

EDWIN A. REIMON, P.E., C.M.E.
Engineering Services

STORM WATER MANAGEMENT REPORT

**PROPOSED 3 STORY MULTI-FAMILY BUILDING
296 OLD BERGEN ROAD
BLOCK 27004, LOT 46**

**LOCATED IN
CITY OF JERSEY CITY
HUDSON COUNTY, NEW JERSEY**

August 2023

A handwritten signature in blue ink, appearing to read 'Edwin A. Reimon', with a horizontal line underneath.

Edwin A. Reimon, P.E.
NJ License No. 38694

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- USDA NRCS 24 HR Rainfall Frequency Data

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I. INTRODUCTION

The subject of this report is to demonstrate compliance with the City of Jersey City requirements for Water Quality and Water Quantity, as well as any State requirements regarding stormwater runoff Quality and Quantity as described in the New Jersey Department of Environmental Protection Stormwater Best Management Practices Manual (N.J.A.C 7:8 - Stormwater Management Rules).

The development is known as Block 27004, Lot 46 located at 296 Bergen Road, in the City of Jersey City, Hudson County, New Jersey. The project site fronts along Old Bergen Road.

II. PRE-DEVELOPED CONDITIONS

The total property on which the proposed development will be constructed is approximately 5,000 SF or 0.115 acres. The site is currently improved with a two story frame dwelling with block garage, wood deck, asphalt driveway, concrete pad and artificial turf areas.

The site soils per the National Resource Conservation Services is: UREOLB

- UREOLB – Urban Land, eolian substratum, 0 to 8 percent slopes

Since the Hydrologic Soil Group (HSG) is not determined for this type of soil an estimated soil type “D” will be used which is consistent with Urban Land Complex.

Pre-Developed Average CN calculation:

Cover Type	Area	CN
Area A – Impervious	0.094	98
Area B – Pervious	0.014	84

Pre-Developed site discharge:

Storm Event	Pre-Dev. Condition (CFS)
2 Year	0.248
10 Year	0.393
100 Year	0.688

III. POST-DEVELOPED CONDITIONS

The post developed site will cover the entire property for the multi-family residential with commercial building. The post-developed area will be the same as the existing 7,511 SF or 0.173 acres with a green roof and blue roof component for reducing the discharge from the site.

Post-Developed Average CN calculation:

Cover Type	Area	CN
Area A – Impervious	0.089	98
Area B – Pervious	0.019	84

Storm Event Area	Post-Dev. Un-Routed Condition (CFS)
2 Year	0.244
10 Year	0.389
100 Year	0.684

IV. HYDROLOGIC ANALYSIS

Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2021 computer software was used to develop the runoff hydrographs of the pre and post-developed conditions for the 2, 10 & 100 year storm events. The USDA Natural Resources Conservation Service (NRCS) methodology was used to compute stormwater runoff rates, volumes and hydrographs.

In accordance with N.J.A.C. 7:8-1.2 the project is considered a “Minor Development” since less than one (1) acre of land will be disturbed and less than 0.25 acres of impervious increase. Per N.J.A.C. when considered a Minor Development the post developed drainage shall therefore match the pre-developed drainage.

	Pre-Dev. Condition				Post Developed	
Storm Event	Pre-Dev. Condition (CFS)	Reduction Rate	Post-Dev. Max. Total Allowable cfs		Post-Dev. Unrouted cfs	Post- Dev. Routed cfs
2yr	0.248	MATCH	0.248		0.244	0.141
10yr	0.393	MATCH	0.393		0.389	0.180
100yr	0.688	MATCH	0.688		0.684	0.322

V. CONCLUSION

The proposed 3 story multi-family building with subsurface basin consisting of 140 LF of 30 Inch pipe will not present any adverse drainage impacts to the surrounding areas.

In summary, all applicable design criteria set forth by the NJDEP Stormwater Management Best Management Practices and N.J.A.C Stormwater Management requirements and Jersey City have been met.

Appendix A: Hydrologic Analysis References



State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

WATERSHED AND LAND MANAGEMENT

DIVISION OF RESILIENCE ENGINEERING AND CONSTRUCTION

OFFICE OF DAM SAFETY & FLOOD ENGINEERING

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SHAWN M. LATOURETTE

Commissioner

July 1, 2022

Updated New Jersey 24-hour Rainfall Frequency Data

The Bureau of Dam Safety is disseminating updated New Jersey 24-hour rainfall frequency data based on the results of an independent study contracted by the NJDEP. The existing Atlas 14 volume available for New Jersey was last updated in 2006 and included data through 1999. This new independent study incorporates the past two decades of rainfall events and allows the State to plan and design projects based on current data through 2019. Effective immediately, the updated rainfall amounts must be utilized for applicable hydrologic and hydraulic studies as well as dam breach analyses for regulated dams in New Jersey. A summary report is available at: www.nj.gov/dep/dsr/publications/nj-atlas-14.pdf. For this transition, any study/analysis currently under review utilizing existing rainfall data is not required to be revised and resubmitted at this time. However, the updated rainfall amounts may need to be incorporated into any studies otherwise requiring revisions and/or your final rehabilitation design. Please contact the Bureau to discuss your specific case. Please refer to the spreadsheet for the rainfall adjustment factors which were developed from the independent study. These factors shall be applied to the NOAA Atlas 14-point precipitation frequency estimates available at https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=nj. The previous and updated average county-specific 24-hour frequency rainfall amounts are also provided on the spreadsheet for reference. Please note that these updates do not apply to any dam with a spillway design storm based on a Probable Maximum Precipitation (PMP) event and the above adjustment factors should not be utilized in those cases. The NJDEP is also updating PMP data for NJ and additional information concerning implementation of that data will be disseminated upon completion of the study.

Should you have any questions regarding this information or wish to discuss a specific project, please contact the Bureau.

NJDEP Bureau of Dam Safety

E-mail: DamSafety@dep.nj.gov

Phone: 609-984-0859

New Jersey
ATLAS 14 Updated 24-Hour Rainfall Through 2019**
(Inches)

	2-Year	10-Year	100-Year
Atlantic	3.34	5.26	9.17
Bergen	3.37	5.22	8.98
Burlington	3.33	5.23	9.16
Camden	3.41	5.26	8.95
Cape May	3.35	5.22	9.08
Cumberland	3.37	5.24	8.85
Essex	3.47	5.38	9.18
Gloucester	3.45	5.35	9.06
Hudson	3.41	5.27	9.06
Hunterdon	3.45	5.25	9.07
Mercer	3.34	5.11	8.66
Middlesex	3.35	5.17	8.89
Monmouth	3.38	5.28	9.12
Morris	3.58	5.40	8.85
Ocean	3.42	5.38	9.48
Passaic	3.47	5.33	9.05
Salem	3.33	5.15	8.70
Somerset	3.34	5.16	8.95
Sussex	3.32	4.89	8.11
Union	3.42	5.33	9.21
Warren	3.41	5.23	8.99

***Changes in Hourly and Daily Extreme Rainfall Amounts in NJ since the Publication of NOAA Atlas 14 Volume*
www.nj.gov/dep/dsr/publications/nj-atlas-14.pdf

Date: June 2022

	NRCS 24-Hour Rainfall Frequency Data (Through 1999)*			ATLAS 14 Update Adjustment Factors			ATLAS 14 Updated 24-Hour Rainfall Data (Through 2019)**			Difference (Inches)		
	2-Year	10-Year	100-Year	2-Year	10-Year	100-Year	2-Year	10-Year	100-Year	2-Year	10-Year	100-Year
Atlantic	3.31	5.16	8.90	1.01	1.02	1.03	3.34	5.26	9.17	0.03	0.10	0.27
Bergen	3.34	5.07	8.47	1.01	1.03	1.06	3.37	5.22	8.98	0.03	0.15	0.51
Burlington	3.36	5.18	8.81	0.99	1.01	1.04	3.33	5.23	9.16	-0.03	0.05	0.35
Camden	3.31	5.06	8.52	1.03	1.04	1.05	3.41	5.26	8.95	0.10	0.20	0.43
Cape May	3.25	5.07	8.73	1.03	1.03	1.04	3.35	5.22	9.08	0.10	0.15	0.35
Cumberland	3.27	5.09	8.76	1.03	1.03	1.01	3.37	5.24	8.85	0.10	0.15	0.09
Essex	3.44	5.22	8.66	1.01	1.03	1.06	3.47	5.38	9.18	0.03	0.16	0.52
Gloucester	3.29	5.05	8.55	1.05	1.06	1.06	3.45	5.35	9.06	0.16	0.30	0.51
Hudson	3.31	5.02	8.31	1.03	1.05	1.09	3.41	5.27	9.06	0.10	0.25	0.75
Hunterdon	3.38	5.00	8.03	1.02	1.05	1.13	3.45	5.25	9.07	0.07	0.25	1.04
Mercer	3.31	5.01	8.33	1.01	1.02	1.04	3.34	5.11	8.66	0.03	0.10	0.33
Middlesex	3.35	5.12	8.63	1.00	1.01	1.03	3.35	5.17	8.89	0.00	0.05	0.26
Monmouth	3.38	5.23	8.94	1.00	1.01	1.02	3.38	5.28	9.12	0.00	0.05	0.18
Morris	3.54	5.24	8.35	1.01	1.03	1.06	3.58	5.40	8.85	0.04	0.16	0.50
Ocean	3.42	5.33	9.20	1.00	1.01	1.03	3.42	5.38	9.48	0.00	0.05	0.28
Passaic	3.47	5.23	8.62	1.00	1.02	1.05	3.47	5.33	9.05	0.00	0.10	0.43
Salem	3.26	5.00	8.45	1.02	1.03	1.03	3.33	5.15	8.70	0.07	0.15	0.25
Somerset	3.34	5.01	8.21	1.00	1.03	1.09	3.34	5.16	8.95	0.00	0.15	0.74
Sussex	3.22	4.70	7.58	1.03	1.04	1.07	3.32	4.89	8.11	0.10	0.19	0.53
Union	3.39	5.17	8.69	1.01	1.03	1.06	3.42	5.33	9.21	0.03	0.16	0.52
Warren	3.34	4.89	7.82	1.02	1.07	1.15	3.41	5.23	8.99	0.07	0.34	1.17

* NRCS New Jersey Supplement Engineering Field Handbook Chapter 2, Part 650 dated August 2012

** *Changes in Hourly and Daily Extreme Rainfall Amounts in NJ since the Publication of NOAA Atlas 14 Volume prepared by Cornell University, Ithaca NY dated October 2021*
www.nj.gov/dep/dsr/publications/nj-atlas-14.pdf

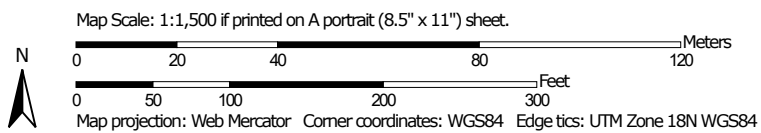
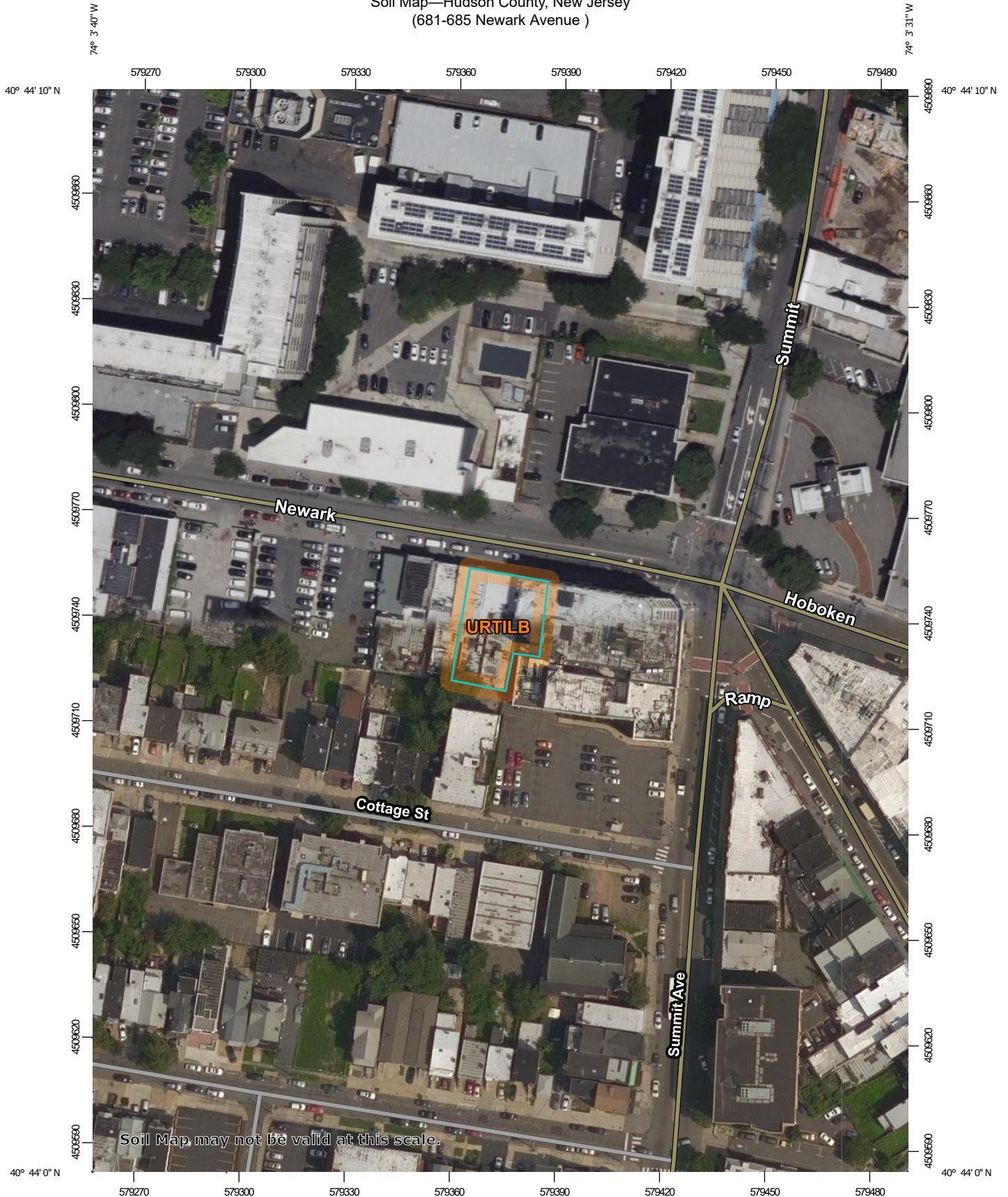
Date: June 2022

