-A1b

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 86.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 12.20		0.00		0.00		
Travel Time (min)	**= 6.04**	**+**	**0.00**	**+**	**0.00**	**=**	**6.04**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.012		0.012		0.012		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

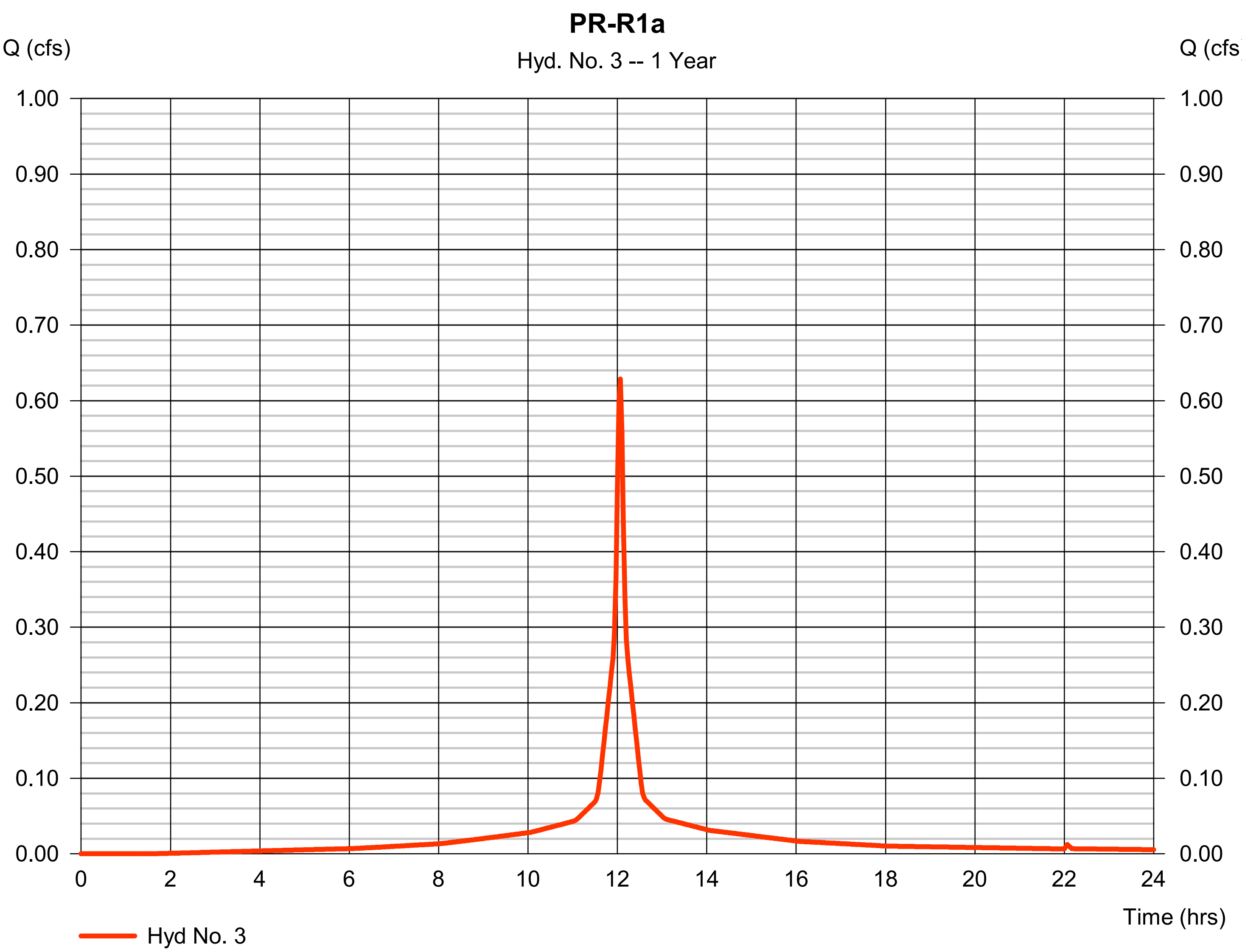
Total Travel Time, Tc .... 6.00 min

Hydrograph Report

Hyd. No. 3

PR-R1a

Hydrograph type	= SCS Runoff	Peak discharge	= 0.629 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 2,101 cuft
Drainage area	= 0.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



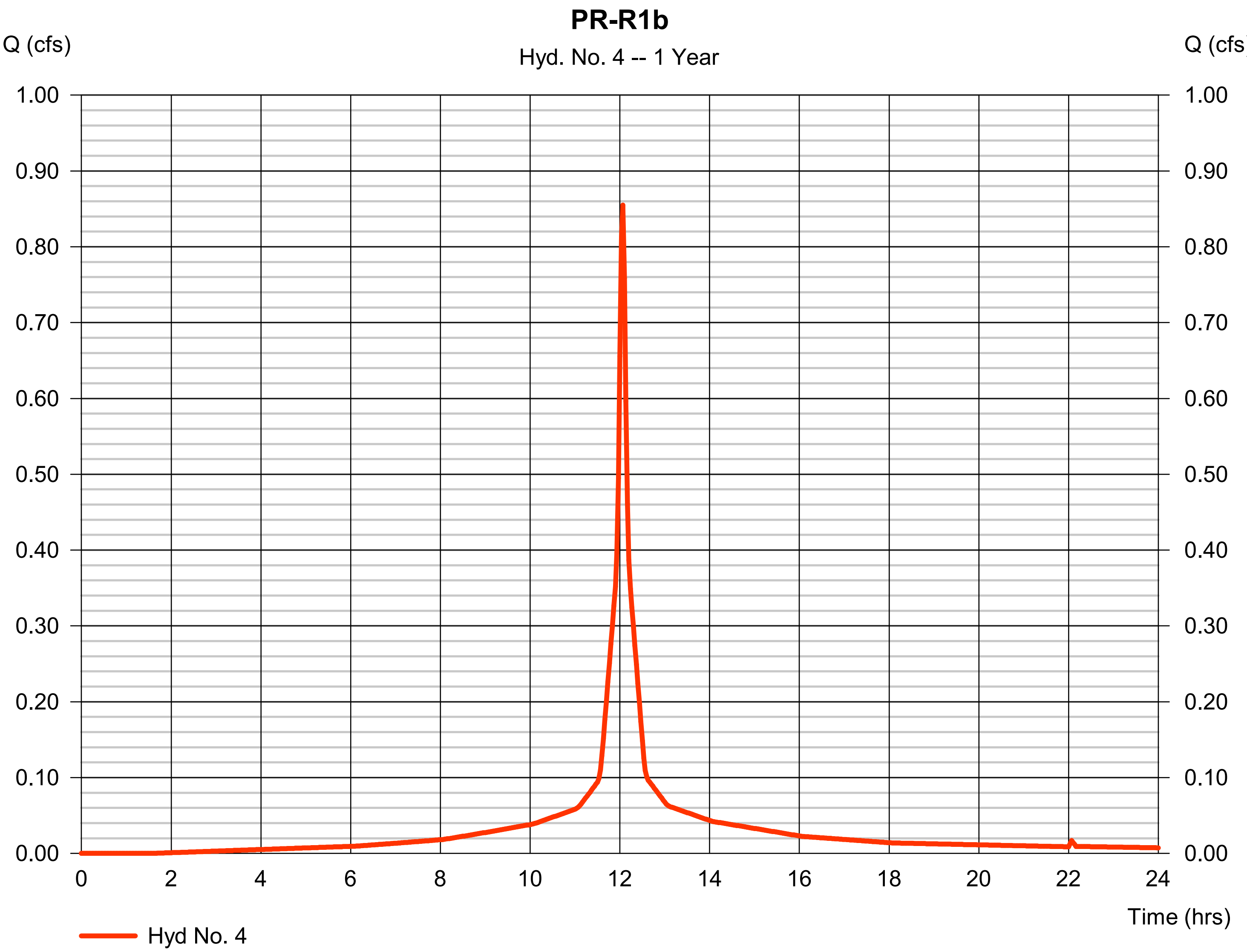
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 4

PR-R1b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.855 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 2,858 cuft
Drainage area	= 0.340 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

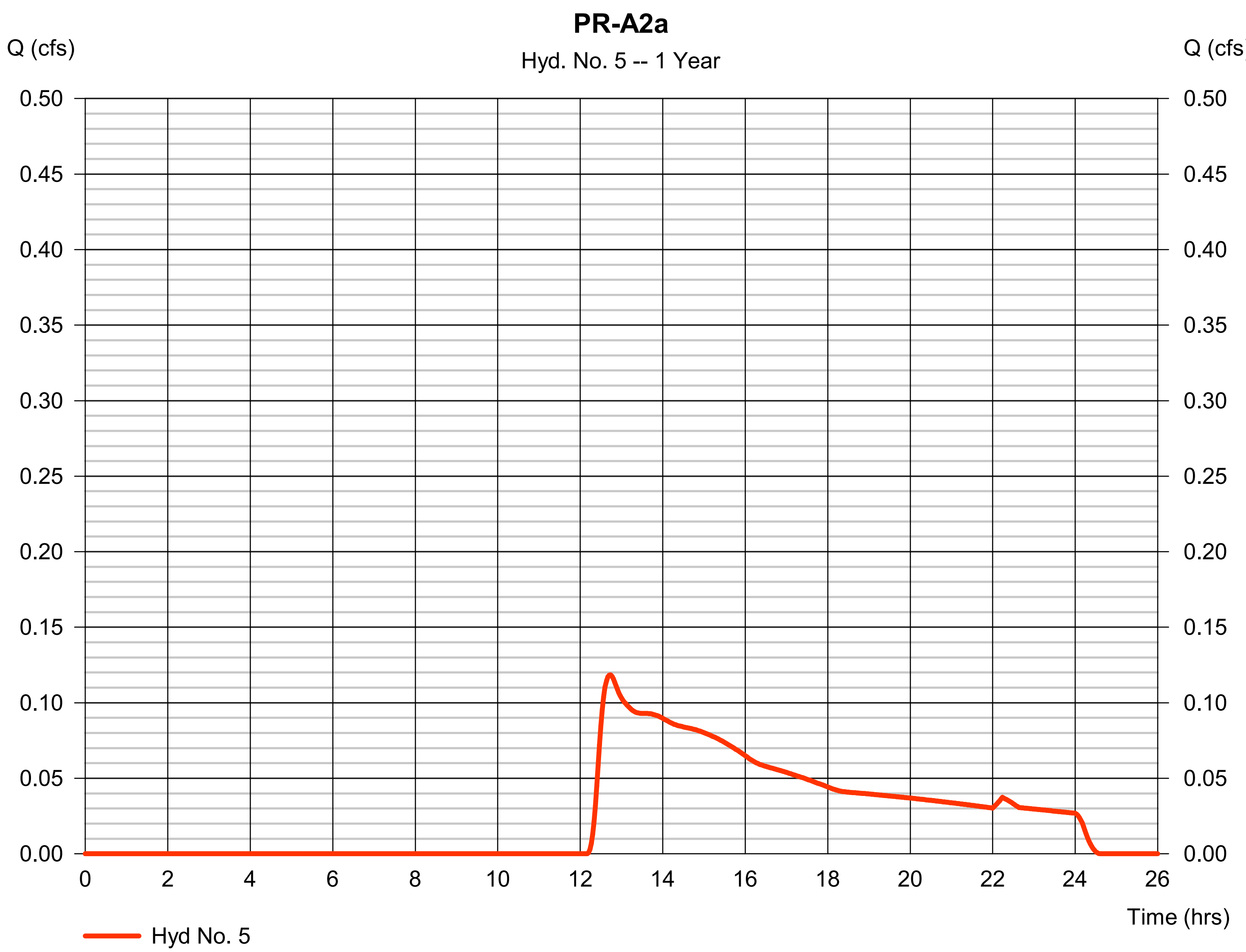
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 5

PR-A2a

Hydrograph type	= SCS Runoff	Peak discharge	= 0.118 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 2,300 cuft
Drainage area	= 5.090 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.390 x 30) + (2.100 x 39) + (1.600 x 98)] / 5.090



TR55 Tc Worksheet

Hyd. No. 5

PR-A2a

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.30		0.00		0.00		
Land slope (%)	=	3.30		0.00		0.00		
Travel Time (min)	**=**	**17.31**	**+**	**0.00**	**+**	**0.00**	**=**	**17.31**
Shallow Concentrated Flow								
Flow length (ft)	=	109.00		161.00		91.00		
Watercourse slope (%)	=	5.20		13.10		2.50		
Surface description	=	Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=3.68			5.84		3.21		
Travel Time (min)	**=**	**0.49**	**+**	**0.46**	**+**	**0.47**	**=**	**1.43**
Channel Flow								
X sectional flow area (sqft)	=	1.77		3.14		1.23		
Wetted perimeter (ft)	=	4.71		6.30		3.93		
Channel slope (%)	=	0.70		0.80		1.58		
Manning's n-value	=	0.012		0.012		0.012		
Velocity (ft/s)	=5.39							
				6.97				
						7.17		
Flow length (ft)	({0})91.0			827.0		19.0		
Travel Time (min)	**=**	**0.28**	**+**	**1.98**	**+**	**0.04**	**=**	**2.30**

Total Travel Time, Tc .... 21.00 min

Hydrograph Report

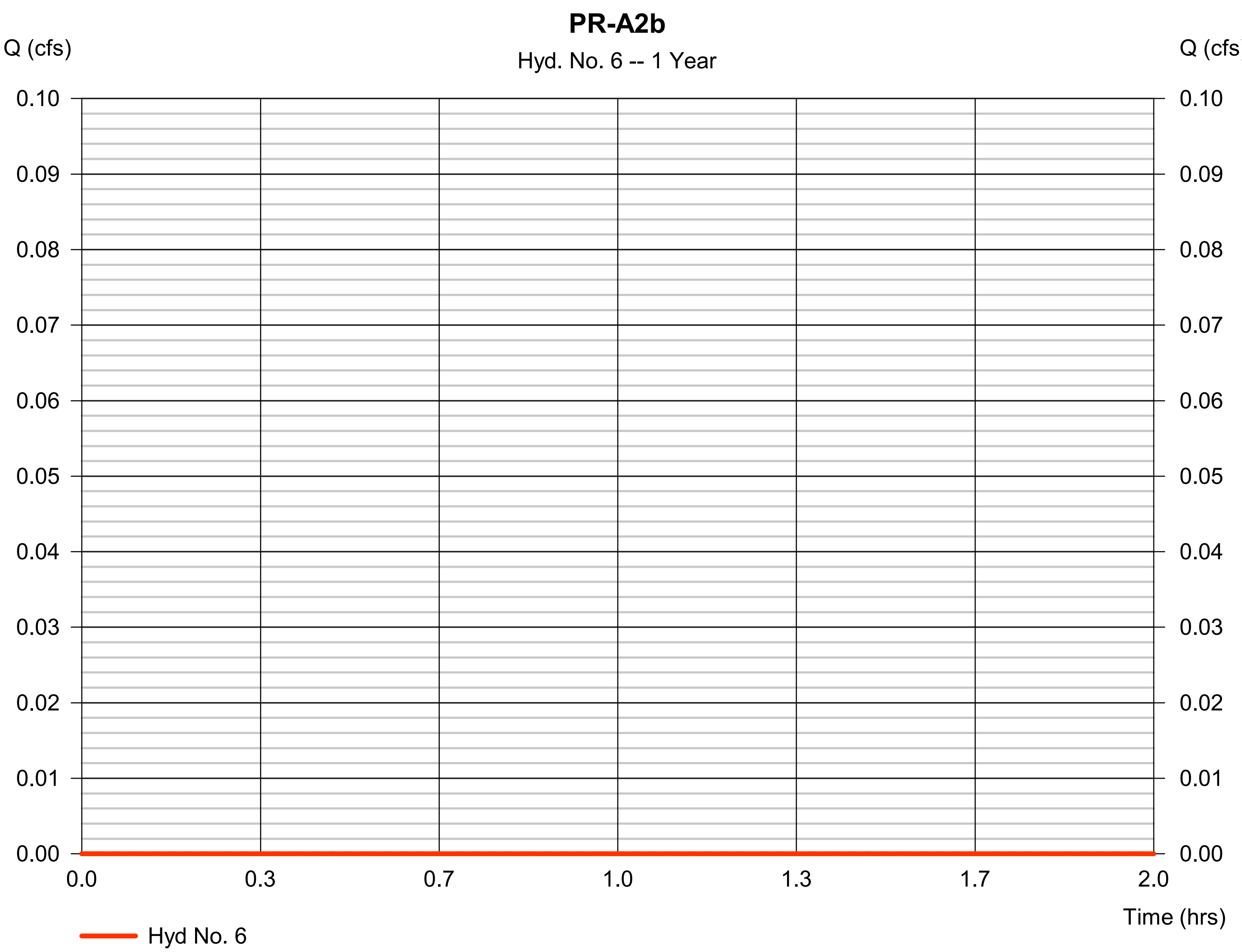
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 6

PR-A2b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.330 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.10 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 39)] / 0.330



TR55 Tc Worksheet

Hyd. No. 6

PR-A2b

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 2.70		0.00		0.00		
Travel Time (min)	**= 12.46**	**+**	**0.00**	**+**	**0.00**	**=**	**12.46**
Shallow Concentrated Flow							
Flow length (ft)	= 143.00		0.00		0.00		
Watercourse slope (%)	= 6.10		0.00		0.00		
Surface description	= Unpaved		Unpaved		Paved		
Average velocity (ft/s)	=3.98		0.00		0.00		
Travel Time (min)	**= 0.60**	**+**	**0.00**	**+**	**0.00**	**=**	**0.60**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.012		0.012		0.012		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 13.10 min

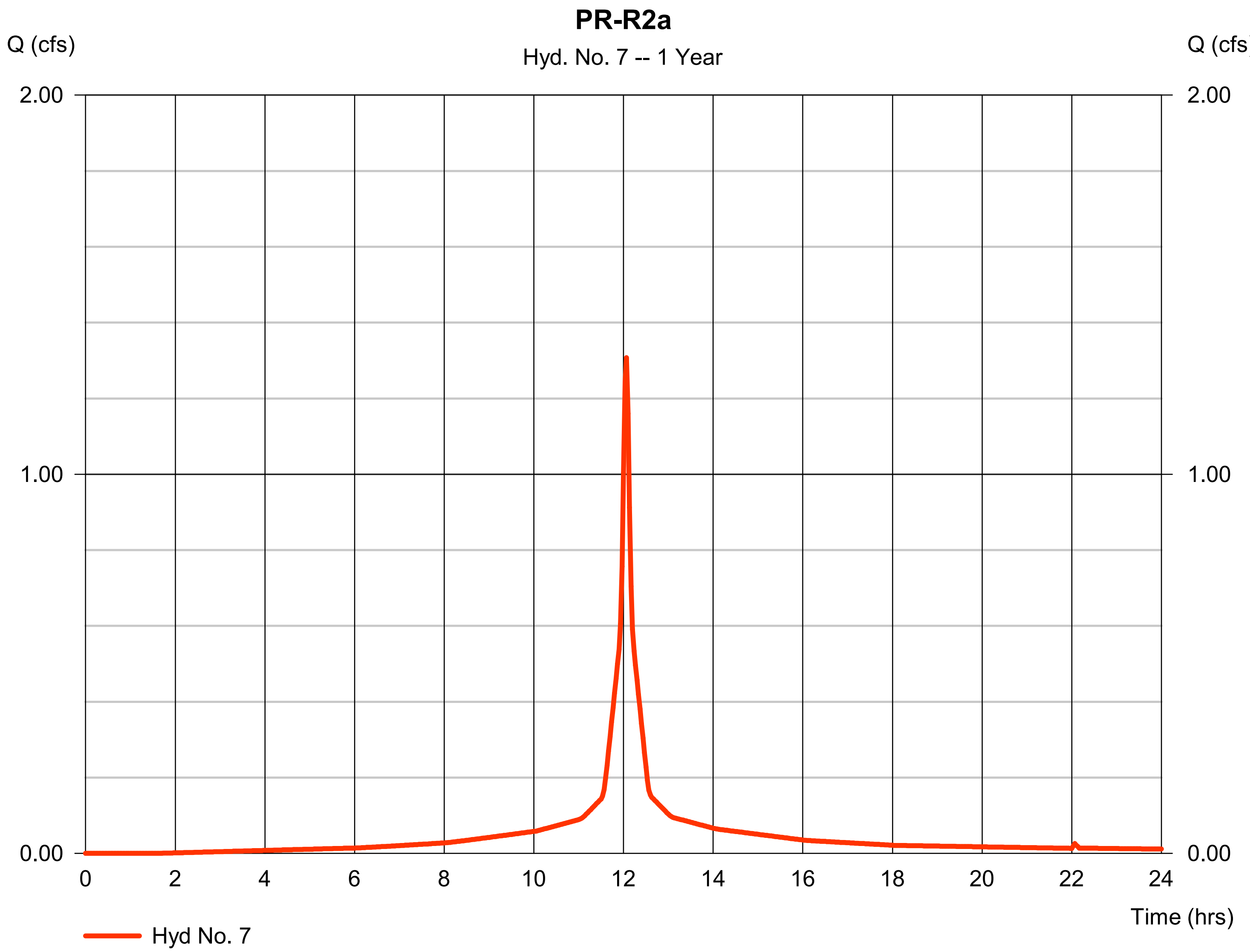
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 7

PR-R2a

Hydrograph type	= SCS Runoff	Peak discharge	= 1.308 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,370 cuft
Drainage area	= 0.520 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



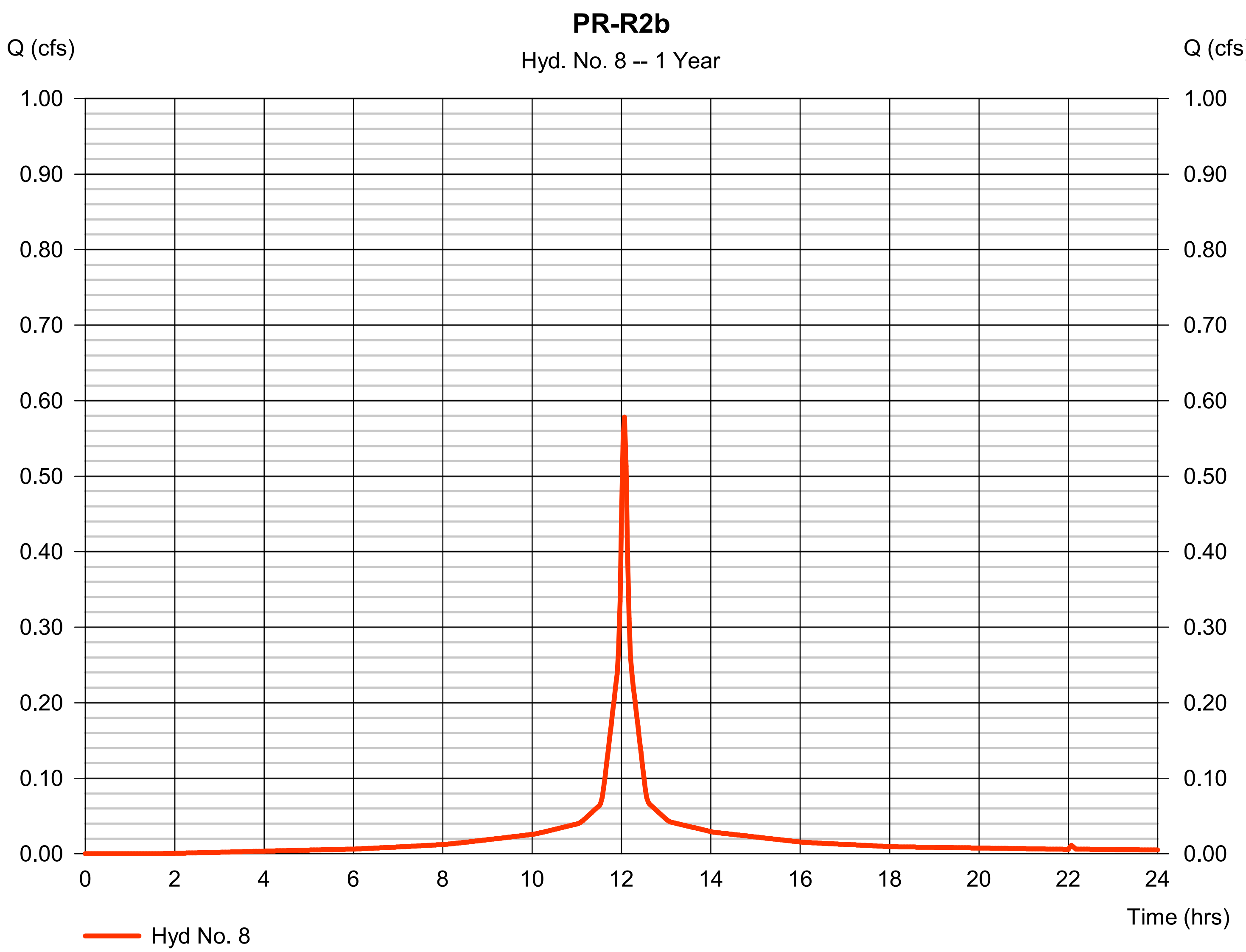
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 8

PR-R2b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.578 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,933 cuft
Drainage area	= 0.230 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



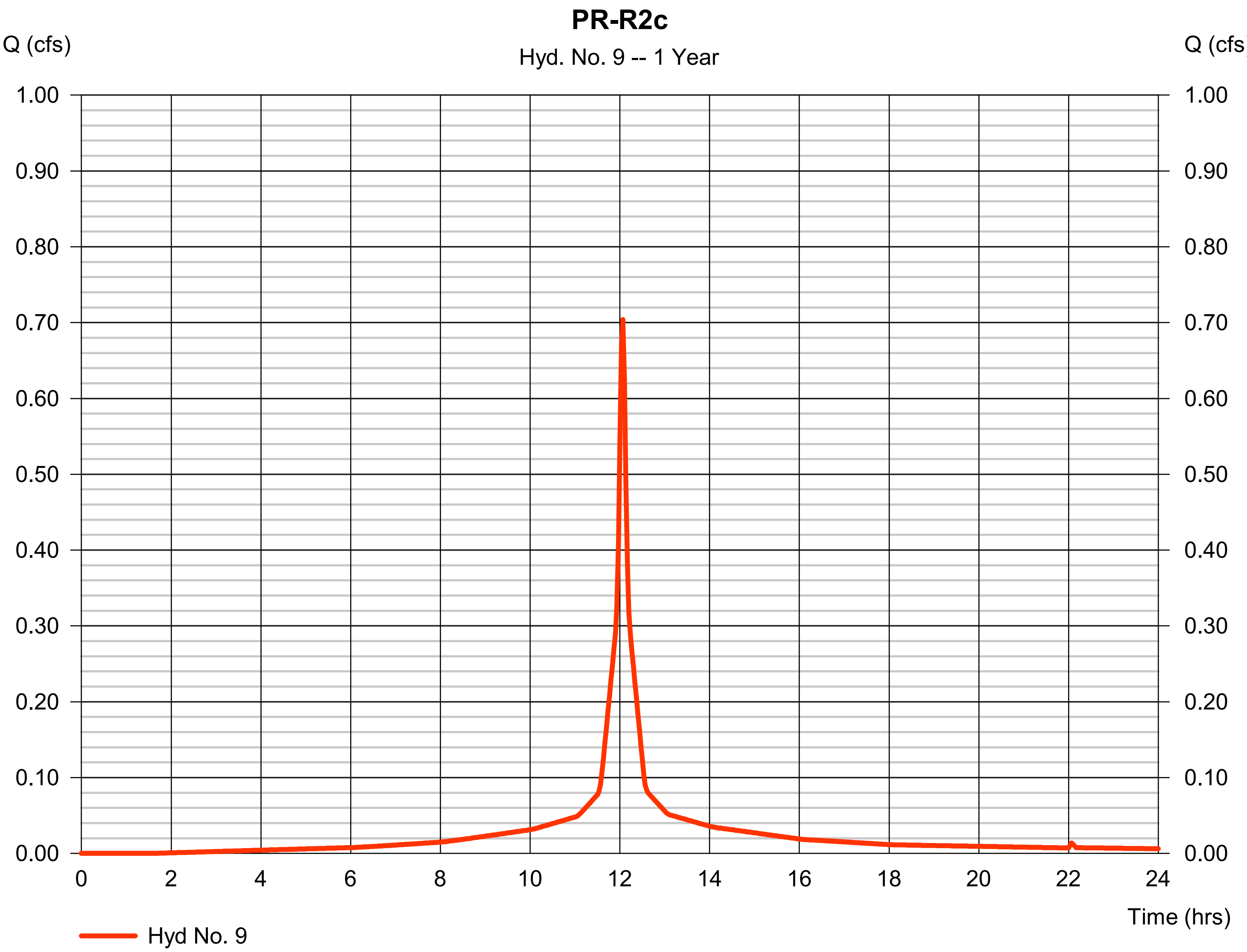
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 9

PR-R2c

Hydrograph type	= SCS Runoff	Peak discharge	= 0.704 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 2,353 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



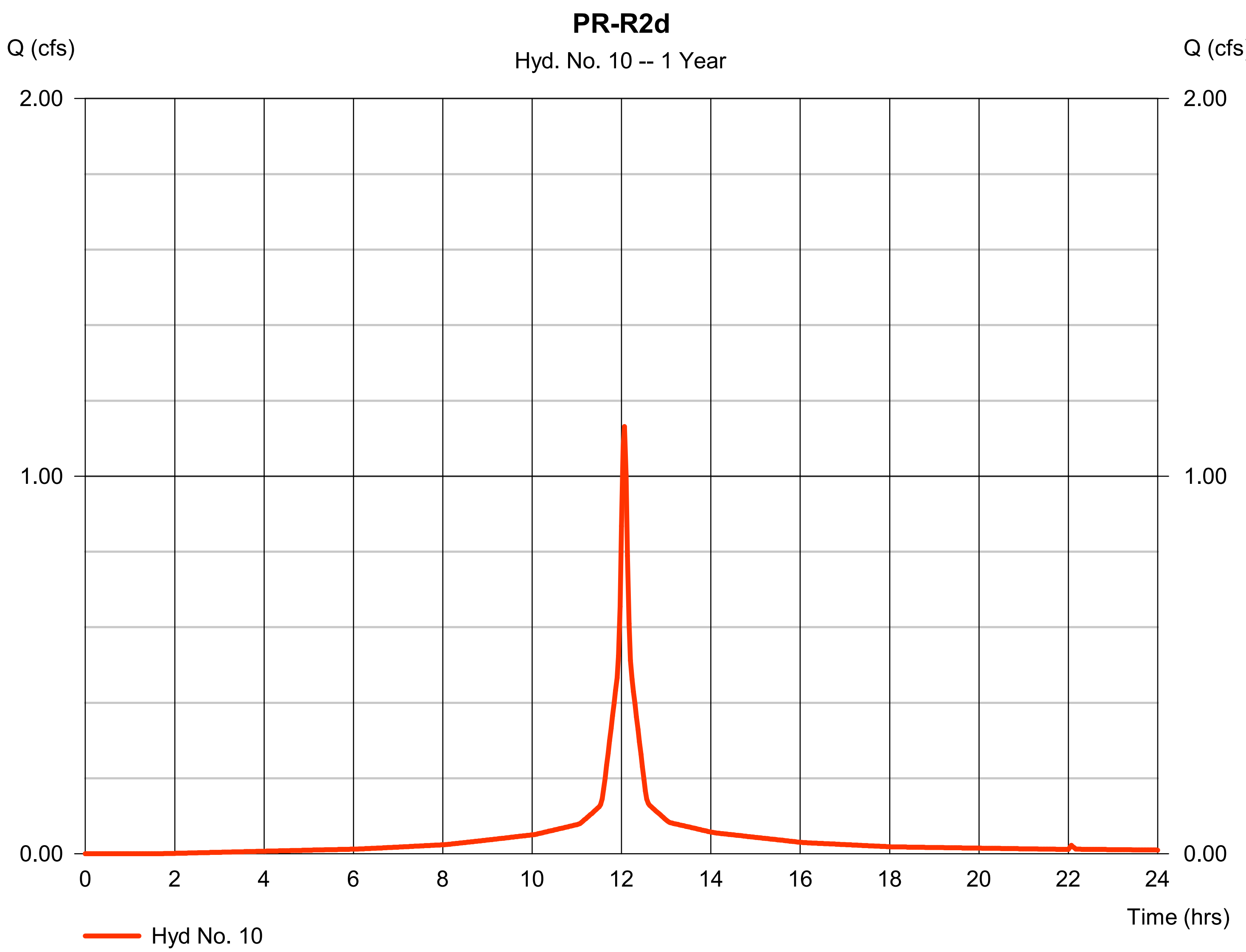
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 10

PR-R2d

Hydrograph type	= SCS Runoff	Peak discharge	= 1.132 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,782 cuft
Drainage area	= 0.450 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

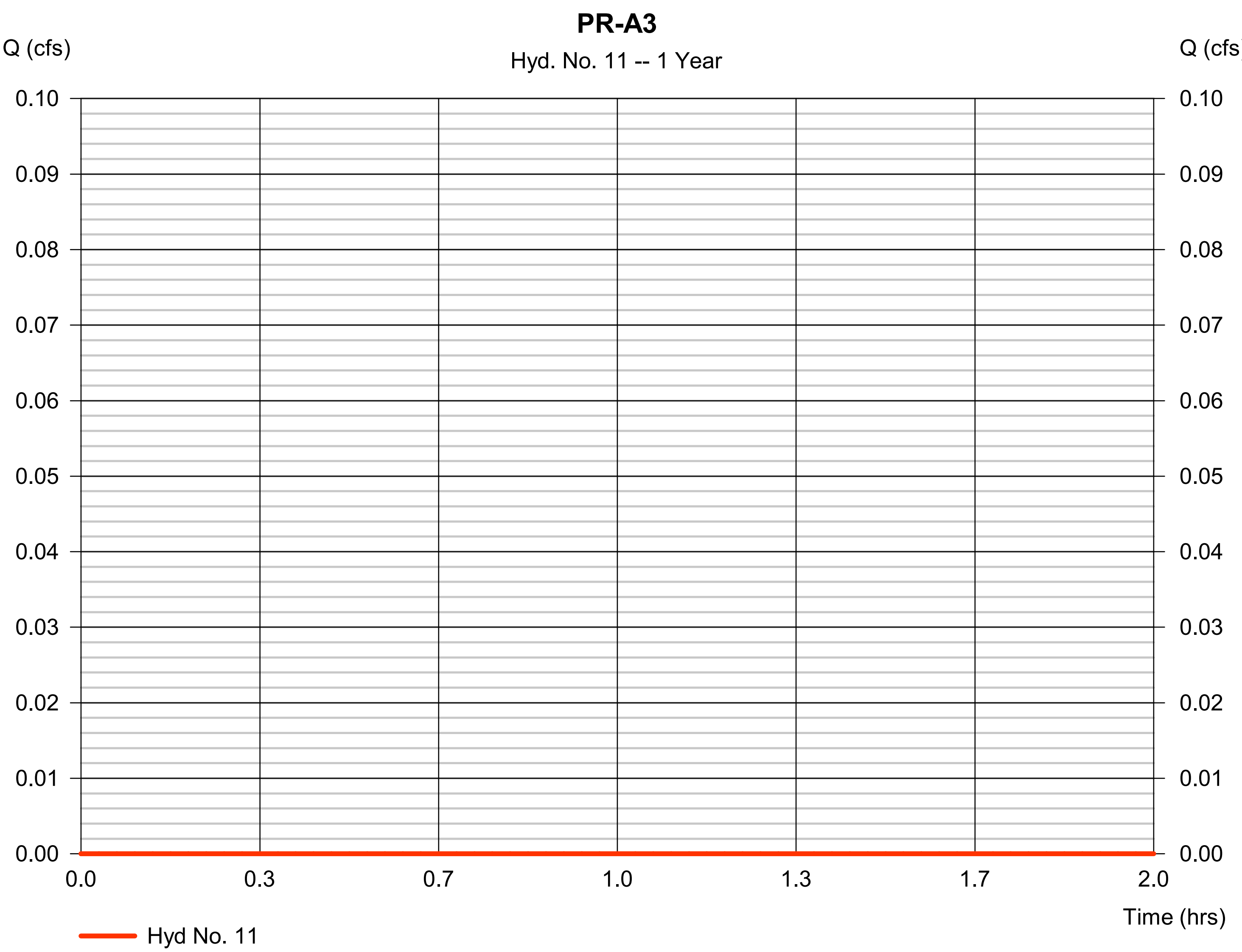
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 11

PR-A3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.950 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.20 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.960 x 39)] / 0.950



TR55 Tc Worksheet

Hyd. No. 11

PR-A3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.30		0.00		0.00		
Land slope (%)	= 5.80		0.00		0.00		
Travel Time (min)	**= 9.18**	**+**	**0.00**	**+**	**0.00**	**=**	**9.18**
Shallow Concentrated Flow							
Flow length (ft)	= 29.00		0.00		0.00		
Watercourse slope (%)	= 21.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=7.46		0.00		0.00		
Travel Time (min)	**= 0.06**	**+**	**0.00**	**+**	**0.00**	**=**	**0.06**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.012		0.012		0.012		
Velocity (ft/s)	=0.00		0.00		0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 9.20 min

Hydrograph Report

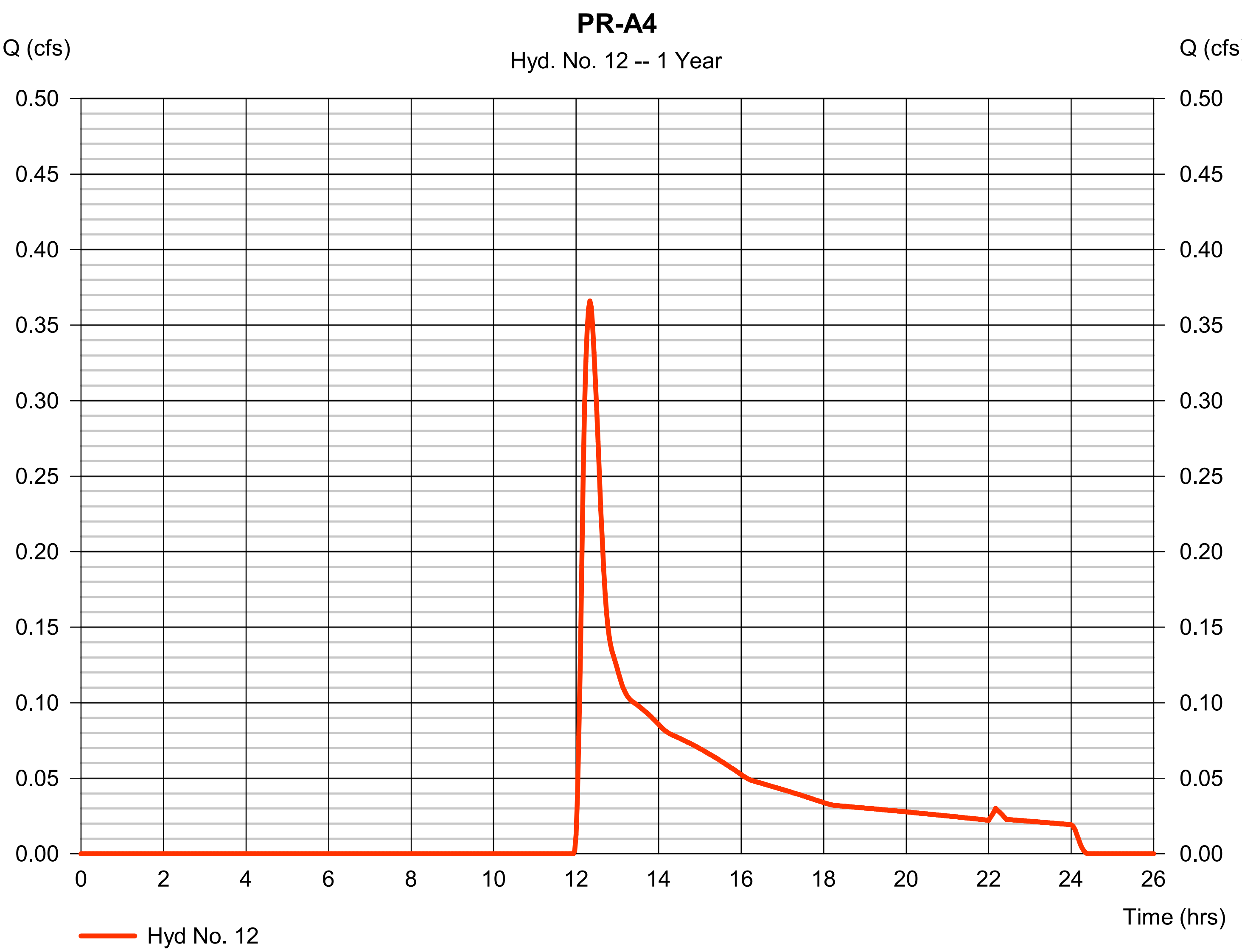
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 12

PR-A4

Hydrograph type	= SCS Runoff	Peak discharge	= 0.366 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 2,516 cuft
Drainage area	= 2.260 ac	Curve number	= 63*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.10 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 30) + (1.010 x 39) + (0.950 x 98)] / 2.260



TR55 Tc Worksheet

Hyd. No. 12

PR-A4

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.30		0.00		0.00		
Land slope (%)	=	10.00		0.00		0.00		
Travel Time (min)	**=**	**11.11**	**+**	**0.00**	**+**	**0.00**	**=**	**11.11**
Shallow Concentrated Flow								
Flow length (ft)	=	129.00		600.00		0.00		
Watercourse slope (%)	=	14.00		3.50		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=6.04			3.80		0.00		
Travel Time (min)	**=**	**0.36**	**+**	**2.63**	**+**	**0.00**	**=**	**2.99**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.012		0.012		0.012		
Velocity (ft/s)	=0.00							
				0.00				
						0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 14.10 min

Hydrograph Report

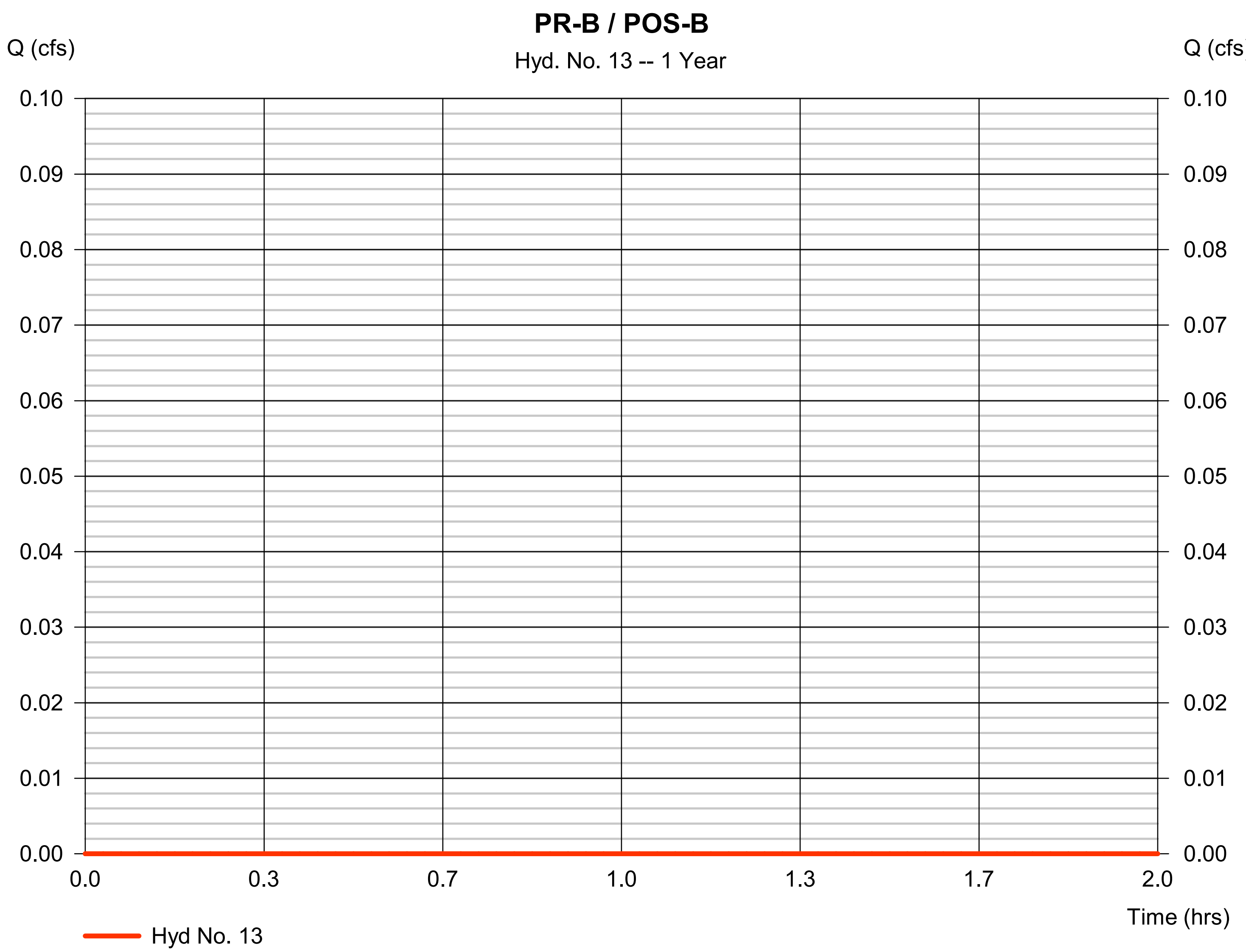
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 13

PR-B / POS-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 1.940 ac	Curve number	= 33*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 2.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.330 x 30) + (0.610 x 39)] / 1.940



TR55 Tc Worksheet

Hyd. No. 13

PR-B / POS-B

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	100.0		0.0		0.0		
Two-year 24-hr precip. (in)	=	3.30		0.00		0.00		
Land slope (%)	=	12.00		0.00		0.00		
Travel Time (min)	**=**	**10.33**	**+**	**0.00**	**+**	**0.00**	**=**	**10.33**
Shallow Concentrated Flow								
Flow length (ft)	=	200.00		0.00		0.00		
Watercourse slope (%)	=	19.00		0.00		0.00		
Surface description	=	Unpaved		Paved		Paved		
Average velocity (ft/s)	=7.03			0.00		0.00		
Travel Time (min)	**=**	**0.47**	**+**	**0.00**	**+**	**0.00**	**=**	**0.47**
Channel Flow								
X sectional flow area (sqft)	=	0.00		0.00		0.00		
Wetted perimeter (ft)	=	0.00		0.00		0.00		
Channel slope (%)	=	0.00		0.00		0.00		
Manning's n-value	=	0.012		0.012		0.012		
Velocity (ft/s)	=0.00			0.00		0.00		
Flow length (ft)	({0})0.0			0.0		0.0		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc .... 10.80 min

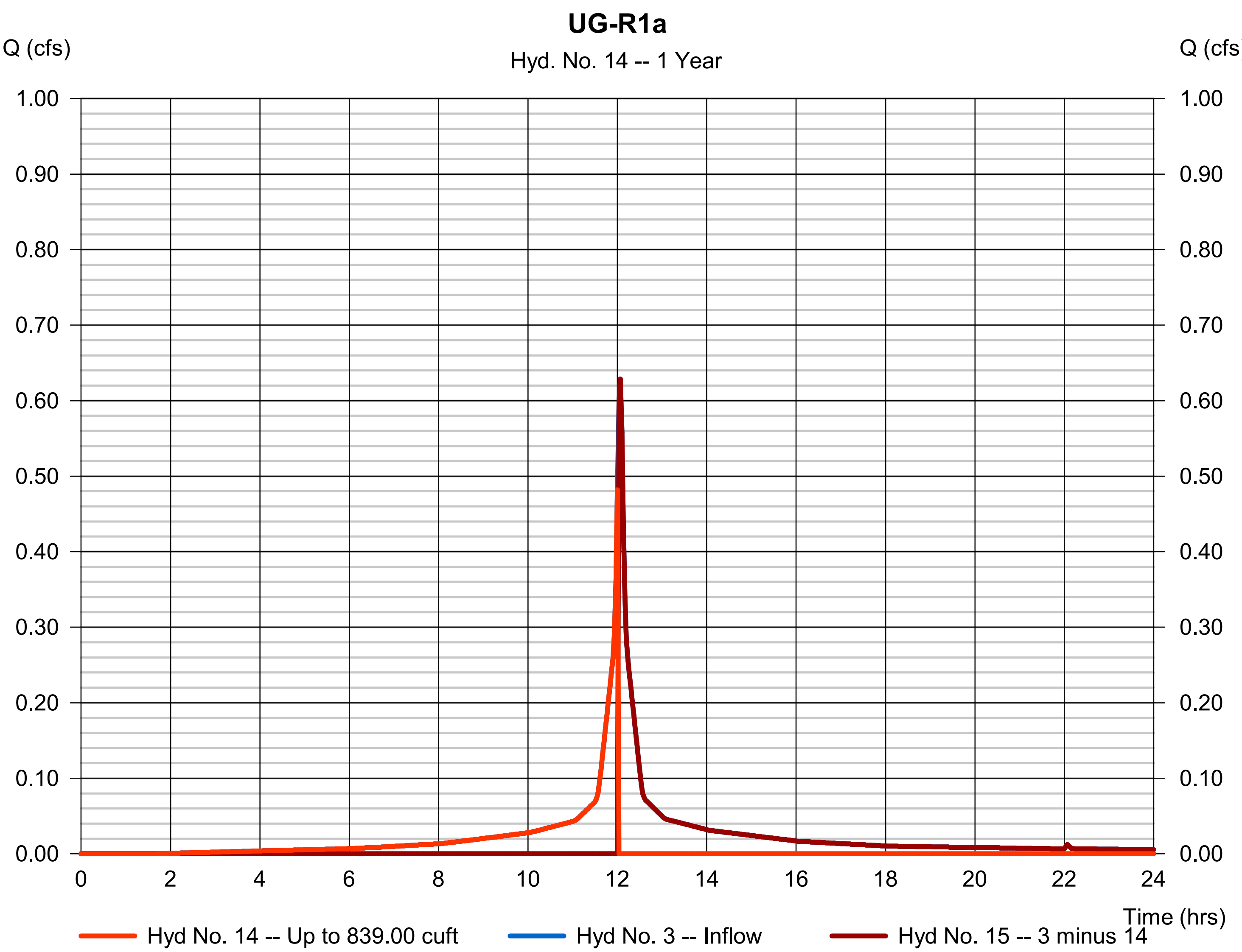
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 14

UG-R1a

Hydrograph type	= Diversion1	Peak discharge	= 0.482 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 867 cuft
Inflow hydrograph	= 3 - PR-R1a	2nd diverted hyd.	= 15
Diversion method	= First Flush Volume	Volume Up To	= 839.00 cuft



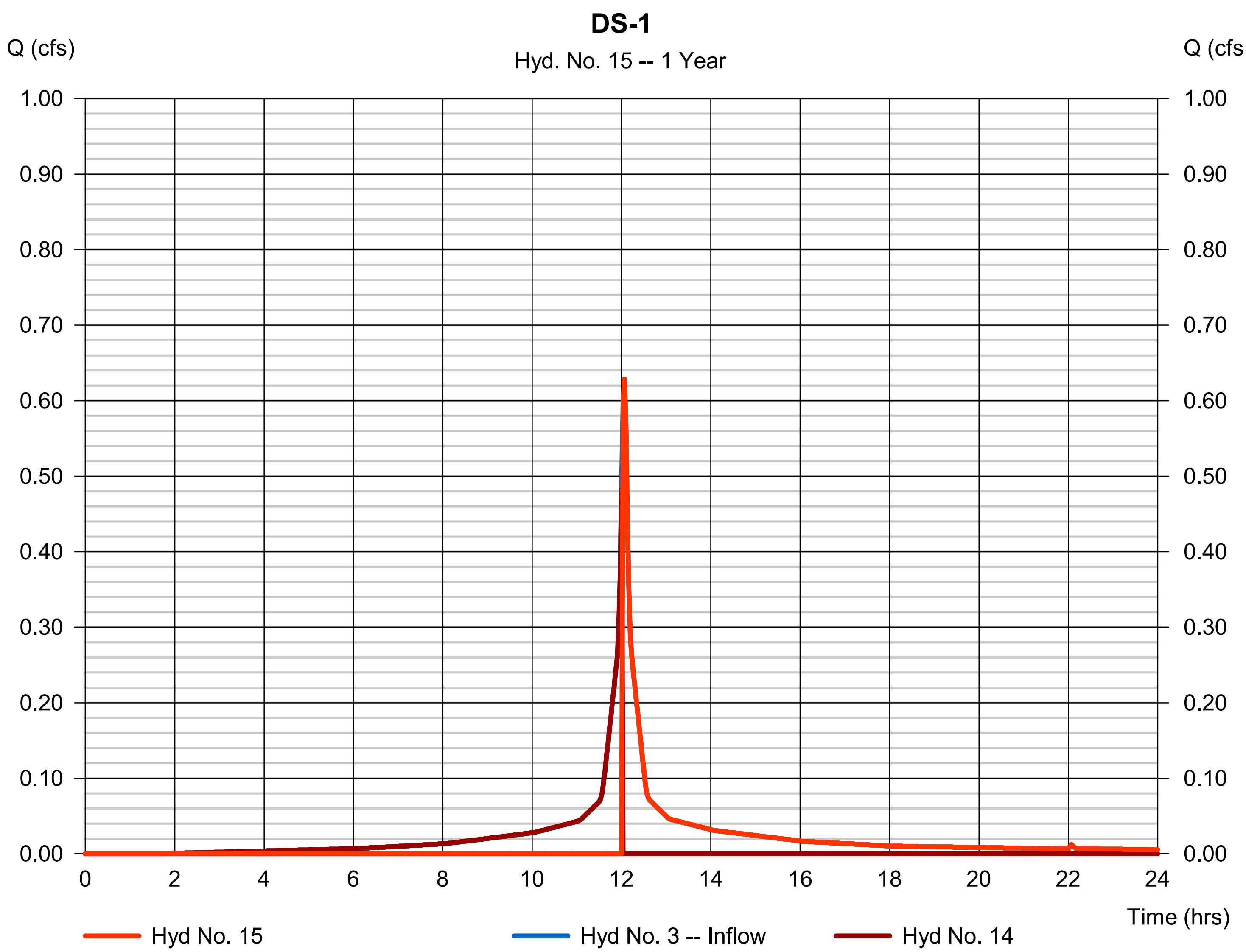
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 15

DS-1

Hydrograph type	= Diversion2	Peak discharge	= 0.629 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,234 cuft
Inflow hydrograph	= 3 - PR-R1a	2nd diverted hyd.	= 14
Diversion method	= First Flush Volume	Volume Up To	= 839.00 cuft



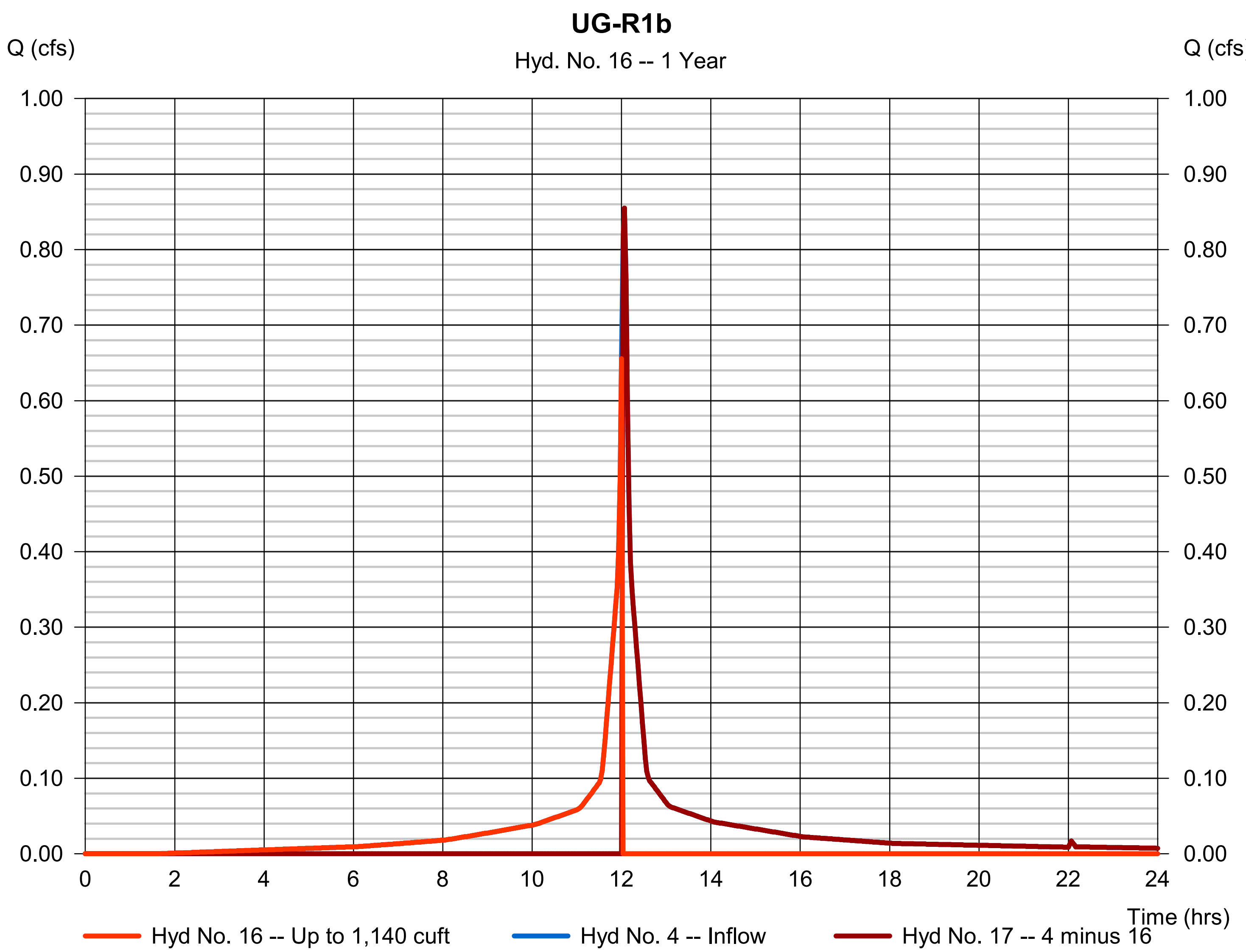
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 16

UG-R1b

Hydrograph type	= Diversion1	Peak discharge	= 0.656 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 1,180 cuft
Inflow hydrograph	= 4 - PR-R1b	2nd diverted hyd.	= 17
Diversion method	= First Flush Volume	Volume Up To	= 1,140 cuft



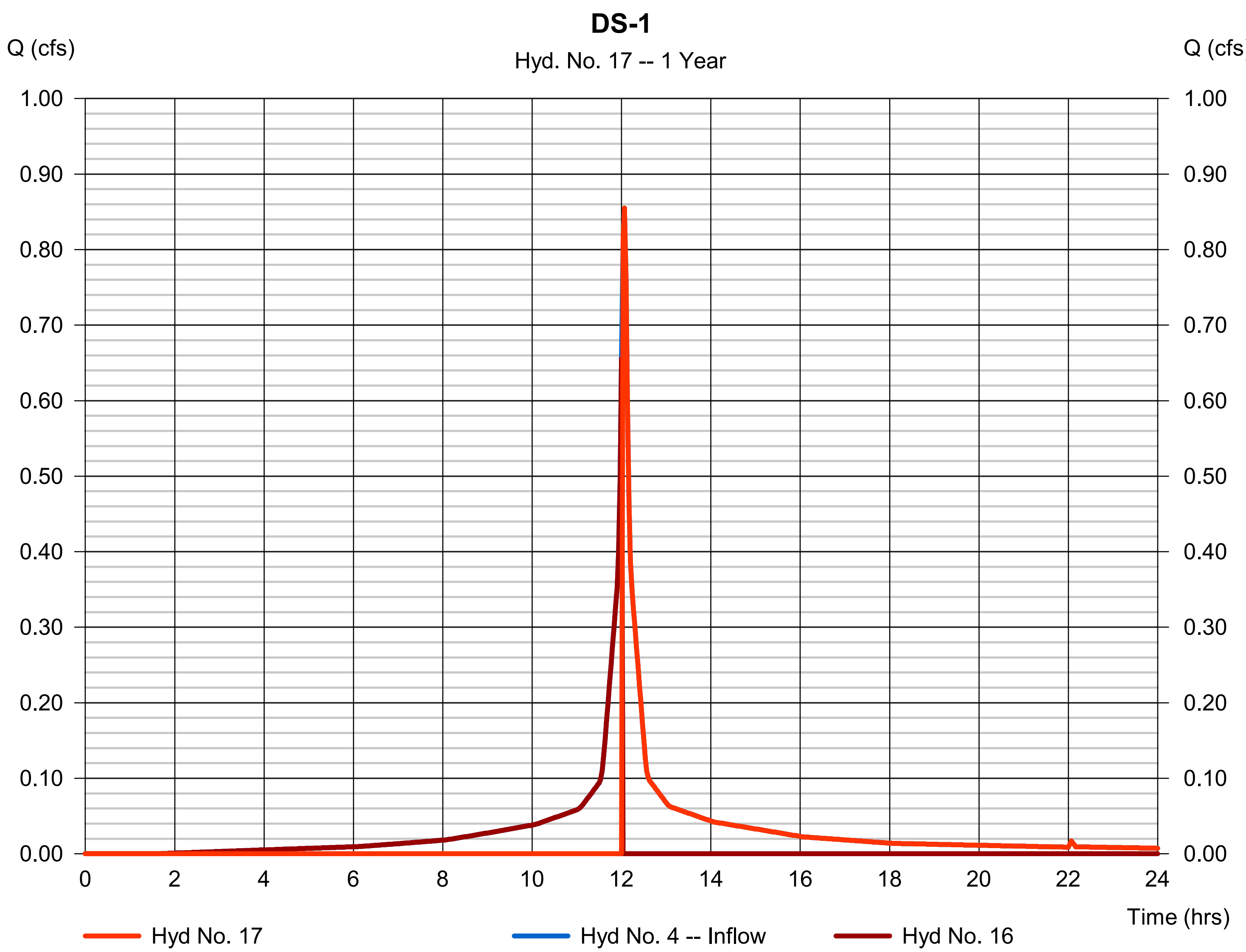
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 17

DS-1

Hydrograph type	= Diversion2	Peak discharge	= 0.855 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,678 cuft
Inflow hydrograph	= 4 - PR-R1b	2nd diverted hyd.	= 16
Diversion method	= First Flush Volume	Volume Up To	= 1,140 cuft



Hydrograph Report

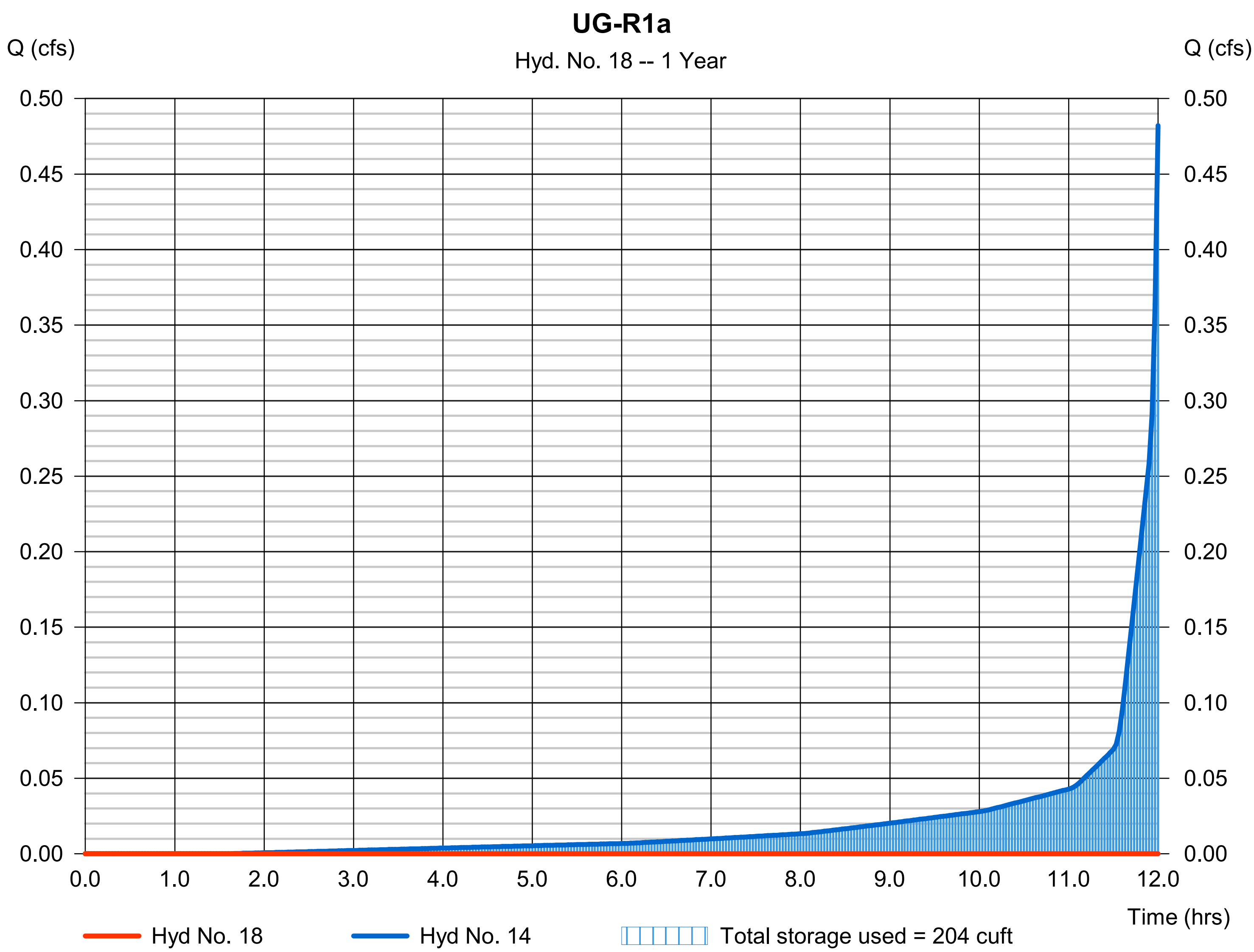
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 18

UG-R1a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 11.43 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - UG-R1a	Max. Elevation	= 277.23 ft
Reservoir name	= UG-R1a	Max. Storage	= 204 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 8 - UG-R1a

Pond Data

UG Chambers -Invert elev. = 277.12 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 12, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 276.12 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	276.12	n/a	0	0
0.35	276.47	n/a	57	57
0.70	276.82	n/a	57	114
1.05	277.17	n/a	67	181
1.40	277.52	n/a	128	309
1.75	277.87	n/a	126	434
2.10	278.22	n/a	121	555
2.45	278.57	n/a	113	668
2.80	278.92	n/a	100	768
3.15	279.27	n/a	73	842
3.50	279.62	n/a	57	899

Culvert / Orifice Structures

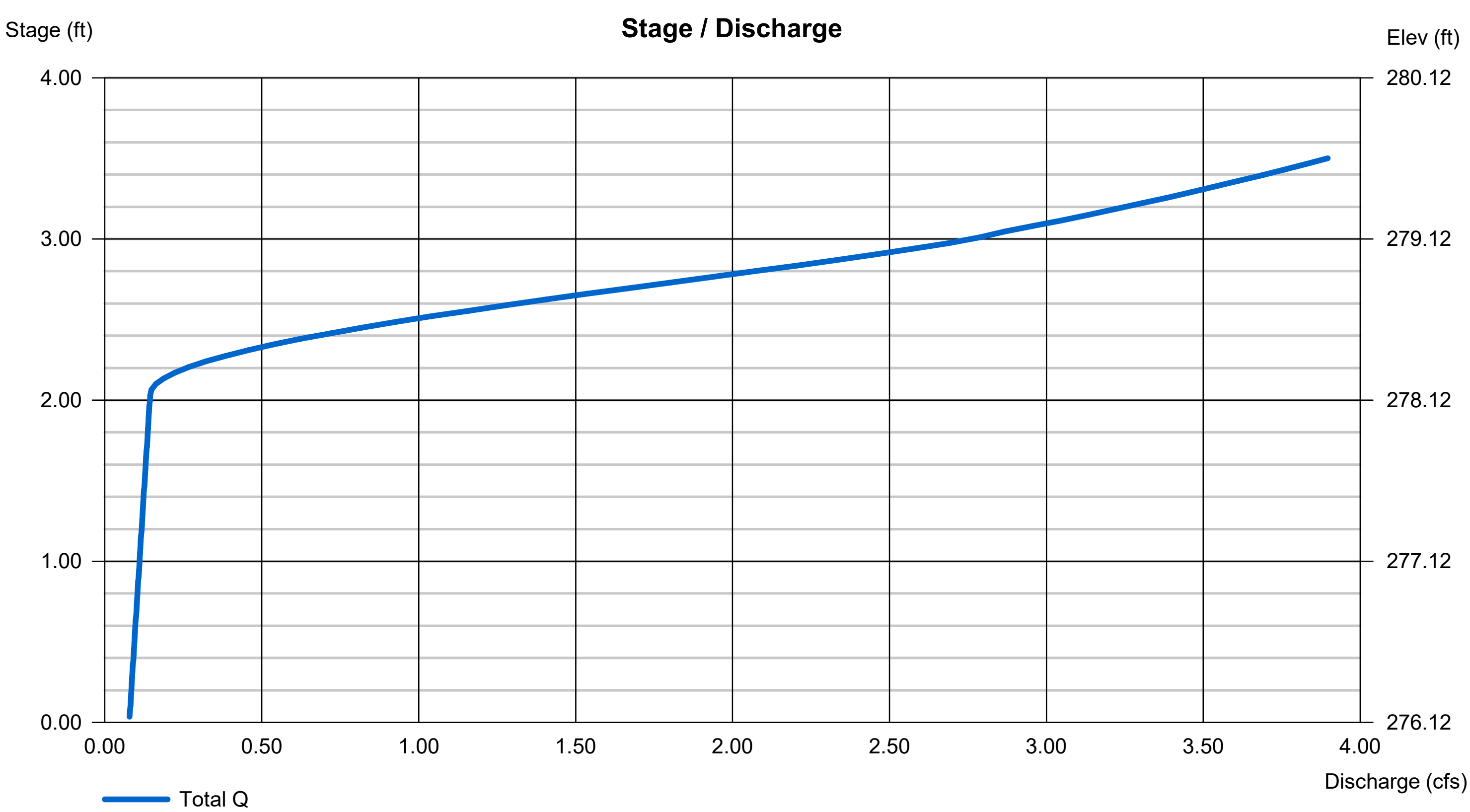
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 278.16	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 8.270 (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).



Hydrograph Report

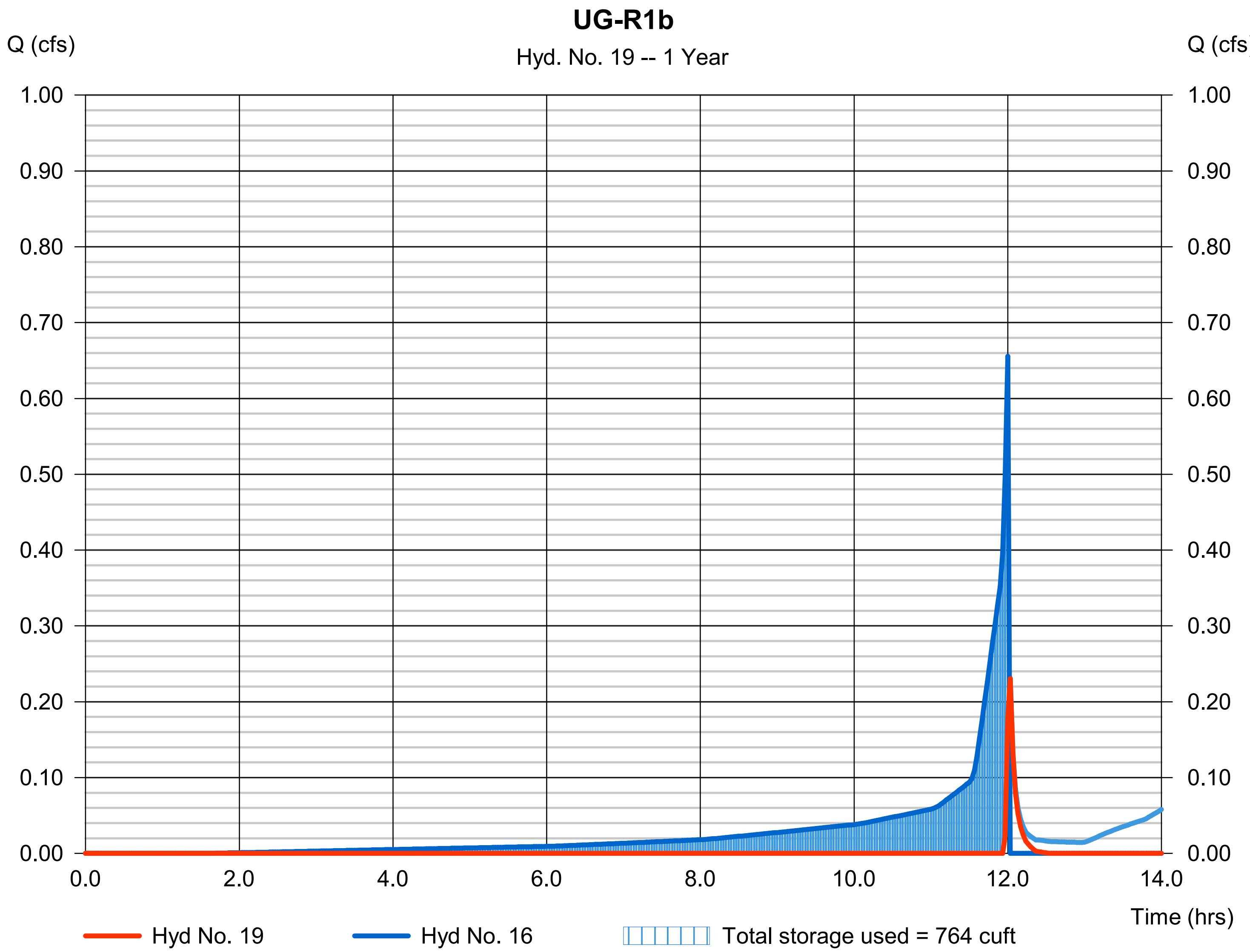
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 19

UG-R1b

Hydrograph type	= Reservoir	Peak discharge	= 0.230 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 96 cuft
Inflow hyd. No.	= 16 - UG-R1b	Max. Elevation	= 278.20 ft
Reservoir name	= UG-R1b	Max. Storage	= 764 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 9 - UG-R1b

Pond Data

UG Chambers -Invert elev. = 276.93 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 15, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 275.93 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	275.93	n/a	0	0
0.35	276.28	n/a	71	71
0.70	276.63	n/a	71	142
1.05	276.98	n/a	84	226
1.40	277.33	n/a	160	386
1.75	277.68	n/a	157	543
2.10	278.03	n/a	151	694
2.45	278.38	n/a	141	835
2.80	278.73	n/a	125	960
3.15	279.08	n/a	92	1,052
3.50	279.43	n/a	71	1,123

Culvert / Orifice Structures

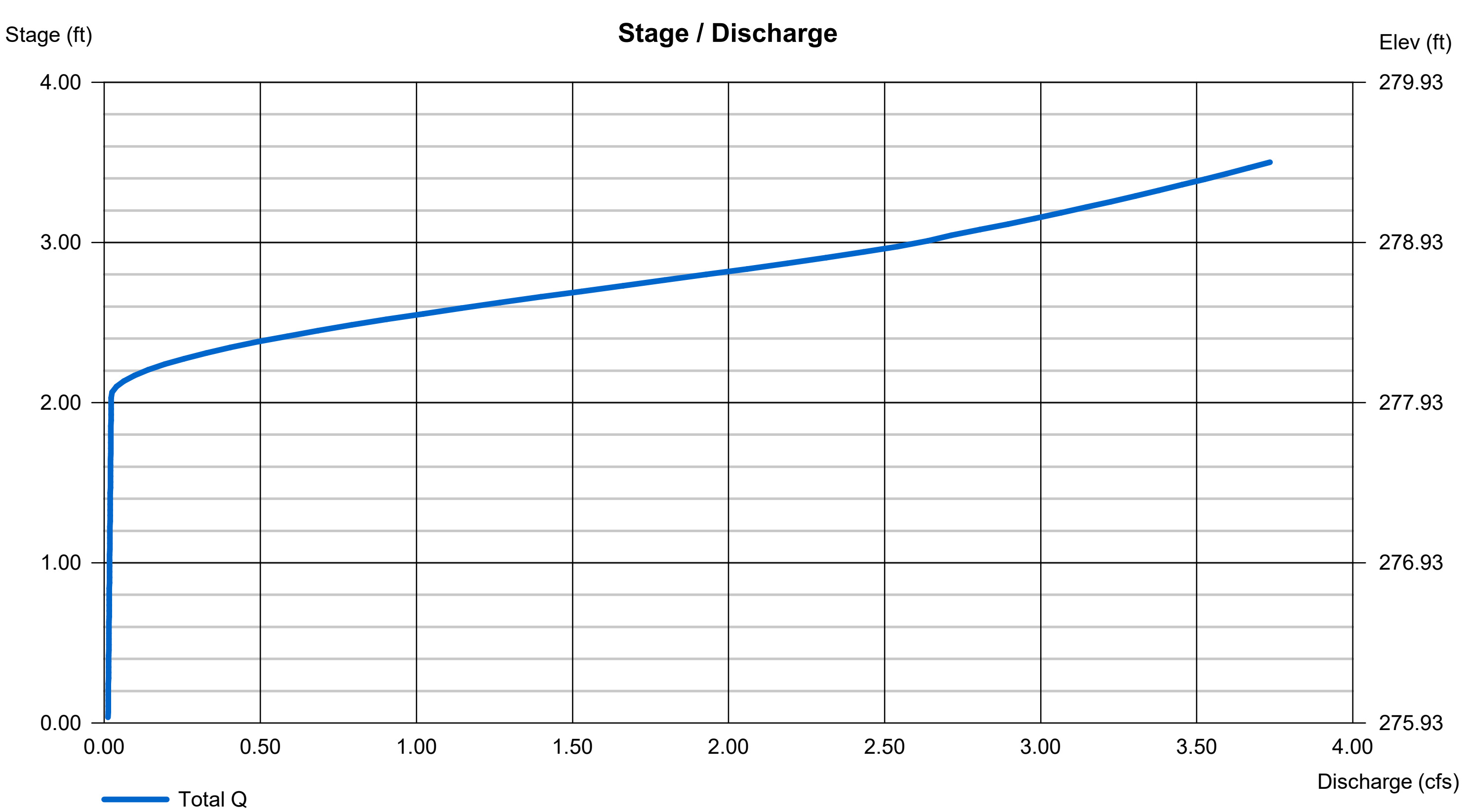
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 277.97	0.00	0.00	0.00
Length (ft)	= 14.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 1.020 (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).



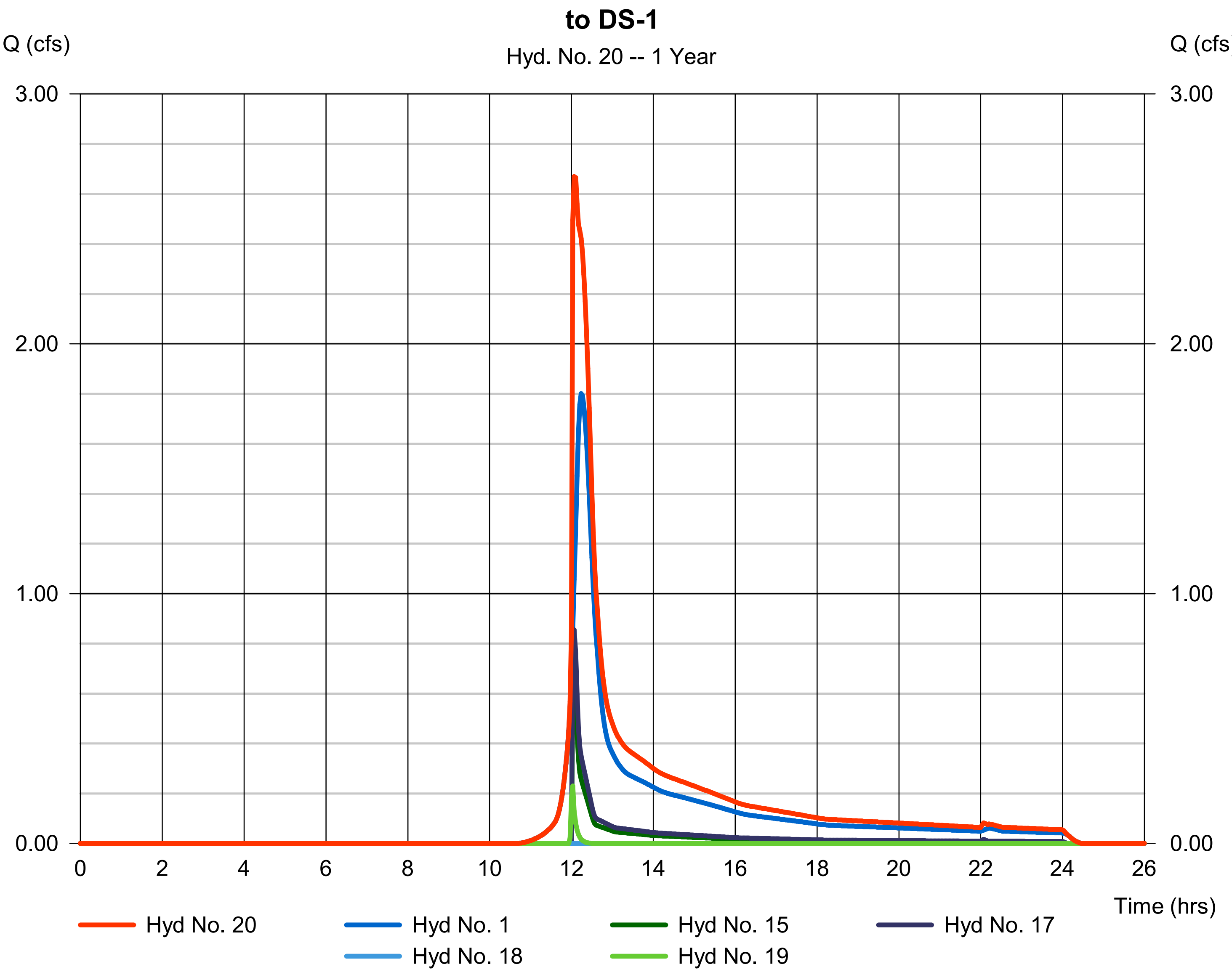
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 20

to DS-1

Hydrograph type	= Combine	Peak discharge	= 2.670 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 11,427 cuft
Inflow hyds.	= 1, 15, 17, 18, 19	Contrib. drain. area	= 2.670 ac



Hydrograph Report

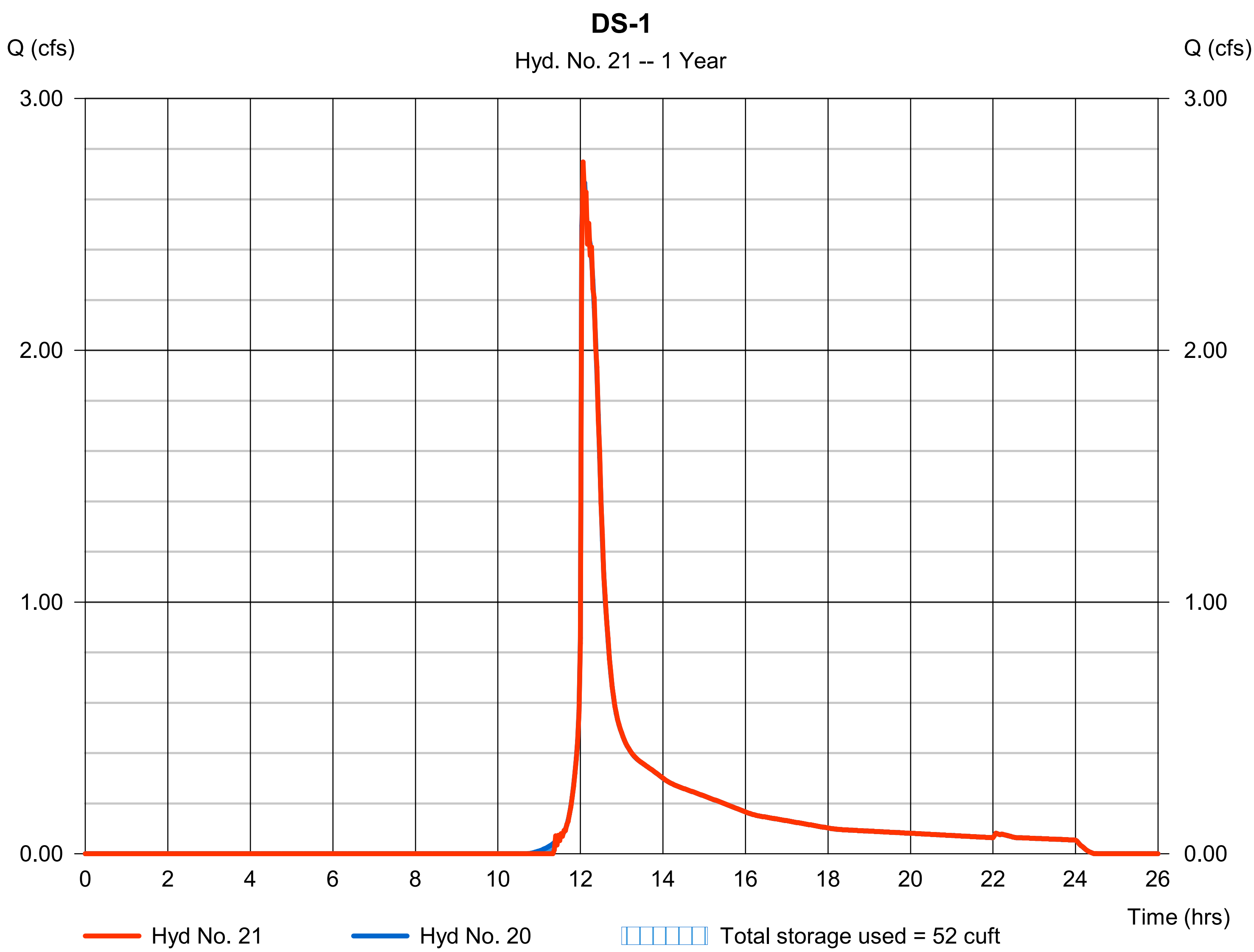
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 21

DS-1

Hydrograph type	= Reservoir	Peak discharge	= 2.748 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 11,389 cuft
Inflow hyd. No.	= 20 - to DS-1	Max. Elevation	= 269.67 ft
Reservoir name	= DS-1	Max. Storage	= 52 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 1 - DS-1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 265.70 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	265.70	13	0	0
7.30	273.00	13	95	95

Culvert / Orifice Structures

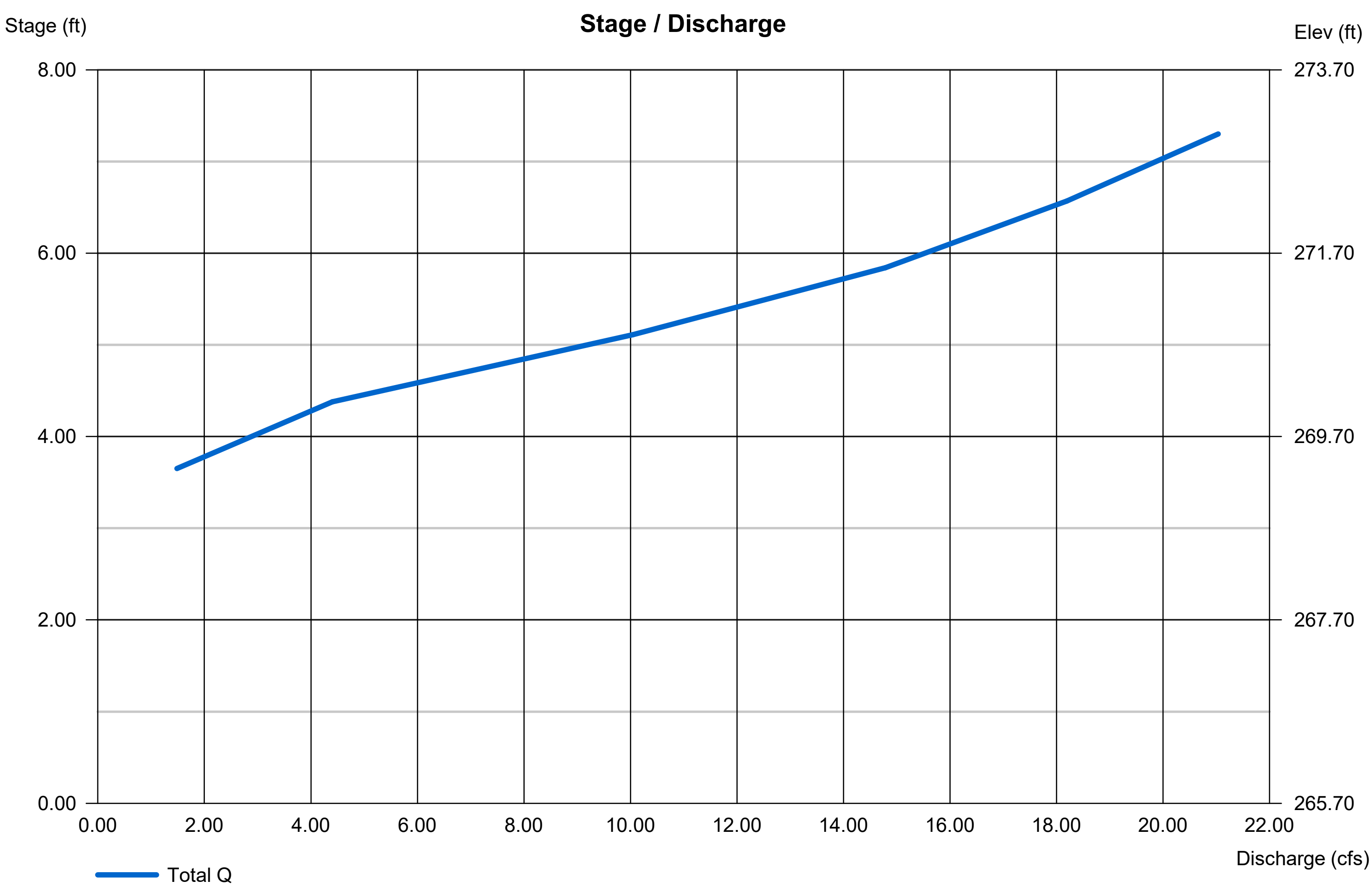
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	12.00	0.00	0.00
Span (in)	= 18.00	12.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 269.67	268.70	0.00	0.00
Length (ft)	= 74.00	30.00	0.00	0.00
Slope (%)	= 5.00	2.30	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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



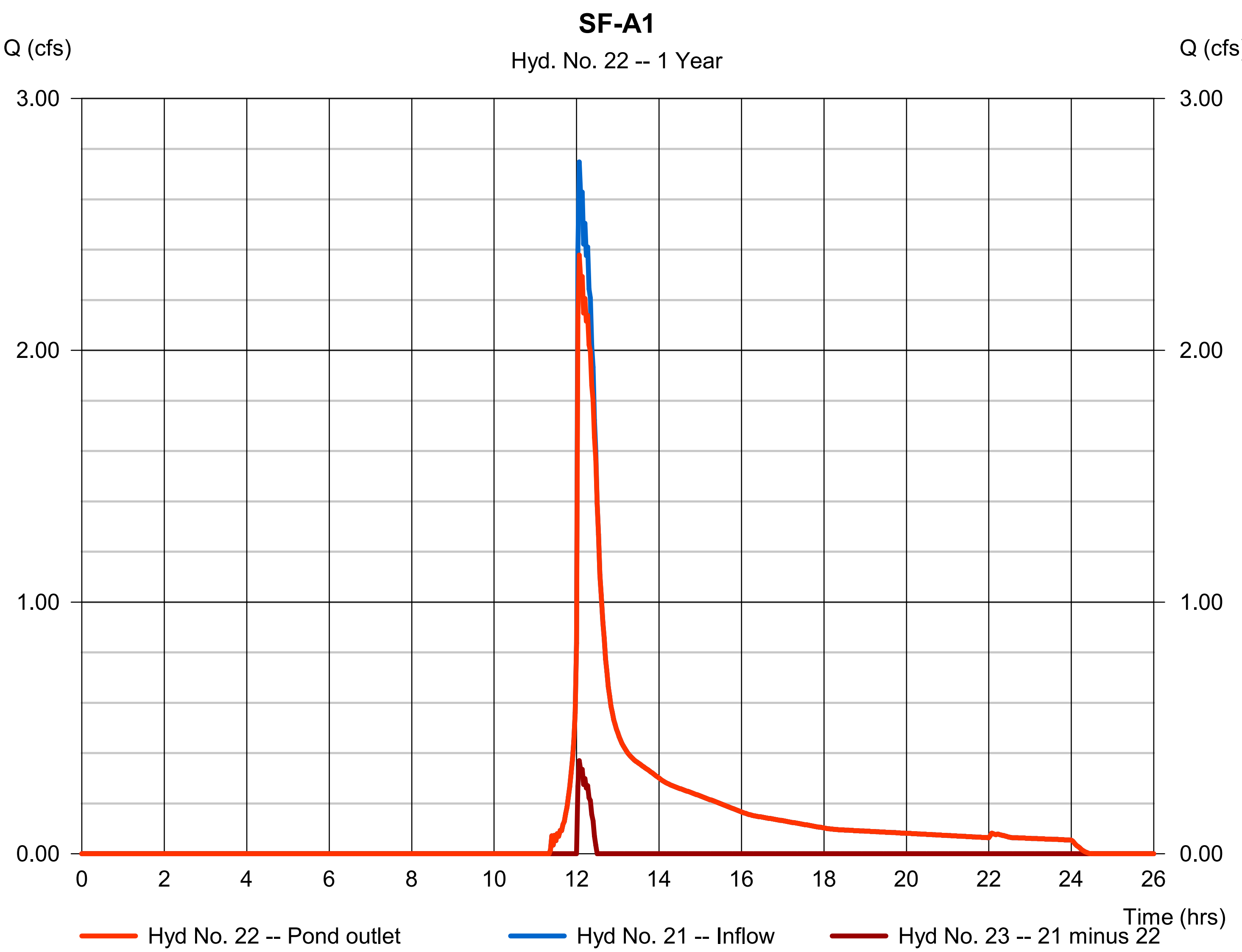
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 22

SF-A1

Hydrograph type	= Diversion1	Peak discharge	= 2.378 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 11,002 cuft
Inflow hydrograph	= 21 - DS-1	2nd diverted hyd.	= 23
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



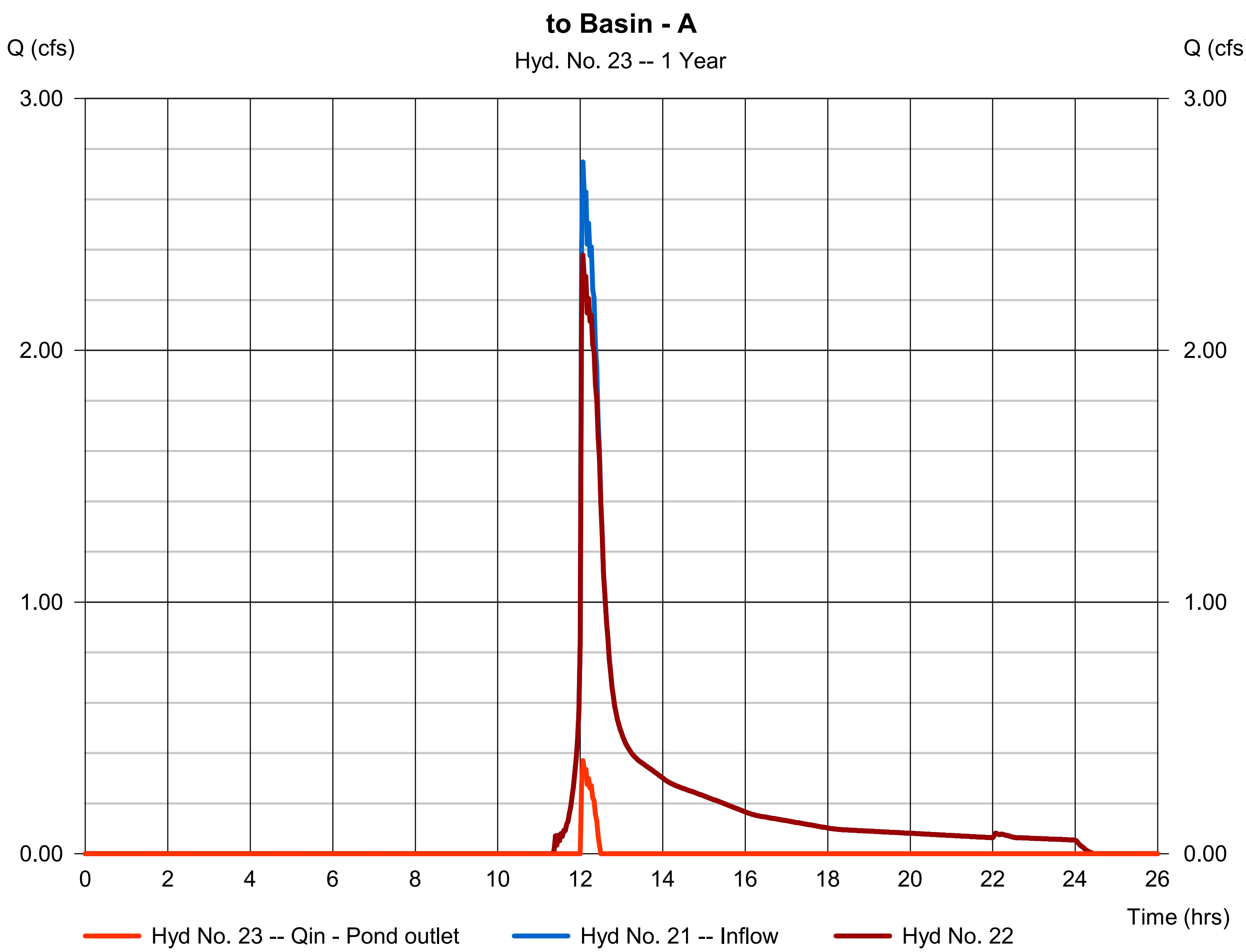
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 23

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 0.370 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 387 cuft
Inflow hydrograph	= 21 - DS-1	2nd diverted hyd.	= 22
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



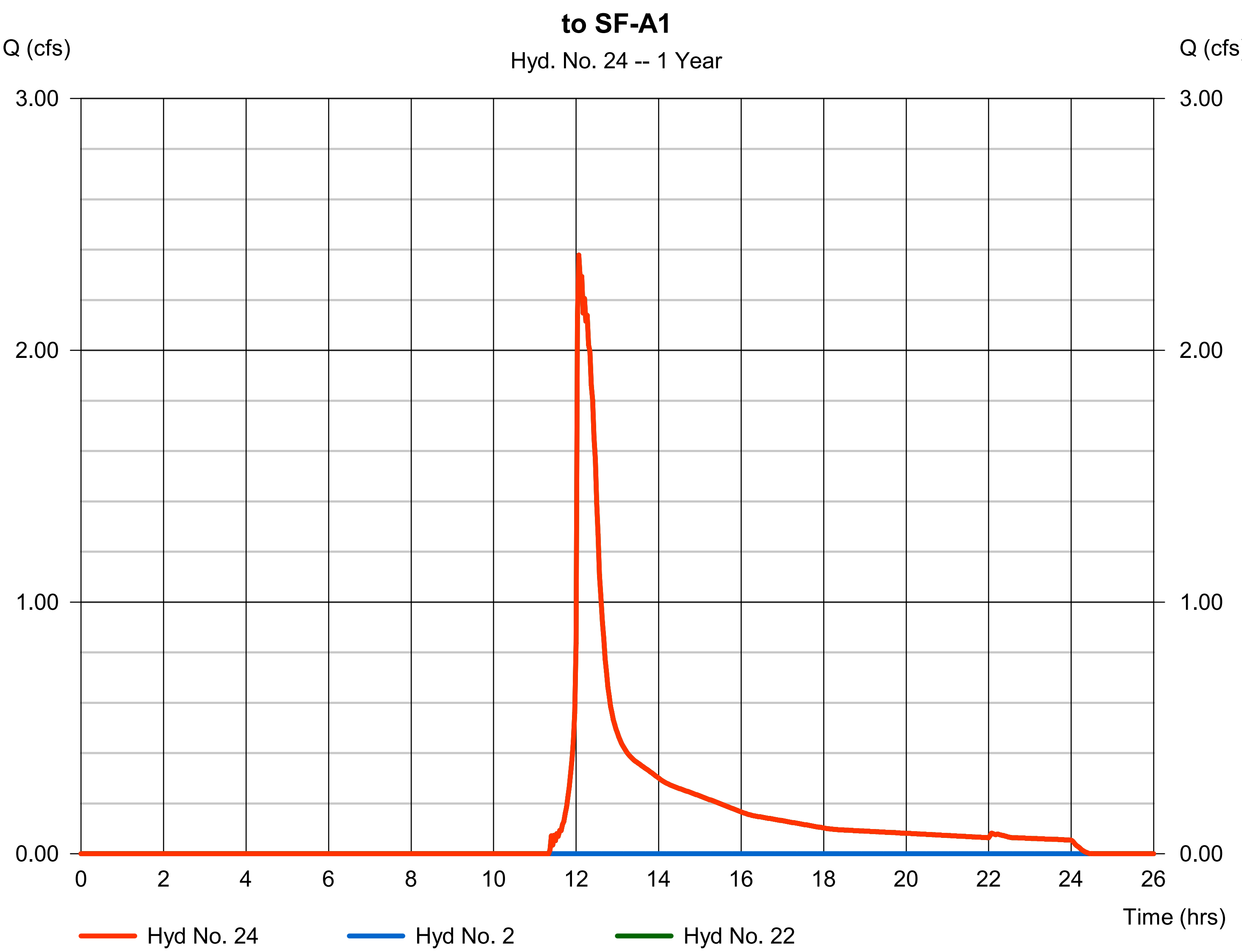
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 24

to SF-A1

Hydrograph type	= Combine	Peak discharge	= 2.378 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 11,002 cuft
Inflow hyds.	= 2, 22	Contrib. drain. area	= 0.170 ac



Hydrograph Report

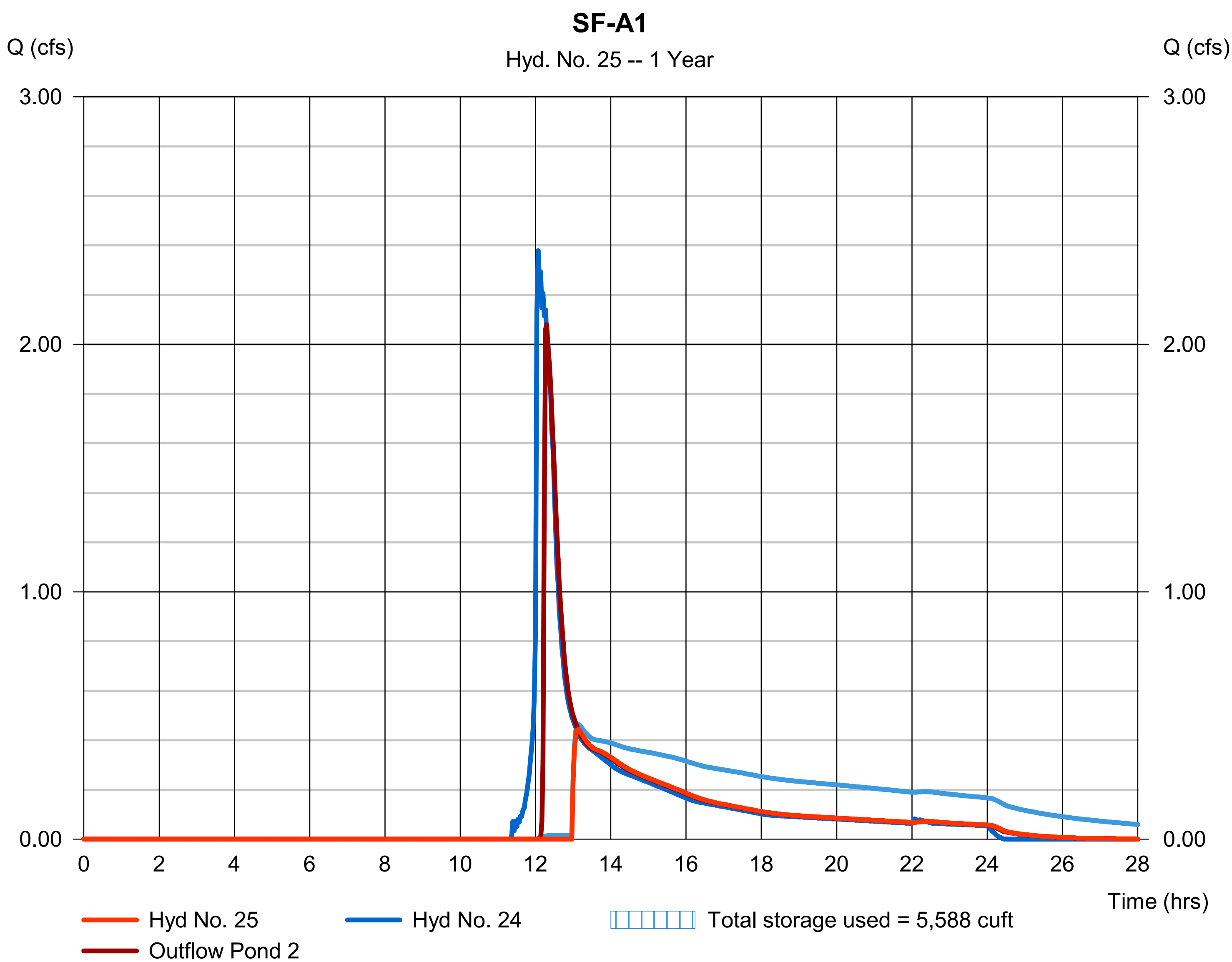
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 25

SF-A1

Hydrograph type	=	Reservoir (Interconnected)	Peak discharge	=	0.444 cfs
Storm frequency	=	1 yrs	Time to peak	=	13.13 hrs
Time interval	=	2 min	Hyd. volume	=	6,117 cuft
Upper Pond	=	Sediment Forebay - A1	**Lower Pond**	=	Sand Filter - A1
Inflow hyd.	=	24 - to SF-A1	Other Inflow hyd.	=	None
Max. Elevation	=	271.65 ft	Max. Elevation	=	271.28 ft
Max. Storage	=	2,164 cuft	Max. Storage	=	3,424 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 2 - Sediment Forebay - A1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 268.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	268.00	127	0	0
1.00	269.00	324	218	218
2.00	270.00	594	452	670
3.00	271.00	938	759	1,430
4.00	272.00	1,336	1,131	2,561

Culvert / Orifice Structures

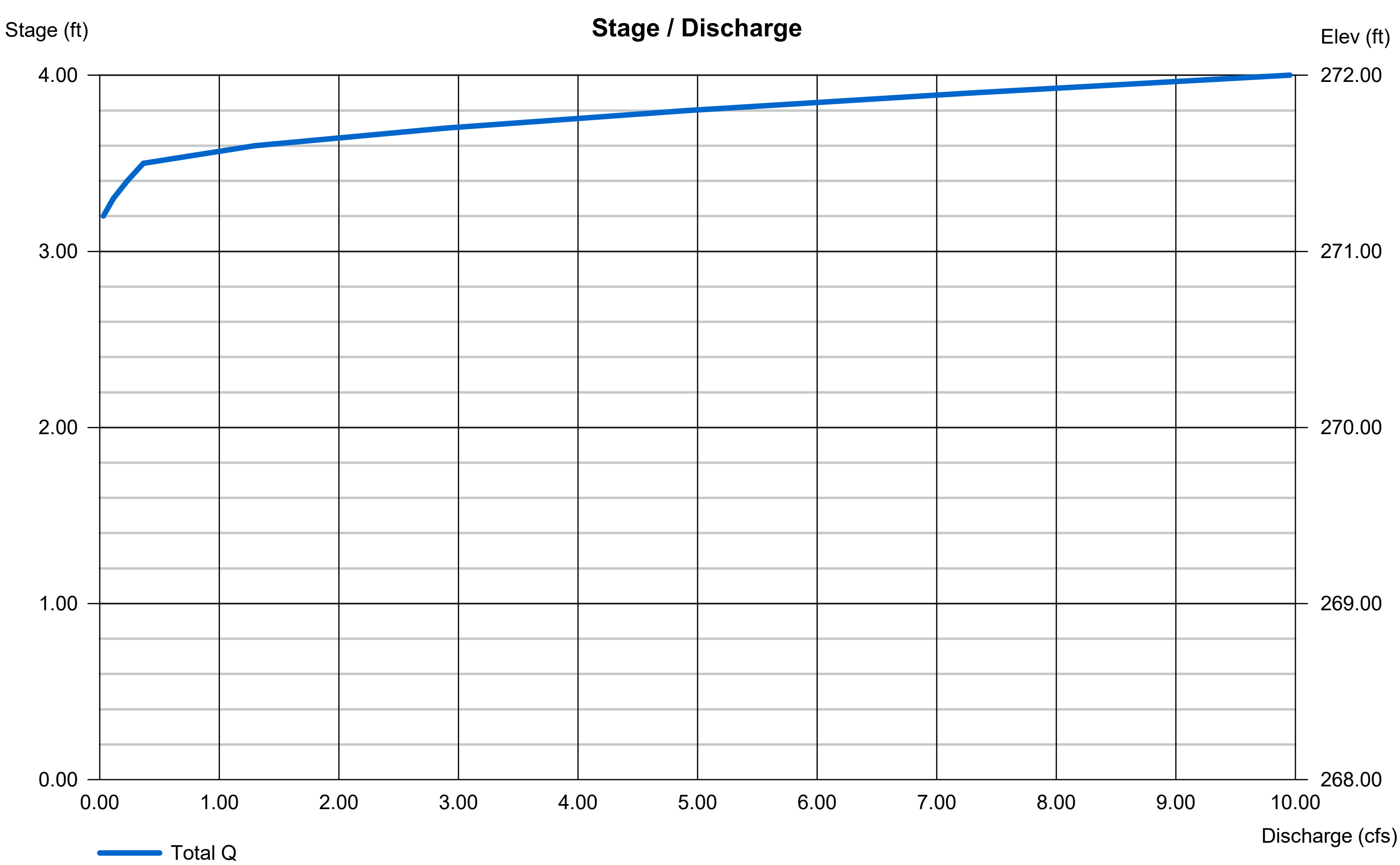
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	0.00	0.00
Span (in)	= 6.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 271.10	0.00	0.00	0.00
Length (ft)	= 13.50	0.00	0.00	0.00
Slope (%)	= 4.44	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 271.50	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).



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 3 - Sand Filter - A1

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	267.50	n/a	0	0
2.00	269.50	n/a	1,312	1,312
2.50	270.00	n/a	398	1,710
3.75	271.25	n/a	1,634	3,344
4.50	272.00	n/a	1,936	5,280

Culvert / Orifice Structures

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

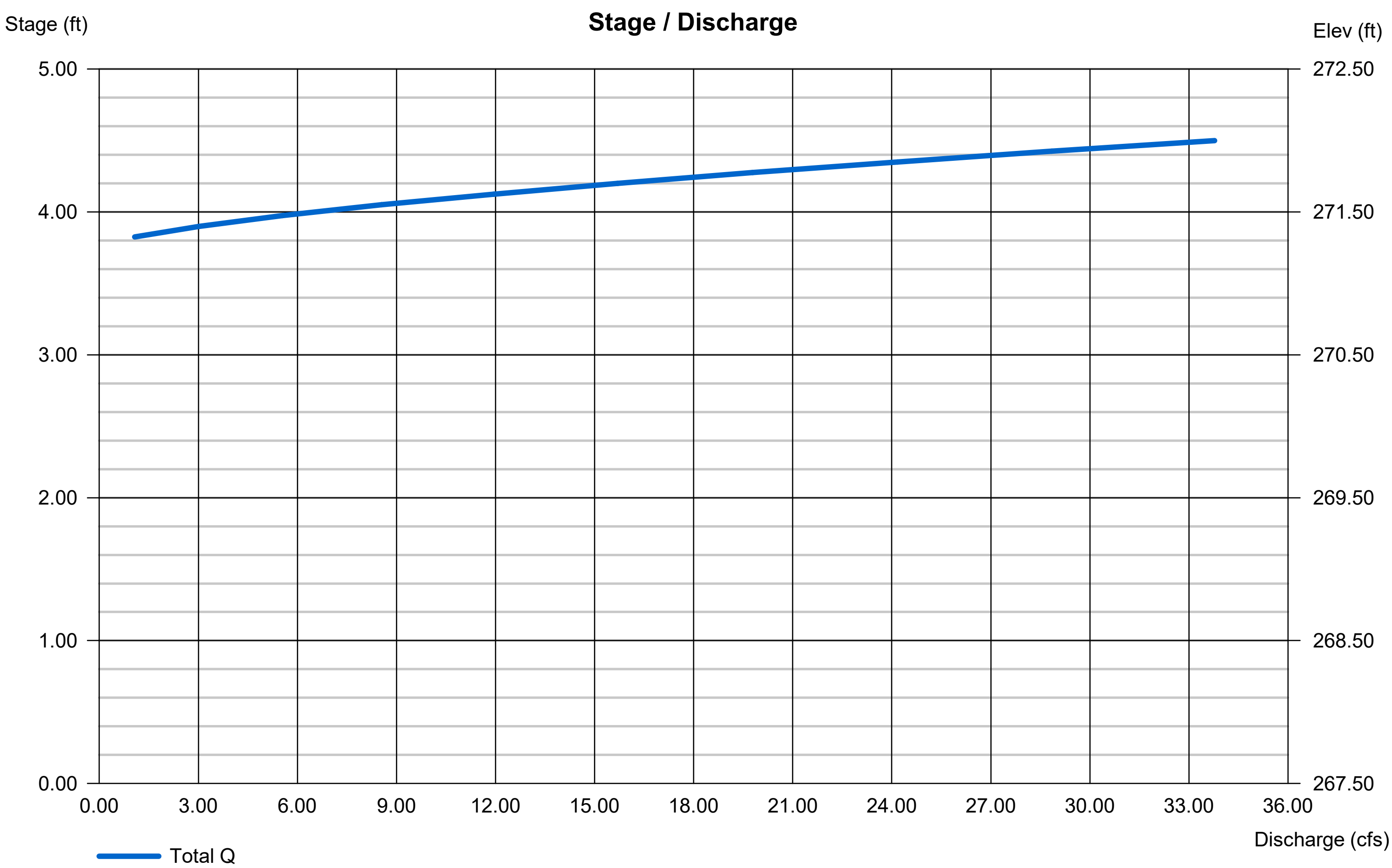
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 271.25	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) = 2.410 (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).



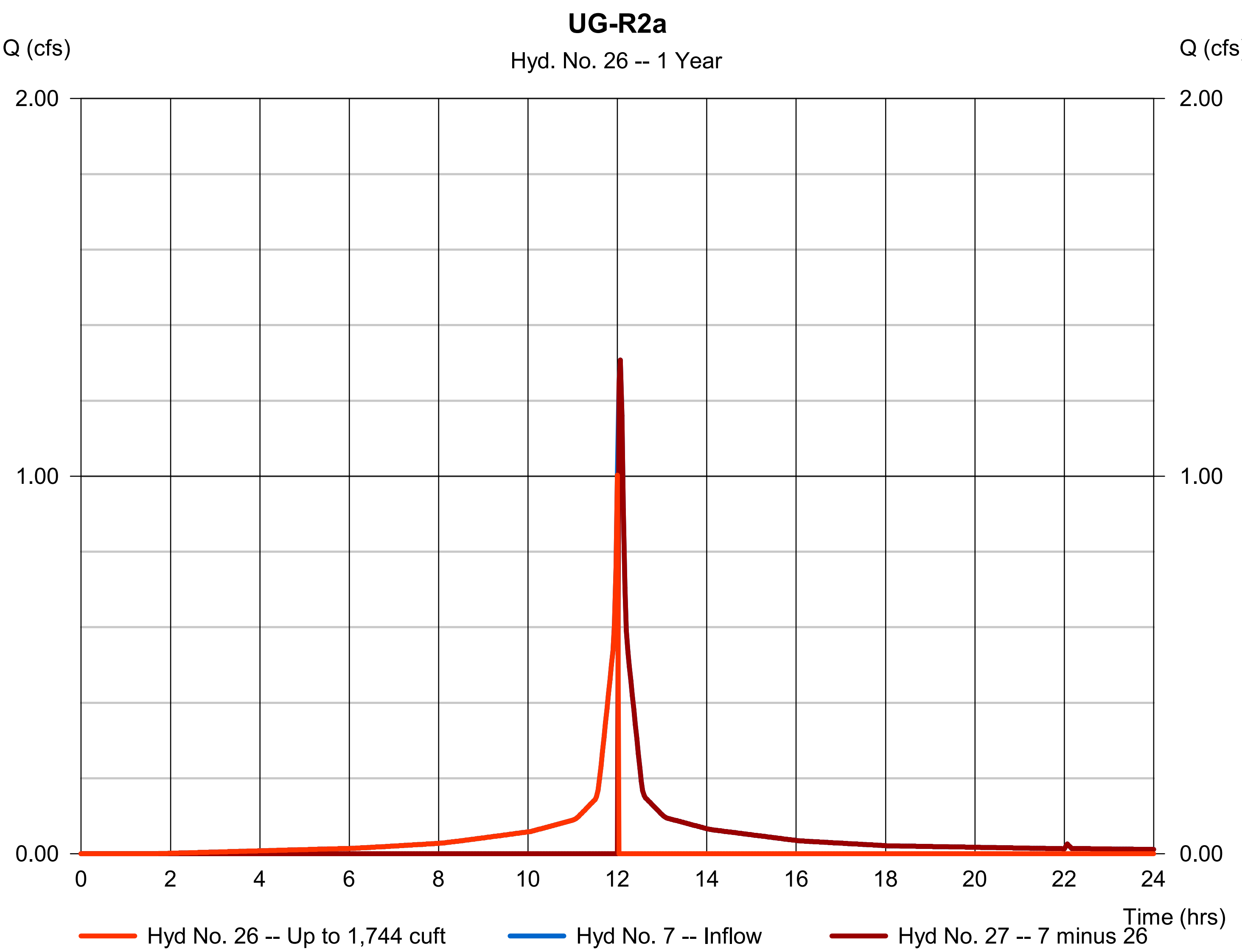
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 26

UG-R2a

Hydrograph type	= Diversion1	Peak discharge	= 1.003 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 1,804 cuft
Inflow hydrograph	= 7 - PR-R2a	2nd diverted hyd.	= 27
Diversion method	= First Flush Volume	Volume Up To	= 1,744 cuft



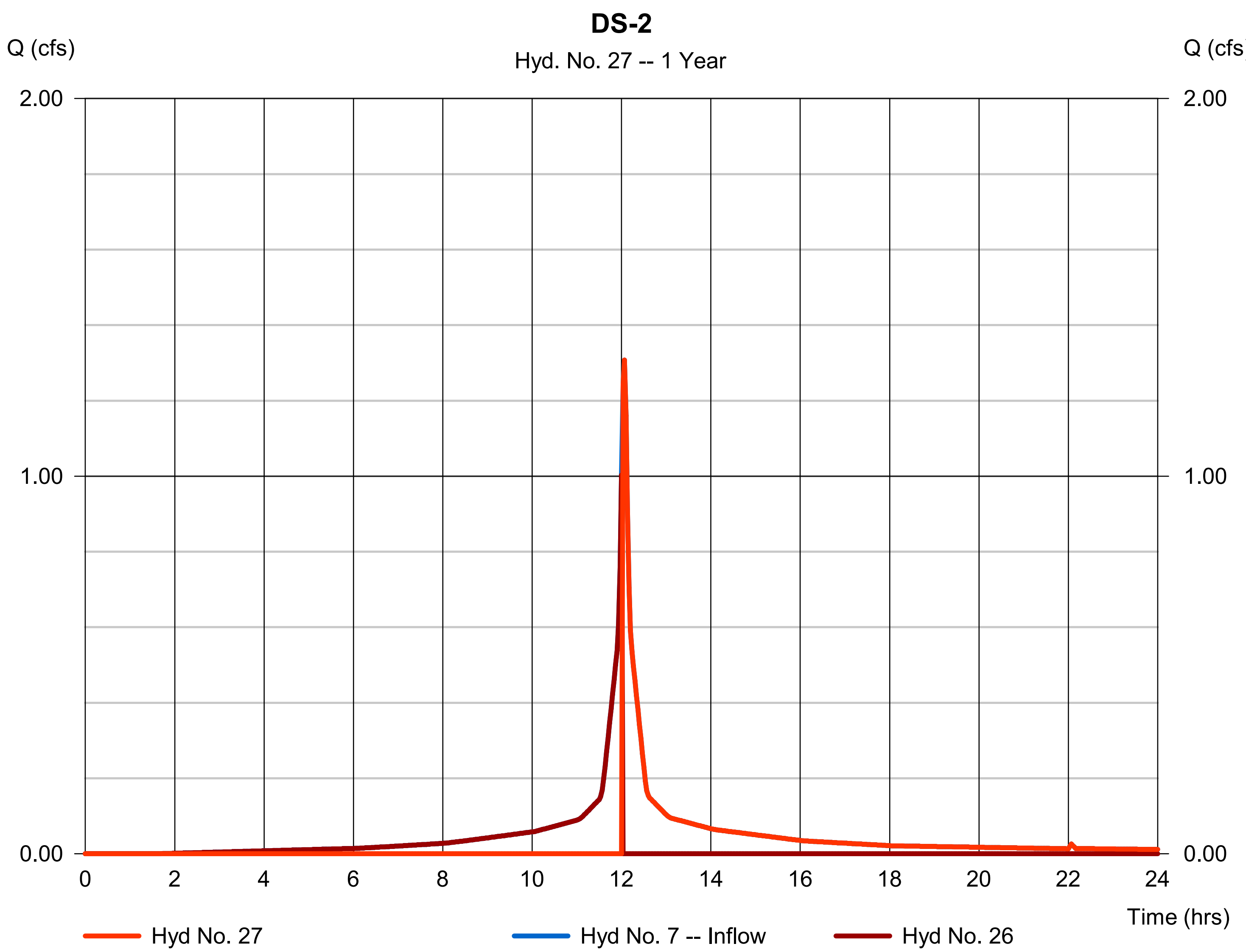
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 27

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 1.308 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 2,566 cuft
Inflow hydrograph	= 7 - PR-R2a	2nd diverted hyd.	= 26
Diversion method	= First Flush Volume	Volume Up To	= 1,744 cuft



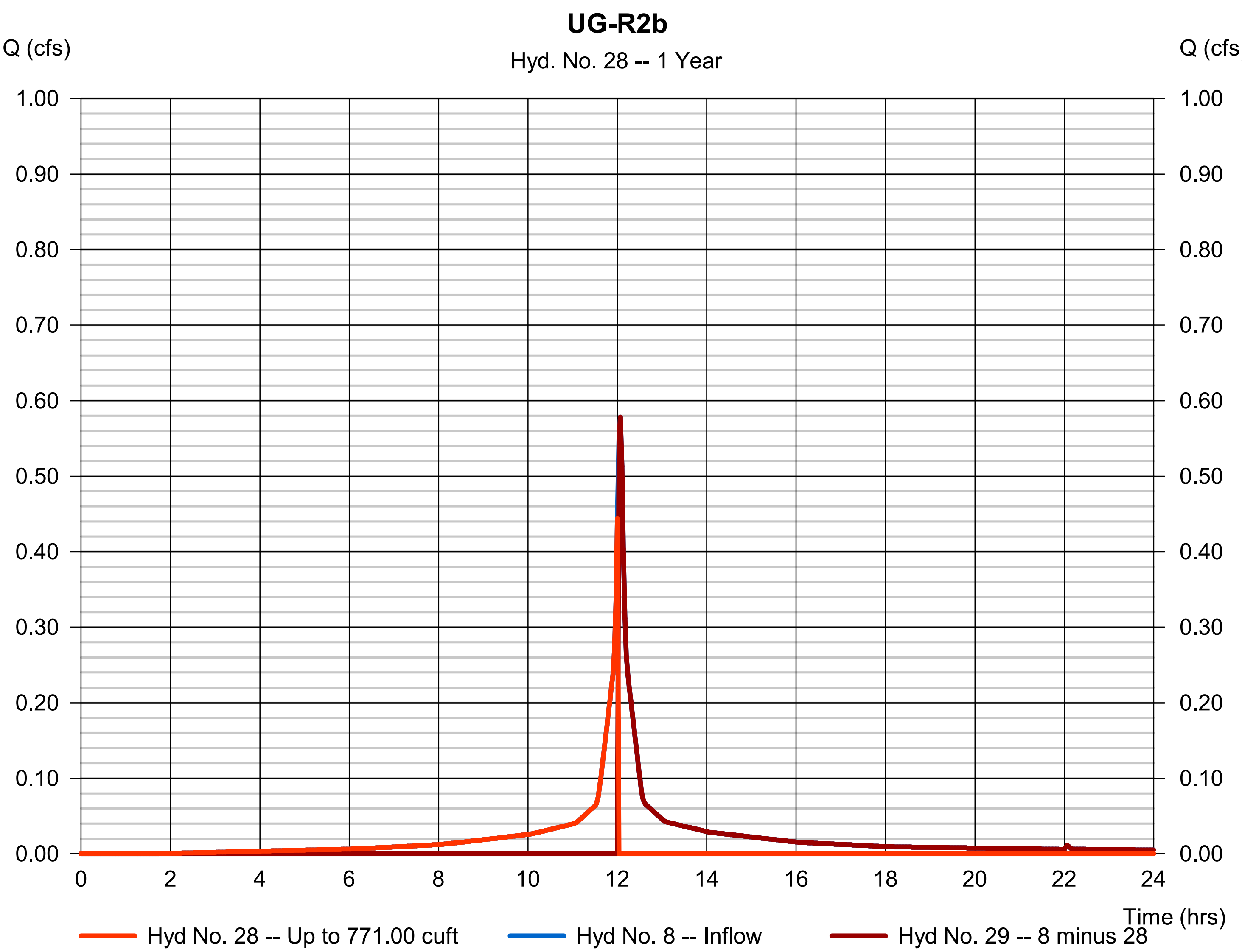
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 28

UG-R2b

Hydrograph type	= Diversion1	Peak discharge	= 0.444 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 798 cuft
Inflow hydrograph	= 8 - PR-R2b	2nd diverted hyd.	= 29
Diversion method	= First Flush Volume	Volume Up To	= 771.00 cuft



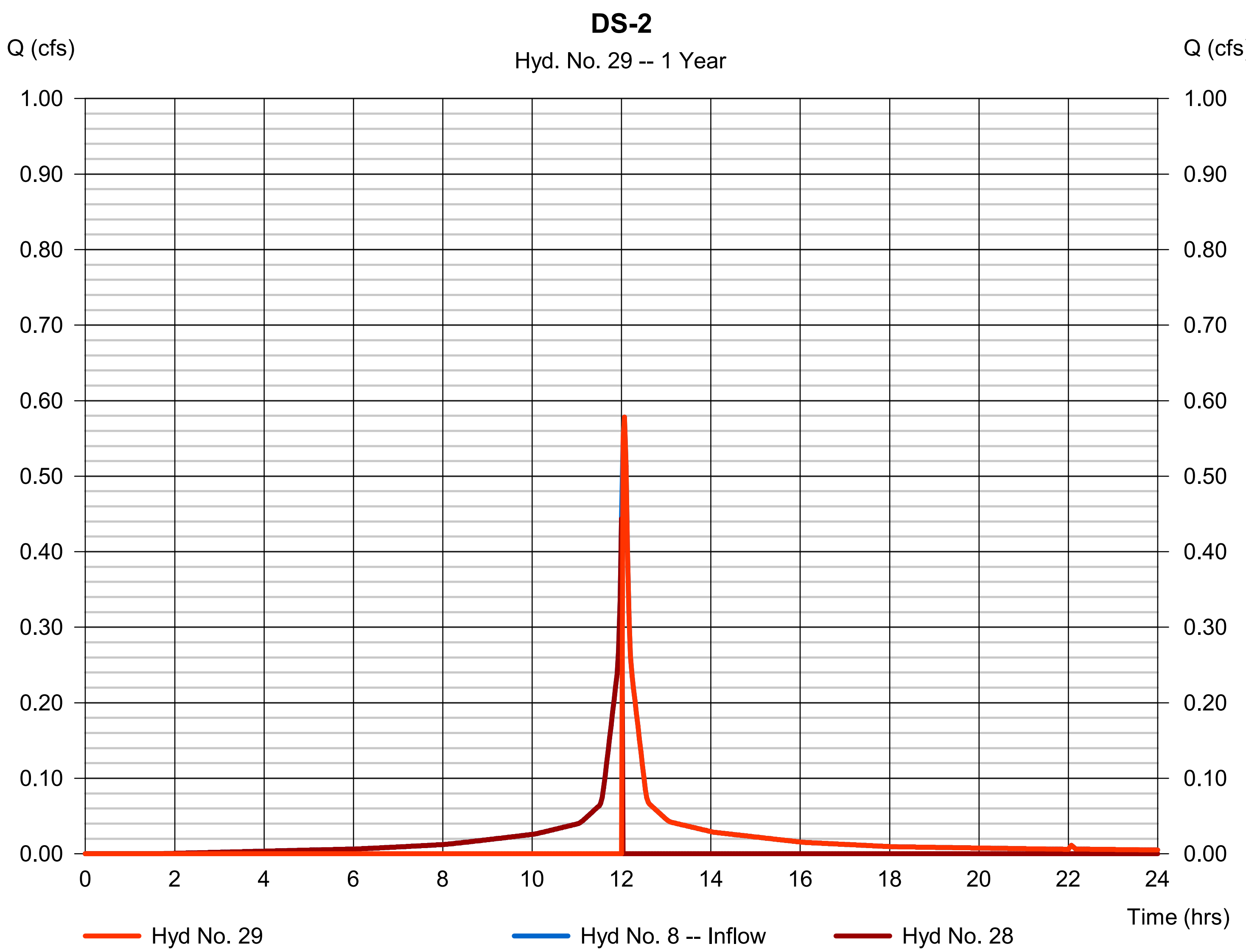
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 29

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 0.578 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,135 cuft
Inflow hydrograph	= 8 - PR-R2b	2nd diverted hyd.	= 28
Diversion method	= First Flush Volume	Volume Up To	= 771.00 cuft



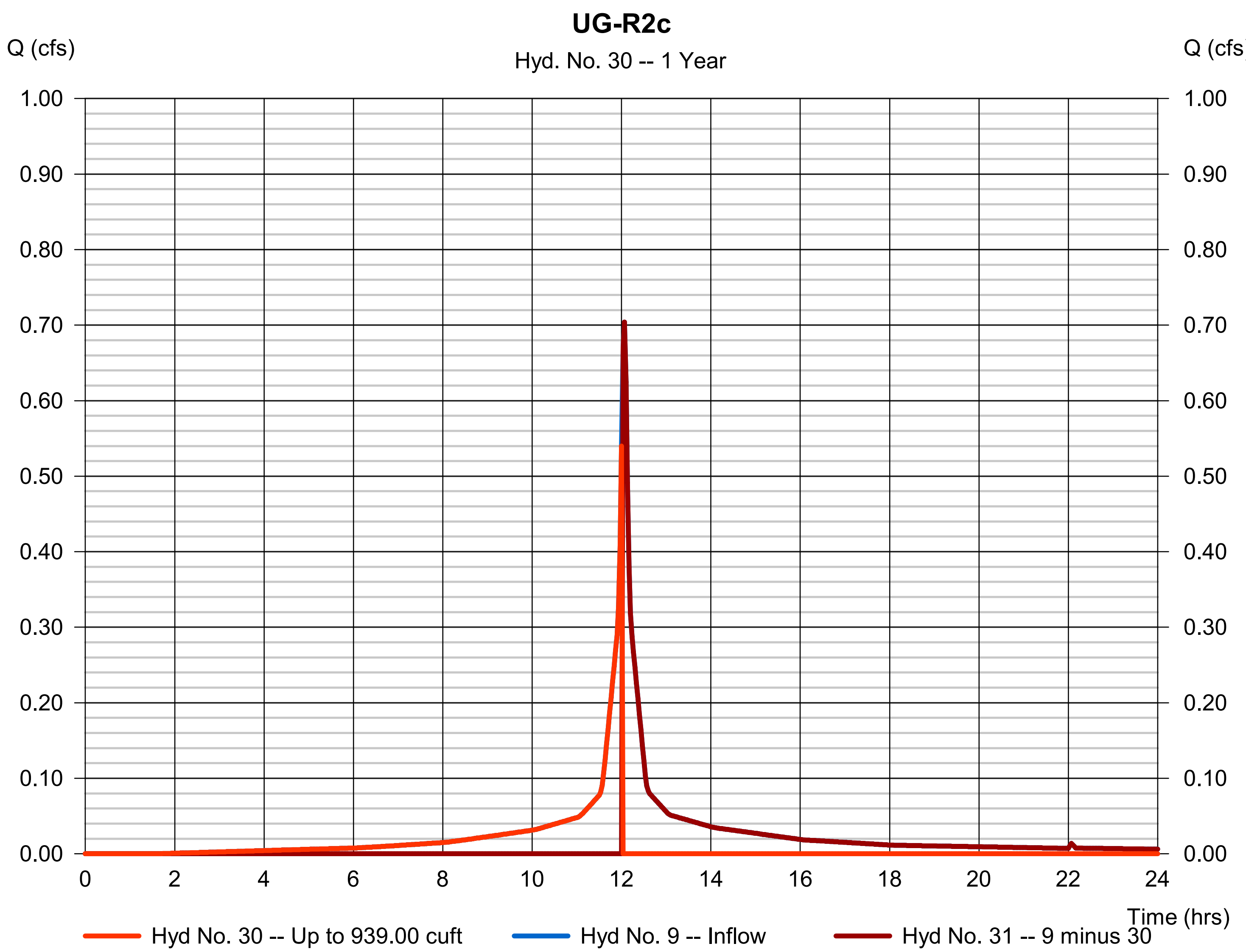
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 30

UG-R2c

Hydrograph type	= Diversion1	Peak discharge	= 0.540 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 971 cuft
Inflow hydrograph	= 9 - PR-R2c	2nd diverted hyd.	= 31
Diversion method	= First Flush Volume	Volume Up To	= 939.00 cuft



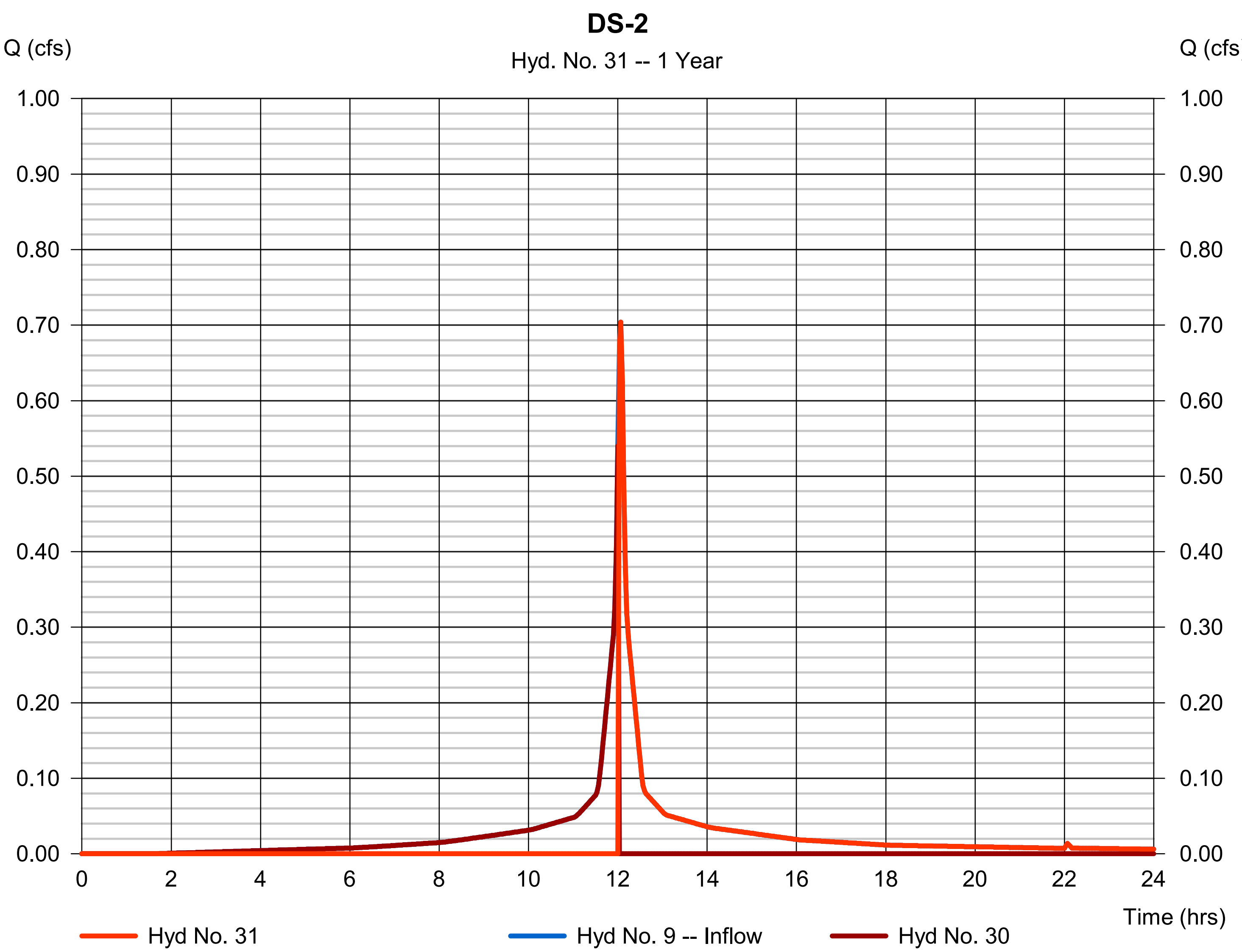
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 31

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 0.704 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,382 cuft
Inflow hydrograph	= 9 - PR-R2c	2nd diverted hyd.	= 30
Diversion method	= First Flush Volume	Volume Up To	= 939.00 cuft



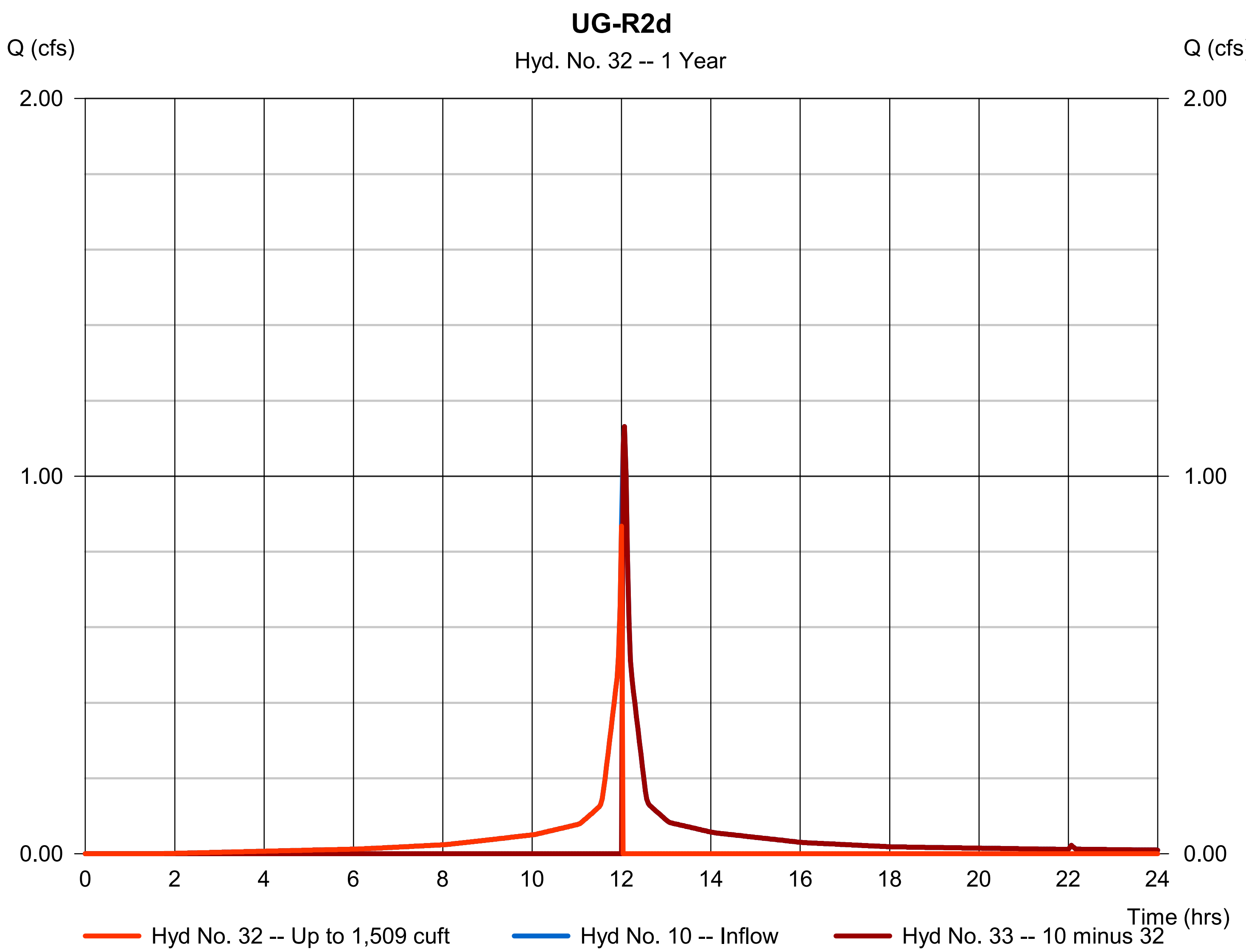
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 32

UG-R2d

Hydrograph type	= Diversion1	Peak discharge	= 0.868 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.00 hrs
Time interval	= 2 min	Hyd. volume	= 1,561 cuft
Inflow hydrograph	= 10 - PR-R2d	2nd diverted hyd.	= 33
Diversion method	= First Flush Volume	Volume Up To	= 1,509 cuft



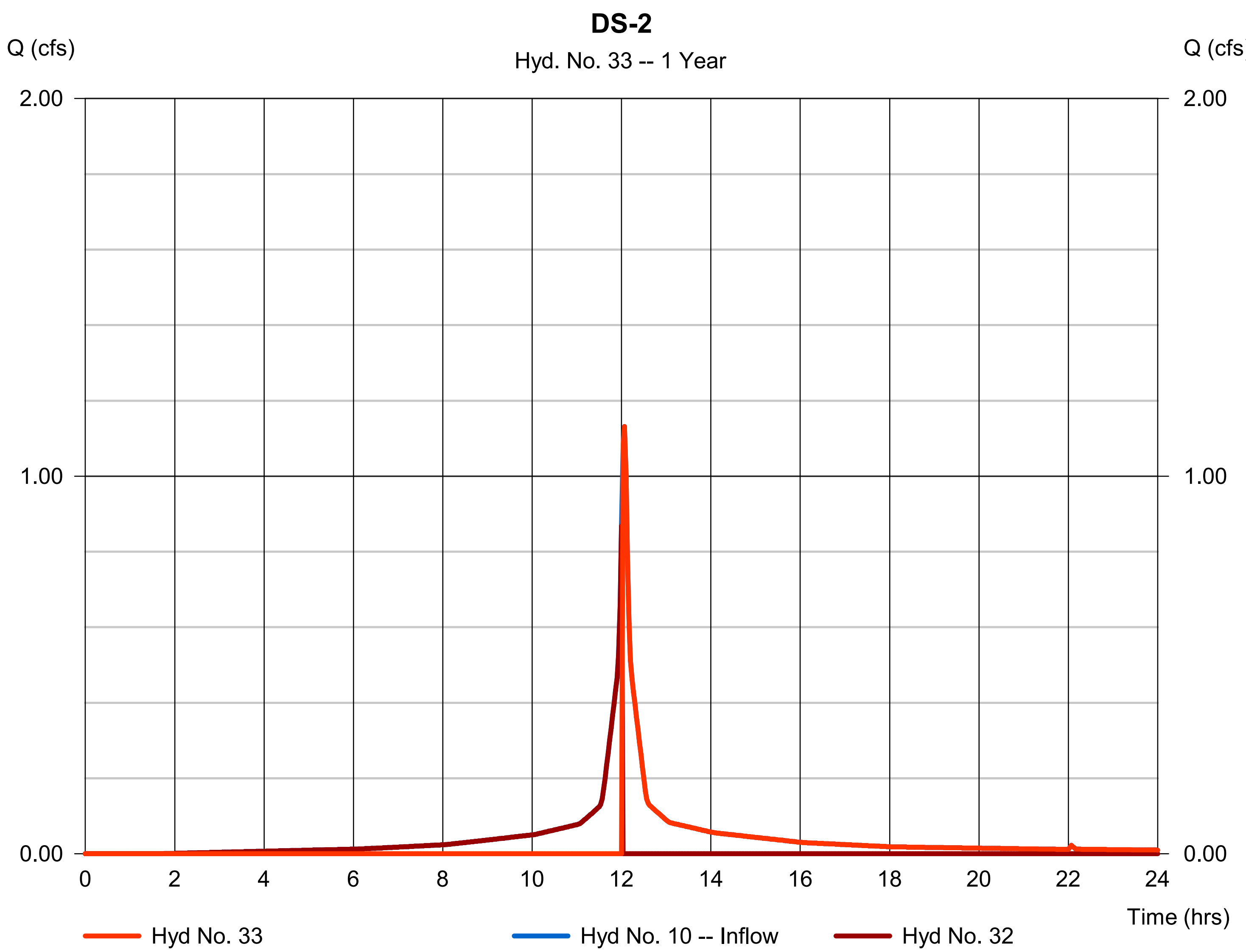
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 33

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 1.132 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 2,221 cuft
Inflow hydrograph	= 10 - PR-R2d	2nd diverted hyd.	= 32
Diversion method	= First Flush Volume	Volume Up To	= 1,509 cuft



Hydrograph Report

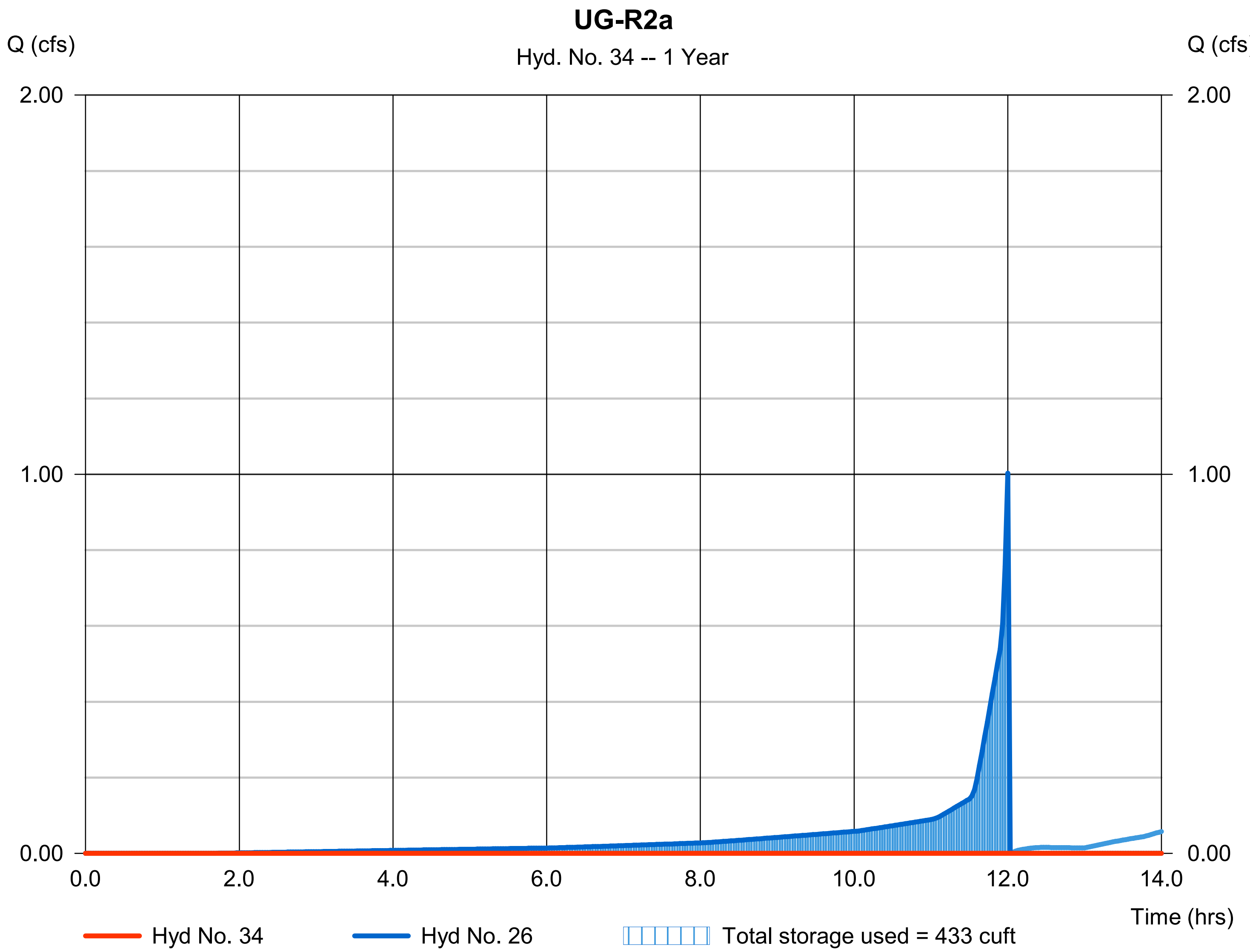
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 34

UG-R2a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 26 - UG-R2a	Max. Elevation	= 277.21 ft
Reservoir name	= UG-R2a	Max. Storage	= 433 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 10 - UG-R2a

Pond Data

UG Chambers -Invert elev. = 277.06 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 24, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 276.06 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	276.06	n/a	0	0
0.35	276.41	n/a	114	114
0.70	276.76	n/a	114	227
1.05	277.11	n/a	134	361
1.40	277.46	n/a	256	618
1.75	277.81	n/a	251	869
2.10	278.16	n/a	242	1,110
2.45	278.51	n/a	226	1,336
2.80	278.86	n/a	200	1,537
3.15	279.21	n/a	147	1,683
3.50	279.56	n/a	114	1,797

Culvert / Orifice Structures

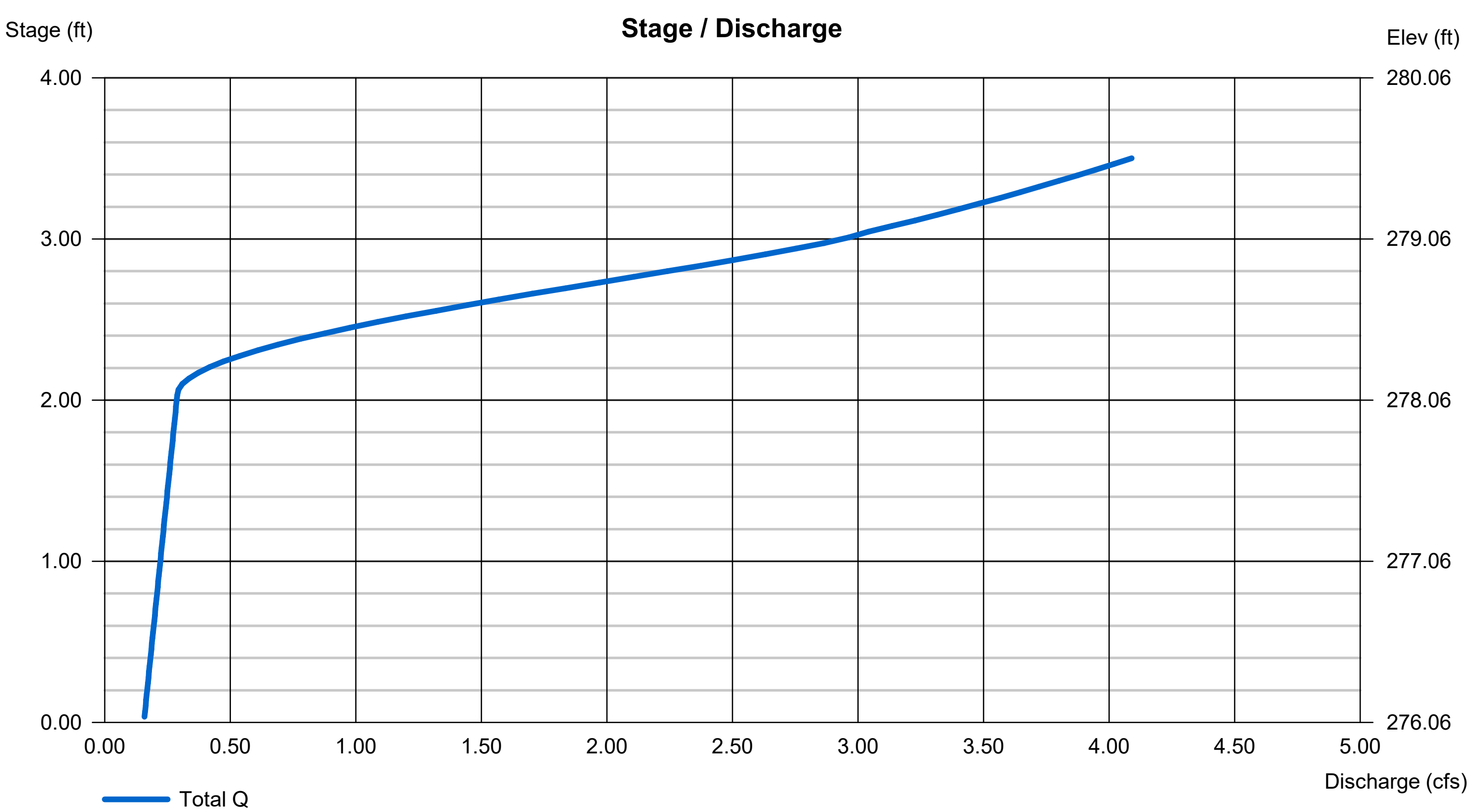
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 278.10	0.00	0.00	0.00
Length (ft)	= 15.00	0.00	0.00	0.00
Slope (%)	= 3.40	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 8.270 (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).



