

STORMWATER MANAGEMENT REPORT

FOR

**THE ESTATE
BLOCK 151 LOT 17.01
TOWNSHIP OF WEST ORANGE
ESSEX COUNTY, NEW JERSEY**

SUBMITTED TO:

**TOWNSHIP OF WEST ORANGE
PLANNING BOARD**

PREPARED FOR:

**THE ESTATE
111 PROSPECT AVENUE
WEST ORANGE, NEW JERSEY 07052**

PREPARED BY:

**PETRY ENGINEERING, LLC
155 PASSAIC AVENUE
FAIRFIELD, NEW JERSEY 07004
973-227-7004**

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J. Michael Petry
**J. MICHAEL PETRY, PE
NJ PROFESSIONAL ENGINEER # 36662
DECEMBER 27, 2024**

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INTRODUCTION

The subject property is located at 111 Prospect Avenue, at the corner of Prospect Avenue and Woodland Avenue in the Township of West Orange, NJ. The property consists of 8.29± acres of land. It is located within the B-2 General Business Zone. The adjacent properties to the south and west are residential. To the north of the property is the Residence Inn. Finally, to the east of the property, across Prospect Avenue, is the Eagle Rock Reservation.

Currently, the site contains a catering hall and restaurant consisting of 3 buildings and multiple paved parking lots that service the buildings. The property slopes from elevation 555 to elevation 505, from the southeast to the northwest. The main building has a footprint of approximately 36,100 square feet and contains 2 stories. There are also 2 smaller buildings on the lot, located in the center and rear of the site. Three large parking lots are located throughout the site. An employee parking lot is located at the southwestern corner. A valet parking lot is located to the east of the main building, and a public parking lot is located to the north. The public parking lot is also partially contained by a cross-access easement and connects to the Residence Inn parking lot.

The NRCS Websoil survey mapping indicates that the portion of the site subject to development contains Hydrologic Group “D” soils, Urban land, Boonton Substratum, (URBONB) with Urban Land. The stormwater analysis considers this soil group type D. (See attached Websoil Survey Mapping.)

PROPOSED IMPROVEMENTS

The proposed improvements call for the renovation of the main building, the front garden area, and the reconstruction of the valet parking lot. Also, a new porte cochere will be constructed at the main entrance. A new storm sewer system is proposed throughout the parking lot to capture stormwater more effectively. The new parking lot will contain substantially more landscape islands throughout which will help to guide traffic as well as allow for improved plantings. Subsequently, the proposed development will reduce the overall impervious on the site. The existing impervious coverage for the site is 5.12 acres and the existing motor vehicle surface is 3.48 acres. The proposed impervious coverage for the site is 5.02 acres and the proposed motor vehicle surface is 3.39 acres. The entirety of the proposed disturbance is limited to previously developed areas.

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 for both current adjusted and future projected rainfall projections. Hydraflow Hydrographs Extension 2024 Modeling Software was used to compute the site's pre- and post-development runoff of the site.

Table 1 – Rainfall Data

Storm Event	Current Rainfall (in)	Current Adjusted Rainfall (in)	Future Rainfall (in)
2-Yr	3.44	3.47	4.09
10-Yr	5.22	5.38	6.37
100-Yr	8.66	9.18	11.52

According to the Township of West Orange Stormwater Management Rules and the NJDEP Stormwater Management regulations, the proposed development is considered a major development since there is more than one acre of disturbance. For major developments, stormwater management measures designed to provide groundwater recharge, stormwater runoff quantity control, and stormwater runoff quality treatment, utilizing green infrastructure. The development does not have to meet the groundwater recharge requirement since it is located within the Metropolitan Planning Area. Also, since the proposed development does not result in a net increase of $\frac{1}{4}$ of an acre or more of impervious surface, the water quality aspect of the Stormwater Management Rules is not required. Therefore, the stormwater management measures have been designed to meet only the stormwater runoff quantity requirements.

According to Section 7:8-5.6(b)1. the design must “*demonstrate through hydrologic and hydraulic analysis that for stormwater leaving the site, post-construction runoff hydrographs for the 2, 10 and 100-year storm events do not exceed, at any point in time, the pre-construction runoff hydrographs for the same storm events.*” The proposed development calls for a decrease in the amount of impervious on the site, the amount of runoff will be reduced. Since the stormwater quantity is satisfied through the use of non-structural strategies, green infrastructure requirements are not required.

EXISTING CONDITIONS

The existing site has been modeled as one drainage area totaling 4.68 acres. (See Fig.1 Existing Drainage Area Map.) The point of analysis for this drainage area is the Type Double “B” Inlet at the rear of the site, which connects to the municipal storm sewer system within Deerfield Drive. The drainage area includes all areas of disturbance, as well as any other areas that drain to the point of analysis.

DRAINAGE AREA 1 (DA-1)

Drainage Area 1 consists of 4.68 acres of both pervious and impervious surfaces. The impervious area, 3.32 acres, consists of the existing parking lot and associated improvements. The pervious area, 0.27 acres, is comprised of landscaped and lawn areas that are in good condition. Two times of concentration have been calculated for this drainage area, one based on the current adjusted rainfall total and one for the future projected rainfall total. The times of concentration are 13.6 and 12.7 minutes, respectively.

CURVE NUMBERS

The CN values used have been taken from the TR-55 Manual “Urban Hydrology for Small Watersheds,” Table 2-2a and Table 2-2c, based on land cover and hydrologic soil groups.

Table 2 – Curve Number (Existing Conditions)

Description	Hydrologic Group	Curve Number
Landscaped Islands (Open Space-Good Conditions)	D	80
Impervious	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 3 – Existing Peak Runoff Rates

Storm Event	Current Adjusted Rainfall		Future Projected Rainfall	
	Existing Site Peak Runoff	Existing Site Runoff Volume	Existing Site Peak Runoff	Existing Site Runoff Volume
2 Year	9.339 cfs	44,031 cf	11.28 cfs	53,349 cf
10 Year	15.35 cfs	73,038 cf	18.49 cfs	88,329 cf
100 Year	27.41 cfs	132,192 cf	34.83 cfs	169,002 cf

PROPOSED CONDITIONS

The proposed site has been modeled as one drainage area totaling 4.68 acres. (See Fig.2 Proposed Drainage Area Map.) The point of analysis for this drainage area is the Type Double “B” Inlet at the rear of the site, which connects to the municipal storm sewer system within Deerfield Drive.

DRAINAGE AREA 1 (DA-1)

Drainage Area 1 consists of 4.68 acres of both pervious and impervious surfaces. The impervious area, 3.32 acres, consists of the existing and proposed parking lot and associated improvements. The pervious area, 0.27 acres, is comprised of landscaped and lawn areas that are in good condition. Two times of concentration have been calculated for this drainage area, one based on the current adjusted rainfall total and one for the future projected rainfall total. The times of concentration are 12.6 and 11.7 minutes, respectively.

CURVE NUMBERS

The CN values used have been taken from the TR-55 Manual “Urban Hydrology for Small Watersheds,” Table 2-2a and Table 2-2c, based on land cover and hydrologic soil groups.

Table 4 – Curve Number (Proposed Conditions)

Description	Hydrologic Group	Curve Number
Landscaped Islands (Open Space-Good Conditions)	D	80
Impervious	D	98

PEAK FLOWS

Using the information described above, the peak flows during the 2-, 10-, and 100-year storm events were calculated. Table 4 below summarizes the peak flows during each storm event. (See attached Hydraflow Output for Proposed Conditions Hydrographs, CN Values, and Time of Concentration Calculations.) As shown in this table, the proposed runoff rates and volumes are reduced from the existing to proposed conditions. Since this regulation requires that we show reductions at each time interval, we have included Table 7 in the appendix of this report which shows the minute-by-minute flows leaving the site for each storm event and compares existing and proposed conditions.

Table 5 – Overall Peak Runoff Rates – Current Adjusted Rainfall

Storm Event	Existing Site Peak Runoff	Existing Site Runoff Volume	Proposed Site Peak Runoff	Proposed Site Runoff Volume
2 Year	9.339 cfs	44,031 cf	9.179 cfs	43,147 cf
10 Year	15.35 cfs	73,038 cf	15.19 cfs	71,995 cf
100 Year	27.41 cfs	132,192 cf	27.27 cfs	130,994 cf

Table 6 – Overall Peak Runoff Rates – Future Projected Rainfall

Storm Event	Existing Site Peak Runoff	Existing Site Runoff Volume	Proposed Site Peak Runoff	Proposed Site Runoff Volume
2 Year	11.28 cfs	53,349 cf	11.12 cfs	52,402 cf
10 Year	18.49 cfs	88,329 cf	18.33 cfs	87,232 cf
100 Year	34.83 cfs	169,002 cf	34.70 cfs	167,752 cf

WATER QUALITY

Since the proposed development does not result in a net increase of $\frac{1}{4}$ of an acre or more of impervious surface, the water quality aspect of the Stormwater Management Rules is not required.

GROUNDWATER RECHARGE

The site is located within the Metropolitan Planning Area. No groundwater recharge is required for the site. A map from Geo Web showing the site within this planning area can be found in the appendix of this report.

STORM SEWER COMPUTATIONS

A storm sewer system has been designed to collect the runoff associated with the proposed parking areas, drive aisles, walkways, and lawn areas. The pipes are designed to carry the flows for the 25-year storm.

The rational method was used to calculate runoff rates. Manning's equation was used to determine the capacity of each system. Storm Sewer Computations are included in the appendix of this report. Also, Fig.-3 shows the drainage areas to each inlet.

The entire site is mapped with soils considered Hydrologic Group D (See attached Appendix for Soil Map). For this analysis, all the drainage areas were assumed to have 0.99 as a Runoff Coefficient (C value), which is the most conservative value.

CONCLUSION

The proposed improvements meet all of the stormwater management regulations for both the Township of West Orange as well as the NJDEP. The stormwater quantity is satisfied through the use of non-structural strategies, specifically the reduction in impervious surfaces. The

proposed development calls for the reconstruction of the existing parking lot, increasing the amount of landscape area by approximately 0.09 acres. The decrease in impervious also means that water quality measures are not required.

The site is located in the Metropolitan Planning Area, which means that stormwater recharge is not required.

**EXISTING CONDITIONS
CURRENT ADJUSTED
HYDROGRAPHS**



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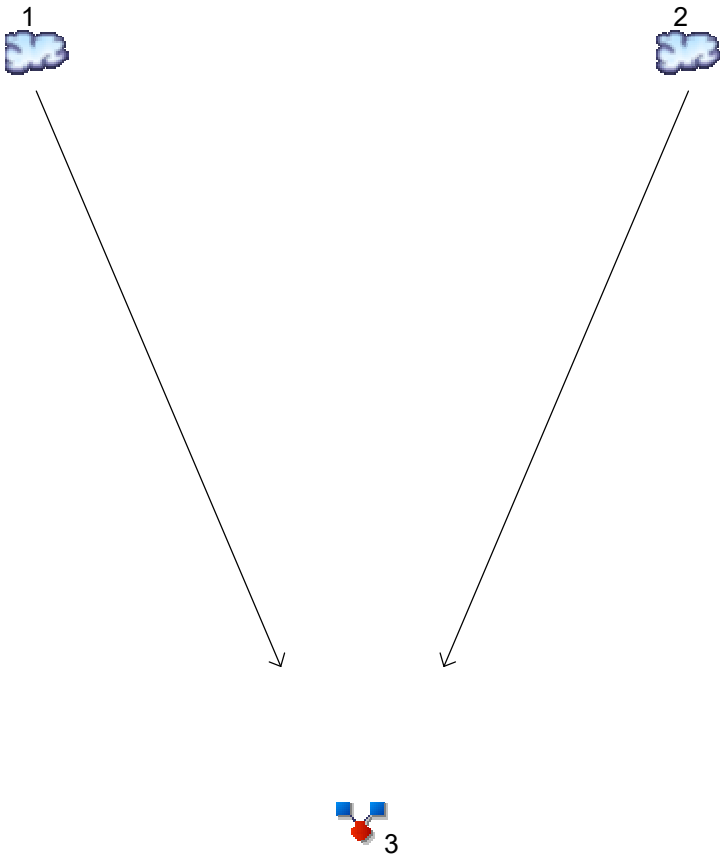
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Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	DA-EX Pervious
2	SCS Runoff	DA-EX Impervious
3	Combine	<no description>

Hydrograph Return Period Recap

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

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Hydrograph Summary Report

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

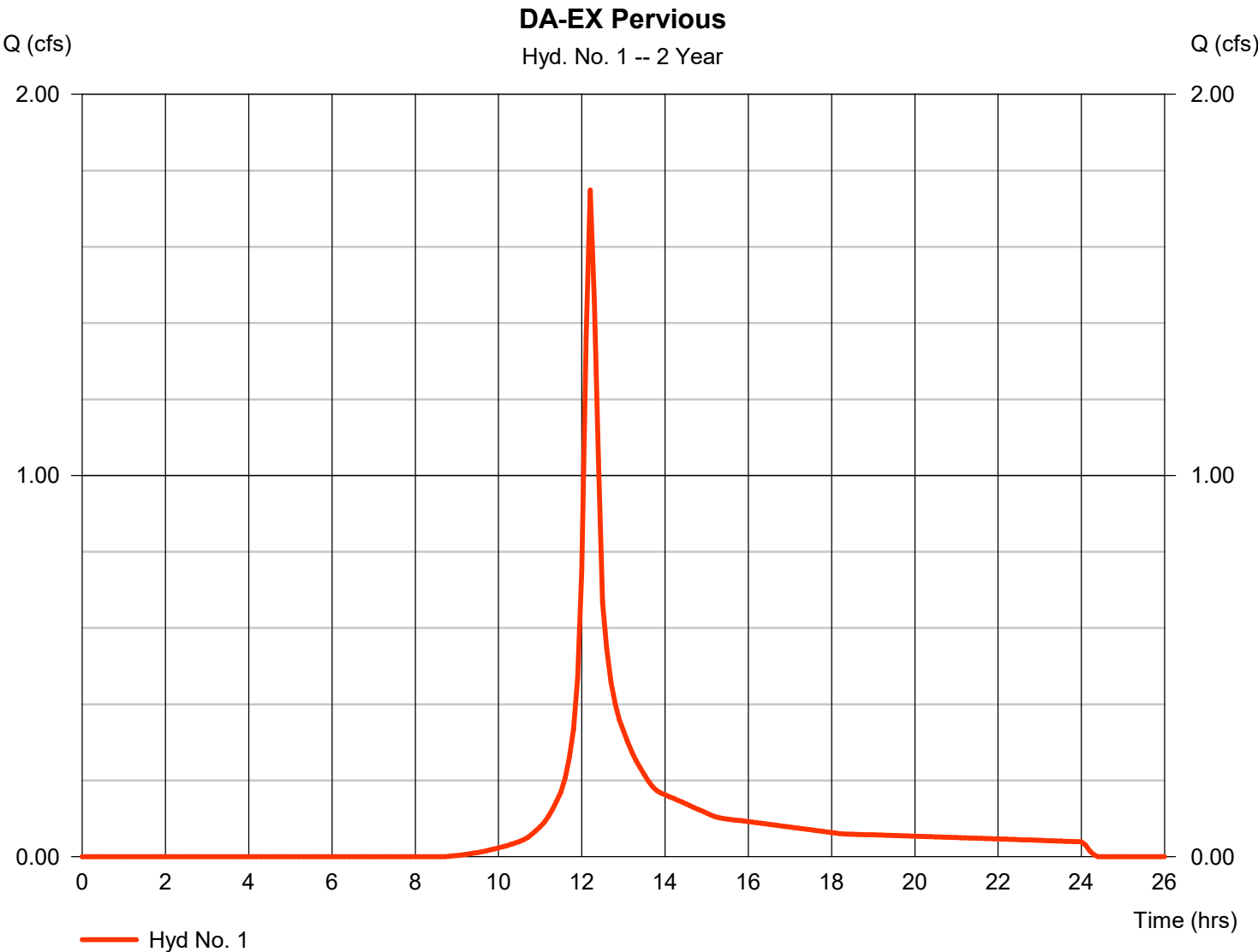
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.749	6	732	7,463	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	7.590	6	732	36,568	-----	-----	-----	DA-EX Impervious
3	Combine	9.339	6	732	44,031	1, 2	-----	-----	<no description>
Existing - Current Adjusted.gpw					Return Period: 2 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 1.749 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 7,463 cuft
Drainage area	= 1.360 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= S:\Petty Engineering Cad Projects\2024\24-170 - Baginask Manor - West Orange		

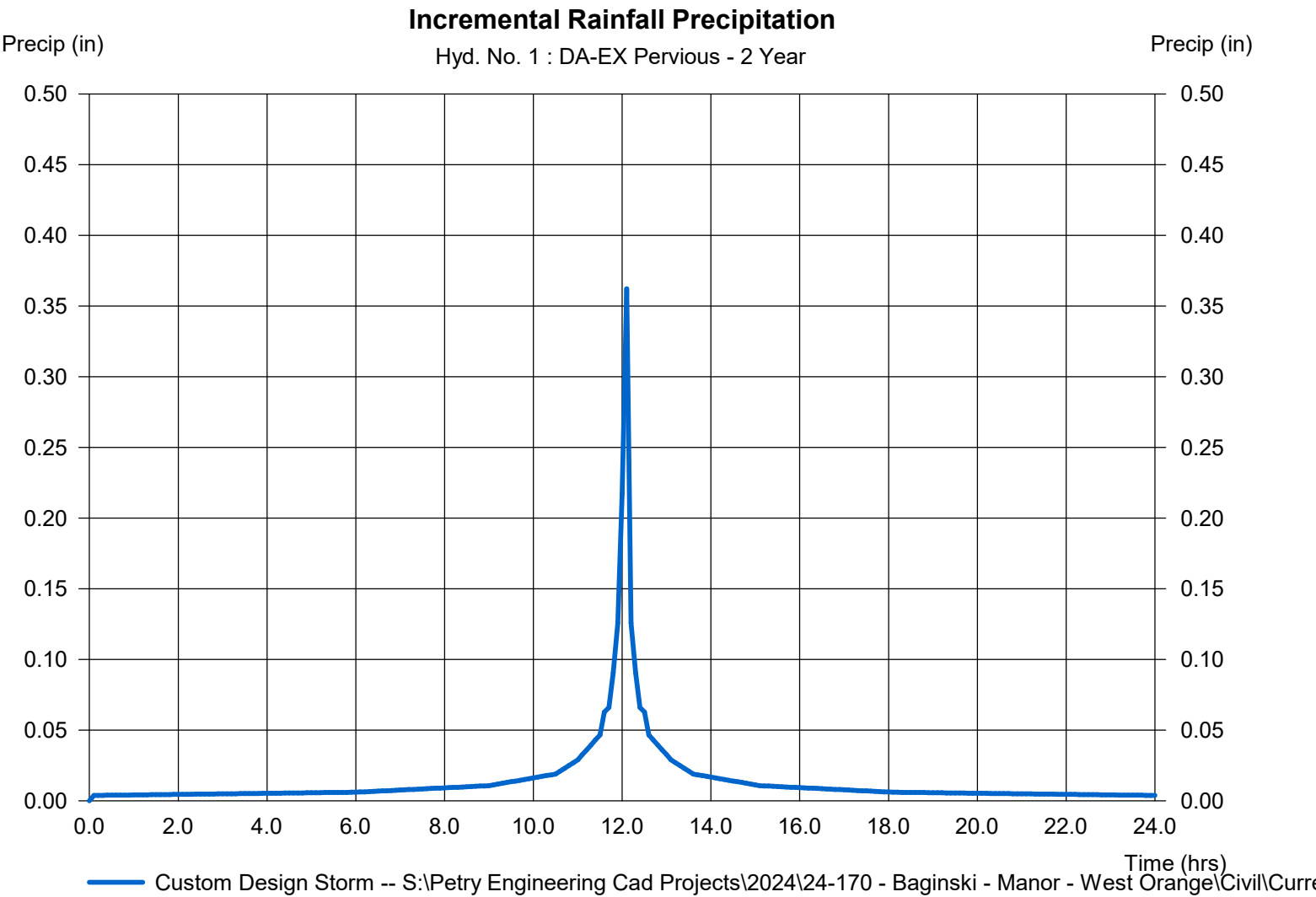


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 2 yrs	Time interval	= 6 min
Total precip.	= 3.4700 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

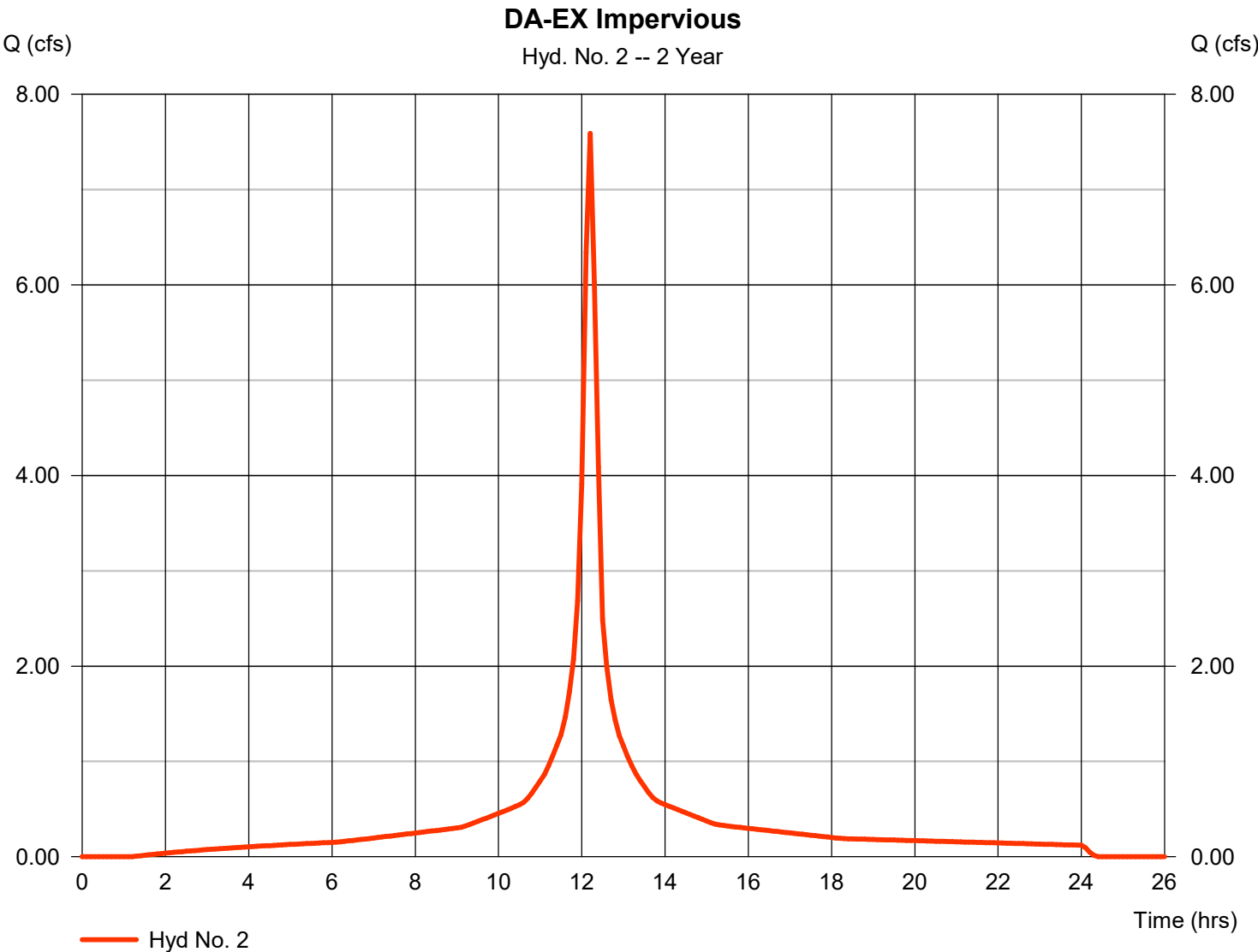


Hydrograph Report

Hyd. No. 2

DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.590 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	36,568 cuft
Drainage area	=	3.320 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.60 min
Total precip.	=	3.47 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2024\24-170 - Baginask Manor - West Orange\Storm 24-24			

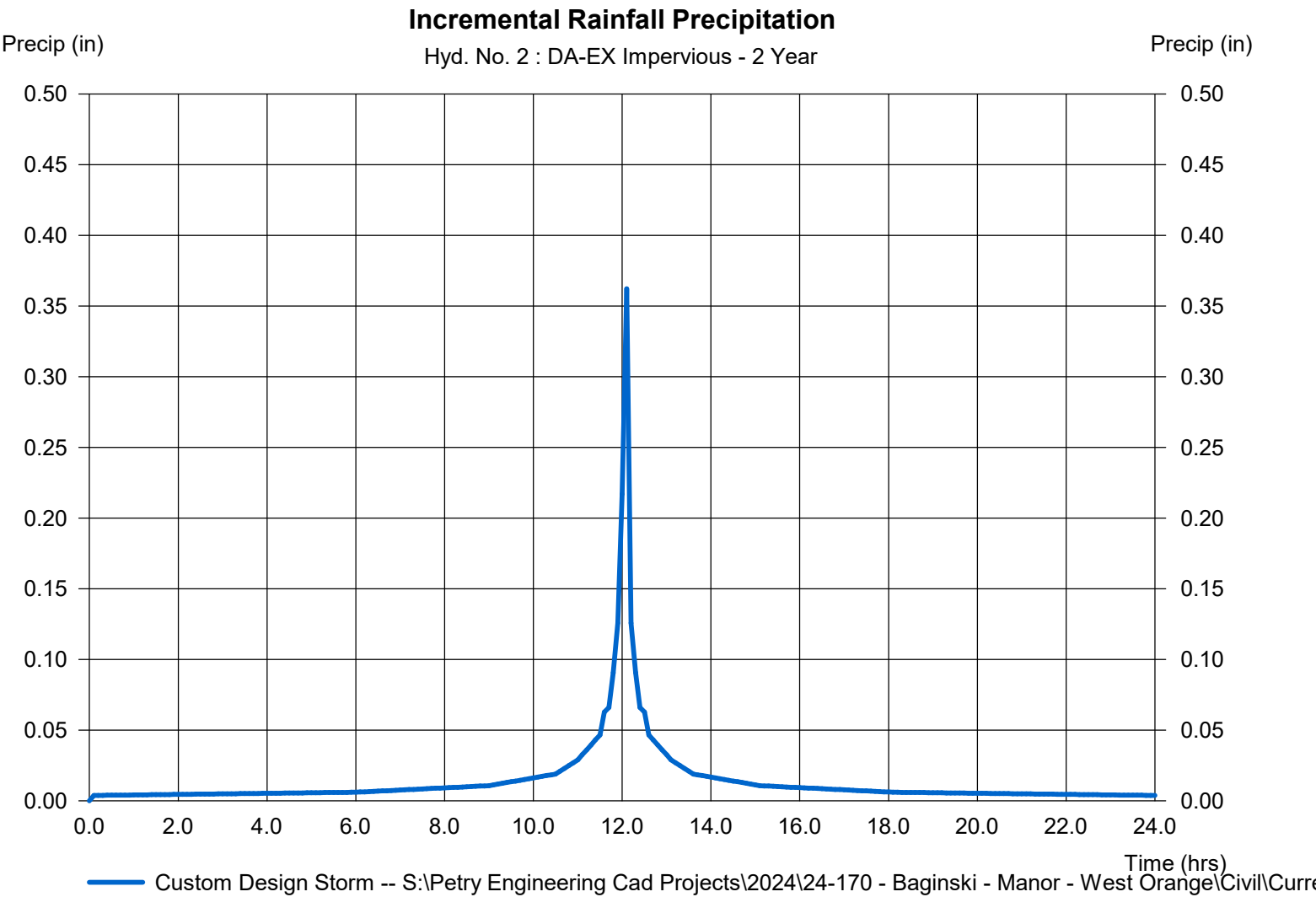


Precipitation Report

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 2 yrs	Time interval	= 6 min
Total precip.	= 3.4700 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

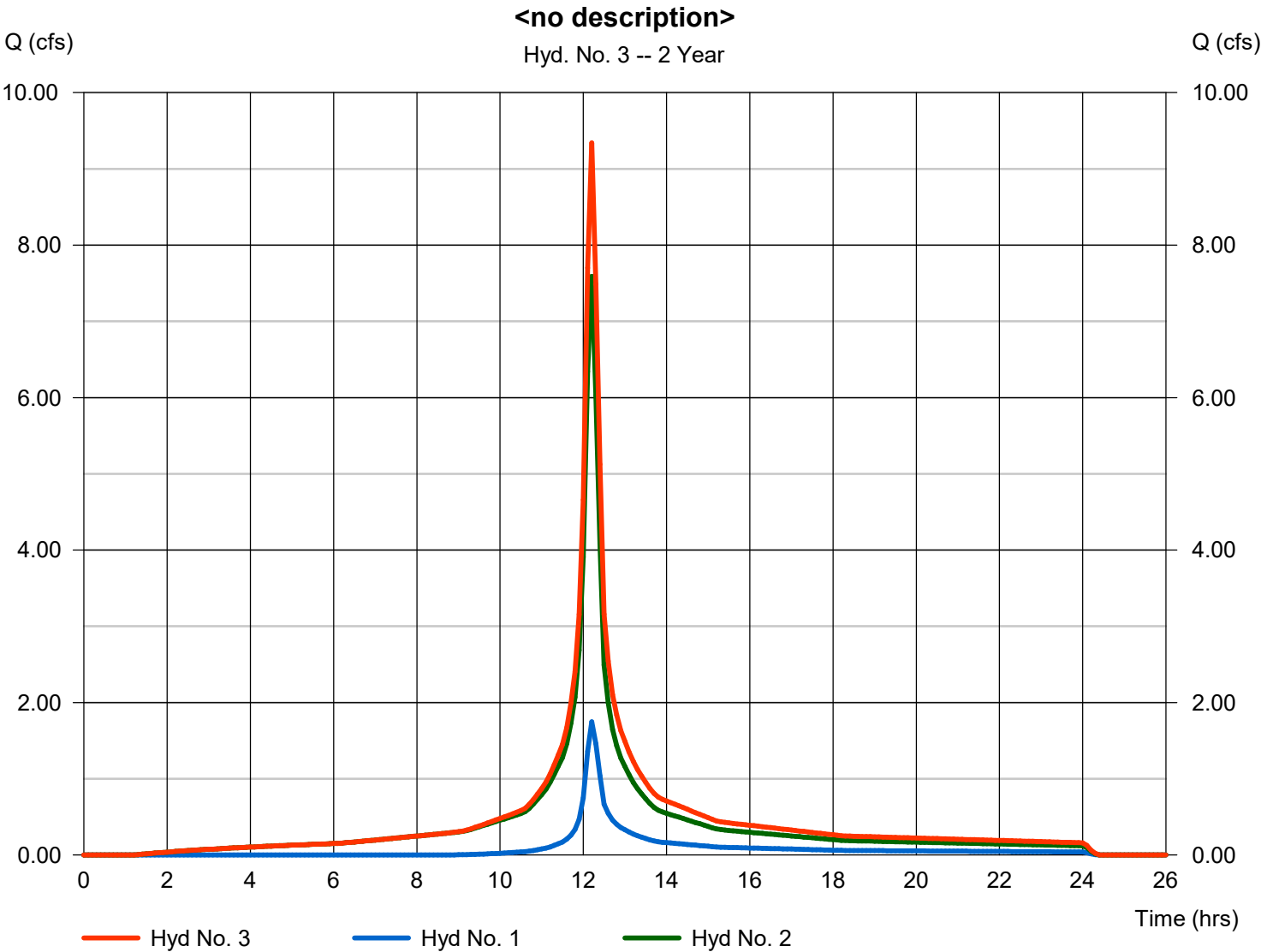


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 9.339 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 44,031 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydrograph Summary Report

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

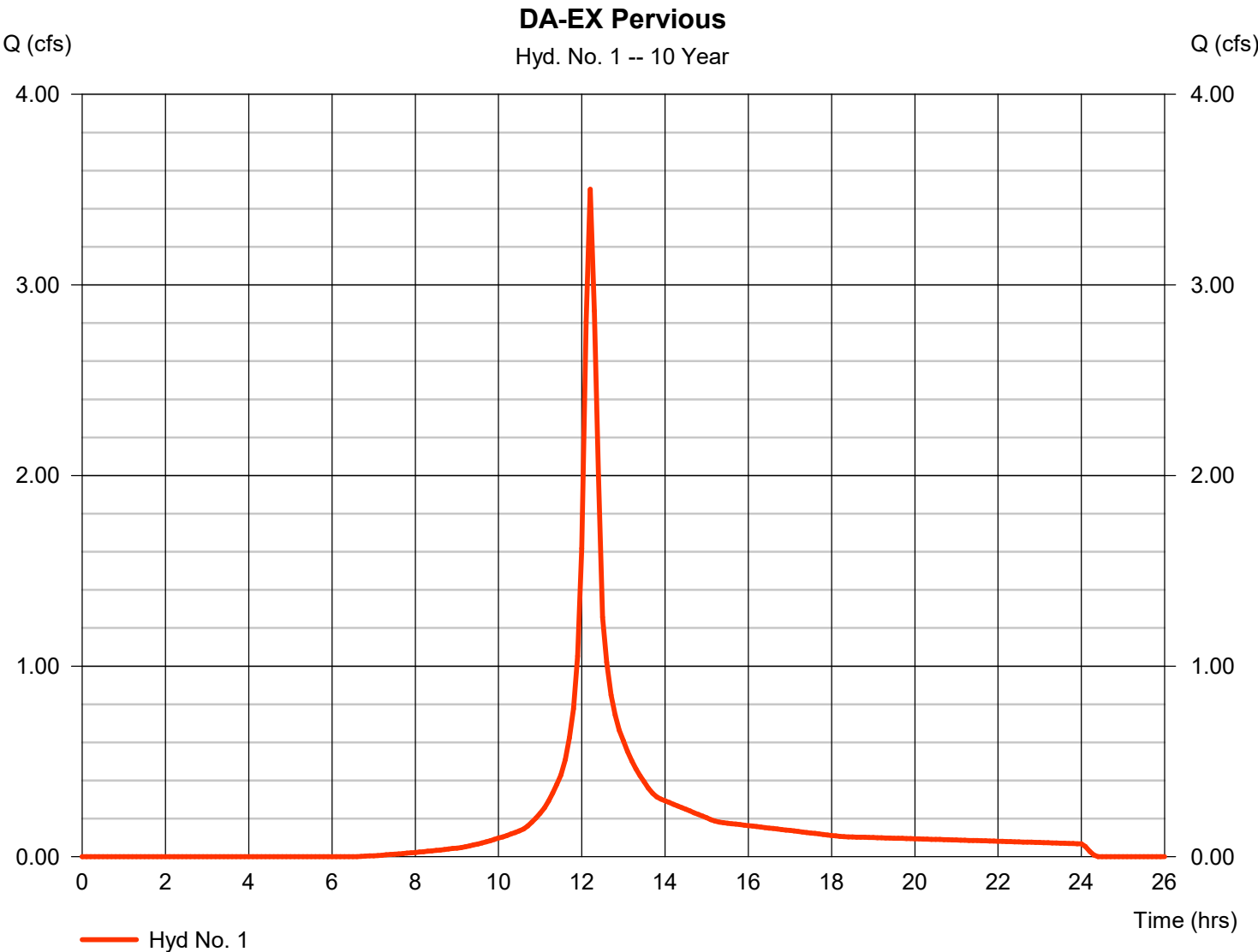
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.502	6	732	14,935	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	11.85	6	732	58,103	-----	-----	-----	DA-EX Impervious
3	Combine	15.35	6	732	73,038	1, 2	-----	-----	<no description>
Existing - Current Adjusted.gpw					Return Period: 10 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 3.502 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 14,935 cuft
Drainage area	= 1.360 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginask - 184 Manor - West Orange		

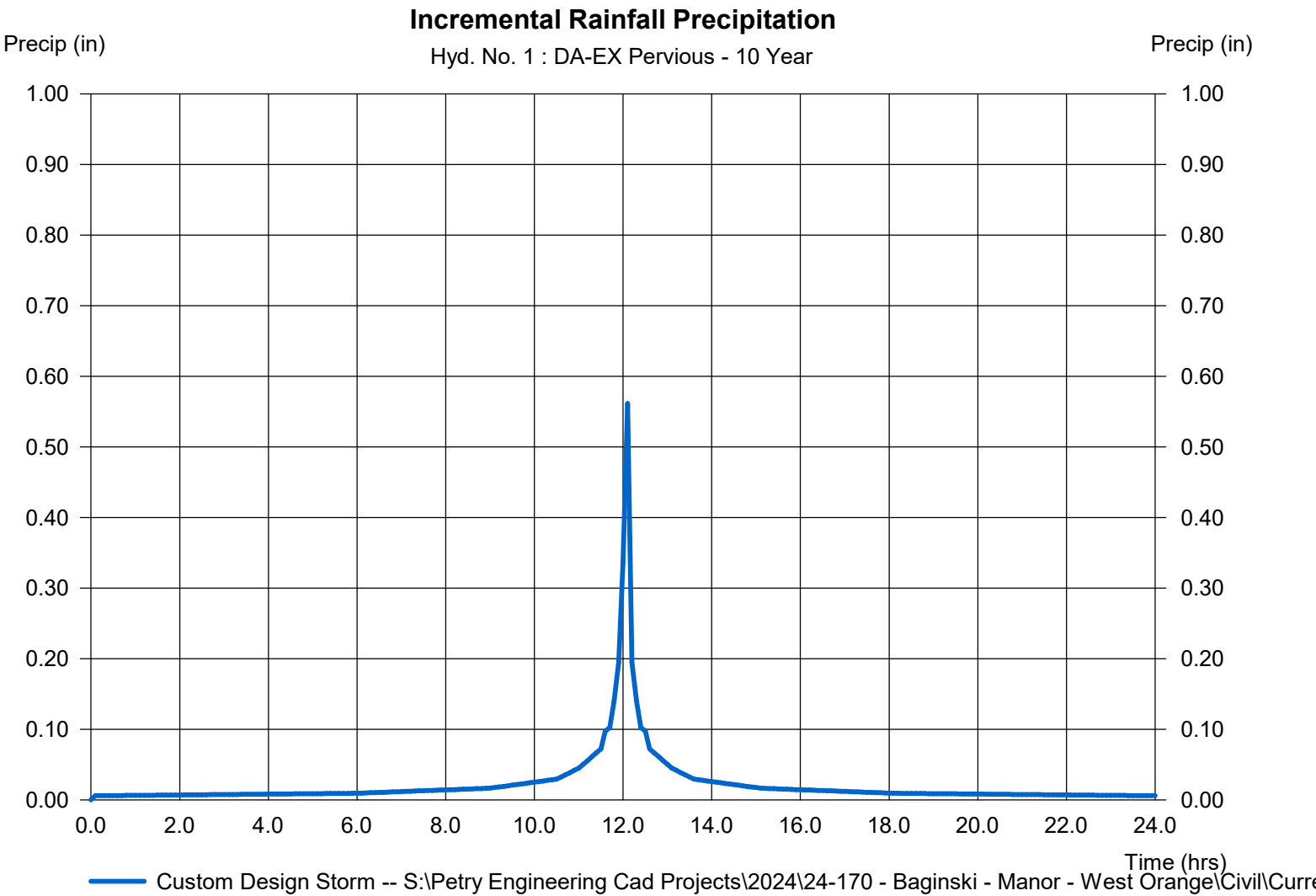


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.3800 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