Table 2-2a Runoff curve numbers for urban areas ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type and hydrologic condition	Average percent impervious area ^{2/}	A	B	C	D
<i>Fully developed urban areas (vegetation established)</i>					
Open space (lawns, parks, golf courses, cemeteries, etc.) ^{3/} :					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only) ^{4/}		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
<i>Developing urban areas</i>					
Newly graded areas					
(pervious areas only, no vegetation) ^{5/}		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

¹ Average runoff condition, and $I_a = 0.2S$.² The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.³ CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.⁴ Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.⁵ Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Soil Map—Hudson County, New Jersey
(681-685 Newark Avenue)



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

6/18/2023
Page 1 of 3

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hudson County, New Jersey
Survey Area Data: Version 12, Aug 29, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 23, 2014—Jul 22, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

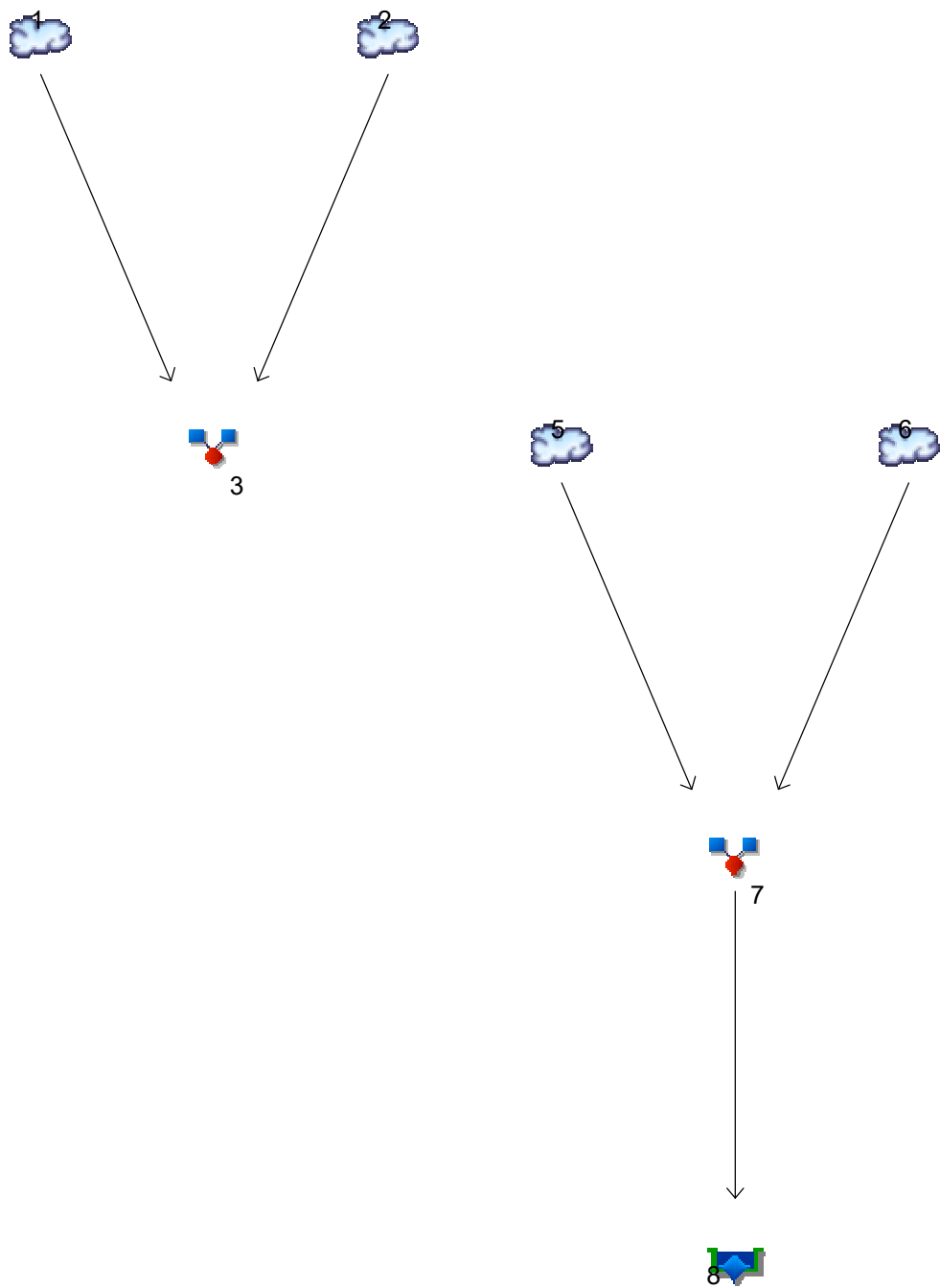
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
URTILB	Urban land, till substratum, 0 to 8 percent slopes	0.2	100.0%
Totals for Area of Interest		0.2	100.0%

Appendix B: Pre & Post-Developed Hydrographs

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	Existing Area A - IMP
2	SCS Runoff	Existing Area B - PERVIOUS
3	Combine	Existing
5	SCS Runoff	Prop Area A - IMP
6	SCS Runoff	Prop Area B - PERVIOUS
7	Combine	Proposed Pre-Routed
8	Reservoir	Basin 1 Routing

Hydrograph Return Period Recap

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

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	-----	-----	0.226	-----	-----	0.351	-----	-----	0.606	Existing Area A - IMP
2	SCS Runoff	-----	-----	0.022	-----	-----	0.042	-----	-----	0.082	Existing Area B - PERVIOUS
3	Combine	1, 2	-----	0.248	-----	-----	0.393	-----	-----	0.688	Existing
5	SCS Runoff	-----	-----	0.214	-----	-----	0.333	-----	-----	0.574	Prop Area A - IMP
6	SCS Runoff	-----	-----	0.030	-----	-----	0.057	-----	-----	0.111	Prop Area B - PERVIOUS
7	Combine	5, 6	-----	0.244	-----	-----	0.389	-----	-----	0.684	Proposed Pre-Routed
8	Reservoir	7	-----	0.141	-----	-----	0.180	-----	-----	0.322	Basin 1 Routing
Proj. file: 2.10.100.R0.gpw										Friday, 08 / 11 / 2023	

Hydrograph Summary Report

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

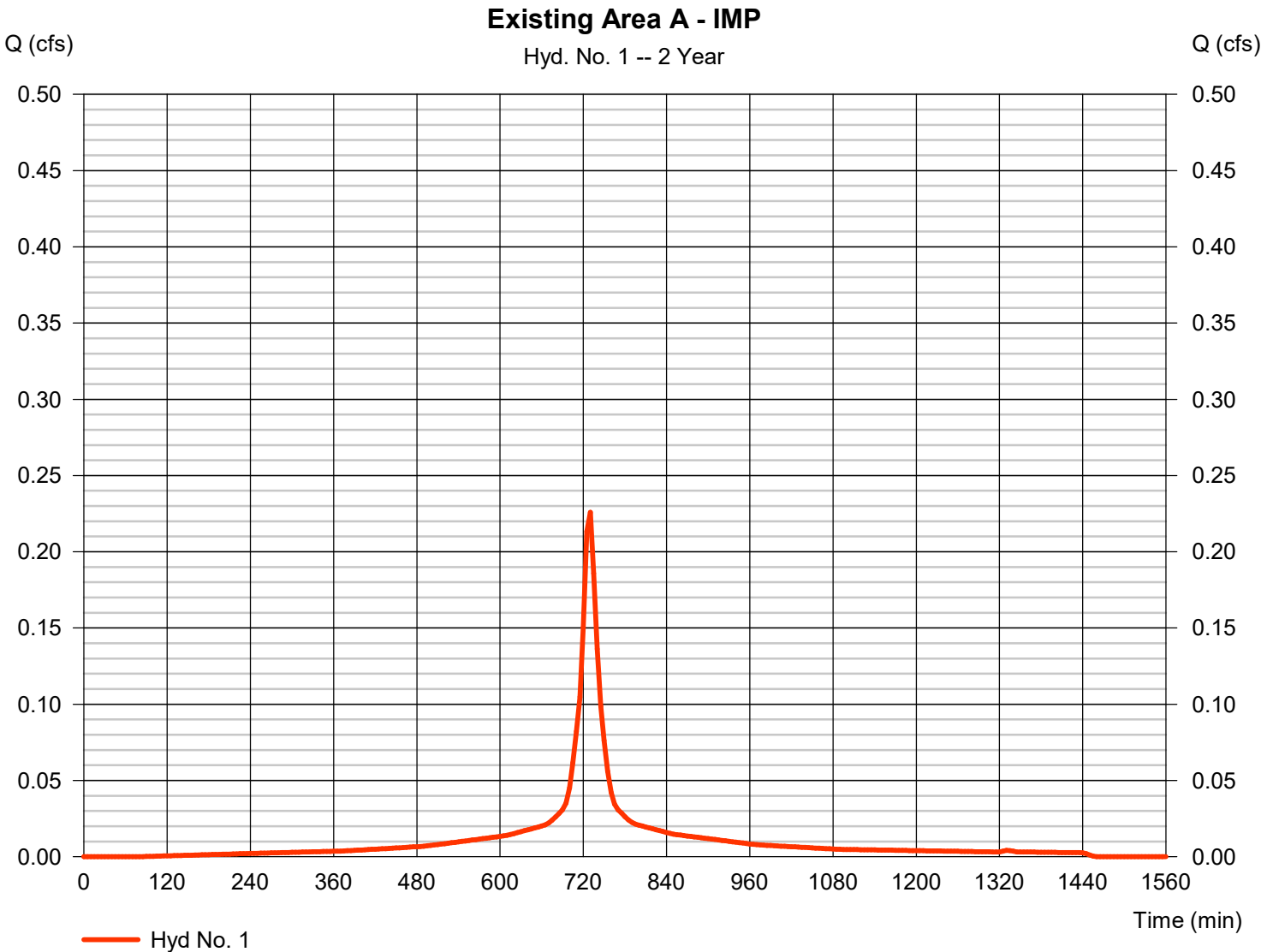
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.226	5	730	1,016	-----	-----	-----	Existing Area A - IMP
2	SCS Runoff	0.022	5	730	89	-----	-----	-----	Existing Area B - PERVIOUS
3	Combine	0.248	5	730	1,105	1, 2	-----	-----	Existing
5	SCS Runoff	0.214	5	730	962	-----	-----	-----	Prop Area A - IMP
6	SCS Runoff	0.030	5	730	120	-----	-----	-----	Prop Area B - PERVIOUS
7	Combine	0.244	5	730	1,082	5, 6	-----	-----	Proposed Pre-Routed
8	Reservoir	0.141	5	740	1,082	7	77.96	134	Basin 1 Routing
2.10.100.R0.gpw					Return Period: 2 Year			Friday, 08 / 11 / 2023	

Hydrograph Report

Hyd. No. 1

Existing Area A - IMP

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.226 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	5 min	Hyd. volume	=	1,016 cuft
Drainage area	=	0.094 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.41 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

