Stormwater Management Report

For

Hudson Pointe

Lots 8 & 9, Block 120 and Lots 42, 48, 49, 50, 51 & 52, Block 130
Borough of Keyport
Monmouth County, NJ

October 30, 2020

Prepared by:

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I. Introduction

The subject property is located at 75 Manchester Avenue in the Township of Howell; it is known as Block 120, Lots 8 & 9 and Block 130, Lots 42, 48, 49, 50, 51, & 52 and consists of 2.51± acres. The site is currently developed with various structures including commercial buildings, millings and gravel, and a single-family home. This application proposes to develop the site as an approved redevelopment plan entitled "Hudson Pointe Redevelopment Plan". This development will disturb a total of 7.9 acres of woodlands while utilizing a detention basin for stormwater management to reduce runoff from the site.

The intent of this report is to analyze the runoff from the area of the proposed development relative to the existing developed condition. Pursuant to NJAC 7:8, this development is a Major Development based upon the 3.75 Ac. area of disturbance and therefore NJDEP runoff quantity reductions are required and demonstrated below. Furthermore, based upon the 0.074 Ac. of new impervious coverage relative to the pre-developed condition, water quality standards are not applicable.

II. Land Characteristics

According to the USDA Web Soil Survey, the soil type found on site in the area of development is:

> **Pemberton loamy sand** - The Pemberton series consists of moderately well drained loamy Eolian sands over old alluvium and/or glauconitic bearing marine deposits. The Pemberton series is a hydrologic soil group "B".

III. Pre-Developed Drainage Conditions

The site currently drains mostly north and west towards a swale that directs runoff into a culvert running beneath the bicycle path to the north. All other runoff from the site flows south and west to the street, where it then flows north to the same culvert running beneath the bicycle path. This culvert is used as the point of analysis for the drainage calculations. The site is currently developed with multiple buildings and accessory structures, with large areas of impervious cover, including a large area of gravel/millings utilized for parking.

A permeability test was attempted in the area of existing millings to better ascertain the proper CN value for this area. However, the surface was excessively compacted, and this office was unable to advance a tube into the milling area. Video

proof of this can be provided upon request. Therefore, for the purposes of this analysis, these areas were assigned a CN of 98. Calculations, performed for the 2, 10, 25, and 100-year storm events, are included in the appendix of this report and summarized below.

Pre-Developed Flow Conditions Summary-

Storm Frequency (Years)	Peak Discharge – Total (cfs)
2	4.97
10	8.59
25	11.38
100	16.76

IV. Post-Developed Drainage Conditions

The site after development will collect runoff in a proposed system of inlets and perforated pipes within stone bedding, in order to promote recharge to the water table. However, based upon the low permeability rate of our tested samples, an outfall has also been provided to discharge runoff into the swale and culvert indicated in the pre-developed condition. All areas that are not retained continue to drain towards the street and eventually to the same culvert to the north west. Calculations, performed for the 2, 10, 25, and 100-year storm events, are included in the appendix of this report and summarized below.

Post-Developed Flow Conditions Summary-

Storm Frequency (Years)	Peak Discharges - Routed (cfs)	Peak Discharges – Not Retained (cfs)	Peak Discharges – Total (cfs)
2	2.19	0.11	2.24
10	5.00	0.25	5.15
25	7.26	0.36	7.50
100	11.32	0.58	11.75

V. Pre vs. Post-Developed Drainage Conditions

The intent of this report is to demonstrate that the required runoff reductions for the area of disturbance on site have been achieved. The runoff rate for the site will

be reduced through the use of the proposed underground storage. The total peak discharge is compared to the post-developed total peak discharge below. As shown, the required runoff reductions for the area of disturbance on site are met and exceeded in the post-developed condition.

Pre vs. Post-Developed Comparison-

Storm Frequency (Years)	Pre - Peak Discharge (cfs)	Allowable - Peak Discharge (cfs)	Post - Peak Discharges (cfs)	Percentage of Pre-Developed (%)
2	4.97	2.49 (50%)	2.24	45%
10	8.59	6.44 (75%)	5.15	60%
25	11.38	--	7.50	66%
100	16.76	13.41 (80%)	11.75	70%

VI. Water Quality

Water quality is not required, however through the use of the proposed underground storage system as well as the change in cover to modern and clean materials provides additional water quality benefits.

VII. Groundwater Recharge

Groundwater recharge calculations demonstrating compliance have been provided in the appendix of this report.

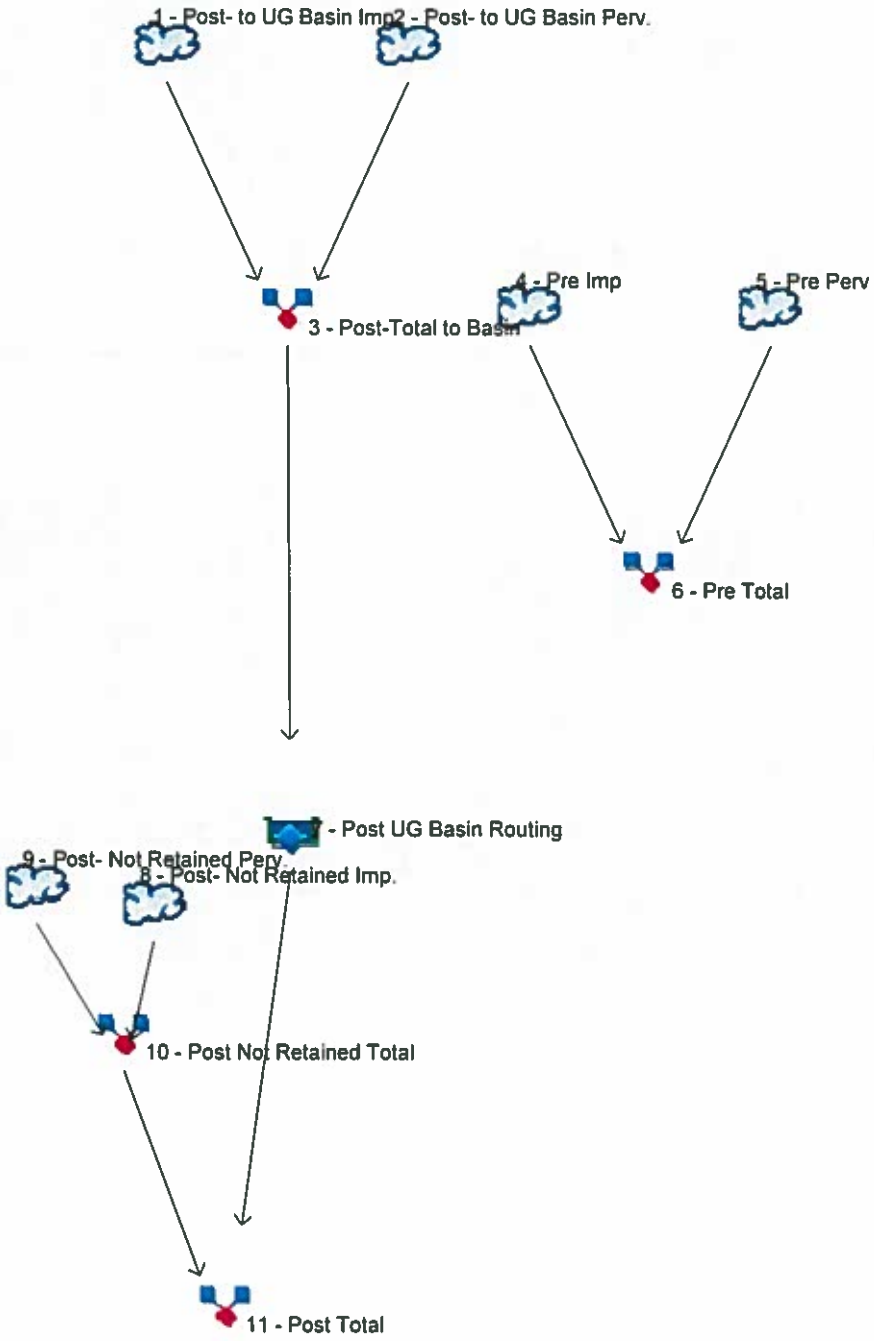
VIII. Conclusion

As can be seen, the proposed development will have no adverse effect on the pre-developed drainage conditions by meeting runoff quantity, groundwater recharge, and stability standards.

A-1 – PRE-DEVELOPED PERVIOUS

Watershed Model Schematic

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



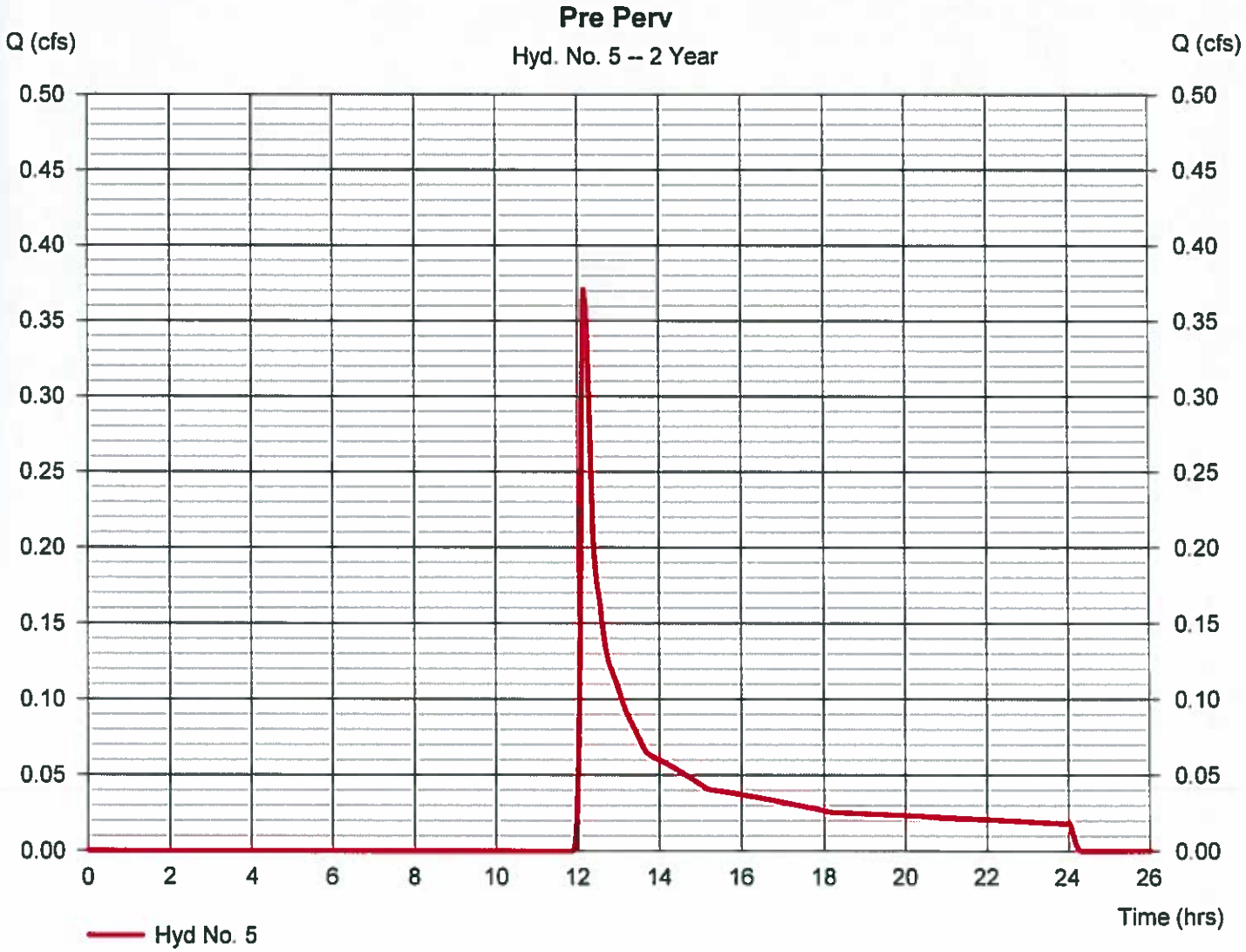
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 11 / 2 / 2020

Hyd. No. 5

Pre Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 0.371 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 2,011 cuft
Drainage area	= 1.140 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m285t.cds		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 11 / 2 / 2020

Hyd. No. 5

Pre Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 1.490 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 5,837 cuft
Drainage area	= 1.140 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
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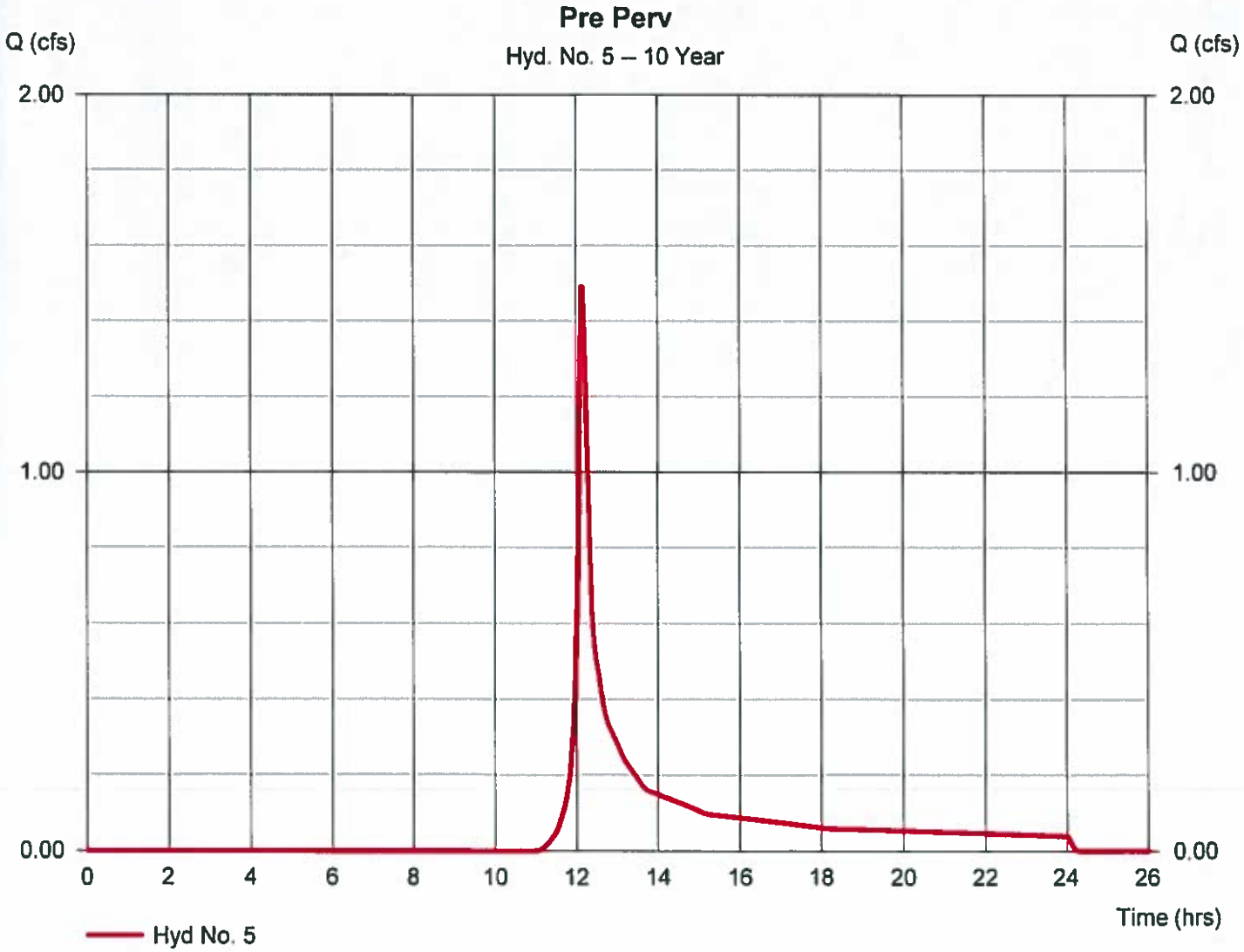


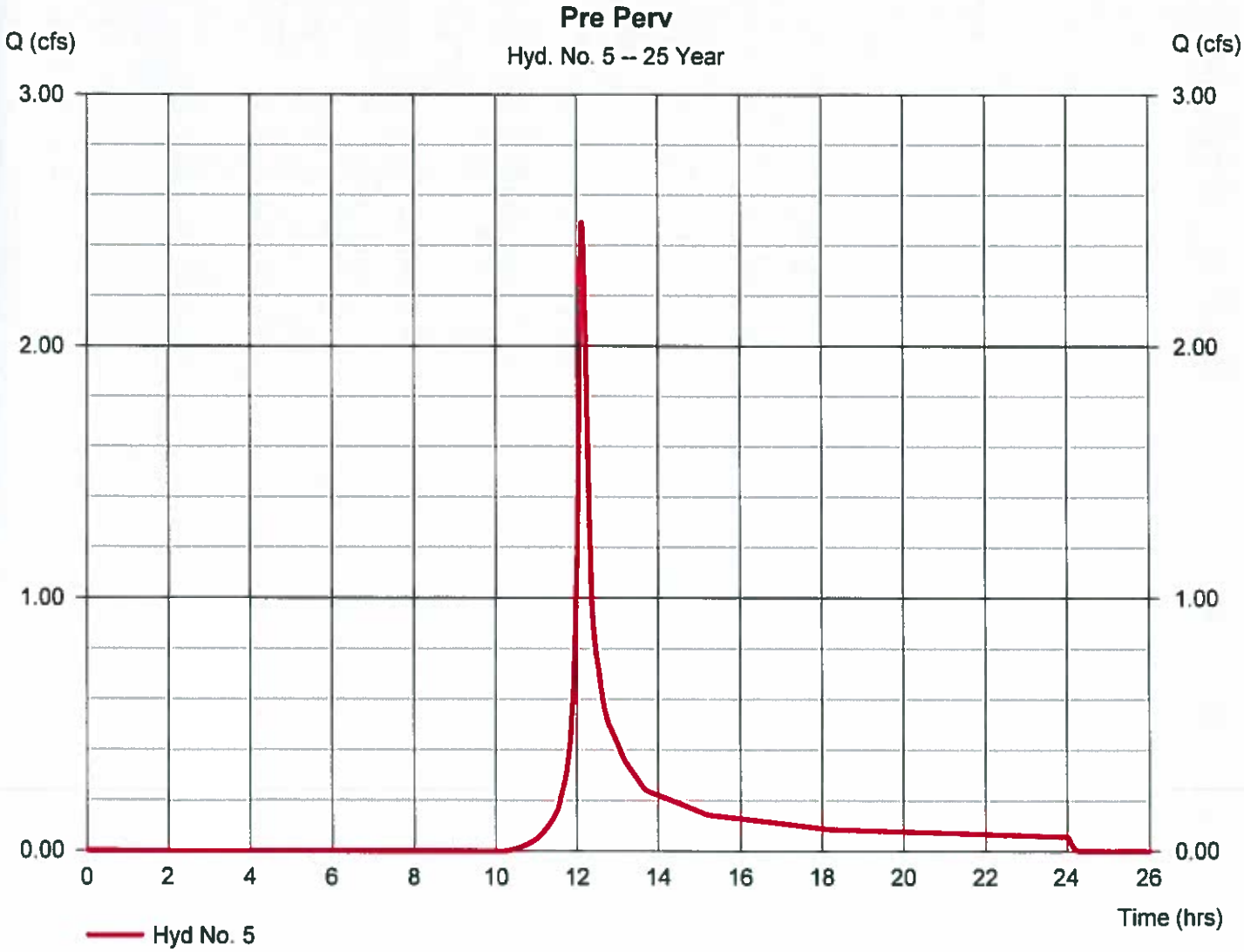
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 5

Pre Perv

Hydrograph type	= SCS Runoff	Peak discharge	= 2.490 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 9,276 cuft
Drainage area	= 1.140 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.50 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m265t.cds	Shape factor	= 285



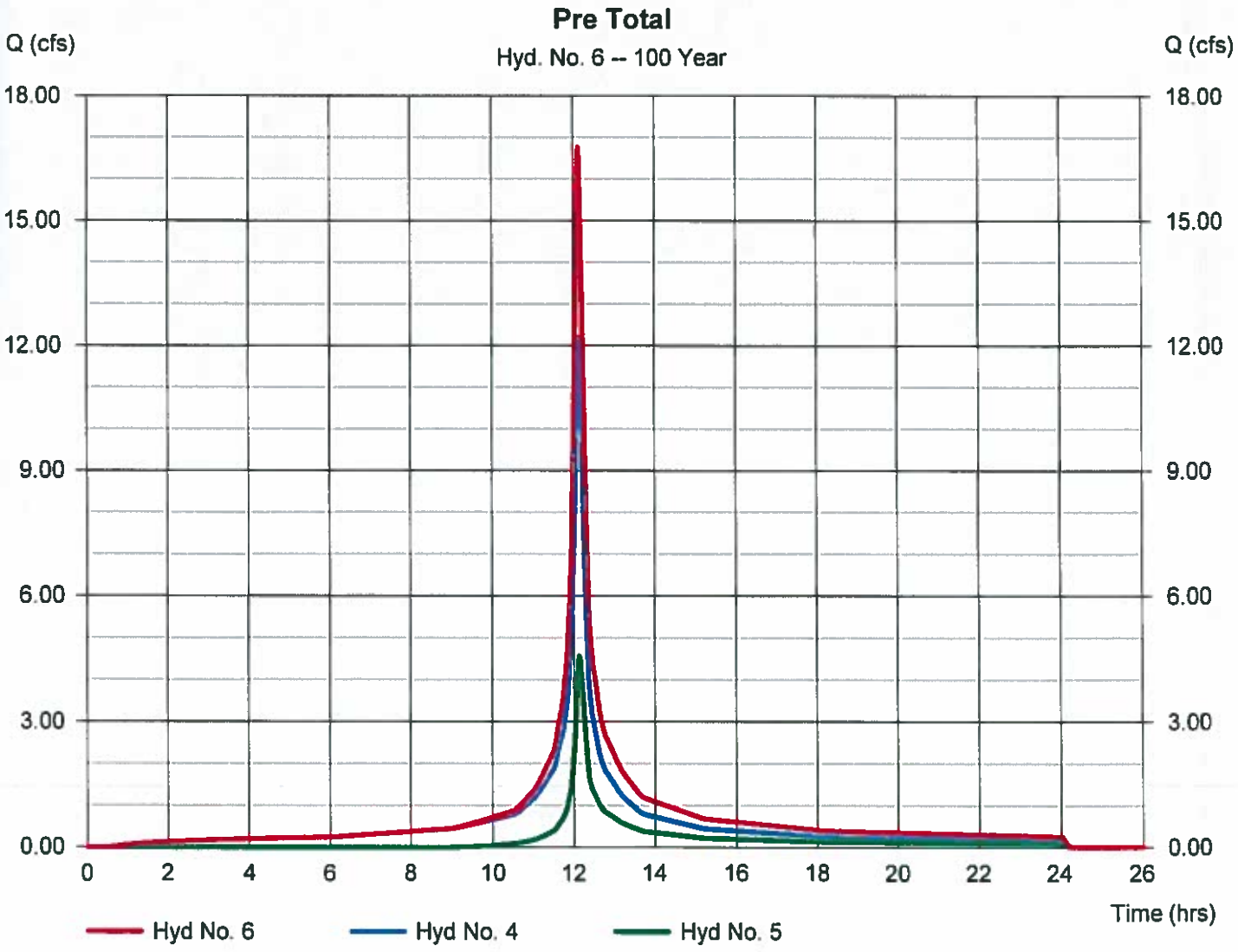
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 6

Pre Total

Hydrograph type	= Combine	Peak discharge	= 16.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 68,392 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 2.800 ac



A-2 – PRE-DEVELOPED IMPERVIOUS

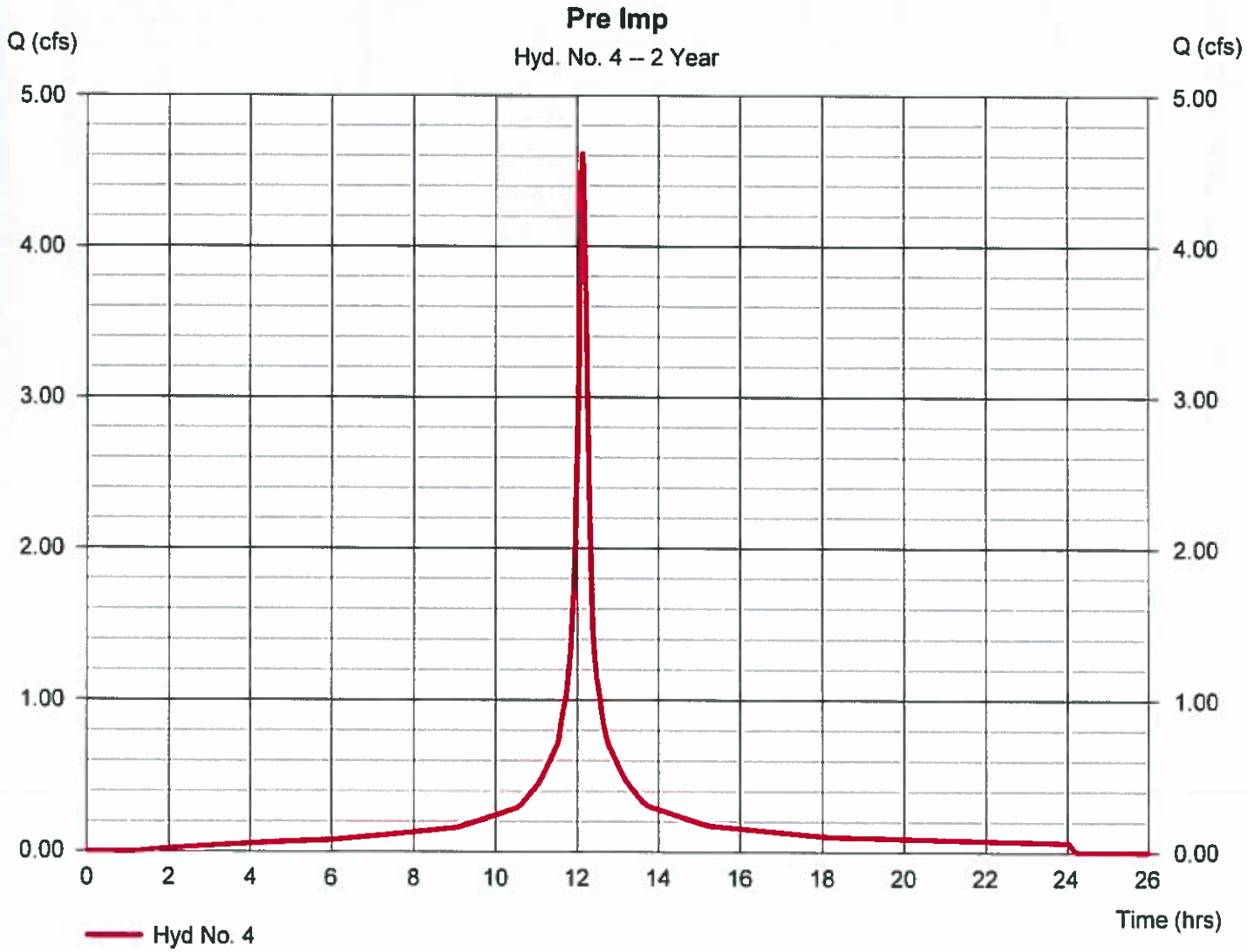
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 4