Hydrograph Report

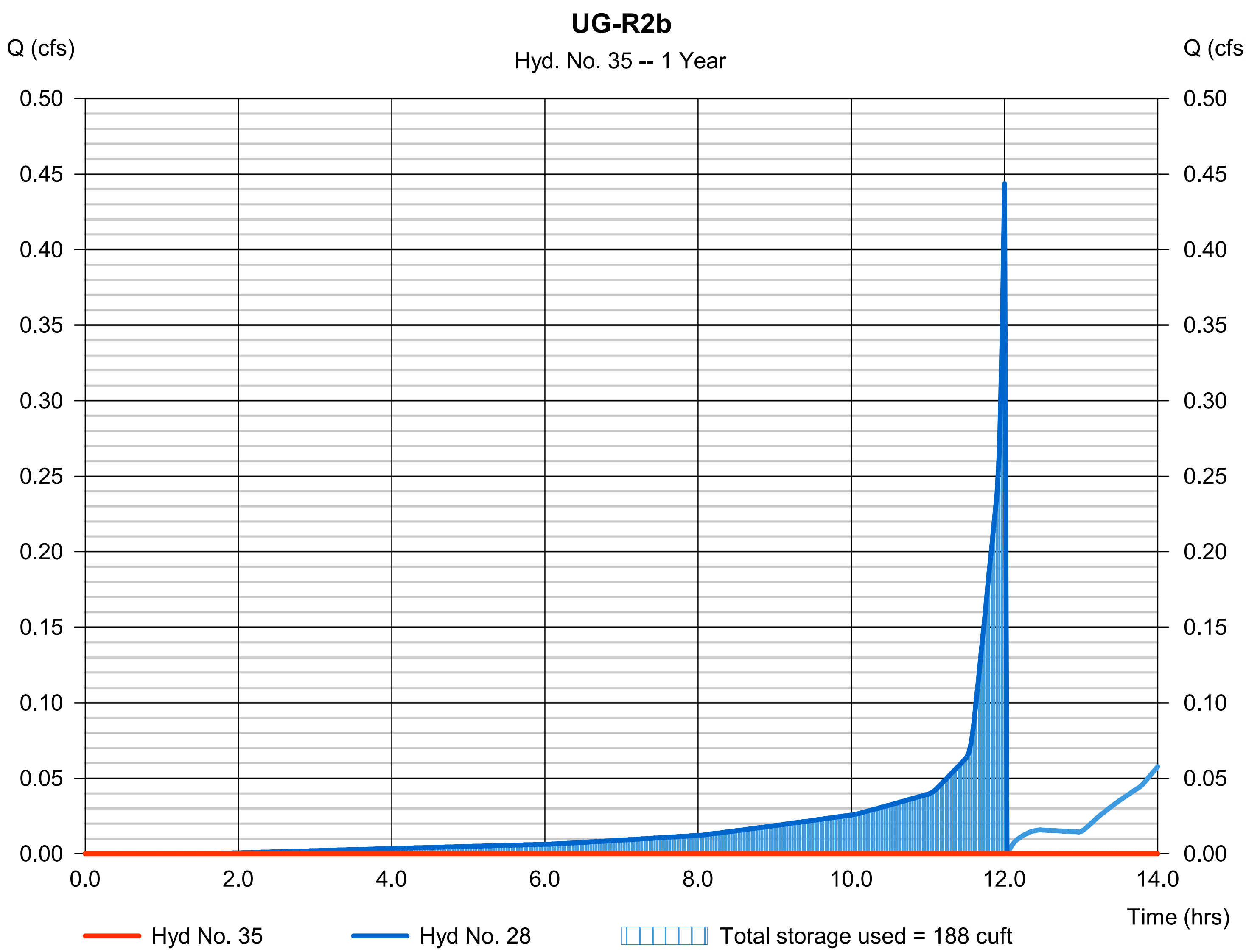
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 35

UG-R2b

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 28 - UG-R2b	Max. Elevation	= 277.42 ft
Reservoir name	= UG-R2b	Max. Storage	= 188 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 11 - UG-R2b

Pond Data

UG Chambers -Invert elev. = 277.30 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 11, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 276.30 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	276.30	n/a	0	0
0.35	276.65	n/a	52	52
0.70	277.00	n/a	52	104
1.05	277.35	n/a	61	166
1.40	277.70	n/a	117	283
1.75	278.05	n/a	115	398
2.10	278.40	n/a	111	509
2.45	278.75	n/a	103	612
2.80	279.10	n/a	92	704
3.15	279.45	n/a	67	772
3.50	279.80	n/a	52	824

Culvert / Orifice Structures

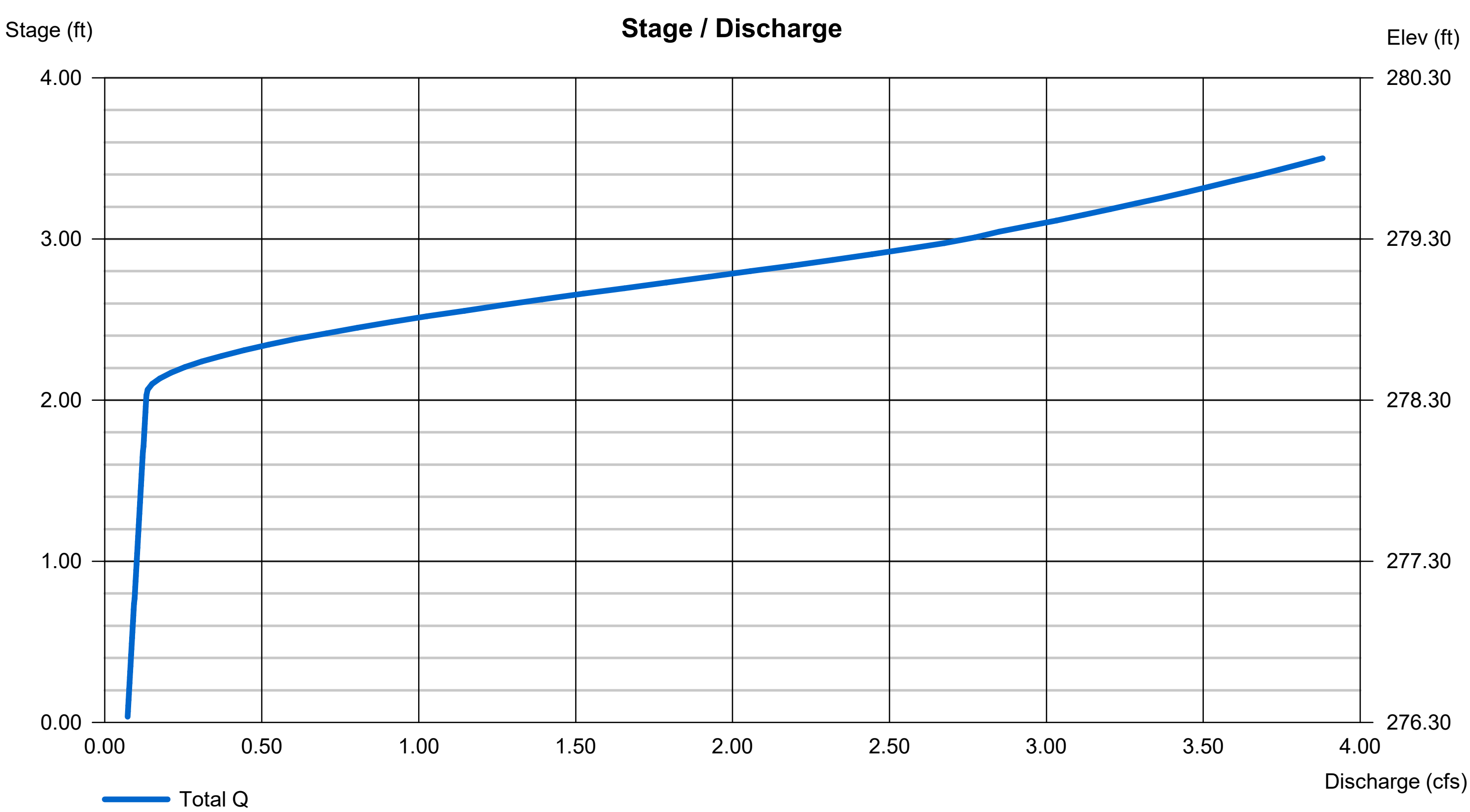
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 278.34	0.00	0.00	0.00
Length (ft)	= 31.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 8.270 (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).



Hydrograph Report

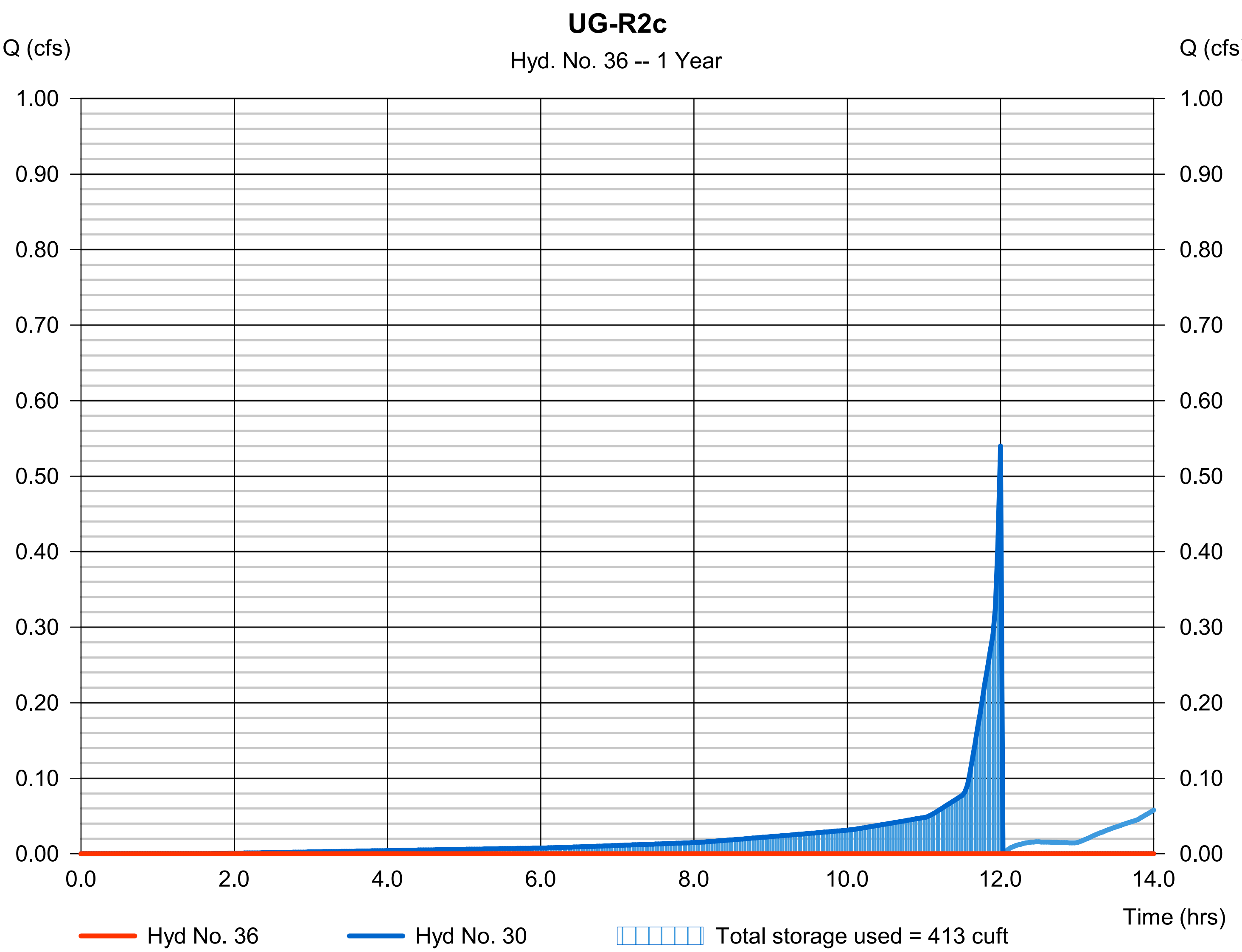
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 36

UG-R2c

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 30 - UG-R2c	Max. Elevation	= 278.46 ft
Reservoir name	= UG-R2c	Max. Storage	= 413 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 12 - UG-R2c

Pond Data

UG Chambers -Invert elev. = 277.67 ft, Rise x Span = 1.15 x 2.30 ft, Barrel Len = 7.12 ft, No. Barrels = 35, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	277.67	n/a	0	0
0.11	277.79	n/a	66	66
0.23	277.90	n/a	65	131
0.34	278.02	n/a	64	195
0.46	278.13	n/a	62	256
0.57	278.24	n/a	59	315
0.69	278.36	n/a	55	370
0.80	278.48	n/a	50	420
0.92	278.59	n/a	44	464
1.03	278.70	n/a	35	498
1.15	278.82	n/a	19	518

Culvert / Orifice Structures

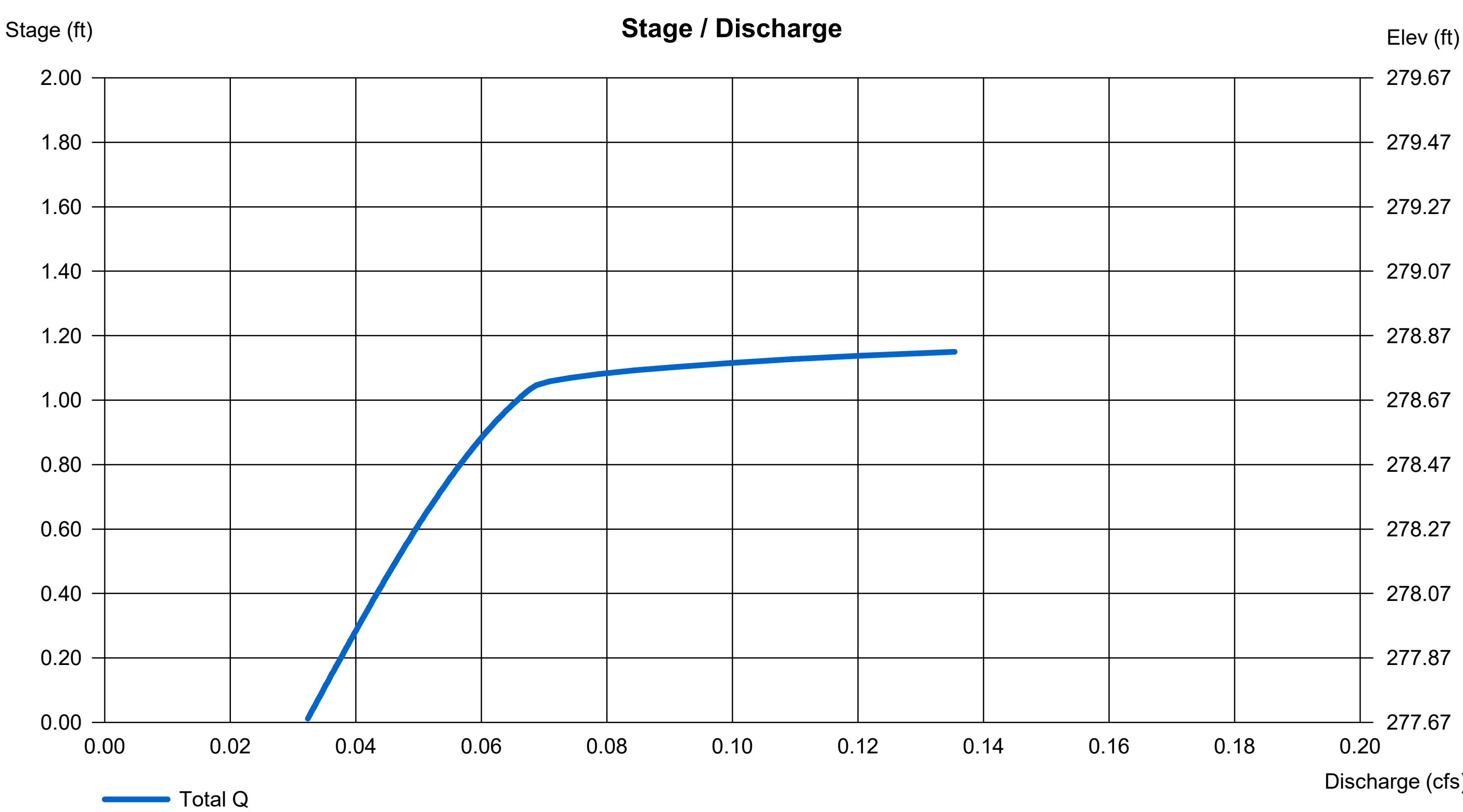
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 278.71	0.00	0.00	0.00
Length (ft)	= 17.00	0.00	0.00	0.00
Slope (%)	= 8.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 2.410 (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).



Hydrograph Report

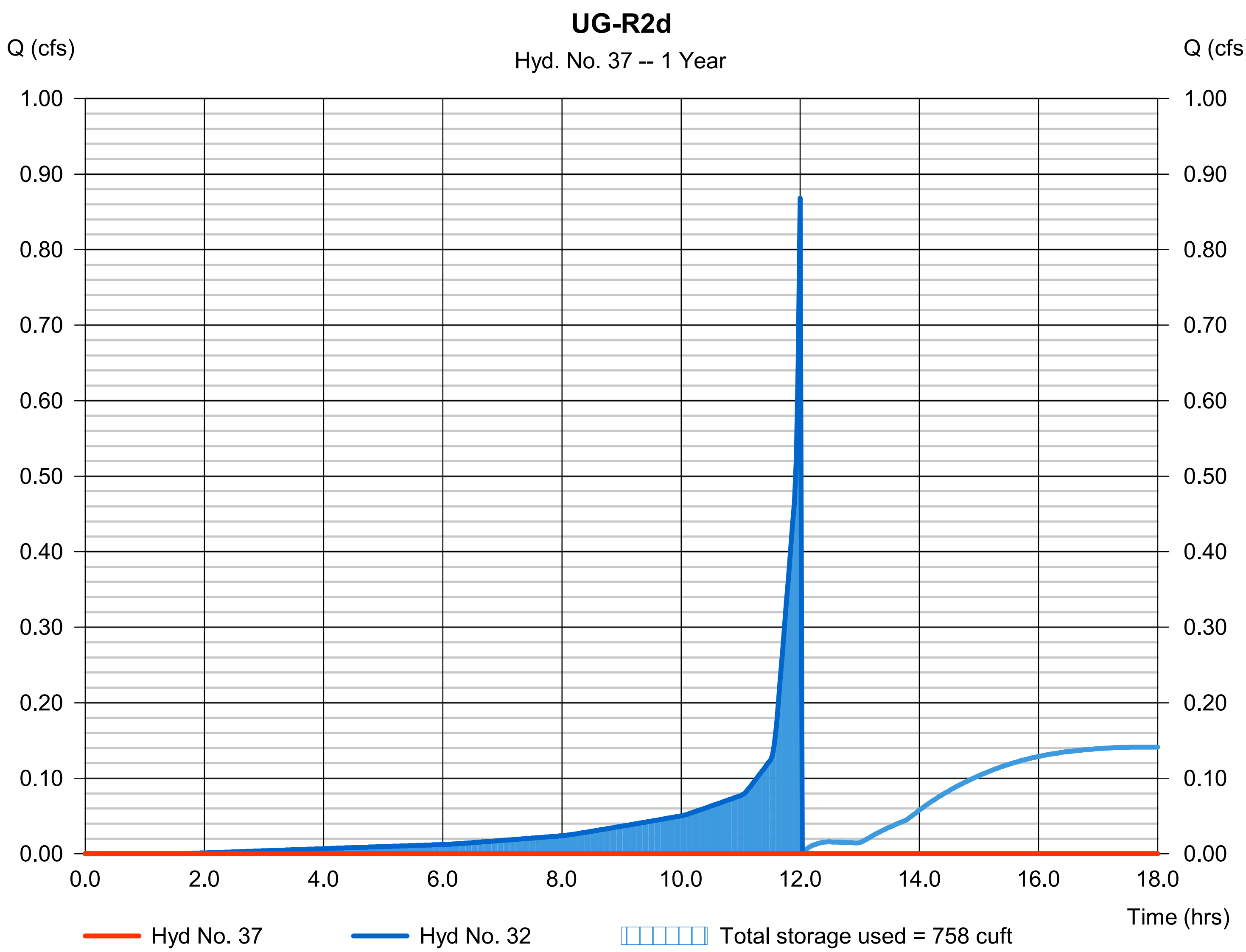
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 37

UG-R2d

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 8.73 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 32 - UG-R2d	Max. Elevation	= 276.63 ft
Reservoir name	= UG-R2d	Max. Storage	= 758 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 13 - UG-R2d

Pond Data

UG Chambers -Invert elev. = 275.82 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 20, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 274.82 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	274.82	n/a	0	0
0.35	275.17	n/a	95	95
0.70	275.52	n/a	95	189
1.05	275.87	n/a	112	301
1.40	276.22	n/a	213	515
1.75	276.57	n/a	209	724
2.10	276.92	n/a	201	925
2.45	277.27	n/a	188	1,113
2.80	277.62	n/a	167	1,280
3.15	277.97	n/a	122	1,403
3.50	278.32	n/a	95	1,498

Culvert / Orifice Structures

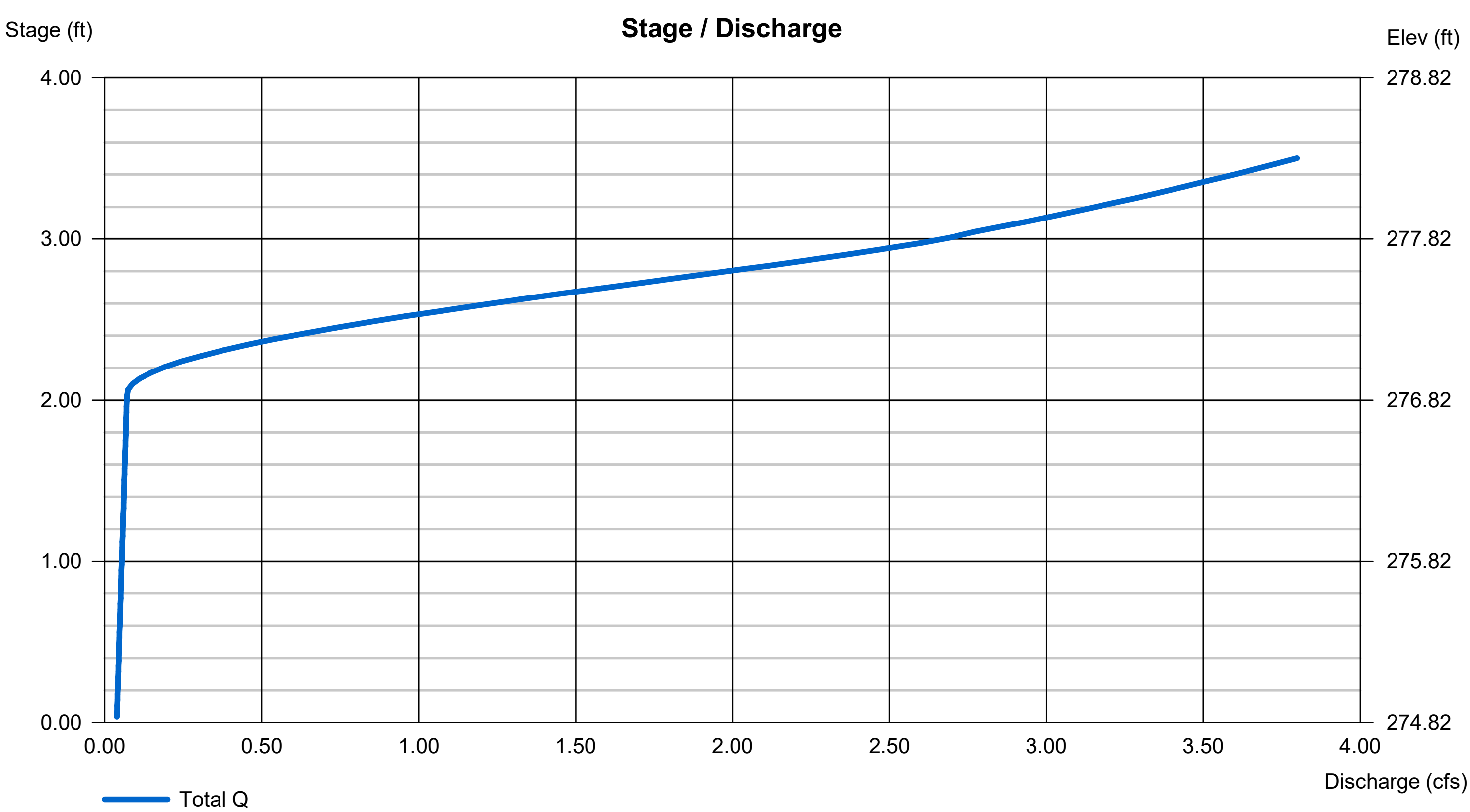
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 276.86	0.00	0.00	0.00
Length (ft)	= 51.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 2.410 (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).



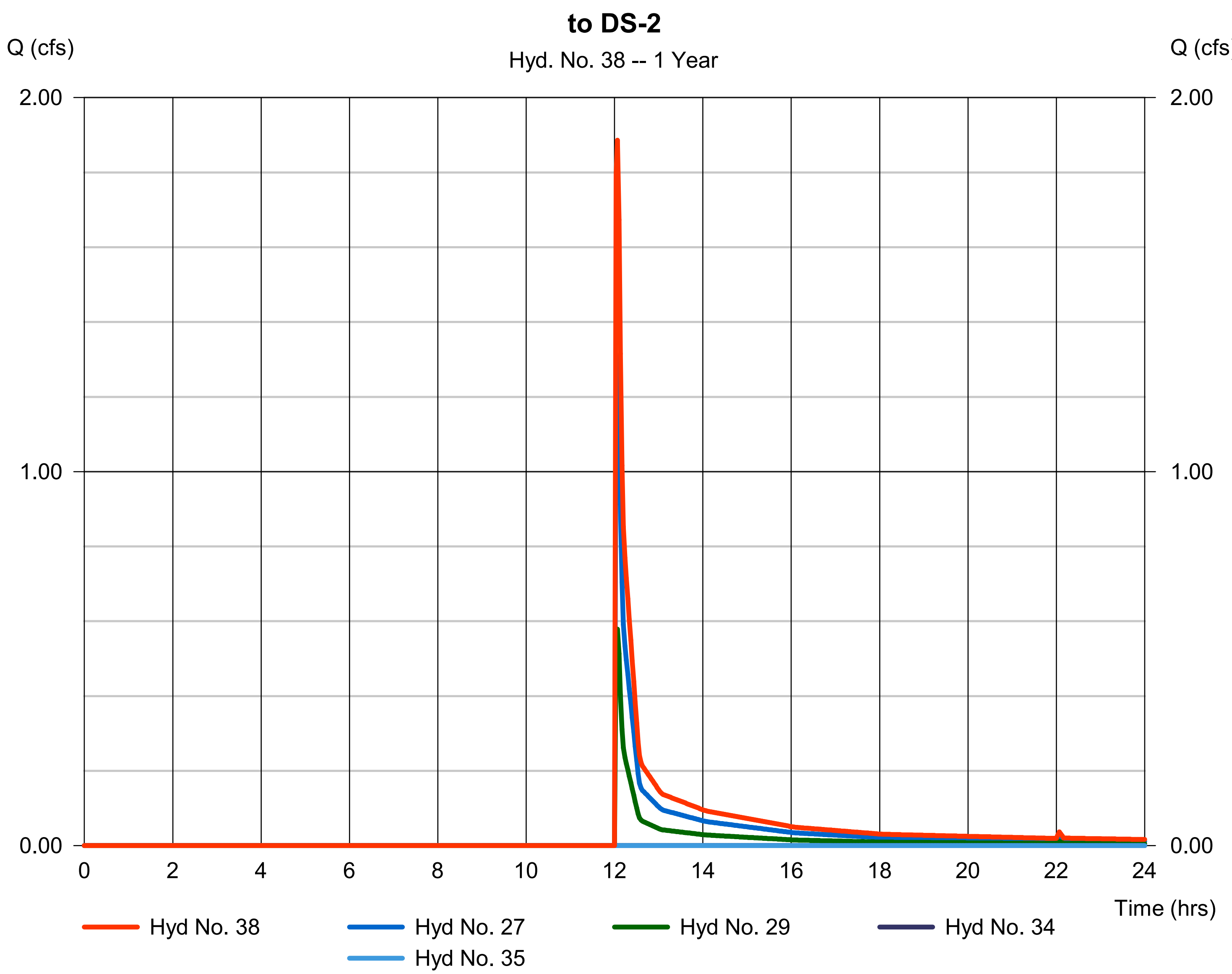
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 38

to DS-2

Hydrograph type	= Combine	Peak discharge	= 1.886 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,701 cuft
Inflow hyds.	= 27, 29, 34, 35	Contrib. drain. area	= 0.000 ac



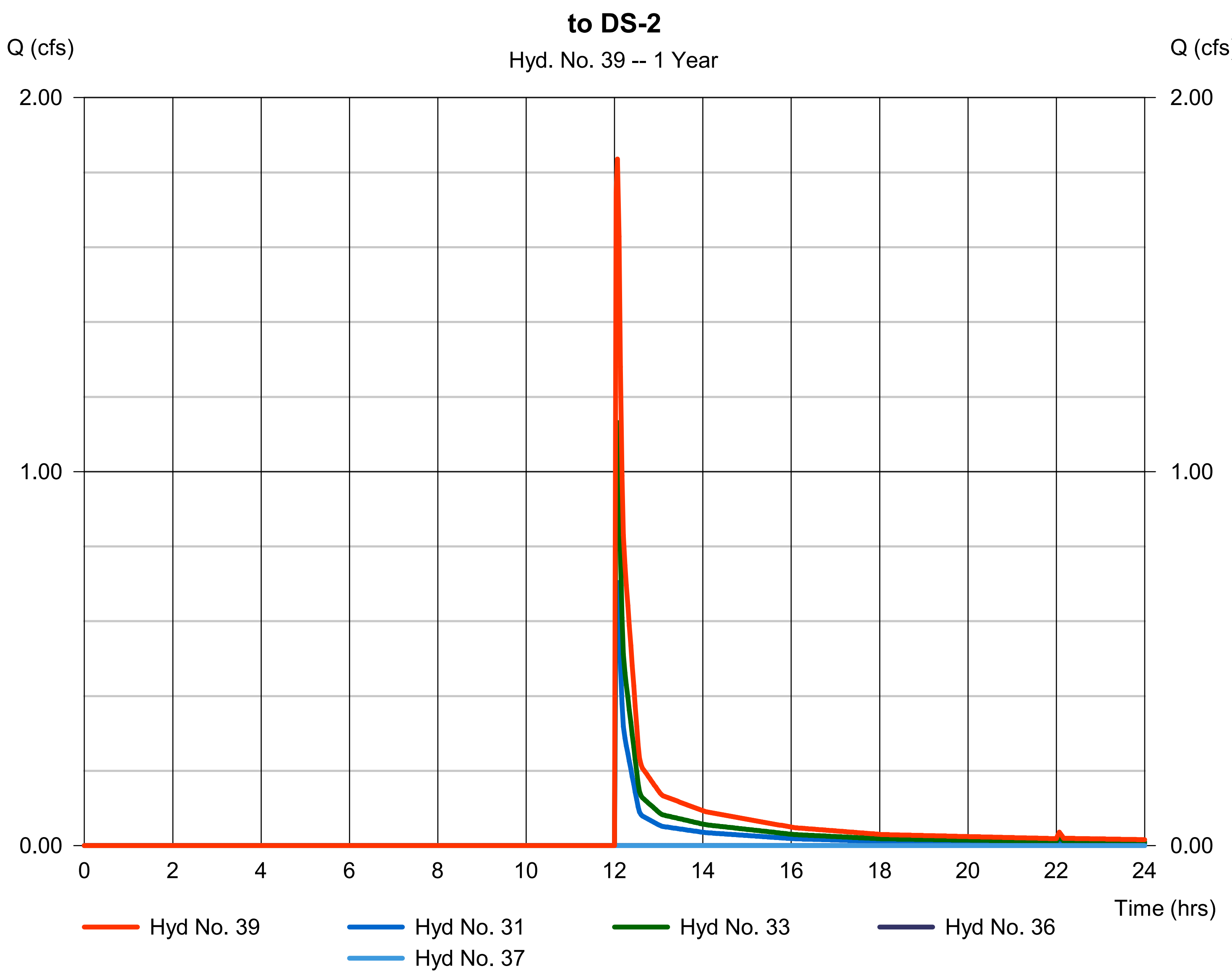
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 39

to DS-2

Hydrograph type	= Combine	Peak discharge	= 1.836 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,603 cuft
Inflow hyds.	= 31, 33, 36, 37	Contrib. drain. area	= 0.000 ac



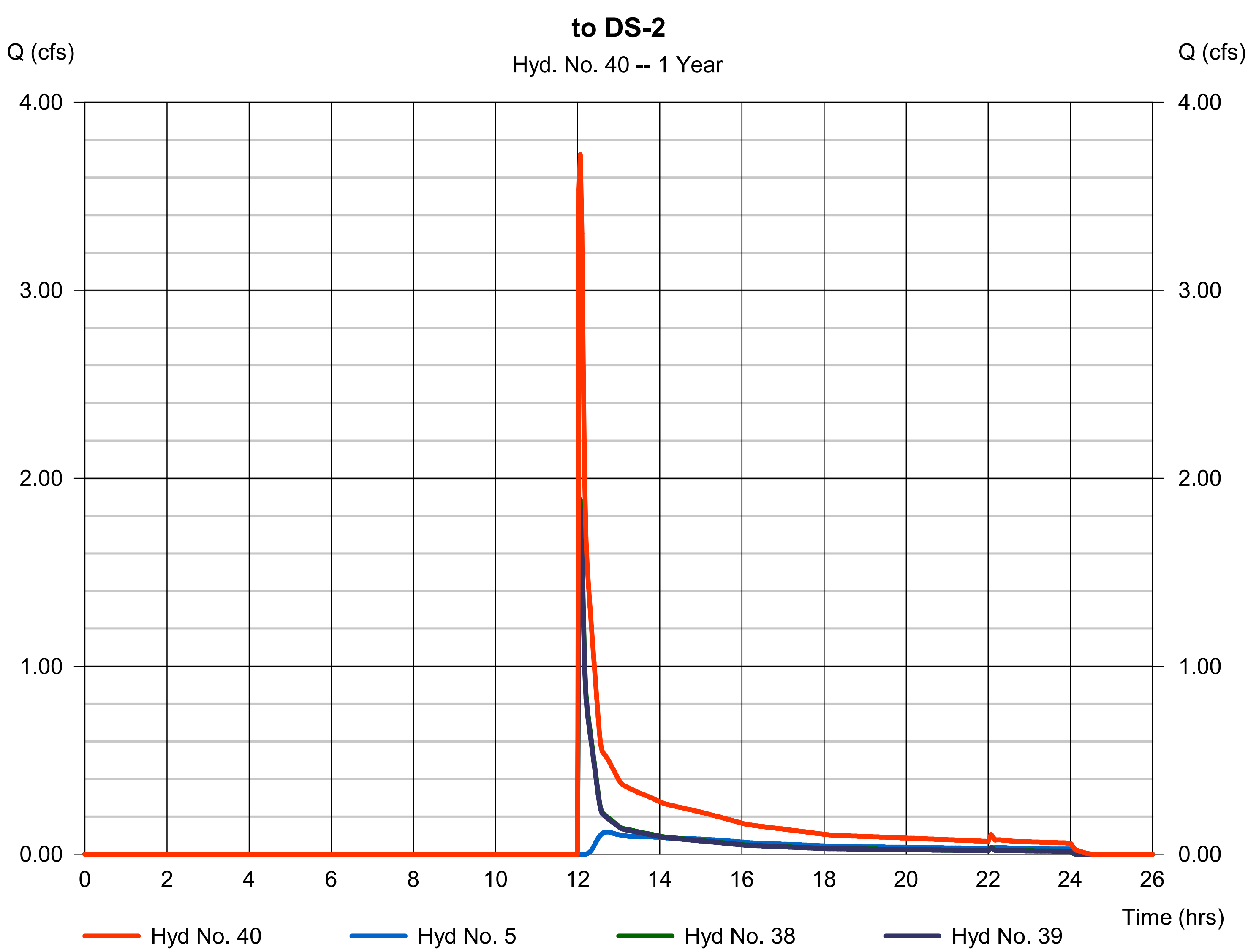
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 40

to DS-2

Hydrograph type	= Combine	Peak discharge	= 3.722 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 9,605 cuft
Inflow hyds.	= 5, 38, 39	Contrib. drain. area	= 5.090 ac



Hydrograph Report

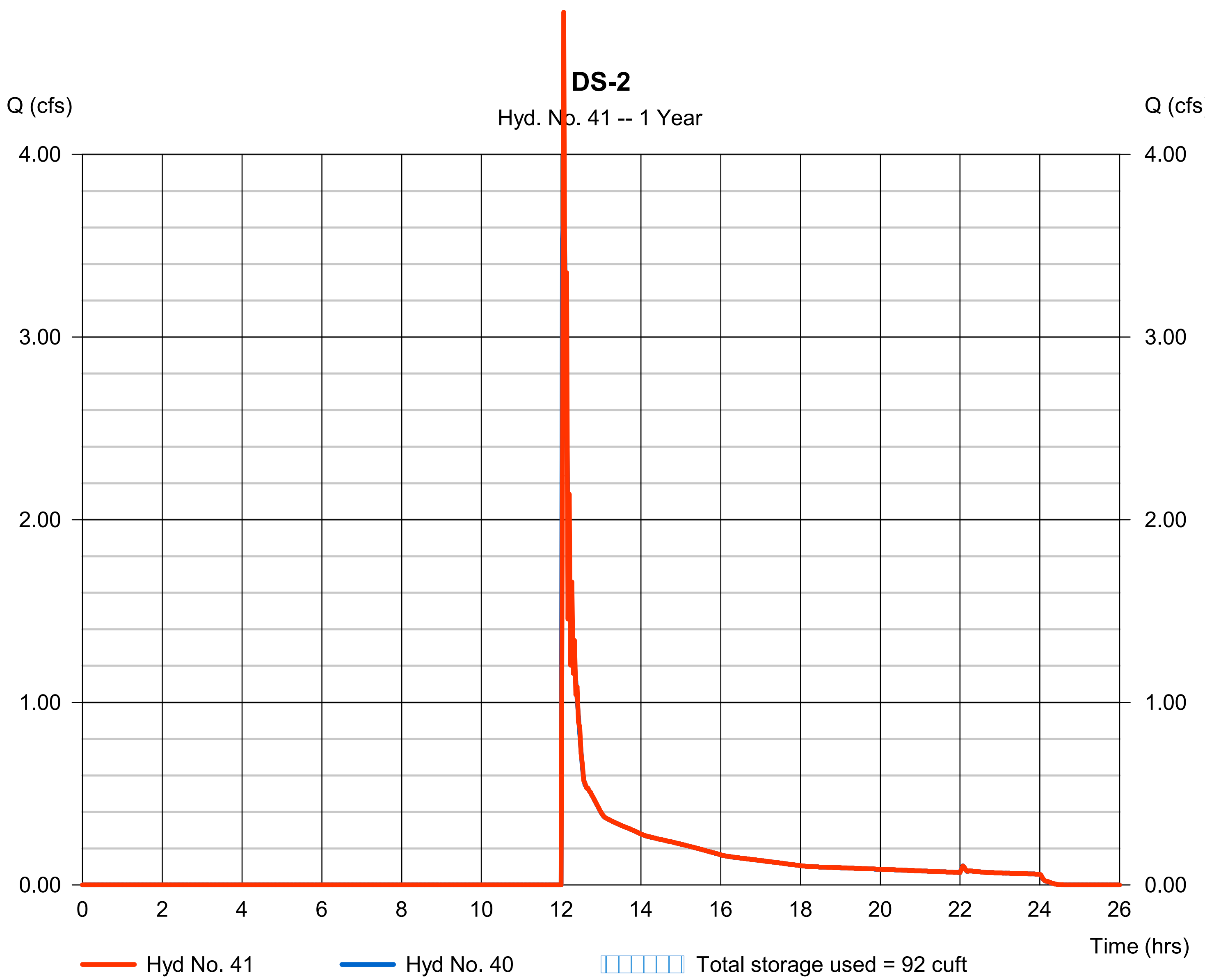
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 41

DS-2

Hydrograph type	= Reservoir	Peak discharge	= 4.778 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 9,548 cuft
Inflow hyd. No.	= 40 - to DS-2	Max. Elevation	= 269.56 ft
Reservoir name	= DS-2	Max. Storage	= 92 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 4 - DS-2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 266.27 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	266.27	28	0	0
6.73	272.55	28	188	188

Culvert / Orifice Structures

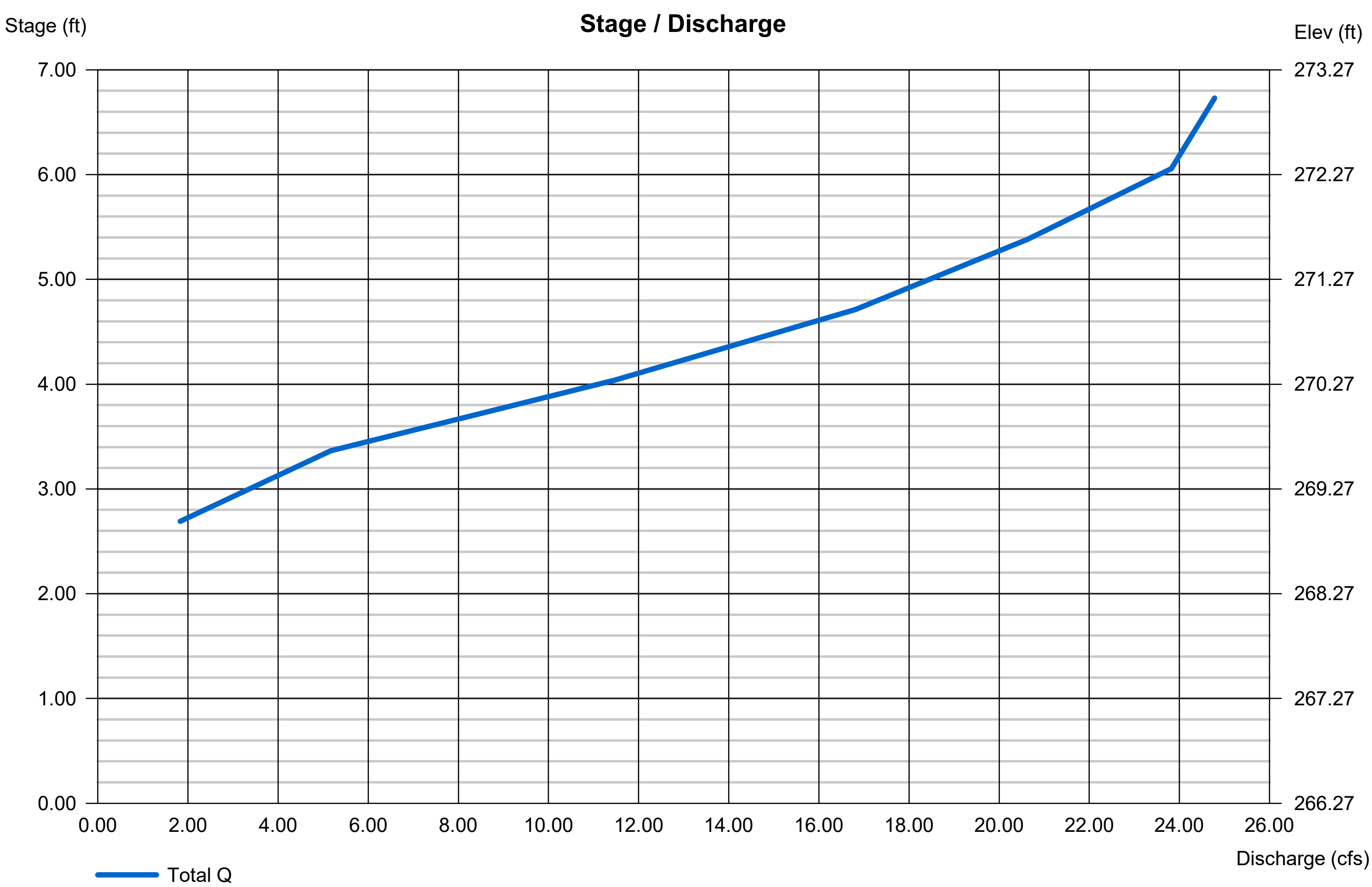
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	15.00	0.00	0.00
Span (in)	= 18.00	15.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 269.27	268.30	0.00	0.00
Length (ft)	= 35.00	19.00	0.00	0.00
Slope (%)	= 9.30	1.60	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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



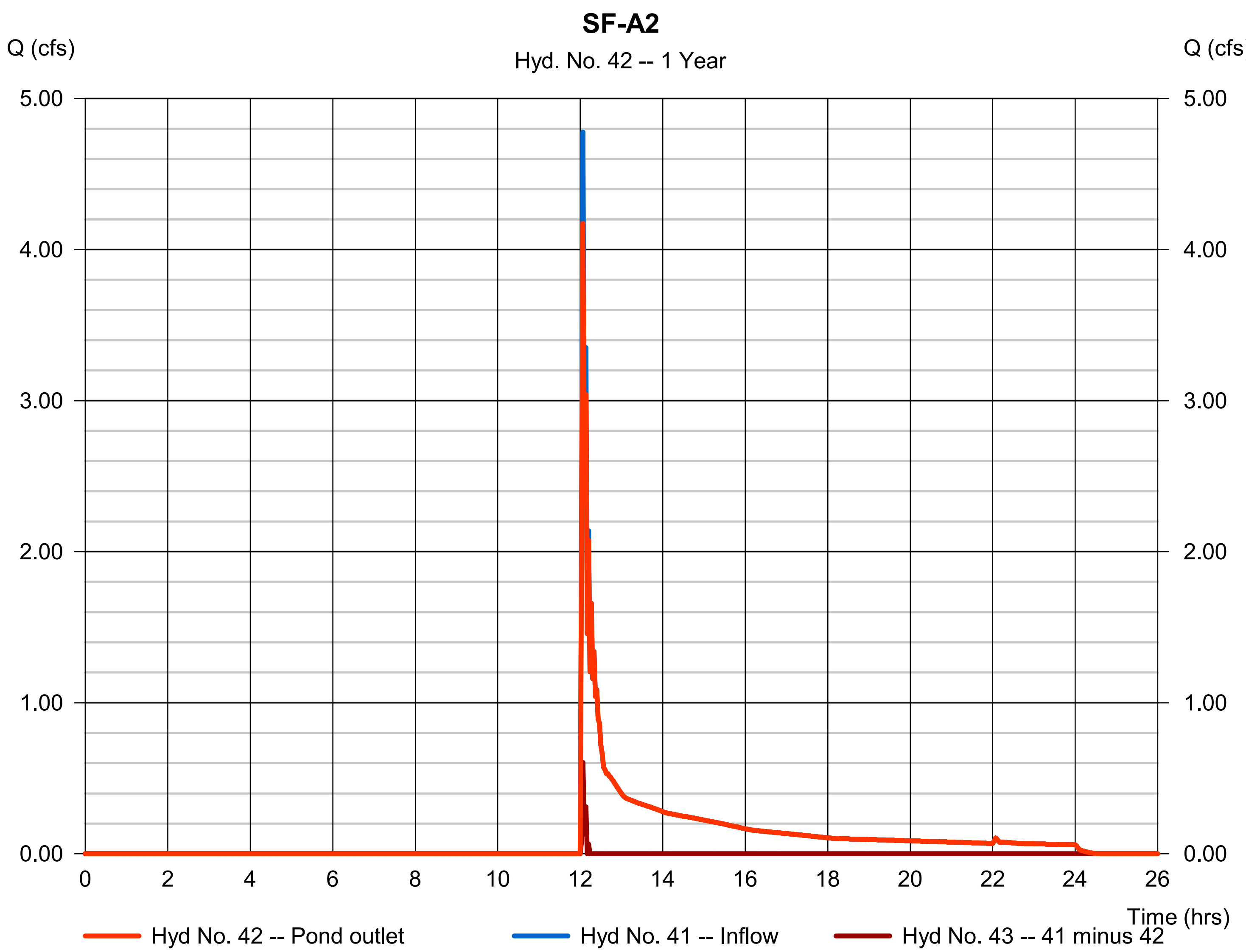
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 42

SF-A2

Hydrograph type	= Diversion1	Peak discharge	= 4.174 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 9,405 cuft
Inflow hydrograph	= 41 - DS-2	2nd diverted hyd.	= 43
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B



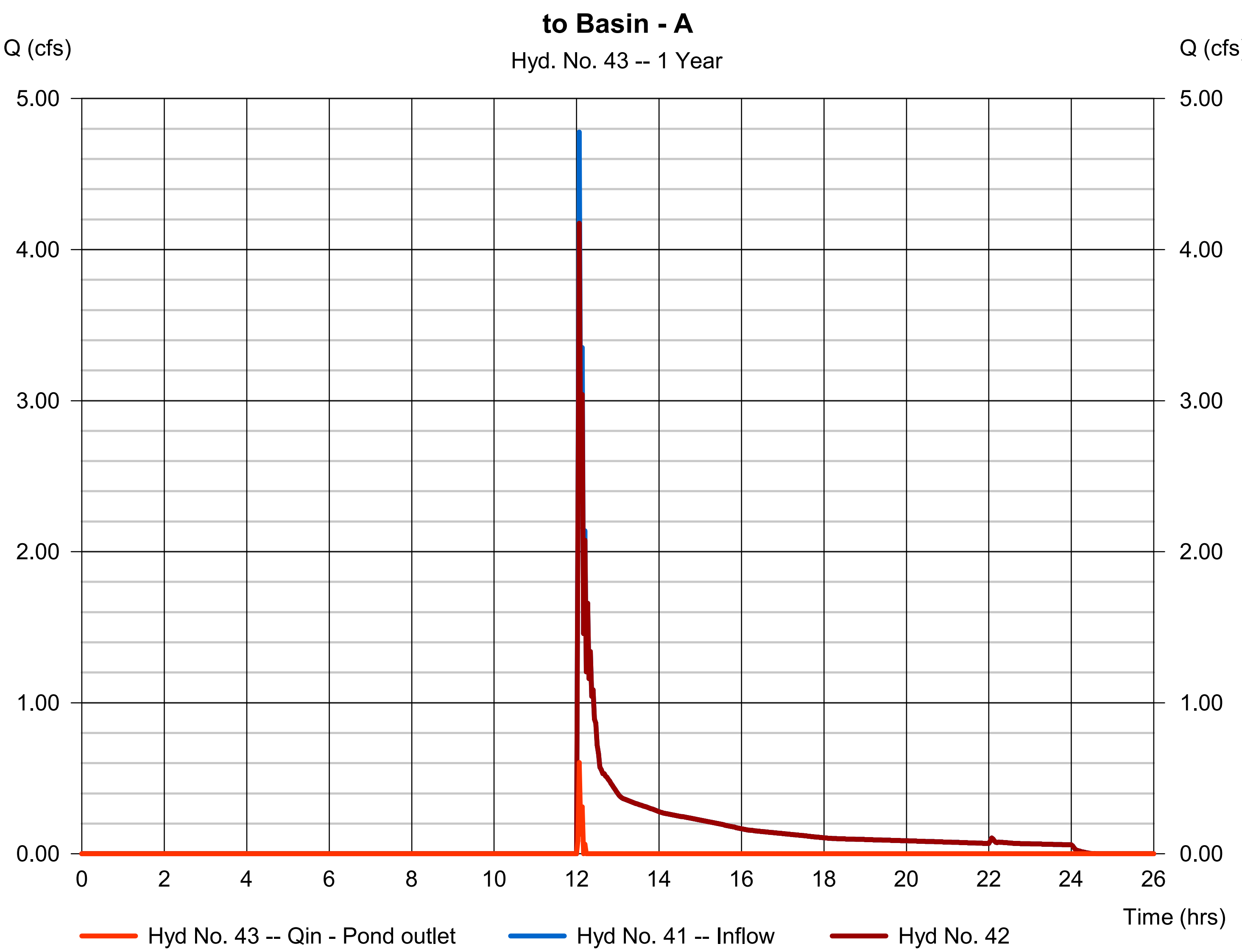
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 43

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 0.604 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 143 cuft
Inflow hydrograph	= 41 - DS-2	2nd diverted hyd.	= 42
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B



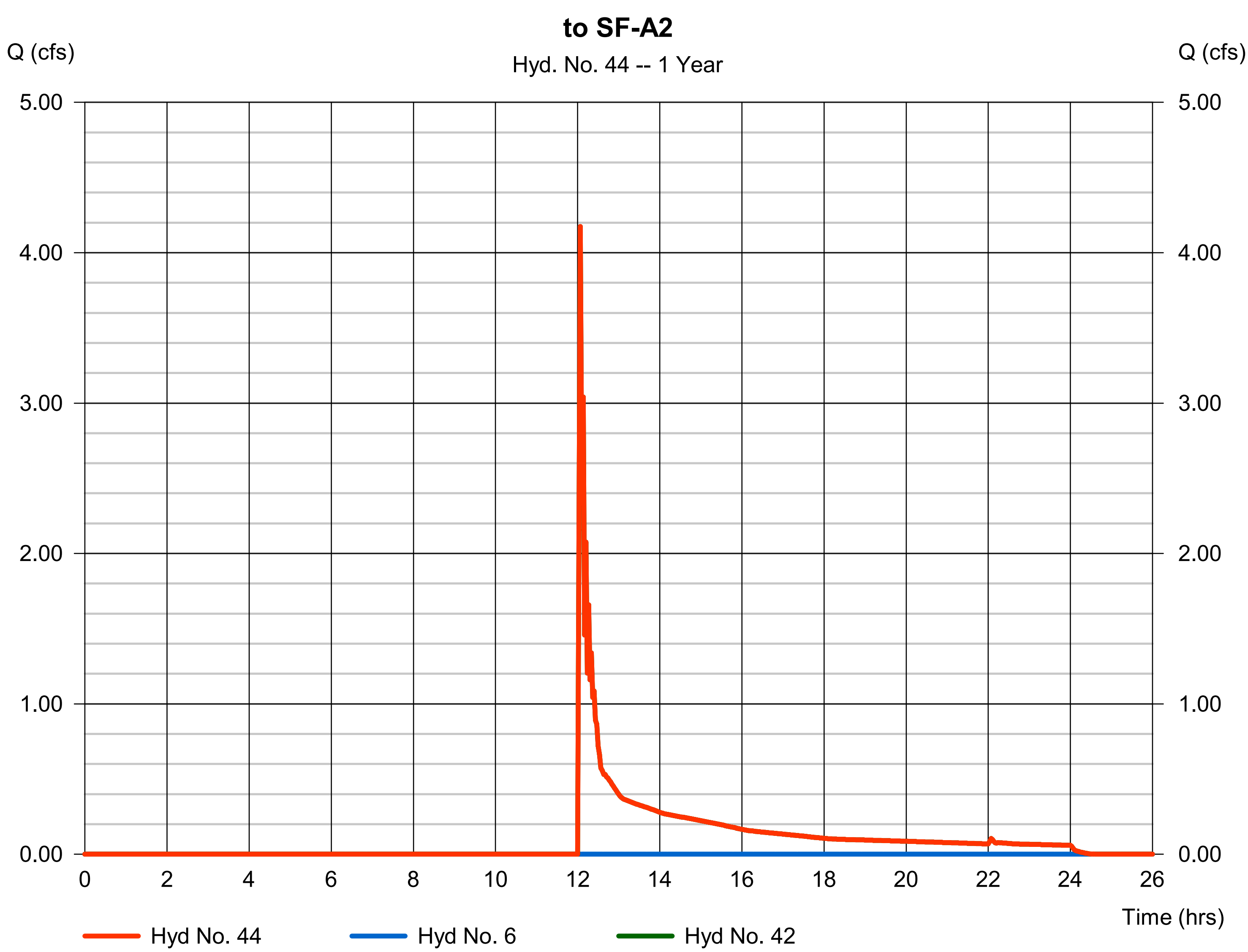
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 44

to SF-A2

Hydrograph type	= Combine	Peak discharge	= 4.174 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 9,405 cuft
Inflow hyds.	= 6, 42	Contrib. drain. area	= 0.330 ac



Hydrograph Report

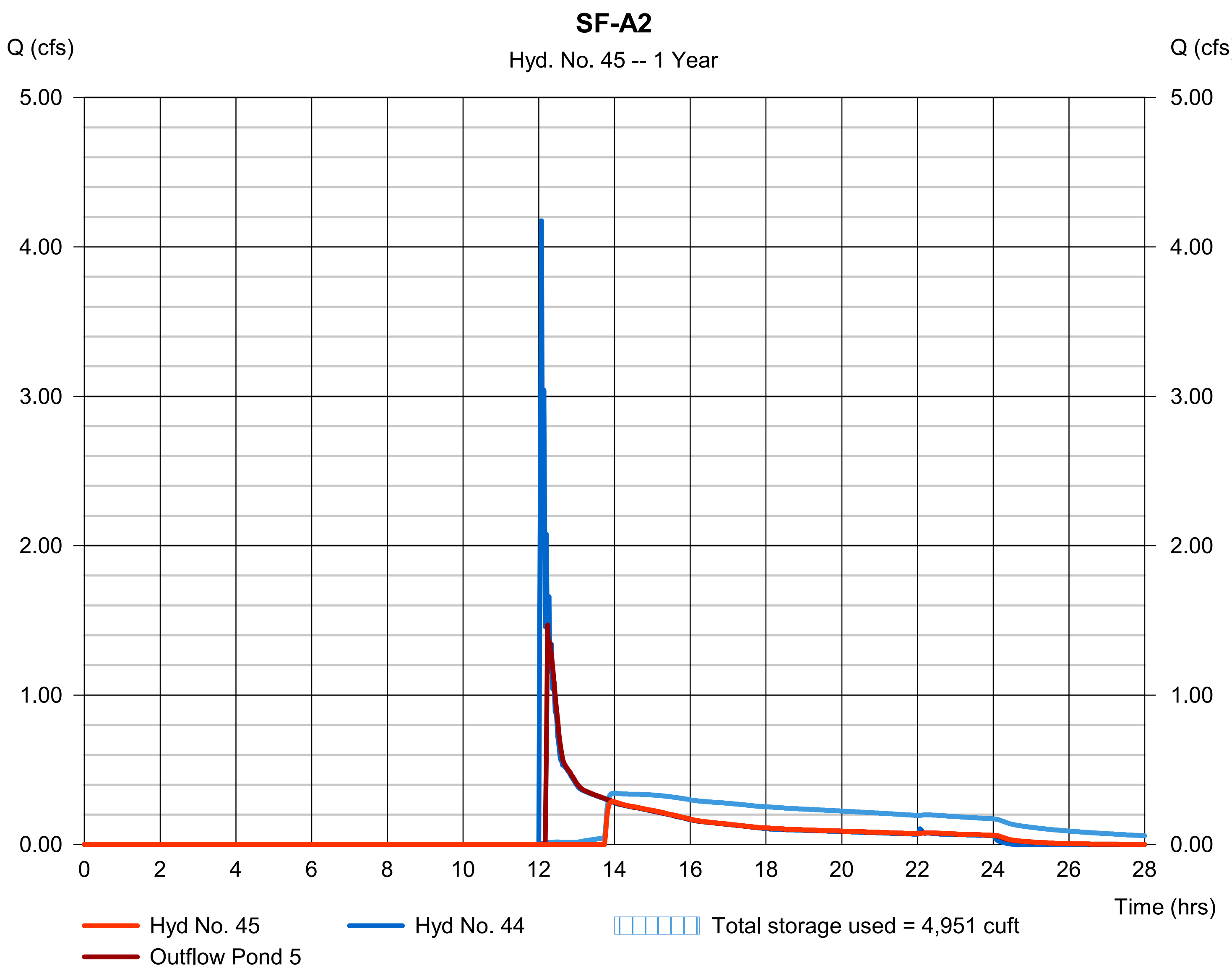
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 45

SF-A2

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.287 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.93 hrs
Time interval	= 2 min	Hyd. volume	= 4,801 cuft
Upper Pond	= Sediment Forebay - A2	**Lower Pond**	= Sand Filter - A2
Inflow hyd.	= 44 - to SF-A2	Other Inflow hyd.	= None
Max. Elevation	= 271.63 ft	Max. Elevation	= 271.27 ft
Max. Storage	= 1,739 cuft	Max. Storage	= 3,212 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 5 - Sediment Forebay - A2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 268.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	268.00	77	0	0
1.00	269.00	237	150	150
2.00	270.00	473	348	498
3.00	271.00	798	628	1,126
4.00	272.00	1,175	980	2,107

Culvert / Orifice Structures

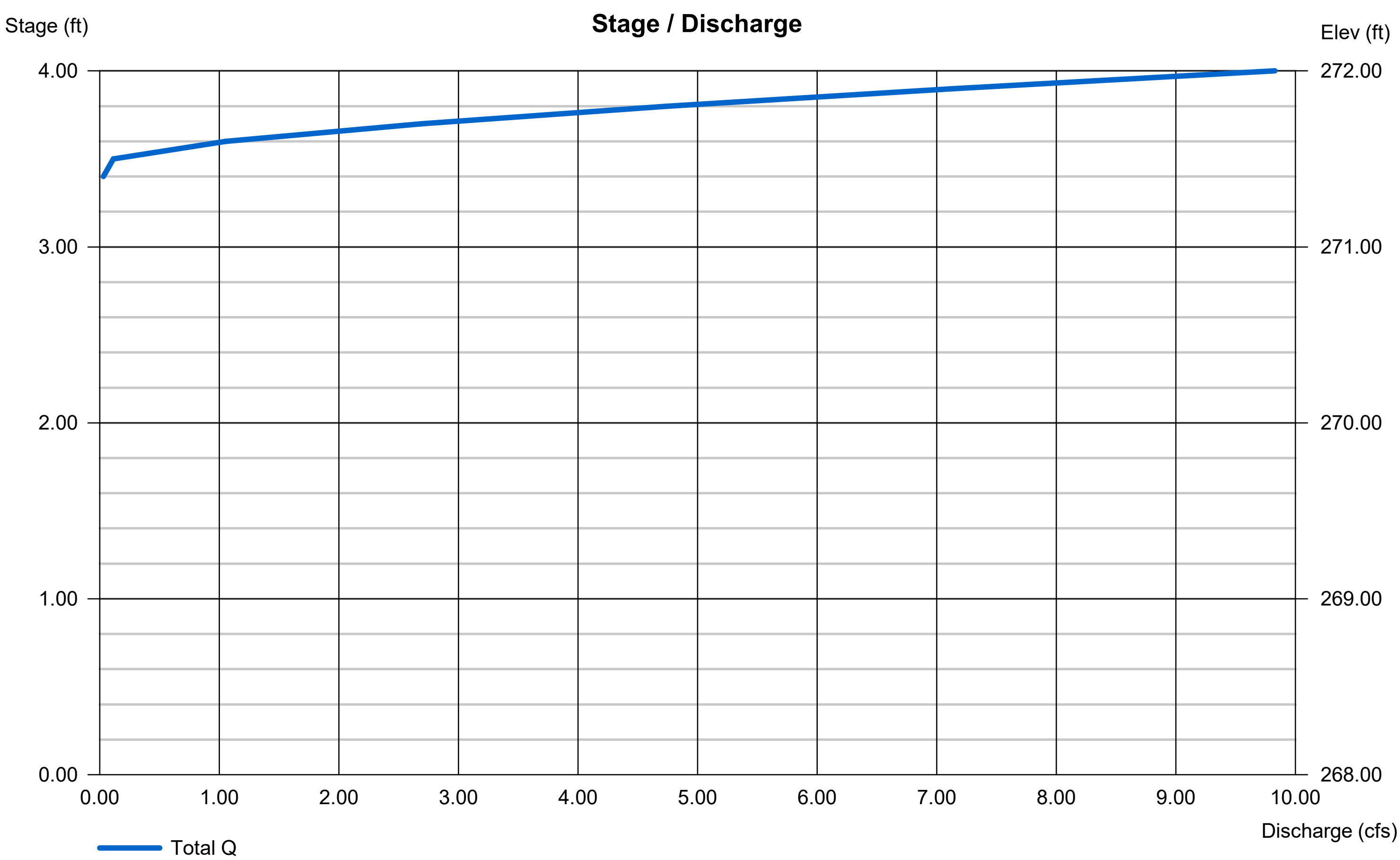
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	0.00	0.00
Span (in)	= 6.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 271.30	0.00	0.00	0.00
Length (ft)	= 13.50	0.00	0.00	0.00
Slope (%)	= 5.93	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 271.50	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).



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 6 - Sand Filter - A2

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	267.50	n/a	0	0
2.00	269.50	n/a	1,239	1,239
2.50	270.00	n/a	375	1,614
3.75	271.25	n/a	1,548	3,162
4.50	272.00	n/a	1,846	5,008

Culvert / Orifice Structures

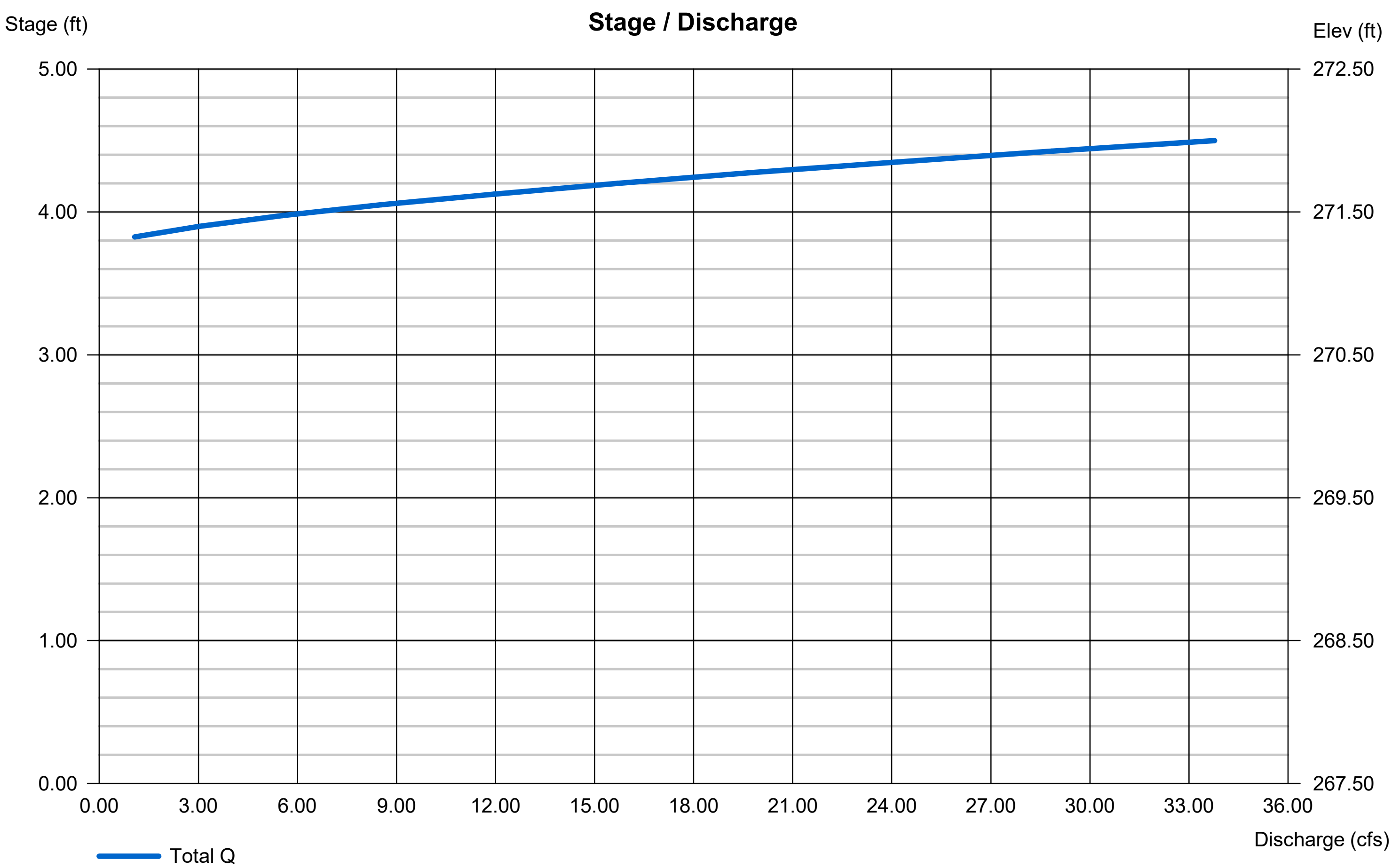
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 271.25	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) = 8.270 (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).



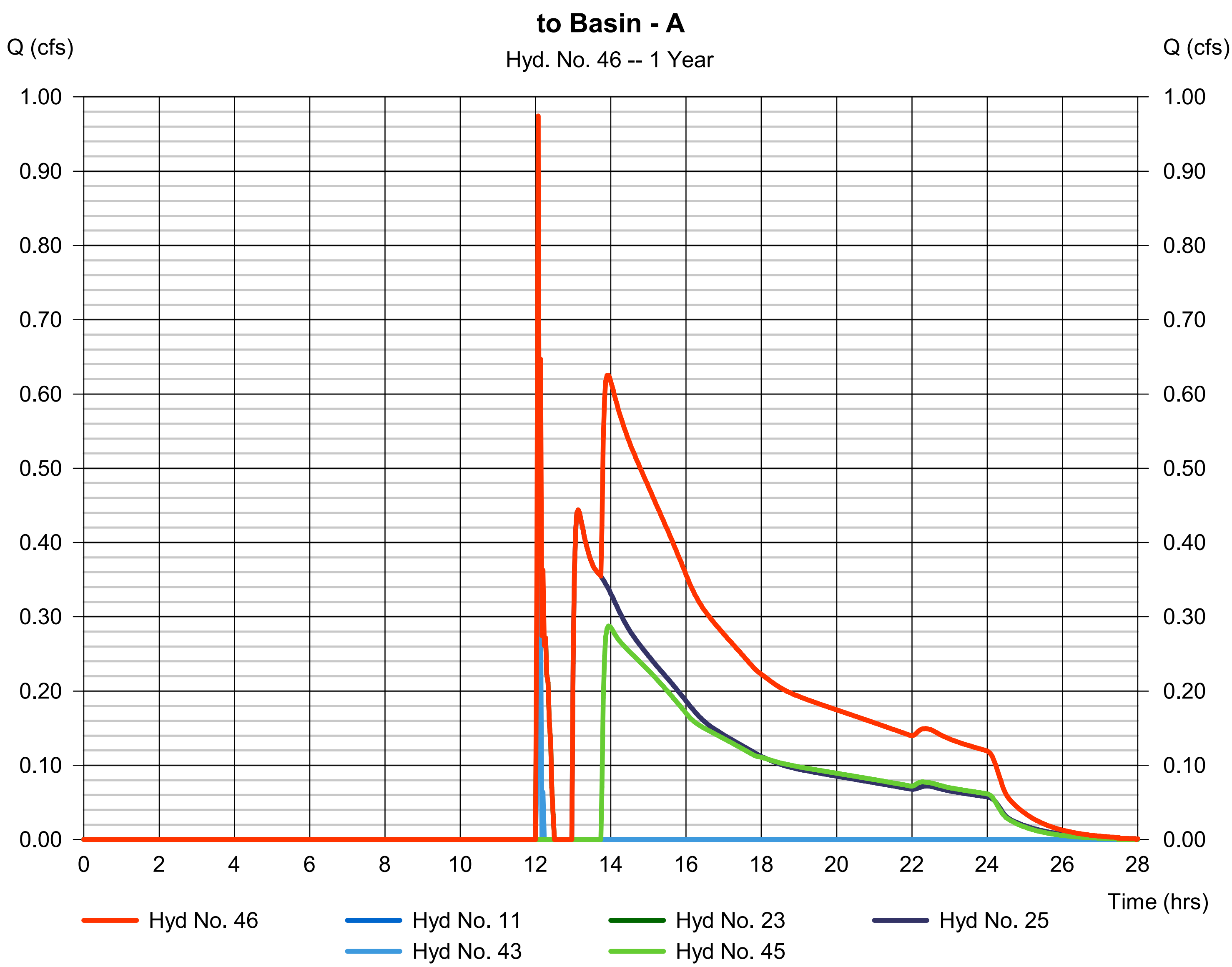
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 46

to Basin - A

Hydrograph type	= Combine	Peak discharge	= 0.974 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 11,449 cuft
Inflow hyds.	= 11, 23, 25, 43, 45	Contrib. drain. area	= 0.950 ac



Hydrograph Report

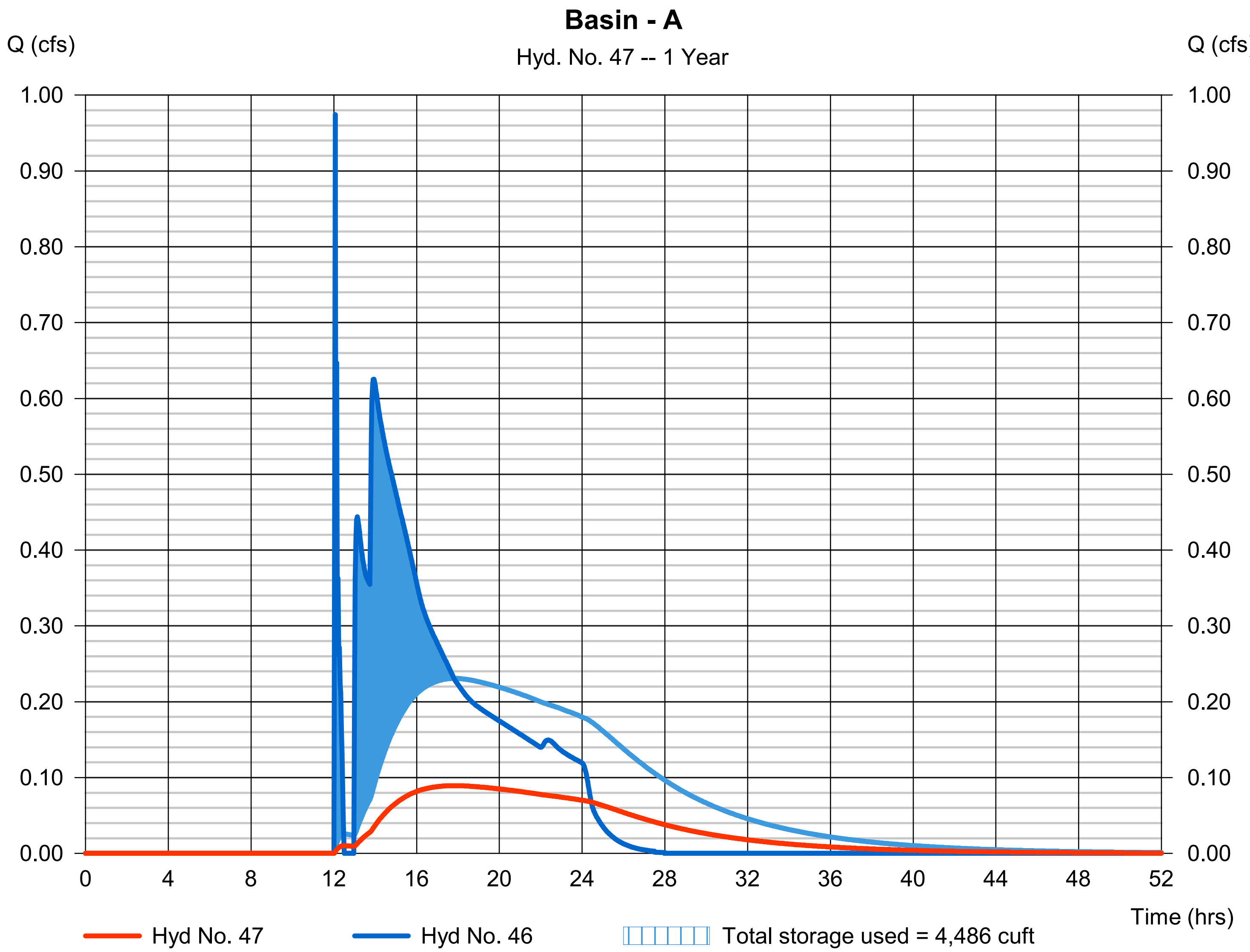
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 47

Basin - A

Hydrograph type	= Reservoir	Peak discharge	= 0.089 cfs
Storm frequency	= 1 yrs	Time to peak	= 17.80 hrs
Time interval	= 2 min	Hyd. volume	= 4,452 cuft
Inflow hyd. No.	= 46 - to Basin - A	Max. Elevation	= 266.31 ft
Reservoir name	= Basin - A	Max. Storage	= 4,486 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 7 - Basin - A

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 266.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	266.00	12,754	0	0
2.00	268.00	16,458	29,130	29,130
4.00	270.00	20,410	36,794	65,924
6.00	272.00	24,675	45,013	110,937

Culvert / Orifice Structures

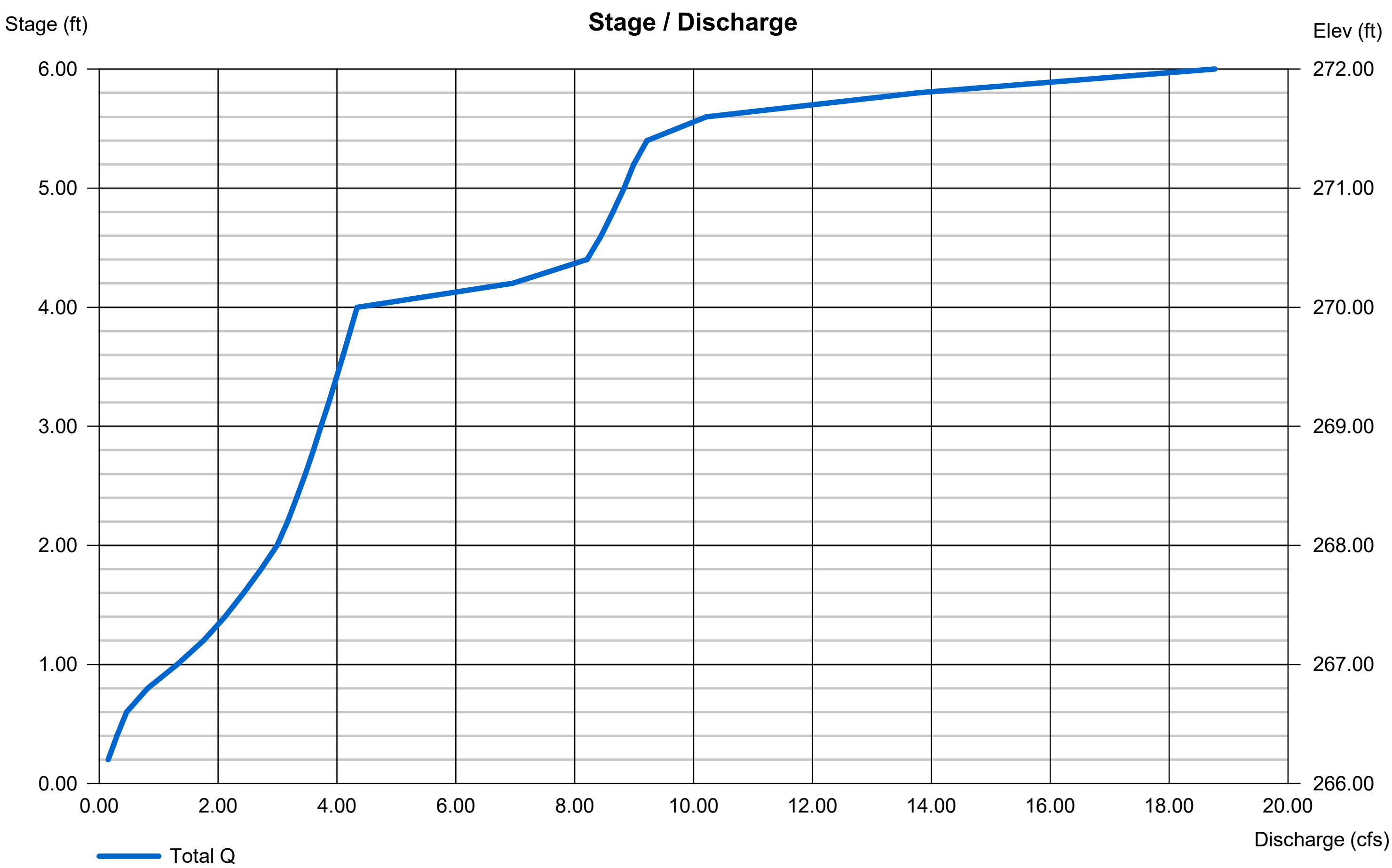
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	8.00	3.00	0.00
Span (in)	= 12.00	8.00	3.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 266.00	266.50	266.00	0.00
Length (ft)	= 64.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 12.57	10.00	0.00	0.00
Crest El. (ft)	= 270.00	271.50	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) = 2.410 (by Contour)
TW Elev. (ft) = 0.00

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



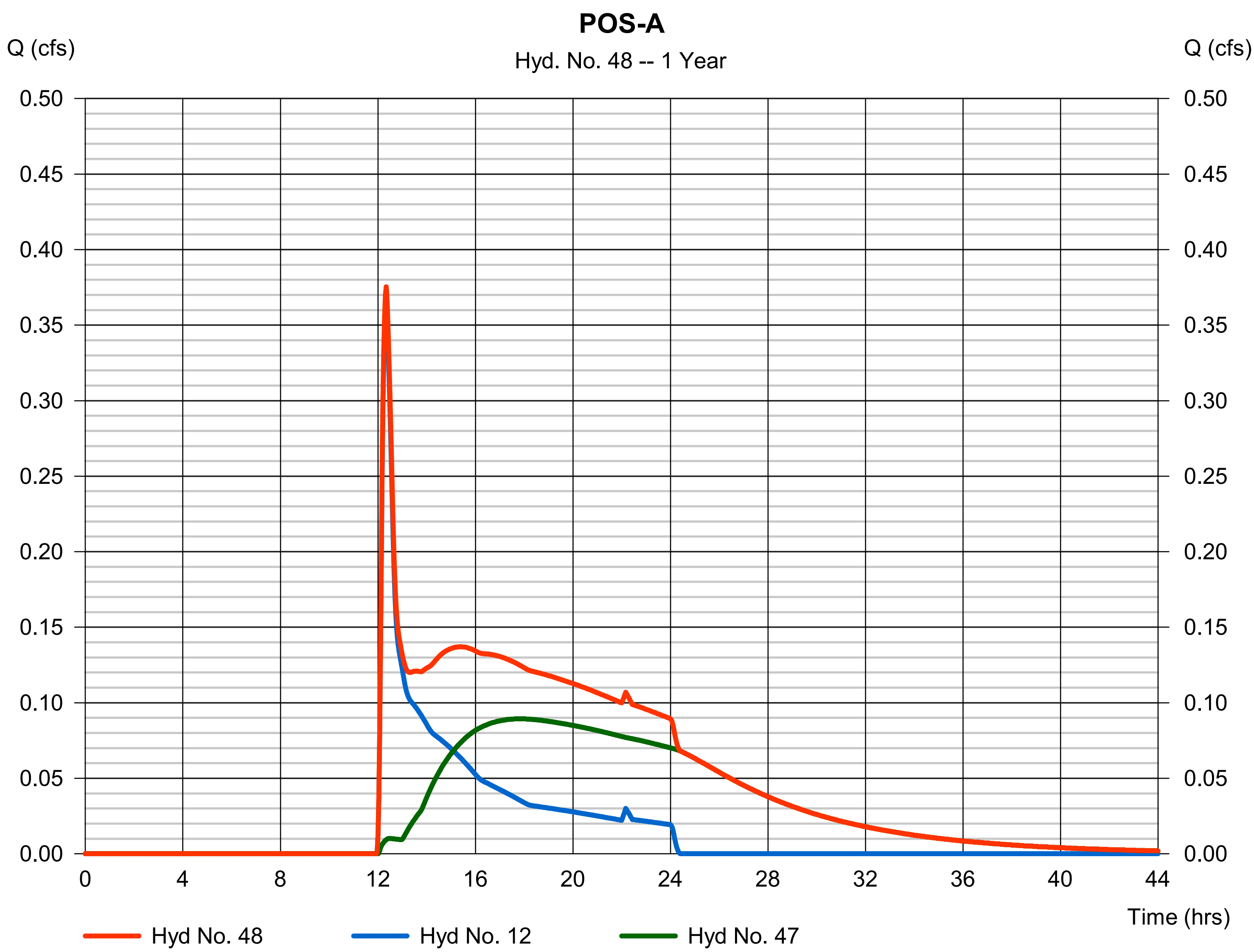
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 48

POS-A

Hydrograph type	= Combine	Peak discharge	= 0.375 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 6,968 cuft
Inflow hyds.	= 12, 47	Contrib. drain. area	= 2.260 ac



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	5.385	2	734	23,809	------	------	------	PR-A1a
2	SCS Runoff	0.004	2	818	93	------	------	------	PR-A1b
3	SCS Runoff	1.131	2	724	3,883	------	------	------	PR-R1a
4	SCS Runoff	1.538	2	724	5,280	------	------	------	PR-R1b
5	SCS Runoff	2.780	2	742	16,590	------	------	------	PR-A2a
6	SCS Runoff	0.008	2	824	199	------	------	------	PR-A2b
7	SCS Runoff	2.352	2	724	8,076	------	------	------	PR-R2a
8	SCS Runoff	1.040	2	724	3,572	------	------	------	PR-R2b
9	SCS Runoff	1.267	2	724	4,348	------	------	------	PR-R2c
10	SCS Runoff	2.036	2	724	6,989	------	------	------	PR-R2d
11	SCS Runoff	0.021	2	822	557	------	------	------	PR-A3
12	SCS Runoff	2.512	2	732	11,068	------	------	------	PR-A4
13	SCS Runoff	0.008	2	1328	189	------	------	------	PR-B / POS-B
14	Diversion1	0.082	2	664	845	3	------	------	UG-R1a
15	Diversion2	1.131	2	724	3,037	3	------	------	DS-1
16	Diversion1	0.112	2	664	1,150	4	------	------	UG-R1b
17	Diversion2	1.538	2	724	4,131	4	------	------	DS-1
18	Reservoir	0.000	2	634	0	14	276.16	6.10	UG-R1a
19	Reservoir	0.002	2	666	1	16	277.99	676	UG-R1b
20	Combine	6.561	2	728	30,978	1, 15, 17, 18, 19	------	------	to DS-1
21	Reservoir	6.565	2	730	30,940	20	270.36	60.6	DS-1
22	Diversion1	4.027	2	730	27,015	21	------	------	SF-A1
23	Diversion2	2.538	2	730	3,925	21	------	------	to Basin - A
24	Combine	4.027	2	730	27,108	2, 22,	------	------	to SF-A1
25	Reservoir(i)	4.016	2	732	22,218	24	271.76	6,092	SF-A1
26	Diversion1	0.171	2	664	1,758	7	------	------	UG-R2a
27	Diversion2	2.352	2	724	6,317	7	------	------	DS-2
28	Diversion1	0.076	2	664	778	8	------	------	UG-R2b
29	Diversion2	1.040	2	724	2,794	8	------	------	DS-2
30	Diversion1	0.092	2	664	947	9	------	------	UG-R2c
31	Diversion2	1.267	2	724	3,402	9	------	------	DS-2
32	Diversion1	0.148	2	664	1,522	10	------	------	UG-R2d
33	Diversion2	2.036	2	724	5,467	10	------	------	DS-2
34	Reservoir	0.000	2	n/a	0	26	276.11	15.2	UG-R2a

17.276.403 Willow Lakes Proposed.gpw	Return Period: 10 Year	Wednesday, 03 / 3 / 2021

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	0.000	2	n/a	0	28	276.34	5.68	UG-R2b
36	Reservoir	0.000	2	n/a	0	30	278.06	220	UG-R2c
37	Reservoir	0.000	2	404	0	32	276.15	472	UG-R2d
38	Combine	3.393	2	724	9,112	27, 29, 34, 35,	------	------	to DS-2
39	Combine	3.302	2	724	8,869	31, 33, 36, 37,	------	------	to DS-2
40	Combine	7.564	2	724	34,571	5, 38, 39	------	------	to DS-2
41	Reservoir	7.544	2	724	34,514	40	269.89	101	DS-2
42	Diversion1	5.414	2	724	32,463	41	------	------	SF-A2
43	Diversion2	2.130	2	724	2,052	41	------	------	to Basin - A
44	Combine	5.414	2	724	32,662	6, 42,	------	------	to SF-A2
45	Reservoir(i)	5.021	2	728	28,077	44	271.83	5,613	SF-A2
46	Combine	12.57	2	728	56,828	11, 23, 25, 43, 45	------	------	to Basin - A
47	Reservoir	1.543	2	792	33,317	46	267.46	21,335	Basin - A
48	Combine	2.653	2	732	44,386	12, 47	------	------	POS-A

17.276.403 Willow Lakes Proposed.gpw	Return Period: 10 Year	Wednesday, 03 / 3 / 2021

Hydrograph Report

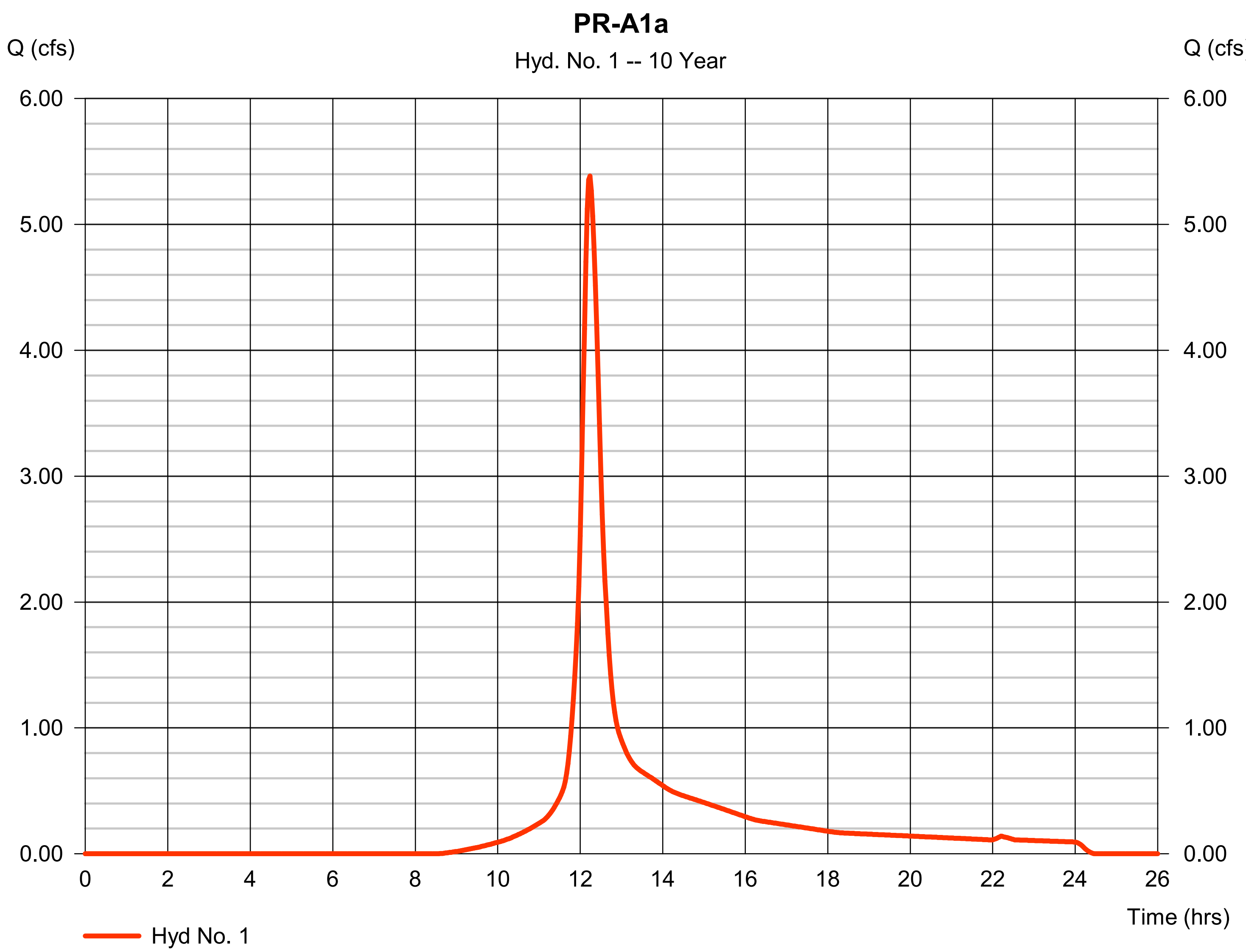
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 1

PR-A1a

Hydrograph type	= SCS Runoff	Peak discharge	= 5.385 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 23,809 cuft
Drainage area	= 2.670 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.60 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.330 x 30) + (0.590 x 39) + (1.750 x 98)] / 2.670



Hydrograph Report

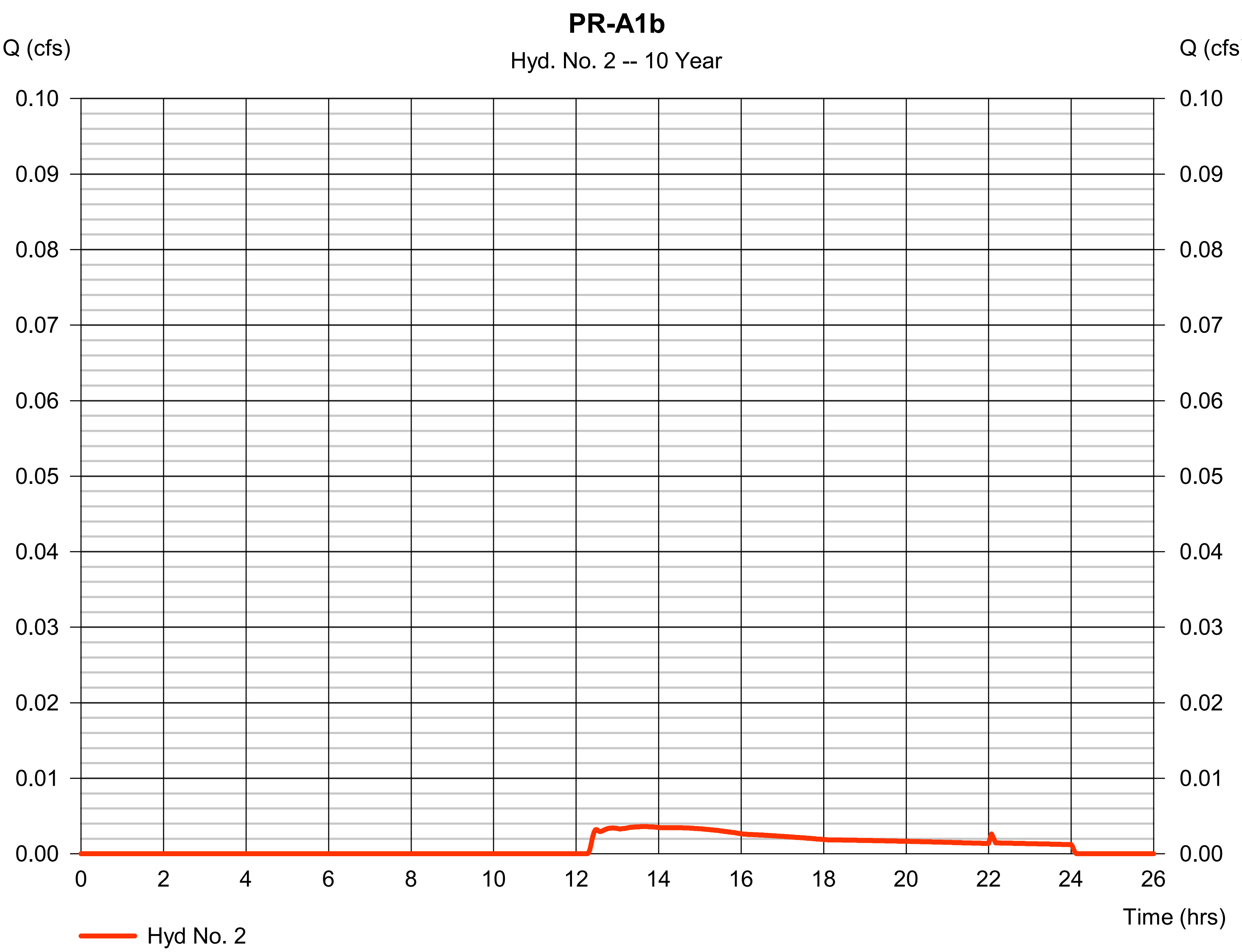
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 2

PR-A1b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.004 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.63 hrs
Time interval	= 2 min	Hyd. volume	= 93 cuft
Drainage area	= 0.170 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 39)] / 0.170



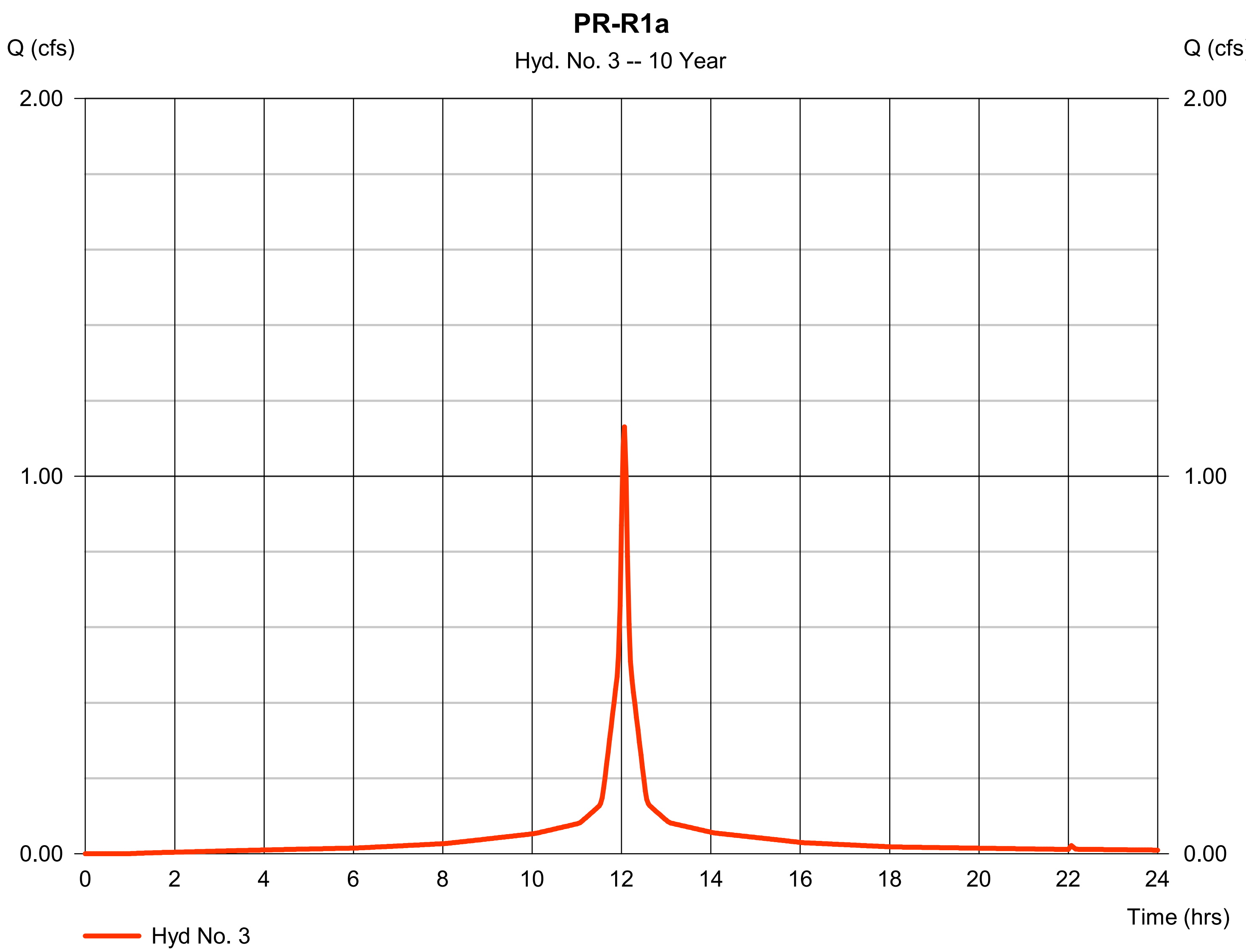
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 3

PR-R1a

Hydrograph type	= SCS Runoff	Peak discharge	= 1.131 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,883 cuft
Drainage area	= 0.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



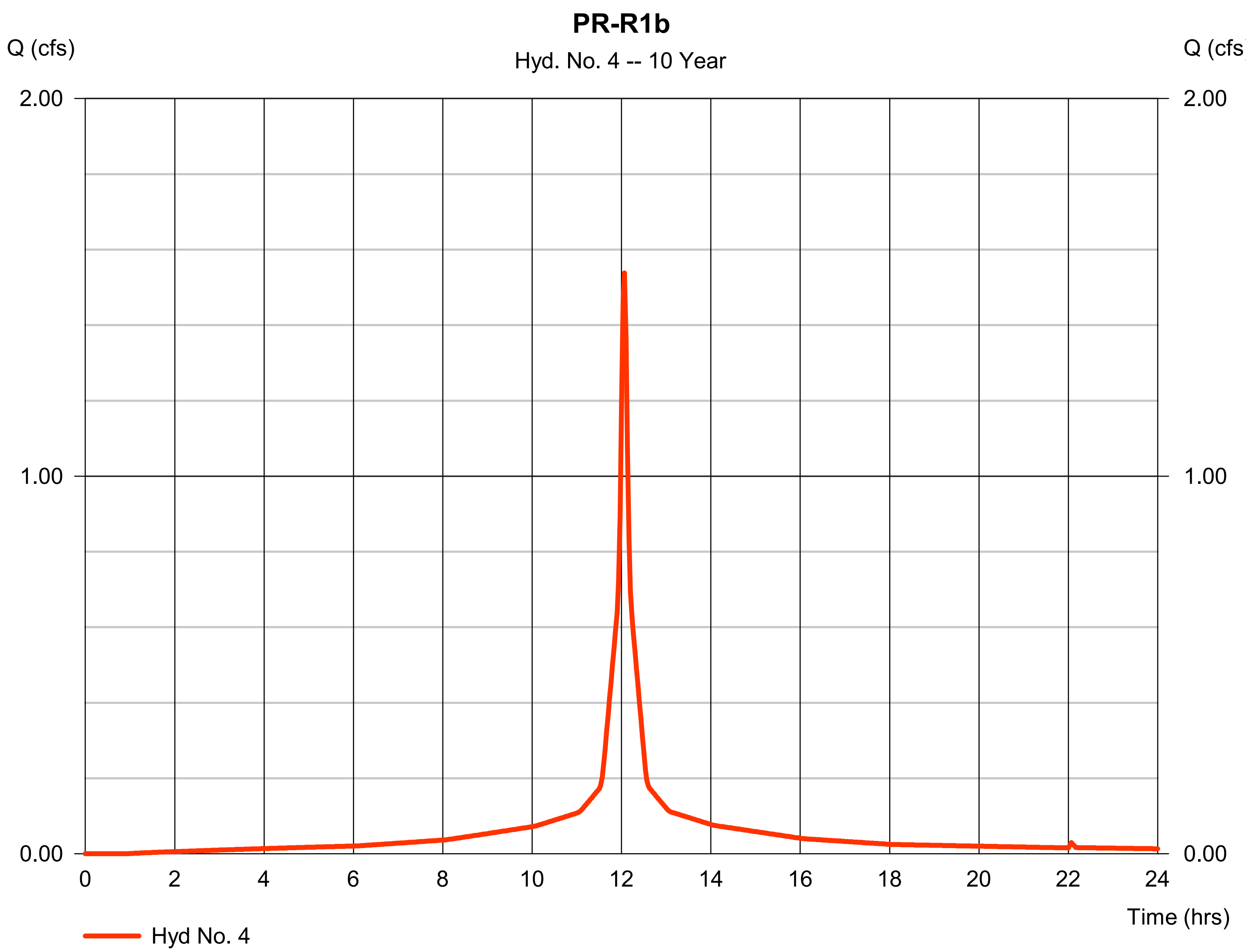
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 4

PR-R1b

Hydrograph type	= SCS Runoff	Peak discharge	= 1.538 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,280 cuft
Drainage area	= 0.340 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

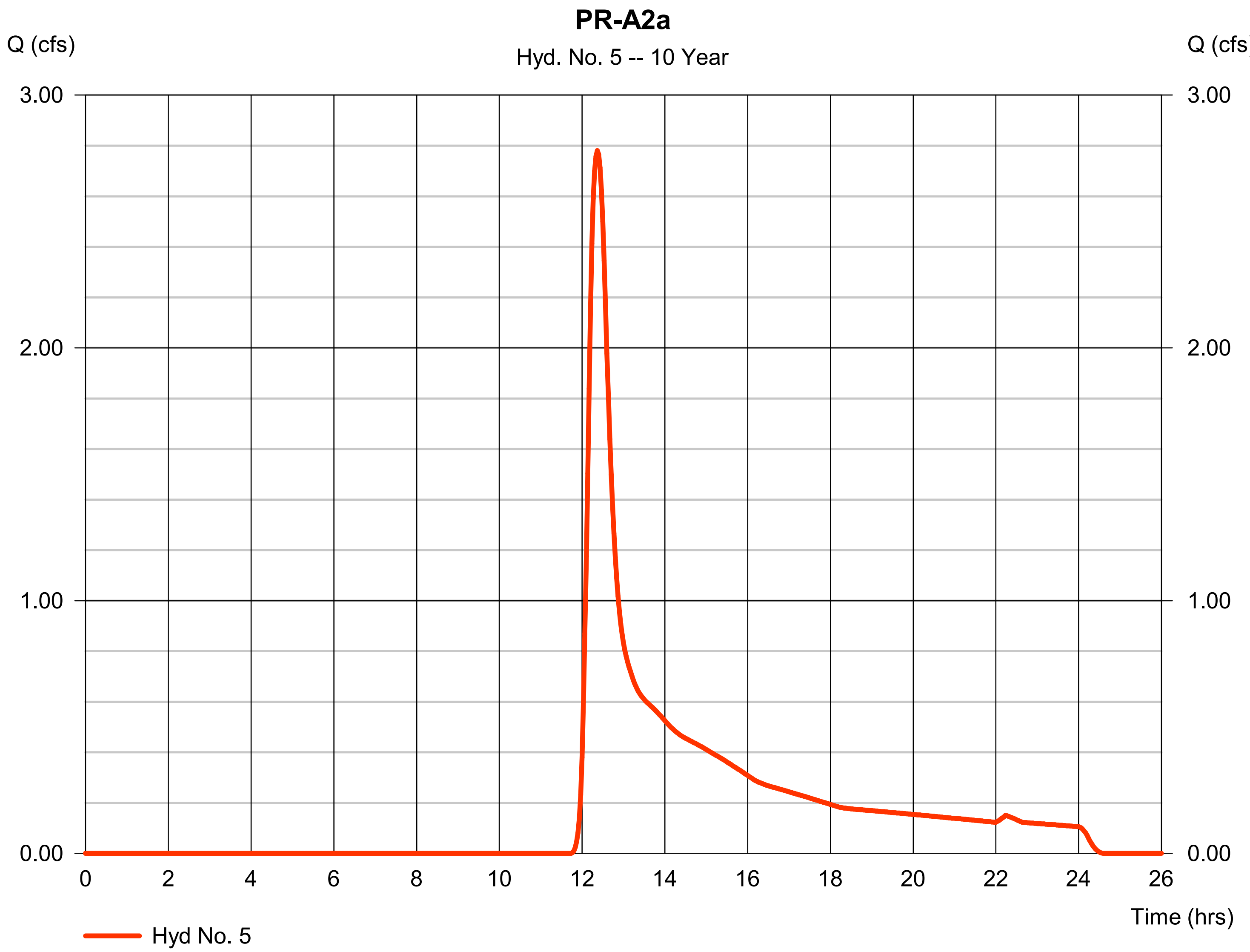
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 5

PR-A2a

Hydrograph type	= SCS Runoff	Peak discharge	= 2.780 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 16,590 cuft
Drainage area	= 5.090 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.390 x 30) + (2.100 x 39) + (1.600 x 98)] / 5.090



Hydrograph Report

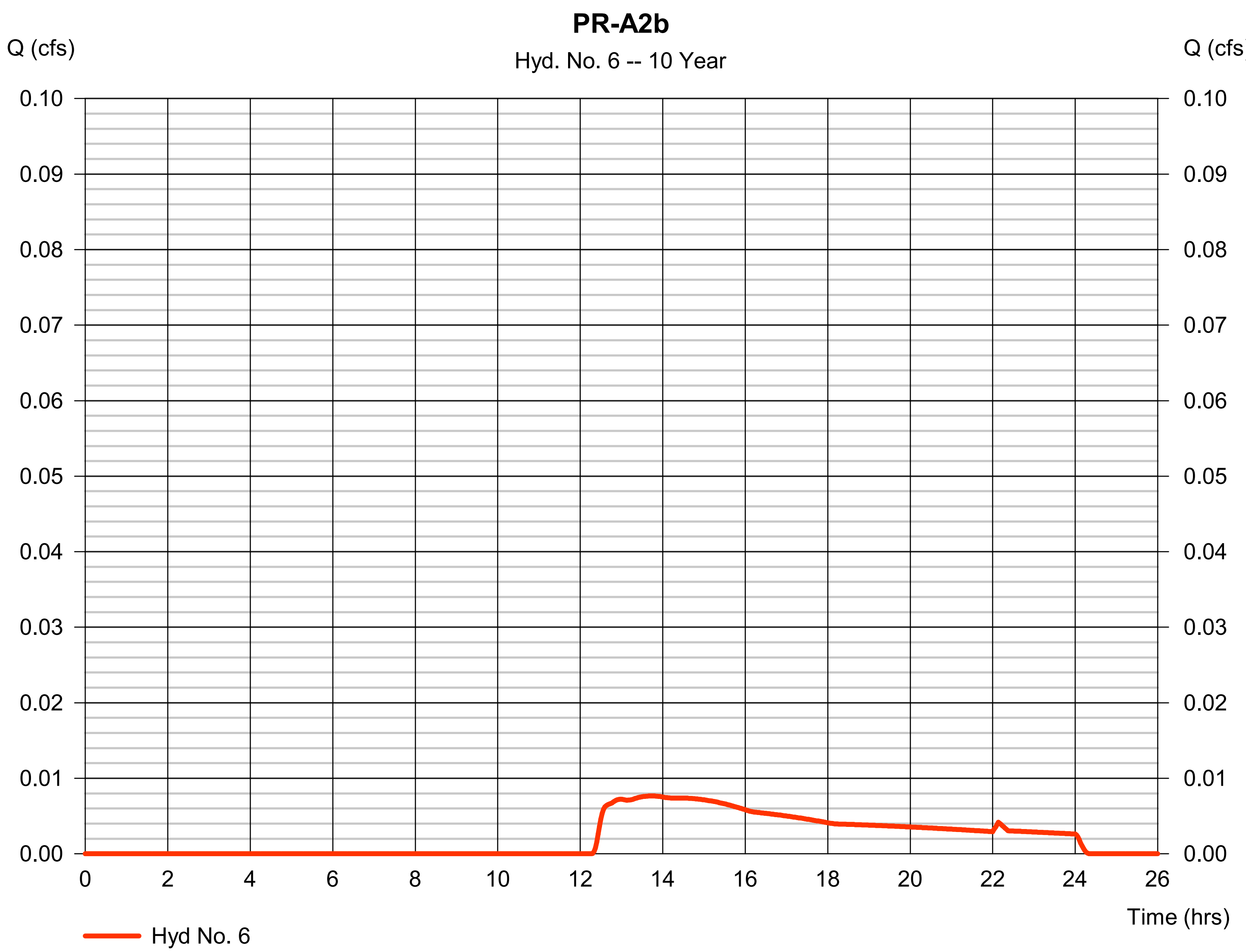
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 6

PR-A2b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.73 hrs
Time interval	= 2 min	Hyd. volume	= 199 cuft
Drainage area	= 0.330 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.10 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 39)] / 0.330



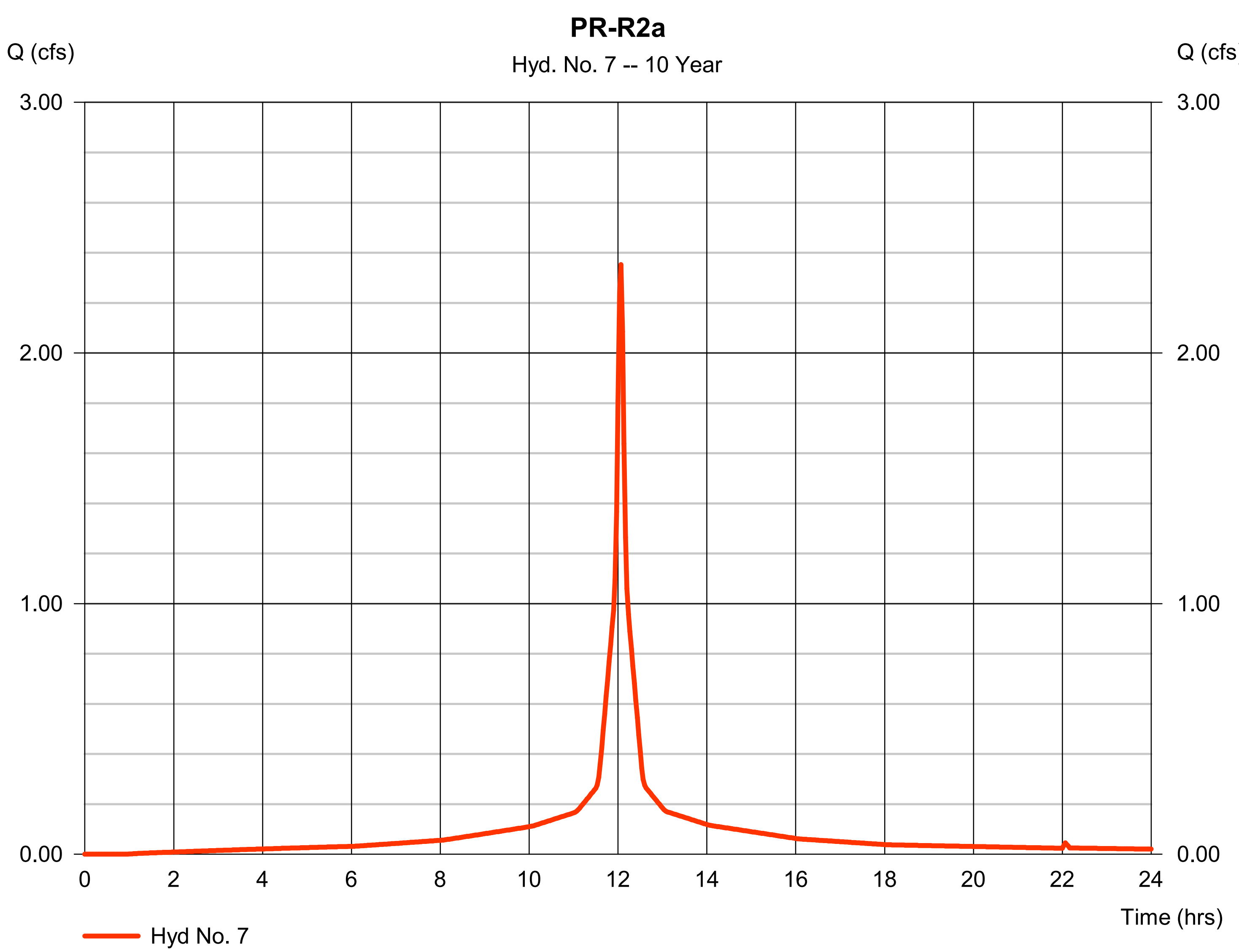
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 7

PR-R2a

Hydrograph type	= SCS Runoff	Peak discharge	= 2.352 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 8,076 cuft
Drainage area	= 0.520 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

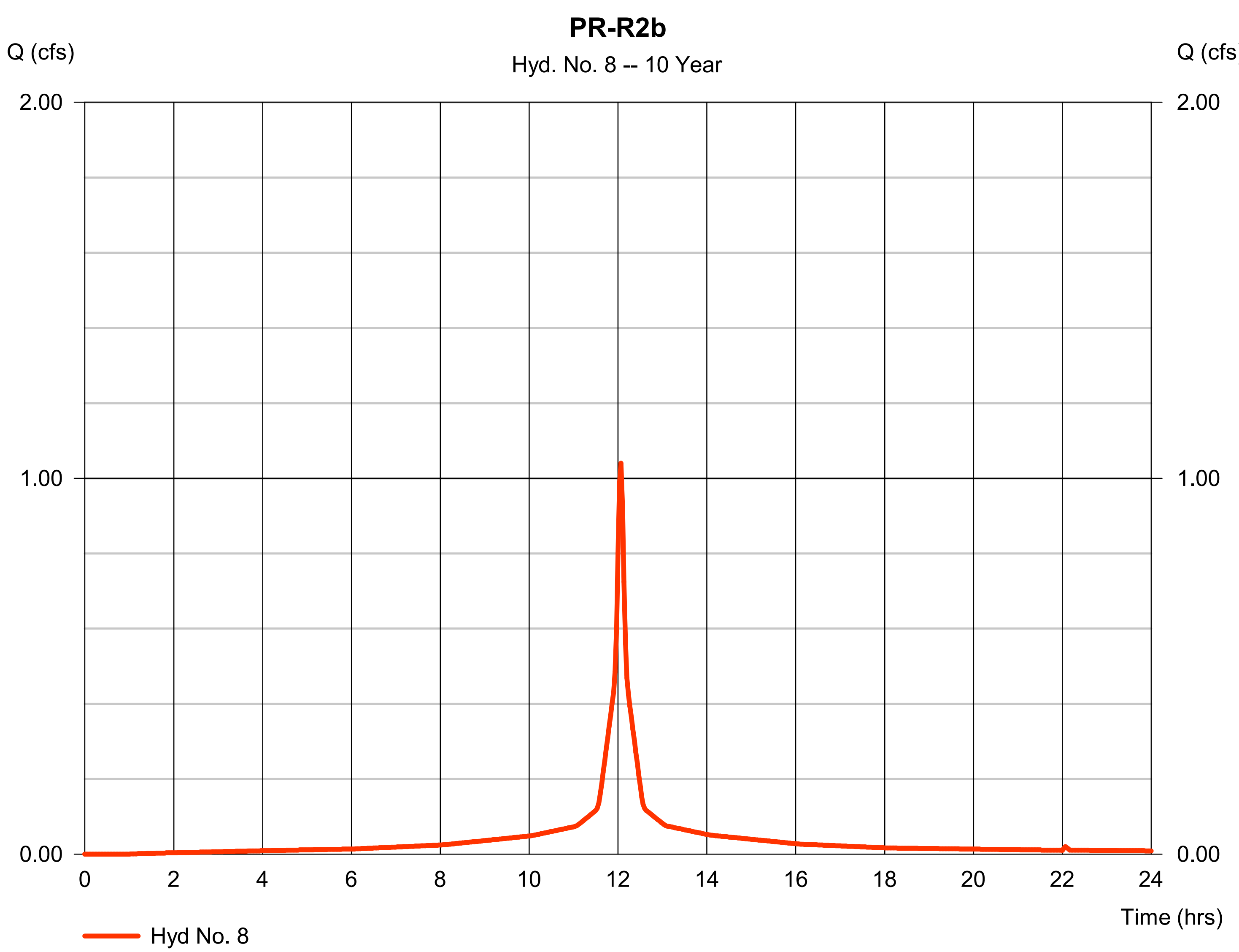


Hydrograph Report

Hyd. No. 8

PR-R2b

Hydrograph type	= SCS Runoff	Peak discharge	= 1.040 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,572 cuft
Drainage area	= 0.230 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



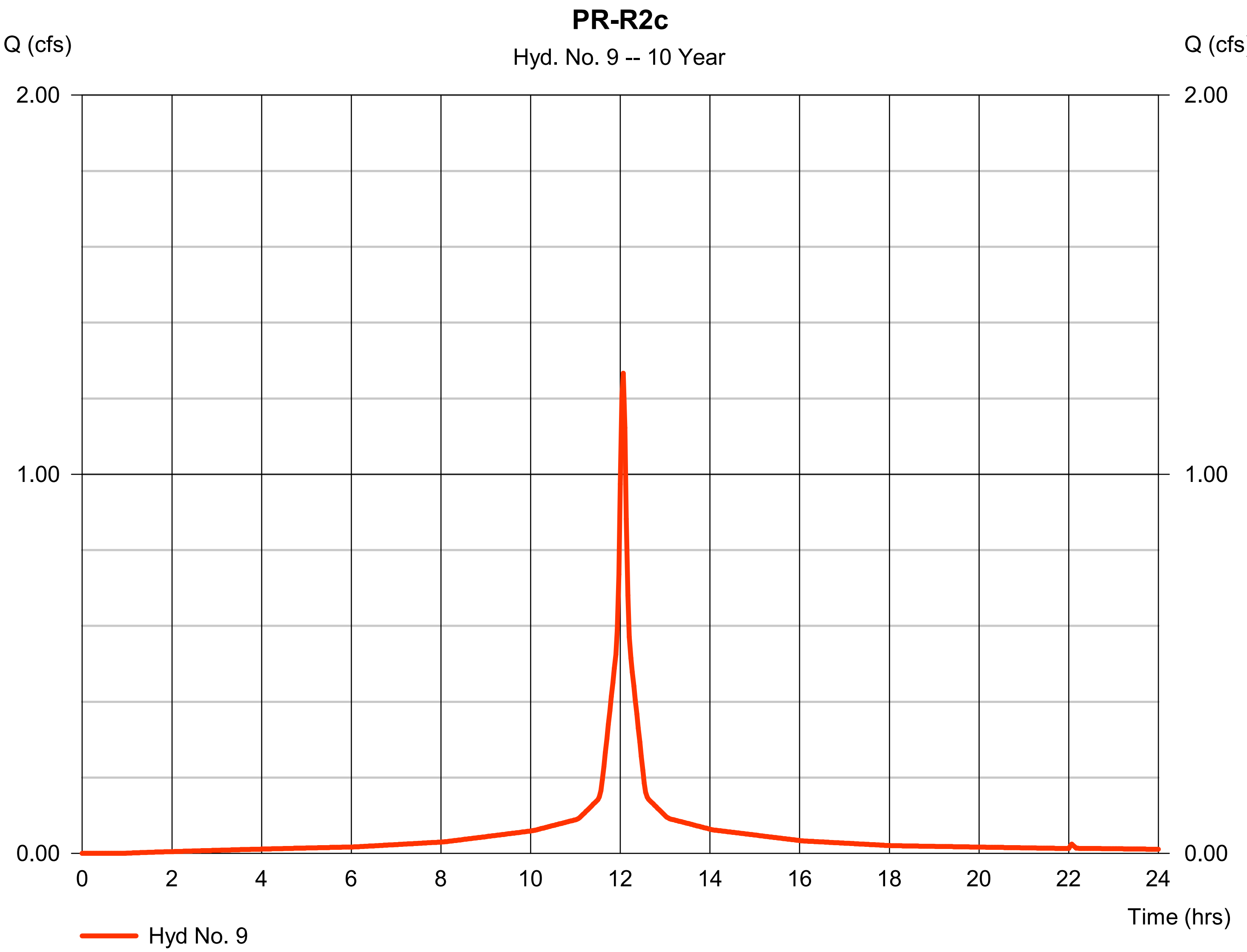
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 9

PR-R2c

Hydrograph type	= SCS Runoff	Peak discharge	= 1.267 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,348 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



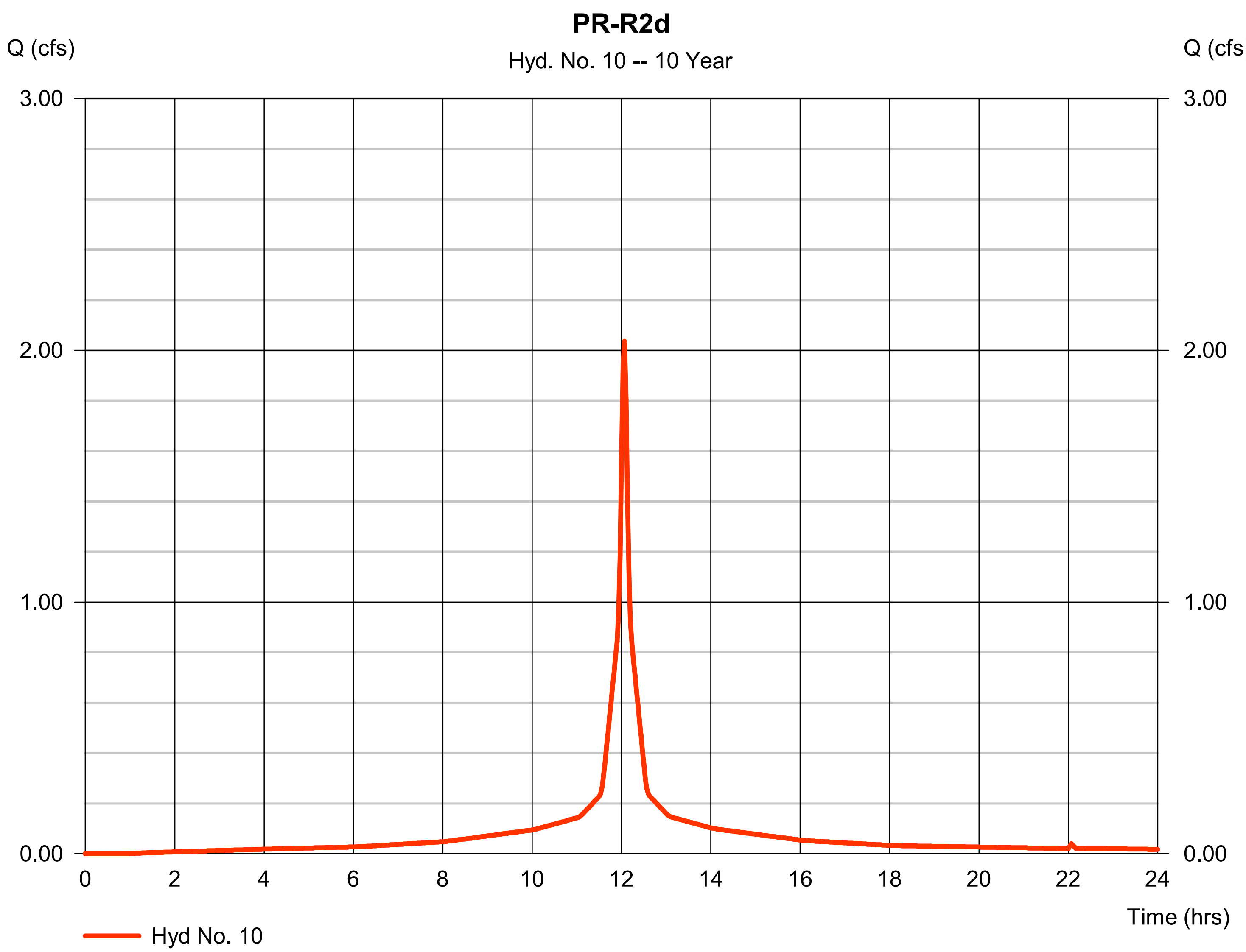
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 10

PR-R2d

Hydrograph type	= SCS Runoff	Peak discharge	= 2.036 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 6,989 cuft
Drainage area	= 0.450 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

