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Lions Trans INC.
4005 N CR 1000 E
Brownsburg, Indiana 46112

Drainage Narrative and Calculations

December 19, 2025

Revision 1

Moench Engineering, P.C.
4000 Clarks Creek Road
Plainfield, Indiana 46168

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Drainage Narrative

1.0 Project Scope

The proposed project involves the development of a truck maintenance facility that will include 42 stalls for truck and trailer parking, a 900 square foot office building (30 ft × 30 ft), and a 2,860 square foot maintenance building (130 ft × 22 ft) located along the southern boundary of the property. In addition, a detention pond will be constructed to manage and control stormwater runoff generated by the site improvements. The project scope will also include off site drainage improvements along County Road 400 North to accommodate discharge from our property.

The project site is located at 4005 N CR 1000 E, Brownsburg, Indiana 46112. The parcel is not currently subject to zoning restrictions. The proposed development will result in approximately 2 acres of land disturbance. Stormwater from the site will discharge to the existing offsite storm sewer network located along CR 400 N, which ultimately conveys flow to Bullard Creek west of the site.

All stormwater management facilities for the proposed development were designed in accordance with the Town of Brownsburg Stormwater Standards and the Brownsburg Stormwater Management Ordinance. The standards were used to establish allowable post-development release rates, minimum storm durations, detention storage requirements, outlet structure sizing, and downstream conveyance criteria.

2.0 Rainfall Information

Table 1. Rainfall Intensities (Hendricks County 2016)

Rainfall Intensities for Various Return Periods and Storm Durations						
Duration	*Intensity (Inches/Hour)*					
	Return Period (Years)					
	2	5	10	25	50	100
5 min	5.57	6.7	7.58	8.76	9.68	10.6
10 min	4.35	5.2	5.85	6.7	7.34	7.98
15 min	3.54	4.26	4.8	5.52	6.06	6.61
30 min	2.37	2.92	3.33	3.89	4.33	4.77
1 hr	1.46	1.83	2.12	2.53	2.85	3.19
2 hr	0.851	1.08	1.25	1.51	1.72	1.95
3 hr	0.603	0.762	0.893	1.08	1.24	1.41
6 hr	0.359	0.455	0.535	0.65	0.747	0.853
12 hr	0.211	0.263	0.306	0.368	0.418	0.473
24 hr	0.126	0.155	0.178	0.21	0.236	0.262

Table 2. Rainfall Depths (NOAA Atlas 14)

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.386 (0.348-0.428)	0.460 (0.415-0.509)	0.551 (0.497-0.611)	0.623 (0.559-0.689)	0.717 (0.640-0.794)	0.792 (0.700-0.879)	0.865 (0.758-0.961)	0.941 (0.817-1.05)	1.04 (0.892-1.18)	1.12 (0.945-1.27)
10-min	0.600 (0.541-0.666)	0.718 (0.647-0.795)	0.857 (0.773-0.950)	0.962 (0.863-1.06)	1.10 (0.978-1.22)	1.20 (1.06-1.33)	1.30 (1.14-1.45)	1.40 (1.22-1.57)	1.54 (1.31-1.73)	1.63 (1.38-1.85)
15-min	0.735 (0.664-0.816)	0.878 (0.792-0.972)	1.05 (0.949-1.17)	1.18 (1.06-1.31)	1.36 (1.21-1.50)	1.49 (1.31-1.65)	1.62 (1.42-1.80)	1.75 (1.52-1.95)	1.92 (1.64-2.16)	2.04 (1.72-2.31)
30-min	0.973 (0.878-1.08)	1.17 (1.06-1.30)	1.44 (1.30-1.60)	1.64 (1.48-1.82)	1.91 (1.71-2.12)	2.12 (1.88-2.36)	2.34 (2.05-2.60)	2.55 (2.21-2.85)	2.84 (2.42-3.20)	3.06 (2.58-3.47)
60-min	1.19 (1.07-1.32)	1.44 (1.30-1.60)	1.81 (1.63-2.00)	2.09 (1.88-2.31)	2.48 (2.21-2.75)	2.80 (2.48-3.11)	3.12 (2.74-3.47)	3.46 (3.00-3.86)	3.93 (3.35-4.42)	4.30 (3.62-4.87)
2-hr	1.39 (1.26-1.55)	1.69 (1.52-1.88)	2.12 (1.91-2.36)	2.48 (2.22-2.75)	2.97 (2.64-3.30)	3.38 (2.98-3.75)	3.82 (3.32-4.24)	4.28 (3.66-4.76)	4.92 (4.13-5.52)	5.45 (4.50-6.16)
3-hr	1.48 (1.34-1.65)	1.79 (1.62-1.99)	2.26 (2.04-2.51)	2.64 (2.37-2.93)	3.19 (2.83-3.53)	3.64 (3.20-4.04)	4.13 (3.59-4.58)	4.64 (3.98-5.18)	5.39 (4.51-6.06)	6.00 (4.93-6.79)
6-hr	1.76 (1.59-1.95)	2.13 (1.93-2.36)	2.69 (2.43-2.99)	3.15 (2.83-3.49)	3.82 (3.39-4.22)	4.38 (3.84-4.84)	4.98 (4.31-5.52)	5.63 (4.79-6.25)	6.57 (5.46-7.35)	7.35 (5.97-8.28)
12-hr	2.08 (1.89-2.30)	2.51 (2.28-2.78)	3.12 (2.84-3.45)	3.63 (3.28-4.01)	4.34 (3.88-4.79)	4.93 (4.36-5.43)	5.55 (4.86-6.12)	6.20 (5.36-6.88)	7.13 (6.03-7.97)	7.88 (6.54-8.87)
24-hr	2.48 (2.30-2.68)	2.97 (2.76-3.21)	3.65 (3.39-3.95)	4.19 (3.88-4.52)	4.92 (4.54-5.31)	5.51 (5.06-5.94)	6.11 (5.59-6.59)	6.72 (6.12-7.26)	7.57 (6.82-8.20)	8.24 (7.37-8.94)
2-day	2.89 (2.69-3.10)	3.46 (3.22-3.72)	4.22 (3.93-4.54)	4.82 (4.48-5.18)	5.63 (5.21-6.04)	6.27 (5.78-6.74)	6.92 (6.36-7.44)	7.59 (6.93-8.17)	8.50 (7.70-9.18)	9.20 (8.27-9.97)
3-day	3.08 (2.89-3.30)	3.68 (3.45-3.94)	4.48 (4.19-4.79)	5.09 (4.76-5.44)	5.93 (5.53-6.34)	6.59 (6.12-7.04)	7.26 (6.72-7.76)	7.94 (7.32-8.50)	8.87 (8.11-9.51)	9.59 (8.72-10.3)
4-day	3.28 (3.09-3.49)	3.91 (3.69-4.17)	4.73 (4.46-5.04)	5.36 (5.04-5.71)	6.23 (5.84-6.63)	6.91 (6.46-7.35)	7.60 (7.09-8.08)	8.30 (7.70-8.83)	9.24 (8.53-9.84)	9.97 (9.17-10.6)
7-day	3.88 (3.64-4.13)	4.61 (4.33-4.91)	5.53 (5.19-5.88)	6.26 (5.87-6.65)	7.25 (6.78-7.70)	8.03 (7.49-8.52)	8.82 (8.21-9.36)	9.62 (8.92-10.2)	10.7 (9.88-11.4)	11.5 (10.6-12.3)
10-day	4.42 (4.16-4.70)	5.24 (4.94-5.58)	6.25 (5.89-6.66)	7.06 (6.64-7.52)	8.15 (7.65-8.67)	9.00 (8.43-9.58)	9.87 (9.22-10.5)	10.7 (10.0-11.4)	11.9 (11.0-12.7)	12.8 (11.8-13.7)
20-day	6.02 (5.70-6.40)	7.12 (6.73-7.56)	8.39 (7.92-8.90)	9.38 (8.84-9.94)	10.7 (10.1-11.3)	11.7 (11.0-12.4)	12.7 (11.9-13.5)	13.7 (12.8-14.5)	15.0 (14.0-16.0)	16.0 (14.8-17.1)
30-day	7.43 (7.03-7.86)	8.75 (8.28-9.26)	10.2 (9.62-10.8)	11.3 (10.6-11.9)	12.7 (12.0-13.4)	13.8 (13.0-14.6)	14.9 (13.9-15.7)	15.9 (14.9-16.8)	17.3 (16.1-18.3)	18.3 (17.0-19.4)
45-day	9.40 (8.92-9.91)	11.0 (10.5-11.6)	12.7 (12.0-13.4)	14.0 (13.2-14.7)	15.6 (14.7-16.4)	16.8 (15.9-17.7)	18.0 (17.0-19.0)	19.1 (18.0-20.2)	20.6 (19.3-21.7)	21.6 (20.2-22.8)
60-day	11.3 (10.7-11.9)	13.2 (12.5-13.9)	15.1 (14.3-15.9)	16.5 (15.7-17.4)	18.4 (17.4-19.3)	19.8 (18.7-20.8)	21.1 (19.9-22.2)	22.3 (21.0-23.5)	23.9 (22.4-25.2)	25.0 (23.5-26.4)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Rainfall intensity and depth data used in the hydrologic analyses were obtained from Chapter 2 of the *Hendricks County Stormwater Technical Standards Manual* (2016). These values form the basis for both Rational Method peak runoff calculations and hydrograph development for the project's watershed, ensuring consistency with county stormwater design requirements.

However, per the Brownsburg Stormwater Management Ordinance (2024), storage volumes for detention ponds shall be calculated based on NRCS TR-55 time of concentration and curve number calculation methodologies.

3.0 Existing Conditions

The project site is currently an undeveloped grassy area with scattered overgrowth. Land use surrounding the parcel includes residential properties to the south, warehouse and manufactured homes to the west, minor commercial development to the north beyond the highway, and railroad tracks to the east.

The existing watershed area encompasses 3.02 acres, consisting entirely of pervious cover. Under current conditions, stormwater runoff generally drains to the east and south.

Runoff Curve Numbers (CN) were assigned based on existing land cover conditions in accordance with the Hendricks County Stormwater Technical Standards Manual (2016) and the Brownsburg Stormwater Management Ordinance (2024). A CN value of 84 was used for areas classified as fair-condition grass on Hydrologic Soil Group D soils. For the existing conditions analysis, the critical storm event was identified as the 2-hour storm. Using the Huff First Quartile distribution for the 2-hour duration, the time of concentration (Tc) for the site was calculated to be 47.0 minutes. The corresponding peak flow rates for the existing conditions are summarized below:

Table 3. Existing Conditions

Return Period	2-year	10-year	25-year	100-year
Runoff	1.172 cfs	2.497 cfs	3.430 cfs	5.175 cfs

4.0 Proposed Conditions

As outlined in the project scope, the proposed development consists of a truck maintenance facility including 42 stalls for truck and trailer parking, a 900 square foot office building (30 ft × 30 ft), and a 2,860 square foot maintenance building (130 ft × 22 ft).

Under proposed conditions, the total site area remains 3.02 acres, consisting of approximately 1.02 acres of pervious surface, 1.91 acres of impervious asphalt pavement, and 0.09 acres of roof area.

For the proposed conditions analysis, the critical storm event was identified as the 30-minute storm. Using the Huff First Quartile distribution for the 30-minute duration, the time of concentration (tc) was calculated to be 9.2 minutes. Curve Numbers (CN) were assigned based on land cover characteristics consistent with the Hendricks County Stormwater Technical Standards Manual (2016) and the Brownsburg Stormwater Management Ordinance (2024). Values applied include CN= 84 for land classified as fair condition grass cover hydrologic soil group D, CN = 98 for asphalt pavement and roof areas. The weighted CN value was calculated as follows:

$$\frac{(1.02\ acres\ \times 84) + (1.91\ acres\ \times 98) + (0.09\ acres\ \times 98)}{3.02\ acres} = 93$$

The resulting peak runoff flow rates for the proposed site conditions are summarized below:

Table 4. Proposed Conditions

Return Period	2-year	10-year	25-year	100-year
Runoff	5.733 cfs	9.947 cfs	12.50 cfs	16.74 cfs

The runoff flowrates increased due to the addition of pervious surface and removal of impervious surface. The percentage increase is as follows:

Table 5. Percentage Increase in Runoff

Return Period	2-year	10-year	25-year	100-year
% Increase	389%	298%	264%	223%

Stormwater runoff from the proposed improvements will be conveyed into inlets and piped to the northwest corner of the site, where a retention pond will be constructed to provide the required storage volume.

4.1 Detention Pond and Outlet Structure

The post-development peak discharge was limited by restricting the 0–10-year storm events to a release rate of 0.2 cfs per acre (0.604 cfs for the site) and the 11–100-year storm events to 0.4 cfs per acre (1.208 cfs for the site). These allowable release rates are more restrictive than the proposed 100-year peak inflow when compared to the existing 10-year conditions, ensuring that post-development discharges do not exceed pre-development rates.

In accordance with the Brownsburg Stormwater Management Ordinance detention standards, “The storm duration shall be equal to or greater than the site time of concentration but shall not be less than thirty (30) minutes.” (2024). Therefore, the time of concentration for the proposed conditions was set to 30 minutes, and the maximum required storage was determined to take place during the 6-hour storm. The detention sizing analysis used the 6-hour storm to calculate the required storage volume for the site.

This analysis determined a required detention volume of 33,478 cubic feet. To meet this requirement, a 34,170-cubic-foot retention pond will be constructed in the northwest corner of the site. The detention pond will be equipped with a multi-stage outlet structure designed to limit discharge rates. A summary of the outlet structure components is provided in Table 6, with supporting calculations included in Appendix B.

Table 6. Outlet Structure Summary

Outlet	Bottom	Intermediate	Emergency Overflow
Size	$4"\ Diameter$	$4"\ Diameter$	$3'x\ 3'w/mesh$
Invert El. (ft)	862.66	865.47	867.01
Peak Outflow (cfs)	0.70	1.23	$\geq 20.93\ (125\%\ 100\ year\ peak)$

Per the Town of Brownsburg Stormwater Standards, the minimum allowable orifice diameter is 4 inches; therefore, a 4-inch orifice is utilized for the outlet structure. Due to this minimum size requirement, the resulting discharge rates from the orifice slightly exceed the calculated allowable release rates. However, the post-development discharge rates remain below the corresponding existing peak flow rates.

4.2 On-Site Stormwater Conveyance

Stormwater runoff generated from the proposed improvements will be collected and conveyed to the site's retention facility. The grading plan directs surface runoff by sheet flow and shallow swales to a series of inlets along the eastern and central portions of the property. These inlets are connected by a storm sewer system that conveys flow westward to the retention pond located in the northwest corner of the site.

- Inlet 1: Connects to 290 linear feet (LF) of 18-inch RCP at a 0.30% slope, discharging into Inlet 2.
- Inlet 2: Connects to 64 LF of 24-inch RCP at 0.30% into the Arcadia AR8, which the discharges into 64 LF of 24" RCP at 0.30% into the pond

Inlet capacity was then checked using the orifice flow equation, incorporating the reduced effective open area (50% of manufacturer-provided open area). This ensures the inlet can maintain adequate capacity under both design flow and partial clogging conditions, in compliance with the requirements of the Manual. The discharge coefficient, C, will be 0.60, gravity acceleration, g, is 32.2 ft/sec2, and ponding height, h is 0.5 ft, and the 10-year flow will be used. The orifice equation is as follows:

Inlet Structure 1:

$$Q = CA\sqrt{2gh}$$

$$5.08\ cfs = (0.6)A\sqrt{2(32.2\ ft/\sec^2)\ 0.5\ ft}$$

$$A = 1.49\ ft^2$$

$$2A = 3.0\ ft^2\ (Clogging\ Condition)$$

Inlet Structure 2 :

$$Q = CA\sqrt{2gh}$$

$$5.69\ cfs = (0.6)A\sqrt{2(32.2\ ft/\sec^2)\ 0.5\ ft}$$

$$A = 1.67\ ft^2$$

$$2A = 3.3\ ft^2\ (Clogging\ Condition)$$

To capture and convey runoff from the site into Inlet Structure 1, a square Neenah Grate Inlet 3287-5 (3.2 square feet of opening area) or equivalent will be installed. To capture and convey runoff from the site into Inlet Structure 2, a square Neenah Grate Inlet 3808-1 (5.2 square feet of opening area) or inlet with 3.3 square foot or greater opening should be installed. Calculations verifying pipe capacity and inlet capture are provided in Appendix B.

For water quality treatment, a hydrodynamic separator will be installed downstream of Inlet 2 to remove sediment and floatable pollutants prior to discharge into the detention basin. The required treatment flow rate is 10.70 cfs. An ADS Arcadia ARC8 unit is proposed, as it has a rated flow capacity of 13.48 cfs. Calculations can be found in Appendix C.

4.3 Off Site Drainage Improvements Along CR 400 N

The existing downstream pipe network is not adequate to convey the required discharge from the site and is therefore proposed to be redesigned to accommodate existing flows in addition to 125 percent of the site's 100-year peak discharge.

The pipe conveying flow from the detention pond was sized to safely pass the 100-year design flow under the assumed conditions of a 0.11 percent slope and a Manning's roughness coefficient (n) of 0.013. The minimum required pipe diameter was calculated using Manning's Equation, as shown below:

$$Q\ (Volumetric\ Flow) = \frac{1.49}{Manning's\ n} * (Area) * (Hydraulic\ Radius)^{2/3}\sqrt{Slope}$$

$$20.93\ cfs = \frac{1.49}{0.013} * \left(\frac{\pi D^2}{4}\right) * (D/4)^{2/3}\sqrt{0.0011}$$

$$D = 35.26\ inches$$

Based on this analysis, a 36-inch diameter pipe is required and will be utilized.

The outlet pipe network extends west from the detention pond and connects to the storm sewer system along CR 400 N. This existing network is made up of 18-inch pipe at various slopes. As part of the proposed improvements, the existing downstream pipes will be replaced with 36-inch RCP. Regrading will occur along the full length of the alignment, and existing drainage structures will be upsized to accommodate the larger pipe diameter. A summary of the proposed downstream pipe network is provided in Table 7. Hydraulic calculations accounting for combined offsite flows and proposed site discharge are included in Appendix B.

Table 7. Pipe Network

Location	Length (ft)	Diameter (in)	Grade (%)	Invert Upstream	Invert Downstream
South to INL7	97	12	3.10	865.49	862.47
INL7 TO INL8	50	36	0.12	862.47	862.41
INL8 TO INL9	175	36	0.13	862.41	862.19
INL9 TO INL10	151	36	0.13	862.19	861.99
INL10 TO INL11	164	36	0.14	861.99	861.76
INL11 TO INL12	164	36	0.14	861.76	861.53
INL12 TO INL13	80	36	0.15	861.53	861.41
INL13 TO INL14	75	36	0.16	861.41	861.29
INL14 to Ronald Reagan	268	36	0.16	861.29	860.86

The complete stormwater management system—including inlets, storm sewers, detention pond, multi-stage outlet structure, and downstream piping—has been designed to control post-development runoff in compliance with the Town of Brownsburg Stormwater Standards.

5.0 Summary

The proposed development at 4005 N CR 1000 E, Brownsburg, Indiana will consist of a truck maintenance facility including 42 truck/trailer parking stalls, a 900 square foot office building, and a 2,860 square foot maintenance building. The project will disturb approximately 2 acres and convert a predominantly pervious 3.02-acre parcel into a mix of impervious asphalt, building roof, and limited vegetated cover. Hydrologic analysis using rainfall data from the Hendricks County Stormwater Technical Standards Manual (2016) indicates a significant increase in runoff under proposed conditions, with the 100-year peak flow rising from 2.10 cfs to 17.61 cfs.

To mitigate this increase, a comprehensive stormwater management system has been designed. Runoff will be collected by inlets and storm sewers, routed through a hydrodynamic separator to remove sediment , and detained within a pond sized to provide 34,170 cubic feet of storage volume. A multi-stage outlet structure will restrict discharges using minimum allowable orifice sizes. The system reduces post-development peak discharge to below pre-development rates, providing both quantity control and water quality treatment.