Pre Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 4.611 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 18,962 cuft
Drainage area	= 1.660 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m285t.cds	Shape factor	



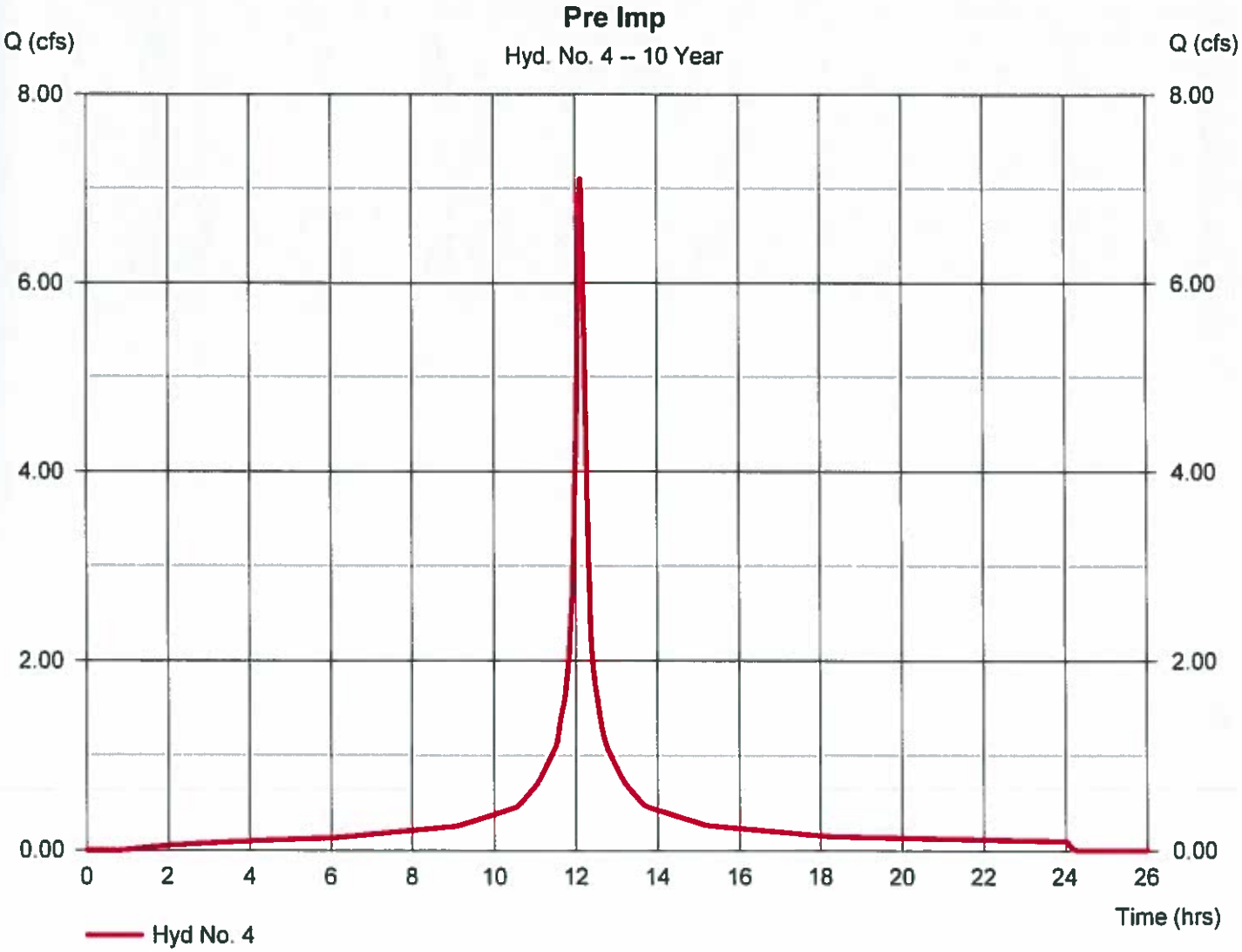
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 4

Pre Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 7.098 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 29,716 cuft
Drainage area	= 1.660 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.20 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m285t.cds	Shape factor	



Hydrograph Report

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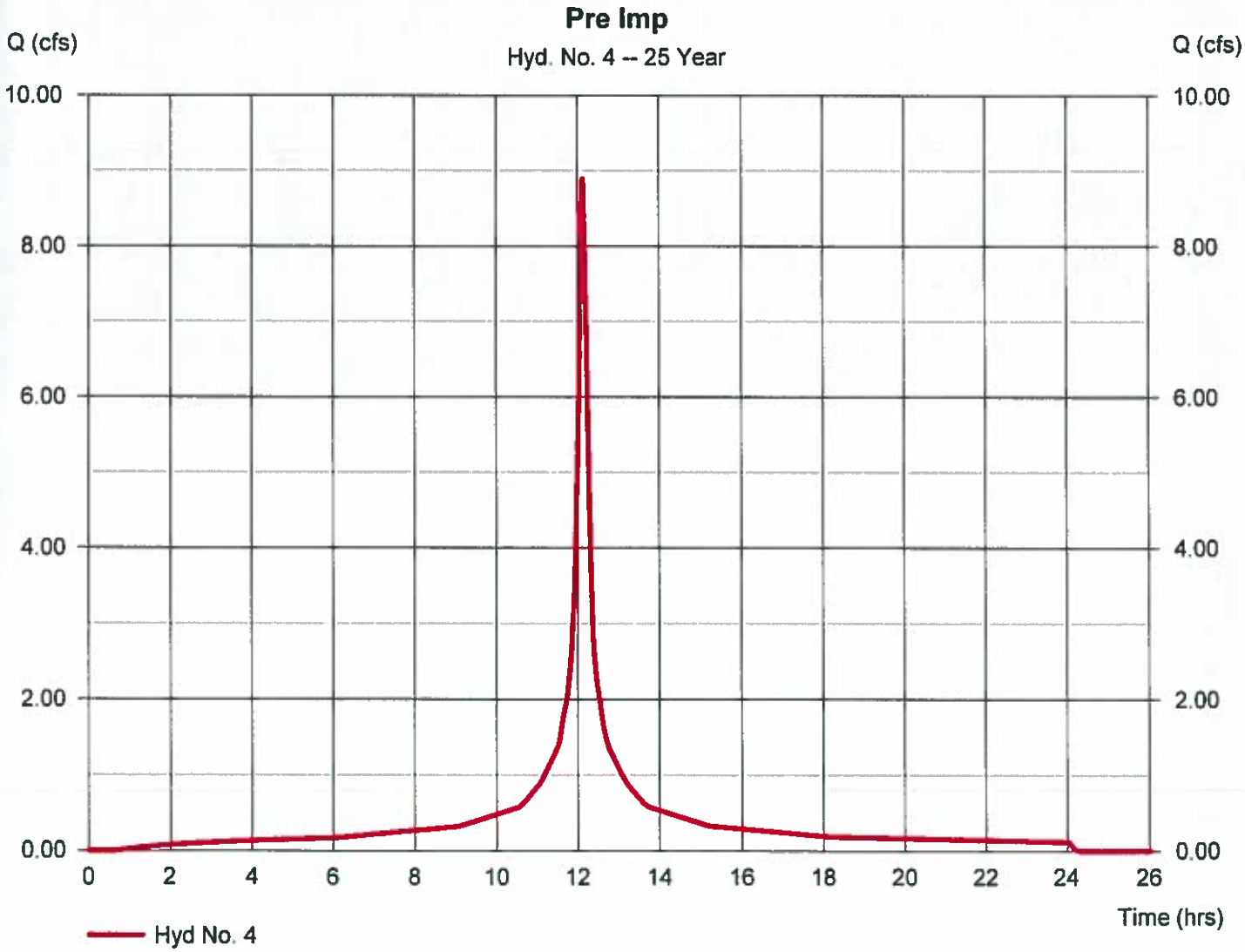
Hyd. No. 4

Pre Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 8.889 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 37,491 cuft
Drainage area	= 1.660 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.50 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m265t.cds		



Hydrograph Report

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Hyd. No. 4

Pre Imp

Hydrograph type	= SCS Runoff	Peak discharge	= 12.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 51,851 cuft
Drainage area	= 1.660 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.90 in	Distribution	= Custom
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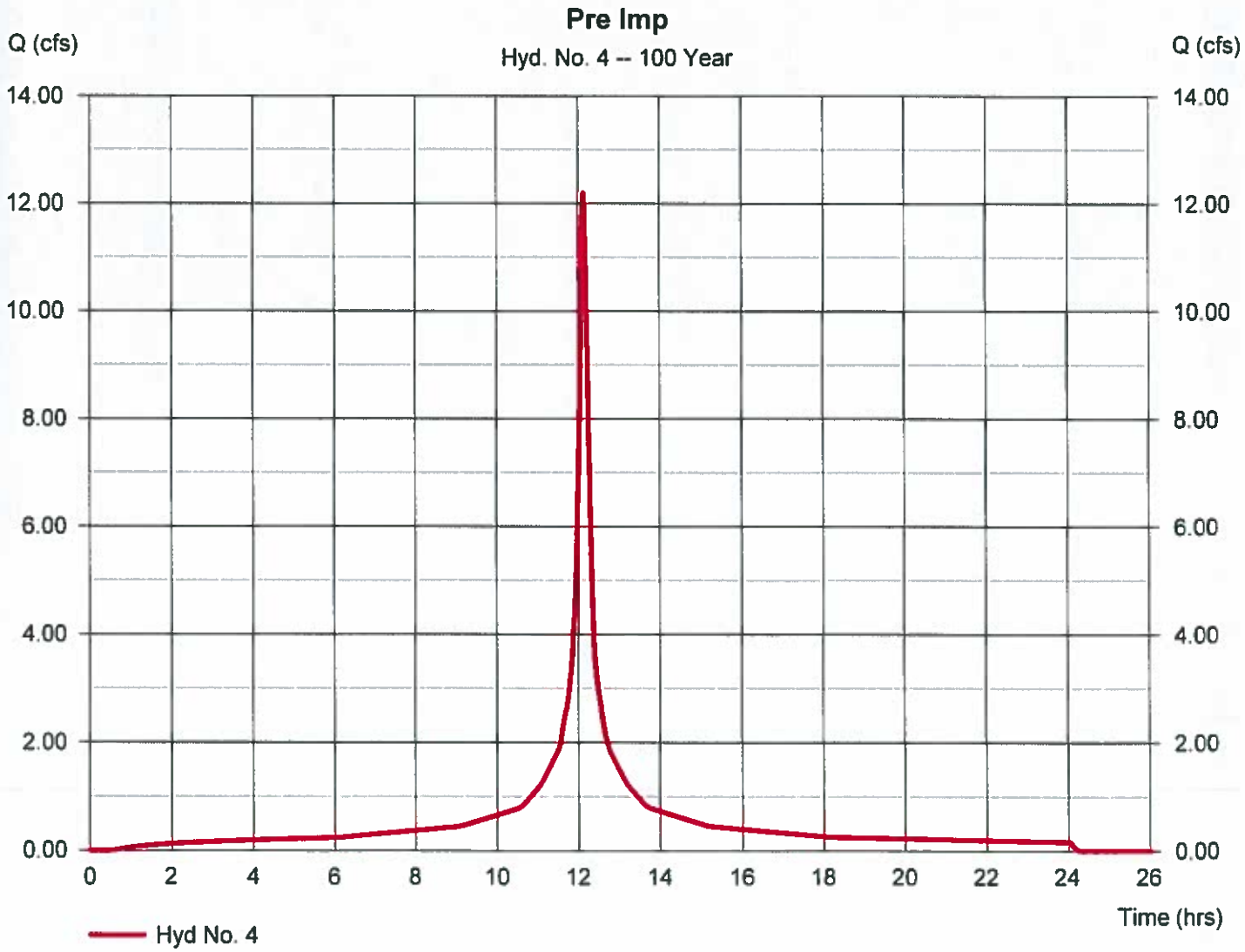


A-3 – PRE – DEVELOPED TOTAL

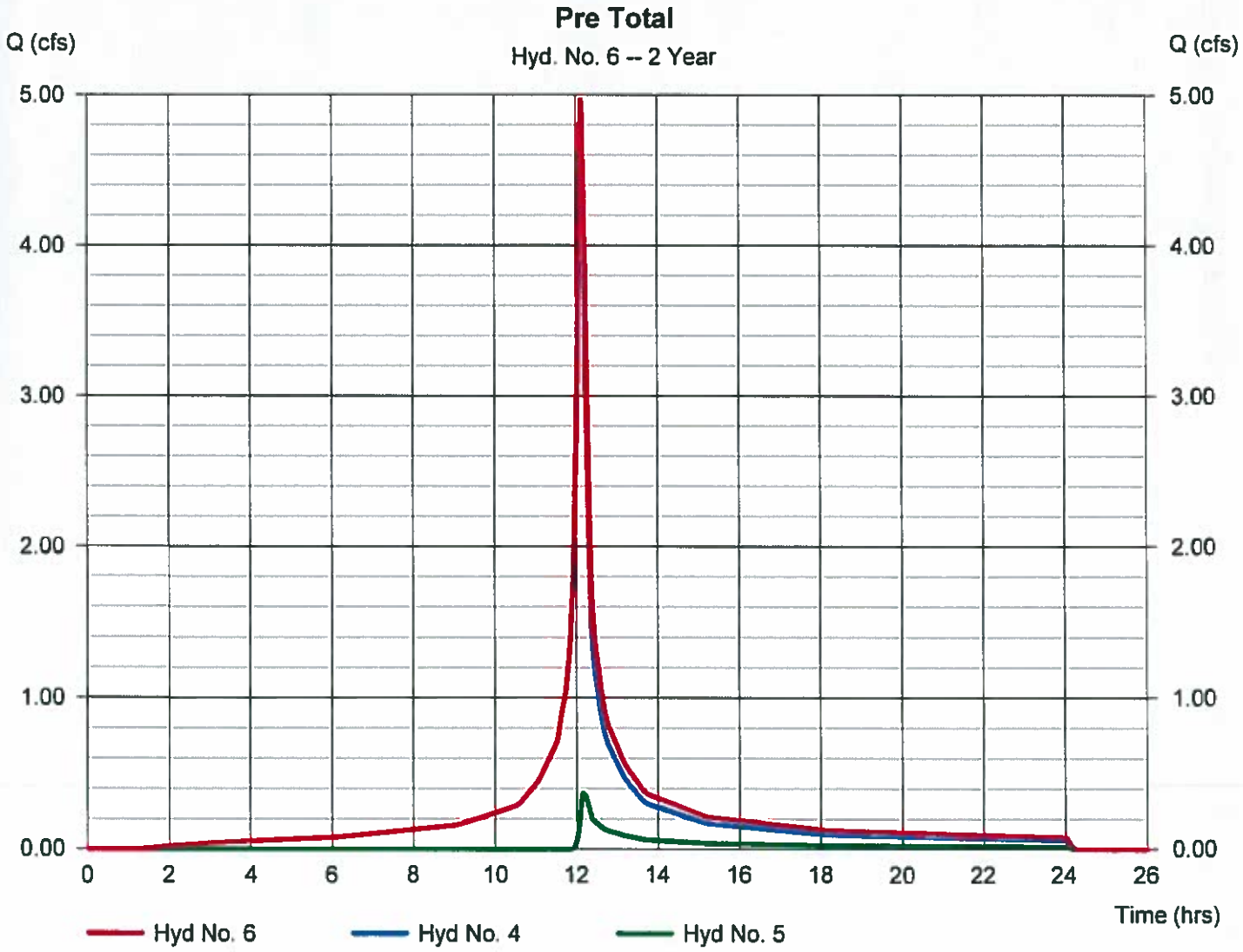
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 6

Pre Total

Hydrograph type	= Combine	Peak discharge	= 4.969 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 20,973 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 2.800 ac



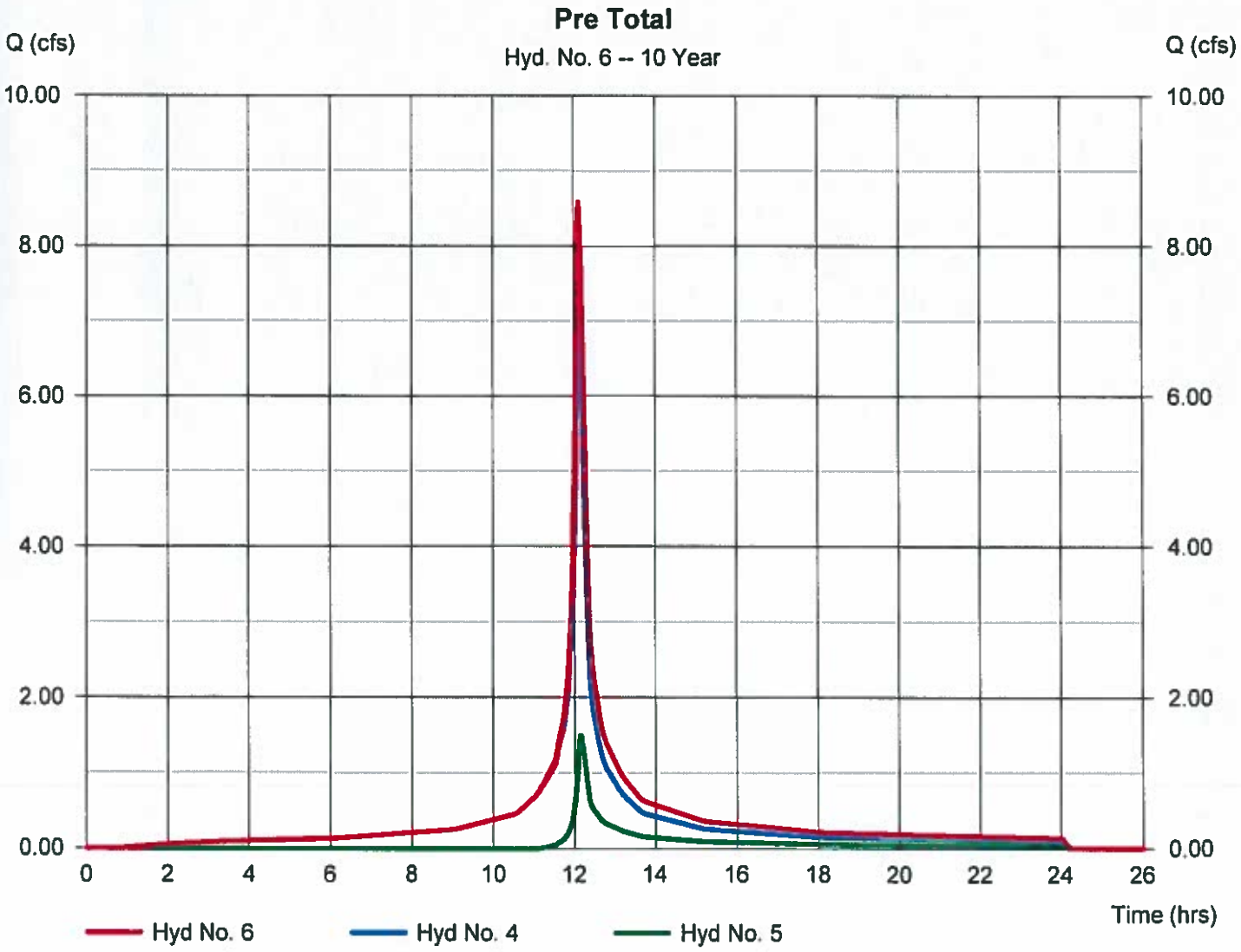
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 6

Pre Total

Hydrograph type	= Combine	Peak discharge	= 8.588 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 35,553 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 2.800 ac



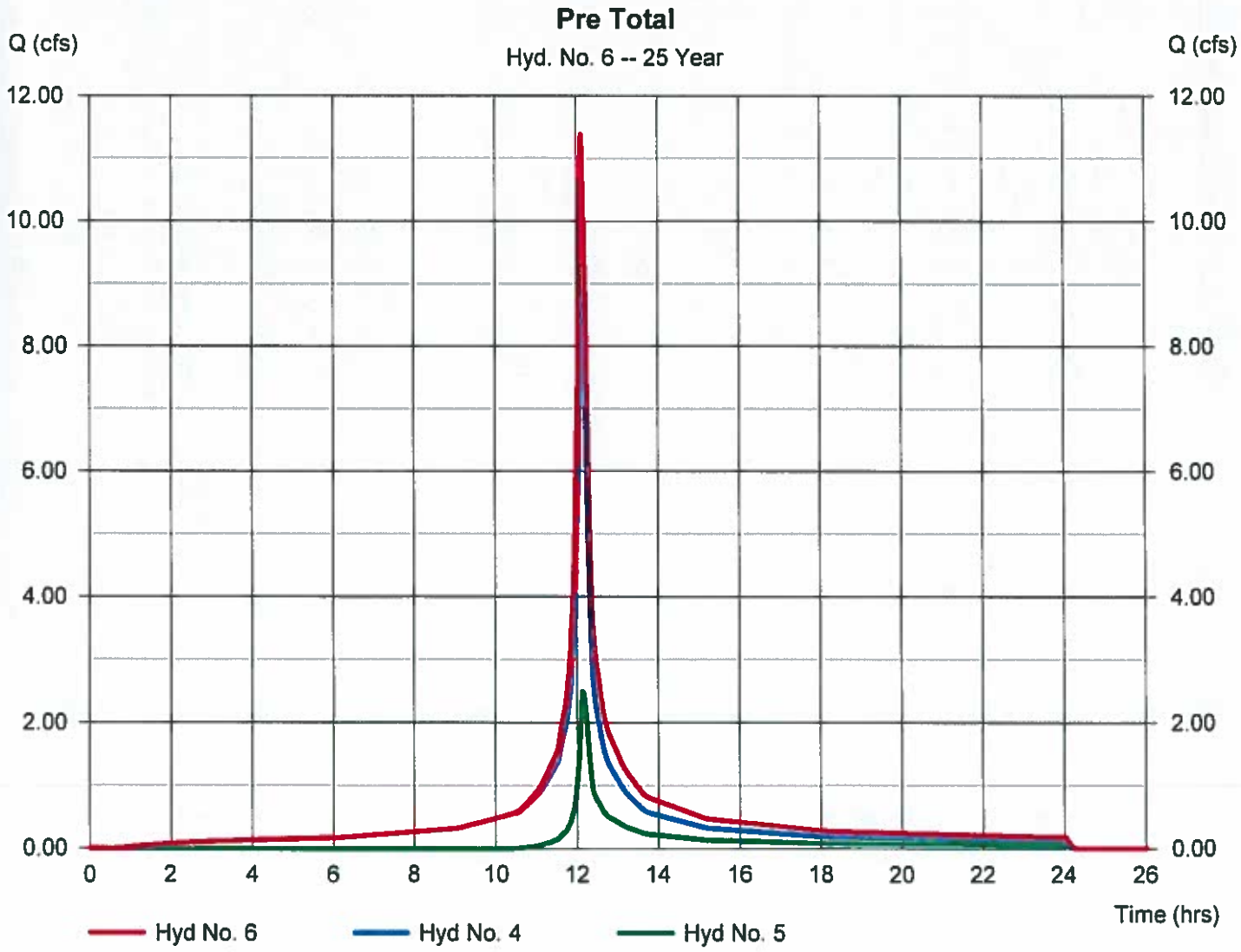
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 6

Pre Total

Hydrograph type	= Combine	Peak discharge	= 11.38 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 46,767 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 2.800 ac