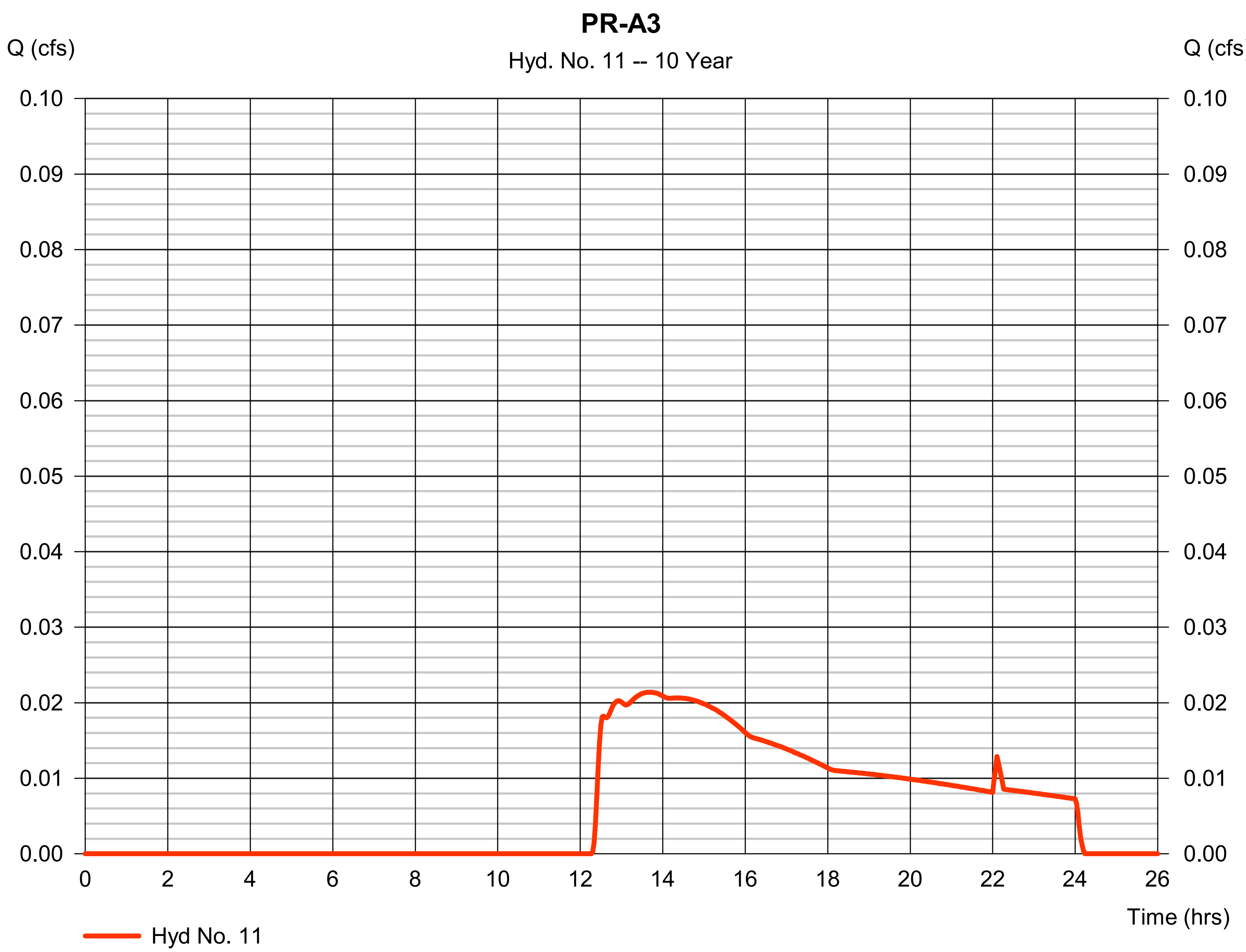
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 11

PR-A3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.021 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.70 hrs
Time interval	= 2 min	Hyd. volume	= 557 cuft
Drainage area	= 0.950 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.20 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.960 x 39)] / 0.950



Hydrograph Report

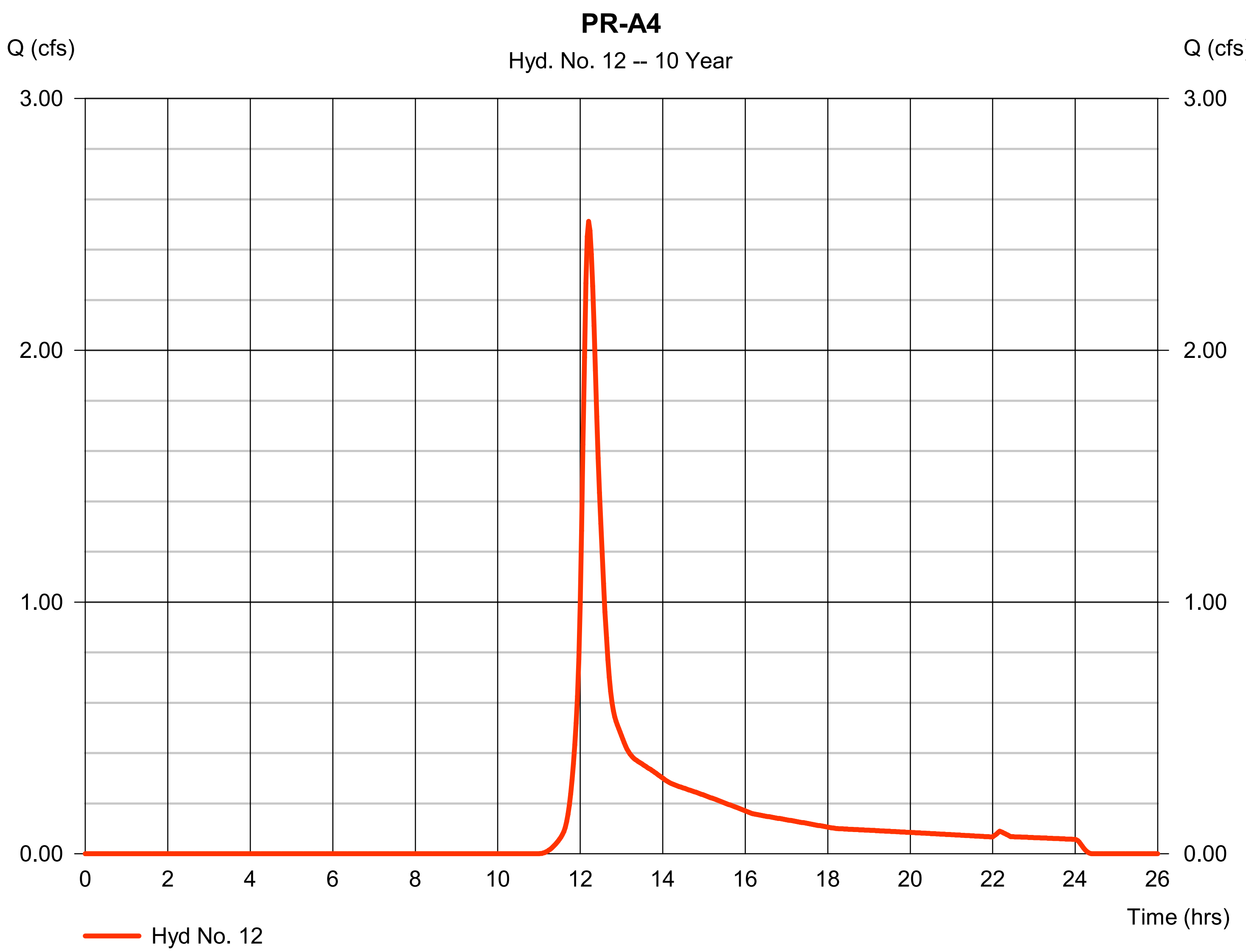
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 12

PR-A4

Hydrograph type	= SCS Runoff	Peak discharge	= 2.512 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 11,068 cuft
Drainage area	= 2.260 ac	Curve number	= 63*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.10 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 30) + (1.010 x 39) + (0.950 x 98)] / 2.260



Hydrograph Report

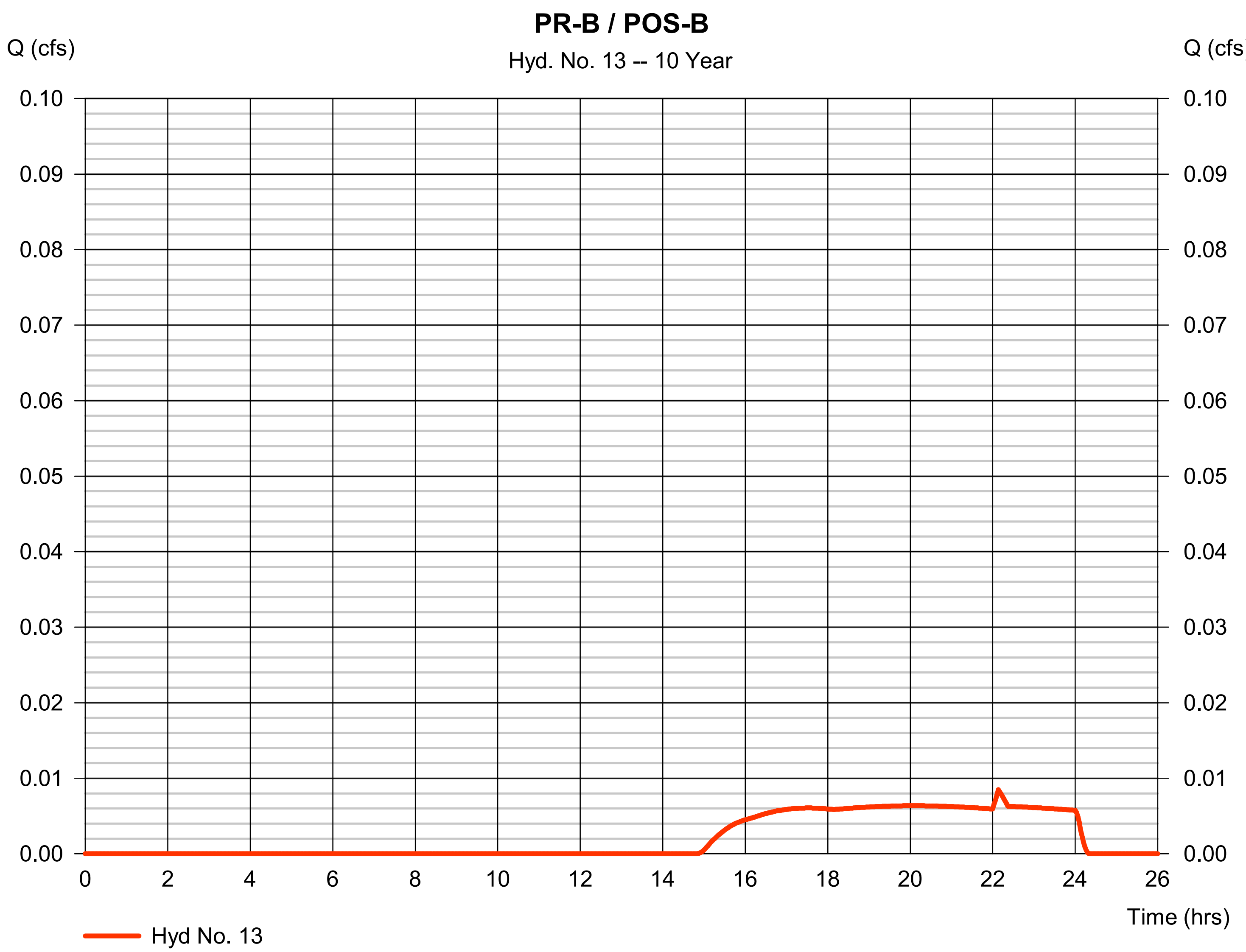
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 13

PR-B / POS-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.008 cfs
Storm frequency	= 10 yrs	Time to peak	= 22.13 hrs
Time interval	= 2 min	Hyd. volume	= 189 cuft
Drainage area	= 1.940 ac	Curve number	= 33*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 4.80 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.330 x 30) + (0.610 x 39)] / 1.940



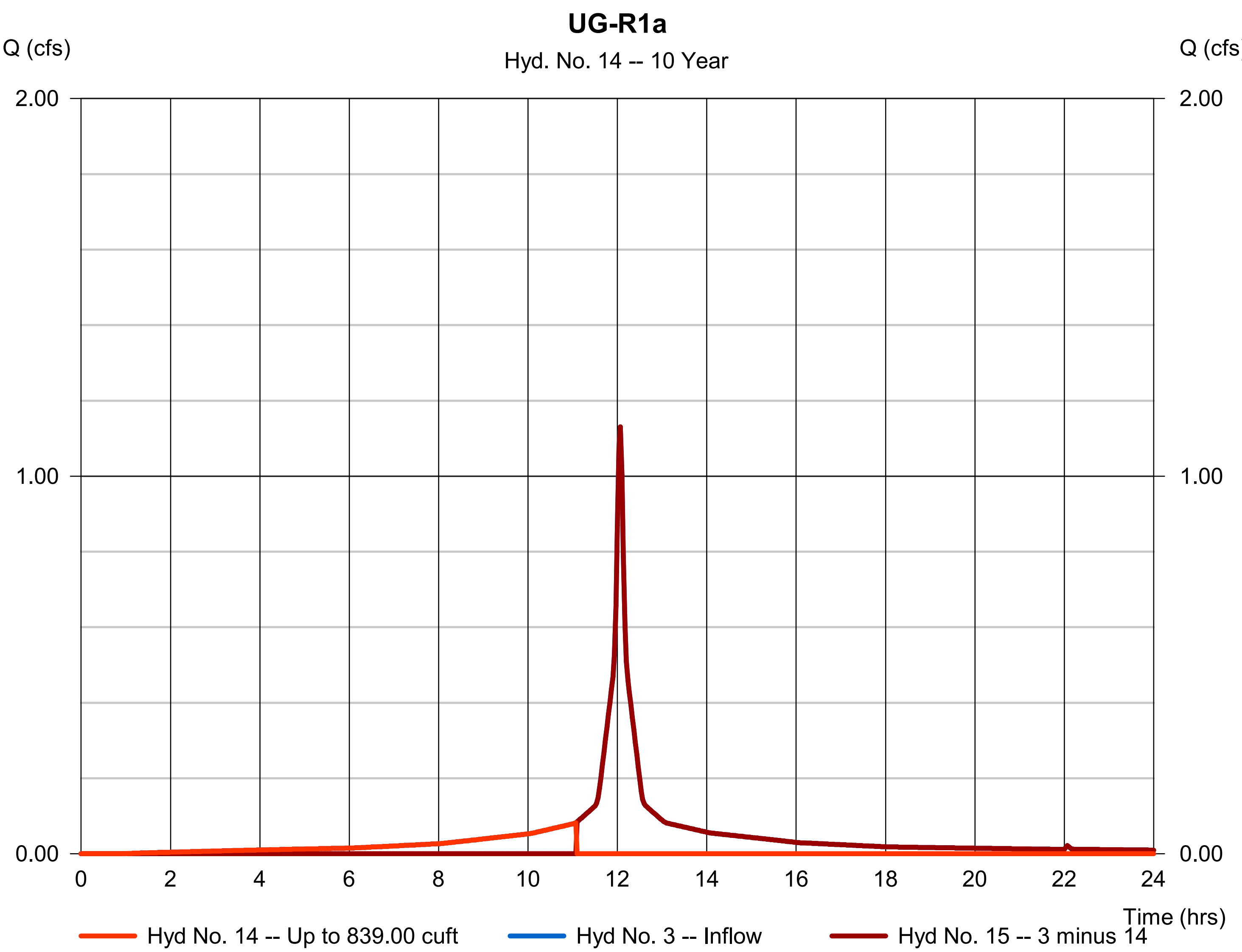
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 14

UG-R1a

Hydrograph type	= Diversion1	Peak discharge	= 0.082 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.07 hrs
Time interval	= 2 min	Hyd. volume	= 845 cuft
Inflow hydrograph	= 3 - PR-R1a	2nd diverted hyd.	= 15
Diversion method	= First Flush Volume	Volume Up To	= 839.00 cuft



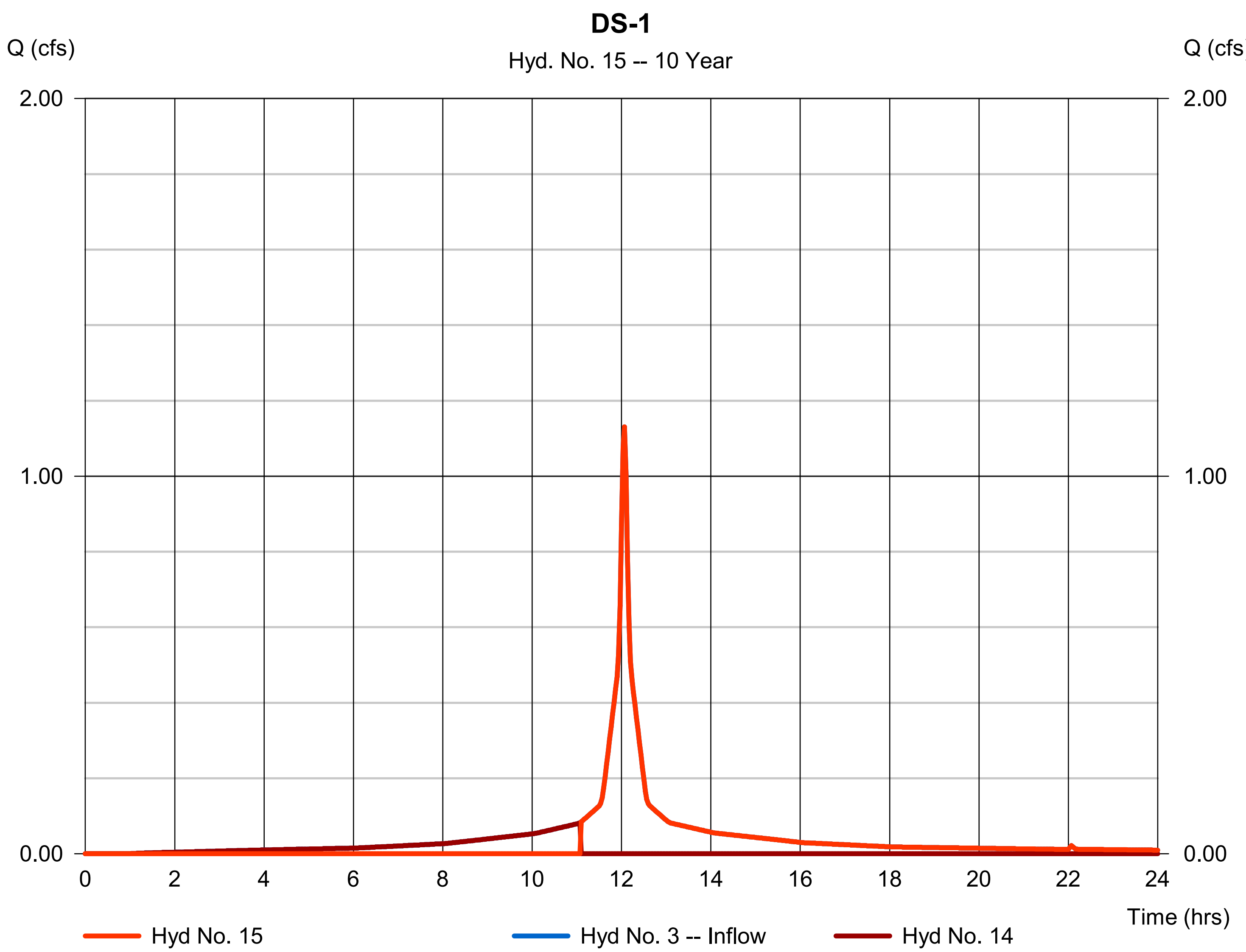
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 15

DS-1

Hydrograph type	= Diversion2	Peak discharge	= 1.131 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,037 cuft
Inflow hydrograph	= 3 - PR-R1a	2nd diverted hyd.	= 14
Diversion method	= First Flush Volume	Volume Up To	= 839.00 cuft



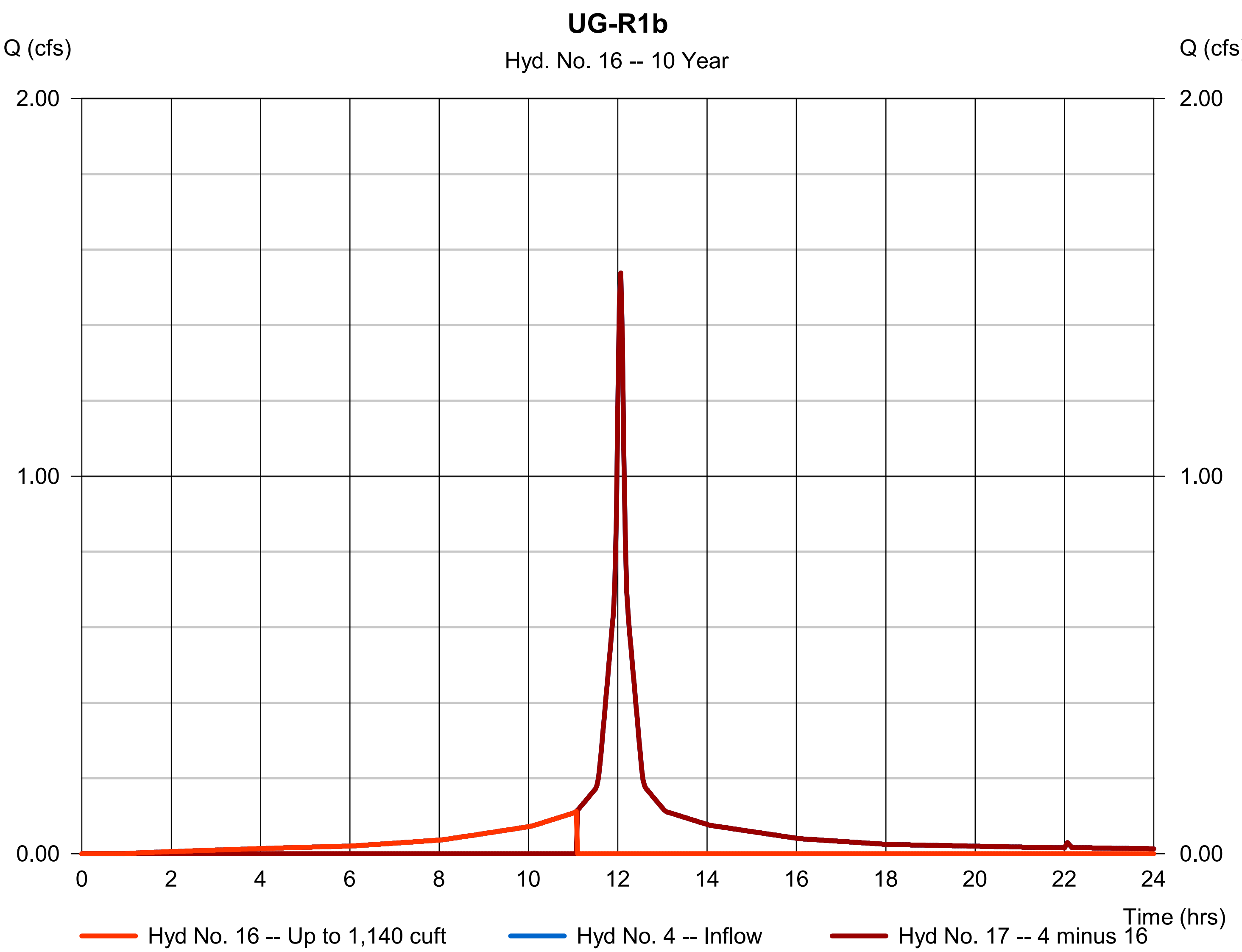
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 16

UG-R1b

Hydrograph type	= Diversion1	Peak discharge	= 0.112 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,150 cuft
Inflow hydrograph	= 4 - PR-R1b	2nd diverted hyd.	= 17
Diversion method	= First Flush Volume	Volume Up To	= 1,140 cuft



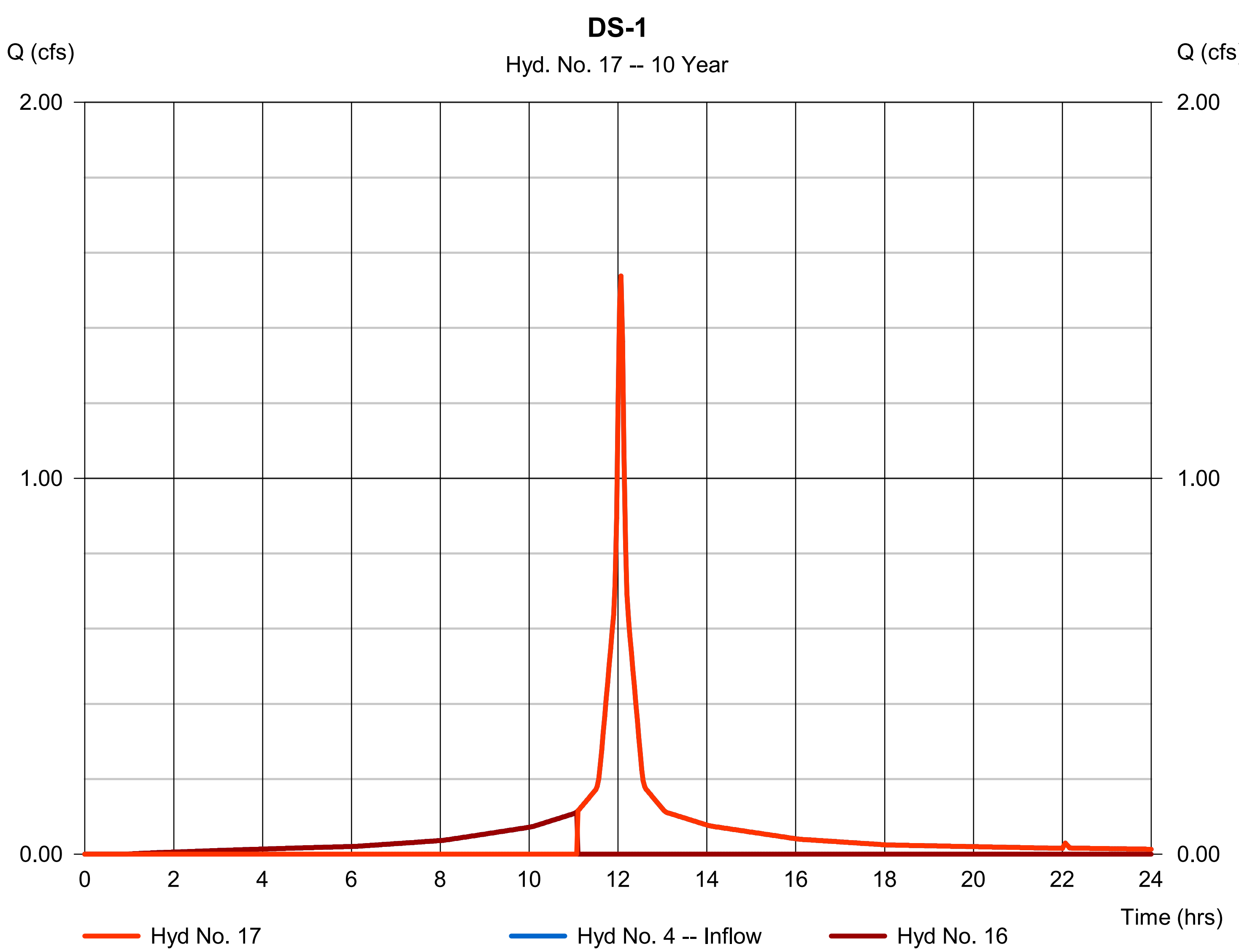
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 17

DS-1

Hydrograph type	= Diversion2	Peak discharge	= 1.538 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,131 cuft
Inflow hydrograph	= 4 - PR-R1b	2nd diverted hyd.	= 16
Diversion method	= First Flush Volume	Volume Up To	= 1,140 cuft



Hydrograph Report

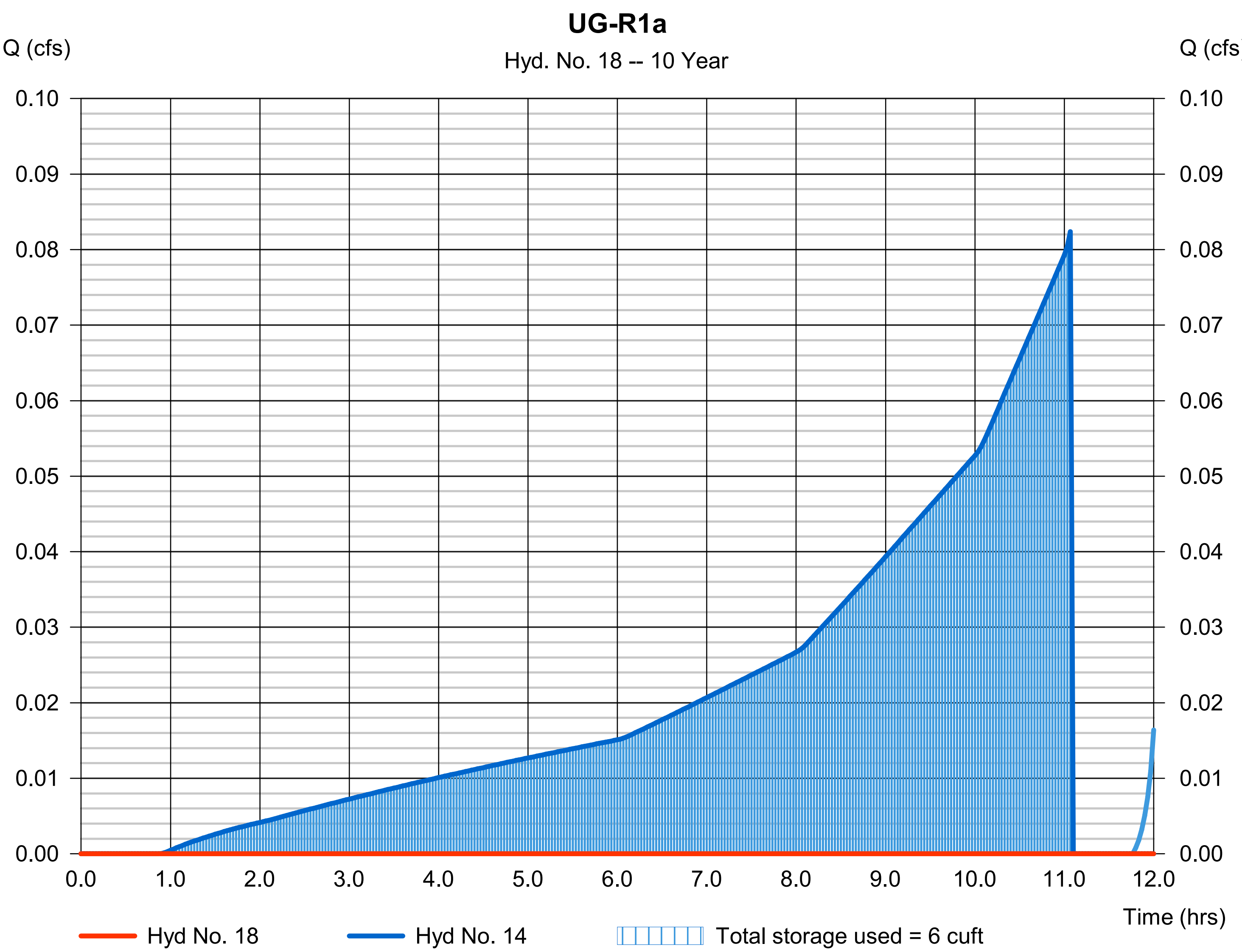
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 18

UG-R1a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 10.57 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - UG-R1a	Max. Elevation	= 276.16 ft
Reservoir name	= UG-R1a	Max. Storage	= 6 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

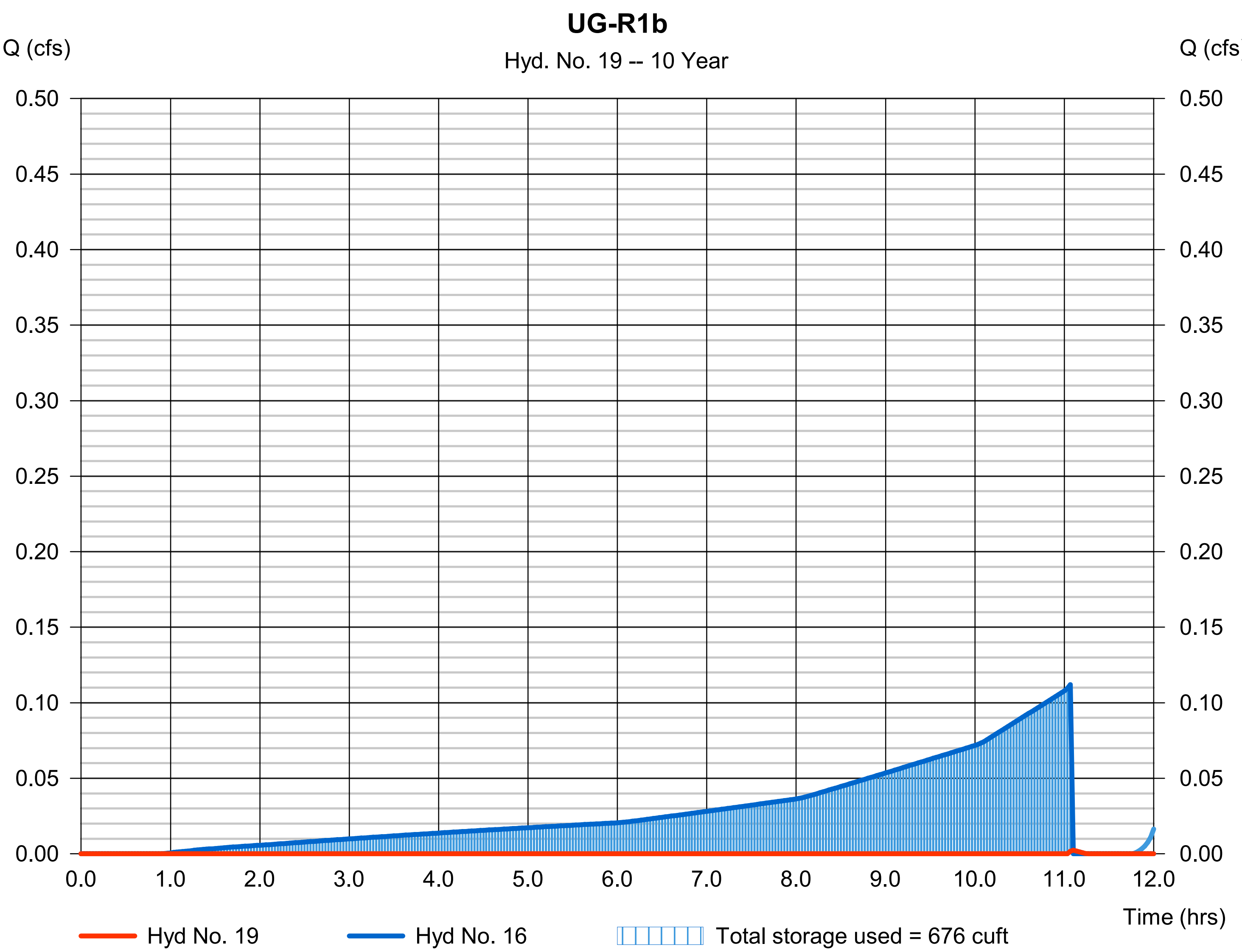
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 19

UG-R1b

Hydrograph type	= Reservoir	Peak discharge	= 0.002 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.10 hrs
Time interval	= 2 min	Hyd. volume	= 1 cuft
Inflow hyd. No.	= 16 - UG-R1b	Max. Elevation	= 277.99 ft
Reservoir name	= UG-R1b	Max. Storage	= 676 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



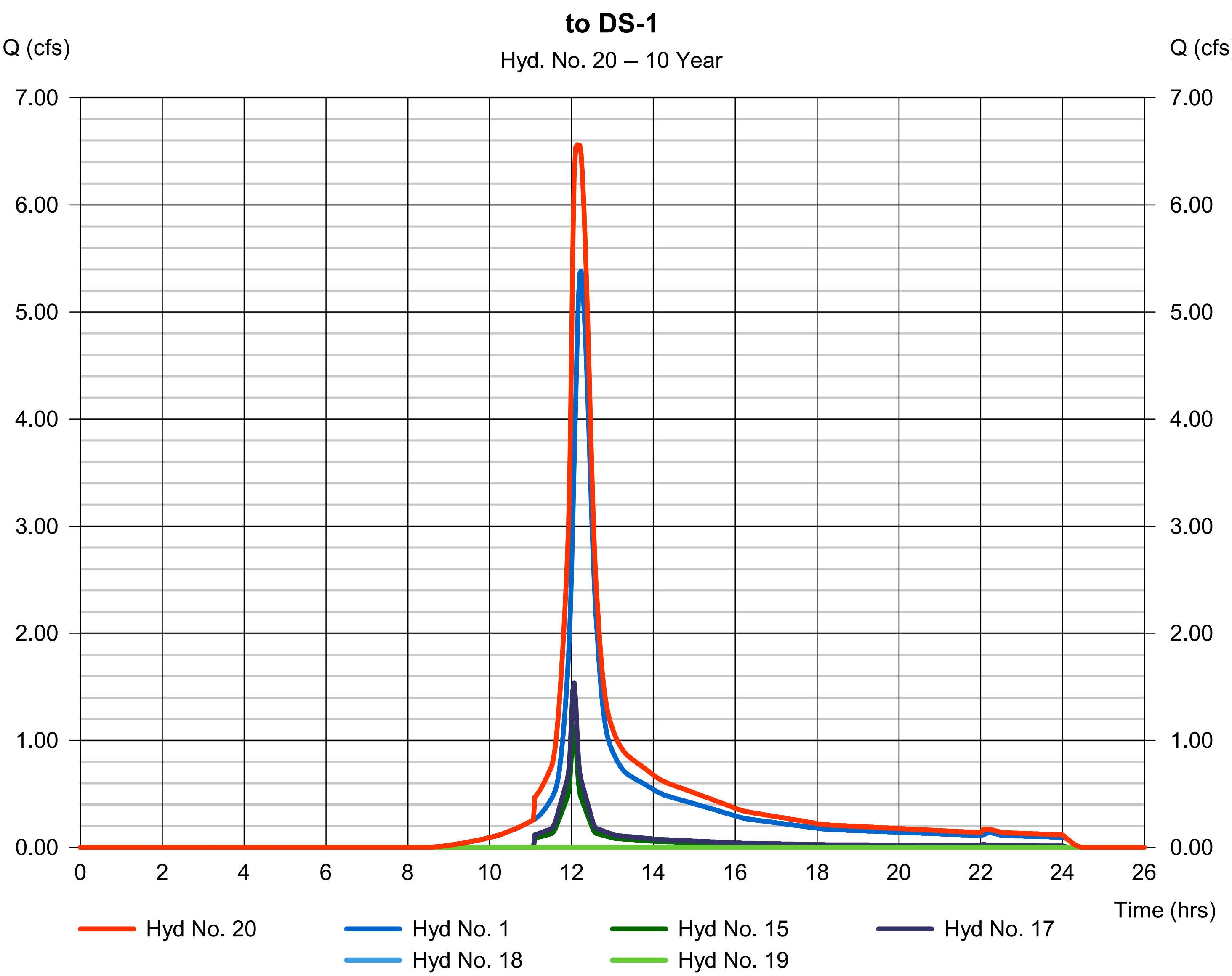
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 20

to DS-1

Hydrograph type	= Combine	Peak discharge	= 6.561 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 30,978 cuft
Inflow hyds.	= 1, 15, 17, 18, 19	Contrib. drain. area	= 2.670 ac



Hydrograph Report

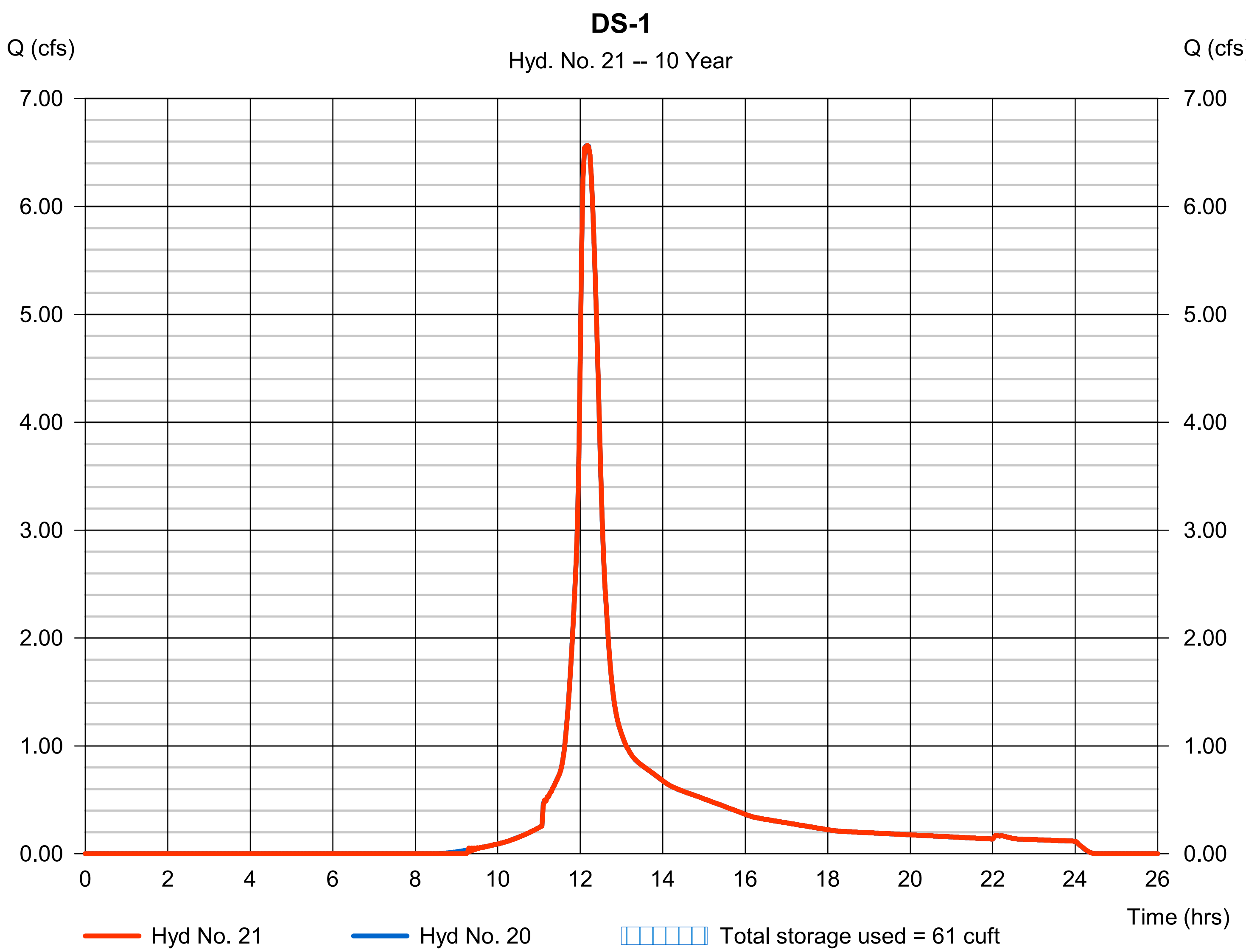
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 21

DS-1

Hydrograph type	= Reservoir	Peak discharge	= 6.565 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 30,940 cuft
Inflow hyd. No.	= 20 - to DS-1	Max. Elevation	= 270.36 ft
Reservoir name	= DS-1	Max. Storage	= 61 cuft

Storage Indication method used.



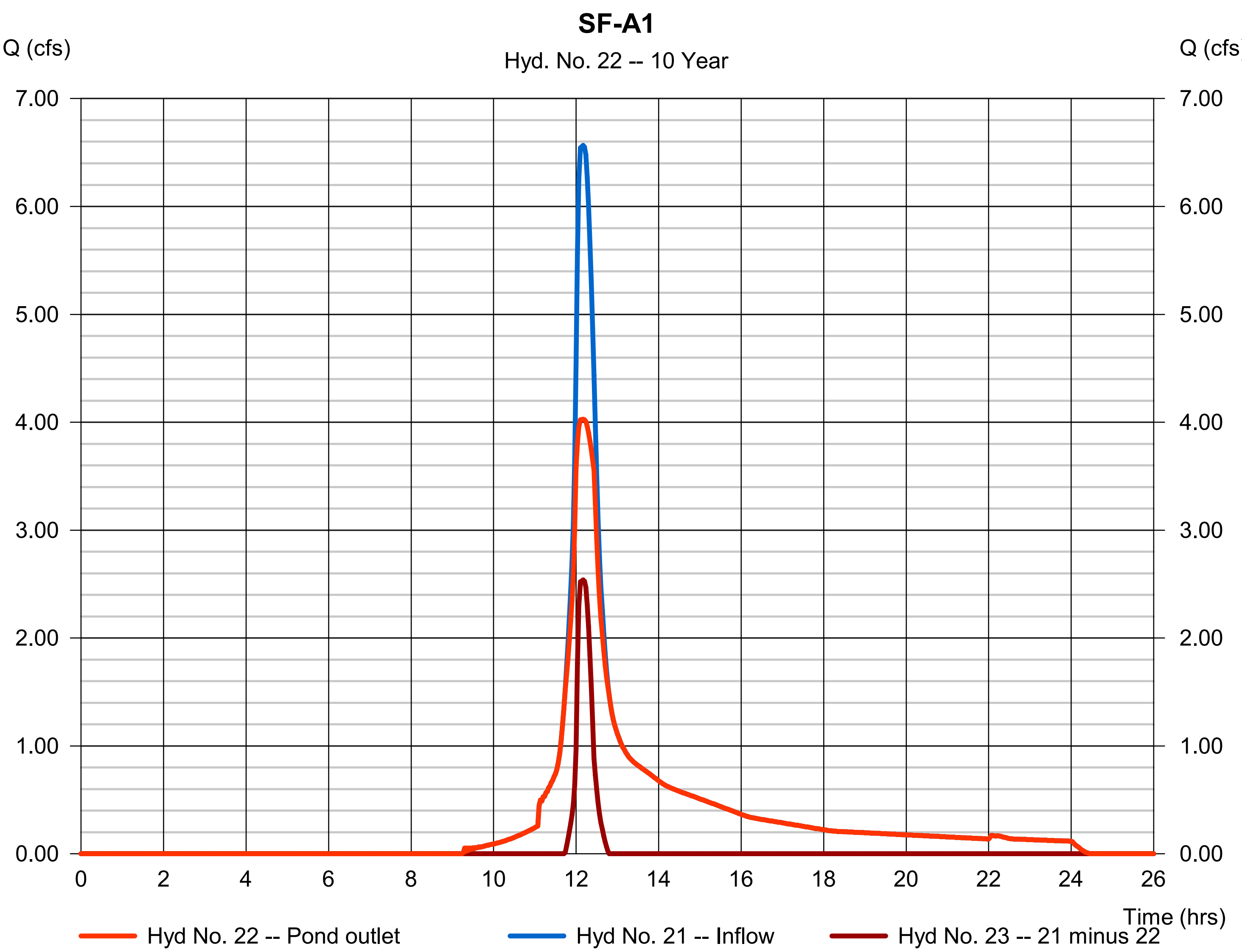
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 22

SF-A1

Hydrograph type	= Diversion1	Peak discharge	= 4.027 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 27,015 cuft
Inflow hydrograph	= 21 - DS-1	2nd diverted hyd.	= 23
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



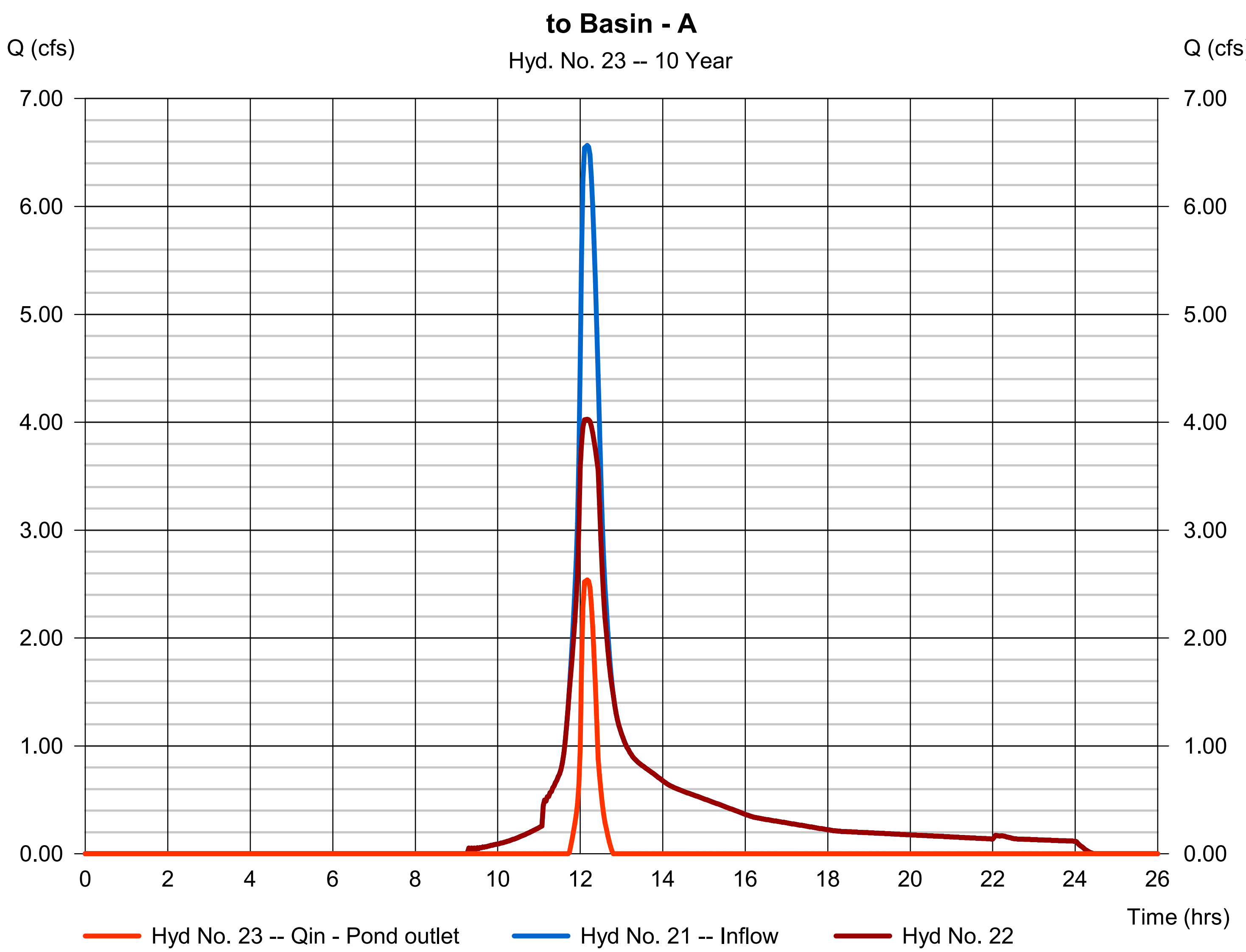
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 23

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 2.538 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 3,925 cuft
Inflow hydrograph	= 21 - DS-1	2nd diverted hyd.	= 22
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



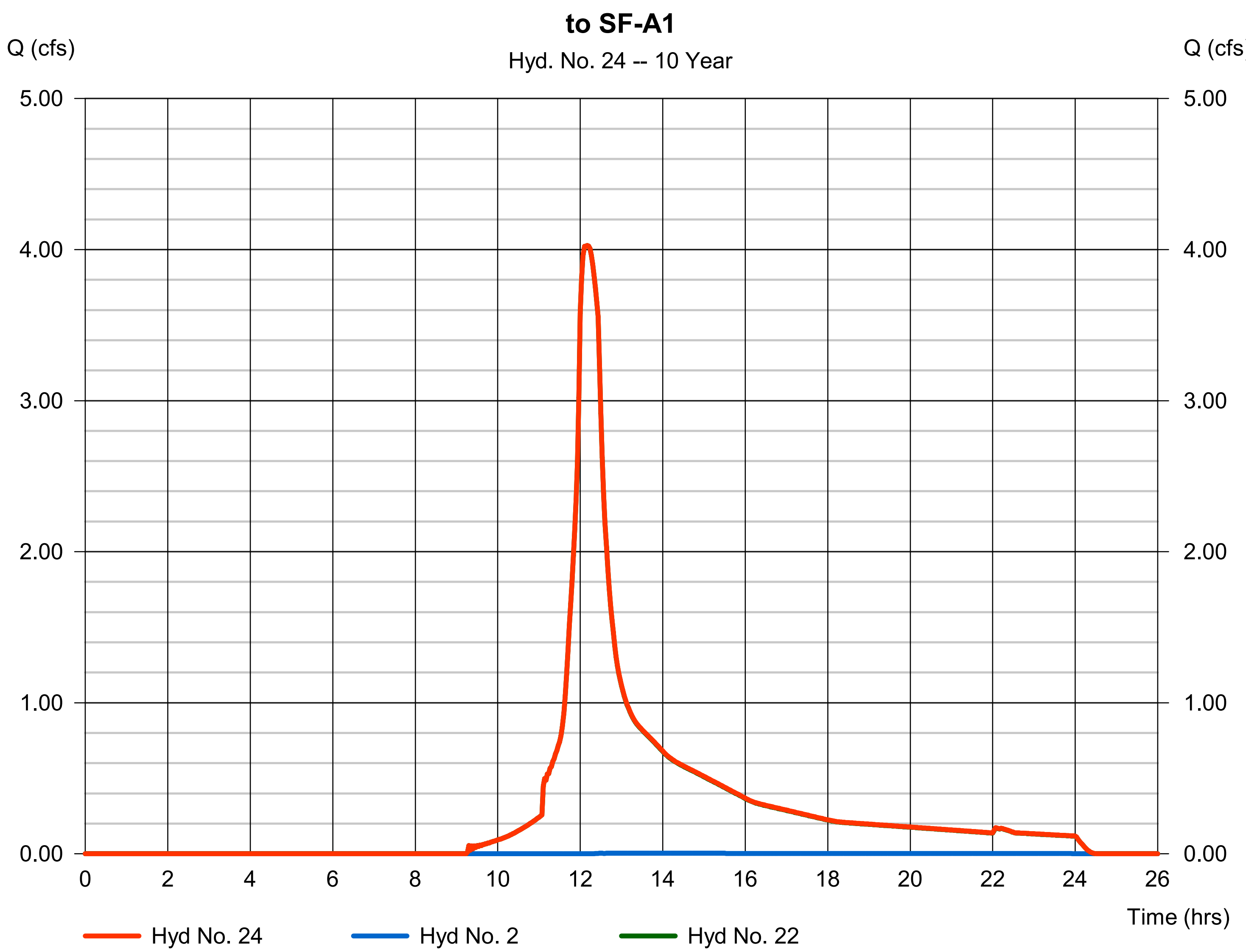
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 24

to SF-A1

Hydrograph type	= Combine	Peak discharge	= 4.027 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 27,108 cuft
Inflow hyds.	= 2, 22	Contrib. drain. area	= 0.170 ac



Hydrograph Report

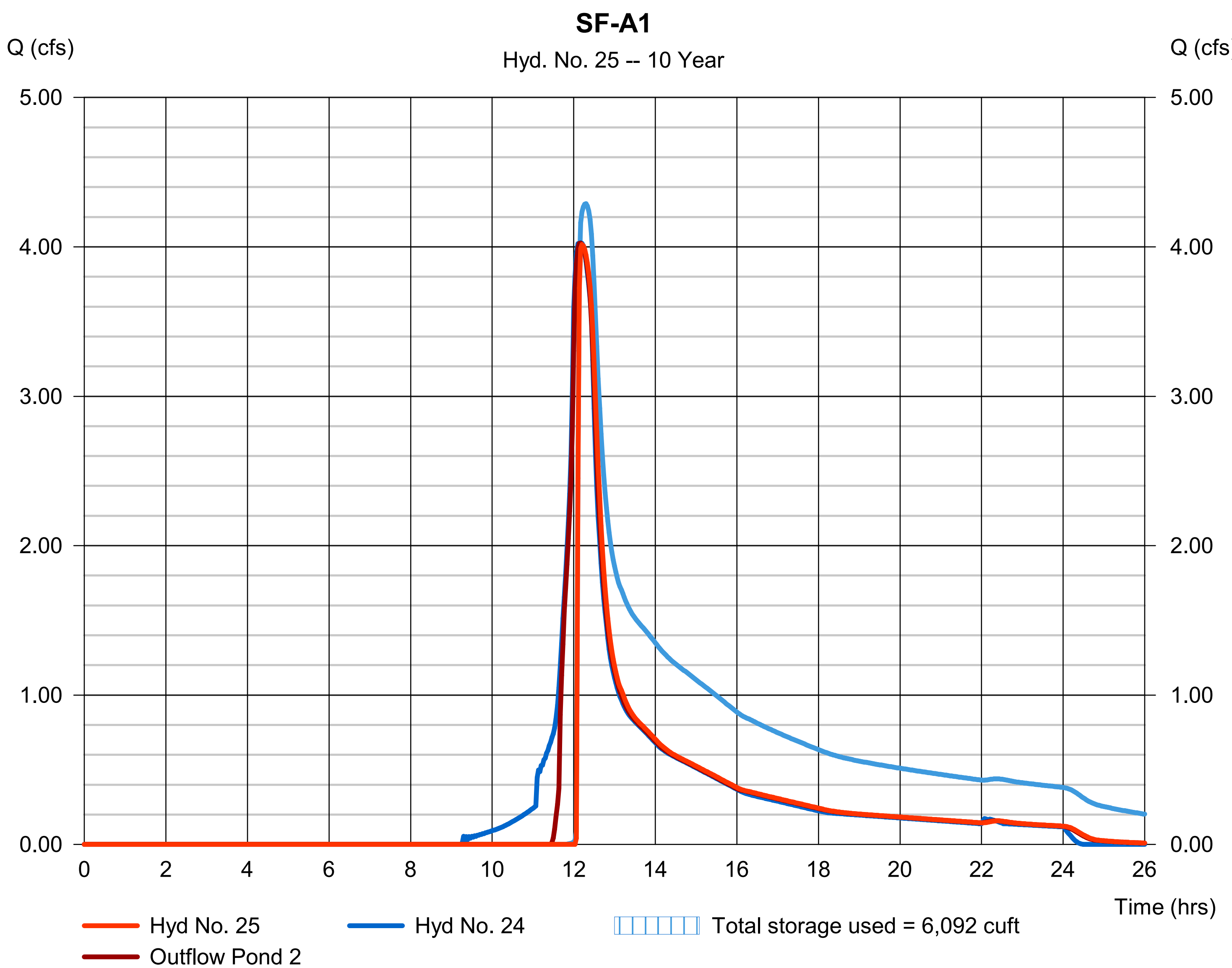
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 25

SF-A1

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 4.016 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 22,218 cuft
Upper Pond	= Sediment Forebay - A1	**Lower Pond**	= Sand Filter - A1
Inflow hyd.	= 24 - to SF-A1	Other Inflow hyd.	= None
Max. Elevation	= 271.76 ft	Max. Elevation	= 271.43 ft
Max. Storage	= 2,285 cuft	Max. Storage	= 3,807 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



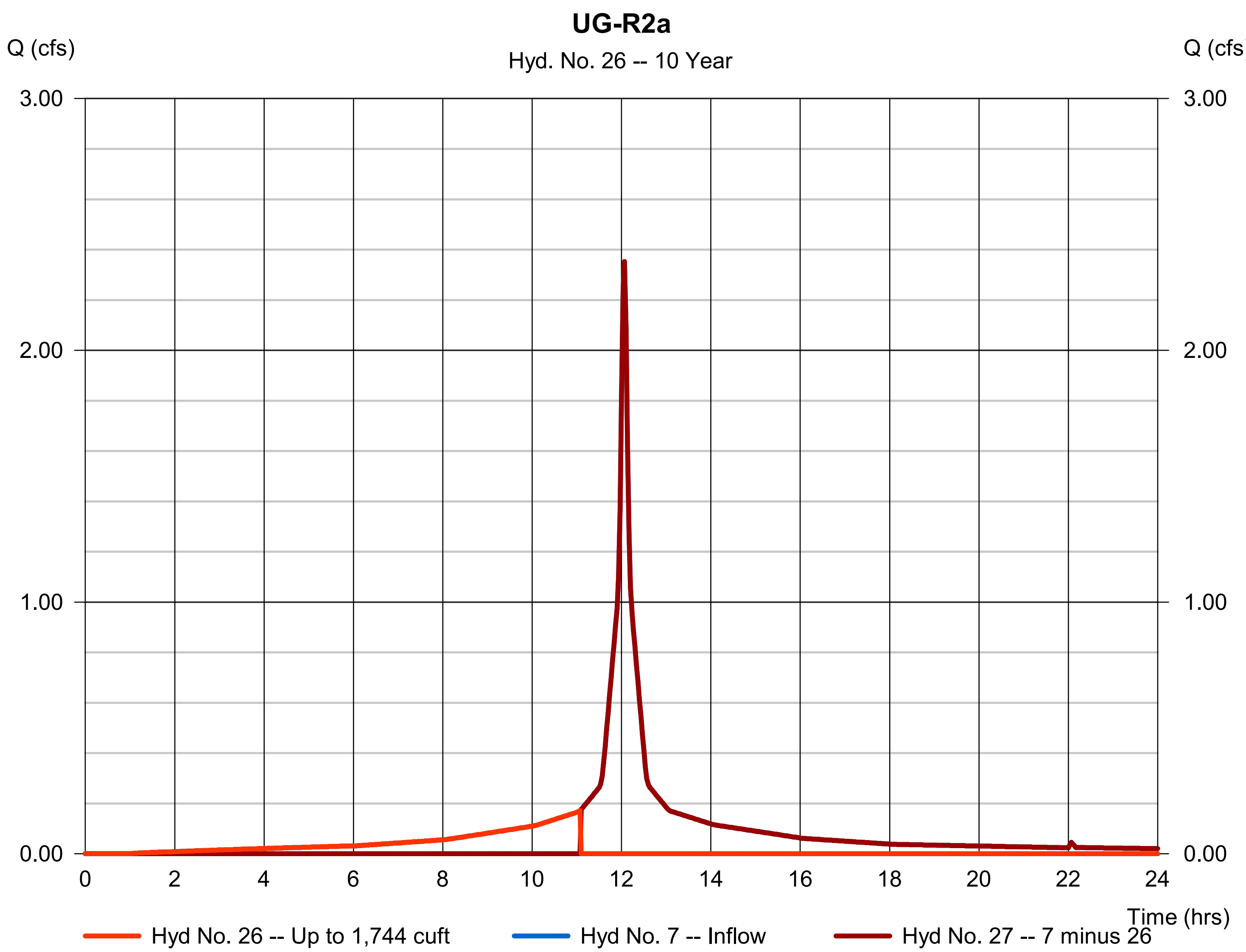
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 26

UG-R2a

Hydrograph type	= Diversion1	Peak discharge	= 0.171 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,758 cuft
Inflow hydrograph	= 7 - PR-R2a	2nd diverted hyd.	= 27
Diversion method	= First Flush Volume	Volume Up To	= 1,744 cuft



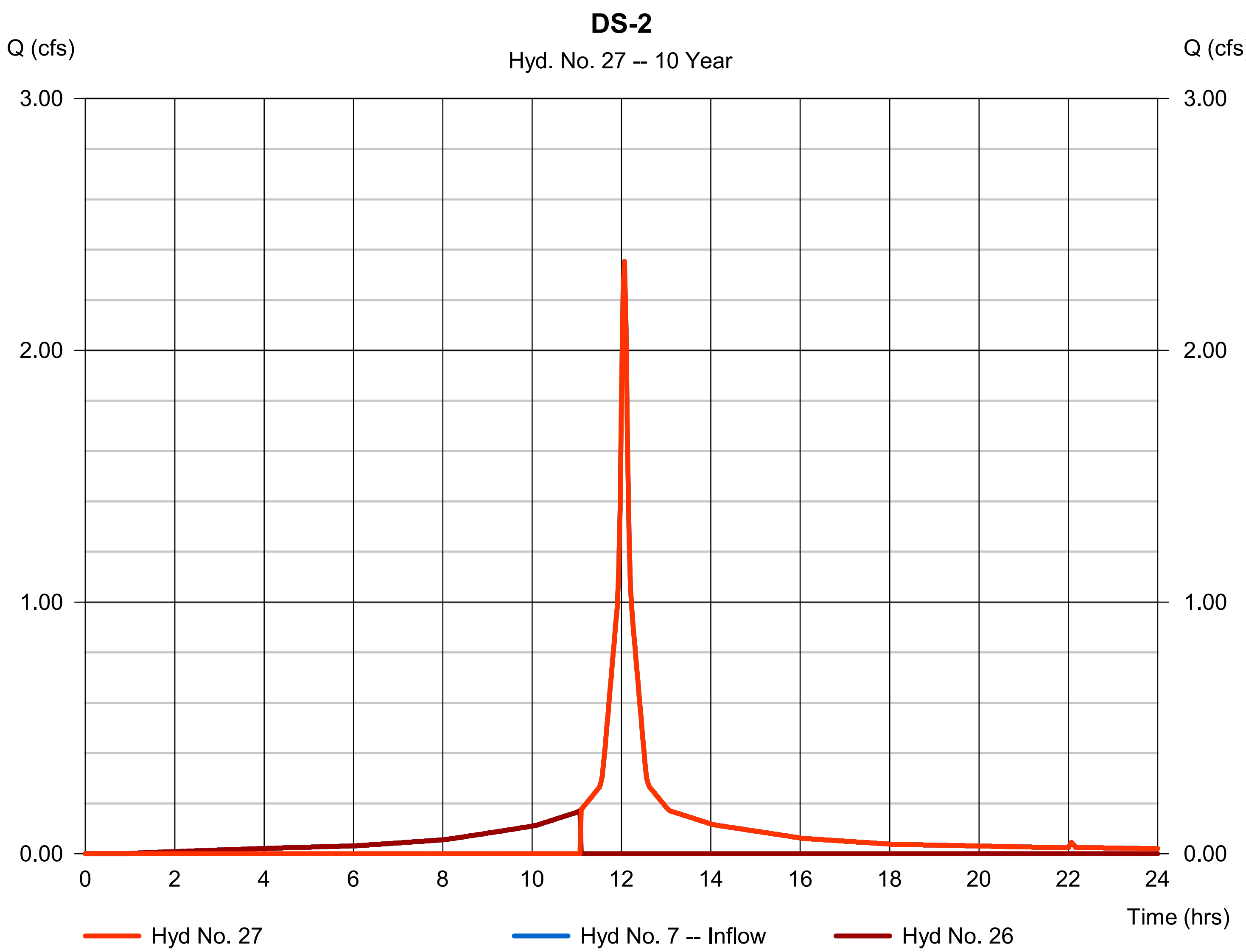
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 27

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 2.352 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 6,317 cuft
Inflow hydrograph	= 7 - PR-R2a	2nd diverted hyd.	= 26
Diversion method	= First Flush Volume	Volume Up To	= 1,744 cuft



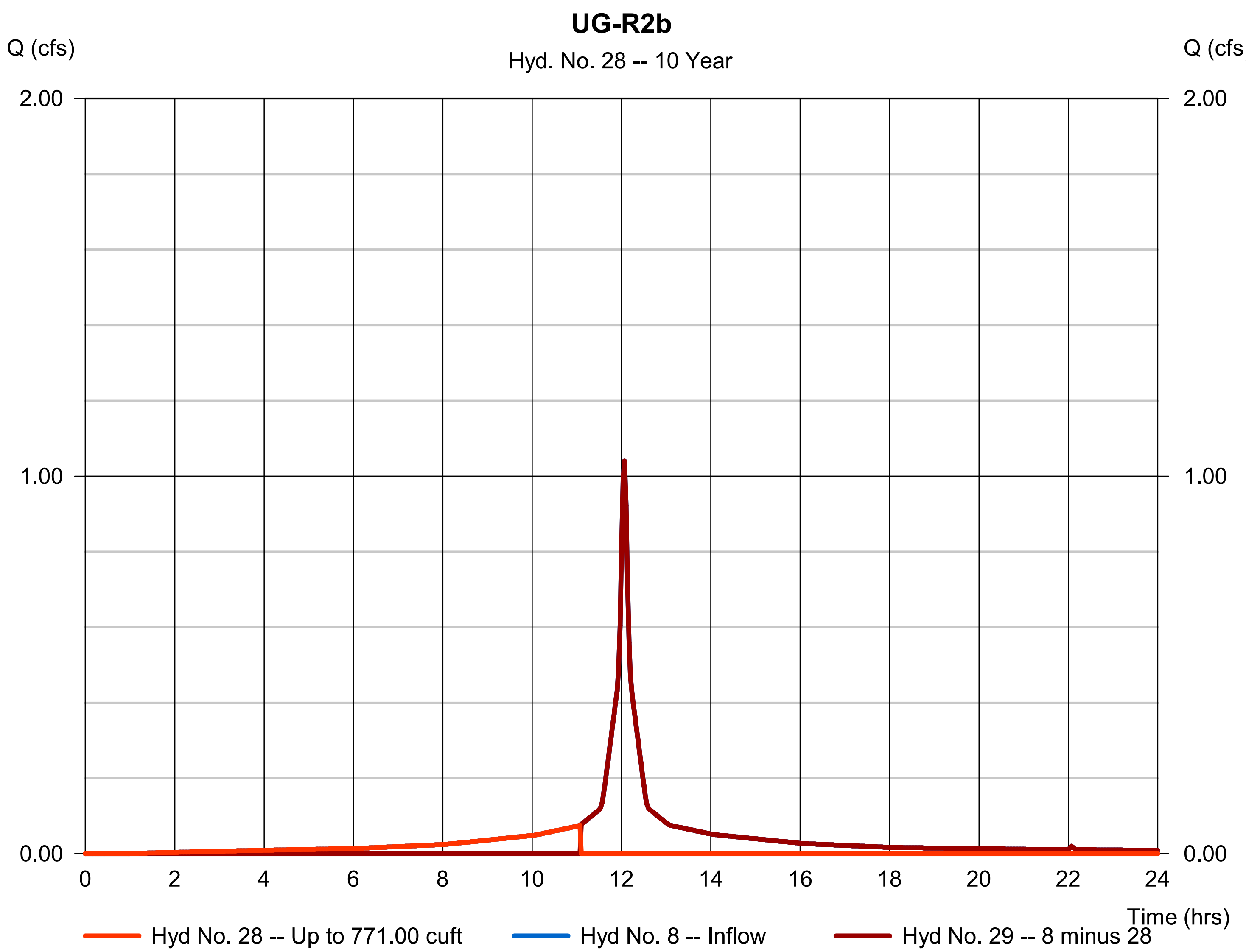
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 28

UG-R2b

Hydrograph type	= Diversion1	Peak discharge	= 0.076 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.07 hrs
Time interval	= 2 min	Hyd. volume	= 778 cuft
Inflow hydrograph	= 8 - PR-R2b	2nd diverted hyd.	= 29
Diversion method	= First Flush Volume	Volume Up To	= 771.00 cuft



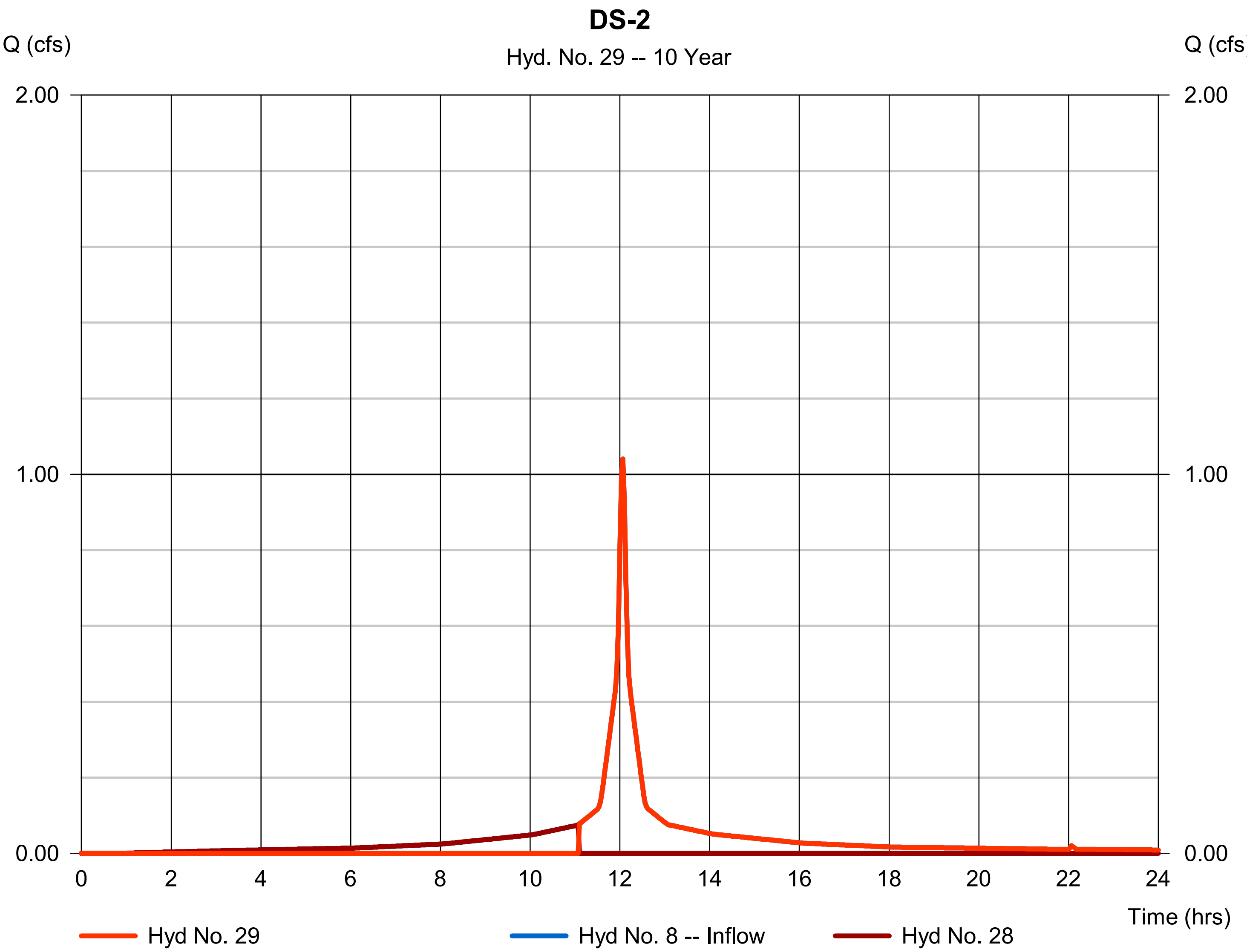
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 29

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 1.040 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 2,794 cuft
Inflow hydrograph	= 8 - PR-R2b	2nd diverted hyd.	= 28
Diversion method	= First Flush Volume	Volume Up To	= 771.00 cuft



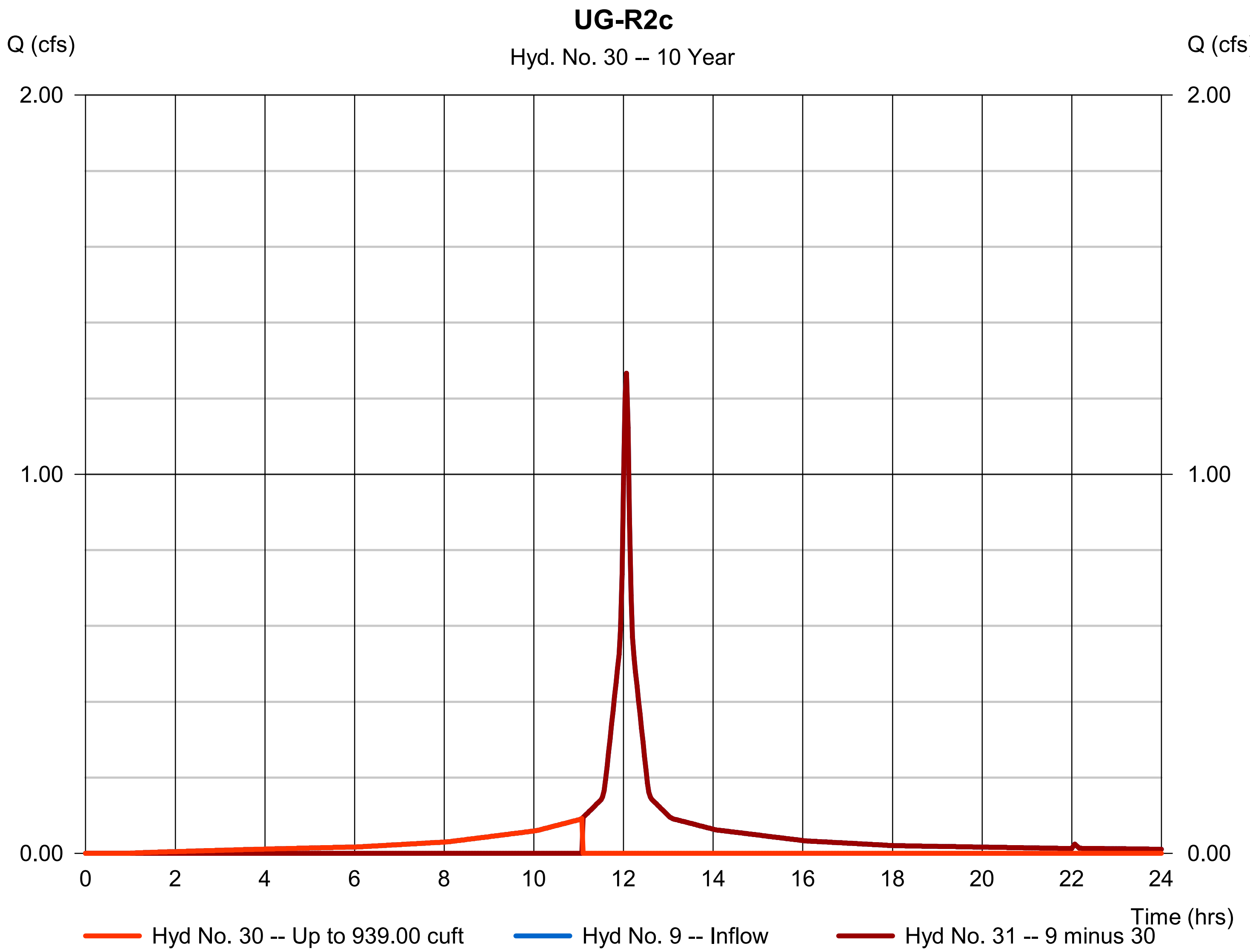
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 30

UG-R2c

Hydrograph type	= Diversion1	Peak discharge	= 0.092 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.07 hrs
Time interval	= 2 min	Hyd. volume	= 947 cuft
Inflow hydrograph	= 9 - PR-R2c	2nd diverted hyd.	= 31
Diversion method	= First Flush Volume	Volume Up To	= 939.00 cuft



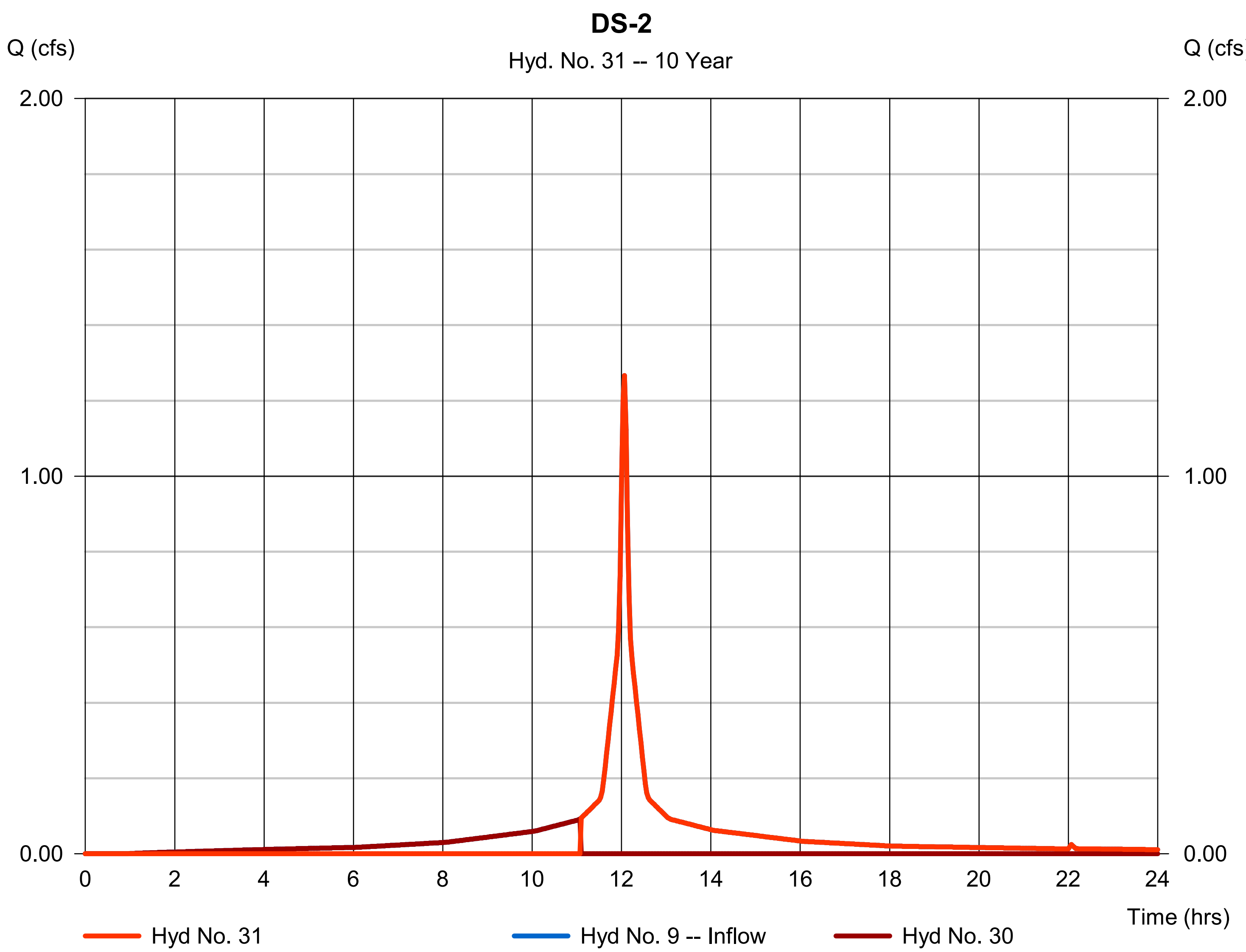
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 31

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 1.267 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,402 cuft
Inflow hydrograph	= 9 - PR-R2c	2nd diverted hyd.	= 30
Diversion method	= First Flush Volume	Volume Up To	= 939.00 cuft



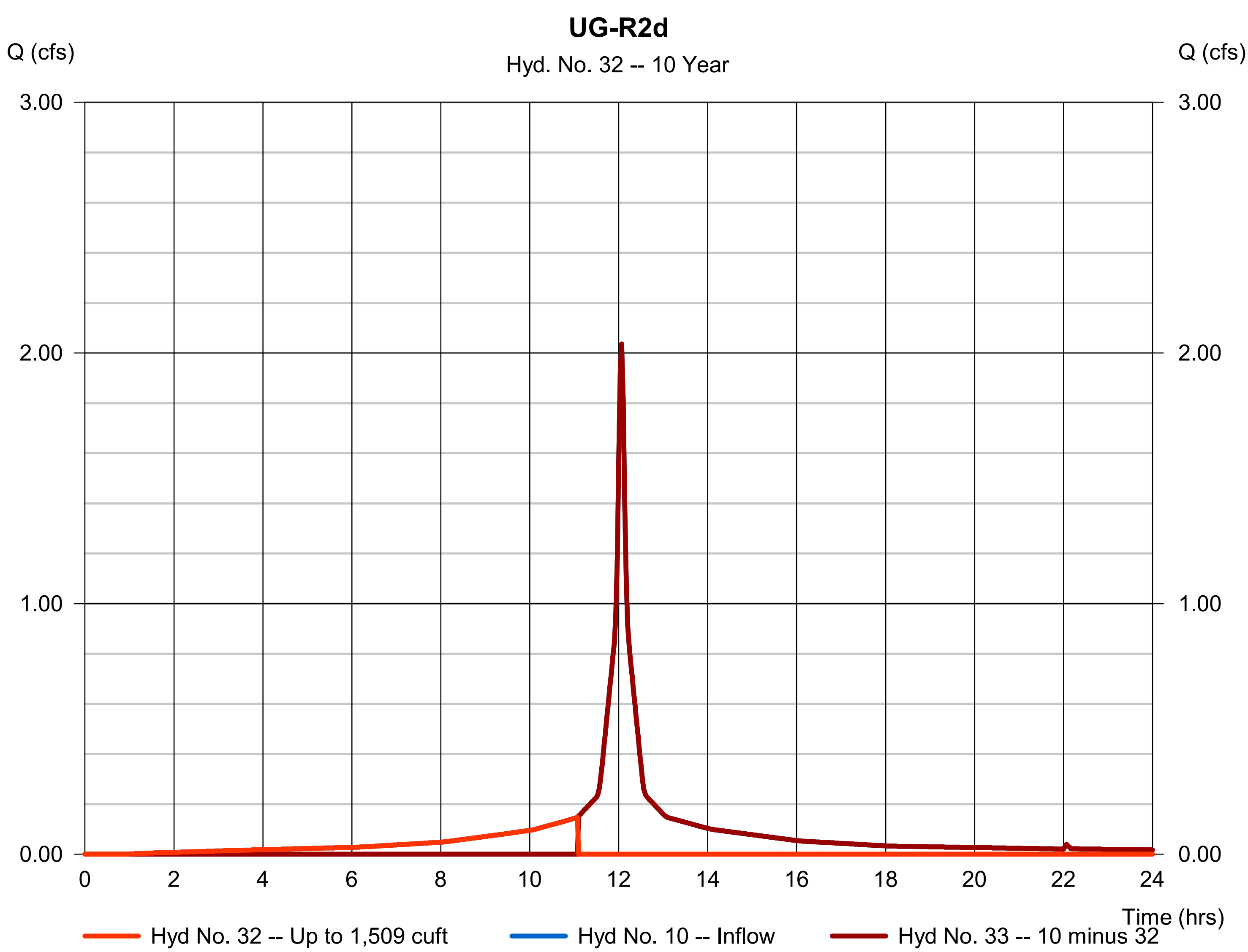
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 32

UG-R2d

Hydrograph type	= Diversion1	Peak discharge	= 0.148 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,522 cuft
Inflow hydrograph	= 10 - PR-R2d	2nd diverted hyd.	= 33
Diversion method	= First Flush Volume	Volume Up To	= 1,509 cuft



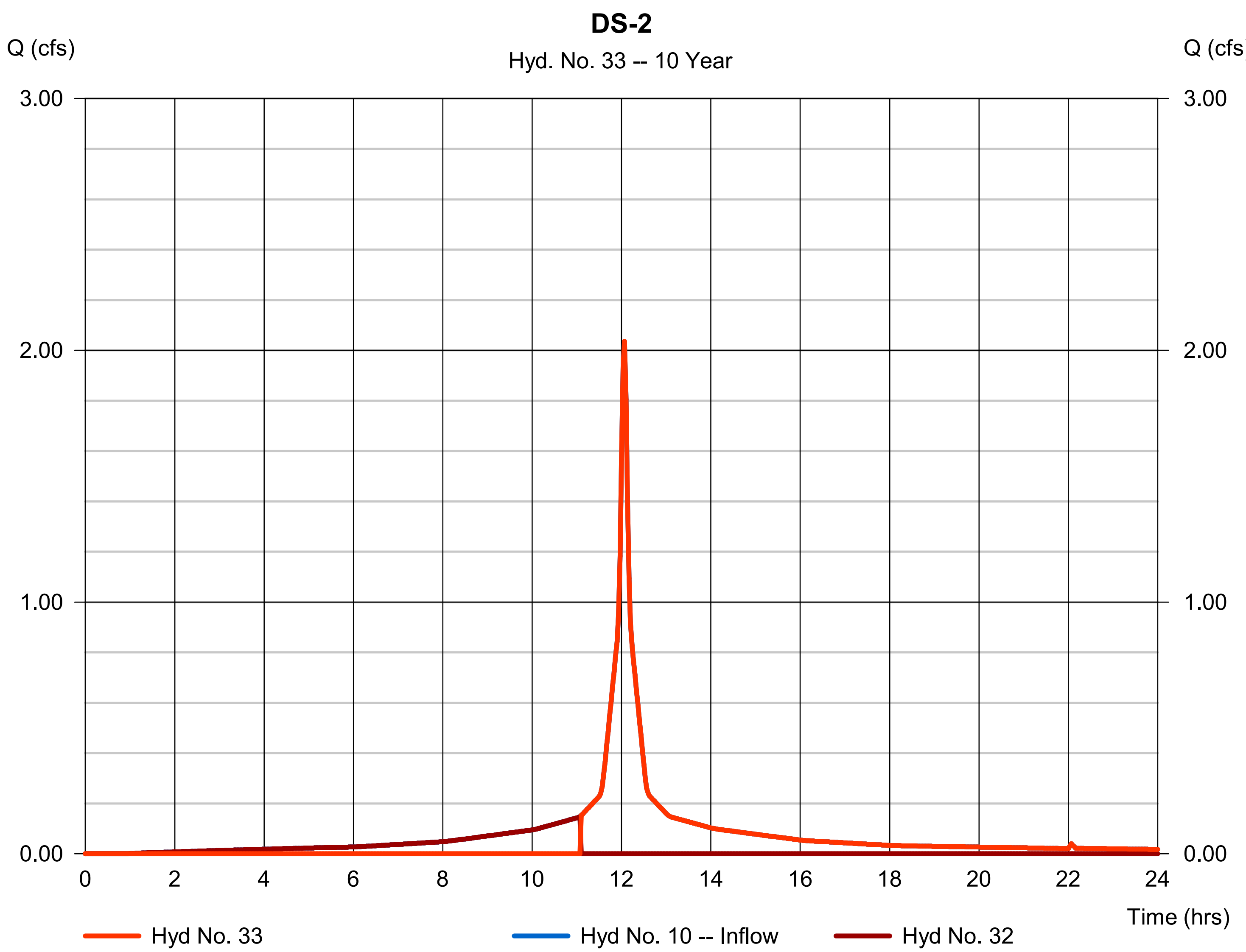
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 33

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 2.036 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,467 cuft
Inflow hydrograph	= 10 - PR-R2d	2nd diverted hyd.	= 32
Diversion method	= First Flush Volume	Volume Up To	= 1,509 cuft



Hydrograph Report

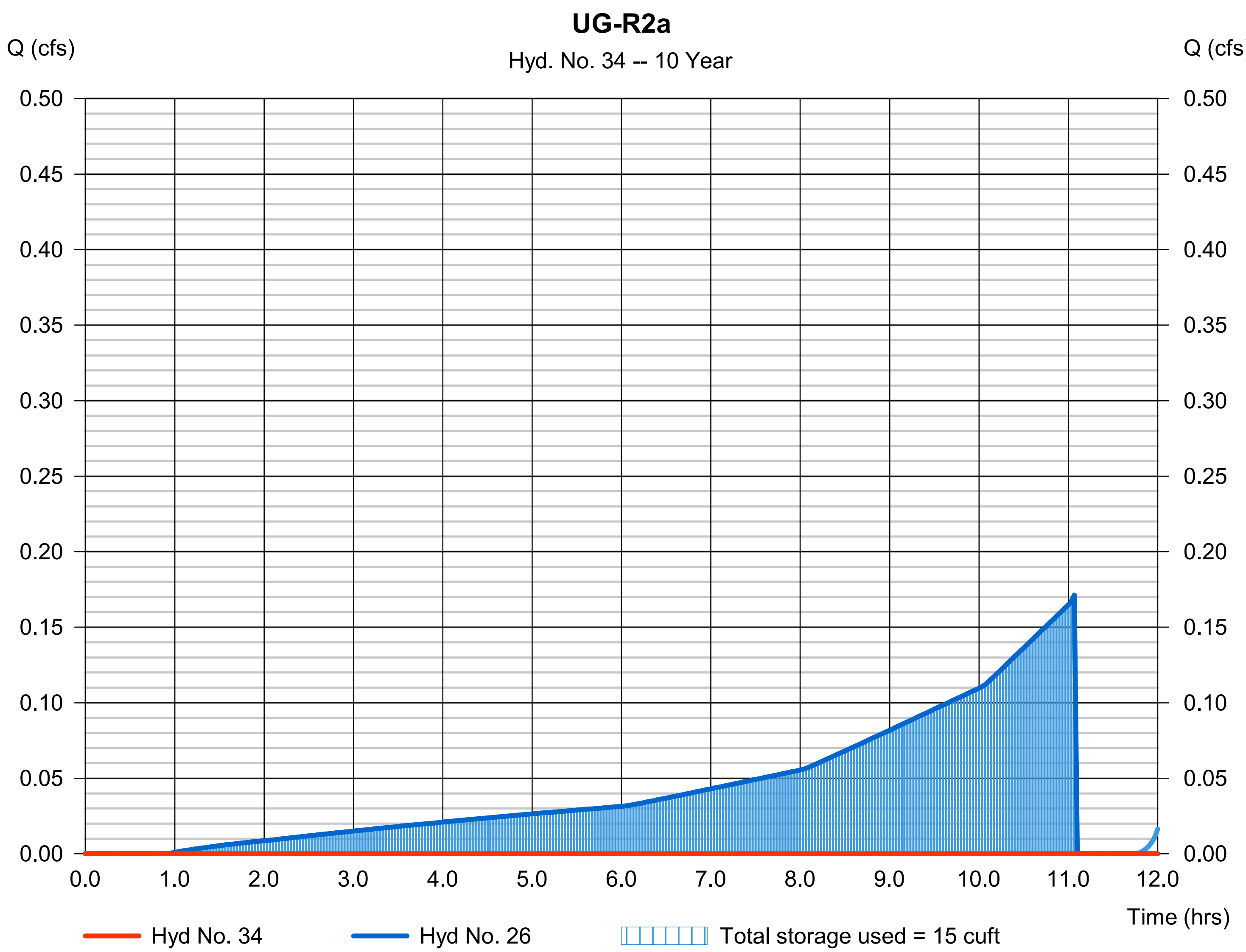
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 34

UG-R2a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 26 - UG-R2a	Max. Elevation	= 276.11 ft
Reservoir name	= UG-R2a	Max. Storage	= 15 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

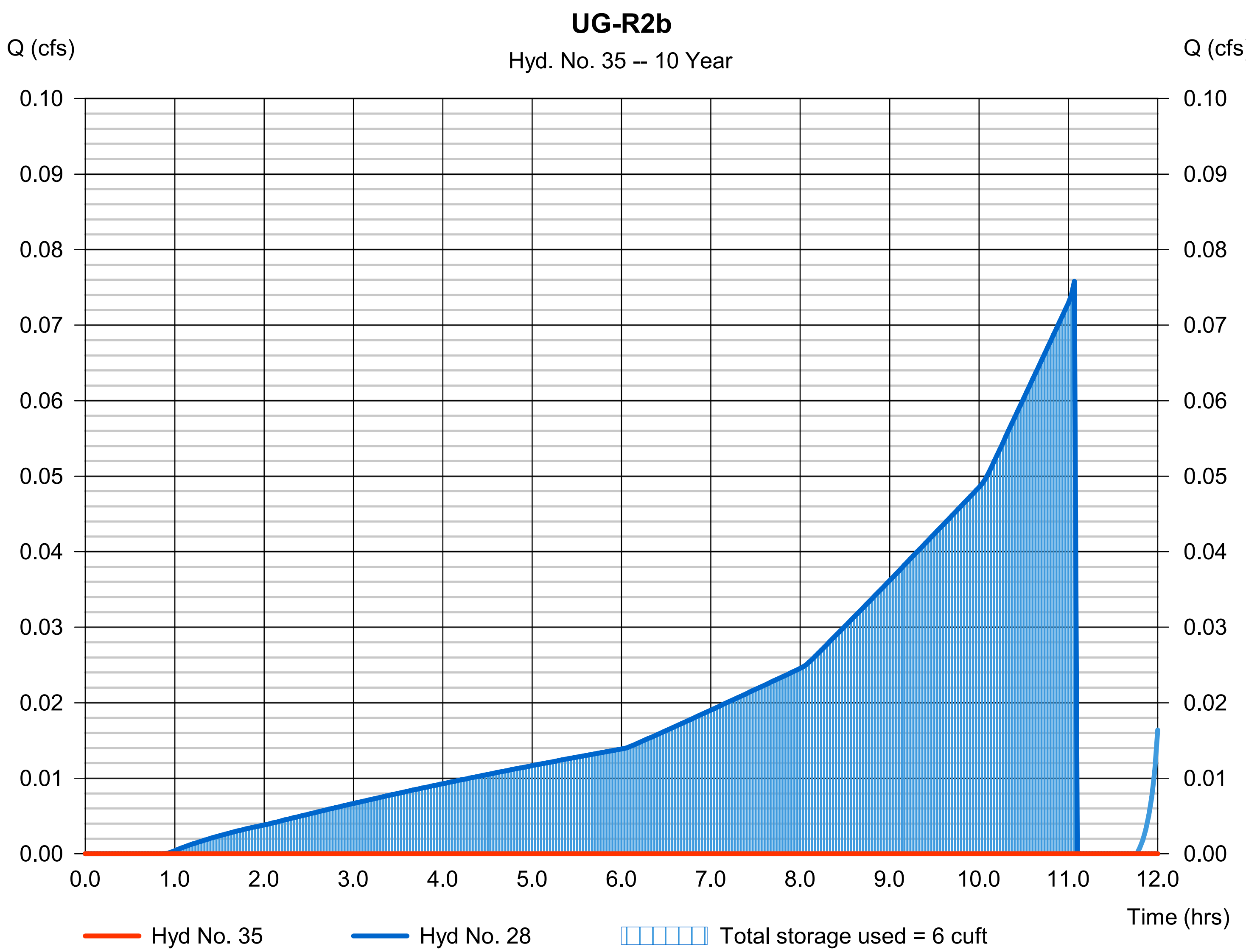
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 35

UG-R2b

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 28 - UG-R2b	Max. Elevation	= 276.34 ft
Reservoir name	= UG-R2b	Max. Storage	= 6 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

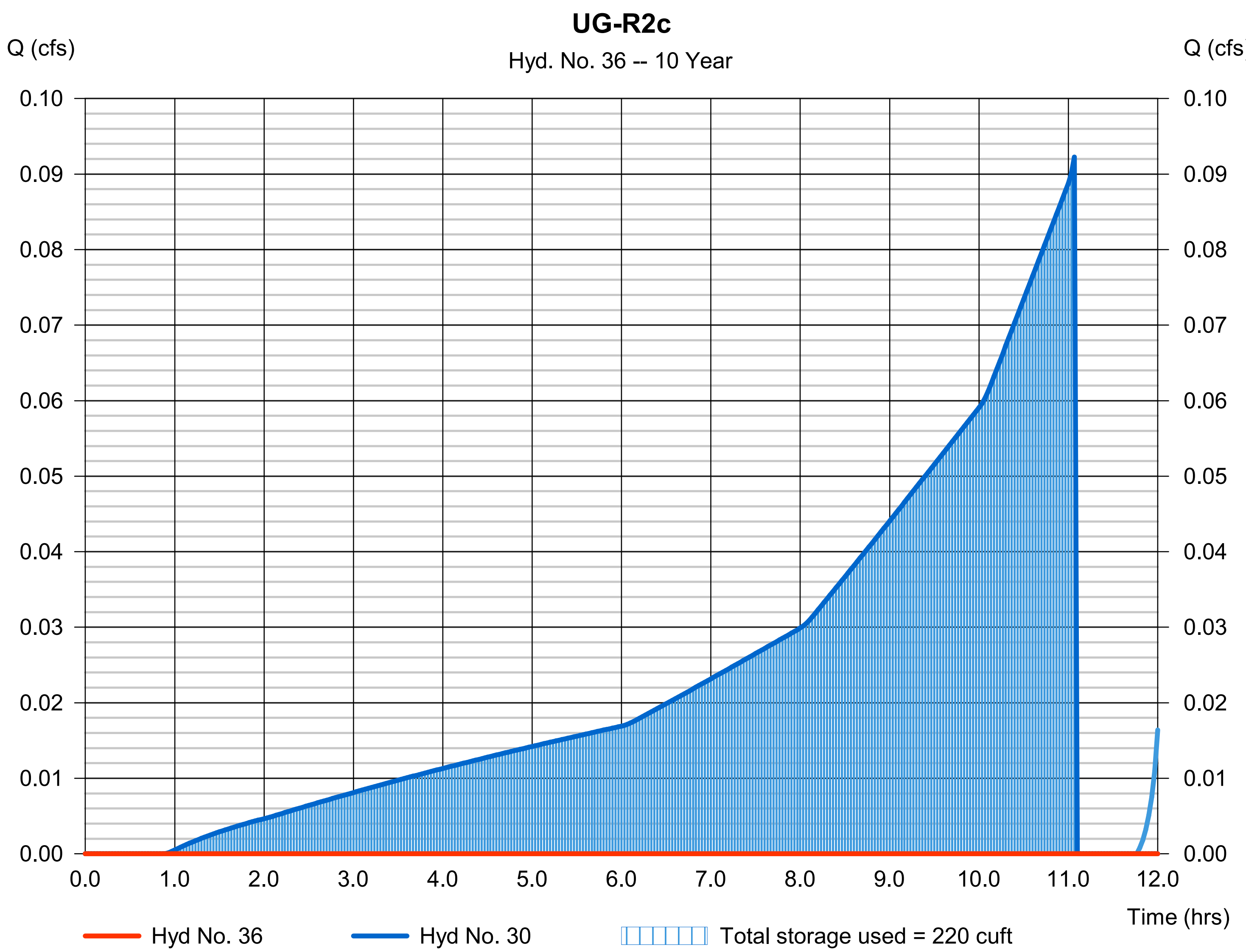
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 36

UG-R2c

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 30 - UG-R2c	Max. Elevation	= 278.06 ft
Reservoir name	= UG-R2c	Max. Storage	= 220 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

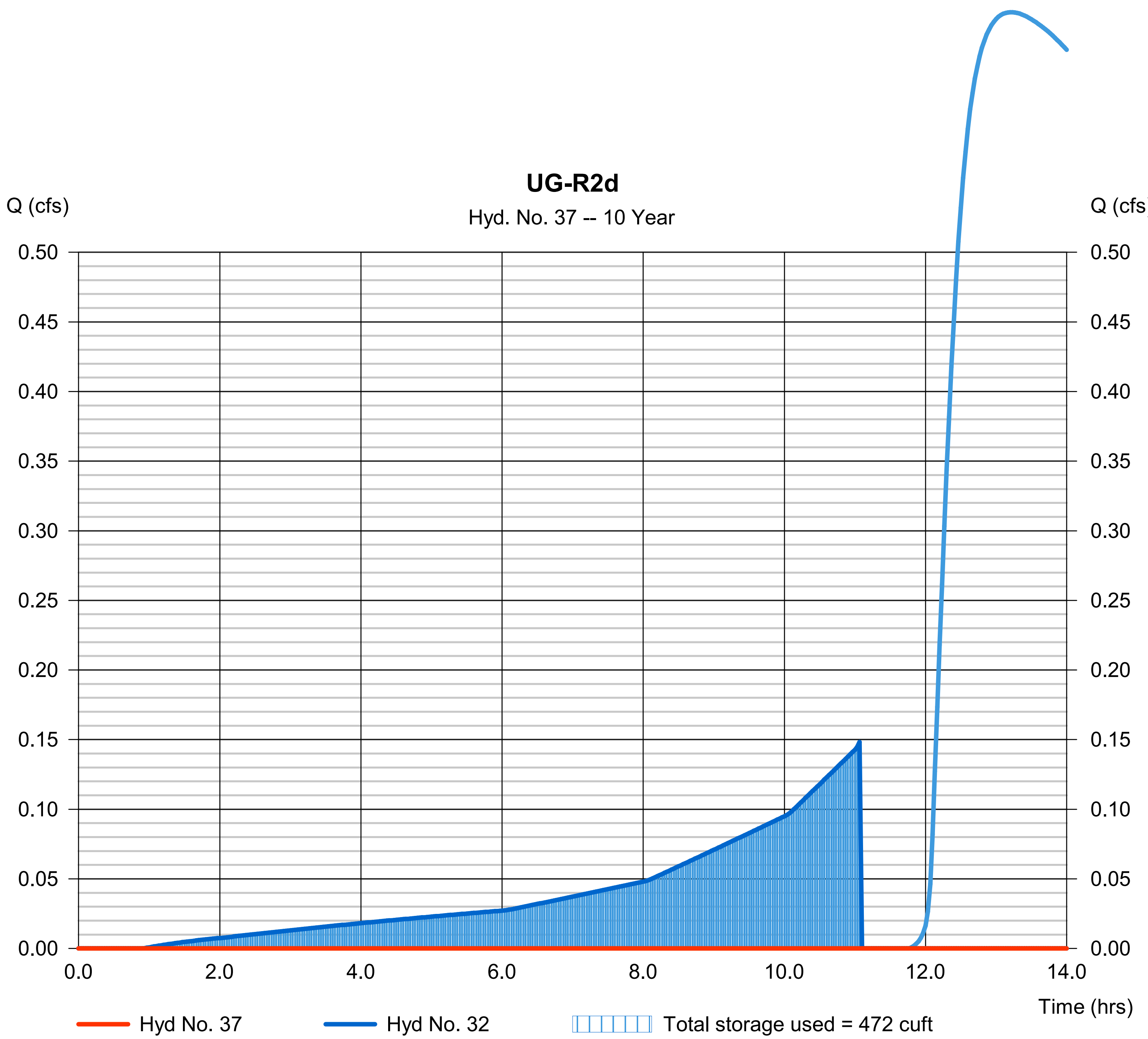
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 37

UG-R2d

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 6.73 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 32 - UG-R2d	Max. Elevation	= 276.15 ft
Reservoir name	= UG-R2d	Max. Storage	= 472 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



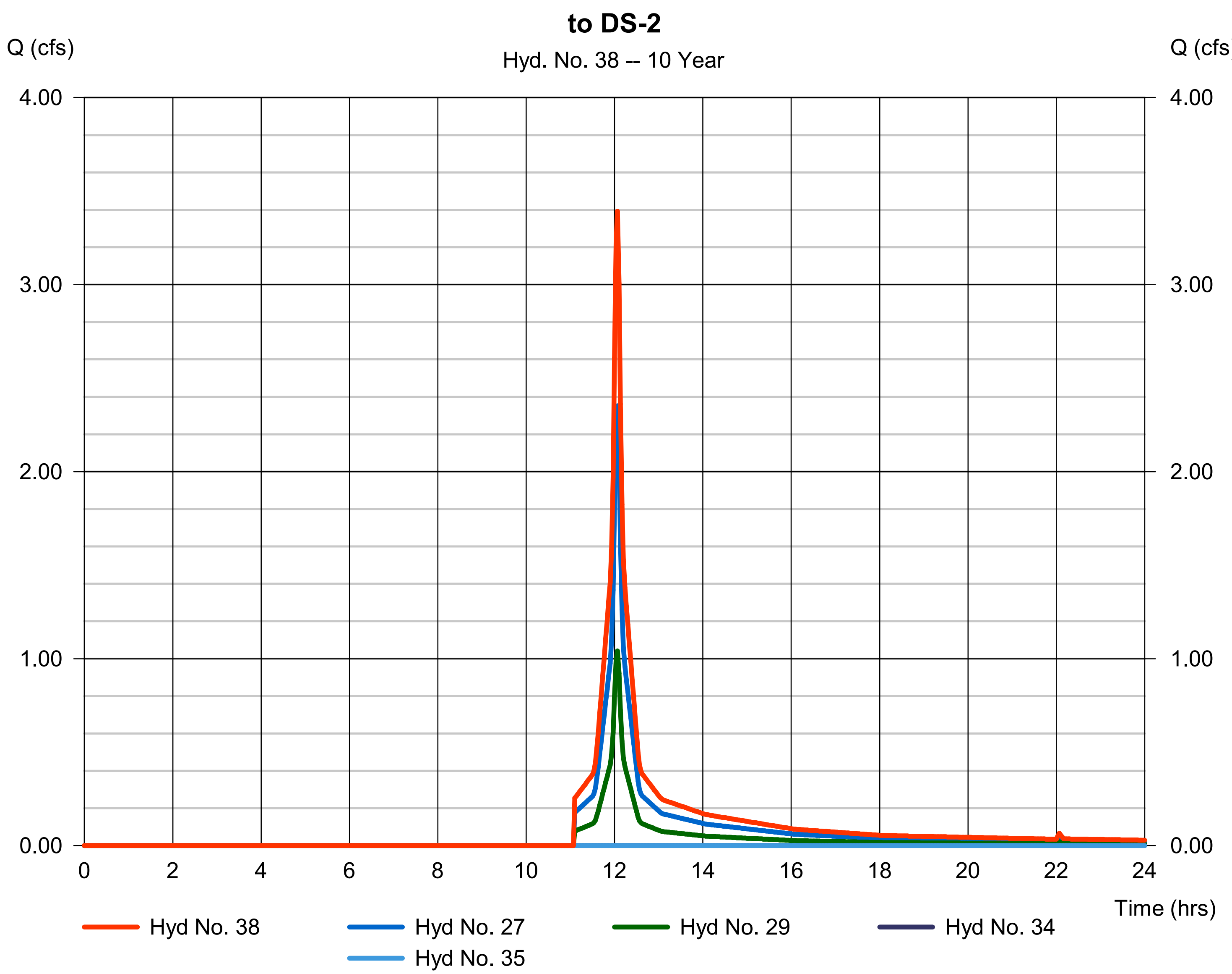
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 38

to DS-2

Hydrograph type	= Combine	Peak discharge	= 3.393 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 9,112 cuft
Inflow hyds.	= 27, 29, 34, 35	Contrib. drain. area	= 0.000 ac



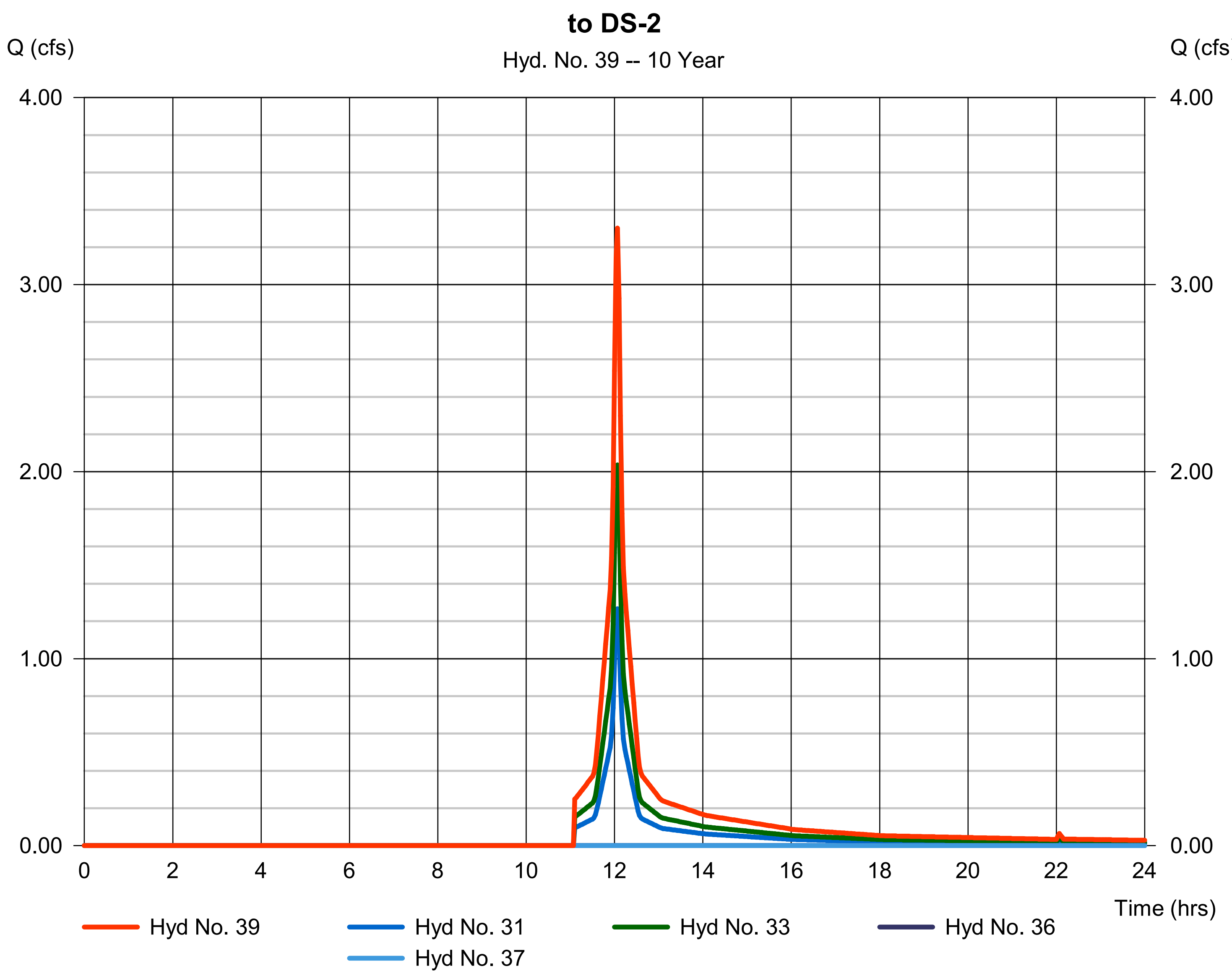
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 39

to DS-2

Hydrograph type	= Combine	Peak discharge	= 3.302 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 8,869 cuft
Inflow hyds.	= 31, 33, 36, 37	Contrib. drain. area	= 0.000 ac



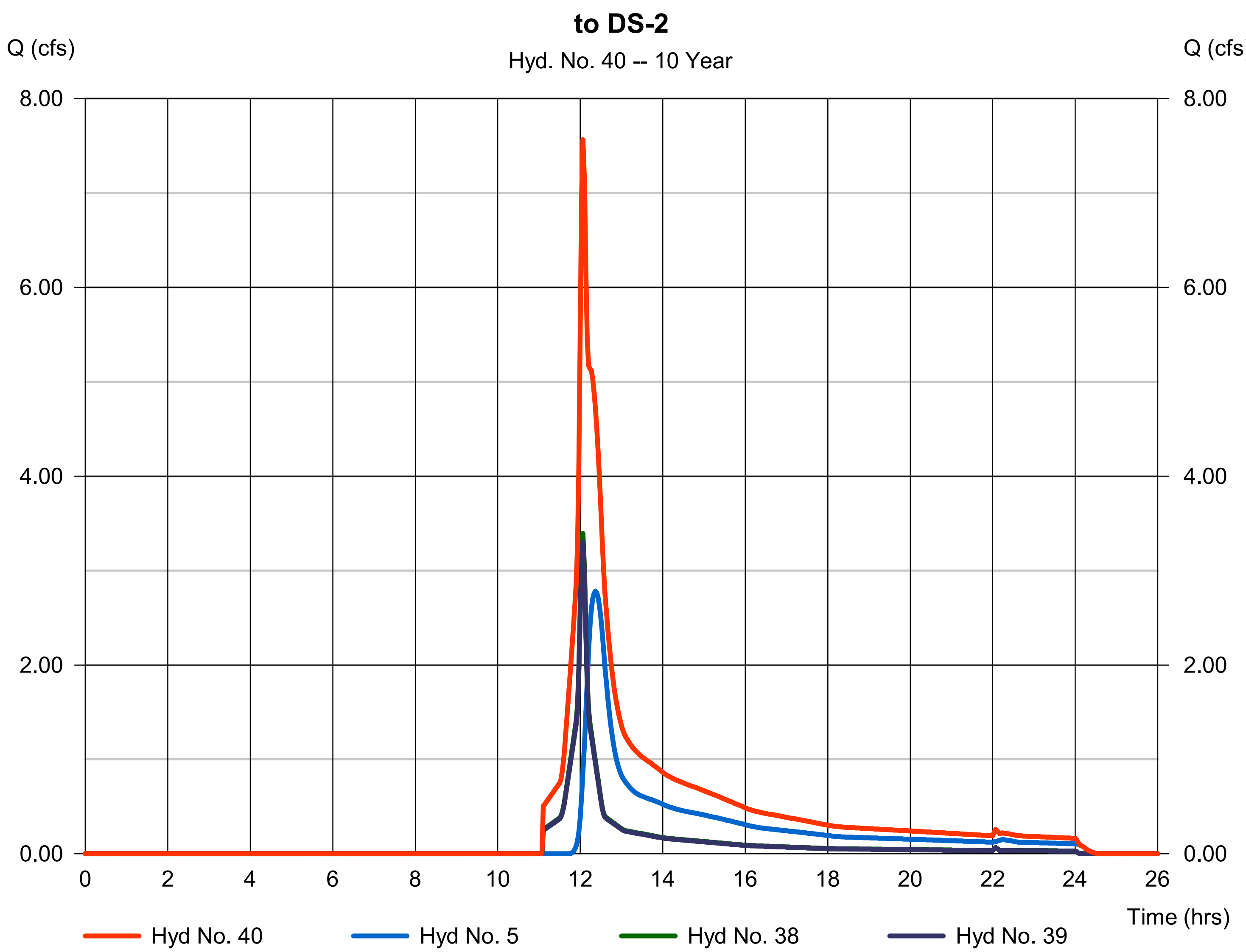
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 40

to DS-2

Hydrograph type	= Combine	Peak discharge	= 7.564 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 34,571 cuft
Inflow hyds.	= 5, 38, 39	Contrib. drain. area	= 5.090 ac



Hydrograph Report

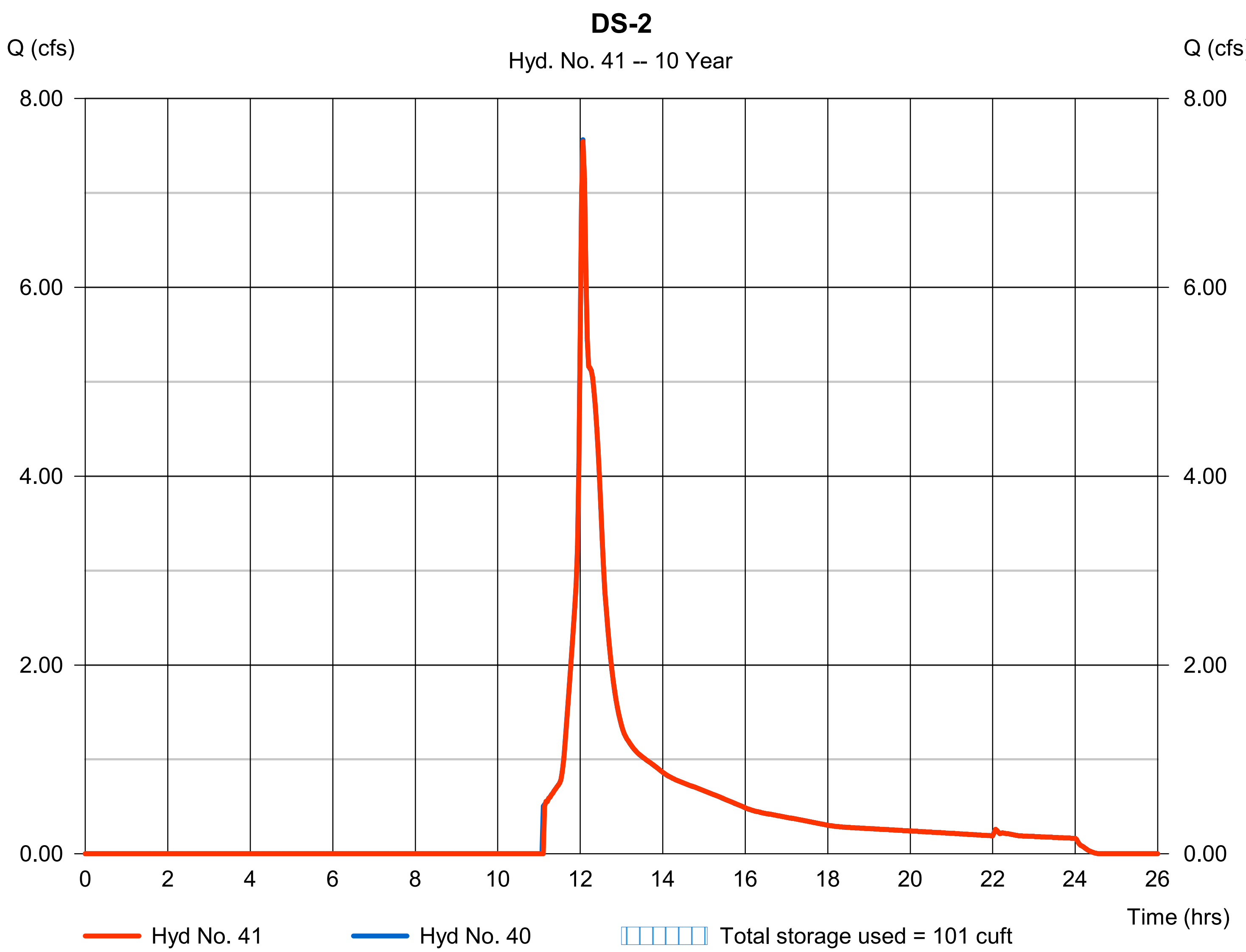
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 41

DS-2

Hydrograph type	= Reservoir	Peak discharge	= 7.544 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 34,514 cuft
Inflow hyd. No.	= 40 - to DS-2	Max. Elevation	= 269.89 ft
Reservoir name	= DS-2	Max. Storage	= 101 cuft

Storage Indication method used.



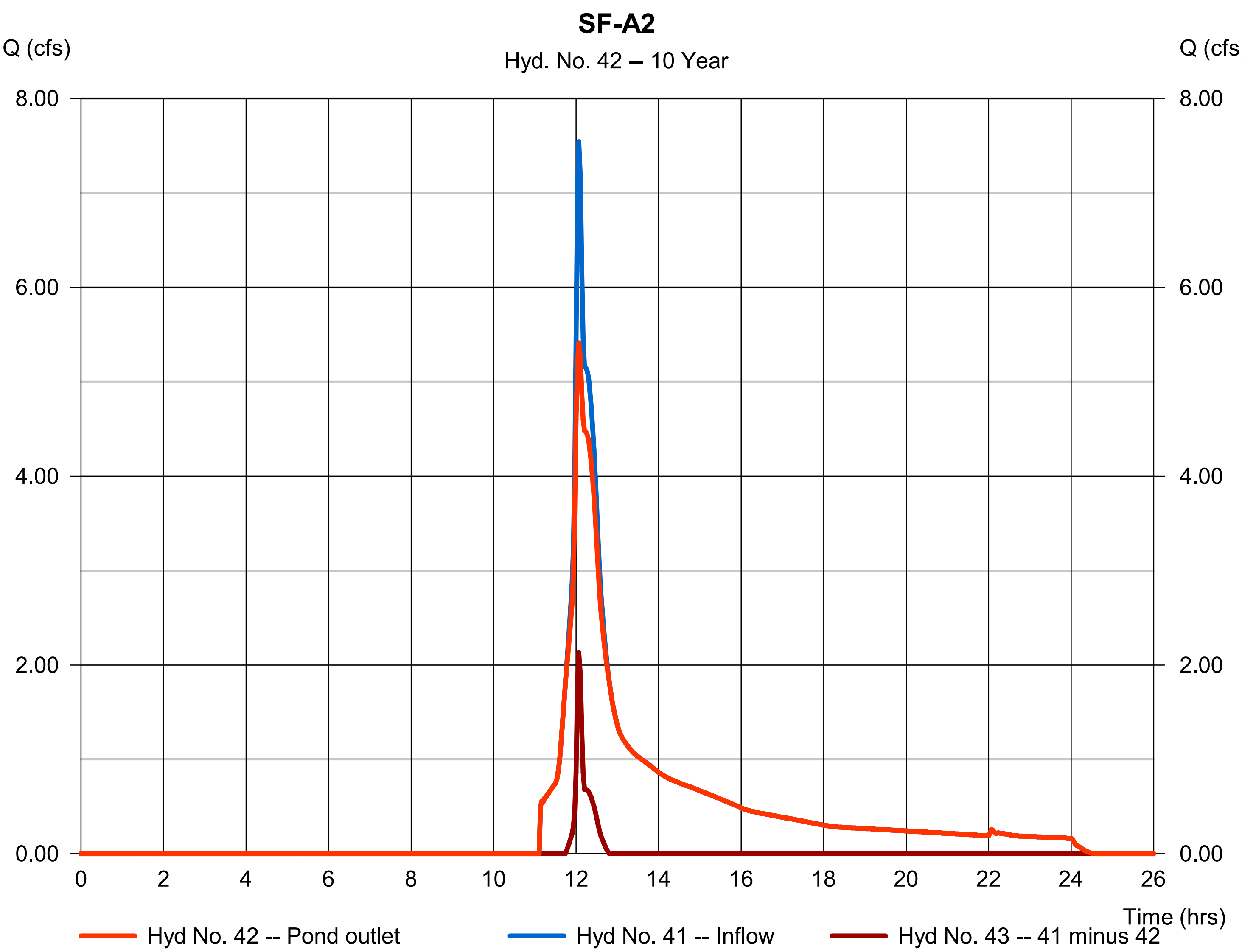
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 42

SF-A2

Hydrograph type	= Diversion1	Peak discharge	= 5.414 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 32,463 cuft
Inflow hydrograph	= 41 - DS-2	2nd diverted hyd.	= 43
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B



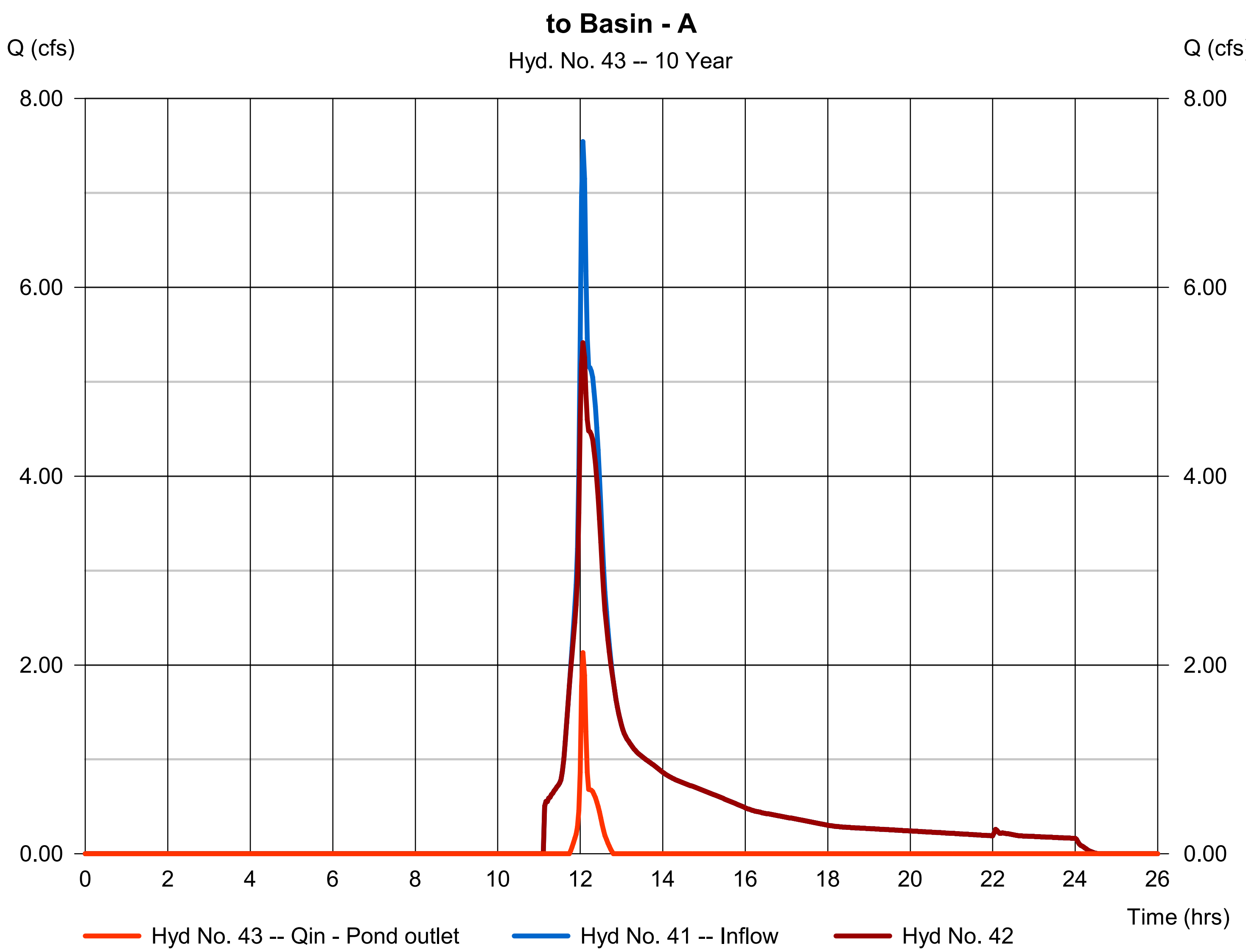
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 43

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 2.130 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 2,052 cuft
Inflow hydrograph	= 41 - DS-2	2nd diverted hyd.	= 42
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B



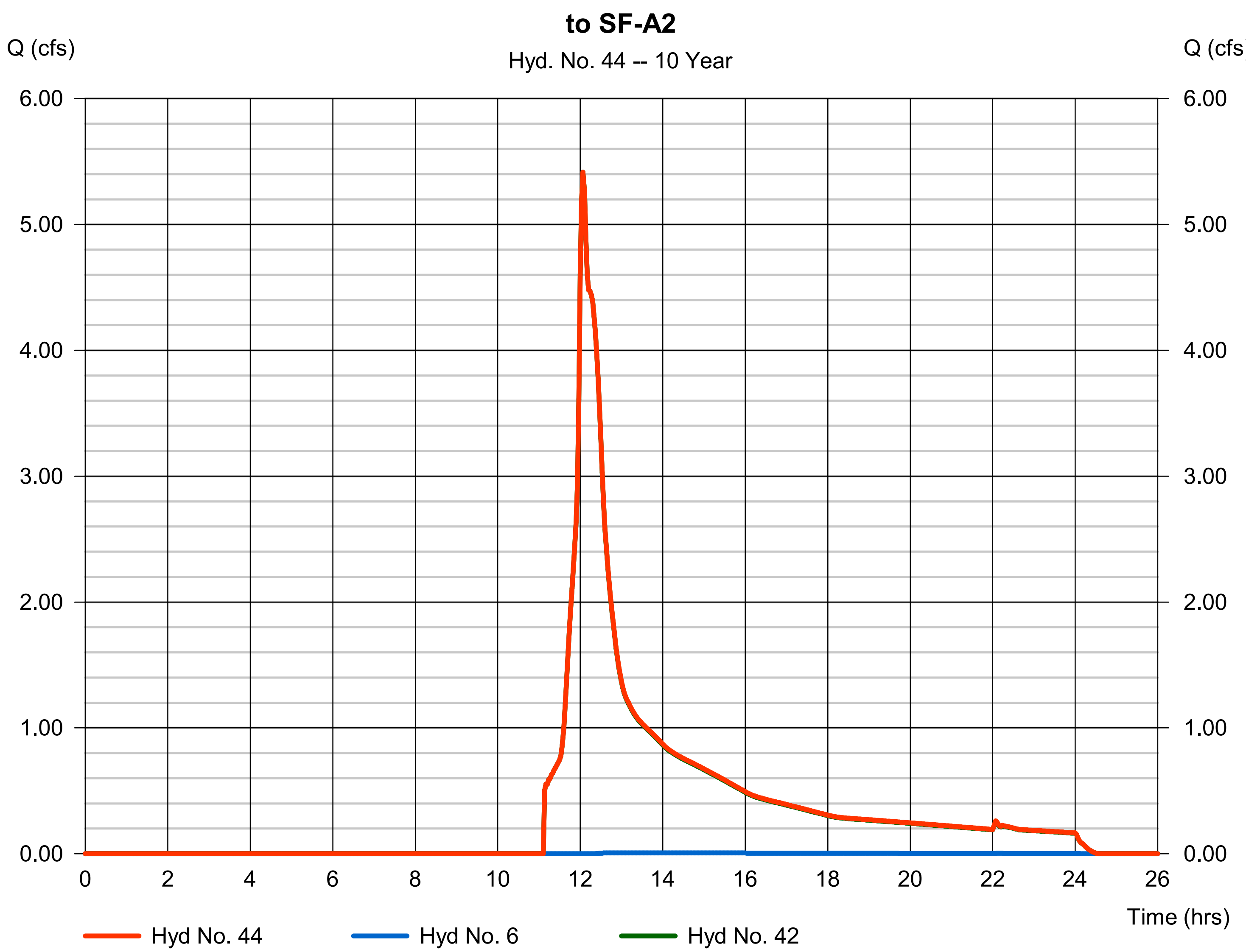
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 44

to SF-A2

Hydrograph type	= Combine	Peak discharge	= 5.414 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 32,662 cuft
Inflow hyds.	= 6, 42	Contrib. drain. area	= 0.330 ac



Hydrograph Report

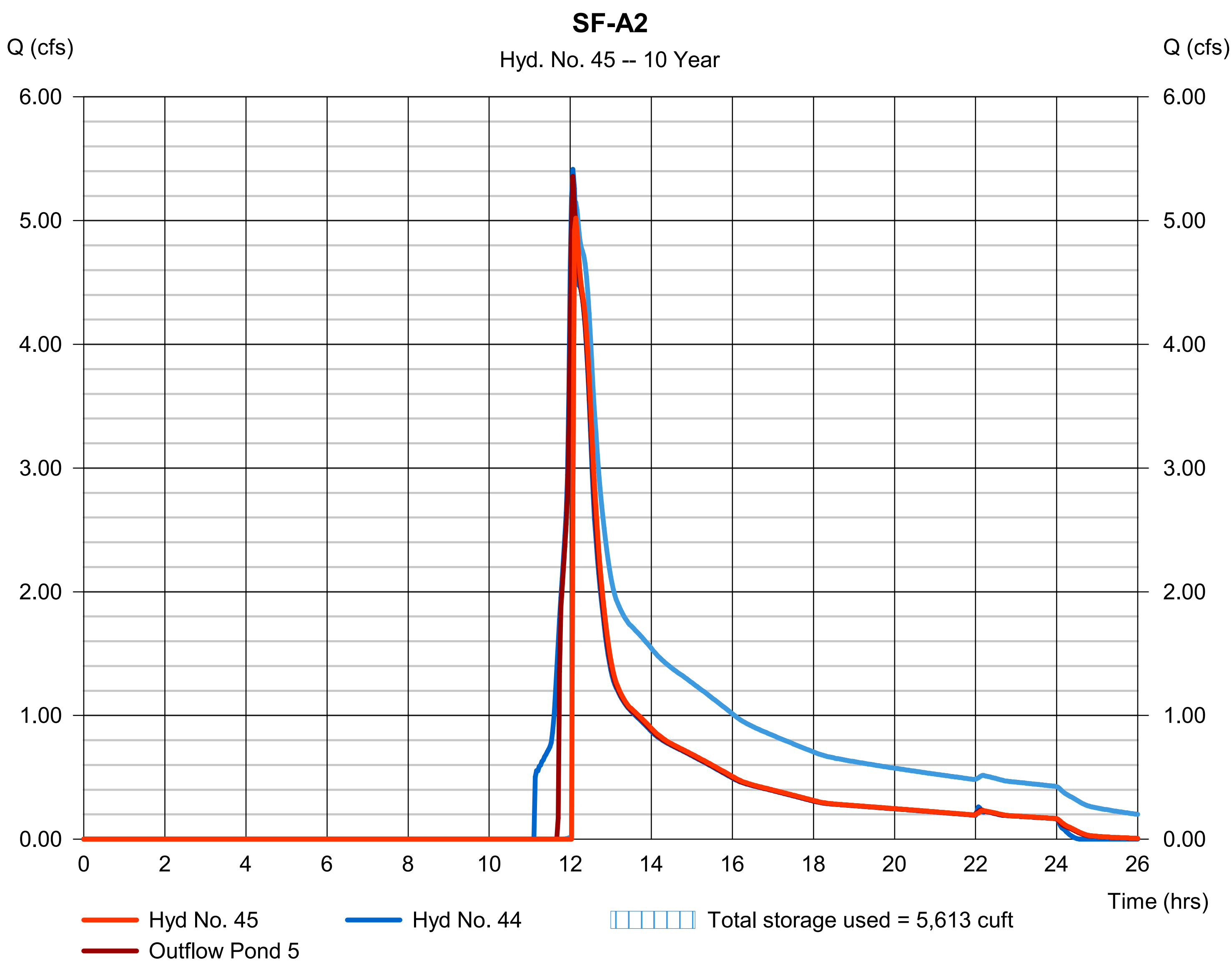
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 45

SF-A2

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 5.021 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 28,077 cuft
Pond name **Upper Pond**	= Sediment Forebay - A2	Pond name **Lower Pond**	= Sand Filter - A2
Inflow hyd.	= 44 - to SF-A2	Other Inflow hyd.	= None
Max. Elevation	= 271.83 ft	Max. Elevation	= 271.46 ft
Max. Storage	= 1,936 cuft	Max. Storage	= 3,677 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



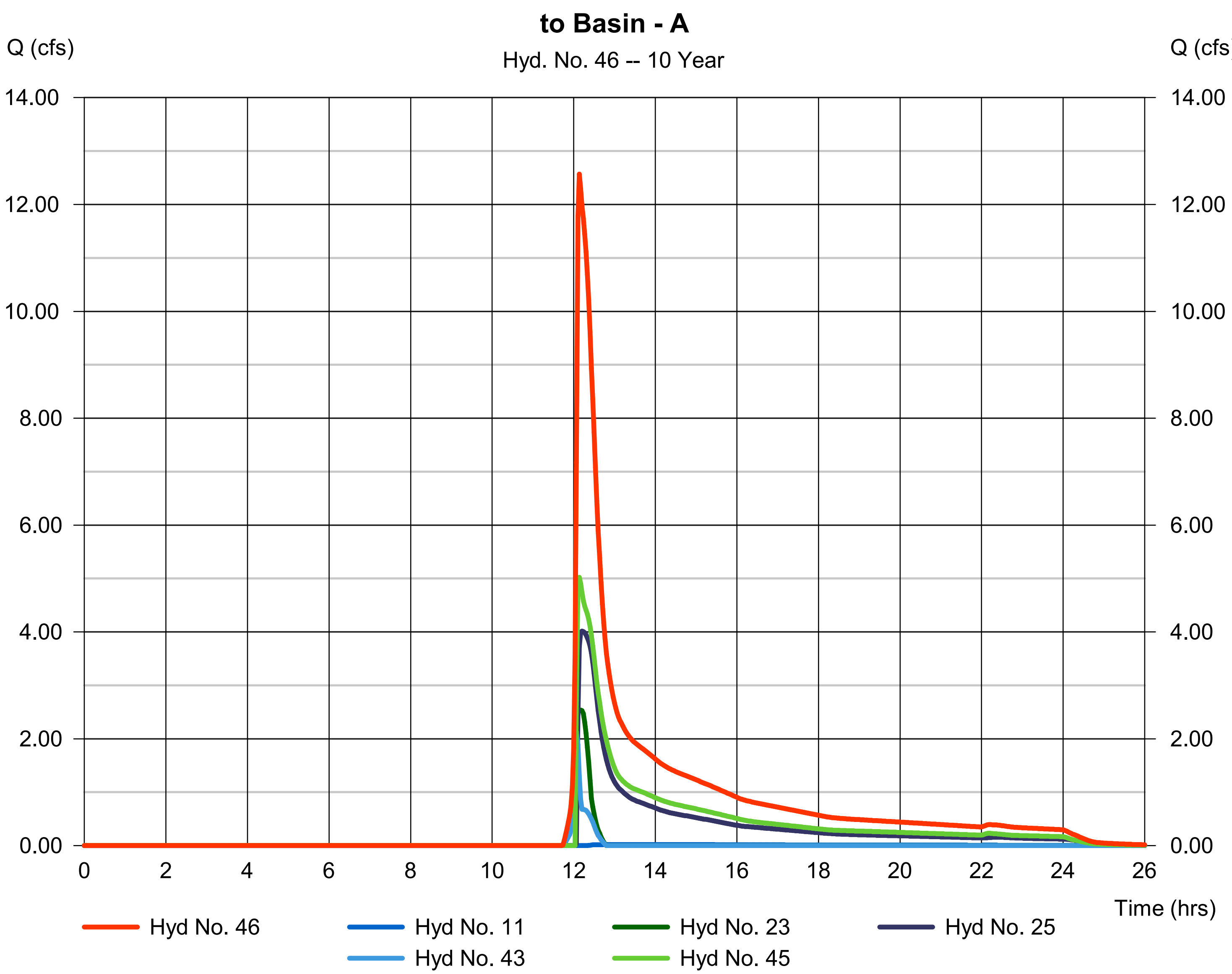
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 46

to Basin - A

Hydrograph type	= Combine	Peak discharge	= 12.57 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 56,828 cuft
Inflow hyds.	= 11, 23, 25, 43, 45	Contrib. drain. area	= 0.950 ac



Hydrograph Report

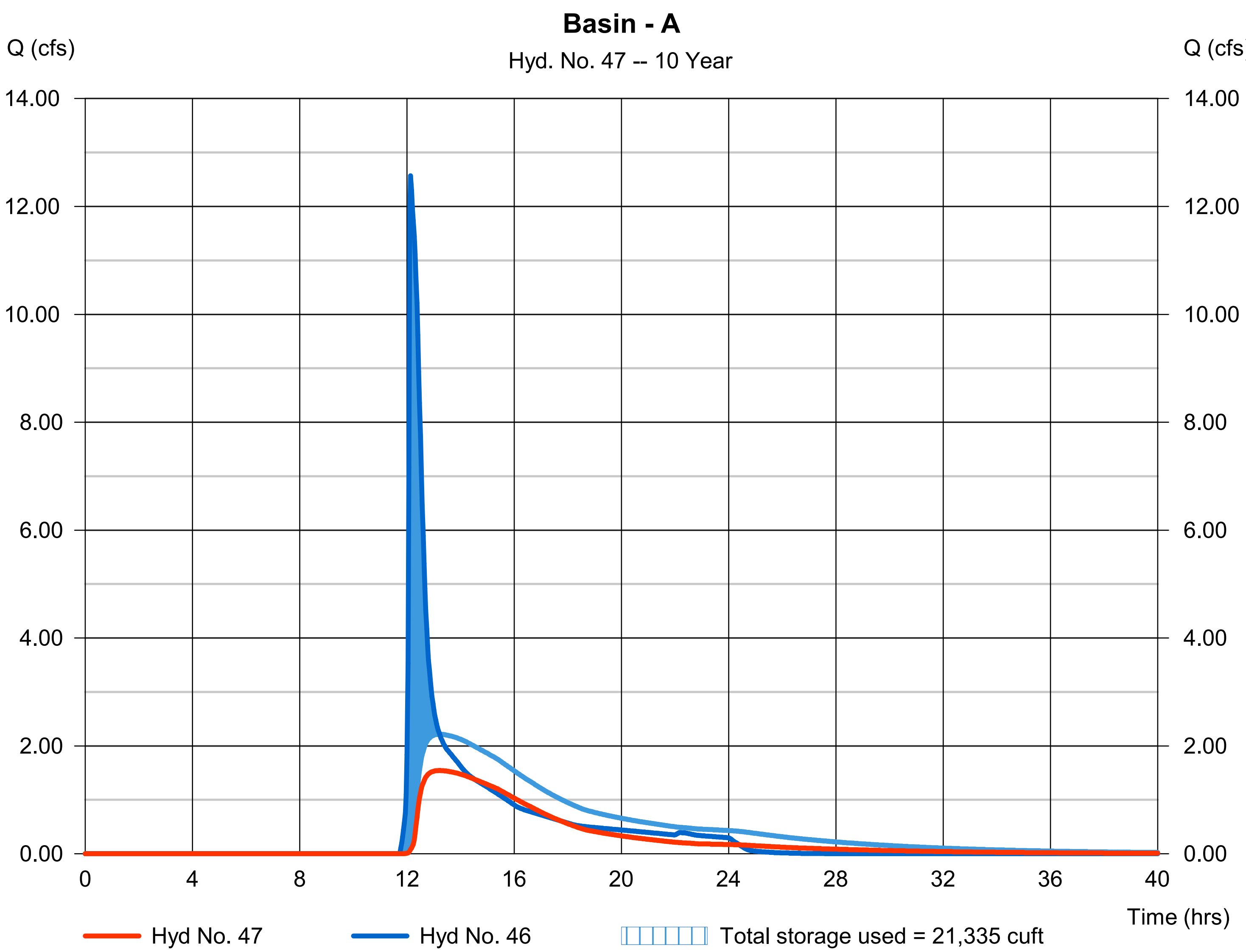
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 47