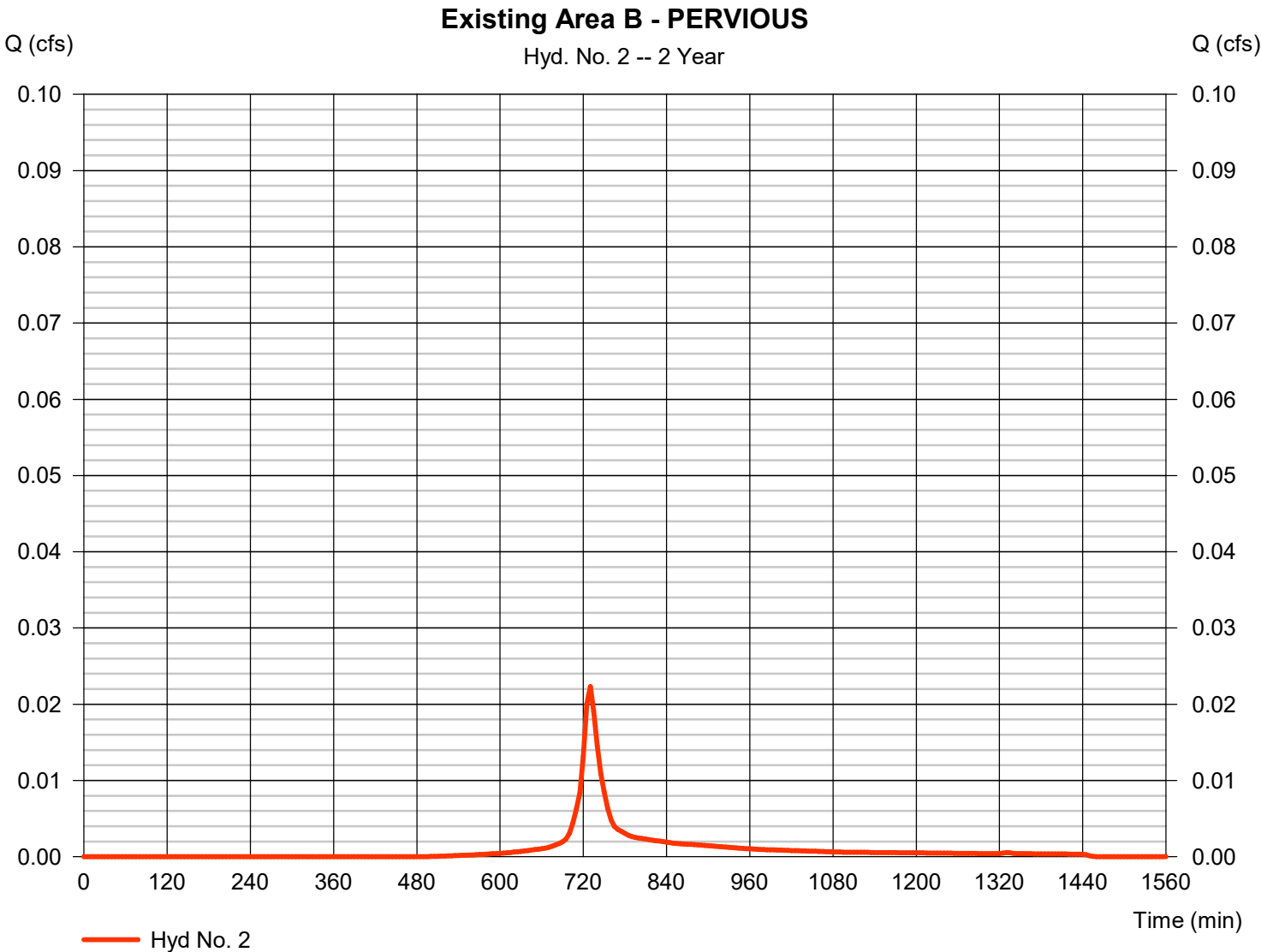


Hydrograph Report

Hyd. No. 2

Existing Area B - PERVIOUS

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.022 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	5 min	Hyd. volume	=	89 cuft
Drainage area	=	0.014 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.41 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

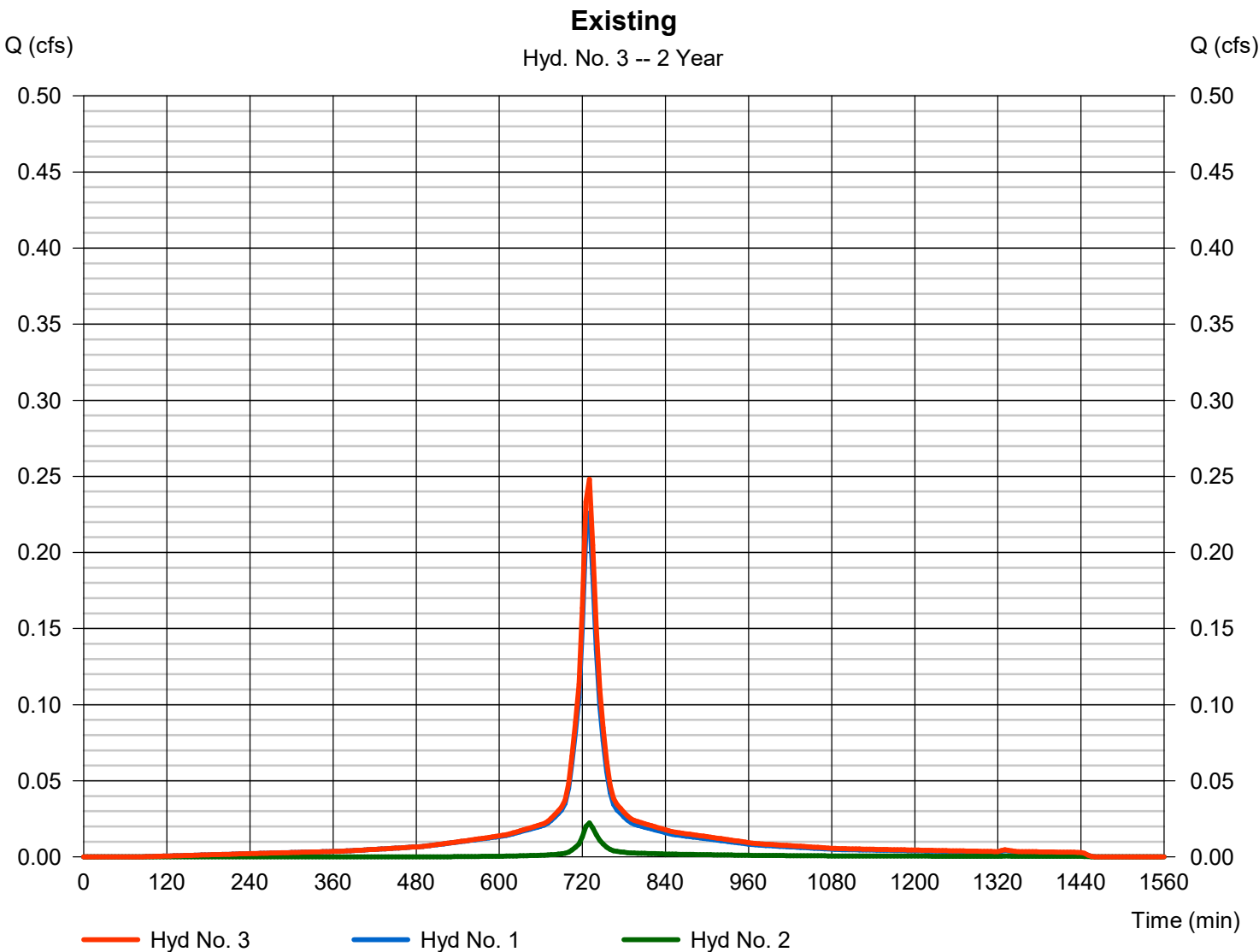


Hydrograph Report

Hyd. No. 3

Existing

Hydrograph type	= Combine	Peak discharge	= 0.248 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,105 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.108 ac

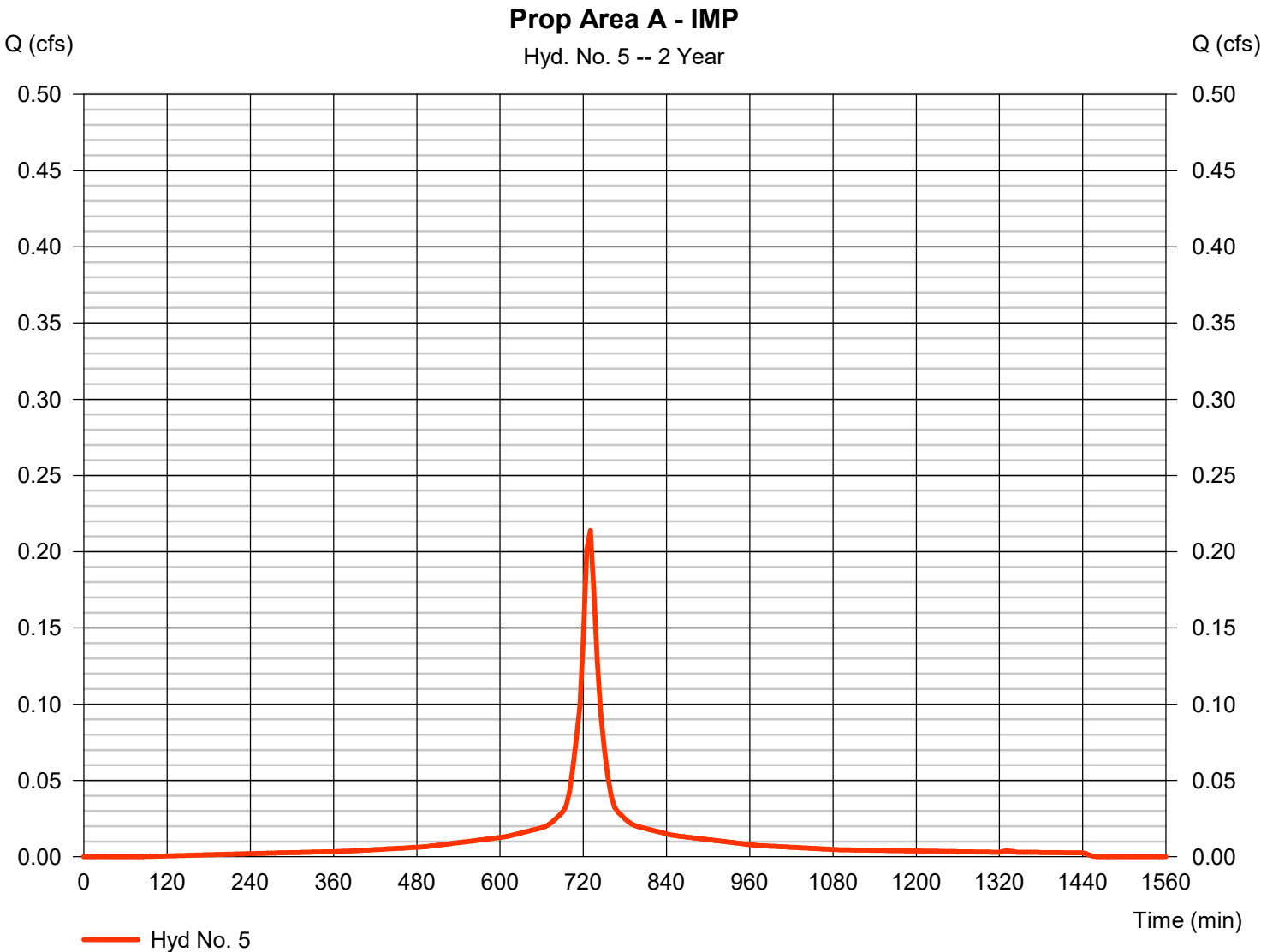


Hydrograph Report

Hyd. No. 5

Prop Area A - IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.214 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 962 cuft
Drainage area	= 0.089 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.41 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

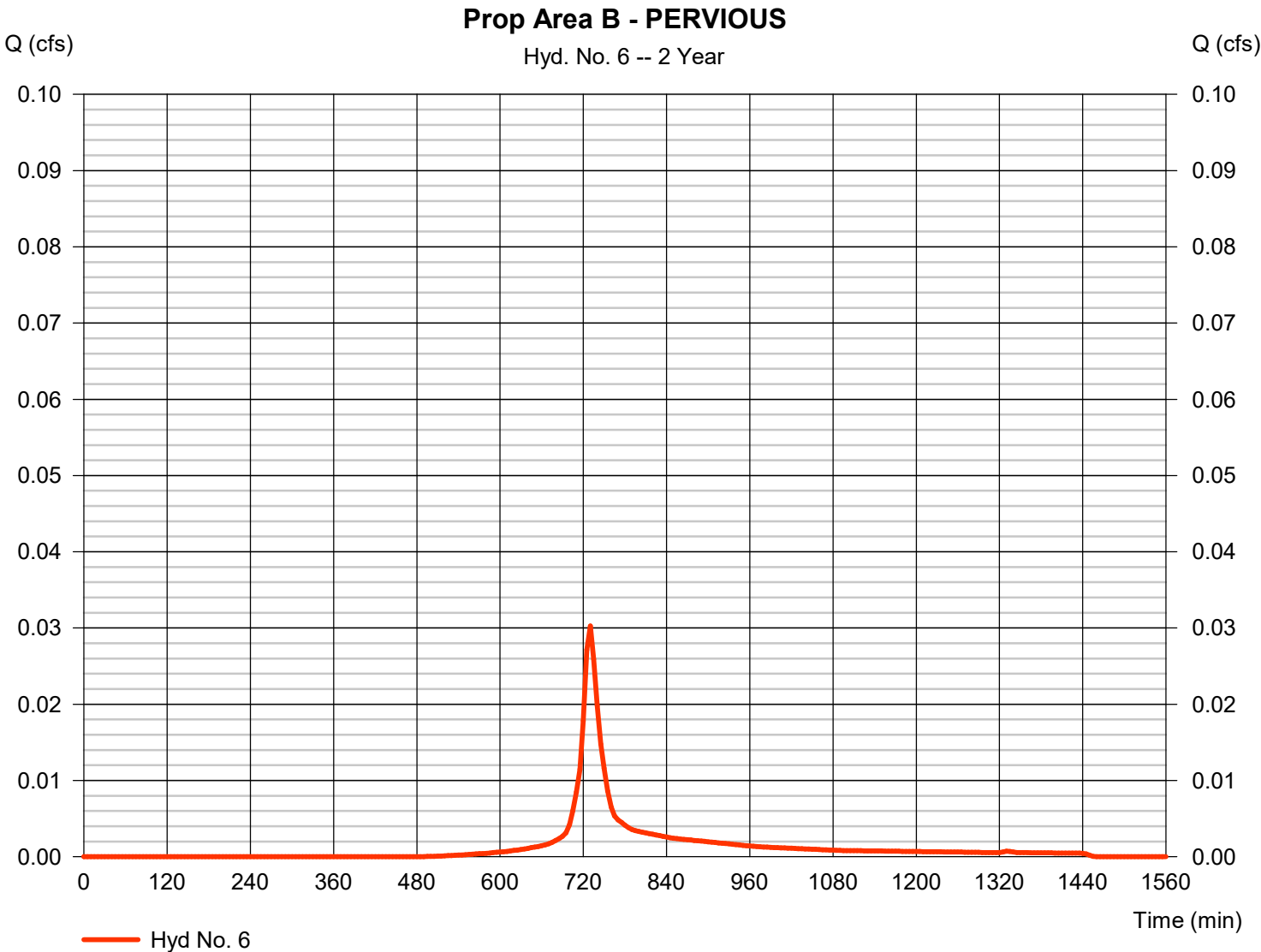


Hydrograph Report

Hyd. No. 6

Prop Area B - PERVIOUS

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.030 cfs
Storm frequency	=	2 yrs	Time to peak	=	730 min
Time interval	=	5 min	Hyd. volume	=	120 cuft
Drainage area	=	0.019 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	3.41 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