Appendix A – Huff Distribution Hydrographs

30-minute storm

Hydrograph Return Period Recap

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

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.931	-------	-------	2.007	2.725	-------	3.949	Existing
2	SCS Runoff	------	-------	5.733	-------	-------	9.947	12.50	-------	16.74	Proposed

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	0.931	1	44	2,545	------	------	------	Existing
2	SCS Runoff	5.733	1	14	6,429	------	------	------	Proposed

Hydrograph Report

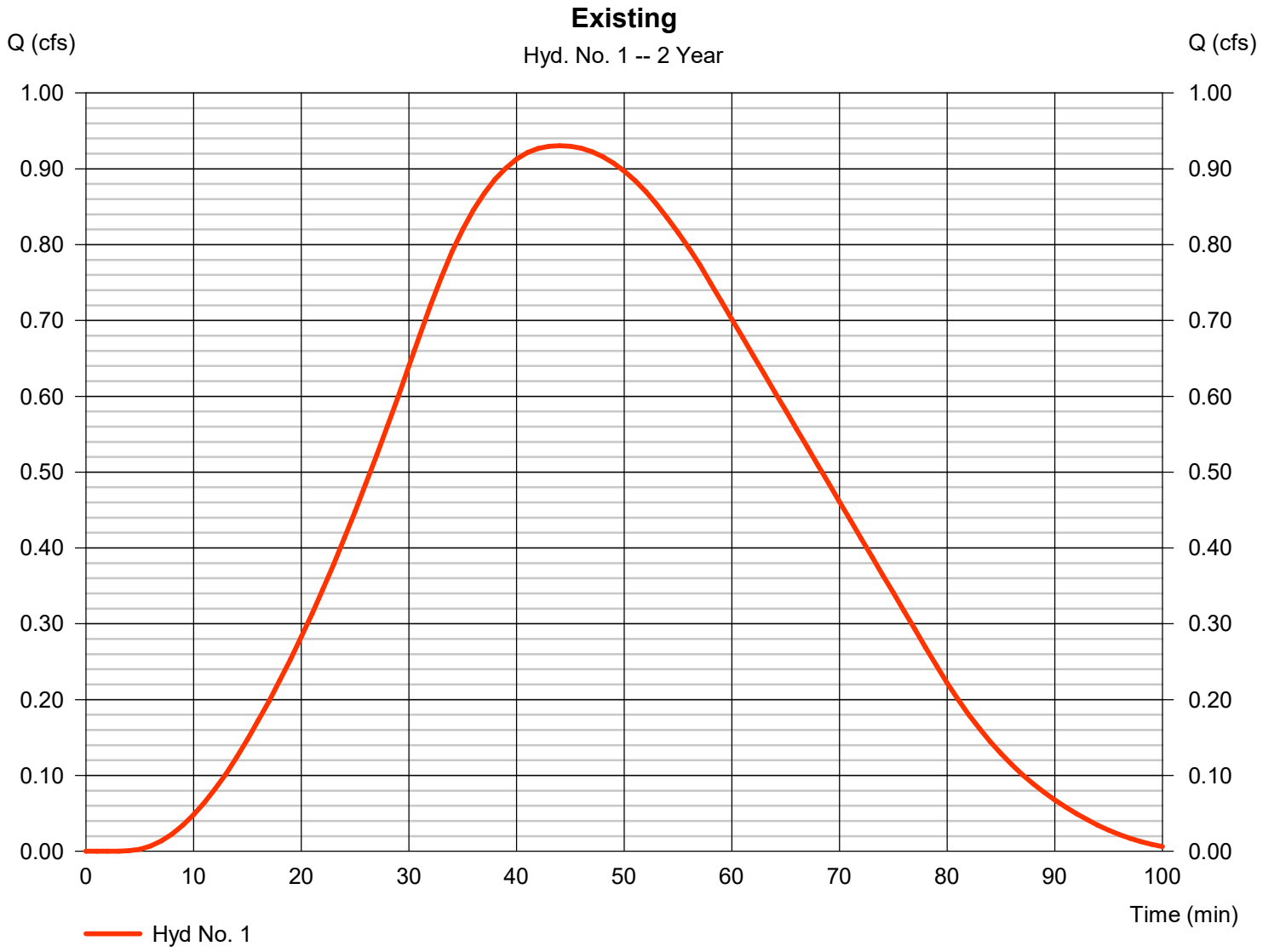
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 0.931 cfs
Storm frequency	= 2 yrs	Time to peak	= 44 min
Time interval	= 1 min	Hyd. volume	= 2,545 cuft
Drainage area	= 3.020 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 47.00 min
Total precip.	= 1.17 in	Distribution	= Huff-1st
Storm duration	= 0.50 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



TR55 Tc Worksheet

Hyd. No. 1

Existing

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.150		0.011		0.011		
Flow length (ft)	= 300.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.01		0.00		0.00		
Land slope (%)	= 0.41		0.00		0.00		
Travel Time (min)	**= 45.86**	**+**	**0.00**	**+**	**0.00**	**=**	**45.86**
Shallow Concentrated Flow							
Flow length (ft)	= 70.00		0.00		0.00		
Watercourse slope (%)	= 0.41		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.03		0.00		0.00		
Travel Time (min)	**= 1.13**	**+**	**0.00**	**+**	**0.00**	**=**	**1.13**
Channel Flow							
X sectional flow area (sqft)	= 0.00		0.00		0.00		
Wetted perimeter (ft)	= 0.00		0.00		0.00		
Channel slope (%)	= 0.00		0.00		0.00		
Manning's n-value	= 0.015		0.015		0.015		
Velocity (ft/s)	=0.00						
			0.00				
					0.00		
Flow length (ft)	({0})0.0		0.0		0.0		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**

Total Travel Time, Tc ..... 47.00 min

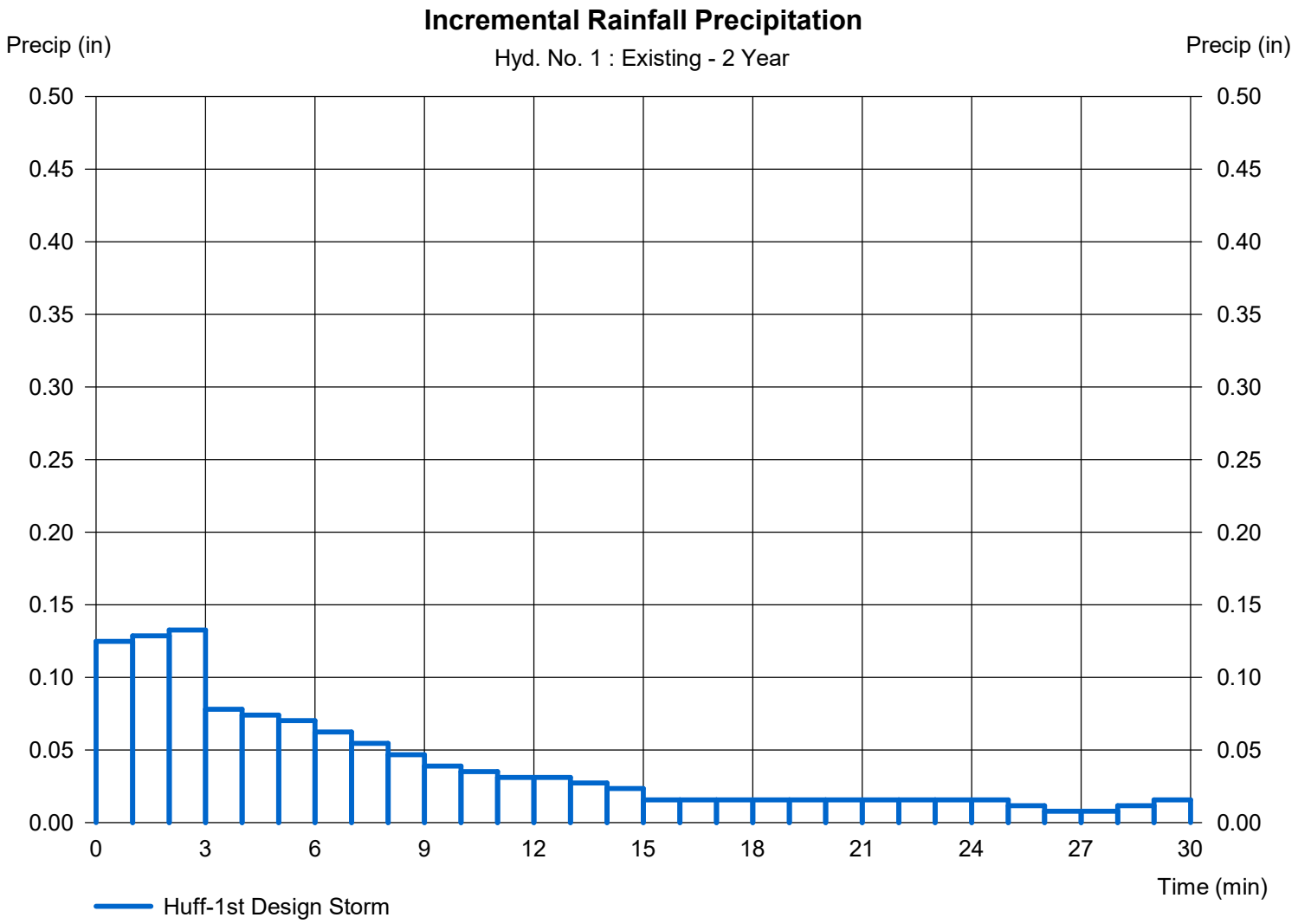
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 2 yrs	Time interval	= 1 min
Total precip.	= 1.1700 in	Distribution	= Huff-1st
Storm duration	= 0.50 hrs		



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	2.007	1	42	5,513	------	------	------	Existing
2	SCS Runoff	9.947	1	13	10,847	------	------	------	Proposed

Hydrograph Report

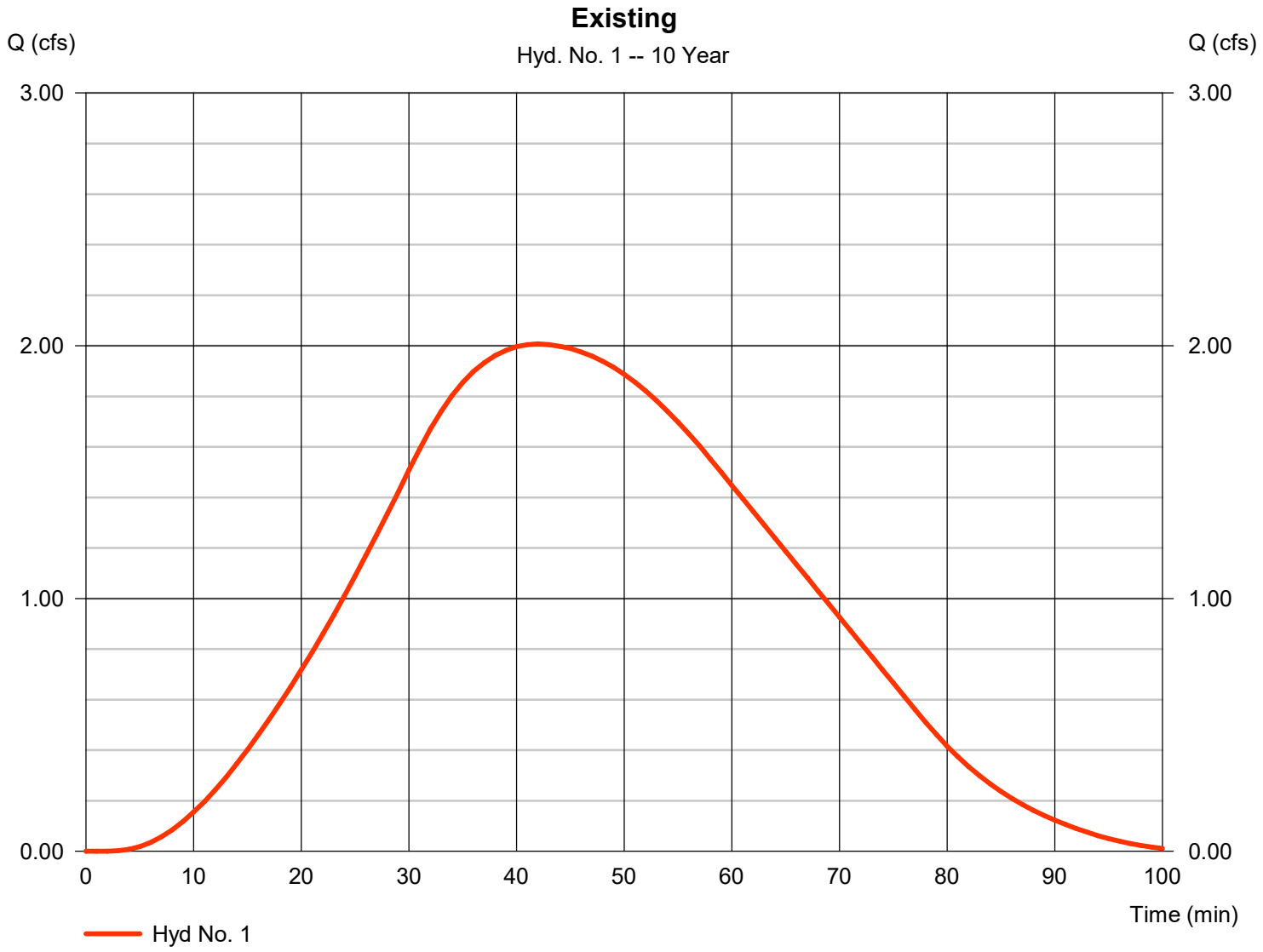
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.007 cfs
Storm frequency	=	10 yrs	Time to peak	=	42 min
Time interval	=	1 min	Hyd. volume	=	5,513 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	1.64 in	Distribution	=	Huff-1st
Storm duration	=	0.50 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



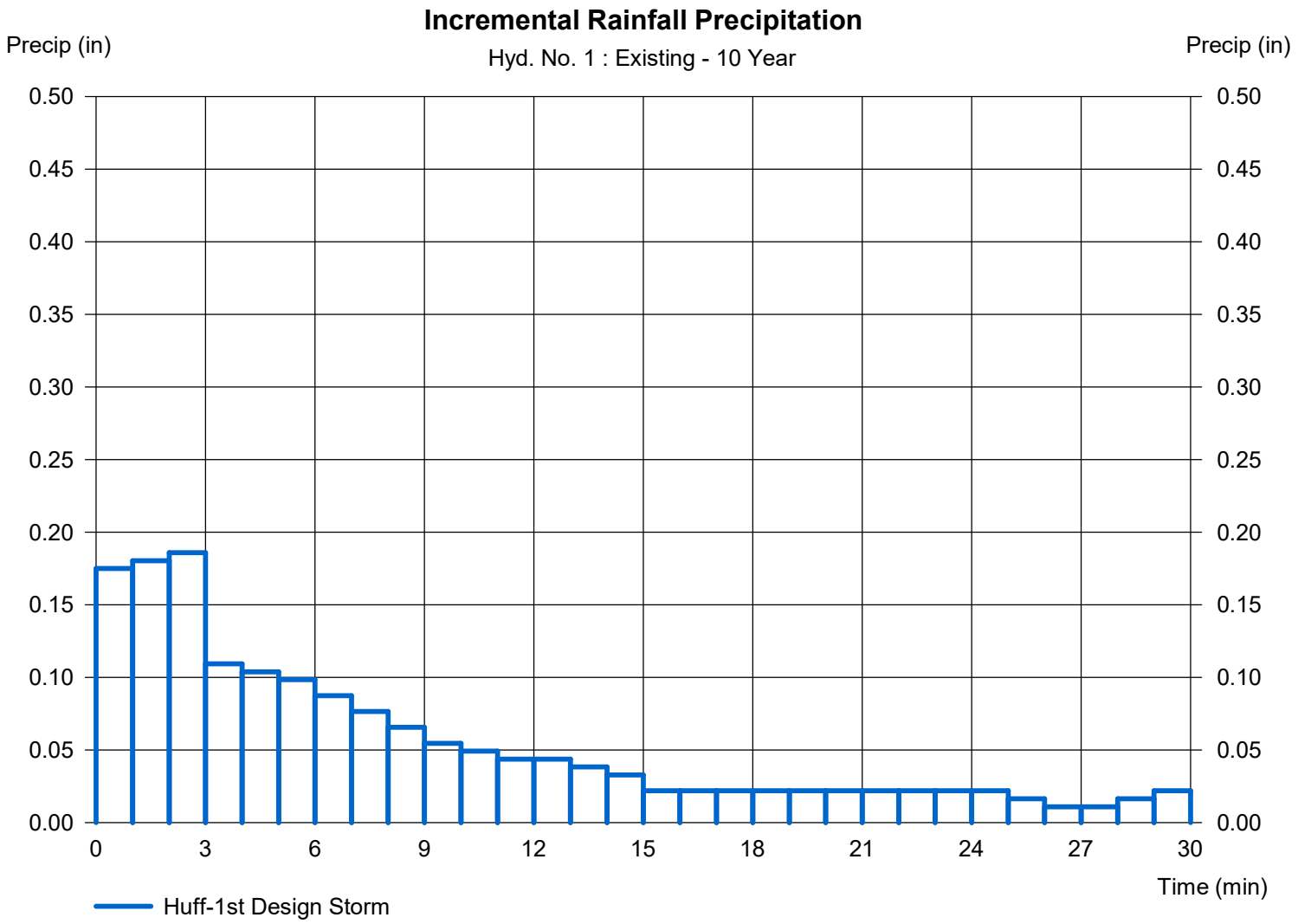
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 10 yrs	Time interval	= 1 min
Total precip.	= 1.6400 in	Distribution	= Huff-1st
Storm duration	= 0.50 hrs		



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	2.725	1	41	7,491	------	------	------	Existing
2	SCS Runoff	12.50	1	13	13,509	------	------	------	Proposed

Hydrograph Report

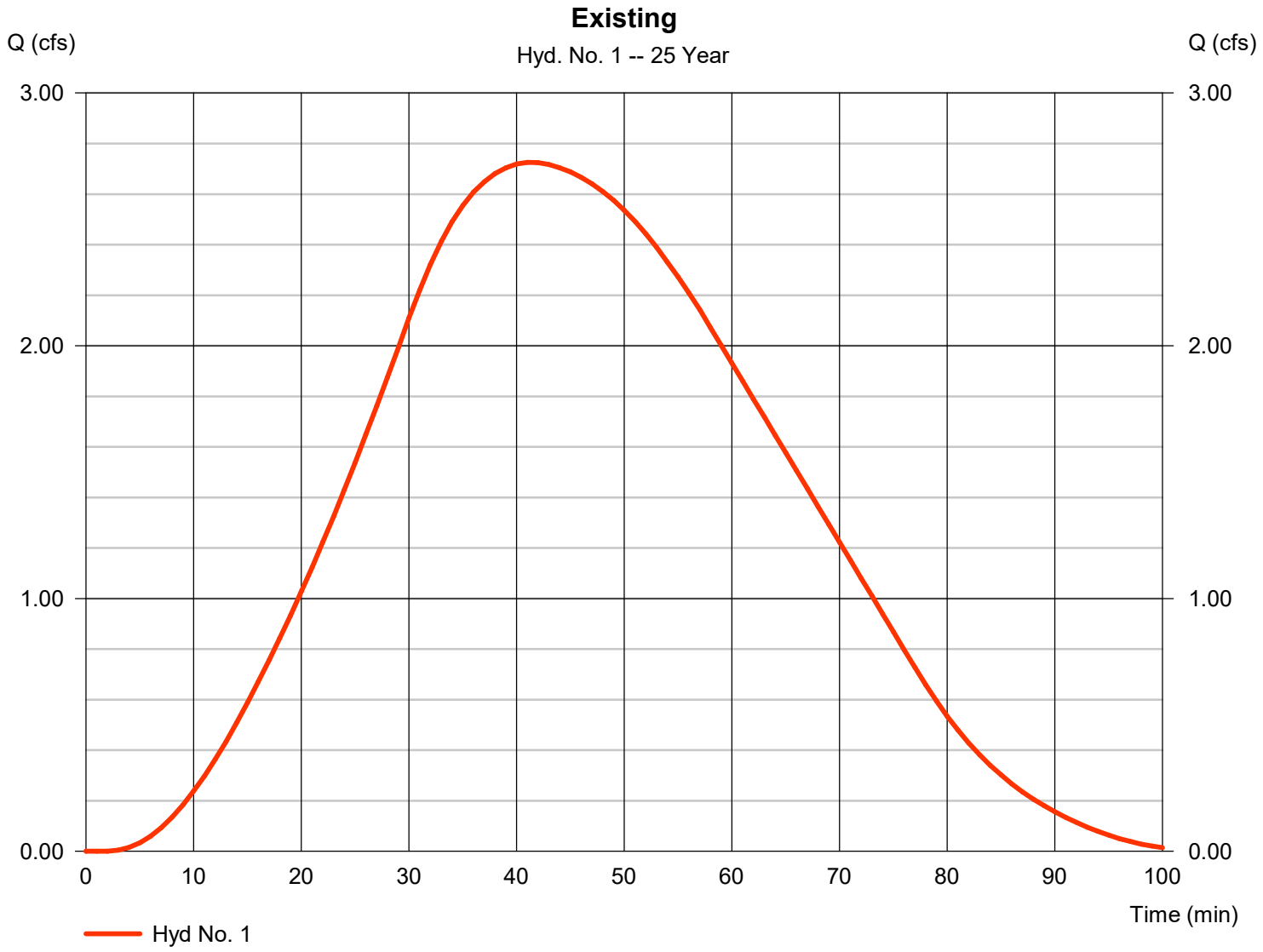
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.725 cfs
Storm frequency	=	25 yrs	Time to peak	=	41 min
Time interval	=	1 min	Hyd. volume	=	7,491 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	1.91 in	Distribution	=	Huff-1st
Storm duration	=	0.50 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



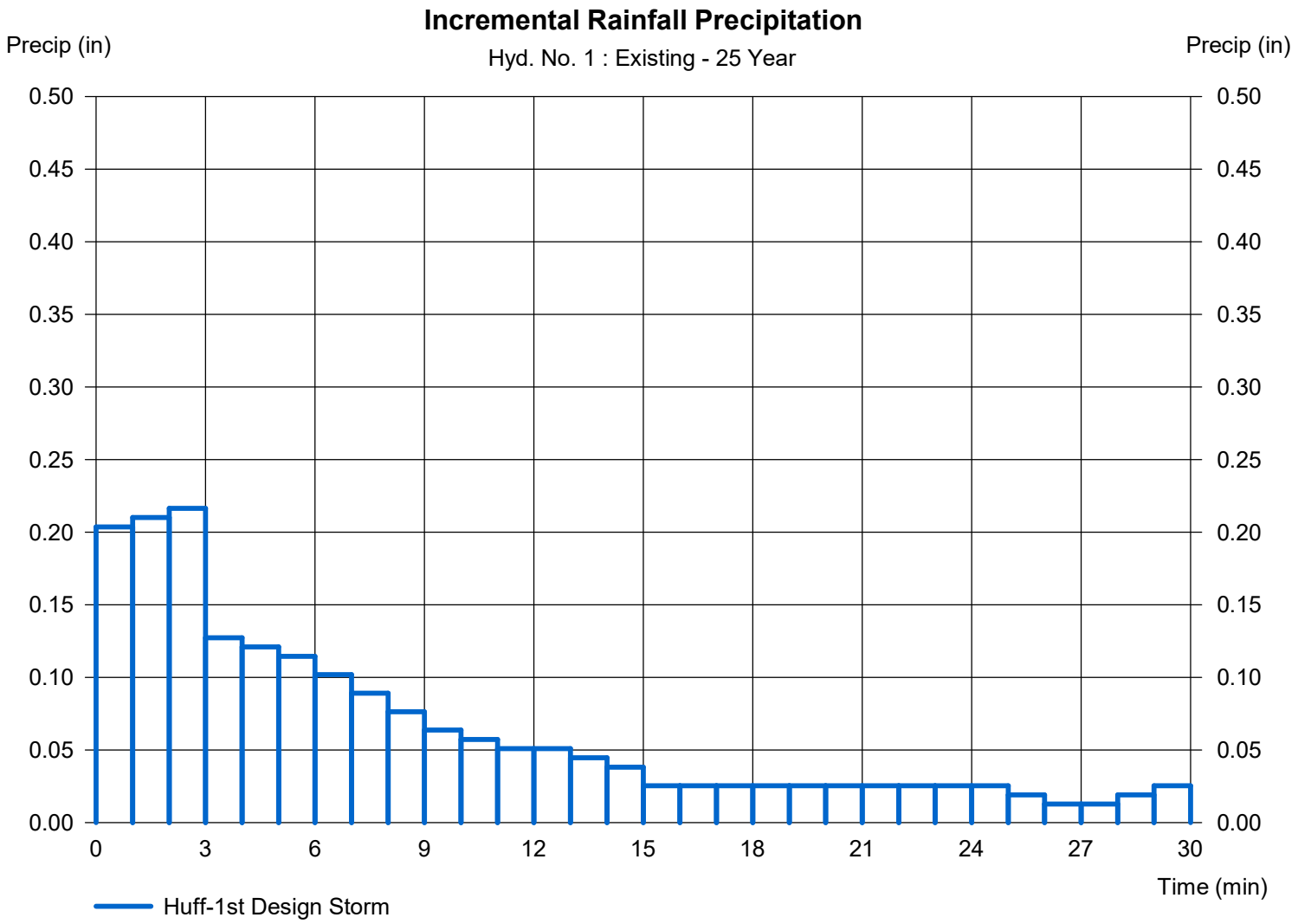
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 25 yrs	Time interval	= 1 min
Total precip.	= 1.9100 in	Distribution	= Huff-1st
Storm duration	= 0.50 hrs		



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	3.949	1	41	10,851	------	------	------	Existing
2	SCS Runoff	16.74	1	12	17,862	------	------	------	Proposed