Basin - A

Hydrograph type	= Reservoir	Peak discharge	= 1.543 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.20 hrs
Time interval	= 2 min	Hyd. volume	= 33,317 cuft
Inflow hyd. No.	= 46 - to Basin - A	Max. Elevation	= 267.46 ft
Reservoir name	= Basin - A	Max. Storage	= 21,335 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



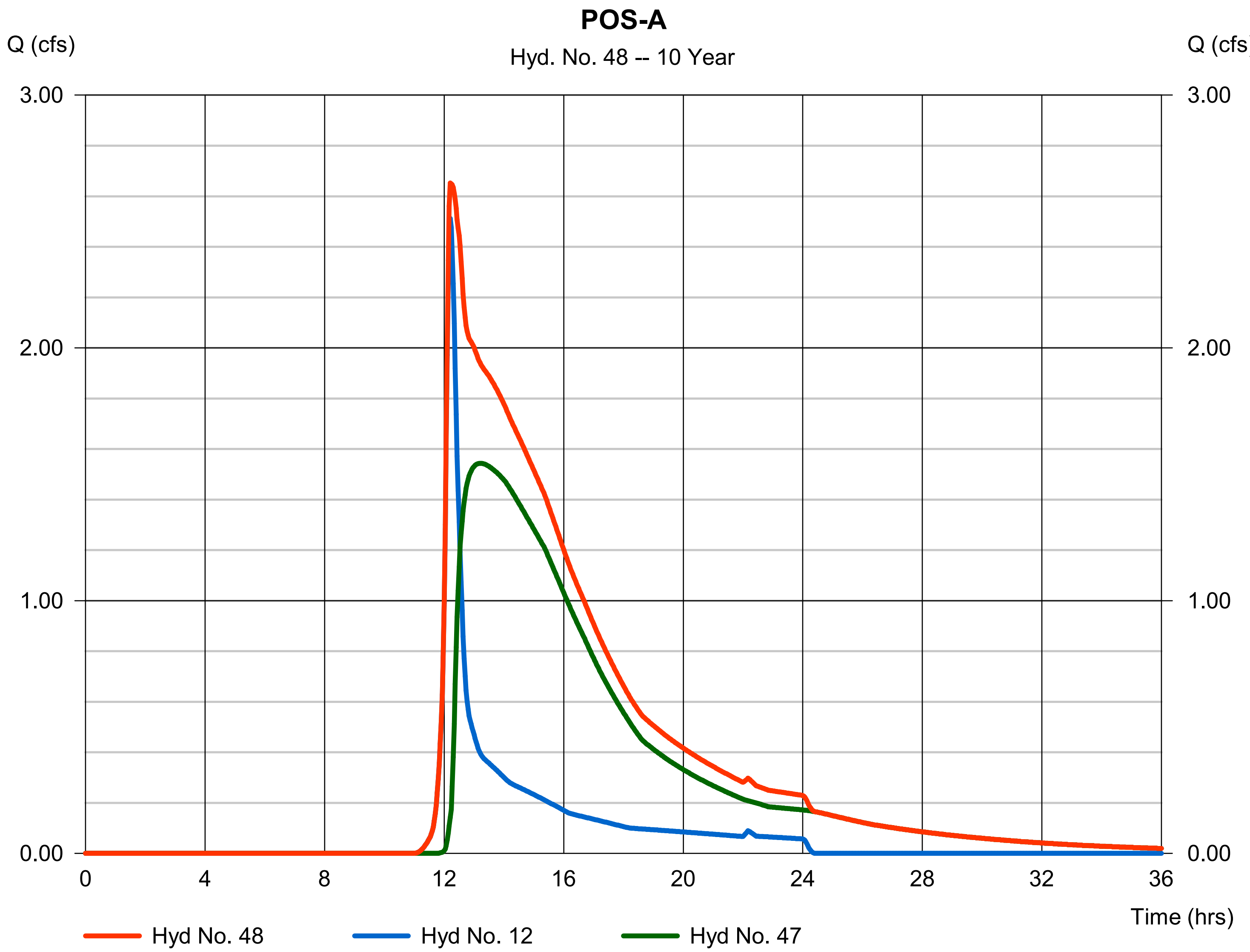
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 48

POS-A

Hydrograph type	= Combine	Peak discharge	= 2.653 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 44,386 cuft
Inflow hyds.	= 12, 47	Contrib. drain. area	= 2.260 ac



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	8.008	2	734	35,418	------	------	------	PR-A1a
2	SCS Runoff	0.034	2	738	292	------	------	------	PR-A1b
3	SCS Runoff	1.464	2	724	5,072	------	------	------	PR-R1a
4	SCS Runoff	1.992	2	724	6,898	------	------	------	PR-R1b
5	SCS Runoff	5.839	2	738	30,731	------	------	------	PR-A2a
6	SCS Runoff	0.071	2	742	623	------	------	------	PR-A2b
7	SCS Runoff	3.046	2	724	10,550	------	------	------	PR-R2a
8	SCS Runoff	1.347	2	724	4,666	------	------	------	PR-R2b
9	SCS Runoff	1.640	2	724	5,681	------	------	------	PR-R2c
10	SCS Runoff	2.636	2	724	9,130	------	------	------	PR-R2d
11	SCS Runoff	0.201	2	740	1,739	------	------	------	PR-A3
12	SCS Runoff	4.419	2	732	18,535	------	------	------	PR-A4
13	SCS Runoff	0.057	2	826	1,481	------	------	------	PR-B / POS-B
14	Diversion1	0.074	2	610	847	3	------	------	UG-R1a
15	Diversion2	1.464	2	724	4,225	3	------	------	DS-1
16	Diversion1	0.100	2	610	1,152	4	------	------	UG-R1b
17	Diversion2	1.992	2	724	5,746	4	------	------	DS-1
18	Reservoir	0.000	2	580	0	14	276.15	5.27	UG-R1a
19	Reservoir	0.003	2	612	1	16	277.99	677	UG-R1b
20	Combine	9.560	2	732	45,390	1, 15, 17, 18, 19	------	------	to DS-1
21	Reservoir	9.558	2	730	45,352	20	270.75	65.6	DS-1
22	Diversion1	4.691	2	730	37,083	21	------	------	SF-A1
23	Diversion2	4.867	2	730	8,269	21	------	------	to Basin - A
24	Combine	4.723	2	732	37,375	2, 22,	------	------	to SF-A1
25	Reservoir(i)	4.717	2	732	32,487	24	271.79	6,185	SF-A1
26	Diversion1	0.154	2	610	1,762	7	------	------	UG-R2a
27	Diversion2	3.046	2	724	8,788	7	------	------	DS-2
28	Diversion1	0.067	2	608	771	8	------	------	UG-R2b
29	Diversion2	1.347	2	724	3,895	8	------	------	DS-2
30	Diversion1	0.083	2	610	949	9	------	------	UG-R2c
31	Diversion2	1.640	2	724	4,732	9	------	------	DS-2
32	Diversion1	0.133	2	610	1,525	10	------	------	UG-R2d
33	Diversion2	2.636	2	724	7,605	10	------	------	DS-2
34	Reservoir	0.000	2	n/a	0	26	276.09	11.0	UG-R2a

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	0.000	2	n/a	0	28	276.33	4.77	UG-R2b
36	Reservoir	0.000	2	n/a	0	30	278.03	201	UG-R2c
37	Reservoir	0.000	2	298	0	32	276.10	444	UG-R2d
38	Combine	4.393	2	724	12,683	27, 29, 34, 35,	------	------	to DS-2
39	Combine	4.276	2	724	12,337	31, 33, 36, 37,	------	------	to DS-2
40	Combine	11.38	2	724	55,752	5, 38, 39	------	------	to DS-2
41	Reservoir	11.37	2	724	55,695	40	270.30	113	DS-2
42	Diversion1	6.907	2	724	48,949	41	------	------	SF-A2
43	Diversion2	4.463	2	724	6,746	41	------	------	to Basin - A
44	Combine	6.913	2	724	49,572	6, 42,	------	------	to SF-A2
45	Reservoir(i)	6.828	2	726	45,015	44	271.89	5,792	SF-A2
46	Combine	20.42	2	726	94,256	11, 23, 25, 43, 45	------	------	to Basin - A
47	Reservoir	2.460	2	790	60,793	46	268.56	39,493	Basin - A
48	Combine	5.786	2	734	79,329	12, 47	------	------	POS-A

Hydrograph Report

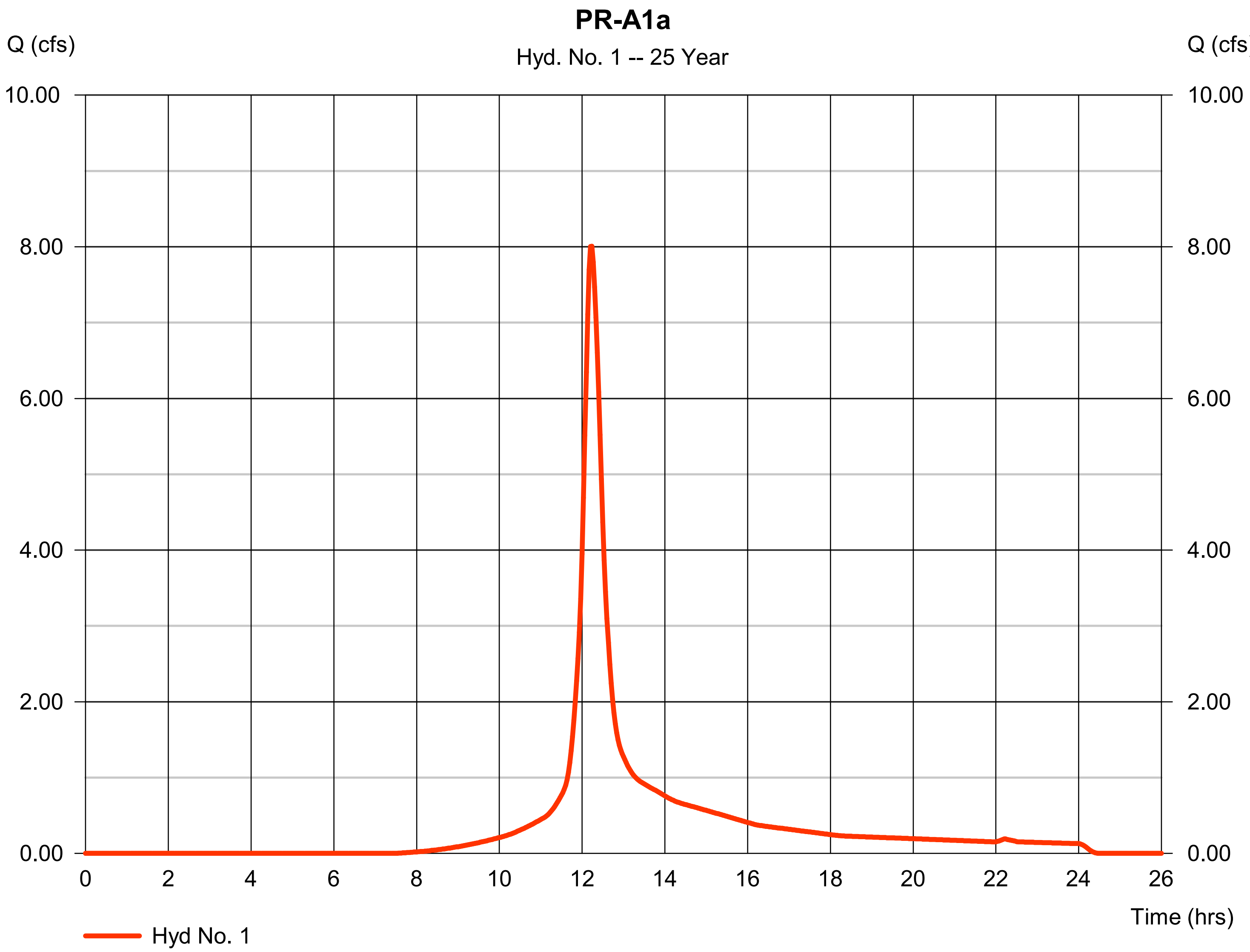
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 1

PR-A1a

Hydrograph type	= SCS Runoff	Peak discharge	= 8.008 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 35,418 cuft
Drainage area	= 2.670 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.60 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.330 x 30) + (0.590 x 39) + (1.750 x 98)] / 2.670



Hydrograph Report

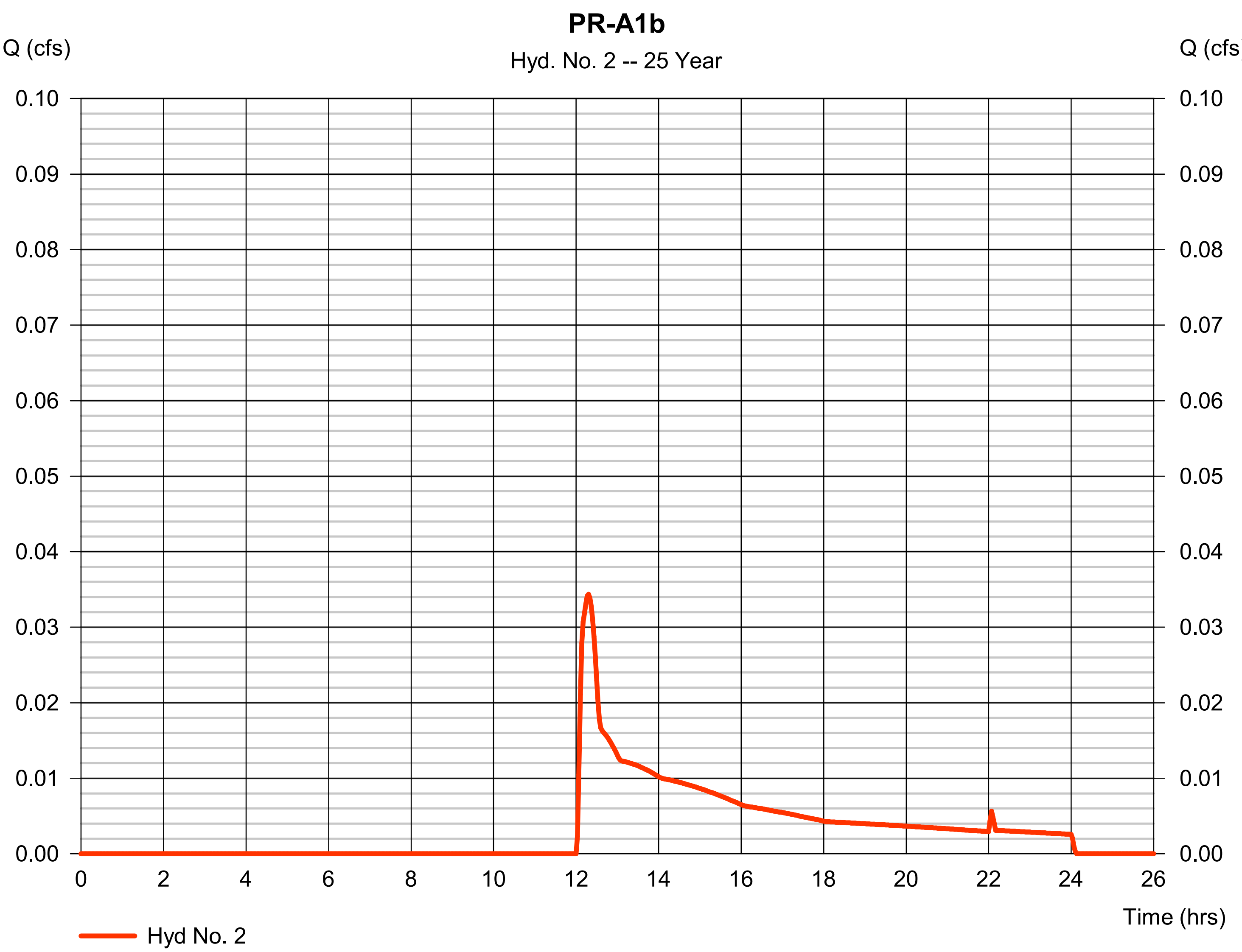
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 2

PR-A1b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.034 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 292 cuft
Drainage area	= 0.170 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 39)] / 0.170



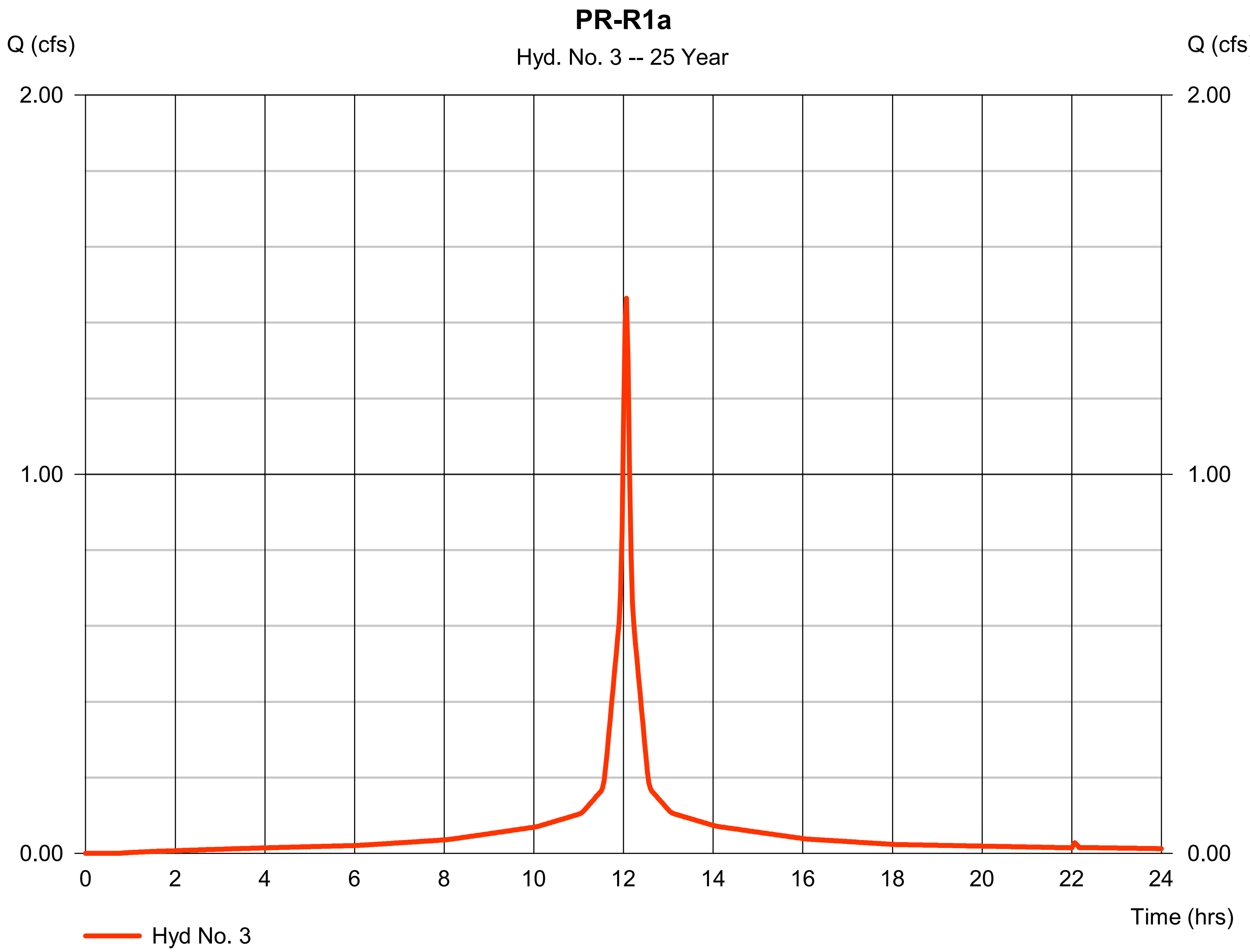
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 3

PR-R1a

Hydrograph type	= SCS Runoff	Peak discharge	= 1.464 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,072 cuft
Drainage area	= 0.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



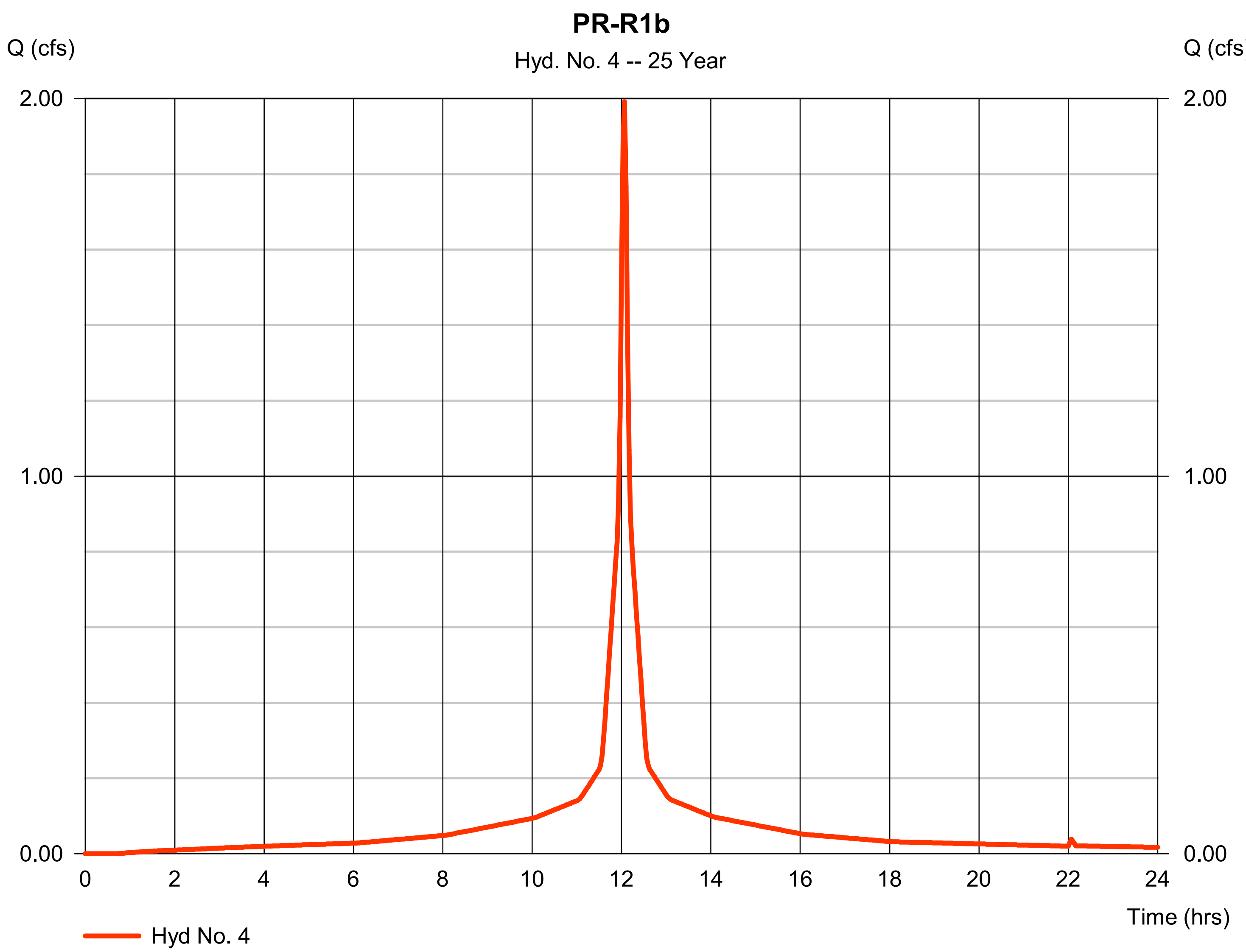
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 4

PR-R1b

Hydrograph type	= SCS Runoff	Peak discharge	= 1.992 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 6,898 cuft
Drainage area	= 0.340 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



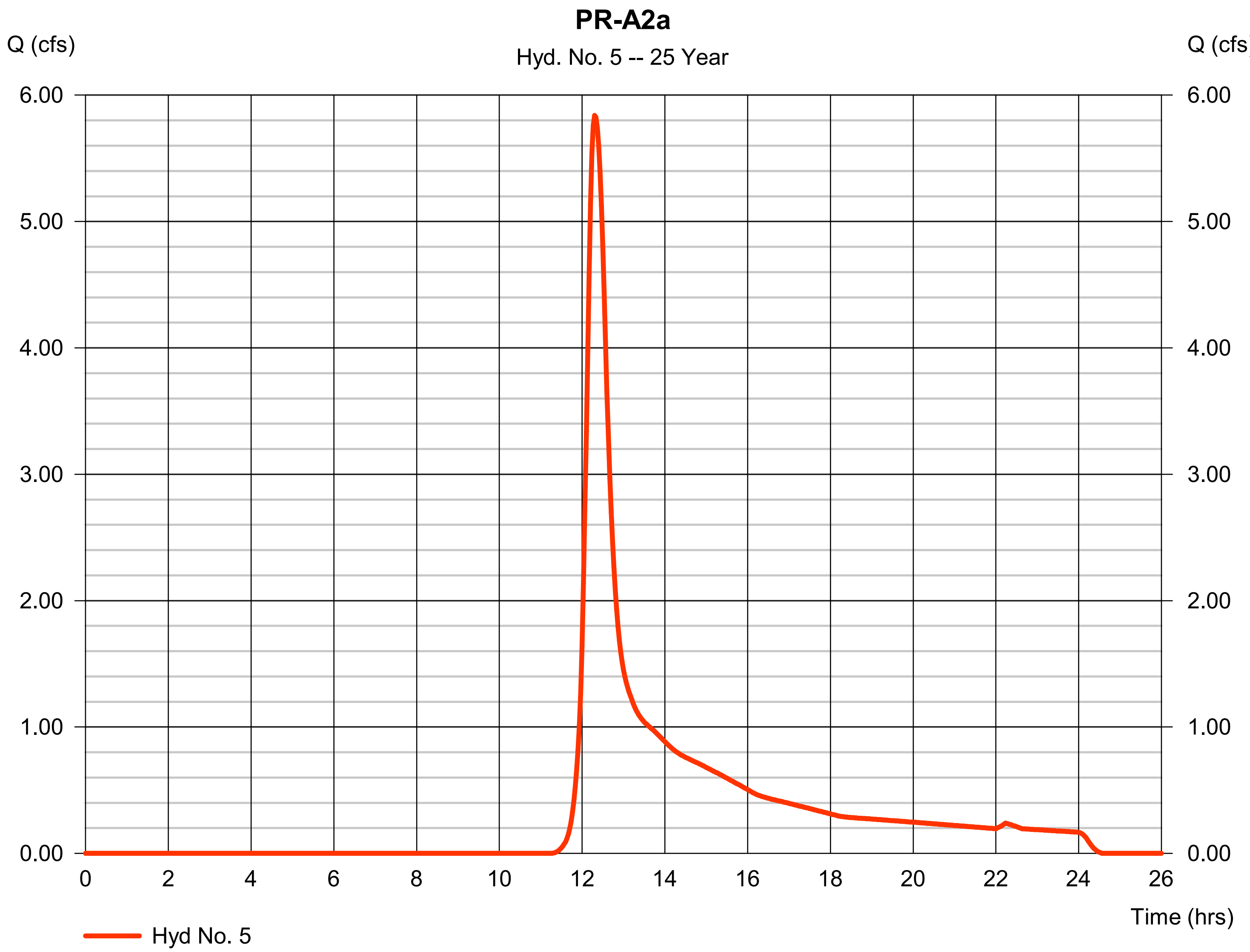
Hydrograph Report

Hyd. No. 5

PR-A2a

Hydrograph type	= SCS Runoff	Peak discharge	= 5.839 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 30,731 cuft
Drainage area	= 5.090 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.390 x 30) + (2.100 x 39) + (1.600 x 98)] / 5.090



Hydrograph Report

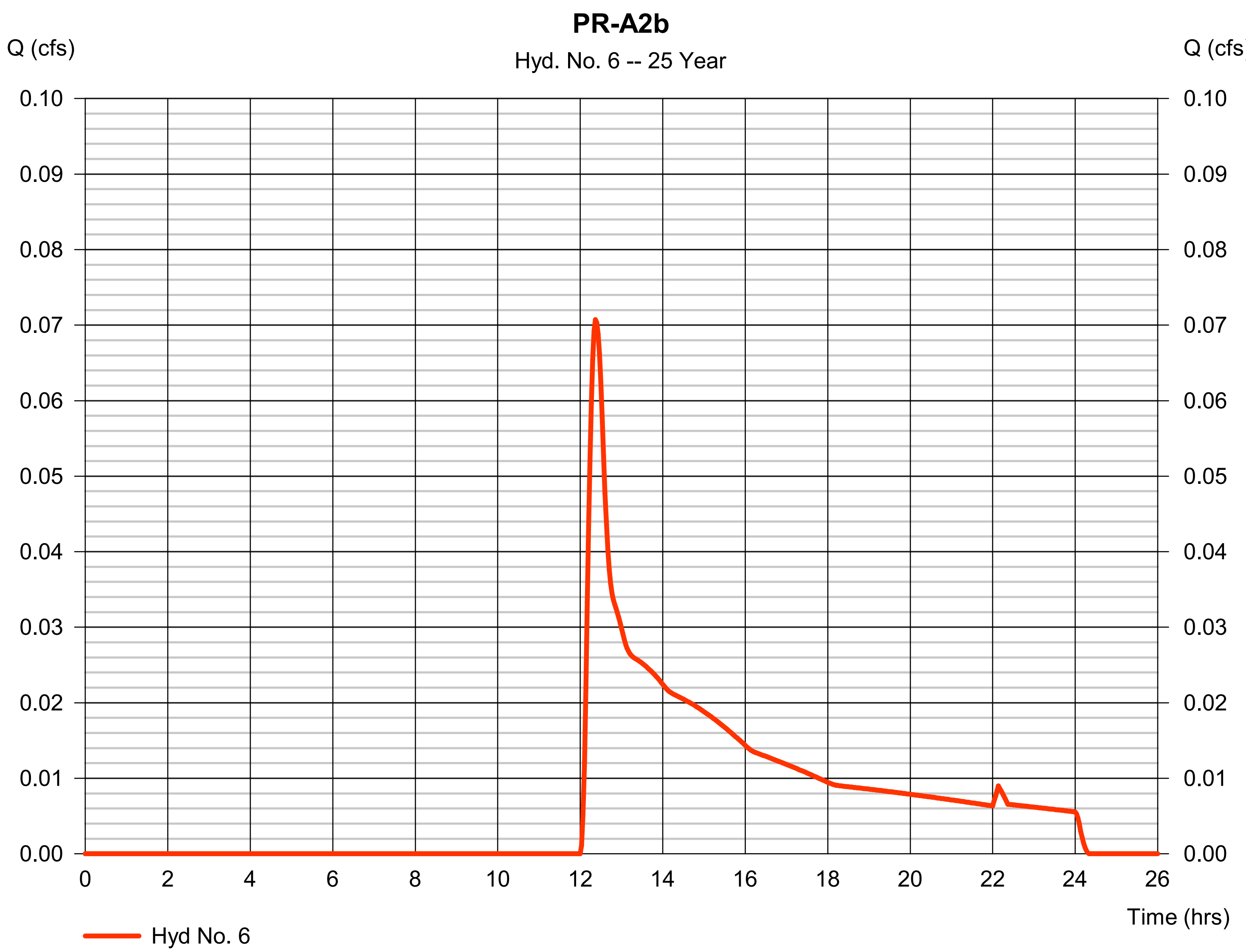
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 6

PR-A2b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.071 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 623 cuft
Drainage area	= 0.330 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.10 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 39)] / 0.330



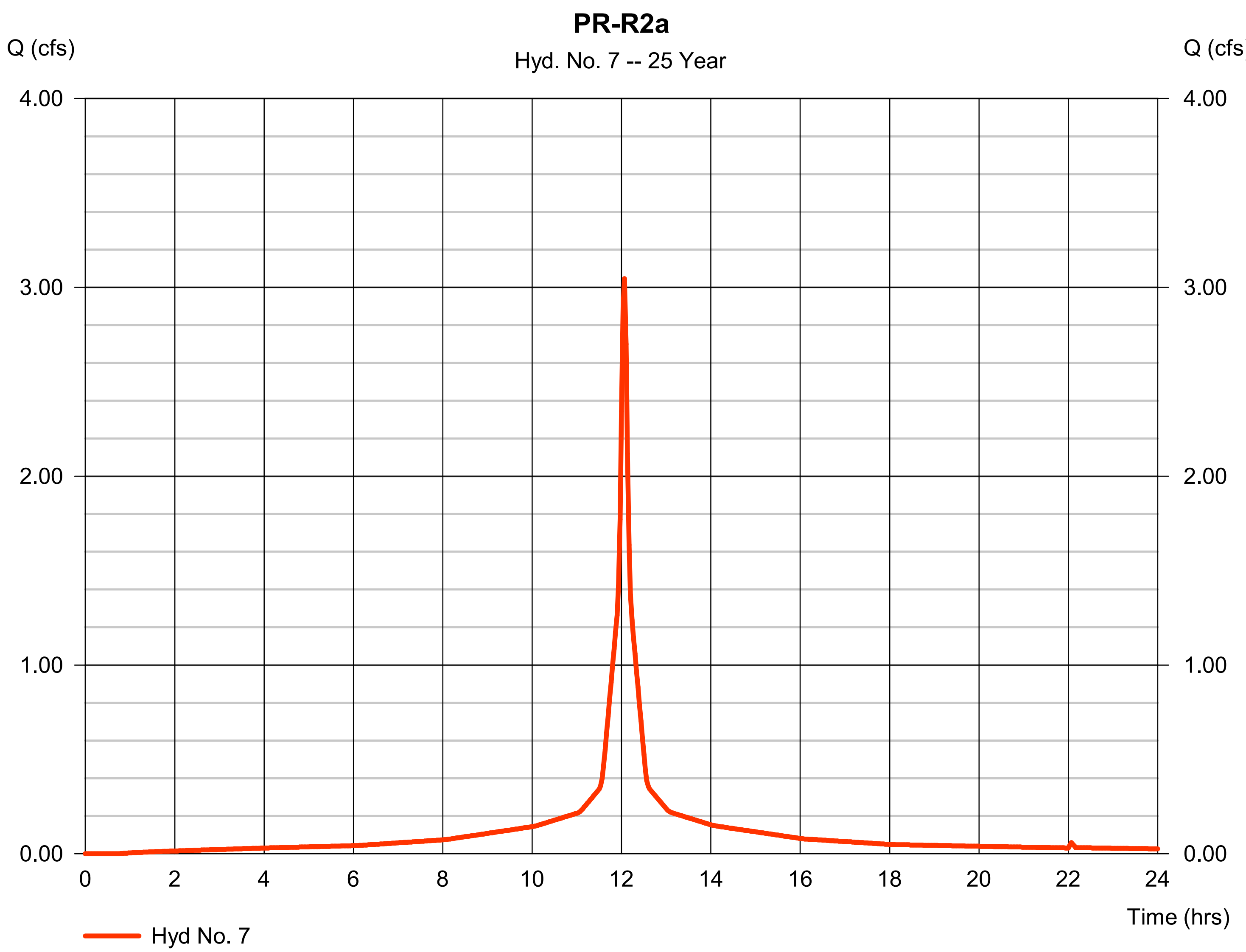
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 7

PR-R2a

Hydrograph type	= SCS Runoff	Peak discharge	= 3.046 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 10,550 cuft
Drainage area	= 0.520 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



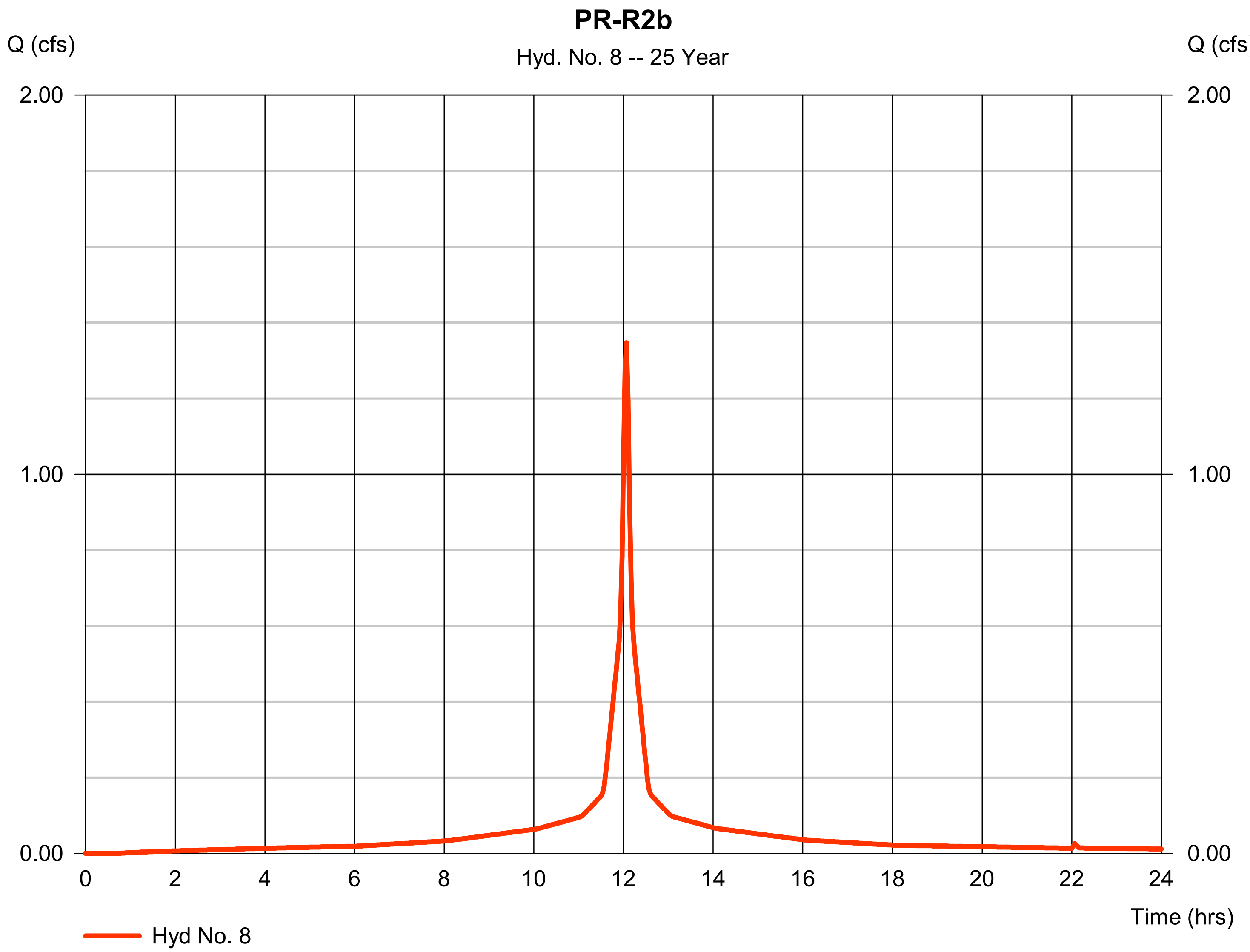
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 8

PR-R2b

Hydrograph type	= SCS Runoff	Peak discharge	= 1.347 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,666 cuft
Drainage area	= 0.230 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



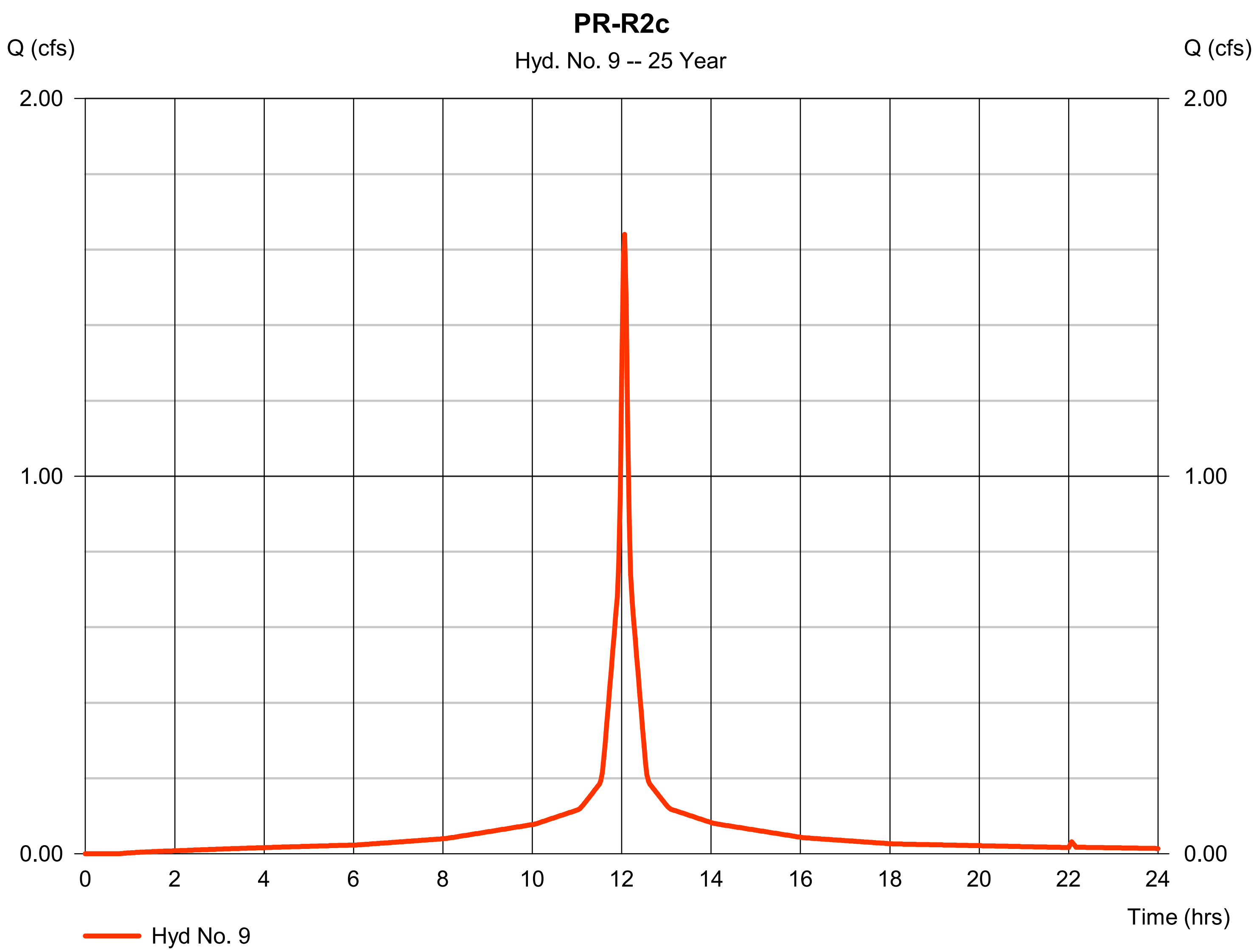
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 9

PR-R2c

Hydrograph type	= SCS Runoff	Peak discharge	= 1.640 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,681 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



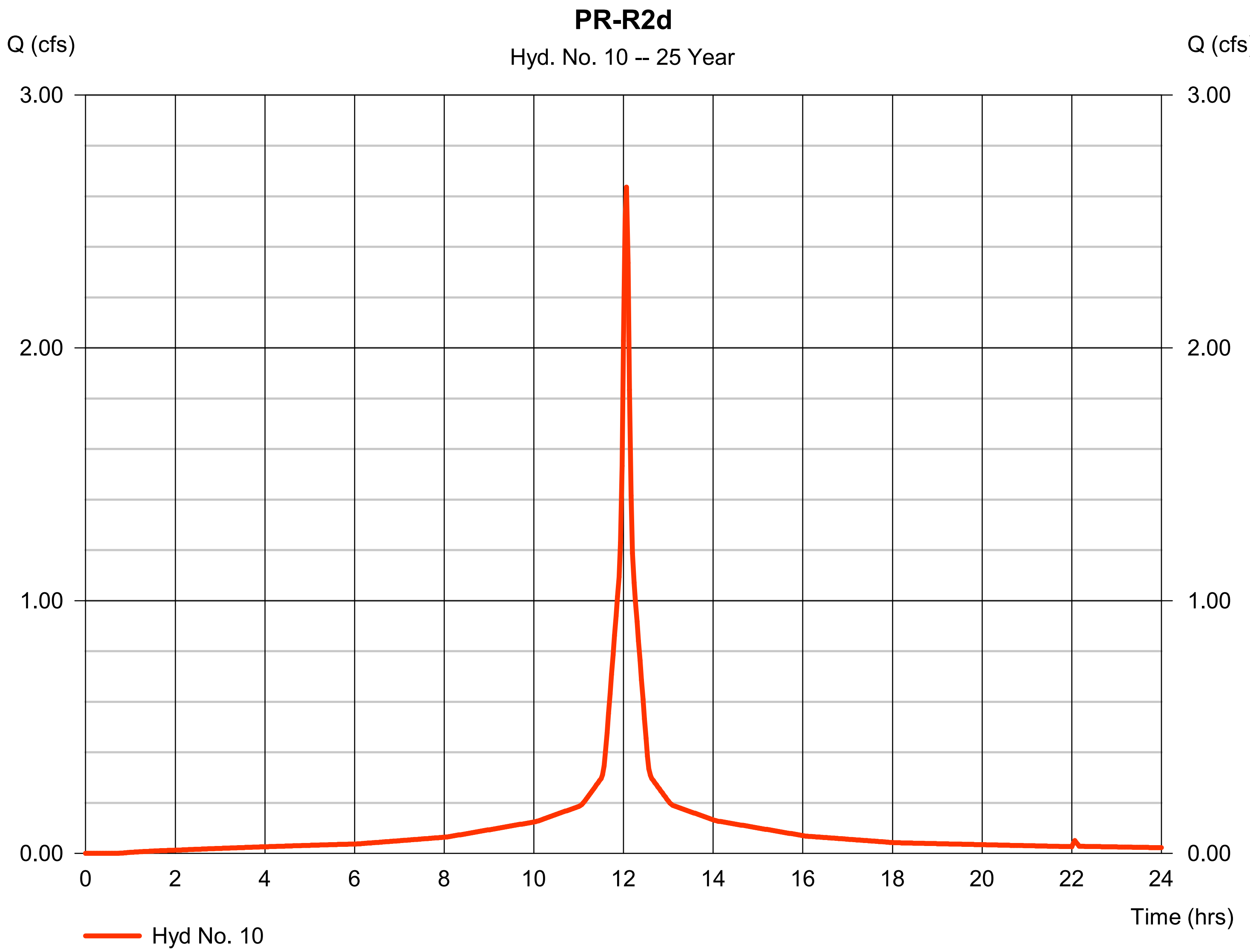
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 10

PR-R2d

Hydrograph type	= SCS Runoff	Peak discharge	= 2.636 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 9,130 cuft
Drainage area	= 0.450 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

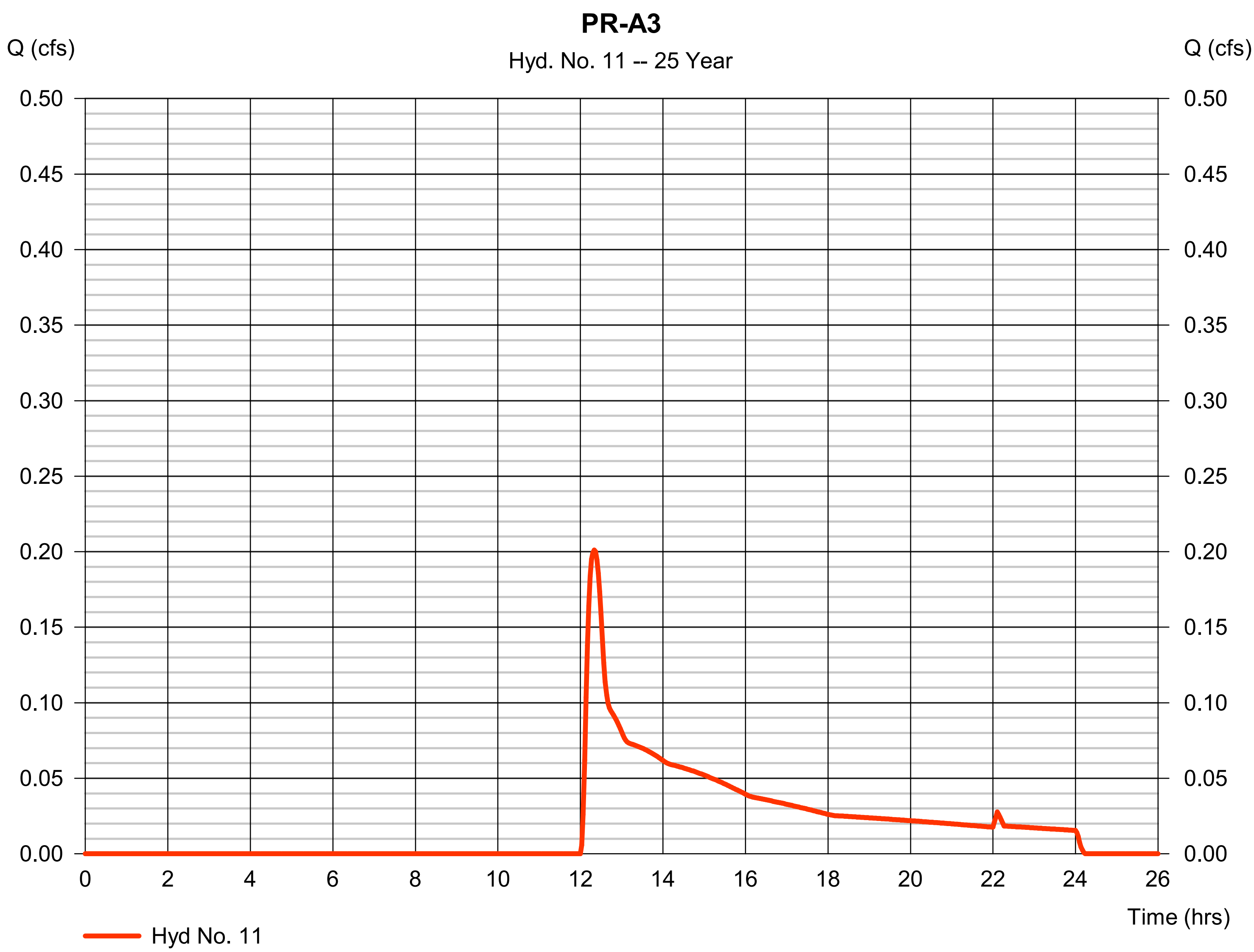
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 11

PR-A3

Hydrograph type	= SCS Runoff	Peak discharge	= 0.201 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 1,739 cuft
Drainage area	= 0.950 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.20 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.960 x 39)] / 0.950



Hydrograph Report

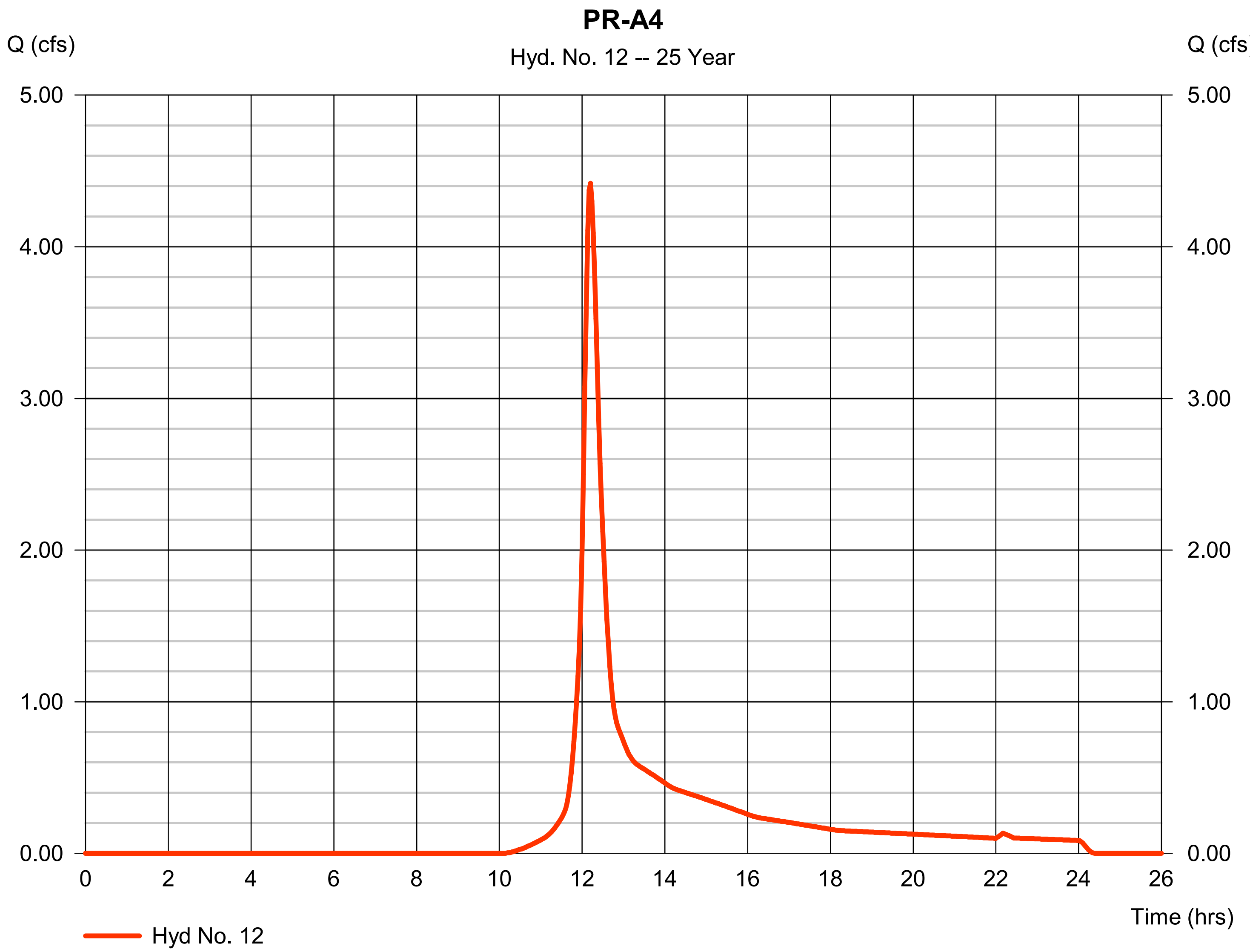
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 12

PR-A4

Hydrograph type	= SCS Runoff	Peak discharge	= 4.419 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 18,535 cuft
Drainage area	= 2.260 ac	Curve number	= 63*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.10 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 30) + (1.010 x 39) + (0.950 x 98)] / 2.260



Hydrograph Report

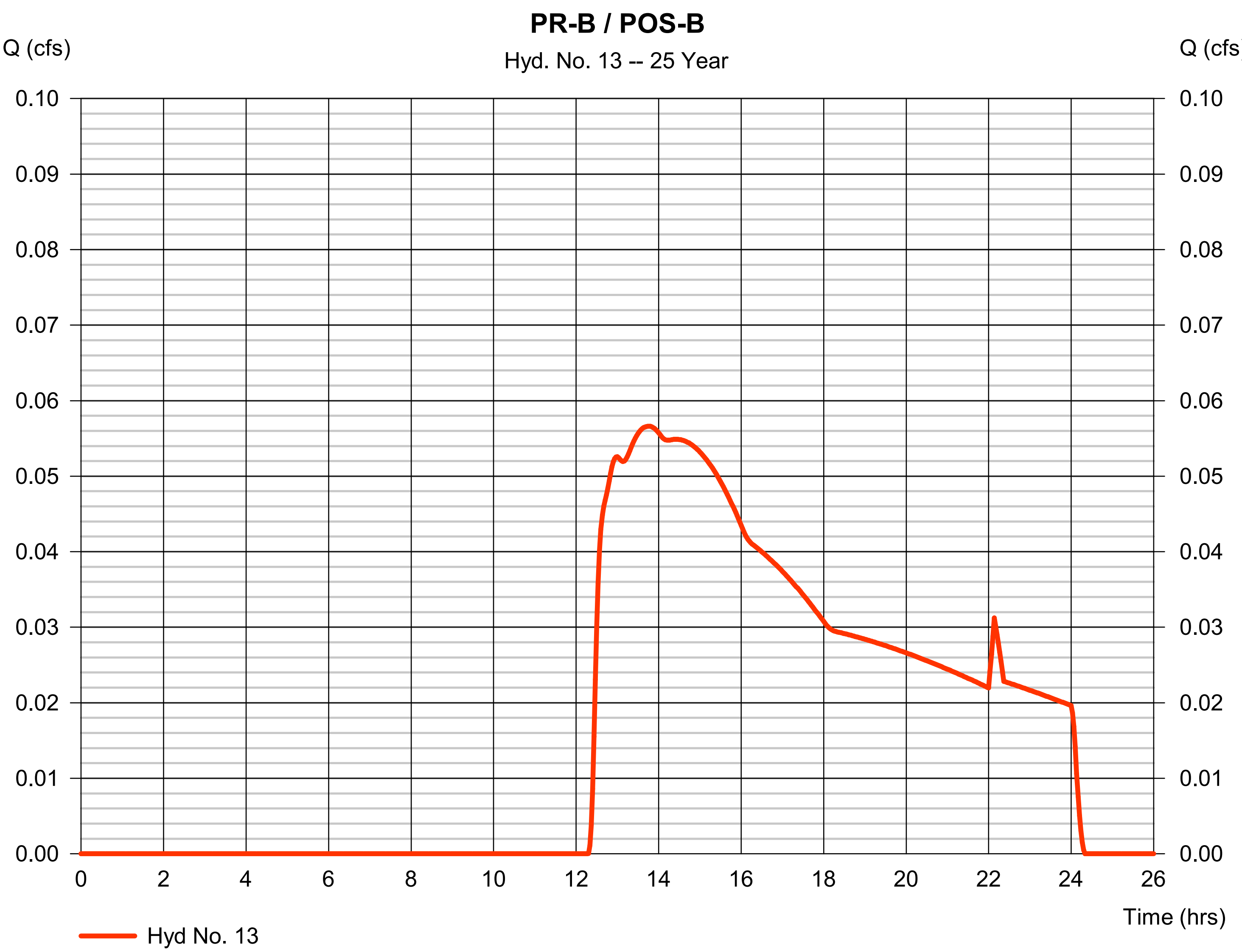
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 13

PR-B / POS-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.057 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.77 hrs
Time interval	= 2 min	Hyd. volume	= 1,481 cuft
Drainage area	= 1.940 ac	Curve number	= 33*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 6.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.330 x 30) + (0.610 x 39)] / 1.940



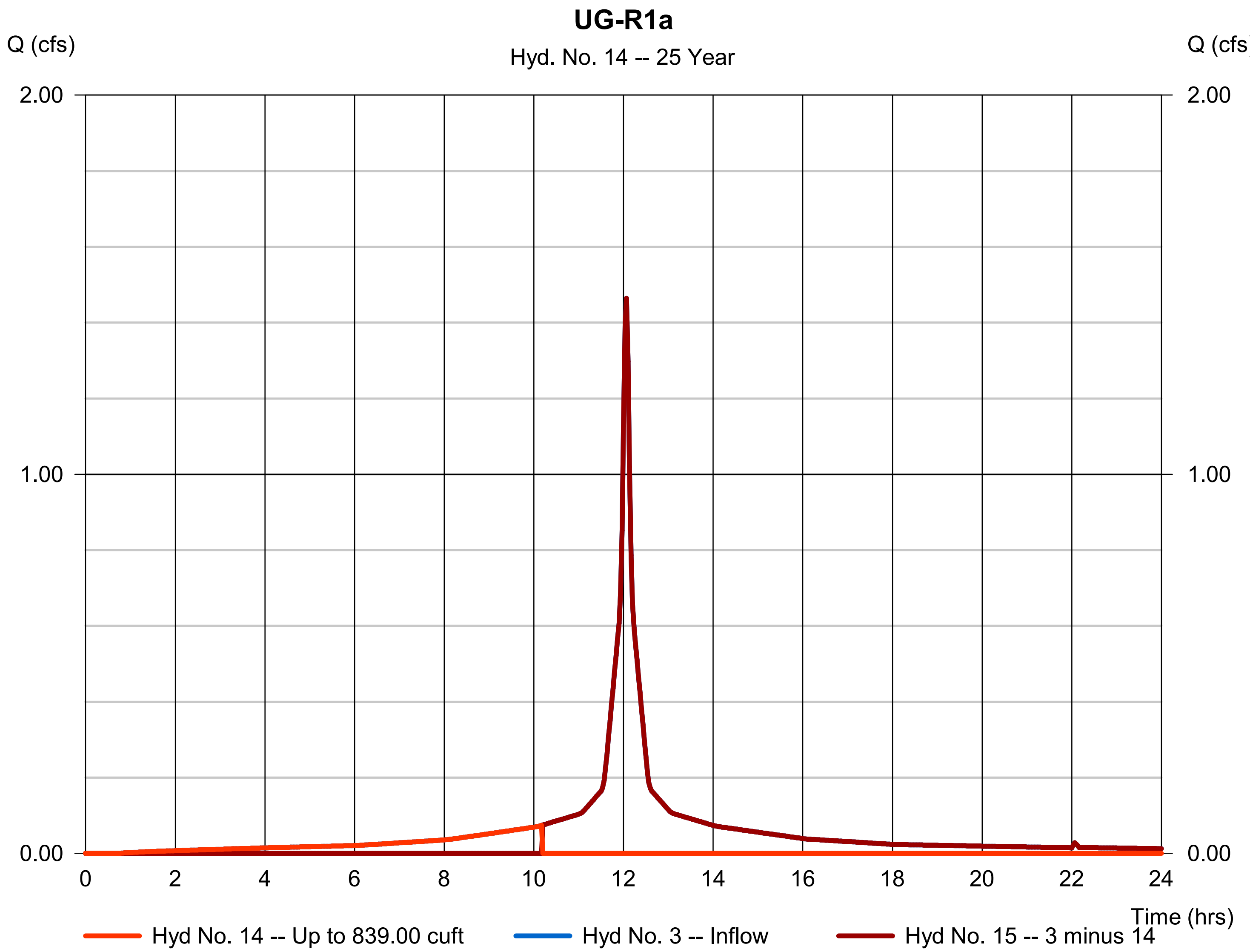
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 14

UG-R1a

Hydrograph type	= Diversion1	Peak discharge	= 0.074 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.17 hrs
Time interval	= 2 min	Hyd. volume	= 847 cuft
Inflow hydrograph	= 3 - PR-R1a	2nd diverted hyd.	= 15
Diversion method	= First Flush Volume	Volume Up To	= 839.00 cuft



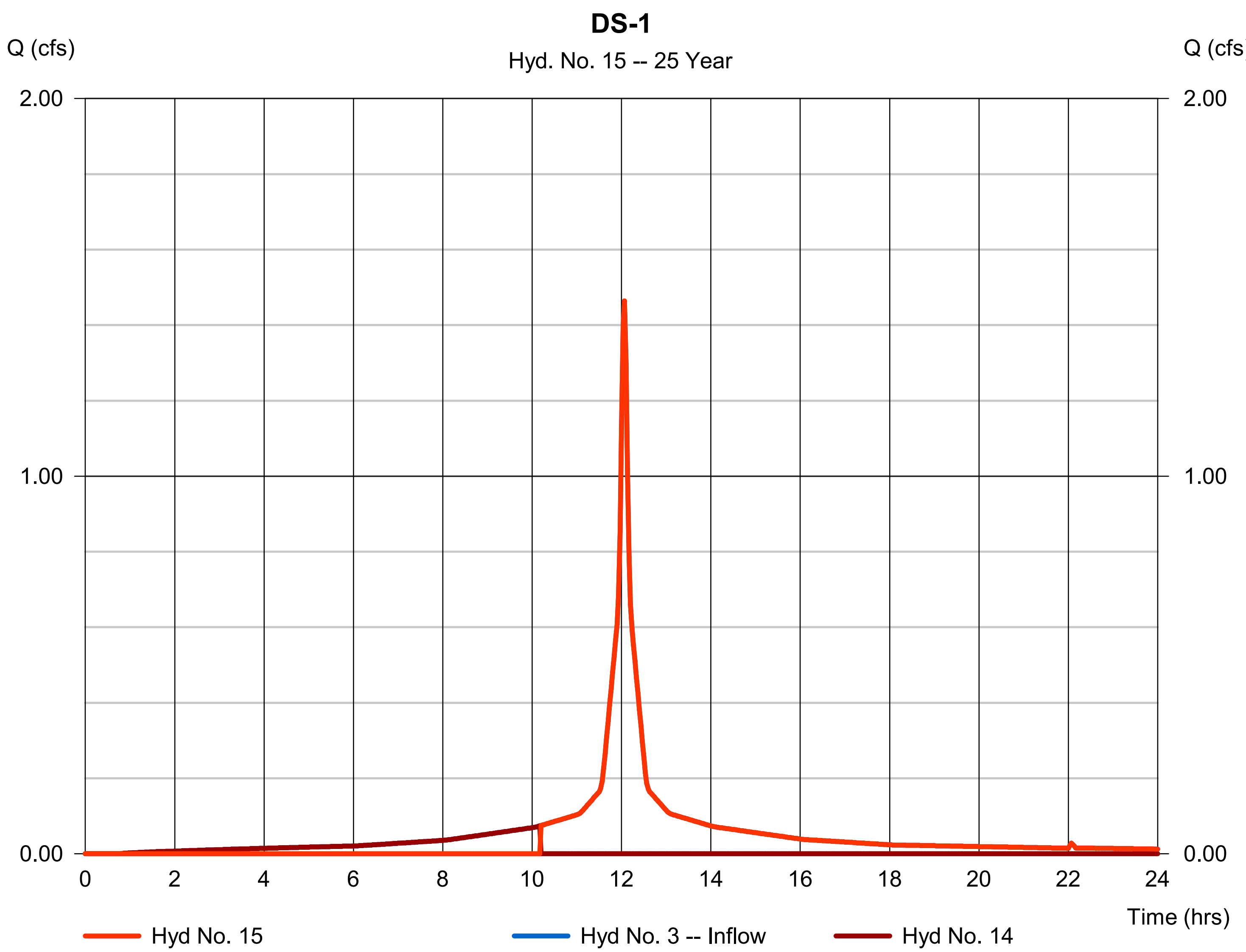
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 15

DS-1

Hydrograph type	= Diversion2	Peak discharge	= 1.464 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,225 cuft
Inflow hydrograph	= 3 - PR-R1a	2nd diverted hyd.	= 14
Diversion method	= First Flush Volume	Volume Up To	= 839.00 cuft



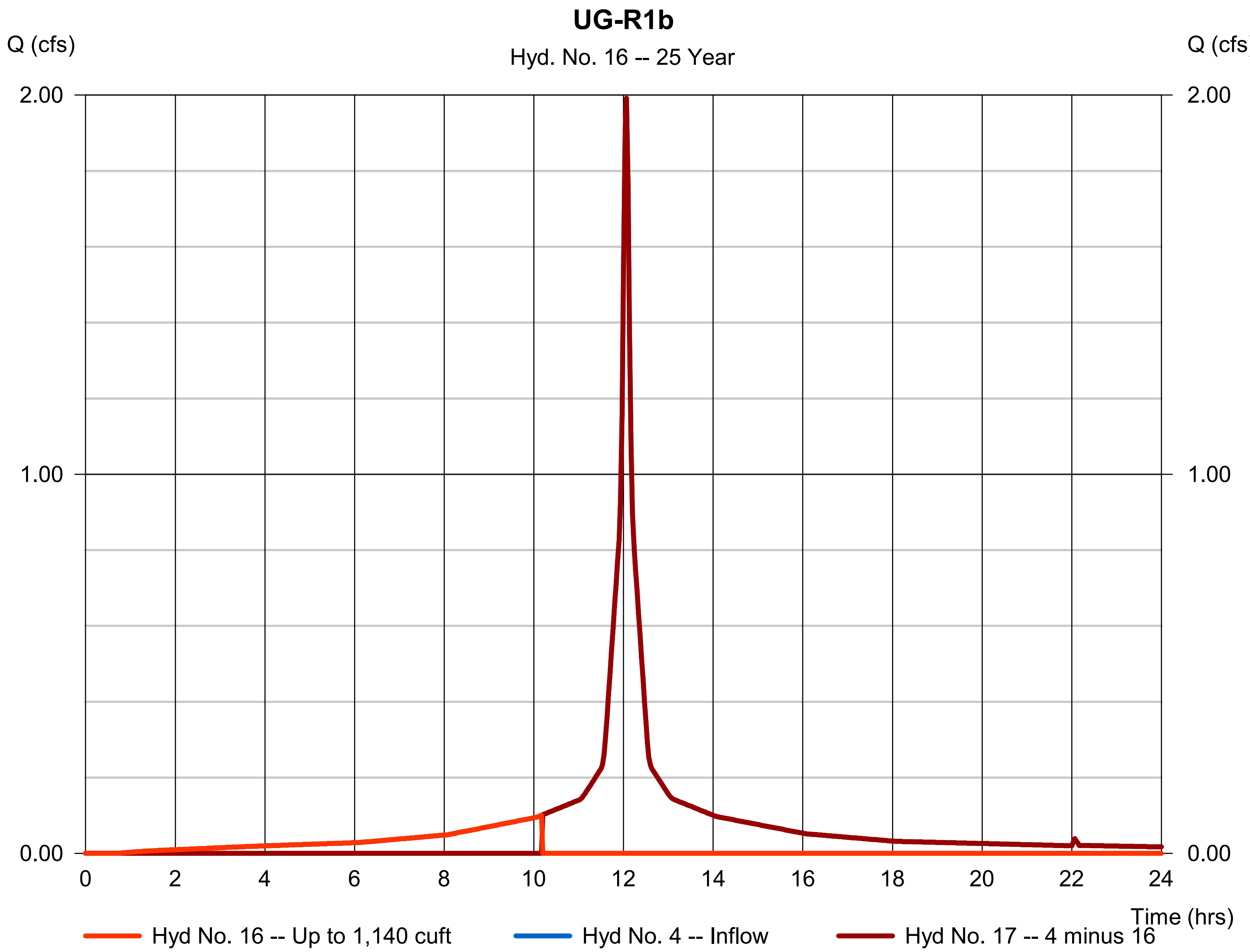
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 16

UG-R1b

Hydrograph type	= Diversion1	Peak discharge	= 0.100 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.17 hrs
Time interval	= 2 min	Hyd. volume	= 1,152 cuft
Inflow hydrograph	= 4 - PR-R1b	2nd diverted hyd.	= 17
Diversion method	= First Flush Volume	Volume Up To	= 1,140 cuft



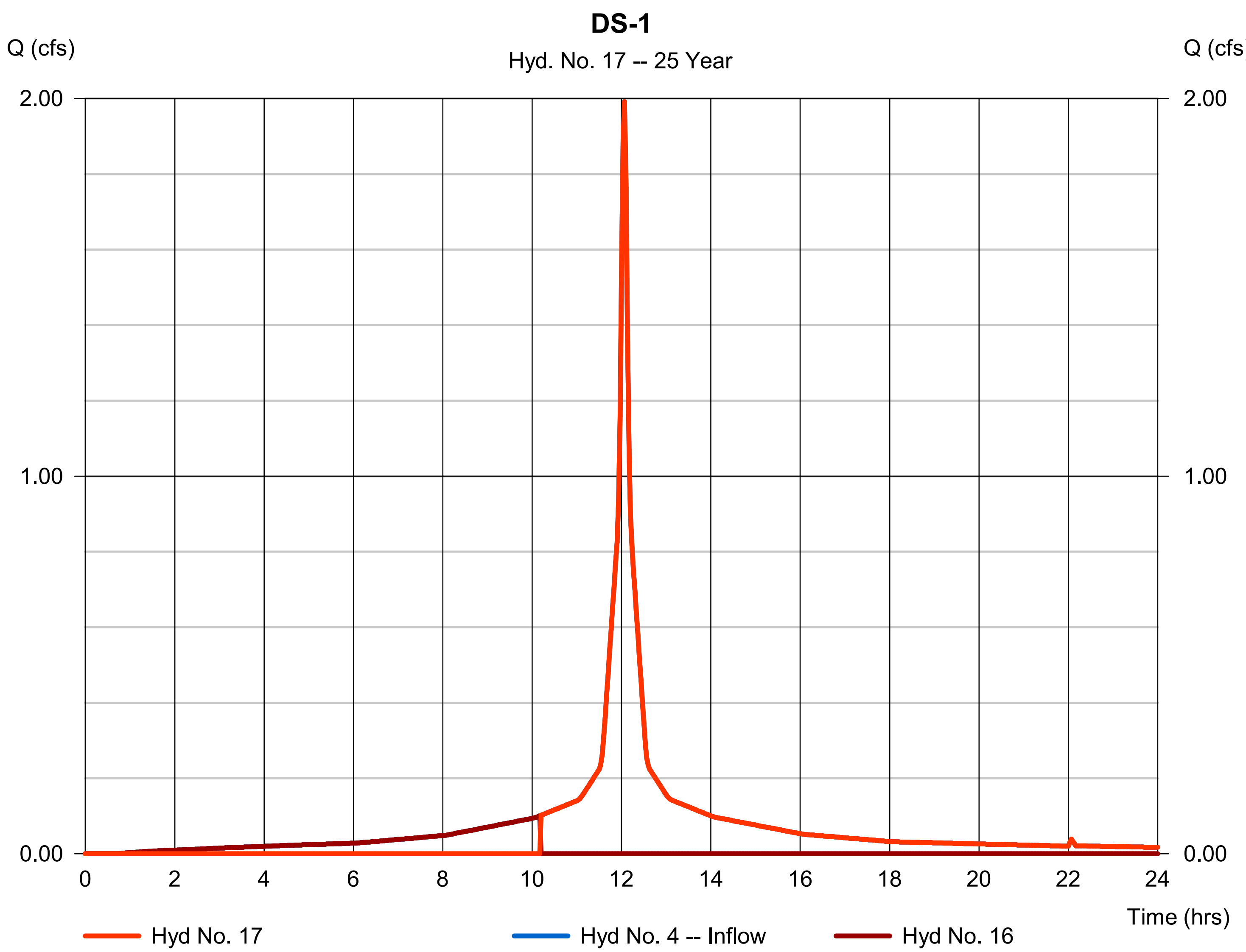
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 17

DS-1

Hydrograph type	= Diversion2	Peak discharge	= 1.992 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,746 cuft
Inflow hydrograph	= 4 - PR-R1b	2nd diverted hyd.	= 16
Diversion method	= First Flush Volume	Volume Up To	= 1,140 cuft



Hydrograph Report

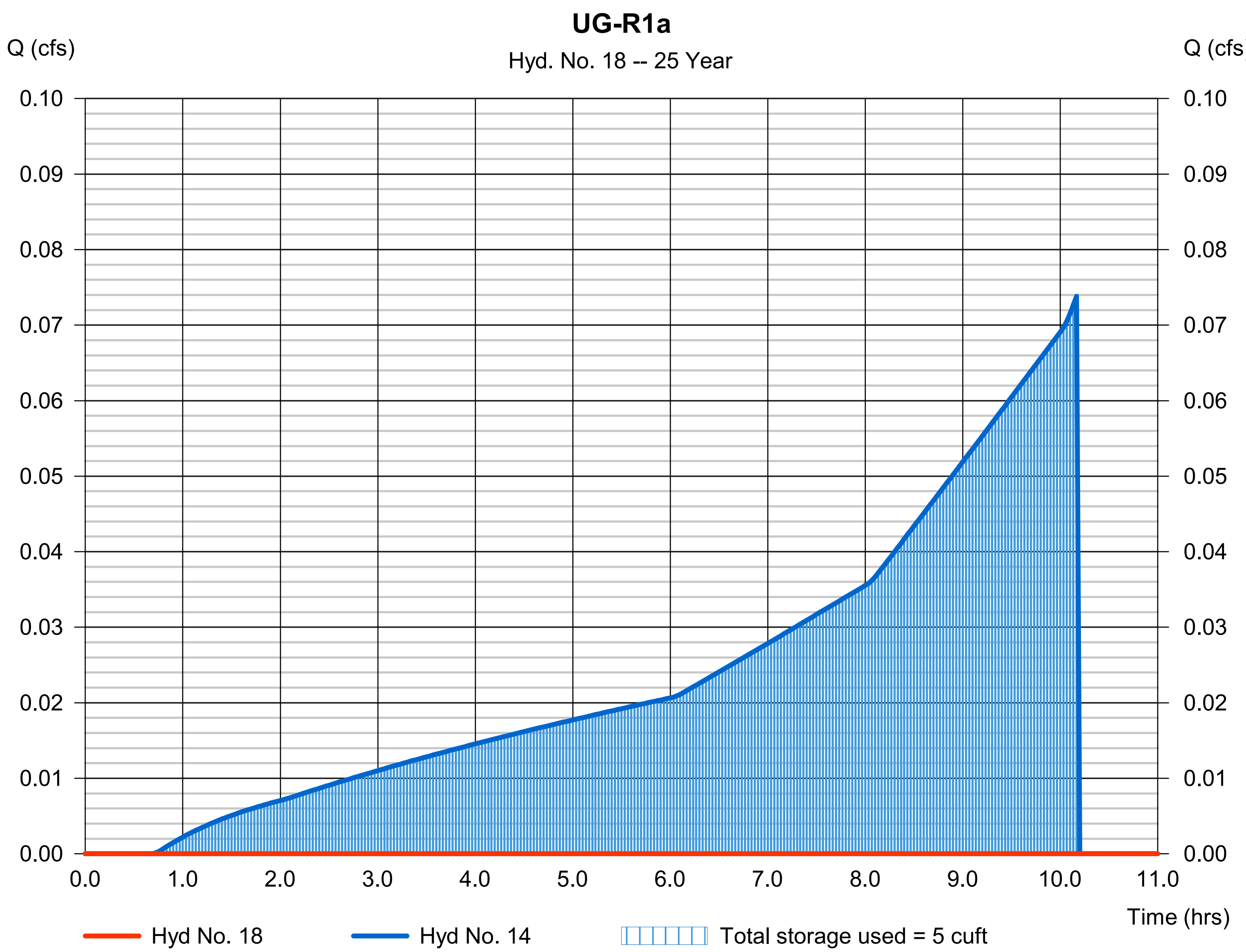
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 18

UG-R1a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 9.67 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - UG-R1a	Max. Elevation	= 276.15 ft
Reservoir name	= UG-R1a	Max. Storage	= 5 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

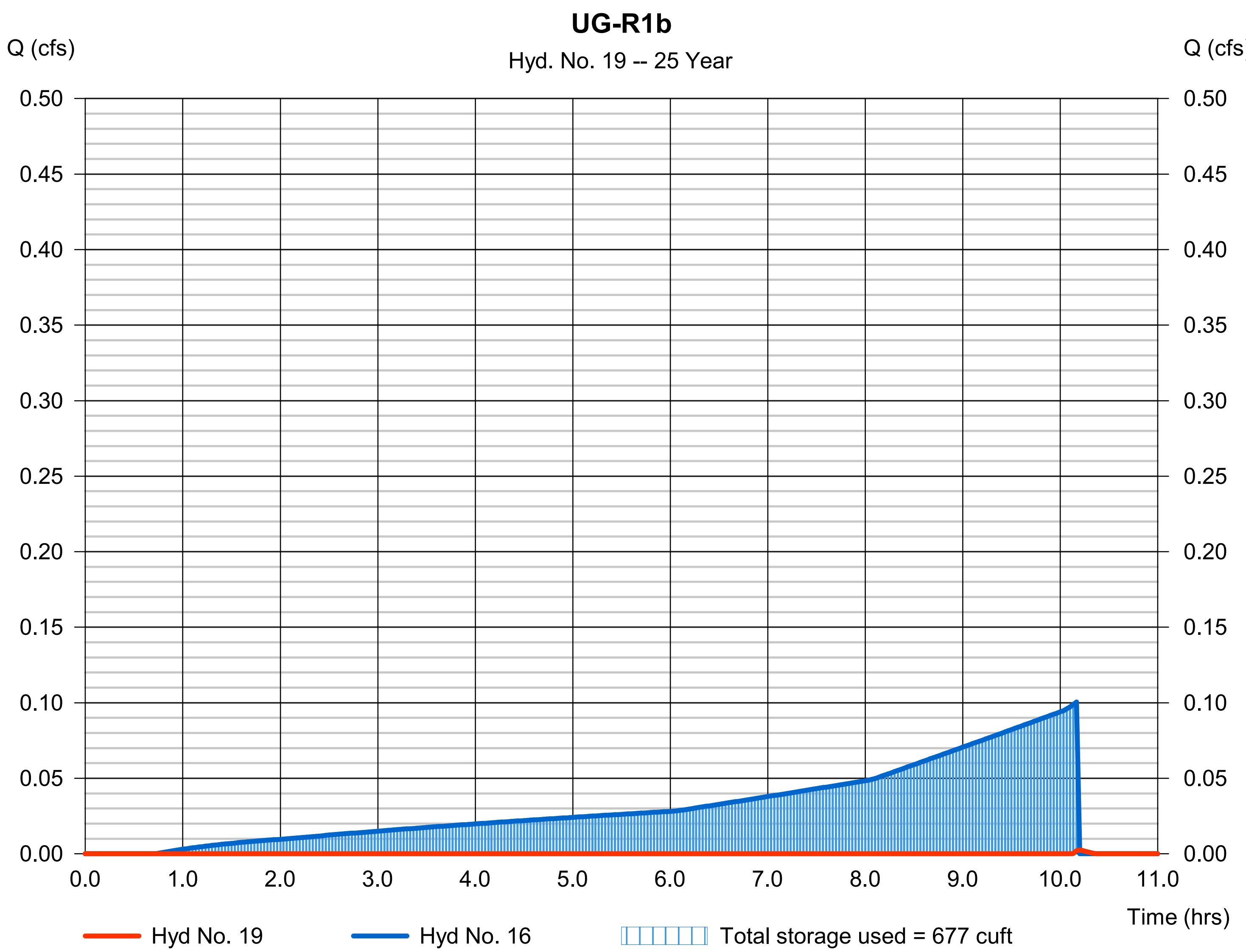
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 19

UG-R1b

Hydrograph type	= Reservoir	Peak discharge	= 0.003 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.20 hrs
Time interval	= 2 min	Hyd. volume	= 1 cuft
Inflow hyd. No.	= 16 - UG-R1b	Max. Elevation	= 277.99 ft
Reservoir name	= UG-R1b	Max. Storage	= 677 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

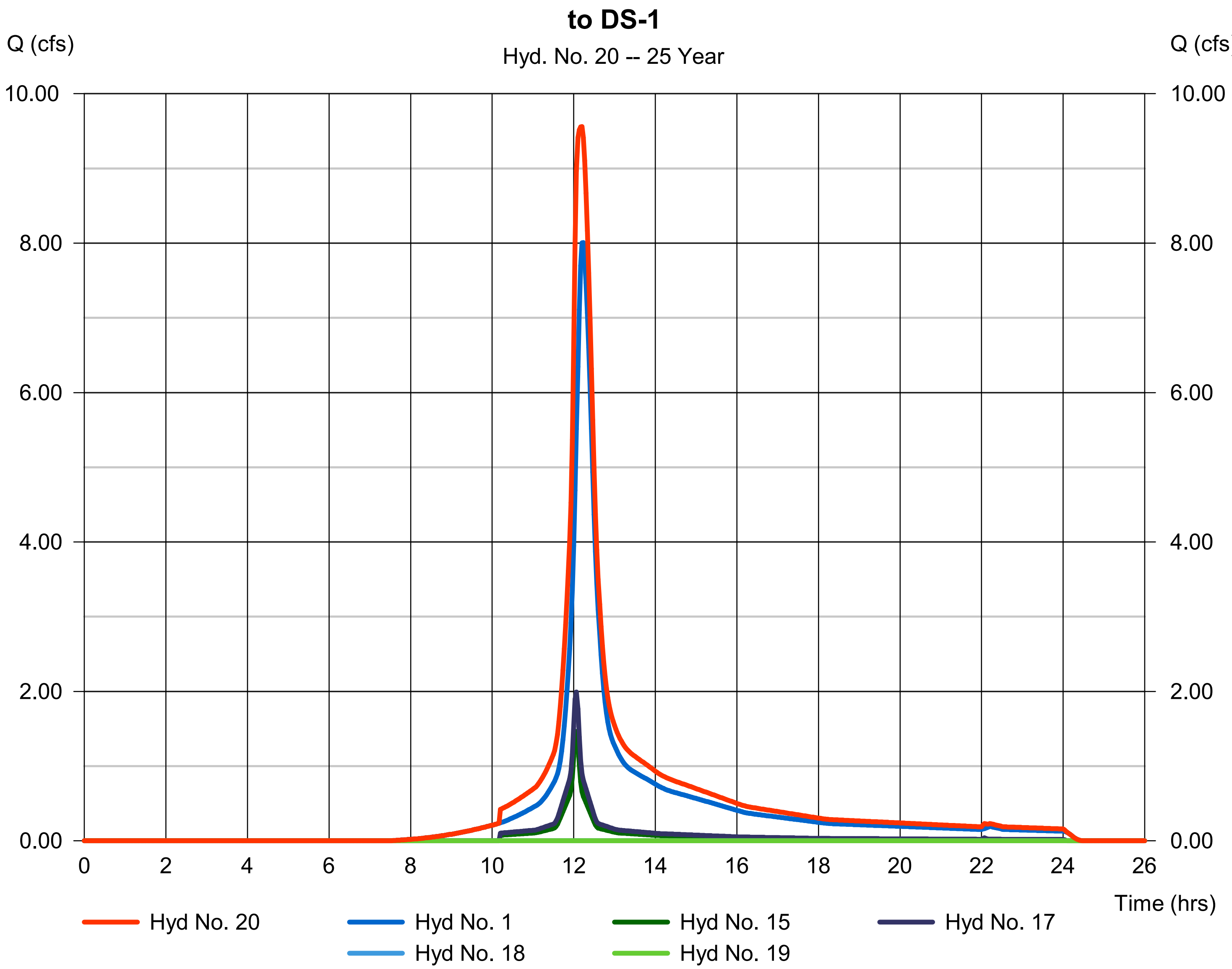


Hydrograph Report

Hyd. No. 20

to DS-1

Hydrograph type	= Combine	Peak discharge	= 9.560 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 45,390 cuft
Inflow hyds.	= 1, 15, 17, 18, 19	Contrib. drain. area	= 2.670 ac



Hydrograph Report

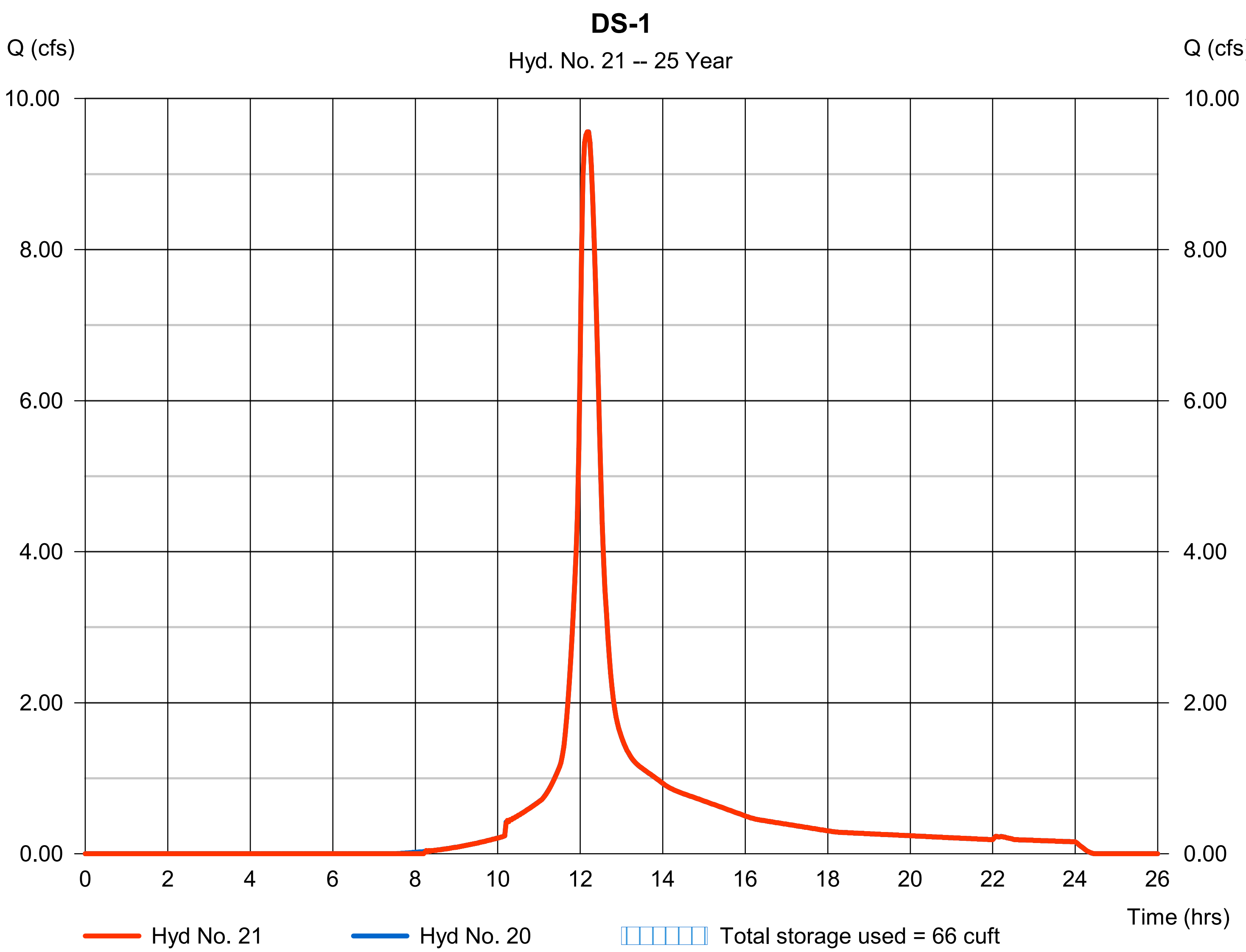
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 21

DS-1

Hydrograph type	= Reservoir	Peak discharge	= 9.558 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 45,352 cuft
Inflow hyd. No.	= 20 - to DS-1	Max. Elevation	= 270.75 ft
Reservoir name	= DS-1	Max. Storage	= 66 cuft

Storage Indication method used.



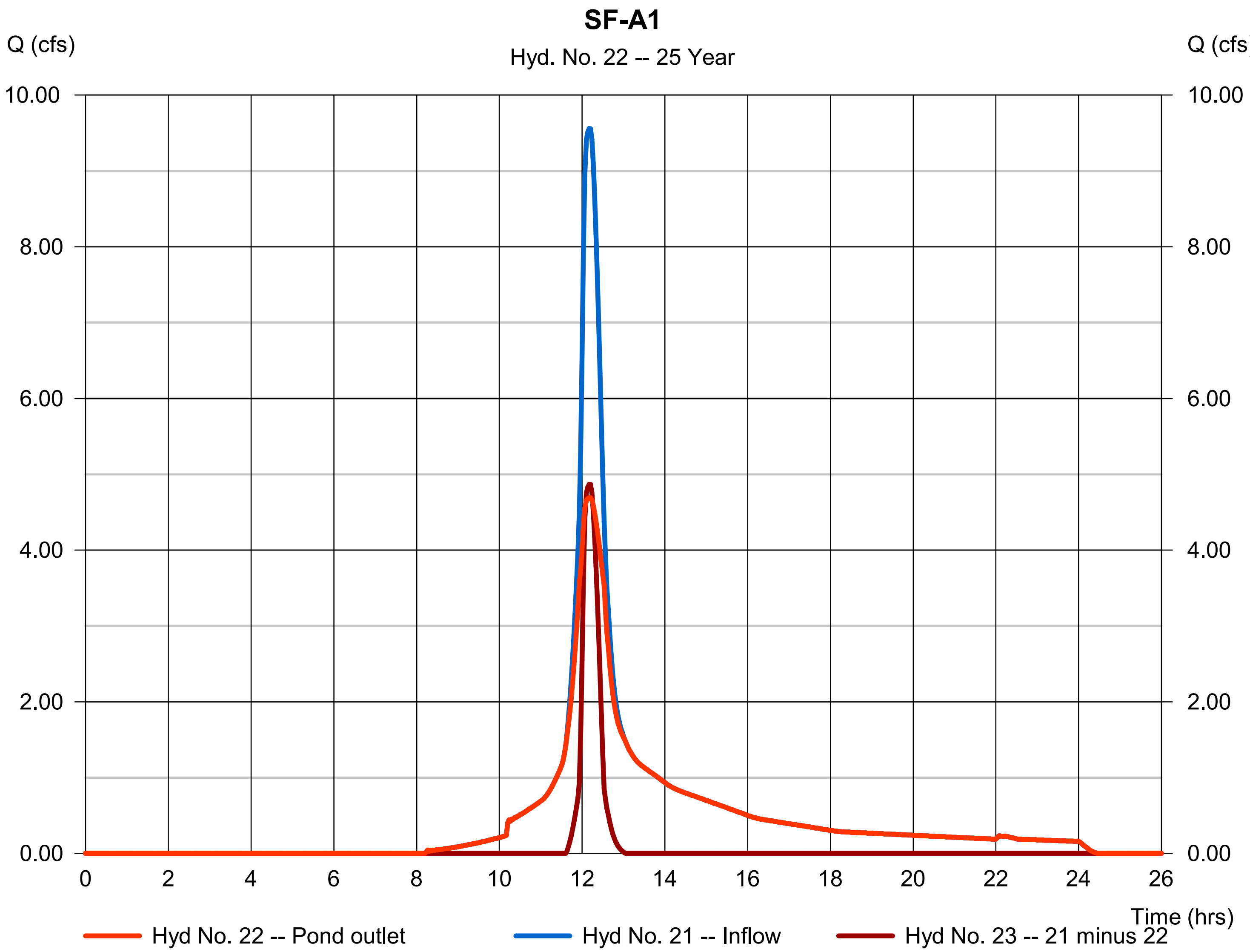
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 22

SF-A1

Hydrograph type	= Diversion1	Peak discharge	= 4.691 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 37,083 cuft
Inflow hydrograph	= 21 - DS-1	2nd diverted hyd.	= 23
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



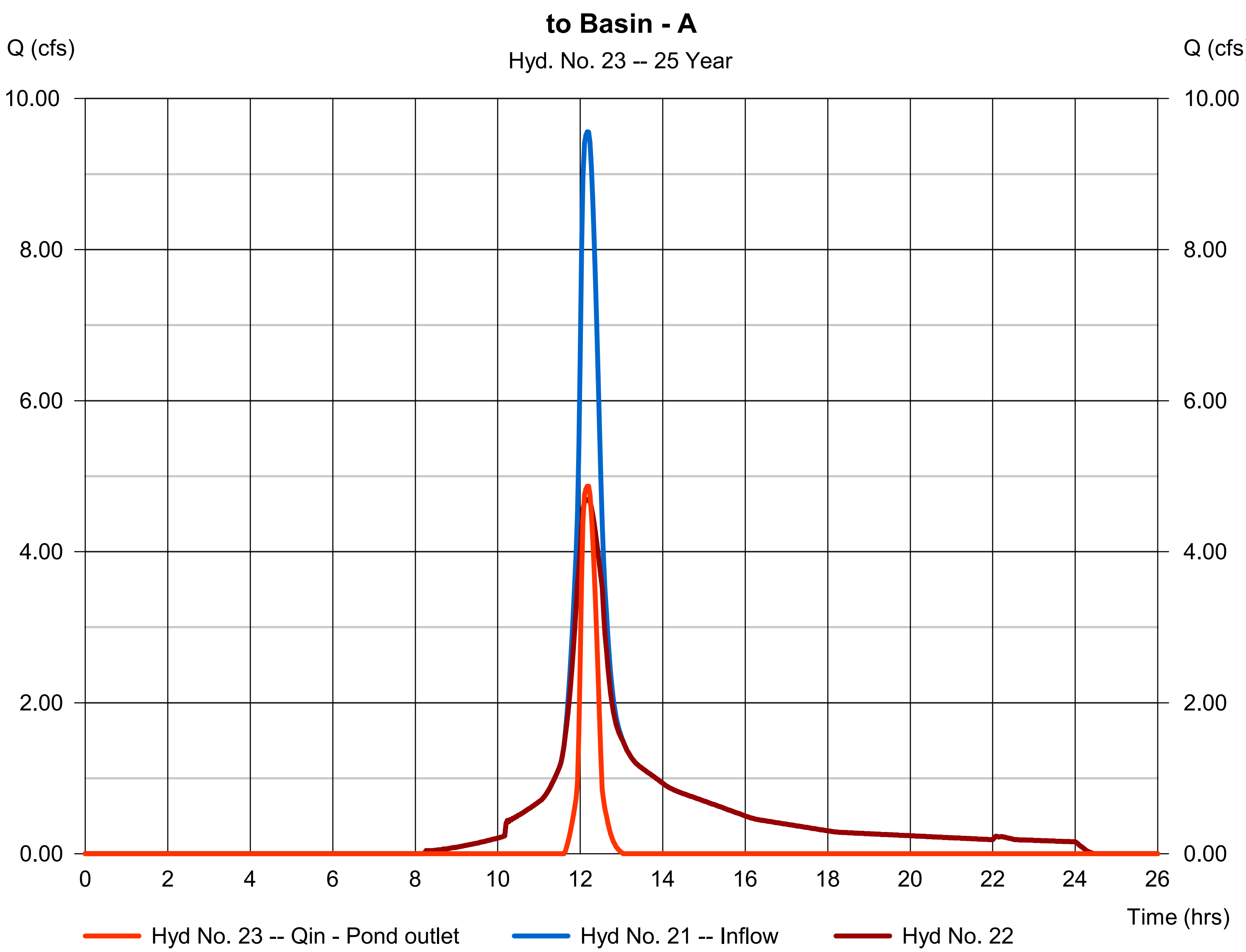
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 23

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 4.867 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 8,269 cuft
Inflow hydrograph	= 21 - DS-1	2nd diverted hyd.	= 22
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



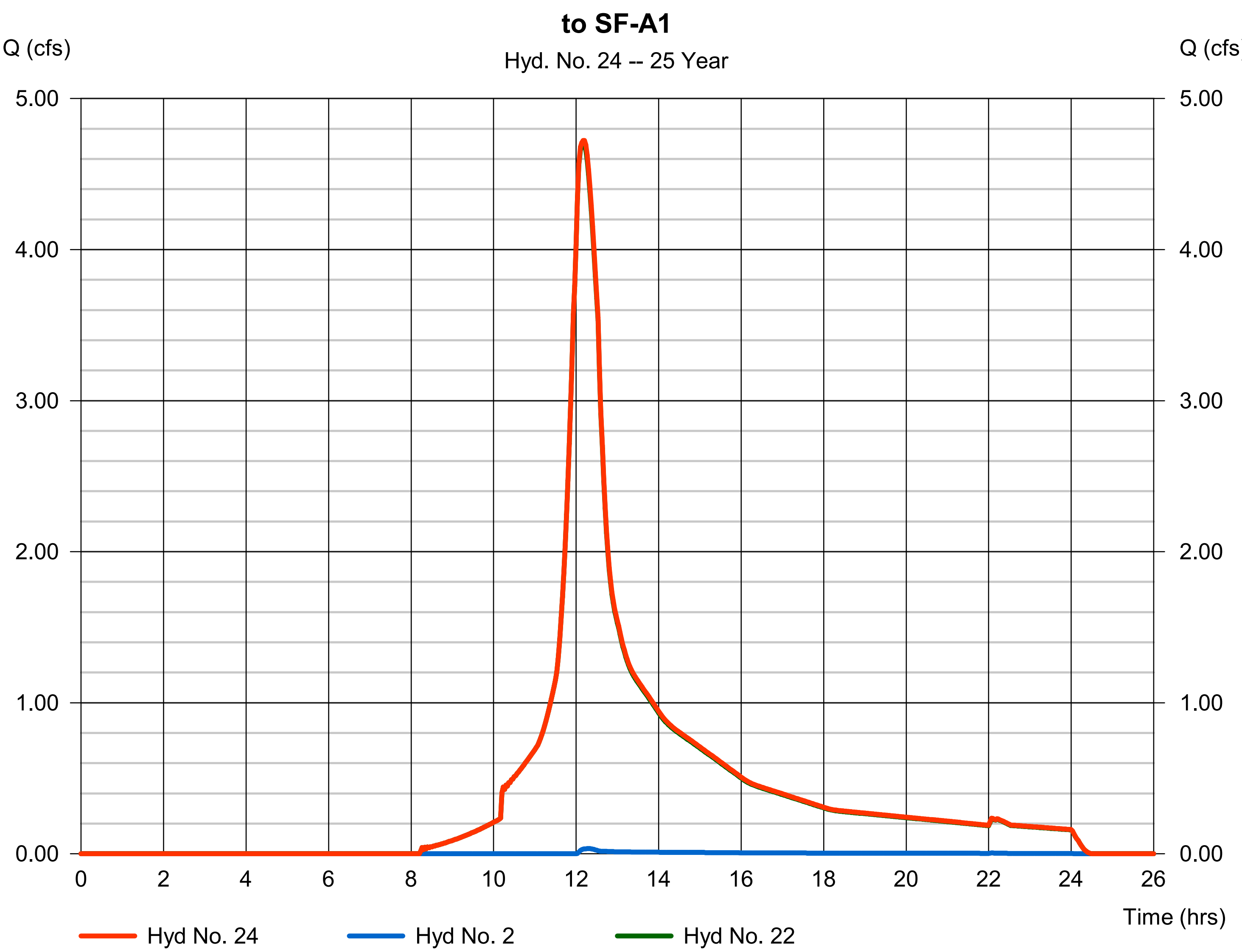
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 24

to SF-A1

Hydrograph type	= Combine	Peak discharge	= 4.723 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 37,375 cuft
Inflow hyds.	= 2, 22	Contrib. drain. area	= 0.170 ac



Hydrograph Report

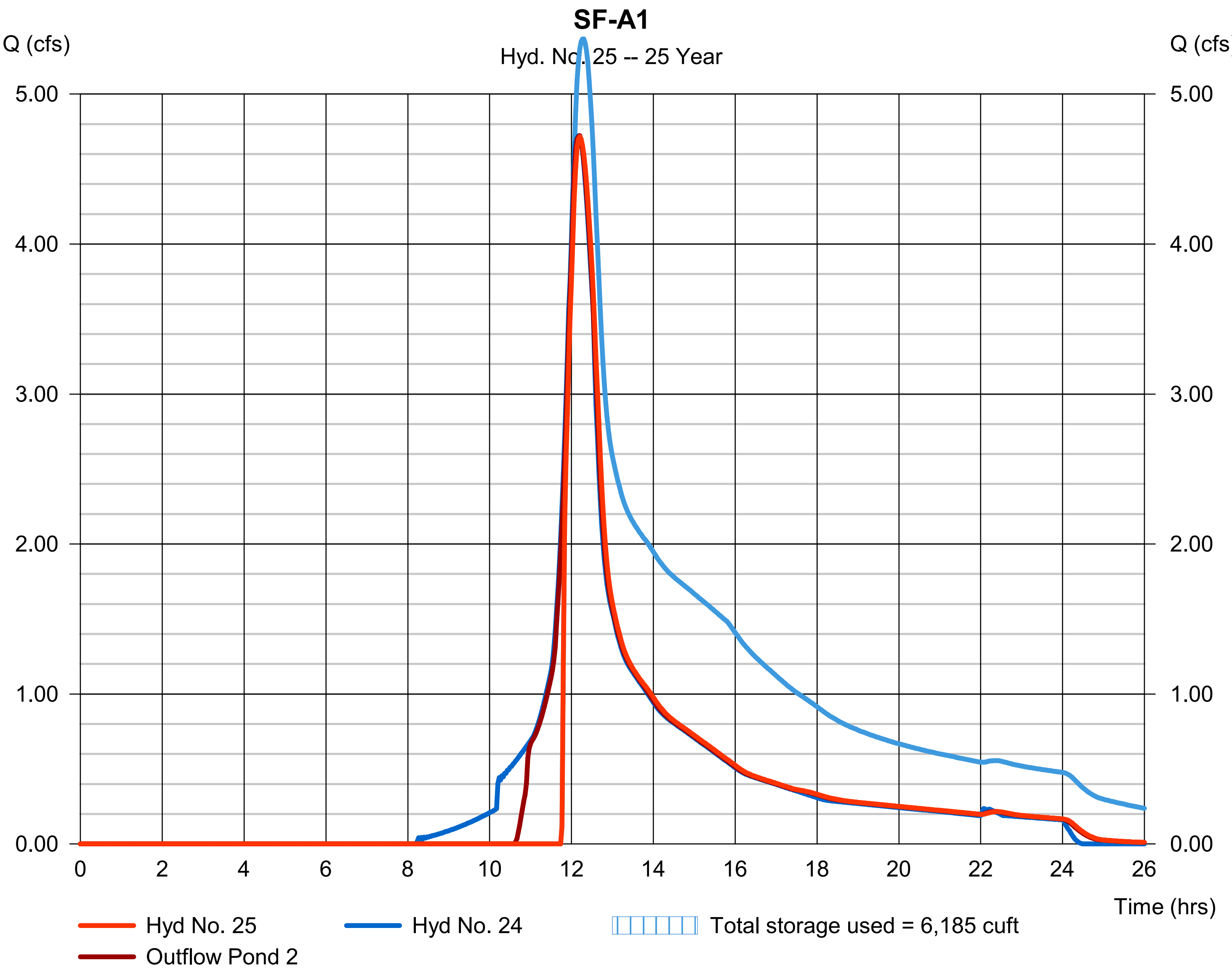
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 25

SF-A1

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 4.717 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 32,487 cuft
Upper Pond	= Sediment Forebay - A1	**Lower Pond**	= Sand Filter - A1
Inflow hyd.	= 24 - to SF-A1	Other Inflow hyd.	= None
Max. Elevation	= 271.79 ft	Max. Elevation	= 271.45 ft
Max. Storage	= 2,324 cuft	Max. Storage	= 3,861 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



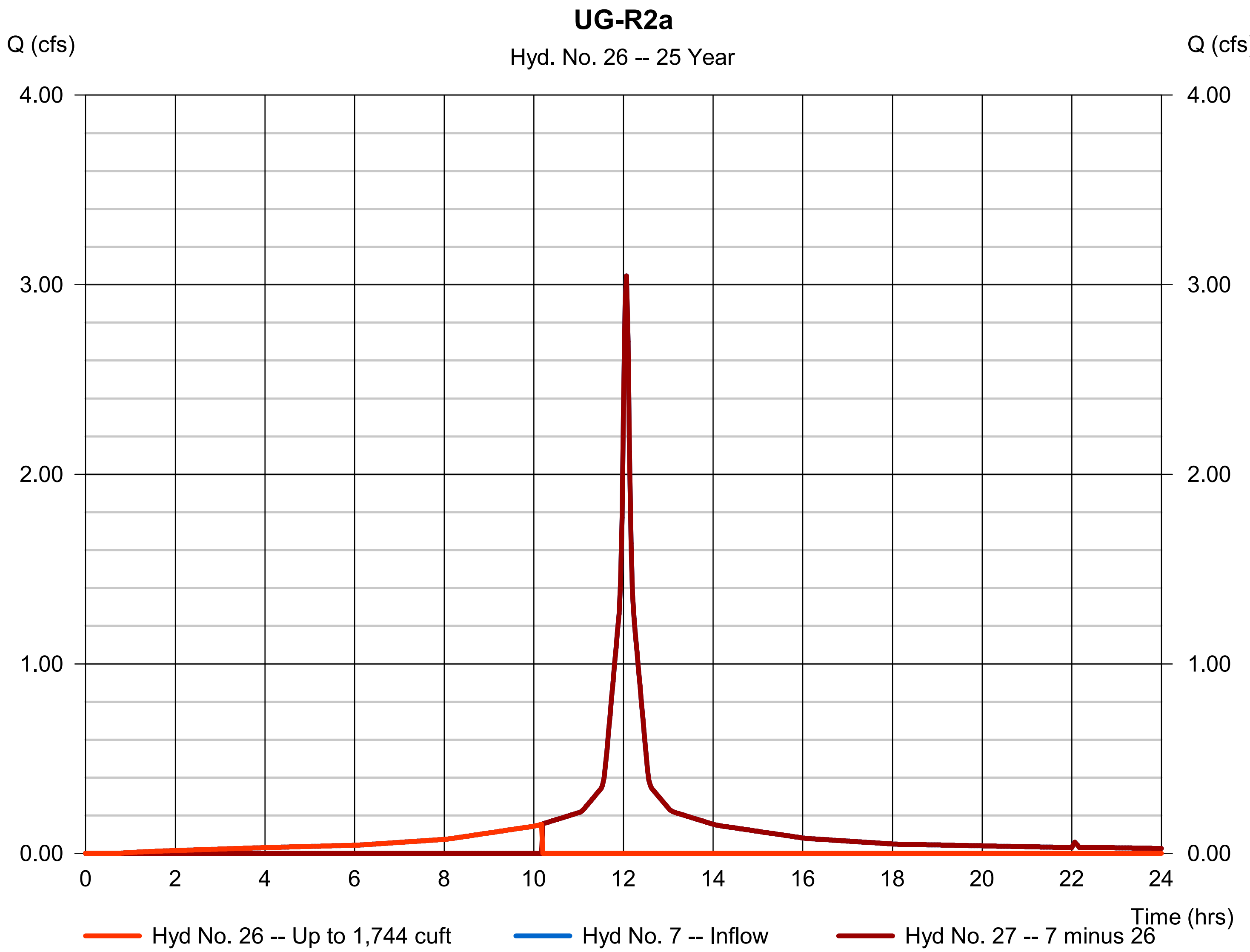
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 26

UG-R2a

Hydrograph type	= Diversion1	Peak discharge	= 0.154 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.17 hrs
Time interval	= 2 min	Hyd. volume	= 1,762 cuft
Inflow hydrograph	= 7 - PR-R2a	2nd diverted hyd.	= 27
Diversion method	= First Flush Volume	Volume Up To	= 1,744 cuft



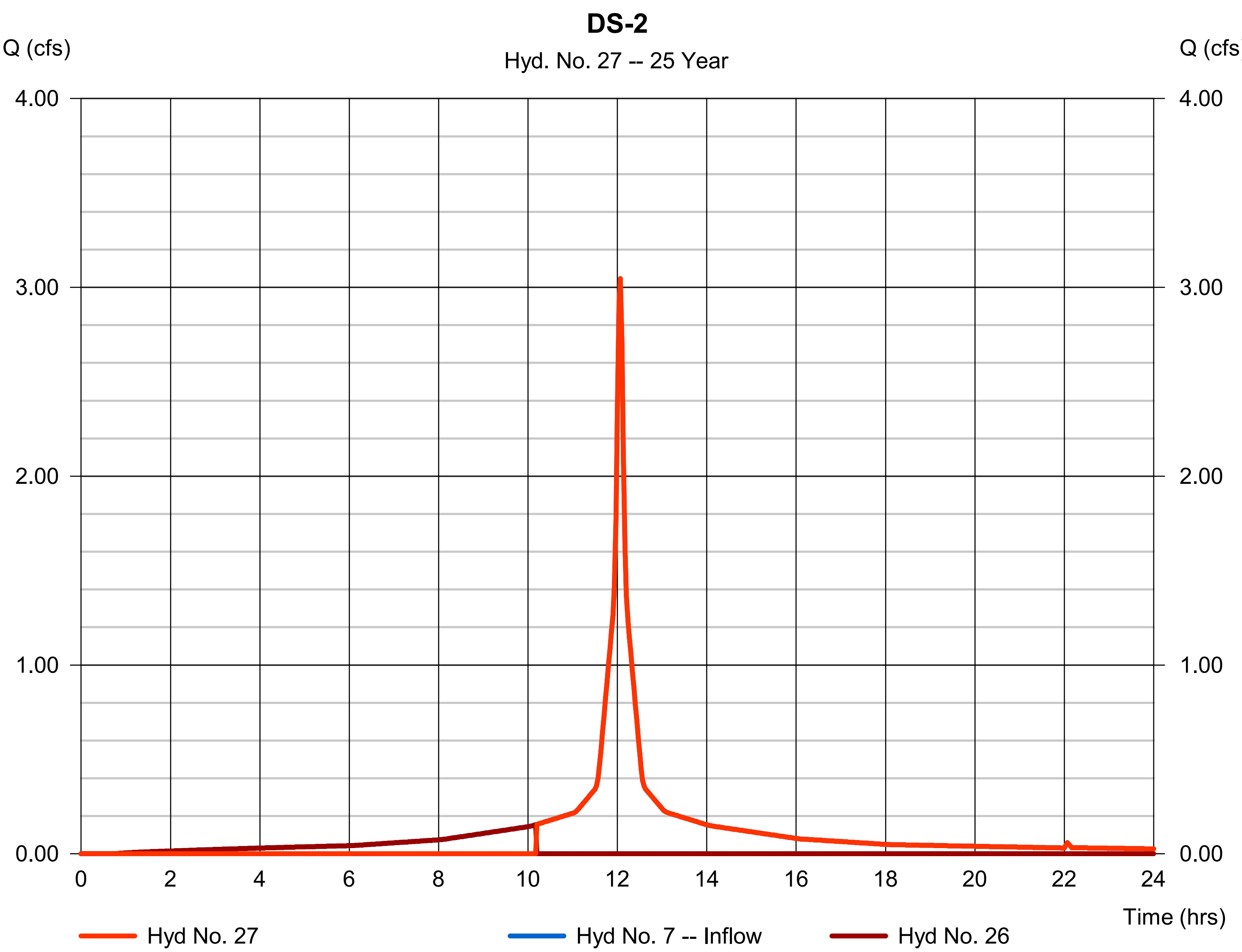
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 27

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 3.046 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 8,788 cuft
Inflow hydrograph	= 7 - PR-R2a	2nd diverted hyd.	= 26
Diversion method	= First Flush Volume	Volume Up To	= 1,744 cuft



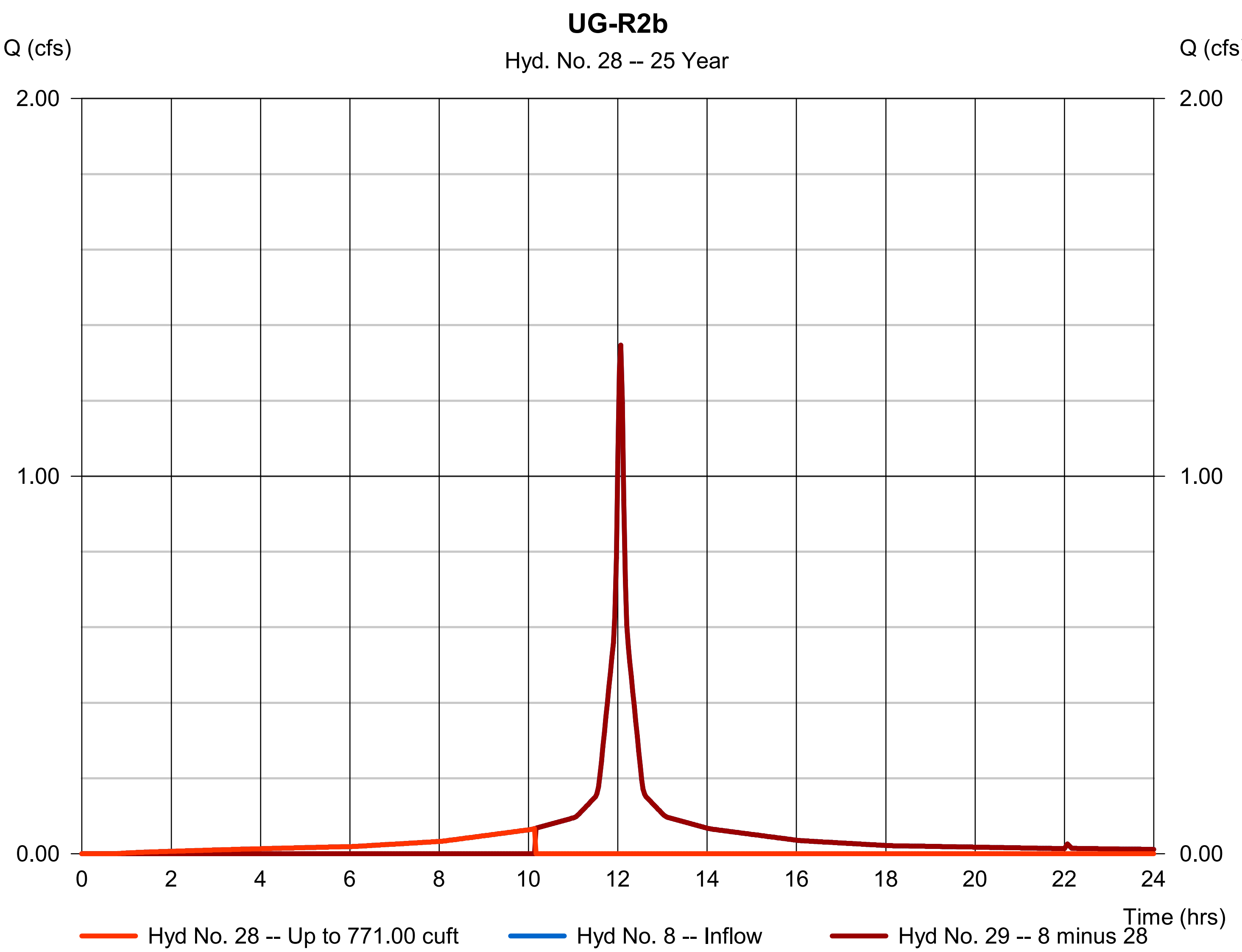
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 28

UG-R2b

Hydrograph type	= Diversion1	Peak discharge	= 0.067 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.13 hrs
Time interval	= 2 min	Hyd. volume	= 771 cuft
Inflow hydrograph	= 8 - PR-R2b	2nd diverted hyd.	= 29
Diversion method	= First Flush Volume	Volume Up To	= 771.00 cuft



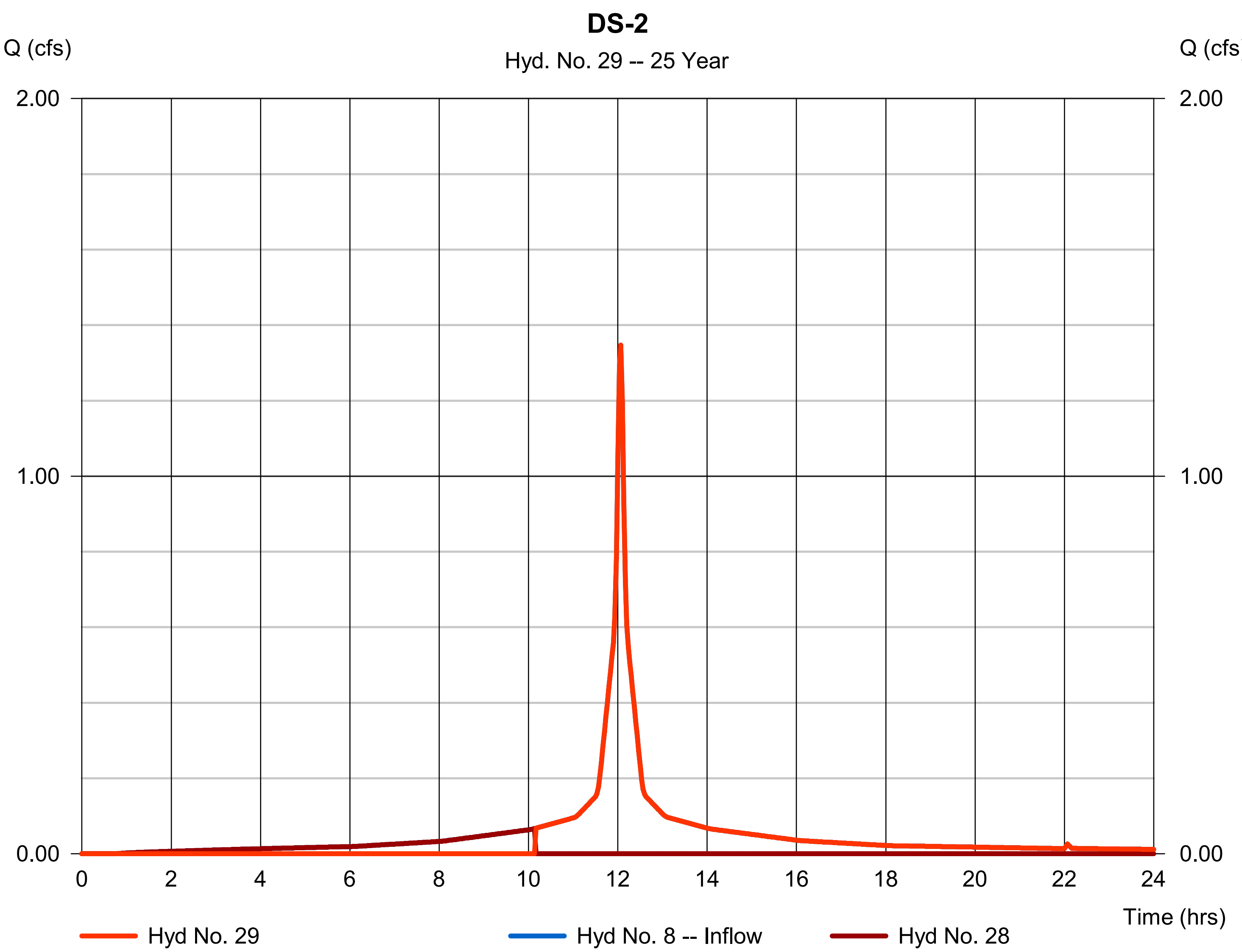
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 29

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 1.347 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,895 cuft
Inflow hydrograph	= 8 - PR-R2b	2nd diverted hyd.	= 28
Diversion method	= First Flush Volume	Volume Up To	= 771.00 cuft



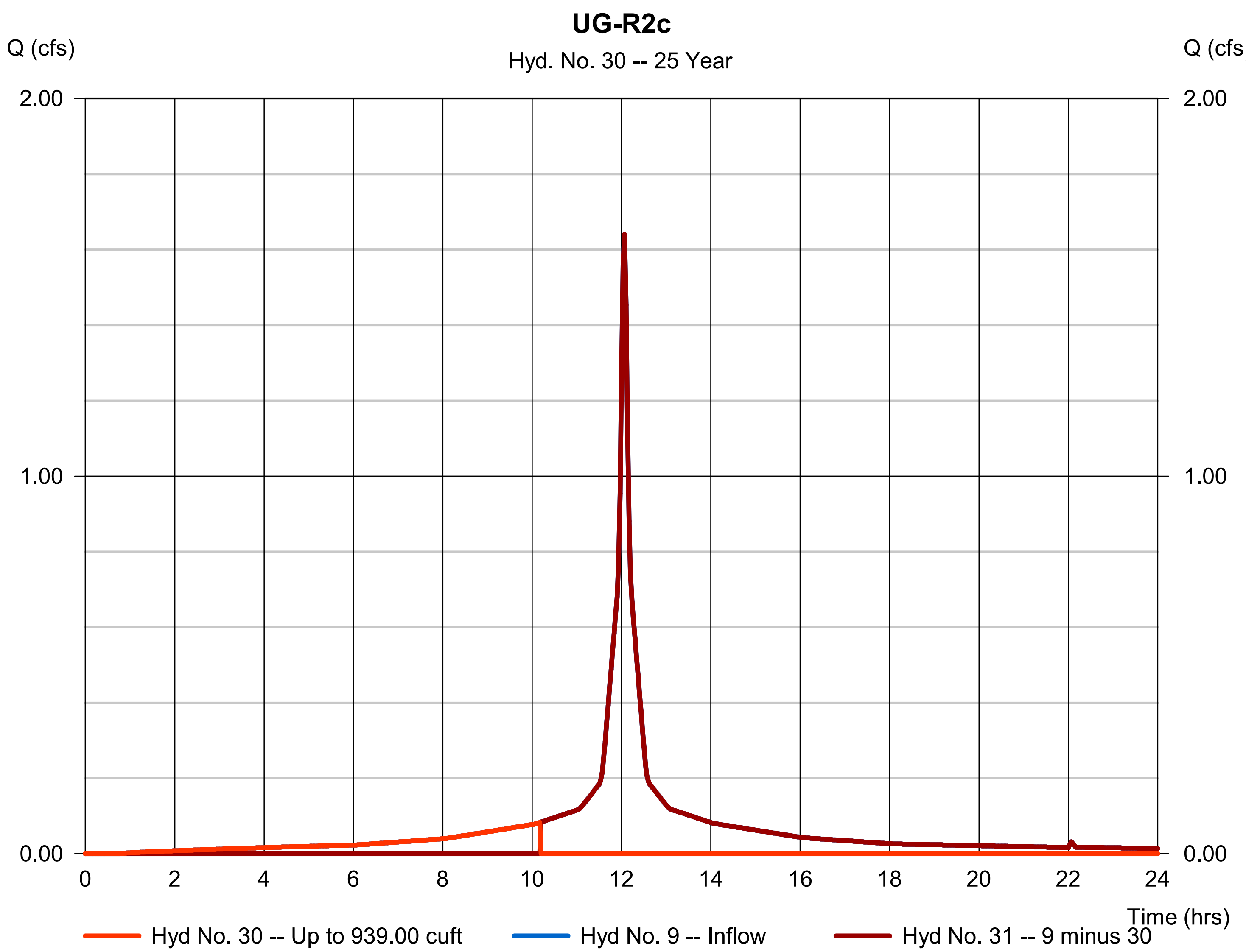
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 30

UG-R2c

Hydrograph type	= Diversion1	Peak discharge	= 0.083 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.17 hrs
Time interval	= 2 min	Hyd. volume	= 949 cuft
Inflow hydrograph	= 9 - PR-R2c	2nd diverted hyd.	= 31
Diversion method	= First Flush Volume	Volume Up To	= 939.00 cuft



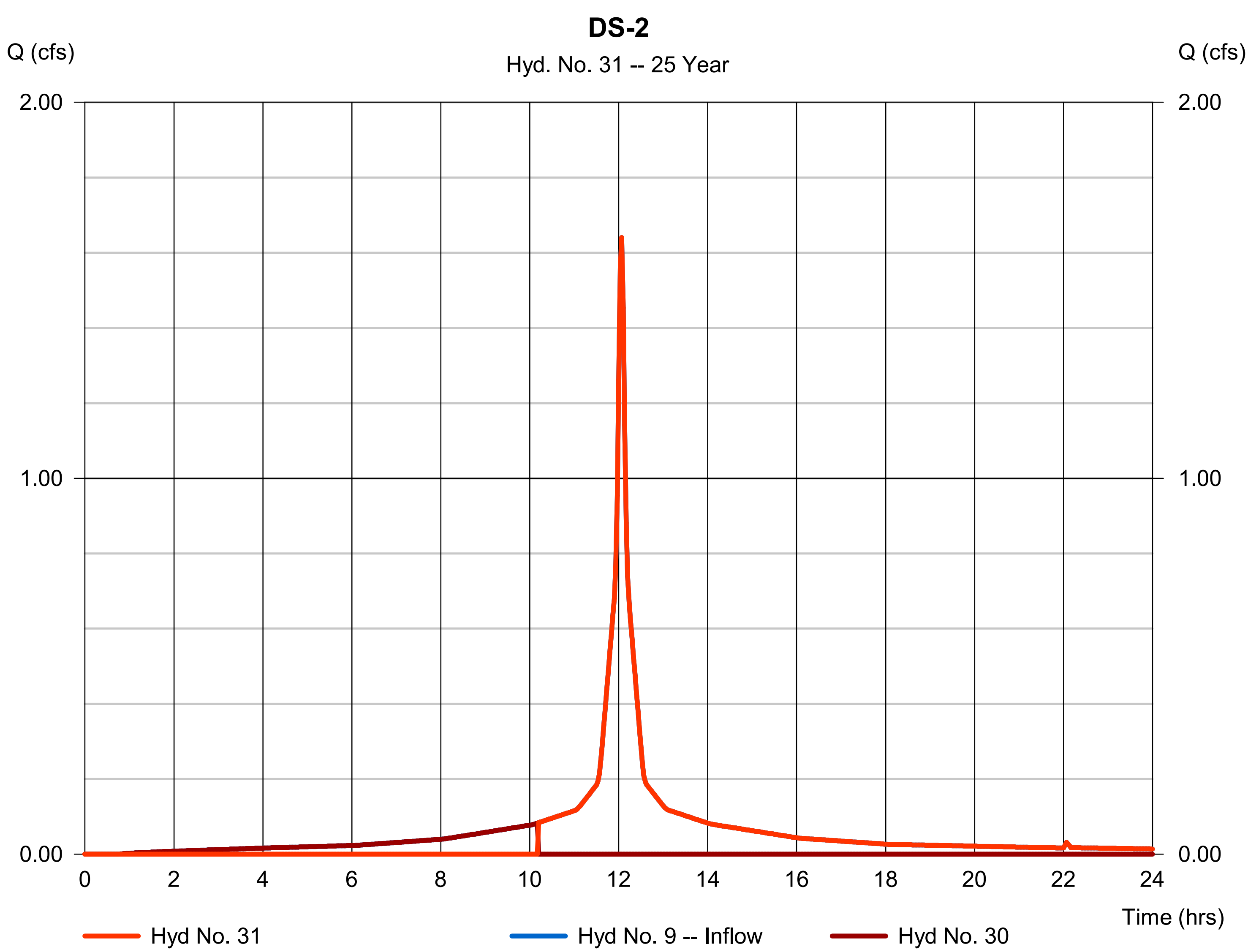
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 31

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 1.640 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,732 cuft
Inflow hydrograph	= 9 - PR-R2c	2nd diverted hyd.	= 30
Diversion method	= First Flush Volume	Volume Up To	= 939.00 cuft



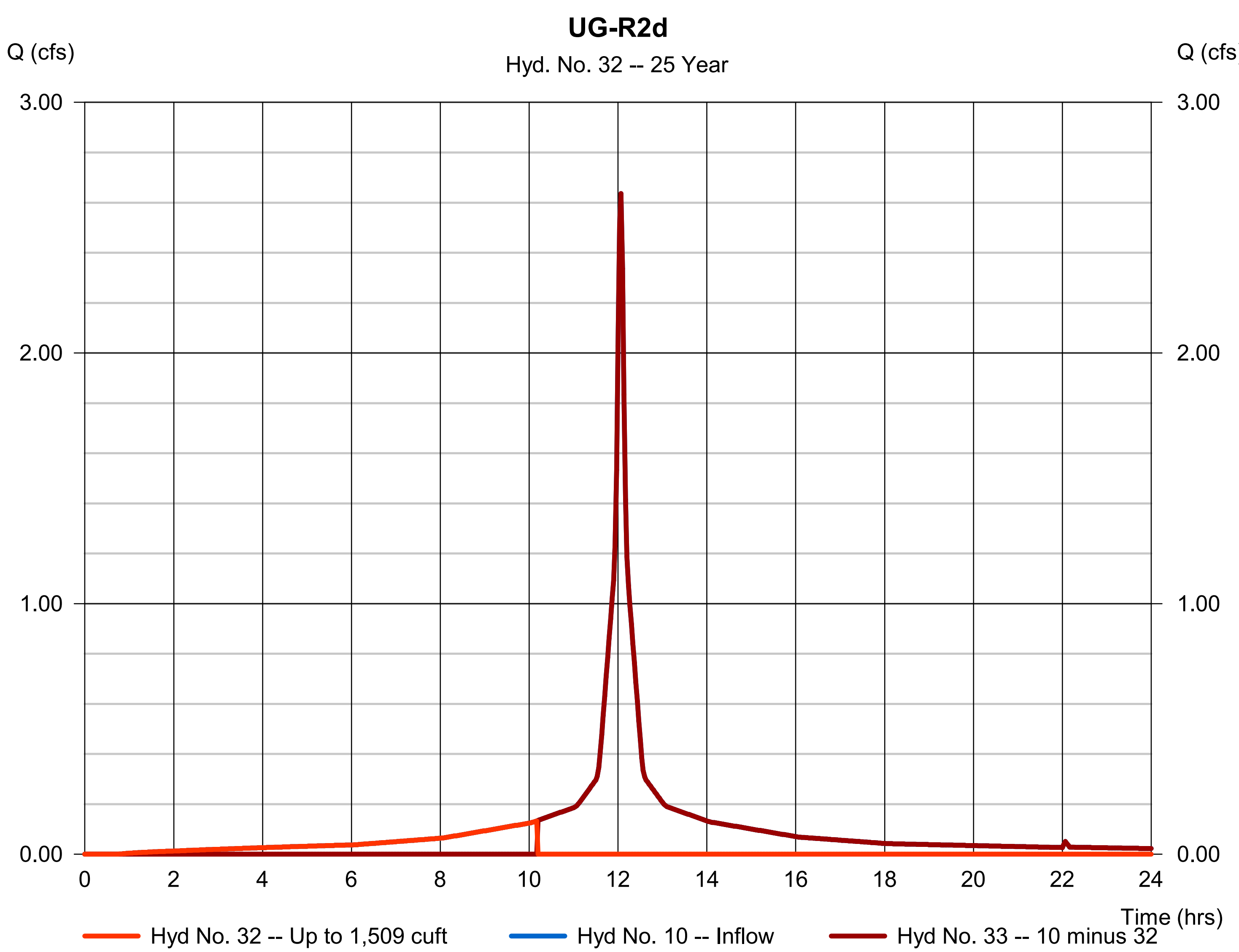
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 32

UG-R2d

Hydrograph type	= Diversion1	Peak discharge	= 0.133 cfs
Storm frequency	= 25 yrs	Time to peak	= 10.17 hrs
Time interval	= 2 min	Hyd. volume	= 1,525 cuft
Inflow hydrograph	= 10 - PR-R2d	2nd diverted hyd.	= 33
Diversion method	= First Flush Volume	Volume Up To	= 1,509 cuft



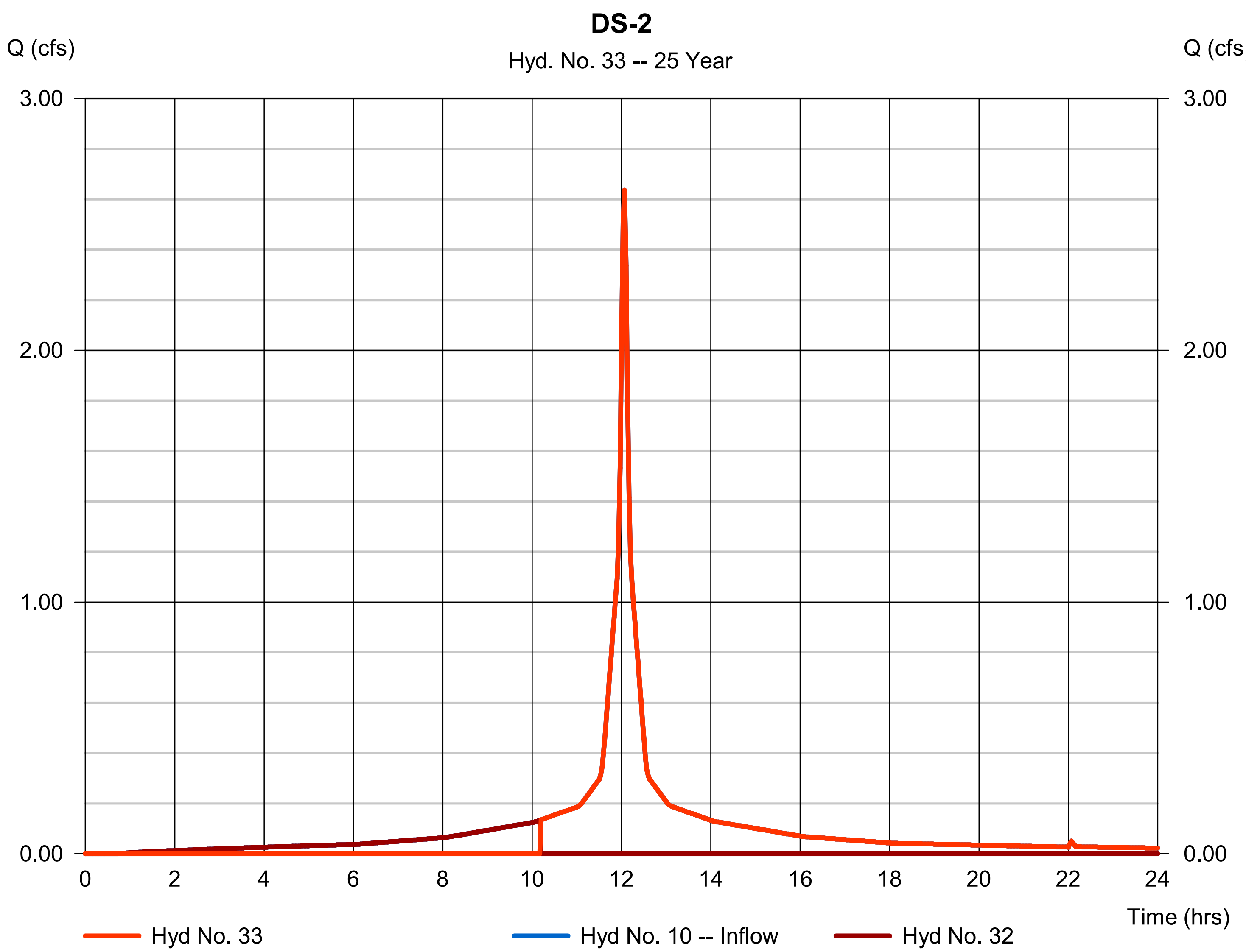
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 33

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 2.636 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 7,605 cuft
Inflow hydrograph	= 10 - PR-R2d	2nd diverted hyd.	= 32
Diversion method	= First Flush Volume	Volume Up To	= 1,509 cuft



Hydrograph Report

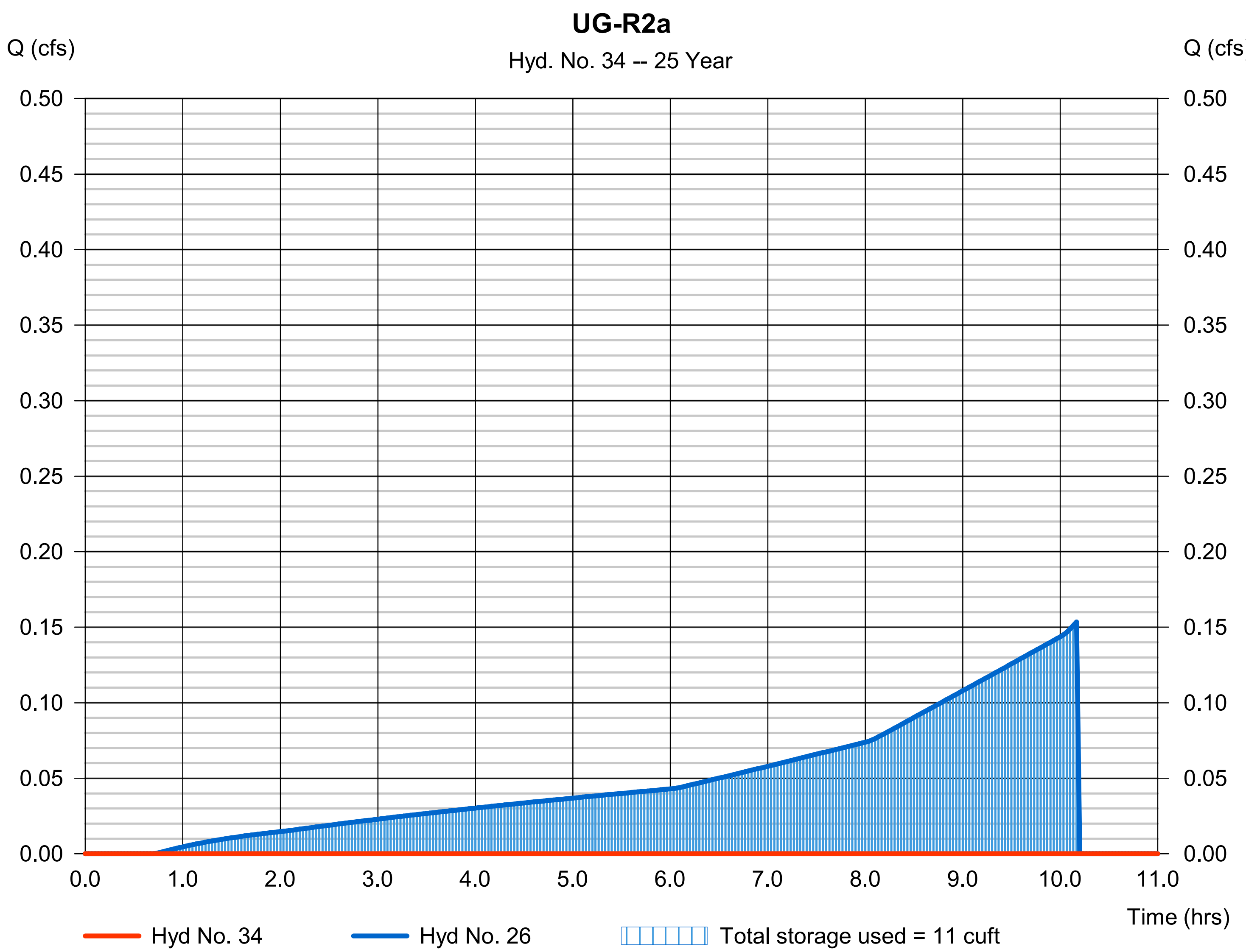
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 34

