STORMWATER MANAGEMENT REPORT

FOR

SOUTH ORANGE AVENUE REDEVELOPMENT
BLOCK 1006, LOTS 1, 2, 3, 9, 10, 11, 13 & 14
VILLAGE OF SOUTH ORANGE
ESSEX COUNTY, NEW JERSEY

SUBMITTED TO:

VILLAGE OF SOUTH ORANGE

PREPARED FOR:

HUB REALTY, LLC
447 NORTHFIELD AVENUE, SUITE 200
WEST ORANGE, NJ 07052

PREPARED BY:

PETRY ENGINEERING, LLC
155 PASSAIC AVENUE
FAIRFIELD NJ 07004

MARCH 26, 2020
REVISED AUGUST 5, 2020

STORMWATER MANAGEMENT REPORT

FOR

SOUTH ORANGE AVENUE REDEVELOPMENT
BLOCK 1006, LOTS 1, 2, 3, 9, 10, 11, 13 & 14
VILLAGE OF SOUTH ORANGE
ESSEX COUNTY, NEW JERSEY

SUBMITTED TO:

VILLAGE OF SOUTH ORANGE

PREPARED FOR:

HUB REALTY, LLC
447 NORTHFIELD AVENUE, SUITE 200
WEST ORANGE, NJ 07052

PREPARED BY:

PETRY ENGINEERING, LLC
155 PASSAIC AVENUE
FAIRFIELD NJ 07004

MARCH 26, 2020
REVISED AUGUST 5, 2020

J. Michael Petry, PE
NJ PE #36662

INTRODUCTION

The existing site to be redeveloped fronts on South Orange Avenue, Vose Street, Taylor Place & Scotland Road. It consists of 8 tax lots that total 1.403 acres. The properties were previously developed with retail/office space and parking lots. The NRCS web soils survey mapping indicates that there are two types of soil on site. Urban Land Boonton Substratum, red sandstone (URBOOB) and Urban Lan Dunellen Substratum exist onsite, both of which are classified as Hydrologic Group "D" soils.

Lots 1, 2, 3, 9, 10, 11, 13 & 14 are to be combined and a mid-rise structure is to be constructed consisting of retail space, office space, apartments, and parking decks. The proposed development disturbs more than 1 acre, yet does not increase impervious surface by 0.25 acres. These improvements classify the site as a major development. As a result, a proposed stormwater management plan will be required. This plan will need to reduce the preconstruction runoff rates by 50%, 75%, and 80% for the 2, 10, and 100-year storms respectively.

METHODOLOGY

The USDA Natural Resources Conservation Service (NRCS) methodology described in the Technical Release 55 – Urban Hydrology for Small Water Sheds (TR-55) will be used for computing stormwater runoff rates, volumes and hydrographs for both existing and proposed conditions. In computing stormwater runoff from all design storms, the relative stormwater runoff rates and volumes of pervious and impervious surfaces will be analyzed separately. The rainfall distribution used was NOAA Type D. The rainfall-duration-frequency data was taken from the NOAA National Weather Service. Hydraflow Hydrographs Extension 2019 Modeling Software was used to compute the sites pre and post development runoff of the site.

EXISTING CONDITIONS

The site in existing conditions consists primarily of parking lots, buildings, and grass areas. We have reviewed the storm sewer mapping provided by the Village and spilt the site into two drainage areas. The northeastern portion of the site drains down Taylor Place and discharges into a catch basin that flow north of Vose Avenue. The southwestern portion of the site drains onto Vose Avenue and South Orange Avenue, meeting at the catch basins off Vose Avenue and heading west. The existing site was modeled using two (2) drainage areas consisting of 0.537 acres for drainage area one and 0.866 acres for drainage area two. *(See Existing Drainage Area Map)* The two drainage areas were then combined to determine the total runoff offsite. The total runoff, an area of 1.403 acres, was used during the proposed reduction calculations.

Based on the soils map provided, there are two soils types on site, URBOOB and URDUNB. While Web Soil Survey does not provide an HSG, the Soil Survey of Essex County Does. It lists the HSG for both as "D". (See attached.) Furthermore, Table 1 in appendix E allows you to assume that the soil group, outside of the coastal plain, pre-development is group "B", and post-development is group "D". The site is currently improved upon and therefore would be considered as group "D". The group "B" would only apply if the land was in its natural state.

Drainage Area 1 (DA 1, Pervious)
Drainage Area 1 (Pervious Areas) consists of 0.053 acres with a composite CN value of 80 (Open Spaces-Lawn, Good). Slopes in this area are between 2 to 9%. This area presently drains to Taylor Place and flows down to the Vose Avenue catch basins. A Tc of 10 minutes will be used, which is reflective of the existing land cover and slopes on the site.

Drainage Area 1 (DA 1, Impervious)
Drainage Area 1 (Impervious Areas) consists of 0.484 acres with a CN value of 98 (Paved Parking Lots and Roofs). Slopes in this area range from 2% to 5%. This area presently drains to Taylor Place and flows down to the Vose Avenue catch basins. A Tc of 10 minutes will be used, which is reflective of the existing land cover and slopes on the site.

Drainage Area 2 (DA 2, Pervious)
Drainage Area 2 (Pervious Areas) consists of 0.062 acres with a composite CN value of 80 (Open Spaces-Lawn, Good). Slopes in this area are between 2 to 44%. This area presently drains to catch basins located near the intersection of Vose Avenue and South Orange Avenue and then heads west. A Tc of 10 minutes will be used, which is reflective of the existing land cover and slopes on the site.

Drainage Area 2 (DA 2, Impervious)
Drainage Area 2 (Impervious Areas) consists of 0.804 acres with a CN value of 98 (Paved Parking Lots and Roofs). Slopes in this area range from 2% to 5%. This area presently drains to catch basins located near the intersection of Vose Avenue and South Orange Avenue and then heads west. A Tc of 10 minutes will be used, which is reflective of the existing land cover and slopes on the site.

Post-Development Target Runoff
The CN values used have been taken from the TR-55 Manual "Urban Hydrology for Small Watersheds", Table 2-2a Runoff Curve Numbers for Urban Areas. For Open Spaces-Lawn (CN 80), and Paved Parking Lots and Roofs (CN 98), all for Hydrologic Soil Group D Soils. Since the site is considered a major development, proposed runoff rates shall be reduced from the preconstruction runoff rates by 50%, 75% and 80%. The total offsite runoff, a combination of drainage area one and two, was used for these calculations.

Table 1 – Target Runoff Rates

Storm Event (Yr.)	Existing Runoff Rates (cfs)	Total Post-Development Target Runoff (cfs)
2 Year	3.017 cfs	1.508 cfs
10 Year	4.703 cfs	3.527 cfs
100 Year	8.009 cfs	6.407 cfs

PROPOSED CONDITIONS

Improvements to the site will consist of the construction of a mid-rise building that will contain residential, retail, and office space while providing two levels of parking decks. The subsurface detention system will attenuate the flows from the site improvements.

The same 1.403-acre drainage area was used to analyze proposed conditions runoff (*See Proposed Drainage Area Map*). Every attempt was made to keep the proposed drainage patterns similar to those of the existing conditions where possible. The drainage areas are described below:

Drainage Area 1 (DA 1), To Detention System

Drainage Area 1 consists of the total area that drains into the detention system located under the parking deck, parallel to Vose Avenue. It includes a majority of the impervious areas on site, capturing 0.955 acres of roof area. A Tc of 10 minutes will be used, which is the minimum time of concentration for the Type D storm distribution.

Drainage Area 2 (DA 2), Bypass

A small portion of the building, fronting on South Orange Avenue, will bypass the Detention Basin. The total area of Drainage Area 2 consists of 0.448 acres of roof areas. Again, a Tc of 10 minutes will be used, which is the minimum time of concentration for the Type D storm distribution.

WATER QUANTITY

In order to meet the runoff requirements for the 2, 10 and 100-year storm events, a detention system was incorporated for water quantity.

Detention System

This detention system will contain 5,472 cubic feet of storage contained in 3' diameter pipes. It will be used for water quantity. The bottom elevation of the 3' Diameter HDPE pipe is at elevation 150.50, and the bottom of the stone encasement is at elevation 150.00. The system consists of three 250-foot lengths of 3' diameter pipe (w/ headers), with one and a half feet of clean crushed stone on each side of the system and half a foot of clean crushed stone on the bottom, and one foot of clean crushed stone on the top of the system. Filter fabric surrounds the stone encasement on each side and the top. The site is located within a Metropolitan Planning Area, therefore, no groundwater recharge is required.

The bottom of the basin will be set at elevation 150.50 while Outlet Structure #1 will have three 2.5" orifices at elevation 150.50, a 6" x 20" rectangular orifice at elevation 152.00 and a 4' wide overflow weir at elevation 153.17.

An 18" pipe is proposed as the outflow pipe for the detention system. This will serve as the emergency spillway for the underground detention. While a 15" pipe did have the capacity to carry the peak 100-year storm routed flow, it was just barely able to hold the capacity. An 18"

will be able to carry to routed and non-routed flows, providing extra capacity for the spillway so backup does not occur in the building if the detention system is completely filled with water.

The CN value used for proposed conditions have been taken from the TR-55 Manual "Urban Hydrology for Small Watersheds", Table 2-2a for Paved Parking Lots, Roofs, Driveways (CN 98), as the entire site will be impervious in proposed conditions. As a result of the proposed design, the water quantity requirements for the proposed development have been met. See Table 2 below:

Table 2 – Proposed Target Runoff Rate Comparisons

Storm Event (Yr.)	Total Post-Development Target Runoff (cfs)	Total Proposed Runoff (cfs)
2 Year	1.508 cfs	1.491 cfs
10 Year	3.527 cfs	3.203 cfs
100 Year	6.407 cfs	6.366 cfs

WATER RECHARGE & QUALITY

South Oranges' Stormwater Control Ordinance 185-102 states that groundwater recharge is not required for projects within the Urban Redevelopment area, which this site is located in. It goes further to state that runoff quality standards are not required unless ¼ acre of impervious surface is being proposed, which is not in this case.

GROUNDWATER

A report prepared by Geotechnical Engineering Services, PC has determined that the groundwater in the vicinity of the detention basin is at roughly elevation 136.9. This is roughly 13.5 feet below the proposed system.

DRAIN TIMES

The drainage time of the system is below 72 hours:

Detention System – Drains in 26.00 hrs.

See attached Elevation vs Time Hydrographs for more information.

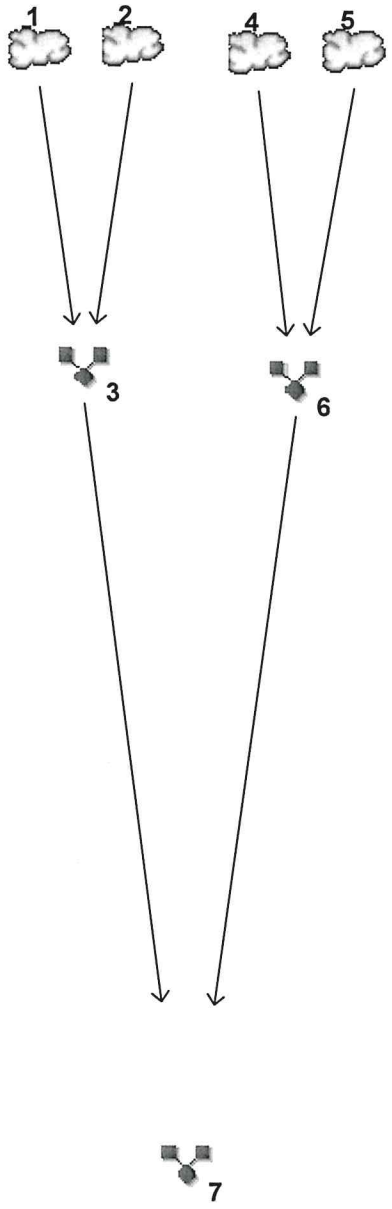
CONCLUSION

To summarize, a stormwater management strategy has been incorporated to satisfy water quantity requirements of the Village of South Orange. The flows have been controlled such that

the water runoff is 50%, 75% and 80% of the preconstruction runoff rates for the 2, 10- and 100-year storms.

HYDROGRAPH
EXISTING CONDITIONS

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	DA1 Pervious
2	SCS Runoff	DA1 Impervious
3	Combine	<no description>
4	SCS Runoff	DA2 Pervious
5	SCS Runoff	DA2 Impervious
6	Combine	<no description>
7	Combine	<no description>

Hydraflow Table of Contents

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 03 / 20 / 2020

Watershed Model Schematic 1

Hydrograph Return Period Recap 2

2 - Year

Summary Report 3
Hydrograph Reports 4
Hydrograph No. 1, SCS Runoff, DA1 Pervious 4
Hydrograph No. 2, SCS Runoff, DA1 Impervious 5
Hydrograph No. 3, Combine, <no description> 6
Hydrograph No. 4, SCS Runoff, DA2 Pervious 7
Hydrograph No. 5, SCS Runoff, DA2 Impervious 8
Hydrograph No. 6, Combine, <no description> 9
Hydrograph No. 7, Combine, <no description> 10

10 - Year

Summary Report 11
Hydrograph Reports 12
Hydrograph No. 1, SCS Runoff, DA1 Pervious 12
Hydrograph No. 2, SCS Runoff, DA1 Impervious 13
Hydrograph No. 3, Combine, <no description> 14
Hydrograph No. 4, SCS Runoff, DA2 Pervious 15
Hydrograph No. 5, SCS Runoff, DA2 Impervious 16
Hydrograph No. 6, Combine, <no description> 17
Hydrograph No. 7, Combine, <no description> 18

25 - Year

Summary Report 19
Hydrograph Reports 20
Hydrograph No. 1, SCS Runoff, DA1 Pervious 20
Hydrograph No. 2, SCS Runoff, DA1 Impervious 21
Hydrograph No. 3, Combine, <no description> 22
Hydrograph No. 4, SCS Runoff, DA2 Pervious 23
Hydrograph No. 5, SCS Runoff, DA2 Impervious 24
Hydrograph No. 6, Combine, <no description> 25
Hydrograph No. 7, Combine, <no description> 26

100 - Year

Summary Report 27
Hydrograph Reports 28
Hydrograph No. 1, SCS Runoff, DA1 Pervious 28
Hydrograph No. 2, SCS Runoff, DA1 Impervious 29
Hydrograph No. 3, Combine, <no description> 30
Hydrograph No. 4, SCS Runoff, DA2 Pervious 31
Hydrograph No. 5, SCS Runoff, DA2 Impervious 32
Hydrograph No. 6, Combine, <no description> 33

Hydrograph No. 7, Combine, <no description>..... 34

IDF Report..... 35

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.065	-------	-------	0.129	0.175	-------	0.260	DA1 Pervious
2	SCS Runoff	------	-------	1.080	-------	-------	1.662	2.064	-------	2.798	DA1 Impervious
3	Combine	1, 2	-------	1.146	-------	-------	1.791	2.239	-------	3.058	<no description>
4	SCS Runoff	------	-------	0.077	-------	-------	0.151	0.205	-------	0.304	DA2 Pervious
5	SCS Runoff	------	-------	1.795	-------	-------	2.761	3.428	-------	4.648	DA2 Impervious
6	Combine	4, 5	-------	1.871	-------	-------	2.912	3.633	-------	4.951	<no description>
7	Combine	3, 6	-------	3.017	-------	-------	4.703	5.871	-------	8.009	<no description>

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.065	6	732	279	------	------	------	DA1 Pervious
2	SCS Runoff	1.080	6	732	5,200	------	------	------	DA1 Impervious
3	Combine	1.146	6	732	5,479	1, 2	------	------	<no description>
4	SCS Runoff	0.077	6	732	327	------	------	------	DA2 Pervious
5	SCS Runoff	1.795	6	732	8,637	------	------	------	DA2 Impervious
6	Combine	1.871	6	732	8,964	4, 5	------	------	<no description>
7	Combine	3.017	6	732	14,443	3, 6	------	------	<no description>

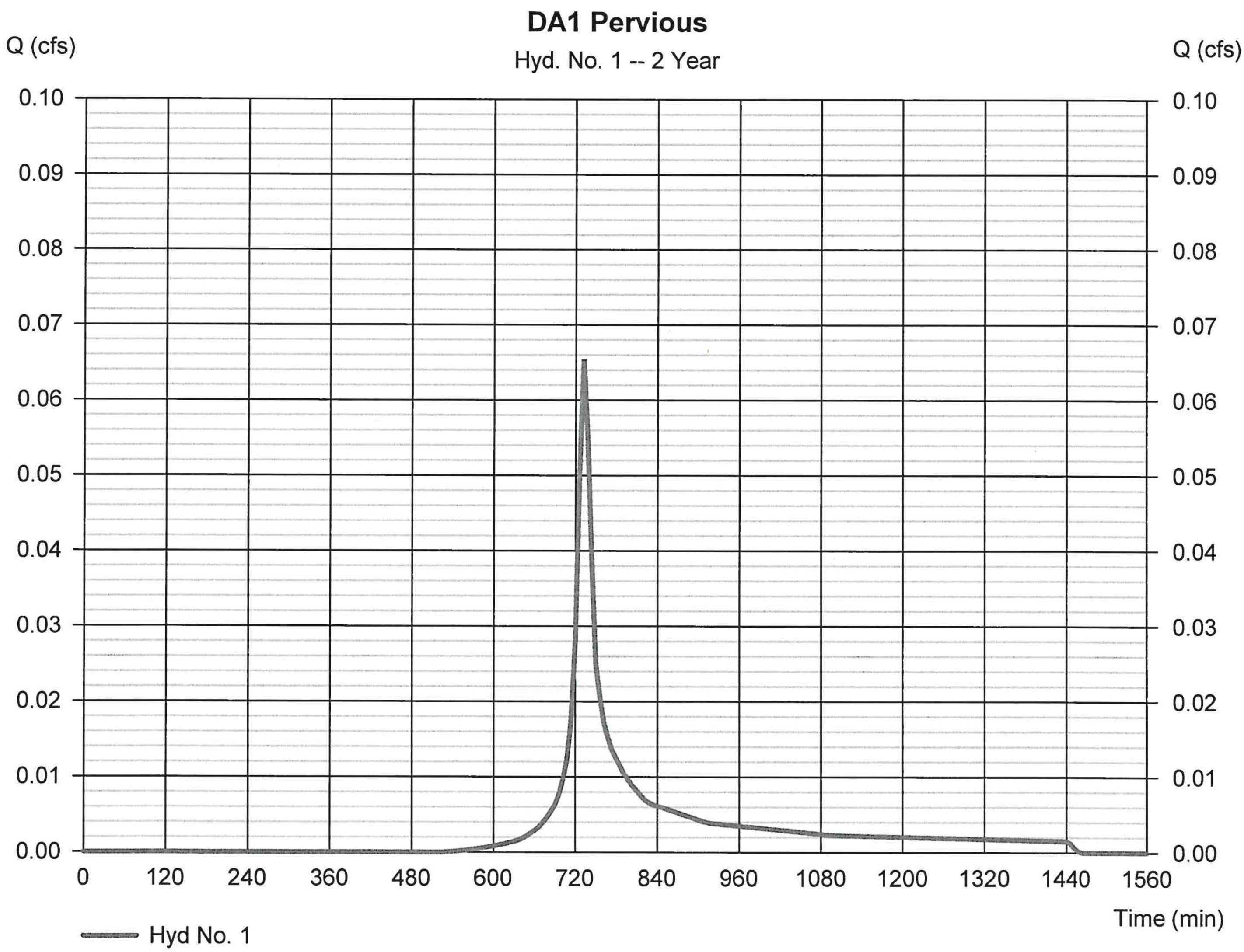
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 03 / 20 / 2020

Hyd. No. 1

DA1 Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.065 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 279 cuft
Drainage area	= 0.053 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.39 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering ResourceShapeLibrary\Stormwater\Storm Distributions\NJ-Typ		= 484

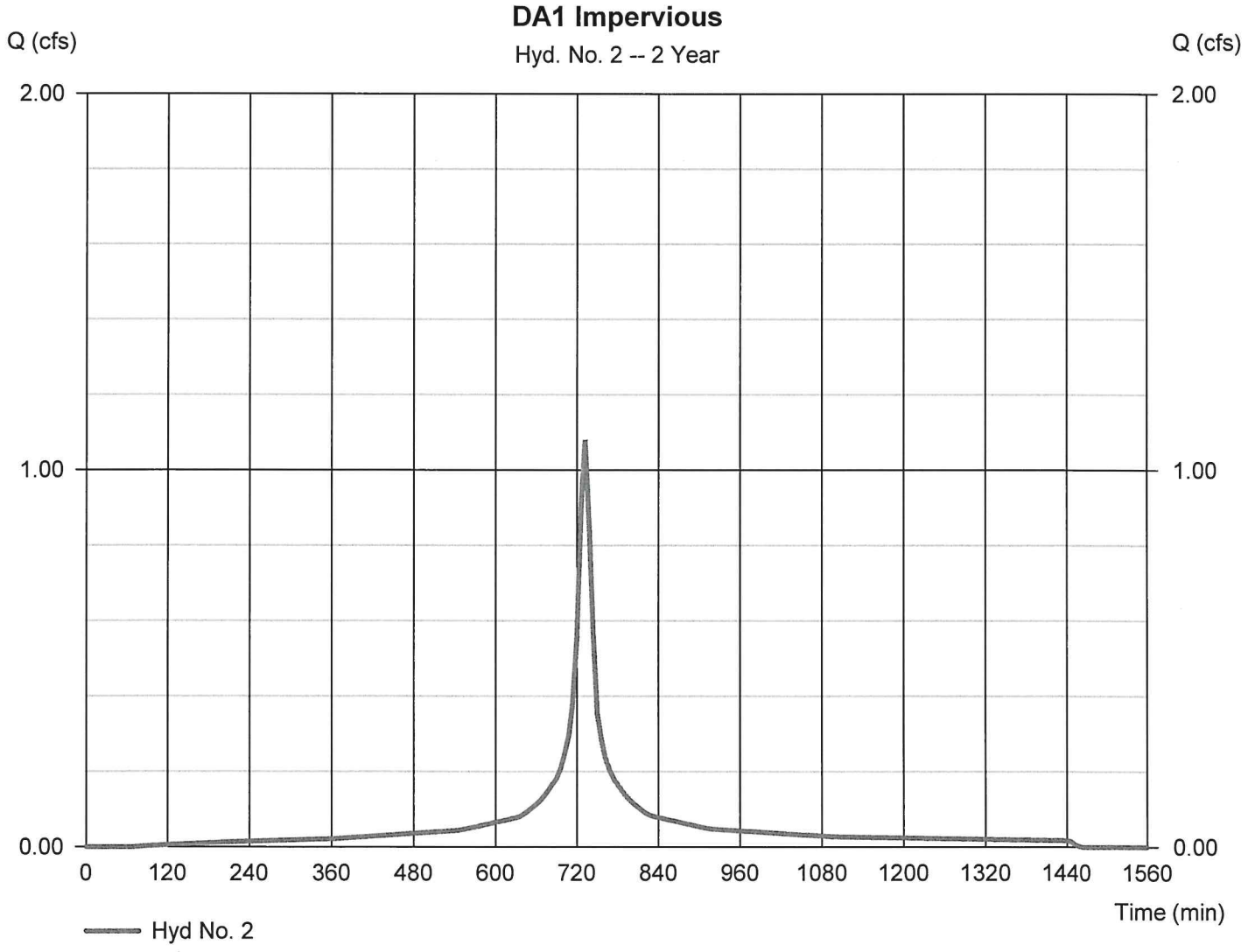


Hydrograph Report

Hyd. No. 2

DA1 Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 1.080 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 5,200 cuft
Drainage area	= 0.484 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.39 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ	Shape factor	= 484

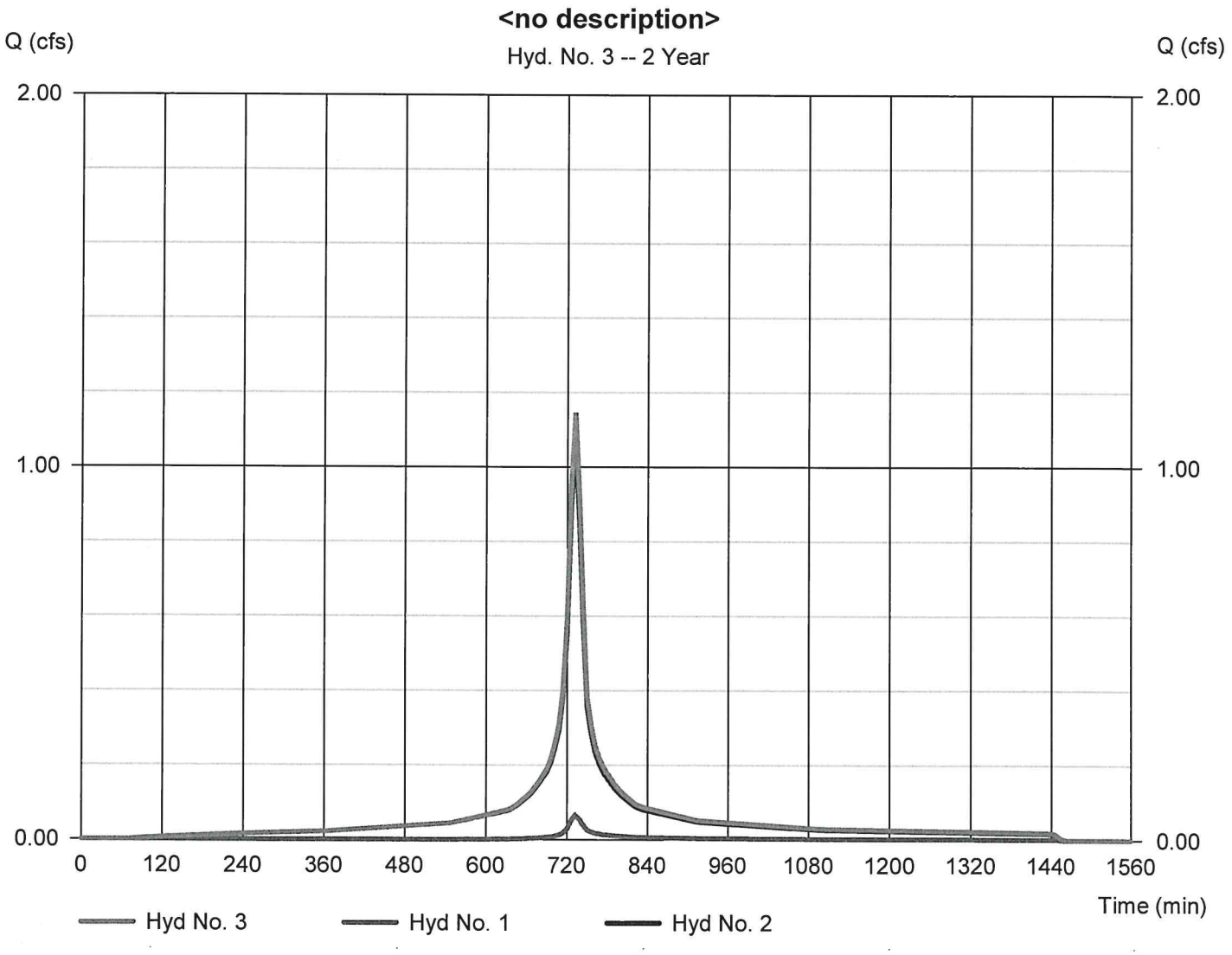


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 1.146 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 5,479 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.537 ac

