

STORMWATER MANAGEMENT REPORT

PREPARED FOR

**DAUGHTERS OF ISRAEL
1155 PLEASANT VALLEY WAY
LOT 12, BLOCK 171**

SUBMITTED TO:

WEST ORANGE ZONING BOARD OF ADJUSTMENT

PREPARED BY:

PETRY ENGINEERING, LLC

155 PASSAIC AVENUE

FAIRFIELD, NEW JERSEY 07004



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INTRODUCTION

Please note that the existing conditions have not been changed since the last revision. The changes that have been made include a slightly altered building footprint and incorporating the analysis of the green roof areas in the stormwater design. This has resulted in the proposed drainage areas to be revised, the proposed subsurface basins (capturing runoff from the roof areas) to reduce in size, and for surface basin #3 to increase in size.

Daughters of Israel is a licensed nursing home that includes a total of 303 beds. The facility sits on a campus setting that contains approximately 18 acres of land. It is located along the westerly side of Pleasant Valley Way, just south of its intersection with Route 10 (See Fig. 1). The parcel is directly across the street from the Essex County Golf Course (Byrne) and includes two separate driveways for ingress and egress (See Fig. 2).

The parcel is bordered to the south by Kessler Institute for Rehabilitation as well as the Kessler Foundation. It is bordered to the north and to the west by a residential development that includes Parson Drive and Skyline Drive. Approximately 60 percent of the property is currently developed, while the remaining 40 percent is primarily wooded buffer located along the abutting properties (See Fig. 3).

Within the developed portion of the property, there are a series of buildings that are interconnected, having been constructed over several decades. These buildings are serviced by an asphalt parking lot that includes a total of 236 parking stalls.

PROPOSED IMPROVEMENTS

The proposed development has been designed to accommodate an Age-in-Place community that will allow its community members the opportunity to be part of a continuum of care facility that offers independent living, assisted living, and skilled nursing units all under one roof. The goal of the project is to allow the existing nursing home to remain functional while the remainder of the project is constructed. This will require the removal of a number of the existing buildings and a staged coordination of the development. The project will be completed in several phases, which will remove and replace the existing buildings on the site as the existing buildings are able to be isolated and removed. The construction will include a complete reconstruction of the parking area.

The proposed development will be completed within the same general development limits as the existing development. The new development will be comprised of the following: 76 one-bedroom independent living units, 87 two-bedroom independent living units, 64 assisted living beds, and 84 skilled nursing beds. It will include parking for 266 vehicles in a surface lot as well as 115 parking spaces for Independent Living residents in a covered parking lot beneath the building.



The proposed development will be serviced by four detention basins, two subsurface, and two surface basins.

METHODOLOGY

The USDA Natural Resources Conservation Service (NRCS) methodology described in the Technical Release 55 – Urban Hydrology for Small Water Sheds (TR-55) is 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 are analyzed separately. The rainfall-duration-frequency data was taken from the NOAA National Weather Service (See attached). The NRCS Type D Design Storm Rainfall Distribution was used to analyze both pre-and post-conditions. Hydraflow Hydrographs Extension 2021 Modeling Software was used to compute the site's pre and post-development runoff.

EXISTING CONDITIONS

The existing conditions was analyzed to include the entire property and any offsite areas that currently drain onto the property. The existing drainage area was broken into 7 drainage areas totaling 20.16 acres. It should be noted that all open space within the existing Limit of Disturbance was modeled as Open Space – D, since it was already previously disturbed. Each of these drainage areas is explained in further detail below.

DRAINAGE AREA 1A (DA-1A)

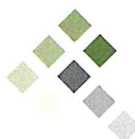
Drainage Area 1A consists of 6.97 acres of both pervious and impervious surfaces that drain via storm sewers to the existing detention basin onsite. See below for a more detailed analysis of the existing detention basin. The pervious surface, 6.09 acres, consists of wooded and landscaped areas. The impervious surface, 0.88 was calculated for this drainage area. A time of concentration of 14.25 minutes was calculated for this drainage area.

DRAINAGE AREA 1B (DA-1B)

Drainage Area 1B consists of 0.24 acres of pervious surface that drains directly into the existing surface basin. These pervious areas are comprised primarily of existing wooded areas. A time of concentration of 9.78 minutes was calculated for this drainage area.

DRAINAGE AREA 2 (DA-2)

Drainage Area 2 consists of 0.60 acres of pervious area, which currently flows from the subject property and onto Kessler's driveway before making its way into the storm sewer system on Pleasant Valley Way. This drainage area includes both wooded areas along with some landscaped and lawn areas. A time of concentration of 10.14 minutes was calculated for this drainage area.



DRAINAGE AREA 3 (DA-3)

Drainage Area 3 consists of 4.54 acres of both pervious and impervious surfaces that drain to via onsite storm sewers directly into the storm sewer located in Pleasant Valley Way. The pervious area, 2.44 acres, consists of a large wooded area along with onsite landscape islands, lawns, and planting beds. The impervious area, 2.10 acres, consists of parking lots, drive aisles, and sidewalks. A time of concentration of 10.47 minutes was calculated for this drainage area.

DRAINAGE AREA 4 (DA-4)

Drainage Area 4 consists of 1.25 acres of mostly pervious surfaces which drain directly onto Pleasant Valley Way, where it will ultimately flow into the storm sewers in the road. The pervious area, 1.22 acres, consists primarily of lawn and landscaped areas, with some wooded sections as well. The impervious area, 0.03 acres, consists of a small portion of the existing driveway that bypasses the onsite storm sewers. A time of concentration of 9.59 minutes was calculated for this drainage area.

DRAINAGE AREA 5 (DA-5)

Drainage Area 5 consists of 3.13 acres of both pervious and impervious surfaces, which are collected through a series of storm sewers that ultimately connect directly to the existing storm sewers within Pleasant Valley Way. The pervious area, 2.59 acres, consists predominately of wooded areas and along with some landscaped and lawn areas. The impervious surfaces, 0.54 acres, include portions of the existing parking lot and sidewalks. A time of concentration of 13.63 minutes was calculated for this drainage area.

DRAINAGE AREA 6 (DA-6)

Drainage Area 6 consists entirely of the existing roof area, 3.43 acres. The existing roof appears to be tied directly into the existing storm sewers within Pleasant Valley Way. A time of concentration of 6 minutes was used in the analysis, which is the minimum time used for this analysis.

EXISTING BASIN

Currently, the subject property contains a detention basin. This detention basin is served by a series of storm sewers that collect runoff from the existing parking lot and wooded areas in the rear of the site. It should be noted that based on record documents, this basin had existed on site since at least 1981, before the current stormwater regulations were in effect. Nevertheless, we have included the basin routing into our existing conditions model.

The existing detention basin has 14,340 cubic feet of storage. Over the years, the basin has become severely degraded and filled with debris and overgrowth, which has resulted in the outlet structure silting up. Based on historic mapping, the outlet structure has an orifice at the bottom, and a wier at the top. Our model reflects this same setup however the size of the bottom orifice is unknown. As such, we have assumed, conservatively, that the existing basin is served only by a 3" orifice located at the bottom. This assumption results in the least amount of runoff in the pre-construction conditions.



CURVE NUMBERS

Table 1 – Curve Number (Existing Conditions)

Description	Hydrologic Group	Curve Number
Woods	A	30
Woods	C	70
Woods	D	77
Open Space	C	74
Open Space	D	80
Impervious	A/B/C/D	98

PEAK FLOWS

Using the information described above, the peak flows during the 2-, 10-, and 100-year storm events were calculated. Table 2 below summarizes the peak flows during each storm event. (See attached Hydraflow Output for Existing Conditions Hydrographs, CN Values, and Time of Concentration Calculations.)

Table 2 – Existing Peak Runoff Rates

Storm Event	Existing Site Runoff
2 Year	20.08 cfs
10 Year	45.76 cfs
100 Year	96.75 cfs

POST-DEVELOPMENT RUNOFF TARGET

Since the improvements on the site are considered a major development, proposed runoff rates shall meet the NJDEP Stormwater regulations and reductions for the 2, 10, and 100-year storm events. NJ standards require that the preconstruction runoff rates are to be reduced to at least 50, 75, and 80, respectively, for the areas which are to be disturbed or developed.

The proposed reductions will only account for the areas of the site, which are being disturbed as a result of the proposed development. The equations below were used to determine the reductions based on the limit of disturbance, as shown on the Soil Erosion and Sediment Control Plan.

$$2 \text{ Year Reduction} = \frac{10.50(0.50)}{20.16} = \mathbf{0.260}$$

$$10 \text{ Year Reduction} = \frac{10.50(0.25)}{20.16} = \mathbf{0.130}$$

$$100 \text{ Year Reduction} = \frac{10.50(0.20)}{20.16} = \mathbf{0.104}$$



Table 3 – Target Runoff Rates

Storm Event (Yr.)	Existing Runoff Rates (cfs)	Percent Reduction	Offsite Runoff Reduction (cfs)	Total Post-Development Target Runoff (cfs)
2 Year	20.08 cfs	26.0%	20.08 (0.260) = 5.221 cfs	20.08 – 5.221 = 14.859 cfs
10 Year	45.76 cfs	13.0%	45.76 (0.130) = 5.949 cfs	45.76 – 5.949 = 39.811 cfs
100 Year	96.75 cfs	10.4%	96.75 (0.104) = 10.062 cfs	96.75 – 10.062 = 86.688 cfs

PROPOSED CONDITIONS

The same overall drainage area used in existing conditions was used for proposed conditions. This drainage area was modeled as 5 drainage areas totaling 20.16 acres. (See Fig.-2 Proposed Drainage Area Map.)

DRAINAGE AREA 1A (DA-1A)

Drainage Area 1A consists of the portion of the building to be constructed under Phase I and the associated interior courtyard. The roof area consists of 1.03 acres of mostly impervious surfaces with green roof areas throughout (See Green Roof Calcs below). The interior courtyard has been assumed to be 50% impervious for this analysis, consisting of 0.03 acres of impervious surfaces and 0.03 acres of pervious surfaces, which will be landscape and grass areas. Drainage Area 1A drains to proposed Basin #1A, a subsurface detention basin. See below for a detailed description of the basin. A time of concentration of 6 minutes was used for the roof area, which is the minimum time that can be used. Meanwhile, a time of concentration of 7.46 minutes was calculated for the courtyard area.

DRAINAGE AREA 1B (DA-1B)

Drainage Area 1B consists of the portion of the building to be constructed under Phase II and III. The roof area consists of 1.75 acres of mostly impervious surfaces with green roof areas throughout (See Green Roof Calcs below). This roofed area drains to proposed Basin #1B, a subsurface detention basin. See below for a detailed description of the basin. A time of concentration of 6 minutes was used for this drainage area, which is the minimum time that can be used.

DRAINAGE AREA 2 (DA-2)

Drainage Area 2 consists of both pervious and impervious surfaces, which will bypass the proposed basins onsite and drain into the Pleasant Valley Way ROW. The pervious area, 3.18 acres, consists of mostly landscape and grass areas along with some existing wooded areas, which are to remain. The impervious area, 1.30 acres, consists of parking areas, drive aisles, and sidewalks. A time of concentration of 10.14 minutes was calculated for this drainage area.



DRAINAGE AREA 3 (DA-3)

Drainage Area 3 consists of both pervious and impervious surfaces which drain to Basin #2. The pervious area, 5.52 acres, consist primarily of the wooded areas in the rear of the site along with some landscaped area around the proposed parking lot. It also includes the remaining two courtyard areas, both of which have been assumed to be 50% impervious surfaces. The impervious area, 1.38 acres, is mainly comprised of the proposed parking lot and surrounding walkways. A time of concentration of 14.46 minutes was calculated for this drainage area.

DRAINAGE AREA 4 (DA-4)

Drainage Area 4 consists of both pervious and impervious surfaces which drain to Basin #3. The pervious area, 4.78 acres, consists primarily of the wooded area located to the rear of the site, along with some lawn and landscape areas around the proposed building and parking lot. The impervious area, 1.15 acres, is comprised of some proposed parking lots, drive aisles, sidewalks, and patios. A time of concentration of 14.30 minutes was calculated for this drainage area.

GREEN ROOF CALCULATIONS

Drainage area 1A and drainage area 1B consist of roof areas that will incorporate green roofs. The green roofs are a modular 24" x 24", 4" deep tray, pre-vegetated, G5 system by Green Grid Roofs (See attached). To account for the reduced runoff from the green roofs within our analysis, we calculated a reduced curve number for the Phase I roof area and the Phase II/III roof area, separately (See attached calculations). The Phase I building will include a total roof area of 44,933 square feet with 4,492 square feet of green roofs. The Phase II/III building will include a total roof area of 76,224 square feet with 18,366 square feet of green roofs. After calculating the adjusted curve numbers for the 2-yr, 10-yr, and 100-yr storm events, we chose to use the highest value for the models to be conservative. The adjusted curve number for the Phase I roof area was 95 and the adjusted curve number for the Phase II/III roof area was 94.

CURVE NUMBERS

Table 4 – Curve Number (Proposed Conditions)

Description	Hydrologic Group	Curve Number
Woods	A	30
Woods	C	70
Woods	D	77
Open Space	A	39
Open Space	C	74
Open Space	D	80
Impervious	A/B/C/D	98
Phase I Roof Area	D	95
Phase II and III Roof Area	D	94



WATER QUANTITY

BASIN #1A – 1,508 CF

Detention Basin #1A is a subsurface detention basin with 1,508 cubic feet of storage. The system is comprised of 2 rows of 48" diameter HDPE pipe, each 60 feet in length. The bottom of the basin is at elevation 418.00, along with 1 – 4" x 6.5" orifice. Lastly, a 4' weir is placed at an elevation of 421.40.

BASIN #1B – 3,042 CF

Detention Basin #1B is a subsurface detention basin with 3,042 cubic feet of storage. The system is comprised of 3 rows of 48" diameter HDPE pipe, each 70 feet in length. The bottom of the basin is at elevation 404.00, along with 2 – 3" x 6" orifices. Lastly, a 4' weir is placed at an elevation of 407.15.

BASIN #2 – 16,898 CF

Detention Basin #2 is a surface basin with 16,898 cubic feet of storage. The bottom of the basin is set at elevation 414.00 along with 1 – 8" x 15" rectangular orifice. 2 – 15" x 21" orifices will be placed at elevation 416.00, and a 4' weir is placed at elevation 418.00. It should be noted that the 100-year storm event reaches an elevation of 417.96, just below the elevation of the weir. The top of the basin is set at elevation 419.00, which allows for 1 foot of freeboard.

BASIN #3 – 13,250 CF

Detention Basin #3 is another surface basin with 13,250 cubic feet of storage. The bottom of the basin is set at elevation 416.00, where 1 – 6" x 8" orifice will also be placed. 1 – 17" x 16" orifices will be placed at elevation 417.30, and finally a 4' weir will be placed at elevation 420.00. It should be noted that the 100-year storm event reaches an elevation of 419.95, just below the elevation of the weir. The top of the basin is set at 421.00, which allows for 1 foot of freeboard.

POST-DEVELOPMENT RUNOFF

Using the information described above, the peak flows during the 2-, 10-, and 100-year storm events were calculated. Table 5 below summarizes the peak flows during each storm event. (See attached Hydraflow Output for Proposed Conditions Hydrographs, CN Values, and Time of Concentration Calculation.)

Table 5 – Proposed Peak Runoff Rates

Storm Event	Target Site Runoff	Proposed Site Runoff
2 Year	14.859 cfs	14.72 cfs
10 Year	39.811 cfs	38.24 cfs
100 Year	86.688 cfs	86.61 cfs



DRAIN TIME

As shown by the Hydraflow Hydrographs attached to this report, the detention time of the system is below 72 hours and is broken down as follows:

Detention Basin #1A – 27 hrs.
Detention Basin #1B – 27 hrs.
Detention Basin #2 – 27 hrs.
Detention Basin #3 – 27 hrs.

WATER QUALITY

Water quality is not required for the proposed development as there is a reduction in the total motor vehicle surface onsite from existing conditions.

GROUNDWATER RECHARGE

The subject property is located within the metropolitan planning area and has been previously developed. As such, the proposed development is not required to meet the groundwater recharge standards.

STORM SEWER COMPUTATIONS

A storm sewer system has been designed to collect the runoff associated with the proposed parking lot and roof. The system's primary purpose is to properly drain the proposed site and deliver the runoff to the proposed stormwater management system for water quantity. See attached Storm Sewer Computations in the appendix of this report. The pipes flowing into the systems were designed for a 25-year storm event. The rational method was used to calculate the runoff rates, and the Manning's equation was used to determine the capacity of each system.

The majority of the site is mapped with soils considered Hydrologic Group A & C. For this analysis it was assumed the entire site was Hydrologic Group C. Runoff coefficients (C values) for hydrologic soil group C were 0.51 and 0.99 for woods - good condition and pavement respectively. In addition, all areas were assumed to have a time of concentration of 6 minutes for a conservative model.

As shown, all pipes were designed with adequate capacity to handle the proposed flows.

CONCLUSION

To summarize, a stormwater management strategy has been incorporated to satisfy both the structural and non-structural water quality and water quantity requirements. This is in keeping with the design and performance standards set forth in the West Orange Stormwater Management Ordinance and New Jersey DEP Regulations.



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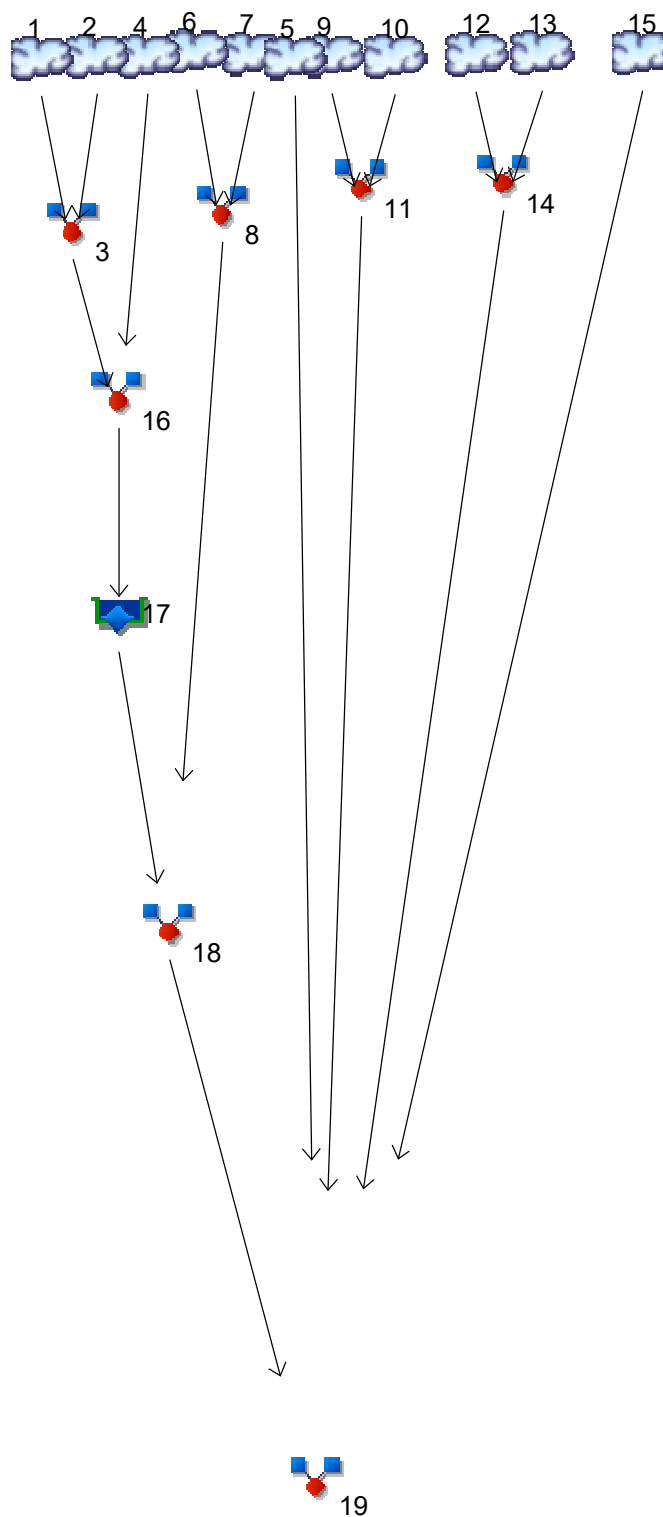
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Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023



Legend

Hyd.	Origin	Description
1	SCS Runoff	DA-1A (Impervious)
2	SCS Runoff	DA-1A (Pervious)
3	Combine	DA-1A
4	SCS Runoff	DA-1B
5	SCS Runoff	DA-2
6	SCS Runoff	DA-3 (Impervious)
7	SCS Runoff	DA-3 (Pervious)
8	Combine	DA-3
9	SCS Runoff	DA-4 (Impervious)
10	SCS Runoff	DA-4 (Pervious)
11	Combine	DA-4
12	SCS Runoff	DA-5 (Impervious)
13	SCS Runoff	DA-5 (Pervious)
14	Combine	DA-5
15	SCS Runoff	DA-6
16	Combine	To Basin #1
17	Reservoir	Basin #1
18	Combine	Combined - SS Southern Driveway
19	Combine	Total Offsite

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	-----	-----	2.479	-----	-----	3.787	4.680	-----	6.303	DA-1A (Impervious)
2	SCS Runoff	-----	-----	4.032	-----	-----	10.61	15.73	-----	25.69	DA-1A (Pervious)
3	Combine	1, 2	-----	6.121	-----	-----	13.83	19.77	-----	31.25	DA-1A
4	SCS Runoff	-----	-----	0.172	-----	-----	0.437	0.642	-----	1.038	DA-1B
5	SCS Runoff	-----	-----	0.429	-----	-----	1.092	1.604	-----	2.594	DA-2
6	SCS Runoff	-----	-----	5.917	-----	-----	9.036	11.17	-----	15.04	DA-3 (Impervious)
7	SCS Runoff	-----	-----	1.361	-----	-----	3.872	5.862	-----	9.775	DA-3 (Pervious)
8	Combine	6, 7	-----	6.988	-----	-----	12.47	16.50	-----	24.15	DA-3
9	SCS Runoff	-----	-----	0.085	-----	-----	0.129	0.160	-----	0.215	DA-4 (Impervious)
10	SCS Runoff	-----	-----	1.365	-----	-----	2.996	4.203	-----	6.501	DA-4 (Pervious)
11	Combine	9, 10	-----	1.447	-----	-----	3.122	4.358	-----	6.716	DA-4
12	SCS Runoff	-----	-----	1.521	-----	-----	2.324	2.872	-----	3.868	DA-5 (Impervious)
13	SCS Runoff	-----	-----	0.039	-----	-----	0.797	2.078	-----	5.043	DA-5 (Pervious)
14	Combine	12, 13	-----	1.521	-----	-----	2.844	4.614	-----	8.458	DA-5
15	SCS Runoff	-----	-----	9.664	-----	-----	14.76	18.24	-----	24.57	DA-6
16	Combine	3, 4,	-----	6.280	-----	-----	14.25	20.39	-----	32.27	To Basin #1
17	Reservoir	16	-----	1.473	-----	-----	14.01	20.15	-----	31.90	Basin #1
18	Combine	8, 17	-----	7.343	-----	-----	24.43	35.85	-----	55.19	Combined - SS Southern Driveway
19	Combine	5, 11, 14, 15, 18	-----	20.08	-----	-----	45.76	64.11	-----	96.75	Total Offsite
Proj. file: Existing Conditions.gpw										Wednesday, 11 / 2 / 2022	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

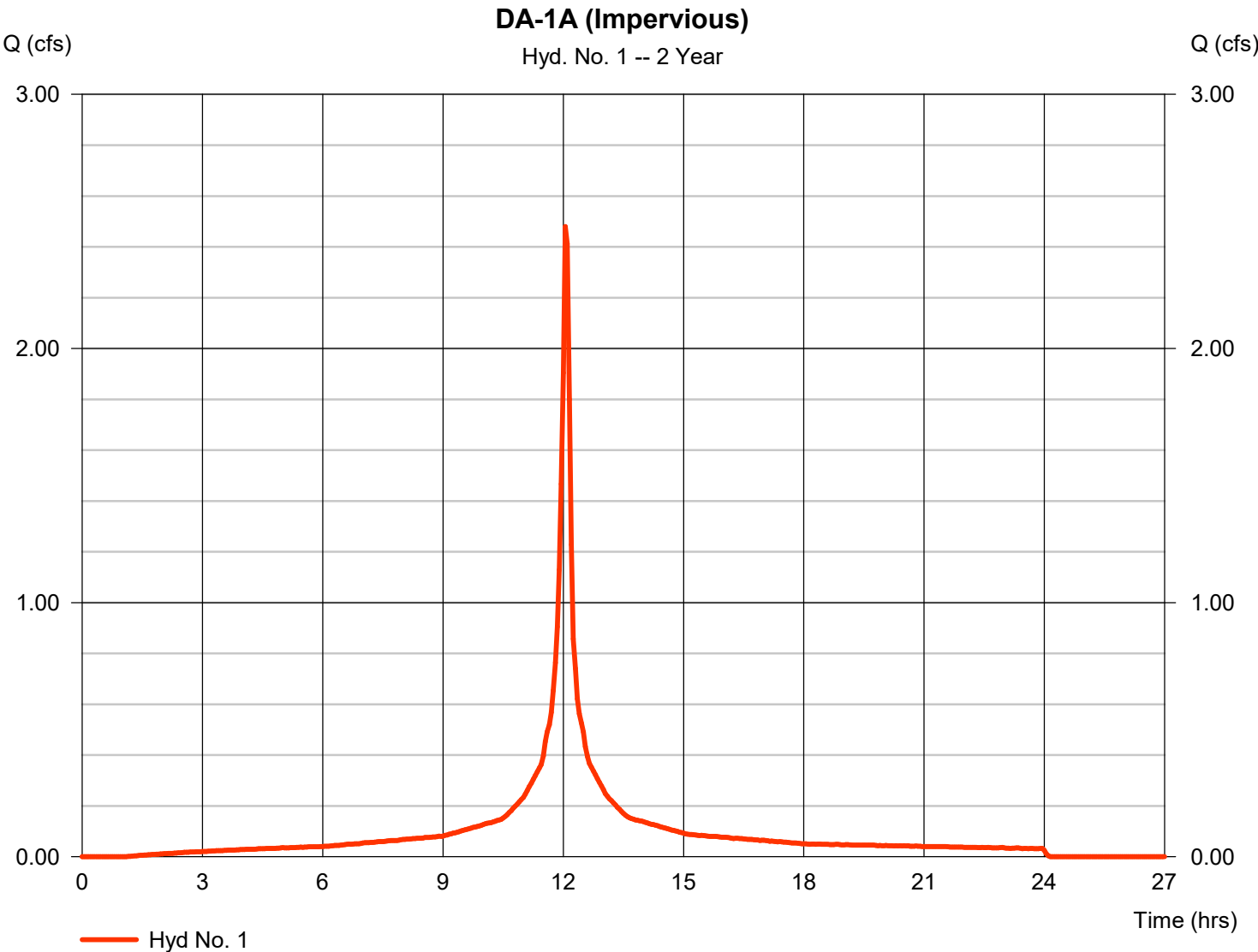
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.479	3	723	9,603	-----	-----	-----	DA-1A (Impervious)
2	SCS Runoff	4.032	3	729	18,052	-----	-----	-----	DA-1A (Pervious)
3	Combine	6.121	3	726	27,655	1, 2	-----	-----	DA-1A
4	SCS Runoff	0.172	3	729	755	-----	-----	-----	DA-1B
5	SCS Runoff	0.429	3	729	1,888	-----	-----	-----	DA-2
6	SCS Runoff	5.917	3	723	22,917	-----	-----	-----	DA-3 (Impervious)
7	SCS Runoff	1.361	3	729	6,384	-----	-----	-----	DA-3 (Pervious)
8	Combine	6.988	3	726	29,300	6, 7	-----	-----	DA-3
9	SCS Runoff	0.085	3	723	327	-----	-----	-----	DA-4 (Impervious)
10	SCS Runoff	1.365	3	726	4,731	-----	-----	-----	DA-4 (Pervious)
11	Combine	1.447	3	726	5,058	9, 10	-----	-----	DA-4
12	SCS Runoff	1.521	3	723	5,893	-----	-----	-----	DA-5 (Impervious)
13	SCS Runoff	0.039	3	795	1,059	-----	-----	-----	DA-5 (Pervious)
14	Combine	1.521	3	723	6,952	12, 13	-----	-----	DA-5
15	SCS Runoff	9.664	3	723	37,430	-----	-----	-----	DA-6
16	Combine	6.280	3	726	28,410	3, 4,	-----	-----	To Basin #1
17	Reservoir	1.473	3	765	28,403	16	419.06	10,296	Basin #1
18	Combine	7.343	3	726	57,703	8, 17	-----	-----	Combined - SS Southern Driveway
19	Combine	20.08	3	723	109,031	5, 11, 14, 15, 18	-----	-----	Total Offsite
Existing Conditions.gpw					Return Period: 2 Year			Wednesday, 11 / 2 / 2022	

Hydrograph Report

Hyd. No. 1

DA-1A (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.479 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	9,603 cuft
Drainage area	=	0.880 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.44 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange			

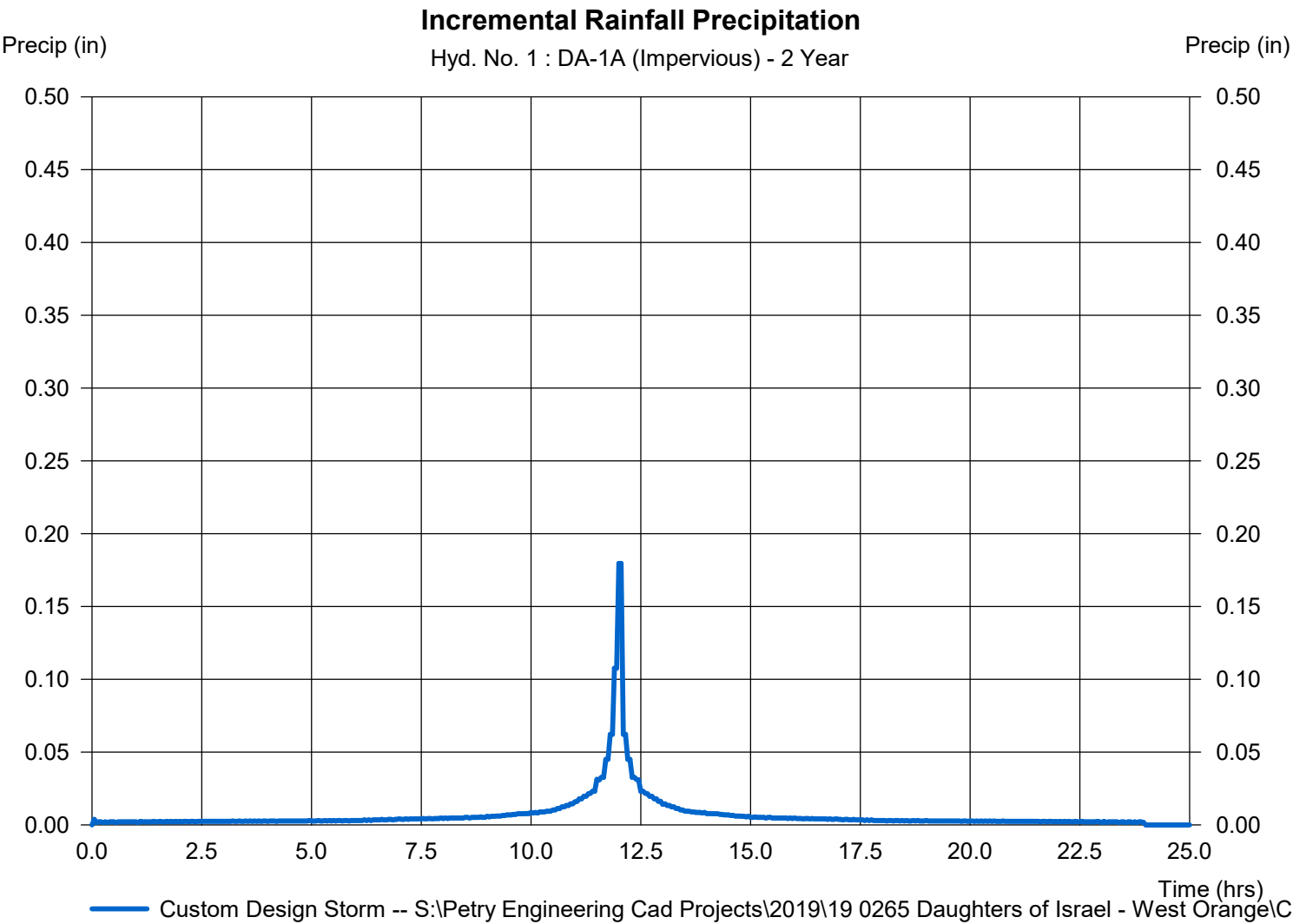


Precipitation Report

Hyd. No. 1

DA-1A (Impervious)

Storm Frequency	= 2 yrs	Time interval	= 3 min
Total precip.	= 3.4400 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\19 0265 Daughters of Israel - West Orange.dwg		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

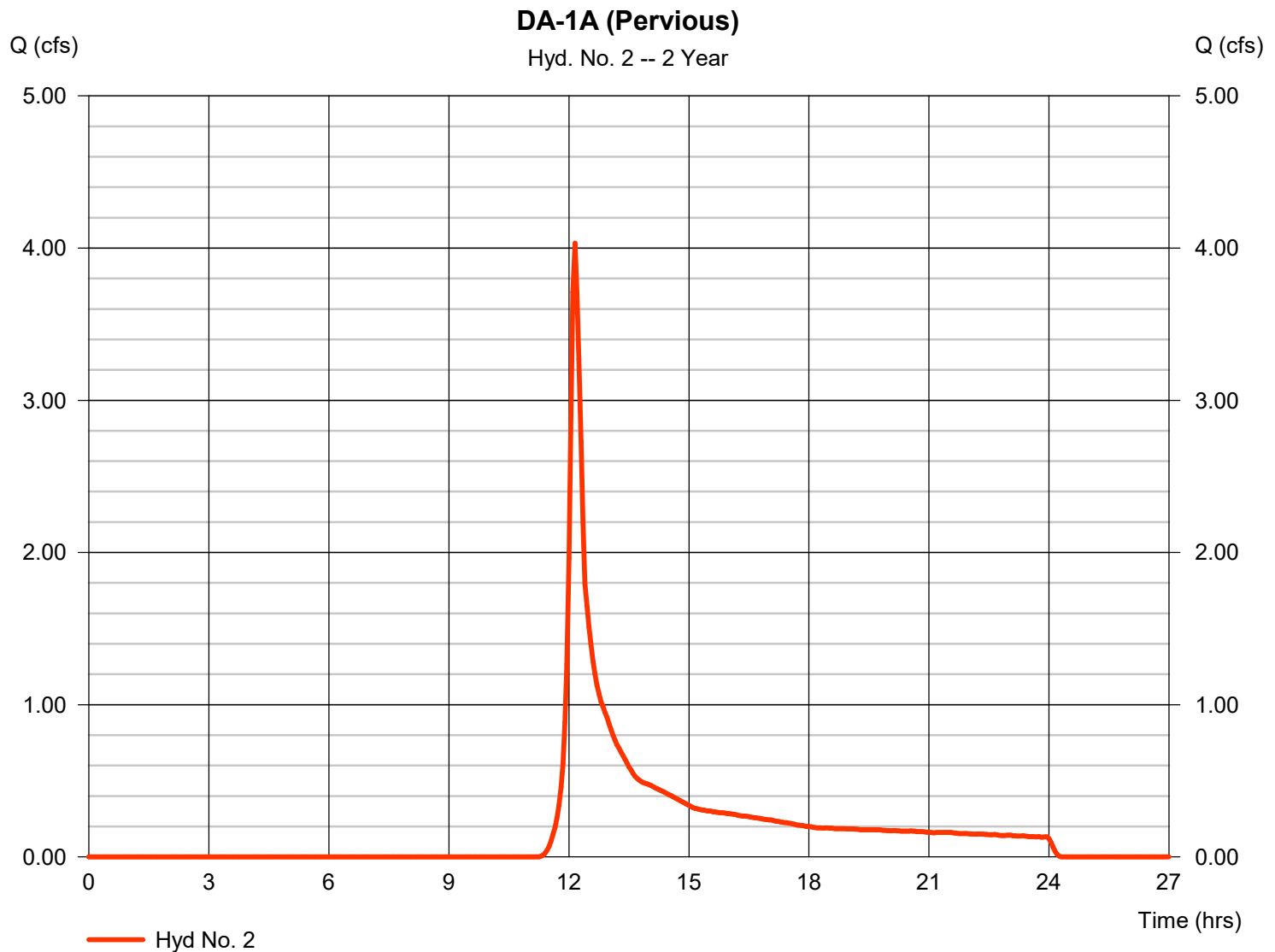
Wednesday, 11 / 2 / 2022

Hyd. No. 2

DA-1A (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.032 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 18,052 cuft
Drainage area	= 6.090 ac	Curve number	= 67*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.30 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\191019 0265 Daugherty of Israel - West Orange		

* Composite (Area/CN) = $[(0.500 \times 30) + (4.740 \times 70) + (0.280 \times 77) + (0.010 \times 80) + (0.560 \times 74)] / 6.090$



Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 2

DA-1A (Pervious)

Storm Frequency

= 2 yrs

Time interval

= 3 min

Total precip.

= 3.4400 in

Distribution

= Custom

Storm duration

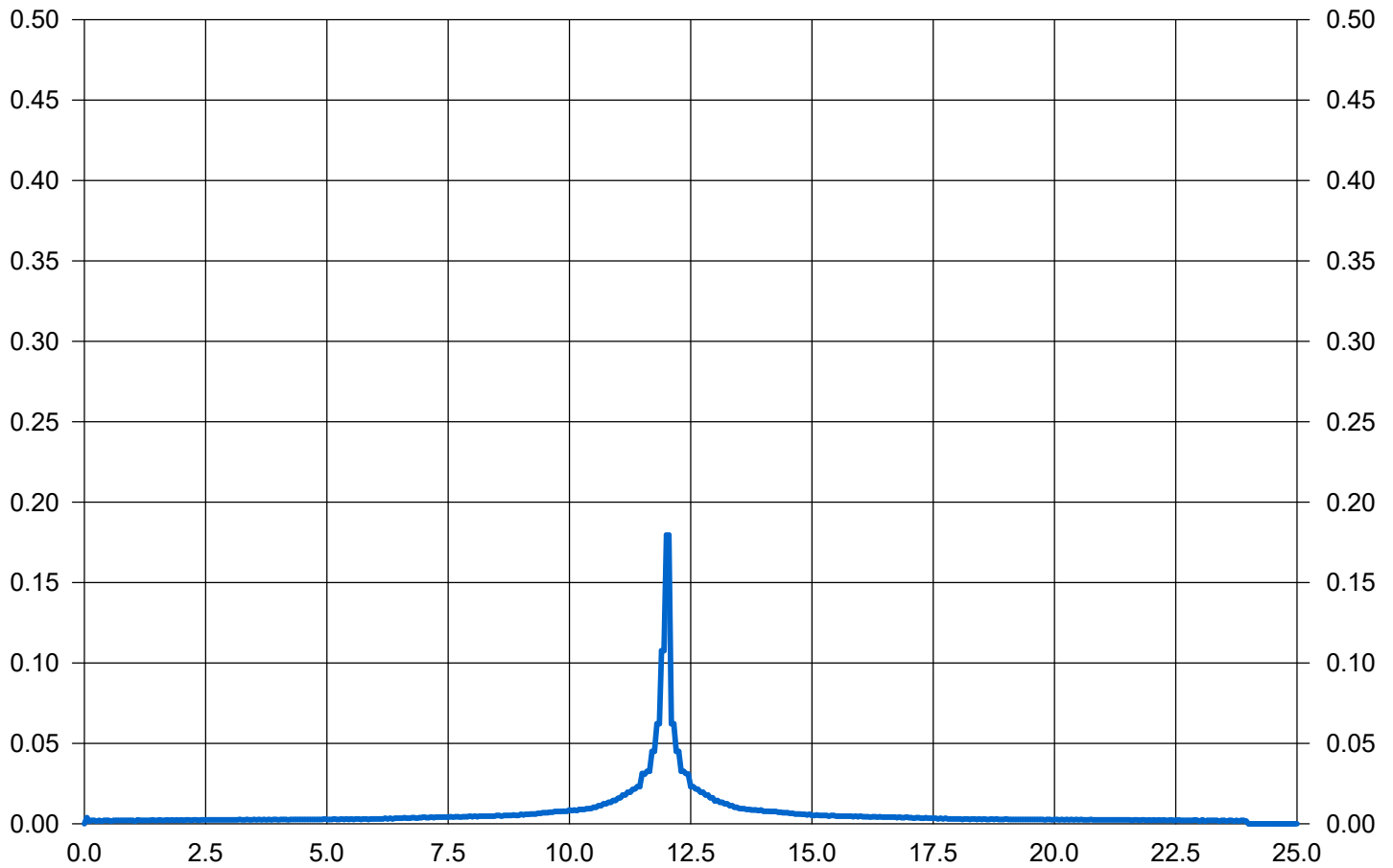
= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Cu

Incremental Rainfall Precipitation

Hyd. No. 2 : DA-1A (Pervious) - 2 Year

Precip (in)

Precip (in)



Time (hrs)

— Custom Design Storm -- S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Cu

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

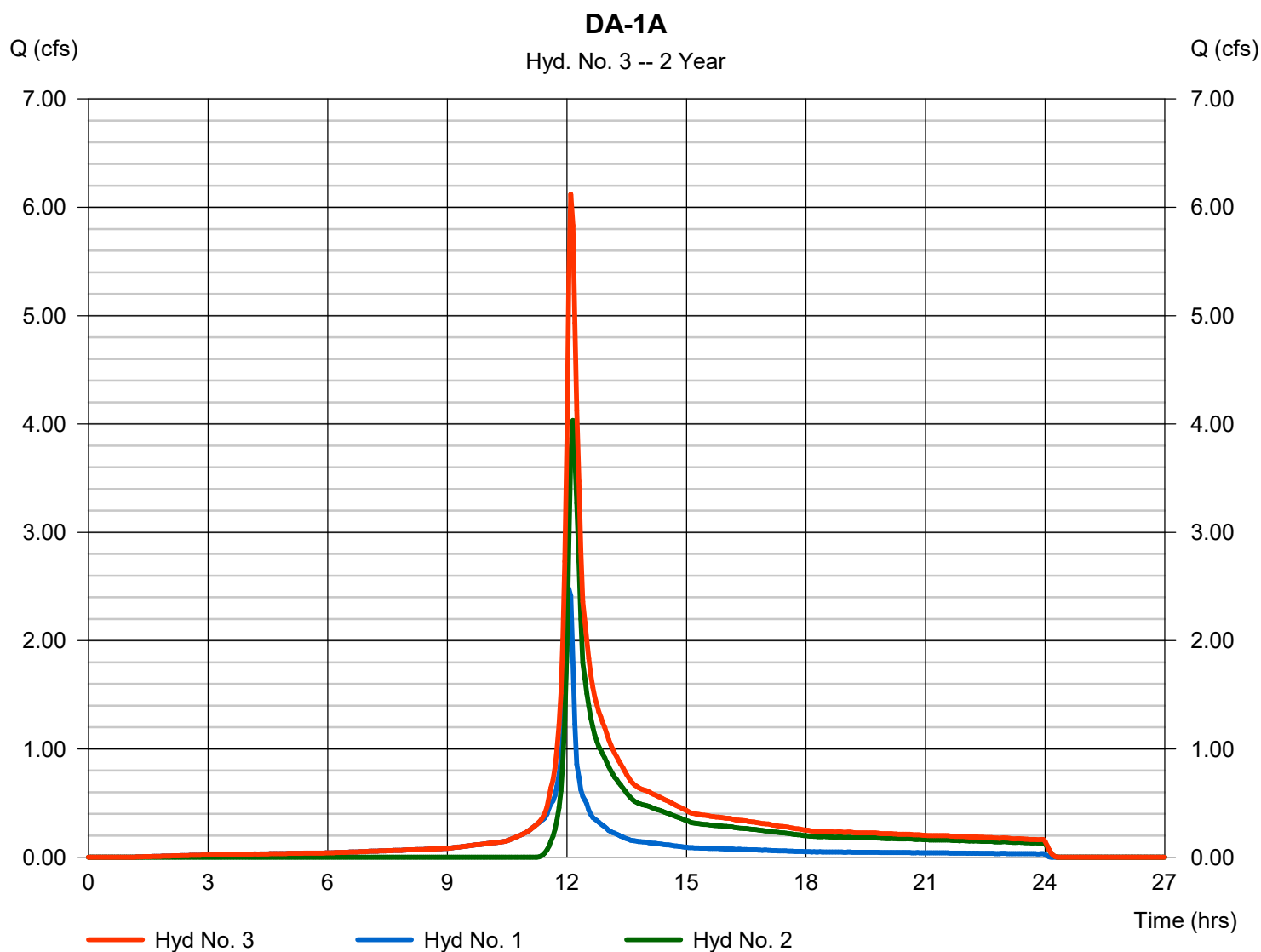
Wednesday, 11 / 2 / 2022

Hyd. No. 3

DA-1A

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 3 min
 Inflow hyds. = 1, 2

Peak discharge = 6.121 cfs
 Time to peak = 12.10 hrs
 Hyd. volume = 27,655 cuft
 Contrib. drain. area = 6.970 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

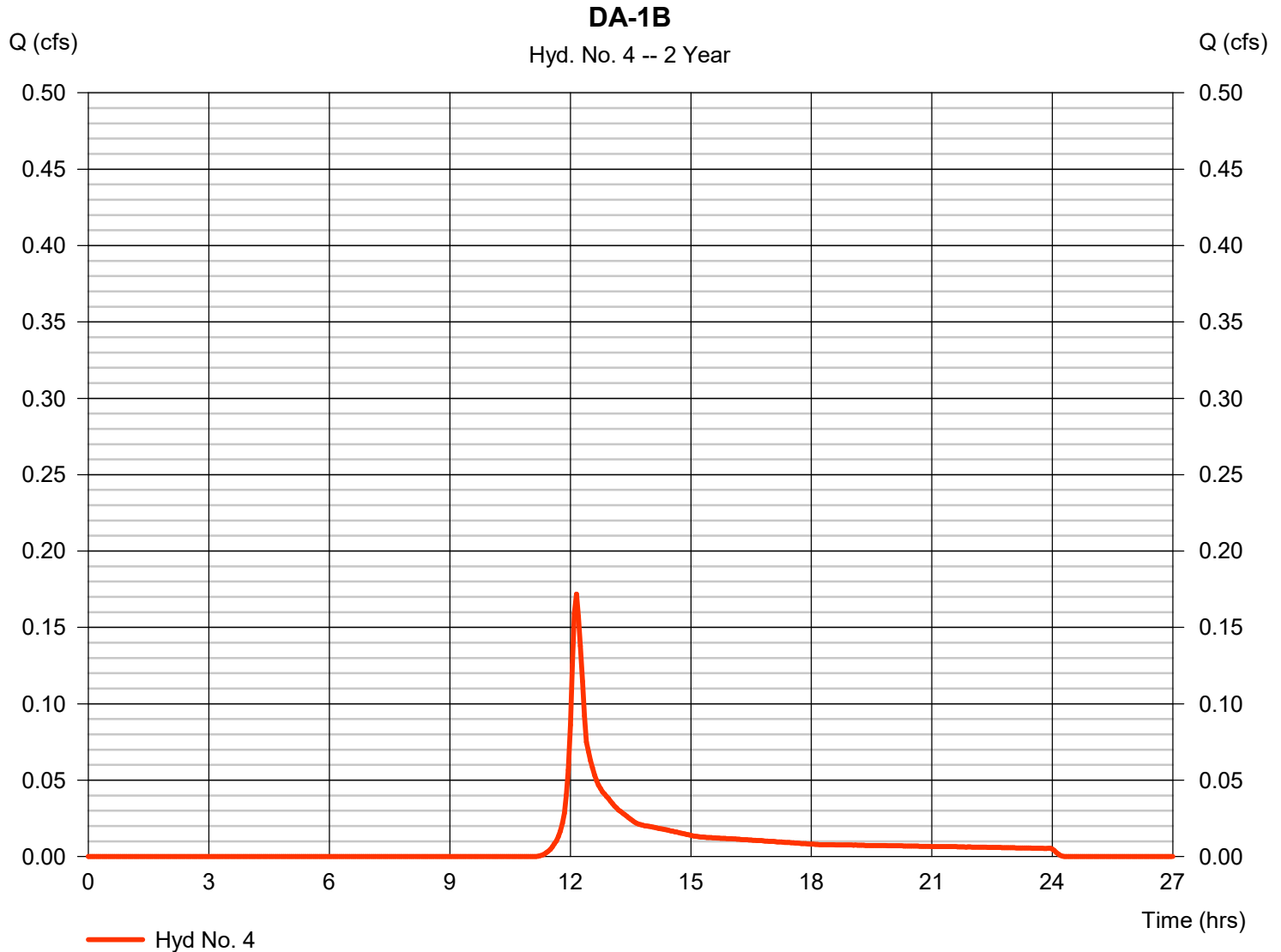
Wednesday, 11 / 2 / 2022

Hyd. No. 4

DA-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.172 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 755 cuft
Drainage area	= 0.240 ac	Curve number	= 68*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.80 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\19-01-0265 Daughters of Israel - West Orange		

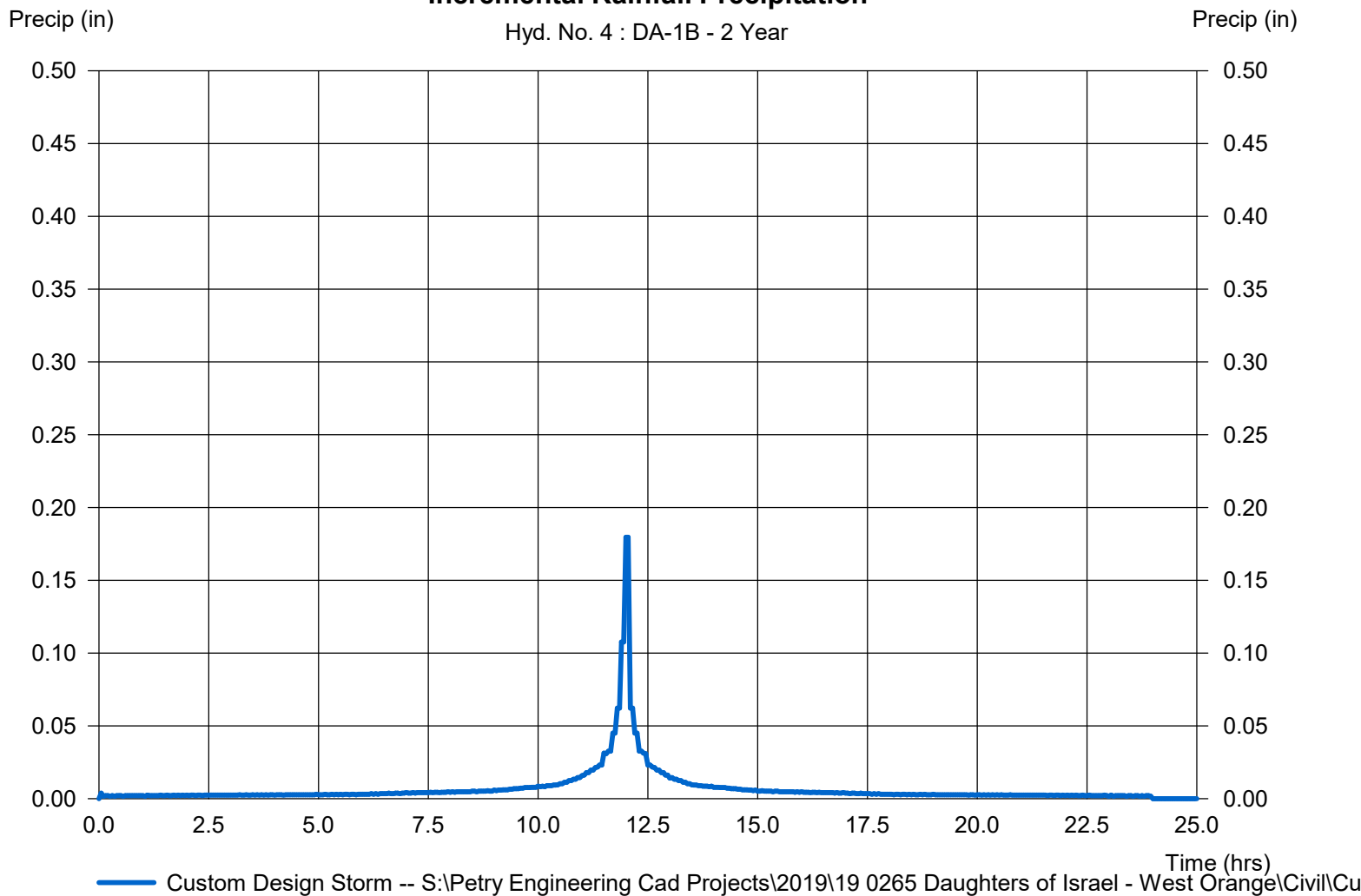
* Composite (Area/CN) = $[(0.020 \times 30) + (0.170 \times 70) + (0.050 \times 77)] / 0.240$



DA-1B

Storm Frequency = 2 yrs Time interval = 3 min
Total precip. = 3.4400 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

Hyd. No. 4 : DA-1B - 2 Year



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

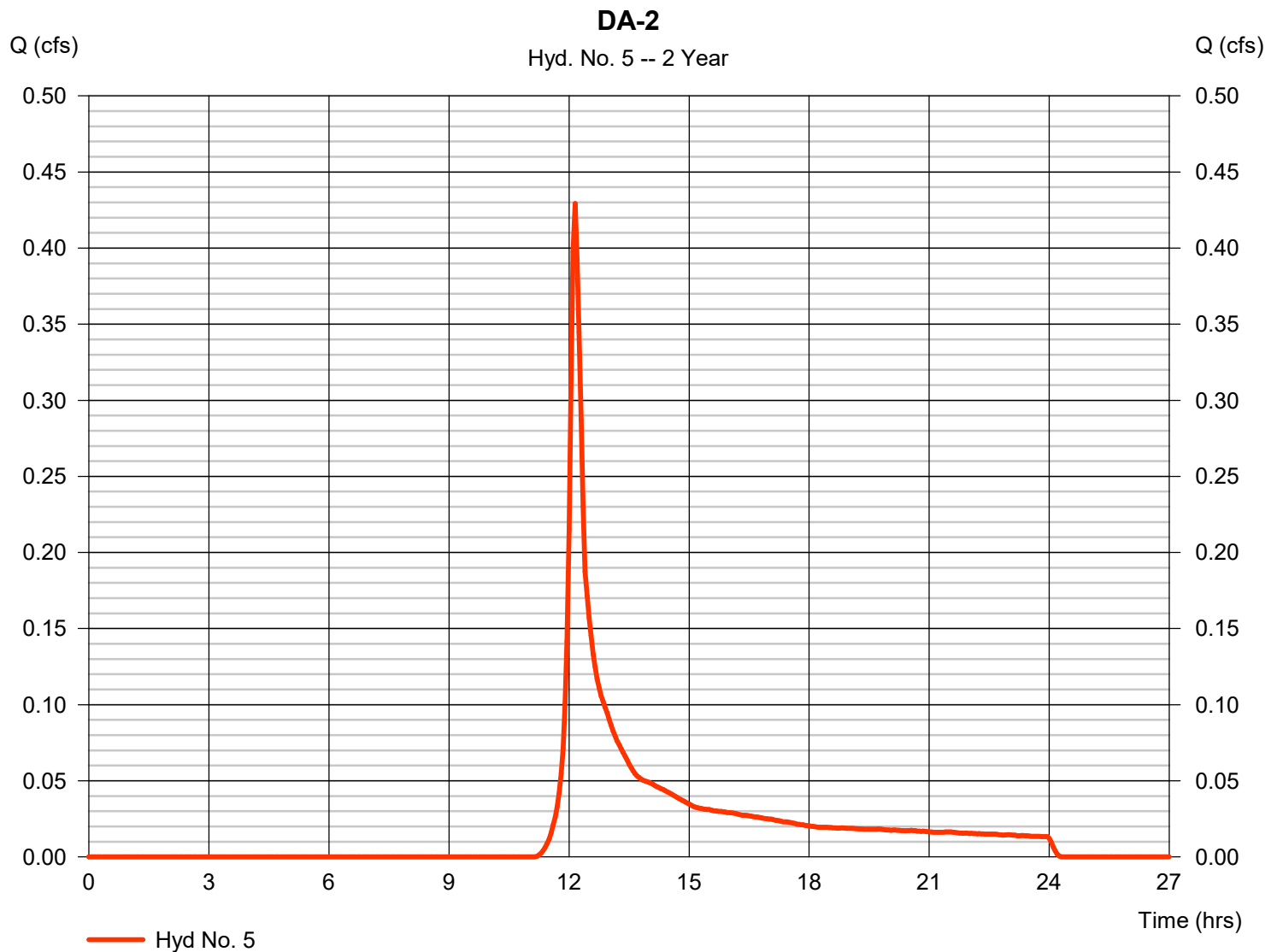
Wednesday, 11 / 2 / 2022

Hyd. No. 5

DA-2

Hydrograph type	= SCS Runoff	Peak discharge	= 0.429 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 1,888 cuft
Drainage area	= 0.600 ac	Curve number	= 68*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.10 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = $[(0.100 \times 77) + (0.140 \times 70) + (0.250 \times 80) + (0.110 \times 30)] / 0.600$



Precipitation Report

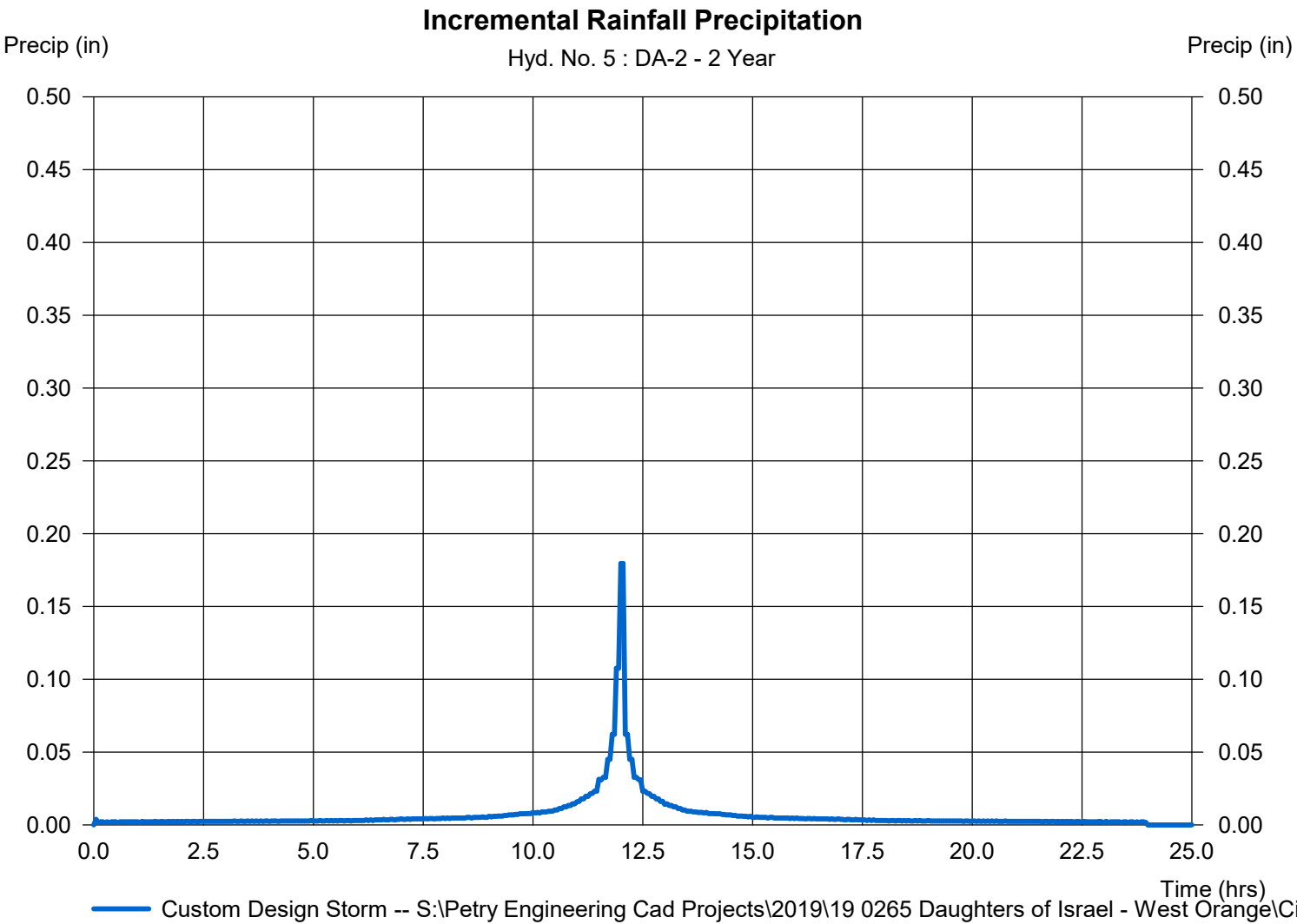
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 5

DA-2

Storm Frequency	= 2 yrs	Time interval	= 3 min
Total precip.	= 3.4400 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\19 0265 Daughters of Israel - West Orange.dwg		

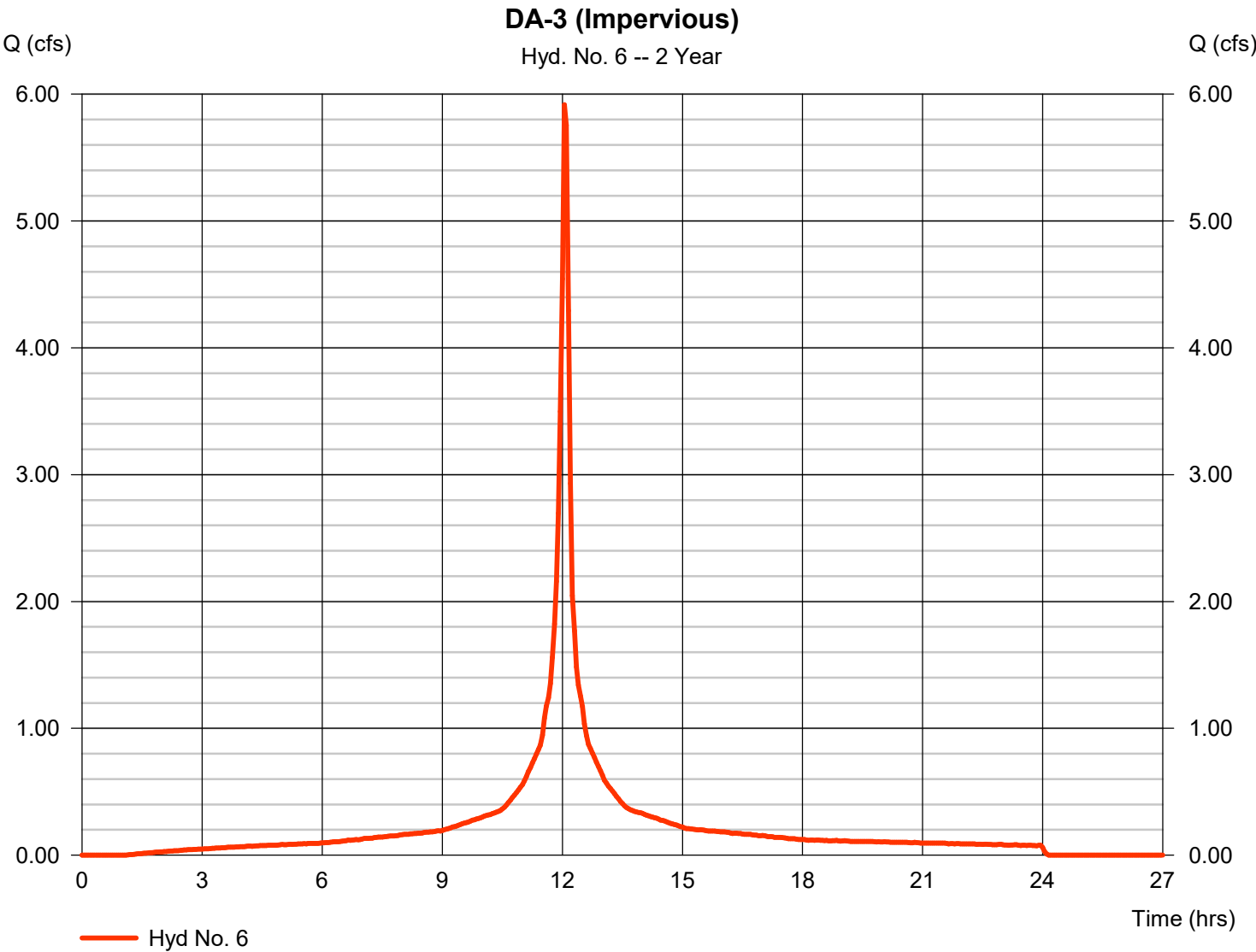


Hydrograph Report

Hyd. No. 6

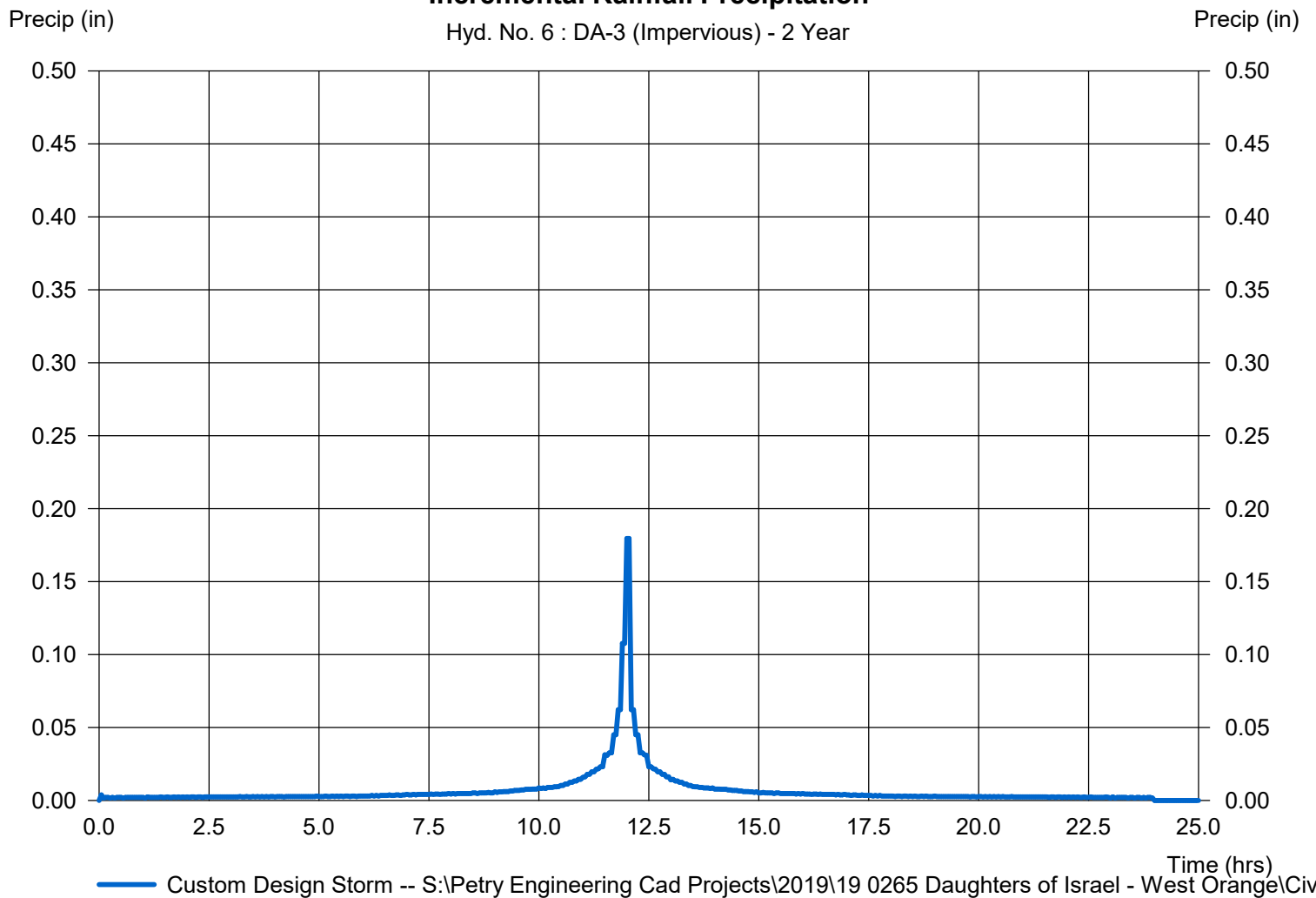
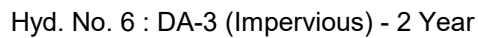
DA-3 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 5.917 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 22,917 cuft
Drainage area	= 2.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\19-0265 Daughters of Israel - West Orange		



DA-3 (Impervious)

Storm Frequency = 2 yrs Time interval = 3 min
Total precip. = 3.4400 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



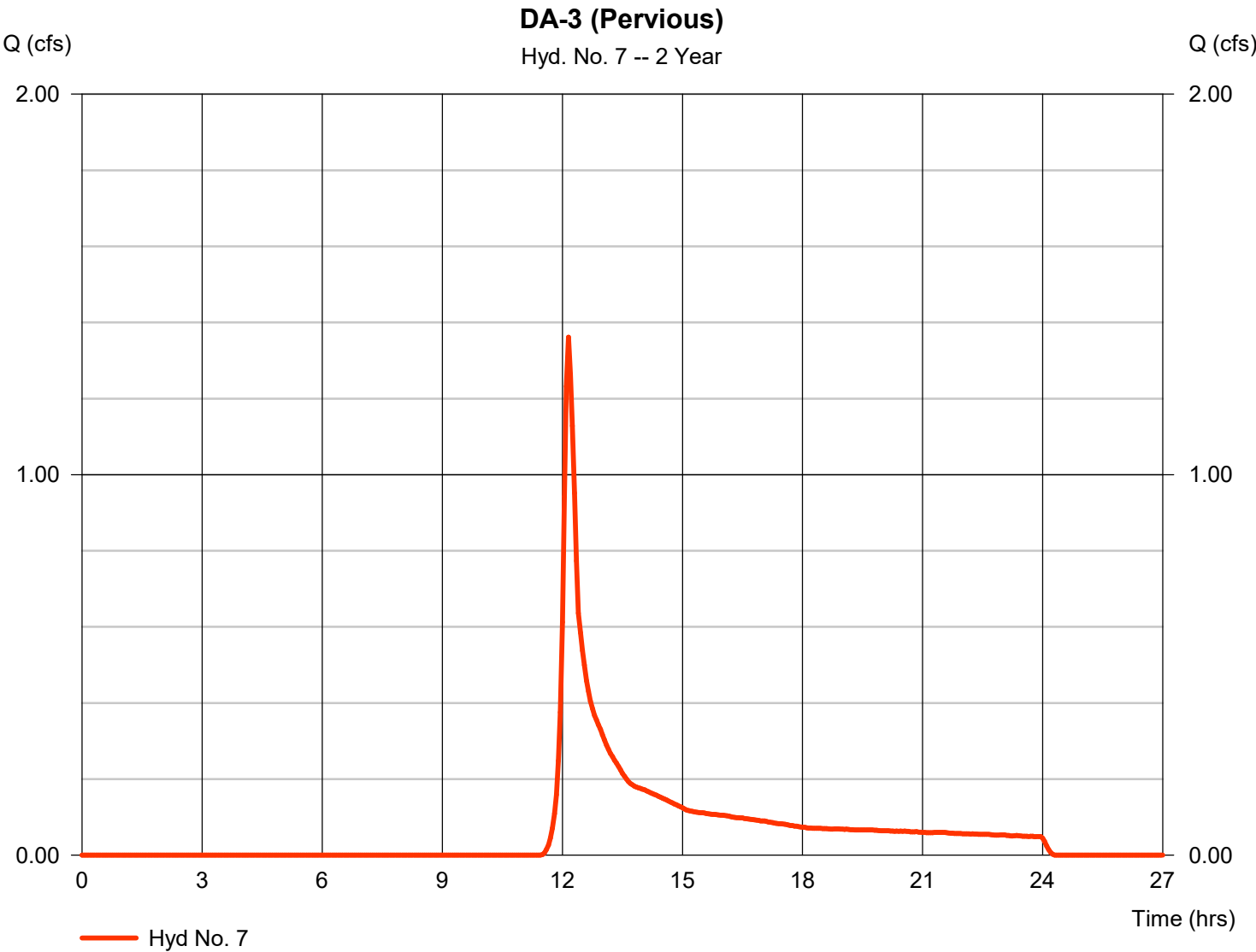
Hydrograph Report

Hyd. No. 7

DA-3 (Pervious)

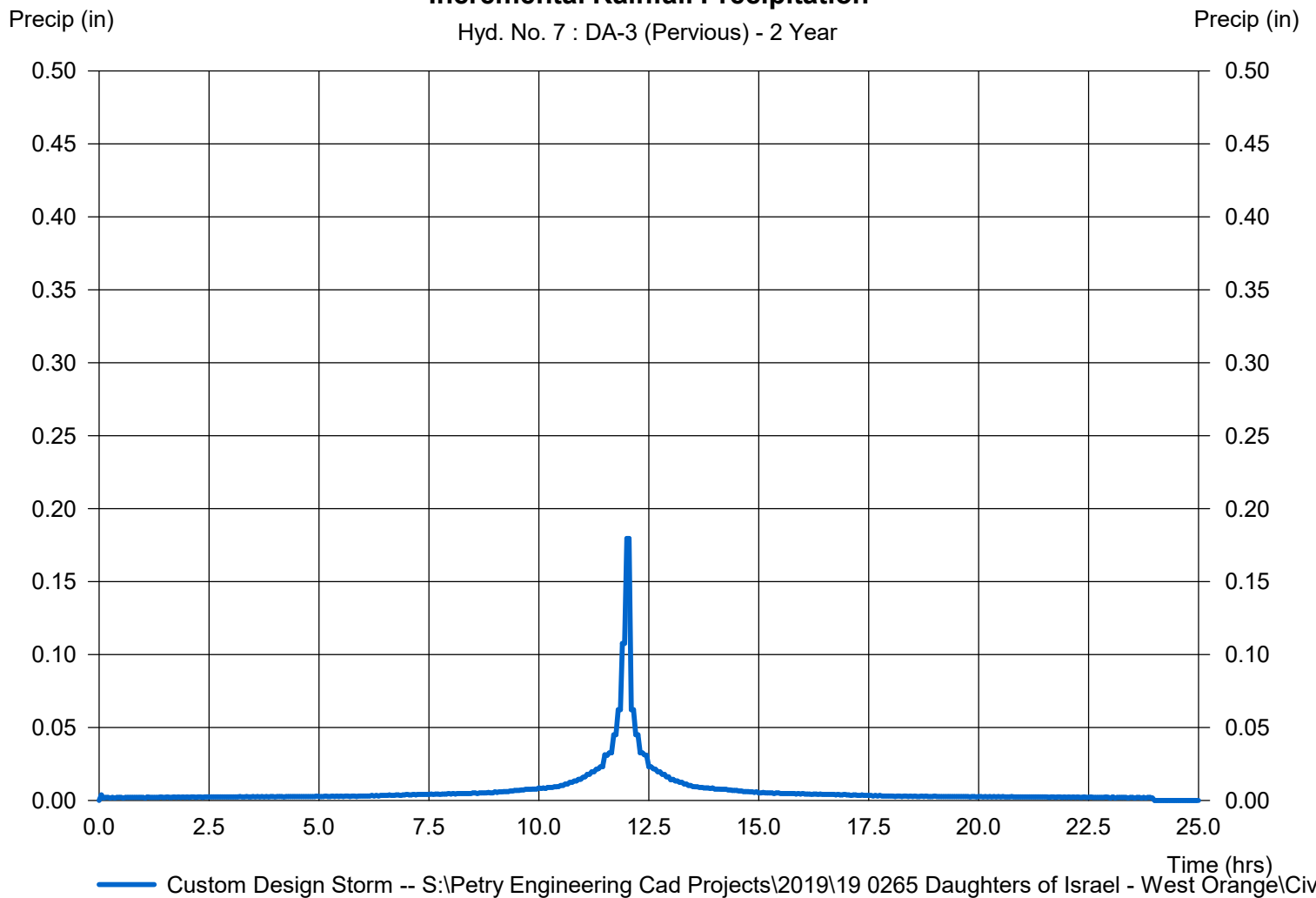
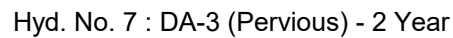
Hydrograph type	=	SCS Runoff	Peak discharge	=	1.361 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.15 hrs
Time interval	=	3 min	Hyd. volume	=	6,384 cuft
Drainage area	=	2.440 ac	Curve number	=	65*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.50 min
Total precip.	=	3.44 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\19-01-0265 Daughters of Israel - West Orange			

* Composite (Area/CN) = [(0.890 x 80) + (0.210 x 74) + (0.550 x 30) + (0.760 x 70) + (0.030 x 77)] / 2.440



DA-3 (Pervious)

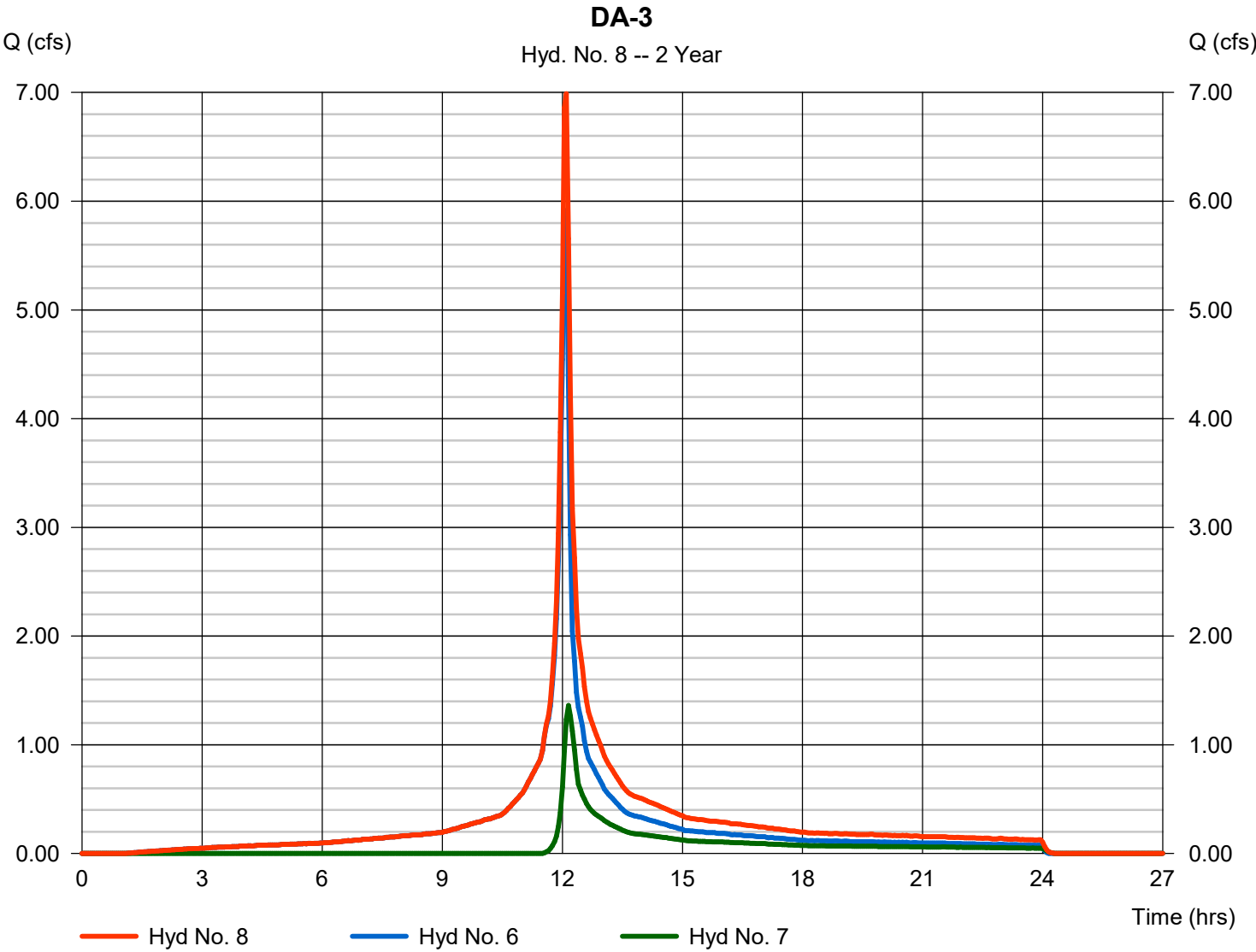
Storm Frequency = 2 yrs Time interval = 3 min
Total precip. = 3.4400 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

Hyd. No. 8

DA-3			
Hydrograph type	= Combine	Peak discharge	= 6.988 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 29,300 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 4.540 ac



Hydrograph Report

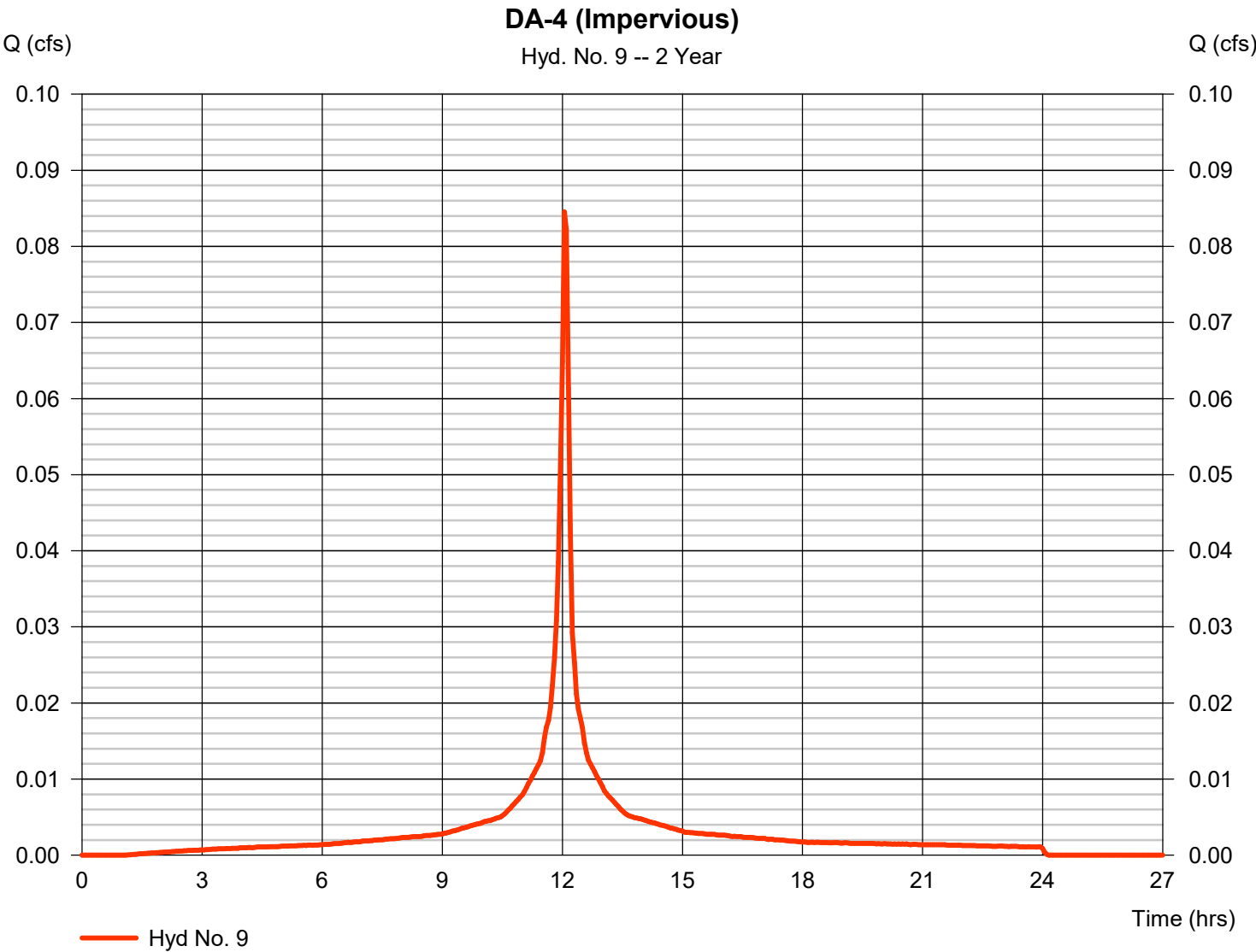
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 9

DA-4 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.085 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 327 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		

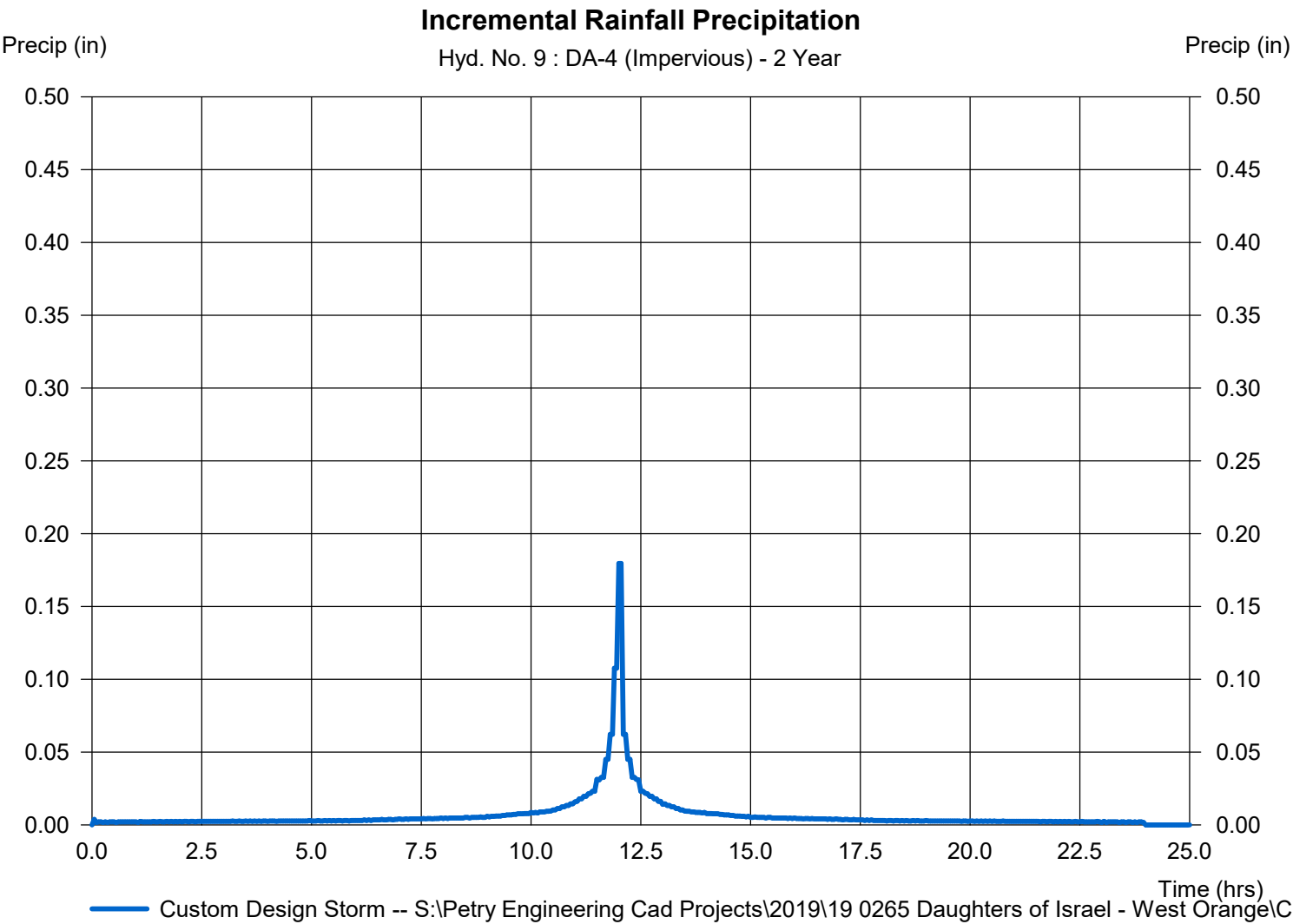


Precipitation Report

Hyd. No. 9

DA-4 (Impervious)

Storm Frequency	= 2 yrs	Time interval	= 3 min
Total precip.	= 3.4400 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Cu		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

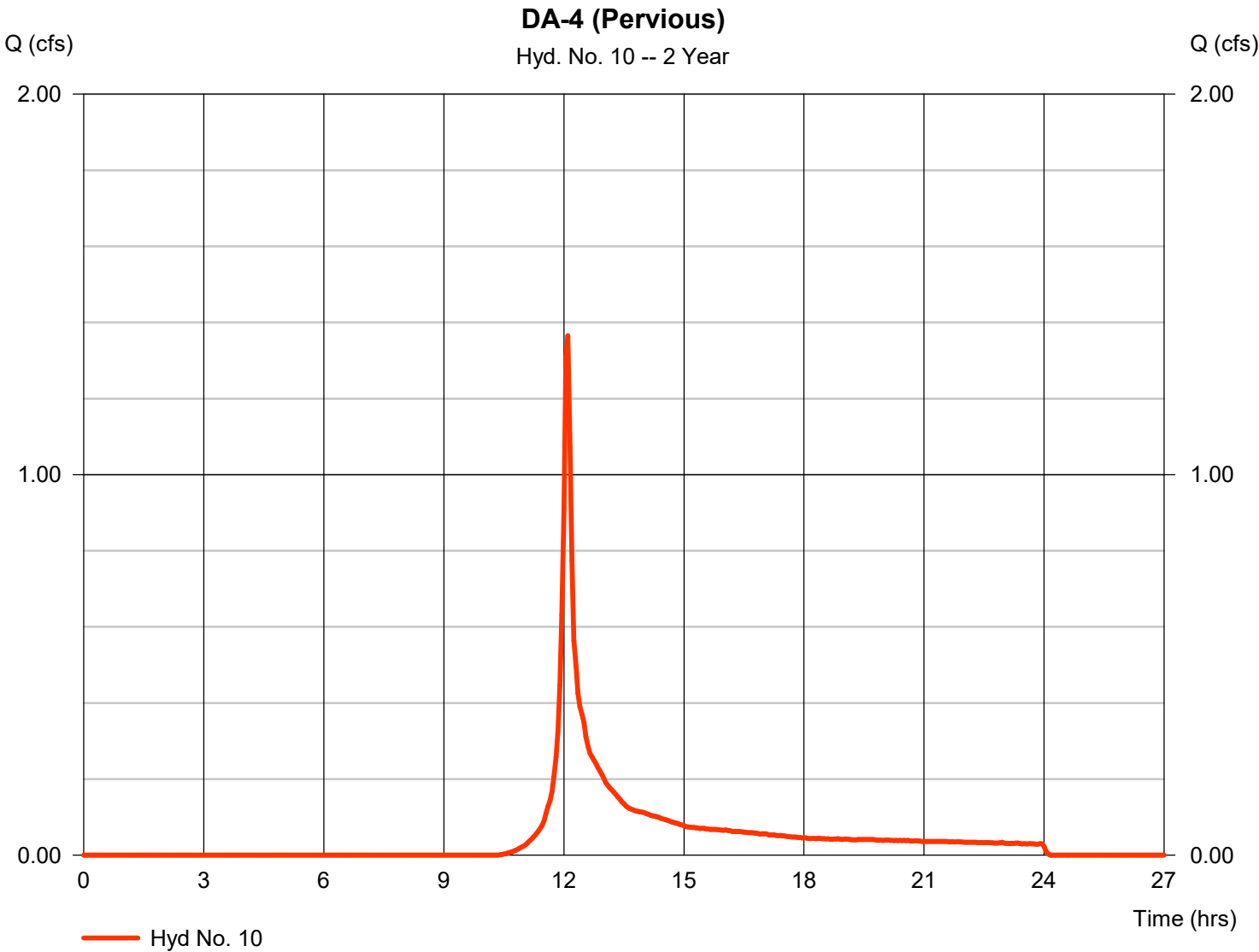
Wednesday, 11 / 2 / 2022

Hyd. No. 10

DA-4 (Pervious)

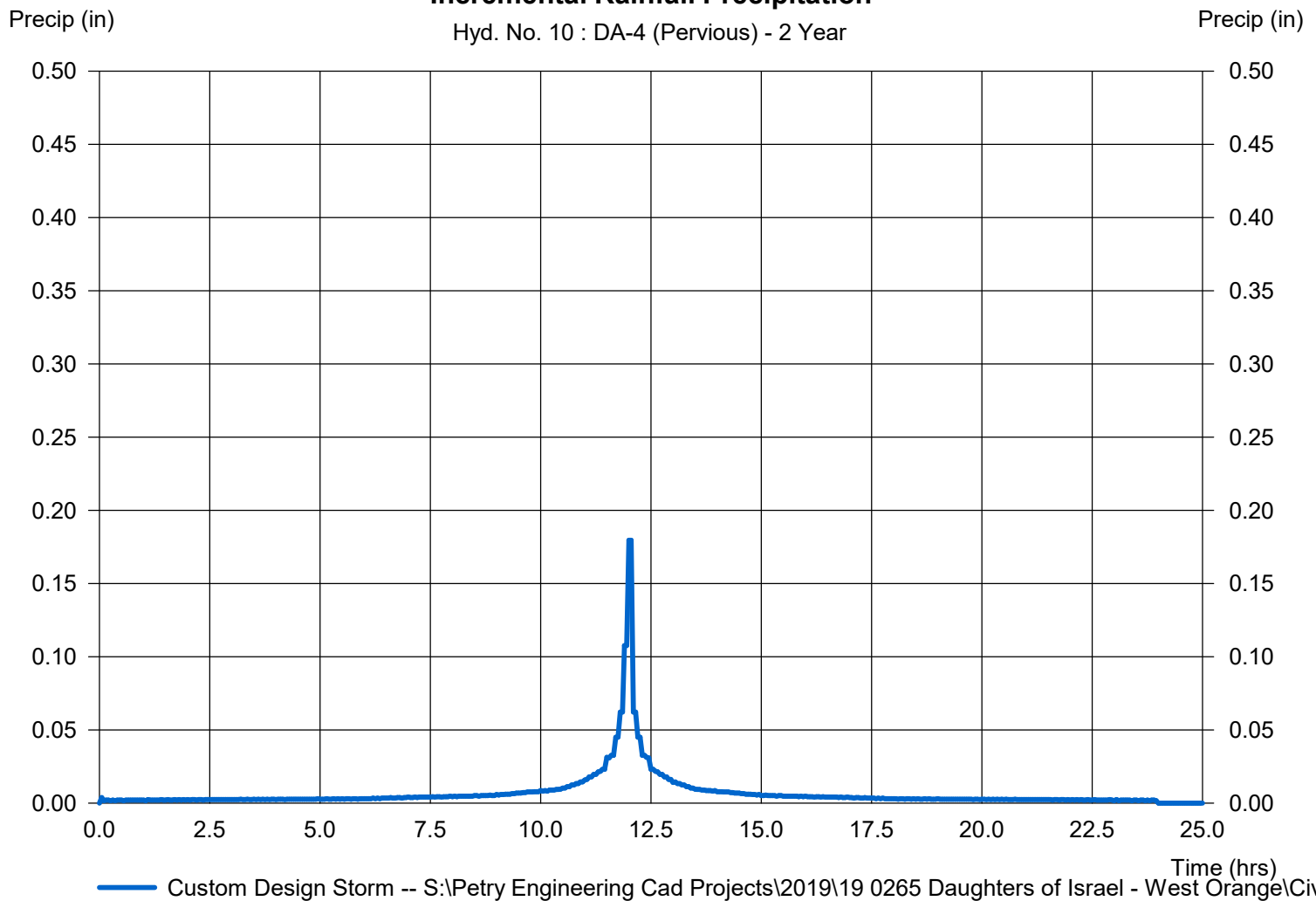
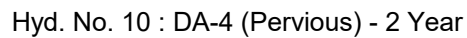
Hydrograph type	= SCS Runoff	Peak discharge	= 1.365 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 4,731 cuft
Drainage area	= 1.220 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.60 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\1010-0265 Daughters of Israel - West Orange, NJ\1010-0265 Daughters of Israel - West Orange, NJ.dwg		

* Composite (Area/CN) = [(1.060 x 80) + (0.160 x 30)] / 1.220



DA-4 (Pervious)

Storm Frequency = 2 yrs Time interval = 3 min
Total precip. = 3.4400 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

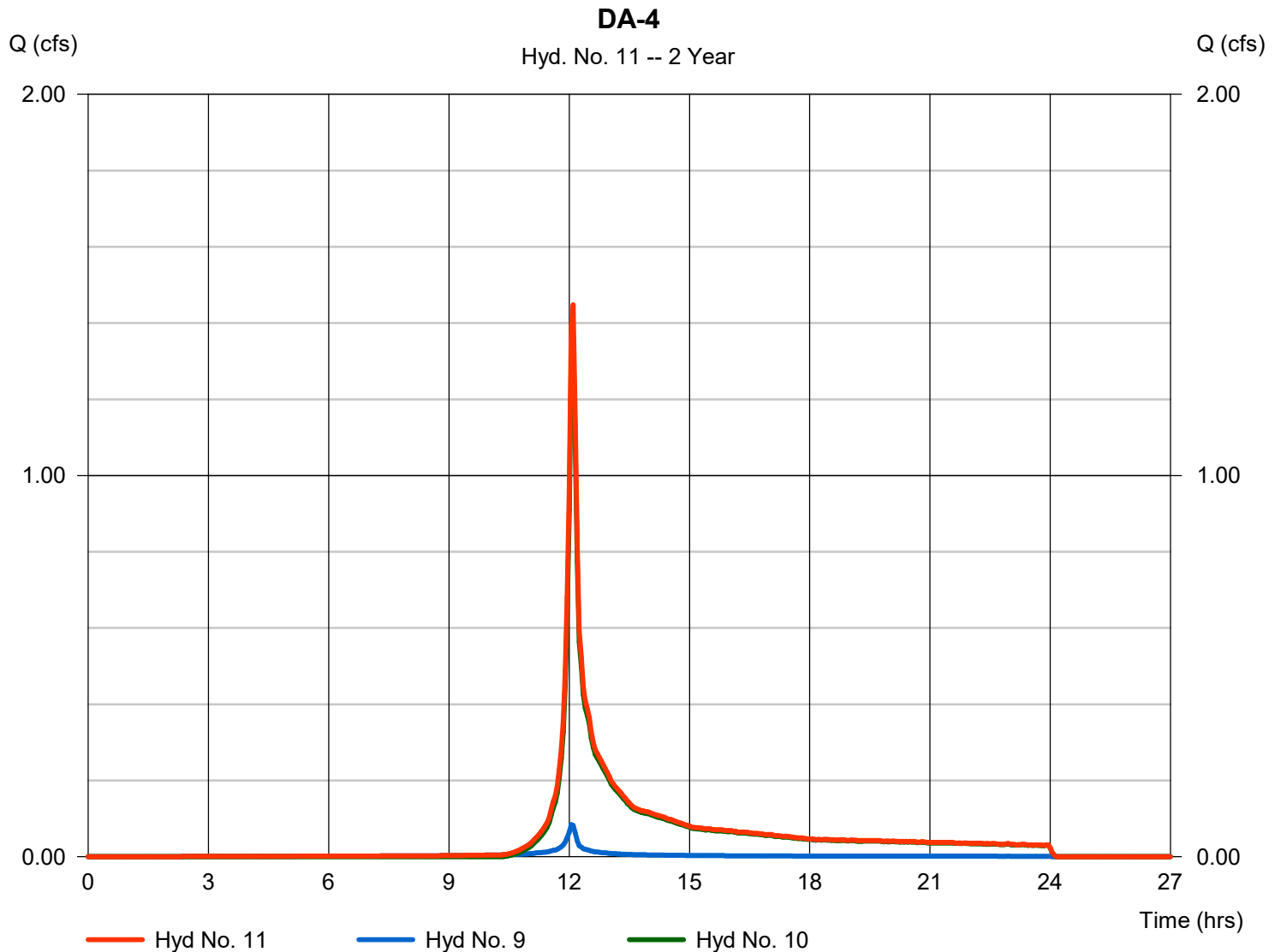
Wednesday, 11 / 2 / 2022

Hyd. No. 11

DA-4

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 3 min
 Inflow hyds. = 9, 10