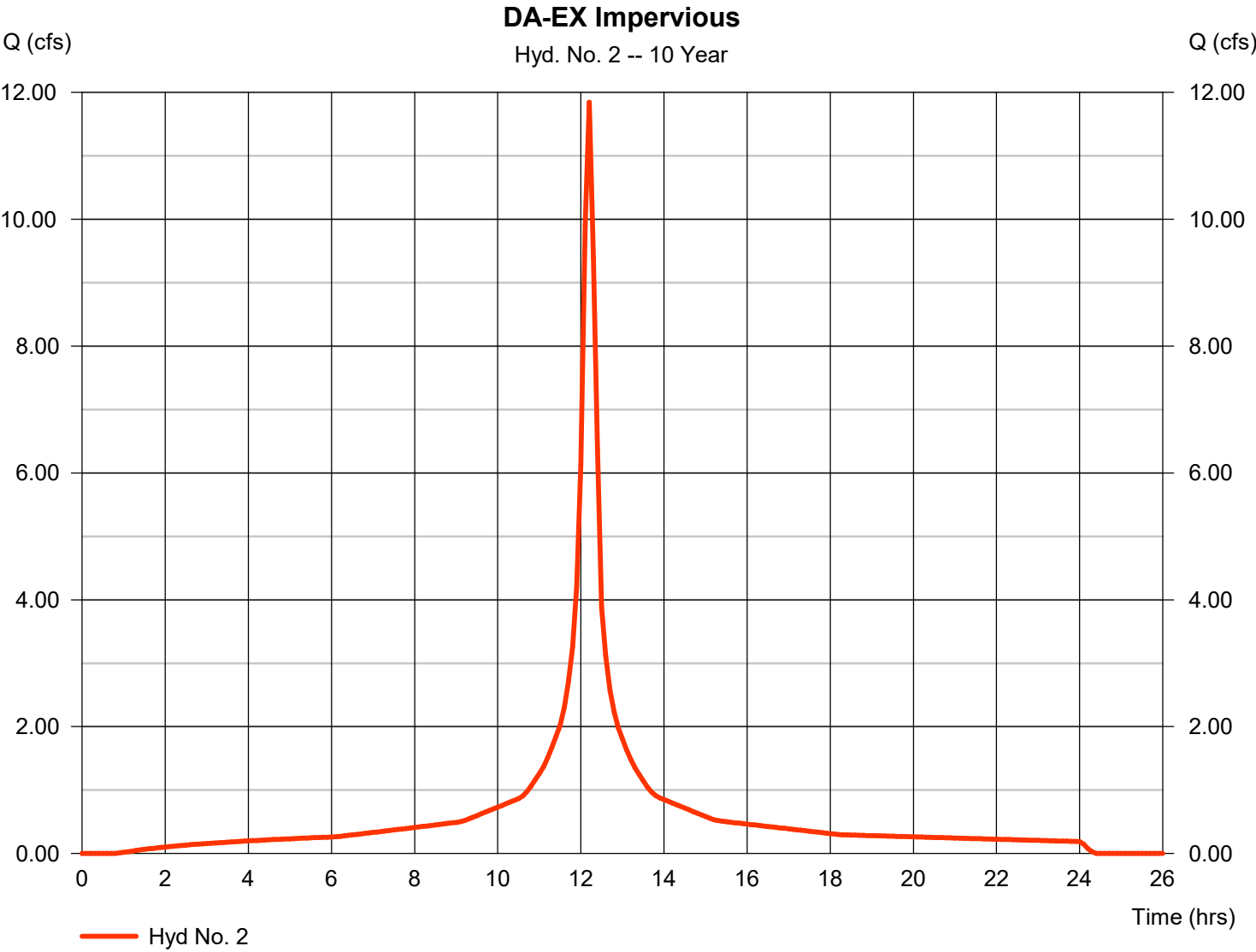


Hydrograph Report

Hyd. No. 2

DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.85 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	58,103 cuft
Drainage area	=	3.320 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.60 min
Total precip.	=	5.38 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2024\24-170 - Baginask Manor - West Orange\Storm 24-24-170 - Baginask Manor - West Orange.cad			

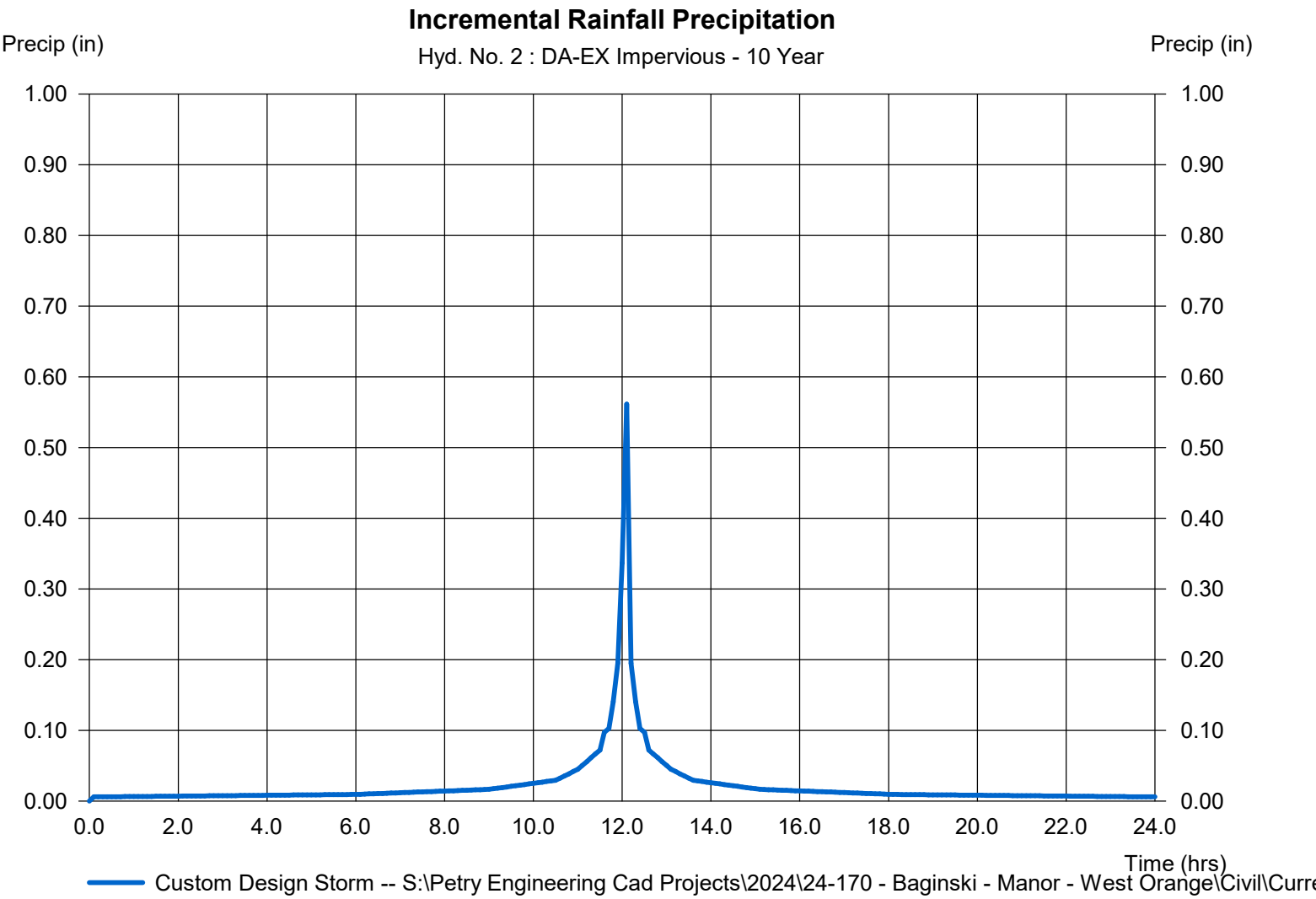


Precipitation Report

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.3800 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current		

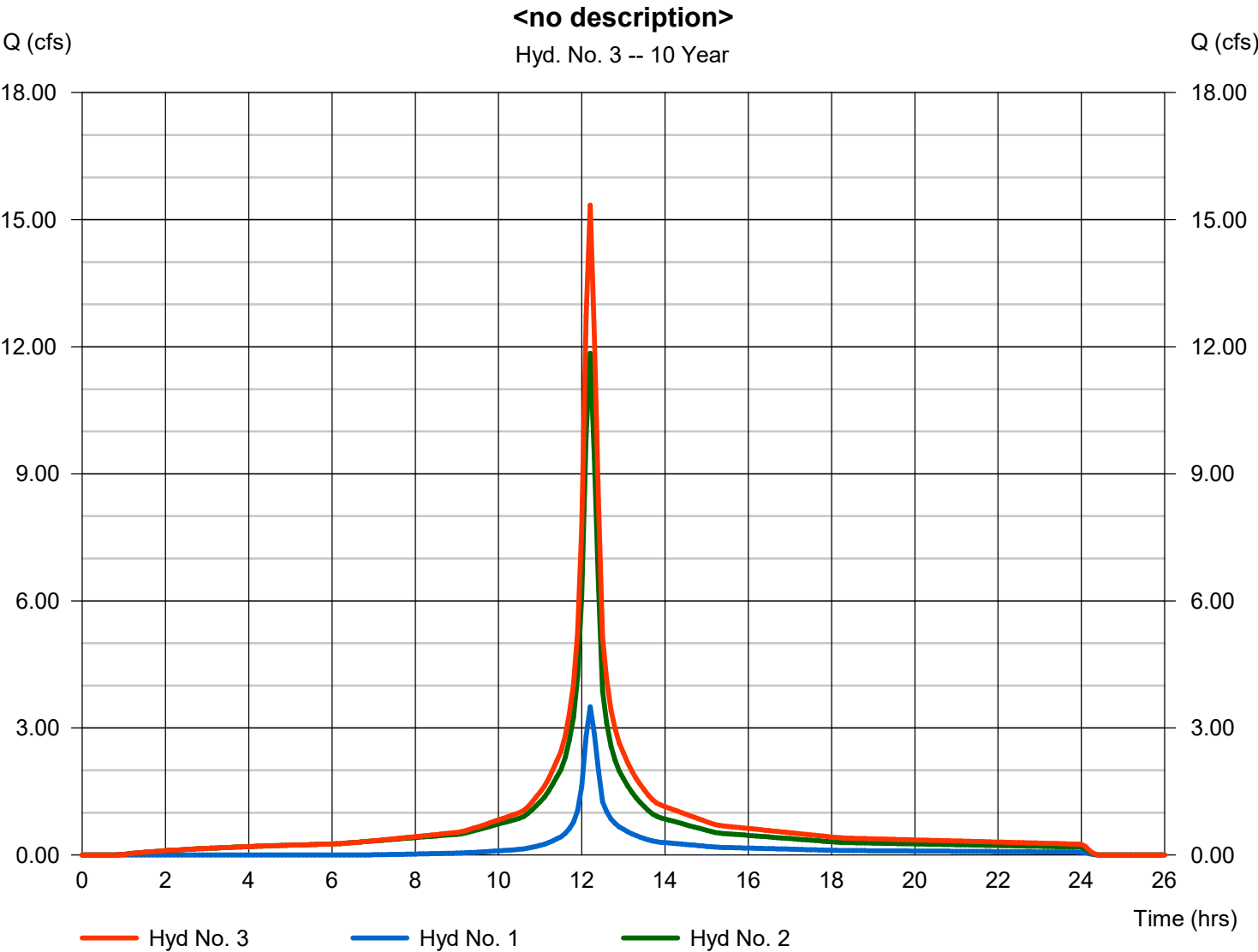


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 15.35 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 73,038 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydrograph Summary Report

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

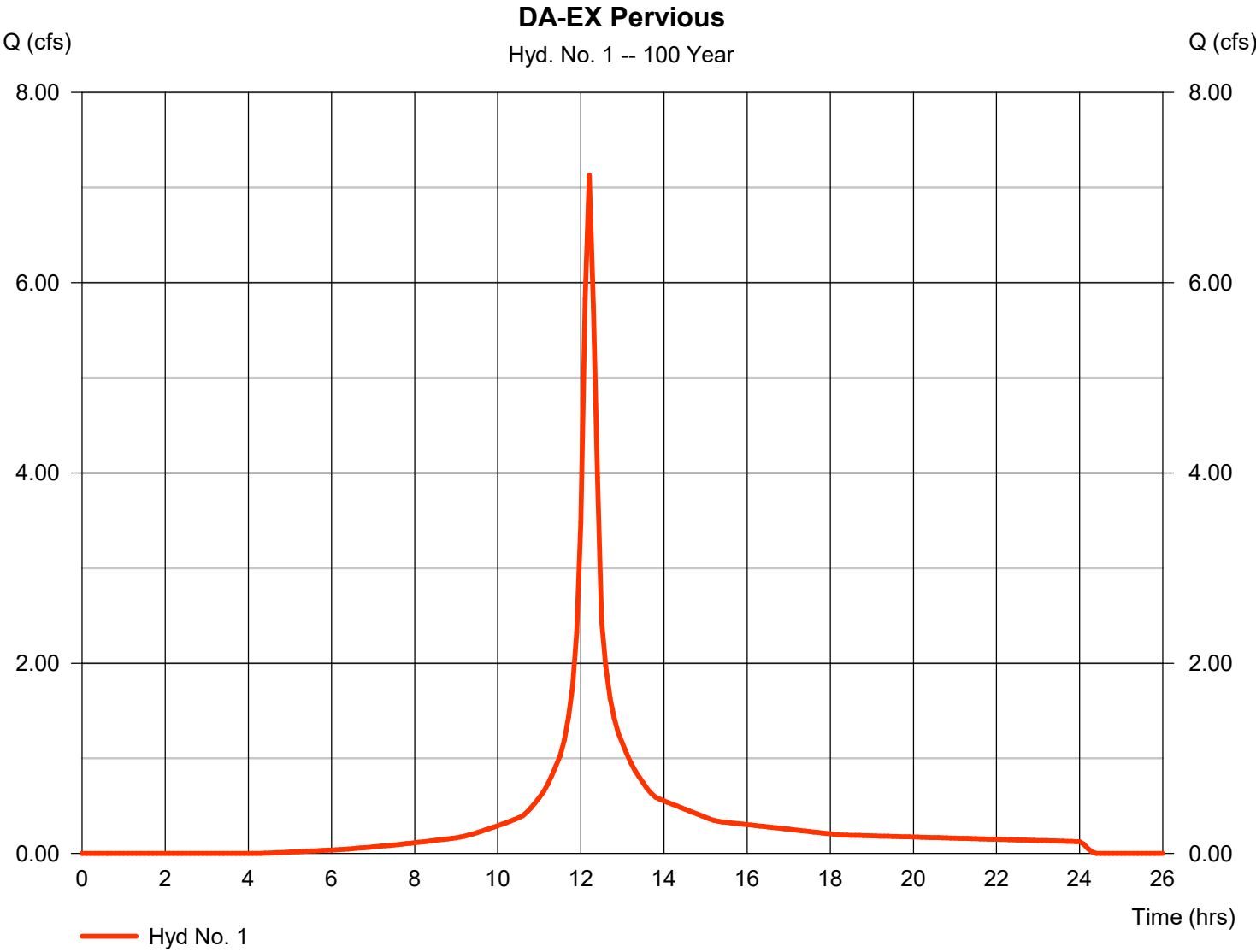
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	7.132	6	732	31,190	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	20.28	6	732	101,003	-----	-----	-----	DA-EX Impervious
3	Combine	27.41	6	732	132,192	1, 2	-----	-----	<no description>
Existing - Current Adjusted.gpw					Return Period: 100 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 7.132 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 31,190 cuft
Drainage area	= 1.360 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 9.18 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024-170 - Bagin - 184 Manor - West Orange		

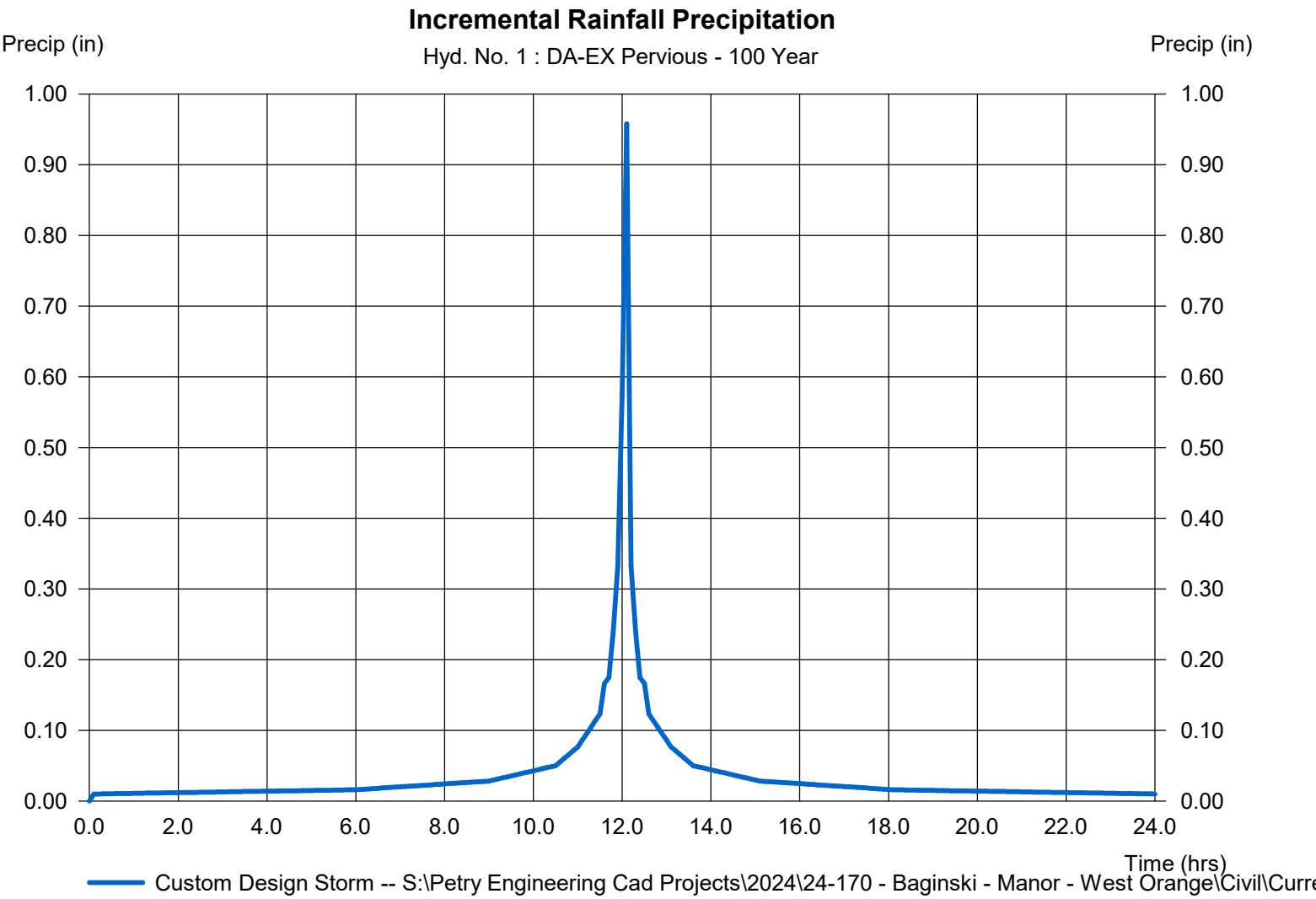


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 100 yrs	Time interval	= 6 min
Total precip.	= 9.1800 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

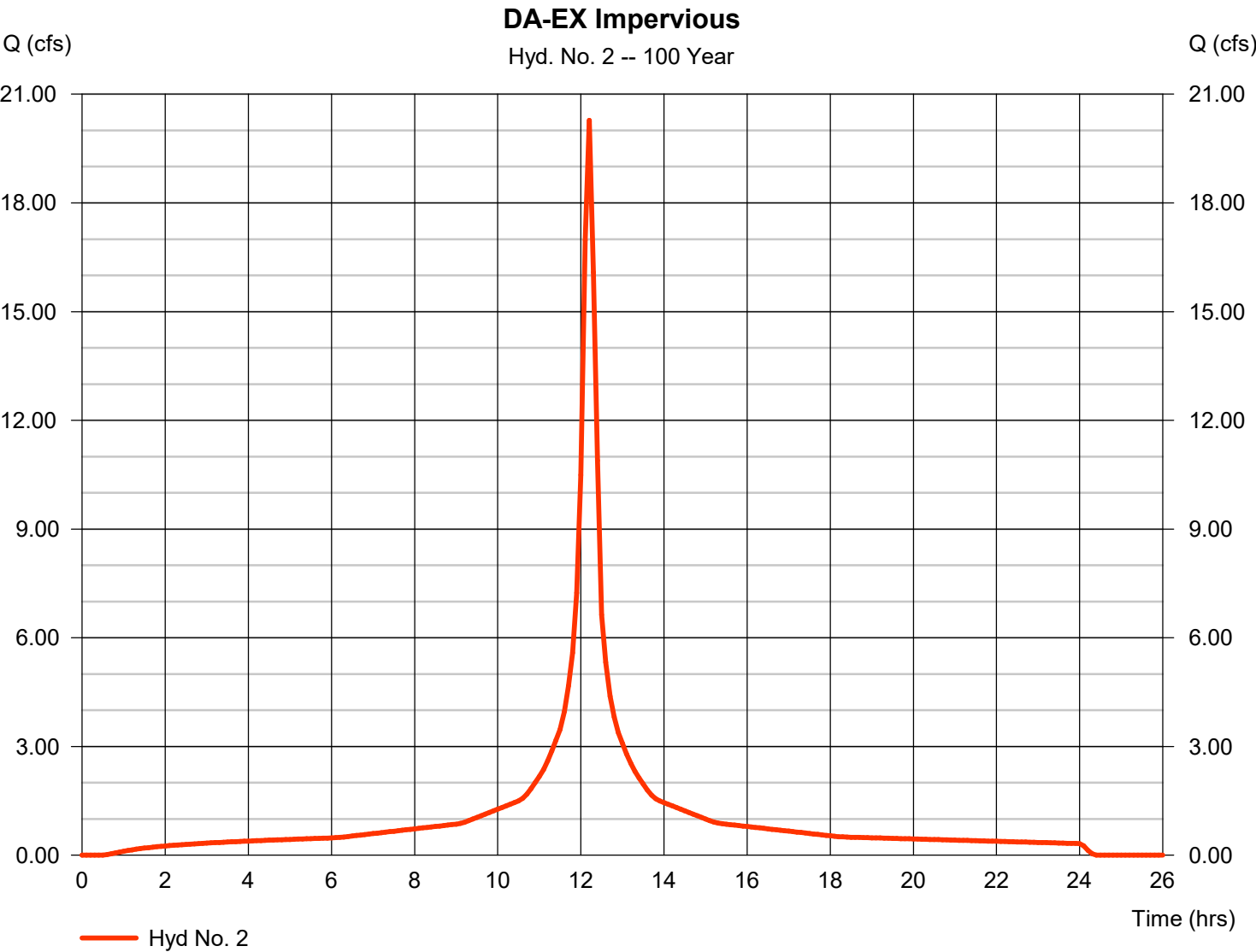


Hydrograph Report

Hyd. No. 2

DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.28 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	101,003 cuft
Drainage area	=	3.320 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.60 min
Total precip.	=	9.18 in	Distribution	=	Custom
Storm duration	=	S:\Petty Engineering Cad Projects\2024\24-170 - Baginns Manor - West Orange\Storm 24-24 - 170 - Baginns Manor - West Orange.cad			



Precipitation Report

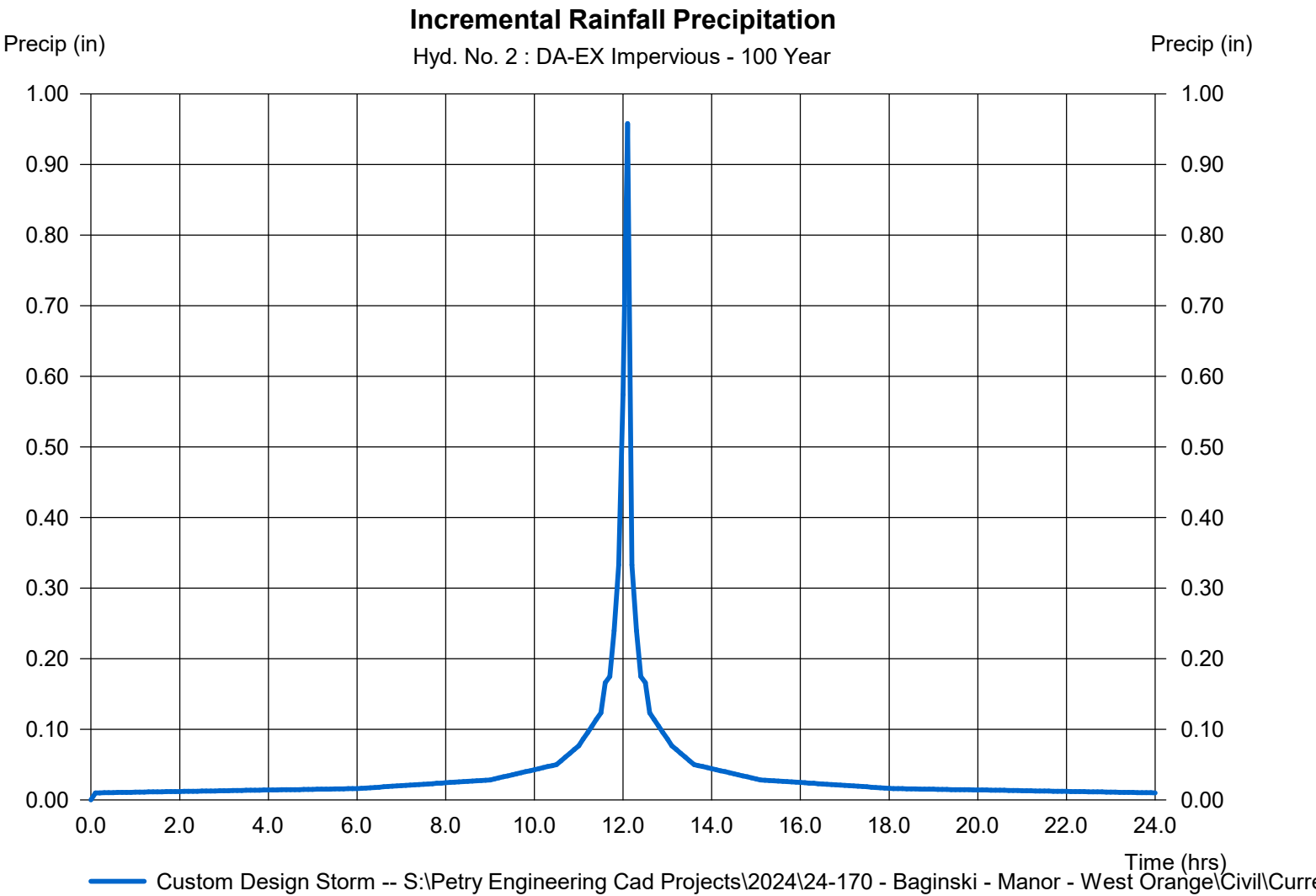
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Monday, 12 / 30 / 2024

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 100 yrs	Time interval	= 6 min
Total precip.	= 9.1800 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		



Hydrograph Report

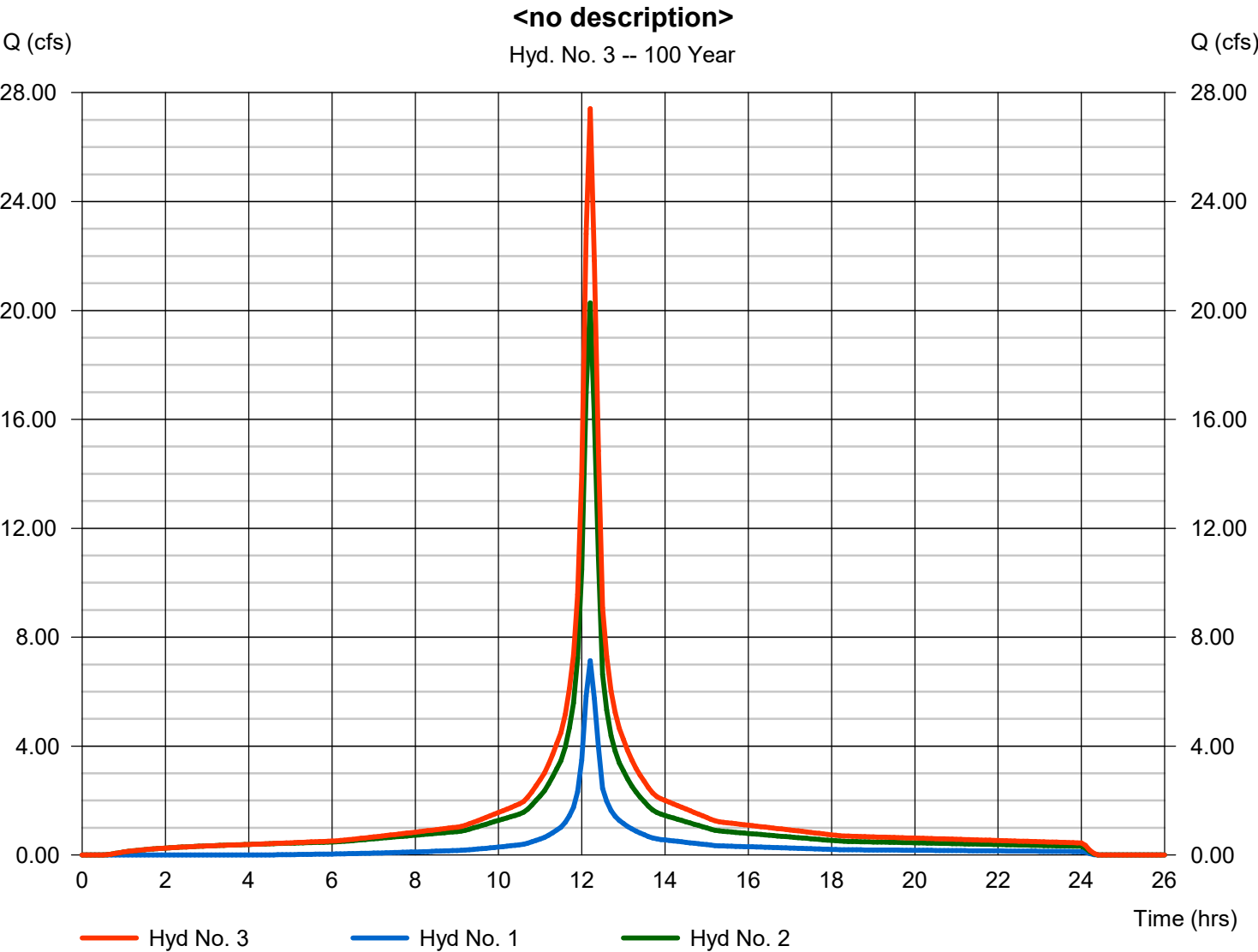
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Monday, 12 / 30 / 2024

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 27.41 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 132,192 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydraflow Rainfall Report

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

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

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

Tc = time in minutes. Values may exceed 60.

Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current\Stormwater\Essex County - Current Adjusted.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	0.00	0.00	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	3.47	0.00	0.00	5.38	0.00	0.00	9.18

**EXISTING CONDITIONS
FUTURE PROJECTED
HYDROGRAPHS**



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Hydrograph Return Period Recap..... 2

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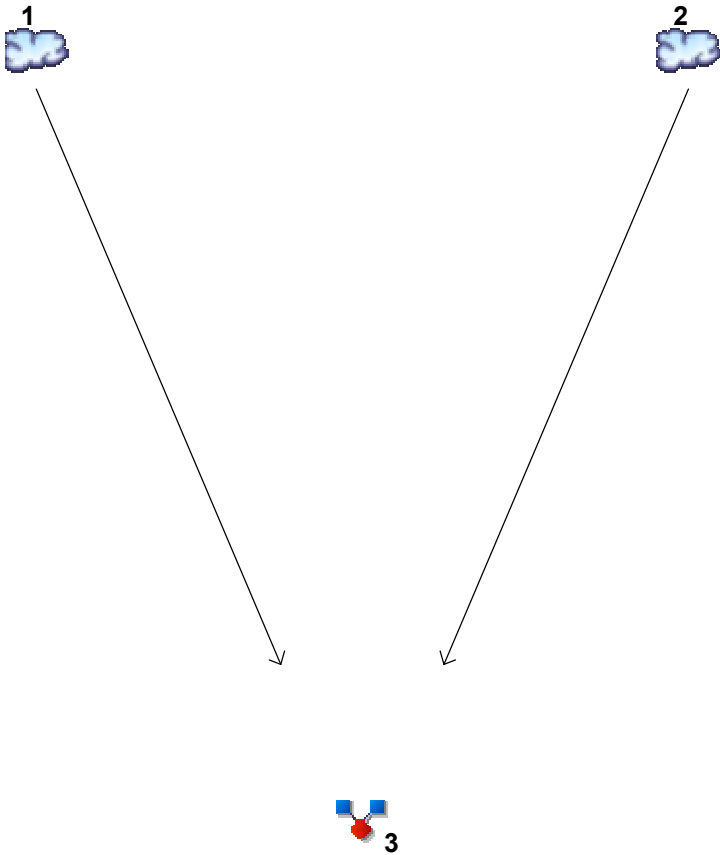
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 Hydrograph No. 3, Combine, <no description>..... 20

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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-EX Pervious
2	SCS Runoff	DA-EX Impervious
3	Combine	<no description>

Hydrograph Summary Report

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

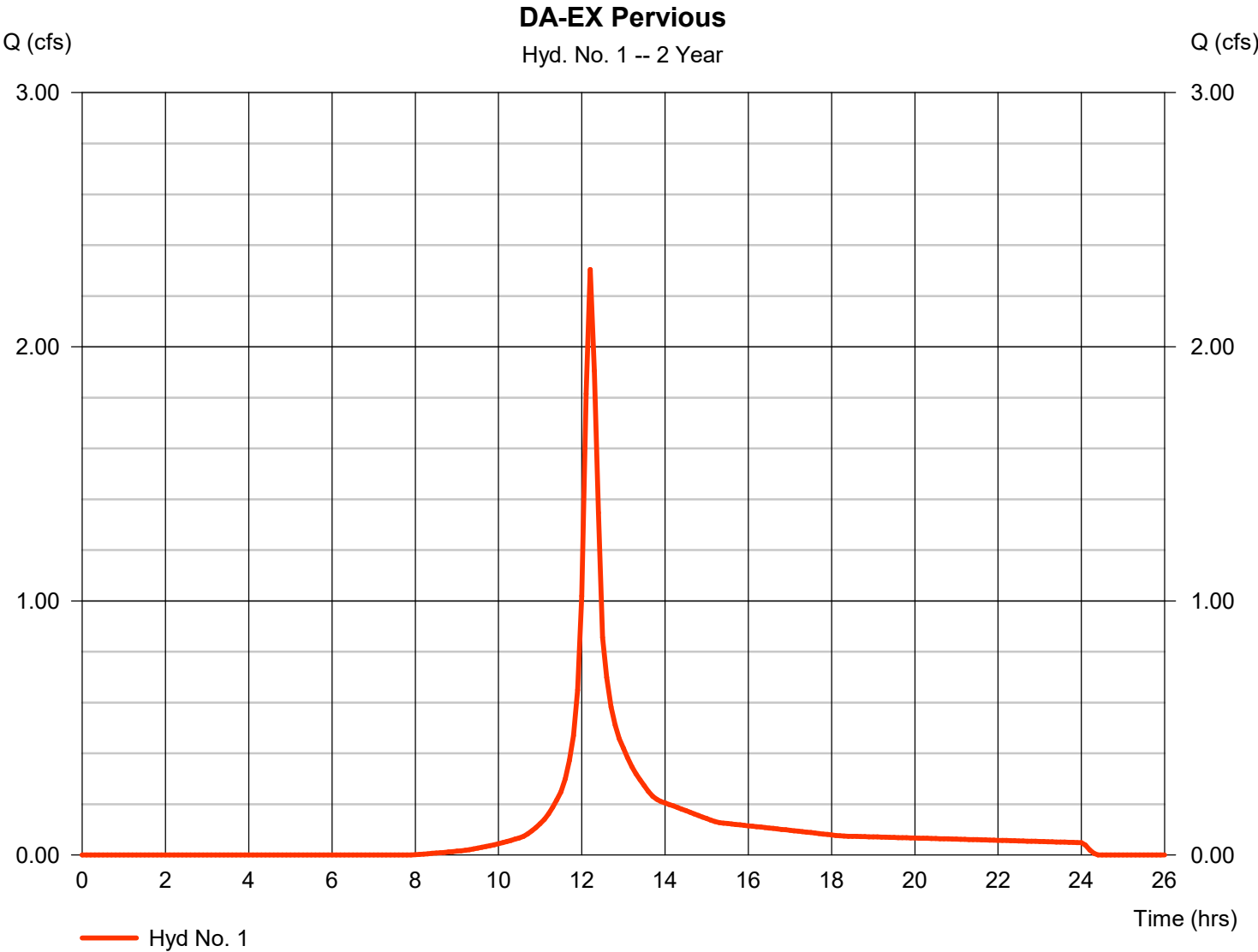
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	2.304	6	732	9,795	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	8.974	6	732	43,554	-----	-----	-----	DA-EX Impervious
3	Combine	11.28	6	732	53,349	1, 2	-----	-----	<no description>
Existing - Future Projected.gpw					Return Period: 2 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 2.304 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 9,795 cuft
Drainage area	= 1.360 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 4.09 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginns Manor - West Orange		

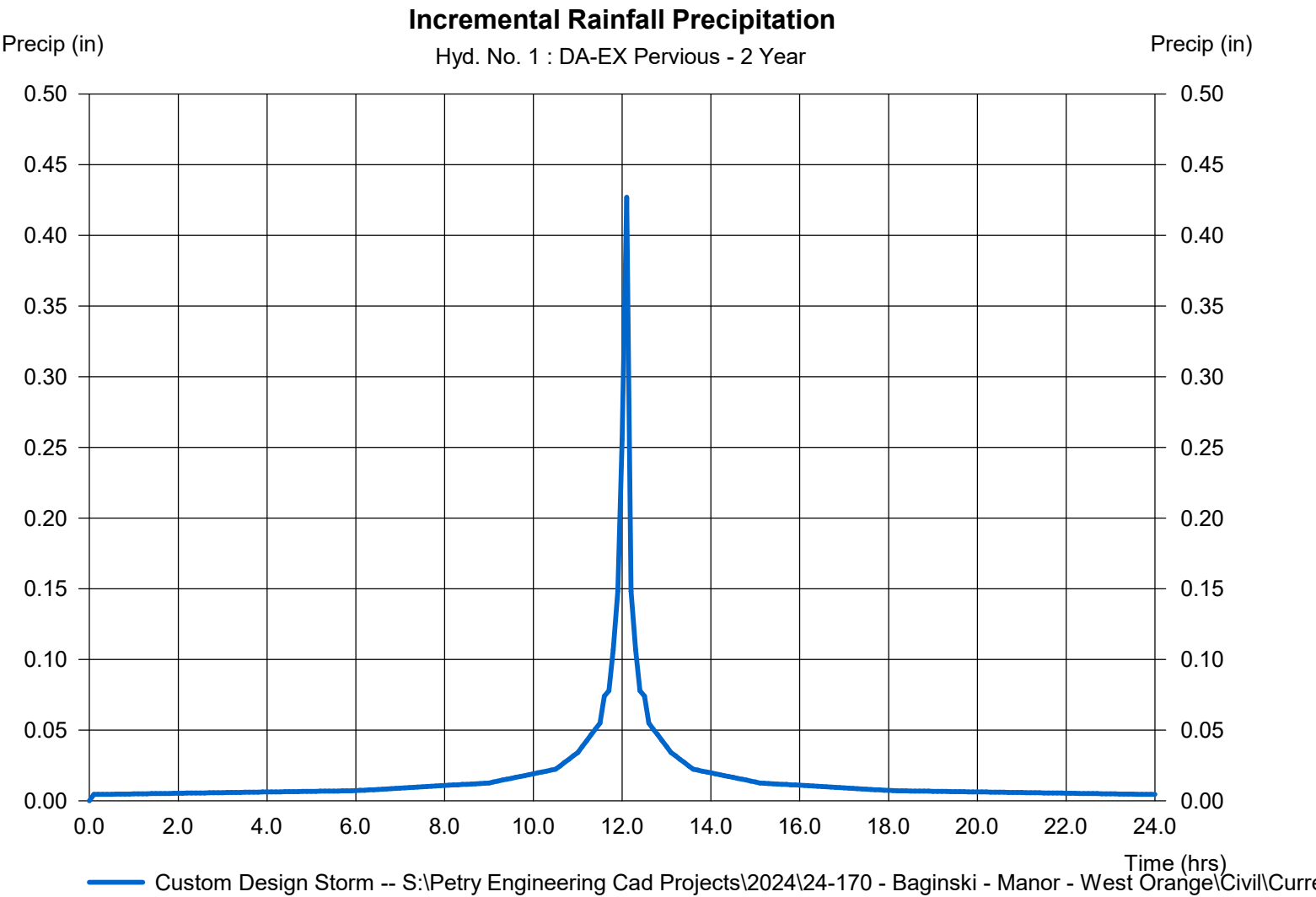


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 2 yrs	Time interval	= 6 min
Total precip.	= 4.0900 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