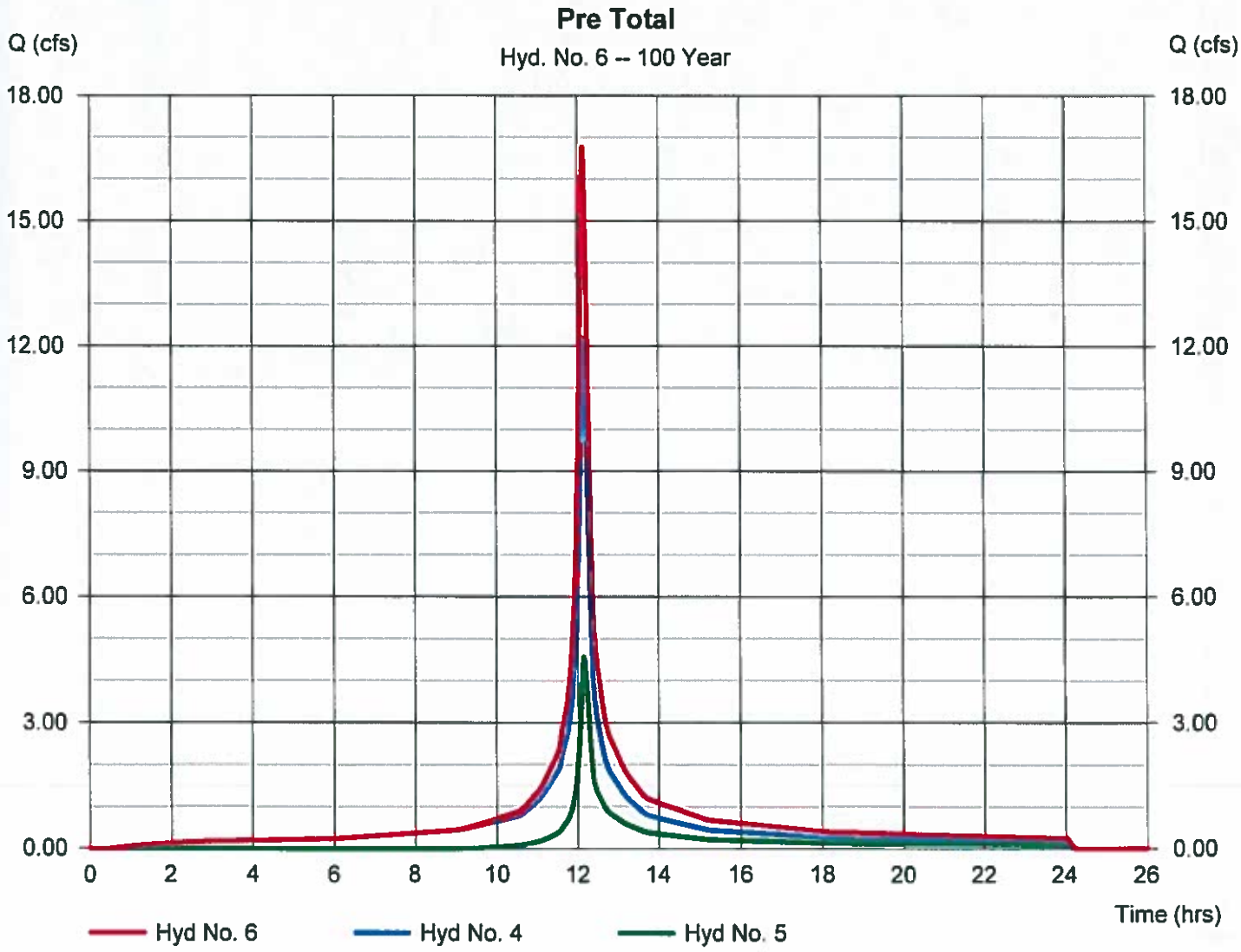
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 6

Pre Total

Hydrograph type	= Combine	Peak discharge	= 16.76 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 68,392 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 2.800 ac



A-4 – POST-DEVELOPED – NOT RETAINED

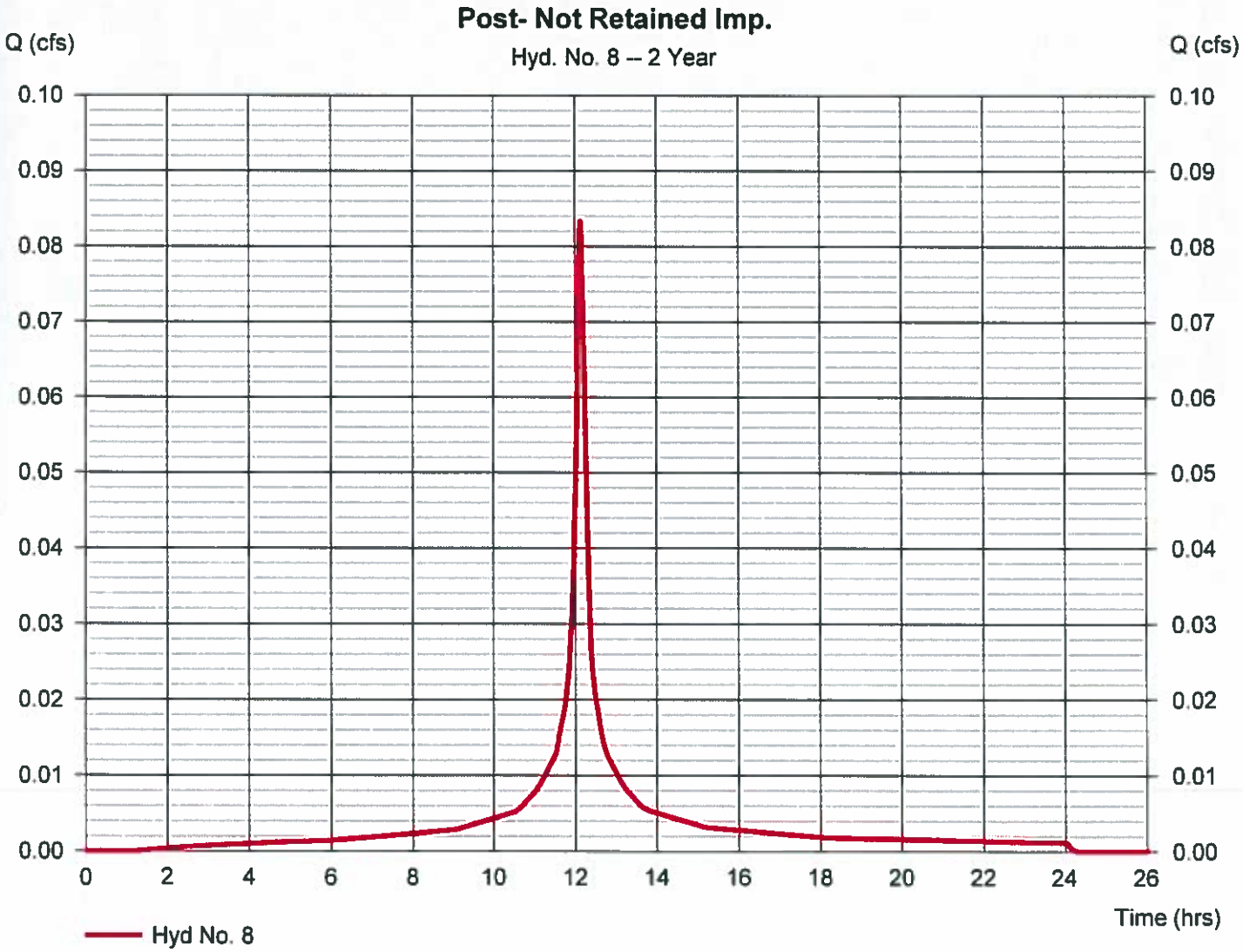
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 8

Post- Not Retained Imp.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.083 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 343 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m285t.cds		



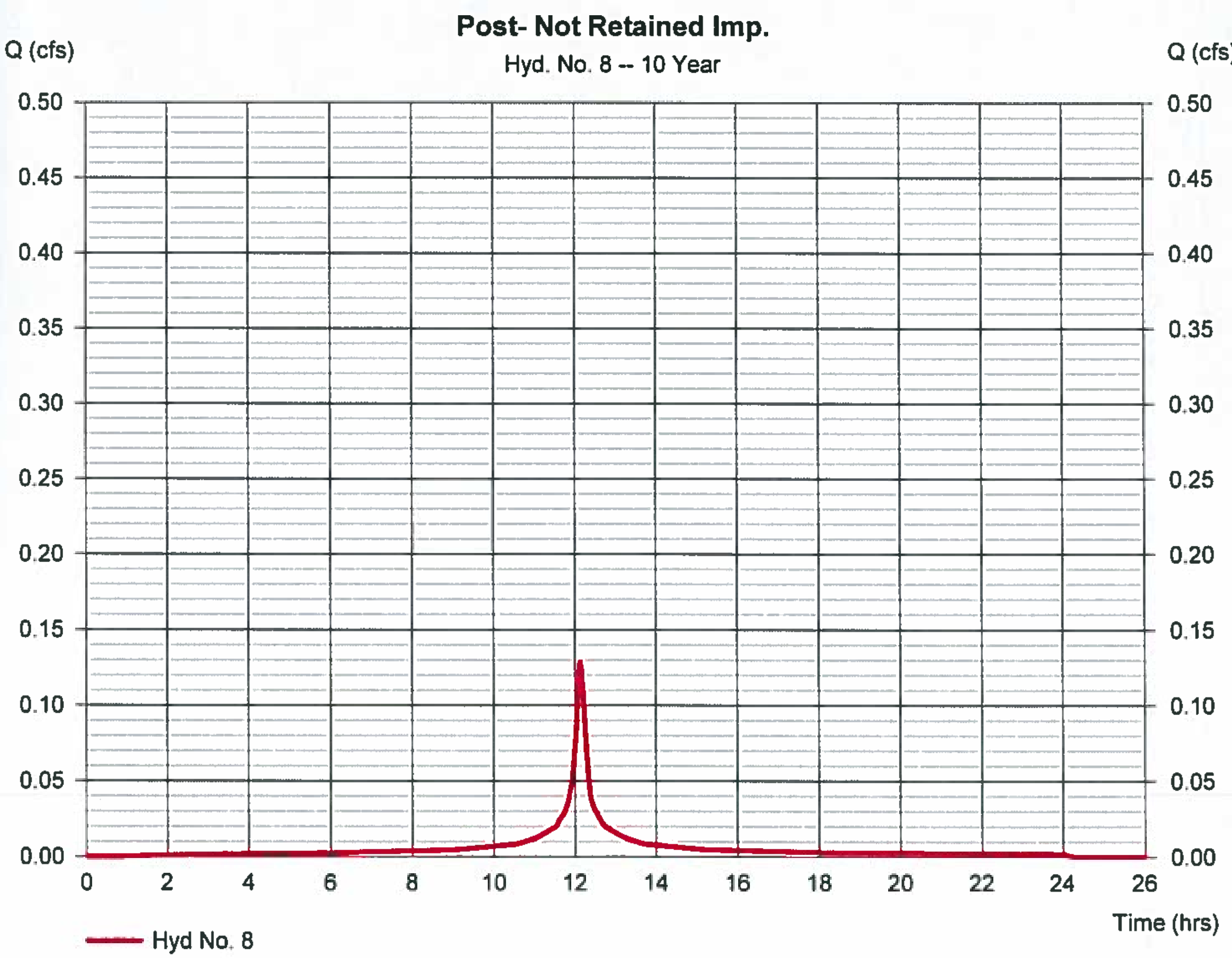
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 8

Post- Not Retained Imp.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.128 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 537 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.20 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1-min.cds	Shape factor	= 285



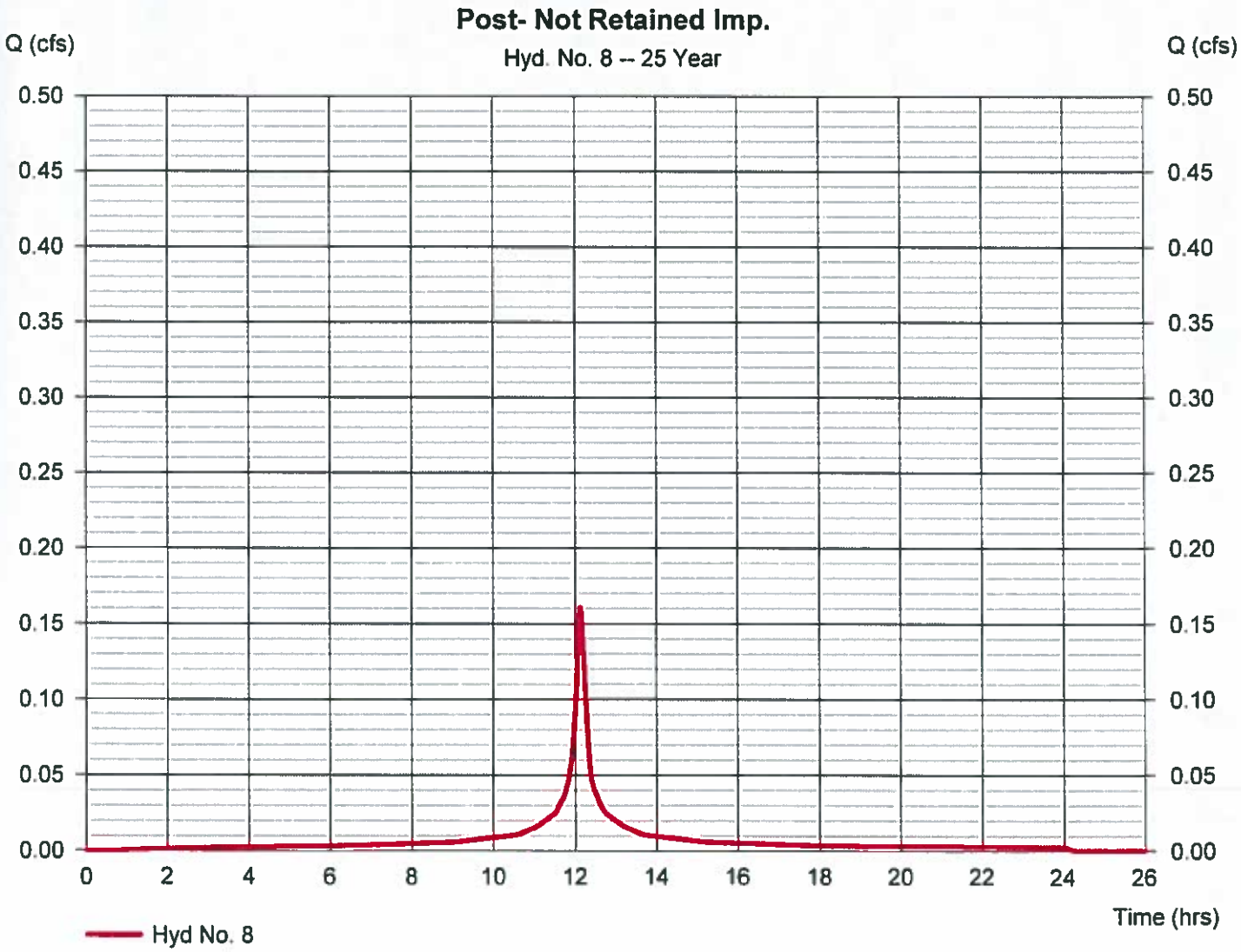
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 11 / 2 / 2020

Hyd. No. 8

Post- Not Retained Imp.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.161 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 678 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.50 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1-m285t.cds	Shape factor	= 285



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 8

Post- Not Retained Imp.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.220 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 937 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.90 in	Distribution	= Custom
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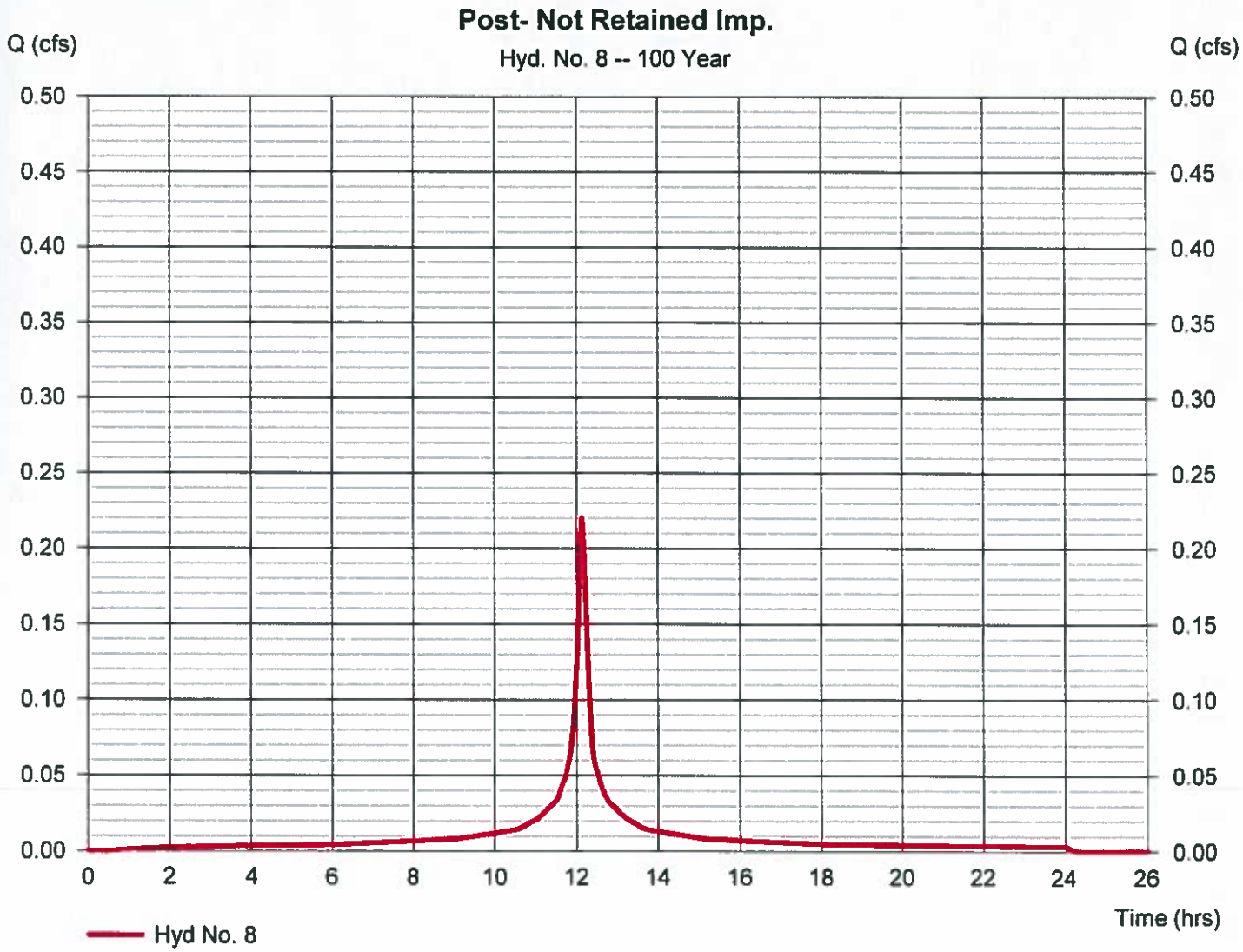


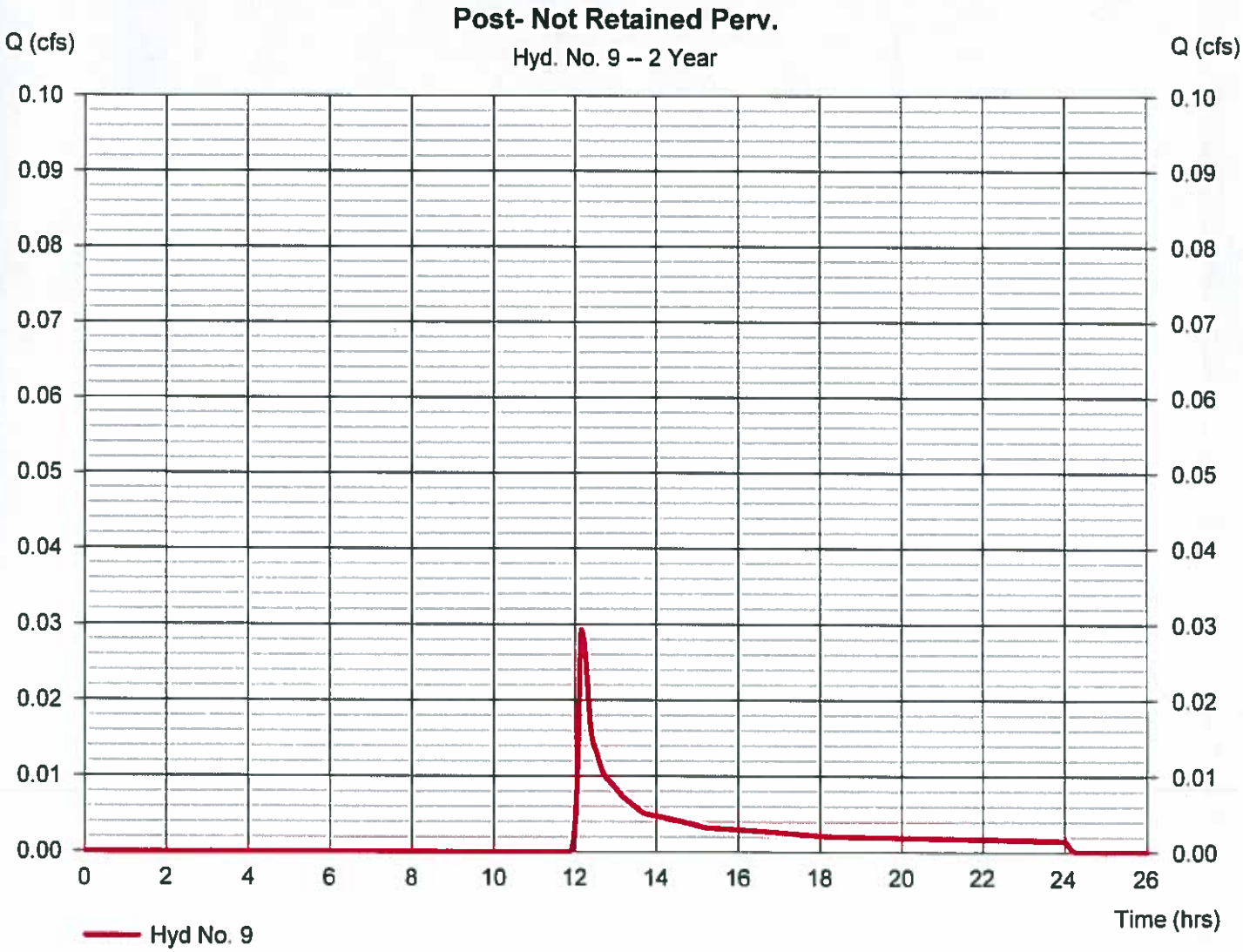
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 9

Post- Not Retained Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.029 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 159 cuft
Drainage area	= 0.090 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m285t.cds	Shape factor	



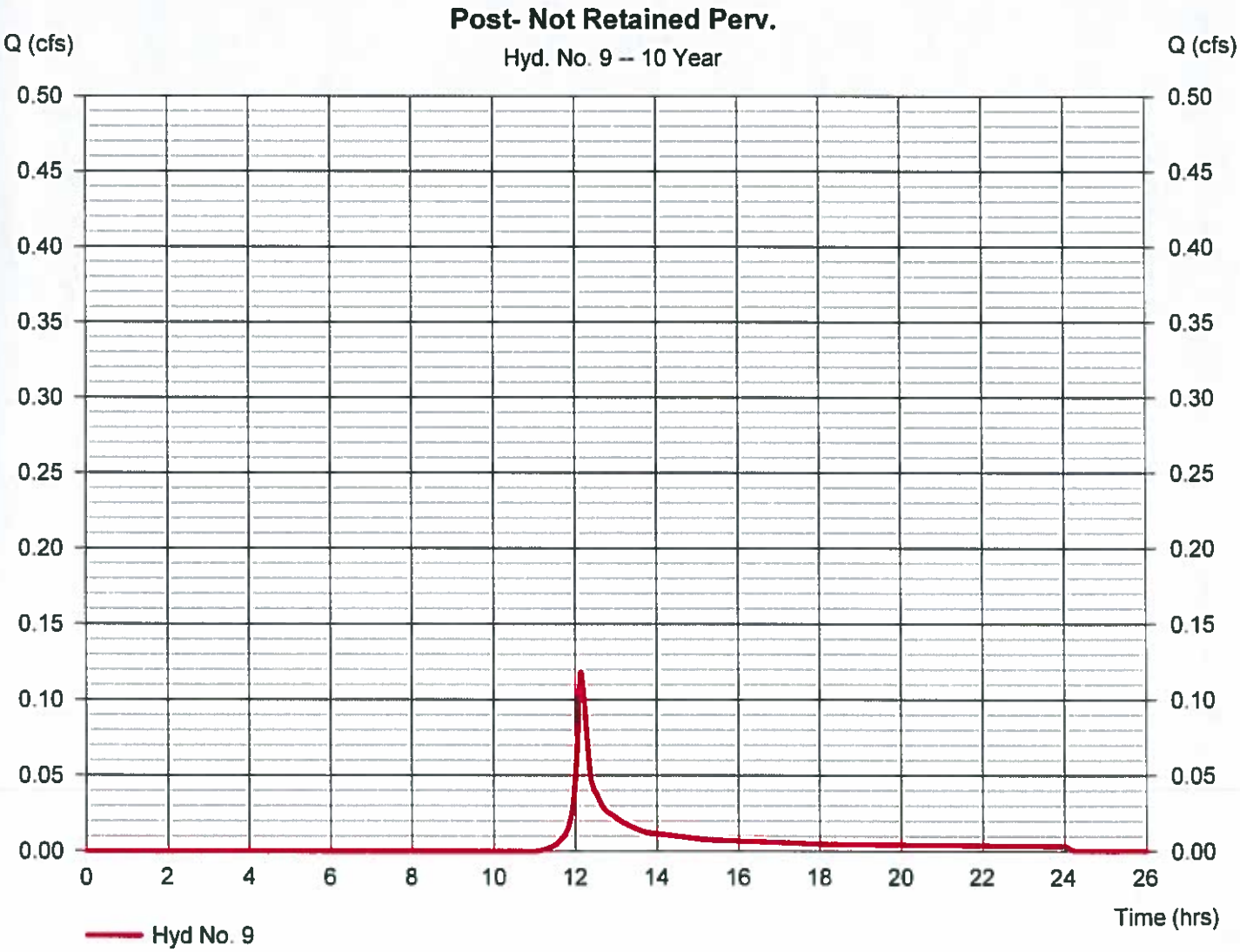
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 9