Peak discharge = 1.447 cfs
 Time to peak = 12.10 hrs
 Hyd. volume = 5,058 cuft
 Contrib. drain. area = 1.250 ac

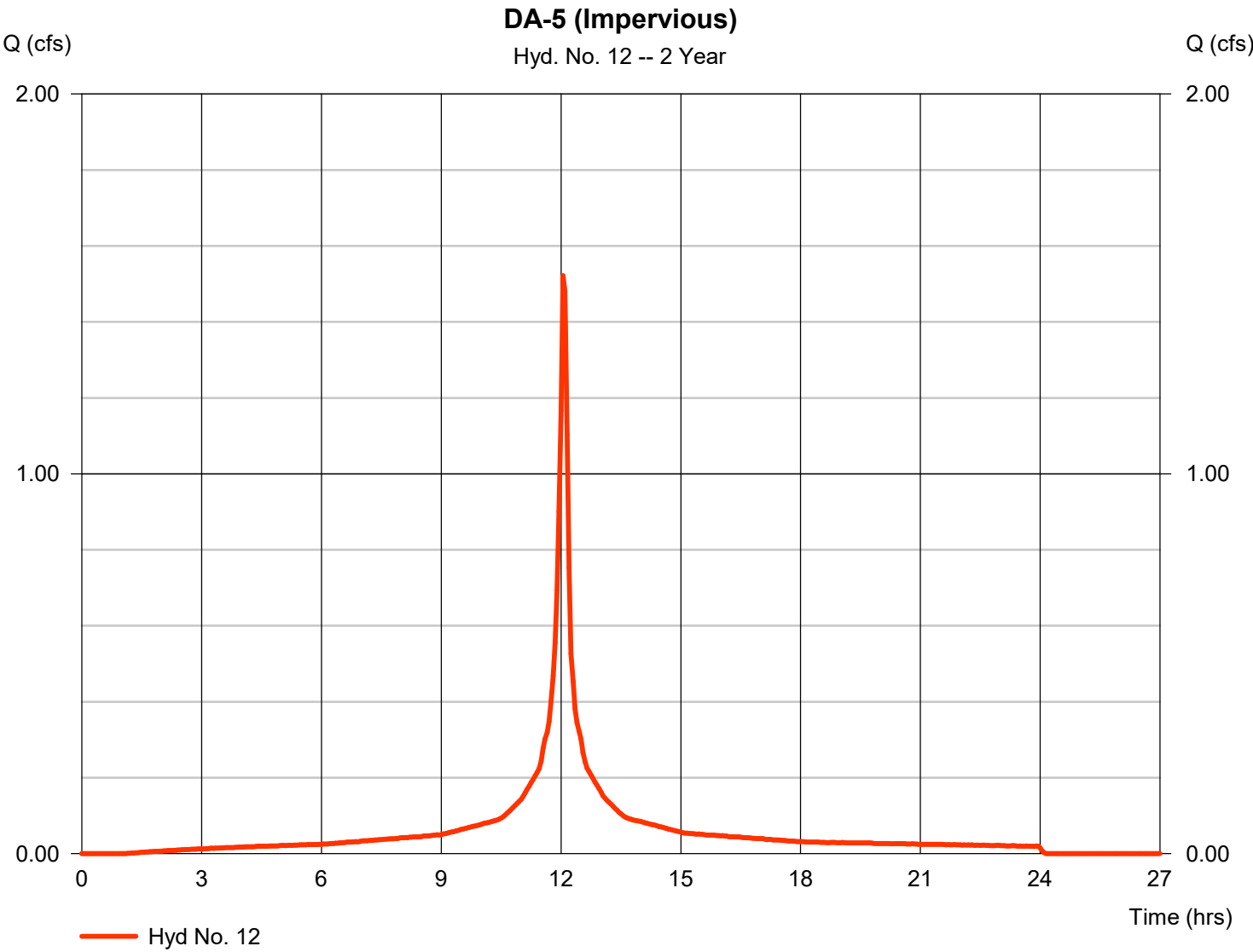


Hydrograph Report

Hyd. No. 12

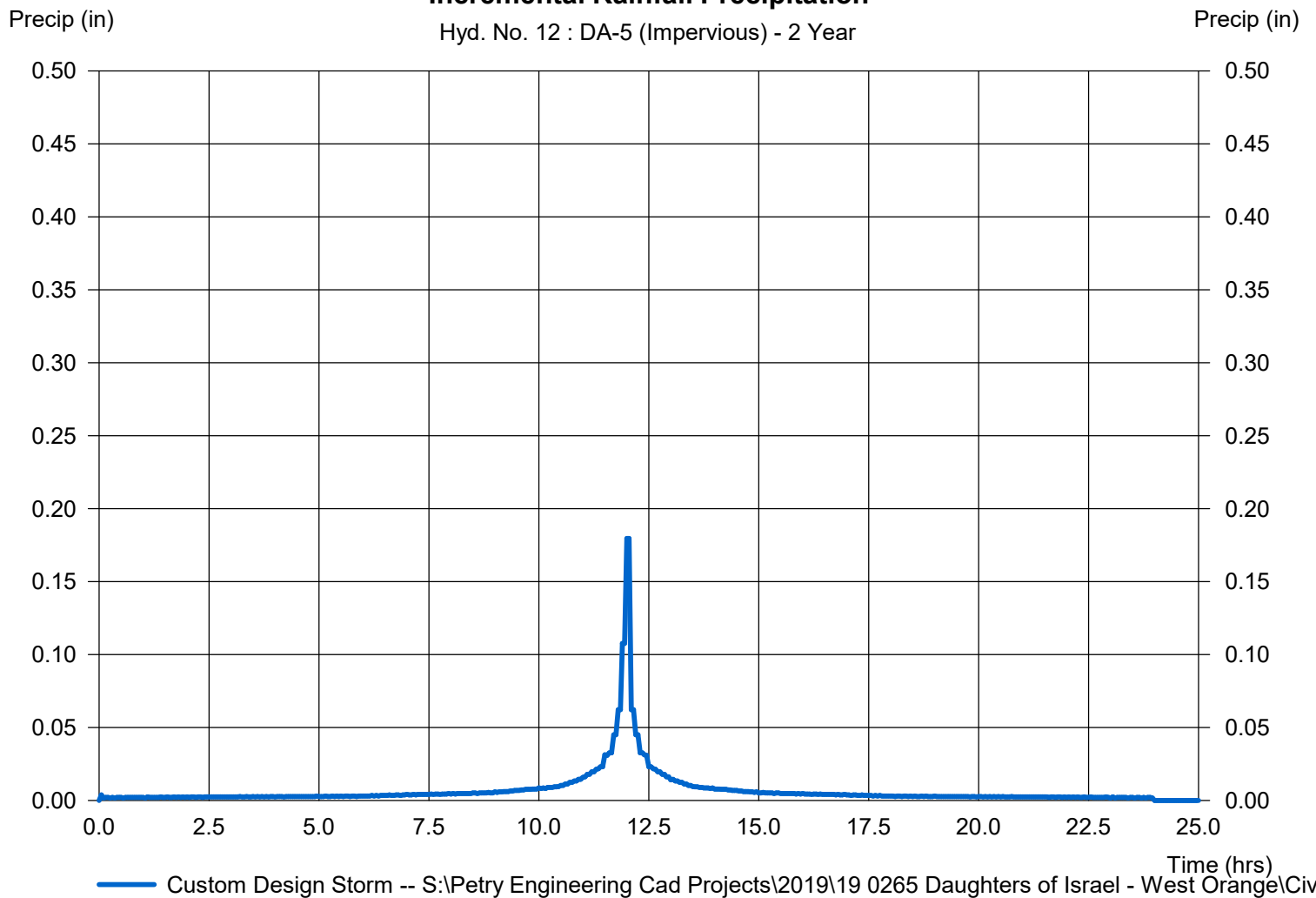
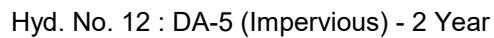
DA-5 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.521 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 5,893 cuft
Drainage area	= 0.540 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\120119 0265 Daughters of Israel - West Orange		



DA-5 (Impervious)

Storm Frequency = 2 yrs Time interval = 3 min
Total precip. = 3.4400 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

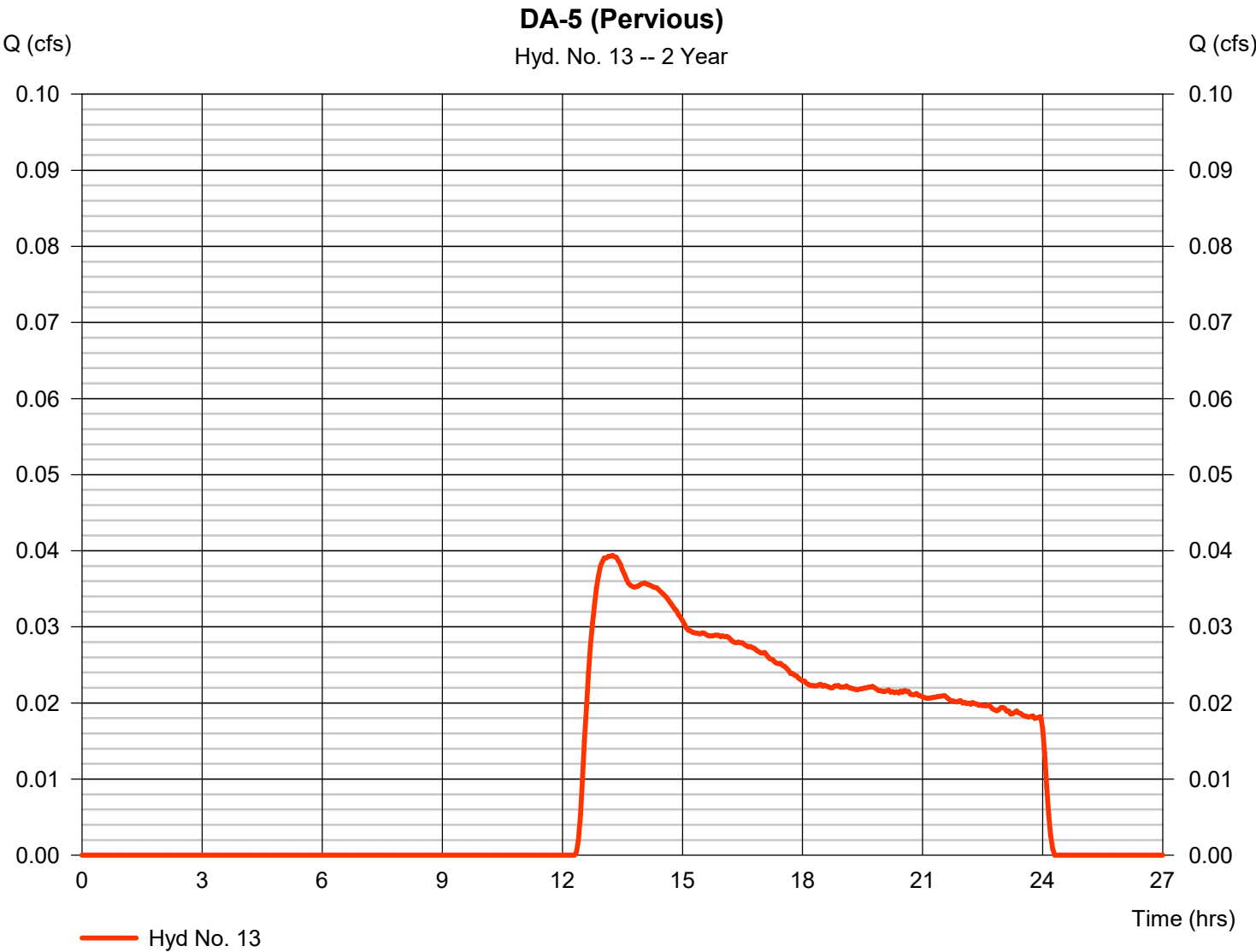
Wednesday, 11 / 2 / 2022

Hyd. No. 13

DA-5 (Pervious)

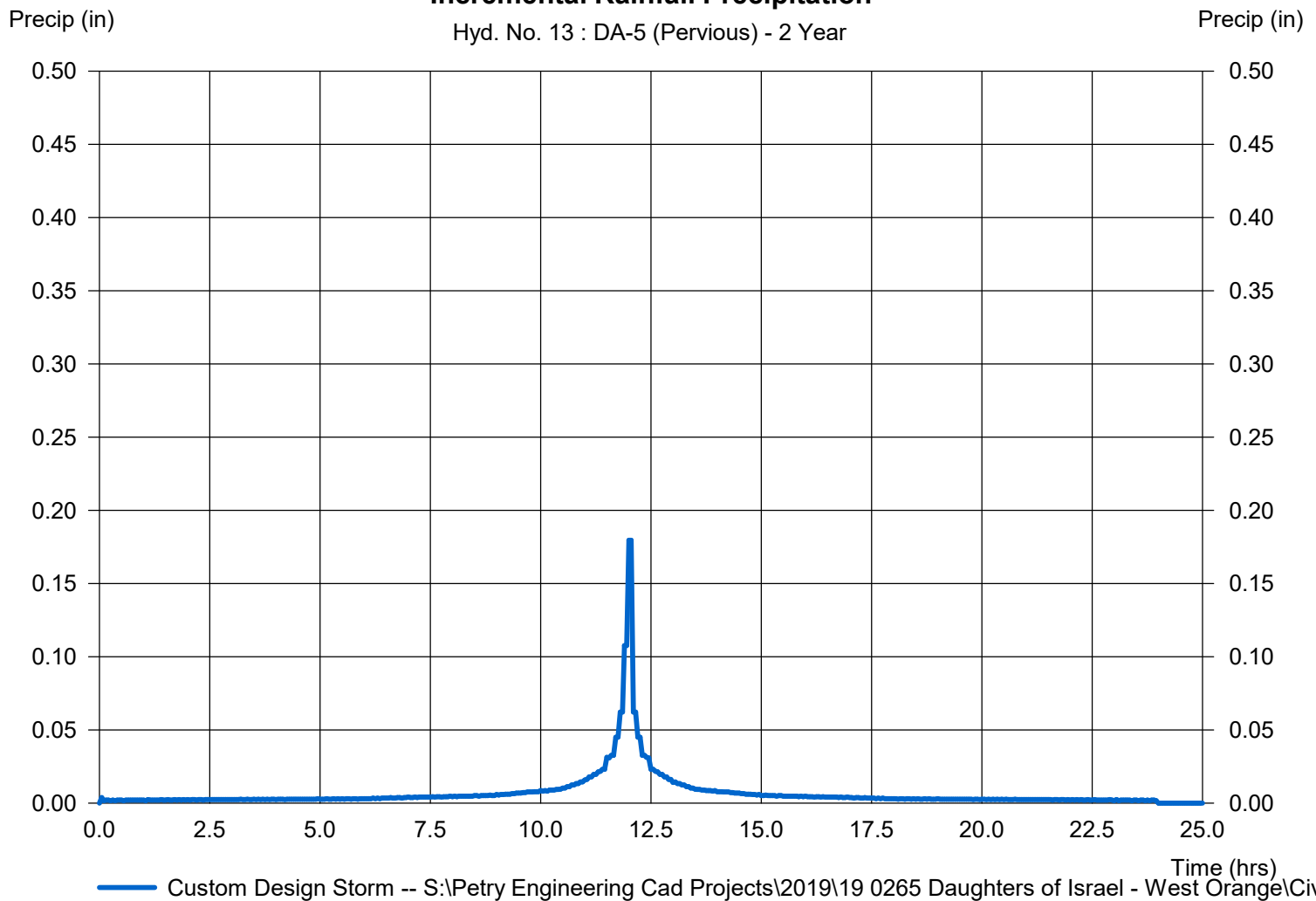
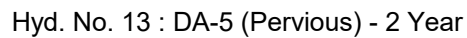
Hydrograph type	=	SCS Runoff	Peak discharge	=	0.039 cfs
Storm frequency	=	2 yrs	Time to peak	=	13.25 hrs
Time interval	=	3 min	Hyd. volume	=	1,059 cuft
Drainage area	=	2.590 ac	Curve number	=	47*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.60 min
Total precip.	=	3.44 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\13019 0265 Daughters of Israel - West Orange			

* Composite (Area/CN) = [(0.760 x 80) + (1.700 x 30) + (0.130 x 70)] / 2.590



DA-5 (Pervious)

Storm Frequency = 2 yrs Time interval = 3 min
Total precip. = 3.4400 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

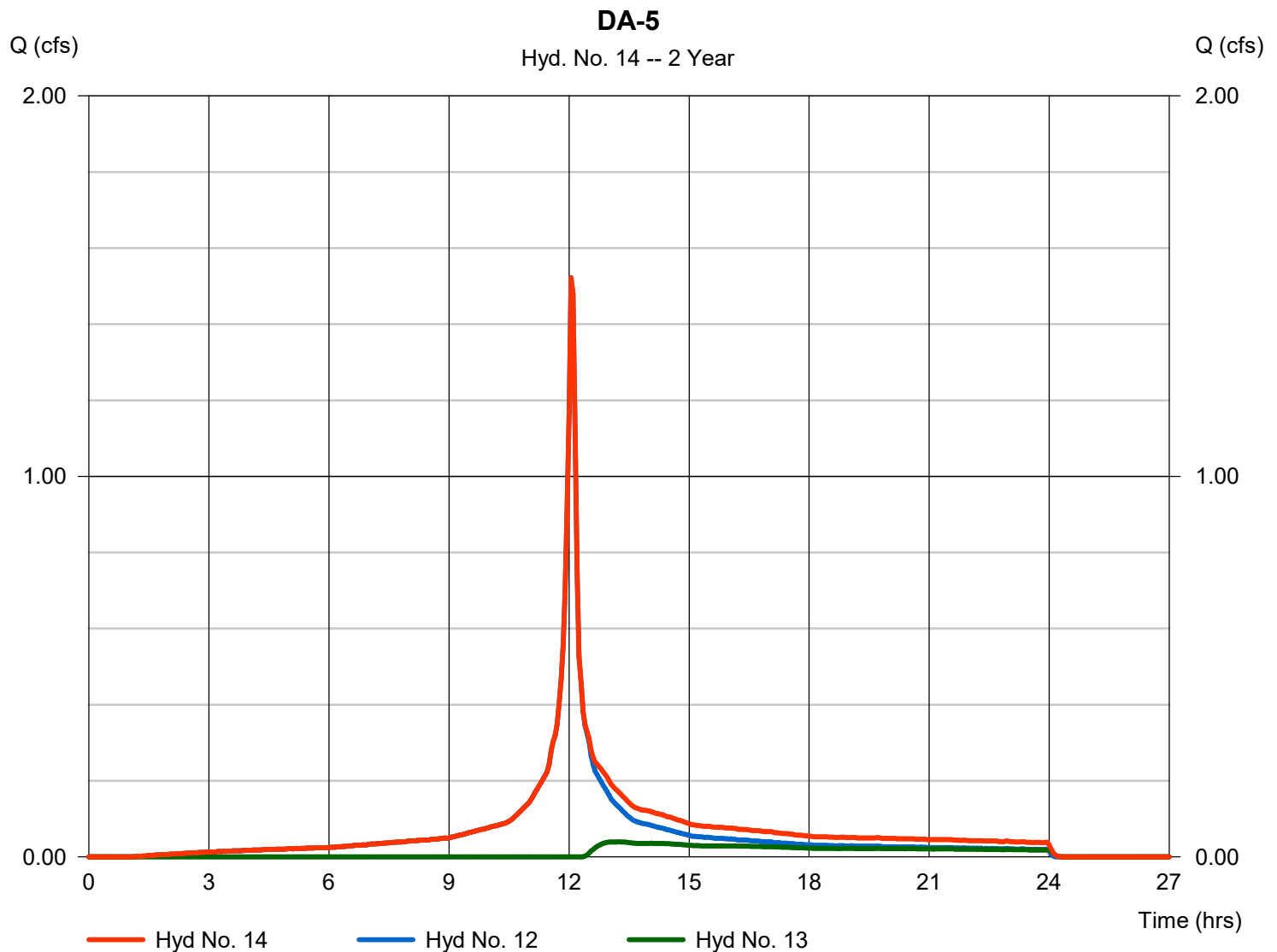
Wednesday, 11 / 2 / 2022

Hyd. No. 14

DA-5

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 3 min
 Inflow hyds. = 12, 13

Peak discharge = 1.521 cfs
 Time to peak = 12.05 hrs
 Hyd. volume = 6,952 cuft
 Contrib. drain. area = 3.130 ac

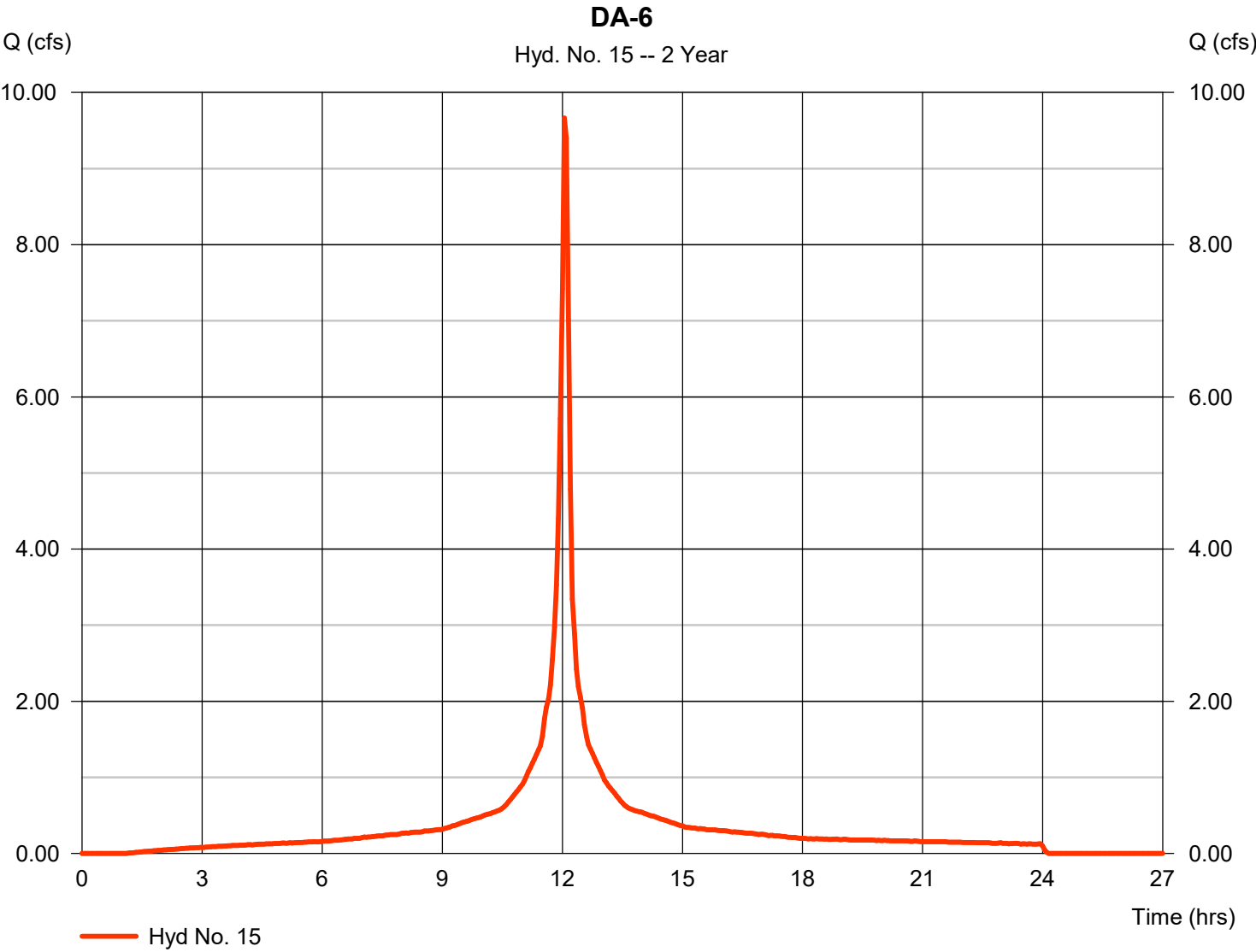


Hydrograph Report

Hyd. No. 15

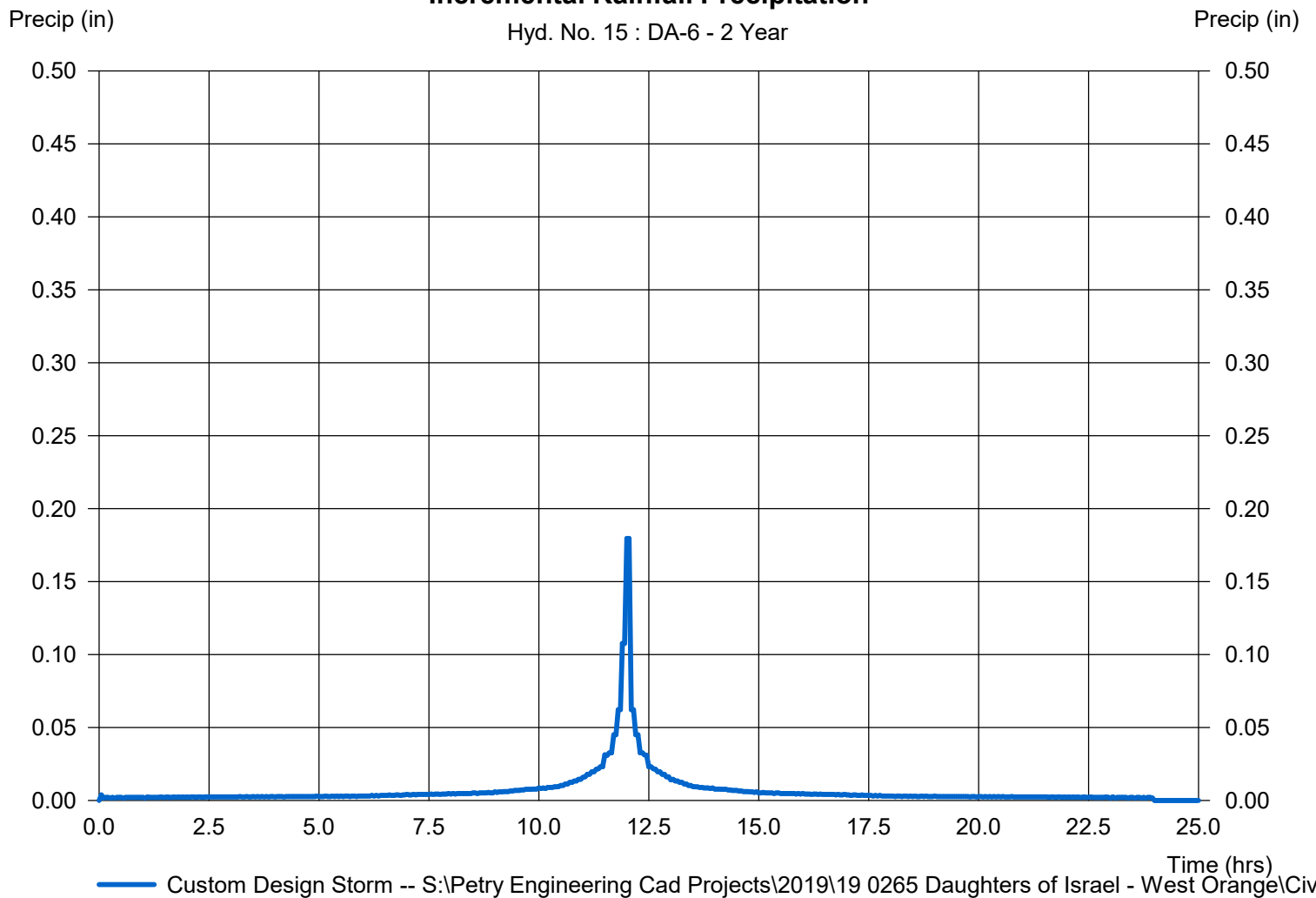
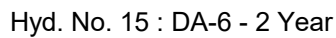
DA-6

Hydrograph type	= SCS Runoff	Peak discharge	= 9.664 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 37,430 cuft
Drainage area	= 3.430 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange, NJ\10-0265 Daughters of Israel - West Orange, NJ.dwg		



DA-6

Storm Frequency = 2 yrs Time interval = 3 min
Total precip. = 3.4400 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

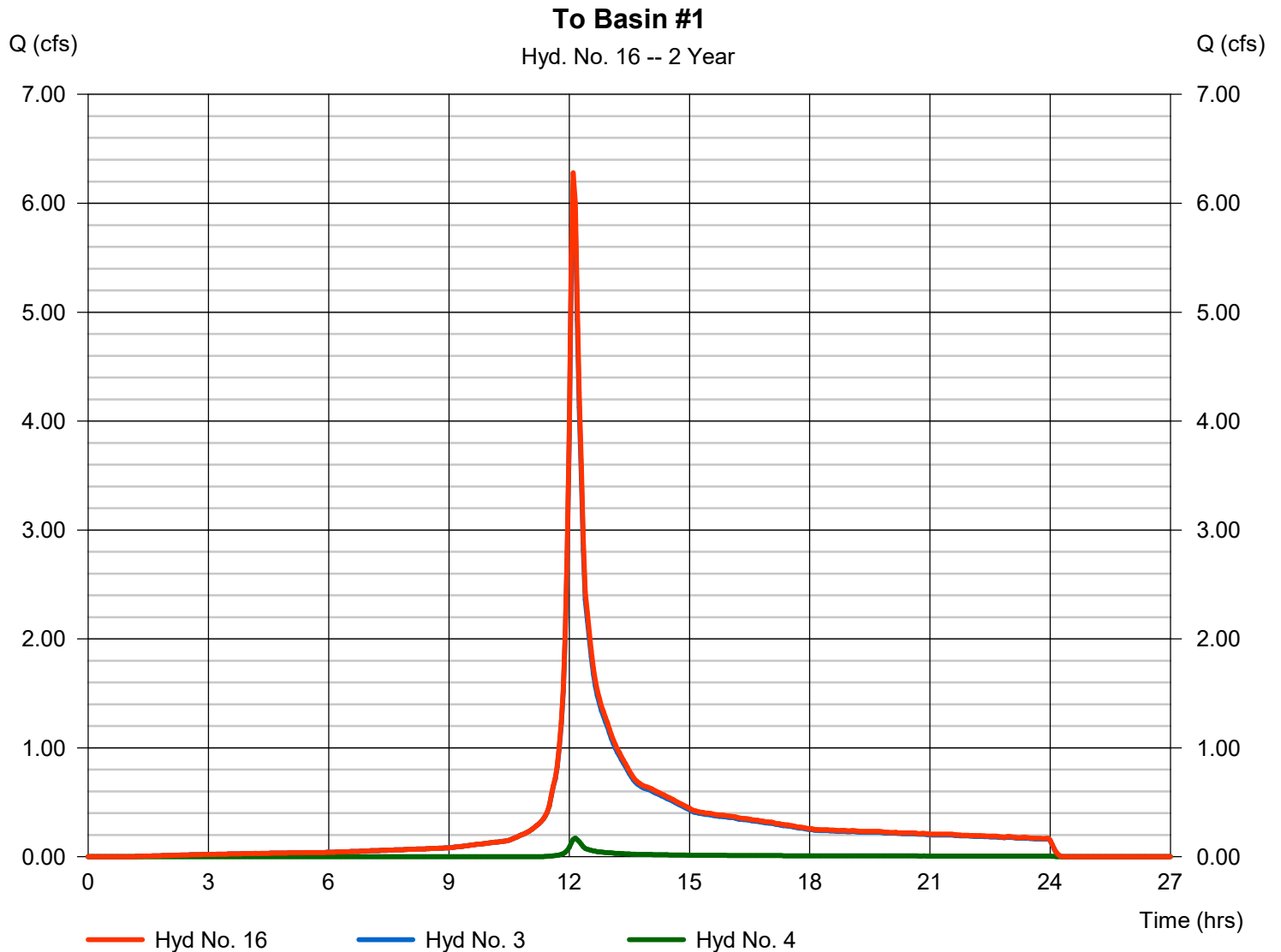
Wednesday, 11 / 2 / 2022

Hyd. No. 16

To Basin #1

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 3 min
Inflow hyds. = 3, 4

Peak discharge = 6.280 cfs
Time to peak = 12.10 hrs
Hyd. volume = 28,410 cuft
Contrib. drain. area = 0.240 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

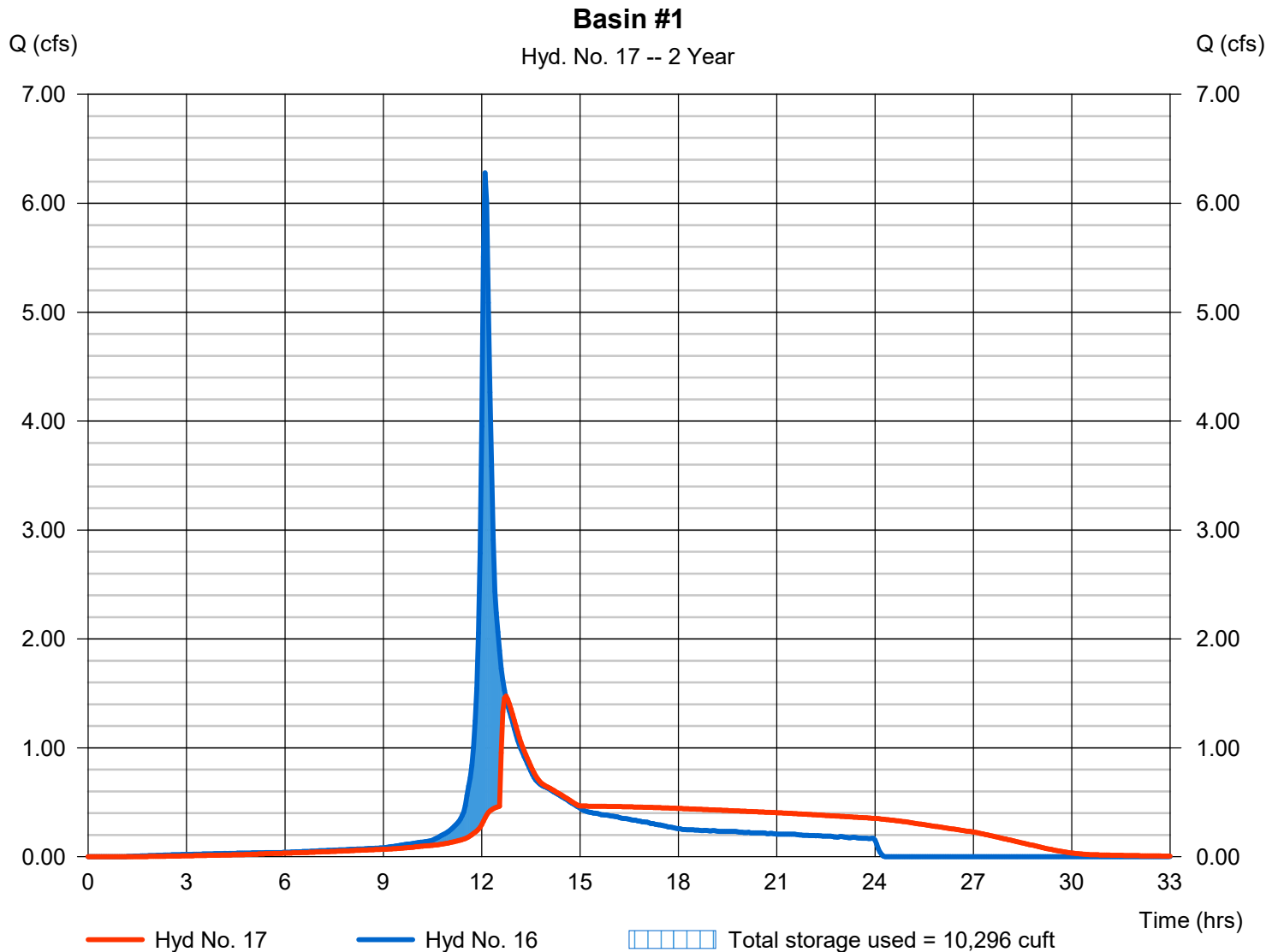
Wednesday, 11 / 2 / 2022

Hyd. No. 17

Basin #1

Hydrograph type	= Reservoir	Peak discharge	= 1.473 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.75 hrs
Time interval	= 3 min	Hyd. volume	= 28,403 cuft
Inflow hyd. No.	= 16 - To Basin #1	Max. Elevation	= 419.06 ft
Reservoir name	= Basin #1	Max. Storage	= 10,296 cuft

Storage Indication method used.



Pond No. 1 - Basin #1

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 415.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	415.00	1,040	0	0
1.00	416.00	1,900	1,470	1,470
2.00	417.00	2,550	2,225	3,695
3.00	418.00	3,170	2,860	6,555
4.00	419.00	3,800	3,485	10,040
5.00	420.00	4,800	4,300	14,340

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 3.00	0.00	0.00	0.00
Span (in)	= 3.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 415.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	0.00	0.00	0.00
Crest El. (ft)	= 419.00	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 Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	415.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.00	1,470	416.00	0.22 ic	---	---	---	0.00	---	---	---	---	---	0.221
2.00	3,695	417.00	0.32 ic	---	---	---	0.00	---	---	---	---	---	0.324
3.00	6,555	418.00	0.40 ic	---	---	---	0.00	---	---	---	---	---	0.401
4.00	10,040	419.00	0.47 ic	---	---	---	0.00	---	---	---	---	---	0.465
5.00	14,340	420.00	0.52 ic	---	---	---	53.28	---	---	---	---	---	53.80

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

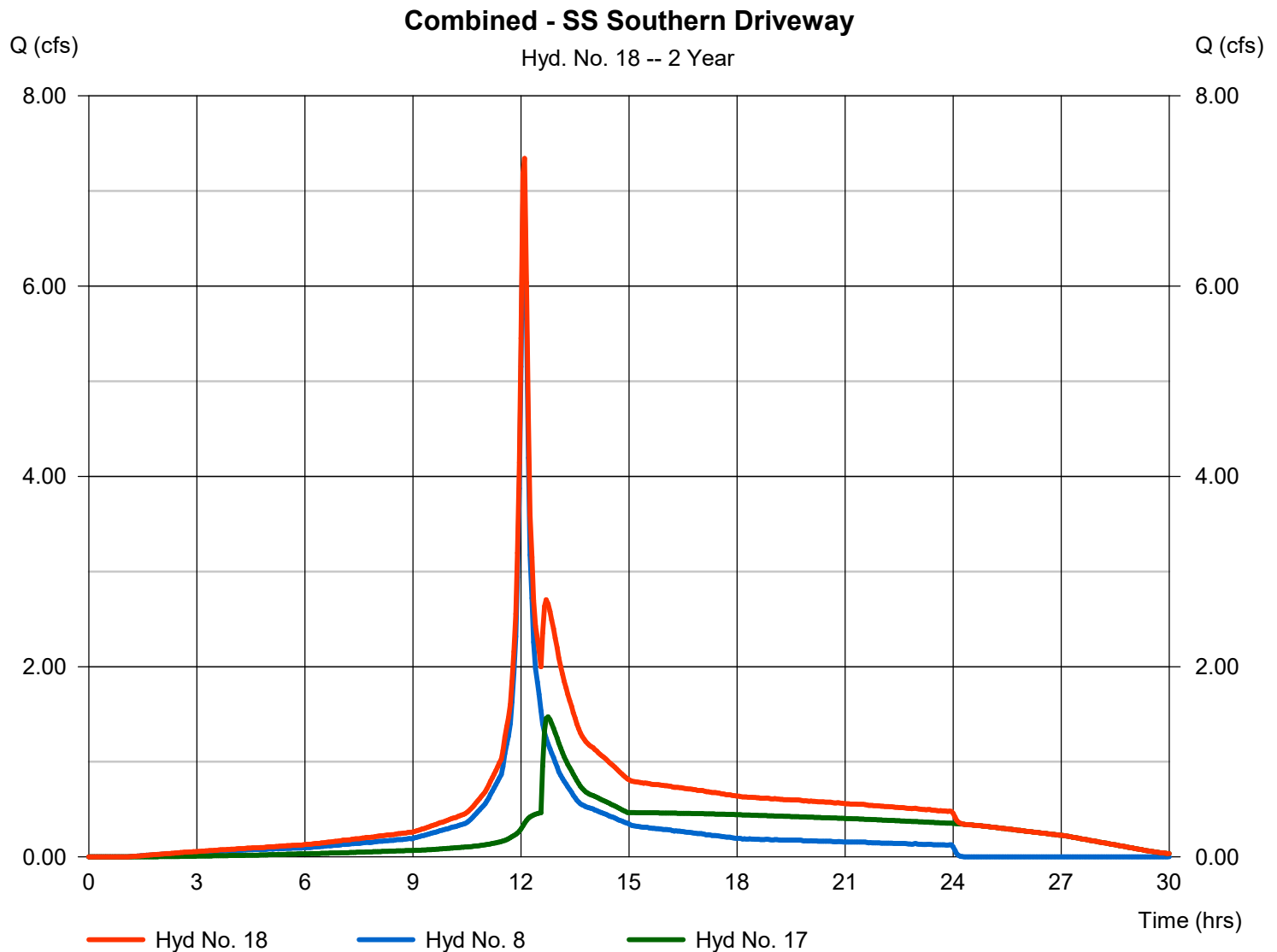
Wednesday, 11 / 2 / 2022

Hyd. No. 18

Combined - SS Southern Driveway

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 3 min
 Inflow hyds. = 8, 17

Peak discharge = 7.343 cfs
 Time to peak = 12.10 hrs
 Hyd. volume = 57,703 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

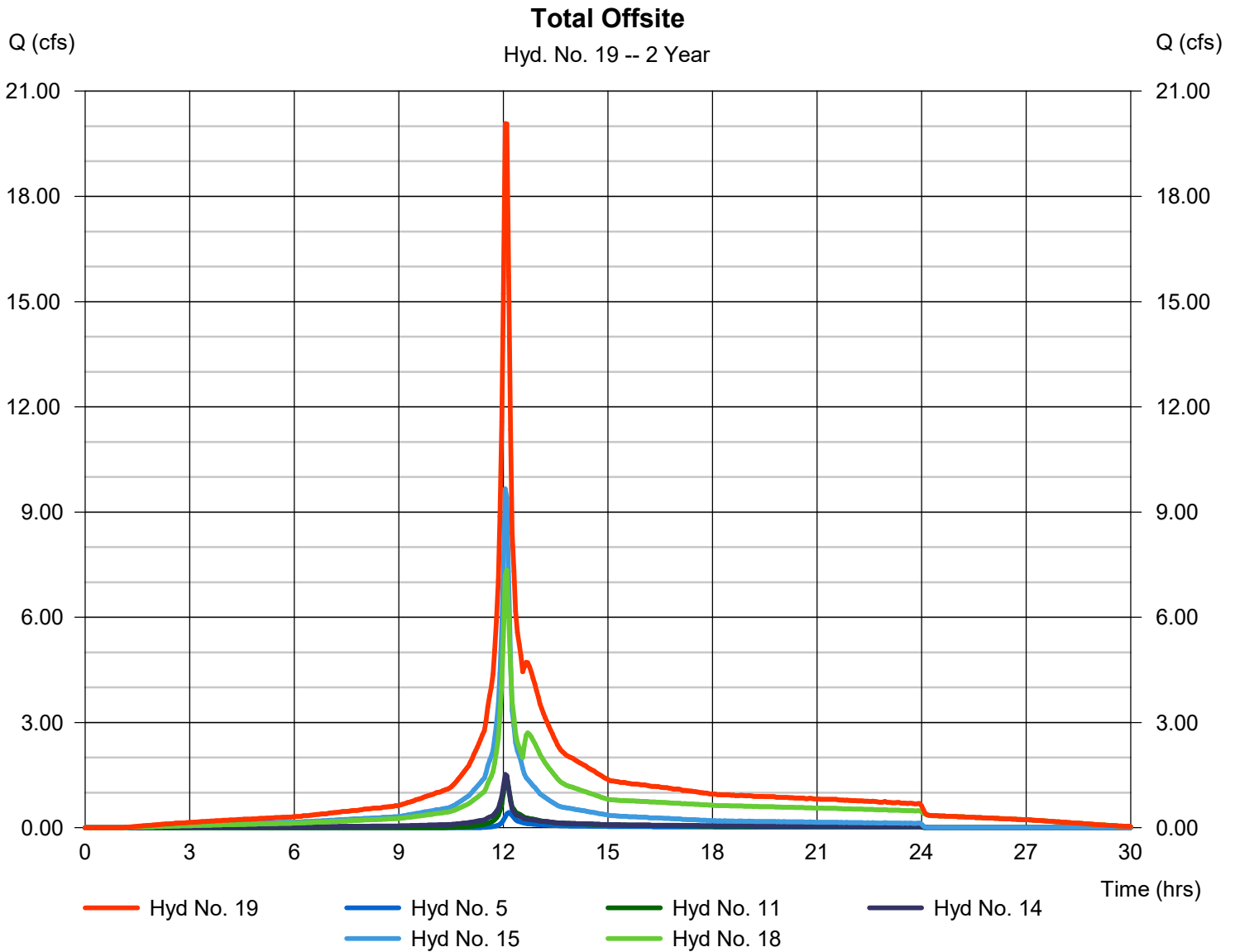
Wednesday, 11 / 2 / 2022

Hyd. No. 19

Total Offsite

Hydrograph type = Combine
 Storm frequency = 2 yrs
 Time interval = 3 min
 Inflow hyds. = 5, 11, 14, 15, 18

Peak discharge = 20.08 cfs
 Time to peak = 12.05 hrs
 Hyd. volume = 109,031 cuft
 Contrib. drain. area = 4.030 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

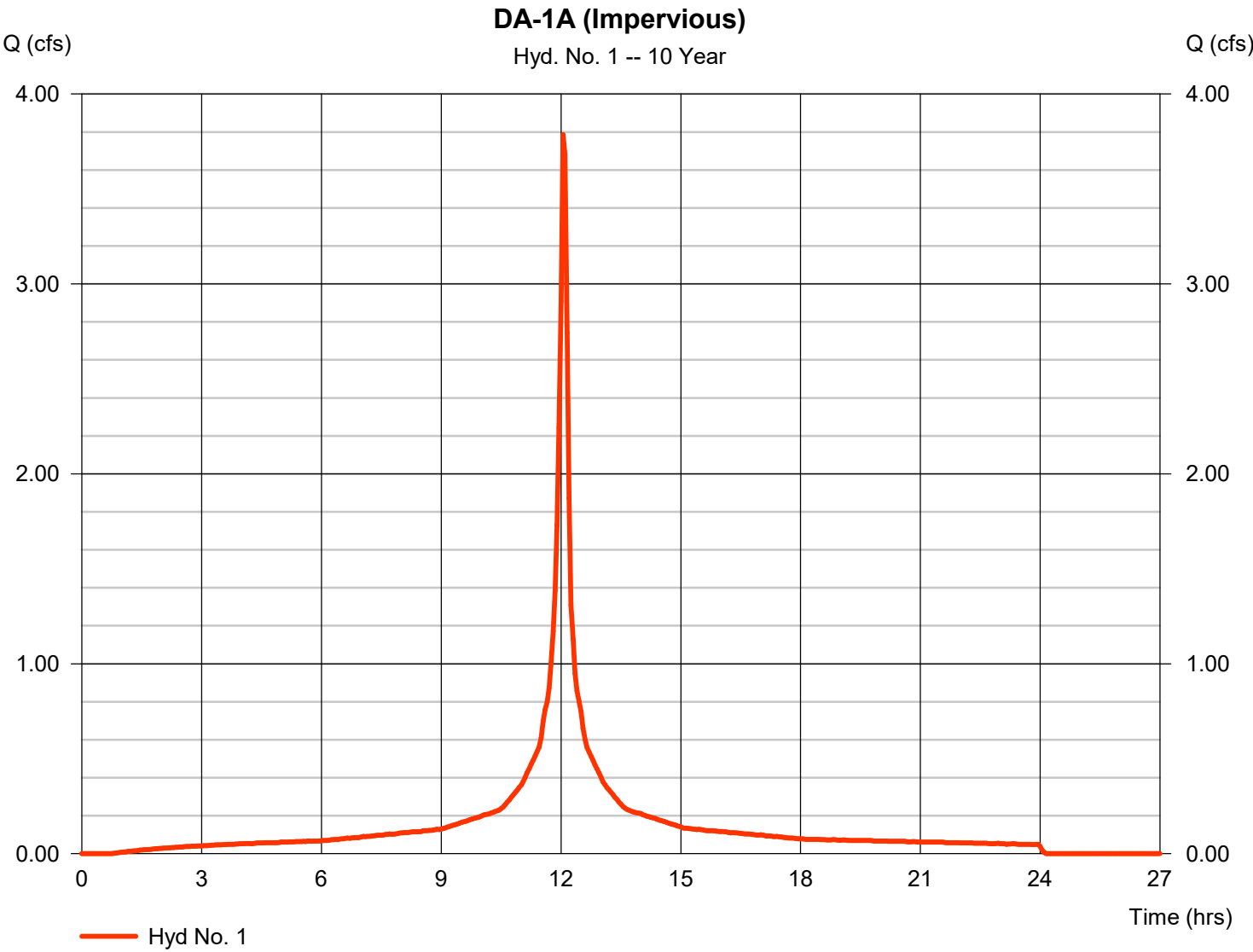
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.787	3	723	14,922	-----	-----	-----	DA-1A (Impervious)
2	SCS Runoff	10.61	3	729	43,282	-----	-----	-----	DA-1A (Pervious)
3	Combine	13.83	3	726	58,204	1, 2	-----	-----	DA-1A
4	SCS Runoff	0.437	3	729	1,775	-----	-----	-----	DA-1B
5	SCS Runoff	1.092	3	729	4,438	-----	-----	-----	DA-2
6	SCS Runoff	9.036	3	723	35,610	-----	-----	-----	DA-3 (Impervious)
7	SCS Runoff	3.872	3	729	15,957	-----	-----	-----	DA-3 (Pervious)
8	Combine	12.47	3	726	51,567	6, 7	-----	-----	DA-3
9	SCS Runoff	0.129	3	723	509	-----	-----	-----	DA-4 (Impervious)
10	SCS Runoff	2.996	3	726	10,189	-----	-----	-----	DA-4 (Pervious)
11	Combine	3.122	3	726	10,698	9, 10	-----	-----	DA-4
12	SCS Runoff	2.324	3	723	9,157	-----	-----	-----	DA-5 (Impervious)
13	SCS Runoff	0.797	3	732	5,797	-----	-----	-----	DA-5 (Pervious)
14	Combine	2.844	3	726	14,954	12, 13	-----	-----	DA-5
15	SCS Runoff	14.76	3	723	58,163	-----	-----	-----	DA-6
16	Combine	14.25	3	726	59,979	3, 4,	-----	-----	To Basin #1
17	Reservoir	14.01	3	729	59,972	16	419.40	11,764	Basin #1
18	Combine	24.43	3	729	111,539	8, 17	-----	-----	Combined - SS Southern Driveway
19	Combine	45.76	3	726	199,793	5, 11, 14, 15, 18	-----	-----	Total Offsite
Existing Conditions.gpw					Return Period: 10 Year			Wednesday, 11 / 2 / 2022	

Hydrograph Report

Hyd. No. 1

DA-1A (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.787 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	14,922 cuft
Drainage area	=	0.880 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.22 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange\10-0265 Daughters of Israel - West Orange.dwg			



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

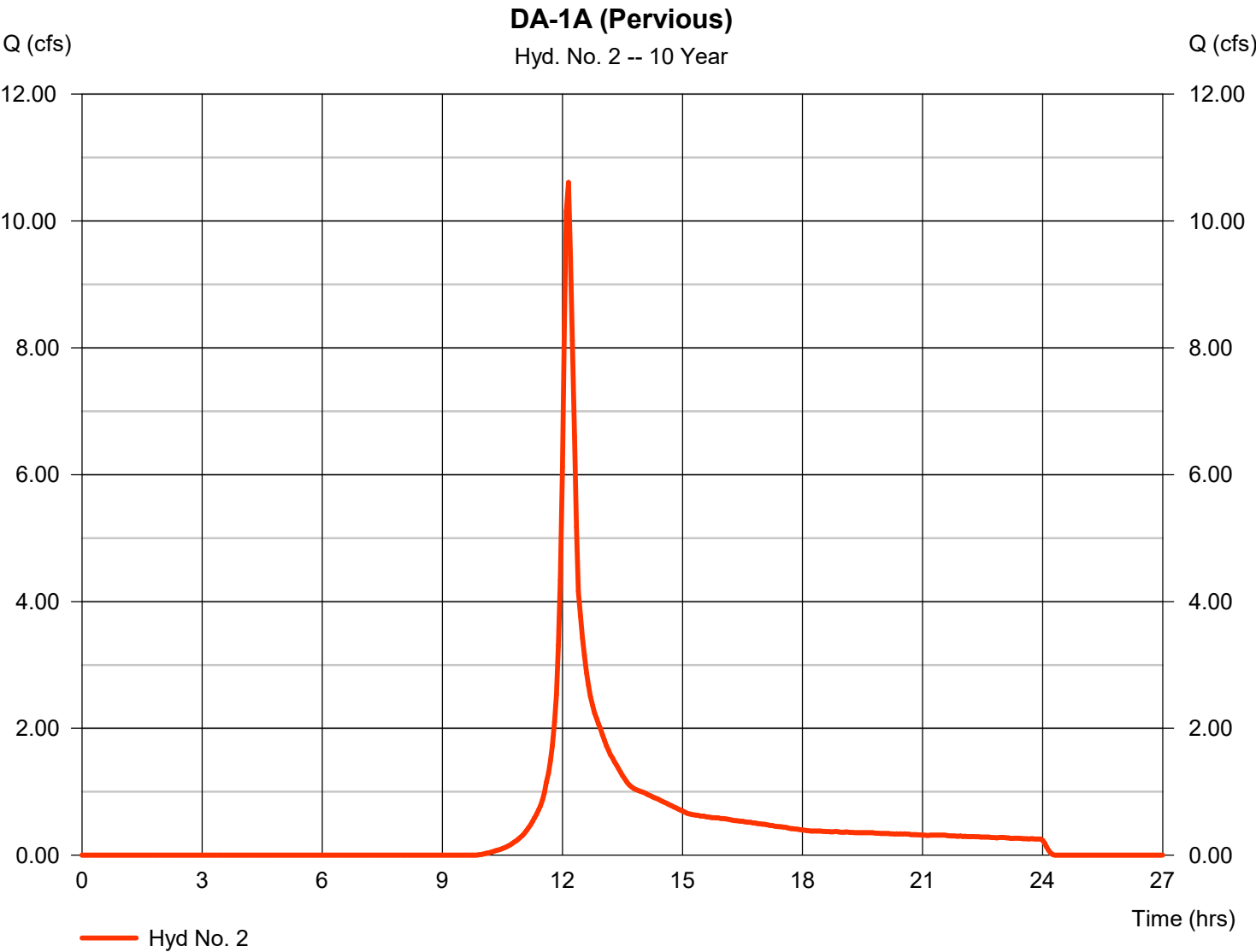
Wednesday, 11 / 2 / 2022

Hyd. No. 2

DA-1A (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 10.61 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 43,282 cuft
Drainage area	= 6.090 ac	Curve number	= 67*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.30 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\191010 0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = [(0.500 x 30) + (4.740 x 70) + (0.280 x 77) + (0.010 x 80) + (0.560 x 74)] / 6.090



DA-1A (Pervious)

= 10 yrs

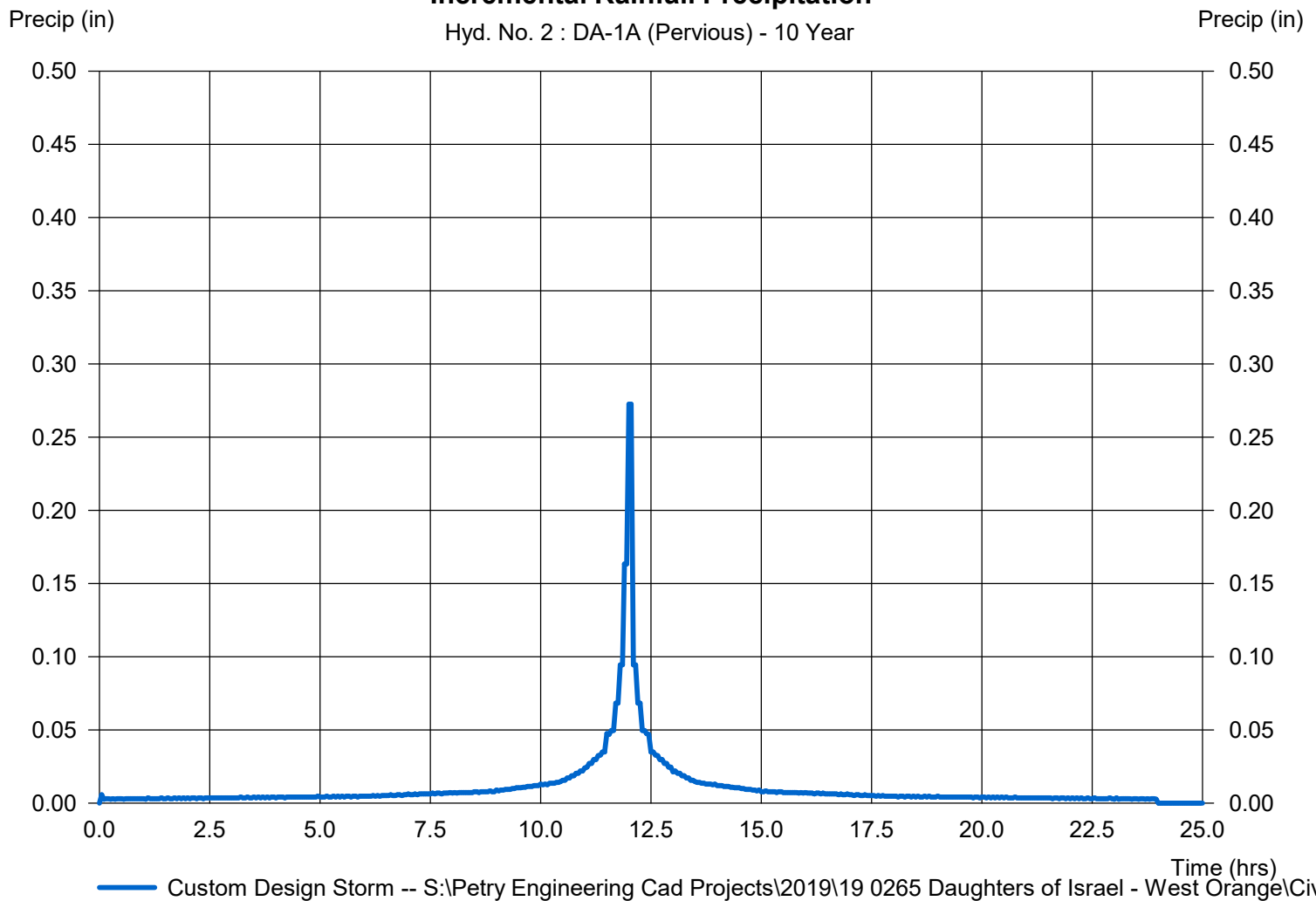
= 3 min

$$= 5.2200 \text{ in}$$

= Custom

= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

Hyd. No. 2 : DA-1A (Pervious) - 10 Year



Hydrograph Report

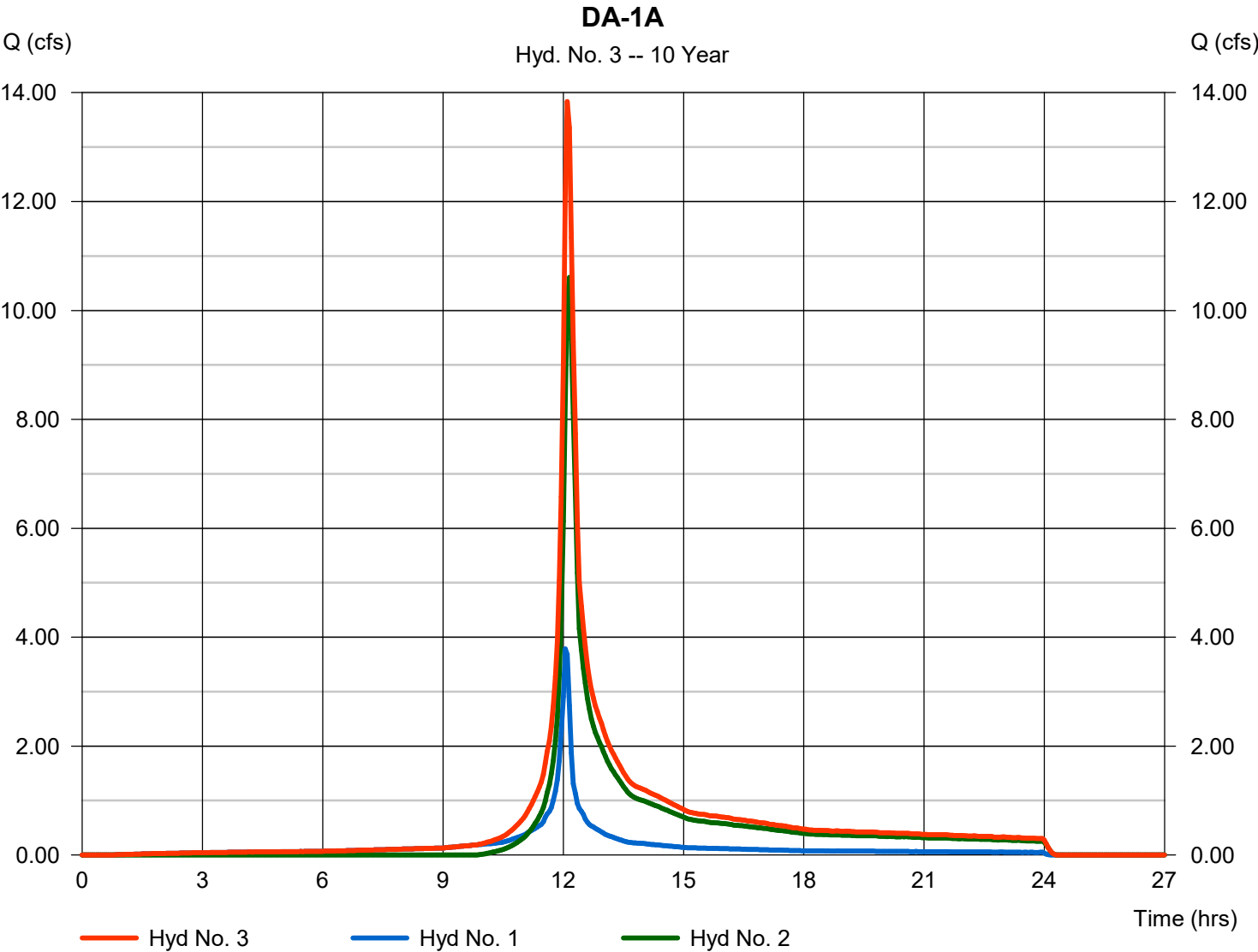
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 3

DA-1A

Hydrograph type	= Combine	Peak discharge	= 13.83 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 58,204 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 6.970 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

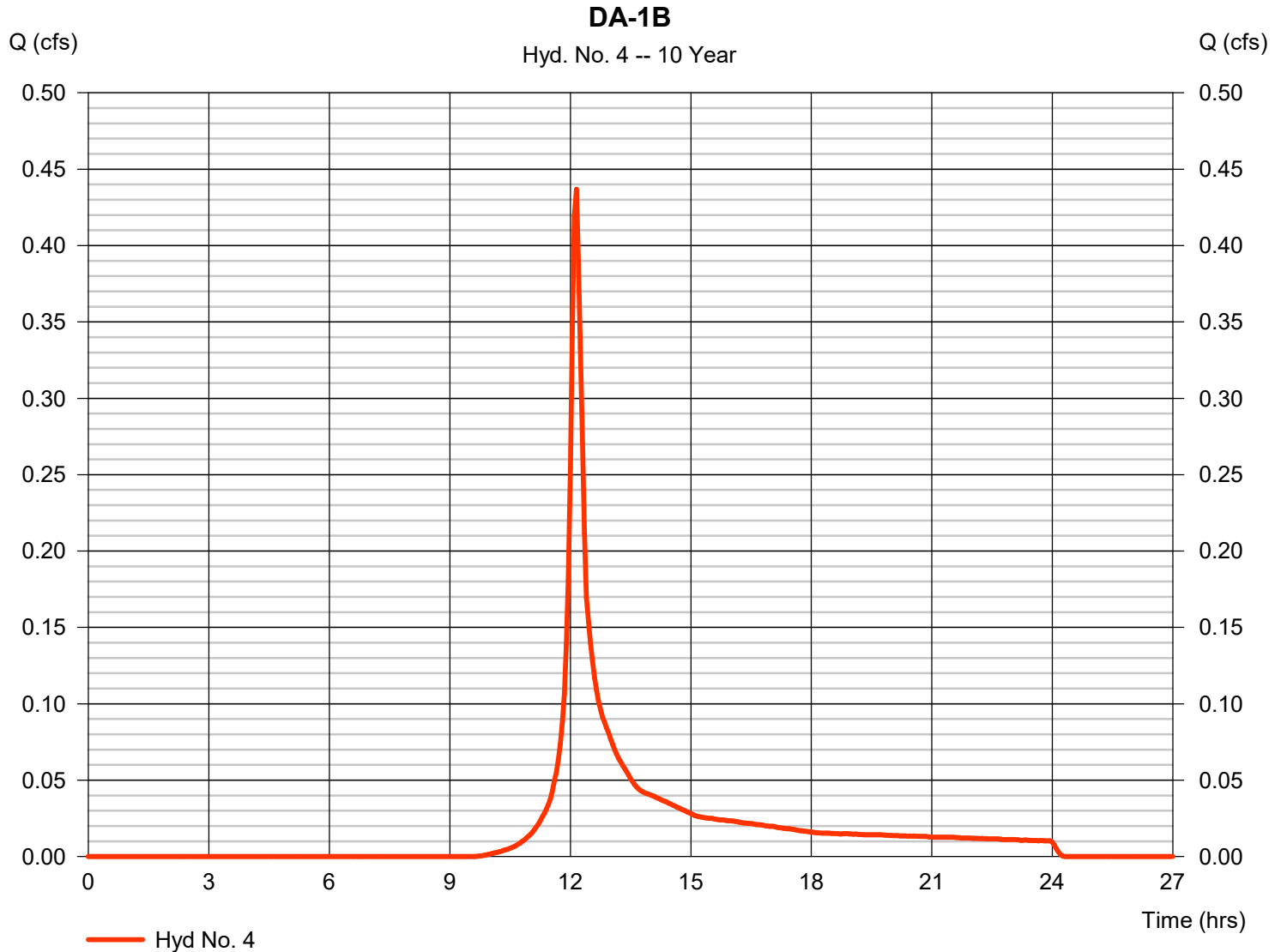
Wednesday, 11 / 2 / 2022

Hyd. No. 4

DA-1B

Hydrograph type	= SCS Runoff	Peak discharge	= 0.437 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 1,775 cuft
Drainage area	= 0.240 ac	Curve number	= 68*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.80 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019-2020\0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = $[(0.020 \times 30) + (0.170 \times 70) + (0.050 \times 77)] / 0.240$

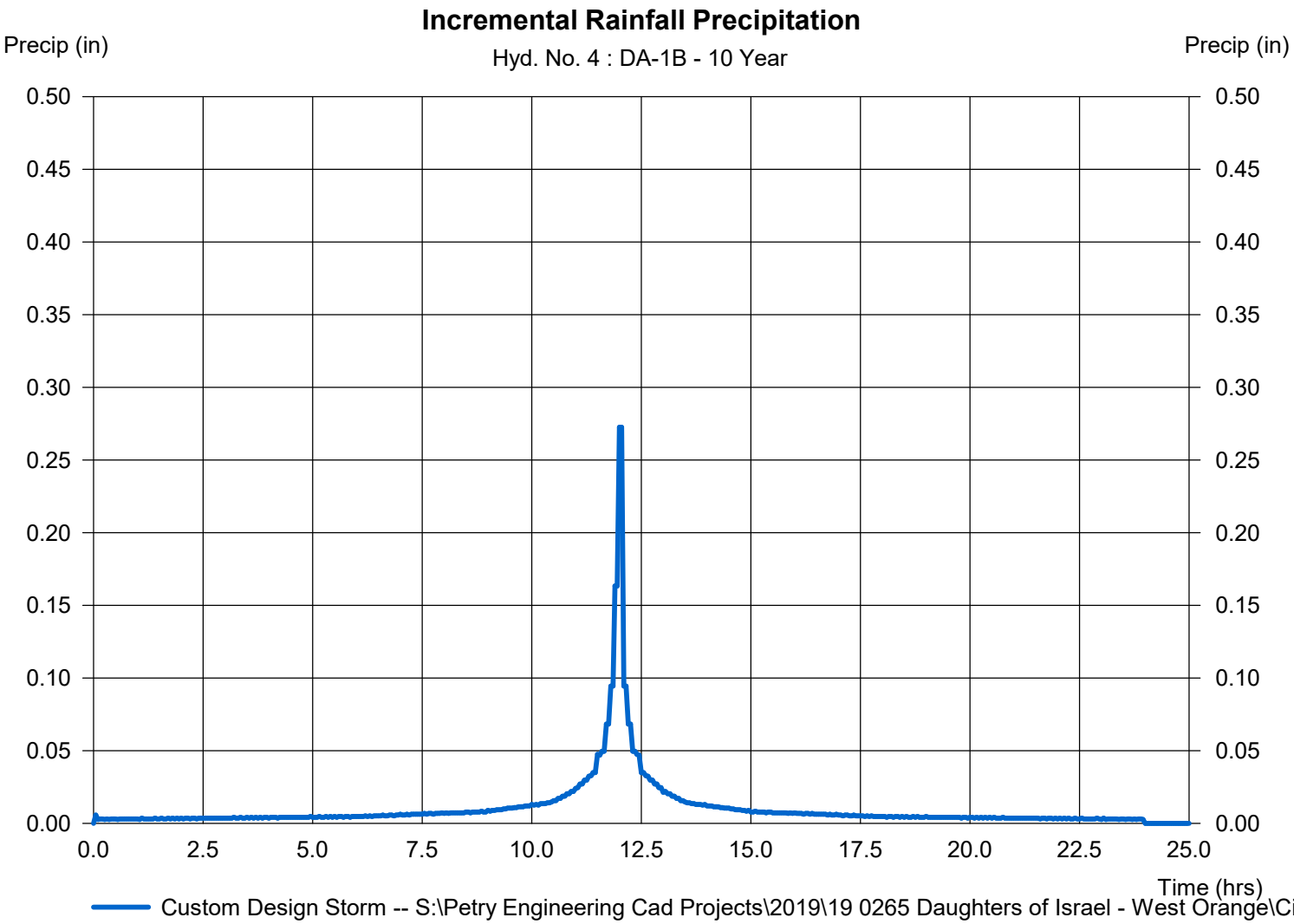


Precipitation Report

Hyd. No. 4

DA-1B

Storm Frequency	= 10 yrs	Time interval	= 3 min
Total precip.	= 5.2200 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Hydrographs\DA-1B - 10 Year		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

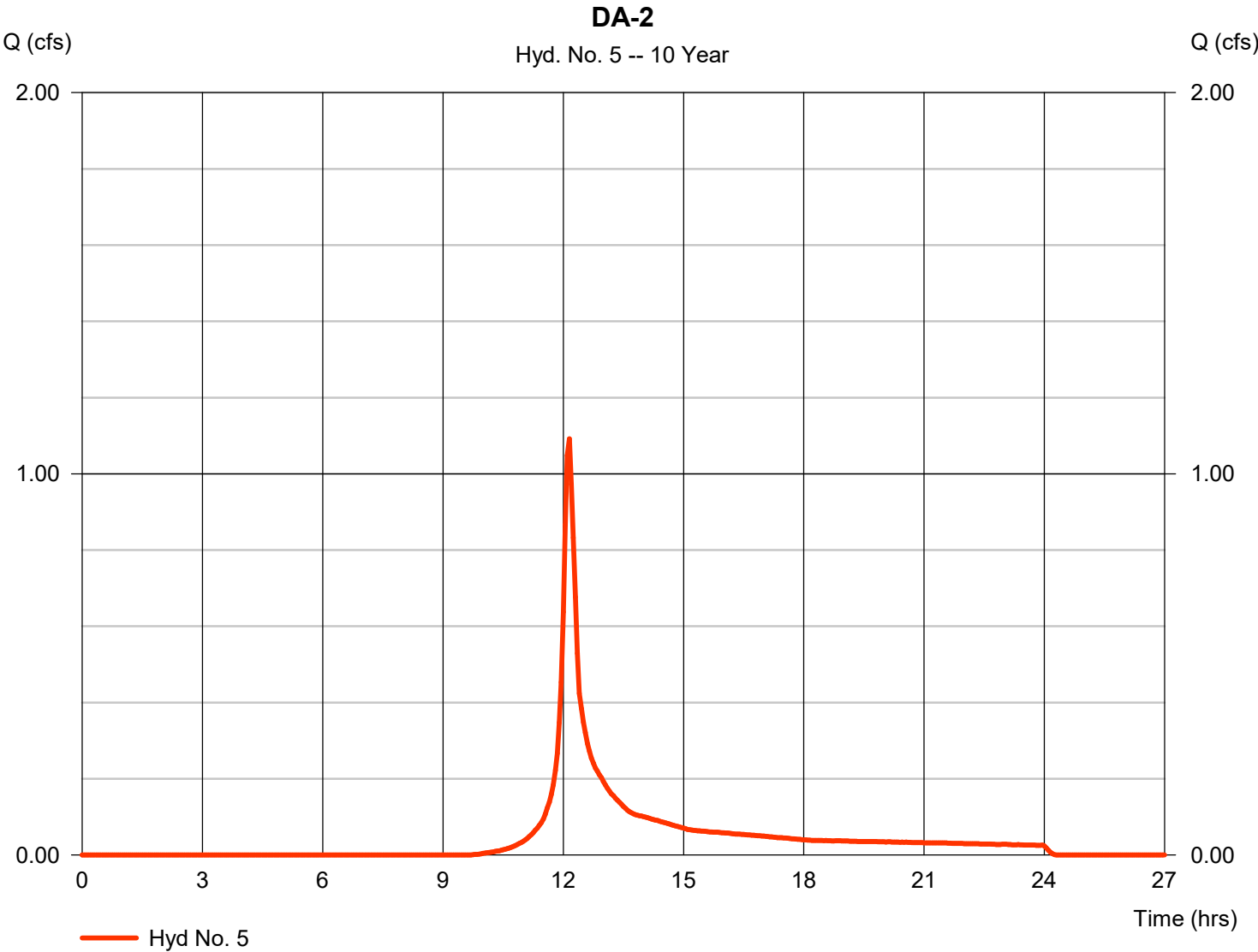
Wednesday, 11 / 2 / 2022

Hyd. No. 5

DA-2

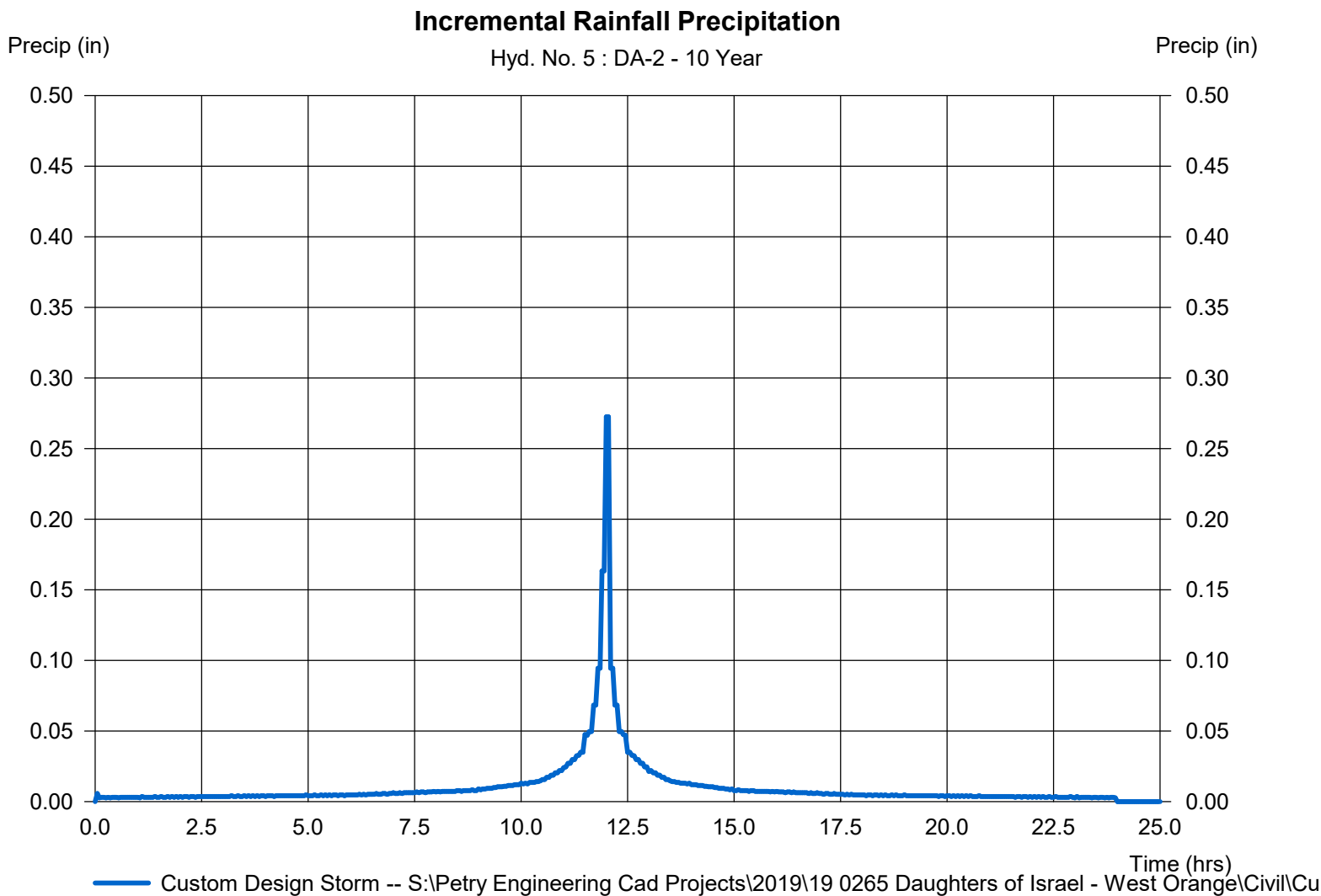
Hydrograph type	=	SCS Runoff	Peak discharge	=	1.092 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.15 hrs
Time interval	=	3 min	Hyd. volume	=	4,438 cuft
Drainage area	=	0.600 ac	Curve number	=	68*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.10 min
Total precip.	=	5.22 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\101010 0265 Daughters of Israel - West Orange			

* Composite (Area/CN) = [(0.100 x 77) + (0.140 x 70) + (0.250 x 80) + (0.110 x 30)] / 0.600



DA-2

Storm Frequency = 10 yrs Time interval = 3 min
Total precip. = 5.2200 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

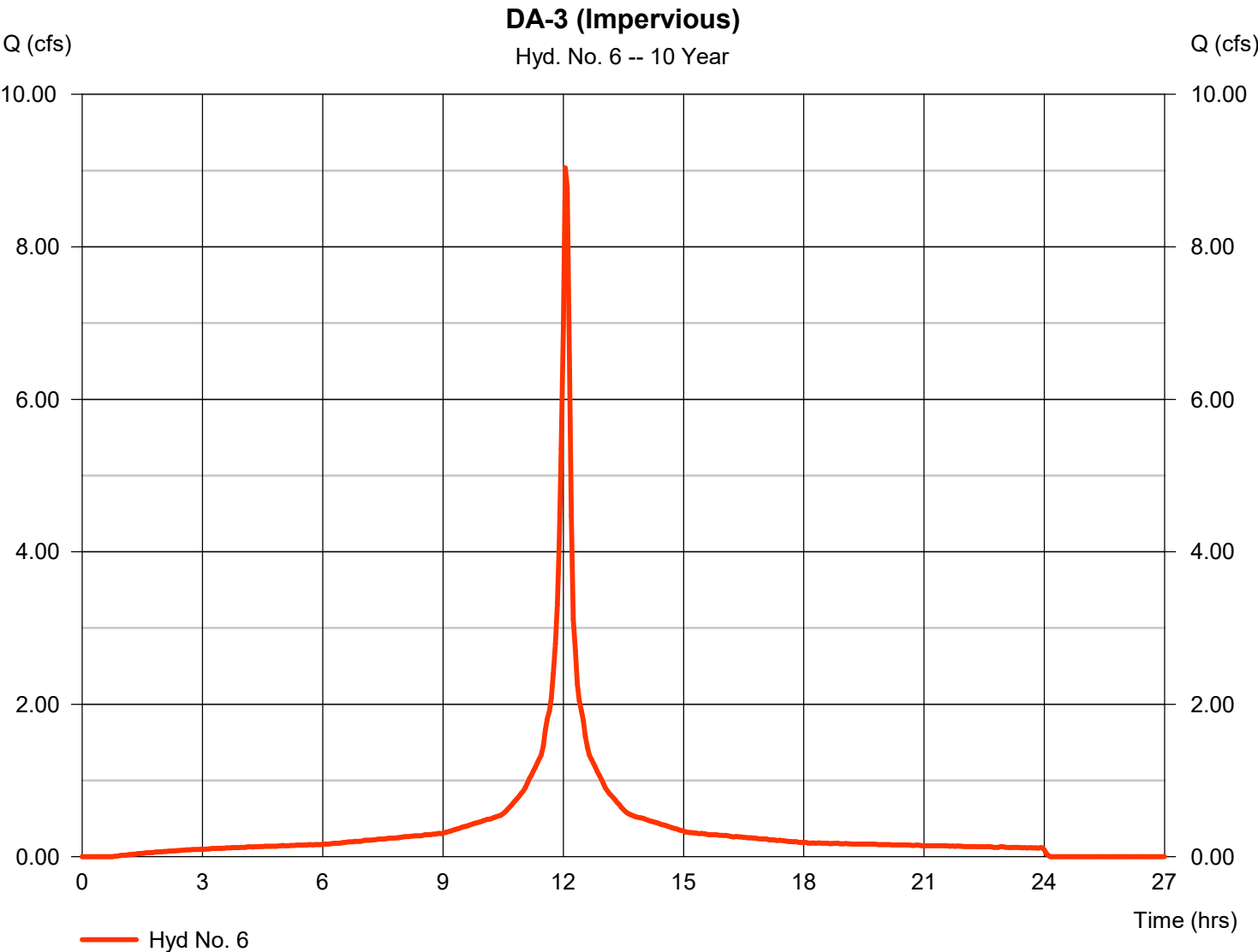
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 6

DA-3 (Impervious)

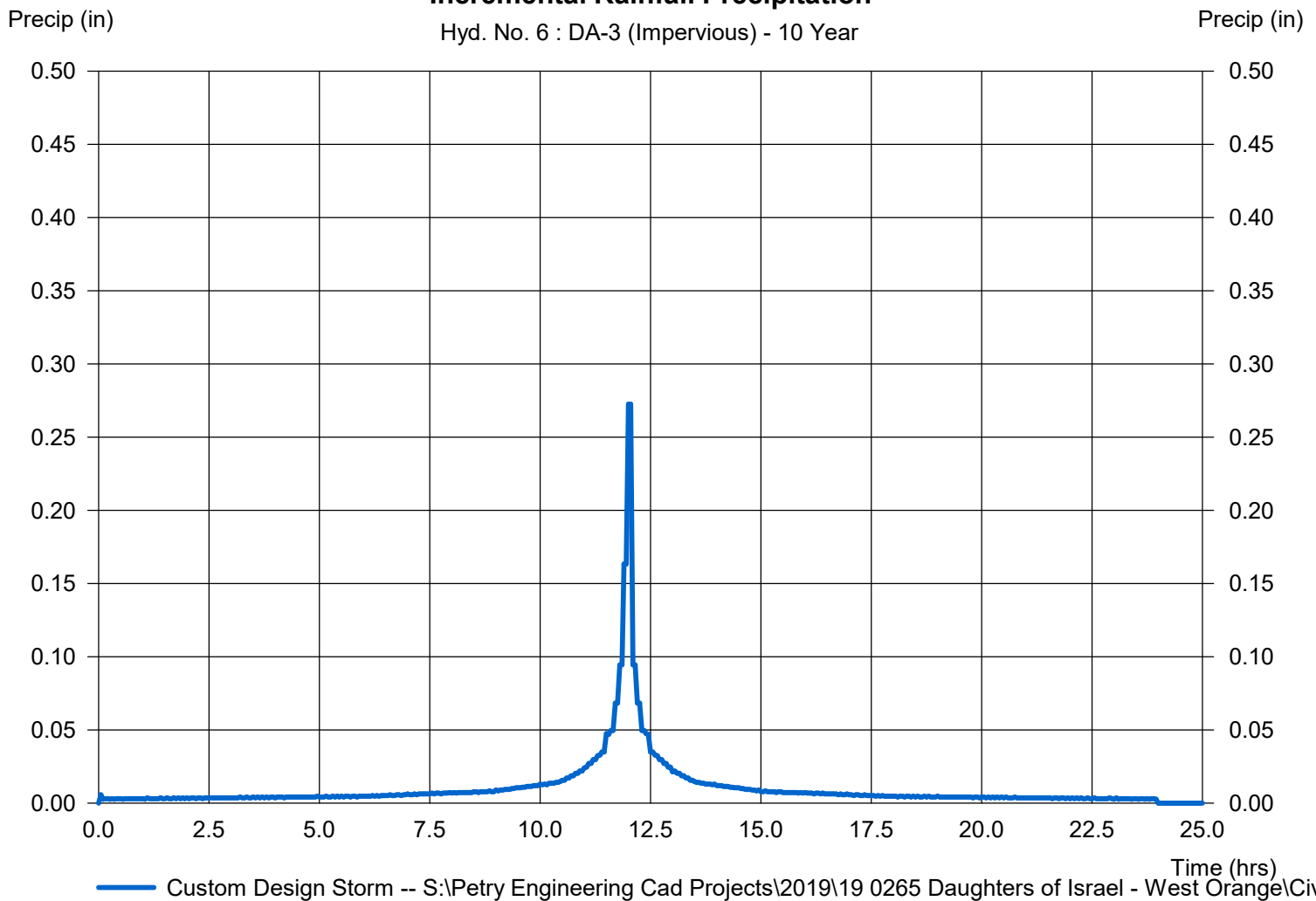
Hydrograph type	= SCS Runoff	Peak discharge	= 9.036 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 35,610 cuft
Drainage area	= 2.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		



DA-3 (Impervious)

Storm Frequency = 10 yrs Time interval = 3 min
Total precip. = 5.2200 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

Hyd. No. 6 : DA-3 (Impervious) - 10 Year



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

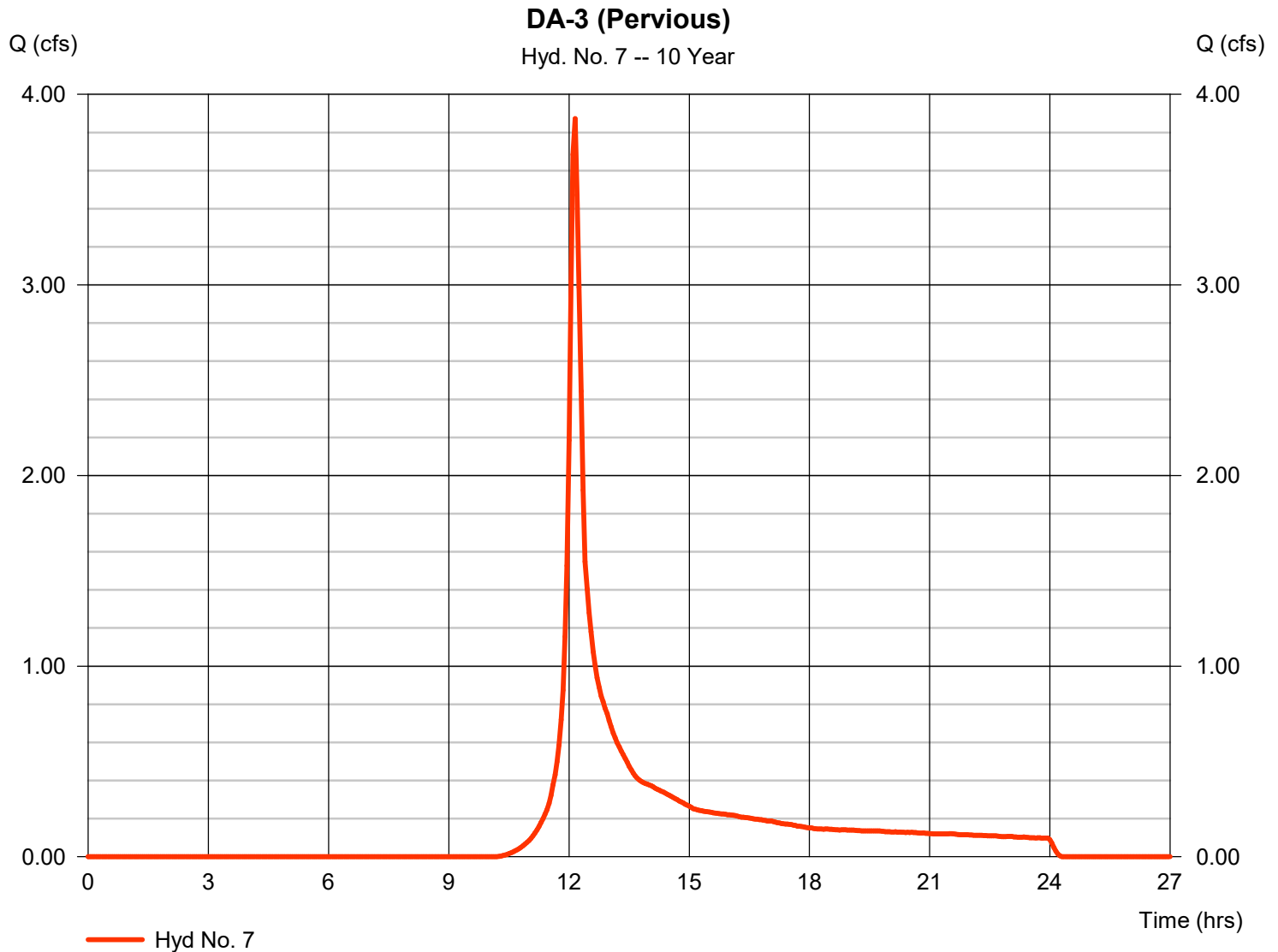
Wednesday, 11 / 2 / 2022

Hyd. No. 7

DA-3 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.872 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 15,957 cuft
Drainage area	= 2.440 ac	Curve number	= 65*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.50 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = $[(0.890 \times 80) + (0.210 \times 74) + (0.550 \times 30) + (0.760 \times 70) + (0.030 \times 77)] / 2.440$



Hydrograph Report

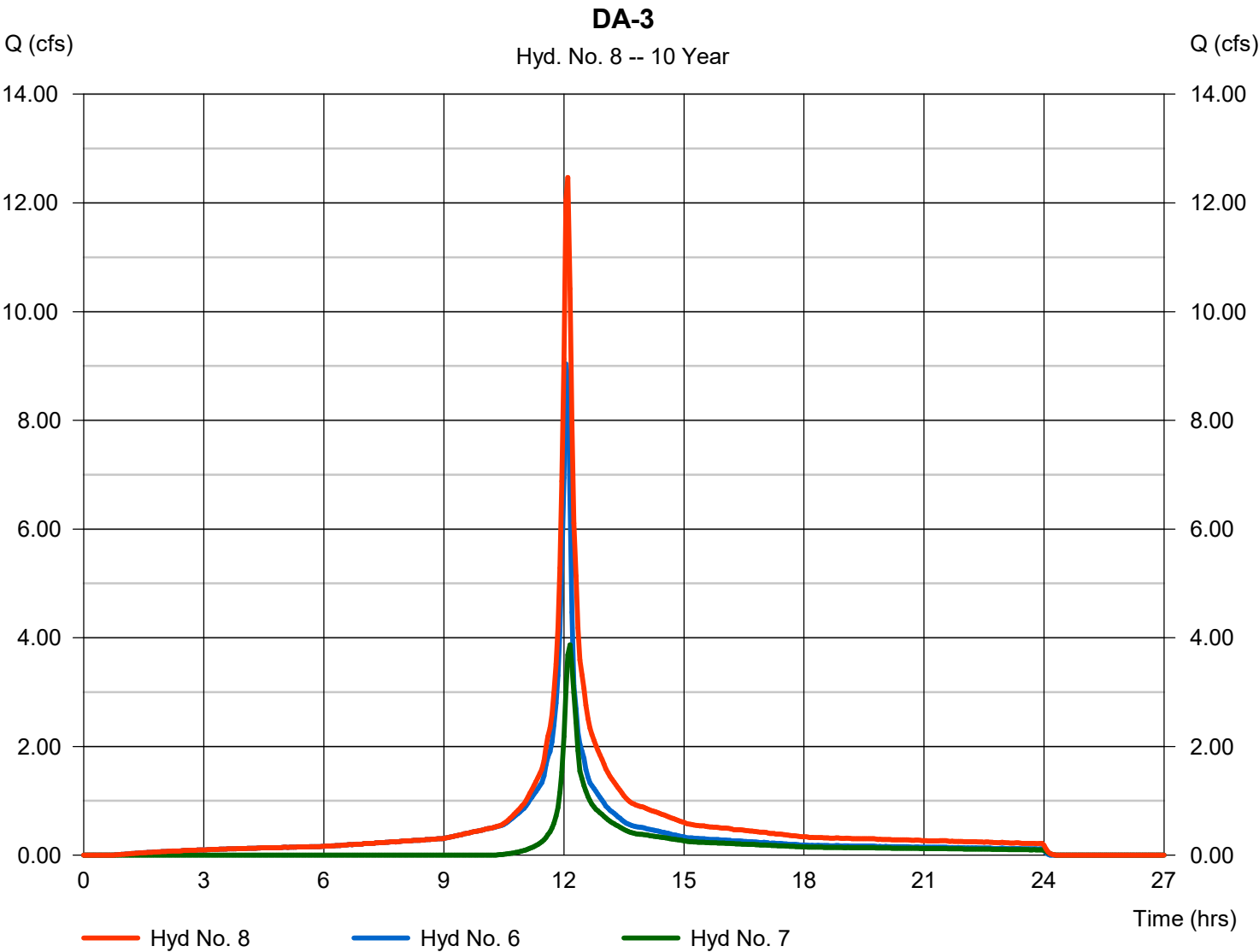
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 8

DA-3

Hydrograph type	= Combine	Peak discharge	= 12.47 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 51,567 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 4.540 ac



Hydrograph Report

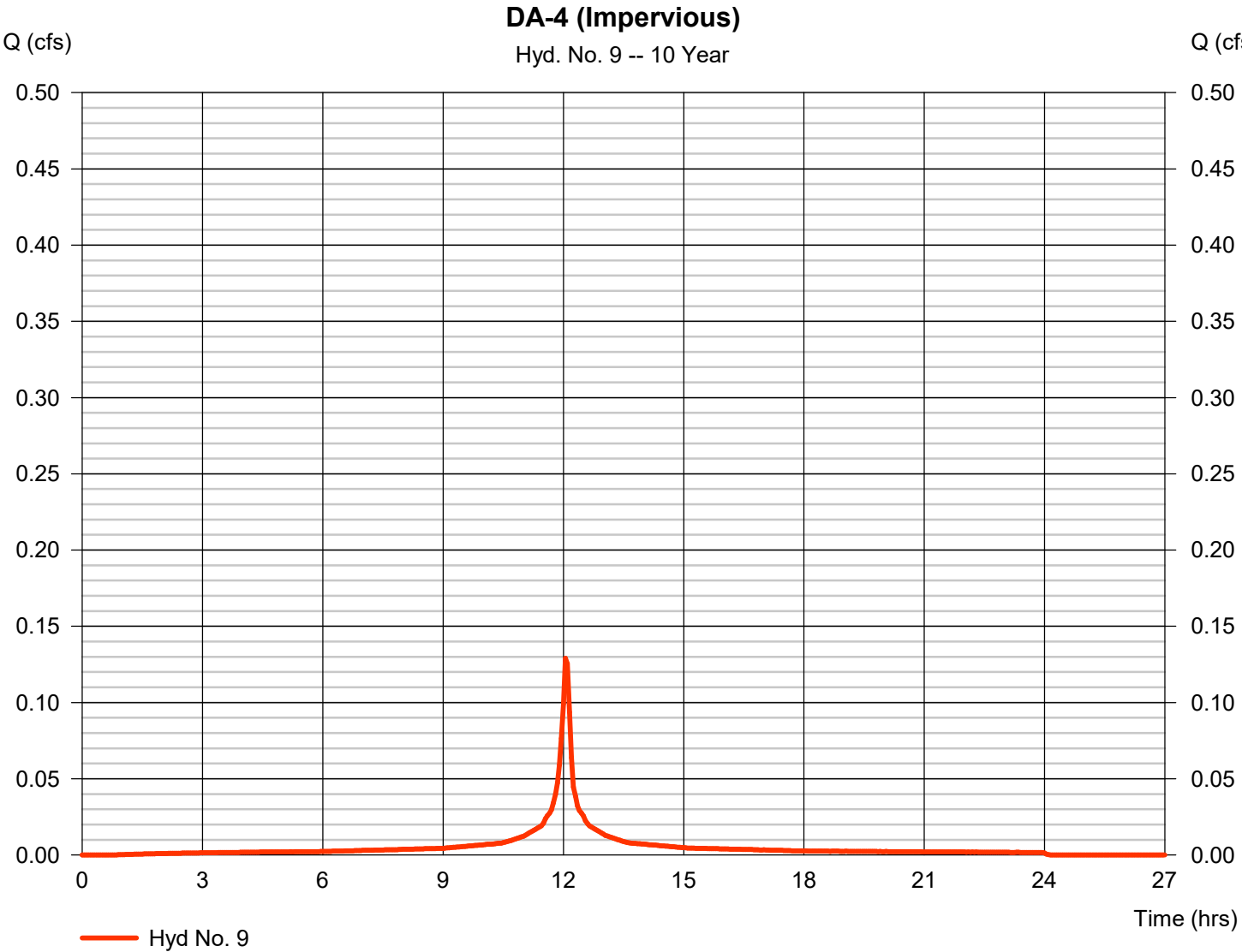
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 9