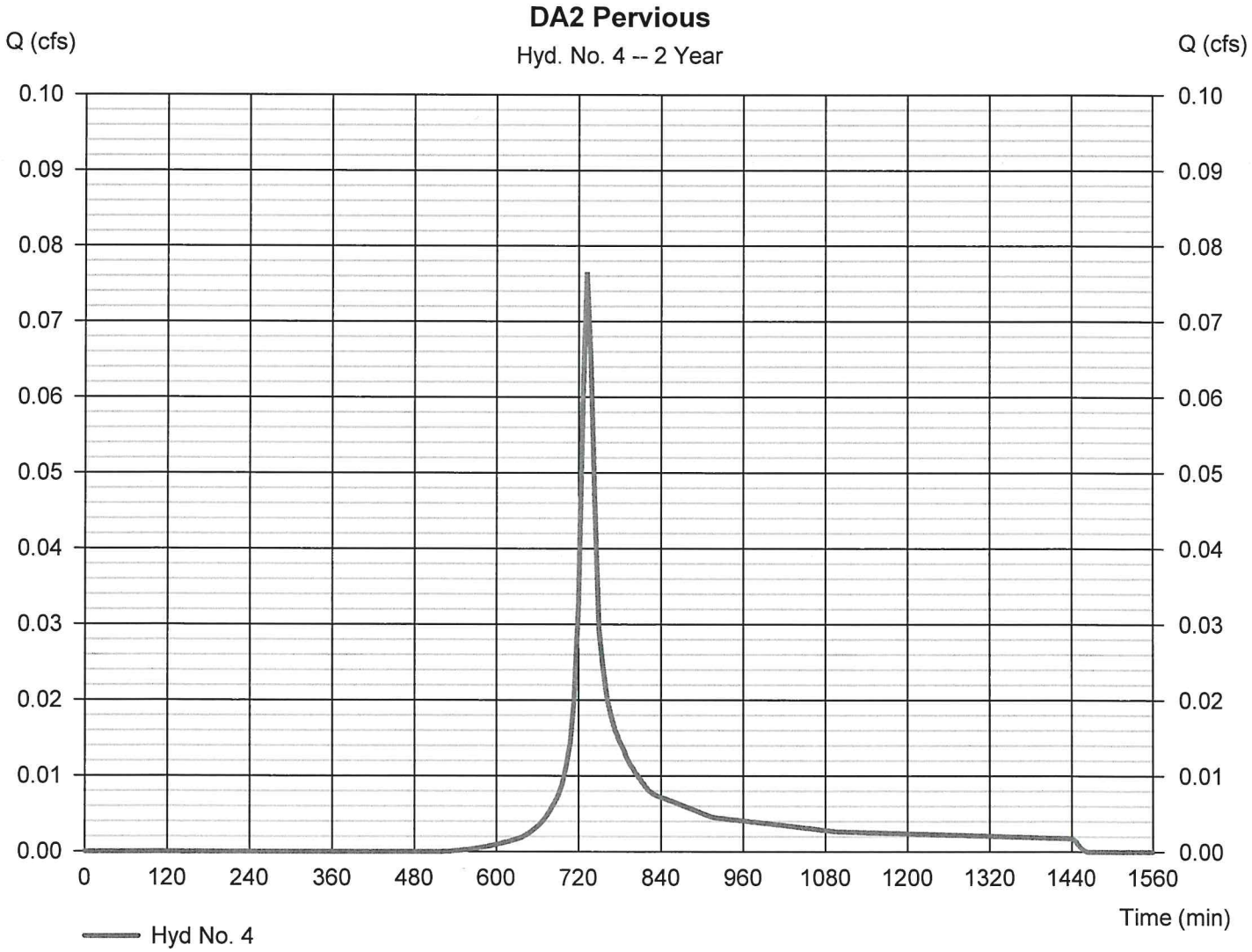


Hydrograph Report

Hyd. No. 4

DA2 Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.077 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 327 cuft
Drainage area	= 0.062 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.39 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Projects\Stormwater\Storm Distributions\NJ-Typ		

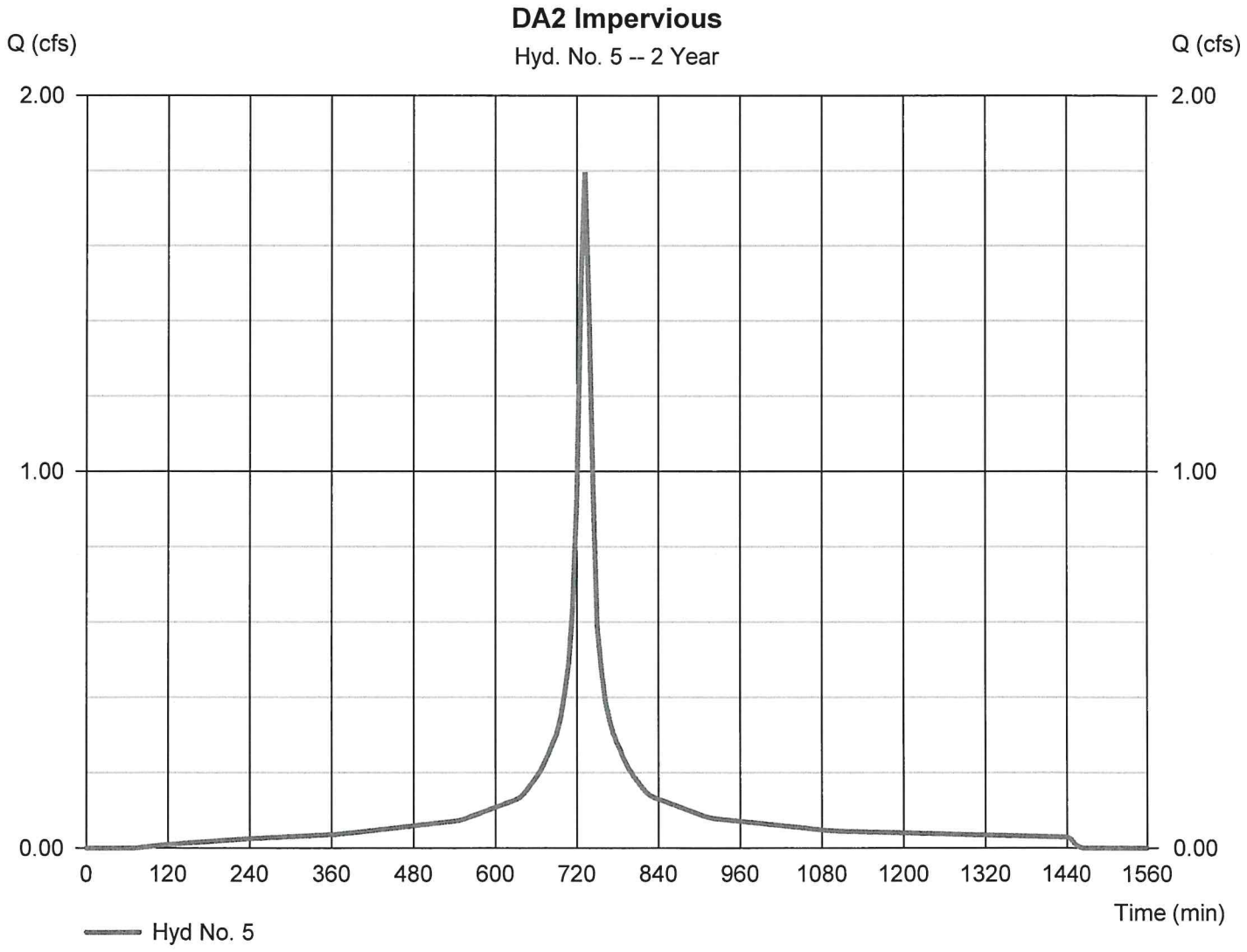


Hydrograph Report

Hyd. No. 5

DA2 Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 1.795 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 8,637 cuft
Drainage area	= 0.804 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.39 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Projects\Stormwater\Storm Distributions\NJ-Typ	Shape factor	= 484

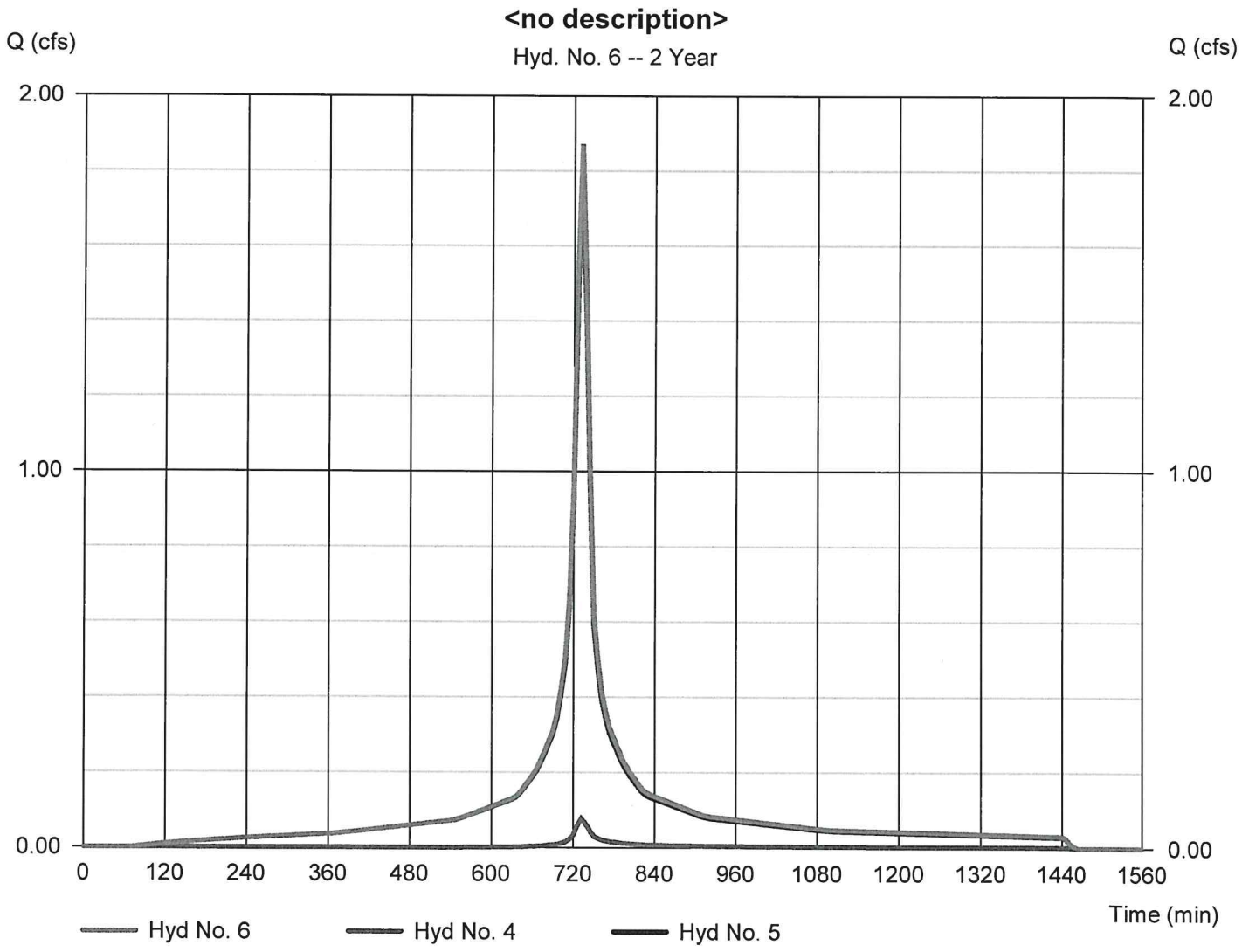


Hydrograph Report

Hyd. No. 6

<no description>

Hydrograph type	= Combine	Peak discharge	= 1.871 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 8,964 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.866 ac

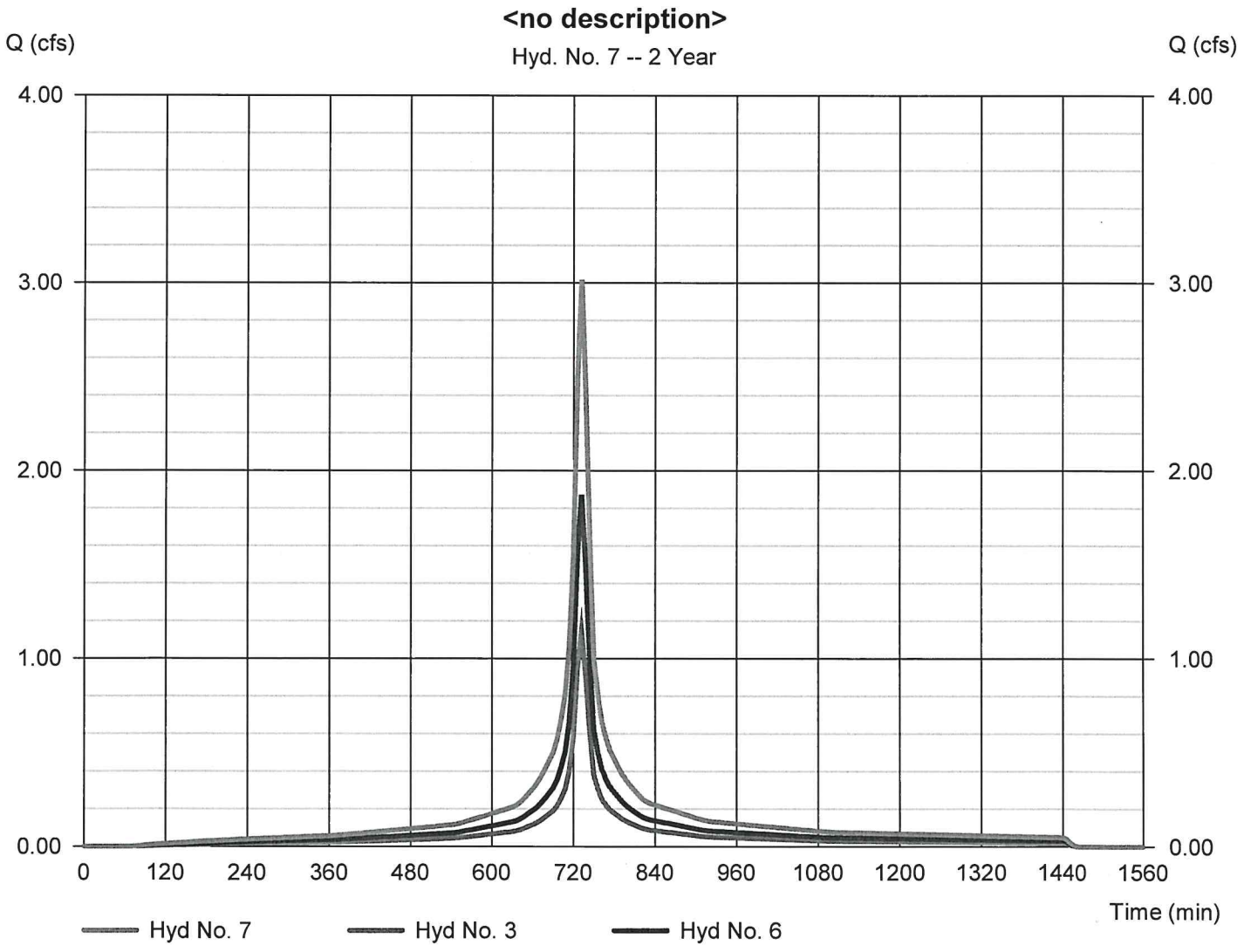


Hydrograph Report

Hyd. No. 7

<no description>

Hydrograph type	= Combine	Peak discharge	= 3.017 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 14,443 cuft
Inflow hyds.	= 3, 6	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

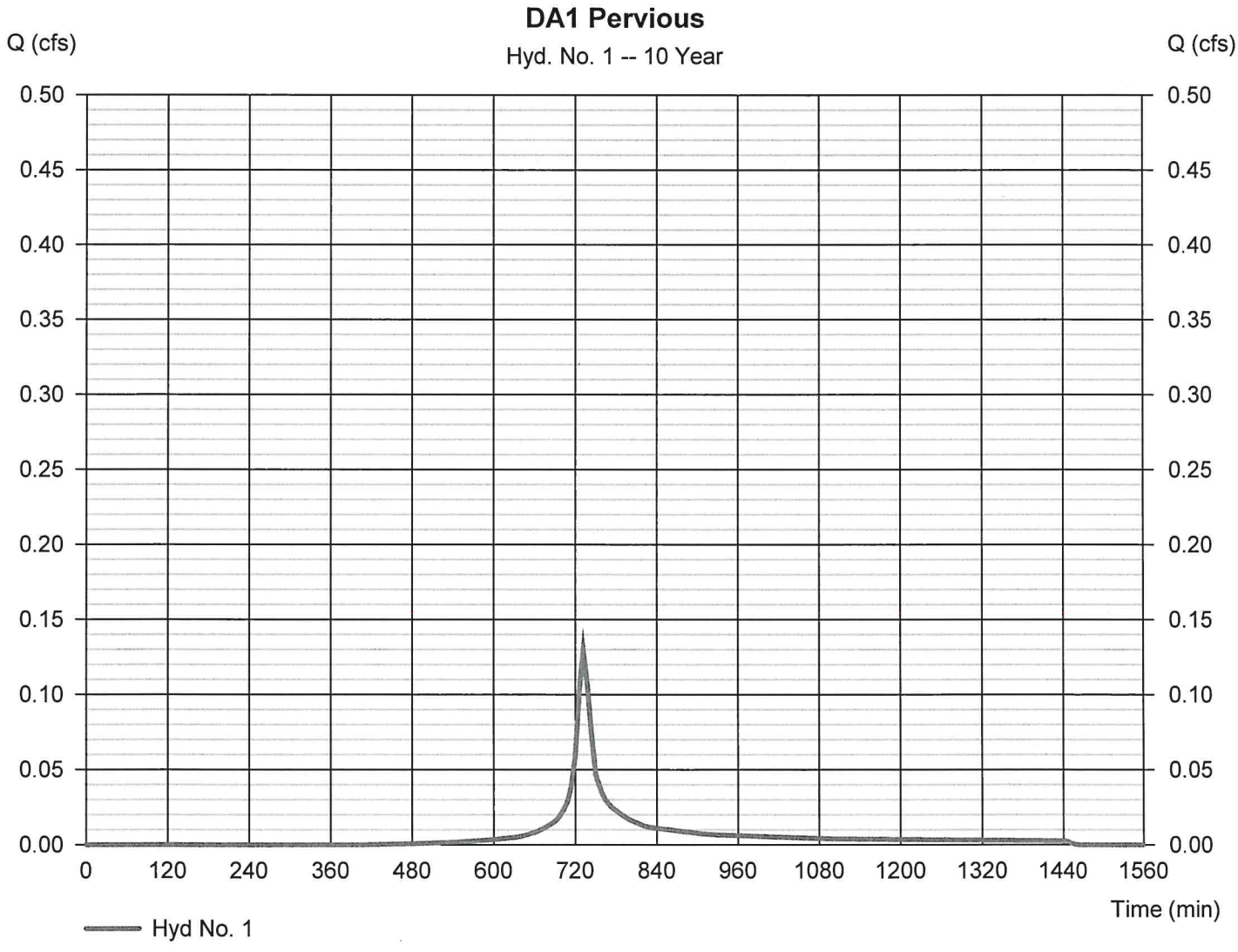
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.129	6	732	550	------	------	------	DA1 Pervious
2	SCS Runoff	1.662	6	732	8,142	------	------	------	DA1 Impervious
3	Combine	1.791	6	732	8,692	1, 2	------	------	<no description>
4	SCS Runoff	0.151	6	732	644	------	------	------	DA2 Pervious
5	SCS Runoff	2.761	6	732	13,524	------	------	------	DA2 Impervious
6	Combine	2.912	6	732	14,168	4, 5	------	------	<no description>
7	Combine	4.703	6	732	22,860	3, 6	------	------	<no description>

Hydrograph Report

Hyd. No. 1

DA1 Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.129 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 550 cuft
Drainage area	= 0.053 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.18 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ	Shape factor	= 484

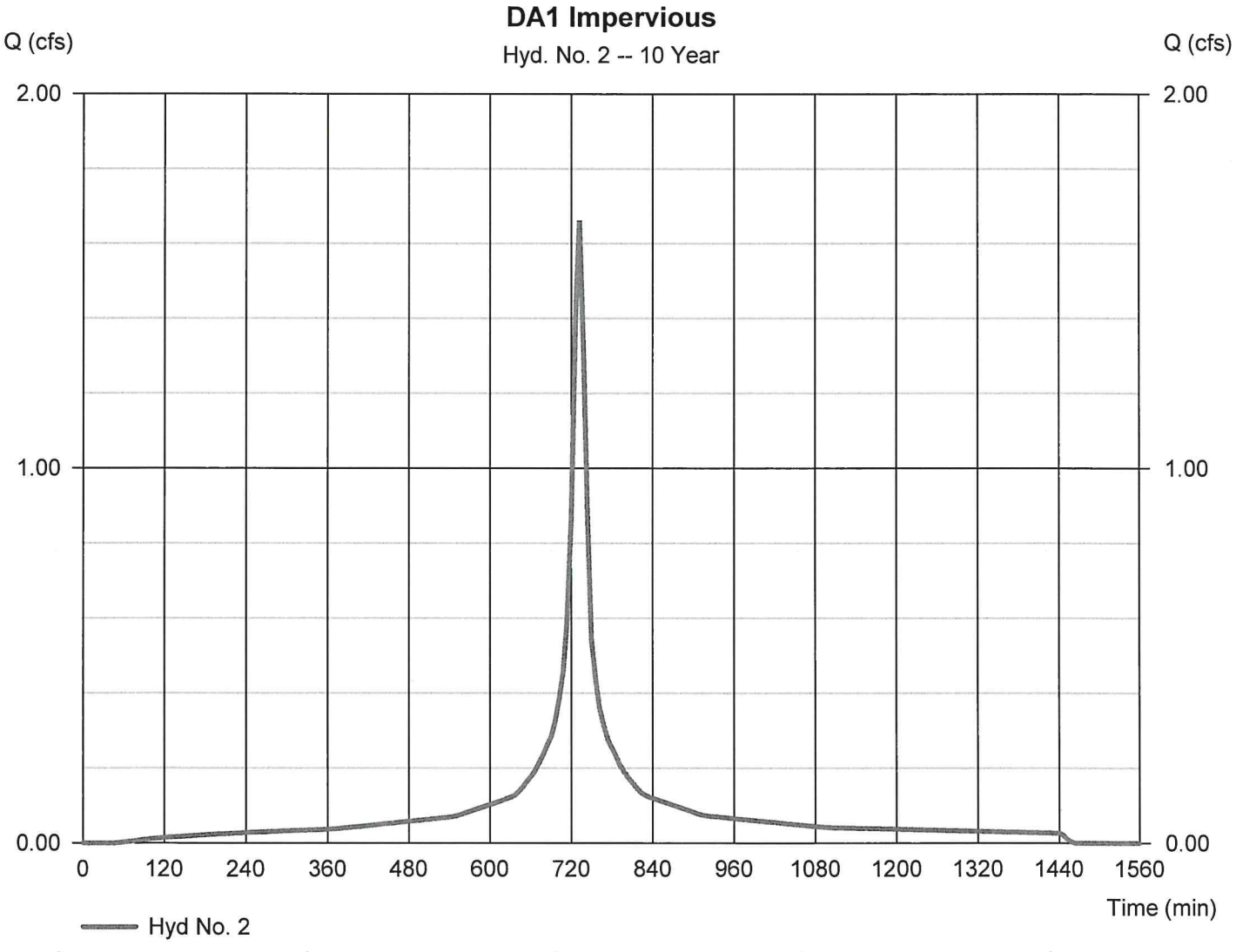


Hydrograph Report

Hyd. No. 2

DA1 Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 1.662 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 8,142 cuft
Drainage area	= 0.484 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.18 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Projects\Stormwater\Storm Distributions\NJ-Typ		