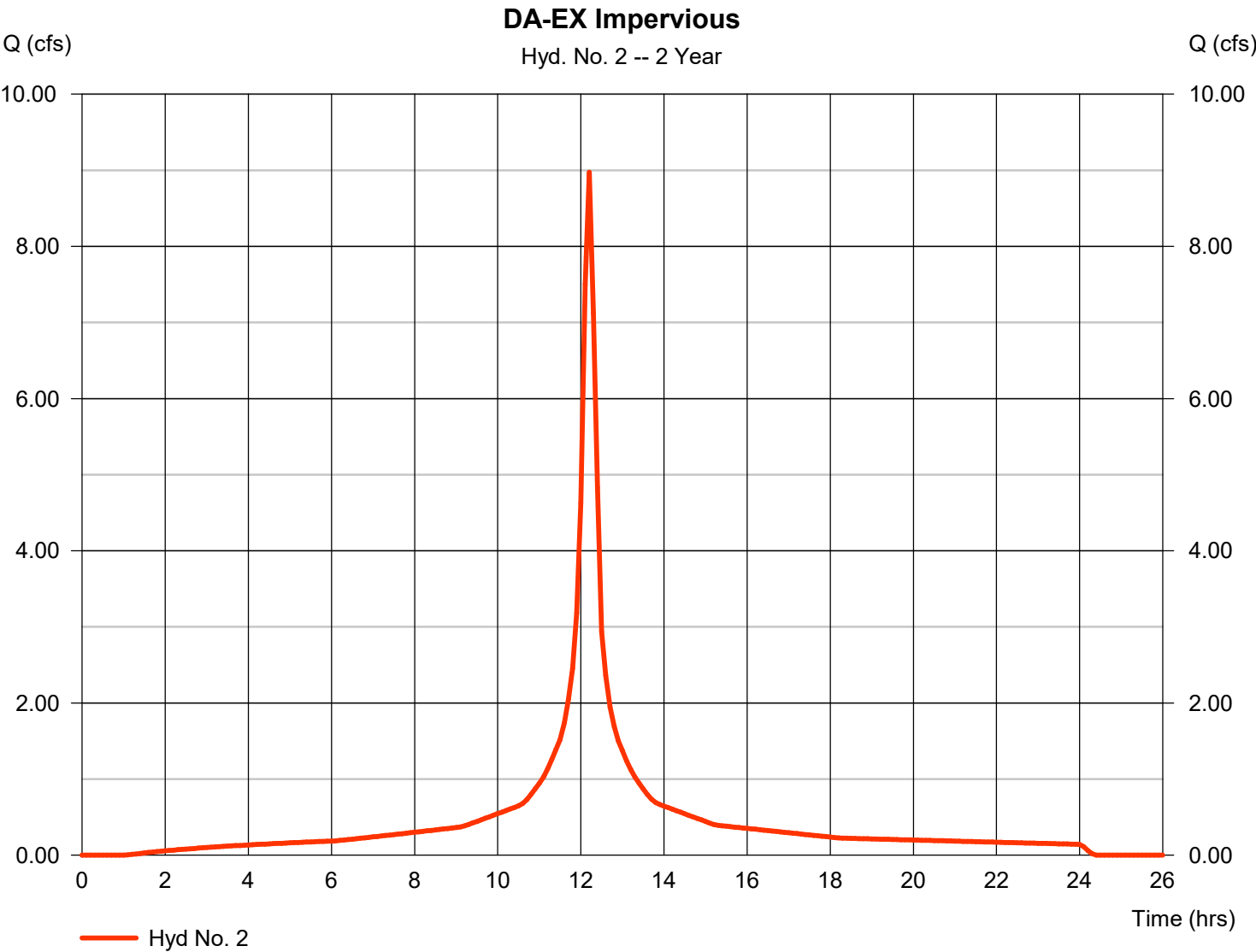


Hydrograph Report

Hyd. No. 2

DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.974 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	43,554 cuft
Drainage area	=	3.320 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.60 min
Total precip.	=	4.09 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2024\24-170 - Baginns Manor - West Orange\Storm 24-24			

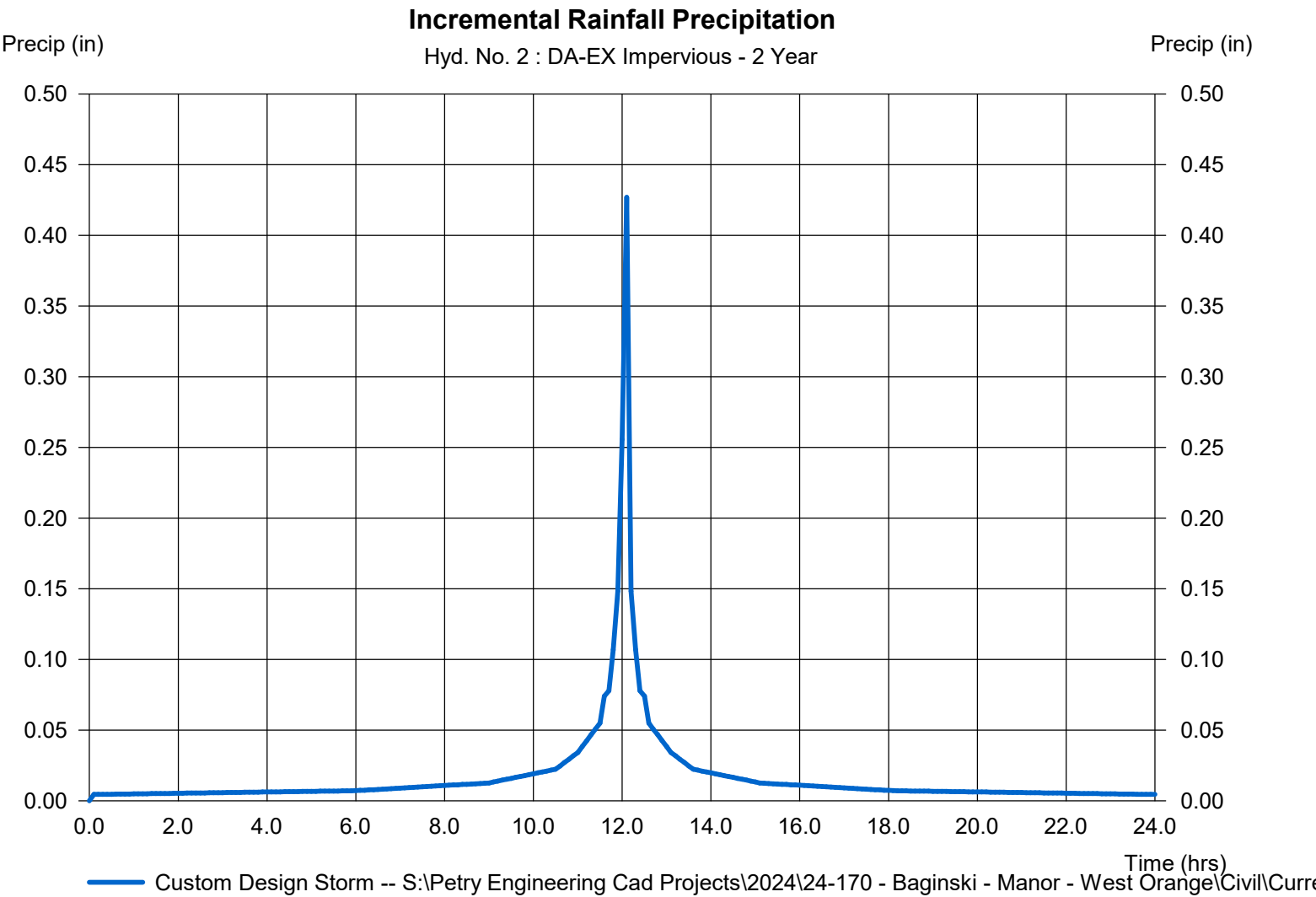


Precipitation Report

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 2 yrs	Time interval	= 6 min
Total precip.	= 4.0900 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

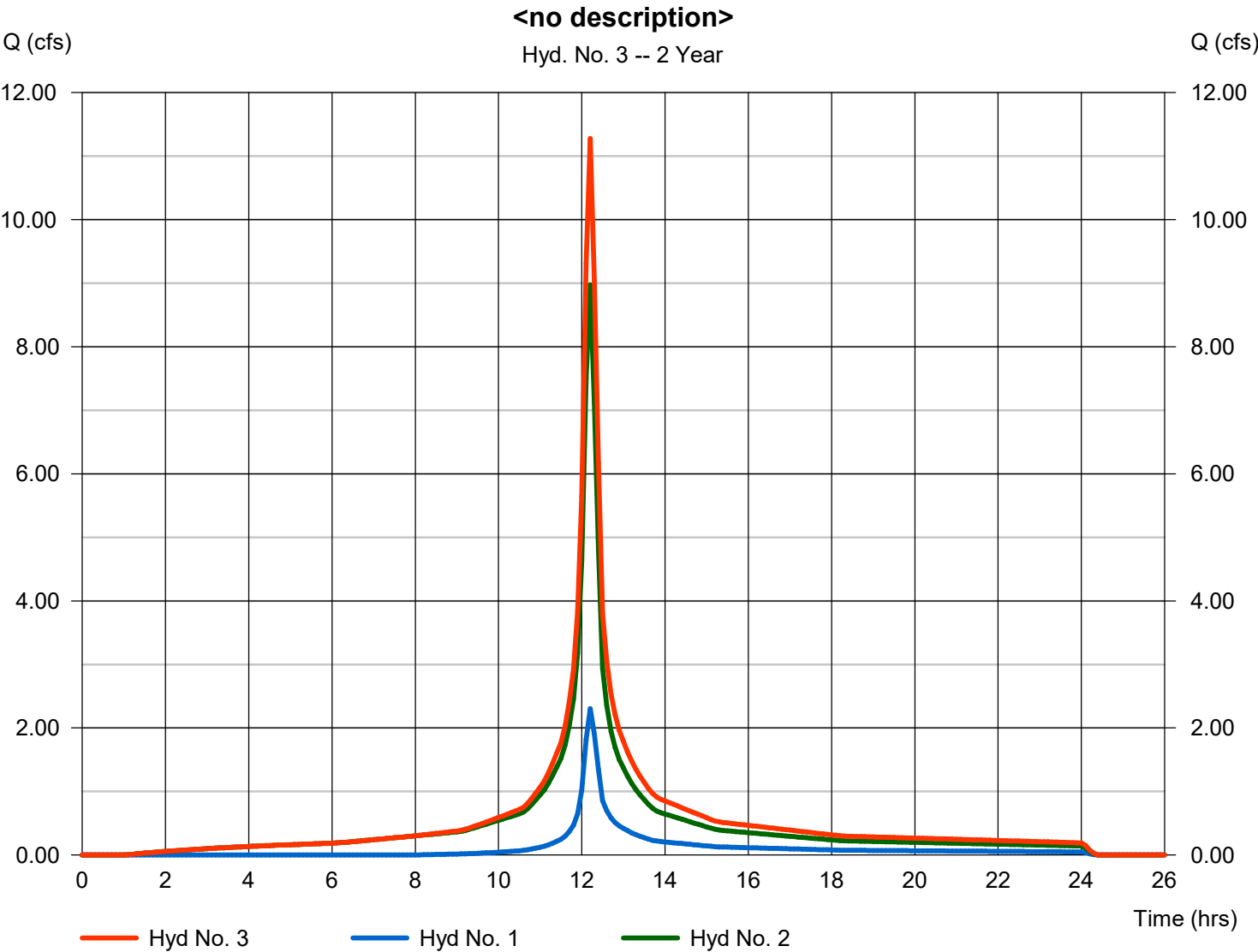


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 11.28 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 53,349 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydrograph Summary Report

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

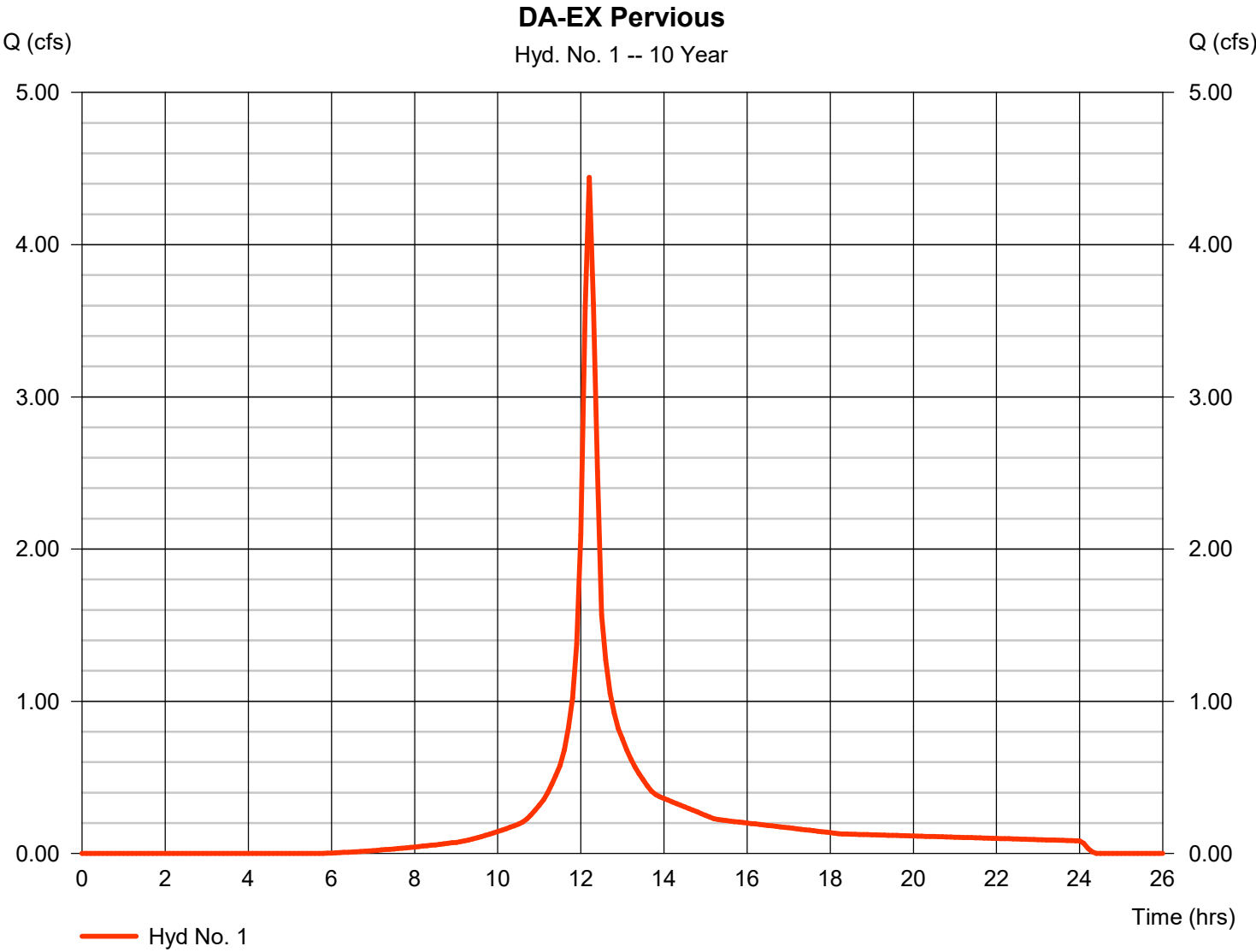
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	4.442	6	732	19,053	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	14.04	6	732	69,275	-----	-----	-----	DA-EX Impervious
3	Combine	18.49	6	732	88,329	1, 2	-----	-----	<no description>
Existing - Future Projected.gpw					Return Period: 10 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 4.442 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 19,053 cuft
Drainage area	= 1.360 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 6.37 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024-170 - Baginask Manor - West Orange		

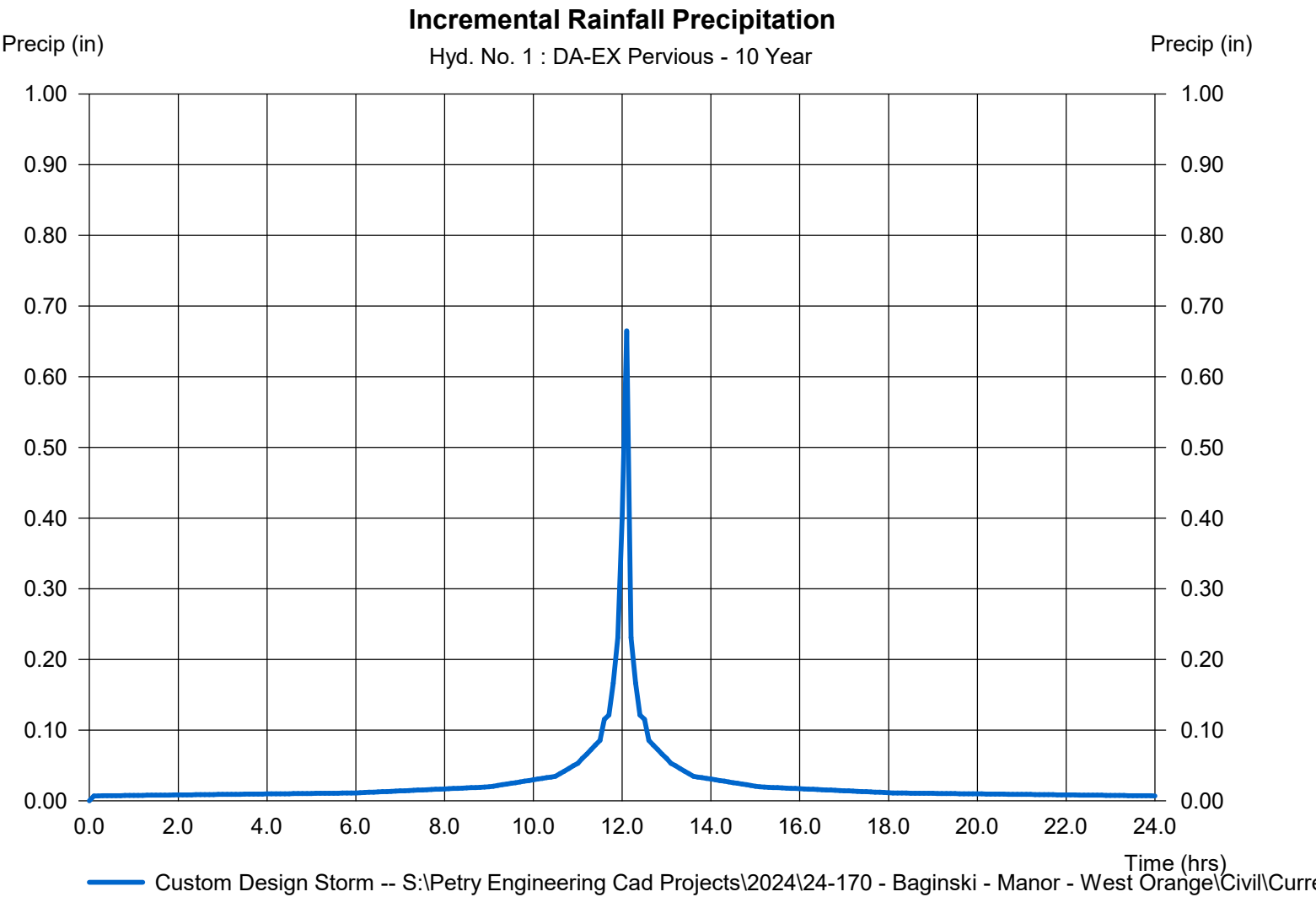


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 6.3700 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

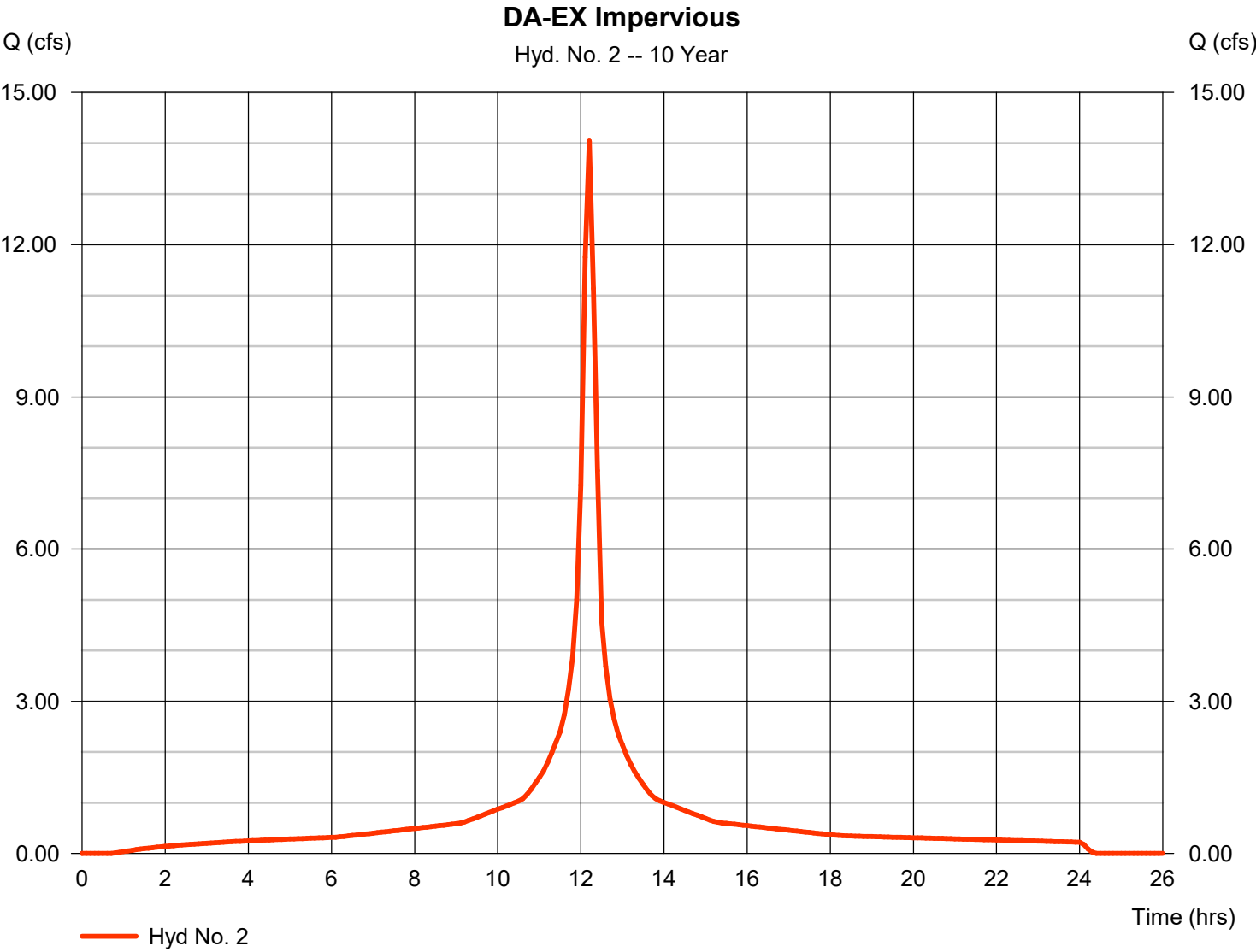


Hydrograph Report

Hyd. No. 2

DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	14.04 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	69,275 cuft
Drainage area	=	3.320 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	13.60 min
Total precip.	=	6.37 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2024\24-170 - Baginok - 184 Manor - West Orange\24-170 - Baginok - 184 Manor - West Orange.dwg			



Precipitation Report

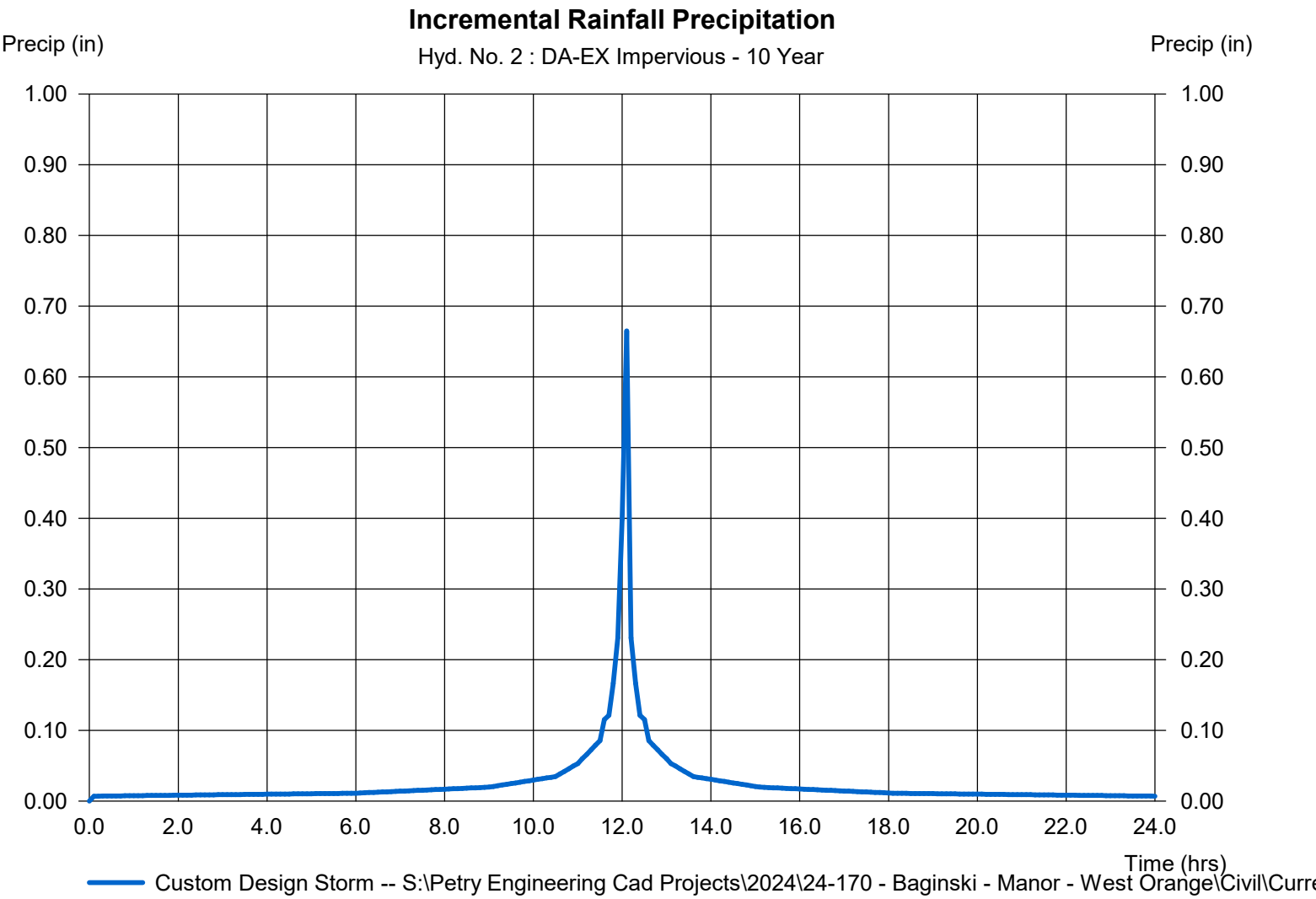
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Monday, 12 / 30 / 2024

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 6.3700 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		



Hydrograph Report

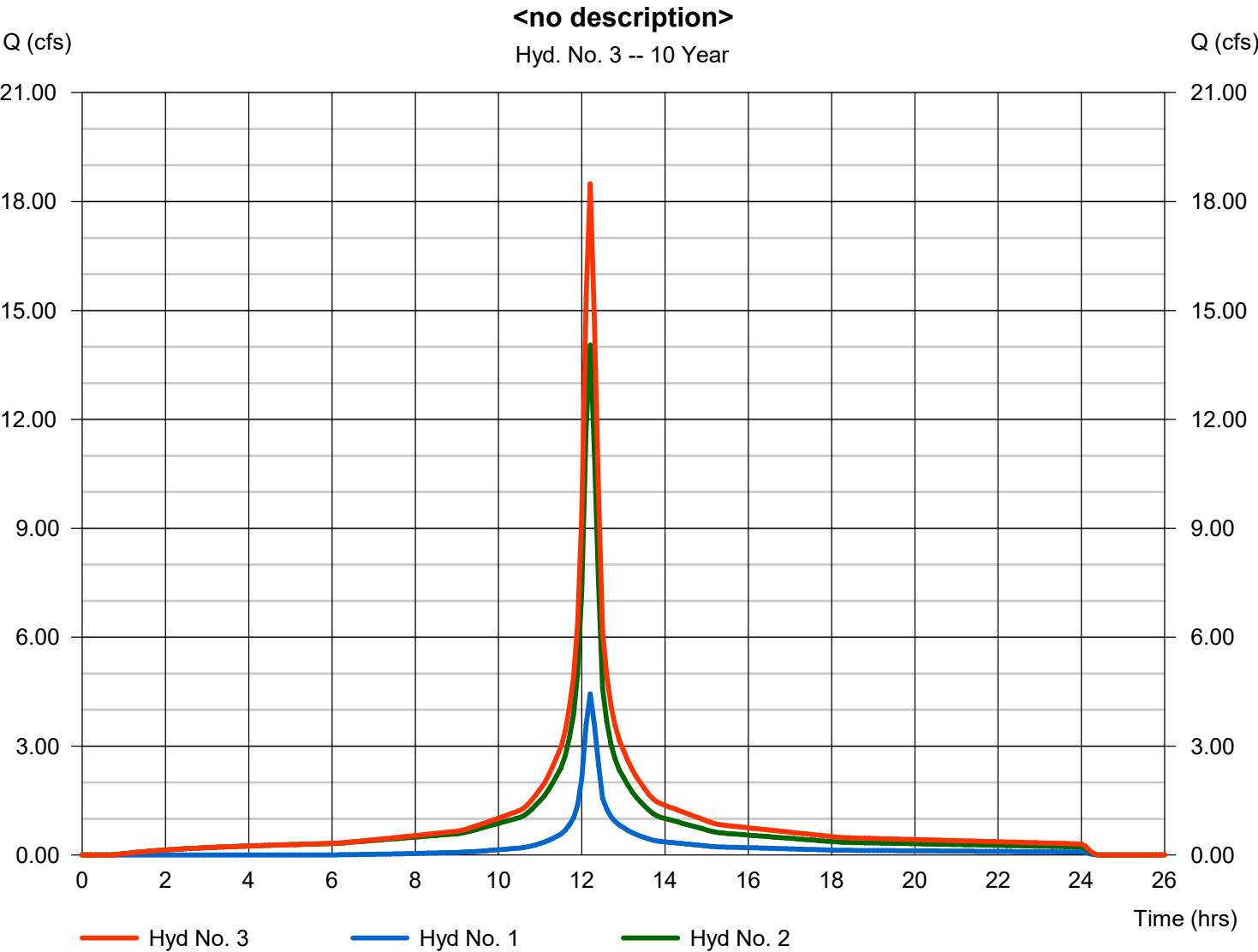
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Monday, 12 / 30 / 2024

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 18.49 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 88,329 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydrograph Summary Report

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

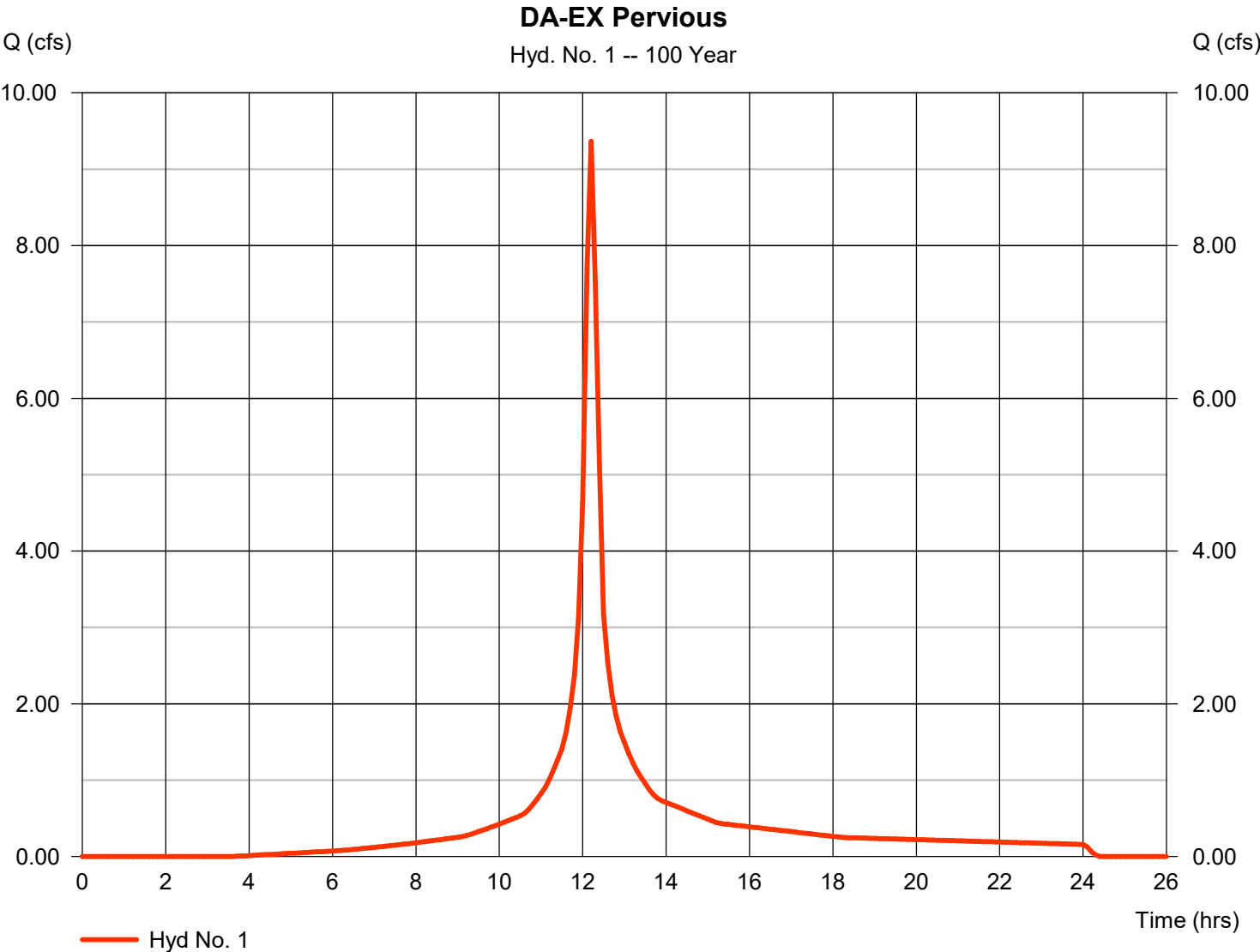
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	9.365	6	732	41,572	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	25.46	6	732	127,430	-----	-----	-----	DA-EX Impervious
3	Combine	34.83	6	732	169,002	1, 2	-----	-----	<no description>
Existing - Future Projected.gpw					Return Period: 100 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 9.365 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 41,572 cuft
Drainage area	= 1.360 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 11.52 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginask - 184 Manor - West Orange		

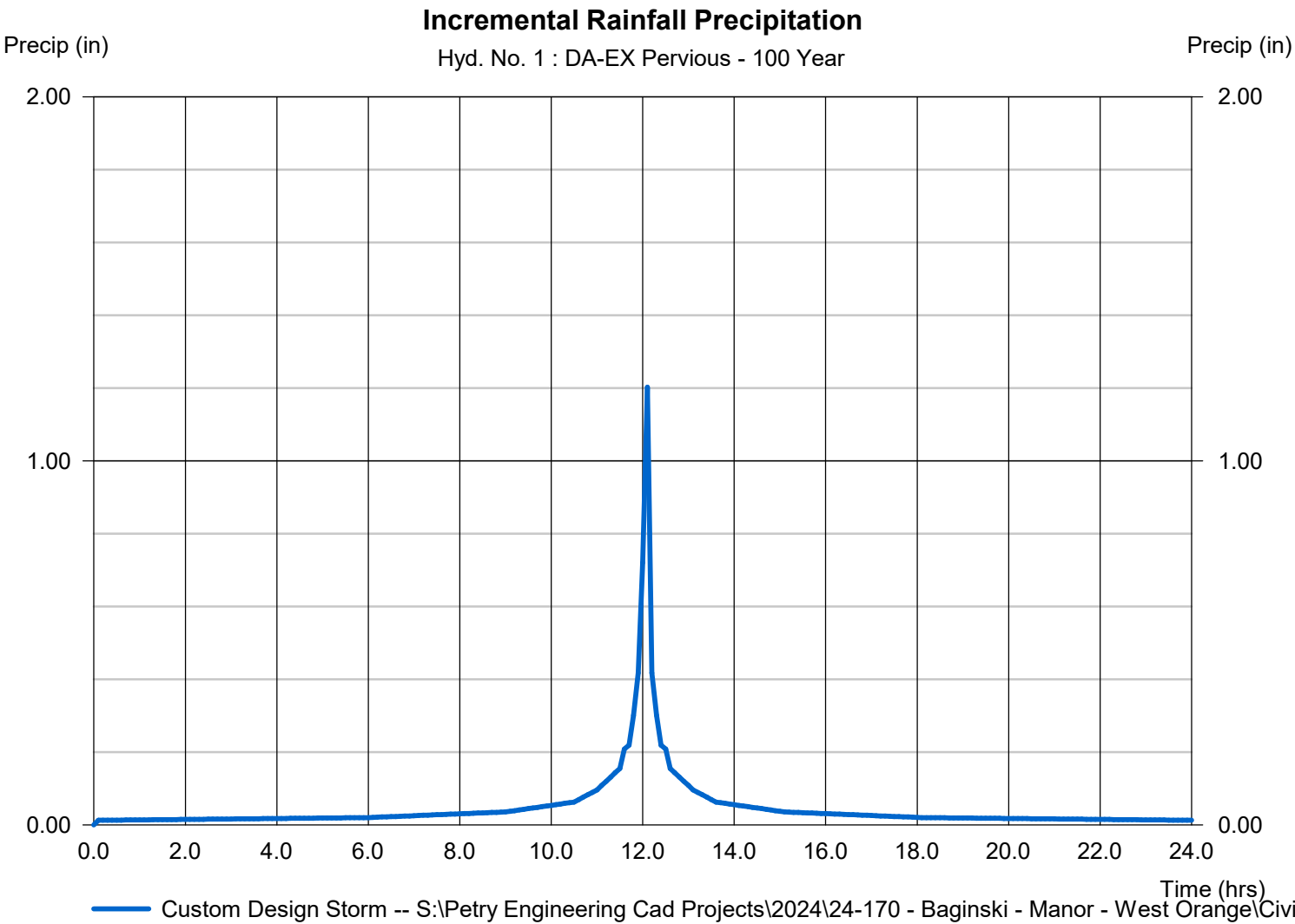


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 100 yrs	Time interval	= 6 min
Total precip.	= 11.5200 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current		



Hydrograph Report

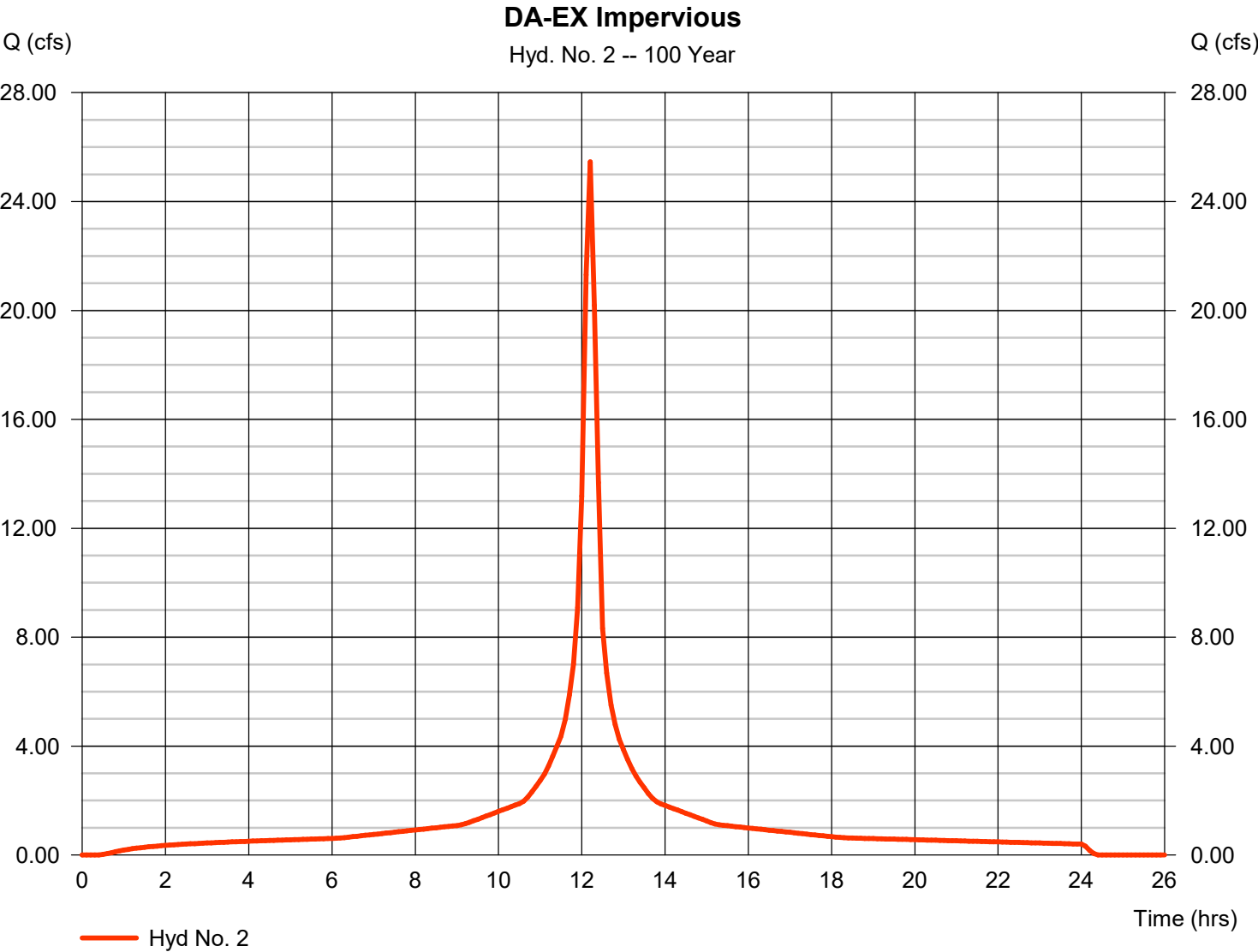
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Monday, 12 / 30 / 2024