Hydrograph Report

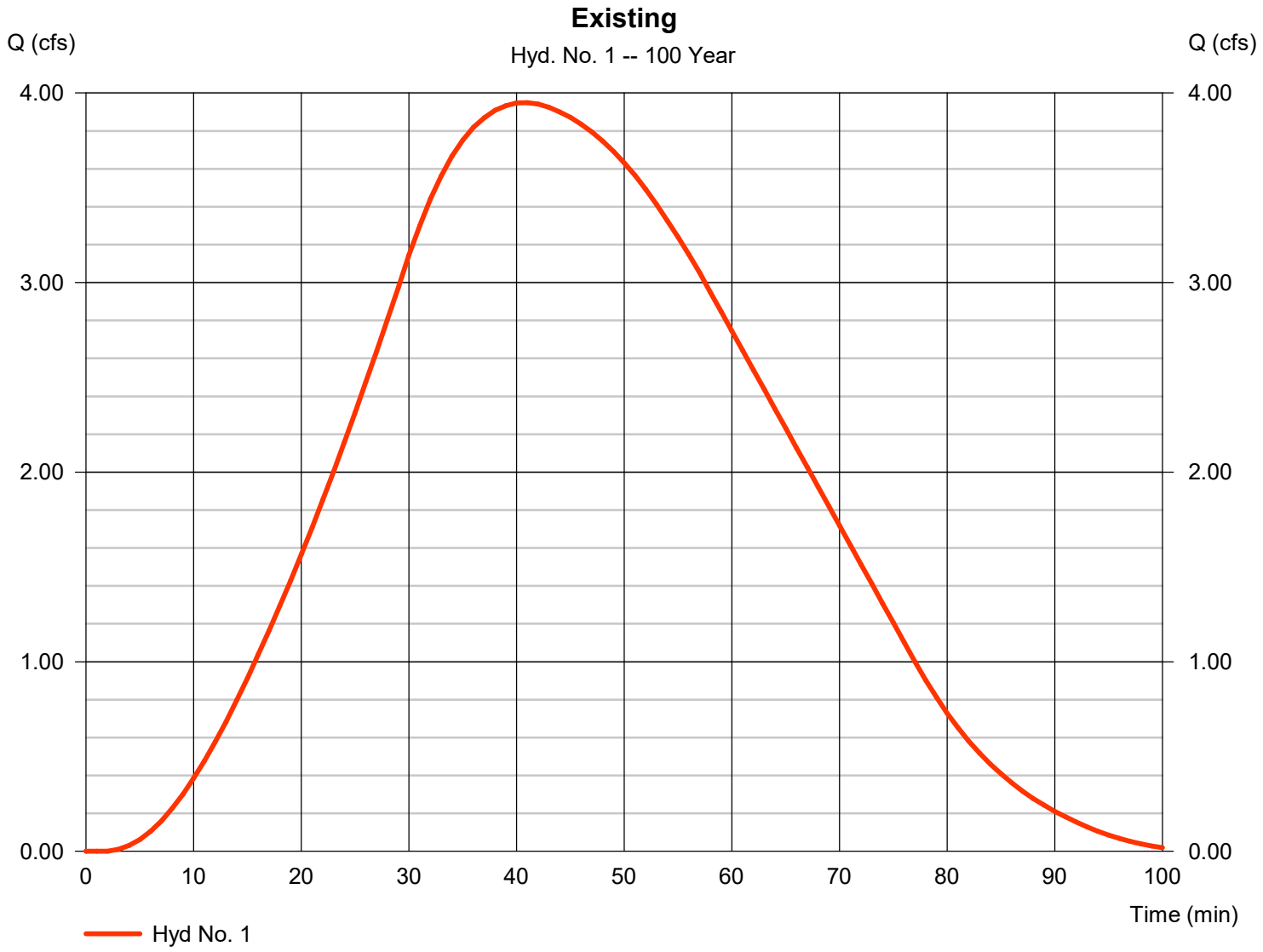
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.949 cfs
Storm frequency	=	100 yrs	Time to peak	=	41 min
Time interval	=	1 min	Hyd. volume	=	10,851 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	2.34 in	Distribution	=	Huff-1st
Storm duration	=	0.50 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



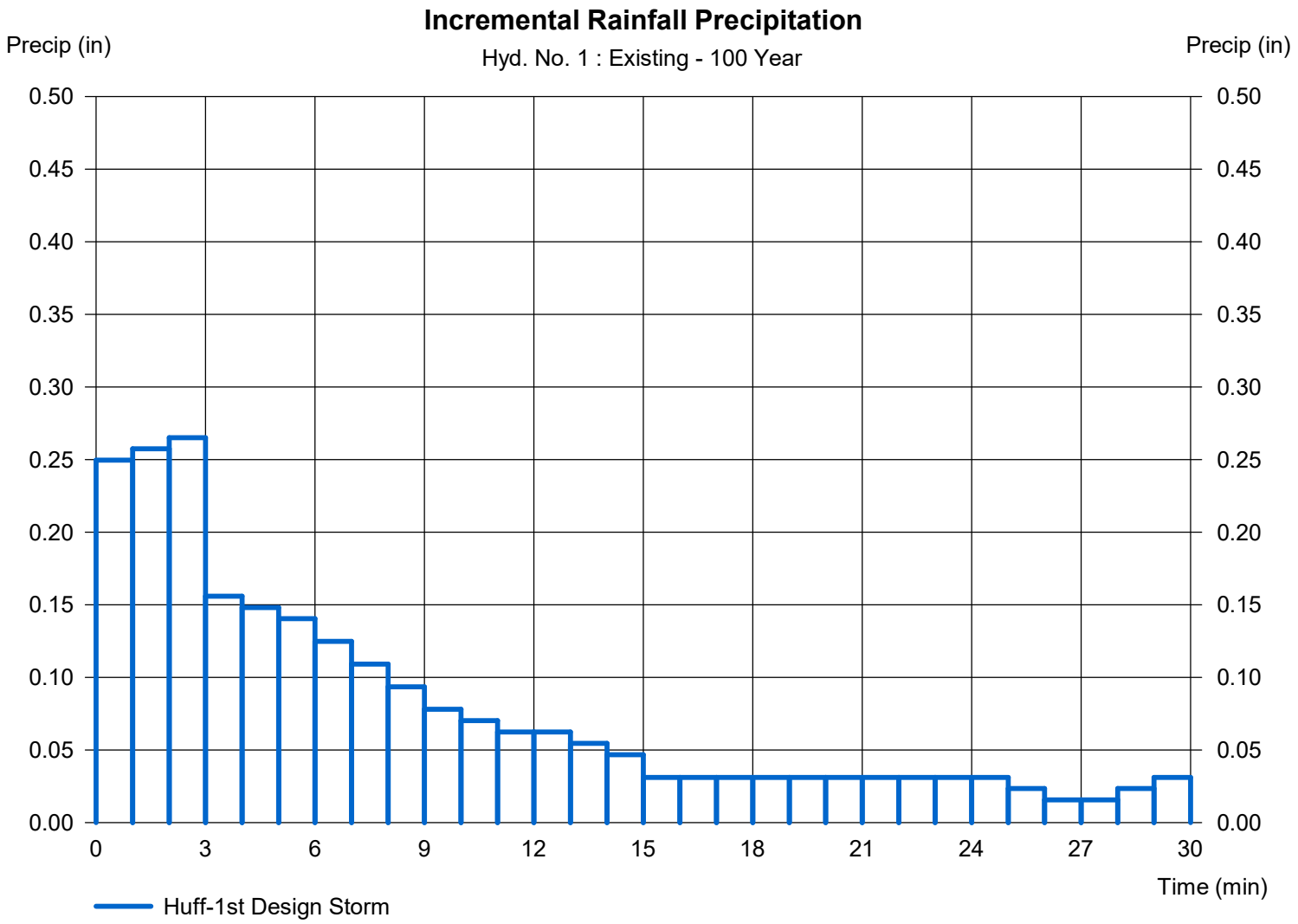
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 100 yrs	Time interval	= 1 min
Total precip.	= 2.3400 in	Distribution	= Huff-1st
Storm duration	= 0.50 hrs		



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	56.8128	9.8000	0.8624	--------
3	0.0000	0.0000	0.0000	--------
5	61.0581	9.5000	0.8270	--------
10	58.2090	8.5000	0.7837	--------
25	54.0065	7.2000	0.7275	--------
50	53.5558	6.6000	0.6986	--------
100	50.0862	5.6000	0.6582	--------

File name: Lions Trucking IDF.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	5.56	4.33	3.56	3.04	2.66	2.37	2.14	1.95	1.80	1.67	1.56	1.46
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	6.69	5.23	4.33	3.72	3.27	2.92	2.65	2.42	2.24	2.08	1.95	1.83
10	7.57	5.91	4.90	4.22	3.71	3.33	3.03	2.78	2.57	2.40	2.25	2.12
25	8.75	6.82	5.66	4.88	4.32	3.89	3.55	3.27	3.04	2.84	2.68	2.53
50	9.66	7.52	6.26	5.41	4.80	4.33	3.96	3.66	3.41	3.19	3.01	2.85
100	10.59	8.21	6.84	5.93	5.27	4.77	4.37	4.05	3.78	3.56	3.36	3.19

Tc = time in minutes. Values may exceed 60.

Precip. file name: Z:\21346 - Lions Tran Inc (Bburg) Maintenance Building\Design\Drainage\Lions_Huff30min.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	1.17	0.00	0.00	1.64	1.91	0.00	2.34
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Hydrograph Return Period Recap 2-hour storm

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

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	1.172	-------	-------	2.497	3.430	-------	5.175	Existing
2	SCS Runoff	------	-------	2.918	-------	-------	5.120	6.552	-------	9.088	Proposed

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	1.172	1	68	5,870	------	------	------	Existing
2	SCS Runoff	2.918	1	44	11,331	------	------	------	Proposed

Hydrograph Report

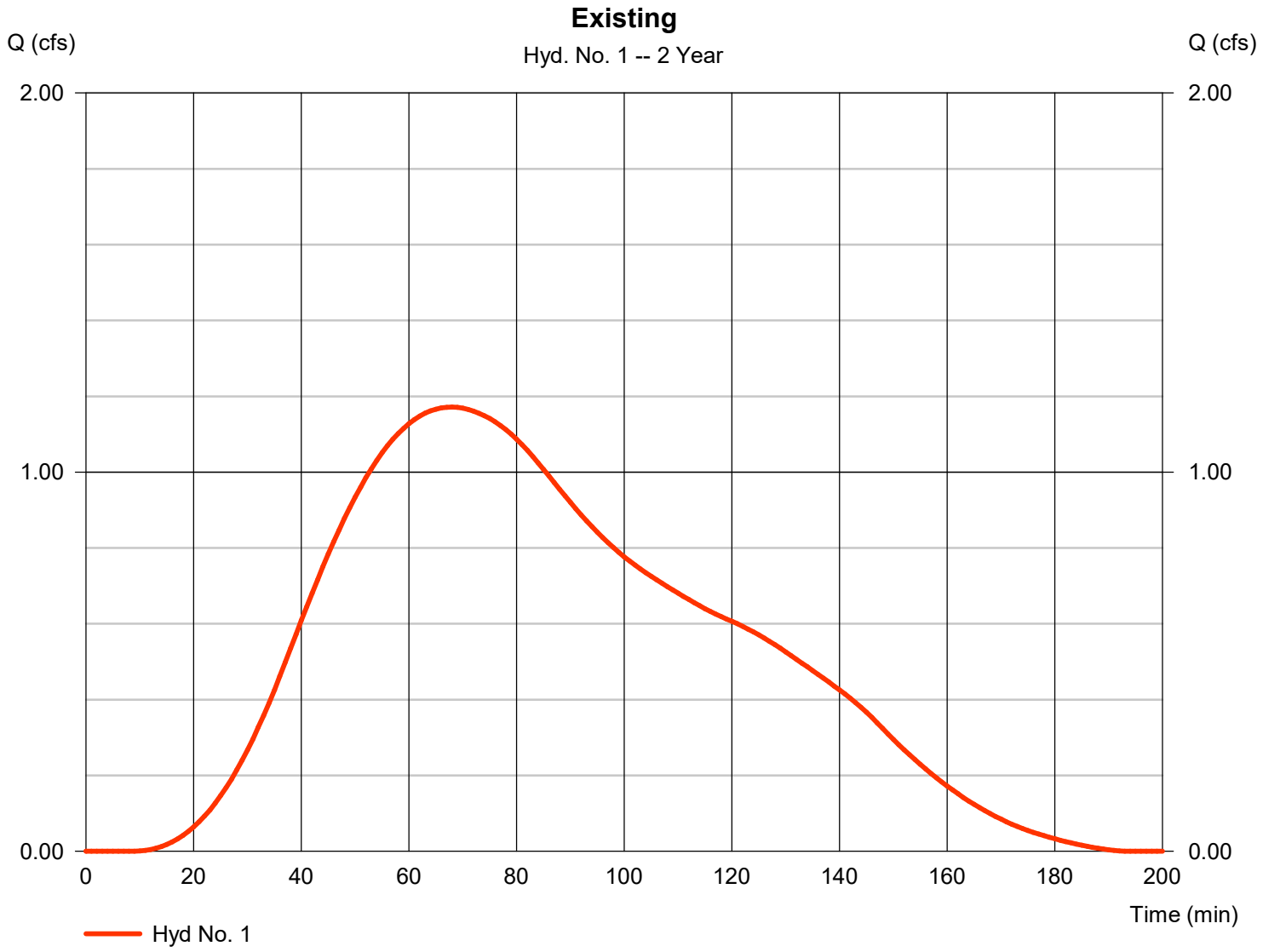
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.172 cfs
Storm frequency	=	2 yrs	Time to peak	=	68 min
Time interval	=	1 min	Hyd. volume	=	5,870 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	1.69 in	Distribution	=	Huff-1st
Storm duration	=	2.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



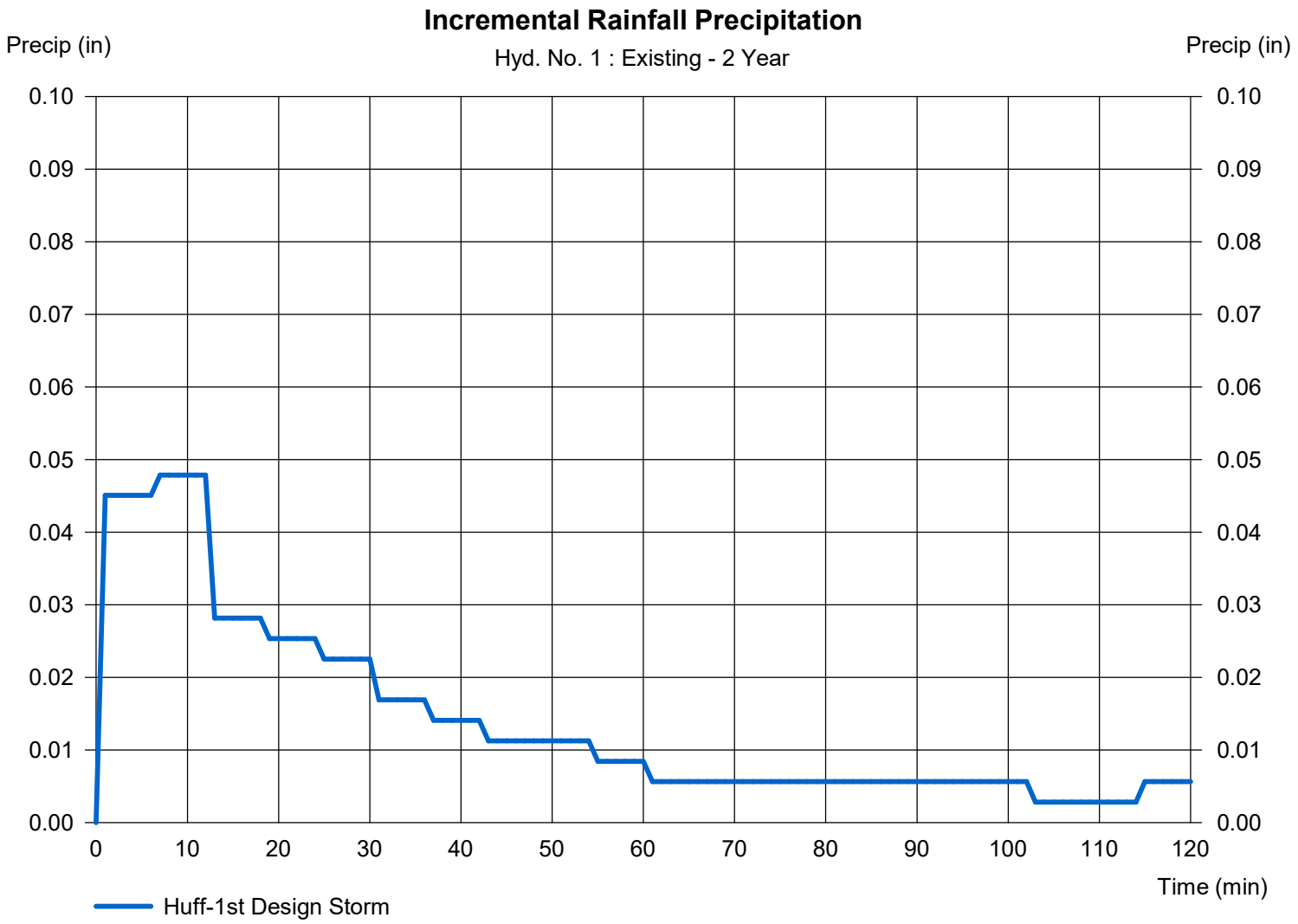
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 2 yrs	Time interval	= 1 min
Total precip.	= 1.6900 in	Distribution	= Huff-1st
Storm duration	= 2.00 hrs		



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	2.497	1	63	12,116	------	------	------	Existing
2	SCS Runoff	5.120	1	42	19,296	------	------	------	Proposed

Hydrograph Report

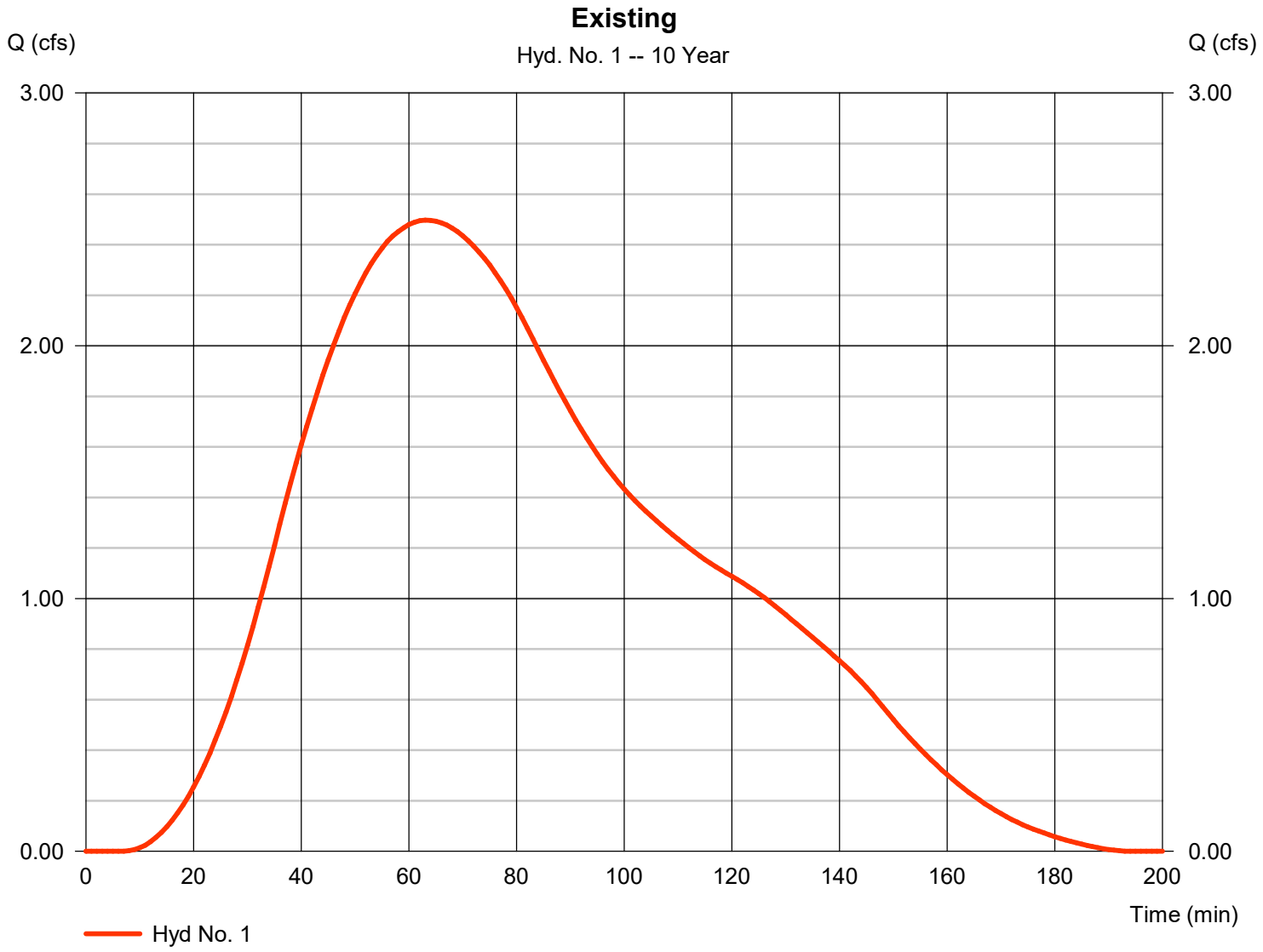
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.497 cfs
Storm frequency	=	10 yrs	Time to peak	=	63 min
Time interval	=	1 min	Hyd. volume	=	12,116 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	2.48 in	Distribution	=	Huff-1st
Storm duration	=	2.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