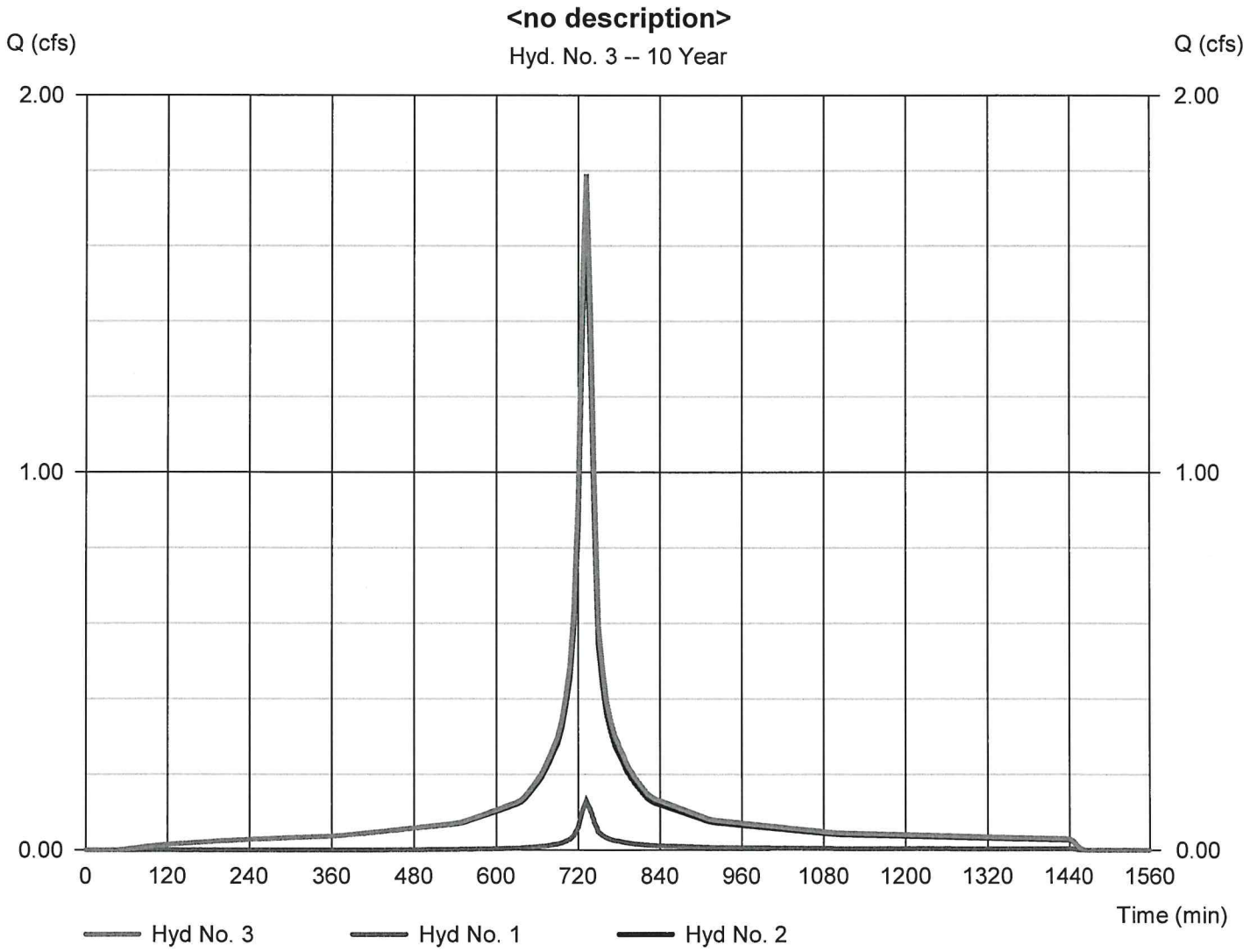


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 1.791 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 8,692 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.537 ac

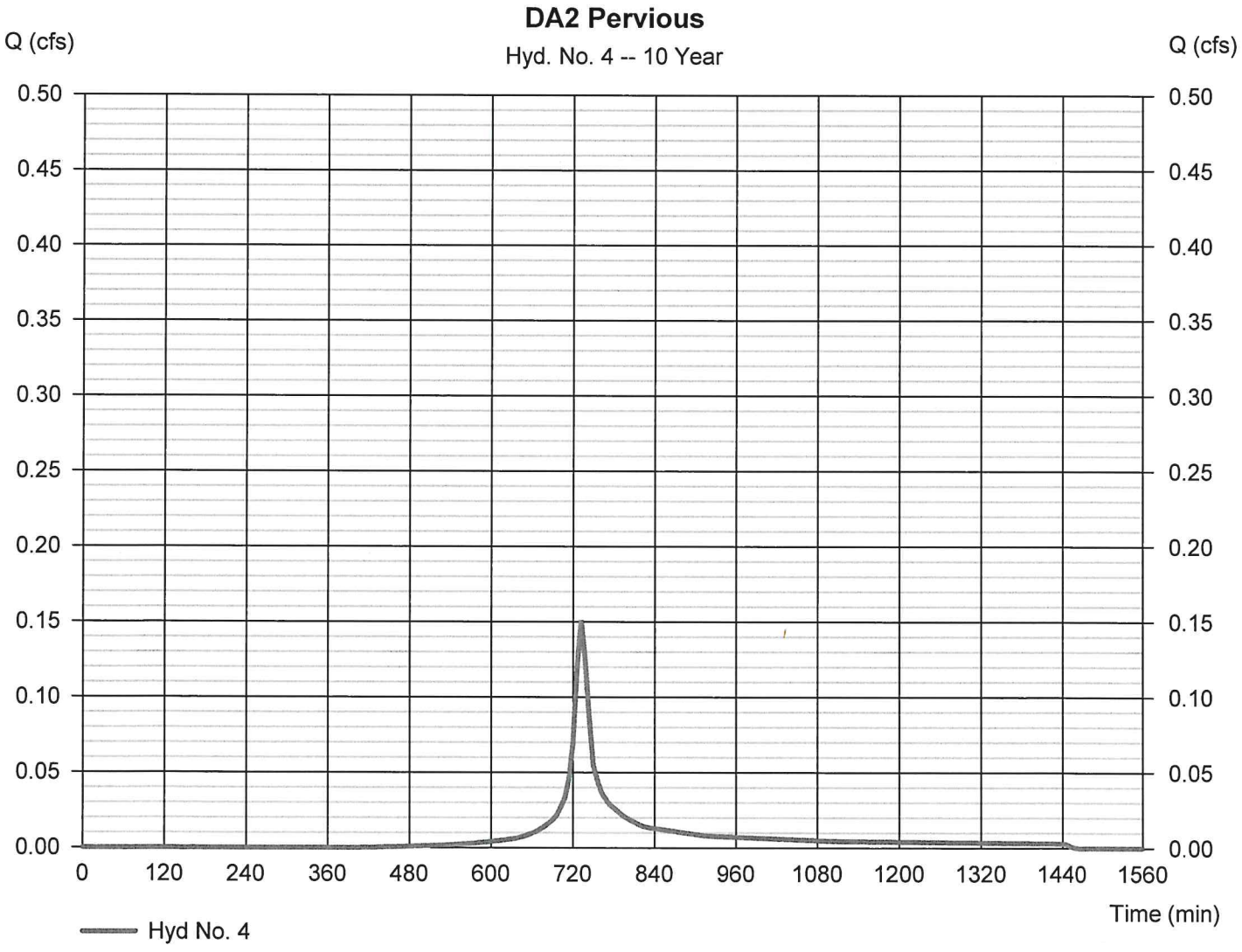


Hydrograph Report

Hyd. No. 4

DA2 Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.151 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 644 cuft
Drainage area	= 0.062 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.18 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ		

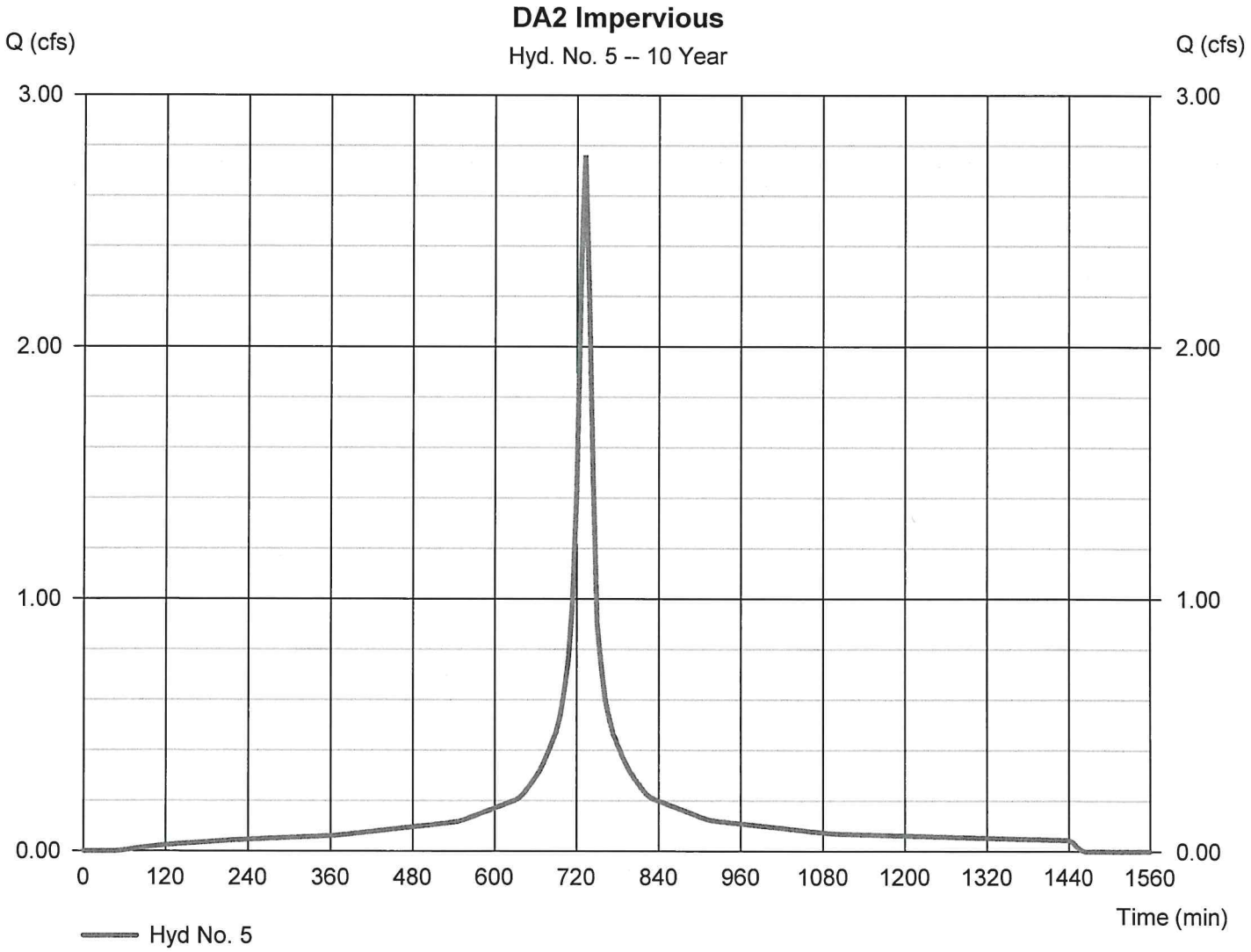


Hydrograph Report

Hyd. No. 5

DA2 Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 2.761 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 13,524 cuft
Drainage area	= 0.804 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.18 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ		

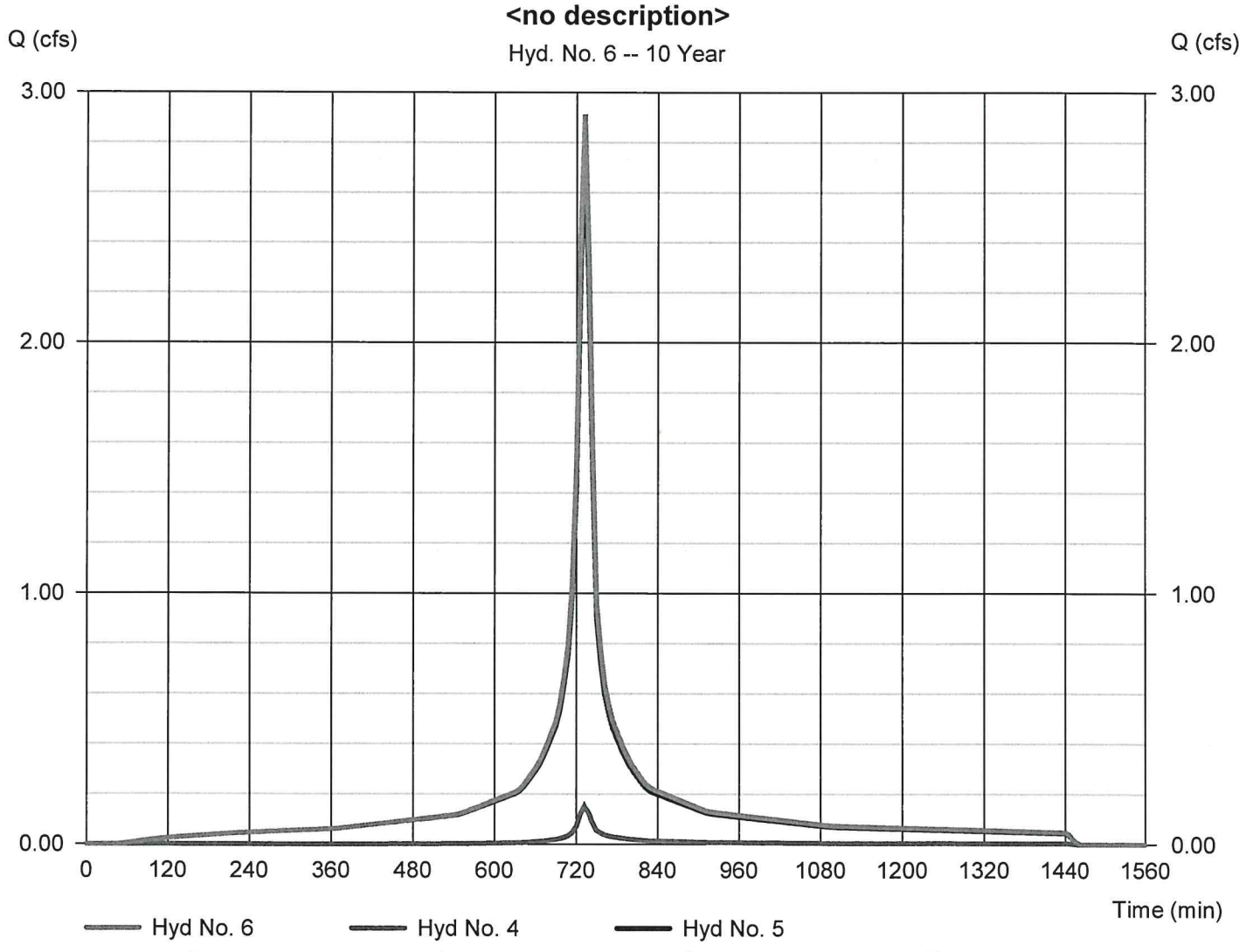


Hydrograph Report

Hyd. No. 6

<no description>

Hydrograph type	= Combine	Peak discharge	= 2.912 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 14,168 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.866 ac

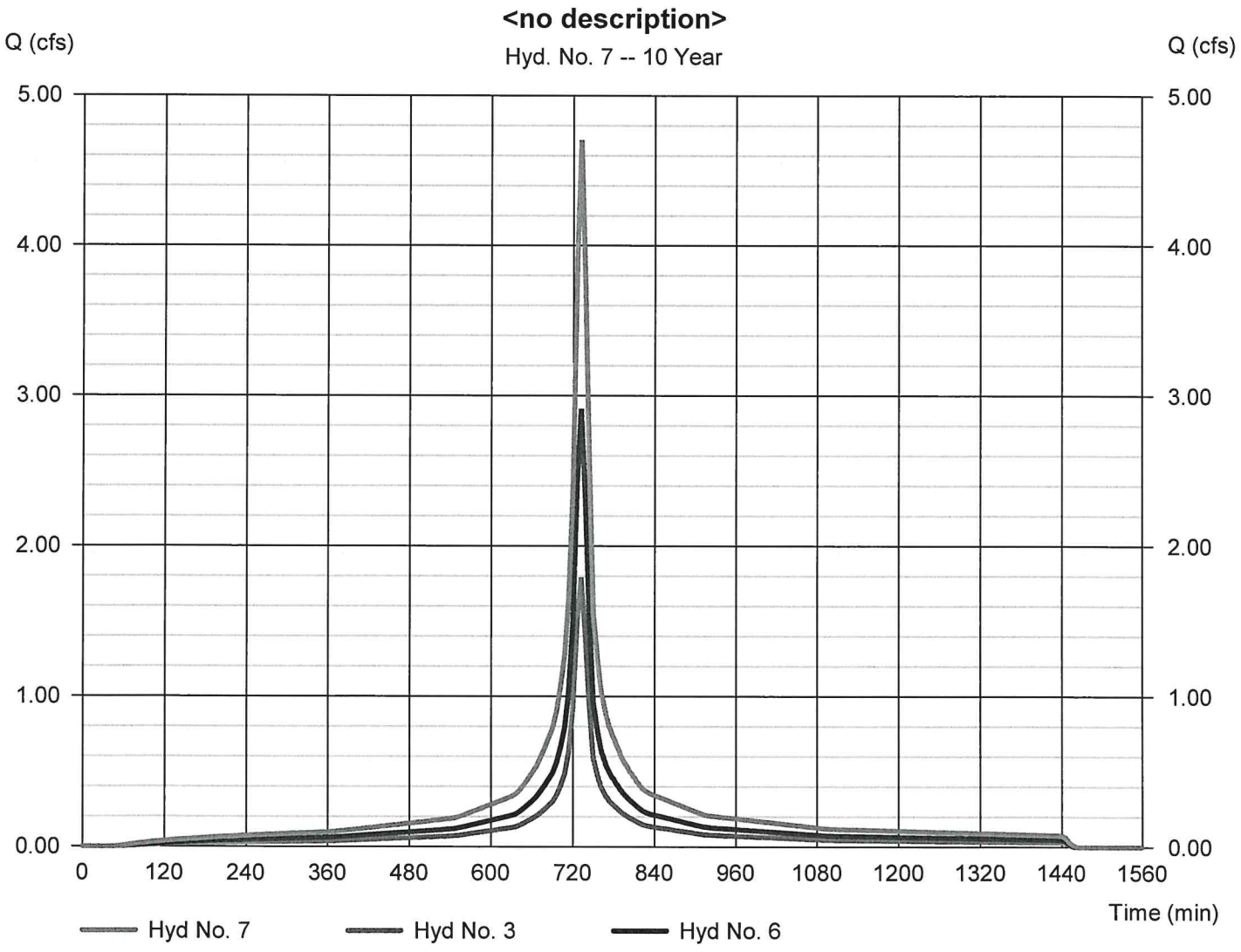


Hydrograph Report

Hyd. No. 7

<no description>

Hydrograph type	= Combine	Peak discharge	= 4.703 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 22,860 cuft
Inflow hyds.	= 3, 6	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

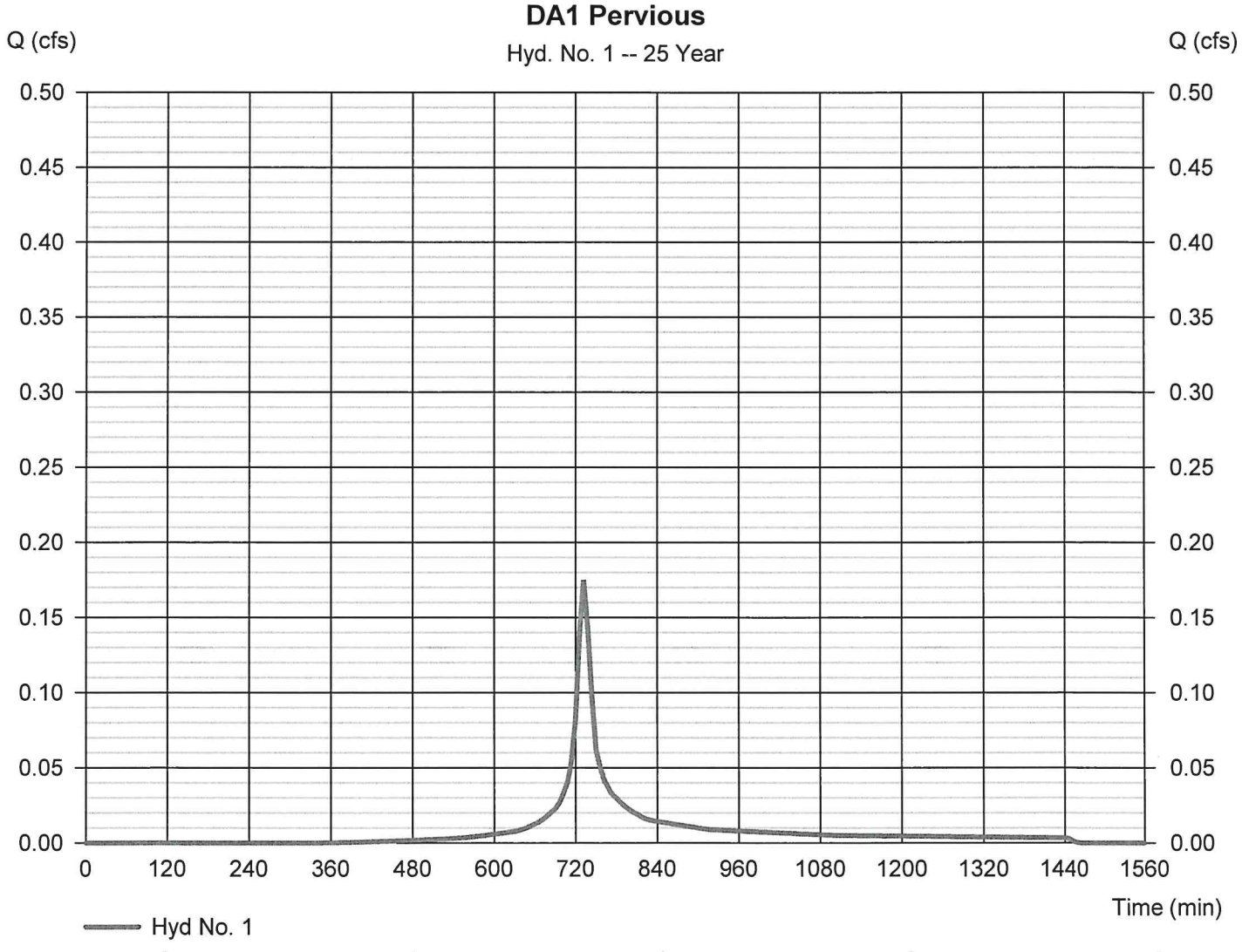
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.175	6	732	751	------	------	------	DA1 Pervious
2	SCS Runoff	2.064	6	732	10,181	------	------	------	DA1 Impervious
3	Combine	2.239	6	732	10,932	1, 2	------	------	<no description>
4	SCS Runoff	0.205	6	732	878	------	------	------	DA2 Pervious
5	SCS Runoff	3.428	6	732	16,913	------	------	------	DA2 Impervious
6	Combine	3.633	6	732	17,791	4, 5	------	------	<no description>
7	Combine	5.871	6	732	28,723	3, 6	------	------	<no description>

Hydrograph Report

Hyd. No. 1

DA1 Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.175 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 751 cuft
Drainage area	= 0.053 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.42 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Projects\Stormwater\Storm Distributions\NJ-Typ		

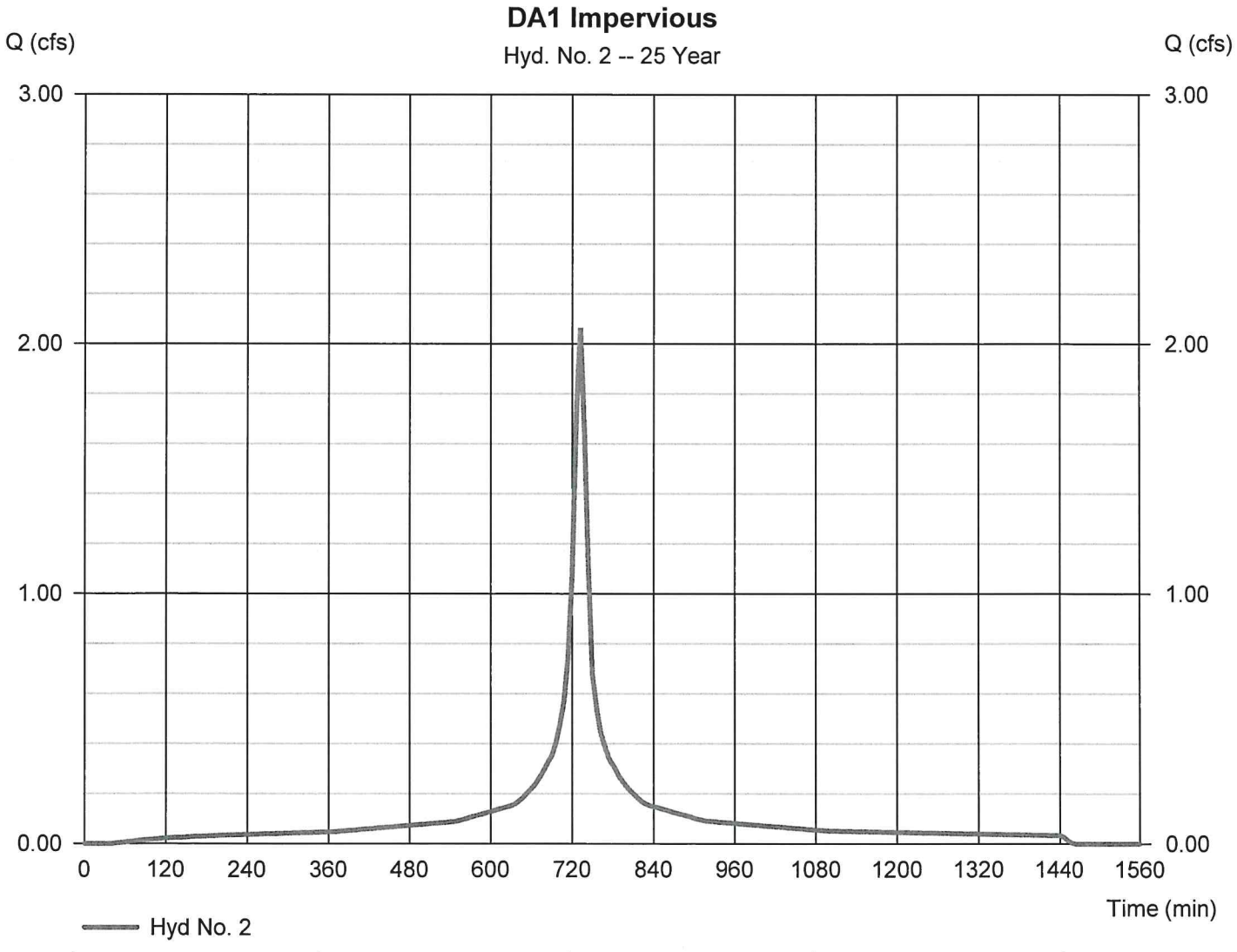


Hydrograph Report

Hyd. No. 2

DA1 Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 2.064 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 10,181 cuft
Drainage area	= 0.484 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.42 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ	Shape factor	= 484