Hyd. No. 2

DA-EX Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 25.46 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 127,430 cuft
Drainage area	= 3.320 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 13.60 min
Total precip.	= 11.52 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024-170 - Baginshel Manor - West Orange		

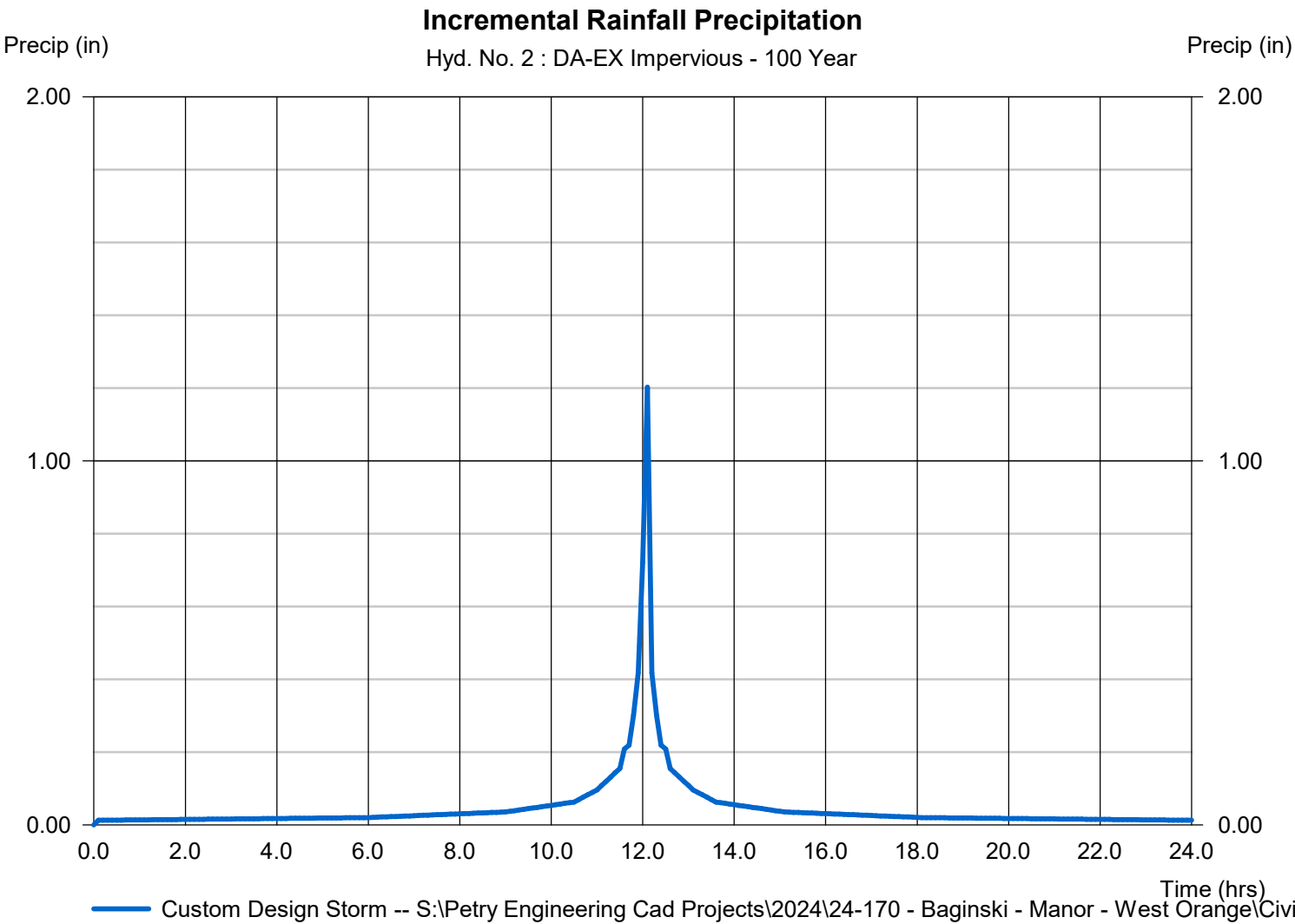


Precipitation Report

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 100 yrs	Time interval	= 6 min
Total precip.	= 11.5200 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current		



Hydrograph Report

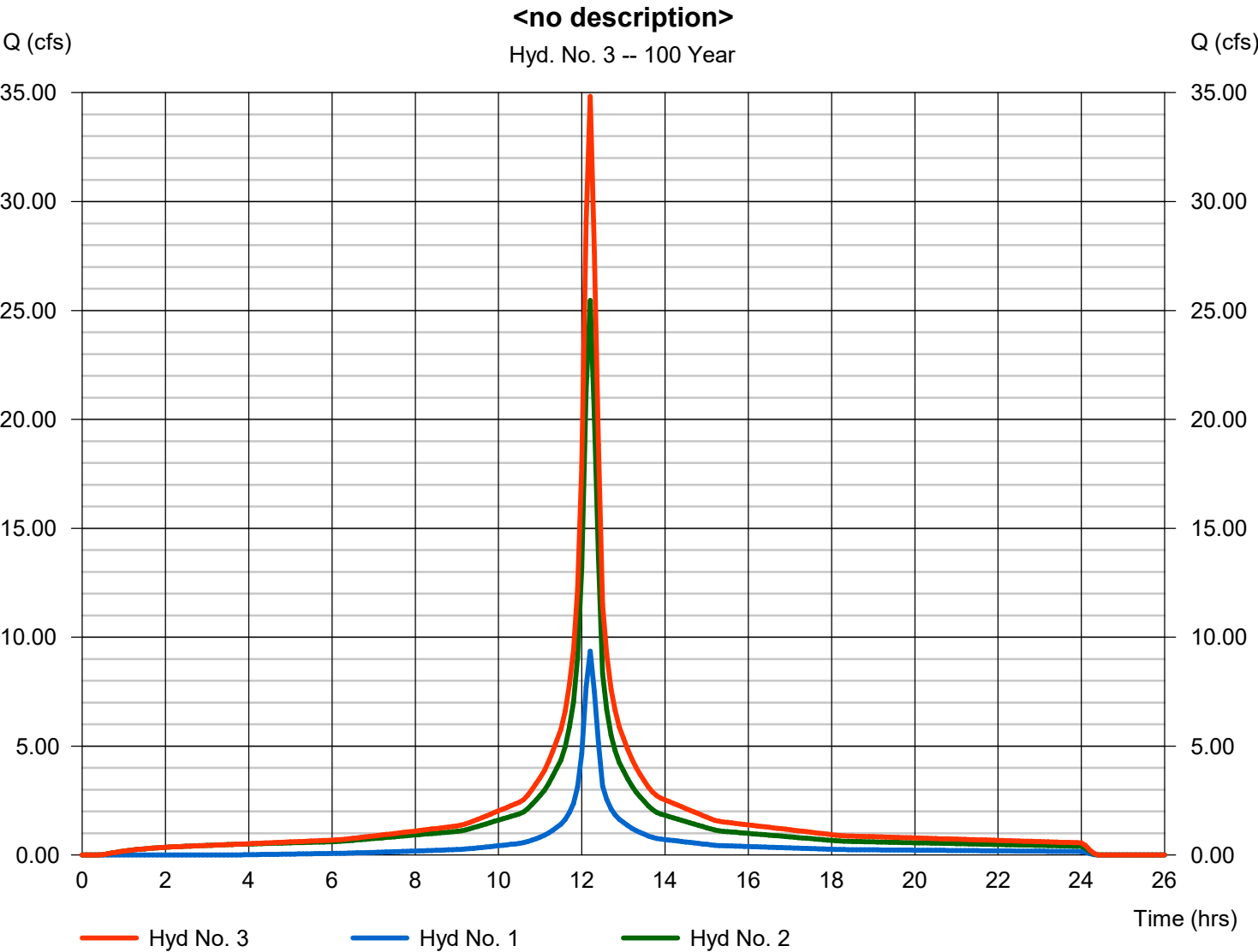
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Monday, 12 / 30 / 2024

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 34.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 169,002 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydraflow Rainfall Report

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

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

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

Tc = time in minutes. Values may exceed 60.

Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current\Stormwater\Essex County - Future Projected.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	0.00	0.00	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	4.09	0.00	0.00	6.37	0.00	0.00	11.52

**PROPOSED CONDITIONS
CURRENT ADJUSTED
HYDROGRAPHS**



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Hydrograph Return Period Recap..... 2

2 - Year

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 Hydrograph No. 2, SCS Runoff, DA-EX Impervious..... 6

 Precipitation Report..... 7

 Hydrograph No. 3, Combine, <no description>..... 8

10 - Year

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 Hydrograph No. 2, SCS Runoff, DA-EX Impervious..... 12

 Precipitation Report..... 13

 Hydrograph No. 3, Combine, <no description>..... 14

100 - Year

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 Hydrograph No. 2, SCS Runoff, DA-EX Impervious..... 18

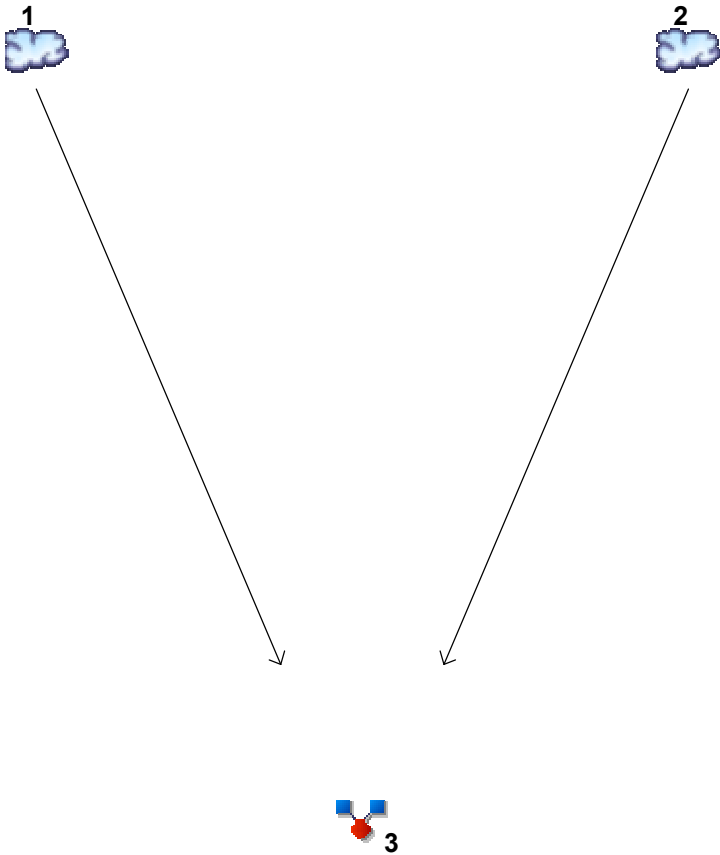
 Precipitation Report..... 19

 Hydrograph No. 3, Combine, <no description>..... 20

IDF Report..... 21

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	DA-EX Pervious
2	SCS Runoff	DA-EX Impervious
3	Combine	<no description>

Hydrograph Summary Report

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

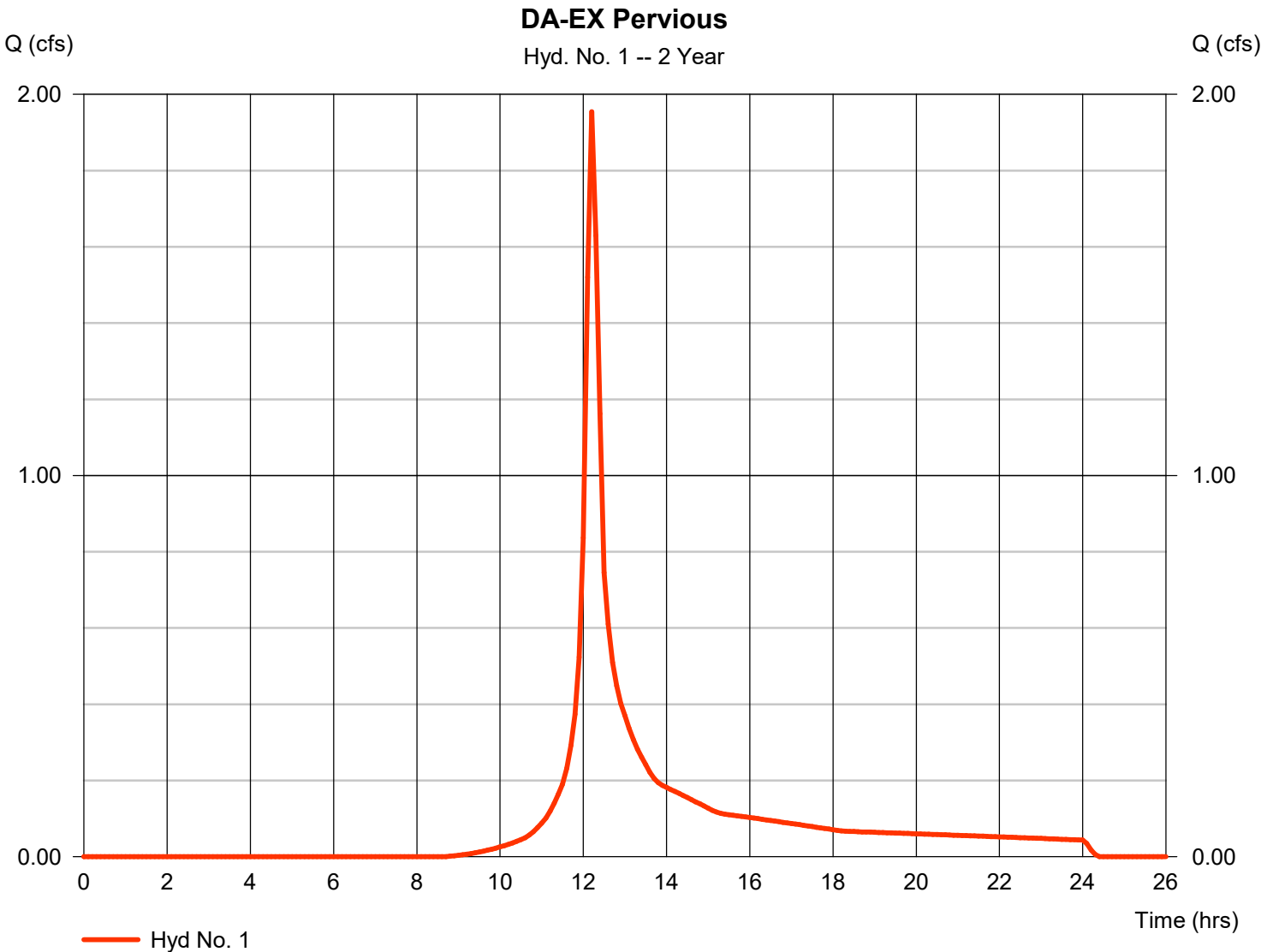
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	1.954	6	732	8,342	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	7.225	6	732	34,806	-----	-----	-----	DA-EX Impervious
3	Combine	9.179	6	732	43,147	1, 2	-----	-----	<no description>
Proposed - Current Adjusted.gpw					Return Period: 2 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 1.954 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 8,342 cuft
Drainage area	= 1.520 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.60 min
Total precip.	= 3.47 in	Distribution	= Custom
Storm duration	= S:\Petty Engineering Cad Projects\2024\24-170 - Baginask Manor - West Orange		

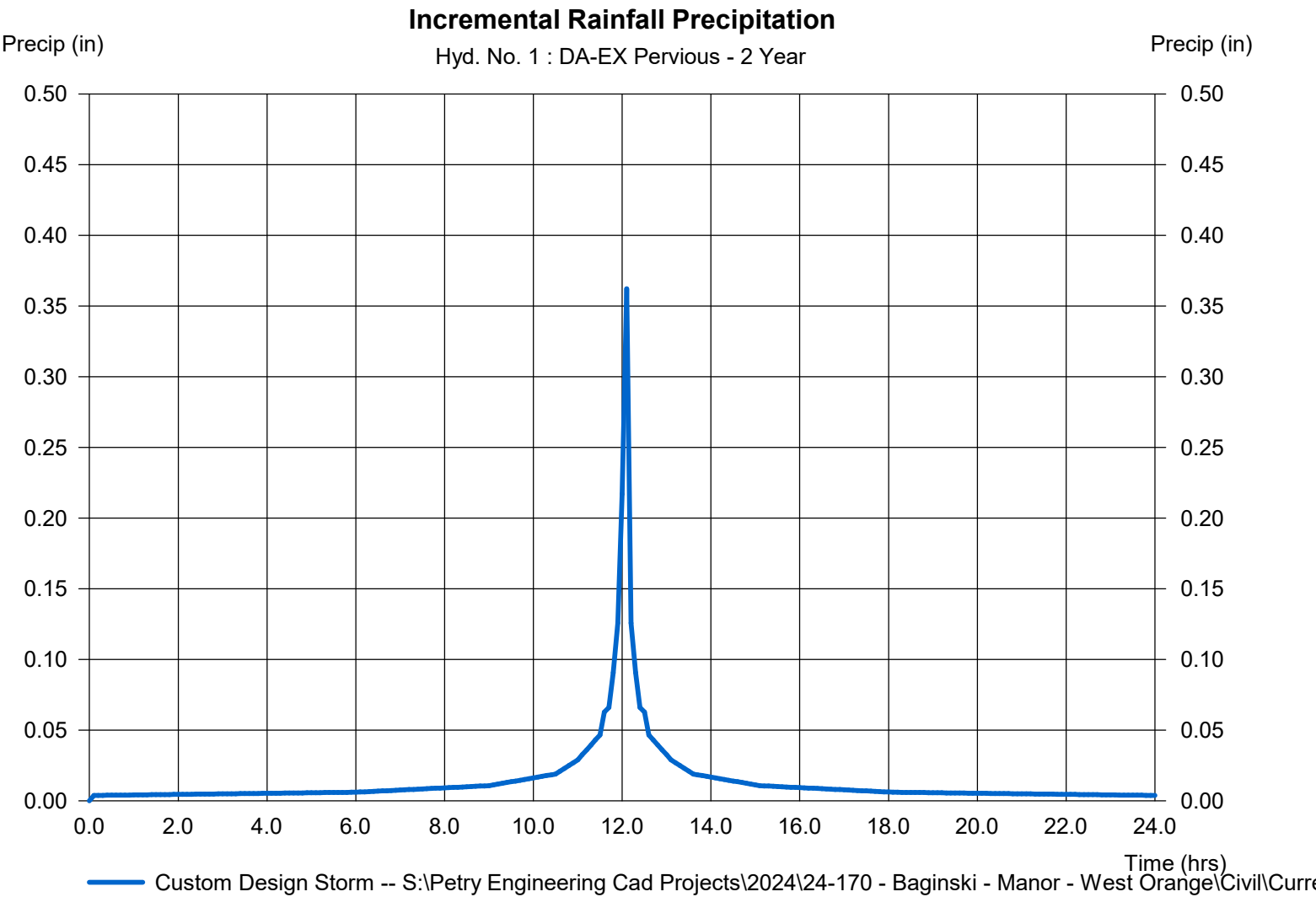


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 2 yrs	Time interval	= 6 min
Total precip.	= 3.4700 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

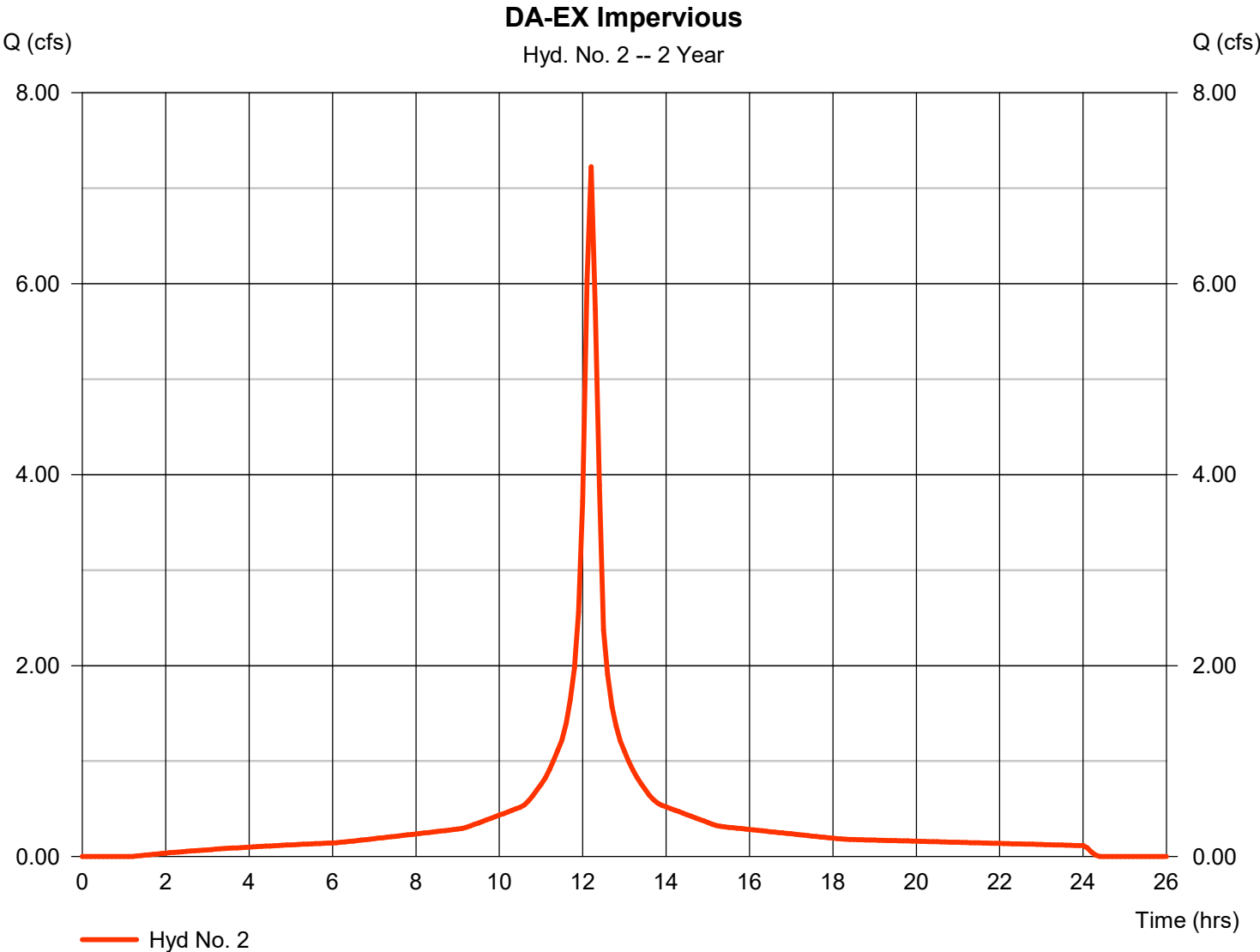


Hydrograph Report

Hyd. No. 2

DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.225 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	34,806 cuft
Drainage area	=	3.160 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.60 min
Total precip.	=	3.47 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2024\24-170 - Baginask Manor - West Orange			



Precipitation Report

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

Monday, 12 / 30 / 2024

Hyd. No. 2

DA-EX Impervious

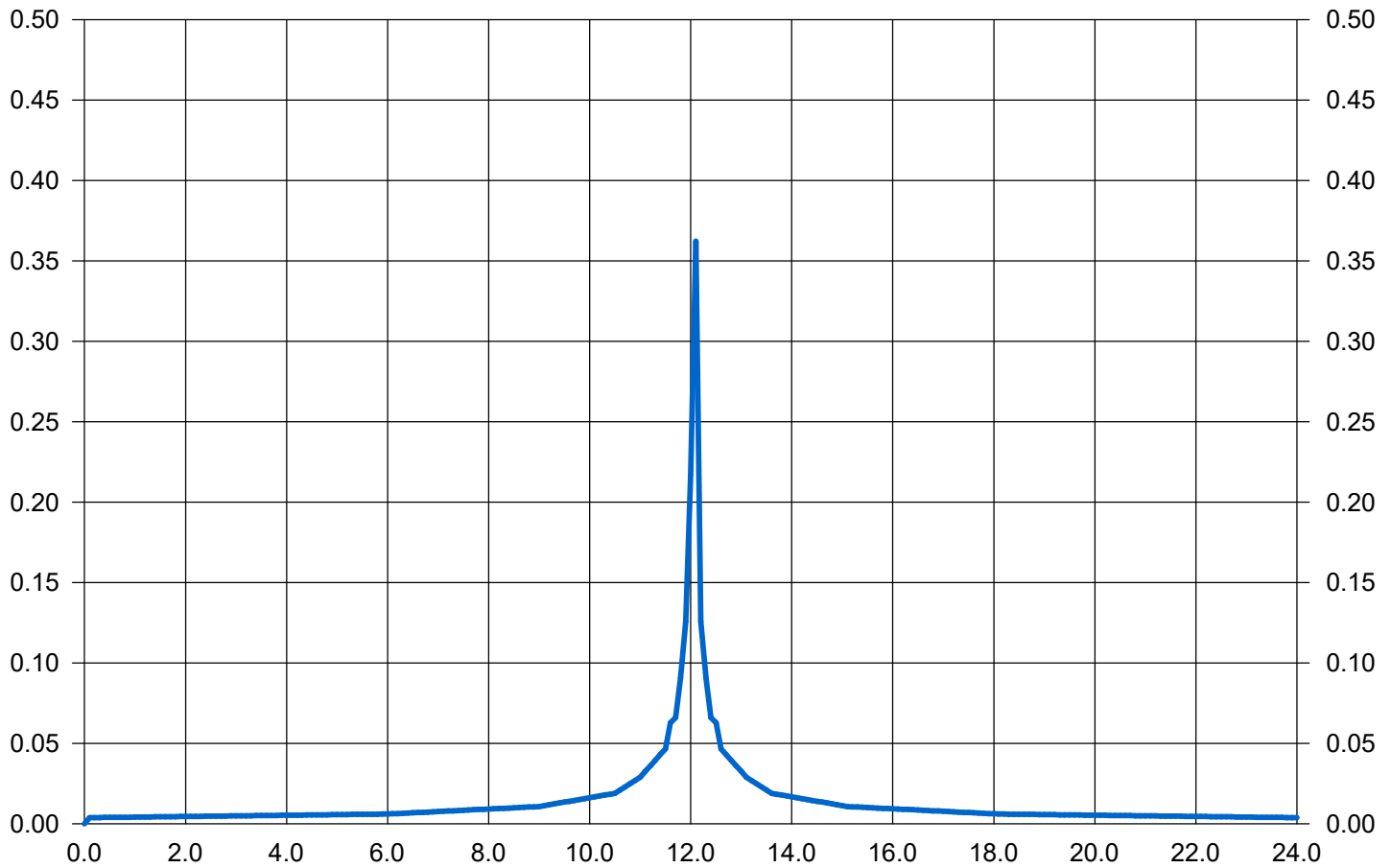
Storm Frequency	= 2 yrs	Time interval	= 6 min
Total precip.	= 3.4700 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

Incremental Rainfall Precipitation

Hyd. No. 2 : DA-EX Impervious - 2 Year

Precip (in)

Precip (in)



Time (hrs)

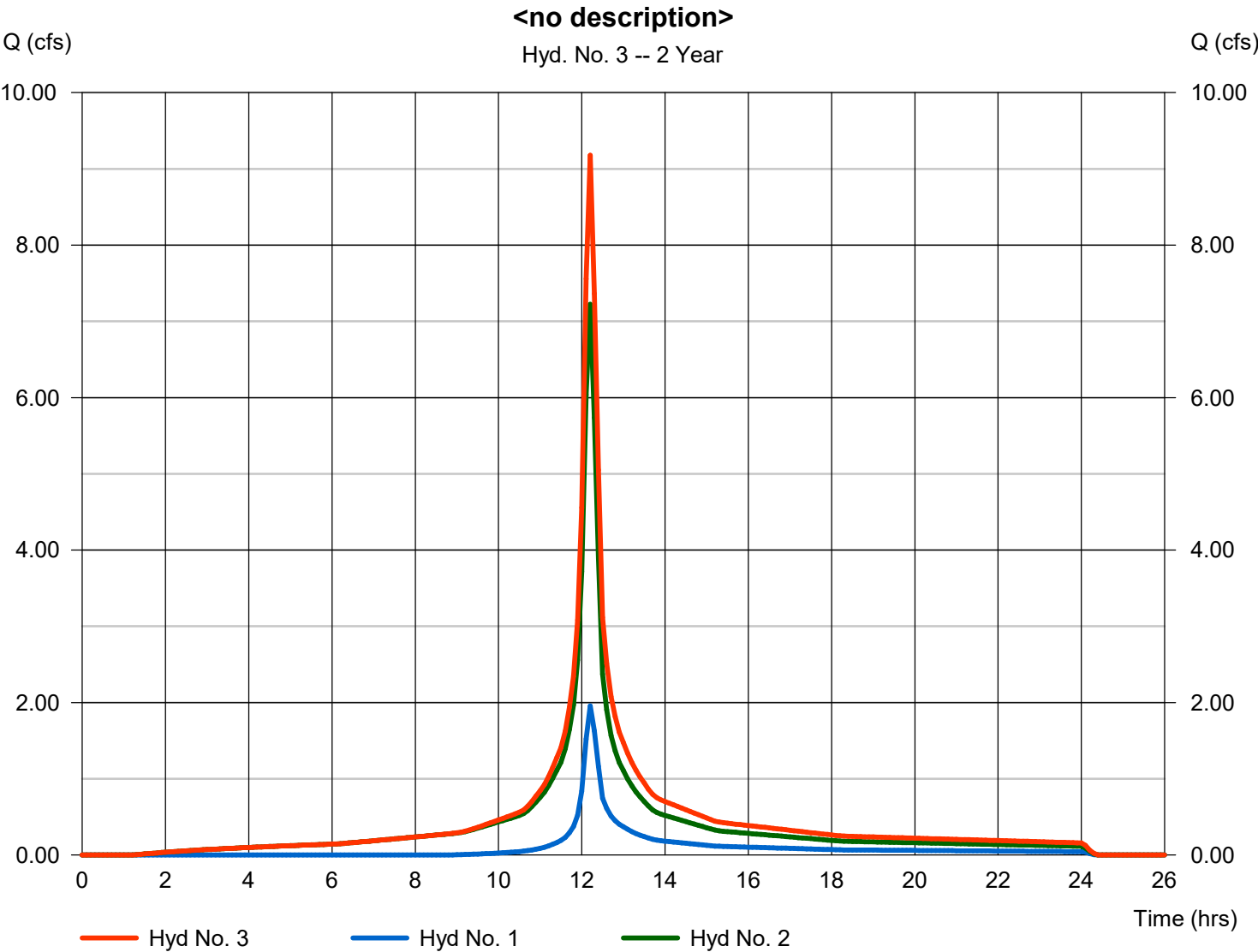
— Custom Design Storm -- S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur

Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 9.179 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 43,147 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydrograph Summary Report

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

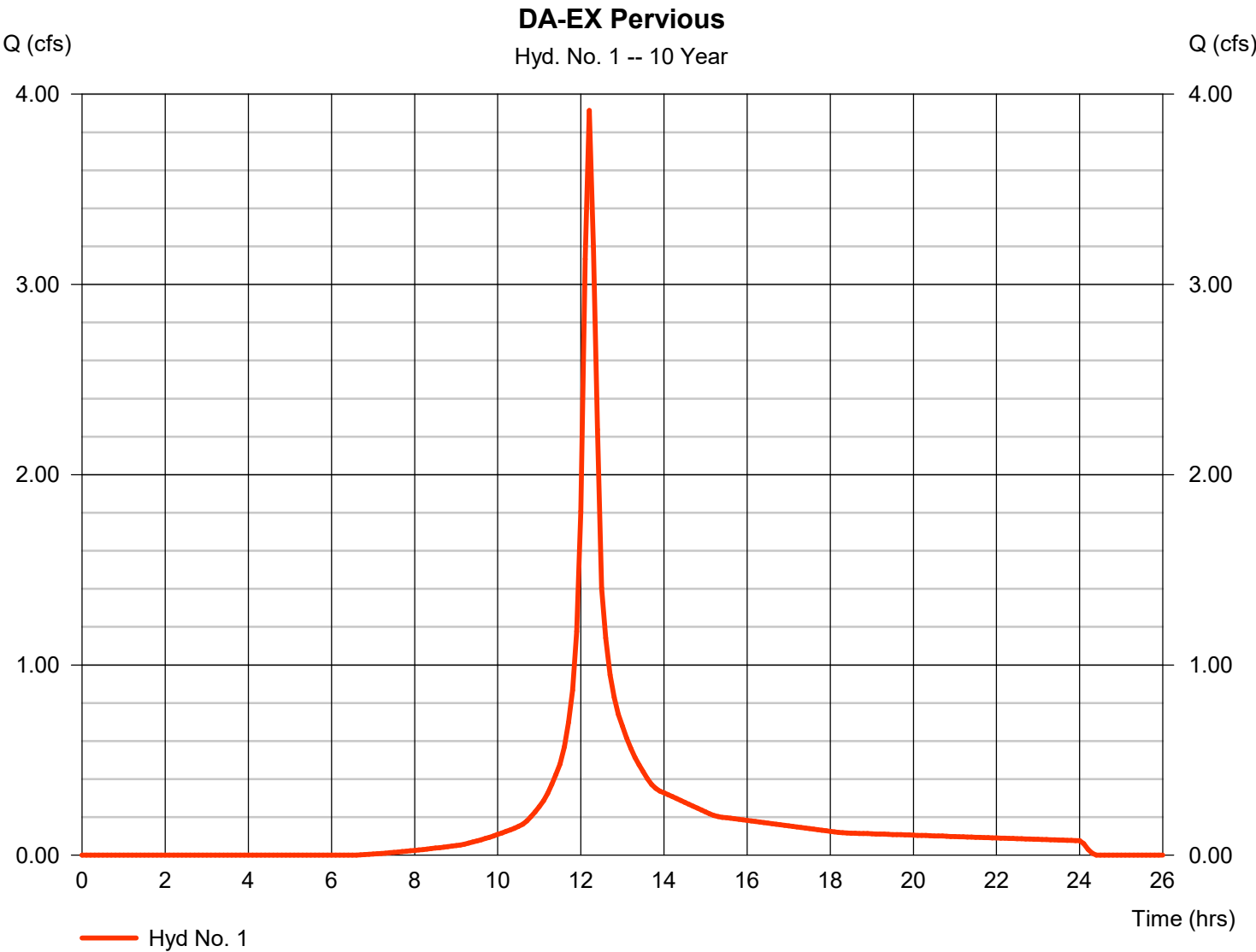
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.915	6	732	16,692	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	11.27	6	732	55,303	-----	-----	-----	DA-EX Impervious
3	Combine	15.19	6	732	71,995	1, 2	-----	-----	<no description>
Proposed - Current Adjusted.gpw					Return Period: 10 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 3.915 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 16,692 cuft
Drainage area	= 1.520 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.60 min
Total precip.	= 5.38 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginask Manor - West Orange		

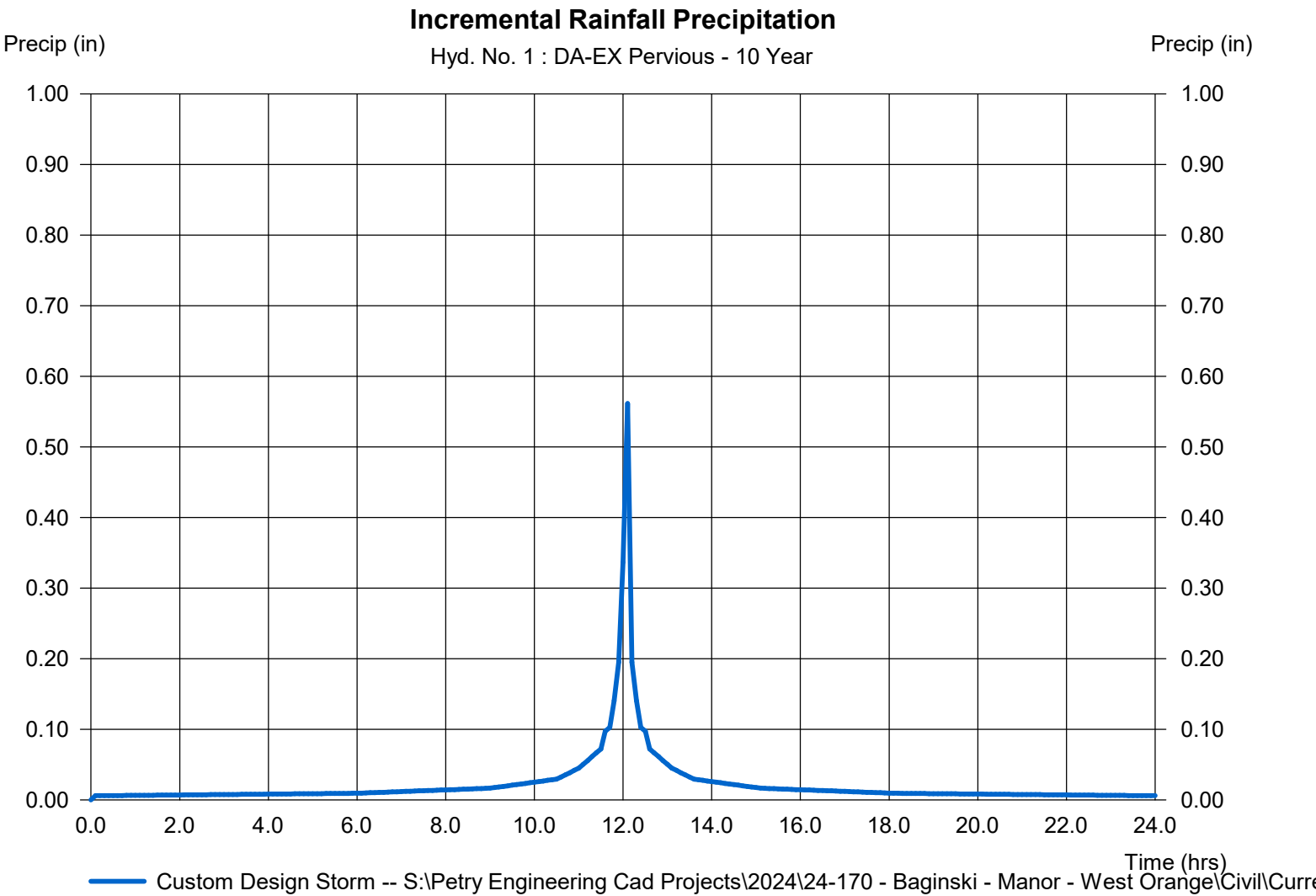


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.3800 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current		

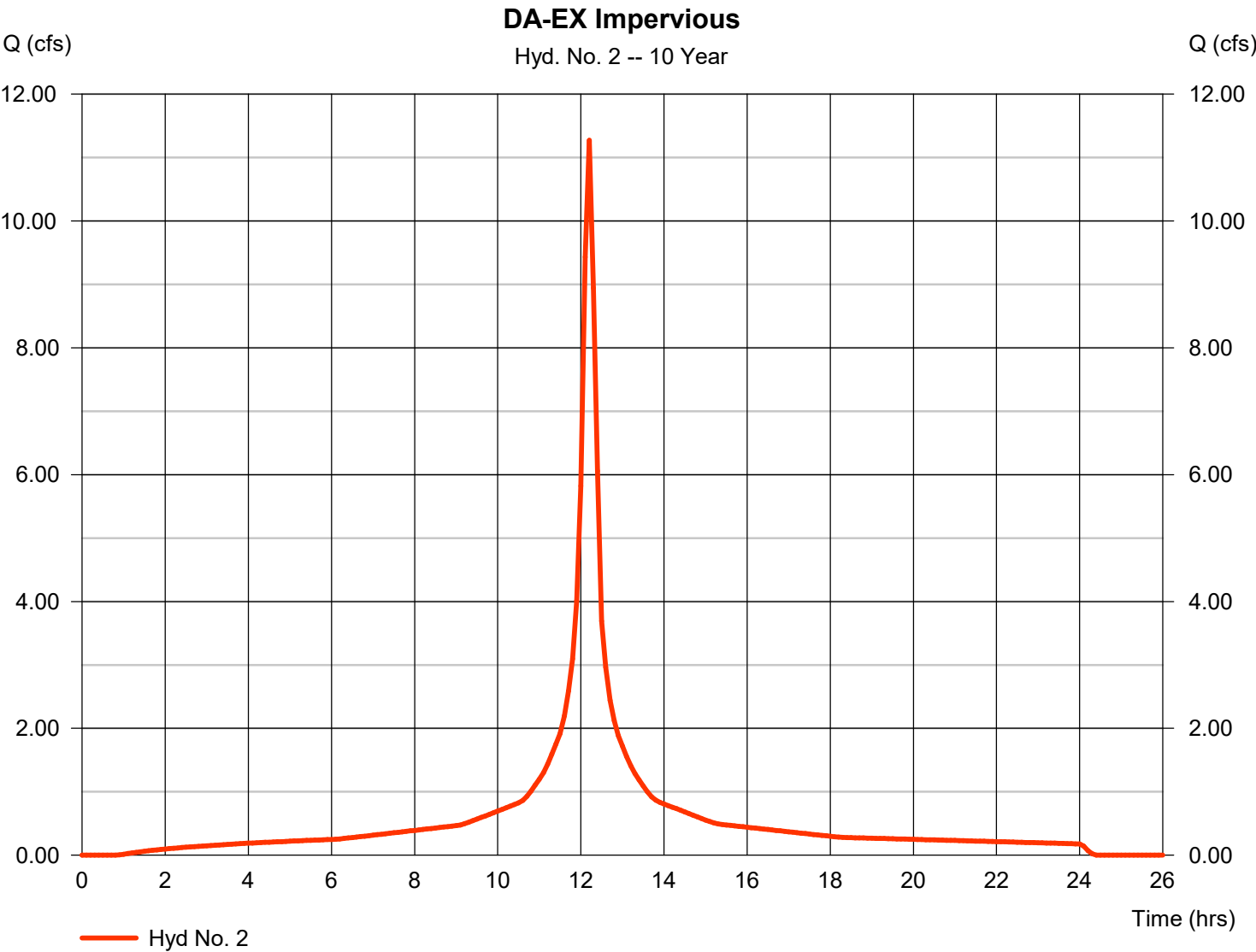


Hydrograph Report

Hyd. No. 2

DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.27 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	55,303 cuft
Drainage area	=	3.160 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.60 min
Total precip.	=	5.38 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2024\24-170 - Baginask Manor - West Orange\12-30-24\12-30-24-170 - Baginask Manor - West Orange.dwg			

