

**DRAINAGE CALCULATIONS,
HYDRAULICS & HYDROLOGY REPORT**

WOODSPRING SUITES

**295 & 313 WILLETTS AVENUE
16 & 18 BOSTON POST ROAD**

AUGUST 2023

Revised October 2, 2023

CLA Engineers, Inc

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WILLETTS AVENUE & BOSTON POST ROAD WATERFORD,CT

The site was previously developed as a sports bar with areas of previously cleared land. The site is proposed to be developed as a hotel. CLA Engineers is providing the design and calculations for the stabilization of the site.

PROPOSED HYDRAULICS

There will be three main on-site drainage areas for the proposed development, the roof drainage, which will outlet to a concrete gallery infiltration system, Drainage Area 3, which flows to the existing shopping center and then out to Willets Avenue, and Drainage Area 1 which flows directly to Willets Avenue. Please see the attached plans entitled Drainage Plan – Existing Conditions and Drainage Plan - Proposed.

Drainage Area 1 is located adjacent to Willetts Avenue and presently drains to the existing drainage system in Willetts Avenue. Proposed Drainage Area 1 will be connected to the existing drainage system in Willetts Avenue, after flowing through Stormwater Basin 1, resulting in a significant decrease in peak flows to the existing drainage system.

Drainage area 2 presently drains to the existing shopping center parking lot and drainage system, which connects to the existing drainage system in Willetts Avenue. Proposed Drainage area 2 will continue to flow to the existing shopping center parking lot drainage system, after flowing thru Sormwater Basin 2, resulting in a significant decrease in peak flows to the existing drainage system.

The roof drainage will connect to an underground infiltration system, which will contain the 100 year storm event. There also is an emergency overflow pipe which will connect to Stormwater Basin 2. A permeability test from the test hole 4, has been provided in this report. The rates are good and will allow for the galleries to empty

quickly between storm events. Infiltration was not included in the modeling program, as a conservative approach to the design.

Both the existing and the proposed conditions for the development site have been analyzed for the 2-year, 5- year, 10-year, 25-year, and 100-year design storms using the TR-55 SCS modeling program. The following is the summary table for the 2-year, 5-year, 10-year, 25-year, and 100-year design storms showing first the existing conditions and proposed conditions, after passing through the proposed roof infiltration system and the water quality basins. The calculations show that there will be a significant decrease in runoff leaving the site. The following are the results of the computer model.

Drainage Area 1

	<u>2-year</u>	<u>5-year</u>	<u>10-year</u>	<u>25-year</u>	<u>100-year</u>
Existing	1.680 cfs	2.462 cfs	3.125 cfs	4.055 cfs	5.503 cfs
Proposed	0.000 cfs	0.000 cfs	0.090 cfs	0.574 cfs	2.213 cfs

Drainage Area 2

	<u>2-year</u>	<u>5-year</u>	<u>10-year</u>	<u>25-year</u>	<u>100-year</u>
Existing	2.798 cfs	4.451 cfs	5.903 cfs	7.995 cfs	11.33 cfs
Proposed	0.000 cfs	0.000 cfs	0.000 cfs	0.000 cfs	1.054 cfs

CT GUIDELINES FOR SOIL EROSION & SEDIMENTATION CONTROL

The 2002 CT Guidelines for Soil Erosion & Sedimentation Control applies to the construction phase of the project. A detailed erosion and sediment control plan has been provided in the site development plans. The proposed Stormwater Basins have been designed to function as sedimentation traps during stabilization, and then as stormwater basins to provide permanent water quality treatment, prior to entering the existing off-site drainage systems, for the life of the facility.

Drainage Area 1, Temporary Sediment Trap 1

The first calculation required by the Guidelines is for the sediment storage volume (SSV). The sediment storage volume is the calculation for one year of predicted sediment load. The calculations for a Temporary Sediment Trap show that the sediment storage volume required is 5,066CF:

$$SSV = A(134CY/Acre)$$

$$A = 1.4 \text{ ACRES}$$

$$SSV = 187.6 \text{ CY} = \underline{5,066 \text{ CF}}$$

The second calculation required by the Guidelines is for wet storage volume (WSV). The wet storage volume is the volume in the basin that is located below the riprap for the level spreader outlet of the basin (elevation 92.0). The volume of the wet storage is required to be half of the required SSV. The required wet storage volume is $5,066 \text{ CF}/2 = \underline{2,533 \text{ CF}}$. The required dry storage volume, located above the bottom of the riprap of the level spreader outlet of the basin (elevation 92.0), is 2,533 CF.

The total storage volume required is the dry storage volume plus the wet storage volume, which is a total of 5,066 CF.

The combined volume required for the Temporary Sedimentation Basin as follows:

2,533 CF of Wet Storage Volume	4,700* CF Provided (Excavated to 90.0)
2,533 CF of Dry Storage Volume	8,323 CF Provided
5,066 CF of Total Volume Required	13,023 CF Total Provided

Drainage Area 2 Temporary Sediment Trap 2

The first calculation required by the Guidelines is for the sediment storage volume (SSV). The sediment storage volume is the calculation for one year of predicted sediment load. The calculations for a Temporary Sediment Trap show that the sediment storage volume required is 7,236 CF:

$$SSV = A(134CY/Acre)$$

$$A = 2.0 \text{ ACRES}$$

$$SSV = 268 \text{ CY} = \underline{7,236 \text{ CF}}$$

The second calculation required by the Guidelines is for wet storage volume (WSV). The wet storage volume is the volume in the basin that is located below the riprap for the level spreader outlet of the basin (elevation 80.5). The volume of the wet storage is required to be half of the required SSV. The required wet storage volume is $7,236 \text{ CF}/2 = \underline{3,618 \text{ CF}}$. The required dry storage volume, located above the bottom of the riprap of the level spreader outlet of the basin (elevation 80.5), is 3,618 CF.

The total storage volume required is the dry storage volume plus the wet storage volume, which is a total of 7,236 CF.

The combined volume required for the Temporary Sedimentation Basin as follows:

3,618 CF of Wet Storage Volume	5,488 CF Provided (Excavated to 79.0)
3,618 CF of Dry Storage Volume	8,743 CF Provided
7,236 CF of Total Volume Required	14,231 CF Total Provided

CONNECTICUT STORMWATER QUALITY MANUAL

The Stormwater Management System, consisting of two Water Quality Basins, have been designed to function as permanent water quality treatment for the life of the facility. The Connecticut 2004 Stormwater Quality Manual (Manual) applies to the post construction phase, for the operation of the facility.

Drainage Area 1, Water Quality Basin 1

The Stormwater Management System meets the criteria of the Connecticut Stormwater Quality Manual for a Water Quality Basin. The calculations show that a Water Quality Volume (WQV) of 3,202 CF is required:

$$WQV = (1'')(R)(A)/12$$

$$A = 1.4 \text{ Acres}$$

$$R = 0.05 + 0.009(I)$$

$$I = 0.9 \text{ Acres} / 1.4 \text{ Acres} = 0.64 \quad (64\%)$$

$$R = 0.63$$

$$WQV = 0.0735 \text{ Ac-Ft} = \underline{3,202 \text{ CF required}}$$

14,400 CF Provided in the Water Quality Basin

As the calculations show that there will be no stormwater leaving the proposed stormwater management system (water quality basin), up to and including the 5 year storm event, the anticipated pollutant removal rate is 99-100%.

Drainage Area 2, Water Quality Basin 2

The Stormwater Management System meets the criteria of the Connecticut Stormwater Quality Manual for a Water Quality Basin. The calculations show that a Water Quality Volume (WQV) of 3,580 CF is required:

$$WQV = (1'')(R)(A)/12$$

$$A = 1.7 \text{ Acres}$$

$$R = 0.05 + 0.009(I)$$

$$I = 1.0 \text{ Acres} / 1.7 \text{ Acres} = 0.59 \quad (59\%)$$

$$R = 0.58$$

$$WQV = 0.0822 \text{ Ac-Ft} = \underline{3,580 \text{ CF required}}$$

23,191 CF Provided in the Water Quality Basin

As the calculations show that there will be no stormwater leaving the proposed stormwater management system (water quality basin), up to and including the 5 year, for Stormwater Basin 1, and 25 year storm event, for Stormwater Basin 2, the anticipated pollutant removal rate is 99-100%.

(https://www.unh.edu/unhsc/sites/default/files/media/ms4_permit_nomographs_sheet_final_2020.pdf) The University of New Hampshire's research reveals that efficiency removal for typical pollutants of concern such as TSS, N, P, and zinc is directly tied to the volume of stormwater that is held and infiltrated. The research reveals that if a 2 inch depth of runoff from a site's impervious surface is held and infiltrated by a given BMP, the reduction in these pollutants is 99-100%. On this site, Stormwater Basin #1 will contain up to and including the 5 year storm event and Stormwater Basin #2 will contain up to and including the 25 year storm event. Thus, CLA believes that pollutant removal rates for pollutants of concern will be greater than 99% and there will be no increase in releases of pollutants to the wetlands system.

The proposed stormwater basins are not infiltration basins, however stormwater will slowly infiltrate into the surrounding soils between storm events.

WILLETTS AVENUE & BOSTON POST ROAD WATERFORD,CT

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The roof drainage will connect to an underground infiltration system, which will contain the 100 year storm event. There also is an emergency overflow pipe which will connect to Stormwater Basin 2. A permeability test from the test hole 4, has been provided in this report. The rates are good and will allow for the galleries to empty

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Drainage Area 2

	<u>2-year</u>	<u>5-year</u>	<u>10-year</u>	<u>25-year</u>	<u>100-year</u>
Existing	2.798 cfs	4.451 cfs	5.903 cfs	7.995 cfs	11.33 cfs
Proposed	0.000 cfs	0.000 cfs	0.000 cfs	0.000 cfs	1.054 cfs

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2,533 CF of Dry Storage Volume	8,323 CF Provided
5,066 CF of Total Volume Required	13,023 CF Total Provided

Drainage Area 2 Temporary Sediment Trap 2

The first calculation required by the Guidelines is for the sediment storage volume (SSV). The sediment storage volume is the calculation for one year of predicted sediment load. The calculations for a Temporary Sediment Trap show that the sediment storage volume required is 7,236 CF:

$$SSV = A(134CY/Acre)$$

$$A = 2.0 \text{ ACRES}$$

$$SSV = 268 \text{ CY} = \underline{7,236 \text{ CF}}$$

The second calculation required by the Guidelines is for wet storage volume (WSV). The wet storage volume is the volume in the basin that is located below the riprap for the level spreader outlet of the basin (elevation 80.5). The volume of the wet storage is required to be half of the required SSV. The required wet storage volume is $7,236 \text{ CF}/2 = \underline{3,618 \text{ CF}}$. The required dry storage volume, located above the bottom of the riprap of the level spreader outlet of the basin (elevation 80.5), is 3,618 CF.

The total storage volume required is the dry storage volume plus the wet storage volume, which is a total of 7,236 CF.

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Drainage Area 1, Water Quality Basin 1

The Stormwater Management System meets the criteria of the Connecticut Stormwater Quality Manual for a Water Quality Basin. The calculations show that a Water Quality Volume (WQV) of 4,162 CF is required:

$$WQV = (1.3'')(R)(A)/12$$

$$A = 1.4 \text{ Acres}$$

$$R = 0.05 + 0.009(I)$$

$$I = 0.9 \text{ Acres} / 1.4 \text{ Acres} = 0.64 \quad (64\%)$$

$$R = 0.63$$

$$WQV = 0.0955 \text{ Ac-Ft} = \underline{4,162 \text{ CF required}}$$

14,400 CF Provided in the Water Quality Basin

As the calculations show that there will be no stormwater leaving the proposed stormwater management system (water quality basin), up to and including the 5 year storm event, the anticipated pollutant removal rate is 99-100%.

Drainage Area 2, Water Quality Basin 2

The Stormwater Management System meets the criteria of the Connecticut Stormwater Quality Manual for a Water Quality Basin. The calculations show that a Water Quality Volume (WQV) of 4,653 CF is required:

$$WQV = (1.3'')(R)(A)/12$$

$$A = 1.7 \text{ Acres}$$

$$R = 0.05 + 0.009(I)$$

$$I = 1.0 \text{ Acres} / 1.7 \text{ Acres} = 0.59 \quad (59\%)$$

$$R = 0.58$$

$$WQV = 0.1068 \text{ Ac-Ft} = \underline{4,653 \text{ CF required}}$$

23,191 CF Provided in the Water Quality Basin

As the calculations show that there will be no stormwater leaving the proposed stormwater management system (water quality basin), up to and including the 5 year, for Stormwater Basin 1, and 25 year storm event, for Stormwater Basin 2, the anticipated pollutant removal rate is 99-100%.

(https://www.unh.edu/unhsc/sites/default/files/media/ms4_permit_nomographs_sheet_final_2020.pdf) The University of New Hampshire's research reveals that efficiency removal for typical pollutants of concern such as TSS, N, P, and zinc is directly tied to the volume of stormwater that is held and infiltrated. The research reveals that if a 2 inch depth of runoff from a site's impervious surface is held and infiltrated by a given BMP, the reduction in these pollutants is 99-100%. On this site, Stormwater Basin #1 will contain up to and including the 5 year storm event and Stormwater Basin #2 will contain up to and including the 25 year storm event. Thus, CLA believes that pollutant removal rates for pollutants of concern will be greater than 99% and there will be no increase in releases of pollutants to the wetlands system.

The proposed stormwater basins are not infiltration basins, however stormwater will slowly infiltrate into the surrounding soils between storm events.

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	1.680	1	730	6,659	----	----	----	Existing Conditions - Areas 1
2	SCS Runoff	2.013	1	729	7,634	----	----	----	Proposed Conditions - Area 1
3	Reservoir	0.000	1	731	0	2	91.53	5,307	Stormwater Basin 1
4	SCS Runoff	2.798	2	724	8,094	----	----	----	Existing Conditions - Area 2
5	SCS Runoff	2.586	2	722	6,915	----	----	----	Proposed Conditions - Area 3
6	SCS Runoff	1.362	2	716	3,192	----	----	----	Roof Drainage
7	Reservoir(i)	0.000	2	886	0	6	89.83	2,738	Roof Infiltration Syst
8	Combine	2.586	2	722	6,915	5, 7	----	----	Proposed area 2 & Roof
9	Reservoir	0.000	2	730	0	8	78.77	3,889	Stormwater Basin 2
Hotel TR55.gpw					Return Period: 2 Year			Monday, Oct 9, 2023	

Hydrograph Report

2

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

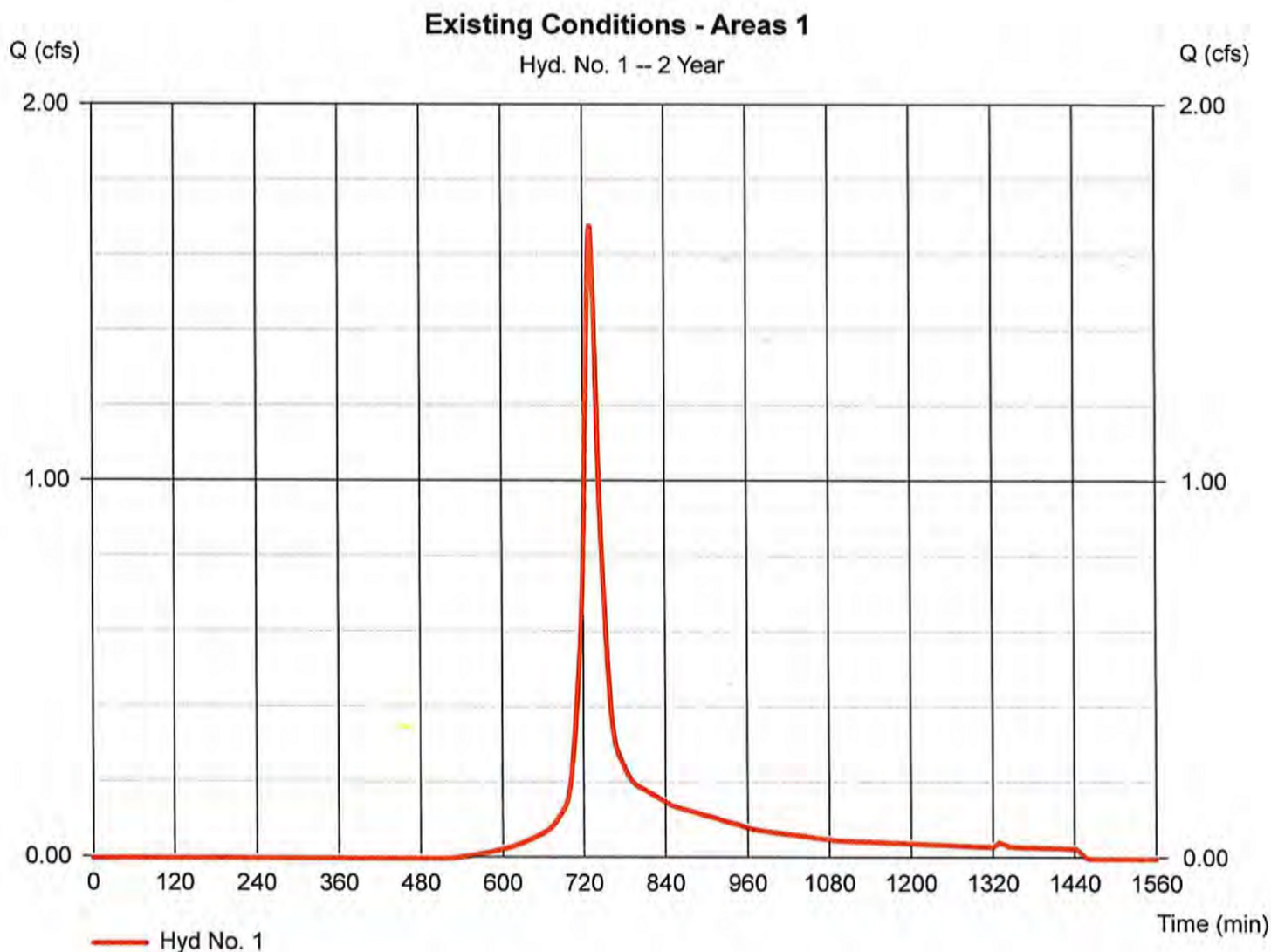
Hyd. No. 1

Existing Conditions - Areas 1

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.100 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.36 in
Storm duration = 24 hrs

Peak discharge = 1.680 cfs
Time to peak = 730 min
Hyd. volume = 6,659 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.400 \times 55) + (0.700 \times 98)] / 1.100$



Hydrograph Report

3

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

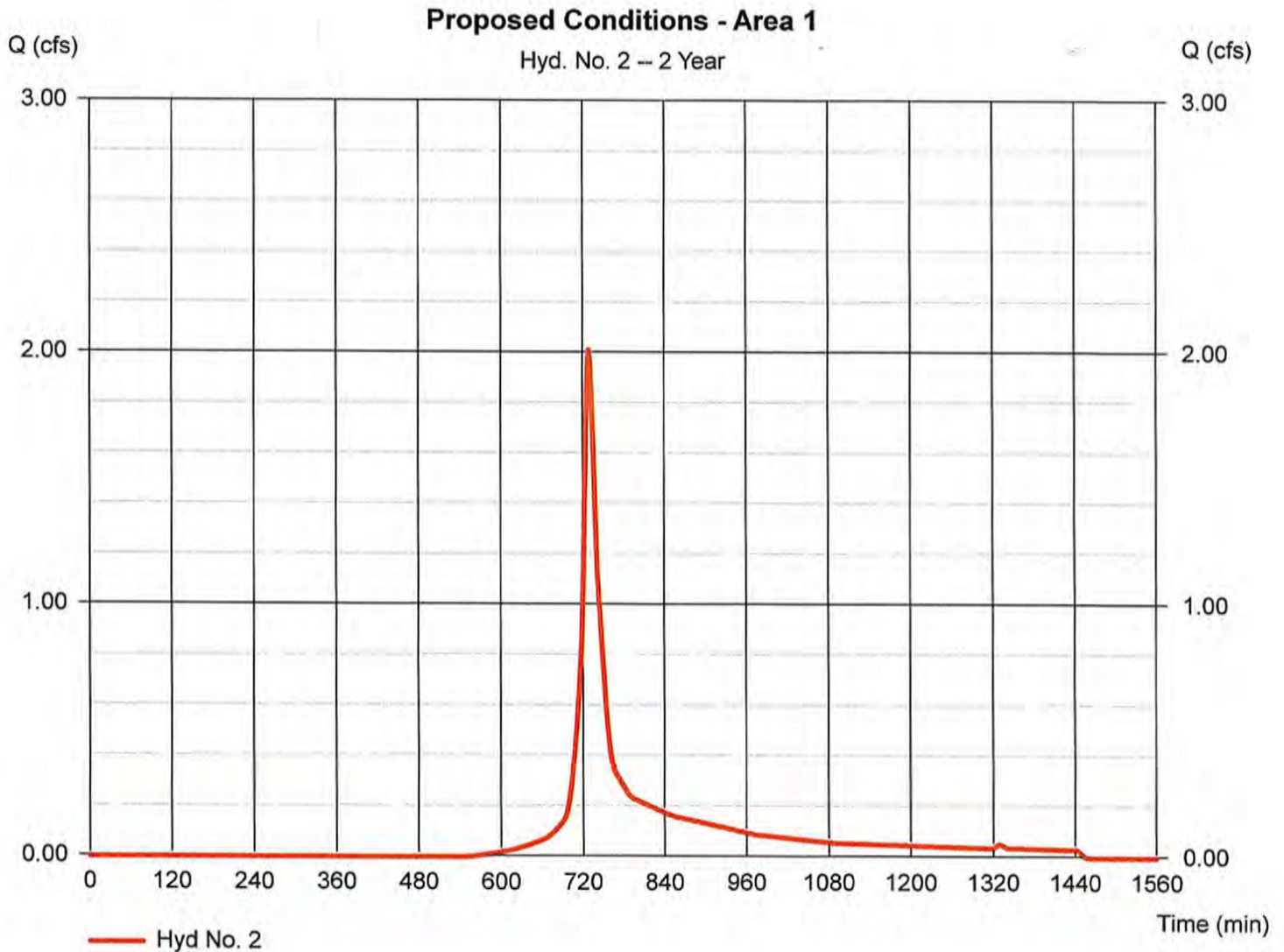
Hyd. No. 2

Proposed Conditions - Area 1

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 1 min
Drainage area = 1.400 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.36 in
Storm duration = 24 hrs

Peak discharge = 2.013 cfs
Time to peak = 729 min
Hyd. volume = 7,634 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 13.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.800 \times 98) + (0.600 \times 55)] / 1.400$



Hydrograph Report

4

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

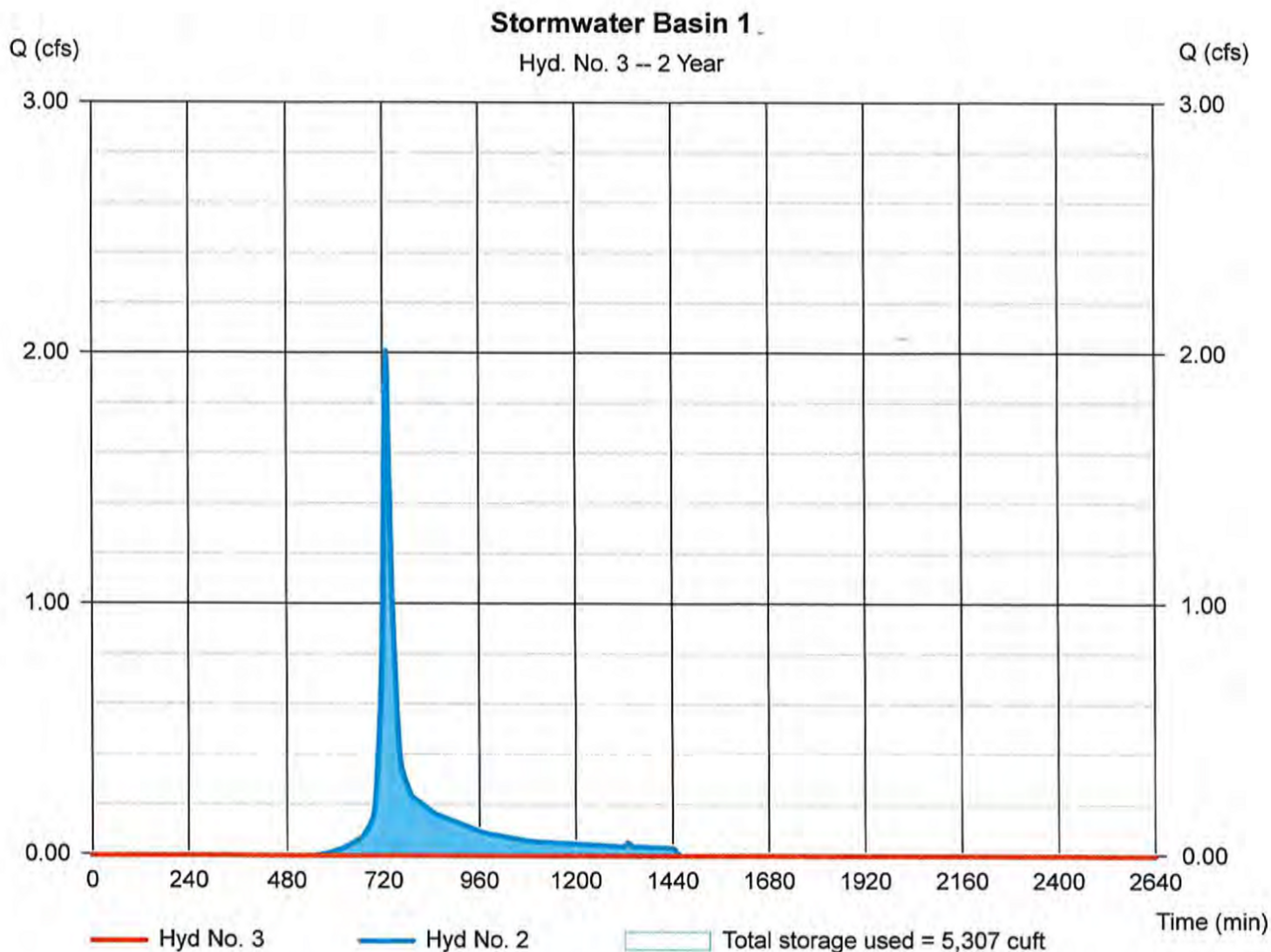
Monday, Oct 9, 2023

Hyd. No. 3

Stormwater Basin 1

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 731 min
Time interval	= 1 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 2 - Proposed Conditions - Area 1	Max. Elevation	= 91.53 ft
Reservoir name	= Forebay & Stormwater Basin 1	Max. Storage	= 5,307 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