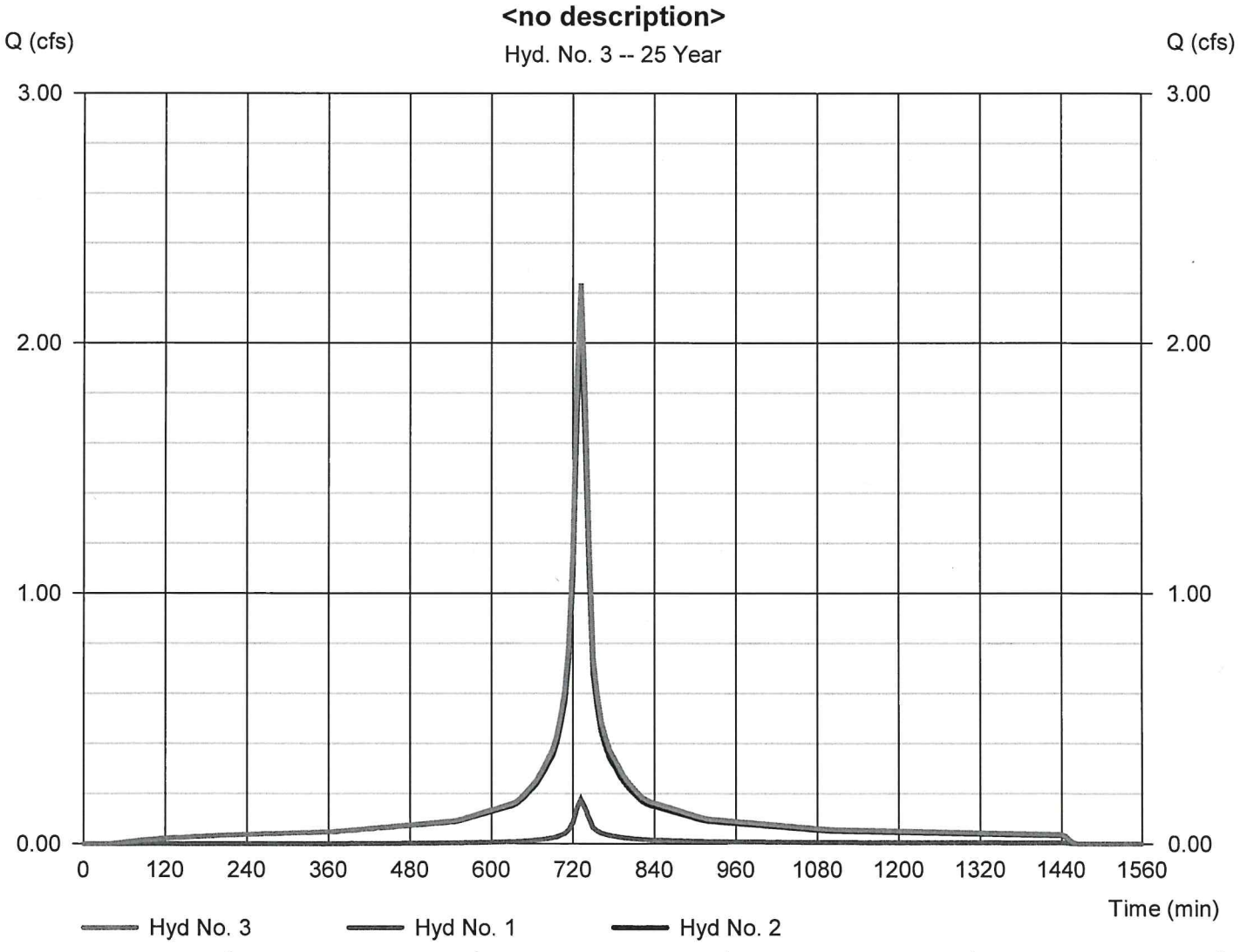


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 2.239 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 10,932 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.537 ac

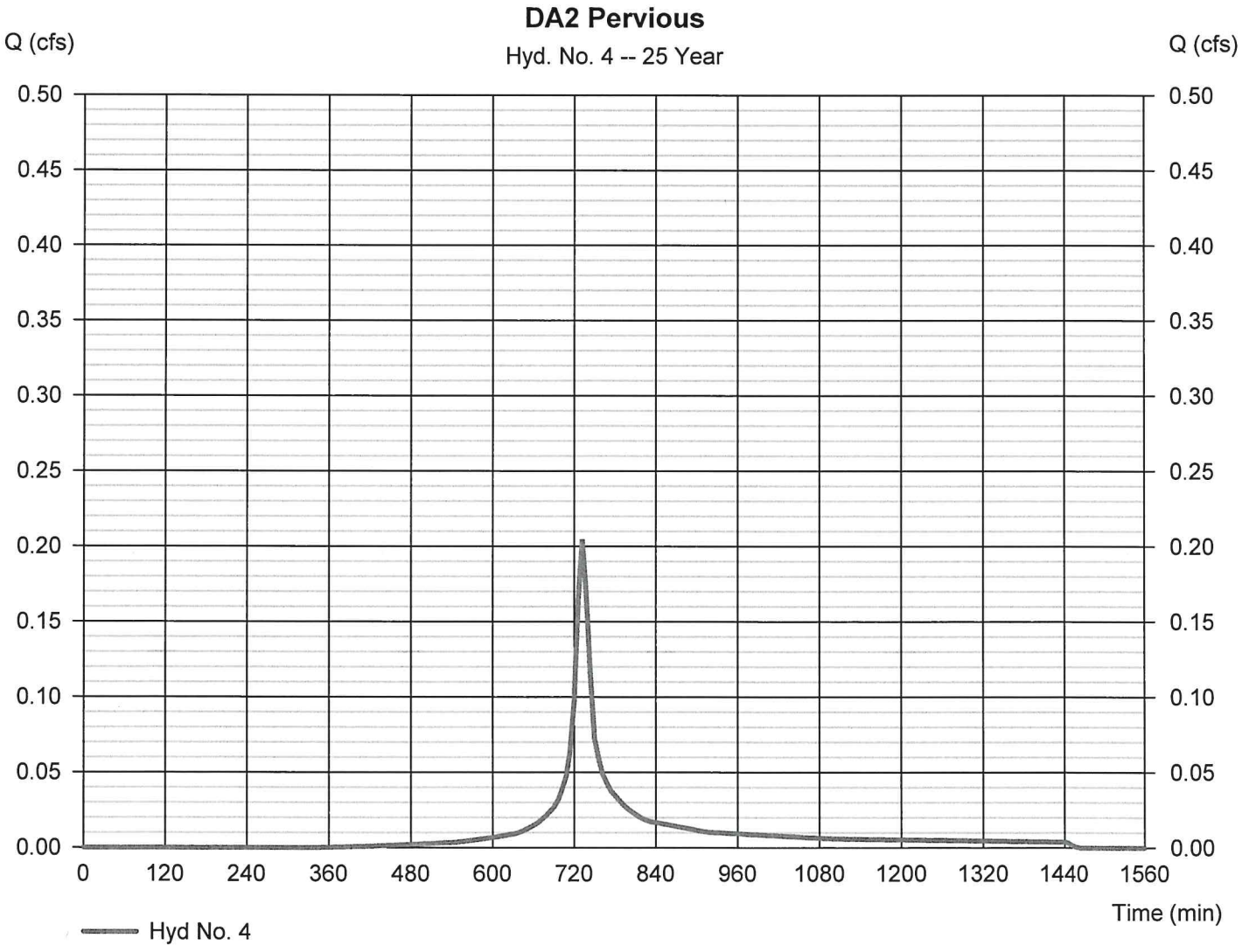


Hydrograph Report

Hyd. No. 4

DA2 Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.205 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 878 cuft
Drainage area	= 0.062 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.42 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Projects\Stormwater\Storm Distributions\NJ-Typ		

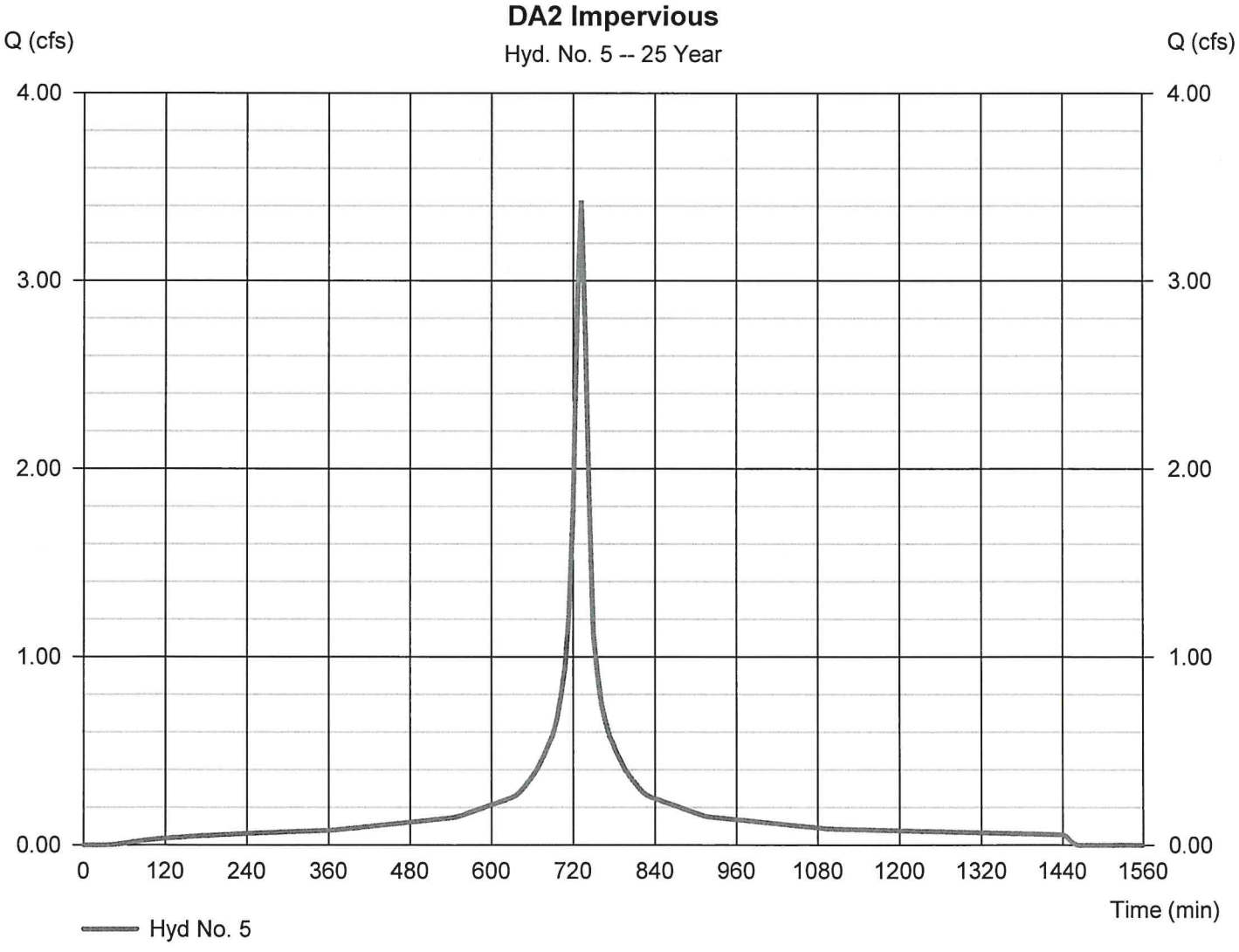


Hydrograph Report

Hyd. No. 5

DA2 Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 3.428 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 16,913 cuft
Drainage area	= 0.804 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.42 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ	Shape factor	= 484

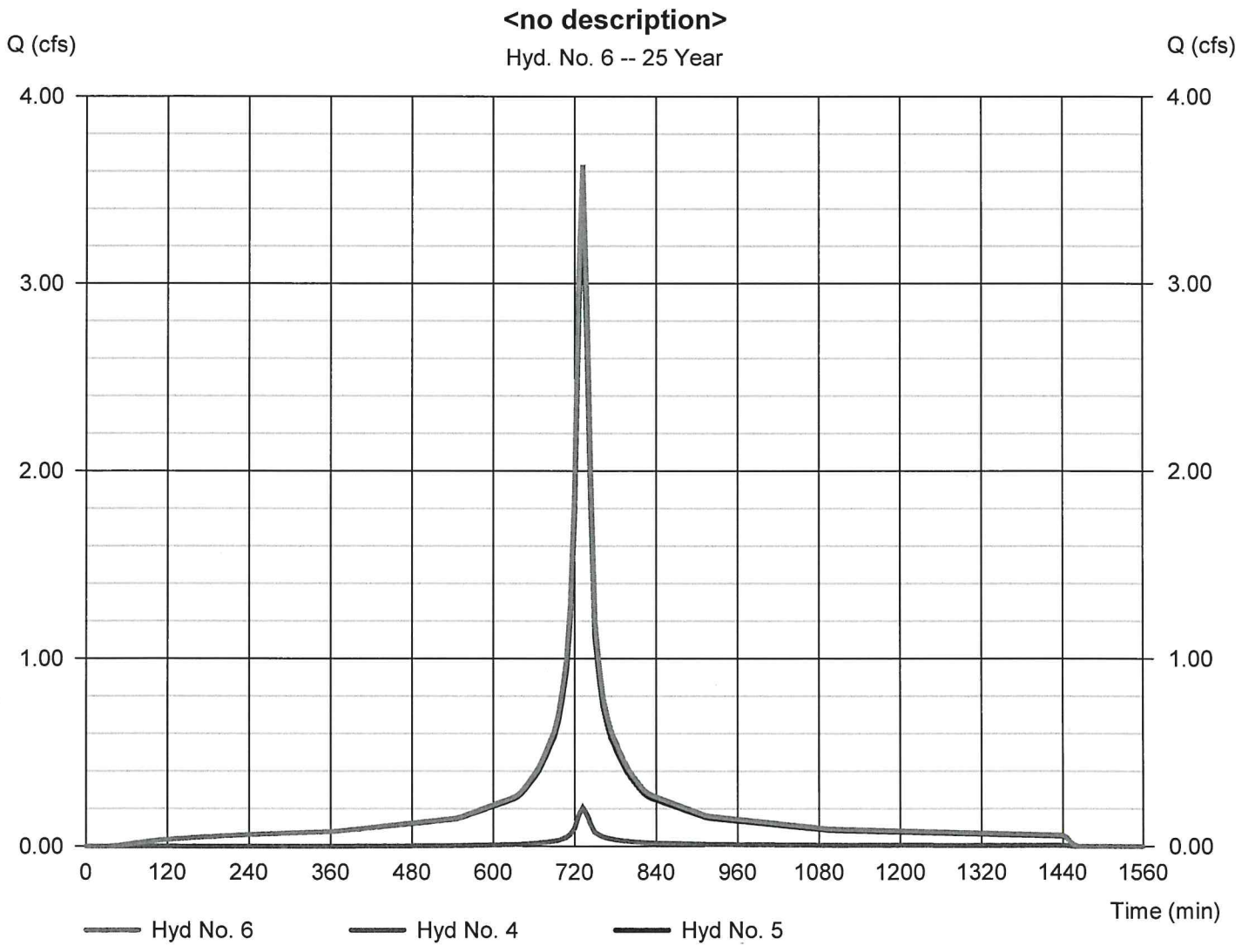


Hydrograph Report

Hyd. No. 6

<no description>

Hydrograph type	= Combine	Peak discharge	= 3.633 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 17,791 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.866 ac

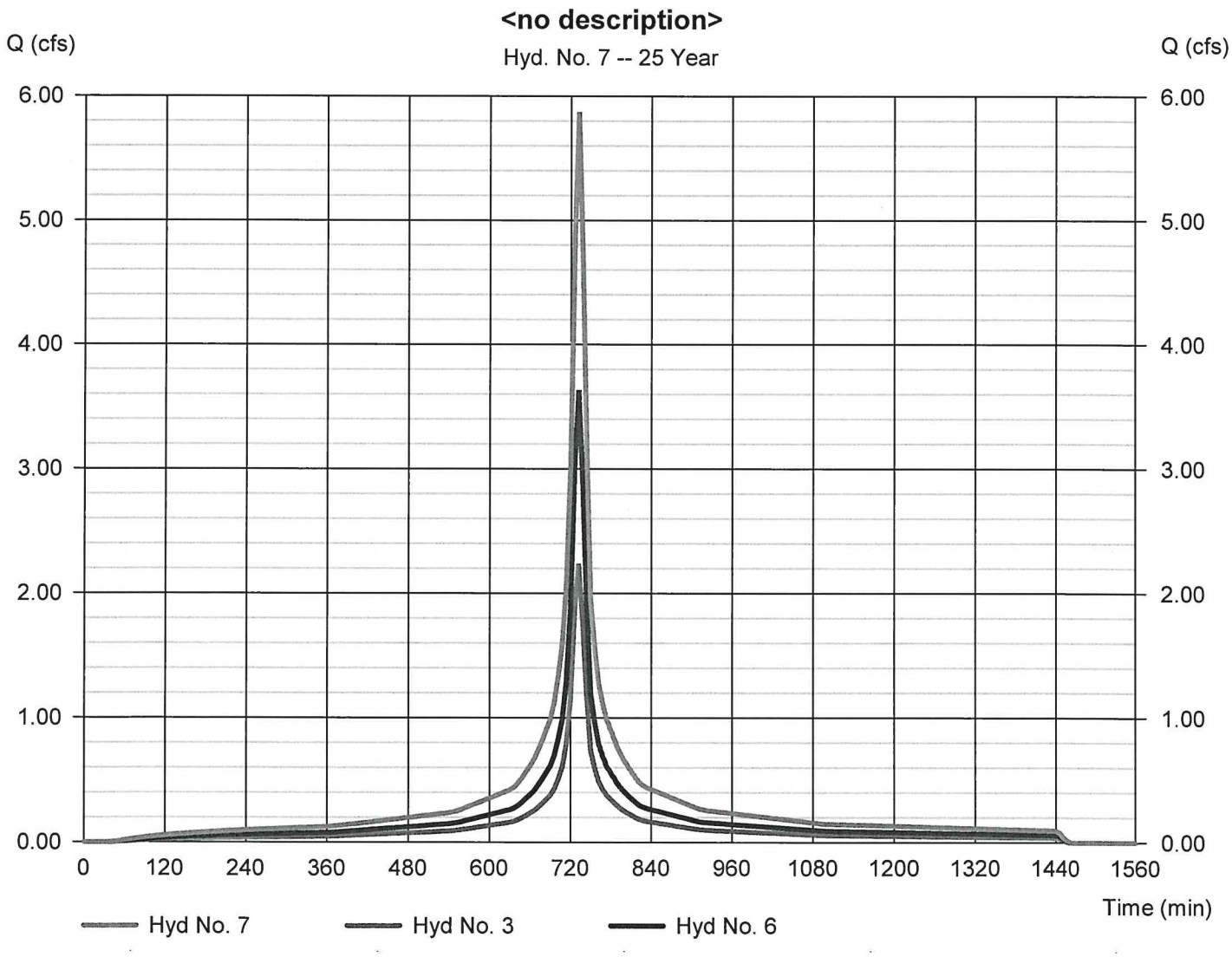


Hydrograph Report

Hyd. No. 7

<no description>

Hydrograph type	= Combine	Peak discharge	= 5.871 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 28,723 cuft
Inflow hyds.	= 3, 6	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

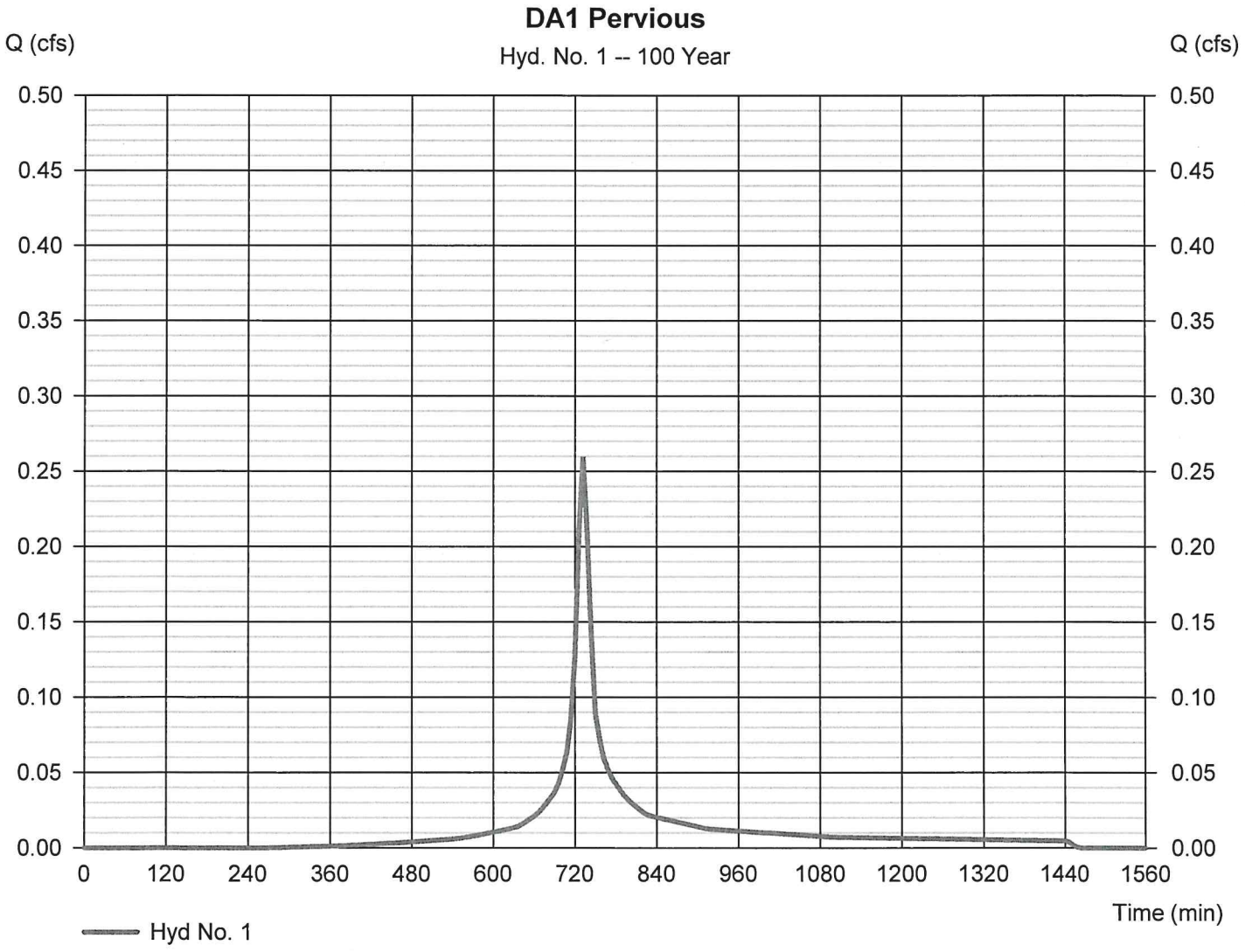
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	0.260	6	732	1,132	------	------	------	DA1 Pervious
2	SCS Runoff	2.798	6	732	13,918	------	------	------	DA1 Impervious
3	Combine	3.058	6	732	15,049	1, 2	------	------	<no description>
4	SCS Runoff	0.304	6	732	1,324	------	------	------	DA2 Pervious
5	SCS Runoff	4.648	6	732	23,120	------	------	------	DA2 Impervious
6	Combine	4.951	6	732	24,443	4, 5	------	------	<no description>
7	Combine	8.009	6	732	39,493	3, 6	------	------	<no description>

Hydrograph Report

Hyd. No. 1

DA1 Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.260 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 1,132 cuft
Drainage area	= 0.053 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.69 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ		

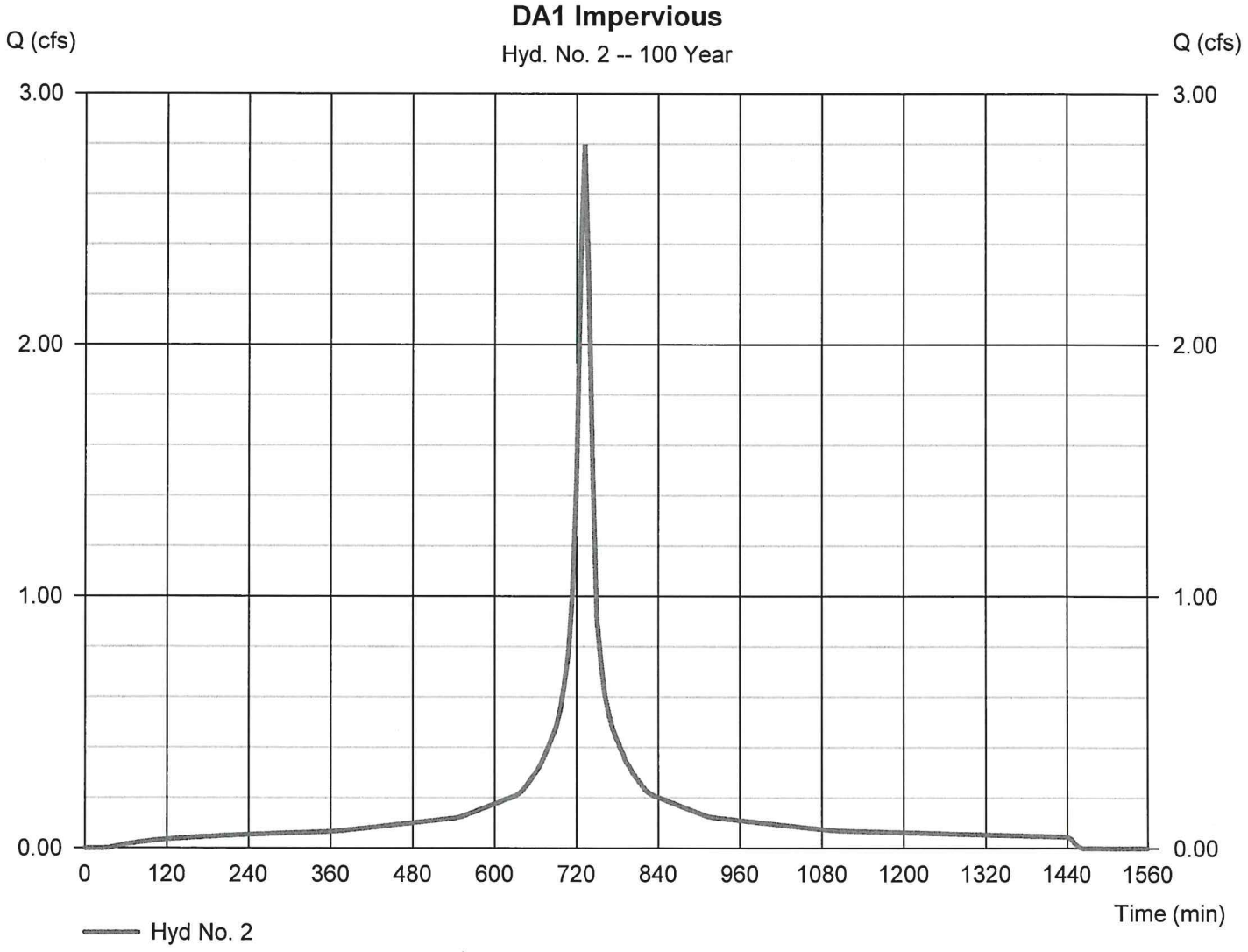


Hydrograph Report

Hyd. No. 2

DA1 Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 2.798 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 13,918 cuft
Drainage area	= 0.484 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.69 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ		