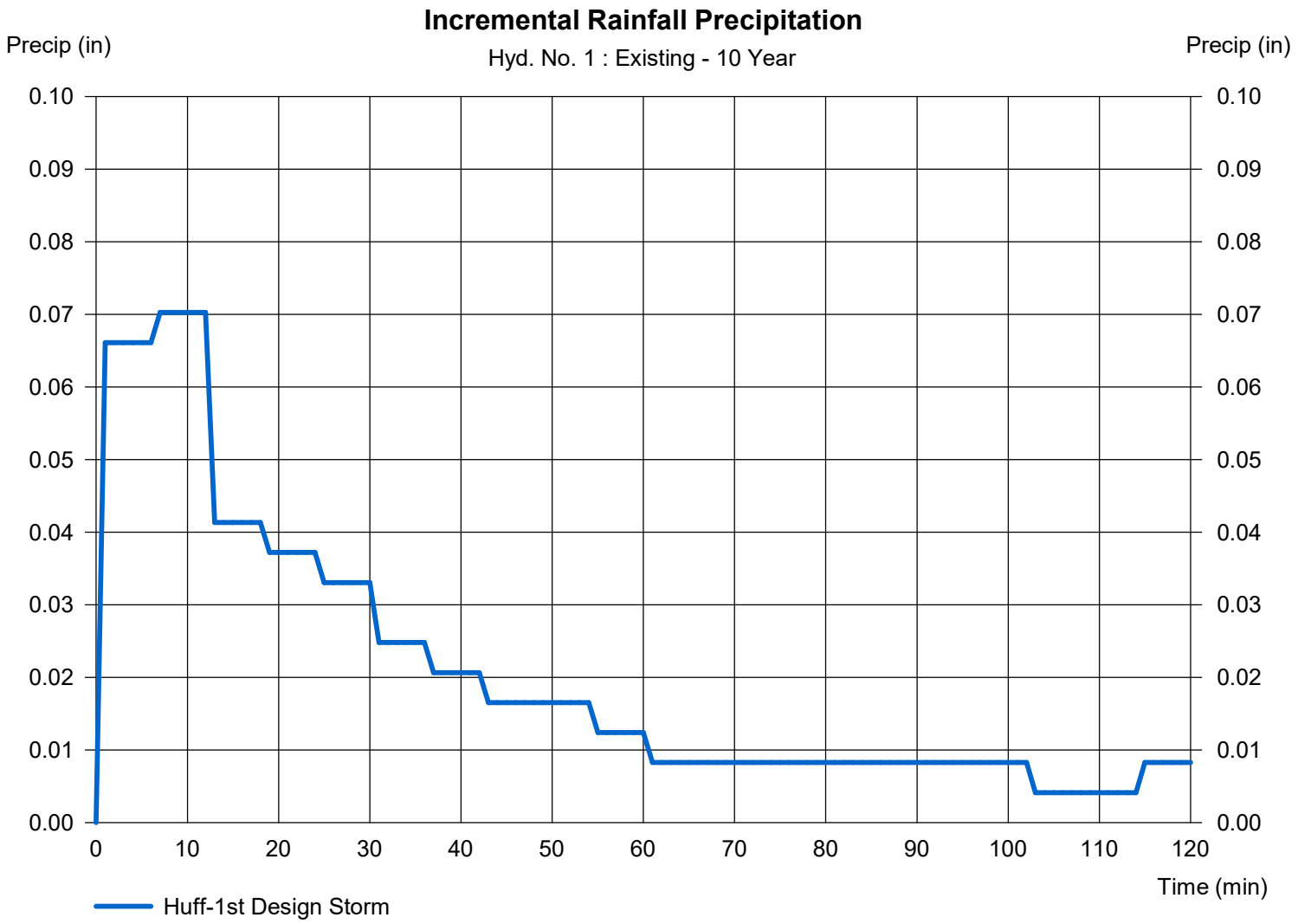
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 10 yrs	Time interval	= 1 min
Total precip.	= 2.4800 in	Distribution	= Huff-1st
Storm duration	= 2.00 hrs		



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	3.430	1	62	16,424	------	------	------	Existing
2	SCS Runoff	6.552	1	41	24,395	------	------	------	Proposed

Hydrograph Report

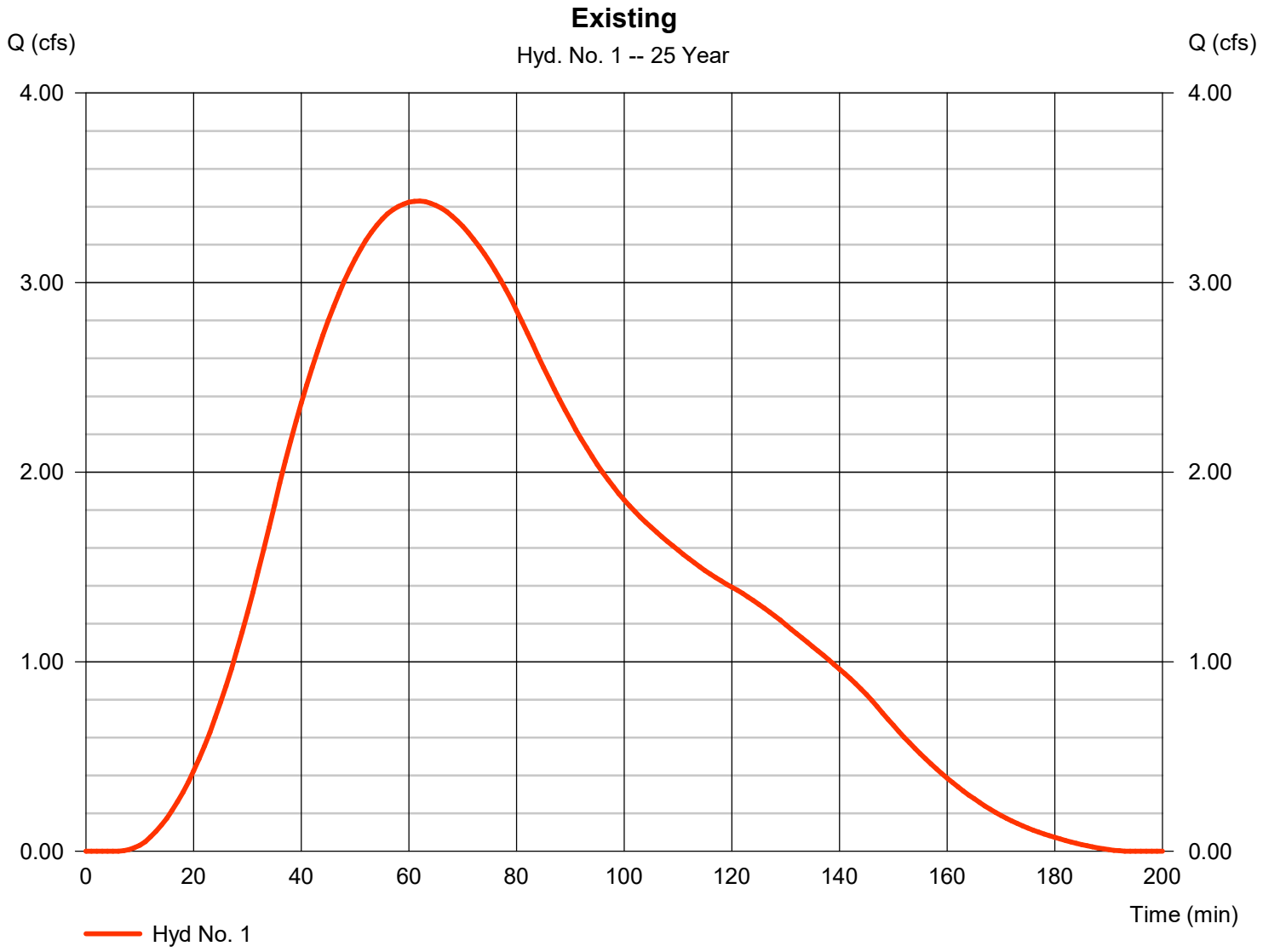
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.430 cfs
Storm frequency	=	25 yrs	Time to peak	=	62 min
Time interval	=	1 min	Hyd. volume	=	16,424 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	2.97 in	Distribution	=	Huff-1st
Storm duration	=	2.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



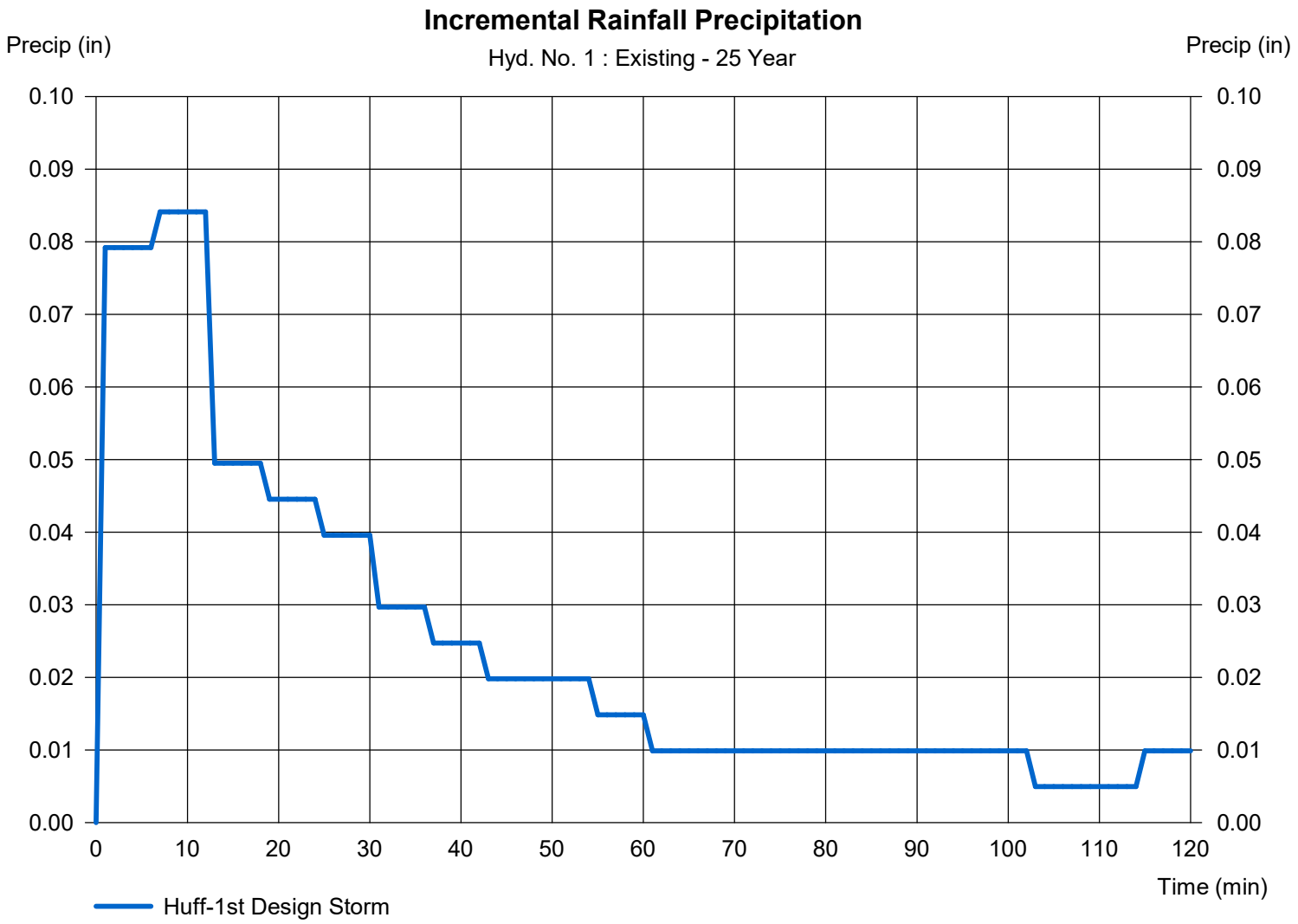
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 25 yrs	Time interval	= 1 min
Total precip.	= 2.9700 in	Distribution	= Huff-1st
Storm duration	= 2.00 hrs		



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	5.175	1	60	24,367	------	------	------	Existing
2	SCS Runoff	9.088	1	40	33,345	------	------	------	Proposed

Hydrograph Report

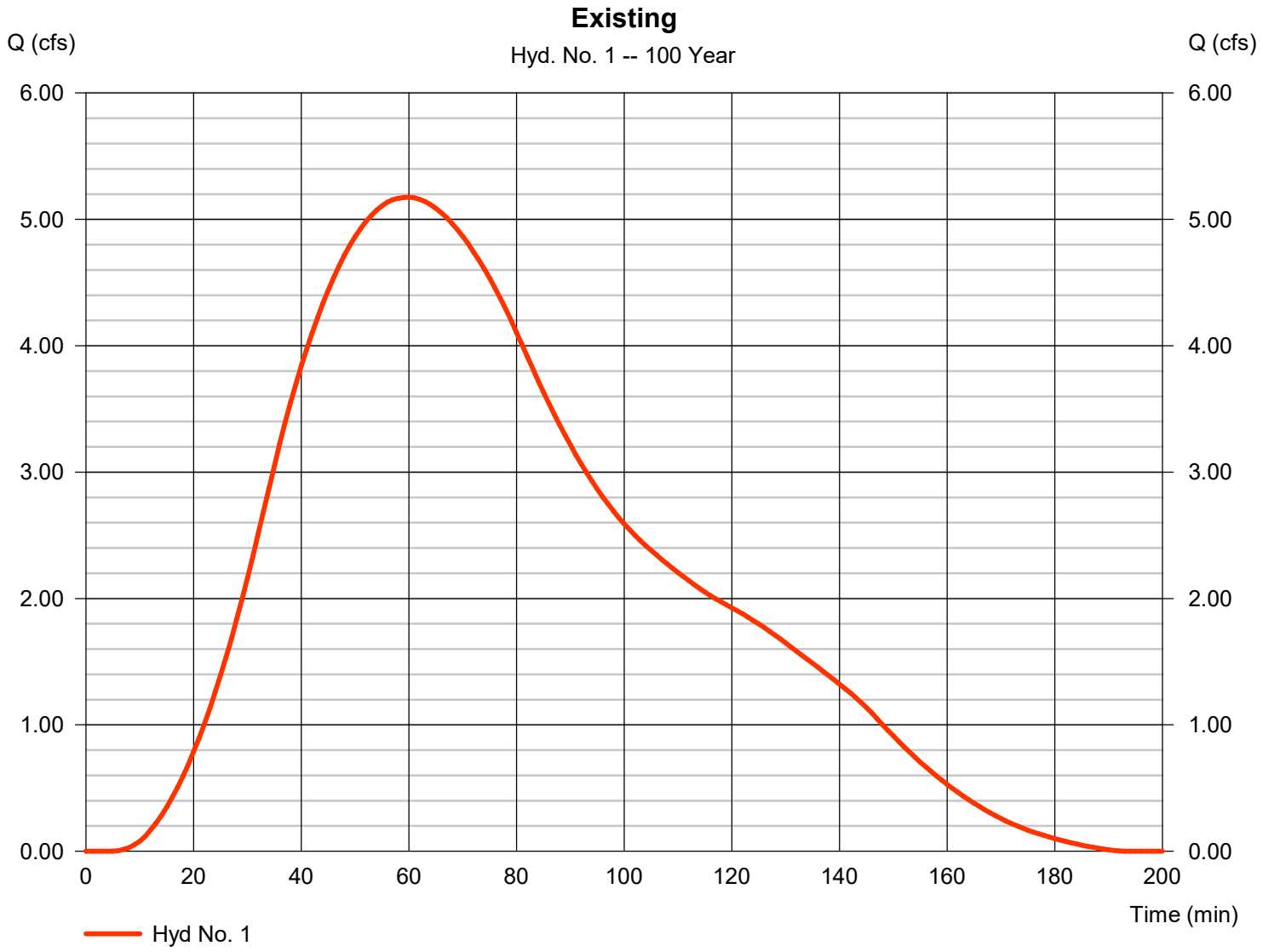
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.175 cfs
Storm frequency	=	100 yrs	Time to peak	=	60 min
Time interval	=	1 min	Hyd. volume	=	24,367 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	3.82 in	Distribution	=	Huff-1st
Storm duration	=	2.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



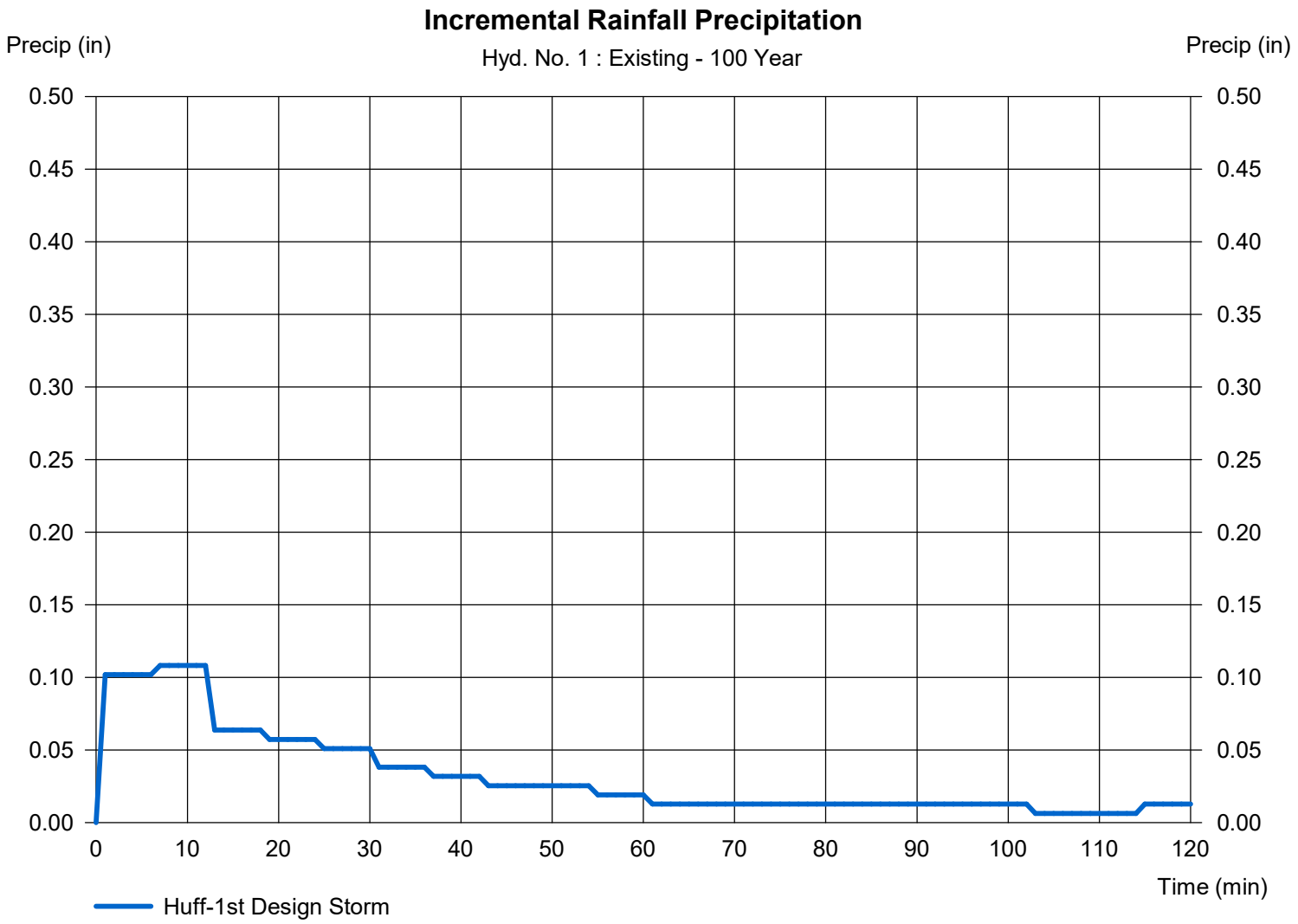
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 100 yrs	Time interval	= 1 min
Total precip.	= 3.8200 in	Distribution	= Huff-1st
Storm duration	= 2.00 hrs		



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	56.8128	9.8000	0.8624	--------
3	0.0000	0.0000	0.0000	--------
5	61.0581	9.5000	0.8270	--------
10	58.2090	8.5000	0.7837	--------
25	54.0065	7.2000	0.7275	--------
50	53.5558	6.6000	0.6986	--------
100	50.0862	5.6000	0.6582	--------

File name: Lions Trucking IDF.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	5.56	4.33	3.56	3.04	2.66	2.37	2.14	1.95	1.80	1.67	1.56	1.46
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	6.69	5.23	4.33	3.72	3.27	2.92	2.65	2.42	2.24	2.08	1.95	1.83
10	7.57	5.91	4.90	4.22	3.71	3.33	3.03	2.78	2.57	2.40	2.25	2.12
25	8.75	6.82	5.66	4.88	4.32	3.89	3.55	3.27	3.04	2.84	2.68	2.53
50	9.66	7.52	6.26	5.41	4.80	4.33	3.96	3.66	3.41	3.19	3.01	2.85
100	10.59	8.21	6.84	5.93	5.27	4.77	4.37	4.05	3.78	3.56	3.36	3.19

Tc = time in minutes. Values may exceed 60.

Precip. file name: Z:\21346 - Lions Tran Inc (Bburg) Maintenance Building\Design\Drainage\Lions_Huff2hr.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	1.69	0.00	0.00	2.48	2.97	0.00	3.82
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00

6-hour storm

Hydrograph Return Period Recap

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

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	------	-------	0.834	-------	-------	1.723	2.383	-------	3.633	Existing
2	SCS Runoff	------	-------	1.738	-------	-------	3.209	4.233	-------	6.057	Proposed

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	0.834	1	105	9,219	------	------	------	Existing
2	SCS Runoff	1.738	1	56	15,722	------	------	------	Proposed

Hydrograph Report

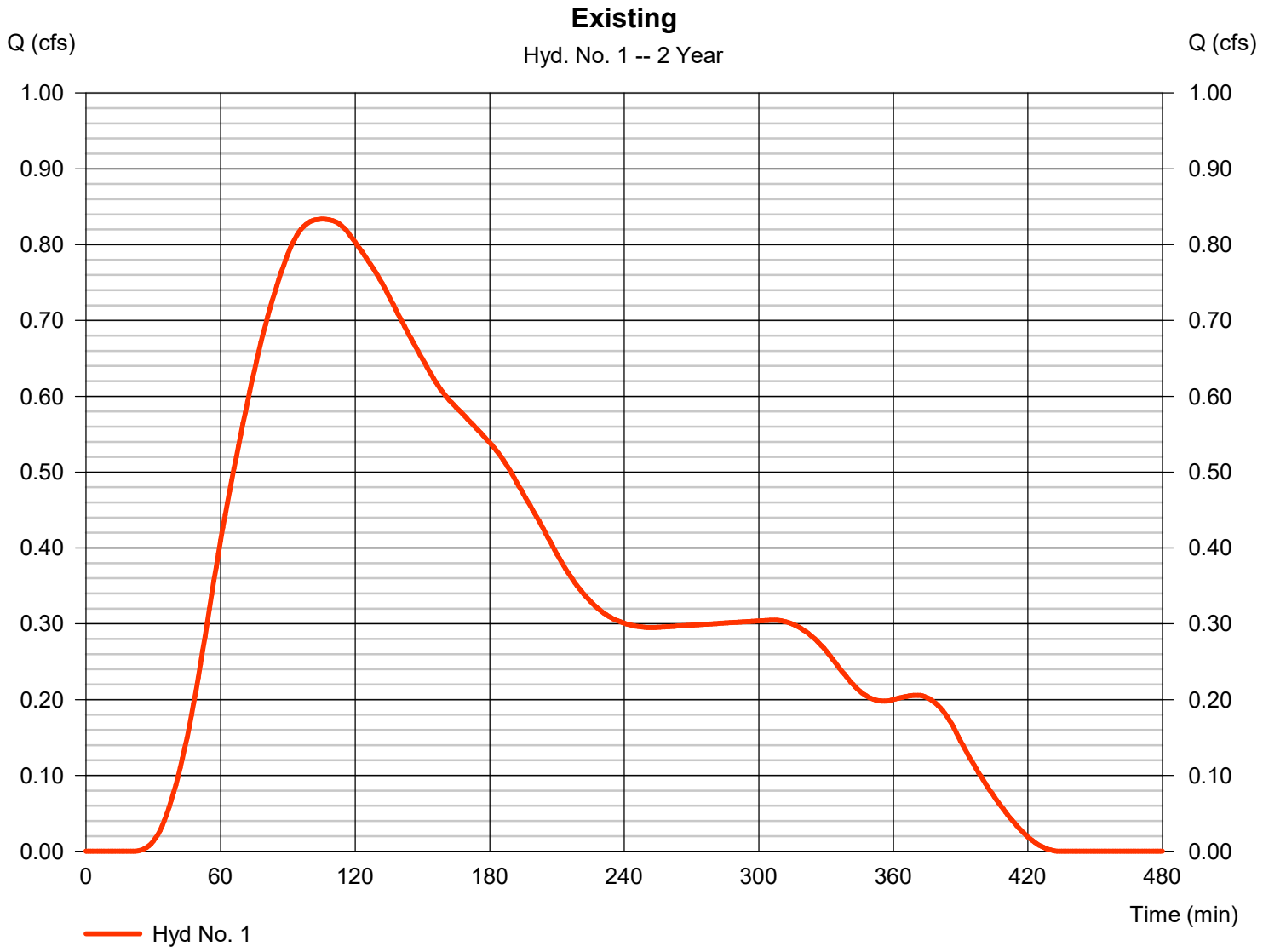
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	= SCS Runoff	Peak discharge	= 0.834 cfs
Storm frequency	= 2 yrs	Time to peak	= 105 min
Time interval	= 1 min	Hyd. volume	= 9,219 cuft
Drainage area	= 3.020 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 47.00 min
Total precip.	= 2.13 in	Distribution	= Huff-1st
Storm duration	= 6.00 hrs	Shape factor	= 484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