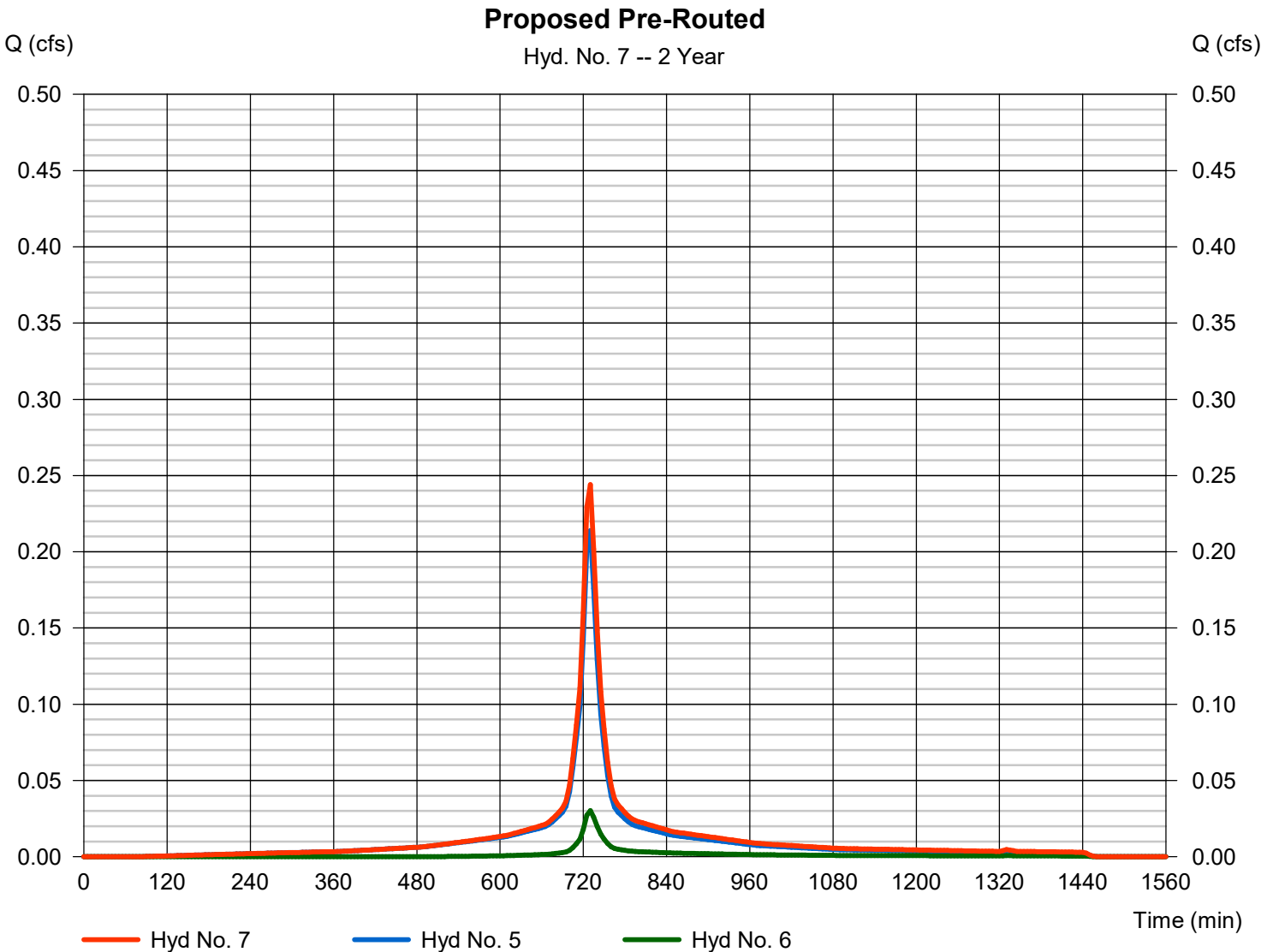


Hydrograph Report

Hyd. No. 7

Proposed Pre-Routed

Hydrograph type	= Combine	Peak discharge	= 0.244 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,082 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.108 ac



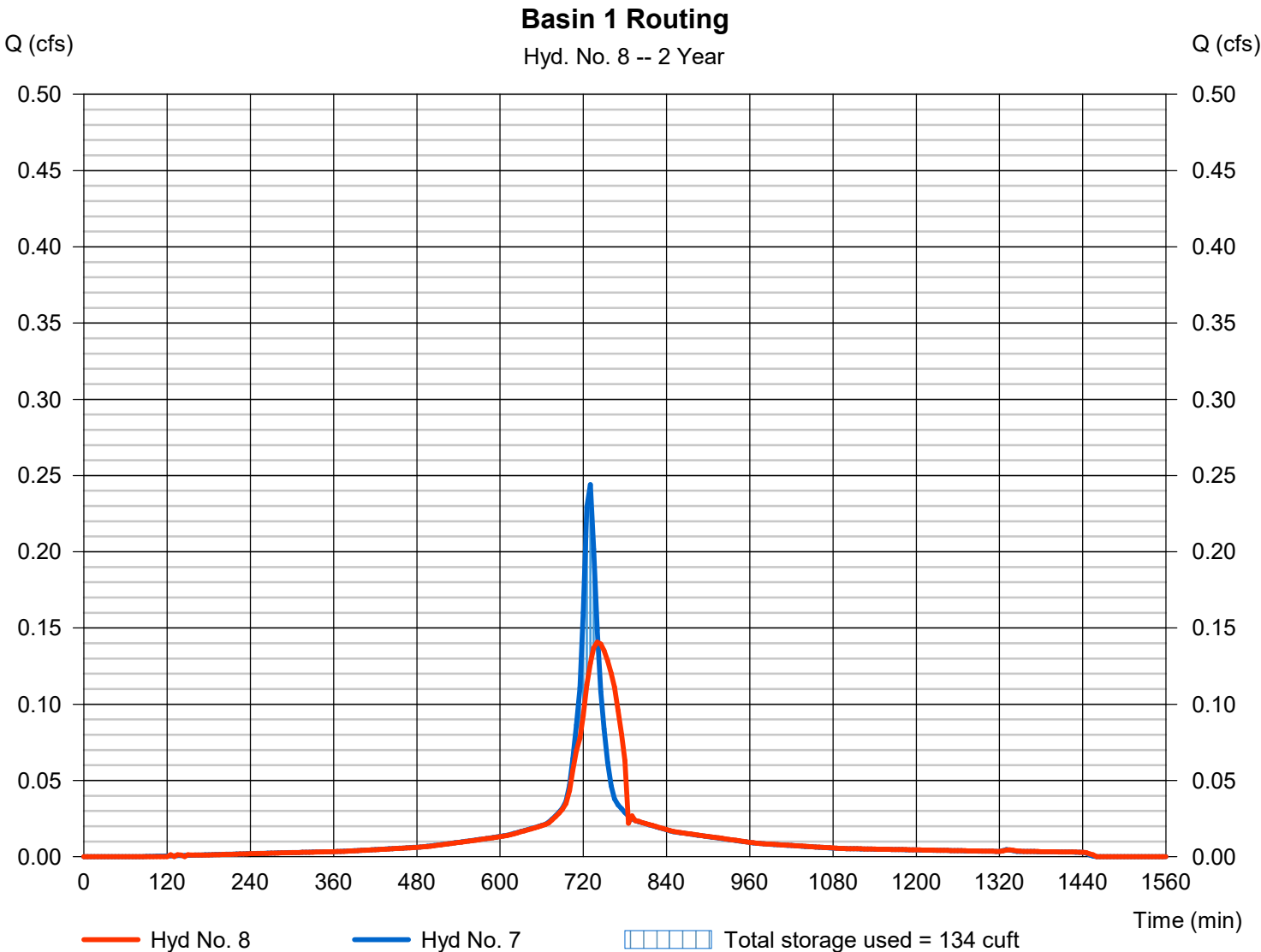
Hydrograph Report

Hyd. No. 8

Basin 1 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.141 cfs
Storm frequency	= 2 yrs	Time to peak	= 740 min
Time interval	= 5 min	Hyd. volume	= 1,082 cuft
Inflow hyd. No.	= 7 - Proposed Pre-Routed	Max. Elevation	= 77.96 ft
Reservoir name	= 140 LF 30 Inch Pipe	Max. Storage	= 134 cuft

Storage Indication method used.



Hydrograph Summary Report

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

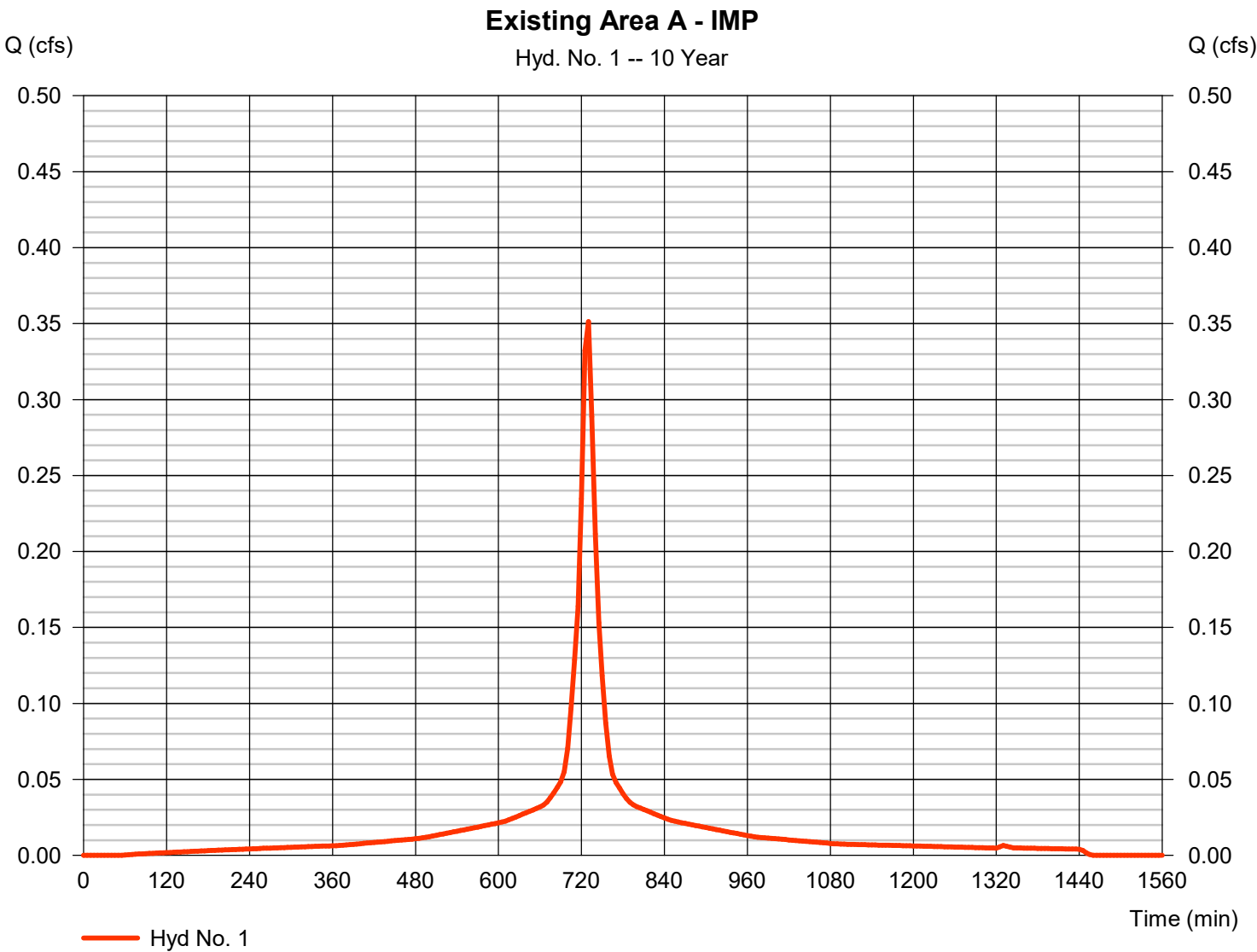
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.351	5	730	1,610	-----	-----	-----	Existing Area A - IMP
2	SCS Runoff	0.042	5	730	168	-----	-----	-----	Existing Area B - PERVIOUS
3	Combine	0.393	5	730	1,778	1, 2	-----	-----	Existing
5	SCS Runoff	0.333	5	730	1,524	-----	-----	-----	Prop Area A - IMP
6	SCS Runoff	0.057	5	730	227	-----	-----	-----	Prop Area B - PERVIOUS
7	Combine	0.389	5	730	1,752	5, 6	-----	-----	Proposed Pre-Routed
8	Reservoir	0.180	5	745	1,751	7	78.46	296	Basin 1 Routing
2.10.100.R0.gpw					Return Period: 10 Year			Friday, 08 / 11 / 2023	

Hydrograph Report

Hyd. No. 1

Existing Area A - IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.351 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,610 cuft
Drainage area	= 0.094 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