Post- Not Retained Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.118 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 461 cuft
Drainage area	= 0.090 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.20 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m265t.cds	Shape factor	= 484



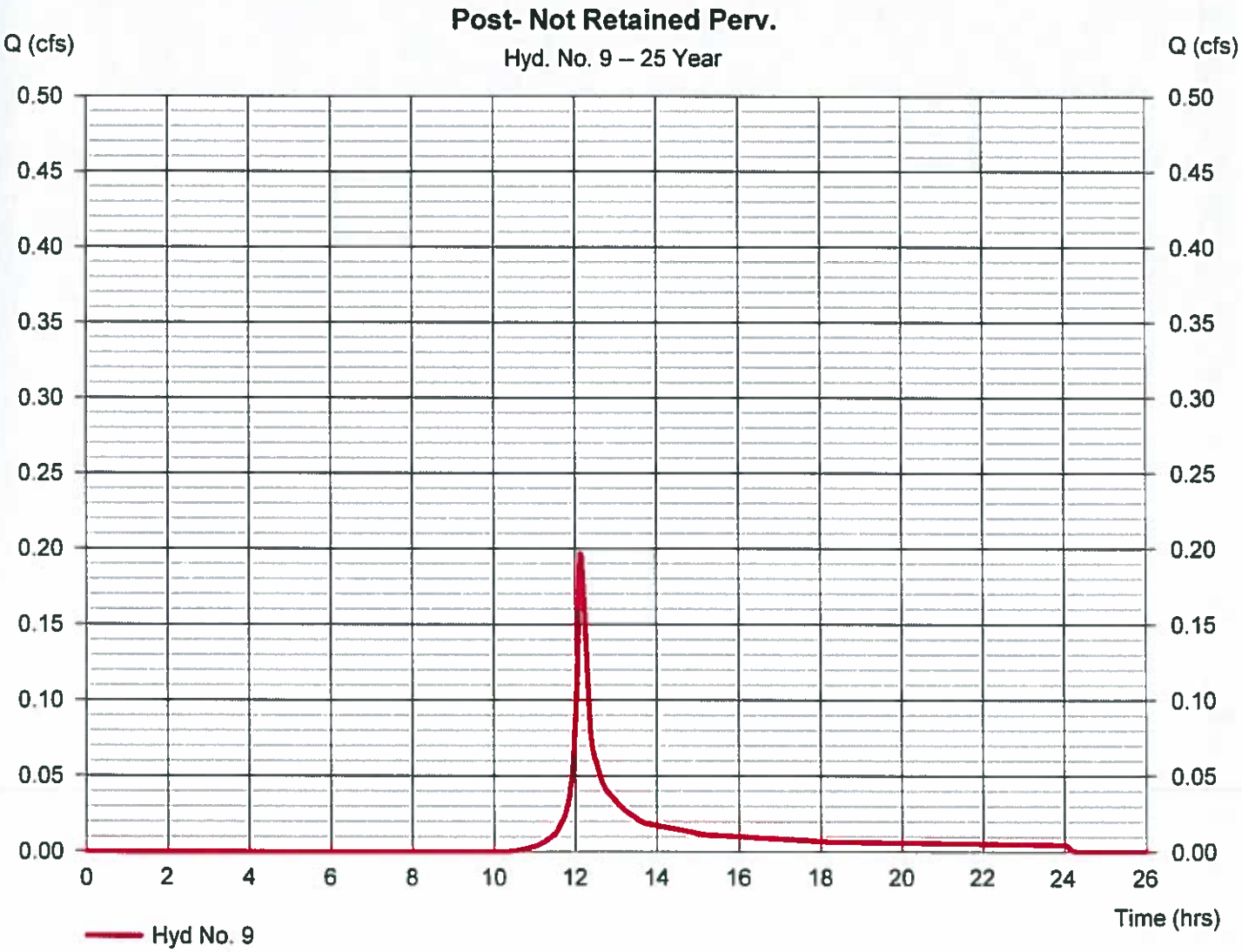
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 9

Post- Not Retained Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.197 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 732 cuft
Drainage area	= 0.090 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.50 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m265t.cds	Shape factor	= 484



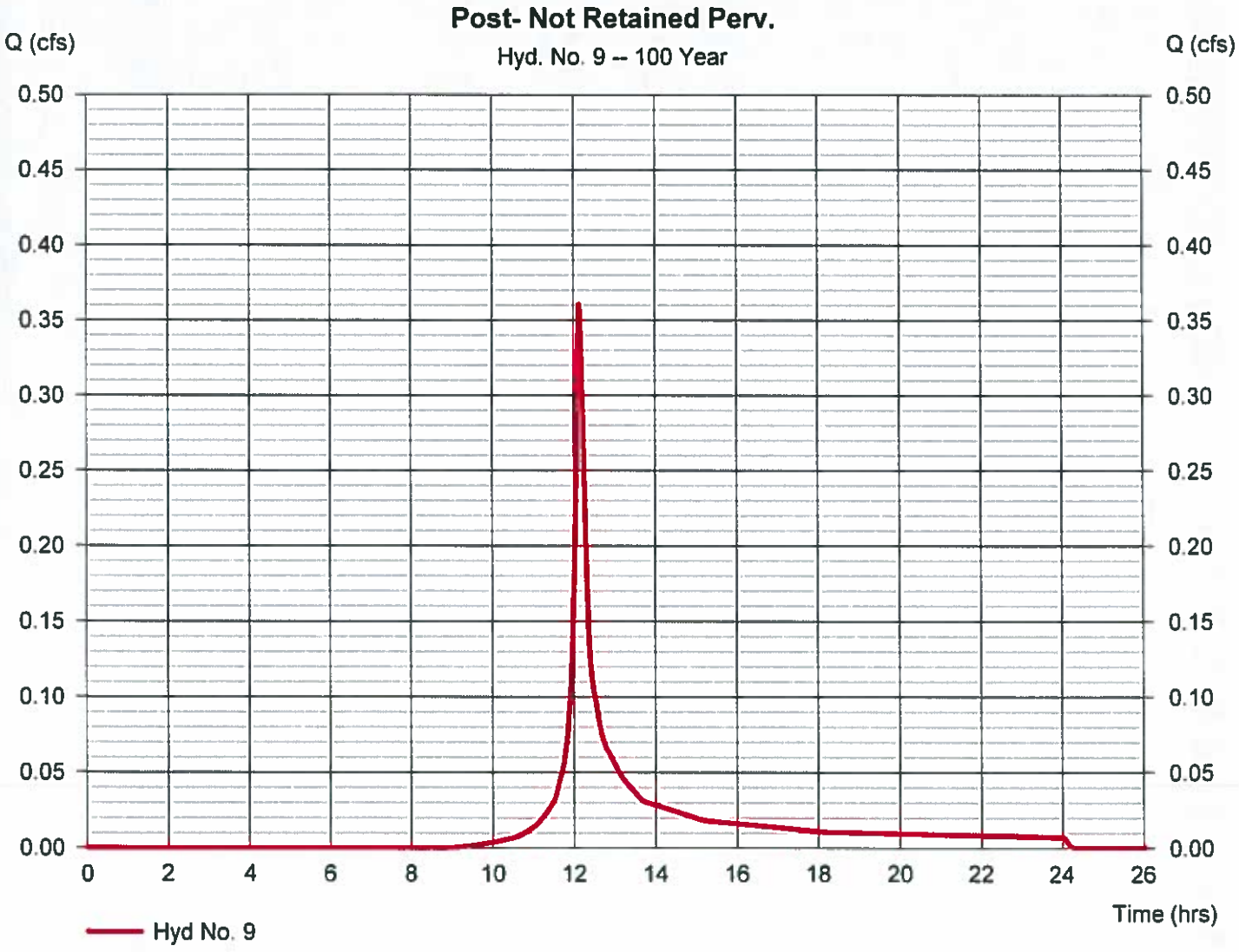
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 9

Post- Not Retained Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.360 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 1,306 cuft
Drainage area	= 0.090 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.90 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1-m285t.cds		



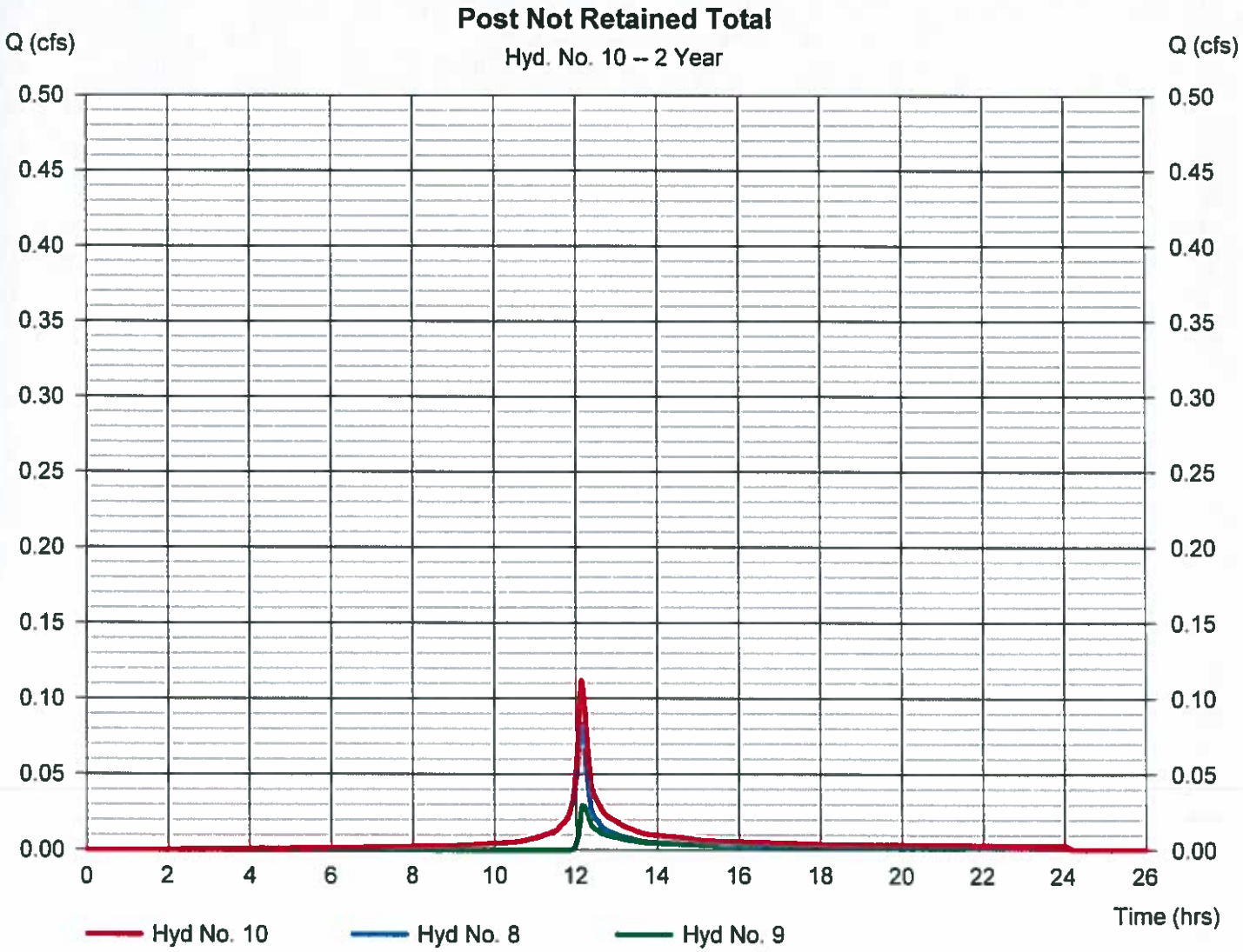
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 11 / 2 / 2020

Hyd. No. 10

Post Not Retained Total

Hydrograph type	= Combine	Peak discharge	= 0.112 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 501 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.120 ac



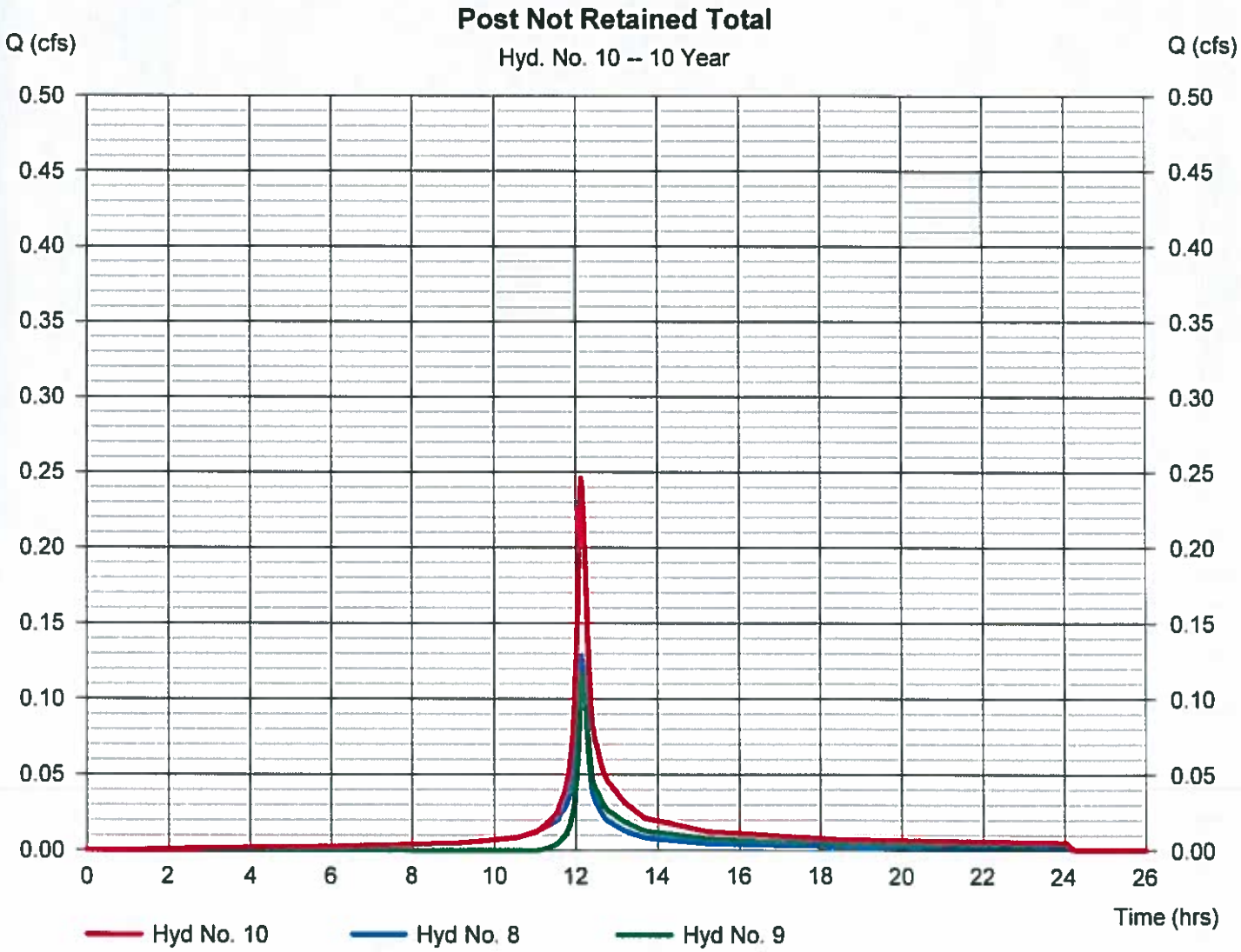
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 11 / 2 / 2020

Hyd. No. 10

Post Not Retained Total

Hydrograph type	= Combine	Peak discharge	= 0.246 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 998 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.120 ac



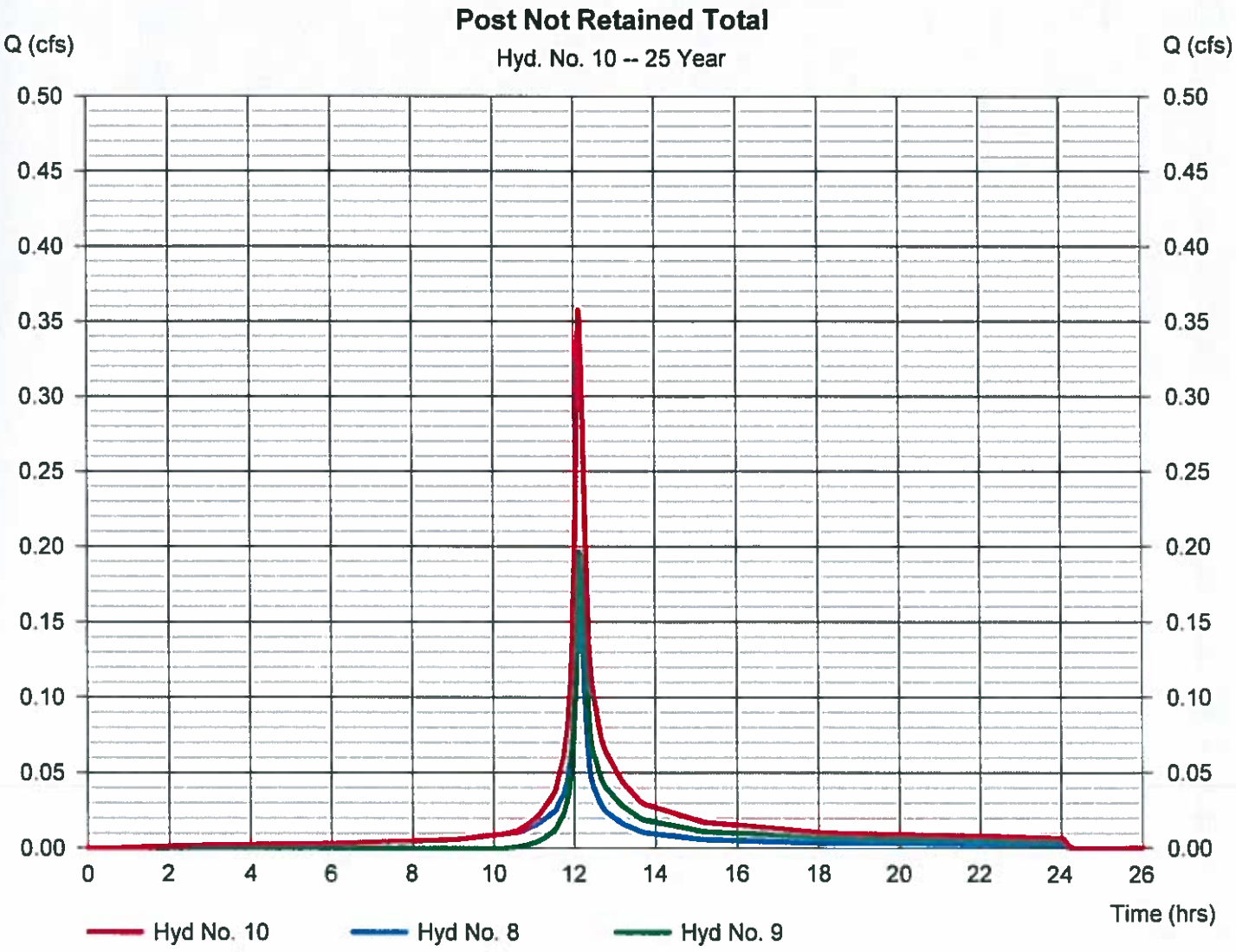
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 10

Post Not Retained Total

Hydrograph type	= Combine	Peak discharge	= 0.357 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 1,410 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.120 ac



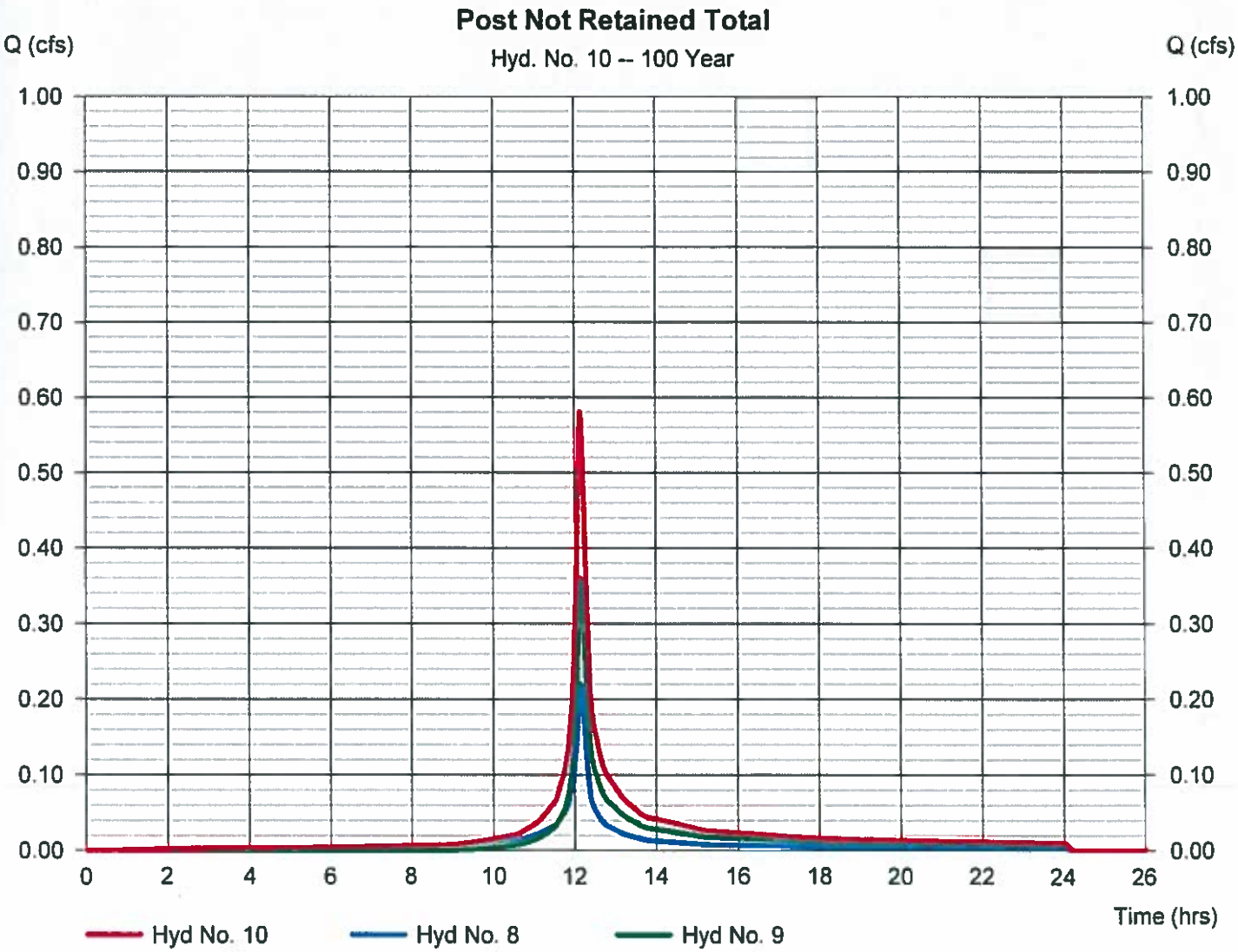
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 10

Post Not Retained Total

Hydrograph type	= Combine	Peak discharge	= 0.581 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 2,243 cuft
Inflow hyds.	= 8, 9	Contrib. drain. area	= 0.120 ac



A-5 – POST-DEVELOPED – TO UG BASIN IMP.

