Proposed Self-Storage Facility

100 N.J.S.H. Route 17 North
Borough of Upper Saddle River
Bergen County, NJ

Stormwater Management Report

January 17, 2020
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1.0 Introduction

This Stormwater Management Report shall be part of the application for Preliminary and Final Site Plan Approval for improvements to Block 1304, Lot 7.01 in the Borough of Upper Saddle River, Bergen County, New Jersey. This report is part of an application being made to the Borough of Upper Saddle River Planning Board.

This report describes the hydrologic and hydraulic analyses that were performed as part of the design of a proposed Self-Storage Facility consisting. The site improvements consist of the construction a 33,993 SF (99,651 GFA) self-storage facility, asphalt parking lot, concrete walkways, and areas of grass/landscaping. The analyses and stormwater management design have been performed in accordance with the Borough of Upper Saddle River ordinances, the NJ Stormwater Management Rule, and the New Jersey Department of Transportation (NJDOT).

2.0 Existing Conditions

Under existing conditions, the entire 2.00-acre parcel is vacant consisting mainly of dilapidated concrete and asphalt surfaces, with areas of grass/plant overgrowth and woods. The impervious surfaces cover approximately 71,190 SF of the property. Various pervious areas of grass, overgrowth and woods consist of the remaining 15,866 SF of the vacant lot.

As shown in the Existing Drainage Area Map (DA-01), stormwater runoff from the site currently flows off-site, undetained, tributary to three (3) different points of analysis. In accordance with the NJ Stormwater Best Practices Manual, and to properly calculate the times of concentration for the various drainage areas, hydrographs for vegetated and non-vegetated areas were calculated separately, then combined to form a composite hydrograph. The following are descriptions of the drainage areas under existing conditions.

Existing Conditions EX-DA-1 (INLET)
The Existing Conditions Drainage Area 1 (EX-DA-1, INLET) includes 0.70-acres of the property. The drainage area consists of asphalt and concrete surfaces with overgrowth and a wooded area bordering the northern and eastern portion of the lot. The stormwater runoff is tributary to the existing inlet located within the right-of-way of the lot directly to the north. **At the recommendation of the Borough, the existing seepage pit located in the northeastern corner of the site has been excluded from the design due to the size and insignificant attenuation of runoff.** The analysis of the drainage area has been divided into two components: a) the impervious surfaces (EX-DA-1 (I)), and b) the pervious surfaces (EX-DA-1 (P)). The runoff curve number 'CN' value calculated for the impervious surfaces is 98 with a time of concentration of 6.0 minutes. The 'CN' value calculated for the pervious surfaces is 58 with a time of concentration of 6.0 minutes. Supporting calculations are provided in this report.

Existing Conditions EX-DA-2 (DOT)
The Existing Conditions Drainage Area 2 (EX-DA-2, DOT) includes 0.61-acres of the property. The drainage area consists of mainly asphalt and concrete surfaces with portions of grass and overgrowth along the southern border of the property. The stormwater runoff is tributary to the existing inlet located within the Route 17 right-of-way. The analysis of the drainage area has been divided into two components: a) the impervious surfaces (EX-DA-2 (I)), and b) the pervious surfaces (EX-DA-2 (P)). The runoff curve number 'CN' value calculated for the impervious surfaces is 98 with a time of concentration

of 6.0 minutes. The 'CN' value calculated for the pervious surfaces is 61 with a time of concentration of 6.0 minutes. Supporting calculations are provided in this report.

Existing Conditions EX-DA-3 (TO LOT 6)

The Existing Conditions Drainage Area 3 (EX-DA-3, TO LOT 6) includes 0.33-acres of the property. The drainage area consists of asphalt driveway and concrete surfaces with small portions of dense overgrowth. The stormwater runoff sheet flows north and west, off-site to the adjacent lot 6 right-of-way. The analysis of the drainage area has been divided into two components: a) the impervious surfaces (EX-DA-3 (I)), and b) the pervious surfaces (EX-DA-3 (P)). The runoff curve number 'CN' value calculated for the impervious surfaces is 98 with a time of concentration of 6.0 minutes. The 'CN' value calculated for the pervious surfaces is 55 with a time of concentration of 6.0 minutes. Supporting calculations are provided in this report.

Existing Conditions EX-DA-4 (DEPRESSION)

The Existing Conditions Drainage Area 4 (EX-DA-4, DEPRESSION) includes 0.36-acres of the property. The drainage area consists of a concrete depression caused by the foundation remains of the previously demolished building. The depression is located within the center of the property and is surrounded by overgrowth. Stormwater runoff accumulates in the depression and does not drain off the property. The weighted runoff curve number 'CN' value calculated for EX-DA-4 is 94 with a time of concentration of 6.0 minutes. Supporting calculations are provided in this report.

The Appendix contains the hydrologic calculations for the Pre-Development conditions. Tables 2.1, 2.2 and 2.3 describe the Existing Conditions Peak Runoff Rates to the surrounding areas:

Table 2.1 Pre-Development Peak Rate of Runoff (cfs)
Tributary to Existing Inlet within Right-of-Way to the North
(EX-DA-1)

Storm Frequency	Existing Conditions
2	1.56
10	2.57
100	4.70

Table 2.2 Pre-Development Peak Rate of Runoff (cfs)
Tributary to Existing DOT Inlet Within Rt. 17 Right-of-Way
(EX-DA-2)

Storm Frequency	Existing Conditions
2	1.70
10	2.65
100	4.57

Table 2.3 Pre-Development Peak Rate of Runoff (cfs)
Tributary Off-Site to North and West (To Lot 6)
(EX-DA-3)

Storm Frequency	Existing Conditions
2	0.90
10	1.41
100	2.43

3.0 Proposed Site Conditions

The proposed site improvements include the construction a 33,993 SF (99,651 GFA) self-storage facility, asphalt parking lot, concrete walkways, and areas of grass/landscaping. The proposed development will result in a net increase of approximately 1,025 SF in impervious surfaces as compared to existing conditions. Consistent with existing conditions, stormwater runoff from the proposed development is tributary to three (3) different points of analysis.

Under proposed conditions, the site was divided into four (4) separate drainage areas. In accordance with the NJ Stormwater Best Practices Manual, and to properly calculate the times of concentration for the various drainage areas, hydrographs for vegetated and non-vegetated areas were calculated separately, then combined to form a composite hydrograph. The following is a description of the proposed drainage areas. Please refer to Proposed Drainage Area Map, DA-02, in this report.

Proposed Conditions PR-DA-1A (INLET)
The Proposed Conditions Drainage Area 1A (PR-DA-1A, INLET) includes 1.38-acres of the property. The drainage area is located within the southern and eastern portion of the site consisting of the roof runoff from the proposed self-storage facility, asphalt and concrete surfaces, areas of grass/landscaping, and existing wooded areas. The fifteen (15) banked parking spaces have been included in the analysis of this drainage area and have been treated as impervious areas under proposed conditions. The stormwater runoff from this drainage area is tributary to the underground detention basin (Subsurface Detention Basin - 1) located beneath the asphalt driveway behind the proposed building. Controlled discharge from the detention basin is conveyed to the existing inlet located within the adjacent 50' wide right-of-way located immediately to the north. The analysis of the drainage area has been divided into two components: a) the impervious surfaces (PR-DA-1A (I)), and b) the pervious surfaces (PR-DA-1A (P)). The runoff curve number 'CN' value calculated for the impervious surfaces is 98 with a time of concentration of 6.0 minutes. The 'CN' value calculated for the pervious surfaces is 58 with a time of concentration of 6.0 minutes. Supporting calculations are provided in this report.

Proposed Conditions PR-DA-1B (INLET)
The Proposed Conditions Drainage Area 1B (PR-DA-1B, INLET) includes 0.26-acres of the property. The drainage area consists of runoff from the asphalt driveway, grass areas and retaining walls located along the northern portion of the site. The stormwater runoff from this drainage area flows undetained, tributary to the existing inlet within the adjacent Lot 6 right-of-way located immediately to the. The analysis of the drainage area has been divided into two components: a) the impervious surfaces (PR-DA-

1B (I)), and b) the pervious surfaces (PR-DA-1B (P)). The runoff curve number 'CN' value calculated for the impervious surfaces is 98 with a time of concentration of 6.0 minutes. The 'CN' value calculated for the pervious surfaces is 61 with a time of concentration of 6.0 minutes. Supporting calculations are provided in this report.

Proposed Conditions PR-DA-2 (DOT)

The Proposed Conditions Drainage Area 2 (PR-DA-2, DOT) includes 0.31-acres of the property. The drainage area consists of asphalt driveway/parking surfaces, concrete walkways, and areas of grass/landscaping located within the western portion of the lot. Runoff from this drainage area flows undetained to the existing stormwater conveyance systems located within the Rt. 17 right-of-way via sheet flow, one (1) curb inlet, and two (2) proposed trench drains constructed within the ingress/egress driveways. The analysis of the drainage area has been divided into two components: a) the impervious surfaces (PR-DA-2 (I)), and b) the pervious surfaces (PR-DA-2 (P)). The runoff curve number 'CN' value calculated for the impervious surfaces is 98 with a time of concentration of 6.0 minutes. The 'CN' value calculated for the pervious surfaces is 61 with a time of concentration of 6.0 minutes. Supporting calculations are provided in this report.

Proposed Conditions PR-DA-3 (TO LOT 6)

The Proposed Conditions Drainage Area 3 (PR-DA-3, TO LOT 6) includes 0.05-acres of the property. The drainage area consists of areas of grass and landscaping in the northwest corner of the lot. The stormwater runoff from this drainage area sheet flows undetained north and west, off-site to the adjacent lot 6 right-of-way. The weighted runoff curve number 'CN' value calculated for PR-DA-3 is 63 with a time of concentration of 6.0 minutes. Supporting calculations are provided in this report

4.0 Subsurface Detention Basins

Under proposed conditions, the site will include one (1) underground stormwater detention basin. Subsurface Detention Basin - 1 (INLET) will be constructed beneath the asphalt parking lot behind the proposed automobile dealership in the eastern portion of the site and accepts runoff from Proposed Conditions Drainage Area 1A (PR-DA-1A). The underground system will consist of 3.5' deep StormTrap Single Trap concrete vaults with a concrete base (no stone void storage below invert). The basin will detain flow before discharging to the existing inlet located within the right-of-way of the property to the north. As shown in the attached analysis, the system will have the capacity to store up to approximately 17,326 cubic feet of runoff. Two circular orifices of 2.5" and 6" and a 1.0' rectangular weir will allow flow to discharge from the system at a controlled rate. Ad depicted within the graphical and numerical outflow analysis (refer to appendix of this report), the detention basin will fully drain the maximum design storm (100-year storm) within approximately 41-44 hours.

5.0 Peak Runoff Rate Comparison

Under proposed conditions, the hydrograph generated by the discharge from the detention basin is combined with the runoff hydrograph from the areas of disturbance that will be undetained to produce an overall proposed conditions runoff hydrograph. Tables 5.1, 5.2, 5.3 and 5.4 below summarize the reduction in peak discharge for each storm event.

Table 5.1 Peak Rate of Runoff Comparison (cfs)
Tributary to Existing Inlet within Right-of-Way to the North
(EX-DA-1 VS. PR-DA-1A + PR-DA-1B)

Storm Event	Existing Conditions Peak Runoff Rate (cfs)	Proposed Conditions Peak Runoff Rate (cfs)	Change (cfs)	Percent of Existing
2	1.56	0.76	-0.80	49% **(OK)**
10	2.57	1.29	-1.28	50% **(OK)**
100	4.70	3.37	-1.33	72% **(OK)**

Table 5.2 Peak Rate of Runoff Comparison (cfs)
Tributary to Existing DOT Inlet within Rt. 17 Right-of-Way
(EX-DA-2 VS. PR-DA-2)

Storm Event	Existing Conditions Peak Runoff Rate (cfs)	Proposed Conditions Peak Runoff Rate (cfs)	Change (cfs)	Percent of Existing
2	1.70	0.80	-0.90	47% **(OK)**
10	2.65	1.27	-1.38	48% **(OK)**
100	4.57	2.24	-2.33	49% **(OK)**

Table 5.3 Peak Rate of Runoff Comparison (cfs)
Tributary Off-Site to North and West (To lot 6)
(EX-DA-3 VS. PR-DA-3))

Storm Event	Existing Conditions Peak Runoff Rate (cfs)	Proposed Conditions Peak Runoff Rate (cfs)	Change (cfs)	Percent of Existing
2	0.90	0.03	-0.87	3% **(OK)**
10	1.41	0.09	-1.32	6% **(OK)**
100	2.43	0.23	-2.20	9% **(OK)**

Table 5.4 Peak Rate of Runoff Comparison (cfs)
Total Existing Combined Vs. Total Proposed Combined

Storm Event	Existing Conditions Peak Runoff Rate (cfs)	Proposed Conditions Peak Runoff Rate (cfs)	Change (cfs)	Percent of Existing
2	4.16	1.59	-2.57	38% **(OK)**
10	6.63	2.65	-3.98	40% **(OK)**
100	11.70	5.65	-6.05	48% **(OK)**

6.0 Hydrology

The stormwater analysis is based on the US Department of Agriculture Natural Resources Conservation Service Technical Release 55 (TR-55) methodology for computing stormwater runoff. The site consists of the following soil types:

- Urban Land complex
- Wethersfield gravelly loam

The Geotechnical Report performed by Johnson Soils indicates the presence of fill up to 12' below pavement on gravelly sand (SW), therefore Hydrologic Soil Group B was used for the stormwater runoff curve number calculations. A copy of the soils map from the NRCS Web Soil Survey and the Geotechnical Report are included in the Appendix of this report. The following runoff curve numbers were chosen for the existing and proposed land uses:

- Impervious Surfaces and Buildings CN = 98
- Grass CN = 61
- Woods CN = 55

Time of Concentration (Tc) lines for each drainage area were developed based upon the topography of the drainage area. Segments for each Tc line were developed based upon type of flow and ground cover. Overland flows of less than 150 ft in length were calculated as sheet flow, and after 150 ft of sheet flow, the flow was assumed to be shallow concentrated flow. The average velocity for shallow concentrated flow was taken from Figure 3.1 of *Urban Hydrology for Small Watersheds, Technical Release No. 55*.

7.0 Pipe Hydraulics

Post-Development Conditions:

The storm sewer system has been designed to accommodate the 25-year storm event. Manning's equation was used to calculate open channel flow in storm sewer pipes:

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

Where:
- Q = Discharge, in cubic feet per second (cfs)
- n = Manning's roughness coefficient (see below)
- A = Cross-sectional area of pipe, in square feet (ft^2)
- R = Hydraulic Radius, in feet (ft)
- S = Bottom Slope, in feet/foot (ft/FT)

Please refer to Inlet Drainage Area Map DA-03 and attached pipe calculations in the appendix of this report.

8.0 Compliance with NJ Stormwater Management Rule

Water Quantity

In accordance with NJAC 7:8-5.4, which describe Stormwater Runoff Quantity Standards, the project shall reduce the proposed conditions peak runoff rate to 50%, 75% and 80% of the 2-year, 10-year and 100-year storm events as compared to existing conditions. As demonstrated in Tables 5.1, 5.2, 5.3 and 5.4 above, the development will reduce peak discharge rates, therefore this condition is met.

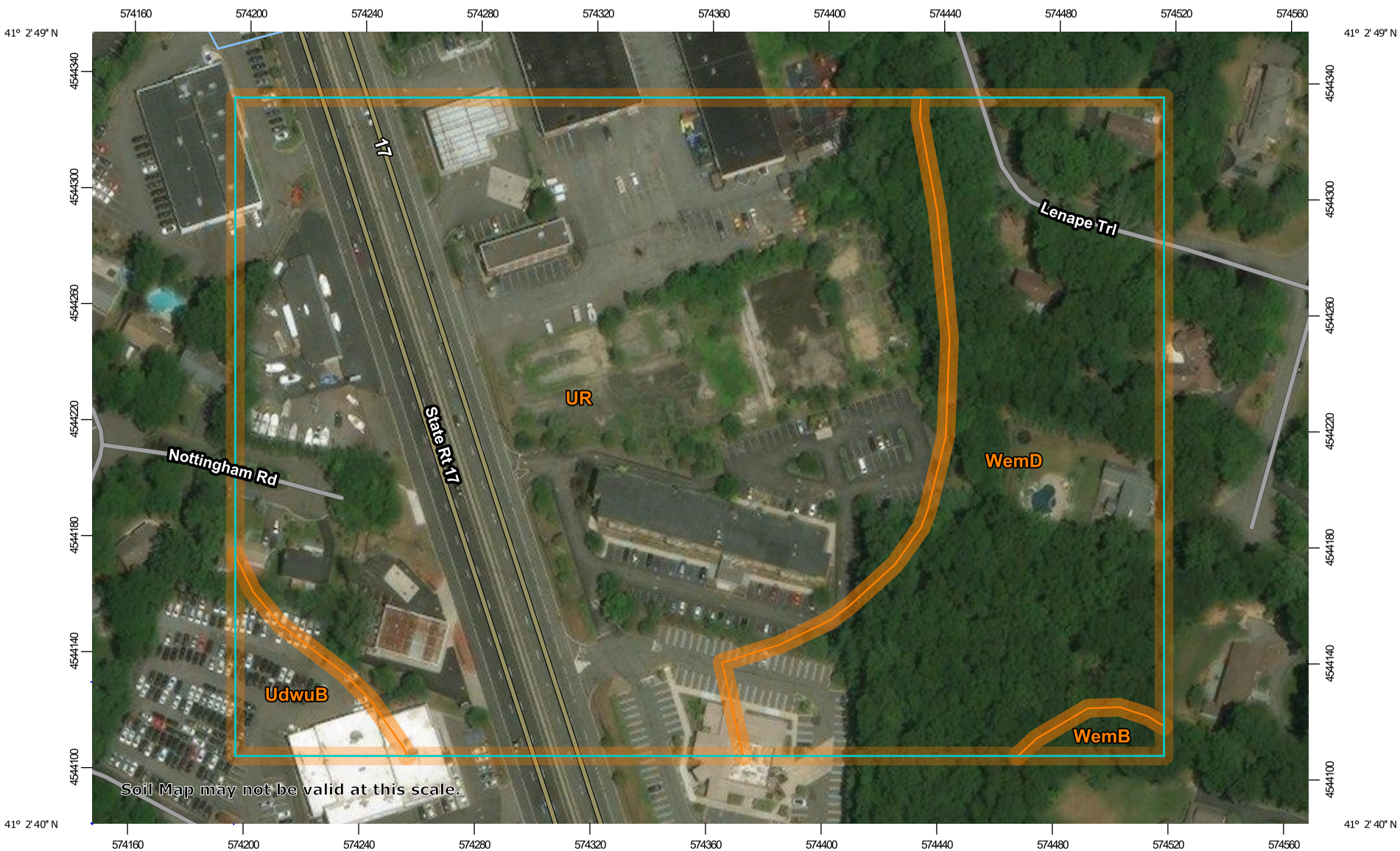
Water Quality

In accordance with current NJDEP rules and regulations, developments that do not create an additional ¼ acre of new impervious, are not subject to the water quality standards of the NJ Stormwater Management Rule. Since the proposed development will create less than ¼ acre of new impervious surface (approximate 1,025 SF increase), this standard does not apply. Furthermore, the proposed detention basin will include a concrete base and does not allow for stone retention; therefore, no pre-treatment is required.

Groundwater Recharge

In accordance with NJAC 7:8-5.4, which describes Stormwater Recharge Standards: “This groundwater recharge requirement does not apply to projects within the urban redevelopment area." The definition of Urban Redevelopment Area includes previously disturbed areas of the State within the Metropolitan Planning Area 1 as delineated on the State Plan Policy Map. This area of Upper Saddle River falls within a Metropolitan Planning Area 1, and the existing site consists primarily of paved surfaces, therefore this requirement does not apply.

Soil Map—Bergen County, New Jersey



Map Scale: 1:1,920 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

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

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

Date(s) aerial images were photographed: Oct 7, 2013—Feb 26, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
UdwuB	Udorthents, wet substratum-Urban land complex	0.5	2.8%
UR	Urban land	12.3	67.8%
WemB	Wethersfield gravelly loam, 3 to 8 percent slopes	0.2	0.8%
WemD	Wethersfield gravelly loam, 15 to 25 percent slopes	5.2	28.6%
Totals for Area of Interest		**18.1**	**100.0%**

Hydrologic Soil Groups
New Jersey

Soil Series	Hydrologic Soil Group
Abbottstown	C
Adelphia	C
Adrian	A/D
Alden	D
Alloway	B
Amwell	C
Annandale	C
Appoquinimink	D
Arendtsville	B
Arnot	D
Askecksy	A/D
Atherton	B/D
Athol	B
Atsion	D
Aura	B
Bartley	C
Bath	C
Beaches	D
Bedington	B
Berks	C
Berryland	B/D
Bertie	B
Biddeford	D
Bigapple	A
Birdsboro	B
Boonton	C
Bowmansville	B/D
Braceville	C
Broadkill	D
Bucks	B
Buddtown	B
Califon	C
Carlisle	A/D
Catden	B/D
Chalfont	C
Charlton	B
Chatfield	C
Chenango	A
Chicone	D
Chillum	B
Chippewa	D
Cokesbury	D

Soil Series	Hydrologic Soil Group
Colemantown	C/D
Collington	B
Colonie	A
Colts Neck	B
Croton	D
Delaware	B
Dennisville	B
Deptford	C
Donlonton	C
Downer	B
Doylestown	D
Duffield	B
Dunellen	A
Elkton	C/D
Ellington variant	B
Evesboro	A
Fallsington	B/D
Farmington	D
Fort Mott	A
Fredon	D
Freehold	B
Galestown	A
Galloway	A
Galway	C
Gladstone	B
Glassboro	C
Great Piece	C/D
Haledon	C
Halsey	B/D
Hammonton	B
Hasbrouck	D
Hazen	B
Hazleton	B
Hero	B
Hibernia	C
Hinckley	A
Hollis	D
Holmdel	C
Holyoke	D
Hooksan	A
Hoosic	B
Horseneck	B

Table NJ 2-1-NJ1

Soil Series	Hydrologic Soil Group
Howell	C
Ingleside	B
Jade Run	B/D
Keansburg	D
Keyport	C
Klej	B
Klinesville	D
Knickerbocker	A
Kresson	C
Lackawanna	C
Lakehurst	A
Lakewood	A
Lamington	D
Lansdale	B
Lansdowne	C
Lawrenceville	C
Legore	B
Lehigh	C
Lenni	C/D
Lenoir	D
Livingston	D
Lordstown	C
Lyons	D
Manahawkin	D
Manlius	C
Mannington	D
Marlton	C
Matapeake	B
Matawan	C
Mattapex	C
Meckesville	C
Middlebury	B
Minoa	C
Mispillion	D
Mount Lucas	C
Mullica	D
Muttontown	B
Nanticoke	D
Nassau	D
Natchaug	B/D
Neshaminy	B
Netcong	B
Nixon	B
Norton	C
Norwich	D
Oquaga	C
Othello	C/D
Otisville	A
Palms	A/D

Soil Series	Hydrologic Soil Group
Palmyra	B
Parker	B
Parsippany	D
Pascack	C
Passaic	D
Pattenburg	B
Pawcatuck	D
Paxton	C
Peckmantown	C
Pedricktown	D
Pemberton	B
Penn	C
Phalanx	B
Plummer	D
Pompton	B/D
Pope	B
Portsmouth variant	B/D
Preakness	D
Quakerbridge	A
Quakertown	C
Raritan	C
Readington	C
Reaville	C
Ridgebury	C
Rikers	A
Riverhead	B
Rockaway	C
Rowland	C
Royce	C
Sassafras	B
Scio	C
Sharptown	C
Shrewsbury	C/D
Steinsburg	C
Swainton	B
Swartswood	C
Swedesboro	B
Tinton	A
Tioga	B
Transquaking	D
Trussum	C/D
Tunkhannock	A
Turbotville	C
Unadilla	B
Venango	D
Wallkill	D
Wallpack	B
Washington	B

Table NJ 2-1-NJ1

Soil Series	Hydrologic Soil Group	Soil Series	Hydrologic Soil Group
Wassaic	C	Whippany	C
Watchung	D	Whitman	D
Wayland	C/D	Willette	A/D
Weeksville	B/D	Woodmansie	B
Wellsboro	C	Woodstown	C
Westphalia	B	Wurtsboro	C
Wethersfield	C	Yalesville	B

*NOTE: The Geotechnical Report performed by Johnson Soils indicates the presence of fill up to 12' below pavement on gravelly sand (SW), therefore Hydrologic Soil Group B was used for the stormwater runoff curve number calculations.

Notes:

The information in this table indicates the dominant soil condition but does not eliminate the need of onsite investigation.

Dual hydrologic soil groups indicate a drained/undrained condition. The drained condition applies where the seasonal high water table can be maintained at least 24 inches below the soil surface.

The official source for NRCS soils information is the NRCS Soil Data Mart (http://soildatamart.nrcs.usda.gov/).

Table 2-2a Runoff curve numbers for urban areas [1]

Cover description: Cover type and hydrologic condition	Average percent impervious area [2]	Curve numbers for hydrologic soil group: A	B	C	D
Fully developed urban areas (vegetation established)					
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
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation) [5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

1 Average runoff condition, and $I_a = 0.2S$.

2 The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.

3 CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.

4 Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.

5 Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4 based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2b Runoff curve numbers for cultivated agricultural lands [1]

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

[1] Average runoff condition, and I_a=0.2S

[2] Crop residue cover applies only if residue is on at least 5% of the surface throughout the year.

[3] Hydraulic condition is based on combination factors that affect infiltration and runoff, including (a) density and canopy of vegetative areas, (b) amount of year-round cover, (c) amount of grass or close-seeded legumes, (d) percent of residue cover on the land surface (good ≥ 20%), and (e) degree of surface roughness.

Poor: Factors impair infiltration and tend to increase runoff.

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

Table 2-2c Runoff curve numbers for other agricultural lands [1]

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

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

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1]

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

1 Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.
2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.
3 Curve numbers for group A have been developed only for desert shrub.

Proposed Self Storage Facility - Upper Saddle River, NJ

Runoff Curve Number CN Calculations (B-Soil)

Existing Conditions (Impervious)

EX-DA-1 (I)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	21,301	98	2,087,498
Grass	0	61	0
Woods	0	55	0
	21,301		2,087,498
	0.49	Ac.	
		Weighted CN =	98

EX-DA-2 (I)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	23,293	98	2,282,714
Grass	0	61	0
Woods	0	55	0
	23,293		2,282,714
	0.54	Ac.	
		Weighted CN =	98

EX-DA-3 (I)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	12,805	98	1,254,890
Grass	0	61	0
Woods	0	55	0
	12,805		1,254,890
	0.29	Ac.	
		Weighted CN =	98

EX-DA-4

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	13,791	98	1,351,518
Grass	1,659	61	101,199
Woods	0	55	0
	15,450		1,452,717
	0.36	Ac.	
		Weighted CN =	94

Existing Conditions (Pervious)

EX-DA-1 (P)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	0	98	0
Grass	4,744	61	289,384
Woods	4,495	55	247,225
	9,239		536,609
	0.21	Ac.	
		Weighted CN =	58

EX-DA-2 (P)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	0	98	0
Grass	3,116	61	190,076
Woods	0	55	0
	3,116		190,076
	0.07	Ac.	
		Weighted CN =	61

EX-DA-3 (P)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	0	98	0
Grass	0	61	0
Woods	1,852	55	101,860
	1,852		101,860
	0.04	Ac.	
		Weighted CN =	55

Proposed Conditions (Impervious)

PR-DA-1A (I)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	52,673	98	5,161,954
Open Space	0	61	0
Woods	0	55	0
	52,673		5,161,954
	1.20	Ac.	
		Weighted CN =	98

PR-DA-1B (I)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	8,479	98	830,942
Open Space	0	61	0
	8,479		830,942
	0.19	Ac.	
		Weighted CN =	98

PR-DA-2 (I)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	10,978	98	1,075,844
Open Space	0	61	0
	10,978		1,075,844
	0.25	Ac.	
		Weighted CN =	98

Proposed Conditions (Pervious)

PR-DA-1A (P)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	0	98	0
Open Space	3,239	61	197,579
Woods	4,490	55	246,950
	7,729		444,529
	0.18	Ac.	
		Weighted CN =	58

PR-DA-1B (P)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	0	98	0
Open Space	2,830	61	172,630
	2,830		172,630
	0.07	Ac.	
		Weighted CN =	61

PR-DA-2 (P)

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	0	98	0
Open Space	2,352	61	143,472
	2,352		143,472
	0.06	Ac.	
		Weighted CN =	61

PR-DA-3

Cover Type	Area (SF)	CN Value	Area x CN
Impervious	85	98	8,330
Open Space	1,930	61	117,730
	2,015		126,060
	0.05	Ac.	
		Weighted CN =	63

NEW JERSEY 24 HOUR RAINFALL FREQUENCY DATA

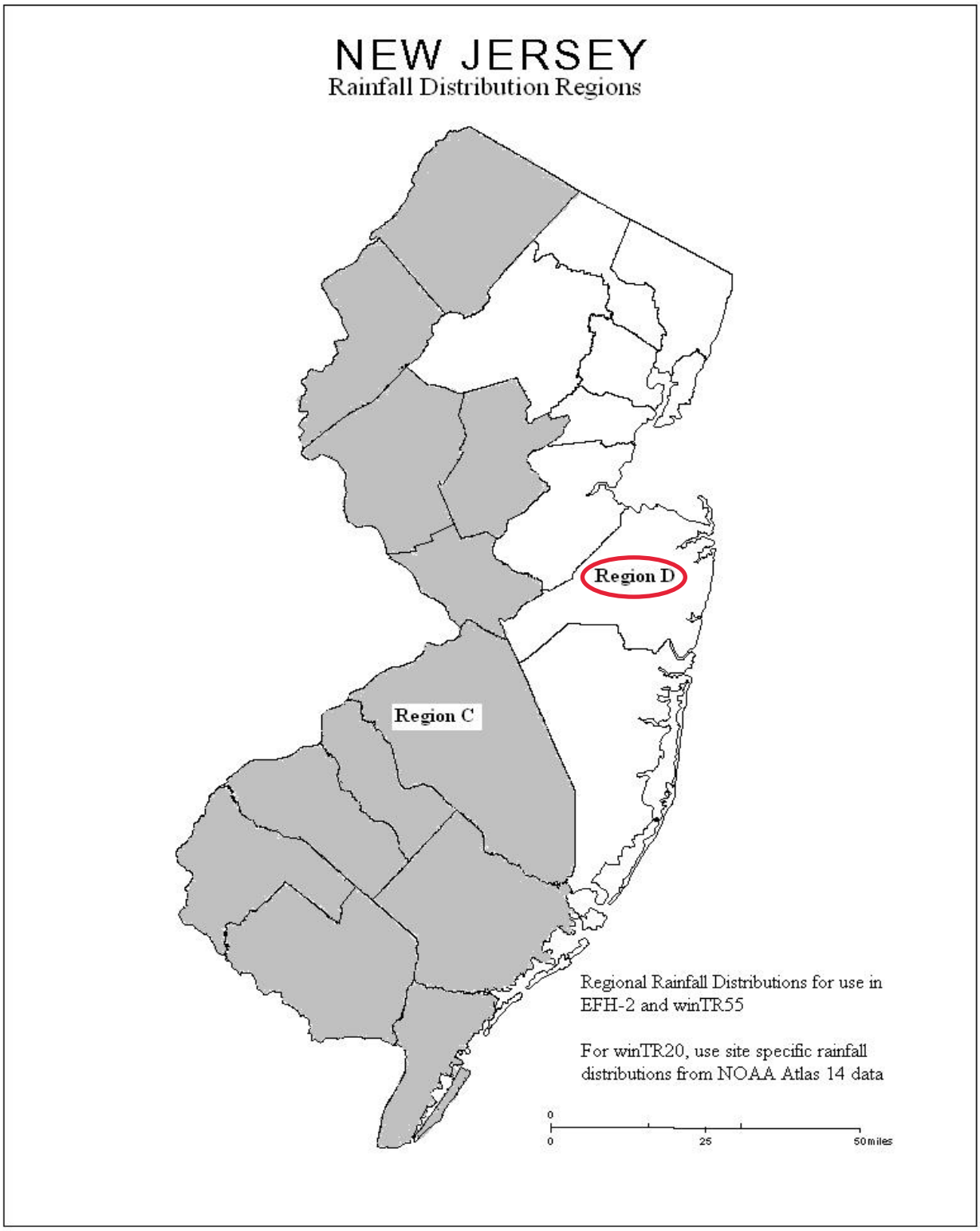
Rainfall amounts in Inches

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

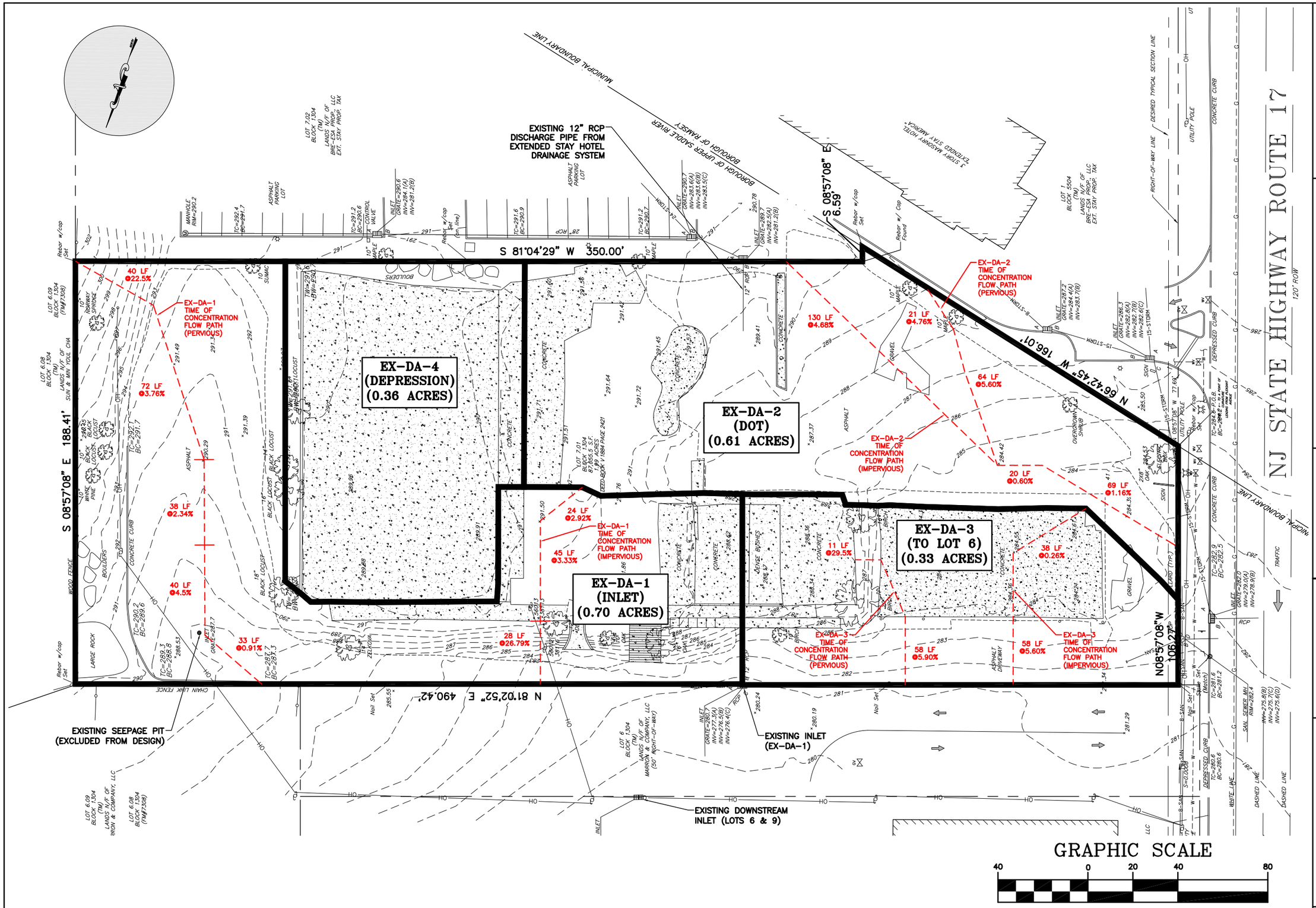
Notes: The average point rainfall amounts listed above were developed from data contained in NOAA Atlas 14 Volume 2.

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.


NEW JERSEY
Rainfall Distribution Regions
Region D
Region C
Regional Rainfall Distributions for use in EFH-2 and winTR55
For winTR20, use site specific rainfall distributions from NOAA Atlas 14 data
0
0
25
50 miles

Existing Conditions
Hydrologic Model



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10/1/2020

Michael E. Dipple, P.E. DATE

NJ Professional Engineer #24GE04081200

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PROJECT:

PROPOSED SELF-STORAGE FACILITY
100 N.J.S.H. ROUTE 17 NORTH
BOROUGH OF UPPER SADDLE RIVER, BERGEN COUNTY, NJ

BLOCK: 1304; LOT: 7.01
TAX MAP: 13

DRAWING TITLE:

EXISTING DRAINAGE AREA MAP

SCALE:	REFER TO PLAN
DATE	1/17/2020
DESIGNED:	TEC
APPROVED:	MED
L2A PROJ. No.:	1901.161
DRAWING No.:	DA-01

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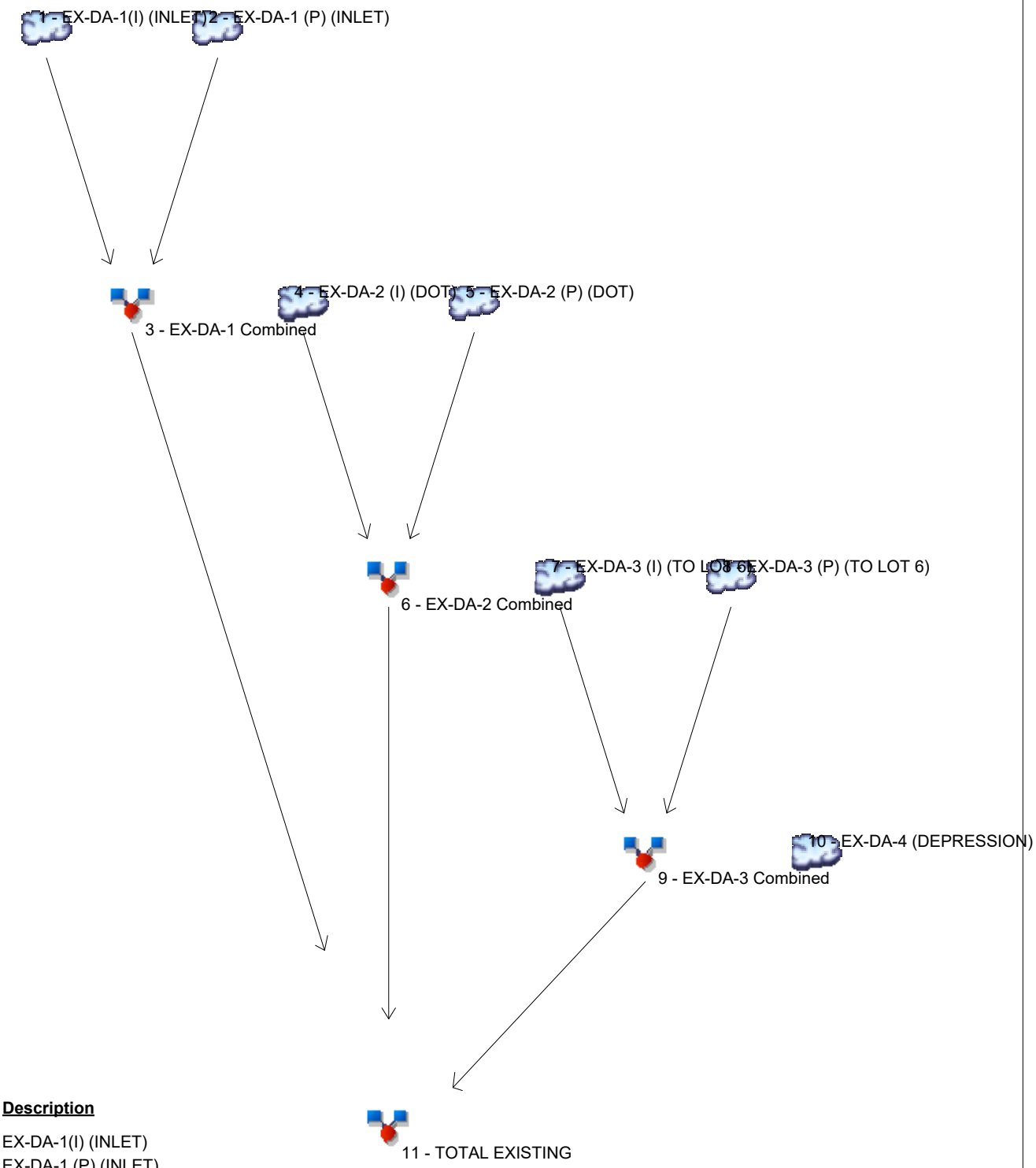
Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	EX-DA-1(I) (INLET)
2	SCS Runoff	EX-DA-1 (P) (INLET)
3	Combine	EX-DA-1 Combined
4	SCS Runoff	EX-DA-2 (I) (DOT)
5	SCS Runoff	EX-DA-2 (P) (DOT)
6	Combine	EX-DA-2 Combined
7	SCS Runoff	EX-DA-3 (I) (TO LOT 6)
8	SCS Runoff	EX-DA-3 (P) (TO LOT 6)
9	Combine	EX-DA-3 Combined
10	SCS Runoff	EX-DA-4 (DEPRESSION)
11	Combine	TOTAL EXISTING

TR55 Tc Worksheet

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

Hyd. No. 1

EX-DA-1(I) (INLET)

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.011		0.240		
Flow length (ft)	=	24.0		45.0		28.0		
Two-year 24-hr precip. (in)	=	3.34		3.34		3.34		
Land slope (%)	=	2.92		3.33		26.79		
Travel Time (min)	**=**	**0.33**	**+**	**0.51**	**+**	**1.79**	**=**	**2.62**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	0.00		0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
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 ..... 2.62 min

USE 6.0 MINUTES

TR55 Tc Worksheet

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

Hyd. No. 2

EX-DA-1 (P) (INLET)

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.400		0.011		0.011		
Flow length (ft)	=	40.0		72.0		0.0		
Two-year 24-hr precip. (in)	=	3.34		3.34		0.00		
Land slope (%)	=	22.50		3.76		0.00		
Travel Time (min)	**=**	**3.84**	**+**	**0.71**	**+**	**0.00**	**=**	**4.54**
Shallow Concentrated Flow								
Flow length (ft)	=	38.00		40.00		33.00		
Watercourse slope (%)	=	2.34		4.50		0.91		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	3.11		4.31		1.94		
Travel Time (min)	**=**	**0.20**	**+**	**0.15**	**+**	**0.28**	**=**	**0.64**
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 ..... 5.19 min

USE 6.0 MINUTES

TR55 Tc Worksheet

Hyd. No. 4

EX-DA-2 (I) (DOT)

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.011		0.011		
Flow length (ft)	=	130.0		20.0		0.0		
Two-year 24-hr precip. (in)	=	3.34		3.34		0.00		
Land slope (%)	=	4.68		0.60		0.00		
Travel Time (min)	**=**	**1.04**	**+**	**0.53**	**+**	**0.00**	**=**	**1.57**
Shallow Concentrated Flow								
Flow length (ft)	=	69.00		0.00		0.00		
Watercourse slope (%)	=	1.16		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	2.19		0.00		0.00		
Travel Time (min)	**=**	**0.53**	**+**	**0.00**	**+**	**0.00**	**=**	**0.53**
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 ..... 2.10 min

USE 6.0 MINUTES

TR55 Tc Worksheet

Hyd. No. 5

EX-DA-2 (P) (DOT)

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 21.0		64.0		20.0		
Two-year 24-hr precip. (in)	= 3.34		3.34		3.34		
Land slope (%)	= 4.76		5.60		0.60		
Travel Time (min)	**= 2.83**	**+**	**0.55**	**+**	**0.53**	**=**	**3.91**
Shallow Concentrated Flow							
Flow length (ft)	= 69.00		0.00		0.00		
Watercourse slope (%)	= 1.16		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.74		0.00		0.00		
Travel Time (min)	**= 0.66**	**+**	**0.00**	**+**	**0.00**	**=**	**0.66**
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 ..... 4.57 min

USE 6.0 MINUTES

TR55 Tc Worksheet

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

Hyd. No. 7

EX-DA-3 (I) (TO LOT 6)

Description		A		B		C		Totals
Sheet Flow								
Manning's n-value	=	0.011		0.011		0.011		
Flow length (ft)	=	38.0		58.0		0.0		
Two-year 24-hr precip. (in)	=	3.34		3.34		0.00		
Land slope (%)	=	0.26		5.60		0.00		
Travel Time (min)	**=**	**1.24**	**+**	**0.51**	**+**	**0.00**	**=**	**1.74**
Shallow Concentrated Flow								
Flow length (ft)	=	0.00		0.00		0.00		
Watercourse slope (%)	=	0.00		0.00		0.00		
Surface description	=	Paved		Paved		Paved		
Average velocity (ft/s)	=	0.00		0.00		0.00		
Travel Time (min)	**=**	**0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
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 ..... 1.74 min

USE 6.0 MINUTES

TR55 Tc Worksheet

Hyd. No. 8

EX-DA-3 (P) (TO LOT 6)

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.240		0.011		0.011		
Flow length (ft)	= 11.0		58.0		0.0		
Two-year 24-hr precip. (in)	= 3.34		3.34		0.00		
Land slope (%)	= 29.50		5.90		0.00		
Travel Time (min)	**= 0.81**	**+**	**0.50**	**+**	**0.00**	**=**	**1.31**
Shallow Concentrated Flow							
Flow length (ft)	= 0.00		0.00		0.00		
Watercourse slope (%)	= 0.00		0.00		0.00		
Surface description	= Paved		Paved		Paved		
Average velocity (ft/s)	=0.00		0.00		0.00		
Travel Time (min)	**= 0.00**	**+**	**0.00**	**+**	**0.00**	**=**	**0.00**
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 ..... 1.31 min