UG-R2a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 26 - UG-R2a	Max. Elevation	= 276.09 ft
Reservoir name	= UG-R2a	Max. Storage	= 11 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

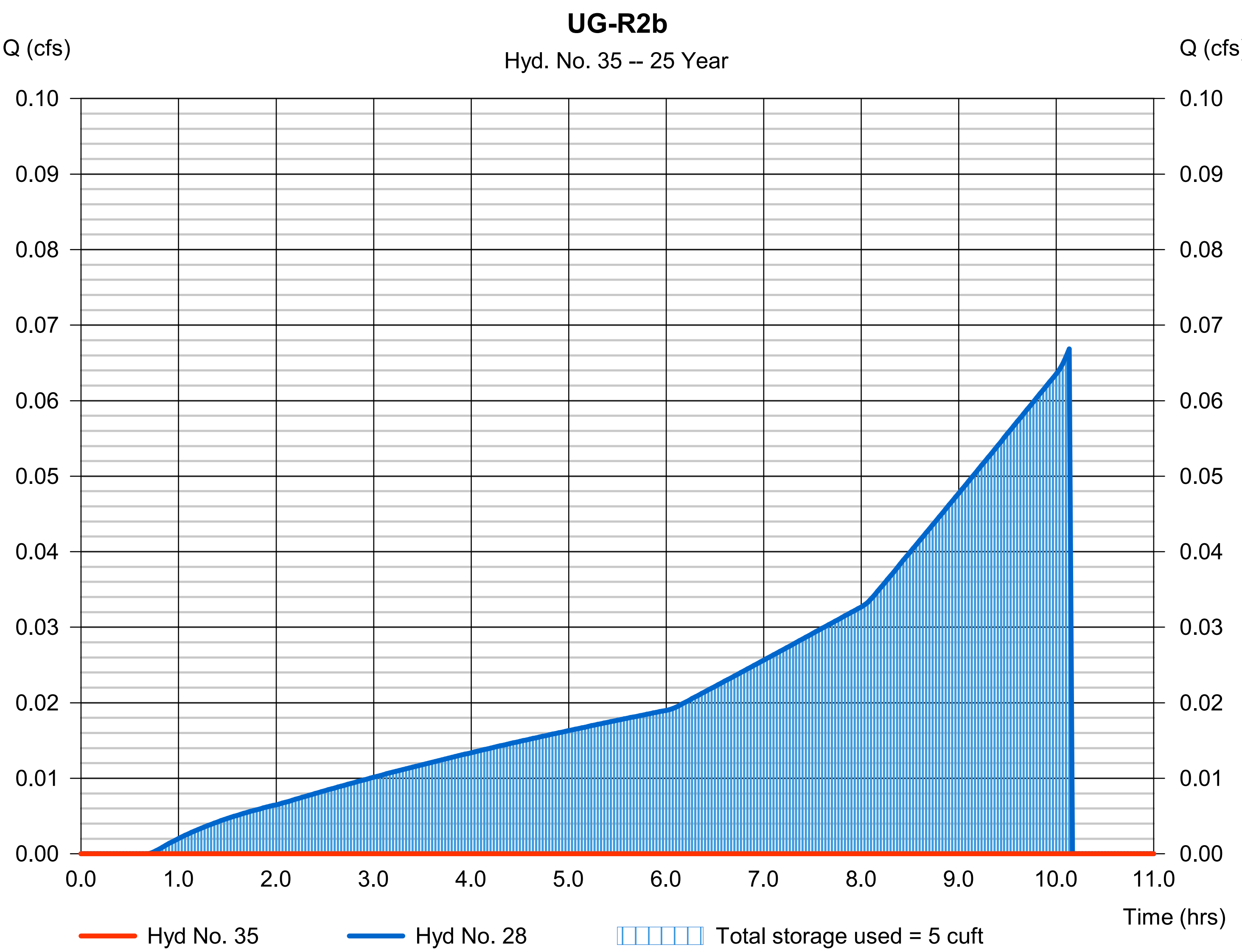
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 35

UG-R2b

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 28 - UG-R2b	Max. Elevation	= 276.33 ft
Reservoir name	= UG-R2b	Max. Storage	= 5 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

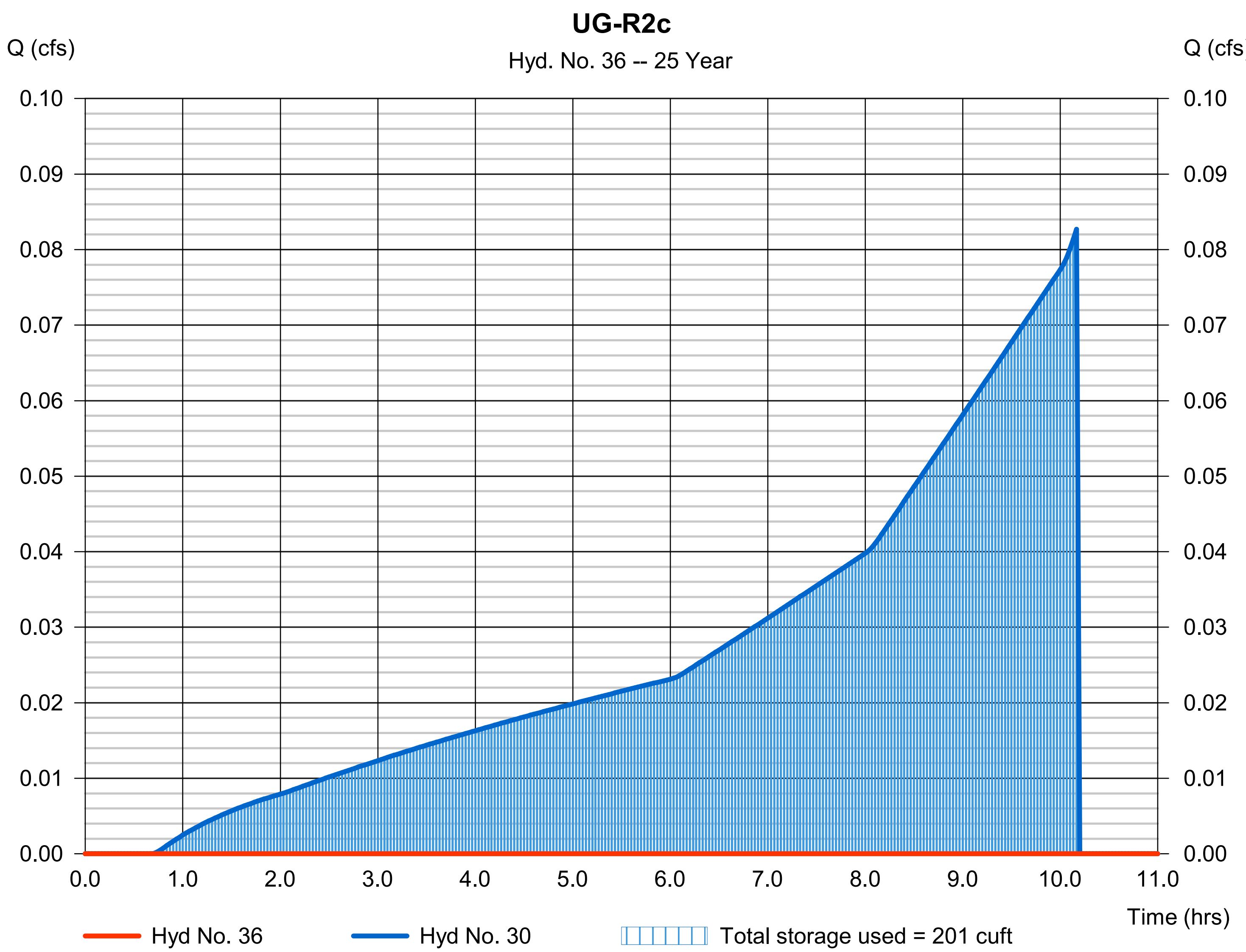
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 36

UG-R2c

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 30 - UG-R2c	Max. Elevation	= 278.03 ft
Reservoir name	= UG-R2c	Max. Storage	= 201 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

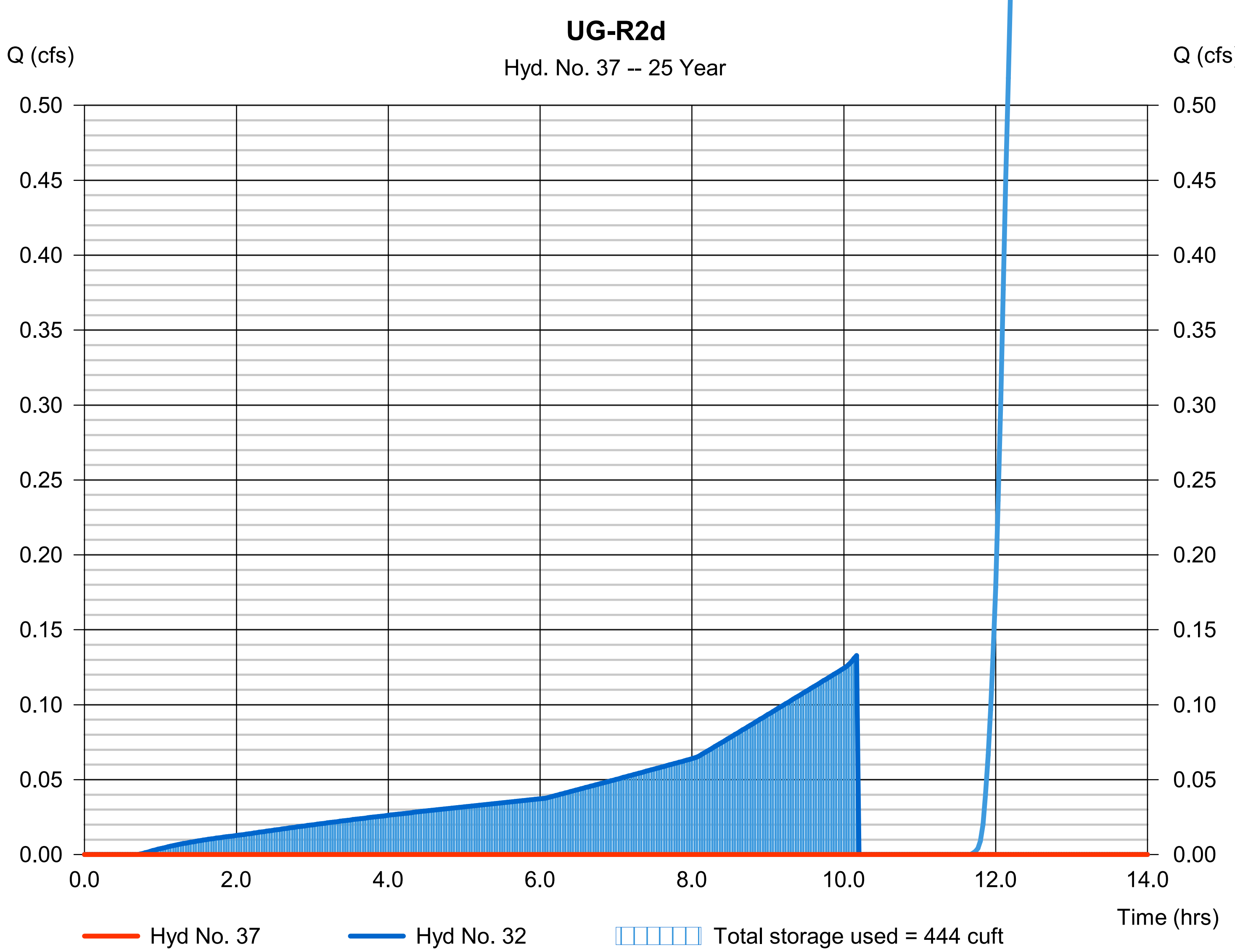
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 37

UG-R2d

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 4.97 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 32 - UG-R2d	Max. Elevation	= 276.10 ft
Reservoir name	= UG-R2d	Max. Storage	= 444 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



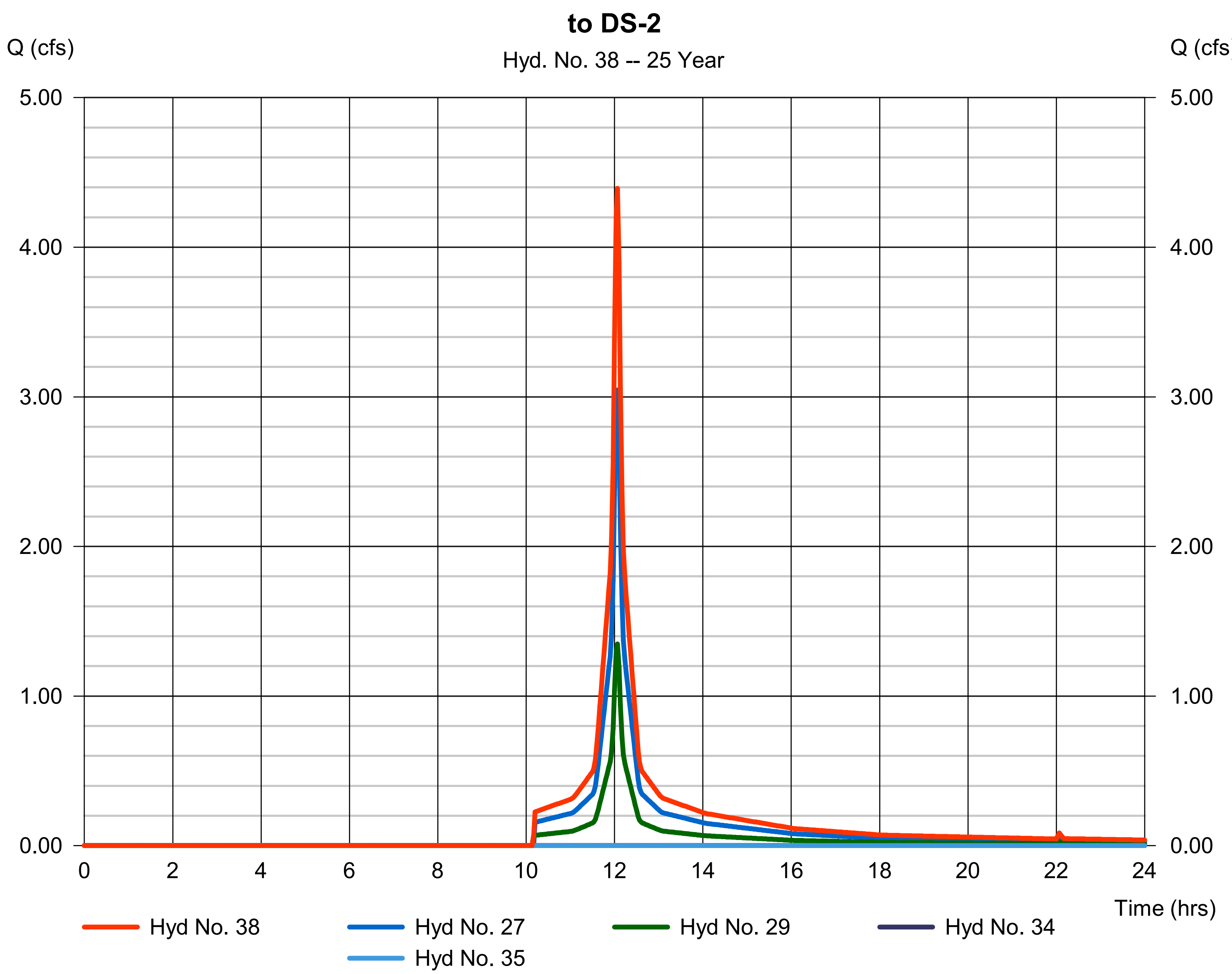
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 38

to DS-2

Hydrograph type	= Combine	Peak discharge	= 4.393 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 12,683 cuft
Inflow hyds.	= 27, 29, 34, 35	Contrib. drain. area	= 0.000 ac



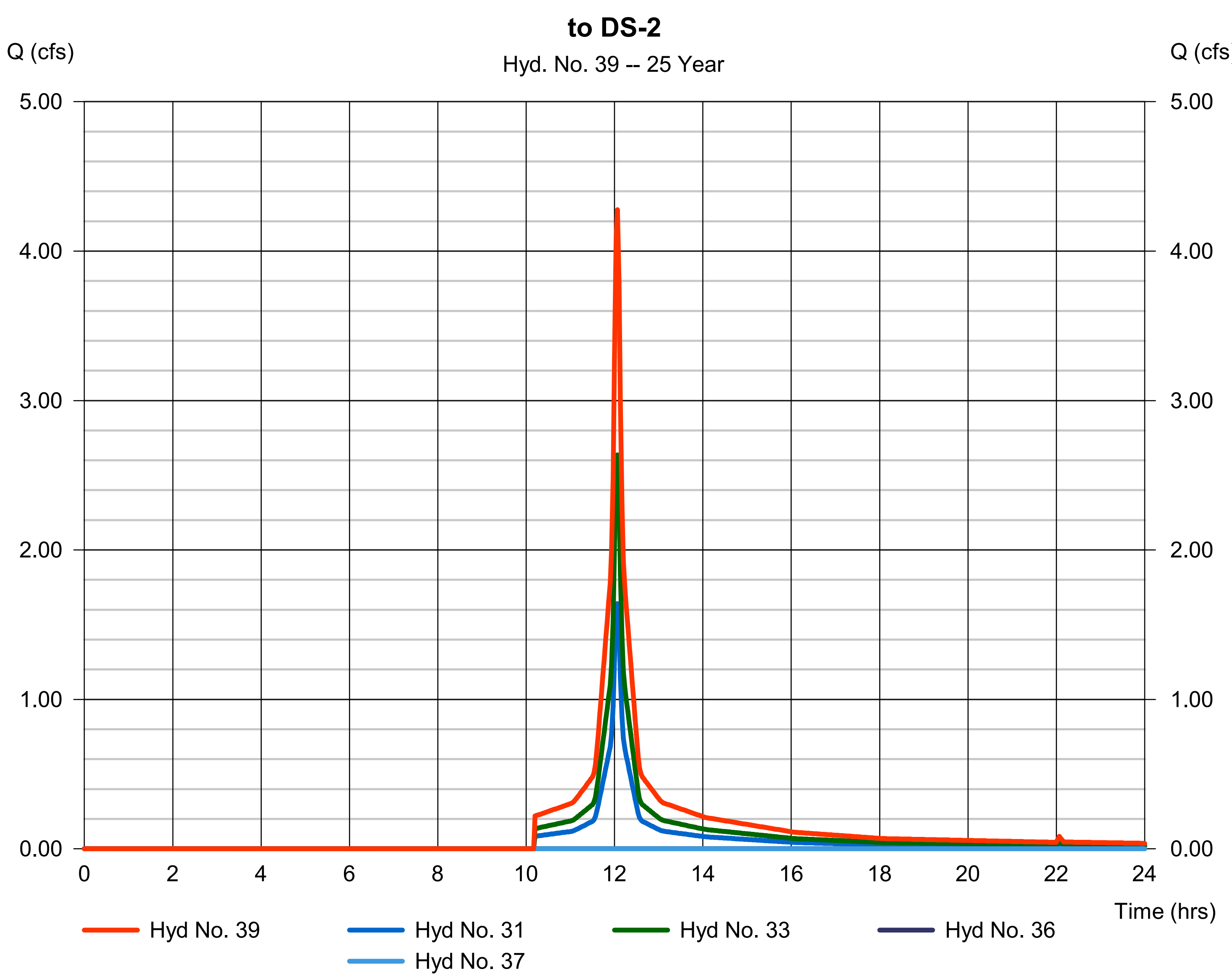
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 39

to DS-2

Hydrograph type	= Combine	Peak discharge	= 4.276 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 12,337 cuft
Inflow hyds.	= 31, 33, 36, 37	Contrib. drain. area	= 0.000 ac



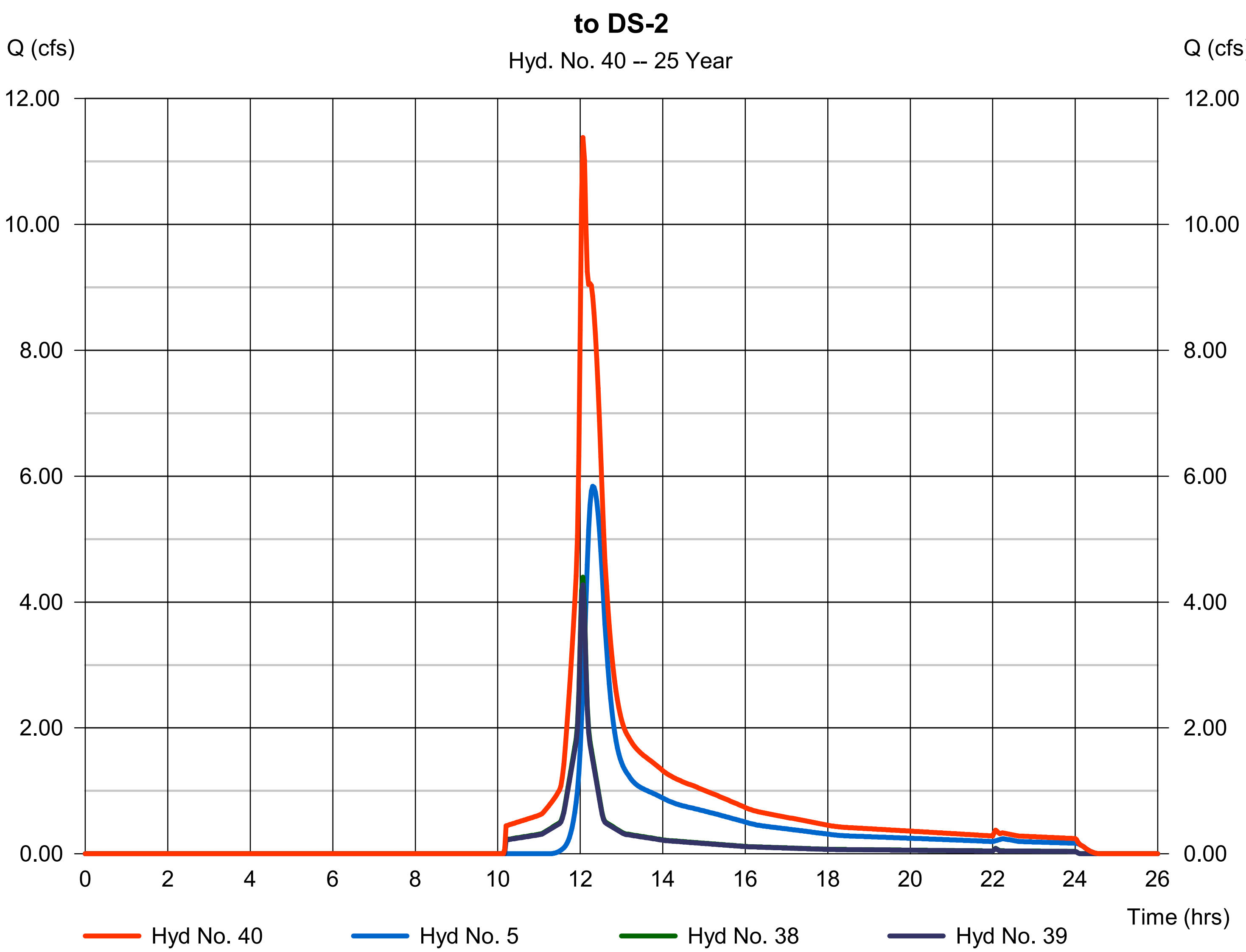
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 40

to DS-2

Hydrograph type	= Combine	Peak discharge	= 11.38 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 55,752 cuft
Inflow hyds.	= 5, 38, 39	Contrib. drain. area	= 5.090 ac



Hydrograph Report

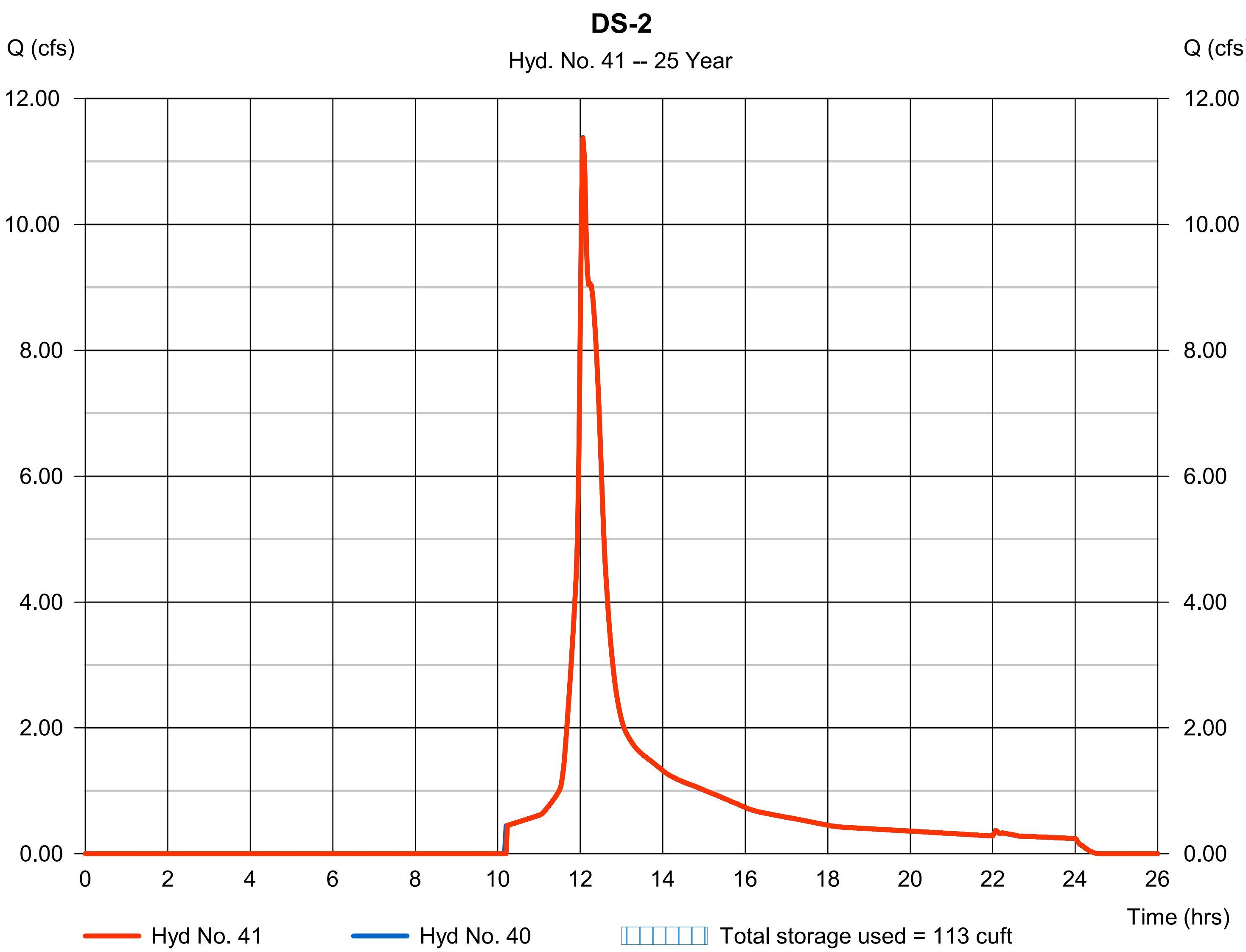
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 41

DS-2

Hydrograph type	= Reservoir	Peak discharge	= 11.37 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 55,695 cuft
Inflow hyd. No.	= 40 - to DS-2	Max. Elevation	= 270.30 ft
Reservoir name	= DS-2	Max. Storage	= 113 cuft

Storage Indication method used.



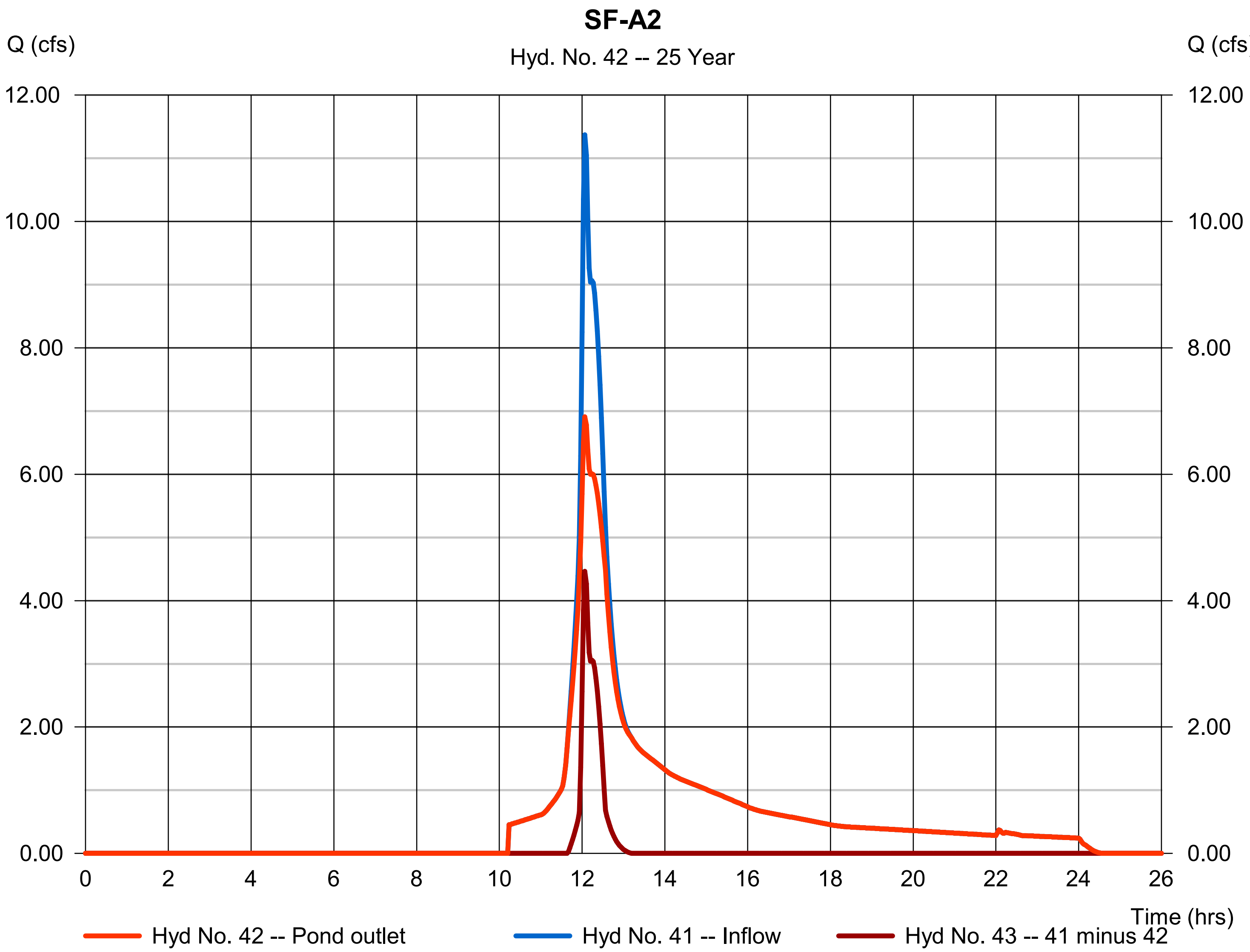
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 42

SF-A2

Hydrograph type	= Diversion1	Peak discharge	= 6.907 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 48,949 cuft
Inflow hydrograph	= 41 - DS-2	2nd diverted hyd.	= 43
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B



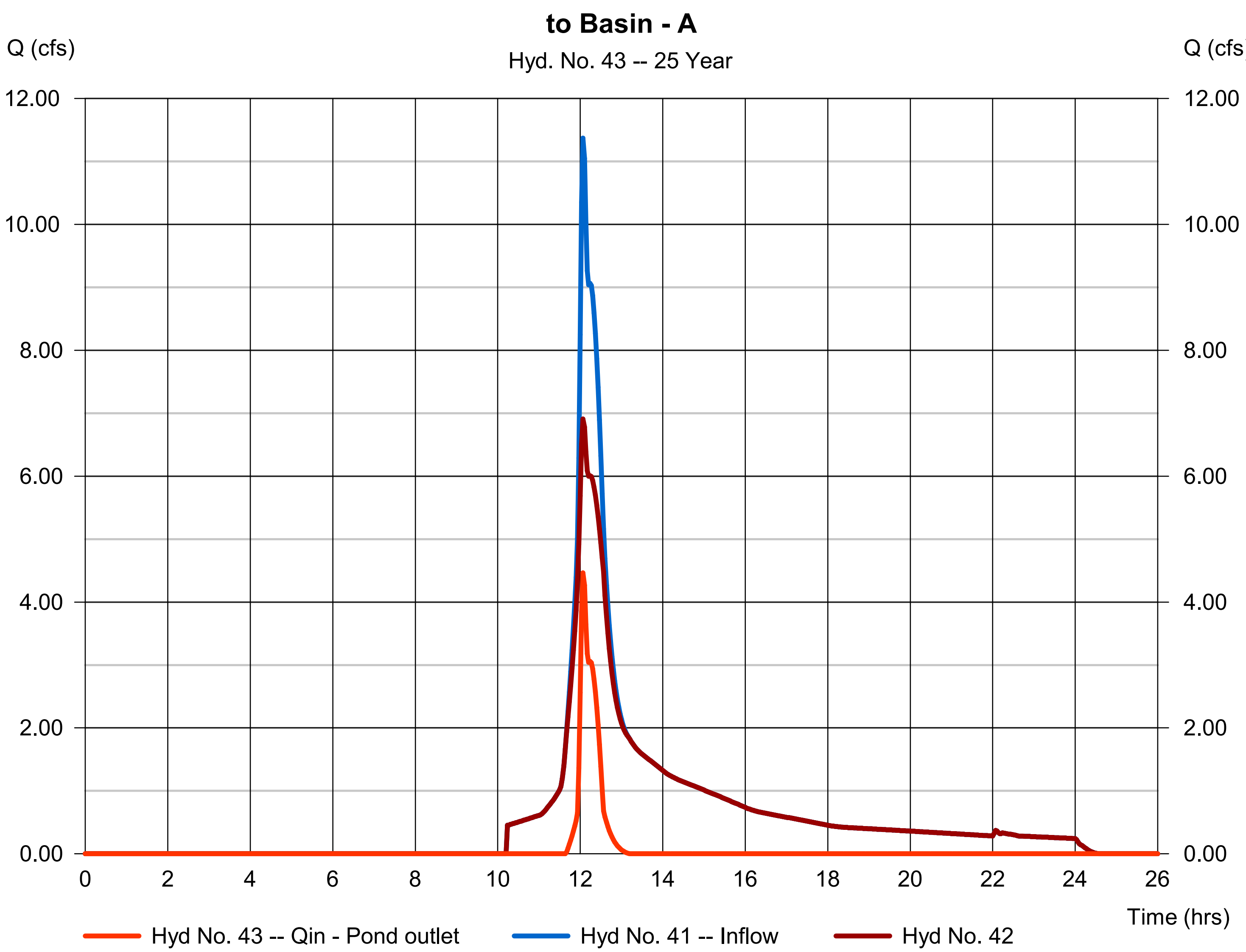
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 43

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 4.463 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 6,746 cuft
Inflow hydrograph	= 41 - DS-2	2nd diverted hyd.	= 42
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B



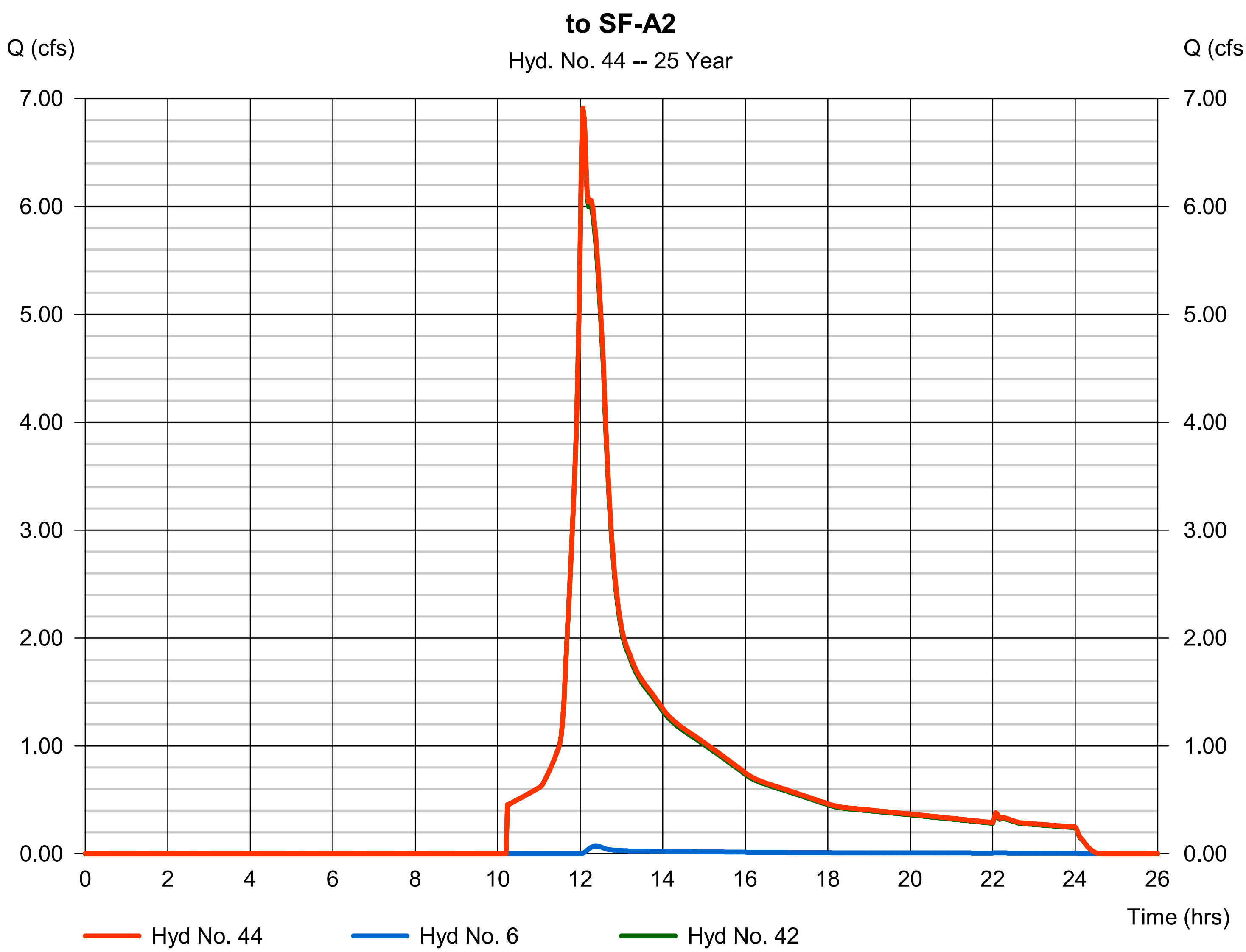
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 44

to SF-A2

Hydrograph type	= Combine	Peak discharge	= 6.913 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 49,572 cuft
Inflow hyds.	= 6, 42	Contrib. drain. area	= 0.330 ac



Hydrograph Report

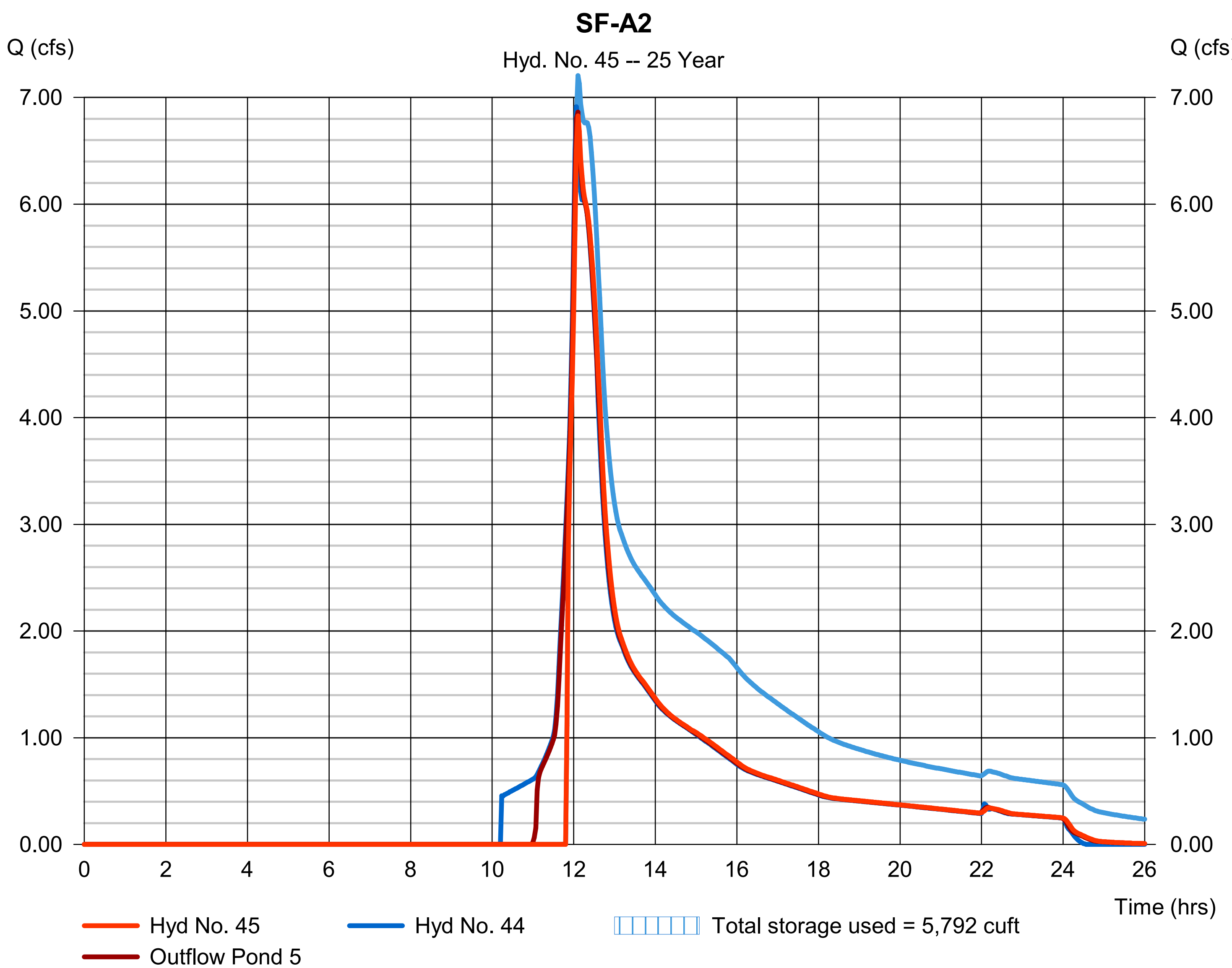
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 45

SF-A2

Hydrograph type	=	Reservoir (Interconnected)	Peak discharge	=	6.828 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.10 hrs
Time interval	=	2 min	Hyd. volume	=	45,015 cuft
Upper Pond Pond name	=	Sediment Forebay - A2	**Lower Pond** Pond name	=	Sand Filter - A2
Inflow hyd.	=	44 - to SF-A2	Other Inflow hyd.	=	None
Max. Elevation	=	271.89 ft	Max. Elevation	=	271.51 ft
Max. Storage	=	1,997 cuft	Max. Storage	=	3,795 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



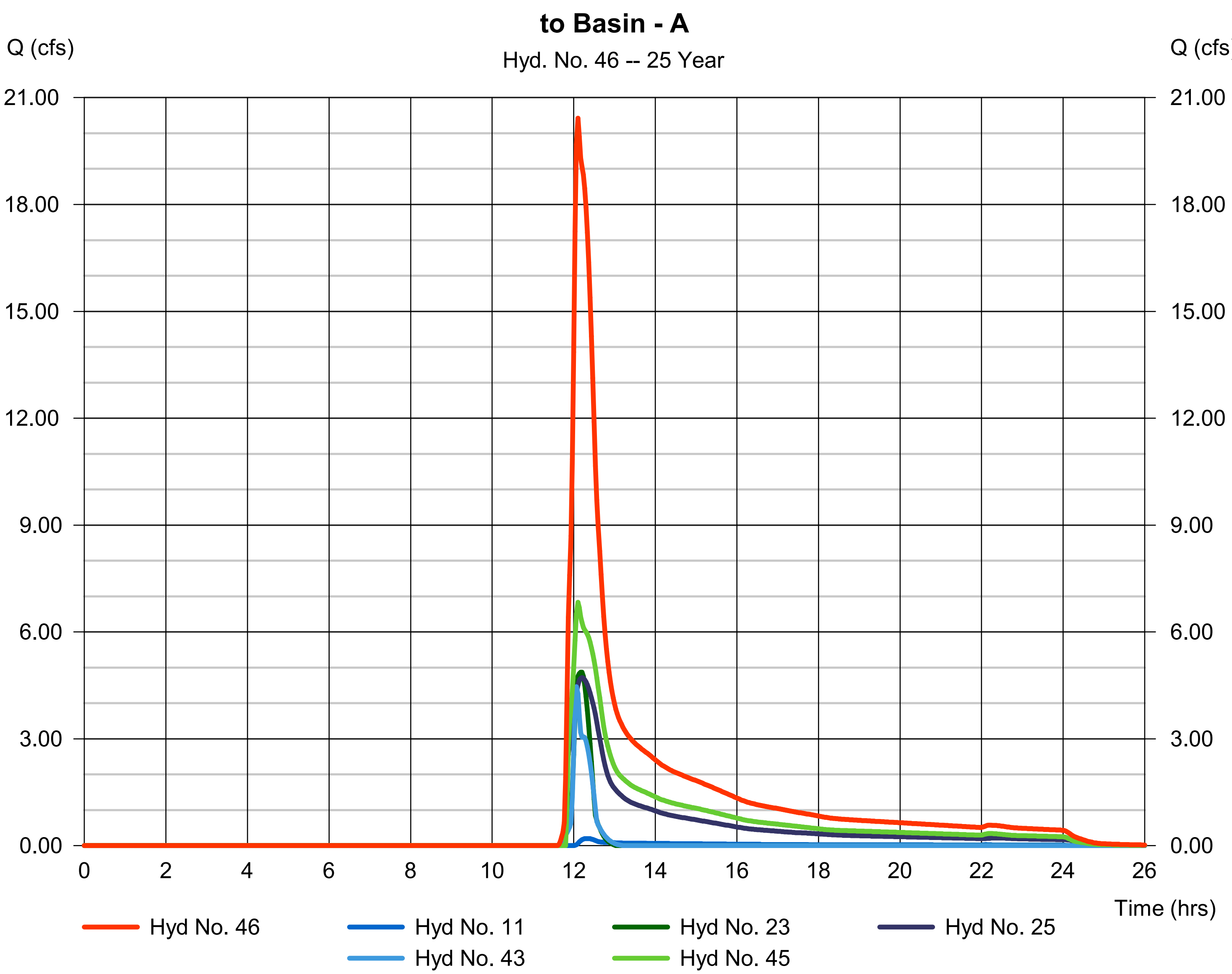
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 46

to Basin - A

Hydrograph type	= Combine	Peak discharge	= 20.42 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 94,256 cuft
Inflow hyds.	= 11, 23, 25, 43, 45	Contrib. drain. area	= 0.950 ac



Hydrograph Report

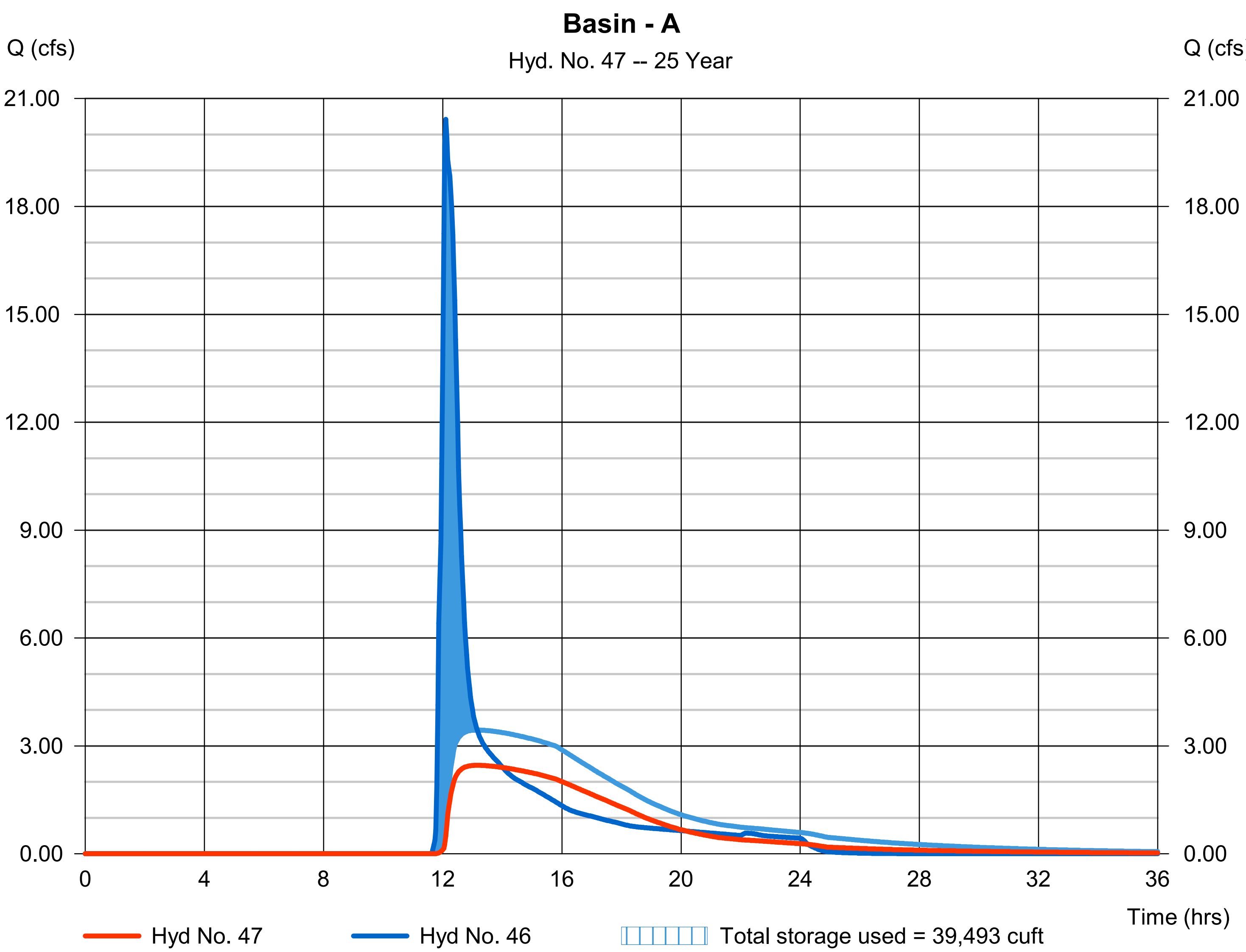
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 47

Basin - A

Hydrograph type	= Reservoir	Peak discharge	= 2.460 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.17 hrs
Time interval	= 2 min	Hyd. volume	= 60,793 cuft
Inflow hyd. No.	= 46 - to Basin - A	Max. Elevation	= 268.56 ft
Reservoir name	= Basin - A	Max. Storage	= 39,493 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



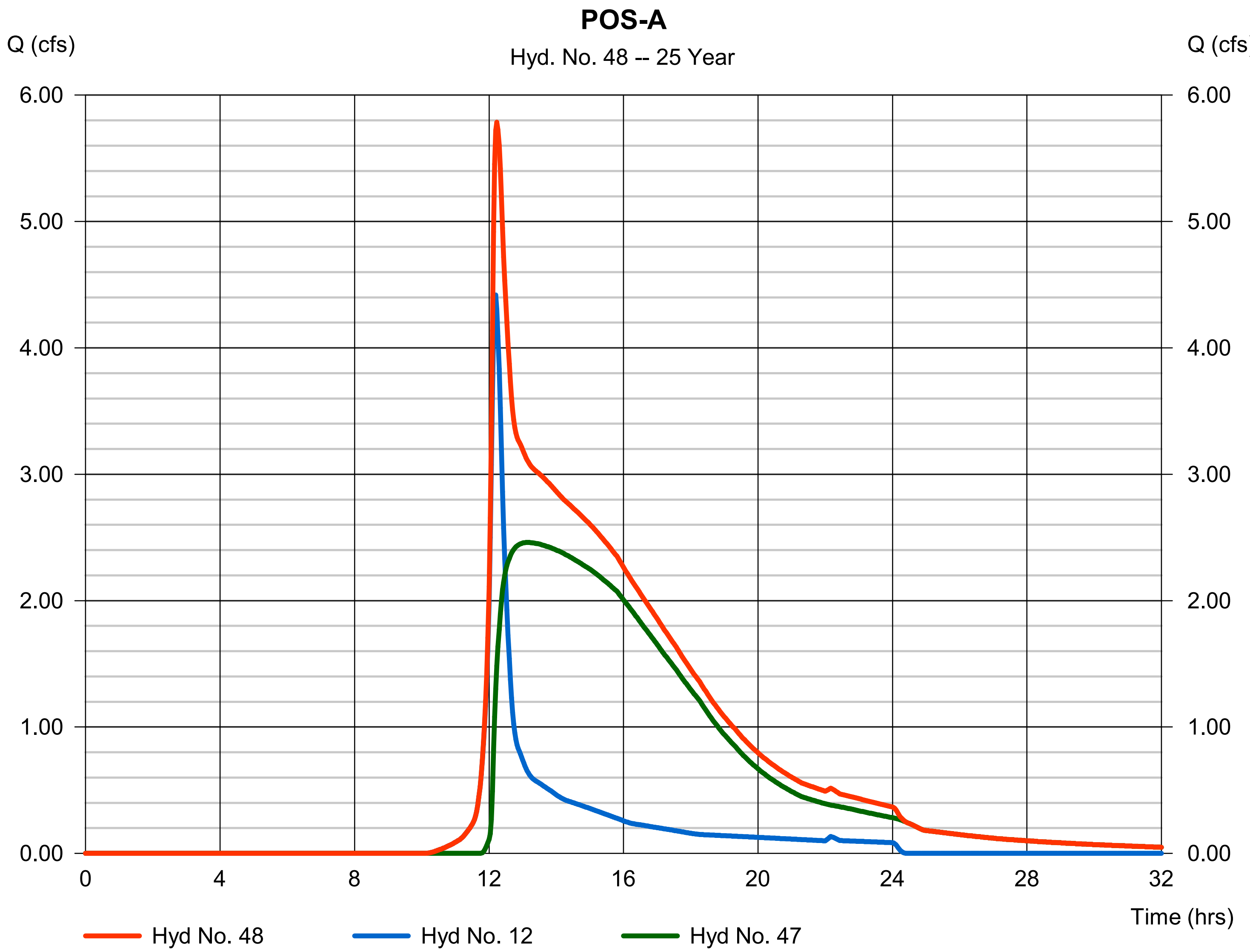
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 48

POS-A

Hydrograph type	= Combine	Peak discharge	= 5.786 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 79,329 cuft
Inflow hyds.	= 12, 47	Contrib. drain. area	= 2.260 ac



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	12.88	2	732	57,379	------	------	------	PR-A1a
2	SCS Runoff	0.207	2	726	847	------	------	------	PR-A1b
3	SCS Runoff	2.059	2	724	7,197	------	------	------	PR-R1a
4	SCS Runoff	2.800	2	724	9,789	------	------	------	PR-R1b
5	SCS Runoff	12.59	2	736	61,550	------	------	------	PR-A2a
6	SCS Runoff	0.349	2	732	1,808	------	------	------	PR-A2b
7	SCS Runoff	4.282	2	724	14,971	------	------	------	PR-R2a
8	SCS Runoff	1.894	2	724	6,622	------	------	------	PR-R2b
9	SCS Runoff	2.306	2	724	8,061	------	------	------	PR-R2c
10	SCS Runoff	3.706	2	724	12,955	------	------	------	PR-R2d
11	SCS Runoff	1.085	2	728	5,047	------	------	------	PR-A3
12	SCS Runoff	8.252	2	730	33,808	------	------	------	PR-A4
13	SCS Runoff	0.829	2	740	6,267	------	------	------	PR-B / POS-B
14	Diversion1	0.070	2	530	840	3	------	------	UG-R1a
15	Diversion2	2.059	2	724	6,358	3	------	------	DS-1
16	Diversion1	0.095	2	530	1,142	4	------	------	UG-R1b
17	Diversion2	2.800	2	724	8,646	4	------	------	DS-1
18	Reservoir	0.000	2	520	0	14	276.15	5.02	UG-R1a
19	Reservoir	0.009	2	532	4	16	278.01	686	UG-R1b
20	Combine	15.07	2	732	72,387	1, 15, 17, 18, 19	------	------	to DS-1
21	Reservoir	15.07	2	732	72,349	20	271.60	76.7	DS-1
22	Diversion1	5.854	2	732	54,562	21	------	------	SF-A1
23	Diversion2	9.218	2	732	17,787	21	------	------	to Basin - A
24	Combine	6.008	2	728	55,409	2, 22,	------	------	to SF-A1
25	Reservoir(i)	6.002	2	730	50,520	24	271.85	6,341	SF-A1
26	Diversion1	0.146	2	530	1,747	7	------	------	UG-R2a
27	Diversion2	4.282	2	724	13,224	7	------	------	DS-2
28	Diversion1	0.064	2	530	773	8	------	------	UG-R2b
29	Diversion2	1.894	2	724	5,849	8	------	------	DS-2
30	Diversion1	0.079	2	530	941	9	------	------	UG-R2c
31	Diversion2	2.306	2	724	7,121	9	------	------	DS-2
32	Diversion1	0.126	2	530	1,512	10	------	------	UG-R2d
33	Diversion2	3.706	2	724	11,444	10	------	------	DS-2
34	Reservoir	0.000	2	n/a	0	26	276.09	10.4	UG-R2a

17.276.403 Willow Lakes Proposed.gpw	Return Period: 100 Year	Wednesday, 03 / 3 / 2021

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	0.000	2	n/a	0	28	276.33	4.62	UG-R2b
36	Reservoir	0.000	2	n/a	0	30	277.99	179	UG-R2c
37	Reservoir	0.000	2	184	0	32	276.07	422	UG-R2d
38	Combine	6.176	2	724	19,073	27, 29, 34, 35,	------	------	to DS-2
39	Combine	6.011	2	724	18,564	31, 33, 36, 37,	------	------	to DS-2
40	Combine	19.16	2	724	99,187	5, 38, 39	------	------	to DS-2
41	Reservoir	19.11	2	724	99,131	40	271.38	143	DS-2
42	Diversion1	9.245	2	724	78,852	41	------	------	SF-A2
43	Diversion2	9.861	2	724	20,278	41	------	------	to Basin - A
44	Combine	9.502	2	726	80,660	6, 42,	------	------	to SF-A2
45	Reservoir(i)	9.419	2	726	76,091	44	271.99	6,043	SF-A2
46	Combine	34.98	2	726	169,723	11, 23, 25, 43, 45	------	------	to Basin - A
47	Reservoir	7.037	2	772	122,088	46	270.42	75,268	Basin - A
48	Combine	10.79	2	732	155,896	12, 47	------	------	POS-A

Hydrograph Report

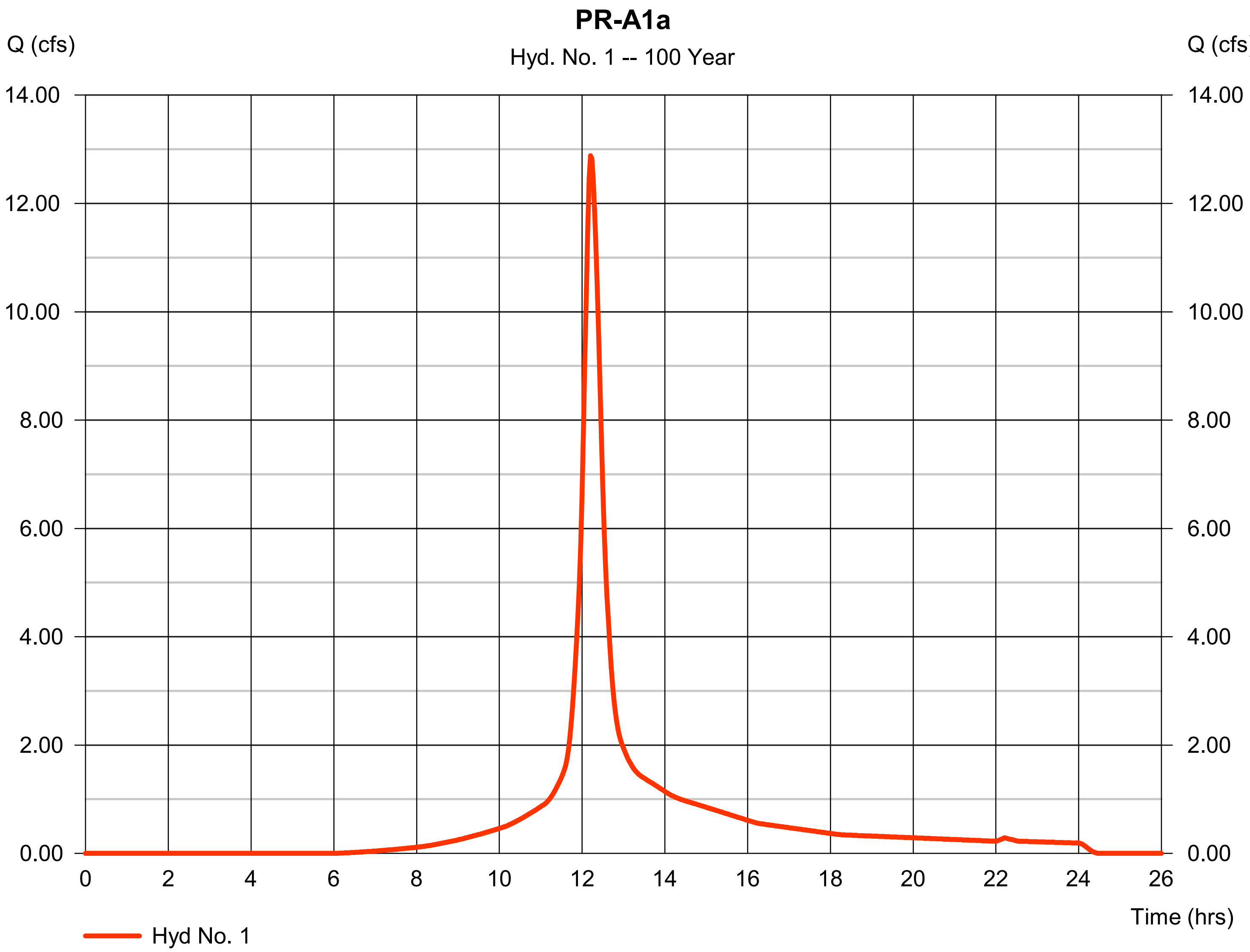
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 1

PR-A1a

Hydrograph type	= SCS Runoff	Peak discharge	= 12.88 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 57,379 cuft
Drainage area	= 2.670 ac	Curve number	= 77*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.60 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.330 x 30) + (0.590 x 39) + (1.750 x 98)] / 2.670



Hydrograph Report

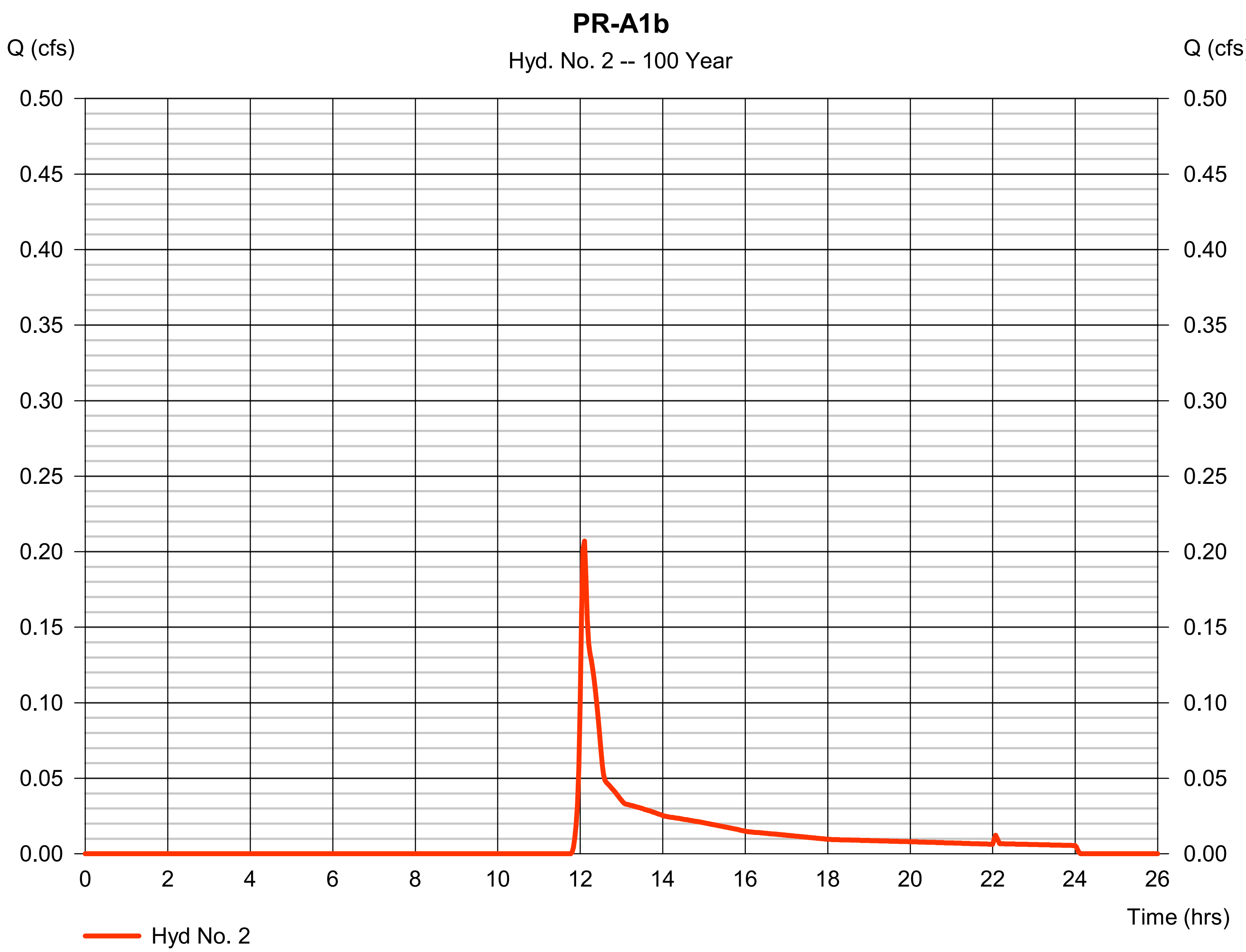
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 2

PR-A1b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.207 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 847 cuft
Drainage area	= 0.170 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.170 x 39)] / 0.170



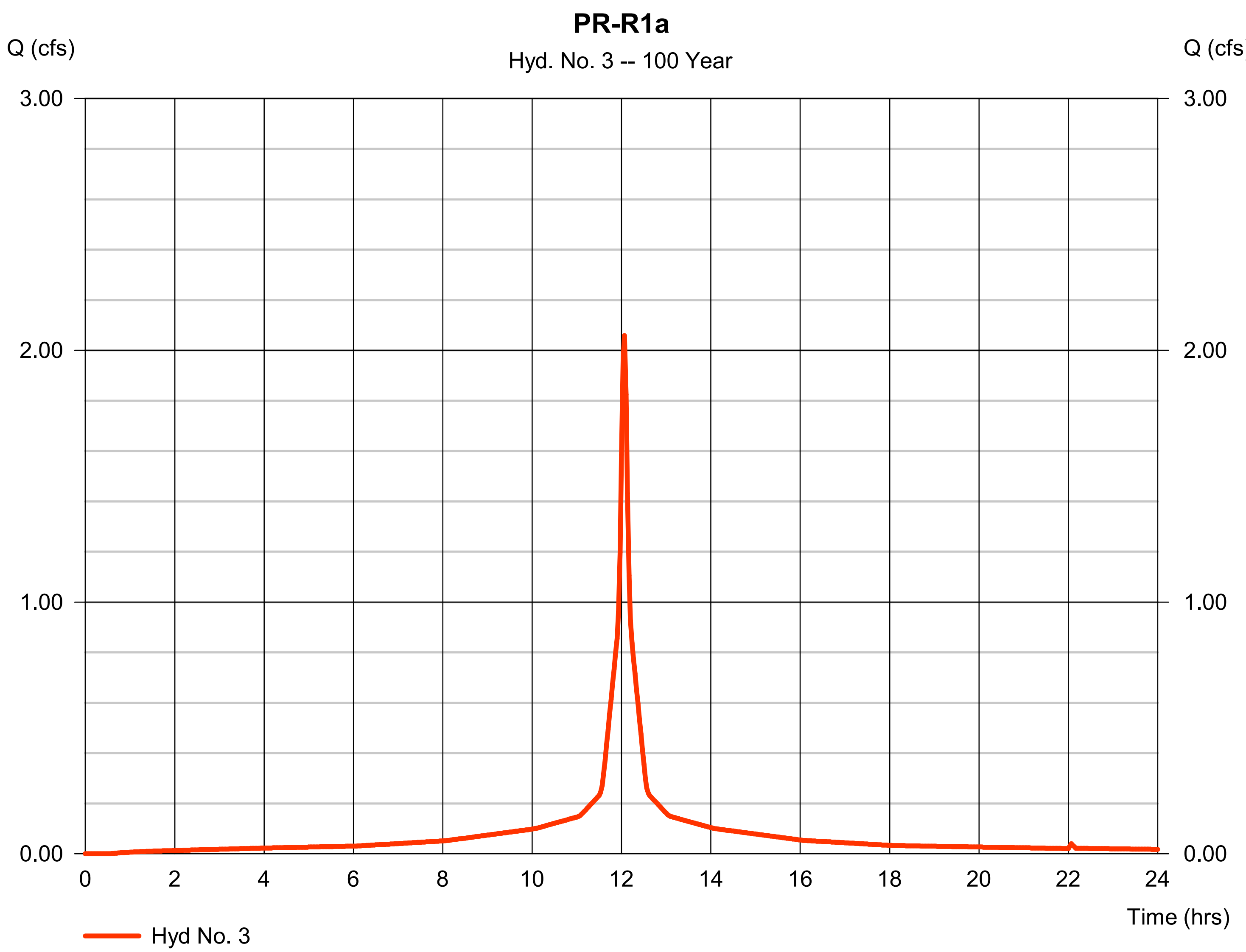
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 3

PR-R1a

Hydrograph type	= SCS Runoff	Peak discharge	= 2.059 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 7,197 cuft
Drainage area	= 0.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



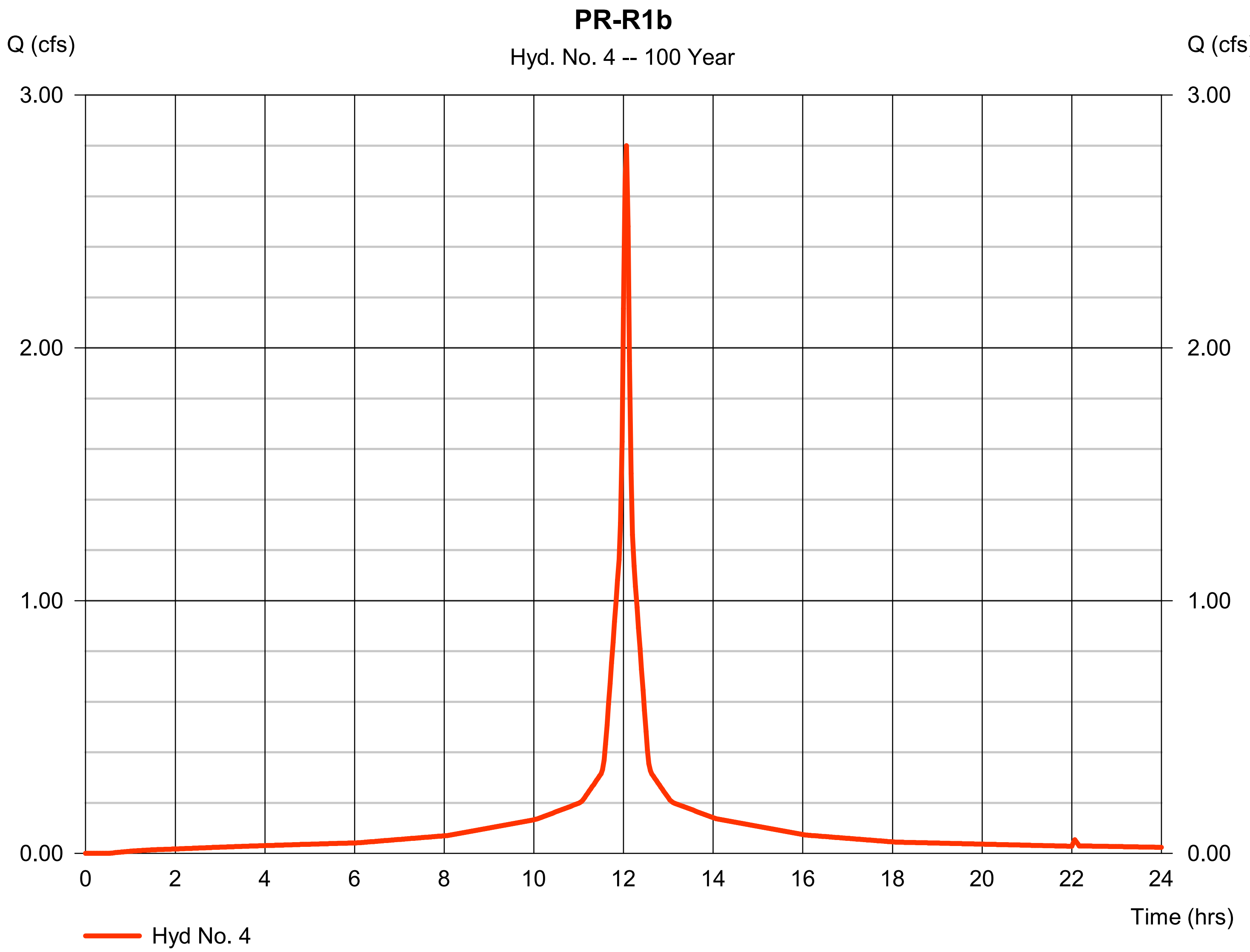
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 4

PR-R1b

Hydrograph type	= SCS Runoff	Peak discharge	= 2.800 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 9,789 cuft
Drainage area	= 0.340 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



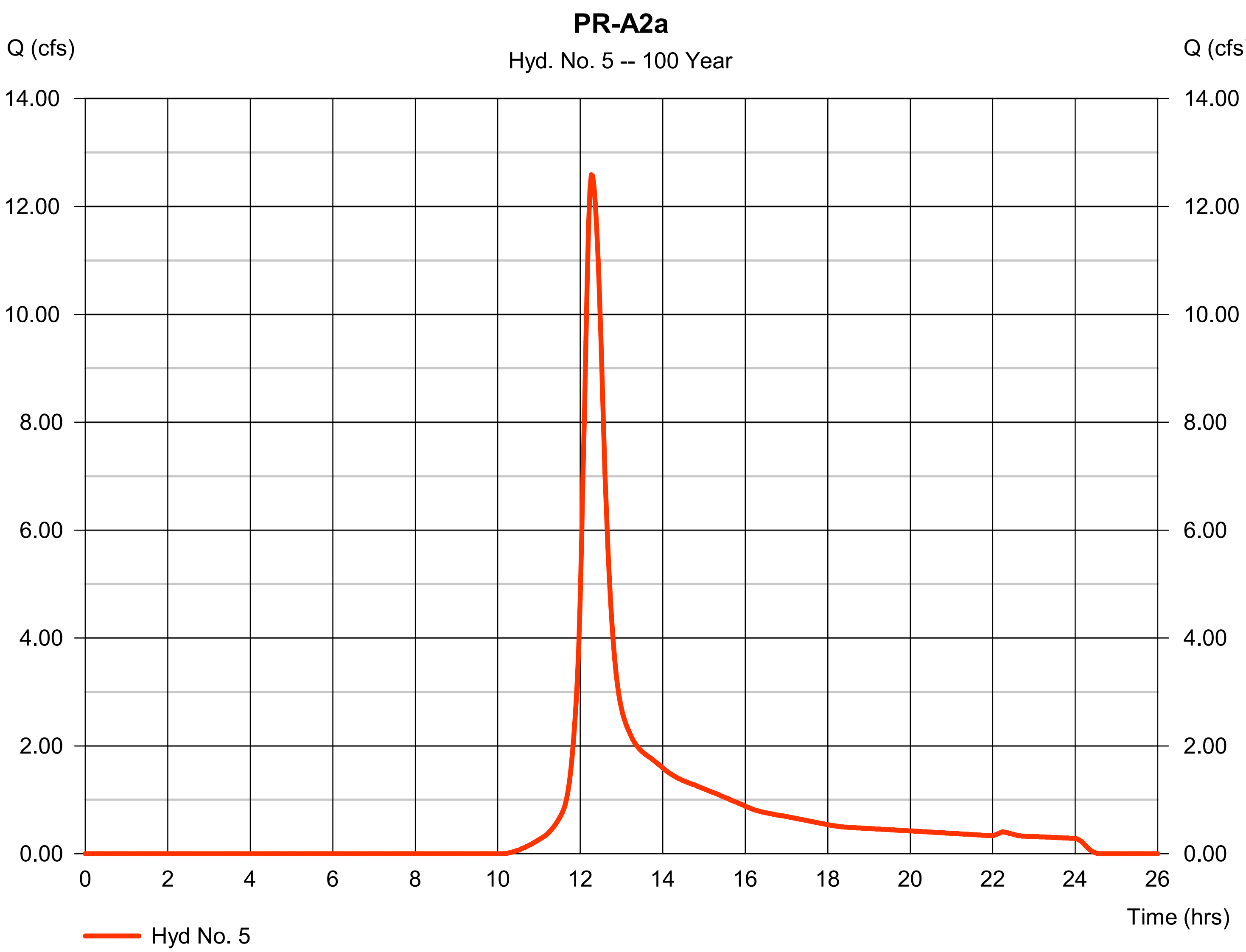
Hydrograph Report

Hyd. No. 5

PR-A2a

Hydrograph type	= SCS Runoff	Peak discharge	= 12.59 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 61,550 cuft
Drainage area	= 5.090 ac	Curve number	= 55*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 21.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.390 x 30) + (2.100 x 39) + (1.600 x 98)] / 5.090



Hydrograph Report

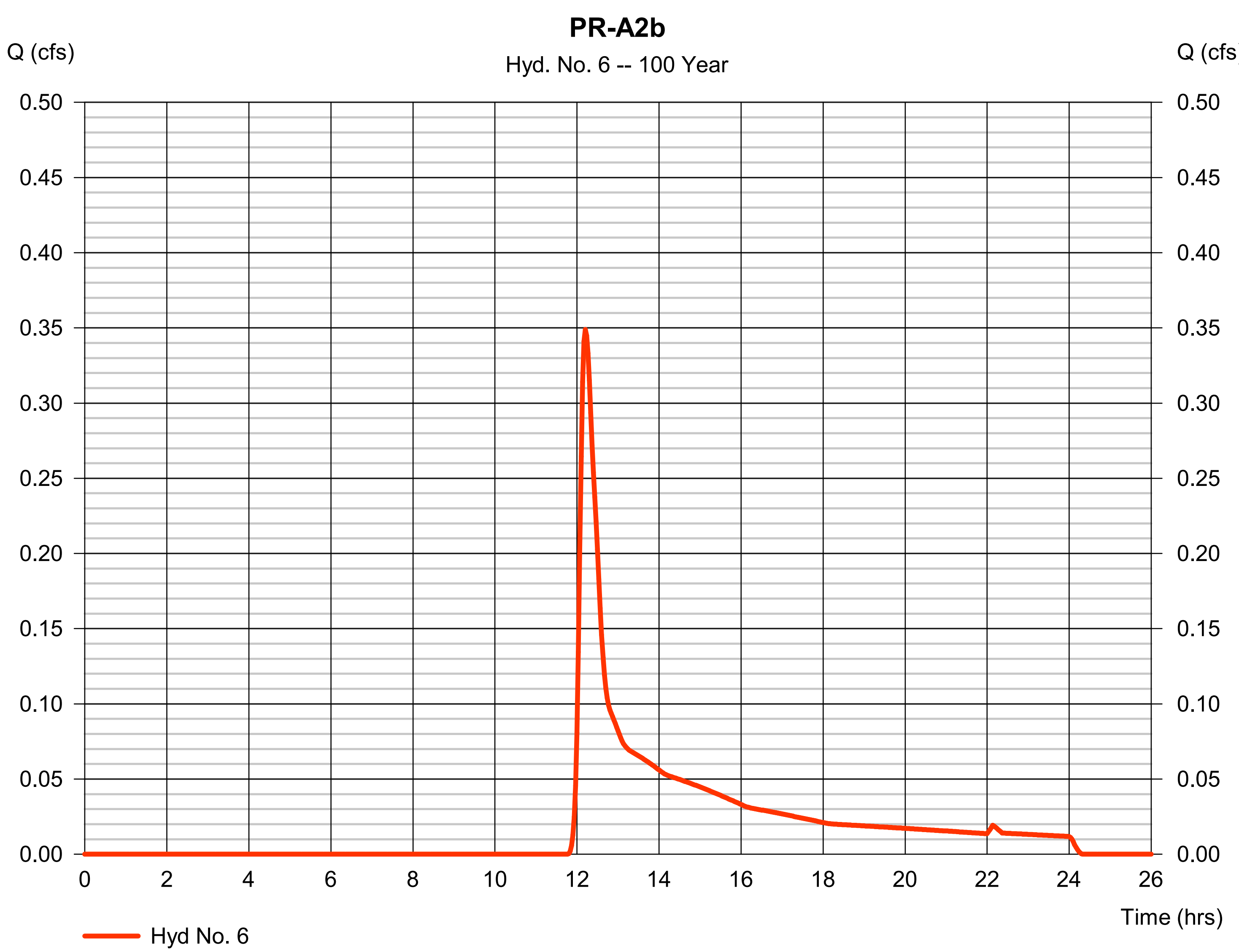
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 6

PR-A2b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.349 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 1,808 cuft
Drainage area	= 0.330 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 13.10 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.320 x 39)] / 0.330



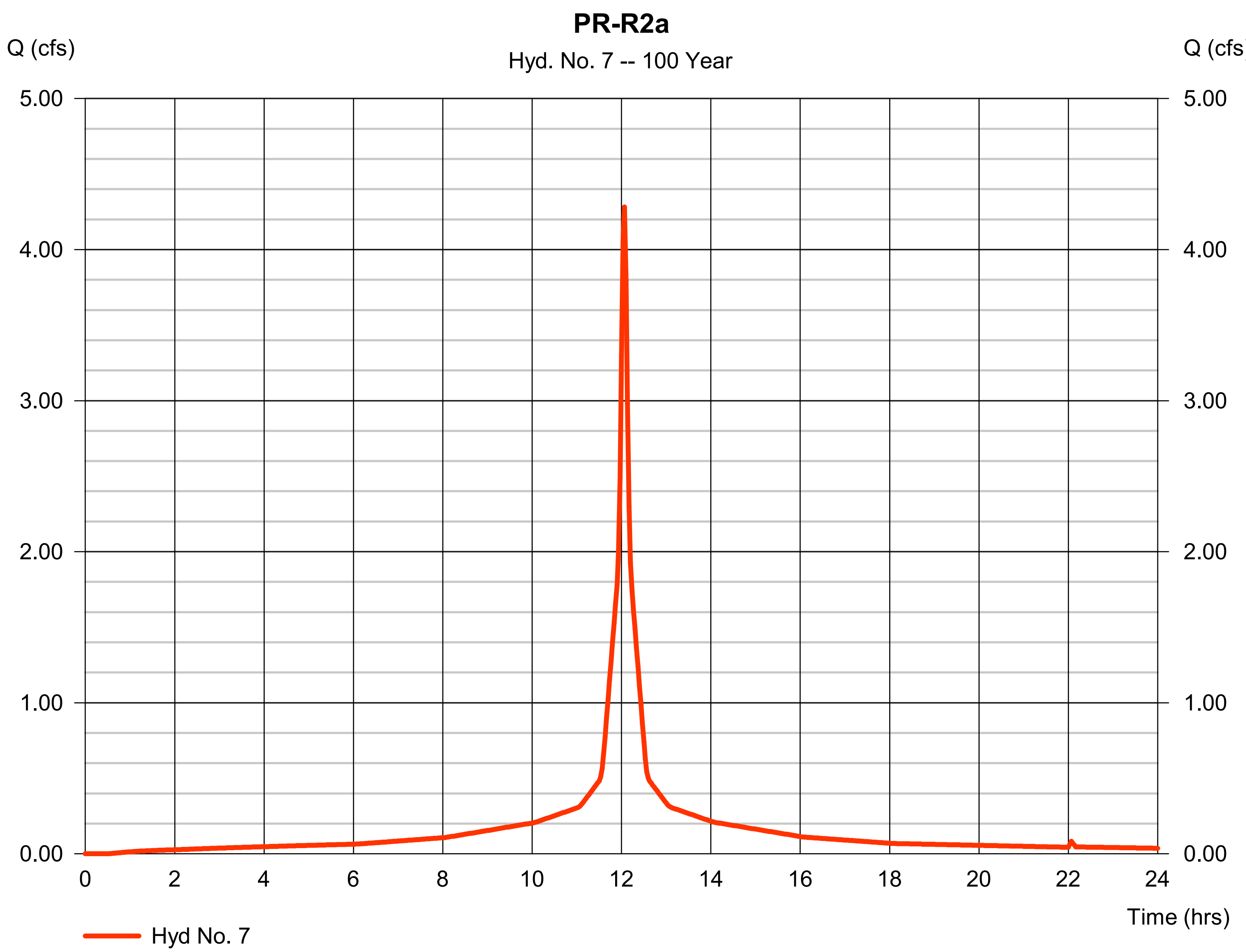
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 7

PR-R2a

Hydrograph type	= SCS Runoff	Peak discharge	= 4.282 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 14,971 cuft
Drainage area	= 0.520 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



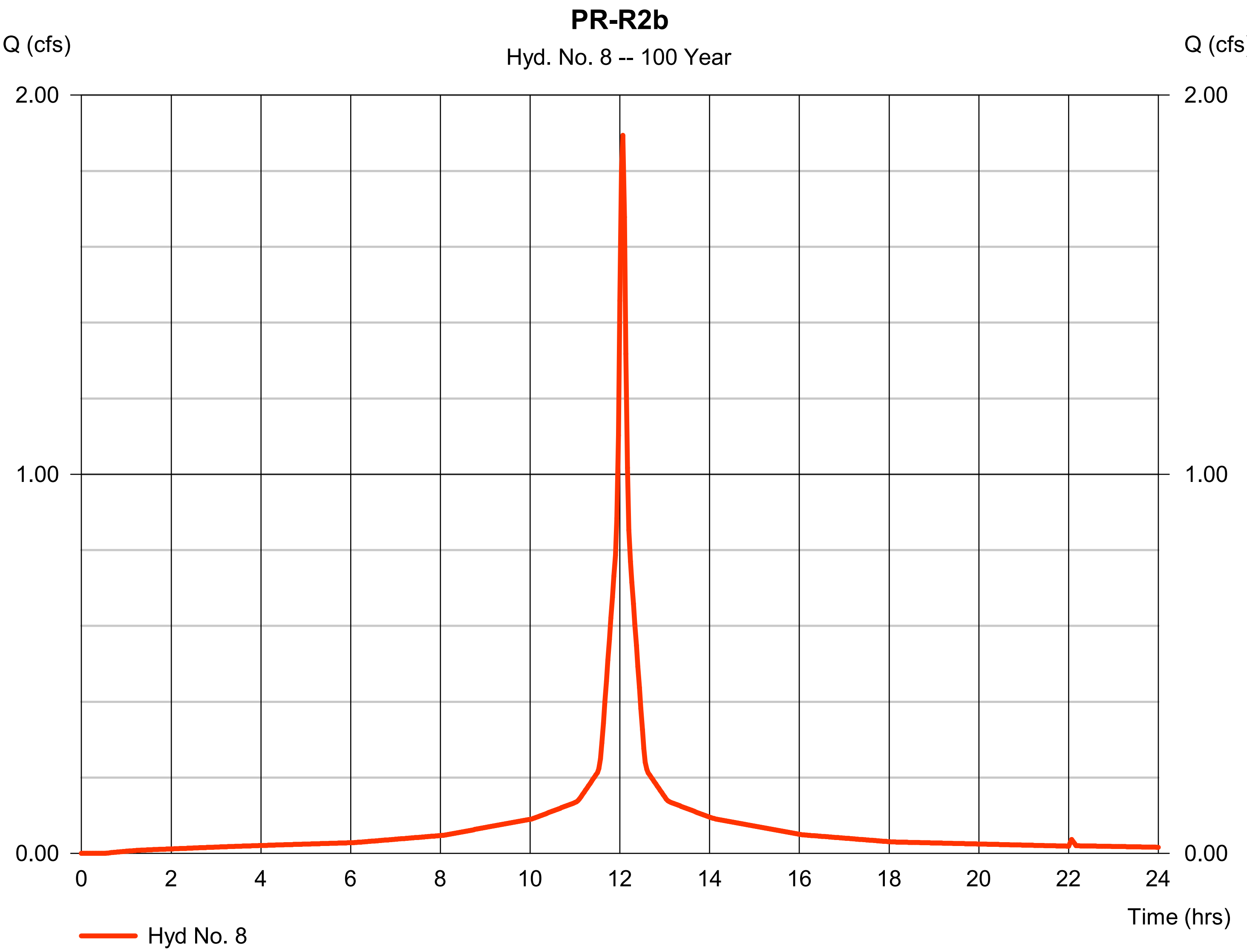
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 8

PR-R2b

Hydrograph type	= SCS Runoff	Peak discharge	= 1.894 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 6,622 cuft
Drainage area	= 0.230 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



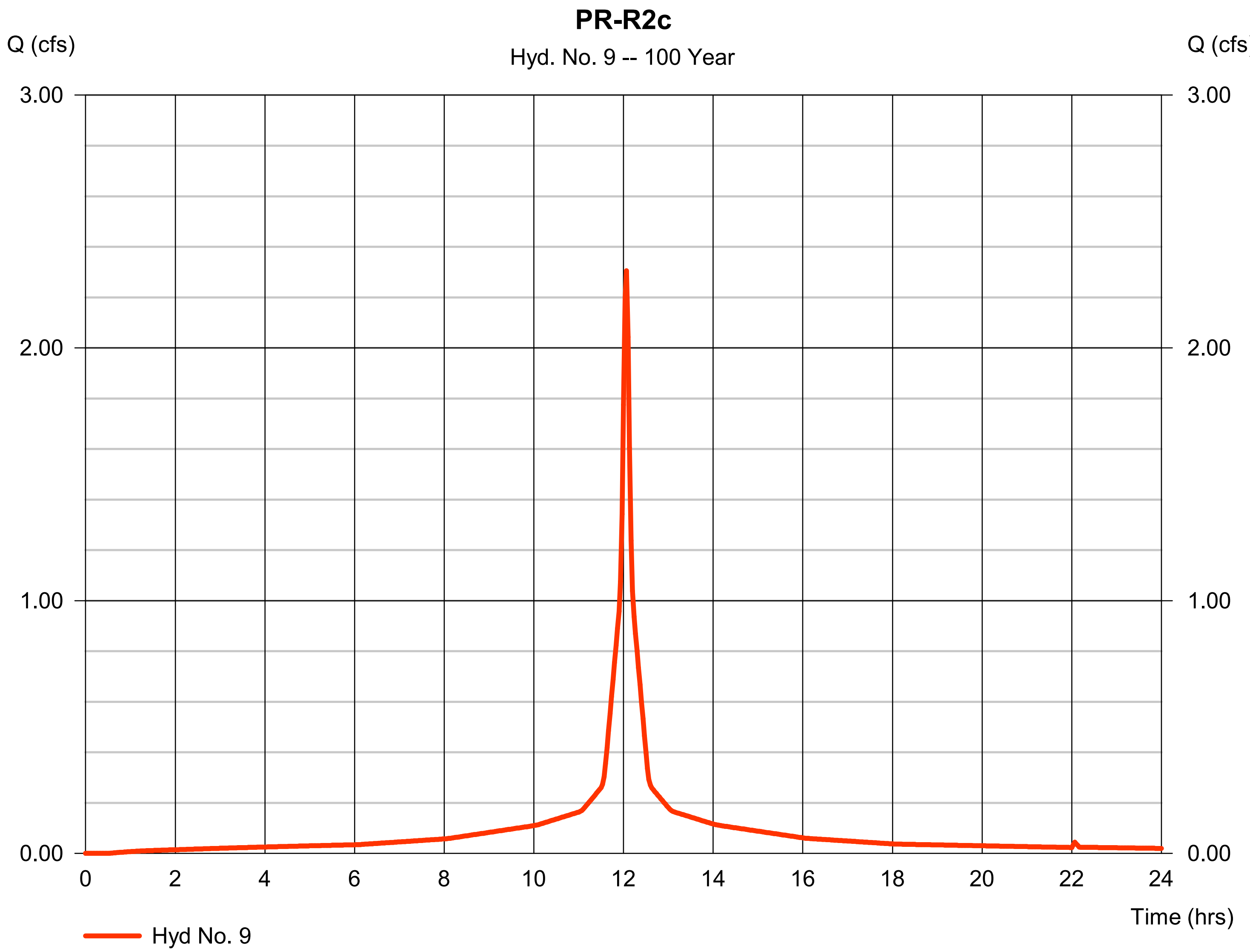
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 9

PR-R2c

Hydrograph type	= SCS Runoff	Peak discharge	= 2.306 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 8,061 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



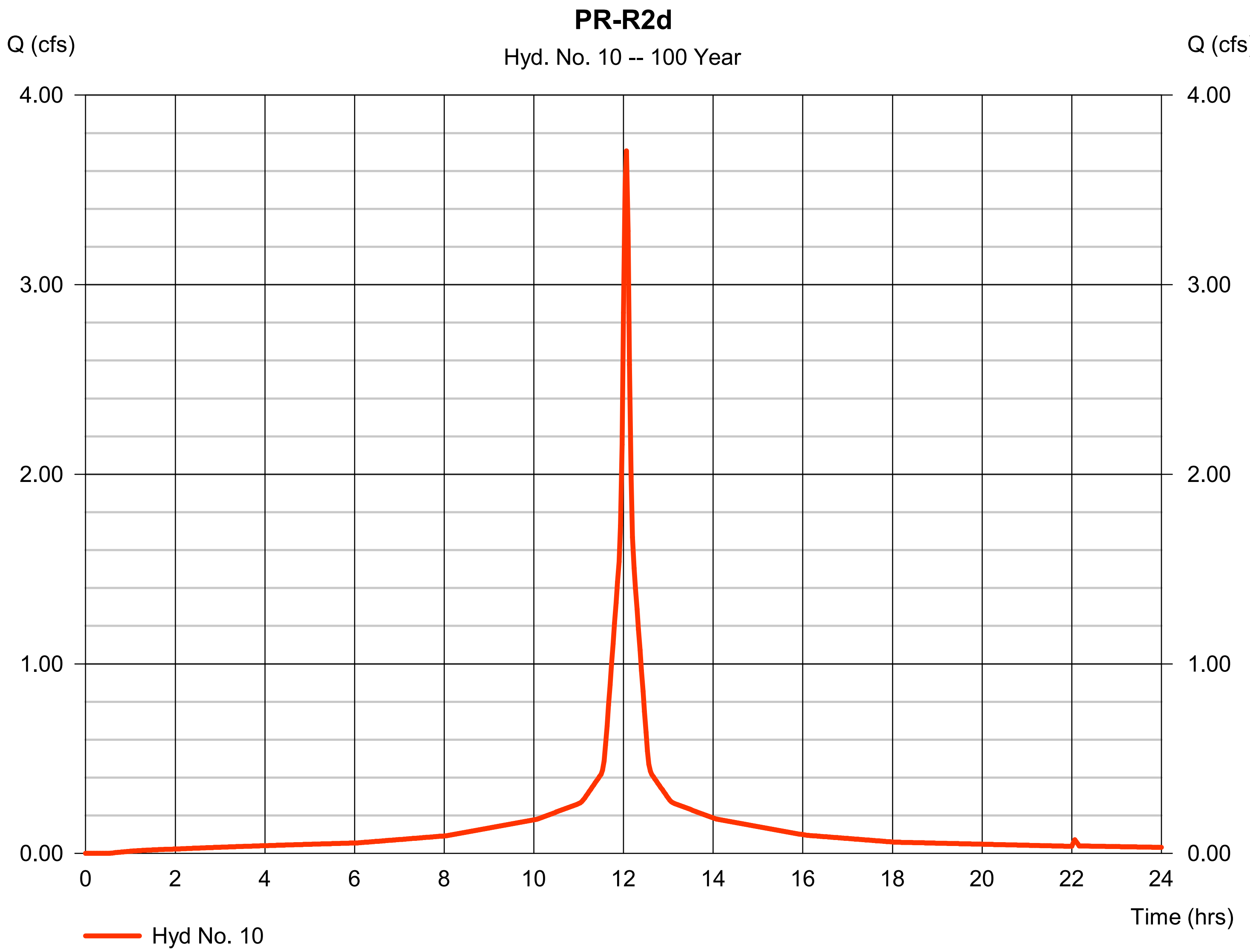
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 10

PR-R2d

Hydrograph type	= SCS Runoff	Peak discharge	= 3.706 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 12,955 cuft
Drainage area	= 0.450 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

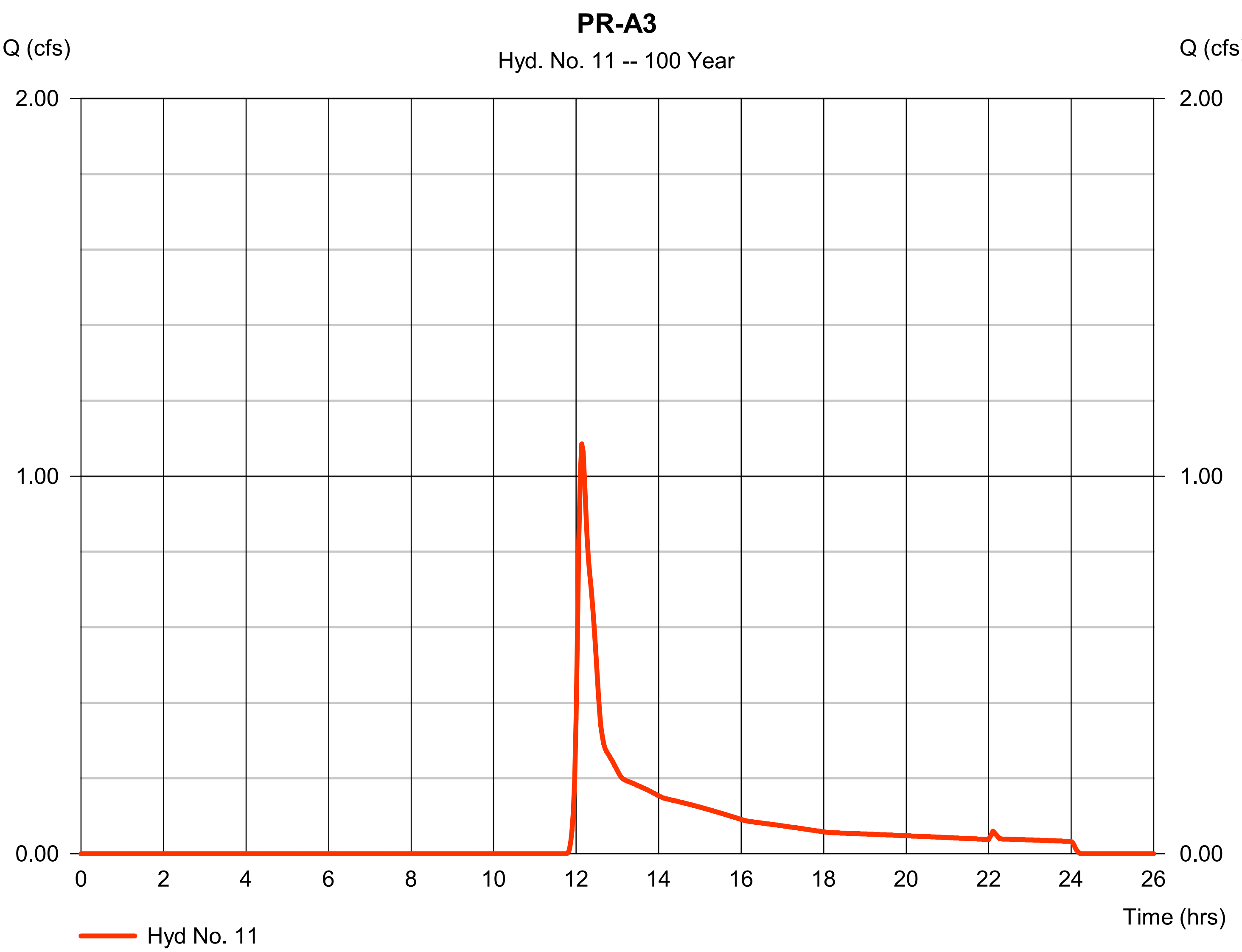
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 11

PR-A3

Hydrograph type	= SCS Runoff	Peak discharge	= 1.085 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 5,047 cuft
Drainage area	= 0.950 ac	Curve number	= 39*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 9.20 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.960 x 39)] / 0.950



Hydrograph Report

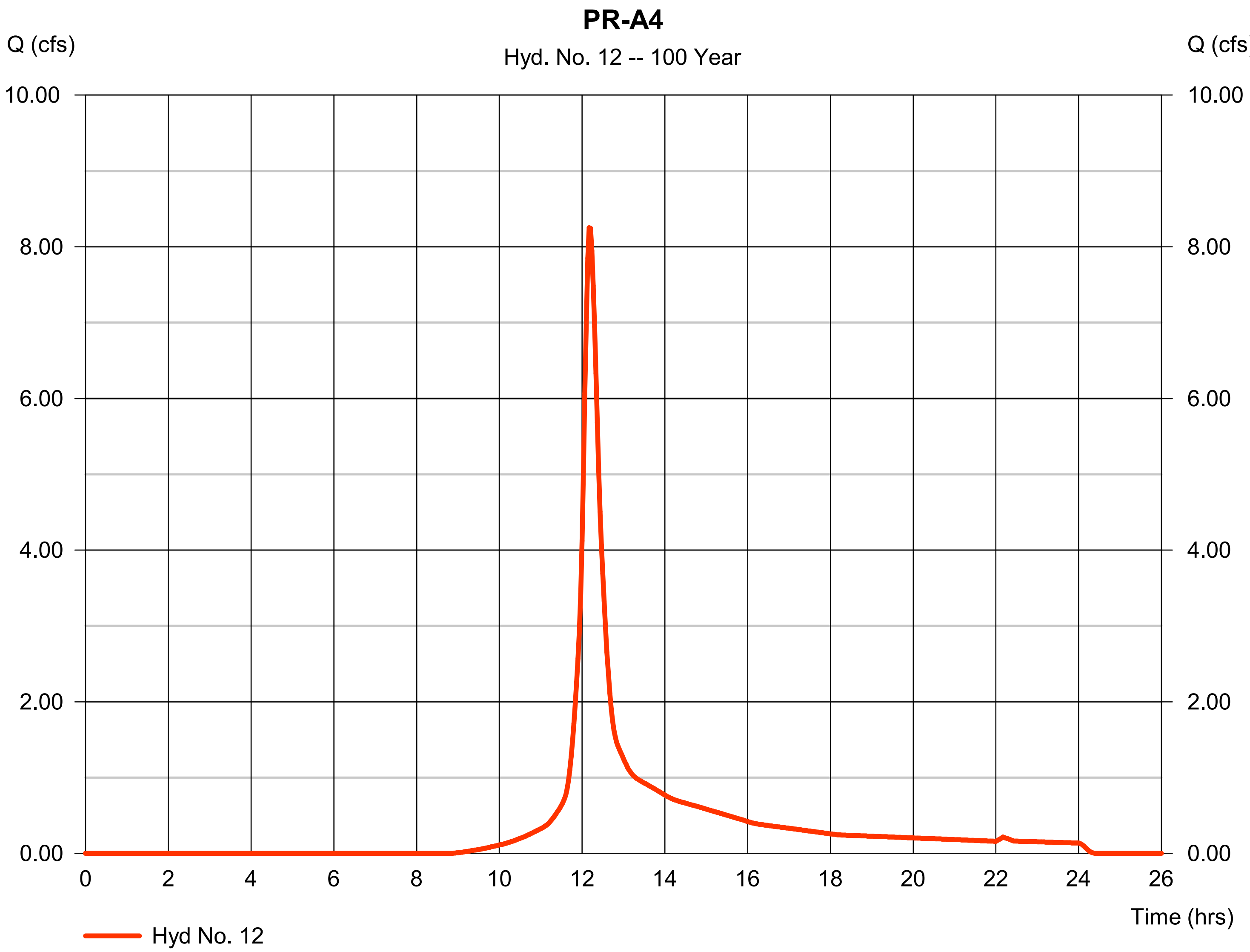
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 12

PR-A4

Hydrograph type	= SCS Runoff	Peak discharge	= 8.252 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 33,808 cuft
Drainage area	= 2.260 ac	Curve number	= 63*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 14.10 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(0.300 x 30) + (1.010 x 39) + (0.950 x 98)] / 2.260



Hydrograph Report

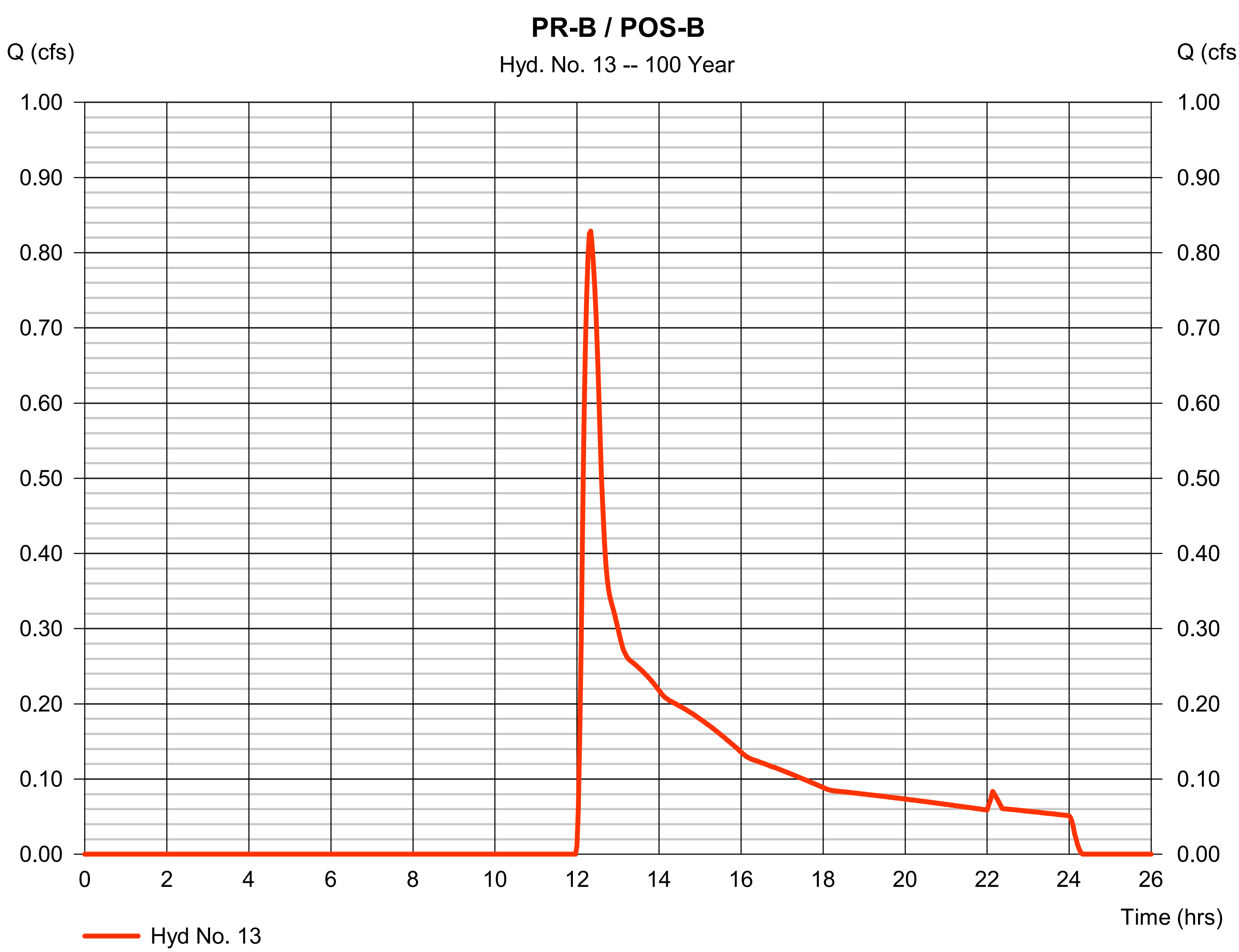
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 13

PR-B / POS-B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.829 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.33 hrs
Time interval	= 2 min	Hyd. volume	= 6,267 cuft
Drainage area	= 1.940 ac	Curve number	= 33*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 10.80 min
Total precip.	= 8.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

* Composite (Area/CN) = [(1.330 x 30) + (0.610 x 39)] / 1.940



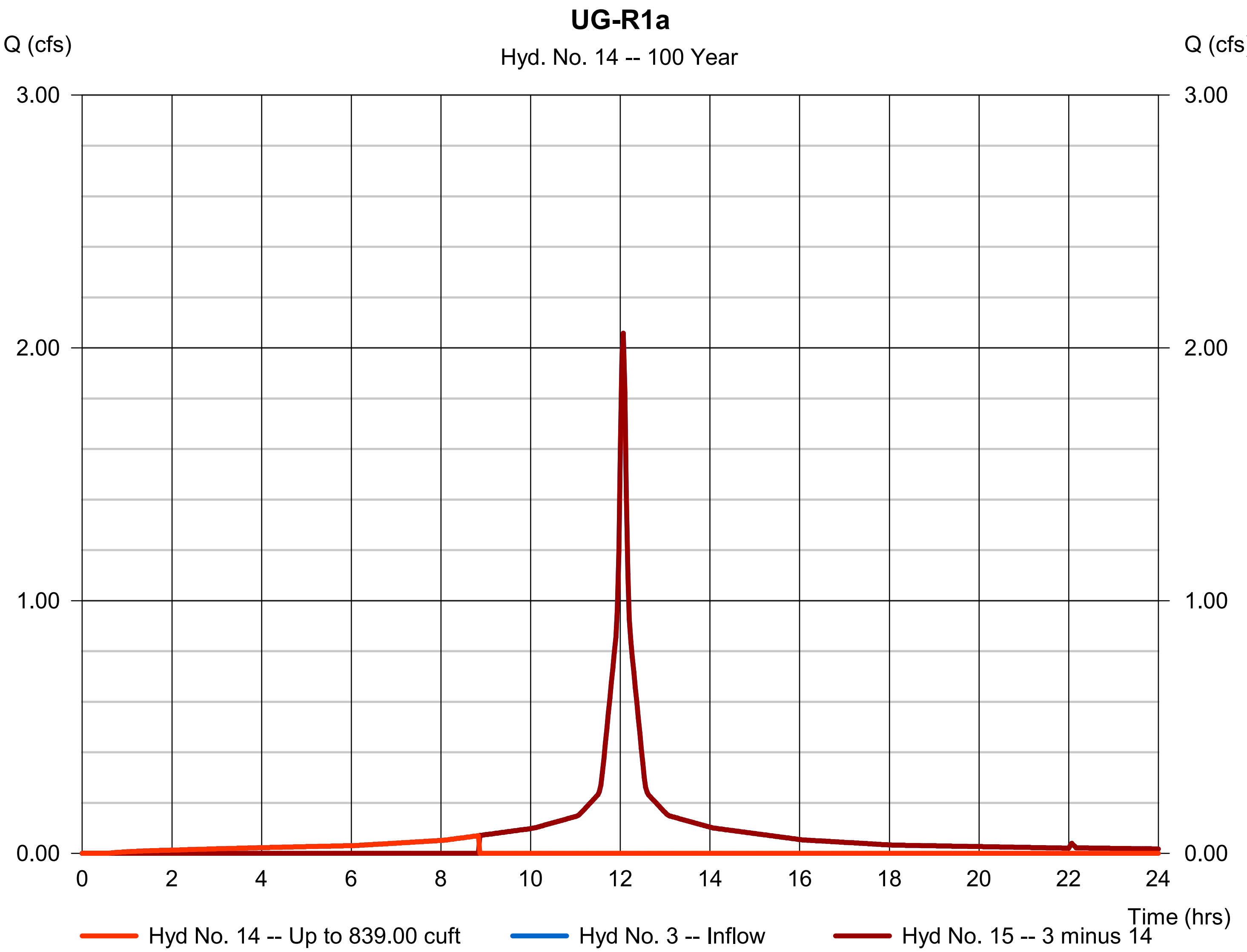
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 14

UG-R1a

Hydrograph type	= Diversion1	Peak discharge	= 0.070 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.83 hrs
Time interval	= 2 min	Hyd. volume	= 840 cuft
Inflow hydrograph	= 3 - PR-R1a	2nd diverted hyd.	= 15
Diversion method	= First Flush Volume	Volume Up To	= 839.00 cuft



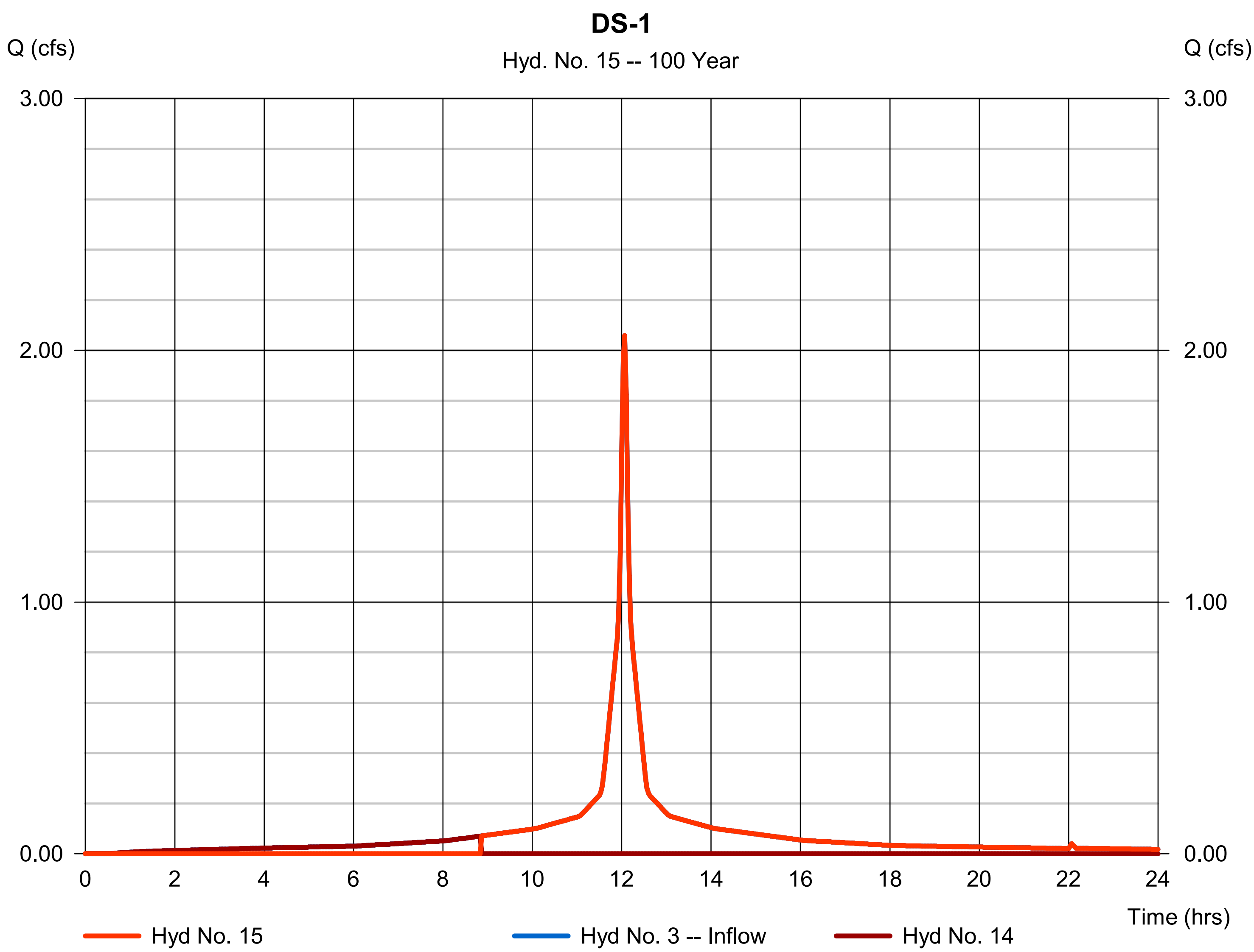
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 15

DS-1

Hydrograph type	= Diversion2	Peak discharge	= 2.059 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 6,358 cuft
Inflow hydrograph	= 3 - PR-R1a	2nd diverted hyd.	= 14
Diversion method	= First Flush Volume	Volume Up To	= 839.00 cuft



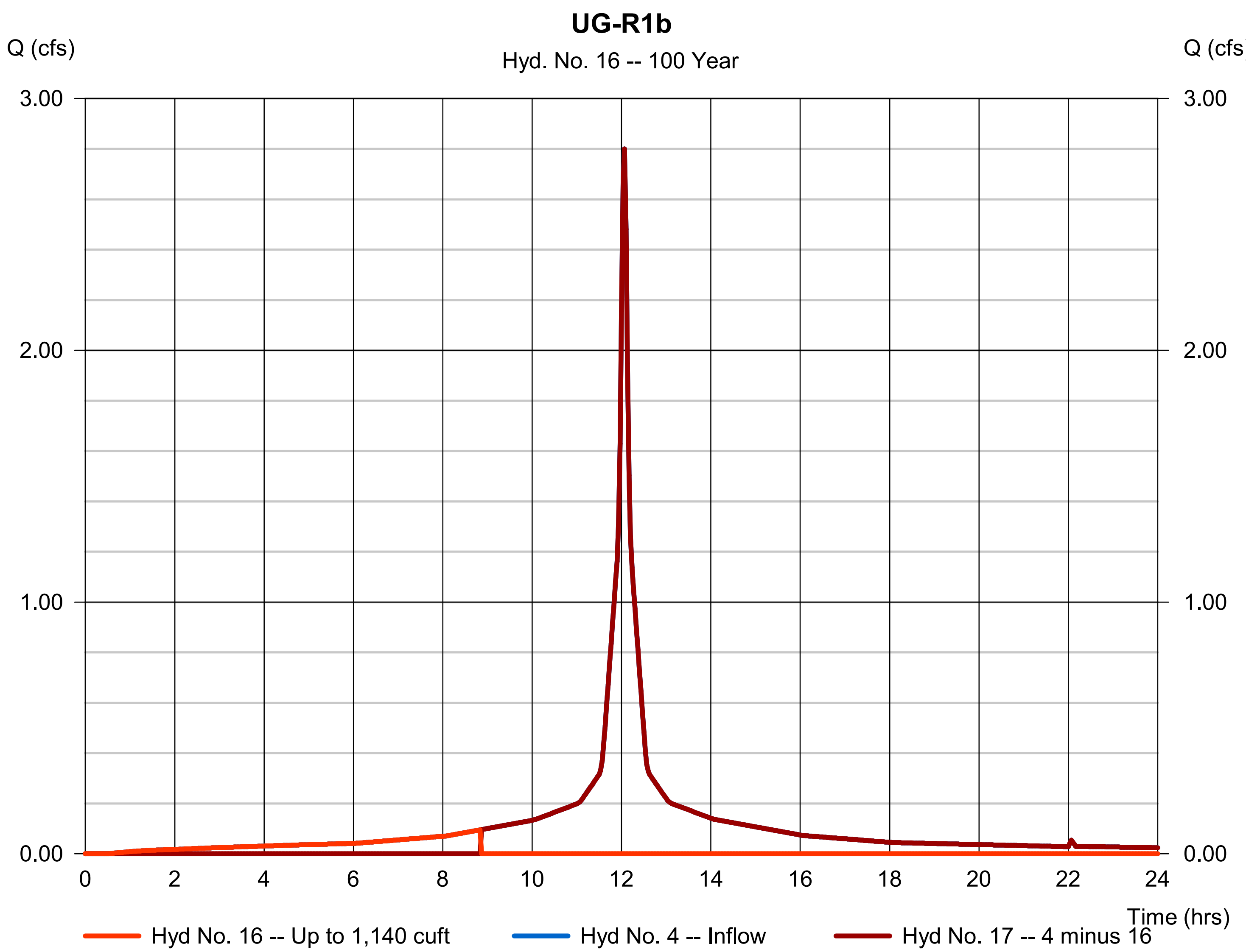
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 16

UG-R1b

Hydrograph type	= Diversion1	Peak discharge	= 0.095 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.83 hrs
Time interval	= 2 min	Hyd. volume	= 1,142 cuft
Inflow hydrograph	= 4 - PR-R1b	2nd diverted hyd.	= 17
Diversion method	= First Flush Volume	Volume Up To	= 1,140 cuft



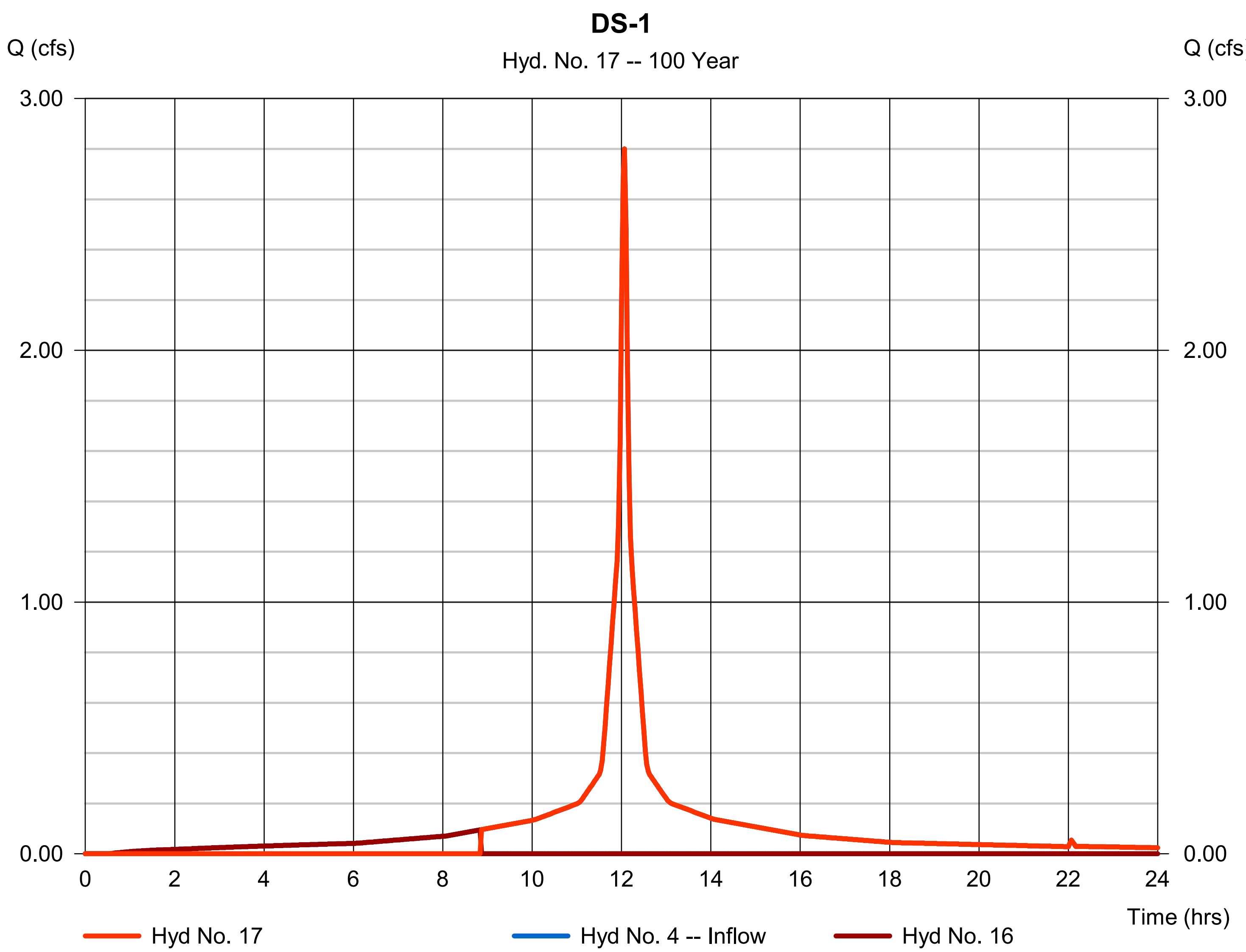
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 17

DS-1

Hydrograph type	= Diversion2	Peak discharge	= 2.800 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 8,646 cuft
Inflow hydrograph	= 4 - PR-R1b	2nd diverted hyd.	= 16
Diversion method	= First Flush Volume	Volume Up To	= 1,140 cuft



Hydrograph Report

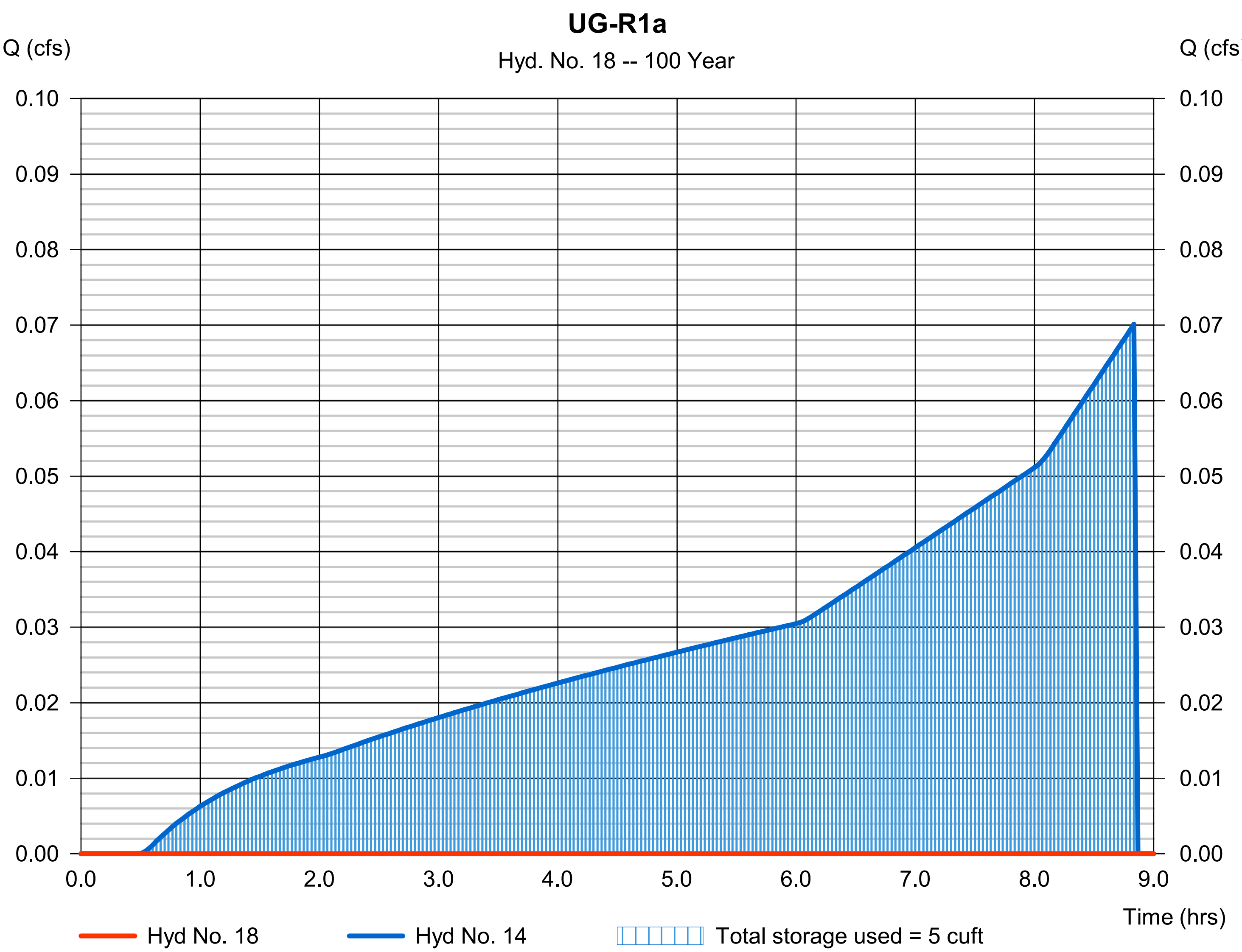
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 18

UG-R1a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.67 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - UG-R1a	Max. Elevation	= 276.15 ft
Reservoir name	= UG-R1a	Max. Storage	= 5 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

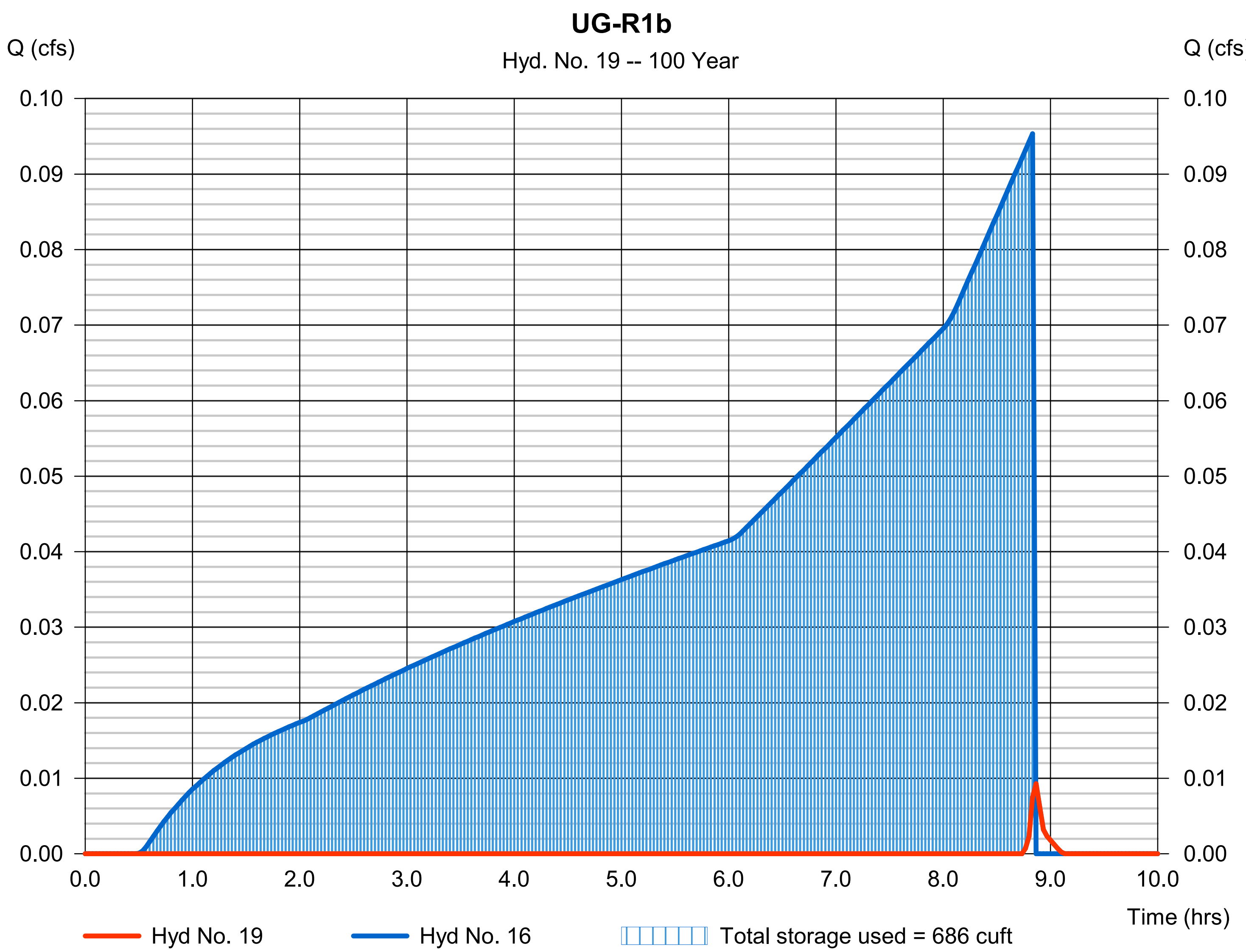
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 19

UG-R1b

Hydrograph type	= Reservoir	Peak discharge	= 0.009 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.87 hrs
Time interval	= 2 min	Hyd. volume	= 4 cuft
Inflow hyd. No.	= 16 - UG-R1b	Max. Elevation	= 278.01 ft
Reservoir name	= UG-R1b	Max. Storage	= 686 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



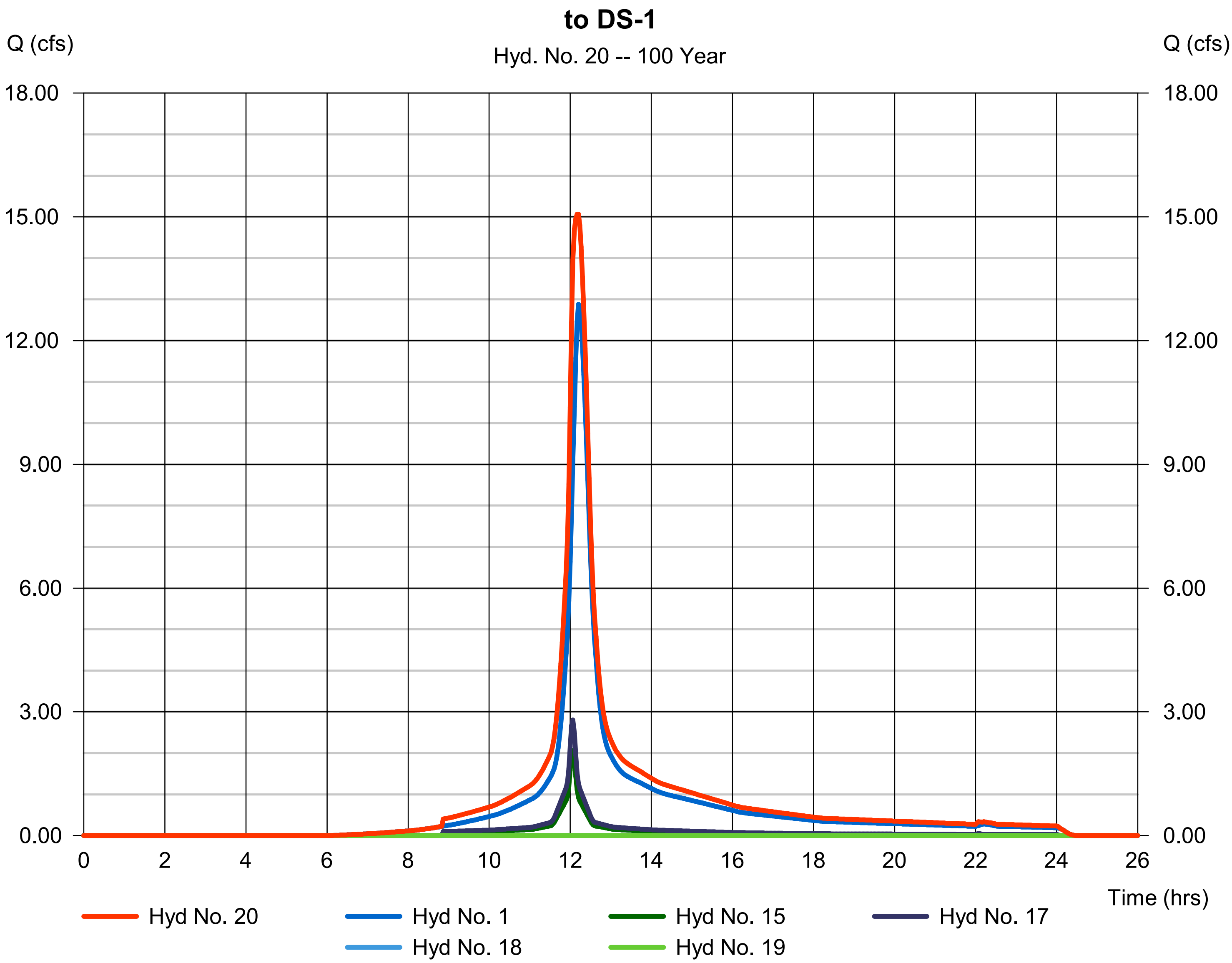
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 20

to DS-1

Hydrograph type	= Combine	Peak discharge	= 15.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 72,387 cuft
Inflow hyds.	= 1, 15, 17, 18, 19	Contrib. drain. area	= 2.670 ac



Hydrograph Report

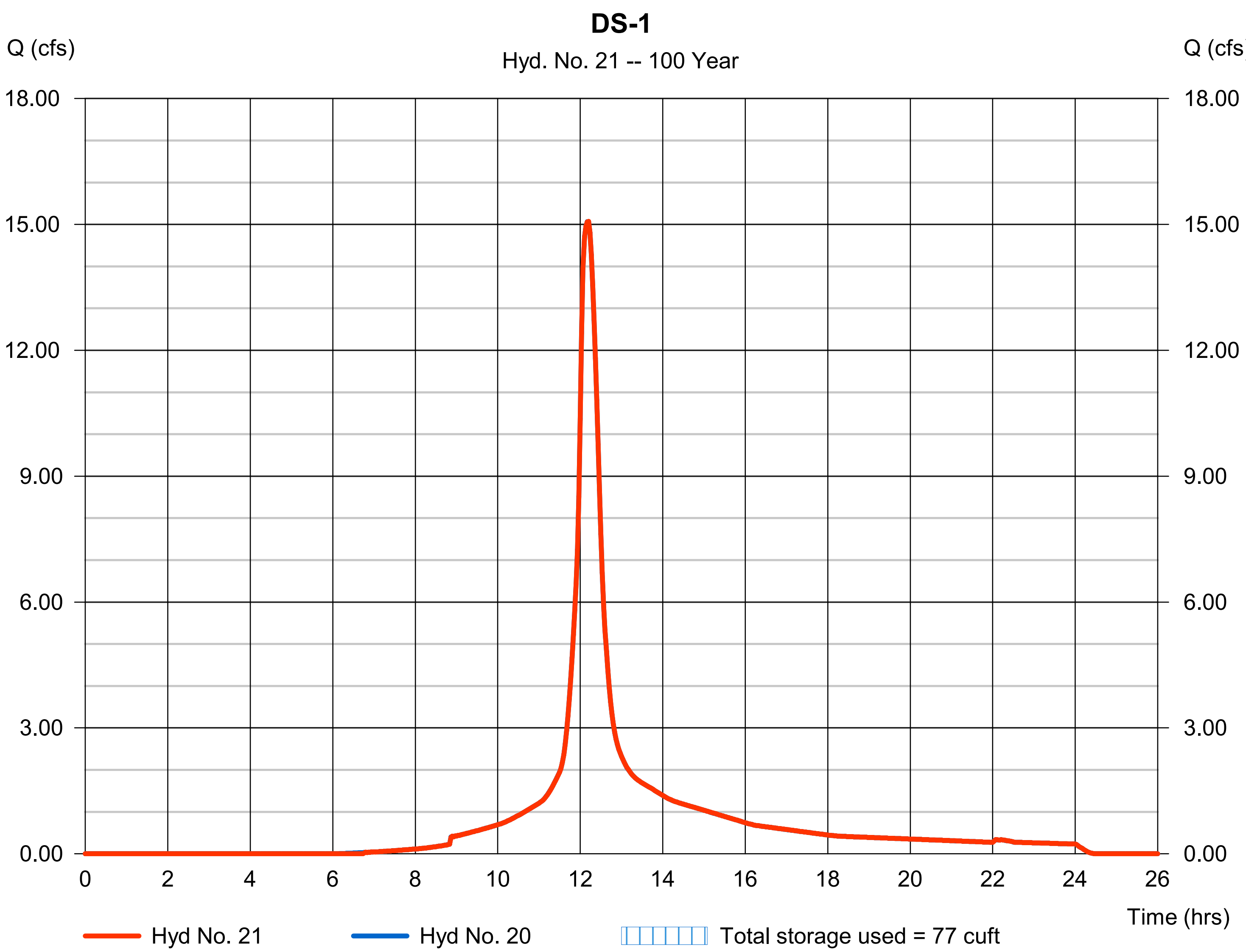
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 21

DS-1

Hydrograph type	= Reservoir	Peak discharge	= 15.07 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 72,349 cuft
Inflow hyd. No.	= 20 - to DS-1	Max. Elevation	= 271.60 ft
Reservoir name	= DS-1	Max. Storage	= 77 cuft

Storage Indication method used.