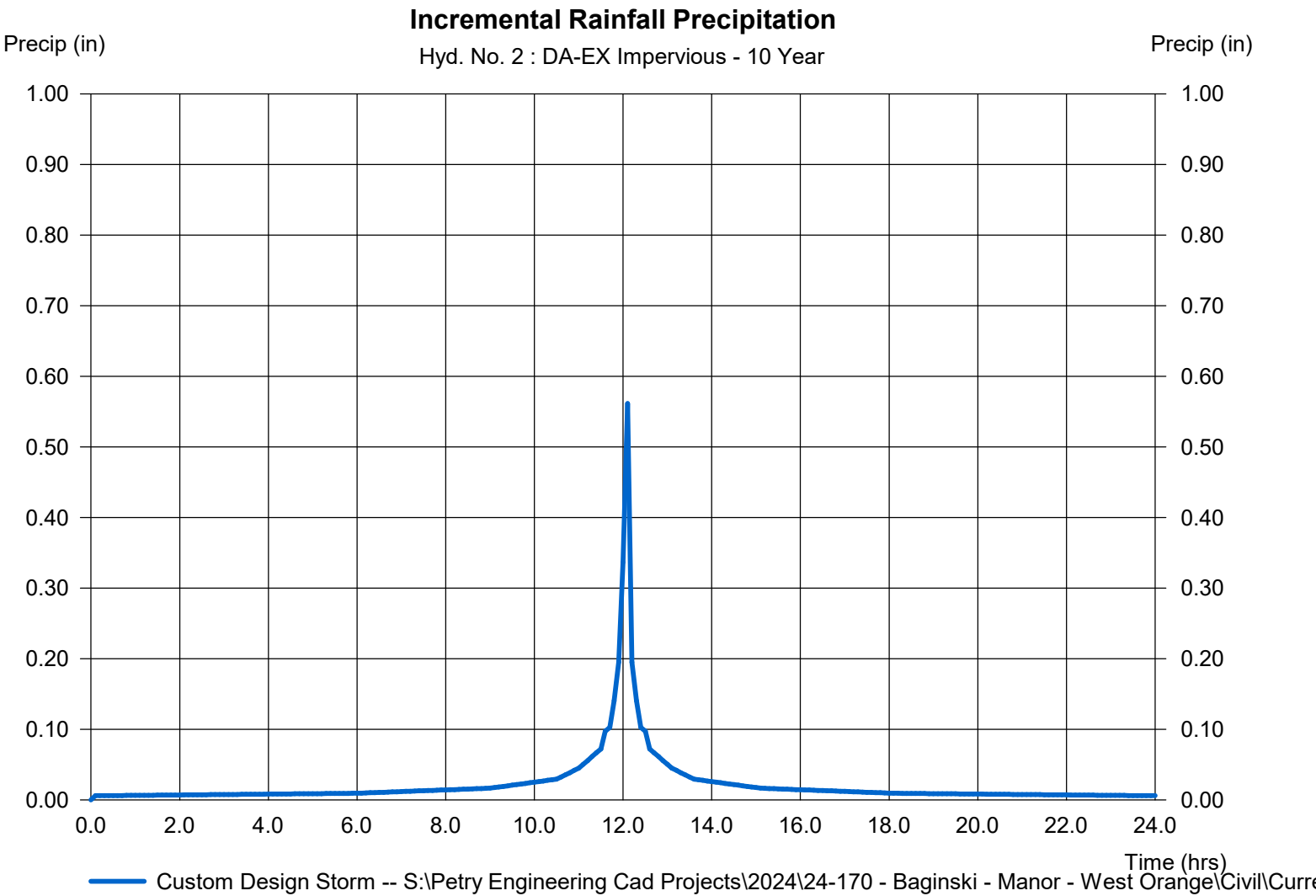


Precipitation Report

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 5.3800 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current		

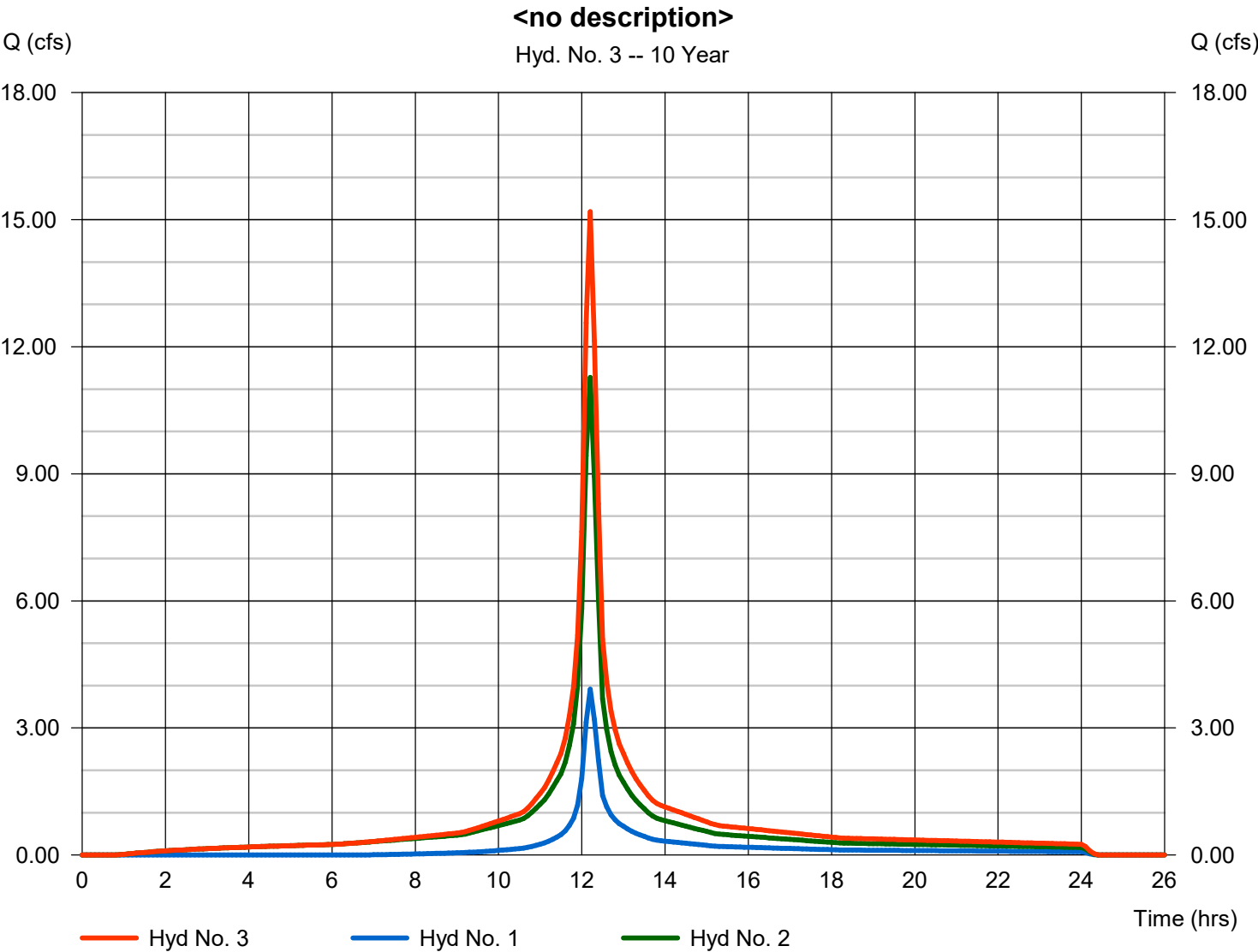


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 15.19 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 71,995 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydrograph Summary Report

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

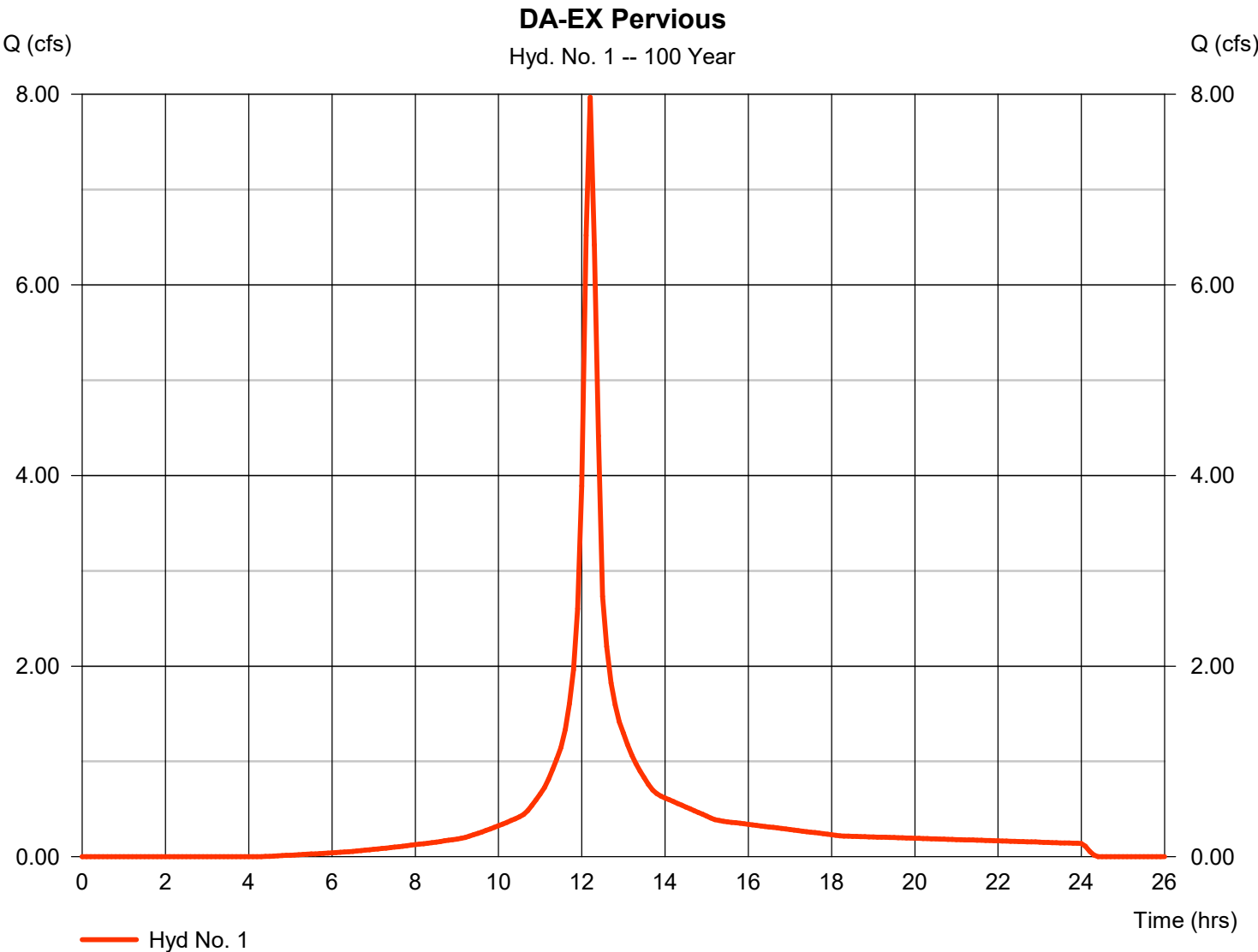
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	7.971	6	732	34,859	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	19.30	6	732	96,135	-----	-----	-----	DA-EX Impervious
3	Combine	27.27	6	732	130,994	1, 2	-----	-----	<no description>
Proposed - Current Adjusted.gpw					Return Period: 100 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 7.971 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 34,859 cuft
Drainage area	= 1.520 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.60 min
Total precip.	= 9.18 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginns Manor - West Orange		

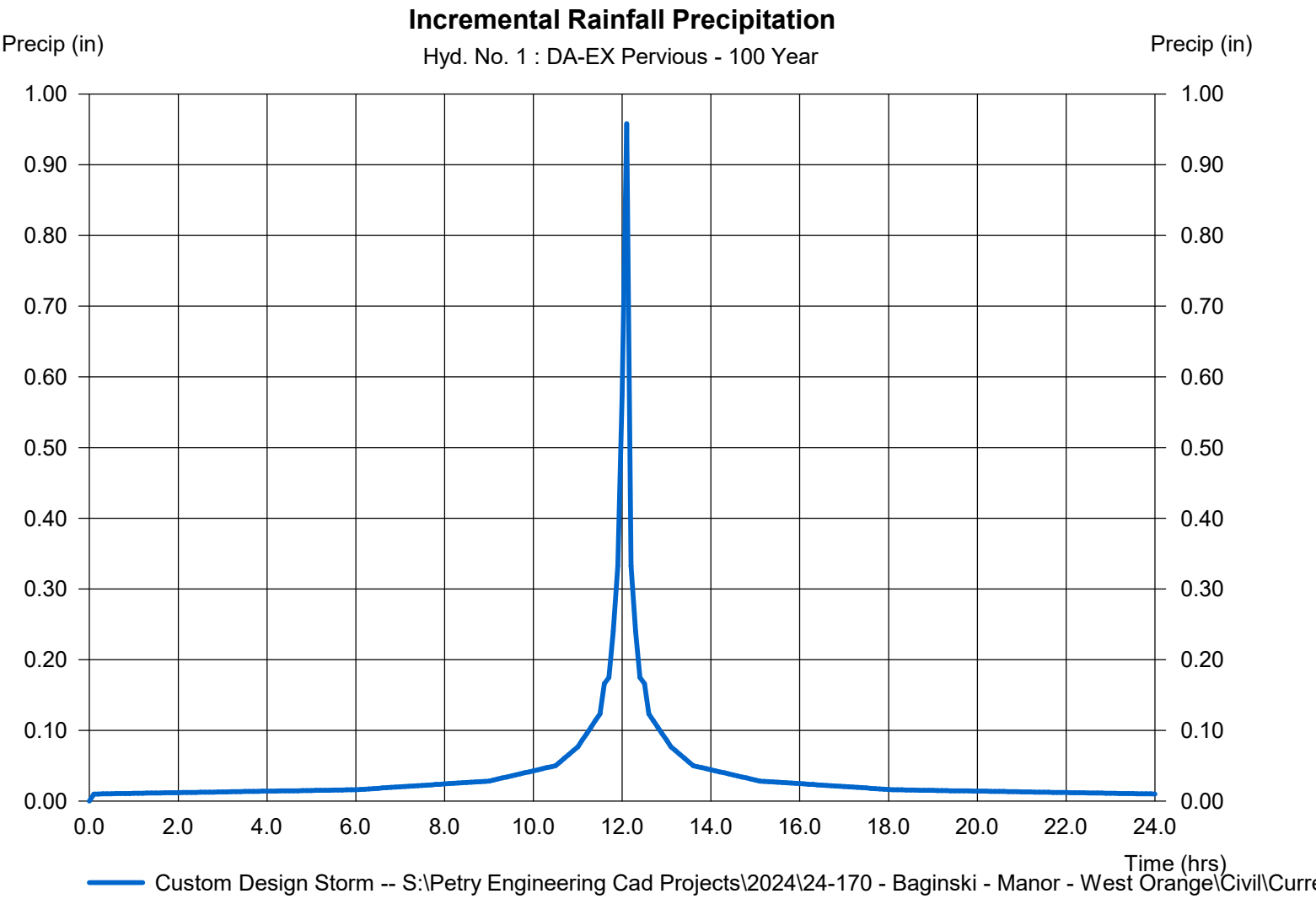


Precipitation Report

Hyd. No. 1

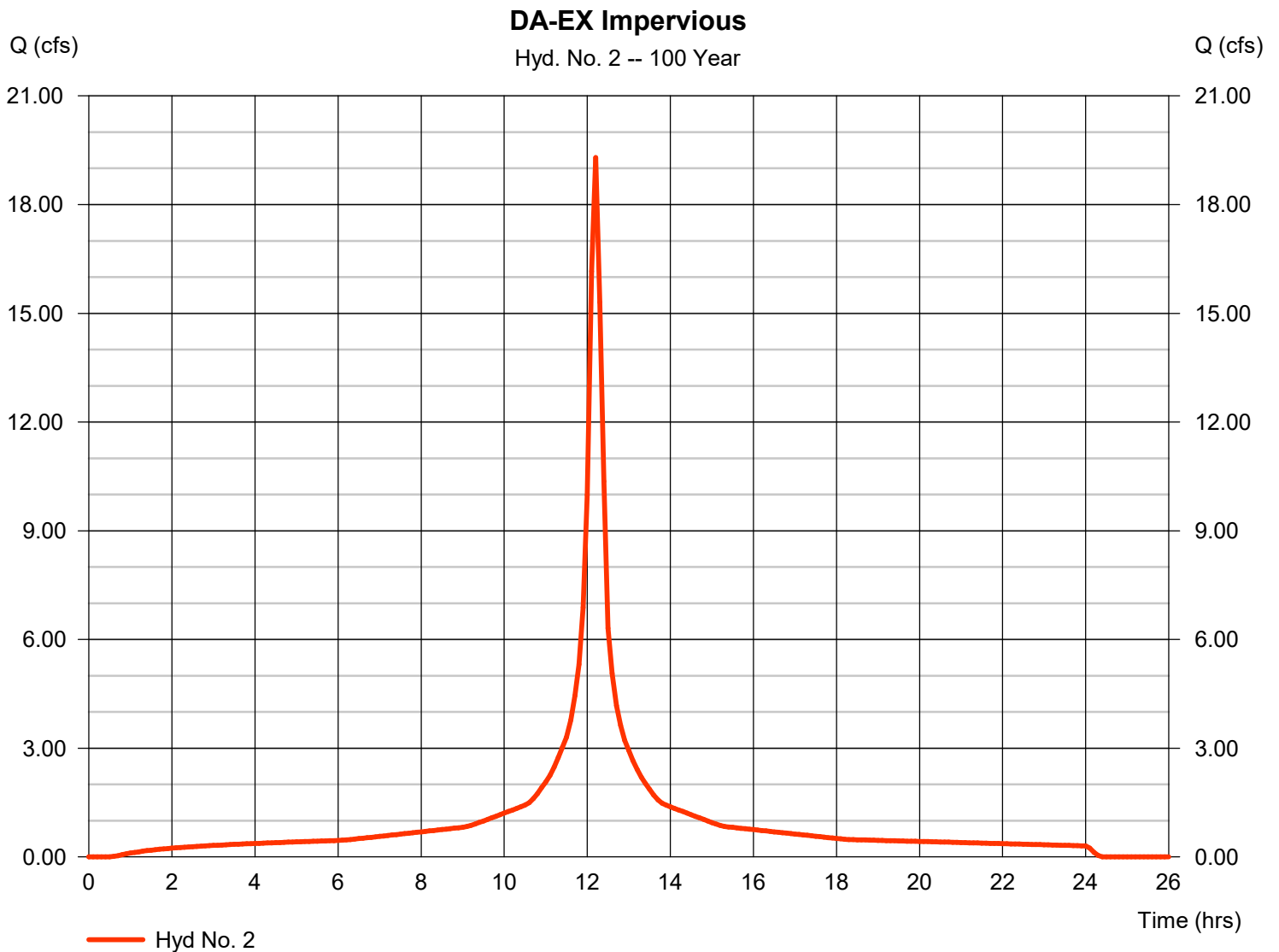
DA-EX Pervious

Storm Frequency	= 100 yrs	Time interval	= 6 min
Total precip.	= 9.1800 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		



DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	19.30 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	96,135 cuft
Drainage area	=	3.160 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.60 min
Total precip.	=	9.18 in	Distribution	=	Custom
Storm duration	=	5 hrs			

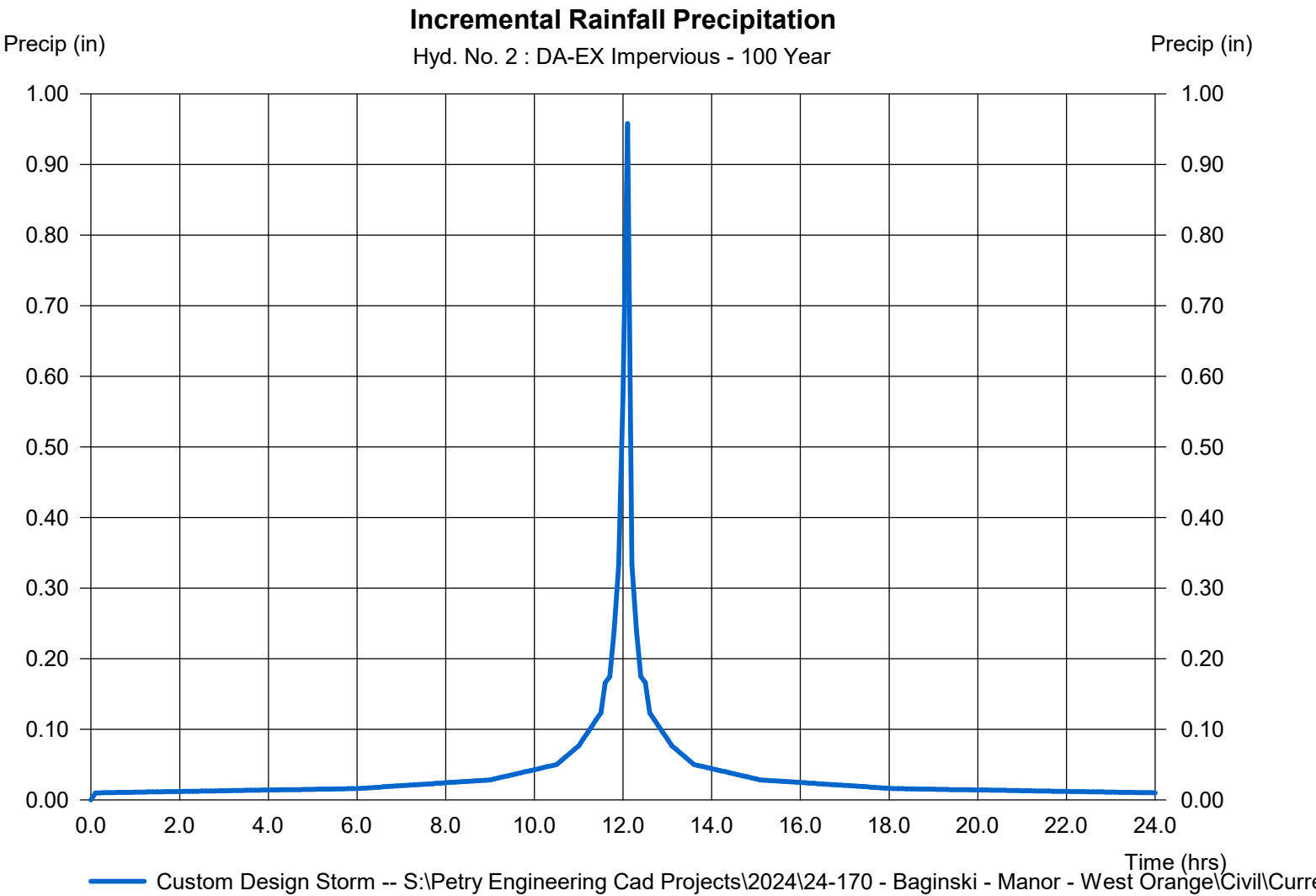


Precipitation Report

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 100 yrs	Time interval	= 6 min
Total precip.	= 9.1800 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current		

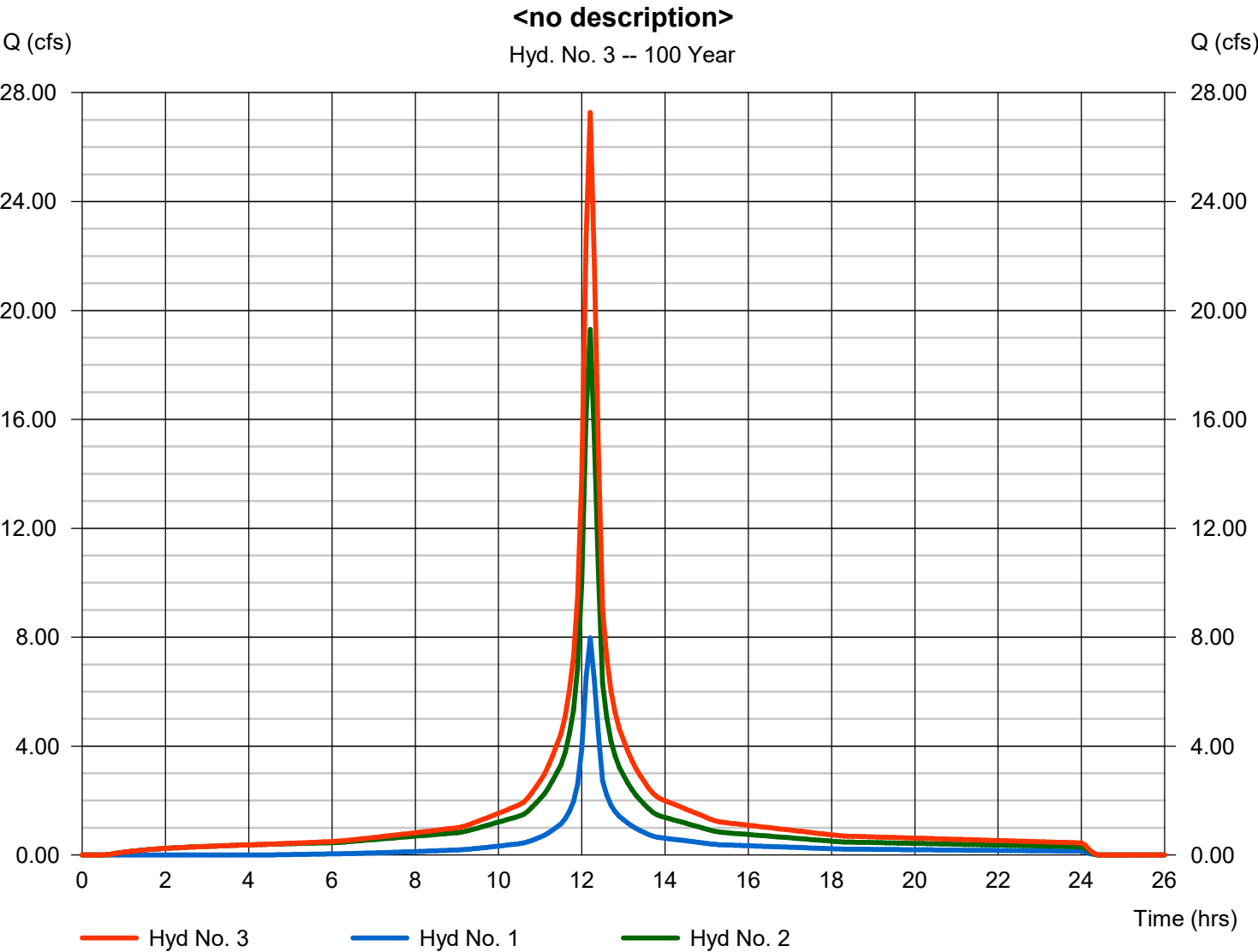


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 27.27 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 130,994 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydraflow Rainfall Report

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

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

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

Tc = time in minutes. Values may exceed 60.

Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current\Stormwater\Essex County - Current Adjusted.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	0.00	0.00	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	3.47	0.00	0.00	5.38	0.00	0.00	9.18

**PROPOSED CONDITIONS
FUTURE PROJECTED
HYDROGRAPHS**



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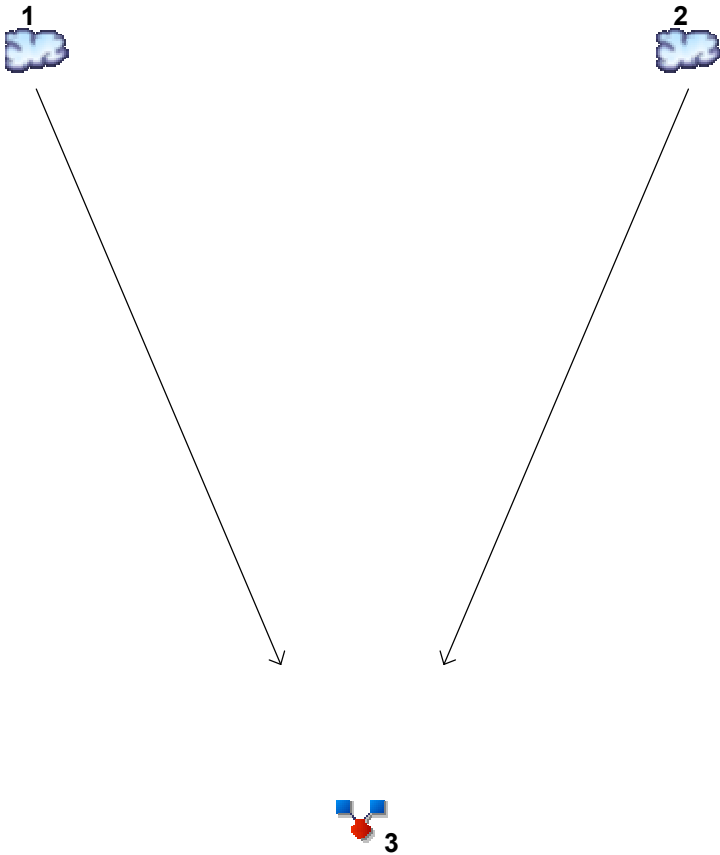
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Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	DA-EX Pervious
2	SCS Runoff	DA-EX Impervious
3	Combine	<no description>

Hydrograph Return Period Recap

Hydrograph Return Period Recap

[illegible]

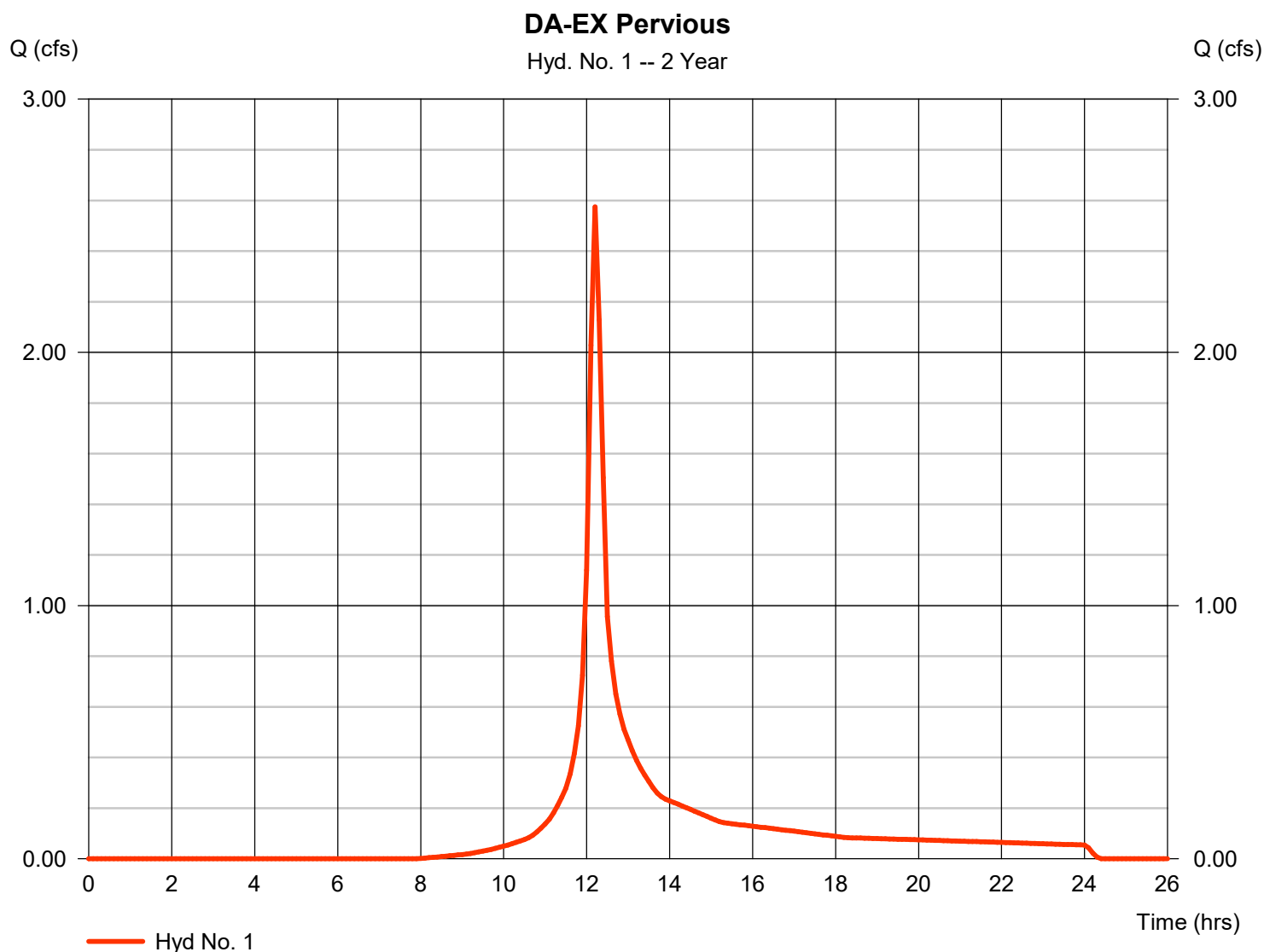
Hydrograph Summary Report

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	2.575	6	732	10,947	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	8.541	6	732	41,455	-----	-----	-----	DA-EX Impervious
3	Combine	11.12	6	732	52,402	1, 2	-----	-----	<no description>
Proposed - Future Projected.gpw					Return Period: 2 Year			Monday, 12 / 30 / 2024	

Hyd. No. 1

Hydrograph type	= SCS Runoff	Peak discharge	= 2.575 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 10,947 cuft
Drainage area	= 1.520 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.70 min
Total precip.	= 4.09 in	Distribution	= Custom
Storm duration	= 5 hrs		

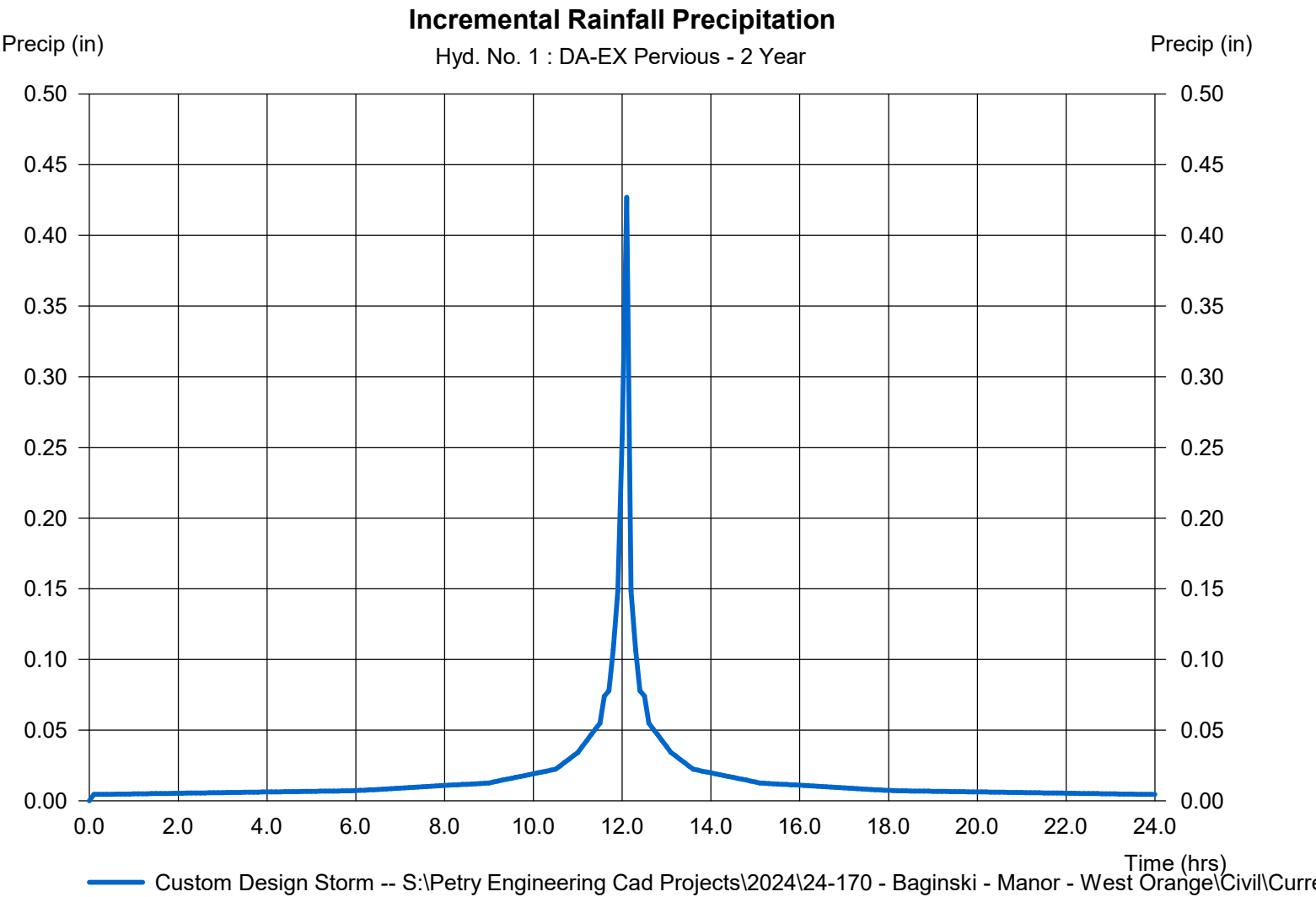


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 2 yrs	Time interval	= 6 min
Total precip.	= 4.0900 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

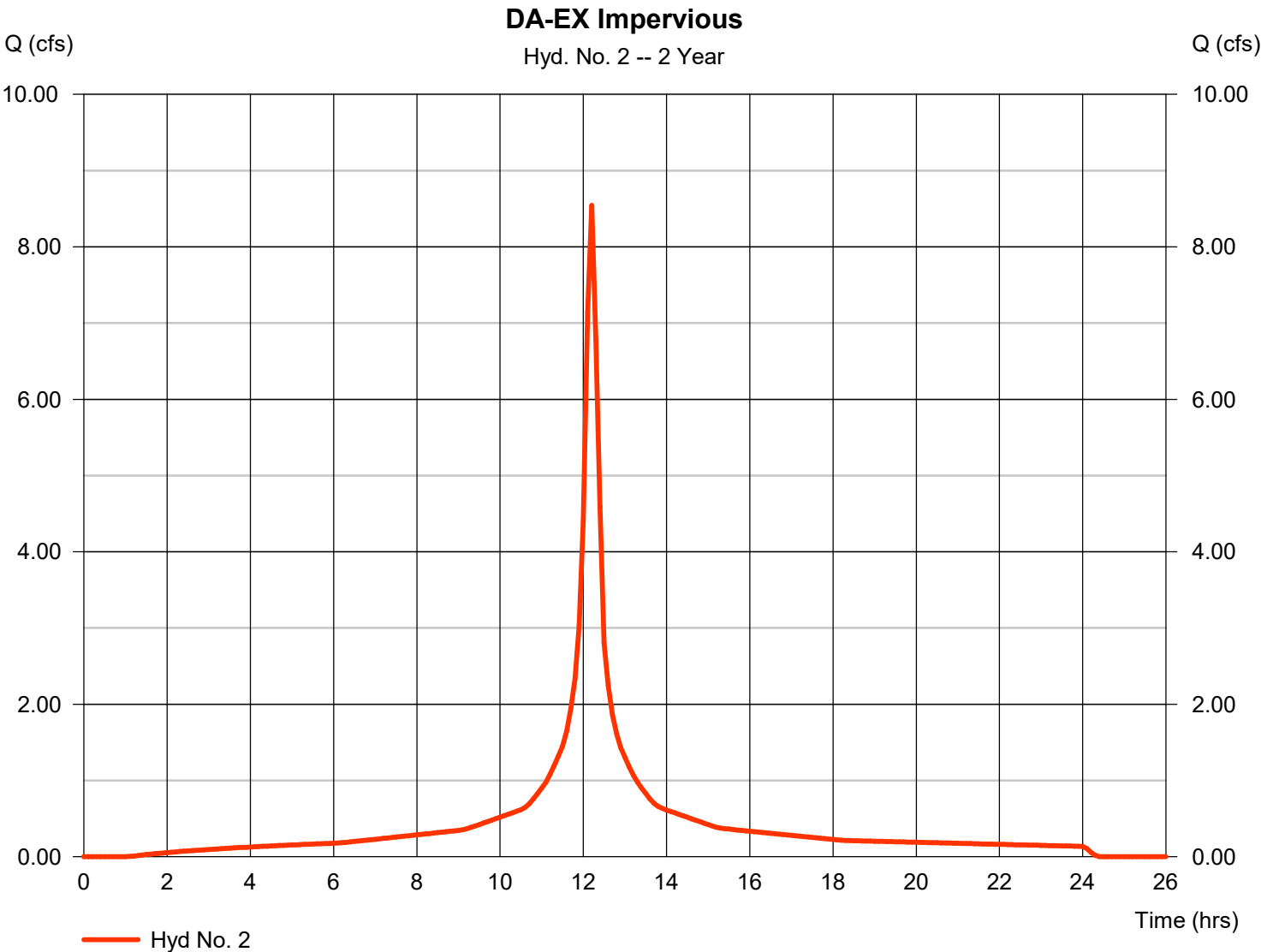


Hydrograph Report

Hyd. No. 2

DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	8.541 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	41,455 cuft
Drainage area	=	3.160 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.70 min
Total precip.	=	4.09 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2024\24-170 - Baginask - 184 Manor - West Orange\Hydrographs\DA-EX Impervious - 2 Year - 4.09 in - 6 min - 98 - 0 ft - 11.70 min - Custom - 8.541 cfs - 41,455 cuft - 12.20 hrs - 3.160 ac - 0.0 % - User - 12/30/2024			