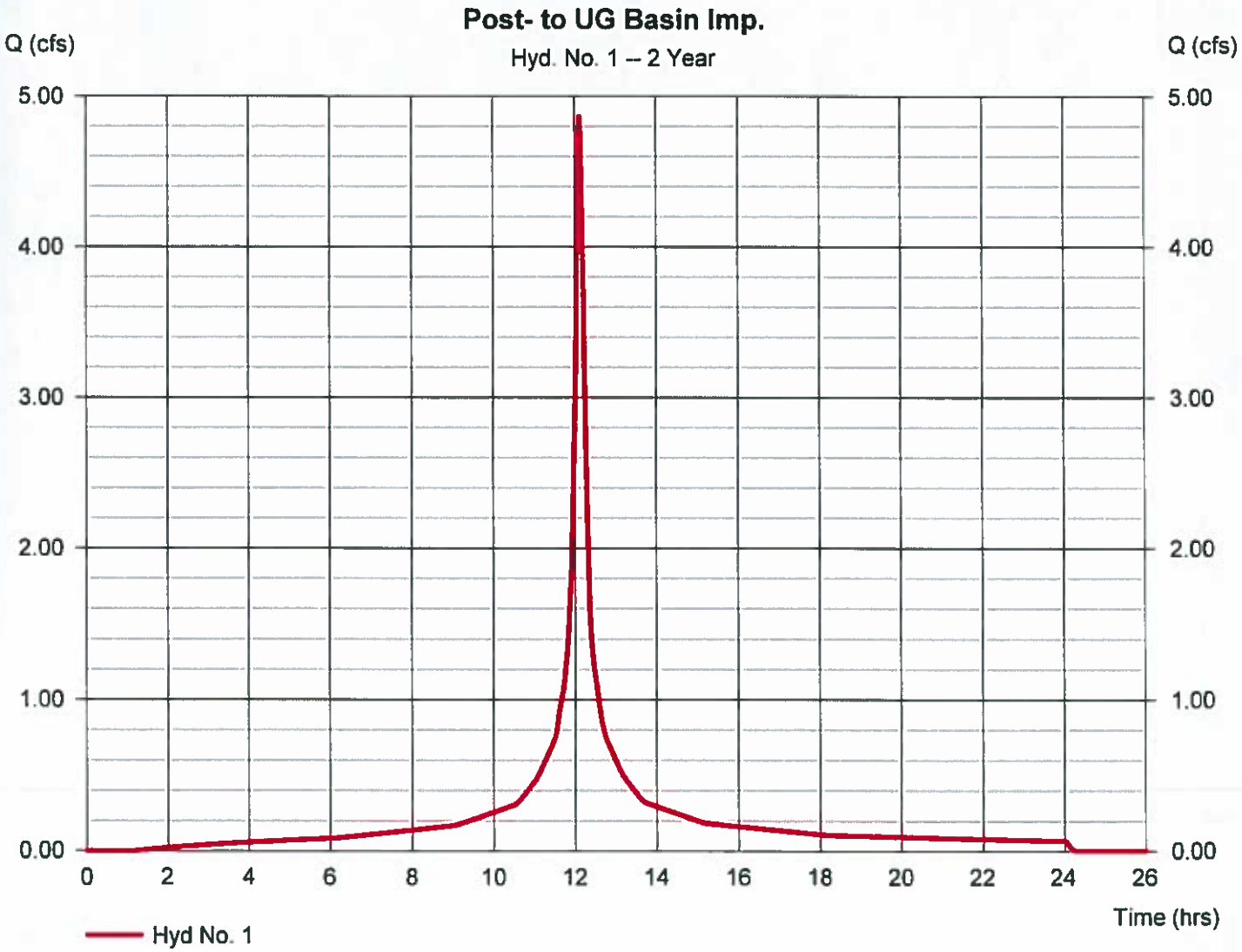
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 1

Post- to UG Basin Imp.

Hydrograph type	= SCS Runoff	Peak discharge	= 4.861 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 19,990 cuft
Drainage area	= 1.750 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m265t.cds		



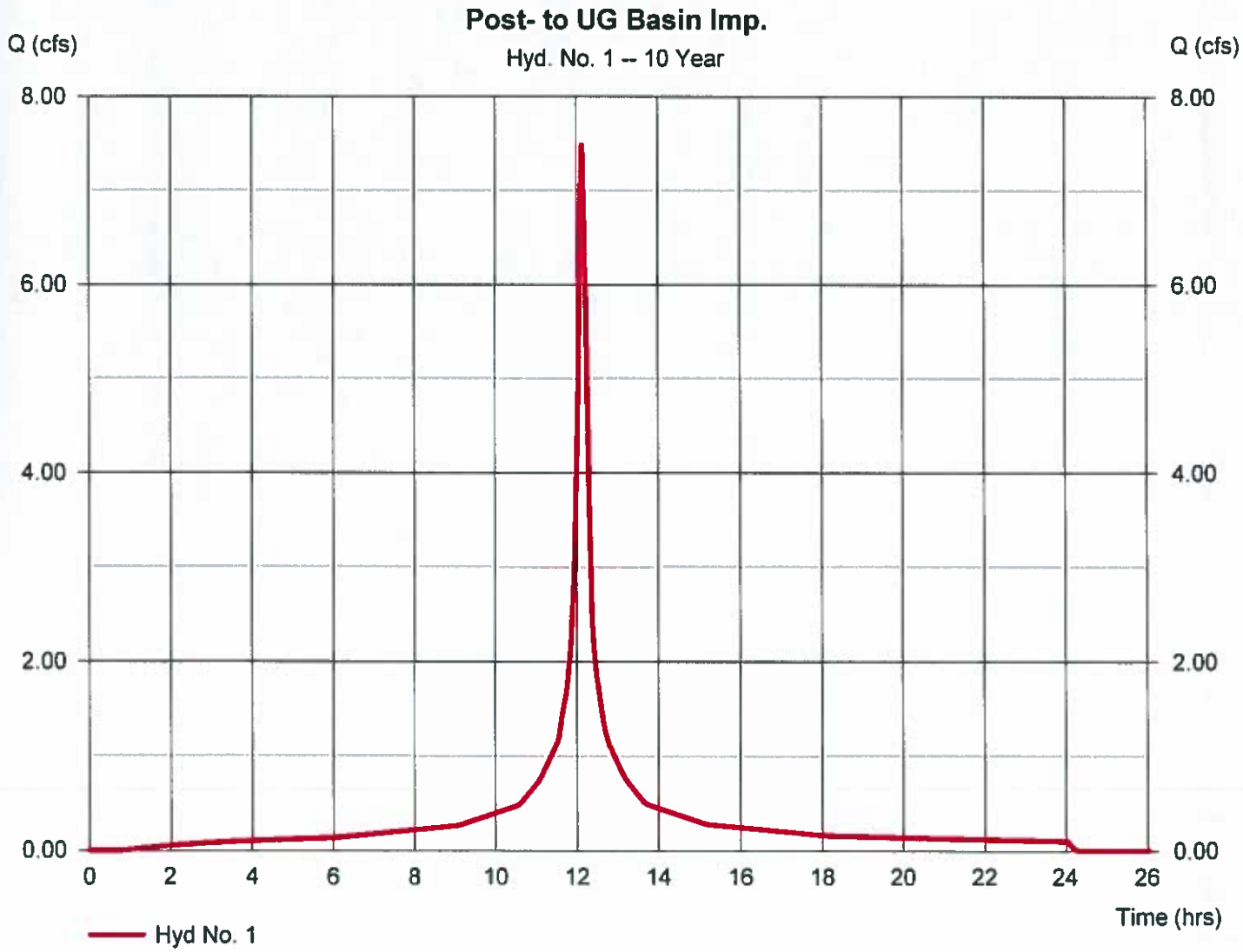
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 1

Post- to UG Basin Imp.

Hydrograph type	= SCS Runoff	Peak discharge	= 7.483 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 31,327 cuft
Drainage area	= 1.750 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.20 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m285t.cds	Shape factor	



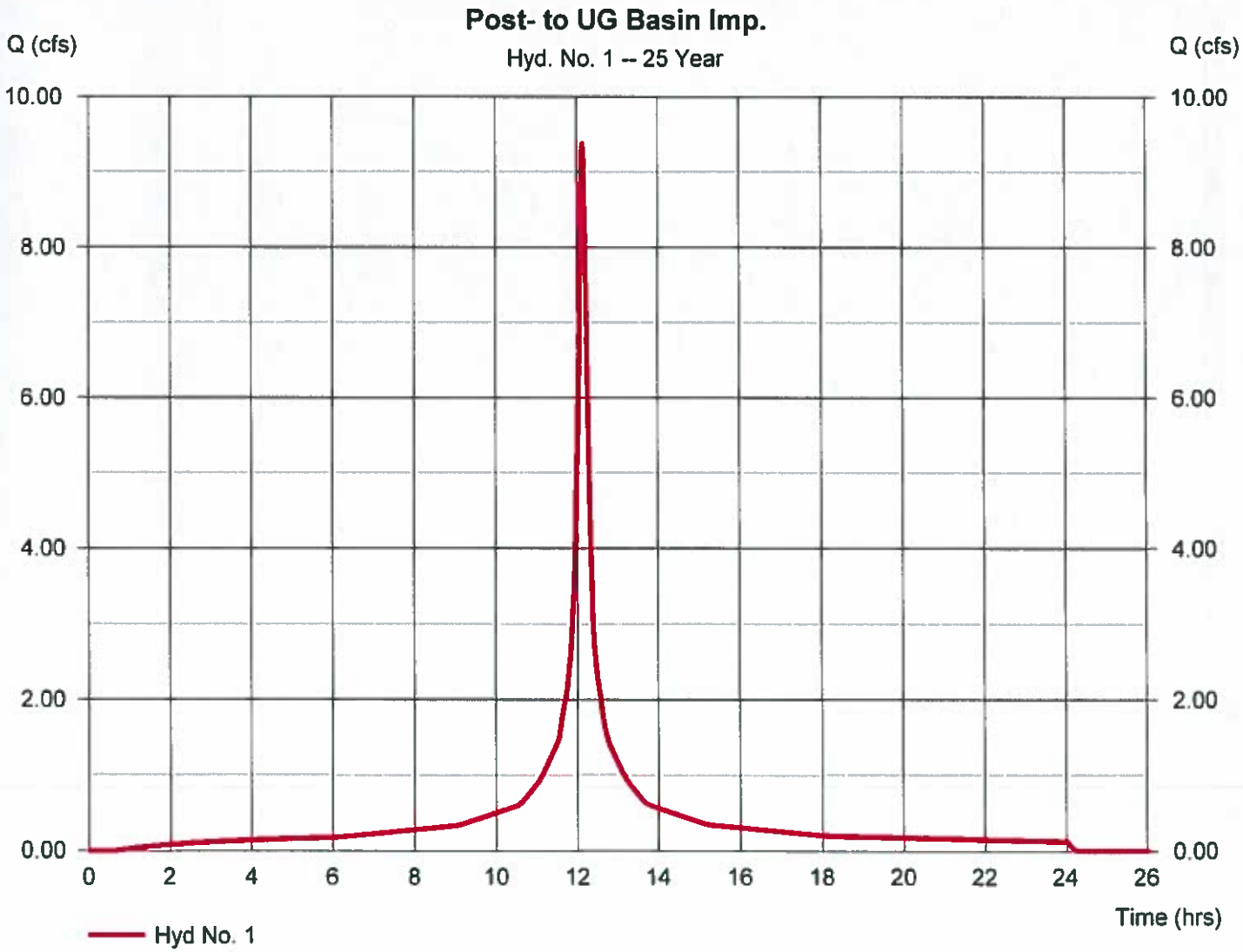
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 1

Post- to UG Basin Imp.

Hydrograph type	= SCS Runoff	Peak discharge	= 9.371 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 39,524 cuft
Drainage area	= 1.750 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.50 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m265t.cds		



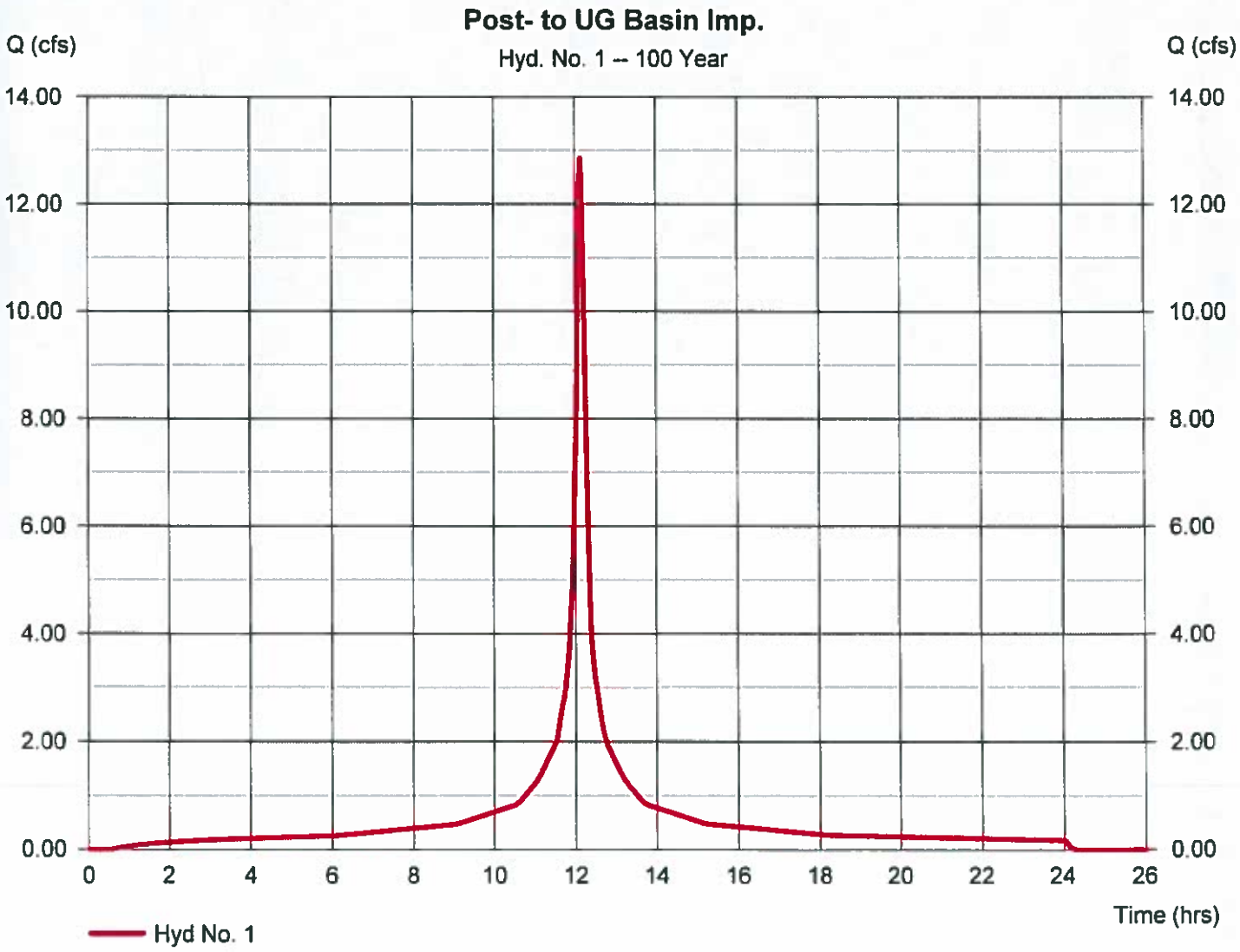
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 1

Post- to UG Basin Imp.

Hydrograph type	= SCS Runoff	Peak discharge	= 12.85 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 54,663 cuft
Drainage area	= 1.750 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.90 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m285t.cds	Shape factor	



A-6 – POST-DEVELOPED – TO UG BASIN PERV.

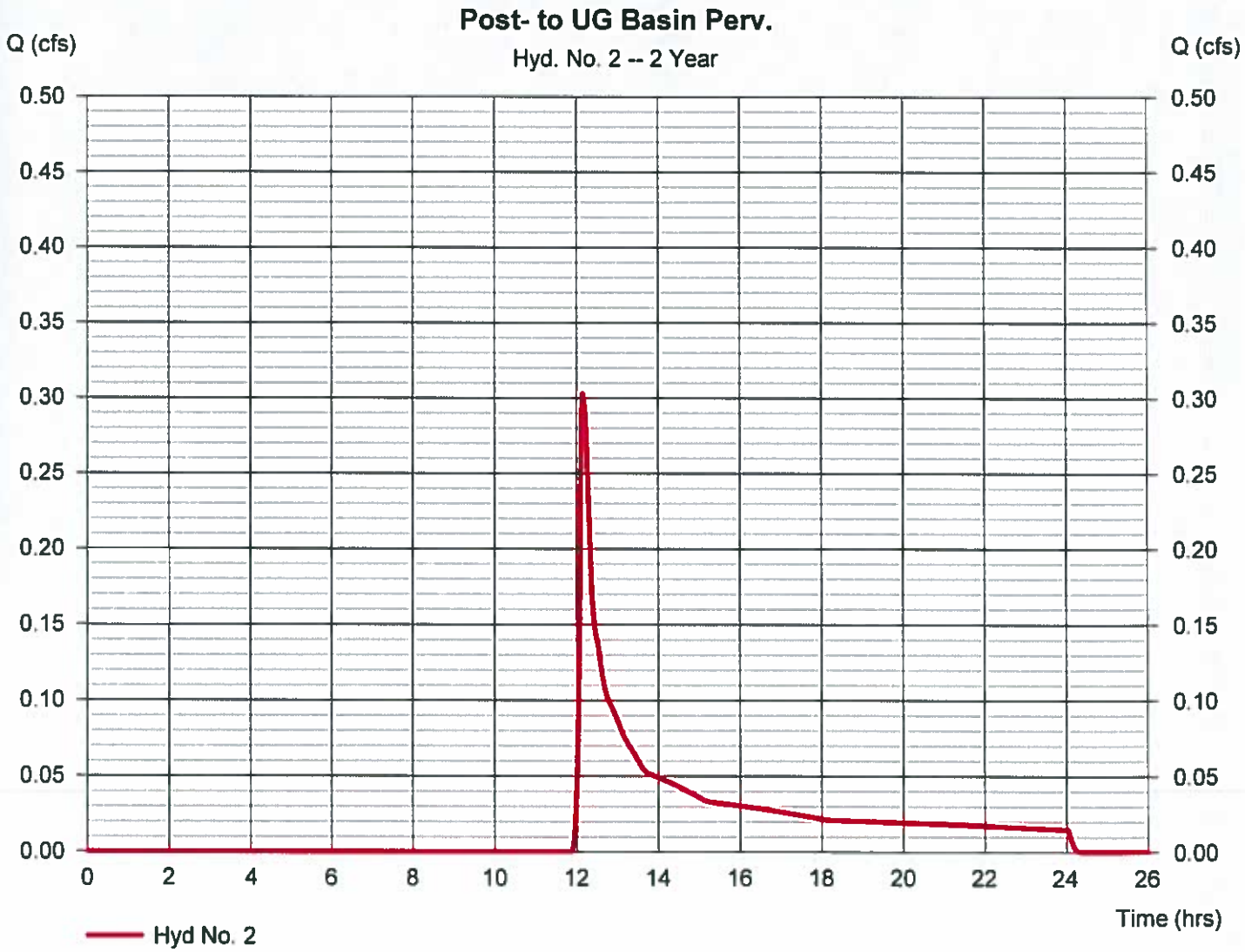
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 2

Post- to UG Basin Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 0.303 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 1,641 cuft
Drainage area	= 0.930 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.40 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distributions\NOAA D 1=m285t.cds		



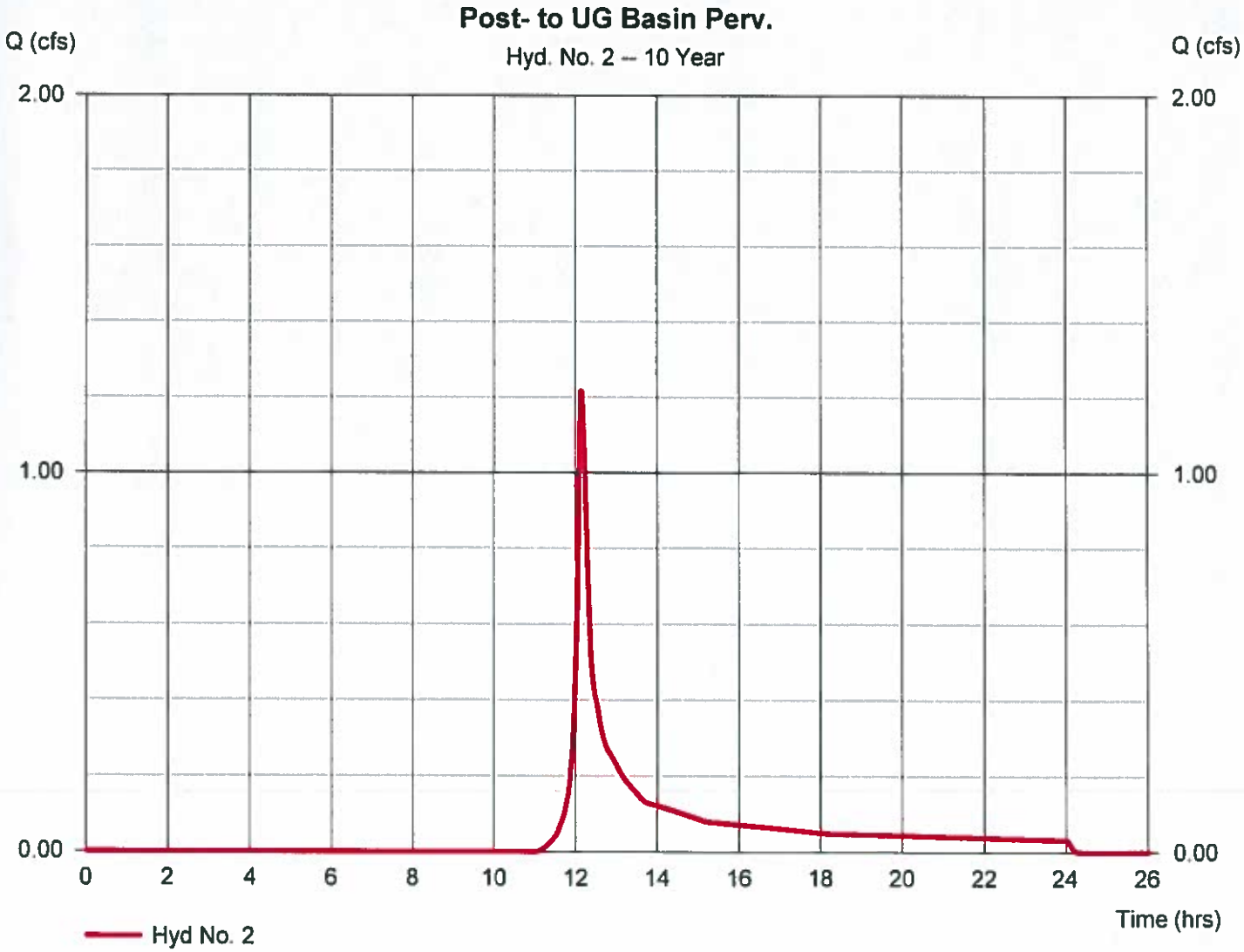
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 2

Post- to UG Basin Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 1.216 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 4,761 cuft
Drainage area	= 0.930 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.20 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=285t.cds	Shape factor	



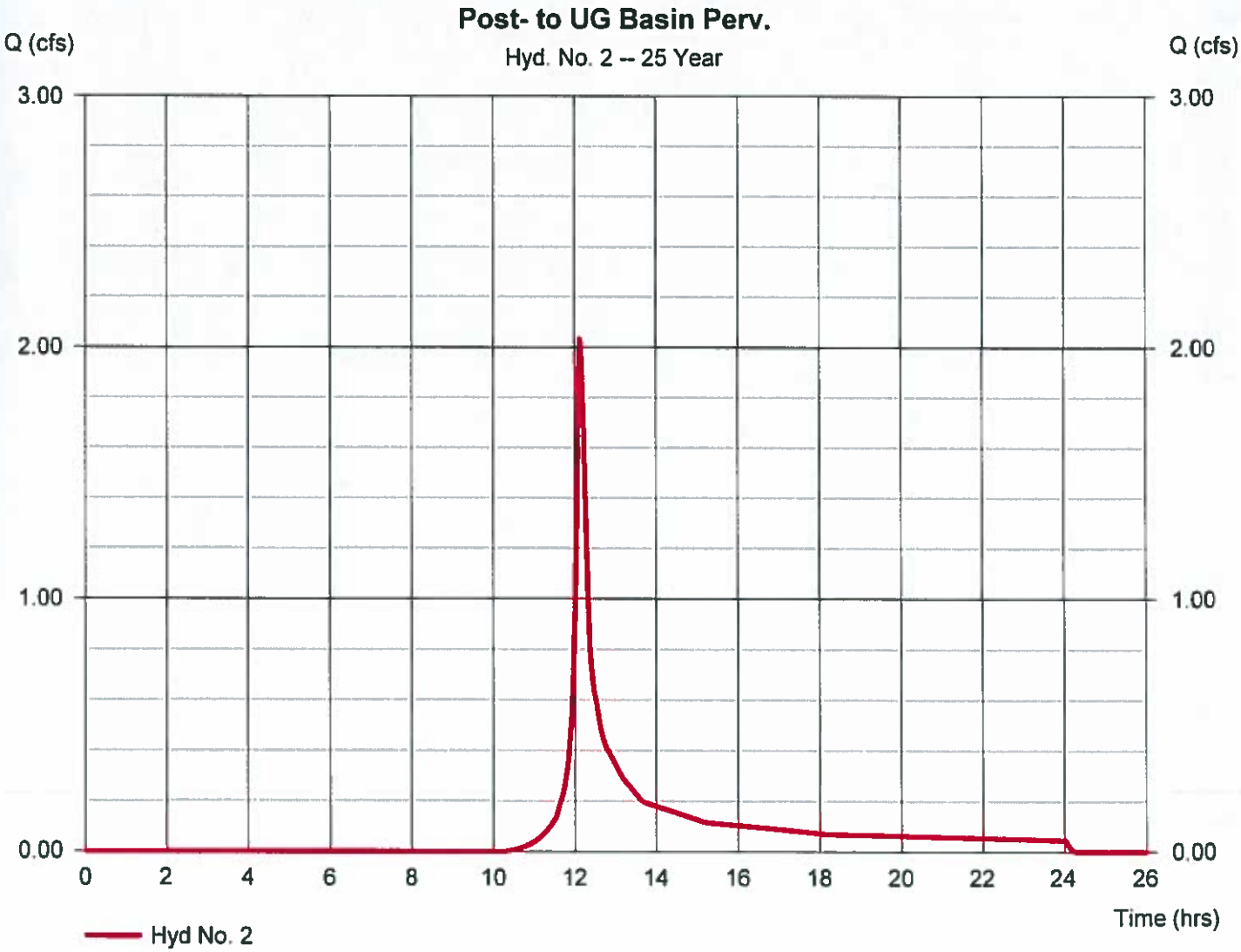
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 2