5

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

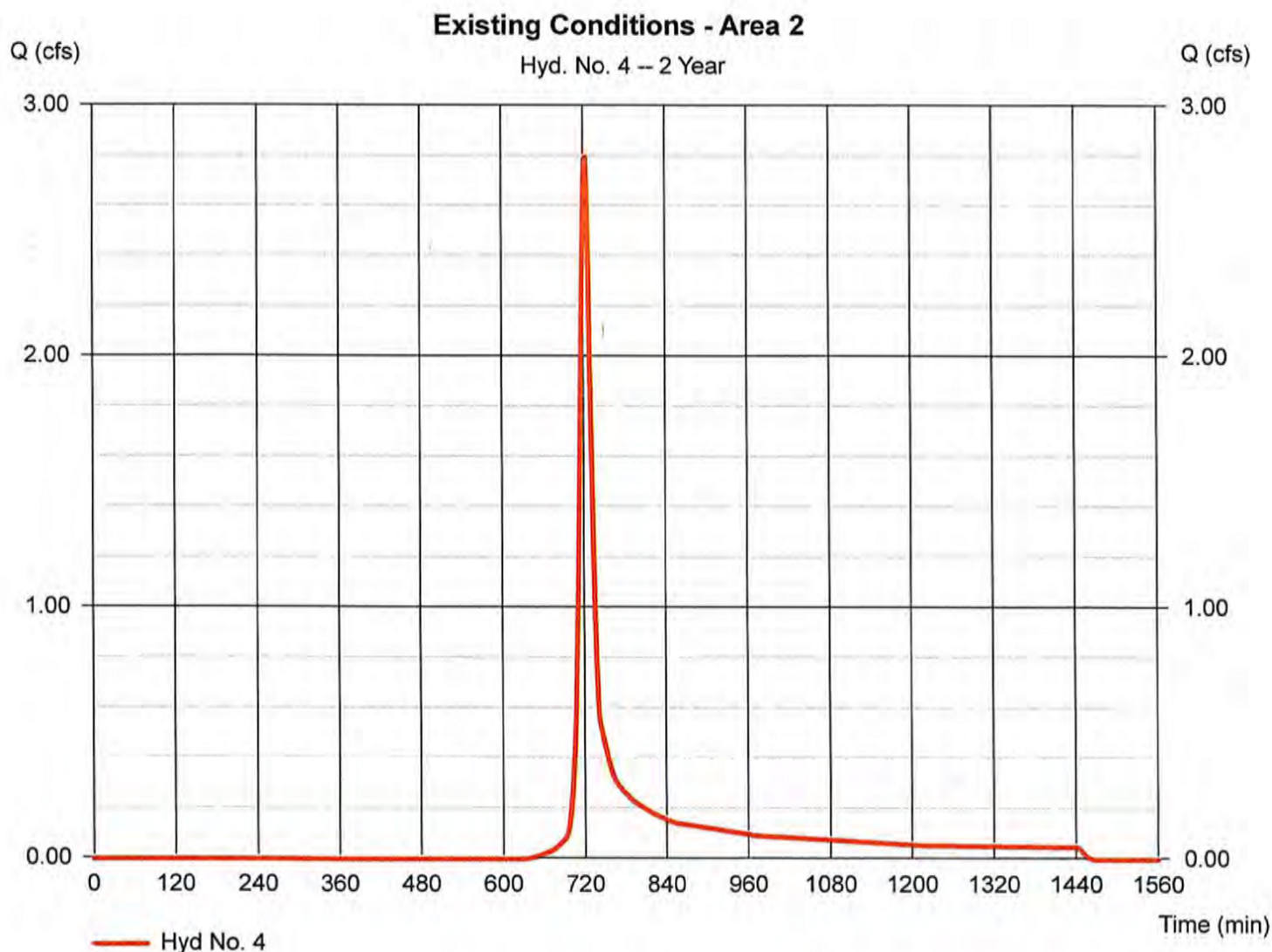
Hyd. No. 4

Existing Conditions - Area 2

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 1.900 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.36 in
Storm duration = 24 hrs

Peak discharge = 2.798 cfs
Time to peak = 724 min
Hyd. volume = 8,094 cuft
Curve number = 75*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(1.000 \times 55) + (0.900 \times 98)] / 1.900$



Hydrograph Report

6

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

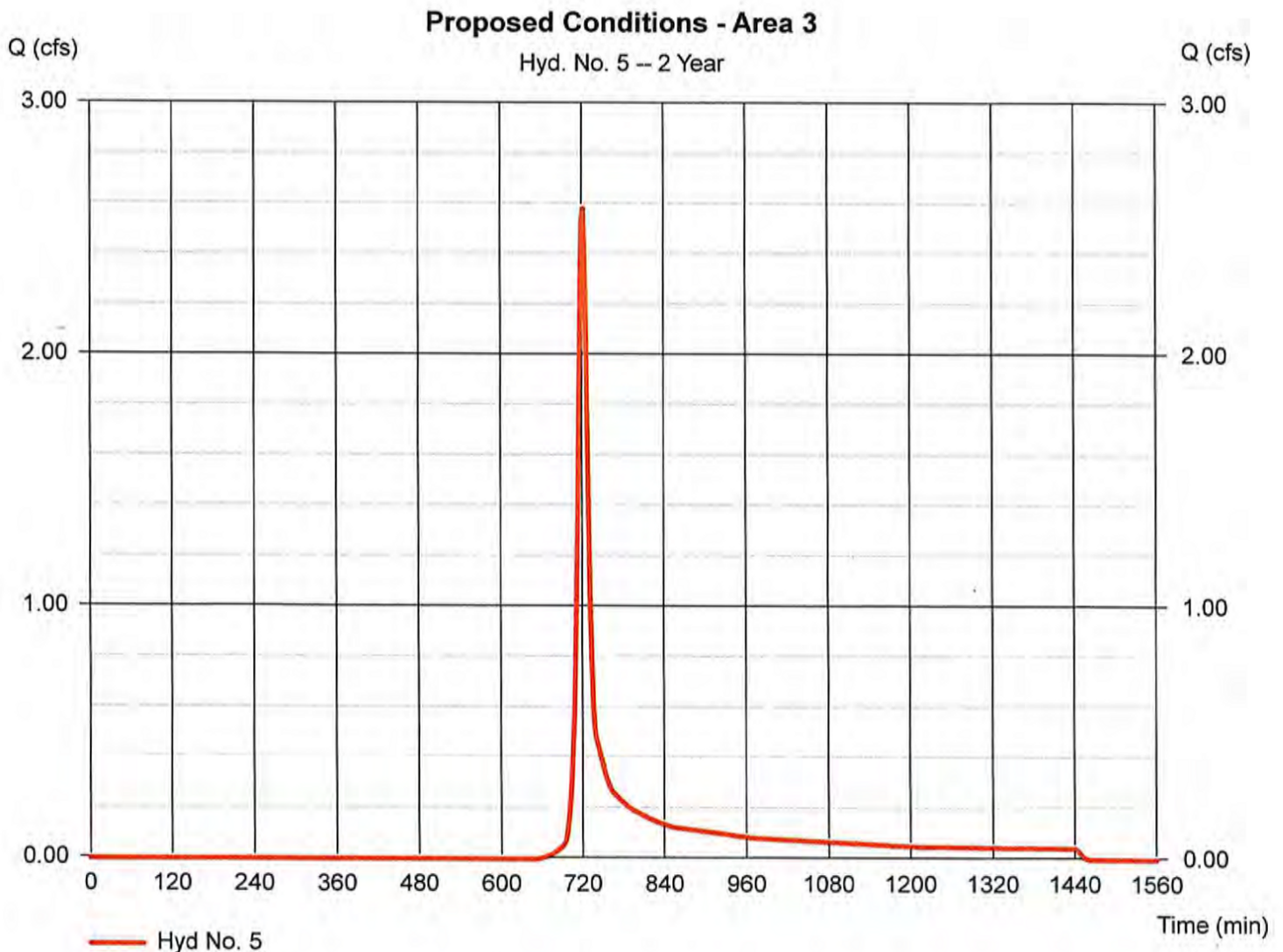
Hyd. No. 5

Proposed Conditions - Area 3

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 1.700 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.36 in
Storm duration = 24 hrs

Peak discharge = 2.586 cfs
Time to peak = 722 min
Hyd. volume = 6,915 cuft
Curve number = 73*
Hydraulic length = 0 ft
Time of conc. (Tc) = 12.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(0.700 \times 98) + (1.000 \times 55)] / 1.700$



Hydrograph Report

7

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

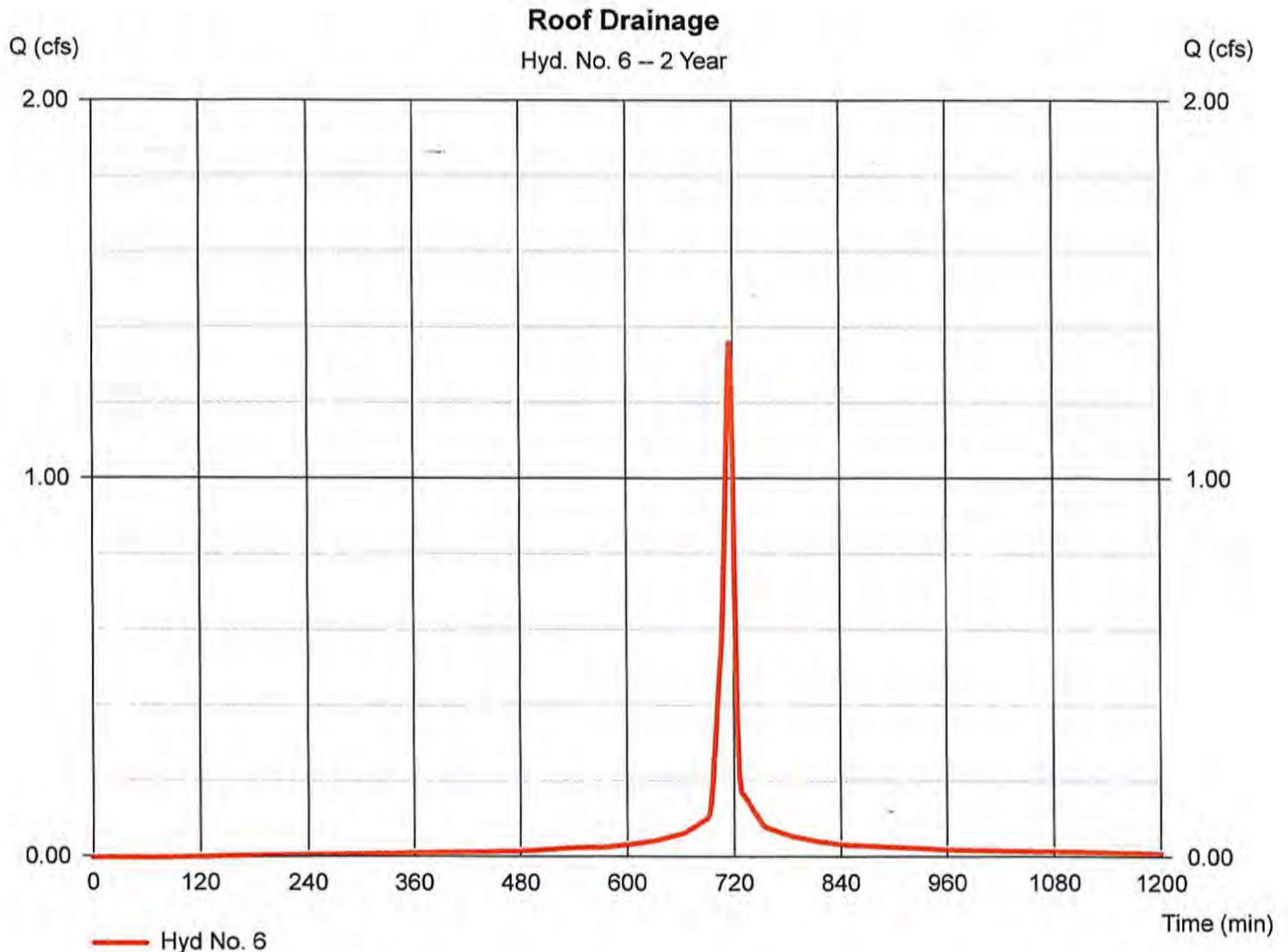
Hyd. No. 6

Roof Drainage

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 0.300 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.36 in
Storm duration = 24 hrs

Peak discharge = 1.362 cfs
Time to peak = 716 min
Hyd. volume = 3,192 cuft
Curve number = 98*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(0.300 \times 98)] / 0.300$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

Hyd. No. 7

Roof Infiltration Syst

Hydrograph type = Reservoir (Interconnected)
Storm frequency = 2 yrs
Time interval = 2 min

Upper Pond

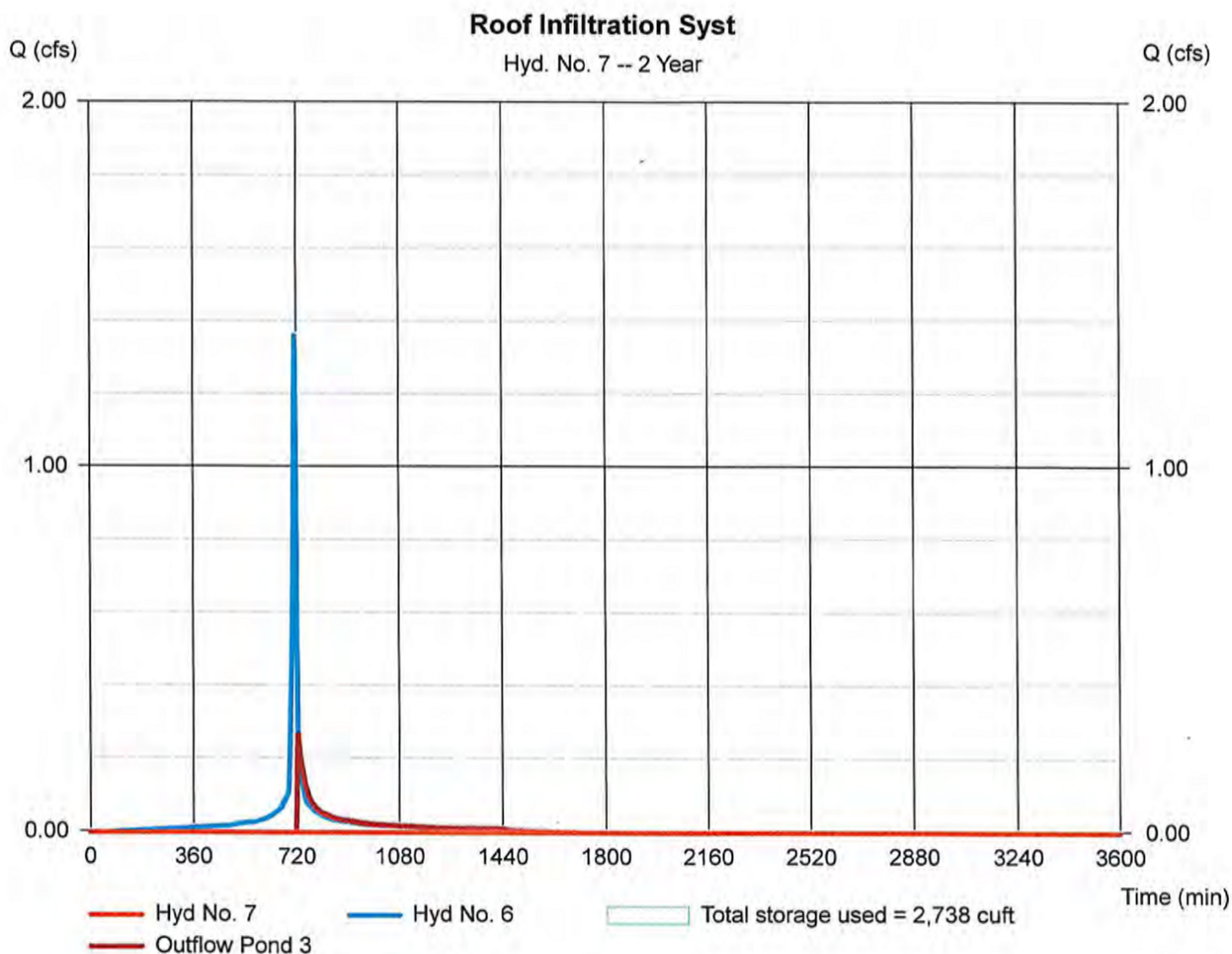
Pond name = Roof Infiltration System
Inflow hyd. = 6 - Roof Drainage
Max. Elevation = 89.83 ft
Max. Storage = 1,985 cuft

Peak discharge = 0.000 cfs
Time to peak = 886 min
Hyd. volume = 0 cuft

Lower Pond

Pond name = Forebay & Stormwater
Other Inflow hyd. = None
Max. Elevation = 78.14 ft
Max. Storage = 752 cuft

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



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

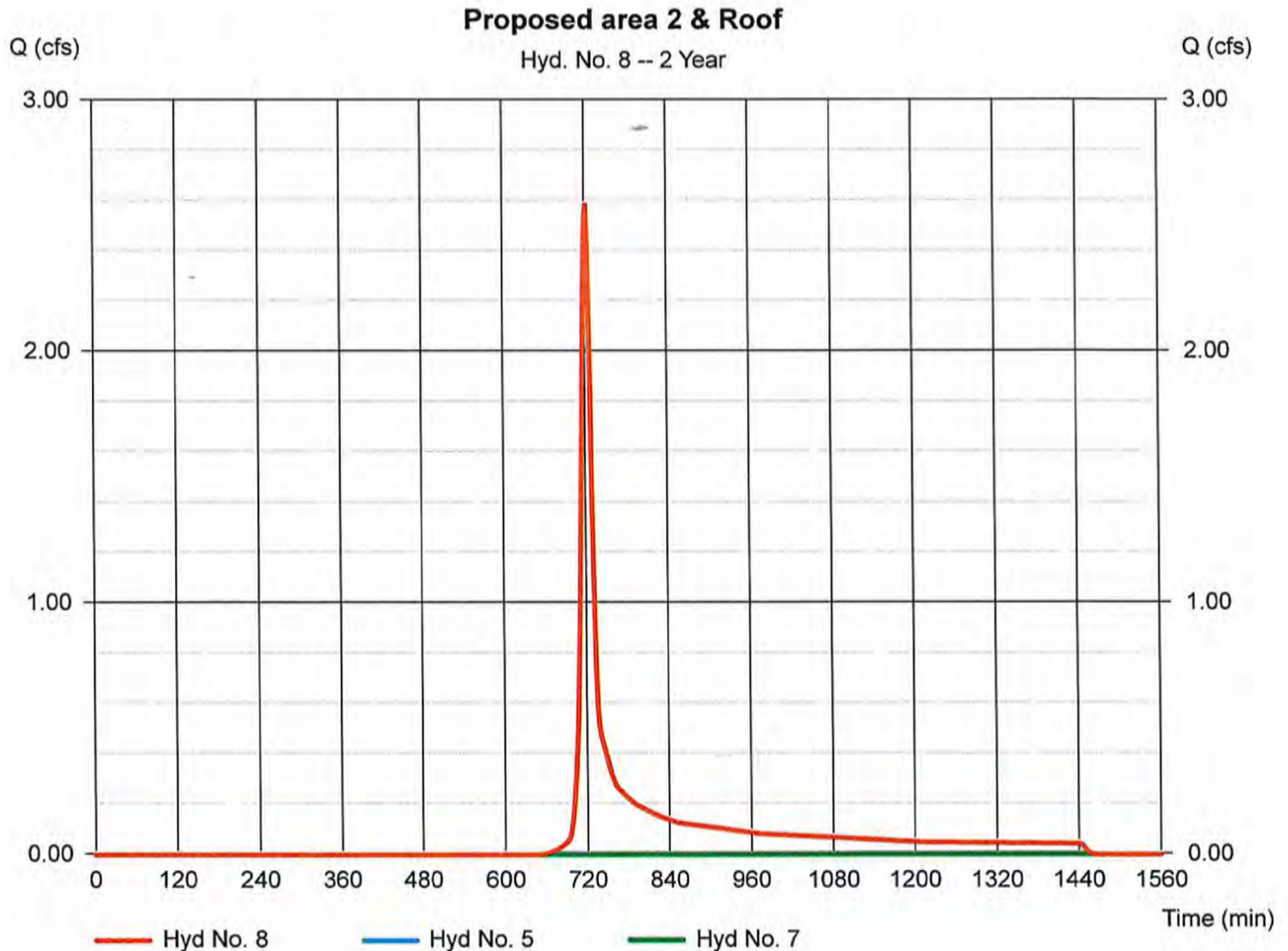
Monday, Oct 9, 2023

Hyd. No. 8

Proposed area 2 & Roof

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 2 min
Inflow hyds. = 5, 7

Peak discharge = 2.586 cfs
Time to peak = 722 min
Hyd. volume = 6,915 cuft
Contrib. drain. area = 1.700 ac



Hydrograph Report

10

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

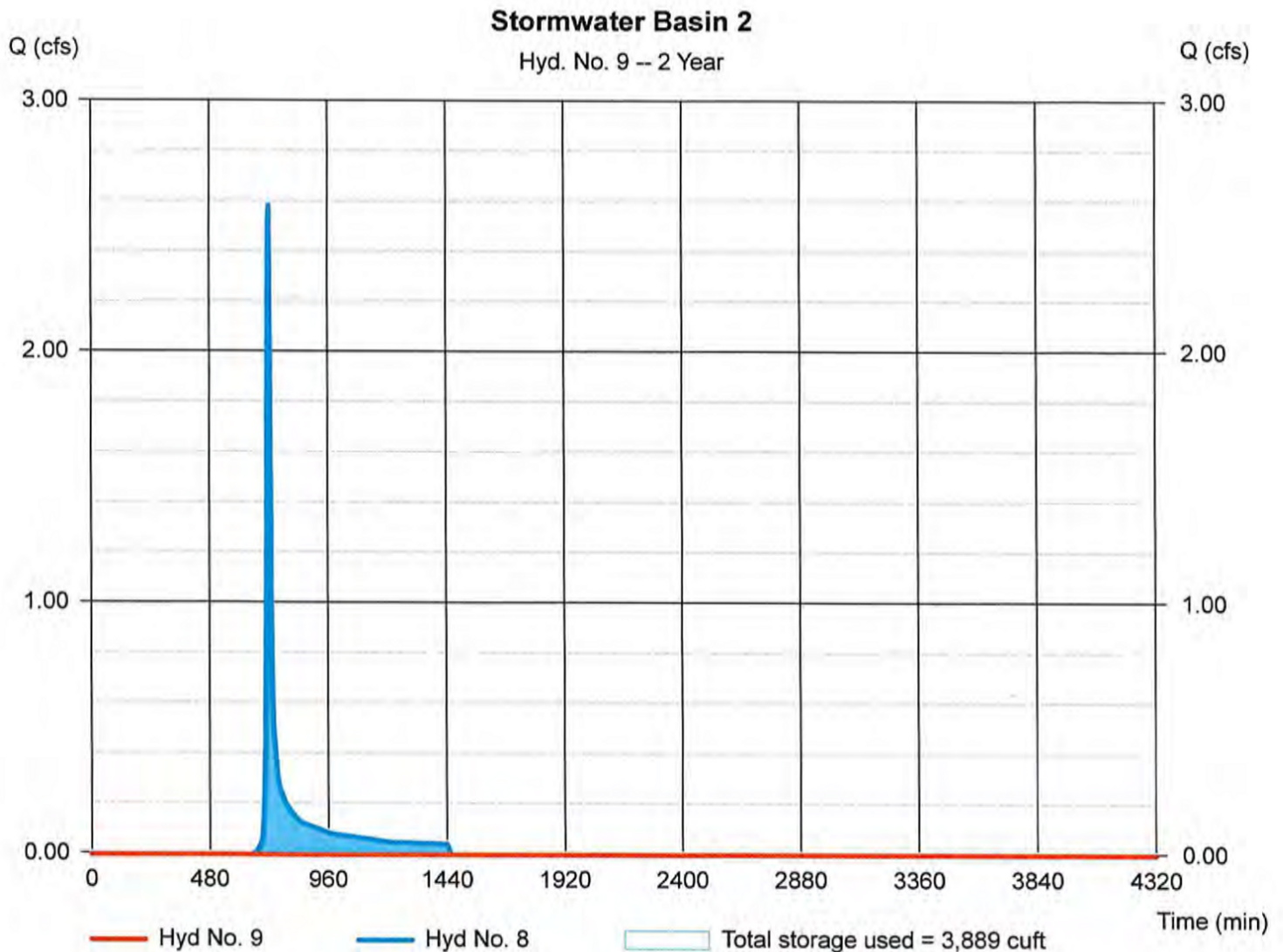
Monday, Oct 9, 2023

Hyd. No. 9

Stormwater Basin 2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 730 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - Proposed area 2 & Roof	Max. Elevation	= 78.77 ft
Reservoir name	= Forebay & Stormwater Basin 2	Max. Storage	= 3,889 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydralow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	2.462	1	730	9,725	---	---	---	Existing Conditions - Areas 1
2	SCS Runoff	3.016	1	729	11,340	---	---	---	Proposed Conditions - Area 1
3	Reservoir	0.000	1	945	0	2	92.46	8,264	Stormwater Basin 1
4	SCS Runoff	4.451	2	722	12,587	---	---	---	Existing Conditions - Area 2
5	SCS Runoff	4.183	2	722	10,971	---	---	---	Proposed Conditions - Area 3
6	SCS Runoff	1.737	2	716	4,119	---	---	---	Roof Drainage
7	Reservoir(i)	0.000	2	932	0	6	90.32	3,647	Roof Infiltration Syst
8	Combine	4.183	2	722	10,971	5, 7	---	---	Proposed area 2 & Roof
9	Reservoir	0.000	2	1548	0	8	79.25	6,586	Stormwater Basin 2
Hotel TR55.gpw					Return Period: 5 Year			Monday, Oct 9, 2023	

Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

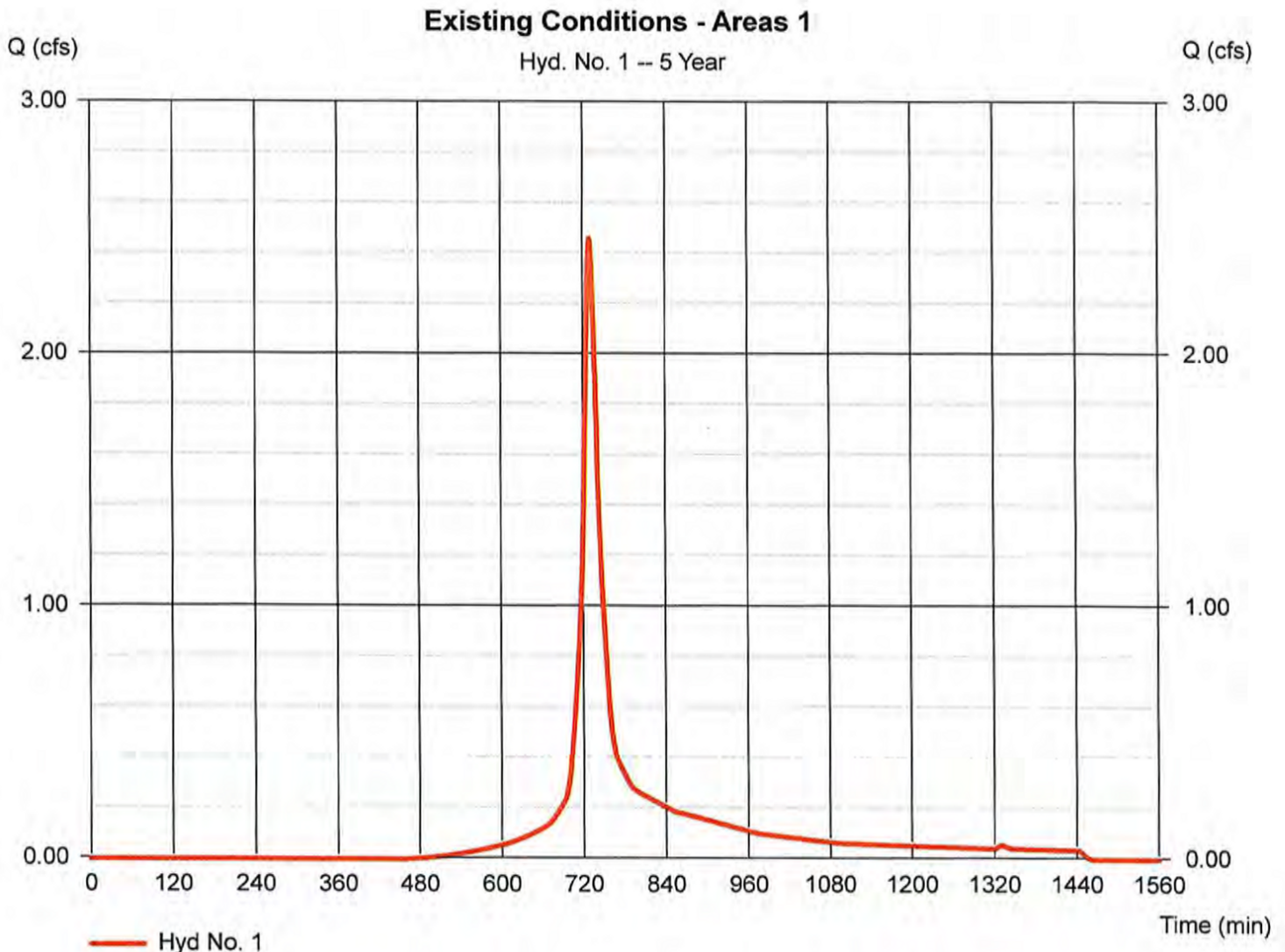
Hyd. No. 1

Existing Conditions - Areas 1

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 1 min
Drainage area = 1.100 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.27 in
Storm duration = 24 hrs

Peak discharge = 2.462 cfs
Time to peak = 730 min
Hyd. volume = 9,725 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.400 \times 55) + (0.700 \times 98)] / 1.100$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

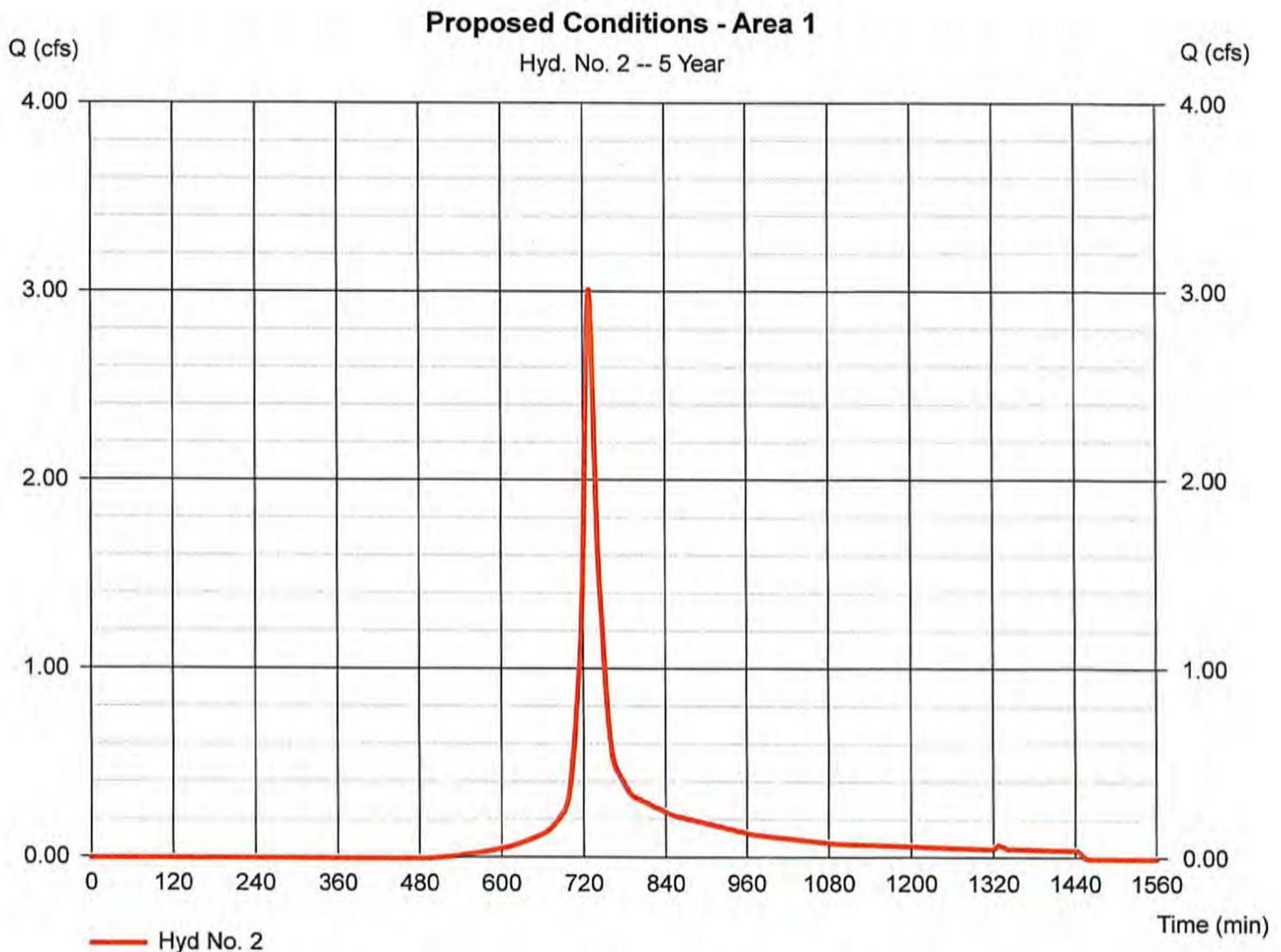
Hyd. No. 2

Proposed Conditions - Area 1

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 1 min
Drainage area = 1.400 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.27 in
Storm duration = 24 hrs

Peak discharge = 3.016 cfs
Time to peak = 729 min
Hyd. volume = 11,340 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 13.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.800 \times 98) + (0.600 \times 55)] / 1.400$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

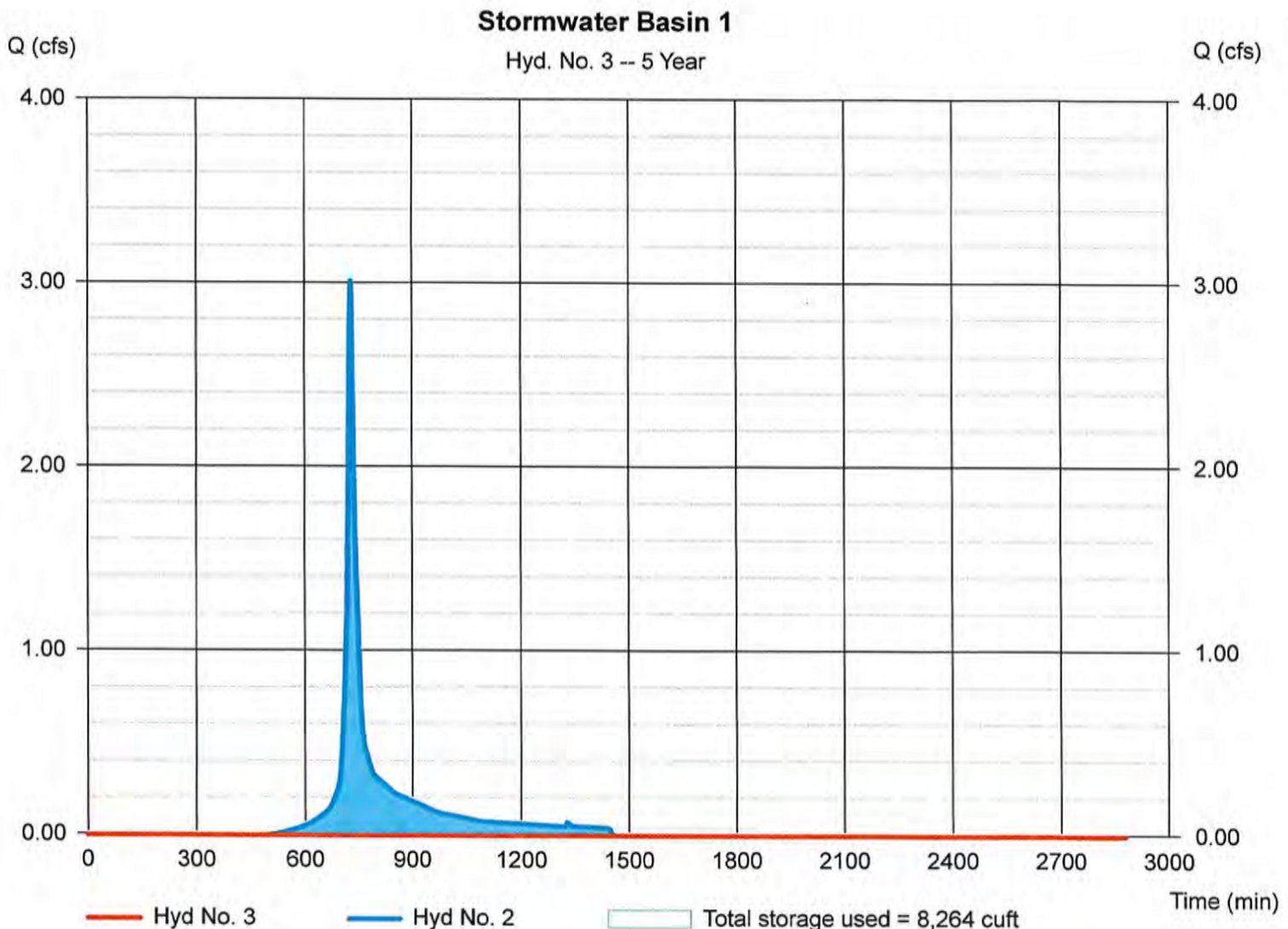
Hyd. No. 3

Stormwater Basin 1

Hydrograph type = Reservoir
Storm frequency = 5 yrs
Time interval = 1 min
Inflow hyd. No. = 2 - Proposed Conditions - Area 1
Reservoir name = Forebay & Stormwater Basin 1

Peak discharge = 0.000 cfs
Time to peak = 945 min
Hyd. volume = 0 cuft
Max. Elevation = 92.46 ft
Max. Storage = 8,264 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

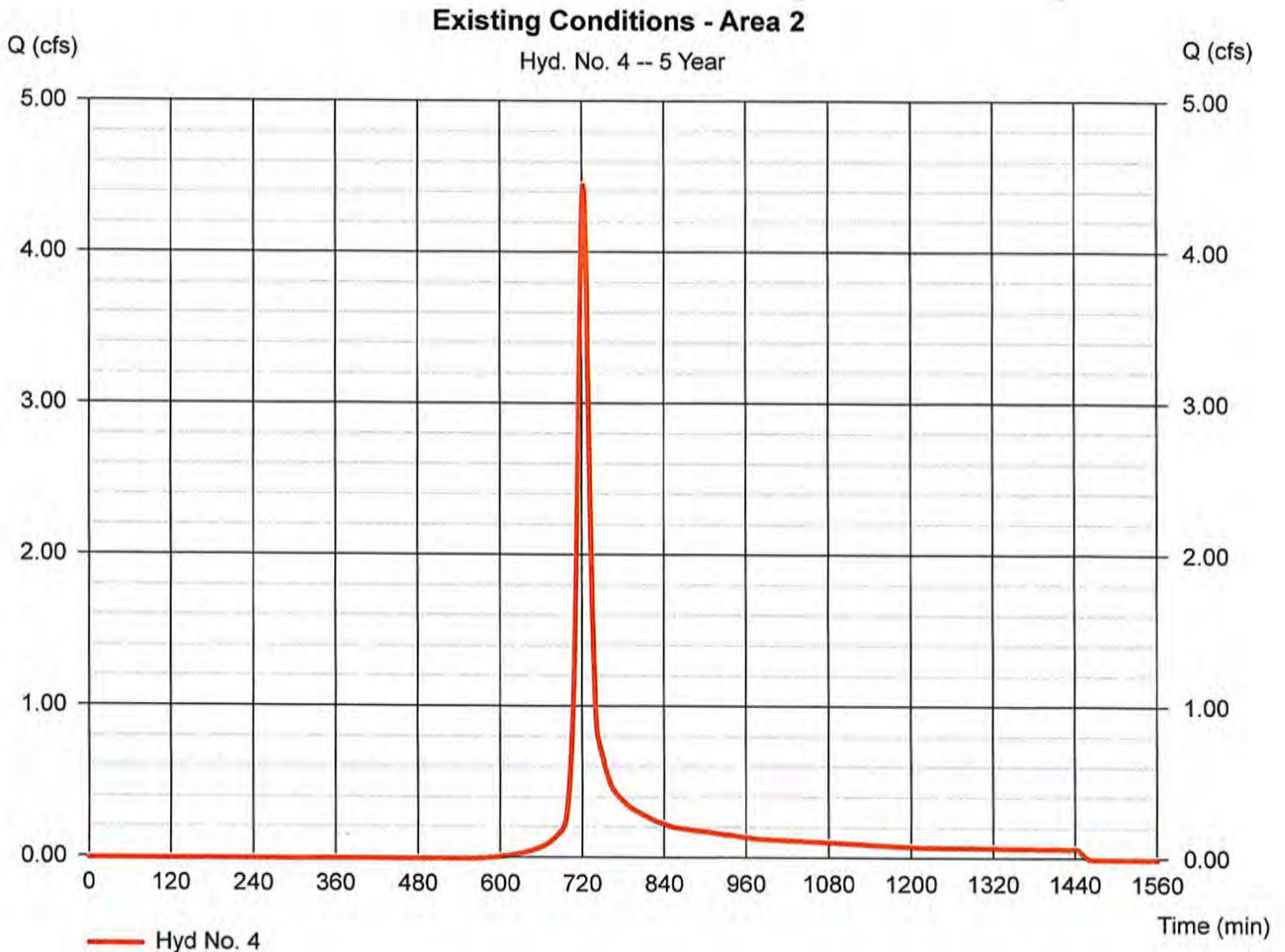
Hyd. No. 4

Existing Conditions - Area 2

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 2 min
Drainage area = 1.900 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.27 in
Storm duration = 24 hrs

Peak discharge = 4.451 cfs
Time to peak = 722 min
Hyd. volume = 12,587 cuft
Curve number = 75*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = [(1.000 x 55) + (0.900 x 98)] / 1.900



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

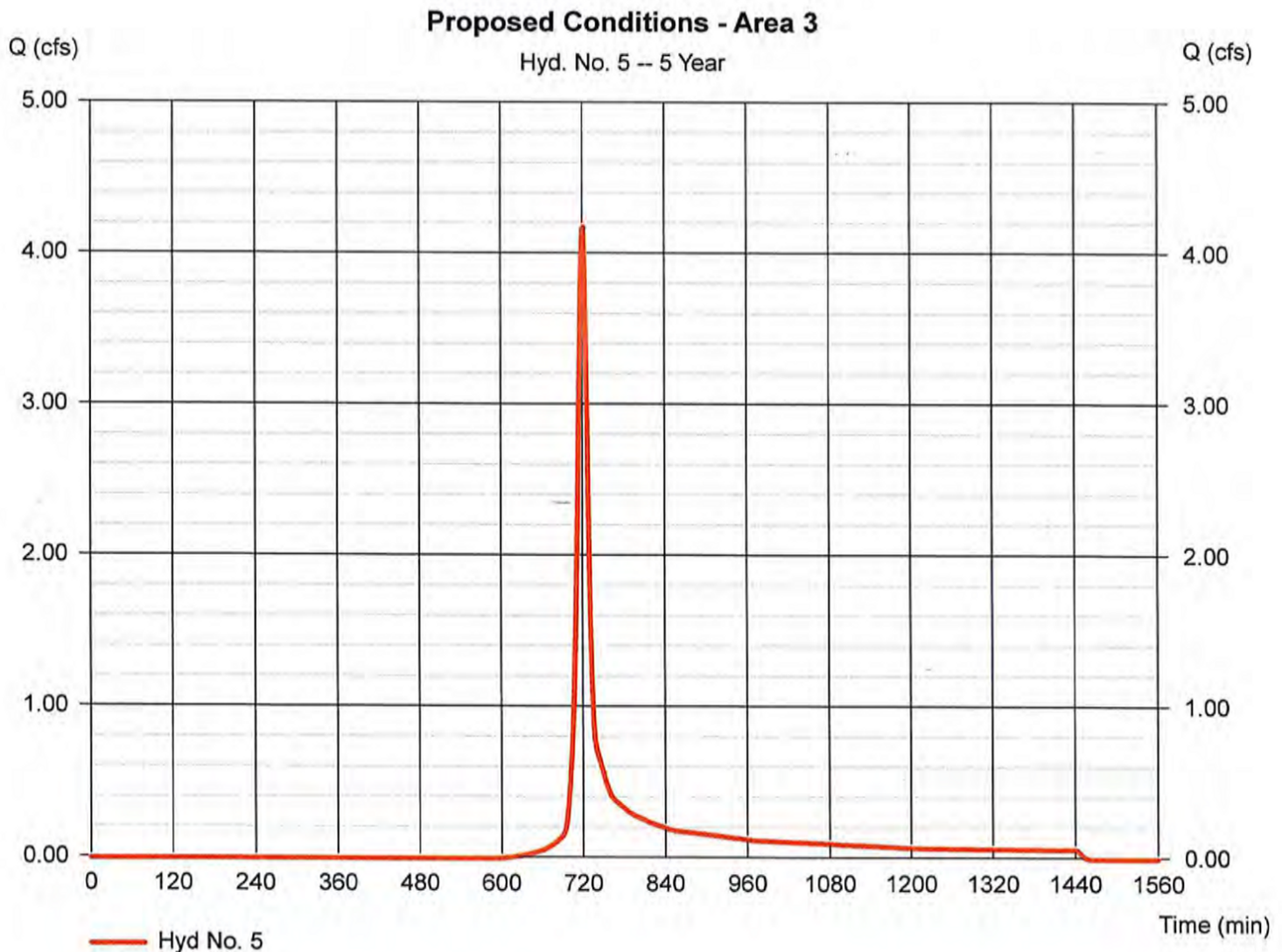
Hyd. No. 5

Proposed Conditions - Area 3

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 2 min
Drainage area = 1.700 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.27 in
Storm duration = 24 hrs

Peak discharge = 4.183 cfs
Time to peak = 722 min
Hyd. volume = 10,971 cuft
Curve number = 73*
Hydraulic length = 0 ft
Time of conc. (Tc) = 12.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(0.700 \times 98) + (1.000 \times 55)] / 1.700$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

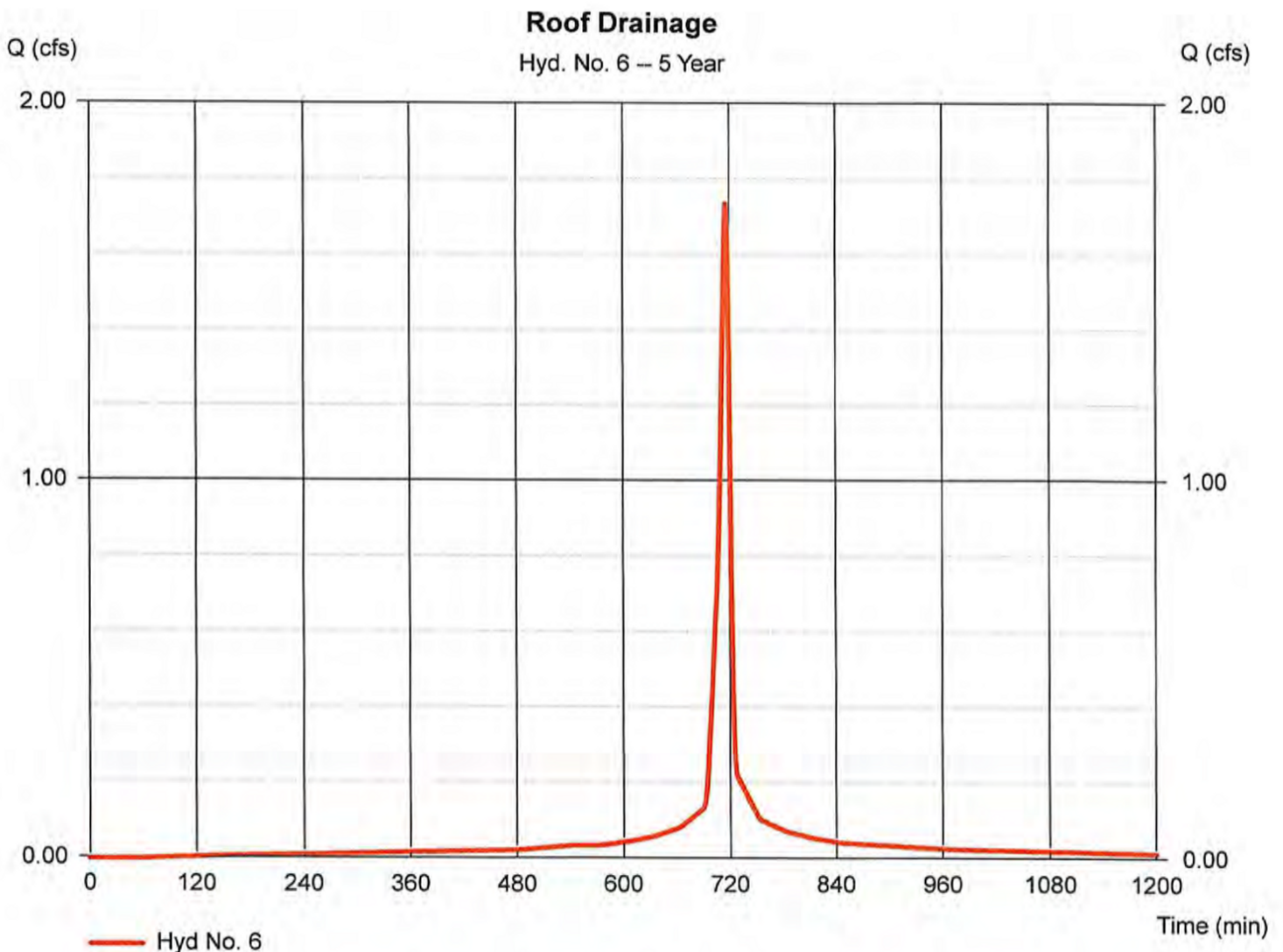
Hyd. No. 6

Roof Drainage

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 2 min
Drainage area = 0.300 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.27 in
Storm duration = 24 hrs

Peak discharge = 1.737 cfs
Time to peak = 716 min
Hyd. volume = 4,119 cuft
Curve number = 98*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(0.300 \times 98)] / 0.300$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

Hyd. No. 7

Roof Infiltration Syst

Hydrograph type = Reservoir (Interconnected)
Storm frequency = 5 yrs
Time interval = 2 min