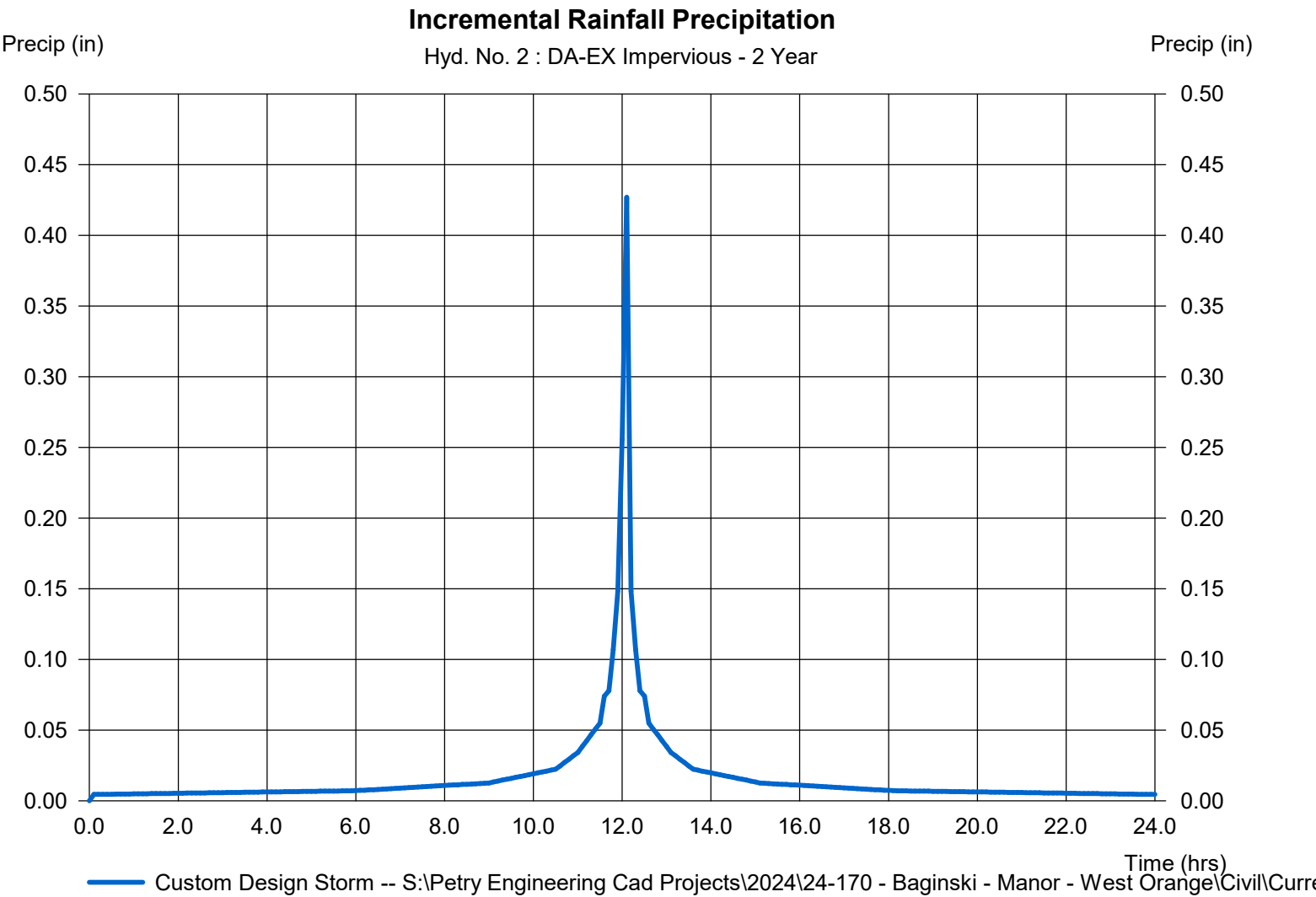


Precipitation Report

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 2 yrs	Time interval	= 6 min
Total precip.	= 4.0900 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

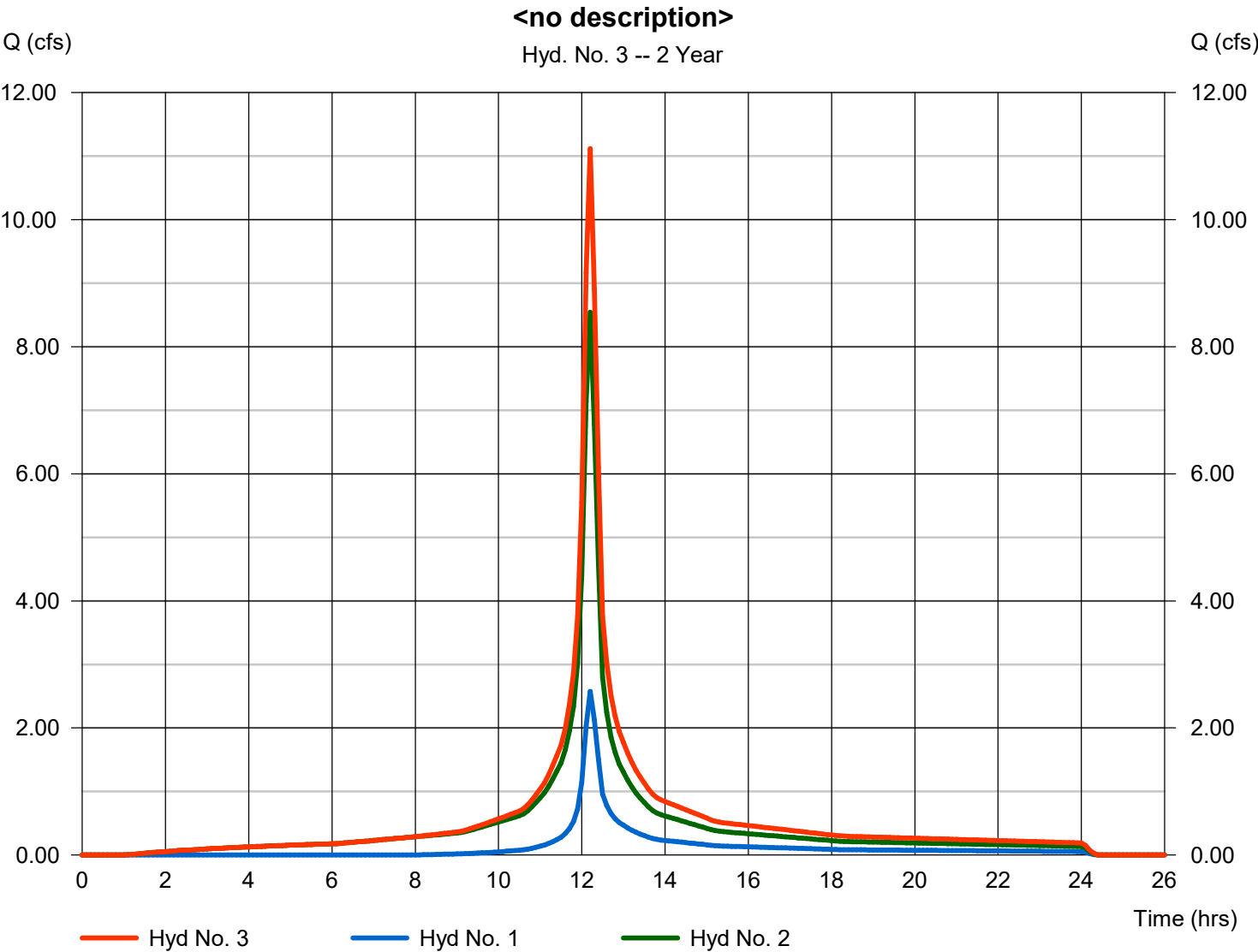


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 11.12 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 52,402 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 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	4.965	6	732	21,295	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	13.37	6	732	65,937	-----	-----	-----	DA-EX Impervious
3	Combine	18.33	6	732	87,232	1, 2	-----	-----	<no description>
Proposed - Future Projected.gpw					Return Period: 10 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

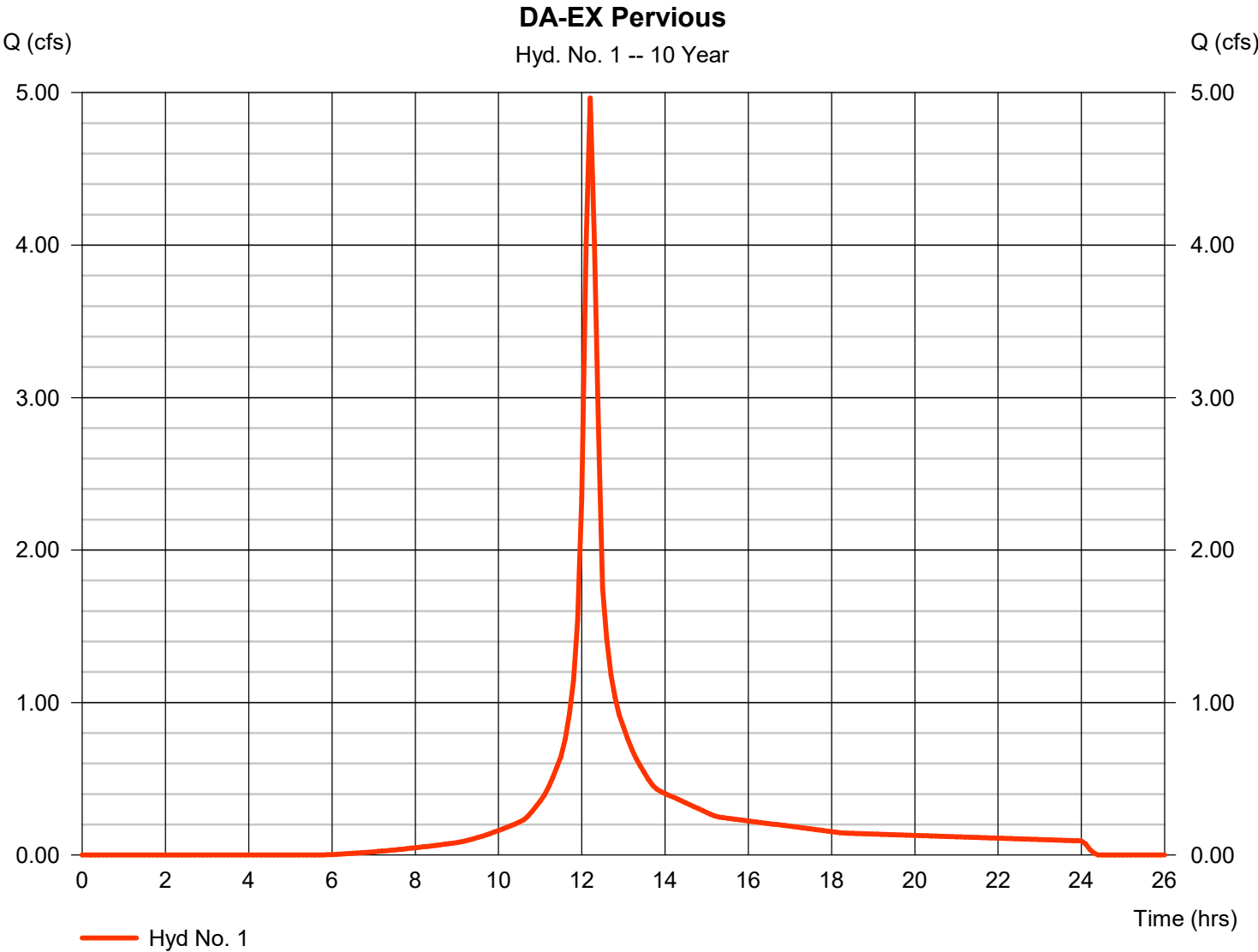
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Monday, 12 / 30 / 2024

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 4.965 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 21,295 cuft
Drainage area	= 1.520 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.70 min
Total precip.	= 6.37 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024-170 - Bagin - 184 Manor - West Orange		

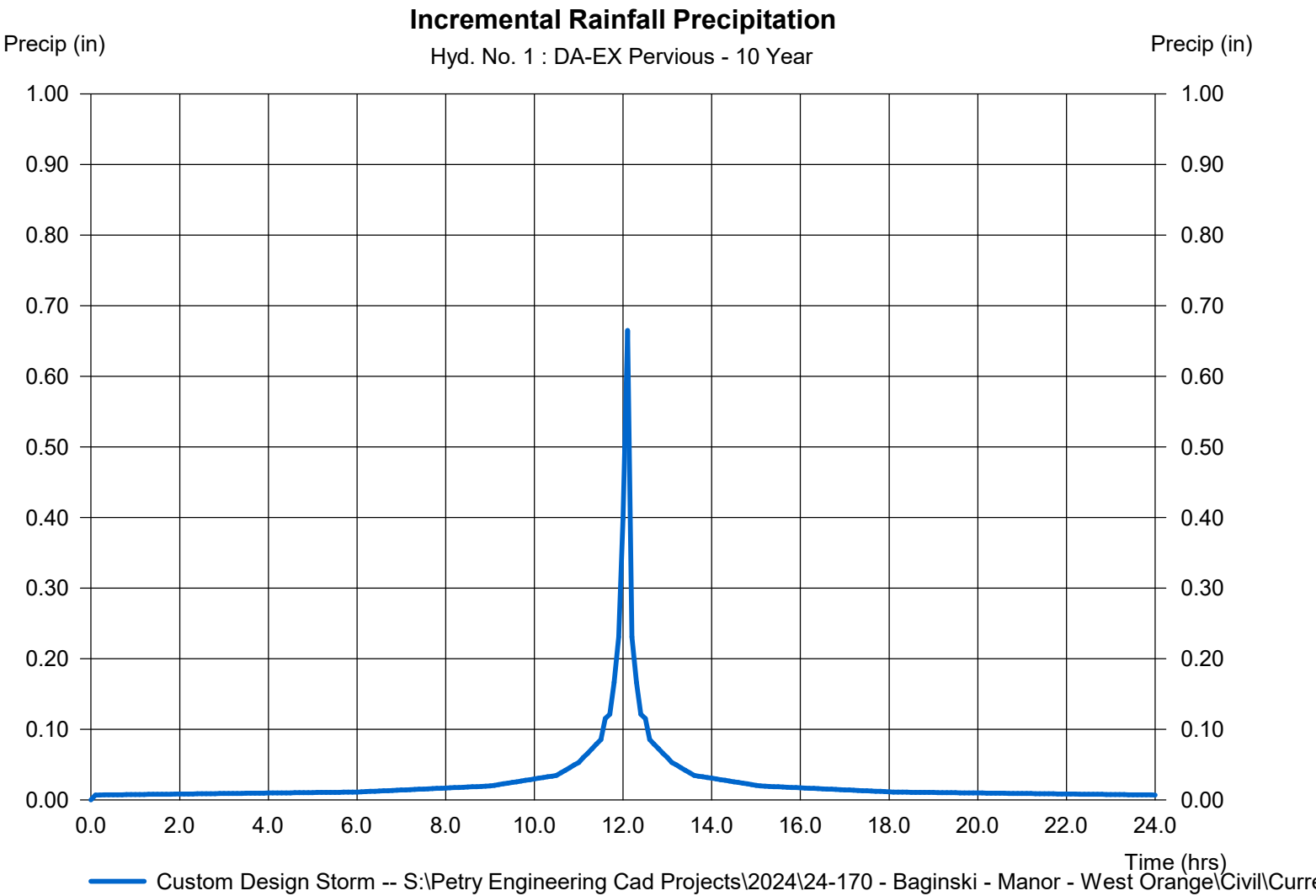


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 6.3700 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

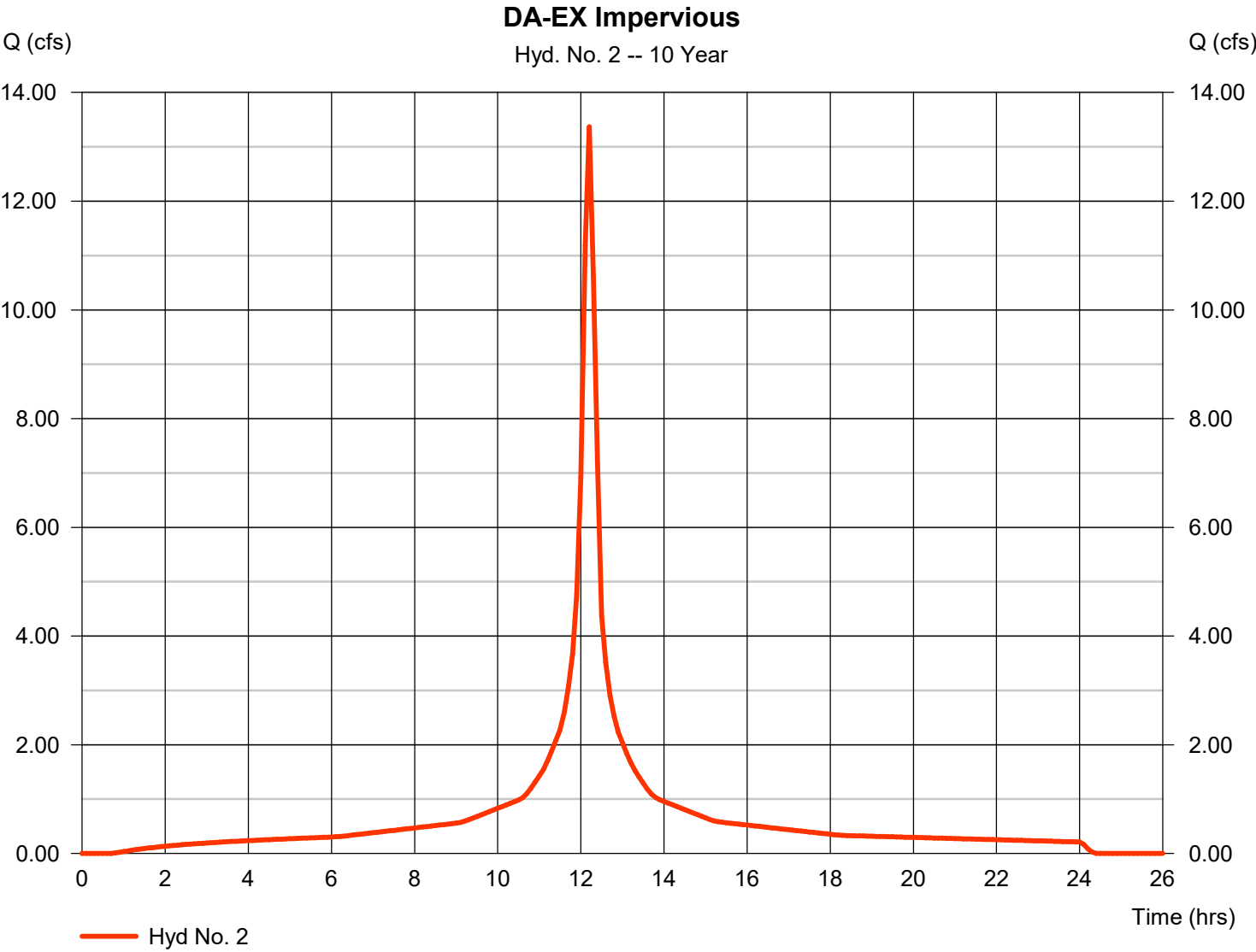


Hydrograph Report

Hyd. No. 2

DA-EX Impervious

Hydrograph type	= SCS Runoff	Peak discharge	= 13.37 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 65,937 cuft
Drainage area	= 3.160 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.70 min
Total precip.	= 6.37 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024-170 - Bagin's 184 Manor - West Orange		

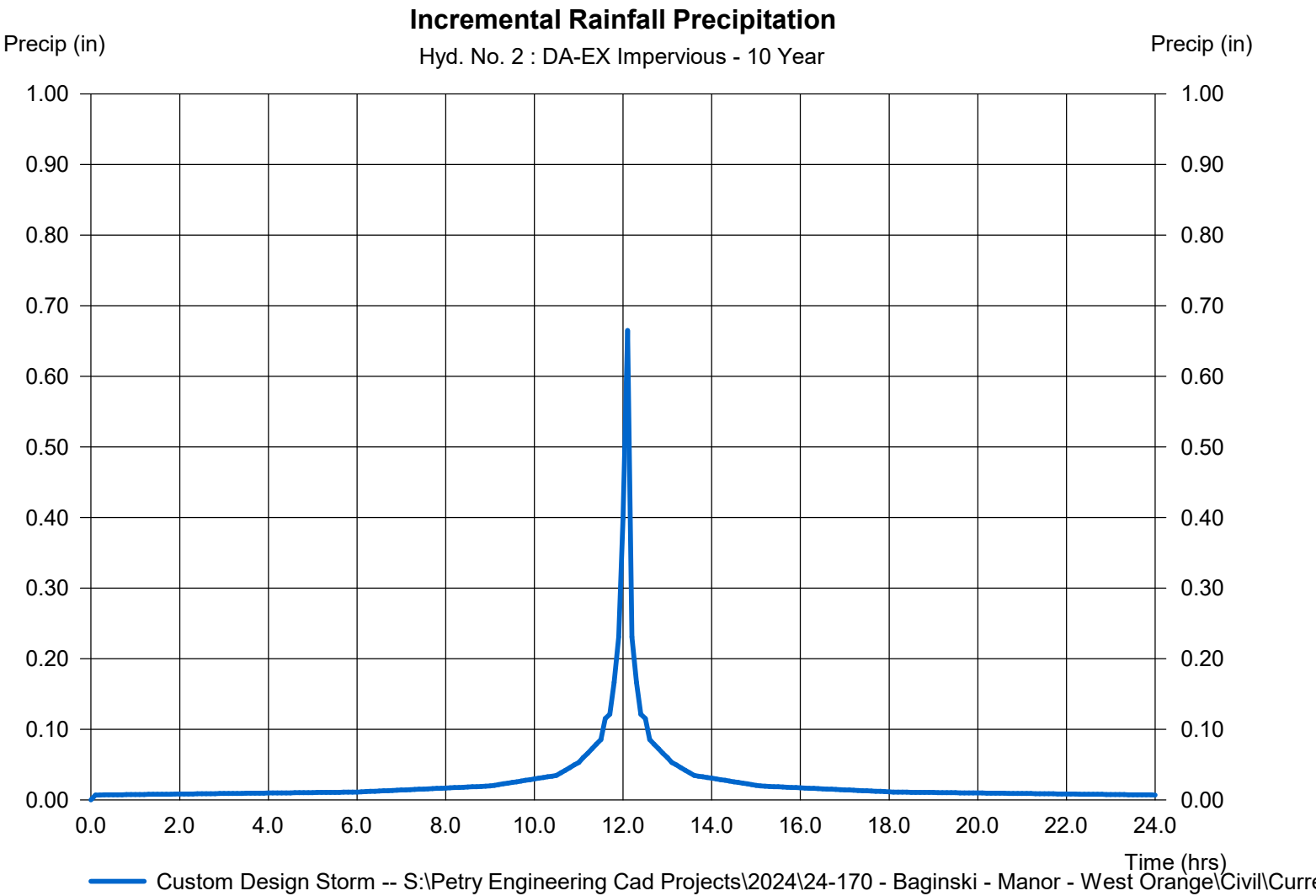


Precipitation Report

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 10 yrs	Time interval	= 6 min
Total precip.	= 6.3700 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		

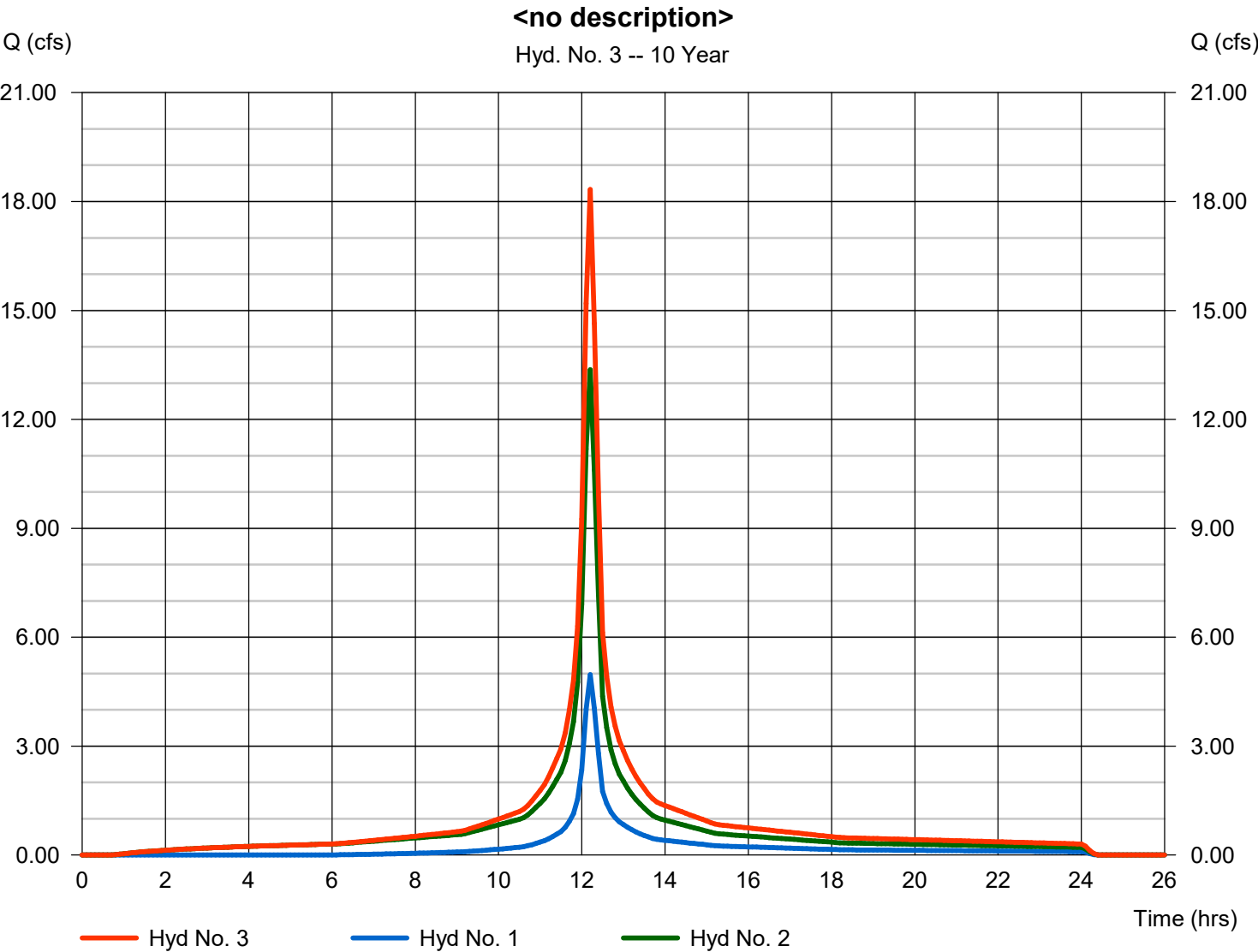


Hydrograph Report

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 18.33 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 87,232 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 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	10.47	6	732	46,463	-----	-----	-----	DA-EX Pervious
2	SCS Runoff	24.24	6	732	121,289	-----	-----	-----	DA-EX Impervious
3	Combine	34.70	6	732	167,752	1, 2	-----	-----	<no description>
Proposed - Future Projected.gpw					Return Period: 100 Year			Monday, 12 / 30 / 2024	

Hydrograph Report

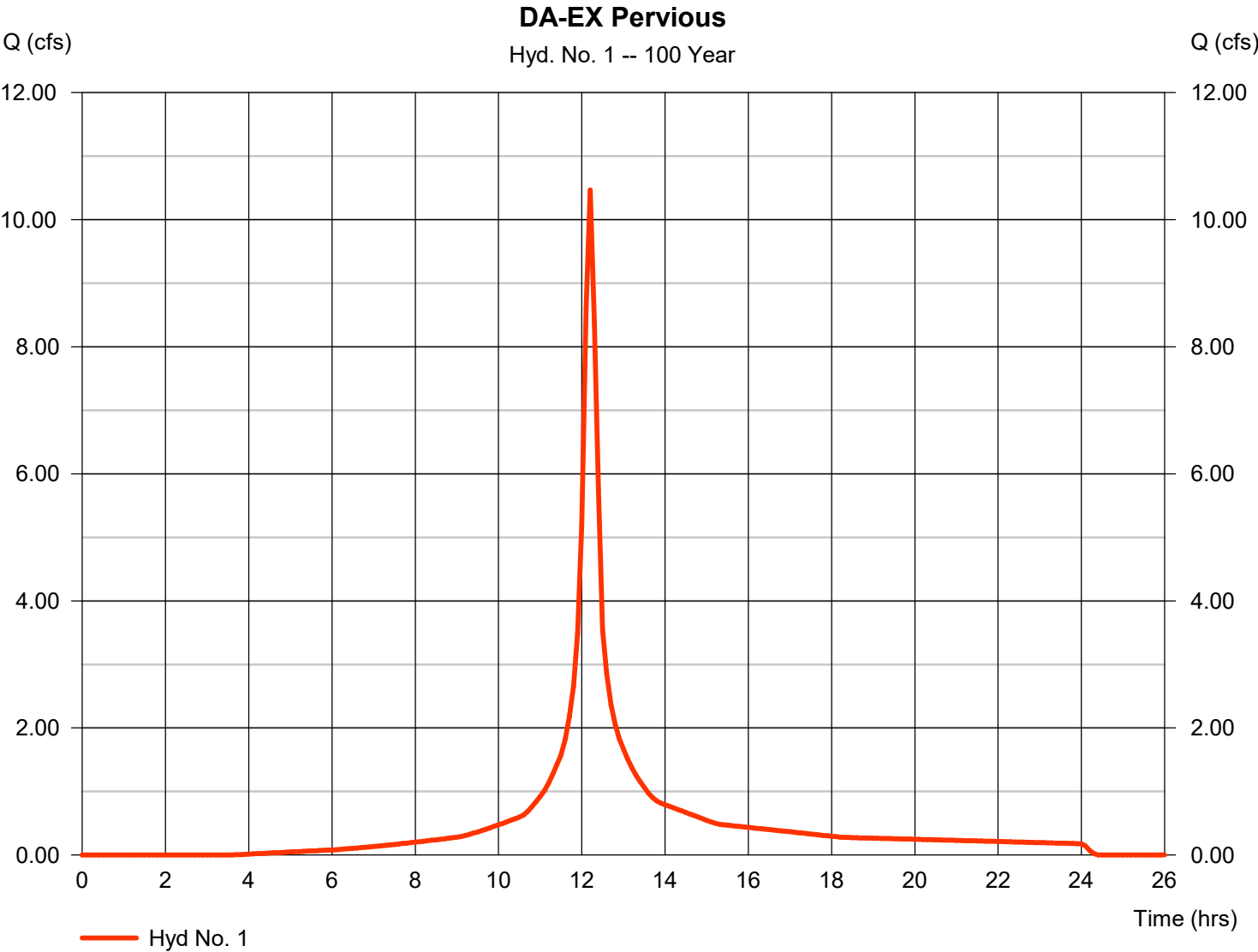
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Monday, 12 / 30 / 2024

Hyd. No. 1

DA-EX Pervious

Hydrograph type	= SCS Runoff	Peak discharge	= 10.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 46,463 cuft
Drainage area	= 1.520 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.70 min
Total precip.	= 11.52 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginask Manor - West Orange		

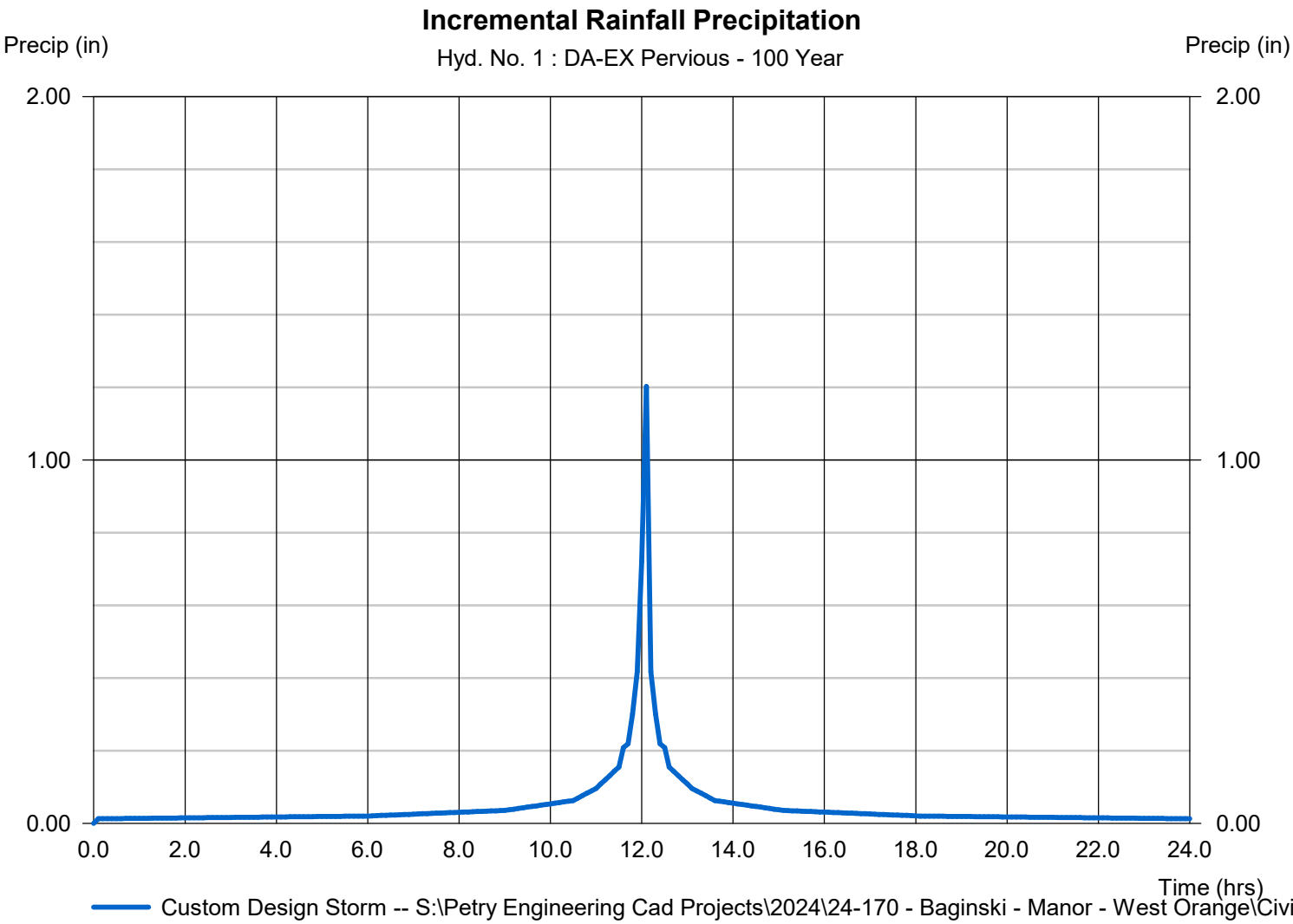


Precipitation Report

Hyd. No. 1

DA-EX Pervious

Storm Frequency	= 100 yrs	Time interval	= 6 min
Total precip.	= 11.5200 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Cur		



Hydrograph Report

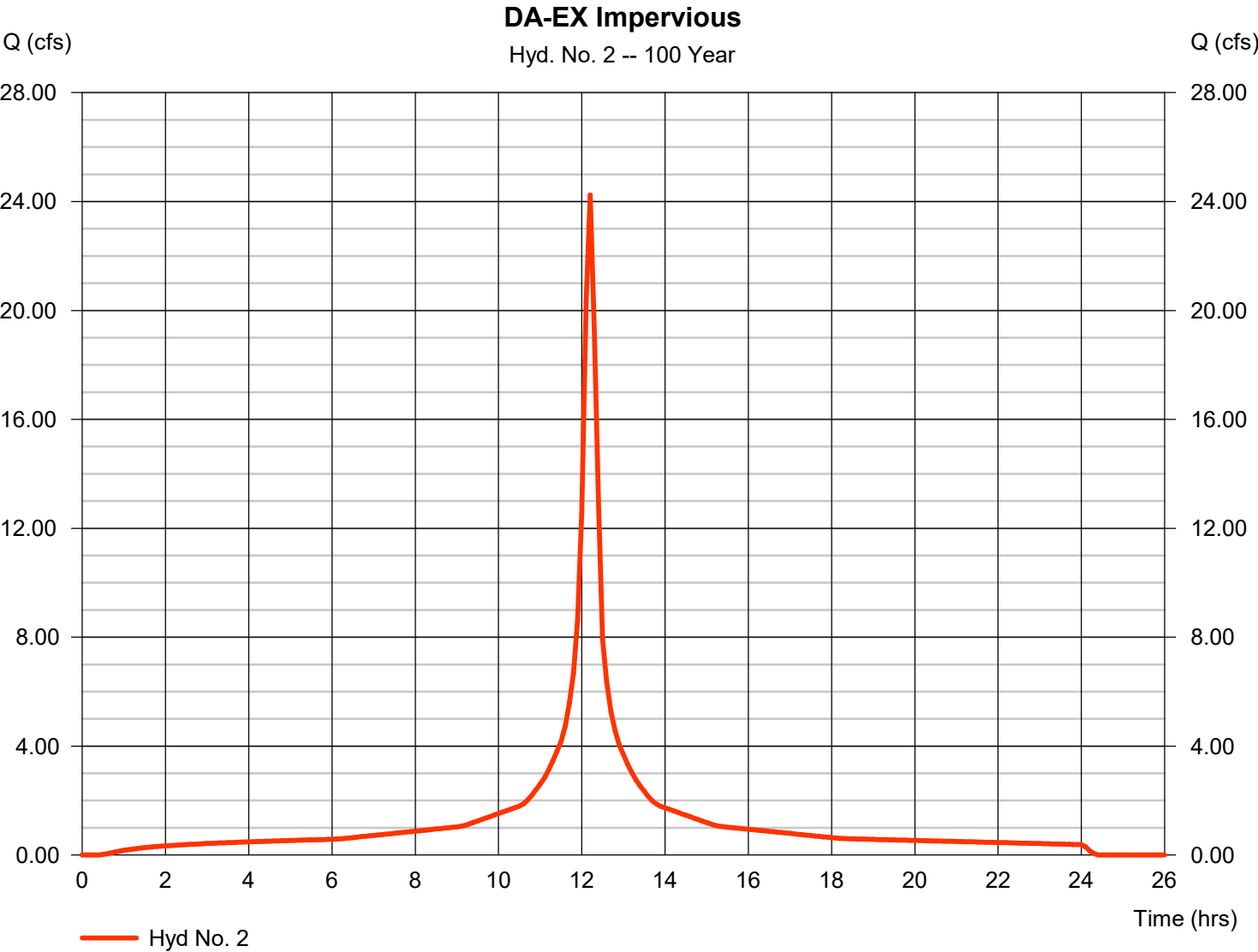
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Monday, 12 / 30 / 2024

Hyd. No. 2

DA-EX Impervious

Hydrograph type	=	SCS Runoff	Peak discharge	=	24.24 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.20 hrs
Time interval	=	6 min	Hyd. volume	=	121,289 cuft
Drainage area	=	3.160 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.70 min
Total precip.	=	11.52 in	Distribution	=	Custom
Storm duration	=	S:\Petry Engineering Cad Projects\2024\24-170 - Baginask Manor - West Orange			