USE 6.0 MINUTES

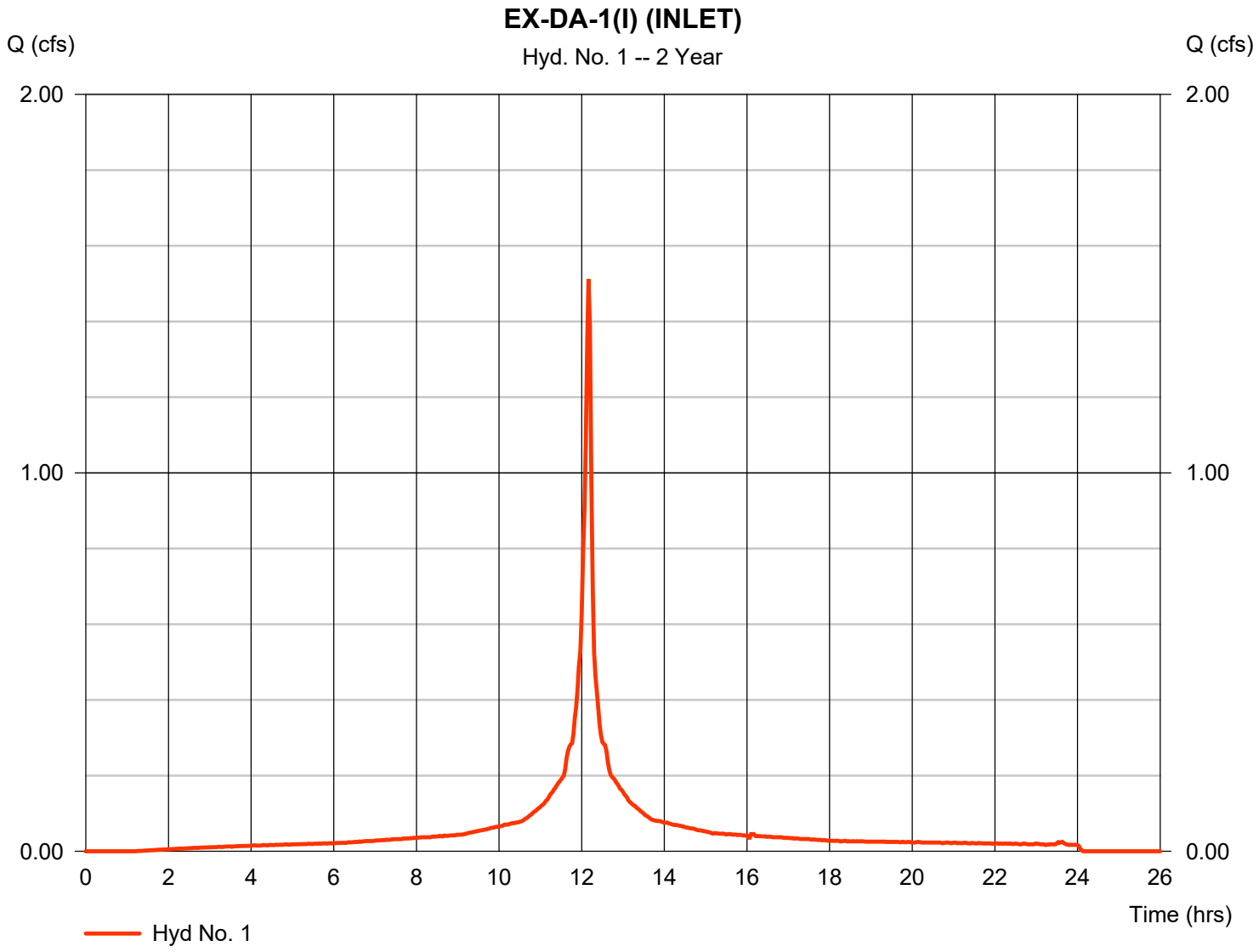
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 1

EX-DA-1(I) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.512 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 5,181 cuft
Drainage area	= 0.490 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



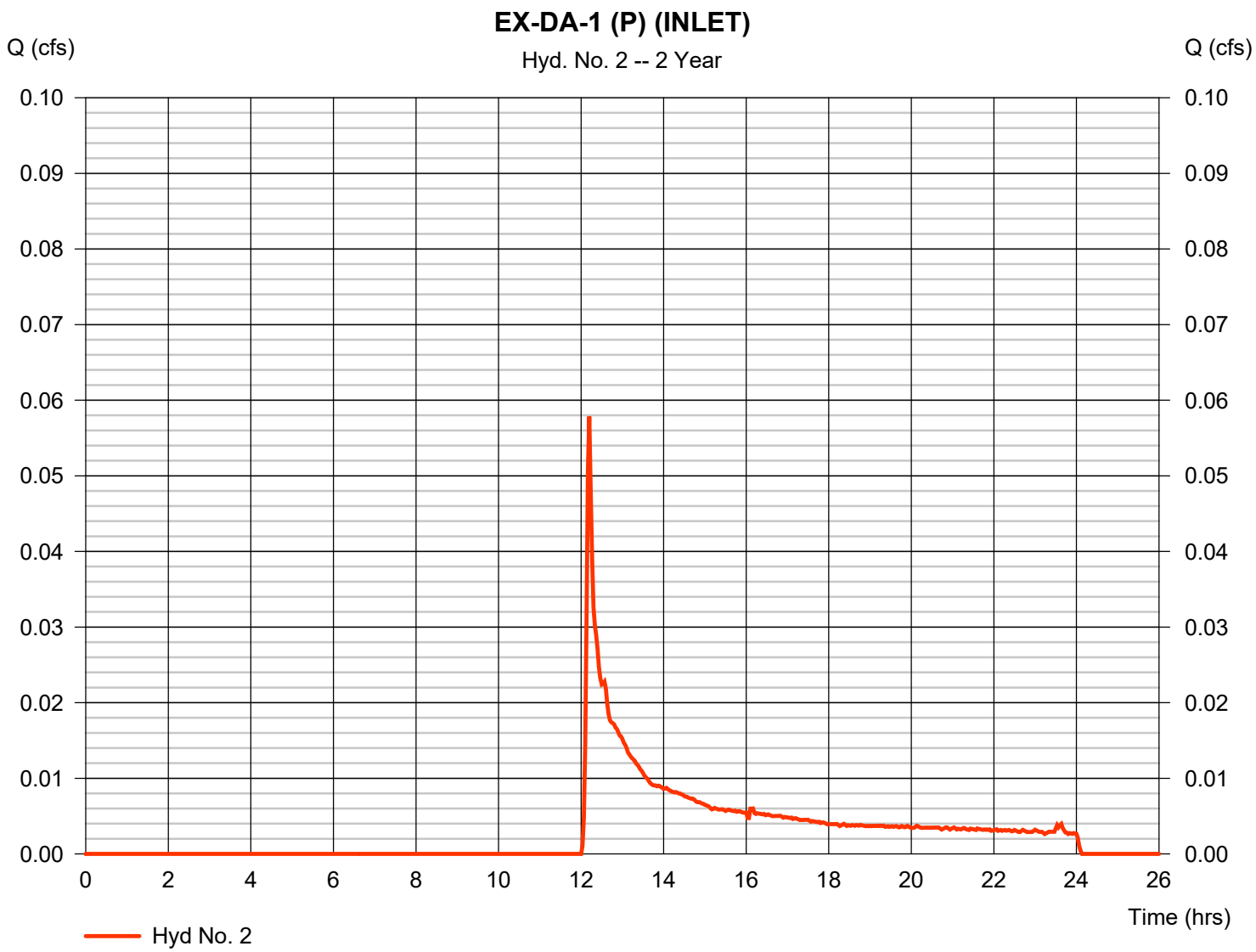
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 2

EX-DA-1 (P) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.058 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 280 cuft
Drainage area	= 0.210 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



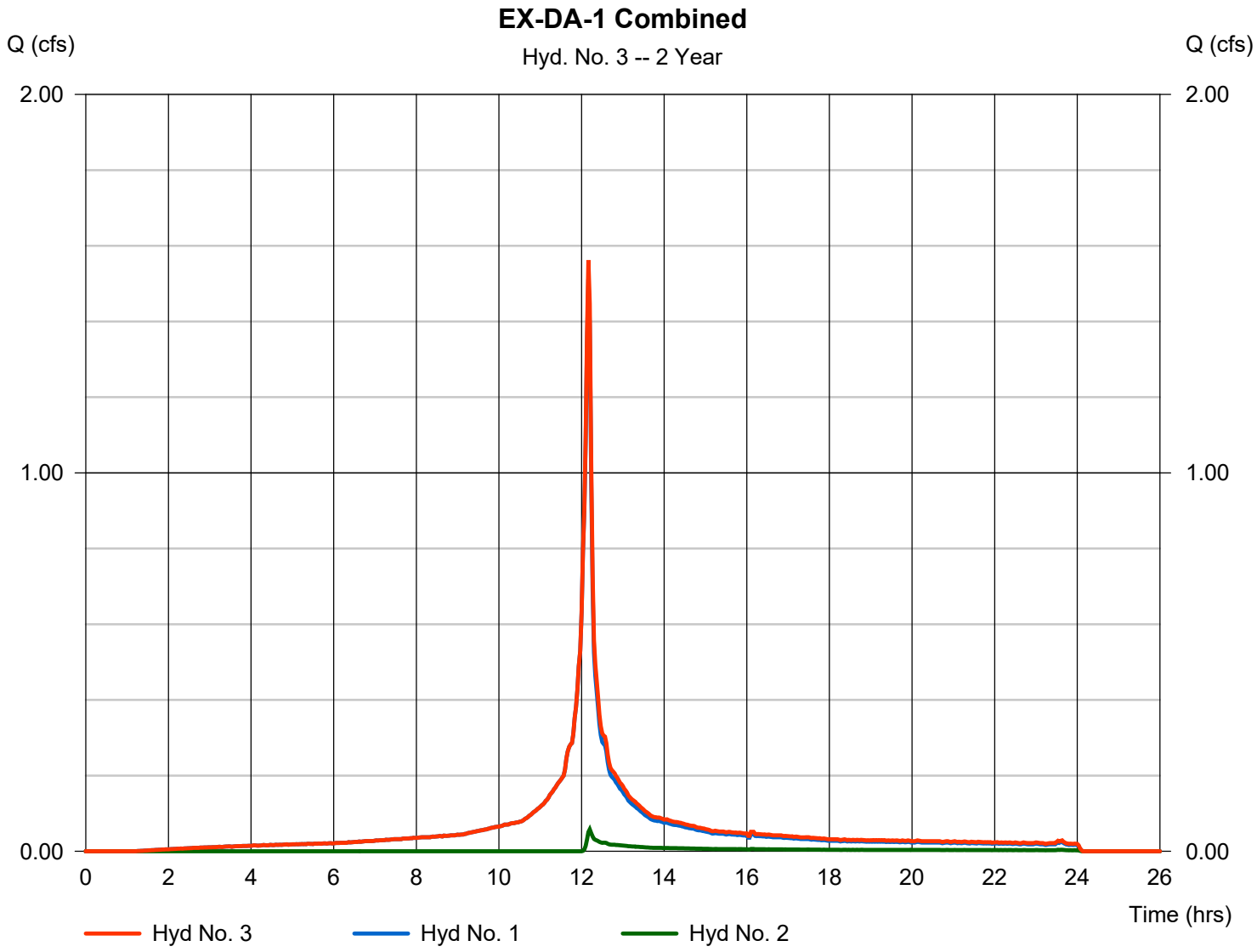
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 3

EX-DA-1 Combined

Hydrograph type	= Combine	Peak discharge	= 1.562 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 5,461 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.700 ac



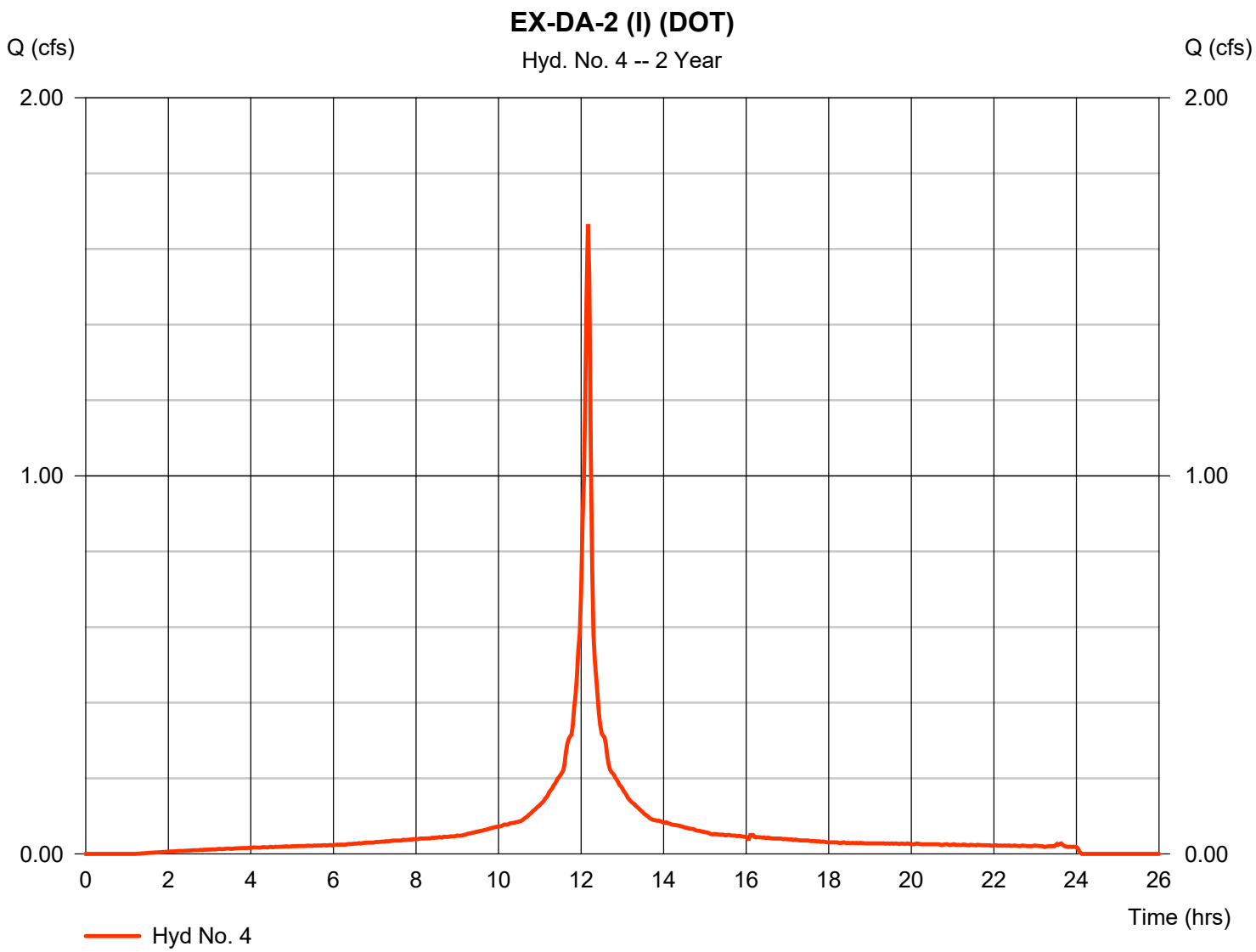
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 4

EX-DA-2 (I) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.666 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 5,710 cuft
Drainage area	= 0.540 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



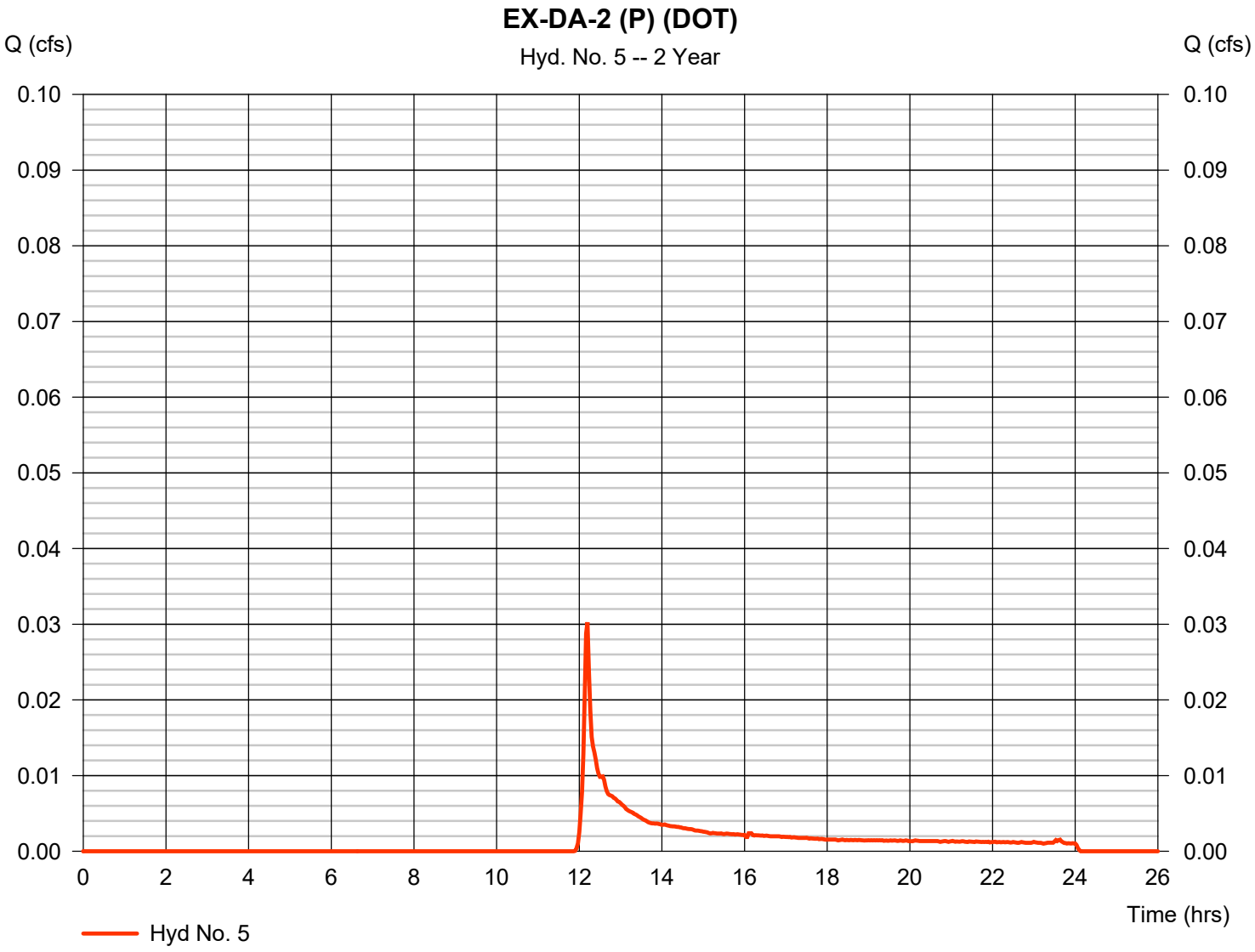
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 5

EX-DA-2 (P) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.030 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 120 cuft
Drainage area	= 0.070 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



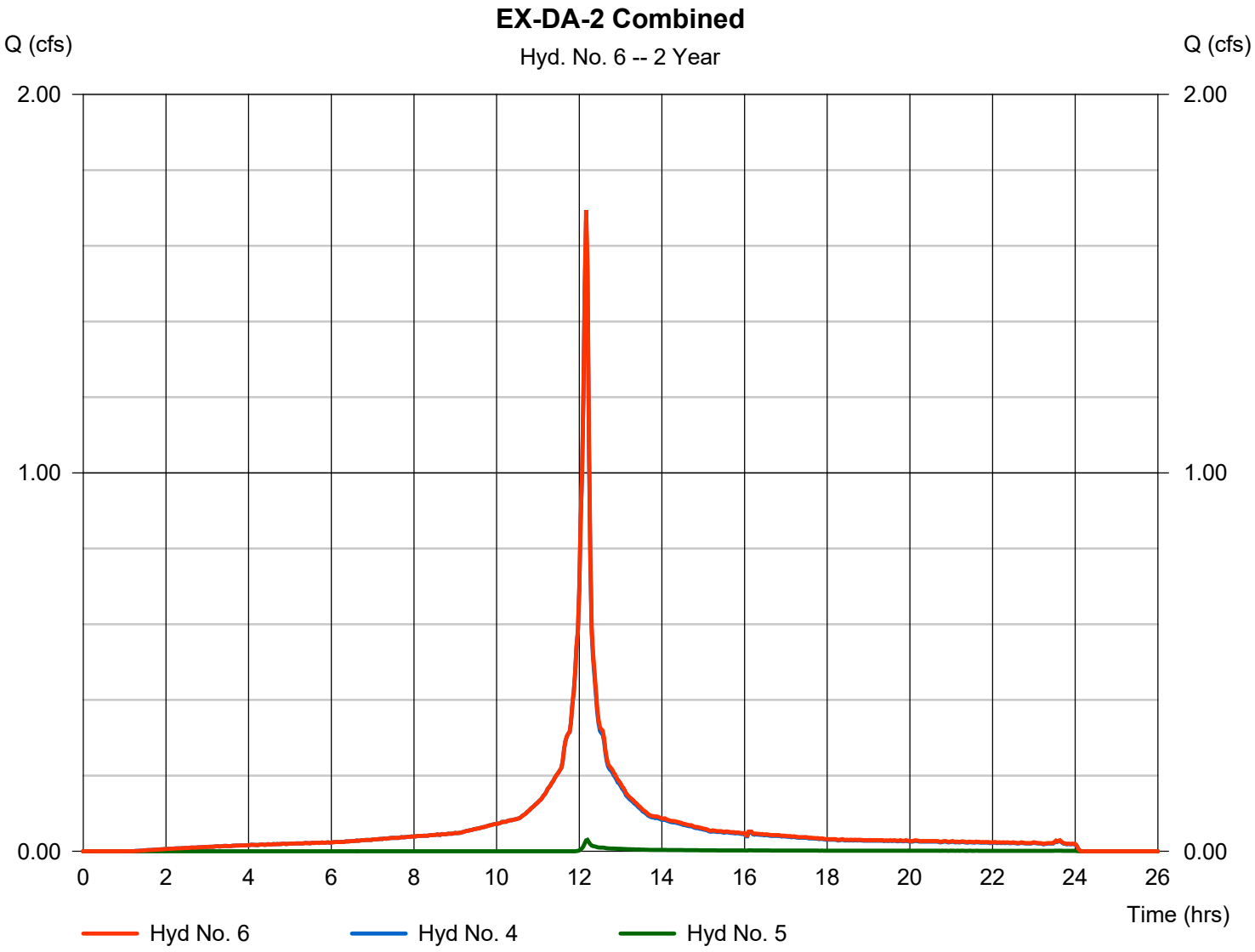
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 6

EX-DA-2 Combined

Hydrograph type	= Combine	Peak discharge	= 1.695 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 5,829 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.610 ac



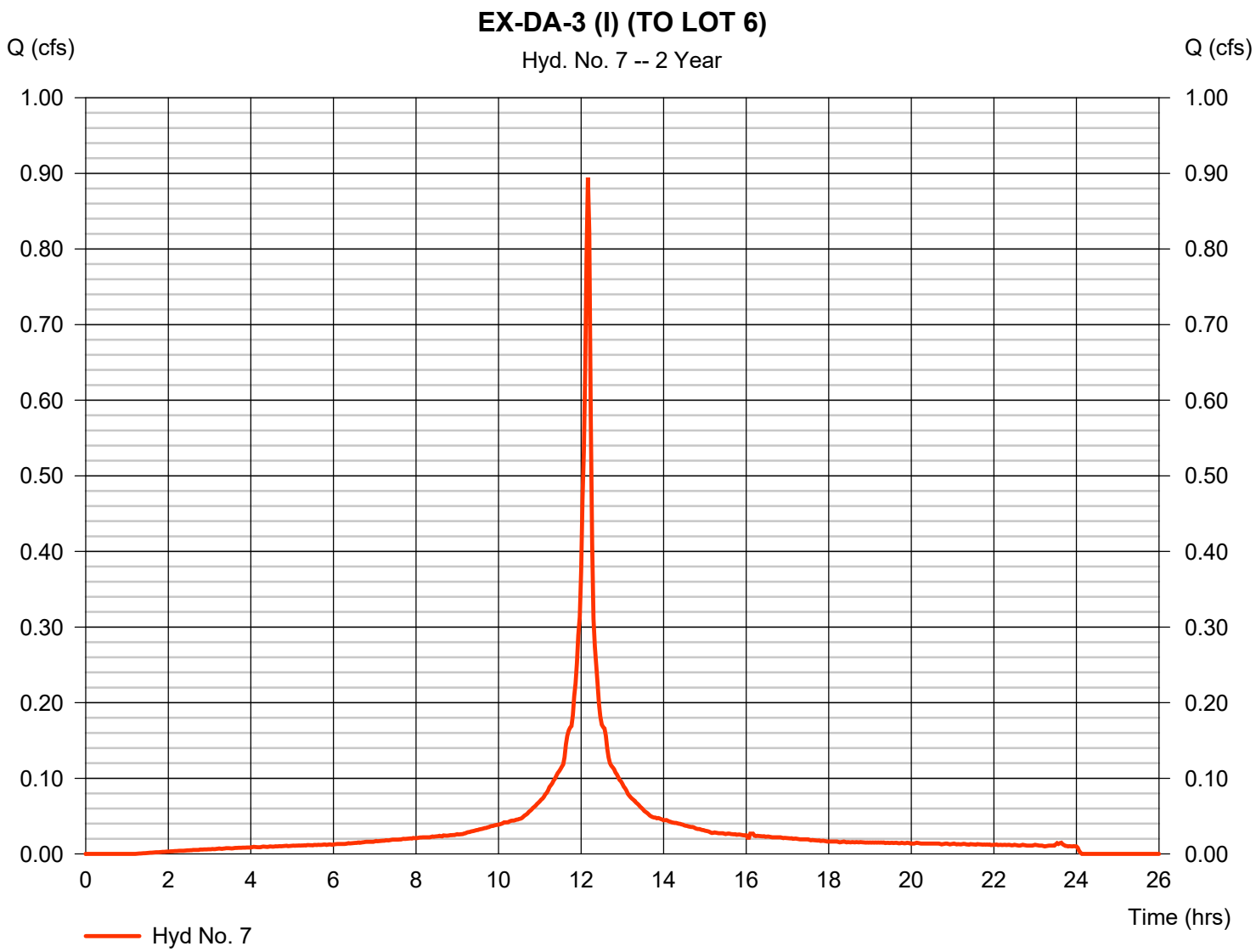
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 7

EX-DA-3 (I) (TO LOT 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.895 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 3,066 cuft
Drainage area	= 0.290 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



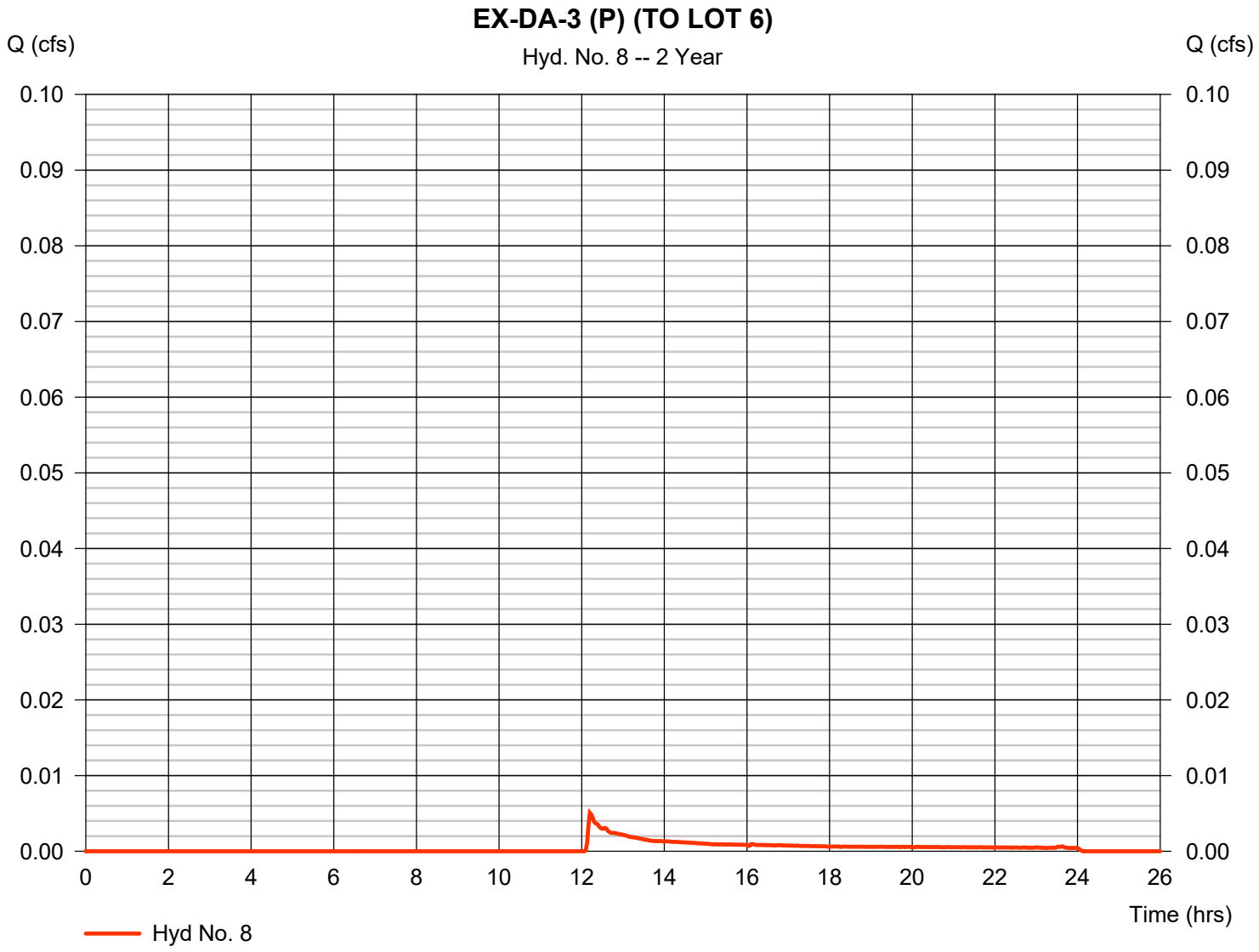
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 8

EX-DA-3 (P) (TO LOT 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.005 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 40 cuft
Drainage area	= 0.040 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



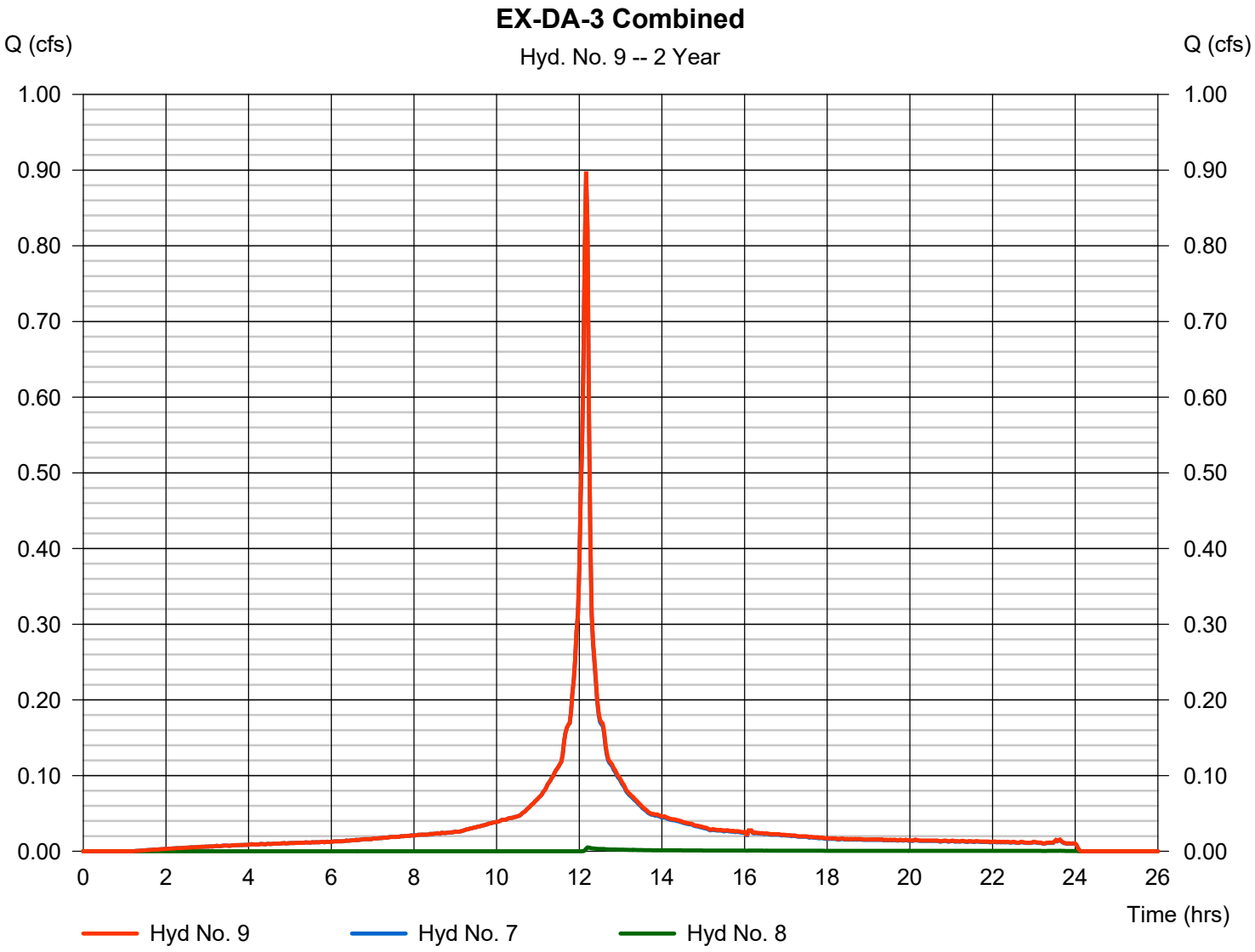
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 9

EX-DA-3 Combined

Hydrograph type	= Combine	Peak discharge	= 0.898 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 3,106 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.330 ac



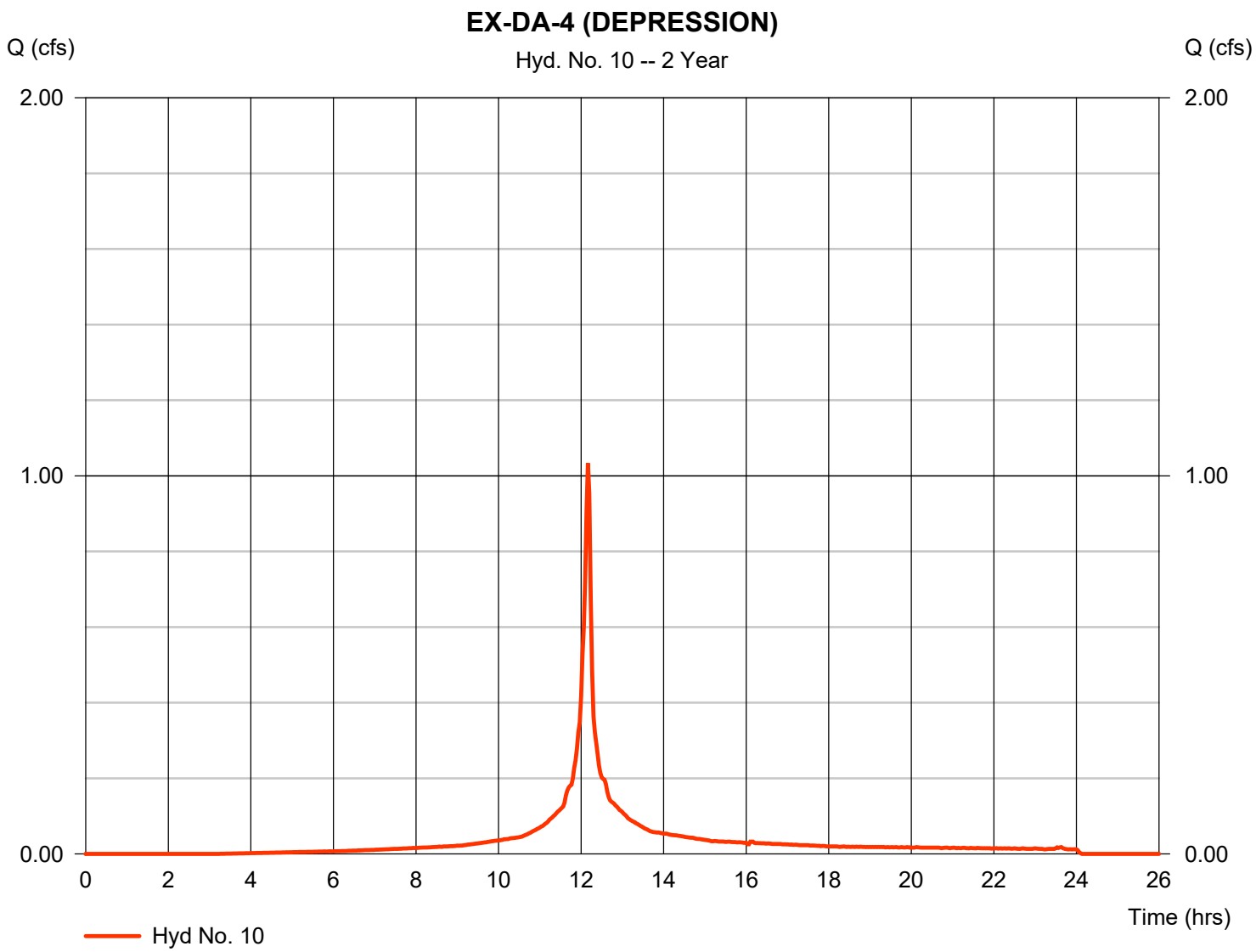
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 10

EX-DA-4 (DEPRESSION)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.033 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 3,283 cuft
Drainage area	= 0.360 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



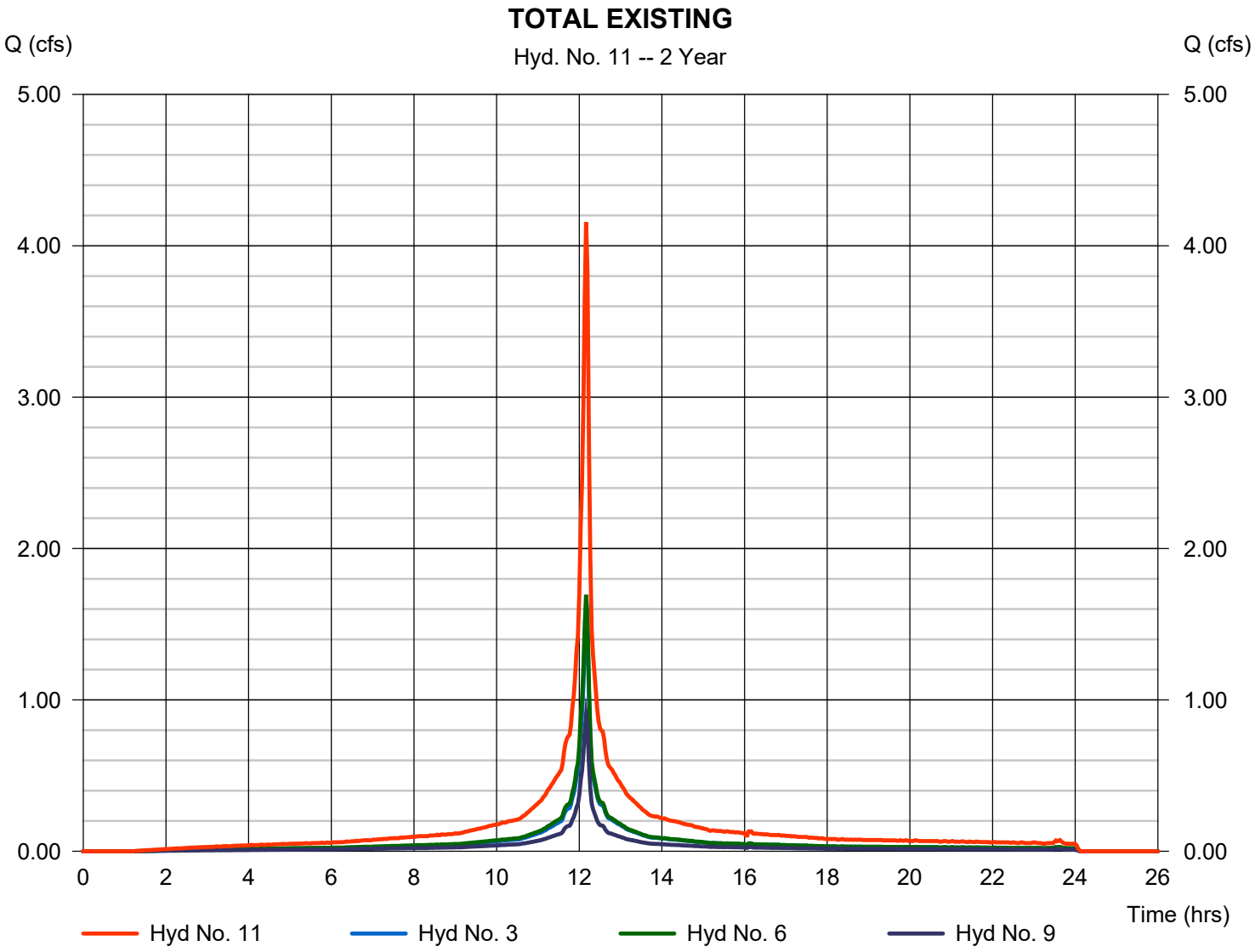
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 11

TOTAL EXISTING

Hydrograph type	= Combine	Peak discharge	= 4.155 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 14,397 cuft
Inflow hyds.	= 3, 6, 9	Contrib. drain. area	= 0.000 ac



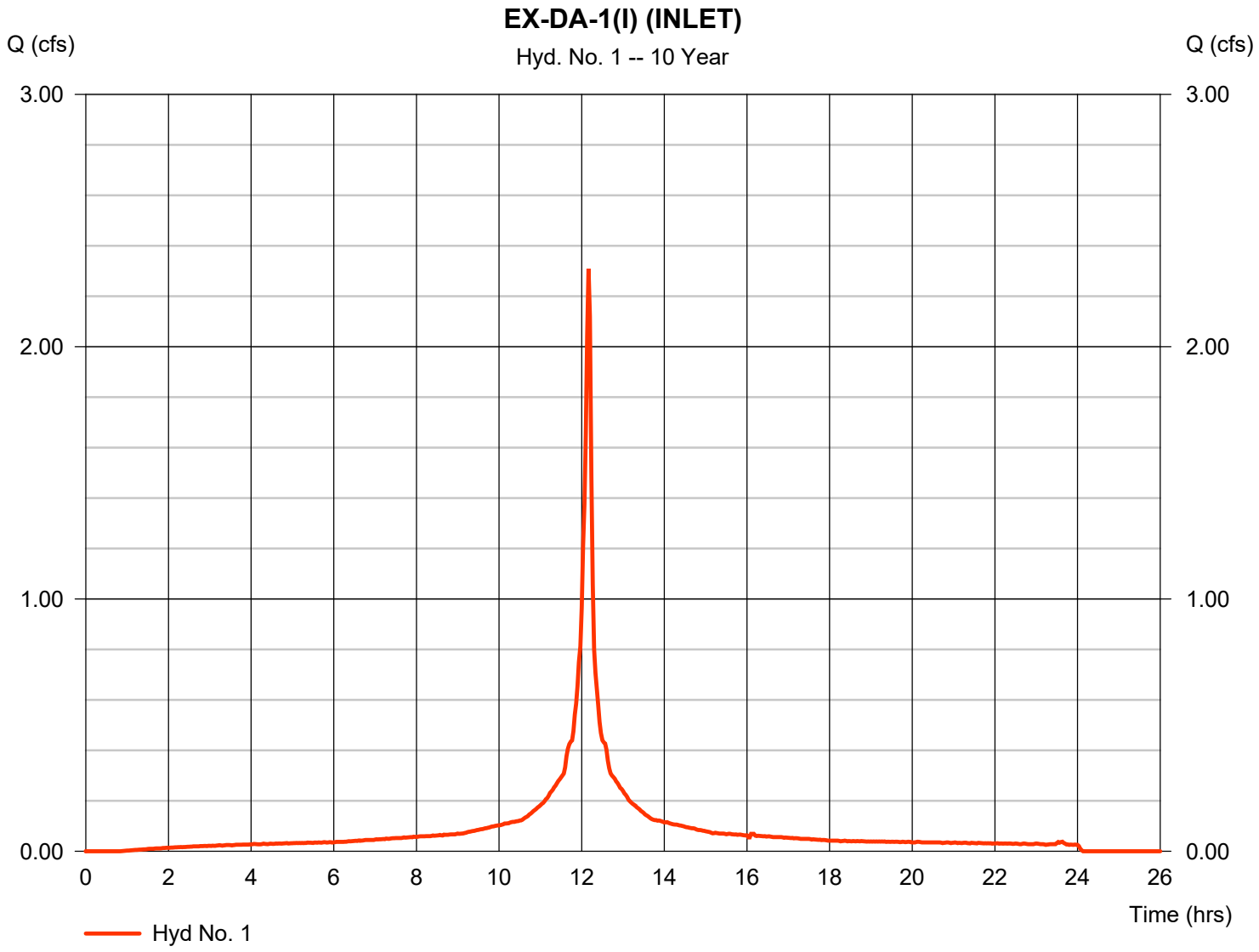
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 1

EX-DA-1(I) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.309 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 8,059 cuft
Drainage area	= 0.490 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



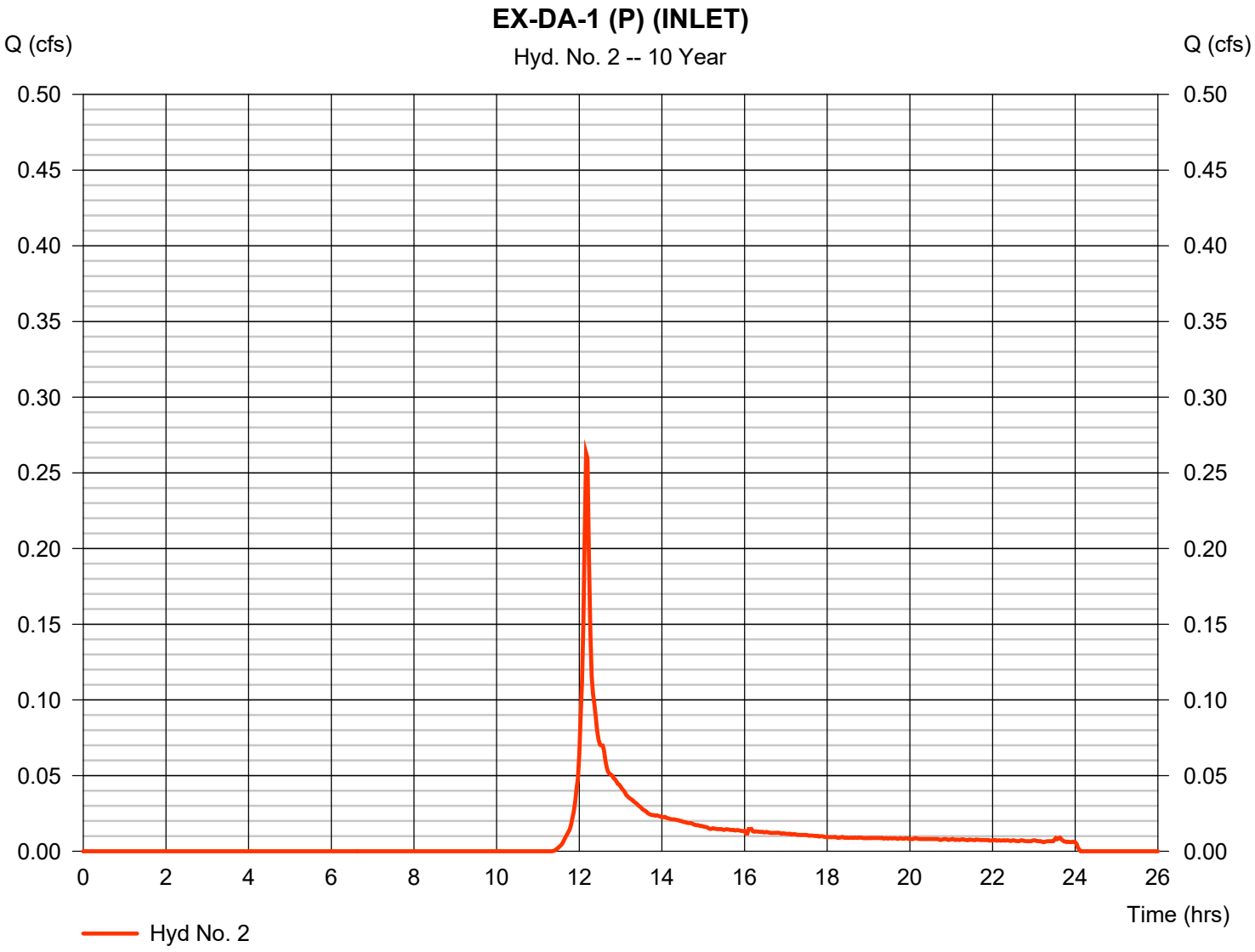
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 2

EX-DA-1 (P) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.263 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 863 cuft
Drainage area	= 0.210 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