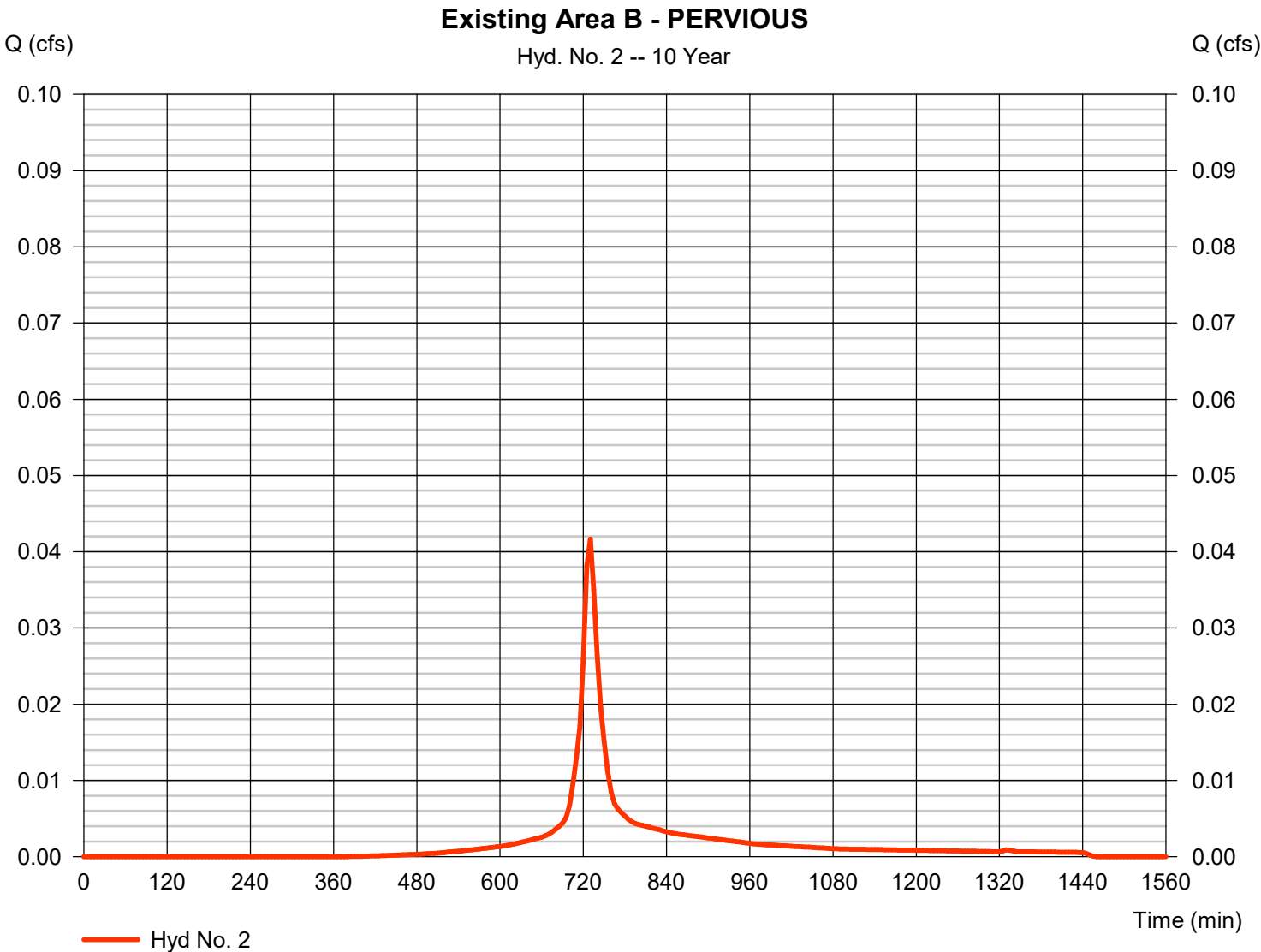


Hydrograph Report

Hyd. No. 2

Existing Area B - PERVIOUS

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.042 cfs
Storm frequency	=	10 yrs	Time to peak	=	730 min
Time interval	=	5 min	Hyd. volume	=	168 cuft
Drainage area	=	0.014 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.27 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

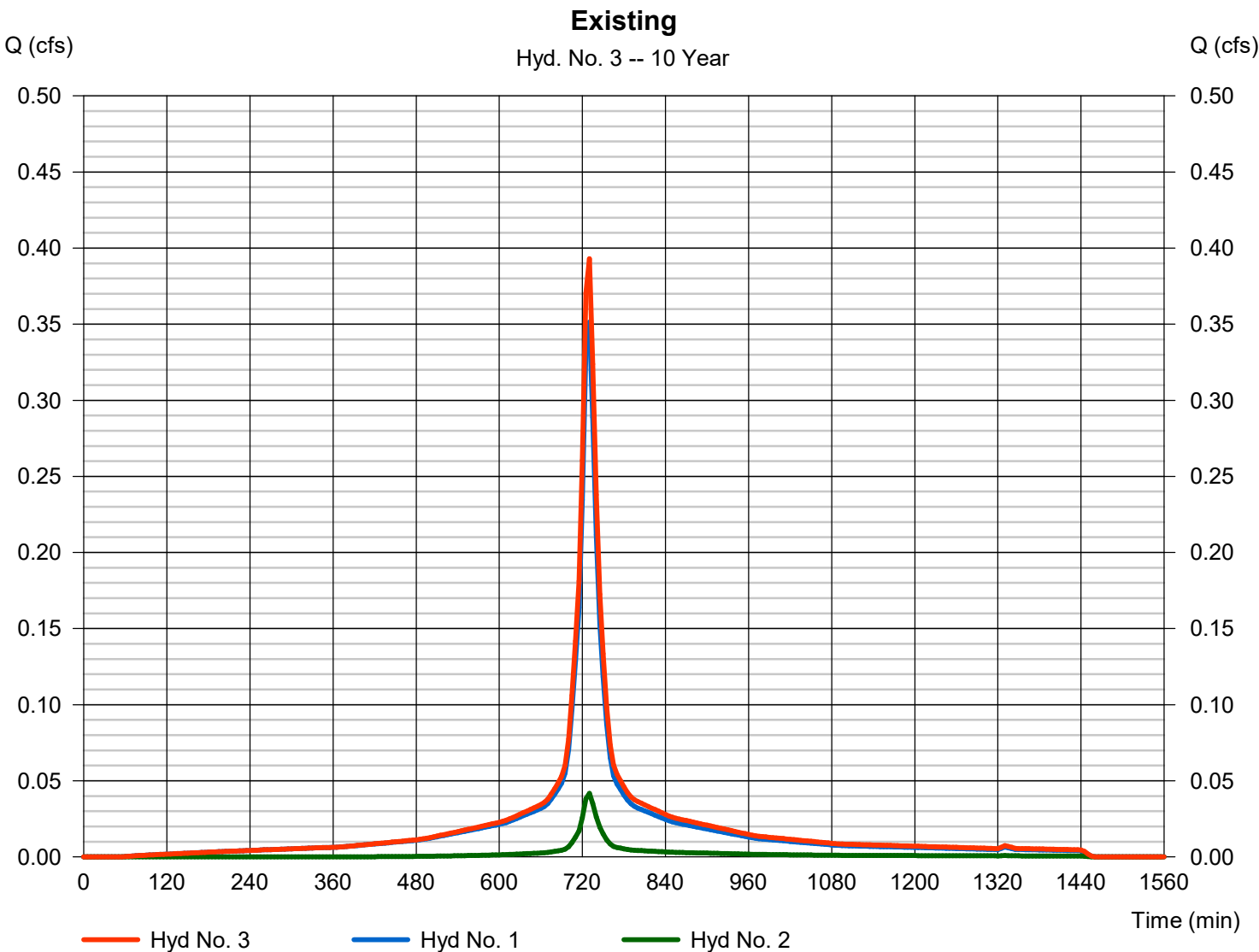


Hydrograph Report

Hyd. No. 3

Existing

Hydrograph type	= Combine	Peak discharge	= 0.393 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,778 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.108 ac

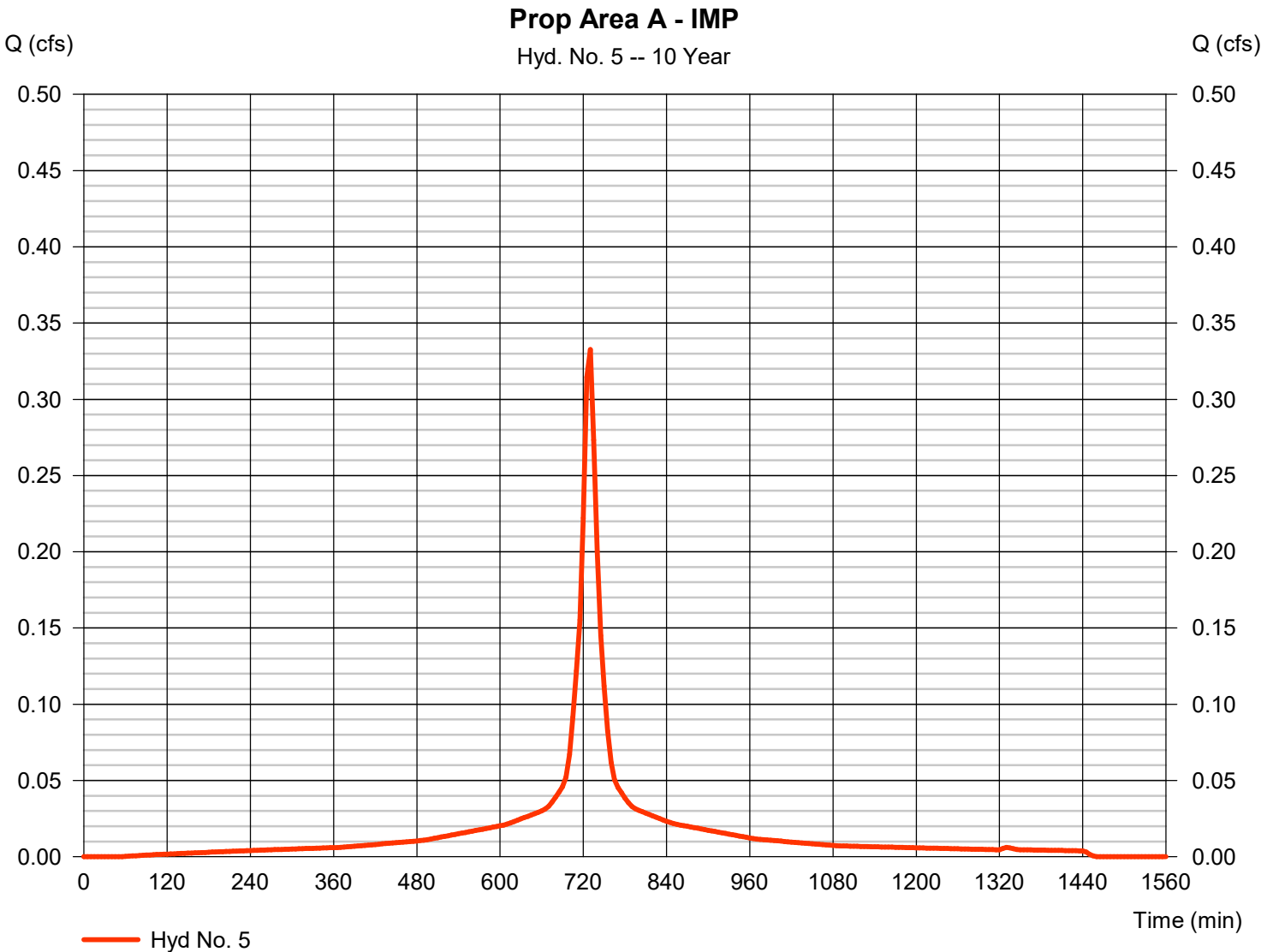


Hydrograph Report

Hyd. No. 5

Prop Area A - IMP

Hydrograph type	= SCS Runoff	Peak discharge	= 0.333 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,524 cuft
Drainage area	= 0.089 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.27 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