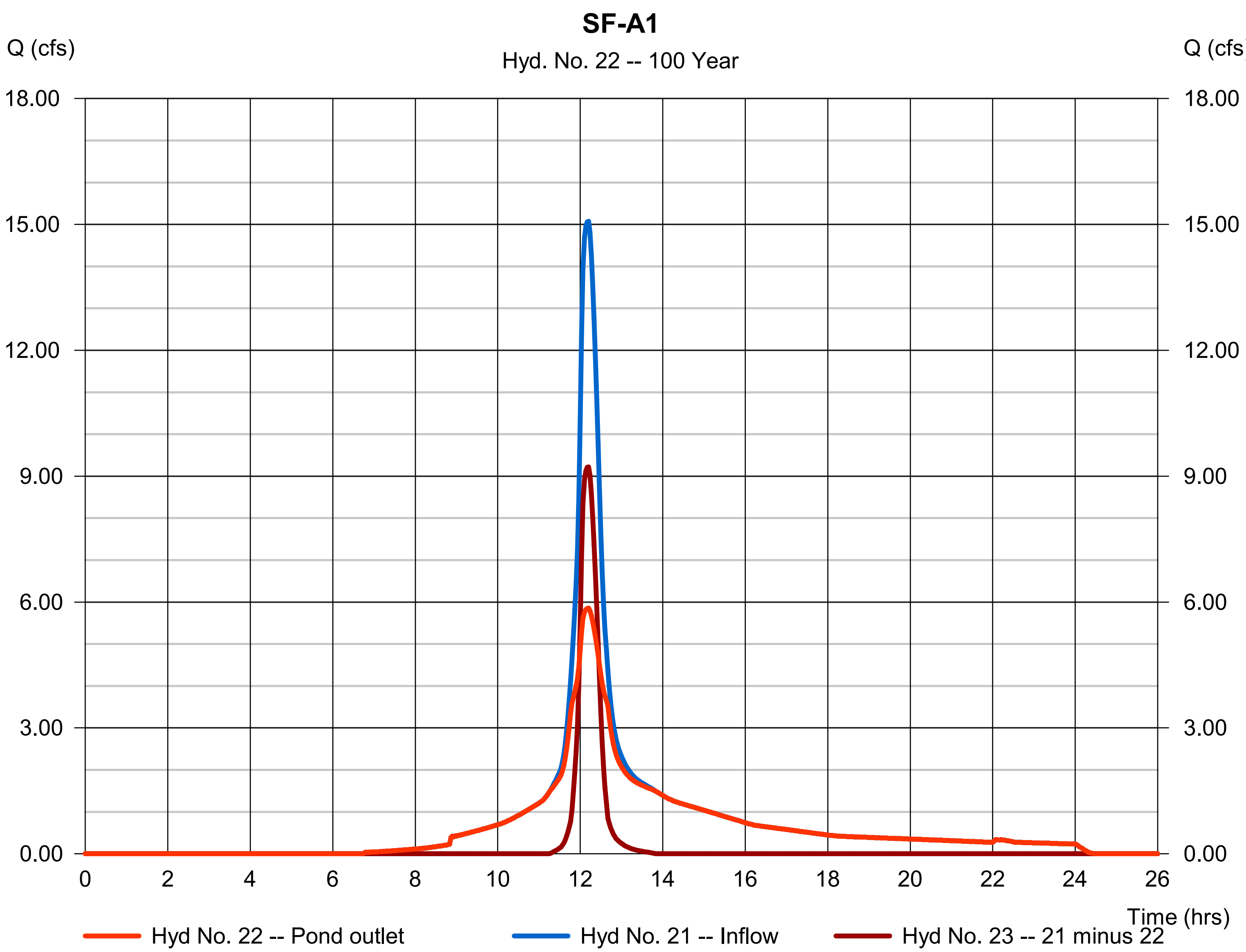
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 22

SF-A1

Hydrograph type	= Diversion1	Peak discharge	= 5.854 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 54,562 cuft
Inflow hydrograph	= 21 - DS-1	2nd diverted hyd.	= 23
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



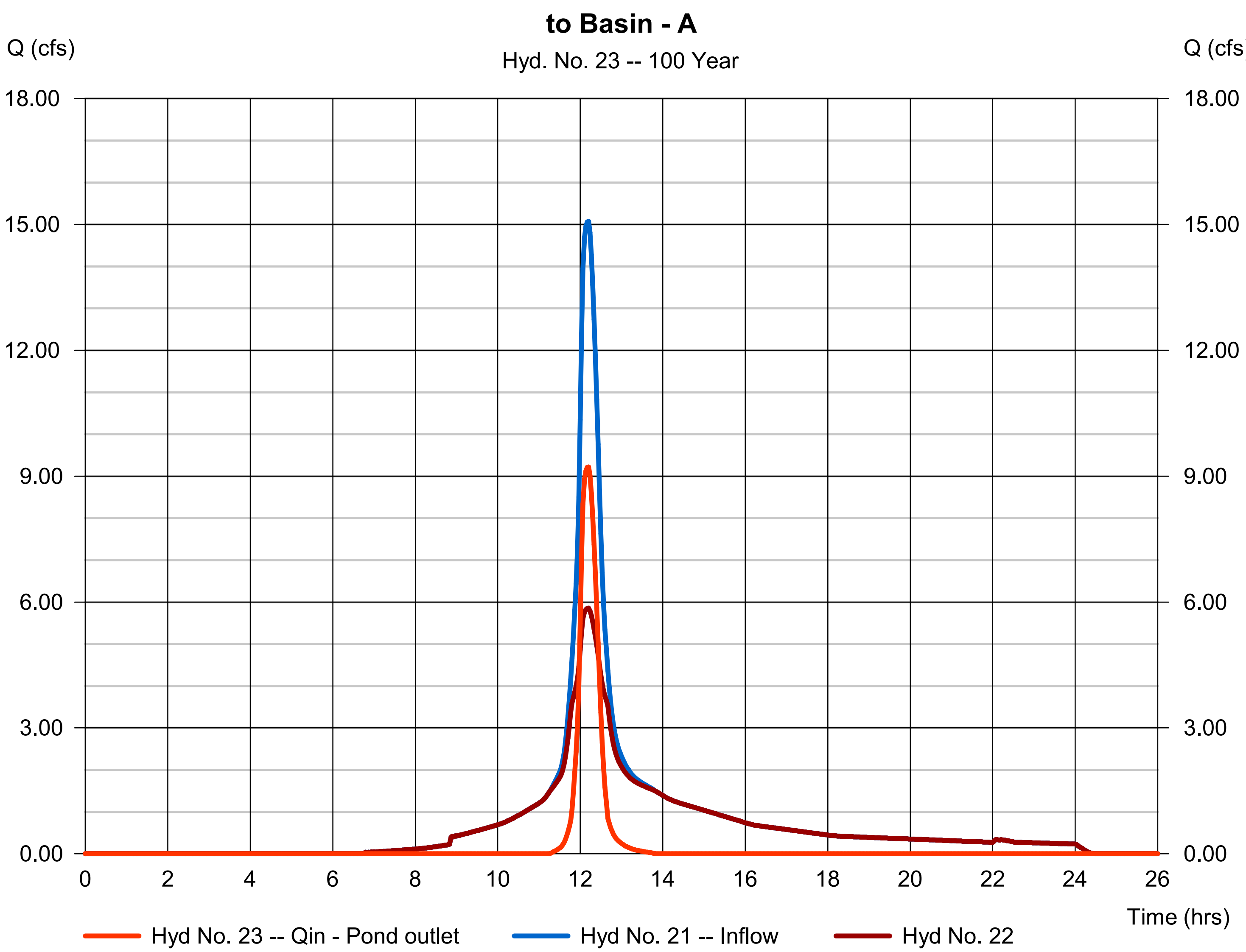
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 23

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 9.218 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 17,787 cuft
Inflow hydrograph	= 21 - DS-1	2nd diverted hyd.	= 22
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



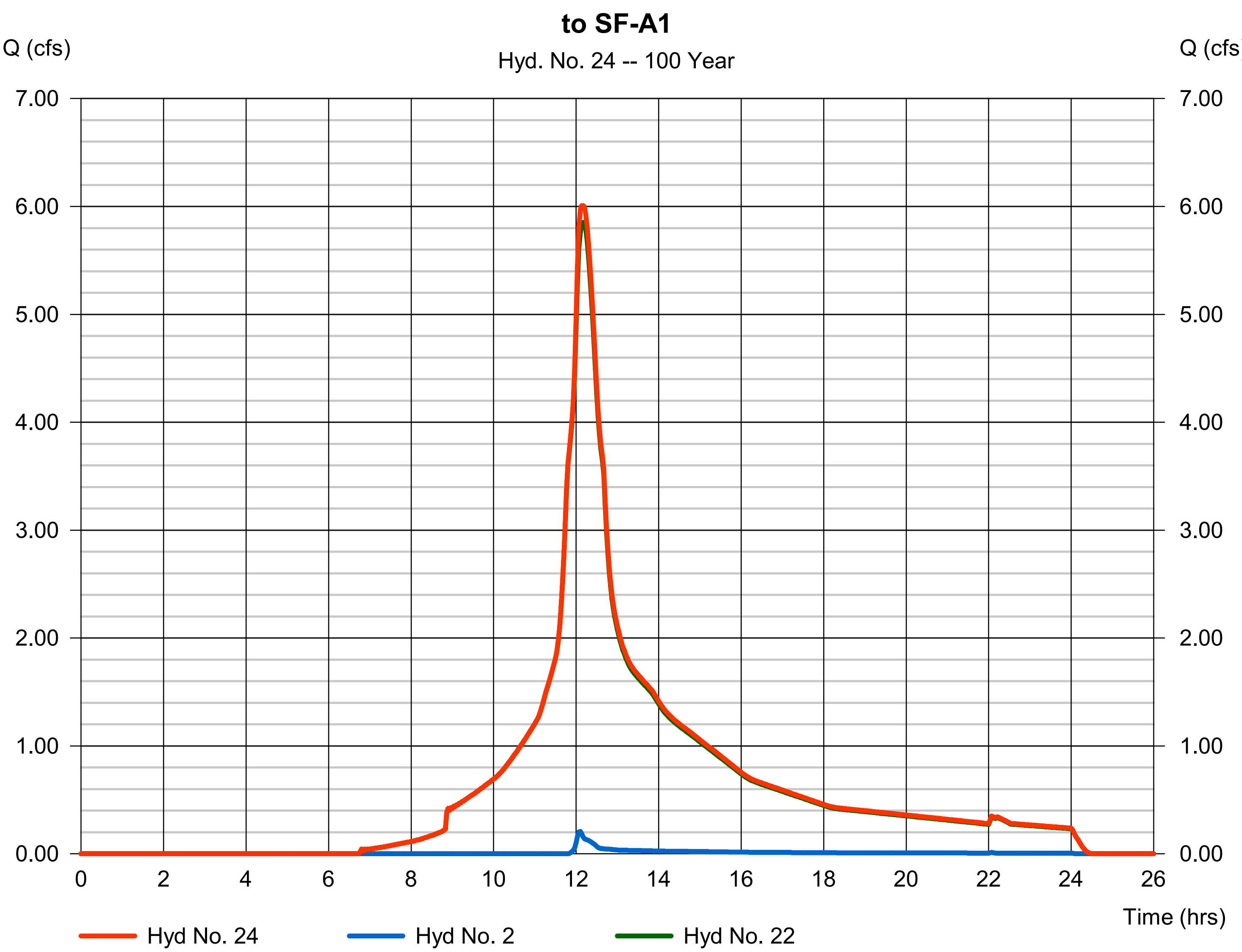
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 24

to SF-A1

Hydrograph type	= Combine	Peak discharge	= 6.008 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 55,409 cuft
Inflow hyds.	= 2, 22	Contrib. drain. area	= 0.170 ac



Hydrograph Report

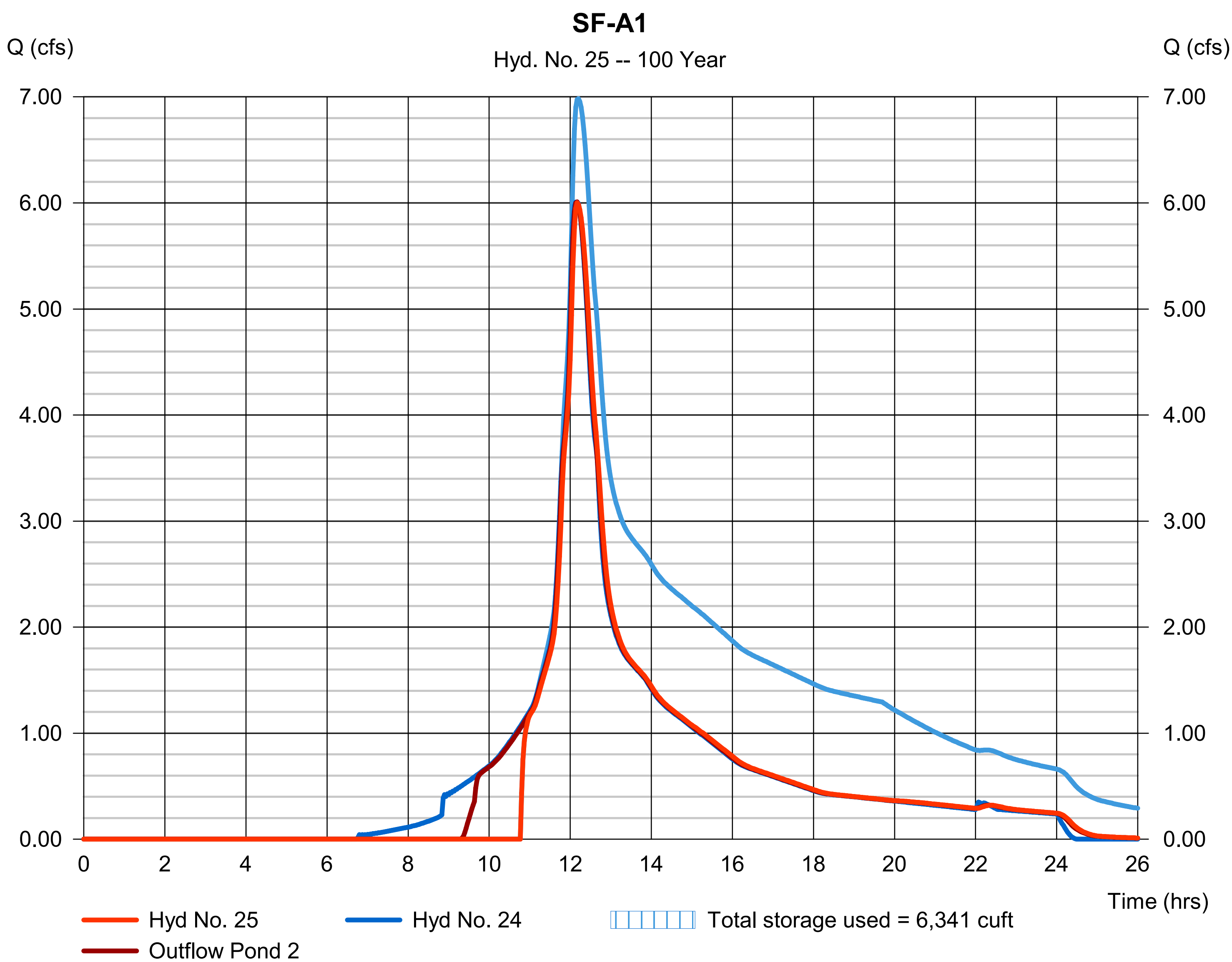
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 25

SF-A1

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 6.002 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 50,520 cuft
Pond name **Upper Pond**	= Sediment Forebay - A1	Pond name **Lower Pond**	= Sand Filter - A1
Inflow hyd.	= 24 - to SF-A1	Other Inflow hyd.	= None
Max. Elevation	= 271.85 ft	Max. Elevation	= 271.49 ft
Max. Storage	= 2,387 cuft	Max. Storage	= 3,954 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



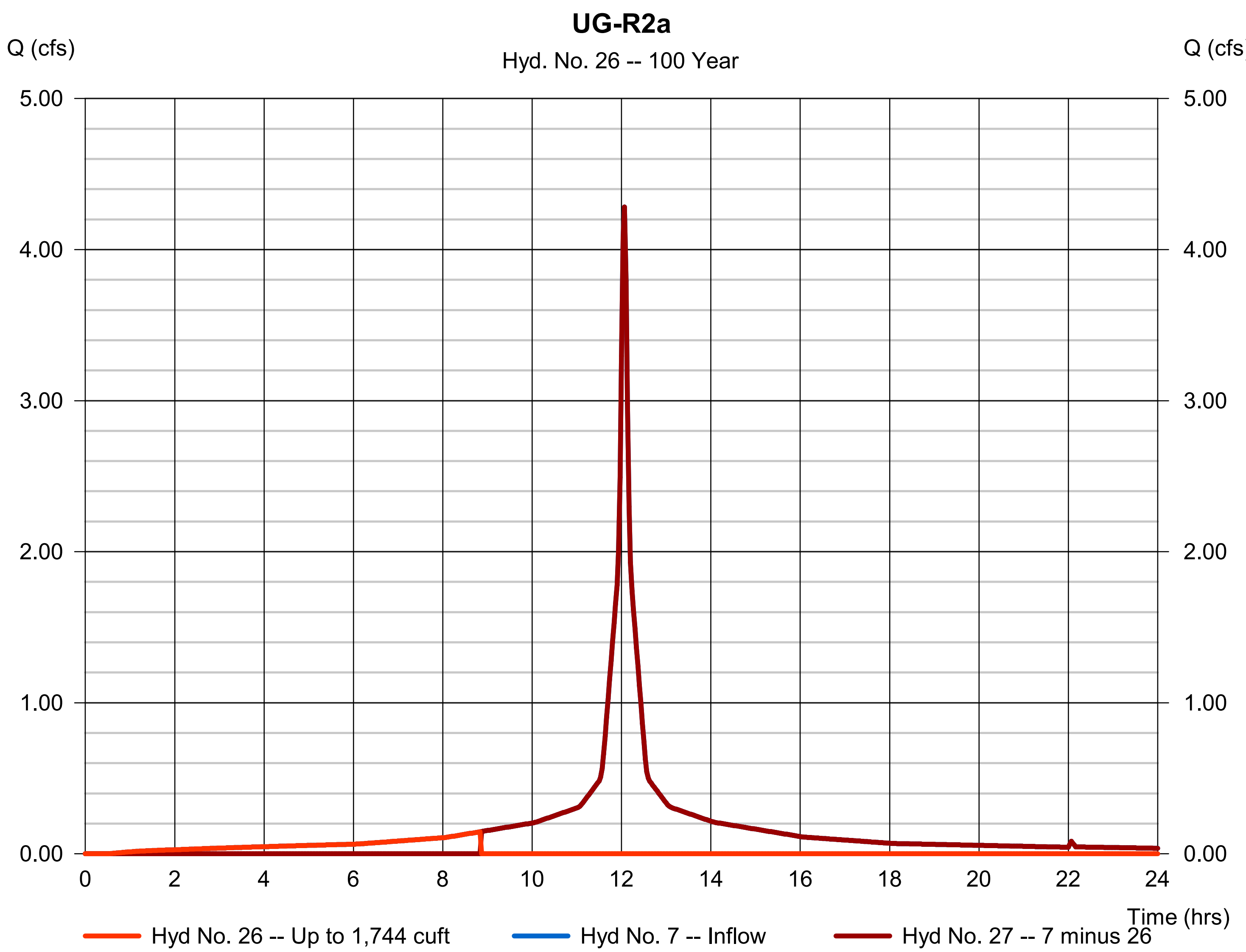
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 26

UG-R2a

Hydrograph type	= Diversion1	Peak discharge	= 0.146 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.83 hrs
Time interval	= 2 min	Hyd. volume	= 1,747 cuft
Inflow hydrograph	= 7 - PR-R2a	2nd diverted hyd.	= 27
Diversion method	= First Flush Volume	Volume Up To	= 1,744 cuft



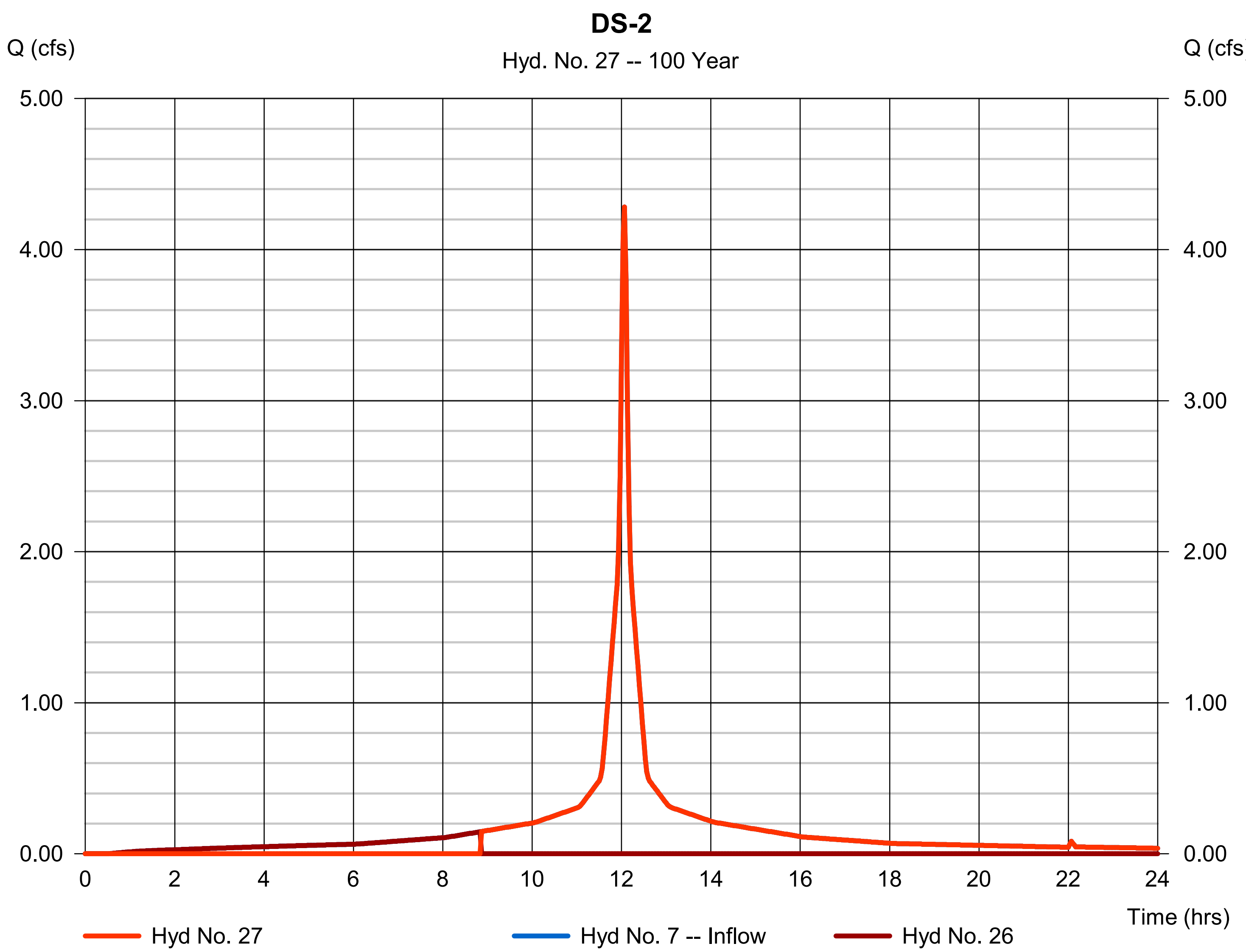
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 27

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 4.282 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 13,224 cuft
Inflow hydrograph	= 7 - PR-R2a	2nd diverted hyd.	= 26
Diversion method	= First Flush Volume	Volume Up To	= 1,744 cuft



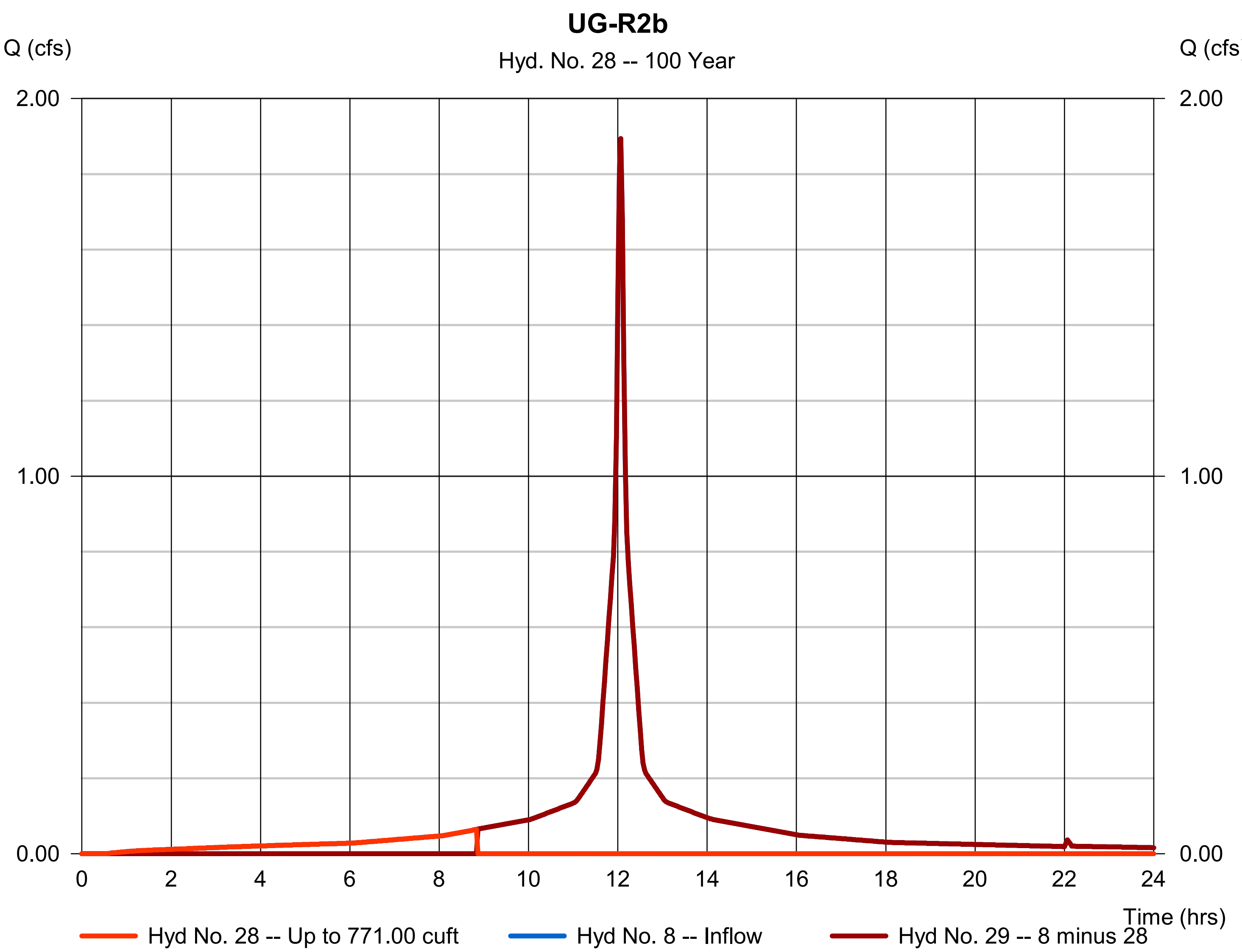
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 28

UG-R2b

Hydrograph type	= Diversion1	Peak discharge	= 0.064 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.83 hrs
Time interval	= 2 min	Hyd. volume	= 773 cuft
Inflow hydrograph	= 8 - PR-R2b	2nd diverted hyd.	= 29
Diversion method	= First Flush Volume	Volume Up To	= 771.00 cuft



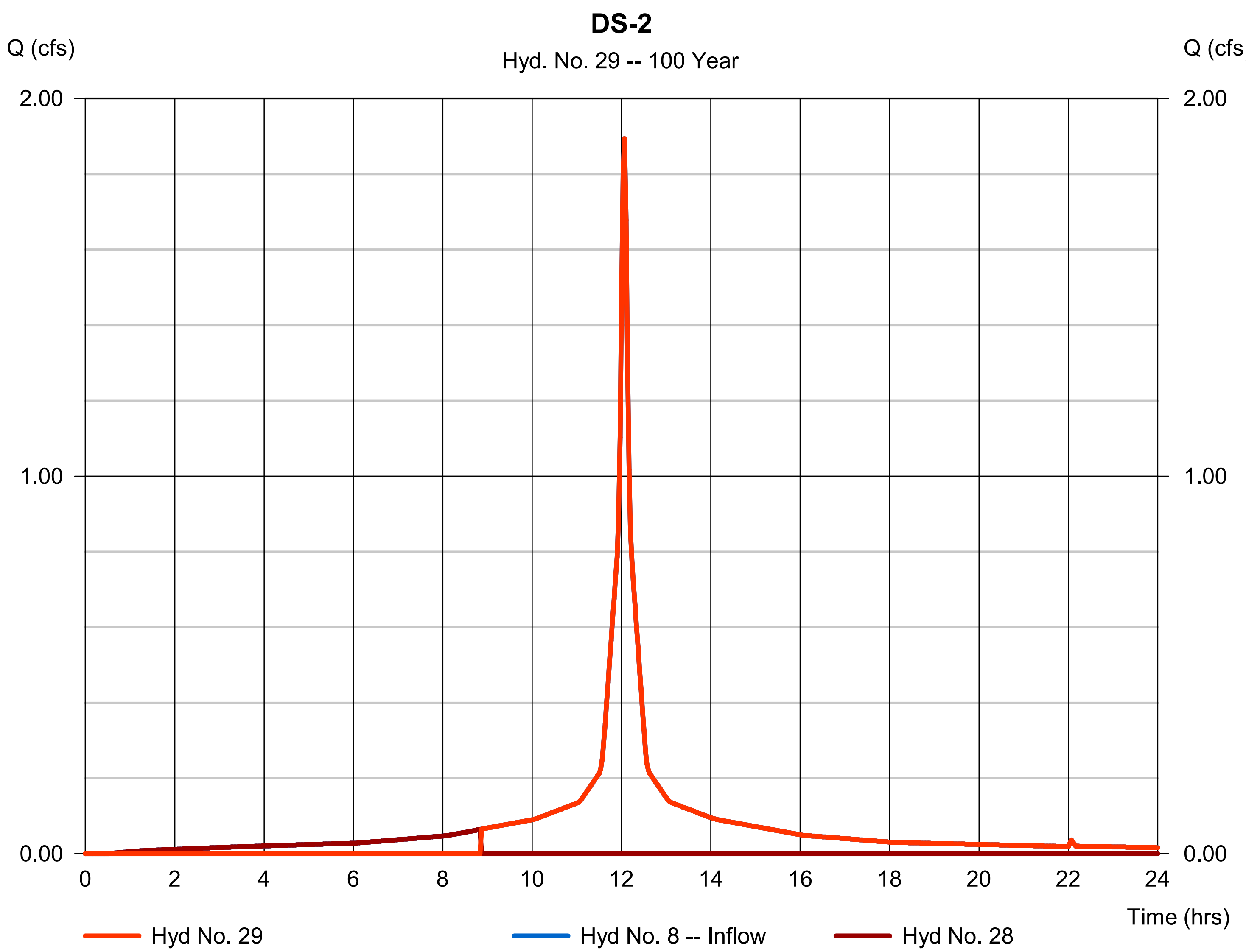
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 29

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 1.894 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,849 cuft
Inflow hydrograph	= 8 - PR-R2b	2nd diverted hyd.	= 28
Diversion method	= First Flush Volume	Volume Up To	= 771.00 cuft



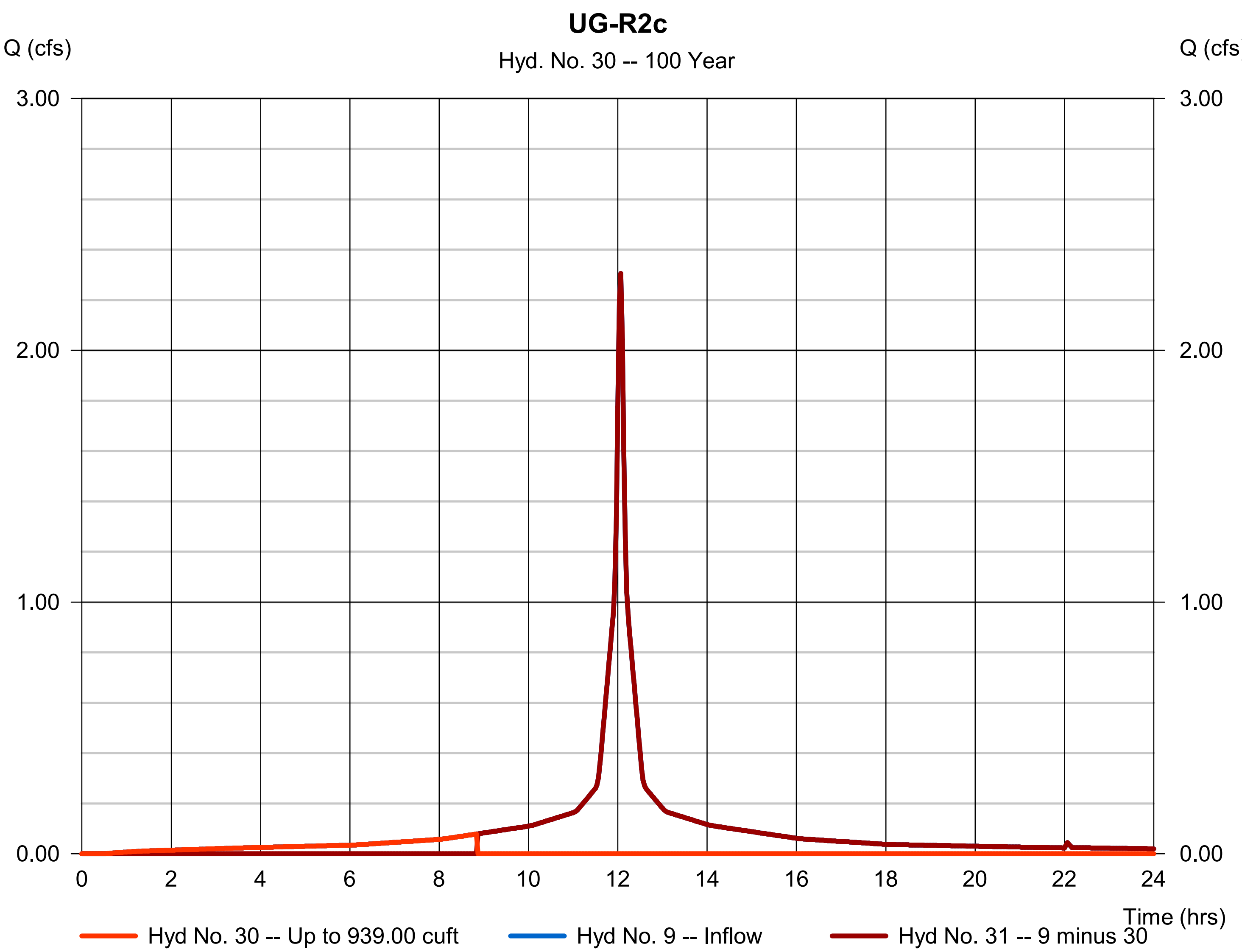
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 30

UG-R2c

Hydrograph type	= Diversion1	Peak discharge	= 0.079 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.83 hrs
Time interval	= 2 min	Hyd. volume	= 941 cuft
Inflow hydrograph	= 9 - PR-R2c	2nd diverted hyd.	= 31
Diversion method	= First Flush Volume	Volume Up To	= 939.00 cuft



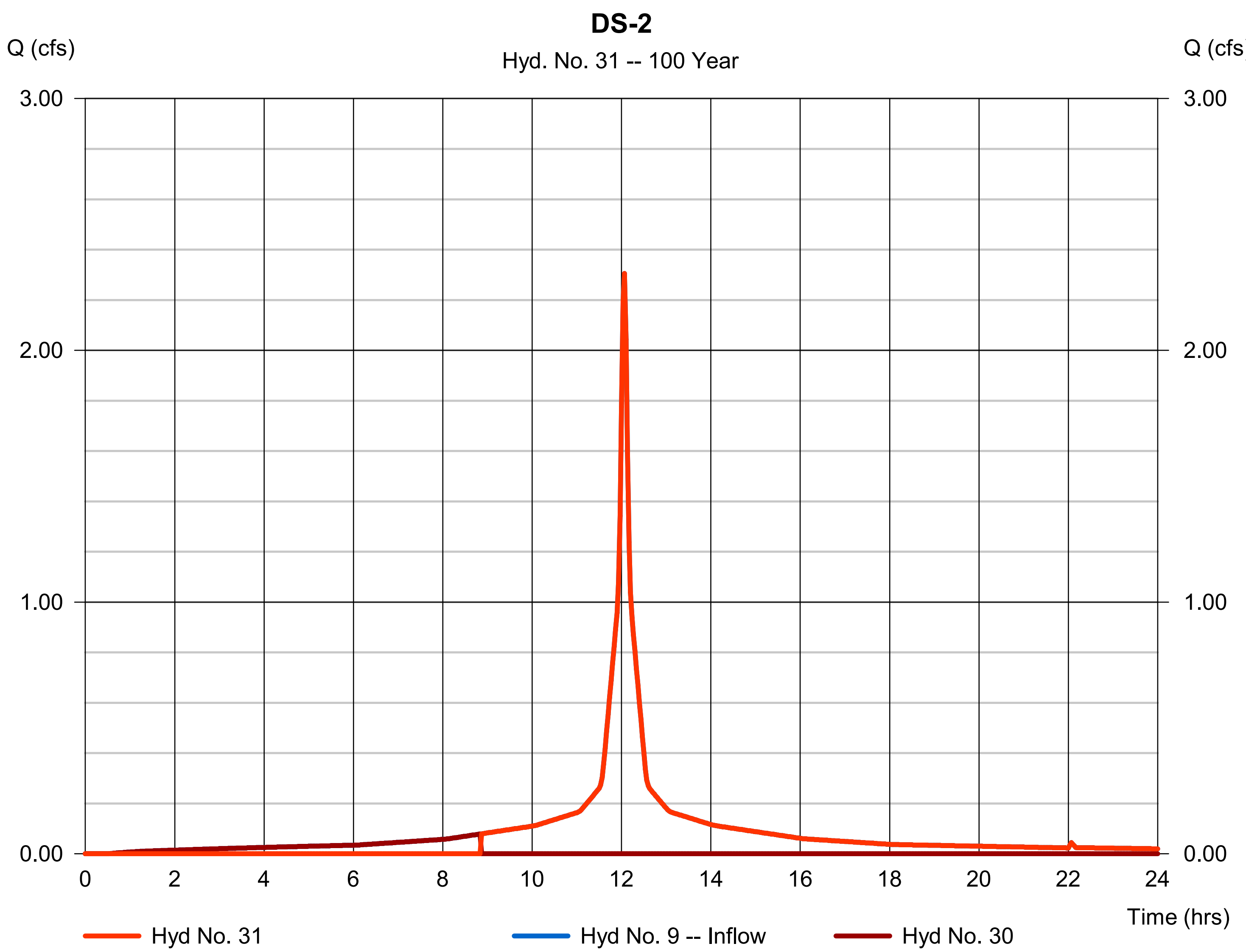
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 31

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 2.306 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 7,121 cuft
Inflow hydrograph	= 9 - PR-R2c	2nd diverted hyd.	= 30
Diversion method	= First Flush Volume	Volume Up To	= 939.00 cuft



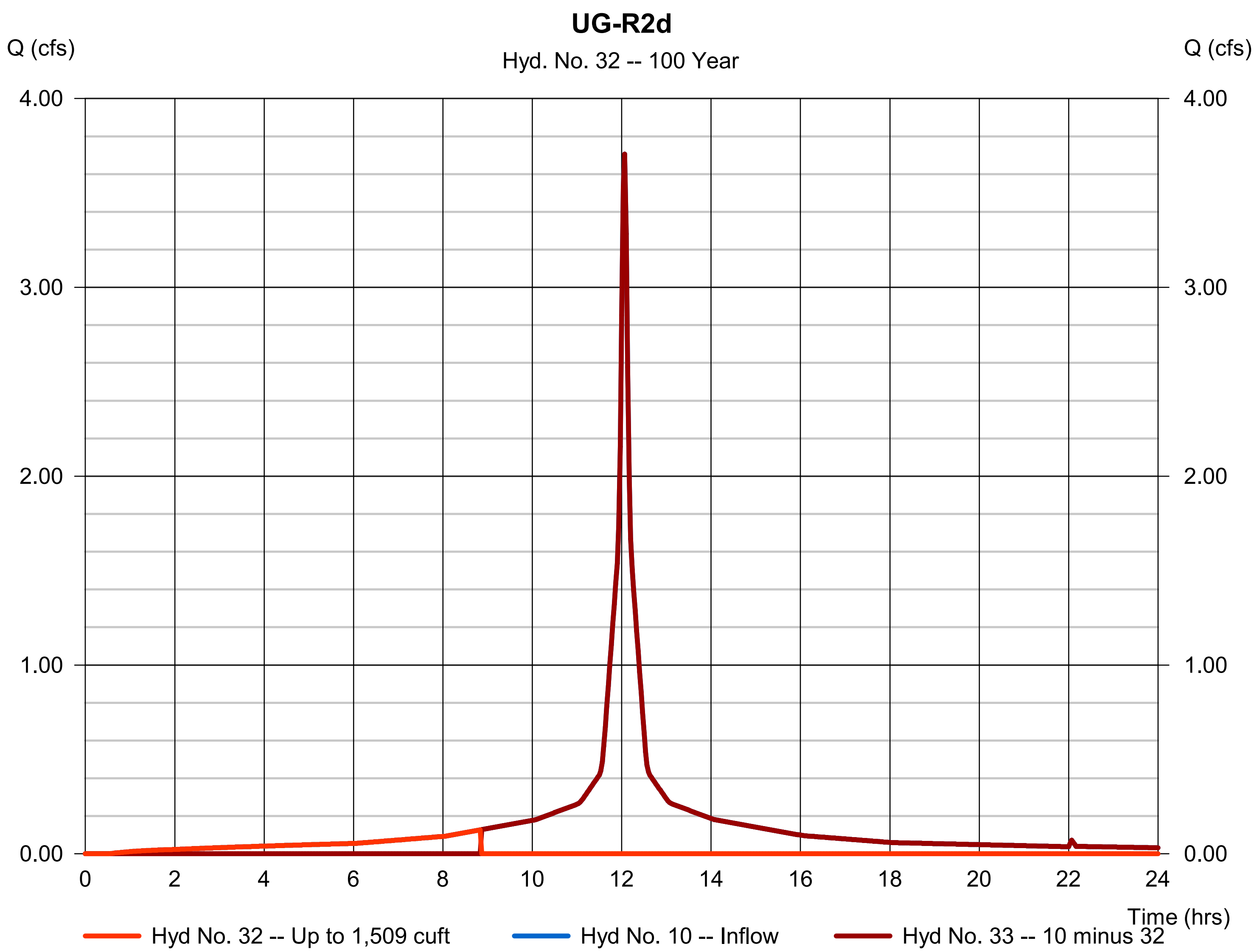
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 32

UG-R2d

Hydrograph type	= Diversion1	Peak discharge	= 0.126 cfs
Storm frequency	= 100 yrs	Time to peak	= 8.83 hrs
Time interval	= 2 min	Hyd. volume	= 1,512 cuft
Inflow hydrograph	= 10 - PR-R2d	2nd diverted hyd.	= 33
Diversion method	= First Flush Volume	Volume Up To	= 1,509 cuft



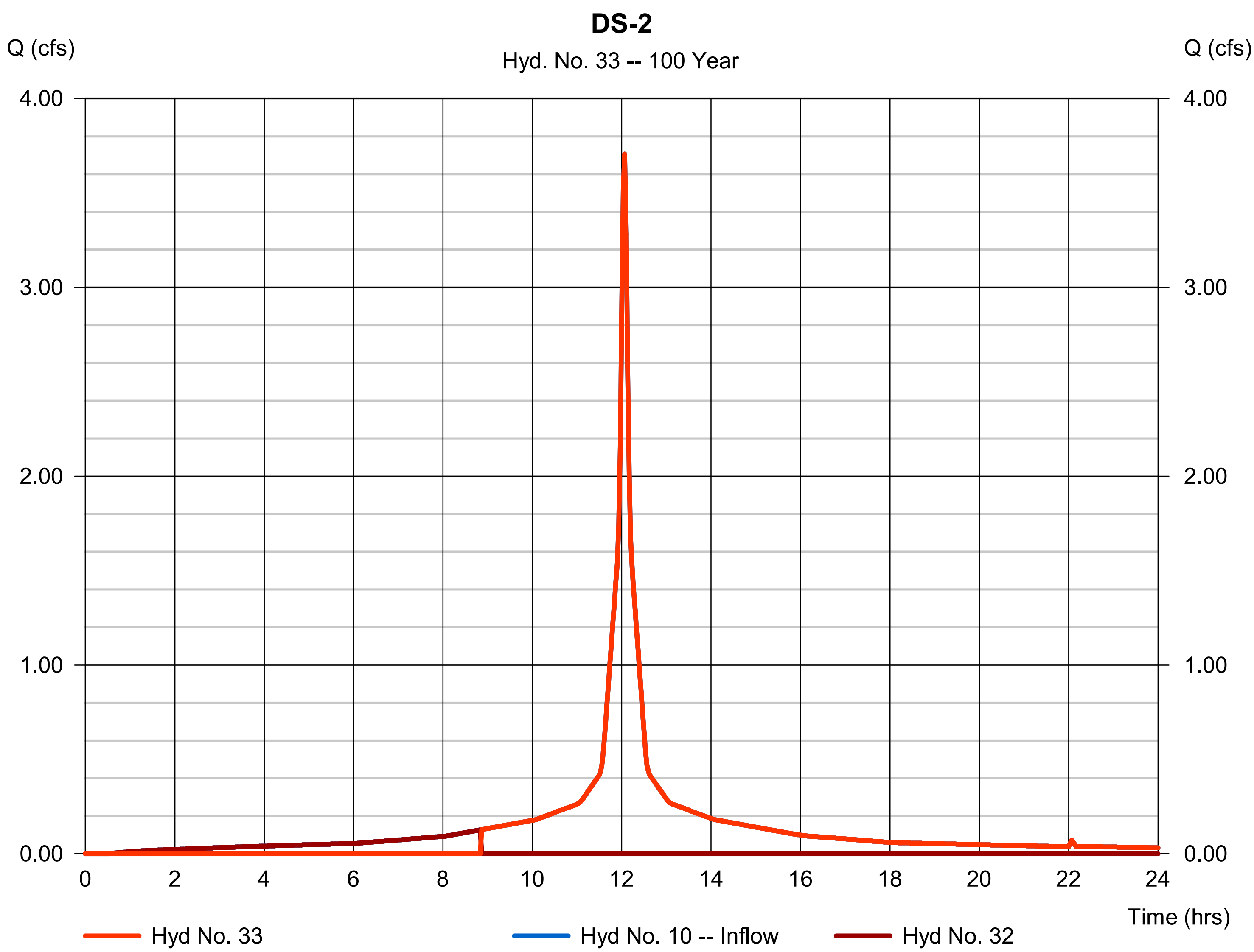
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 33

DS-2

Hydrograph type	= Diversion2	Peak discharge	= 3.706 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 11,444 cuft
Inflow hydrograph	= 10 - PR-R2d	2nd diverted hyd.	= 32
Diversion method	= First Flush Volume	Volume Up To	= 1,509 cuft



Hydrograph Report

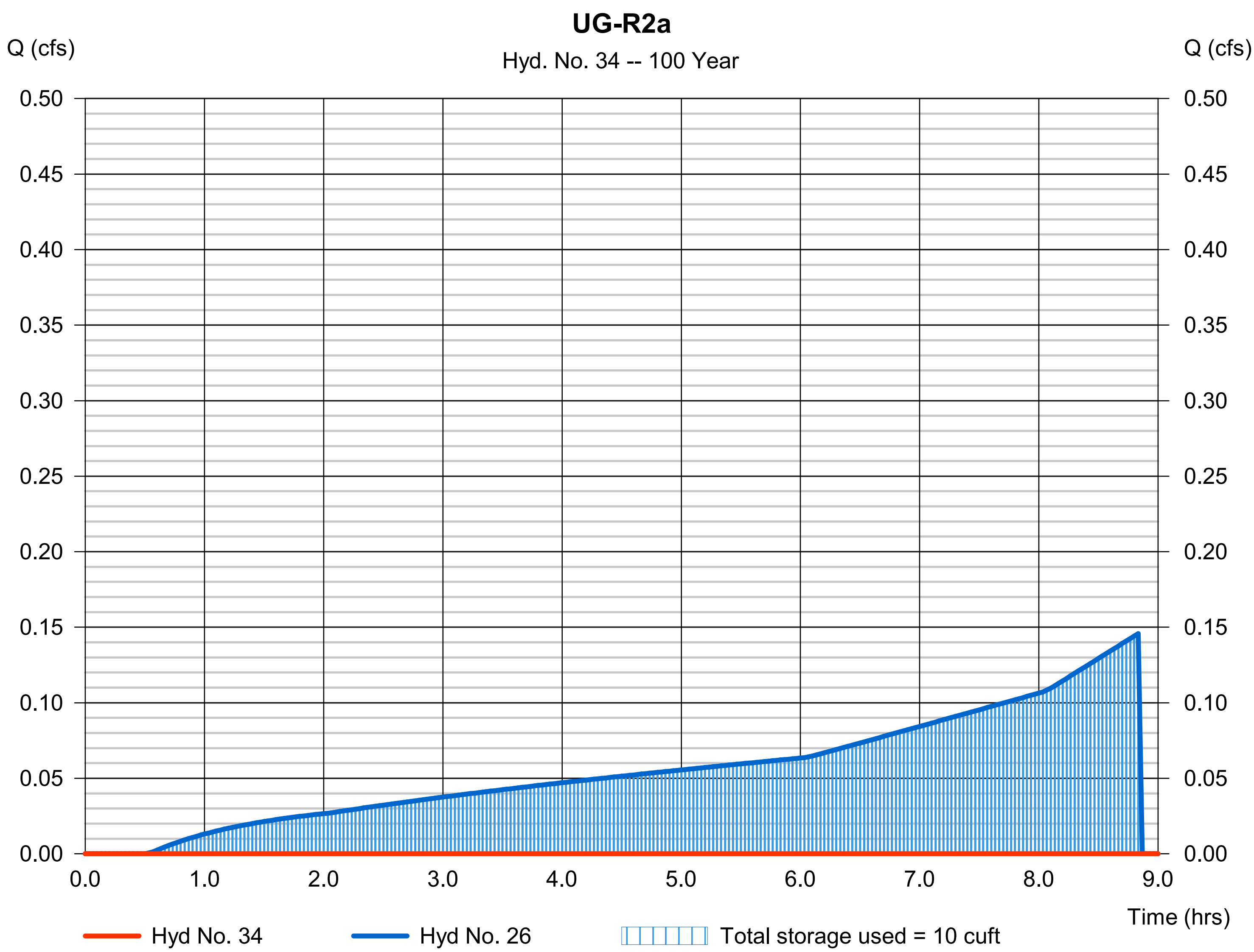
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 34

UG-R2a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 26 - UG-R2a	Max. Elevation	= 276.09 ft
Reservoir name	= UG-R2a	Max. Storage	= 10 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

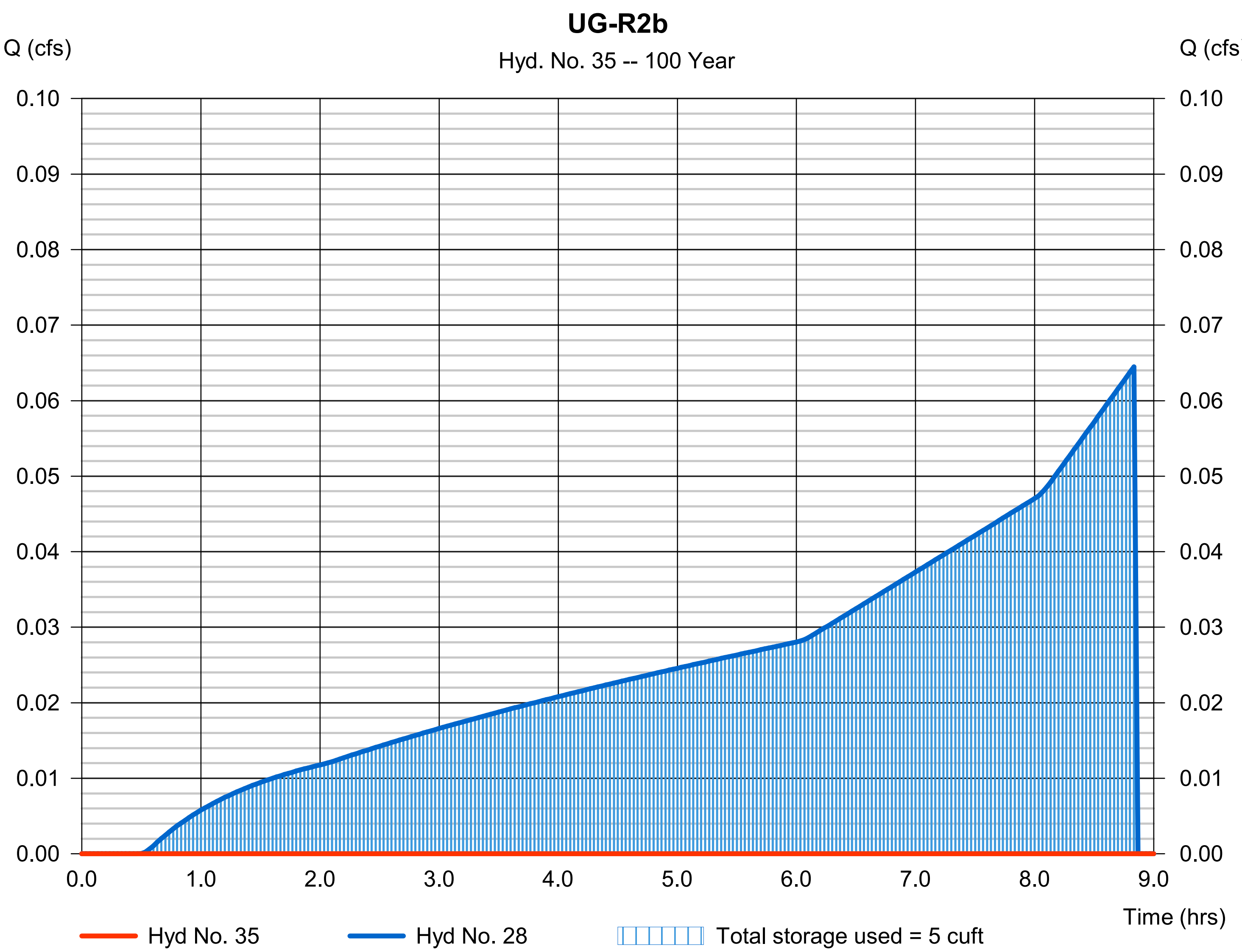
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 35

UG-R2b

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 28 - UG-R2b	Max. Elevation	= 276.33 ft
Reservoir name	= UG-R2b	Max. Storage	= 5 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

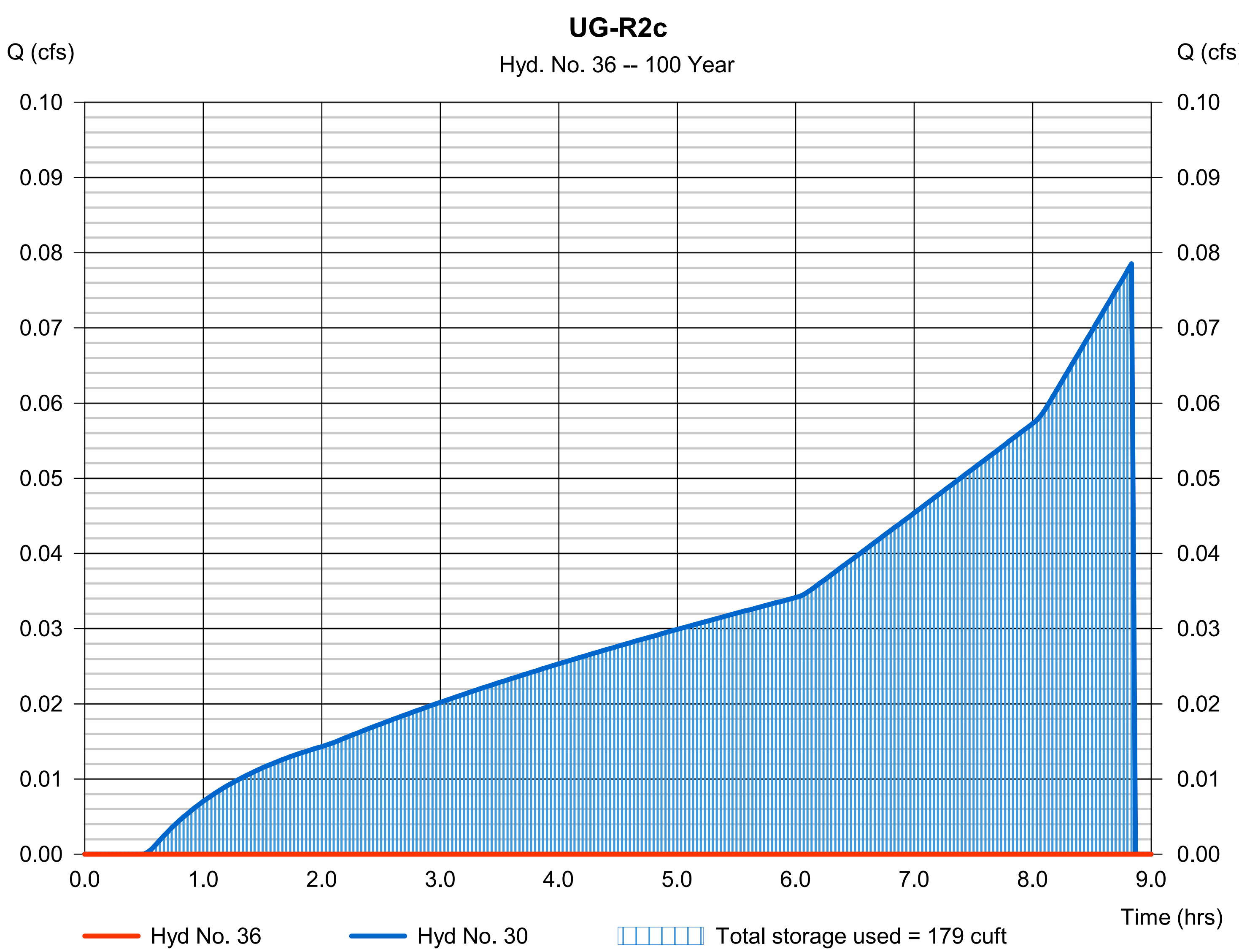
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 36

UG-R2c

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 30 - UG-R2c	Max. Elevation	= 277.99 ft
Reservoir name	= UG-R2c	Max. Storage	= 179 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

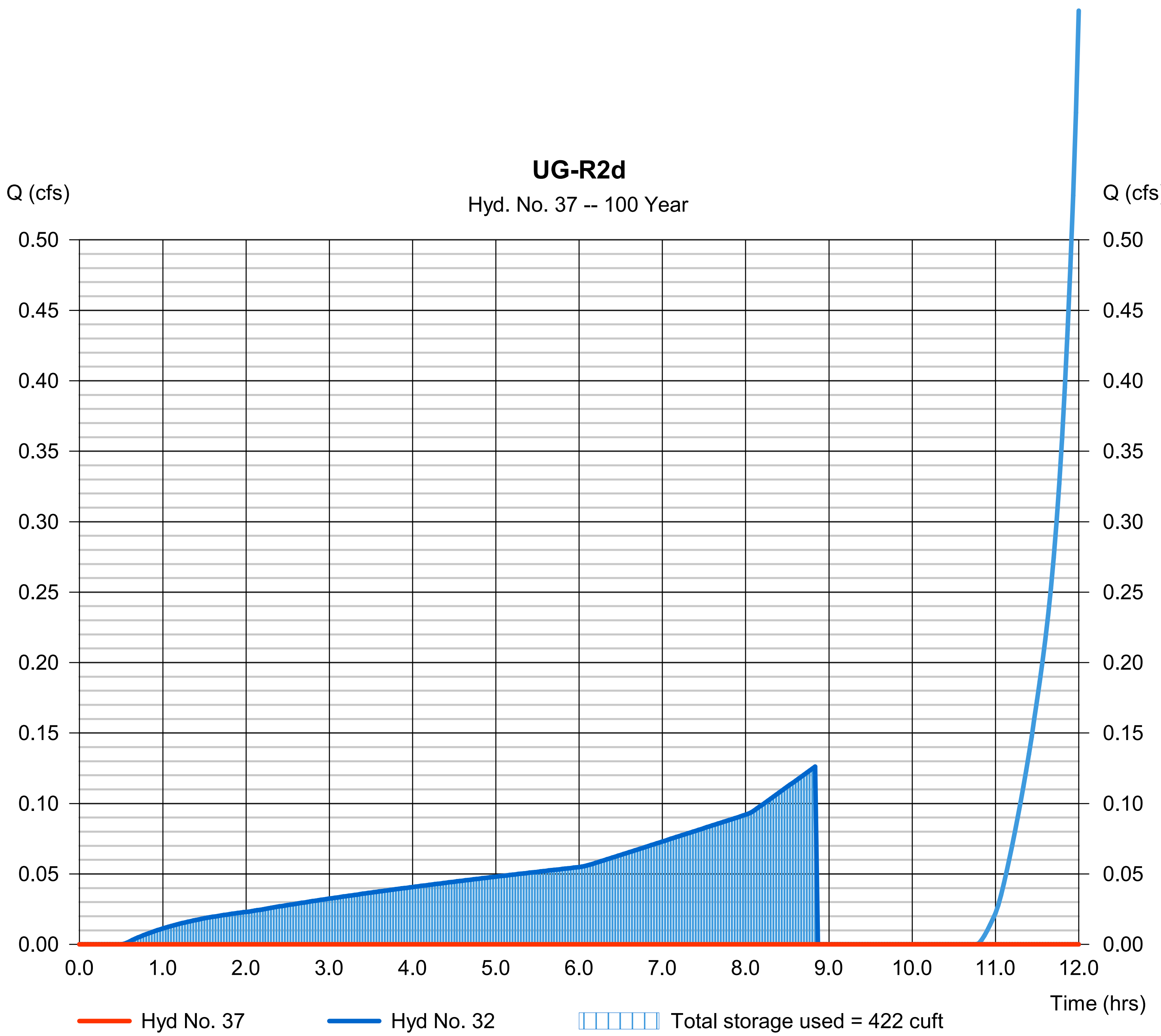
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 37

UG-R2d

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 100 yrs	Time to peak	= 3.07 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 32 - UG-R2d	Max. Elevation	= 276.07 ft
Reservoir name	= UG-R2d	Max. Storage	= 422 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



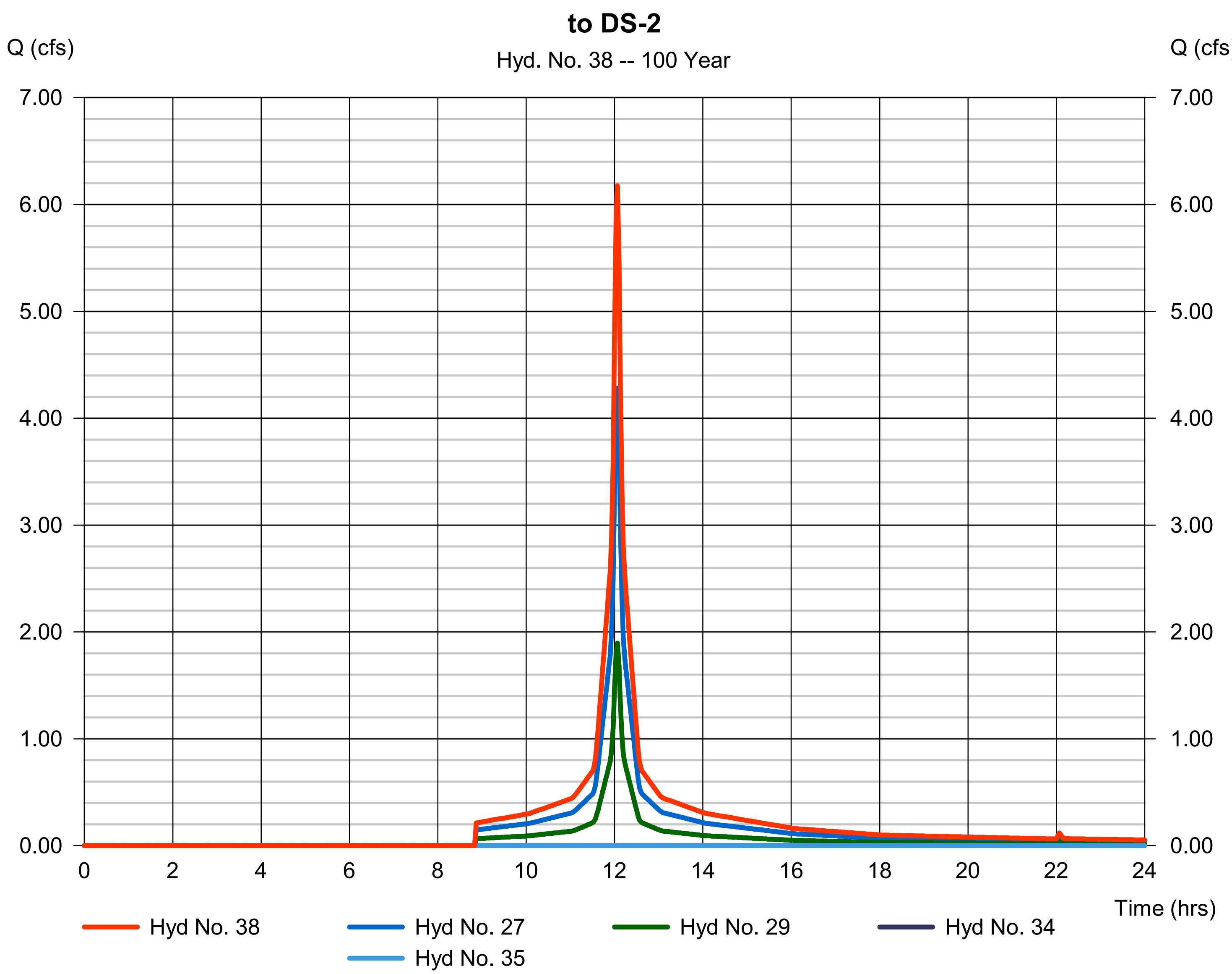
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 38

to DS-2

Hydrograph type	= Combine	Peak discharge	= 6.176 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 19,073 cuft
Inflow hyds.	= 27, 29, 34, 35	Contrib. drain. area	= 0.000 ac



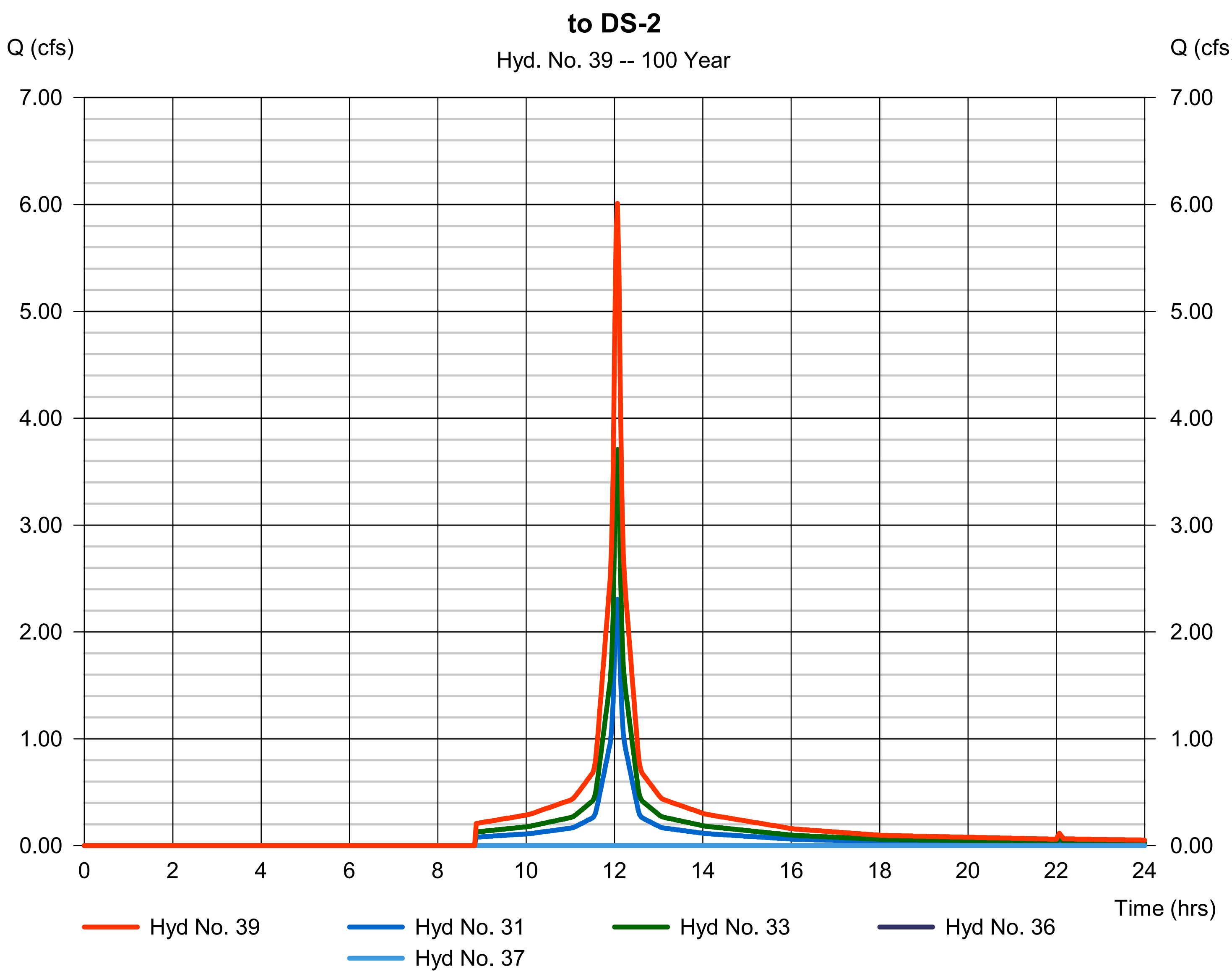
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 39

to DS-2

Hydrograph type	= Combine	Peak discharge	= 6.011 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 18,564 cuft
Inflow hyds.	= 31, 33, 36, 37	Contrib. drain. area	= 0.000 ac



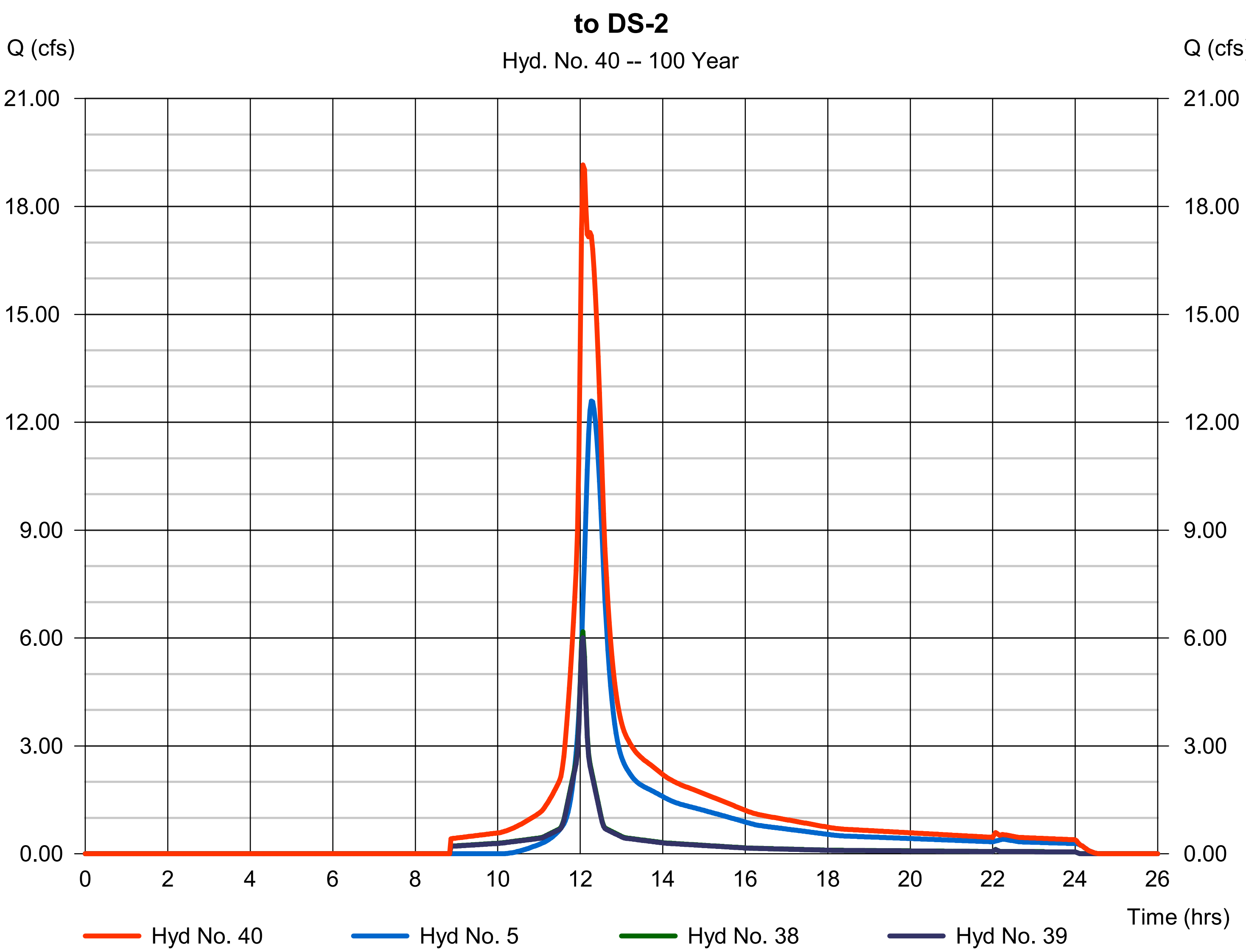
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 40

to DS-2

Hydrograph type	= Combine	Peak discharge	= 19.16 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 99,187 cuft
Inflow hyds.	= 5, 38, 39	Contrib. drain. area	= 5.090 ac



Hydrograph Report

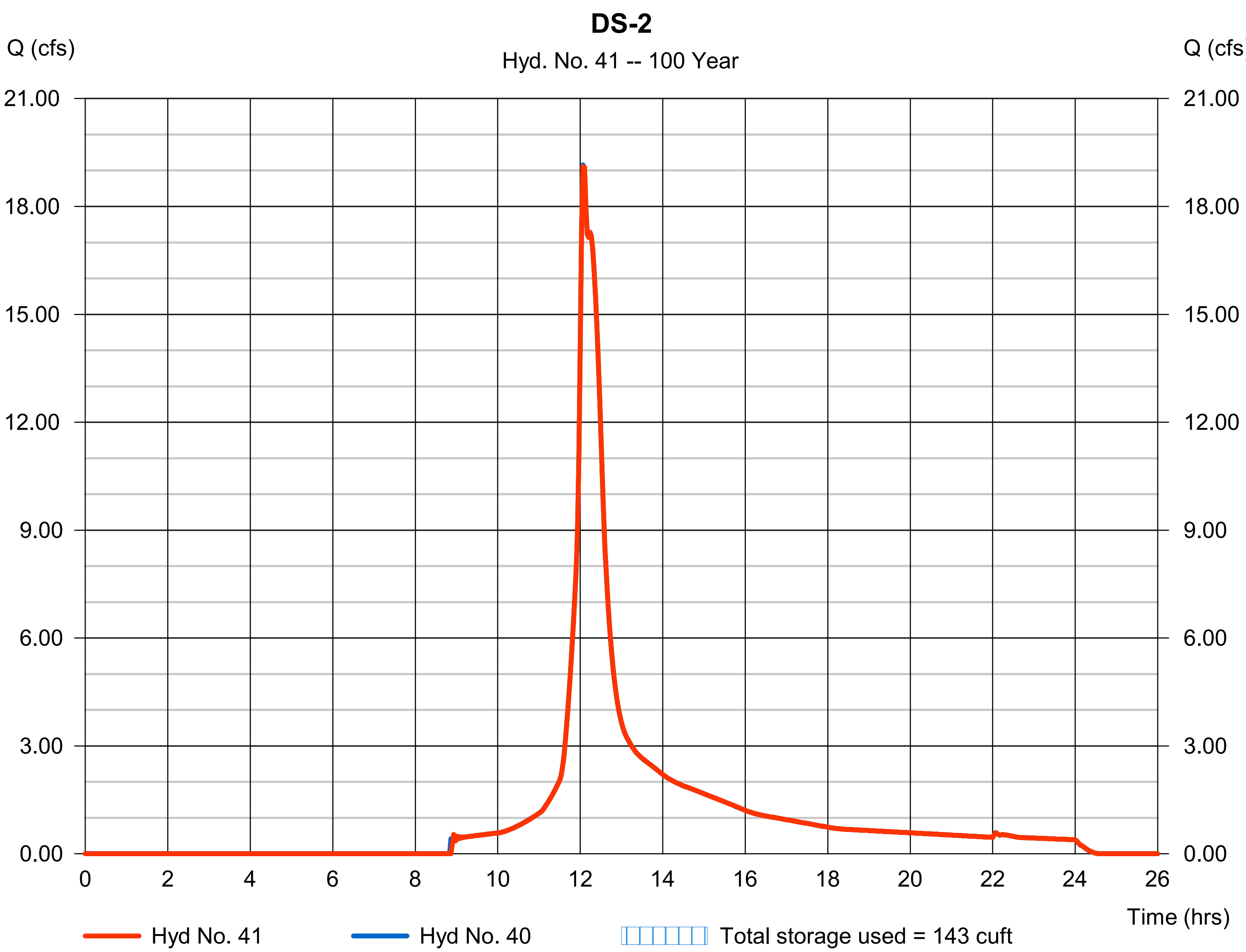
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 41

DS-2

Hydrograph type	= Reservoir	Peak discharge	= 19.11 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 99,131 cuft
Inflow hyd. No.	= 40 - to DS-2	Max. Elevation	= 271.38 ft
Reservoir name	= DS-2	Max. Storage	= 143 cuft

Storage Indication method used.



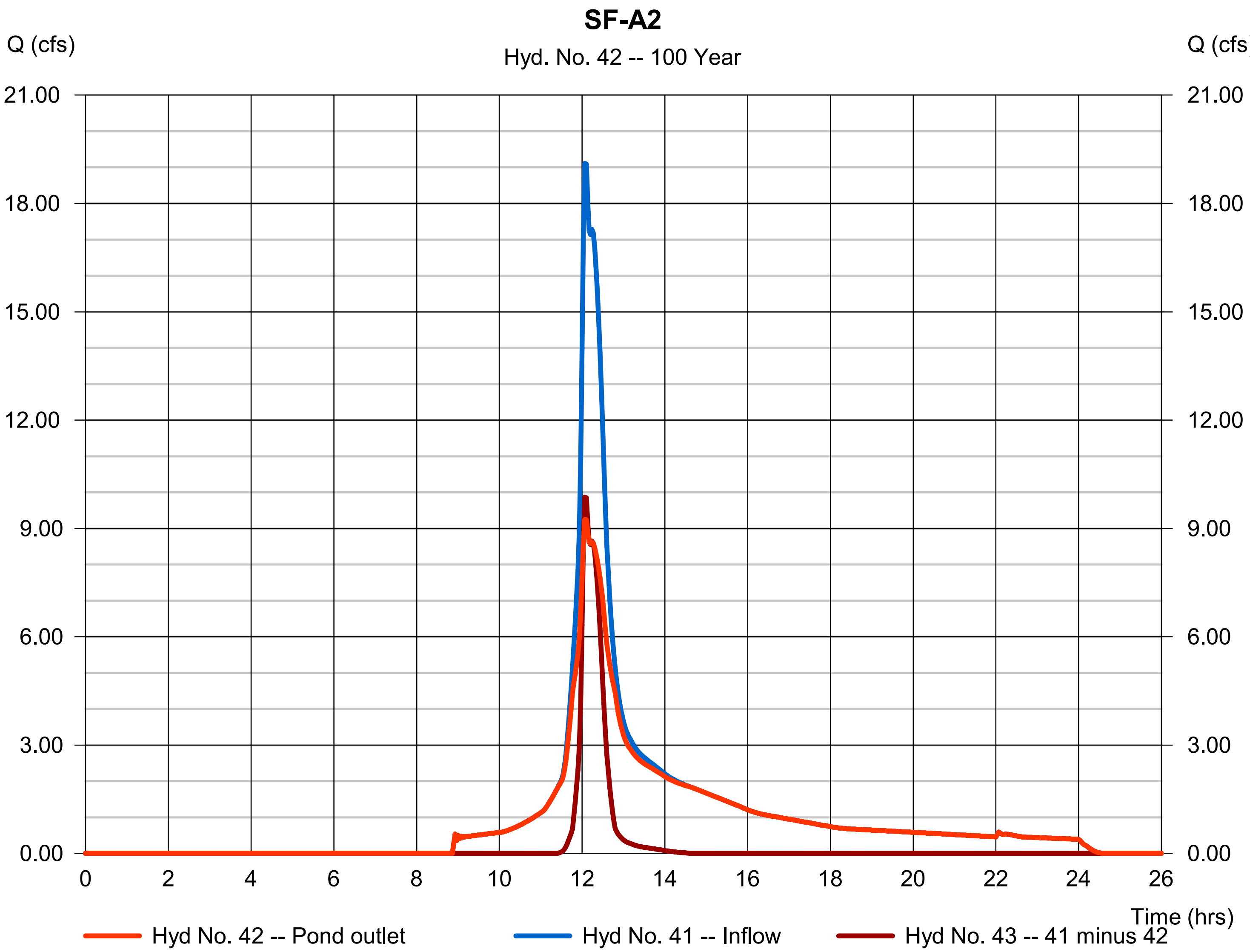
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 42

SF-A2

Hydrograph type	= Diversion1	Peak discharge	= 9.245 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 78,852 cuft
Inflow hydrograph	= 41 - DS-2	2nd diverted hyd.	= 43
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B



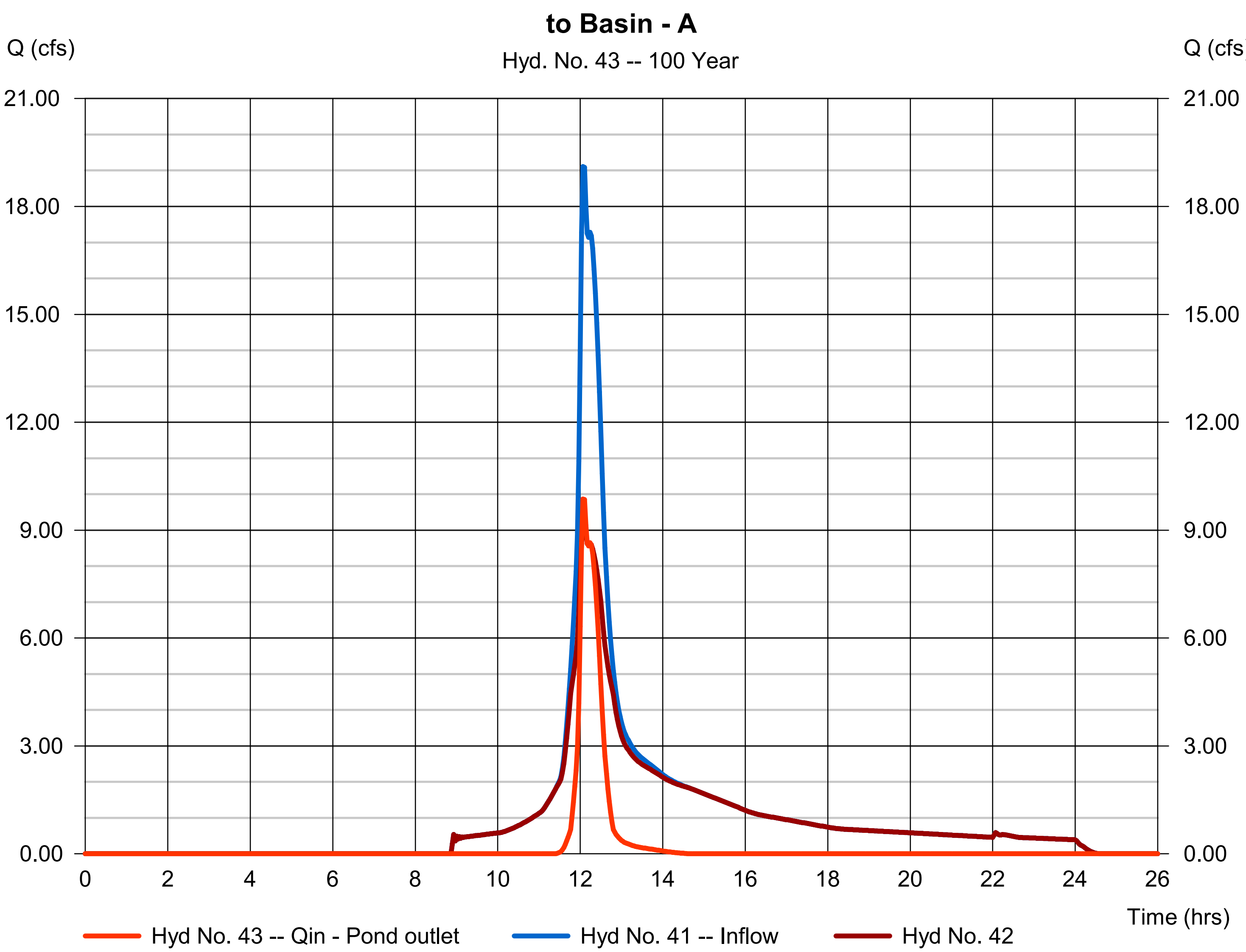
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 43

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 9.861 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 20,278 cuft
Inflow hydrograph	= 41 - DS-2	2nd diverted hyd.	= 42
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B



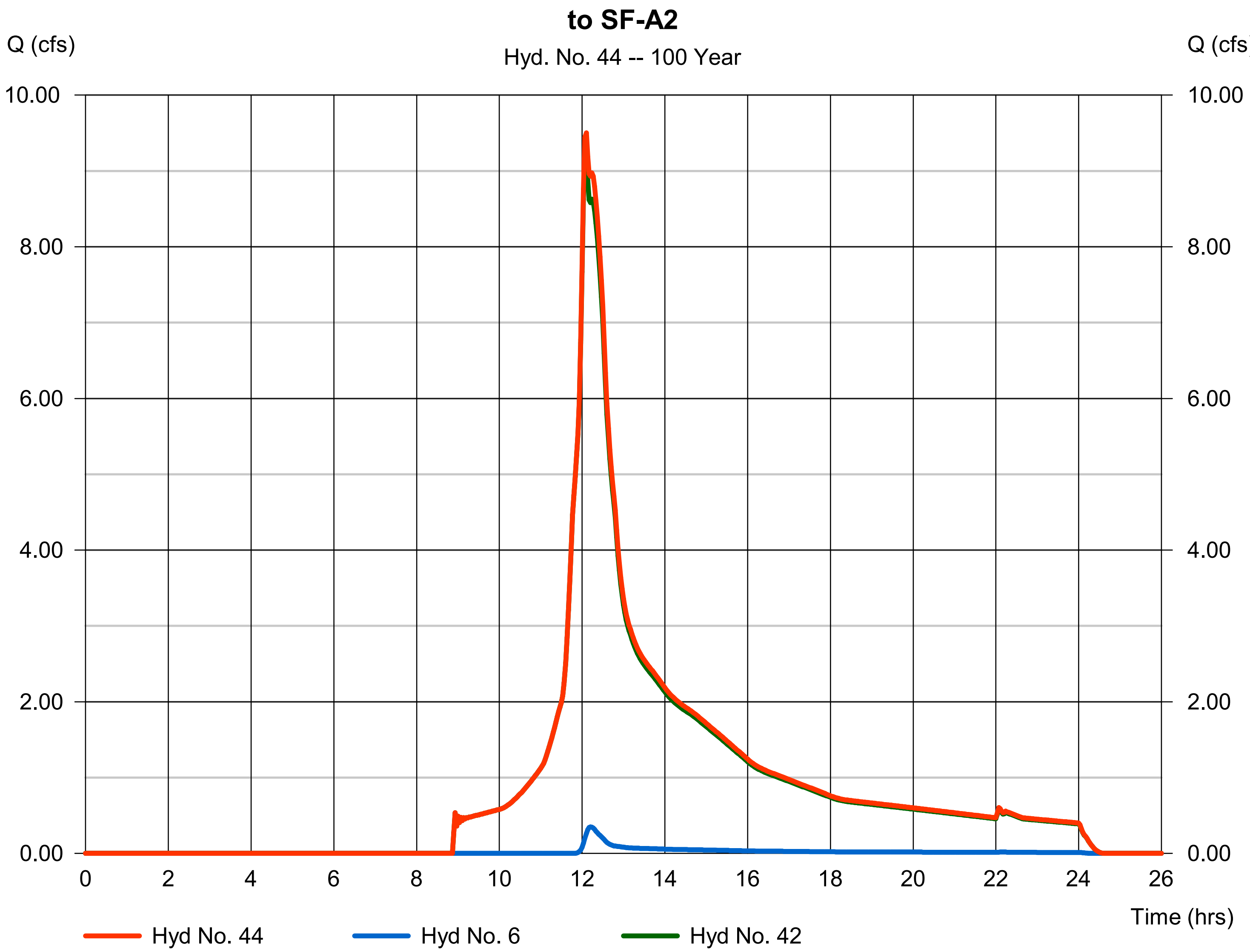
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 44

to SF-A2

Hydrograph type	= Combine	Peak discharge	= 9.502 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 80,660 cuft
Inflow hyds.	= 6, 42	Contrib. drain. area	= 0.330 ac



Hydrograph Report

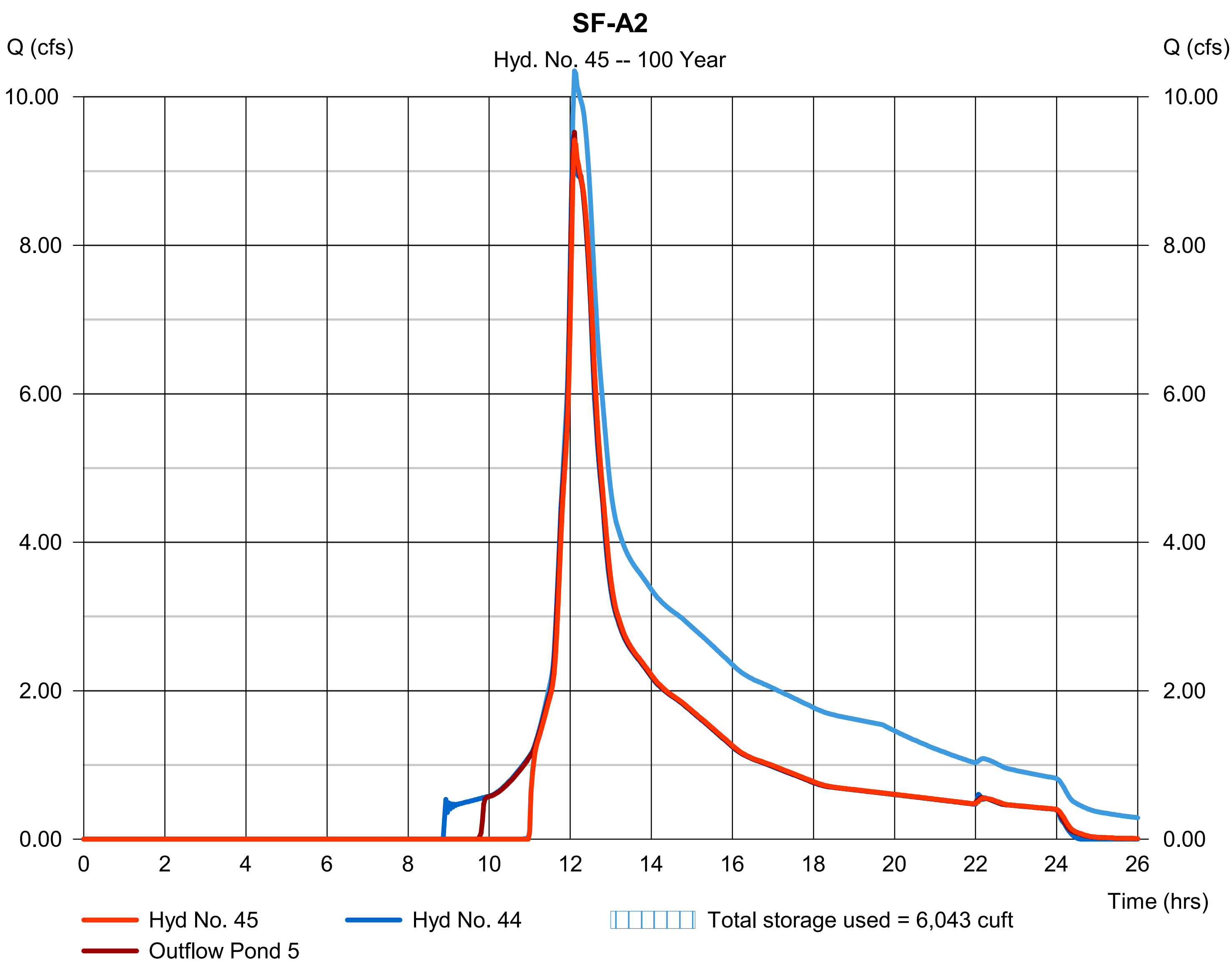
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 45

SF-A2

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 9.419 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 76,091 cuft
Upper Pond	= Sediment Forebay - A2	**Lower Pond**	= Sand Filter - A2
Inflow hyd.	= 44 - to SF-A2	Other Inflow hyd.	= None
Max. Elevation	= 271.99 ft	Max. Elevation	= 271.57 ft
Max. Storage	= 2,096 cuft	Max. Storage	= 3,948 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



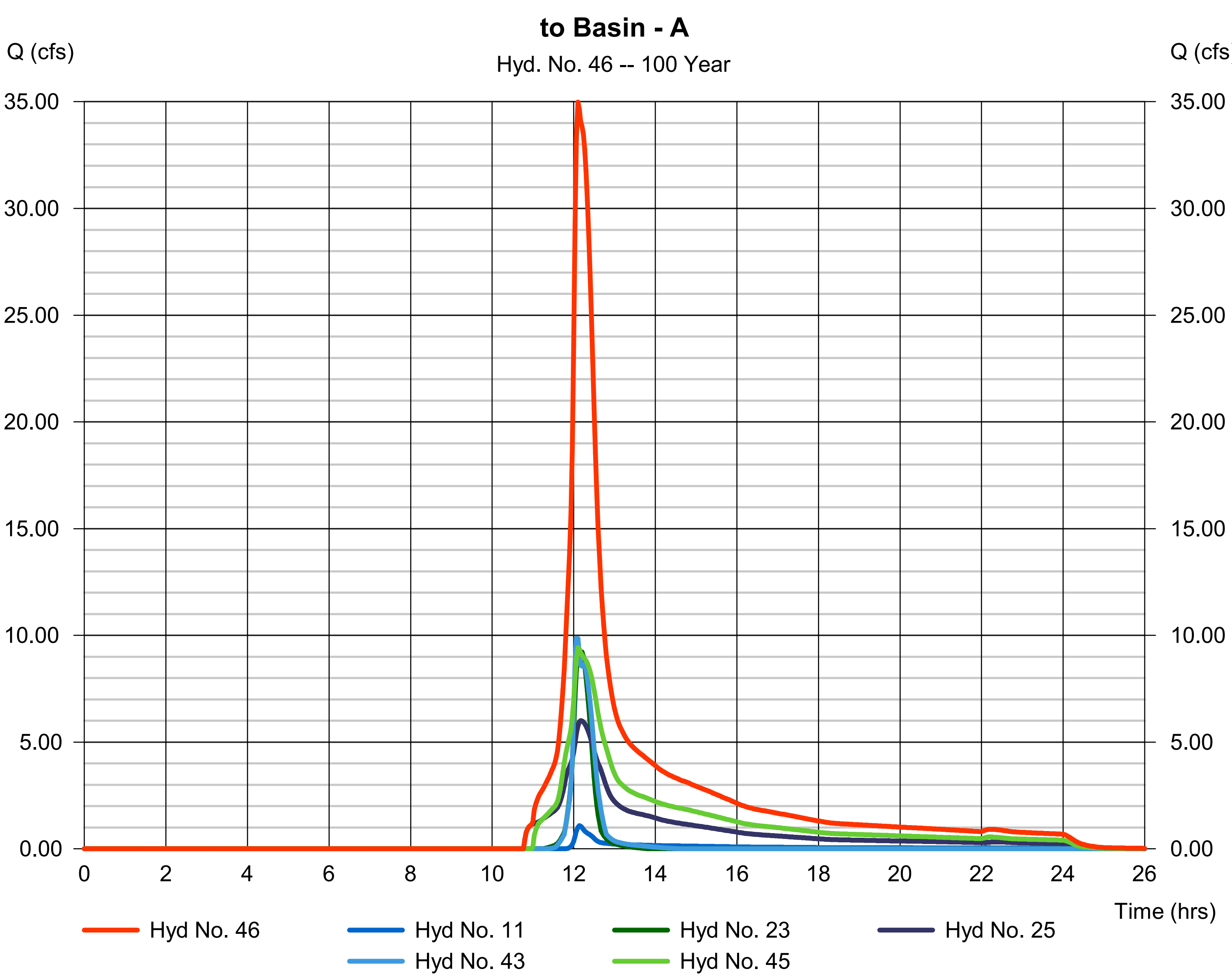
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 46

to Basin - A

Hydrograph type	= Combine	Peak discharge	= 34.98 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 2 min	Hyd. volume	= 169,723 cuft
Inflow hyds.	= 11, 23, 25, 43, 45	Contrib. drain. area	= 0.950 ac



Hydrograph Report

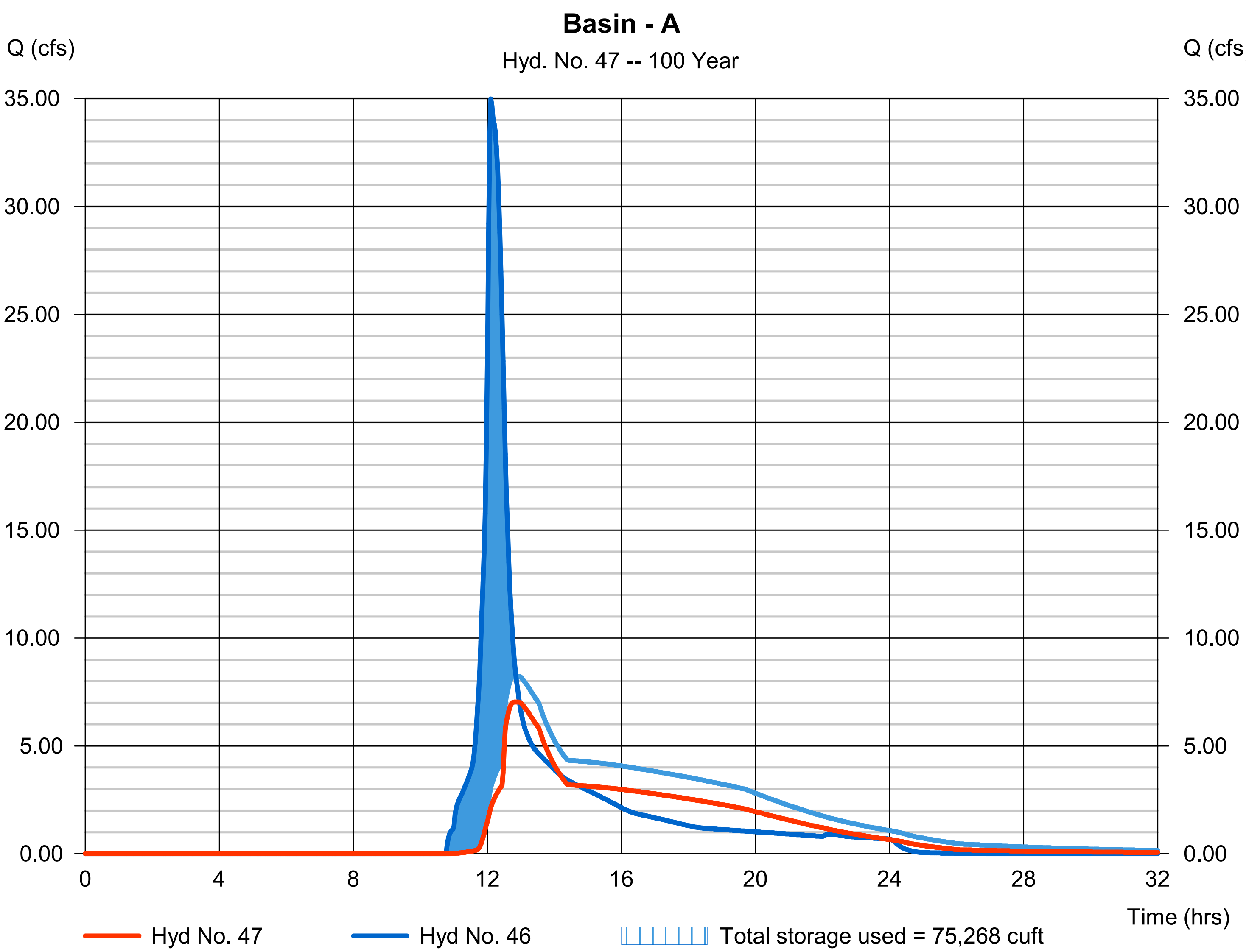
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 47

Basin - A

Hydrograph type	= Reservoir	Peak discharge	= 7.037 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.87 hrs
Time interval	= 2 min	Hyd. volume	= 122,088 cuft
Inflow hyd. No.	= 46 - to Basin - A	Max. Elevation	= 270.42 ft
Reservoir name	= Basin - A	Max. Storage	= 75,268 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



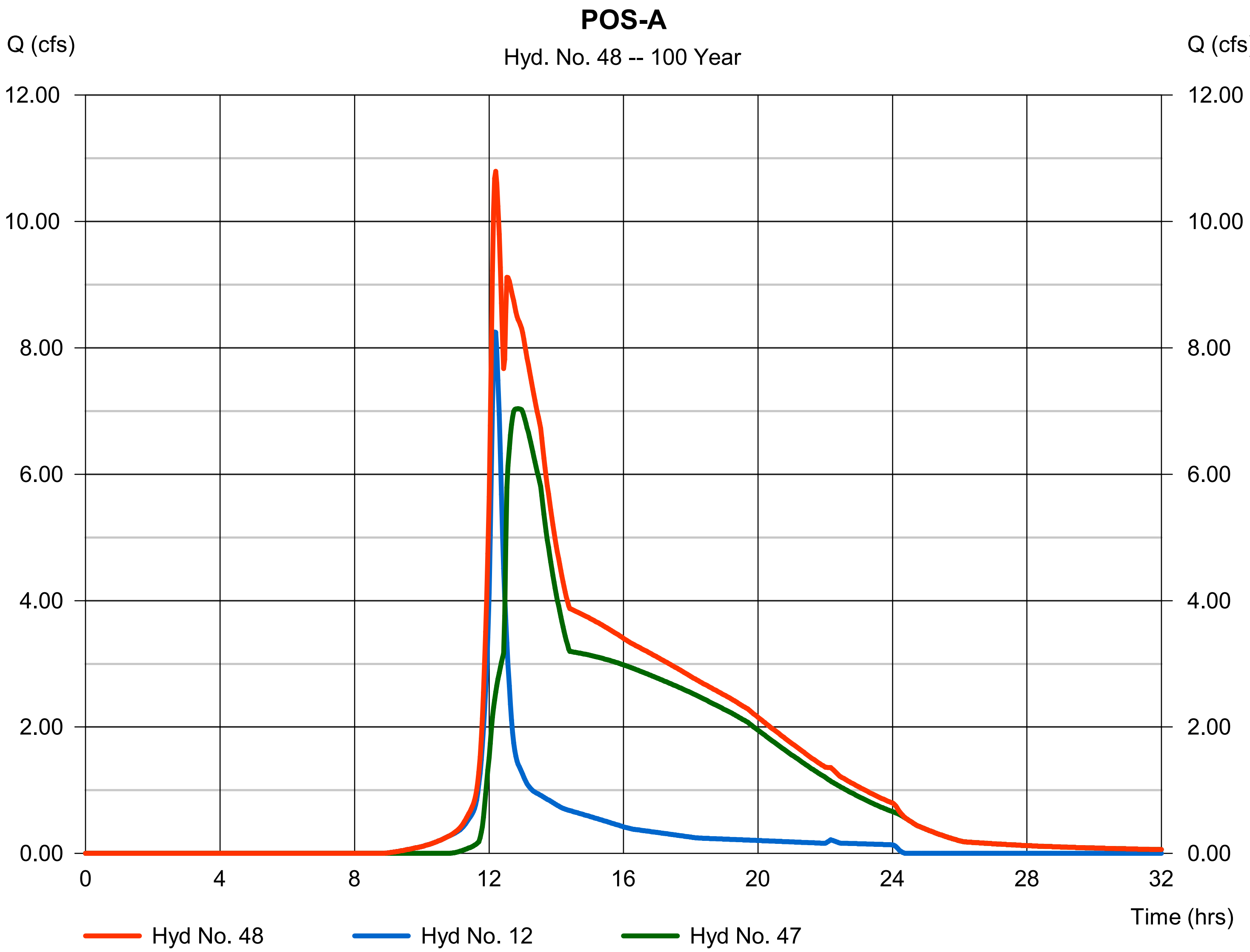
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 48

POS-A

Hydrograph type	= Combine	Peak discharge	= 10.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 155,896 cuft
Inflow hyds.	= 12, 47	Contrib. drain. area	= 2.260 ac



Appendix E

BMP Sizing Calculation Worksheets

250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
p. (401) 921-3344 f. (401) 921-3303 www.MillstoneEng.com

Watershed:	PR-A1a & PR-A1b	
Soils:	A Soils	
Total Area (A, sf):	123735	sf
Total Area (A, ac):	2.84	ac
Impervious Area (I, sf):	76264	sf
Impervious Area (I, ac):	1.75	ac

Recharge Volume Calculation (Re_v)

Re_v = (1")(F)(I)/12	F =	0.60	
Where:	I =	1.75	ac
Re_v = groundwater recharge volume (ac-ft)	Re_v =	0.09	ac-ft
F = recharge factor	Required Re_v =	3813	ft^3
I = impervious area (ac)			
Recharge volume provided by Sand Filter	Total Re_v =	4890	ft^3

Recharge volume requirements have been met!

4890 cf > 3813 cf

Water Quality Volume Calculation (WQ_v)

WQv = (1")(I)/12	I =	1.75	ac
Where:	WQ_v =	0.146	ac-ft
WQv = water quality volume (ac-ft)	WQ_v =	6355	ft^3
I = impervious area (ac)			

Sediment Forebay Pretreatment (25% of WQ_v required)

	I =	1.75	ac
	WQ_v =	0.146	ac-ft
	WQ_v =	6355	ft^3
A_s = 5,750*Q	Required Pretreatment Volume =	1589	ft^3
Where:	Q =	0.018	cfs
A_s = sedimentation surface area (ft^2)	Minimum Surface Area (A_s) =	106	ft^2
Q = discharge from drainage area = %WQ_v / 86400 sec (cfs)	Depth of forebay provided =	3.50	ft
	Pretreatment volume provided =	1589	ft^3

Pretreatment volume provided is greater than required!

1589 cf >= 1589 cf

Sand Filter Sizing

$A_f = WQ_v (d_f) / [(k)(h_f+d_f)(t_f)]$	WQ_v =	6355	ft^3
Where:	d_f =	2.00	ft
A_f = Surface area of filter bed (ft^2)	k =	3.50	ft/day
d_f = Filter bed depth (ft) - minimum of 18 in for Sand Filter	h_f =	0.38	ft
k = Coefficient of permeability of filter media (ft/day)	t_f =	2	days
h_f = Average height of water above surface of practice	A_f required =	765	ft^2
t_f = Design filter bed drain time (days)	Width provided =		ft
	Length provided =		ft
	A_f provided =	1988	ft^2

Filter surface area provided is greater than required!

1988 sf > 765 sf

System Total WQ_v Provided

System must provide 75% of WQ_v:	4767	ft^3
Pretreatment:	1589	ft^3
Sand Filter Ponding:	1634	ft^3
Filter Media:	1710	ft^3
Total WQv provided:	4933	ft^3

Required WQv has been met!

4933 cf > 4767 cf

Modified CN Calculation - PR-A1a

$CN = 1000 / [10 + 5P + 10Q - 10(Q^2 + 1.25\ QP)^{1/2}]$

Where:

P = rainfall, in inches

Q = runoff volume (WQ_v / total watershed area)

P =	1.2	in
Q =	0.655	in
CN =	93.73	
Use CN =	94	

Watershed:	PR-A2a & PR-A2b	
Soils:	A Soils	
Total Area (A, sf):	236220	sf
Total Area (A, ac):	5.42	ac
Impervious Area (I, sf):	69745	sf
Impervious Area (I, ac):	1.60	ac

Recharge Volume Calculation (Re_v)

$Re_v = (1")(F)(I)/12$	F =	0.60	
Where:	I =	1.60	ac
Re_v = groundwater recharge volume (ac-ft)	Re_v =	0.08	ac-ft
F = recharge factor	Required Re_v =	3487	ft^3
I = impervious area (ac)			
Recharge volume provided by Sand Filter	Total Re_v =	4586	ft^3

Recharge volume requirements have been met!

4586 cf > 3487 cf

Water Quality Volume Calculation (WQ_v)

$WQv = (1")(I)/12$	I =	1.60	ac
Where:	WQ_v =	0.133	ac-ft
WQv = water quality volume (ac-ft)	WQ_v =	5812	ft^3
I = impervious area (ac)			

Sediment Forebay Pretreatment (25% of WQ_v required)

	I =	1.60	ac
	WQ_v =	0.133	ac-ft
	WQ_v =	5812	ft^3
$A_s = 5{,}750*Q$	Required Pretreatment Volume =	1453	ft^3
Where:	Q =	0.017	cfs
A_s = sedimentation surface area (ft^2)	Minimum Surface Area (A_s) =	97	ft^2
Q = discharge from drainage area = %WQ_v / 86400 sec (cfs)	Depth of forebay provided =	3.50	ft
	Pretreatment volume provided =	1453	ft^3

Pretreatment volume provided is greater than required!

1453 cf >= 1453 cf

Sand Filter Sizing

$A_f = WQ_v (d_f) / [(k)(h_f+d_f)(t_f)]$	WQ_v =	5812	ft^3
Where:	d_f =	2.00	ft
A_f = Surface area of filter bed (ft^2)	k =	3.50	ft/day
d_f = Filter bed depth (ft) - minimum of 18 in for Sand Filter	h_f =	0.38	ft
k = Coefficient of permeability of filter media (ft/day)	t_f =	2	days
h_f = Average height of water above surface of practice	A_f required =	699	ft^2
t_f = Design filter bed drain time (days)	Width provided =		ft
	Length provided =		ft
	A_f provided =	1876	ft^2

Filter surface area provided is greater than required!

1876 sf > 699 sf

System Total WQ_v Provided		
System must provide 75% of WQ_v:	4359	ft^3
Pretreatment:	1453	ft^3
Sand Filter Ponding:	1548	ft^3
Filter Media:	1614	ft^3
Total WQv provided:	4615	ft^3

Required WQv has been met!

4615 cf > 4359 cf

Modified CN Calculation

$CN = 1000 / [10 + 5P + 10Q - 10(Q^2 + 1.25\ QP)^{1/2}]$	P =	1.2	in
Where:	Q =	0.314	in
P = rainfall, in inches	CN =	86.26	
Q = runoff volume (WQ_v / total watershed area)	Use CN =	86	

Watershed:	PR-R1a	
Soils:	A Soils	
Total Area (A, sf):	11061	sf
Total Area (A, ac):	0.25	ac
Impervious Area (I, sf):	11061	sf
Impervious Area (I, ac):	0.25	ac

Recharge Volume Calculation (Re_v)

$Re_v = (1")(F)(I)/12$	F =	0.60	
Where:	I =	0.25	ac
Re_v = groundwater recharge volume (ac-ft)	Re_v =	0.01	ac-ft
F = recharge factor	Required Re_v =	553	ft^3
I = impervious area (ac)			
Recharge volume provided by Sand Filter	Total Re_v =	839	ft^3

Recharge volume requirements have been met!

839 cf > 553 cf

Water Quality Volume Calculation (WQ_v)

WQv = (1")(I)/12	I =	0.25	ac
Where:	WQ_v =	0.021	ac-ft
WQv = water quality volume (ac-ft)	WQ_v =	922	ft^3
I = impervious area (ac)			

Underground Storage

Stormtech SC-740 Chamber	# chambers required =	12	
	Volume of single chamber with 12-inch stone bed =	81.70	ft^3
	Total volume provided =	980	ft^3

Required WQv has been met!

980 cf > 922 cf

Watershed:	PR-R1b	
Soils:	A Soils	
Total Area (A, sf):	14601	sf
Total Area (A, ac):	0.34	ac
Impervious Area (I, sf):	14601	sf
Impervious Area (I, ac):	0.34	ac

Recharge Volume Calculation (Re_v)

Re_v = (1")(F)(I)/12	F =	0.60	
Where:	I =	0.34	ac
Re_v = groundwater recharge volume (ac-ft)	Re_v =	0.02	ac-ft
F = recharge factor	Required Re_v =	730	ft^3
I = impervious area (ac)			
Recharge volume provided by Sand Filter	Total Re_v =	1140	ft^3

Recharge volume requirements have been met!

1140 cf > 730 cf

Water Quality Volume Calculation (WQ_v)

WQv = (1")(I)/12	I =	0.34	ac
Where:	WQ_v =	0.028	ac-ft
WQv = water quality volume (ac-ft)	WQ_v =	1217	ft^3
I = impervious area (ac)			

Underground Storage

Stormtech SC-740 Chamber	# chambers required =	15	
	Volume of single chamber with 12-inch stone bed =	81.70	ft^3
	Total volume provided =	1,226	ft^3

Required WQv has been met!

1226 cf > 1217 cf

Watershed:	PR-R2a	
Soils:	A Soils	
Total Area (A, sf):	22757	sf
Total Area (A, ac):	0.52	ac
Impervious Area (I, sf):	22757	sf
Impervious Area (I, ac):	0.52	ac

Recharge Volume Calculation (Re_v)

$Re_v = (1")(F)(I)/12$	F =	0.60	
Where:	I =	0.52	ac
Re_v = groundwater recharge volume (ac-ft)	Re_v =	0.03	ac-ft
F = recharge factor	Required Re_v =	1138	ft^3
I = impervious area (ac)			
Recharge volume provided by Sand Filter	Total Re_v =	1744	ft^3

Recharge volume requirements have been met!

1744 cf > 1138 cf

Water Quality Volume Calculation (WQ_v)

WQv = (1")(I)/12	I =	0.52	ac
Where:	WQ_v =	0.044	ac-ft
WQv = water quality volume (ac-ft)	WQ_v =	1896	ft^3
I = impervious area (ac)			

Underground Storage

Stormtech SC-740 Chamber	# chambers required =	24	
	Volume of single chamber with 12-inch stone bed =	81.70	ft^3
	Total volume provided =	1,961	ft^3

Required WQv has been met!

1961 cf > 1896 cf

Watershed:	PR-R2b	
Soils:	A Soils	
Total Area (A, sf):	9942	sf
Total Area (A, ac):	0.23	ac
Impervious Area (I, sf):	9942	sf
Impervious Area (I, ac):	0.23	ac

Recharge Volume Calculation (Re_v)

Re_v = (1")(F)(I)/12	F =	0.60	
Where:	I =	0.23	ac
Re_v = groundwater recharge volume (ac-ft)	Re_v =	0.01	ac-ft
F = recharge factor	Required Re_v =	497	ft^3
I = impervious area (ac)			
Recharge volume provided by Sand Filter	Total Re_v =	771	ft^3

Recharge volume requirements have been met!

771 cf > 497 cf

Water Quality Volume Calculation (WQ_v)

WQv = (1")(I)/12	I =	0.23	ac
Where:	WQ_v =	0.019	ac-ft
WQv = water quality volume (ac-ft)	WQ_v =	829	ft^3
I = impervious area (ac)			

Underground Storage

Stormtech SC-740 Chamber	# chambers required =	11	
	Volume of single chamber with 12-inch stone bed =	81.70	ft^3
	Total volume provided =	899	ft^3

Required WQv has been met!

899 cf > 829 cf

Watershed:	PR-R2c	
Soils:	A Soils	
Total Area (A, sf):	12196	sf
Total Area (A, ac):	0.28	ac
Impervious Area (I, sf):	12196	sf
Impervious Area (I, ac):	0.28	ac

Recharge Volume Calculation (Re_v)

Re_v = (1")(F)(I)/12	F =	0.60	
Where:	I =	0.28	ac
Re_v = groundwater recharge volume (ac-ft)	Re_v =	0.01	ac-ft
F = recharge factor	Required Re_v =	610	ft^3
I = impervious area (ac)			
Recharge volume provided by Sand Filter	Total Re_v =	939	ft^3

Recharge volume requirements have been met!

939 cf > 610 cf

Water Quality Volume Calculation (WQ_v)

WQv = (1")(I)/12	I =	0.28	ac
Where:	WQ_v =	0.023	ac-ft
WQv = water quality volume (ac-ft)	WQ_v =	1,016	ft^3
I = impervious area (ac)			

Underground Storage

Stormtech SC-310 Chamber	# chambers required =	35	
	Volume of single chamber with 6-inch stone bed =	29.30	ft^3
	Total volume provided =	1,026	ft^3

Required WQv has been met!

1026 cf > 1016 cf

Watershed:	PR-R2d	
Soils:	A Soils	
Total Area (A, sf):	19563	sf
Total Area (A, ac):	0.45	ac
Impervious Area (I, sf):	19563	sf
Impervious Area (I, ac):	0.45	ac

Recharge Volume Calculation (Re_v)

Re_v = (1")(F)(I)/12	F =	0.60	
Where:	I =	0.45	ac
Re_v = groundwater recharge volume (ac-ft)	Re_v =	0.02	ac-ft
F = recharge factor	Required Re_v =	978	ft^3
I = impervious area (ac)			
Recharge volume provided by Sand Filter	Total Re_v =	1509	ft^3

Recharge volume requirements have been met!

1509 cf > 978 cf

Water Quality Volume Calculation (WQ_v)

WQv = (1")(I)/12	I =	0.45	ac
Where:	WQ_v =	0.037	ac-ft
WQv = water quality volume (ac-ft)	WQ_v =	1630	ft^3
I = impervious area (ac)			

Underground Storage

Stormtech SC-740 Chamber	# chambers required =	20	
	Volume of single chamber with 12-inch stone bed =	81.70	ft^3
	Total volume provided =	1,634	ft^3

Required WQv has been met!

1634 cf > 1630 cf

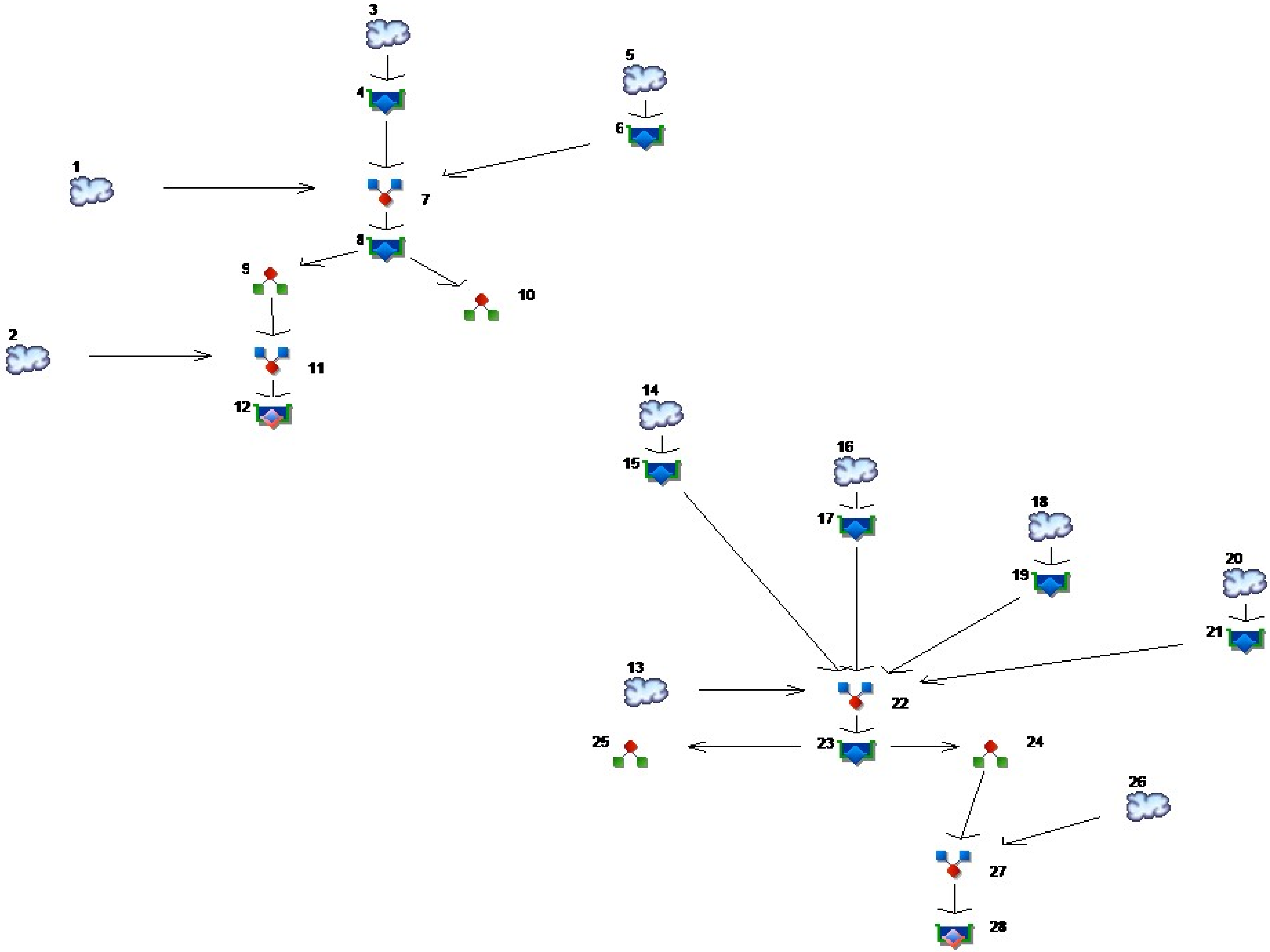
Channel Protection Volume		
V_r	11449.0	1-year runoff volume (cf)
V_s	7441.9	0.65 * V_r
CP_V	7441.9	Same as V_s
	2989.9	Volume Infiltrated (cf)
	4452.0	Volume Through Outlet (cf)
	0.05	Average Release Rate over 24-Hours (cfs)

Appendix F

Hydraflow Water Quality Modeling Printouts

250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
p. (401) 921-3344 f. (401) 921-3303 www.MillstoneEng.com

Hydraflow Table of Contents



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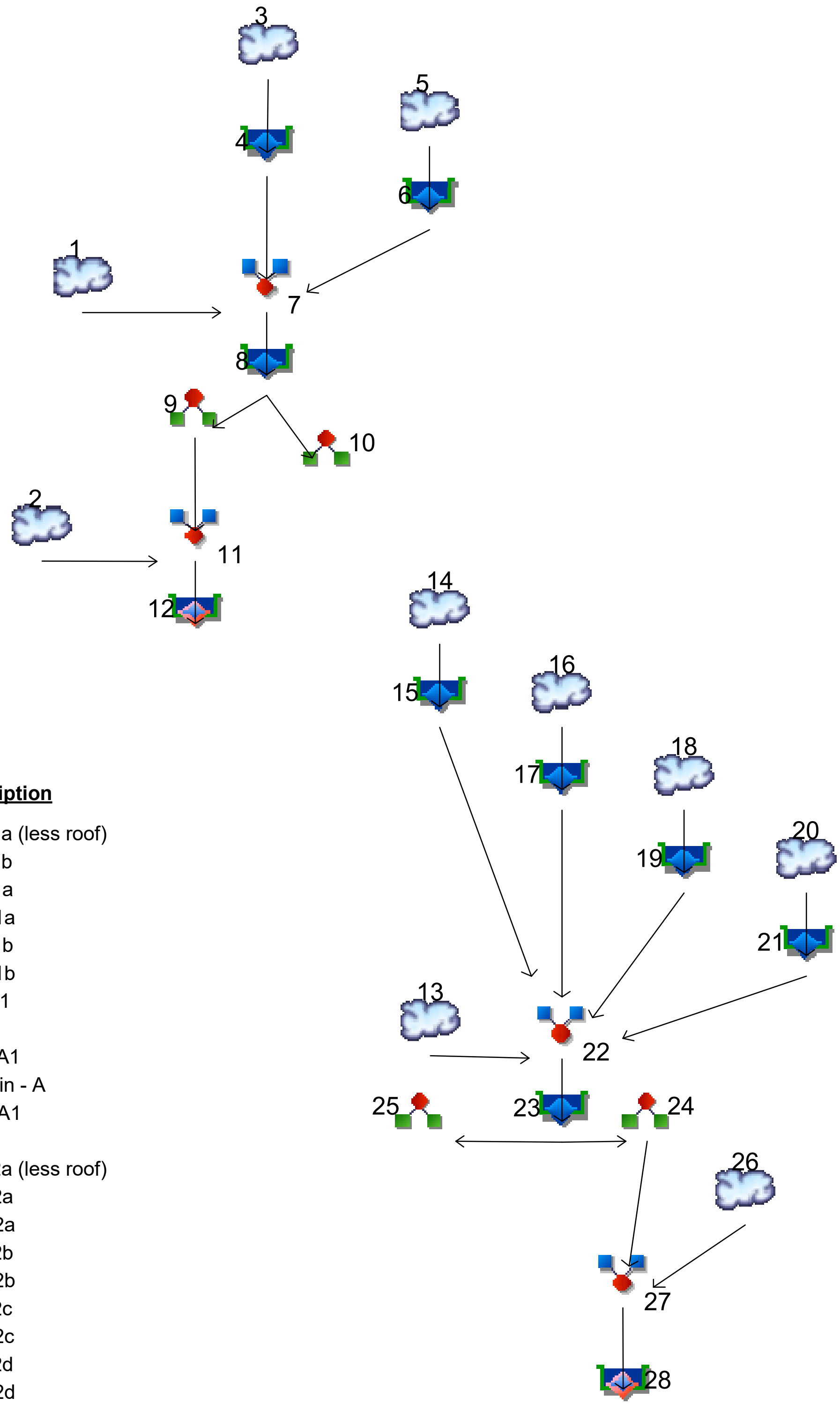
Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	PR-A1a (less roof)
2	SCS Runoff	PR-A1b
3	SCS Runoff	PR-R1a
4	Reservoir	UG-R1a
5	SCS Runoff	PR-R1b
6	Reservoir	UG-R1b
7	Combine	to DS-1
8	Reservoir	DS-1
9	Diversion1	WQF-A1
10	Diversion2	to Basin - A
11	Combine	to SF-A1
12	Reservoir(i)	SF-A1
13	SCS Runoff	PR-A2a (less roof)
14	SCS Runoff	PR-R2a
15	Reservoir	UG-R2a
16	SCS Runoff	PR-R2b
17	Reservoir	UG-R2b
18	SCS Runoff	PR-R2c
19	Reservoir	UG-R2c
20	SCS Runoff	PR-R2d
21	Reservoir	UG-R2d
22	Combine	to DS-2
23	Reservoir	DS-2
24	Diversion1	WQF-A2
25	Diversion2	to Basin - A
26	SCS Runoff	PR-A2b
27	Combine	to SF-A2
28	Reservoir(i)	SF-A2

Project: 17.276.403 Willow Lakes - WQV.gpw

Wednesday, 03 / 3 / 2021

Hydrograph Return Period Recap

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

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	-------	1.475	-------	-------	-------	-------	-------	PR-A1a (less roof)
2	SCS Runoff	------	-------	-------	0.000	-------	-------	-------	-------	-------	PR-A1b
3	SCS Runoff	------	-------	-------	0.264	-------	-------	-------	-------	-------	PR-R1a
4	Reservoir	3	-------	-------	0.000	-------	-------	-------	-------	-------	UG-R1a
5	SCS Runoff	------	-------	-------	0.360	-------	-------	-------	-------	-------	PR-R1b
6	Reservoir	5	-------	-------	0.000	-------	-------	-------	-------	-------	UG-R1b
7	Combine	1, 4, 6	-------	-------	1.475	-------	-------	-------	-------	-------	to DS-1
8	Reservoir	7	-------	-------	1.476	-------	-------	-------	-------	-------	DS-1
9	Diversion1	8	-------	-------	1.476	-------	-------	-------	-------	-------	WQF-A1
10	Diversion2	8	-------	-------	0.000	-------	-------	-------	-------	-------	to Basin - A
11	Combine	2, 9,	-------	-------	1.476	-------	-------	-------	-------	-------	to SF-A1
12	Reservoir(i)	11	-------	-------	0.099	-------	-------	-------	-------	-------	SF-A1
13	SCS Runoff	------	-------	-------	1.081	-------	-------	-------	-------	-------	PR-A2a (less roof)
14	SCS Runoff	------	-------	-------	0.550	-------	-------	-------	-------	-------	PR-R2a
15	Reservoir	14	-------	-------	0.000	-------	-------	-------	-------	-------	UG-R2a
16	SCS Runoff	------	-------	-------	0.243	-------	-------	-------	-------	-------	PR-R2b
17	Reservoir	16	-------	-------	0.000	-------	-------	-------	-------	-------	UG-R2b
18	SCS Runoff	------	-------	-------	0.296	-------	-------	-------	-------	-------	PR-R2c
19	Reservoir	18	-------	-------	0.000	-------	-------	-------	-------	-------	UG-R2c
20	SCS Runoff	------	-------	-------	0.476	-------	-------	-------	-------	-------	PR-R2d
21	Reservoir	20	-------	-------	0.000	-------	-------	-------	-------	-------	UG-R2d
22	Combine	13, 15, 17, 19, 21	-------	-------	1.081	-------	-------	-------	-------	-------	to DS-2
23	Reservoir	22	-------	-------	1.081	-------	-------	-------	-------	-------	DS-2
24	Diversion1	23	-------	-------	1.081	-------	-------	-------	-------	-------	WQF-A2
25	Diversion2	23	-------	-------	0.000	-------	-------	-------	-------	-------	to Basin - A
26	SCS Runoff	------	-------	-------	0.000	-------	-------	-------	-------	-------	PR-A2b
27	Combine	24, 26	-------	-------	1.081	-------	-------	-------	-------	-------	to SF-A2
28	Reservoir(i)	27	-------	-------	0.061	-------	-------	-------	-------	-------	SF-A2

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	1.475	2	734	6,515	------	------	------	PR-A1a (less roof)
2	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-A1b
3	SCS Runoff	0.264	2	724	839	------	------	------	PR-R1a
4	Reservoir	0.000	2	708	0	3	276.83	116	UG-R1a
5	SCS Runoff	0.360	2	724	1,140	------	------	------	PR-R1b
6	Reservoir	0.000	2	496	0	5	277.69	549	UG-R1b
7	Combine	1.475	2	734	6,515	1, 4, 6	------	------	to DS-1
8	Reservoir	1.476	2	734	6,477	7	269.35	47.4	DS-1
9	Diversion1	1.476	2	734	6,477	8	------	------	WQF-A1
10	Diversion2	0.000	2	770	0	8	------	------	to Basin - A
11	Combine	1.476	2	734	6,477	2, 9,	------	------	to SF-A1
12	Reservoir(i)	0.099	2	936	1,587	11	271.60	5,470	SF-A1
13	SCS Runoff	1.081	2	738	5,747	------	------	------	PR-A2a (less roof)
14	SCS Runoff	0.550	2	724	1,744	------	------	------	PR-R2a
15	Reservoir	0.000	2	n/a	0	14	276.82	250	UG-R2a
16	SCS Runoff	0.243	2	724	771	------	------	------	PR-R2b
17	Reservoir	0.000	2	n/a	0	16	277.02	107	UG-R2b
18	SCS Runoff	0.296	2	724	939	------	------	------	PR-R2c
19	Reservoir	0.000	2	n/a	0	18	278.19	289	UG-R2c
20	SCS Runoff	0.476	2	724	1,509	------	------	------	PR-R2d
21	Reservoir	0.000	2	670	0	20	276.22	517	UG-R2d
22	Combine	1.081	2	738	5,747	13, 15, 17, 19, 21	------	------	to DS-2
23	Reservoir	1.081	2	740	5,690	22	268.69	67.7	DS-2
24	Diversion1	1.081	2	740	5,690	23	------	------	WQF-A2
25	Diversion2	0.000	2	1228	0	23	------	------	to Basin - A
26	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-A2b
27	Combine	1.081	2	740	5,690	24, 26	------	------	to SF-A2
28	Reservoir(i)	0.061	2	1094	1,104	27	271.57	4,856	SF-A2

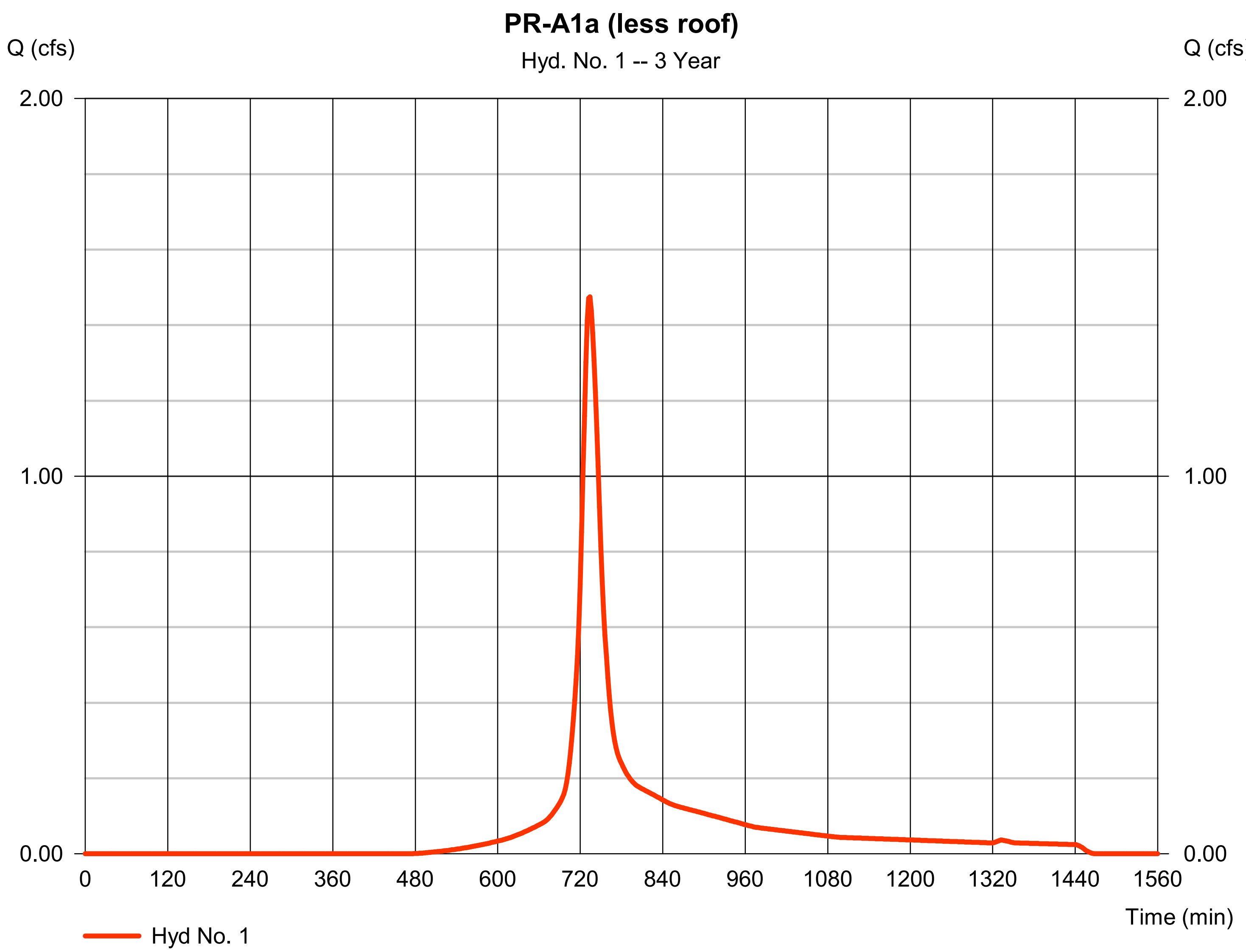
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 1

PR-A1a (less roof)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.475 cfs
Storm frequency	= 3 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 6,515 cuft
Drainage area	= 2.670 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 17.60 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



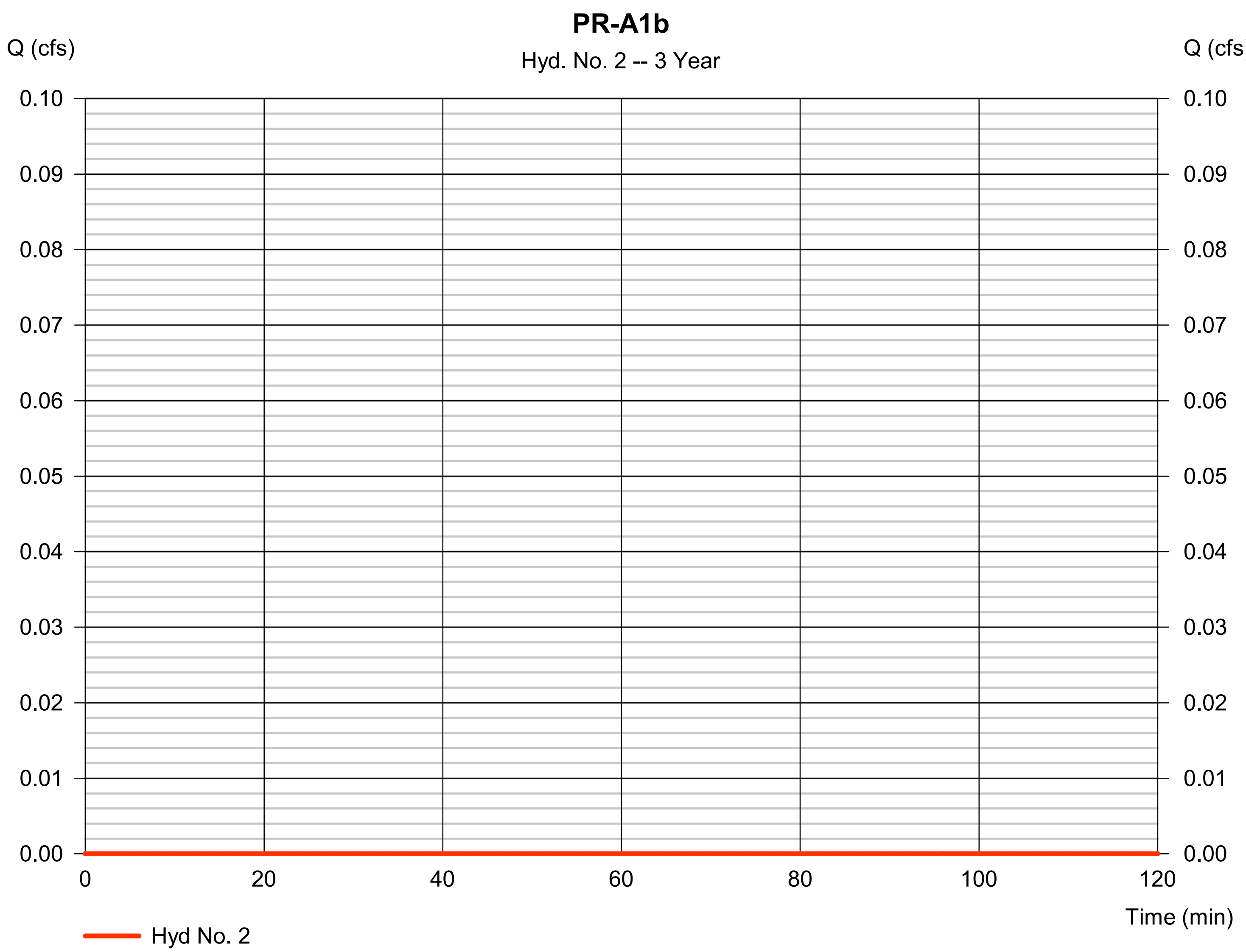
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 2

PR-A1b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.170 ac	Curve number	= 39
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

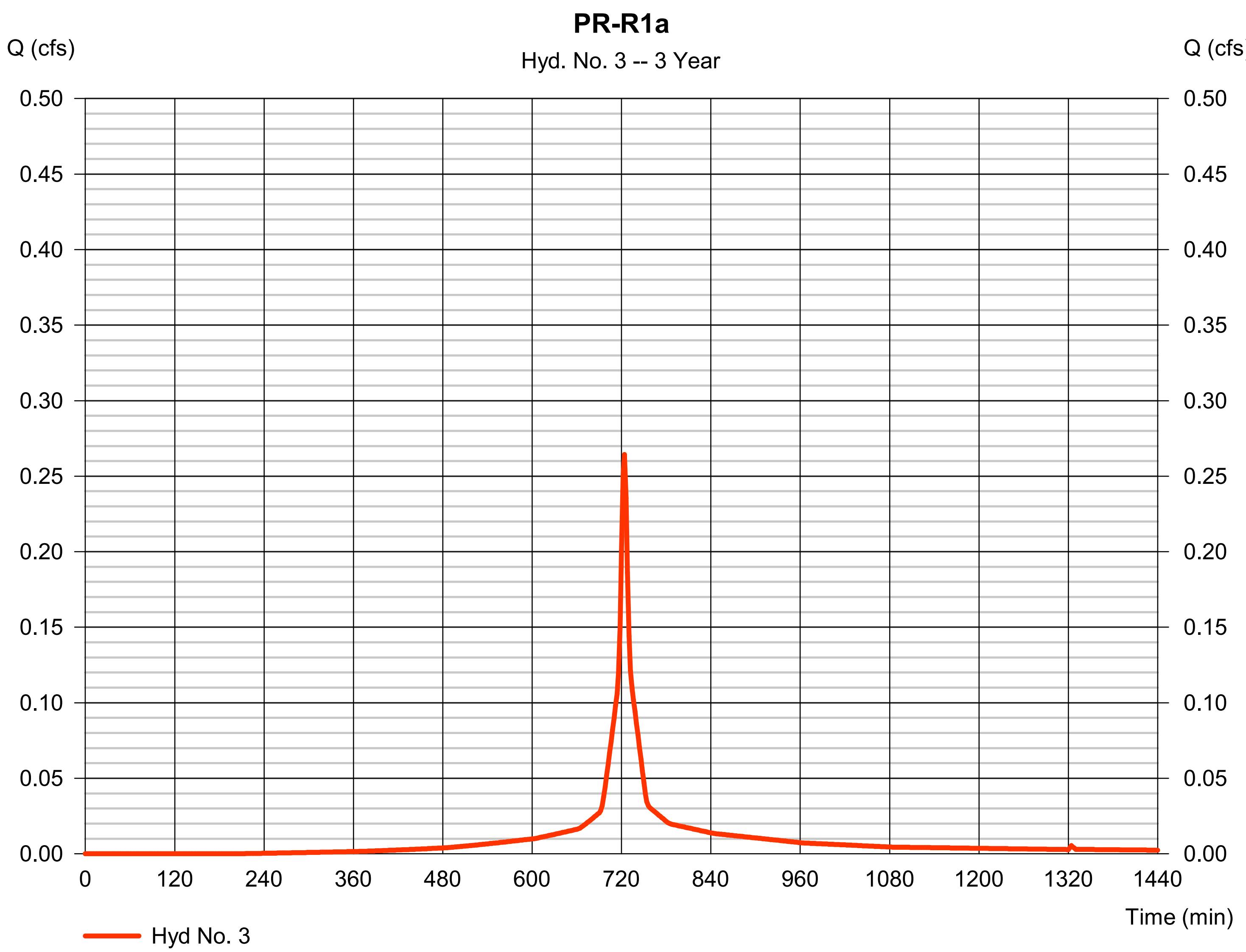


Hydrograph Report

Hyd. No. 3

PR-R1a

Hydrograph type	= SCS Runoff	Peak discharge	= 0.264 cfs
Storm frequency	= 3 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 839 cuft
Drainage area	= 0.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

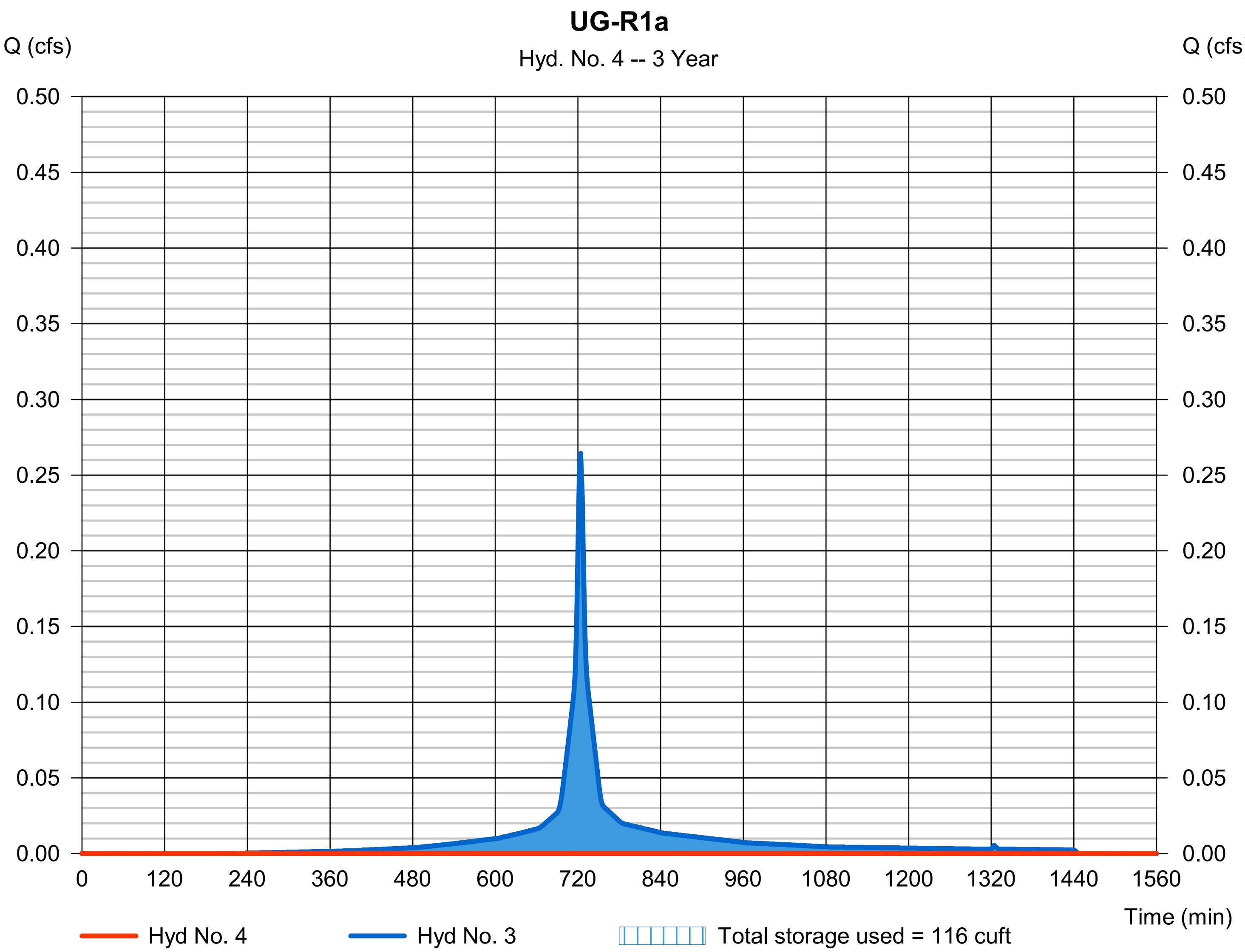
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 4

UG-R1a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 708 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 3 - PR-R1a	Max. Elevation	= 276.83 ft
Reservoir name	= UG-R1a	Max. Storage	= 116 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Pond No. 8 - UG-R1a

Pond Data

UG Chambers -Invert elev. = 277.12 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 12, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 276.12 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	276.12	n/a	0	0
0.35	276.47	n/a	57	57
0.70	276.82	n/a	57	114
1.05	277.17	n/a	67	181
1.40	277.52	n/a	128	309
1.75	277.87	n/a	126	434
2.10	278.22	n/a	121	555
2.45	278.57	n/a	113	668
2.80	278.92	n/a	100	768
3.15	279.27	n/a	73	842
3.50	279.62	n/a	57	899

Culvert / Orifice Structures

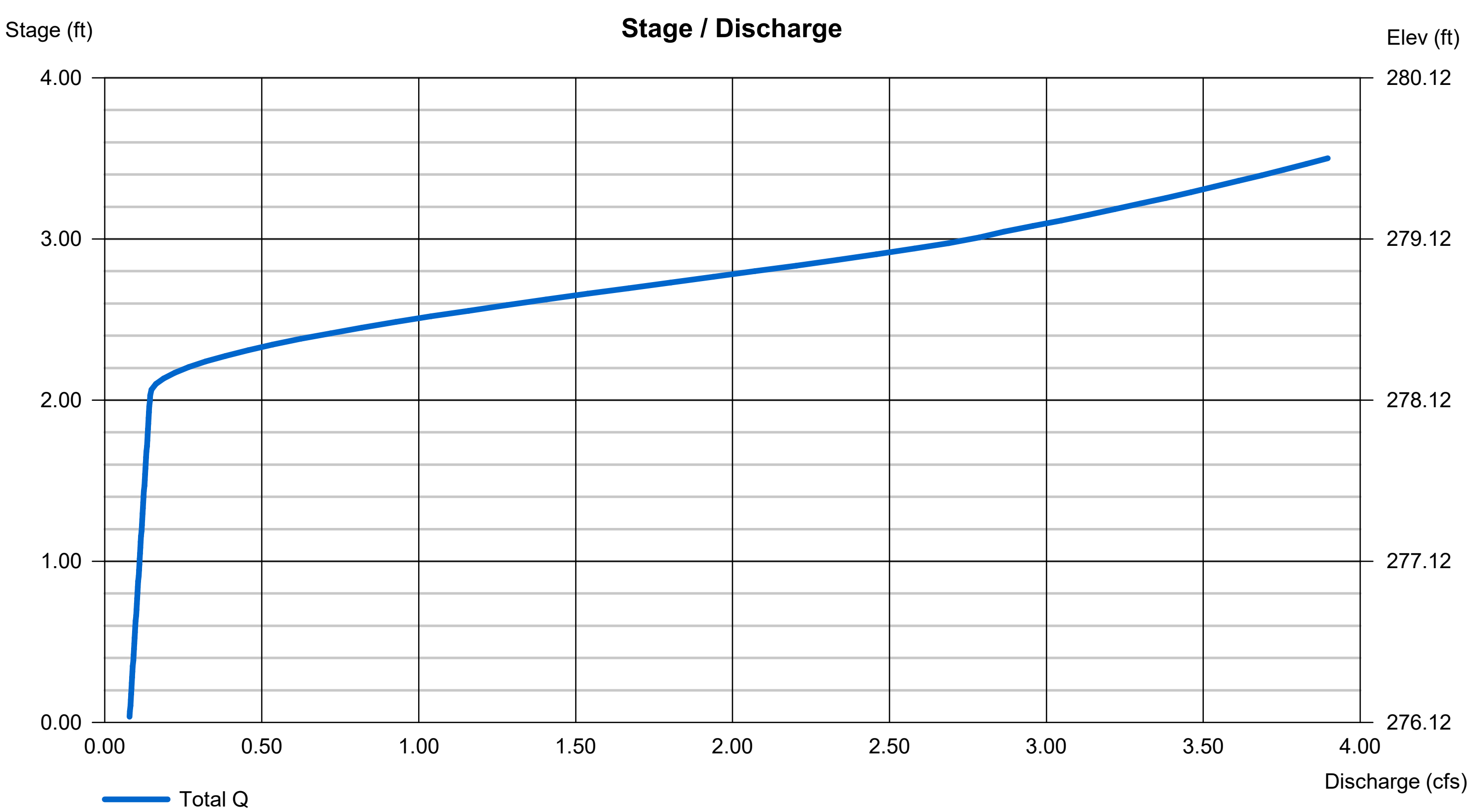
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 278.16	0.00	0.00	0.00
Length (ft)	= 20.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 8.270 (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).