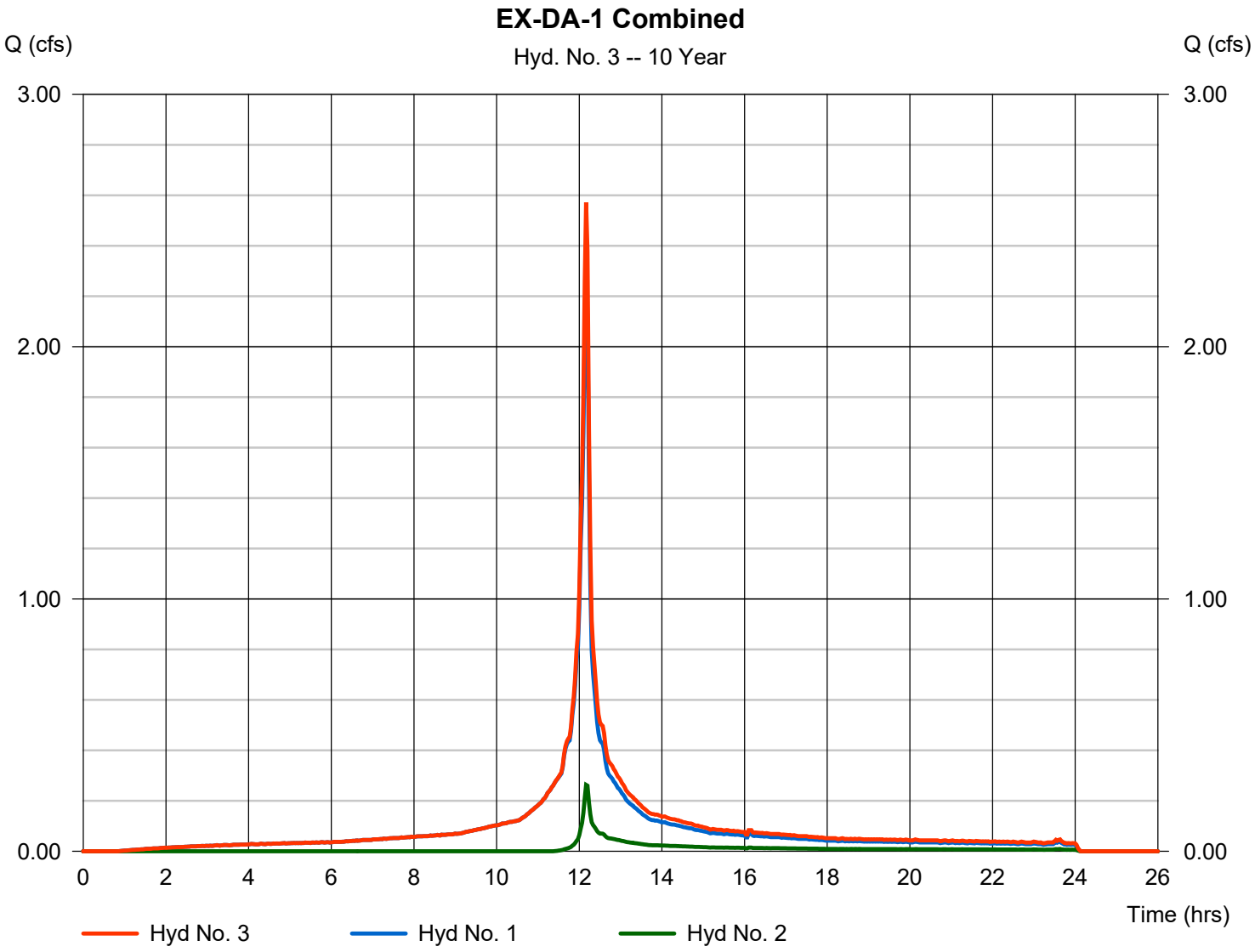
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 3

EX-DA-1 Combined

Hydrograph type	= Combine	Peak discharge	= 2.572 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 8,922 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.700 ac



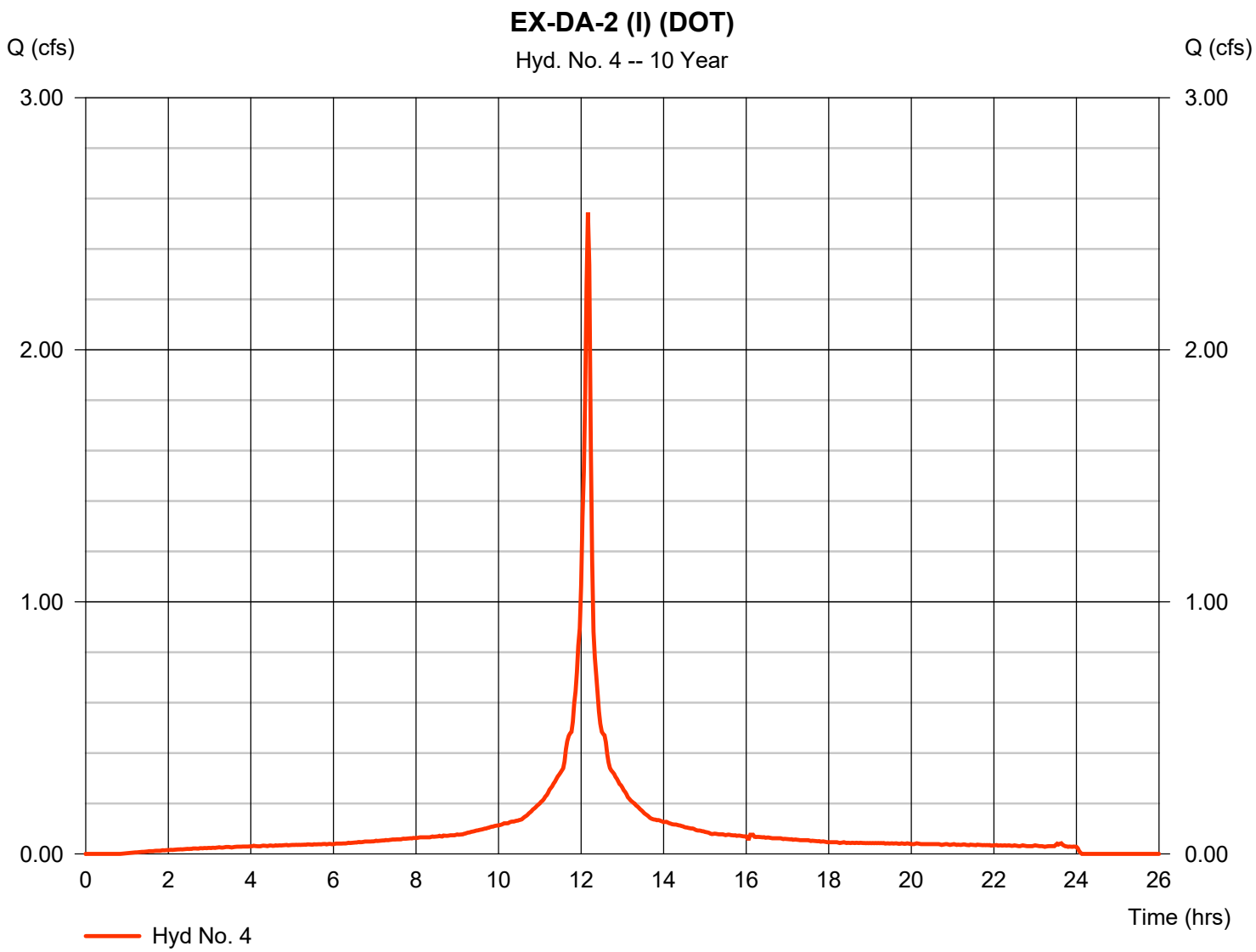
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 4

EX-DA-2 (I) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.545 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 8,882 cuft
Drainage area	= 0.540 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



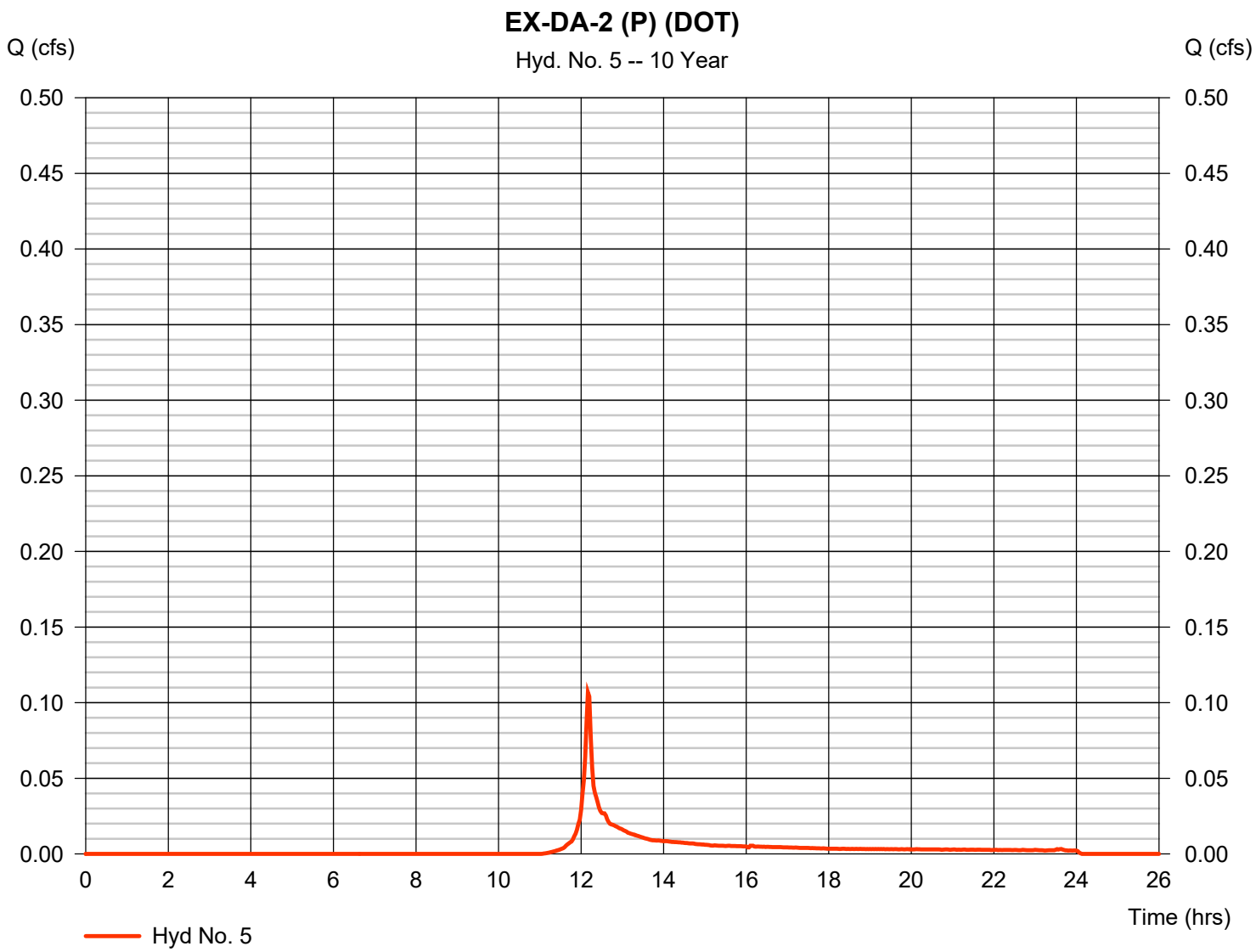
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 5

EX-DA-2 (P) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.107 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 336 cuft
Drainage area	= 0.070 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



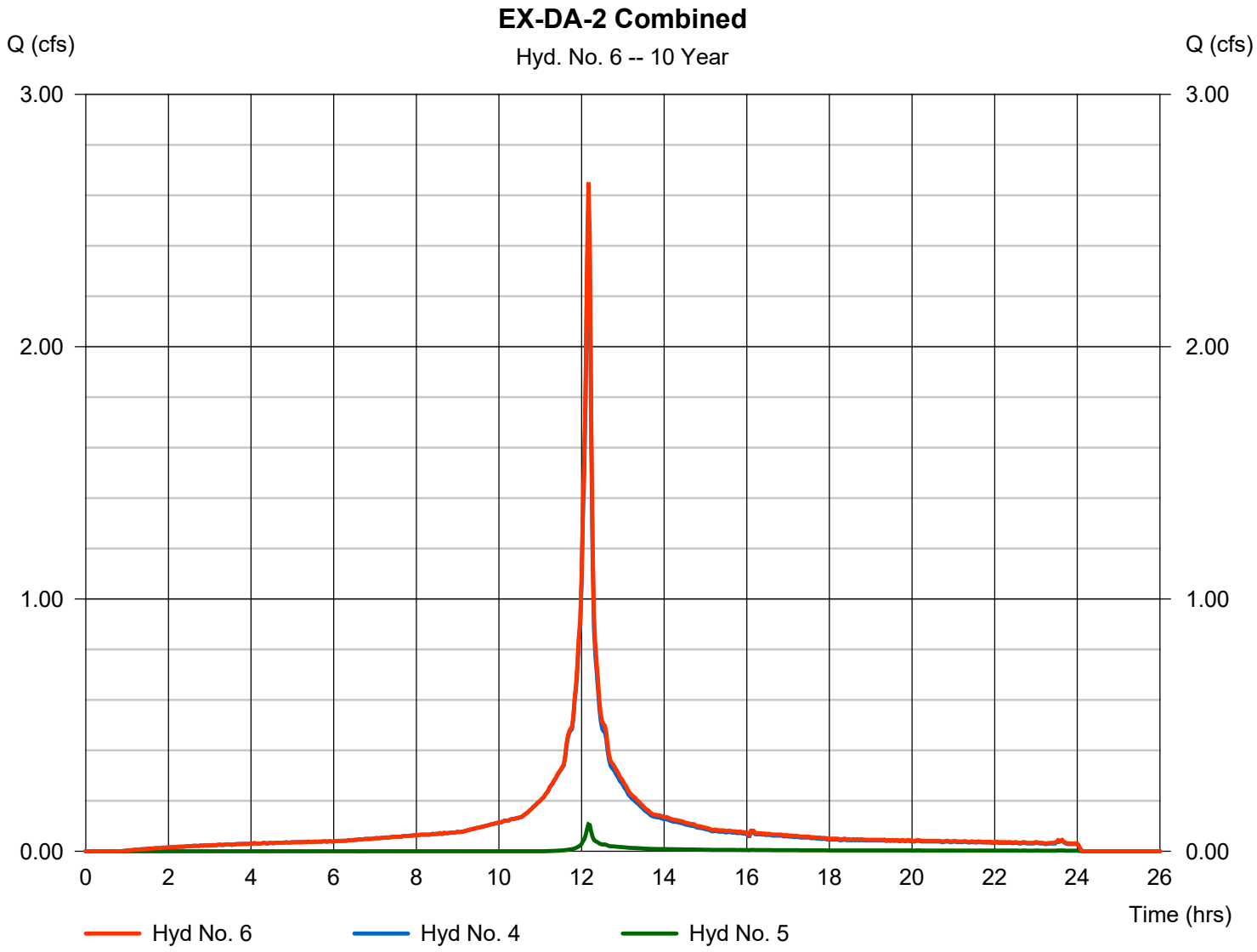
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 6

EX-DA-2 Combined

Hydrograph type	= Combine	Peak discharge	= 2.651 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 9,218 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.610 ac



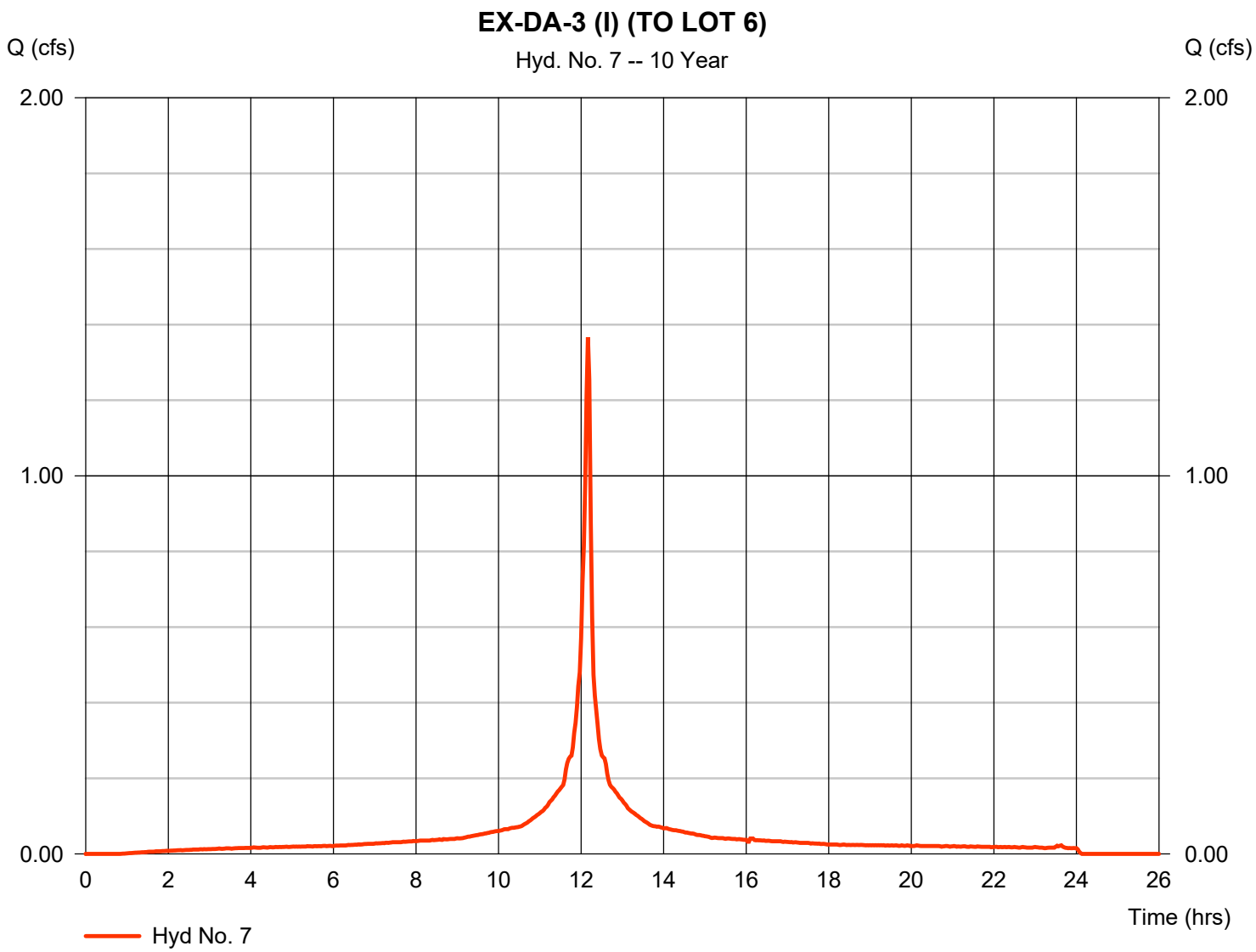
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 7

EX-DA-3 (I) (TO LOT 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.366 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 4,770 cuft
Drainage area	= 0.290 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



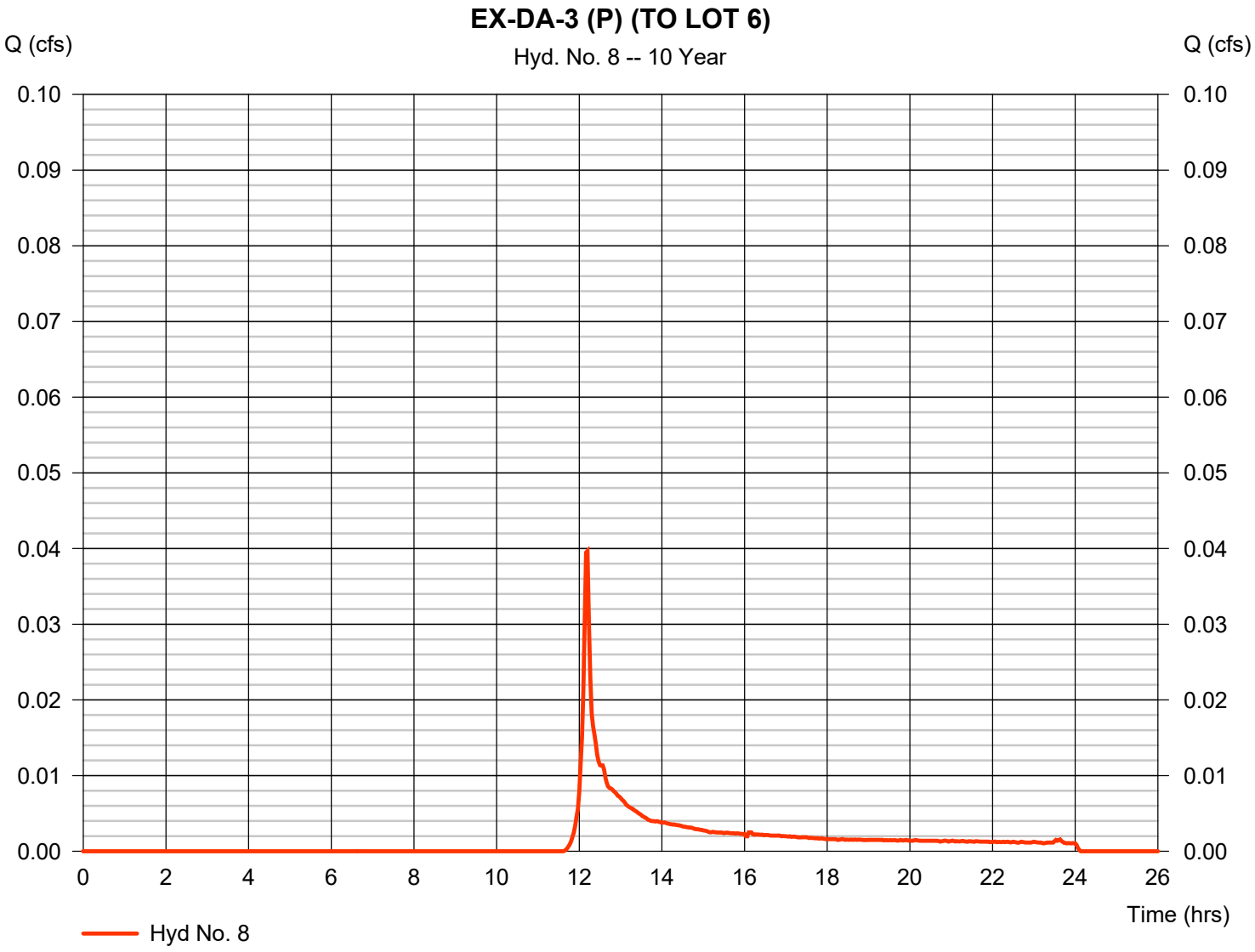
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 8

EX-DA-3 (P) (TO LOT 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.040 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 138 cuft
Drainage area	= 0.040 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



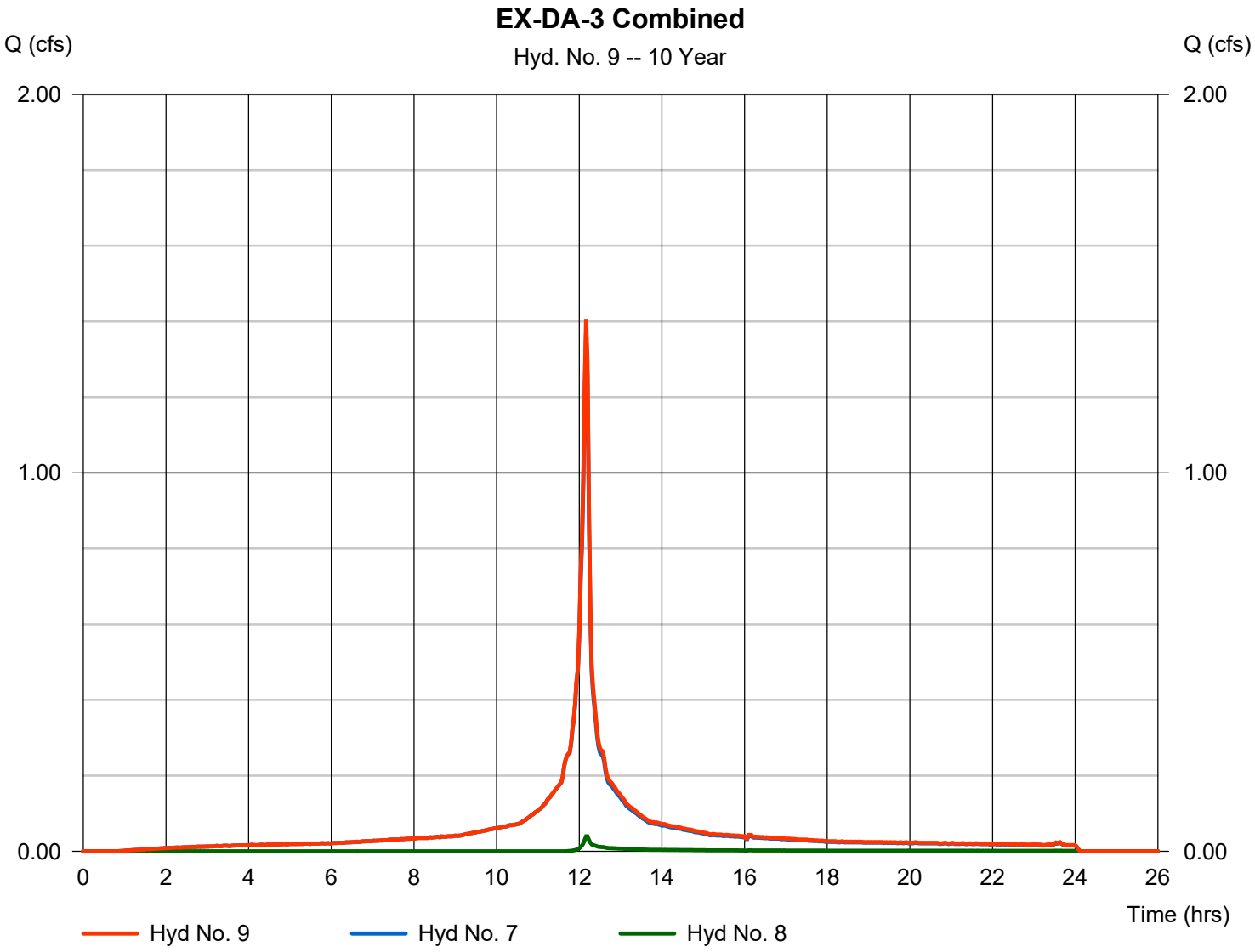
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 9

EX-DA-3 Combined

Hydrograph type	= Combine	Peak discharge	= 1.406 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 4,908 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.330 ac



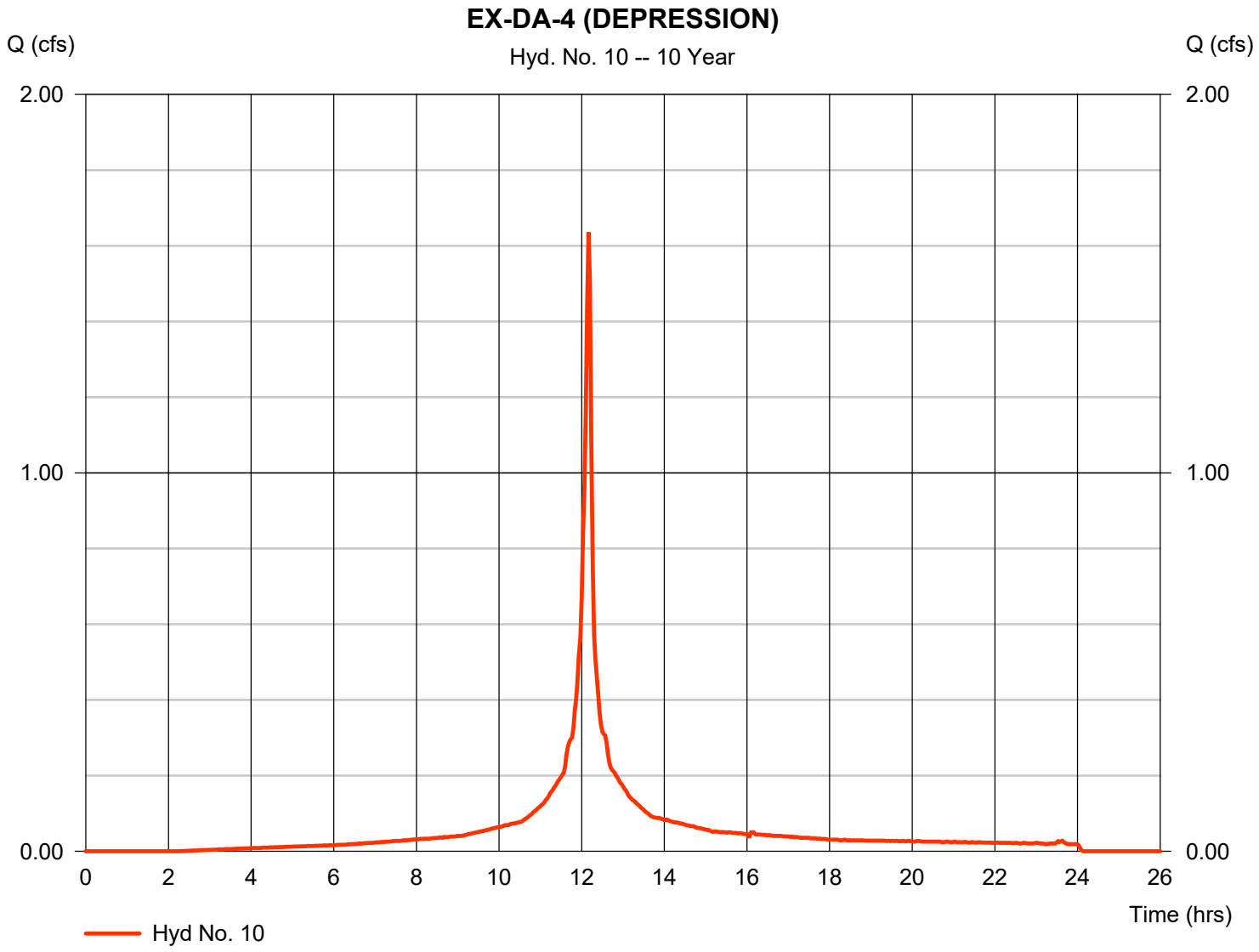
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 10

EX-DA-4 (DEPRESSION)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.635 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 5,362 cuft
Drainage area	= 0.360 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



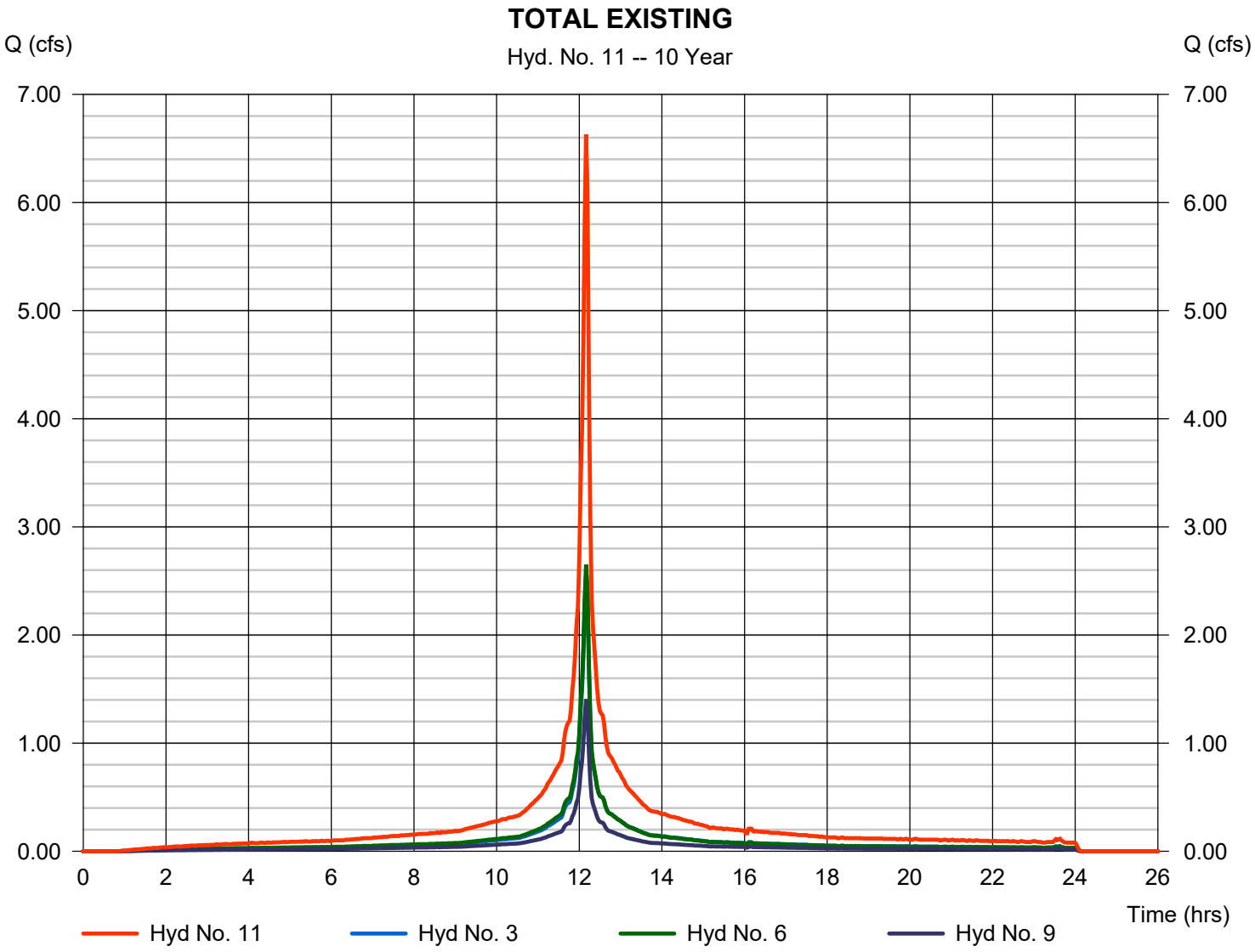
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 11

TOTAL EXISTING

Hydrograph type	= Combine	Peak discharge	= 6.629 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 23,048 cuft
Inflow hyds.	= 3, 6, 9	Contrib. drain. area	= 0.000 ac



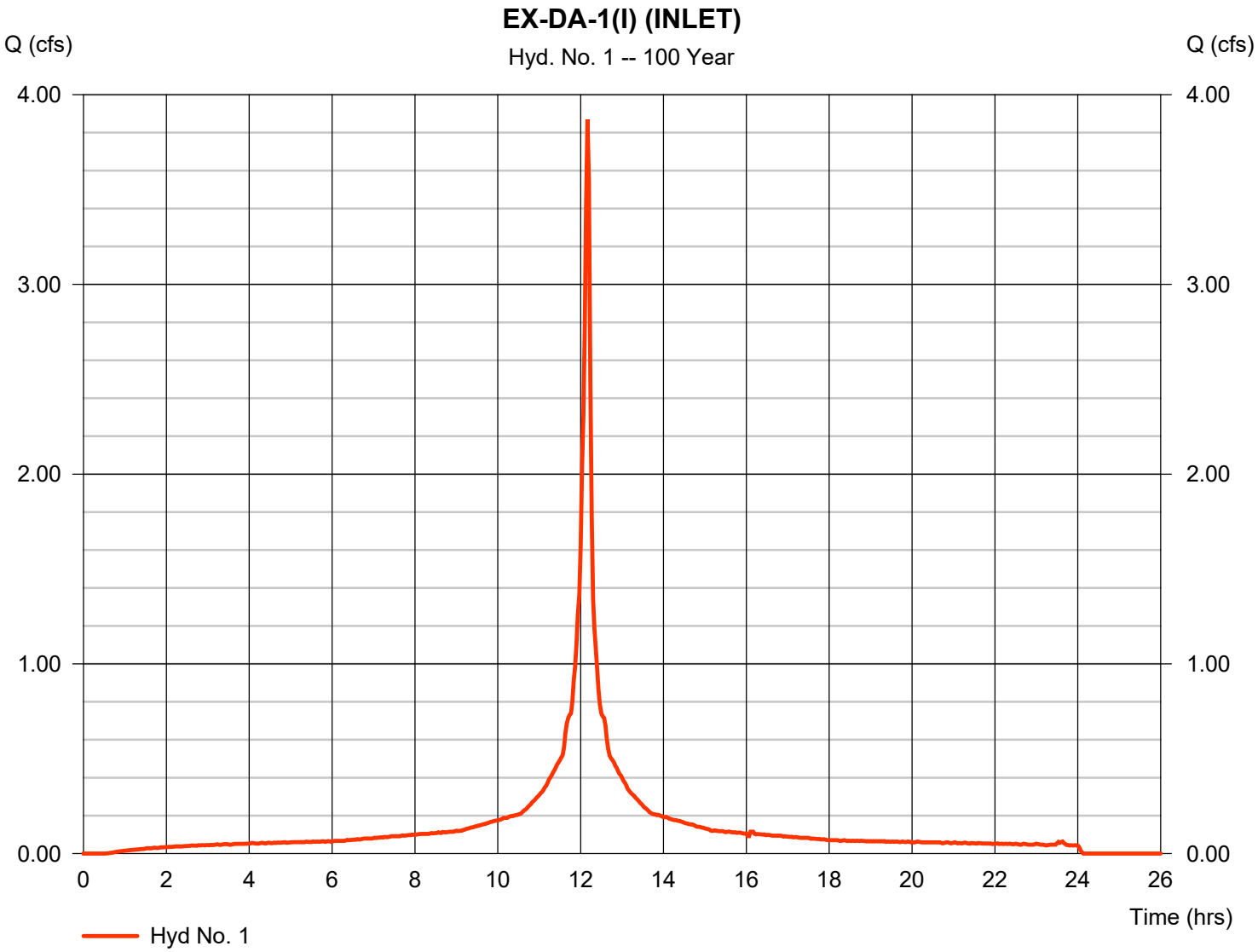
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 1

EX-DA-1(I) (INLET)

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.870 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	13,724 cuft
Drainage area	=	0.490 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	8.47 in	Distribution	=	Custom
Storm duration	=	NRCS Type D.cds	Shape factor	=	484



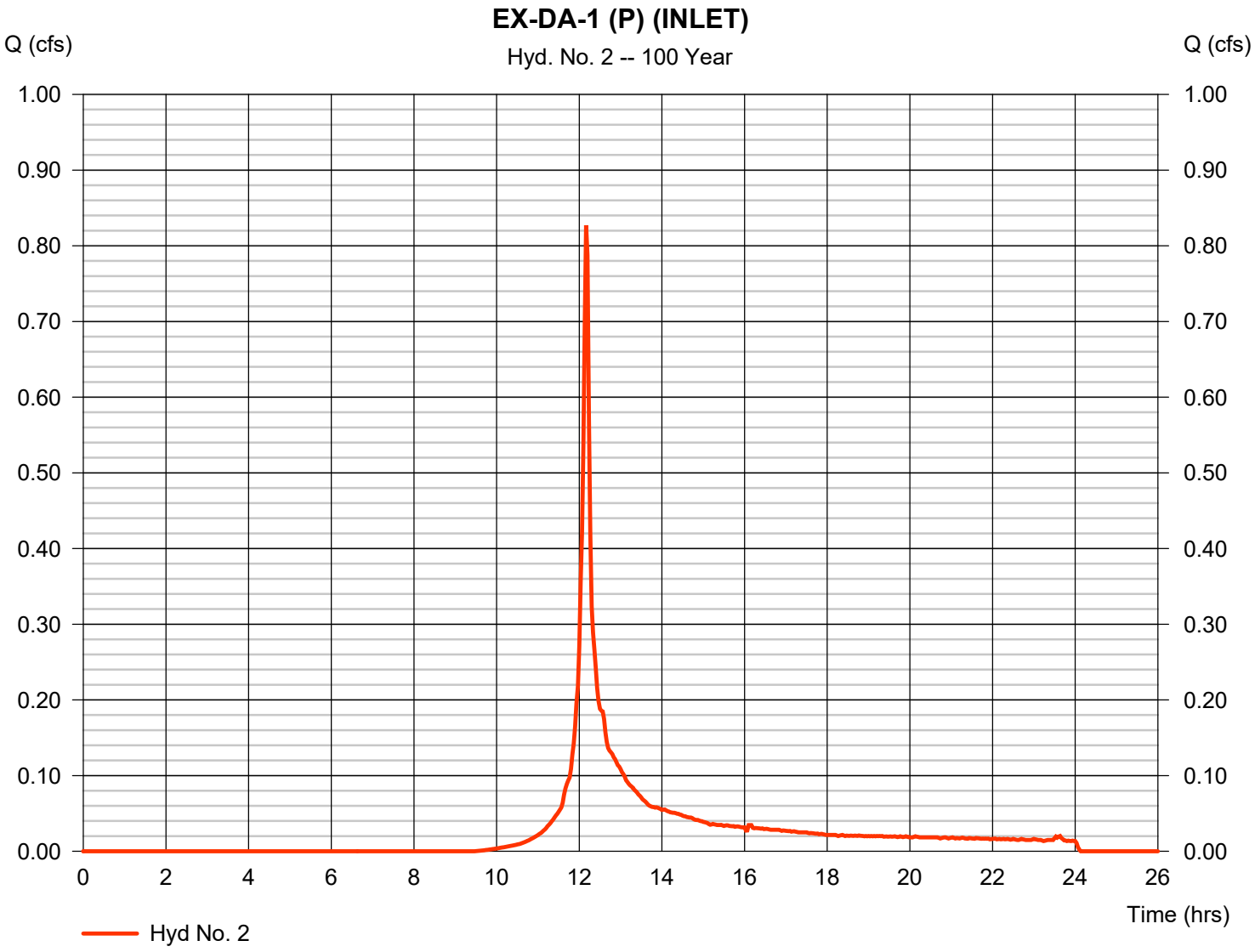
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 2

EX-DA-1 (P) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.827 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 2,470 cuft
Drainage area	= 0.210 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



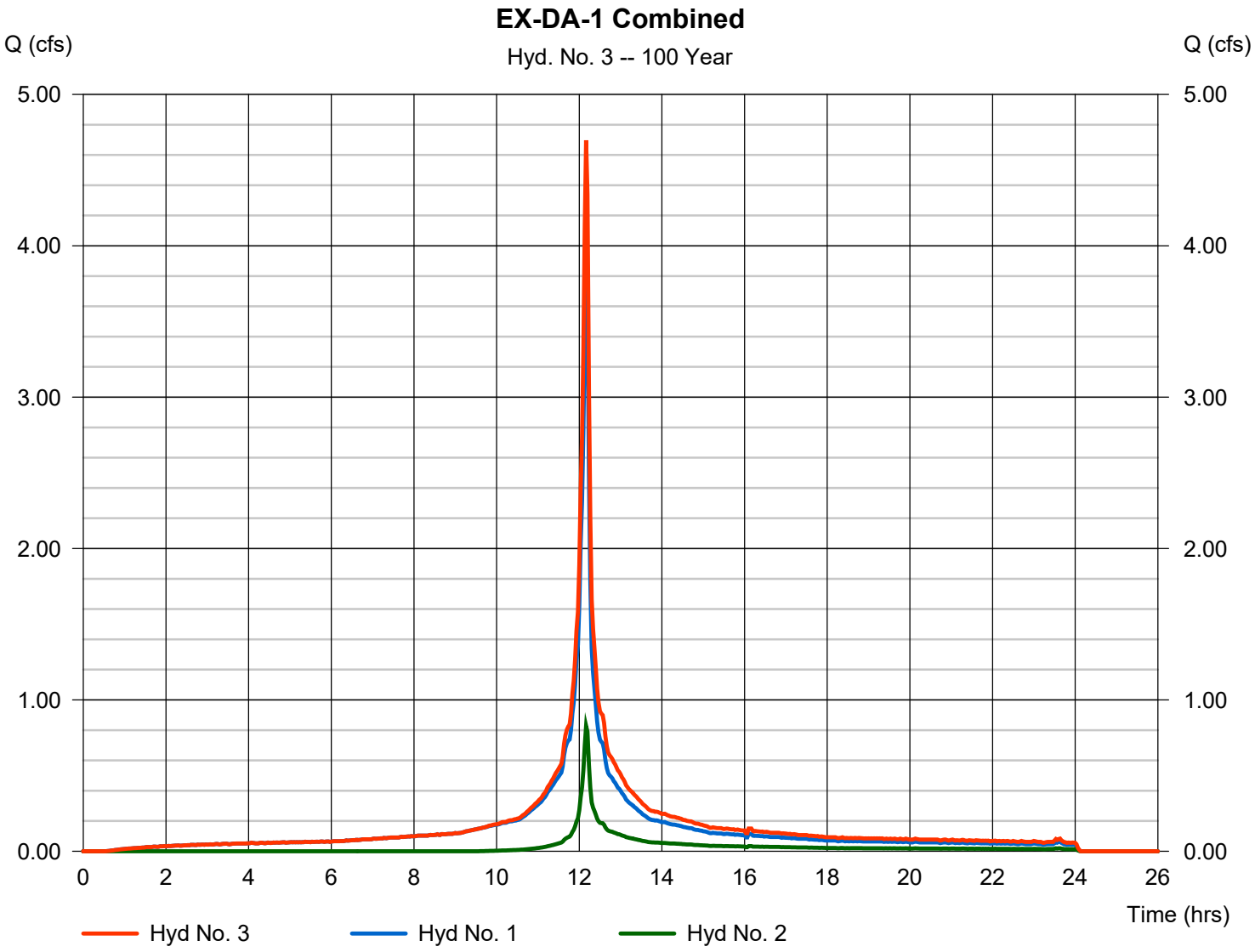
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 3

EX-DA-1 Combined

Hydrograph type	= Combine	Peak discharge	= 4.697 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 16,194 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 0.700 ac



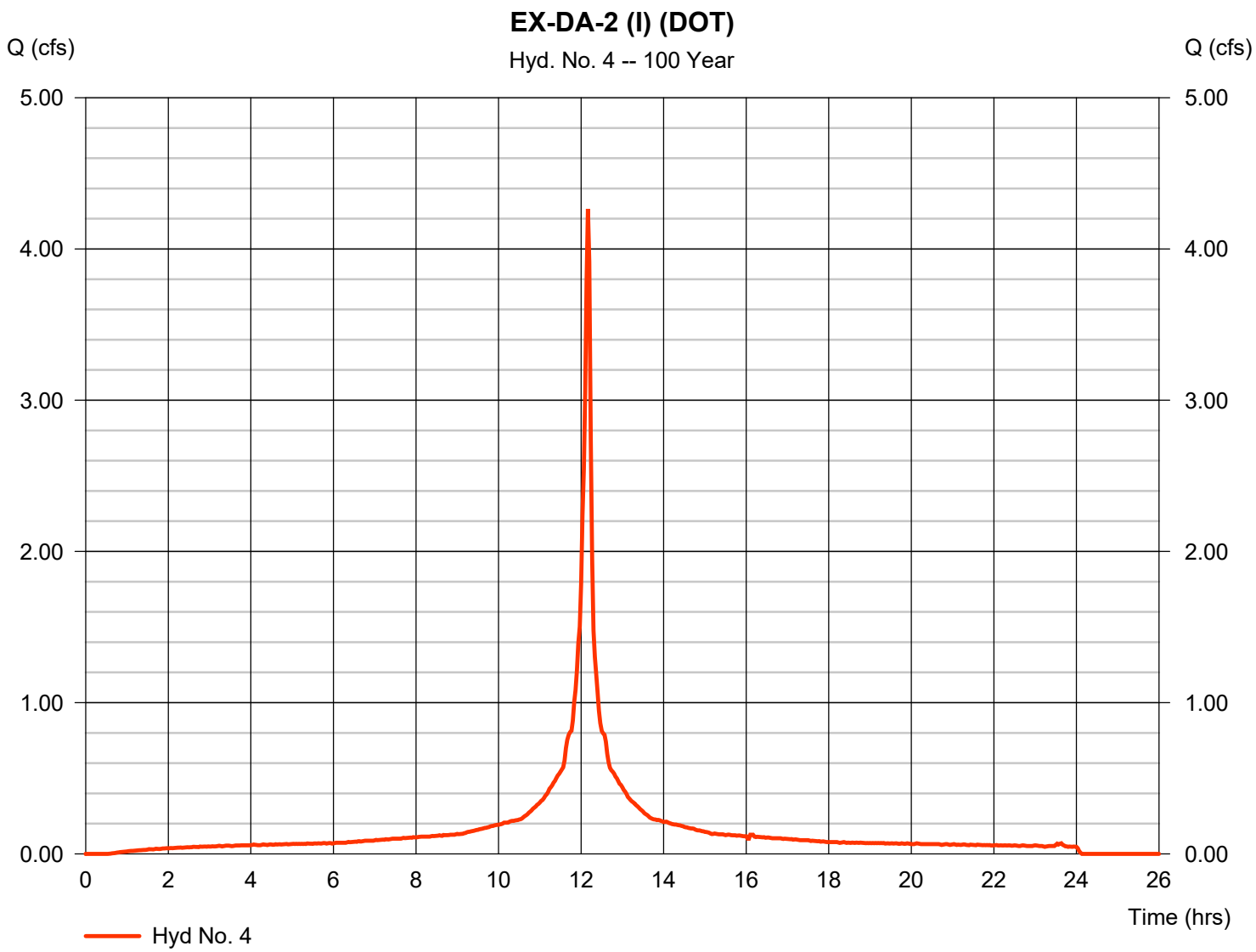
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 4