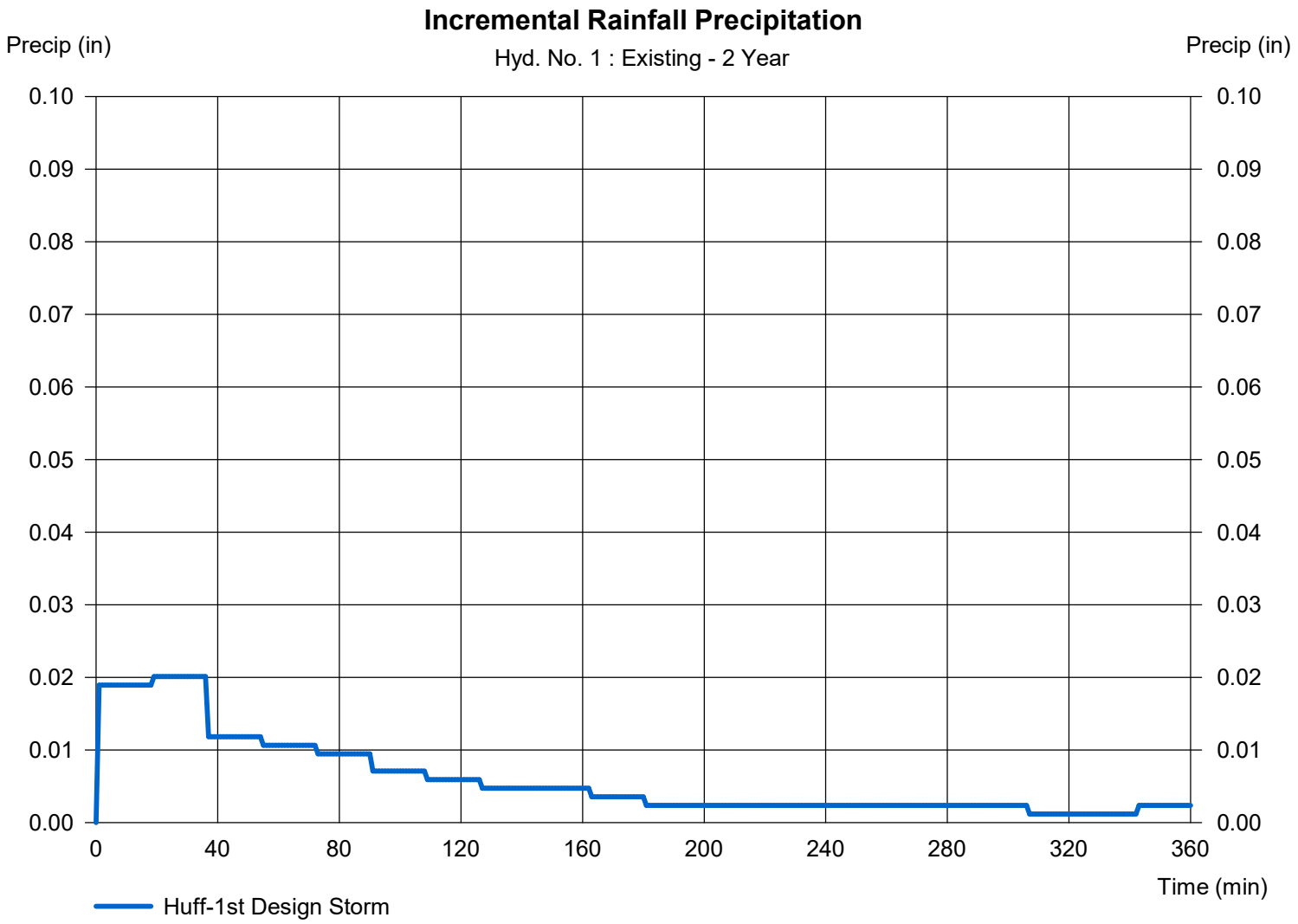
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 2 yrs	Time interval	= 1 min
Total precip.	= 2.1300 in	Distribution	= Huff-1st
Storm duration	= 6.00 hrs		



Hydrograph Report

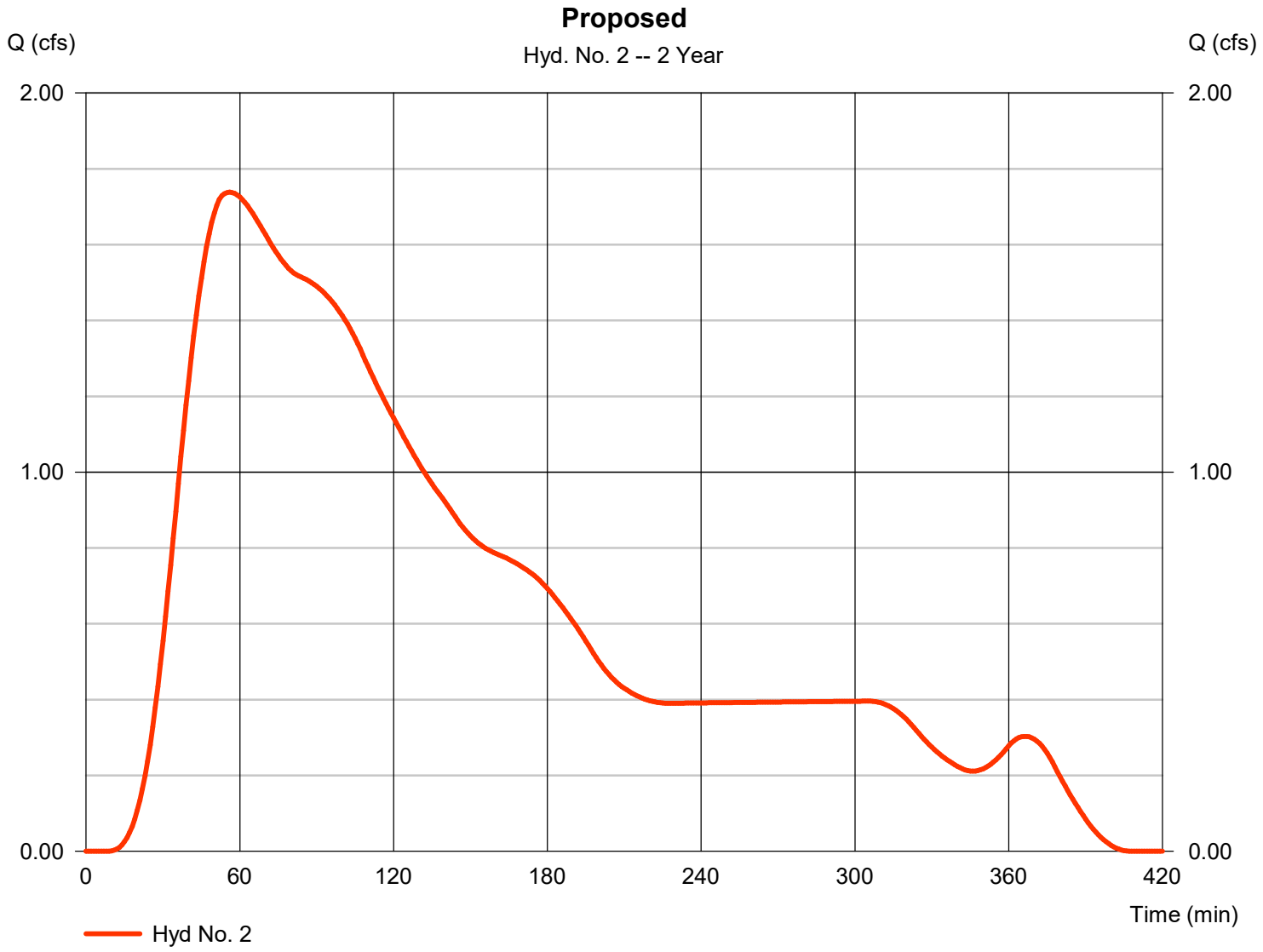
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 2

Proposed

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.738 cfs
Storm frequency	=	2 yrs	Time to peak	=	56 min
Time interval	=	1 min	Hyd. volume	=	15,722 cuft
Drainage area	=	3.020 ac	Curve number	=	93*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	30.00 min
Total precip.	=	2.13 in	Distribution	=	Huff-1st
Storm duration	=	6.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.020 x 84) + (1.910 x 98) + (0.090 x 98)] / 3.020



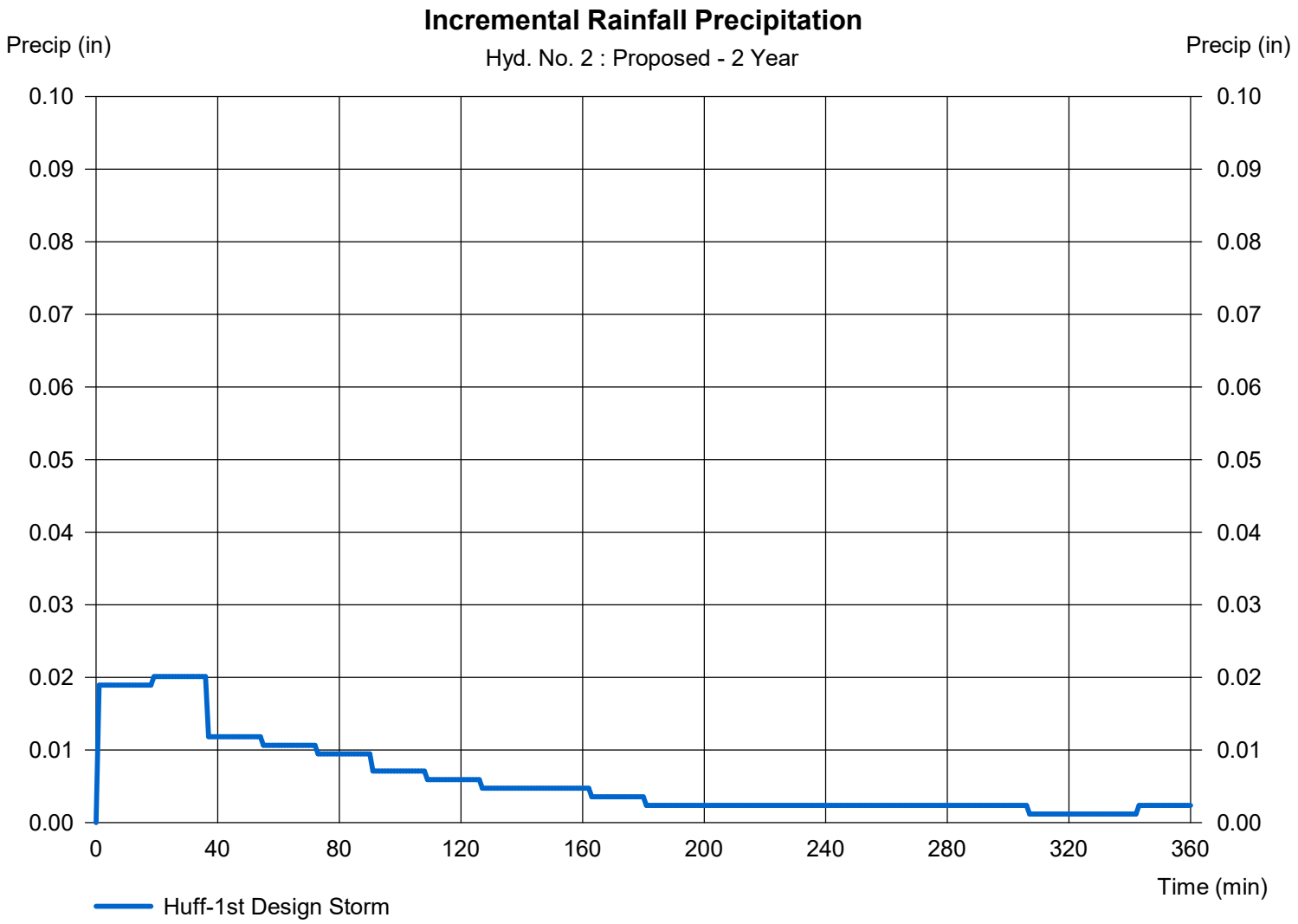
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 2

Proposed

Storm Frequency	= 2 yrs	Time interval	= 1 min
Total precip.	= 2.1300 in	Distribution	= Huff-1st
Storm duration	= 6.00 hrs		



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	1.723	1	93	18,064	------	------	------	Existing
2	SCS Runoff	3.209	1	52	26,284	------	------	------	Proposed

Hydrograph Report

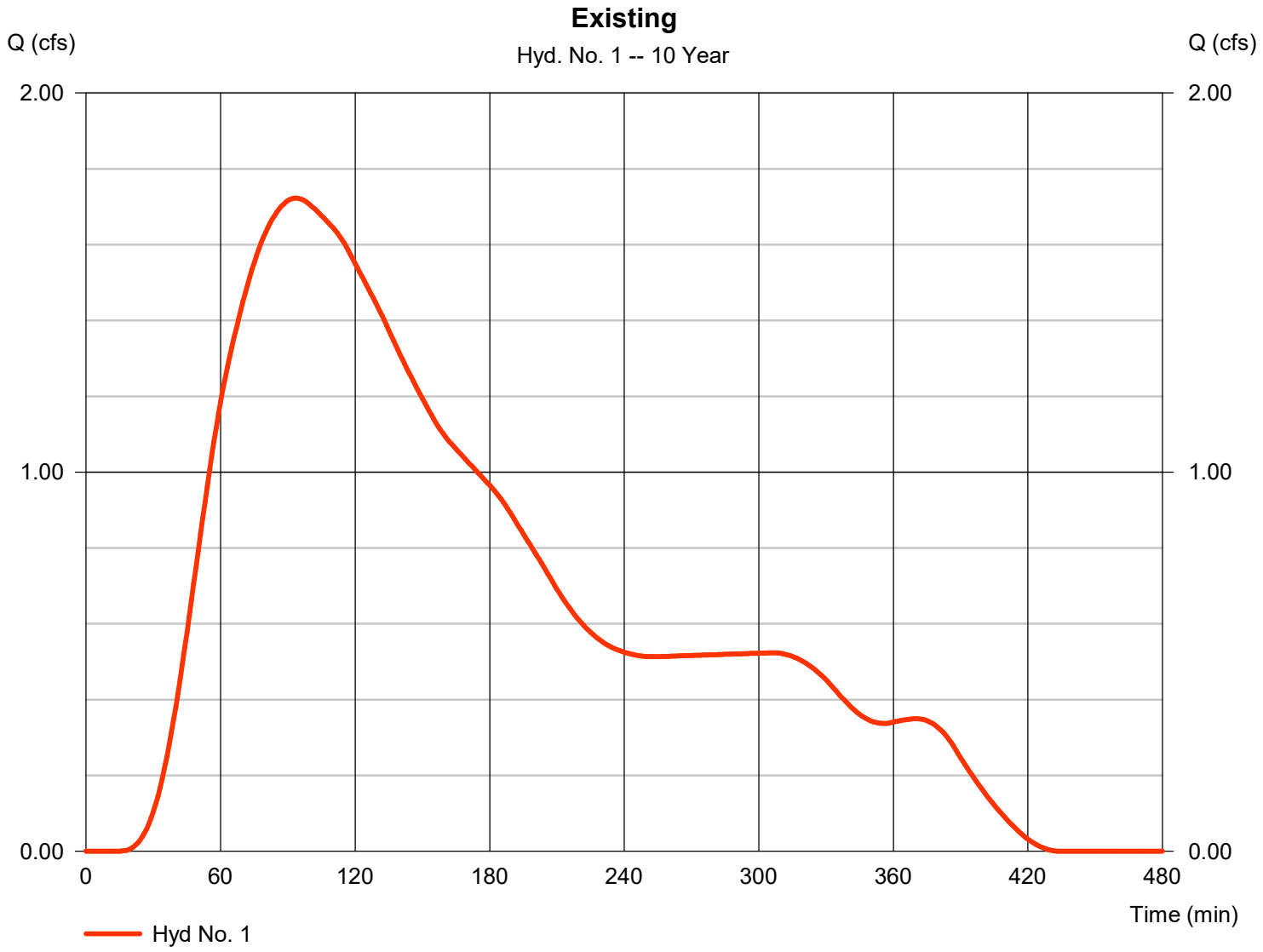
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.723 cfs
Storm frequency	=	10 yrs	Time to peak	=	93 min
Time interval	=	1 min	Hyd. volume	=	18,064 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	3.15 in	Distribution	=	Huff-1st
Storm duration	=	6.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



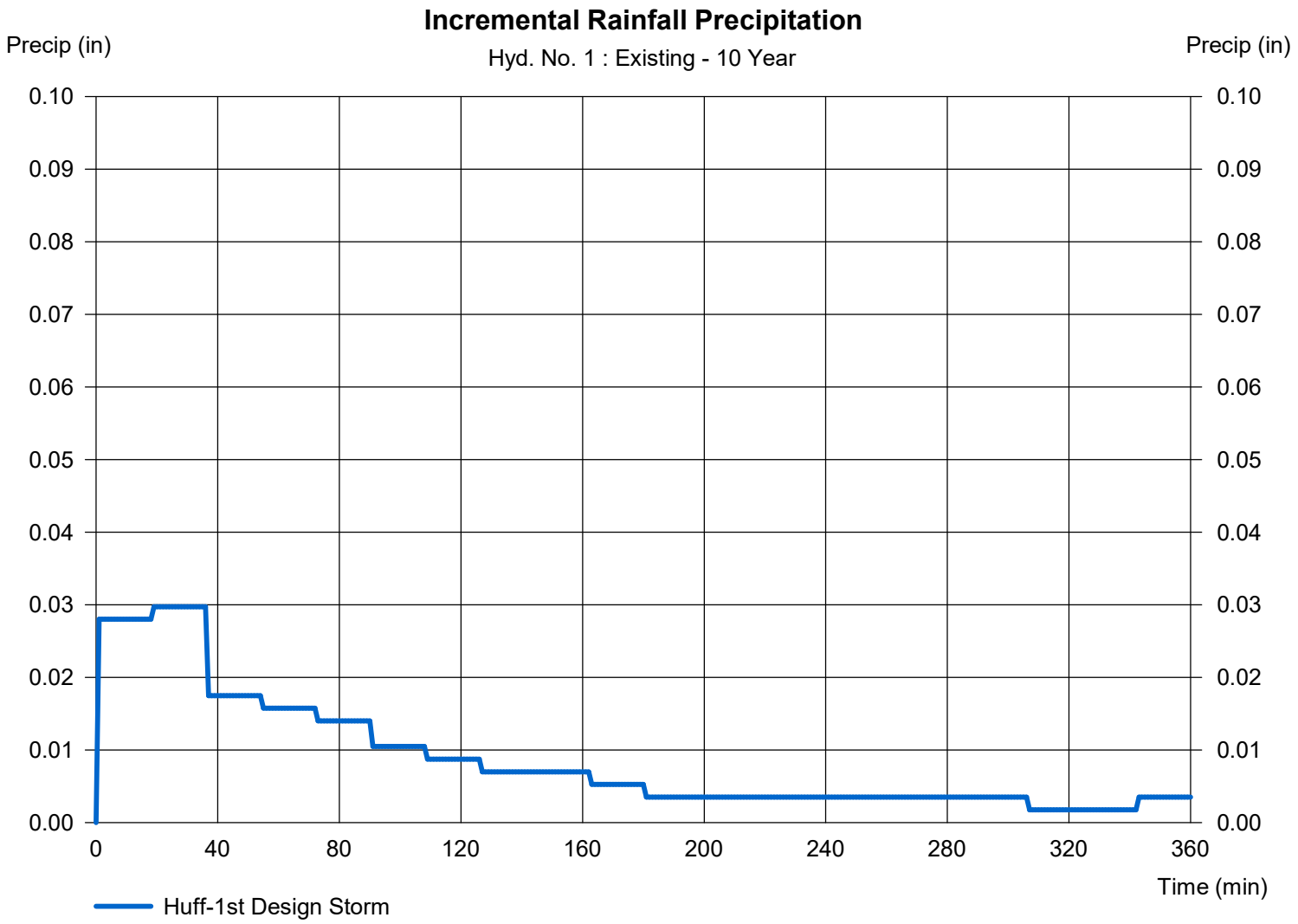
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 10 yrs	Time interval	= 1 min
Total precip.	= 3.1500 in	Distribution	= Huff-1st
Storm duration	= 6.00 hrs		