Upper Pond

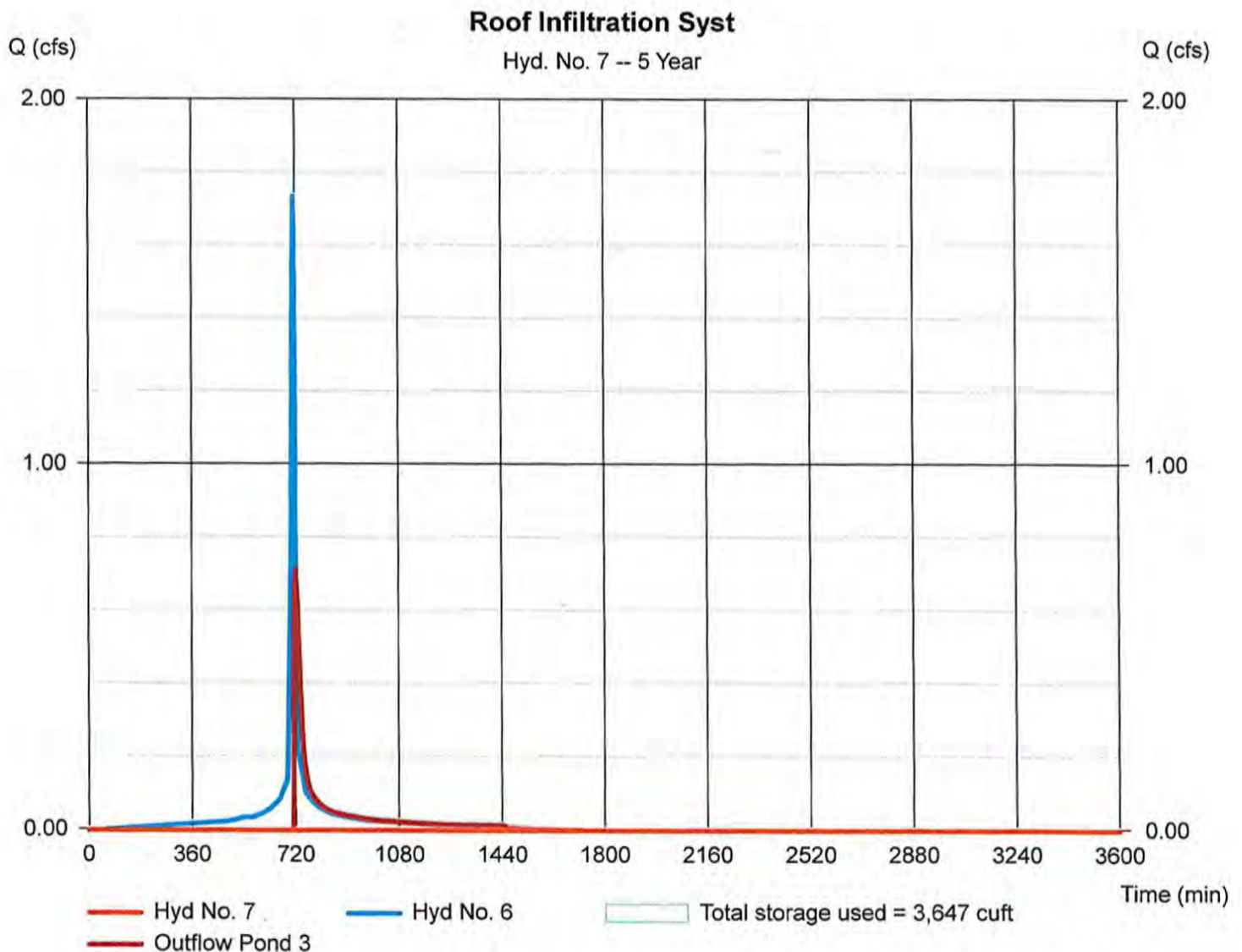
Pond name = Roof Infiltration System
Inflow hyd. = 6 - Roof Drainage
Max. Elevation = 90.32 ft
Max. Storage = 2,324 cuft

Peak discharge = 0.000 cfs
Time to peak = 932 min
Hyd. volume = 0 cuft

Lower Pond

Pond name = Forebay & Stormwater
Other Inflow hyd. = None
Max. Elevation = 78.25 ft
Max. Storage = 1,323 cuft

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



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

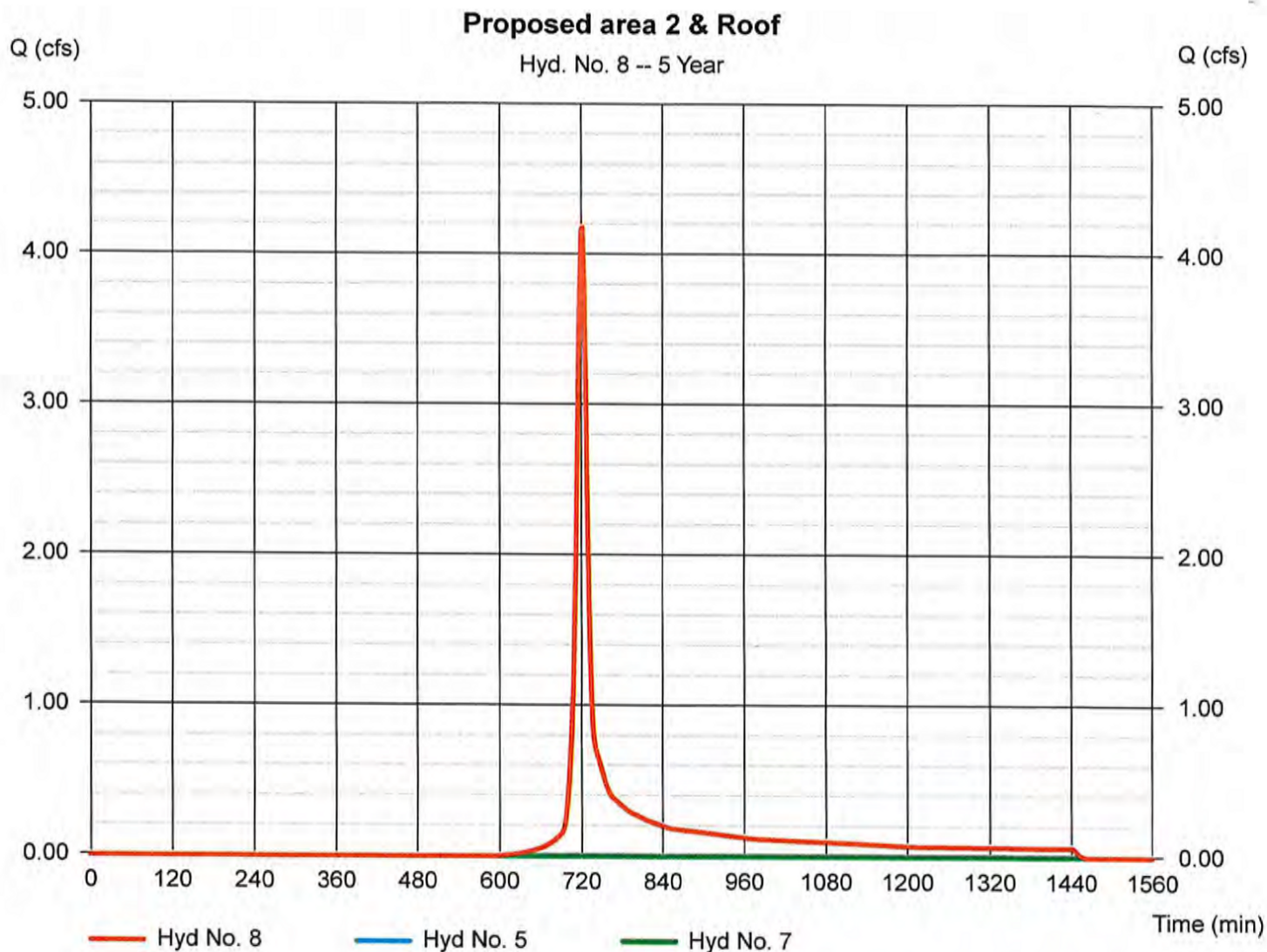
Monday, Oct 9, 2023

Hyd. No. 8

Proposed area 2 & Roof

Hydrograph type = Combine
Storm frequency = 5 yrs
Time interval = 2 min
Inflow hyds. = 5, 7

Peak discharge = 4.183 cfs
Time to peak = 722 min
Hyd. volume = 10,971 cuft
Contrib. drain. area= 1.700 ac



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

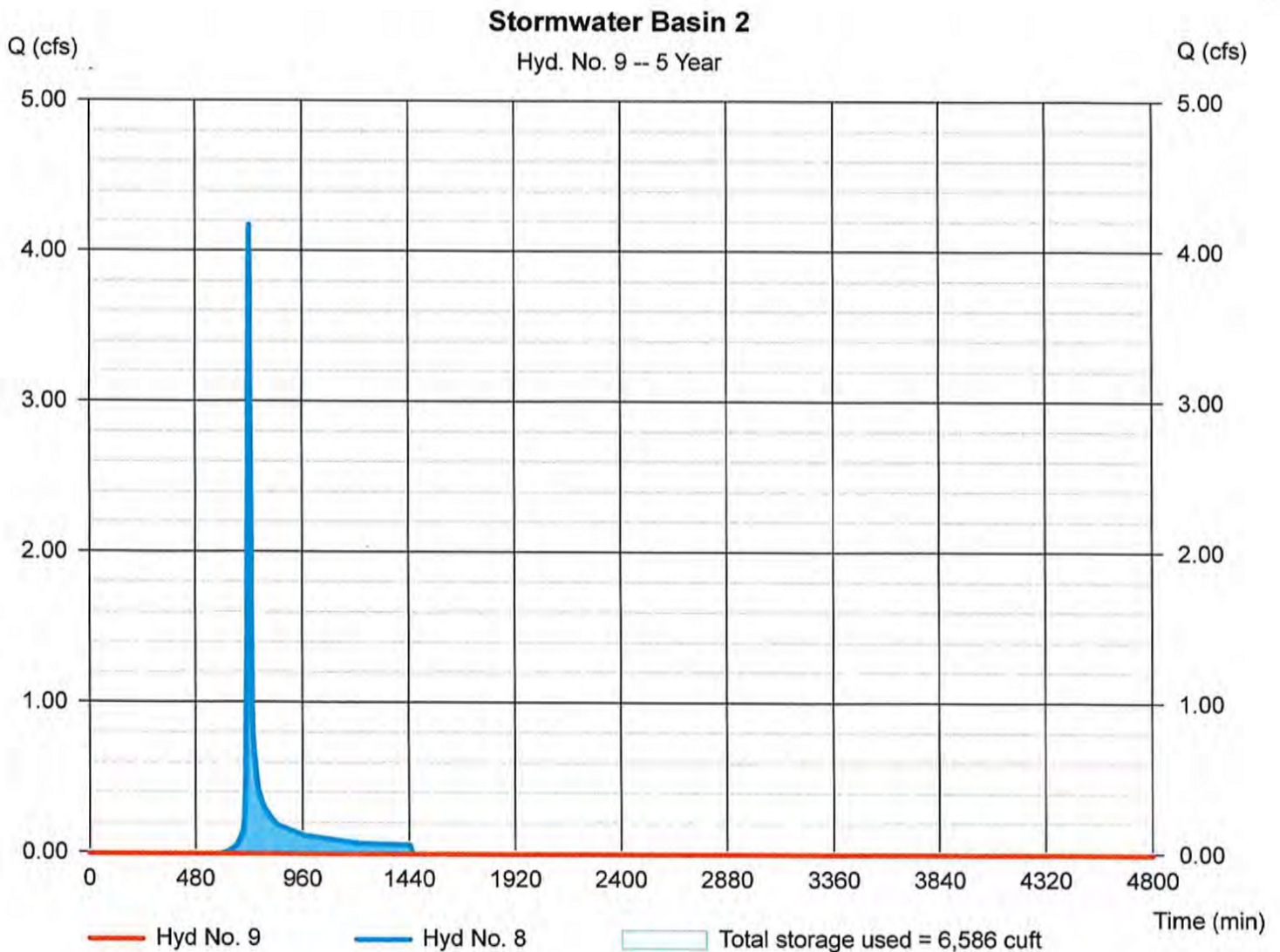
Monday, Oct 9, 2023

Hyd. No. 9

Stormwater Basin 2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 5 yrs	Time to peak	= 1548 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - Proposed area 2 & Roof	Max. Elevation	= 79.25 ft
Reservoir name	= Forebay & Stormwater Basin 2	Max. Storage	= 6,586 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	3.125	1	730	12,366	-----	-----	-----	Existing Conditions - Areas 1
2	SCS Runoff	3.873	1	729	14,559	-----	-----	-----	Proposed Conditions - Area 1
3	Reservoir	0.090	1	942	639	2	93.03	10,324	Stormwater Basin 1
4	SCS Runoff	5.903	2	722	16,579	-----	-----	-----	Existing Conditions - Area 2
5	SCS Runoff	5.609	2	720	14,612	-----	-----	-----	Proposed Conditions - Area 3
6	SCS Runoff	2.047	2	716	4,883	-----	-----	-----	Roof Drainage
7	Reservoir(i)	0.000	2	752	0	6	90.69	4,426	Roof Infiltration Syst
8	Combine	5.609	2	720	14,612	5, 7	-----	-----	Proposed area 2 & Roof
9	Reservoir	0.000	2	1886	0	8	79.70	9,383	Stormwater Basin 2
Hotel TR55.gpw					Return Period: 10 Year			Monday, Oct 9, 2023	

Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

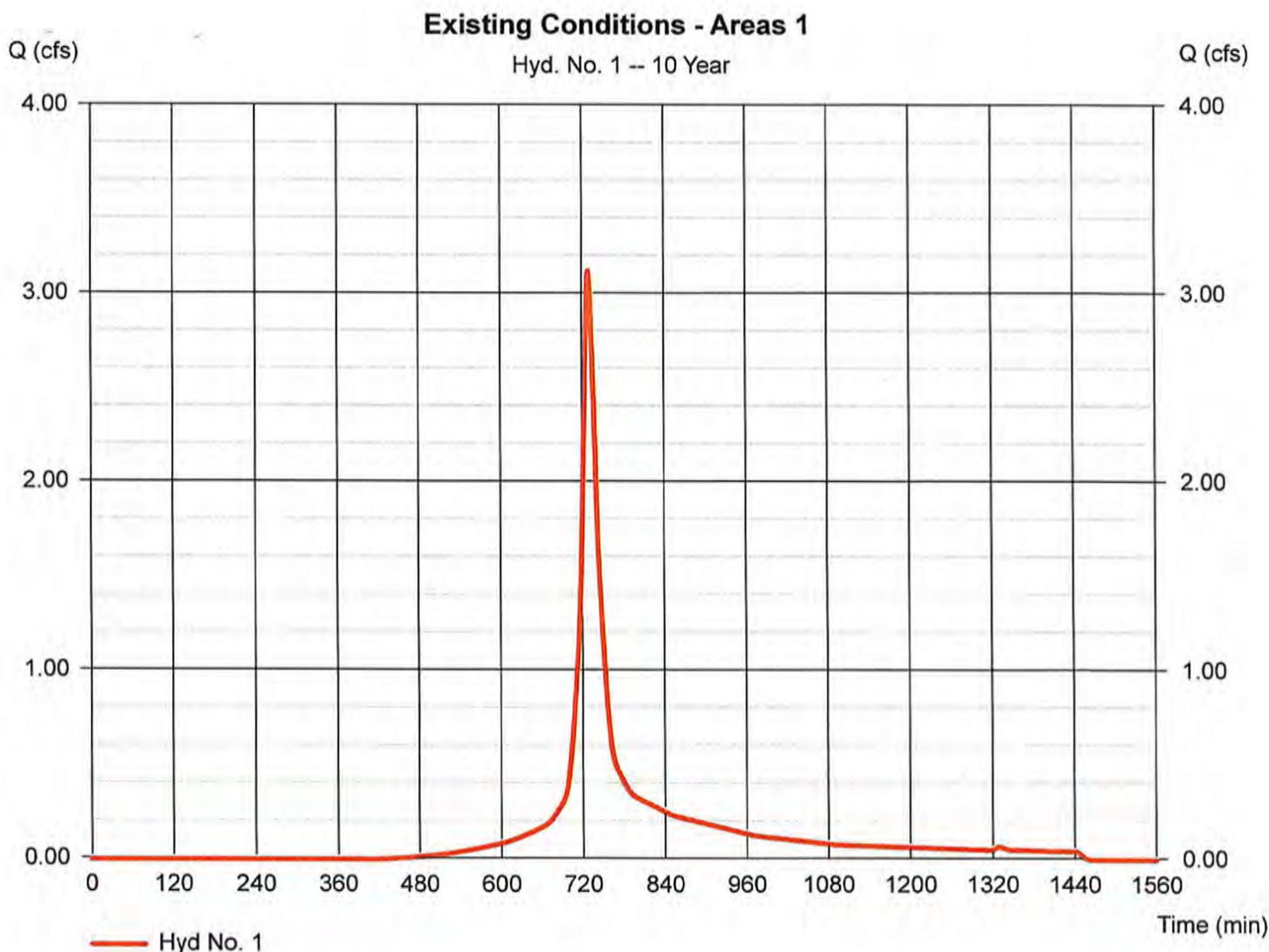
Hyd. No. 1

Existing Conditions - Areas 1

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.100 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.02 in
Storm duration = 24 hrs

Peak discharge = 3.125 cfs
Time to peak = 730 min
Hyd. volume = 12,366 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.400 \times 55) + (0.700 \times 98)] / 1.100$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

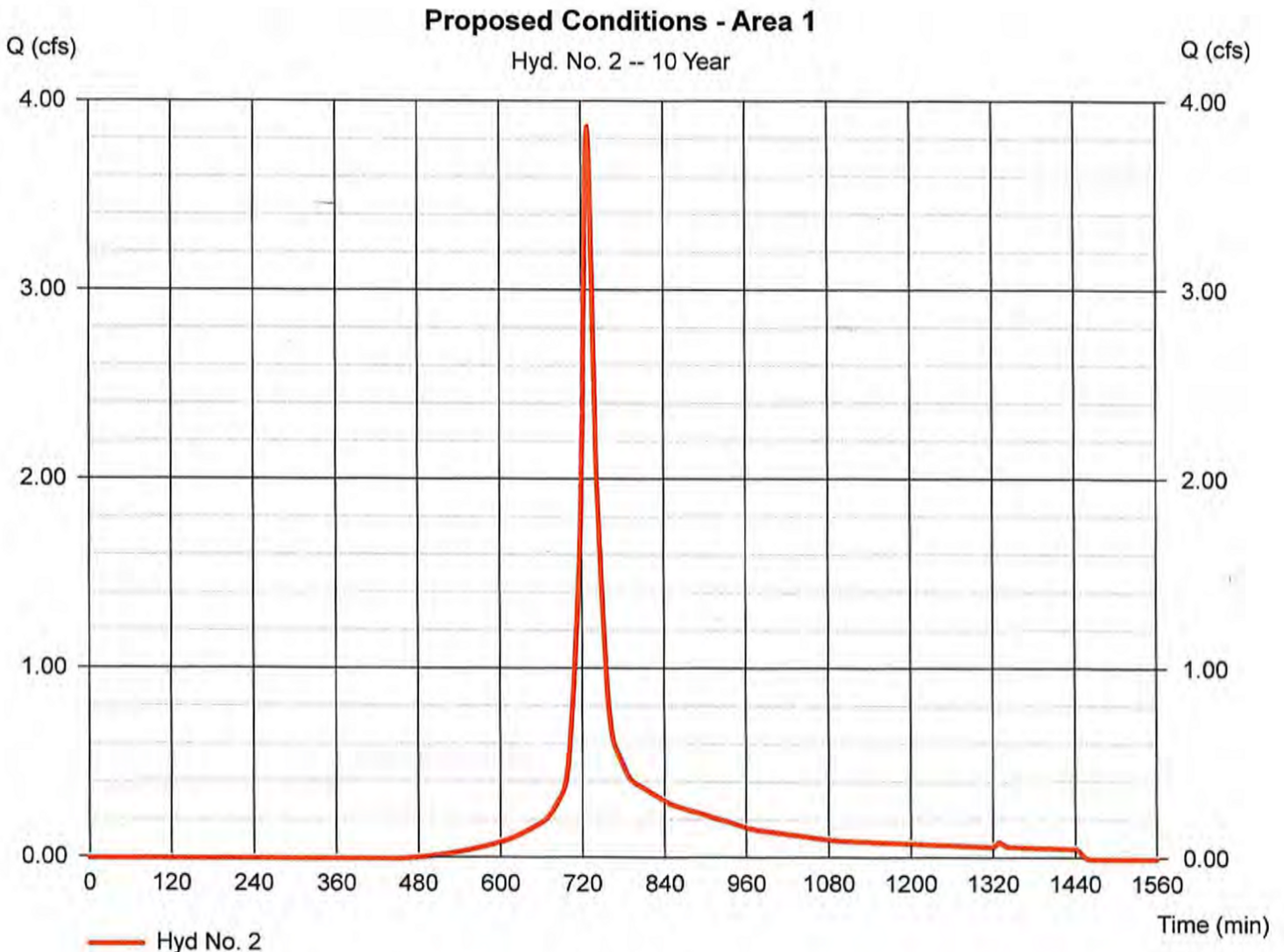
Hyd. No. 2

Proposed Conditions - Area 1

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 1.400 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.02 in
Storm duration = 24 hrs

Peak discharge = 3.873 cfs
Time to peak = 729 min
Hyd. volume = 14,559 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 13.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.800 \times 98) + (0.600 \times 55)] / 1.400$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

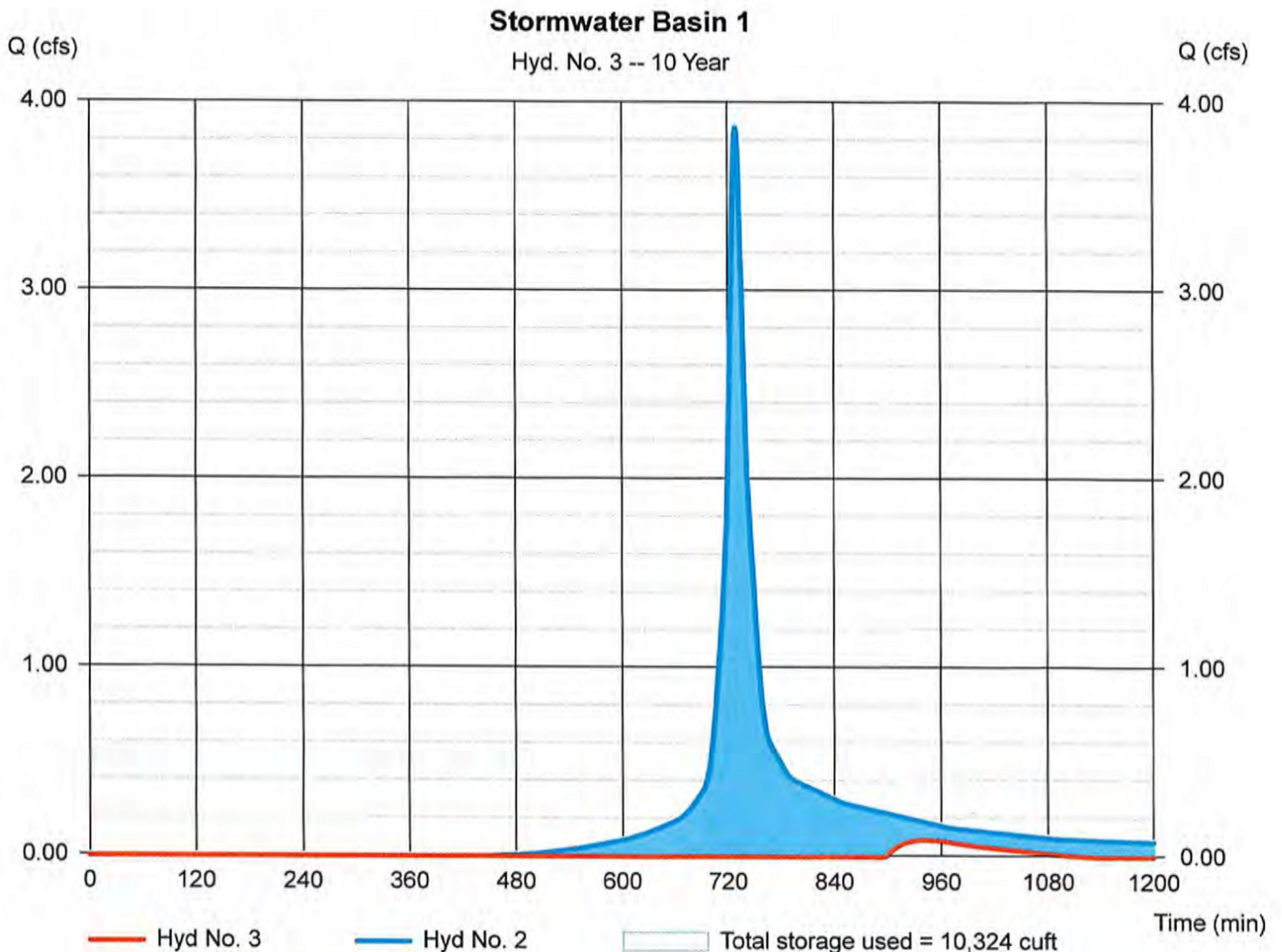
Hyd. No. 3

Stormwater Basin 1

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyd. No. = 2 - Proposed Conditions - Area 1
Reservoir name = Forebay & Stormwater Basin 1

Peak discharge = 0.090 cfs
Time to peak = 942 min
Hyd. volume = 639 cuft
Max. Elevation = 93.03 ft
Max. Storage = 10,324 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