Post- to UG Basin Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 2.032 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 7,567 cuft
Drainage area	= 0.930 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 6.50 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m265t.cds	Shape factor	



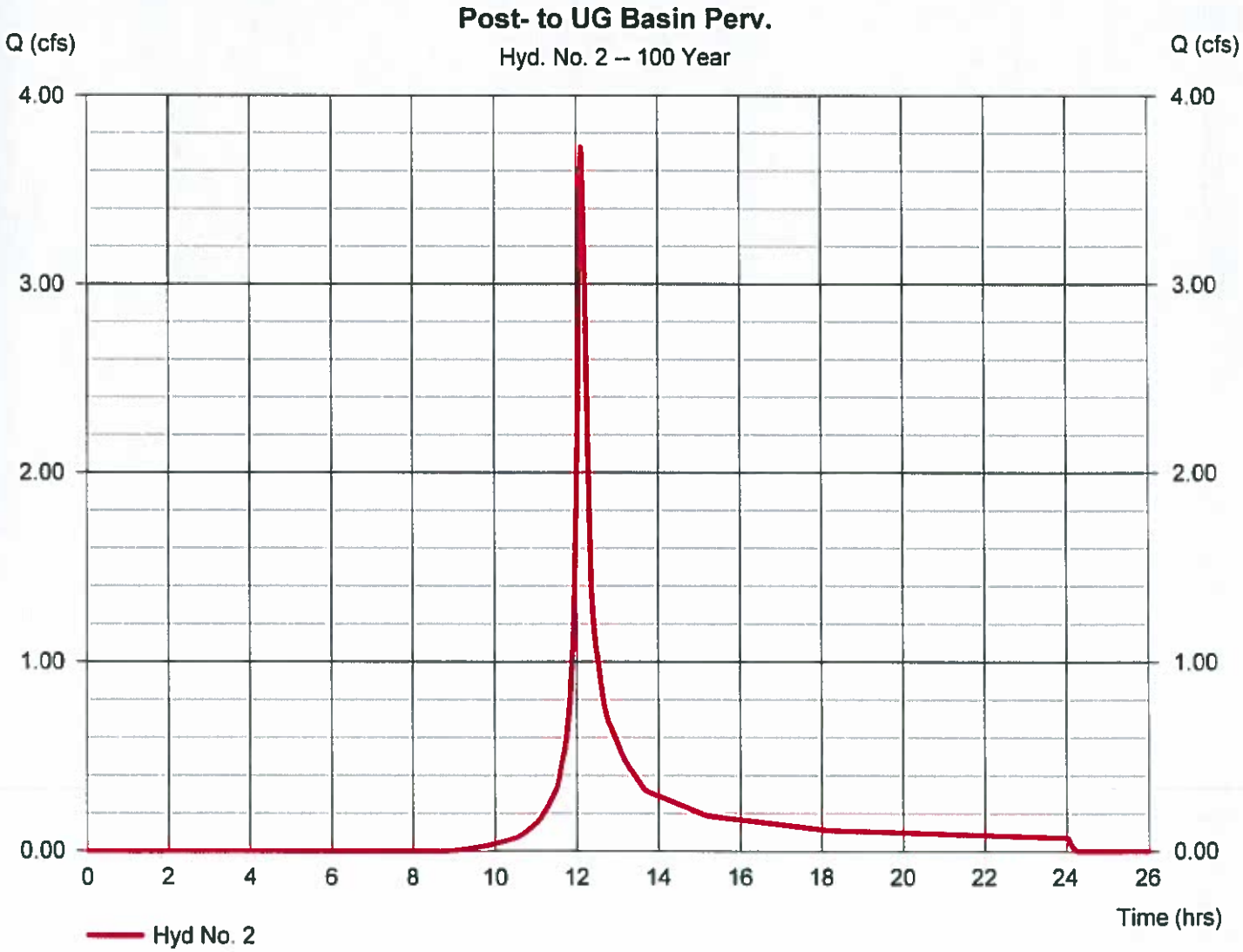
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 2

Post- to UG Basin Perv.

Hydrograph type	= SCS Runoff	Peak discharge	= 3.724 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 13,494 cuft
Drainage area	= 0.930 ac	Curve number	= 60
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.90 in	Distribution	= Custom
Storm duration	= W:\Projects\NOAA Atlas 14 Distribution\NOAA D 1=m285t.cds		



A-7 – POST-DEVELOPED – TOTAL TO BASIN

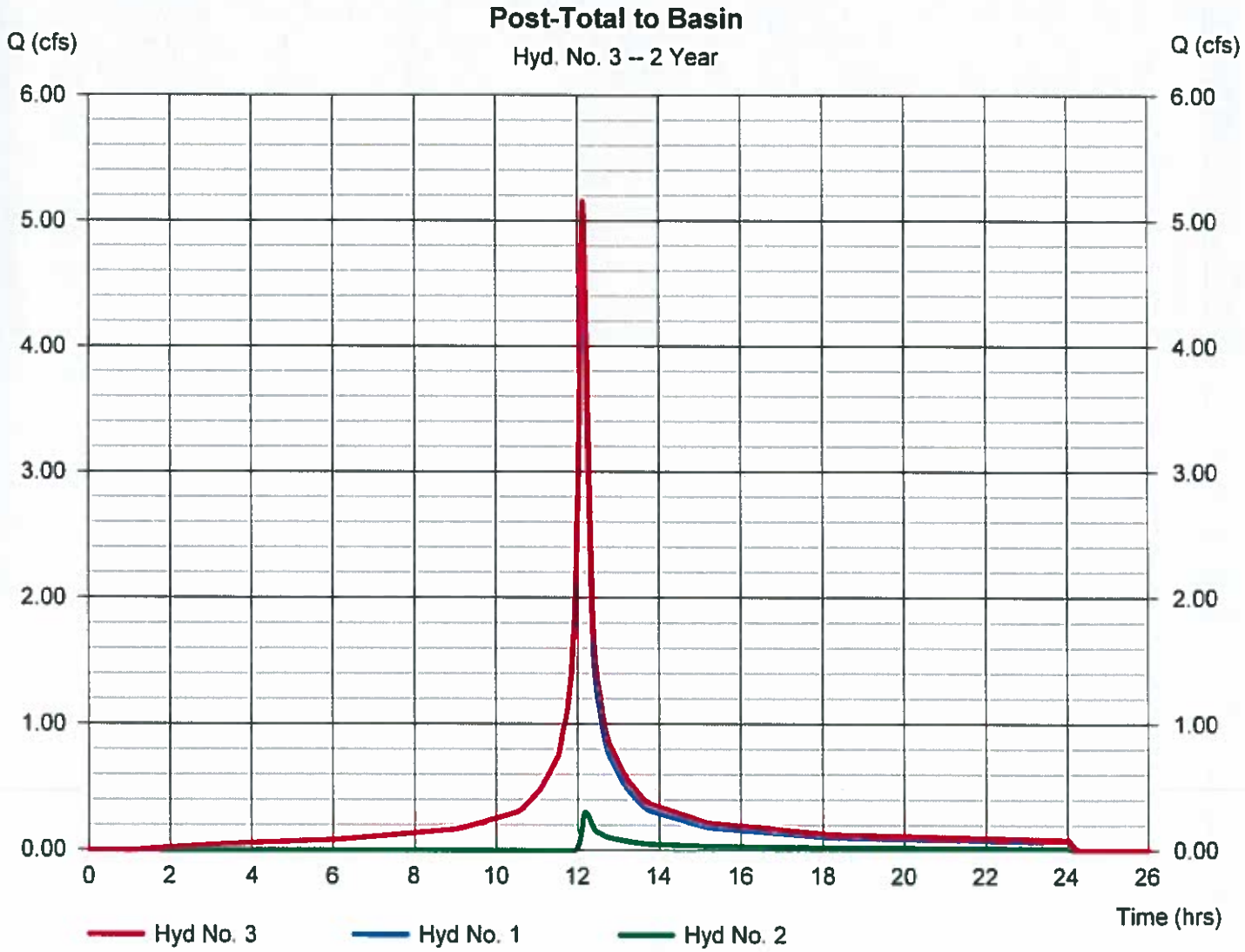
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 3

Post-Total to Basin

Hydrograph type	= Combine	Peak discharge	= 5.153 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 21,630 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.680 ac



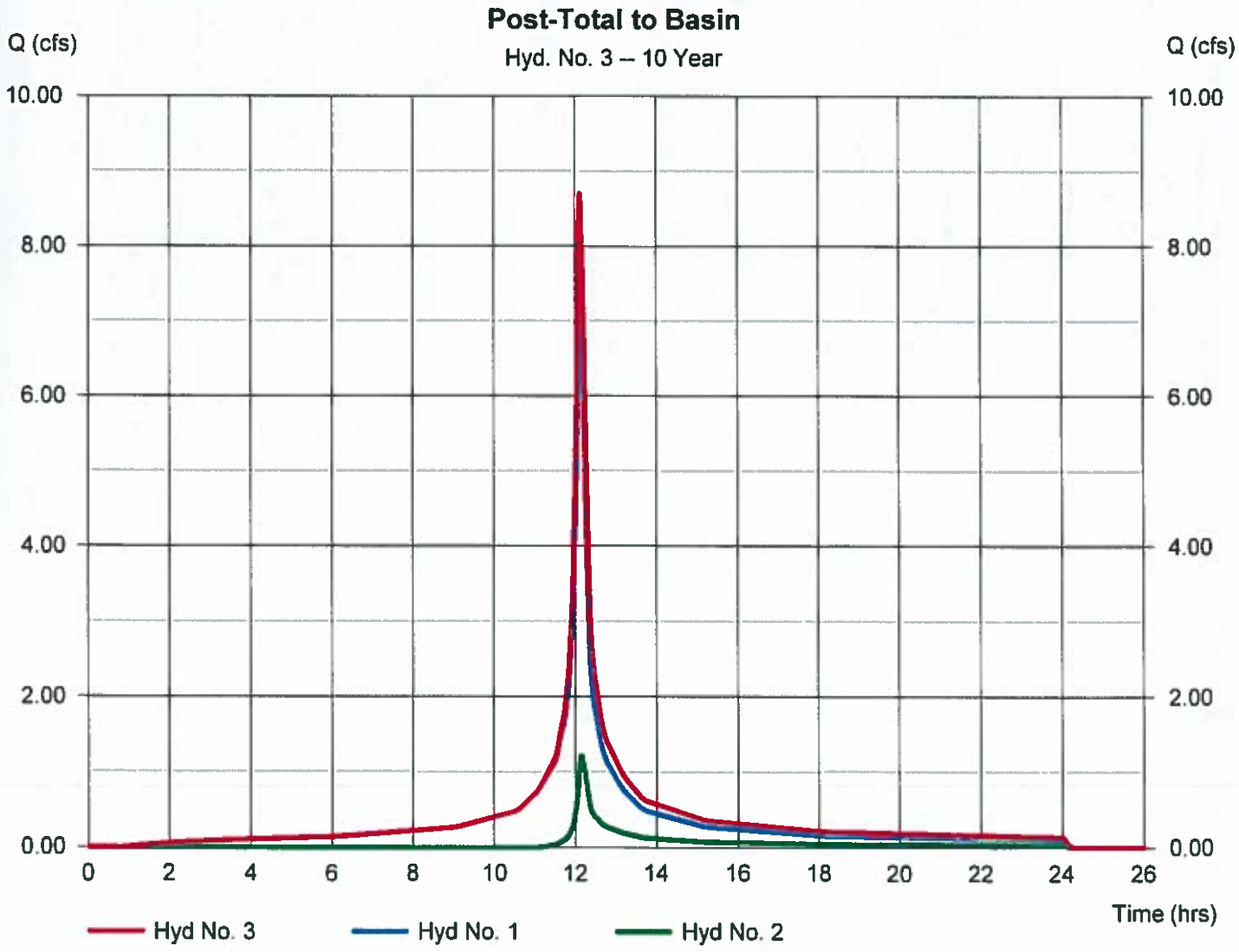
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 3

Post-Total to Basin

Hydrograph type	= Combine	Peak discharge	= 8.699 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 36,089 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.680 ac



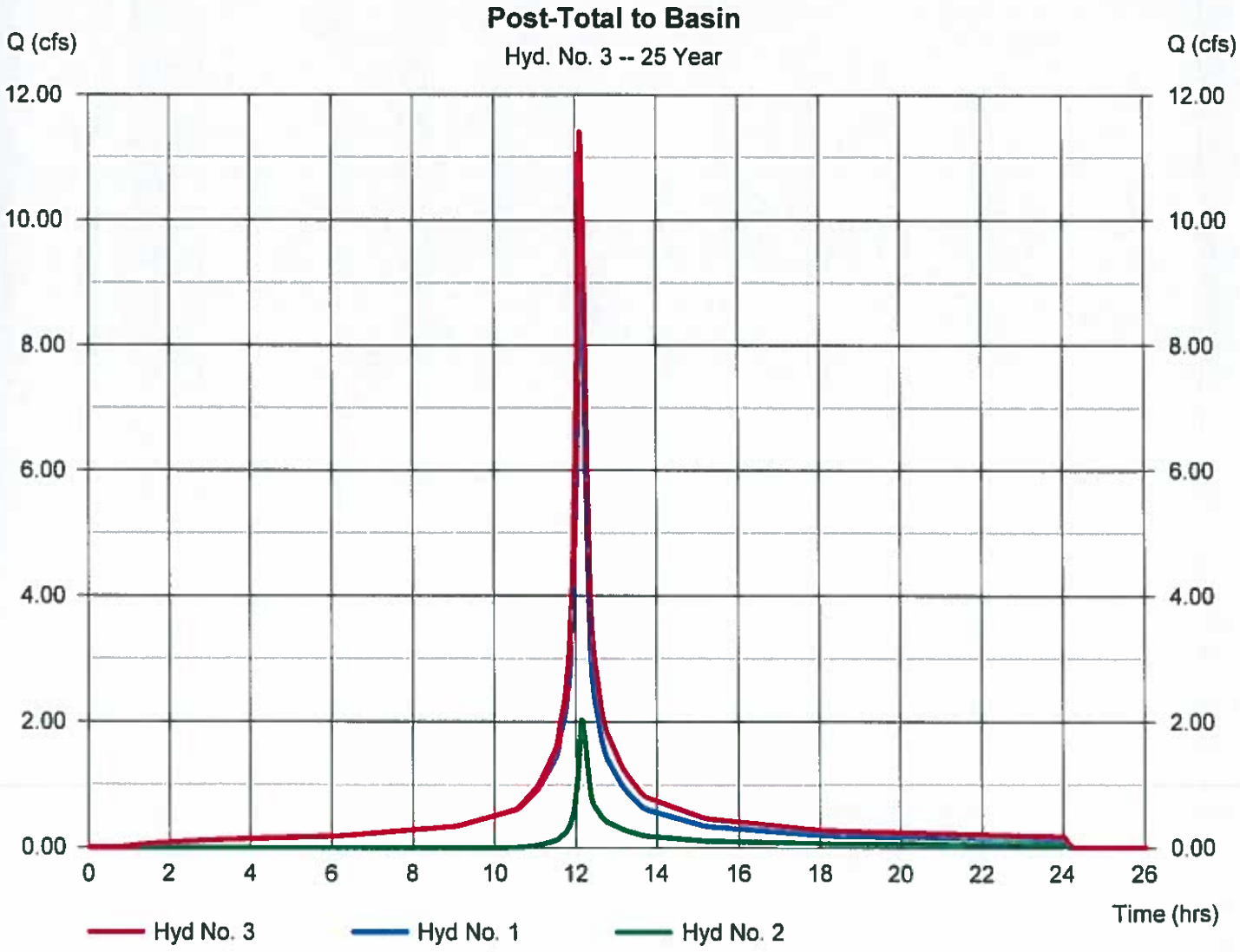
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 Monday, 11 / 2 / 2020

Hyd. No. 3

Post-Total to Basin

Hydrograph type	= Combine	Peak discharge	= 11.40 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 47,091 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.680 ac



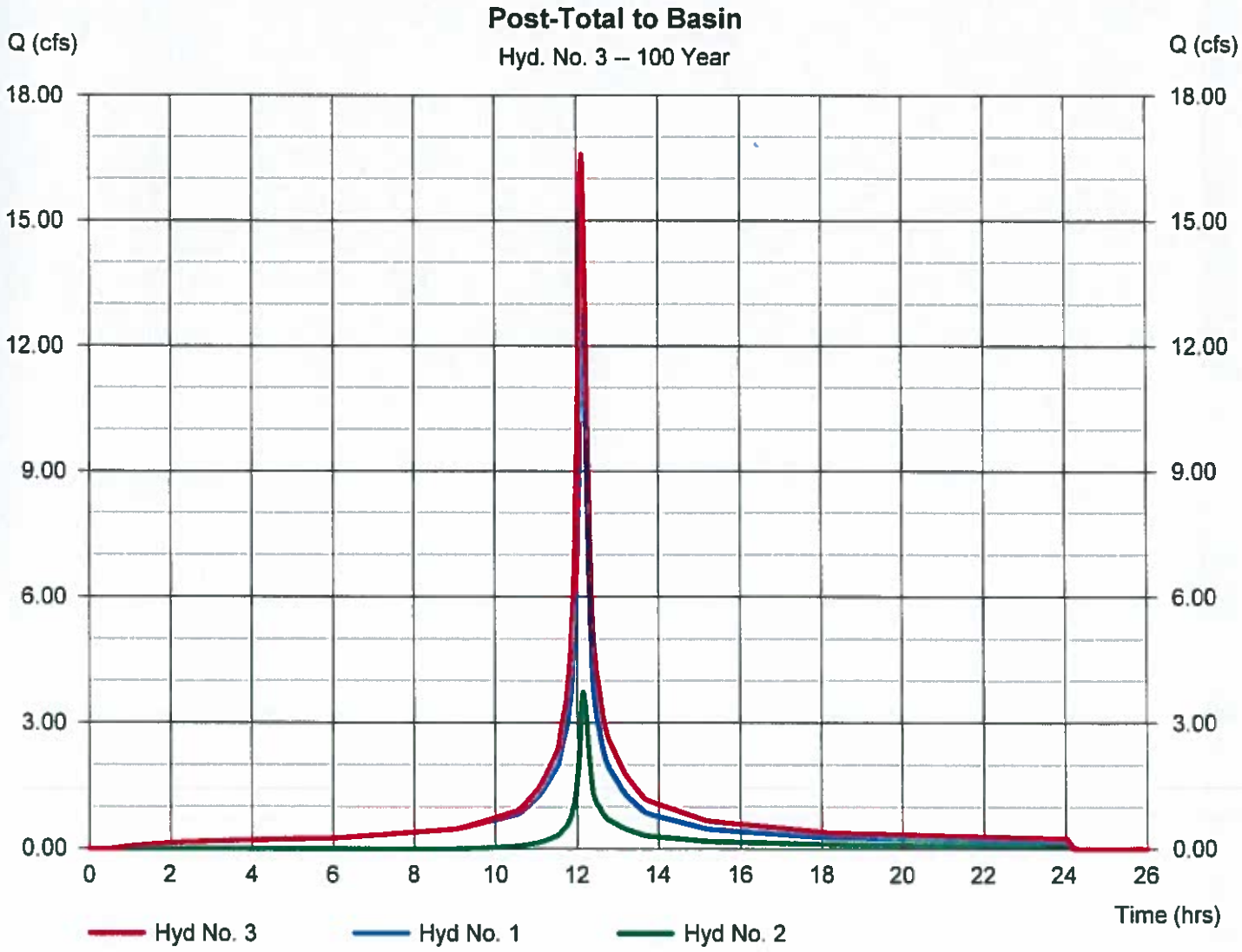
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 3

Post-Total to Basin

Hydrograph type	= Combine	Peak discharge	= 16.58 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.13 hrs
Time interval	= 1 min	Hyd. volume	= 68,157 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 2.680 ac



A-8 – POST-DEVELOPED – UG BASIN ROUTING

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Pond No. 1 - Underground Storage

Pond Data

UG Chambers -Invert elev. = 24.10 ft, Rise x Span = 2.00 x 2.00 ft, Barrel Len = 1749.00 ft, No. Barrels = 1, Slope = 0.00%, Headers = No
Encasement -Invert elev. = 23.60 ft, Width = 4.00 ft, Height = 3.00 ft, Voids = 40.00%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	23.60	n/a	0	0
0.30	23.90	n/a	840	840
0.60	24.20	n/a	902	1,741
0.90	24.50	n/a	1,248	2,989
1.20	24.80	n/a	1,399	4,388
1.50	25.10	n/a	1,459	5,848
1.80	25.40	n/a	1,460	7,308
2.10	25.70	n/a	1,398	8,706
2.40	26.00	n/a	1,247	9,953
2.70	26.30	n/a	901	10,855
3.00	26.60	n/a	840	11,694

Culvert / Orifice Structures

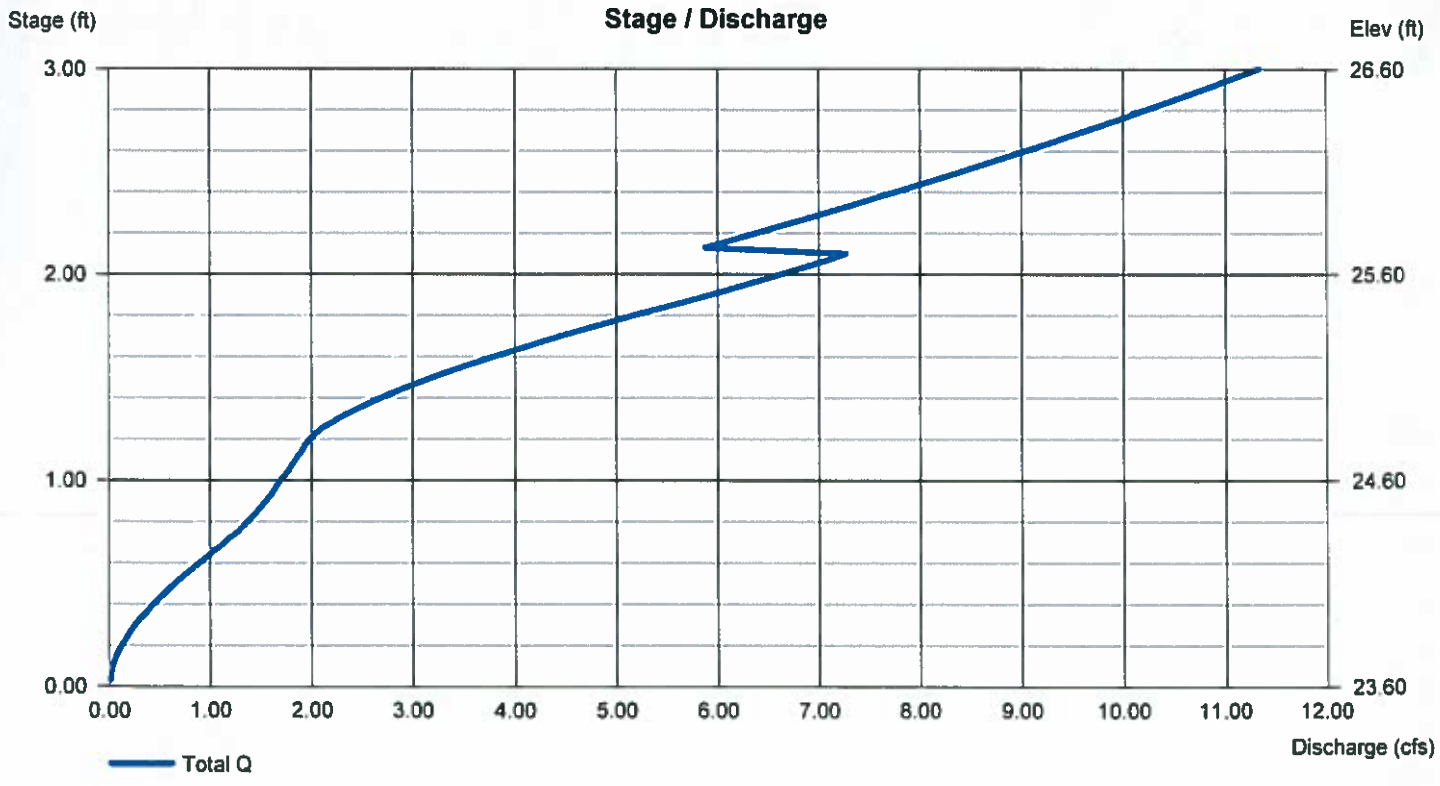
	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	10.00	0.00	0.00
Span (in)	= 18.00	10.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 23.60	23.60	0.00	0.00
Length (ft)	= 25.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .010	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 2.50	Inactive	Inactive	0.00
Crest El. (ft)	= 24.80	27.50	26.20	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	Ciplti	Rect	---
Multi-Stage	= Yes	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)
TW Elev. (ft) = 0.00

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



Hydrograph Report

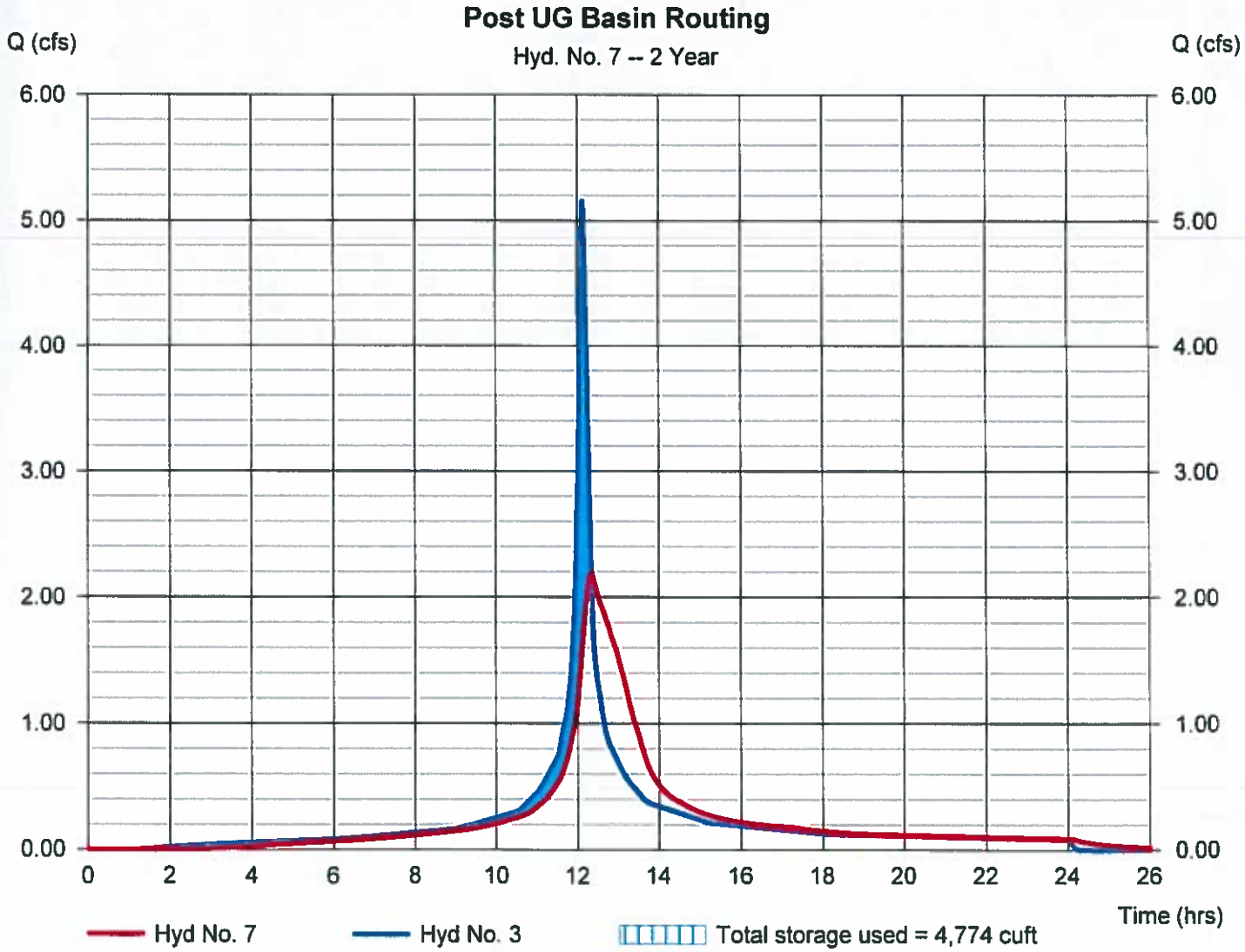
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 7

Post UG Basin Routing

Hydrograph type	= Reservoir	Peak discharge	= 2.188 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.33 hrs
Time interval	= 1 min	Hyd. volume	= 21,602 cuft
Inflow hyd. No.	= 3 - Post-Total to Basin	Max. Elevation	= 24.88 ft
Reservoir name	= Underground Storage	Max. Storage	= 4,774 cuft

Storage Indication method used.