Hydrograph Report

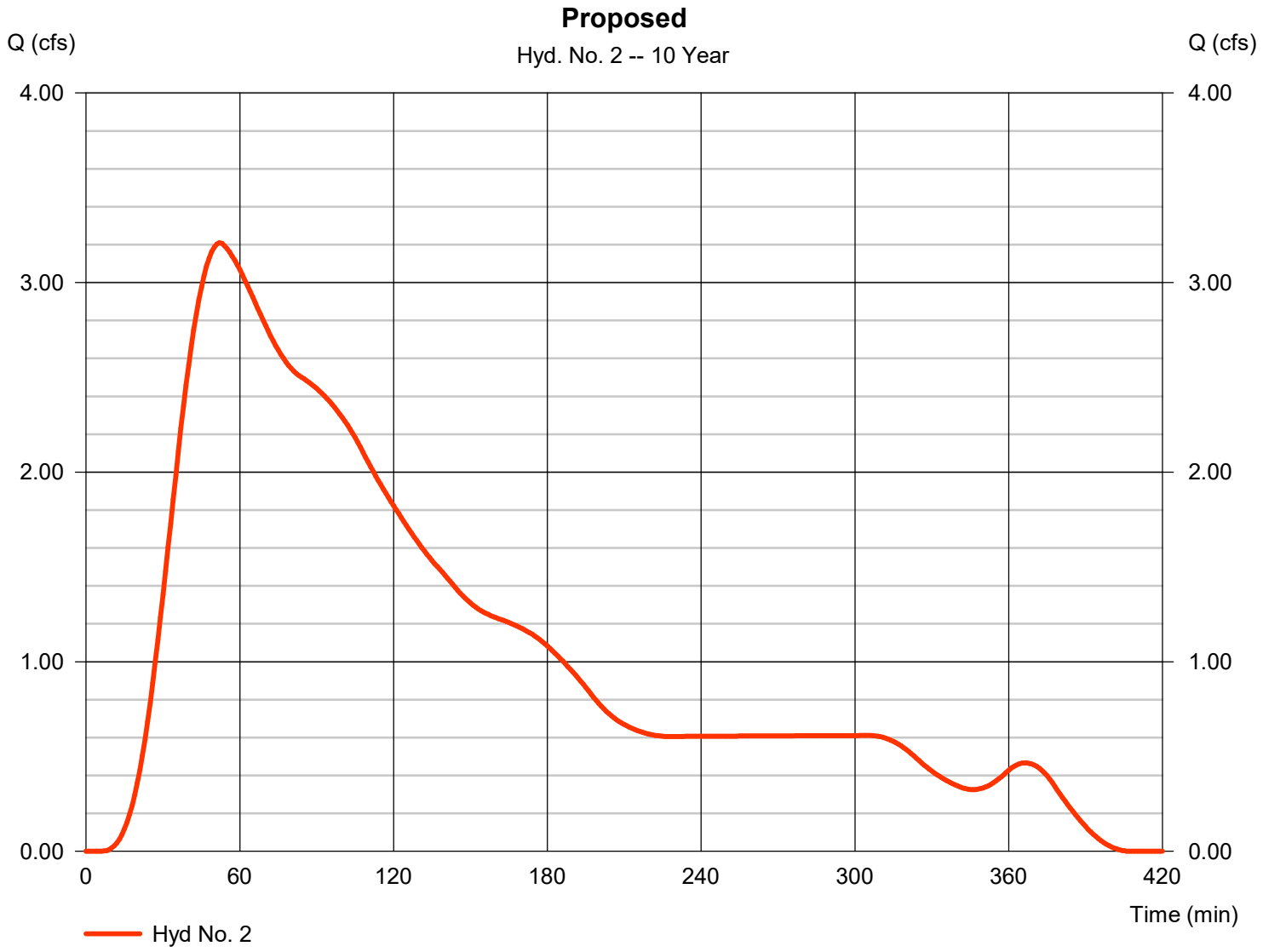
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 2

Proposed

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.209 cfs
Storm frequency	=	10 yrs	Time to peak	=	52 min
Time interval	=	1 min	Hyd. volume	=	26,284 cuft
Drainage area	=	3.020 ac	Curve number	=	93*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	30.00 min
Total precip.	=	3.15 in	Distribution	=	Huff-1st
Storm duration	=	6.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.020 x 84) + (1.910 x 98) + (0.090 x 98)] / 3.020



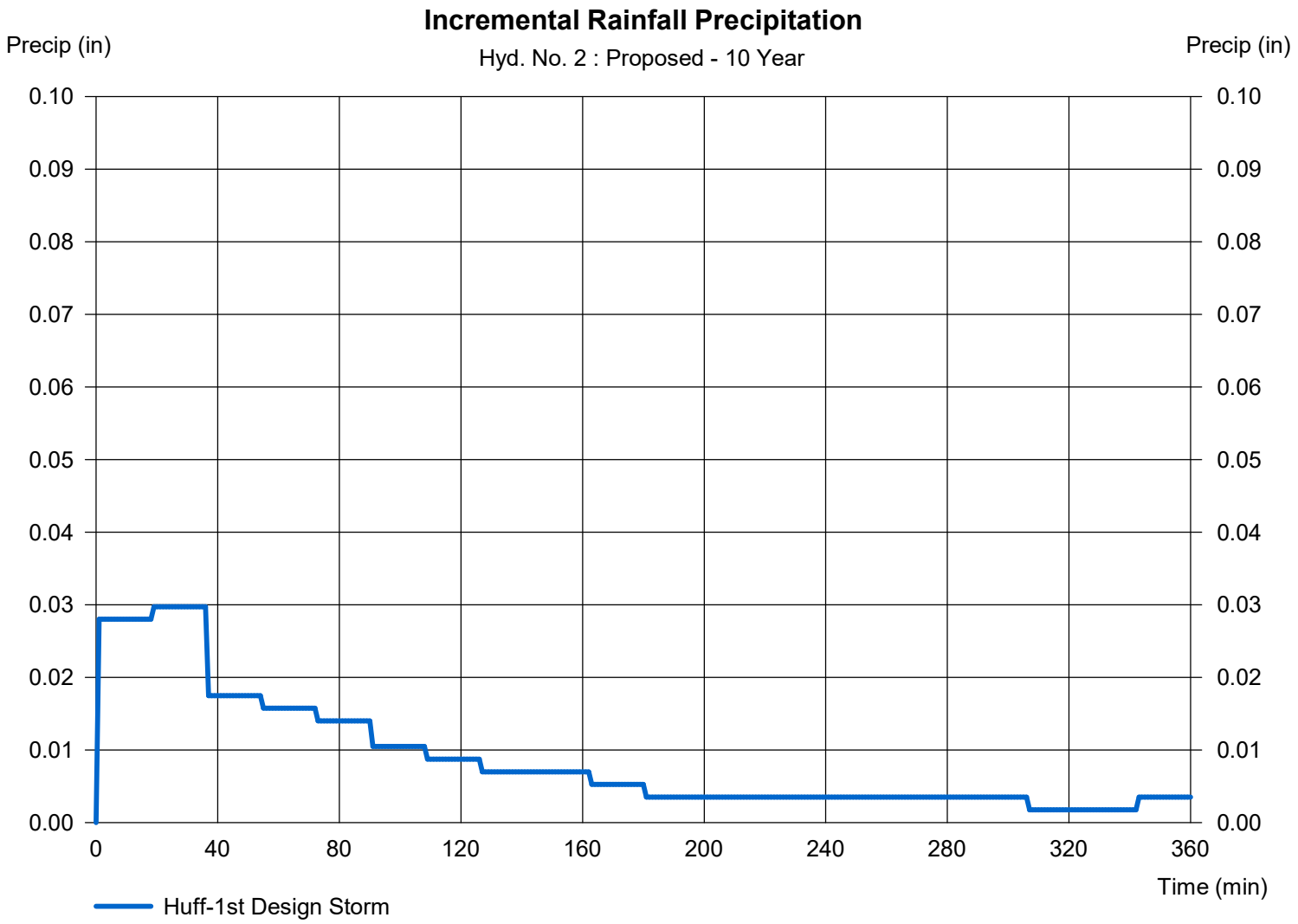
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 2

Proposed

Storm Frequency	= 10 yrs	Time interval	= 1 min
Total precip.	= 3.1500 in	Distribution	= Huff-1st
Storm duration	= 6.00 hrs		



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	2.383	1	90	24,371	------	------	------	Existing
2	SCS Runoff	4.233	1	51	33,377	------	------	------	Proposed

Hydrograph Report

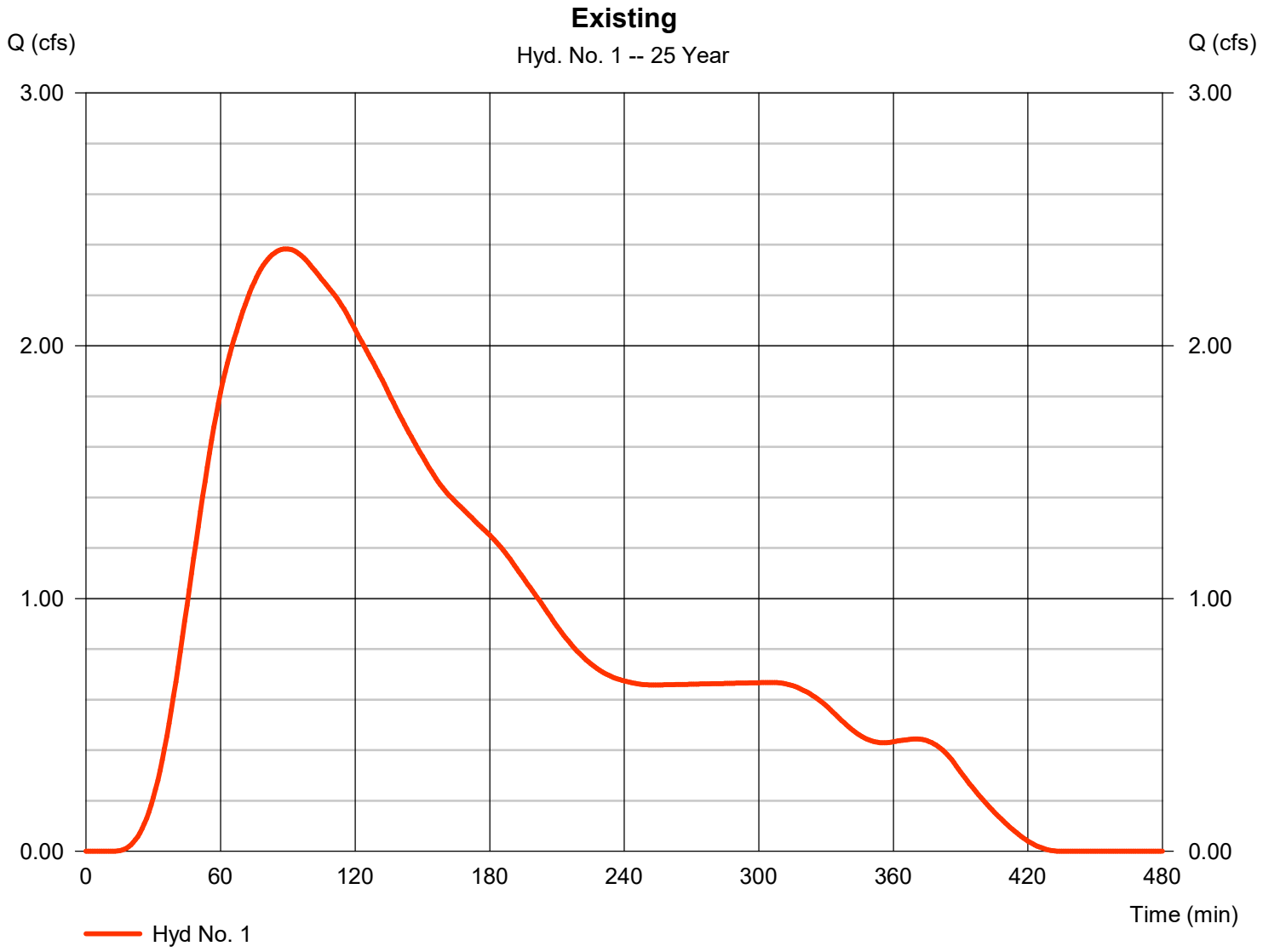
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.383 cfs
Storm frequency	=	25 yrs	Time to peak	=	90 min
Time interval	=	1 min	Hyd. volume	=	24,371 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	3.82 in	Distribution	=	Huff-1st
Storm duration	=	6.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



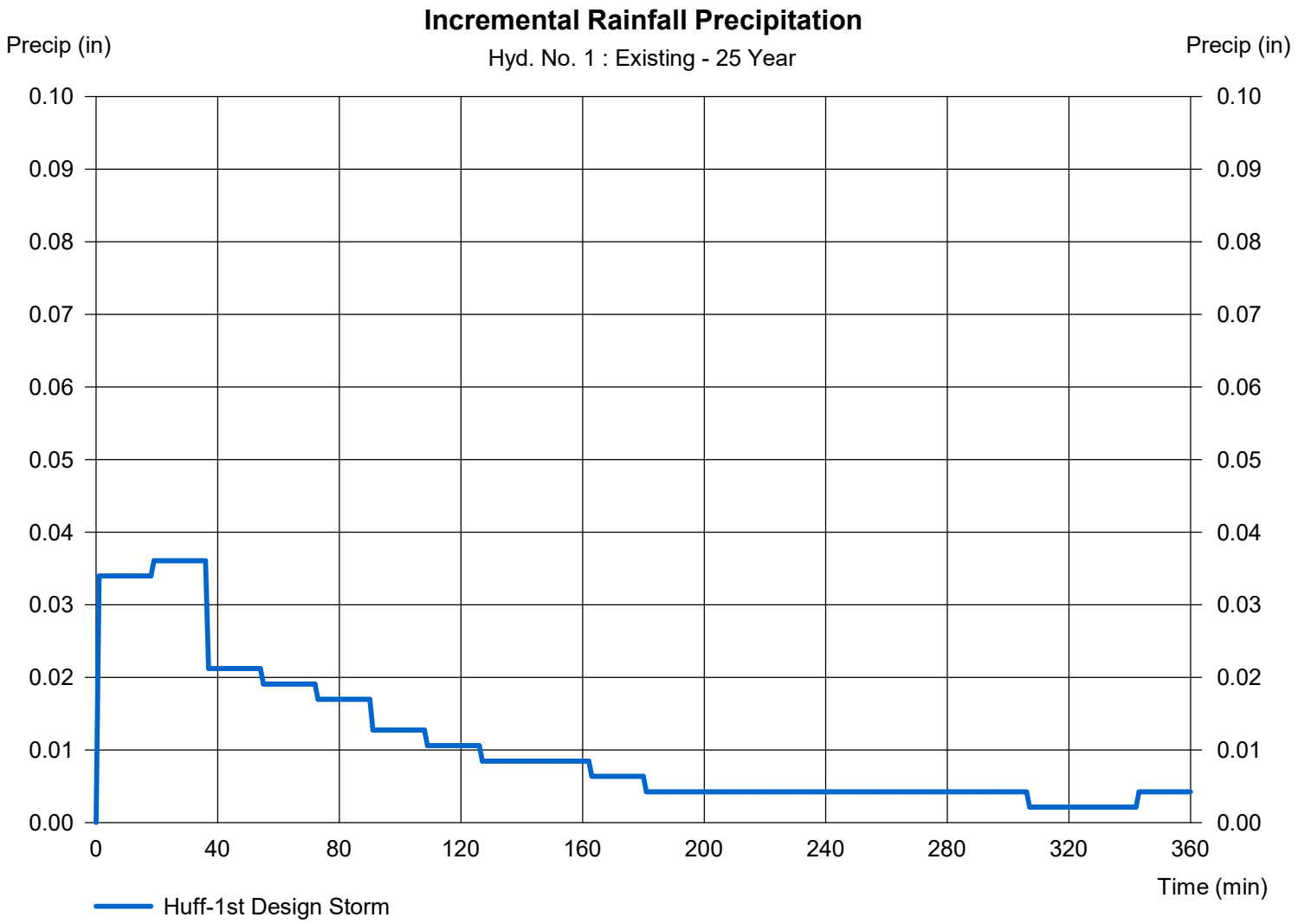
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 25 yrs	Time interval	= 1 min
Total precip.	= 3.8200 in	Distribution	= Huff-1st
Storm duration	= 6.00 hrs		



Hydrograph Report

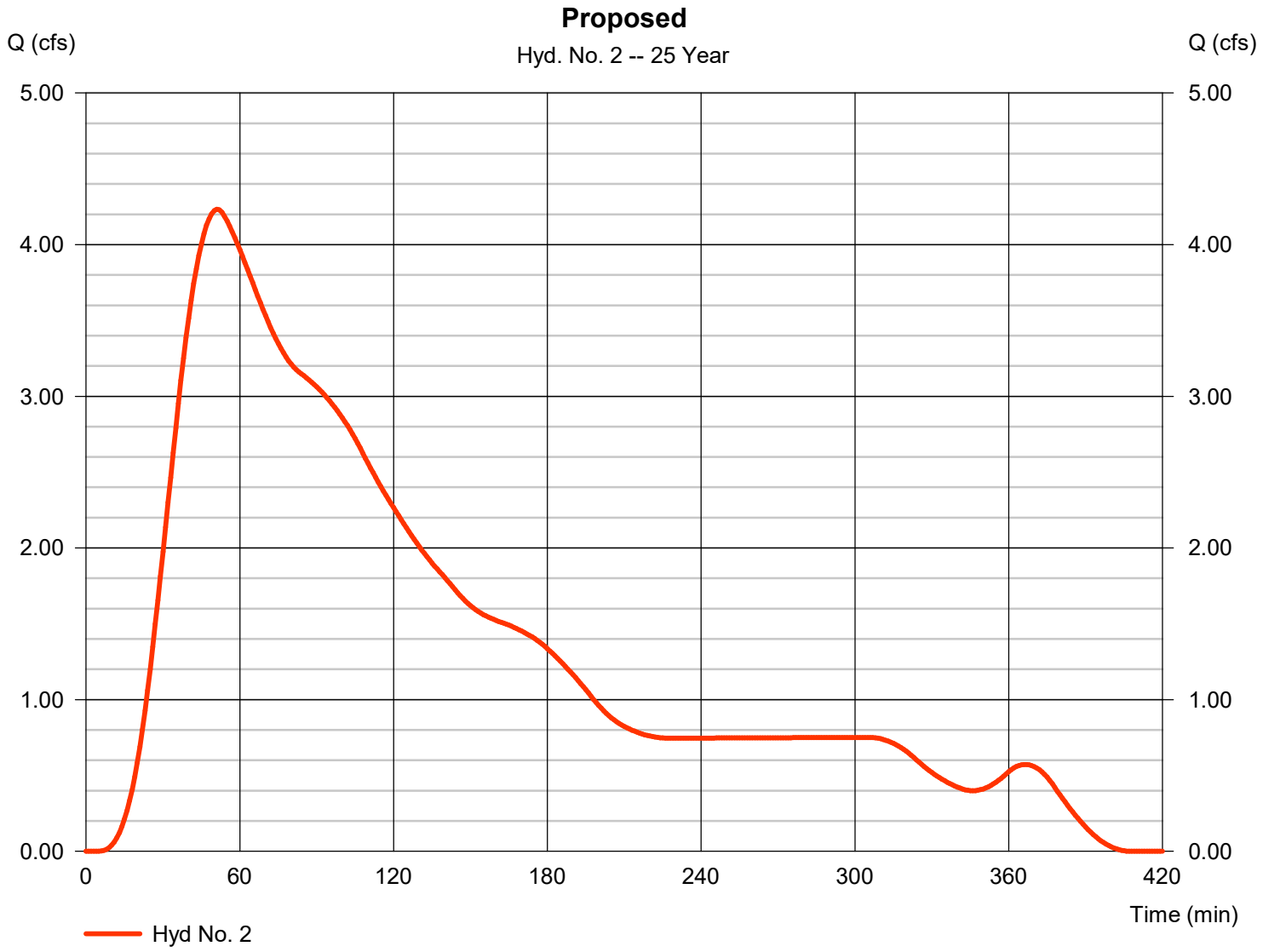
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 2

Proposed

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.233 cfs
Storm frequency	=	25 yrs	Time to peak	=	51 min
Time interval	=	1 min	Hyd. volume	=	33,377 cuft
Drainage area	=	3.020 ac	Curve number	=	93*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	30.00 min
Total precip.	=	3.82 in	Distribution	=	Huff-1st
Storm duration	=	6.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.020 x 84) + (1.910 x 98) + (0.090 x 98)] / 3.020



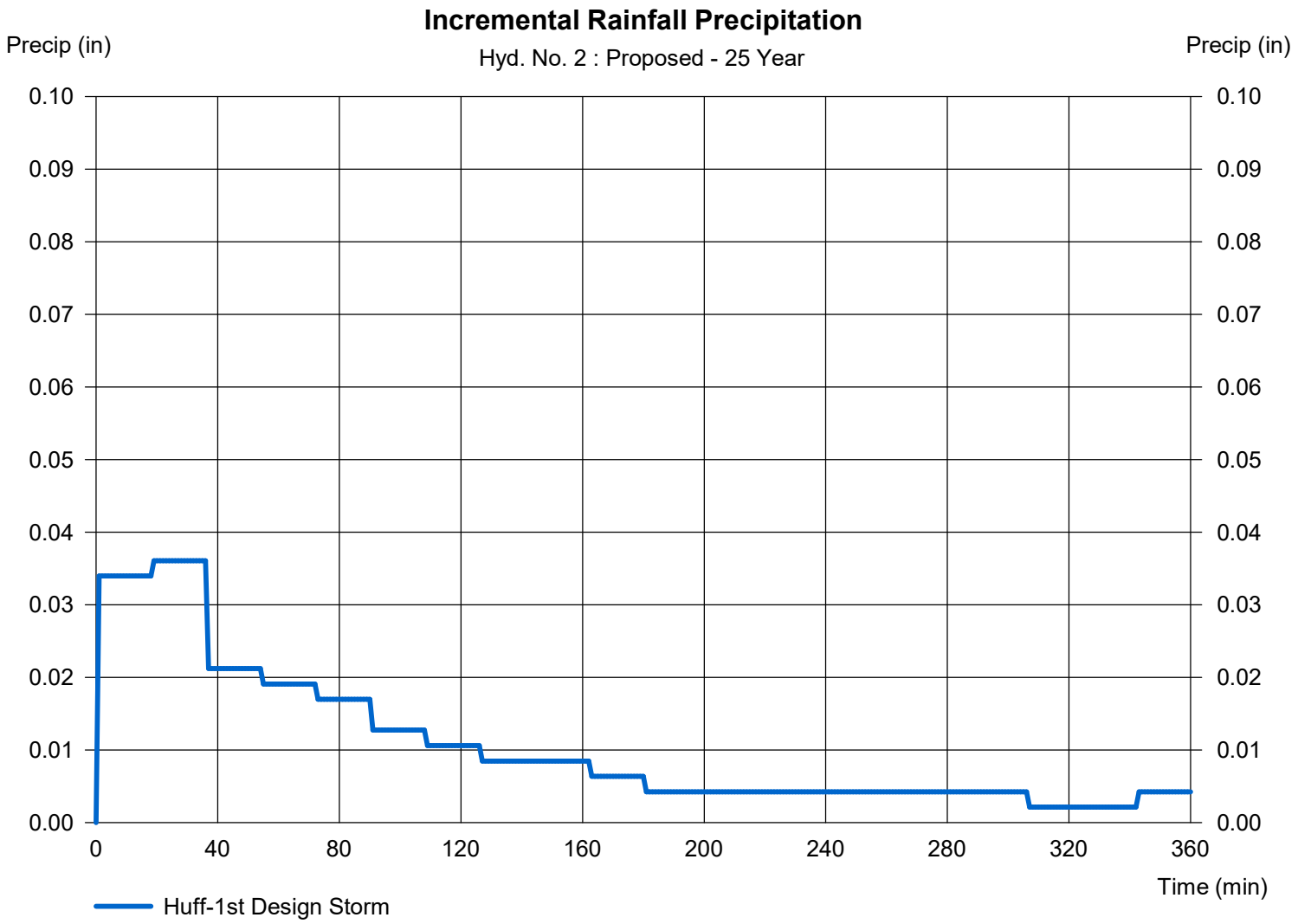
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 2

Proposed

Storm Frequency	= 25 yrs	Time interval	= 1 min
Total precip.	= 3.8200 in	Distribution	= Huff-1st
Storm duration	= 6.00 hrs		



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	3.633	1	83	35,809	------	------	------	Existing
2	SCS Runoff	6.057	1	50	45,800	------	------	------	Proposed