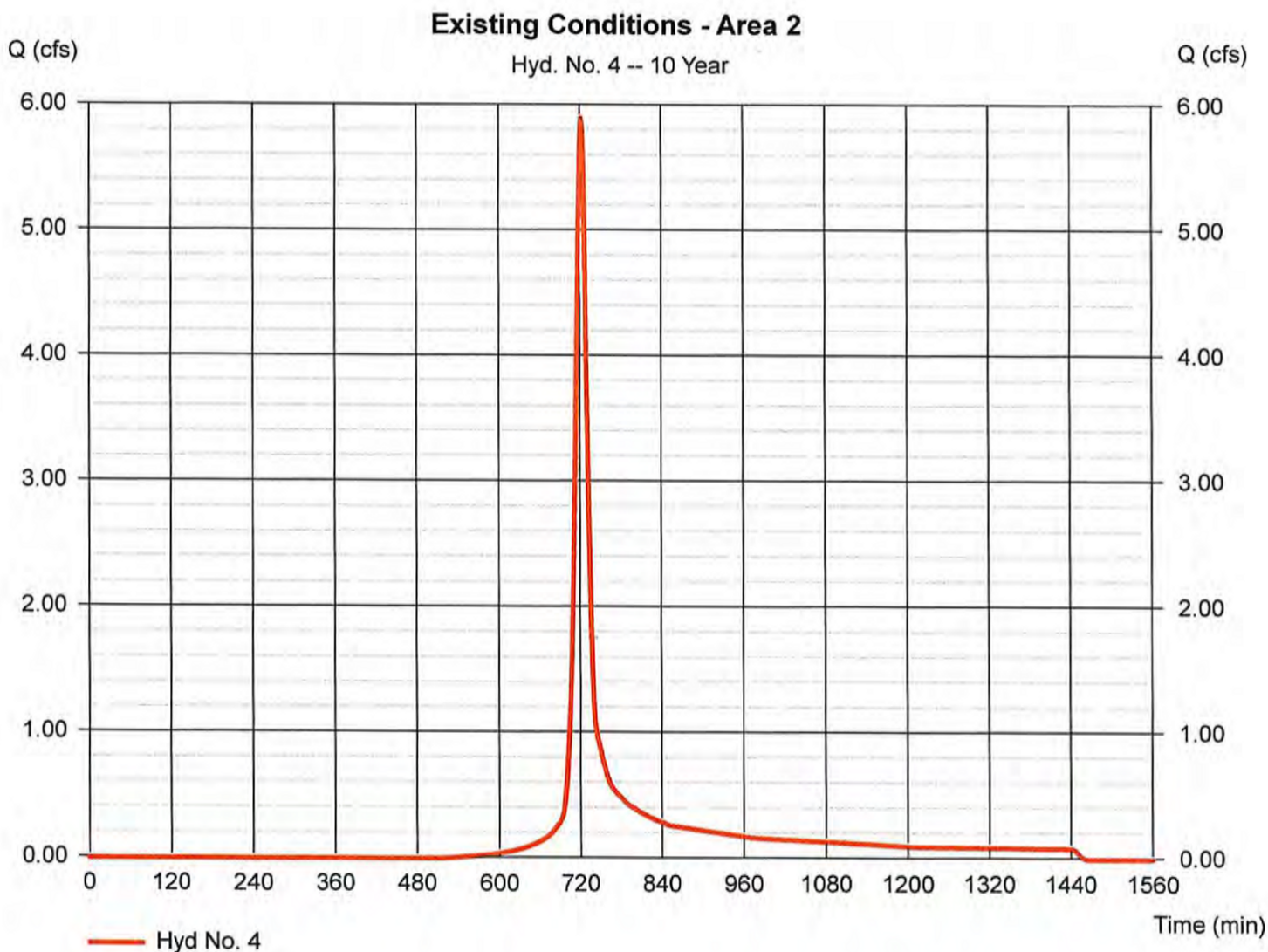
Hyd. No. 4

Existing Conditions - Area 2

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 1.900 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.02 in
Storm duration = 24 hrs

Peak discharge = 5.903 cfs
Time to peak = 722 min
Hyd. volume = 16,579 cuft
Curve number = 75*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(1.000 \times 55) + (0.900 \times 98)] / 1.900$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

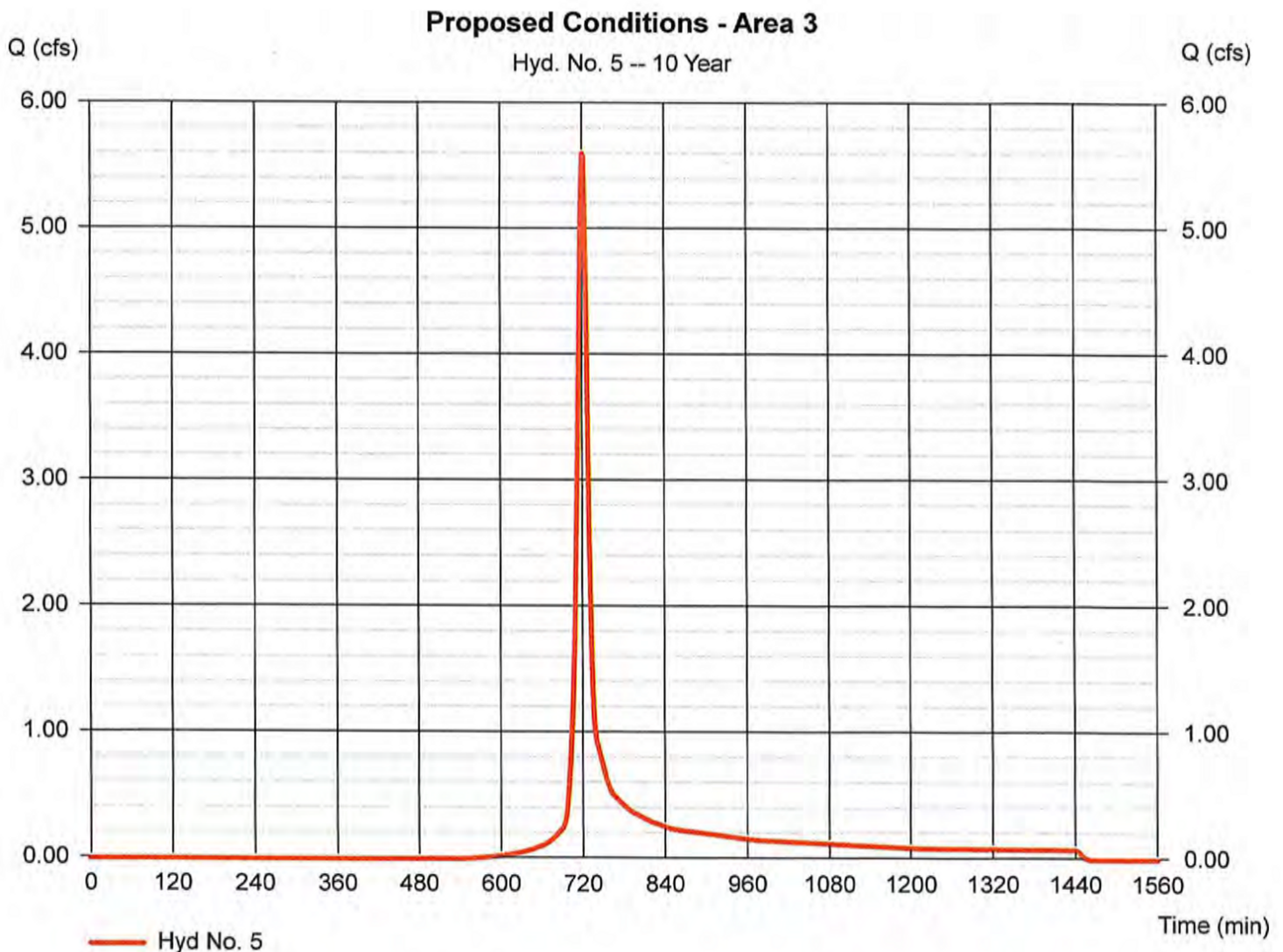
Hyd. No. 5

Proposed Conditions - Area 3

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 1.700 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.02 in
Storm duration = 24 hrs

Peak discharge = 5.609 cfs
Time to peak = 720 min
Hyd. volume = 14,612 cuft
Curve number = 73*
Hydraulic length = 0 ft
Time of conc. (Tc) = 12.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(0.700 \times 98) + (1.000 \times 55)] / 1.700$



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

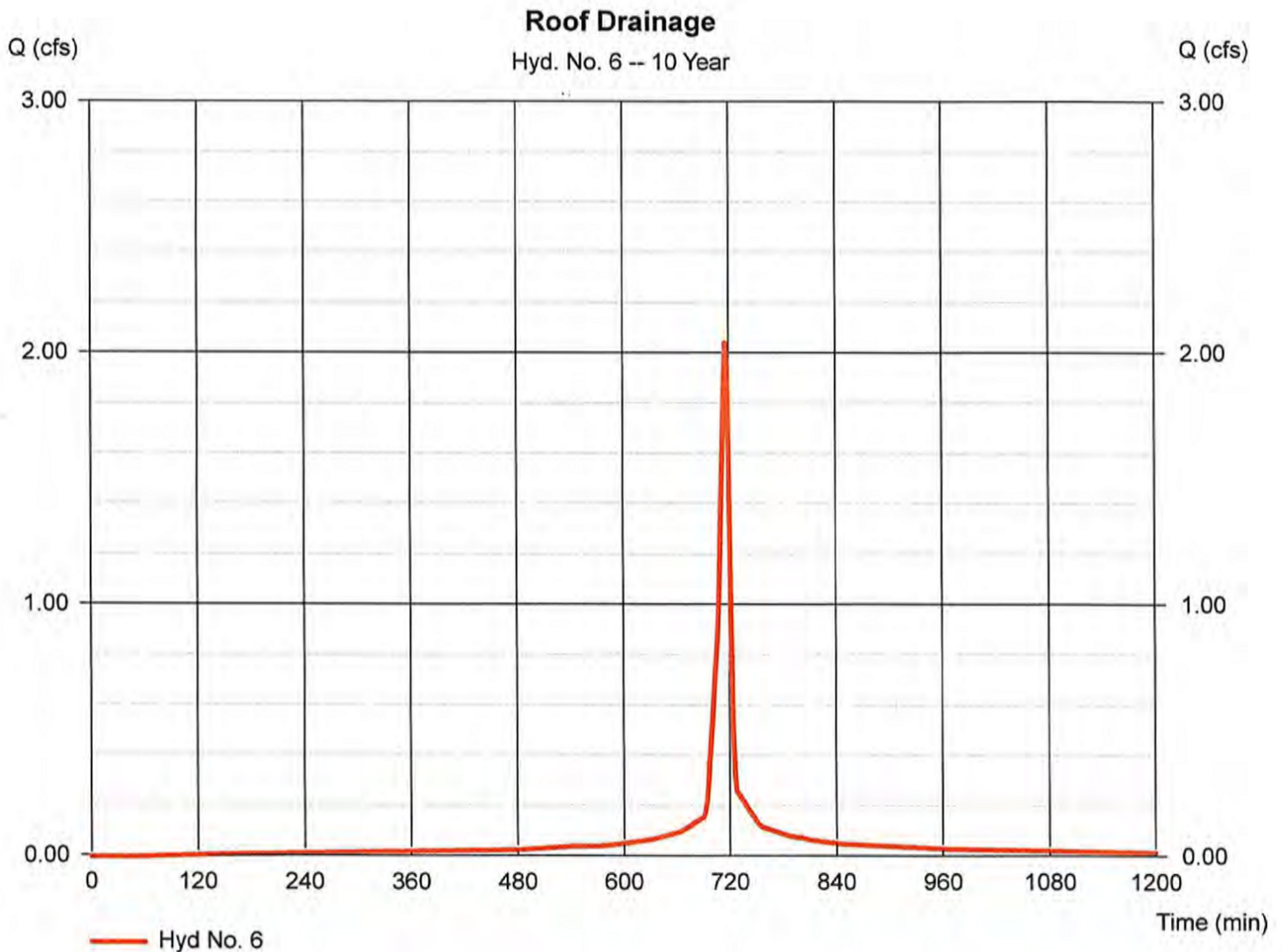
Hyd. No. 6

Roof Drainage

Hydrograph type = SCS Runoff
 Storm frequency = 10 yrs
 Time interval = 2 min
 Drainage area = 0.300 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 5.02 in
 Storm duration = 24 hrs

Peak discharge = 2.047 cfs
 Time to peak = 716 min
 Hyd. volume = 4,883 cuft
 Curve number = 98*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 5.00 min
 Distribution = Type II
 Shape factor = 484

* Composite (Area/CN) = $[(0.300 \times 98)] / 0.300$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

Hyd. No. 7

Roof Infiltration Syst

Hydrograph type = Reservoir (Interconnected)
Storm frequency = 10 yrs
Time interval = 2 min

Upper Pond

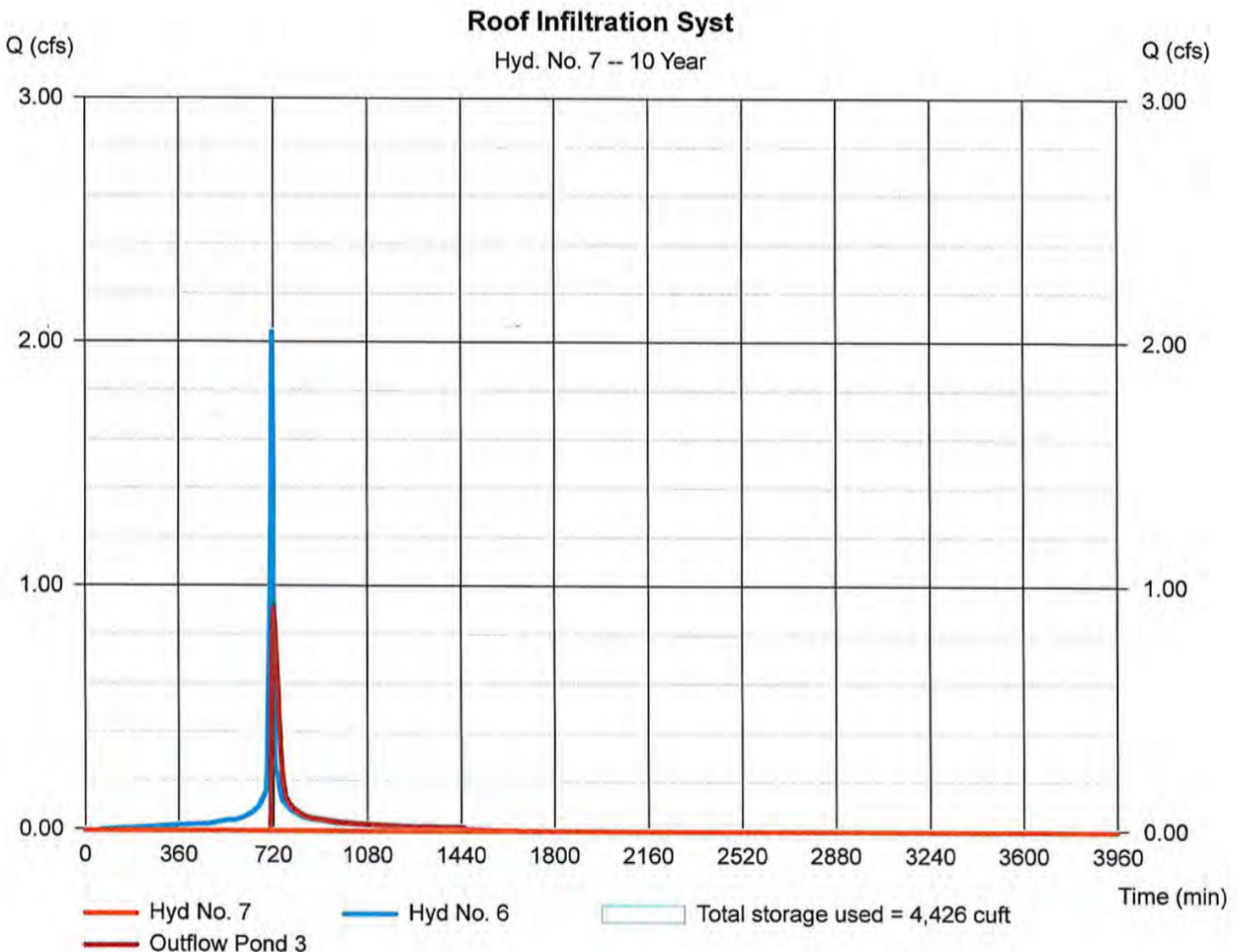
Pond name = Roof Infiltration System
Inflow hyd. = 6 - Roof Drainage
Max. Elevation = 90.69 ft
Max. Storage = 2,606 cuft

Peak discharge = 0.000 cfs
Time to peak = 752 min
Hyd. volume = 0 cuft

Lower Pond

Pond name = Forebay & Stormwater
Other Inflow hyd. = None
Max. Elevation = 78.35 ft
Max. Storage = 1,820 cuft

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



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

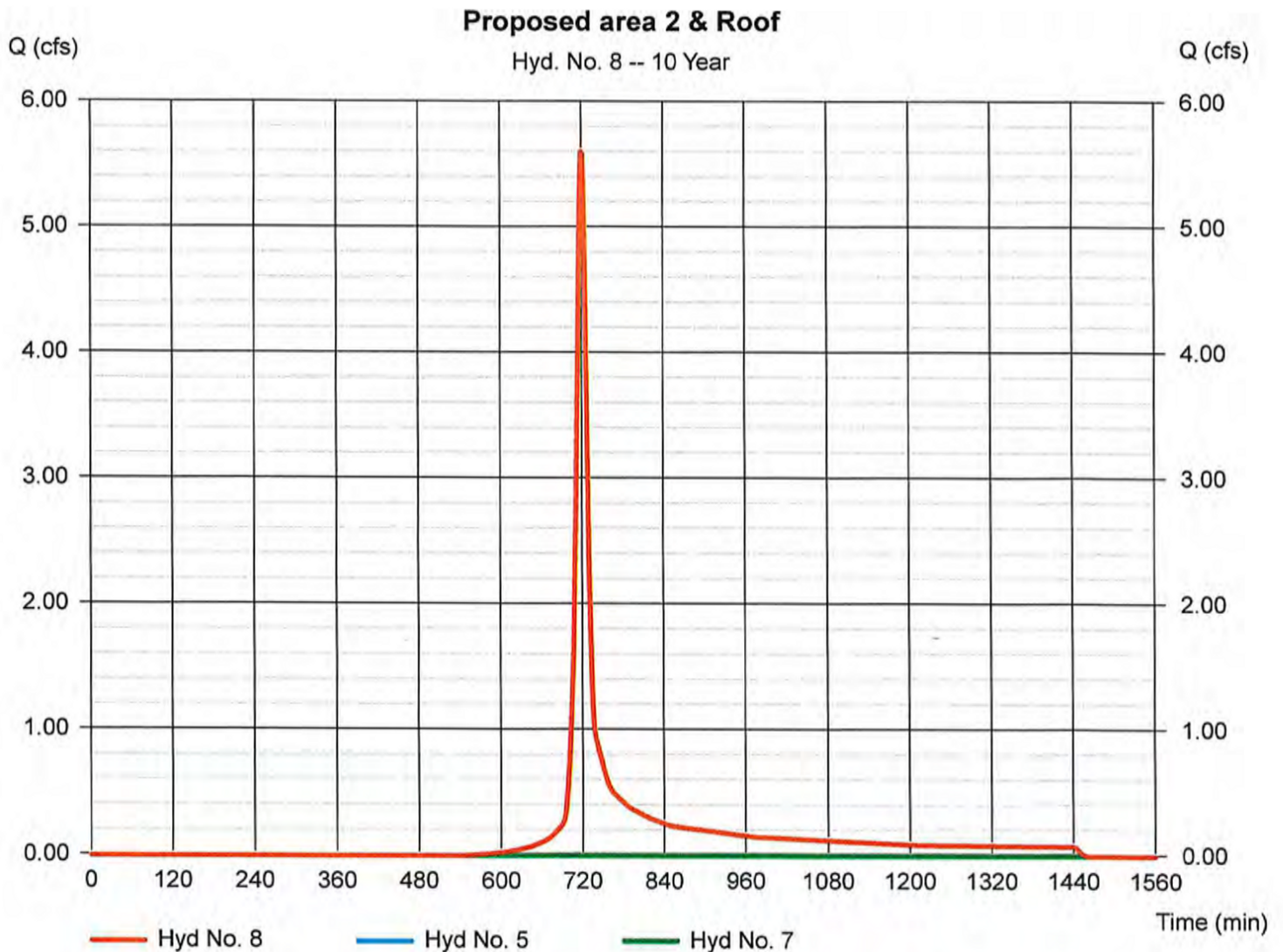
Monday, Oct 9, 2023

Hyd. No. 8

Proposed area 2 & Roof

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 2 min
Inflow hyds. = 5, 7

Peak discharge = 5.609 cfs
Time to peak = 720 min
Hyd. volume = 14,612 cuft
Contrib. drain. area= 1.700 ac



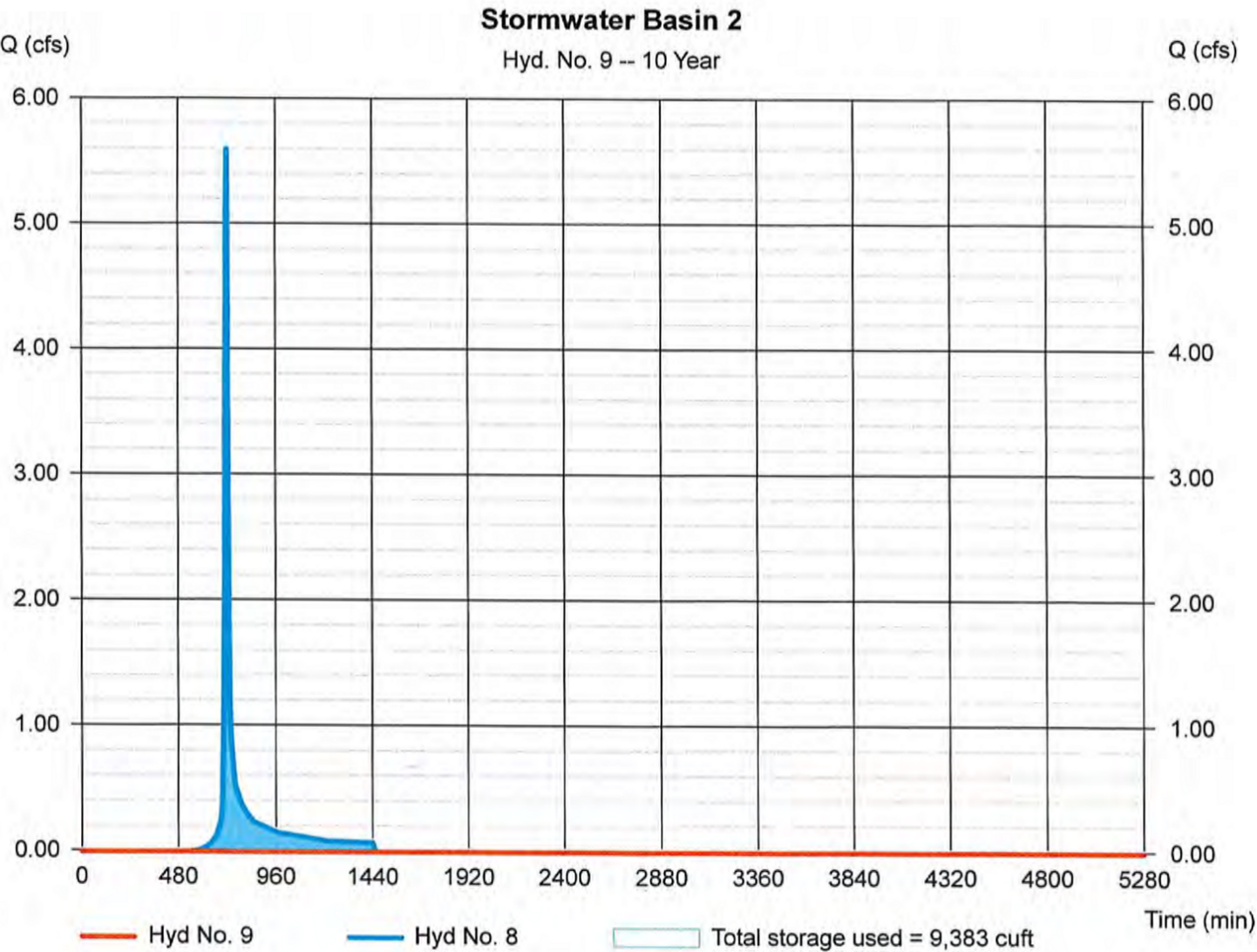
Hydrograph Report

Hyd. No. 9

Stormwater Basin 2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 10 yrs	Time to peak	= 1886 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - Proposed area 2 & Roof	Max. Elevation	= 79.70 ft
Reservoir name	= Forebay & Stormwater Basin 2	Max. Storage	= 9,383 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydralow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	4.055	1	730	16,141	----	----	----	Existing Conditions - Areas 1
2	SCS Runoff	5.084	1	729	19,187	----	----	----	Proposed Conditions - Area 1
3	Reservoir	0.574	1	775	4,786	2	93.14	10,856	Stormwater Basin 1
4	SCS Runoff	7.995	2	722	22,415	----	----	----	Existing Conditions - Area 2
5	SCS Runoff	7.702	2	720	19,973	----	----	----	Proposed Conditions - Area 3
6	SCS Runoff	2.475	2	716	5,944	----	----	----	Roof Drainage
7	Reservoir(i)	0.000	2	1006	0	6	91.16	5,505	Roof Infiltration Syst
8	Combine	7.702	2	720	19,973	5, 7	----	----	Proposed area 2 & Roof
9	Reservoir	0.000	2	2426	0	8	80.31	13,649	Stormwater Basin 2
Hotel TR55.gpw					Return Period: 25 Year			Monday, Oct 9, 2023	

Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

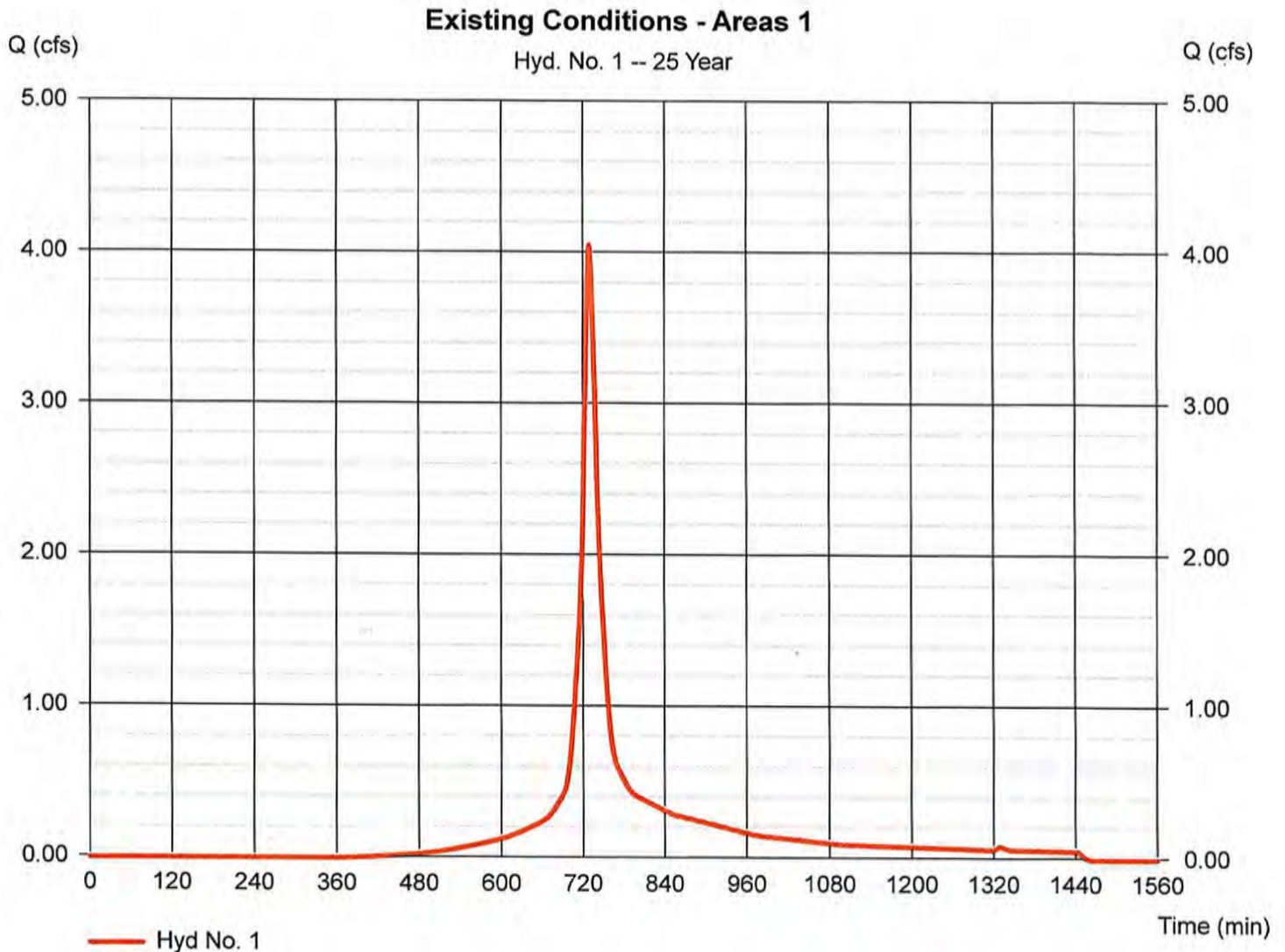
Hyd. No. 1

Existing Conditions - Areas 1

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 1 min
Drainage area = 1.100 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.06 in
Storm duration = 24 hrs

Peak discharge = 4.055 cfs
Time to peak = 730 min
Hyd. volume = 16,141 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.400 \times 55) + (0.700 \times 98)] / 1.100$



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

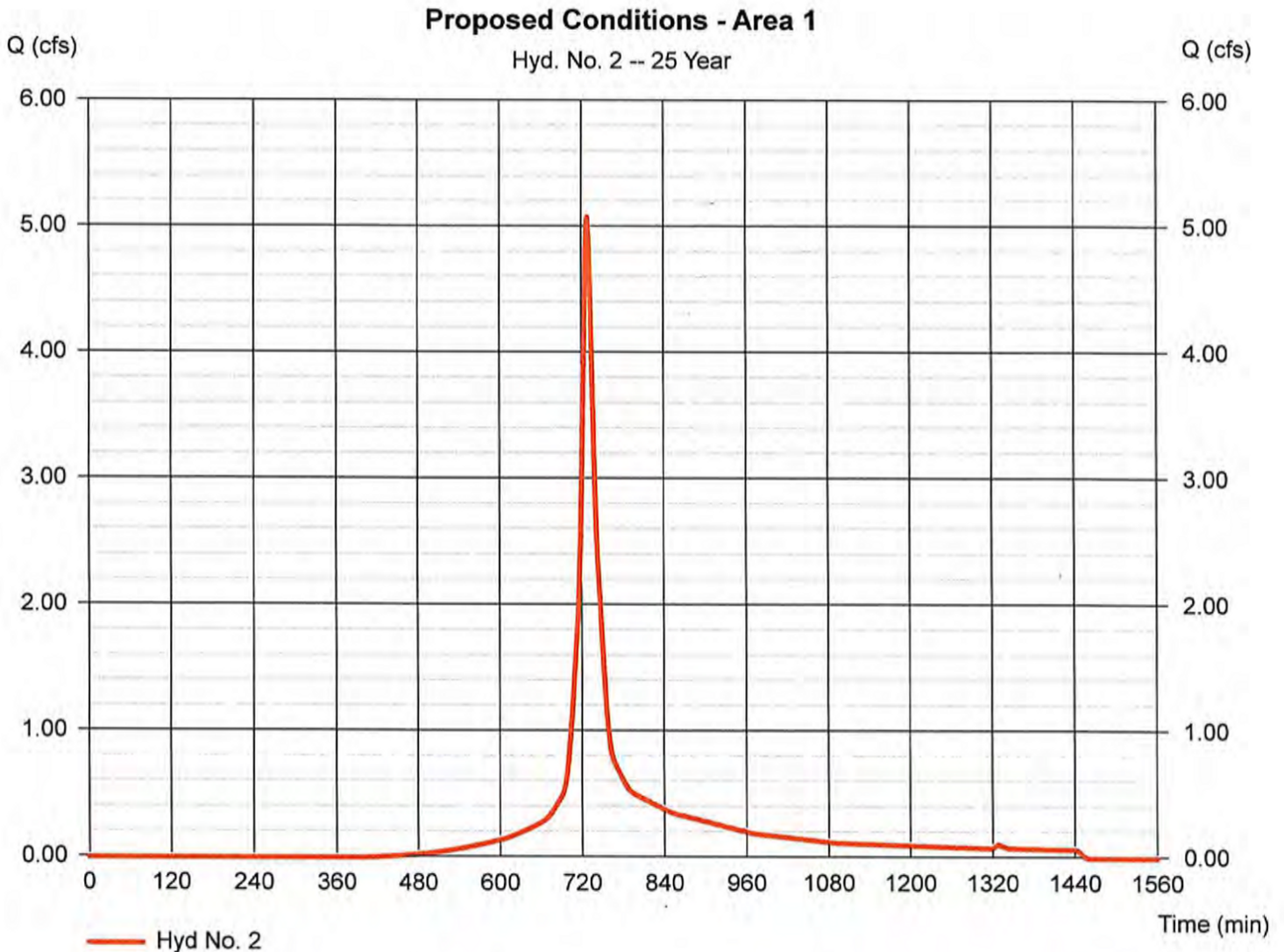
Hyd. No. 2

Proposed Conditions - Area 1

Hydrograph type = SCS Runoff
 Storm frequency = 25 yrs
 Time interval = 1 min
 Drainage area = 1.400 ac
 Basin Slope = 0.0 %
 Tc method = USER
 Total precip. = 6.06 in
 Storm duration = 24 hrs

Peak discharge = 5.084 cfs
 Time to peak = 729 min
 Hyd. volume = 19,187 cuft
 Curve number = 80*
 Hydraulic length = 0 ft
 Time of conc. (Tc) = 13.00 min
 Distribution = Type III
 Shape factor = 484

* Composite (Area/CN) = $[(0.800 \times 98) + (0.600 \times 55)] / 1.400$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

Hyd. No. 3

Stormwater Basin 1

Hydrograph type = Reservoir

Storm frequency = 25 yrs

Time interval = 1 min

Inflow hyd. No. = 2 - Proposed Conditions - Area 1

Reservoir name = Forebay & Stormwater Basin 1

Peak discharge = 0.574 cfs

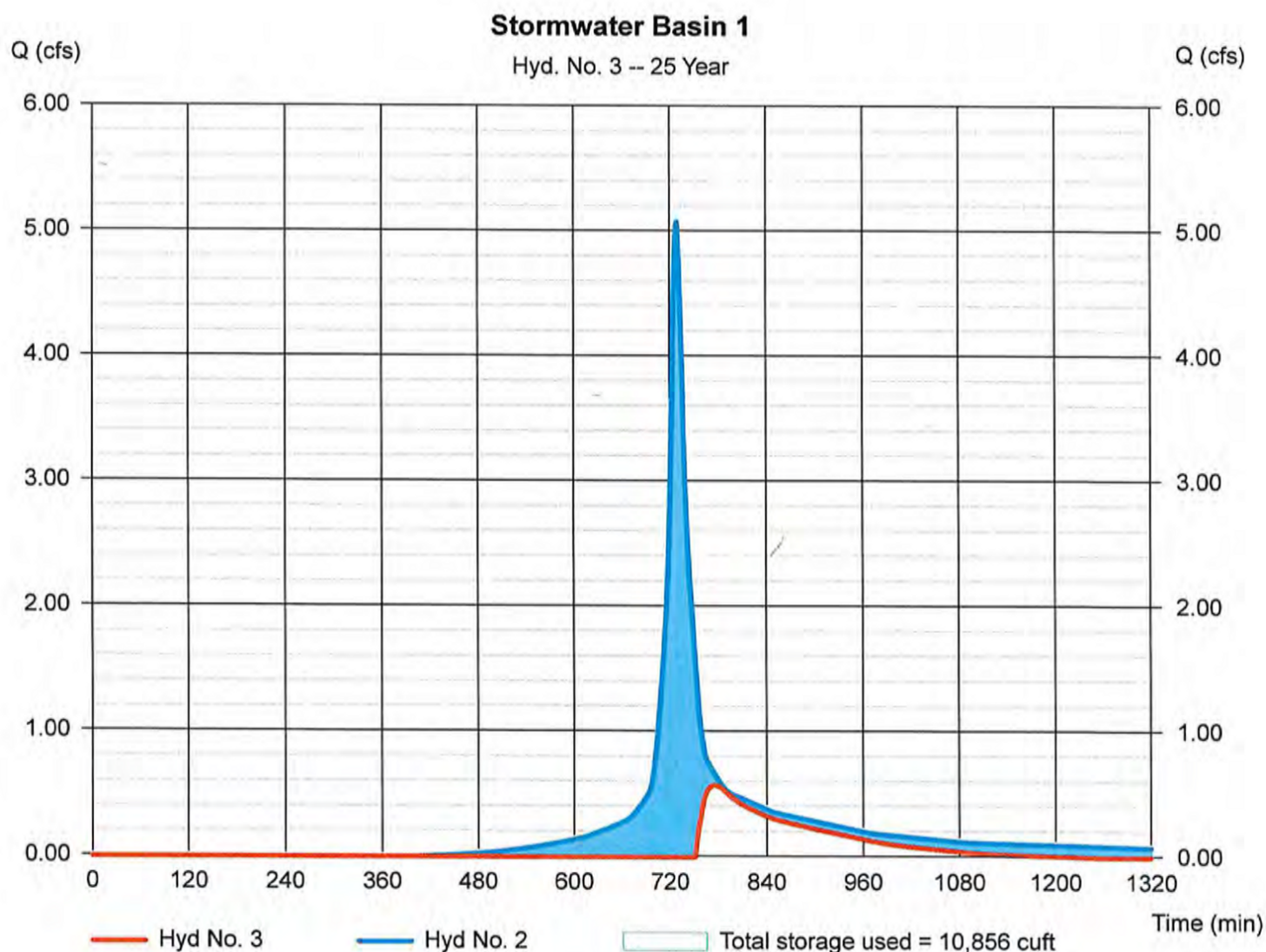
Time to peak = 775 min

Hyd. volume = 4,786 cuft

Max. Elevation = 93.14 ft

Max. Storage = 10,856 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

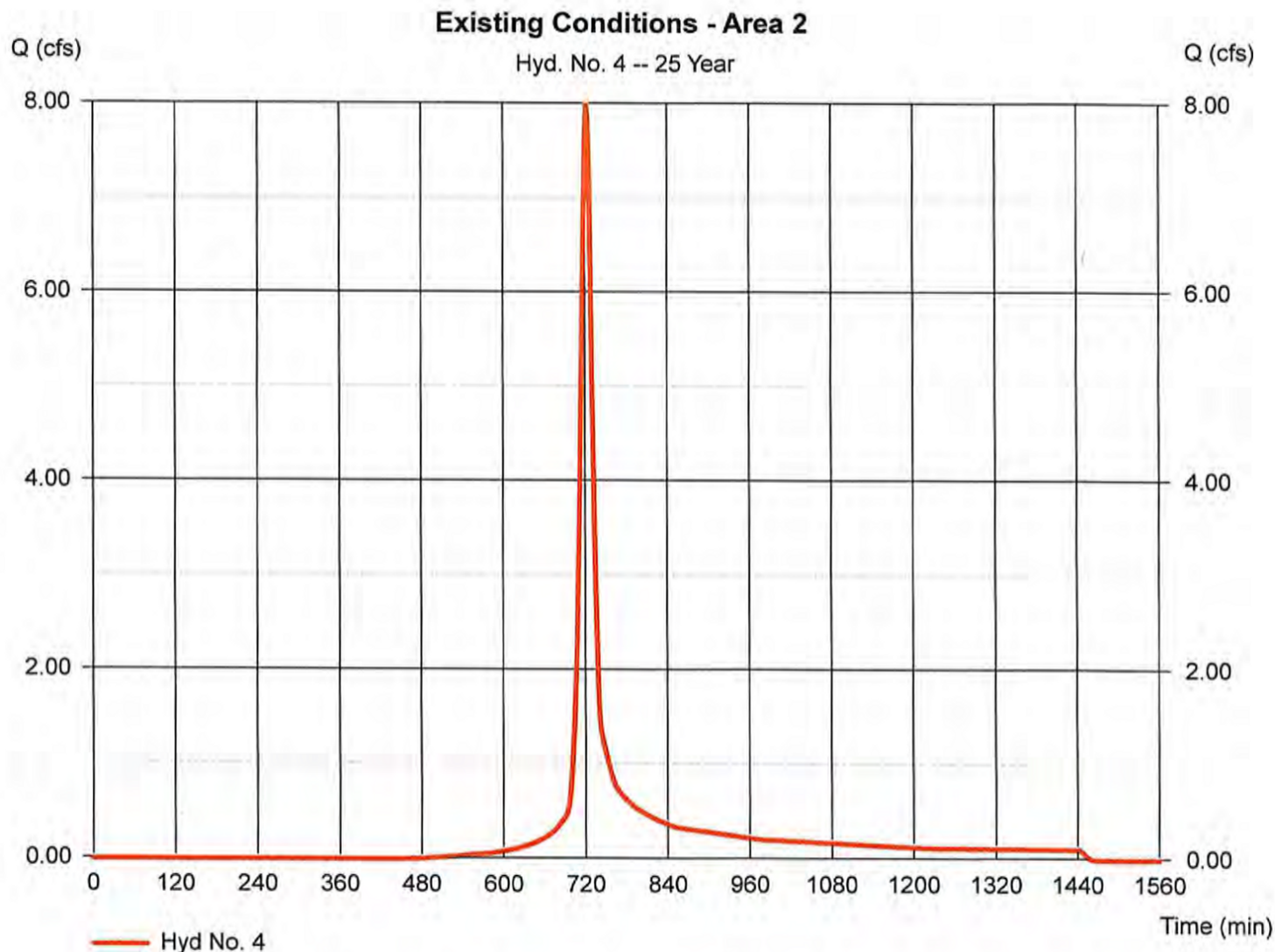
Hyd. No. 4

Existing Conditions - Area 2

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 1.900 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.06 in
Storm duration = 24 hrs

Peak discharge = 7.995 cfs
Time to peak = 722 min
Hyd. volume = 22,415 cuft
Curve number = 75*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(1.000 \times 55) + (0.900 \times 98)] / 1.900$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

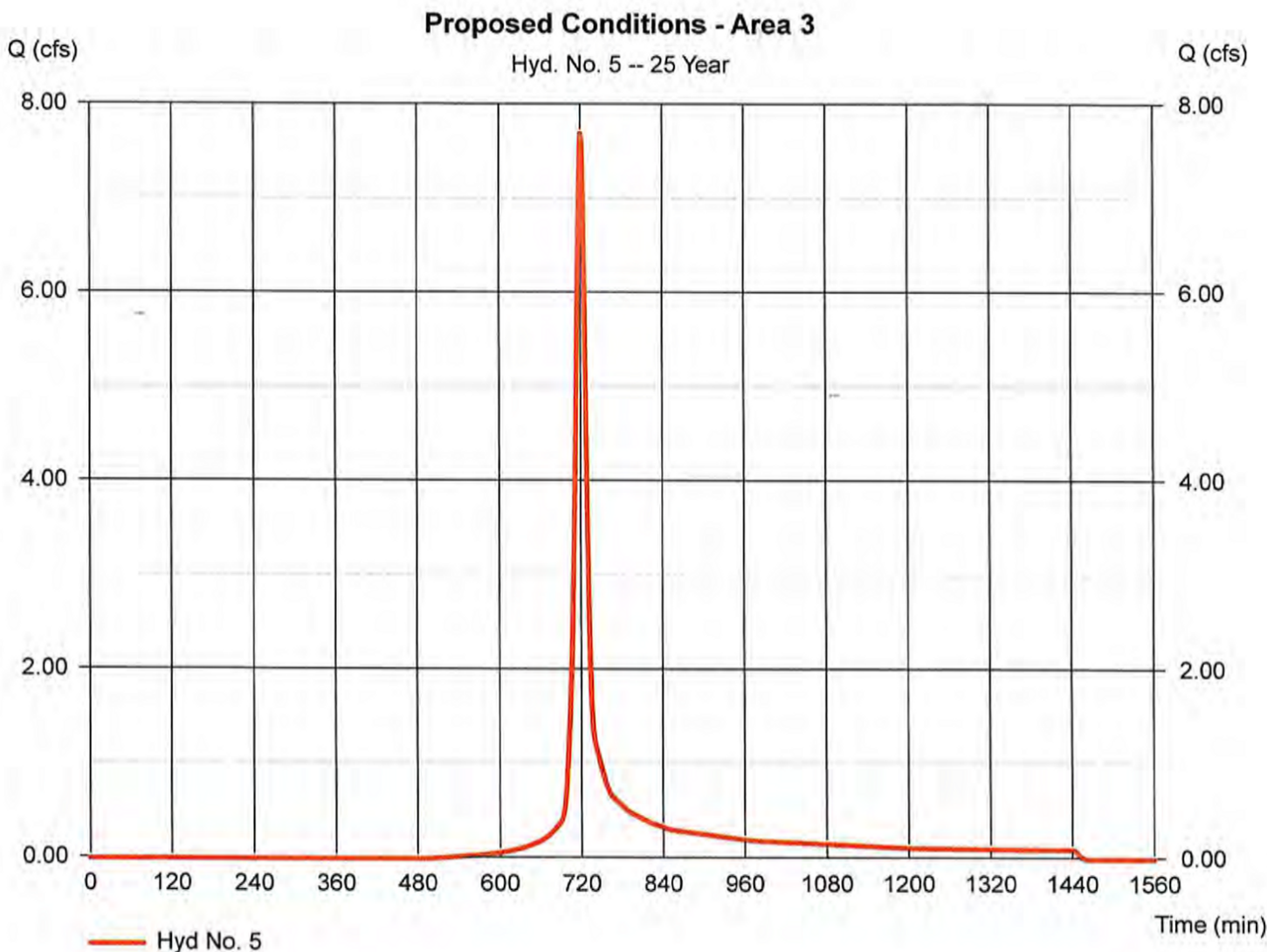
Hyd. No. 5

Proposed Conditions - Area 3

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 1.700 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.06 in
Storm duration = 24 hrs

Peak discharge = 7.702 cfs
Time to peak = 720 min
Hyd. volume = 19,973 cuft
Curve number = 73*
Hydraulic length = 0 ft
Time of conc. (Tc) = 12.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = [(0.700 x 98) + (1.000 x 55)] / 1.700



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

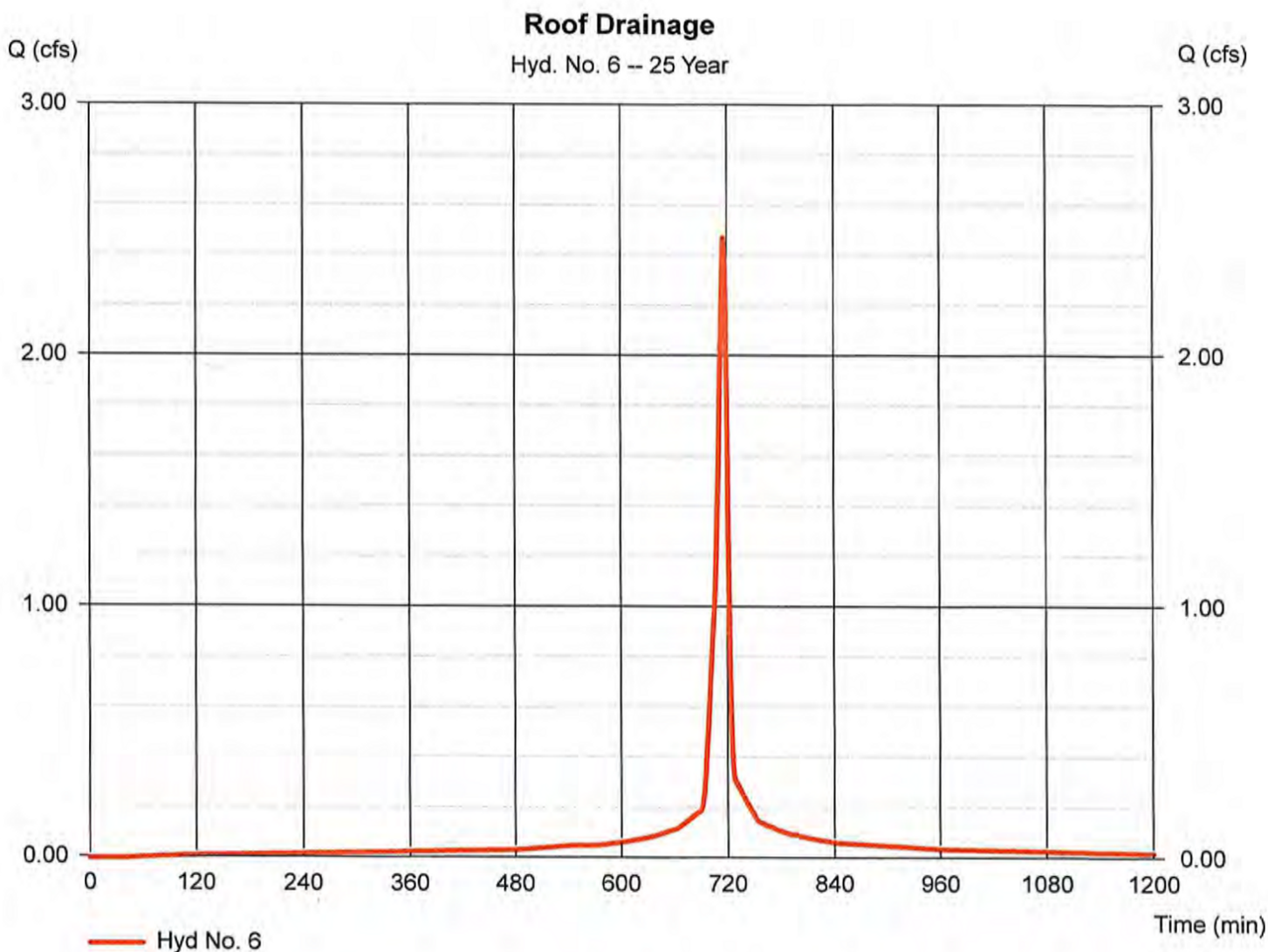
Hyd. No. 6

Roof Drainage

Hydrograph type = SCS Runoff
Storm frequency = 25 yrs
Time interval = 2 min
Drainage area = 0.300 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 6.06 in
Storm duration = 24 hrs

Peak discharge = 2.475 cfs
Time to peak = 716 min
Hyd. volume = 5,944 cuft
Curve number = 98*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(0.300 \times 98)] / 0.300$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

Hyd. No. 7

Roof Infiltration Syst

Hydrograph type = Reservoir (Interconnected)
Storm frequency = 25 yrs
Time interval = 2 min