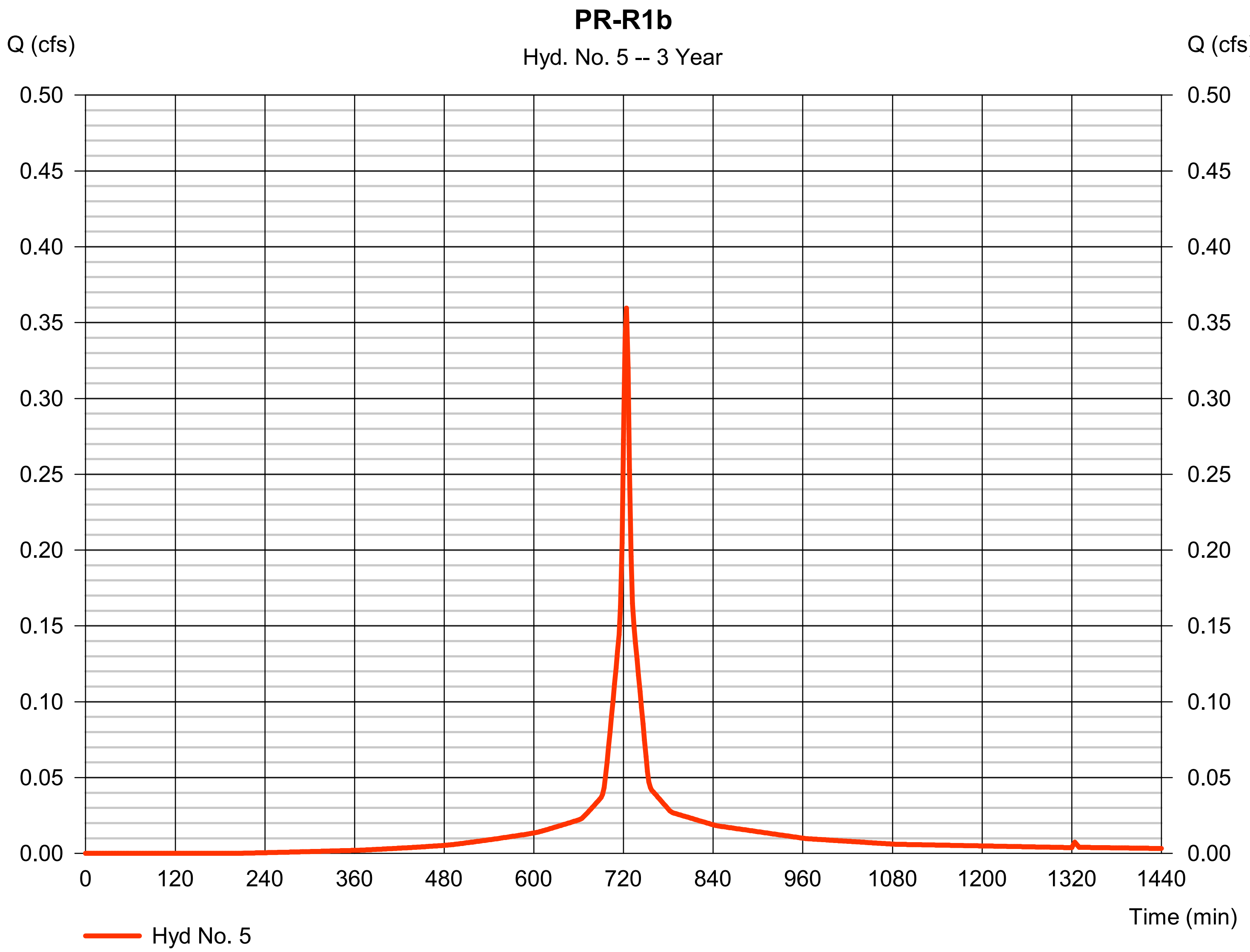
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 5

PR-R1b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.360 cfs
Storm frequency	= 3 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,140 cuft
Drainage area	= 0.340 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

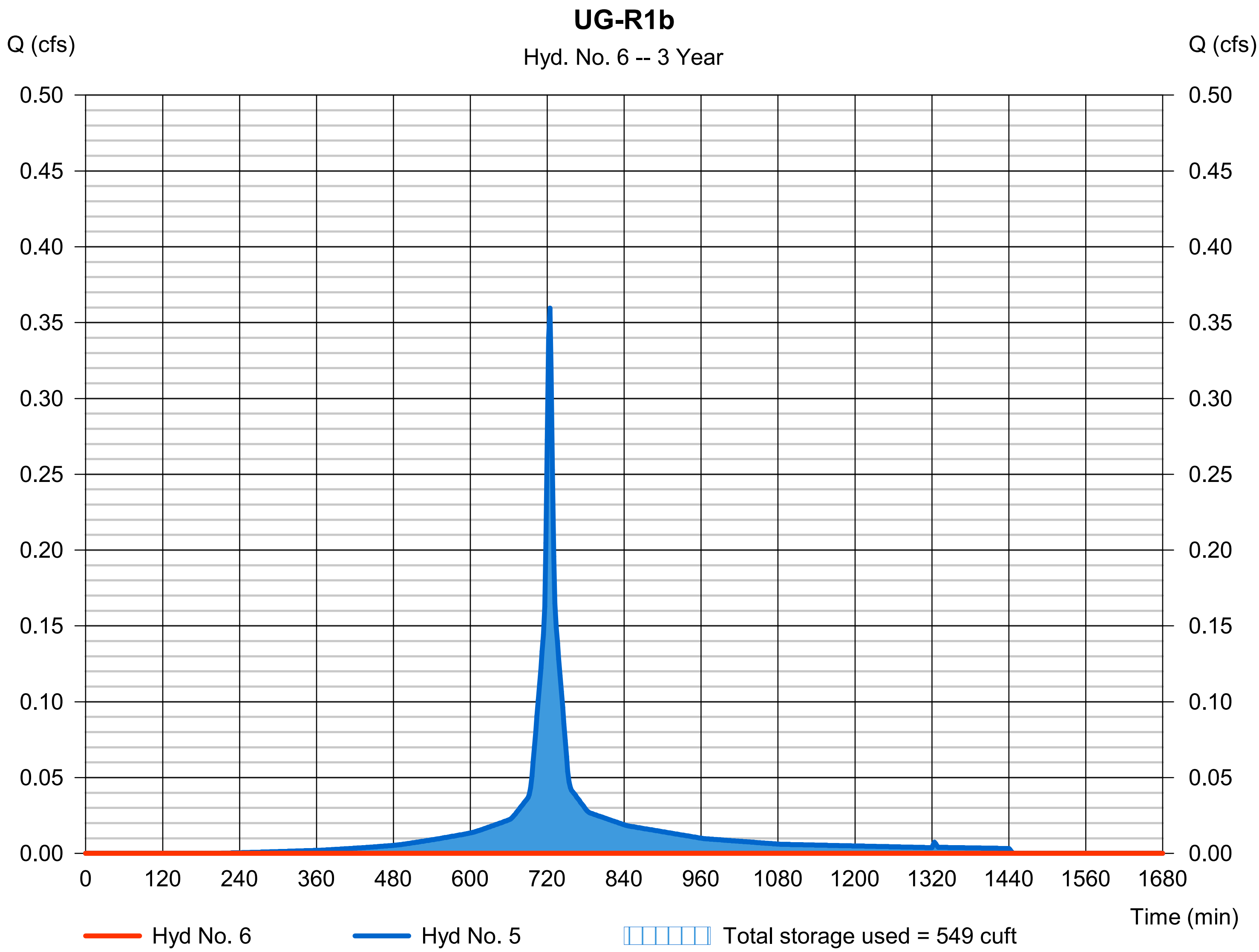
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 6

UG-R1b

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 496 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - PR-R1b	Max. Elevation	= 277.69 ft
Reservoir name	= UG-R1b	Max. Storage	= 549 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 9 - UG-R1b

Pond Data

UG Chambers -Invert elev. = 276.93 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 15, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 275.93 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	275.93	n/a	0	0
0.35	276.28	n/a	71	71
0.70	276.63	n/a	71	142
1.05	276.98	n/a	84	226
1.40	277.33	n/a	160	386
1.75	277.68	n/a	157	543
2.10	278.03	n/a	151	694
2.45	278.38	n/a	141	835
2.80	278.73	n/a	125	960
3.15	279.08	n/a	92	1,052
3.50	279.43	n/a	71	1,123

Culvert / Orifice Structures

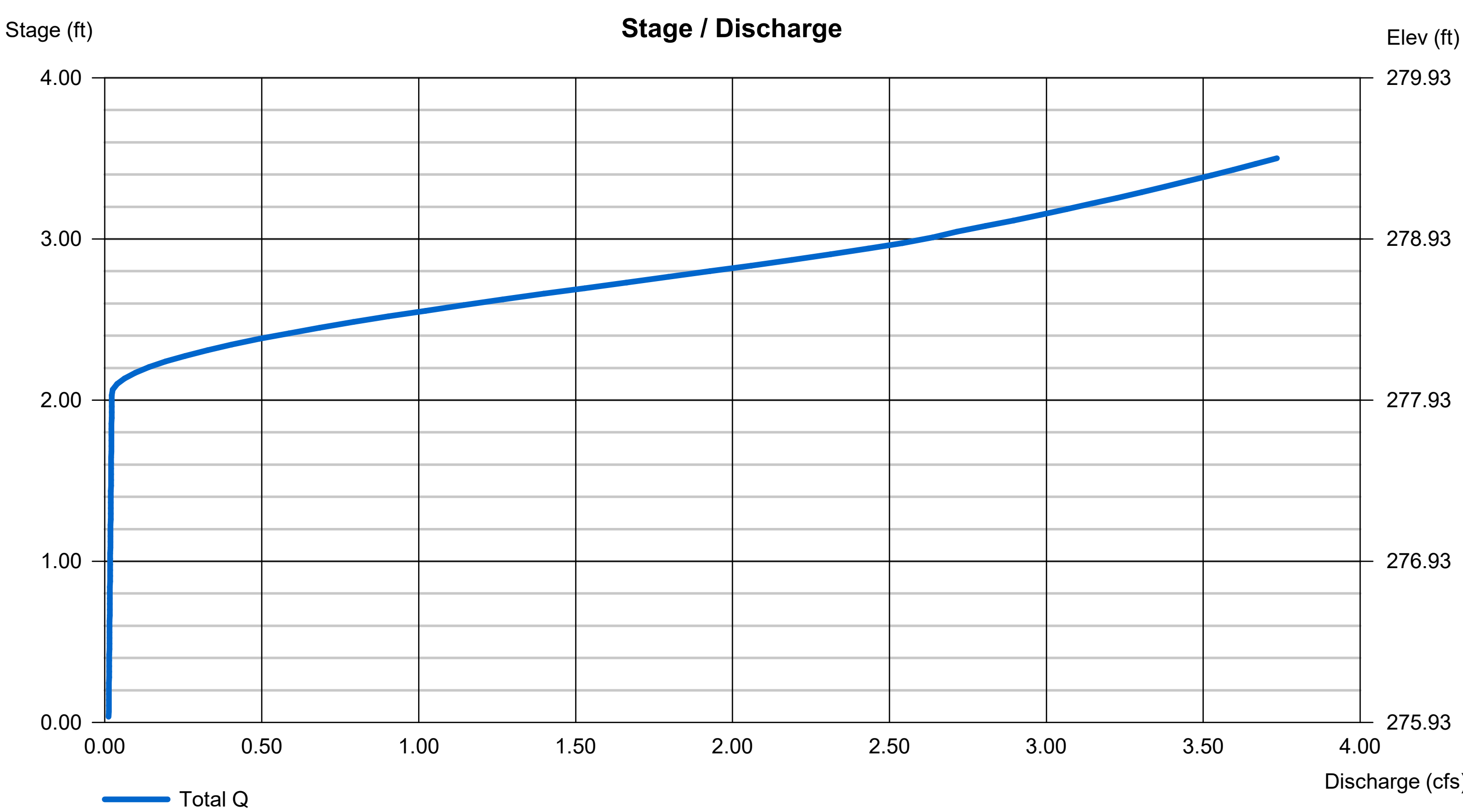
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 277.97	0.00	0.00	0.00
Length (ft)	= 14.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 1.020 (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).



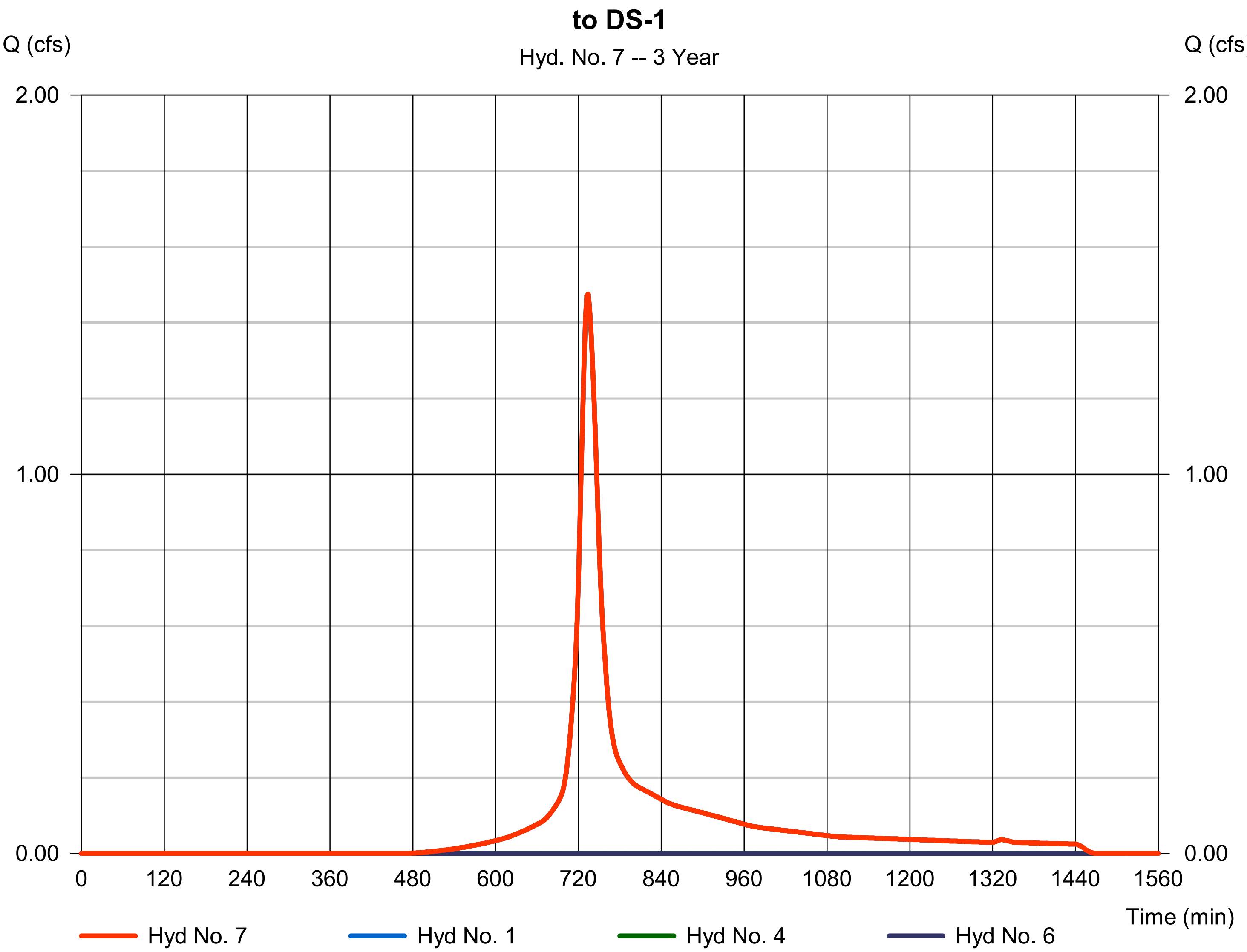
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 7

to DS-1

Hydrograph type	= Combine	Peak discharge	= 1.475 cfs
Storm frequency	= 3 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 6,515 cuft
Inflow hyds.	= 1, 4, 6	Contrib. drain. area	= 2.670 ac



Hydrograph Report

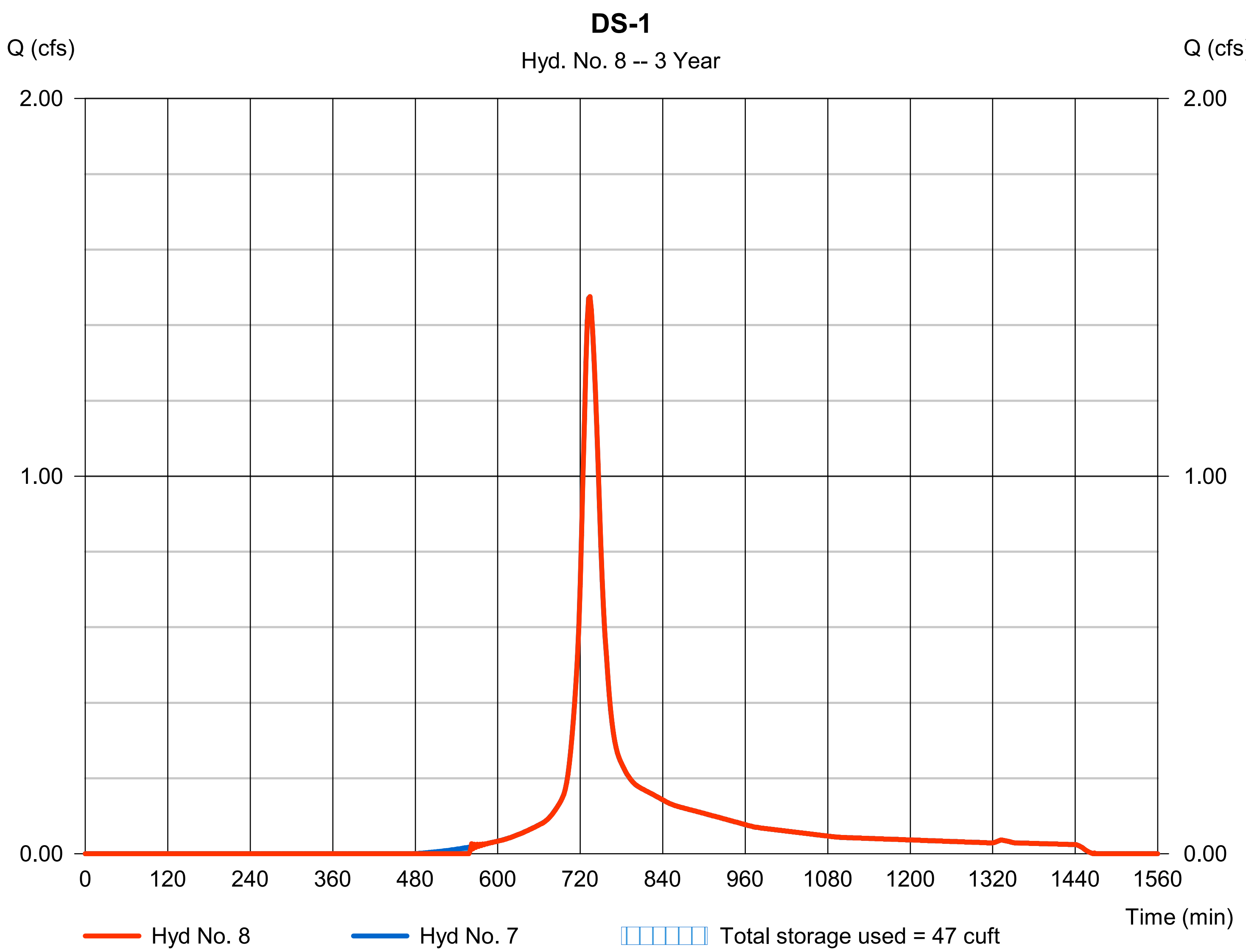
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 8

DS-1

Hydrograph type	= Reservoir	Peak discharge	= 1.476 cfs
Storm frequency	= 3 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 6,477 cuft
Inflow hyd. No.	= 7 - to DS-1	Max. Elevation	= 269.35 ft
Reservoir name	= DS-1	Max. Storage	= 47 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 1 - DS-1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 265.70 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	265.70	13	0	0
7.30	273.00	13	95	95

Culvert / Orifice Structures

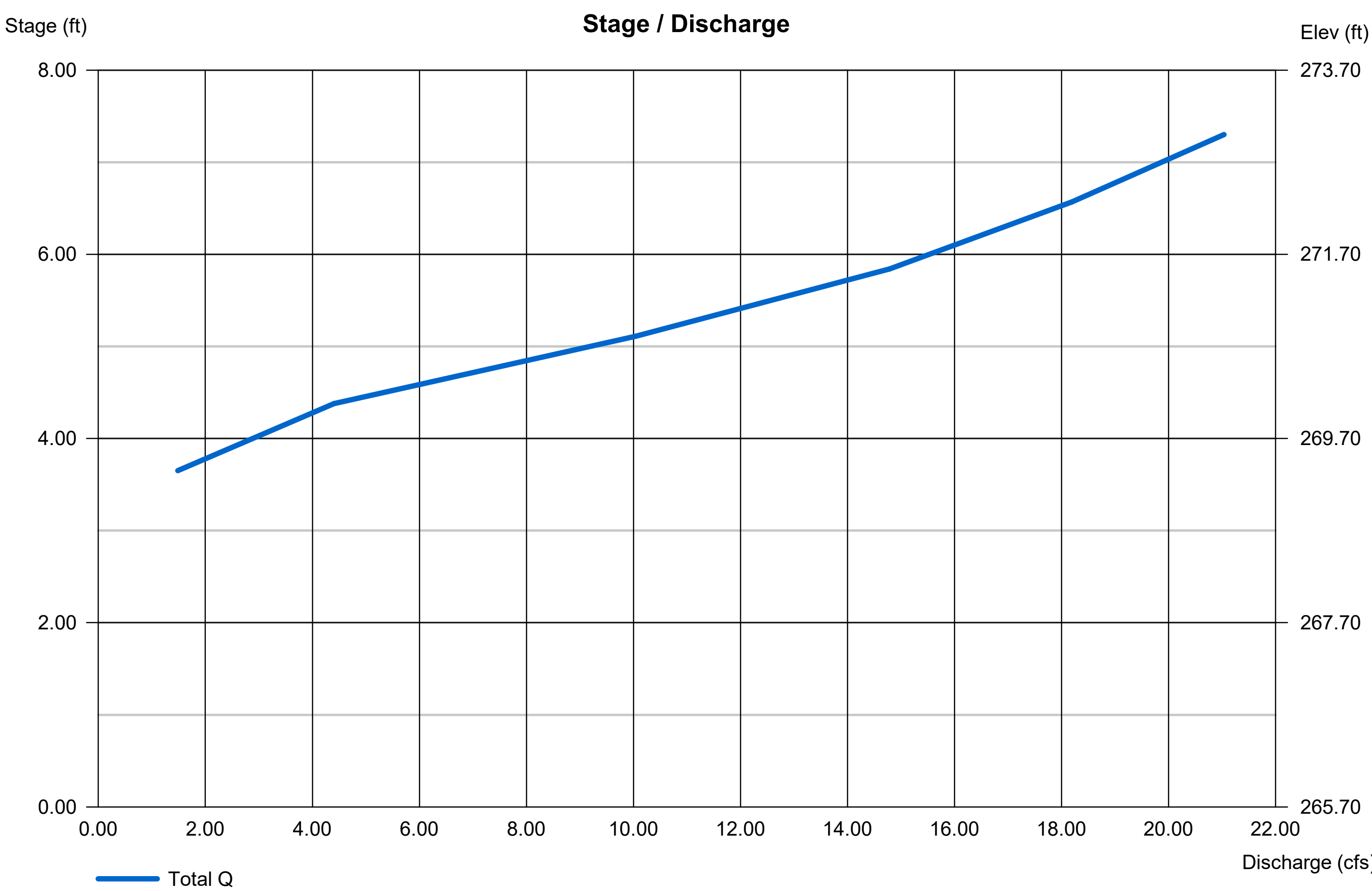
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	12.00	0.00	0.00
Span (in)	= 18.00	12.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 269.67	268.70	0.00	0.00
Length (ft)	= 74.00	30.00	0.00	0.00
Slope (%)	= 5.00	2.30	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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



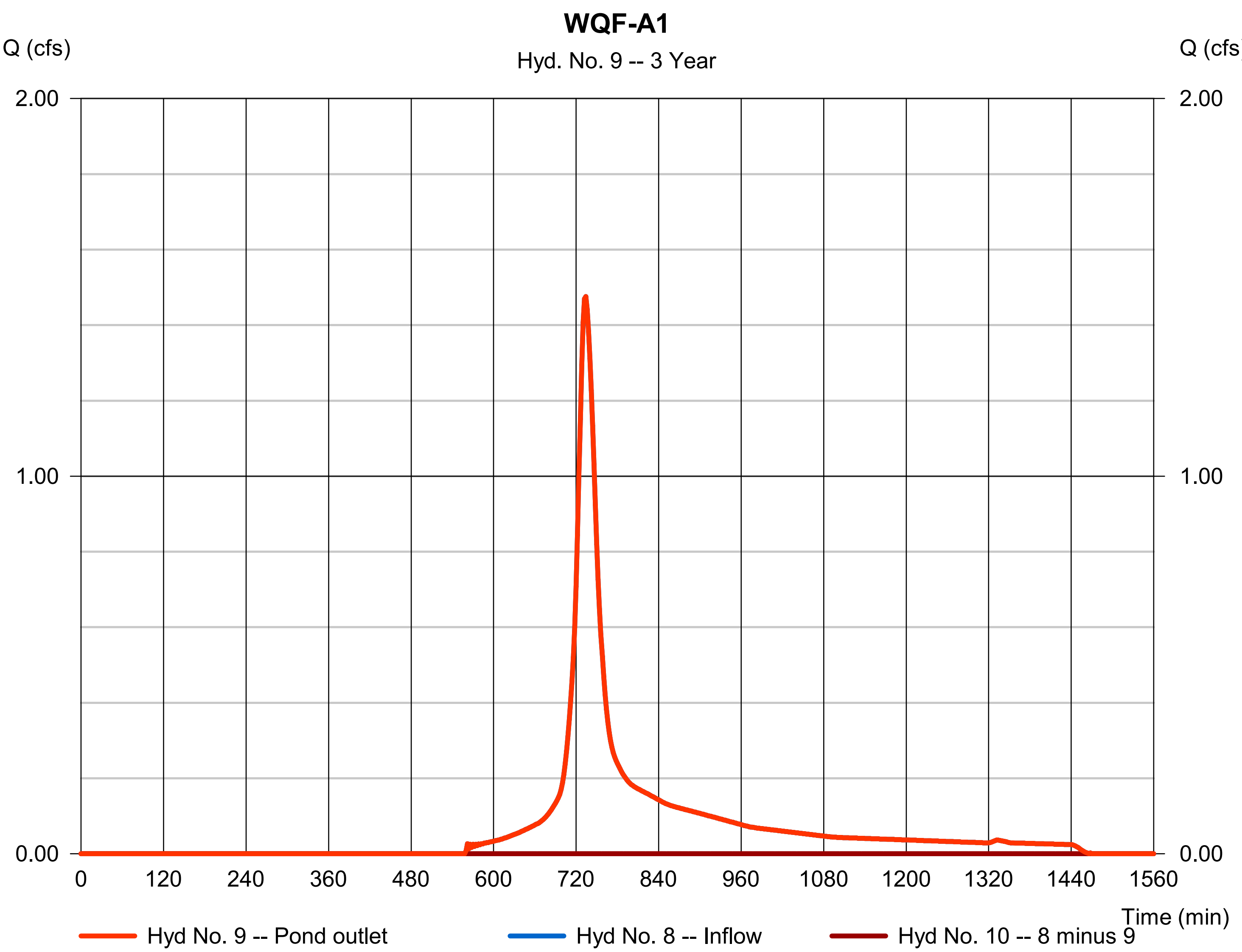
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 9

WQF-A1

Hydrograph type	= Diversion1	Peak discharge	= 1.476 cfs
Storm frequency	= 3 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 6,477 cuft
Inflow hydrograph	= 8 - DS-1	2nd diverted hyd.	= 10
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



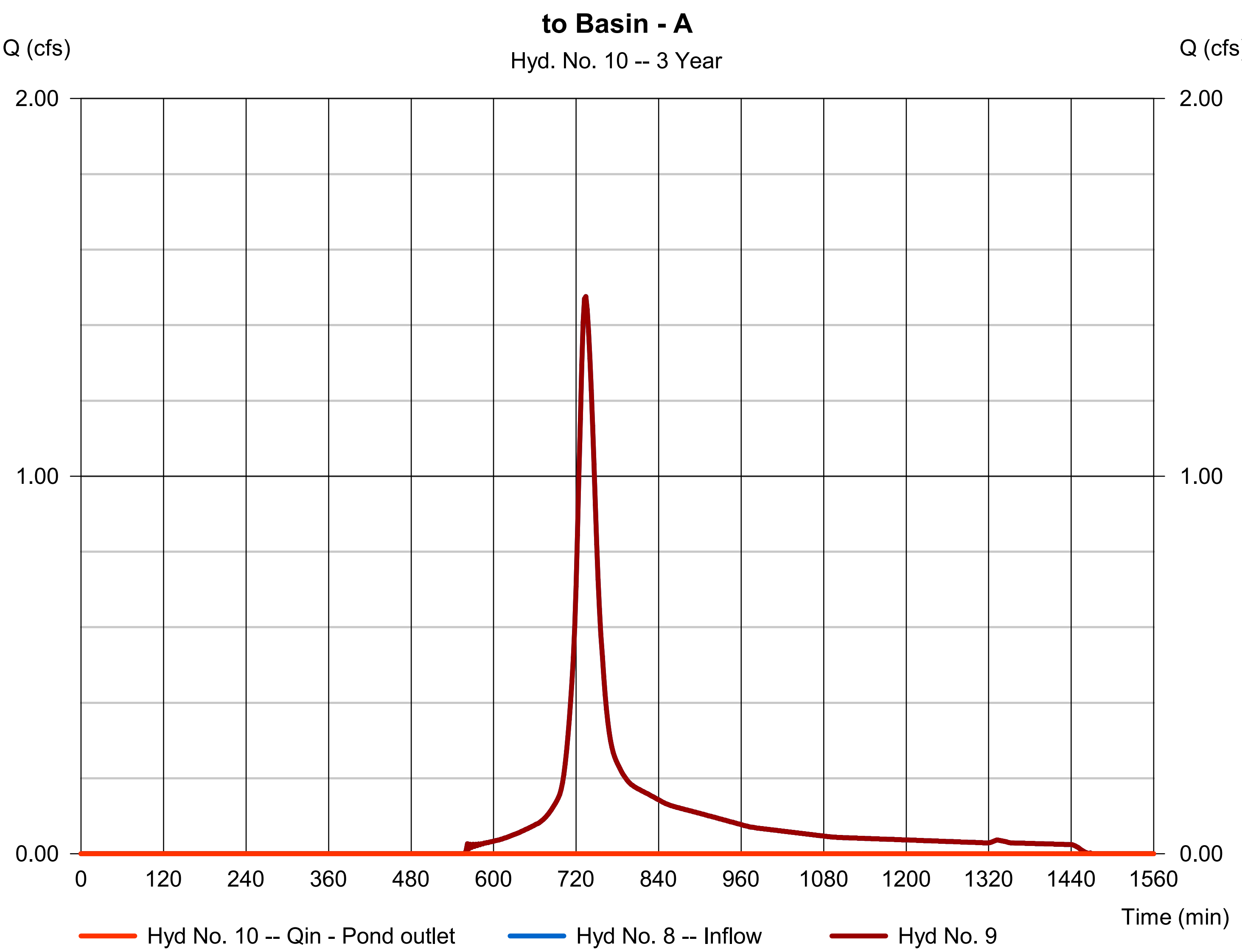
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 10

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 770 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 8 - DS-1	2nd diverted hyd.	= 9
Diversion method	= Pond - DS-1	Pond structure	= Culv/Orf B



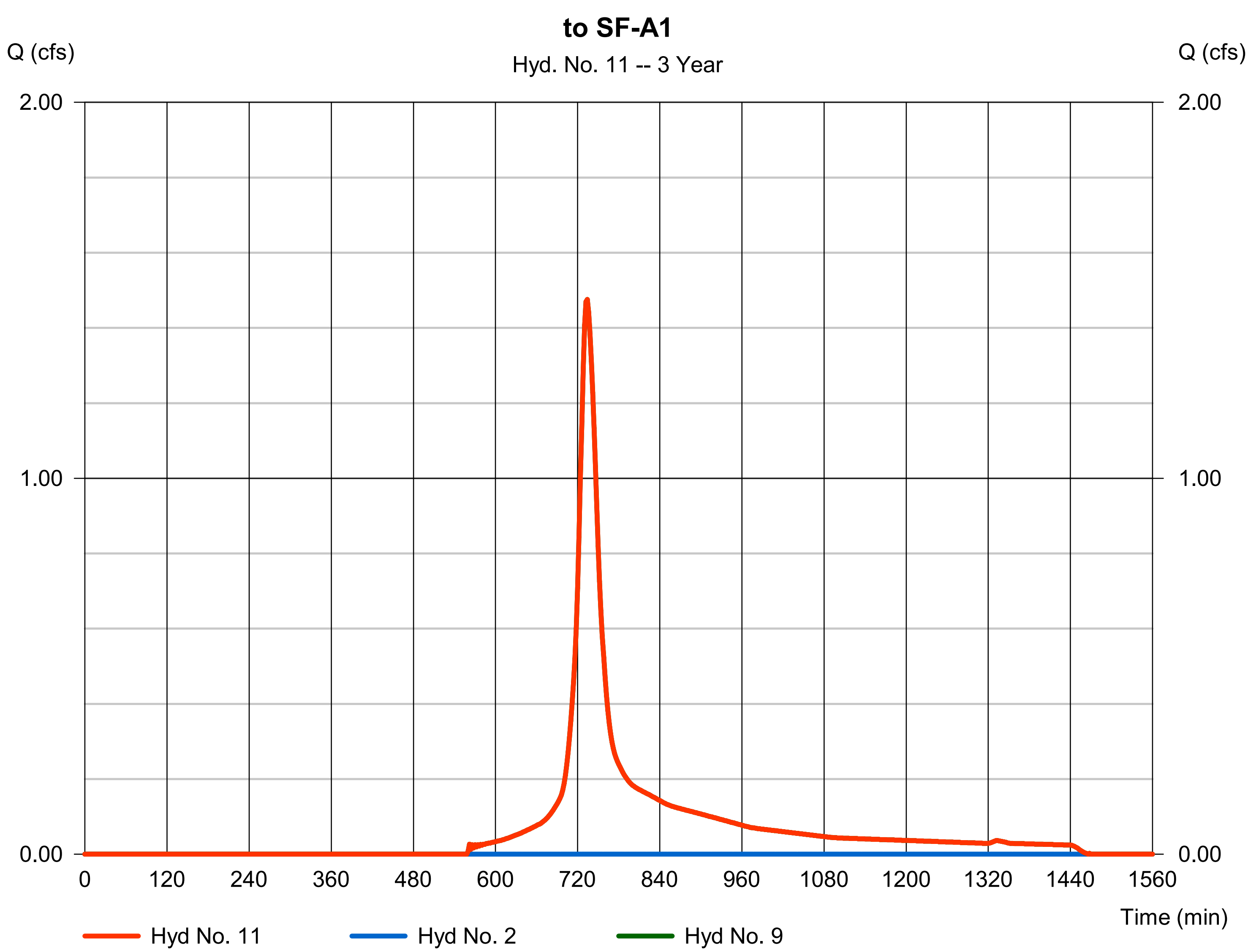
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 11

to SF-A1

Hydrograph type	= Combine	Peak discharge	= 1.476 cfs
Storm frequency	= 3 yrs	Time to peak	= 734 min
Time interval	= 2 min	Hyd. volume	= 6,477 cuft
Inflow hyds.	= 2, 9	Contrib. drain. area	= 0.170 ac



Hydrograph Report

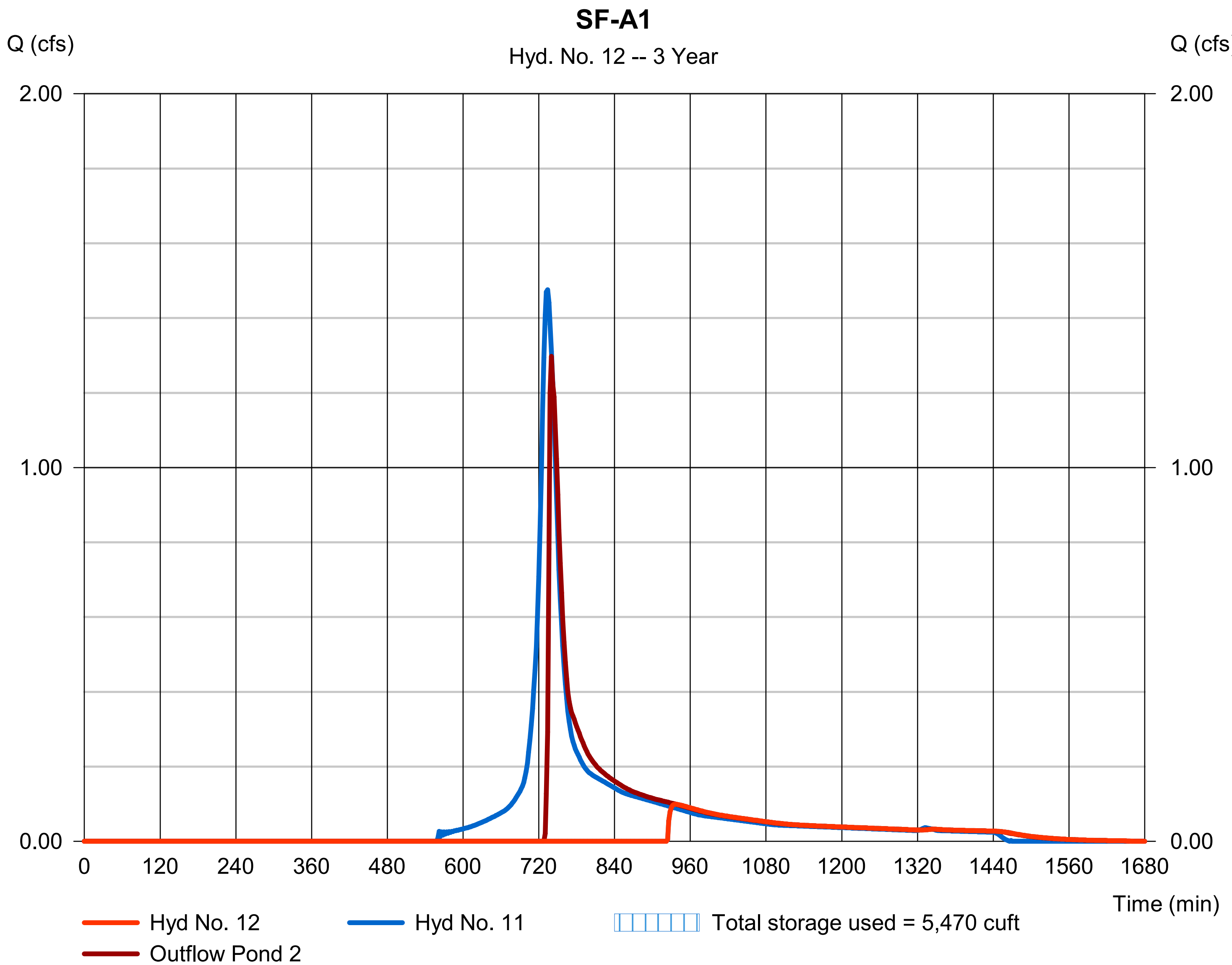
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 12

SF-A1

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.099 cfs
Storm frequency	= 3 yrs	Time to peak	= 936 min
Time interval	= 2 min	Hyd. volume	= 1,587 cuft
Upper Pond Pond name	= Sediment Forebay - A1	**Lower Pond** Pond name	= Sand Filter - A1
Inflow hyd.	= 11 - to SF-A1	Other Inflow hyd.	= None
Max. Elevation	= 271.60 ft	Max. Elevation	= 271.26 ft
Max. Storage	= 2,108 cuft	Max. Storage	= 3,362 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 2 - Sediment Forebay - A1

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 268.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	268.00	127	0	0
1.00	269.00	324	218	218
2.00	270.00	594	452	670
3.00	271.00	938	759	1,430
4.00	272.00	1,336	1,131	2,561

Culvert / Orifice Structures

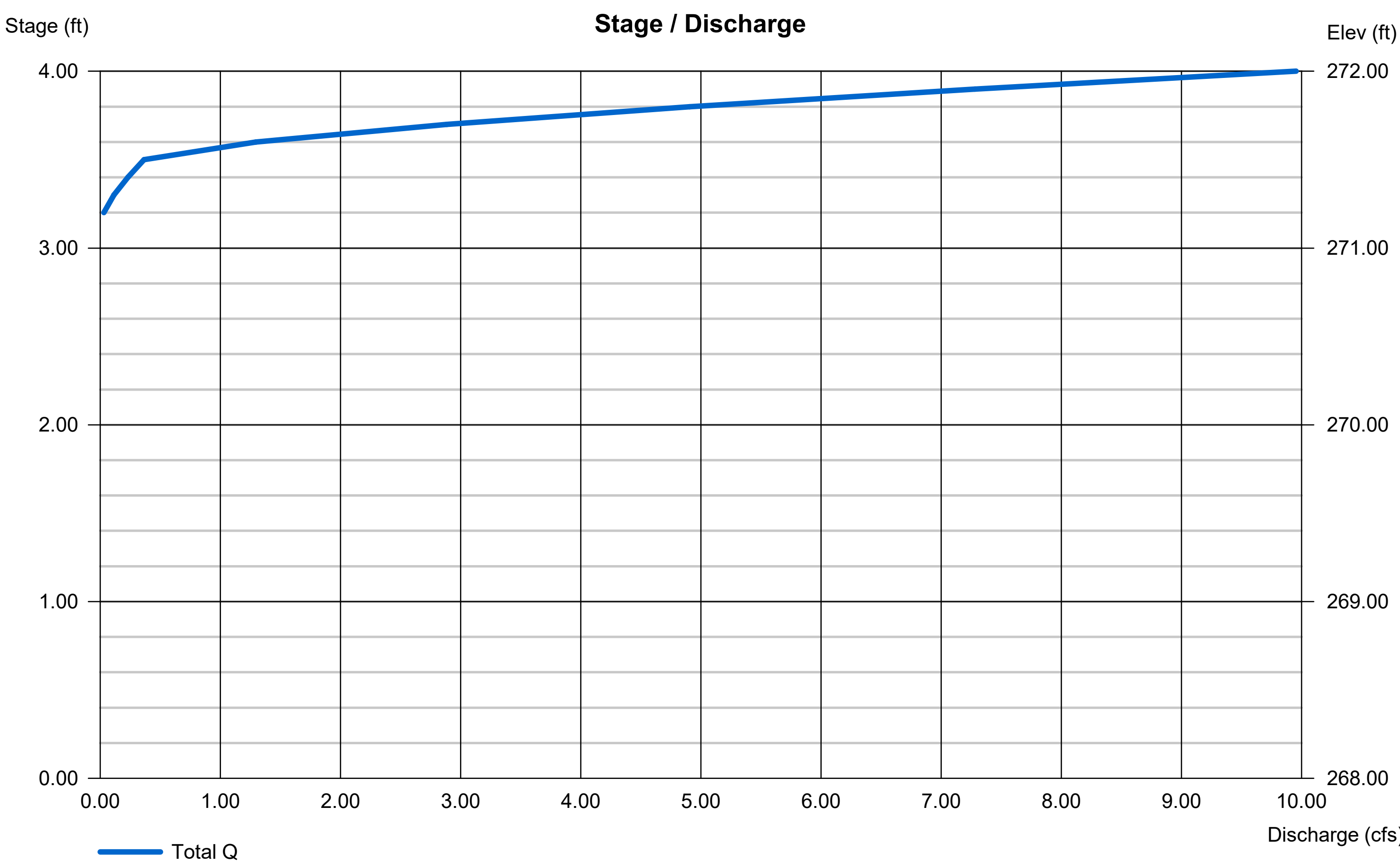
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	0.00	0.00
Span (in)	= 6.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 271.10	0.00	0.00	0.00
Length (ft)	= 13.50	0.00	0.00	0.00
Slope (%)	= 4.44	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 271.50	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).



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 3 - Sand Filter - A1

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	267.50	n/a	0	0
2.00	269.50	n/a	1,312	1,312
2.50	270.00	n/a	398	1,710
3.75	271.25	n/a	1,634	3,344
4.50	272.00	n/a	1,936	5,280

Culvert / Orifice Structures

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

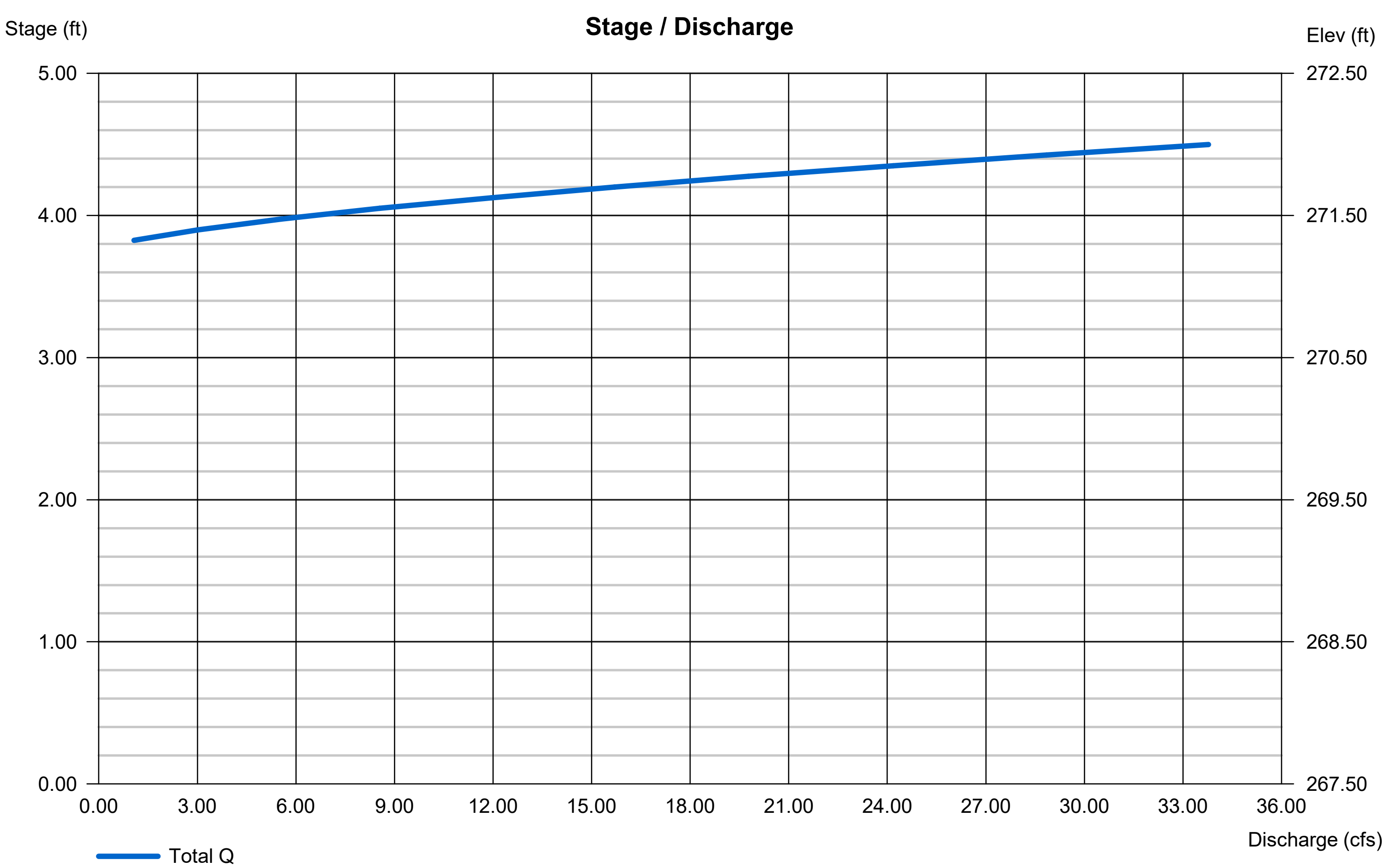
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 271.25	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) = 2.410 (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).



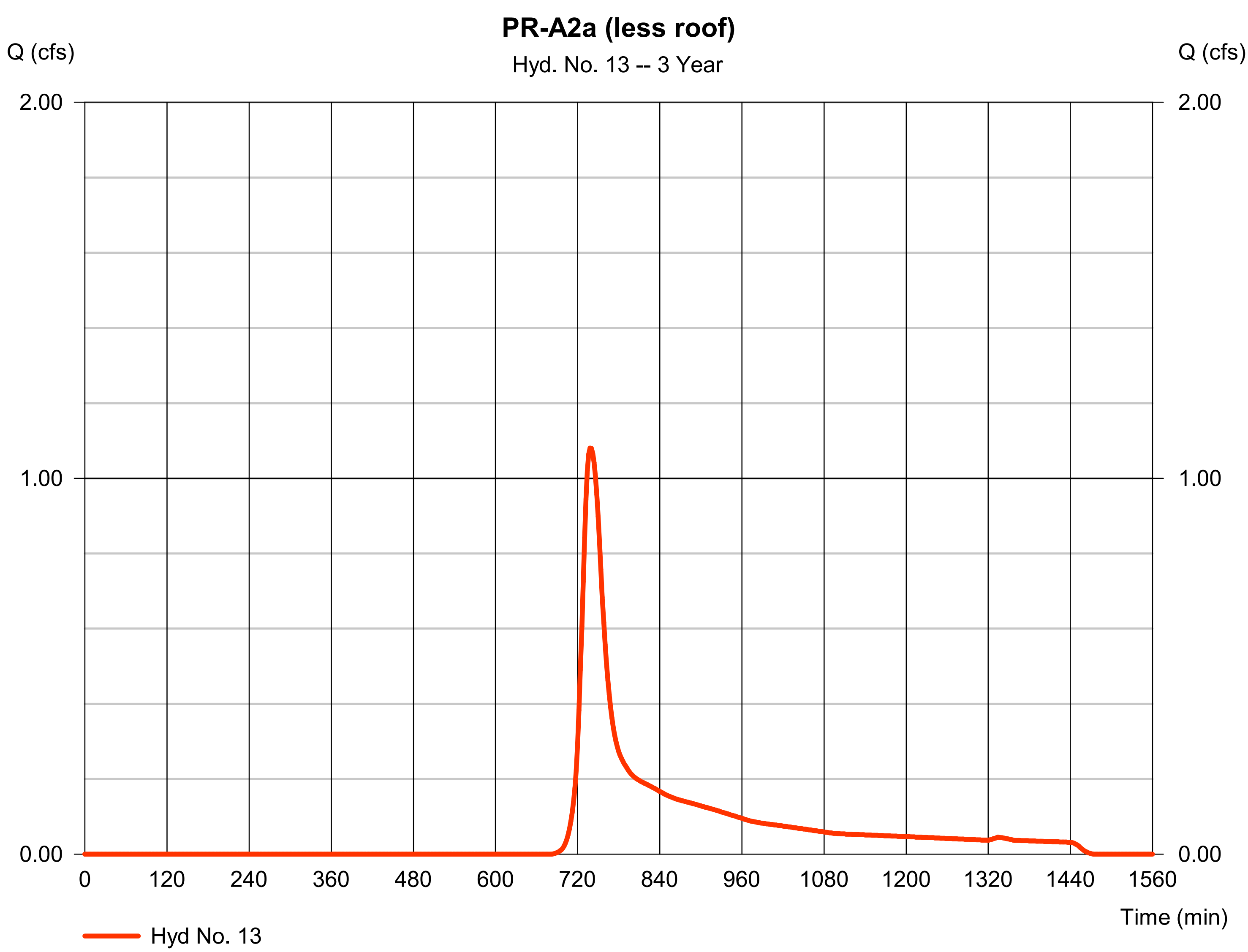
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 13

PR-A2a (less roof)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.081 cfs
Storm frequency	= 3 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 5,747 cuft
Drainage area	= 5.090 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 21.00 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

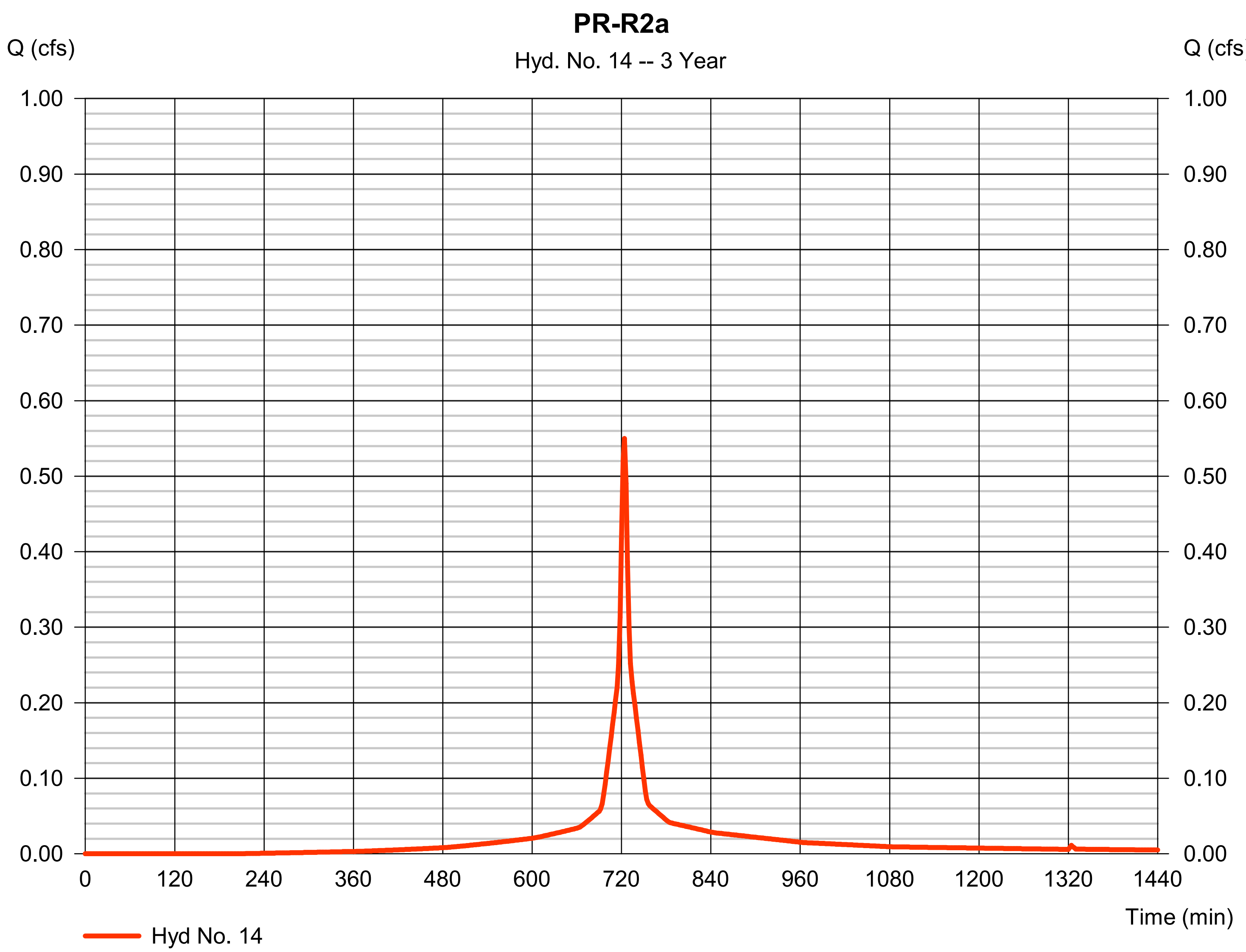


Hydrograph Report

Hyd. No. 14

PR-R2a

Hydrograph type	= SCS Runoff	Peak discharge	= 0.550 cfs
Storm frequency	= 3 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,744 cuft
Drainage area	= 0.520 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

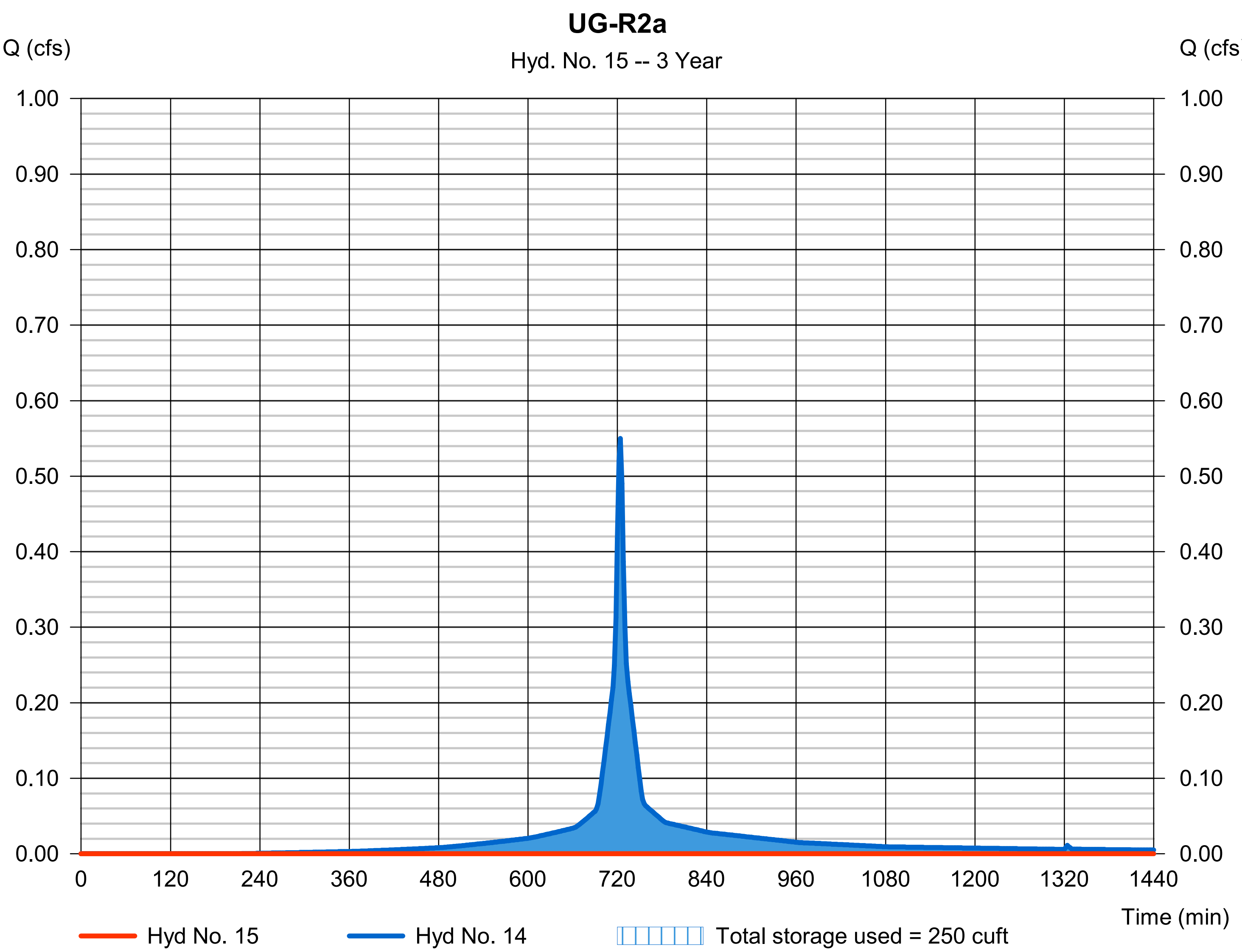
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 15

UG-R2a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - PR-R2a	Max. Elevation	= 276.82 ft
Reservoir name	= UG-R2a	Max. Storage	= 250 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 10 - UG-R2a

Pond Data

UG Chambers -Invert elev. = 277.06 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 24, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 276.06 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	276.06	n/a	0	0
0.35	276.41	n/a	114	114
0.70	276.76	n/a	114	227
1.05	277.11	n/a	134	361
1.40	277.46	n/a	256	618
1.75	277.81	n/a	251	869
2.10	278.16	n/a	242	1,110
2.45	278.51	n/a	226	1,336
2.80	278.86	n/a	200	1,537
3.15	279.21	n/a	147	1,683
3.50	279.56	n/a	114	1,797

Culvert / Orifice Structures

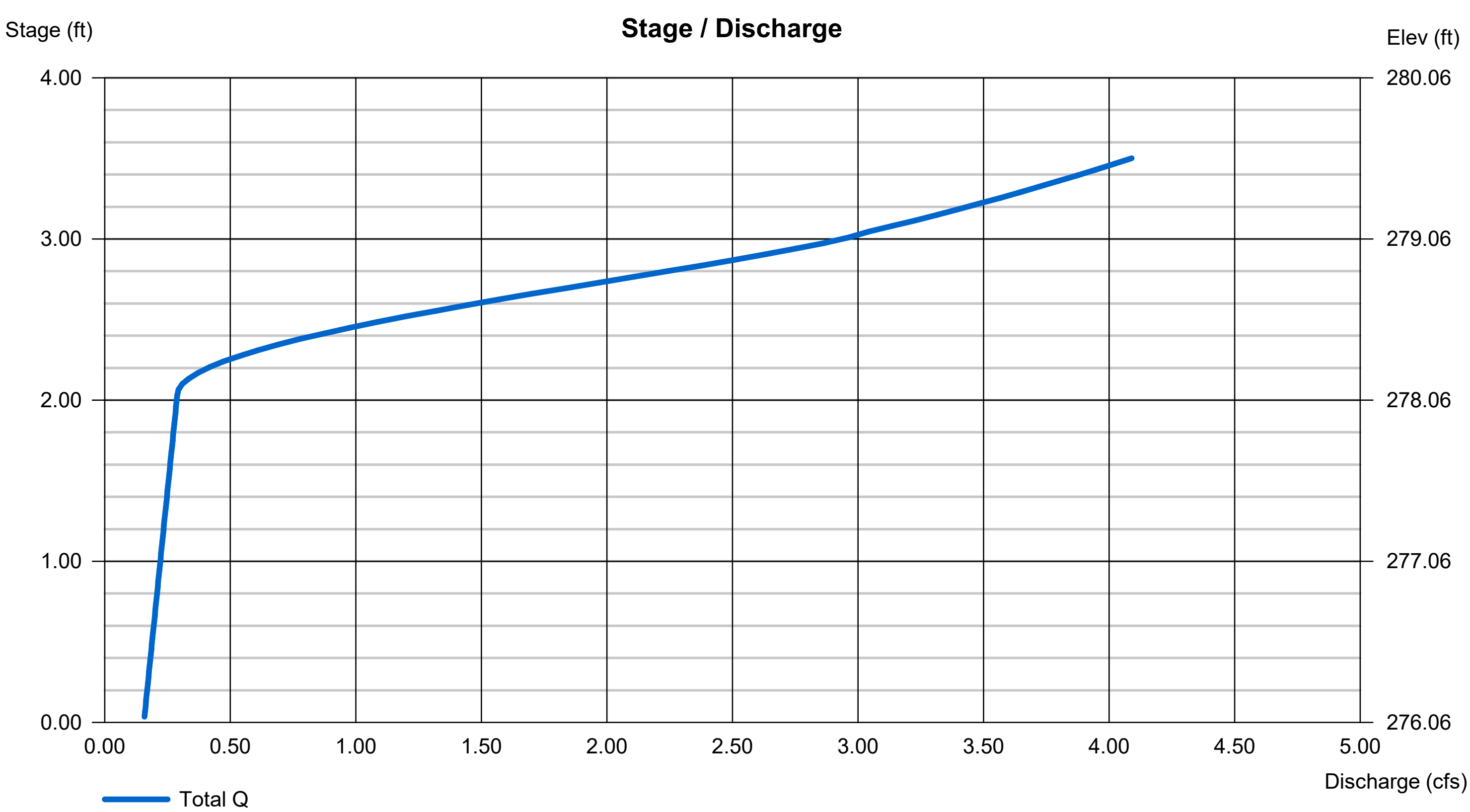
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 278.10	0.00	0.00	0.00
Length (ft)	= 15.00	0.00	0.00	0.00
Slope (%)	= 3.40	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 8.270 (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).



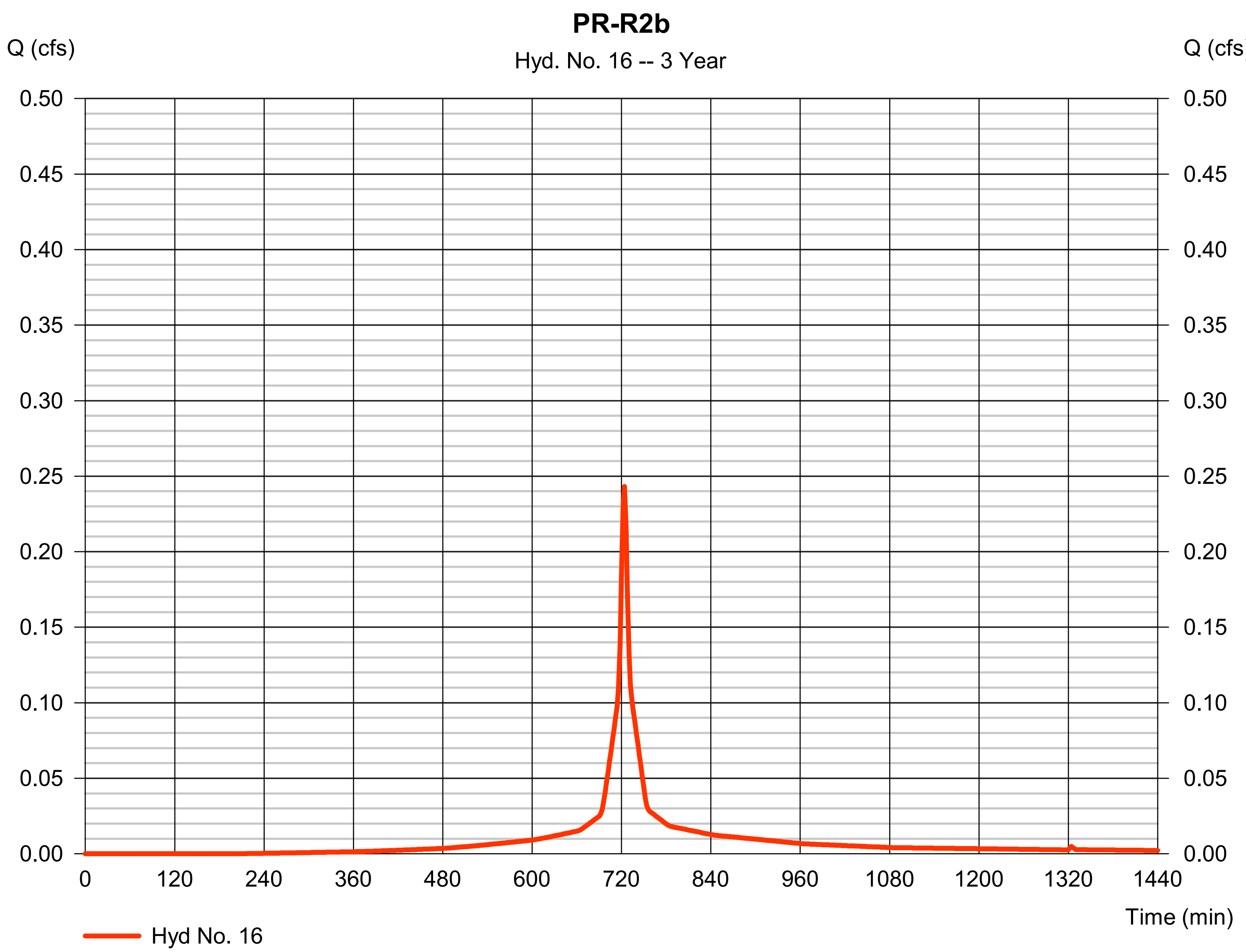
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 16

PR-R2b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.243 cfs
Storm frequency	= 3 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 771 cuft
Drainage area	= 0.230 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

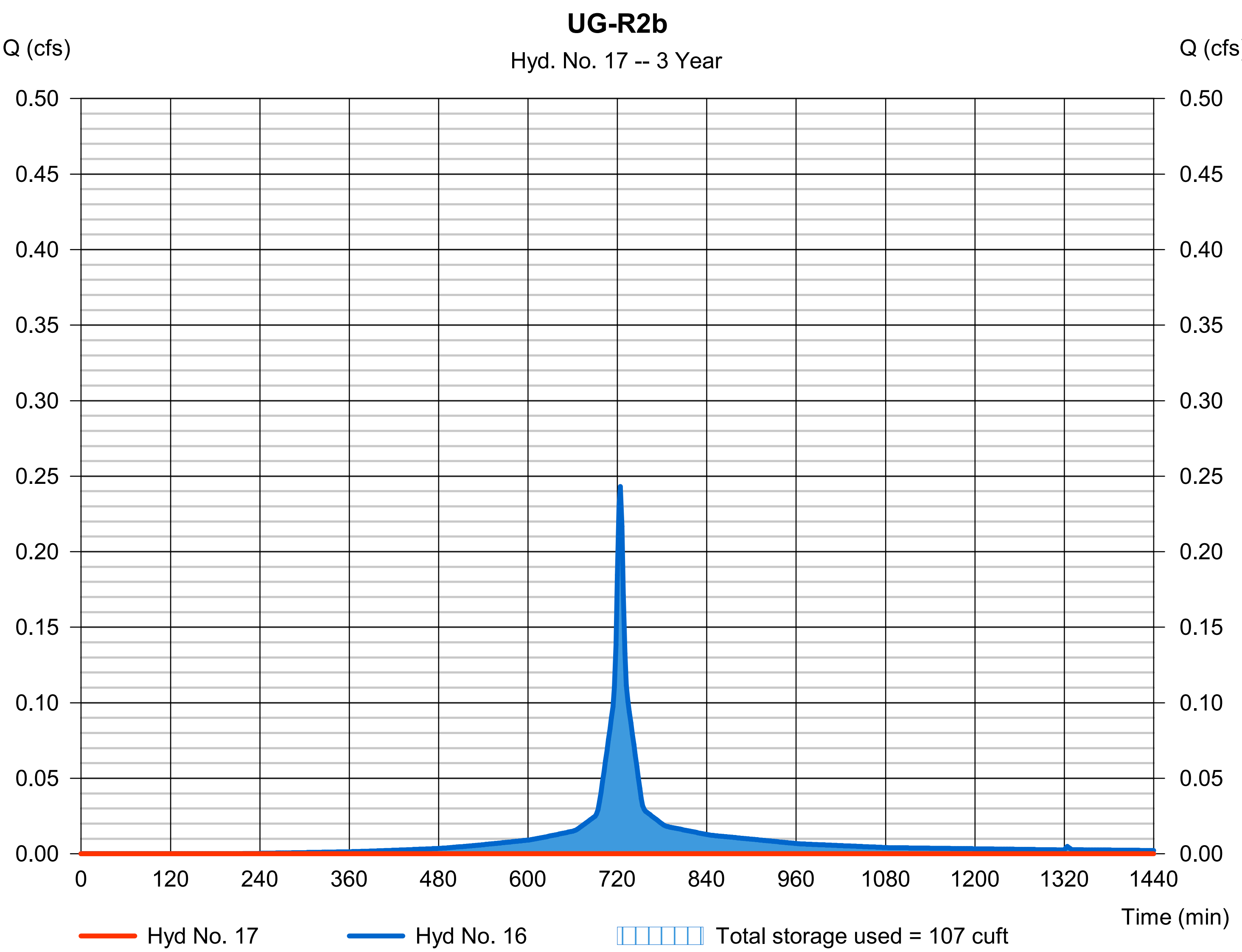
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 17

UG-R2b

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 16 - PR-R2b	Max. Elevation	= 277.02 ft
Reservoir name	= UG-R2b	Max. Storage	= 107 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Pond No. 11 - UG-R2b

Pond Data

UG Chambers -Invert elev. = 277.30 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 11, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 276.30 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	276.30	n/a	0	0
0.35	276.65	n/a	52	52
0.70	277.00	n/a	52	104
1.05	277.35	n/a	61	166
1.40	277.70	n/a	117	283
1.75	278.05	n/a	115	398
2.10	278.40	n/a	111	509
2.45	278.75	n/a	103	612
2.80	279.10	n/a	92	704
3.15	279.45	n/a	67	772
3.50	279.80	n/a	52	824

Culvert / Orifice Structures

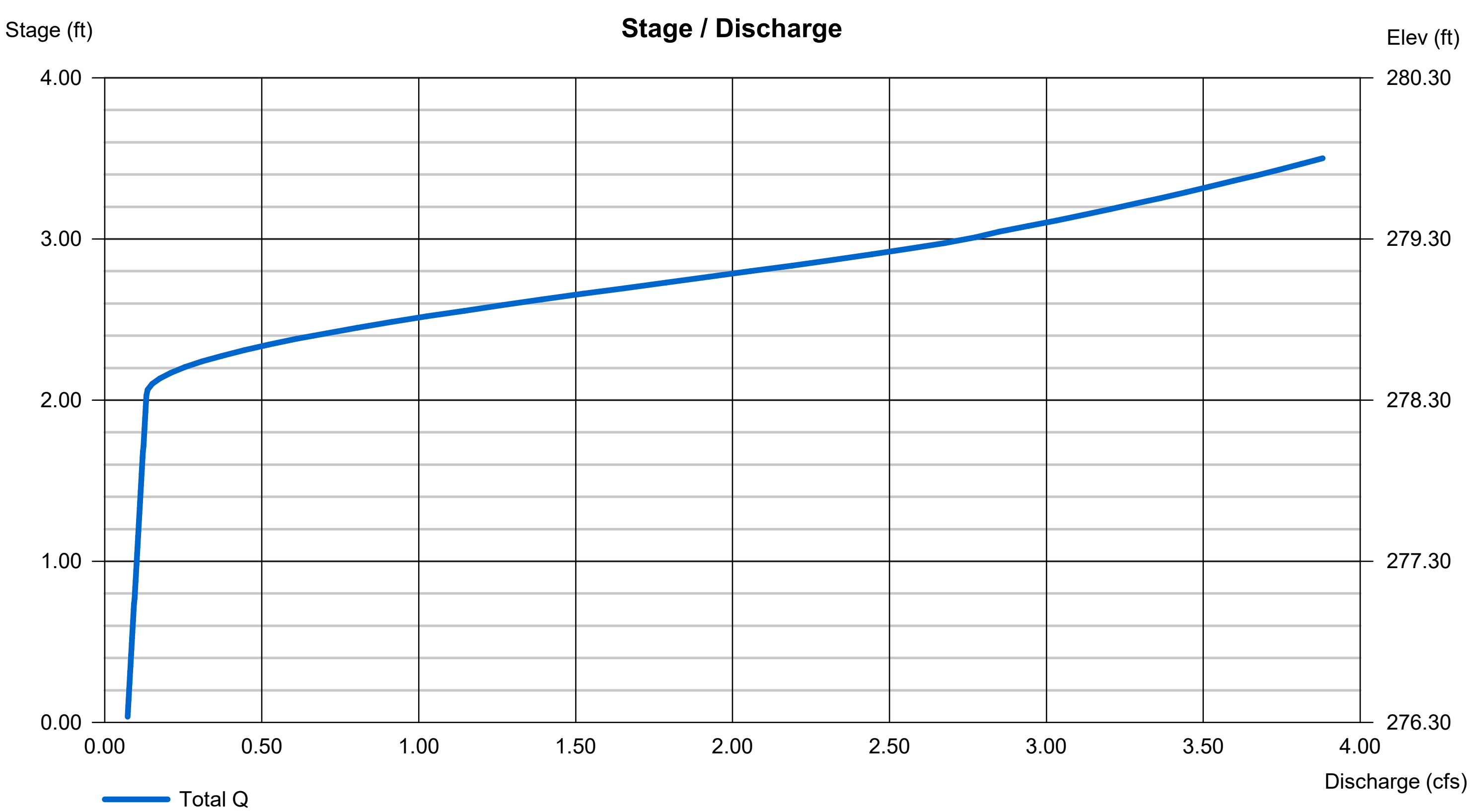
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 278.34	0.00	0.00	0.00
Length (ft)	= 31.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 8.270 (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).



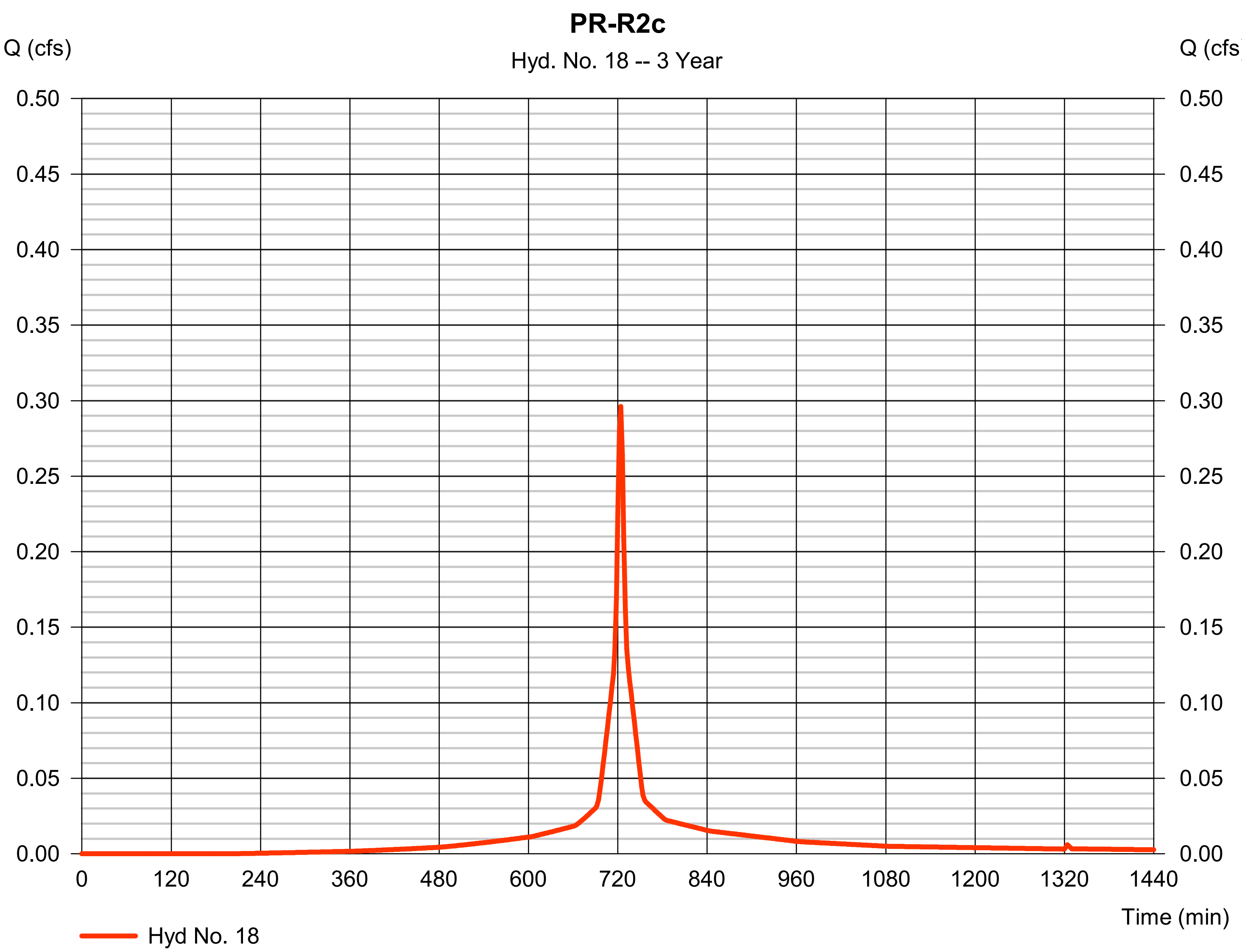
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 18

PR-R2c

Hydrograph type	= SCS Runoff	Peak discharge	= 0.296 cfs
Storm frequency	= 3 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 939 cuft
Drainage area	= 0.280 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

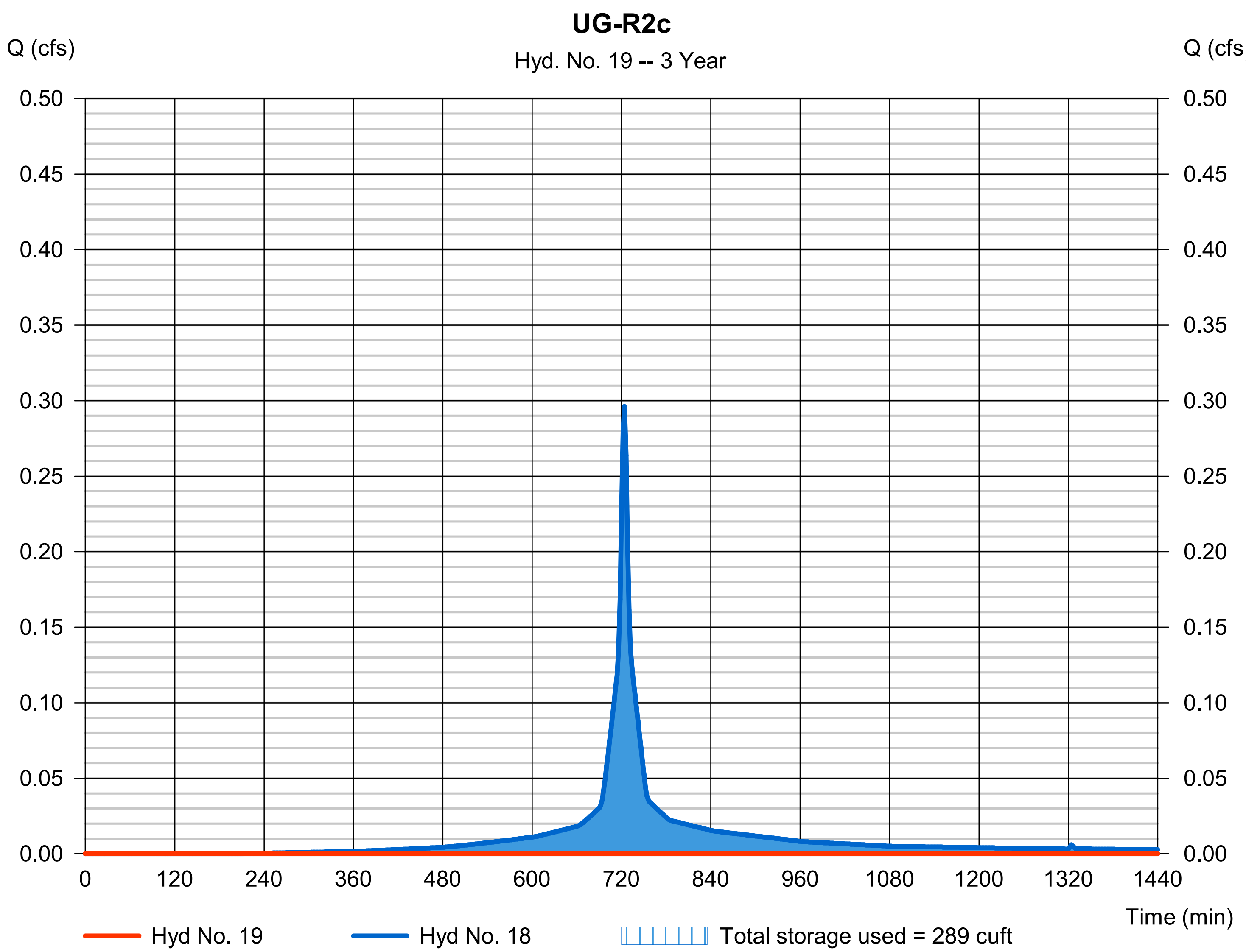
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 19

UG-R2c

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 18 - PR-R2c	Max. Elevation	= 278.19 ft
Reservoir name	= UG-R2c	Max. Storage	= 289 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 12 - UG-R2c

Pond Data

UG Chambers -Invert elev. = 277.67 ft, Rise x Span = 1.15 x 2.30 ft, Barrel Len = 7.12 ft, No. Barrels = 35, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	277.67	n/a	0	0
0.11	277.79	n/a	66	66
0.23	277.90	n/a	65	131
0.34	278.02	n/a	64	195
0.46	278.13	n/a	62	256
0.57	278.24	n/a	59	315
0.69	278.36	n/a	55	370
0.80	278.48	n/a	50	420
0.92	278.59	n/a	44	464
1.03	278.70	n/a	35	498
1.15	278.82	n/a	19	518

Culvert / Orifice Structures

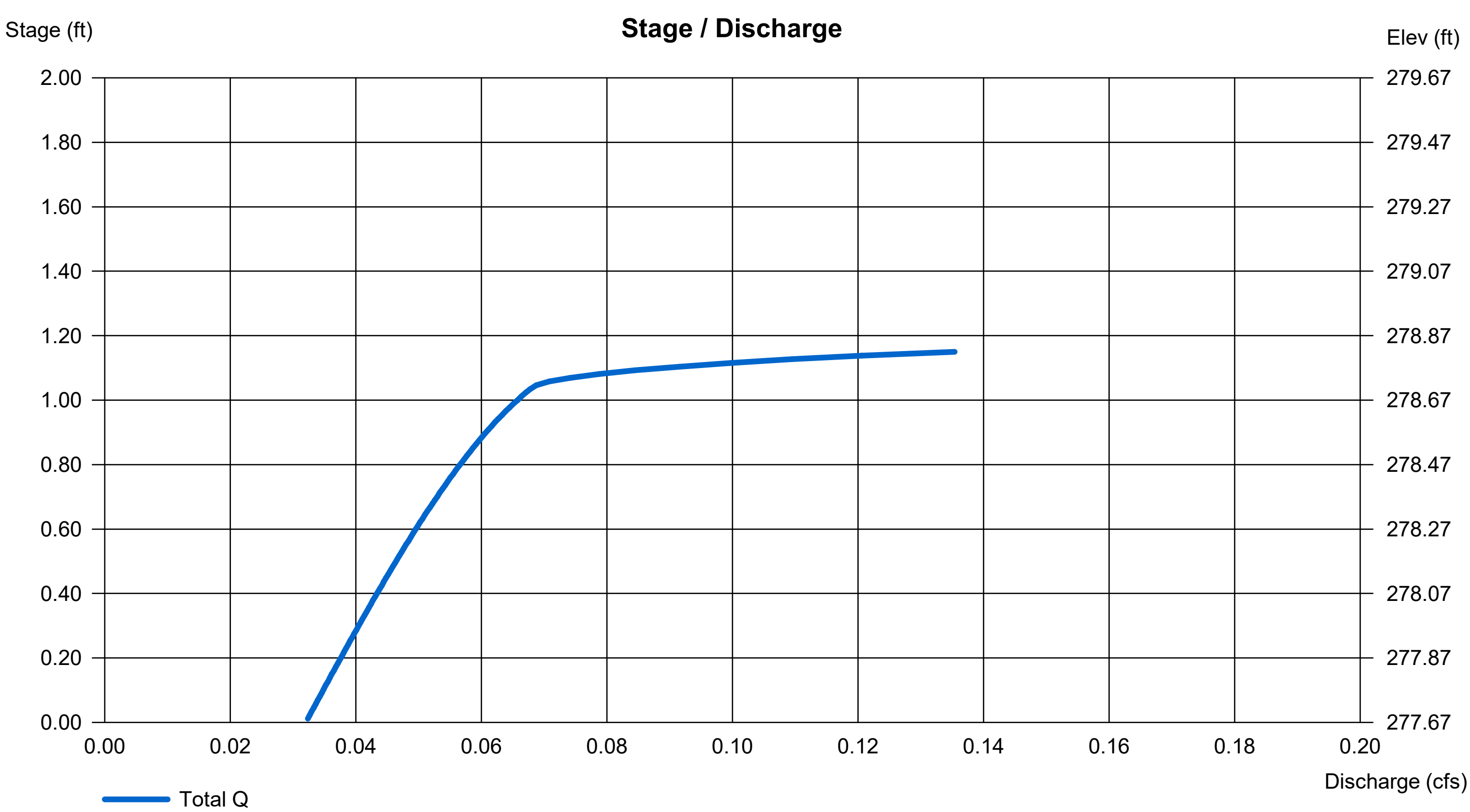
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 278.71	0.00	0.00	0.00
Length (ft)	= 17.00	0.00	0.00	0.00
Slope (%)	= 8.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 2.410 (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).



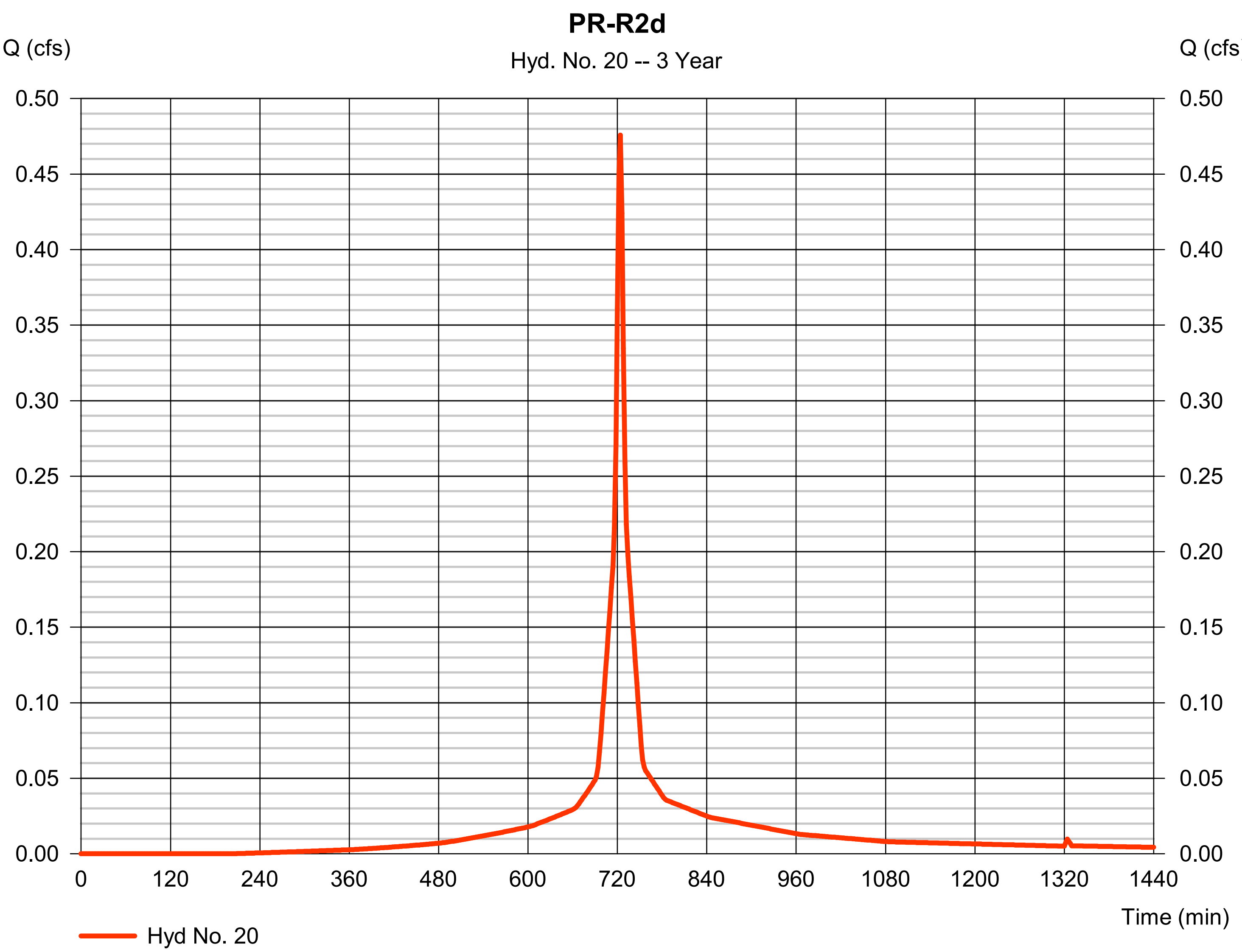
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Wednesday, 03 / 3 / 2021

Hyd. No. 20

PR-R2d

Hydrograph type	= SCS Runoff	Peak discharge	= 0.476 cfs
Storm frequency	= 3 yrs	Time to peak	= 724 min
Time interval	= 2 min	Hyd. volume	= 1,509 cuft
Drainage area	= 0.450 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

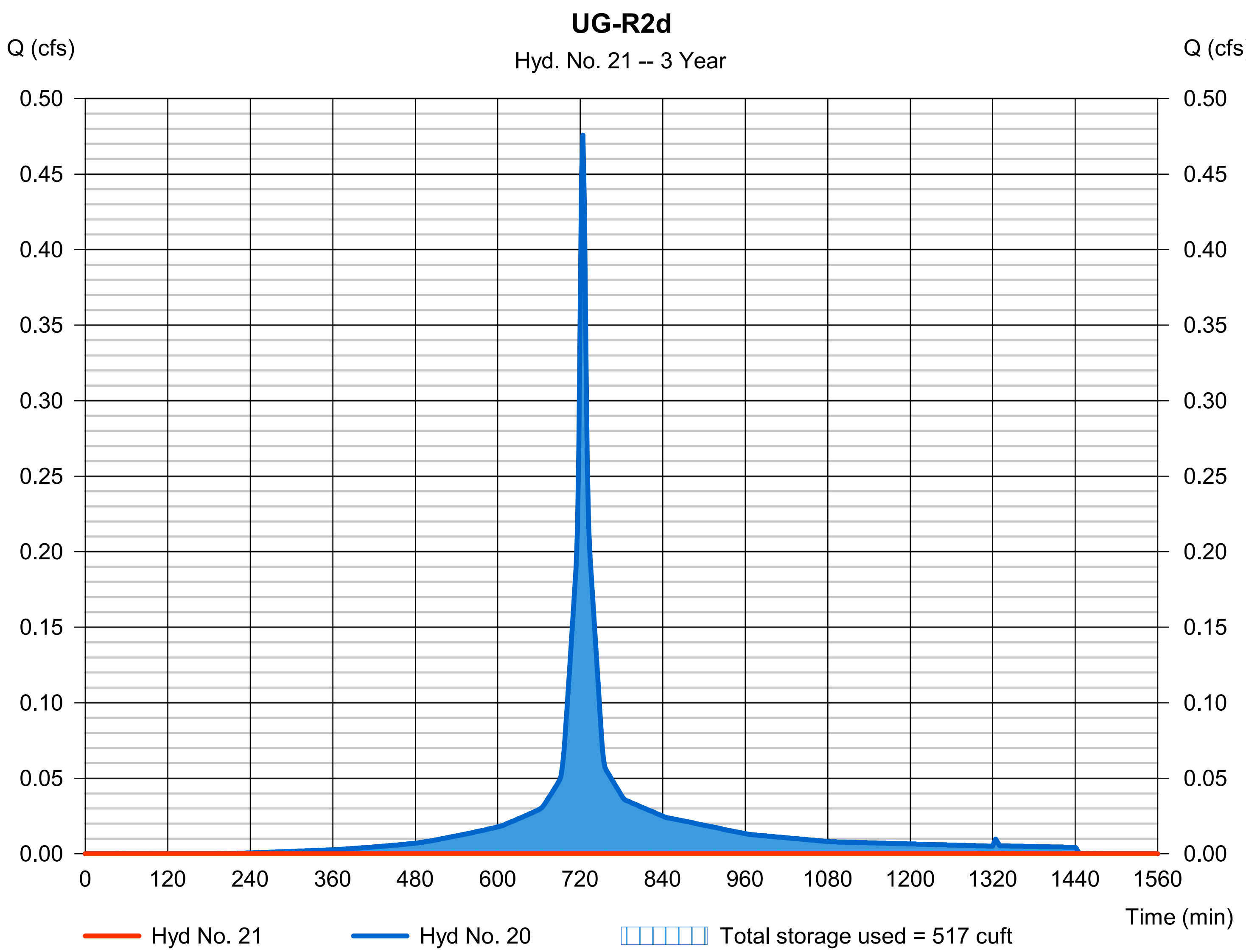
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Wednesday, 03 / 3 / 2021

Hyd. No. 21

UG-R2d

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 670 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 20 - PR-R2d	Max. Elevation	= 276.22 ft
Reservoir name	= UG-R2d	Max. Storage	= 517 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 13 - UG-R2d

Pond Data

UG Chambers -Invert elev. = 275.82 ft, Rise x Span = 2.05 x 4.00 ft, Barrel Len = 7.12 ft, No. Barrels = 20, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 274.82 ft, Width = 4.75 ft, Height = 3.50 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	274.82	n/a	0	0
0.35	275.17	n/a	95	95
0.70	275.52	n/a	95	189
1.05	275.87	n/a	112	301
1.40	276.22	n/a	213	515
1.75	276.57	n/a	209	724
2.10	276.92	n/a	201	925
2.45	277.27	n/a	188	1,113
2.80	277.62	n/a	167	1,280
3.15	277.97	n/a	122	1,403
3.50	278.32	n/a	95	1,498

Culvert / Orifice Structures

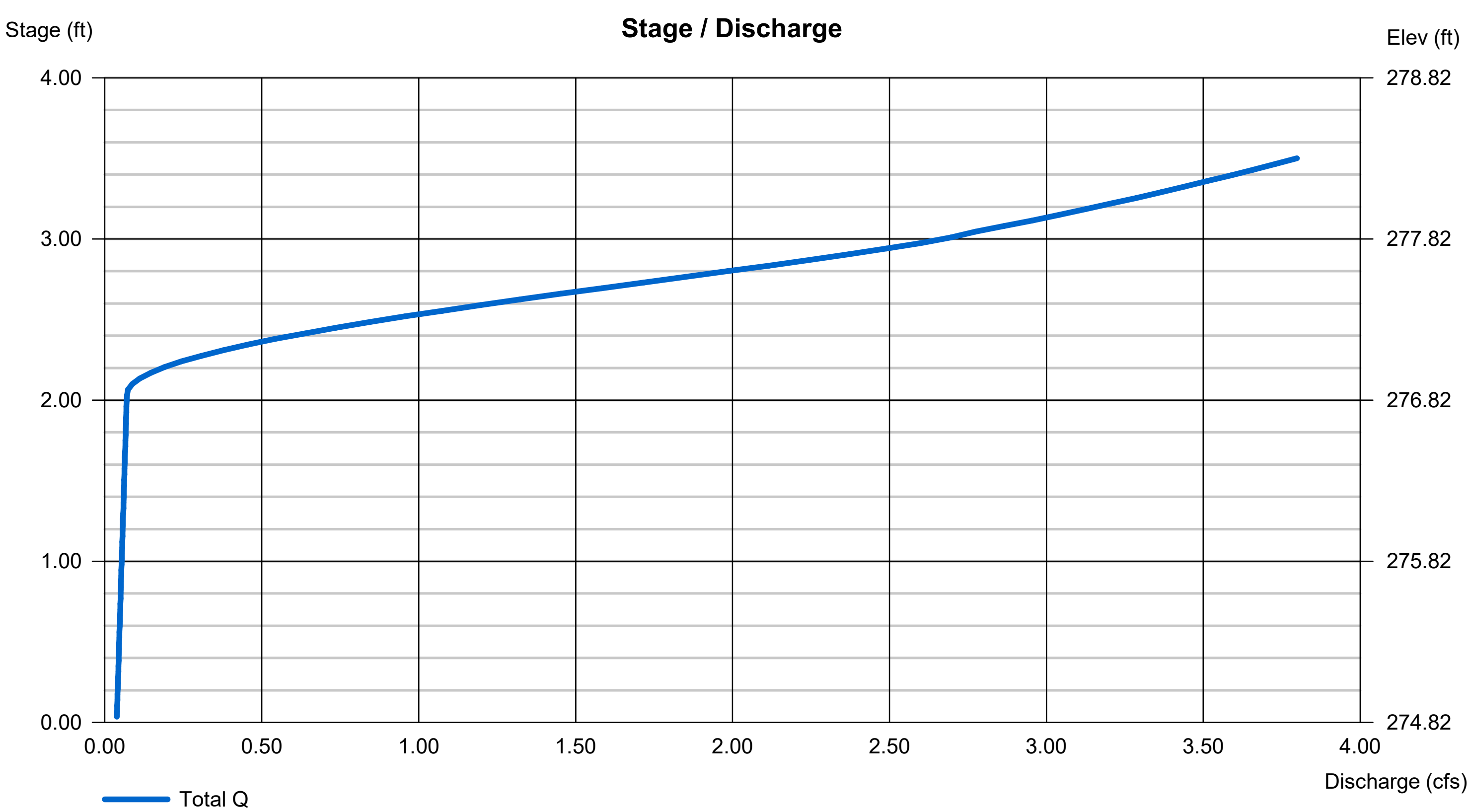
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 12.00	0.00	0.00	0.00
Span (in)	= 12.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 276.86	0.00	0.00	0.00
Length (ft)	= 51.00	0.00	0.00	0.00
Slope (%)	= 3.00	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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

Exfil.(in/hr) = 2.410 (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).



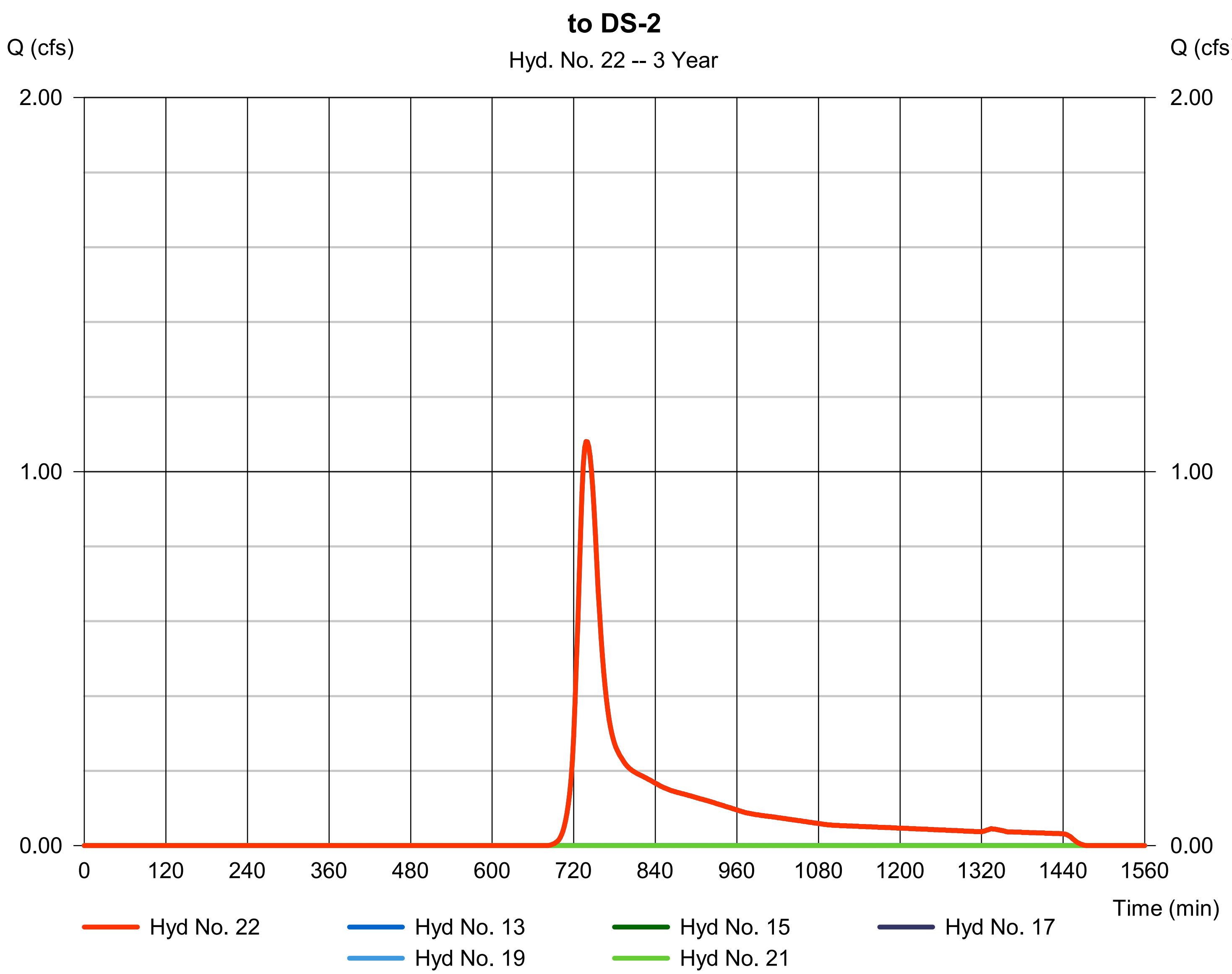
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 22

to DS-2

Hydrograph type	= Combine	Peak discharge	= 1.081 cfs
Storm frequency	= 3 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 5,747 cuft
Inflow hyds.	= 13, 15, 17, 19, 21	Contrib. drain. area	= 5.090 ac



Hydrograph Report

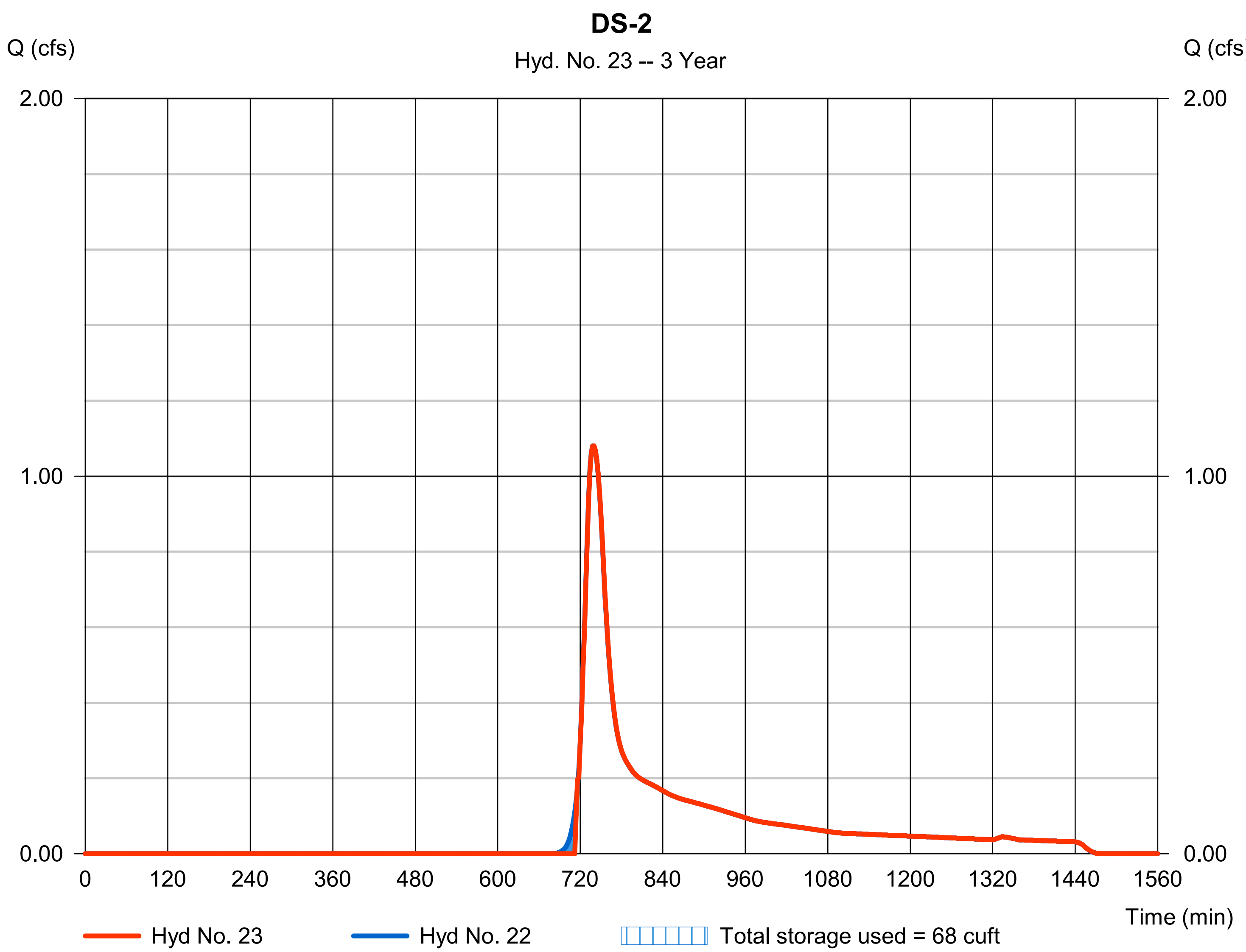
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 23

DS-2

Hydrograph type	= Reservoir	Peak discharge	= 1.081 cfs
Storm frequency	= 3 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 5,690 cuft
Inflow hyd. No.	= 22 - to DS-2	Max. Elevation	= 268.69 ft
Reservoir name	= DS-2	Max. Storage	= 68 cuft

Storage Indication method used.



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Pond No. 4 - DS-2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 266.27 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	266.27	28	0	0
6.73	272.55	28	188	188

Culvert / Orifice Structures

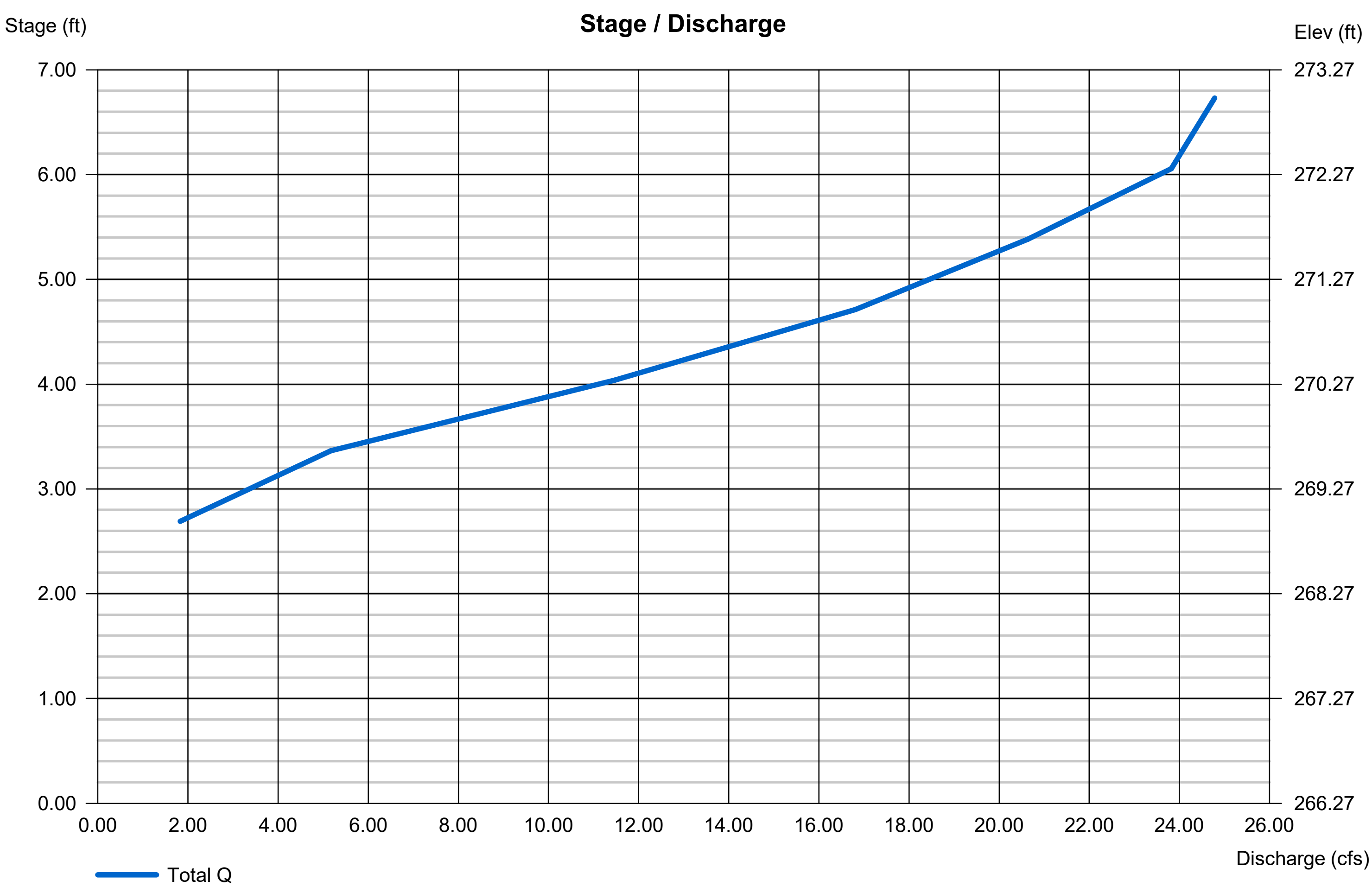
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	15.00	0.00	0.00
Span (in)	= 18.00	15.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 269.27	268.30	0.00	0.00
Length (ft)	= 35.00	19.00	0.00	0.00
Slope (%)	= 9.30	1.60	0.00	n/a
N-Value	= .012	.012	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

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



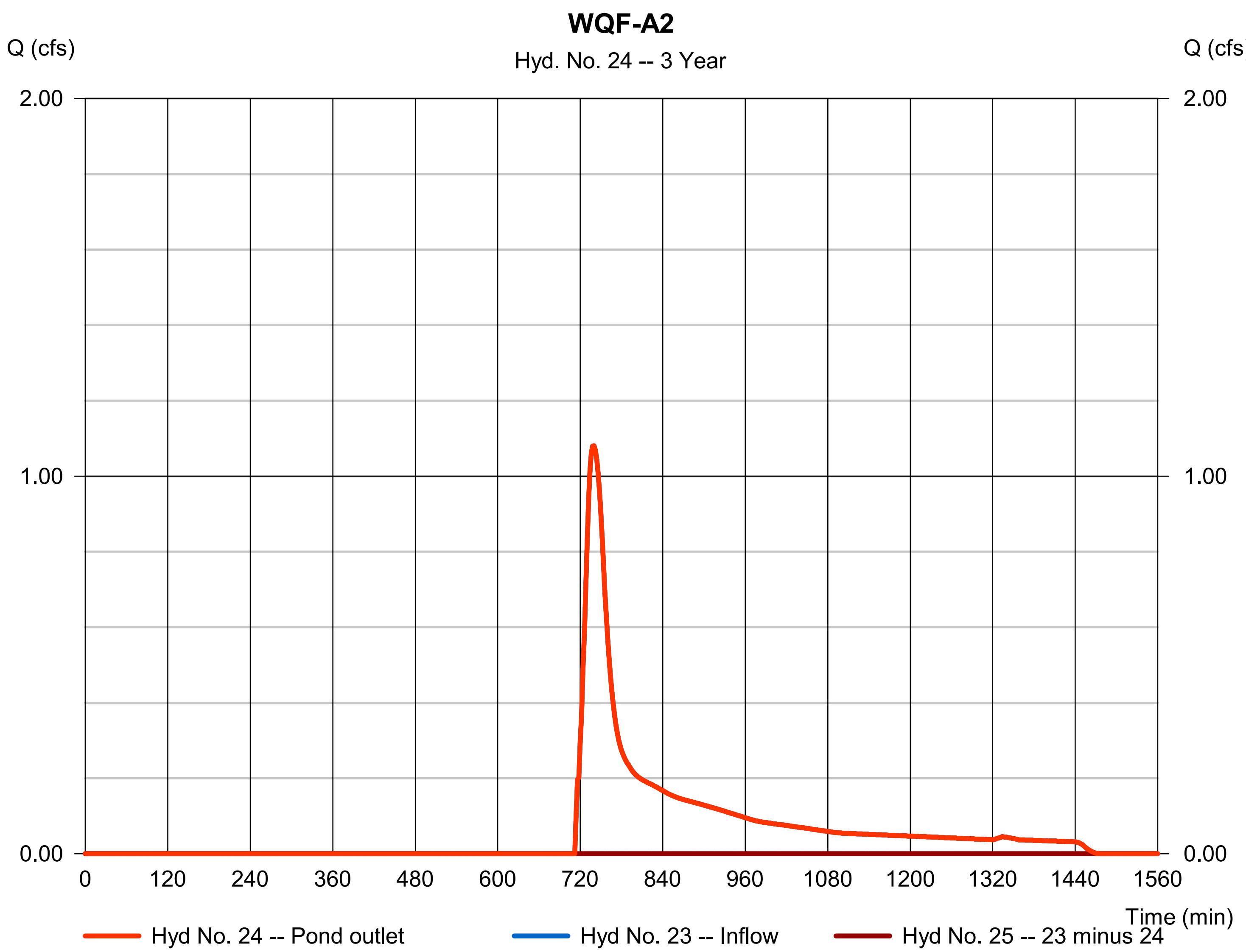
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 24

WQF-A2

Hydrograph type	= Diversion1	Peak discharge	= 1.081 cfs
Storm frequency	= 3 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 5,690 cuft
Inflow hydrograph	= 23 - DS-2	2nd diverted hyd.	= 25
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B



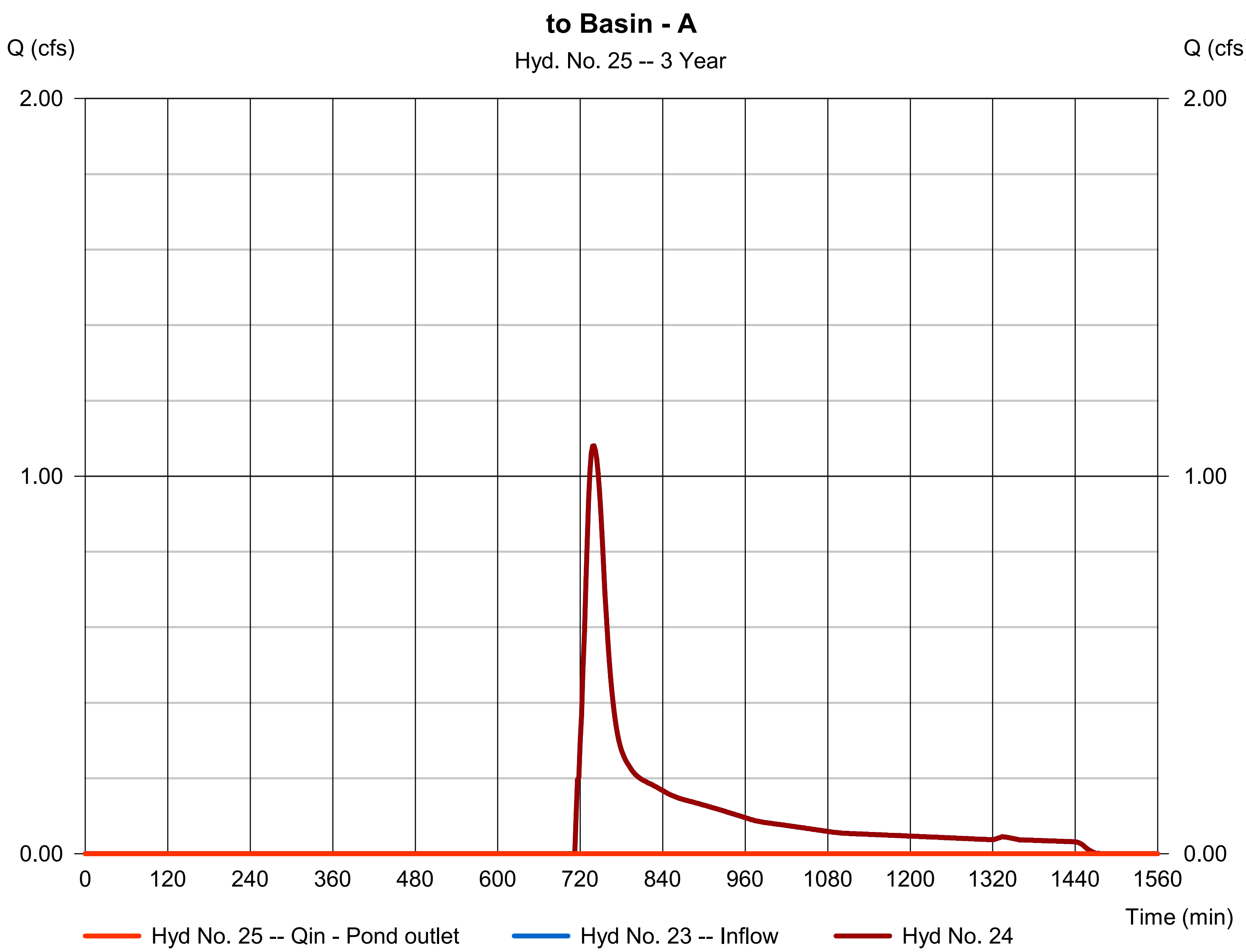
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 25

to Basin - A

Hydrograph type	= Diversion2	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 1228 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hydrograph	= 23 - DS-2	2nd diverted hyd.	= 24
Diversion method	= Pond - DS-2	Pond structure	= Culv/Orf B

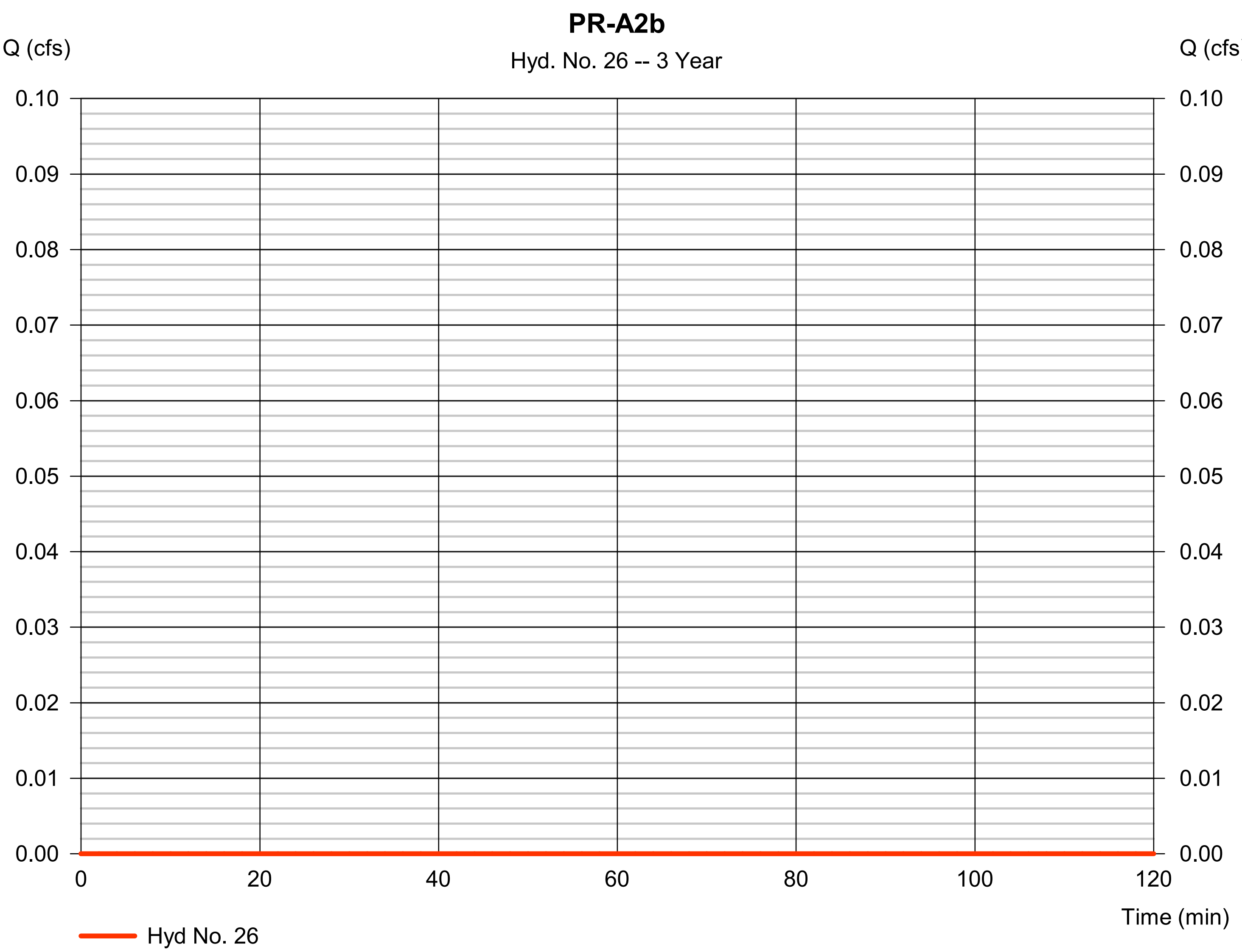


Hydrograph Report

Hyd. No. 26

PR-A2b

Hydrograph type	= SCS Runoff	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Drainage area	= 0.330 ac	Curve number	= 39
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.10 min
Total precip.	= 1.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



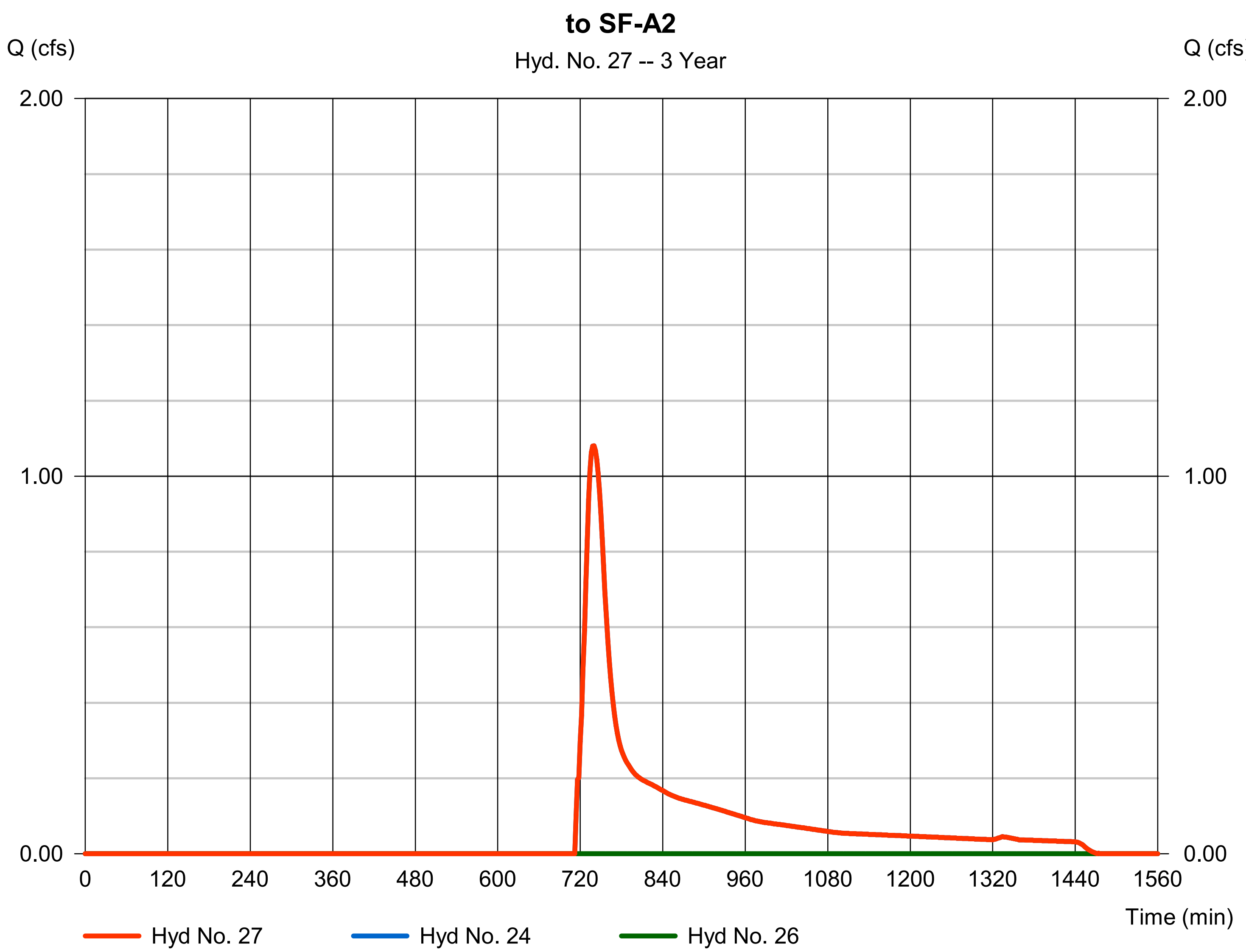
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Wednesday, 03 / 3 / 2021

Hyd. No. 27

to SF-A2

Hydrograph type	= Combine	Peak discharge	= 1.081 cfs
Storm frequency	= 3 yrs	Time to peak	= 740 min
Time interval	= 2 min	Hyd. volume	= 5,690 cuft
Inflow hyds.	= 24, 26	Contrib. drain. area	= 0.330 ac



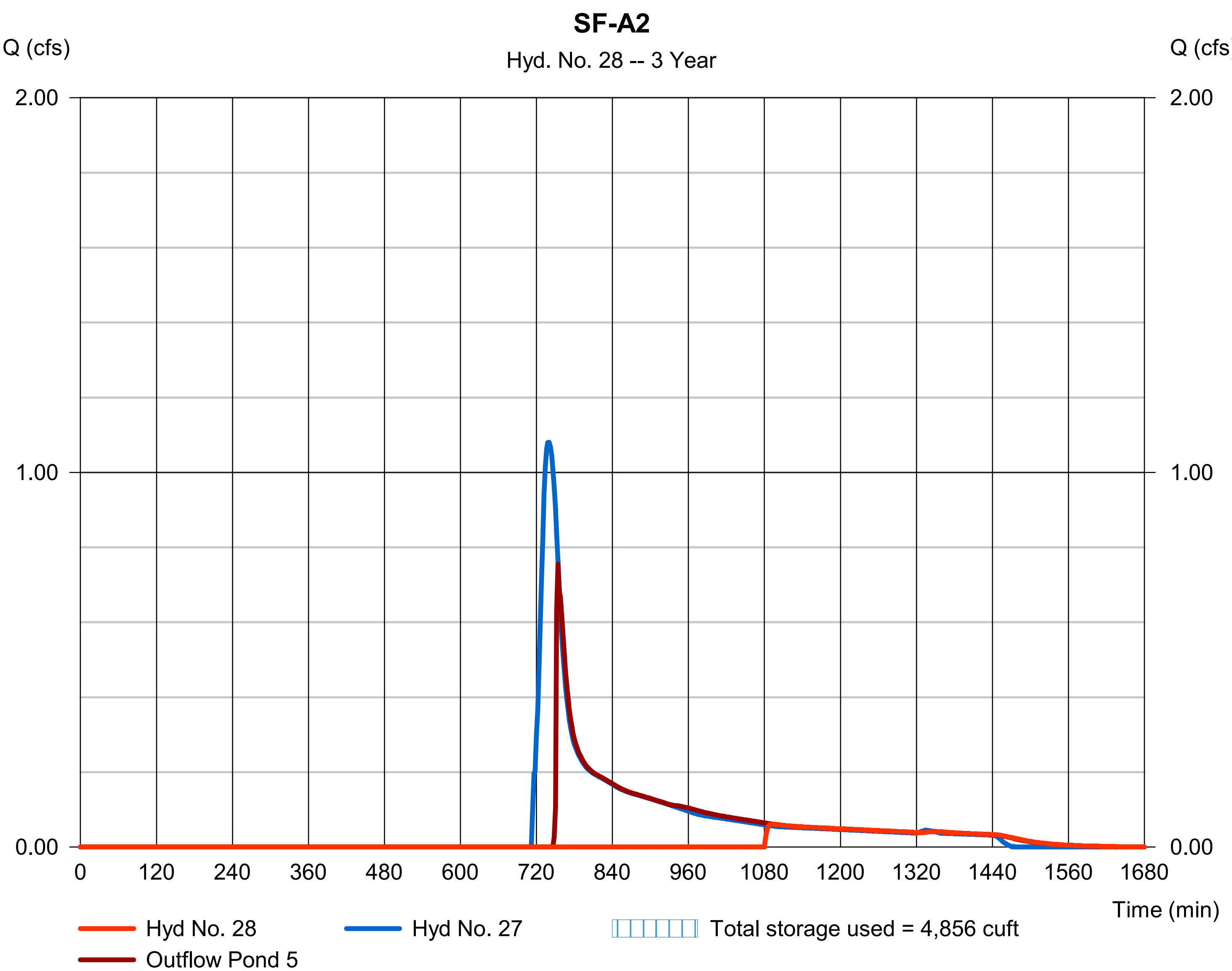
Hydrograph Report

Hyd. No. 28

SF-A2

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.061 cfs
Storm frequency	= 3 yrs	Time to peak	= 1094 min
Time interval	= 2 min	Hyd. volume	= 1,104 cuft
Pond name **Upper Pond**	= Sediment Forebay - A2	Pond name **Lower Pond**	= Sand Filter - A2
Inflow hyd.	= 27 - to SF-A2	Other Inflow hyd.	= None
Max. Elevation	= 271.57 ft	Max. Elevation	= 271.25 ft
Max. Storage	= 1,684 cuft	Max. Storage	= 3,173 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 5 - Sediment Forebay - A2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 268.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	268.00	77	0	0
1.00	269.00	237	150	150
2.00	270.00	473	348	498
3.00	271.00	798	628	1,126
4.00	272.00	1,175	980	2,107

Culvert / Orifice Structures

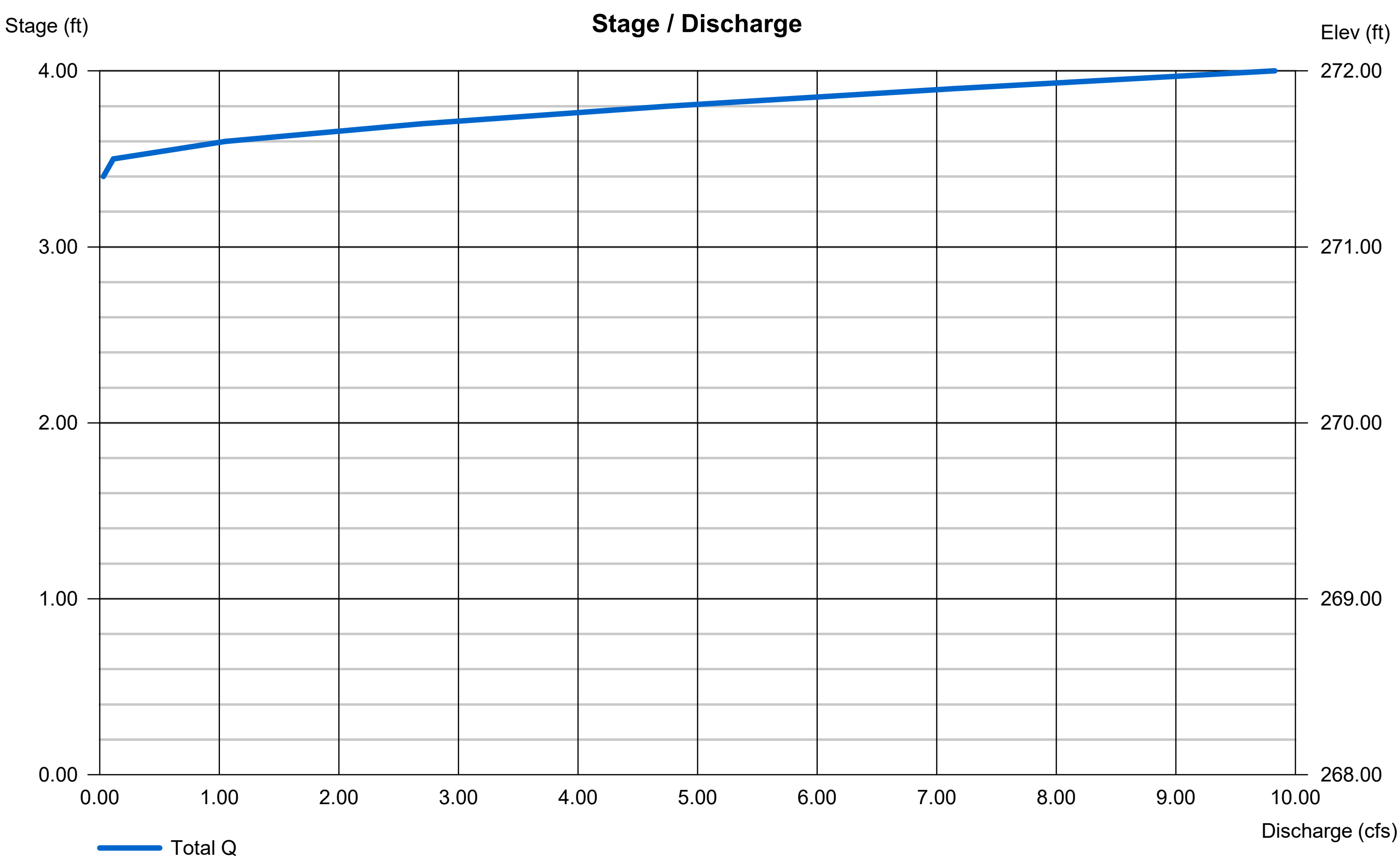
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	0.00	0.00	0.00
Span (in)	= 6.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 271.30	0.00	0.00	0.00
Length (ft)	= 13.50	0.00	0.00	0.00
Slope (%)	= 5.93	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 271.50	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).