EX-DA-2 (I) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 4.265 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 15,124 cuft
Drainage area	= 0.540 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



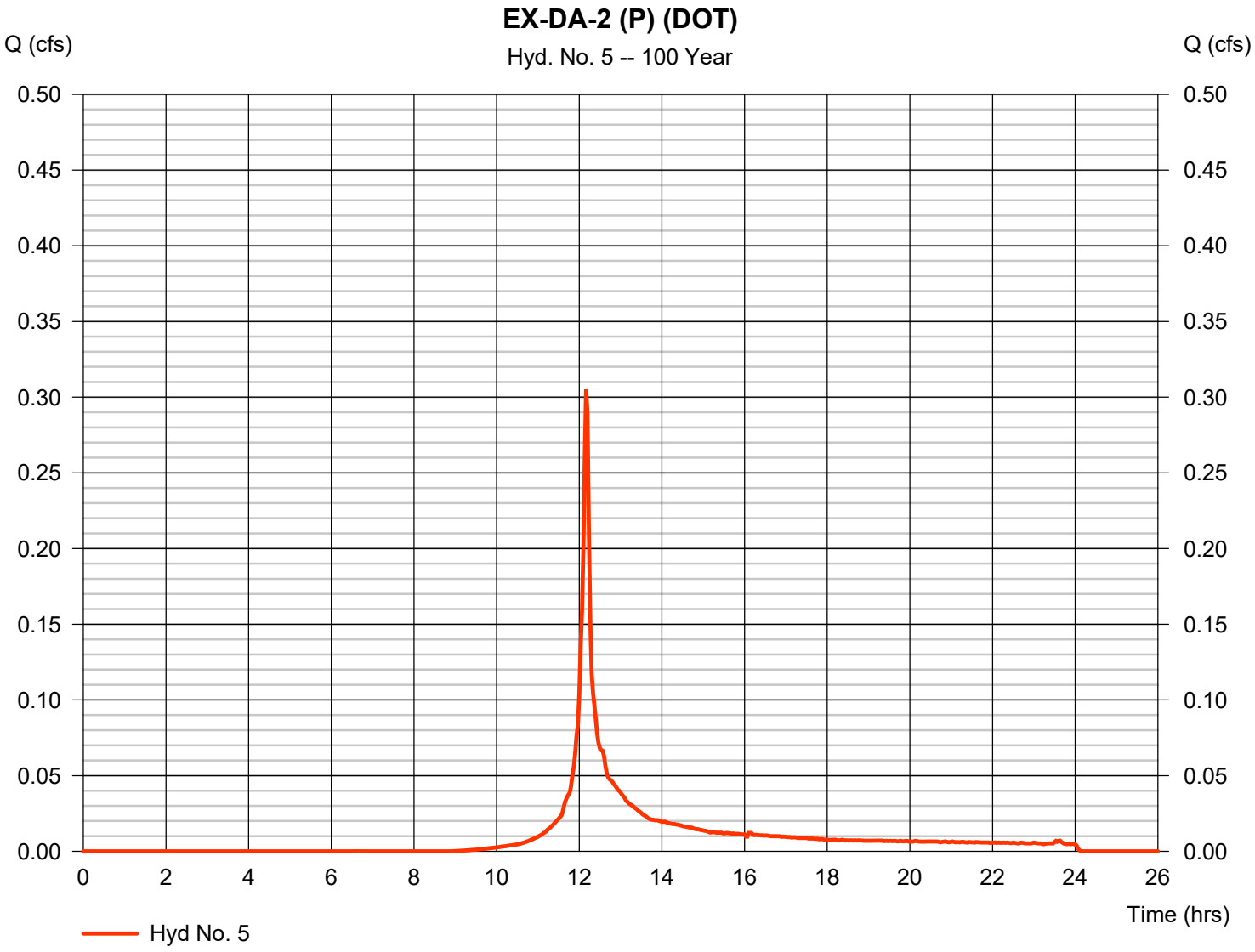
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 5

EX-DA-2 (P) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.305 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 907 cuft
Drainage area	= 0.070 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



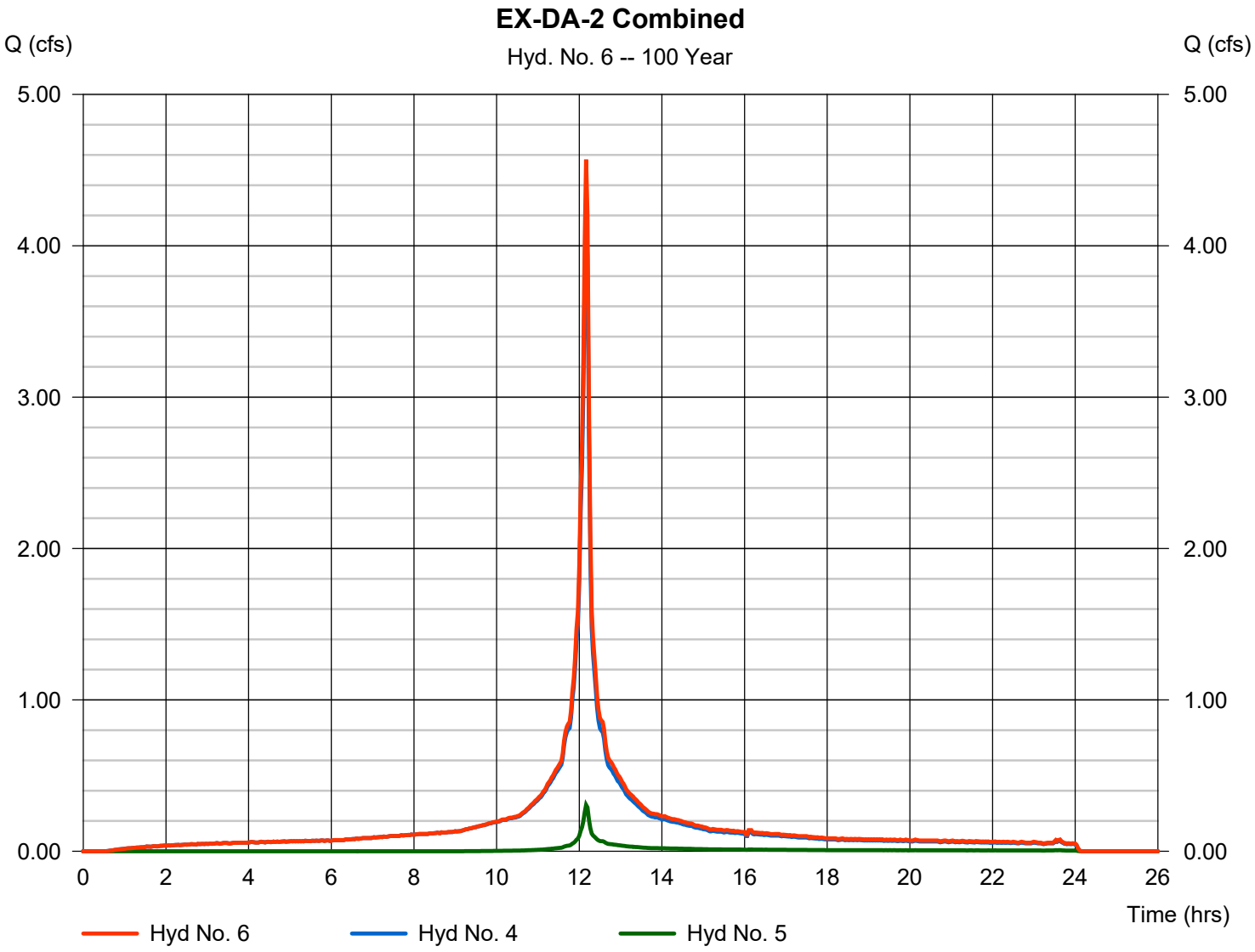
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 6

EX-DA-2 Combined

Hydrograph type	= Combine	Peak discharge	= 4.570 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 16,031 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.610 ac



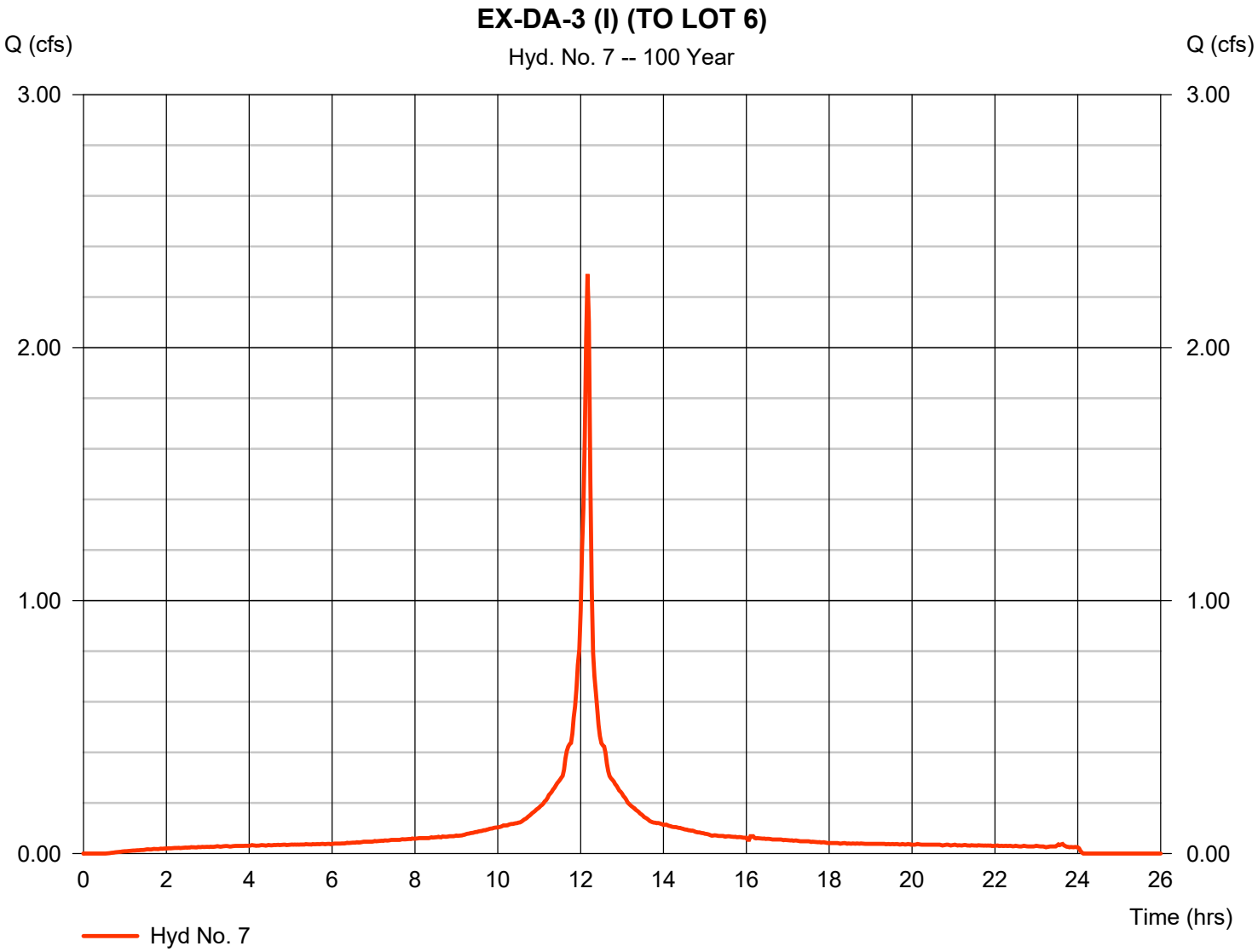
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 7

EX-DA-3 (I) (TO LOT 6)

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.290 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	8,122 cuft
Drainage area	=	0.290 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	8.47 in	Distribution	=	Custom
Storm duration	=	NRCS Type D.cds	Shape factor	=	484



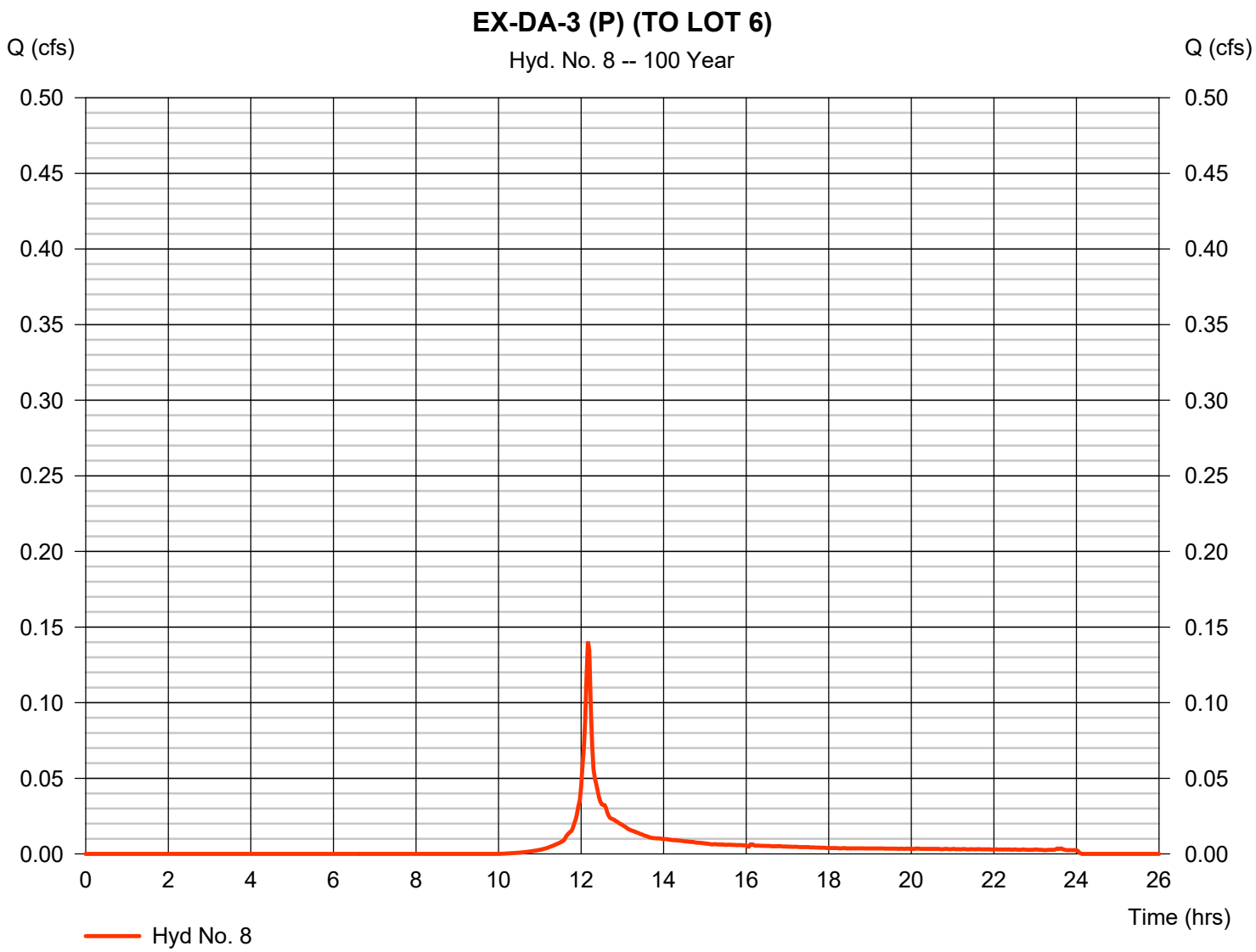
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 8

EX-DA-3 (P) (TO LOT 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.140 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 423 cuft
Drainage area	= 0.040 ac	Curve number	= 55
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



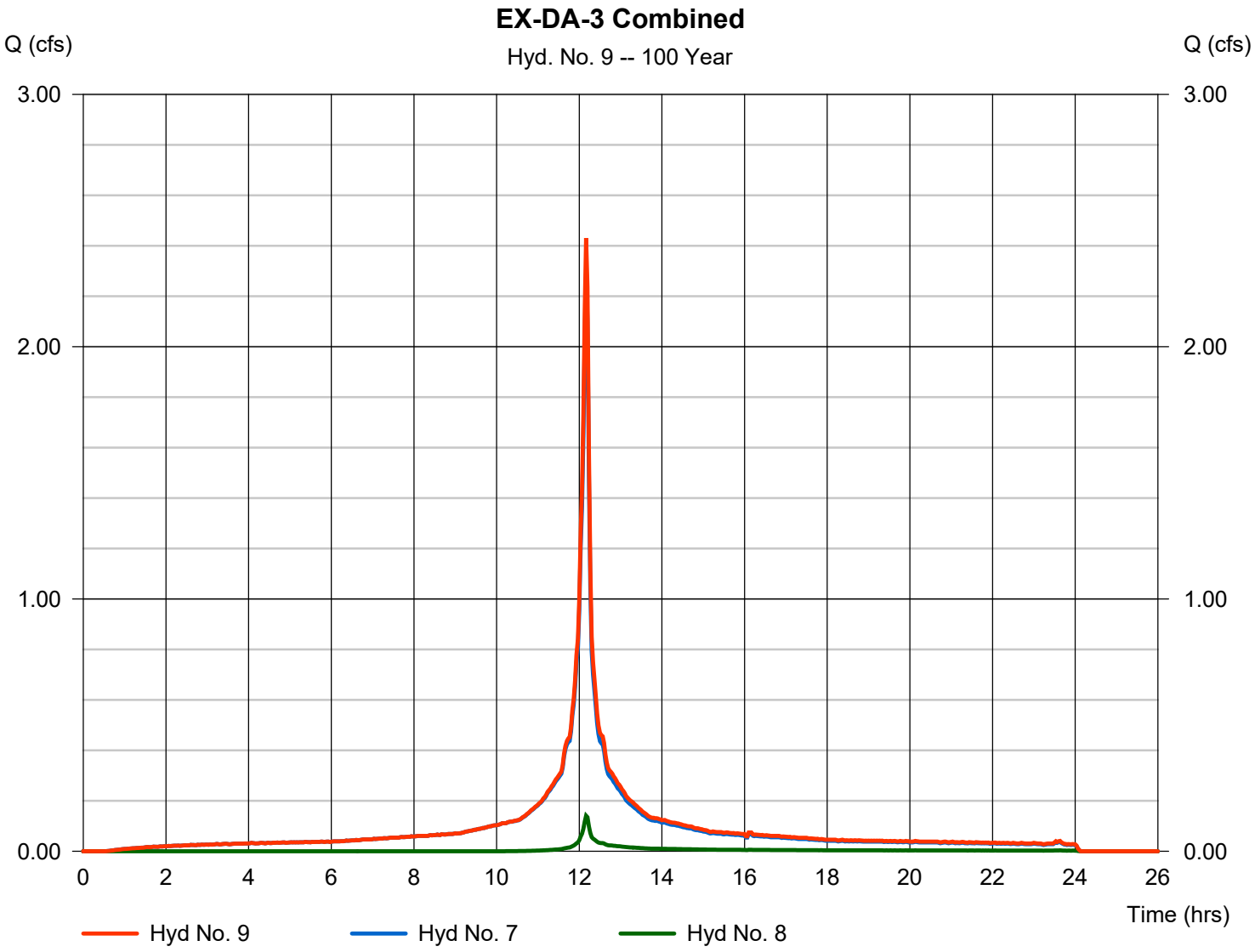
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 9

EX-DA-3 Combined

Hydrograph type	= Combine	Peak discharge	= 2.431 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 8,546 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.330 ac



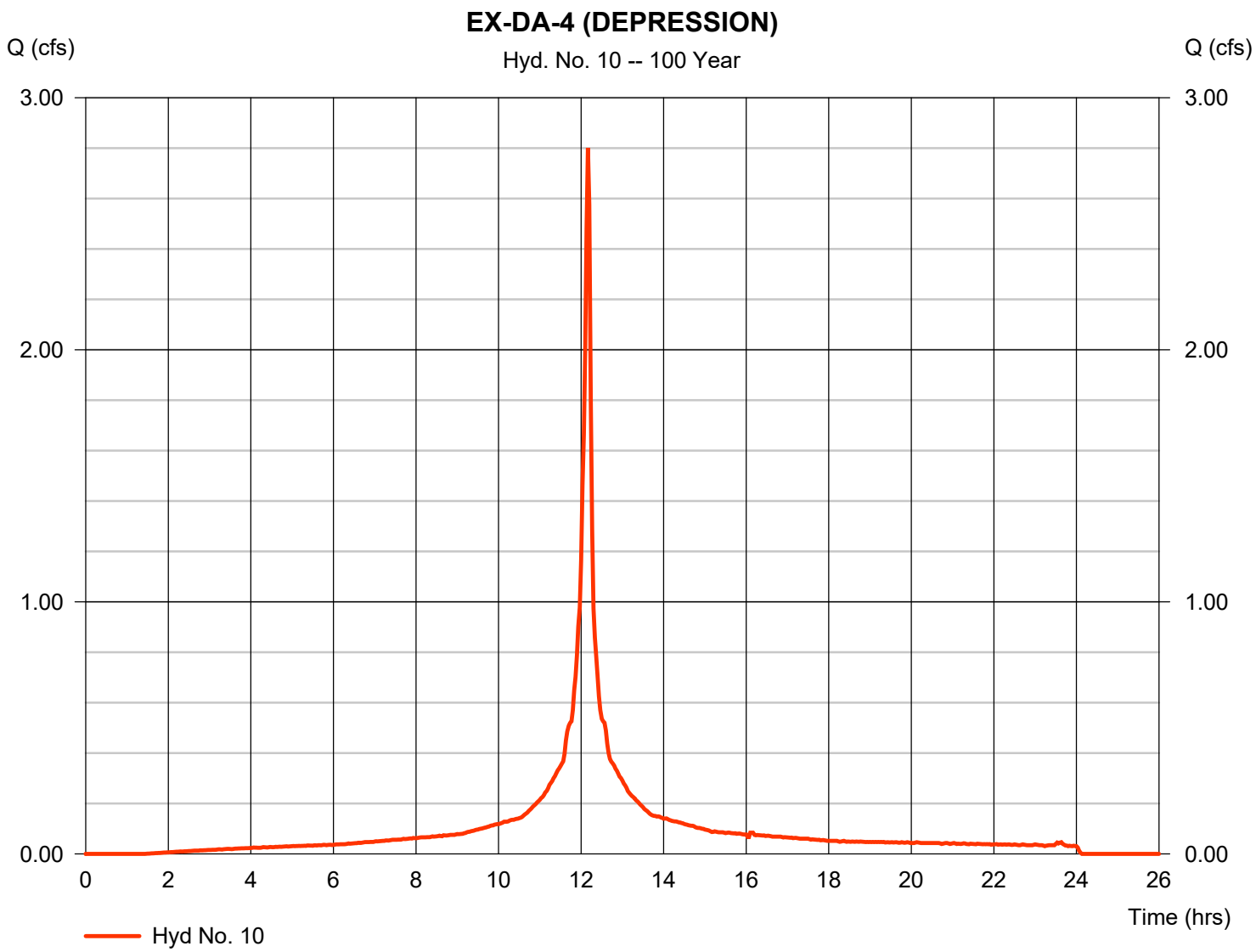
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 10

EX-DA-4 (DEPRESSION)

Hydrograph type	= SCS Runoff	Peak discharge	= 2.801 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 9,494 cuft
Drainage area	= 0.360 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



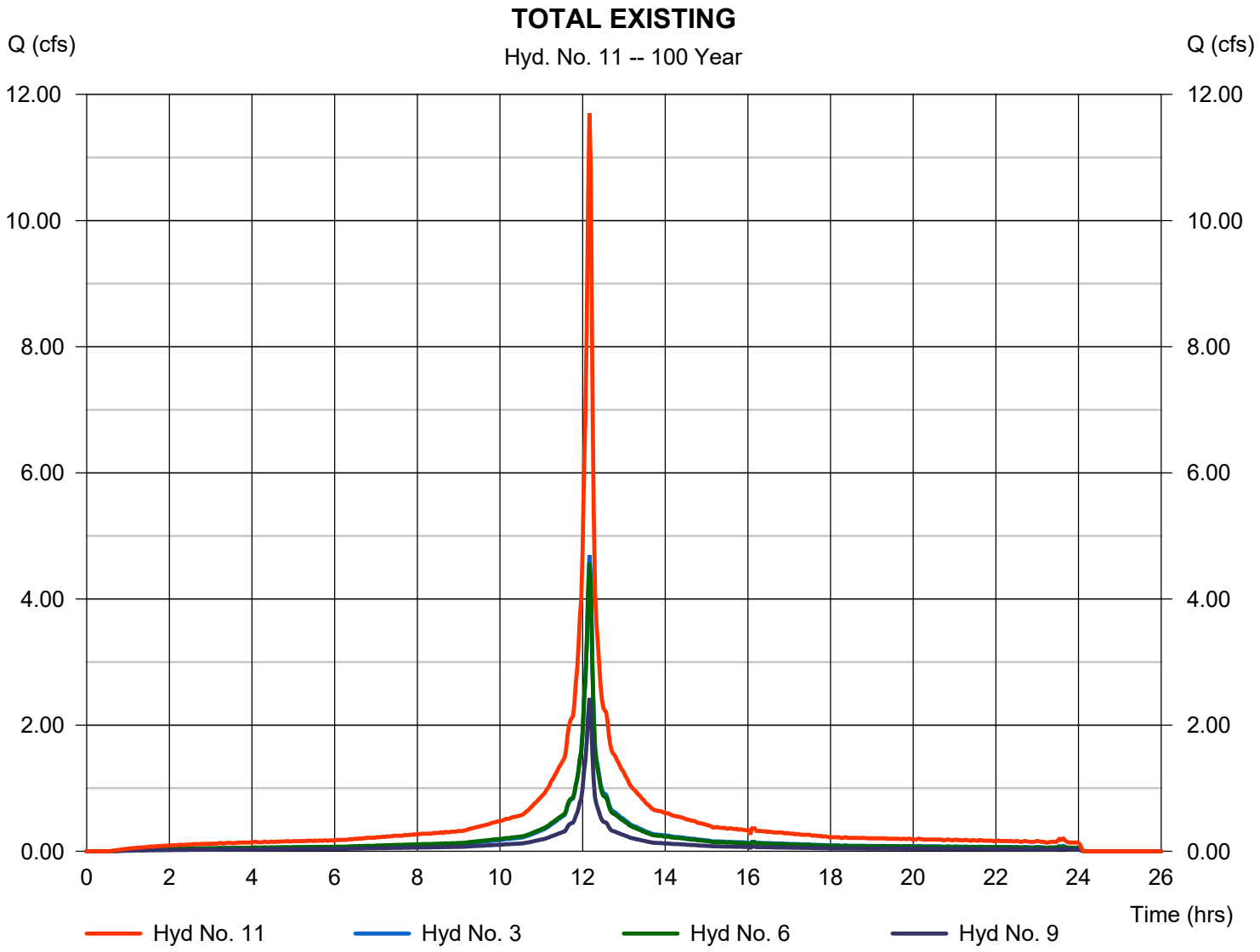
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

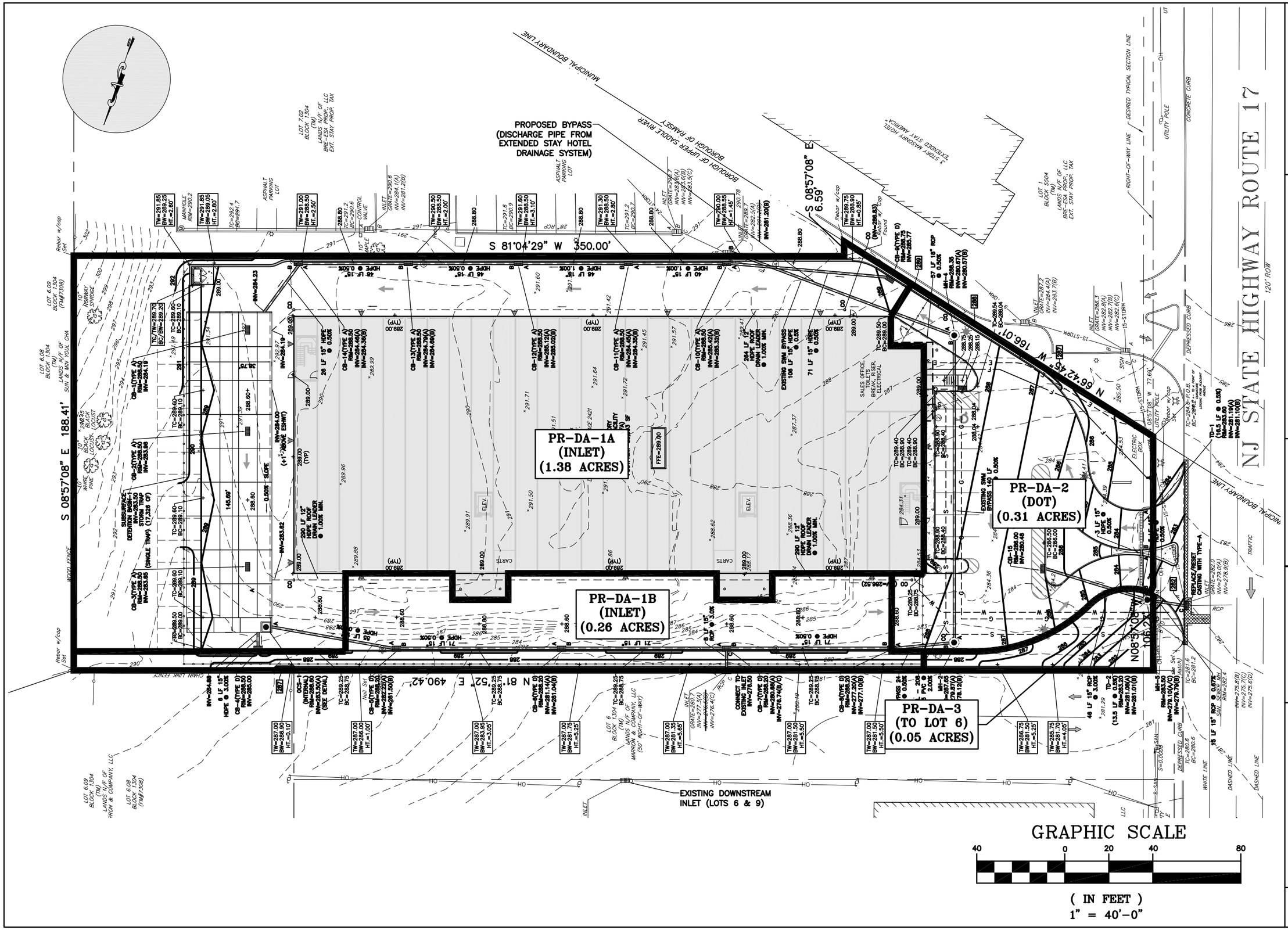
Hyd. No. 11

TOTAL EXISTING

Hydrograph type	= Combine	Peak discharge	= 11.70 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 40,770 cuft
Inflow hyds.	= 3, 6, 9	Contrib. drain. area	= 0.000 ac



Proposed Conditions
Hydrologic Model



L2A LAND DESIGN LLC
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www.L2Alanddesign.com
New Jersey Certificate of Authorization No. 24GA28130900

5/1/2020

Michael E. Dipple, P.E. DATE

NJ Professional Engineer #24GE04081200

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PROJECT:

PROPOSED SELF-STORAGE FACILITY
100 N.J.S.H. ROUTE 17 NORTH
BOROUGH OF UPPER SADDLE RIVER,
BERGEN COUNTY, NJ

BLOCK: 1304; LOT: 7.01
TAX MAP: 13

DRAWING TITLE:

PROPOSED DRAINAGE AREA MAP

SCALE:	REFER TO PLAN
DATE	1/17/2020
DESIGNED:	TEC
APPROVED:	MED
L2A PROJ. No.:	1901.161
DRAWING No.:	DA-02

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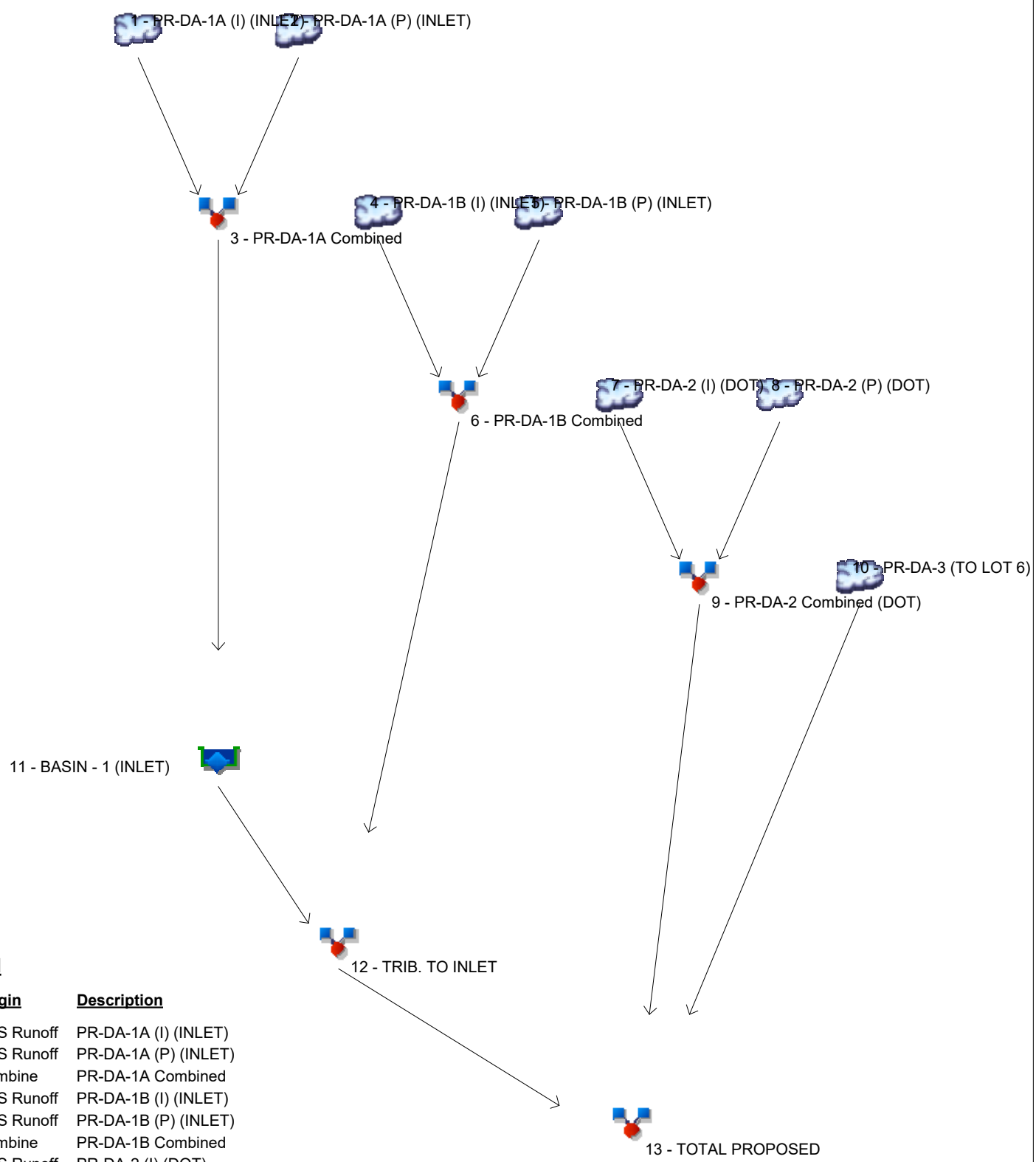
Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
1	SCS Runoff	PR-DA-1A (I) (INLET)
2	SCS Runoff	PR-DA-1A (P) (INLET)
3	Combine	PR-DA-1A Combined
4	SCS Runoff	PR-DA-1B (I) (INLET)
5	SCS Runoff	PR-DA-1B (P) (INLET)
6	Combine	PR-DA-1B Combined
7	SCS Runoff	PR-DA-2 (I) (DOT)
8	SCS Runoff	PR-DA-2 (P) (DOT)
9	Combine	PR-DA-2 Combined (DOT)
10	SCS Runoff	PR-DA-3 (TO LOT 6)
11	Reservoir	BASIN - 1 (INLET)
12	Combine	TRIB. TO INLET
13	Combine	TOTAL PROPOSED

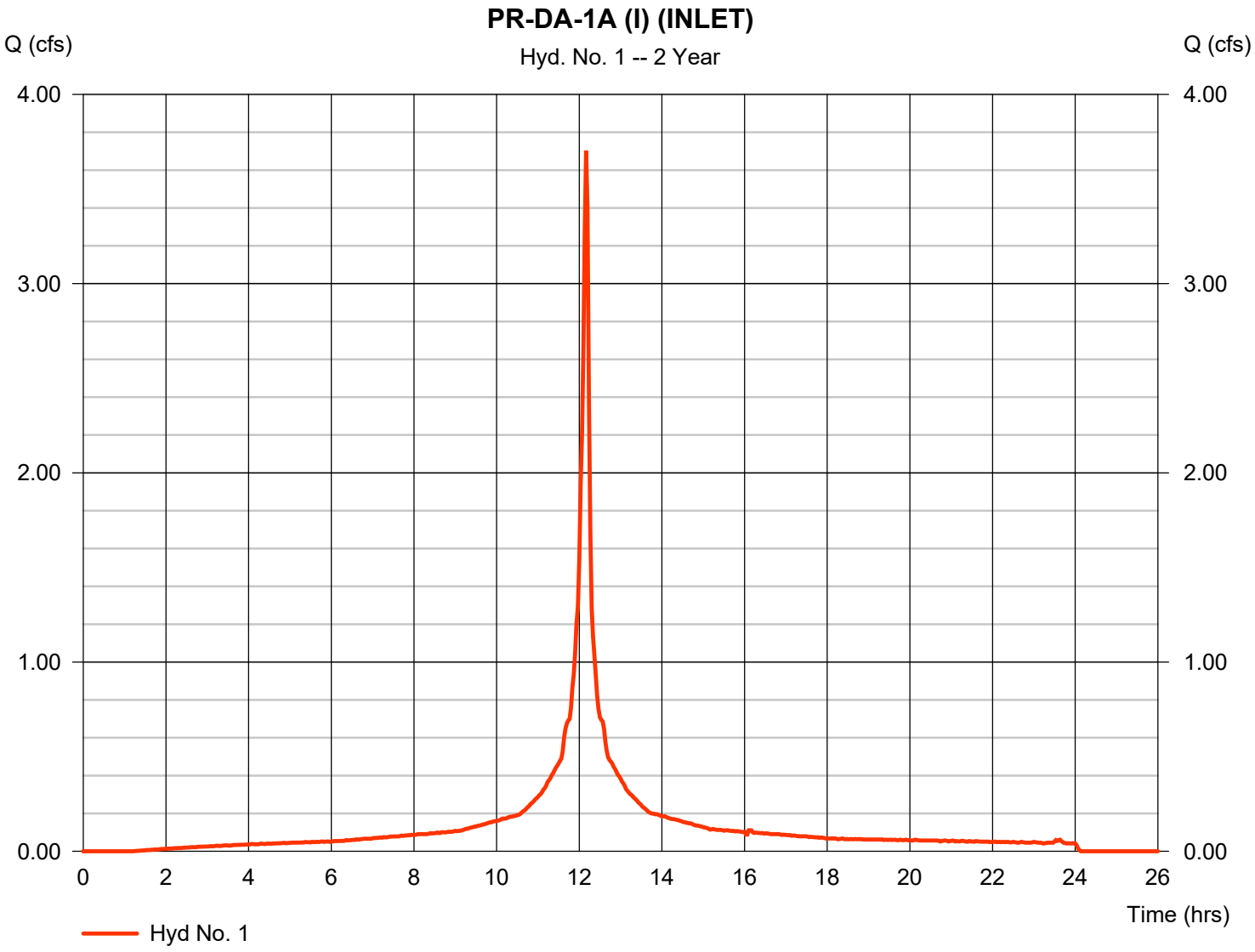
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 1

PR-DA-1A (I) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 3.702 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 12,688 cuft
Drainage area	= 1.200 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



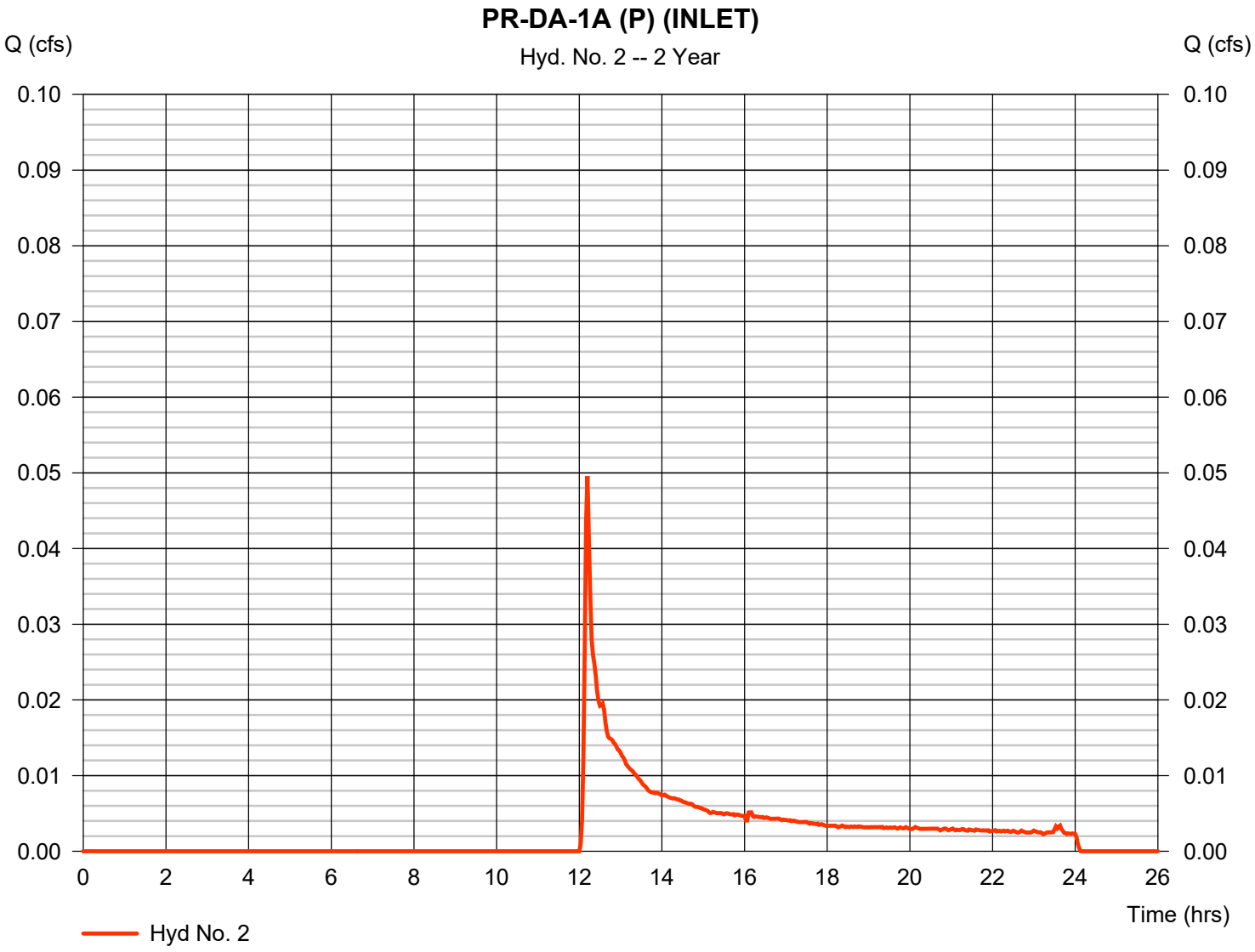
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 2

PR-DA-1A (P) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.050 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 240 cuft
Drainage area	= 0.180 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



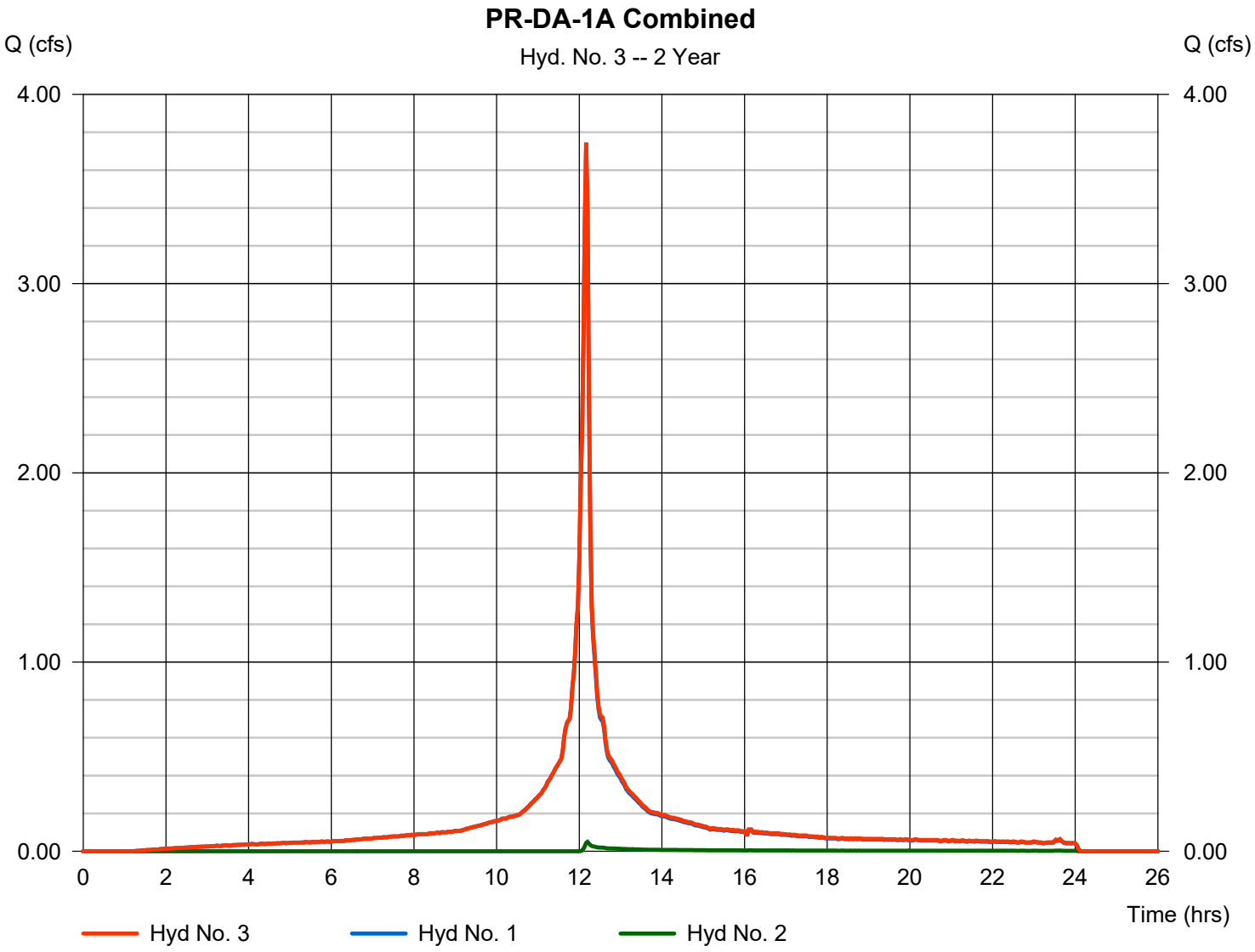
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 3