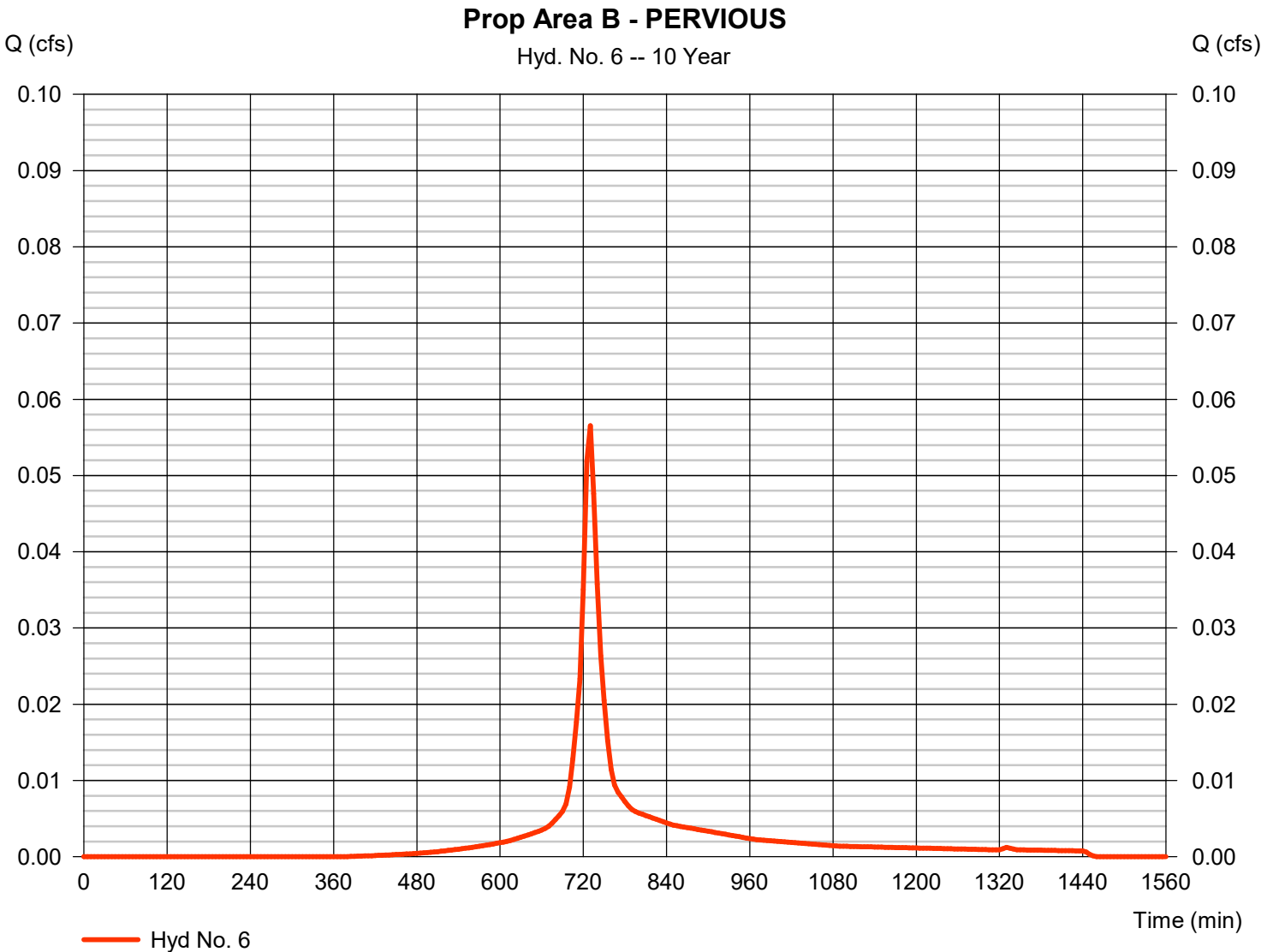


Hydrograph Report

Hyd. No. 6

Prop Area B - PERVIOUS

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.057 cfs
Storm frequency	=	10 yrs	Time to peak	=	730 min
Time interval	=	5 min	Hyd. volume	=	227 cuft
Drainage area	=	0.019 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	5.27 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

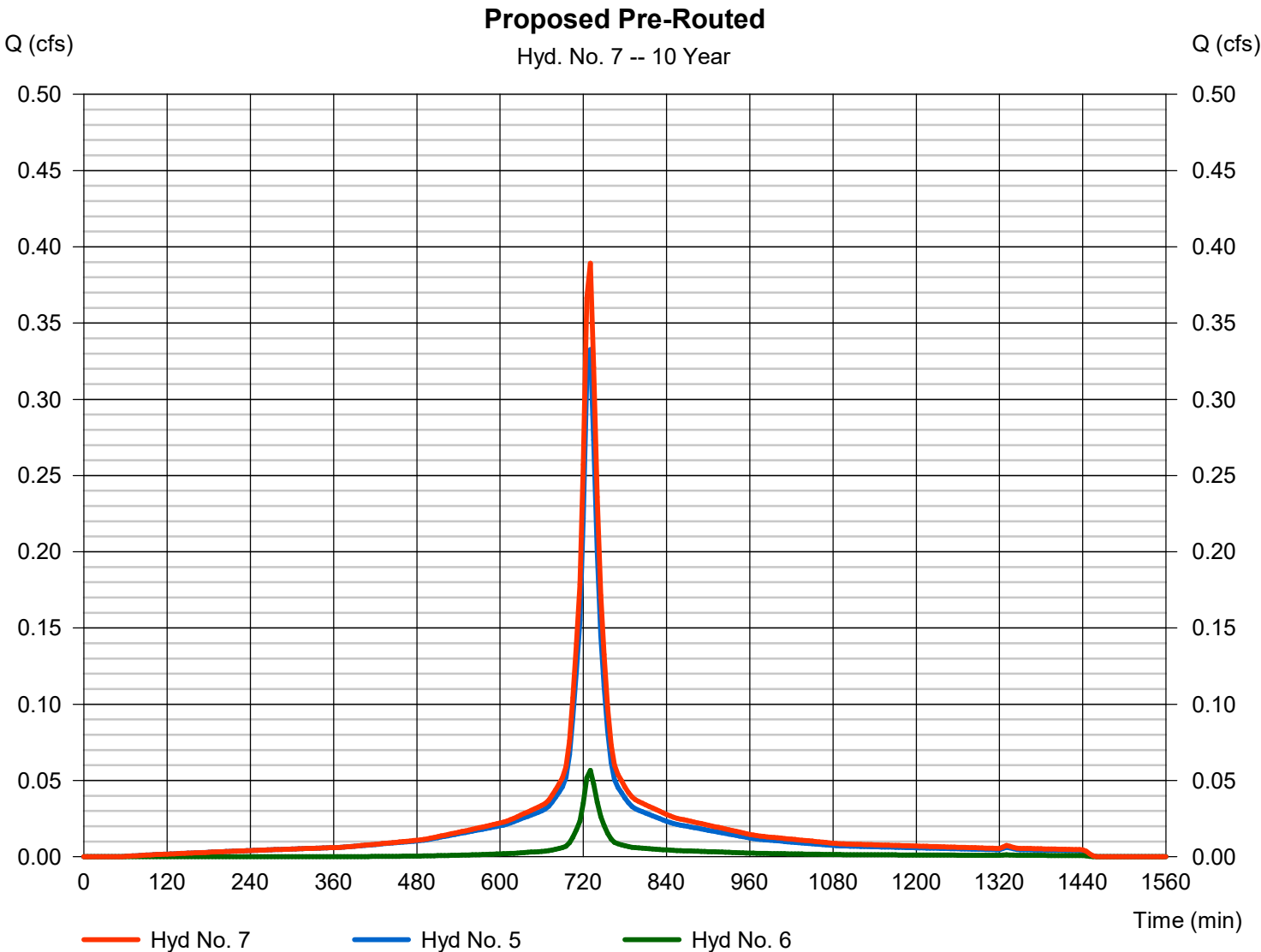


Hydrograph Report

Hyd. No. 7

Proposed Pre-Routed

Hydrograph type	= Combine	Peak discharge	= 0.389 cfs
Storm frequency	= 10 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 1,752 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.108 ac



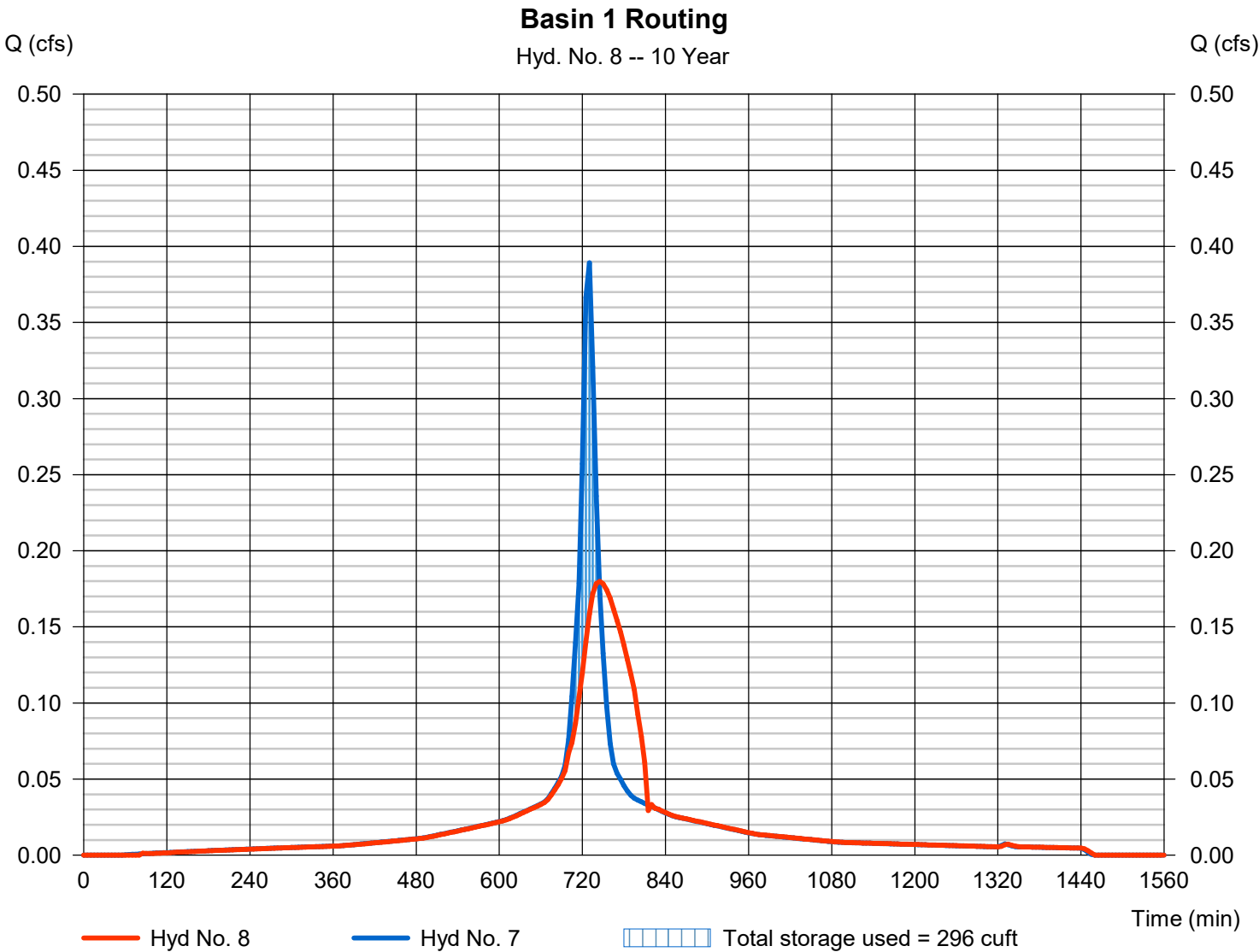
Hydrograph Report

Hyd. No. 8

Basin 1 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.180 cfs
Storm frequency	= 10 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 1,751 cuft
Inflow hyd. No.	= 7 - Proposed Pre-Routed	Max. Elevation	= 78.46 ft
Reservoir name	= 140 LF 30 Inch Pipe	Max. Storage	= 296 cuft

Storage Indication method used.



Hydrograph Summary Report

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

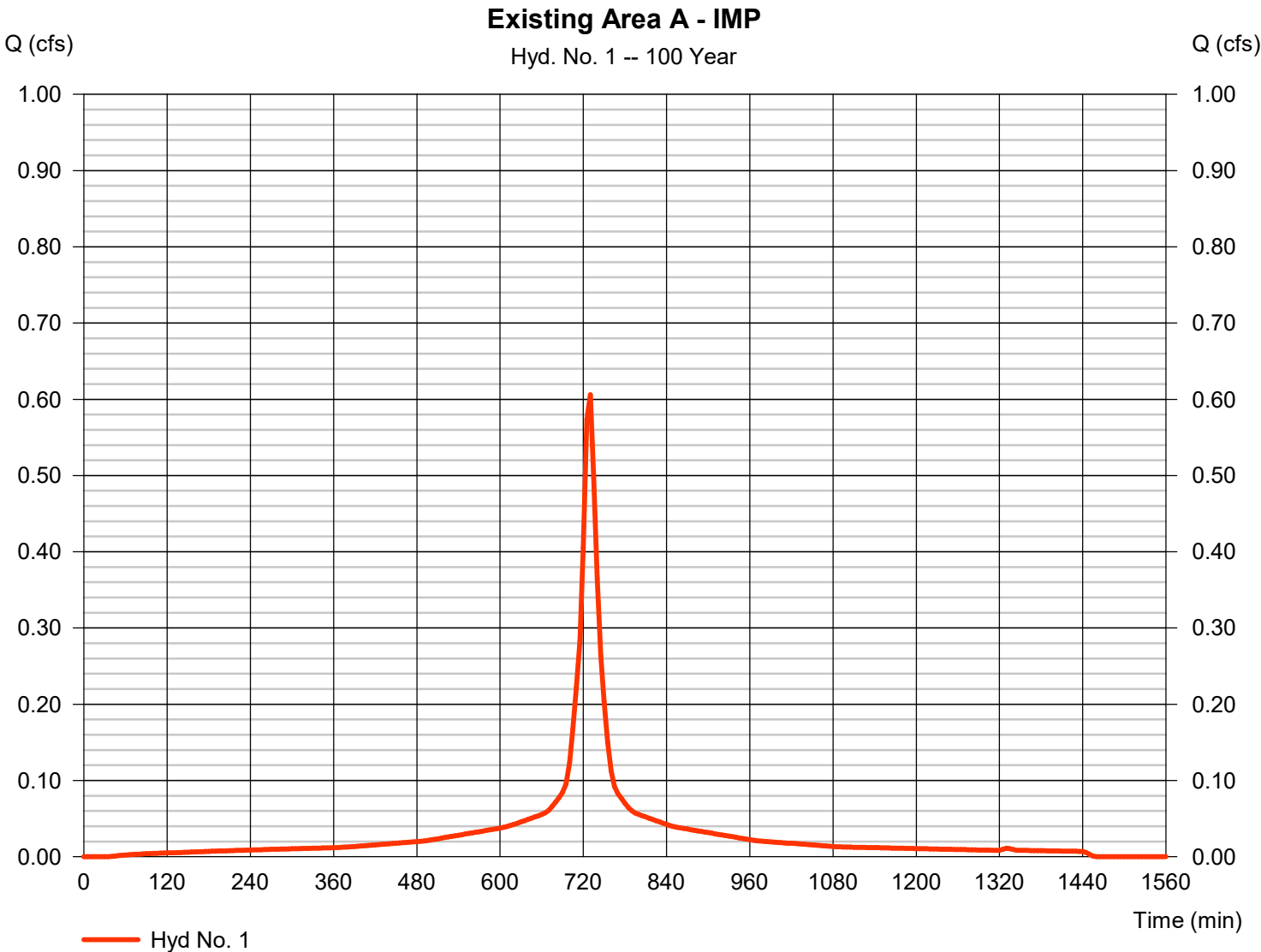
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.606	5	730	2,821	-----	-----	-----	Existing Area A - IMP
2	SCS Runoff	0.082	5	730	339	-----	-----	-----	Existing Area B - PERVIOUS
3	Combine	0.688	5	730	3,160	1, 2	-----	-----	Existing
5	SCS Runoff	0.574	5	730	2,671	-----	-----	-----	Prop Area A - IMP
6	SCS Runoff	0.111	5	730	460	-----	-----	-----	Prop Area B - PERVIOUS
7	Combine	0.684	5	730	3,131	5, 6	-----	-----	Proposed Pre-Routed
8	Reservoir	0.322	5	745	3,131	7	79.48	615	Basin 1 Routing
2.10.100.R0.gpw					Return Period: 100 Year			Friday, 08 / 11 / 2023	