DA-4 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.129 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	509 cuft
Drainage area	=	0.030 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.22 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange			



Precipitation Report

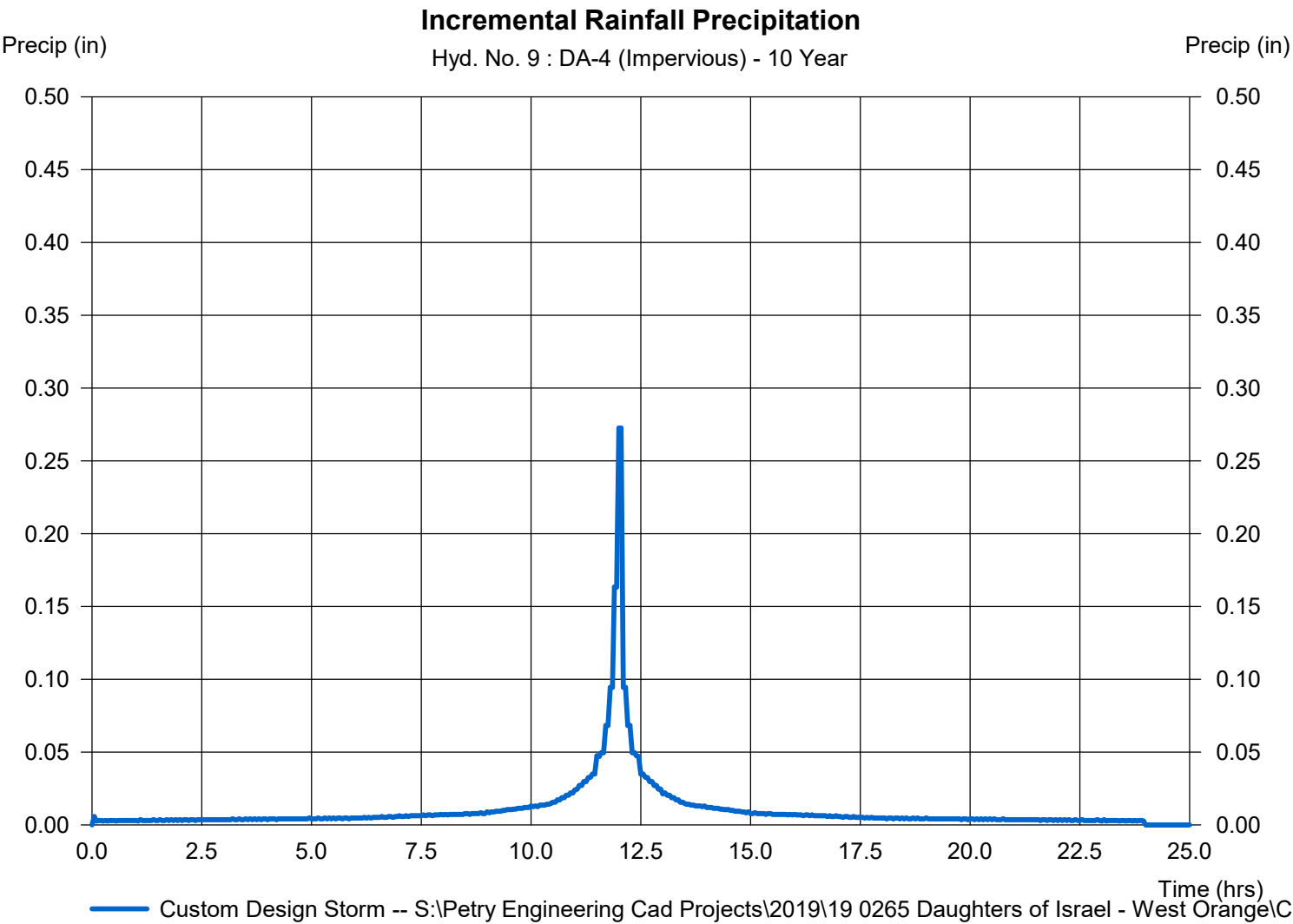
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 9

DA-4 (Impervious)

Storm Frequency	= 10 yrs	Time interval	= 3 min
Total precip.	= 5.2200 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Hydrographs\Hydrograph\DA-4 (Impervious) - 10 Year		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

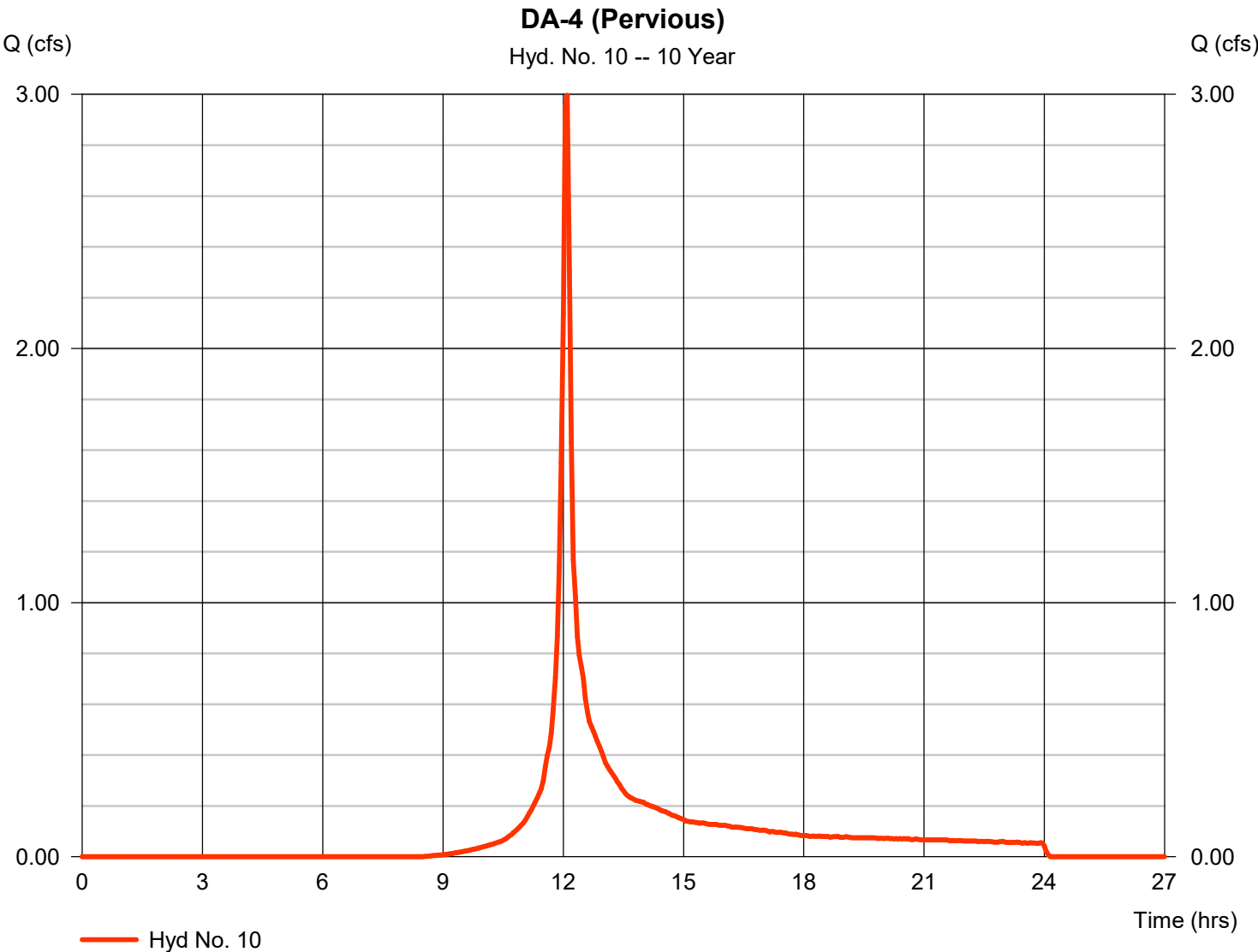
Wednesday, 11 / 2 / 2022

Hyd. No. 10

DA-4 (Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.996 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	10,189 cuft
Drainage area	=	1.220 ac	Curve number	=	73*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.60 min
Total precip.	=	5.22 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\10-10-2021\10-10-2021 0265 Daughters of Israel - West Orange NJ\10-10-2021 0265 Daughters of Israel - West Orange NJ.dwg			

* Composite (Area/CN) = [(1.060 x 80) + (0.160 x 30)] / 1.220



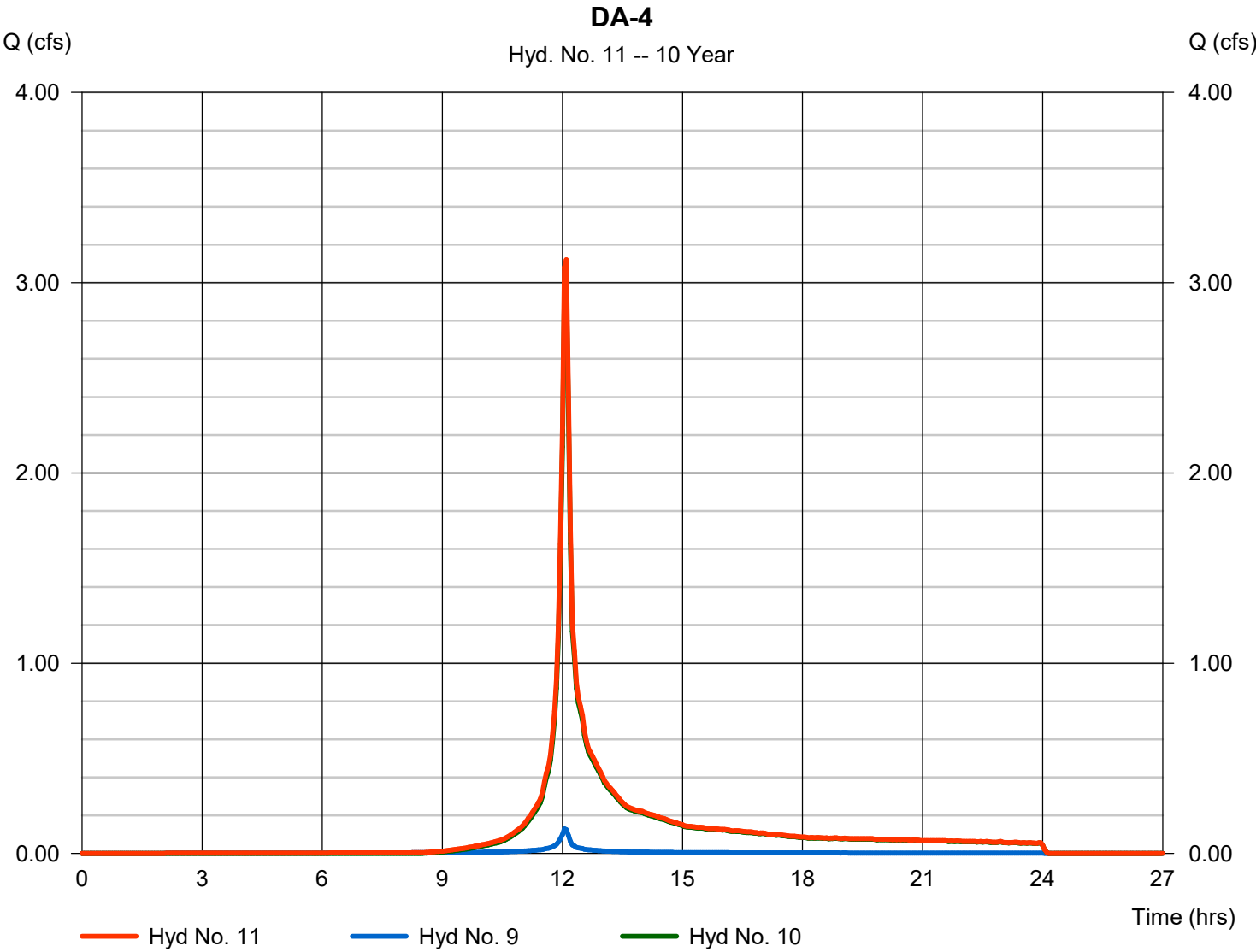
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 11

DA-4			
Hydrograph type	= Combine	Peak discharge	= 3.122 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 10,698 cuft
Inflow hyds.	= 9, 10	Contrib. drain. area	= 1.250 ac

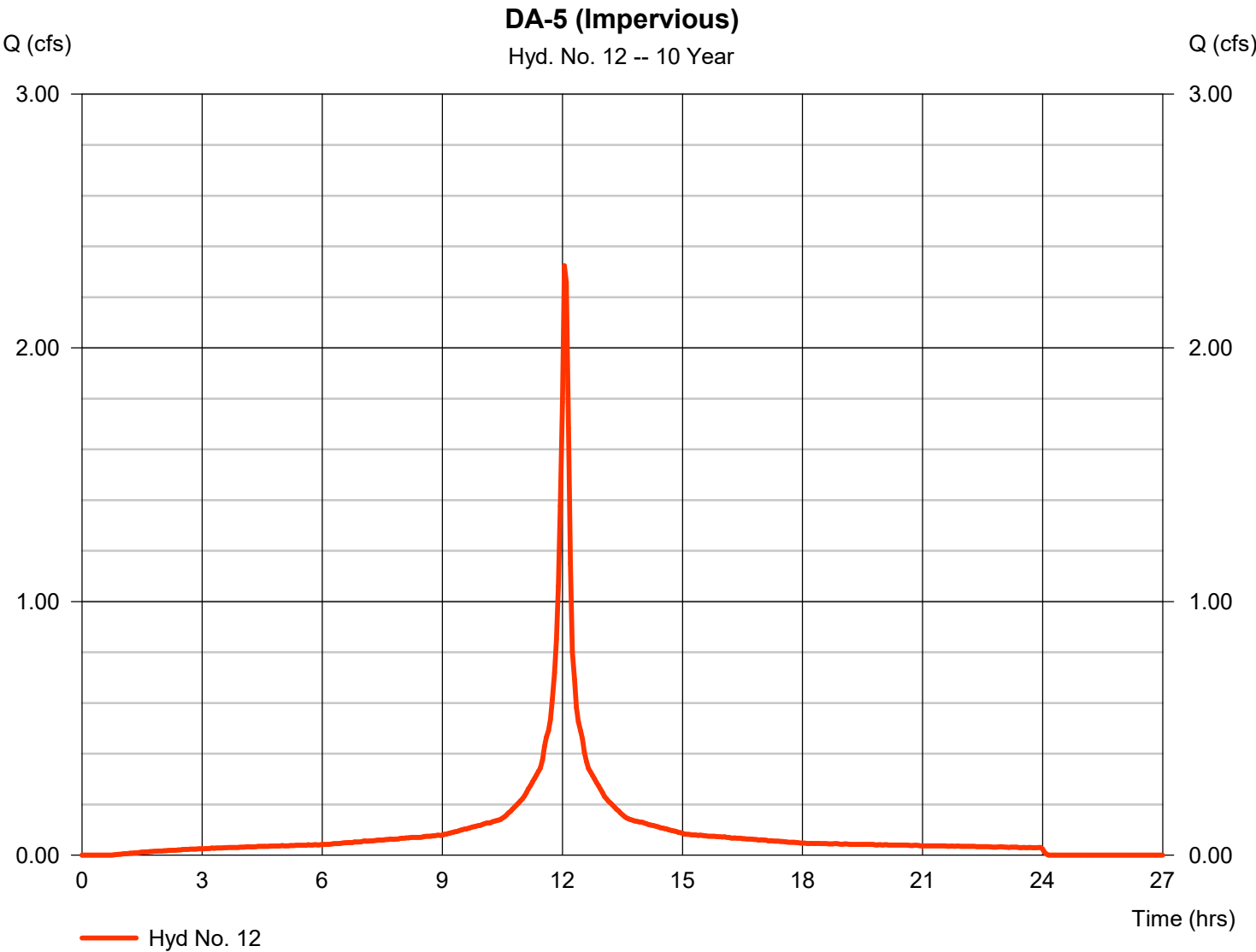


Hydrograph Report

Hyd. No. 12

DA-5 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.324 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	9,157 cuft
Drainage area	=	0.540 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.22 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange			



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— Custom Design Storm -- S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Cu

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

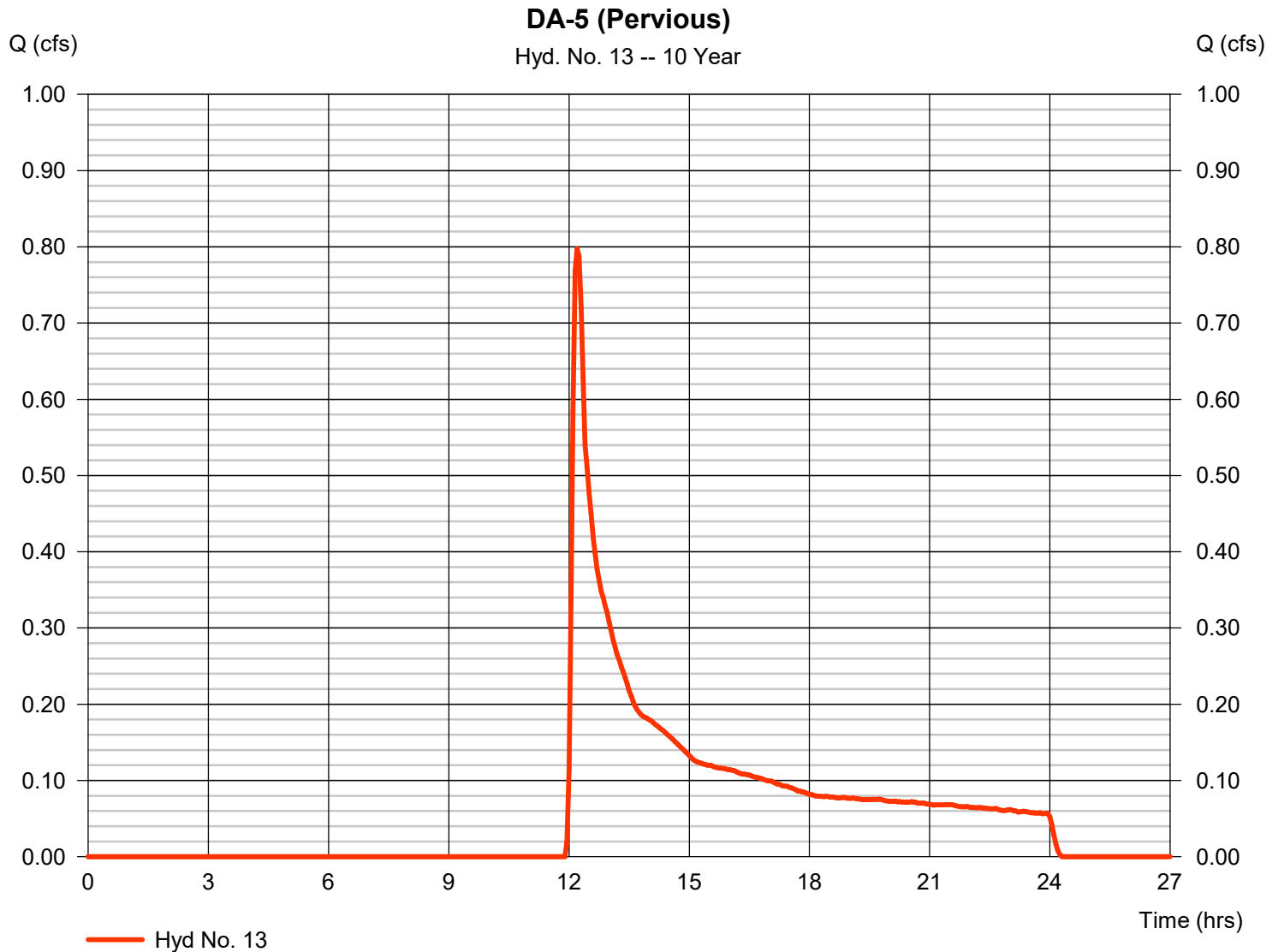
Wednesday, 11 / 2 / 2022

Hyd. No. 13

DA-5 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.797 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 3 min	Hyd. volume	= 5,797 cuft
Drainage area	= 2.590 ac	Curve number	= 47*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = $[(0.760 \times 80) + (1.700 \times 30) + (0.130 \times 70)] / 2.590$



Hydrograph Report

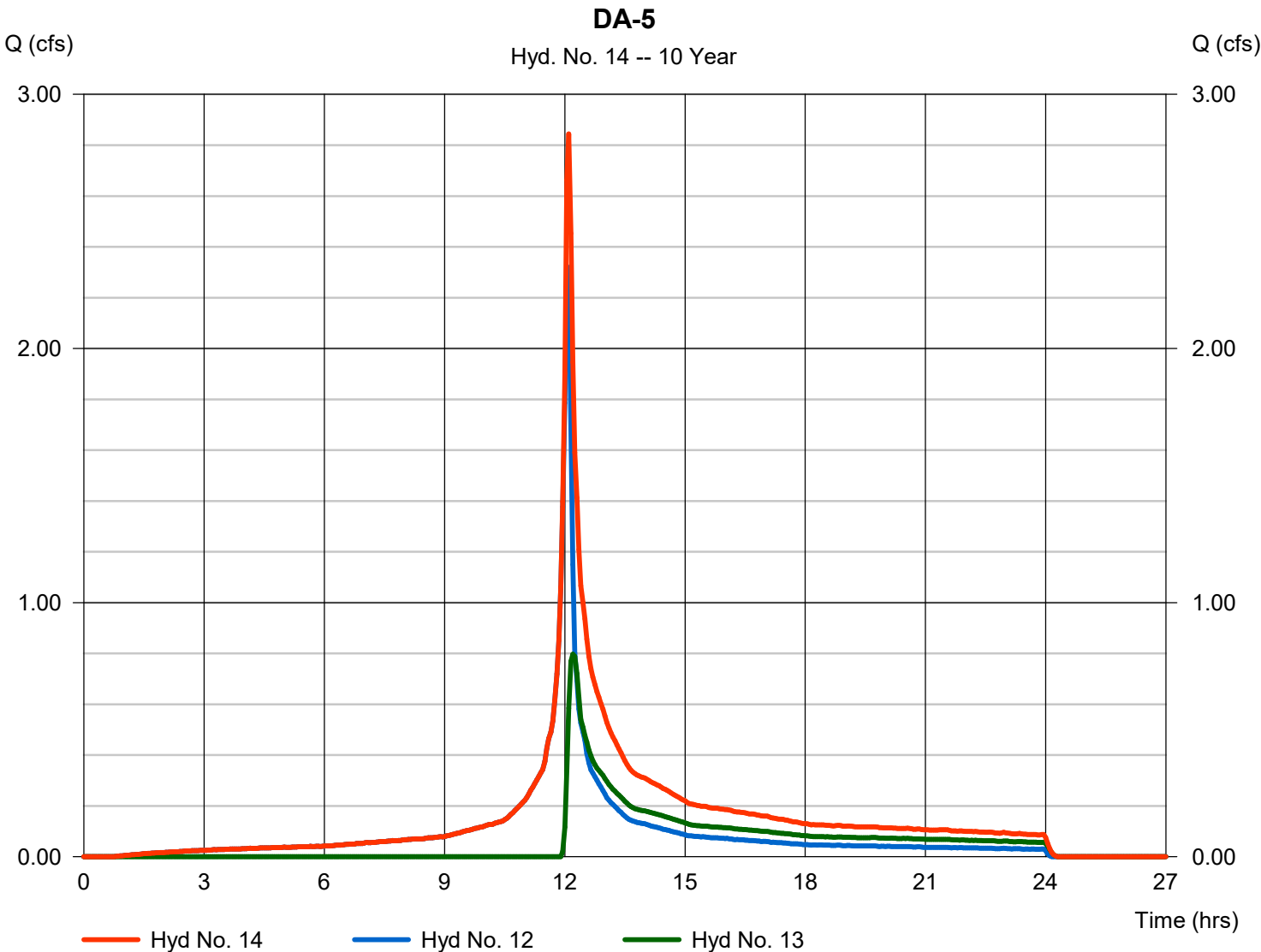
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 14

DA-5

Hydrograph type	= Combine	Peak discharge	= 2.844 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 14,954 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 3.130 ac

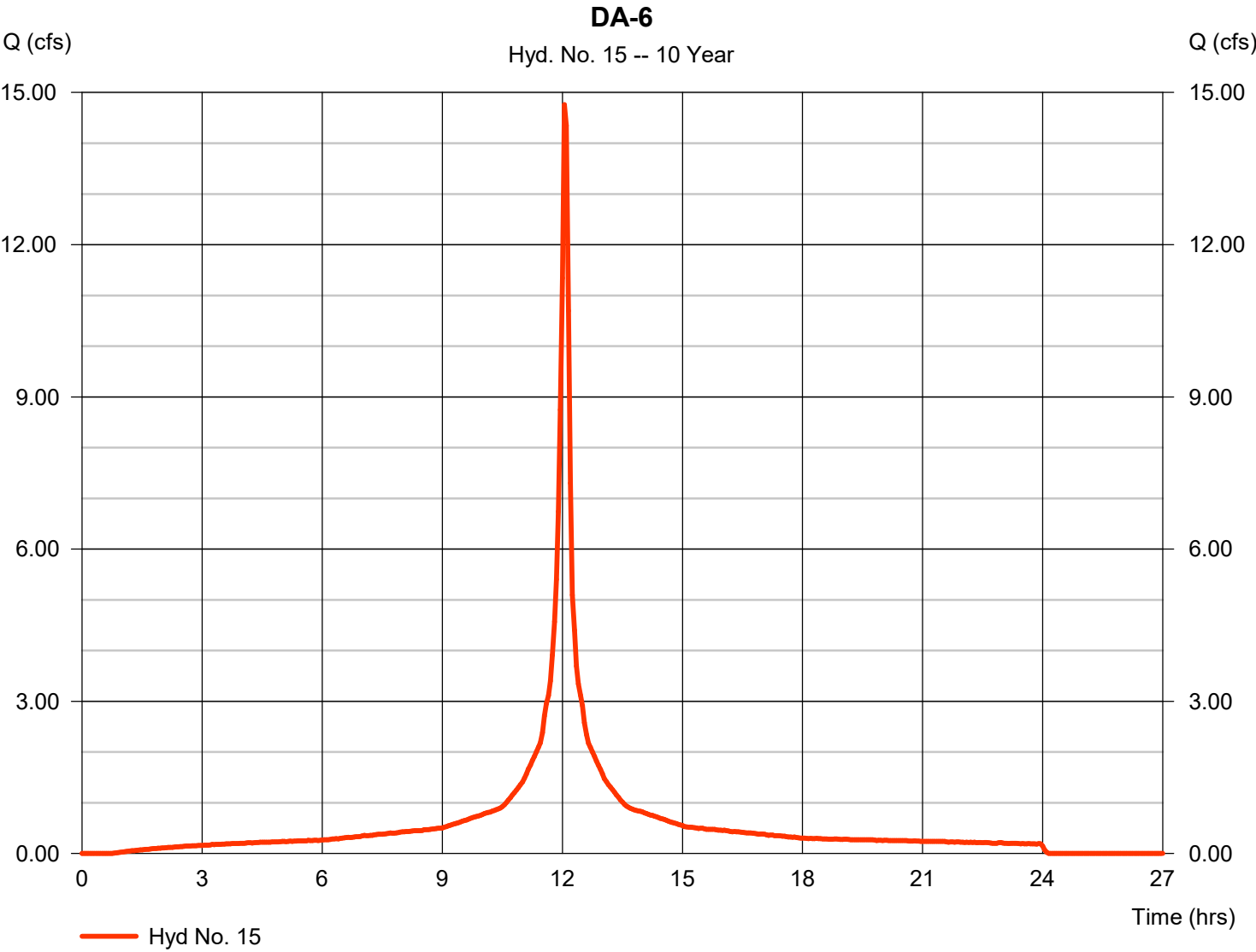


Hydrograph Report

Hyd. No. 15

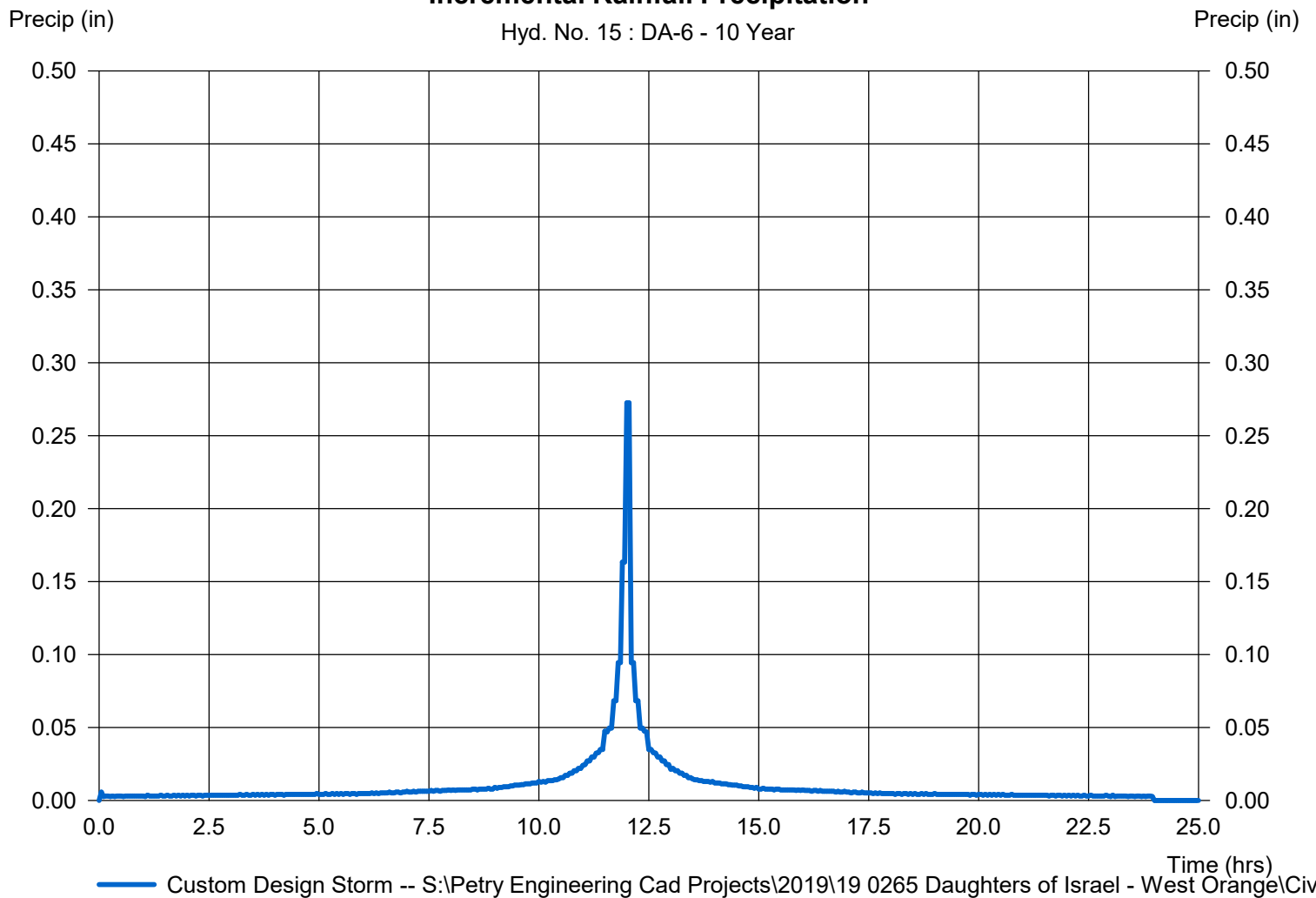
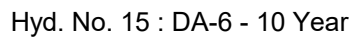
DA-6

Hydrograph type	= SCS Runoff	Peak discharge	= 14.76 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 58,163 cuft
Drainage area	= 3.430 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		



DA-6

Storm Frequency = 10 yrs Time interval = 3 min
Total precip. = 5.2200 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

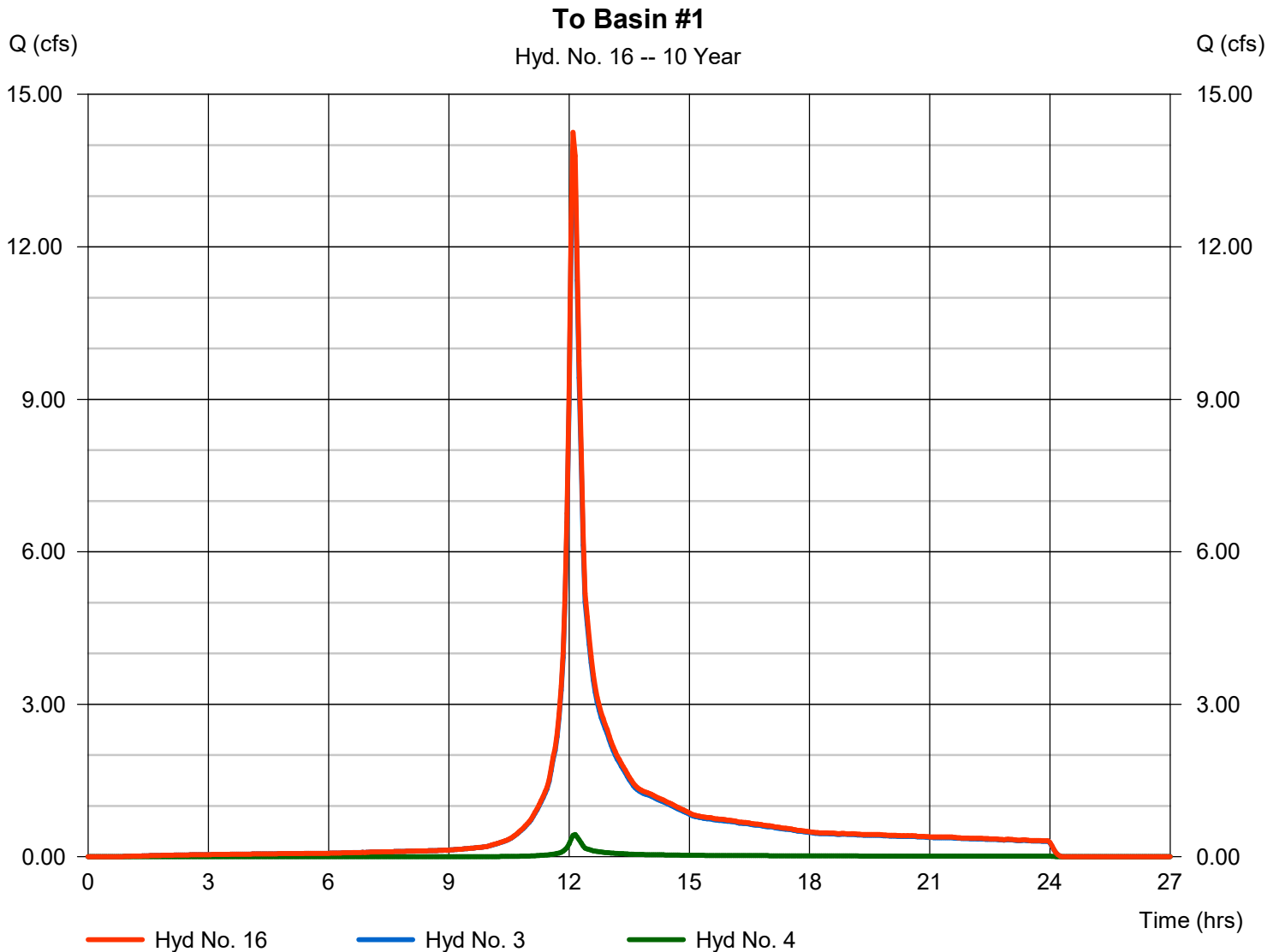
Wednesday, 11 / 2 / 2022

Hyd. No. 16

To Basin #1

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 3 min
 Inflow hyds. = 3, 4

Peak discharge = 14.25 cfs
 Time to peak = 12.10 hrs
 Hyd. volume = 59,979 cuft
 Contrib. drain. area = 0.240 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

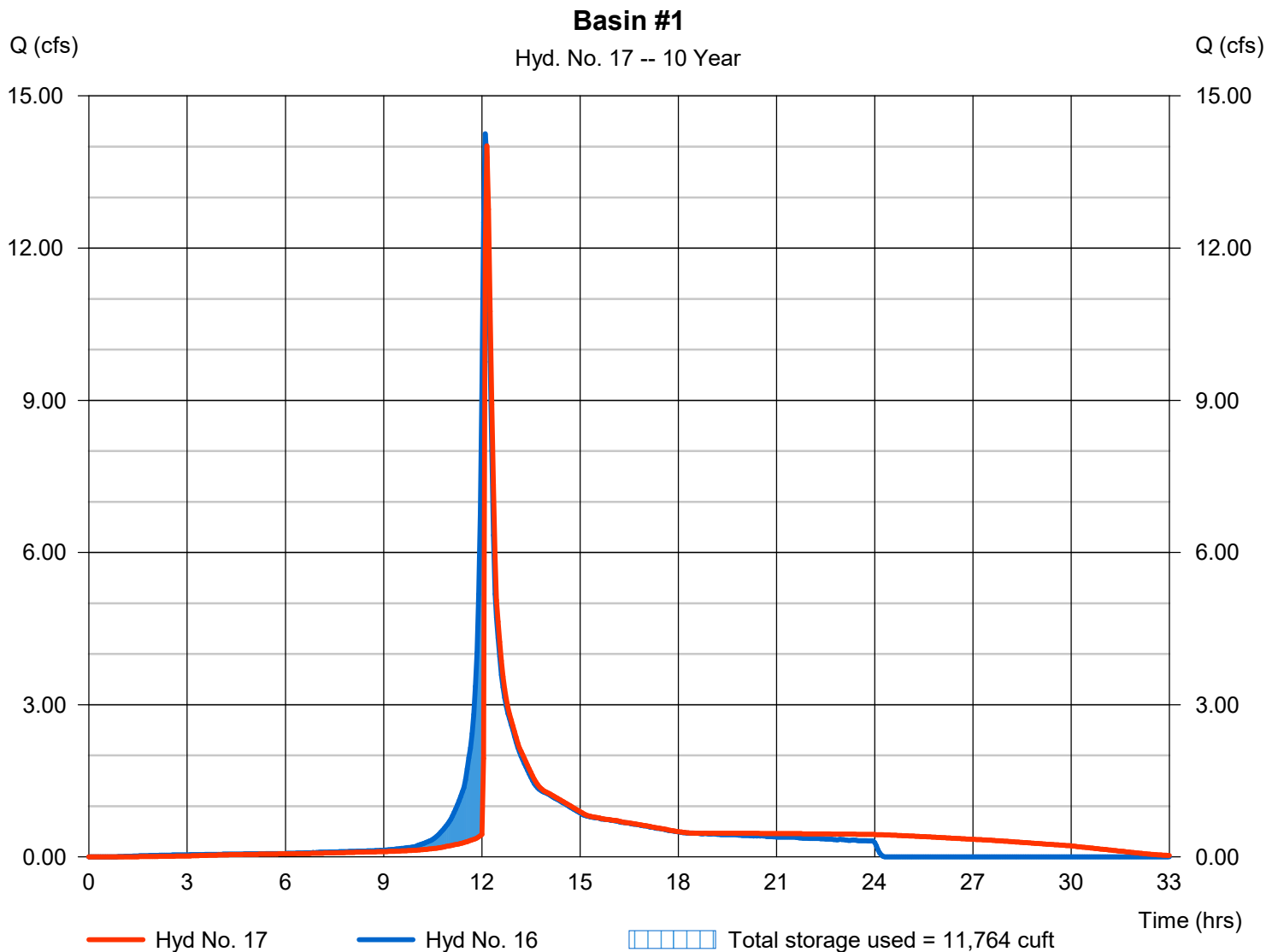
Wednesday, 11 / 2 / 2022

Hyd. No. 17

Basin #1

Hydrograph type	= Reservoir	Peak discharge	= 14.01 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 59,972 cuft
Inflow hyd. No.	= 16 - To Basin #1	Max. Elevation	= 419.40 ft
Reservoir name	= Basin #1	Max. Storage	= 11,764 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

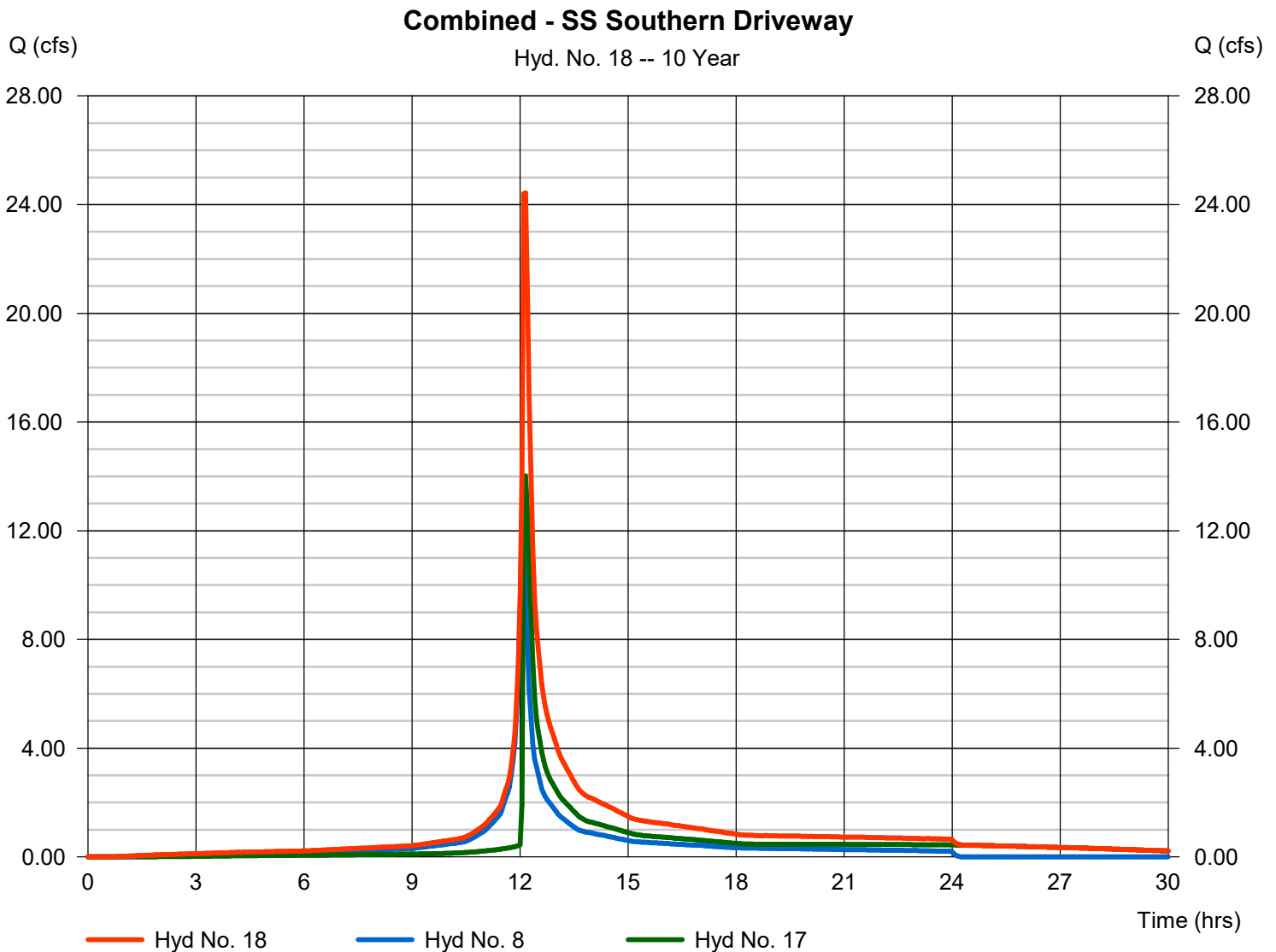
Wednesday, 11 / 2 / 2022

Hyd. No. 18

Combined - SS Southern Driveway

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 3 min
 Inflow hyds. = 8, 17

Peak discharge = 24.43 cfs
 Time to peak = 12.15 hrs
 Hyd. volume = 111,539 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

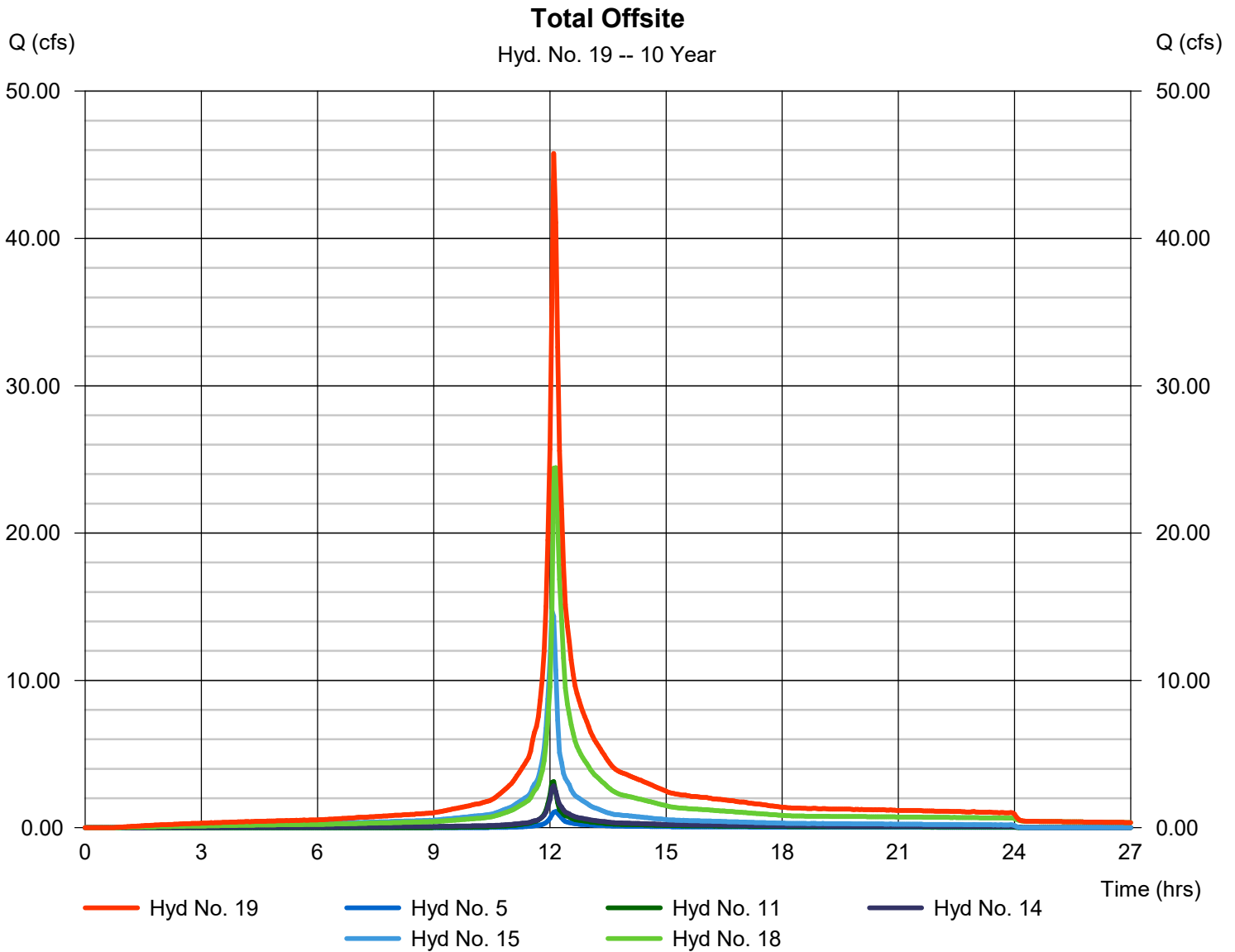
Wednesday, 11 / 2 / 2022

Hyd. No. 19

Total Offsite

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 3 min
 Inflow hyds. = 5, 11, 14, 15, 18

Peak discharge = 45.76 cfs
 Time to peak = 12.10 hrs
 Hyd. volume = 199,793 cuft
 Contrib. drain. area = 4.030 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

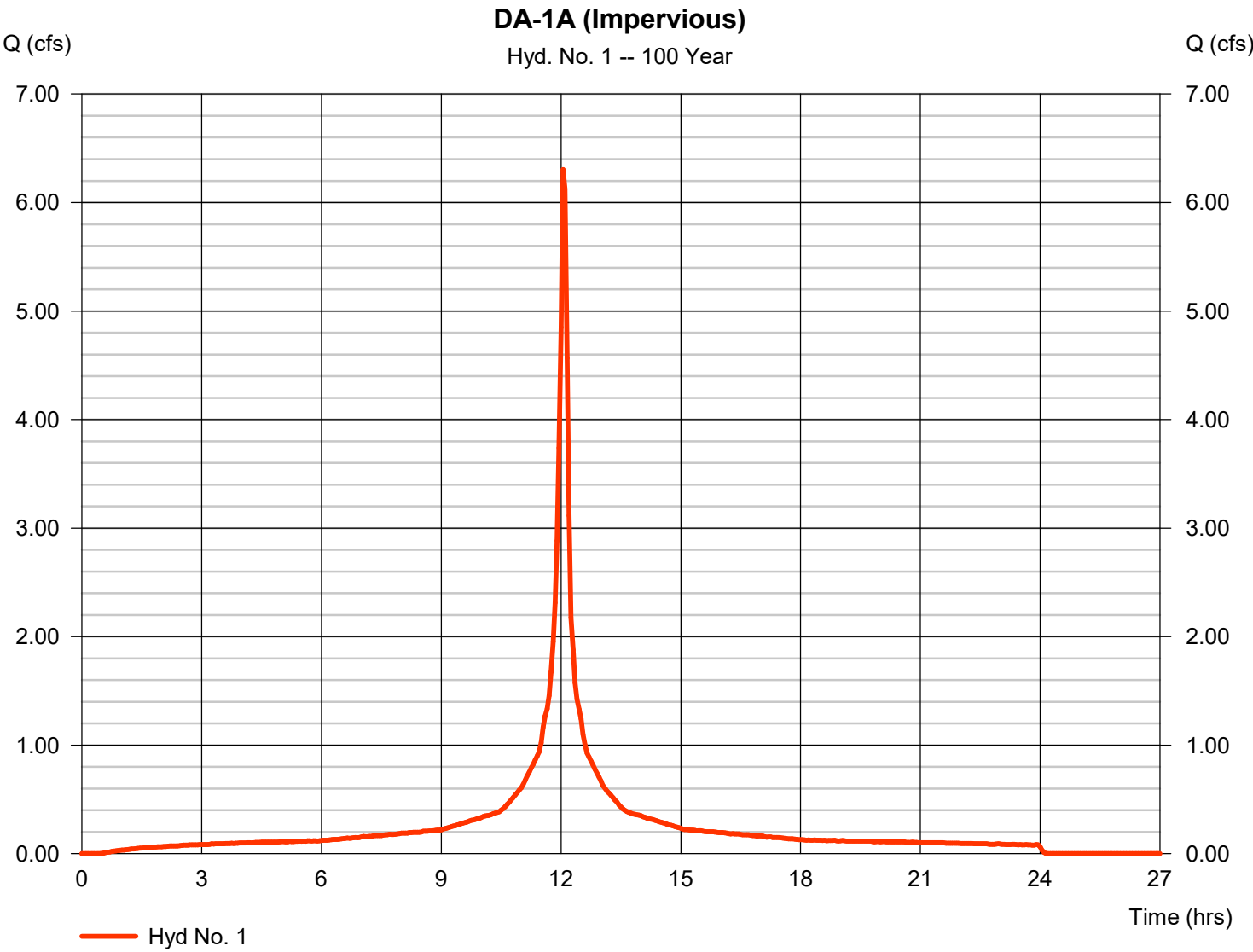
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	6.303	3	723	25,215	-----	-----	-----	DA-1A (Impervious)
2	SCS Runoff	25.69	3	729	103,346	-----	-----	-----	DA-1A (Pervious)
3	Combine	31.25	3	726	128,561	1, 2	-----	-----	DA-1A
4	SCS Runoff	1.038	3	729	4,178	-----	-----	-----	DA-1B
5	SCS Runoff	2.594	3	729	10,444	-----	-----	-----	DA-2
6	SCS Runoff	15.04	3	723	60,173	-----	-----	-----	DA-3 (Impervious)
7	SCS Runoff	9.775	3	729	39,276	-----	-----	-----	DA-3 (Pervious)
8	Combine	24.15	3	726	99,448	6, 7	-----	-----	DA-3
9	SCS Runoff	0.215	3	723	860	-----	-----	-----	DA-4 (Impervious)
10	SCS Runoff	6.501	3	723	22,416	-----	-----	-----	DA-4 (Pervious)
11	Combine	6.716	3	723	23,275	9, 10	-----	-----	DA-4
12	SCS Runoff	3.868	3	723	15,473	-----	-----	-----	DA-5 (Impervious)
13	SCS Runoff	5.043	3	729	21,812	-----	-----	-----	DA-5 (Pervious)
14	Combine	8.458	3	726	37,285	12, 13	-----	-----	DA-5
15	SCS Runoff	24.57	3	723	98,282	-----	-----	-----	DA-6
16	Combine	32.27	3	726	132,738	3, 4,	-----	-----	To Basin #1
17	Reservoir	31.90	3	729	132,731	16	419.70	13,062	Basin #1
18	Combine	55.19	3	726	232,179	8, 17	-----	-----	Combined - SS Southern Driveway
19	Combine	96.75	3	726	401,465	5, 11, 14, 15, 18	-----	-----	Total Offsite
Existing Conditions.gpw					Return Period: 100 Year			Wednesday, 11 / 2 / 2022	

Hydrograph Report

Hyd. No. 1

DA-1A (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.303 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	25,215 cuft
Drainage area	=	0.880 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	8.66 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange			



= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

Custom Design Storm -- S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Cu

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

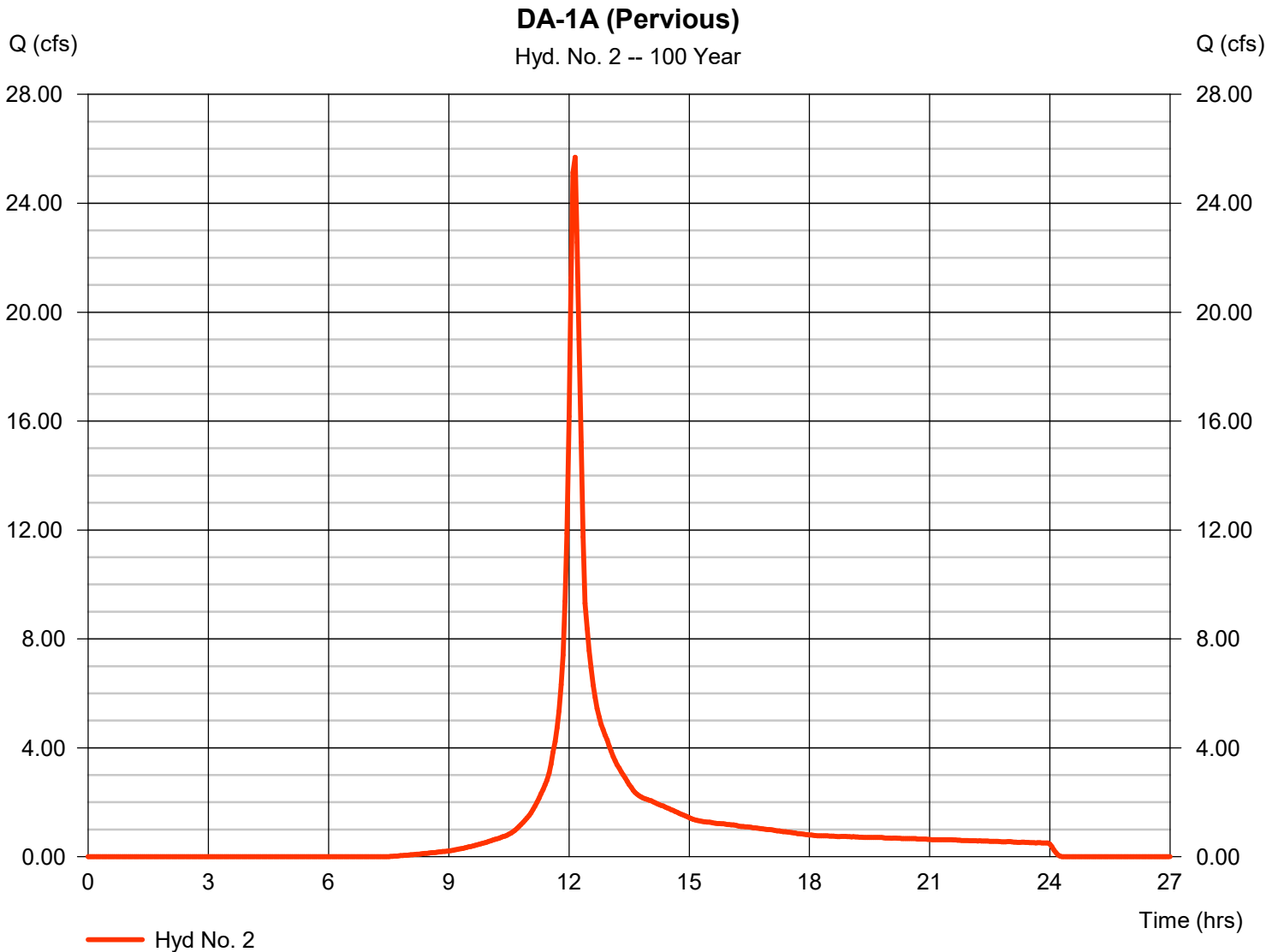
Wednesday, 11 / 2 / 2022

Hyd. No. 2

DA-1A (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 25.69 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 103,346 cuft
Drainage area	= 6.090 ac	Curve number	= 67*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.30 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\100100265 Daughters of Israel - West Orange		

* Composite (Area/CN) = $[(0.500 \times 30) + (4.740 \times 70) + (0.280 \times 77) + (0.010 \times 80) + (0.560 \times 74)] / 6.090$



DA-1A (Pervious)

Storm Frequency

= 100 yrs

Time interval

= 3 min

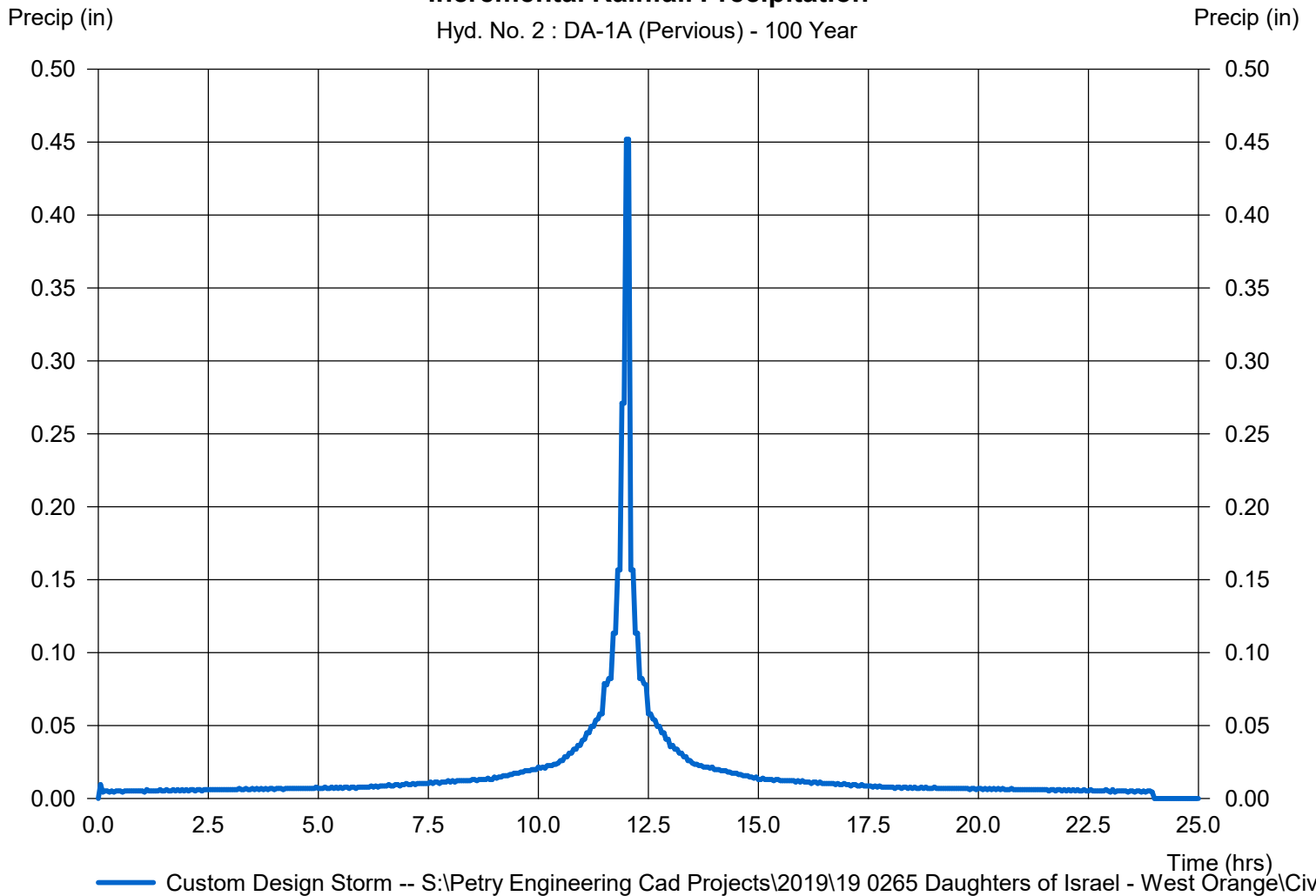
Total precip. = 8.6600 in

Distribution

= Custom

Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

Hyd. No. 2 : DA-1A (Pervious) - 100 Year



Hydrograph Report

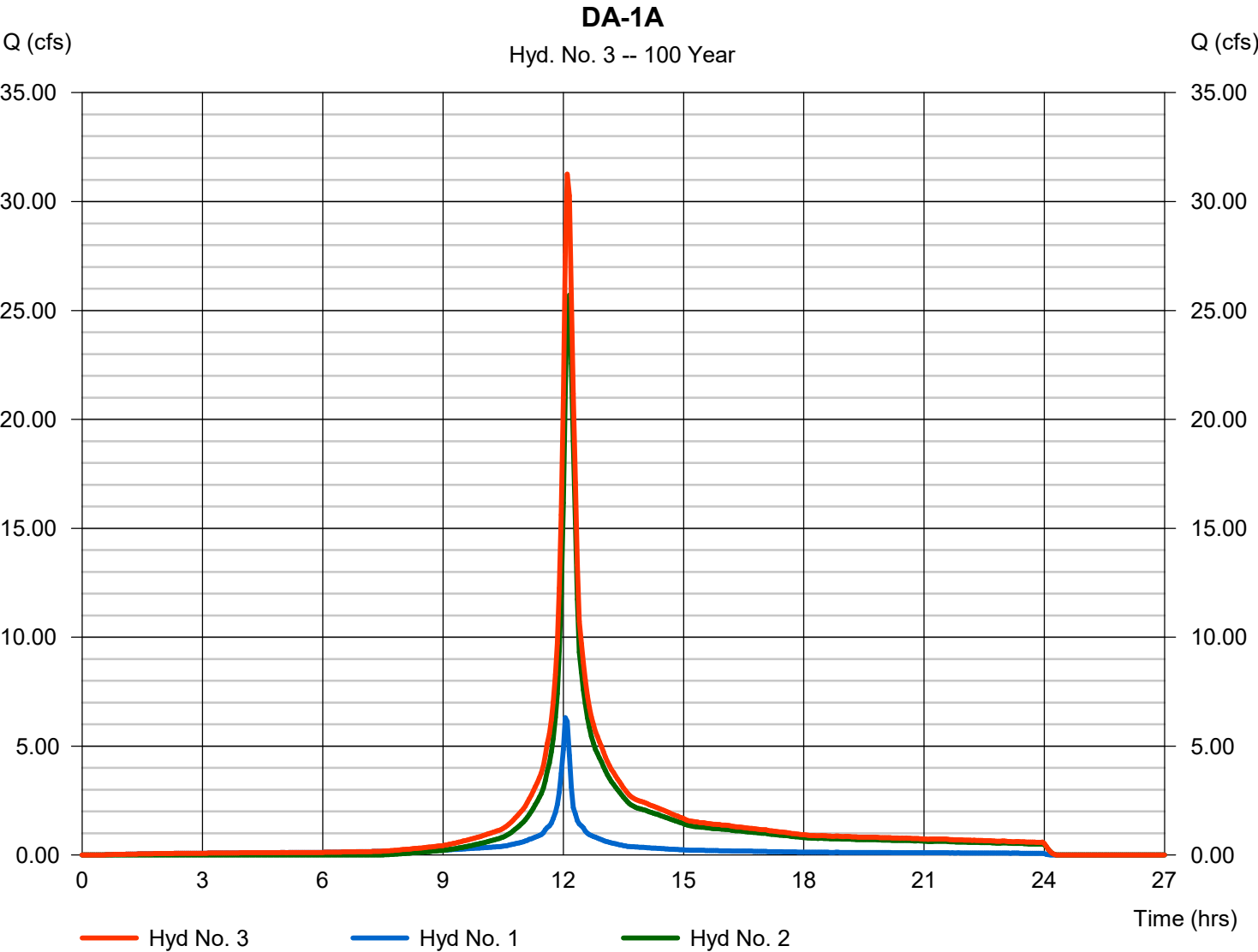
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 3

DA-1A

Hydrograph type	= Combine	Peak discharge	= 31.25 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 128,561 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 6.970 ac



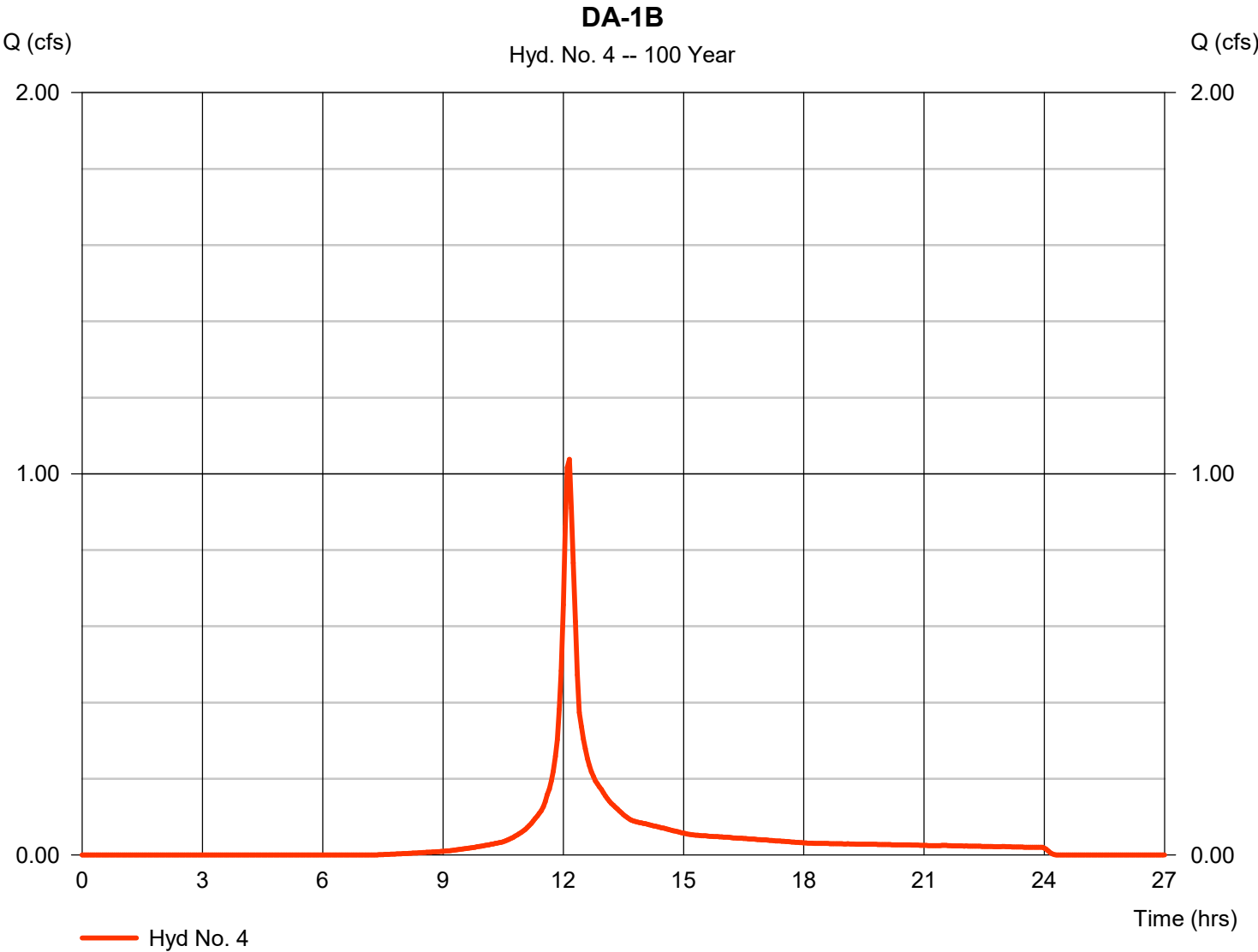
Hydrograph Report

Hyd. No. 4

DA-1B

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.038 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.15 hrs
Time interval	=	3 min	Hyd. volume	=	4,178 cuft
Drainage area	=	0.240 ac	Curve number	=	68*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	9.80 min
Total precip.	=	8.66 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\100100265 Daughters of Israel - West Orange, NJ\100100265 Daughters of Israel - West Orange, NJ.dwg			

* Composite (Area/CN) = [(0.020 x 30) + (0.170 x 70) + (0.050 x 77)] / 0.240

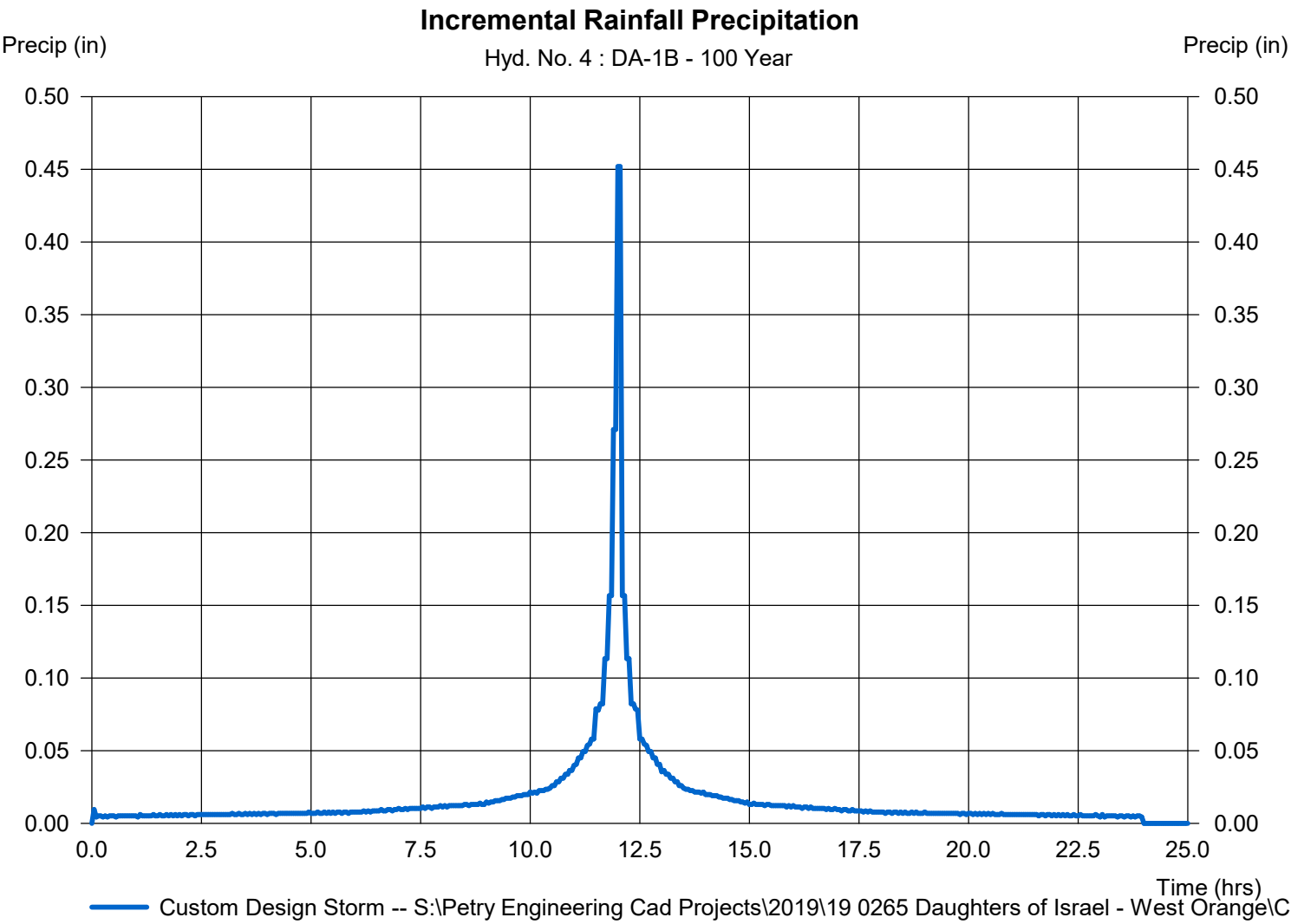


Precipitation Report

Hyd. No. 4

DA-1B

Storm Frequency	= 100 yrs	Time interval	= 3 min
Total precip.	= 8.6600 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora		



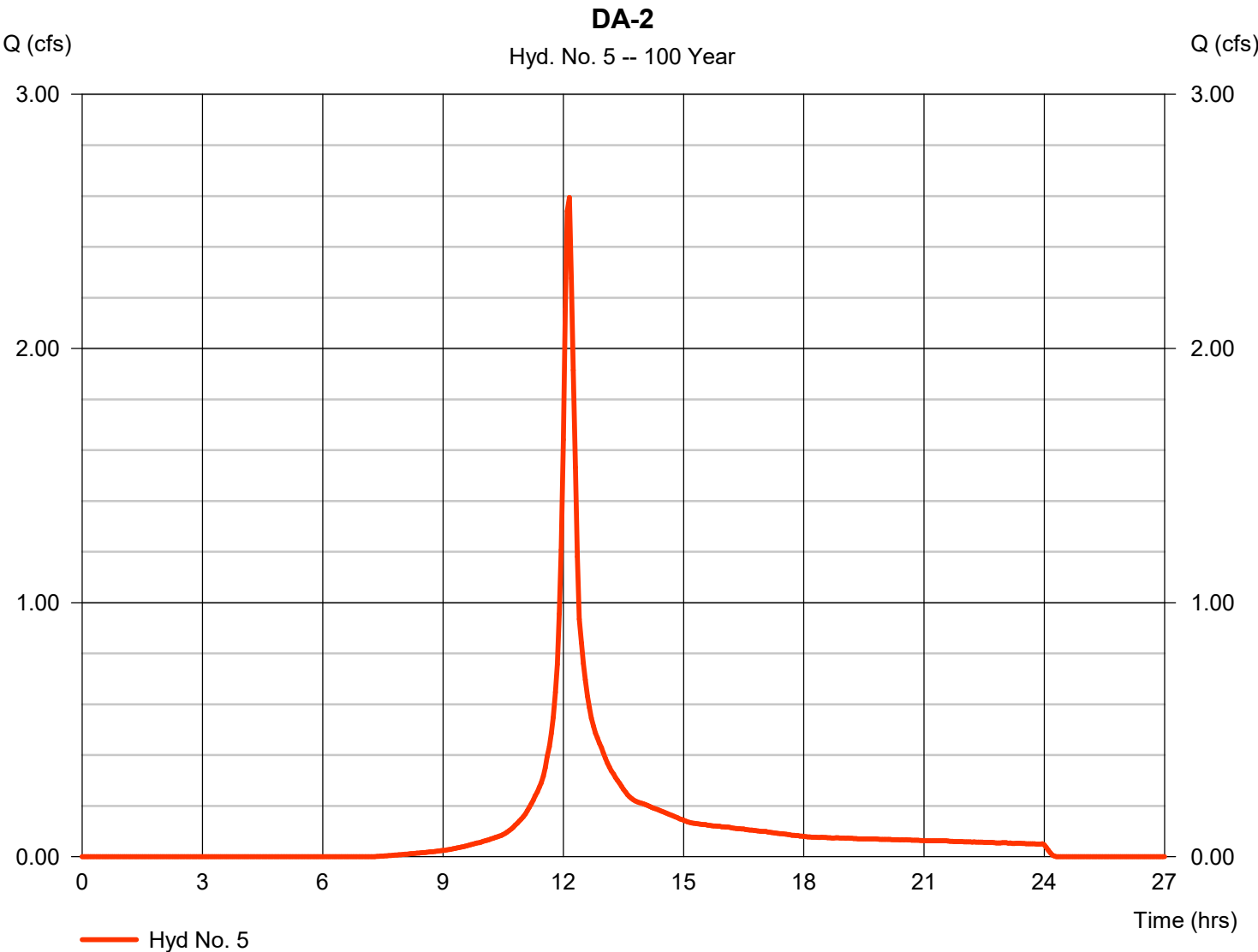
Hydrograph Report

Hyd. No. 5

DA-2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.594 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.15 hrs
Time interval	=	3 min	Hyd. volume	=	10,444 cuft
Drainage area	=	0.600 ac	Curve number	=	68*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.10 min
Total precip.	=	8.66 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\1001010265 Daughters of Israel - West Orange			

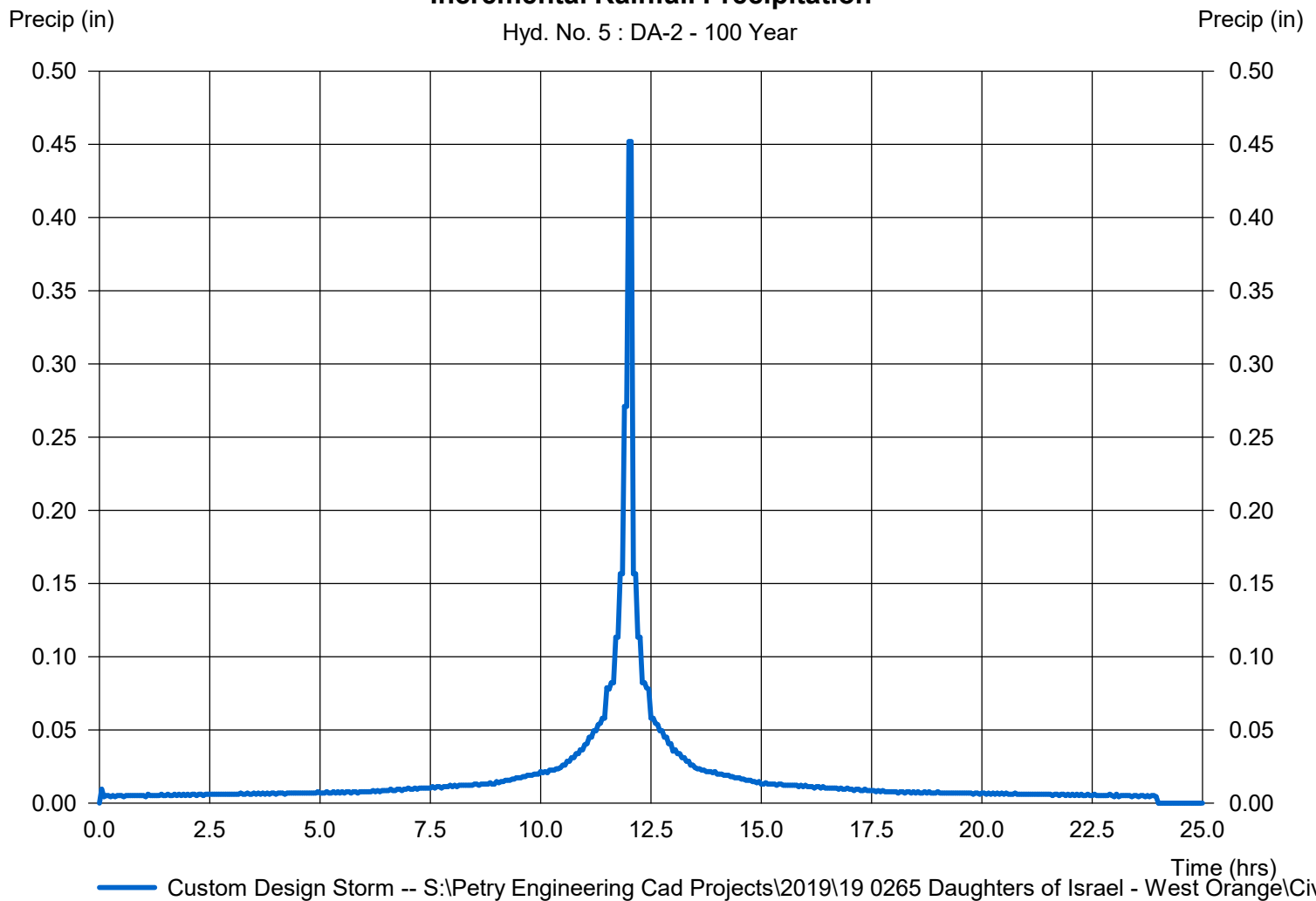
* Composite (Area/CN) = [(0.100 x 77) + (0.140 x 70) + (0.250 x 80) + (0.110 x 30)] / 0.600



DA-2

Storm Frequency = 100 yrs Time interval = 3 min
Total precip. = 8.6600 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

Hyd. No. 5 : DA-2 - 100 Year



Hydrograph Report

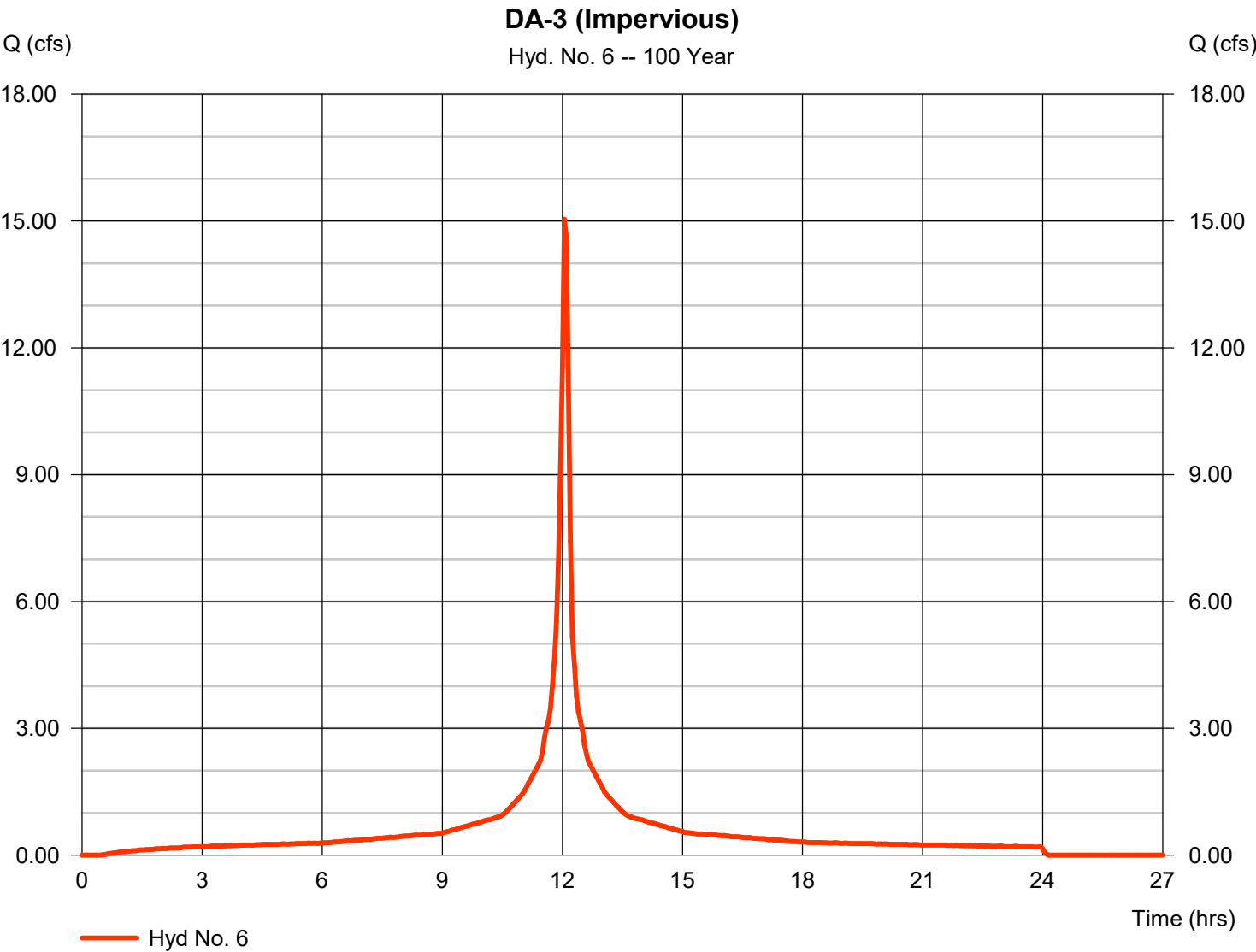
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 6

DA-3 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 15.04 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 60,173 cuft
Drainage area	= 2.100 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\19-010-0265 Daughters of Israel - West Orange		

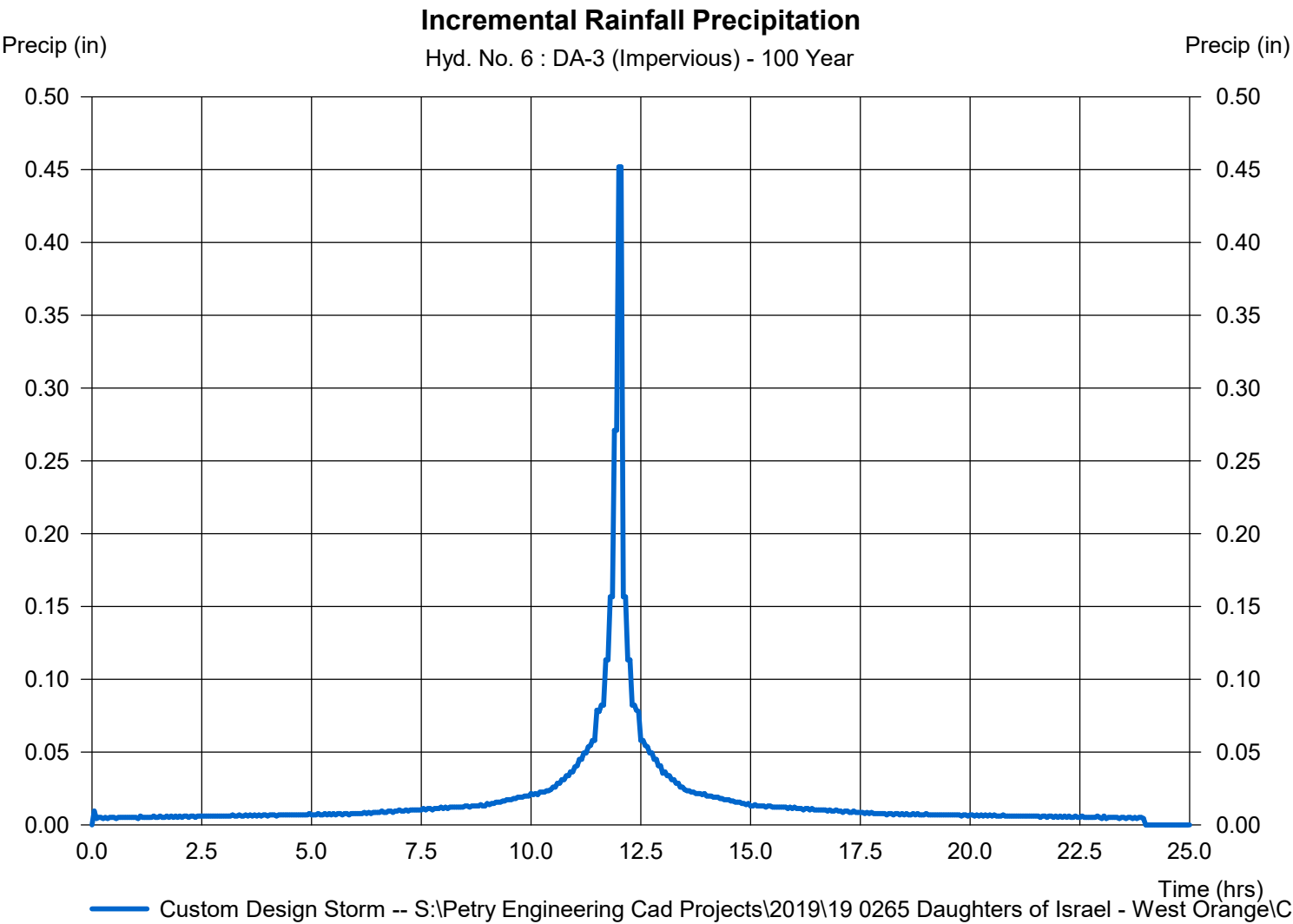


Precipitation Report

Hyd. No. 6

DA-3 (Impervious)

Storm Frequency	= 100 yrs	Time interval	= 3 min
Total precip.	= 8.6600 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Hydro\DA-3 (Impervious) - 100 Year		



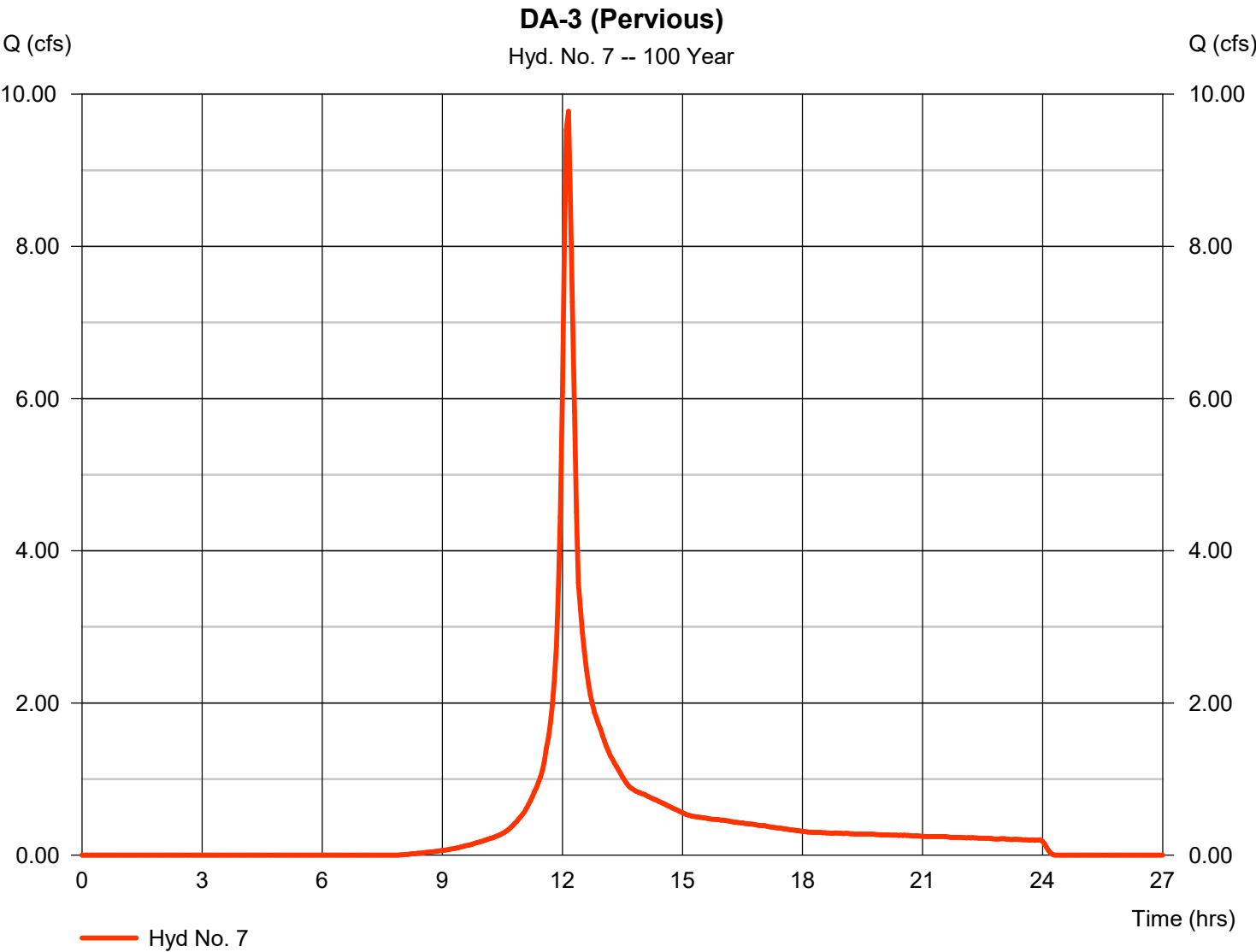
Hydrograph Report

Hyd. No. 7

DA-3 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 9.775 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 39,276 cuft
Drainage area	= 2.440 ac	Curve number	= 65*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.50 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange, NJ\10-0265 Daughters of Israel - West Orange, NJ.dwg		

* Composite (Area/CN) = [(0.890 x 80) + (0.210 x 74) + (0.550 x 30) + (0.760 x 70) + (0.030 x 77)] / 2.440



Hydrograph Report

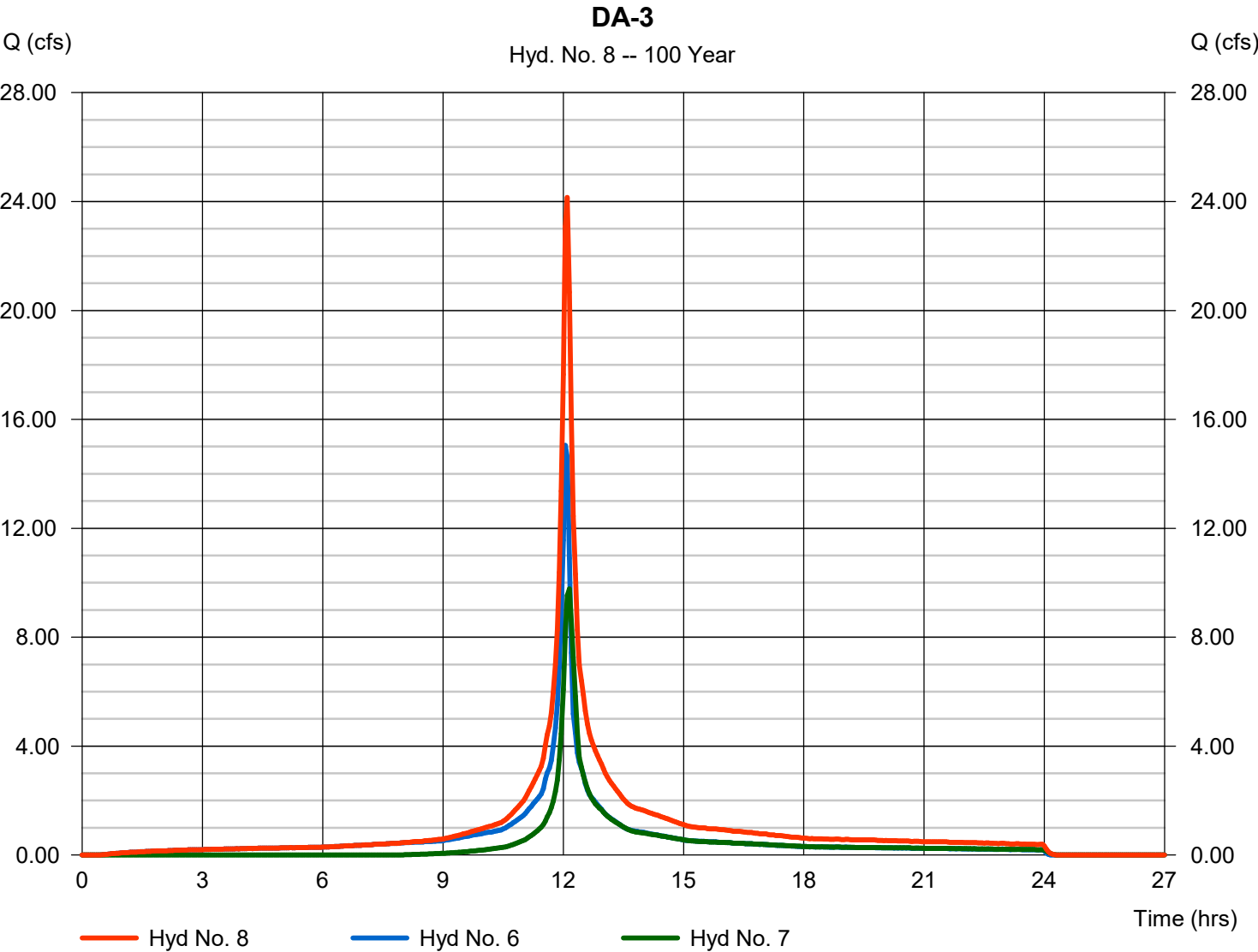
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 8

DA-3

Hydrograph type	= Combine	Peak discharge	= 24.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 99,448 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 4.540 ac