PR-DA-1A Combined

Hydrograph type	= Combine	Peak discharge	= 3.745 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 12,928 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.380 ac



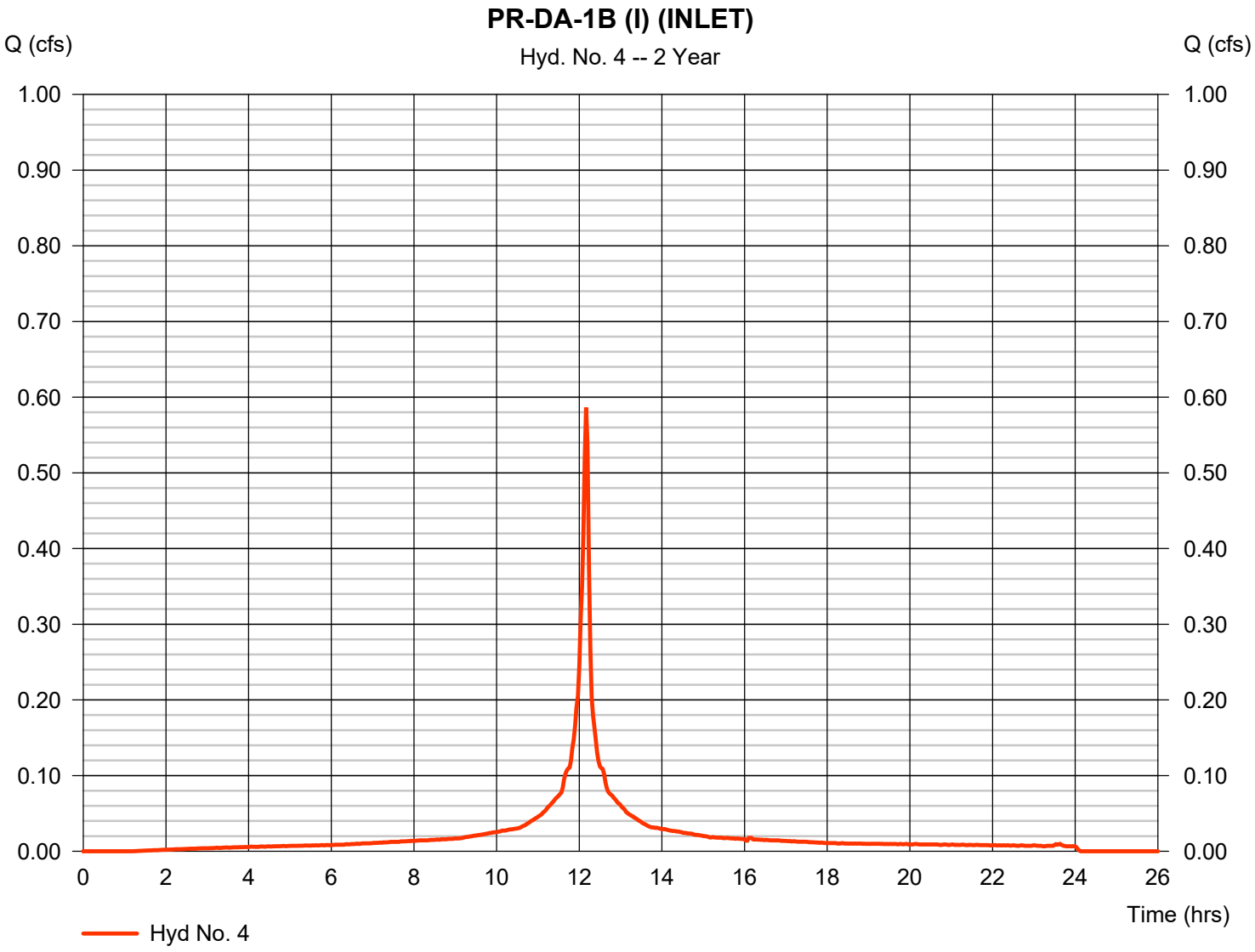
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 4

PR-DA-1B (I) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.586 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 2,009 cuft
Drainage area	= 0.190 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



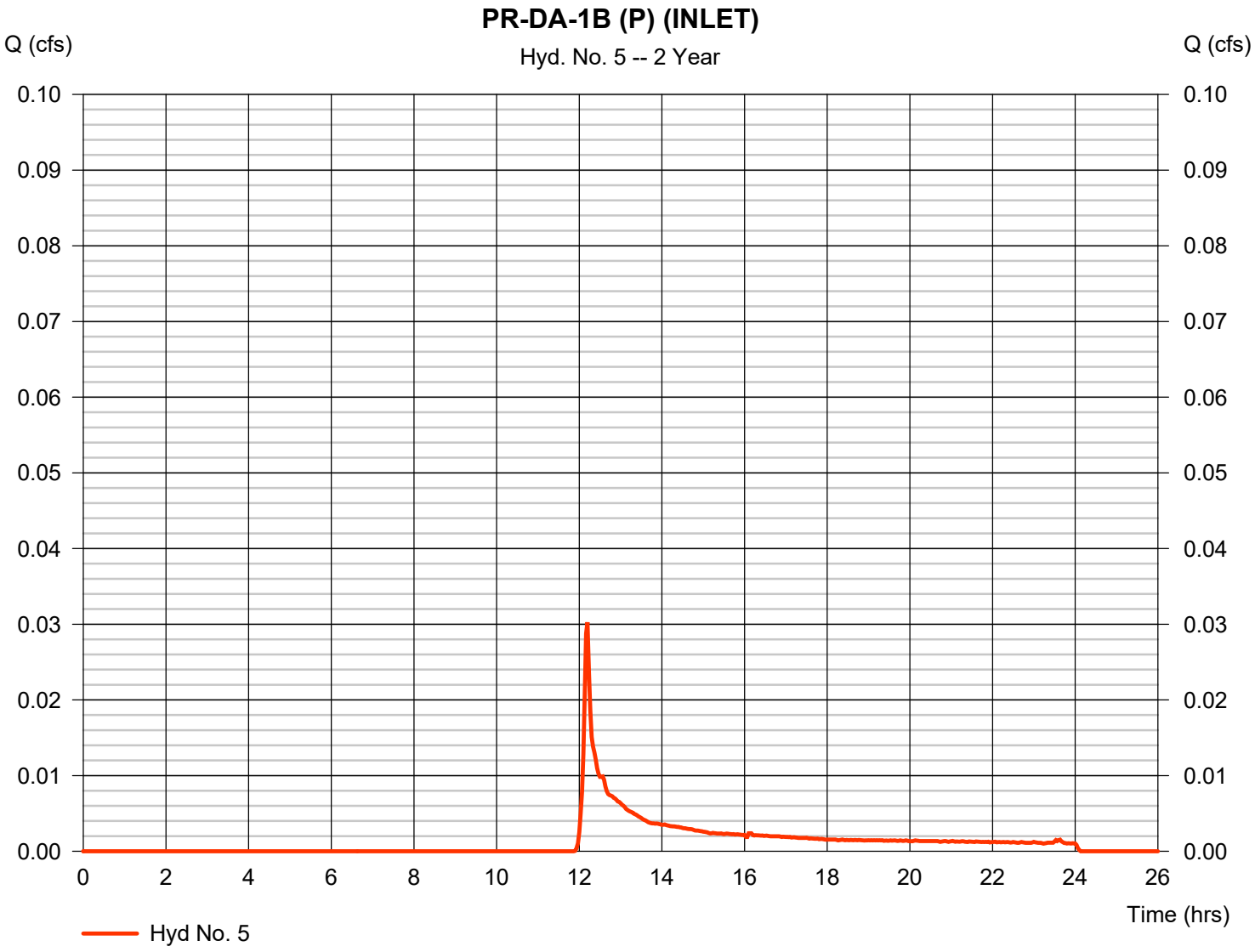
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 5

PR-DA-1B (P) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.030 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 120 cuft
Drainage area	= 0.070 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



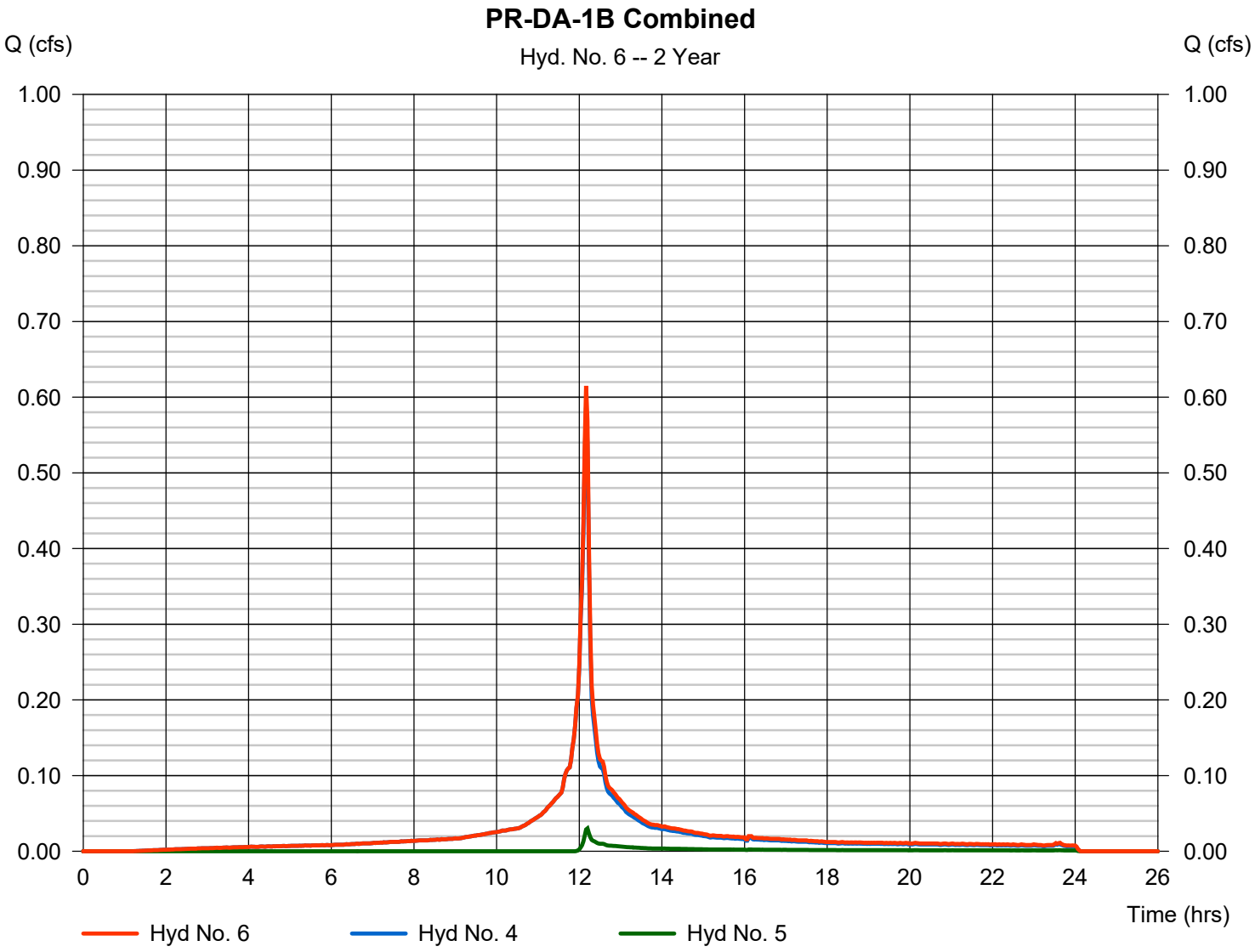
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 6

PR-DA-1B Combined

Hydrograph type	= Combine	Peak discharge	= 0.615 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 2,129 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.260 ac



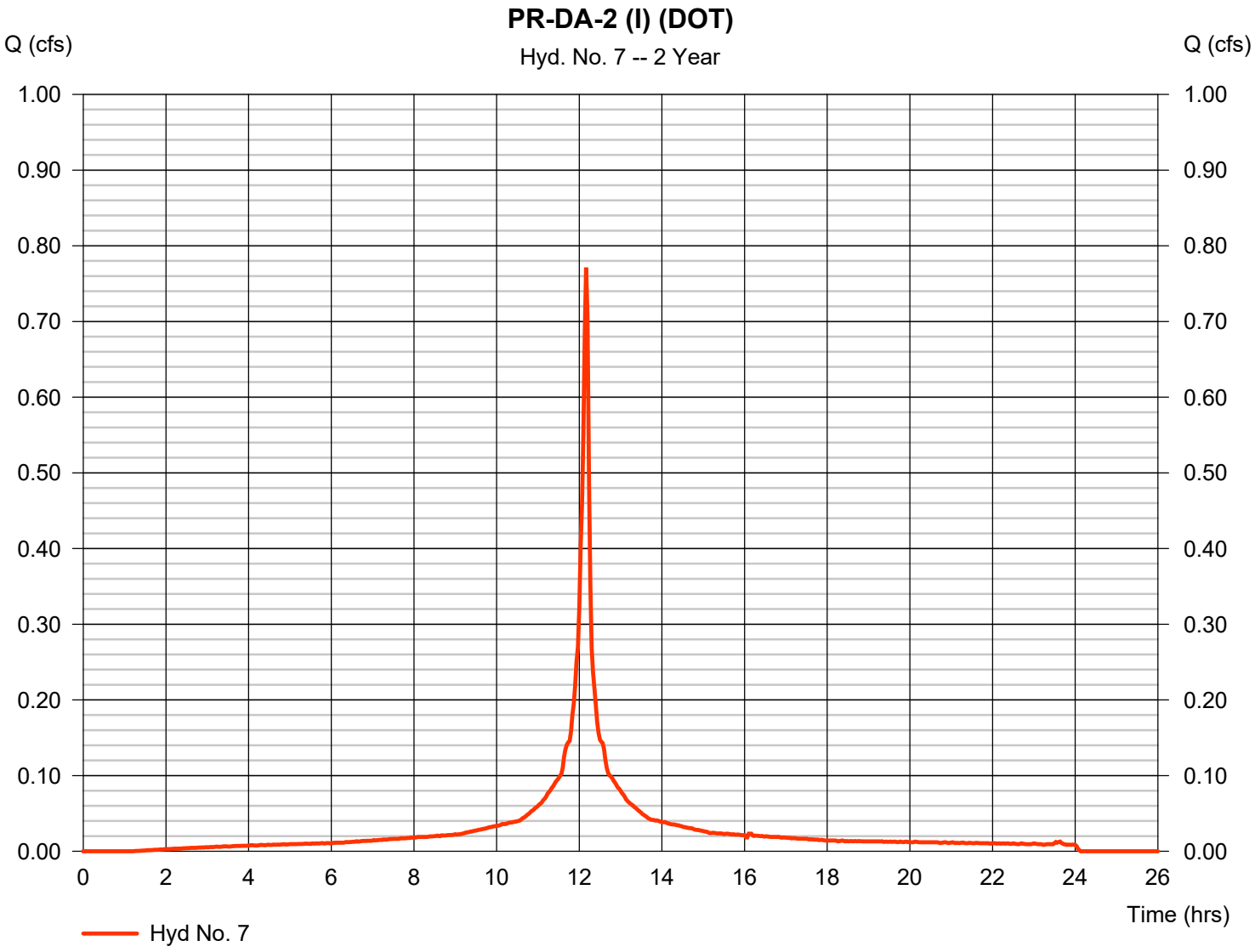
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 7

PR-DA-2 (I) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.771 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 2,643 cuft
Drainage area	= 0.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



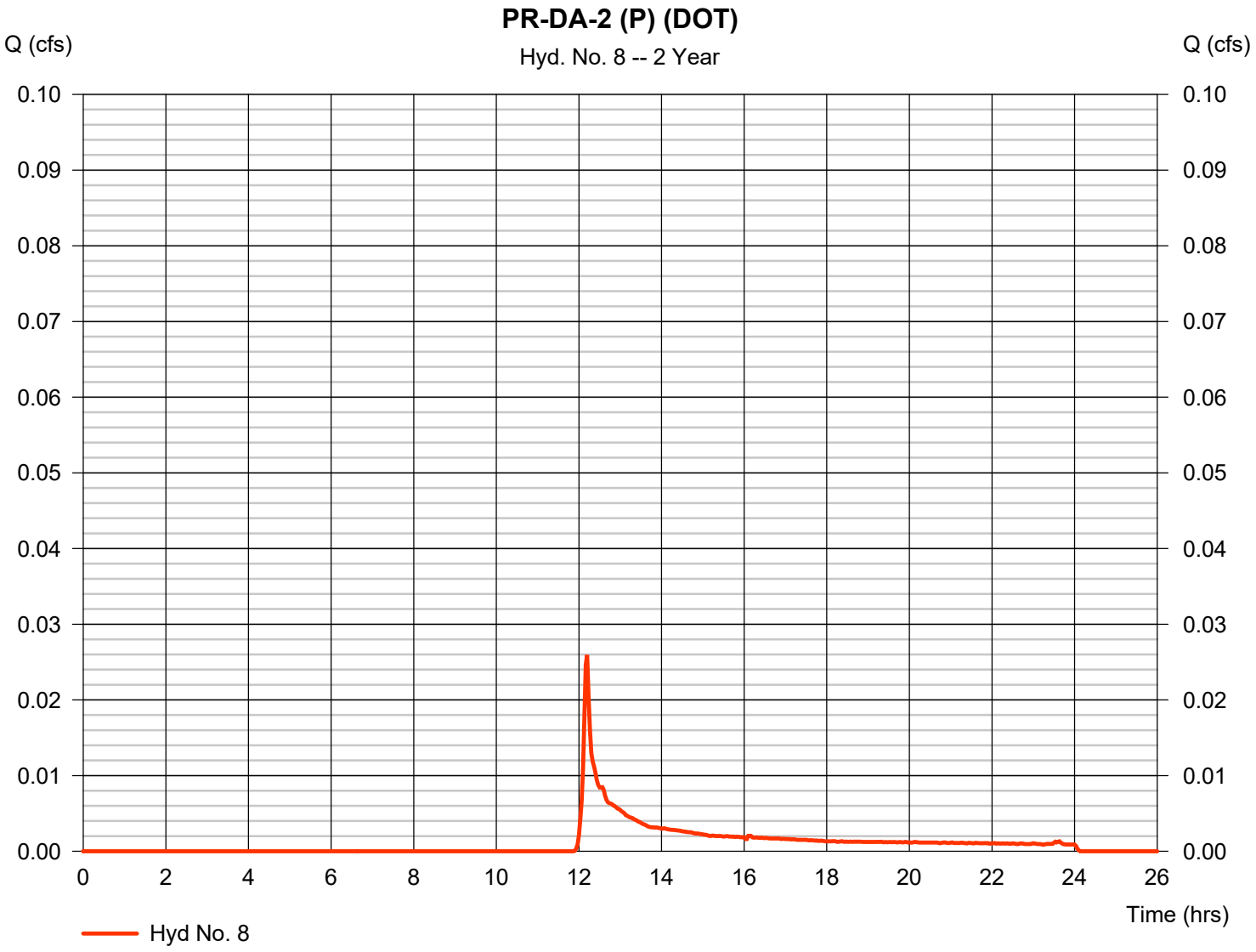
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 8

PR-DA-2 (P) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.026 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 103 cuft
Drainage area	= 0.060 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



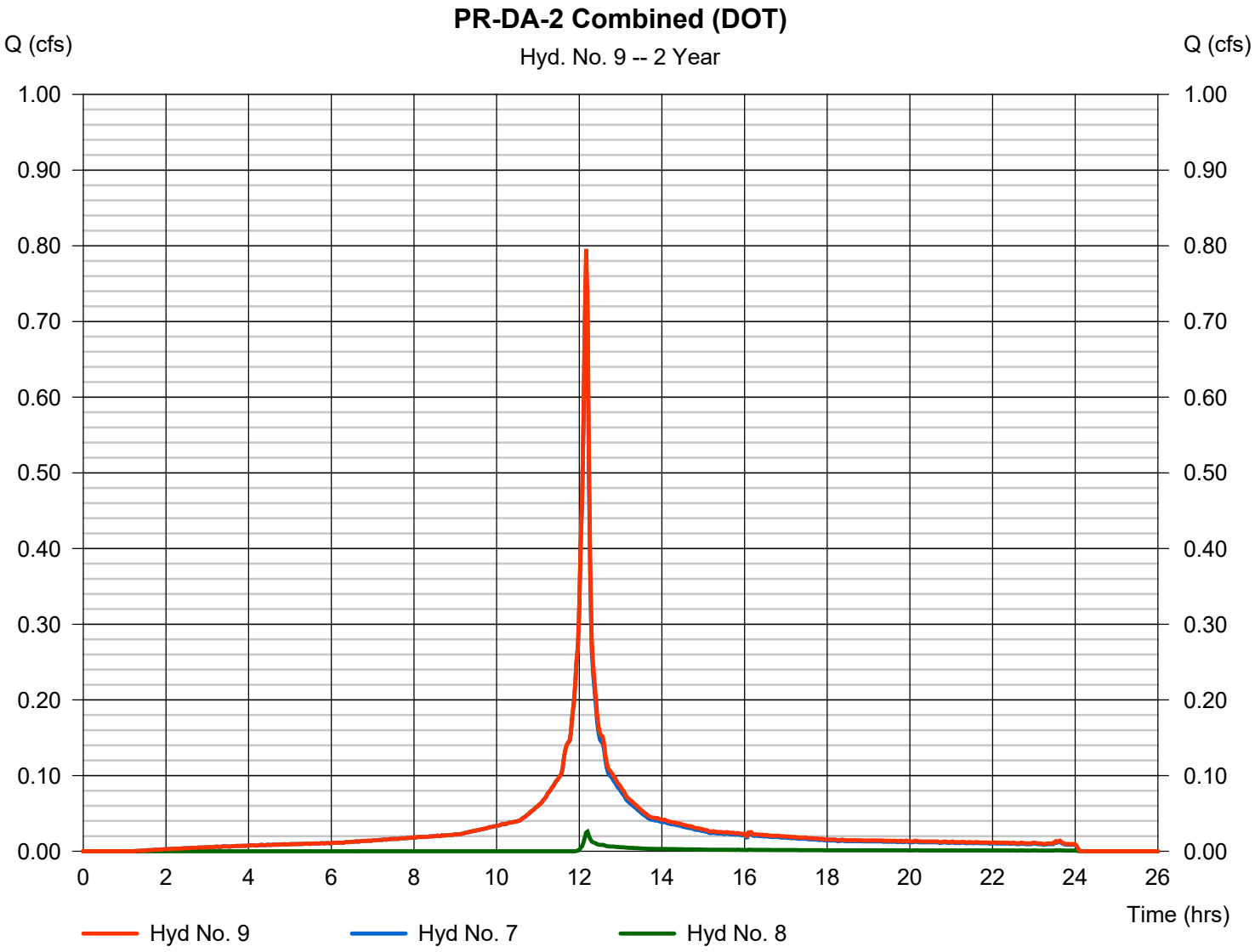
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 9

PR-DA-2 Combined (DOT)

Hydrograph type	= Combine	Peak discharge	= 0.796 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 2,746 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.310 ac



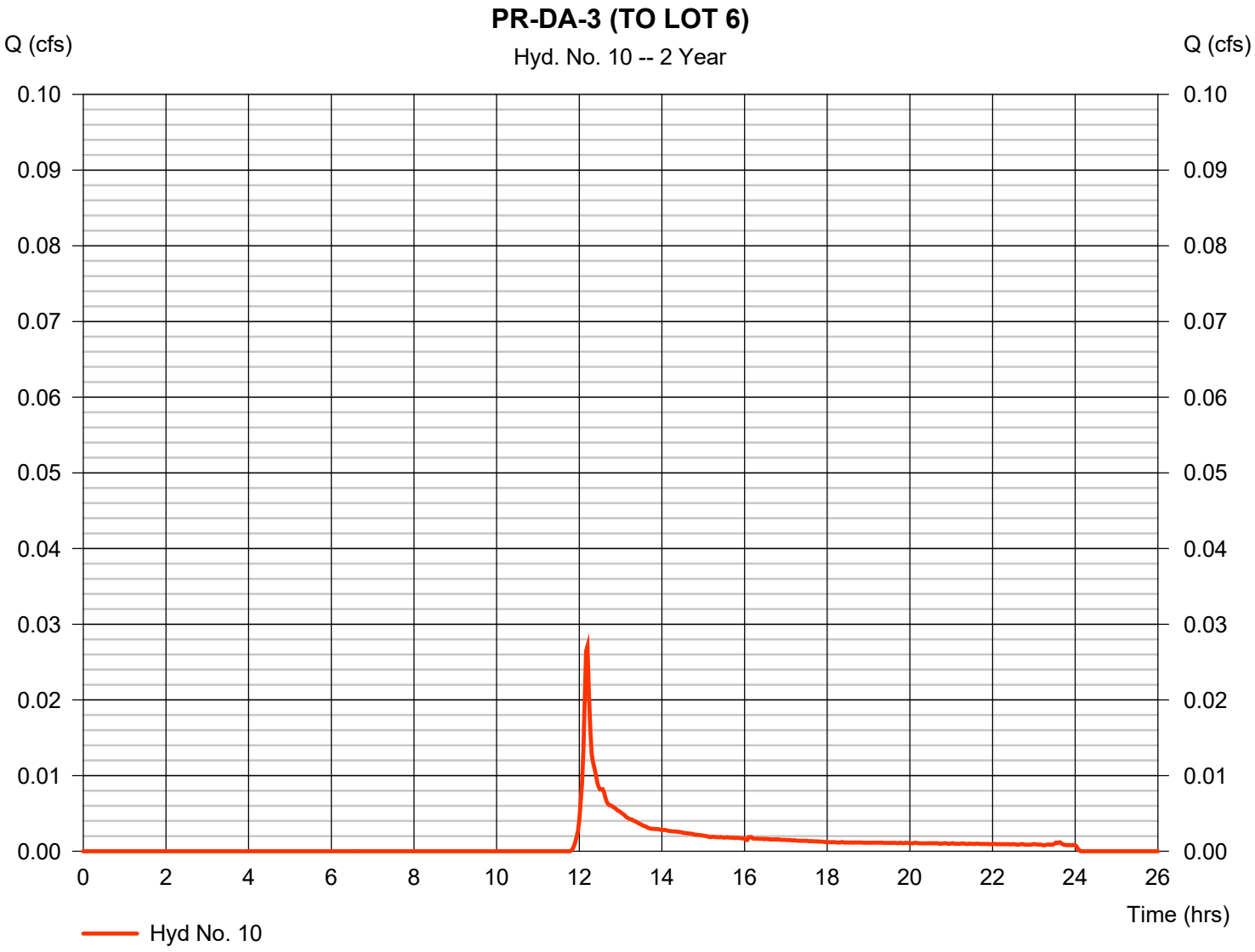
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 10

PR-DA-3 (TO LOT 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.027 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 99 cuft
Drainage area	= 0.050 ac	Curve number	= 63
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 3.34 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



Hydrograph Report

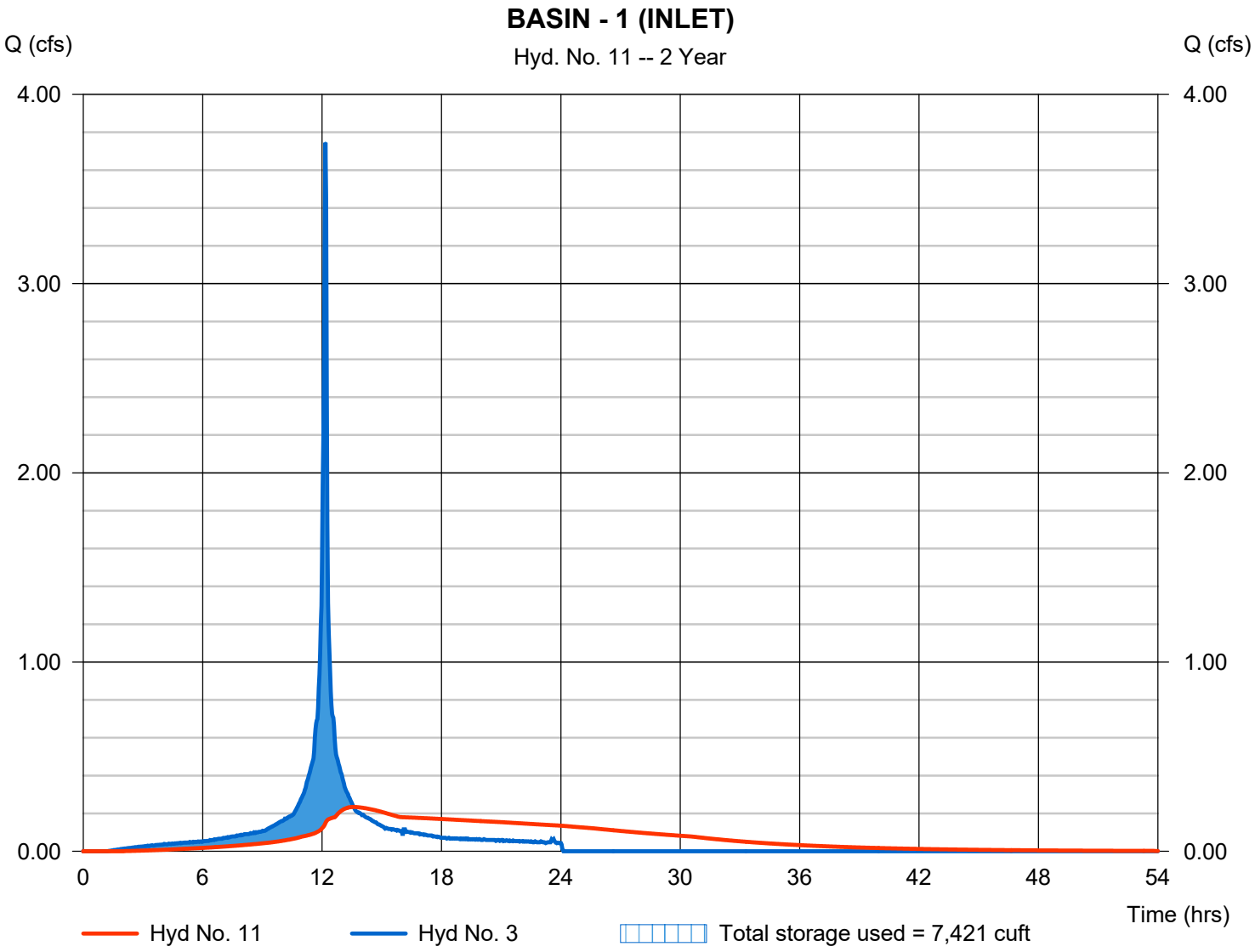
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 11

BASIN - 1 (INLET)

Hydrograph type	= Reservoir	Peak discharge	= 0.234 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.60 hrs
Time interval	= 2 min	Hyd. volume	= 12,906 cuft
Inflow hyd. No.	= 3 - PR-DA-1A Combined	Max. Elevation	= 285.00 ft
Reservoir name	= DET. BASIN - 1 (INLET)	Max. Storage	= 7,421 cuft

Storage Indication method used.



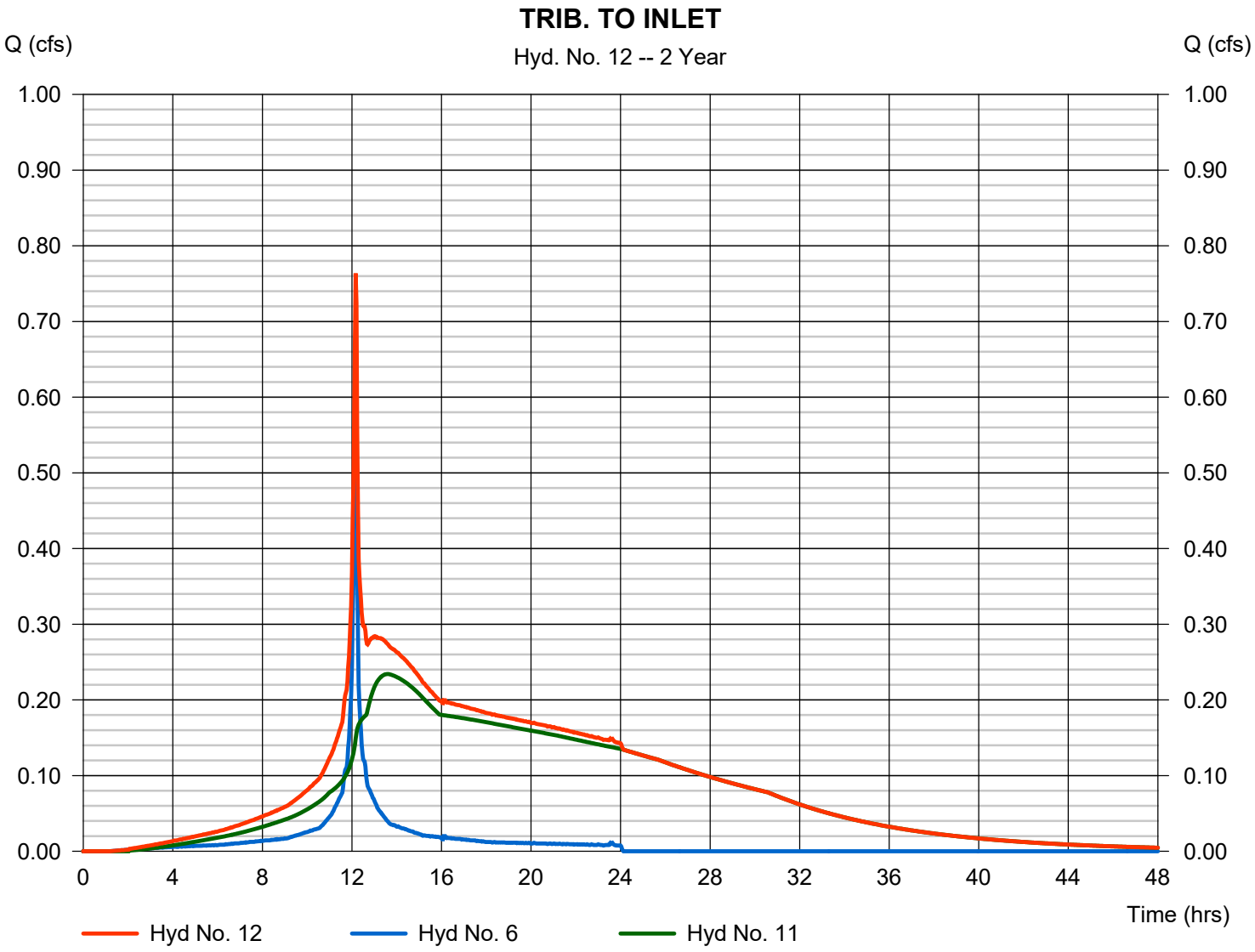
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 12

TRIB. TO INLET

Hydrograph type	= Combine	Peak discharge	= 0.764 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 15,035 cuft
Inflow hyds.	= 6, 11	Contrib. drain. area	= 0.000 ac



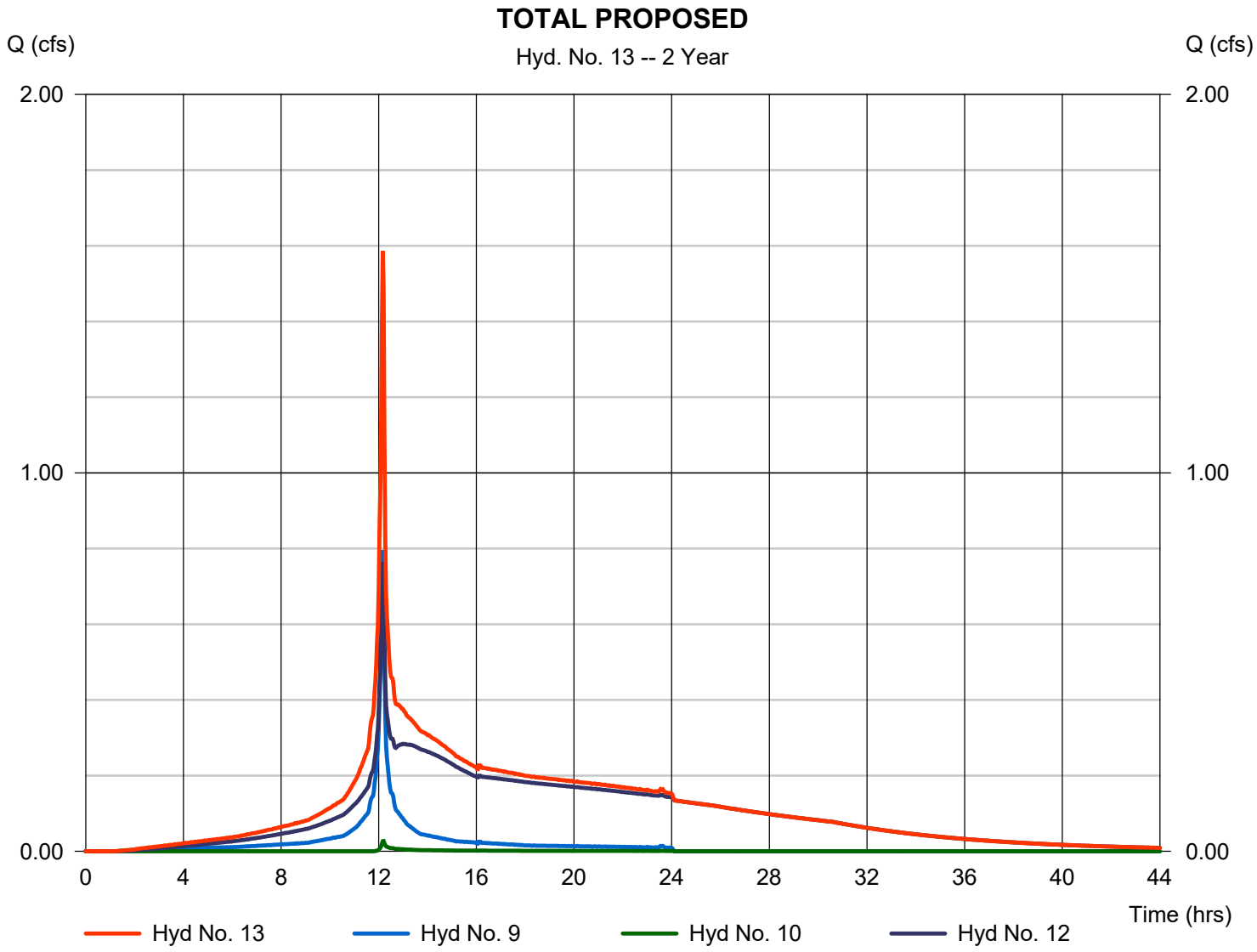
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 13

TOTAL PROPOSED

Hydrograph type	= Combine	Peak discharge	= 1.586 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 17,880 cuft
Inflow hyds.	= 9, 10, 12	Contrib. drain. area	= 0.050 ac



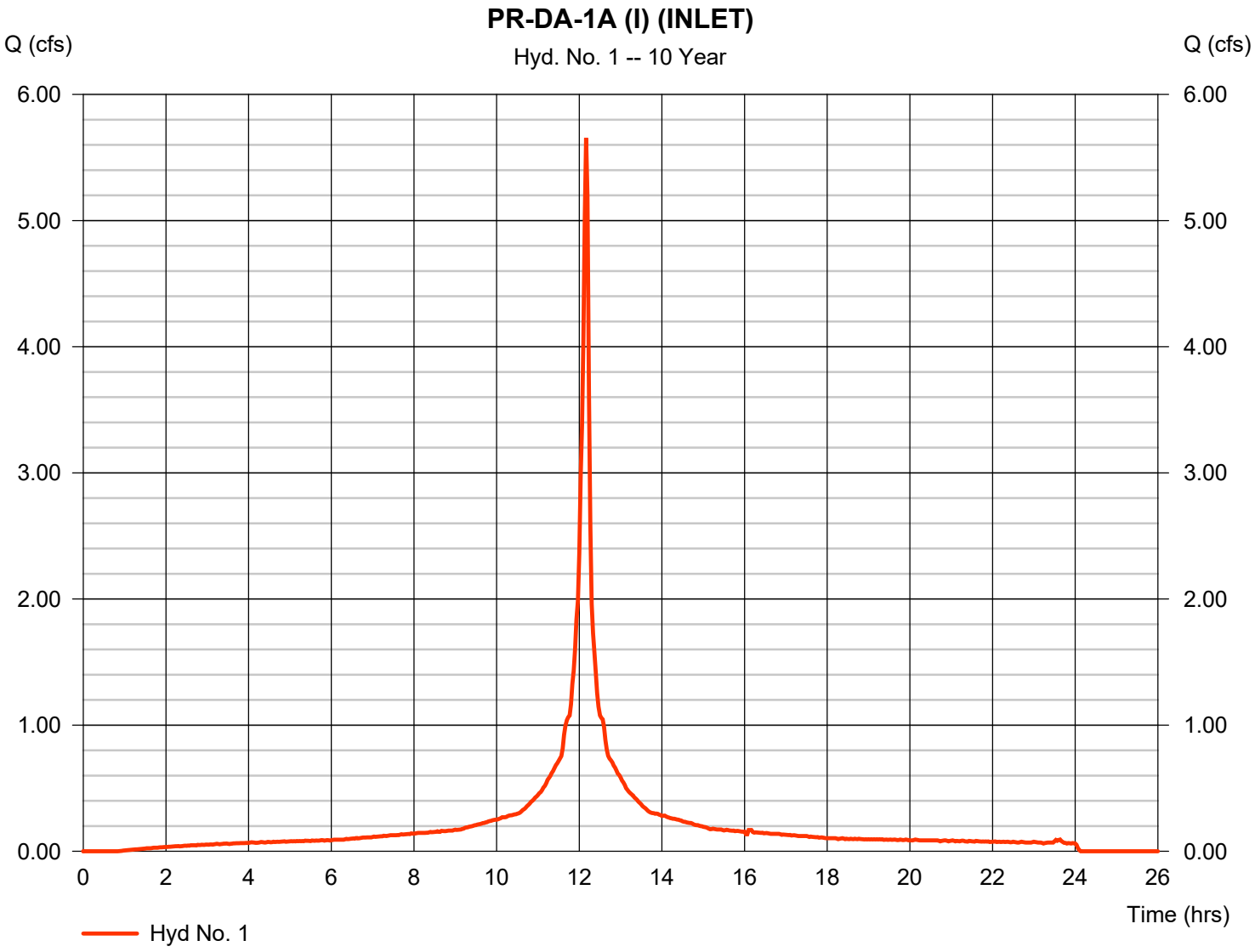
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 1

PR-DA-1A (I) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 5.654 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 19,737 cuft
Drainage area	= 1.200 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



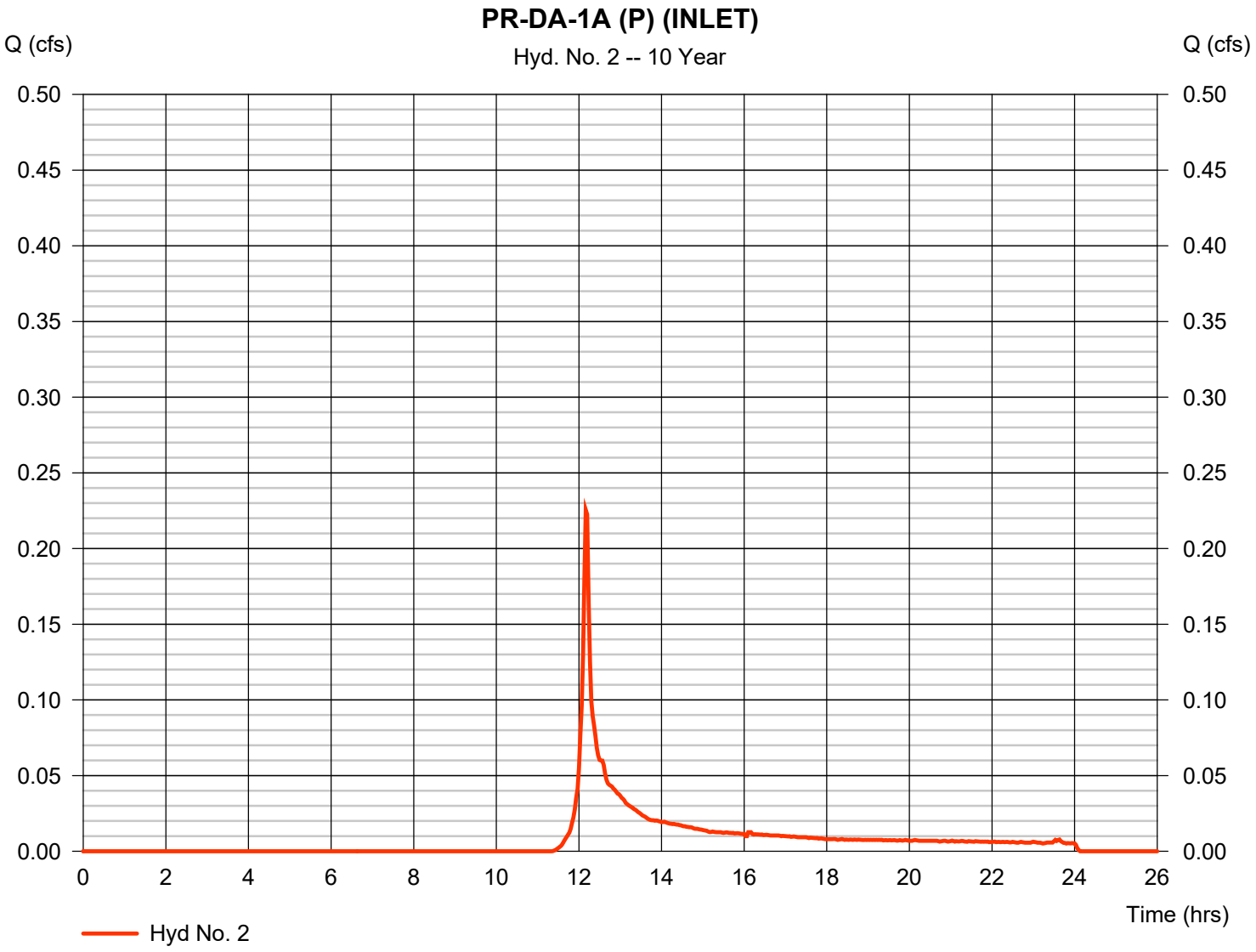
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 2

PR-DA-1A (P) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.225 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 740 cuft
Drainage area	= 0.180 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