Hydrograph Report

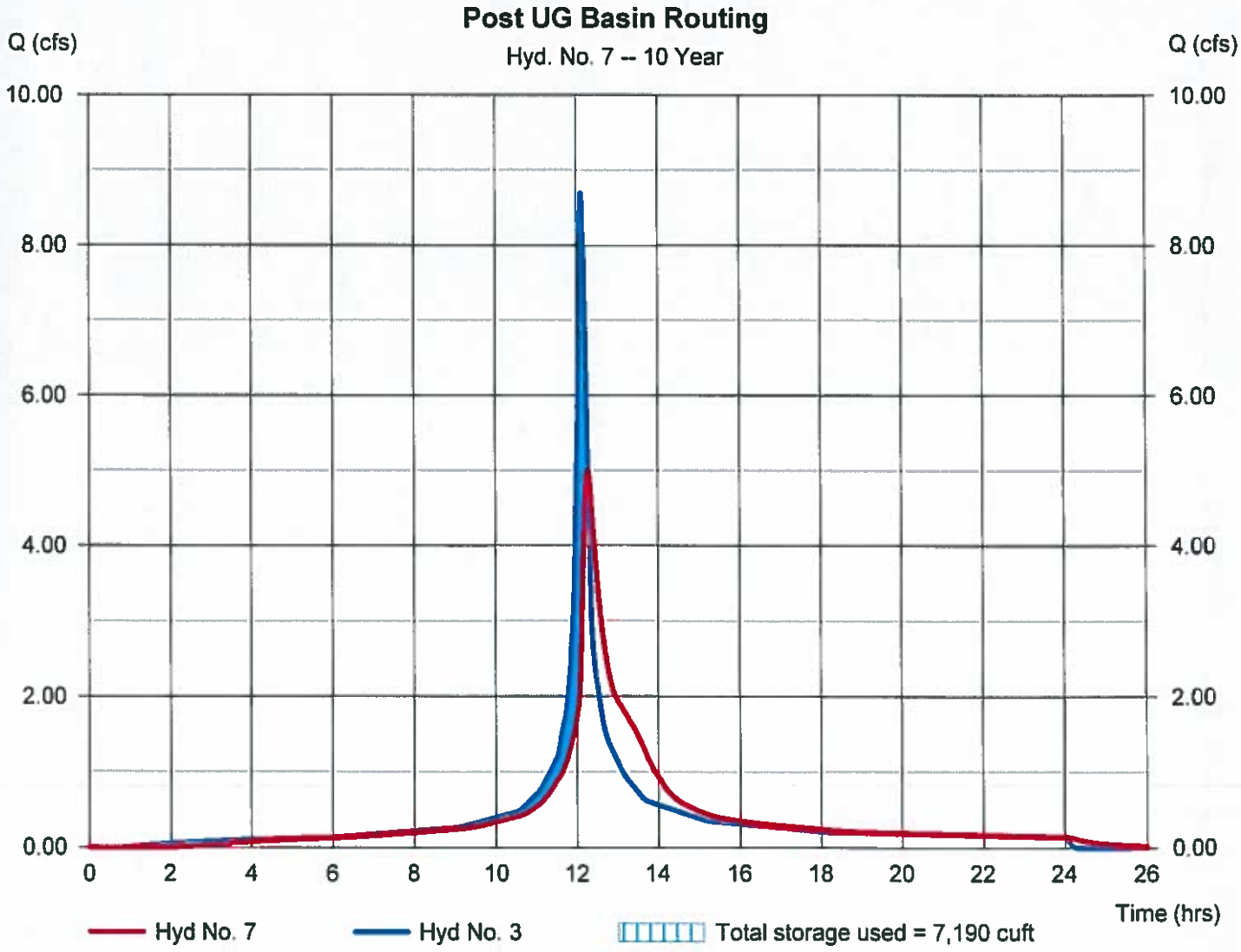
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 7

Post UG Basin Routing

Hydrograph type	= Reservoir	Peak discharge	= 4.996 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 36,060 cuft
Inflow hyd. No.	= 3 - Post-Total to Basin	Max. Elevation	= 25.38 ft
Reservoir name	= Underground Storage	Max. Storage	= 7,190 cuft

Storage Indication method used.



Hydrograph Report

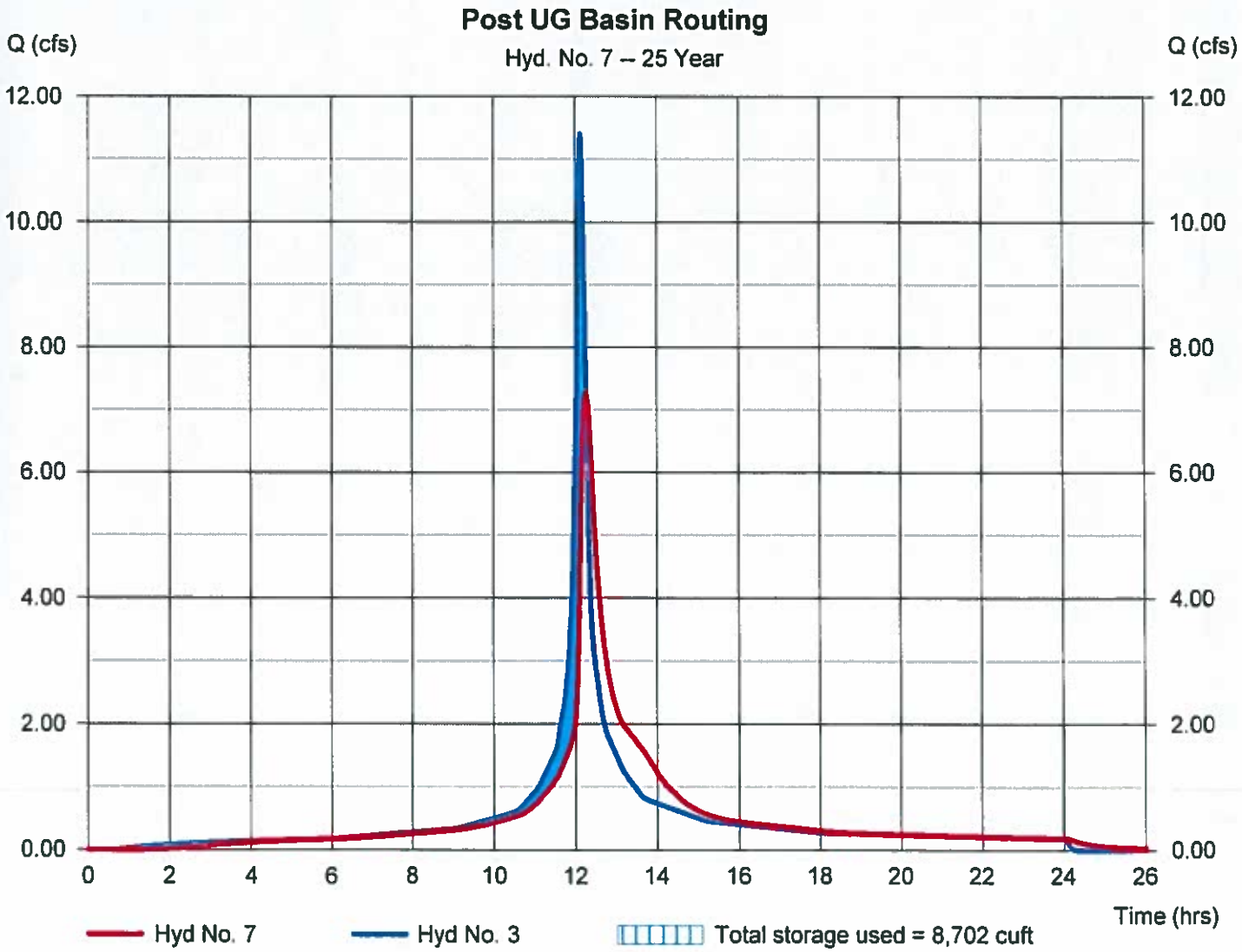
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 7

Post UG Basin Routing

Hydrograph type	= Reservoir	Peak discharge	= 7.257 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.25 hrs
Time interval	= 1 min	Hyd. volume	= 47,062 cuft
Inflow hyd. No.	= 3 - Post-Total to Basin	Max. Elevation	= 25.70 ft
Reservoir name	= Underground Storage	Max. Storage	= 8,702 cuft

Storage Indication method used.



Hydrograph Report

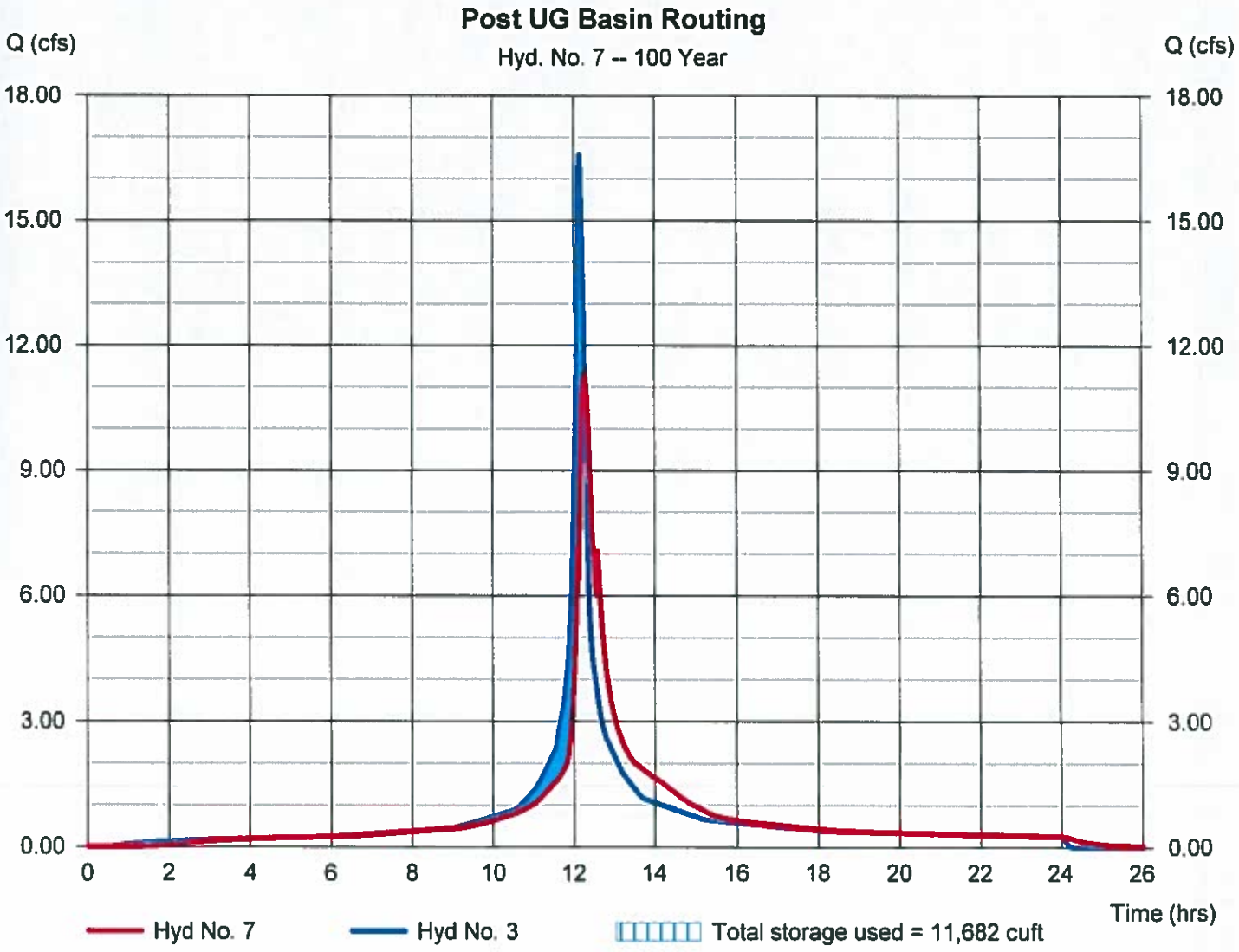
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 7

Post UG Basin Routing

Hydrograph type	= Reservoir	Peak discharge	= 11.32 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 68,128 cuft
Inflow hyd. No.	= 3 - Post-Total to Basin	Max. Elevation	= 26.60 ft
Reservoir name	= Underground Storage	Max. Storage	= 11,682 cuft

Storage Indication method used.



A-9 – POST-DEVELOPED TOTAL

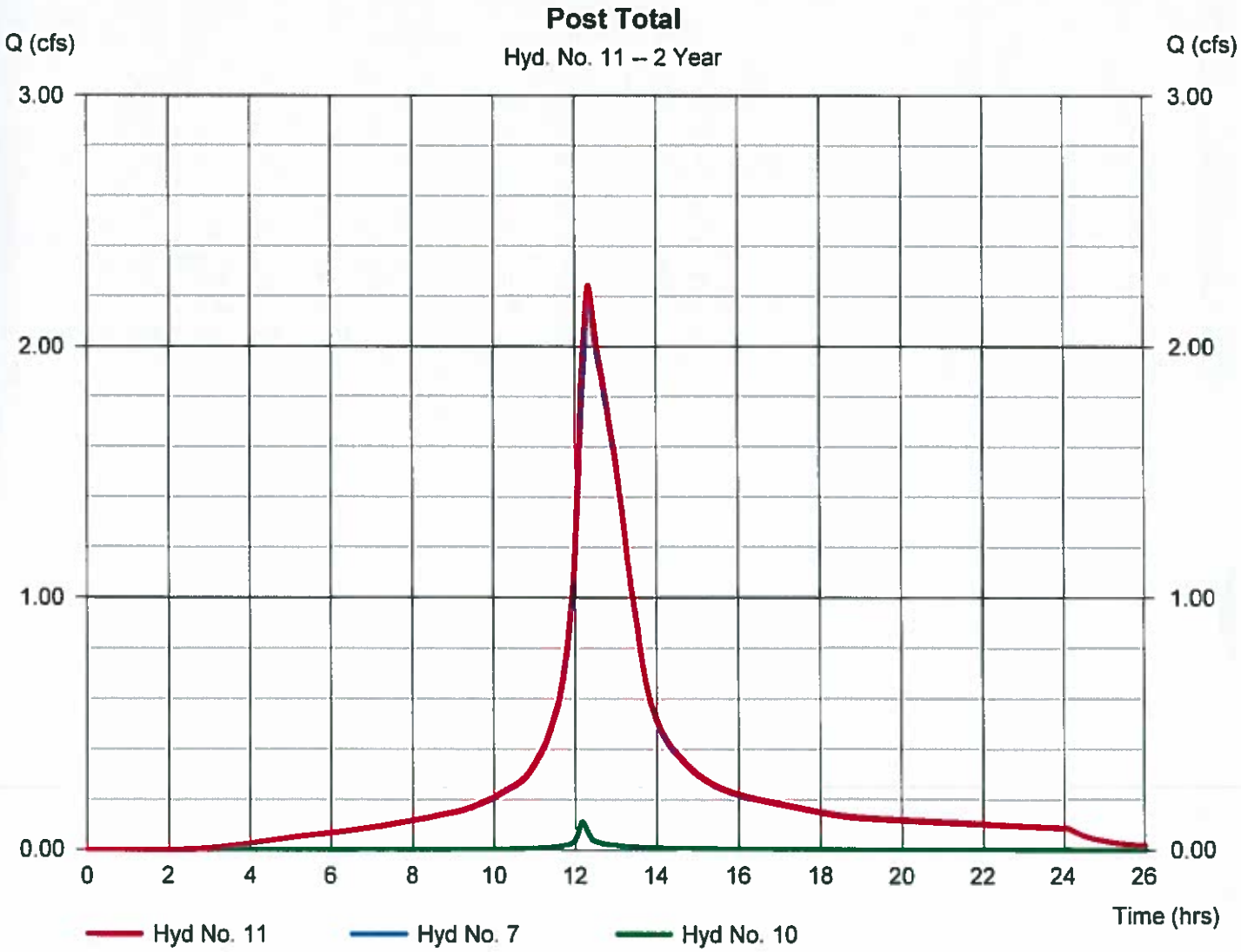
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 11

Post Total

Hydrograph type	= Combine	Peak discharge	= 2.243 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.32 hrs
Time interval	= 1 min	Hyd. volume	= 22,103 cuft
Inflow hyds.	= 7, 10	Contrib. drain. area	= 0.000 ac



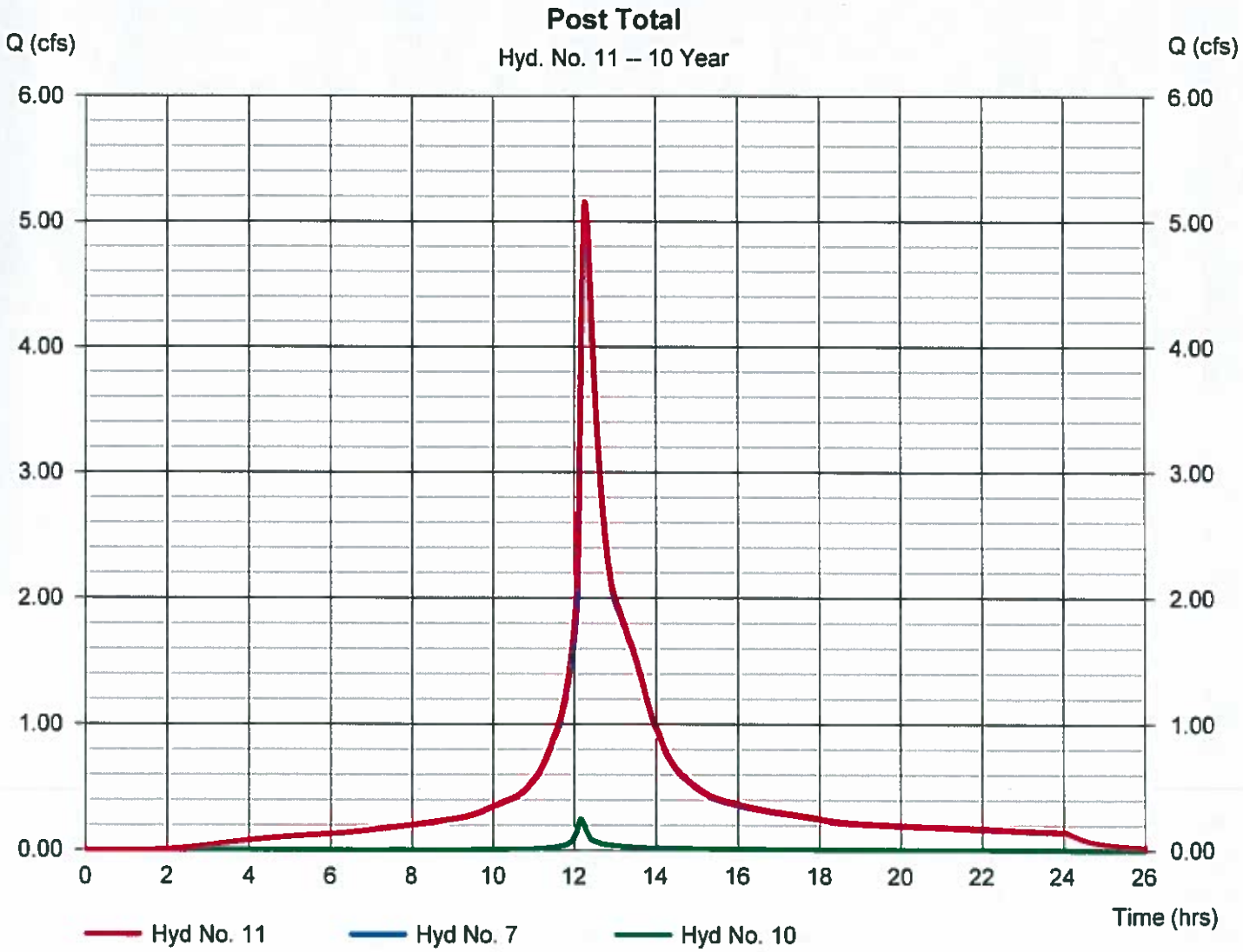
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 11

Post Total

Hydrograph type	= Combine	Peak discharge	= 5.152 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.27 hrs
Time interval	= 1 min	Hyd. volume	= 37,058 cuft
Inflow hyds.	= 7, 10	Contrib. drain. area	= 0.000 ac



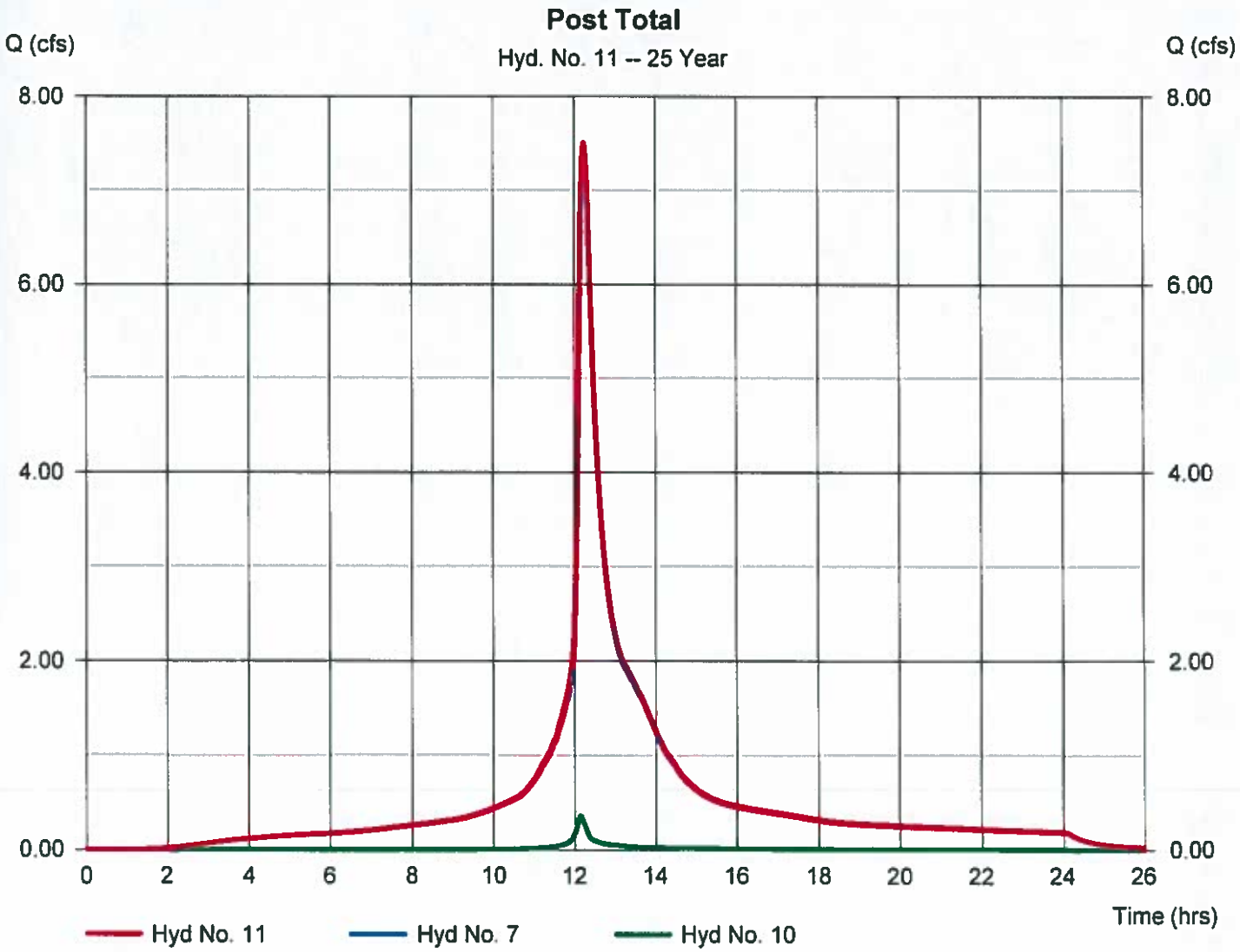
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 11