Upper Pond

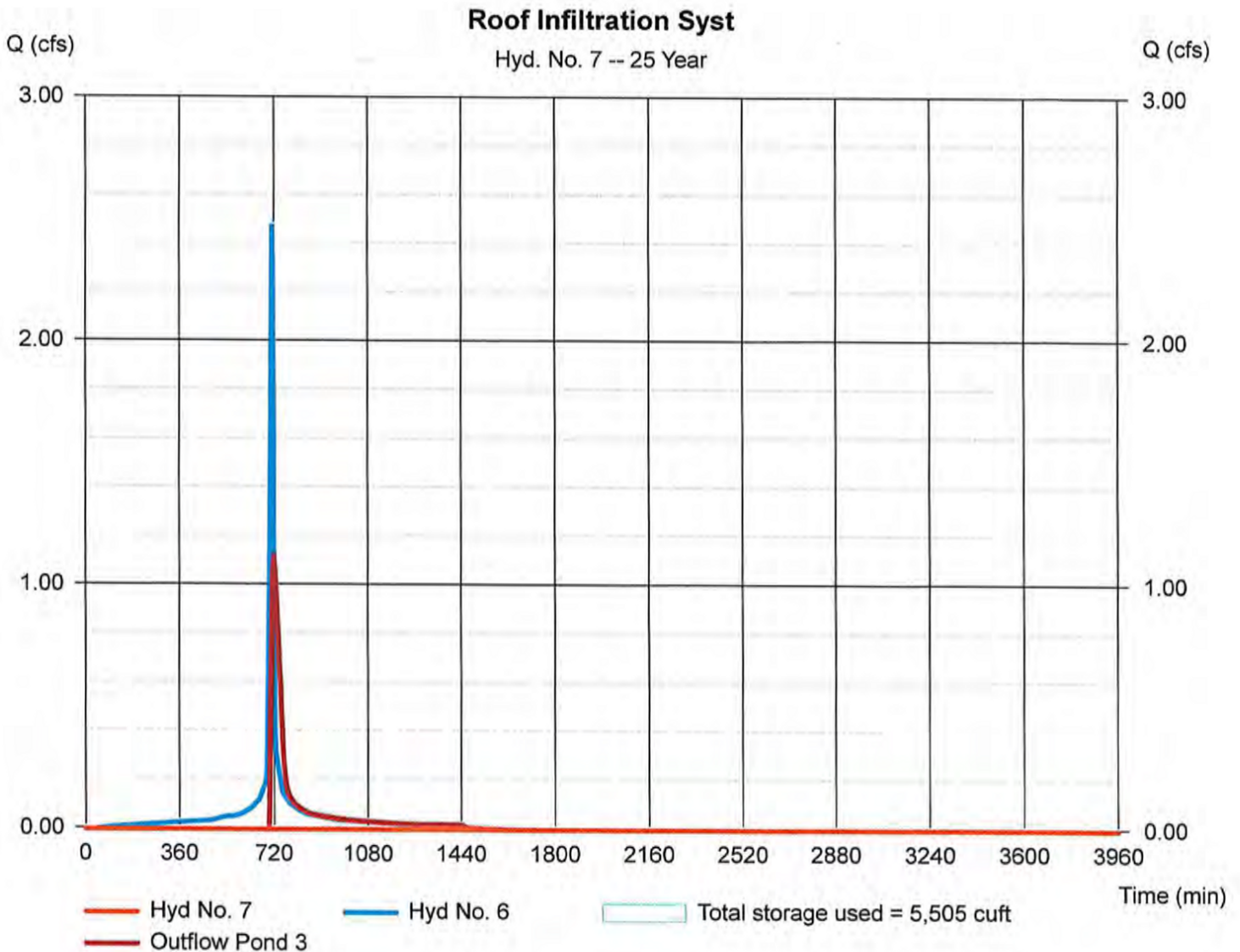
Pond name = Roof Infiltration System
Inflow hyd. = 6 - Roof Drainage
Max. Elevation = 91.16 ft
Max. Storage = 2,970 cuft

Peak discharge = 0.000 cfs
Time to peak = 1006 min
Hyd. volume = 0 cuft

Lower Pond

Pond name = Forebay & Stormwater
Other Inflow hyd. = None
Max. Elevation = 78.49 ft
Max. Storage = 2,536 cuft

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



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

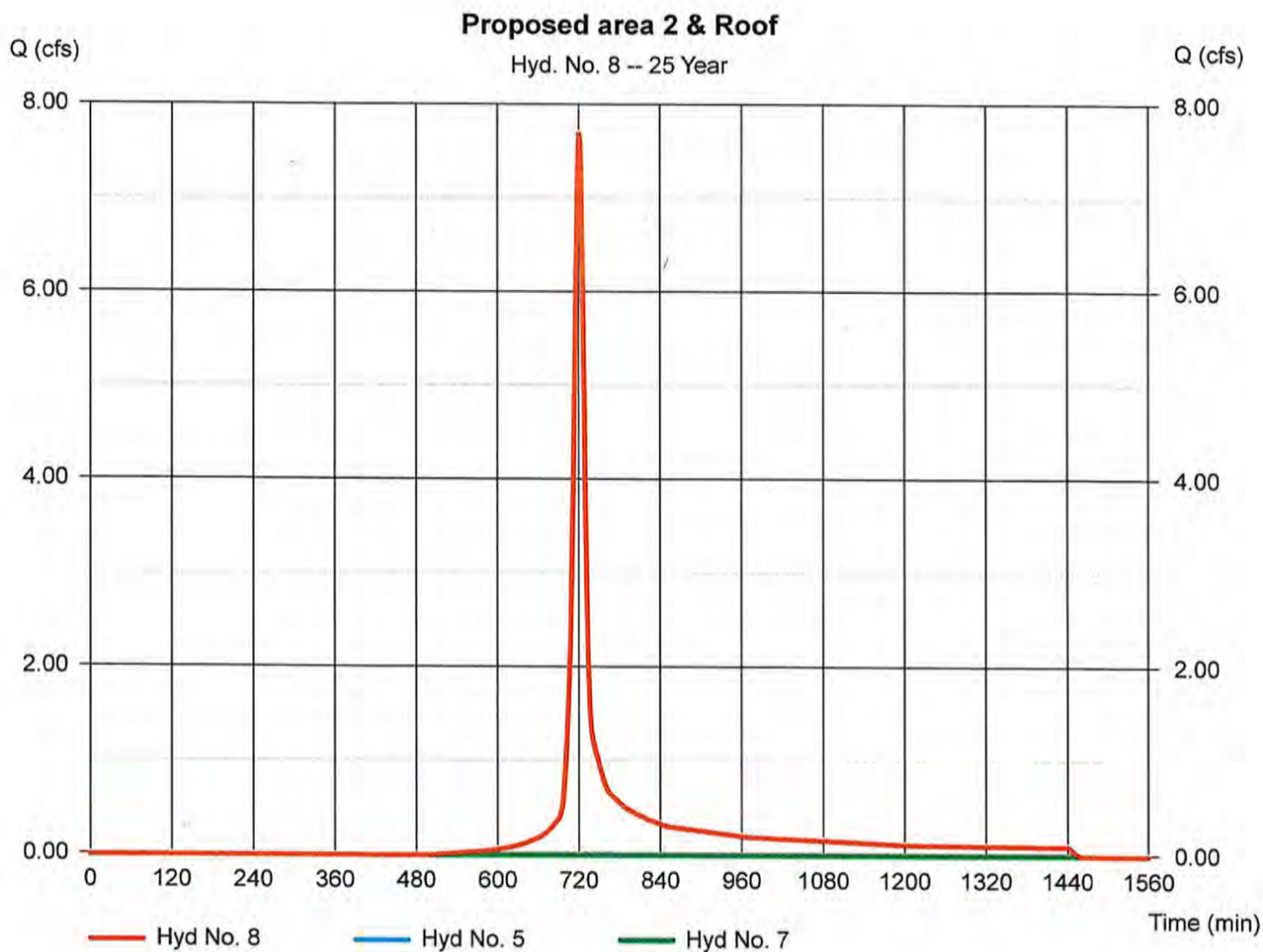
Monday, Oct 9, 2023

Hyd. No. 8

Proposed area 2 & Roof

Hydrograph type = Combine
Storm frequency = 25 yrs
Time interval = 2 min
Inflow hyds. = 5, 7

Peak discharge = 7.702 cfs
Time to peak = 720 min
Hyd. volume = 19,973 cuft
Contrib. drain. area = 1.700 ac



Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

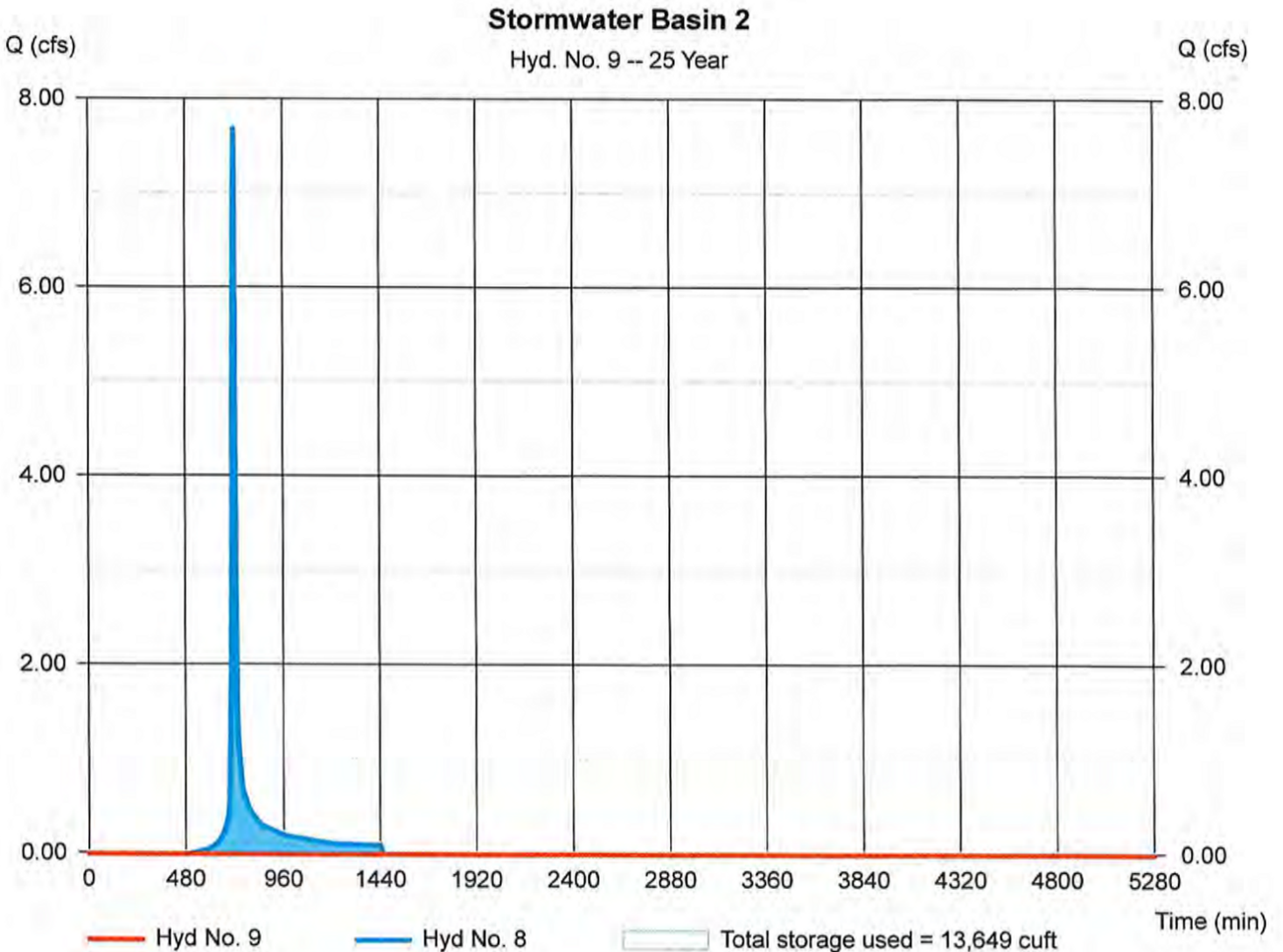
Monday, Oct 9, 2023

Hyd. No. 9

Stormwater Basin 2

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 25 yrs	Time to peak	= 2426 min
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - Proposed area 2 & Roof	Max. Elevation	= 80.31 ft
Reservoir name	= Forebay & Stormwater Basin 2	Max. Storage	= 13,649 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Summary Report

Hydroflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

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	5.503	1	730	22,149	-----	-----	-----	Existing Conditions - Areas 1
2	SCS Runoff	6.980	1	729	26,595	-----	-----	-----	Proposed Conditions - Area 1
3	Reservoir	2.213	1	750	11,812	2	93.54	12,647	Stormwater Basin 1
4	SCS Runoff	11.33	2	722	31,908	-----	-----	-----	Existing Conditions - Area 2
5	SCS Runoff	11.07	2	720	28,756	-----	-----	-----	Proposed Conditions - Area 3
6	SCS Runoff	3.136	2	716	7,586	-----	-----	-----	Roof Drainage
7	Reservoir(i)	0.000	2	860	0	6	91.82	7,131	Roof Infiltration Syst
8	Combine	11.07	2	720	28,756	5, 7	-----	-----	Proposed area 2 & Roof
9	Reservoir	1.054	2	752	6,228	8	80.60	15,793	Stormwater Basin 2
Hotel TR55.gpw					Return Period: 100 Year			Monday, Oct 9, 2023	

Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

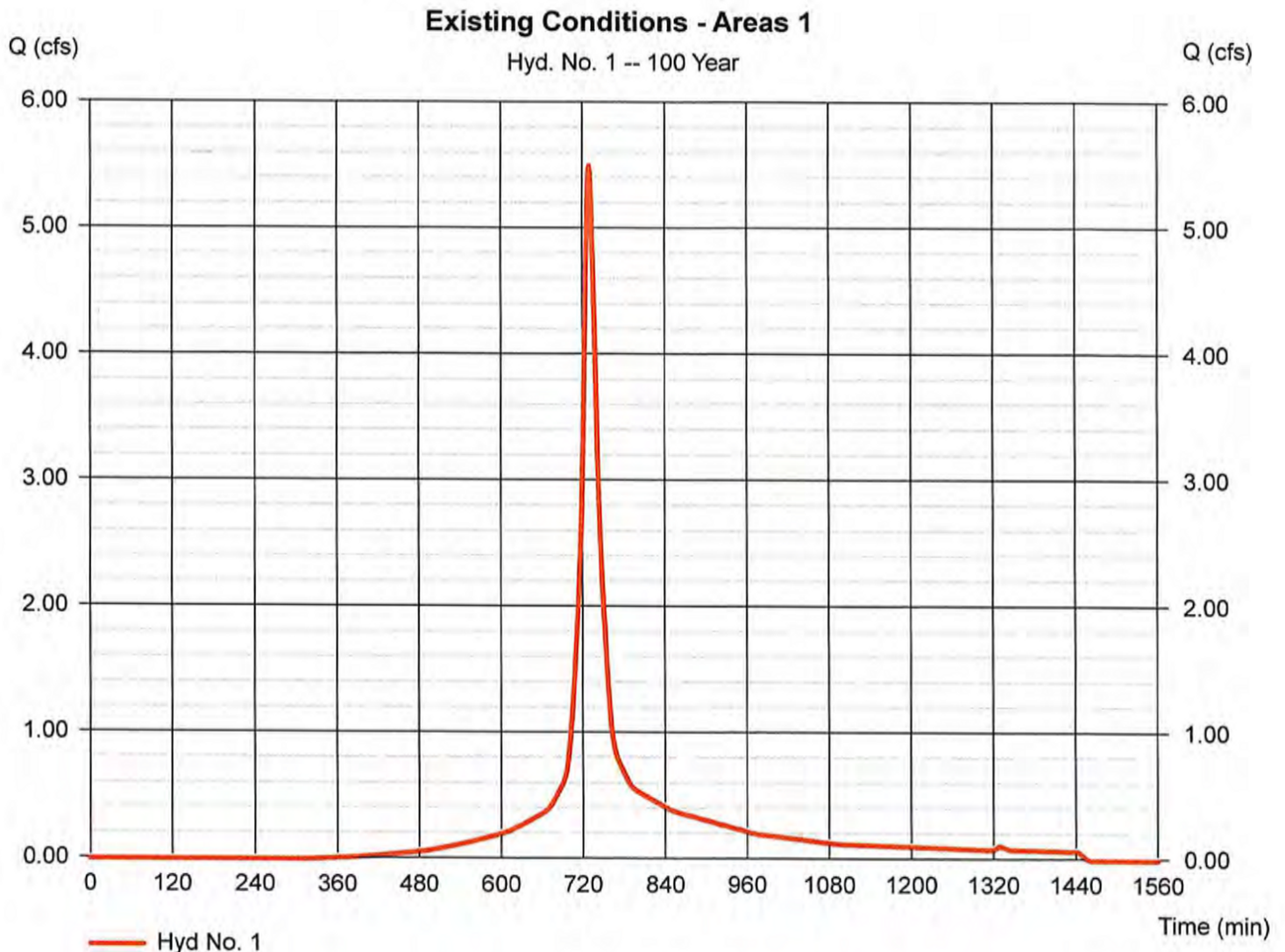
Hyd. No. 1

Existing Conditions - Areas 1

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.100 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.67 in
Storm duration = 24 hrs

Peak discharge = 5.503 cfs
Time to peak = 730 min
Hyd. volume = 22,149 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.400 \times 55) + (0.700 \times 98)] / 1.100$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

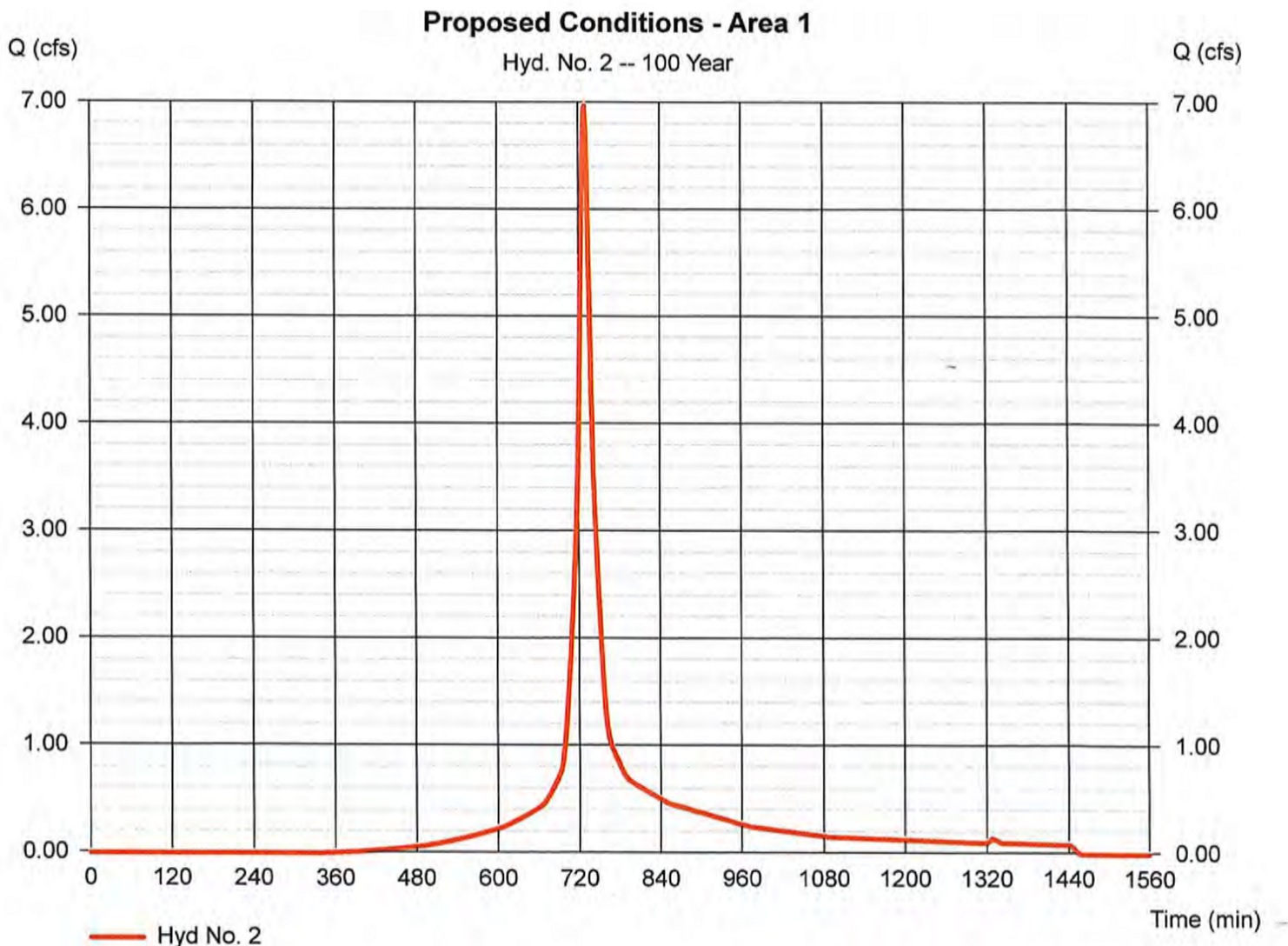
Hyd. No. 2

Proposed Conditions - Area 1

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 1 min
Drainage area = 1.400 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.67 in
Storm duration = 24 hrs

Peak discharge = 6.980 cfs
Time to peak = 729 min
Hyd. volume = 26,595 cuft
Curve number = 80*
Hydraulic length = 0 ft
Time of conc. (Tc) = 13.00 min
Distribution = Type III
Shape factor = 484

* Composite (Area/CN) = $[(0.800 \times 98) + (0.600 \times 55)] / 1.400$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

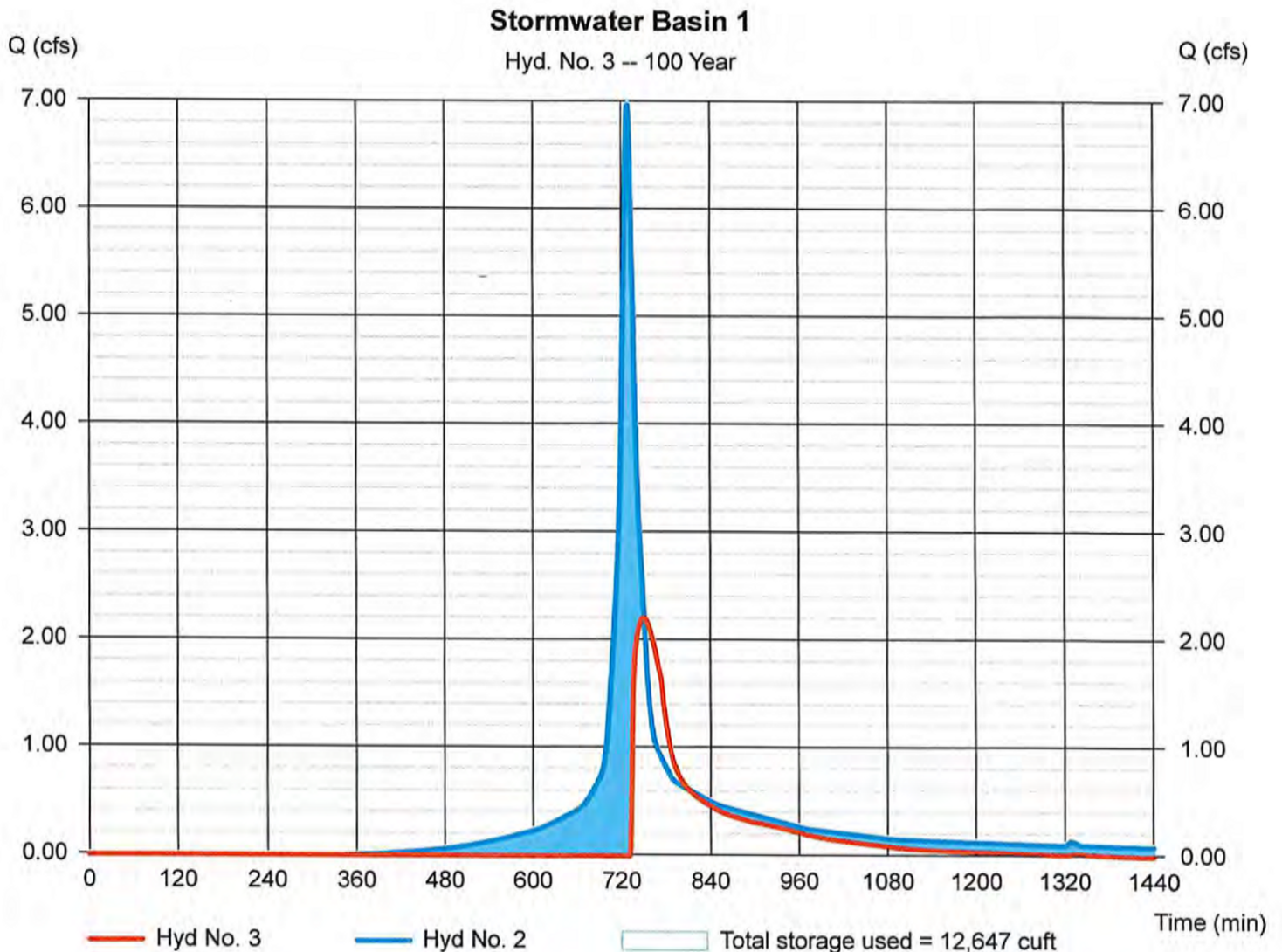
Hyd. No. 3

Stormwater Basin 1

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyd. No. = 2 - Proposed Conditions - Area 1
Reservoir name = Forebay & Stormwater Basin 1

Peak discharge = 2.213 cfs
Time to peak = 750 min
Hyd. volume = 11,812 cuft
Max. Elevation = 93.54 ft
Max. Storage = 12,647 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