Hydrograph Report

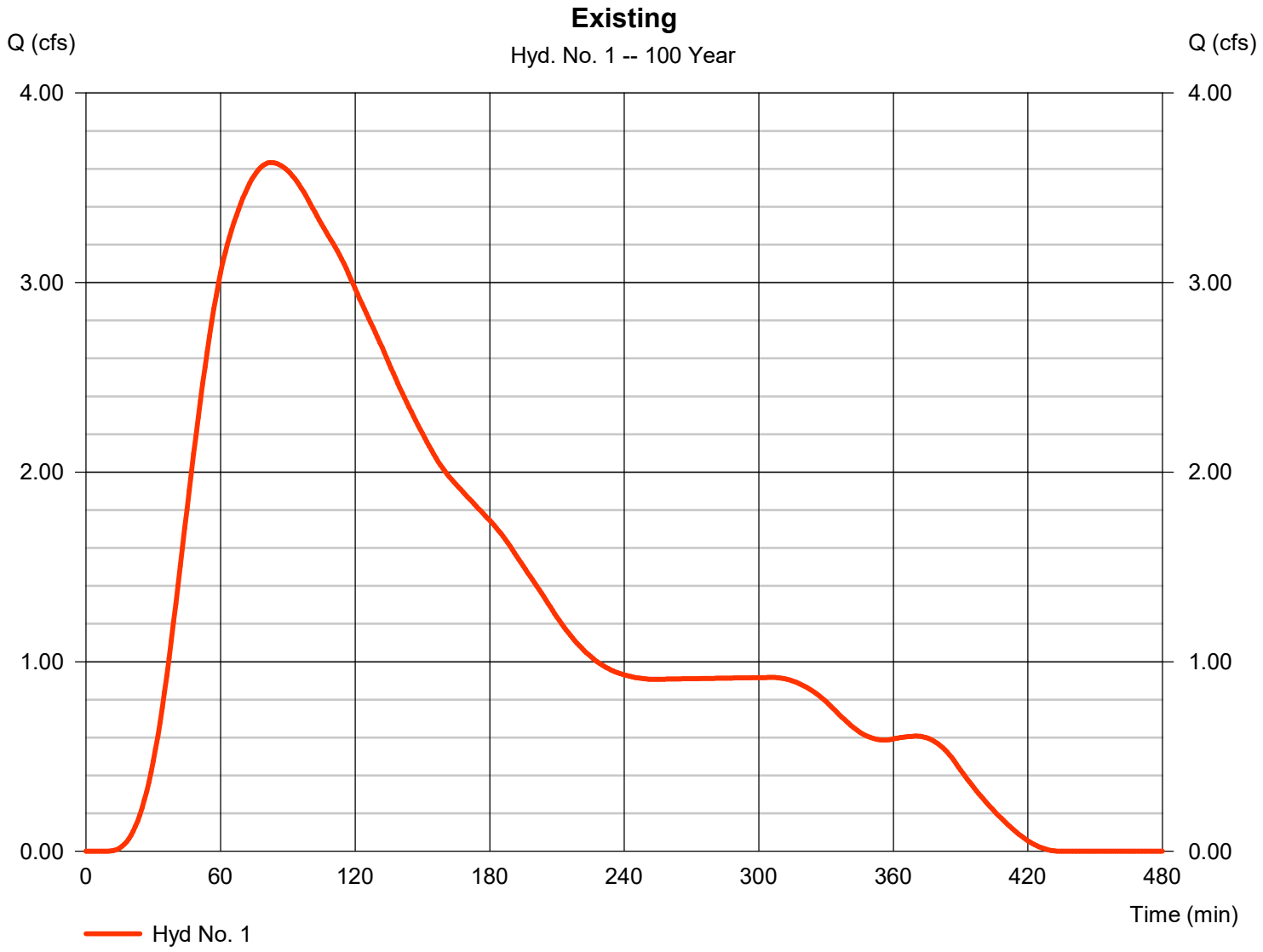
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.633 cfs
Storm frequency	=	100 yrs	Time to peak	=	83 min
Time interval	=	1 min	Hyd. volume	=	35,809 cuft
Drainage area	=	3.020 ac	Curve number	=	84*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	47.00 min
Total precip.	=	4.98 in	Distribution	=	Huff-1st
Storm duration	=	6.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(3.020 x 84)] / 3.020



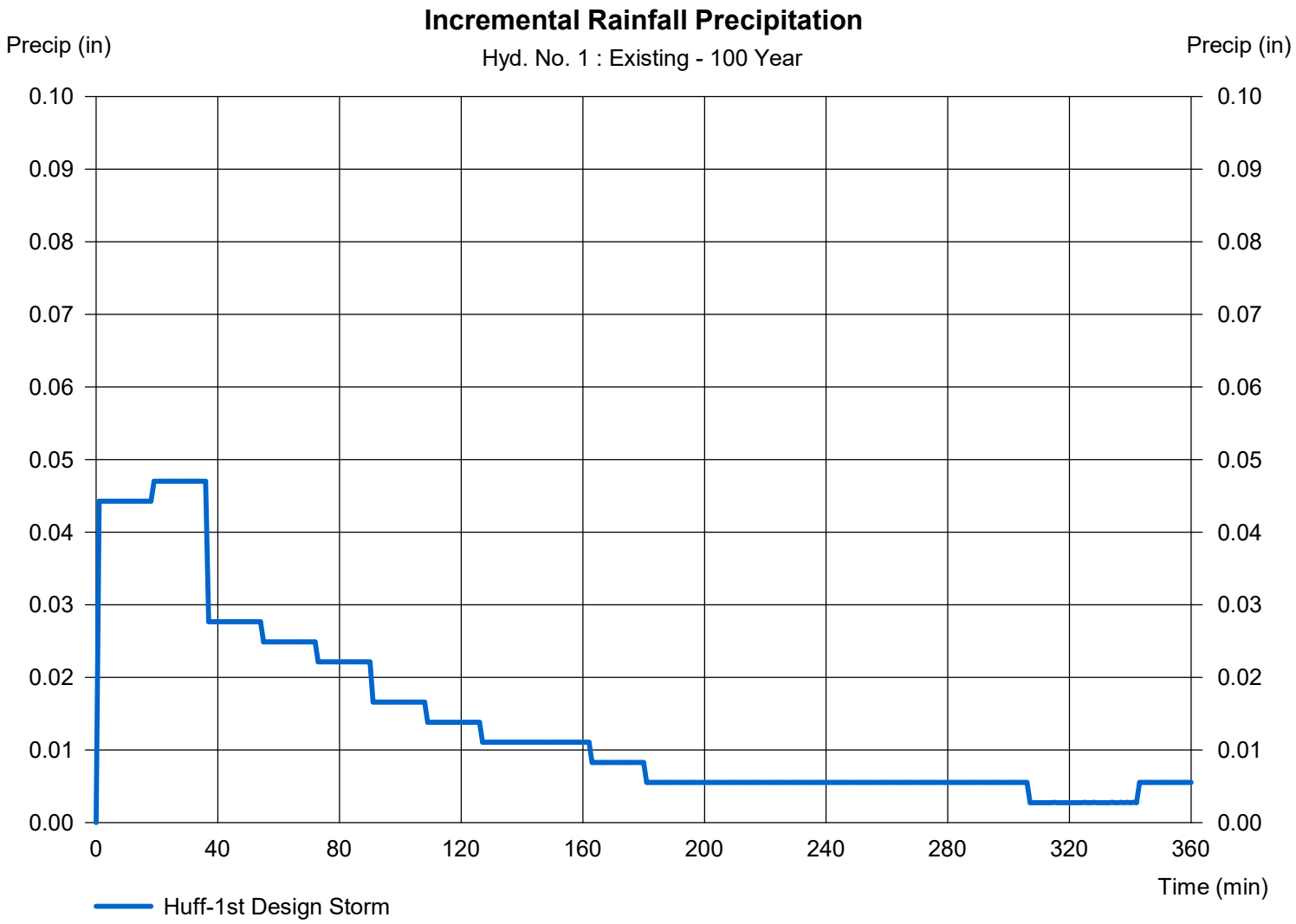
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 1

Existing

Storm Frequency	= 100 yrs	Time interval	= 1 min
Total precip.	= 4.9800 in	Distribution	= Huff-1st
Storm duration	= 6.00 hrs		



Hydrograph Report

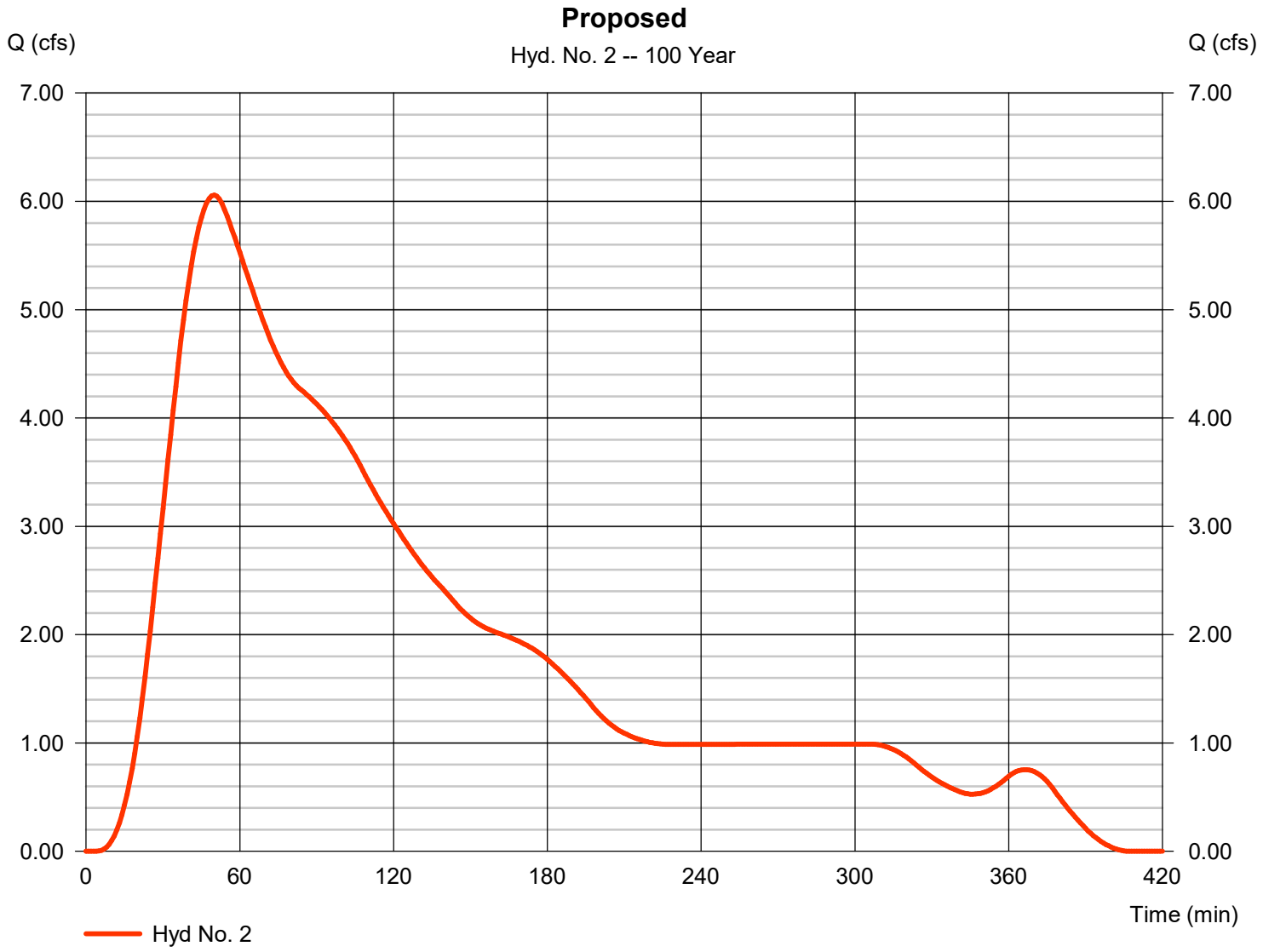
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 2

Proposed

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.057 cfs
Storm frequency	=	100 yrs	Time to peak	=	50 min
Time interval	=	1 min	Hyd. volume	=	45,800 cuft
Drainage area	=	3.020 ac	Curve number	=	93*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	30.00 min
Total precip.	=	4.98 in	Distribution	=	Huff-1st
Storm duration	=	6.00 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.020 x 84) + (1.910 x 98) + (0.090 x 98)] / 3.020



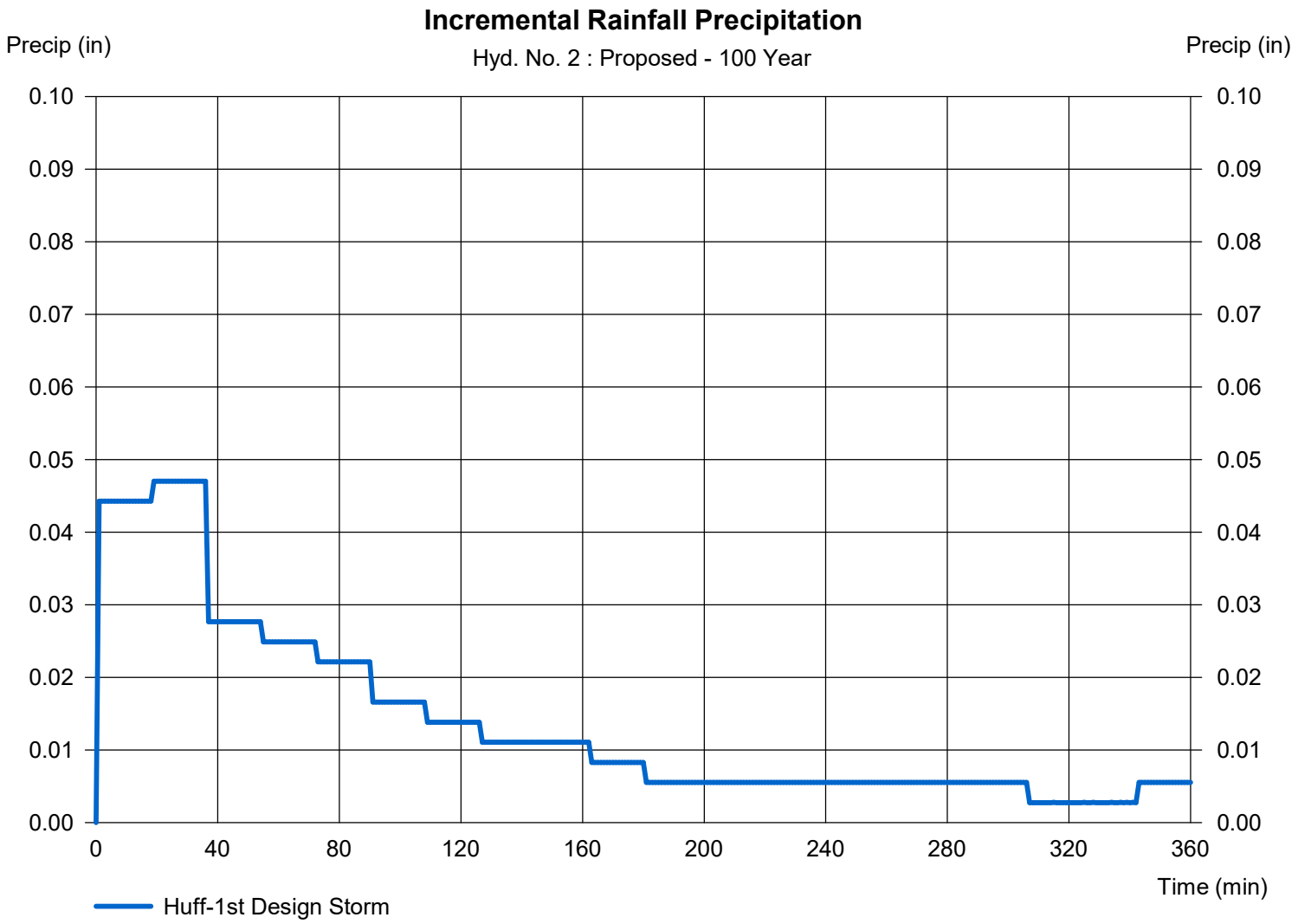
Precipitation Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Hyd. No. 2

Proposed

Storm Frequency	= 100 yrs	Time interval	= 1 min
Total precip.	= 4.9800 in	Distribution	= Huff-1st
Storm duration	= 6.00 hrs		



Hydraflow Rainfall Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	56.8128	9.8000	0.8624	--------
3	0.0000	0.0000	0.0000	--------
5	61.0581	9.5000	0.8270	--------
10	58.2090	8.5000	0.7837	--------
25	54.0065	7.2000	0.7275	--------
50	53.5558	6.6000	0.6986	--------
100	50.0862	5.6000	0.6582	--------

File name: Lions Trucking IDF.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	5.56	4.33	3.56	3.04	2.66	2.37	2.14	1.95	1.80	1.67	1.56	1.46
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	6.69	5.23	4.33	3.72	3.27	2.92	2.65	2.42	2.24	2.08	1.95	1.83
10	7.57	5.91	4.90	4.22	3.71	3.33	3.03	2.78	2.57	2.40	2.25	2.12
25	8.75	6.82	5.66	4.88	4.32	3.89	3.55	3.27	3.04	2.84	2.68	2.53
50	9.66	7.52	6.26	5.41	4.80	4.33	3.96	3.66	3.41	3.19	3.01	2.85
100	10.59	8.21	6.84	5.93	5.27	4.77	4.37	4.05	3.78	3.56	3.36	3.19

Tc = time in minutes. Values may exceed 60.

Precip. file name: Z:\21346 - Lions Tran Inc (Bburg) Maintenance Building\Design\Drainage\Lions_Huff6hr.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	2.13	0.00	0.00	3.15	3.82	0.00	4.98
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	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix B – Pipe, Orifice, and Inlet Calculations

MOENCH ENGINEERING, P.C.

STORM SEWER DESIGN - RATIONAL METHOD

10-YEAR RAINFALL INTENSITY:HENDRICKS CNTY DCAM EQUATION MANNING ROUGHNESS COEFFICIENT = 0.013 RCP

PROJ.: 21346 **DATE:** 12/19/2025

DESC: Lion Trans Inc. **ENGR:** **C. Brown**

LINE DESIG.	FROM STR. NO.	TO STR. NO.	PIPE LENGTH (FT)	C	A (ACRE)	C x A	SUM OF CA	Tc (MIN)	Tcum (MIN)	I (IN/HR)	Q (CFS)	PIPE DIA. (IN)	PIPE GRADE (%)	PIPE CAP. (CFS)	PIPE % FLOW	FULL VEL. (FPS)	EXTRA CAP. (CFS)	TRAV. TIME (MIN)	RIM ELEV. UPSTM.	RIM ELEV. DNSTM.	INVERT ELEV. UPSTM.	INVERT ELEV. DNSTM.	PIPE COVER UPSTM.	PIPE COVER DNSTM.
New Line	INLET1	INLET2	290	0.72	1.27	0.91	0.91	5.0	5.00	5.57	5.081	18	0.30	5.753	88.315	3.26	0.67	1.5	870.56	869.99	864.01	863.14	4.84	5.14
	INLET2	AR8	64	0.67	1.75	1.17	2.08	5.0	6.48	5.13	10.686	24	0.30	12.391	86.237	3.94	1.71	0.3	869.99	870.90	863.14	862.95	4.60	5.70
	AR8	END	64								10.686	24	0.30	12.391	86.241	3.94	1.70	0.3	870.90	NA	862.85	862.66	5.80	NA

Inlet Calculations

Calculations for Outlet Orifice Size

Q=Cd*Ao*SQRT(2*g*h)

Ao = Area of Orifice, Cd = Coefficient of Orifice, Q = Flow, g = gravity constant, h = height of water abov

We know Q, and need to solve for Ao

Ao = Q/(Cd*SQRT(2*g*h))

INLET 1			INLET 2		
Q =	5.081		Q =	5.689	
Cd =	0.6		Cd =	0.6	
g =	32.2		g =	32.2	
h =	0.5		h =	0.5	
Ao =	1.49	Square Feet	Ao =	1.67	Square Feet

Outlet Structure Calculations

Calculations for Outlet Orifice Size

Q=Cd*Ao*SQRT(2*g*h)

Ao = Area of Orifice, Cd = Coefficient of Orifice, Q = Flow, g = gravity constant, h = height of water above invert of orifice.

We know A, need to find Q

2-Year			10-Year		
A =	0.087266		A =	0.087266	
Cd =	0.6		Cd =	0.6	
g =	32.2		g =	32.2	
h =	1.65		h =	2.81	
Q =	0.54	Cubic Feet per Second	Q =	0.70	Cubic Feet per Second
solving for d in circular pipe: d=SQRT(4*Ao/*pie)*			solving for d in circular pipe: d=SQRT(4*Ao/*pie)*		
d =	0.33	feet	d =	0.33	feet
d =	**4.00**	**inches (Pipe diameter in inches)**	**d =**	**4.00**	**inches (Pipe diameter in inches)**

25-Year			100-year		
A =	0.087266		A =	0.087266	
Cd =	0.6		Cd =	0.6	
g =	32.2		g =	32.2	
h =	0.59		h =	1.54	
Q =	0.32	Cubic Feet per Second	Q =	0.52	Cubic Feet per Second
solving for d in circular pipe: d=SQRT(4*Ao/*pie)*			solving for d in circular pipe: d=SQRT(4*Ao/*pie)*		
d =	0.33	feet	d =	0.33	feet
d =	**4.00**	**inches (Pipe diameter in inches)**	**d =**	**4.00**	**inches (Pipe diameter in inches)**
Qtotal =	1.03	Cubic Feet per Second	Qtotal =	1.23	Cubic Feet per Second
Qtotal= Q10-year+Q25-year			Qtotal= Q10-year+Q100-year		

Emergency		
Q =	20.93	
Cd =	0.6	
g =	32.2	
h =	0.99	
Ao =	4.37	Square Feet
solving for d in circular pipe: d=SQRT(4*Ao/*pie)*		
d =	1.38	feet
d =	**16.55**	**inches (Pipe diameter in inches)**

MOENCH ENGINEERING, P.C.