Post Total

Hydrograph type	= Combine	Peak discharge	= 7.501 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.25 hrs
Time interval	= 1 min	Hyd. volume	= 48,472 cuft
Inflow hyds.	= 7, 10	Contrib. drain. area	= 0.000 ac



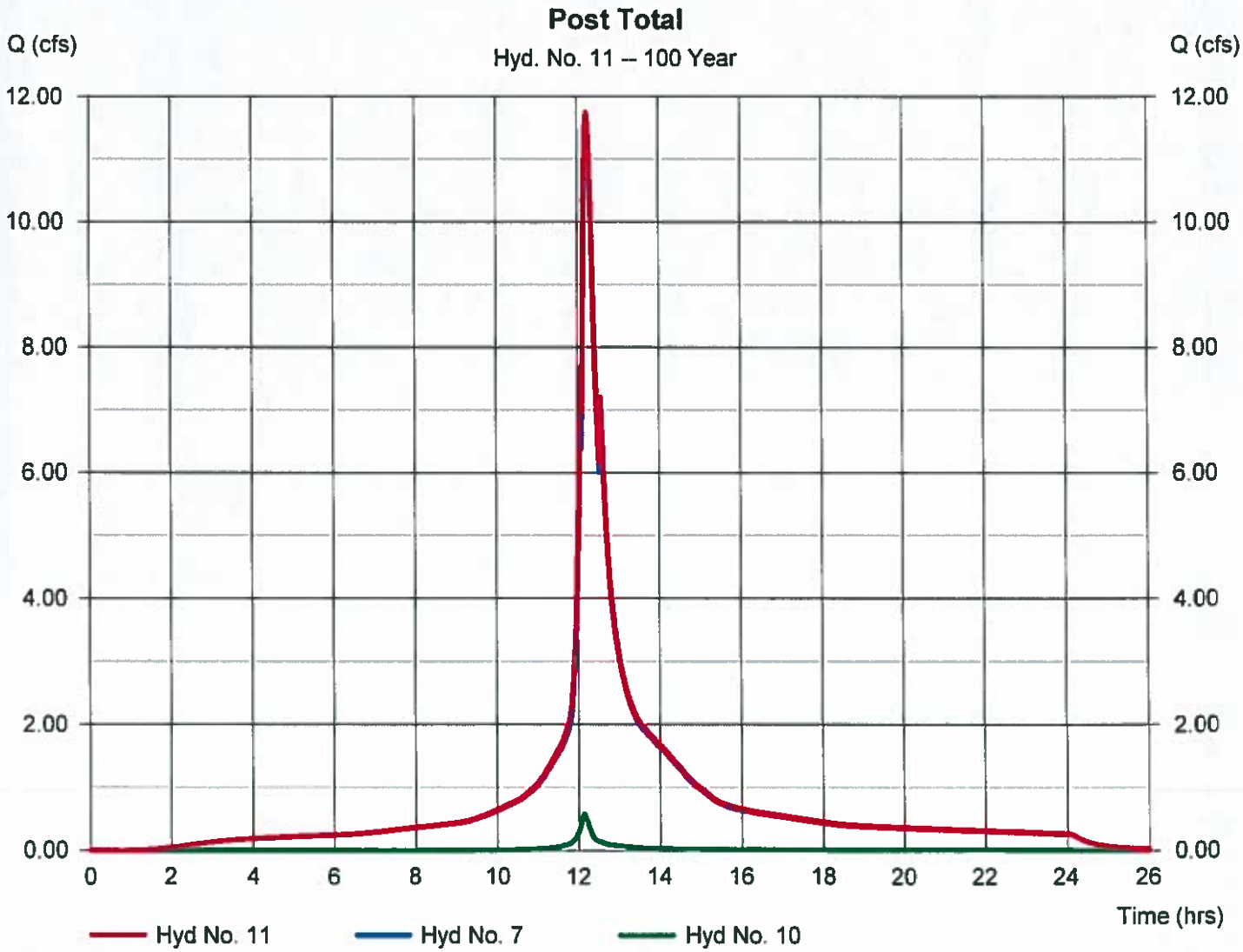
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2021 — Monday, 11 / 2 / 2020

Hyd. No. 11

Post Total

Hydrograph type	= Combine	Peak discharge	= 11.75 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.23 hrs
Time interval	= 1 min	Hyd. volume	= 70,371 cuft
Inflow hyds.	= 7, 10	Contrib. drain. area	= 0.000 ac



A-10 – PREFORMED SCOUR HOLE CALCULATIONS

SCOUR HOLE SIZING CALCULATIONS

STRUCTURE	Detention Basin Outfall
TW	0.5
Do	1.50
Wo	1.50
Q	7.26

LENGTH
L=3Do + 6*.5D0

LENGTH= **9.00**

WIDTH
W=2Do + 6*.5D0

WIDTH= **7.50**

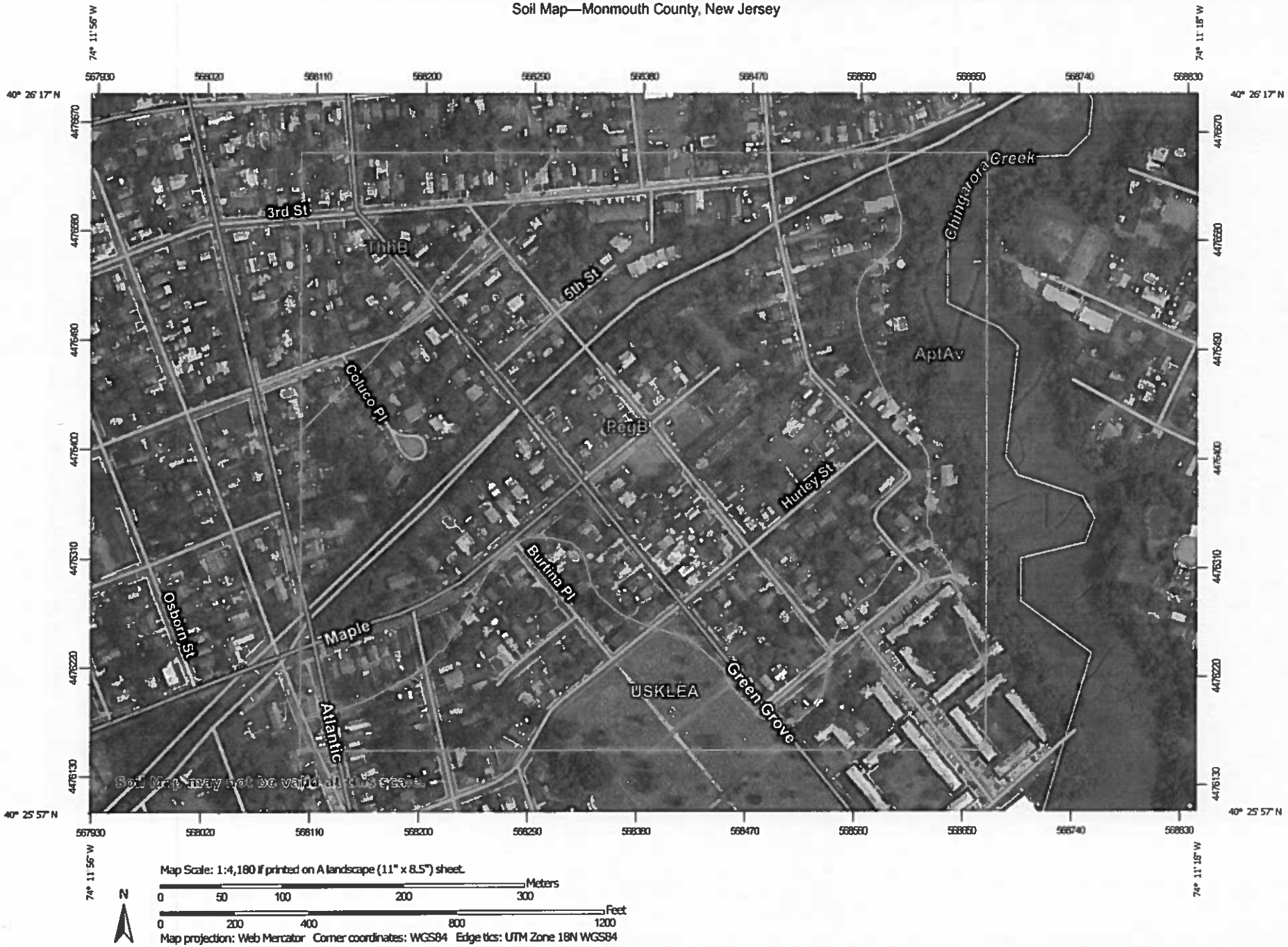
D_{50}= .0125/T_w x q^1.33

D_{50}= **0.20** **feet or** **2.44 inches**

Depth = 0.5*Do 0.75 feet

A-11 – WEB SOIL SURVEY HYDROLOGIC SOILS GROUP MAP

Soil Map—Monmouth County, New Jersey



Map Scale: 1:4,180 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

A-12 – SOIL LOGS

JENSEN DESIGN GROUP
ENGINEERING · PERMITTING · FIELD SERVICES · FORENSIC INVESTIGATION

WJH ENGINEERING
75 Manchester Avenue
Keyport, New Jersey

Lot 48, Block 130

(Soil Log #1 Performed on 8-26-19 in the Open Yard Area)

(Elevation at Log was Approximately 26.6)

Depth:	**Soil Description:**
0" - 12"	Top Soil
12" - 22"	Strong Brown 7.5YR 4/6, Sandy Loam, Subangular Blocky, Friable
22" - 54"	Reddish Yellow 7.5YR 6/8, Sandy Loam, Subangular Blocky, Friable
54" - 72"	Strong Brown 7.5YR 5/6, Sandy Clay Loam, Subangular Blocky, Friable Mottling at 60", Light Brownish Gray, 10YR 6/2 Moisture at 66"
72" - 84"	Yellowish Brown 10YR 5/6, Sandy Loam, Subangular Blocky, Friable Water encountered at 74" (Sample Taken)
84" – 120"	Very Dark Gray 10YR 3/1, Clay, Very Firm, Strong

Estimated Seasonal High Water Table at 60" Below Grade (Elevation = 21.6)

8-27-19

William E. Jensen, Jr., PE
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75 Manchester Avenue
Keyport, New Jersey

Lot 42, Block 130

(Soil Log #2 Performed on 8-26-19 in the Open Yard Area)

(Elevation at Log was Approximately 26.5)

Depth:	**Soil Description:**
0" - 12"	Top Soil / Gravel
12" - 30"	Strong Brown 7.5YR 4/6, Sandy Loam, Subangular Blocky, Friable
30" - 48"	Reddish Yellow 7.5YR 6/8, Sandy Loam, Subangular Blocky, Friable
48" - 64"	Strong Brown 7.5YR 5/6, Sandy Clay Loam, Subangular Blocky, Friable Mottling at 58", Light Brownish Gray, 10YR 6/2 (Sample Taken) Moisture at 60" Water encountered at 64"
64" – 120"	Very Dark Gray 10YR 3/1, Clay, Very Firm, Strong

Estimated Seasonal High Water Table at 58" Below Grade (Elevation = 21.7)

8-27-19

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75 Manchester Avenue
Keyport, New Jersey

Lot 51, Block 130

(Soil Log #3 Performed on 8-26-19 in the Open Yard Area)

(Elevation at Log was Approximately 25.5)

Depth:	**Soil Description:**
0" - 27"	Gravel / Fill
27" - 50"	Strong Brown 7.5YR 4/6, Sandy Loam, Subangular Blocky, Friable
50" - 65"	Strong Brown 7.5YR 5/6, Sandy Clay Loam, Subangular Blocky, Friable Mottling at 55", Light Brownish Gray, 10YR 6/2 Moisture at 62"
65" - 84"	Yellowish Brown 10YR 5/6, Sandy Loam, Subangular Blocky, Friable (Sample Taken) Water encountered at 84"
84" - 108"	Gray 10YR 5/1, Loamy Sand, Angular Blocky, Very Friable (Sample Taken)
108" - 120"	Strong Brown 7.5YR 5/6, Clay, Very Firm, Strong

Estimated Seasonal High Water Table at 55" Below Grade (Elevation = 20.9)

8-27-19

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A-13 – GROUNDWATER RECHARGE

Project Name	Description	Analysis Date	BMP or LID Type
Hudson Pointe	For Stormwater Report.	10/30/20	

Recharge BMP Input Parameters

Parameter	Symbol	Value	Unit
BMP Area	ABMP	6996.0	sq.ft
BMP Effective Depth, this is the design variable	dBMP	0.9	in
Upper level of the BMP surface (negative if above ground)	dBMPu	12.0	in
Depth of lower surface of BMP, must be>=dBMPu	dEXC	48.0	in
Post-development Land Segment Location of BMP , Input Zero if Location is distributed or undetermined	SegBMP	1	unitless

Root Zone Water capacity Calculated Parameters

Parameter	Symbol	Value	Unit
Empty Portion of RWC under Post-D Natural Recharge	ERWC	1.84	in
ERWC Modified to consider dEXC	EDRWC	0.99	in
Empty Portion of RWC under Infilt. BMP	RERWC	0.60	in

Recharge Design Parameters

Parameter	Symbol	Value	Unit
Inches of Runoff to capture	Qdesign	0.09	in
Inches of Rainfall to capture	Pdesign	0.14	in
Recharge Provided Avg. over Imp. Area		0.9	in
Runoff Captured Avg. over Imp. Area		6.4	in

BMP Calculated Size Parameters

ABMP/Aimp	Aratio	0.09	unitless
BMP Volume	VBMP	547	cu.ft

Parameters from Annual Recharge Worksheet

Post-D Deficit Recharge (or desired recharge volume)	Vdef	5,563	cu.ft
Post-D Impervious Area (or target Impervious Area)	Aimp	77,537	sq.ft
Root Zone Water Capacity	RWC	6.58	in
RWC Modified to consider dEXC	DRWC	3.55	in
Climatic Factor	C-factor	1.44	no units
Average Annual P	Pavg	44.9	in
Recharge Requirement over Imp. Area	dr	0.9	in

System Performance Calculated Parameters

Annual BMP Recharge Volume		5,563	cu.ft
Avg BMP Recharge Efficiency		13.5%	Represents % Infiltration Recharged
%Rainfall became Runoff		77.7%	%
%Runoff Infiltrated		18.3%	%
%Runoff Recharged		2.5%	%
%Rainfall Recharged		1.9%	%

CALCULATION CHECK MESSAGES

Volume Balance-> OK
dBMP Check---> OK
dEXC Check---> OK
BMP Location---> OK

OTHER NOTES

Pdesign is accurate only after BMP dimensions are updated to make rech volume= deficit volume. The portion of BMP infiltration prior to filling and the area occupied by BMP are ignored in these calculations. Results are sensetive to dBMP, make sure dBMP selected is small enough for BMP to empty in less than 3 days. For land Segment Location of BMP if you select "impervious areas" RWC will be minimal but not zero as determined by the soil type and a shallow root zone for this Land Cover allowing consideration of lateral flow and other losses.

How to solve for different recharge volumes: By default the spreadsheet assigns the values of total deficit recharge volume "Vdef" and total proposed Impervious area "Aimp" from the "Annual Recharge" sheet to "Vdef" and "Aimp" on this page. This allows solution for a single BMP to handle the entire recharge requirement assuming the runoff from entire impervious area is available to the BMP.
To solve for a smaller BMP or a LID-IMP to recharge only part of the recharge requirement, set Vdef to your target value and Aimp to impervious area directly connected to your infiltration facility and then solve for ABMP or dBMP. To go back to the default configuration clik the "Default Vdef & Aimp" button.

New Jersey Groundwater Recharge Spreadsheet Version 2.0 November 2003

Annual Groundwater Recharge Analysis (based on GSR-32)

Select Township ↓	Average Annual P (in)	Climatic Factor
MONMOUTH CO., KEYPORT BORO	44.9	1.44

Project Name:	Hudson Pointe
Description:	For Stormwater Report.
Analysis Date:	10/30/20

Pre-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.14	Open space	Pemberton	13.8	57,114
2	1.66	Impervious areas	Pemberton	0.0	-
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	2.8			Total Annual Recharge (in)	Total Annual Recharge (cu-ft)
				5.6	57,114

Post-Developed Conditions

Land Segment	Area (acres)	TR-55 Land Cover	Soil	Annual Recharge (in)	Annual Recharge (cu.ft)
1	1.02	Woods-grass combination	Pemberton	13.9	51,551
2	1.78	Impervious areas	Pemberton	0.0	-
3	0				
4	0				
5	0				
6	0				
7	0				
8	0				
9	0				
10	0				
11	0				
12	0				
13	0				
14	0				
15	0				
Total =	2.8			Total Annual Recharge (in)	Total Annual Recharge (cu.ft)
		Annual Recharge Requirements Calculation ↓		5.1	51,551
				Total Impervious Area (sq.ft)	77,537

% of Pre-Developed Annual Recharge to Preserve =	100%	
Post-Development Annual Recharge Deficit=	*5,563*	(cubic feet)

Recharge Efficiency Parameters Calculations (area averages)

RWC=	#N/A	(in)	DRWC= #N/A	(in)
ERWC =	#N/A	(in)	EDRWC= #N/A	(in)

Procedure to fill the Pre-Development and Post-Development Conditions Tables

For each land segment, first enter the area, then select TR-55 Land Cover, then select Soil. Start from the top of the table and proceed downward. Don't leave blank rows (with A=0) in between your segment entries. Rows with A=0 will not be displayed or used in calculations. For impervious areas outside of standard lots select "Impervious Areas" as the Land Cover. Soil type for impervious areas are only required if an infiltration facility will be built within these areas.

A-14 – DRAINAGE AREA MAPS

PRE-DEVELOPED
IMPERVIOUS= 1.66 Ac. (CN 98)
Tc= 6 min.

PERVIOUS= 1.28 Ac. (CN 60)
Tc= 12.5 min.

TOTAL= 2.68 Ac.

FULTON STREET
(R.O.W. VARIES)

MANCHESTER AVENUE
(40' R.O.W.)
ONE WAY

MAPLE PLACE
(75' R.O.W.)

E. SEVENTH STREET
(40' R.O.W.)

(FORMERLY CENTRAL RAILROAD OF NEW JERSEY)

SCALE: (1 Inch = 30 Feet)
30 0 30 60 90

NO.	DATE	DESCRIPTION	DRAWN BY

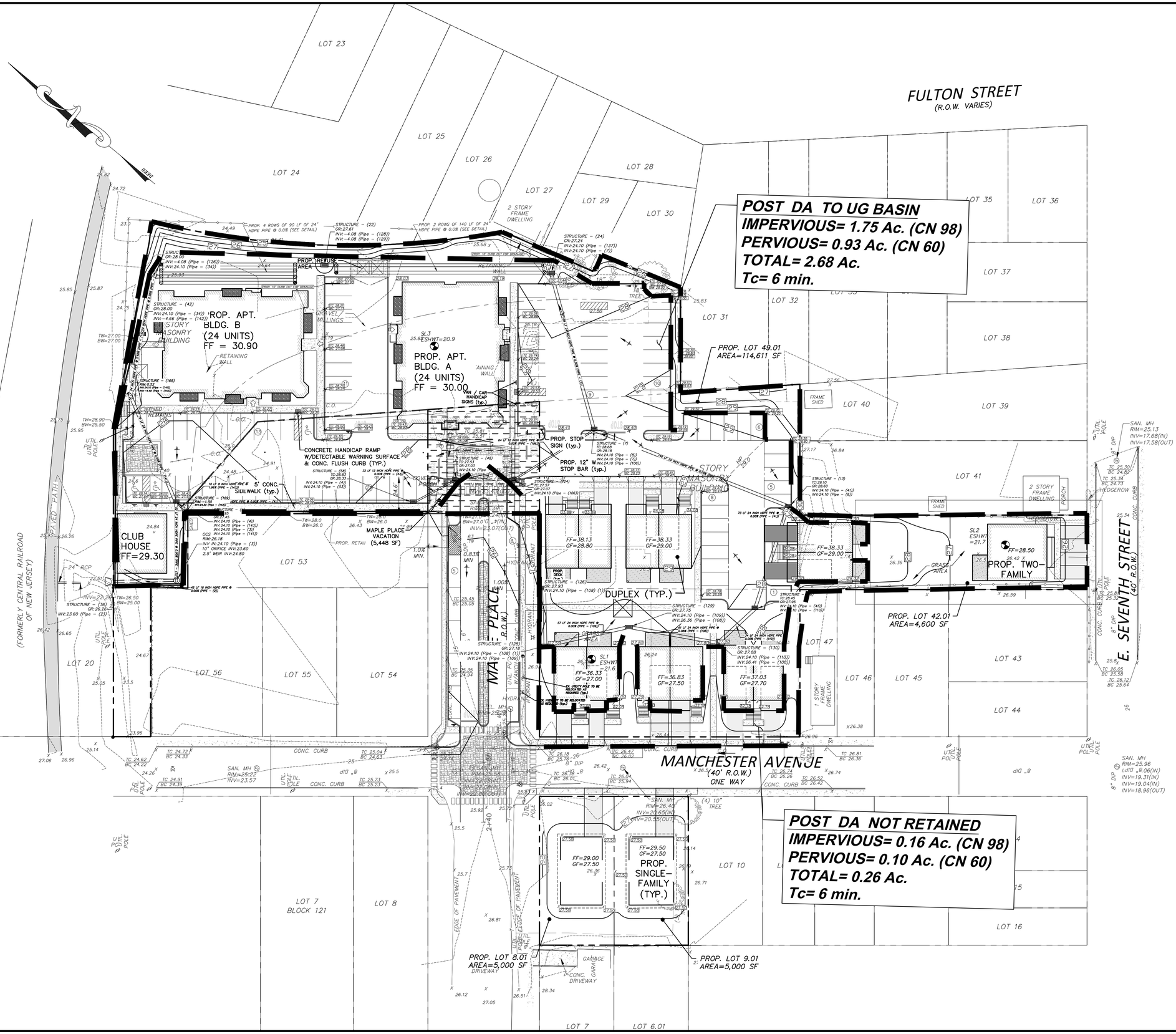
PRELIMINARY AND FINAL MAJOR SITE PLAN
OF
LOTS 8 & 9, BLOCK 120 AND LOTS 42, 48, 49, 50, 51 & 52, BLOCK 130
BOROUGH OF KEYPORT MONMOUTH COUNTY NEW JERSEY

WH ENGINEERING
CERT. OF AUTH. NO. 24GA28117300
257 MONMOUTH ROAD, BLDG. A, SUITE 7
OAKHURST, NJ 07755
PHONE - 732-223-1313
WWW.WJHENGINEERING.COM

PRE-DEVELOPED DRAINAGE AREA MAP

WALTER JOSEPH HOPKIN
N.J. PROFESSIONAL ENGINEER, LIC. No. 40673

SCALE:	DRAWN BY:	DATE:	JOB No.:	SHEET No.:
1"= 30'	JHD	10/30/20	19129	1 OF 1



NO.	DATE	DESCRIPTION	DRAWN BY

PRELIMINARY AND FINAL MAJOR SITE PLAN

OF

LOTS 8 & 9, BLOCK 120 AND LOTS 42, 48, 49, 50, 51 & 52, BLOCK 130

BOROUGH OF KEYPORT MONMOUTH COUNTY NEW JERSEY

WJH ENGINEERING

CERT. OF AUTH. NO. 24GA28117300

257 MONMOUTH ROAD, BLDG. A, SUITE 7, OAKHURST, NJ 07755

PHONE · 732-223-1313

WWW.WJHENGINEERING.COM

POST-DEVELOPED DRAINAGE AREA MAP

WALTER JOSEPH HOPKIN

N.J. PROFESSIONAL ENGINEER, LIC. No. 40673

SCALE:	DRAWN BY:	DATE:	JOB No.:	SHEET No.:
1"= 30'	JHD	10/30/20	20153	1 OF 1