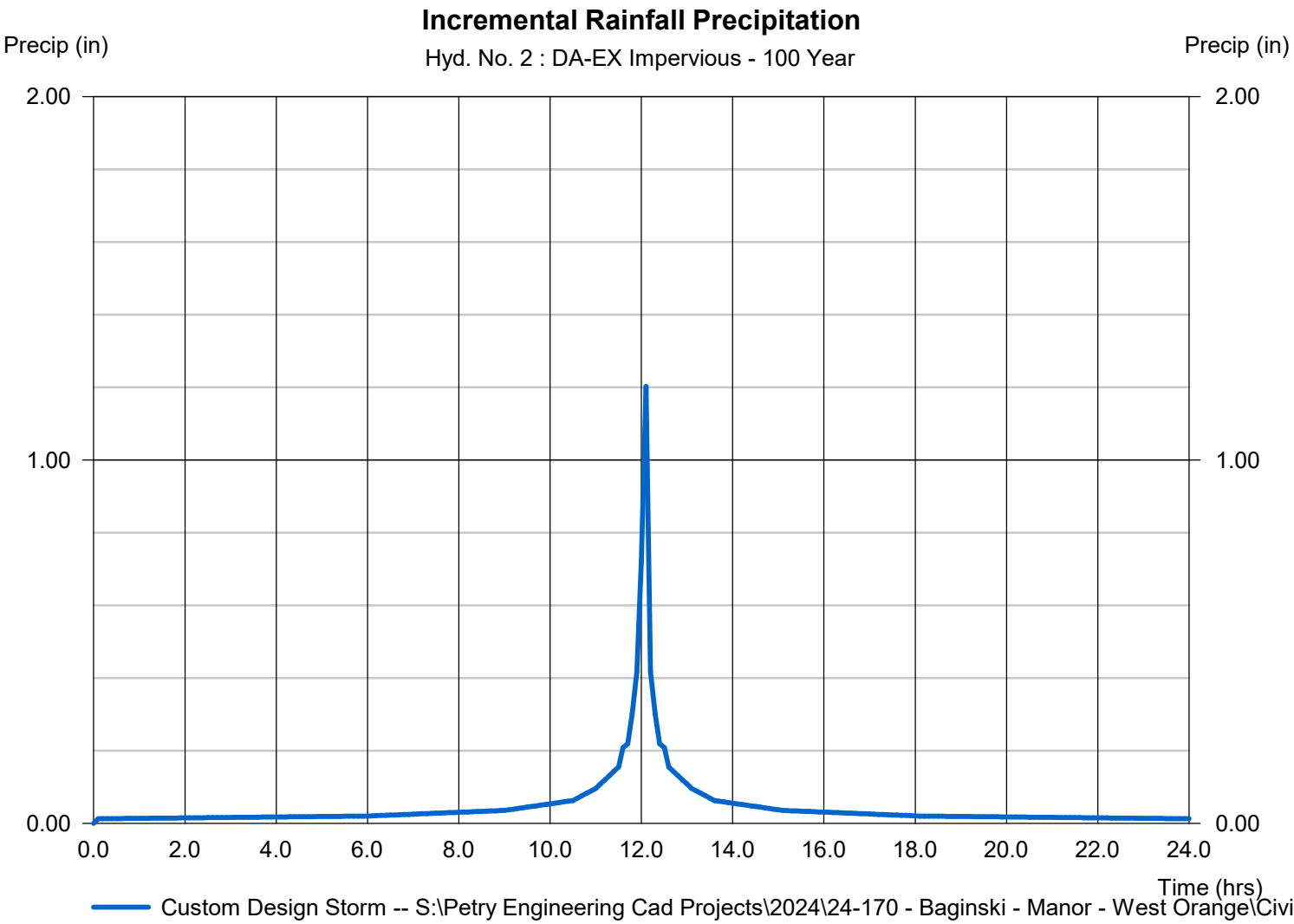


Precipitation Report

Hyd. No. 2

DA-EX Impervious

Storm Frequency	= 100 yrs	Time interval	= 6 min
Total precip.	= 11.5200 in	Distribution	= Custom
Storm duration	= S:\Petry Engineering Cad Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current		



Hydrograph Report

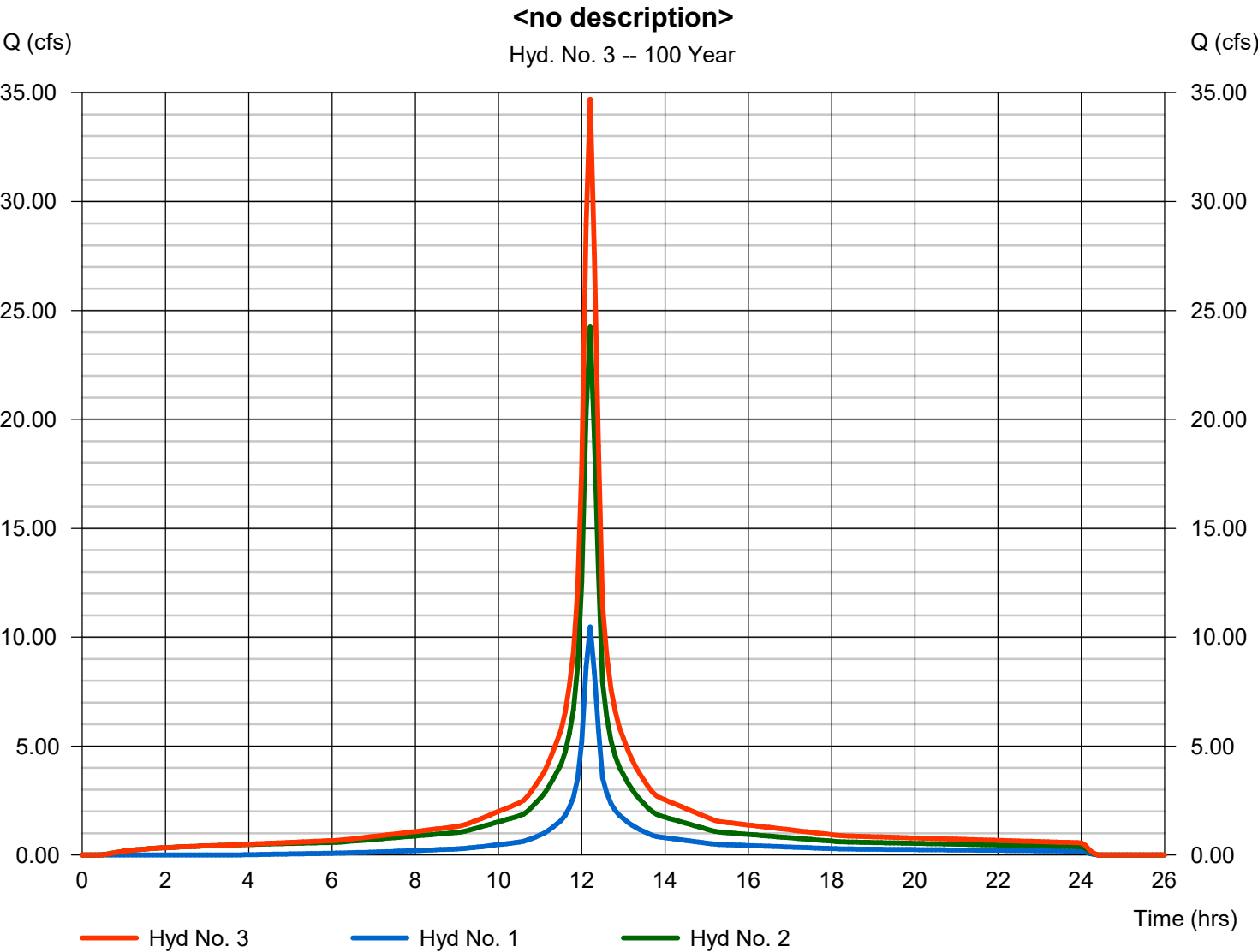
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023

Monday, 12 / 30 / 2024

Hyd. No. 3

<no description>

Hydrograph type	= Combine	Peak discharge	= 34.70 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 6 min	Hyd. volume	= 167,752 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 4.680 ac



Hydraflow Rainfall Report

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

File name: SampleFHA.idf

Intensity = B / (Tc + D)^E

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

Tc = time in minutes. Values may exceed 60.

Projects\2024\24-170 - Baginski - Manor - West Orange\Civil\Current\Stormwater\Essex County - Future Projected.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	0.00	0.00	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	4.09	0.00	0.00	6.37	0.00	0.00	11.52

EXISTING VS. PROPOSED RUNOFF RATES



TABLE 7 EXISTING VS. PROPOSED RUNOFF RATES - CURRENT ADJUSTED RAINFALL									
Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
0	0	0	0	0	0	0	0.000	0.000	0.000
6	0	0	0	0	0	0	0.000	0.000	0.000
12	0	0	0	0	0	0	0.000	0.000	0.000
18	0	0	0	0	0	0	0.000	0.000	0.000
24	0	0	0	0	0	0	0.000	0.000	0.000
30	0	0	0.003225	0	0	0.003069	0.000	0.000	0.000
36	0	0	0.015587	0	0	0.014836	0.000	0.000	-0.001
42	0	0	0.036973	0	0	0.035191	0.000	0.000	-0.002
48	0	0.001798	0.062243	0	0.001712	0.059243	0.000	0.000	-0.003
54	0	0.007612	0.086874	0	0.007245	0.082687	0.000	0.000	-0.004
60	0	0.016587	0.109252	0	0.015788	0.103987	0.000	-0.001	-0.005
66	0.000251	0.026946	0.129527	0.000239	0.025648	0.123285	0.000	-0.001	-0.006
72	0.001802	0.037058	0.147887	0.001715	0.035272	0.14076	0.000	-0.002	-0.007
78	0.005251	0.046701	0.164983	0.004998	0.044451	0.157032	0.000	-0.002	-0.008
84	0.009828	0.055803	0.180575	0.009355	0.053114	0.171872	0.000	-0.003	-0.009
90	0.014789	0.064426	0.194963	0.014076	0.061321	0.185568	-0.001	-0.003	-0.009
96	0.019584	0.072561	0.208121	0.01864	0.069064	0.198091	-0.001	-0.003	-0.010
102	0.02422	0.080286	0.22034	0.023053	0.076417	0.209721	-0.001	-0.004	-0.011
108	0.028707	0.087635	0.23173	0.027323	0.083412	0.220562	-0.001	-0.004	-0.011
114	0.033114	0.094804	0.24279	0.031518	0.090235	0.231089	-0.002	-0.005	-0.012
120	0.037393	0.101662	0.253209	0.035591	0.096762	0.241006	-0.002	-0.005	-0.012
126	0.04152	0.10814	0.262809	0.039519	0.102928	0.250143	-0.002	-0.005	-0.013
132	0.045606	0.114535	0.272321	0.043408	0.109016	0.259197	-0.002	-0.006	-0.013
138	0.049545	0.120581	0.281112	0.047157	0.11477	0.267564	-0.002	-0.006	-0.014
144	0.053375	0.126394	0.28948	0.050803	0.120302	0.27553	-0.003	-0.006	-0.014
150	0.057058	0.131874	0.297193	0.054308	0.125519	0.28287	-0.003	-0.006	-0.014
156	0.060639	0.137149	0.304555	0.057717	0.13054	0.289877	-0.003	-0.007	-0.015
162	0.064226	0.142451	0.312067	0.061131	0.135586	0.297027	-0.003	-0.007	-0.015
168	0.067727	0.147581	0.319297	0.064463	0.140468	0.303909	-0.003	-0.007	-0.015
174	0.071084	0.152413	0.325969	0.067658	0.145068	0.31026	-0.003	-0.007	-0.016
180	0.07436	0.157091	0.332403	0.070776	0.14952	0.316383	-0.004	-0.008	-0.016
186	0.077491	0.161481	0.338308	0.073757	0.153699	0.322004	-0.004	-0.008	-0.016
192	0.080734	0.16612	0.344813	0.076843	0.158115	0.328196	-0.004	-0.008	-0.017
198	0.083837	0.170488	0.350823	0.079797	0.162271	0.333916	-0.004	-0.008	-0.017
204	0.086874	0.174736	0.356663	0.082687	0.166315	0.339475	-0.004	-0.008	-0.017
210	0.089899	0.17897	0.362529	0.085566	0.170345	0.345058	-0.004	-0.009	-0.017
216	0.092863	0.1831	0.368252	0.088388	0.174276	0.350505	-0.004	-0.009	-0.018
222	0.095689	0.186971	0.373512	0.091077	0.17796	0.355512	-0.005	-0.009	-0.018
228	0.098457	0.190748	0.378648	0.093712	0.181555	0.3604	-0.005	-0.009	-0.018
234	0.101085	0.19427	0.383334	0.096213	0.184907	0.36486	-0.005	-0.009	-0.018
240	0.103886	0.198141	0.388765	0.09888	0.188592	0.370029	-0.005	-0.010	-0.019

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
246	0.106552	0.201765	0.39376	0.101417	0.192041	0.374784	-0.005	-0.010	-0.019
252	0.109169	0.205314	0.398745	0.103907	0.19542	0.379542	-0.005	-0.010	-0.019
258	0.111648	0.208619	0.403799	0.106268	0.198565	0.384449	-0.005	-0.010	-0.019
264	0.114232	0.212133	0.410084	0.108727	0.201909	0.390657	-0.006	-0.010	-0.019
270	0.116775	0.215584	0.416799	0.111147	0.205194	0.397359	-0.006	-0.010	-0.019
276	0.11918	0.218796	0.423326	0.113437	0.208252	0.40392	-0.006	-0.011	-0.019
282	0.121546	0.22195	0.42979	0.115688	0.211254	0.410422	-0.006	-0.011	-0.019
288	0.123774	0.224867	0.435843	0.117809	0.21403	0.416532	-0.006	-0.011	-0.019
294	0.126224	0.228202	0.442751	0.120141	0.217204	0.423461	-0.006	-0.011	-0.019
300	0.128538	0.231303	0.449251	0.122344	0.220156	0.430002	-0.006	-0.011	-0.019
306	0.130819	0.234357	0.455704	0.124514	0.223063	0.436498	-0.006	-0.011	-0.019
312	0.132963	0.237179	0.461748	0.126555	0.225749	0.442604	-0.006	-0.011	-0.019
318	0.135241	0.240251	0.468318	0.128723	0.228673	0.449216	-0.007	-0.012	-0.019
324	0.137489	0.243283	0.474849	0.130863	0.231558	0.455791	-0.007	-0.012	-0.019
330	0.1396	0.246085	0.48097	0.132872	0.234226	0.461975	-0.007	-0.012	-0.019
336	0.141683	0.248851	0.487054	0.134855	0.236858	0.468124	-0.007	-0.012	-0.019
342	0.14363	0.251386	0.492725	0.136708	0.239271	0.473876	-0.007	-0.012	-0.019
348	0.145832	0.254382	0.499329	0.138804	0.242122	0.480528	-0.007	-0.012	-0.019
354	0.147897	0.257151	0.505522	0.14077	0.244758	0.486784	-0.007	-0.012	-0.019
360	0.149939	0.259889	0.511685	0.142713	0.247364	0.493013	-0.007	-0.013	-0.019
366	0.152548	0.26361	0.519825	0.145196	0.250906	0.501151	-0.007	-0.013	-0.019
372	0.156378	0.269432	0.532158	0.148841	0.256447	0.51334	-0.008	-0.013	-0.019
378	0.160983	0.276572	0.547156	0.153225	0.263243	0.528111	-0.008	-0.013	-0.019
384	0.166025	0.284437	0.563661	0.158024	0.270729	0.544352	-0.008	-0.014	-0.019
390	0.170861	0.292023	0.579488	0.162627	0.277966	0.559955	-0.008	-0.014	-0.020
396	0.175785	0.300073	0.595638	0.167313	0.285703	0.575885	-0.008	-0.014	-0.020
402	0.180795	0.308667	0.61211	0.172082	0.294026	0.592143	-0.009	-0.015	-0.020
408	0.18589	0.317671	0.628903	0.176932	0.302788	0.608728	-0.009	-0.015	-0.020
414	0.19107	0.32694	0.646016	0.181862	0.311826	0.625639	-0.009	-0.015	-0.020
420	0.196213	0.336187	0.663044	0.186757	0.320854	0.642483	-0.009	-0.015	-0.021
426	0.201437	0.345615	0.68039	0.191729	0.330065	0.659651	-0.010	-0.016	-0.021
432	0.206619	0.355016	0.697639	0.196661	0.339261	0.676741	-0.010	-0.016	-0.021
438	0.21188	0.364595	0.715201	0.201669	0.348637	0.694149	-0.010	-0.016	-0.021
444	0.217096	0.374142	0.73266	0.206634	0.357992	0.711471	-0.010	-0.016	-0.021
450	0.222389	0.383866	0.750431	0.211671	0.367526	0.729111	-0.011	-0.016	-0.021
456	0.227442	0.393222	0.767448	0.216481	0.376718	0.746032	-0.011	-0.017	-0.021
462	0.232568	0.402751	0.784766	0.22136	0.386086	0.763258	-0.011	-0.017	-0.022
468	0.237959	0.412788	0.803036	0.226491	0.39595	0.781425	-0.011	-0.017	-0.022
474	0.243231	0.422662	0.82096	0.231509	0.405667	0.799266	-0.012	-0.017	-0.022
480	0.248447	0.43249	0.838755	0.236473	0.415349	0.816995	-0.012	-0.017	-0.022
486	0.253927	0.442829	0.857505	0.24169	0.425532	0.835667	-0.012	-0.017	-0.022
492	0.259155	0.452777	0.875465	0.246666	0.435347	0.853581	-0.012	-0.017	-0.022
498	0.264257	0.46255	0.893058	0.251521	0.445003	0.871147	-0.013	-0.018	-0.022

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
504	0.269493	0.472612	0.911172	0.256506	0.454947	0.889234	-0.013	-0.018	-0.022
510	0.274927	0.483068	0.930012	0.261677	0.465278	0.908038	-0.013	-0.018	-0.022
516	0.280174	0.493116	0.948035	0.266684	0.475224	0.926057	-0.013	-0.018	-0.022
522	0.285973	0.503681	0.967017	0.272262	0.485678	0.945022	-0.014	-0.018	-0.022
528	0.292093	0.514184	0.985845	0.278211	0.49608	0.963847	-0.014	-0.018	-0.022
534	0.298335	0.524498	1.004282	0.284319	0.506307	0.982299	-0.014	-0.018	-0.022
540	0.304635	0.534746	1.022558	0.290502	0.516479	1.000601	-0.014	-0.018	-0.022
546	0.313493	0.549452	1.049296	0.299133	0.53097	1.027203	-0.014	-0.018	-0.022
552	0.326998	0.572255	1.091399	0.312215	0.553308	1.068874	-0.015	-0.019	-0.023
558	0.343809	0.60077	1.14426	0.328471	0.581197	1.121122	-0.015	-0.020	-0.023
564	0.362481	0.632448	1.202984	0.346529	0.612181	1.179163	-0.016	-0.020	-0.024
570	0.381197	0.664104	1.261475	0.364657	0.643184	1.237031	-0.017	-0.021	-0.024
576	0.400302	0.696339	1.320875	0.383183	0.674788	1.295845	-0.017	-0.022	-0.025
582	0.419446	0.728543	1.380025	0.401775	0.706401	1.354468	-0.018	-0.022	-0.026
588	0.438977	0.761321	1.440073	0.420764	0.738612	1.414024	-0.018	-0.023	-0.026
594	0.458893	0.794672	1.501008	0.440152	0.771419	1.474506	-0.019	-0.023	-0.027
600	0.478837	0.827976	1.561662	0.459594	0.804221	1.534762	-0.019	-0.024	-0.027
606	0.499163	0.861847	1.623188	0.479431	0.837611	1.595924	-0.020	-0.024	-0.027
612	0.519506	0.895655	1.684397	0.499313	0.870981	1.656825	-0.020	-0.025	-0.028
618	0.540224	0.930018	1.746455	0.519583	0.904929	1.718607	-0.021	-0.025	-0.028
624	0.561315	0.964932	1.809354	0.54024	0.939451	1.781263	-0.021	-0.025	-0.028
630	0.582406	0.999757	1.871892	0.560925	0.973924	1.843607	-0.021	-0.026	-0.028
636	0.613351	1.051344	1.965493	0.591146	1.024788	1.936621	-0.022	-0.027	-0.029
642	0.663681	1.135912	2.120251	0.640121	1.107899	2.090019	-0.024	-0.028	-0.030
648	0.727601	1.243407	2.317116	0.702299	1.213504	2.285091	-0.025	-0.030	-0.032
654	0.798908	1.363114	2.535893	0.771726	1.331192	2.501978	-0.027	-0.032	-0.034
660	0.871193	1.484012	2.7559	0.842234	1.45023	2.720311	-0.029	-0.034	-0.036
666	0.95503	1.624009	3.01019	0.924075	1.588158	2.972759	-0.031	-0.036	-0.037
672	1.061159	1.801204	3.331961	1.02769	1.762739	3.292183	-0.033	-0.038	-0.040
678	1.182835	2.003937	3.699216	1.146605	1.962635	3.65693	-0.036	-0.041	-0.042
684	1.313931	2.221654	4.092117	1.274925	2.177567	4.047457	-0.039	-0.044	-0.045
690	1.447354	2.442226	4.488061	1.405807	2.395693	4.441442	-0.042	-0.047	-0.047
696	1.672744	2.815929	5.161236	1.626587	2.764771	5.110632	-0.046	-0.051	-0.051
702	1.990397	3.342481	6.109565	1.937762	3.284786	6.053252	-0.053	-0.058	-0.056
708	2.405526	4.028267	7.340042	2.345039	3.962811	7.277119	-0.060	-0.065	-0.063
714	3.156396	5.267673	9.562263	3.081908	5.188314	9.487363	-0.074	-0.079	-0.075
720	4.657614	7.736543	13.97224	4.557312	7.631952	13.87593	-0.100	-0.105	-0.096
726	7.702218	12.71337	22.80845	7.55659	12.56577	22.67678	-0.146	-0.148	-0.132
732	9.33902	15.34767	27.40988	9.178928	15.18888	27.27162	-0.160	-0.159	-0.138
738	7.484421	12.25998	21.82383	7.365558	12.14398	21.72465	-0.119	-0.116	-0.099
744	5.125889	8.366888	14.84156	5.051342	8.295491	14.78176	-0.075	-0.071	-0.060
750	3.157937	5.135263	9.076007	3.116356	5.09625	9.044058	-0.042	-0.039	-0.032
756	2.546166	4.133986	7.295726	2.514032	4.10408	7.271444	-0.032	-0.030	-0.024

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
762	2.103873	3.412002	6.01526	2.078145	3.388201	5.996051	-0.026	-0.024	-0.019
768	1.835614	2.974214	5.239058	1.813742	2.954074	5.222885	-0.022	-0.020	-0.016
774	1.631239	2.640944	4.648634	1.612244	2.623527	4.634709	-0.019	-0.017	-0.014
780	1.49289	2.415371	4.249068	1.475836	2.399786	4.23665	-0.017	-0.016	-0.012
786	1.353531	2.188621	3.848162	1.338332	2.174773	3.837163	-0.015	-0.014	-0.011
792	1.225577	1.980691	3.480938	1.212029	1.968381	3.471188	-0.014	-0.012	-0.010
798	1.12195	1.812357	3.183764	1.109722	1.801273	3.175006	-0.012	-0.011	-0.009
804	1.034124	1.669775	2.9322	1.022997	1.659712	2.924267	-0.011	-0.010	-0.008
810	0.95418	1.540108	2.703598	0.944031	1.530948	2.69639	-0.010	-0.009	-0.007
816	0.873784	1.409866	2.474217	0.864588	1.40158	2.46771	-0.009	-0.008	-0.007
822	0.80496	1.298406	2.277983	0.796571	1.29086	2.272067	-0.008	-0.008	-0.006
828	0.759844	1.225268	2.149113	0.751997	1.218221	2.143597	-0.008	-0.007	-0.006
834	0.73035	1.177384	2.064627	0.722873	1.170678	2.059385	-0.007	-0.007	-0.005
840	0.708465	1.141802	2.001797	0.701271	1.135359	1.996768	-0.007	-0.006	-0.005
846	0.6868	1.106618	1.939694	0.67988	1.100428	1.934869	-0.007	-0.006	-0.005
852	0.664902	1.071082	1.87703	0.658253	1.065142	1.872406	-0.007	-0.006	-0.005
858	0.643243	1.035954	1.815116	0.636857	1.030256	1.810685	-0.006	-0.006	-0.004
864	0.621348	1.000478	1.752619	0.615223	0.995019	1.748379	-0.006	-0.005	-0.004
870	0.599226	0.964654	1.689563	0.593358	0.95943	1.68551	-0.006	-0.005	-0.004
876	0.577342	0.929236	1.627255	0.571725	0.924241	1.623384	-0.006	-0.005	-0.004
882	0.555235	0.893484	1.564399	0.549866	0.888715	1.560706	-0.005	-0.005	-0.004
888	0.533375	0.858153	1.502299	0.528248	0.853603	1.498779	-0.005	-0.005	-0.004
894	0.51129	0.82248	1.439636	0.506403	0.818147	1.436287	-0.005	-0.004	-0.003
900	0.488985	0.786472	1.376417	0.484337	0.782354	1.373238	-0.005	-0.004	-0.003
906	0.46693	0.750881	1.313958	0.462514	0.746972	1.310943	-0.004	-0.004	-0.003
912	0.447778	0.71997	1.259713	0.443564	0.716243	1.25684	-0.004	-0.004	-0.003
918	0.435114	0.699509	1.223765	0.431039	0.695907	1.22099	-0.004	-0.004	-0.003
924	0.426967	0.686319	1.200542	0.422987	0.682804	1.197836	-0.004	-0.004	-0.003
930	0.420978	0.676609	1.183409	0.417072	0.673161	1.180757	-0.004	-0.003	-0.003
936	0.414606	0.666276	1.165212	0.410775	0.662898	1.162616	-0.004	-0.003	-0.003
942	0.408415	0.656244	1.147546	0.404658	0.652933	1.145003	-0.004	-0.003	-0.003
948	0.402315	0.646357	1.130146	0.39863	0.643112	1.127655	-0.004	-0.003	-0.002
954	0.395829	0.635849	1.111662	0.392219	0.632672	1.109225	-0.004	-0.003	-0.002
960	0.389715	0.625948	1.094236	0.386175	0.622835	1.09185	-0.004	-0.003	-0.002
966	0.383778	0.616349	1.077342	0.380306	0.613297	1.075004	-0.003	-0.003	-0.002
972	0.377646	0.606433	1.059907	0.374243	0.603444	1.057619	-0.003	-0.003	-0.002
978	0.371226	0.596055	1.041677	0.367894	0.59313	1.039439	-0.003	-0.003	-0.002
984	0.365177	0.586277	1.024495	0.361912	0.583412	1.022305	-0.003	-0.003	-0.002
990	0.358745	0.575882	1.006243	0.355549	0.57308	1.004101	-0.003	-0.003	-0.002
996	0.352403	0.565641	0.988251	0.349275	0.5629	0.986157	-0.003	-0.003	-0.002
1002	0.34624	0.555693	0.970783	0.343179	0.553012	0.968736	-0.003	-0.003	-0.002
1008	0.340168	0.545893	0.953583	0.337171	0.543269	0.951581	-0.003	-0.003	-0.002
1014	0.333994	0.535932	0.936112	0.331061	0.533366	0.934156	-0.003	-0.003	-0.002

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
1020	0.327722	0.525821	0.918379	0.324854	0.523313	0.916468	-0.003	-0.003	-0.002
1026	0.321352	0.515555	0.900366	0.318549	0.513105	0.8985	-0.003	-0.002	-0.002
1032	0.315069	0.505427	0.882613	0.31233	0.503034	0.880791	-0.003	-0.002	-0.002
1038	0.308689	0.495138	0.864585	0.306014	0.492802	0.862808	-0.003	-0.002	-0.002
1044	0.302397	0.485003	0.846827	0.299785	0.482723	0.845093	-0.003	-0.002	-0.002
1050	0.296009	0.474713	0.828803	0.293459	0.472489	0.827112	-0.003	-0.002	-0.002
1056	0.289705	0.464571	0.81103	0.287217	0.462402	0.809381	-0.002	-0.002	-0.002
1062	0.283301	0.454271	0.792999	0.280875	0.452157	0.791392	-0.002	-0.002	-0.002
1068	0.277277	0.444577	0.776014	0.274909	0.442514	0.774449	-0.002	-0.002	-0.002
1074	0.271152	0.434717	0.758772	0.268843	0.432707	0.757246	-0.002	-0.002	-0.002
1080	0.264932	0.424707	0.741254	0.262682	0.422749	0.739769	-0.002	-0.002	-0.001
1086	0.258611	0.414542	0.723472	0.256421	0.412636	0.722027	-0.002	-0.002	-0.001
1092	0.253047	0.405599	0.707821	0.25091	0.40374	0.706411	-0.002	-0.002	-0.001
1098	0.249572	0.400003	0.698003	0.247469	0.398175	0.696618	-0.002	-0.002	-0.001
1104	0.247427	0.396537	0.691923	0.245347	0.39473	0.690554	-0.002	-0.002	-0.001
1110	0.245757	0.393837	0.687169	0.243697	0.392047	0.685813	-0.002	-0.002	-0.001
1116	0.244086	0.39113	0.682412	0.242045	0.389357	0.68107	-0.002	-0.002	-0.001
1122	0.242608	0.388729	0.678186	0.240583	0.386972	0.676856	-0.002	-0.002	-0.001
1128	0.241127	0.386333	0.673971	0.23912	0.384591	0.672654	-0.002	-0.002	-0.001
1134	0.239834	0.384243	0.670287	0.237843	0.382515	0.668981	-0.002	-0.002	-0.001
1140	0.238064	0.381379	0.66526	0.236092	0.379669	0.663967	-0.002	-0.002	-0.001
1146	0.23648	0.378822	0.660754	0.234526	0.377128	0.659475	-0.002	-0.002	-0.001
1152	0.234902	0.376259	0.65626	0.232965	0.374581	0.654992	-0.002	-0.002	-0.001
1158	0.233514	0.374003	0.6523	0.231593	0.372339	0.651044	-0.002	-0.002	-0.001
1164	0.231836	0.371298	0.647537	0.229933	0.369651	0.646293	-0.002	-0.002	-0.001
1170	0.230155	0.368592	0.642775	0.228271	0.366961	0.641544	-0.002	-0.002	-0.001
1176	0.228663	0.366182	0.638543	0.226795	0.364565	0.637324	-0.002	-0.002	-0.001
1182	0.227175	0.363771	0.63432	0.225323	0.362169	0.633112	-0.002	-0.002	-0.001
1188	0.225875	0.361673	0.630628	0.224038	0.360084	0.62943	-0.002	-0.002	-0.001
1194	0.224098	0.3588	0.625597	0.222279	0.357228	0.624412	-0.002	-0.002	-0.001
1200	0.222509	0.356238	0.621091	0.220707	0.354681	0.619918	-0.002	-0.002	-0.001
1206	0.22092	0.353674	0.616587	0.219135	0.352131	0.615425	-0.002	-0.002	-0.001
1212	0.219519	0.351416	0.61262	0.217749	0.349887	0.611469	-0.002	-0.002	-0.001
1218	0.217837	0.348699	0.607854	0.216085	0.347185	0.606715	-0.002	-0.002	-0.001
1224	0.216151	0.345974	0.603078	0.214415	0.344476	0.601951	-0.002	-0.001	-0.001
1230	0.214653	0.343559	0.598839	0.212933	0.342075	0.597723	-0.002	-0.001	-0.001
1236	0.213156	0.341144	0.594607	0.211451	0.339674	0.593502	-0.002	-0.001	-0.001
1242	0.21185	0.33904	0.5909	0.210159	0.337582	0.589804	-0.002	-0.001	-0.001
1248	0.210063	0.336158	0.585864	0.20839	0.334716	0.58478	-0.002	-0.001	-0.001
1254	0.208468	0.333585	0.581362	0.206812	0.332157	0.580289	-0.002	-0.001	-0.001
1260	0.206869	0.331014	0.576854	0.205228	0.3296	0.575792	-0.002	-0.001	-0.001
1266	0.205177	0.328287	0.572083	0.203553	0.326888	0.571033	-0.002	-0.001	-0.001
1272	0.203486	0.325565	0.567307	0.201879	0.324181	0.566269	-0.002	-0.001	-0.001

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
1278	0.201985	0.323146	0.56306	0.200392	0.321775	0.562032	-0.002	-0.001	-0.001
1284	0.200483	0.320726	0.558825	0.198905	0.319369	0.557807	-0.002	-0.001	-0.001
1290	0.19917	0.31861	0.555118	0.197606	0.317264	0.554109	-0.002	-0.001	-0.001
1296	0.197375	0.315723	0.550068	0.195828	0.314392	0.54907	-0.002	-0.001	-0.001
1302	0.195774	0.313152	0.54556	0.194242	0.311835	0.544572	-0.002	-0.001	-0.001
1308	0.194173	0.310575	0.541048	0.192656	0.309272	0.540071	-0.002	-0.001	-0.001
1314	0.192763	0.308305	0.537071	0.191261	0.307014	0.536104	-0.002	-0.001	-0.001
1320	0.191356	0.306032	0.533093	0.189868	0.304753	0.532135	-0.001	-0.001	-0.001
1326	0.189656	0.303296	0.52831	0.188183	0.302031	0.527364	-0.001	-0.001	-0.001
1332	0.187954	0.300561	0.523524	0.186497	0.29931	0.522587	-0.001	-0.001	-0.001
1338	0.186443	0.298134	0.519275	0.185	0.296895	0.518348	-0.001	-0.001	-0.001
1344	0.184643	0.295245	0.514231	0.183216	0.294021	0.513315	-0.001	-0.001	-0.001
1350	0.183039	0.29267	0.509722	0.181628	0.291459	0.508816	-0.001	-0.001	-0.001
1356	0.181433	0.290087	0.505215	0.180037	0.288889	0.504319	-0.001	-0.001	-0.001
1362	0.180019	0.287808	0.501224	0.178636	0.286622	0.500337	-0.001	-0.001	-0.001
1368	0.178605	0.285534	0.497237	0.177234	0.284359	0.496359	-0.001	-0.001	-0.001
1374	0.177188	0.283254	0.493264	0.175831	0.282091	0.492395	-0.001	-0.001	-0.001
1380	0.175482	0.280519	0.488477	0.174141	0.279369	0.487618	-0.001	-0.001	-0.001
1386	0.173775	0.277779	0.483694	0.172448	0.276643	0.482845	-0.001	-0.001	-0.001
1392	0.172259	0.275349	0.479443	0.170946	0.274225	0.478603	-0.001	-0.001	-0.001
1398	0.170458	0.272454	0.474381	0.169161	0.271343	0.473551	-0.001	-0.001	-0.001
1404	0.168851	0.269866	0.469857	0.167568	0.268768	0.469037	-0.001	-0.001	-0.001
1410	0.167238	0.267282	0.465345	0.16597	0.266196	0.464535	-0.001	-0.001	-0.001
1416	0.165815	0.265006	0.461364	0.164559	0.263931	0.460562	-0.001	-0.001	-0.001
1422	0.164392	0.262724	0.457382	0.163148	0.261661	0.456589	-0.001	-0.001	-0.001
1428	0.162685	0.259977	0.452595	0.161457	0.258926	0.451811	-0.001	-0.001	-0.001
1434	0.160975	0.25723	0.447792	0.159762	0.256193	0.447018	-0.001	-0.001	-0.001
1440	0.159744	0.255256	0.444341	0.158542	0.254228	0.443575	-0.001	-0.001	-0.001
1446	0.127152	0.203172	0.353671	0.126196	0.202355	0.353062	-0.001	-0.001	-0.001
1452	0.063482	0.101436	0.176574	0.063005	0.101028	0.176271	0.000	0.000	0.000
1458	0.021098	0.03371	0.058683	0.020939	0.033575	0.058582	0.000	0.000	0.000

TABLE 8
EXISTING VS. PROPOSED RUNOFF RATES - FUTURE PROJECTED RAINFALL

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
0	0	0	0	0	0	0	0.000	0.000	0.000
6	0	0	0	0	0	0	0.000	0.000	0.000
12	0	0	0	0	0	0	0.000	0.000	0.000
18	0	0	0	0	0	0	0.000	0.000	0.000
24	0	0	0.002988	0	0	0.002844	0.000	0.000	0.000
30	0	0	0.018113	0	0	0.01724	0.000	0.000	-0.001
36	0	0	0.048266	0	0	0.04594	0.000	0.000	-0.002
42	0	0.002519	0.08504	0	0.002398	0.080942	0.000	0.000	-0.004
48	0	0.010551	0.121314	0	0.010042	0.115467	0.000	-0.001	-0.006
54	0	0.022668	0.152981	0	0.021575	0.145609	0.000	-0.001	-0.007
60	0.001043	0.036563	0.181248	0.000993	0.034801	0.172513	0.000	-0.002	-0.009
66	0.004488	0.049934	0.206418	0.004272	0.047528	0.19647	0.000	-0.002	-0.010
72	0.009936	0.062379	0.228807	0.009458	0.059373	0.21778	0.000	-0.003	-0.011
78	0.016391	0.074161	0.249453	0.015601	0.070587	0.237431	-0.001	-0.004	-0.012
84	0.022837	0.085165	0.268009	0.021737	0.08106	0.255093	-0.001	-0.004	-0.013
90	0.029023	0.095503	0.284955	0.027624	0.0909	0.271223	-0.001	-0.005	-0.014
96	0.034949	0.105162	0.300252	0.033265	0.100094	0.285782	-0.002	-0.005	-0.014
102	0.040642	0.114268	0.314342	0.038683	0.108761	0.299193	-0.002	-0.006	-0.015
108	0.046116	0.122872	0.327386	0.043894	0.116951	0.311608	-0.002	-0.006	-0.016
114	0.05148	0.131245	0.340075	0.048999	0.12492	0.323685	-0.002	-0.006	-0.016
120	0.056659	0.139213	0.351977	0.053929	0.132504	0.335014	-0.003	-0.007	-0.017
126	0.061615	0.146679	0.36284	0.058646	0.13961	0.345353	-0.003	-0.007	-0.017
132	0.066516	0.154049	0.37367	0.063311	0.146625	0.355662	-0.003	-0.007	-0.018
138	0.071206	0.160964	0.383594	0.067774	0.153207	0.365107	-0.003	-0.008	-0.018
144	0.075746	0.167587	0.393025	0.072096	0.159511	0.374084	-0.004	-0.008	-0.019
150	0.08008	0.173786	0.401641	0.076221	0.165411	0.382285	-0.004	-0.008	-0.019
156	0.084277	0.179733	0.409859	0.080216	0.171071	0.390107	-0.004	-0.009	-0.020
162	0.088485	0.185728	0.418343	0.08422	0.176777	0.398182	-0.004	-0.009	-0.020
168	0.092575	0.191514	0.426511	0.088114	0.182284	0.405957	-0.004	-0.009	-0.021
174	0.096473	0.196928	0.43399	0.091824	0.187438	0.413075	-0.005	-0.009	-0.021
180	0.100263	0.202159	0.441208	0.095431	0.192416	0.419945	-0.005	-0.010	-0.021
186	0.103862	0.207033	0.447775	0.098857	0.197056	0.426196	-0.005	-0.010	-0.022
192	0.107613	0.21224	0.455186	0.102426	0.202011	0.433249	-0.005	-0.010	-0.022
198	0.11118	0.21711	0.461984	0.105822	0.206647	0.43972	-0.005	-0.010	-0.022
204	0.114661	0.221844	0.468601	0.109135	0.211152	0.446018	-0.006	-0.011	-0.023
210	0.118128	0.226568	0.475603	0.112435	0.215649	0.452735	-0.006	-0.011	-0.023
216	0.121518	0.231173	0.483356	0.115662	0.220032	0.460316	-0.006	-0.011	-0.023
222	0.124729	0.235461	0.49151	0.118718	0.224114	0.468441	-0.006	-0.011	-0.023
228	0.127869	0.239644	0.50011	0.121707	0.228095	0.477084	-0.006	-0.012	-0.023
234	0.13083	0.243516	0.508337	0.124525	0.231781	0.485403	-0.006	-0.012	-0.023
240	0.134019	0.247837	0.517587	0.12756	0.235893	0.4947	-0.006	-0.012	-0.023