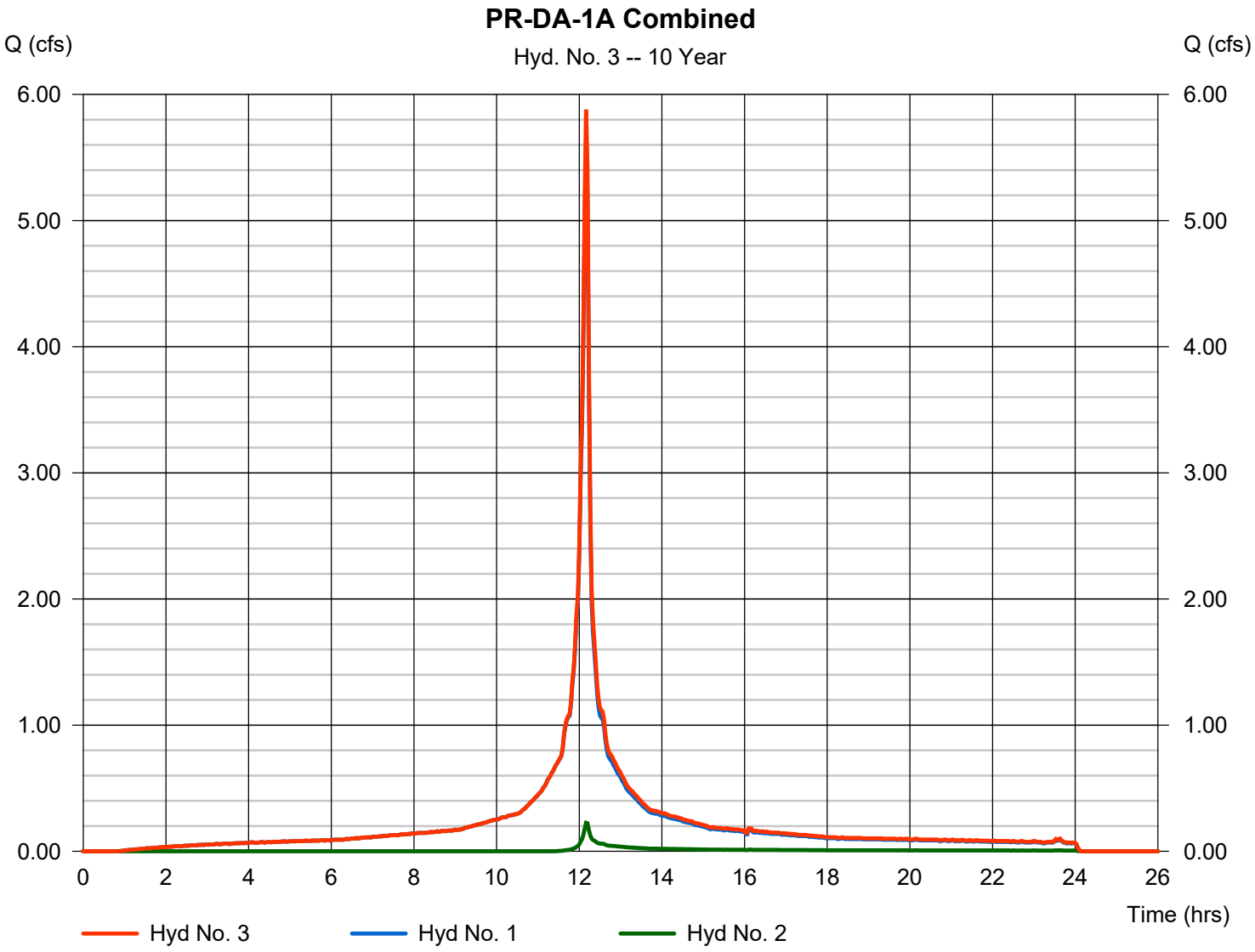
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 3

PR-DA-1A Combined

Hydrograph type	= Combine	Peak discharge	= 5.880 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 20,477 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.380 ac



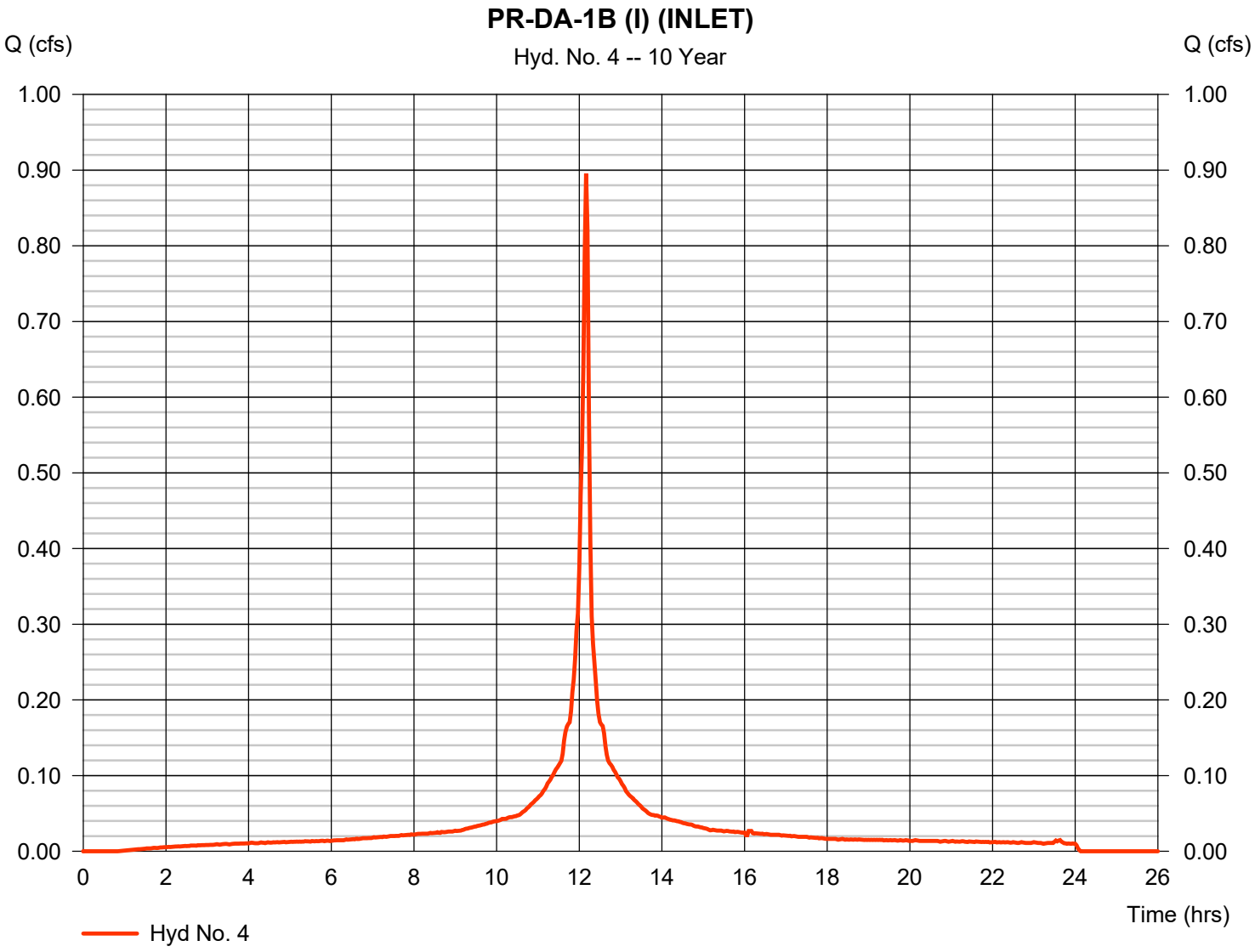
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 4

PR-DA-1B (I) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.895 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 3,125 cuft
Drainage area	= 0.190 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



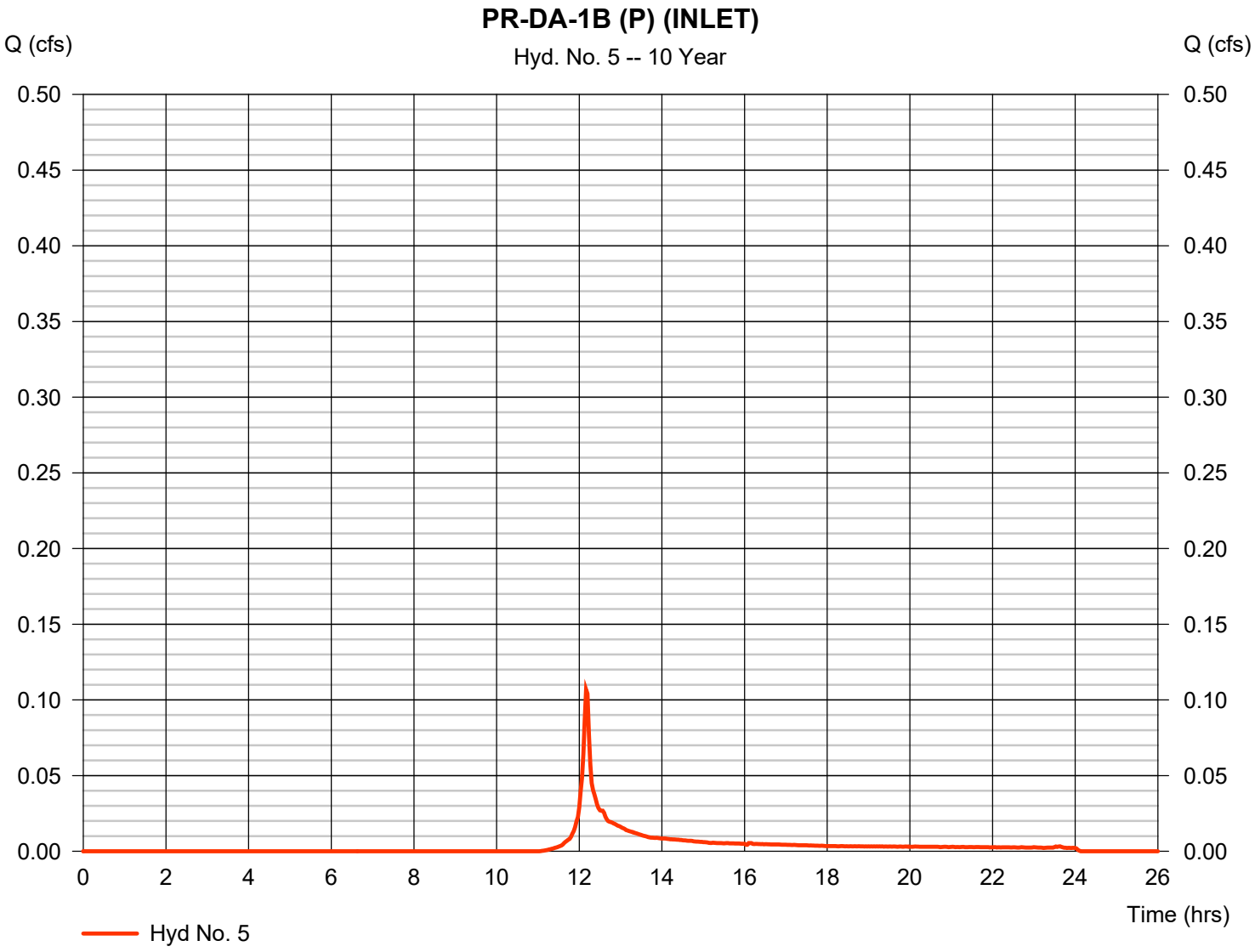
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 5

PR-DA-1B (P) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.107 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 336 cuft
Drainage area	= 0.070 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



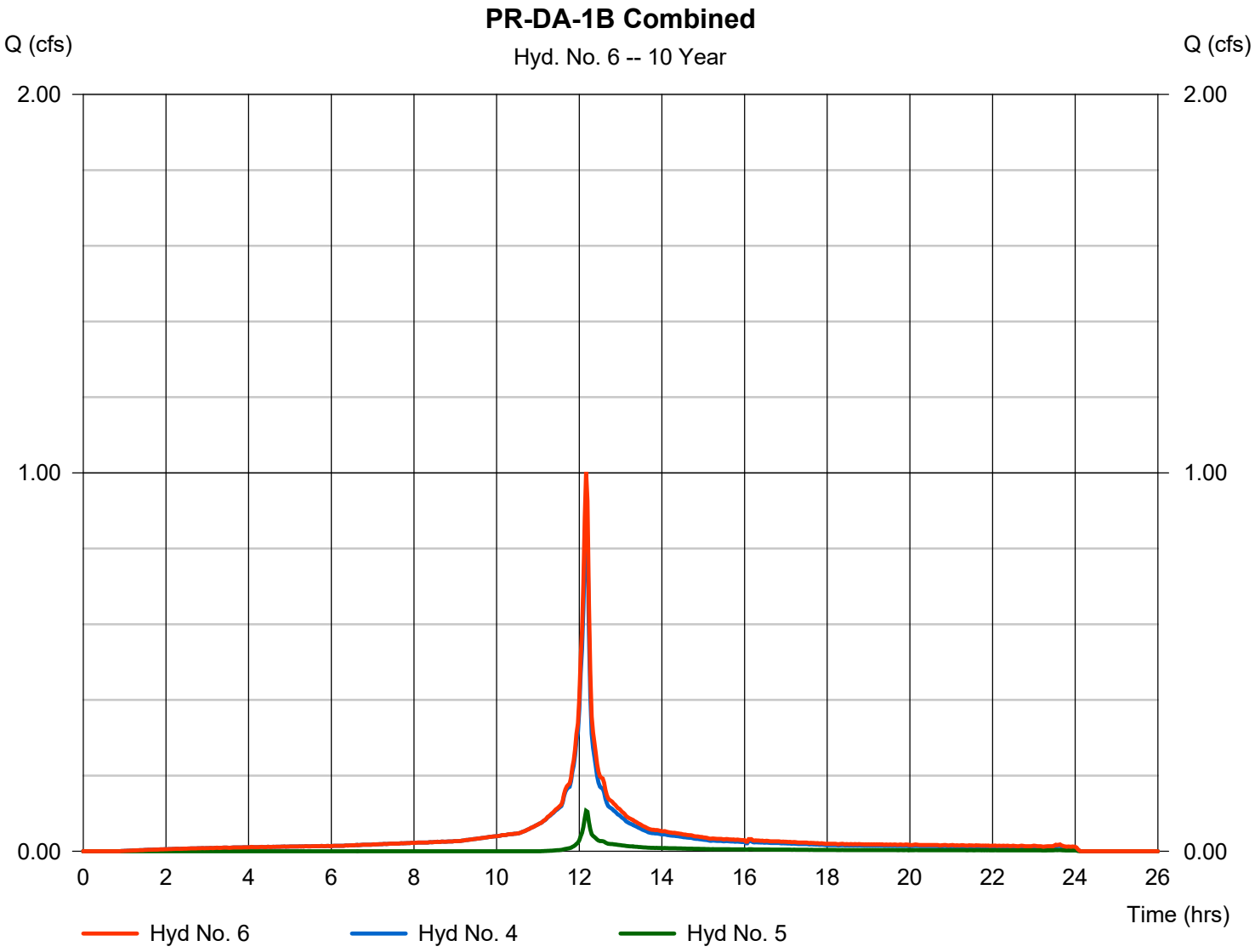
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 6

PR-DA-1B Combined

Hydrograph type	= Combine	Peak discharge	= 1.002 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 3,461 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.260 ac



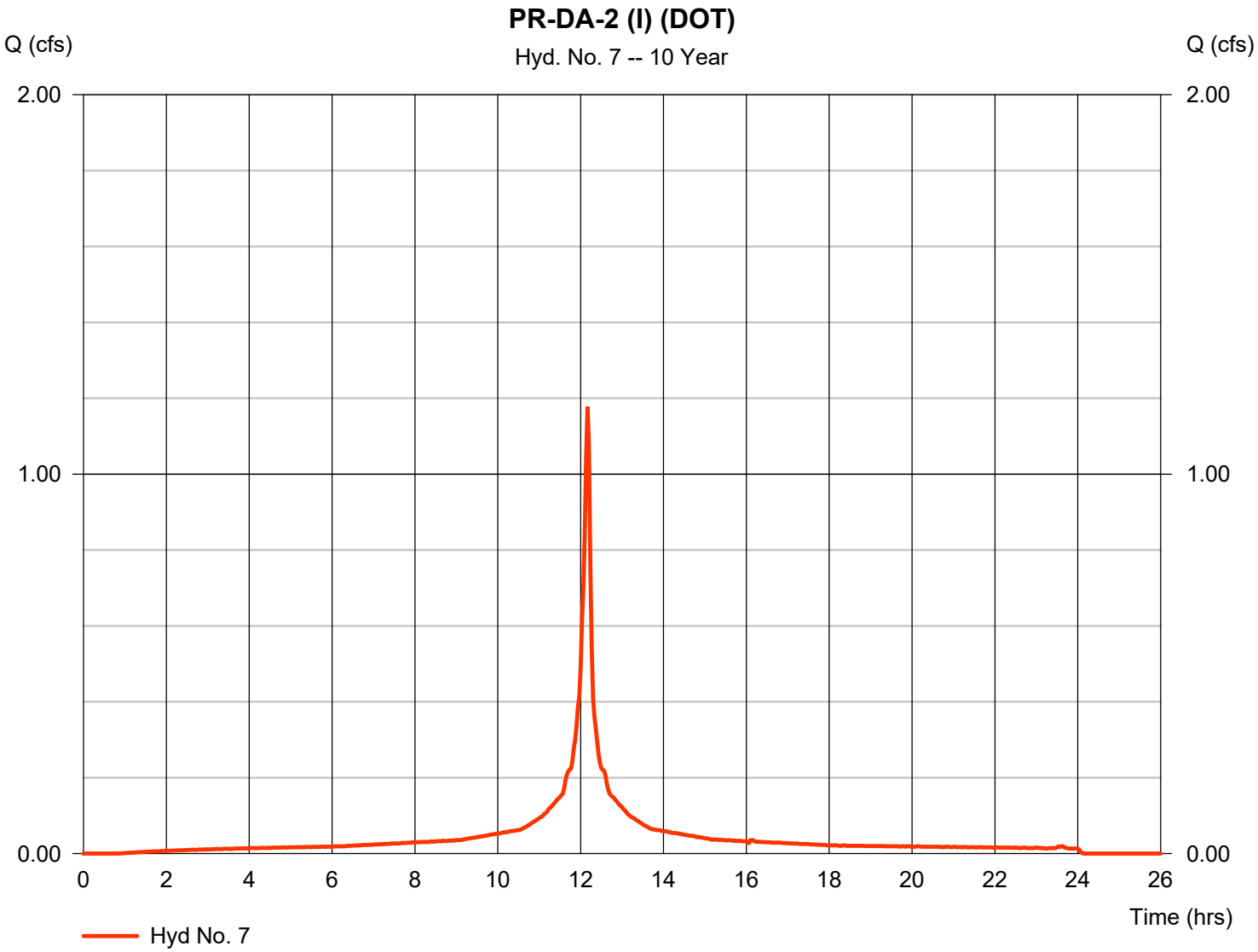
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 7

PR-DA-2 (I) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.178 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 4,112 cuft
Drainage area	= 0.250 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



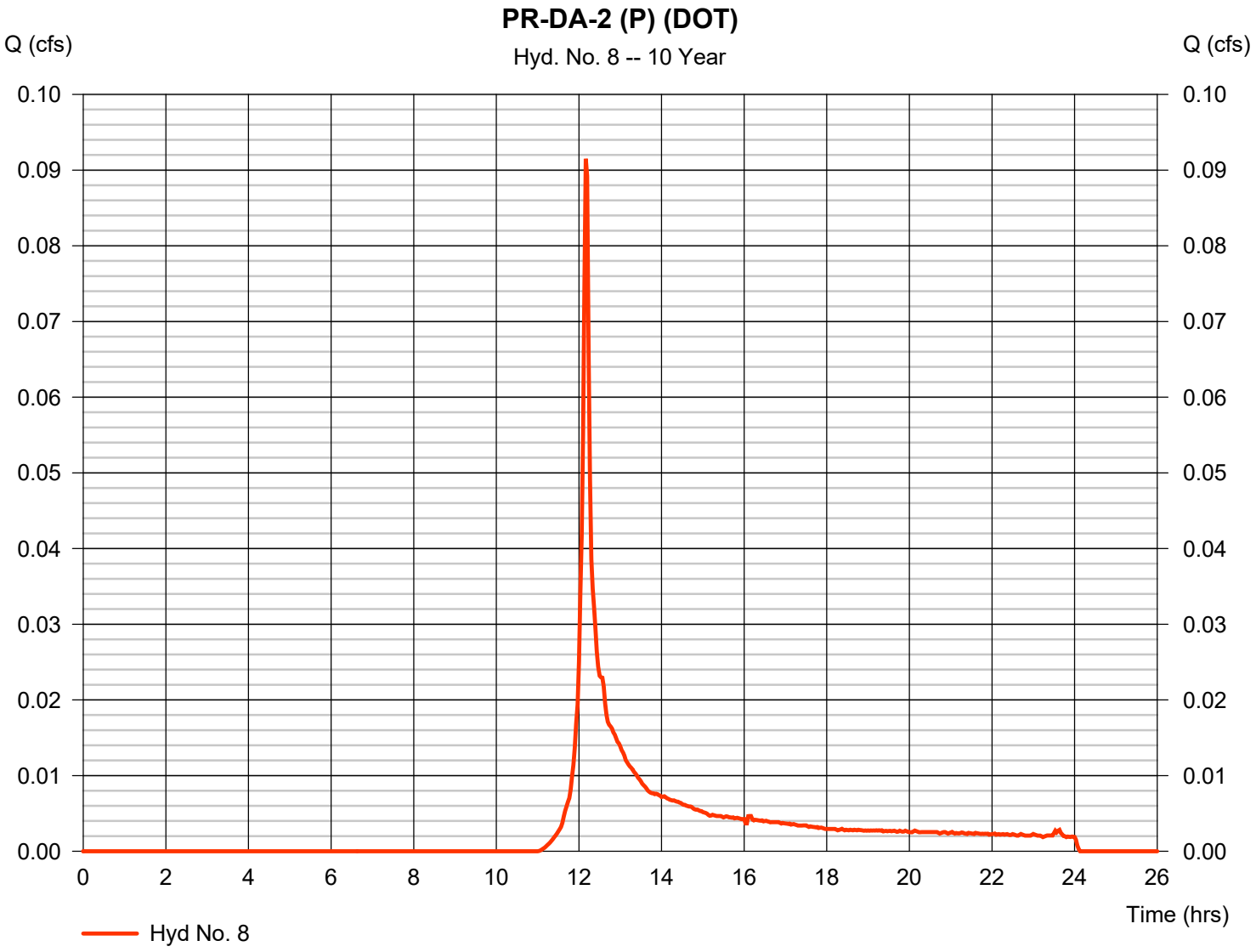
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 8

PR-DA-2 (P) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.092 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 288 cuft
Drainage area	= 0.060 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



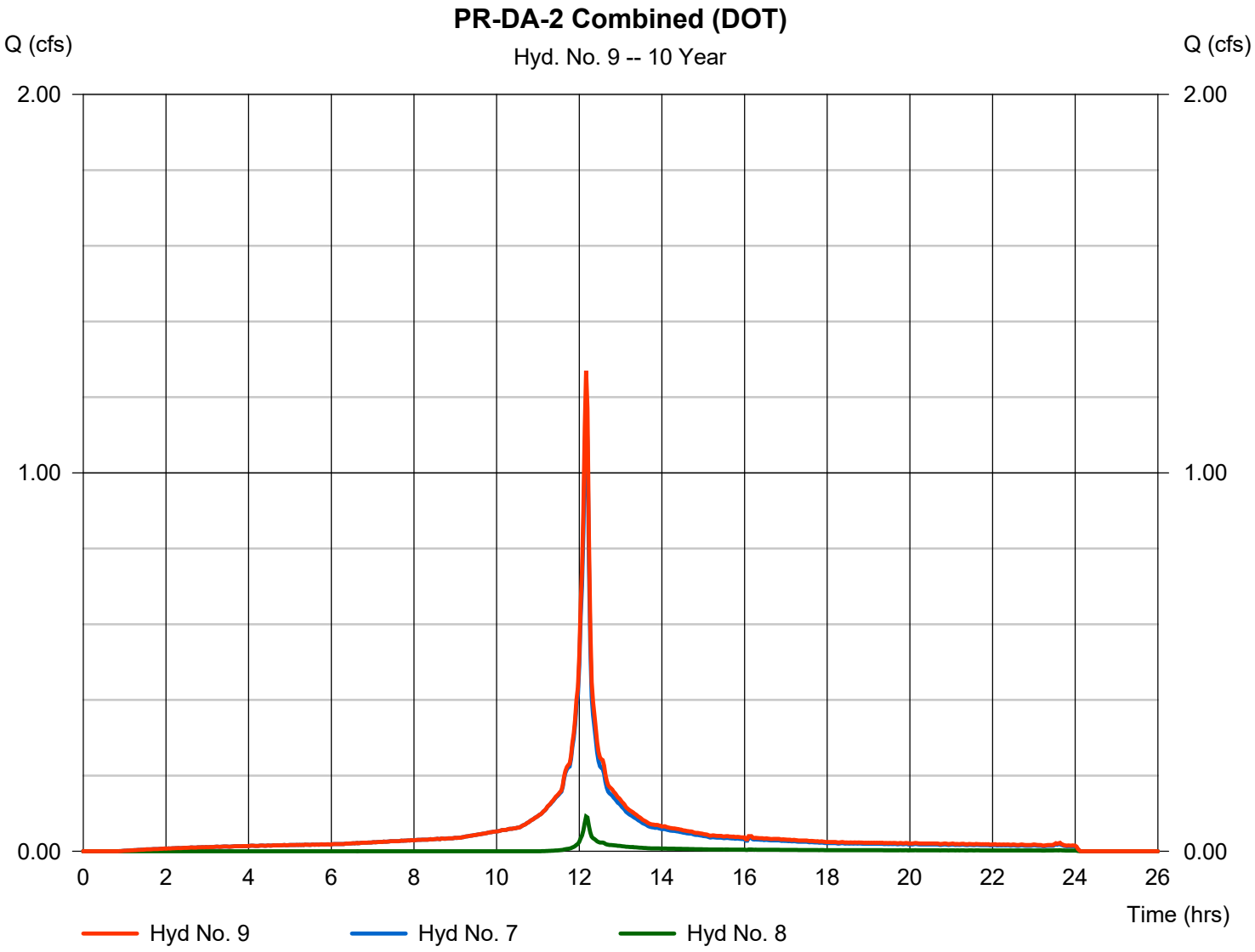
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 9

PR-DA-2 Combined (DOT)

Hydrograph type	= Combine	Peak discharge	= 1.270 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 4,400 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.310 ac



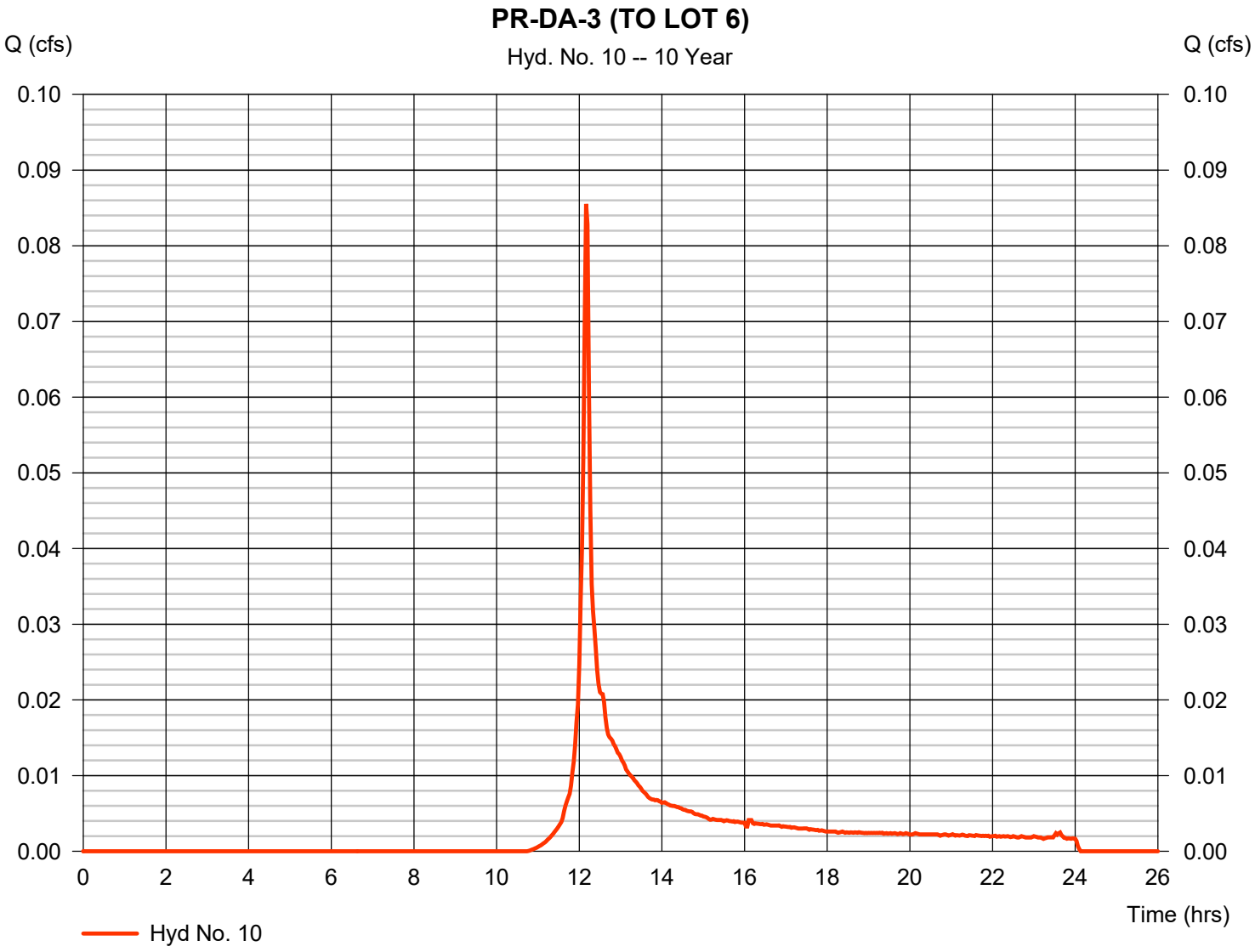
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 10

PR-DA-3 (TO LOT 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.086 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 264 cuft
Drainage area	= 0.050 ac	Curve number	= 63
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 5.07 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



Hydrograph Report

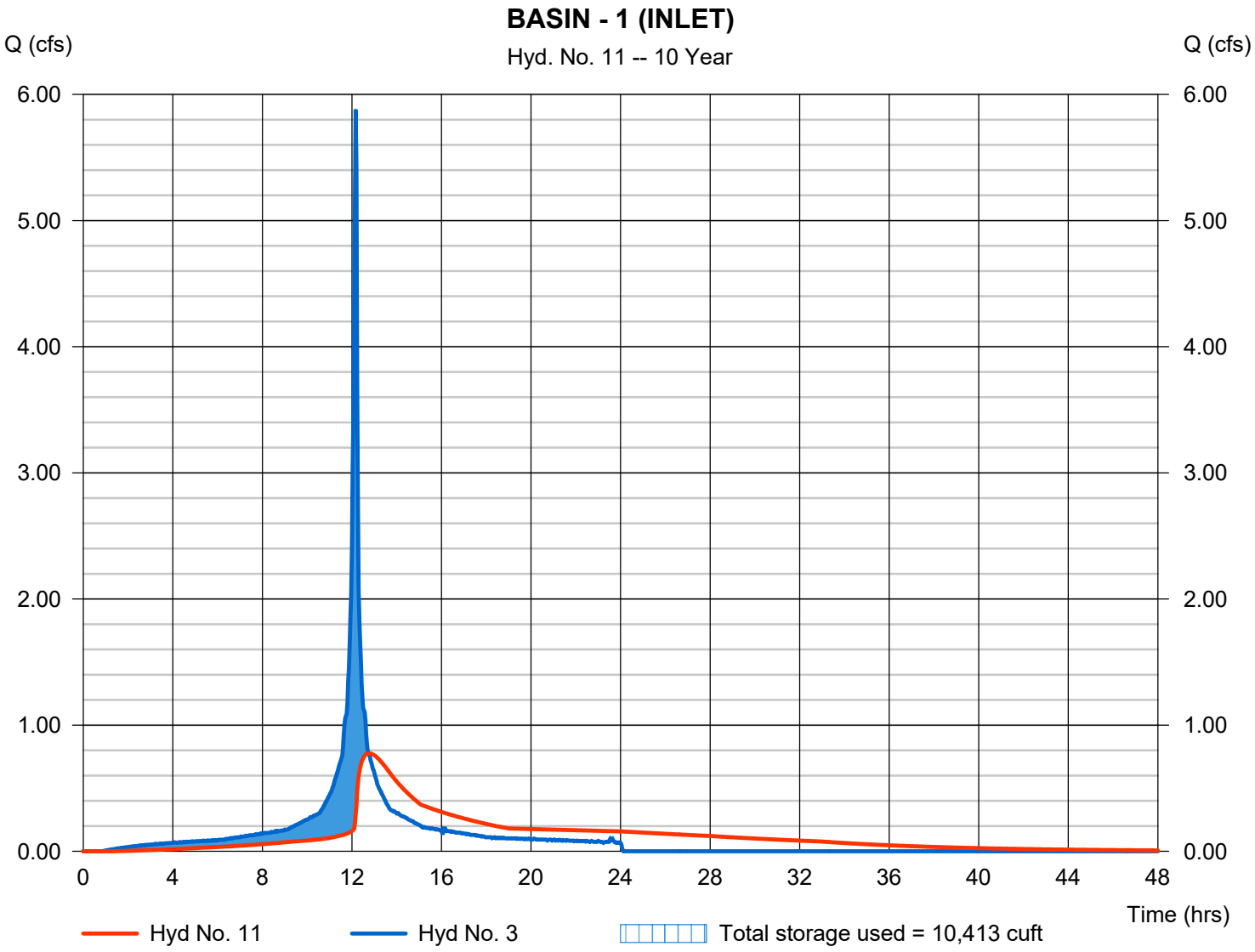
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 11

BASIN - 1 (INLET)

Hydrograph type	= Reservoir	Peak discharge	= 0.775 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 20,454 cuft
Inflow hyd. No.	= 3 - PR-DA-1A Combined	Max. Elevation	= 285.60 ft
Reservoir name	= DET. BASIN - 1 (INLET)	Max. Storage	= 10,413 cuft

Storage Indication method used.



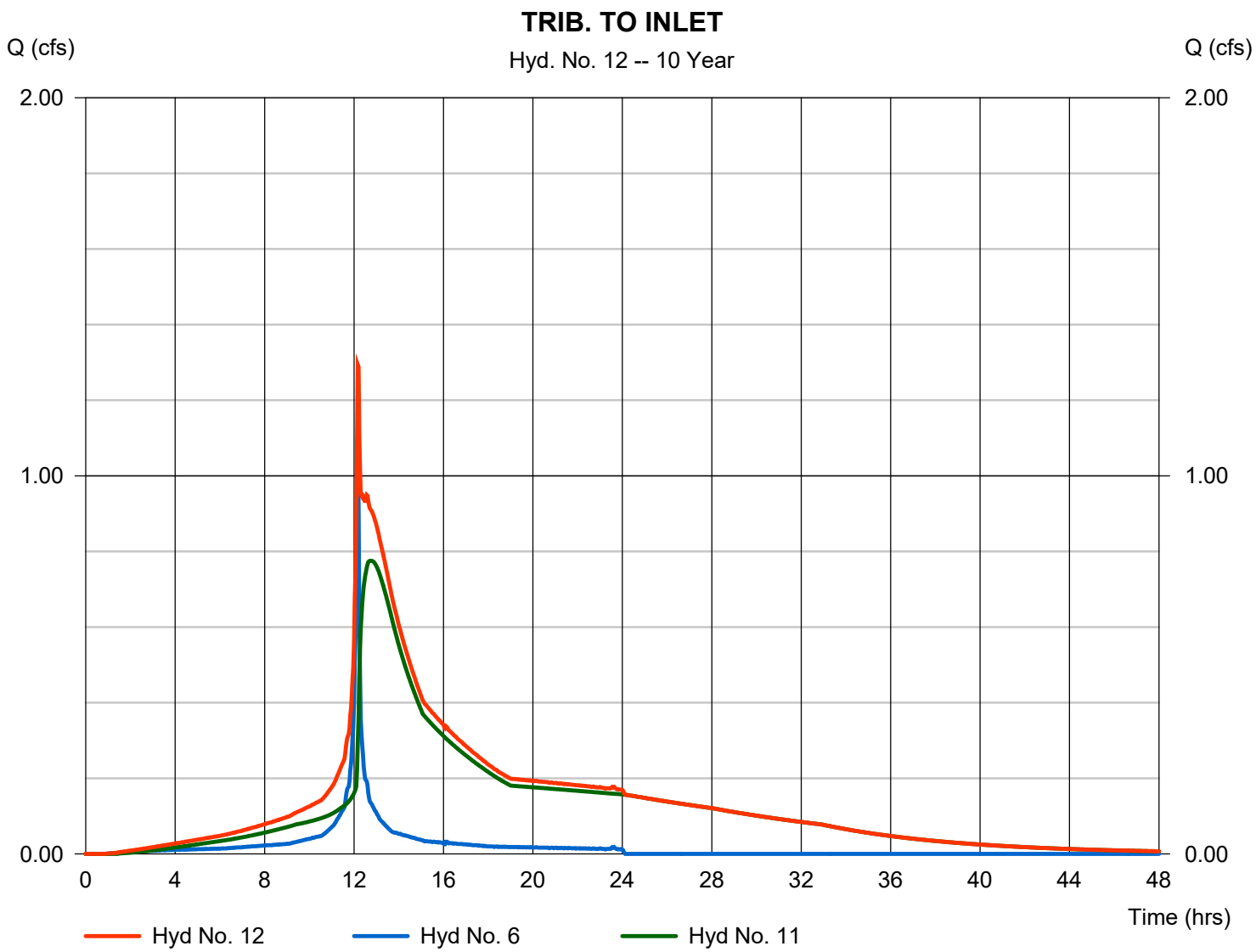
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 12

TRIB. TO INLET

Hydrograph type	= Combine	Peak discharge	= 1.293 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 23,916 cuft
Inflow hyds.	= 6, 11	Contrib. drain. area	= 0.000 ac



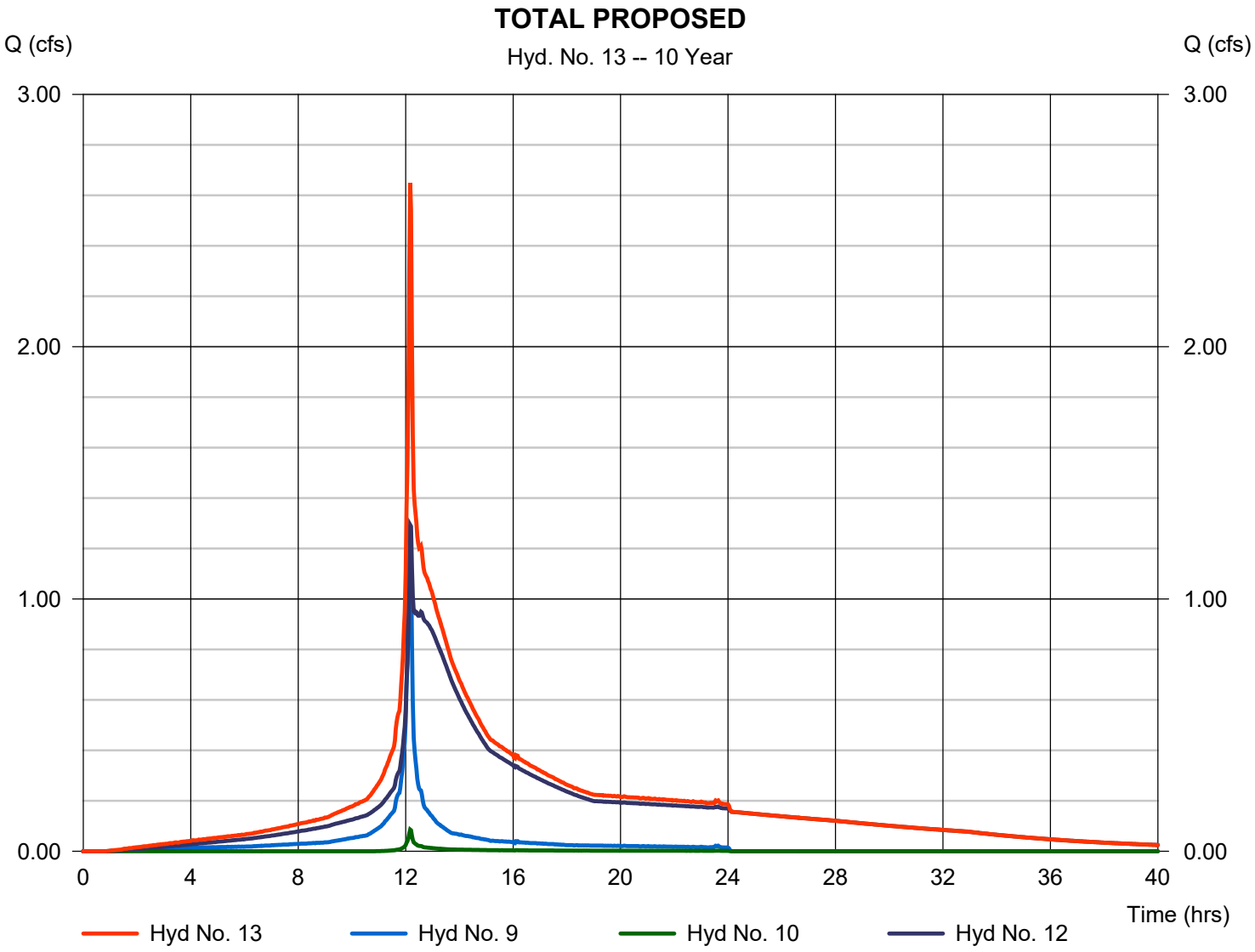
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 13

TOTAL PROPOSED

Hydrograph type	= Combine	Peak discharge	= 2.648 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 28,580 cuft
Inflow hyds.	= 9, 10, 12	Contrib. drain. area	= 0.050 ac



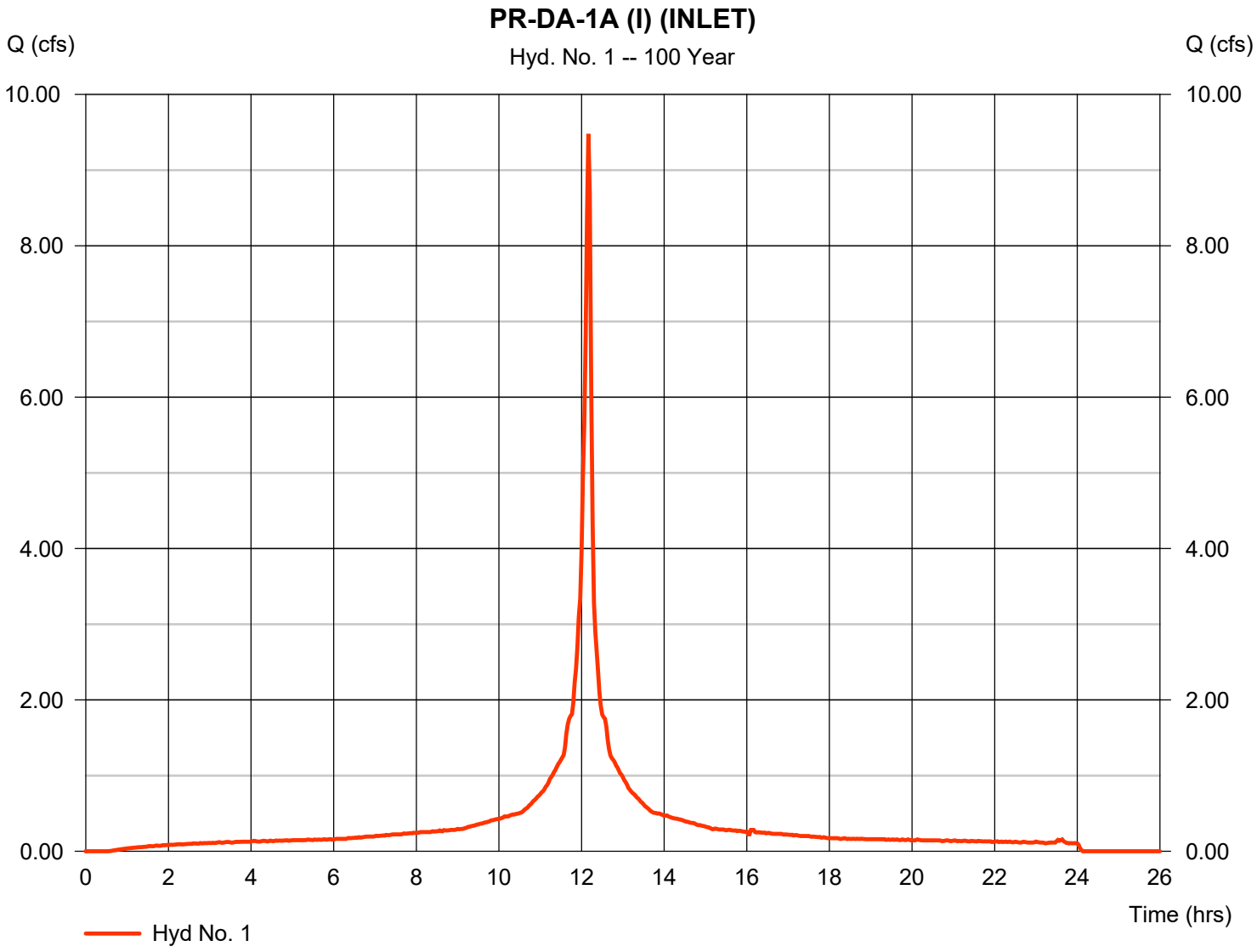
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 1

PR-DA-1A (I) (INLET)

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.478 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	33,609 cuft
Drainage area	=	1.200 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	8.47 in	Distribution	=	Custom
Storm duration	=	NRCS Type D.cds	Shape factor	=	484



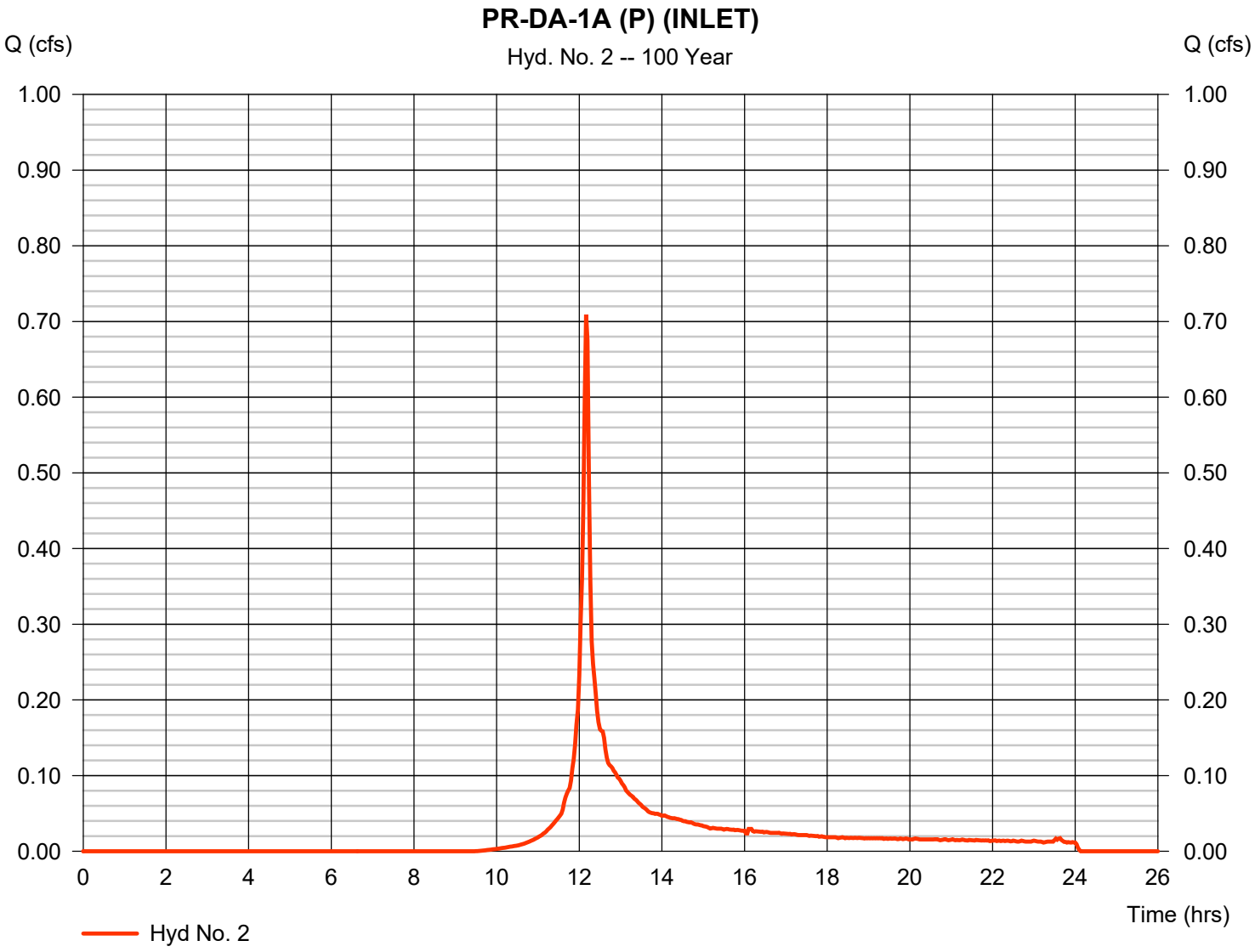
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 2