Hydrograph Report

Hyd. No. 1

Existing Area A - IMP

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.606 cfs
Storm frequency	=	100 yrs	Time to peak	=	730 min
Time interval	=	5 min	Hyd. volume	=	2,821 cuft
Drainage area	=	0.094 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	9.06 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

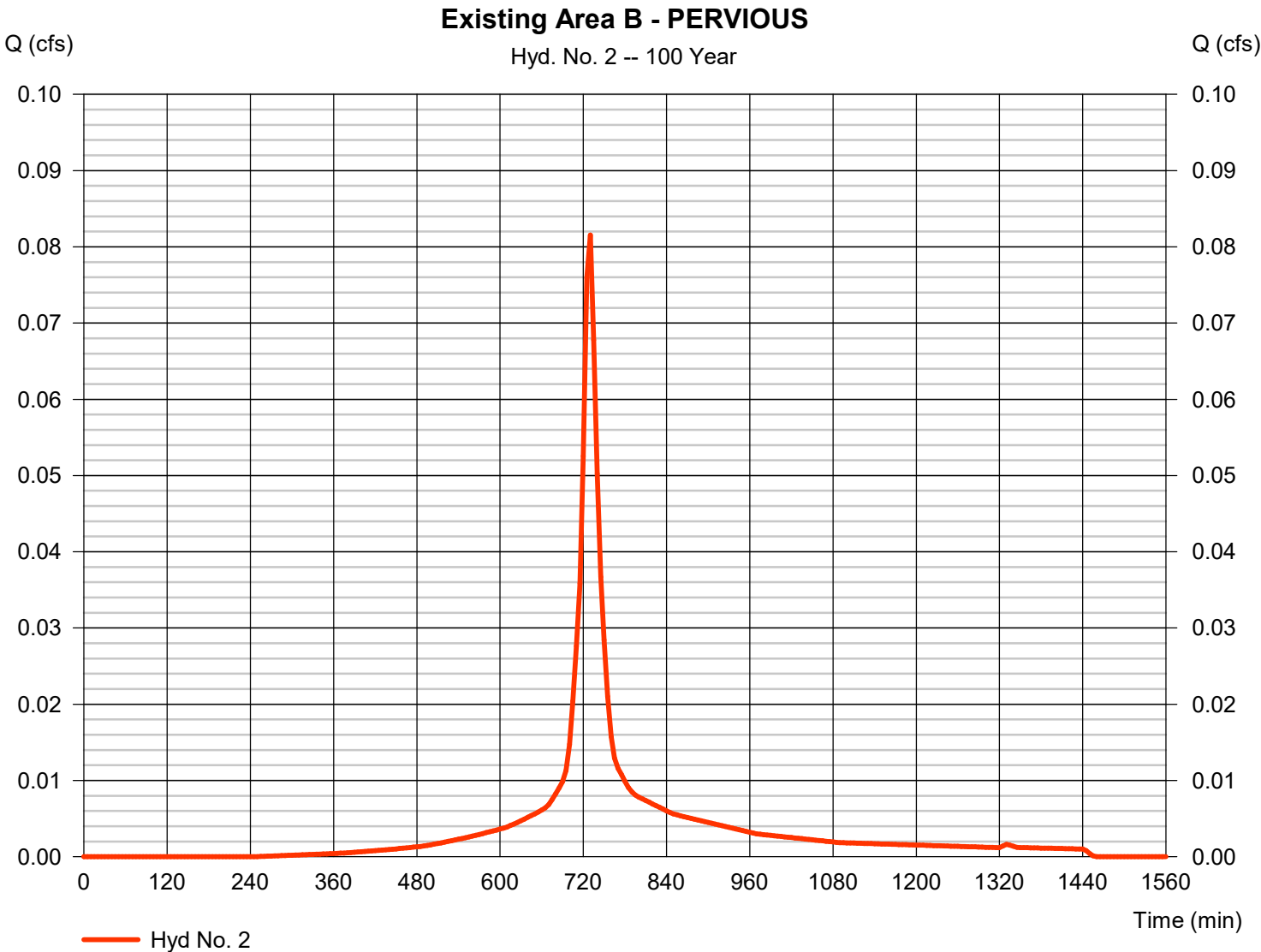


Hydrograph Report

Hyd. No. 2

Existing Area B - PERVIOUS

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.082 cfs
Storm frequency	=	100 yrs	Time to peak	=	730 min
Time interval	=	5 min	Hyd. volume	=	339 cuft
Drainage area	=	0.014 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	9.06 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

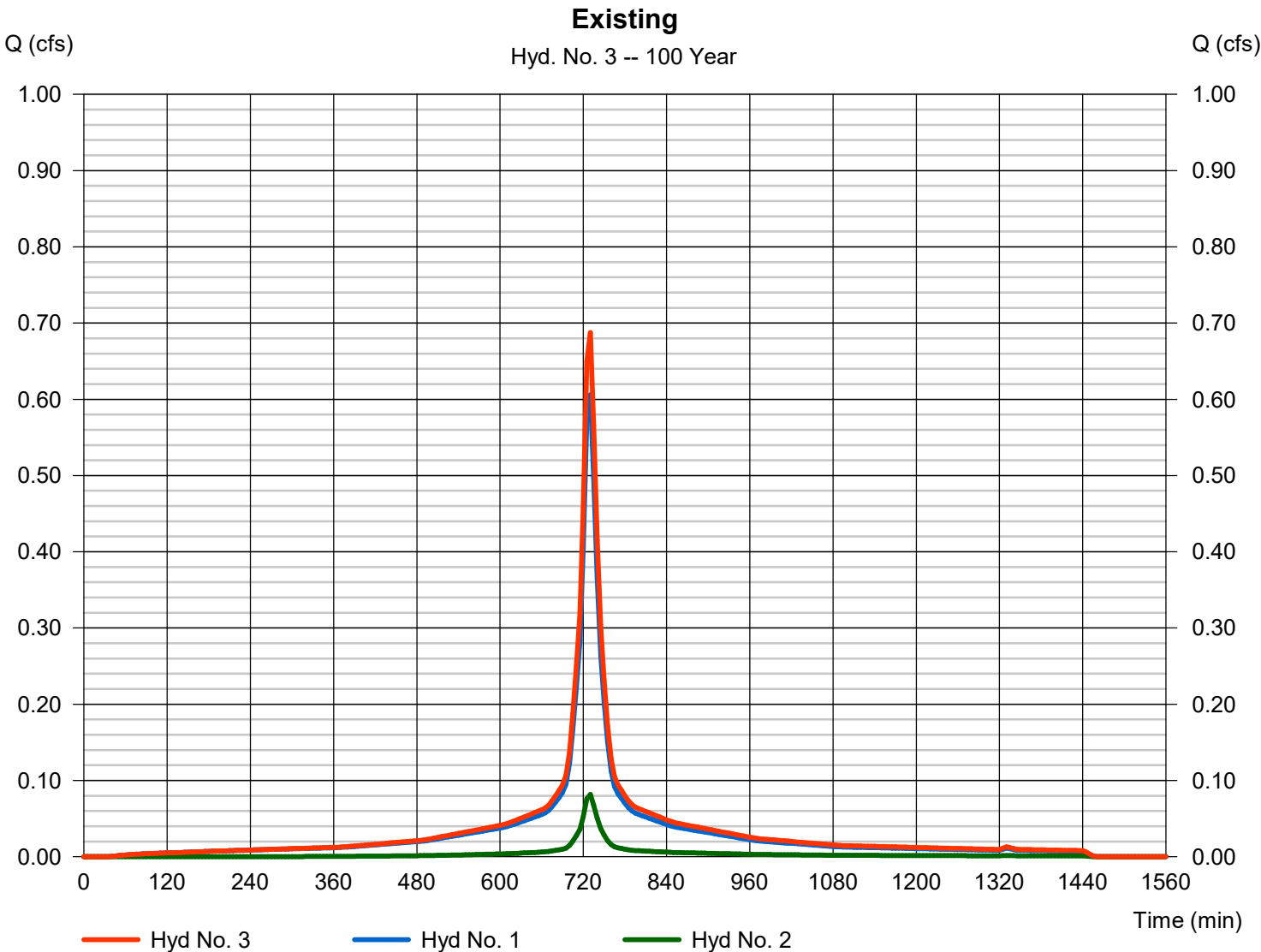


Hydrograph Report

Hyd. No. 3

Existing

Hydrograph type	= Combine	Peak discharge	= 0.688 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 3,160 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.108 ac

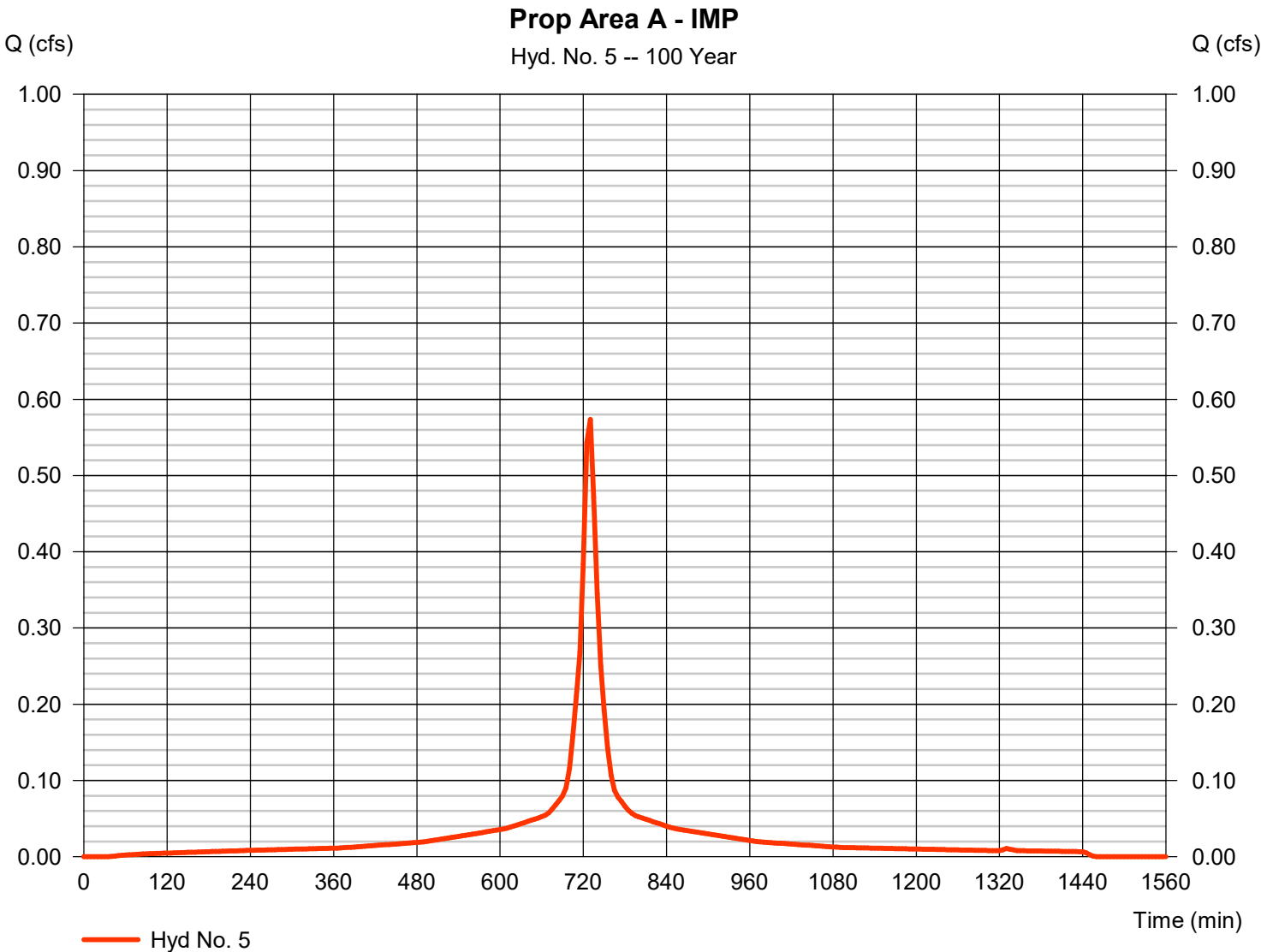


Hydrograph Report

Hyd. No. 5

Prop Area A - IMP

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.574 cfs
Storm frequency	=	100 yrs	Time to peak	=	730 min
Time interval	=	5 min	Hyd. volume	=	2,671 cuft
Drainage area	=	0.089 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	9.06 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