Hydrograph Report

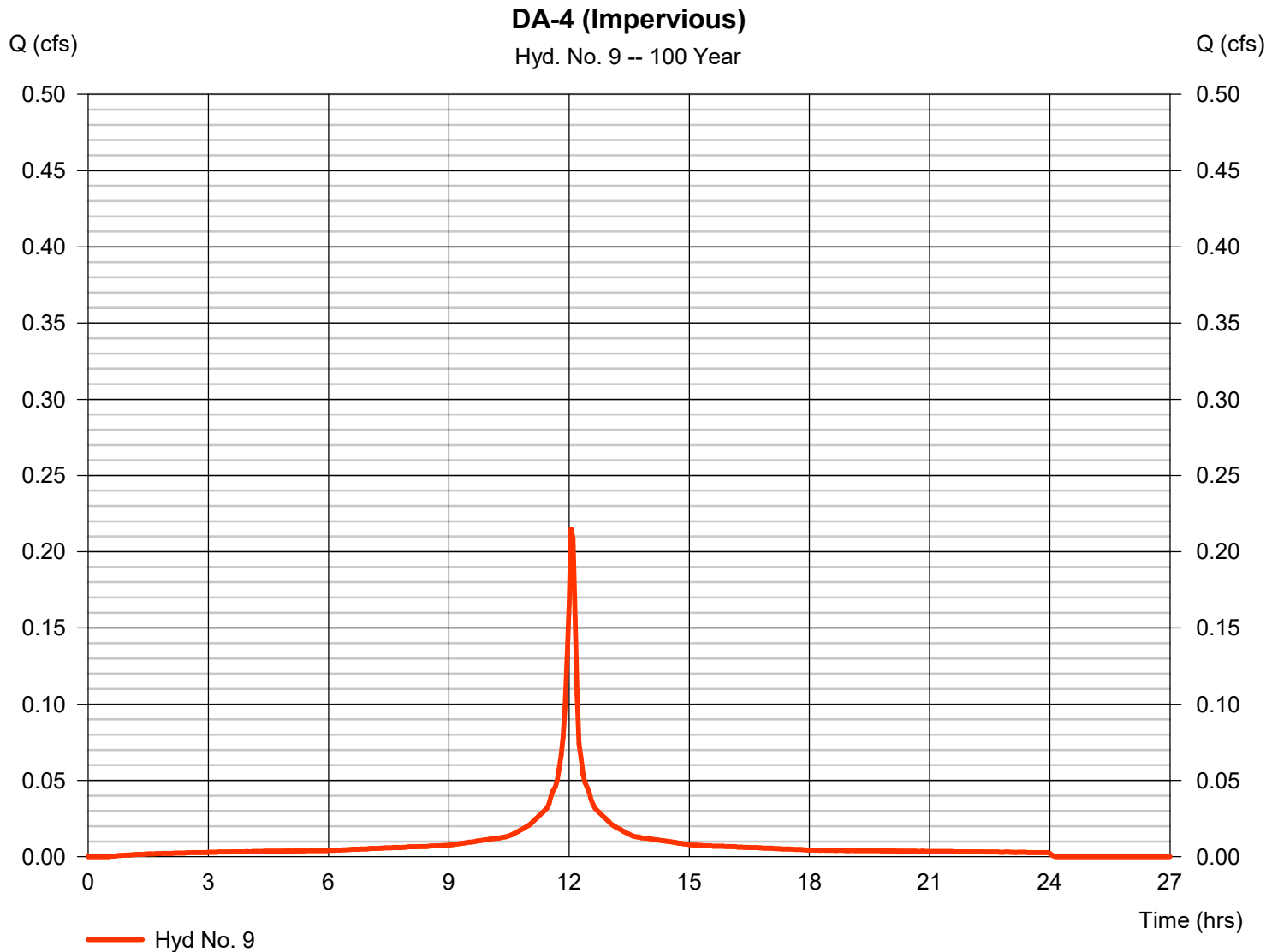
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 9

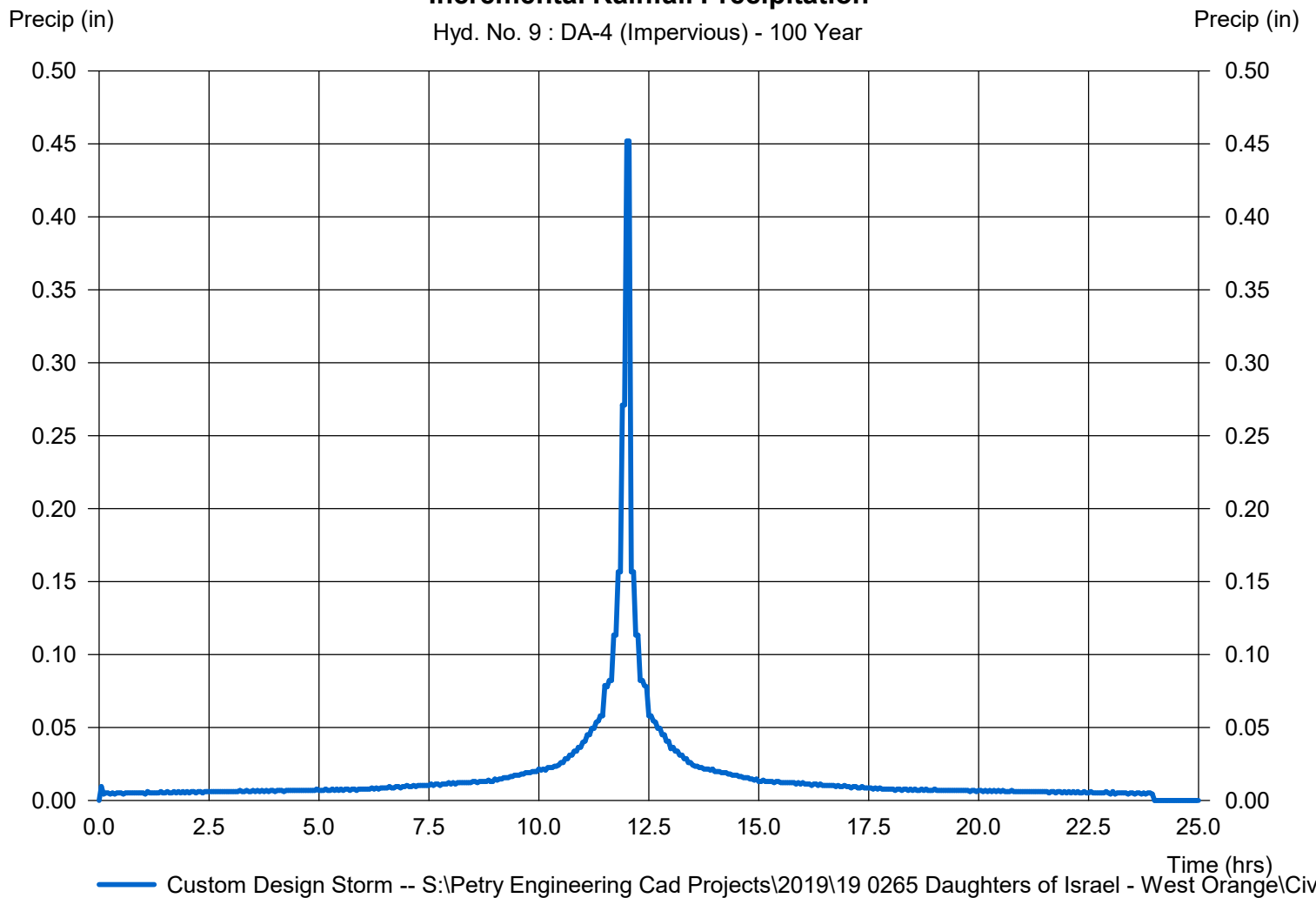
DA-4 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.215 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 860 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		



DA-4 (Impervious)

Storm Frequency = 100 yrs Time interval = 3 min
Total precip. = 8.6600 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



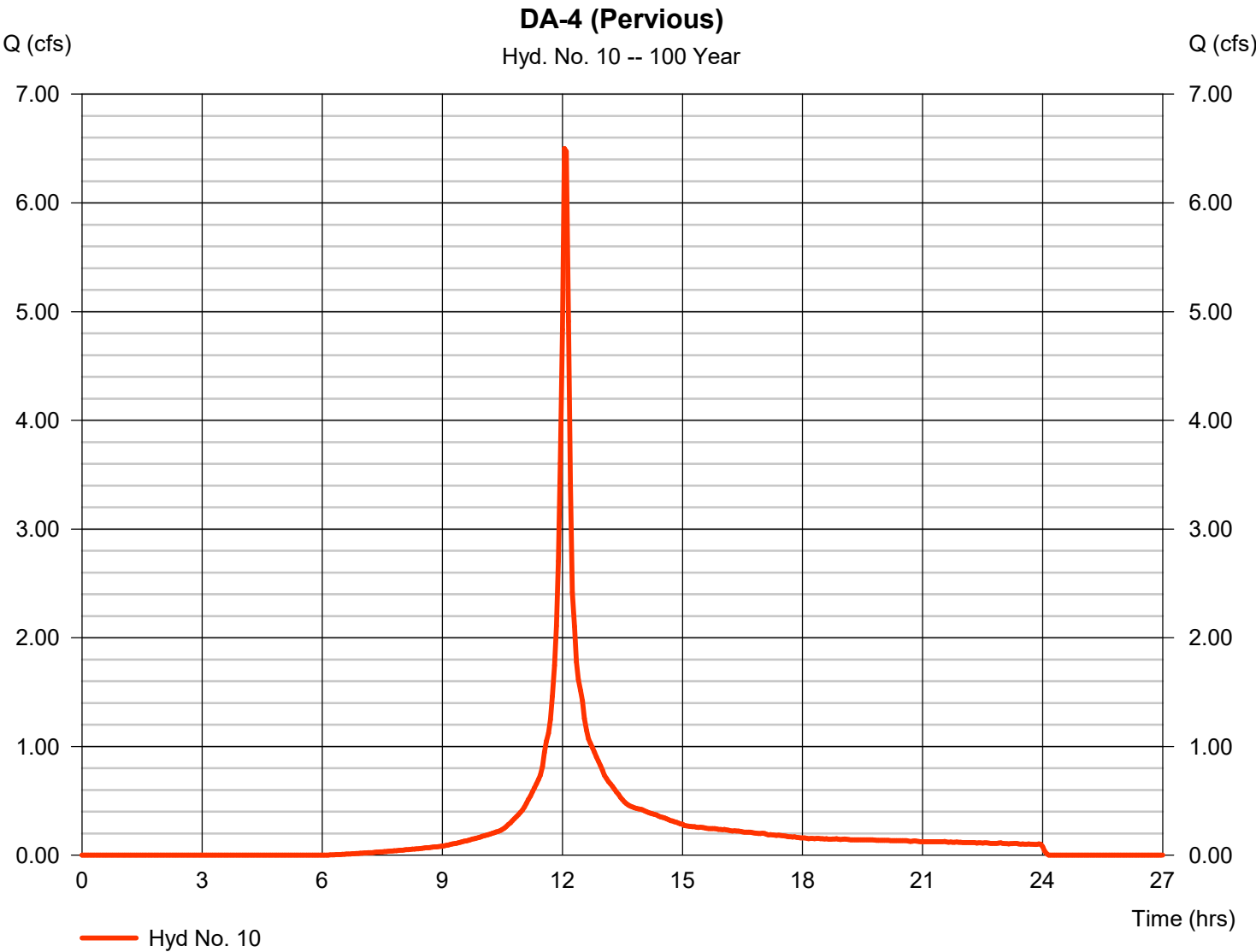
Hydrograph Report

Hyd. No. 10

DA-4 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.501 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 22,416 cuft
Drainage area	= 1.220 ac	Curve number	= 73*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.60 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = [(1.060 x 80) + (0.160 x 30)] / 1.220



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

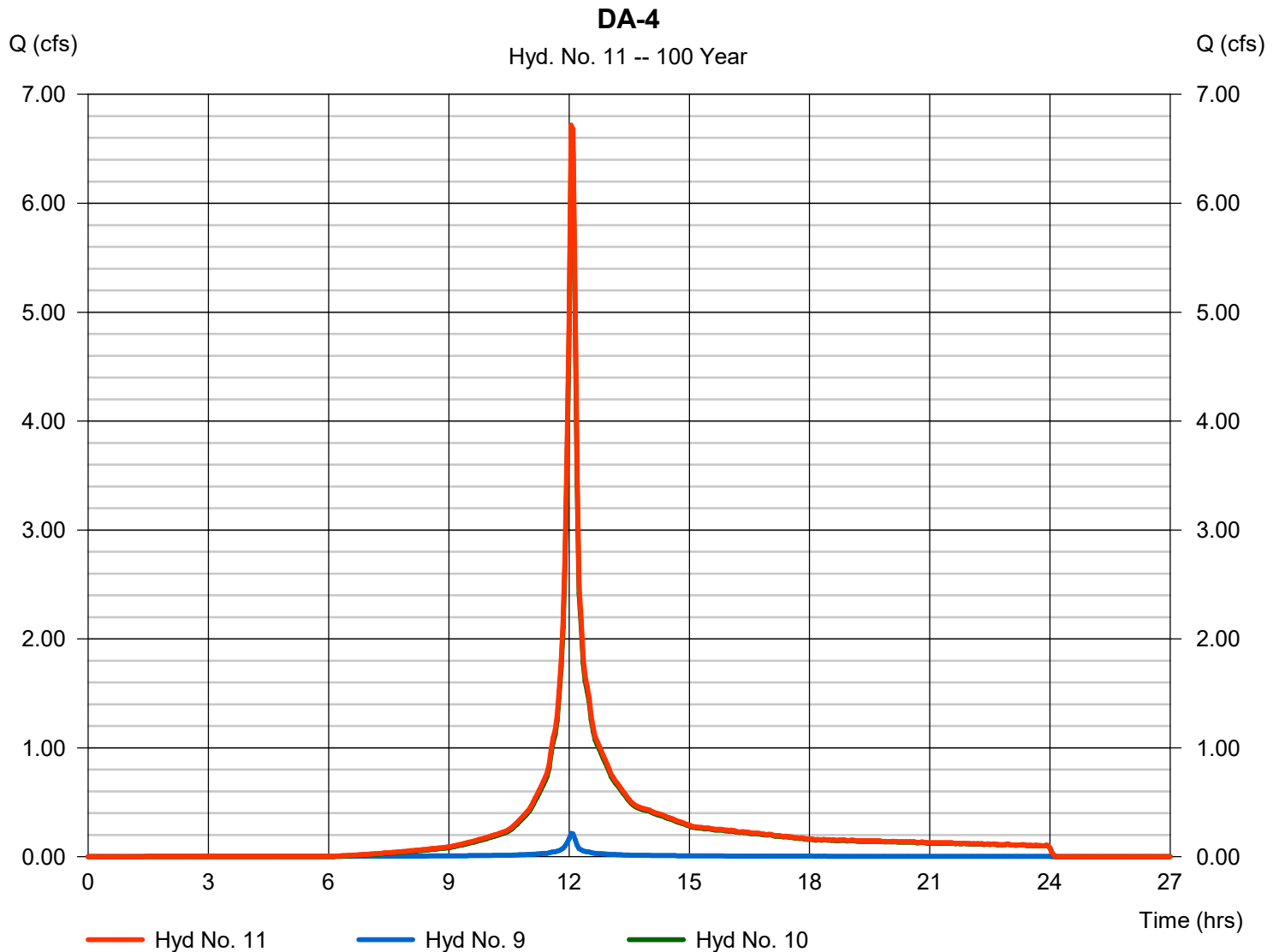
Wednesday, 11 / 2 / 2022

Hyd. No. 11

DA-4

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 3 min
 Inflow hyds. = 9, 10

Peak discharge = 6.716 cfs
 Time to peak = 12.05 hrs
 Hyd. volume = 23,275 cuft
 Contrib. drain. area = 1.250 ac

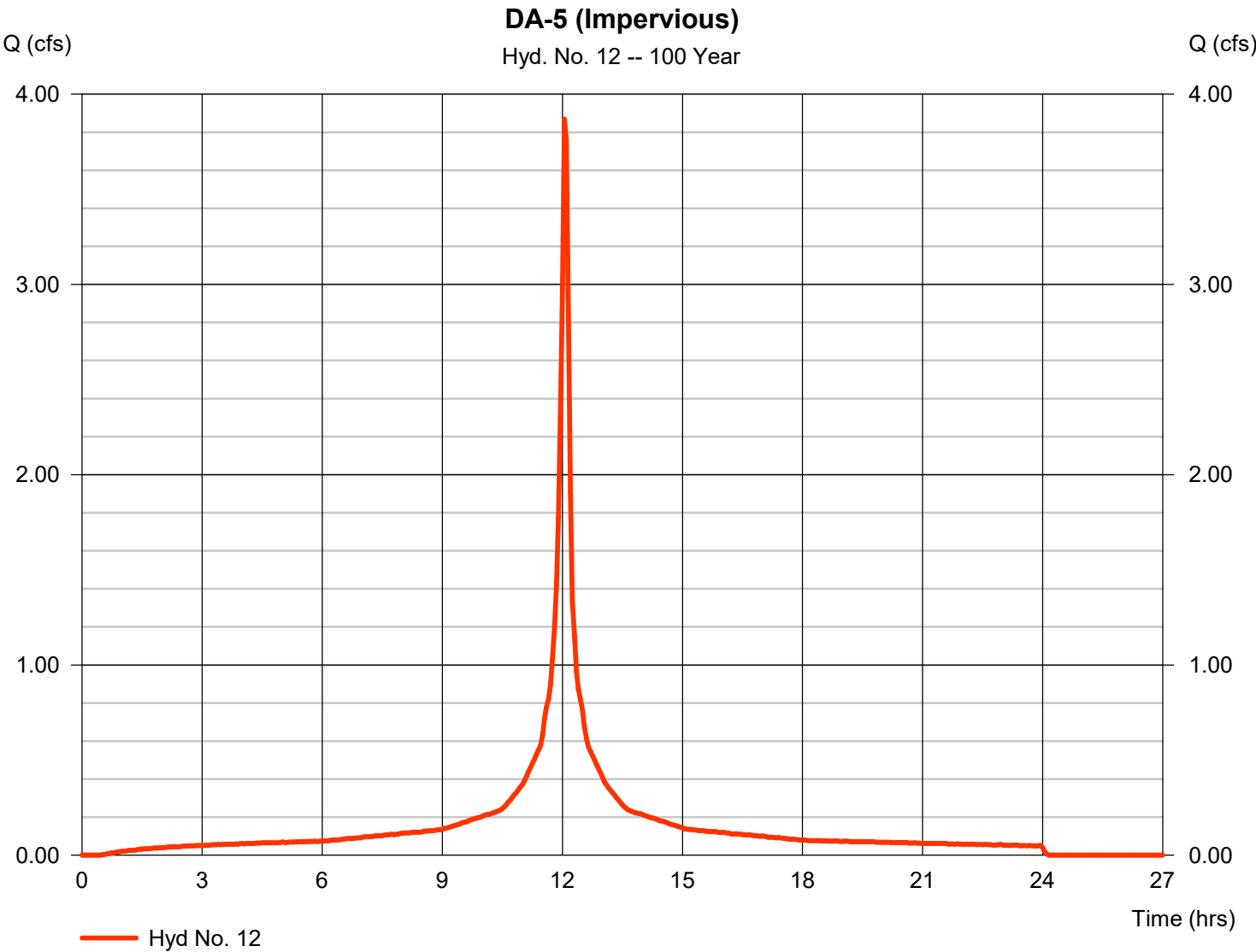


Hydrograph Report

Hyd. No. 12

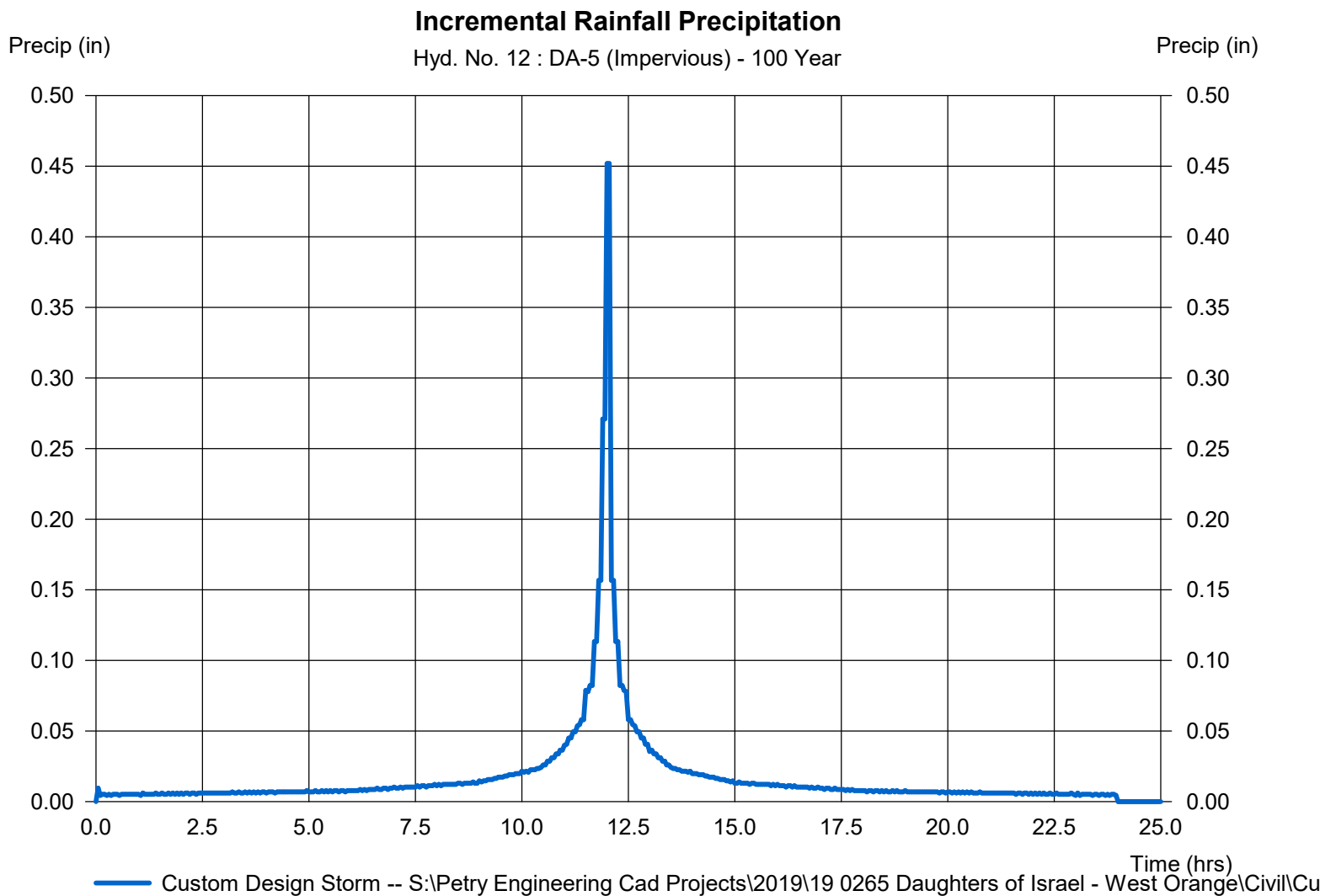
DA-5 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.868 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 15,473 cuft
Drainage area	= 0.540 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		



DA-5 (Impervious)

Storm Frequency = 100 yrs Time interval = 3 min
Total precip. = 8.6600 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



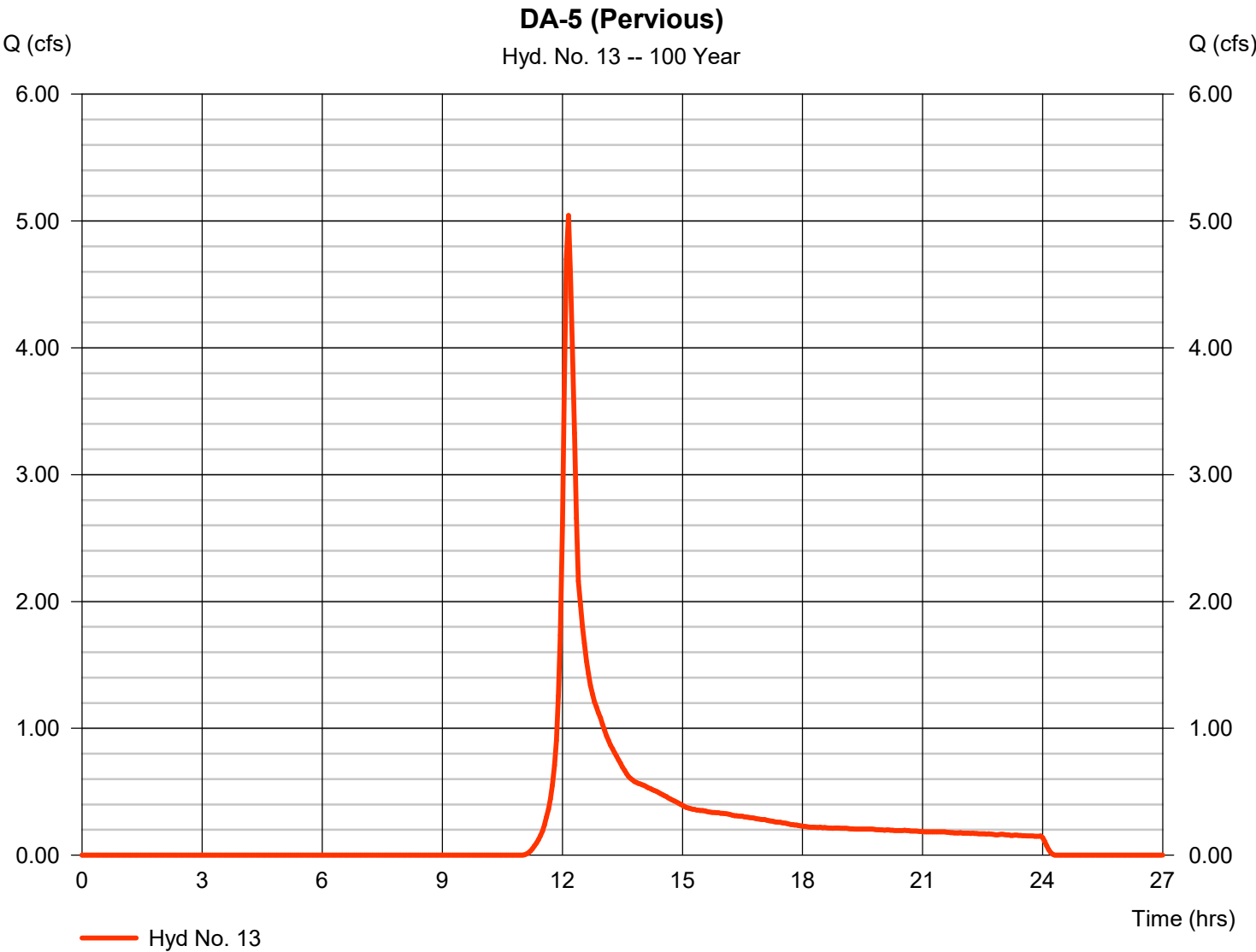
Hydrograph Report

Hyd. No. 13

DA-5 (Pervious)

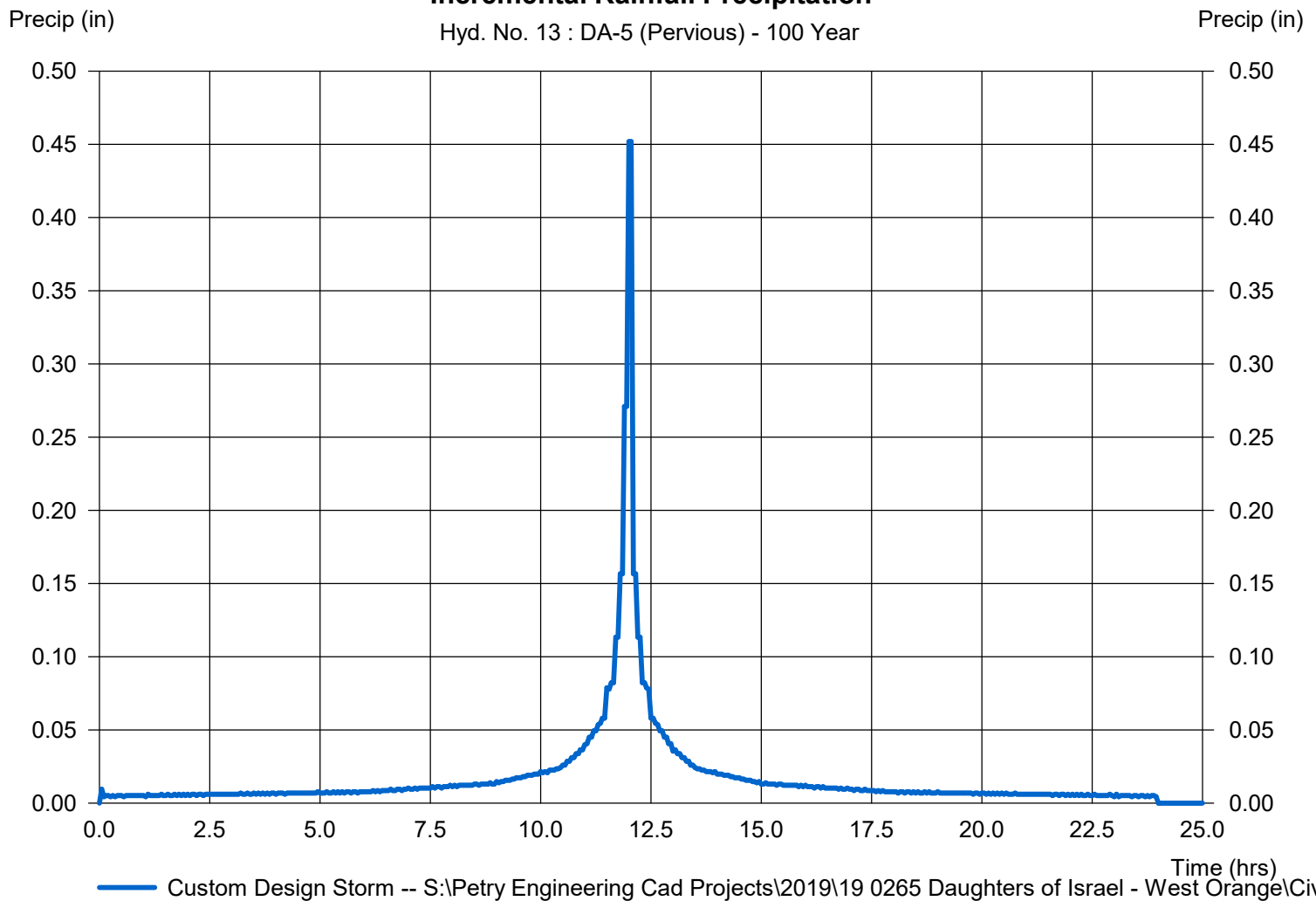
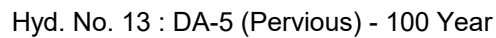
Hydrograph type	= SCS Runoff	Peak discharge	= 5.043 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 21,812 cuft
Drainage area	= 2.590 ac	Curve number	= 47*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = [(0.760 x 80) + (1.700 x 30) + (0.130 x 70)] / 2.590



DA-5 (Pervious)

Storm Frequency = 100 yrs Time interval = 3 min
Total precip. = 8.6600 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

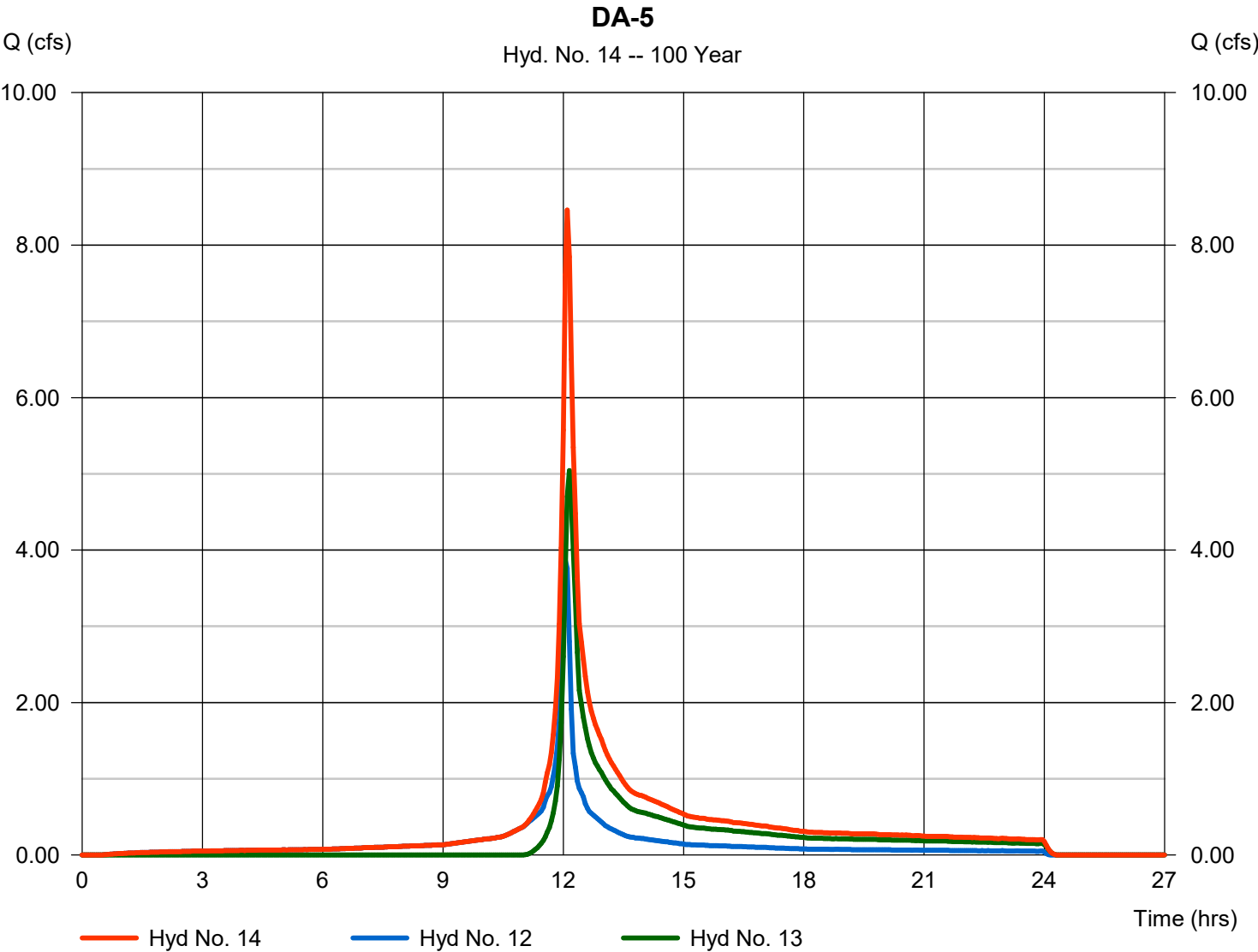


Hydrograph Report

Hyd. No. 14

DA-5

Hydrograph type	= Combine	Peak discharge	= 8.458 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 37,285 cuft
Inflow hyds.	= 12, 13	Contrib. drain. area	= 3.130 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

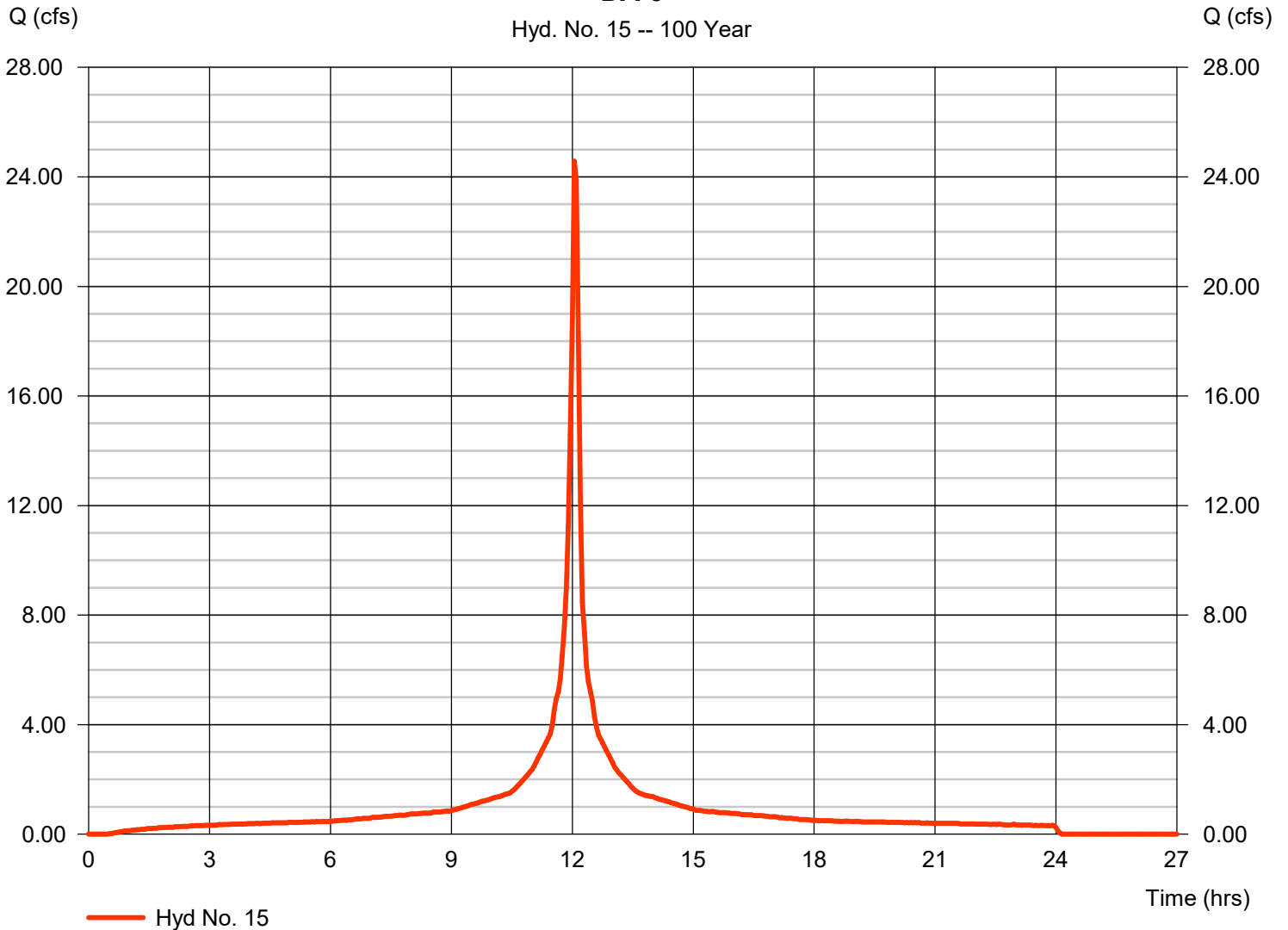
Wednesday, 11 / 2 / 2022

Hyd. No. 15

DA-6

Hydrograph type	= SCS Runoff	Peak discharge	= 24.57 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 98,282 cuft
Drainage area	= 3.430 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange		

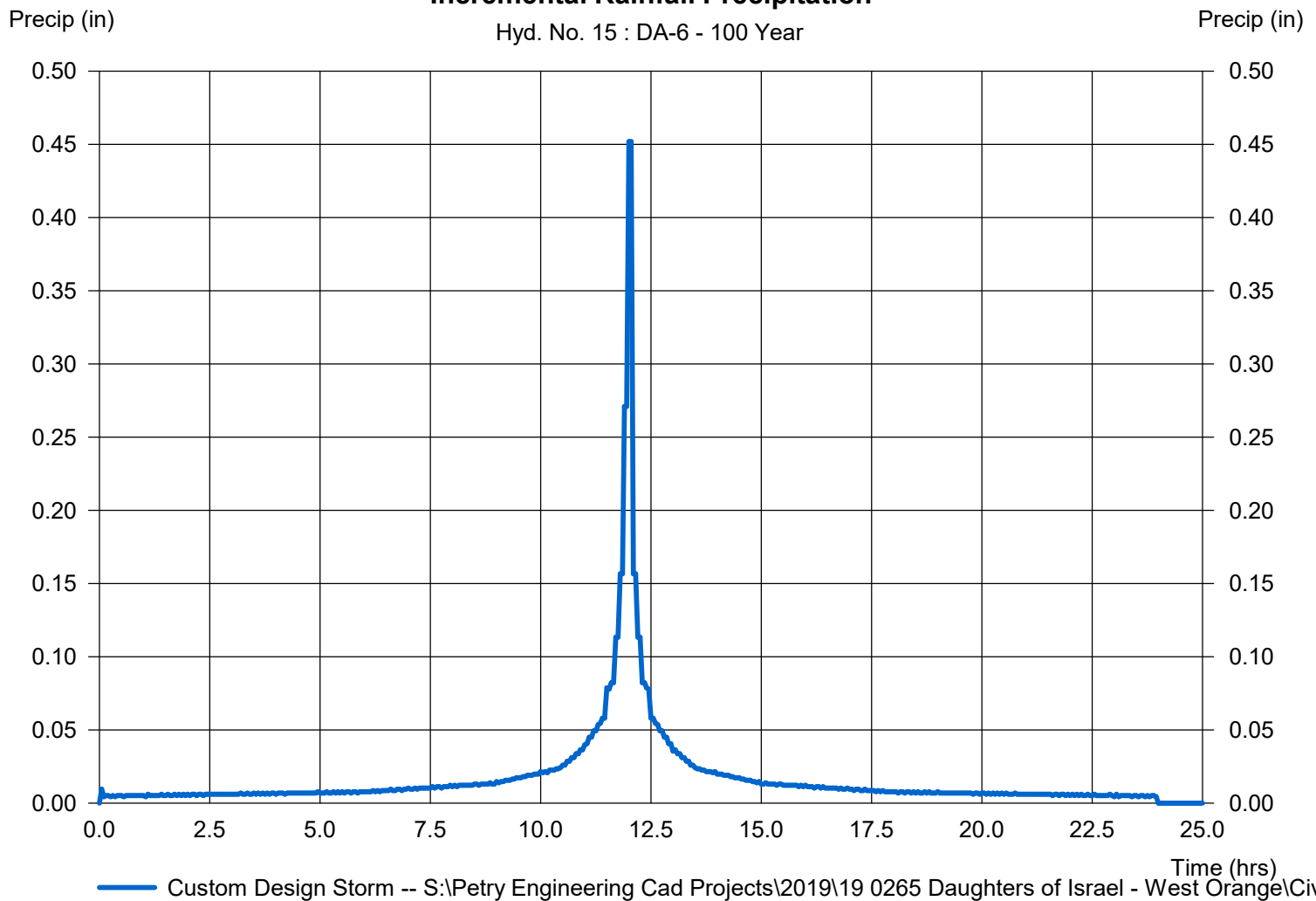
DA-6



DA-6

Storm Frequency = 100 yrs Time interval = 3 min
Total precip. = 8.6600 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

Hyd. No. 15 : DA-6 - 100 Year



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

Hyd. No. 16

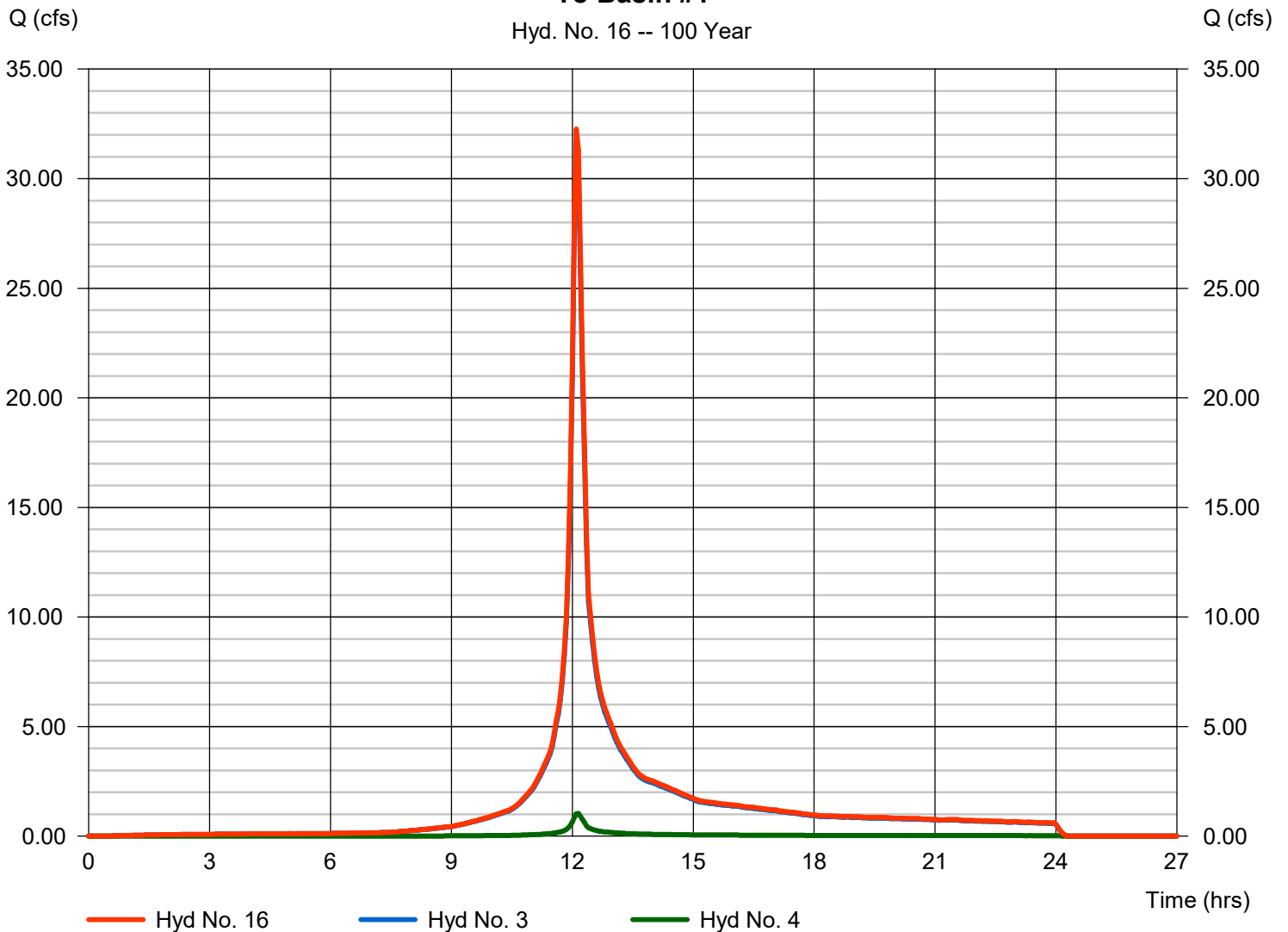
To Basin #1

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 3 min
 Inflow hyds. = 3, 4

Peak discharge = 32.27 cfs
 Time to peak = 12.10 hrs
 Hyd. volume = 132,738 cuft
 Contrib. drain. area = 0.240 ac

To Basin #1

Hyd. No. 16 -- 100 Year



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

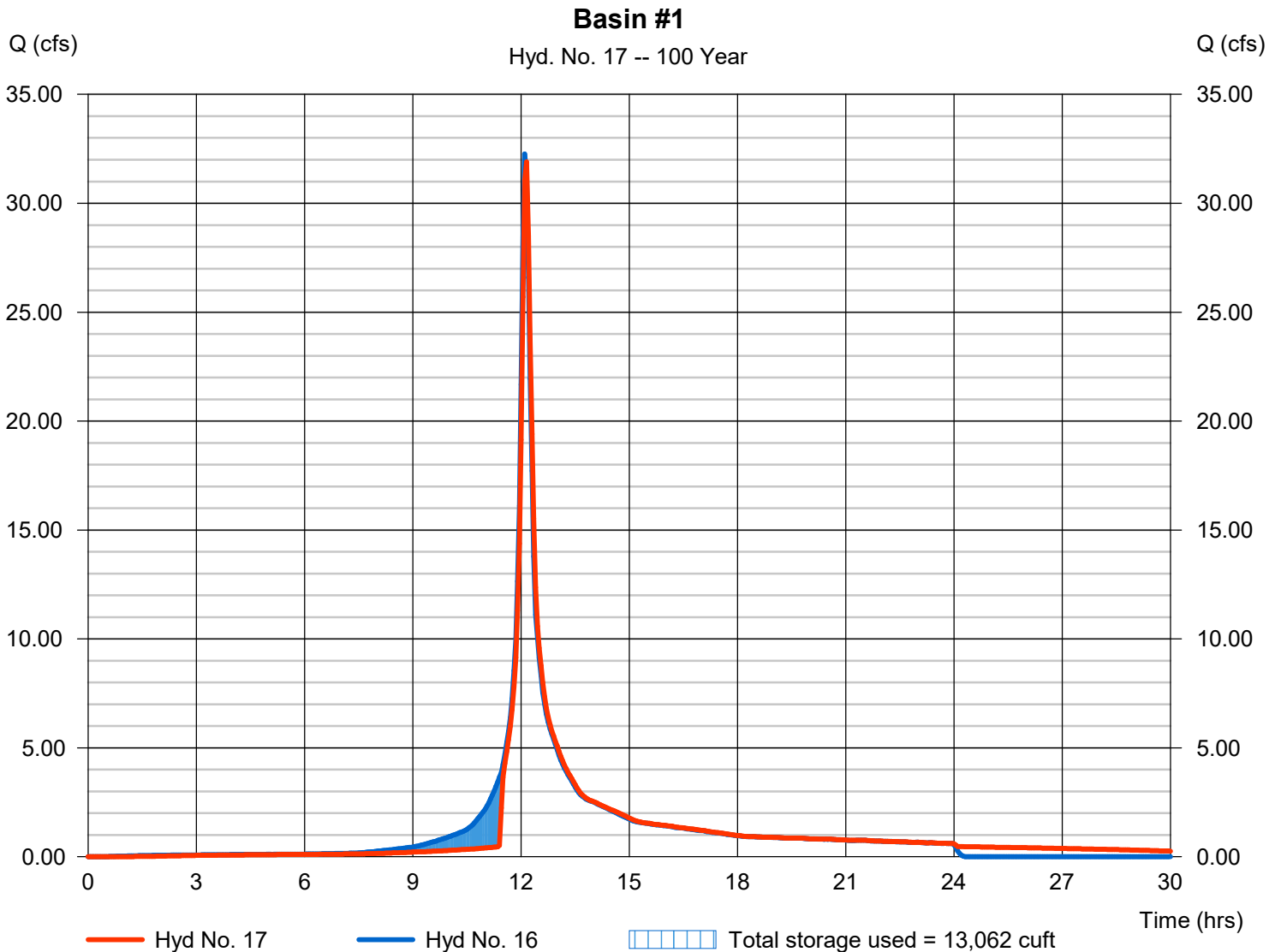
Hyd. No. 17

Basin #1

Hydrograph type = Reservoir
 Storm frequency = 100 yrs
 Time interval = 3 min
 Inflow hyd. No. = 16 - To Basin #1
 Reservoir name = Basin #1

Peak discharge = 31.90 cfs
 Time to peak = 12.15 hrs
 Hyd. volume = 132,731 cuft
 Max. Elevation = 419.70 ft
 Max. Storage = 13,062 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

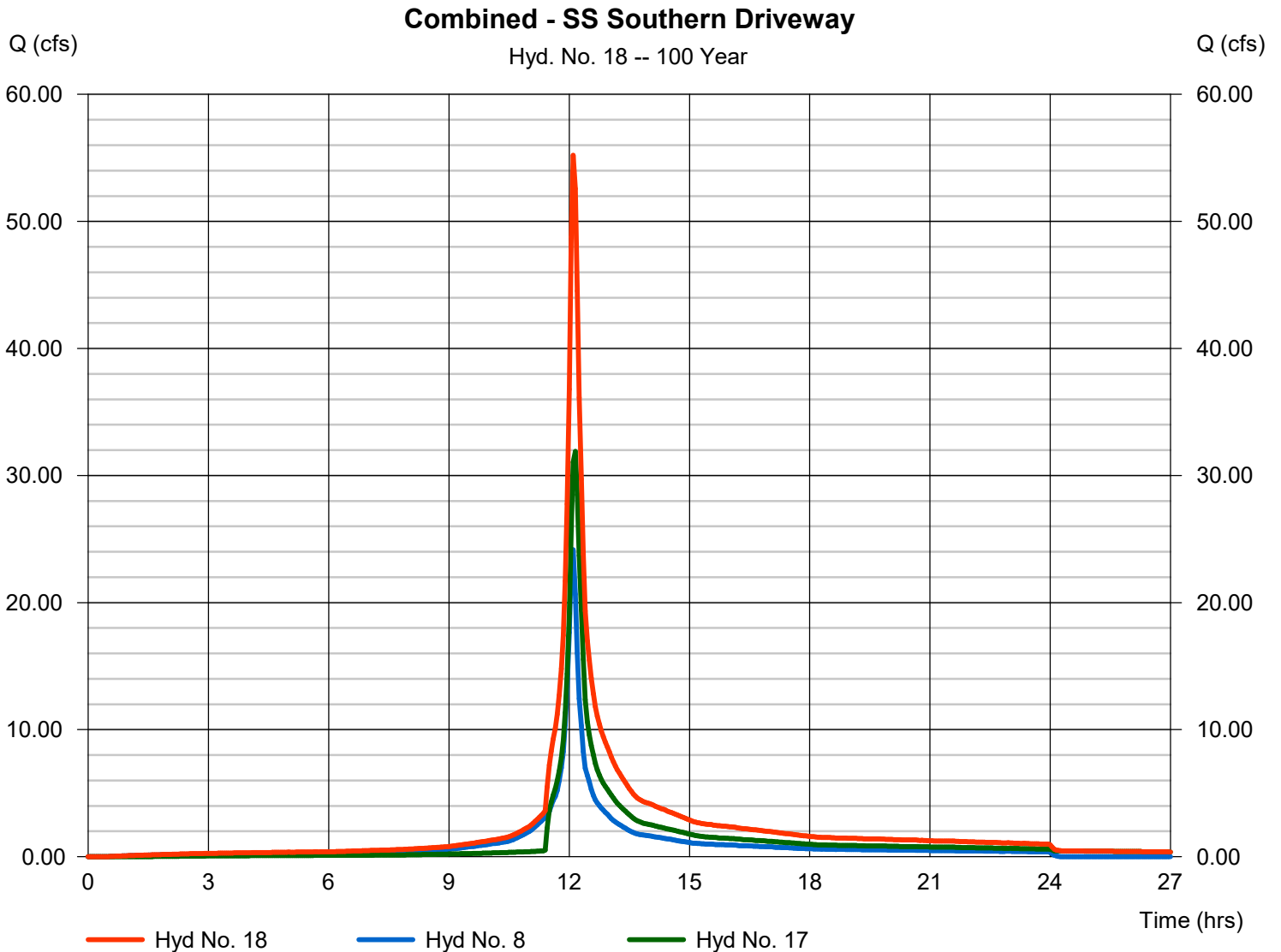
Wednesday, 11 / 2 / 2022

Hyd. No. 18

Combined - SS Southern Driveway

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 3 min
 Inflow hyds. = 8, 17

Peak discharge = 55.19 cfs
 Time to peak = 12.10 hrs
 Hyd. volume = 232,179 cuft
 Contrib. drain. area = 0.000 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

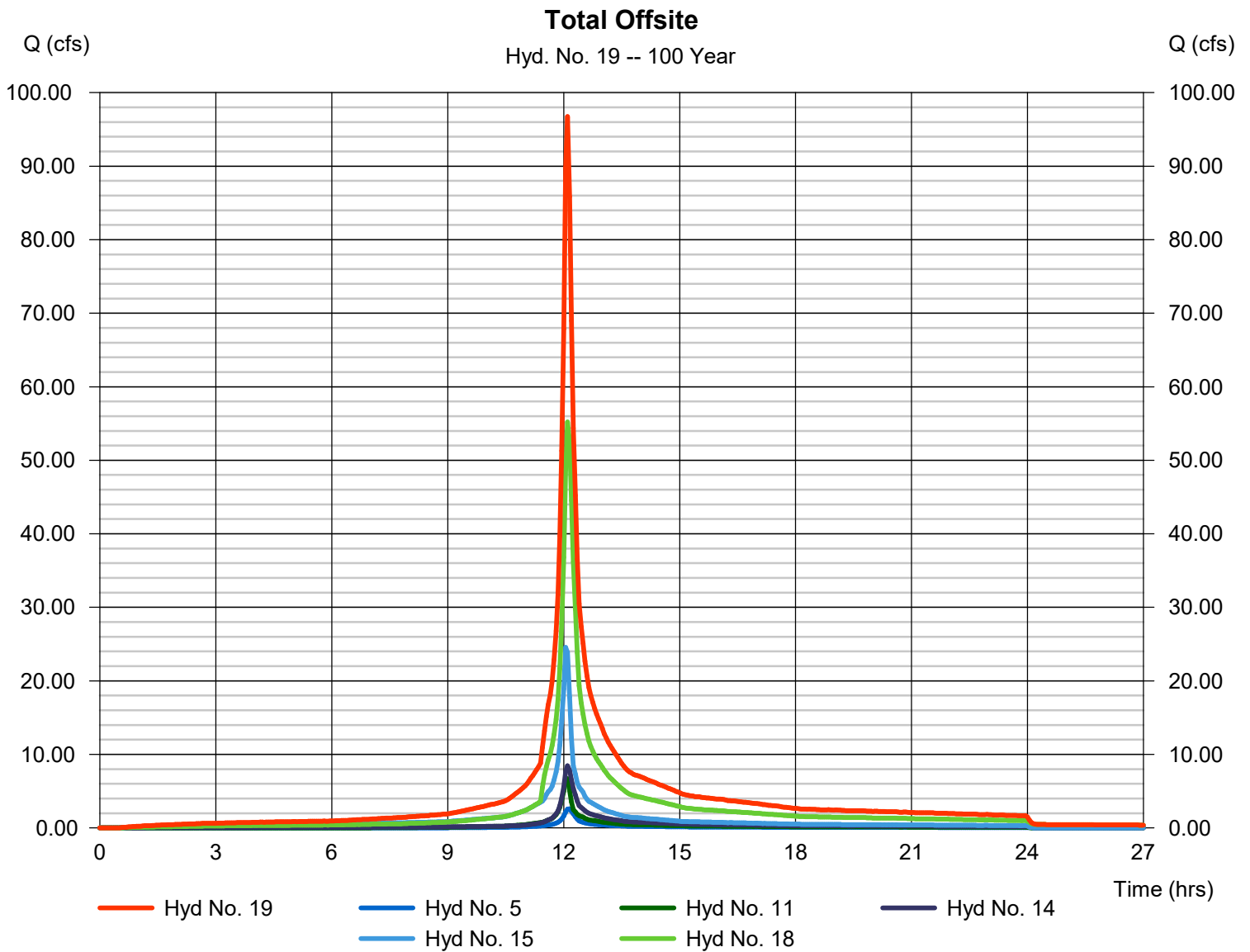
Wednesday, 11 / 2 / 2022

Hyd. No. 19

Total Offsite

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 3 min
 Inflow hyds. = 5, 11, 14, 15, 18

Peak discharge = 96.75 cfs
 Time to peak = 12.10 hrs
 Hyd. volume = 401,465 cuft
 Contrib. drain. area = 4.030 ac



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Wednesday, 11 / 2 / 2022

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

$$\text{Intensity} = B / (T_c + D)^E$$

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

T_c = time in minutes. Values may exceed 60.

Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Current\Stormwater\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	3.44	0.00	0.00	0.00	0.00	0.00	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	0.00	3.44	0.00	0.00	5.22	6.44	0.00	8.66

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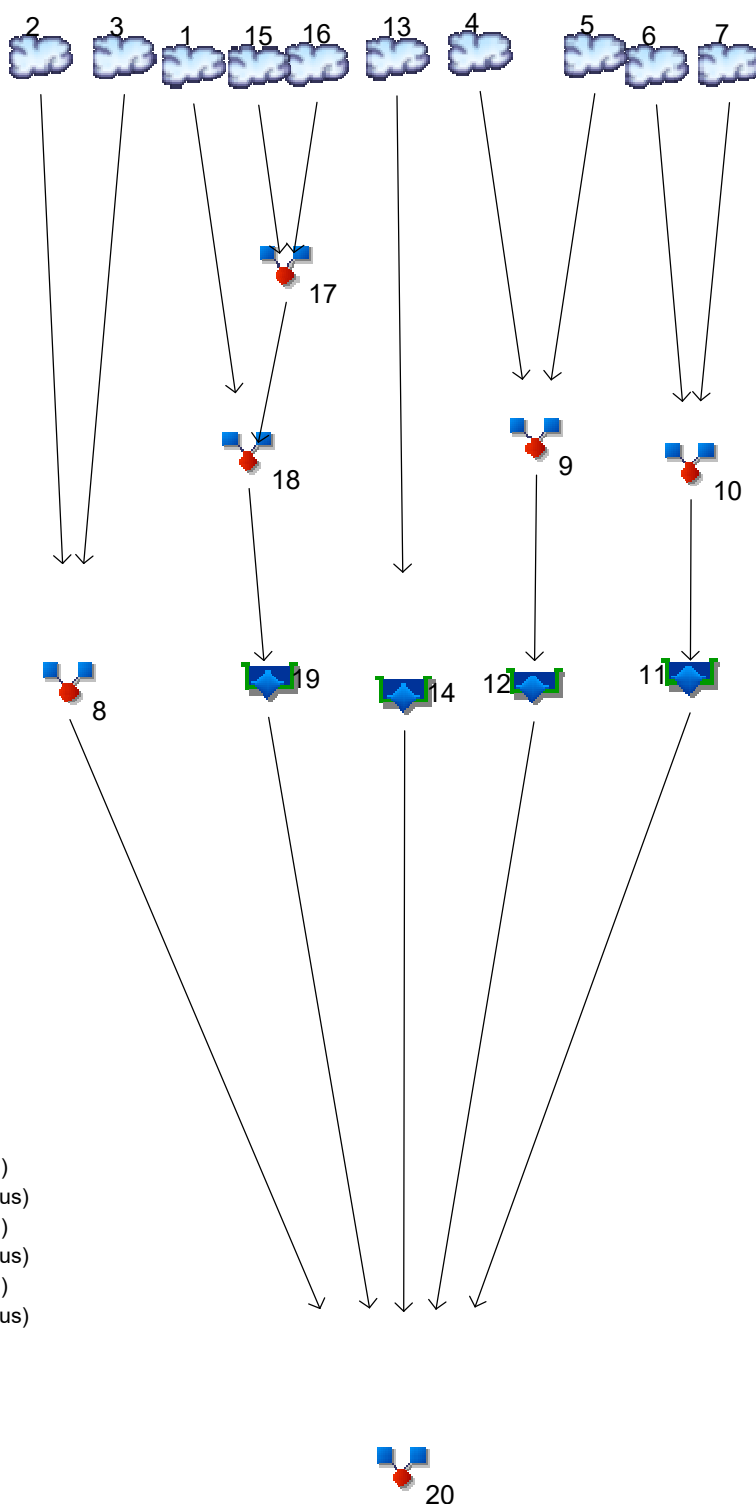
100 - Year

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Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023



Legend

Hyd.	Origin	Description
1	SCS Runoff	DA-1A (Roof)
2	SCS Runoff	DA-2 (Pervious)
3	SCS Runoff	DA-2 (Impervious)
4	SCS Runoff	DA-3 (Pervious)
5	SCS Runoff	DA-3 (Impervious)
6	SCS Runoff	DA-4 (Pervious)
7	SCS Runoff	DA-4 (Impervious)
8	Combine	DA-2
9	Combine	DA-3
10	Combine	DA-4
11	Reservoir	Basin #3
12	Reservoir	Basin #2
13	SCS Runoff	DA-1B (Roof)
14	Reservoir	Basin #1B
15	SCS Runoff	DA-1A (Courtyard Pervious)
16	SCS Runoff	DA-1A (Courtyard Impervious)
17	Combine	<no description>
18	Combine	<no description>
19	Reservoir	<no description>
20	Combine	<no description>

Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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	-----	-----	2.759	-----	-----	4.321	5.382	-----	7.302	DA-1A (Roof)
2	SCS Runoff	-----	-----	2.804	-----	-----	6.540	9.358	-----	14.72	DA-2 (Pervious)
3	SCS Runoff	-----	-----	3.663	-----	-----	5.594	6.914	-----	9.312	DA-2 (Impervious)
4	SCS Runoff	-----	-----	5.185	-----	-----	11.79	16.74	-----	26.10	DA-3 (Pervious)
5	SCS Runoff	-----	-----	4.085	-----	-----	6.239	7.711	-----	10.39	DA-3 (Impervious)
6	SCS Runoff	-----	-----	0.475	-----	-----	3.696	6.756	-----	13.24	DA-4 (Pervious)
7	SCS Runoff	-----	-----	3.240	-----	-----	4.948	6.116	-----	8.237	DA-4 (Impervious)
8	Combine	2, 3,	-----	6.202	-----	-----	11.76	15.84	-----	23.52	DA-2
9	Combine	4, 5,	-----	8.874	-----	-----	17.48	23.83	-----	35.79	DA-3
10	Combine	6, 7,	-----	3.362	-----	-----	8.123	12.23	-----	20.65	DA-4
11	Reservoir	10	-----	1.497	-----	-----	5.430	9.569	-----	15.74	Basin #3
12	Reservoir	9	-----	4.761	-----	-----	14.78	21.66	-----	31.90	Basin #2
13	SCS Runoff	-----	-----	4.580	-----	-----	7.253	9.066	-----	12.34	DA-1B (Roof)
14	Reservoir	13	-----	2.090	-----	-----	8.143	9.263	-----	12.33	Basin #1B
15	SCS Runoff	-----	-----	0.048	-----	-----	0.092	0.123	-----	0.182	DA-1A (Courtyard Pervious)
16	SCS Runoff	-----	-----	0.085	-----	-----	0.129	0.160	-----	0.215	DA-1A (Courtyard Impervious)
17	Combine	15, 16	-----	0.131	-----	-----	0.221	0.283	-----	0.397	<no description>
18	Combine	1, 17	-----	2.890	-----	-----	4.542	5.665	-----	7.698	<no description>
19	Reservoir	18	-----	1.551	-----	-----	5.092	5.876	-----	7.726	<no description>
20	Combine	8, 11, 12, 14, 19	-----	14.72	-----	-----	39.24	57.06	-----	86.61	<no description>
Proj. file: Proposed Conditions - Green Roof.gpw										Friday, 01 / 27 / 2023	

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

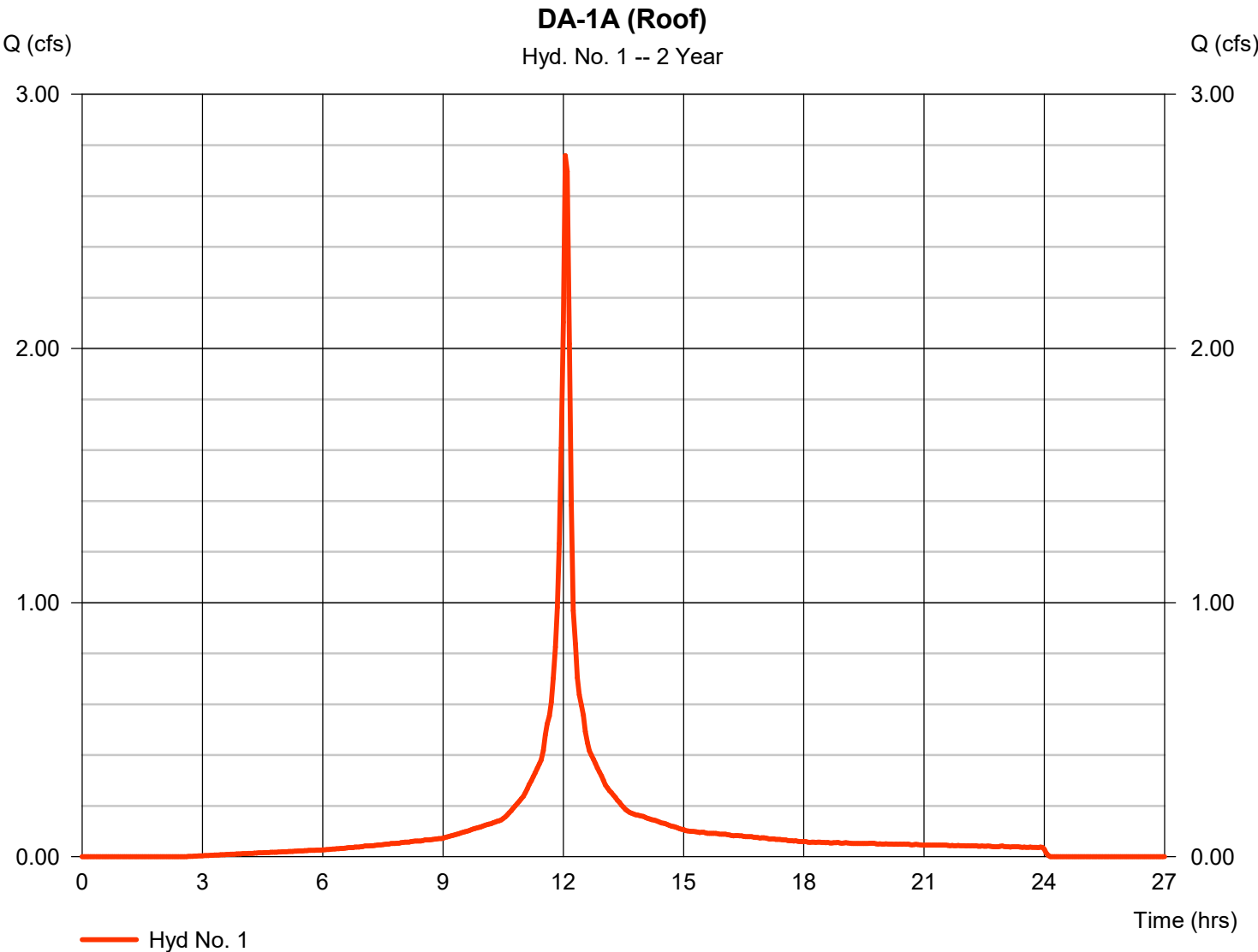
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.759	3	723	10,096	-----	-----	-----	DA-1A (Roof)
2	SCS Runoff	2.804	3	729	11,841	-----	-----	-----	DA-2 (Pervious)
3	SCS Runoff	3.663	3	723	14,186	-----	-----	-----	DA-2 (Impervious)
4	SCS Runoff	5.185	3	729	21,678	-----	-----	-----	DA-3 (Pervious)
5	SCS Runoff	4.085	3	723	15,823	-----	-----	-----	DA-3 (Impervious)
6	SCS Runoff	0.475	3	738	5,095	-----	-----	-----	DA-4 (Pervious)
7	SCS Runoff	3.240	3	723	12,550	-----	-----	-----	DA-4 (Impervious)
8	Combine	6.202	3	726	26,028	2, 3,	-----	-----	DA-2
9	Combine	8.874	3	726	37,501	4, 5,	-----	-----	DA-3
10	Combine	3.362	3	726	17,644	6, 7,	-----	-----	DA-4
11	Reservoir	1.497	3	738	17,643	10	417.07	2,825	Basin #3
12	Reservoir	4.761	3	738	37,500	9	415.75	5,922	Basin #2
13	SCS Runoff	4.580	3	723	16,539	-----	-----	-----	DA-1B (Roof)
14	Reservoir	2.090	3	732	16,539	13	407.13	2,550	Basin #1B
15	SCS Runoff	0.048	3	726	162	-----	-----	-----	DA-1A (Courtyard Pervious)
16	SCS Runoff	0.085	3	723	327	-----	-----	-----	DA-1A (Courtyard Impervious)
17	Combine	0.131	3	723	490	15, 16	-----	-----	<no description>
18	Combine	2.890	3	723	10,585	1, 17	-----	-----	<no description>
19	Reservoir	1.551	3	732	10,585	18	421.35	1,344	<no description>
20	Combine	14.72	3	729	108,294	8, 11, 12, 14, 19	-----	-----	<no description>
Proposed Conditions - Green Roof.gpw					Return Period: 2 Year			Friday, 01 / 27 / 2023	

Hydrograph Report

Hyd. No. 1

DA-1A (Roof)

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.759 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	10,096 cuft
Drainage area	=	1.030 ac	Curve number	=	95
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.44 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\19-01-0265 Daughters of Israel - West Orange			

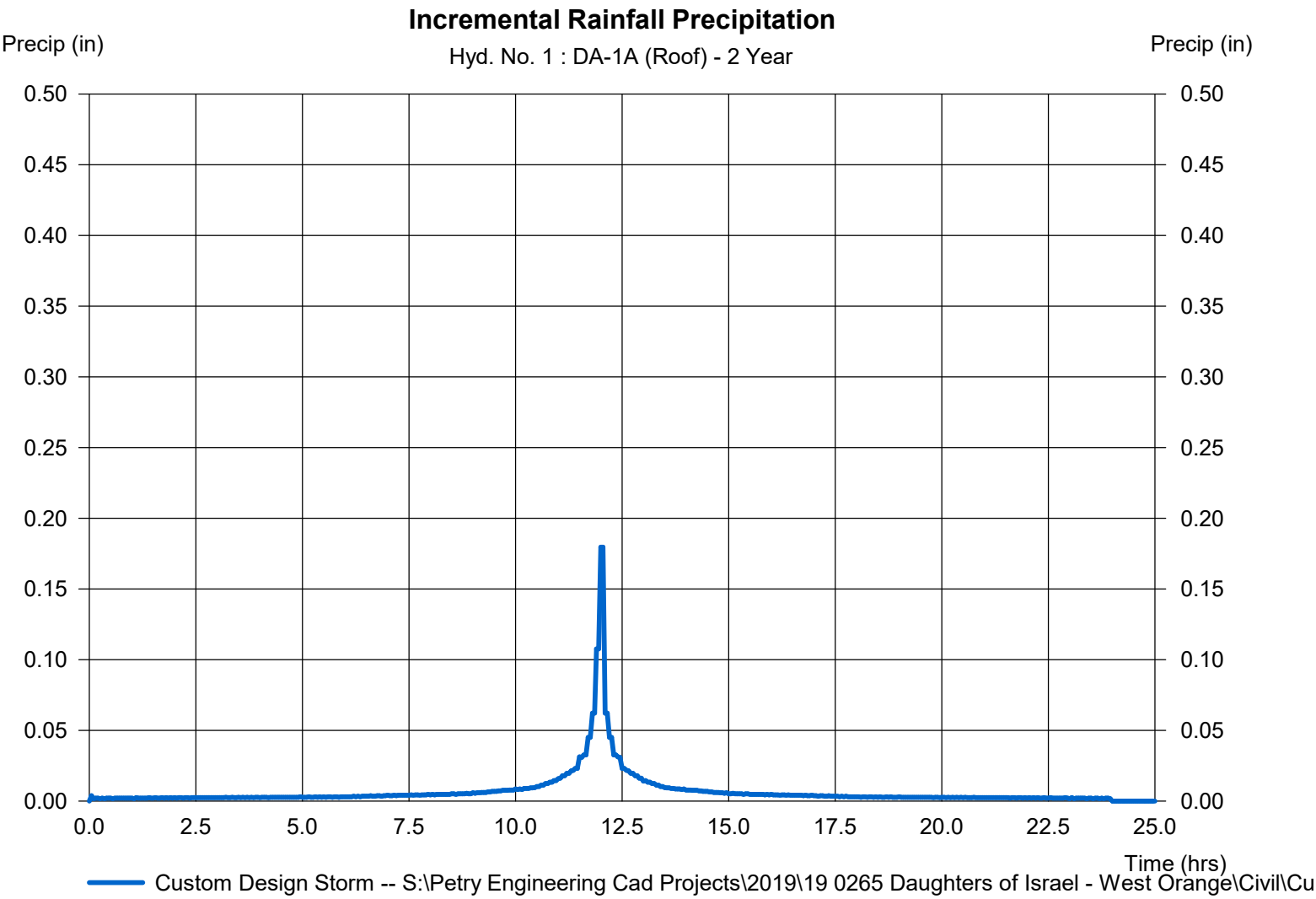


Precipitation Report

Hyd. No. 1

DA-1A (Roof)

Storm Frequency	= 2 yrs	Time interval	= 3 min
Total precip.	= 3.4400 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Hydro\DA-1A (Roof).hgt		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

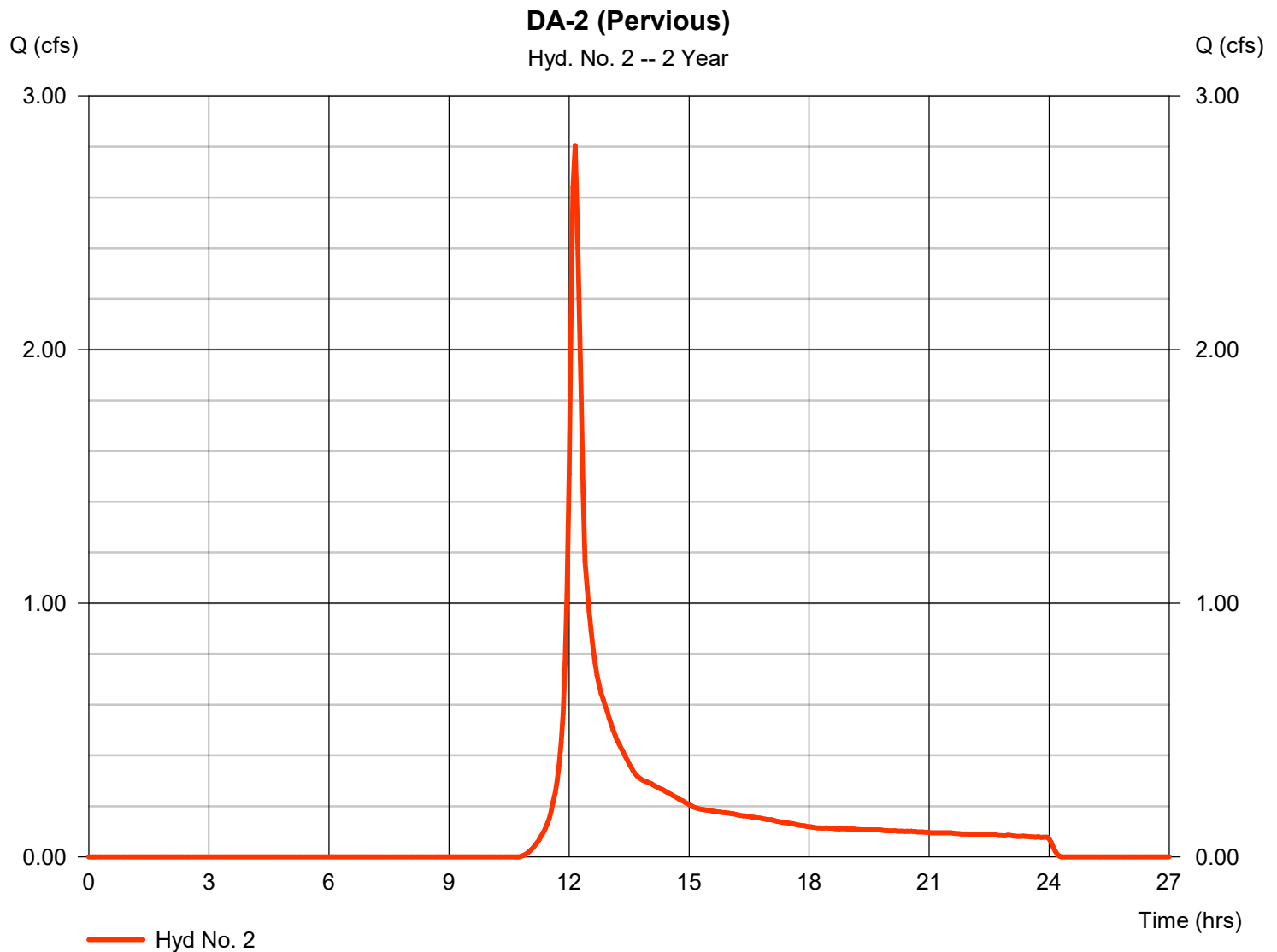
Friday, 01 / 27 / 2023

Hyd. No. 2

DA-2 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.804 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 11,841 cuft
Drainage area	= 3.180 ac	Curve number	= 71*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.10 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\191010-0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = $[(0.510 \times 30) + (0.110 \times 77) + (0.160 \times 70) + (2.400 \times 80)] / 3.180$



Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 2

DA-2 (Pervious)

Storm Frequency

= 2 yrs

Time interval

= 3 min

Total precip.

= 3.4400 in

Distribution

= Custom

Storm duration

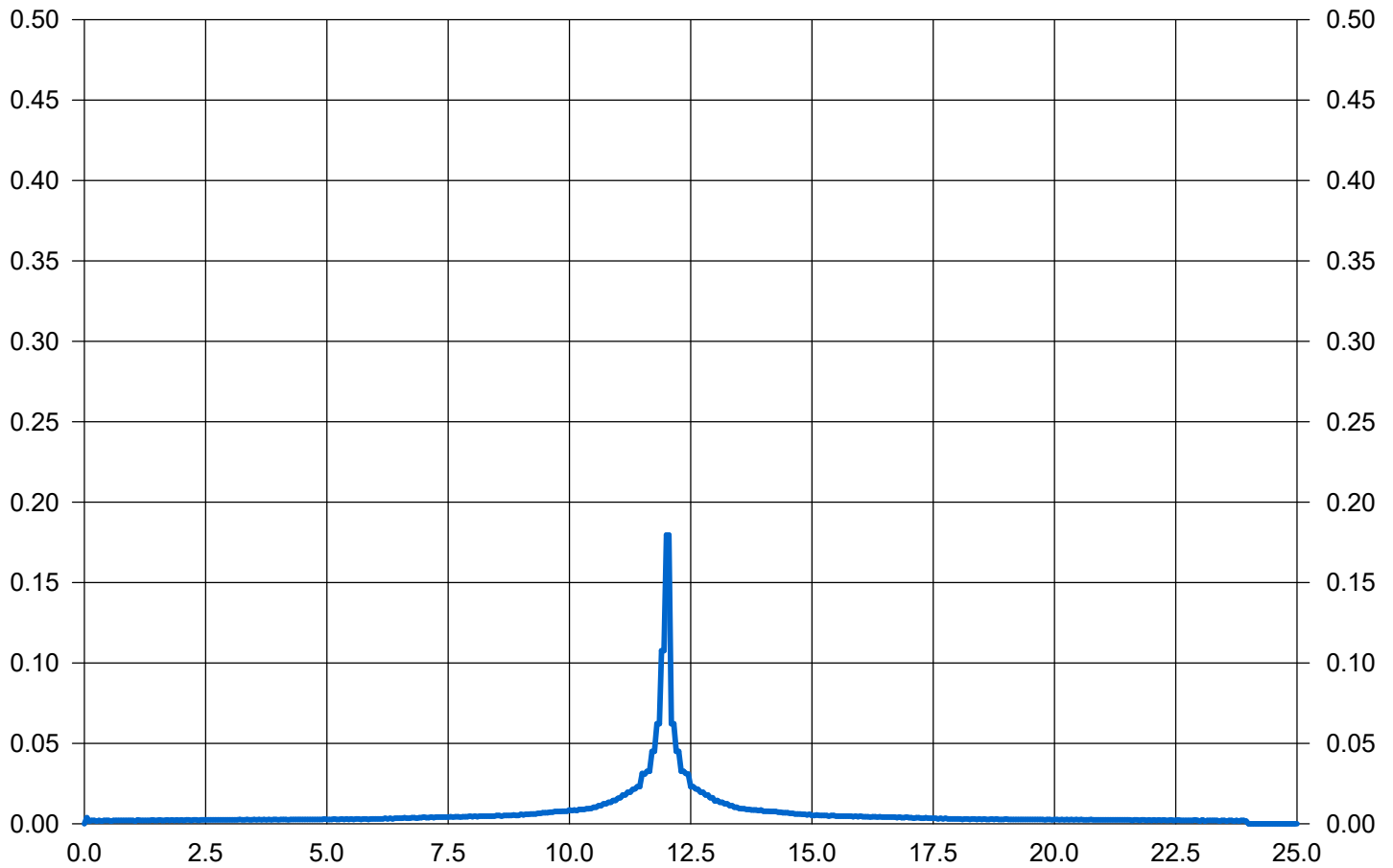
= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Cu

Incremental Rainfall Precipitation

Hyd. No. 2 : DA-2 (Pervious) - 2 Year

Precip (in)

Precip (in)



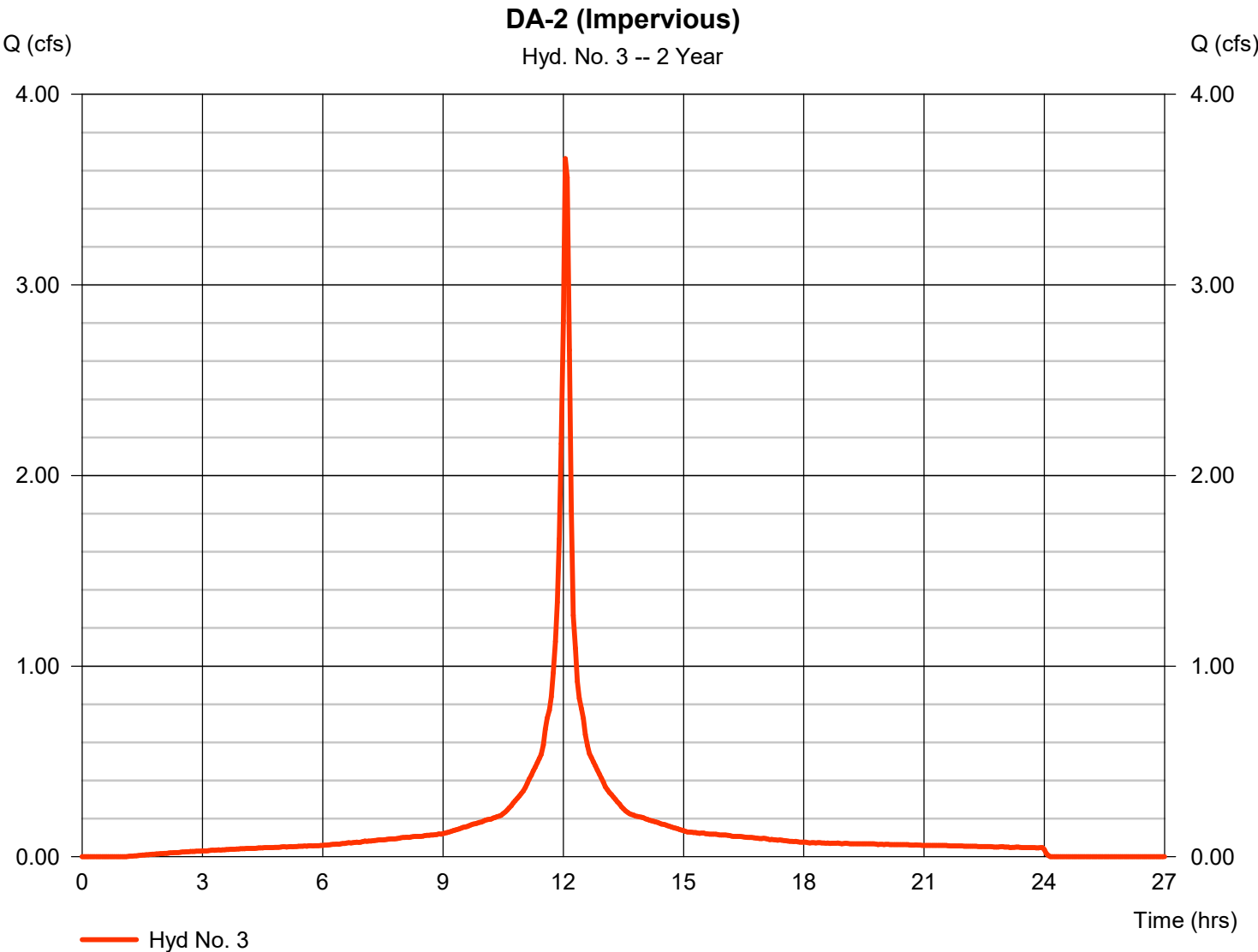
— Custom Design Storm -- S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Cu

Hydrograph Report

Hyd. No. 3

DA-2 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.663 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 14,186 cuft
Drainage area	= 1.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\19-01-0265 Daughters of Israel - West Orange		

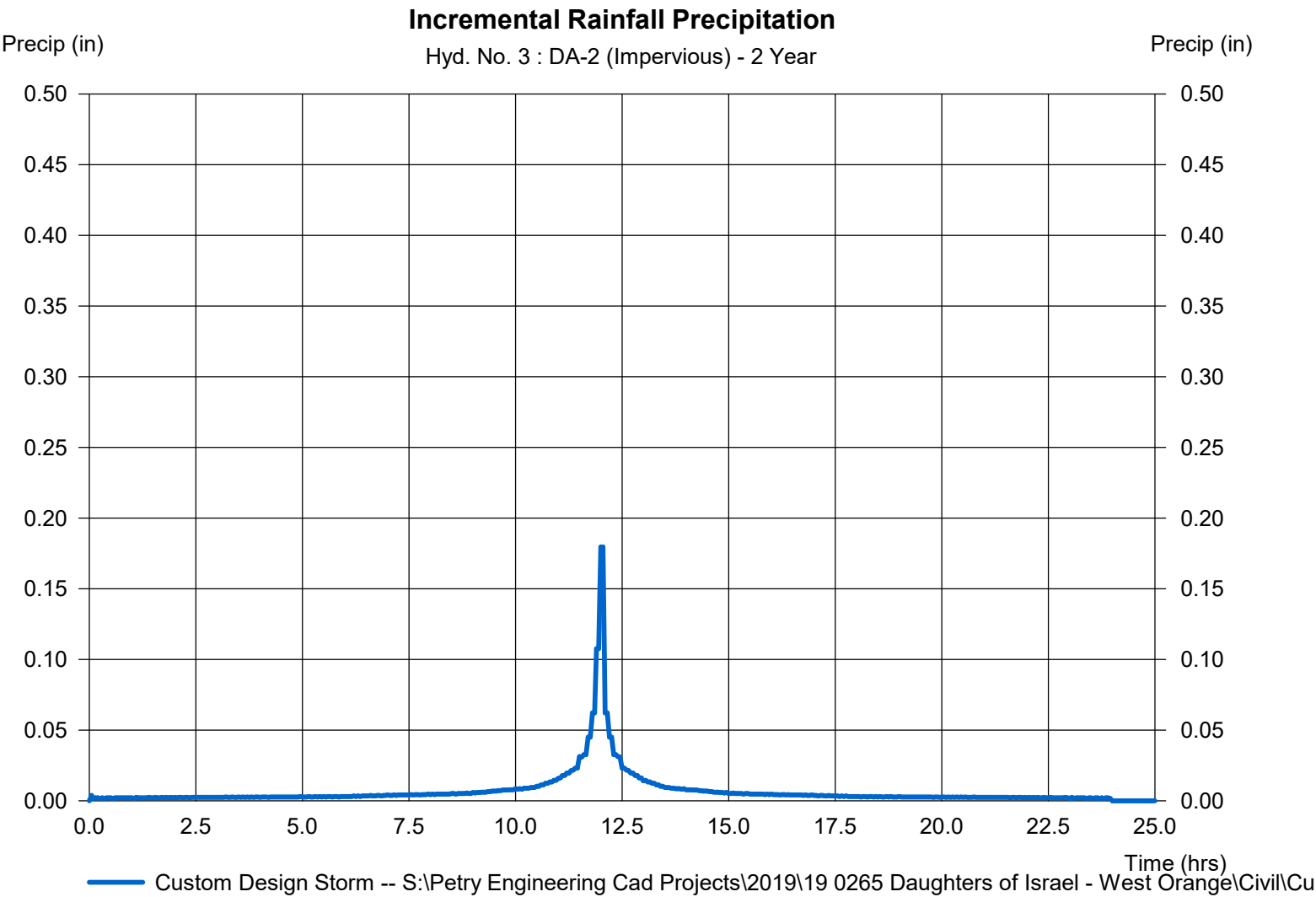


Precipitation Report

Hyd. No. 3

DA-2 (Impervious)

Storm Frequency	= 2 yrs	Time interval	= 3 min
Total precip.	= 3.4400 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\19 0265 Daughters of Israel - West Orange.dwg		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

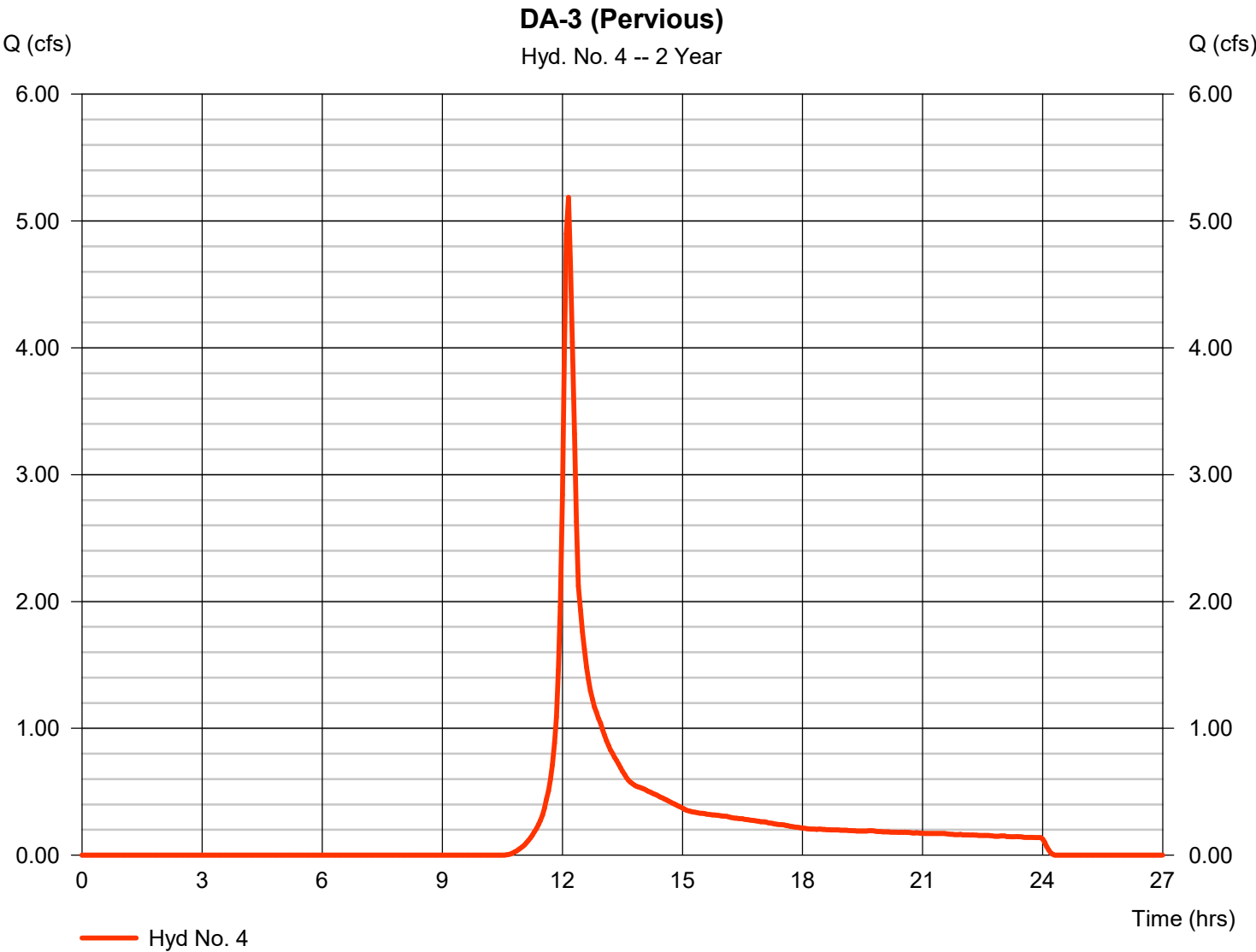
Friday, 01 / 27 / 2023

Hyd. No. 4

DA-3 (Pervious)

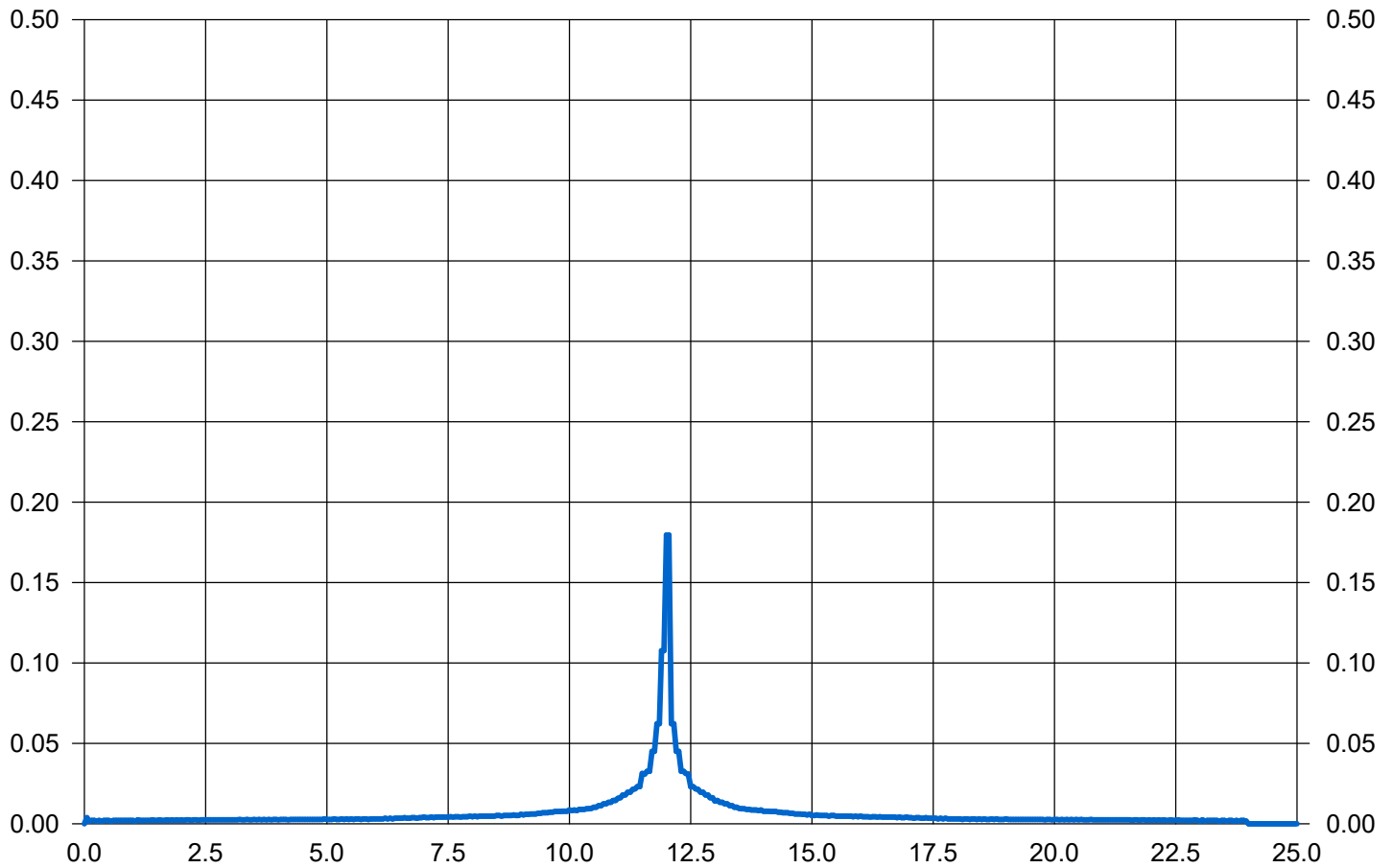
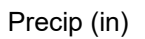
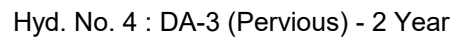
Hydrograph type	= SCS Runoff	Peak discharge	= 5.185 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 21,678 cuft
Drainage area	= 5.520 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.50 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\191019 0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = [(0.010 x 30) + (4.210 x 70) + (0.340 x 77) + (0.400 x 74) + (0.560 x 80)] / 5.520