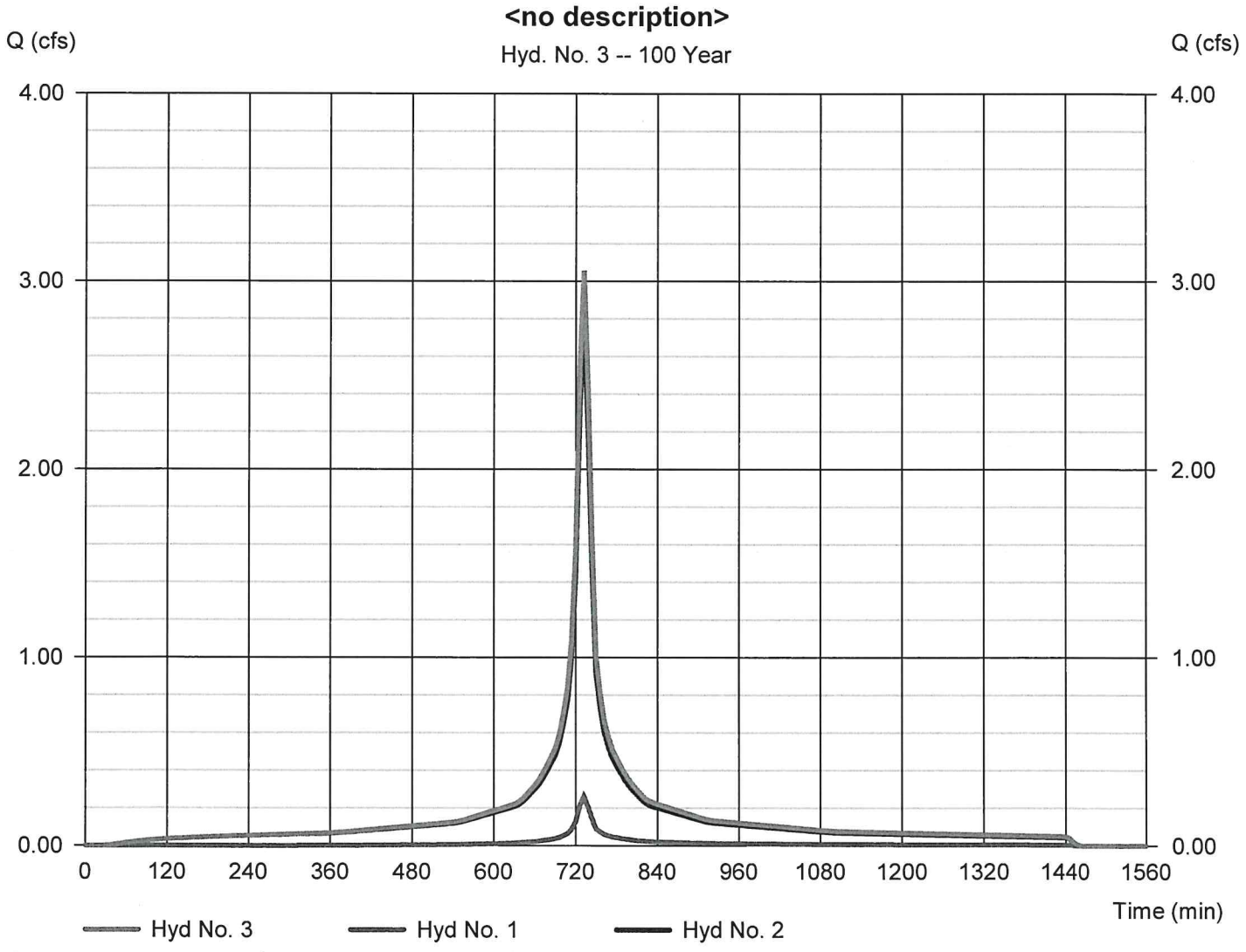


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 3.058 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 15,049 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.537 ac

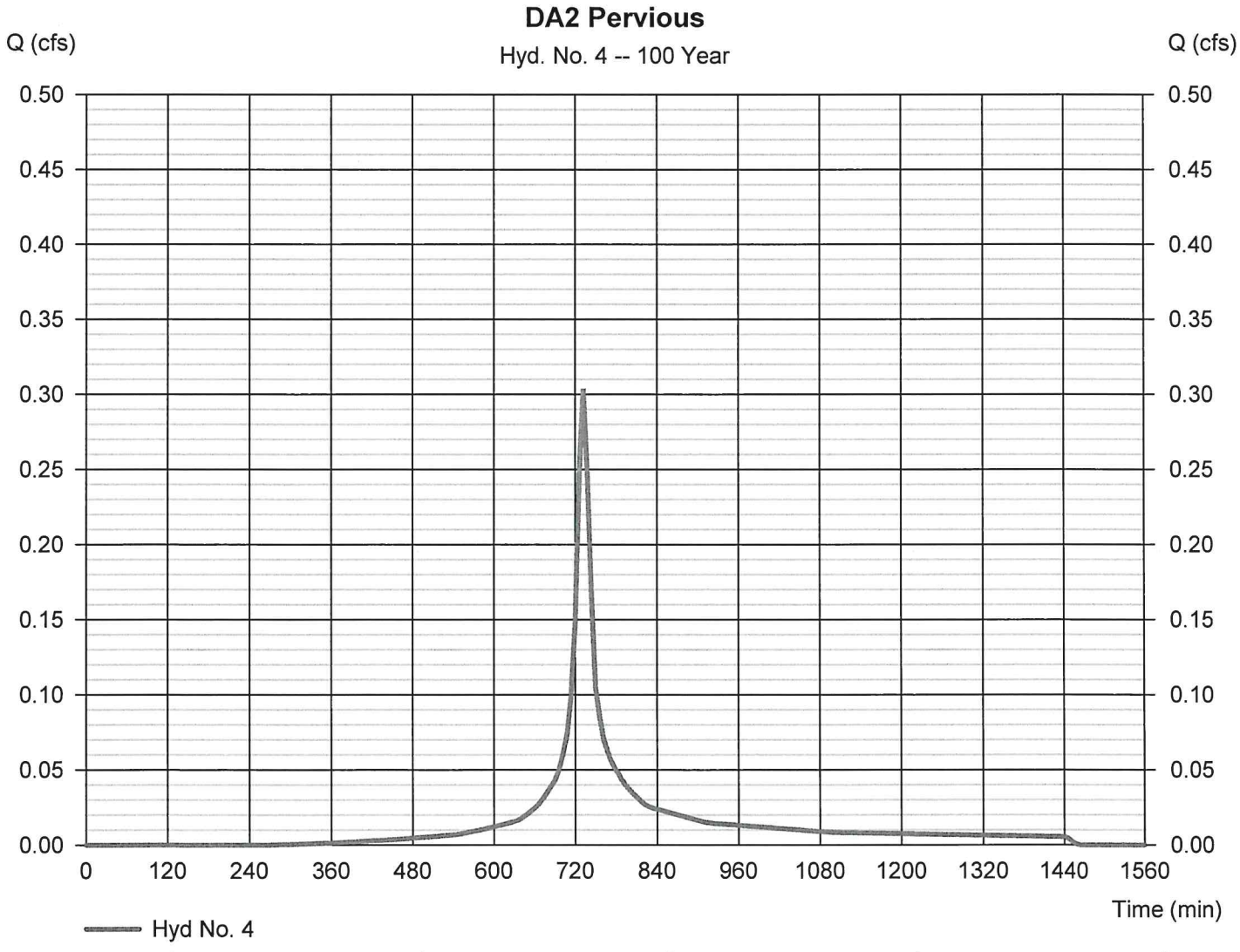


Hydrograph Report

Hyd. No. 4

DA2 Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 0.304 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 1,324 cuft
Drainage area	= 0.062 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.69 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Laserfiche\Stormwater\Storm Distributions\NJ-Typ	Shape factor	= 484

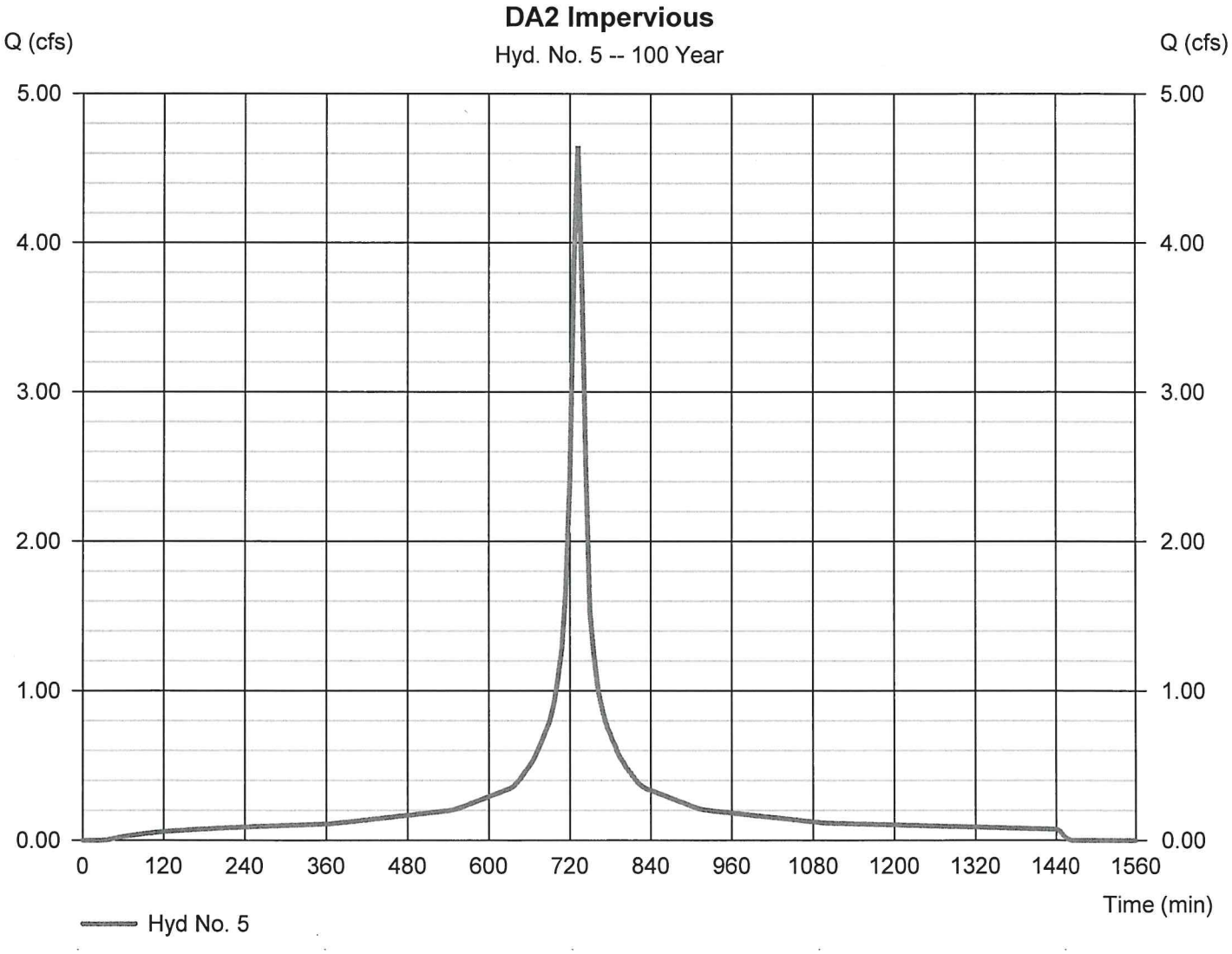


Hydrograph Report

Hyd. No. 5

DA2 Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 4.648 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 23,120 cuft
Drainage area	= 0.804 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.69 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ	Shape factor	= 484

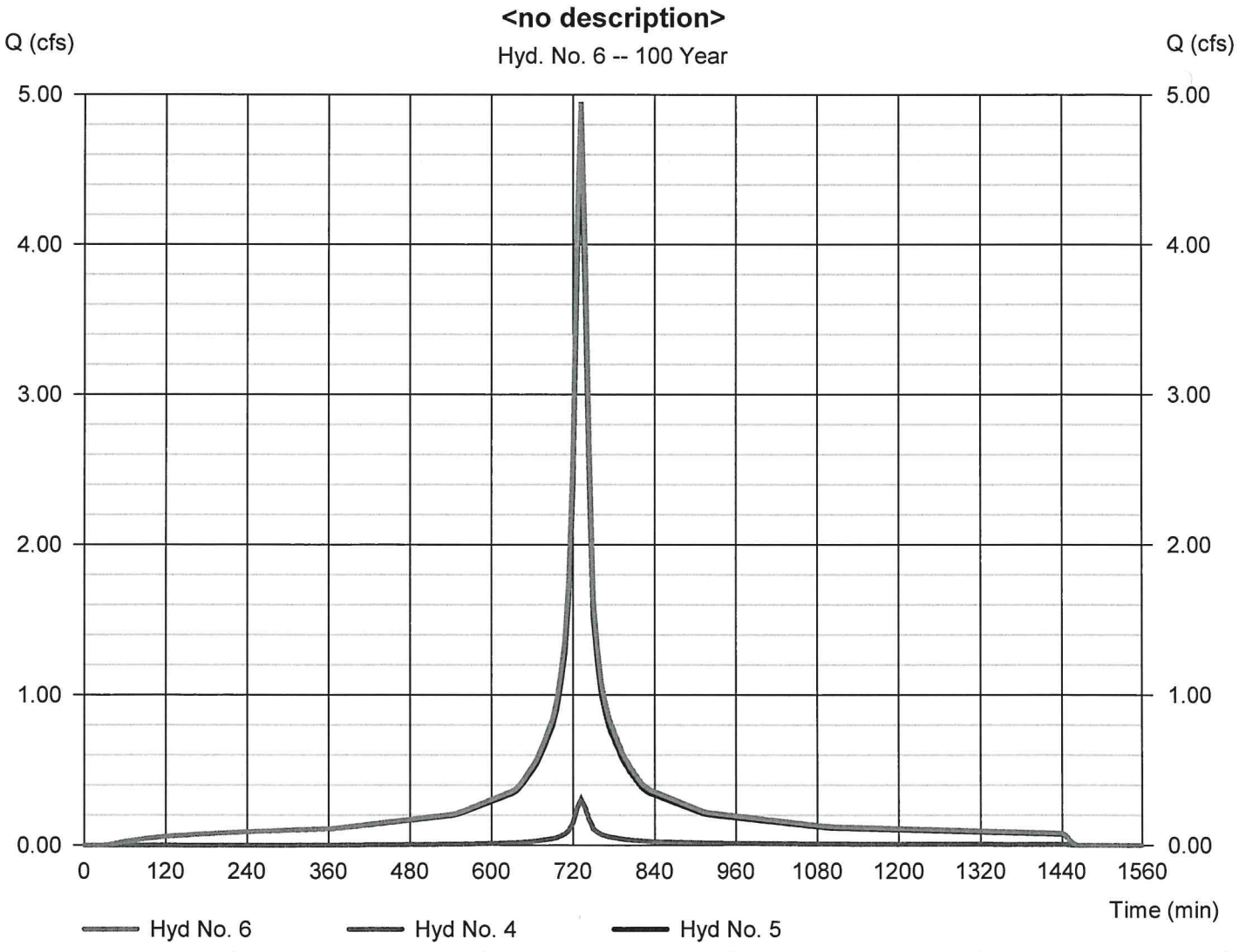


Hydrograph Report

Hyd. No. 6

<no description>

Hydrograph type	= Combine	Peak discharge	= 4.951 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 24,443 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.866 ac

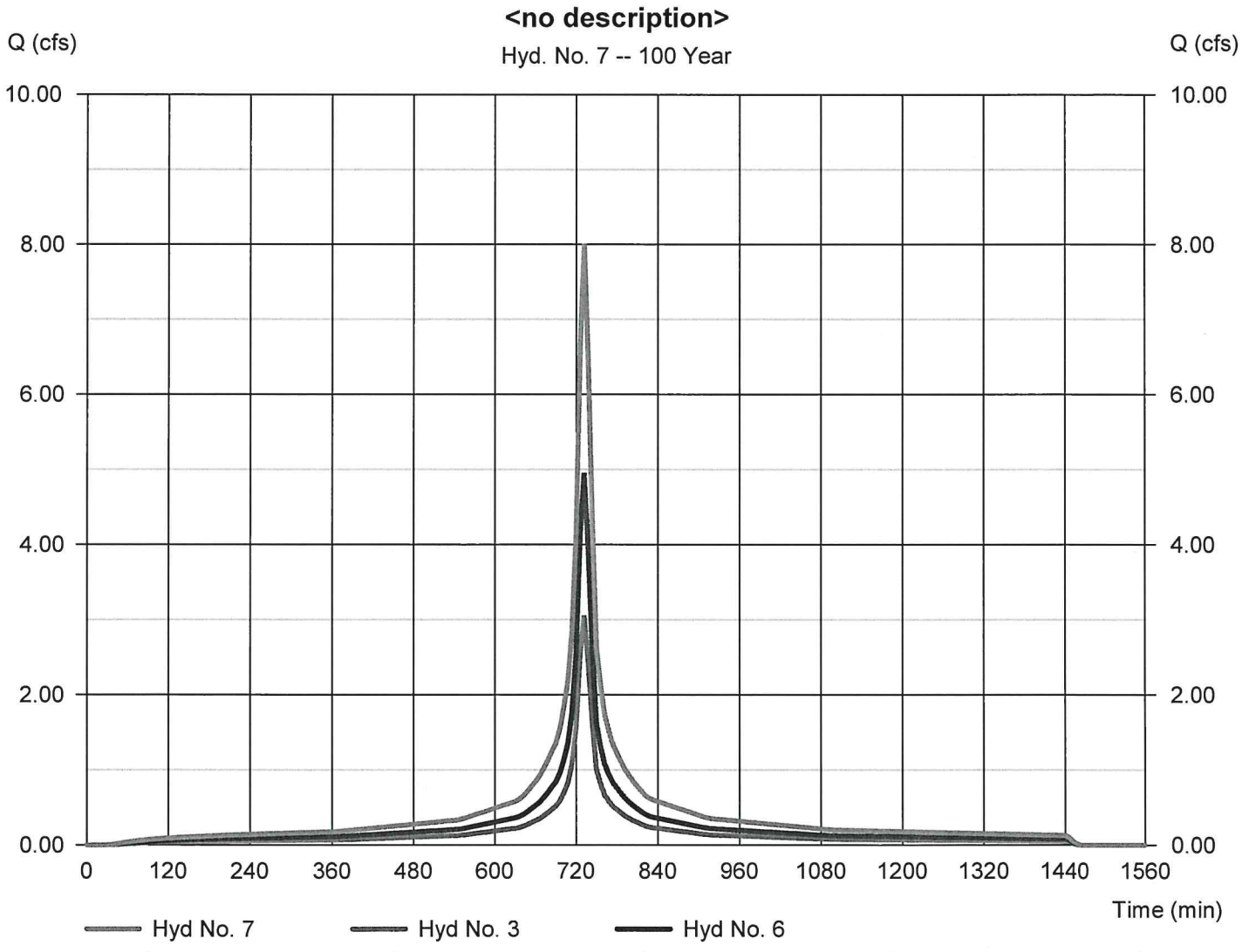


Hydrograph Report

Hyd. No. 7

<no description>

Hydrograph type	= Combine	Peak discharge	= 8.009 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 39,493 cuft
Inflow hyds.	= 3, 6	Contrib. drain. area	= 0.000 ac



Hydraflow Rainfall Report

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

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

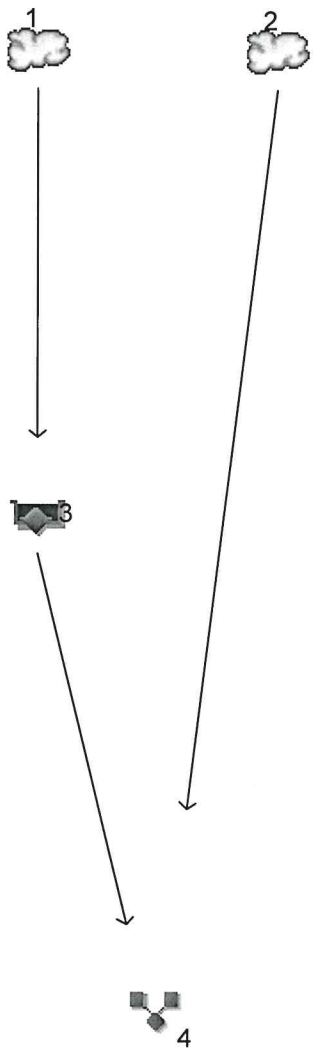
Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	0.00	0.00	4.26	0.00	0.00	7.30	0.00
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.39	0.00	0.00	5.18	6.42	0.00	8.69

HYDROGRAPH
PROPOSED CONDITIONS

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	Impervious to Basin
2	SCS Runoff	Impervious Bypass
3	Reservoir	Basin
4	Combine	<no description>

Hydraflow Table of Contents

Proposed Revised.gpw

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Friday, 03 / 20 / 2020

Watershed Model Schematic 1

Hydrograph Return Period Recap 2

2 - Year

Summary Report 3

Hydrograph Reports 4

Hydrograph No. 1, SCS Runoff, Impervious to Basin 4

Hydrograph No. 2, SCS Runoff, Impervious Bypass 5

Hydrograph No. 3, Reservoir, Basin 6

Pond Report - Detention Basin 7

Hydrograph No. 4, Combine, <no description> 8

10 - Year

Summary Report 9

Hydrograph Reports 10

Hydrograph No. 1, SCS Runoff, Impervious to Basin 10

Hydrograph No. 2, SCS Runoff, Impervious Bypass 11

Hydrograph No. 3, Reservoir, Basin 12

Hydrograph No. 4, Combine, <no description> 13

25 - Year

Summary Report 14

Hydrograph Reports 15

Hydrograph No. 1, SCS Runoff, Impervious to Basin 15

Hydrograph No. 2, SCS Runoff, Impervious Bypass 16

Hydrograph No. 3, Reservoir, Basin 17

Hydrograph No. 4, Combine, <no description> 18

100 - Year

Summary Report 19

Hydrograph Reports 20

Hydrograph No. 1, SCS Runoff, Impervious to Basin 20

Hydrograph No. 2, SCS Runoff, Impervious Bypass 21

Hydrograph No. 3, Reservoir, Basin 22

Hydrograph No. 4, Combine, <no description> 23

IDF Report 24

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	2.132	-------	-------	3.279	4.072	-------	5.521	Impervious to Basin
2	SCS Runoff	------	-------	1.000	-------	-------	1.538	1.910	-------	2.590	Impervious Bypass
3	Reservoir	1	-------	0.596	-------	-------	2.106	3.061	-------	4.265	Basin
4	Combine	2, 3	-------	1.491	-------	-------	3.203	4.576	-------	6.366	<no description>