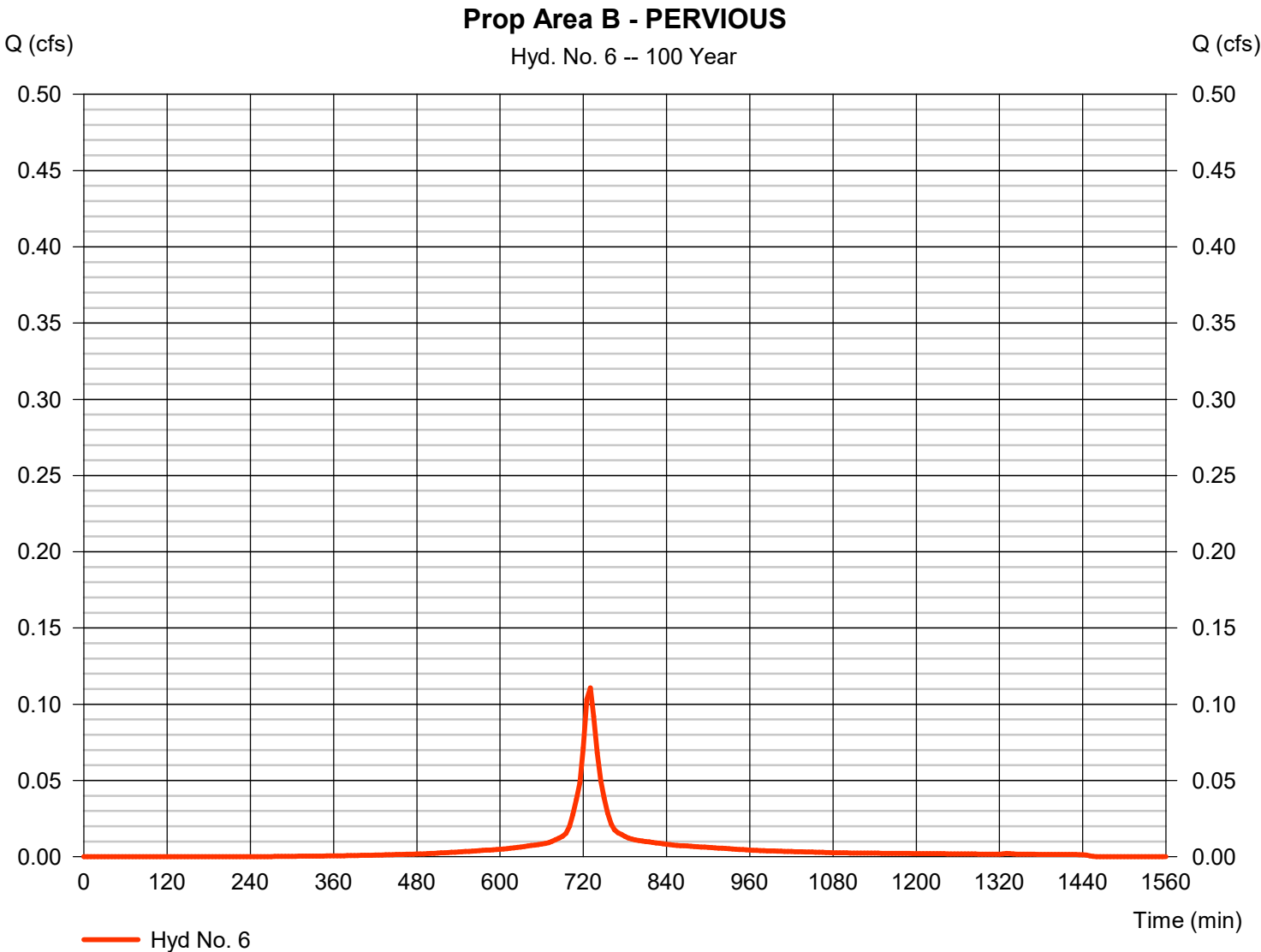


Hydrograph Report

Hyd. No. 6

Prop Area B - PERVIOUS

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.111 cfs
Storm frequency	=	100 yrs	Time to peak	=	730 min
Time interval	=	5 min	Hyd. volume	=	460 cuft
Drainage area	=	0.019 ac	Curve number	=	84
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.00 min
Total precip.	=	9.06 in	Distribution	=	Type III
Storm duration	=	24 hrs	Shape factor	=	484

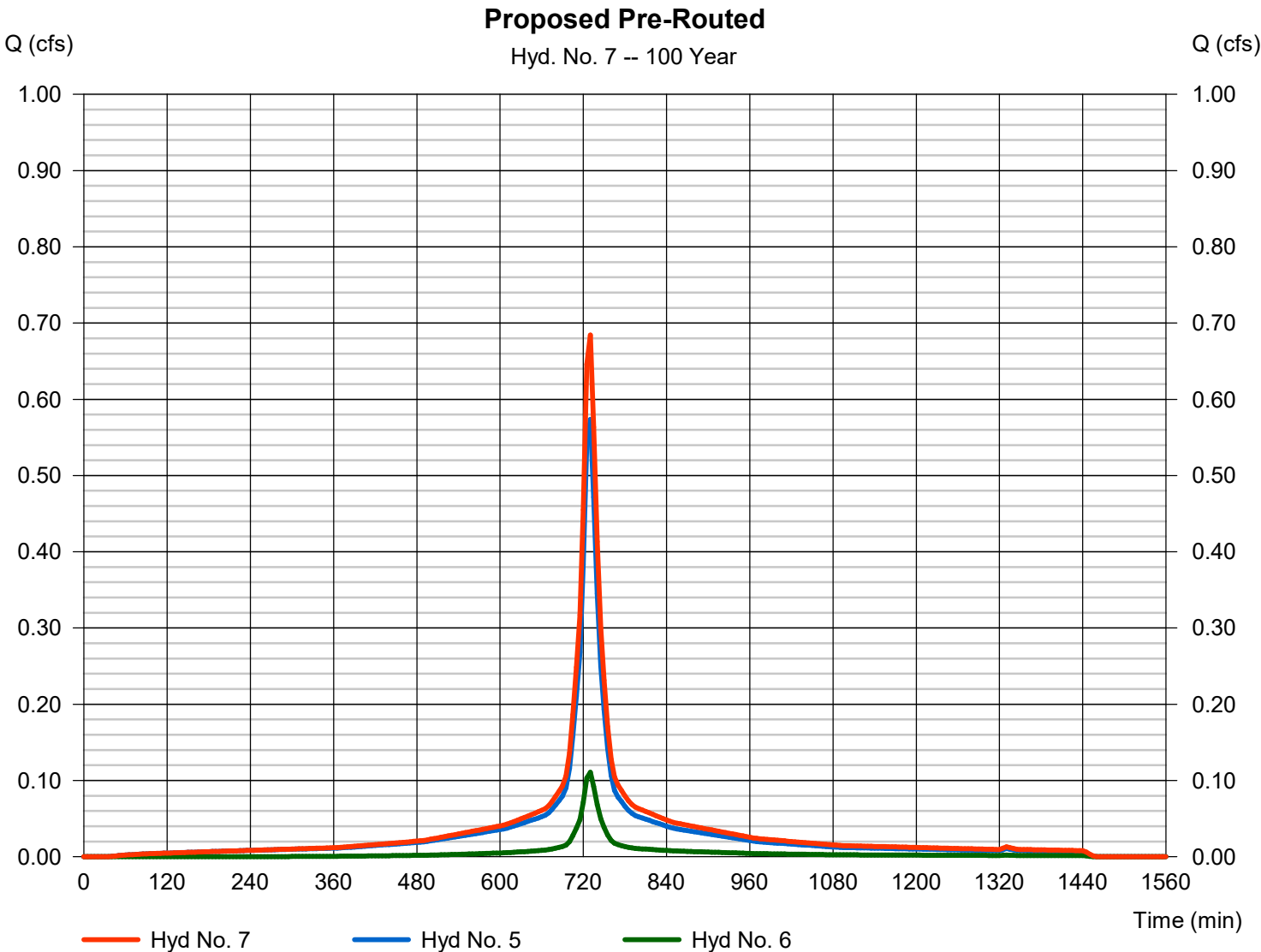


Hydrograph Report

Hyd. No. 7

Proposed Pre-Routed

Hydrograph type	= Combine	Peak discharge	= 0.684 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 5 min	Hyd. volume	= 3,131 cuft
Inflow hyds.	= 5, 6	Contrib. drain. area	= 0.108 ac



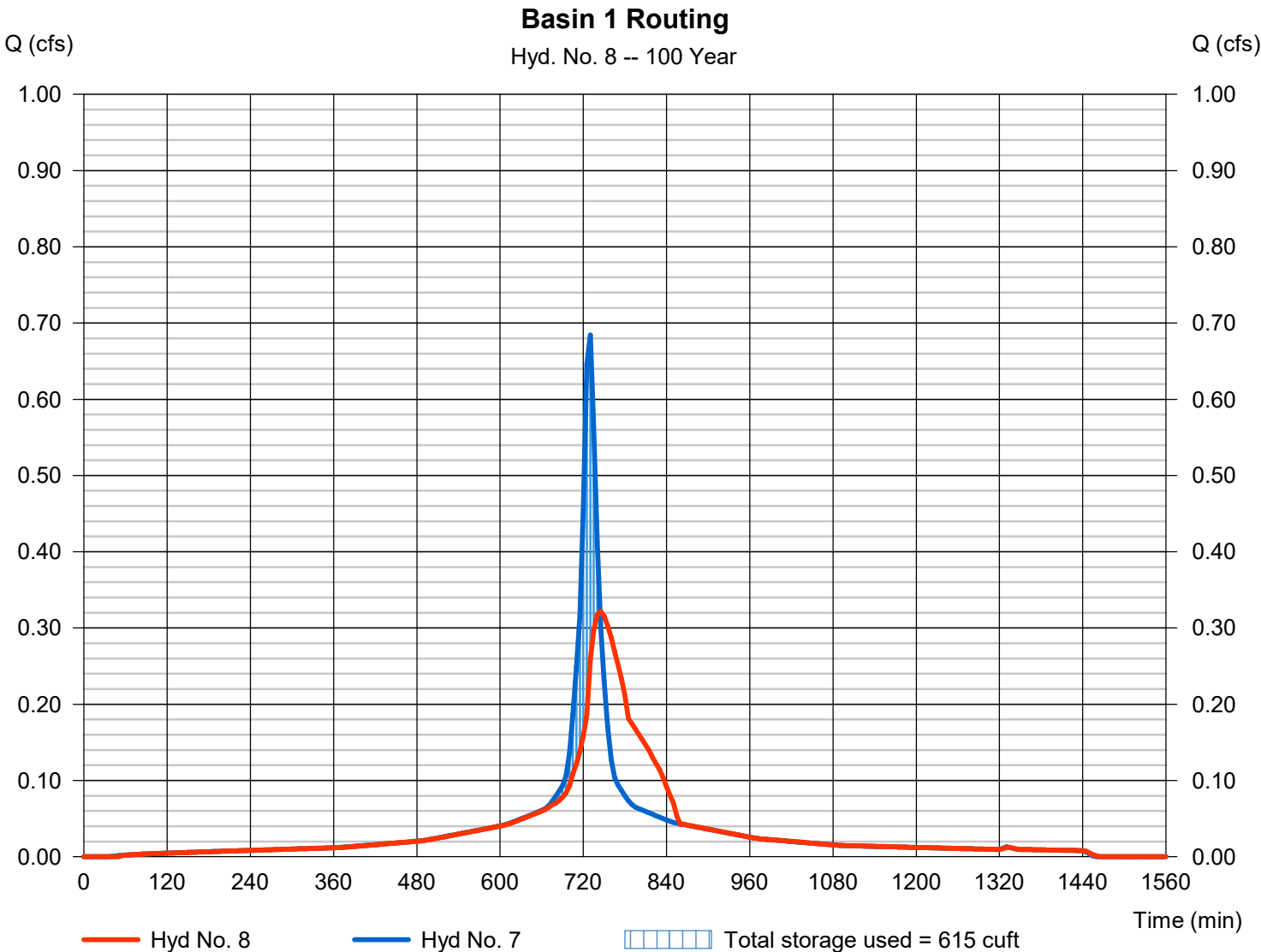
Hydrograph Report

Hyd. No. 8

Basin 1 Routing

Hydrograph type	= Reservoir	Peak discharge	= 0.322 cfs
Storm frequency	= 100 yrs	Time to peak	= 745 min
Time interval	= 5 min	Hyd. volume	= 3,131 cuft
Inflow hyd. No.	= 7 - Proposed Pre-Routed	Max. Elevation	= 79.48 ft
Reservoir name	= 140 LF 30 Inch Pipe	Max. Storage	= 615 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - 140 LF 30 Inch Pipe

Pond Data

UG Chambers -Invert elev. = 77.00 ft, Rise x Span = 2.50 x 2.50 ft, Barrel Len = 140.00 ft, No. Barrels = 1, Slope = 0.50%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	77.00	n/a	0	0
0.32	77.32	n/a	9	9
0.64	77.64	n/a	44	53
0.96	77.96	n/a	81	133
1.28	78.28	n/a	101	235
1.60	78.60	n/a	109	344
1.92	78.92	n/a	109	453
2.24	79.24	n/a	101	554
2.56	79.56	n/a	81	635
2.88	79.88	n/a	44	679
3.20	80.20	n/a	9	687

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	2.50	0.00	0.00
Span (in)	= 6.00	2.50	0.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 77.00	77.00	0.00	0.00
Length (ft)	= 30.00	1.00	0.00	0.00
Slope (%)	= 2.00	2.00	2.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	0.00	0.00
Crest El. (ft)	= 78.50	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by 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).