DA-3 (Pervious)

Storm Frequency = 2 yrs Time interval = 3 min
Total precip. = 3.4400 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Time (hrs)
 Custom Design Storm -- S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Cu

Hydrograph Report

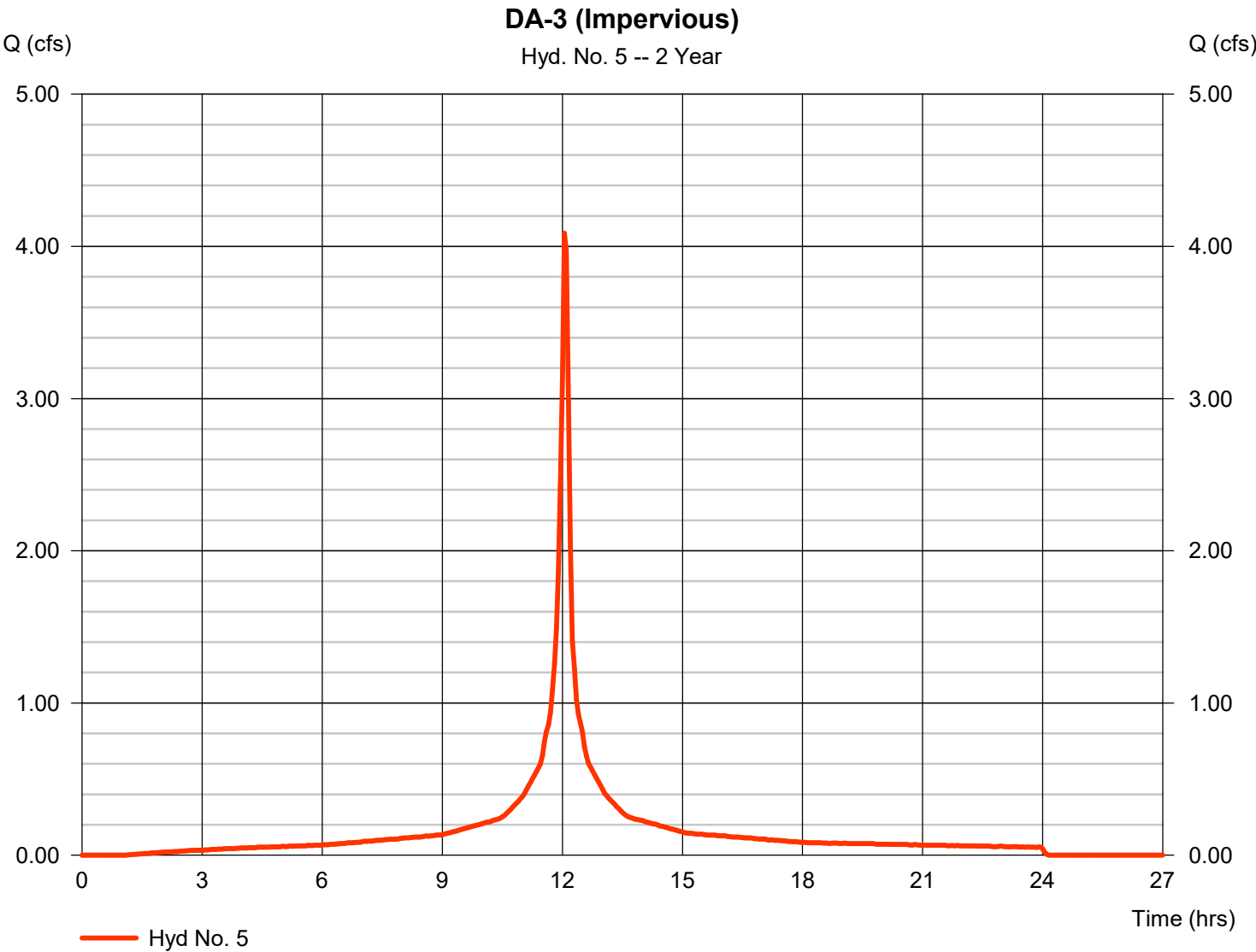
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 5

DA-3 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.085 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	15,823 cuft
Drainage area	=	1.450 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.44 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\12012023\0265 Daughters of Israel - West Orange\12012023\0265 Daughters of Israel - West Orange.dwg			

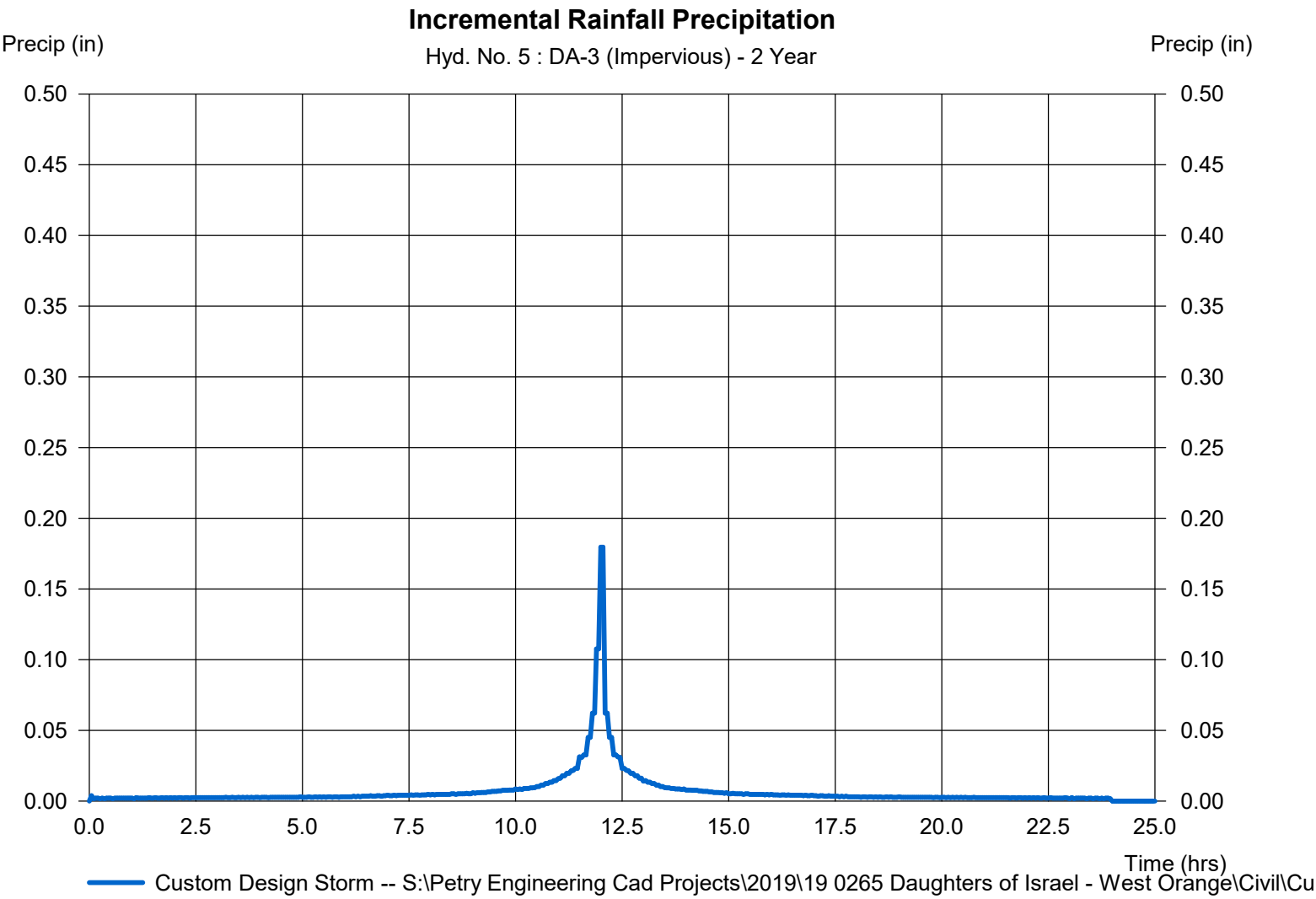


Precipitation Report

Hyd. No. 5

DA-3 (Impervious)

Storm Frequency	= 2 yrs	Time interval	= 3 min
Total precip.	= 3.4400 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\19 0265 Daughters of Israel - West Orange.dwg		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

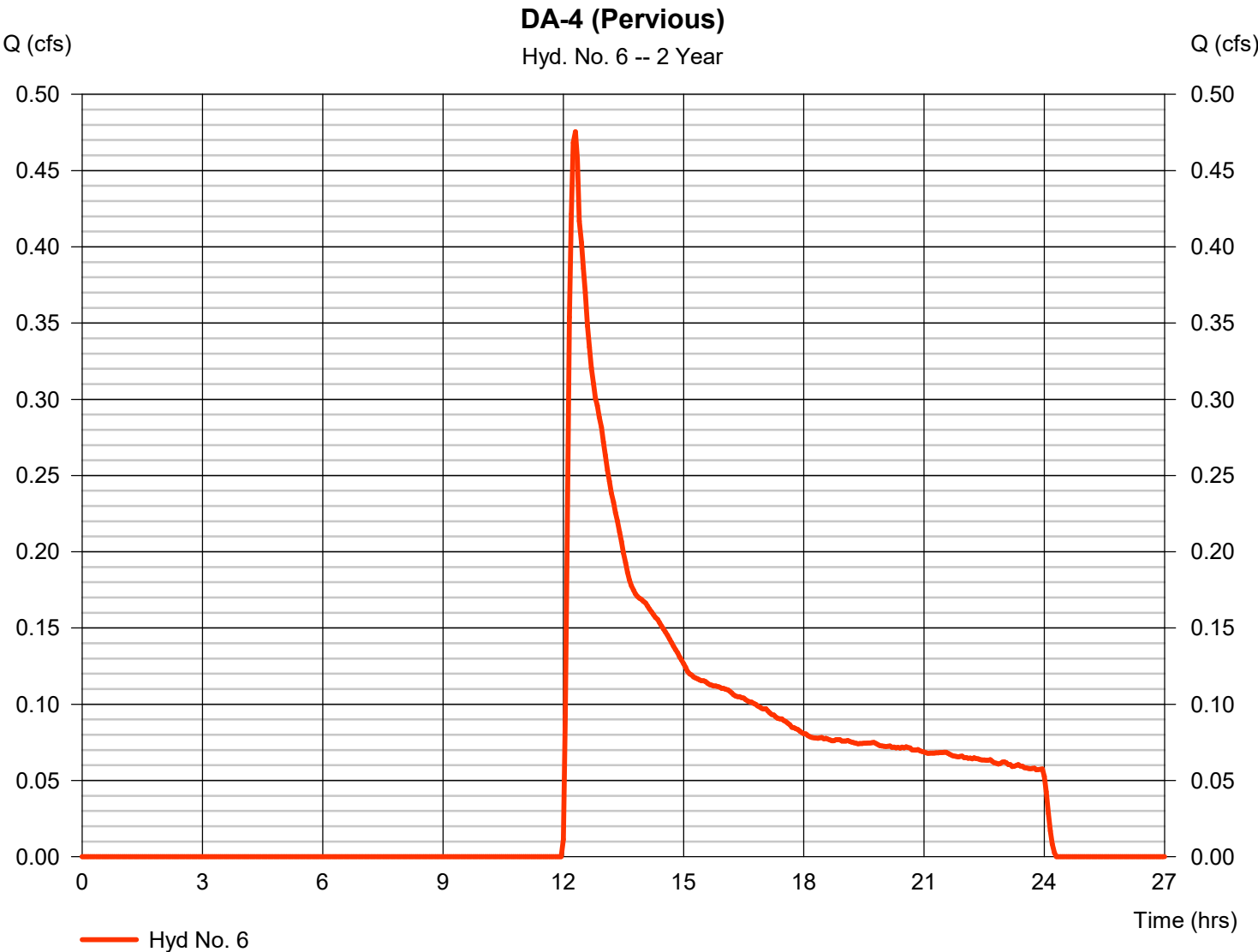
Friday, 01 / 27 / 2023

Hyd. No. 6

DA-4 (Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.475 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.30 hrs
Time interval	=	3 min	Hyd. volume	=	5,095 cuft
Drainage area	=	4.780 ac	Curve number	=	54*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	14.30 min
Total precip.	=	3.44 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\191019 0265 Daughters of Israel - West Orange			

* Composite (Area/CN) = [(2.140 x 30) + (1.440 x 70) + (0.360 x 74) + (0.840 x 80)] / 4.780



Precipitation Report

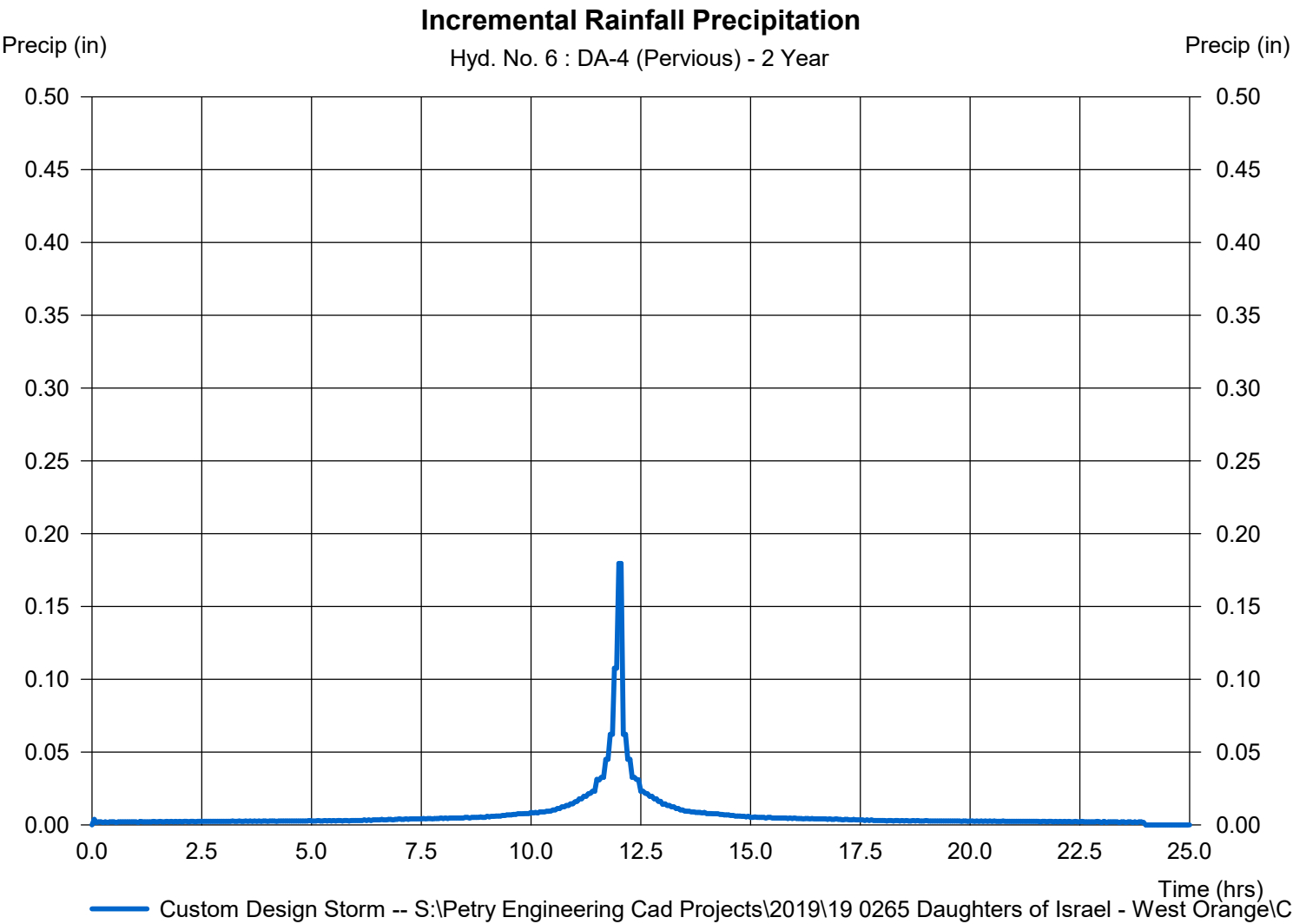
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 6

DA-4 (Pervious)

Storm Frequency	= 2 yrs	Time interval	= 3 min
Total precip.	= 3.4400 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora		



Hydrograph Report

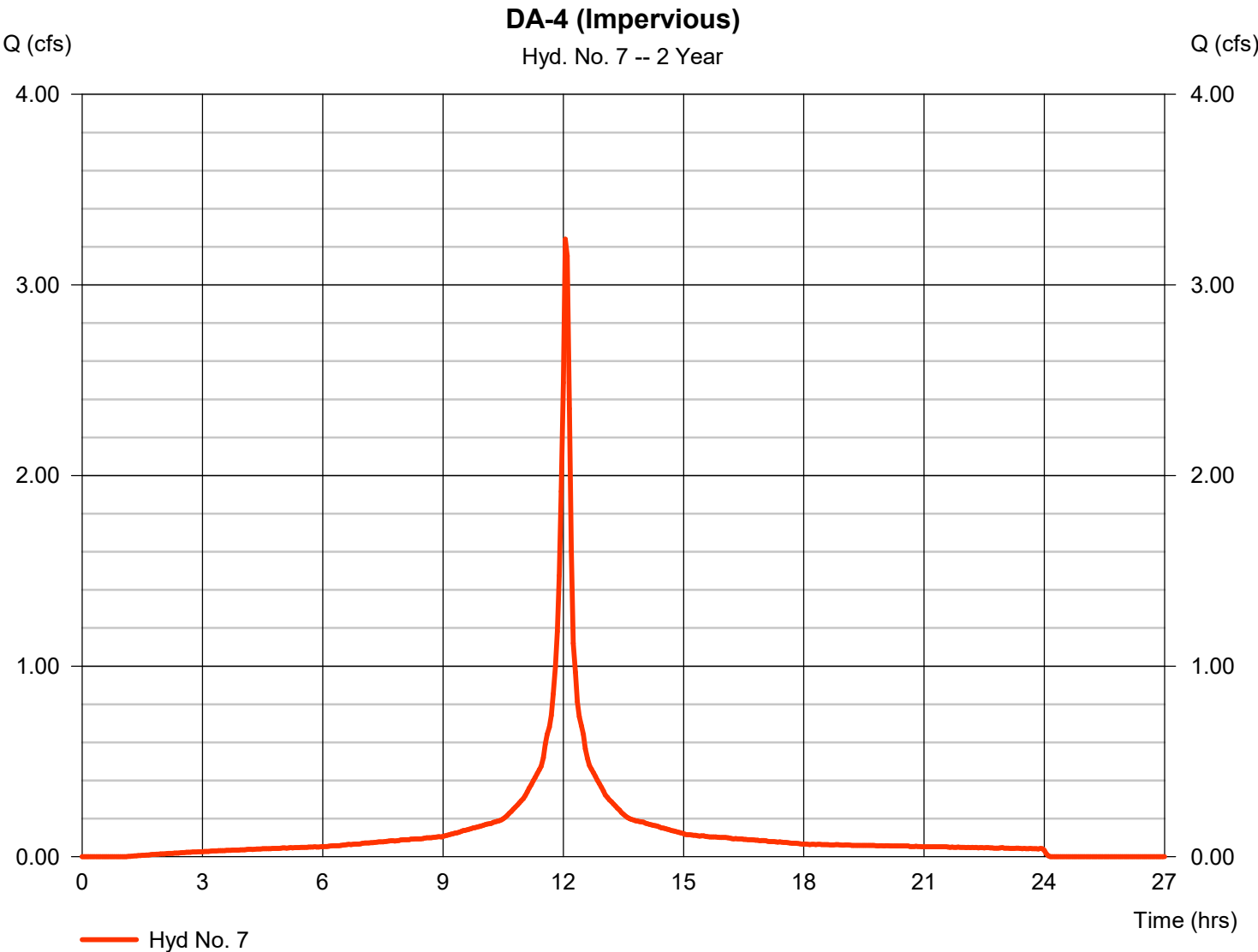
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 7

DA-4 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.240 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	12,550 cuft
Drainage area	=	1.150 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	3.44 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\191019 0265 Daughters of Israel - West Orange			

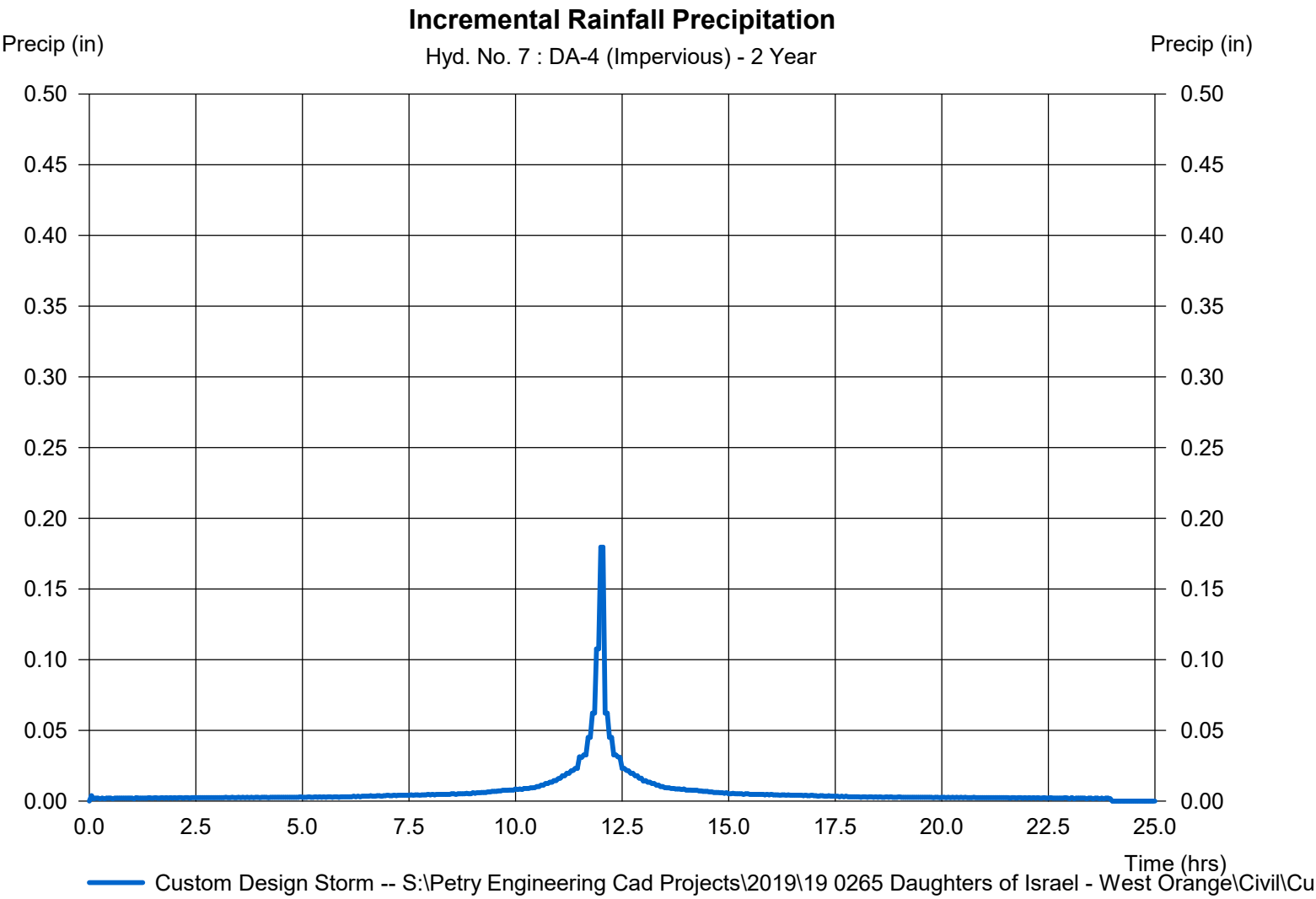


Precipitation Report

Hyd. No. 7

DA-4 (Impervious)

Storm Frequency	= 2 yrs	Time interval	= 3 min
Total precip.	= 3.4400 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora		



Hydrograph Report

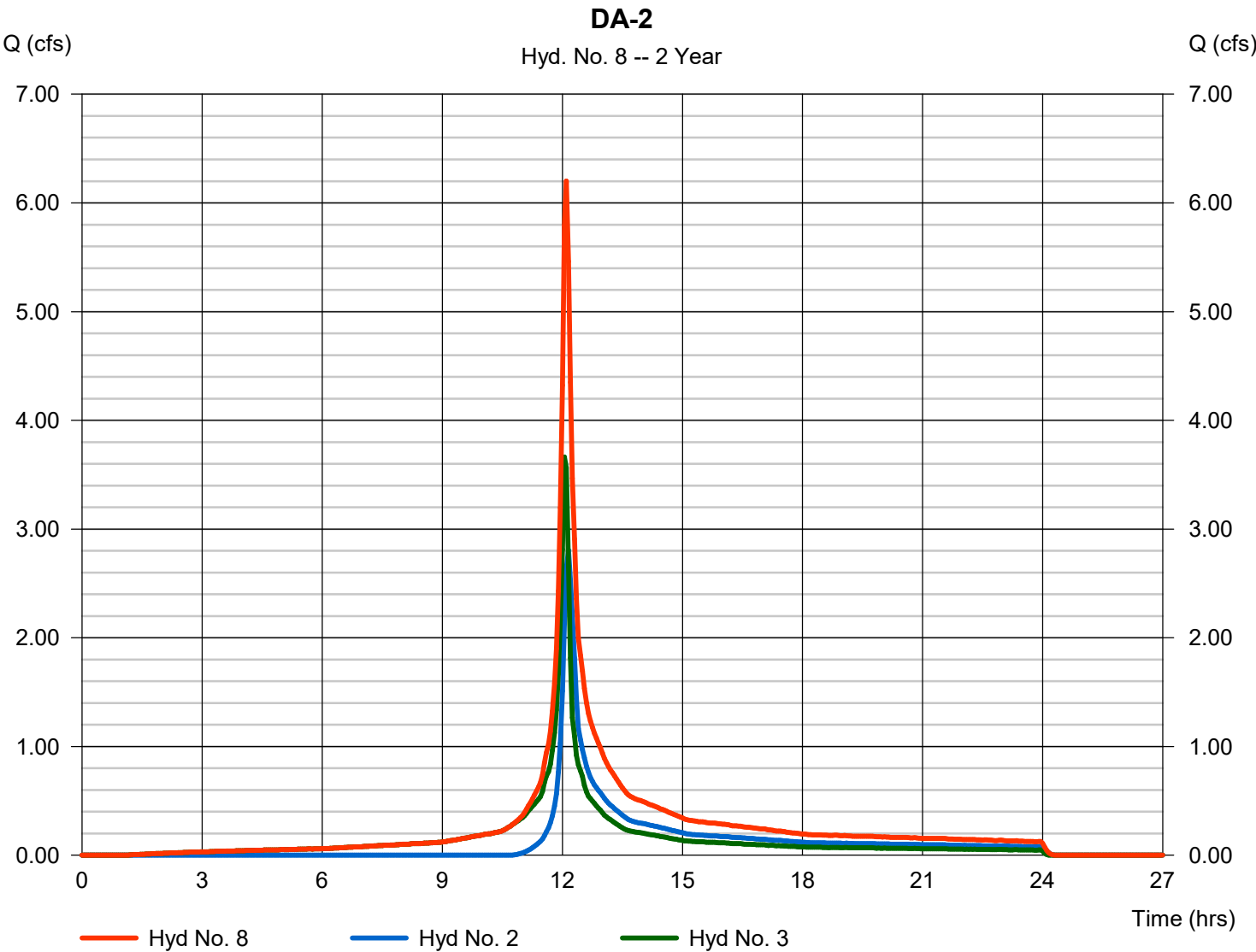
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 8

DA-2

Hydrograph type	= Combine	Peak discharge	= 6.202 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 26,028 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 4.480 ac



Hydrograph Report

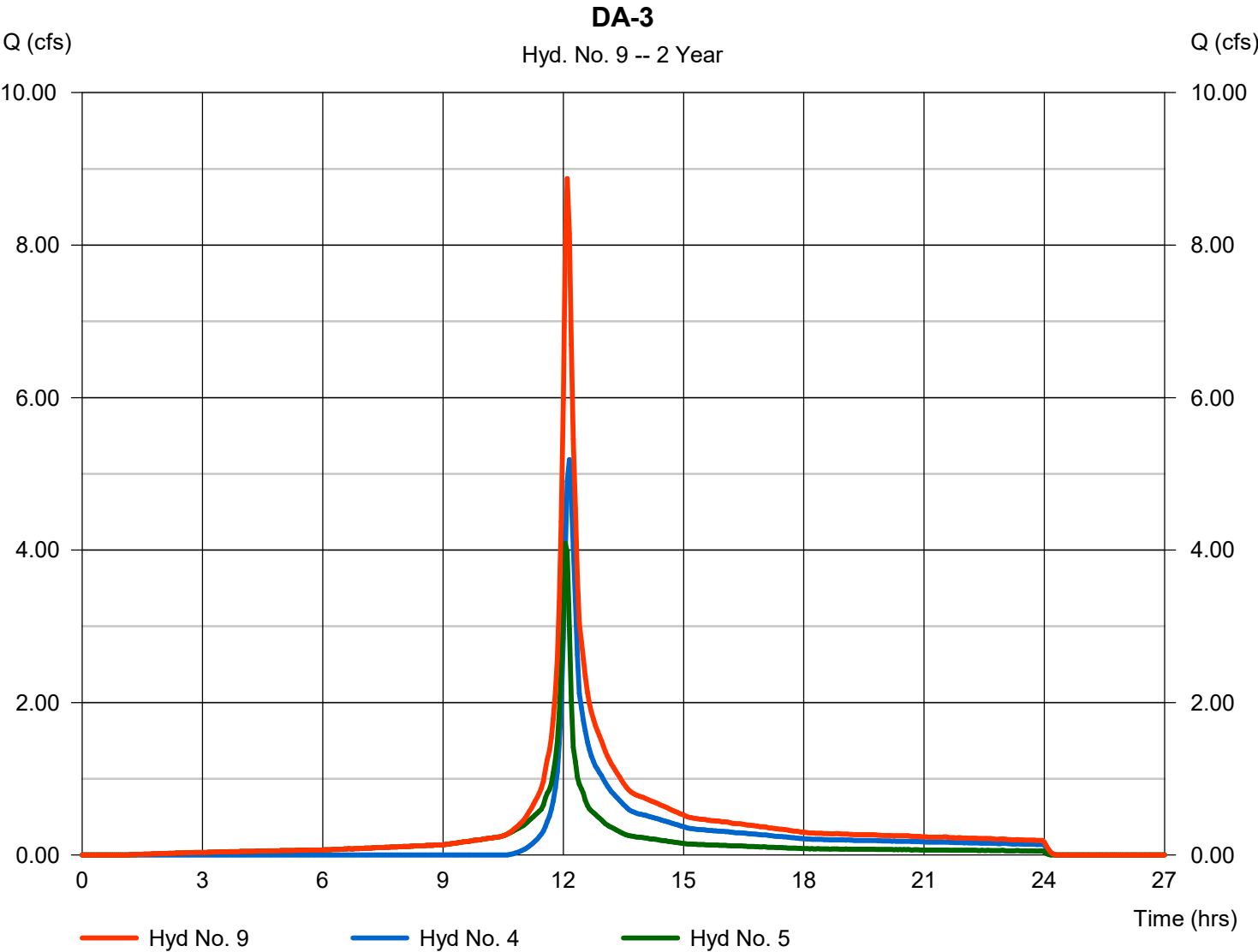
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 9

DA-3

Hydrograph type	= Combine	Peak discharge	= 8.874 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 37,501 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 6.970 ac



Hydrograph Report

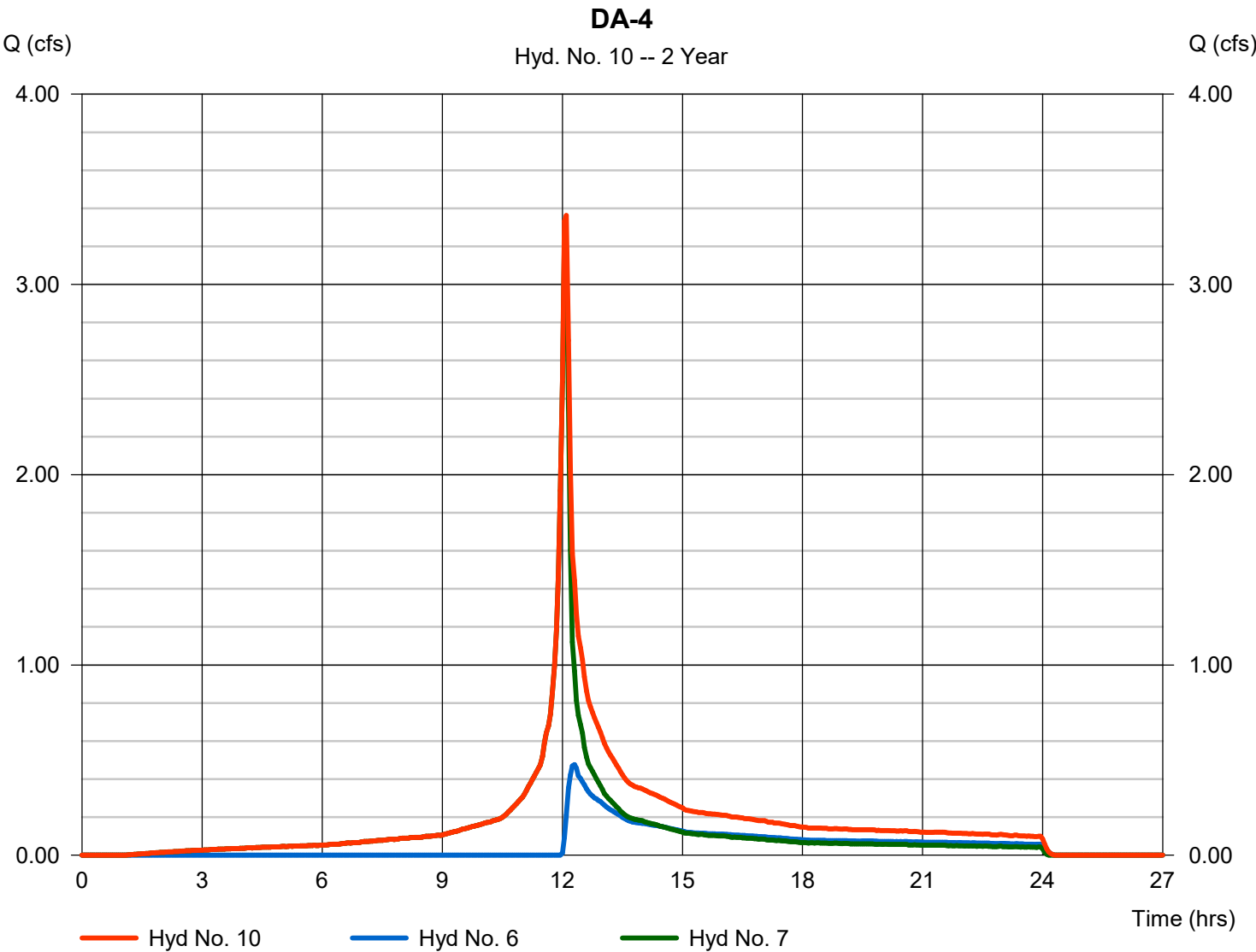
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 10

DA-4

Hydrograph type	= Combine	Peak discharge	= 3.362 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 17,644 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 5.930 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

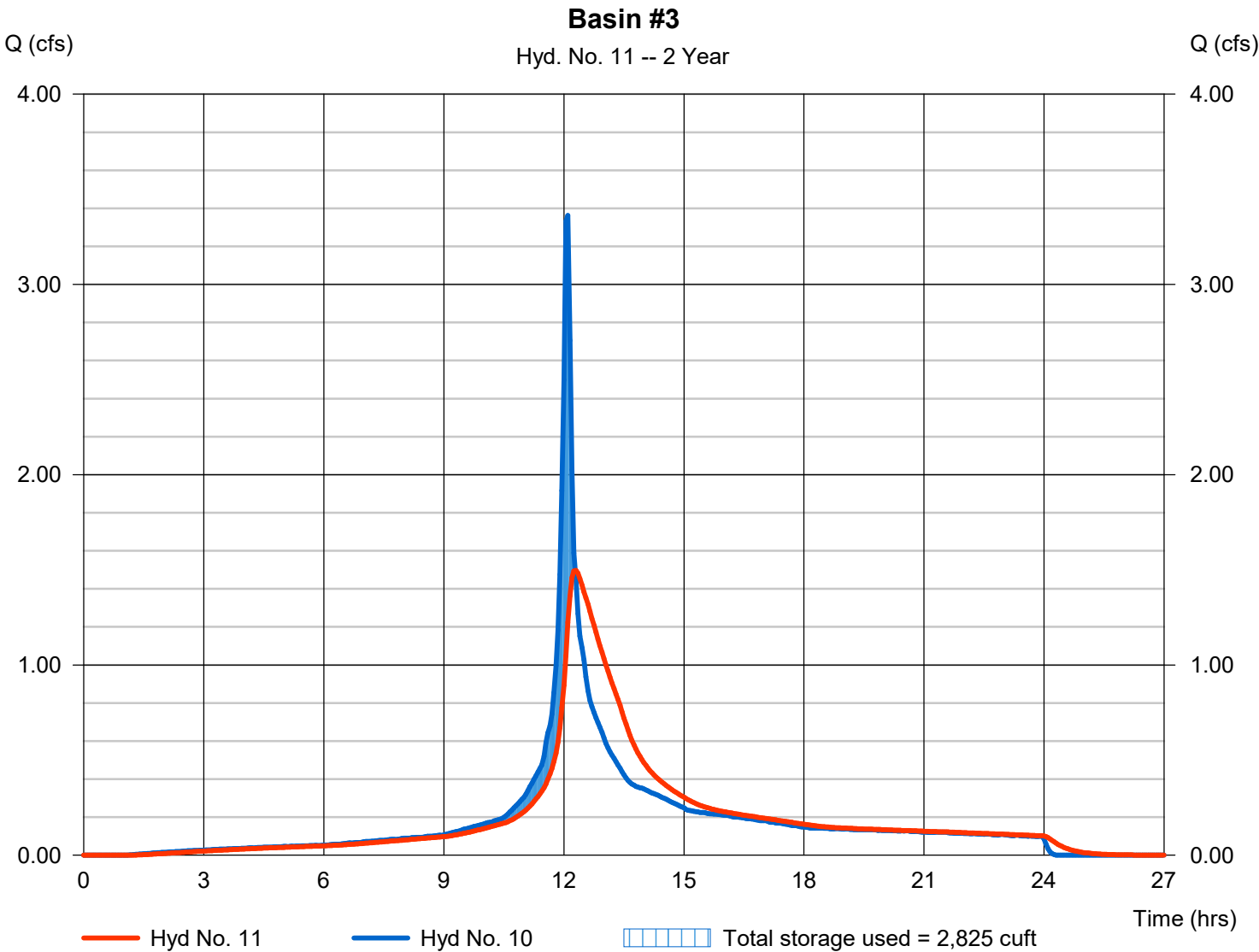
Friday, 01 / 27 / 2023

Hyd. No. 11

Basin #3

Hydrograph type	= Reservoir	Peak discharge	= 1.497 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.30 hrs
Time interval	= 3 min	Hyd. volume	= 17,643 cuft
Inflow hyd. No.	= 10 - DA-4	Max. Elevation	= 417.07 ft
Reservoir name	= Basin #3	Max. Storage	= 2,825 cuft

Storage Indication method used.



Pond No. 2 - Basin #3

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Beginning Elevation = 416.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	416.00	1,200	0	0
5.00	421.00	4,100	13,250	13,250

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 6.00	17.00	0.00	0.00
Span (in)	= 8.00	16.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 416.00	417.30	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)	= 420.00	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	416.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
5.00	13,250	421.00	3.50 ic	15.73 ic	---	---	13.32	---	---	---	---	---	32.55

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

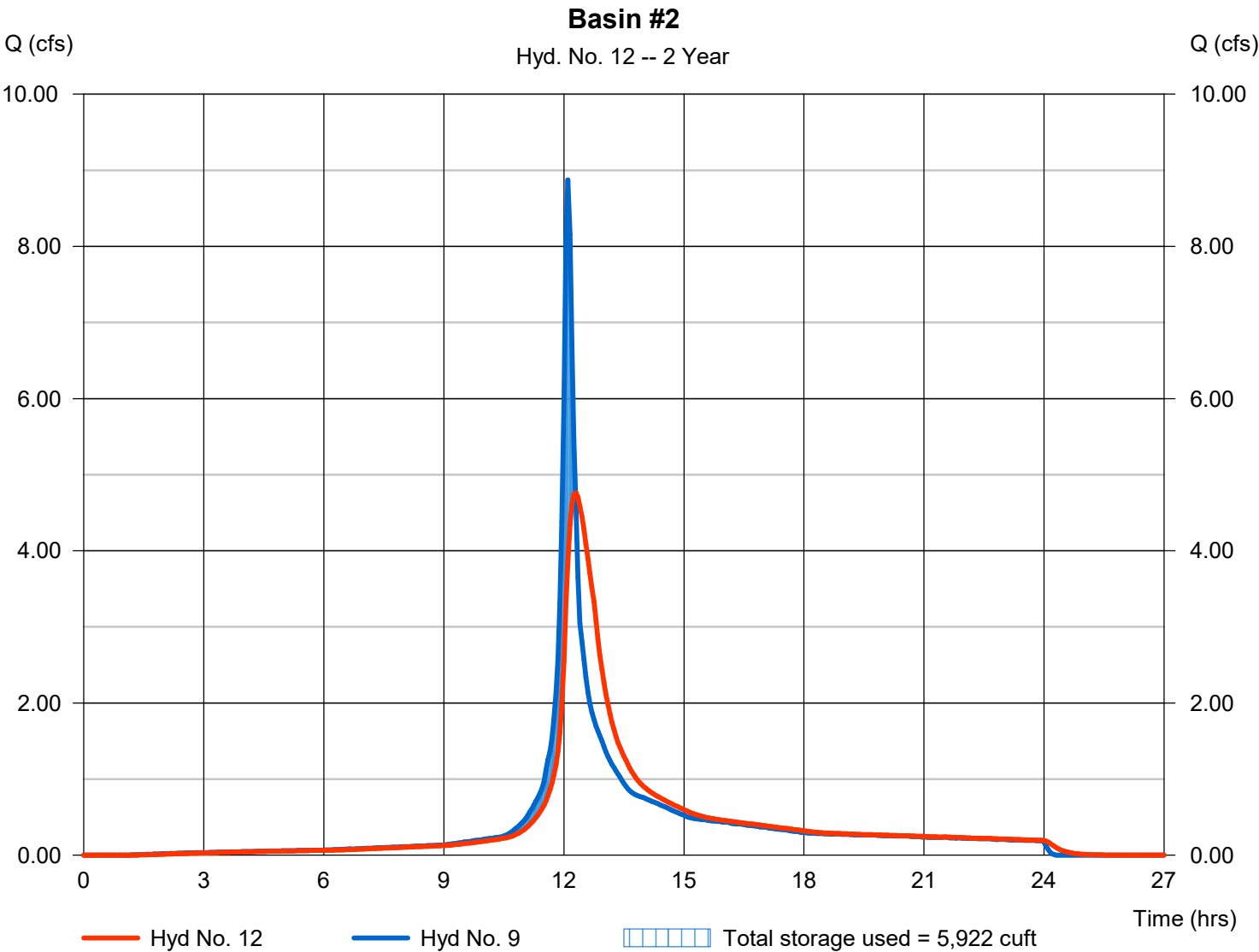
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Hyd. No. 12

Basin #2

Hydrograph type	= Reservoir	Peak discharge	= 4.761 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.30 hrs
Time interval	= 3 min	Hyd. volume	= 37,500 cuft
Inflow hyd. No.	= 9 - DA-3	Max. Elevation	= 415.75 ft
Reservoir name	= Basin #2	Max. Storage	= 5,922 cuft

Storage Indication method used.



Pond No. 1 - Basin #2

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 414.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	414.00	3,360	0	0
5.00	419.00	3,400	16,898	16,898

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 8.00	15.00	0.00	0.00
Span (in)	= 15.00	21.00	0.00	0.00
No. Barrels	= 1	2	0	0
Invert El. (ft)	= 414.00	416.00	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)	= 418.00	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 Contour)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Civ A cfs	Civ B cfs	Civ C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	414.00	0.00	0.00	---	---	0.00	---	---	---	---	---	0.000
5.00	16,898	419.00	8.67 ic	32.46 ic	---	---	13.32	---	---	---	---	---	54.45

Hydrograph Report

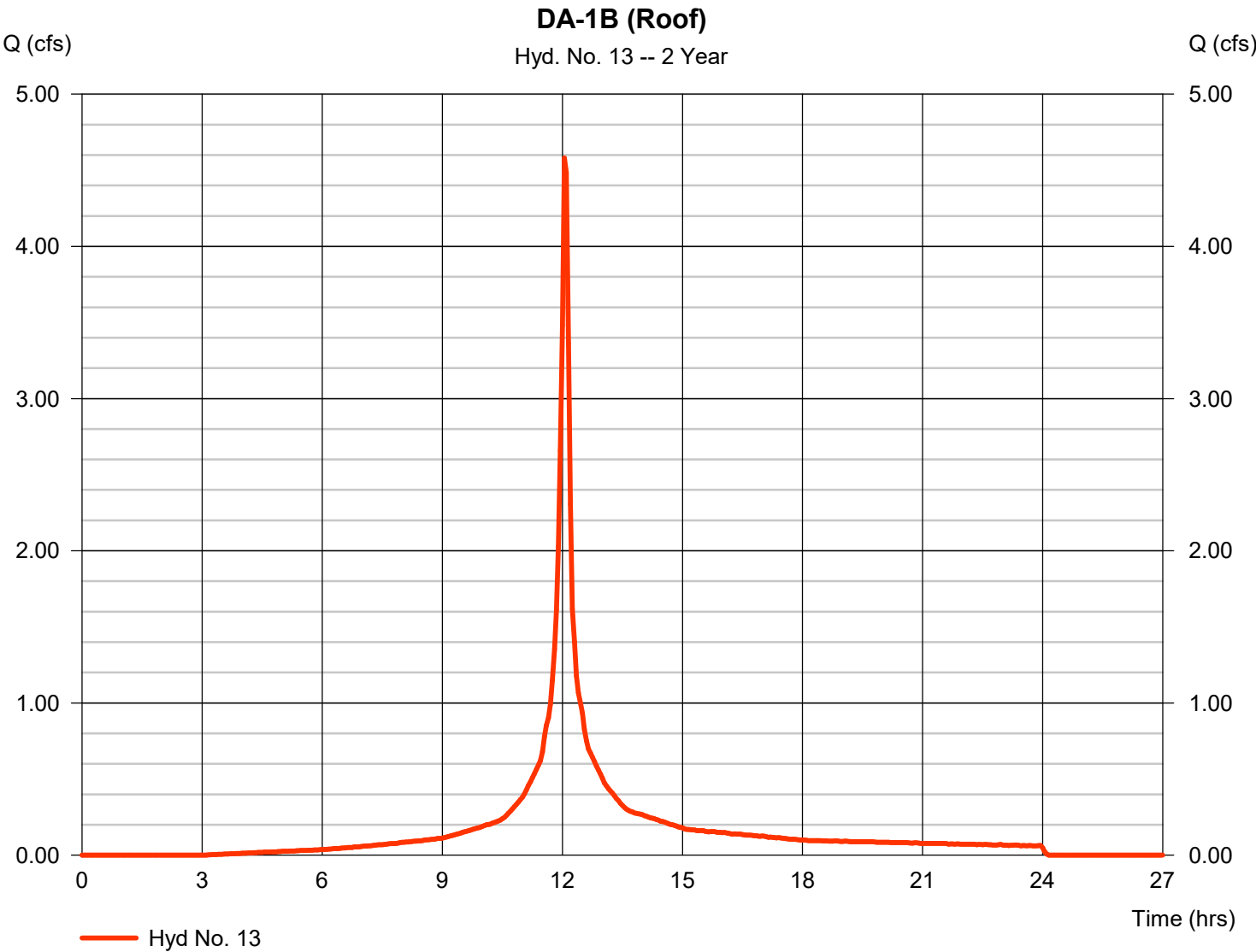
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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Hyd. No. 13

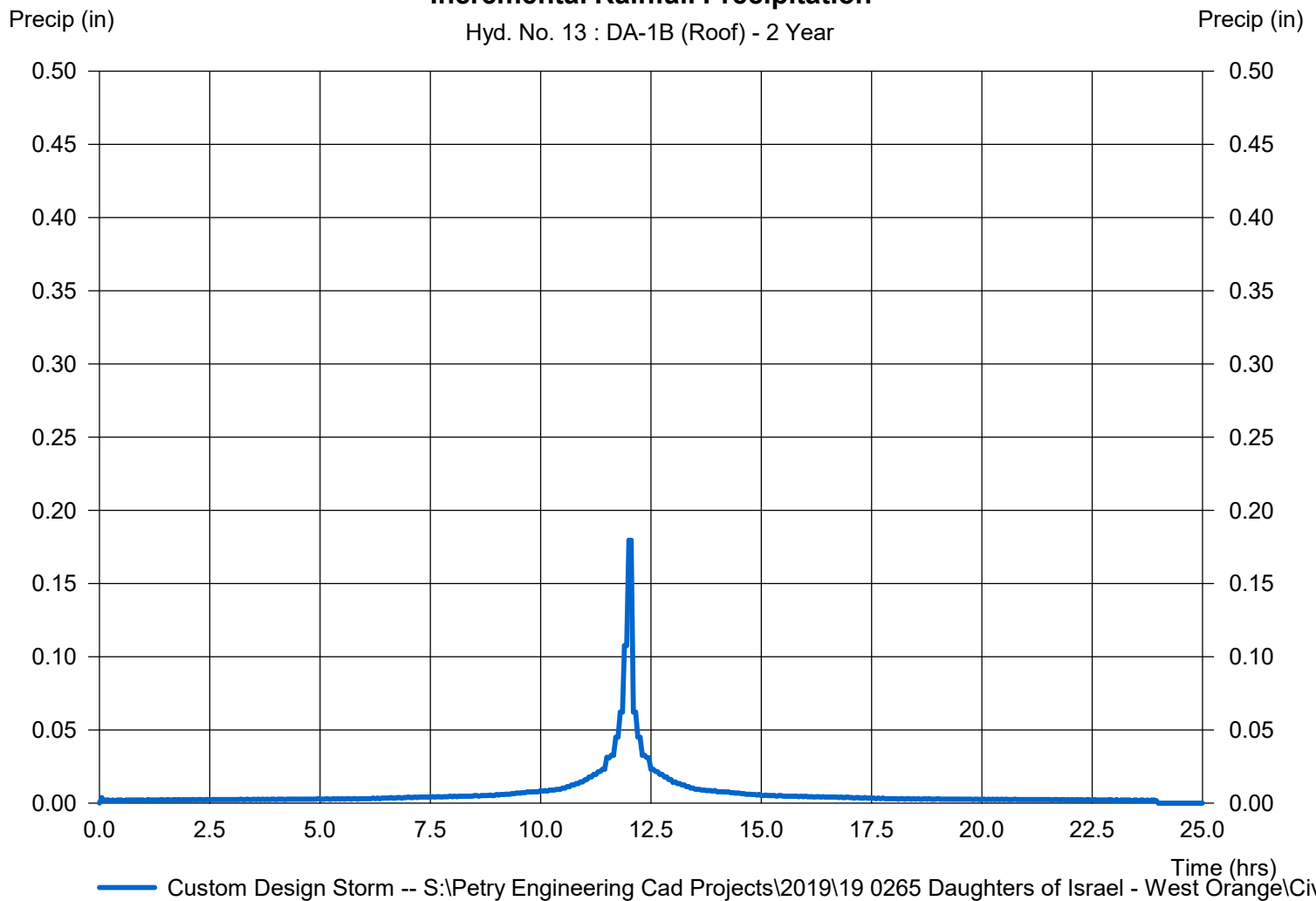
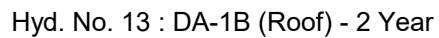
DA-1B (Roof)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.580 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 16,539 cuft
Drainage area	= 1.750 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\13010265 Daughters of Israel - West Orange		



DA-1B (Roof)

Storm Frequency = 2 yrs Time interval = 3 min
Total precip. = 3.4400 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

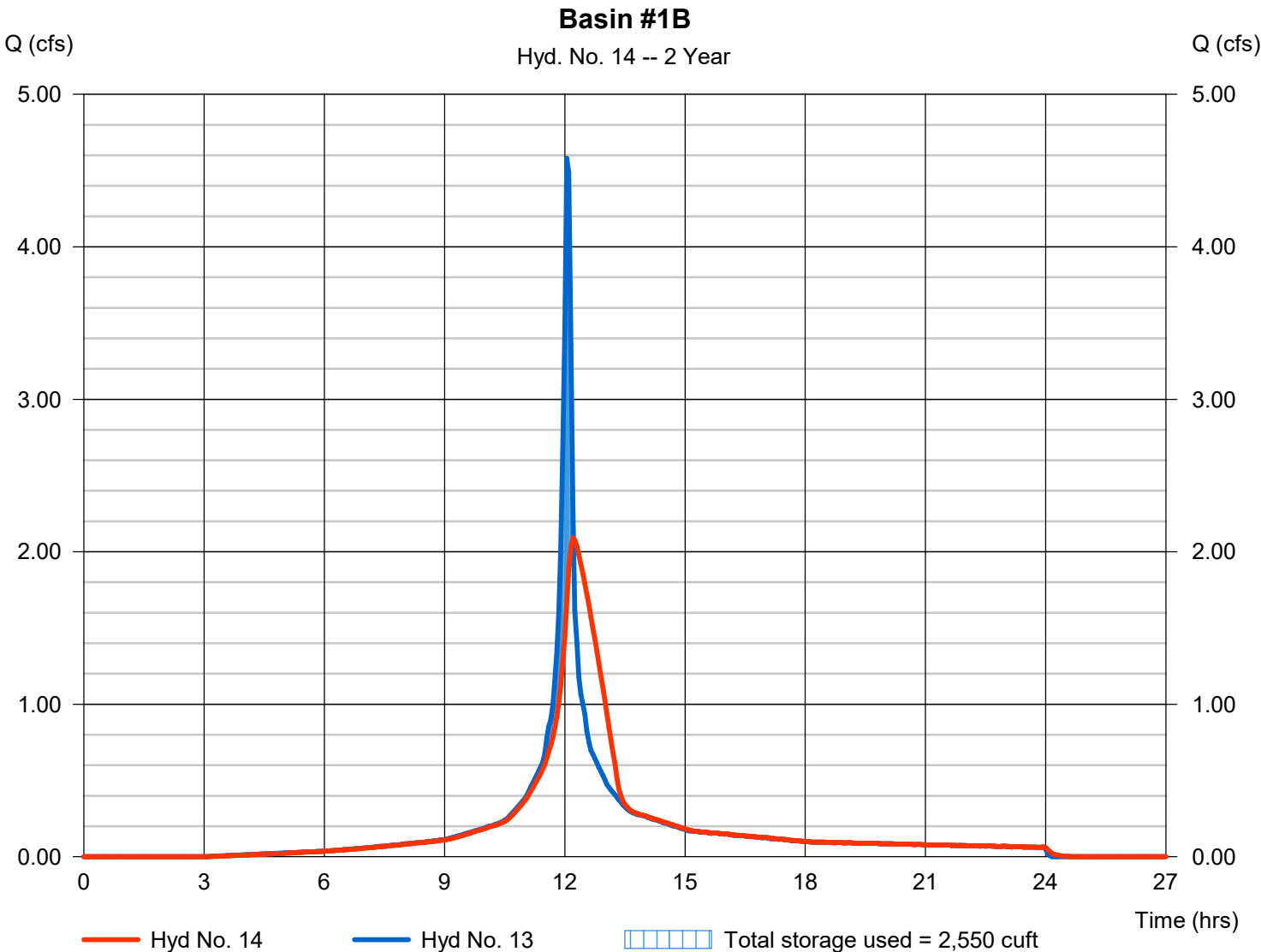
Friday, 01 / 27 / 2023

Hyd. No. 14

Basin #1B

Hydrograph type	= Reservoir	Peak discharge	= 2.090 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 3 min	Hyd. volume	= 16,539 cuft
Inflow hyd. No.	= 13 - DA-1B (Roof)	Max. Elevation	= 407.13 ft
Reservoir name	= Basin #1B	Max. Storage	= 2,550 cuft

Storage Indication method used.



Pond Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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Pond No. 3 - Basin #1B

Pond Data

UG Chambers -Invert elev. = 404.00 ft, Rise x Span = 4.00 x 4.00 ft, Barrel Len = 70.00 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	404.00	n/a	0	0
0.40	404.40	n/a	158	158
0.80	404.80	n/a	275	433
1.20	405.20	n/a	334	768
1.60	405.60	n/a	368	1,136
2.00	406.00	n/a	385	1,521
2.40	406.40	n/a	385	1,906
2.80	406.80	n/a	368	2,274
3.20	407.20	n/a	334	2,609
3.60	407.60	n/a	275	2,884
4.00	408.00	n/a	158	3,042

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 3.00	0.00	0.00	0.00
Span (in)	= 6.00	0.00	0.00	0.00
No. Barrels	= 2	0	0	0
Invert El. (ft)	= 404.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 407.15	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	404.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.40	158	404.40	0.63 ic	---	---	---	0.00	---	---	---	---	---	0.631
0.80	433	404.80	0.99 ic	---	---	---	0.00	---	---	---	---	---	0.989
1.20	768	405.20	1.25 ic	---	---	---	0.00	---	---	---	---	---	1.248
1.60	1,136	405.60	1.46 ic	---	---	---	0.00	---	---	---	---	---	1.462
2.00	1,521	406.00	1.65 ic	---	---	---	0.00	---	---	---	---	---	1.648
2.40	1,906	406.40	1.82 ic	---	---	---	0.00	---	---	---	---	---	1.816
2.80	2,274	406.80	1.97 ic	---	---	---	0.00	---	---	---	---	---	1.969
3.20	2,609	407.20	2.11 ic	---	---	---	0.15	---	---	---	---	---	2.260
3.60	2,884	407.60	2.24 ic	---	---	---	4.02	---	---	---	---	---	6.265
4.00	3,042	408.00	2.37 ic	---	---	---	10.44	---	---	---	---	---	12.81

Hydrograph Report

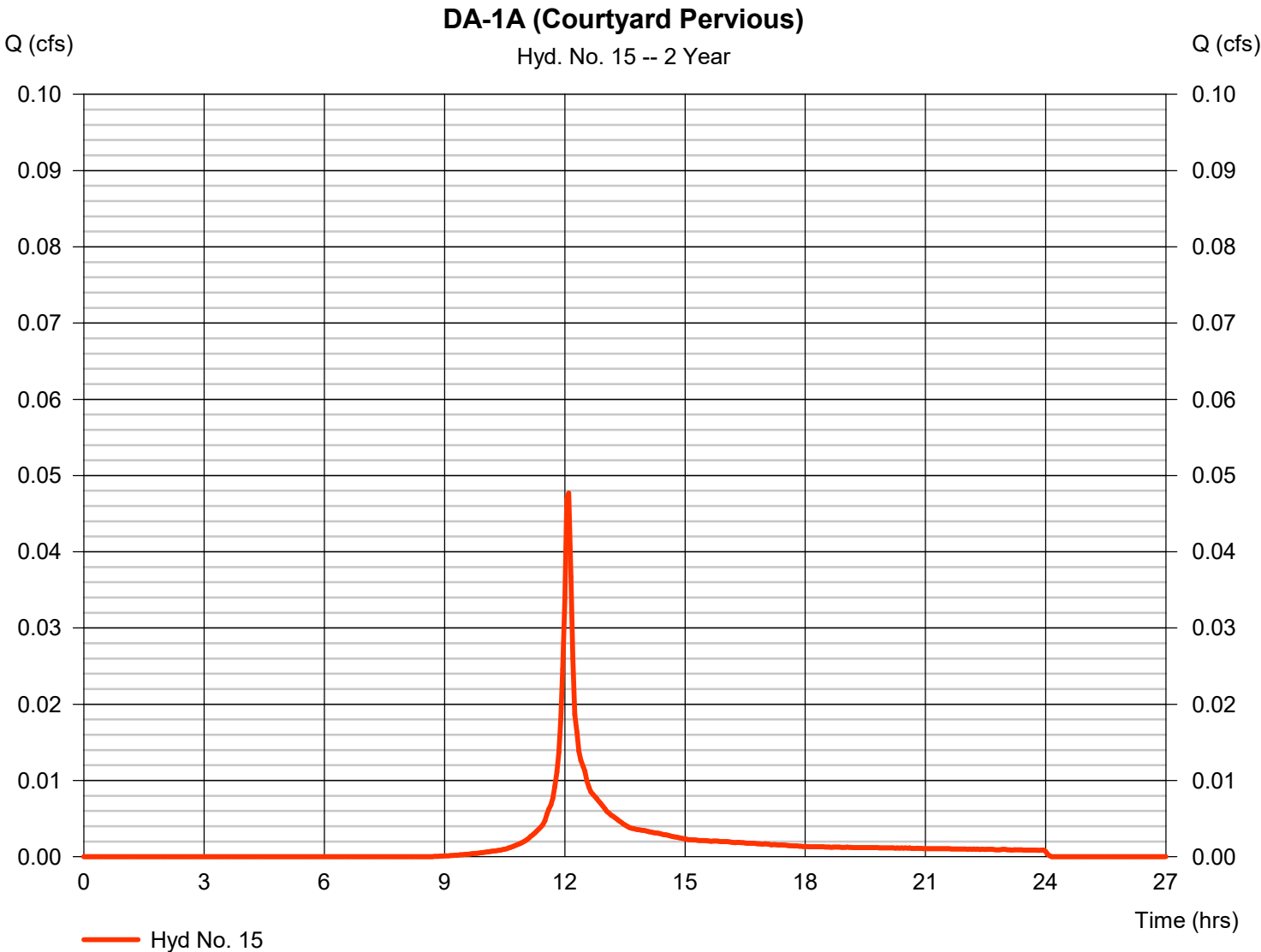
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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Hyd. No. 15

DA-1A (Courtyard Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.048 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
Time interval	=	3 min	Hyd. volume	=	162 cuft
Drainage area	=	0.030 ac	Curve number	=	80
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	7.50 min
Total precip.	=	3.44 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\12012019\0265 Daughters of Israel - West Orange NJ\12012019\0265 Daughters of Israel - West Orange NJ.dwg			



= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

— Custom Design Storm -- S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Cu

Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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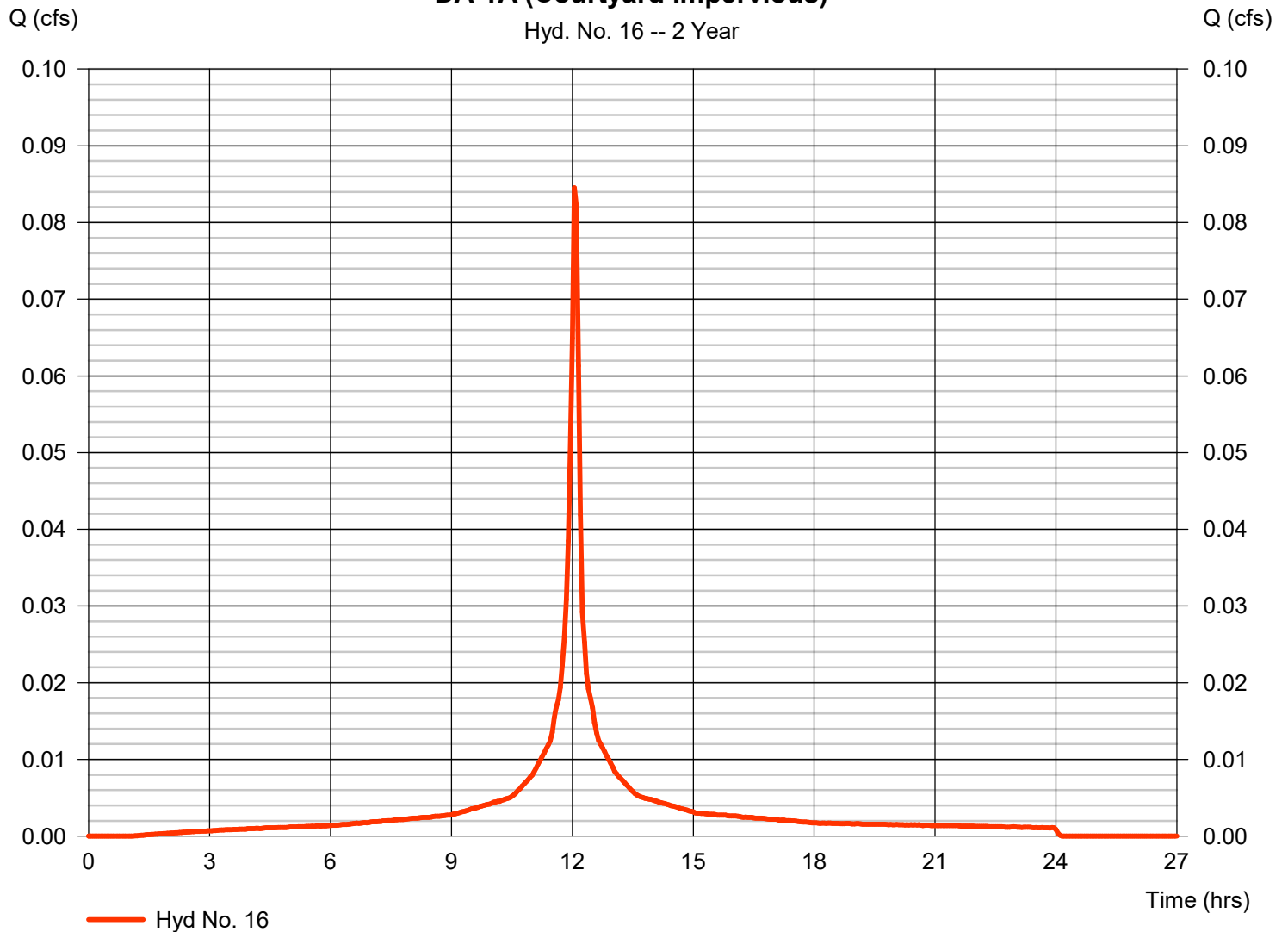
Hyd. No. 16

DA-1A (Courtyard Impervious)

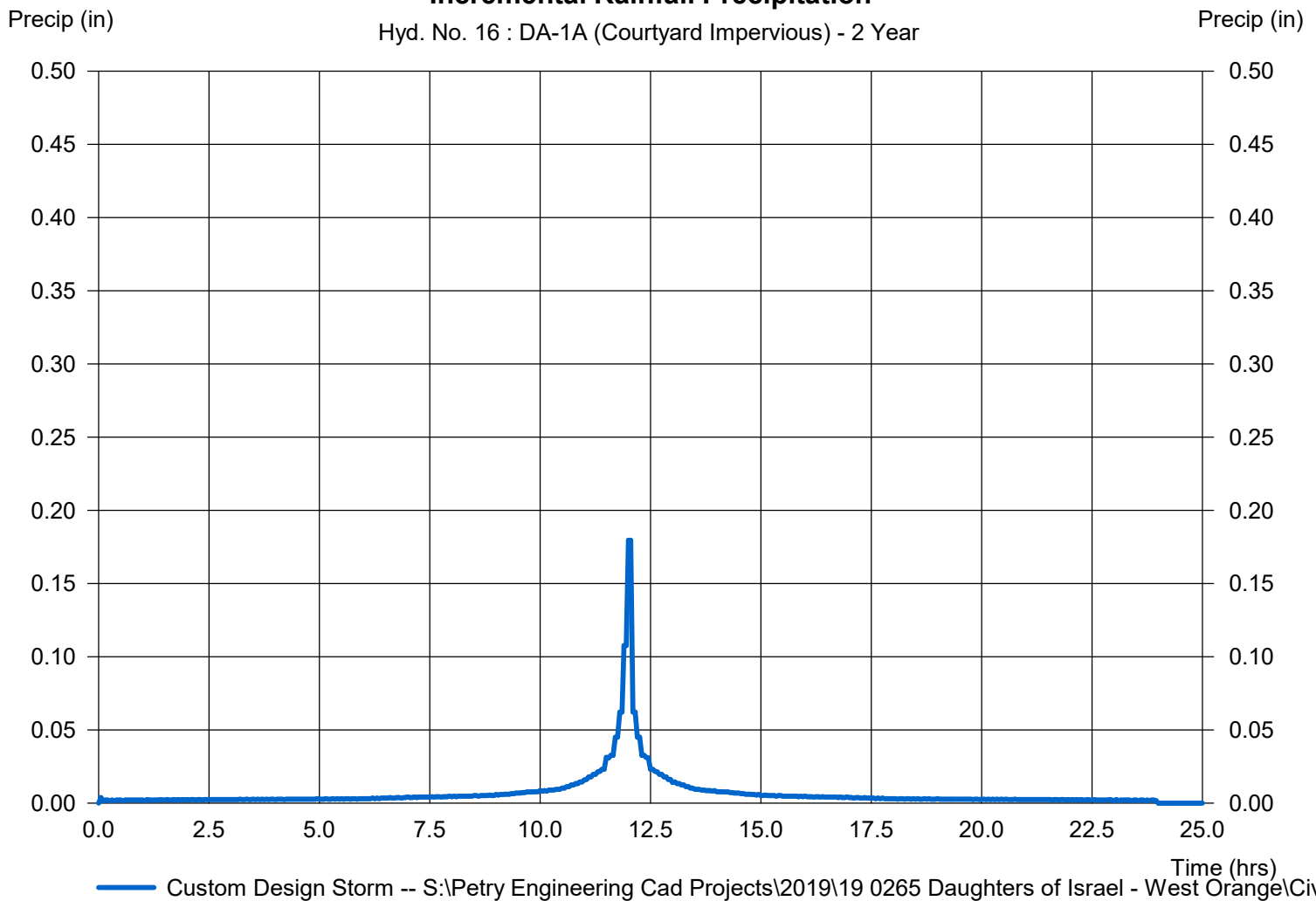
Hydrograph type	= SCS Runoff	Peak discharge	= 0.085 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 327 cuft
Drainage area	= 0.030 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.50 min
Total precip.	= 3.44 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\19-01-0265 Daughters of Israel - West Orange		

DA-1A (Courtyard Impervious)

Hyd. No. 16 -- 2 Year



= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

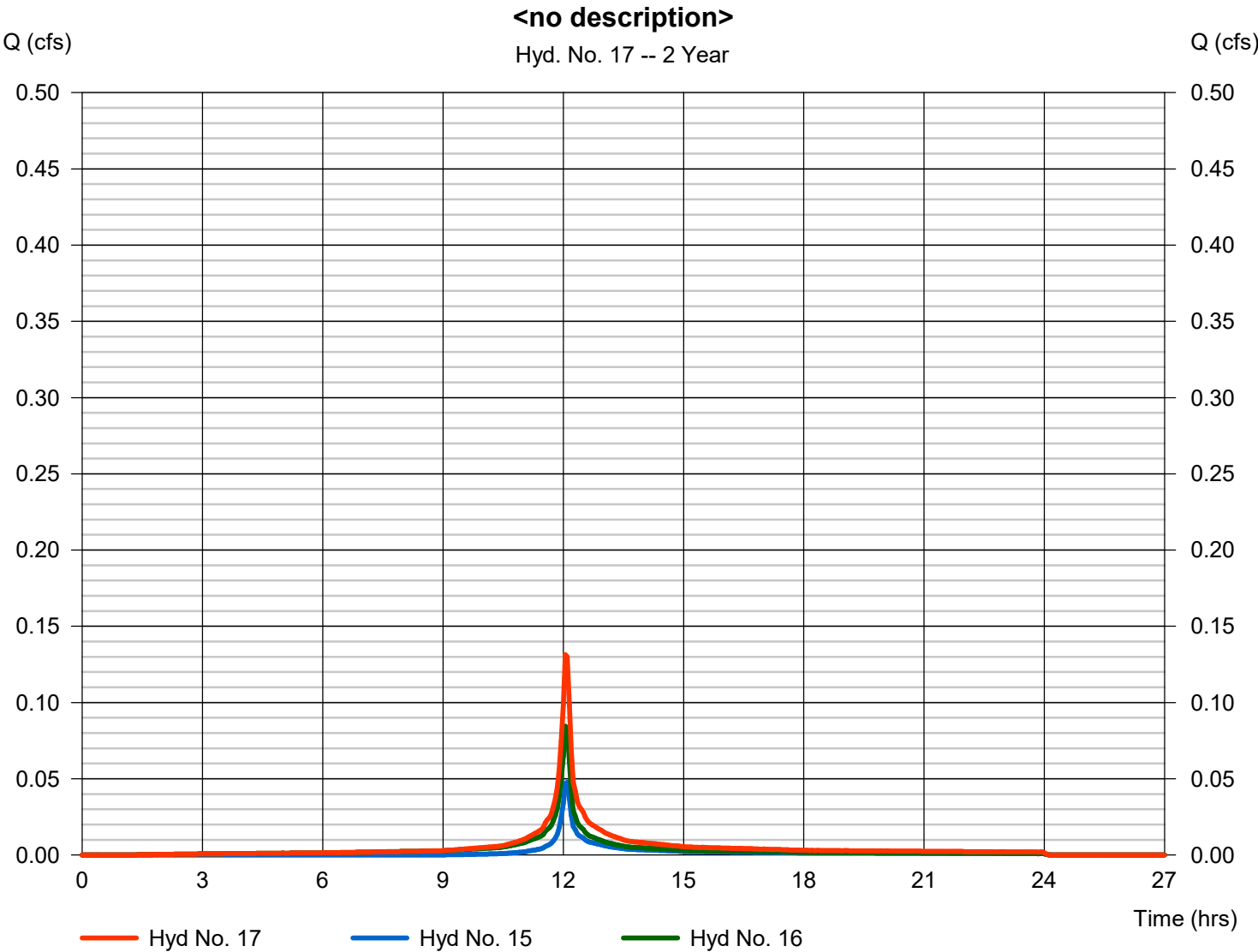
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 17

<no description>

Hydrograph type	= Combine	Peak discharge	= 0.131 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 490 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.060 ac



Hydrograph Report

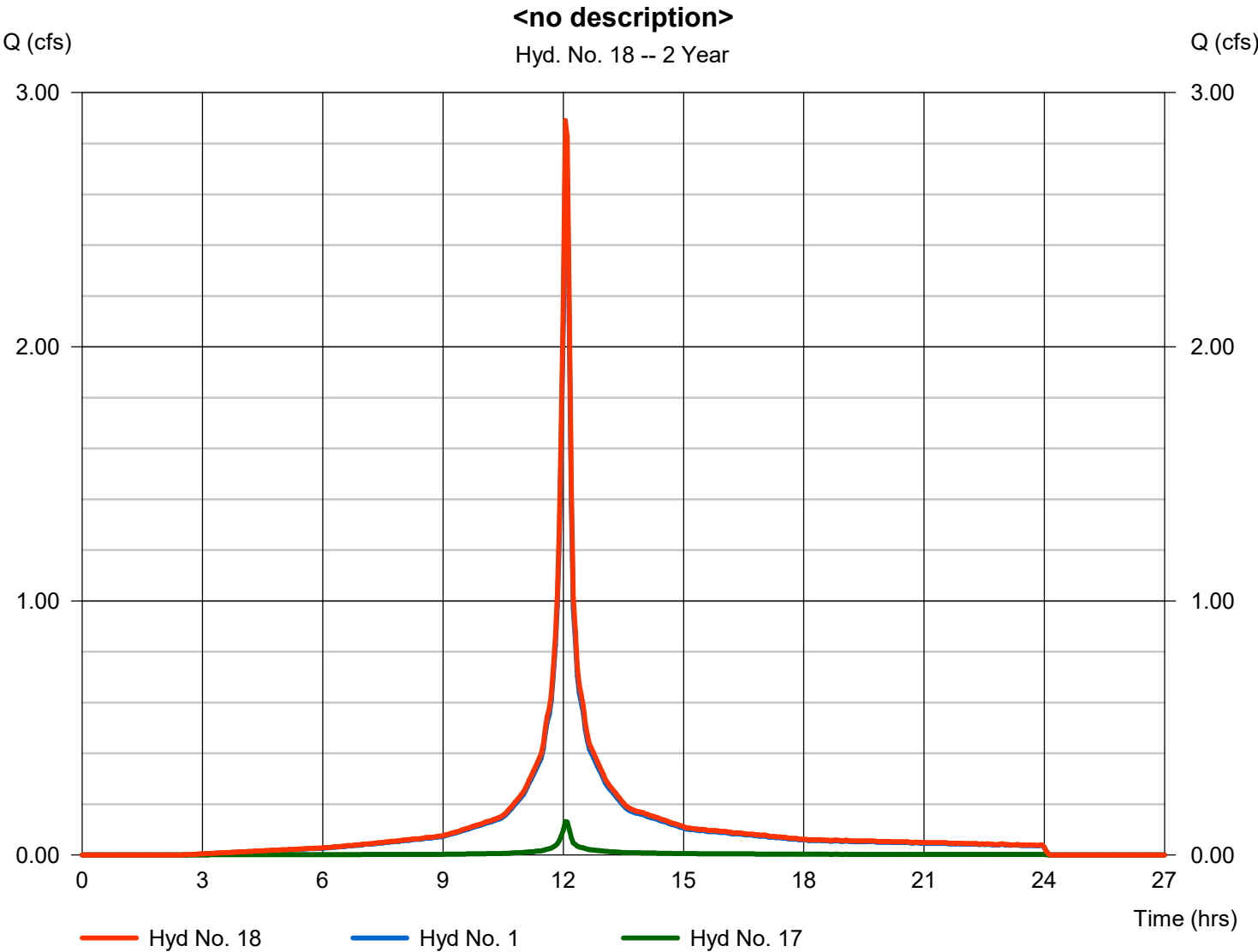
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 18

<no description>

Hydrograph type	= Combine	Peak discharge	= 2.890 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 10,585 cuft
Inflow hyds.	= 1, 17	Contrib. drain. area	= 1.030 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

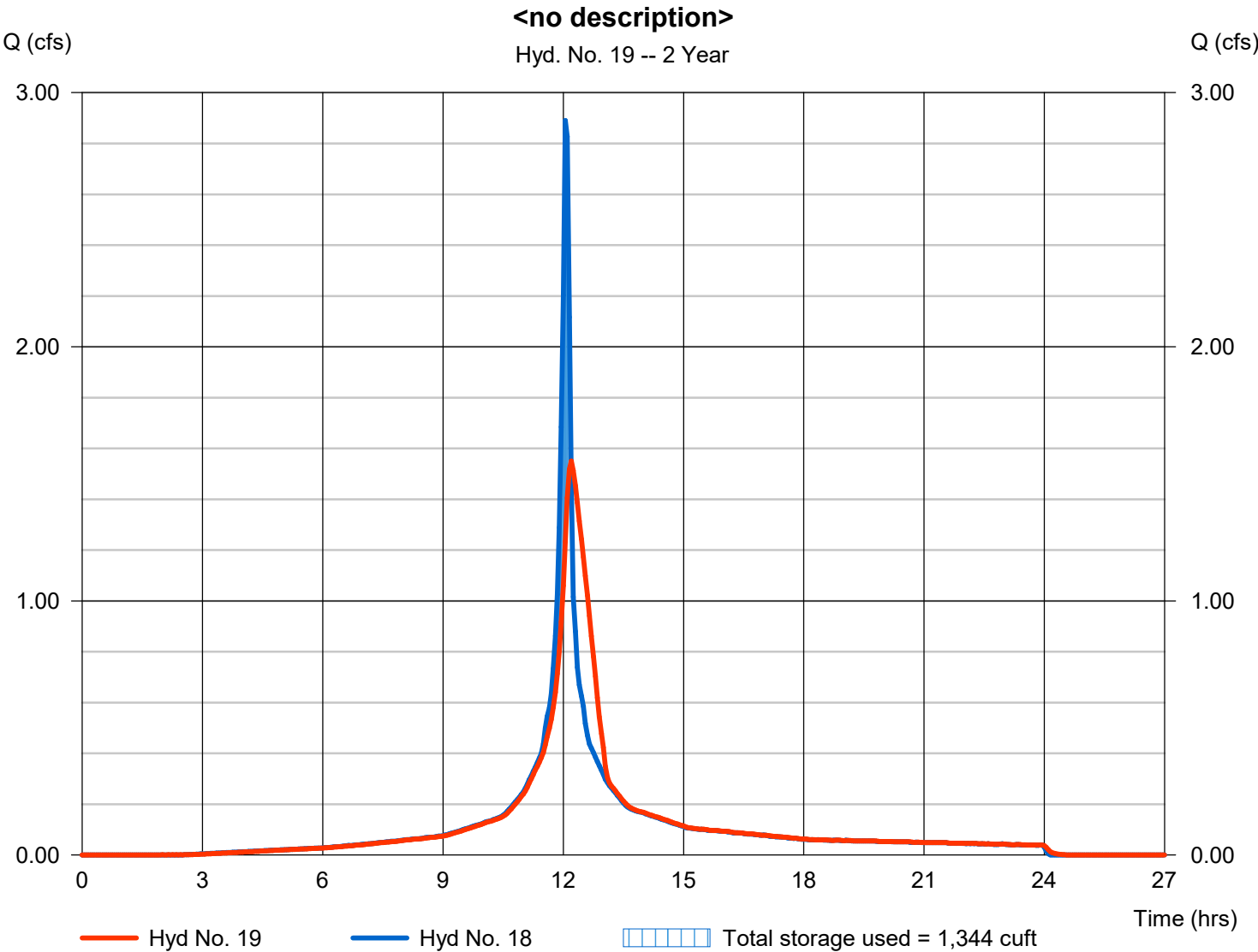
Friday, 01 / 27 / 2023

Hyd. No. 19

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 1.551 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 3 min	Hyd. volume	= 10,585 cuft
Inflow hyd. No.	= 18 - <no description>	Max. Elevation	= 421.35 ft
Reservoir name	= Basin #1A	Max. Storage	= 1,344 cuft

Storage Indication method used.



Pond Report

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Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

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Pond No. 4 - Basin #1A

Pond Data

UG Chambers -Invert elev. = 418.00 ft, Rise x Span = 4.00 x 4.00 ft, Barrel Len = 60.00 ft, No. Barrels = 2, Slope = 0.00%, Headers = No

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	418.00	n/a	0	0
0.40	418.40	n/a	78	78
0.80	418.80	n/a	136	215
1.20	419.20	n/a	166	381
1.60	419.60	n/a	183	563
2.00	420.00	n/a	191	754
2.40	420.40	n/a	191	945
2.80	420.80	n/a	183	1,128
3.20	421.20	n/a	166	1,294
3.60	421.60	n/a	136	1,430
4.00	422.00	n/a	78	1,508

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.00	0.00	0.00	0.00
Span (in)	= 6.50	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 418.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 4.00	0.00	0.00	0.00
Crest El. (ft)	= 421.40	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).

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	418.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
0.40	78	418.40	0.42 ic	---	---	---	0.00	---	---	---	---	---	0.420
0.80	215	418.80	0.69 ic	---	---	---	0.00	---	---	---	---	---	0.692
1.20	381	419.20	0.88 ic	---	---	---	0.00	---	---	---	---	---	0.884
1.60	563	419.60	1.04 ic	---	---	---	0.00	---	---	---	---	---	1.041
2.00	754	420.00	1.18 ic	---	---	---	0.00	---	---	---	---	---	1.177
2.40	945	420.40	1.30 ic	---	---	---	0.00	---	---	---	---	---	1.299
2.80	1,128	420.80	1.41 ic	---	---	---	0.00	---	---	---	---	---	1.411
3.20	1,294	421.20	1.51 ic	---	---	---	0.00	---	---	---	---	---	1.514
3.60	1,430	421.60	1.61 ic	---	---	---	1.19	---	---	---	---	---	2.802
4.00	1,508	422.00	1.70 ic	---	---	---	6.19	---	---	---	---	---	7.893

Hydrograph Report

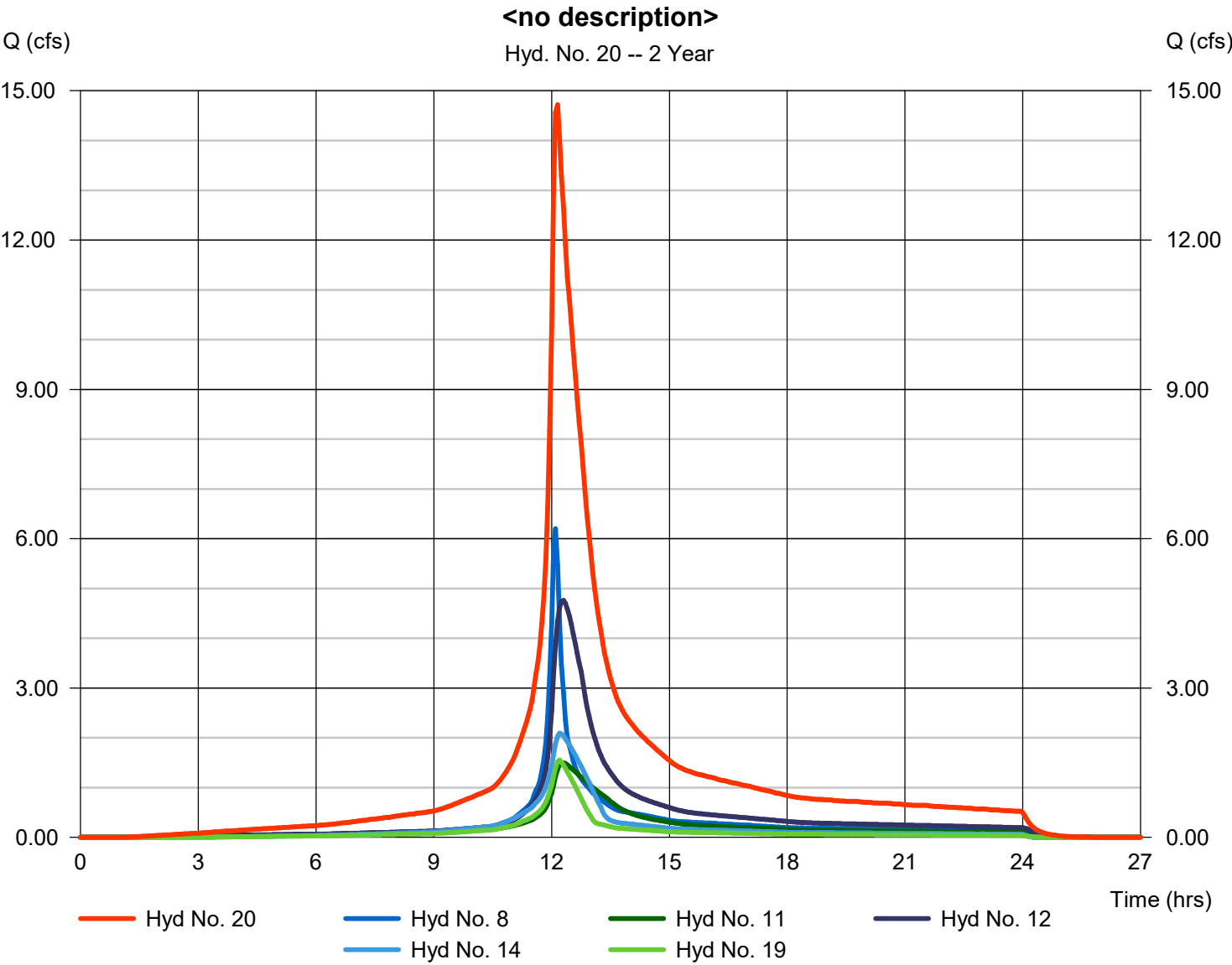
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 20

<no description>

Hydrograph type	= Combine	Peak discharge	= 14.72 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 108,294 cuft
Inflow hyds.	= 8, 11, 12, 14, 19	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

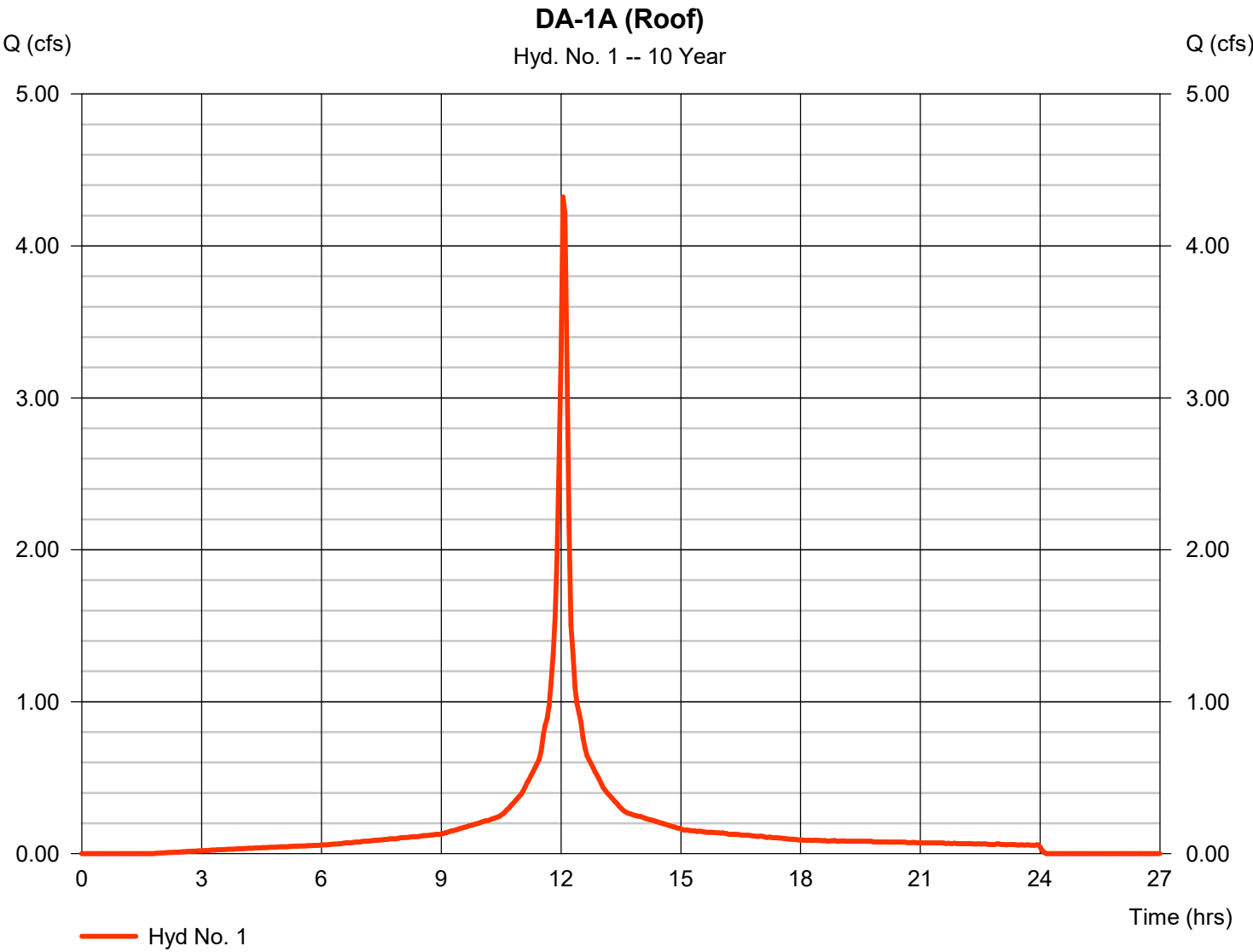
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.321	3	723	16,256	-----	-----	-----	DA-1A (Roof)
2	SCS Runoff	6.540	3	729	26,367	-----	-----	-----	DA-2 (Pervious)
3	SCS Runoff	5.594	3	723	22,044	-----	-----	-----	DA-2 (Impervious)
4	SCS Runoff	11.79	3	729	47,462	-----	-----	-----	DA-3 (Pervious)
5	SCS Runoff	6.239	3	723	24,588	-----	-----	-----	DA-3 (Impervious)
6	SCS Runoff	3.696	3	729	17,827	-----	-----	-----	DA-4 (Pervious)
7	SCS Runoff	4.948	3	723	19,501	-----	-----	-----	DA-4 (Impervious)
8	Combine	11.76	3	726	48,412	2, 3,	-----	-----	DA-2
9	Combine	17.48	3	726	72,050	4, 5,	-----	-----	DA-3
10	Combine	8.123	3	726	37,327	6, 7,	-----	-----	DA-4
11	Reservoir	5.430	3	732	37,326	10	418.09	5,539	Basin #3
12	Reservoir	14.78	3	732	72,049	9	416.78	9,392	Basin #2
13	SCS Runoff	7.253	3	723	26,949	-----	-----	-----	DA-1B (Roof)
14	Reservoir	8.143	3	726	26,949	13	407.73	2,934	Basin #1B
15	SCS Runoff	0.092	3	723	315	-----	-----	-----	DA-1A (Courtyard Pervious)
16	SCS Runoff	0.129	3	723	509	-----	-----	-----	DA-1A (Courtyard Impervious)
17	Combine	0.221	3	723	824	15, 16	-----	-----	<no description>
18	Combine	4.542	3	723	17,079	1, 17	-----	-----	<no description>
19	Reservoir	5.092	3	726	17,079	18	421.80	1,470	<no description>
20	Combine	39.24	3	726	201,813	8, 11, 12, 14, 19	-----	-----	<no description>
Proposed Conditions - Green Roof.gpw					Return Period: 10 Year			Friday, 01 / 27 / 2023	

Hydrograph Report

Hyd. No. 1

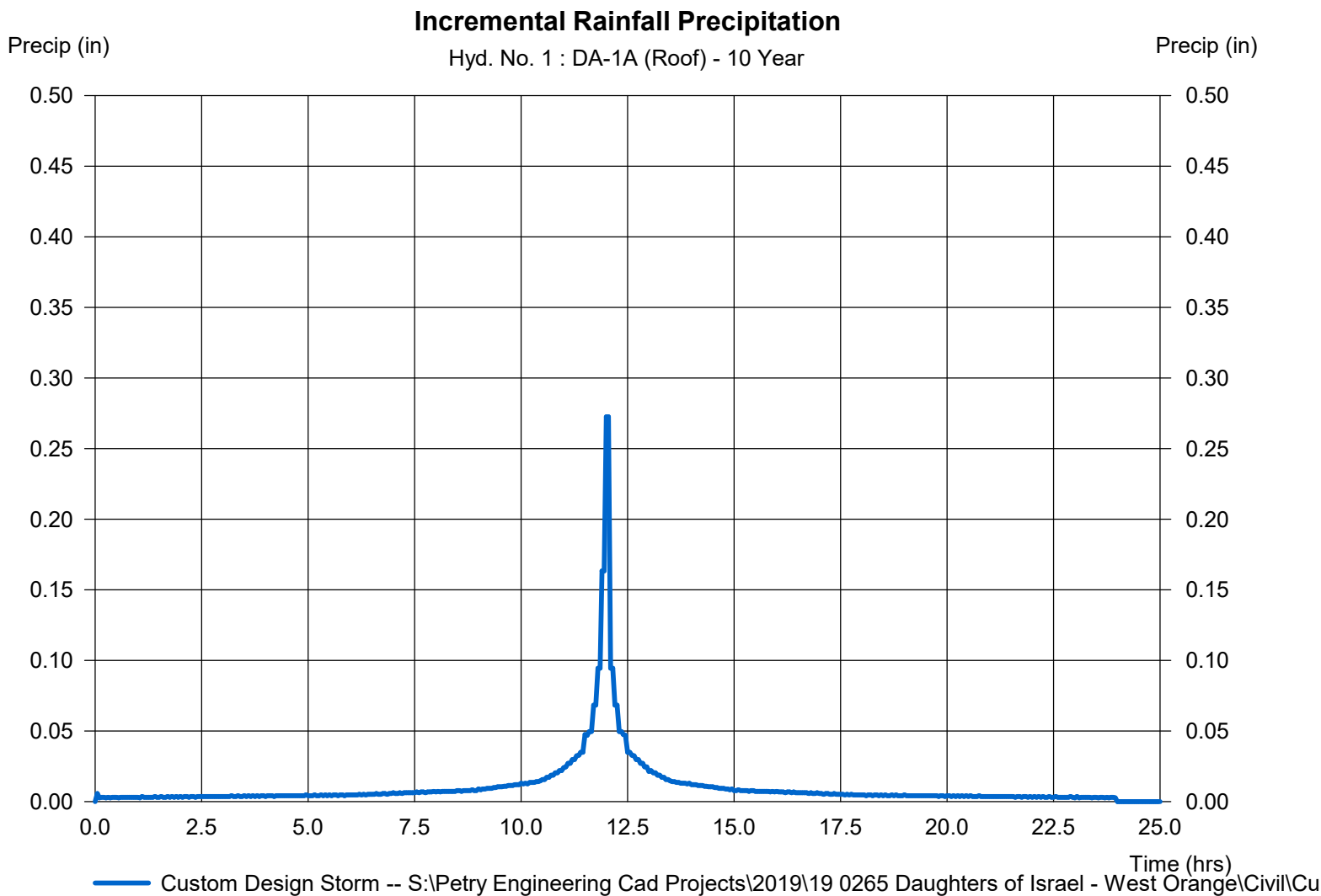
DA-1A (Roof)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.321 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 16,256 cuft
Drainage area	= 1.030 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\10-0265 Daughters of Israel - West Orange, NJ\10-0265 Daughters of Israel - West Orange, NJ.dwg		



DA-1A (Roof)

Storm Frequency = 10 yrs Time interval = 3 min
Total precip. = 5.2200 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