Pond Report

Pond No. 6 - Sand Filter - A2

Pond Data

Pond storage is based on user-defined values.

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	267.50	n/a	0	0
2.00	269.50	n/a	1,239	1,239
2.50	270.00	n/a	375	1,614
3.75	271.25	n/a	1,548	3,162
4.50	272.00	n/a	1,846	5,008

Culvert / Orifice Structures

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

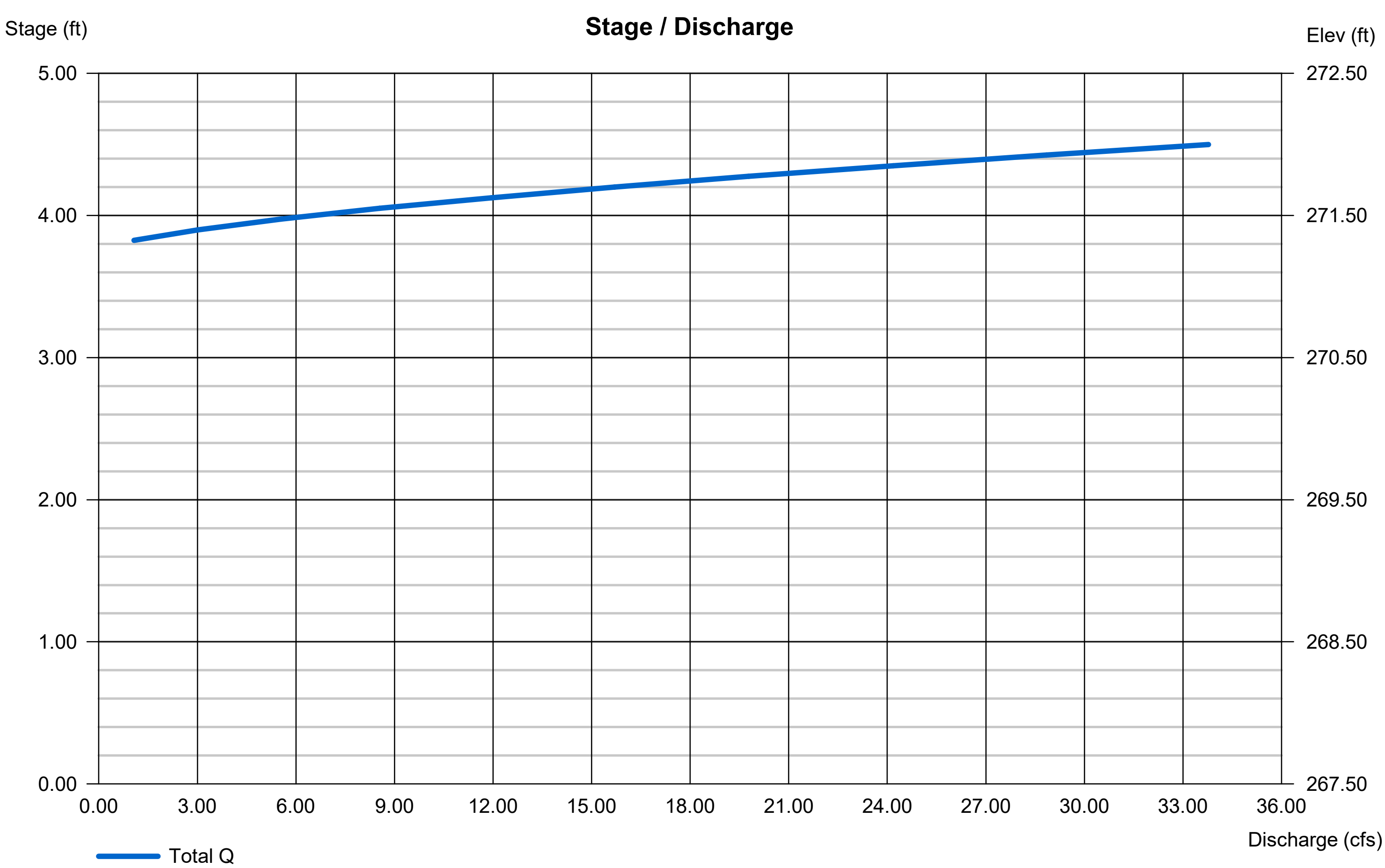
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 271.25	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) = 8.270 (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).



Appendix G

Pipe Sizing Calculations

250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
p. (401) 921-3344 f. (401) 921-3303 www.MillstoneEng.com

From	To	Ai (sf)	Ai (ac)	Ap (sf)	Ap (ac)	Atotal (ac)	C_i	C_p	$C_{weighted}$	Tc (min)	Q_{actual} (cfs)	Length (ft)	Pipe Dia. (in)	Wall Thickness (in)	n	U/S Invert Elev (ft)	D/S Invert Elev (ft)	Pipe Slope	$V_{capacity}$ (fps)	$Q_{capacity}$ (cfs)	Pipe Size Check	"To" Rim Elev (ft)	Cover Check
																						280.70	2.00
CB-1	MH-1	11,480.00	0.26	28,320.00	0.65	0.91	0.90	0.18	0.39	15.00	1.91	57.00	12	1.25	0.012	277.49	277.21	0.005	3.48	2.74	OK	281.08	2.67
MH-1	CB-2	11,480.00	0.26	28,320.00	0.65	0.91	0.90	0.18	0.39	15.27	1.91	145.00	12	1.25	0.012	277.21	276.48	0.005	3.48	2.74	OK	280.80	3.11
CB-2	CB-3	39,791.00	0.91	32,249.00	0.74	1.65	0.90	0.18	0.58	15.97	5.16	267.00	18	2.00	0.012	276.48	275.15	0.005	4.57	8.07	OK	280.80	3.82
CB-3	CB-5	64,066.00	1.47	35,820.00	0.82	2.29	0.90	0.18	0.64	16.94	7.95	275.00	18	2.00	0.012	275.15	272.95	0.008	5.78	10.21	OK	277.50	2.72
																						277.50	2.00
CB-4	CB-5	17,080.00	0.39	786.00	0.02	0.41	0.90	0.18	0.87	5.00	2.78	174.00	15	1.50	0.012	274.00	273.13	0.005	4.04	4.96	OK	277.50	2.87
CB-5	DS-1	101,910.00	2.34	40,579.00	0.93	3.27	0.90	0.18	0.69	5.72	17.73	45.00	18	2.00	0.012	272.95	269.17	0.084	18.71	33.07	OK	273.00	2.00
DS-1	SF-A1										5.81	30.00	12	1.25	0.012	268.70	268.00	0.023				273.00	3.09
DS-1	Basin A										9.26	74.00	18	2.00	0.012	269.67	266.00	0.050				273.00	1.50
																						280.80	2.00
CB-6	MH-2	32,700.00	0.75	31,445.00	0.72	1.47	0.90	0.18	0.55	17.00	4.35	162.00	15	1.50	0.012	277.30	276.33	0.006	4.43	5.44	OK	280.86	3.03
MH-2	CB-7	32,700.00	0.75	31,445.00	0.72	1.47	0.90	0.18	0.55	17.61	4.35	44.00	15	1.50	0.012	276.33	276.06	0.006	4.43	5.44	OK	280.56	3.00
CB-7	CB-8	55,705.00	1.28	41,076.00	0.94	2.22	0.90	0.18	0.59	17.78	7.13	91.00	18	2.00	0.012	276.06	275.43	0.007	5.40	9.55	OK	281.42	4.16
CB-8	CB-9	69,417.00	1.59	69,291.00	1.59	3.18	0.90	0.18	0.54	18.06	9.29	130.00	24	2.00	0.012	275.43	274.78	0.005	5.53	17.38	OK	280.77	3.66
CB-9	CB-10	77,845.00	1.79	111,820.00	2.57	4.35	0.90	0.18	0.48	18.45	11.18	213.00	24	2.00	0.012	274.78	273.71	0.005	5.53	17.38	OK	279.00	2.95
CB-10	CB-11	85,907.00	1.97	141,461.00	3.25	5.22	0.90	0.18	0.45	19.09	12.74	116.00	24	2.00	0.012	273.71	273.13	0.005	5.53	17.38	OK	278.86	3.39
CB-11	CB-12	115,891.00	2.66	147,497.00	3.39	6.05	0.90	0.18	0.50	19.44	16.22	101.00	24	2.00	0.012	273.13	272.53	0.006	6.06	19.03	OK	277.42	2.56
CB-12	CB-13	124,920.00	2.87	152,762.00	3.51	6.37	0.90	0.18	0.50	19.72	17.35	68.00	24	2.00	0.012	272.53	271.71	0.012	8.57	26.92	OK	276.13	2.09
CB-13	CB-14	127,332.00	2.92	152,762.00	3.51	6.43	0.90	0.18	0.51	19.85	17.62	50.00	24	2.00	0.012	271.71	270.86	0.017	10.20	32.04	OK	275.29	2.10
CB-14	CB-15	128,138.00	2.94	152,762.00	3.51	6.45	0.90	0.18	0.51	19.93	17.71	24.00	24	2.00	0.012	270.86	270.64	0.009	7.42	23.31	OK	275.29	2.31
CB-15	DS-2	130,249.00	2.99	152,762.00	3.51	6.50	0.90	0.18	0.51	19.98	17.94	125.00	24	2.00	0.012	270.64	268.63	0.016	9.93	31.18	OK	273.00	2.04
																						271.77	2.00
CB-16	CB-17	1,874.00	0.04	0.00	0.00	0.04	0.90	0.18	0.90	5.00	0.30	24.00	12	1.25	0.012	268.56	268.44	0.005	3.48	2.74	OK	271.77	2.12
CB-17	DS-2	3,956.00	0.09	0.00	0.00	0.09	0.90	0.18	0.90	5.11	0.64	18.00	12	1.25	0.012	268.44	268.35	0.005	3.48	2.74	OK	273.00	3.44

From	To	Ai (sf)	Ai (ac)	Ap (sf)	Ap (ac)	Atotal (ac)	C_i	C_p	$C_{weighted}$	Tc (min)	Q_{actual} (cfs)	Length (ft)	Pipe Dia. (in)	Wall Thickness (in)	n	U/S Invert Elev (ft)	D/S Invert Elev (ft)	Pipe Slope	$V_{capacity}$ (fps)	$Q_{capacity}$ (cfs)	Pipe Size Check	"To" Rim Elev (ft)	Cover Check
DS-2	SF-A2										**9.25**	19.00	15	1.50	0.012	268.30	268.00	0.016				**273.00**	**3.20**
DS-2	Basin A										**9.90**	35.00	18	2.00	0.012	269.27	266.00	0.093				**273.00**	**1.90**
OS	EX CB										**3.30**	65.00	12	1.25	0.012	266.00	265.35	0.010				**270.00**	**2.79**

Appendix H

Groundwater Mounding Analysis Calculations

250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
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Input Parameters for Hantush Analytical Model for Groundwater Mounding (USGS Spreadsheet)

Willow Lakes
Coventry, RI

February 2021

(green)	Input Parameter
(blue)	Calculated Result

Variable	Description	Unit	Sand Filter-A1	Sand Filter-A2	Basin A	UG-R1A	UG-R1B	UG-R2A	UG-R2B	UG-R2C	UG-R2D	Resource
	BMP Length (Rounded)	ft	54	46	177	29	36	43	29	50	50	AutoCAD Drawing
	BMP Width (Rounded)	ft	40	43	67	16	16	21	16	19	16	AutoCAD Drawing
x	One-Half of BMP Length	ft	27.0	23.0	88.5	14.5	18.0	21.5	14.5	25.0	25.0	
y	One-Half of BMP Width	ft	20.0	21.5	33.5	8.0	8.0	10.5	8.0	9.5	8.0	
A	Area of Infiltration (Bottom of BMP, Rounded)	ft^2	1,989	1,877	12,755	464	576	903	464	950	800	AutoCAD Drawing
	Test Hole Used		2014	2013	5, 2005	2007	2008	2009	2010	2011	2012	AutoCAD Drawing
	Top of Facility Elevation (Spillway for Basins)		271.25	271.25	271.50	279.62	279.43	279.56	279.80	279.07	278.32	Hydraflow
	Bottom of Facility Elevation		267.50	267.50	266.00	276.12	275.93	276.06	276.30	277.92	274.82	Hydraflow
	Seasonal High Groundwater Elevation (SHGWT)		258.90	260.00	260.20	271.20	264.10	270.80	270.90	271.80	270.70	AutoCAD Drawing
h_i	Initial Thickness of Saturated Zone	ft	12.35	11.25	11.30	8.42	15.33	8.76	8.90	7.27	7.62	
	Design Storm Analyzed		WQ Storm	WQ Storm	100-year	WQ Storm	WQ Storm	WQ Storm	WQ Storm	WQ Storm	WQ Storm	
	Volume of Runoff without Exfiltration	ft^3	3,555	6,069	169,704	838	1,140	1,744	771	939	1,509	Hydraflow
	Volume of Runoff with Exfiltration	ft^3	1,587	963	122,088	0	0	0	0	0	0	Hydraflow
V	Infiltration Volume	ft^3	1,968	5,106	47,616	838	1,140	1,744	771	939	1,509	
I	Infiltration Rate Used (Restrictive Layer)	in/hr	2.41	2.41	2.41	8.27	8.27	8.27	8.27	2.41	2.41	RISDISM
R	Recharge Rate (Same as Infiltration Rate from RISDISM)	in/hr	2.41	2.41	2.41	8.27	8.27	8.27	8.27	2.41	2.41	
		ft/day	4.82	4.82	4.82	16.54	16.54	16.54	16.54	4.82	4.82	
t	Duration of Infiltration Period											
	t=[V (ft^3) x 12 (in/ft)] / A (ft^2) x R (ft/day)]	hr	4.93	13.55	18.59	2.62	2.87	2.80	2.41	4.92	9.39	
		day	0.21	0.56	0.77	0.11	0.12	0.12	0.10	0.21	0.39	
	Material below BMP		Medum Sand	Coarse Sand	Coarse Sand	Coarse Sand	Coarse Sand	Coarse Sand	Coarse Sand	Fine Sand	Coarse Sand	Soil Evaluation
S_y	Specific Yield	%	0.26	0.27	0.27	0.27	0.27	0.27	0.27	0.21	0.27	Per Reference 1
K	Hydraulic Conductivity	ft / day	12	45	45	45	45	45	45	2.5	45	Per Reference 2
	Maximum Groundwater Mounding at Center	ft	3.427	3.250	8.976	2.776	2.337	3.841	2.603	4.519	1.852	USGS Hantush Spreadsheet
			OK	**OK**	**OK**	**OK**	**OK**	**OK**	**OK**	**OK**	**OK**	

References

1. Geological Survey Water Supply Paper 1662-D. Specific Yield--Compilation of Specific Yields for Various Materials. U.S. Department of the Interior.
2. Todd, D.K (1980). Groundwater Hydrology, Second Edition. John Wiles & Sons.
3. Rhode Island Stormwater Design and Installation Standards Manual, Amended March 2015.

Basin A

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values

4.8200	***R***	**Recharge (infiltration) rate (feet/day)**
0.270	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
45.00	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
88.500	**x**	**1/2 length of basin (x direction, in feet)**
33.500	**y**	**1/2 width of basin (y direction, in feet)**
0.970	**t**	**duration of infiltration period (days)**
11.300	**hi(0)**	**initial thickness of saturated zone (feet)**
19.282	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
7.982	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

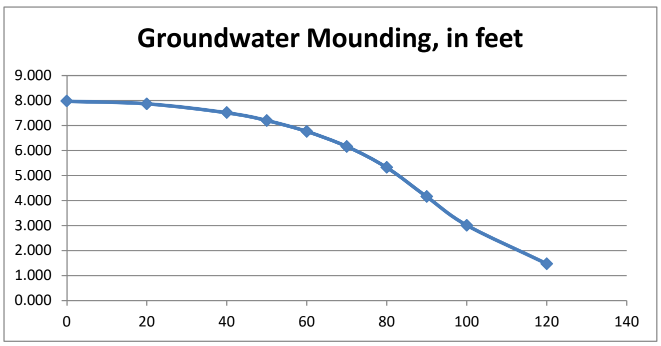
Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
7.982	**0**
7.876	**20**
7.518	**40**
7.207	**50**
6.771	**60**
6.166	**70**
5.325	**80**
4.157	**90**
3.013	**100**
1.470	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Sand Filter A1

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
Cells highlighted in yellow are values that can be changed by the user. Cells highlighted in red are output values based on user-specified inputs. The user MUST click the blue "Re-Calculate Now" button each time ANY of the user-specified inputs are changed otherwise necessary iterations to converge on the correct solution will not be done and values shown will be incorrect. Use consistent units for all input values (for example, feet and days)

use consistent units (e.g. feet & days **or** inches & hours)

Input Values

4.8200	***R***	**Recharge (infiltration) rate (feet/day)**
0.260	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
12.00	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
27.000	**x**	**1/2 length of basin (x direction, in feet)**
20.000	**y**	**1/2 width of basin (y direction, in feet)**
0.210	**t**	**duration of infiltration period (days)**
12.350	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

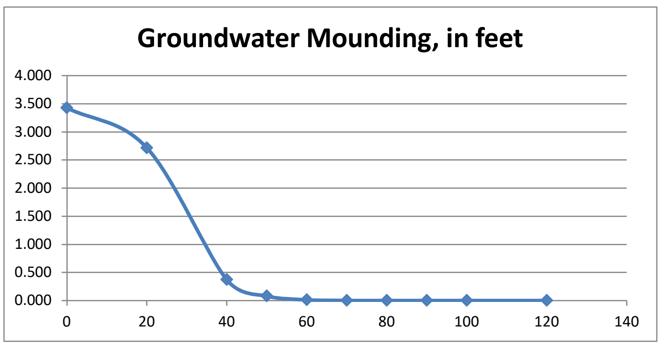
inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

15.777	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
3.427	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
3.427	**0**
2.718	**20**
0.371	**40**
0.081	**50**
0.014	**60**
0.003	**70**
0.001	**80**
0.001	**90**
0.001	**100**
0.001	**120**

Re-Calculate Now



Disclaimer

This spreadsheet solving the Hantush (1967) equation for ground-water mounding beneath an infiltration basin is made available to the general public as a convenience for those wishing to replicate values documented in the USGS Scientific Investigations Report 2010-5102 "Groundwater mounding beneath hypothetical stormwater infiltration basins" or to calculate values based on user-specified site conditions. Any changes made to the spreadsheet (other than values identified as user-specified) after transmission from the USGS could have unintended, undesirable consequences. These consequences could include, but may not be limited to: erroneous output, numerical instabilities, and violations of underlying assumptions that are inherent in results presented in the accompanying USGS published report. The USGS assumes no responsibility for the consequences of any changes made to the spreadsheet. If changes are made to the spreadsheet, the user is responsible for documenting the changes and justifying the results and conclusions.

Sand Filter A2

This spreadsheet will calculate the height of a groundwater mound beneath a stormwater infiltration basin. More information can be found in the U.S. Geological Survey Scientific Investigations Report 2010-5102 "Simulation of groundwater mounding beneath hypothetical stormwater infiltration basins".

The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.

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use consistent units (e.g. feet & days **or** inches & hours)

Input Values

4.8200	*R*	**Recharge (infiltration) rate (feet/day)**
0.270	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
45.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
23.000	x	**1/2 length of basin (x direction, in feet)**
21.500	y	**1/2 width of basin (y direction, in feet)**
0.550	t	**duration of infiltration period (days)**
11.250	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table

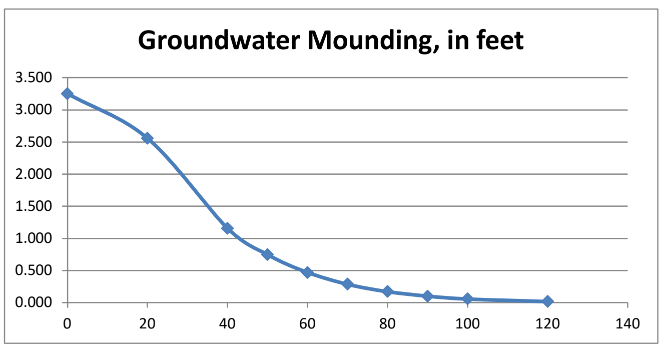
inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

14.500	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
3.250	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
3.250	**0**
2.558	**20**
1.158	**40**
0.746	**50**
0.469	**60**
0.287	**70**
0.171	**80**
0.099	**90**
0.057	**100**
0.018	**120**

Re-Calculate Now



Disclaimer

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Rooftop Infiltration UG-R1A

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Input Values		use consistent units (e.g. feet & days **or** inches & hours)
16.5400	*R*	**Recharge (infiltration) rate (feet/day)**
0.270	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
45.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
14.500	x	**1/2 length of basin (x direction, in feet)**
8.000	y	**1/2 width of basin (y direction, in feet)**
0.110	t	**duration of infiltration period (days)**
8.420	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table

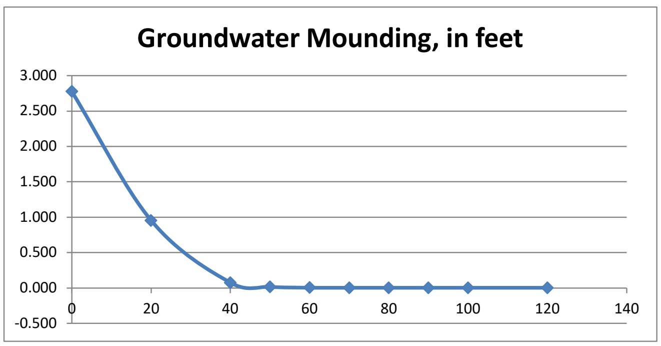
inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

11.196	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
2.776	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
2.776	**0**
0.952	**20**
0.073	**40**
0.017	**50**
0.005	**60**
0.003	**70**
0.002	**80**
0.002	**90**
0.002	**100**
0.002	**120**

Re-Calculate Now



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Rooftop Infiltration UG-R1B

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The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

Input Values		
16.5400	*R*	**Recharge (infiltration) rate (feet/day)**
0.270	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
45.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
18.000	x	**1/2 length of basin (x direction, in feet)**
8.000	y	**1/2 width of basin (y direction, in feet)**
0.120	t	**duration of infiltration period (days)**
15.330	hi(0)	**initial thickness of saturated zone (feet)**

Conversion Table

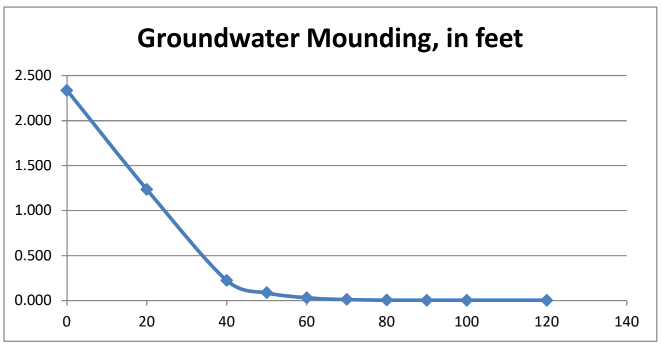
inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

17.667	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
2.337	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
2.337	0
1.236	20
0.223	40
0.086	50
0.031	60
0.011	70
0.005	80
0.003	90
0.003	100
0.002	120

Re-Calculate Now



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Rooftop Infiltration UG-R2A

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The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin.
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use consistent units (e.g. feet & days **or** inches & hours)

Input Values

16.5400	*R*	**Recharge (infiltration) rate (feet/day)**
0.270	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**
45.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***
21.500	x	**1/2 length of basin (x direction, in feet)**
10.500	y	**1/2 width of basin (y direction, in feet)**
0.120	t	**duration of infiltration period (days)**
8.760	hi(0)	**initial thickness of saturated zone (feet)**
12.601	h(max)	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
3.841	Δh(max)	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

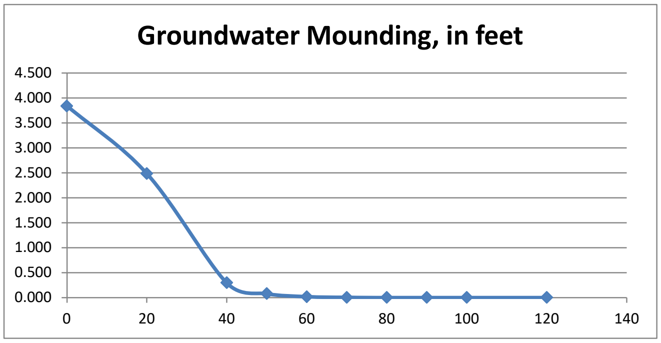
Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
3.841	0
2.488	20
0.297	40
0.080	50
0.019	60
0.005	70
0.003	80
0.002	90
0.002	100
0.002	120

Re-Calculate Now



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Rooftop Infiltration UG-R2B

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The user must specify infiltration rate (R), specific yield (Sy), horizontal hydraulic conductivity (Kh), basin dimensions (x, y), duration of infiltration period (t), and the initial thickness of the saturated zone (hi(0), height of the water table if the bottom of the aquifer is the datum). For a square basin the half width equals the half length (x = y). For a rectangular basin, if the user wants the water-table changes perpendicular to the long side, specify x as the short dimension and y as the long dimension. Conversely, if the user wants the values perpendicular to the short side, specify y as the short dimension, x as the long dimension. All distances are from the center of the basin. Users can change the distances from the center of the basin at which water-table aquifer thickness are calculated.
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use consistent units (e.g. feet & days **or** inches & hours)

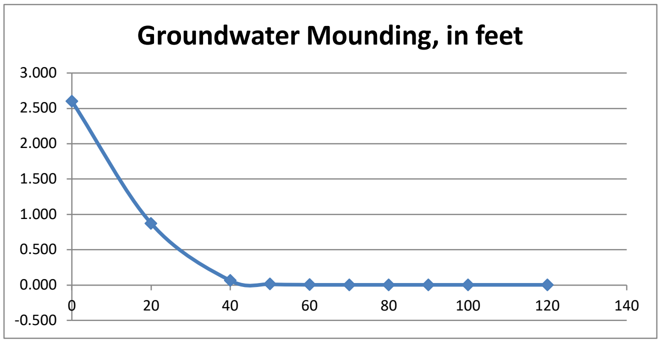
Input Values			Conversion Table	
			inch/hour	**feet/day**
16.5400	*R*	**Recharge (infiltration) rate (feet/day)**	0.67	1.33
0.270	Sy	**Specific yield, Sy (dimensionless, between 0 and 1)**		
45.00	K	**Horizontal hydraulic conductivity, Kh (feet/day)***	2.00	4.00
14.500	x	**1/2 length of basin (x direction, in feet)**		
8.000	y	**1/2 width of basin (y direction, in feet)**	**hours**	**days**
0.100	t	**duration of infiltration period (days)**	36	1.50
8.900	hi(0)	**initial thickness of saturated zone (feet)**		

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

11.503	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
2.603	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
2.603	0
0.871	20
0.063	40
0.014	50
0.004	60
0.002	70
0.002	80
0.002	90
0.002	100
0.002	120

Re-Calculate Now



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Rooftop Infiltration UG-R2C

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use consistent units (e.g. feet & days **or** inches & hours)

Input Values

4.8200	***R***	**Recharge (infiltration) rate (feet/day)**
0.210	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**
2.50	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***
25.000	**x**	**1/2 length of basin (x direction, in feet)**
9.500	**y**	**1/2 width of basin (y direction, in feet)**
0.210	**t**	**duration of infiltration period (days)**
7.270	**hi(0)**	**initial thickness of saturated zone (feet)**

Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00

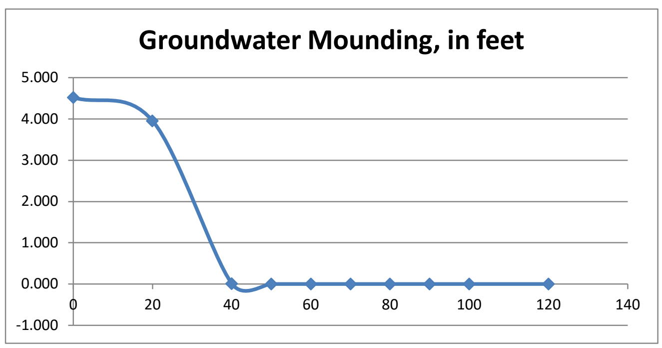
hours	**days**
36	1.50

In the report accompanying this spreadsheet (USGS SIR 2010-5102), vertical soil permeability (ft/d) is assumed to be one-tenth horizontal hydraulic conductivity (ft/d).

11.789	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
4.519	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
4.519	**0**
3.953	**20**
0.007	**40**
0.002	**50**
0.002	**60**
0.002	**70**
0.002	**80**
0.002	**90**
0.002	**100**
0.002	**120**

Re-Calculate Now



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Rooftop Infiltration UG-R2D

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use consistent units (e.g. feet & days **or** inches & hours)

Input Values				
4.8200	***R***	**Recharge (infiltration) rate (feet/day)**		
0.270	**Sy**	**Specific yield, Sy (dimensionless, between 0 and 1)**		
45.00	**K**	**Horizontal hydraulic conductivity, Kh (feet/day)***		
25.000	**x**	**1/2 length of basin (x direction, in feet)**		
8.000	**y**	**1/2 width of basin (y direction, in feet)**		
0.390	**t**	**duration of infiltration period (days)**		
7.620	**hi(0)**	**initial thickness of saturated zone (feet)**		

Conversion Table

inch/hour	**feet/day**
0.67	1.33
2.00	4.00
hours	**days**
36	1.50

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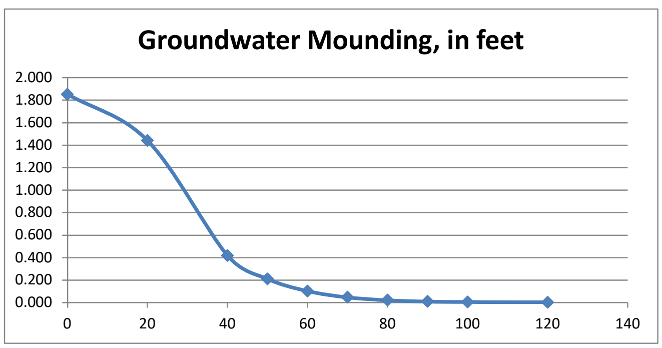
9.472	**h(max)**	**maximum thickness of saturated zone (beneath center of basin at end of infiltration period)**
1.852	**Δh(max)**	**maximum groundwater mounding (beneath center of basin at end of infiltration period)**

Ground-water Mounding, in feet	**Distance from center of basin in x direction, in feet**
1.852	**0**
1.442	**20**
0.418	**40**
0.210	**50**
0.102	**60**
0.047	**70**
0.021	**80**
0.010	**90**
0.005	**100**
0.003	**120**

Re-Calculate Now



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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	0.000	2	n/a	0	28	276.33	4.62	UG-R2b
36	Reservoir	0.000	2	n/a	0	30	277.99	179	UG-R2c
37	Reservoir	0.000	2	184	0	32	276.07	422	UG-R2d
38	Combine	6.176	2	724	19,073	27, 29, 34, 35,	------	------	to DS-2
39	Combine	6.011	2	724	18,564	31, 33, 36, 37,	------	------	to DS-2
40	Combine	19.16	2	724	99,187	5, 38, 39	------	------	to DS-2
41	Reservoir	19.11	2	724	99,131	40	271.38	143	DS-2
42	Diversion1	9.245	2	724	78,852	41	------	------	SF-A2
43	Diversion2	9.861	2	724	20,278	41	------	------	to Basin - A
44	Combine	9.502	2	726	80,660	6, 42,	------	------	to SF-A2
45	Reservoir(i)	9.419	2	726	76,091	44	271.99	6,043	SF-A2
46	Combine	34.98	2	726	169,723	11, 23, 25, 43, 45	------	------	to Basin - A
47	Reservoir	8.225	2	772	169,704	46	270.42	75,268	Basin - A No Exfiltration
48	Combine	11.79	2	732	203,512	12, 47	------	------	POS-A

Hydrograph Report

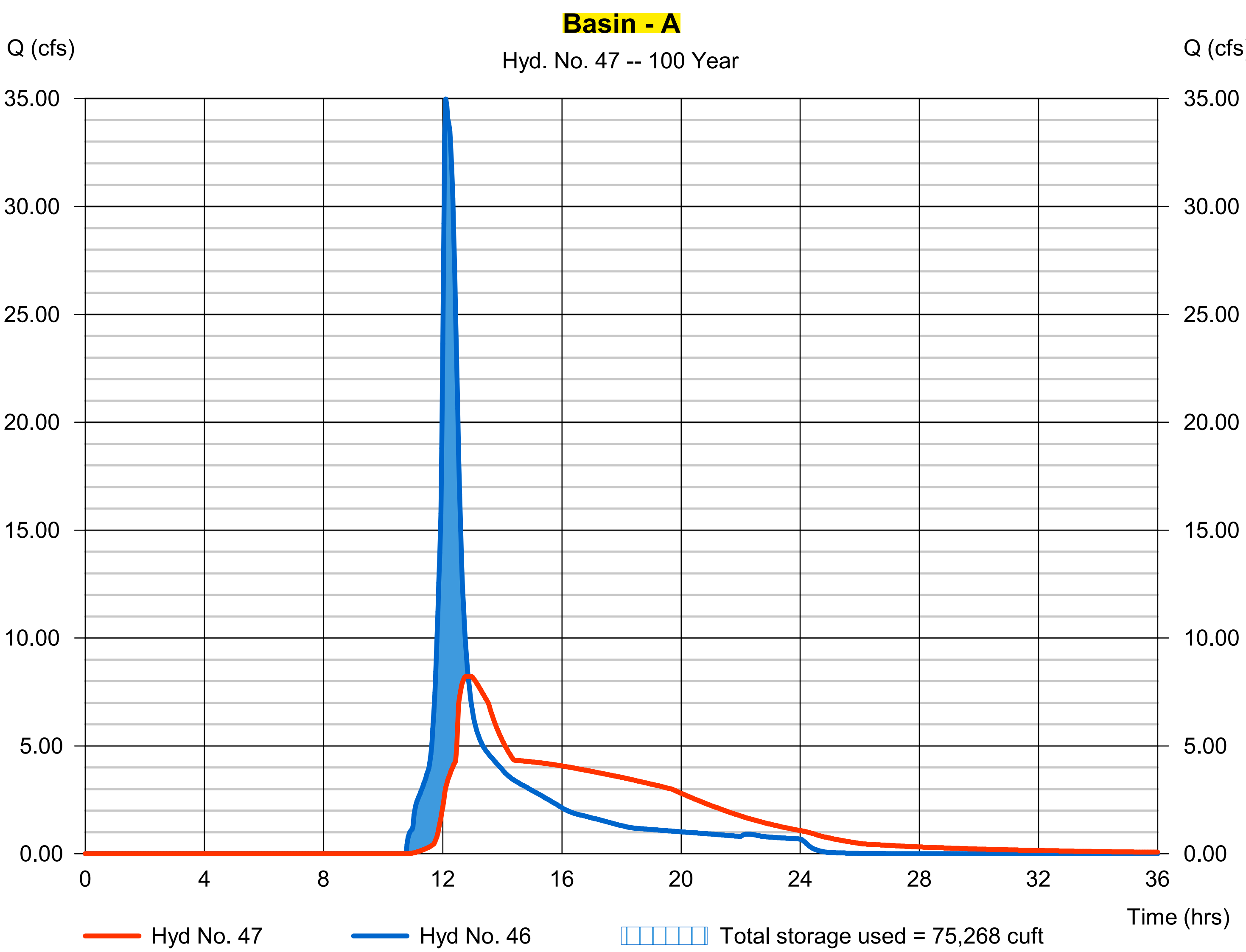
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 47

Basin - A

Hydrograph type	= Reservoir	Peak discharge	= 8.225 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.87 hrs
Time interval	= 2 min	Hyd. volume	= 169,704 cuft
Inflow hyd. No.	= 46 - to Basin - A	Max. Elevation	= 270.42 ft
Reservoir name	= Basin - A	Max. Storage	= 75,268 cuft

Storage Indication method used. Outflow includes exfiltration.



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	0.000	2	n/a	0	28	276.33	4.62	UG-R2b
36	Reservoir	0.000	2	n/a	0	30	277.99	179	UG-R2c
37	Reservoir	0.000	2	184	0	32	276.07	422	UG-R2d
38	Combine	6.176	2	724	19,073	27, 29, 34, 35,	------	------	to DS-2
39	Combine	6.011	2	724	18,564	31, 33, 36, 37,	------	------	to DS-2
40	Combine	19.16	2	724	99,187	5, 38, 39	------	------	to DS-2
41	Reservoir	19.11	2	724	99,131	40	271.38	143	DS-2
42	Diversion1	9.245	2	724	78,852	41	------	------	SF-A2
43	Diversion2	9.861	2	724	20,278	41	------	------	to Basin - A
44	Combine	9.502	2	726	80,660	6, 42,	------	------	to SF-A2
45	Reservoir(i)	9.419	2	726	76,091	44	271.99	6,043	SF-A2
46	Combine	34.98	2	726	169,723	11, 23, 25, 43, 45	------	------	to Basin - A
47	Reservoir	7.037	2	772	122,088	46	270.42	75,268	Basin - A With Exfiltration
48	Combine	10.79	2	732	155,896	12, 47	------	------	POS-A

Hydrograph Report

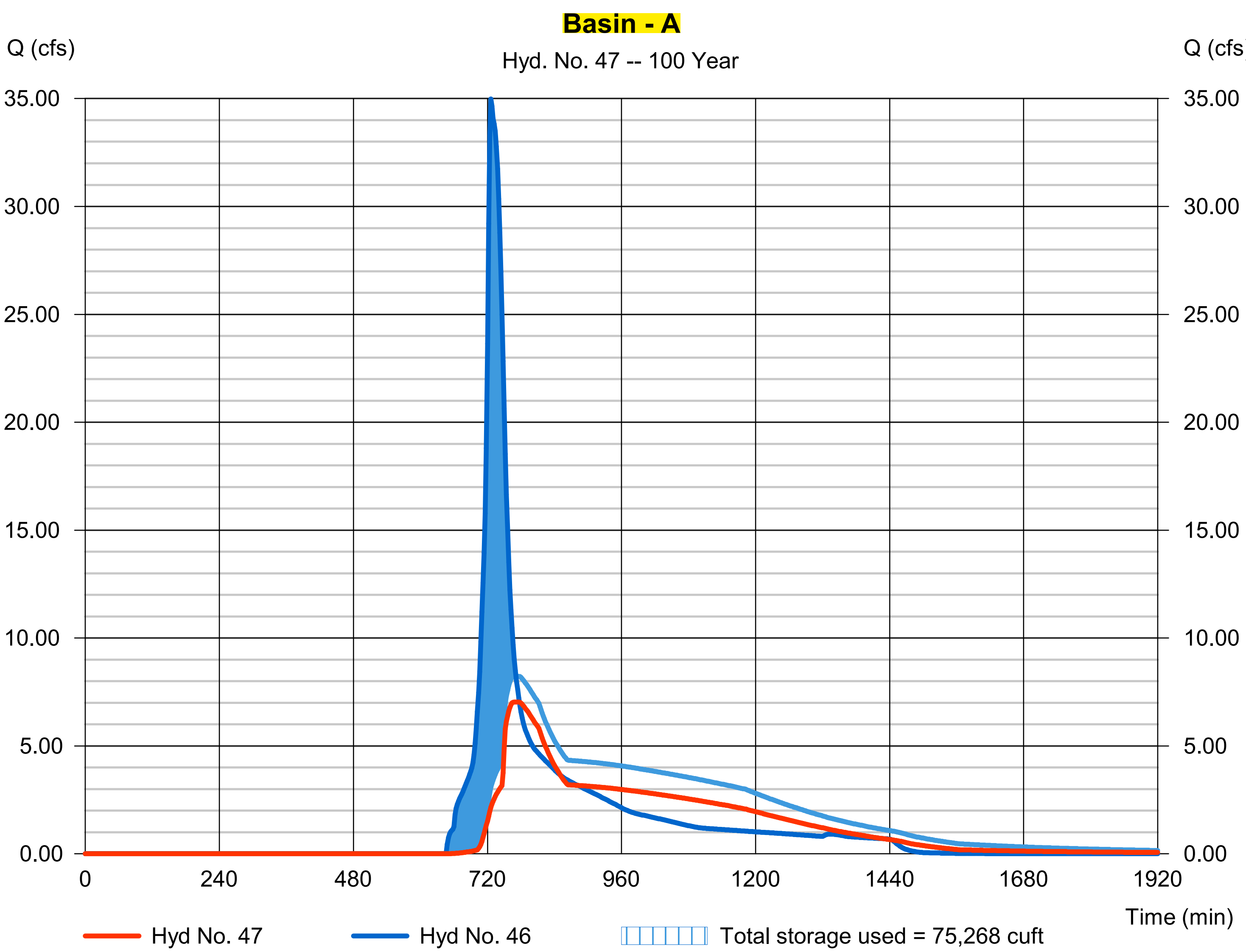
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 47

Basin - A

Hydrograph type	= Reservoir	Peak discharge	= 7.037 cfs
Storm frequency	= 100 yrs	Time to peak	= 772 min
Time interval	= 2 min	Hyd. volume	= 122,088 cuft
Inflow hyd. No.	= 46 - to Basin - A	Max. Elevation	= 270.42 ft
Reservoir name	= Basin - A	Max. Storage	= 75,268 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



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	1.475	2	734	6,515	------	------	------	PR-A1a (less roof)
2	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-A1b
3	SCS Runoff	0.264	2	724	839	------	------	------	PR-R1a
4	Reservoir	0.101	2	736	838	3	276.83	116	UG-R1a No Exfiltration
5	SCS Runoff	0.360	2	724	1,140	------	------	------	PR-R1b
6	Reservoir	0.021	2	826	1,140	5	277.69	549	UG-R1b No Exfiltration
7	Combine	1.595	2	734	8,493	1, 4, 6	------	------	to DS-1
8	Reservoir	1.595	2	734	8,455	7	269.38	47.8	DS-1
9	Diversion1	1.563	2	734	8,443	8	------	------	WQF-A1
10	Diversion2	0.032	2	734	12	8	------	------	to Basin - A
11	Combine	1.563	2	734	8,443	2, 9,	------	------	to SF-A1
12	Reservoir(i)	0.211	2	828	3,555	11	271.62	5,508	SF-A1 No Exfiltration
13	SCS Runoff	1.081	2	738	5,747	------	------	------	PR-A2a (less roof)
14	SCS Runoff	0.550	2	724	1,744	------	------	------	PR-R2a
15	Reservoir	0.205	2	736	1,744	14	276.82	250	UG-R2a No Exfiltration
16	SCS Runoff	0.243	2	724	771	------	------	------	PR-R2b
17	Reservoir	0.093	2	736	771	16	277.02	107	UG-R2b No Exfiltration
18	SCS Runoff	0.296	2	724	939	------	------	------	PR-R2c
19	Reservoir	0.047	2	752	939	18	278.19	289	UG-R2c No Exfiltration
20	SCS Runoff	0.476	2	724	1,509	------	------	------	PR-R2d
21	Reservoir	0.060	2	754	1,509	20	276.22	517	UG-R2d No Exfiltration
22	Combine	1.483	2	738	10,710	13, 15, 17, 19, 21	------	------	to DS-2
23	Reservoir	1.483	2	740	10,654	22	268.83	71.8	DS-2
24	Diversion1	1.483	2	740	10,654	23	------	------	WQF-A2
25	Diversion2	0.000	2	890	0	23	------	------	to Basin - A
26	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-A2b
27	Combine	1.483	2	740	10,654	24, 26	------	------	to SF-A2
28	Reservoir(i)	0.610	2	778	6,069	27	271.63	5,008	SF-A2 No Exfiltration

Hydrograph Report

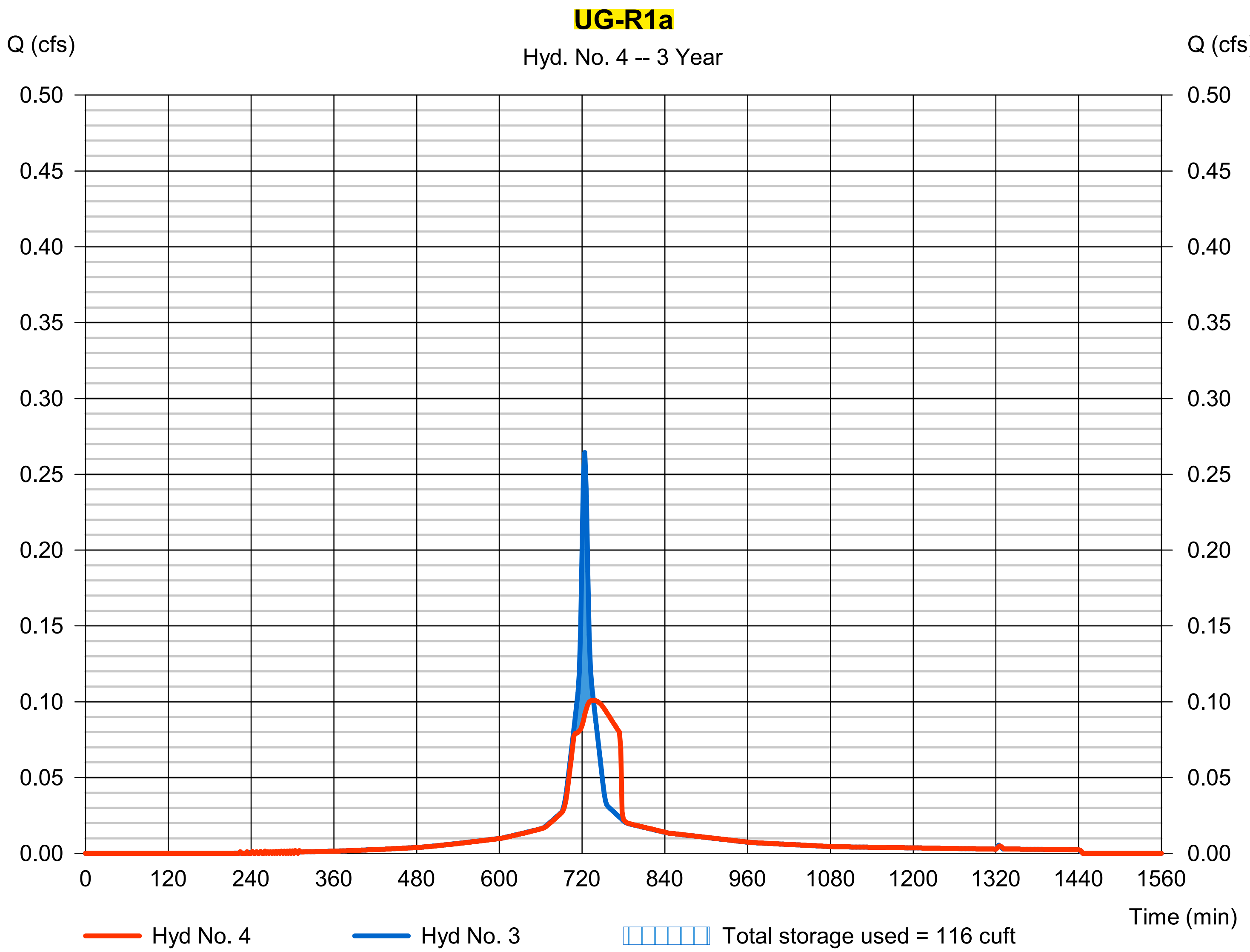
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 4

UG-R1a

Hydrograph type	= Reservoir	Peak discharge	= 0.101 cfs
Storm frequency	= 3 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 838 cuft
Inflow hyd. No.	= 3 - PR-R1a	Max. Elevation	= 276.83 ft
Reservoir name	= UG-R1a	Max. Storage	= 116 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

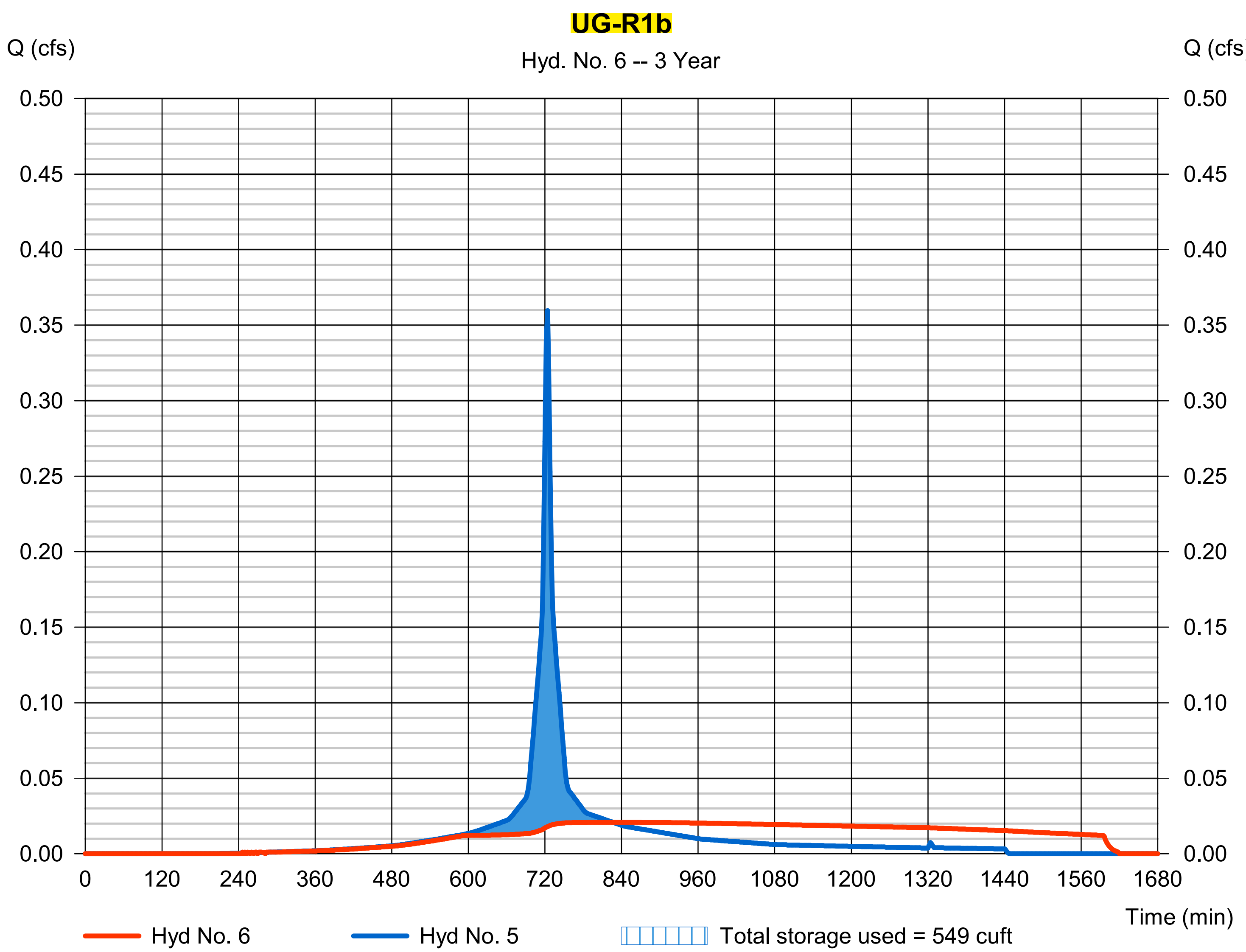
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 | Monday, 03 / 1 / 2021

Hyd. No. 6

UG-R1b

Hydrograph type	= Reservoir	Peak discharge	= 0.021 cfs
Storm frequency	= 3 yrs	Time to peak	= 826 min
Time interval	= 2 min	Hyd. volume	= 1,140 cuft
Inflow hyd. No.	= 5 - PR-R1b	Max. Elevation	= 277.69 ft
Reservoir name	= UG-R1b	Max. Storage	= 549 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

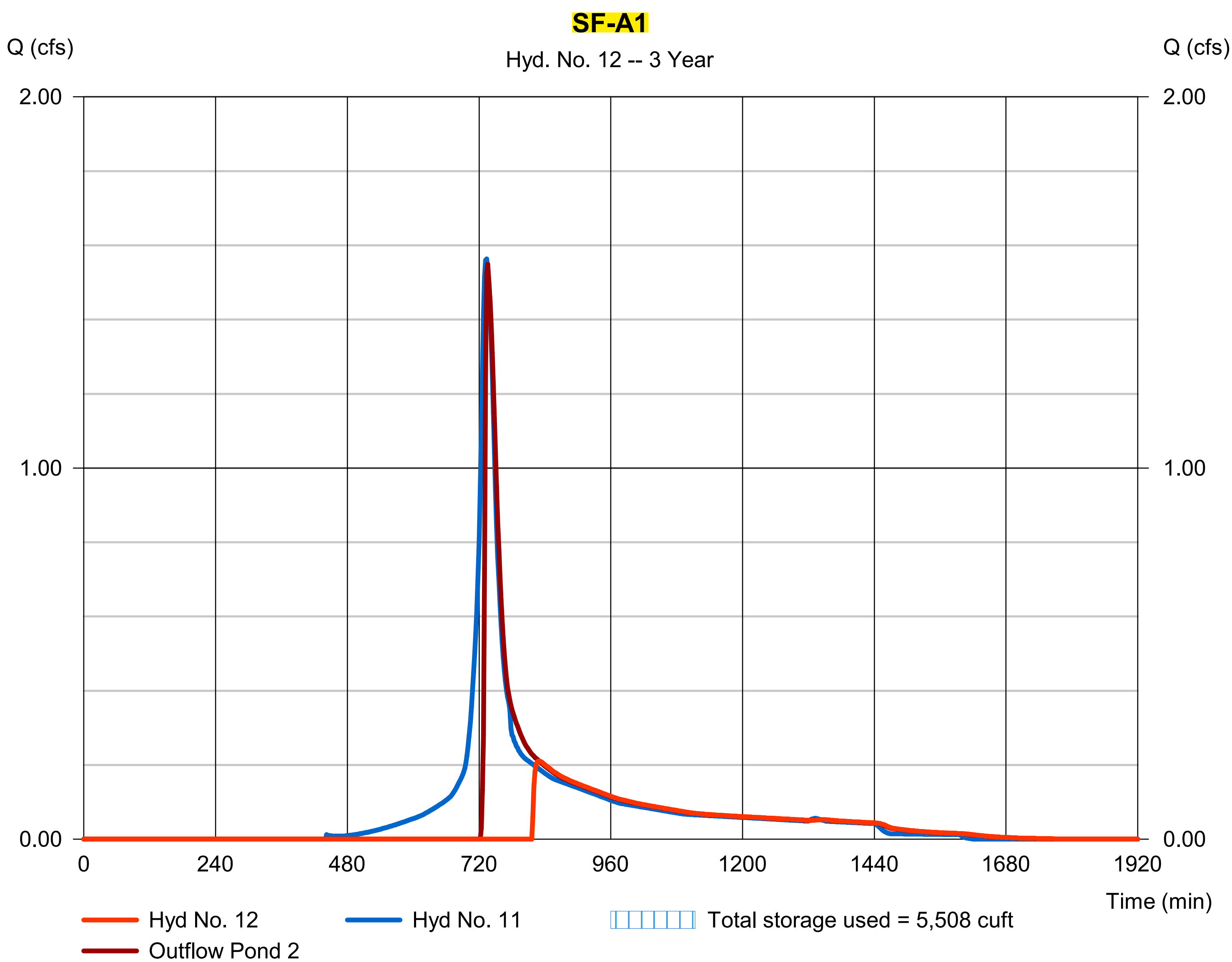
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Monday, 03 / 1 / 2021

Hyd. No. 12

SF-A1

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.211 cfs
Storm frequency	= 3 yrs	Time to peak	= 828 min
Time interval	= 2 min	Hyd. volume	= 3,555 cuft
Upper Pond	= Sediment Forebay - A1	**Lower Pond**	= Sand Filter - A1
Inflow hyd.	= 11 - to SF-A1	Other Inflow hyd.	= None
Max. Elevation	= 271.62 ft	Max. Elevation	= 271.26 ft
Max. Storage	= 2,126 cuft	Max. Storage	= 3,382 cuft

Interconnected Pond Routing. Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

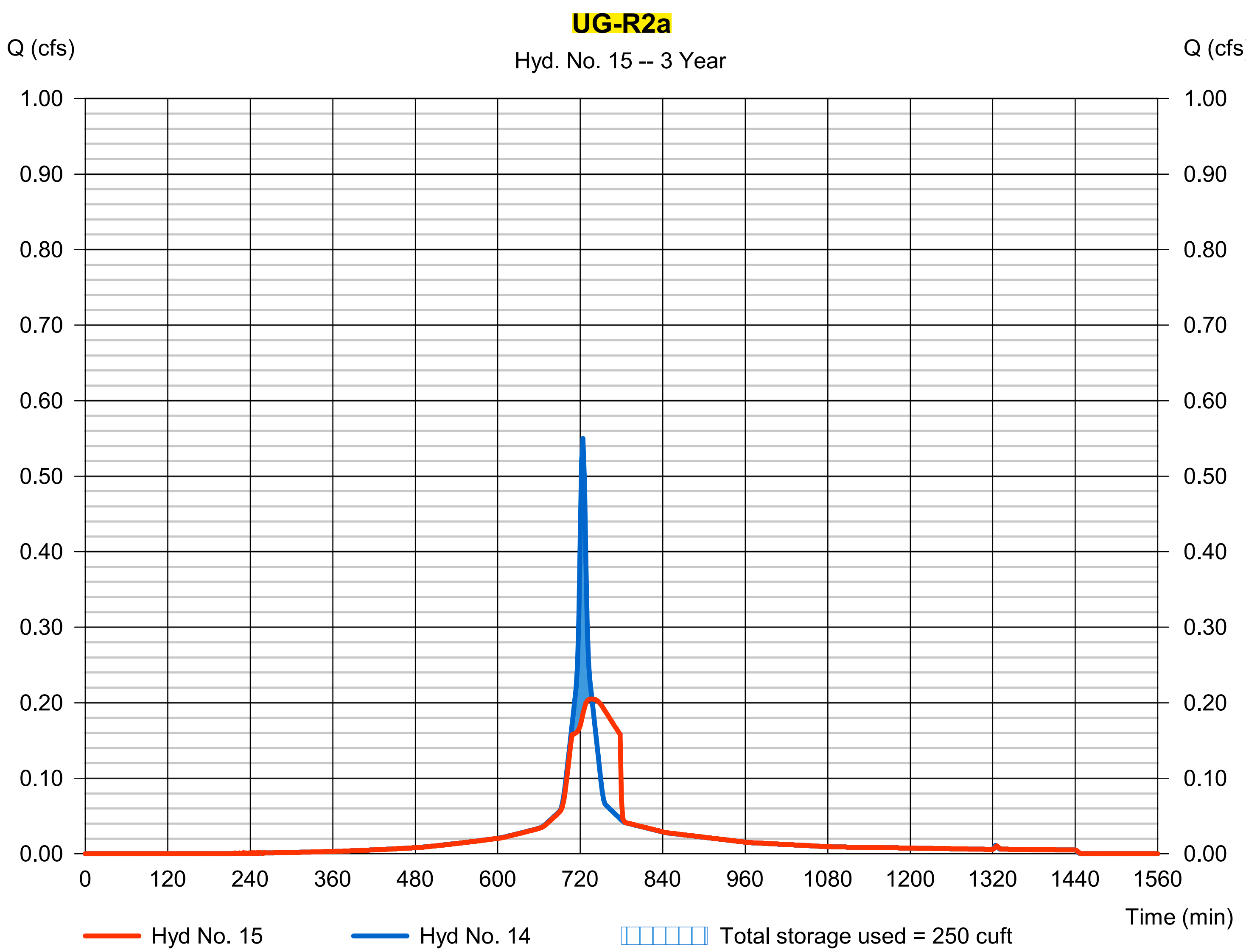
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Monday, 03 / 1 / 2021

Hyd. No. 15

UG-R2a

Hydrograph type	= Reservoir	Peak discharge	= 0.205 cfs
Storm frequency	= 3 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 1,744 cuft
Inflow hyd. No.	= 14 - PR-R2a	Max. Elevation	= 276.82 ft
Reservoir name	= UG-R2a	Max. Storage	= 250 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

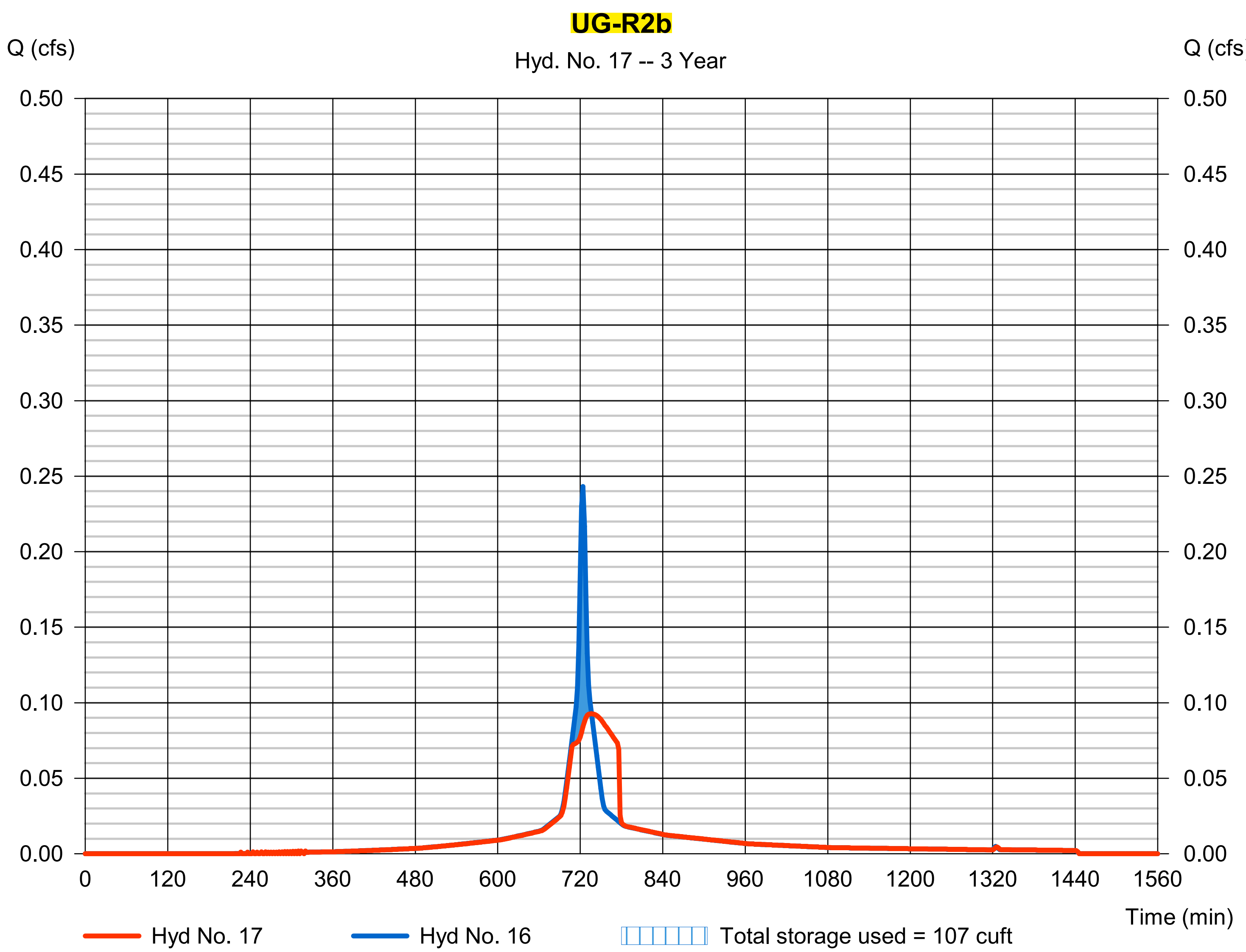
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 17

UG-R2b

Hydrograph type	= Reservoir	Peak discharge	= 0.093 cfs
Storm frequency	= 3 yrs	Time to peak	= 736 min
Time interval	= 2 min	Hyd. volume	= 771 cuft
Inflow hyd. No.	= 16 - PR-R2b	Max. Elevation	= 277.02 ft
Reservoir name	= UG-R2b	Max. Storage	= 107 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

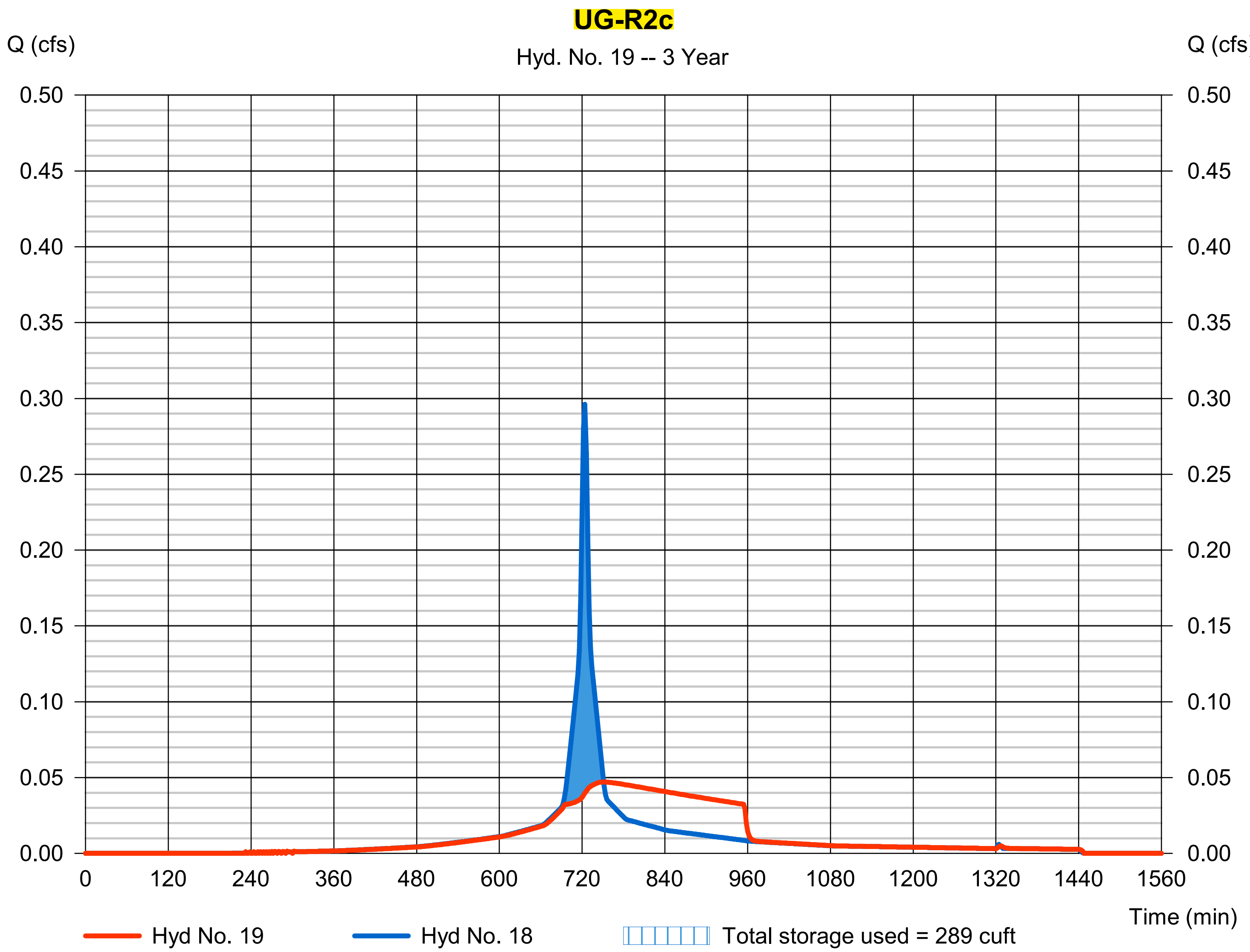
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 19

UG-R2c

Hydrograph type	= Reservoir	Peak discharge	= 0.047 cfs
Storm frequency	= 3 yrs	Time to peak	= 752 min
Time interval	= 2 min	Hyd. volume	= 939 cuft
Inflow hyd. No.	= 18 - PR-R2c	Max. Elevation	= 278.19 ft
Reservoir name	= UG-R2c	Max. Storage	= 289 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

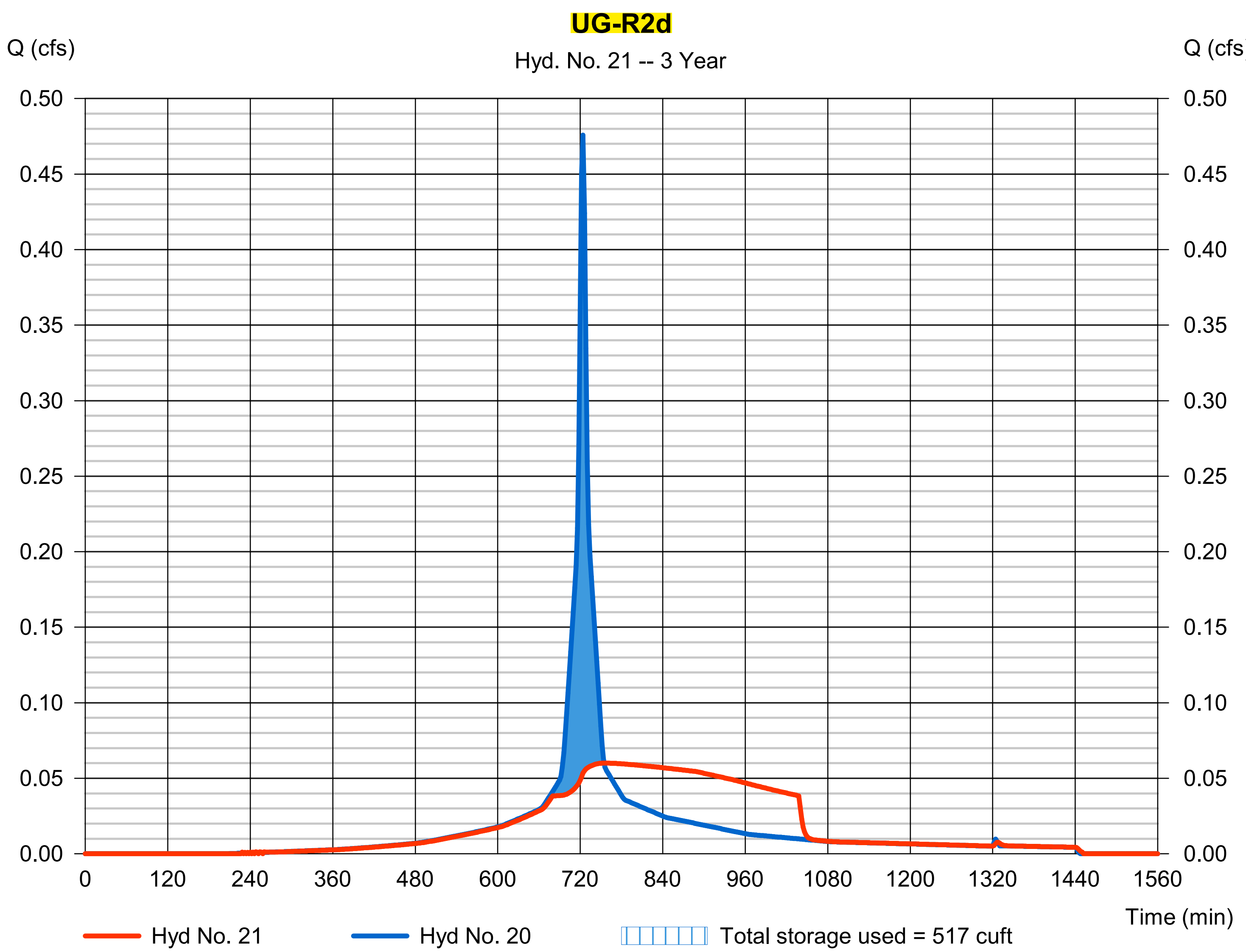
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 21

UG-R2d

Hydrograph type	= Reservoir	Peak discharge	= 0.060 cfs
Storm frequency	= 3 yrs	Time to peak	= 754 min
Time interval	= 2 min	Hyd. volume	= 1,509 cuft
Inflow hyd. No.	= 20 - PR-R2d	Max. Elevation	= 276.22 ft
Reservoir name	= UG-R2d	Max. Storage	= 517 cuft

Storage Indication method used. Outflow includes exfiltration.



Hydrograph Report

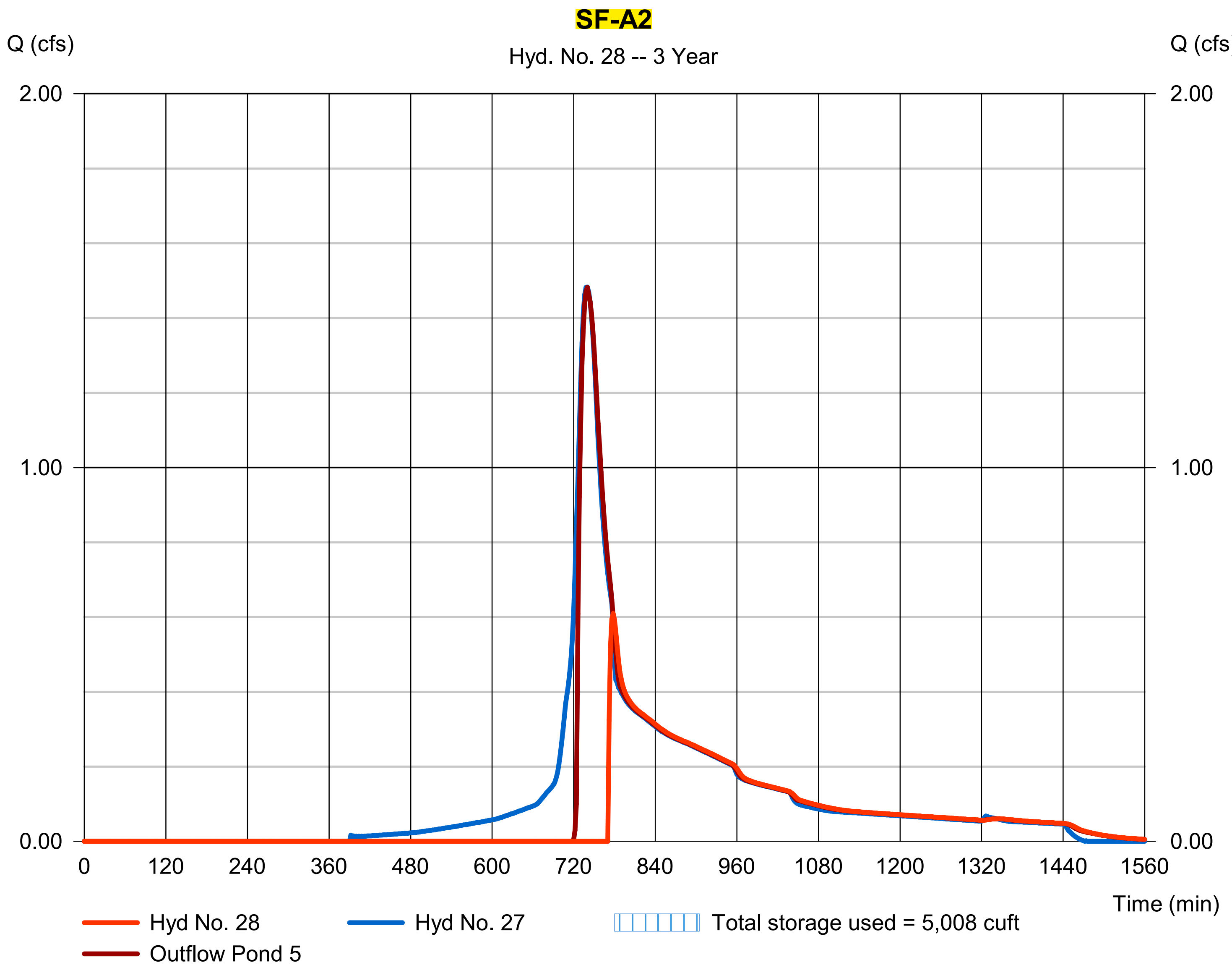
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 28

SF-A2

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.610 cfs
Storm frequency	= 3 yrs	Time to peak	= 778 min
Time interval	= 2 min	Hyd. volume	= 6,069 cuft
Upper Pond	= Sediment Forebay - A2	**Lower Pond**	= Sand Filter - A2
Inflow hyd.	= 27 - to SF-A2	Other Inflow hyd.	= None
Max. Elevation	= 271.63 ft	Max. Elevation	= 271.29 ft
Max. Storage	= 1,740 cuft	Max. Storage	= 3,267 cuft

Interconnected Pond Routing. Storage Indication method used. Outflow includes exfiltration.



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	1.475	2	734	6,515	------	------	------	PR-A1a (less roof)
2	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-A1b
3	SCS Runoff	0.264	2	724	839	------	------	------	PR-R1a
4	Reservoir	0.000	2	708	0	3	276.83	116	UG-R1a With Exfiltration
5	SCS Runoff	0.360	2	724	1,140	------	------	------	PR-R1b
6	Reservoir	0.000	2	496	0	5	277.69	549	UG-R1b With Exfiltration
7	Combine	1.475	2	734	6,515	1, 4, 6	------	------	to DS-1
8	Reservoir	1.476	2	734	6,477	7	269.35	47.4	DS-1
9	Diversion1	1.476	2	734	6,477	8	------	------	WQF-A1
10	Diversion2	0.000	2	770	0	8	------	------	to Basin - A
11	Combine	1.476	2	734	6,477	2, 9,	------	------	to SF-A1
12	Reservoir(i)	0.099	2	936	1,587	11	271.60	5,470	SF-A1 With Exfiltration
13	SCS Runoff	1.081	2	738	5,747	------	------	------	PR-A2a (less roof)
14	SCS Runoff	0.550	2	724	1,744	------	------	------	PR-R2a
15	Reservoir	0.000	2	n/a	0	14	276.82	250	UG-R2a With Exfiltration
16	SCS Runoff	0.243	2	724	771	------	------	------	PR-R2b
17	Reservoir	0.000	2	n/a	0	16	277.02	107	UG-R2b With Exfiltration
18	SCS Runoff	0.296	2	724	939	------	------	------	PR-R2c
19	Reservoir	0.000	2	n/a	0	18	278.19	289	UG-R2c With Exfiltration
20	SCS Runoff	0.476	2	724	1,509	------	------	------	PR-R2d
21	Reservoir	0.000	2	670	0	20	276.22	517	UG-R2d With Exfiltration
22	Combine	1.081	2	738	5,747	13, 15, 17, 19, 21	------	------	to DS-2
23	Reservoir	1.081	2	740	5,690	22	268.69	67.7	DS-2
24	Diversion1	1.081	2	740	5,690	23	------	------	WQF-A2
25	Diversion2	0.000	2	1228	0	23	------	------	to Basin - A
26	SCS Runoff	0.000	2	n/a	0	------	------	------	PR-A2b
27	Combine	1.081	2	740	5,690	24, 26	------	------	to SF-A2
28	Reservoir(i)	0.061	2	1094	1,104	27	271.57	4,856	SF-A2 With Exfiltration

Hydrograph Report

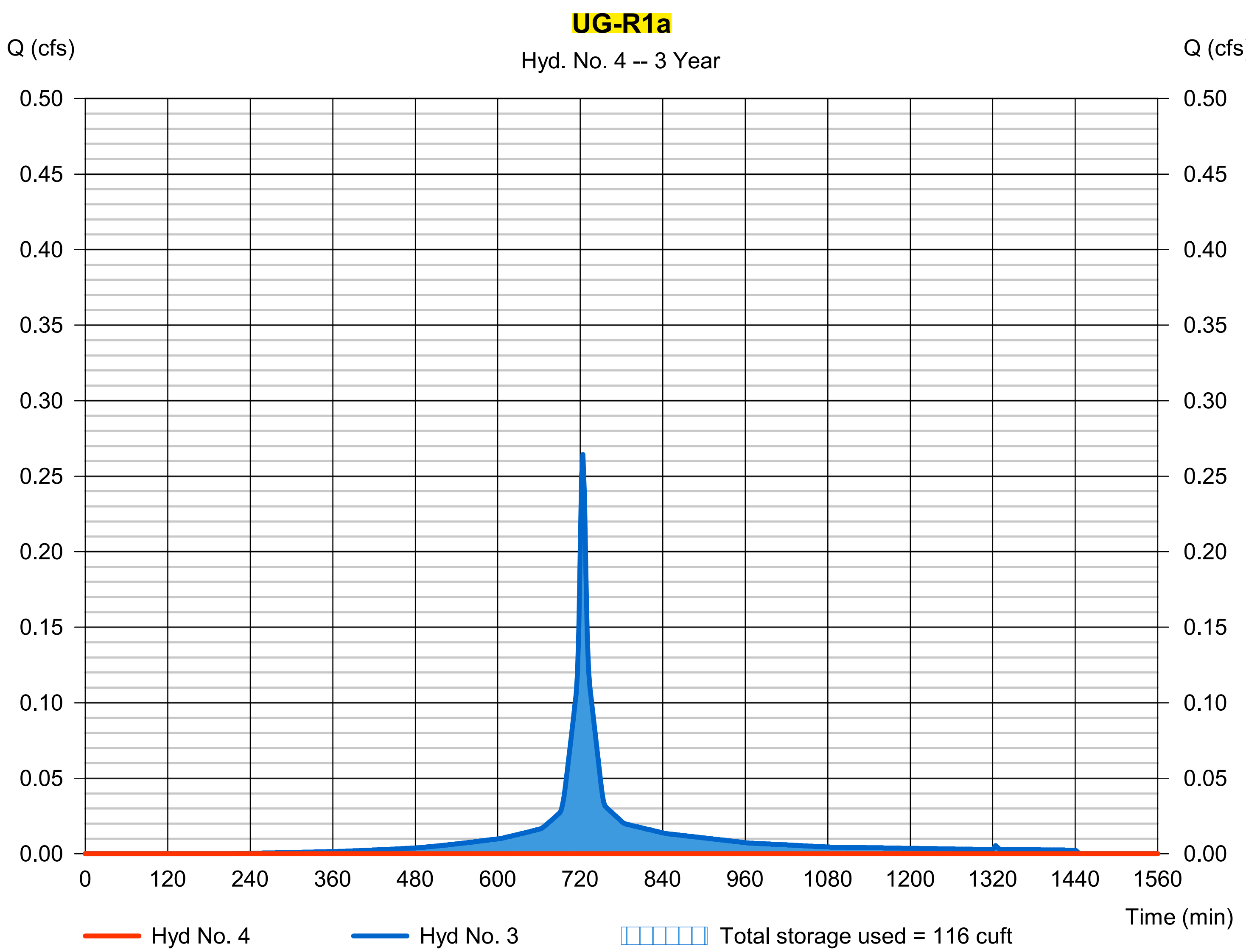
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 4

UG-R1a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 708 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 3 - PR-R1a	Max. Elevation	= 276.83 ft
Reservoir name	= UG-R1a	Max. Storage	= 116 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

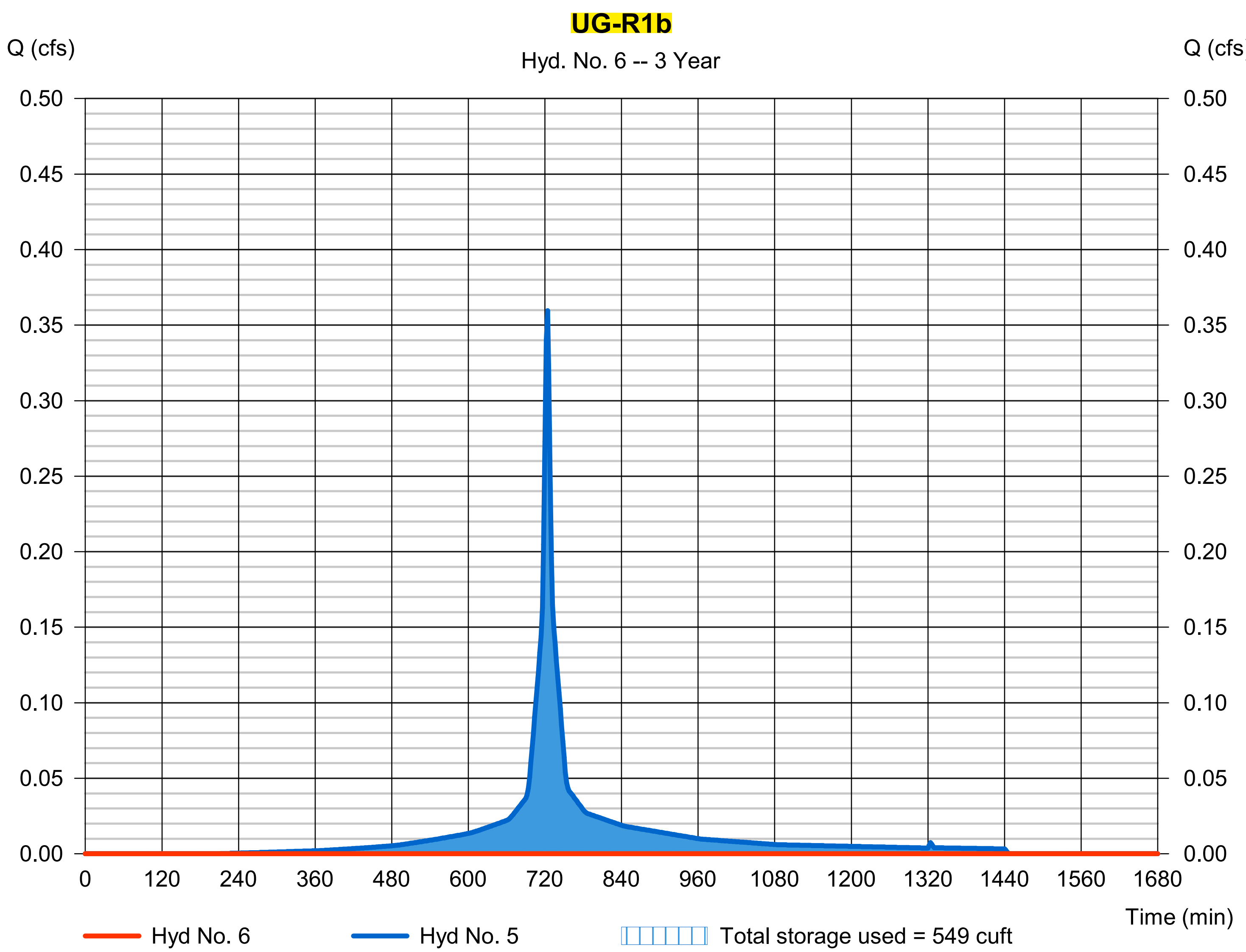
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 — Monday, 03 / 1 / 2021

Hyd. No. 6

UG-R1b

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 496 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 5 - PR-R1b	Max. Elevation	= 277.69 ft
Reservoir name	= UG-R1b	Max. Storage	= 549 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

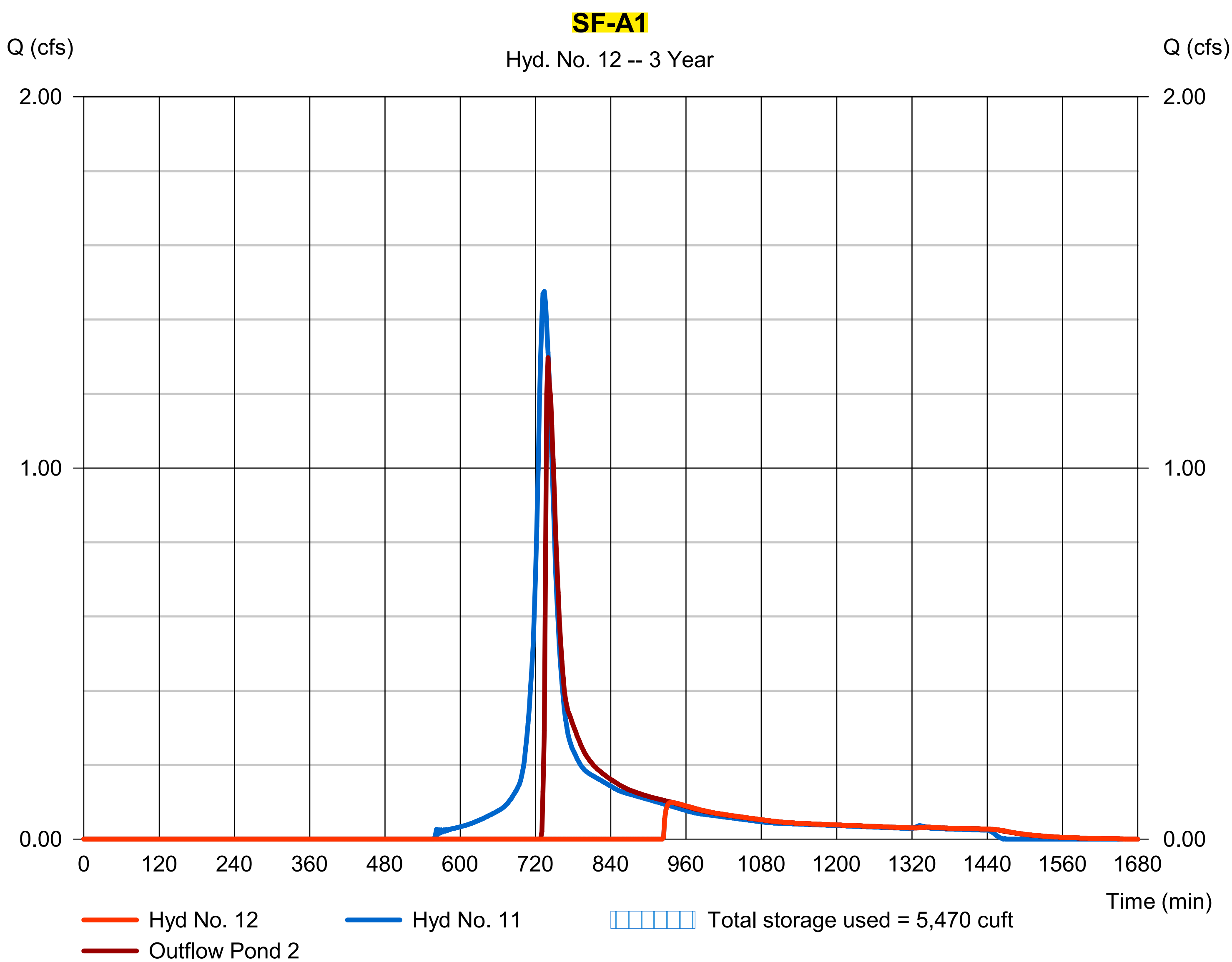
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 12

SF-A1

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.099 cfs
Storm frequency	= 3 yrs	Time to peak	= 936 min
Time interval	= 2 min	Hyd. volume	= 1,587 cuft
Pond name **Upper Pond**	= Sediment Forebay - A1	Pond name **Lower Pond**	= Sand Filter - A1
Inflow hyd.	= 11 - to SF-A1	Other Inflow hyd.	= None
Max. Elevation	= 271.60 ft	Max. Elevation	= 271.26 ft
Max. Storage	= 2,108 cuft	Max. Storage	= 3,362 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

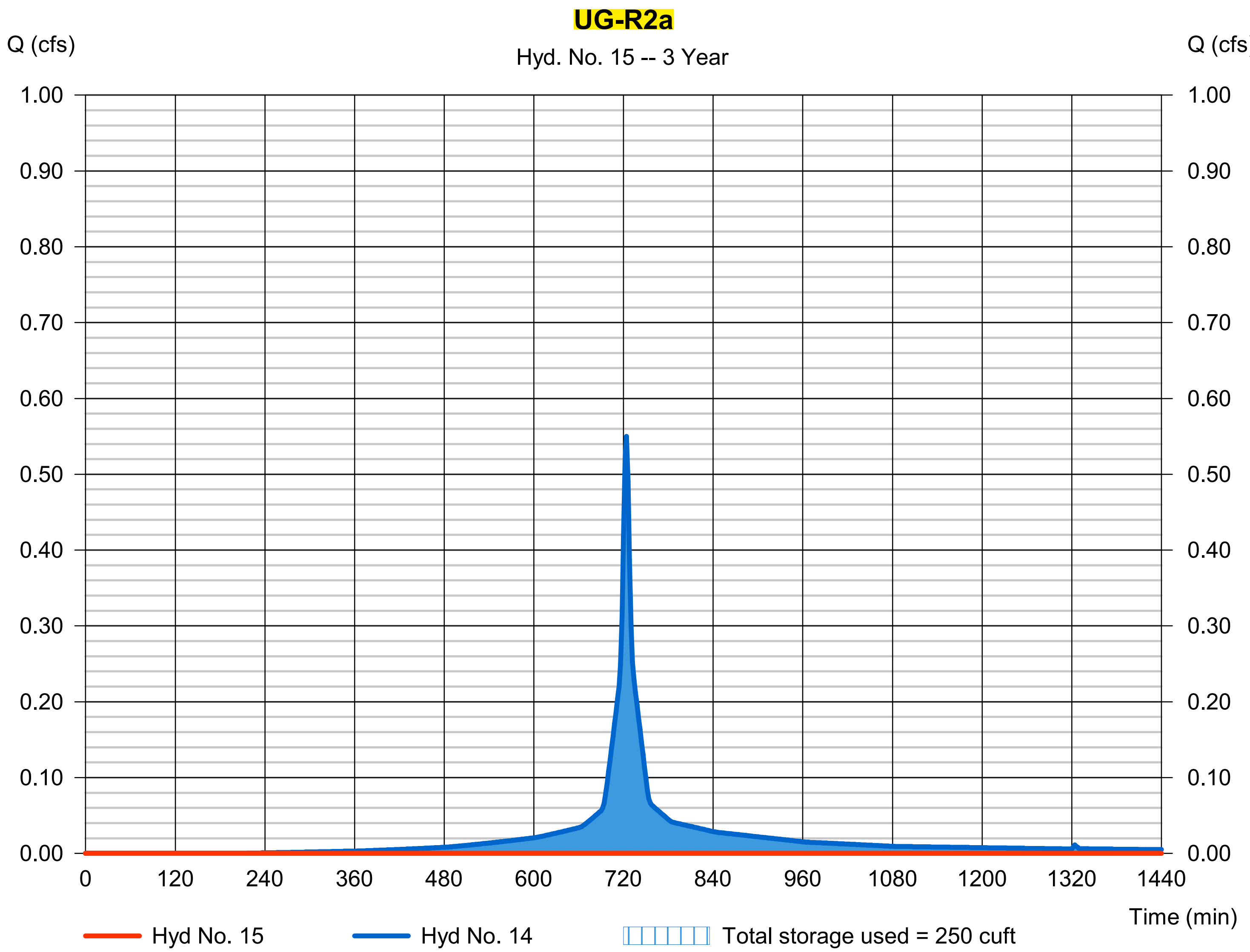
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 15

UG-R2a

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 14 - PR-R2a	Max. Elevation	= 276.82 ft
Reservoir name	= UG-R2a	Max. Storage	= 250 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

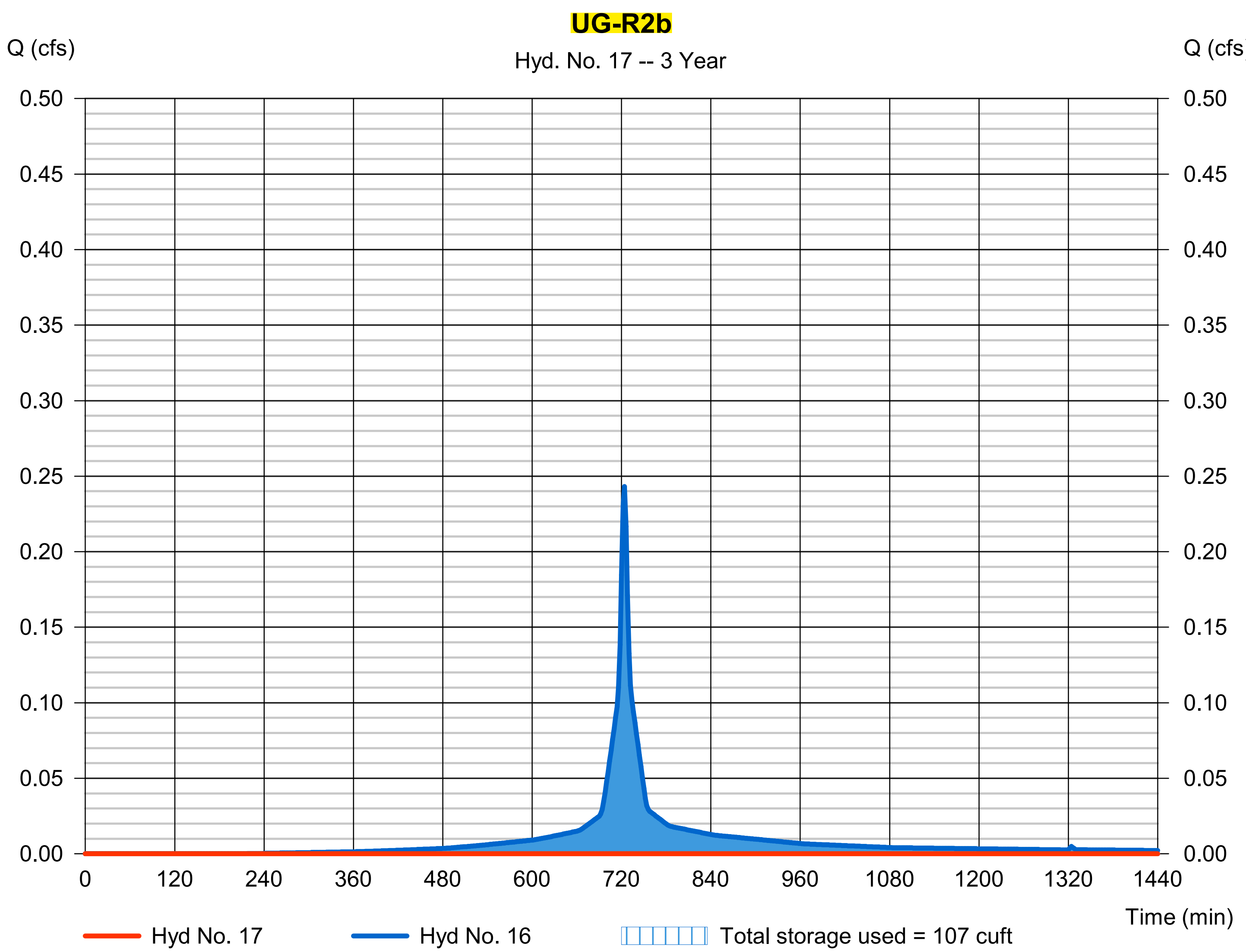
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 17

UG-R2b

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 16 - PR-R2b	Max. Elevation	= 277.02 ft
Reservoir name	= UG-R2b	Max. Storage	= 107 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

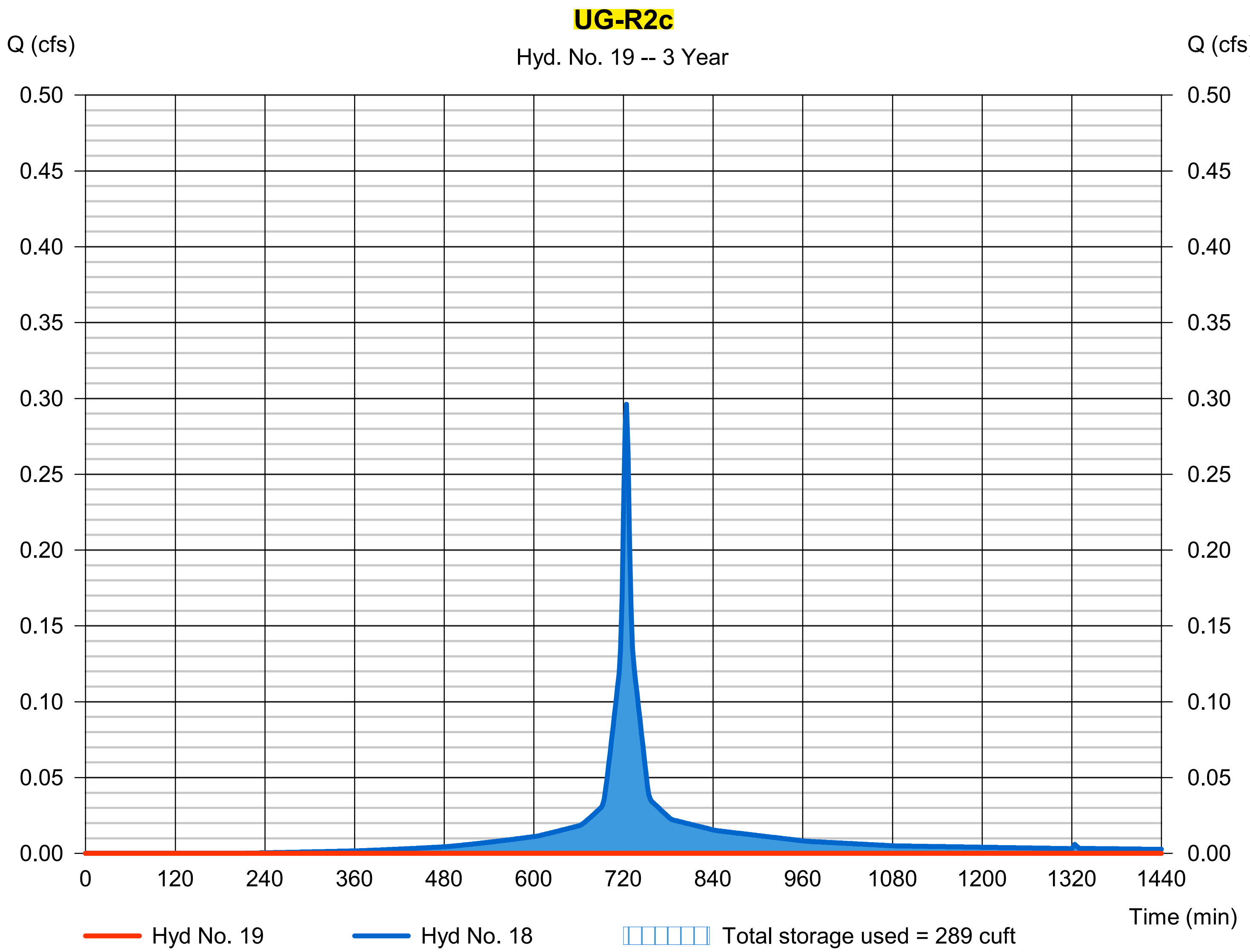
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 19

UG-R2c

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= n/a
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 18 - PR-R2c	Max. Elevation	= 278.19 ft
Reservoir name	= UG-R2c	Max. Storage	= 289 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

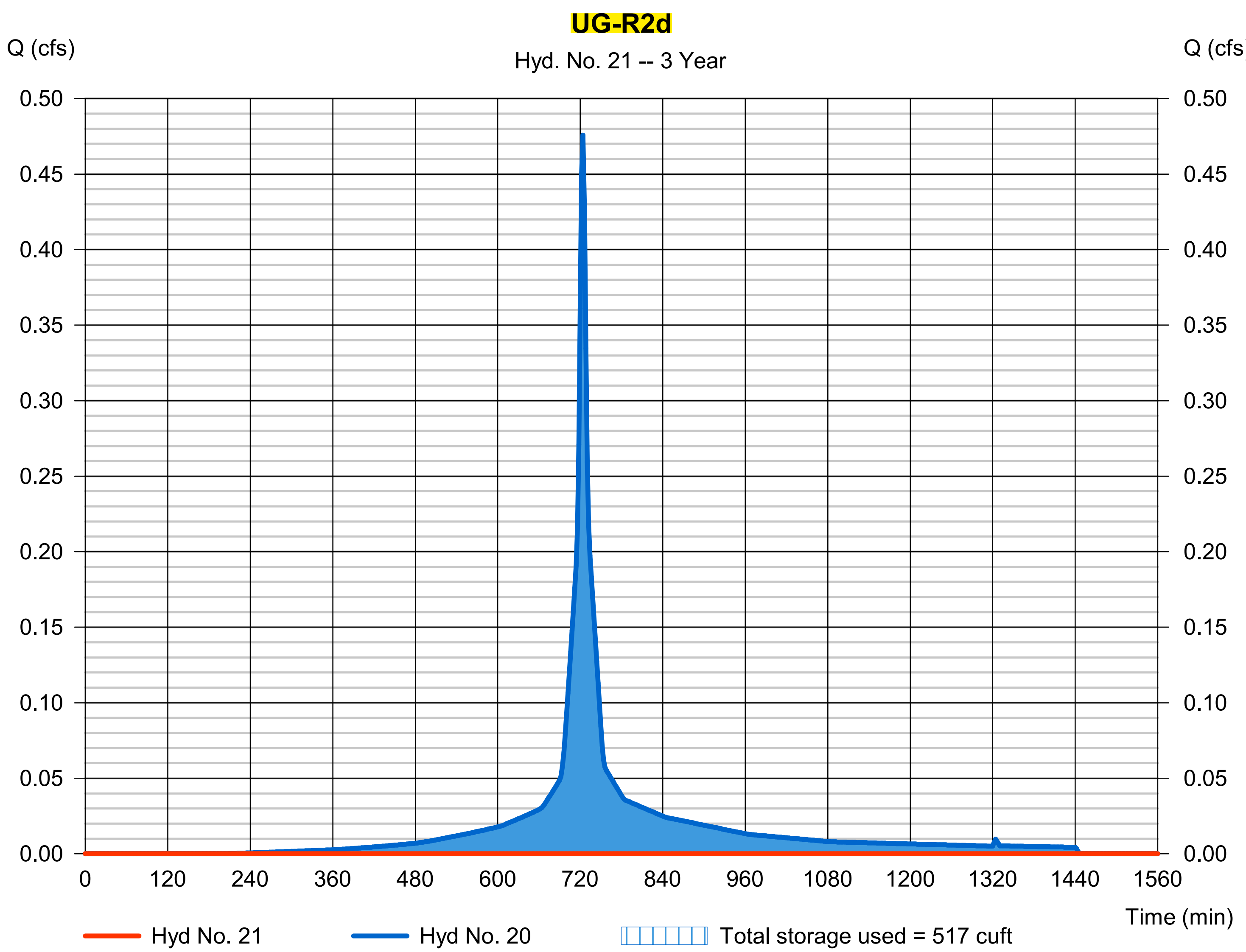
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 21

UG-R2d

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 670 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 20 - PR-R2d	Max. Elevation	= 276.22 ft
Reservoir name	= UG-R2d	Max. Storage	= 517 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

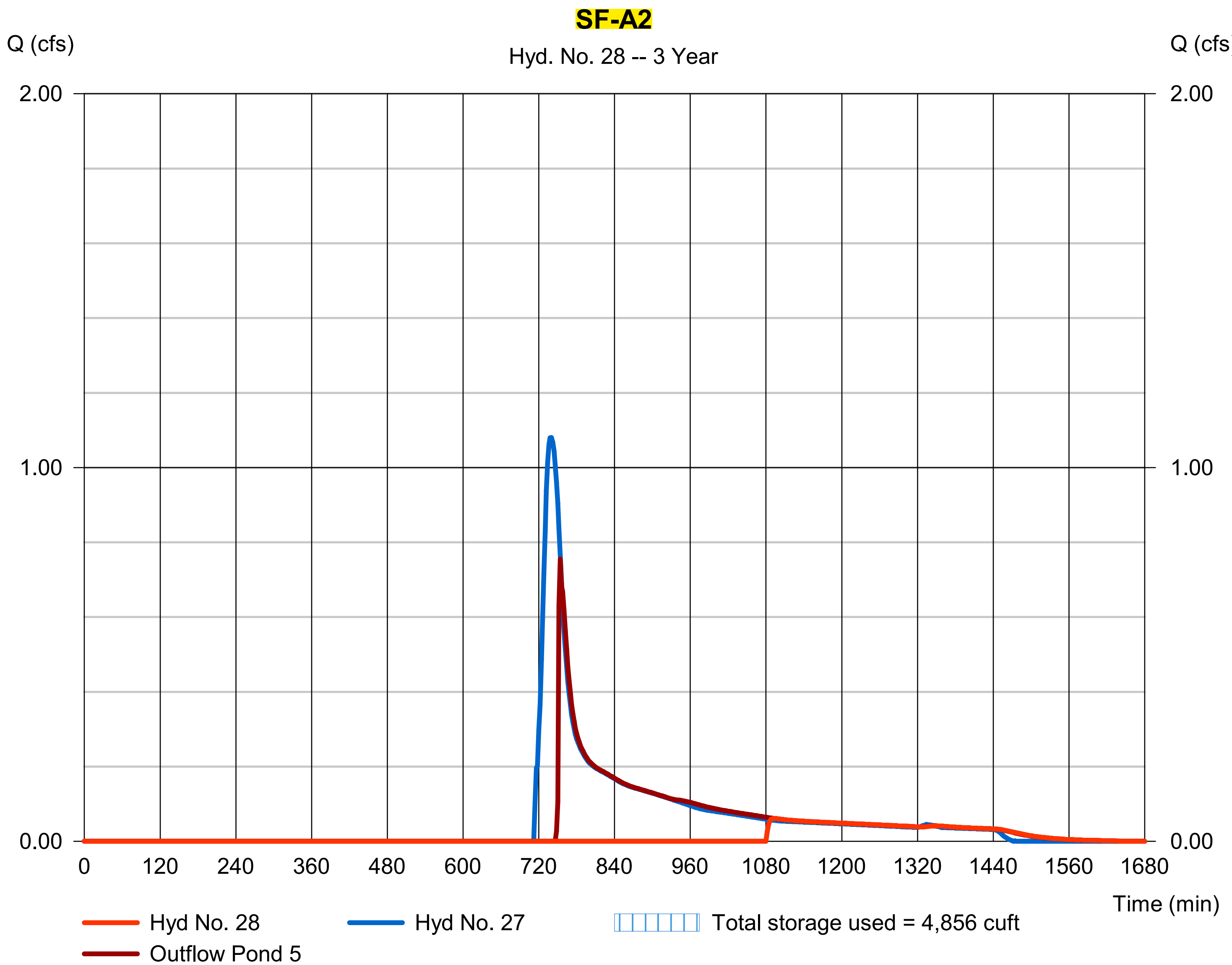
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Monday, 03 / 1 / 2021

Hyd. No. 28

SF-A2

Hydrograph type	= Reservoir (Interconnected)	Peak discharge	= 0.061 cfs
Storm frequency	= 3 yrs	Time to peak	= 1094 min
Time interval	= 2 min	Hyd. volume	= 1,104 cuft
Pond name **Upper Pond**	= Sediment Forebay - A2	Pond name **Lower Pond**	= Sand Filter - A2
Inflow hyd.	= 27 - to SF-A2	Other Inflow hyd.	= None
Max. Elevation	= 271.57 ft	Max. Elevation	= 271.25 ft
Max. Storage	= 1,684 cuft	Max. Storage	= 3,173 cuft

Interconnected Pond Routing. Storage Indication method used. Exfiltration extracted from Outflow.



Reference 1

HYDROLOGIC PROPERTIES OF EARTH MATERIALS

SPECIFIC YIELD—COMPILATION OF SPECIFIC YIELDS FOR VARIOUS MATERIALS

By A. I. Johnson

ABSTRACT

Specific yield is defined as the ratio of (1) the volume of water that a saturated rock or soil will yield by gravity to (2) the total volume of the rock or soil. Specific yield is usually expressed as a percentage. The value is not definitive, because the quantity of water that will drain by gravity depends on variables such as duration of drainage, temperature, mineral composition of the water, and various physical characteristics of the rock or soil under consideration. Values of specific yield, nevertheless, offer a convenient means by which hydrologists can estimate the water-yielding capacities of earth materials and, as such, are very useful in hydrologic studies.

The present report consists mostly of direct or modified quotations from many selected reports that present and evaluate methods for determining specific yield, limitations of those methods, and results of the determinations made on a wide variety of rock and soil materials. Although no particular values are recommended in this report, a table summarizes values of specific yield, and their averages, determined for 10 rock textures. The following is an abstract of the table:

Specific yields, in percent, of various materials

[Rounded to nearest whole percent]

Material	Number of determinations	Specific yield Maximum	Minimum	Average
Clay	15	5	0	2
Silt	16	19	3	8
Sandy clay	12	12	3	7
Fine sand	17	28	10	21
Medium sand	17	32	15	26
Coarse sand	17	35	20	27
Gravelly sand	15	35	20	25
Fine gravel	17	35	21	25
Medium gravel	14	26	13	23
Coarse gravel	14	26	12	22

INTRODUCTION

PURPOSE AND SCOPE

The purpose of this report is to assist hydrologists in estimating the quantity of water in storage in ground-water reservoirs by providing

Reference 2

TABLE 3.1 Representative Values of Hydraulic Conductivity (after Morris and Johnson[45])

Material	Hydraulic Conductivity, m/day	Type of Measurement[a]
Gravel, coarse	150	R
Gravel, medium	270	R
Gravel, fine	450	R
Sand, coarse	45	R
Sand, medium	12	R
Sand, fine	2.5	R
Silt	0.08	H
Clay	0.0002	H
Sandstone, fine-grained	0.2	V
Sandstone, medium-grained	3.1	V
Limestone	0.94	V
Dolomite	0.001	V
Dune sand	20	V
Loess	0.08	V
Peat	5.7	V
Schist	0.2	V
Slate	0.00008	V
Till, predominantly sand	0.49	R
Till, predominantly gravel	30	R
Tuff	0.2	V
Basalt	0.01	V
Gabbro, weathered	0.2	V
Granite, weathered	1.4	V

[a]H is horizontal hydraulic conductivity, R is a repacked sample, and V is vertical hydraulic conductivity.

mental work. Most permeability formulas have the general form

$$k = cd^2 \tag{3.15}$$

where c is a dimensionless coefficient, or

$$k = f_s f_\alpha d^2 \tag{3.16}$$

where f_s is a grain (or pore) shape factor, f_α is a porosity factor, and d is characteristic grain diameter.[17,37,43] Few formulas give reliable estimates of results because of the difficulty of including all possible variables in porous media. For an ideal medium, such as an assemblage of spheres of uniform diameter, hydraulic conductivity can be accurately evaluated from known porosity and packing conditions.

Because of the problems inherent in formulas, other techniques for determining hydraulic conductivity are preferable.

Design Guidance

- The sides of infiltration chambers, trenches, and dry wells should be lined with an acceptable filter fabric that prevents soil piping.

5.3.4 Treatment

Required Elements

- If the in-situ infiltration rate for the underlying soils is greater than 8.3 inches per hour, 100% of the WQ_v shall be treated by an acceptable water quality practice prior to entry into an infiltration facility.
- Infiltration practices shall be designed to exfiltrate the entire WQ_v through the floor of each practice (i.e., sidewalls are not considered in sizing), unless the depth is greater than ½ the square root of the bottom surface area.
- The construction sequence and specifications for each infiltration practice shall be precisely followed. Experience has shown that the longevity of infiltration practices is strongly influenced by the care taken during construction.
- Design infiltration rates (f_c) shall be determined by using Table 5-3, or shall be determined by in-situ rates (using a factor of safety of 2 from the field-derived value) established by one of the approved methods listed in Appendix H.1.3 (rates derived from standard percolation tests are not acceptable).

Table 5-3 Design Infiltration Rates for Different Soil Textures (Rawls et al., 1982)

USDA Soil Texture	Design Infiltration Rate (f_c) (in/hr)	Design Infiltration Rate (f_c) (ft/min)
Sand	8.27	0.0115
Loamy Sand	2.41	0.0033
Sandy Loam	1.02	0.0014
Loam	0.52	0.0007
Silt Loam	0.27	0.0004

Design Guidance

- Infiltration practices are best used in conjunction with other practices, and often downstream detention is still needed to meet the CP_v and Q_p sizing criteria.
- A porosity value (V_v/V_t) of 0.33 should be used to design stone reservoirs for infiltration practices.
- The bottom of the stone reservoir should be completely flat or nearly so (i.e., 0.5% slope) in order that infiltrated runoff will be able to infiltrate through the entire bottom surface area.
- One method to calculate the surface area of infiltration trenches is to use the following equation:

$$A_p = V / (nd_t + f_c t/12)$$

Where:

A_p = surface area at the bottom of the trench (ft^2)

Appendix I

Stormwater Management Operation and Maintenance Plan

See stand-alone document

250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
p. (401) 921-3344 f. (401) 921-3303 www.MillstoneEng.com

Appendix J

Supporting Documentation

- Rainfall Data
- Soils Data & Evaluation Forms

250 Centerville Road, Building E-12, Warwick, Rhode Island 02886
p. (401) 921-3344 f. (401) 921-3303 www.MillstoneEng.com

Table 3-1 Design Rainfall Amounts for Rhode Island

RI County	24-hour (Type III) Rainfall Amount (inches)*						
	1-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
Providence County	2.7	3.3	4.1	4.9	6.1	7.3	8.7
Bristol County	2.8	3.3	4.1	4.9	6.1	7.3	8.6
Newport County	2.8	3.3	4.1	4.9	6.1	7.3	8.6
Kent County	2.7	3.3	4.1	4.8	6.2	7.3	8.7
Washington County	2.8	3.3	4.1	4.9	6.1	7.2	8.5

*All Rhode Island County rainfall values were obtained from the Northeast Regional Climate Center (NRCC) using regional rainfall data processed by NRCC from the period of record through December 2008. The NRCC in collaboration with the Natural Resource Conservation Service has under development an interactive web tool at www.precip.net for analysis of precipitation events based on long-term, station-specific data. Applicants may elect to use site-specific data derived from this web tool once the beta site becomes final rather than the RI County values in Table 3-1.

State of Rhode Island and Providence Plantations
Department of Environmental Management
Office of Water Resources

Site Evaluation Form
Part A - Soil Profile Description

Application Number DRAINAGE

Property Owner: Cardi Corp

Property Location: New London Turnpike, AP 16 Lot 1, 3, Coventry

Date of Test Hole: August 27, 2020

Soil Evaluator: Kevin Fetzer   License Number: D-4029

Weather: Sunny, Warm   Shaded: Yes ☒ No ☐   Time: 0900

	TH 2005 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab.	S.	Con.	Texture	Structure	Consistence	in/hr ft/min
FILL	^C	84 - 0	a	s	2.5Y 5/4					cb gls	O - sg	loose	8.27 0.0115
	C	0 - 72			2.5 5/3					cb gls	O - sg	loose	8.27 0.0115

	TH 2007 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab.	S.	Con.	Texture	Structure	Consistence	in/hr ft/min
FILL	^C	32 - 14	a	s	2.5Y 6/3					fs	O - sg	loose	8.27 0.0115
FILL	^2C	14 - 0	a	s	2.5Y 5/4					gls	O - sg	loose	2.41 0.0033
	Bb	0 - 24	a	w	7.5YR 5/8					sl	1 sbk f	fr	1.02 0.0014
	2C	24-124			10YR 6/4					gs	O - sg	loose	8.27 0.0115

Soil Class: HTM over Ice Contact

Total Depth of each Test Hole: 156" - 156"

Depth to Groundwater Seepage: No Groundwater Seepage Encountered

Depth to Impervious or Limiting Layer: No Ledge Encountered

Estimated Seasonal High Water Table: 60" OG 100"OG

Comments: HTM = Fill Material ; IC = Ice Contact

OG = Original Grade

Part B

<u>**Site Evaluation** - to be completed by Class II or III Designer or Soil Evaluator</u>

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:
- Approximate location of test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north

1. Relief and Slope: ______________________________
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES☐ NO☐
6. Has soil been excavated from or fill deposited on site? YES☐ NO☐ If yes, locate on above sketch
7. Site's potential for flooding or ponding: NONE☐ SLIGHT☐ MODERATE☐ SEVERE☐
8. Landscape position: ______________________________
9. Vegetation: ______________________________
10. Indicate approximate location of property lines and roadways.
11. Additional comments, site constraints or additional information regarding site: ______________________________

The soil evaluation results will provide soil texture and the estimated depth to the Seasonal High Water Table (SHWT) based upon qualitative field assessment techniques. No lab analysis of soil material is proposed to verify qualitative estimates in the field. To definitively determine the actual depth to the SHWT, it is necessary to install monitoring wells/pipes and record water level fluctuations over a long time period. No long-term monitoring is proposed. Original soil texture and SHWT estimates may need to be revised based upon additional information from other soil evaluations, excavations, and/or bottom inspections prior to the OWTS installation or drainage structure installation. Soil evaluations for septic system design only, not for foundation elevation.

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: [signature] D-4029

Signature License #

Part B prepared by: ______________________________

Signature License #

FOR OFFICE USE ONLY

Decision: Approved ☐ Disclaimed ☐

Comments: ______________________________

____

____

____

______________________________ ______________________________

Signature Authorized Agent Date

State of Rhode Island and Providence Plantations
Department of Environmental Management
Office of Water Resources

Site Evaluation Form
Part A - Soil Profile Description

Application Number DRAINAGE

Property Owner: Cardi Corp
Property Location: New London Turnpike, AP 16 Lot 1, 3, Coventry
Date of Test Hole: August 27, 2020
Soil Evaluator: Kevin Fetzer License Number: D-4029
Weather: Sunny, Warm Shaded: Yes ☒ No ☐ Time: 0900

	TH 2008 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab. S. Con.	Texture	Structure	Consistence	in/hr ft/min
FILL	^C	108-72	a	s	2.5Y 6/3			s	O - sg	loose	8.27 0.0115
FILL	^2C	72 - 0	a	s	2.5Y 5/3			ls	O - sg	loose	2.41 0.0033
	Bb	0 - 24	a	s	10YR 4/6			sl	1 sbk f	fr	1.02 0.0014
	Bw	24 - 36	a	s	10YR 3/6			sl	1 sbk f	fr	1.02 0.0014
	C	36 - 48			10YR 5/4			gs	O - sg	loose	8.27 0.0115

	TH 2009 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab. S. Con.	Texture	Structure	Consistence	in/hr ft/min
FILL	^C	24 - 10	a	s	2.5Y 6/2			s	O - sg	loose	8.27 0.0115
FILL	^2C	10 - 0	a	s	2.5Y 6/1			fs	O - sg	loose	8.27 0.0115
	C	0 - 8	a	s	2.5Y 6/4			ls	O - sg	loose	2.41 0.0033
	2C	8 -16	a	s	2.5Y 5/2			sil	O - m	fr	0.27 0.0004
	3C 2C'	16 -44 44-65	a a	s s	2.5Y 6/2 2.5Y 5/3			fs sil	O - pl O - pl	fr fr	8.27/0.0115 0.27/ 0.0004
	4C 5C	65-132 **132-156**	a	s	2.5Y 6/3 2.5Y 6/2			s gs	O - sg O - sg	loose loose	8.27/0.0115 8.27/0.0115

Soil Class: SE-8 = HTM over Ice Contact SE-9 = HTM over lacustrine/outwash
Total Depth of each Test Hole: 156" - 180"
Depth to Groundwater Seepage: **No Groundwater Seepage Encountered**
Depth to Impervious or Limiting Layer: No Ledge Encountered
Estimated Seasonal High Water Table: 24" OG 84" OG
Comments: HTM = Fill Material ; IC = Ice Contact
OG = Original Grade

Part B

Site Evaluation - to be completed by Class II or III Designer or Soil Evaluator

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:
- Approximate location of test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north

1. Relief and Slope: ____________________
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES☐ NO☐
6. Has soil been excavated from or fill deposited on site? YES☐ NO☐ If yes, locate on above sketch
7. Site's potential for flooding or ponding: NONE☐ SLIGHT☐ MODERATE☐ SEVERE☐
8. Landscape position: ____________________
9. Vegetation: ____________________
10. Indicate approximate location of property lines and roadways.
11. Additional comments, site constraints or additional information regarding site: ____________________

The soil evaluation results will provide soil texture and the estimated depth to the Seasonal High Water Table (SHWT) based upon qualitative field assessment techniques. No lab analysis of soil material is proposed to verify qualitative estimates in the field. To definitively determine the actual depth to the SHWT, it is necessary to install monitoring wells/pipes and record water level fluctuations over a long time period. No long-term monitoring is proposed. Original soil texture and SHWT estimates may need to be revised based upon additional information from other soil evaluations, excavations, and/or bottom inspections prior to the OWTS installation or drainage structure installation. Soil evaluations for septic system design only, not for foundation elevation.

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: D-4029

Signature License #

Part B prepared by:

Signature License #

FOR OFFICE USE ONLY

Decision: Approved ☐ Disclaimed ☐

Comments: ____________________

Signature Authorized Agent

Date

revised 5/8/01

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources

Site Evaluation Form
Part A - Soil Profile Description

Application Number DRAINAGE

Property Owner: Cardi Corp
Property Location: New London Turnpike, AP 16 Lot 1, 3, Coventry
Date of Test Hole: August 27, 2020
Soil Evaluator: Kevin Fetzer License Number: D-4029
Weather: Sunny, Warm Shaded: Yes ☒ No ☐ Time: 0900

	TH 2010 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab. S. Con.	Texture	Structure	Consistence	in/hr ft/min
FILL	^C	16 - 0	a	s	2.5Y 6/2			fs	O - sg	loose	8.27 0.0115
	C	0 - 16	a	s	2.5 6/2			sil	O - m	fr	0.27 0.0004
	2C	16 - 30	a	s	2.5Y 6/2			fs	O - sg	loose	8.27 0.0115
	3C	30 - 84	a	s	2.5Y 5/3			fs	O - pl	vfr	8.27 0.0115
	4C	84-164			2.5Y 6/2			s	0 - sg	loose	8.27 0.0115

	TH 2011 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab. S. Con.	Texture	Structure	Consistence	in/hr ft/min
FILL	^C	13 - 0	a	s	10YR 6/1			s	O - sg	loose	8.27 0.0115
	C	0 - 13	a	s	2.5Y 6/2			fs	O - pl	fr	8.27 0.0115
	C'	13 - 35	a	s	2.5Y 5/3			fs	O - pl	fr	1.02 0.0014
	2C	35 - 60	a	s	10YR 6/2			fs	O - sg	loose	8.27 0.0115
	C''	60-155			2.5Y 6/2			lfs	O - pl	fr	2.41 0.0033

Soil Class: HTM over Ice Contact/Lacustrine
Total Depth of each Test Hole: 180" - 168"
Depth to Groundwater Seepage: No Groundwater Seepage Encountered
Depth to Impervious or Limiting Layer: No Ledge Encountered
Estimated Seasonal High Water Table: 104" OG 131" OG
Comments: HTM = Fill Material ; IC = Ice Contact
OG = Original Grade

Part B

Site Evaluation - to be completed by Class II or III Designer or Soil Evaluator

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:
- Approximate location of test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north

1. Relief and Slope: ______
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES☐ NO☐
6. Has soil been excavated from or fill deposited on site? YES☐ NO☐ If yes, locate on above sketch
7. Site's potential for flooding or ponding: NONE☐ SLIGHT☐ MODERATE☐ SEVERE☐
8. Landscape position: ______
9. Vegetation: ______
10. Indicate approximate location of property lines and roadways.
11. Additional comments, site constraints or additional information regarding site: ______

The soil evaluation results will provide soil texture and the estimated depth to the Seasonal High Water Table (SHWT) based upon qualitative field assessment techniques. No lab analysis of soil material is proposed to verify qualitative estimates in the field. To definitively determine the actual depth to the SHWT, it is necessary to install monitoring wells/pipes and record water level fluctuations over a long time period. No long-term monitoring is proposed. Original soil texture and SHWT estimates may need to be revised based upon additional information from other soil evaluations, excavations, and/or bottom inspections prior to the OWTS installation or drainage structure installation. Soil evaluations for septic system design only, not for foundation elevation.

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: D-4029

Signature License #

Part B prepared by: ______

Signature License #

FOR OFFICE USE ONLY

Decision: Approved ☐ Disclaimed ☐

Comments: ______

______

______

______

______ ______

Signature Authorized Agent Date

revised 5/8/01

State of Rhode Island and Providence Plantations
Department of Environmental Management
Office of Water Resources

Site Evaluation Form
Part A - Soil Profile Description

Application Number: DRAINAGE

Property Owner: Cardi Corp
Property Location: New London Turnpike, AP 16 Lot 1, 3, Coventry
Date of Test Hole: August 27, 2020
Soil Evaluator: Kevin Fetzer   License Number: D-4029
Weather: Sunny, Warm   Shaded: Yes [X] No [ ]   Time: 0900

	TH 2012 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab.	S.	Con.	Texture	Structure	Consistence	in/hr ft/min
FILL	^C	18 - 0	a	s	2.5Y 4/3					lfs	O - m	fr	2.41 0.0033
	C	0 - 48	a	s	2.5 5/3					lfs	O - pl	fr	2.41 0.0033
	2C	48-150			2.5Y 6/2					fs	O - sg	loose	8.27 0.0115

	TH 2013 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab.	S.	Con.	Texture	Structure	Consistence	in/hr ft/min
FILL	^C	98 - 88	a	s	10YR 6/3					s	O - sg	loose	8.27 0.0115
FILL	^2C	88 - 72	a	s	2.5Y 4/3					s	O - sg	loose	8.27 0.0115
FILL	^3C	72 - 42	a	s	2.5Y 4/4					ls	O - m	fr	2.41 0.0033
	2C	42 - 0	a	s	2.5Y 3/3					gls	O - m	fr	2.41 0.0033
	Bb	0 - 30	a	s	10YR 4/6					sl	1 sbk f	fr	1.02 0.0014
	C	30-58			10YR 5/4					gls	O - sg	loose	8.27 0.0115

Soil Class: HTM over Ice Contact/Lacustrine
Total Depth of each Test Hole: 168" - 156"
Depth to Groundwater Seepage: No Groundwater Seepage Encountered
Depth to Impervious or Limiting Layer: No Ledge Encountered
Estimated Seasonal High Water Table: 78" OG   30" OG
Comments: HTM = Fill Material : IC = Ice Contact
OG = Original Grade

Part B

<u>**Site Evaluation** - to be completed by Class II or III Designer or Soil Evaluator</u>

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:
- Approximate location of test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north

1. Relief and Slope: ______
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES☐ NO☐
6. Has soil been excavated from or fill deposited on site? YES☐ NO☐ If yes, locate on above sketch
7. Site's potential for flooding or ponding: NONE☐ SLIGHT☐ MODERATE☐ SEVERE☐
8. Landscape position: ______
9. Vegetation: ______
10. Indicate approximate location of property lines and roadways.
11. Additional comments, site constraints or additional information regarding site: ______

The soil evaluation results will provide soil texture and the estimated depth to the Seasonal High Water Table (SHWT) based upon qualitative field assessment techniques. No lab analysis of soil material is proposed to verify qualitative estimates in the field. To definitively determine the actual depth to the SHWT, it is necessary to install monitoring wells/pipes and record water level fluctuations over a long time period. No long-term monitoring is proposed. Original soil texture and SHWT estimates may need to be revised based upon additional information from other soil evaluations, excavations, and/or bottom inspections prior to the OWTS installation or drainage structure installation. Soil evaluations for septic system design only, not for foundation elevation.

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: D-4029

Signature License #

Part B prepared by:

Signature License #

FOR OFFICE USE ONLY

Decision: Approved ☐ Disclaimed ☐

Comments: ______

______

______

______

______ ______

Signature Authorized Agent Date

revised 5/8/01

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources

Site Evaluation Form
Part A - Soil Profile Description

Application Number DRAINAGE

Property Owner: Cardi Corp
Property Location: New London Turnpike, AP 16 Lot 1, 3, Coventry
Date of Test Hole: August 27, 2020
Soil Evaluator: Kevin Fetzer   License Number: D-4029
Weather: Sunny, Warm   Shaded: Yes ☒ No ☐   Time: 0900

TH 2014 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab.	S.	Con.	Texture	Structure	Consistence	in/hr ft/min
B	0 - 21	a	s	10YR 5/6					fsl	1 sbk f	fr	1.02 0.0014
C	21 - 30	a	s	2.5 5/2					sil	O - m	fr	0.27 0.0004
2C	30-144			2.5Y 5/2					cb vgls	O - m	fr	2.41 0.0033

TH 2015 Horizon	Depth	Horizon Boundaries Dist	Topo	Soil Colors Matrix	Re-Dox Features	Re-Dox Description Ab.	S.	Con.	Texture	Structure	Consistence	in/hr ft/min
^C	60 - 52	a	w	10YR 5/4					gs	O - sg	loose	8.27 0.0115
^2C	52 - 42	a	w	2.5Y 5/3					cb gls	O - m	fr	2.41 0.0033
^3C	42 - 0	a	s	10YR 5/4					cb gls	O - m	fr	2.41 0.0033
C	0 - 96			2.5Y 5/2					cb gcos	O - sg	loose	8.27 0.0115

FILL

Soil Class: HTM over Ice Contact
Total Depth of each Test Hole: 144" - 156"
Depth to Groundwater Seepage: No Groundwater Seepage Encountered
Depth to Impervious or Limiting Layer: No Ledge Encountered
Estimated Seasonal High Water Table: 96" 36" OG
Comments: HTM = Fill Material : IC = Ice Contact
OG = Original Grade

Part B

Site Evaluation - to be completed by Class II or III Designer or Soil Evaluator

Please use the area below to locate:

1. Test holes
2. Approximate direction of due north
3. Offsets from test holes to fixed points such as street, utility pole, or other permanent, marked object

Key:

- Approximate location of test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north

1. Relief and Slope: ____
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
3. Presence of existing or proposed private drinking water wells within 200 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
4. Public drinking water wells within 500 feet of test holes: YES☐ NO☐ If yes, locate on above sketch.
5. Is site within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00? YES☐ NO☐
6. Has soil been excavated from or fill deposited on site? YES☐ NO☐ If yes, locate on above sketch
7. Site's potential for flooding or ponding: NONE☐ SLIGHT☐ MODERATE☐ SEVERE☐
8. Landscape position: ____
9. Vegetation: ____
10. Indicate approximate location of property lines and roadways.
11. Additional comments, site constraints or additional information regarding site: ____

The soil evaluation results will provide soil texture and the estimated depth to the Seasonal High Water Table (SHWT) based upon qualitative field assessment techniques. No lab analysis of soil material is proposed to verify qualitative estimates in the field. To definitively determine the actual depth to the SHWT, it is necessary to install monitoring wells/pipes and record water level fluctuations over a long time period. No long-term monitoring is proposed. Original soil texture and SHWT estimates may need to be revised based upon additional information from other soil evaluations, excavations, and/or bottom inspections prior to the OWTS installation or drainage structure installation. Soil evaluations for septic system design only, not for foundation elevation.

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: ____ D-4029

Signature License #

Part B prepared by: ____

Signature License #

FOR OFFICE USE ONLY

Decision: Approved ☐ Disclaimed ☐

Comments: ____

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Signature Authorized Agent Date