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

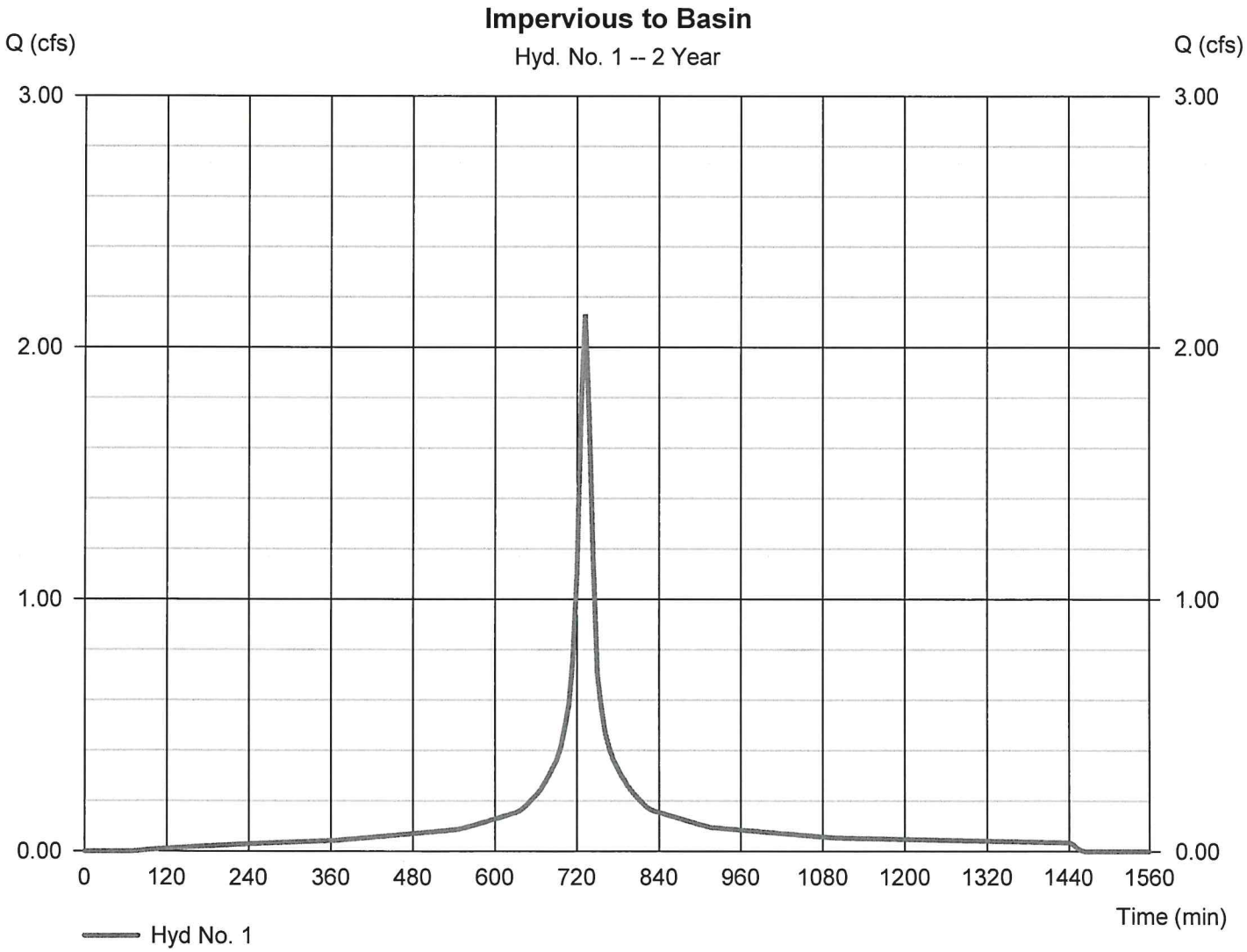
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.132	6	732	10,260	------	------	------	Impervious to Basin
2	SCS Runoff	1.000	6	732	4,813	------	------	------	Impervious Bypass
3	Reservoir	0.596	6	756	10,254	1	152.02	2,765	Basin
4	Combine	1.491	6	732	15,067	2, 3	------	------	<no description>

Hydrograph Report

Hyd. No. 1

Impervious to Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 2.132 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 10,260 cuft
Drainage area	= 0.955 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.39 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources Library\Stormwater\Storm Distributions\NJ-Type 484		

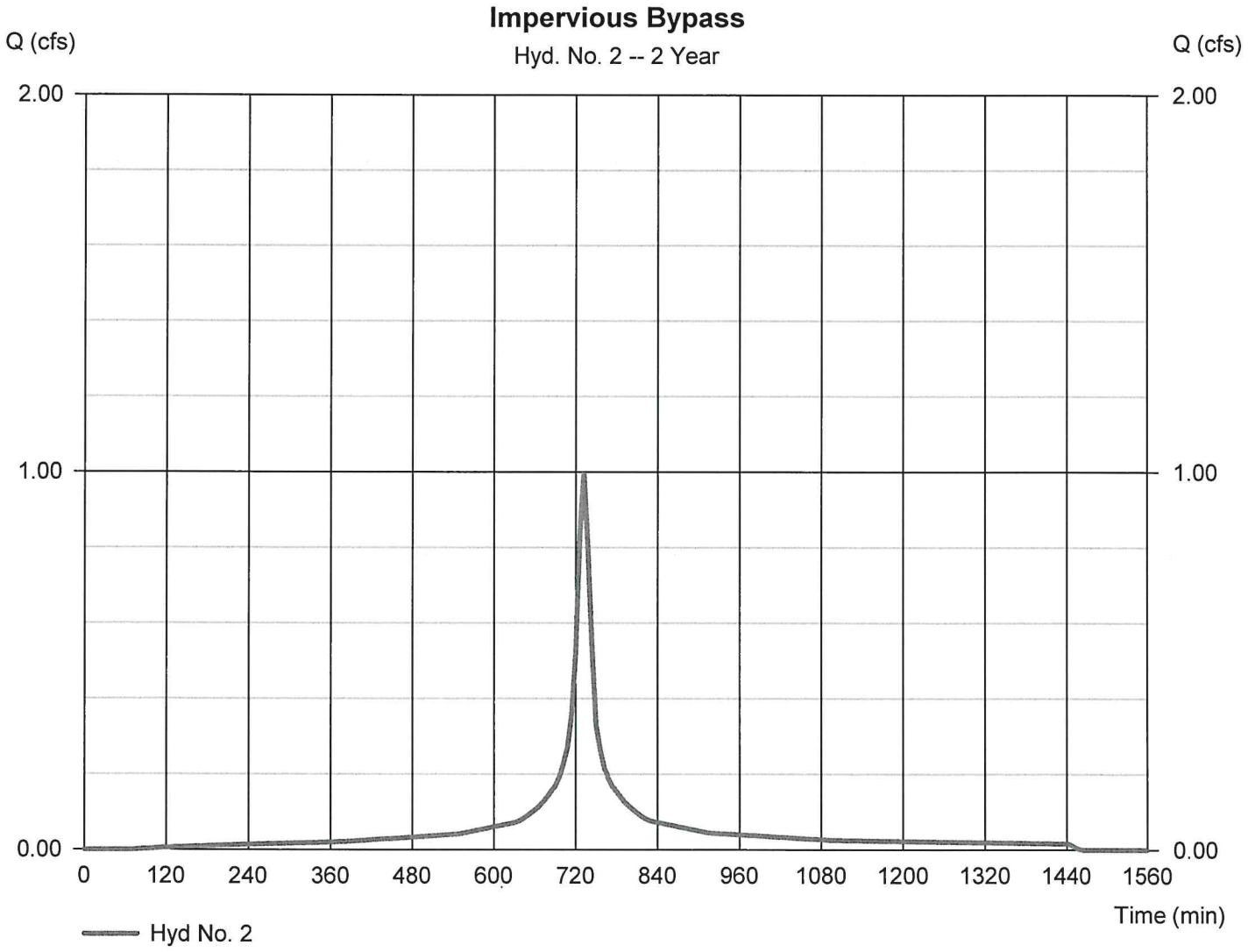


Hydrograph Report

Hyd. No. 2

Impervious Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 1.000 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 4,813 cuft
Drainage area	= 0.448 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 3.39 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ		



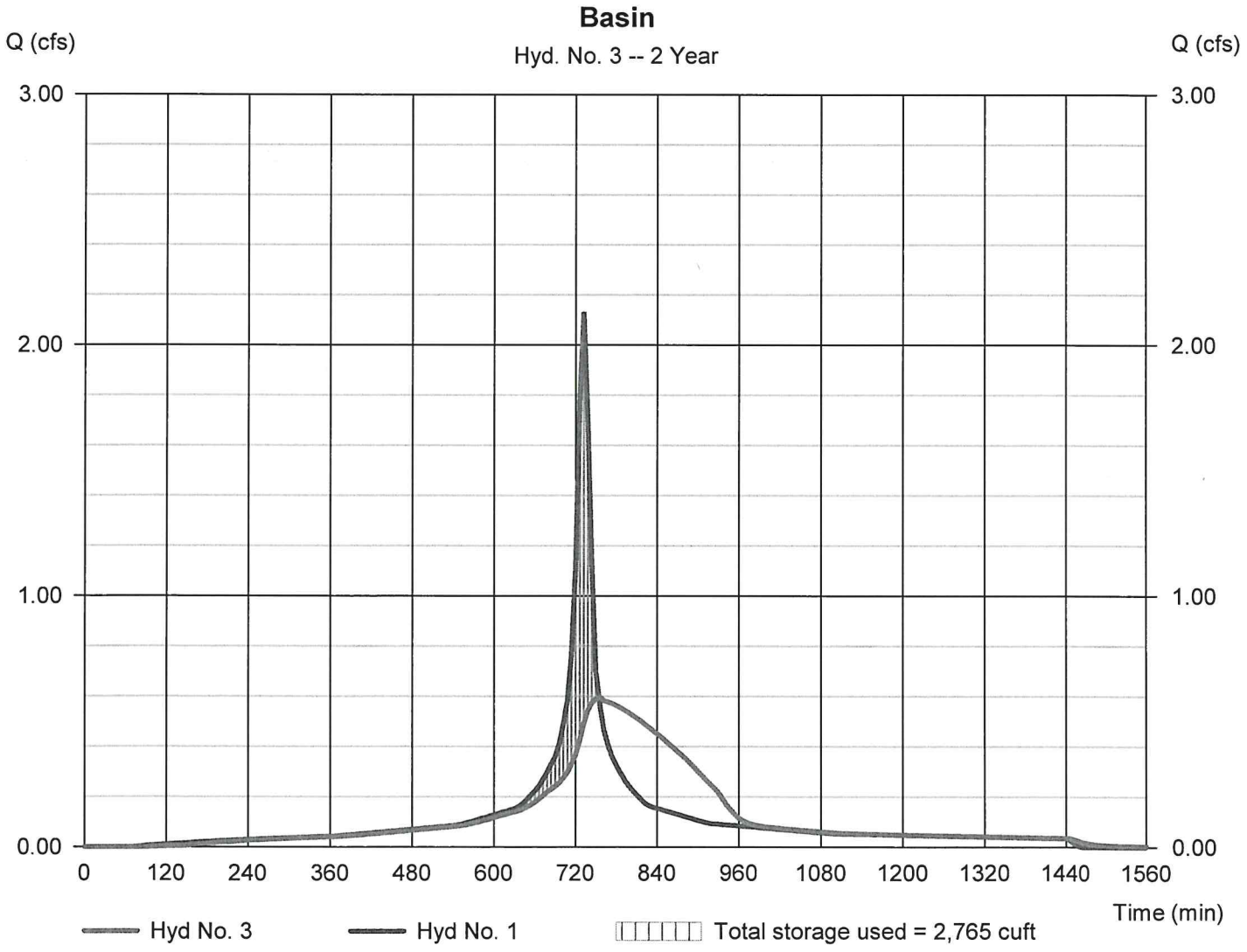
Hydrograph Report

Hyd. No. 3

Basin

Hydrograph type	= Reservoir	Peak discharge	= 0.596 cfs
Storm frequency	= 2 yrs	Time to peak	= 756 min
Time interval	= 6 min	Hyd. volume	= 10,254 cuft
Inflow hyd. No.	= 1 - Impervious to Basin	Max. Elevation	= 152.02 ft
Reservoir name	= Detention Basin	Max. Storage	= 2,765 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - Detention Basin

Pond Data

UG Chambers -Invert elev. = 150.50 ft, Rise x Span = 3.00 x 3.00 ft, Barrel Len = 250.00 ft, No. Barrels = 3, Slope = 0.00%, Headers = Yes

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	150.50	n/a	0	0
0.30	150.80	n/a	285	285
0.60	151.10	n/a	494	780
0.90	151.40	n/a	602	1,381
1.20	151.70	n/a	663	2,044
1.50	152.00	n/a	693	2,737
1.80	152.30	n/a	692	3,429
2.10	152.60	n/a	663	4,092
2.40	152.90	n/a	601	4,693
2.70	153.20	n/a	494	5,188
3.00	153.50	n/a	284	5,472

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 2.50	6.00	0.00	0.00
Span (in)	= 2.50	20.00	0.00	0.00
No. Barrels	= 3	1	0	0
Invert El. (ft)	= 150.50	152.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

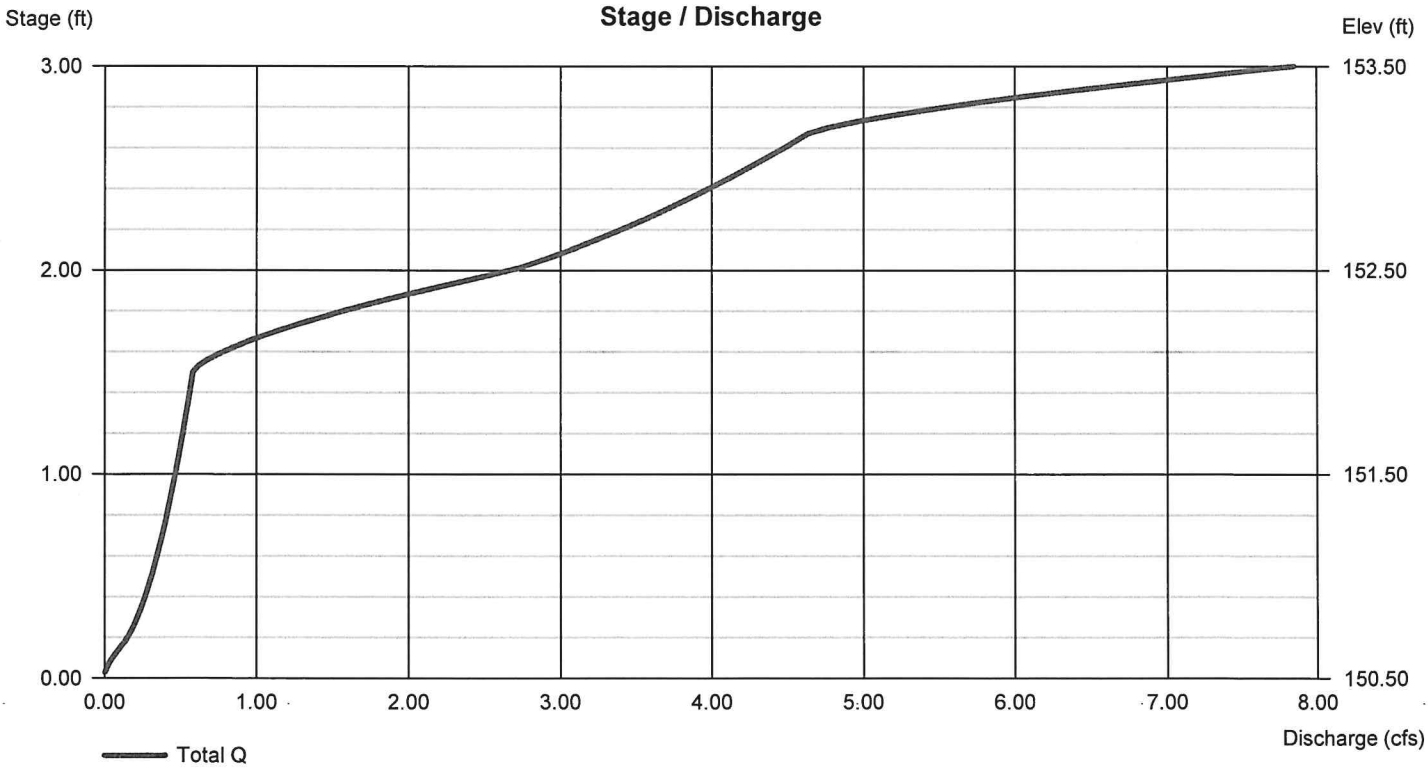
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 153.17	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfil.(in/hr) = 0.000 (by Wet area)

TW Elev. (ft) = 0.00

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

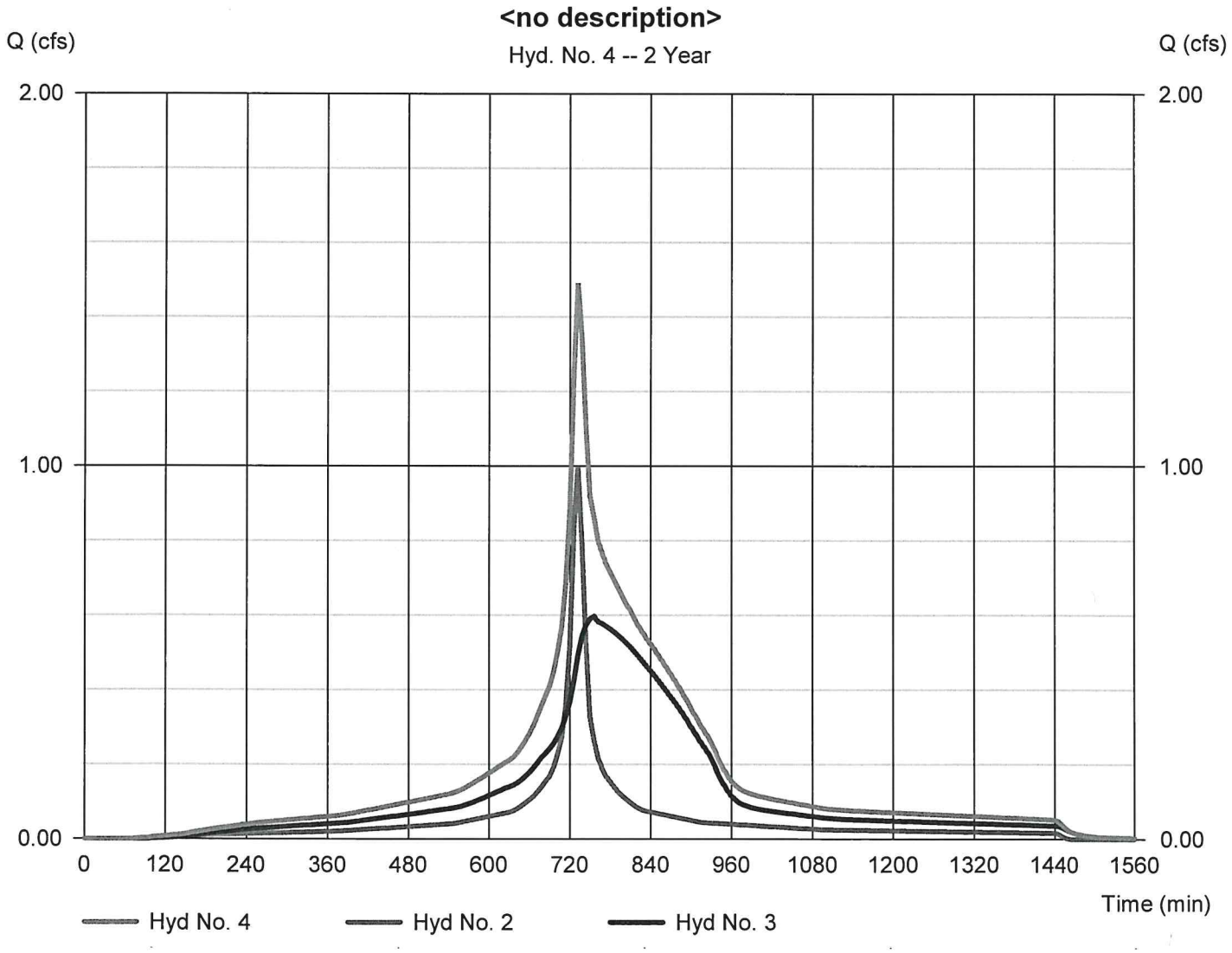


Hydrograph Report

Hyd. No. 4

<no description>

Hydrograph type	= Combine	Peak discharge	= 1.491 cfs
Storm frequency	= 2 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 15,067 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 0.448 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

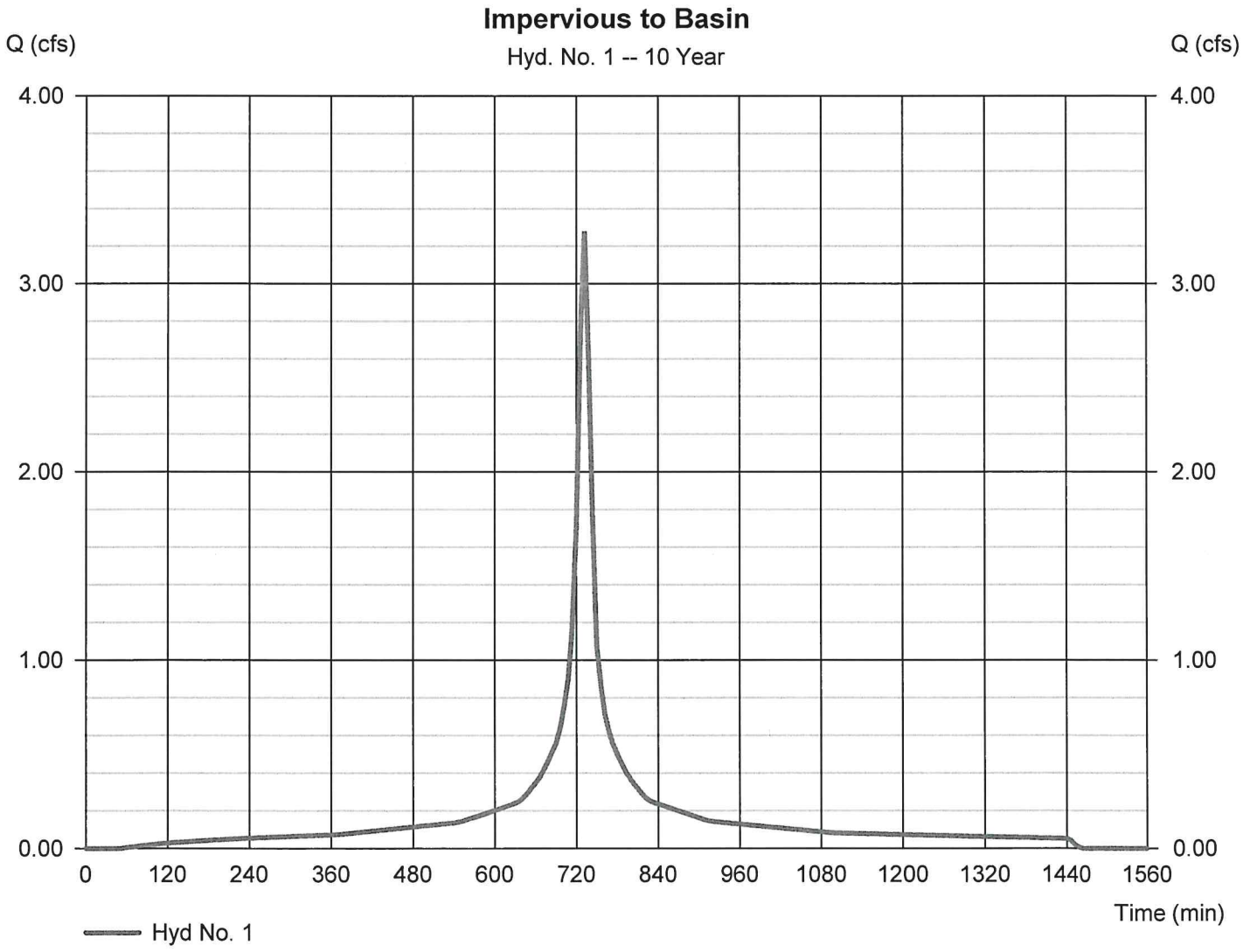
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.279	6	732	16,064	------	------	------	Impervious to Basin
2	SCS Runoff	1.538	6	732	7,536	------	------	------	Impervious Bypass
3	Reservoir	2.106	6	744	16,059	1	152.43	3,654	Basin
4	Combine	3.203	6	738	23,595	2, 3	------	------	<no description>

Hydrograph Report

Hyd. No. 1

Impervious to Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 3.279 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 16,064 cuft
Drainage area	= 0.955 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.18 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Projects\Stormwater\Storm Distributions\NJ-Typ		

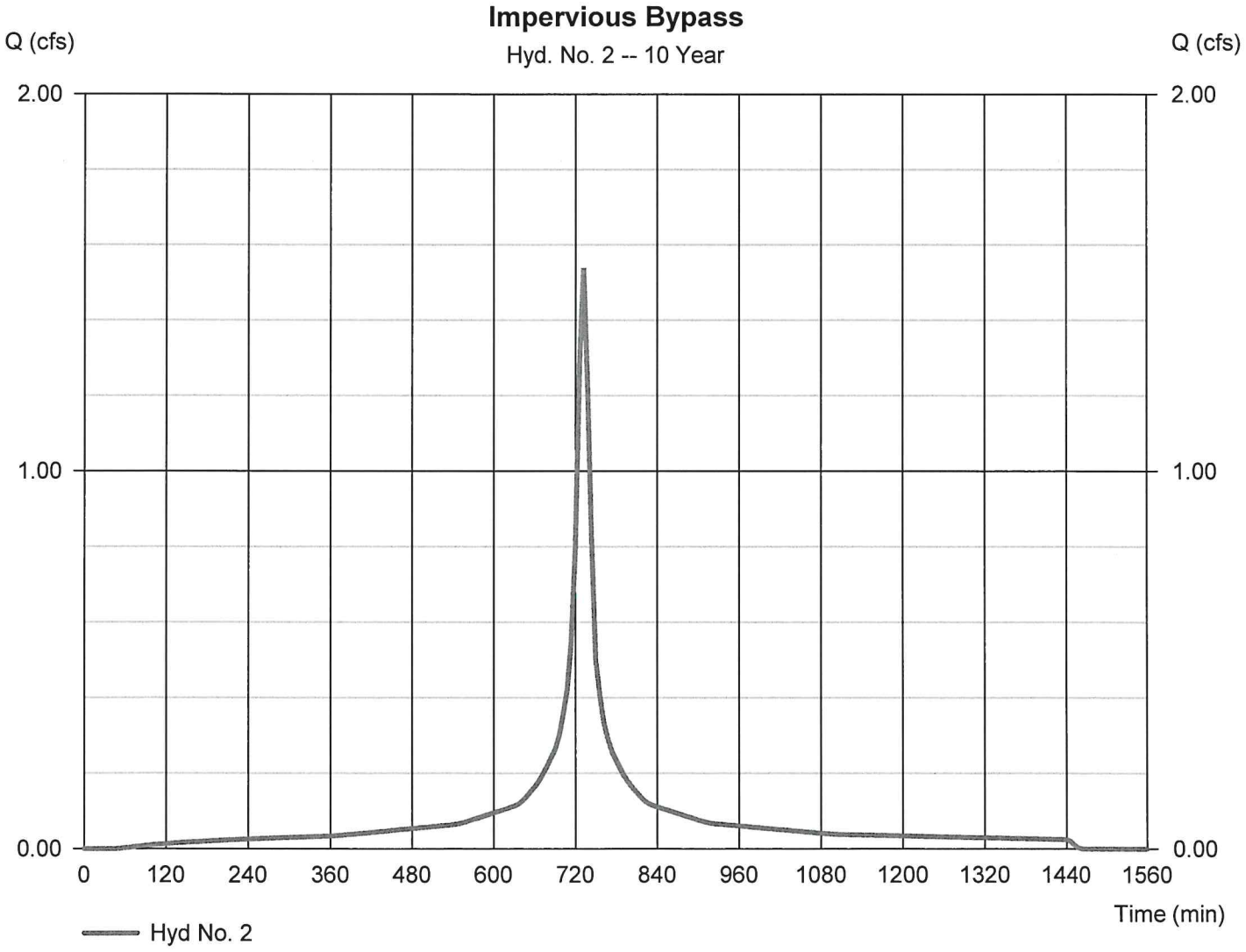


Hydrograph Report

Hyd. No. 2

Impervious Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 1.538 cfs
Storm frequency	= 10 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 7,536 cuft
Drainage area	= 0.448 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 5.18 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ		