PR-DA-1A (P) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.709 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 2,118 cuft
Drainage area	= 0.180 ac	Curve number	= 58
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



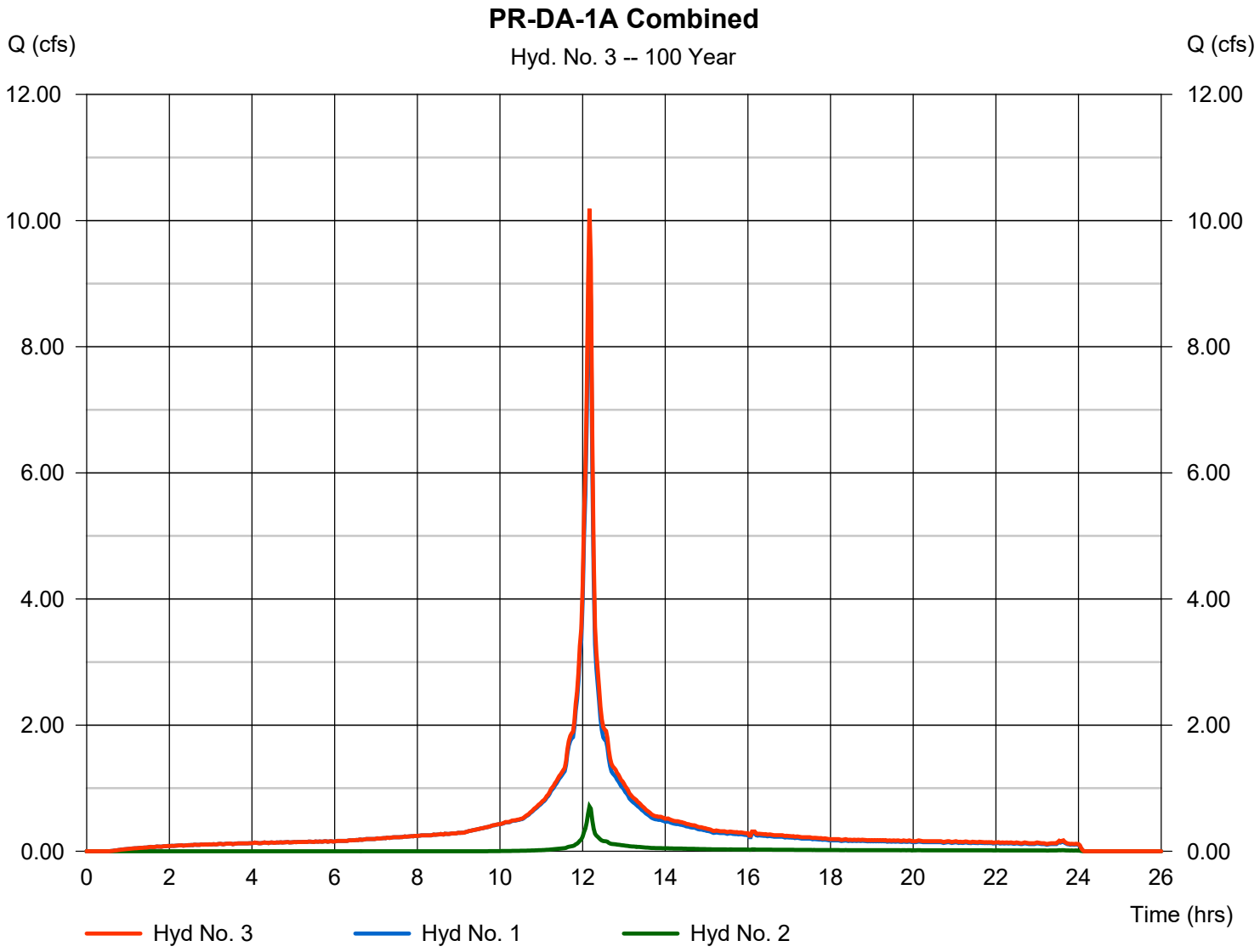
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 3

PR-DA-1A Combined

Hydrograph type	= Combine	Peak discharge	= 10.19 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 35,726 cuft
Inflow hyds.	= 1, 2	Contrib. drain. area	= 1.380 ac



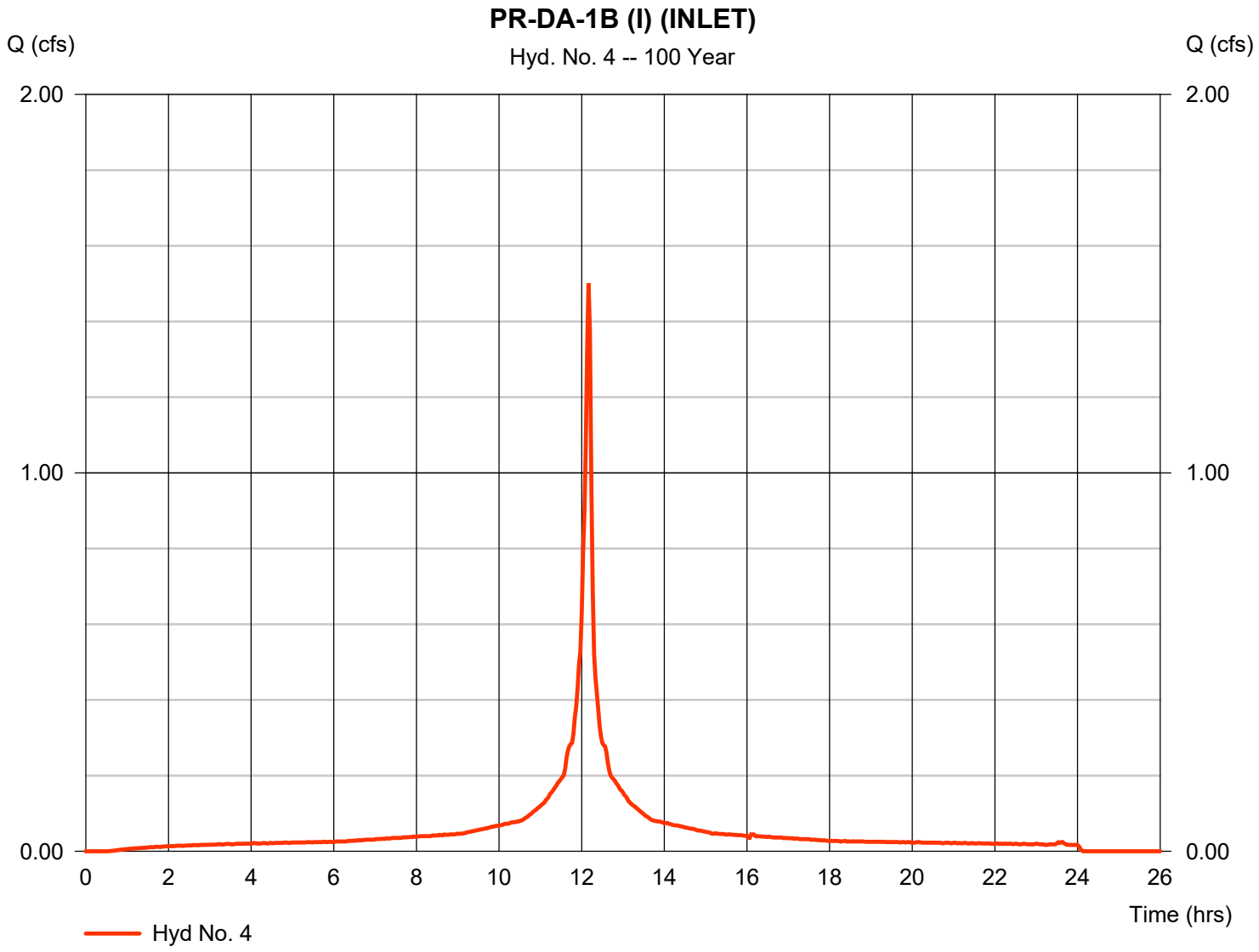
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 4

PR-DA-1B (I) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 1.501 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 5,321 cuft
Drainage area	= 0.190 ac	Curve number	= 98
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



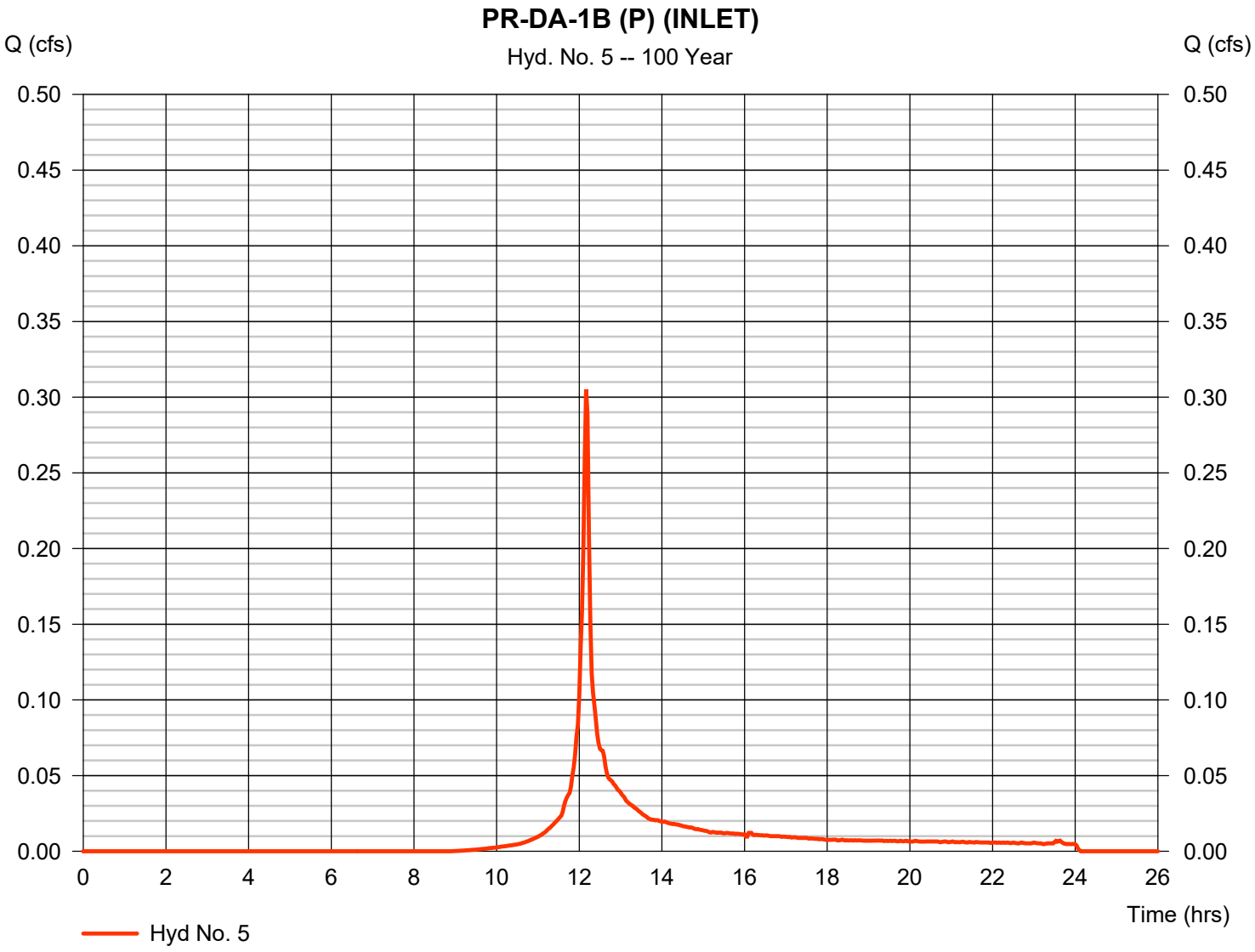
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 5

PR-DA-1B (P) (INLET)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.305 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 907 cuft
Drainage area	= 0.070 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



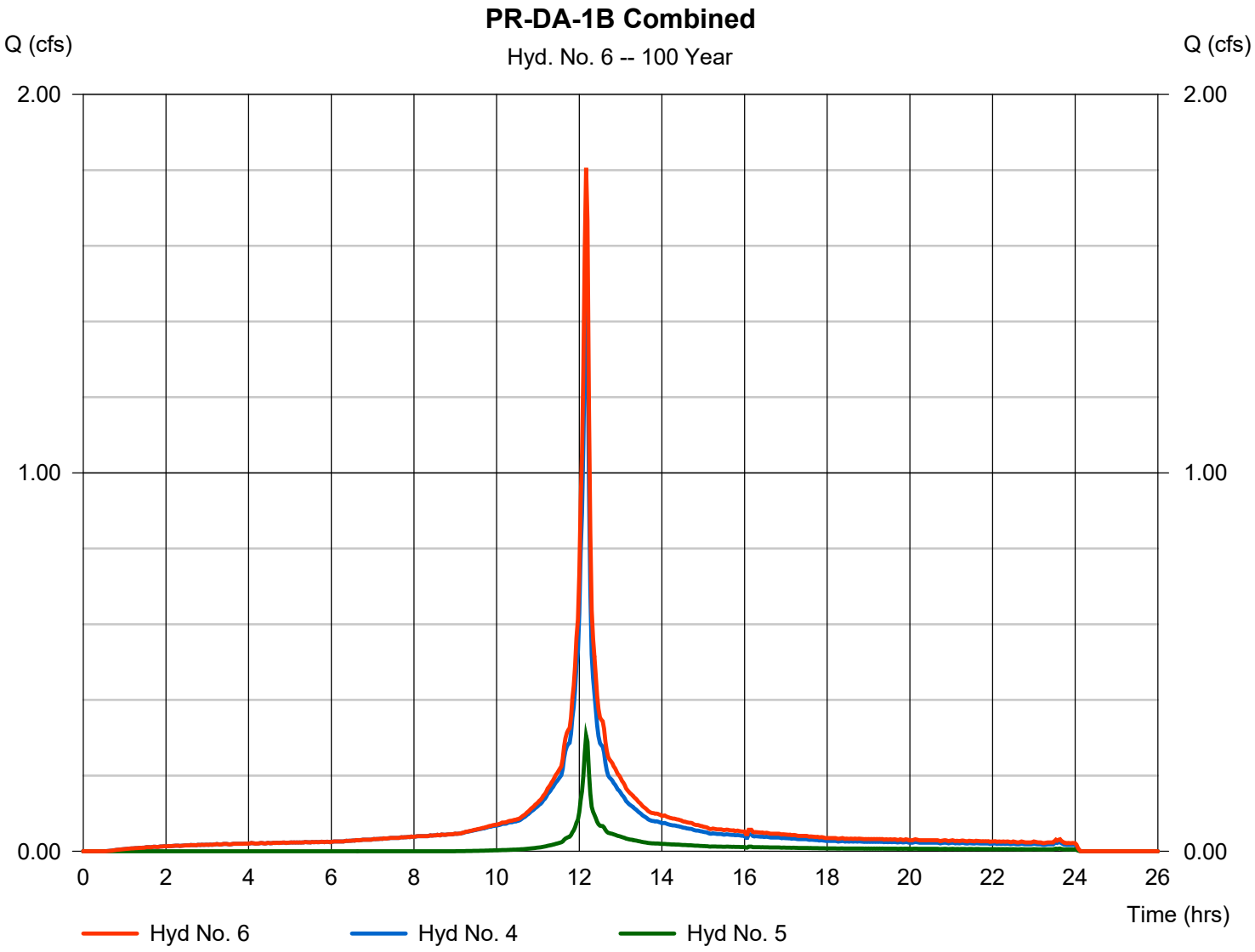
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 6

PR-DA-1B Combined

Hydrograph type	= Combine	Peak discharge	= 1.806 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 6,228 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 0.260 ac



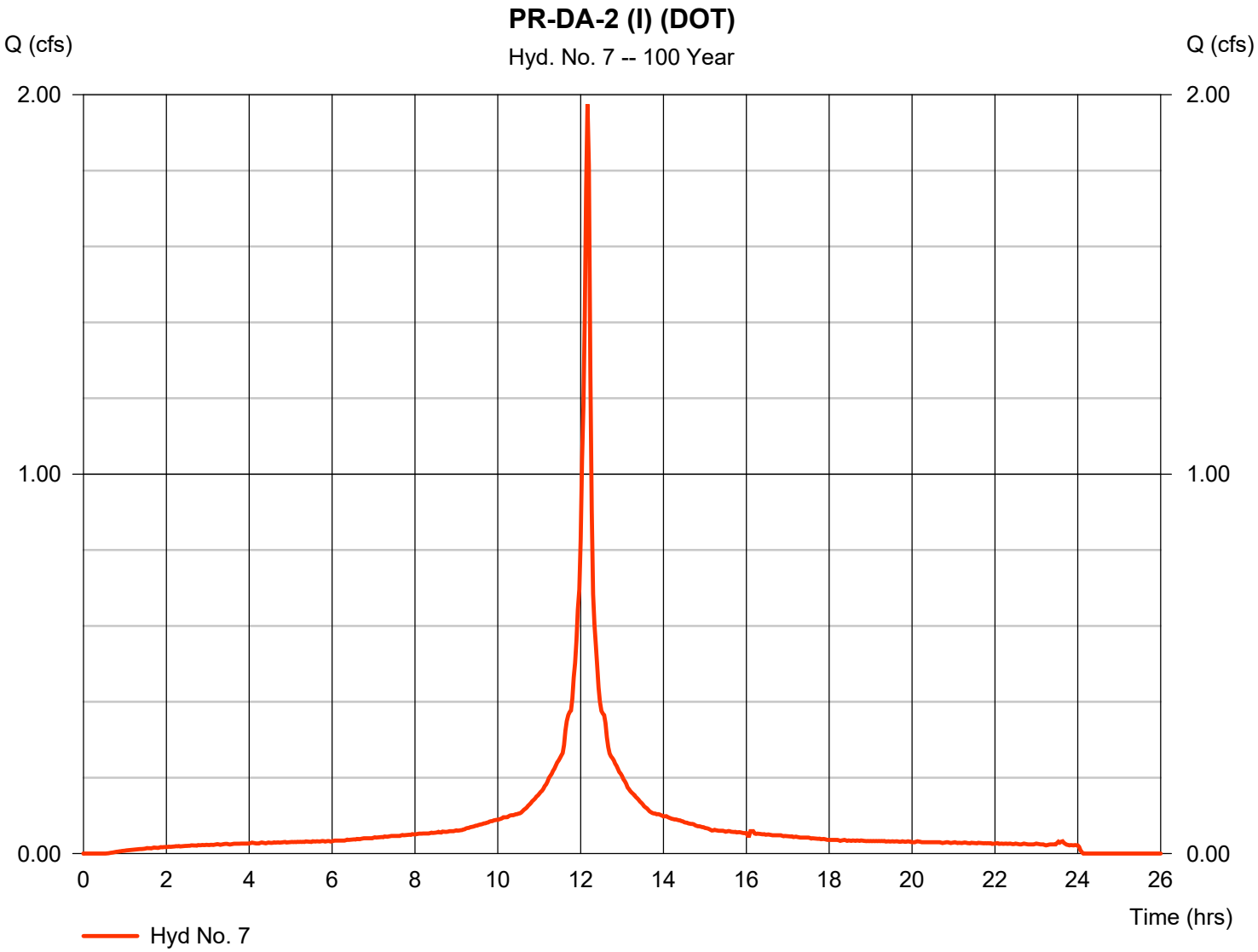
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 7

PR-DA-2 (I) (DOT)

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.975 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.17 hrs
Time interval	=	2 min	Hyd. volume	=	7,002 cuft
Drainage area	=	0.250 ac	Curve number	=	98
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	6.00 min
Total precip.	=	8.47 in	Distribution	=	Custom
Storm duration	=	NRCS Type D.cds	Shape factor	=	484



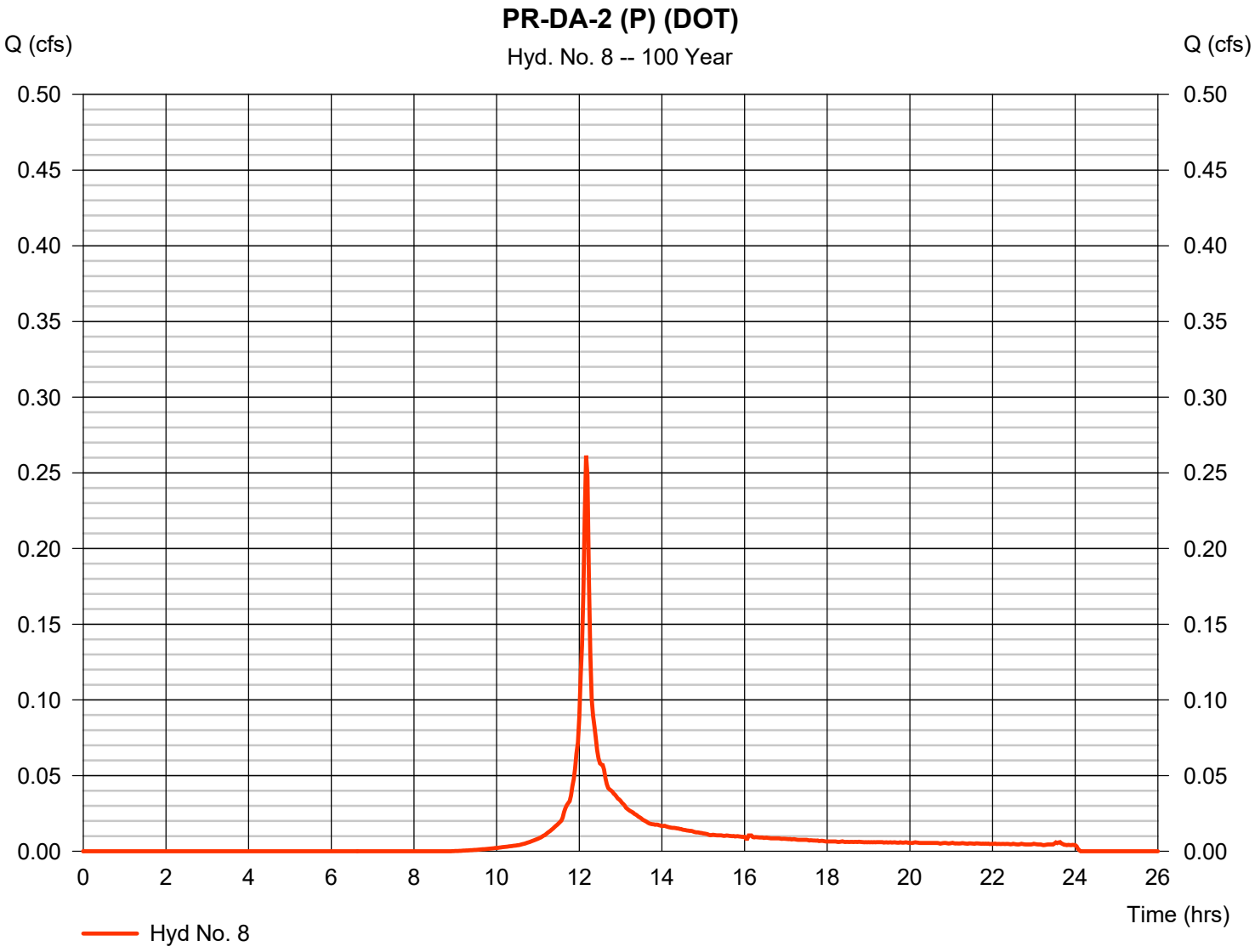
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 8

PR-DA-2 (P) (DOT)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.261 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 777 cuft
Drainage area	= 0.060 ac	Curve number	= 61
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



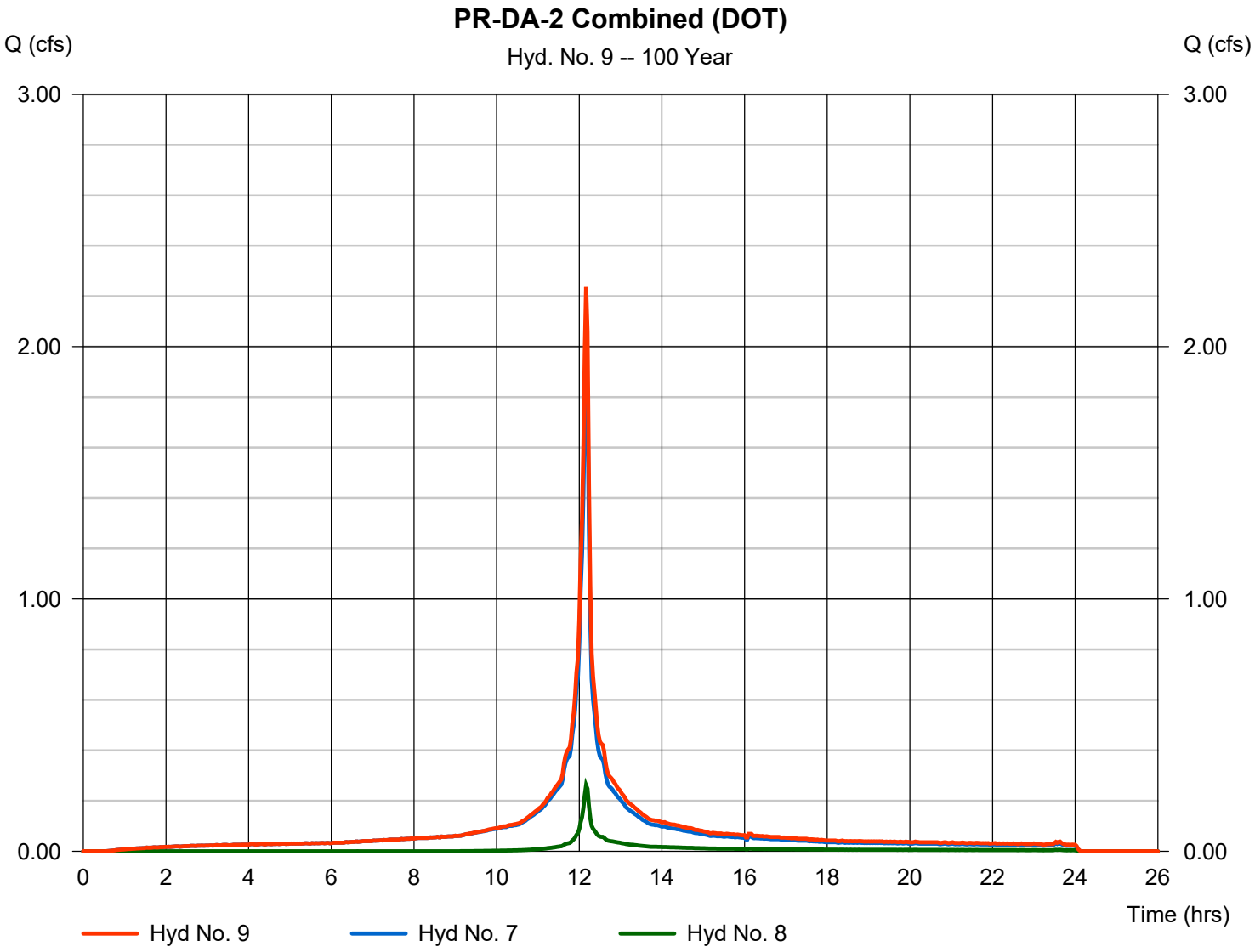
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 9

PR-DA-2 Combined (DOT)

Hydrograph type	= Combine	Peak discharge	= 2.236 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 7,779 cuft
Inflow hyds.	= 7, 8	Contrib. drain. area	= 0.310 ac



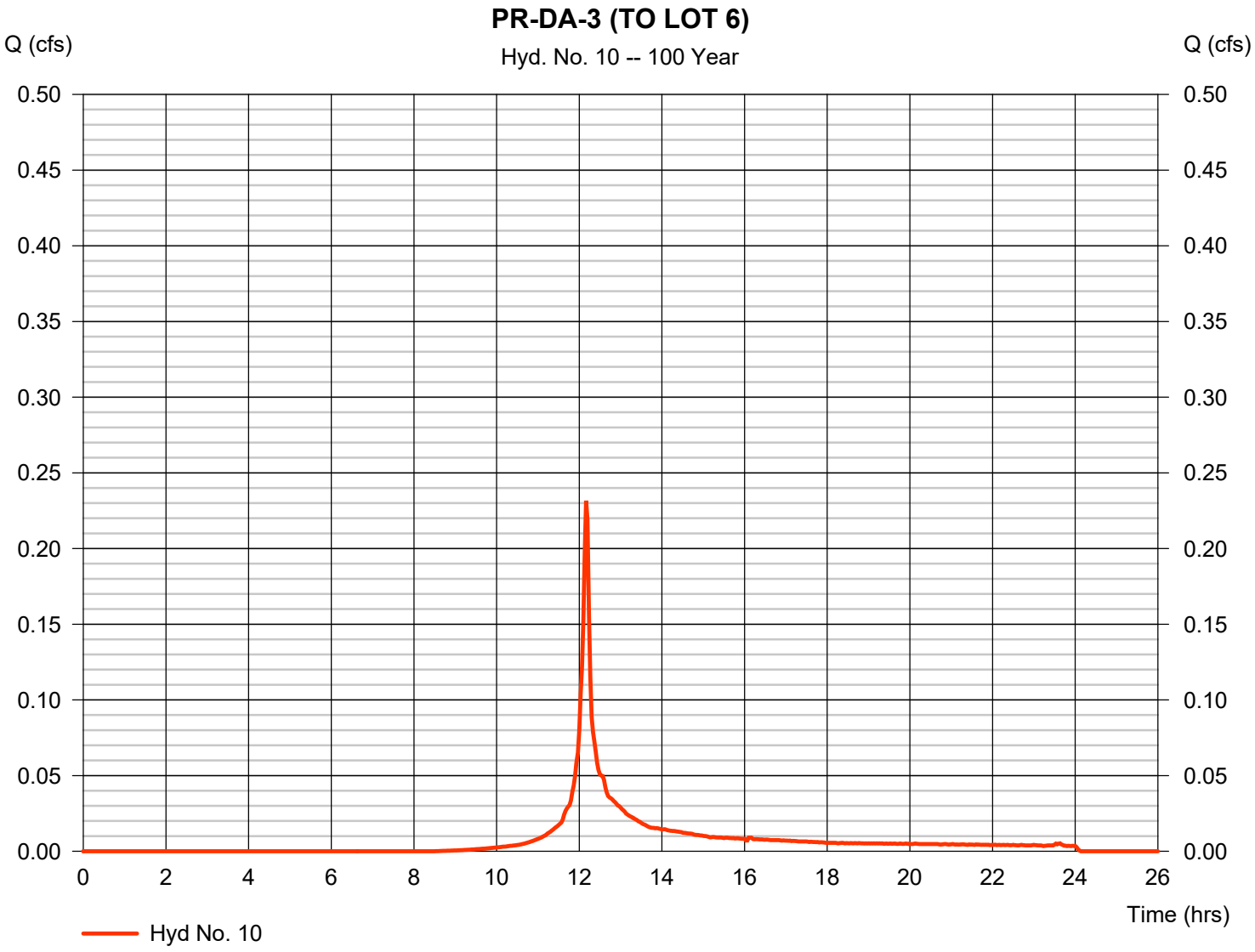
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 10

PR-DA-3 (TO LOT 6)

Hydrograph type	= SCS Runoff	Peak discharge	= 0.232 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 688 cuft
Drainage area	= 0.050 ac	Curve number	= 63
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 6.00 min
Total precip.	= 8.47 in	Distribution	= Custom
Storm duration	= NRCS Type D.cds	Shape factor	= 484



Hydrograph Report

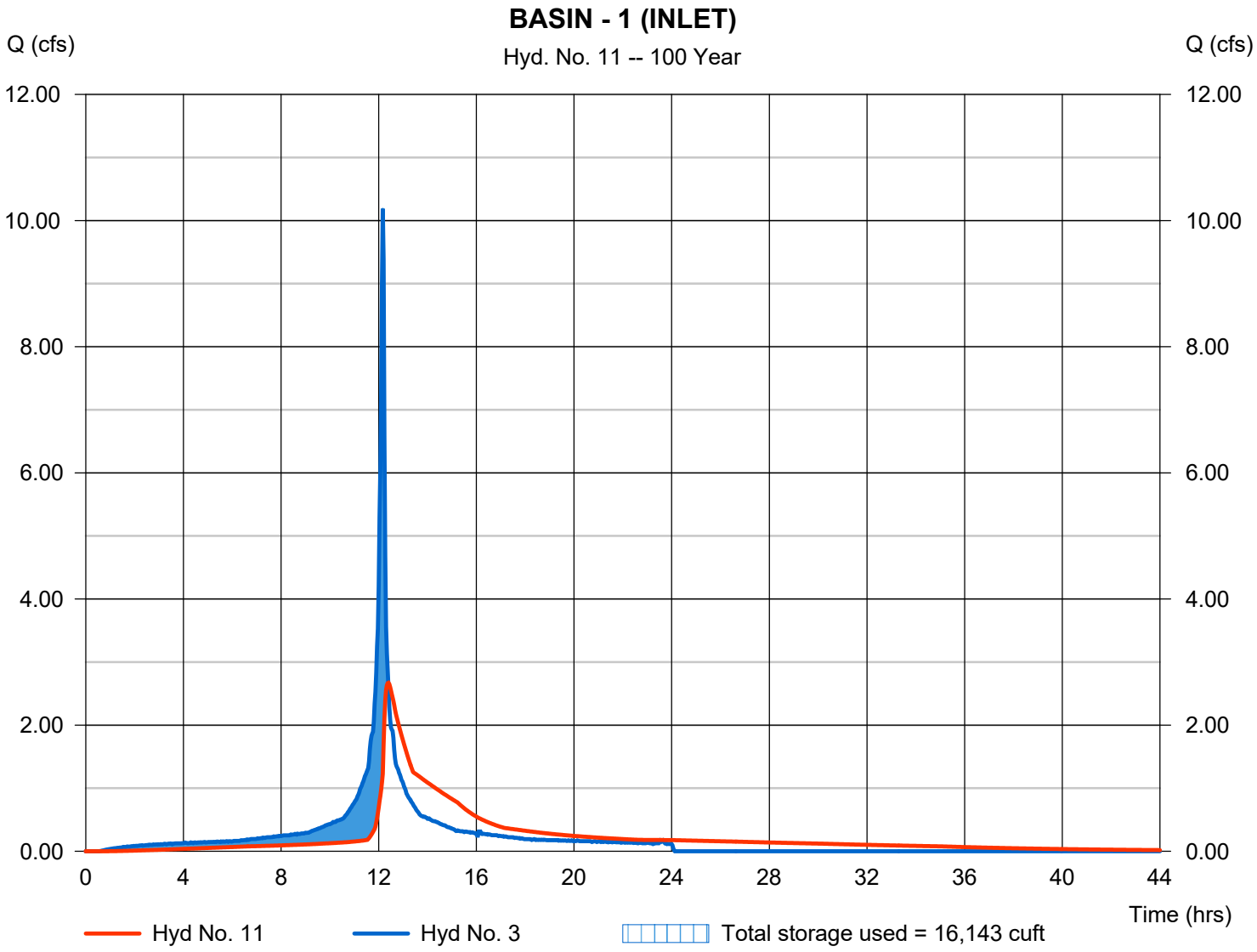
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 11

BASIN - 1 (INLET)

Hydrograph type	= Reservoir	Peak discharge	= 2.671 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 35,704 cuft
Inflow hyd. No.	= 3 - PR-DA-1A Combined	Max. Elevation	= 286.76 ft
Reservoir name	= DET. BASIN - 1 (INLET)	Max. Storage	= 16,143 cuft

Storage Indication method used.



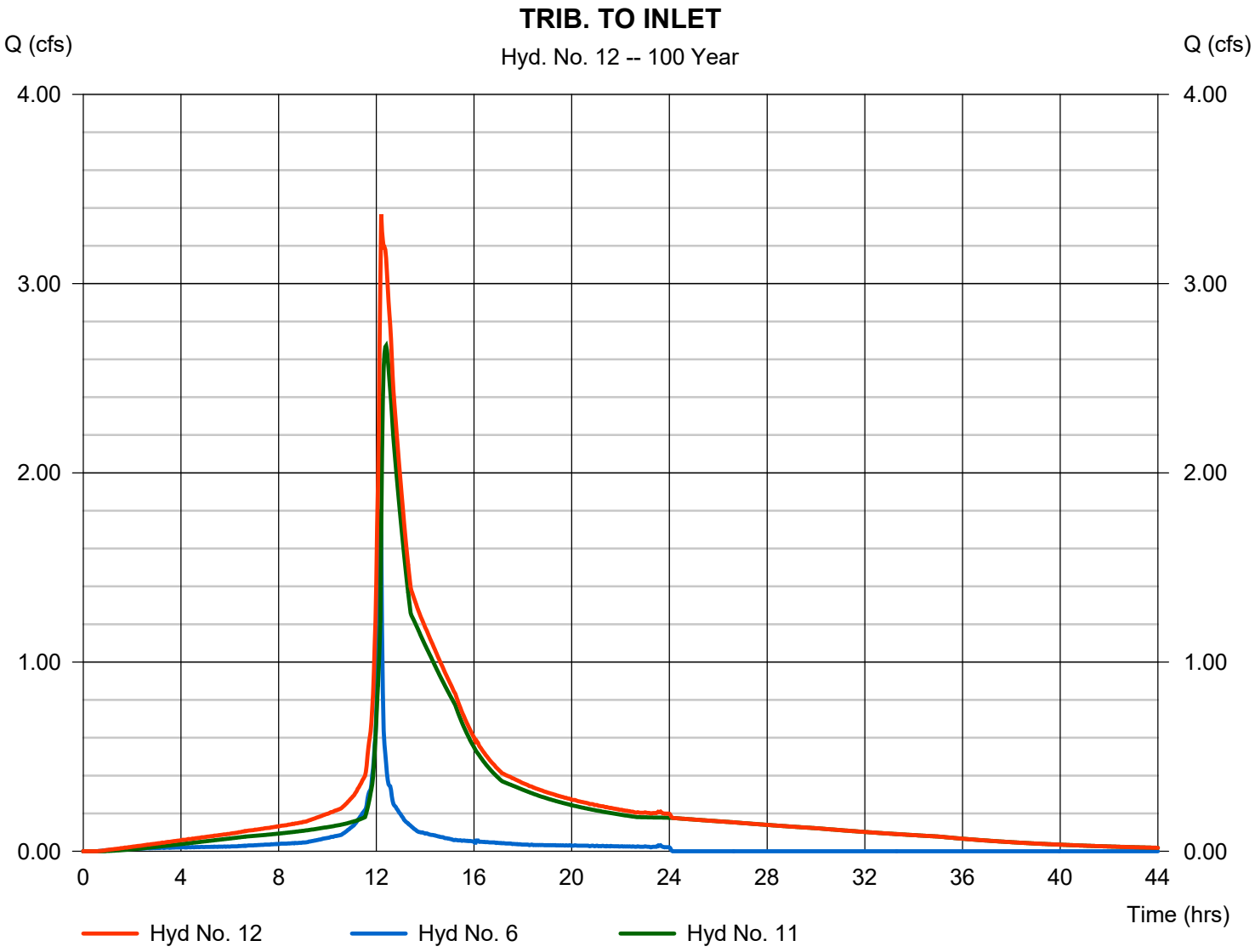
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 12

TRIB. TO INLET

Hydrograph type	= Combine	Peak discharge	= 3.367 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 41,933 cuft
Inflow hyds.	= 6, 11	Contrib. drain. area	= 0.000 ac



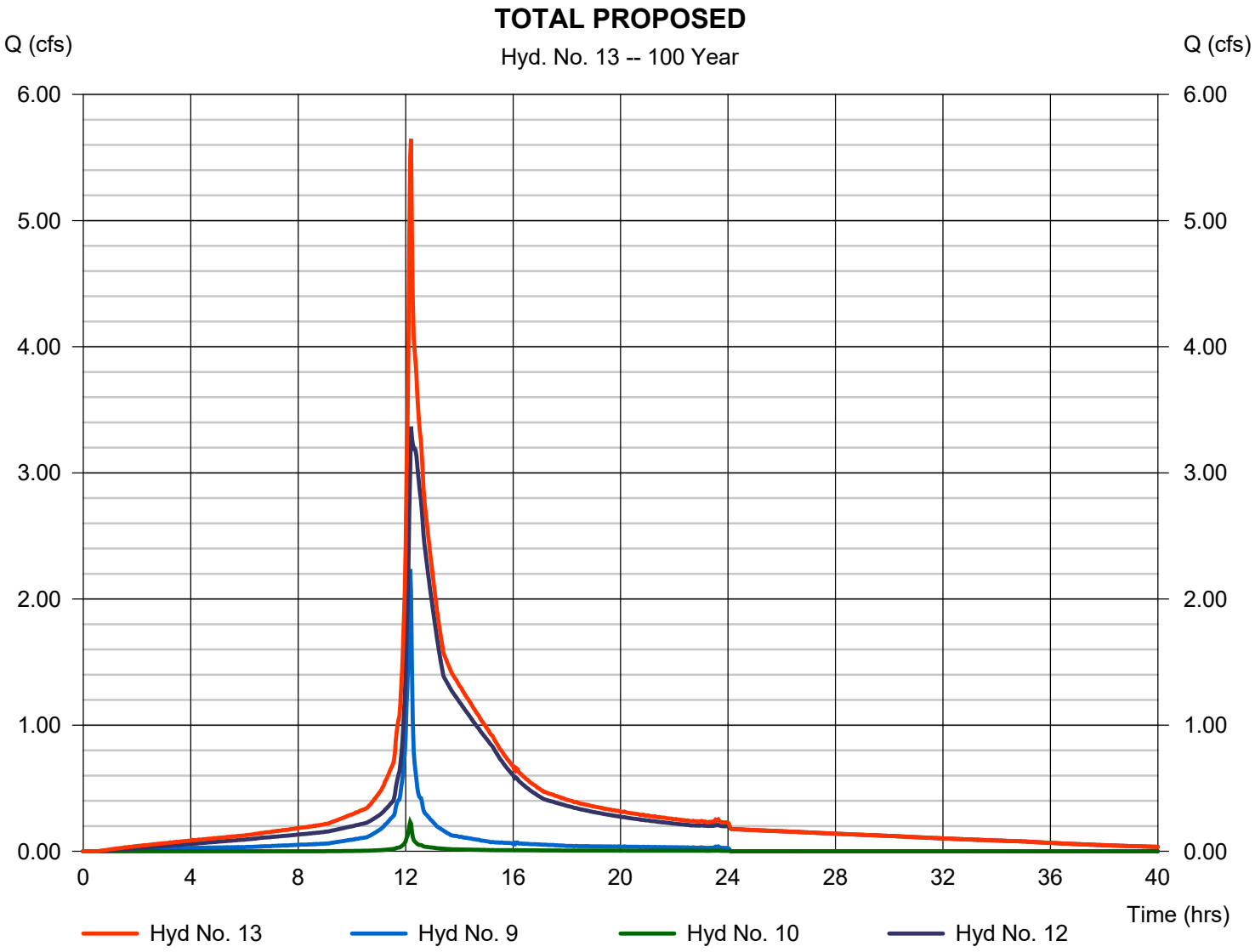
Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 13

TOTAL PROPOSED

Hydrograph type	= Combine	Peak discharge	= 5.646 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 50,399 cuft
Inflow hyds.	= 9, 10, 12	Contrib. drain. area	= 0.050 ac



Pond Reports

Pond Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Pond No. 2 - DET. BASIN - 1 (INLET)

Pond Data

Contours -User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 283.50 ft. Voids = 87.70%

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	283.50	5,645	0	0
3.50	287.00	5,645	17,326	17,326

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	2.50	6.00	0.00
Span (in)	= 15.00	2.50	6.00	0.00
No. Barrels	= 1	1	1	0
Invert El. (ft)	= 283.50	283.50	285.00	0.00
Length (ft)	= 55.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .012	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	Yes	No

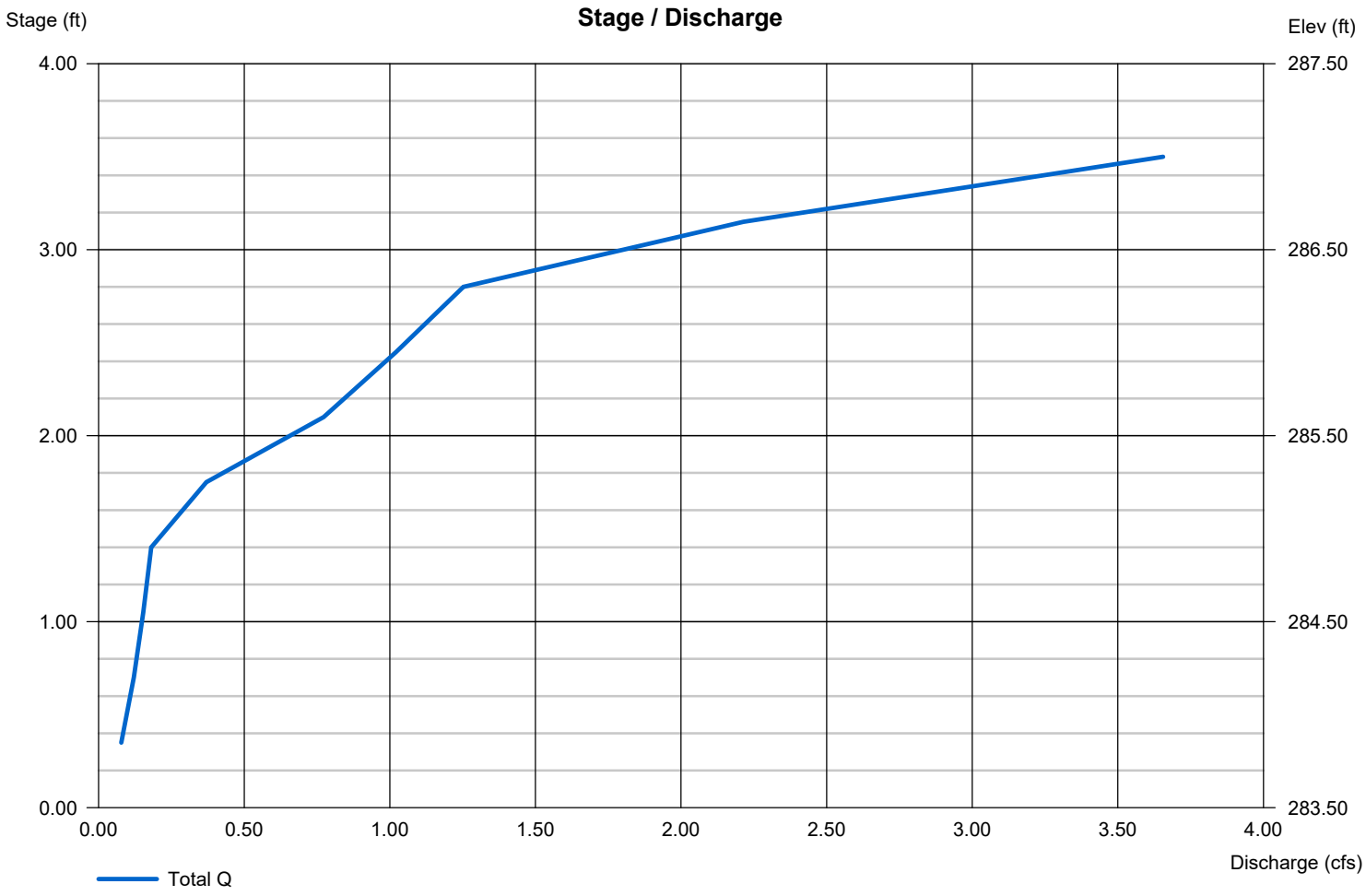
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 1.00	0.00	0.00	0.00
Crest El. (ft)	= 286.25	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	3.33	3.33
Weir Type	= Rect	---	---	---
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).