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
246	0.137034	0.251859	0.526294	0.13043	0.239721	0.50348	-0.007	-0.012	-0.023
252	0.13999	0.255798	0.534907	0.133244	0.24347	0.512171	-0.007	-0.012	-0.023
258	0.142773	0.259441	0.542979	0.135893	0.246938	0.520345	-0.007	-0.013	-0.023
264	0.145693	0.263352	0.551684	0.138671	0.25066	0.529127	-0.007	-0.013	-0.023
270	0.148562	0.267195	0.560315	0.141402	0.254318	0.537837	-0.007	-0.013	-0.022
276	0.15126	0.27075	0.568407	0.14397	0.257702	0.546034	-0.007	-0.013	-0.022
282	0.153911	0.274242	0.576432	0.146493	0.261026	0.554165	-0.007	-0.013	-0.022
288	0.15639	0.277449	0.583916	0.148854	0.264078	0.561778	-0.008	-0.013	-0.022
294	0.159154	0.281179	0.592559	0.151484	0.267629	0.570505	-0.008	-0.014	-0.022
300	0.161749	0.284629	0.600666	0.153953	0.270912	0.578718	-0.008	-0.014	-0.022
306	0.164304	0.288029	0.608719	0.156386	0.274148	0.586879	-0.008	-0.014	-0.022
312	0.166691	0.29115	0.616233	0.158658	0.277119	0.594521	-0.008	-0.014	-0.022
318	0.169248	0.294584	0.624457	0.161091	0.280387	0.602849	-0.008	-0.014	-0.022
324	0.17177	0.297975	0.632638	0.163492	0.283615	0.611135	-0.008	-0.014	-0.022
330	0.174126	0.301092	0.640277	0.165734	0.286582	0.6189	-0.008	-0.015	-0.021
336	0.176449	0.30417	0.647874	0.167945	0.289511	0.626622	-0.009	-0.015	-0.021
342	0.178604	0.307087	0.654926	0.169997	0.292307	0.633818	-0.009	-0.015	-0.021
348	0.18108	0.310933	0.663225	0.172354	0.296046	0.642221	-0.009	-0.015	-0.021
354	0.18339	0.314924	0.670978	0.174552	0.299993	0.650097	-0.009	-0.015	-0.021
360	0.185672	0.31914	0.678697	0.176724	0.304196	0.657938	-0.009	-0.015	-0.021
366	0.188656	0.324676	0.689037	0.179565	0.309676	0.668325	-0.009	-0.015	-0.021
372	0.193147	0.332837	0.704925	0.183839	0.317665	0.684103	-0.009	-0.015	-0.021
378	0.19859	0.342676	0.724329	0.189019	0.327266	0.703306	-0.010	-0.015	-0.021
384	0.204563	0.353475	0.745708	0.194704	0.337794	0.724444	-0.010	-0.016	-0.021
390	0.210273	0.363866	0.76617	0.200139	0.347945	0.74471	-0.010	-0.016	-0.021
396	0.216081	0.374477	0.787036	0.205667	0.358318	0.765388	-0.010	-0.016	-0.022
402	0.221987	0.385309	0.808306	0.211288	0.368914	0.786476	-0.011	-0.016	-0.022
408	0.227989	0.39636	0.829979	0.217002	0.379732	0.807975	-0.011	-0.017	-0.022
414	0.234087	0.407631	0.852054	0.222806	0.390773	0.829883	-0.011	-0.017	-0.022
420	0.240131	0.418864	0.873993	0.228559	0.401791	0.851676	-0.012	-0.017	-0.022
426	0.246268	0.430314	0.896328	0.234399	0.413028	0.873873	-0.012	-0.017	-0.022
432	0.252347	0.441722	0.918516	0.240186	0.424237	0.895944	-0.012	-0.017	-0.023
438	0.258516	0.453344	0.941096	0.246057	0.435663	0.918412	-0.012	-0.018	-0.023
444	0.264624	0.464918	0.963517	0.251871	0.447054	0.940743	-0.013	-0.018	-0.023
450	0.270819	0.476703	0.986326	0.257767	0.458661	0.963467	-0.013	-0.018	-0.023
456	0.276718	0.488025	1.008123	0.263382	0.469833	0.985217	-0.013	-0.018	-0.023
462	0.282701	0.499555	1.030297	0.269077	0.481215	1.007351	-0.014	-0.018	-0.023
468	0.289089	0.511706	1.053701	0.275172	0.493207	1.0307	-0.014	-0.018	-0.023
474	0.295644	0.523652	1.076628	0.281477	0.505011	1.053596	-0.014	-0.019	-0.023
480	0.302537	0.535531	1.099366	0.288173	0.516762	1.076321	-0.014	-0.019	-0.023
486	0.310024	0.548035	1.123333	0.29548	0.529127	1.100262	-0.015	-0.019	-0.023
492	0.317332	0.560049	1.146246	0.302639	0.541029	1.123182	-0.015	-0.019	-0.023
498	0.324524	0.571843	1.16866	0.309692	0.552728	1.145624	-0.015	-0.019	-0.023

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
504	0.331925	0.583987	1.191735	0.316954	0.564775	1.168726	-0.015	-0.019	-0.023
510	0.339607	0.596608	1.215736	0.32449	0.577293	1.192746	-0.015	-0.019	-0.023
516	0.347009	0.608722	1.238651	0.331765	0.589328	1.215712	-0.015	-0.019	-0.023
522	0.35478	0.621467	1.2628	0.339401	0.601985	1.239898	-0.015	-0.019	-0.023
528	0.362513	0.63413	1.286729	0.347008	0.614572	1.263879	-0.016	-0.020	-0.023
534	0.370119	0.646555	1.310128	0.354498	0.626937	1.287347	-0.016	-0.020	-0.023
540	0.377682	0.658889	1.333294	0.361955	0.639222	1.310595	-0.016	-0.020	-0.023
546	0.388407	0.676704	1.367465	0.372453	0.656839	1.34468	-0.016	-0.020	-0.023
552	0.404877	0.704471	1.421607	0.388476	0.68414	1.398432	-0.016	-0.020	-0.023
558	0.425418	0.739243	1.489687	0.408429	0.718277	1.465941	-0.017	-0.021	-0.024
564	0.448236	0.777872	1.565316	0.430596	0.756202	1.540931	-0.018	-0.022	-0.024
570	0.471078	0.816433	1.640547	0.452818	0.794105	1.615587	-0.018	-0.022	-0.025
576	0.494372	0.855664	1.716856	0.475505	0.832706	1.691364	-0.019	-0.023	-0.025
582	0.517685	0.894817	1.792743	0.498243	0.871275	1.766783	-0.019	-0.024	-0.026
588	0.541448	0.934637	1.869696	0.521447	0.910539	1.84331	-0.020	-0.024	-0.026
594	0.56566	0.975121	1.947704	0.545115	0.950494	1.920932	-0.021	-0.025	-0.027
600	0.589878	1.015506	2.025238	0.568822	0.990397	1.99814	-0.021	-0.025	-0.027
606	0.61454	1.056542	2.103802	0.592989	1.030979	2.076414	-0.022	-0.026	-0.027
612	0.639197	1.09746	2.181866	0.617184	1.071488	2.154246	-0.022	-0.026	-0.028
618	0.66429	1.139019	2.260927	0.641832	1.112666	2.233111	-0.022	-0.026	-0.028
624	0.689815	1.181211	2.340974	0.66693	1.154503	2.312995	-0.023	-0.027	-0.028
630	0.715316	1.223254	2.420453	0.692036	1.196234	2.392362	-0.023	-0.027	-0.028
636	0.752878	1.285737	2.539943	0.728862	1.258024	2.511356	-0.024	-0.028	-0.029
642	0.814164	1.38845	2.738209	0.788737	1.359284	2.708366	-0.025	-0.029	-0.030
648	0.892027	1.519037	2.99051	0.864781	1.487979	2.958999	-0.027	-0.031	-0.032
654	0.978831	1.664366	3.270669	0.949628	1.631294	3.237408	-0.029	-0.033	-0.033
660	1.066698	1.810937	3.551924	1.035663	1.776031	3.517144	-0.031	-0.035	-0.035
666	1.168547	1.980562	3.876778	1.135462	1.943623	3.840332	-0.033	-0.037	-0.036
672	1.297476	2.195235	4.287822	1.261804	2.155722	4.24924	-0.036	-0.040	-0.039
678	1.445175	2.440655	4.756548	1.406674	2.398363	4.715704	-0.039	-0.042	-0.041
684	1.60411	2.703886	5.257292	1.562793	2.658895	5.214338	-0.041	-0.045	-0.043
690	1.765589	2.970108	5.760903	1.721728	2.922789	5.716267	-0.044	-0.047	-0.045
696	2.038685	3.421647	6.618396	1.990145	3.369838	6.570188	-0.049	-0.052	-0.048
702	2.423545	4.057808	7.826417	2.368421	3.999628	7.773056	-0.055	-0.058	-0.053
708	2.925855	4.885306	9.391795	2.86281	4.819624	9.332526	-0.063	-0.066	-0.059
714	3.834138	6.380405	12.21846	3.75695	6.301246	12.14841	-0.077	-0.079	-0.070
720	5.647526	9.354704	17.82119	5.544424	9.251216	17.73197	-0.103	-0.103	-0.089
726	9.316653	15.3377	29.02586	9.168562	15.19318	28.90532	-0.148	-0.145	-0.121
732	11.27752	18.4869	34.82886	11.11605	18.33267	34.70341	-0.161	-0.154	-0.125
738	9.026646	14.75084	27.70126	8.907494	14.63885	27.61186	-0.119	-0.112	-0.089
744	6.173652	10.05443	18.81739	6.099453	9.985968	18.7639	-0.074	-0.068	-0.053
750	3.797862	6.163055	11.49421	3.756798	6.125929	11.46587	-0.041	-0.037	-0.028
756	3.060246	4.958788	9.235504	3.028612	4.930411	9.214029	-0.032	-0.028	-0.021

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
762	2.527525	4.09122	7.612184	2.502255	4.068681	7.595233	-0.025	-0.023	-0.017
768	2.204447	3.5652	6.628247	2.183003	3.546161	6.614	-0.021	-0.019	-0.014
774	1.958381	3.16488	5.880004	1.939789	3.148439	5.867754	-0.019	-0.016	-0.012
780	1.791817	2.893937	5.373673	1.775145	2.879242	5.362762	-0.017	-0.015	-0.011
786	1.624177	2.621763	4.865909	1.609337	2.608721	4.856256	-0.015	-0.013	-0.010
792	1.470336	2.37227	4.400972	1.457121	2.360686	4.392423	-0.013	-0.012	-0.009
798	1.34576	2.170324	4.024773	1.333844	2.159904	4.017102	-0.012	-0.010	-0.008
804	1.240201	1.999308	3.70634	1.229367	1.989854	3.699397	-0.011	-0.009	-0.007
810	1.144153	1.843824	3.417045	1.134279	1.835224	3.410741	-0.010	-0.009	-0.006
816	1.047611	1.687711	3.126862	1.03867	1.679938	3.121174	-0.009	-0.008	-0.006
822	0.964976	1.554136	2.878646	0.956826	1.54706	2.873478	-0.008	-0.007	-0.005
828	0.910783	1.466457	2.715597	0.903164	1.459854	2.710781	-0.008	-0.007	-0.005
834	0.875327	1.409015	2.608668	0.868071	1.402735	2.604094	-0.007	-0.006	-0.005
840	0.849008	1.366326	2.529106	0.842029	1.360294	2.524719	-0.007	-0.006	-0.004
846	0.822969	1.324115	2.450493	0.816261	1.318323	2.446286	-0.007	-0.006	-0.004
852	0.796655	1.281508	2.371183	0.790213	1.275952	2.367154	-0.006	-0.006	-0.004
858	0.77063	1.239389	2.292837	0.764445	1.234062	2.288977	-0.006	-0.005	-0.004
864	0.744335	1.19686	2.213782	0.738405	1.191758	2.210091	-0.006	-0.005	-0.004
870	0.717776	1.153928	2.134034	0.712098	1.149048	2.130507	-0.006	-0.005	-0.004
876	0.691509	1.11149	2.055249	0.686075	1.106826	2.05188	-0.005	-0.005	-0.003
882	0.664976	1.068656	1.975767	0.659785	1.064204	1.972555	-0.005	-0.004	-0.003
888	0.638746	1.026342	1.897254	0.633791	1.022096	1.894194	-0.005	-0.004	-0.003
894	0.612255	0.983625	1.818037	0.607534	0.979583	1.815127	-0.005	-0.004	-0.003
900	0.585513	0.940512	1.738123	0.581023	0.936672	1.73536	-0.004	-0.004	-0.003
906	0.559068	0.897909	1.659193	0.554804	0.894264	1.656574	-0.004	-0.004	-0.003
912	0.536101	0.860906	1.590641	0.532034	0.857432	1.588145	-0.004	-0.003	-0.002
918	0.520907	0.836406	1.545192	0.516975	0.833049	1.542783	-0.004	-0.003	-0.002
924	0.511124	0.820595	1.515815	0.507284	0.81732	1.513467	-0.004	-0.003	-0.002
930	0.503933	0.808945	1.494137	0.500166	0.805734	1.491836	-0.004	-0.003	-0.002
936	0.496282	0.796566	1.471133	0.492588	0.79342	1.46888	-0.004	-0.003	-0.002
942	0.488846	0.78454	1.448778	0.485225	0.781458	1.446572	-0.004	-0.003	-0.002
948	0.481516	0.772683	1.426756	0.477965	0.769663	1.424596	-0.004	-0.003	-0.002
954	0.473726	0.7601	1.403391	0.470248	0.757143	1.401277	-0.003	-0.003	-0.002
960	0.466385	0.748234	1.381366	0.462976	0.745338	1.379297	-0.003	-0.003	-0.002
966	0.45926	0.736724	1.359993	0.455917	0.733886	1.357966	-0.003	-0.003	-0.002
972	0.451902	0.724845	1.337938	0.448626	0.722065	1.335955	-0.003	-0.003	-0.002
978	0.444201	0.712415	1.314875	0.440994	0.709696	1.312937	-0.003	-0.003	-0.002
984	0.436944	0.700711	1.293162	0.433803	0.698048	1.291265	-0.003	-0.003	-0.002
990	0.429225	0.688275	1.270088	0.426151	0.685671	1.268234	-0.003	-0.003	-0.002
996	0.421615	0.676005	1.24735	0.418607	0.673459	1.245538	-0.003	-0.003	-0.002
1002	0.414227	0.664093	1.225286	0.411283	0.661602	1.223515	-0.003	-0.002	-0.002
1008	0.406948	0.652357	1.203556	0.404066	0.64992	1.201824	-0.003	-0.002	-0.002
1014	0.399549	0.640437	1.181484	0.39673	0.638054	1.179791	-0.003	-0.002	-0.002

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
1020	0.392032	0.628334	1.159048	0.389276	0.626005	1.157395	-0.003	-0.002	-0.002
1026	0.384393	0.616039	1.13629	0.3817	0.613765	1.134677	-0.003	-0.002	-0.002
1032	0.376863	0.603924	1.113877	0.374232	0.601703	1.112301	-0.003	-0.002	-0.002
1038	0.369216	0.59162	1.091115	0.366647	0.589453	1.089578	-0.003	-0.002	-0.002
1044	0.361681	0.579492	1.068678	0.359173	0.577377	1.067178	-0.003	-0.002	-0.002
1050	0.354024	0.56718	1.045897	0.351577	0.565117	1.044435	-0.002	-0.002	-0.001
1056	0.346474	0.55505	1.023447	0.344086	0.553038	1.022023	-0.002	-0.002	-0.001
1062	0.338808	0.542733	1.000673	0.33648	0.540772	0.999285	-0.002	-0.002	-0.001
1068	0.331589	0.531135	0.979234	0.329318	0.529222	0.977881	-0.002	-0.002	-0.001
1074	0.324256	0.519348	0.957461	0.322041	0.517484	0.956143	-0.002	-0.002	-0.001
1080	0.316804	0.507376	0.935348	0.314646	0.50556	0.934064	-0.002	-0.002	-0.001
1086	0.309238	0.495219	0.912879	0.307137	0.493453	0.911631	-0.002	-0.002	-0.001
1092	0.302577	0.484525	0.893102	0.300528	0.482802	0.891886	-0.002	-0.002	-0.001
1098	0.298417	0.477836	0.880715	0.296401	0.476142	0.879519	-0.002	-0.002	-0.001
1104	0.295842	0.473684	0.873029	0.293848	0.472009	0.871847	-0.002	-0.002	-0.001
1110	0.293836	0.470449	0.867019	0.291861	0.46879	0.865849	-0.002	-0.002	-0.001
1116	0.291826	0.467199	0.861007	0.28987	0.465557	0.859849	-0.002	-0.002	-0.001
1122	0.290051	0.464322	0.855668	0.288111	0.462694	0.854521	-0.002	-0.002	-0.001
1128	0.288273	0.461448	0.85032	0.286351	0.459836	0.849183	-0.002	-0.002	-0.001
1134	0.286725	0.458936	0.845657	0.284818	0.457337	0.844529	-0.002	-0.002	-0.001
1140	0.284603	0.455516	0.839297	0.282714	0.453933	0.838182	-0.002	-0.002	-0.001
1146	0.282705	0.452456	0.833624	0.280834	0.450888	0.83252	-0.002	-0.002	-0.001
1152	0.280803	0.449394	0.827936	0.278948	0.44784	0.826843	-0.002	-0.002	-0.001
1158	0.279131	0.44669	0.822936	0.277292	0.44515	0.821853	-0.002	-0.002	-0.001
1164	0.277121	0.443439	0.816927	0.275299	0.441915	0.815854	-0.002	-0.002	-0.001
1170	0.27511	0.440194	0.810907	0.273306	0.438685	0.809846	-0.002	-0.002	-0.001
1176	0.27332	0.437309	0.805545	0.271532	0.435814	0.804494	-0.002	-0.001	-0.001
1182	0.27153	0.434427	0.800187	0.269758	0.432945	0.799146	-0.002	-0.001	-0.001
1188	0.269976	0.431911	0.795518	0.268218	0.430441	0.794485	-0.002	-0.001	-0.001
1194	0.267845	0.42848	0.789176	0.266105	0.427026	0.788155	-0.002	-0.001	-0.001
1200	0.265934	0.425407	0.783478	0.26421	0.423967	0.782467	-0.002	-0.001	-0.001
1206	0.264027	0.422339	0.77778	0.26232	0.420913	0.776779	-0.002	-0.001	-0.001
1212	0.26235	0.419629	0.772764	0.260657	0.418216	0.771773	-0.002	-0.001	-0.001
1218	0.260333	0.416382	0.766746	0.258657	0.414983	0.765766	-0.002	-0.001	-0.001
1224	0.25831	0.41312	0.76073	0.256651	0.411736	0.759759	-0.002	-0.001	-0.001
1230	0.256515	0.410238	0.755373	0.254871	0.408867	0.754412	-0.002	-0.001	-0.001
1236	0.254721	0.407348	0.750021	0.253092	0.405989	0.749069	-0.002	-0.001	-0.001
1242	0.253155	0.404819	0.74534	0.251539	0.403472	0.744396	-0.002	-0.001	-0.001
1248	0.251018	0.401372	0.738974	0.24942	0.40004	0.73804	-0.002	-0.001	-0.001
1254	0.249105	0.398293	0.733278	0.247522	0.396974	0.732354	-0.002	-0.001	-0.001
1260	0.247187	0.395221	0.727583	0.245619	0.393915	0.726669	-0.002	-0.001	-0.001
1266	0.245161	0.391961	0.721549	0.24361	0.390669	0.720645	-0.002	-0.001	-0.001
1272	0.243132	0.388703	0.715524	0.241596	0.387425	0.71463	-0.002	-0.001	-0.001

Time (Min)	Existing Conditions			Proposed Conditions			Difference		
	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)	2-Year (CFS)	10-Year (CFS)	100-Year (CFS)
1278	0.241331	0.385802	0.710159	0.23981	0.384536	0.709274	-0.002	-0.001	-0.001
1284	0.239533	0.382902	0.704808	0.238027	0.381649	0.703932	-0.002	-0.001	-0.001
1290	0.237964	0.380377	0.700135	0.23647	0.379135	0.699266	-0.001	-0.001	-0.001
1296	0.235813	0.376932	0.693753	0.234336	0.375704	0.692895	-0.001	-0.001	-0.001
1302	0.233898	0.373851	0.688059	0.232436	0.372635	0.68721	-0.001	-0.001	-0.001
1308	0.231979	0.370764	0.68237	0.230532	0.369561	0.681531	-0.001	-0.001	-0.001
1314	0.230289	0.368048	0.677348	0.228856	0.366856	0.676516	-0.001	-0.001	-0.001
1320	0.228596	0.365334	0.672322	0.227175	0.364154	0.671498	-0.001	-0.001	-0.001
1326	0.226563	0.362064	0.66628	0.225157	0.360897	0.665465	-0.001	-0.001	-0.001
1332	0.224533	0.358801	0.660234	0.223143	0.357647	0.659429	-0.001	-0.001	-0.001
1338	0.222723	0.355891	0.654881	0.221347	0.354748	0.654084	-0.001	-0.001	-0.001
1344	0.220569	0.35243	0.648497	0.219208	0.351301	0.647709	-0.001	-0.001	-0.001
1350	0.218648	0.349354	0.642804	0.217302	0.348236	0.642025	-0.001	-0.001	-0.001
1356	0.216725	0.346276	0.637114	0.215393	0.345171	0.636343	-0.001	-0.001	-0.001
1362	0.215034	0.343554	0.632089	0.213714	0.34246	0.631326	-0.001	-0.001	-0.001
1368	0.213335	0.340831	0.627067	0.212028	0.339747	0.626312	-0.001	-0.001	-0.001
1374	0.211638	0.338102	0.622025	0.210344	0.337029	0.621278	-0.001	-0.001	-0.001
1380	0.209596	0.334828	0.615988	0.208317	0.333768	0.61525	-0.001	-0.001	-0.001
1386	0.207558	0.33156	0.609953	0.206293	0.330512	0.609223	-0.001	-0.001	-0.001
1392	0.205752	0.328652	0.604577	0.2045	0.327616	0.603855	-0.001	-0.001	-0.001
1398	0.203595	0.325195	0.59819	0.202359	0.324171	0.597478	-0.001	-0.001	-0.001
1404	0.201662	0.322104	0.592505	0.20044	0.321091	0.591801	-0.001	-0.001	-0.001
1410	0.199729	0.319014	0.586805	0.19852	0.318014	0.586109	-0.001	-0.001	-0.001
1416	0.198026	0.316278	0.581763	0.19683	0.315288	0.581075	-0.001	-0.001	-0.001
1422	0.196335	0.313552	0.576741	0.19515	0.312572	0.576059	-0.001	-0.001	-0.001
1428	0.194289	0.31028	0.570691	0.193119	0.309311	0.570018	-0.001	-0.001	-0.001
1434	0.192246	0.307004	0.564646	0.19109	0.306047	0.563981	-0.001	-0.001	-0.001
1440	0.190771	0.304642	0.560275	0.189626	0.303695	0.559616	-0.001	-0.001	-0.001
1446	0.151843	0.242482	0.445937	0.150933	0.241729	0.445414	-0.001	-0.001	-0.001
1452	0.075809	0.121061	0.222634	0.075354	0.120686	0.222373	0.000	0.000	0.000
1458	0.025193	0.040234	0.073988	0.025042	0.040109	0.073901	0.000	0.000	0.000

APPENDIX



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.

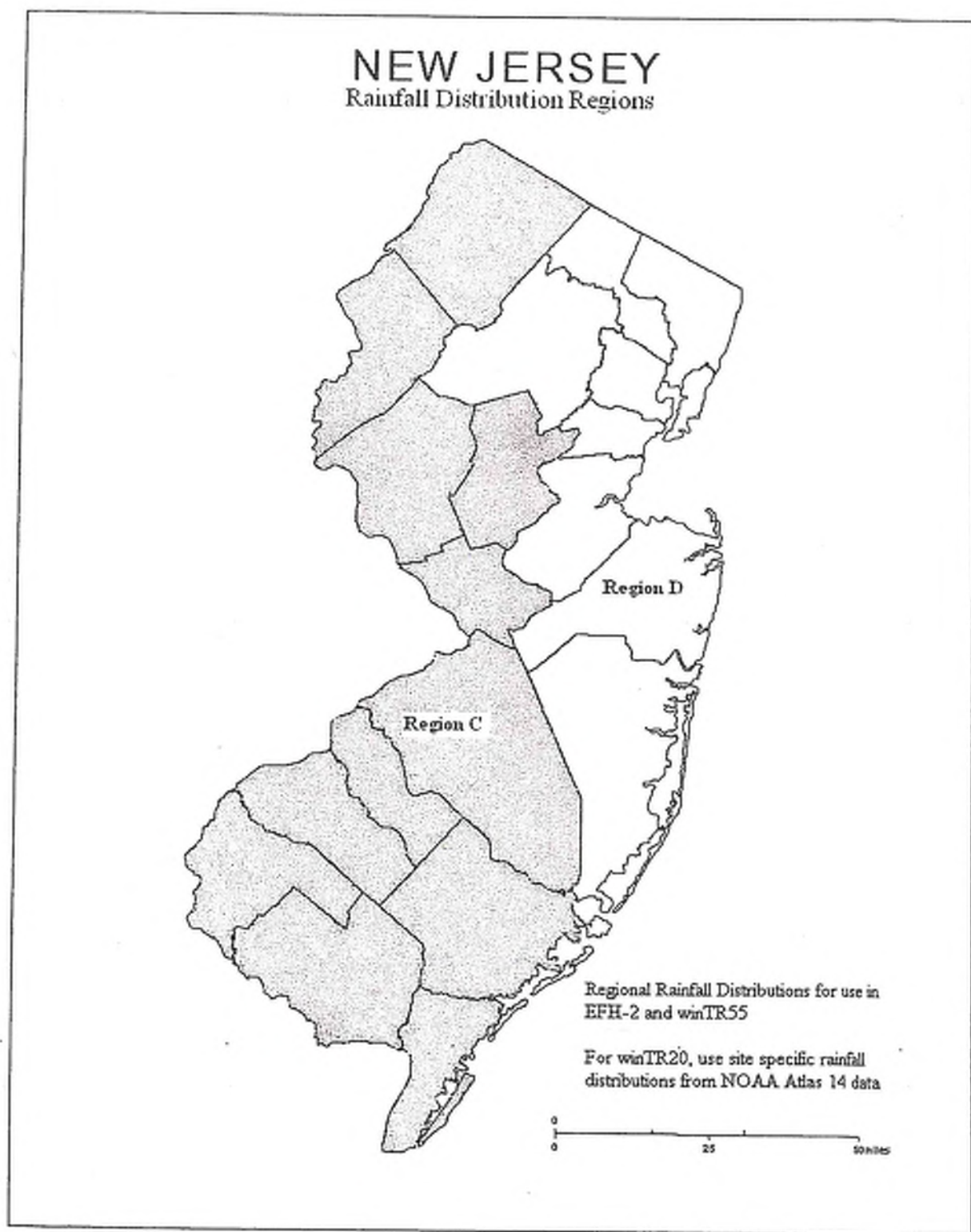


Table 2-2a Runoff curve numbers for urban areas ^{1/}

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 2-2c 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.

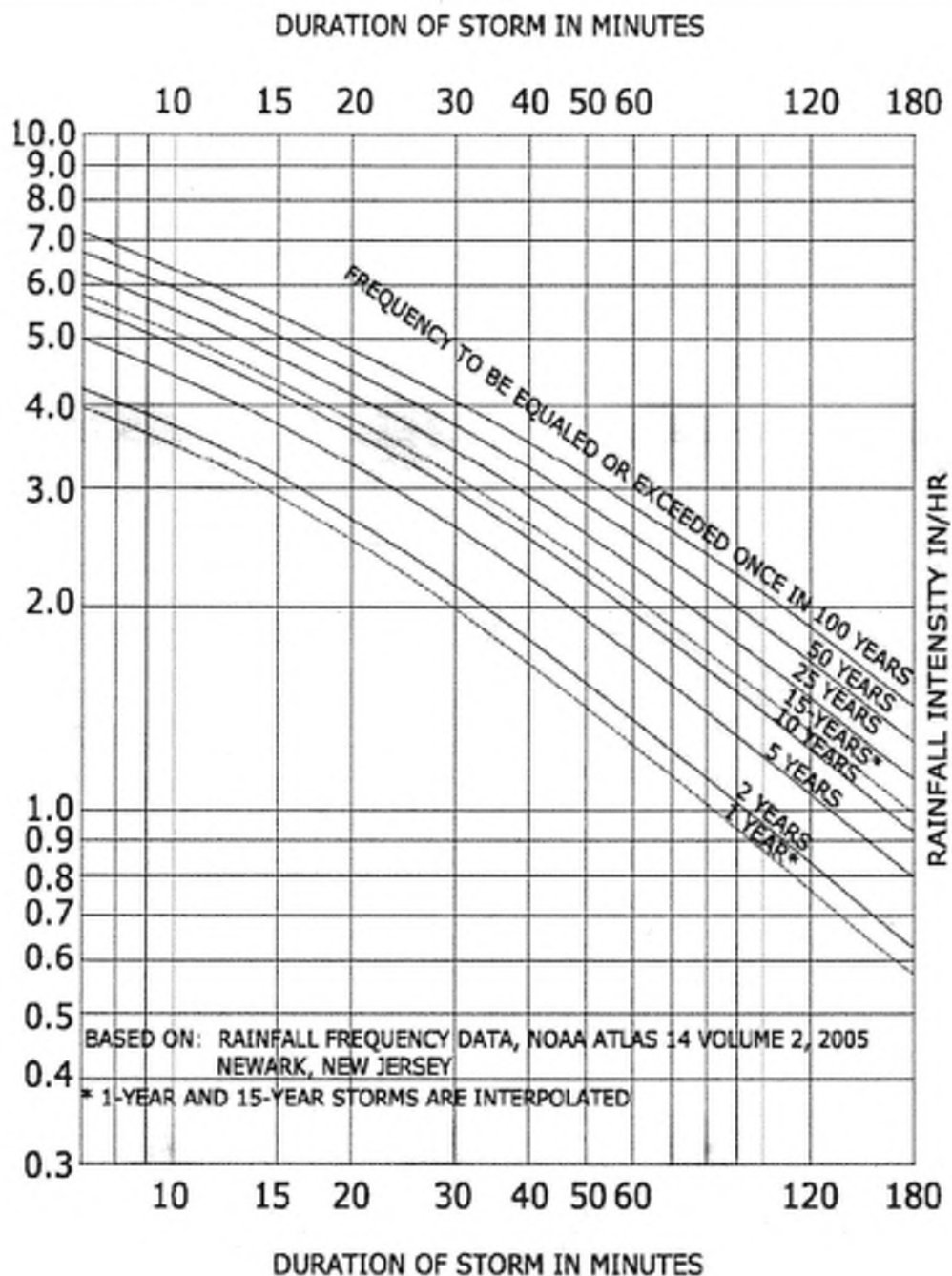
Good: Woods are protected from grazing, and litter and brush adequately cover the soil.

Table 10-4
Recommended Coefficient of Runoff Values
for Various Selected Land Uses

Land Use	Description	Hydrologic Soils Group			
		A	B	C	D
Cultivated Land	without conservation treatment	0.49	0.67	0.81	0.88
	with conservation treatment	0.27	0.43	0.67	0.67
Pasture or Range Land Meadow	poor condition	0.38	0.63	0.78	0.84
	good condition	---	0.25	0.51	0.65
	good condition	---	---	0.41	0.61
Wood or Forest Land	thin stand, poor cover, no mulch	---	0.34	0.59	0.70
	good cover	---	---	0.45	0.59
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries					
	Good Condition	---	0.25	0.51	0.65
	Fair Condition	---	0.45	0.63	0.74
Commercial and Business Area	85% impervious	0.84	0.90	0.93	0.96
Industrial Districts	72% impervious	0.67	0.81	0.88	0.92
Residential	average % impervious				
Average Lot Size (acres)					
1/8	65	0.59	0.76	0.86	0.90
1/4	38	0.29	0.55	0.70	0.80
1/3	30	---	0.49	0.67	0.78
1/2	25	---	0.45	0.65	0.76
1	20	---	0.41	0.63	0.74
Paved Areas	parking lots, roofs, driveways, etc.	0.99	0.99	0.99	0.99
Streets and Roads	paved with curbs & storm	0.99	0.99	0.99	0.99
	sewers	0.57	0.76	0.84	0.88
	gravel	0.49	0.69	0.80	0.84
	dirt				

NOTE: Values are based on NRCS (formerly SCS) definitions and are average values.
Source: Technical Manual for Land Use Regulation Program, Bureau of Inland and Coastal
Regulations, NJDEP Flood Hazard Area Permits, New Jersey Department of
Environmental Protection

**FIGURE 10-B:
RAINFALL INTENSITY-DURATION FREQUENCY CURVE -
NORTHERN REGION**





Time of Concentration Calculations

Project #: 24-170

Project: The Estate

County: Essex

Pre-Development ☒

Post-Development ☐

Drainage Area: DA-1 (Current Adjusted)

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Grass, Dense Grasses	Grass, Dense Grasses		
Manning's Roughness Coeff., n (Table 3-1)	0.24	0.24	-	
Flow Length, L (total ≤ 100 ft)	20	80		
Two-Year 24-Hour Rainfall, P_2	3.47	3.47	3.47	
Land Slope, s (ft/ft)	0.025	0.05		
T_t	3.46	7.95	-	11.40

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	paved	paved	
Flow Length, L	70	340	120	
Watercourse Slope, s (ft/ft)	0.05	0.05	0.025	
Average Velocity	3.6	4.6	3.2	
T_t	0.33	1.25	0.62	2.20

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
				13.60



Time of Concentration Calculations

Project #: 24-170

Project: The Estate

County: Essex

Pre-Development ☒

Post-Development ☐

Drainage Area: DA-1 Future Projected)

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Grass, Dense Grasses	Grass, Dense Grasses		
Manning's Roughness Coeff., n (Table 3-1)	0.24	0.24	-	
Flow Length, L (total ≤ 100 ft)	20	80		
Two-Year 24-Hour Rainfall, P_2	4.09	4.09	4.09	
Land Slope, s (ft/ft)	0.025	0.05		
T_t	3.19	7.32	-	10.50

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	paved	paved	
Flow Length, L	70	340	120	
Watercourse Slope, s (ft/ft)	0.05	0.05	0.025	
Average Velocity	3.6	4.6	3.2	
T_t	0.33	1.25	0.62	2.20

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
				12.70



Time of Concentration Calculations

Project #: 24-170

Project: The Estate

County: Essex

Pre-Development ☐

Post-Development ☒

Drainage Area: DA-1 (Current Adjusted)

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Grass, Dense Grasses	Grass, Dense Grasses		
Manning's Roughness Coeff., n (Table 3-1)	0.24	0.24	-	
Flow Length, L (total ≤ 100 ft)	20	80		
Two-Year 24-Hour Rainfall, P_2	3.47	3.47	3.47	
Land Slope, s (ft/ft)	0.025	0.05		
T_t	3.46	7.95	-	11.40

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	paved		
Flow Length, L	70	159		
Watercourse Slope, s (ft/ft)	0.05	0.05		
Average Velocity	3.6	4.6	-	
T_t	0.33	0.58	-	0.91

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a	4.909	4.909		
Wetted Perimeter, P_w	7.854	7.854		
Hydraulic Radius, r	0.63	0.63	-	
Channel Slope, s	0.01	0.035		
Manning's Roughness Description	HDPE Pipe	HDPE Pipe		
Manning's Roughness	0.01	0.01	-	
Velocity	10.89	20.38	-	
Flow Length	24	310		
T_t	0.04	0.25	-	0.29
				12.60



Time of Concentration Calculations

Project #: 24-170

Pre-Development ☐

Project: The Estate

Post-Development ☒

County: Essex

Drainage Area: DA-1 (Future Projected)

Sheet Flow

	Segment 1	Segment 2	Segment 3	
Surface Description (Table 3-1)	Grass, Dense Grasses	Grass, Dense Grasses		
Manning's Roughness Coeff., n (Table 3-1)	0.24	0.24	-	
Flow Length, L (total ≤ 100 ft)	20	80		
Two-Year 24-Hour Rainfall, P_2	4.09	4.09	4.09	
Land Slope, s (ft/ft)	0.025	0.05		
T_t	3.19	7.32	-	10.50

Shallow Concentrated Flow

	Segment 1	Segment 2	Segment 3	
Surface Description	Unpaved	paved		
Flow Length, L	70	159		
Watercourse Slope, s (ft/ft)	0.05	0.05		
Average Velocity	3.6	4.6	-	
T_t	0.33	0.58	-	0.91

Channel Flow

	Segment 1	Segment 2	Segment 3	
Cross Sectional Flow Area, a	4.909	4.909		
Wetted Perimeter, P_w	7.854	7.854		
Hydraulic Radius, r	0.63	0.63	-	
Channel Slope, s	0.01	0.035		
Manning's Roughness Description	HDPE Pipe	HDPE Pipe		
Manning's Roughness	0.01	0.01	-	
Velocity	10.89	20.38	-	
Flow Length	24	310		
T_t	0.04	0.25	-	0.29
				11.70

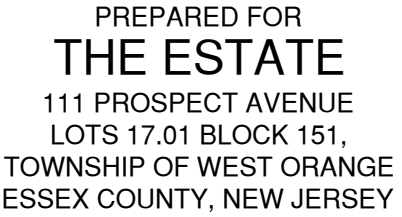
STORM SEWER COMPUTATIONS
RATIONAL METHOD - (Q=CIA)
25 YR. STORM

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 (cfs) (Cumulative)	Pipe/Box Length (FT.)	Slope (%)	Pipe/Box Size (IN.)	Capacity (FULL) (cfs)	Velocity (Design) (fps)	Pipe Travel Time(min)
Type "B" #5-2	Type "B" #5-1	0.08	0.99	0.08	6.0	5.80	0.46	0.46	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #5-1	Type "B" #4-1	0.05	0.99	0.05	6.0	5.80	0.29	0.75	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #4-3	Type "B" #4-2	0.22	0.99	0.22	6.0	5.80	1.26	1.26	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #4-2	Type "B" #4-1	0.34	0.99	0.34	6.0	5.80	1.95	3.22	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #4-1	MH #1-3	0.15	0.99	0.15	6.0	5.80	0.86	4.82	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #3-2	Type "B" #3-1	0.03	0.99	0.03	6.0	5.80	0.17	0.17	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #3-1	Type "B" #2-2	0.03	0.99	0.03	6.0	5.80	0.17	0.34	165	1.0%	15" HDPE	8.42	6.86	0.40
Courtyard	Type "B" #2-3	0.42	0.99	0.42	6.0	5.80	2.41	2.41	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #2-3	Type "B" #2-2	0.02	0.99	0.02	6.0	5.80	0.11	2.53	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #2-2	Type "B" #2-1	0.02	0.99	0.02	6.0	5.80	0.11	2.99	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #2-1	Type "B" #1-4	0.18	0.99	0.18	6.0	5.80	1.03	4.02	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #1-6	Type "B" #1-5	0.32	0.99	0.32	6.0	5.80	1.84	1.84	165	1.0%	15" HDPE	8.42	6.86	0.40
Walkways	Type "B" #1-5	0.02	0.99	0.02	6.0	5.80	0.11	1.95	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #1-5	Type "B" #1-4	0.13	0.99	0.13	6.0	5.80	0.75	2.70	165	1.0%	15" HDPE	8.42	6.86	0.40
Type "B" #1-4	MH #1-3	0.34	0.99	0.34	6.0	5.80	1.95	8.67	165	1.5%	15" HDPE	10.31	8.40	0.33
MH #1-3	Type "B" #1-2				6.0	5.80	0.00	13.49	165	3.5%	15" HDPE	15.75	12.84	0.21
Type "B" #1-2	Type "B" #1-1	0.13	0.99	0.13	6.0	5.80	0.75	14.24	165	3.5%	15" HDPE	15.75	12.84	0.21
Type "B" #1-1	Ex. Type Double "B" Inlet	0.20	0.99	0.20	6.0	5.80	1.15	15.39	165	3.5%	15" HDPE	15.75	12.84	0.21



1. BOUNDARY INFORMATION TAKEN FROM A CERTAIN MAP ENTITLED "BOUNDARY SURVEY PREPARED FOR BOW AND ARROW MANOR, INCORPORATED, NO. 111 PROSPECT AVENUE, LOTS 17.01 BLOCK 151, LOTS 5 & 6 BLOCK 151.03, TOWNSHIP OF WEST RANGE, ESSEX COUNTY, NEW JERSEY" PREPARED BY ZDRAVKO LUGIN, L.S. DATED 2/29/2012.
2. TOPOGRAPHIC INFORMATION TAKEN FROM A CERTAIN MAP ENTITLED "TOPOGRAPHIC MAPPING 111 PROSPECT AVE, WEST RANGE, NJ, FLIGHT DATE & SCALE: 04/13/2023 & 9.0CM GSD, DATUM: NAD83 NJ - NAVD88" PREPARED BY ROBINSON, ONE EDGEVIEW DRIVE, HACKETTSTOWN, NJ, 07840, CERTIFICATE OF AUTHORIZATION NO.24624800600 AND DATED 06/06/2023.

FIG.-1





1. BOUNDARY INFORMATION TAKEN FROM A CERTAIN MAP ENTITLED "BOUNDARY SURVEY PREPARED FOR BOW AND ARROW MANOR, INCORPORATED, NO. 111 PROSPECT AVENUE, LOTS 17.01 BLOCK 151, LOTS 5 & 6 BLOCK 151.03, TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NEW JERSEY" PREPARED BY ZDRAVOK LUCIN, L.S. DATED 2/29/2012.
2. TOPOGRAPHIC INFORMATION TAKEN FROM A CERTAIN MAP ENTITLED "TOPOGRAPHIC MAPPING 111 PROSPECT AVE, WEST ORANGE, NJ - FLIGHT DATE & SCALE: 04/13/2023 & 90CM GSD, DATUM: NAD83 NJ - NAVD88" PREPARED BY ROBINSON, ONE EDGEVIEW DRIVE, HACKETTSTOWN, NJ, 07840, CERTIFICATE OF AUTHORIZATION NO.246GA2800600 AND DATED 06/06/2023.