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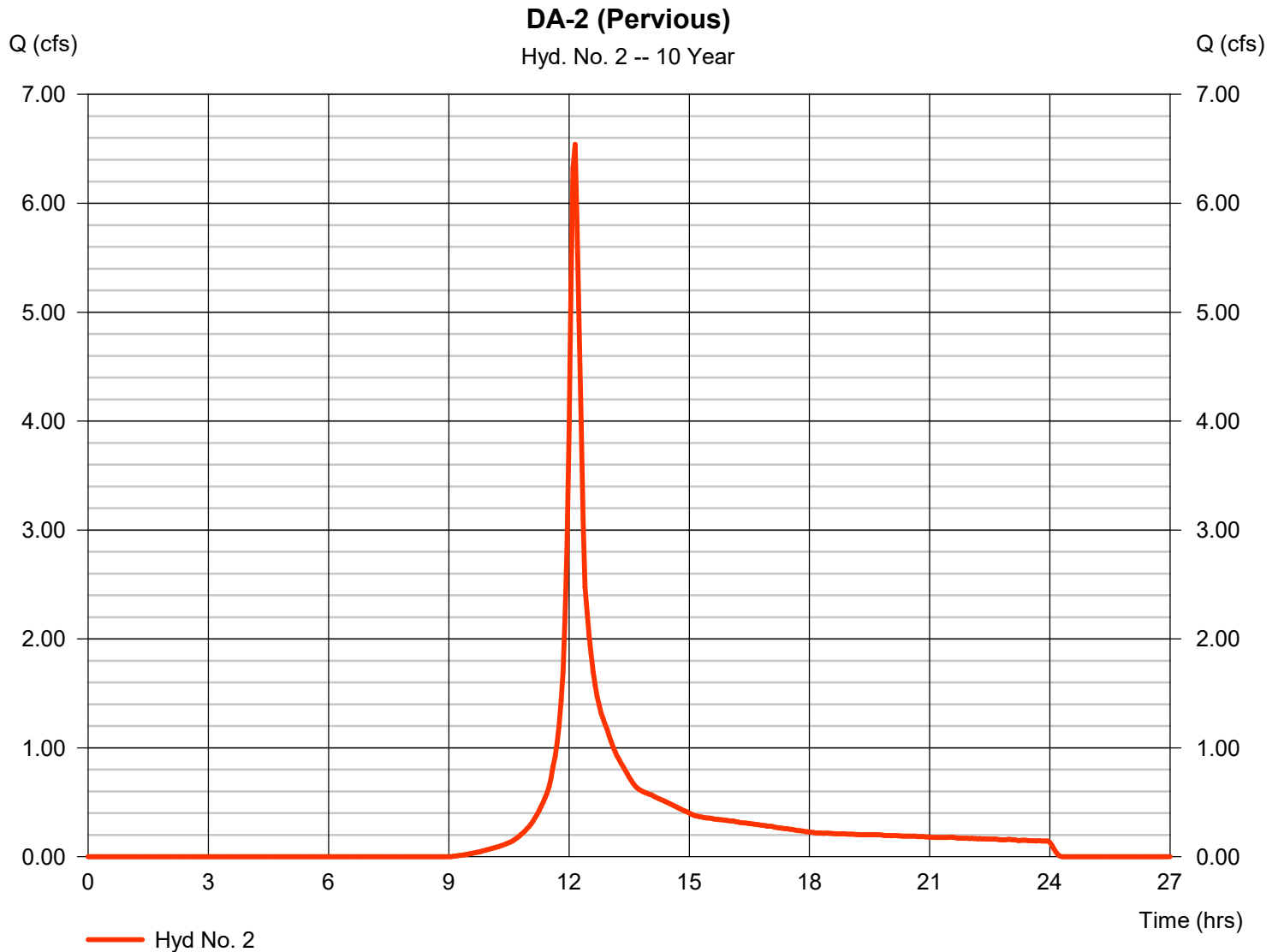
Friday, 01 / 27 / 2023

Hyd. No. 2

DA-2 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.540 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 26,367 cuft
Drainage area	= 3.180 ac	Curve number	= 71*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.10 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = $[(0.510 \times 30) + (0.110 \times 77) + (0.160 \times 70) + (2.400 \times 80)] / 3.180$



Hydrograph Report

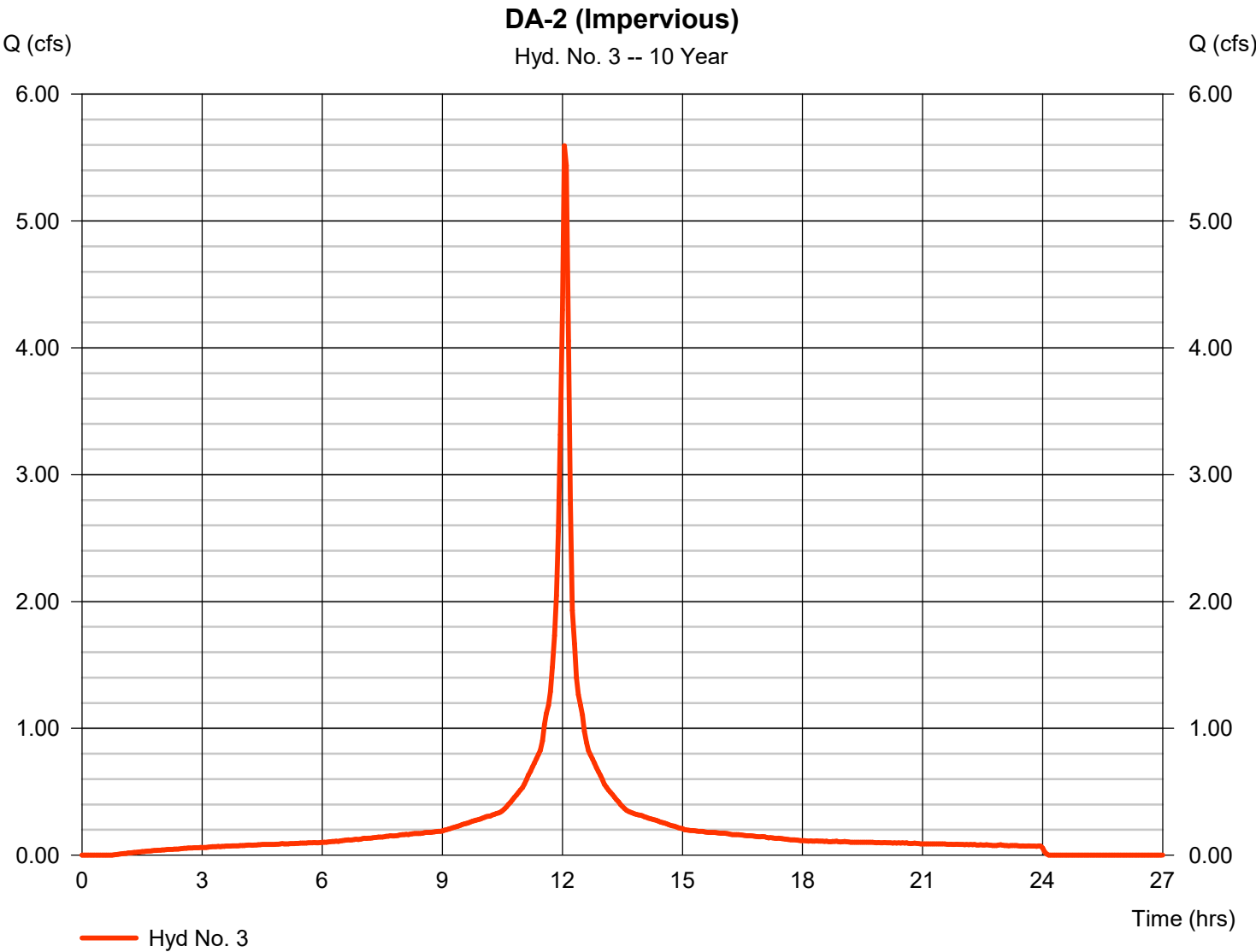
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Friday, 01 / 27 / 2023

Hyd. No. 3

DA-2 (Impervious)

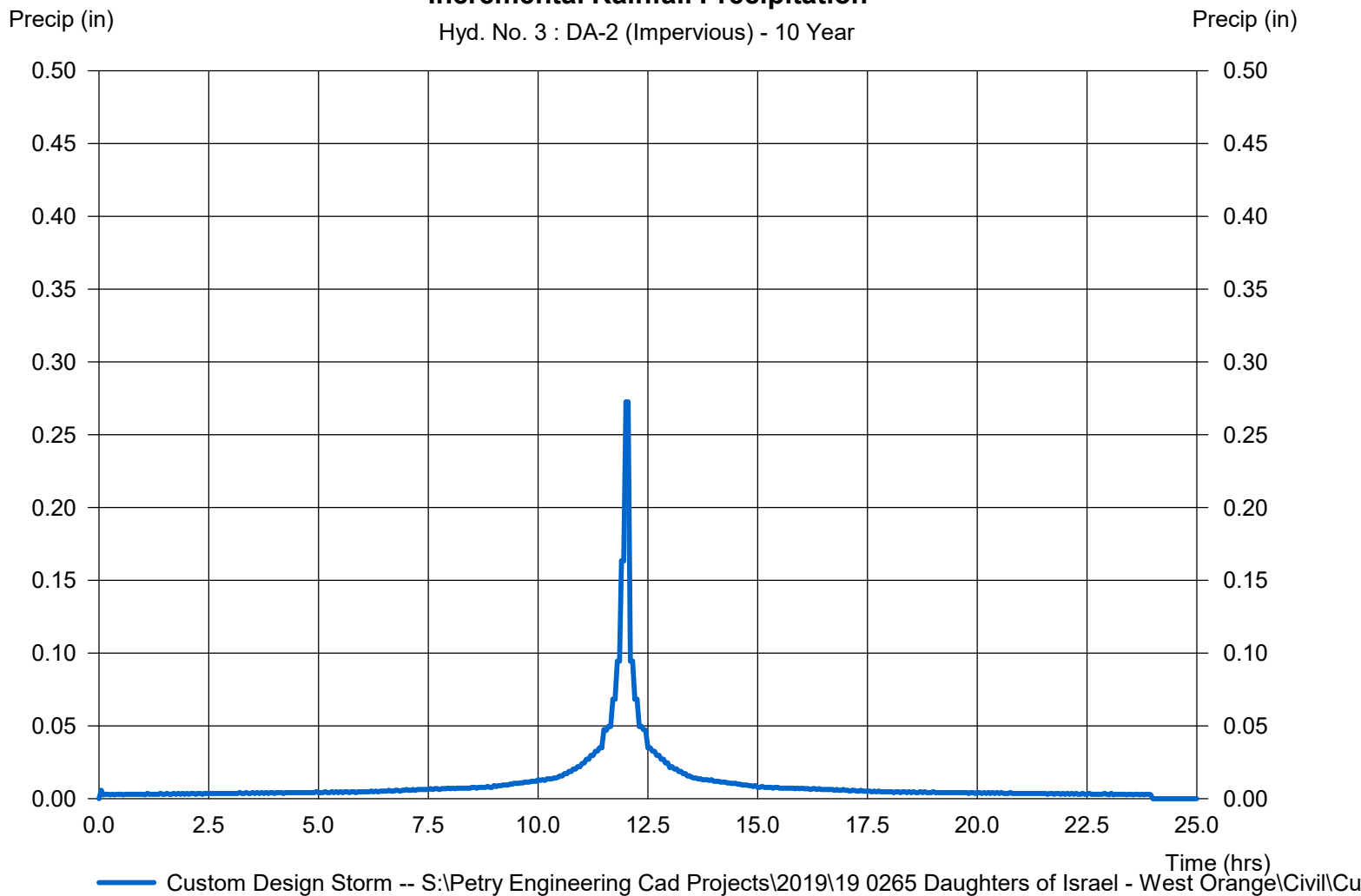
Hydrograph type	=	SCS Runoff	Peak discharge	=	5.594 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	22,044 cuft
Drainage area	=	1.300 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.22 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\191019 0265 Daughters of Israel - West Orange			



DA-2 (Impervious)

Storm Frequency = 10 yrs Time interval = 3 min
Total precip. = 5.2200 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

Hyd. No. 3 : DA-2 (Impervious) - 10 Year



Hydrograph Report

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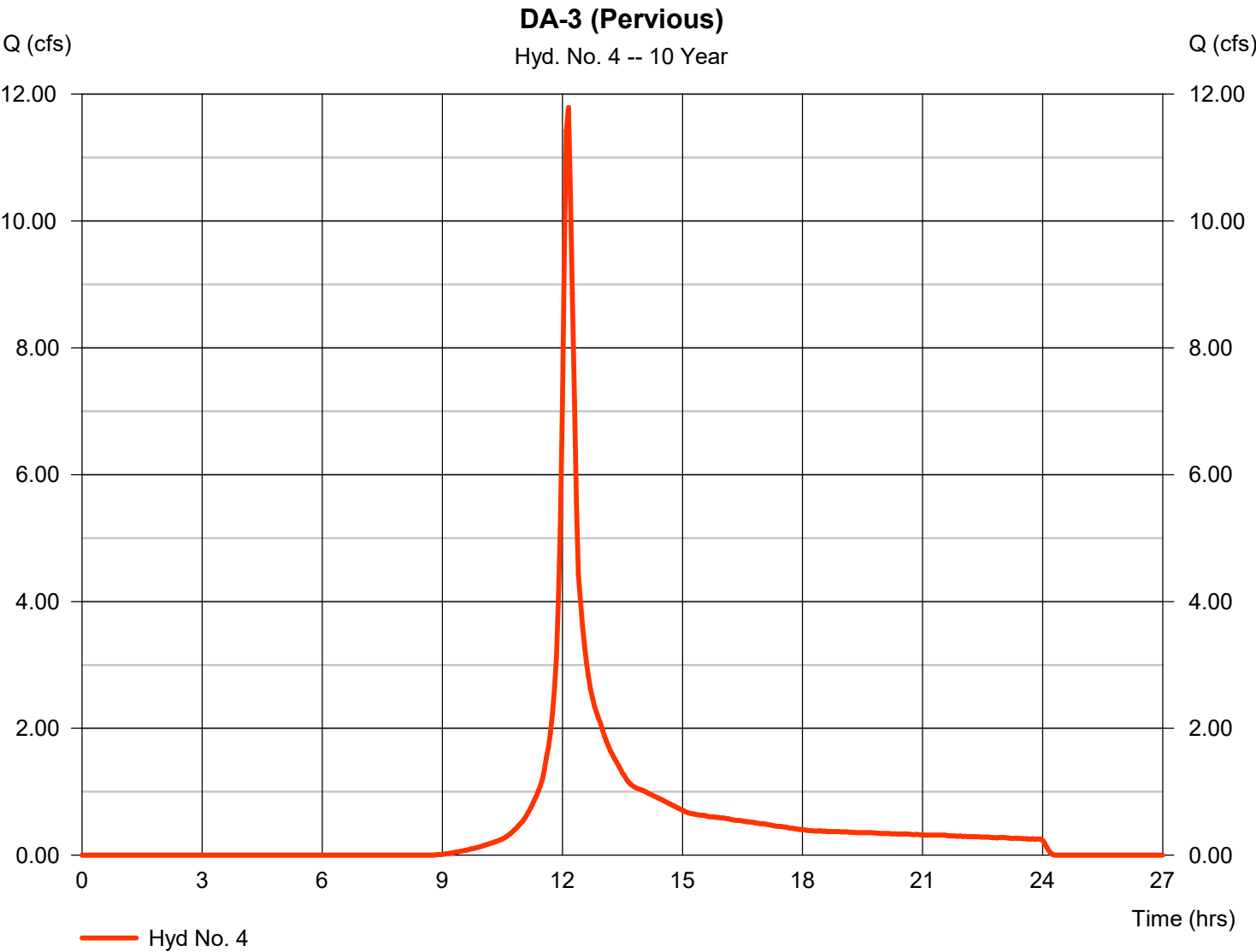
Friday, 01 / 27 / 2023

Hyd. No. 4

DA-3 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 11.79 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 47,462 cuft
Drainage area	= 5.520 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.50 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\191019 0265 Daughters of Israel - West Orange		

* Composite (Area/CN) = [(0.010 x 30) + (4.210 x 70) + (0.340 x 77) + (0.400 x 74) + (0.560 x 80)] / 5.520

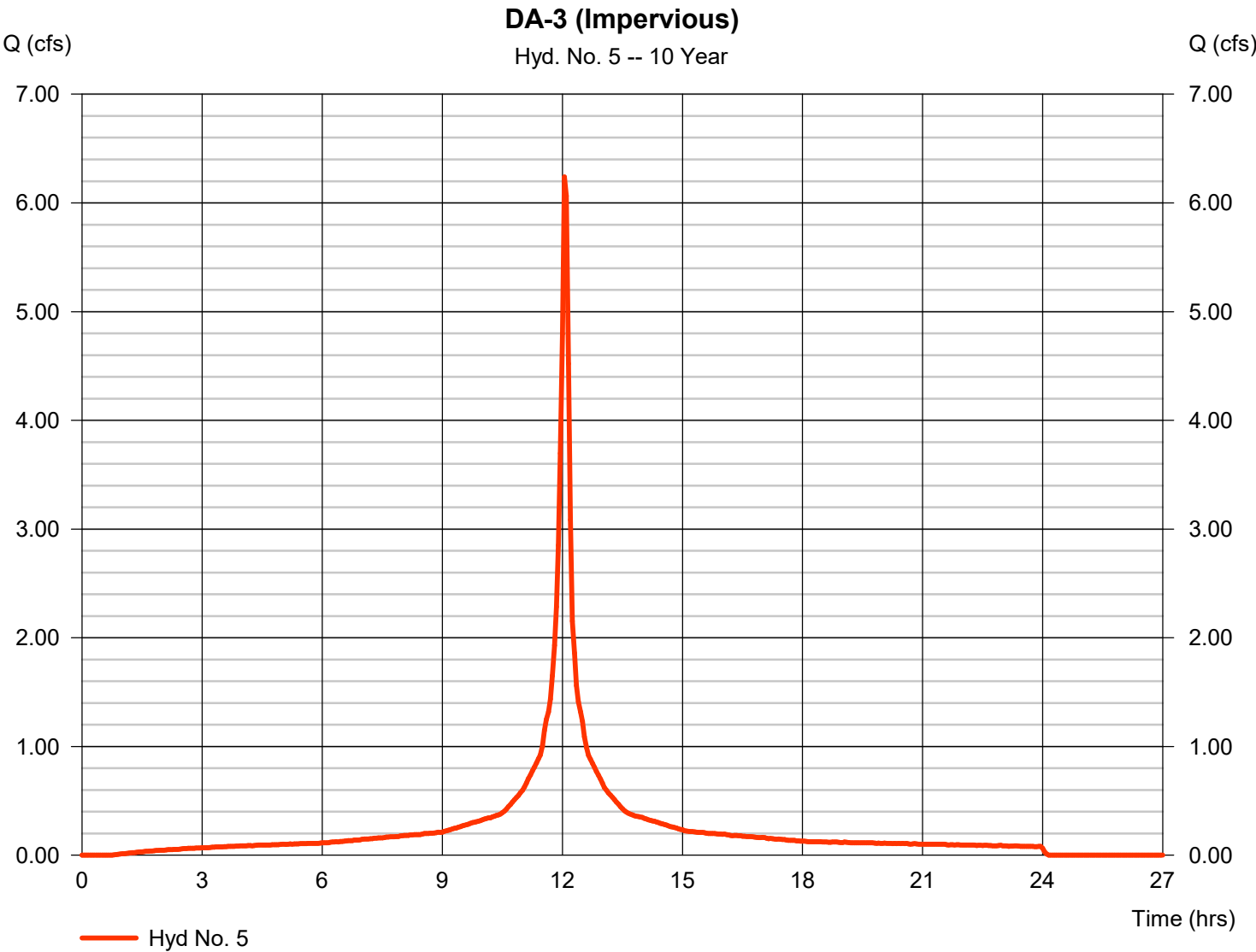


Hydrograph Report

Hyd. No. 5

DA-3 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 6.239 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 24,588 cuft
Drainage area	= 1.450 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\0265 Daughters of Israel - West Orange		



Precipitation Report

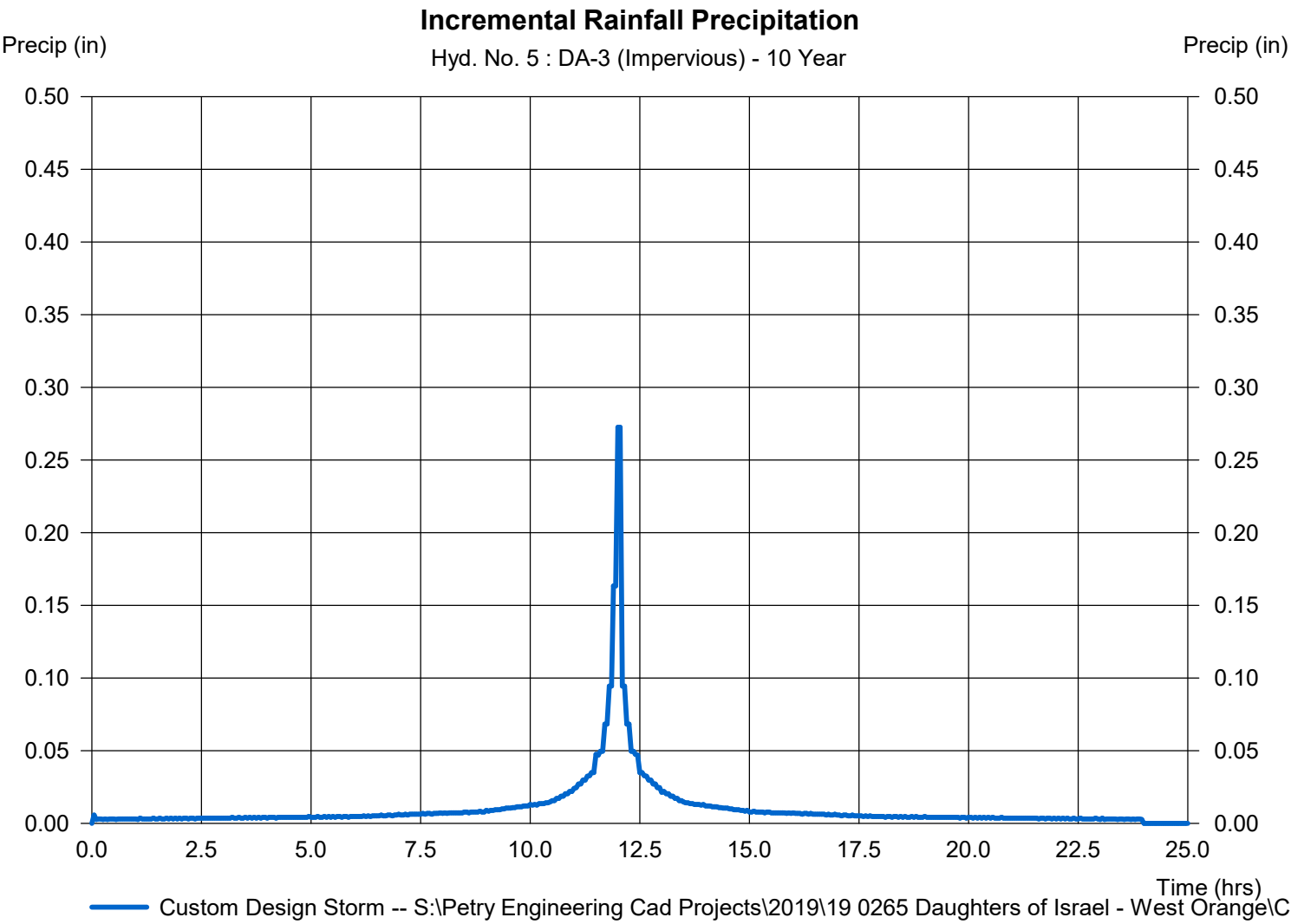
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Hyd. No. 5

DA-3 (Impervious)

Storm Frequency	= 10 yrs	Time interval	= 3 min
Total precip.	= 5.2200 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\19 0265 Daughters of Israel - West Orange.dwg		



Hydrograph Report

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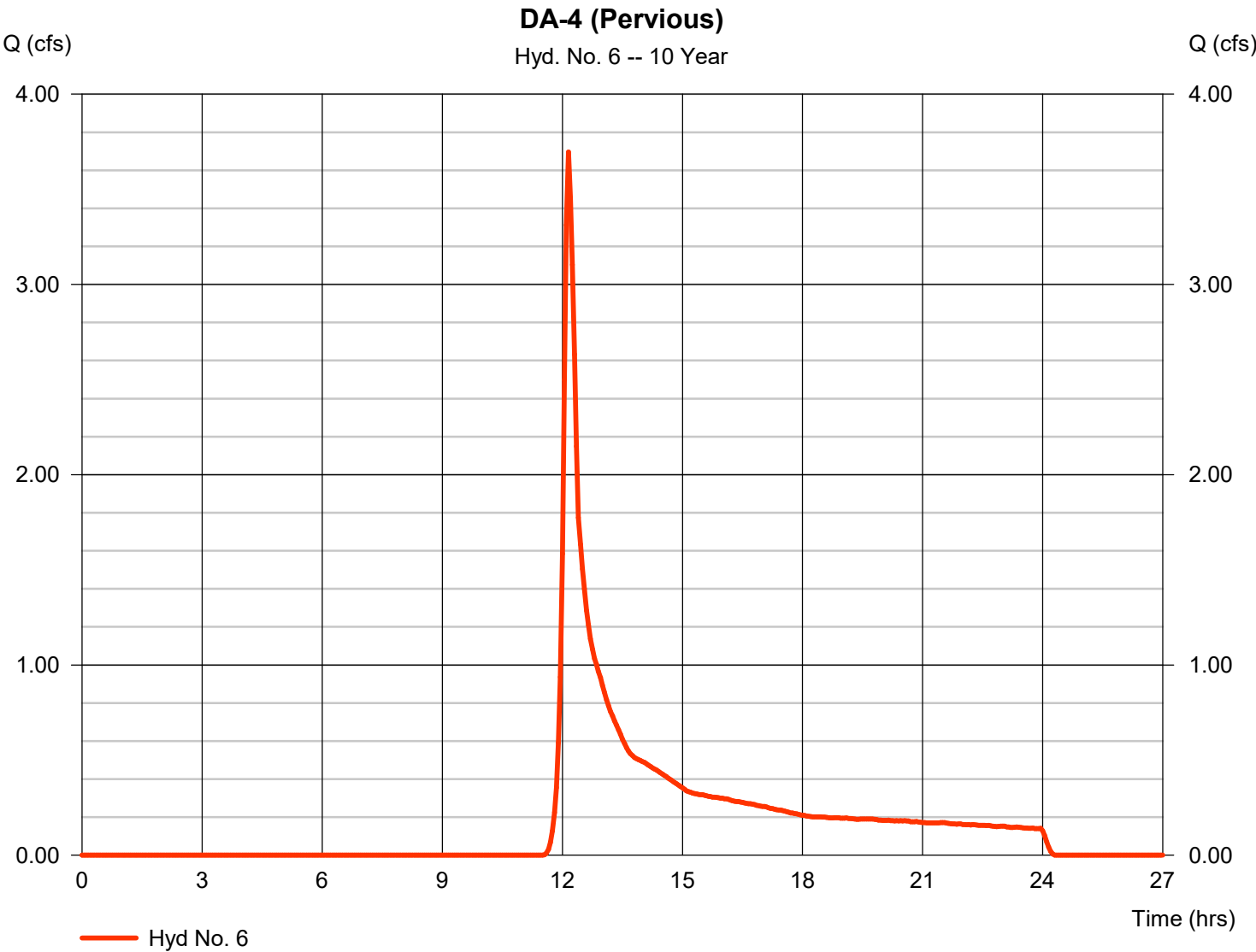
Friday, 01 / 27 / 2023

Hyd. No. 6

DA-4 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.696 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 17,827 cuft
Drainage area	= 4.780 ac	Curve number	= 54*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.30 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\191019 0265 Daughters of Israel - West Orange, NJ\191019 0265 Daughters of Israel - West Orange, NJ.dwg		

* Composite (Area/CN) = [(2.140 x 30) + (1.440 x 70) + (0.360 x 74) + (0.840 x 80)] / 4.780

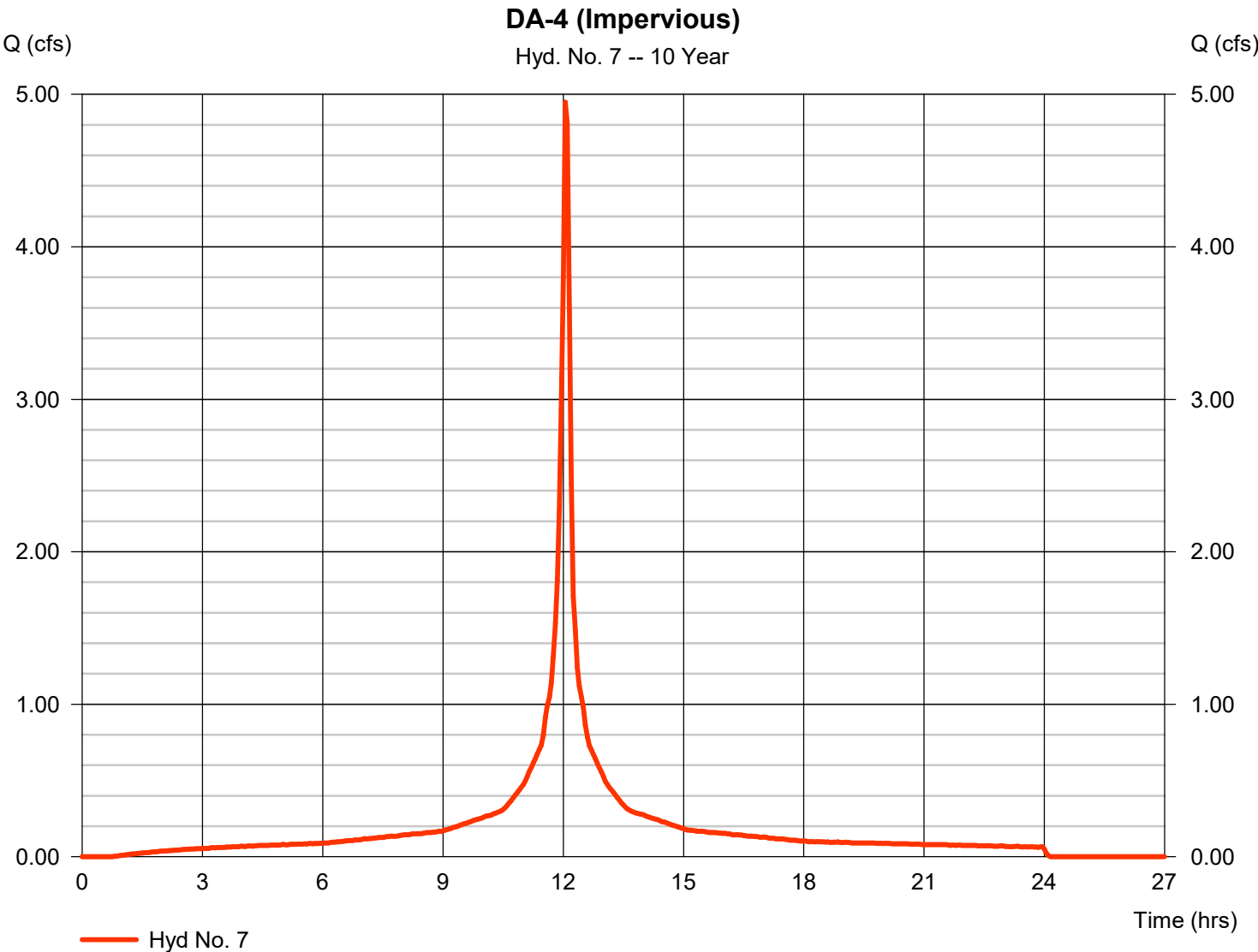


Hydrograph Report

Hyd. No. 7

DA-4 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.948 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	19,501 cuft
Drainage area	=	1.150 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	5.22 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2019\19-0265 Daughters of Israel - West Orange			



Precipitation Report

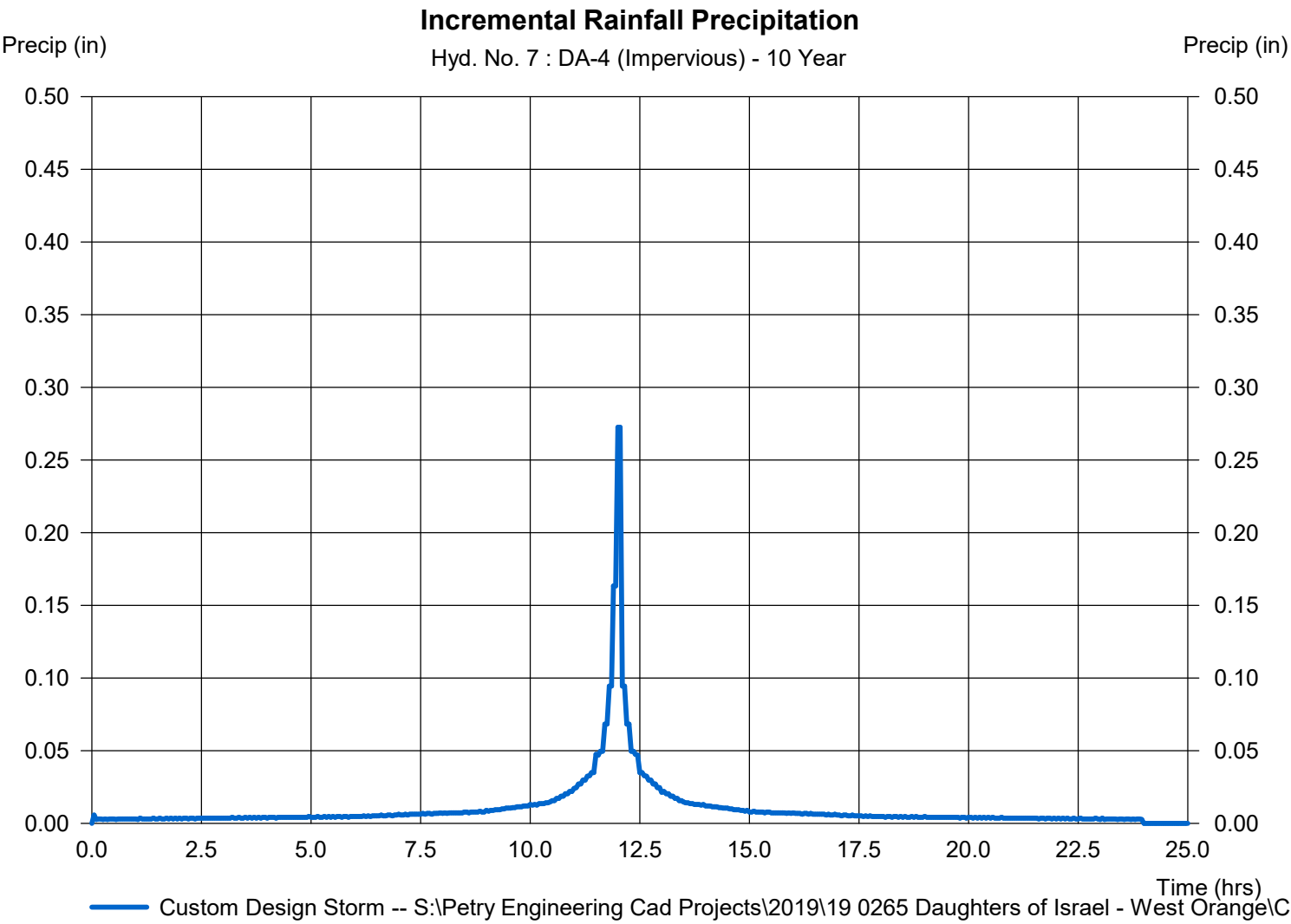
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Friday, 01 / 27 / 2023

Hyd. No. 7

DA-4 (Impervious)

Storm Frequency	= 10 yrs	Time interval	= 3 min
Total precip.	= 5.2200 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\19 0265 Daughters of Israel - West Orange.dwg		



Hydrograph Report

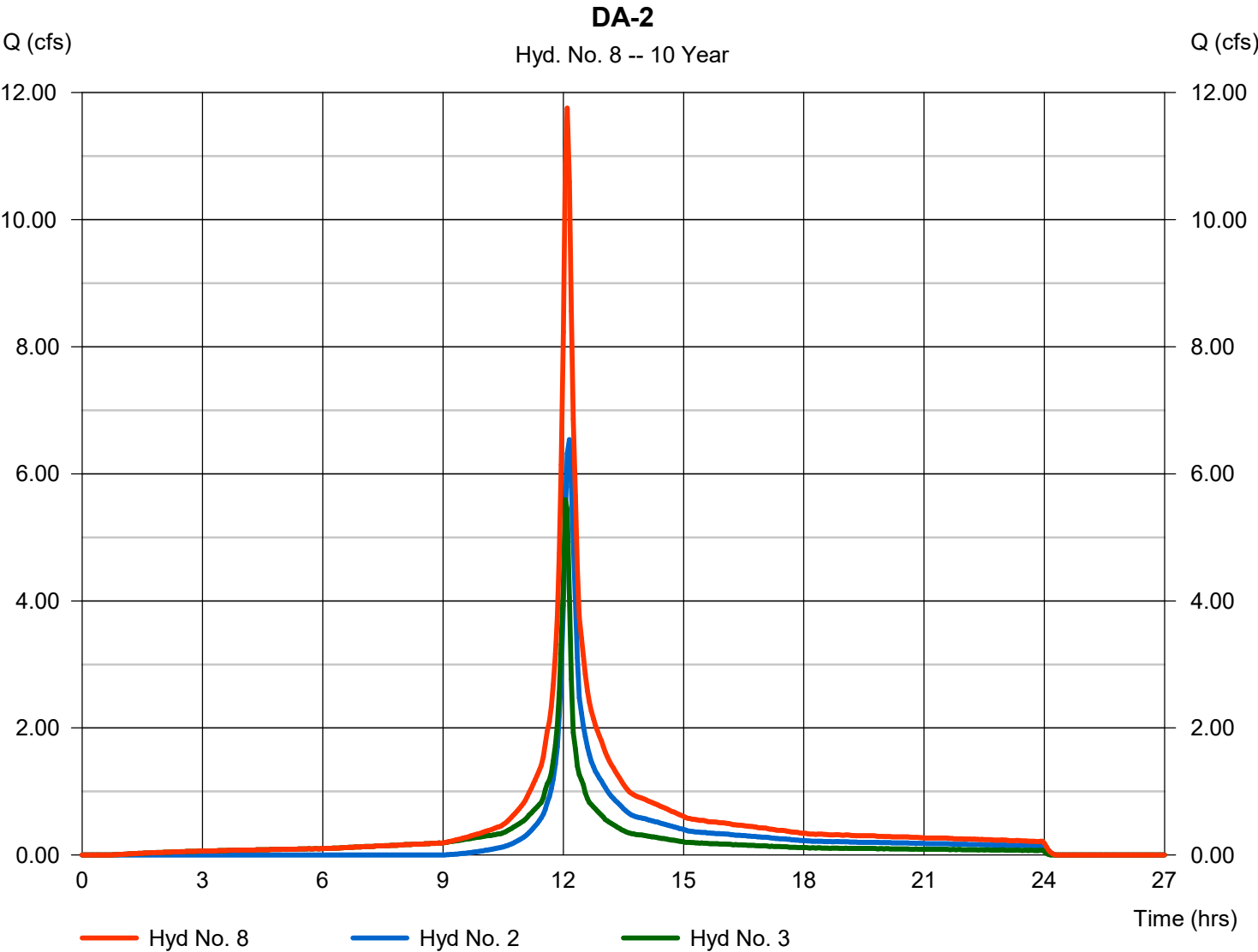
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Friday, 01 / 27 / 2023

Hyd. No. 8

DA-2

Hydrograph type	= Combine	Peak discharge	= 11.76 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 48,412 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 4.480 ac



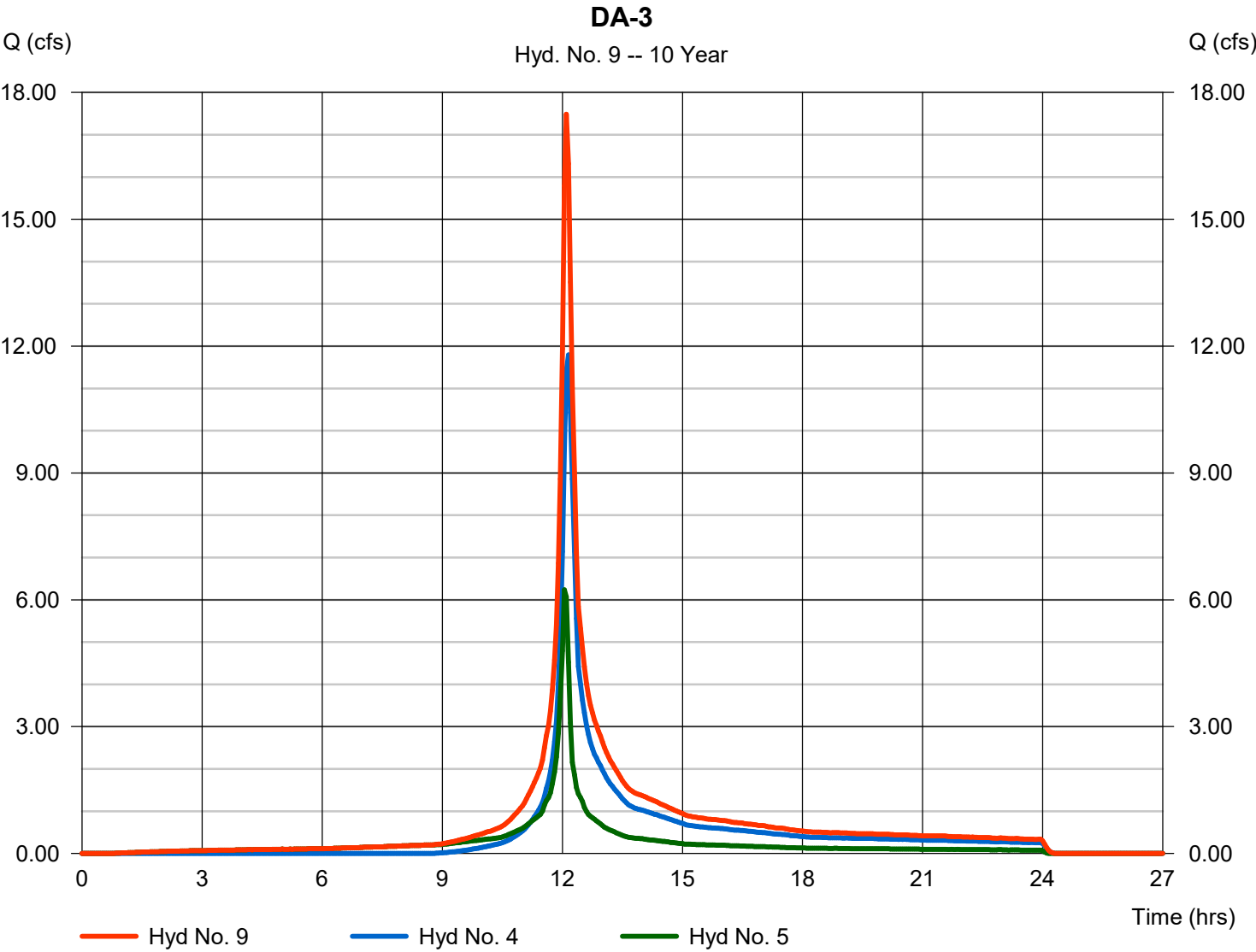
Hydrograph Report

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Hyd. No. 9

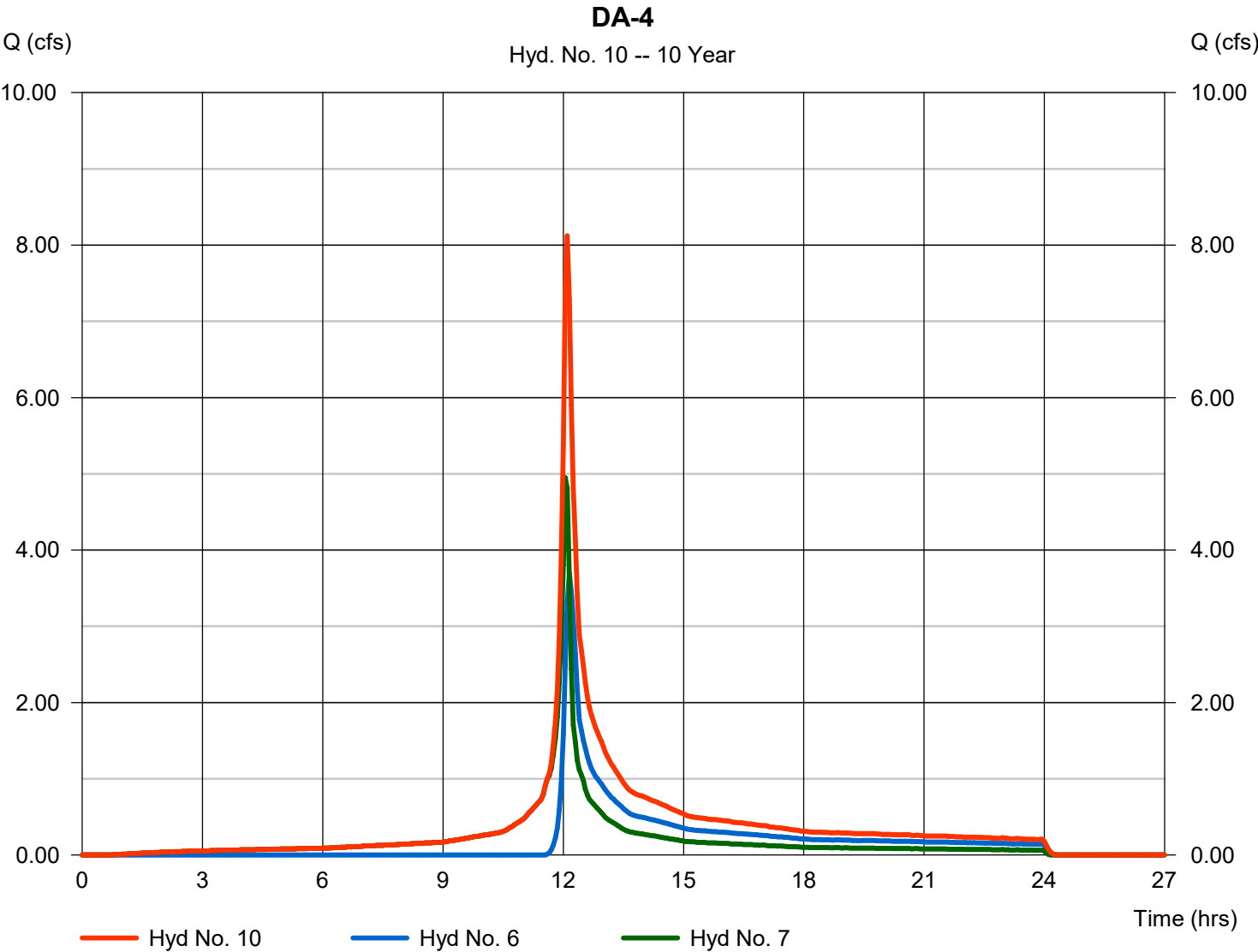
DA-3			
Hydrograph type	= Combine	Peak discharge	= 17.48 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 72,050 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 6.970 ac



Hydrograph Report

Hyd. No. 10

DA-4			
Hydrograph type	= Combine	Peak discharge	= 8.123 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 37,327 cuft
Inflow hyds.	= 6, 7	Contrib. drain. area	= 5.930 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

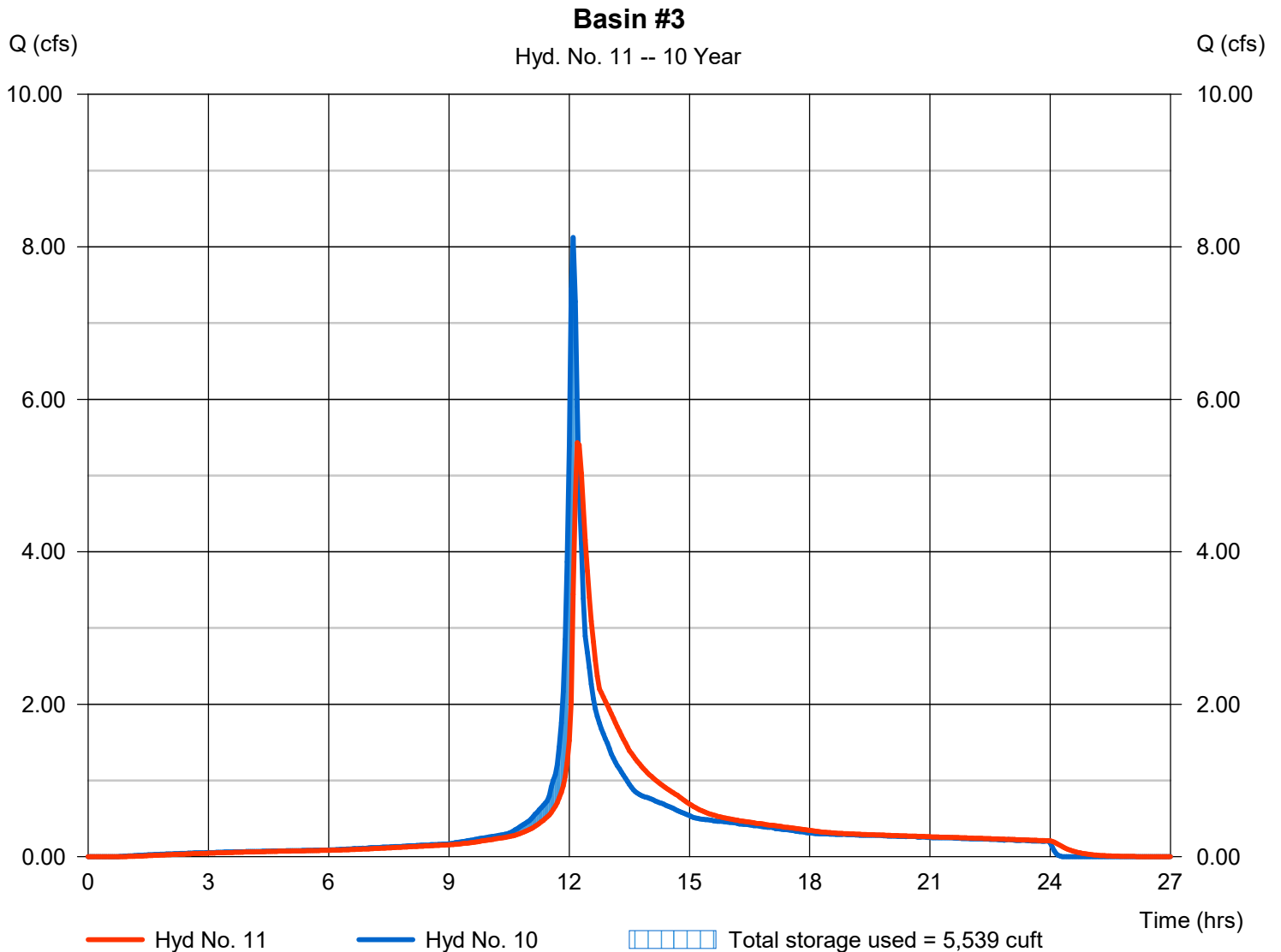
Hyd. No. 11

Basin #3

Hydrograph type = Reservoir
 Storm frequency = 10 yrs
 Time interval = 3 min
 Inflow hyd. No. = 10 - DA-4
 Reservoir name = Basin #3

Peak discharge = 5.430 cfs
 Time to peak = 12.20 hrs
 Hyd. volume = 37,326 cuft
 Max. Elevation = 418.09 ft
 Max. Storage = 5,539 cuft

Storage Indication method used.



Hydrograph Report

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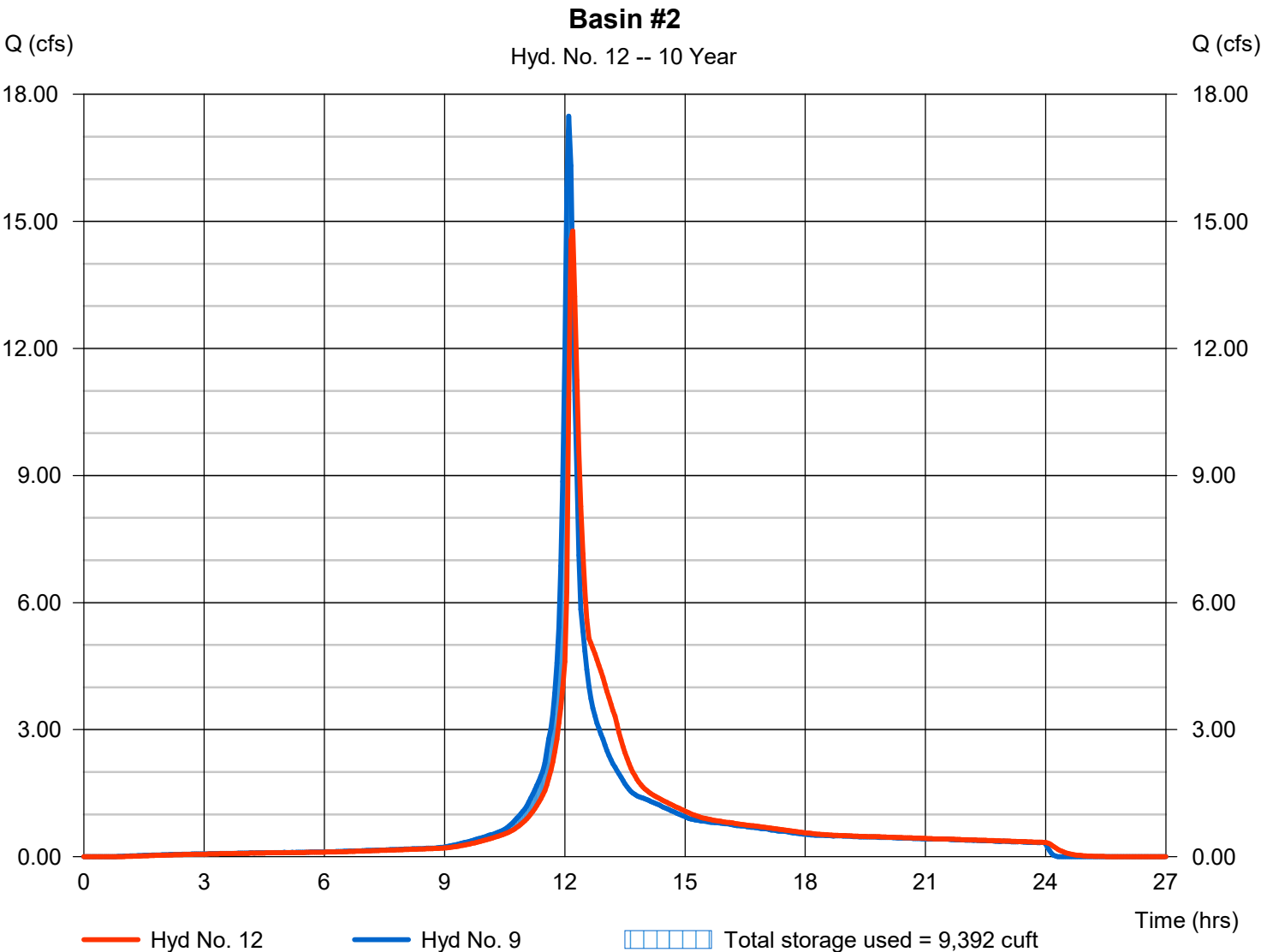
Friday, 01 / 27 / 2023

Hyd. No. 12

Basin #2

Hydrograph type	= Reservoir	Peak discharge	= 14.78 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 3 min	Hyd. volume	= 72,049 cuft
Inflow hyd. No.	= 9 - DA-3	Max. Elevation	= 416.78 ft
Reservoir name	= Basin #2	Max. Storage	= 9,392 cuft

Storage Indication method used.

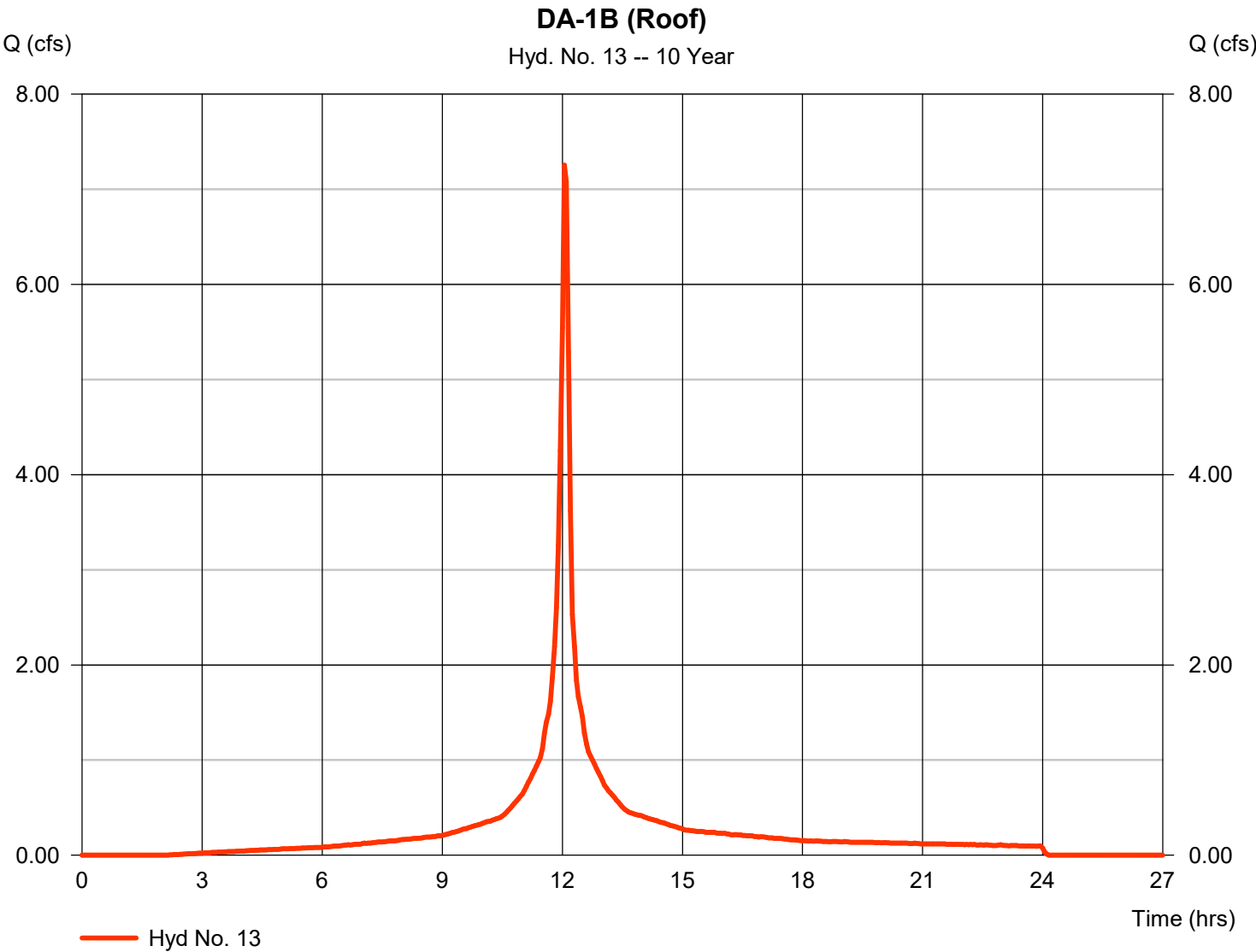


Hydrograph Report

Hyd. No. 13

DA-1B (Roof)

Hydrograph type	= SCS Runoff	Peak discharge	= 7.253 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 26,949 cuft
Drainage area	= 1.750 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\0265 Daughters of Israel - West Orange		



Precipitation Report

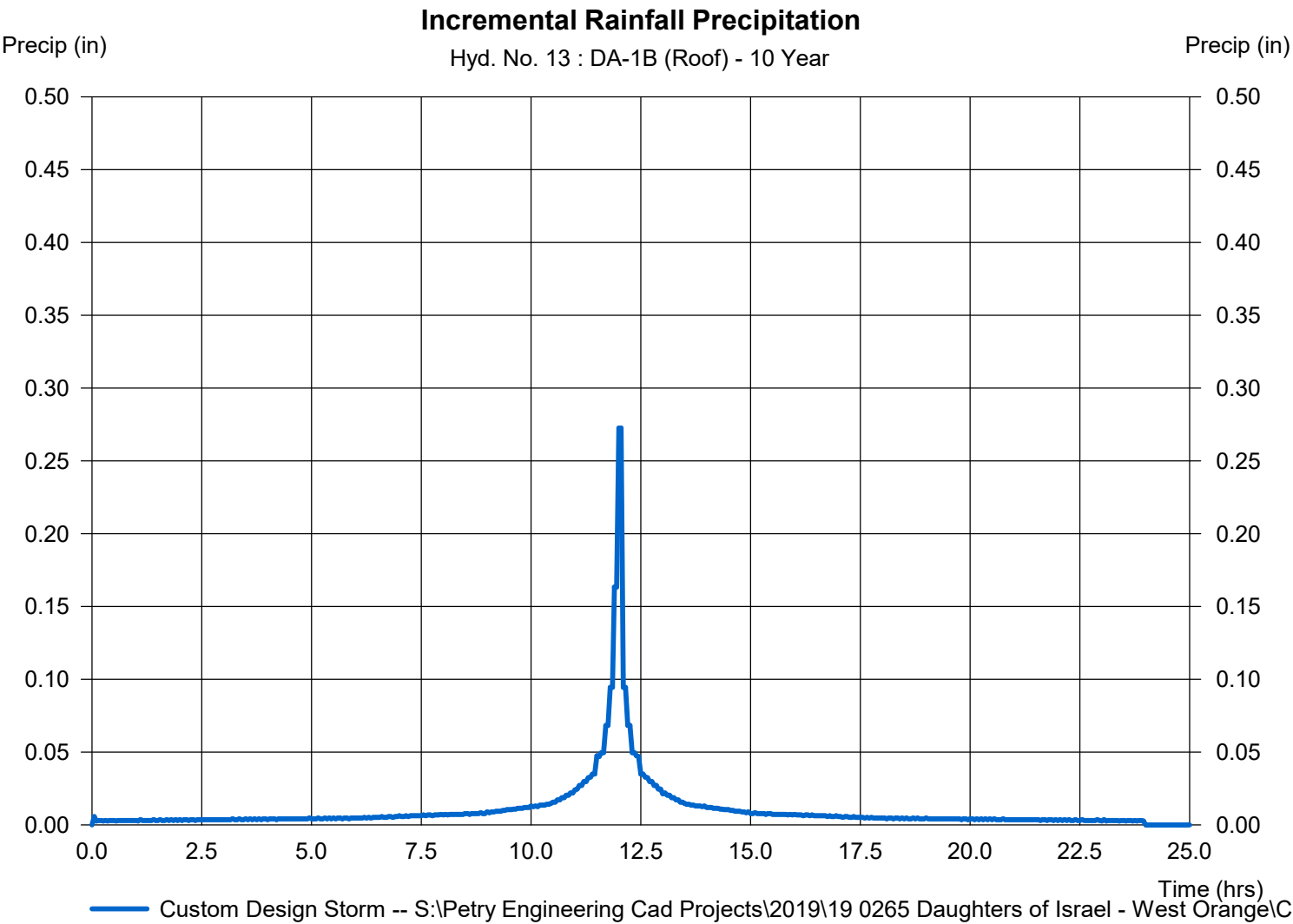
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Hyd. No. 13

DA-1B (Roof)

Storm Frequency	= 10 yrs	Time interval	= 3 min
Total precip.	= 5.2200 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora		



Hydrograph Report

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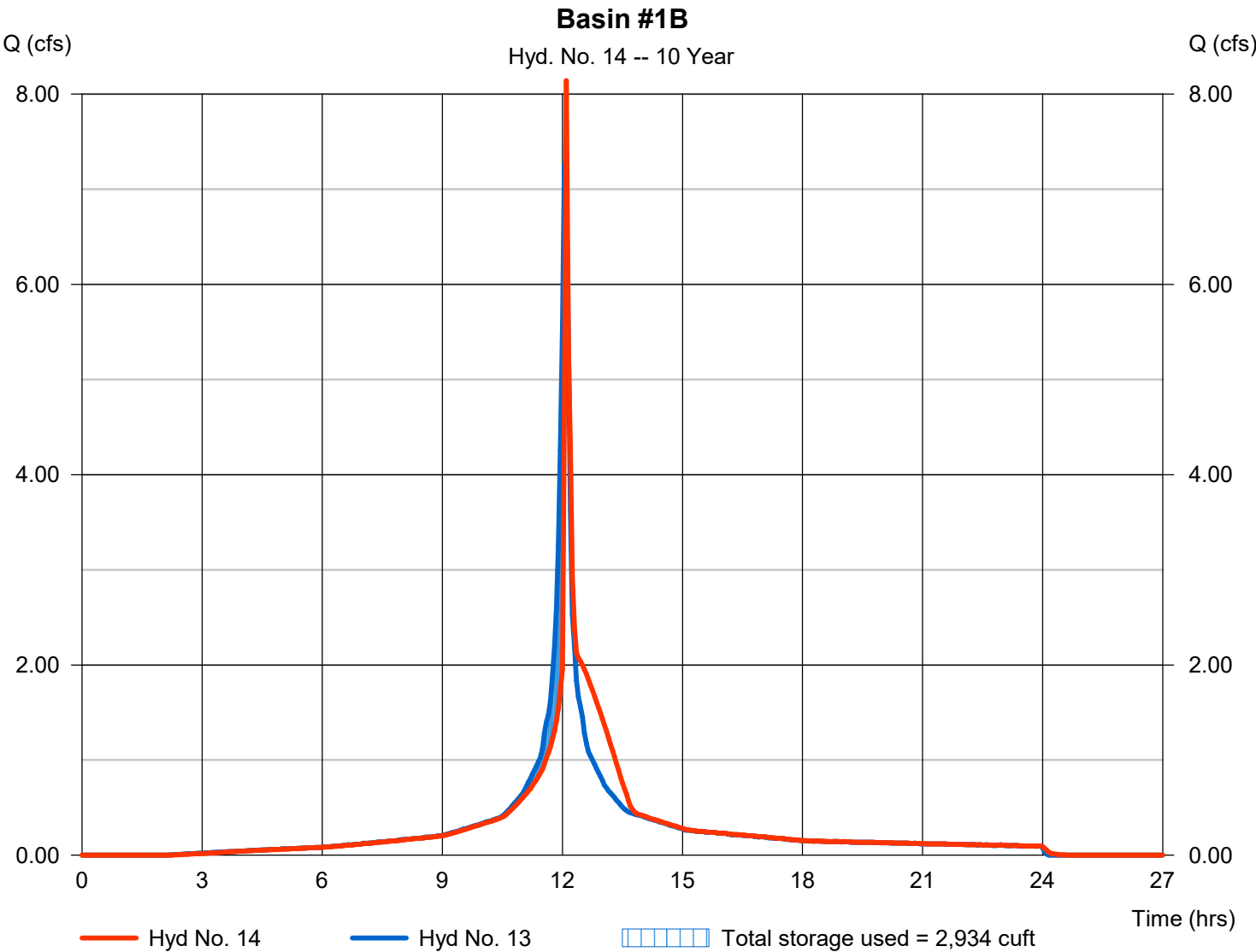
Friday, 01 / 27 / 2023

Hyd. No. 14

Basin #1B

Hydrograph type	= Reservoir	Peak discharge	= 8.143 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 26,949 cuft
Inflow hyd. No.	= 13 - DA-1B (Roof)	Max. Elevation	= 407.73 ft
Reservoir name	= Basin #1B	Max. Storage	= 2,934 cuft

Storage Indication method used.



Hydrograph Report

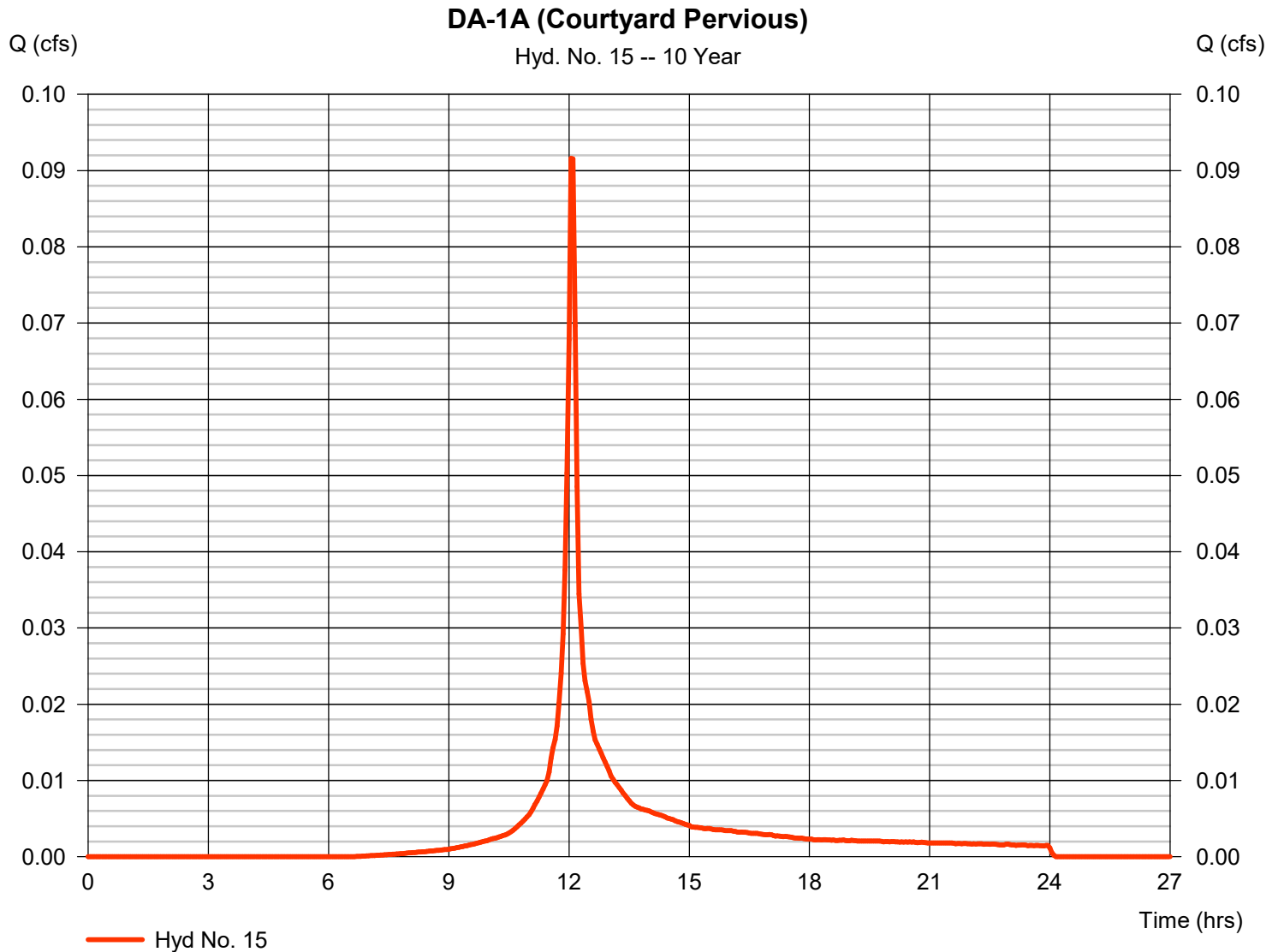
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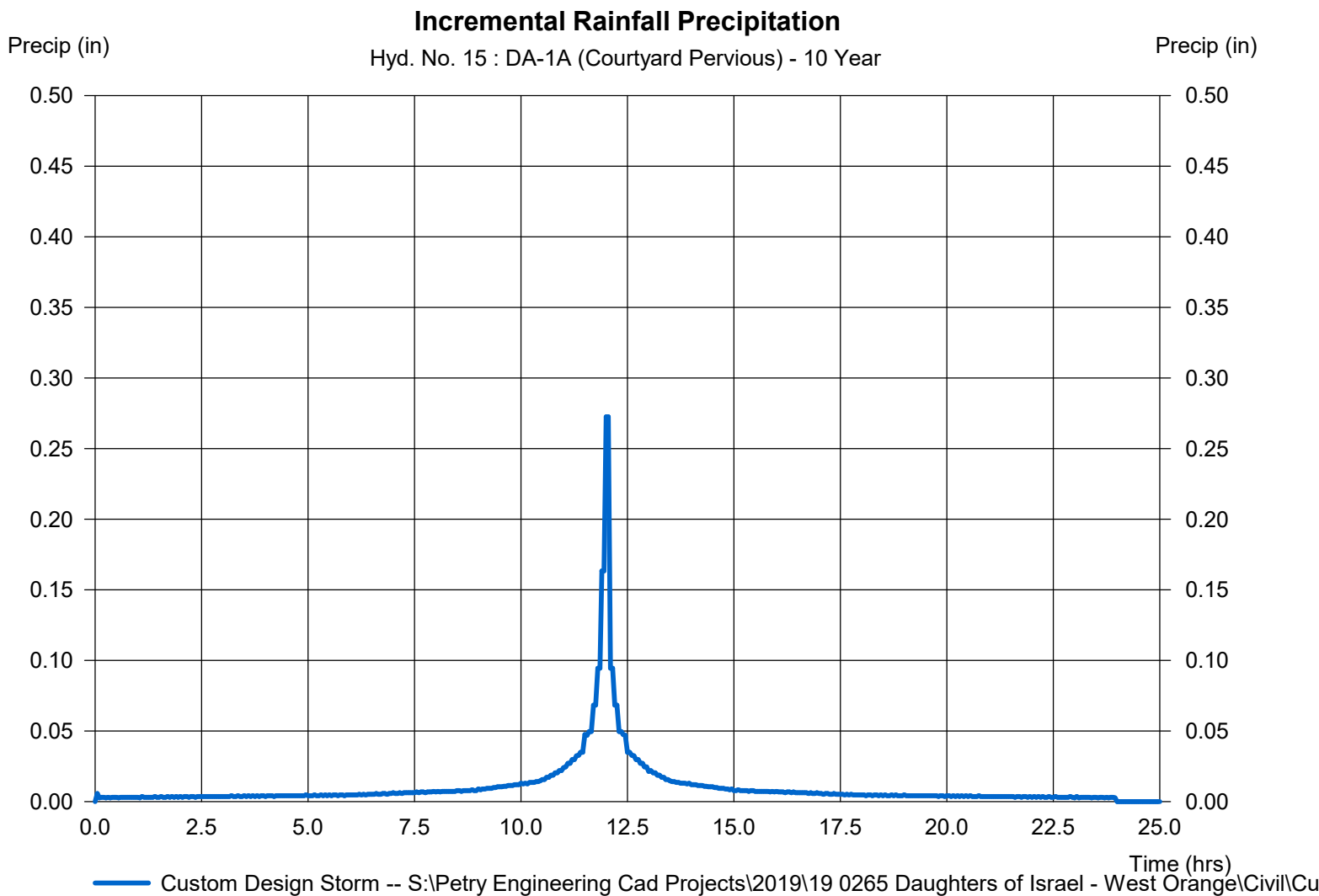
Hyd. No. 15

DA-1A (Courtyard Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.092 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 315 cuft
Drainage area	= 0.030 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 7.50 min
Total precip.	= 5.22 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\10-0265 Daughters of Israel - West Orange		



Storm Frequency = 10 yrs Time interval = 3 min
Total precip. = 5.2200 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

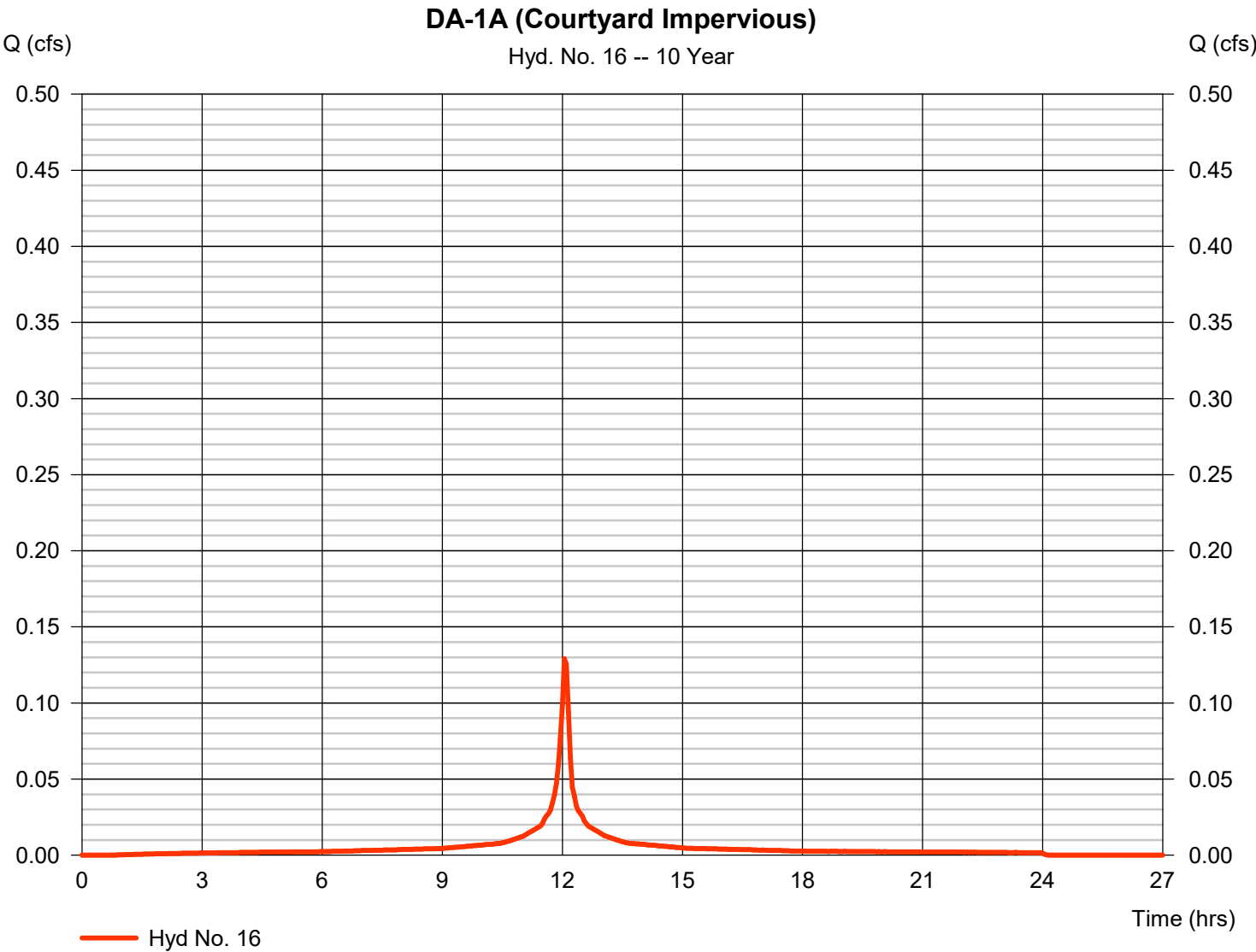


Hydrograph Report

Hyd. No. 16

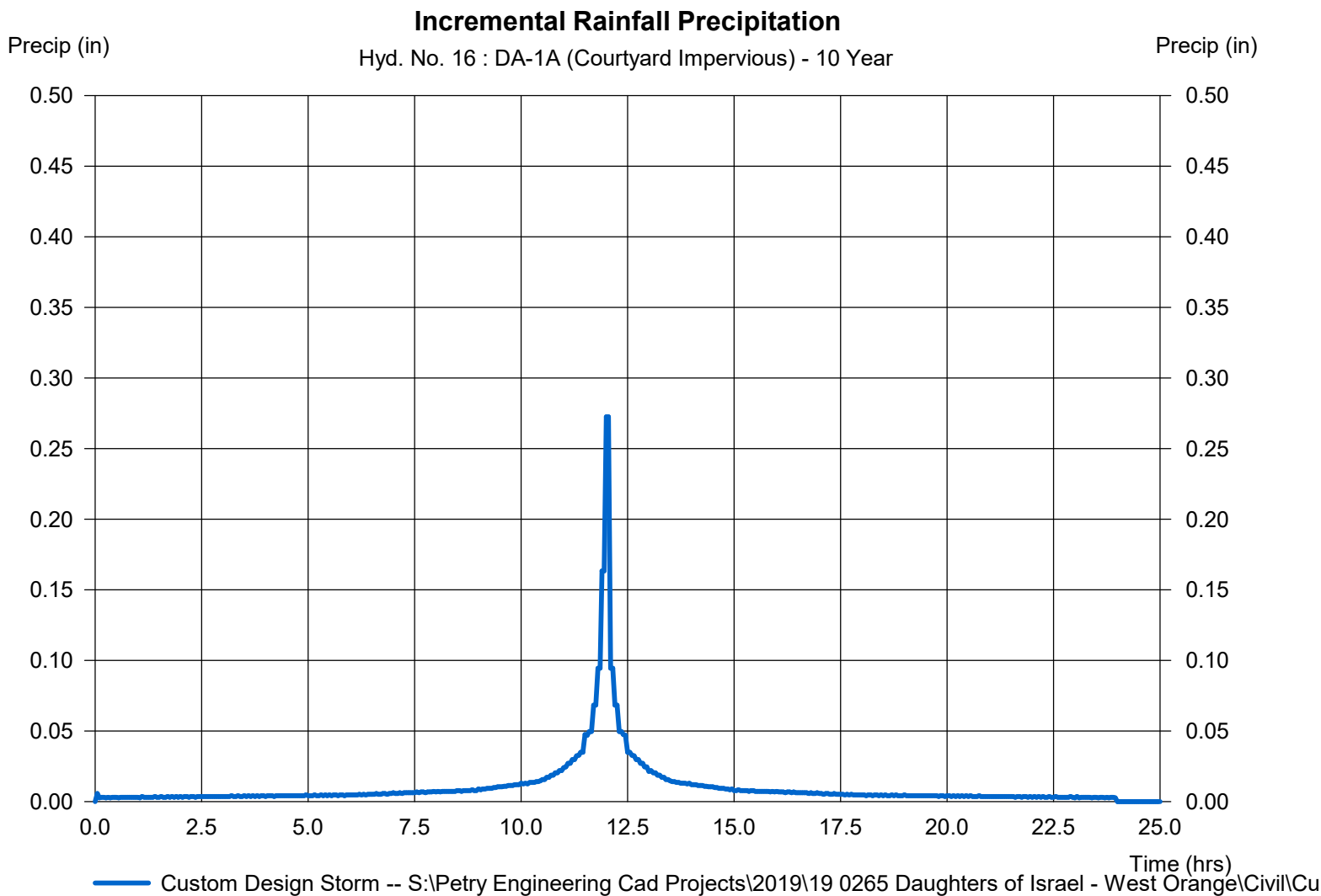
DA-1A (Courtyard Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.129 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	509 cuft
Drainage area	=	0.030 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	7.50 min
Total precip.	=	5.22 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2019\10-0265 Daughters of Israel - West Orange NJ\10-0265 Daughters of Israel - West Orange NJ.dwg			



DA-1A (Courtyard Impervious)

Storm Frequency = 10 yrs Time interval = 3 min
 Total precip. = 5.2200 in Distribution = Custom
 Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora

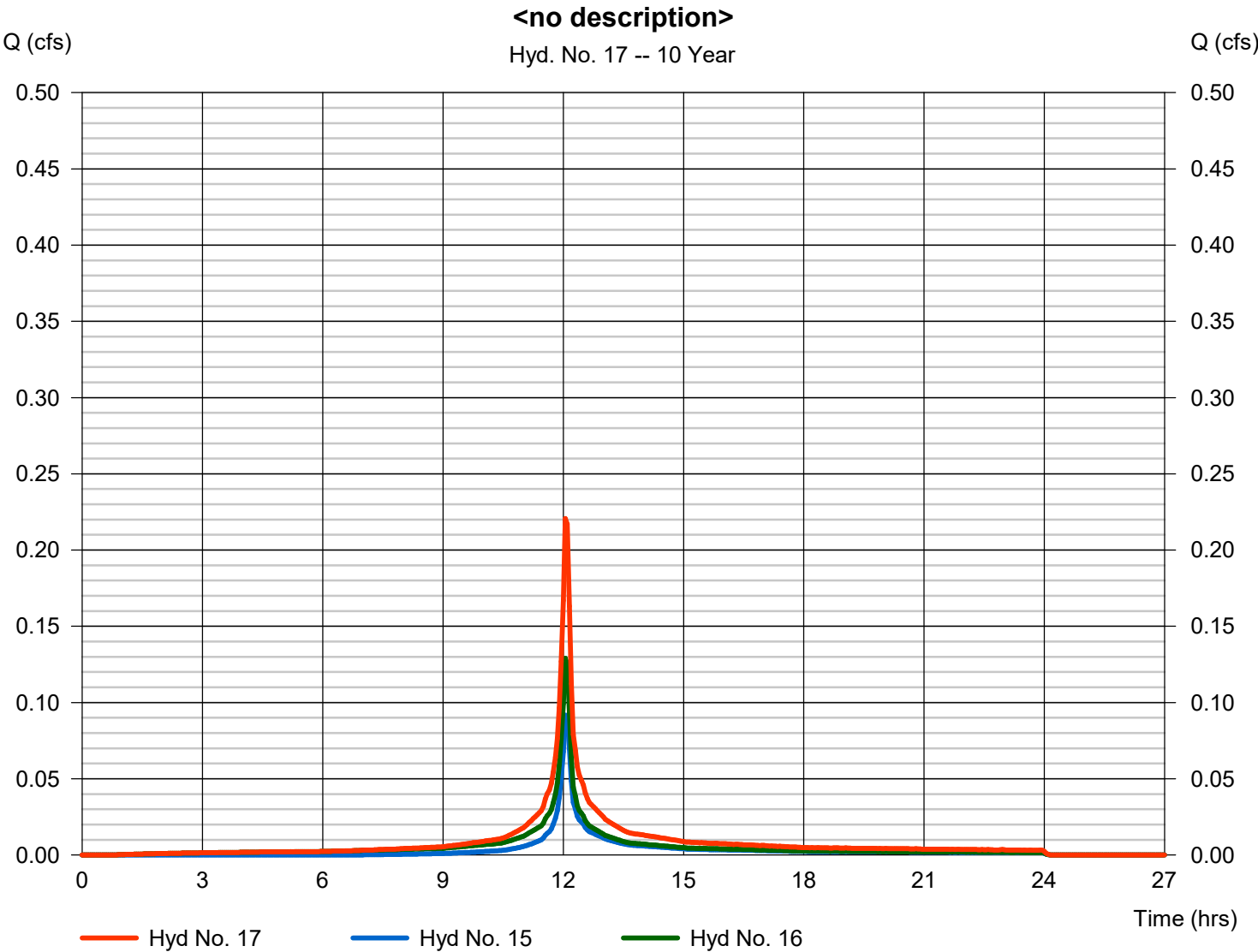


Hydrograph Report

Hyd. No. 17

<no description>

Hydrograph type	= Combine	Peak discharge	= 0.221 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 824 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.060 ac



Hydrograph Report

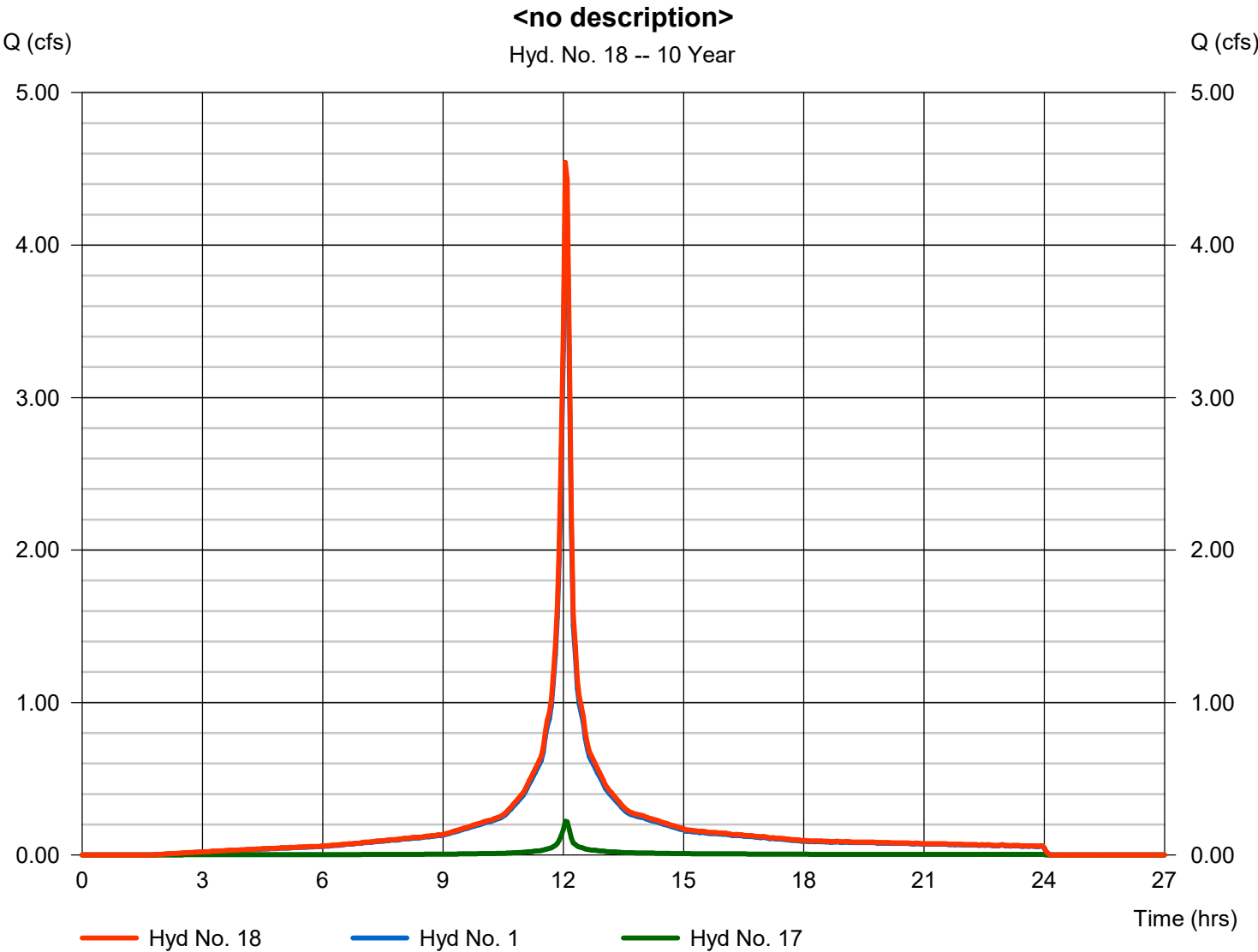
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Hyd. No. 18

<no description>

Hydrograph type	= Combine	Peak discharge	= 4.542 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 17,079 cuft
Inflow hyds.	= 1, 17	Contrib. drain. area	= 1.030 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

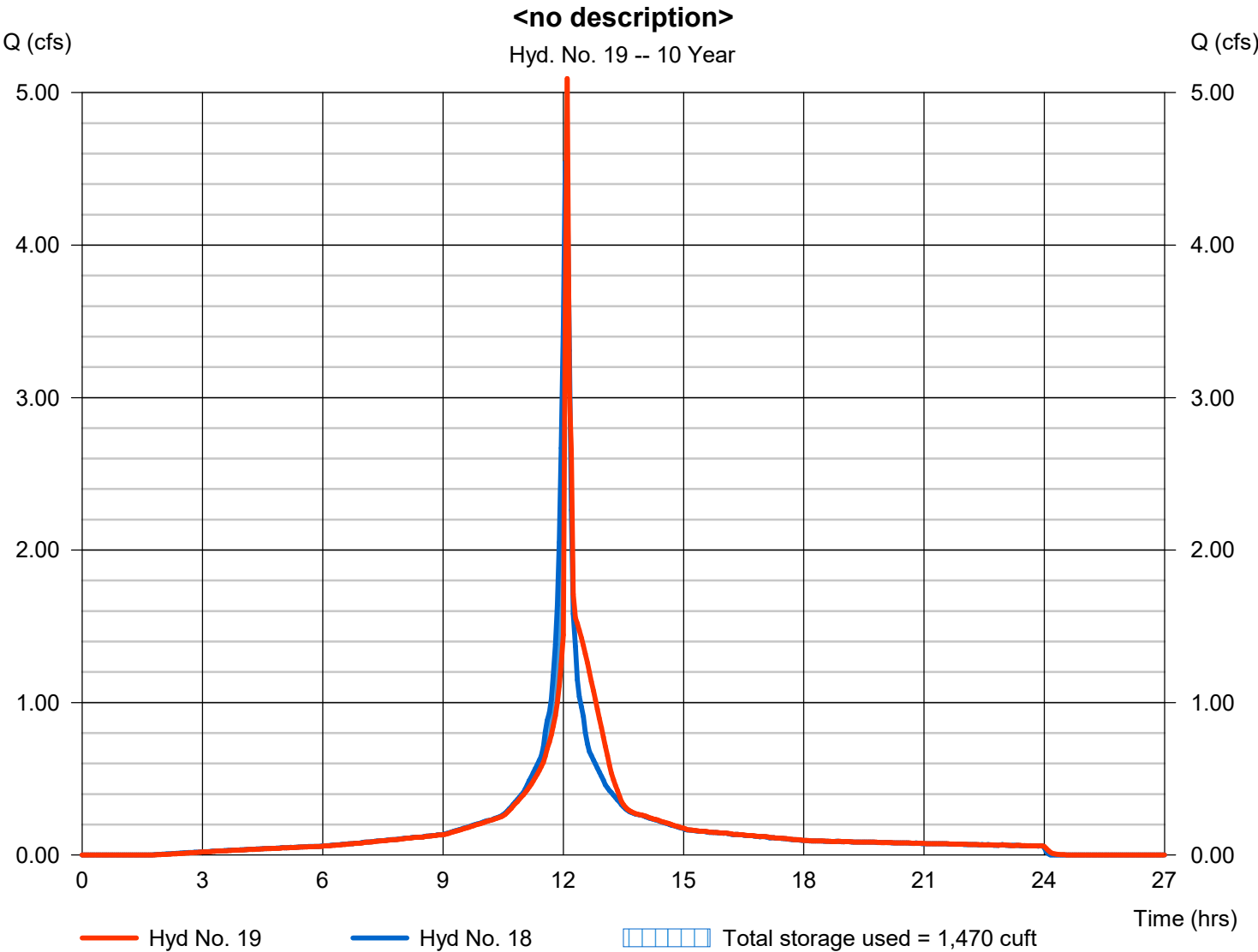
Friday, 01 / 27 / 2023

Hyd. No. 19

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 5.092 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 17,079 cuft
Inflow hyd. No.	= 18 - <no description>	Max. Elevation	= 421.80 ft
Reservoir name	= Basin #1A	Max. Storage	= 1,470 cuft

Storage Indication method used.