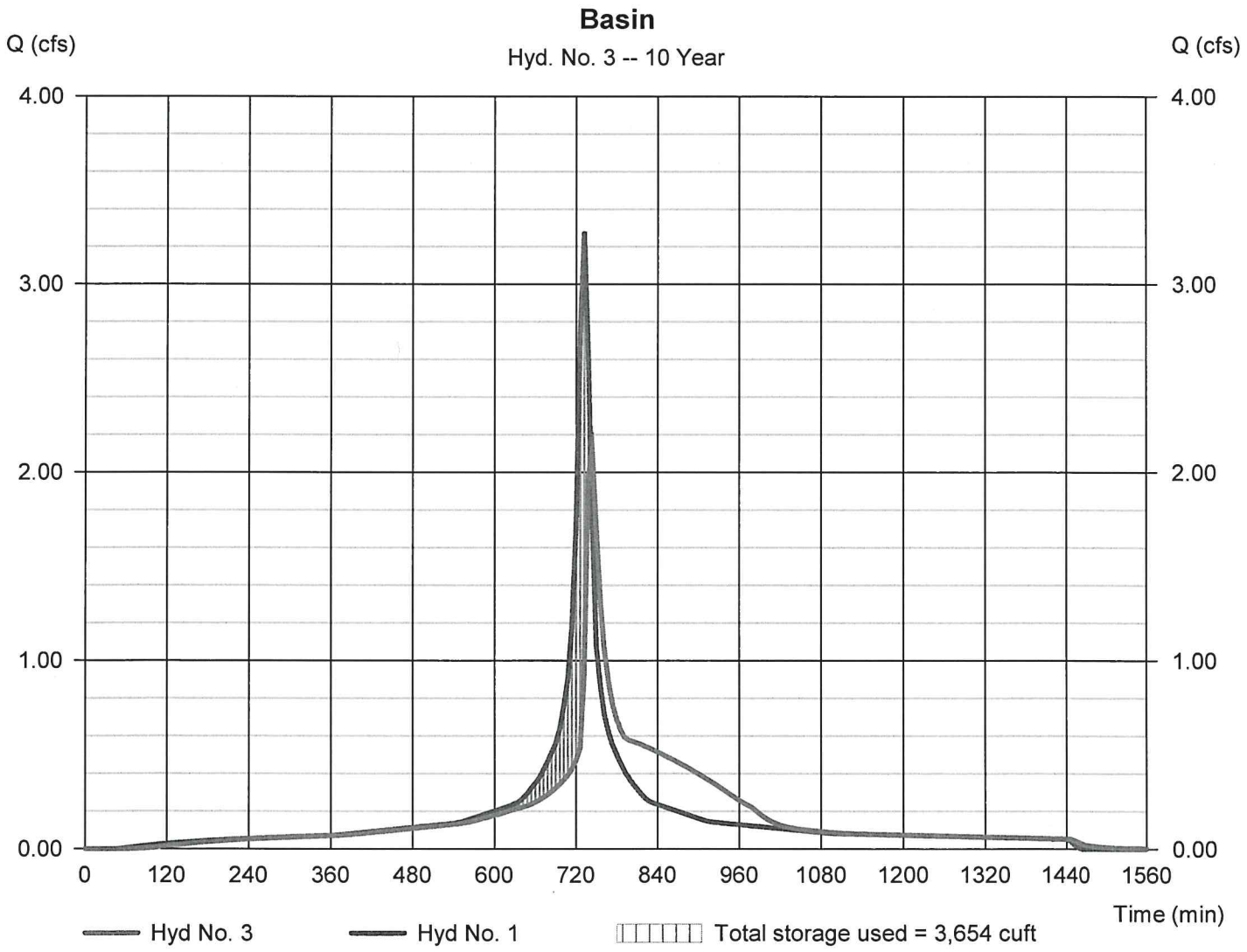
Hydrograph Report

Hyd. No. 3

Basin

Hydrograph type	= Reservoir	Peak discharge	= 2.106 cfs
Storm frequency	= 10 yrs	Time to peak	= 744 min
Time interval	= 6 min	Hyd. volume	= 16,059 cuft
Inflow hyd. No.	= 1 - Impervious to Basin	Max. Elevation	= 152.43 ft
Reservoir name	= Detention Basin	Max. Storage	= 3,654 cuft

Storage Indication method used.

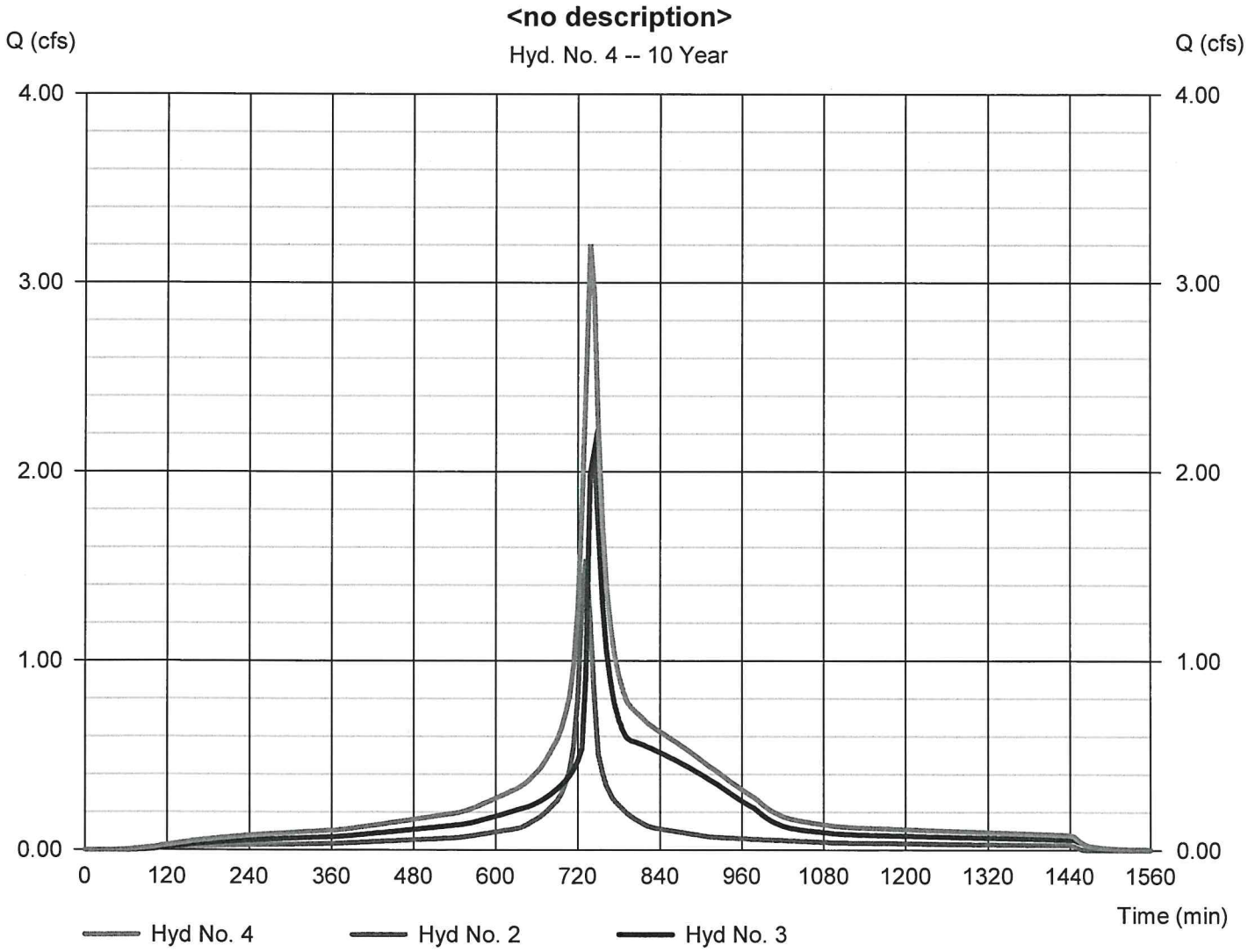


Hydrograph Report

Hyd. No. 4

<no description>

Hydrograph type	= Combine	Peak discharge	= 3.203 cfs
Storm frequency	= 10 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 23,595 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 0.448 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

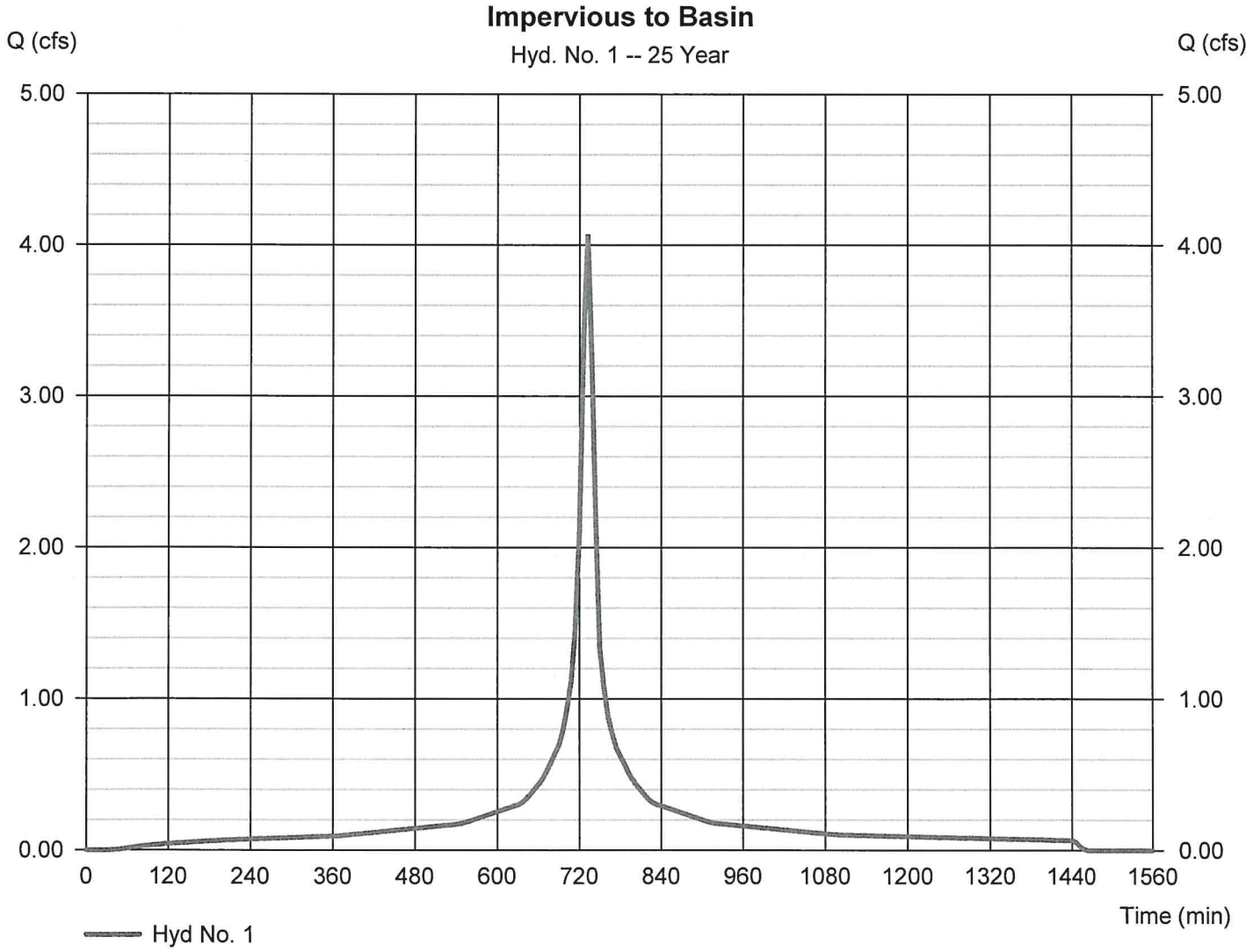
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.072	6	732	20,089	------	------	------	Impervious to Basin
2	SCS Runoff	1.910	6	732	9,424	------	------	------	Impervious Bypass
3	Reservoir	3.061	6	738	20,084	1	152.61	4,087	Basin
4	Combine	4.576	6	738	29,508	2, 3	------	------	<no description>

Hydrograph Report

Hyd. No. 1

Impervious to Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 4.072 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 20,089 cuft
Drainage area	= 0.955 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.42 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Laserfiche\Stormwater\Storm Distributions\NJ-Typ		

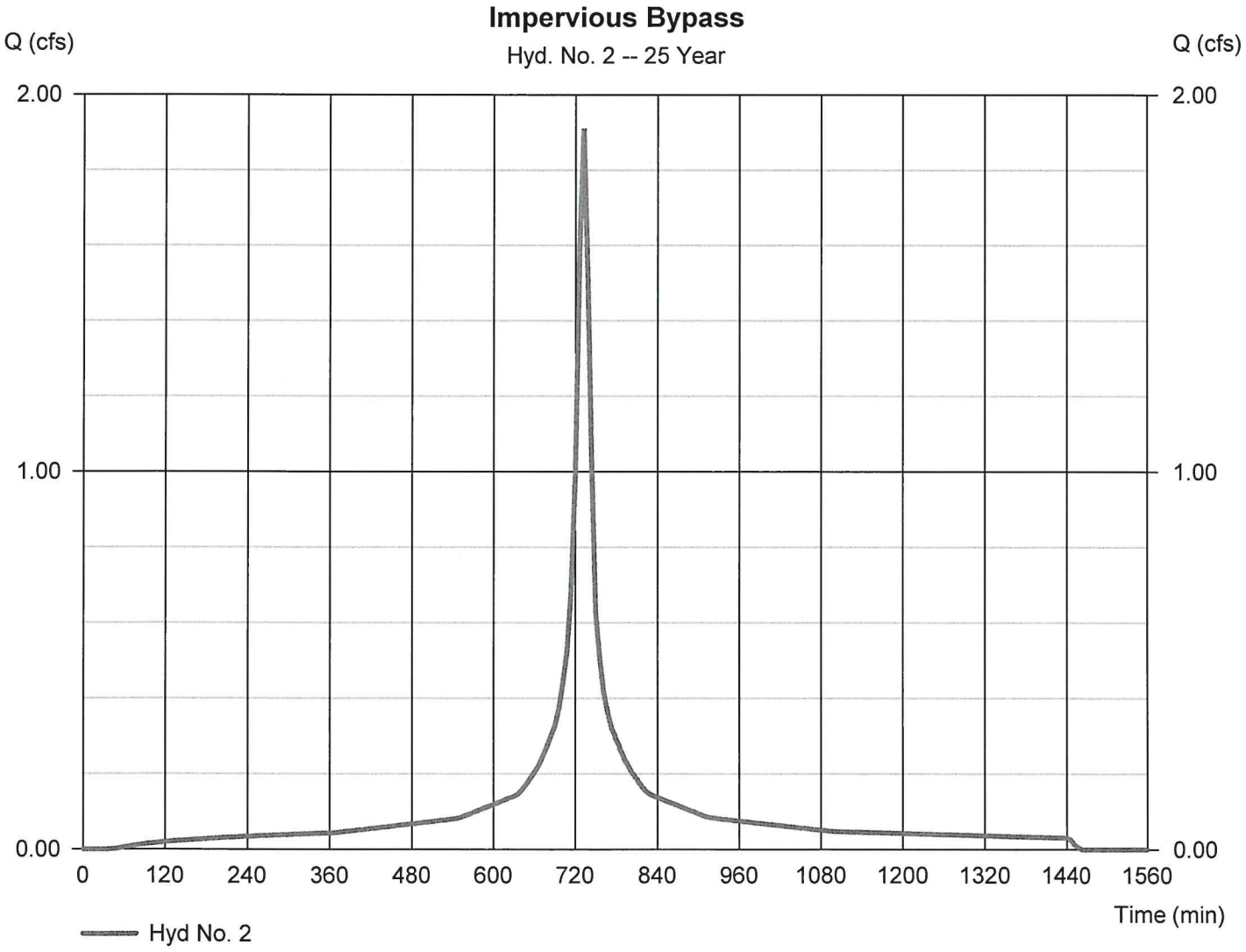


Hydrograph Report

Hyd. No. 2

Impervious Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 1.910 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 9,424 cuft
Drainage area	= 0.448 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 6.42 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ		



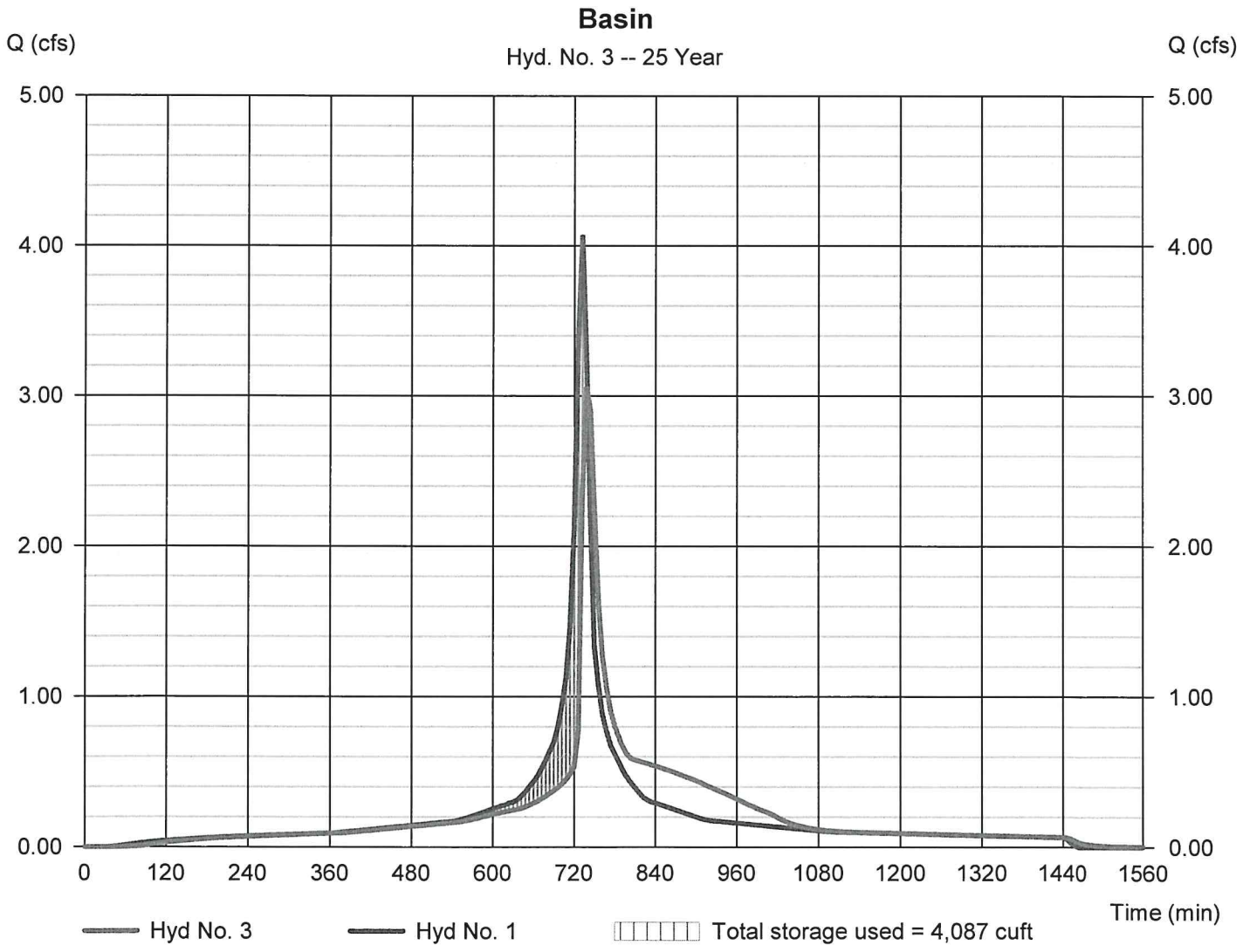
Hydrograph Report

Hyd. No. 3

Basin

Hydrograph type	= Reservoir	Peak discharge	= 3.061 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 20,084 cuft
Inflow hyd. No.	= 1 - Impervious to Basin	Max. Elevation	= 152.61 ft
Reservoir name	= Detention Basin	Max. Storage	= 4,087 cuft

Storage Indication method used.

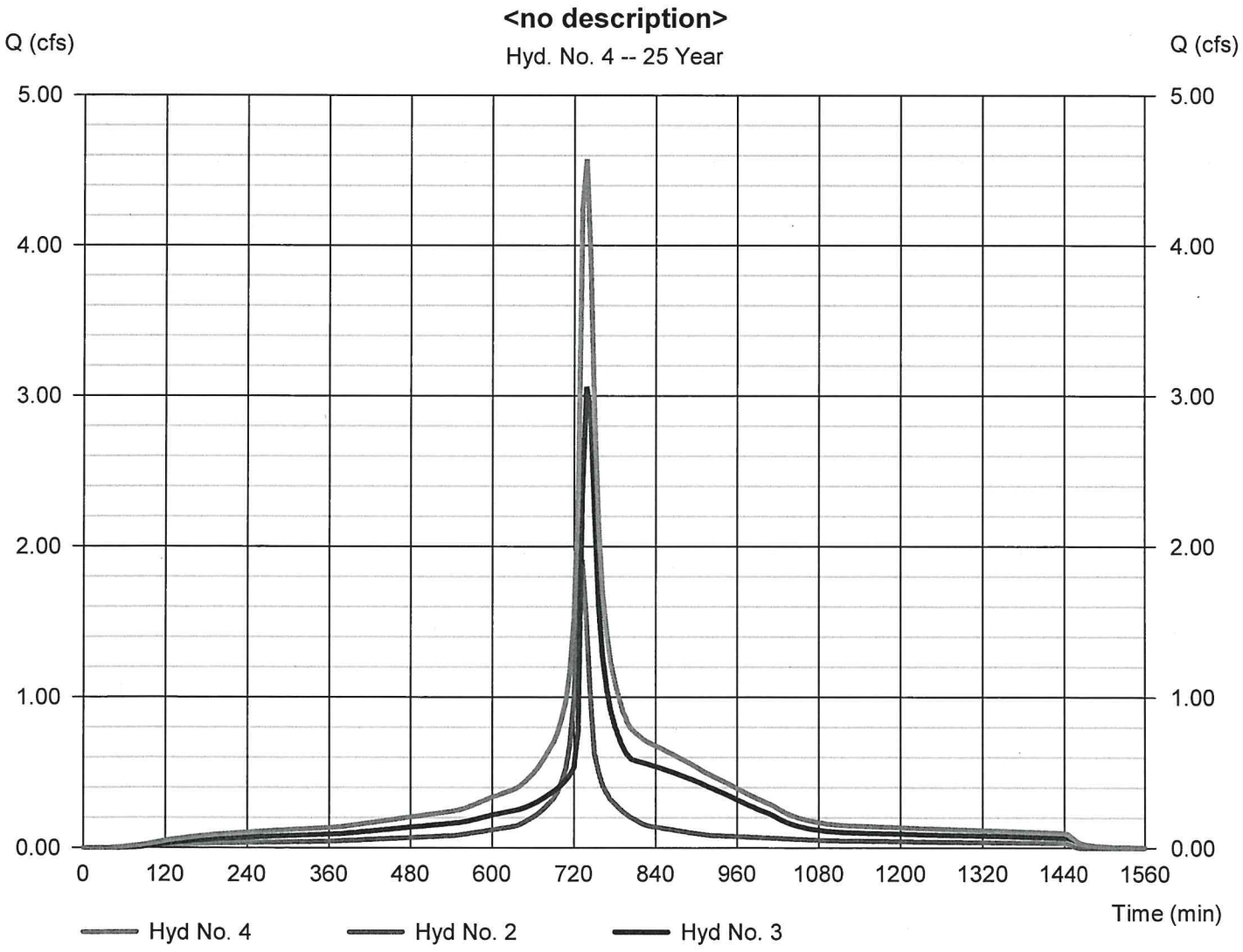


Hydrograph Report

Hyd. No. 4

<no description>

Hydrograph type	= Combine	Peak discharge	= 4.576 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 29,508 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 0.448 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020