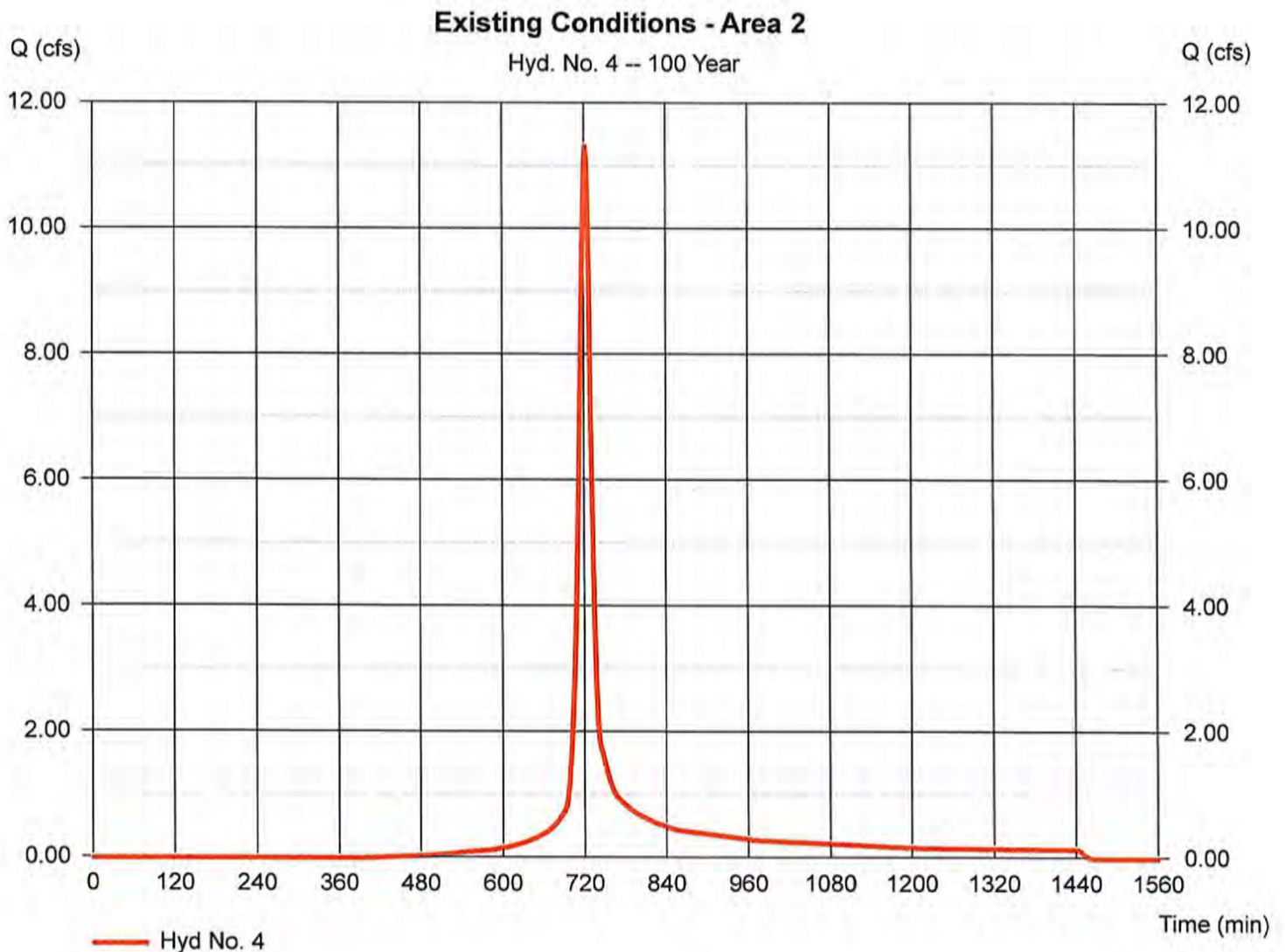
Hyd. No. 4

Existing Conditions - Area 2

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 1.900 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.67 in
Storm duration = 24 hrs

Peak discharge = 11.33 cfs
Time to peak = 722 min
Hyd. volume = 31,908 cuft
Curve number = 75*
Hydraulic length = 0 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(1.000 \times 55) + (0.900 \times 98)] / 1.900$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

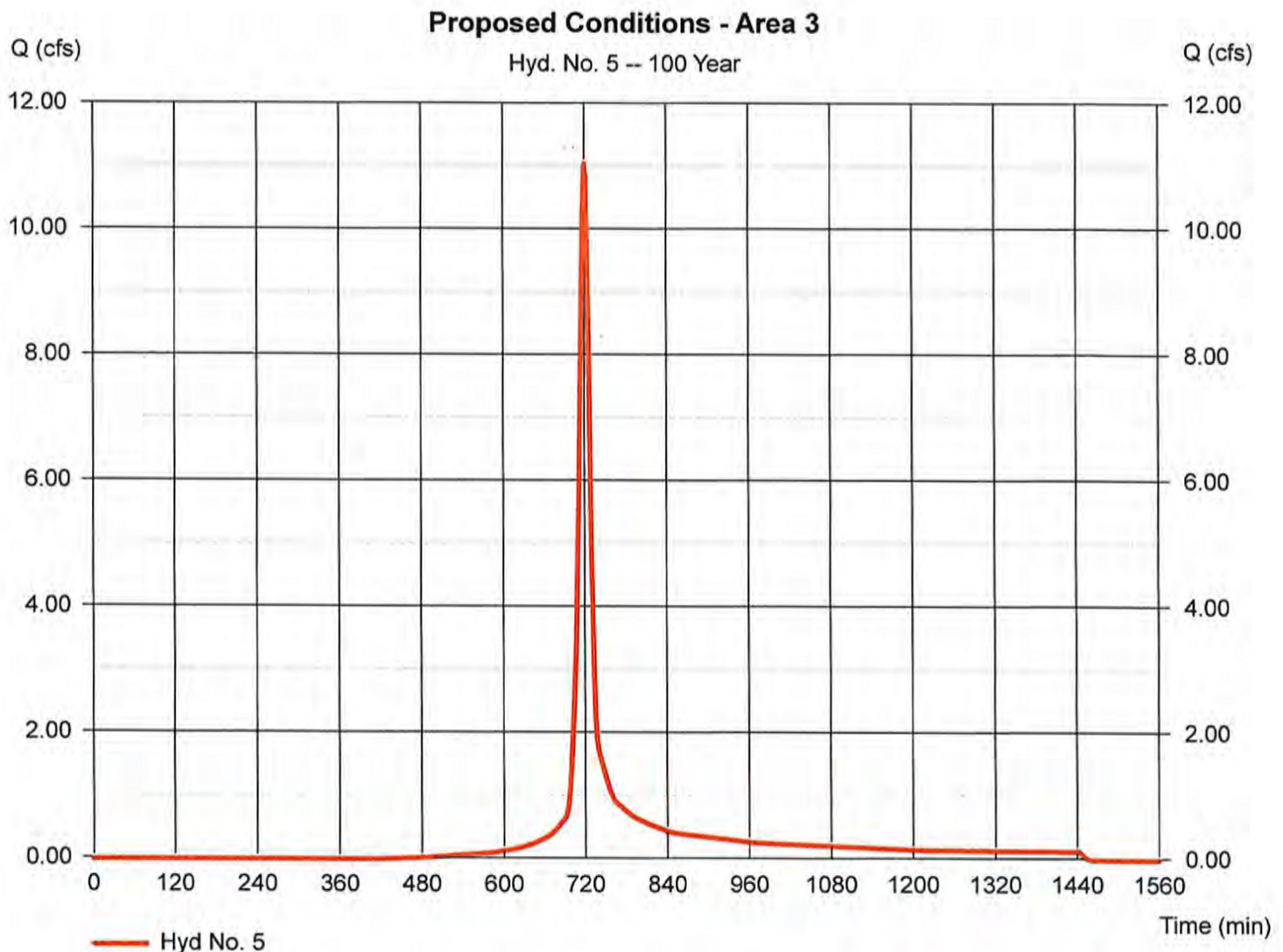
Hyd. No. 5

Proposed Conditions - Area 3

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 1.700 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.67 in
Storm duration = 24 hrs

Peak discharge = 11.07 cfs
Time to peak = 720 min
Hyd. volume = 28,756 cuft
Curve number = 73*
Hydraulic length = 0 ft
Time of conc. (Tc) = 12.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(0.700 \times 98) + (1.000 \times 55)] / 1.700$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

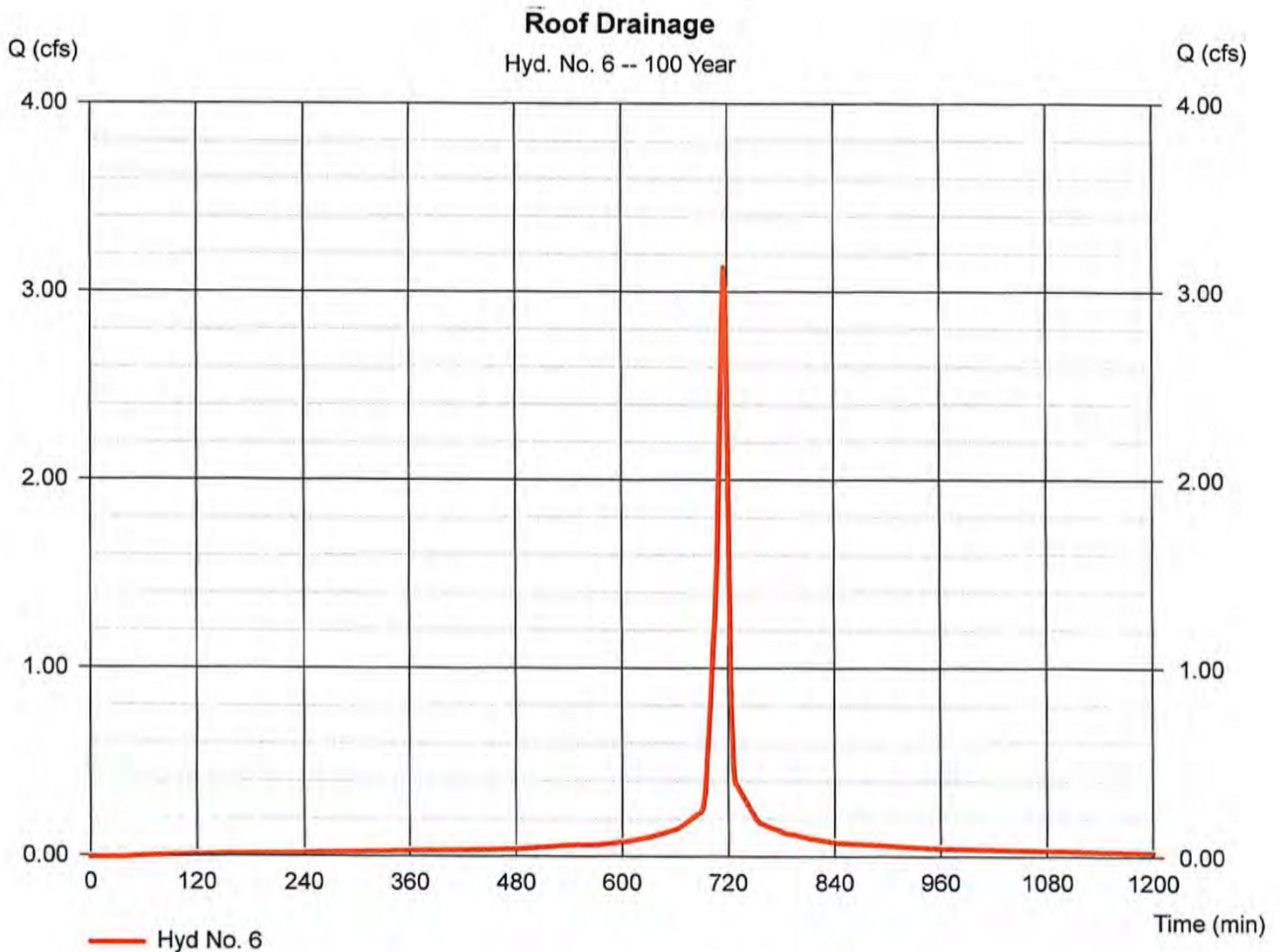
Hyd. No. 6

Roof Drainage

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 0.300 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.67 in
Storm duration = 24 hrs

Peak discharge = 3.136 cfs
Time to peak = 716 min
Hyd. volume = 7,586 cuft
Curve number = 98*
Hydraulic length = 0 ft
Time of conc. (Tc) = 5.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(0.300 \times 98)] / 0.300$



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

Hyd. No. 7

Roof Infiltration Syst

Hydrograph type = Reservoir (Interconnected)
Storm frequency = 100 yrs
Time interval = 2 min

Upper Pond

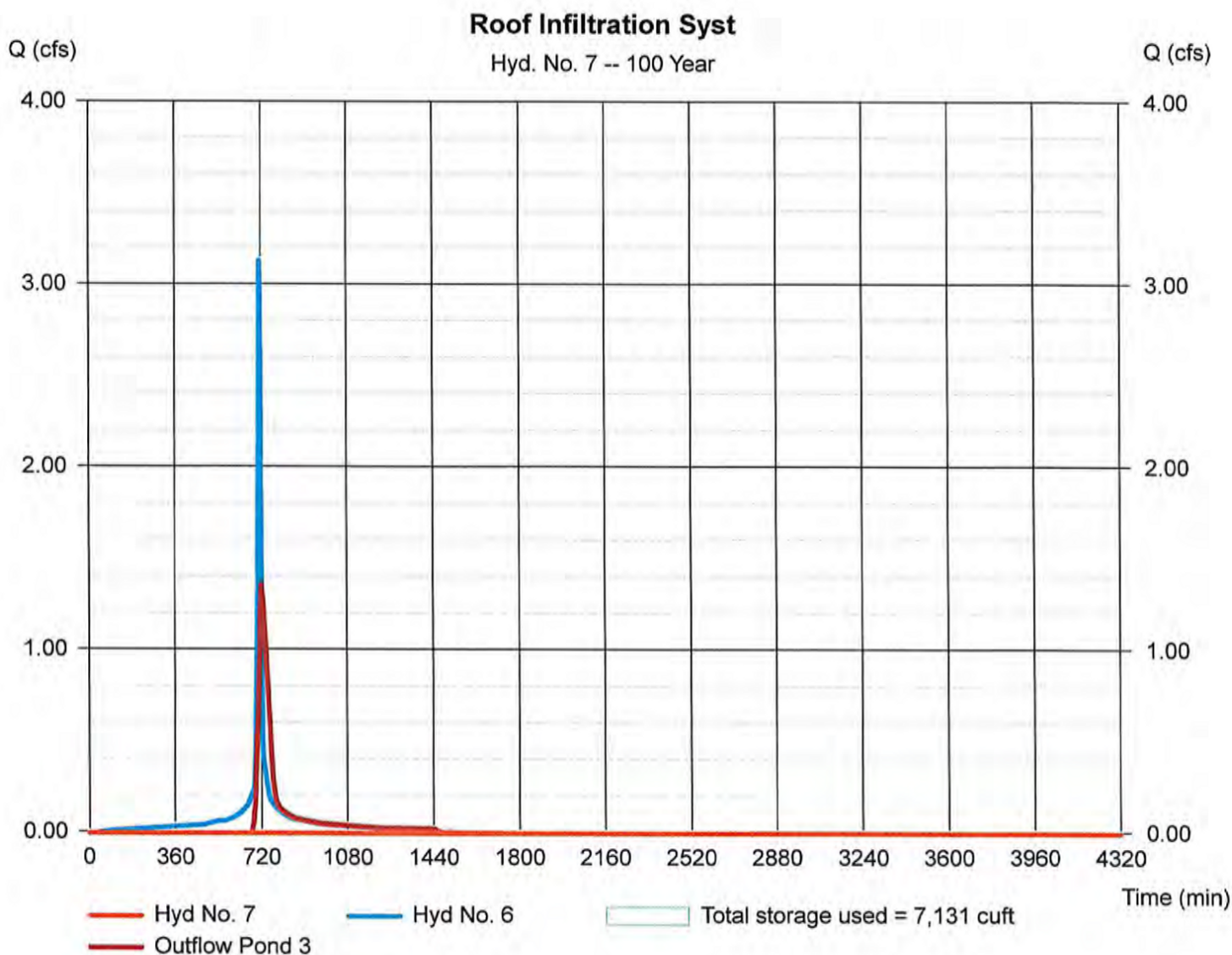
Pond name = Roof Infiltration System
Inflow hyd. = 6 - Roof Drainage
Max. Elevation = 91.82 ft
Max. Storage = 3,471 cuft

Peak discharge = 0.000 cfs
Time to peak = 860 min
Hyd. volume = 0 cuft

Lower Pond

Pond name = Forebay & Stormwater
Other Inflow hyd. = None
Max. Elevation = 78.70 ft
Max. Storage = 3,660 cuft

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



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

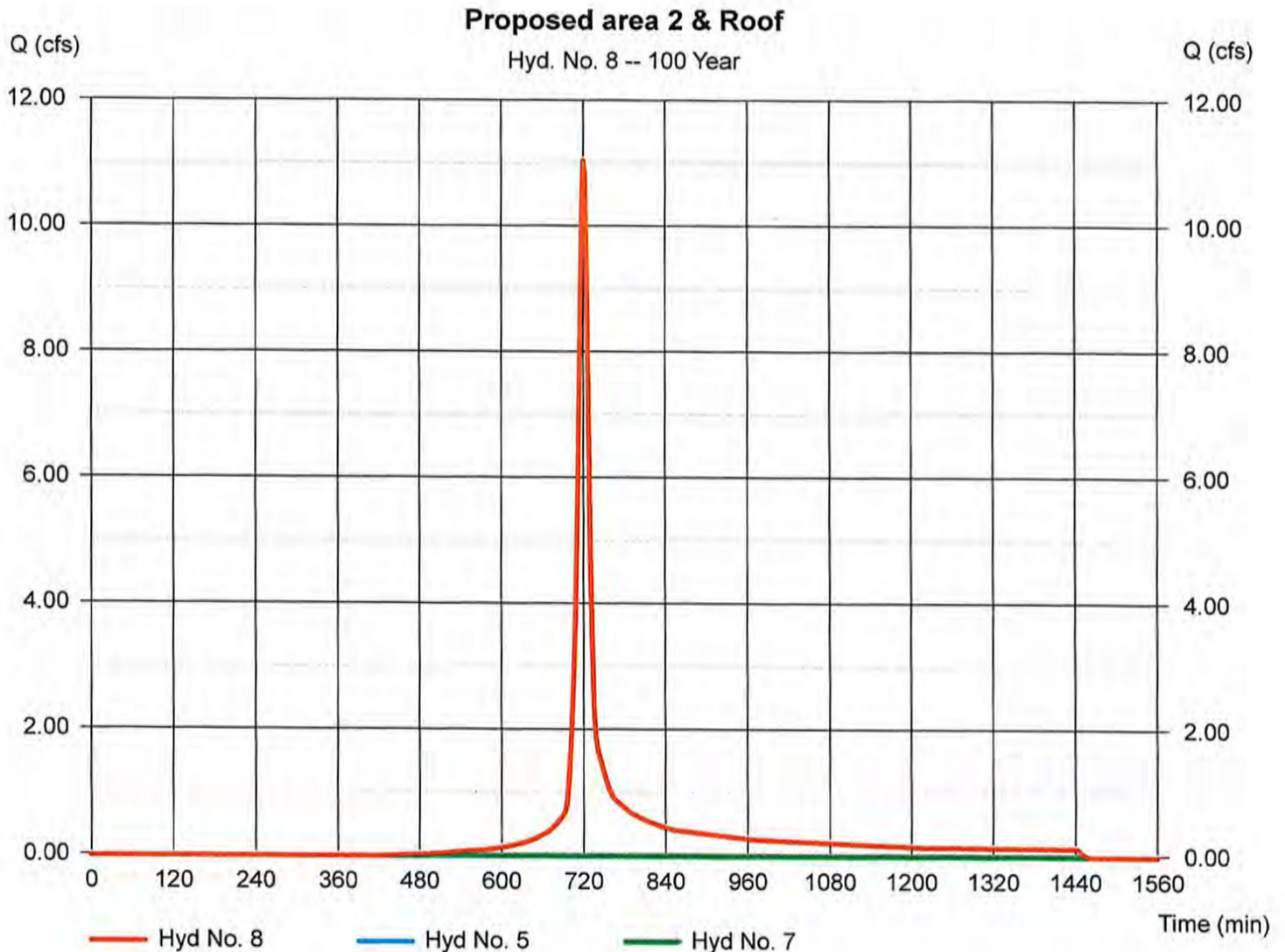
Monday, Oct 9, 2023

Hyd. No. 8

Proposed area 2 & Roof

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyds. = 5, 7

Peak discharge = 11.07 cfs
Time to peak = 720 min
Hyd. volume = 28,756 cuft
Contrib. drain. area= 1.700 ac



Hydrograph Report

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Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. v6.066

Monday, Oct 9, 2023

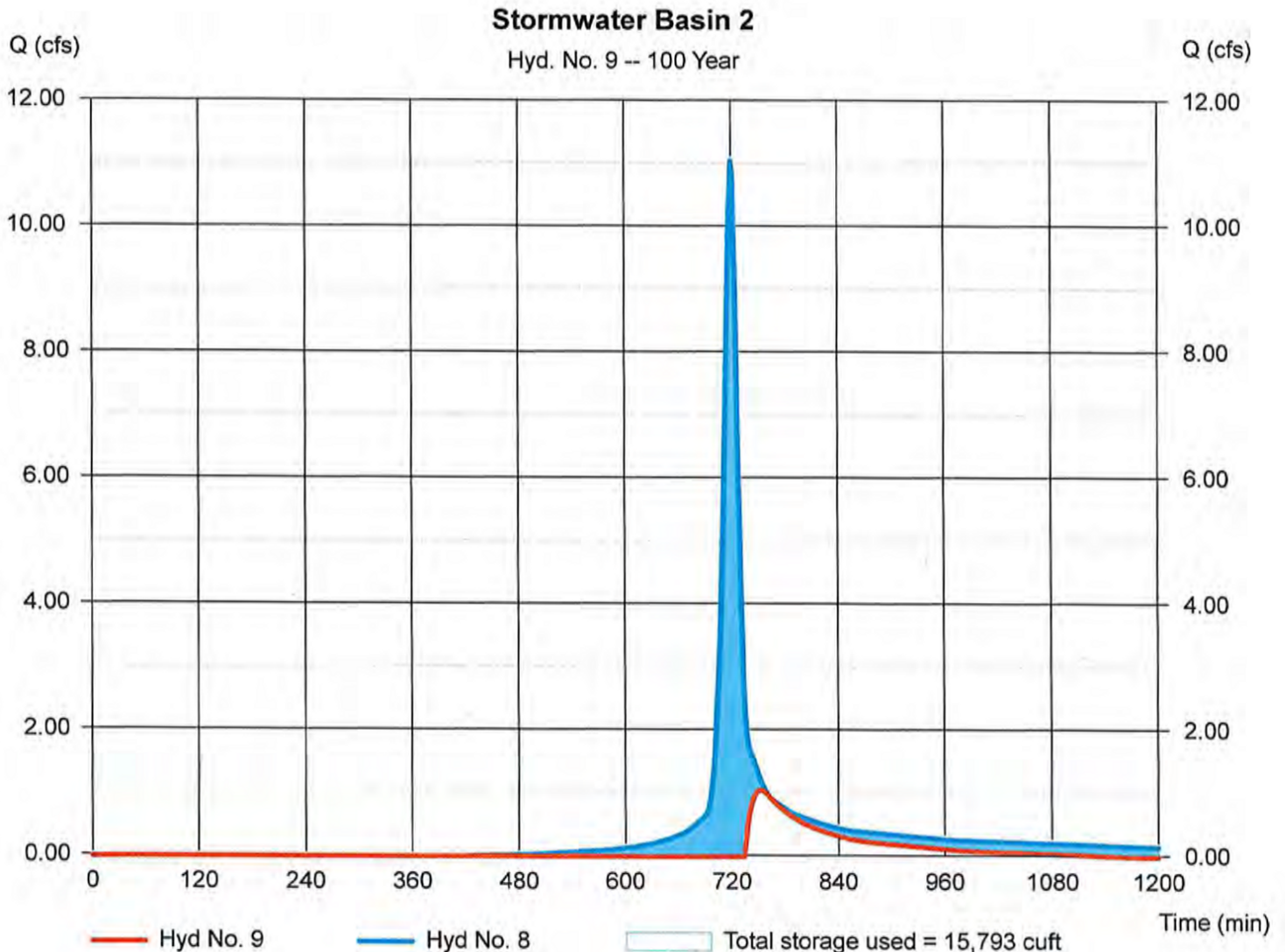
Hyd. No. 9

Stormwater Basin 2

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Time interval = 2 min
Inflow hyd. No. = 8 - Proposed area 2 & Roof
Reservoir name = Forebay & Stormwater Basin 2

Peak discharge = 1.054 cfs
Time to peak = 752 min
Hyd. volume = 6,228 cuft
Max. Elevation = 80.60 ft
Max. Storage = 15,793 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



CLA Engineers, Inc.

Civil • Structural • Survey

317 MAIN STREET

NORWICH, CT 06360

(860) 886-1966

(860) 886-9165 FAX

Permeability of Soils using Compaction Permeameter

Date: 10/8/2023

Project: 296 & 313 Willetts Avenue, Waterford, Ct.

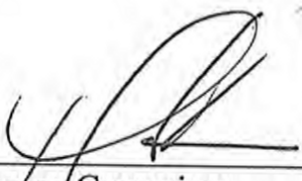
CLA Project #: 7401

Material: On-site material manually extracted

Specification: Compacted to 110.0 lbs/cu ft per Soil Profiles

Sample #1: Test Hole #1 30 to 40 inches

Permeability: 1.67×10^{-3} cm/sec or 4.7 ft/day


Thomas Cummings 10/8/23
PE No. 9606



CLA Engineers, Inc.

Civil • Structural • Survey

317 MAIN STREET

NORWICH, CT 06360

(860) 886-1966

(860) 886-9165 FAX

SIEVE ANALYSIS

Date: 10/5/2023

Project: 286 & 313 Willetts Avenue, Waterford, Ct.

CLA Project #: 7401

Material: Manually Extracted Test Hole

Specification: N/A

Sample Designation: TH 30 to 40 inches

Sieve Size	% Passing
3/4 in	74.0
1/4 in	70.9
#4	69.5
#10	64.6
#20	57.1
#40	45.3
#60	30.5
#100	16.6
#200	4.9



Thomas Cummings
PE No. 9606

9 OCT 23



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