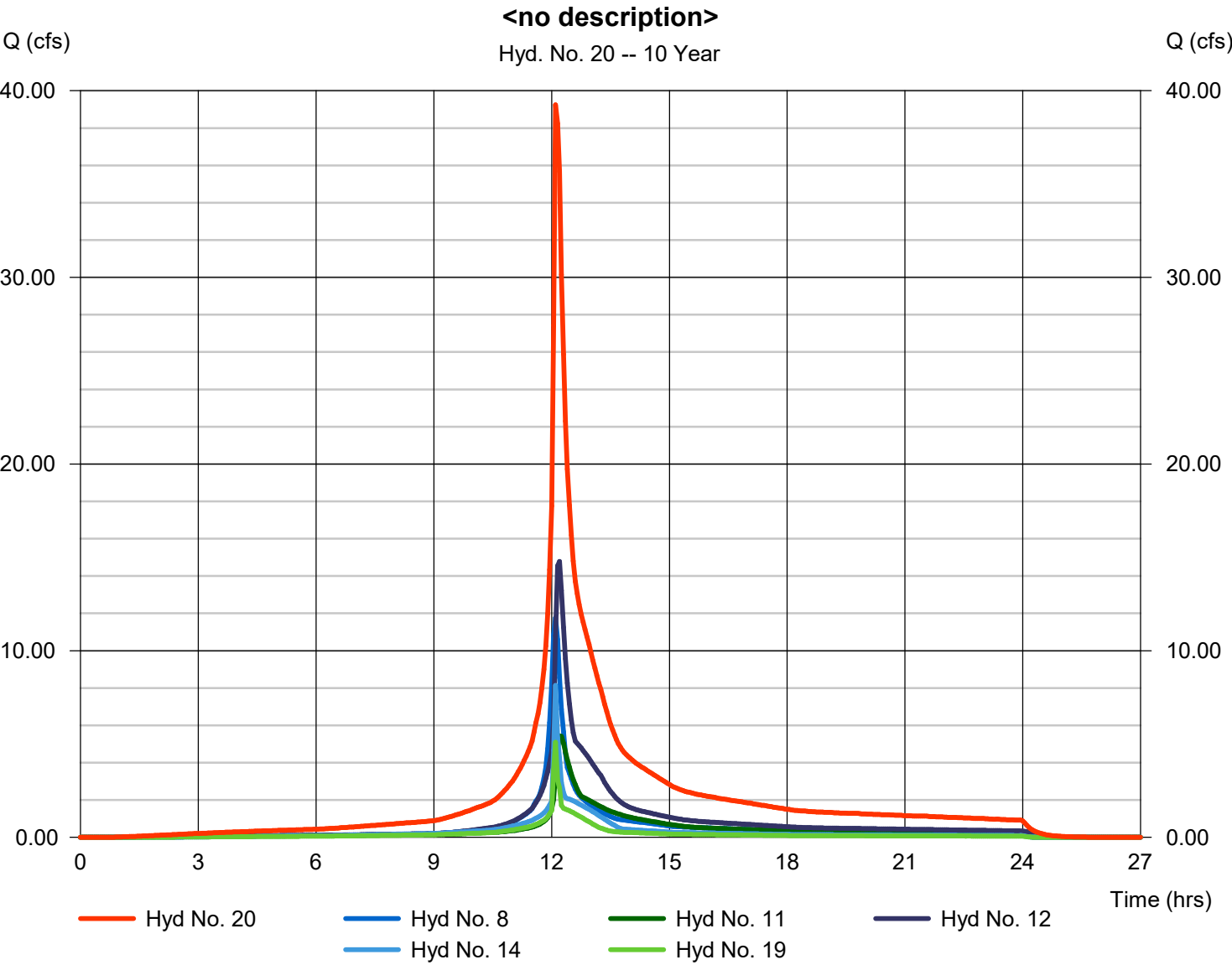


Hydrograph Report

Hyd. No. 20

<no description>

Hydrograph type	= Combine	Peak discharge	= 39.24 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 201,813 cuft
Inflow hyds.	= 8, 11, 12, 14, 19	Contrib. drain. area	= 0.000 ac



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

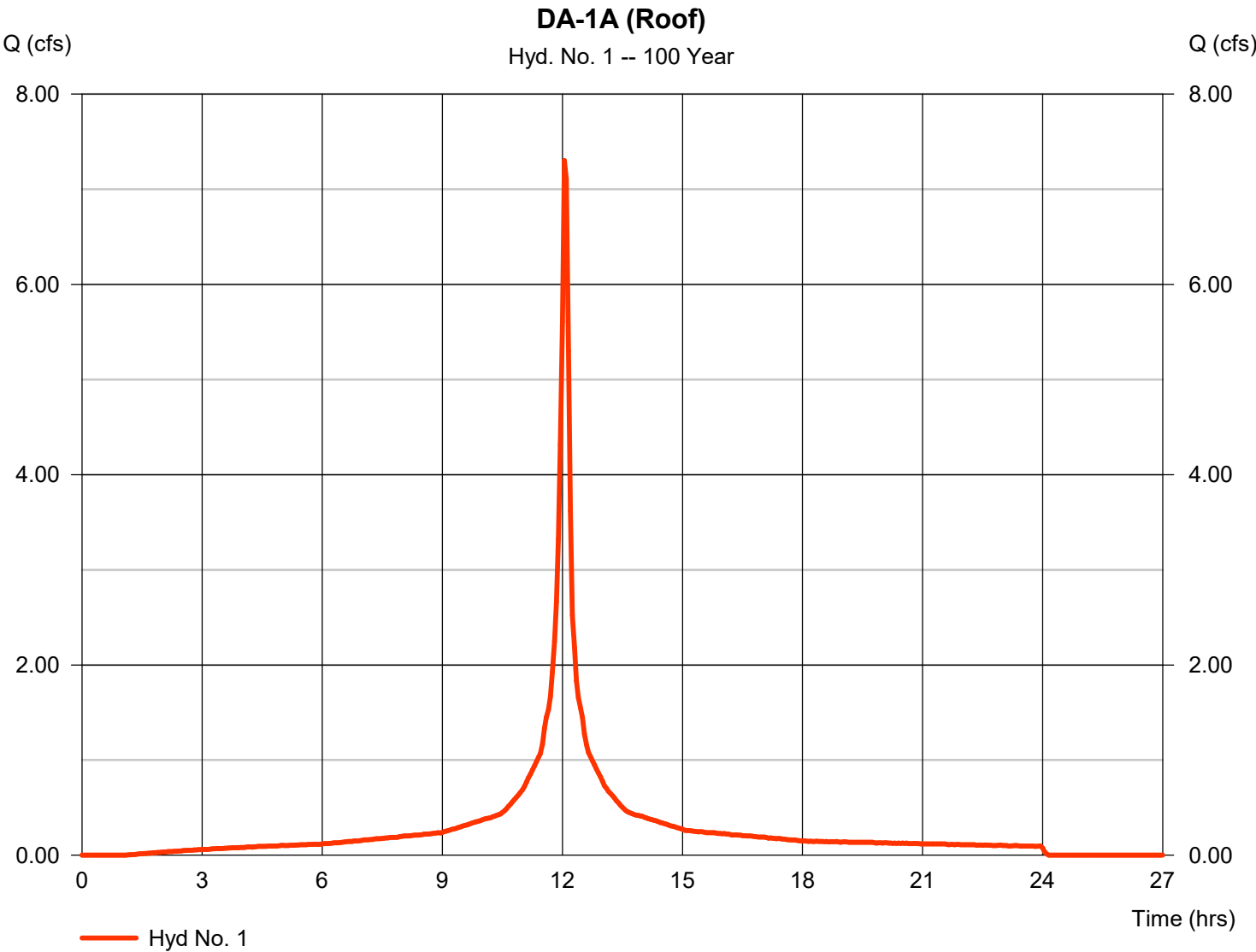
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	7.302	3	723	28,248	-----	-----	-----	DA-1A (Roof)
2	SCS Runoff	14.72	3	729	59,533	-----	-----	-----	DA-2 (Pervious)
3	SCS Runoff	9.312	3	723	37,250	-----	-----	-----	DA-2 (Impervious)
4	SCS Runoff	26.10	3	729	105,761	-----	-----	-----	DA-3 (Pervious)
5	SCS Runoff	10.39	3	723	41,548	-----	-----	-----	DA-3 (Impervious)
6	SCS Runoff	13.24	3	729	54,258	-----	-----	-----	DA-4 (Pervious)
7	SCS Runoff	8.237	3	723	32,952	-----	-----	-----	DA-4 (Impervious)
8	Combine	23.52	3	726	96,782	2, 3,	-----	-----	DA-2
9	Combine	35.79	3	726	147,309	4, 5,	-----	-----	DA-3
10	Combine	20.65	3	726	87,210	6, 7,	-----	-----	DA-4
11	Reservoir	15.74	3	732	87,208	10	419.95	10,462	Basin #3
12	Reservoir	31.90	3	729	147,308	9	417.96	13,372	Basin #2
13	SCS Runoff	12.34	3	723	47,277	-----	-----	-----	DA-1B (Roof)
14	Reservoir	12.33	3	726	47,277	13	407.97	3,031	Basin #1B
15	SCS Runoff	0.182	3	723	638	-----	-----	-----	DA-1A (Courtyard Pervious)
16	SCS Runoff	0.215	3	723	860	-----	-----	-----	DA-1A (Courtyard Impervious)
17	Combine	0.397	3	723	1,497	15, 16	-----	-----	<no description>
18	Combine	7.698	3	723	29,746	1, 17	-----	-----	<no description>
19	Reservoir	7.726	3	723	29,745	18	421.99	1,506	<no description>
20	Combine	86.61	3	726	408,320	8, 11, 12, 14, 19	-----	-----	<no description>
Proposed Conditions - Green Roof.gpw					Return Period: 100 Year			Friday, 01 / 27 / 2023	

Hydrograph Report

Hyd. No. 1

DA-1A (Roof)

Hydrograph type	= SCS Runoff	Peak discharge	= 7.302 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 28,248 cuft
Drainage area	= 1.030 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19-0265 Daughters of Israel - West Orange, NJ\19-0265 Daughters of Israel - West Orange, NJ.dwg		



Precipitation Report

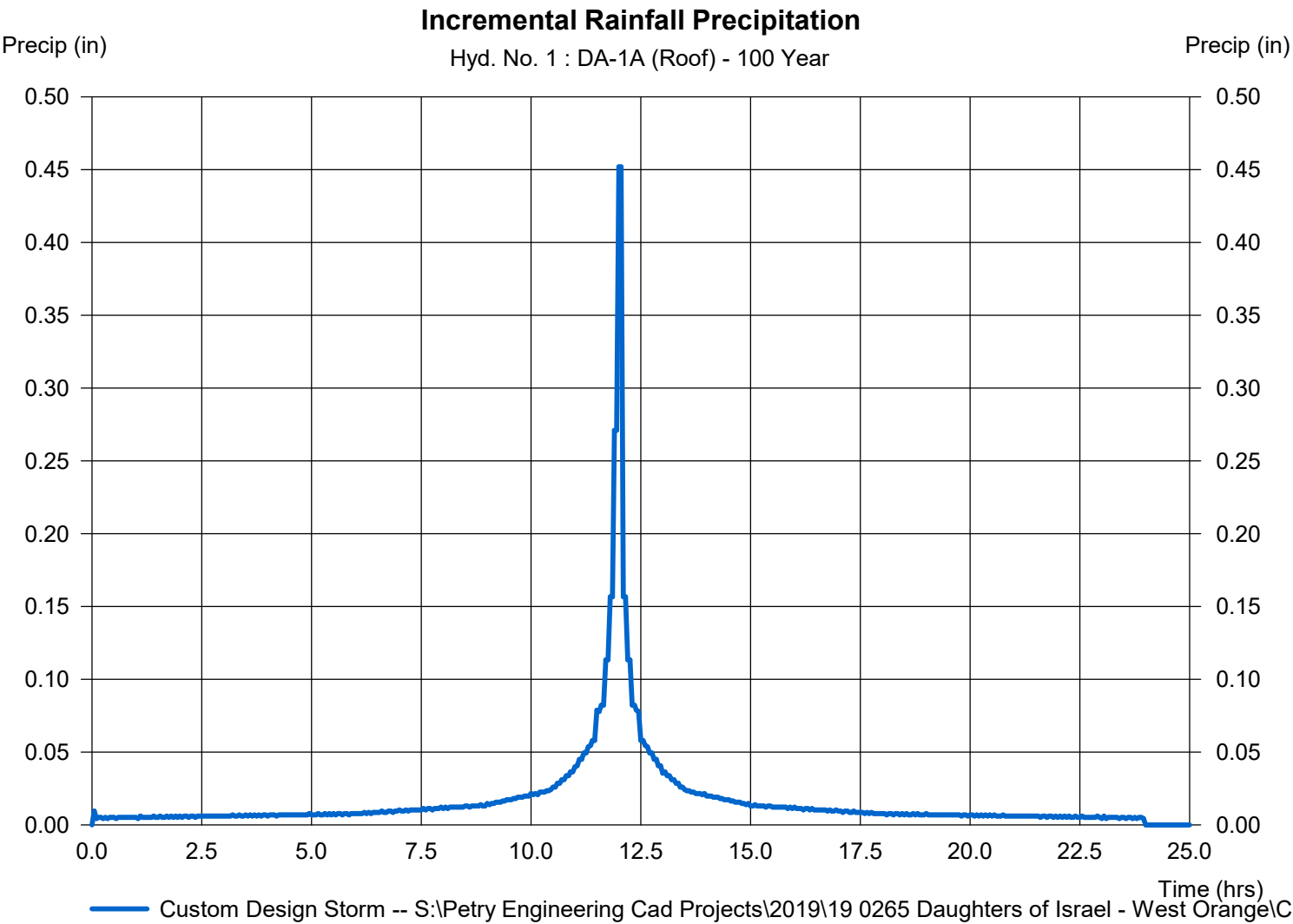
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 1

DA-1A (Roof)

Storm Frequency	= 100 yrs	Time interval	= 3 min
Total precip.	= 8.6600 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

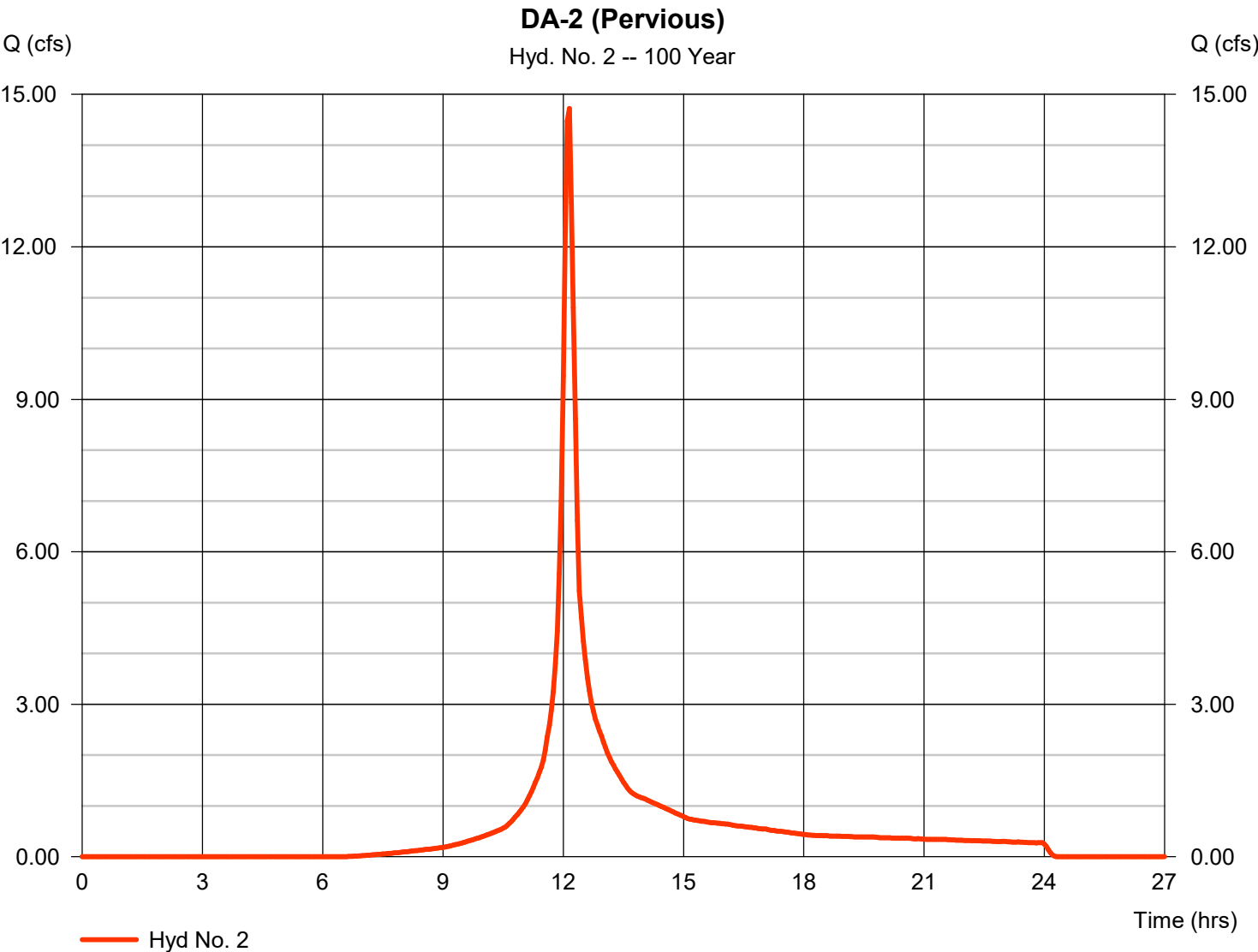
Friday, 01 / 27 / 2023

Hyd. No. 2

DA-2 (Pervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.72 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.15 hrs
Time interval	=	3 min	Hyd. volume	=	59,533 cuft
Drainage area	=	3.180 ac	Curve number	=	71*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.10 min
Total precip.	=	8.66 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\100100265 Daughters of Israel - West Orange, NJ\100100265 Daughters of Israel - West Orange, NJ.dwg			

* Composite (Area/CN) = [(0.510 x 30) + (0.110 x 77) + (0.160 x 70) + (2.400 x 80)] / 3.180



Precipitation Report

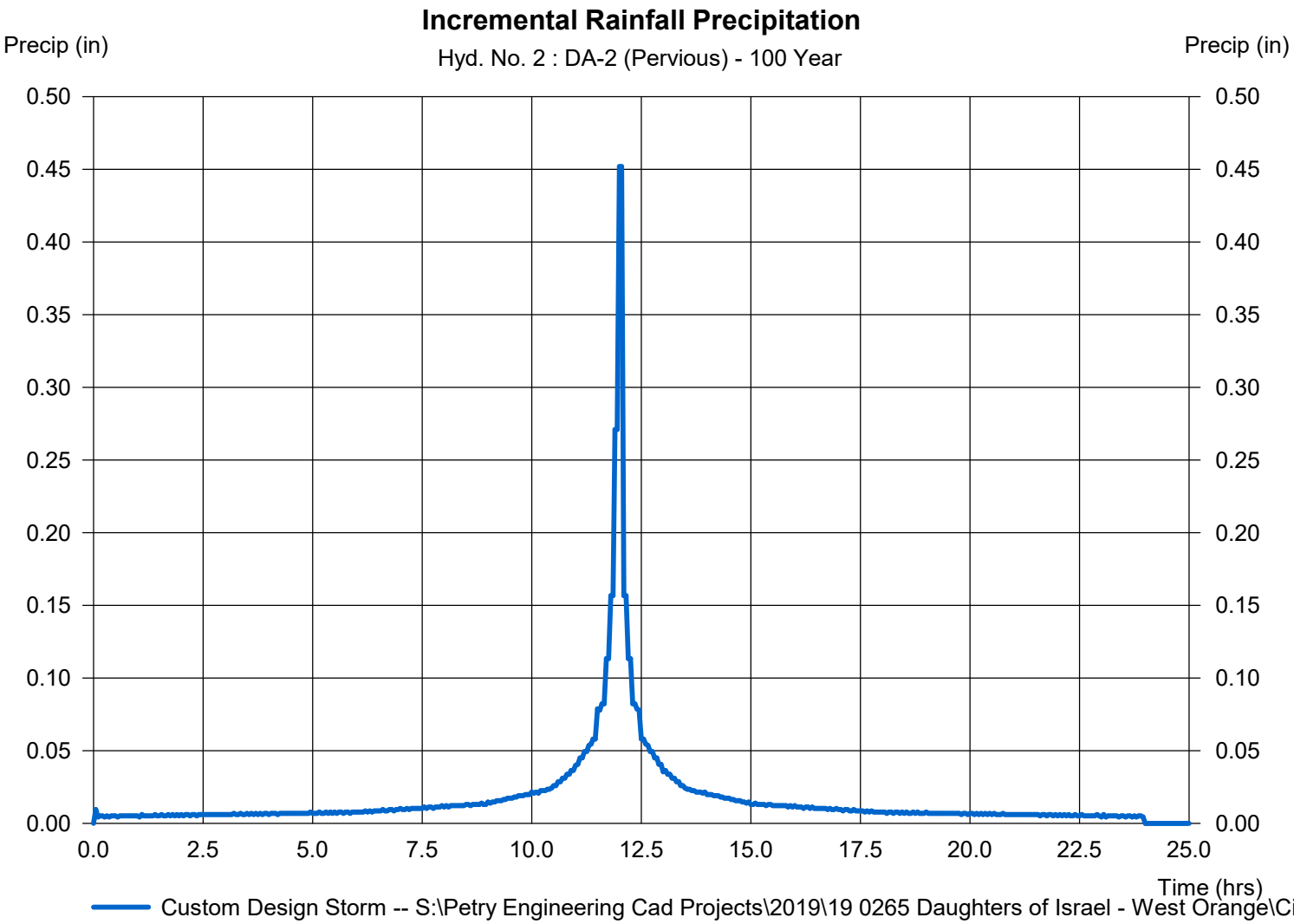
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 2

DA-2 (Pervious)

Storm Frequency	= 100 yrs	Time interval	= 3 min
Total precip.	= 8.6600 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Hydrographs\DA-2 (Pervious) - 100 Year		



Hydrograph Report

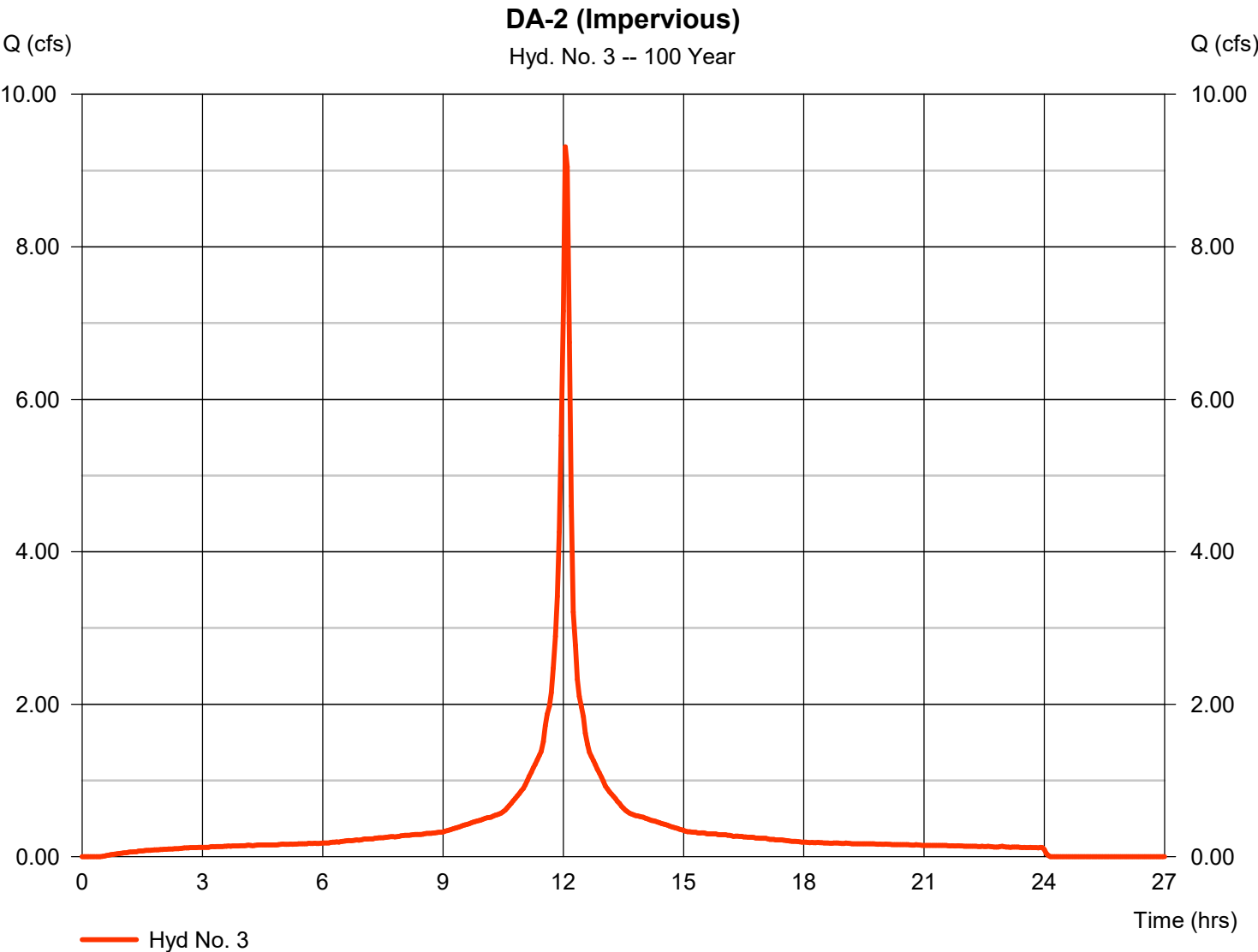
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 3

DA-2 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 9.312 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 37,250 cuft
Drainage area	= 1.300 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\191019 0265 Daughters of Israel - West Orange		

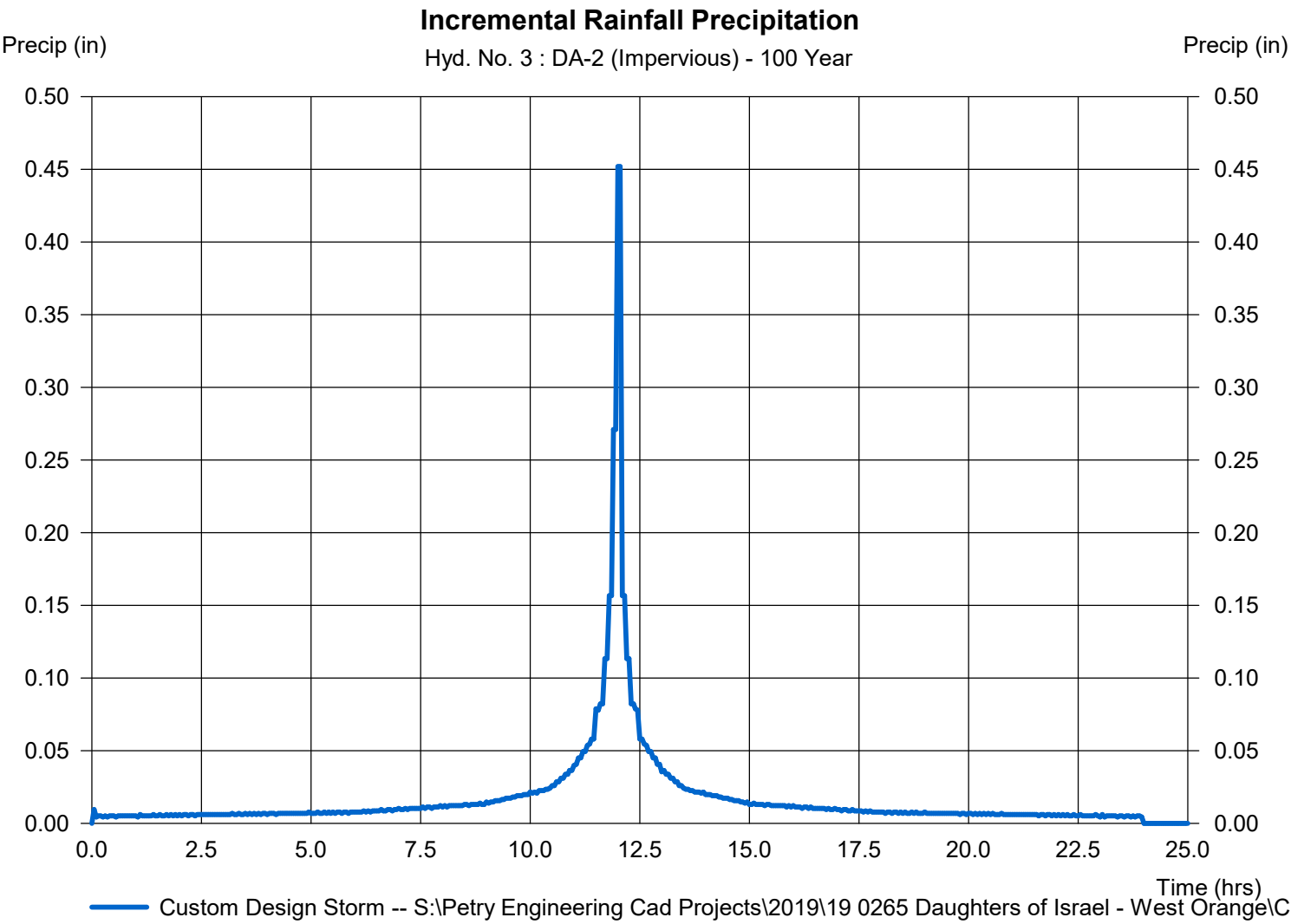


Precipitation Report

Hyd. No. 3

DA-2 (Impervious)

Storm Frequency	= 100 yrs	Time interval	= 3 min
Total precip.	= 8.6600 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

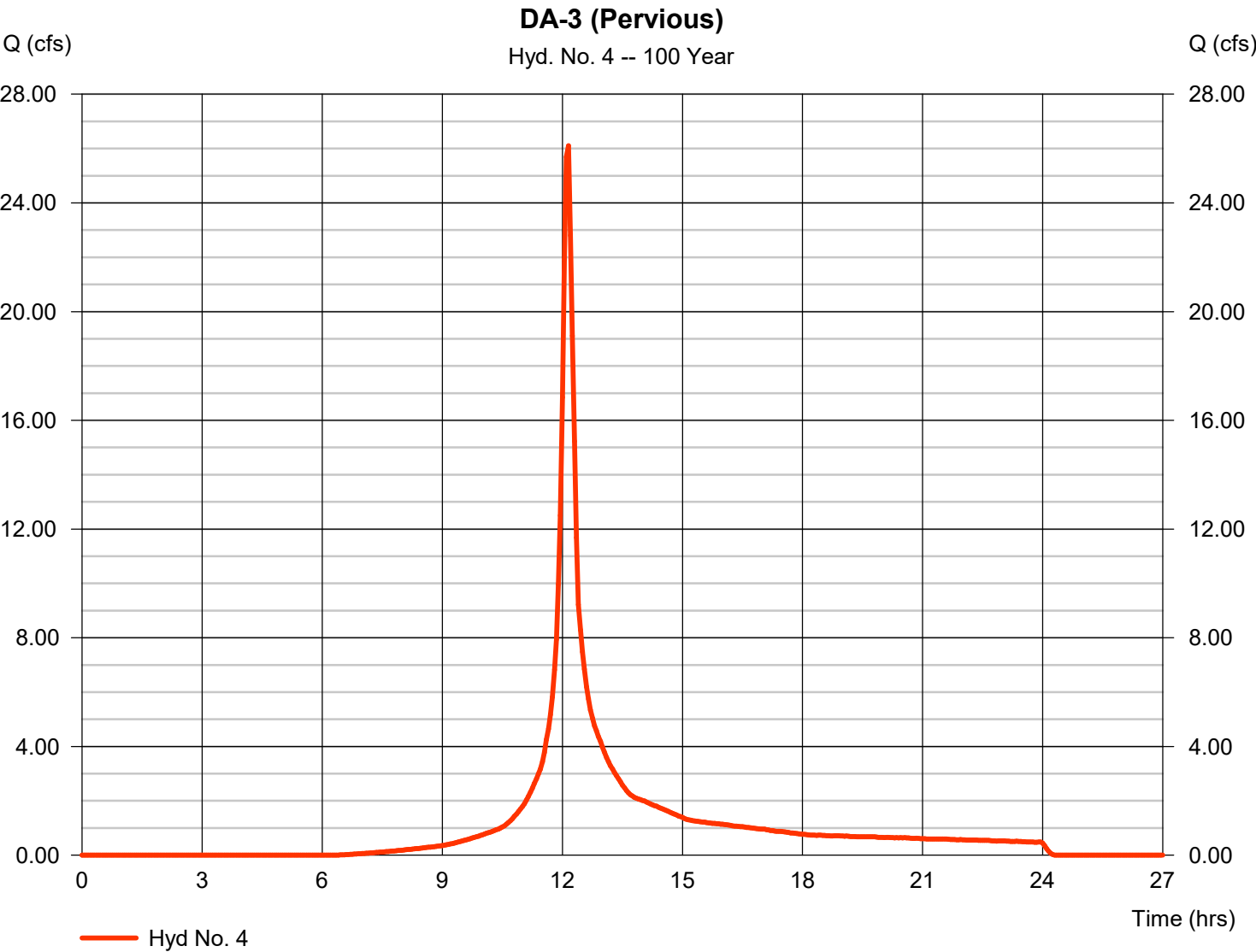
Friday, 01 / 27 / 2023

Hyd. No. 4

DA-3 (Pervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 26.10 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 105,761 cuft
Drainage area	= 5.520 ac	Curve number	= 72*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.50 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\12012019\0265 Daughters of Israel - West Orange, NJ\DA-3 (Pervious) - 100 Year Storm		

* Composite (Area/CN) = [(0.010 x 30) + (4.210 x 70) + (0.340 x 77) + (0.400 x 74) + (0.560 x 80)] / 5.520

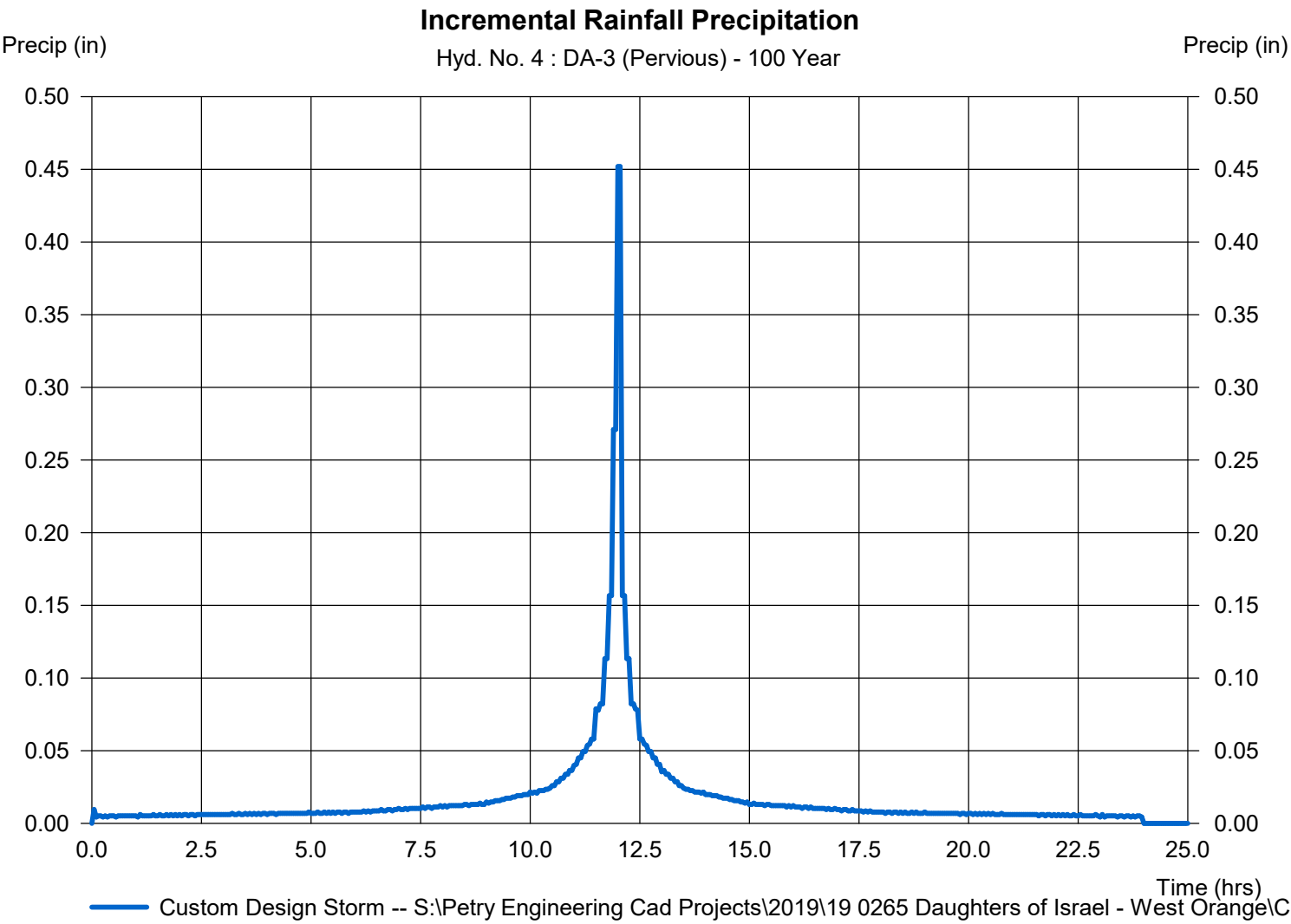


Precipitation Report

Hyd. No. 4

DA-3 (Pervious)

Storm Frequency	= 100 yrs	Time interval	= 3 min
Total precip.	= 8.6600 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Hydrographs\DA-3 (Pervious) - 100 Year		

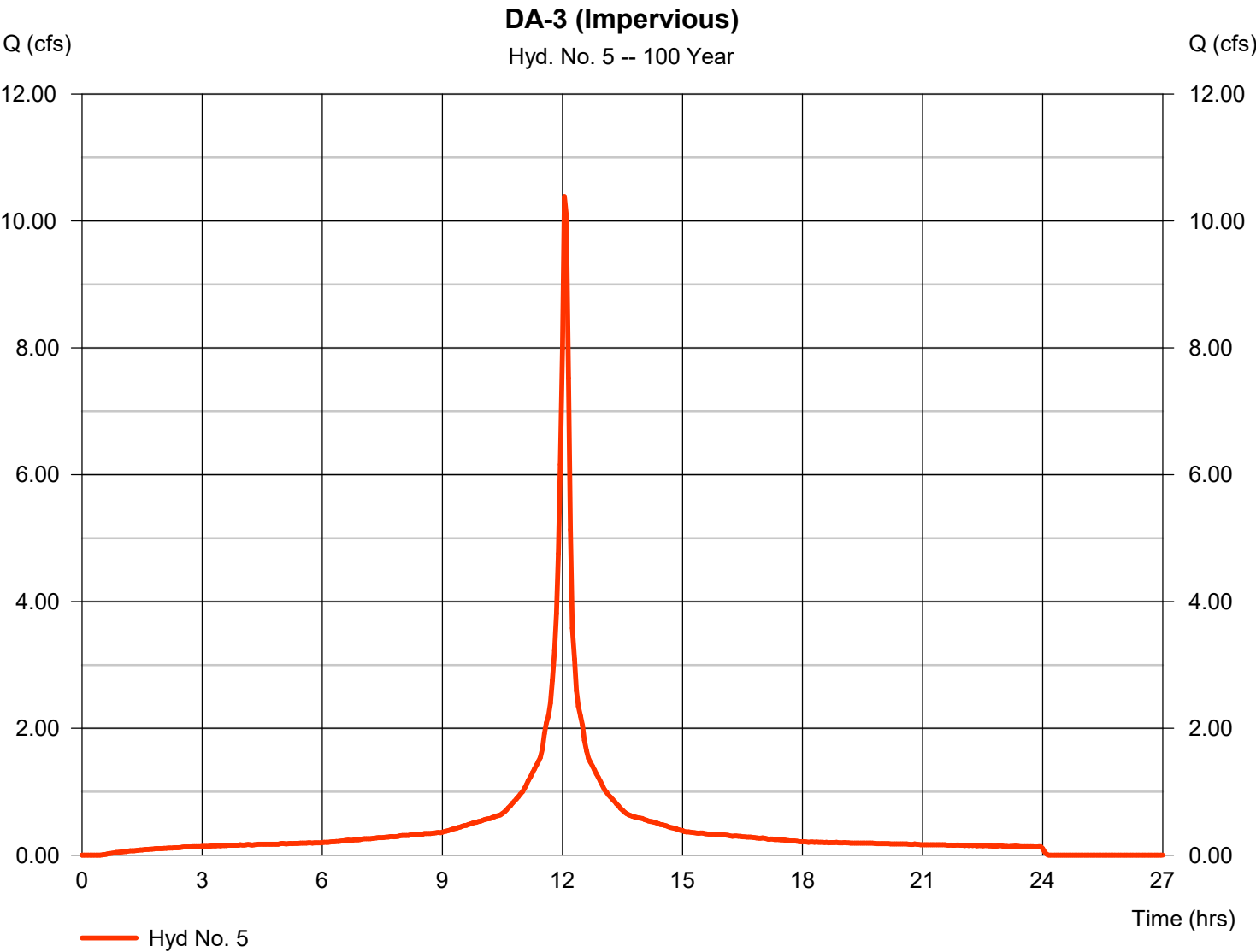


Hydrograph Report

Hyd. No. 5

DA-3 (Impervious)

Hydrograph type	= SCS Runoff	Peak discharge	= 10.39 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 41,548 cuft
Drainage area	= 1.450 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\19-01-0265 Daughters of Israel - West Orange		

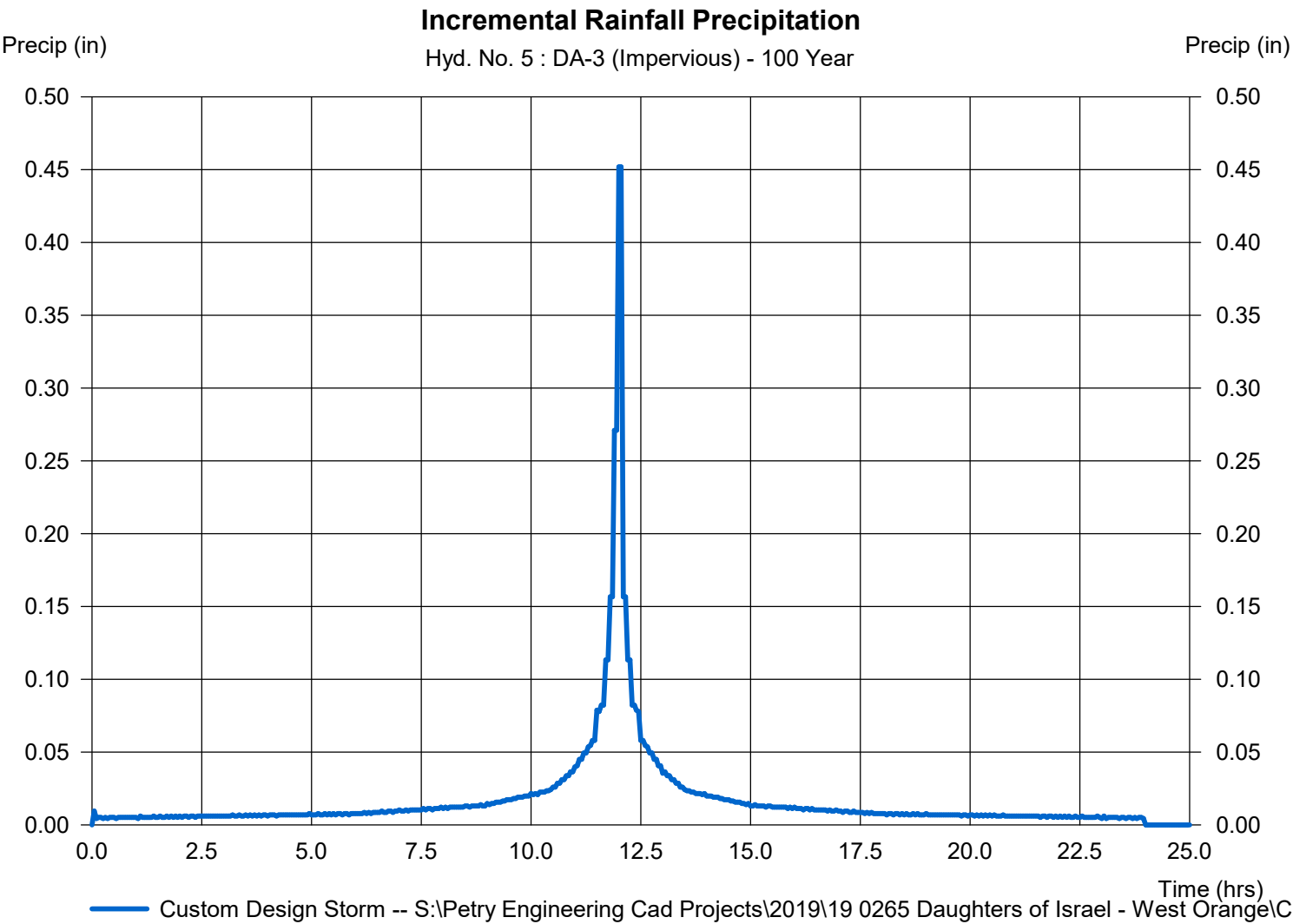


Precipitation Report

Hyd. No. 5

DA-3 (Impervious)

Storm Frequency	= 100 yrs	Time interval	= 3 min
Total precip.	= 8.6600 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Hydrographs\Hydrograph\Hydrograph Data\DA-3 (Impervious) - 100 Year		



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

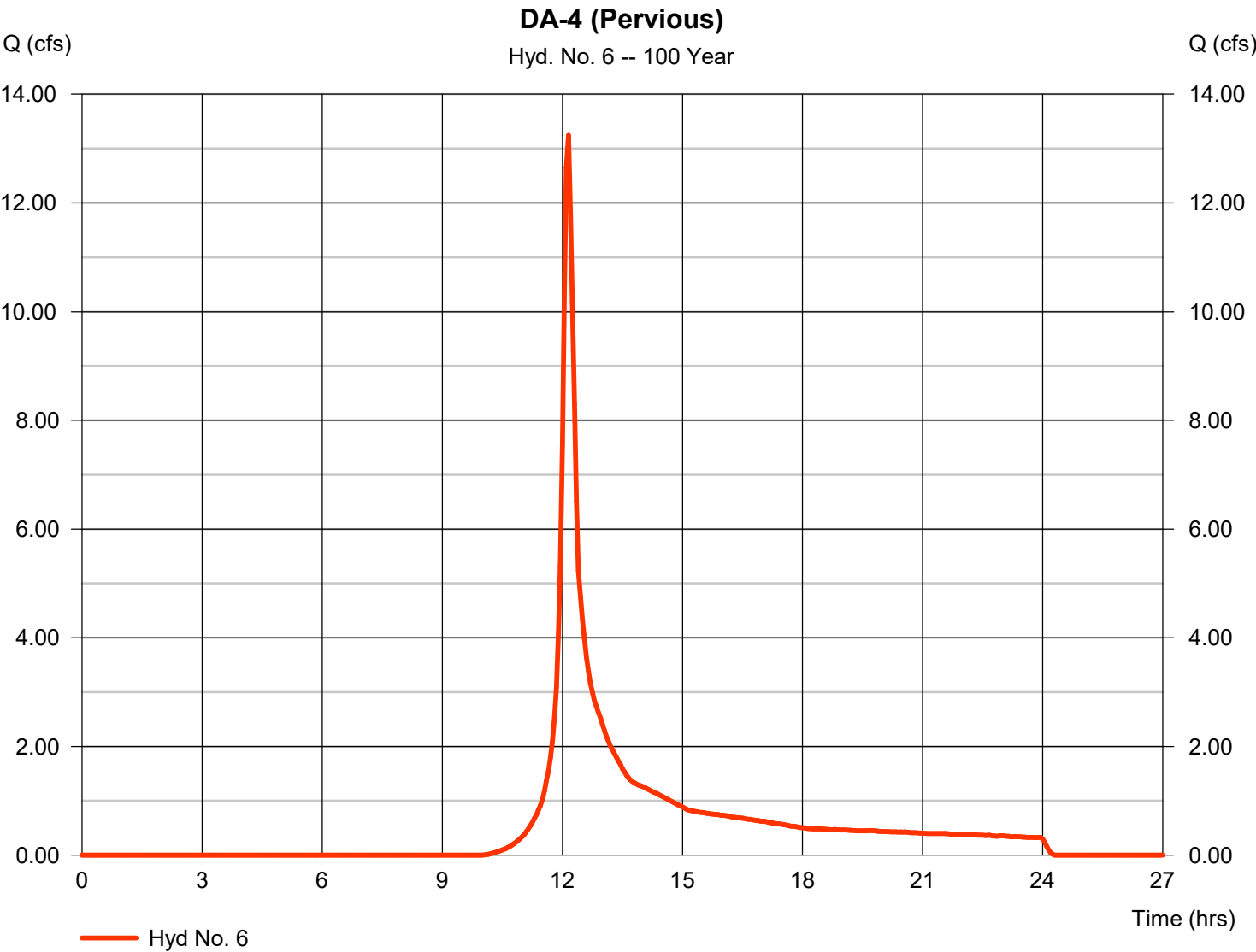
Friday, 01 / 27 / 2023

Hyd. No. 6

DA-4 (Pervious)

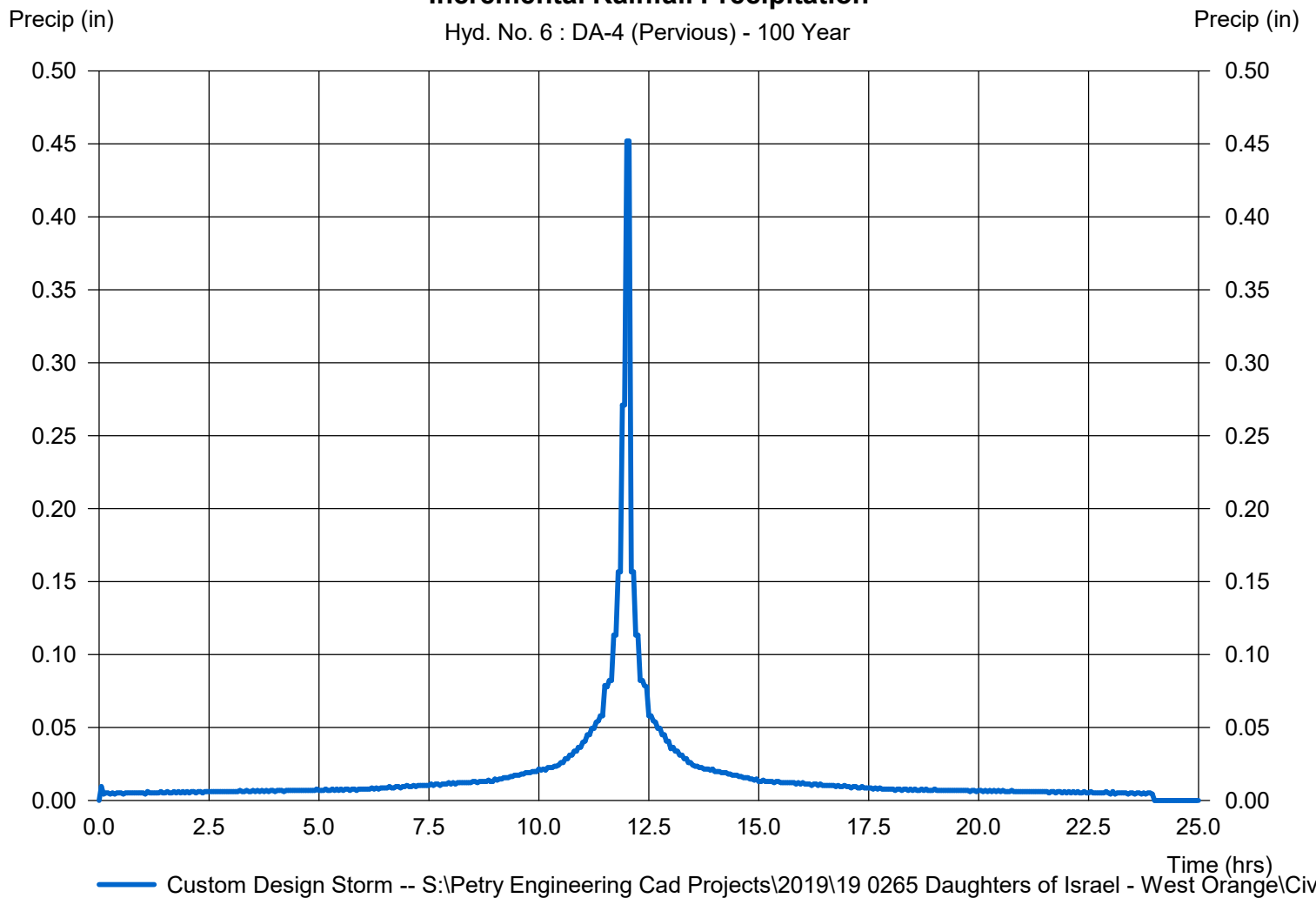
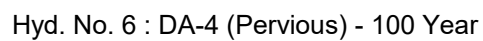
Hydrograph type	=	SCS Runoff	Peak discharge	=	13.24 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.15 hrs
Time interval	=	3 min	Hyd. volume	=	54,258 cuft
Drainage area	=	4.780 ac	Curve number	=	54*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	14.30 min
Total precip.	=	8.66 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\19-01-0265 Daughters of Israel - West Orange			

* Composite (Area/CN) = [(2.140 x 30) + (1.440 x 70) + (0.360 x 74) + (0.840 x 80)] / 4.780



DA-4 (Pervious)

Storm Frequency = 100 yrs Time interval = 3 min
 Total precip. = 8.6600 in Distribution = Custom
 Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

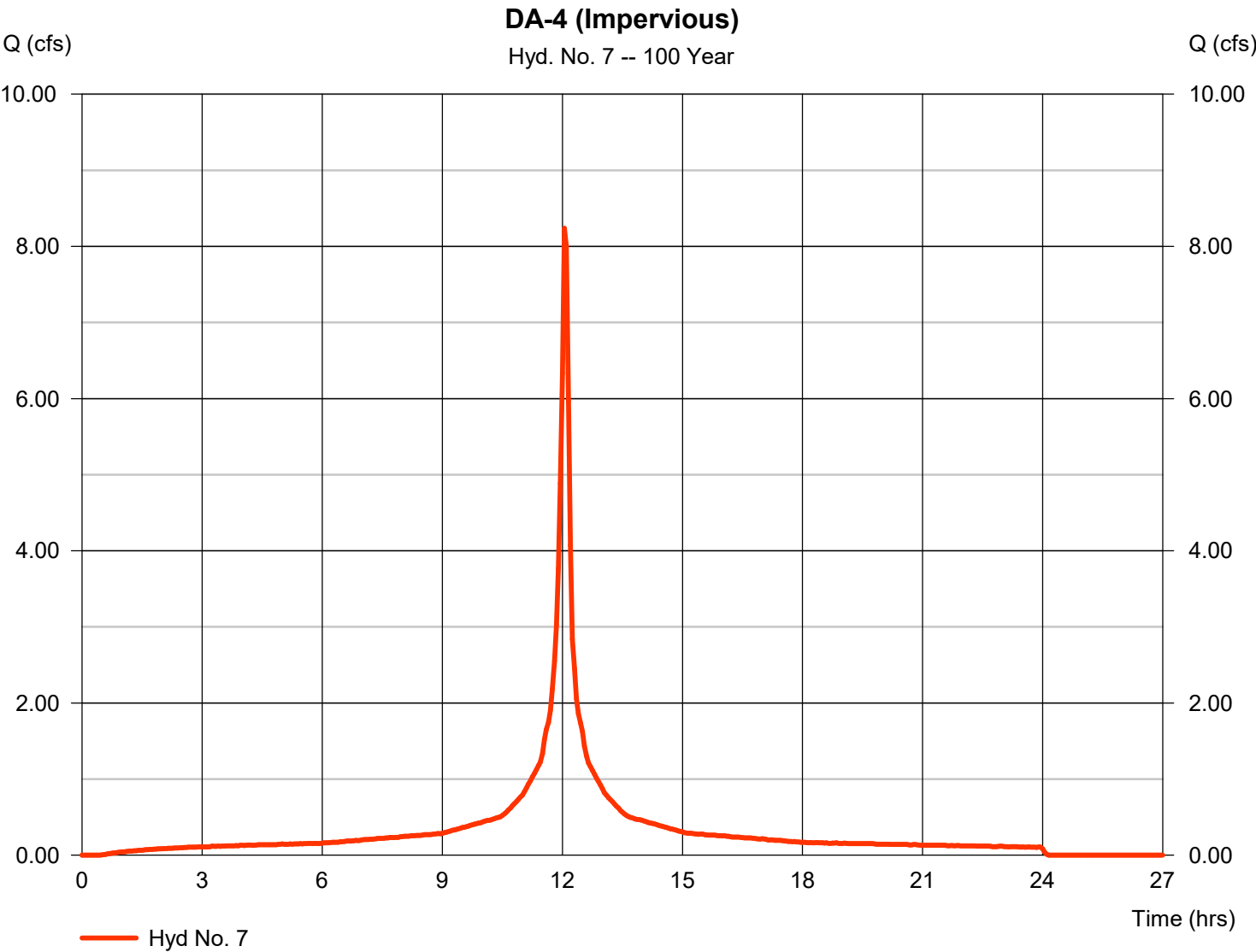
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 7

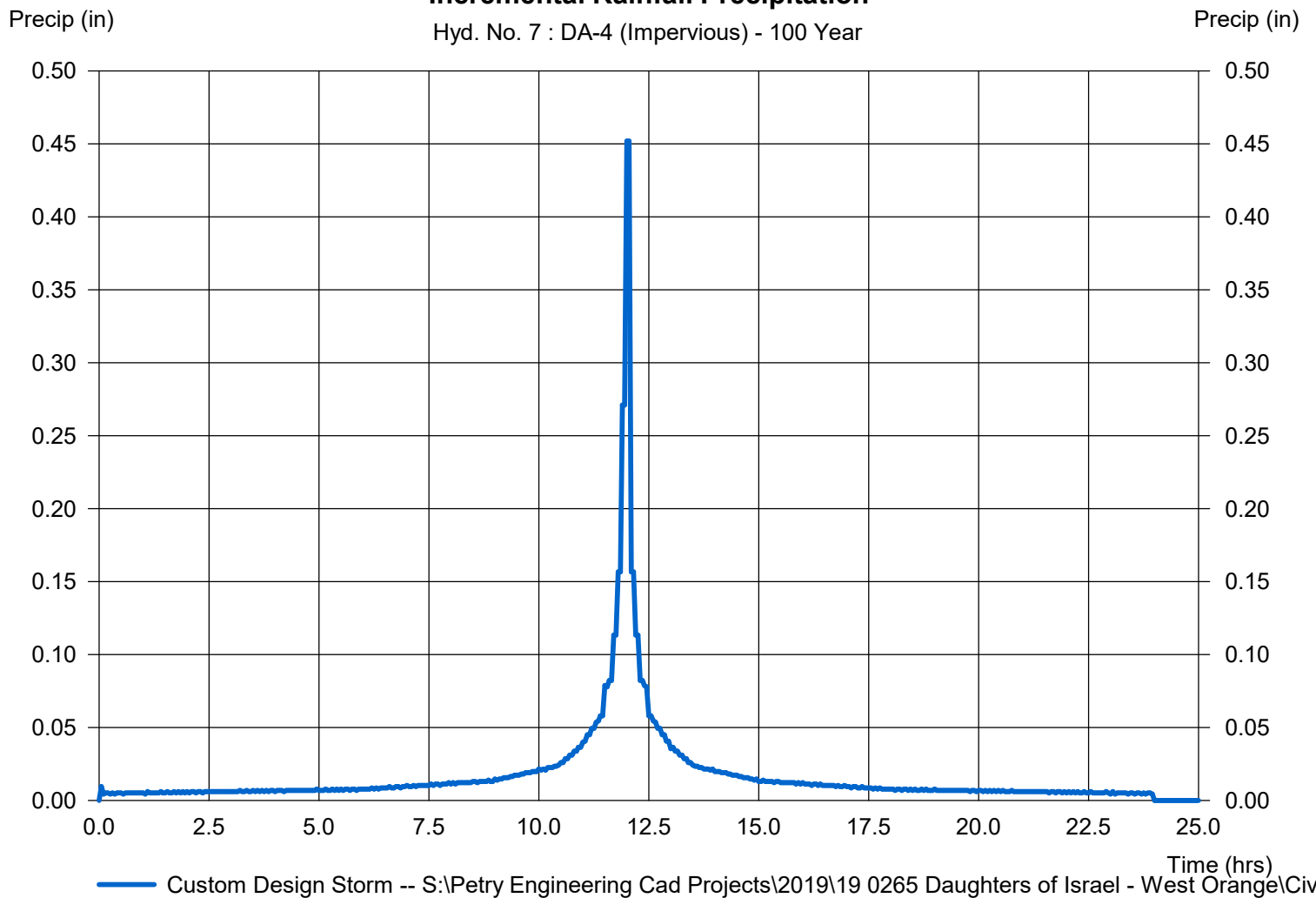
DA-4 (Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.237 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	32,952 cuft
Drainage area	=	1.150 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	8.66 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\191019 0265 Daughters of Israel - West Orange			



DA-4 (Impervious)

Storm Frequency = 100 yrs Time interval = 3 min
Total precip. = 8.6600 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



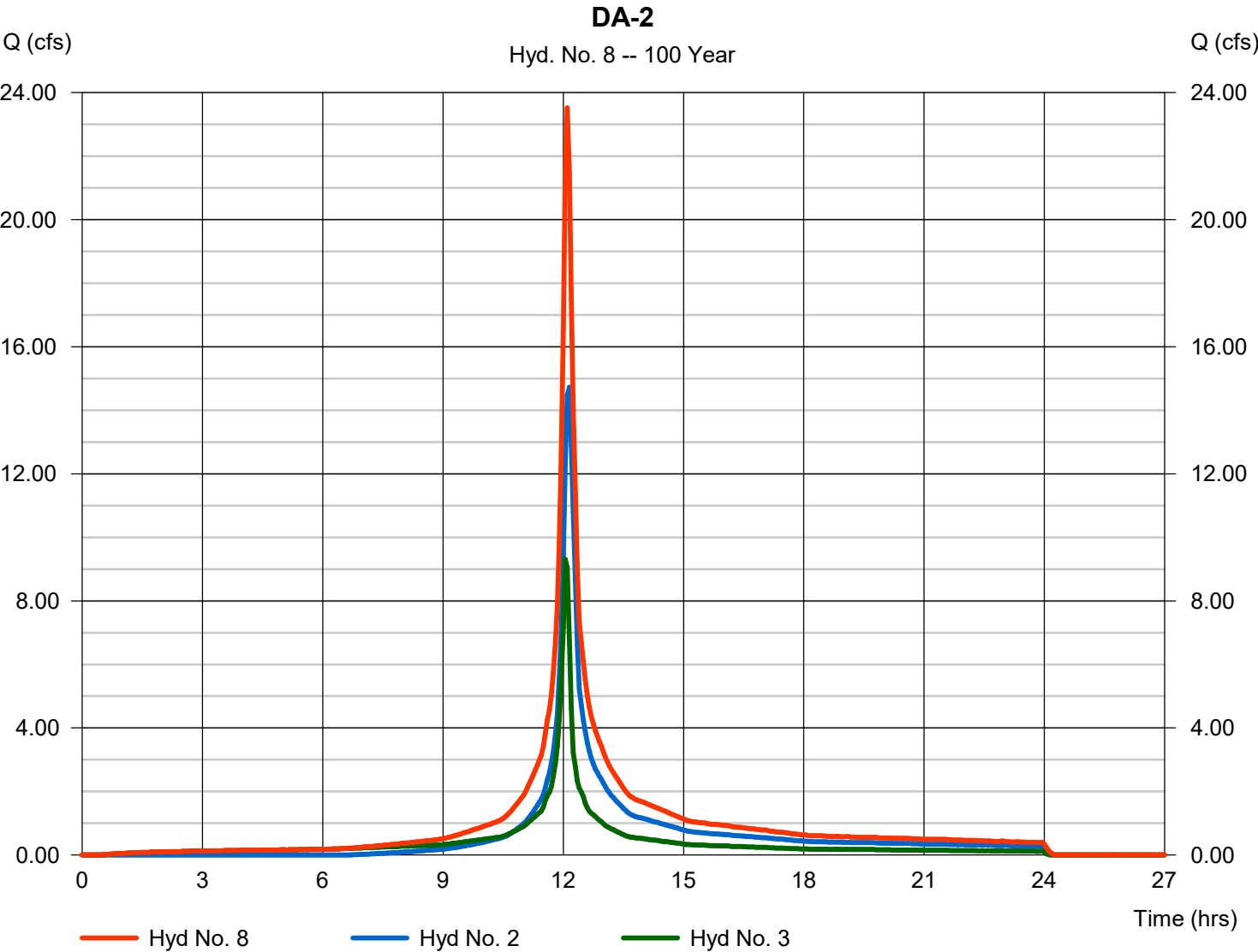
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 8

DA-2			
Hydrograph type	= Combine	Peak discharge	= 23.52 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 96,782 cuft
Inflow hyds.	= 2, 3	Contrib. drain. area	= 4.480 ac



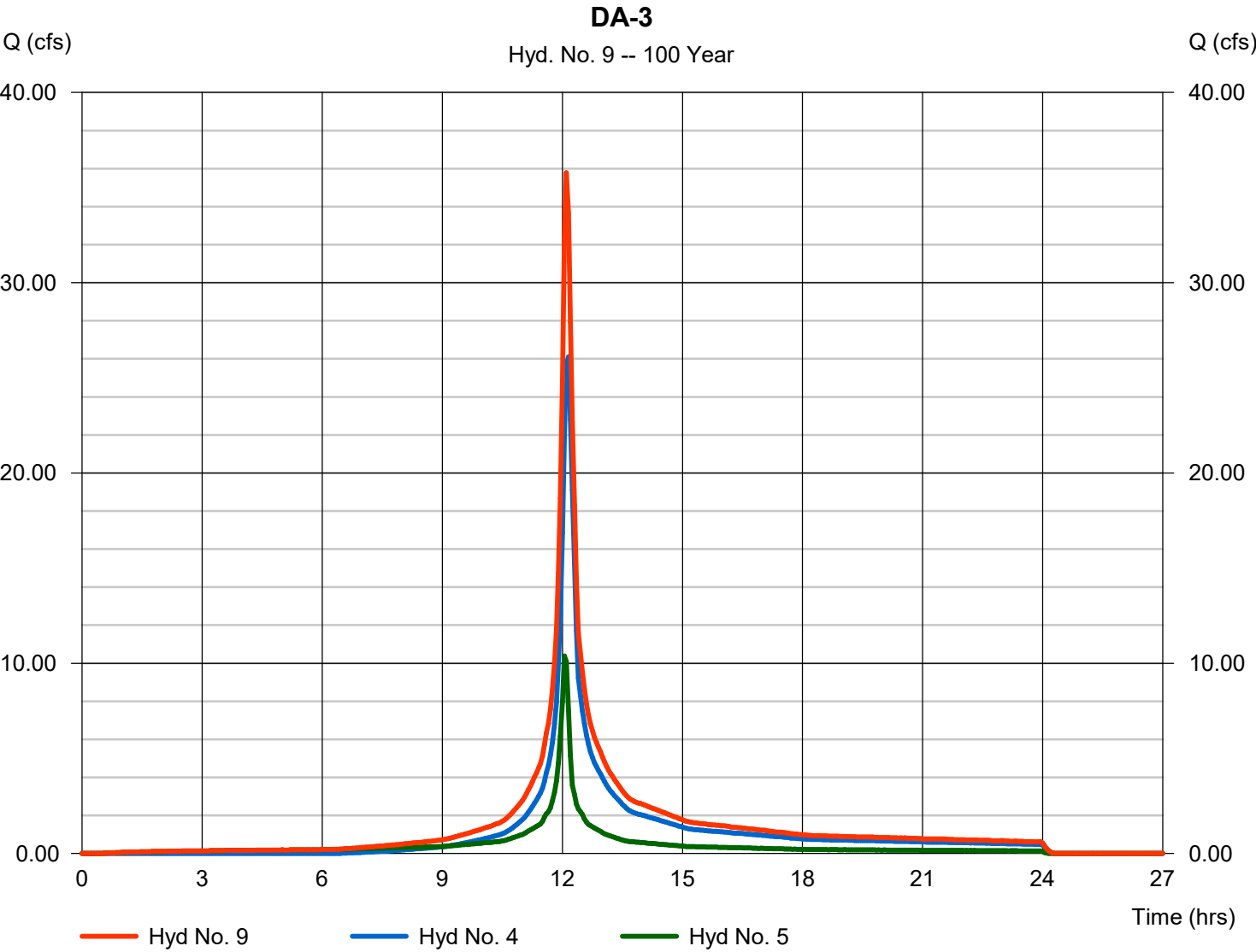
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 9

DA-3			
Hydrograph type	= Combine	Peak discharge	= 35.79 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 147,309 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 6.970 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

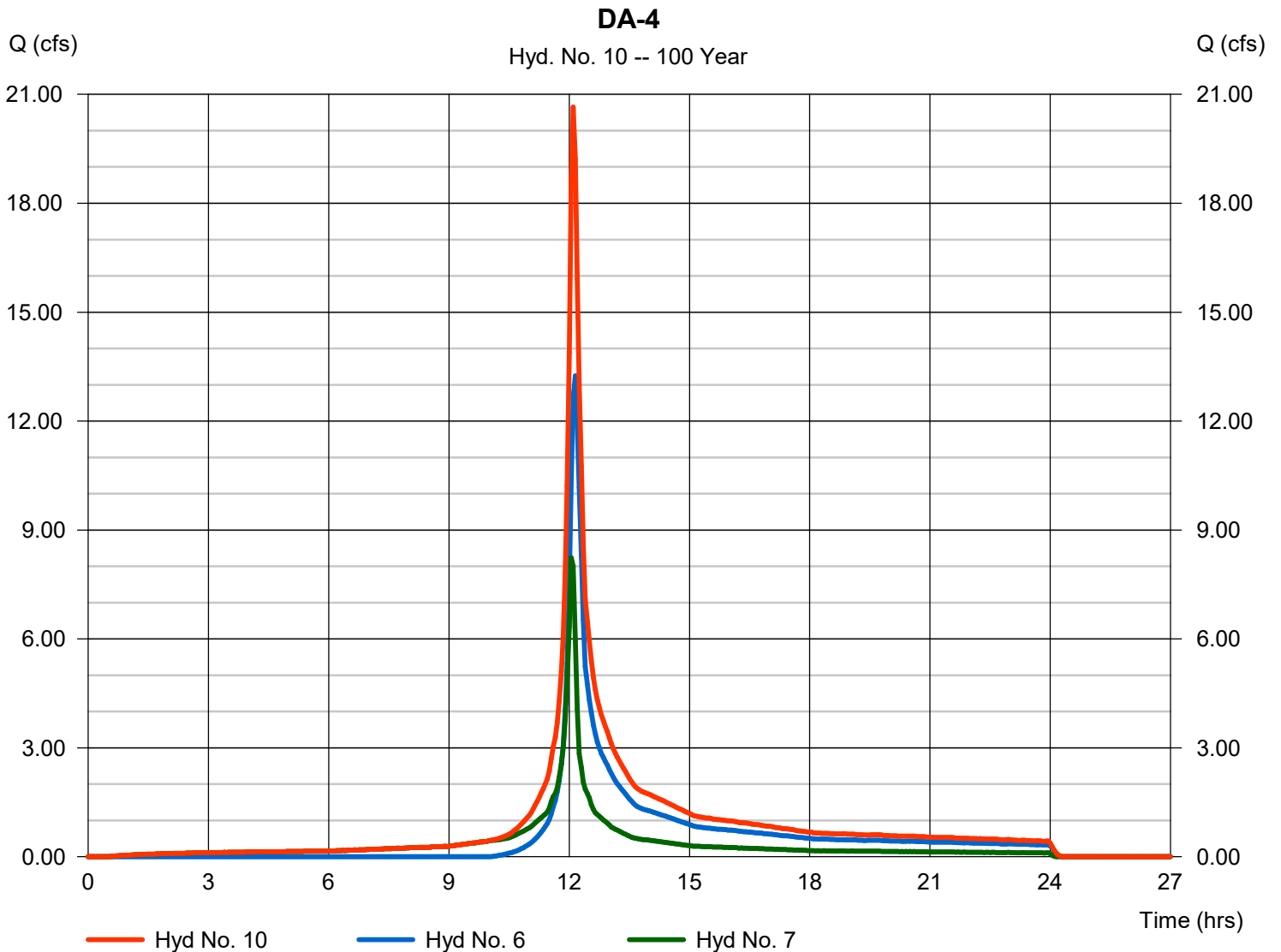
Friday, 01 / 27 / 2023

Hyd. No. 10

DA-4

Hydrograph type = Combine
 Storm frequency = 100 yrs
 Time interval = 3 min
 Inflow hyds. = 6, 7

Peak discharge = 20.65 cfs
 Time to peak = 12.10 hrs
 Hyd. volume = 87,210 cuft
 Contrib. drain. area = 5.930 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

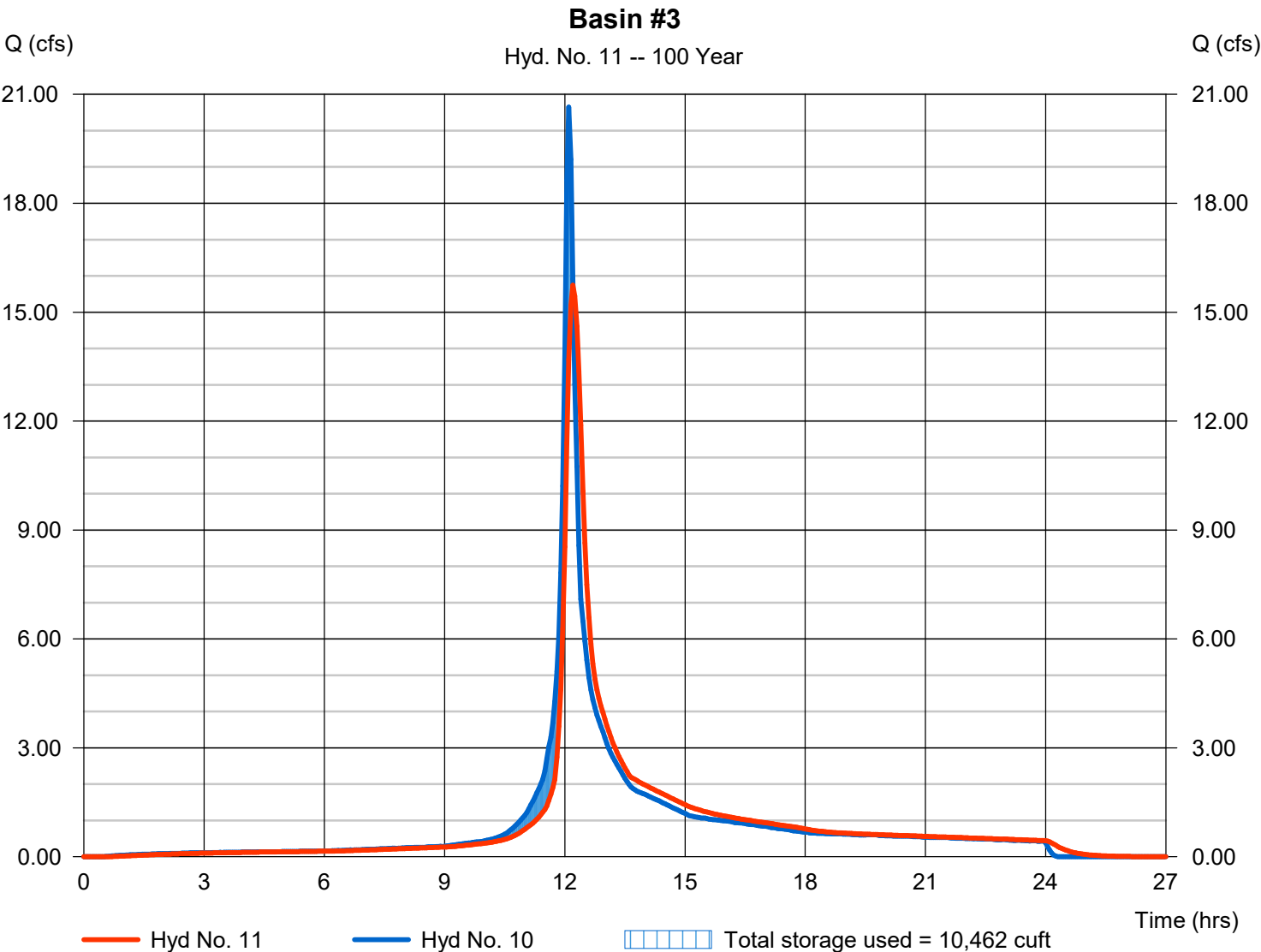
Friday, 01 / 27 / 2023

Hyd. No. 11

Basin #3

Hydrograph type	= Reservoir	Peak discharge	= 15.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 3 min	Hyd. volume	= 87,208 cuft
Inflow hyd. No.	= 10 - DA-4	Max. Elevation	= 419.95 ft
Reservoir name	= Basin #3	Max. Storage	= 10,462 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

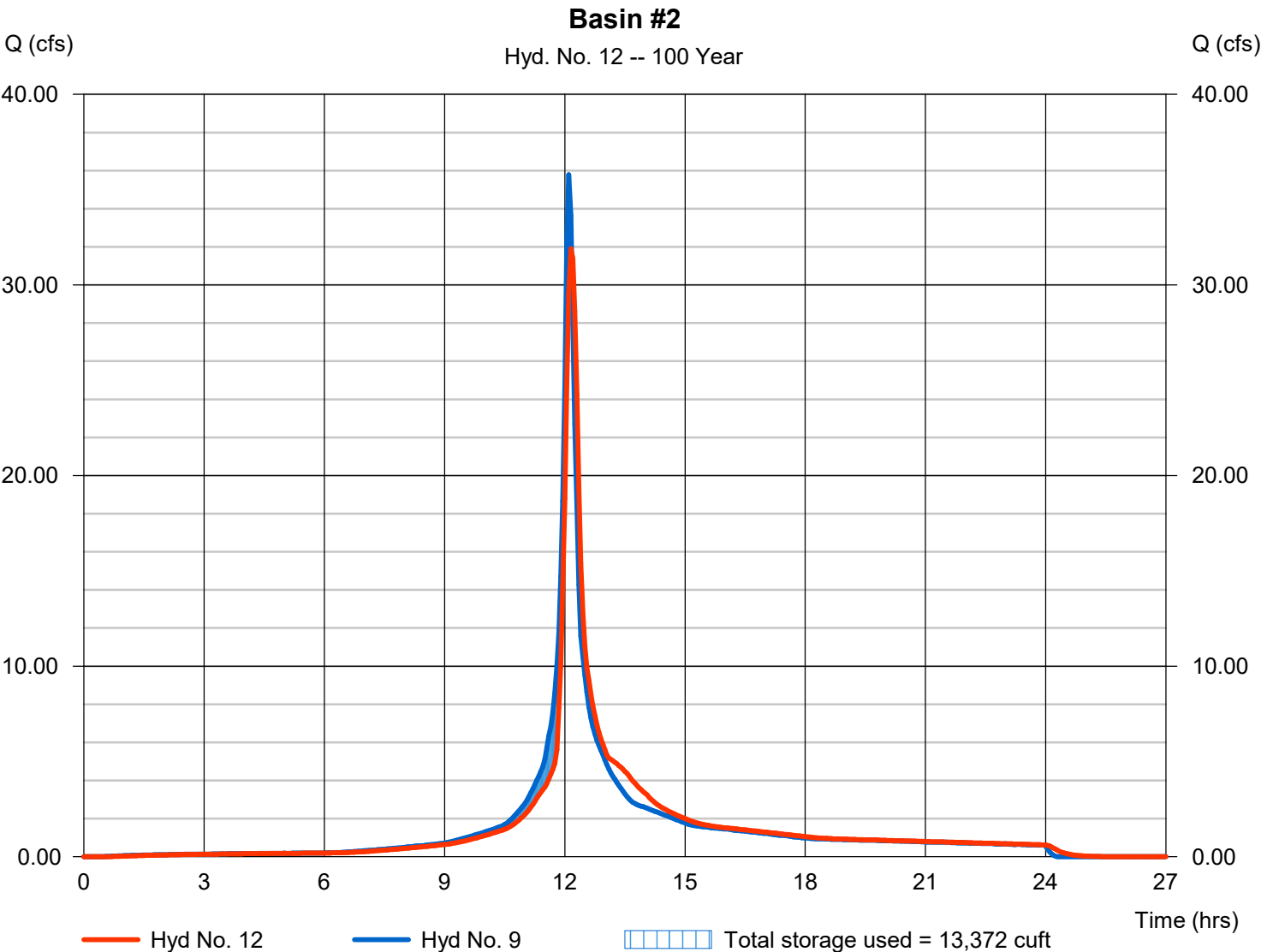
Friday, 01 / 27 / 2023

Hyd. No. 12

Basin #2

Hydrograph type	= Reservoir	Peak discharge	= 31.90 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 147,308 cuft
Inflow hyd. No.	= 9 - DA-3	Max. Elevation	= 417.96 ft
Reservoir name	= Basin #2	Max. Storage	= 13,372 cuft

Storage Indication method used.



Hydrograph Report

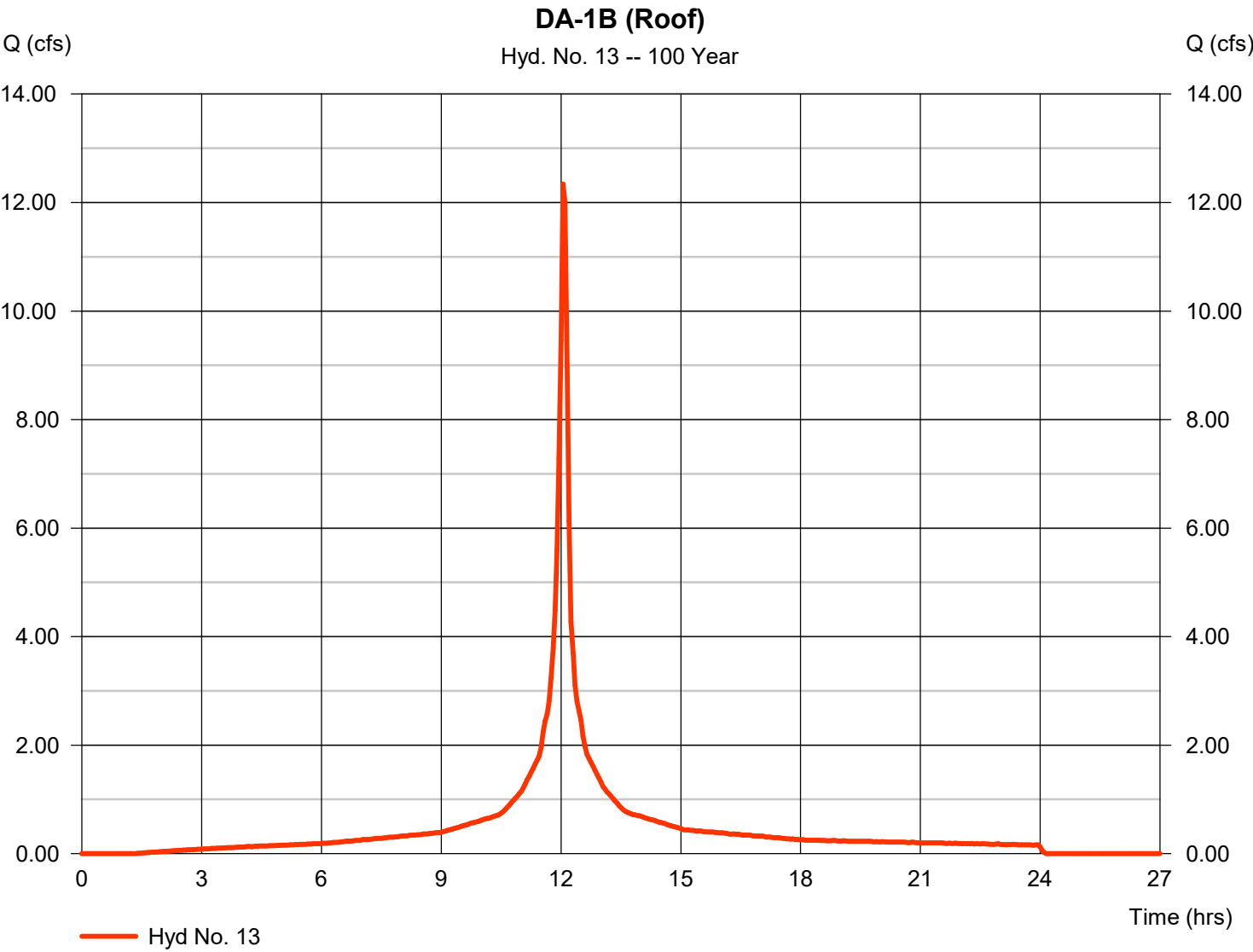
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 13

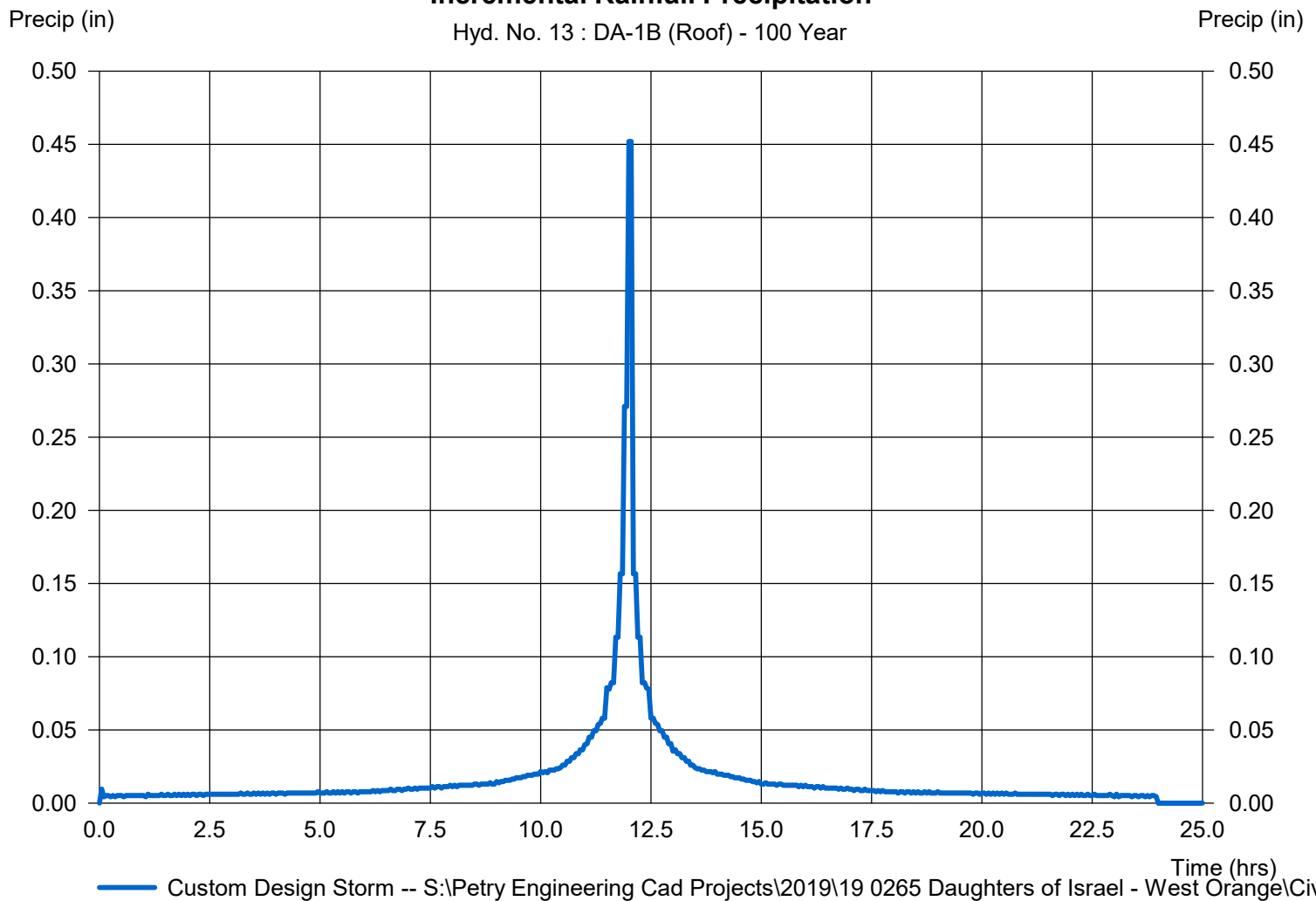
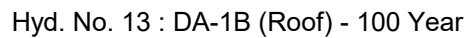
DA-1B (Roof)

Hydrograph type	= SCS Runoff	Peak discharge	= 12.34 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 47,277 cuft
Drainage area	= 1.750 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.66 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\13010 0265 Daughters of Israel - West Orange		



DA-1B (Roof)

Storm Frequency = 100 yrs Time interval = 3 min
Total precip. = 8.6600 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

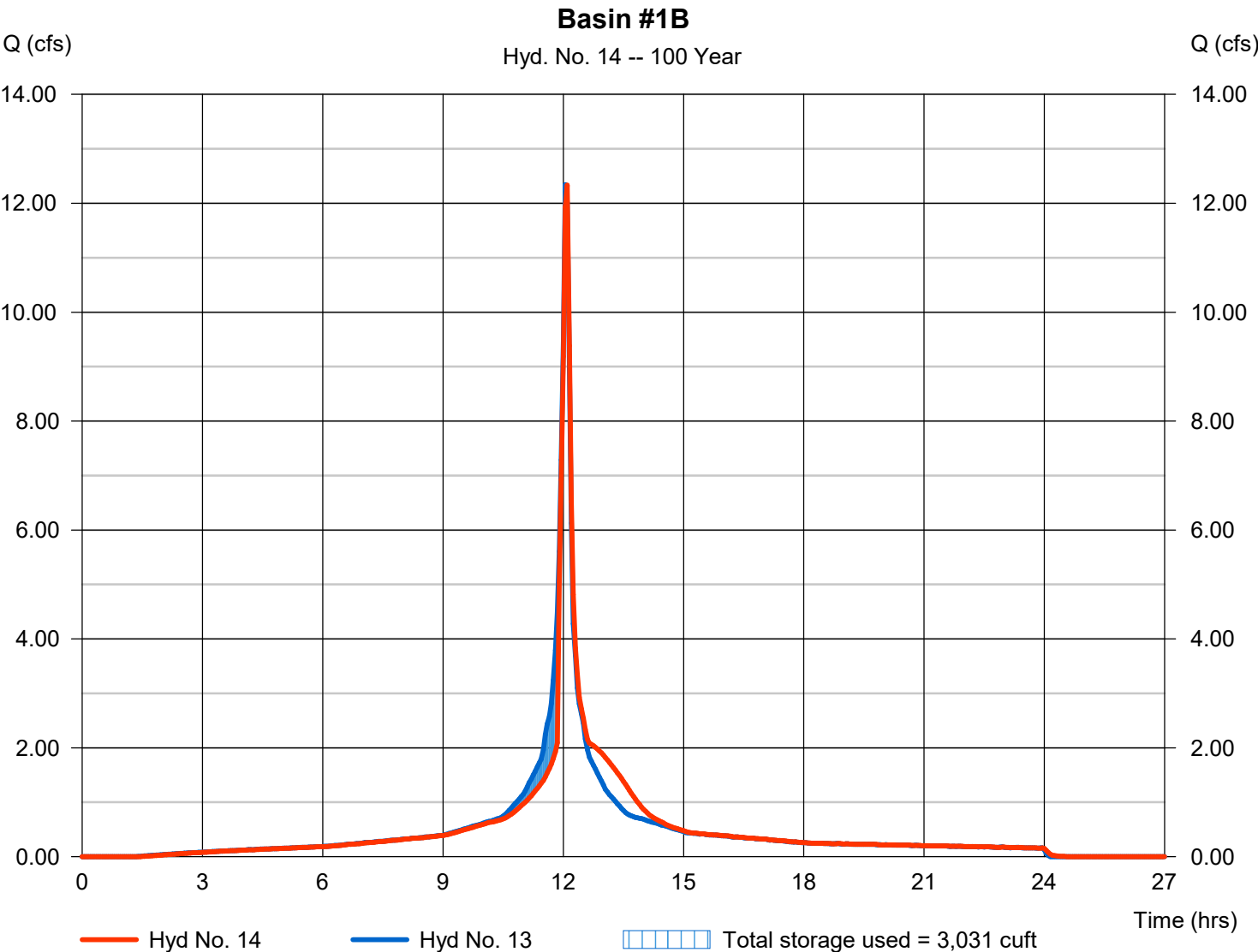
Friday, 01 / 27 / 2023

Hyd. No. 14

Basin #1B

Hydrograph type	= Reservoir	Peak discharge	= 12.33 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 47,277 cuft
Inflow hyd. No.	= 13 - DA-1B (Roof)	Max. Elevation	= 407.97 ft
Reservoir name	= Basin #1B	Max. Storage	= 3,031 cuft

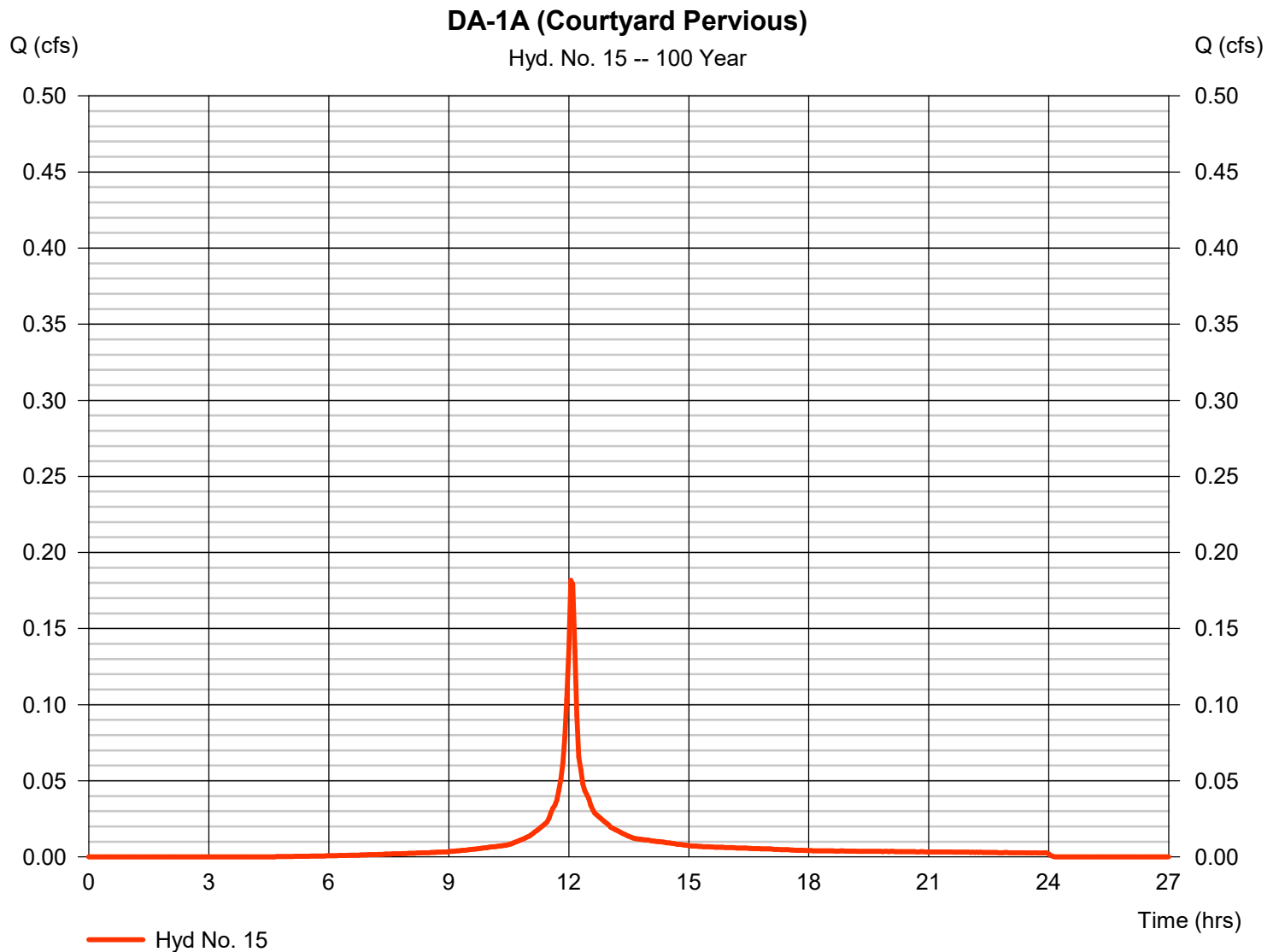
Storage Indication method used.