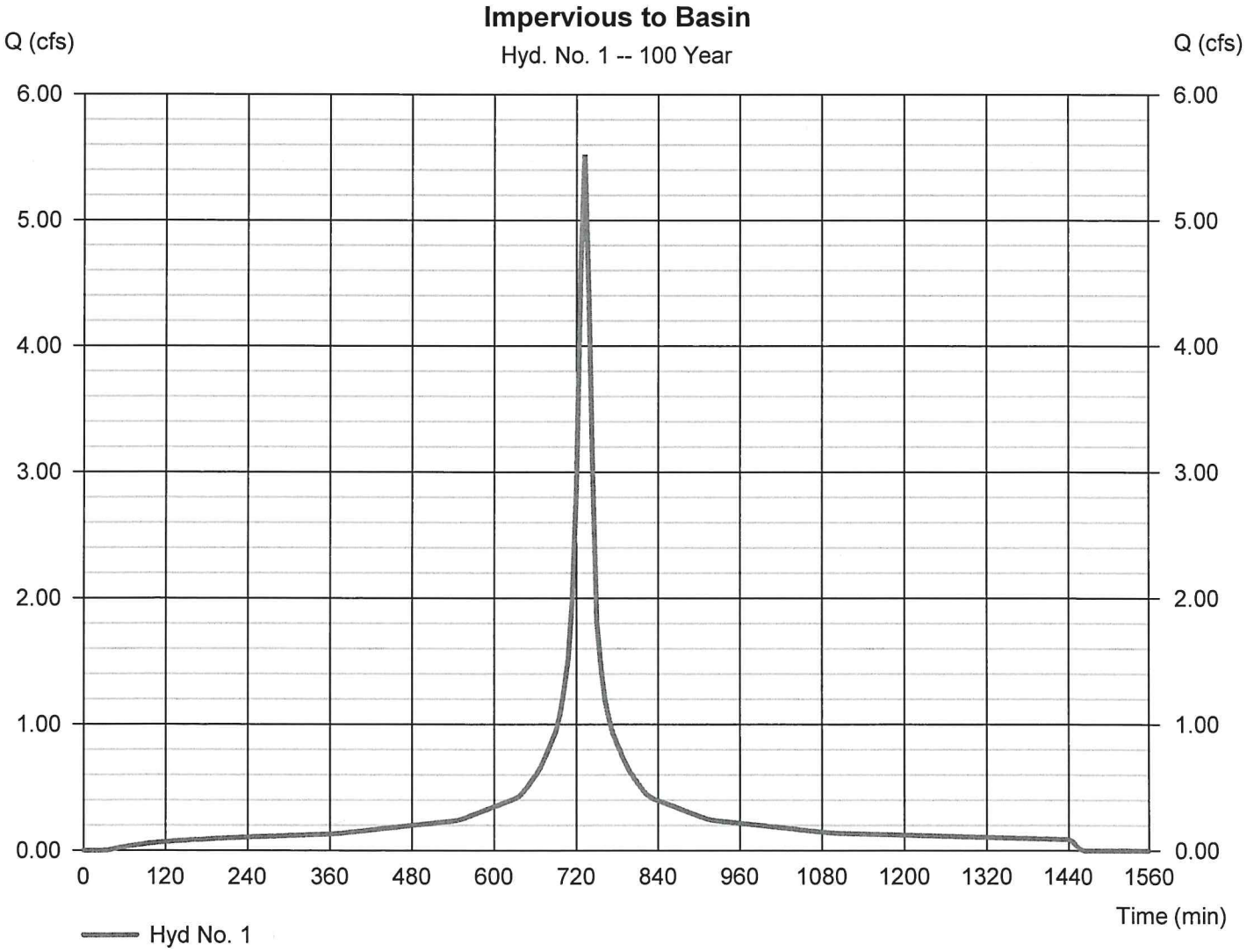
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.521	6	732	27,462	------	------	------	Impervious to Basin
2	SCS Runoff	2.590	6	732	12,883	------	------	------	Impervious Bypass
3	Reservoir	4.265	6	738	27,456	1	153.02	4,877	Basin
4	Combine	6.366	6	732	40,339	2, 3	------	------	<no description>

Hydrograph Report

Hyd. No. 1

Impervious to Basin

Hydrograph type	= SCS Runoff	Peak discharge	= 5.521 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 27,462 cuft
Drainage area	= 0.955 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.69 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Library\Stormwater\Storm Distributions\NJ-Typ	Shape factor	= 484

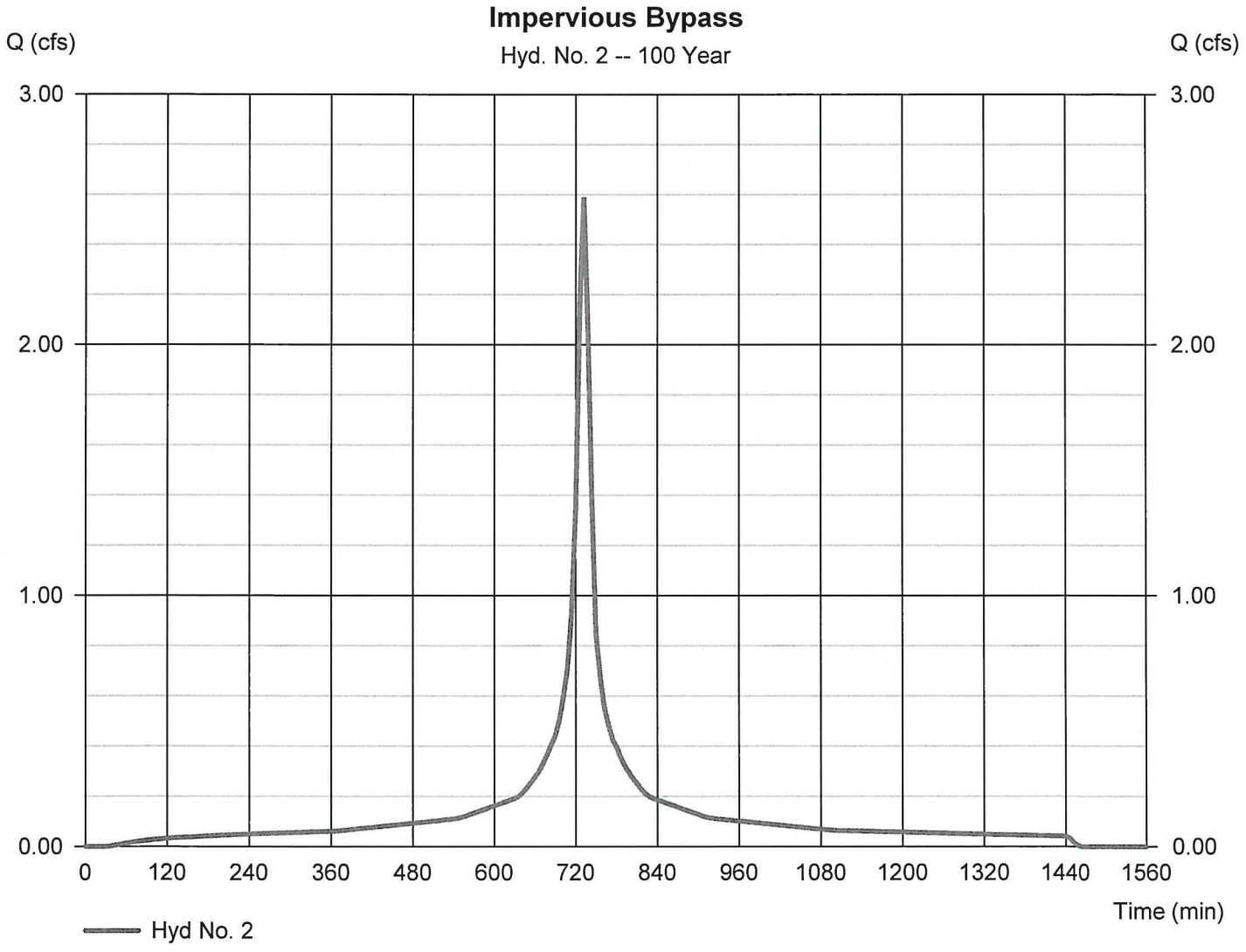


Hydrograph Report

Hyd. No. 2

Impervious Bypass

Hydrograph type	= SCS Runoff	Peak discharge	= 2.590 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 12,883 cuft
Drainage area	= 0.448 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.00 min
Total precip.	= 8.69 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Resources\Laserfiche\Stormwater\Storm Distributions\NJ-Typ		



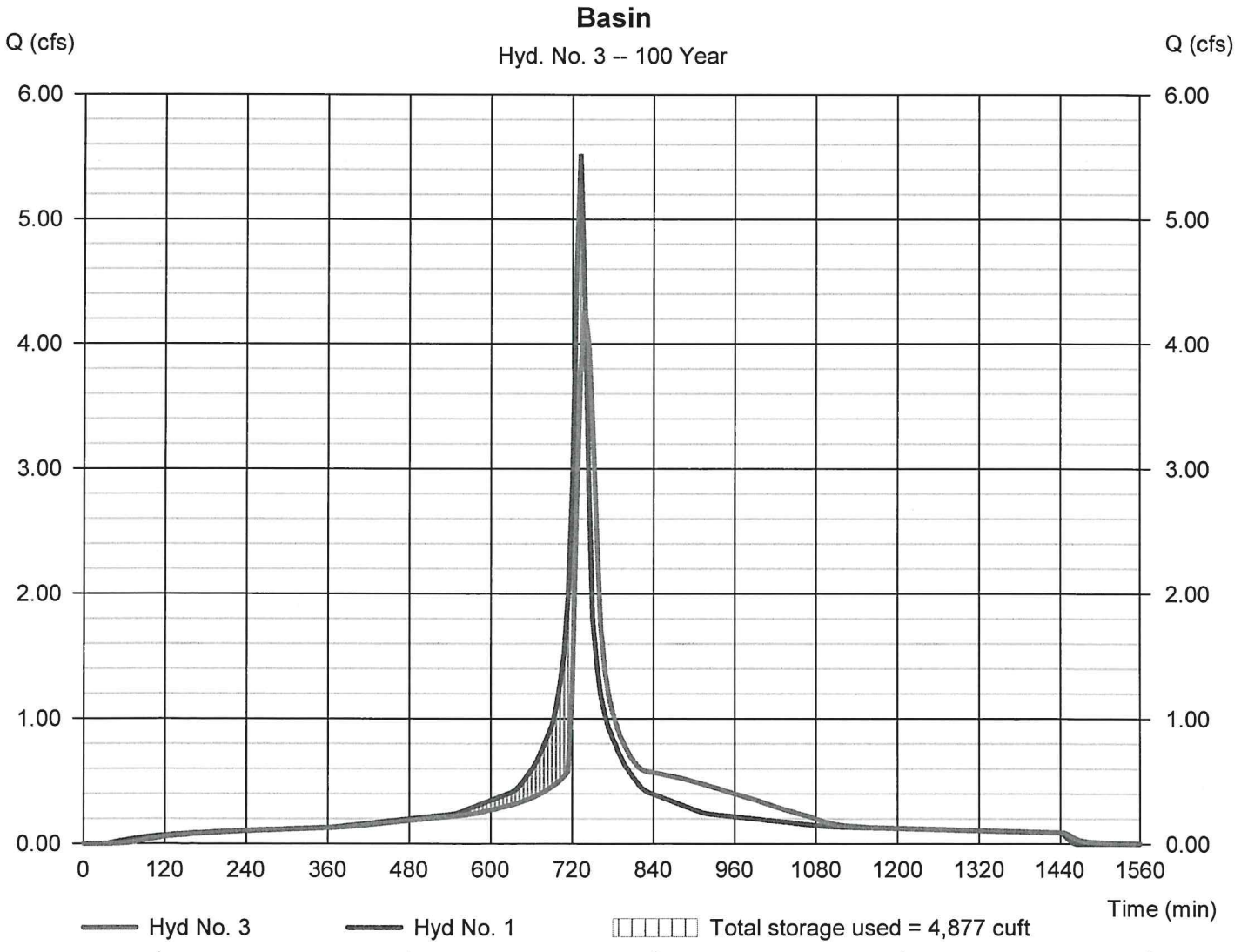
Hydrograph Report

Hyd. No. 3

Basin

Hydrograph type	= Reservoir	Peak discharge	= 4.265 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 6 min	Hyd. volume	= 27,456 cuft
Inflow hyd. No.	= 1 - Impervious to Basin	Max. Elevation	= 153.02 ft
Reservoir name	= Detention Basin	Max. Storage	= 4,877 cuft

Storage Indication method used.

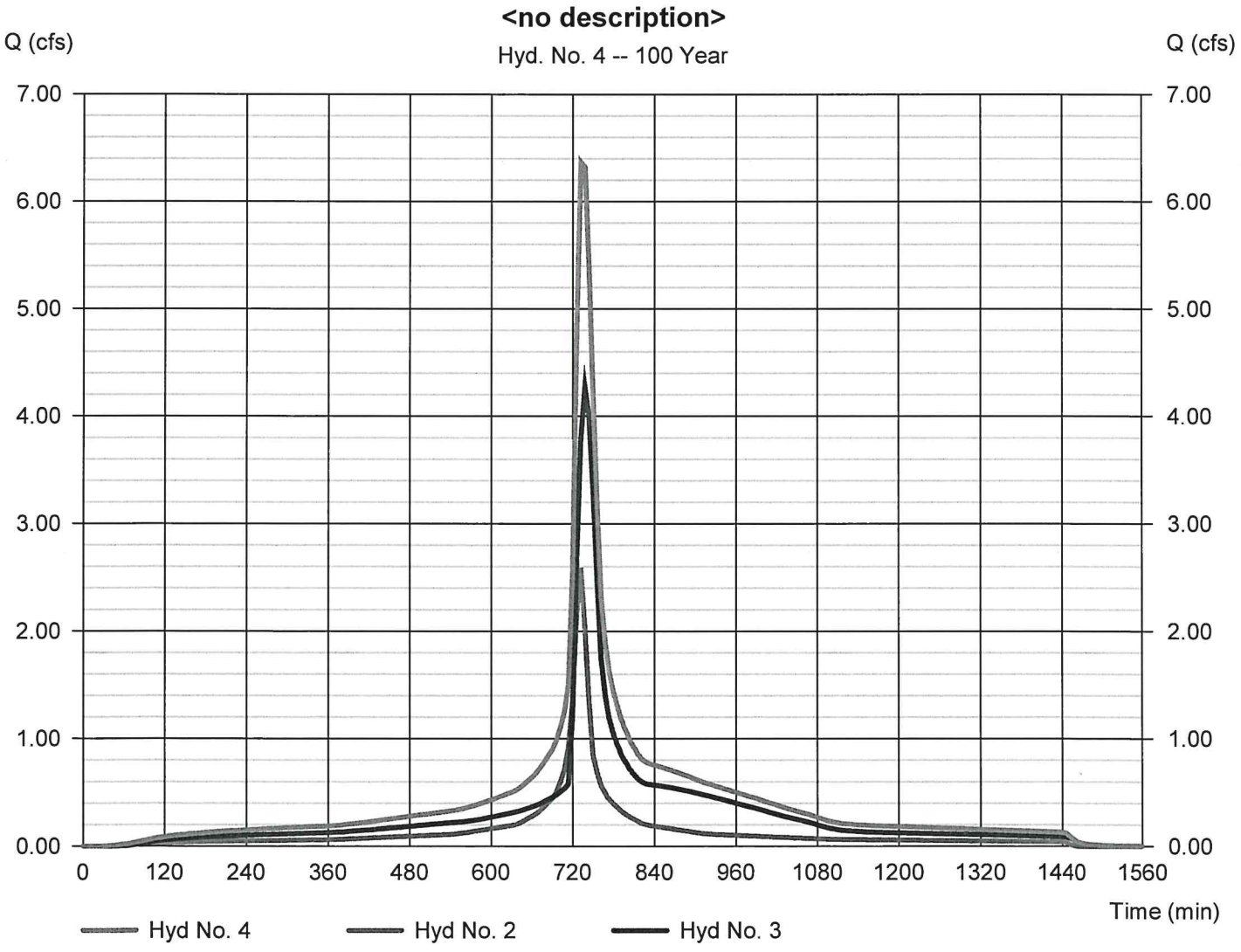


Hydrograph Report

Hyd. No. 4

<no description>

Hydrograph type	= Combine	Peak discharge	= 6.366 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 6 min	Hyd. volume	= 40,339 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 0.448 ac



Hydraflow Rainfall Report

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

File name: SampleFHA.idf

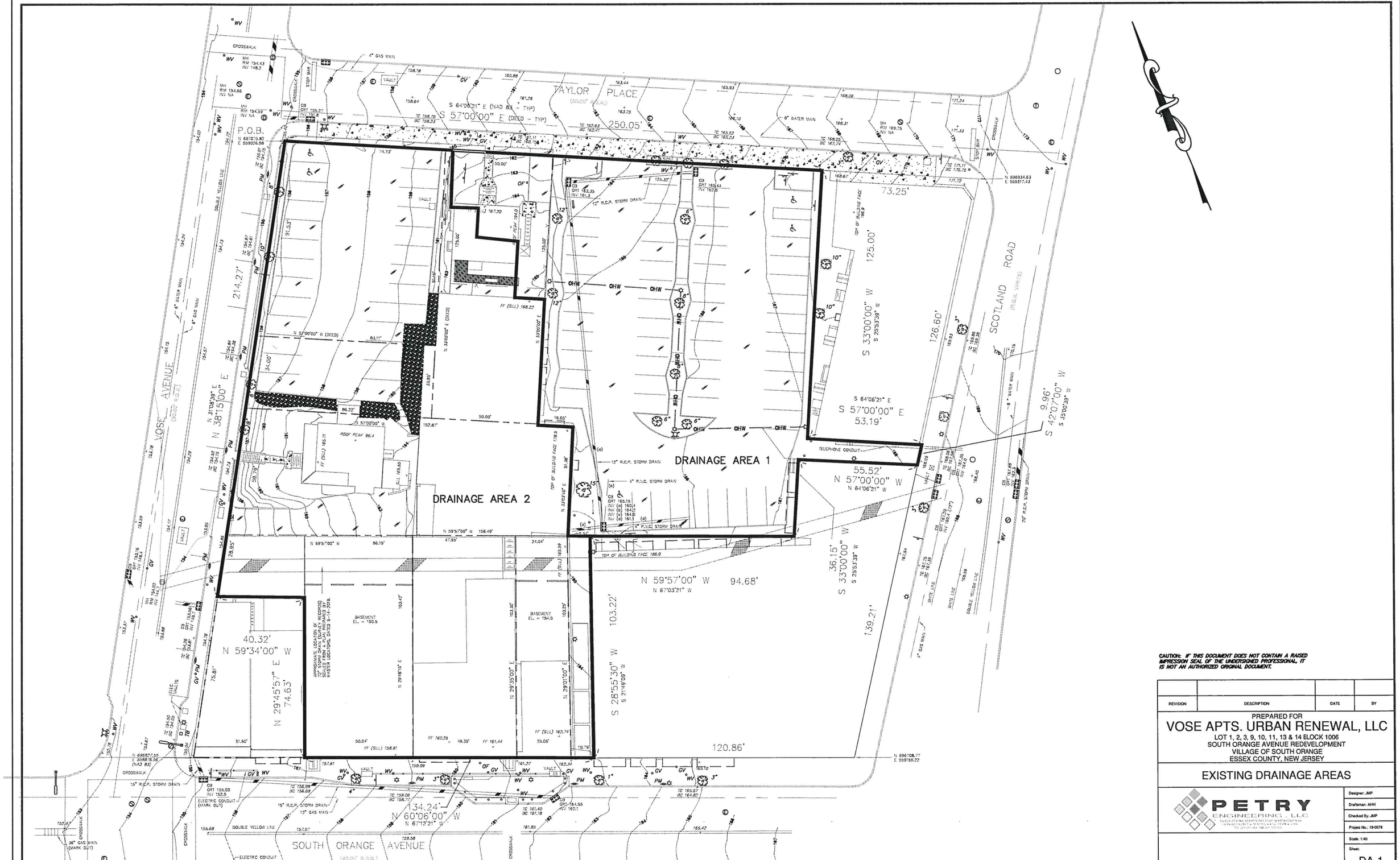
Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.69	4.61	3.89	3.38	2.99	2.69	2.44	2.24	2.07	1.93	1.81	1.70
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.57	5.43	4.65	4.08	3.65	3.30	3.02	2.79	2.59	2.42	2.27	2.15
10	7.24	6.04	5.21	4.59	4.12	3.74	3.43	3.17	2.95	2.77	2.60	2.46
25	8.25	6.95	6.03	5.34	4.80	4.38	4.02	3.73	3.48	3.26	3.07	2.91
50	9.04	7.65	6.66	5.92	5.34	4.87	4.49	4.16	3.88	3.65	3.44	3.25
100	9.83	8.36	7.30	6.50	5.87	5.36	4.94	4.59	4.29	4.03	3.80	3.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: S:\Petry Engineering Cad Projects\2019\19 0078 Lustbader - 52-62 Taylor Place\Rainfall.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	0.00	0.00	4.26	0.00	0.00	7.30	0.00
SCS 6-Hr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-1st	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	1.25	3.39	0.00	0.00	5.18	6.42	0.00	8.69



CAUTION: IF THIS DOCUMENT DOES NOT CONTAIN A RAISED IMPRESSION SEAL OF THE UNDERSIGNED PROFESSIONAL, IT IS NOT AN AUTHORIZED ORIGINAL DOCUMENT.

REVISION	DESCRIPTION	DATE	BY

PREPARED FOR

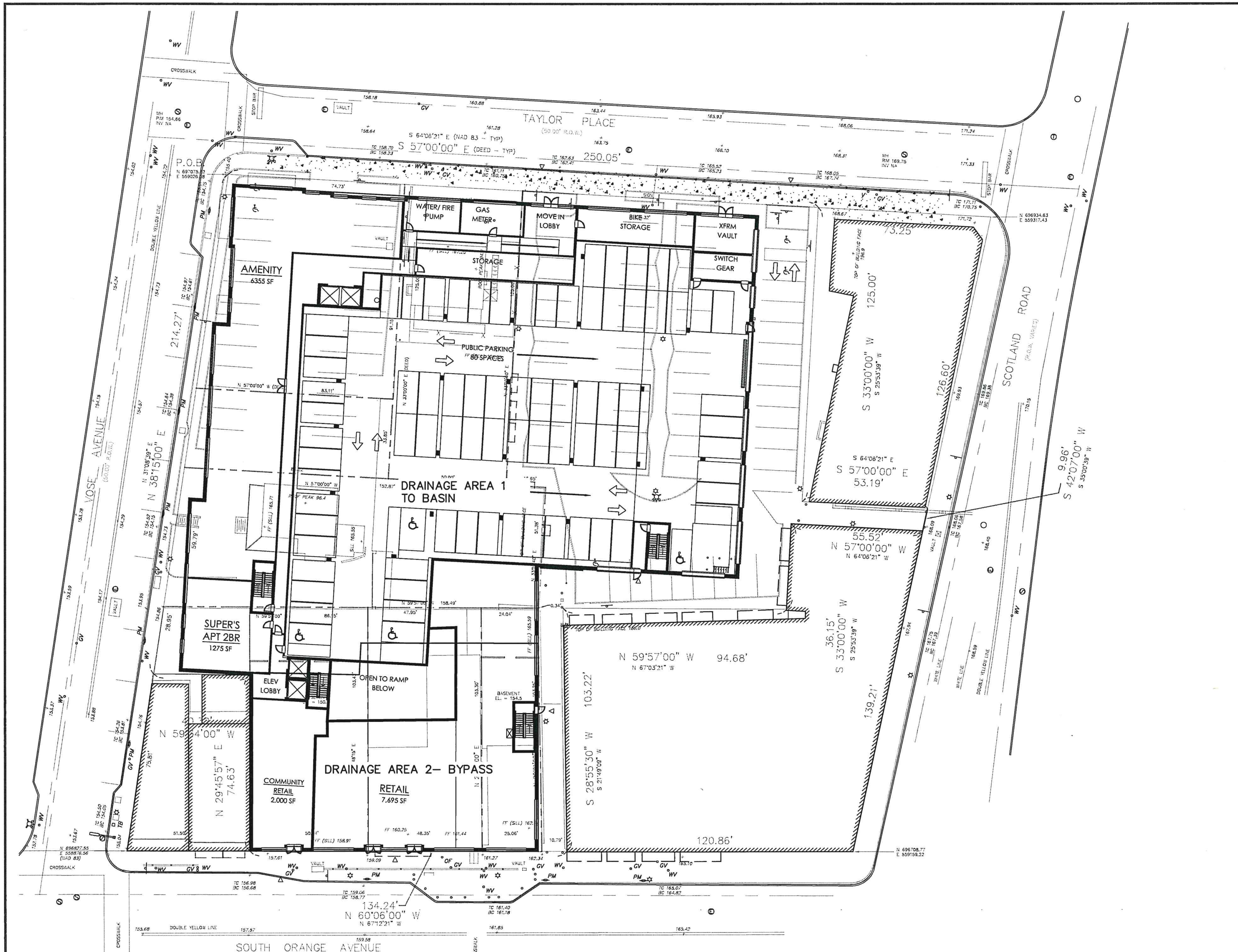
VOSE APTS. URBAN RENEWAL, LLC

LOT 1, 2, 3, 9, 10, 11, 13 & 14 BLOCK 1006
SOUTH ORANGE AVENUE REDEVELOPMENT
VILLAGE OF SOUTH ORANGE
ESSEX COUNTY, NEW JERSEY

EXISTING DRAINAGE AREAS

PETRY ENGINEERING, LLC

Designer: JMP	
Draftsman: AHH	
Checked By: JMP	
Project No.: 19-0078	
Scale: 1:40	
Sheet:	DA-1


TAYLOR PLACE
SCOTLAND ROAD
VOSE AVENUE
SOUTH ORANGE AVENUE
AMENITY
6355 SF
WATER/ FIRE PUMP
GAS METER
MOVE IN LOBBY
BIKE STORAGE
XFRM VAULT
SWITCH GEAR
STORAGE
PUBLIC PARKING 80 SPACES
DRAINAGE AREA 1 TO BASIN
SUPER'S APT 2BR
1275 SF
ELEV LOBBY
OPEN TO RAMP BELOW
COMMUNITY RETAIL
2,000 SF
DRAINAGE AREA 2– BYPASS
RETAIL
7,695 SF
S 57°00'00" E (DEED - TYP)
250.05'
N 38°15'00" E
214.27'
125.00'
S 33°00'00" W
126.60'
S 57°00'00" E
53.19'
9.96'
S 42°07'00" W
55.52'
N 57°00'00" W
N 59°57'00" W
94.68'
103.22'
S 28°55'30" W
36.15'
S 33°00'00" W
139.21'
120.86'
N 29°45'57" E
74.63'
134.24'
N 60°06'00" W
P.O.B.

REVISION	DESCRIPTION	DATE	BY

PREPARED FOR
VOSE APTS. URBAN RENEWAL, LLC
LOT 1, 2, 3, 9, 10, 11, 13 & 14 BLOCK 1006
SOUTH ORANGE AVENUE REDEVELOPMENT
VILLAGE OF SOUTH ORANGE
ESSEX COUNTY, NEW JERSEY

PROPOSED DRAINAGE AREAS

PETRY ENGINEERING, LLC

Designer: JMP
Draftsman: AHH
Checked By: JMP
Project No.: 19-0078
Scale: 1:40
Sheet:
DA-2