STORM SEWER DESIGN - RATIONAL METHOD

MANNING ROUGHNESS COEFFICIENT = 0.013 RCP

PROJ.: 21346 **DATE:** 12/19/2025

DESC: Lion Trans Inc. **ENGR:** C. Brown

LINE DESIG.	FROM STR. NO.	TO STR. NO.	PIPE LENGTH (FT)	C	A (ACRE)	C x A	SUM OF CA	Tc (MIN)	Tcum (MIN)	I (IN/HR)	Q (CFS)	PIPE DIA. (IN)	PIPE GRADE (%)	PIPE CAP. (CFS)	PIPE % FLOW	FULL VEL. (FPS)	EXTRA CAP. (CFS)	TRAV. TIME (MIN)	RIM ELEV. UPSTM.	RIM ELEV. DNSTM.	INVERT ELEV. UPSTM.	INVERT ELEV. DNSTM.	PIPE COVER UPSTM.	PIPE COVER DNSTM.
NEW LINE	INV	INL6	116								20.930	36	0.11	22.121	94.614	3.13	1.19	0.6	na	868.25	862.66	862.53	na	2.38
	INL6	INL7	54								20.930	36	0.11	22.121	94.614	3.13	1.19	0.3	868.25	868.85	862.53	862.47	2.38	3.04
	INL7	INL8	50	0.43	0.17	0.07	0.07	5.0	5.00	7.56	21.482	36	0.12	23.105	92.977	3.27	1.62	0.3	868.85	868.32	862.47	862.41	3.04	2.57
	INL8	INL9	175	0.60	0.10	0.06	0.13	5.0	5.25	7.46	21.929	36	0.13	24.048	91.185	3.40	2.12	0.9	868.32	868.41	862.41	862.19	2.57	2.89
	INL9	INL10	151	0.65	0.13	0.08	0.22	5.0	6.11	7.11	22.483	36	0.13	24.048	93.491	3.40	1.57	0.7	868.41	867.81	862.19	861.99	2.89	2.49
	INL10	INL11	164	0.71	0.14	0.10	0.32	5.0	6.85	6.84	23.105	36	0.14	24.956	92.581	3.53	1.85	0.8	867.81	867.83	861.99	861.76	2.49	2.74
	INL11	INL12	164	0.71	0.14	0.10	0.42	5.0	7.63	6.58	23.677	36	0.14	24.956	94.874	3.53	1.28	0.8	867.83	867.79	861.76	861.53	2.74	2.93
	INL12	INL13	80	0.71	0.09	0.06	0.48	5.0	8.40	6.34	23.980	36	0.15	25.832	92.832	3.65	1.85	0.4	867.79	867.57	861.53	861.41	2.93	2.83
	INL13	INL14	75	0.55	0.13	0.07	0.55	5.0	8.77	6.24	24.376	36	0.16	26.679	91.365	3.77	2.30	0.3	867.57	867.38	861.41	861.29	2.83	2.76
	INL14	END	268	0.43	0.31	0.13	0.69	5.0	9.10	6.14	25.145	36	0.16	26.679	94.249	3.77	1.53	1.2	867.38	865.35	861.29	860.86	2.76	1.16
	SOUTH	INL7	97	0.42	0.12	0.05	0.05	5.0	5.00	7.56	0.378	12	3.13	6.299	6.005	8.02	5.92	0.2	na	867.49	865.49	862.47	na	3.85

Appendix C – Water Quality Calculations

Water Quality Calculations

Project Name: Lion's Trucking
Project Job #: 21346

Water Quality Volume
WQv = ((P)(Rv)(A))/12

P= 1" of Rainfall
Rv = Volumetric Flow Rate = 0.05 + 0.009 (I)
I = percent of impervious area
A = Area in acres

Total Site (acres)	3.02	Percent -Impervious Area (%)	66.23
Total Impervious Area (acres)	2	Volumetric Flow Rate	0.65
Prop. Time of Conc. (min)	9.00	Water Quality Volume (ac-ft)	0.16
		Water Quality Volume (ft3)	**7082.13**
*Forebay Volume is included in overall req. volume		Forebay (ac-ft)	0.02
		Forebay (ft3)	**726.00**

Water Quality Curve Number

$$\text{WQ Curve Number} = \frac{1000}{[10+5P+10Qa- 10*(\text{sqrt}(Qa^2+1.25*Qa*P))]}$$

P = 1" (rainfall for water quality storm event)
Qa = runoff volume, in inches = 1" * Rv = Rv (inches)
Rv = volumetric runoff coefficient

WQ Curve Number = 96.22 * Check with CBBEL WQ-CN Graph

Water Quality Runoff Rate TR-20 Method * Design Criteria different for City of Indianapolis

	Input Data	* Indy
Dimensionless Hydrograph:	SCS Type II Distribution	Huff 1st quartile
Curve Number:	96.22	98
Area:	3.02	3.02
Rainfall:	1.00	0.30
Time of Concentration:	9.00	9.00

Area for TR-20 calculated runoff * Utilize Peak Discharge for WQ Structure BMP

SCS Method

Given Input Data:
- Description ..... Water Quality
- Drainage area ..... 1.5540 ac
- Runoff curve number, CN 97
- Time of concentration, Tc ..... 5.0000 min
- Dimensionless Hydrograph ..... scsdim
- Rainfall ..... 1.0000 in
- Distribution Curve ..... tr20t2: Type 2, 24 hrs

Computed Results:
- **Peak discharge, qp ..... 1.5871 cfs**
- Peak Time, Tp ..... 717.5407 min
- Peak rate factor 484
- Constant, K 0.7500
- Runoff Volume ..... 0.6923 in
- ..... 1.0849 cfs-hrs
- ..... 0.0897 acft

Req. AquaShield Aqua-Swirl (per City of Indy WQ Flowrate Standards in Stormwater Manual) **AS-10**

Appendix D – Stage Storage/Discharge Table

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Tuesday, 12 / 16 / 2025

Pond No. 1 - <New Pond>

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 862.66 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	862.66	3,979	0	0
0.34	863.00	4,250	1,398	1,398
1.34	864.00	5,096	4,666	6,065
2.34	865.00	6,013	5,548	11,612
3.34	866.00	6,990	6,495	18,107
4.34	867.00	8,024	7,500	25,608
5.34	868.00	9,114	8,562	34,170

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.00	4.00	0.00	Inactive
Span (in)	= 4.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	1
Invert El. (ft)	= 862.66	865.47	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	862.66	0.00	0.00	---	---	---	---	---	---	---	---	0.000
0.34	1,398	863.00	0.17 ic	0.00	---	---	---	---	---	---	---	---	0.175
1.34	6,065	864.00	0.46 ic	0.00	---	---	---	---	---	---	---	---	0.455
2.34	11,612	865.00	0.62 ic	0.00	---	---	---	---	---	---	---	---	0.619
3.34	18,107	866.00	0.75 ic	0.25 ic	---	---	---	---	---	---	---	---	1.002
4.34	25,608	867.00	0.86 ic	0.49 ic	---	---	---	---	---	---	---	---	1.349
5.34	34,170	868.00	0.96 ic	0.65 ic	---	---	---	---	---	---	---	---	1.601

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Pond No. 1 - <New Pond>

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 862.66 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	862.66	3,979	0	0
0.34	863.00	4,250	1,398	1,398
1.34	864.00	5,096	4,666	6,065
2.34	865.00	6,013	5,548	11,612
3.34	866.00	6,990	6,495	18,107
4.34	867.00	8,024	7,500	25,608
5.34	868.00	9,114	8,562	34,170

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 4.00	4.00	0.00	Inactive
Span (in)	= 4.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	1
Invert El. (ft)	= 862.66	865.47	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

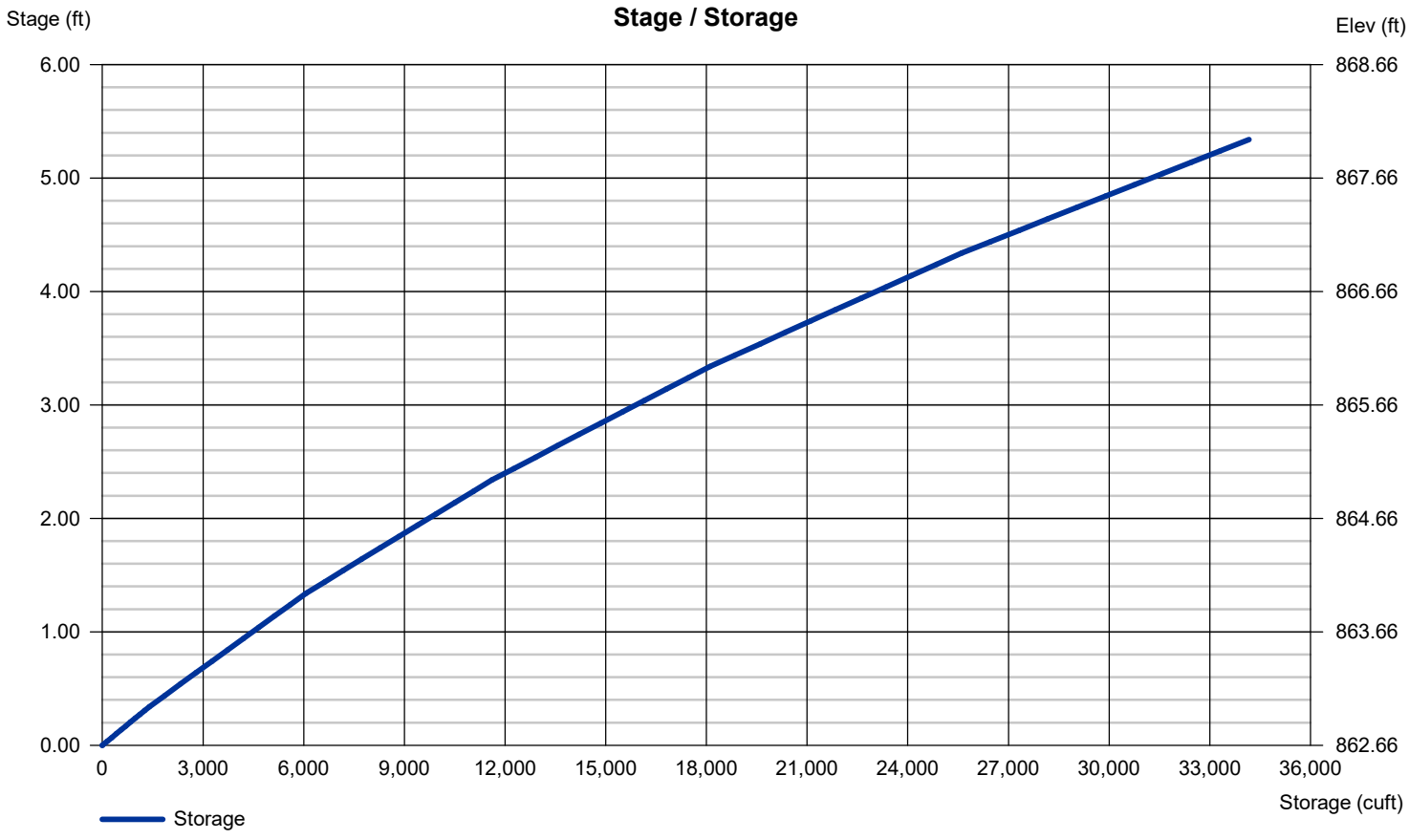
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No

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

TW Elev. (ft) = 0.00

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



Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Wednesday, 12 / 17 / 2025

Pond No. 1 - <New Pond>

Pond Data

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1.34	864.00	5,096	4,666	6,065
2.34	865.00	6,013	5,548	11,612
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Culvert / Orifice Structures

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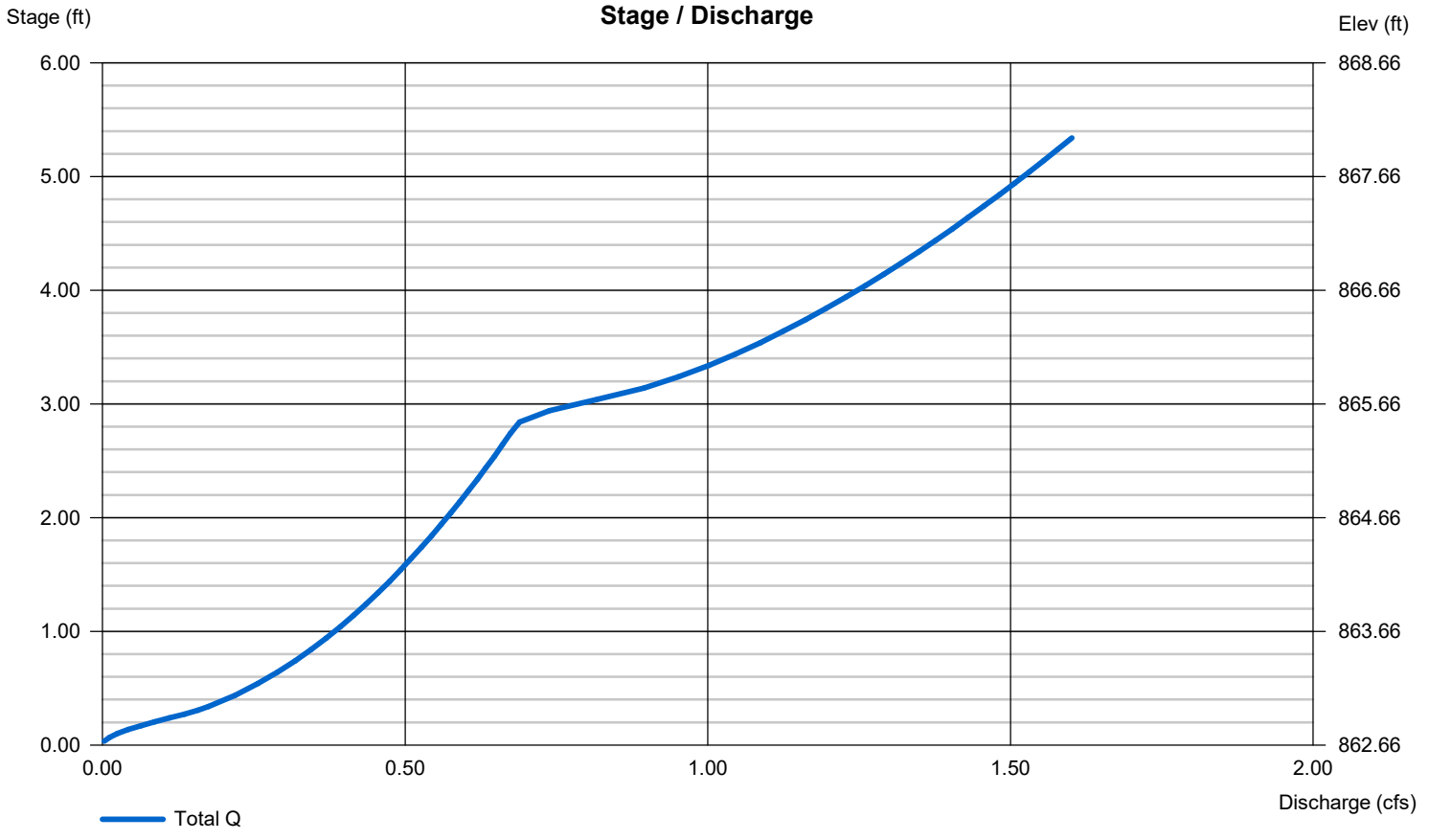
Rise (in)	= 4.00	4.00	0.00	Inactive
Span (in)	= 4.00	4.00	0.00	0.00
No. Barrels	= 1	1	0	1
Invert El. (ft)	= 862.66	865.47	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

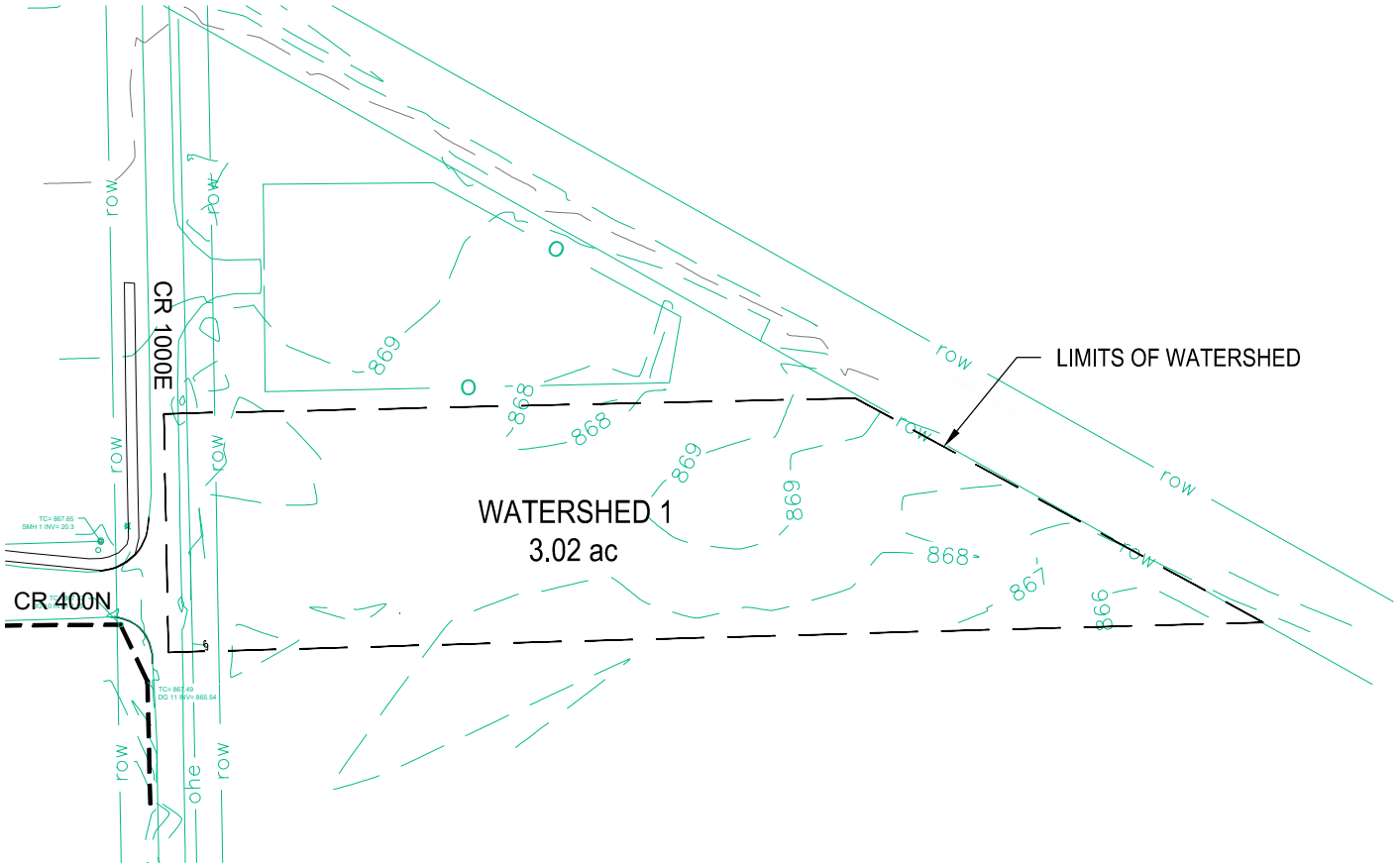
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	0.00	0.00	0.00
Crest El. (ft)	= 0.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= 1	---	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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



Appendix E – Existing Watershed



N

150 0 150 300

GRAPHIC SCALE: 1" = 150'

NOTE
PERVIOUS SURFACE = 2.97 ac (131,401 sf)
IMPERVIOUS SURFACE = 0.05 ac (2,144 sf)

Lion Transfer Inc.
4005 N. County Road 1000 E
Brownsbburg, Indiana 46122
Hendricks County, Lincoln Township

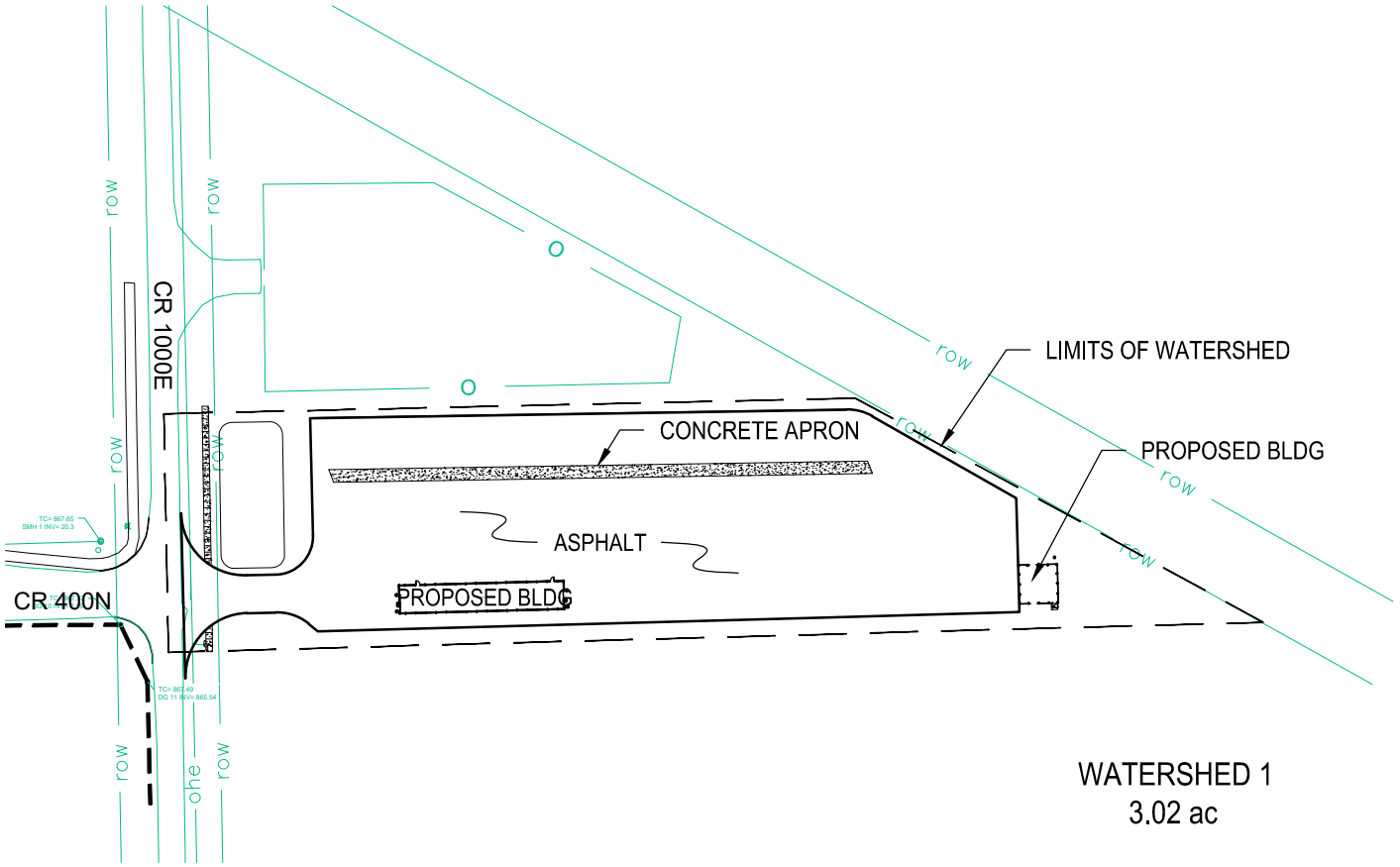
EXISTING WATERSHED MAP

Drawn By: JBF
Checked By: BEM
Project No. 21346
Date: 6/20/24

Moench Engineering
4000 Clarks Creek Road
Plainfield, Indiana 46168
Phone (317) 837-2767

Sheet Number:
WSE

Appendix F – Proposed Watershed



N

150 0 150 300

GRAPHIC SCALE: 1" = 150'

NOTE
PERVIOUS SURFACE = 0.77 ac (33,488 sf)
IMPERVIOUS SURFACE = 2.17 ac (94,492 sf)
IMPERVIOUS ROOF AREA = 0.08 ac (3,760 sf)

Lion Transfer Inc.
4005 N. County Road 1000 E
Brownsbburg, Indiana 46122
Hendricks County, Lincoln Township

PROPOSED WATERSHED MAP

Drawn By: JBF
Checked By: BEM
Project No. 21346
Date: 6/20/24

Moench Engineering
4000 Clarks Creek Road
Plainfield, Indiana 46168
Phone (317) 837-2767

Sheet Number:
WSP