DA-1A (Courtyard Pervious)

Peak discharge	= 0.182 cfs
Time to peak	= 12.05 hrs
Hyd. volume	= 638 cuft
Curve number	= 80
Hydraulic length	= 0 ft
Time of conc. (Tc)	= 7.50 min
Distribution	= Custom

John 20:19-29 0265 Daughters of Israel - West Orange

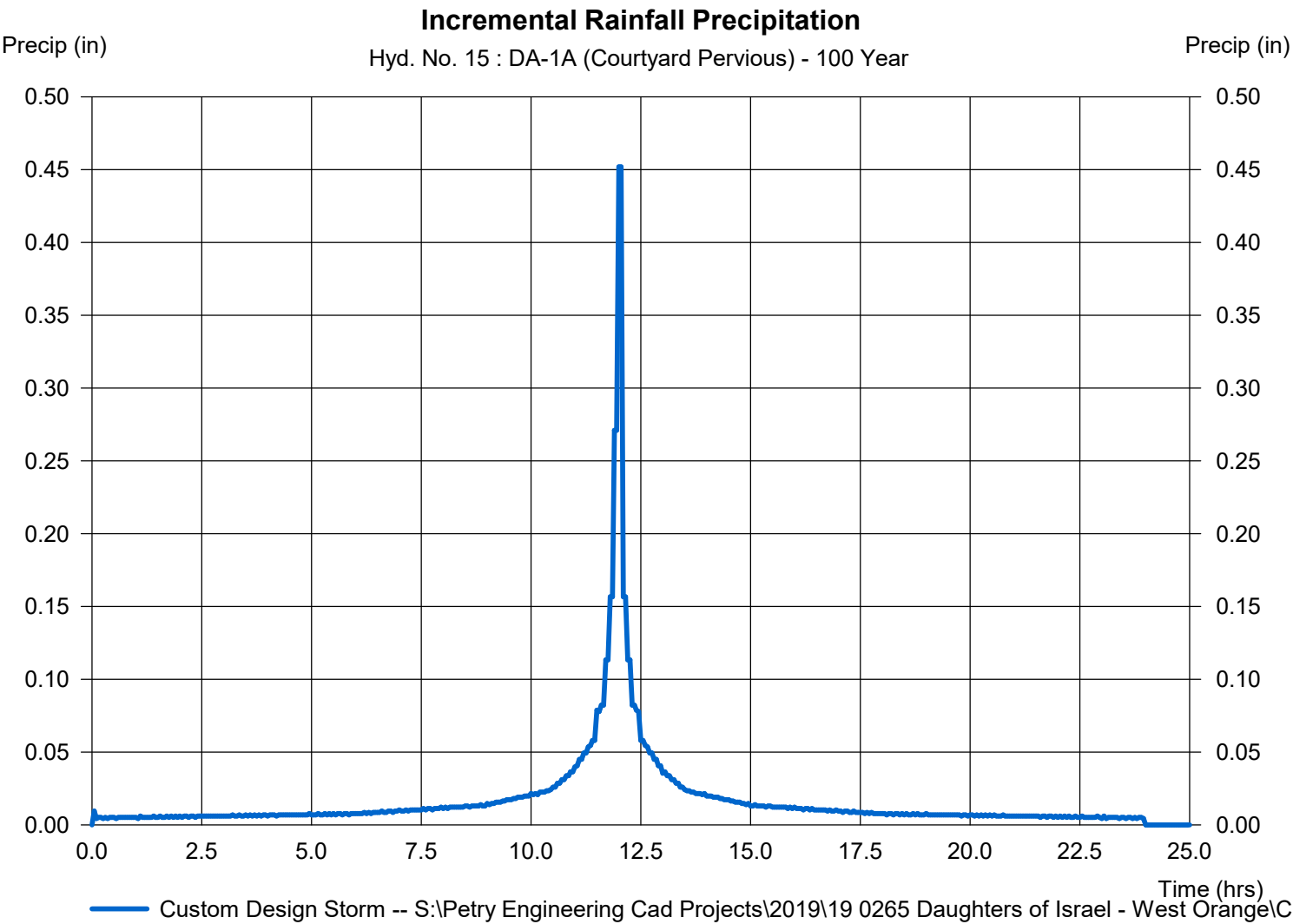


Precipitation Report

Hyd. No. 15

DA-1A (Courtyard Pervious)

Storm Frequency	= 100 yrs	Time interval	= 3 min
Total precip.	= 8.6600 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora		



Hydrograph Report

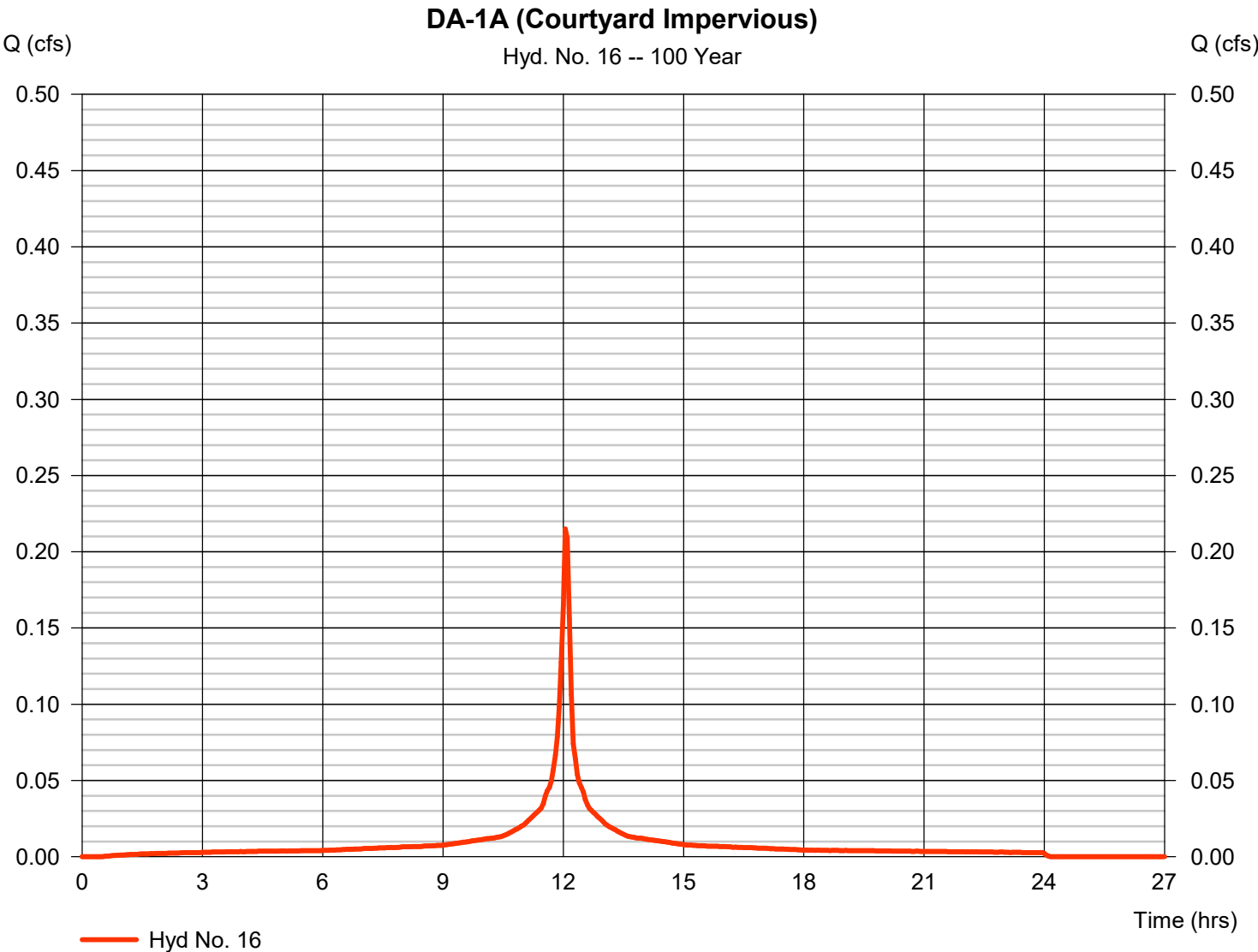
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 16

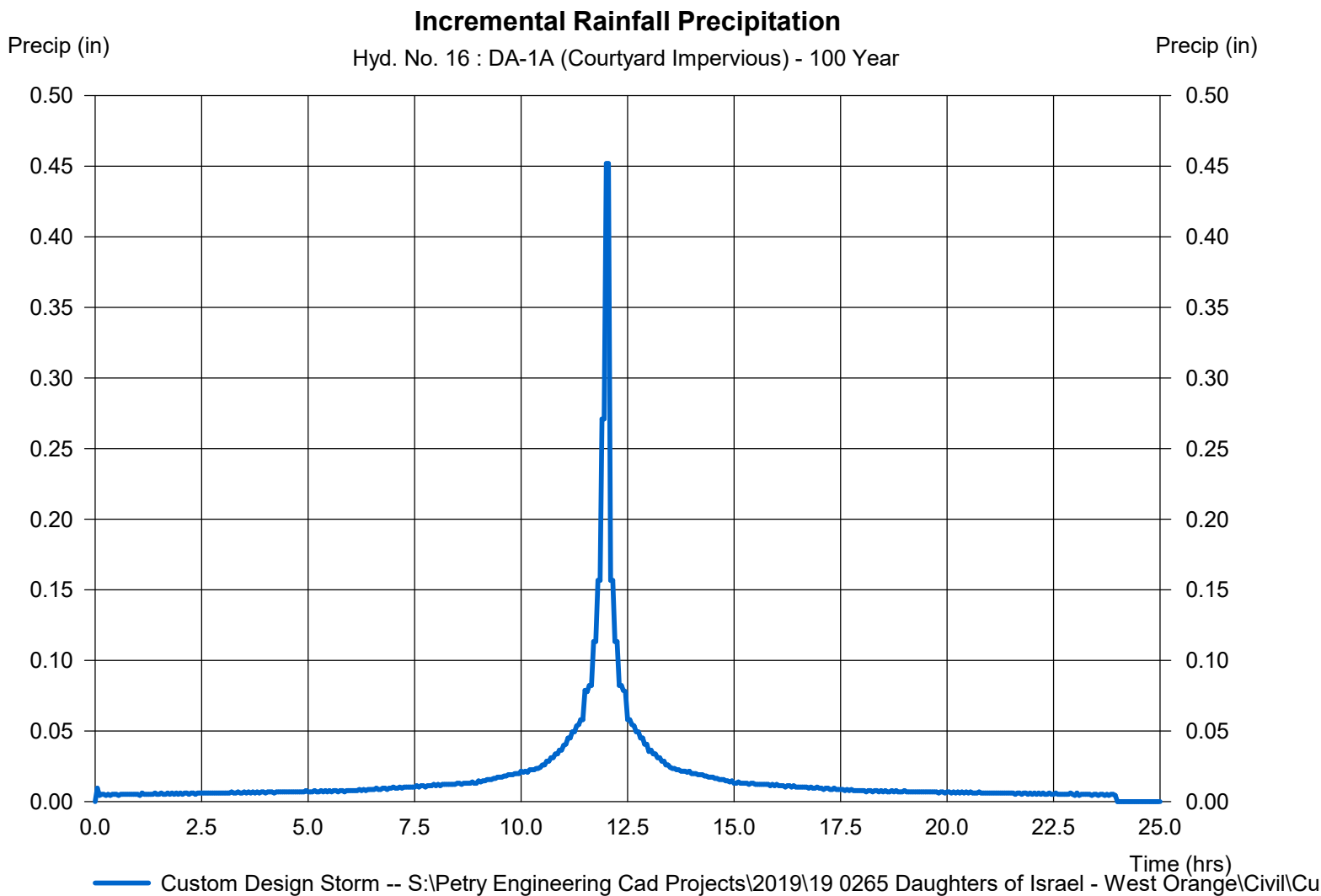
DA-1A (Courtyard Impervious)

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.215 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.05 hrs
Time interval	=	3 min	Hyd. volume	=	860 cuft
Drainage area	=	0.030 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	7.50 min
Total precip.	=	8.66 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2019\10-0265 Daughters of Israel - West Orange, NJ\10-0265 Daughters of Israel - West Orange, NJ.dwg			



DA-1A (Courtyard Impervious)

Storm Frequency = 100 yrs Time interval = 3 min
Total precip. = 8.6600 in Distribution = Custom
Storm duration = S:\Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Ora



Hydrograph Report

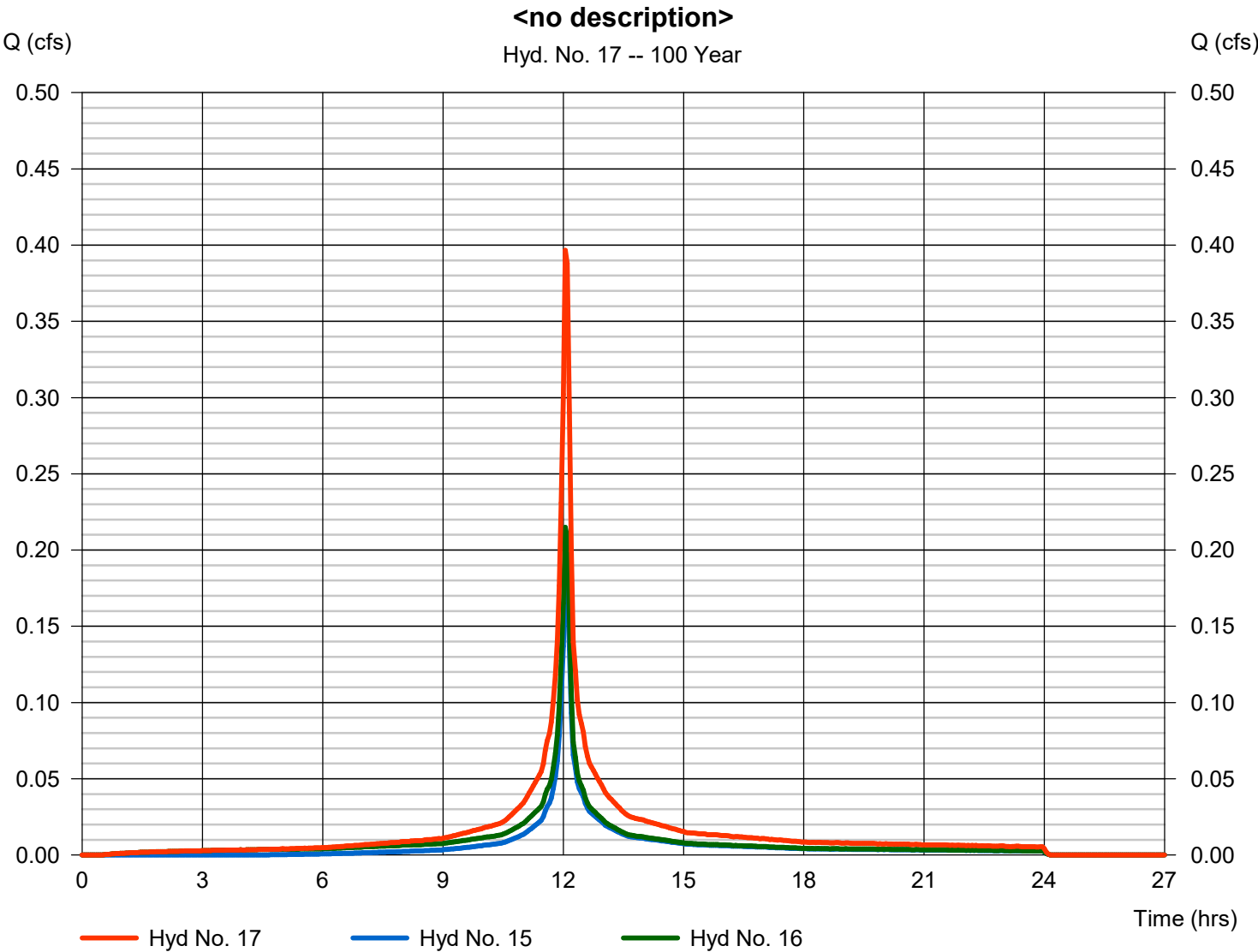
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

Hyd. No. 17

<no description>

Hydrograph type	= Combine	Peak discharge	= 0.397 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 1,497 cuft
Inflow hyds.	= 15, 16	Contrib. drain. area	= 0.060 ac

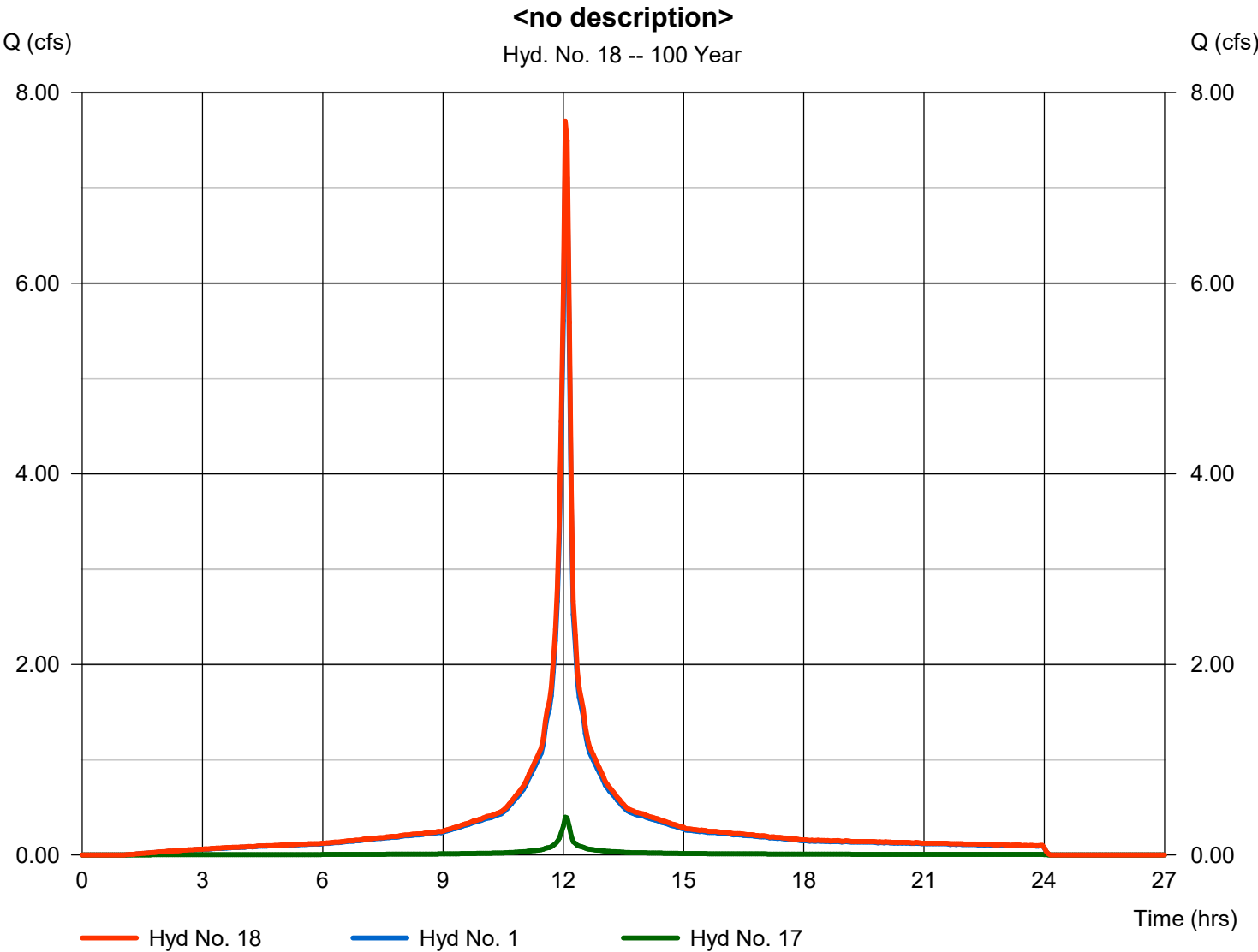


Hydrograph Report

Hyd. No. 18

<no description>

Hydrograph type	= Combine	Peak discharge	= 7.698 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 29,746 cuft
Inflow hyds.	= 1, 17	Contrib. drain. area	= 1.030 ac



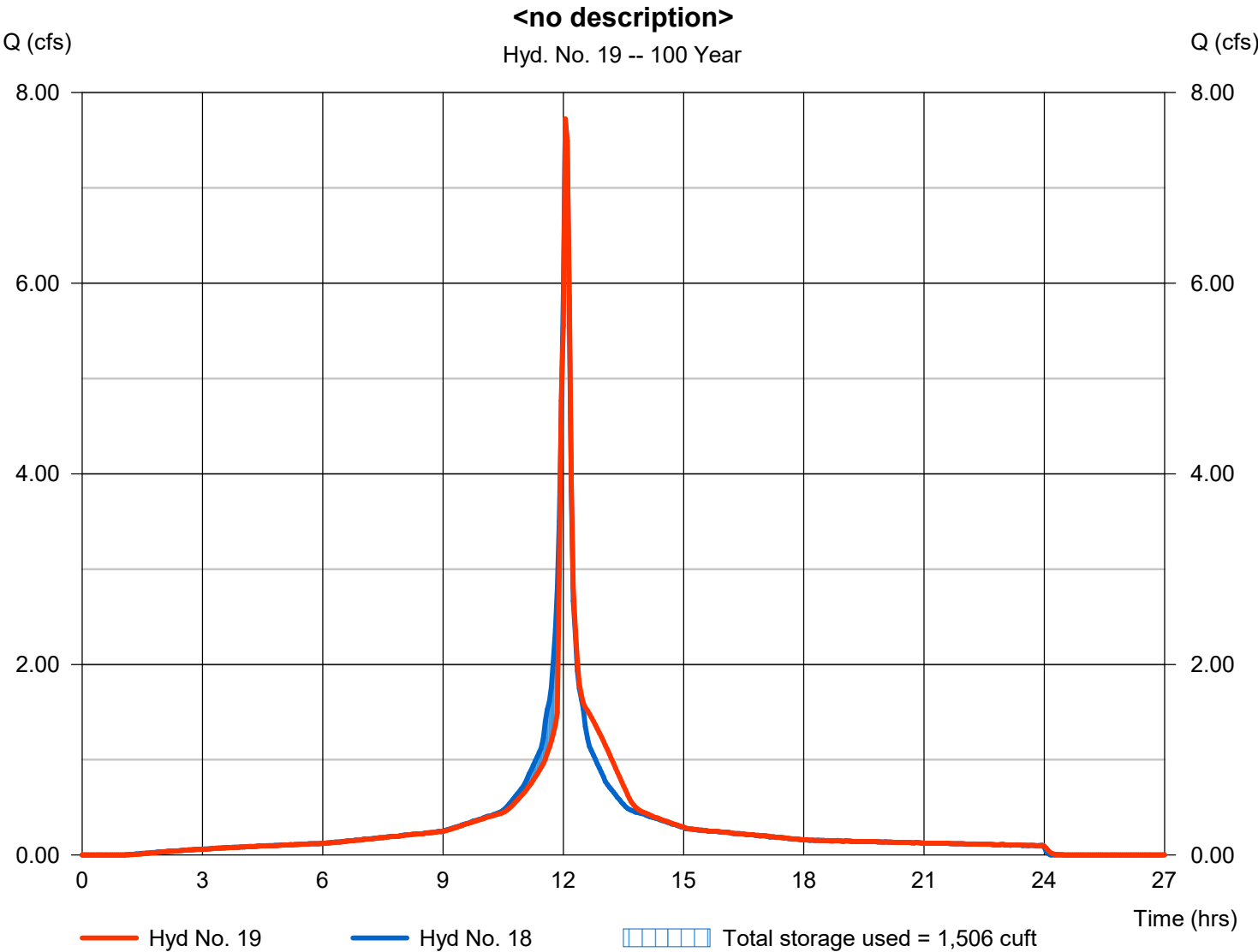
Hydrograph Report

Hyd. No. 19

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 7.726 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 29,745 cuft
Inflow hyd. No.	= 18 - <no description>	Max. Elevation	= 421.99 ft
Reservoir name	= Basin #1A	Max. Storage	= 1,506 cuft

Storage Indication method used.

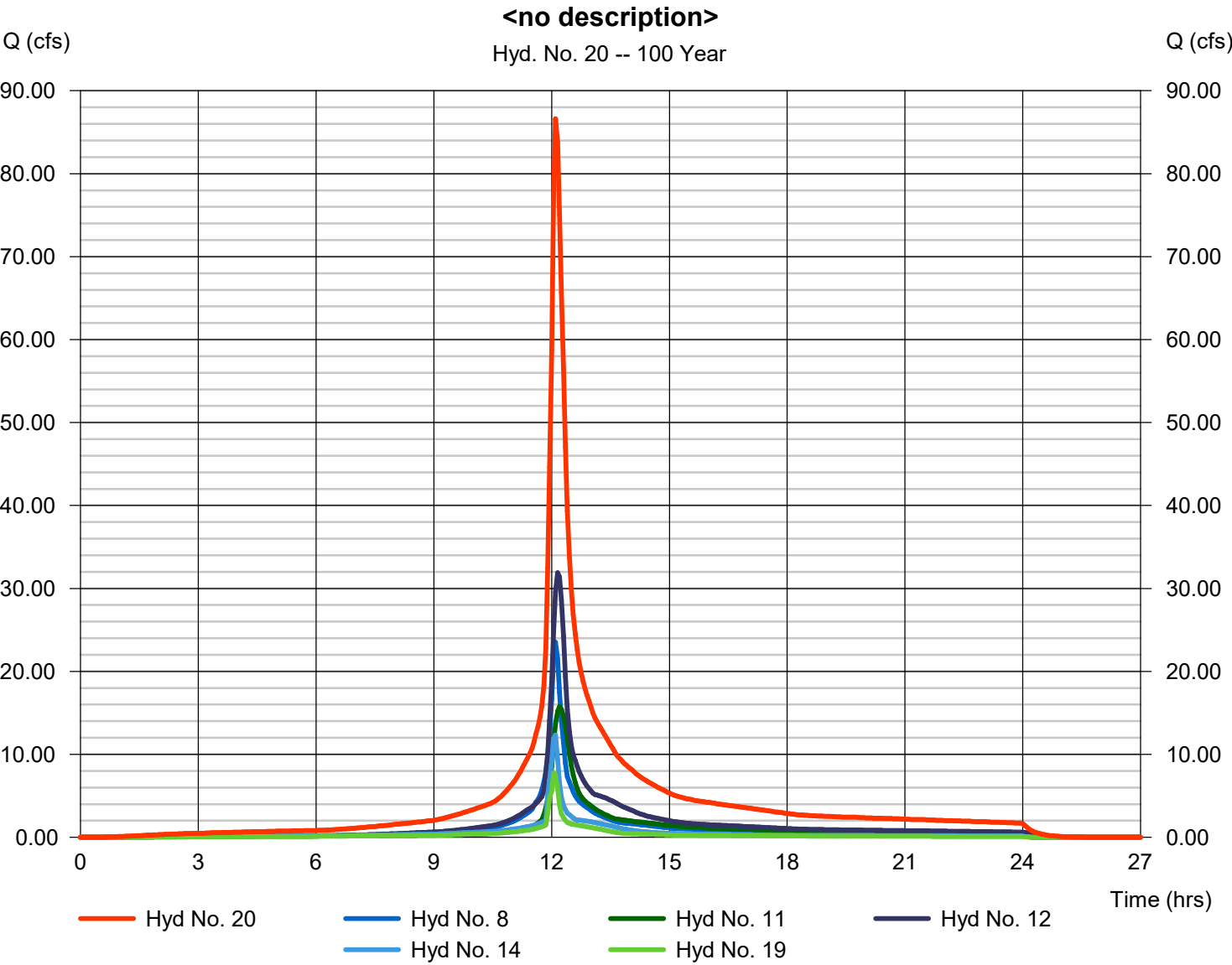


Hydrograph Report

Hyd. No. 20

<no description>

Hydrograph type	= Combine	Peak discharge	= 86.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 408,320 cuft
Inflow hyds.	= 8, 11, 12, 14, 19	Contrib. drain. area	= 0.000 ac



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Friday, 01 / 27 / 2023

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

$$\text{Intensity} = B / (T_c + D)^E$$

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

T_c = time in minutes. Values may exceed 60.

Petry Engineering Cad Projects\2019\19 0265 Daughters of Israel - West Orange\Civil\Current\Stormwater\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	3.44	0.00	0.00	0.00	0.00	0.00	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	0.00	3.44	0.00	0.00	5.22	6.44	0.00	8.66

ELEVATION VS. TIME HYDOGRPAHS



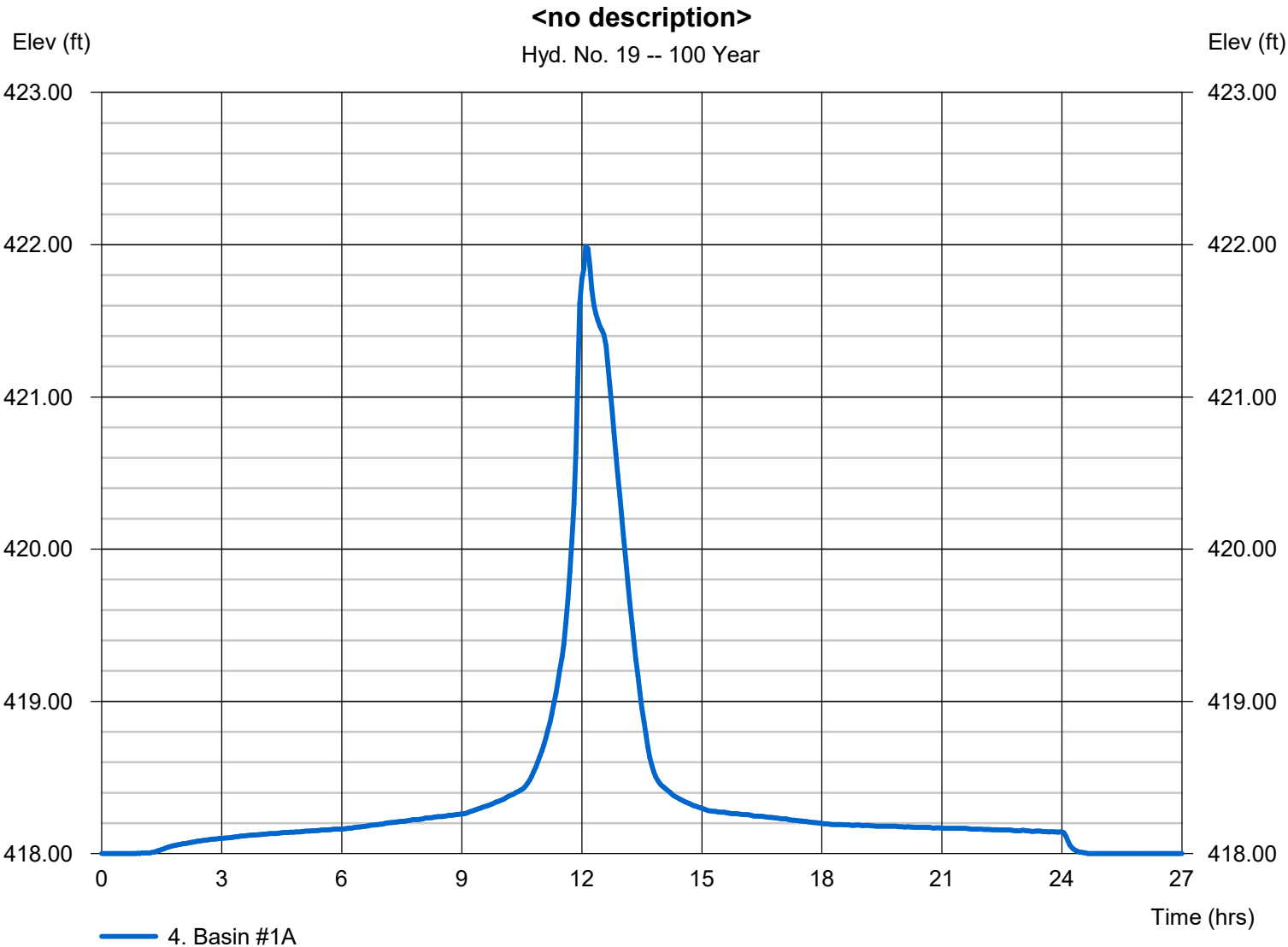
Hydrograph Report

Hyd. No. 19

<no description>

Hydrograph type	= Reservoir	Peak discharge	= 7.726 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.05 hrs
Time interval	= 3 min	Hyd. volume	= 29,745 cuft
Inflow hyd. No.	= 18 - <no description>	Max. Elevation	= 421.99 ft
Reservoir name	= Basin #1A	Max. Storage	= 1,506 cuft

Storage Indication method used.



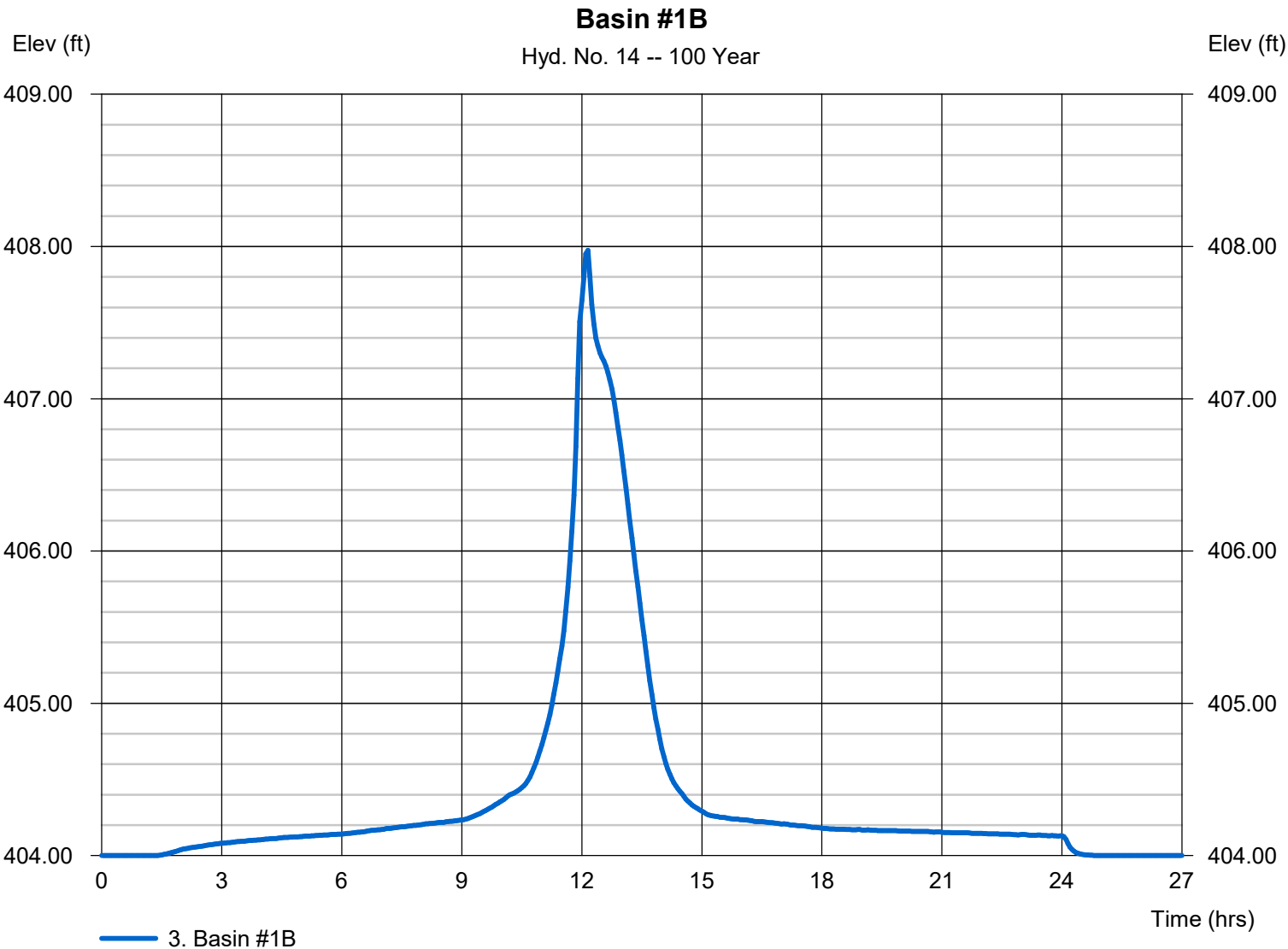
Hydrograph Report

Hyd. No. 14

Basin #1B

Hydrograph type	= Reservoir	Peak discharge	= 12.33 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.10 hrs
Time interval	= 3 min	Hyd. volume	= 47,277 cuft
Inflow hyd. No.	= 13 - DA-1B (Roof)	Max. Elevation	= 407.97 ft
Reservoir name	= Basin #1B	Max. Storage	= 3,031 cuft

Storage Indication method used.



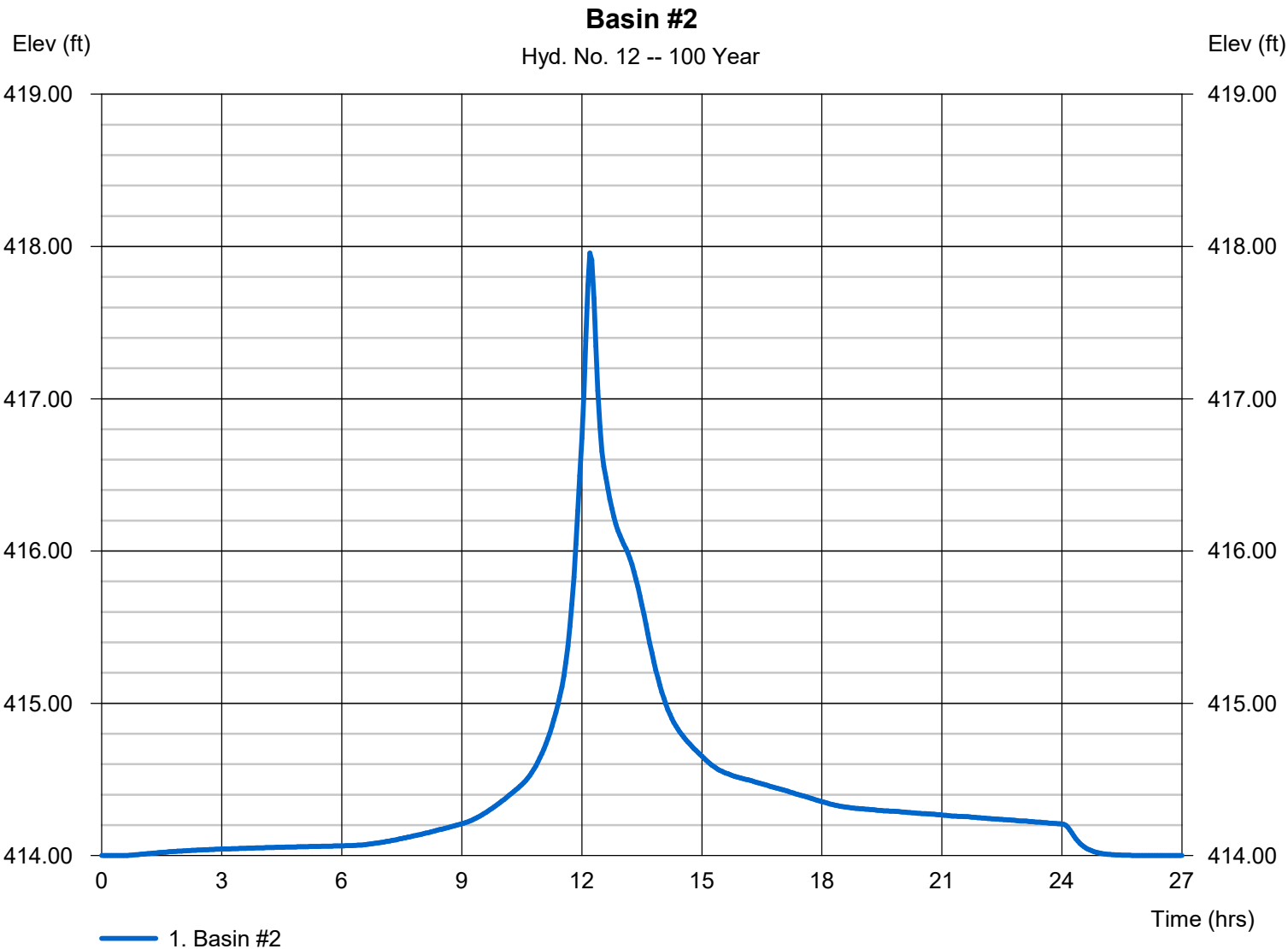
Hydrograph Report

Hyd. No. 12

Basin #2

Hydrograph type	= Reservoir	Peak discharge	= 31.90 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 3 min	Hyd. volume	= 147,308 cuft
Inflow hyd. No.	= 9 - DA-3	Max. Elevation	= 417.96 ft
Reservoir name	= Basin #2	Max. Storage	= 13,372 cuft

Storage Indication method used.



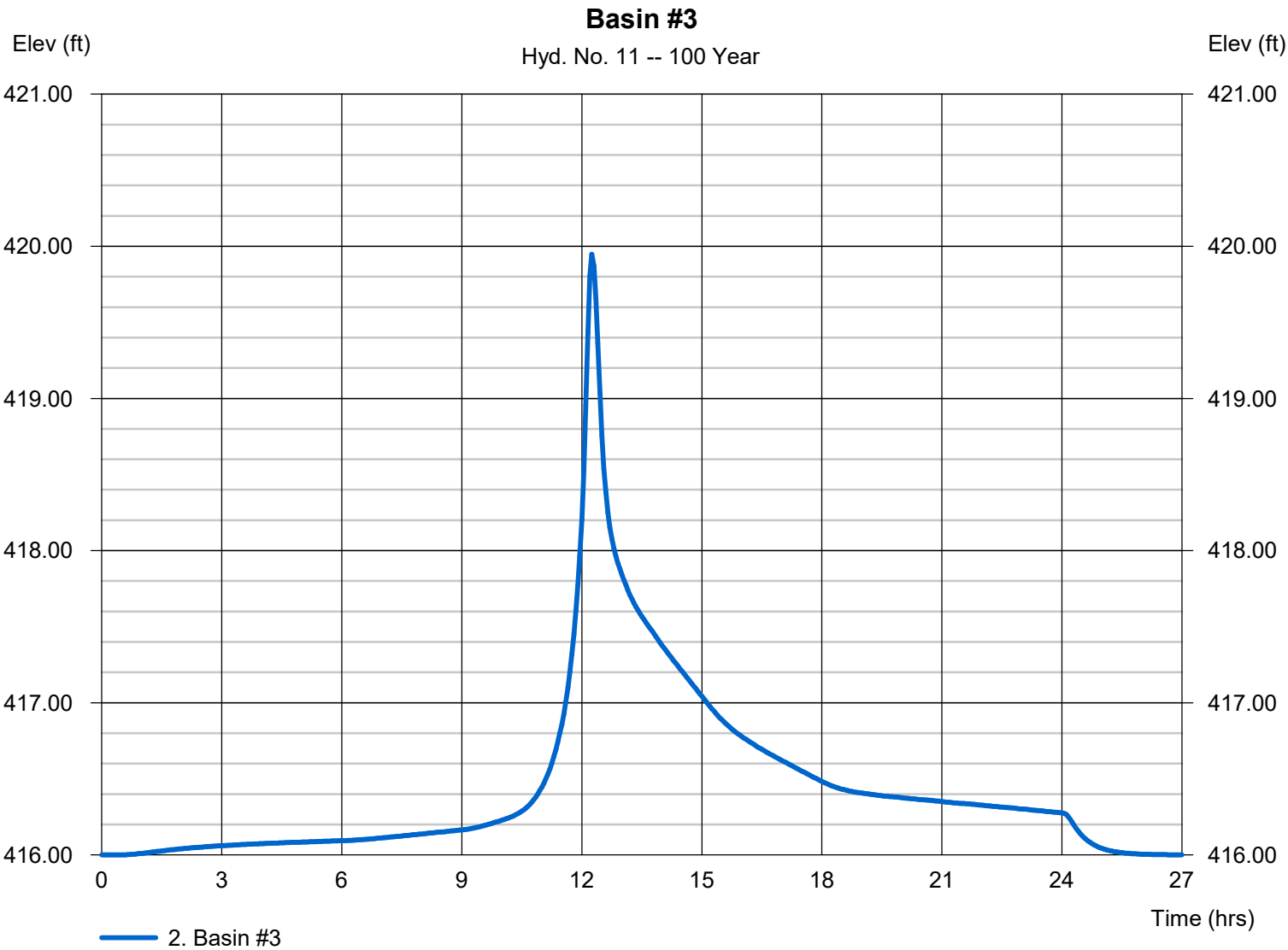
Hydrograph Report

Hyd. No. 11

Basin #3

Hydrograph type	= Reservoir	Peak discharge	= 15.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 3 min	Hyd. volume	= 87,208 cuft
Inflow hyd. No.	= 10 - DA-4	Max. Elevation	= 419.95 ft
Reservoir name	= Basin #3	Max. Storage	= 10,462 cuft

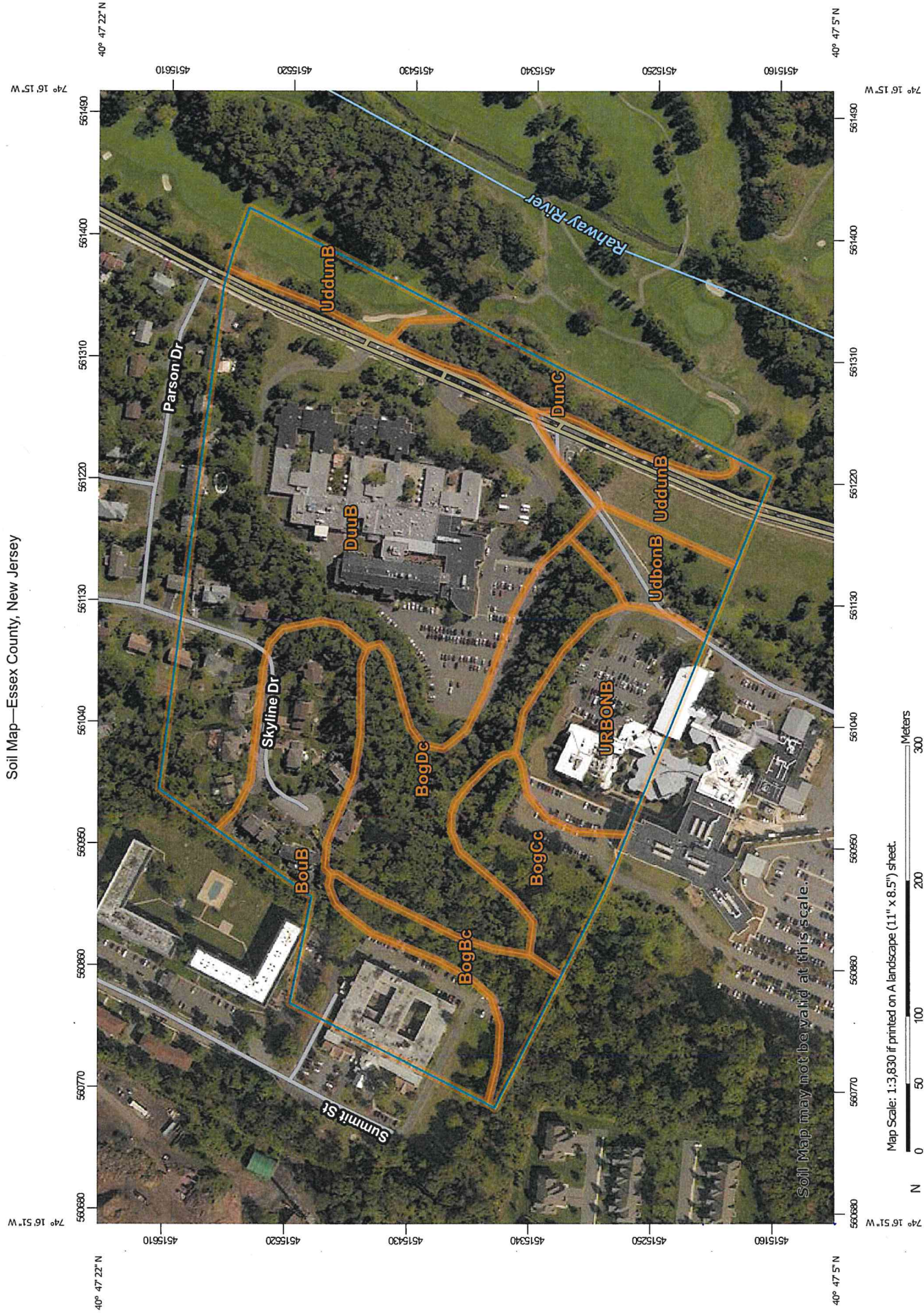
Storage Indication method used.



APPENDIX



Soil Map—Essex County, New Jersey



MAP LEGEND

- Area of Interest (AOI)

Area of Interest (AOI)
- Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points
- Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot
- Water Features

Streams and Canals
- Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads
- Background

Aerial Photography
- Special Line Features

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

MAP INFORMATION

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

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

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

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

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

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

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 15, Sep 16, 2019

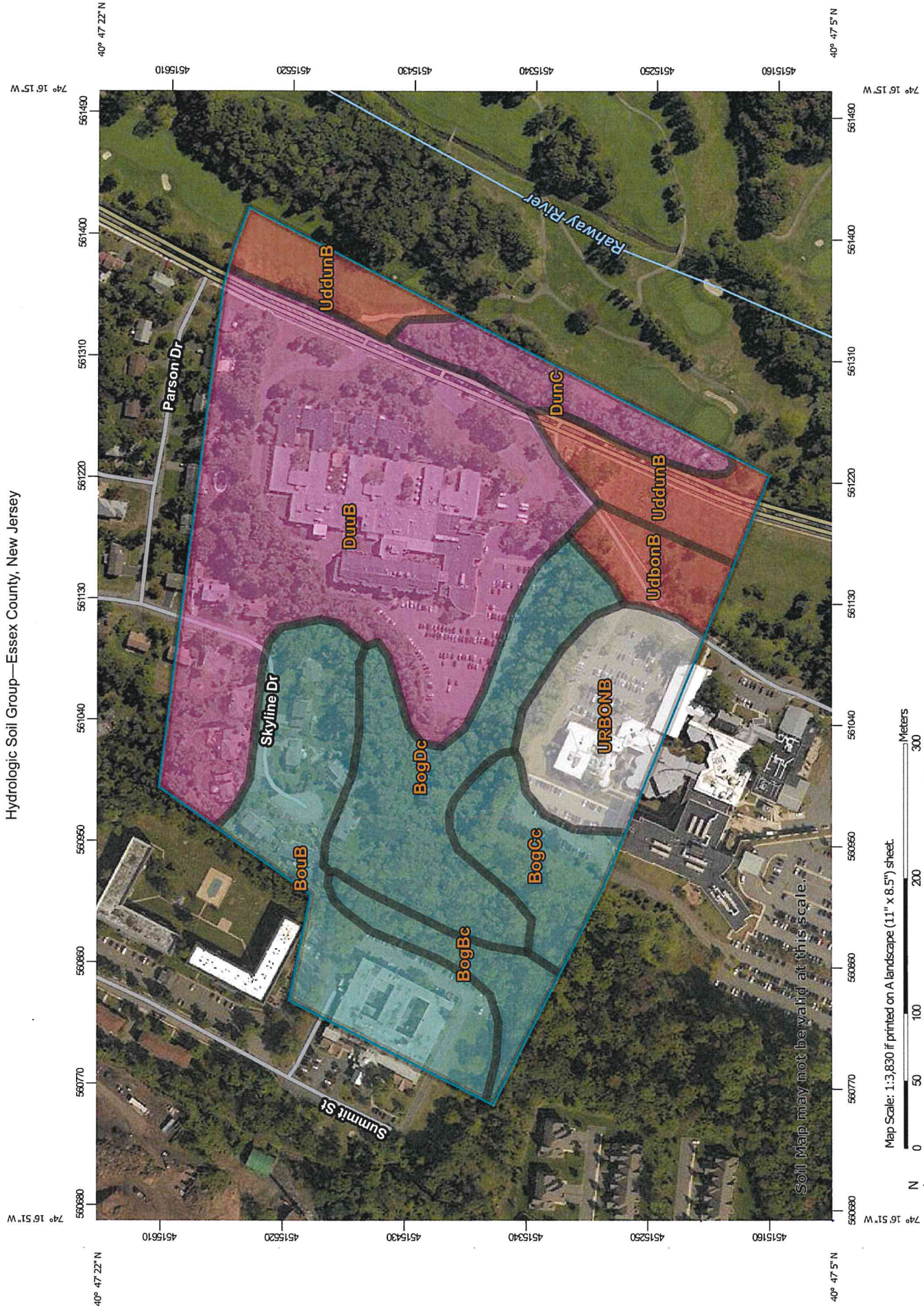
Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 25, 2014—Sep 27, 2014

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BogBc	Boonton loam, 0 to 8 percent slopes, extremely stony	1.6	3.5%
BogCc	Boonton loam, 8 to 15 percent slopes, extremely stony	2.5	5.5%
BogDc	Boonton loam, 15 to 35 percent slopes, extremely stony	5.7	12.8%
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	6.4	14.4%
DunC	Dunellen sandy loam, 8 to 15 percent slopes	2.0	4.4%
DuuB	Dunellen - Urban land, Dunellen substratum complex, 0 to 8 percent slopes	17.5	39.3%
UdbonB	Udorthents, Boonton substratum, 0 to 8 percent slopes	1.5	3.3%
UddunB	Udorthents, Dunellen substratum, 0 to 8 percent slopes	3.6	8.1%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes	3.8	8.6%
Totals for Area of Interest		44.5	100.0%



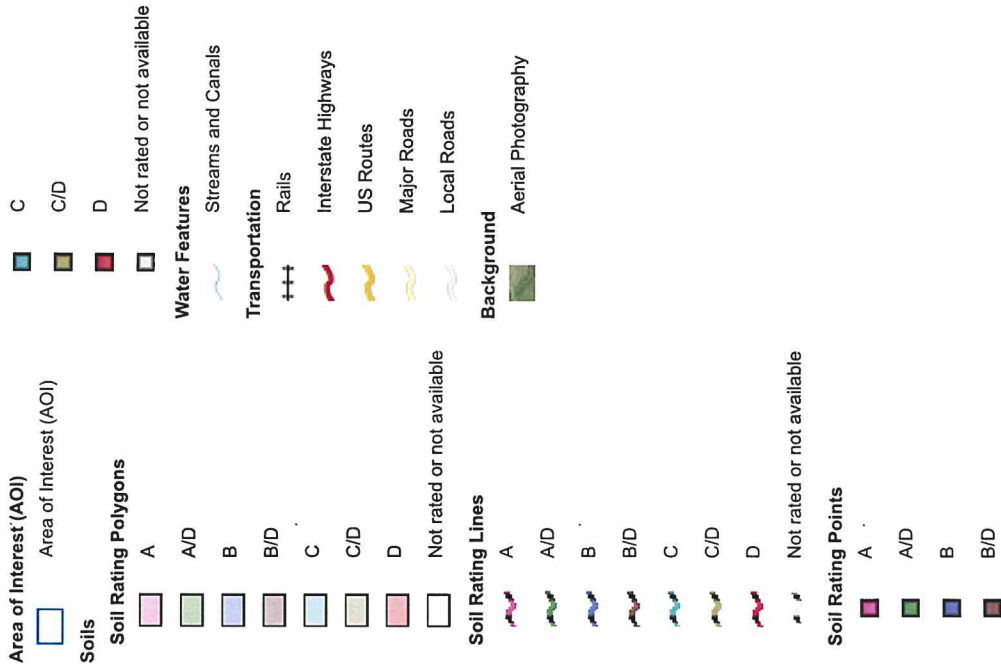
Map Scale: 1:3,830 if printed on A landscape (11" x 8.5") sheet.



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

Soil Map may not be valid at this scale.

MAP LEGEND



MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 15, Sep 16, 2019

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

Date(s) aerial images were photographed: Aug 25, 2014—Sep 27, 2014

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BogBc	Boonton loam, 0 to 8 percent slopes, extremely stony	C	1.6	3.5%
BogCc	Boonton loam, 8 to 15 percent slopes, extremely stony	C	2.5	5.5%
BogDc	Boonton loam, 15 to 35 percent slopes, extremely stony	C	5.7	12.8%
BouB	Boonton - Urban land, Boonton substratum complex, 0 to 8 percent slopes	C	6.4	14.4%
DunC	Dunellen sandy loam, 8 to 15 percent slopes	A	2.0	4.4%
DuuB	Dunellen - Urban land, Dunellen substratum complex, 0 to 8 percent slopes	A	17.5	39.3%
UdbonB	Udorthents, Boonton substratum, 0 to 8 percent slopes	D	1.5	3.3%
UddunB	Udorthents, Dunellen substratum, 0 to 8 percent slopes	D	3.6	8.1%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes		3.8	8.6%
Totals for Area of Interest			44.5	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NEW JERSEY 24 HOUR RAINFALL FREQUENCY DATA

Rainfall amounts in Inches

County	1 year	2 year	5 year	10 year	25 year	50 year	100 year
Atlantic	2.72	3.31	4.30	5.16	6.46	7.61	8.90
Bergen	2.75	3.34	4.27	5.07	6.28	7.32	8.47
Burlington	2.77	3.36	4.34	5.18	6.45	7.56	8.81
Camden	2.73	3.31	4.25	5.06	6.28	7.34	8.52
Cape May	2.67	3.25	4.22	5.07	6.34	7.47	8.73
Cumberland	2.69	3.27	4.25	5.09	6.37	7.49	8.76
Essex	2.85	3.44	4.40	5.22	6.44	7.49	8.66
Gloucester	2.71	3.29	4.24	5.05	6.29	7.36	8.55
Hudson	2.73	3.31	4.23	5.02	6.19	7.20	8.31
Hunterdon	2.80	3.38	4.26	5.00	6.09	7.02	8.03
Mercer	2.74	3.31	4.23	5.01	6.19	7.20	8.33
Middlesex	2.76	3.35	4.30	5.12	6.36	7.43	8.63
Monmouth	2.79	3.38	4.38	5.23	6.53	7.66	8.94
Morris	2.94	3.54	4.47	5.24	6.37	7.32	8.35
Ocean	2.81	3.42	4.45	5.33	6.68	7.87	9.20
Passaic	2.87	3.47	4.42	5.23	6.43	7.47	8.62
Salem	2.69	3.26	4.20	5.00	6.22	7.28	8.45
Somerset	2.76	3.34	4.25	5.01	6.15	7.13	8.21
Sussex	2.68	3.22	4.02	4.70	5.72	6.60	7.58
Union	2.80	3.39	4.35	5.17	6.42	7.49	8.69
Warren	2.78	3.34	4.18	4.89	5.93	6.83	7.82

Notes: The average point rainfall amounts listed above were developed from data contained in NOAA Atlas 14 Volume 2.

Point rainfall estimates for specific locations may be obtained from the Precipitation Frequency Data Server located at <http://www.nws.noaa.gov/ohd/hdsc/>

For most hydrologic design procedures, the rainfall amounts listed above may be rounded to the nearest tenth of an inch.

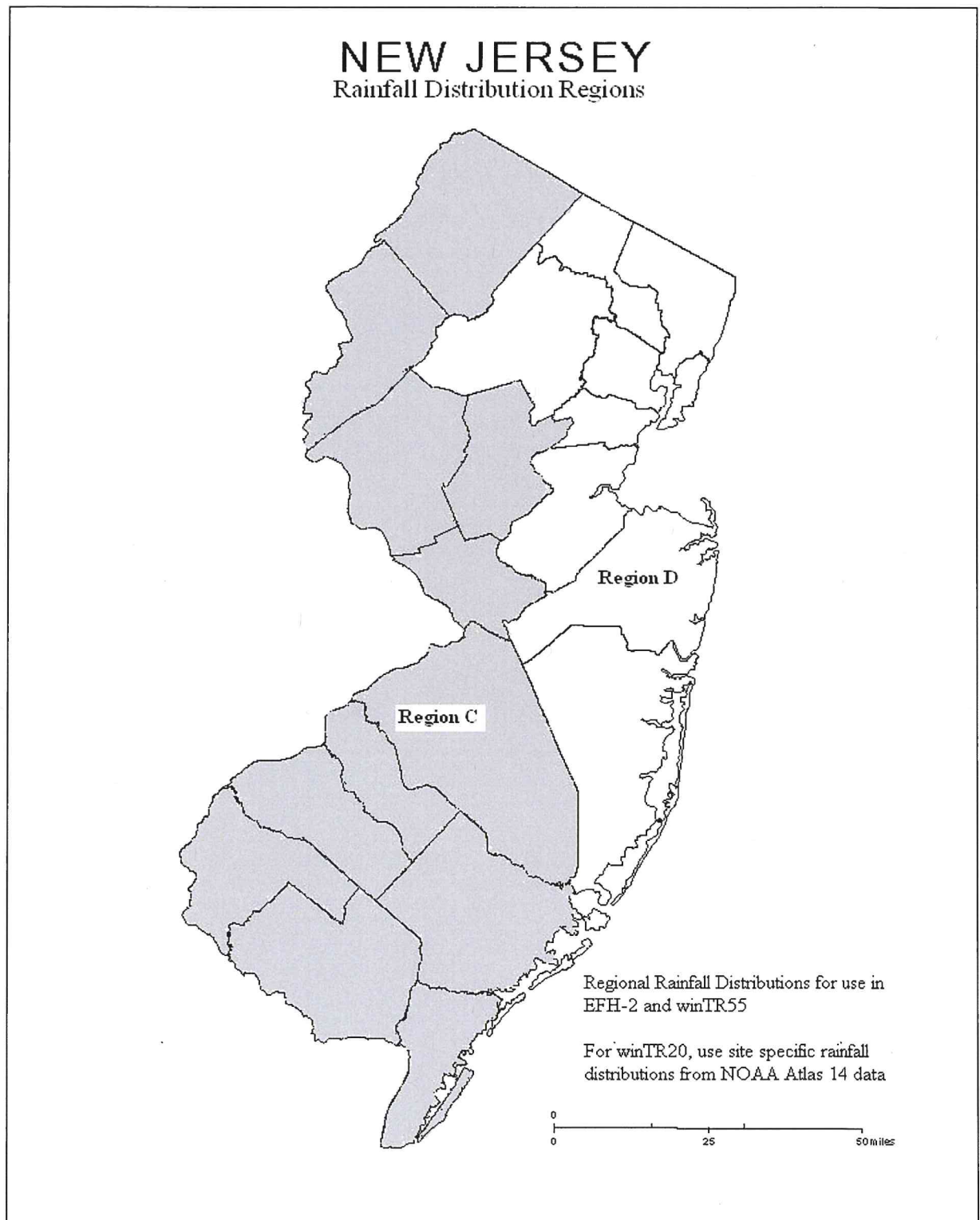


Table 2-2a Runoff curve numbers for urban areas ^{1/}

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

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

Table 2-2b Runoff curve numbers for cultivated agricultural lands ^{1/}

Cover description			Curve numbers for hydrologic soil group			
Cover type	Treatment ^{2/}	Hydrologic condition ^{3/}	A	B	C	D
Fallow	Bare soil	—	77	86	91	94
	Crop residue cover (CR)	Poor	76	85	90	93
		Good	74	83	88	90
Row crops	Straight row (SR)	Poor	72	81	88	91
		Good	67	78	85	89
	SR + CR	Poor	71	80	87	90
		Good	64	75	82	85
	Contoured (C)	Poor	70	79	84	88
		Good	65	75	82	86
	C + CR	Poor	69	78	83	87
		Good	64	74	81	85
	Contoured & terraced (C&T)	Poor	66	74	80	82
		Good	62	71	78	81
Small grain	SR	Poor	65	76	84	88
		Good	63	75	83	87
	SR + CR	Poor	64	75	83	86
		Good	60	72	80	84
	C	Poor	63	74	82	85
		Good	61	73	81	84
	C + CR	Poor	62	73	81	84
		Good	60	72	80	83
	C&T	Poor	61	72	79	82
		Good	59	70	78	81
Close-seeded or broadcast legumes or rotation meadow	SR	Poor	66	77	85	89
		Good	58	72	81	85
	C	Poor	64	75	83	85
		Good	55	69	78	83
	C&T	Poor	63	73	80	83
		Good	51	67	76	80

¹ Average runoff condition, and $I_a=0.2S$ ² Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.³ Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good $\geq 20\%$), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

Good: Factors encourage average and better than average infiltration and tend to decrease runoff.

Table 2-2c Runoff curve numbers for other agricultural lands ^{1/}

Cover type	Cover description	Hydrologic condition	Curve numbers for hydrologic soil group			
			A	B	C	D
Pasture, grassland, or range—continuous forage for grazing. ^{2/}		Poor	68	79	86	89
		Fair	49	69	79	84
		Good	39	61	74	80
Meadow—continuous grass, protected from grazing and generally mowed for hay.		—	30	58	71	78
Brush—brush-weed-grass mixture with brush the major element. ^{3/}		Poor	48	67	77	83
		Fair	35	56	70	77
		Good	30 ^{4/}	48	65	73
Woods—grass combination (orchard or tree farm). ^{5/}		Poor	57	73	82	86
		Fair	43	65	76	82
		Good	32	58	72	79
Woods. ^{6/}		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	30 ^{4/}	55	70	77
Farmsteads—buildings, lanes, driveways, and surrounding lots.		—	59	74	82	86

¹ Average runoff condition, and $I_a = 0.2S$.² *Poor*: <50% ground cover or heavily grazed with no mulch.*Fair*: 50 to 75% ground cover and not heavily grazed.*Good*: > 75% ground cover and lightly or only occasionally grazed.³ *Poor*: <50% ground cover.*Fair*: 50 to 75% ground cover.*Good*: >75% ground cover.⁴ Actual curve number is less than 30; use CN = 30 for runoff computations.⁵ CN's shown were computed for areas with 50% woods and 50% grass (pasture) cover. Other combinations of conditions may be computed from the CN's for woods and pasture.⁶ *Poor*: Forest litter, small trees, and brush are destroyed by heavy grazing or regular burning.*Fair*: Woods are grazed but not burned, and some forest litter covers the soil.*Good*: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 2-2d Runoff curve numbers for arid and semiarid rangelands ^{1/}

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition ^{2/}	A ^{3/}	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

¹ Average runoff condition, and $I_w = 0.2S$. For range in humid regions, use table 2-2c.² Poor: <30% ground cover (litter, grass, and brush overstory).

Fair: 30 to 70% ground cover.

Good: > 70% ground cover.

³ Curve numbers for group A have been developed only for desert shrub.

STORM SEWER COMPUTATIONS
RATIONAL METHOD - (Q=CIA)
25 YR. STORM

Project: Daughters of Israel
Date: 01/26/23
By: JAF

PIPE SEGMENT														
FROM	TO	A-Incremental	C-Runoff Coef.	AxC-Incremental	Tc (MIN.)	I-Rainfall Int. (in./hr)	Qp-Peak Runoff (cfs)	Qp-Peak Runoff Cumulative (cfs)	Pipe/Box Length (FT.)	Slope (%)	Pipe/Box Size (IN.)	Capacity (FULL) (cfs)	Velocity (Design) (fps)	Pipe Travel Time(min)
Type "B" #6-4	Type "B" #6-3	0.64	0.75	0.48	6.0	5.60	2.69	2.69		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #6-3	Type "B" #6-2	0.34	0.75	0.26	6.0	5.60	1.43	4.12		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #6-2	Type "B" #6-1	5.37	0.75	4.03	6.0	5.60	22.55	26.67		2.0%	24" HDPE	34.75	11.06	0.00
Type "B" #7-2	Type "B" #7-1	0.18	0.99	0.18	6.0	5.60	1.00	1.00		1.0%	15" HDPE	7.65	6.24	0.00
Type "B" #7-1	Type "E" #6-1	0.03	0.99	0.03	6.0	5.60	0.17	1.16		1.0%	15" HDPE	7.65	6.24	0.00
Type "E" #6-1	Basin #2	0.15	0.99	0.15	6.0	5.60	0.83	28.67		2.0%	24" HDPE	34.75	11.06	0.00
2'x2' #10-3	Type "E" #10-2	0.07	0.99	0.07	6.0	5.60	0.39	0.39		1.0%	12" PVC	4.22	5.38	0.00
Phase 1 Roof Leaders	Type "E" #10-2	1.03	0.99	1.02	6.0	5.60	5.71	5.71		1.0%	10" PVC	7.8*	4.76	0.00
Type "E" #10-2	Subsurface Basin #1A	0	0.99	0.00	6.0	5.60	0.00	6.10		1.0%	15" HDPE	7.65	6.24	0.00
Subsurface Basin #1A	MH #5-6							5.88		3.5%	24" HDPE	45.97	14.63	0.00
Basin #2	MH #5-6							21.66		2.0%	24" HDPE	34.75	11.06	0.00
MH #5-6	Type "B" #5-5							27.54		3.5%	24" HDPE	45.97	14.63	0.00
Type "B" #5-5A	Type "B" #5-5	0.04	0.99	0.04	6.0	5.60	0.22	0.22		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #5-5	Type "B" #5-4	0.05	0.99	0.05	6.0	5.60	0.28	28.04		3.5%	24" HDPE	45.97	14.63	0.00
Type "B" #5-4A	Type "B" #5-4	0.3	0.99	0.30	6.0	5.60	1.66	1.66		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #5-4	Type "B" #5-2	0.03	0.99	0.03	6.0	5.60	0.17	29.87		3.5%	24" HDPE	45.97	14.63	0.00
Type "B" #5-2A	Type "B" #5-2	0.37	0.99	0.37	6.0	5.60	2.05	2.05		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #5-2	Type "B" #5-1	0.06	0.99	0.06	6.0	5.60	0.33	32.25		3.5%	24" HDPE	45.97	14.63	0.00

Type "B" #5-1	MH #8-1	0.14	0.99	0.14	6.0	5.60	0.78	33.03		3.5%	24" HDPE	45.97	14.63	0.00
Phase 2/3 Roof Leaders	Subsurface Basin #1B	1.75	0.99	1.73	6.0	5.60	9.70	9.70		1.0%	10" PVC	10.40**	4.76	0.00
Subsurface Basin #1B	MH #8-1							9.26		5.0%	15" HDPE	17.12	13.95	0.00
Type "B" #4-7	Type "B" #4-6	0.21	0.99	0.21	6.0	5.60	1.16	1.16		1.2%	15" HDPE	8.39	6.83	0.00
Type "B" #4-6	Type "B" #4-5	1.35	0.75	1.01	6.0	5.60	5.67	6.83		1.2%	15" HDPE	8.39	6.83	0.00
Type "B" #4-5	Type "B" #4-4	0.91	0.75	0.68	6.0	5.60	3.82	10.66		1.2%	18" HDPE	12.50	7.07	0.00
Type "B" #4-4	Type "B" #4-3	0.75	0.75	0.56	6.0	5.60	3.15	13.81		1.2%	24" HDPE	26.92	8.57	0.00
Type "B" #4-3	Type "B" #4-2	0.26	0.99	0.26	6.0	5.60	1.44	15.25		1.2%	24" HDPE	26.92	8.57	0.00
Type "B" #4-2	MH#4-1	0.47	0.75	0.35	6.0	5.60	1.97	17.22		1.2%	24" HDPE	26.92	8.57	0.00
Type "B" #4-1A	MH#4-1	0.6	0.75	0.45	6.0	5.60	2.52	2.52		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #3-2	Type "B" #3-1	0.59	0.75	0.44	6.0	5.60	2.48	2.48		1.0%	15" HDPE	7.65	6.24	0.00
Type "B" #3-1	MH#4-1	0.11	0.99	0.11	6.0	5.60	0.61	3.09		1.0%	15" HDPE	7.65	6.24	0.00
MH #4-1	Basin #3							22.83		1.2%	24" HDPE	26.92	8.57	0.00
2'x2' #11-3	2'x2' #11-2	0.08	0.99	0.08	6.0	5.60	0.44	0.44		2.0%	12" PVC	5.97	7.60	0.00
2'x2' #11-2	2'x2' #11-1	0.13	0.99	0.13	6.0	5.60	0.72	1.16		2.0%	12" PVC	5.97	7.60	0.00
2'x2' #11-1	Basin #3	0.13	0.99	0.13	6.0	5.60	0.72	1.88		3.0%	12" PVC	7.31	9.31	0.00
Basin #3	Type "B" #1-7							9.56		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #1-7A	Type "B" #1-7	0.24	0.75	0.18	6.0	5.60	1.01	1.01		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #1-7	Type "B" #1-6	0.11	0.99	0.11	6.0	5.60	0.61	11.18		2.5%	15" HDPE	12.10	9.86	0.00
Type "B" #1-6A	Type "B" #1-6	0.15	0.75	0.11	6.0	5.60	0.63	0.63		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #1-6	Type "B" #1-5	0.05	0.99	0.05	6.0	5.60	0.28	12.09		2.5%	18" HDPE	18.04	10.21	0.00
Type "B" #1-5A	Type "B" #1-5	0.08	0.99	0.08	6.0	5.60	0.44	0.44		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #2-2	Type "B" #1-5	0.58	0.99	0.57	6.0	5.60	3.22	3.22		2.5%	15" HDPE	12.10	9.86	0.00
Type "B" #1-5	Type "B" #1-3	0.06	0.99	0.06	6.0	5.60	0.33	16.08		2.5%	18" HDPE	18.04	10.21	0.00
Type "B" #1-3A	Type "B" #1-3	0.22	0.99	0.22	6.0	5.60	1.22	1.22		2.0%	15" HDPE	10.83	8.82	0.00
Type "B" #1-3	Type "B" #1-2	0.04	0.99	0.04	6.0	5.60	0.22	17.52		2.5%	18" HDPE	18.04	10.21	0.00
Type "B" #1-2A	Type "B" #1-2	0.17	0.99	0.17	6.0	5.60	0.94	0.94		2.0%	15" HDPE	10.83	8.82	0.00

Type "B" #1-2	MH #1-1	0.02	0.99	0.02	6.0	5.60	0.11	18.57		2.0%	24" HDPE	34.75	11.06	0.00
MH #8-1	EX. MH in Pleasant Valley Way							42.29		3.0%	30" RCP	61.74	12.58	0.00

* Phase 1 Roof leaders capacity for 3-10" PVC pipes

** Phase 2/3 Roof leaders capacity for 4-10" PVC pipes



Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☒

Post-Development ☐

Drainage Area: DA-1

TOC Line 1

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Grass, Dense Grasses	Woods, Light Underbrush	Woods, Light Underbrush	
Manning's Roughness Coeff., n (Table 3-1)	0.24	0.4	0.4	
Flow Length, L (total $\leq$ 100 ft)	23	51	26	
Two-Year 24-Hour Rainfall, P_2	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.04	0.08	0.46	
T_t	3.22	6.94	2.01	12.17

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	Unpaved	paved	
Flow Length, L	345	185	157	
Watercourse Slope, s	0.31	0.06	0.04	
Average Velocity	8.9	3.9	4.1	
T_t	0.65	0.79	0.64	2.08

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P_w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T_t	-	-	-	0.00
				14.25



Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☒

Post-Development ☐

Drainage Area: DA-1B

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Woods, Light Underbrush			
Manning's Roughness Coeff., n (Table 3-1)	0.4	-	-	
Flow Length, L (total $\leq$ 100 ft)	100			
Two-Year 24-Hour Rainfall, P_2	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.14			
T_t	9.51	-	-	9.51

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	Unpaved	Unpaved	
Flow Length, L	51	23	36	
Watercourse Slope, s	0.09	0.26	0.72	
Average Velocity	4.8	8.2	13.6	
T_t	0.18	0.05	0.04	0.27

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P_w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T_t	-	-	-	0.00
				9.78



Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☒

Post-Development ☐

Drainage Area: DA-2

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Woods, Light Underbrush			
Manning's Roughness Coeff., n (Table 3-1)	0.4	-	-	
Flow Length, L (total $\leq$ 100 ft)	100			
Two-Year 24-Hour Rainfall, P_2	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.13			
T_t	9.80	-	-	9.80

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	Unpaved		
Flow Length, L	66	63		
Watercourse Slope, s	0.11	0.22		
Average Velocity	5.3	7.5	-	
T_t	0.21	0.14	-	0.35

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P_w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T_t	-	-	-	0.00
				10.14

Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☒

Post-Development ☐

Drainage Area: DA-3

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Grass, Dense Grasses	Woods, Light Underbrush		
Manning's Roughness Coeff., n (Table 3-1)	0.24	0.4	-	
Flow Length, L (total $\leq$ 100 ft)	45	55		
Two-Year 24-Hour Rainfall, P_2	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.11	0.16		
T_t	3.67	5.59	-	9.26

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	Unpaved	paved	
Flow Length, L	140	115	64	
Watercourse Slope, s	0.04	0.52	0.03	
Average Velocity	3.2	11.5	3.5	
T_t	0.73	0.17	0.30	1.20

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P_w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T_t	-	-	-	0.00
				10.47



Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☒

Post-Development ☐

Drainage Area: DA-4

TOC Line 2

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Woods, Light Underbrush			
Manning's Roughness Coeff., n (Table 3-1)	0.4	-	-	
Flow Length, L (total ≤ 100 ft)	100			
Two-Year 24-Hour Rainfall, P_2	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.15			
T_t	9.25	-	-	9.25

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved			
Flow Length, L	138			
Watercourse Slope, s	0.18			
Average Velocity	6.8	-	-	
T_t	0.34	-	-	0.34

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P_w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T_t	-	-	-	0.00
				9.59



Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☒

Post-Development ☐

Drainage Area: DA-5

TOC Line 1

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Woods, Light Underbrush	Woods, Light Underbrush		
Manning's Roughness Coeff., n (Table 3-1)	0.4	0.4	-	
Flow Length, L (total $\leq$ 100 ft)	48	52		
Two-Year 24-Hour Rainfall, P_2	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.08	0.19		
T_t	6.61	4.99	-	11.60

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	Unpaved	paved	
Flow Length, L	135	271	77	
Watercourse Slope, s	0.04	0.17	0.01	
Average Velocity	3.2	6.6	2.0	
T_t	0.71	0.69	0.64	2.03

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P_w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T_t	-	-	-	0.00
				13.63



Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☐

Post-Development ☒

Drainage Area: 1

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Smooth Surfaces (Concrete, Asphalt, Grass, Dense Grasses Gravel, or Bare Soil) Grass, Dense Grasses			
Manning's Roughness Coeff., n (Table 3-1)	0.24	0.011	0.24	
Flow Length, L (total ≤ 100 ft)	16	32	9	
Two-Year 24-Hour Rainfall, P ₂	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.01	0.01	0.01	
T _t	4.19	0.62	2.65	7.46

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description				
Flow Length, L				
Watercourse Slope, s				
Average Velocity	-	-	-	
T _t	-	-	-	0.00

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P _w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T _t	-	-	-	0.00
				7.46



Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☐

Post-Development ☒

Drainage Area: DA-2

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Woods, Light Underbrush			
Manning's Roughness Coeff., n (Table 3-1)	0.4	-	-	
Flow Length, L (total ≤ 100 ft)	100			
Two-Year 24-Hour Rainfall, P_2	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.13			
T_t	9.80	-	-	9.80

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	Unpaved		
Flow Length, L	66	63		
Watercourse Slope, s	0.11	0.22		
Average Velocity	5.3	7.5	-	
T_t	0.21	0.14	-	0.35

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P_w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T_t	-	-	-	0.00
				10.14



Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☐

Post-Development ☒

Drainage Area: DA-3

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Grass, Dense Grasses	Woods, Light Underbrush	Woods, Light Underbrush	
Manning's Roughness Coeff., n (Table 3-1)	0.24	0.4	0.4	
Flow Length, L (total $\leq$ 100 ft)	23	51	26	
Two-Year 24-Hour Rainfall, P_2	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.04	0.08	0.46	
T_t	3.22	6.94	2.01	12.17

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	Unpaved	paved	
Flow Length, L	345	185	207	
Watercourse Slope, s	0.31	0.06	0.04	
Average Velocity	8.9	3.9	4.1	
T_t	0.65	0.79	0.85	2.28

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P_w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T_t	-	-	-	0.00
				14.46



Time of Concentration Calculations

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Pre-Development ☐

Post-Development ☒

Drainage Area: DA-4

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Woods, Light Underbrush	Woods, Light Underbrush		
Manning's Roughness Coeff., n (Table 3-1)	0.4	0.4	-	
Flow Length, L (total $\leq$ 100 ft)	48	52		
Two-Year 24-Hour Rainfall, P_2	3.44	3.44	3.44	
Land Slope, s (ft/ft)	0.08	0.19		
T_t	6.61	4.99	-	11.60

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	Unpaved	paved	
Flow Length, L	52	117	270	
Watercourse Slope, s	0.06	0.24	0.01	
Average Velocity	3.9	7.8	2.0	
T_t	0.22	0.25	2.23	2.70

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a				
Wetted Perimeter, P_w				
Hydraulic Radius, r	-	-	-	
Channel Slope, s				
Manning's Roughness Description				
Manning's Roughness	-	-	-	
Velocity	-	-	-	
Flow Length				
T_t	-	-	-	0.00
				14.30

Project #: 20-0265

Project: Daughters of Israel

County: Essex

Green Roof Calculations

Depth of Media (In)	4
Available water capacity for Runoff retention *	0.231
Drainage Layer Depth	0
Drainage Layer Field Capacity	0

*Based on 20% 1-7mm pumice,
60% 4-10mm pumic, 20%
composted pine bark fines (BMP
Manual)

Total Rainfall (IN)		
2 YR	10 YR	100 YR
3.44	5.22	8.66

	Area of Roof (SF)	Area of Green Roof (SF)	Sv (SF)
Phase I	44933	4492	345.9
Phase II & III	76224	18366	1414.2

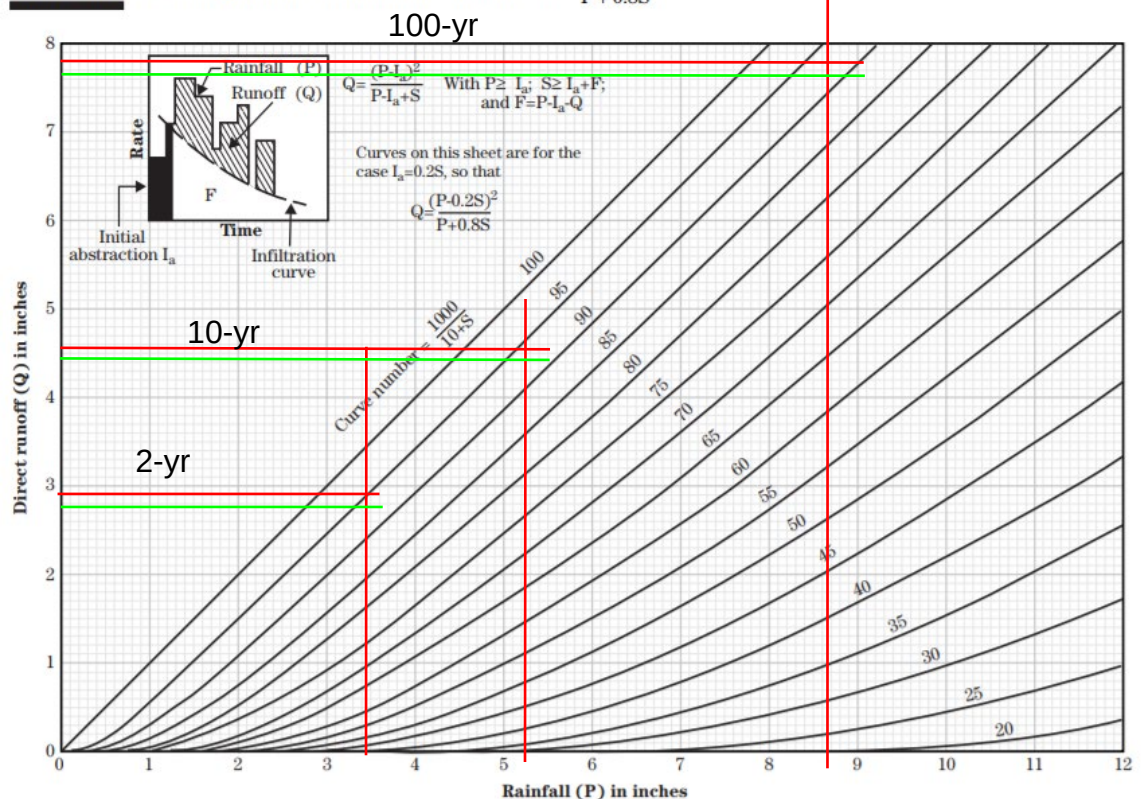
Volume Without Green Roof (CF)			
	2 YR	10 YR	100 YR
P1	11,240	17,466	29,513
P2/3	19,097	29,675	50,144

Volume With Green Roof (CF)			
	2 YR	10 YR	100 YR
P1	10,894	17,120	29,167
P2/3	17,683	28,261	48,730

Q (CFS)			
	2 YR	10 YR	100 YR
P1	2.91	4.57	7.79
P2/3	2.78	4.45	7.67

Adjusted CN			
	2 YR	10 YR	100 YR
P1	95	94	93
P2/3	94	93	92

Figure 10-2 ES-1001 graphical solution of the equation $Q = \frac{(P - 0.2S)^2}{P + 0.8S}$



- Phase 1
- Phase 2/3

Step 5: Calculate Peak Flow Rates by Adjusted Curve Number

Calculate the time of concentration and use it along with the adjusted curve numbers determined in Step 4 to calculate the peak flow rates of each of the storm events using NRCS methodology.

Note that the time of concentration of a green roof must be calculated based on the vegetation condition, roof slope and drainage path. A green roof with dense vegetation and a milder slope may provide a longer time of concentration, which will slow down the discharge of the roof runoff and lower the peak rate of the runoff. The time of concentration must be calculated in accordance with the velocity method described in the *NEH, Chapter 15 - Time of Concentration*.

The Newest GreenGrid® Modular Vegetative Green Roof System



GreenGrid®
*Engineered to Perform
Designed to Inspire* **ROOFS**

The 5th Generation GreenGrid® Module Launches 2021

These new zero-edged modules are an improvement to the previous generation of GreenGrid®, maintaining the functionality of the original modular green roof system, but adding improved structural design, multiple depth configurations, connectivity, and excellent stormwater retention.

Unlike hybrid /subterranean modular systems and traditional layered systems, G5 modules can be easily accessed and removed to perform maintenance or repairs to the underlying roof without damaging the vegetation. Additionally, G5 modules are specifically designed to maximize stormwater control, and now allow irrigation lines directly beneath modules.

GreenGrid offers versatility and design flexibility, with modules available in FOUR different depths for a variety of planting options. Modules can be pre-grown at our nurseries to meet plant coverage specifications up to 95% and delivered to the job site to create an instant mature green roof. This translates to a successful green roof with less up-front maintenance, plus a beautiful look from day one. In addition, GreenGrid modules can be custom cut with curves or angles.

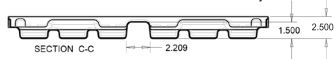


www.GreenGridRoofs.com

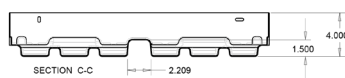


GreenGrid is a registered trademark of Weston Solutions, Inc. (WESTON). The GreenGrid® system is a proprietary technology of WESTON in the U.S. and Canada.
U.S. patents 7,900,397 / 7,997,027 / 8,555,545
Canadian patents 2,416,457 / 2,416,463 / 2,418,262

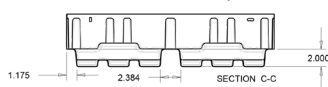
Two and a Half Inch Tray



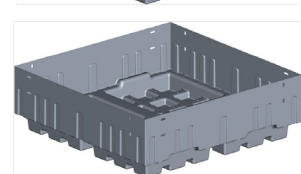
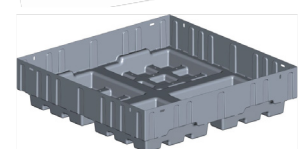
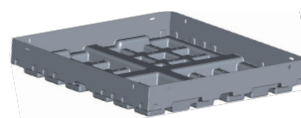
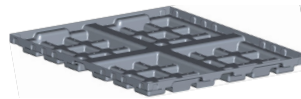
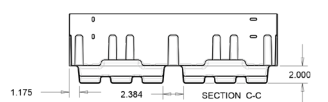
Four Inch Tray



Six Inch Tray



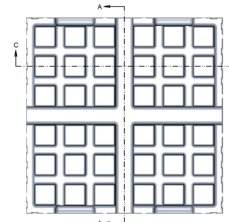
Eight Inch Tray



Pre-Vegetated 4-inch Module



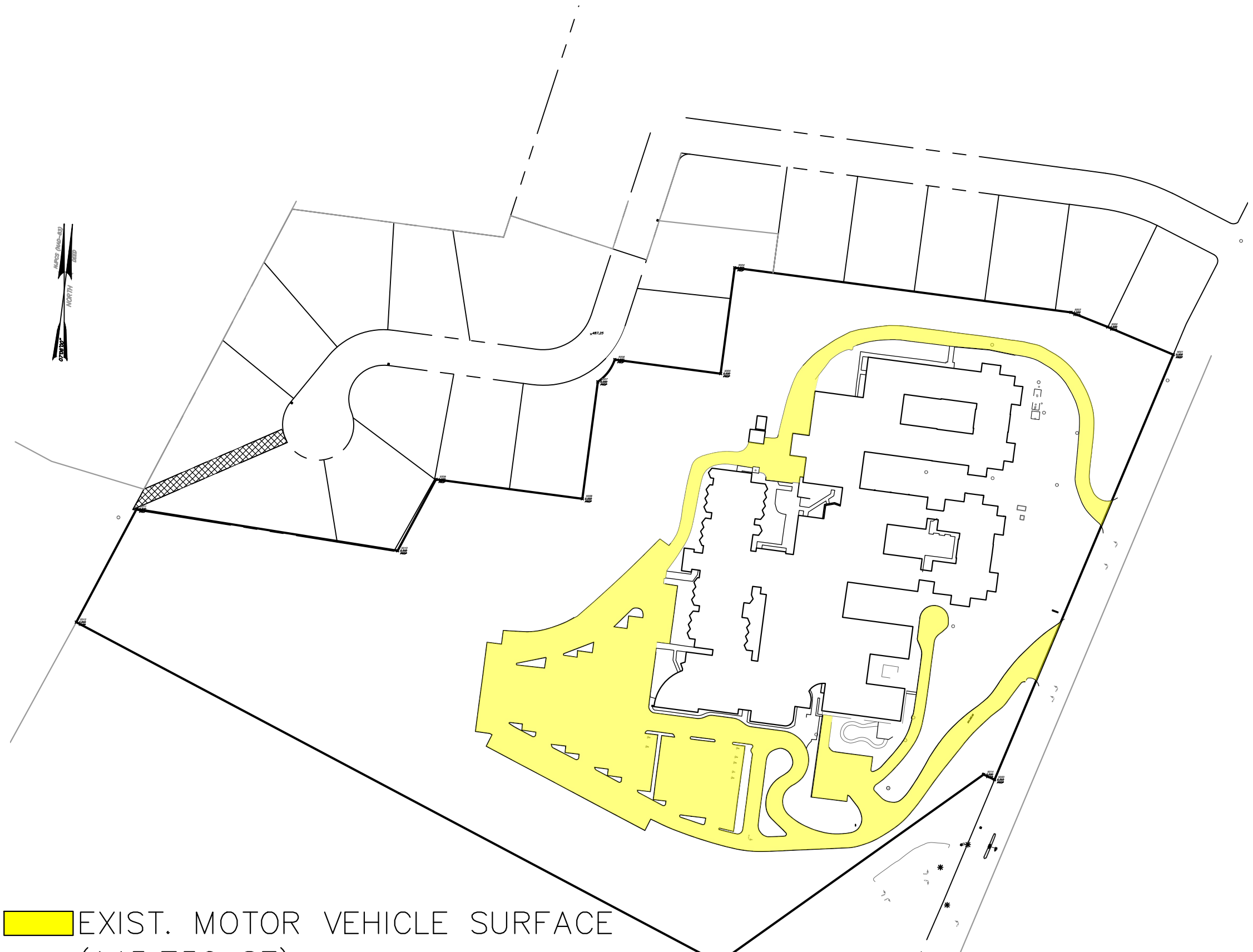
Top View Four Inch Tray



GreenGrid Component	Specification Description and Notes			
G5 System Modules	Dimensions (W x L)		Depth (D)	
	Standard Units	SI Units	Standard Units	SI Units
Ultra-Extensive	24 in. x 24 in. [OD ± 1/8 in.]	60.96 cm x 60.96 cm [OD ± 0.318 cm]	2.5 in.	6.35 cm
Extensive			4.0 in.	10.80 cm
Semi-Intensive			6.0 in.	15.24 cm
Intensive			8.0 in.	29.32 cm
Weight Range	Approximate Minimum ^{Note 1}		Approximate Maximum ^{Note1}	
Ultra-Extensive	10 lbs/sf	48.82 kg/m²	15 lbs/sf	73.24 kg/m²
Extensive	20 lbs/sf	97.65 kg/m²	30 lbs/sf	141.59 kg/m²
Semi-Intensive	25 lbs/sf	122.06 kg/m²	45 lbs/sf	214.83 kg/m²
Intensive	30 lbs/sf	141.59 kg/m²	60 lbs/sf	292.95 kg/m²
Drainage Clearance	3/4 in.	1.91 cm	All size modules	
Module Material	100% pre-consumer linear low density or medium density polyethylene. Protected with UV inhibitors and stabilizers.			
Ultra-Extensive				
Extensive				
Semi-Intensive				
Intensive				
Module Color	Black [custom colors available upon request]			
Planting options	Pre-planted and grown to mature coverage. Upgrades for higher planting density, larger plants, and/or sedum mats available. Crossover (hidden module) planting option with sedum mat.			
Growing Medium	FLL-compliant extensive, semi-intensive, and intensive regional blends. Custom blends also available.			
Vegetation	Varies by depth and project location. Succulents and groundcovers typical in all module depths. Ornamental grasses and perennials for 6-in and 8-in applications. Native and other custom plantings also available.			
Typical Underlayment	Single-source warranties available with Carlisle.			
Module Connectors	Nylon/Plastic panel fasteners or zip ties. 1/4 in. (0.64 cm) drill hole diameter required.			
Irrigation Systems	Proprietary system designed based on project-specific requirements.			

Note 1: All weights are presented with growing media at maximum water-holding capacity. Conservative estimates for vegetation and module weight per SF have been included in above weight ranges. Weights may vary based on requirements for project-specific vegetation selections and variations in regional materials incorporated into engineered growing media. Consult GreenGrid representative for further information.

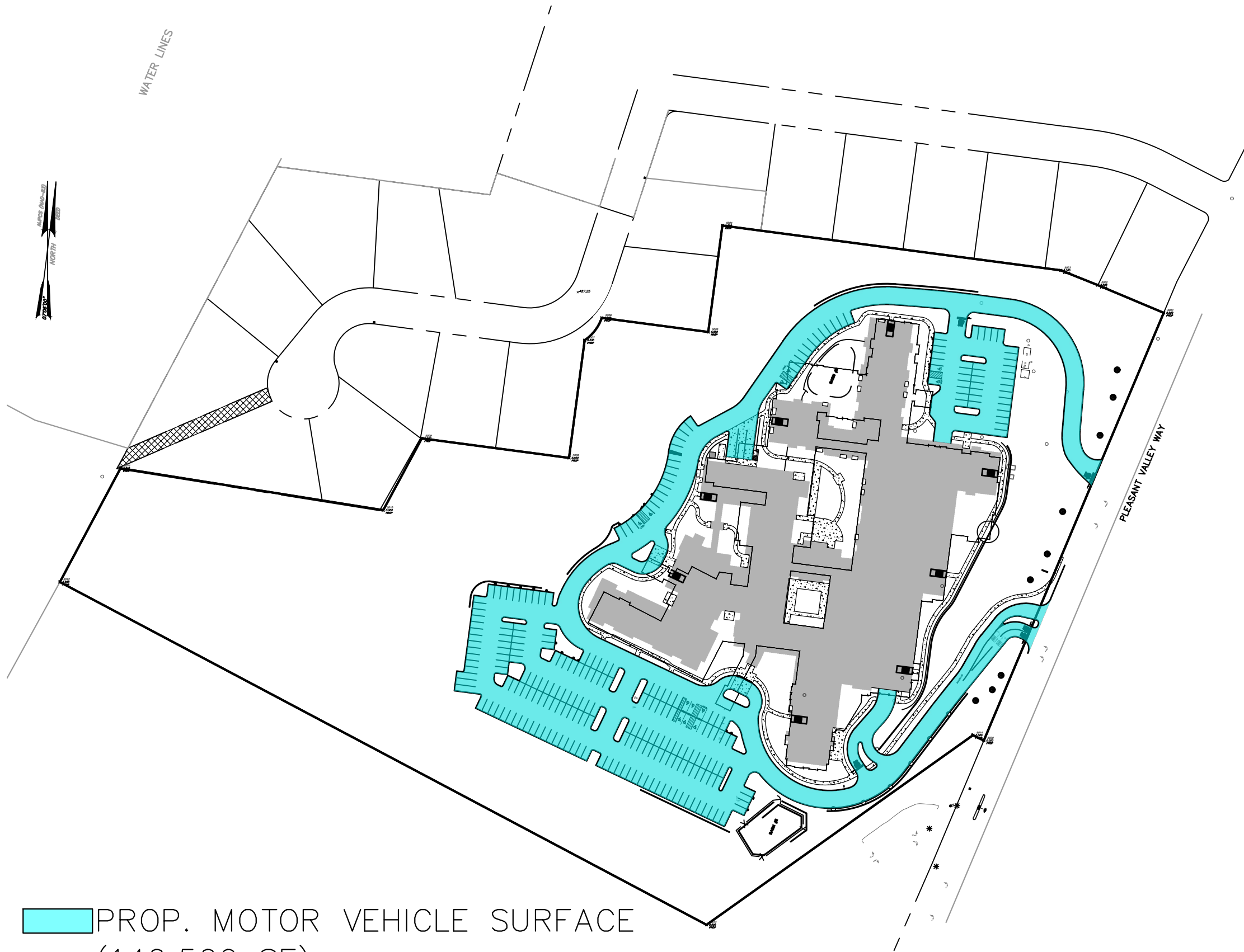
Local contacts are available on our Web site www.GreenGridRoofs.com or contact our headquarters office at 888-404-4743



 EXIST. MOTOR VEHICLE SURFACE
(145,750 SF)

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REVISION	DESCRIPTION	DATE	BY
PREPARED FOR DAUGHTERS OF ISRAEL 1155 PLEASANT VALLEY WAY BLOCK 171 LOT 12 TOWNSHIP OF WEST ORANGE ESSEX COUNTY, NEW JERSEY			
EXISTING CONDITIONS			
 PETRY ENGINEERING, LLC DIVISION OF CONSUMER AFFAIRS LICENSE NUMBER JH403819800 100 PASADENA AVENUE • FAIRFIELD, NJ 07004 • NEW JERSEY • 07004 TEL (973) 227-7004 FAX (973) 227-7074			Designer: J.M.P. Draftsman: P.P.P. Checked By: J.M.P. Project No.: 19-265 Scale: 1" = 150' Sheet: MV-1



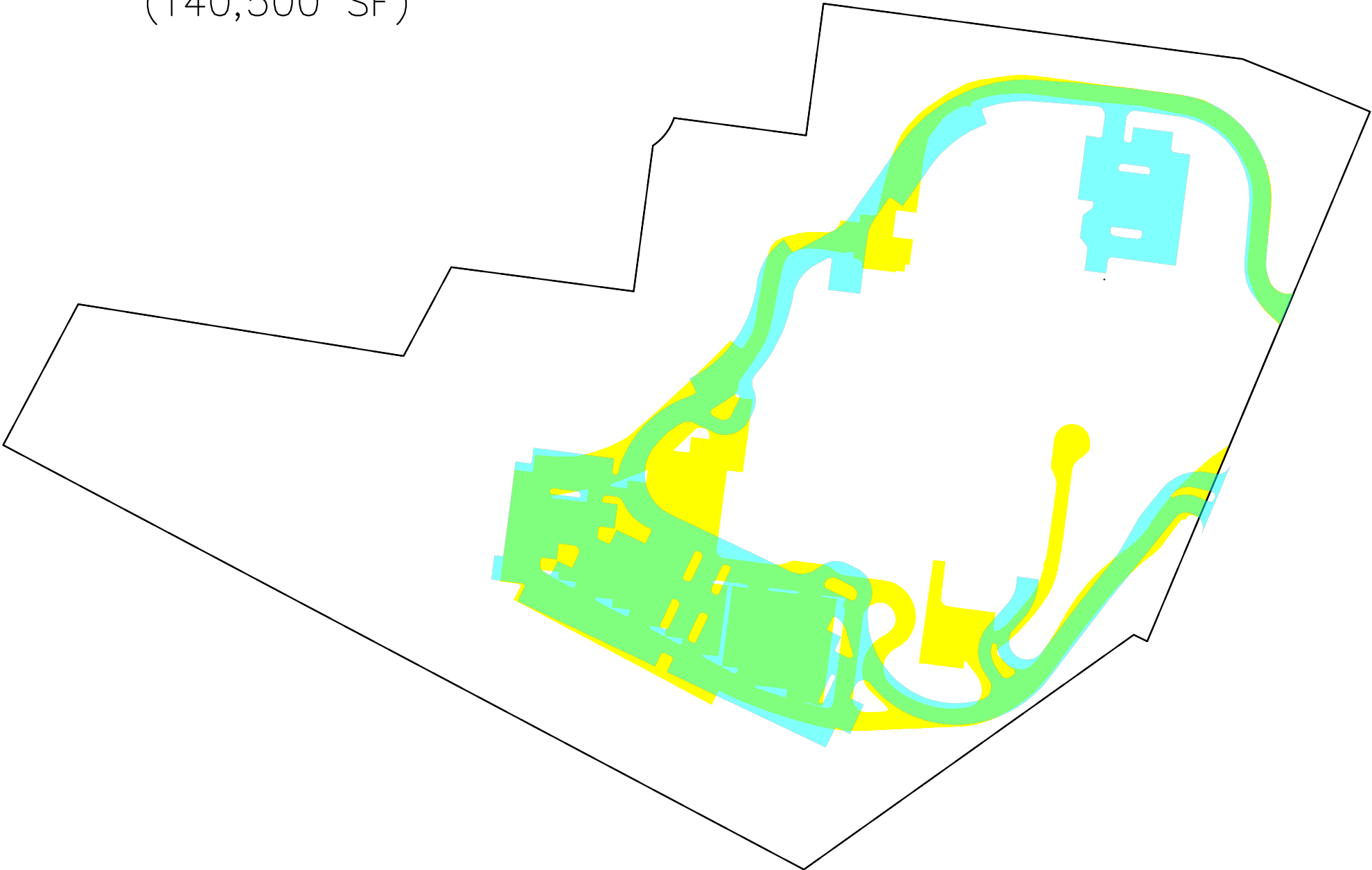
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REVISION	DESCRIPTION	DATE	BY
PREPARED FOR DAUGHTERS OF ISRAEL 1155 PLEASANT VALLEY WAY BLOCK 171 LOT 12 TOWNSHIP OF WEST ORANGE ESSEX COUNTY, NEW JERSEY			
PROPOSED CONDITIONS			
 PETRY ENGINEERING, LLC DIVISION OF CONSUMER AFFAIRS LICENSE NUMBER 24502155000 155 PASSAIC AVENUE • FAIRFIELD • NEW JERSEY • 07004 TEL. (973) 527-7004 FAX (973) 527-7014			Designer: JMP
			Draftsman: PPP
			Checked By: JMP
			Project No.: 19-265
			Scale: 1" = 150'
			Sheet: MV-2

FIGURE:

EXIST. MOTOR VEHICLE SURFACE
(145,750 SF)

PROP. MOTOR VEHICLE SURFACE
(140,500 SF)



REVISION	DESCRIPTION	DATE	BY
PREPARED FOR DAUGHTERS OF ISRAEL 1155 PLEASANT VALLEY WAY BLOCK 171 LOT 12 TOWNSHIP OF WEST ORANGE ESSEX COUNTY, NEW JERSEY			
EXISTING & PROPOSED OVERLAY			
 PETRY ENGINEERING, LLC DIVISION OF CONSUMER AFFAIRS LICENSE NUMBER 9404815500 135 PASSAIC AVENUE • FAIRFIELD • NEW JERSEY 07004 TEL. (973) 227-7004 FAX (973) 227-7074			Designer: JMP
			Draftsman: PPP
			Checked By: JMP
			Project No.: 19-265
			Scale: 1" = 150'
			Sheet: MV-3

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