Basin Drain Time Verification

Hydrograph Report

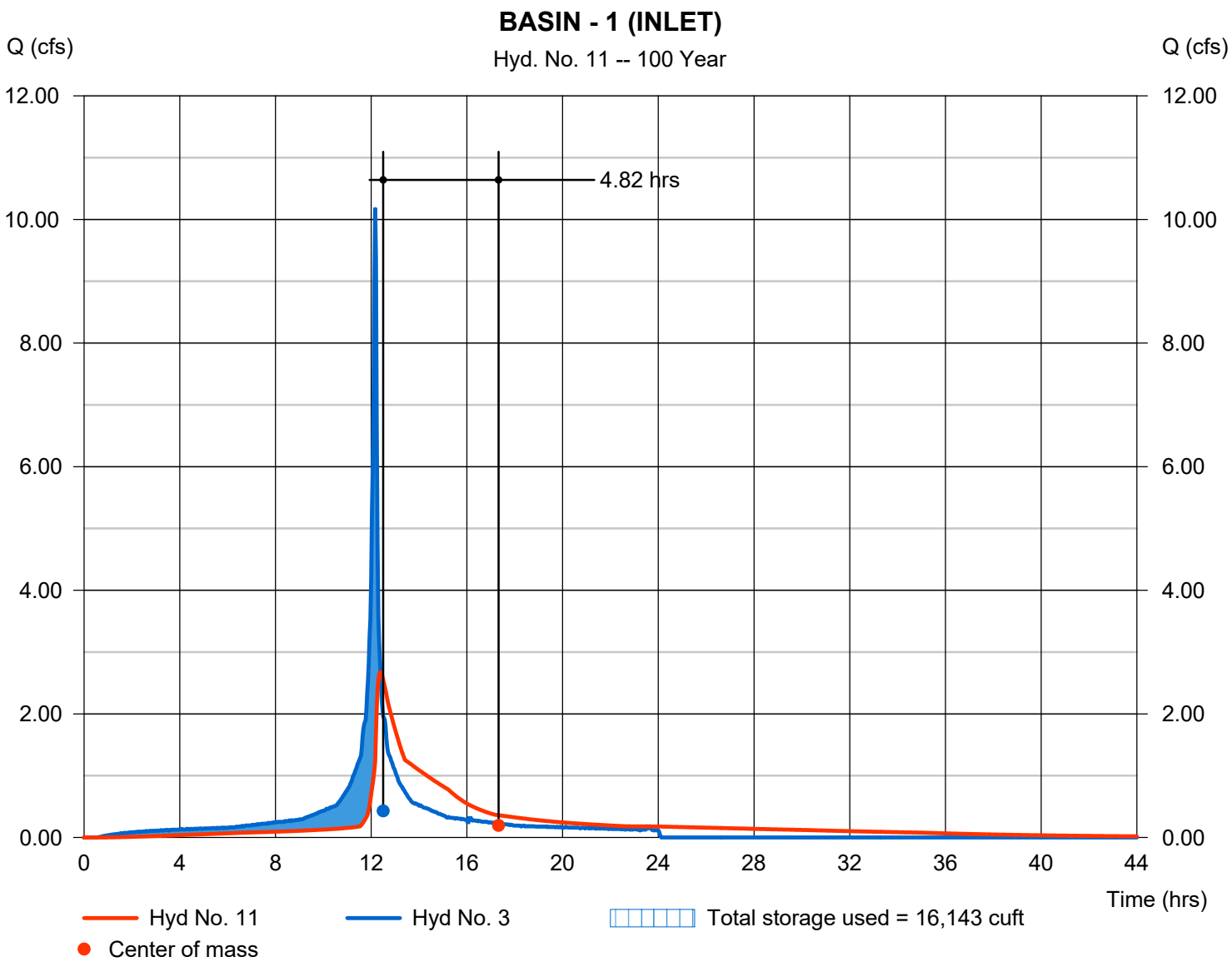
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 11

BASIN - 1 (INLET)

Hydrograph type	= Reservoir	Peak discharge	= 2.671 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.40 hrs
Time interval	= 2 min	Hyd. volume	= 35,704 cuft
Inflow hyd. No.	= 3 - PR-DA-1A Combined	Max. Elevation	= 286.76 ft
Reservoir name	= DET. BASIN - 1 (INLET)	Max. Storage	= 16,143 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

Hyd. No. 11

BASIN - 1 (INLET)

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Storm frequency	= 100 yrs	Time to peak	= 12.40 hrs
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Inflow hyd. No.	= 3 - PR-DA-1A Combined	Reservoir name	= DET. BASIN - 1 (I
Max. Elevation	= 286.76 ft	Max. Storage	= 16,143 cuft

Storage Indication method used.

Hydrograph Discharge Table

(Printed values >= 1.00% of Qp.)

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
3.23	0.120	283.62	0.028	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
3.27	0.115	283.62	0.029	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
3.30	0.111	283.62	0.029	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
3.33	0.114	283.63	0.030	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
3.37	0.118	283.63	0.030	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
3.40	0.122	283.63	0.031	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
3.43	0.122	283.63	0.031	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
3.47	0.122	283.64	0.032	0.030	-----	-----	-----	-----	-----	-----	-----	0.030
3.50	0.118	283.64	0.033	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
3.53	0.113	283.64	0.033	0.031	-----	-----	-----	-----	-----	-----	-----	0.031
3.57	0.117	283.64	0.033	0.032	-----	-----	-----	-----	-----	-----	-----	0.032
3.60	0.120	283.64	0.034	0.032	-----	-----	-----	-----	-----	-----	-----	0.032
3.63	0.124	283.65	0.034	0.033	-----	-----	-----	-----	-----	-----	-----	0.033
3.67	0.124	283.65	0.035	0.033	-----	-----	-----	-----	-----	-----	-----	0.033
3.70	0.124	283.65	0.036	0.033	-----	-----	-----	-----	-----	-----	-----	0.033
3.73	0.125	283.65	0.036	0.034	-----	-----	-----	-----	-----	-----	-----	0.034
3.77	0.125	283.66	0.037	0.034	-----	-----	-----	-----	-----	-----	-----	0.034
3.80	0.125	283.66	0.037	0.035	-----	-----	-----	-----	-----	-----	-----	0.035
3.83	0.126	283.66	0.038	0.035	-----	-----	-----	-----	-----	-----	-----	0.035
3.87	0.126	283.66	0.038	0.036	-----	-----	-----	-----	-----	-----	-----	0.036

Continues on next page...

BASIN - 1 (INLET)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
12.30	3.560	286.73	2.556	0.250	1.150	-----	1.154	-----	-----	-----	-----	2.554
12.33	3.143	286.75	2.632	0.249	1.157	-----	1.224	-----	-----	-----	-----	2.630
12.37	2.869	286.76	2.668	0.249	1.160	-----	1.256	-----	-----	-----	-----	2.666
12.40	2.585	286.76 <<	2.674	0.249	1.160	-----	1.262	-----	-----	-----	-----	2.671
12.43	2.289	286.76	2.651	0.249	1.158	-----	1.241	-----	-----	-----	-----	2.649
12.47	2.092	286.75	2.608	0.250	1.154	-----	1.201	-----	-----	-----	-----	2.606
12.50	1.965	286.73	2.553	0.250	1.149	-----	1.151	-----	-----	-----	-----	2.551
12.53	1.931	286.72	2.496	0.251	1.144	-----	1.099	-----	-----	-----	-----	2.493
12.57	1.909	286.70	2.441	0.251	1.139	-----	1.049	-----	-----	-----	-----	2.439
12.60	1.799	286.69	2.386	0.251	1.134	-----	0.998	-----	-----	-----	-----	2.383
12.63	1.607	286.68	2.321	0.252	1.128	-----	0.939	-----	-----	-----	-----	2.318
12.67	1.471	286.66	2.247	0.252	1.121	-----	0.871	-----	-----	-----	-----	2.244
12.70	1.384	286.64	2.185	0.252	1.114	-----	0.816	-----	-----	-----	-----	2.182
12.73	1.344	286.62	2.132	0.252	1.105	-----	0.772	-----	-----	-----	-----	2.129
12.77	1.317	286.60	2.080	0.252	1.097	-----	0.729	-----	-----	-----	-----	2.078
12.80	1.289	286.58	2.030	0.252	1.090	-----	0.687	-----	-----	-----	-----	2.028
12.83	1.243	286.56	1.981	0.251	1.082	-----	0.646	-----	-----	-----	-----	1.979
12.87	1.214	286.55	1.932	0.251	1.074	-----	0.605	-----	-----	-----	-----	1.930
12.90	1.172	286.53	1.885	0.251	1.067	-----	0.565	-----	-----	-----	-----	1.883
12.93	1.128	286.51	1.838	0.250	1.060	-----	0.526	-----	-----	-----	-----	1.836
12.97	1.108	286.50	1.791	0.250	1.052	-----	0.487	-----	-----	-----	-----	1.790
13.00	1.074	286.48	1.746	0.250	1.045	-----	0.449	-----	-----	-----	-----	1.745
13.03	1.028	286.46	1.701	0.250	1.038	-----	0.412	-----	-----	-----	-----	1.700
13.07	1.001	286.45	1.657	0.249	1.031	-----	0.375	-----	-----	-----	-----	1.656
13.10	0.966	286.43	1.614	0.249	1.025	-----	0.339	-----	-----	-----	-----	1.612
13.13	0.917	286.42	1.570	0.249	1.018	-----	0.302	-----	-----	-----	-----	1.569
13.17	0.892	286.40	1.527	0.249	1.011	-----	0.266	-----	-----	-----	-----	1.526

Continues on next page...

BASIN - 1 (INLET)

Hydrograph Discharge Table

Time (hrs)	Inflow cfs	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	Outflow cfs
41.20	0.000	283.63	0.030	0.029	-----	-----	-----	-----	-----	-----	-----	0.029
41.23	0.000	283.63	0.030	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
41.27	0.000	283.63	0.030	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
41.30	0.000	283.63	0.030	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
41.33	0.000	283.63	0.030	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
41.37	0.000	283.63	0.030	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
41.40	0.000	283.62	0.029	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
41.43	0.000	283.62	0.029	0.028	-----	-----	-----	-----	-----	-----	-----	0.028
41.47	0.000	283.62	0.029	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
41.50	0.000	283.62	0.029	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
41.53	0.000	283.62	0.029	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
41.57	0.000	283.62	0.029	0.027	-----	-----	-----	-----	-----	-----	-----	0.027
41.60	0.000	283.62	0.028	0.027	-----	-----	-----	-----	-----	-----	-----	0.027

...End

Geotechnical Investigation Analysis

MEMORANDUM

To: M. Porter / Krisujen Realty, LP

From: John G. Yakimik, PE

Date: 3/22/16

Re: Prestige Lincoln
100 Rt. 17 North
Upper Saddle River, NJ
Soil Test Pits

CC: C. Koch, J. Mones / Environetics
M. Infante
L. Mahle-Greco / Johnson Soils

Pursuant to our field observations on 3/21/16, we present our findings regarding soil conditions and groundwater. Please refer to our marked "Test Pit (TP) and Boring Location Plan" dated 3/22/16 and the Johnson Soils Report (JSC) dated 3/9/16. The test pits were performed following a relatively dry period over the previous week. The open pits were reviewed in the field by a representative of JSC.

Test Pit No. 1

TP-1 was excavated to a total depth of 16 feet (ft.) from an approximate surface elevation of 292.5. Groundwater of low flow was observed at a depth of 9 ft. or, El. 283.5. Soil strata from the top of the excavation consisted of 6 inches (in.) Topsoil / 15.5 ft. Brown Fine to Coarse Sand.

Test Pit No. 2

TP-2 was excavated to a total depth of 19 ft. from an approximate surface elevation of 284.5. Groundwater of moderate flow was observed at a depth of 5 ft. or, El. 279.5 and at a depth of 13 ft. or, El. 271.5. Soil strata from the top of the excavation consisted of 6 in. Concrete/ 4.5 ft. Fill, Cinders, Brown Fine to Coarse Sand, Wood Logs / 14 ft. Gray Fine to Coarse Sand and Organic Silt. Two hours following excavation, the pit had collapsed to 10 ft. of depth with few inches of water at bottom.

Test Pit No. 3

TP-3 was excavated to a total depth of 15 ft. from an approximate surface elevation of 290.5. Groundwater was initially not observed throughout the full depth of the excavation. Low groundwater flow was observed one hour following the excavation at a depth of 10 ft. or, El. 280.5. Soil strata from

the top of the excavation consisted of 6 in. Concrete/ 4.5 ft. Fill, Fine to Coarse Sand / 5 ft. Gray Organic Silt and Fine to Coarse Sand/ 5 ft. Brown Fine to Coarse Sand and some silt.

Test Pit No. 4

TP-4 was excavated to a total depth of 16 ft. from an approximate surface elevation of 292. Groundwater of low flow was observed at a depth 13 ft. or, El. 279. Soil strata from the top of the excavation consisted of 6 inches (in.) Topsoil, 2 ft. of Brown Fine to Coarse Sand, 13.5 ft. Fill, Cinders, Bricks, Broken Concrete.

Summary

Referring and corresponding to the Table on Pg. 3 of the JSC Geotechnical Engineering Report dated 3/9/16, we report the following:

	Boring Top of Water Levels		**Corresponding Test Pit and Top of Water Level**	
Boring 2	286.75	2/21/16	TP-1	283.0 (low flow / lot rear)
	286.59	2/23/16		
	287.33	2/29/16		
Boring 5	278.75	2/21/16	TP-2	279.5 (moderate flow / lot front)
	278.42	2/23/16		
	281.67	2/29/16		
			Other Test Pits	
			TP-3	280.5 (low flow / lot rear)
			TP-4	279.0 (low flow / lot center)

JOHNSON SOILS COMPANY

66 Glen Avenue
Glen Rock, NJ 07452
Telephone: 201-301-1045
Fax: 201-857-8002
Email: info@johnsonsoils.com

March 9, 2016

INFANTE ASSOCIATES
9 Robinson Lane
Ridgewood, NJ 07450

Attn: Mark Infante

Re: Geotechnical Engineering Report
Prestige Lincoln Dealership
100 N.J.S.H Route 17 North
Upper Saddle River, NJ
JSC Job # 16-050

This report is submitted to **Infante Associates** as per our proposal dated January 14, 2016. It includes our findings, conclusions and recommendations related to the construction of the proposed building and addition.

The site is located in Upper Saddle River, New Jersey. The proposed features are shown on the plan entitled "Boring Location Plan", which was provided by **Infante Associates.**

INVESTIGATION

Eight (8) Borings were completed between February 15, 2016 and February 17, 2016. The Borings were performed by our sub-contractor RV Drilling Inc. and advanced using a truck mounted drill rig with a hollow stem auger in accordance with the procedures of the Standard Penetration Test (ASTM-1586). For this test, a standard split barrel sampler of two (2) inches outside diameter, one and three eighth (1 3/8) inches inside diameter is advanced into the soil using a one hundred and forty (140) pound weight hammer falling 30 inches. Standard Penetration Tests were taken continuously from zero (0) to twelve (12) feet and at five (5) feet intervals thereafter.

Piezometers were installed in Borings 2 & 5 to evaluate the ground water elevations.

The boring location plan and record sheet for the borings are attached to this report.

FINDINGS

Surface Features: The existing property is vacant area with concrete, asphalt and misc. materials scattered across the property.

Subsurface Conditions: The explorations for this study indicate that the site is underlain by relatively non-uniform subsurface conditions. The strata are listed below in order of increasing depth. Detailed descriptions of the subsurface conditions are shown on the individual logs of Borings, Plate 3A to 3H.

1. Asphalt: A layer of Asphalt was encountered to a depth of two (2) to three (3) inches below the existing grade at Borings 6 and 8.

2. Concrete: A layer of Concrete was encountered to a depth of five (5) to seven (7) inches below the existing grade at Borings 1, 2, 5 and 7.

3. Fill: A layer of Fill was encountered to a depth of seven (7) to twelve (12) feet below the existing grade at Boring 1, 3, 5 and 7, and to a depth of ten (10) inches below the existing grade at Boring 4.

4. Gravelly Sand (SW): A layer of Gravelly-Sand was encountered below the fill to a depth of twenty-five (25) feet below the existing grade at Borings 1, 3, 4, 5, 6 and 8, to a depth of eighteen (18) feet below the existing grade at Boring 2 and to a depth of twenty-one (21) feet below the existing grade at Boring 7.

5. Sand and Silt (SM-ML): A layer of Sand and Silt was encountered below the Gravelly-Sand and to a depth of twenty-five (25) feet below the existing grade at Boring 2.

6. Boulders: Boulders were encountered below the Gravelly-Sand and at a depth of twenty-one (21) feet below the existing grade at Boring 7.

Ground water was observed at a depth of six (6) to sixteen (16) feet below the exiting grade at the eight (8) Borings at the time of the drilling investigation.

Below is a table from the water level readings taken in the 2 piezometers installed (B-2 & B-5).

Date	**Boring 2 (depth from existing grade/est. elev)**	**Boring 5 (depth from existing grade /est. elev)**
Approx. Existing Ground elevation	290 +/-	284.5+/-
Proposed Basement Elev.	276.50	276.50
Water Level 2/21/2016	45"/286.75	69"/278.75
Water Level 2/23/2016	41"/286.59	73"/278.42
Water Level 2/29/2016	32"/287.33	61"/281.67

The water level reading on 2/29/2016 was after the rain on 2/26/2016. It appears the water flows down from the higher elevations to the east side of the property and follows the ground contours. This is typical of ground water flow patterns. Additionally, the ground water levels can fluctuate fairly quickly due to the high permeability of the Fill and Gravelly Sand.

COMMENTS AND CONCLUSIONS

The eight (8) borings were completed around the edges and inside of the proposed new building footprint.

Misc. fill was found to depths ranging from ten (10) inches to twelve (12) feet below the existing ground surface. The Misc. Fill is unsuitable for spread footings. The proposed foundation can be supported using conventional spread footings after the removal of fill and excavating into the Gravelly-Sand layer and replacing with compacted controlled fill for all footings (exterior and interior footings).

The proposed basement elevation of 276.50 is below the high water elevations. Boring 2 has a high water elevation of 287.33 and Boring 5 has a high water elevation of 281.67. In order to excavate for the proposed basement elevation a dewatering system would have to be installed during construction to dewater the up to 10 feet of groundwater. Additionally, a water tight foundation would have to be designed and installed to create a bath tub like effect.

It appears that the ground water continually flows from the higher elevations on the east side of the property.

JSC dos not recommend placing the basement below the existing high water elevation. Typically, the high ground water level should be a minimum of 1 foot below the bottom of the proposed slab elevation in order to keep the area dry at all times.

Please see the Recommendations section for additional information.

In the instance where surface runoff that may enter the proposed excavations may be effectively controlled by sump pits placed within or adjacent to the proposed excavations. It should be noted that the water level conditions might vary due to variations in rainfall, temperature and other factors at the time of construction.

RECOMMENDATIONS

1. Foundation:
   - **a. Option 1 – With Basement (not recommended)**
     - i. Remove all Misc. Fill down to the Gravelly-Sand.
       - a. Estimated depth of excavation varies from 7.5 to 13.5 feet below the existing surface grade.
     - ii. Excavate to the proposed footing elevations and into the Gravelly-Sand, whichever is deeper.
     - iii. Ground water dewatering system will have to be installed during construction.
       - a. Estimated depths below the high ground water elevation are approximately between 5 to 11 feet.
     - iv. All interior piers will also need to be excavated to the Gravelly Sand.
     - v. Excavation shall be a minimum of three (3) feet outside the proposed building dimension.
     - vi. Replace with crushed stone (3/4" or 1 ½") up to the bottom of proposed footing elevation.
     - vii. A minimum of one (1) foot outside the proposed footing dimension.
     - viii. Use an allowable bearing capacity of four thousand (4,000) pounds per square foot (PSF) on Crushed Stone on Gravelly-Sand.
     - ix. Maximum settlement is less than 1 in.
     - x. Estimated differential settlement is less than 0.5 in.
     - xi. Minimum depth for frost protection is three feet (3') below the final exterior grade.
     - xii. All concrete footings should be kept dry a minimum of 48 hours after the footings are poured, for proper curing.
     - xiii. Concrete blankets (or equivalent) are required if the temperature drops below 32°, to prevent the concrete from freezing.

b. Option 2 – NO Basement

i. Remove all Misc. Fill down to the Gravelly-Sand.
   a. Estimated depth of excavation varies from 3 to 12 feet below the existing surface grade.

ii. Excavate to the proposed footing elevations and into the Gravelly-Sand, whichever is deeper.

iii. Ground water dewatering system will have to be installed during construction.
   a. Estimated depths below the high ground water elevation are approximately between 5 to 11 feet.

iv. All interior piers will also need to be excavated to the Gravelly Sand.

v. Excavation shall be a minimum of three (3) feet outside the proposed building dimension.

vi. Replace with crushed stone (3/4" or 1 ½") up to the bottom of proposed footing elevation.

vii. A minimum of one (1) foot outside the proposed footing dimension.

viii. Use an allowable bearing capacity of four thousand (4,000) pounds per square foot (PSF) on Crushed Stone on Gravelly-Sand.

ix. Maximum settlement is less than 1 in.

x. Estimated differential settlement is less than 0.5 in.

xi. Minimum depth for frost protection is three feet (3') below the final exterior grade.

xii. All concrete footings should be kept dry a minimum of 48 hours after the footings are poured, for proper curing.

xiii. Concrete blankets (or equivalent) are required if the temperature drops below 32°, to prevent the concrete from freezing.

2. Slab on Grade:
   a. OPTION 1 – with Basement (not recommended)
      i. Excavate to the bottom of slab
      ii. Basement slab will need to withstand an estimated 11 feet of head of water.
      iii. Proof roll area with a minimum of four passes of heavy vibratory compactor with a minimum static drum weight of 12,000 pounds or equal.
      iv. Any areas, which are observed to be soft or unstable, should be removed and replaced with controlled fill and compacted as per recommendations # 7 & #8
      v. Where compaction is performed, use a Modulus of Subgrade Reaction (k) of one hundred fifty (150) pounds per cubic inch (pci) for slab design.
   b. OPTION 2 – NO Basement
      i. Excavate to the bottom of slab
      ii. Proof roll area with a minimum of four (4) passes of heavy vibratory compactor with a minimum static drum weight of 12,000 pounds or equal.
      iii. Any areas, which are observed to be soft or unstable, should be removed and replaced with controlled fill and compacted as per recommendations # 7 & #8
      iv. Where compaction is performed, use a Modulus of Subgrade Reaction (k) of one hundred twenty five (125) pounds per cubic inch (pci) for slab design.

3. Retaining Wall Design:
   a. Well Graded Sand (SW)
      i. $\gamma = 130$ PCF
      ii. $\phi = 32^{o}$
      iii. $C = 0$

4. Parking & Driveway areas:
    a. Proof roll area with a minimum of 4 passes with a heavy vibratory compactor with a minimum static drum weight of 12,000 pounds or equal
    b. Any areas, which are observed to be soft or unstable, should be removed and replaced with controlled fill and compacted as per recommendations # 7 & #8.
    c. Subbase: Quarry Process Stone – 8"
    d. Base Course – I-2 – 6"
    e. Surface Course – I-5 – 2"

5. Soil Classification "C" as per OSHA 1926 Subpart P App A with maximum allowable slopes (H:V) of 1.5:1 as per OSHA 1926 Subpart P App B Table B-1.
    a. This is for short term maximum allowable slopes less than 12 feet.
    b. Sloping or benching for excavations greater than 20 feet deep shall be designed by a Professional Engineer licensed in the State of New Jersey.

6. The Seismic Site Classification is "D" in terms of the International Building Code (IBC). Also the profile is considered not to be susceptible to liquefaction.
    a. $S_S = 0.271$ g
    b. $S_1 = 0.072$ g
    c. $S_{MS} = 0.429$ g
    d. $S_{M1} = 0.173$ g
    e. $S_{DS} = 0.286$ g
    f. $S_{D1} = 0.115$ g

7. Controlled Fill:
    a. Crushed Stone – ¾" or 1 ½" with no fines
    b. Sand and Gravel with less than 20% passing the #200 sieve.
    c. Quarry Process Stone (QP) with less than 20% passing the #200 sieve
    d. The existing misc. fill is **unsuitable** for use as backfill or controlled fill.

8. Controlled and compacted Fill Requirements:
   a. A geotechnical engineer licensed in the state of New Jersey to inspect all earthwork operations.
   b. The contractor and/or owner shall notify the geotechnical engineer in writing a minimum of 5 days prior to the start of all work on the project. The notification shall include all sources of fill, equipment to be used and estimated dates of the work and the proposed onsite supervisor.
   c. In areas where an old basement will be filled to the proposed subgrade elevation. Any previous building debris, including concrete slab, shall be removed and the area proof rolled to check for soft or loose material.
   d. All misc. Fill and Topsoil shall be graded prior to the start of all earthwork operations.
   e. All fill areas shall be proof rolled prior to the placement of any new fill. All proof rolling shall be performed in the presence of the geotechnical engineer. If soft areas are found during the proof rolling process, the area shall be removed and replaced with compacted controlled fill as per the direction of the geotechnical engineer.
   f. Any proposed fill area shall be leveled before placement of any fill. The area shall be free from ruts, hummocks or other uneven surfaces that would prevent uniform compaction.
   g. Use any of the material stated in the types of controlled fill section or other material approved by the geotechnical engineer.
   h. A 50-lb bag of material shall be submitted to the geotechnical engineer for approval and testing a minimum of 5 days prior to the start of work. No fill material shall be placed until the geotechnical engineer has approved the material for use in the project.
   i. All controlled fill should be placed in horizontal layers of eight to twelve (8-12) inches in loose thickness and be uniformly compacted to achieve a density of at least ninety-five (95) percent of the maximum dry density as determined by in the laboratory when tested in accordance with the most recent ASTM D1557 Standard.
   j. Backfill within confined areas should be placed in layers of six to eight (6-8) inches in loose thickness and compacted to the same 95% of maximum dry density using portable compaction equipment.

k. No fill material shall be placed, spread, or compacted when the ground or fill is frozen or thawing or during unfavorable weather conditions. When work is interrupted by heavy rain or frost, operations shall not be resumed unless the moisture content and density of the fill are acceptable to the geotechnical engineer.
l. A sufficient number of passes shall be approved by the geotechnical engineer in order to achieve the acceptable specified density above. A minimum of 3 passes of the approved compactor shall be required over all areas of each lift.
m. Field density tests shall be made by the geotechnical engineer to determine the in place field density in each layer placed. No fill shall be placed over any layer that has not been previously approved by the geotechnical engineer. Should any of the tests find insufficient density; additional compaction will be required until the required density is obtained.

9. The following construction tasks should be inspected by a geotechnical engineer using appropriate laboratory and field testing support:
   a. Confirmation bottom of excavated area for footings.
   b. Approve all types of controlled fill soils to be used in footings and slabs.
   c. Compaction of all controlled fill for footings and slab areas.

The recommendations above are based on the data obtained from soil borings performed at the indicated specific location and from other identified information. This report does not reflect any variations which may occur across the site apart from the borings. The nature and extent of such variations may not become evident until construction. If variations appear evident, it will be necessary to re-evaluate the recommendations of this report.

This report has been prepared for the specific application to the project noted. In the event that there are changes in the nature, design or locations of the proposed structures, the conclusions and recommendations contained herein are not valid unless the changes are reviewed and the recommendations modified in writing by JSC.

The information and opinions rendered in our report are exclusively for use **Infante Associates** and JSC will not distribute or publish this report without written consent except as required by law or court order. The information and opinions expressed in this report are given in response to a limited assignment and should be considered and implemented only in light of that assignment. The services provided by JSC in completing this project were consistent with normal standards of the profession. No warranty, expressed or implied, is made.

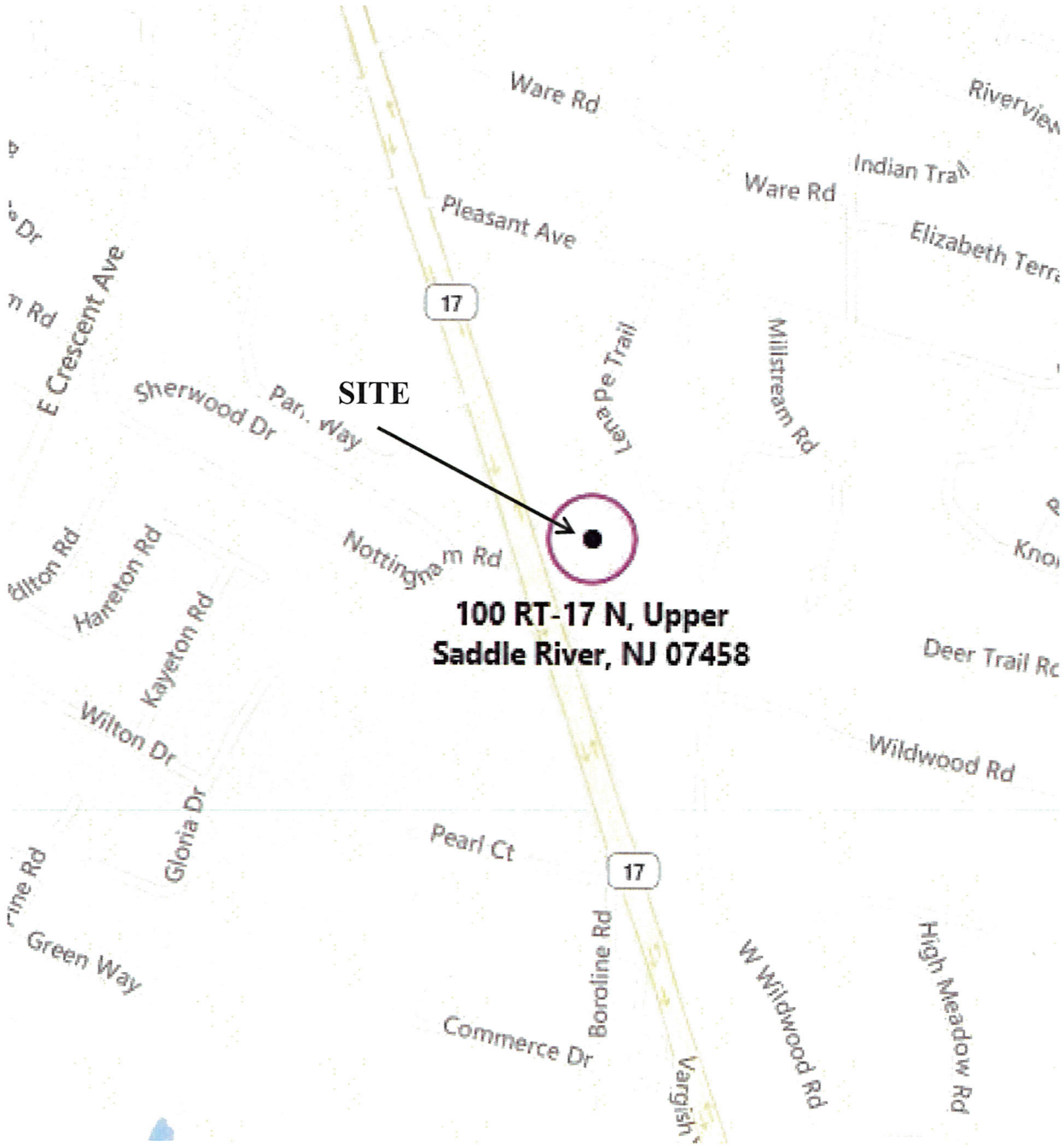
The following Plates are attached to this report:

Plate 1 -	Site Location Map
Plate 2 -	Boring Location Plan
Plates 3A-3H -	Log of Borings
Plate 4-	Unified Soil Classification System

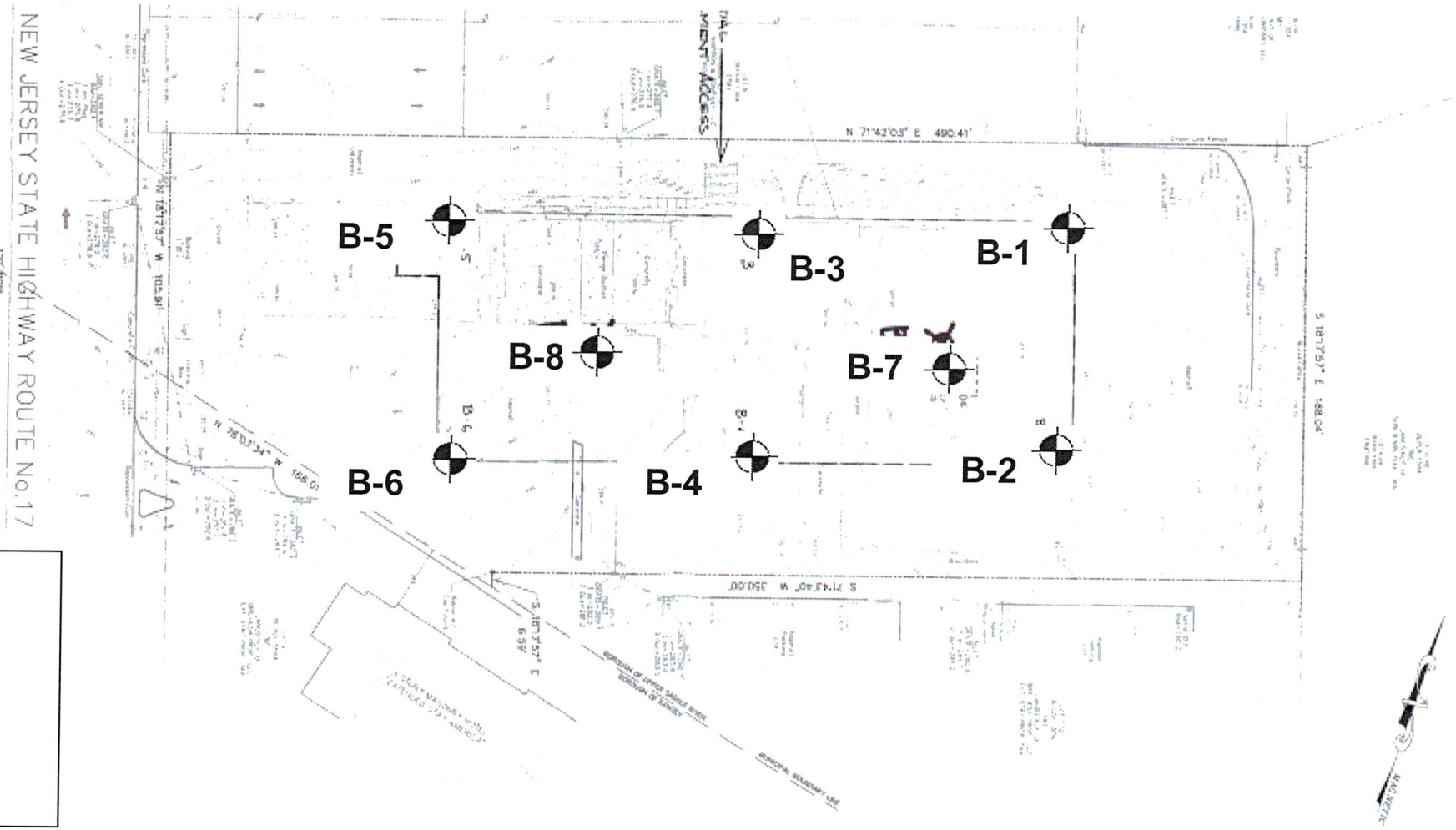
Very truly yours,
JOHNSON SOILS COMPANY

Lisa V. Mahle-Greco

Lisa V. Mahle-Greco, PE
Engineering Manager
NJ Lic. No. 43197



JOHNSON SOILS COMPANY	**Site Location Plan**	JSC #16-050
	100 N.J.S.H Route 17, Upper Saddle River, NJ	PLATE 1



Scale: N.T.S.

JOHNSON SOILS COMPANY	Boring Location Plan	JSC #16-050
	100 N.J.S.H. Route 17 North Upper Saddle River, NJ	PLATE 2

JOHNSON SOILS COMPANY

LOG OF BORING

B-1

Sheet: 1 of 8
Project Number : 16-050
Date Started: 02/15/16
Date Completed: 02/17/16
Ground Surface El:
Depth to Ground Water:

Depth (Feet)	Sample No.	Depth (Feet)	Sample/Spoon Blows/6"	Symbol USCS	Description
0	S-1	0-2	0		0 to 7" Concrete
-					7" to 8' Fill, Fine to Coarse Sand and Organic Silt
-	S-2	2-4	5-5-5-6		
-					
-	S-3	4-6	4-4-5-4		
5					
-	S-4	6-8	4-5-7-8		
-					
-	S-5	8-10	3-2-4-6		8' to 25' Brown Fine to Coarse Sand, Little Gravel, Trace Silt
-					(Wet, Loose Grading)
10	S-6	10-12	4-4-5-7		
-					
-					
-					
-					
15	S-7	15-17	11-17-13-15	SW	(Wet, Medium Dense)
-					
-					
-					
-					
20	S-8	20-22	14-23-52-43		(Wet, Very Dense)
-					
-					
-	S-9	23-25	50-62-87-55		
-					
25					Boring Completed @ 25' on 02/15/2016
-					
-					
-					
-					
30					

Remarks:

Client: Infante Associates
Project: 100 N.J.S.H Route 17 North
Location: Upper Saddle River, NJ
Driller: **RV Drilling**

- [x] Hollow Stem Auger
- [ ] Mud Rotary
- [ ] Portable Equipment

PLATE: 3A

JOHNSON SOILS COMPANY

LOG OF BORING

B-2

Sheet: 2 of 8
Project Number : 16-050
Date Started: 02/15/16
Date Completed: 02/17/16
Ground Surface El: 290+-
Depth to Ground Water: 9'

Depth (Feet)	Sample No.	Depth (Feet)	Sample/Spoon Blows/6"	Symbol USCS	Description
0	S-1	0-2	-10-11-11		0 to 7" Concrete
-				SW	7" to 18' Brown Fine to Coarse Sand, little Gravel, Trace Silt
-	S-2	2-4	10-9-11-16		
-					(Moist, Medium Dense)
-	S-3	4-6	14-16-14-13		
5					
-	S-4	6-8	10-12-12-25		
-					
-	S-5	8-10	39-28-27-28		(Wet, Very Dense)
-					
10	S-6	10-12	15-16-17-16		(Wet, Dense)
-					
-					
-					
-					
15	S-7	15-17	17-20-23-30		
-					
-					
-					
-				SM-ML	18' to 25' Gray Fine Sand and Silt
20	S-8	20-22	23-28-38-41		(Wet, Very Dense)
-					
-					
-	S-9	23-25	52-65-65-75		
-					
25					Boring Completed @ 25' on 02/15/2016
-					
-					
-					
-					
30					

Remarks:

Client: Infante Associates
Project: 100 N.J.S.H Route 17 North
Location: Upper Saddle River, NJ
Driller: **RV Drilling**

- [x] Hollow Stem Auger
- [ ] Mud Rotary
- [ ] Portable Equipment

PLATE: 3B

JOHNSON SOILS COMPANY

LOG OF BORING

B-3

Sheet: 3 of 8
Project Number : 16-050
Date Started: 02/15/16
Date Completed: 02/17/16
Ground Surface El:
Depth to Ground Water: 16'

Depth (Feet)	Sample No.	Depth (Feet)	Sample/Spoon Blows/6"	Symbol USCS	Description
0	S-1	0-2	3-6-7-8		0 to 12' Fill, Cinders, Concrete
-	S-2	2-4	7-8-8-10		
-	S-3	4-6	9-6-5-5		
5	S-4	6-8	5-3-3-6		
-	S-5	8-10	4-5-5-5		
10	S-6	10-12	5-8-15-100/.5"		
-				SW	12' to 25' Brown Fine to Coarse Sand, Little Gravel, Trace Silt
15	S-7	15-17	4-5-6-6		(Wet, Medium Dense)
-					
20	S-8	20-22	4-10-16-27		
-	S-9	23-25	32-23-19-27		(Wet, Dense)
25					Boring Completed @ 25' on 02/17/2016
30					

Remarks:

Client: Infante Associates
Project: 100 N.J.S.H Route 17 North
Location: Upper Saddle River, NJ
Driller: **RV Drilling**

- [x] Hollow Stem Auger
- [ ] Mud Rotary
- [ ] Portable Equipment

PLATE: 3C

JOHNSON SOILS COMPANY

LOG OF BORING

B-4

Sheet: 4 of 8
Project Number : 16-050
Date Started: 02/15/16
Date Completed: 02/17/16
Ground Surface El:
Depth to Ground Water: 13'

Depth (Feet)	Sample No.	Depth (Feet)	Sample/Spoon Blows/6"	Symbol USCS	Description
0	S-1	0-2	6-26-41-19		0 to 10" Fill, Brick, Gravel, Concrete
-				SW	10" to 25' Brown Fine to Coarse Sand, Little Gravel, Trace Silt
-	S-2	2-4	17-13-15-12		
-					
-	S-3	4-6	8-6-8-10		(Moist, Medium Dense Grading)
5					
-	S-4	6-8	6-6-8-8		
-					
-	S-5	8-10	7-5-4-6		(Moist, Loose Grading)
-					
10	S-6	10-12	6-6-8-7		(Moist, Medium Dense Grading)
-					
-					
-					
-					
15	S-7	15-17	5-6-2-14		(Wet, Loose Grading)
-					
-					
-					
-					
20	S-8	20-22	4-6-11-14		(Wet, Medium Dense Grading)
-					
-					
-	S-9	23-25	18-16-17-20		(Wet, Dense Grading)
-					
25					Boring Completed @ 25' on 02/15/2016
-					
-					
-					
-					
30					

Remarks:

Client: Infante Associates
Project: 100 N.J.S.H Route 17 North
Location: Upper Saddle River, NJ
Driller: **RV Drilling**

- [x] Hollow Stem Auger
- [ ] Mud Rotary
- [ ] Portable Equipment

PLATE: 3D

JOHNSON SOILS COMPANY

LOG OF BORING

B-5

Sheet: 5 of 8
Project Number : 16-050
Date Started: 02/15/16
Date Completed: 02/17/16
Ground Surface El: 284.5 +/-
Depth to Ground Water: 15'

Depth (Feet)	Sample No.	Depth (Feet)	Sample/Spoon Blows/6"	Symbol USCS	Description
0	S-1	0-2	-2-3-3		0 to 5" Concrete
-					5" to 10' Fill, Cinders, Fine to Coarse Sand
-	S-2	2-4	5-4-5-4		
-					
-	S-3	4-6	4-9-7-5		
5					
-	S-4	6-8	3-3-3-3		
-					
-	S-5	8-10	3-3-1-2		
-					
10	S-6	10-12	8-10-8-7	SW	10' to 25' Brown Fine to Coarse Sand, Little Gravel, Trace Silt
-					(Moist, Medium Dense)
-					
-					
15	S-7	15-17	12-12-9-7		(Wet, Medium Dense)
-					
-					
-					
-					
20	S-8	20-22	26-33-28-35		(Wet, Very Dense)
-					
-					
-	S-9	23-25	57-60-78-76		
-					
25					Boring Completed @ 25' on 02/17/2016
-					
-					
-					
-					
30					

Remarks:

Client: Infante Associates
Project: 100 N.J.S.H Route 17 North
Location: Upper Saddle River, NJ
Driller: **RV Drilling**

- [x] Hollow Stem Auger
- [ ] Mud Rotary
- [ ] Portable Equipment

PLATE: 3E

Project Number : 16-050
Date Started: 02/15/16
Date Completed: 02/17/16
Ground Surface El:
Depth to Ground Water: 16'

JOHNSON SOILS COMPANY

LOG OF BORING

B-6

Depth (Feet)	Sample No.	Depth (Feet)	Sample/Spoon Blows/6"	Symbol USCS	Description
0	S-1	0-2	-7-13-14		0 to 2" Asphalt
-					2" to 1' Gray Fine to Coarse Sand and Gravel
-	S-2	2-4	11-10-10-9		1' to 25' Brown Fine to Coarse Sand, Little Gravel, Trace Silt
-					
-	S-3	4-6	9-9-6-4		
5					(Moist, Medium Dense)
-	S-4	6-8	4-4-5-12		
-					(Moist, Loose Grading)
-	S-5	8-10	17-16-5-10		
-					(Moist, Medium Dense Grading)
10	S-6	10-12	9-11-15-13		
-					
-				SW	
-					
-					
15	S-7	15-17	11-13-20-24		
-					(Wet, Dense)
-					
-					
-					
20	S-8	20-22	21-29-3-30		
-					
-					
-	S-9	23-25	27-53-47-55		
-					(Wet, Very Dense)
25					Boring Completed @ 25' on 02/17/2016
-					
-					
-					
-					
30					

Remarks:

Client: Infante Associates
Project: 100 N.J.S.H Route 17 North
Location: Upper Saddle River, NJ
Driller: **RV Drilling**

- [x] Hollow Stem Auger
- [ ] Mud Rotary
- [ ] Portable Equipment

PLATE: 3F

JOHNSON SOILS COMPANY

LOG OF BORING

B-7

Sheet: 7 of 8
Project Number : 16-050
Date Started: 02/15/16
Date Completed: 02/17/16
Ground Surface El:
Depth to Ground Water: 6'

Depth (Feet)	Sample No.	Depth (Feet)	Sample/Spoon Blows/6"	Symbol USCS	Description
0	S-1	0-2	-5-12-85		0 to 5" Concrete
-					5" to 7' Fill, Fine to Coarse Sand and Organic Silt
-	S-2	2-4	24-21-14-20		
-					
-	S-3	4-6	18-26-18-18		
5					
-	S-4	6-8	12-8-7-7	SW	4' to 21' Brown Fine to Coarse Sand, Little Gravel Trace Silt
-					
-	S-5	8-10	7-8-8-10		(Wet, Medium Dense)
-					
10	S-6	10-12	7-9-17-14		
-					
-					
-					
-					
15	S-7	15-17	11-13-12-13		
-					
-					
-					
-					
20	S-8	20-22	17-53-100/2"		
-					21' to 21'2" Boulder
-					Boring Refusal @21'2" on 02/15/2016
-					
-					
25					
-					
-					
-					
-					
30					

Remarks:

Client: Infante Associates
Project: 100 N.J.S.H Route 17 North
Location: Upper Saddle River, NJ
Driller: **RV Drilling**

- [x] Hollow Stem Auger
- [ ] Mud Rotary
- [ ] Portable Equipment

PLATE: 3G

Project Number : 16-050
Date Started: 02/15/16
Date Completed: 02/17/16
Ground Surface El:
Depth to Ground Water: 12'

JOHNSON SOILS COMPANY

LOG OF BORING

B-8

Depth (Feet)	Sample No.	Depth (Feet)	Sample/Spoon Blows/6"	Symbol USCS	Description
0	S-1	0-2	-6-13-15		0 to 3" Asphalt
-					3" to 7" Gravel
-	S-2	2-4	25-14-9-10		7" to 25' Brown Find to Coarse Sand, Little Gravel, Trace Silt
-	S-3	4-6	8-9-9-10		
5					
-	S-4	6-8	6-6-8-7		(Moist, Medium Dense)
-	S-5	8-10	14-30-21-13		(Moist, Very Dense)
10	S-6	10-12	11-12-11-14		(Moist, Medium Dense)
-				SW	
15	S-7	15-17	8-7-8-18		
20	S-8	20-22	14-16-14-14		
-	S-9	23-25	12-15-17-18		(Wet, Dense)
25					Boring Completed @ 25' on 02/17/2016
30					

Remarks:

Client: Infante Associates
Project: 100 N.J.S.H Route 17 North
Location: Upper Saddle River, NJ
Driller: **RV Drilling**

- [x] Hollow Stem Auger
- [ ] Mud Rotary
- [ ] Portable Equipment

PLATE: 3H

Pipe Sizing Calculations

Hydrograph Report

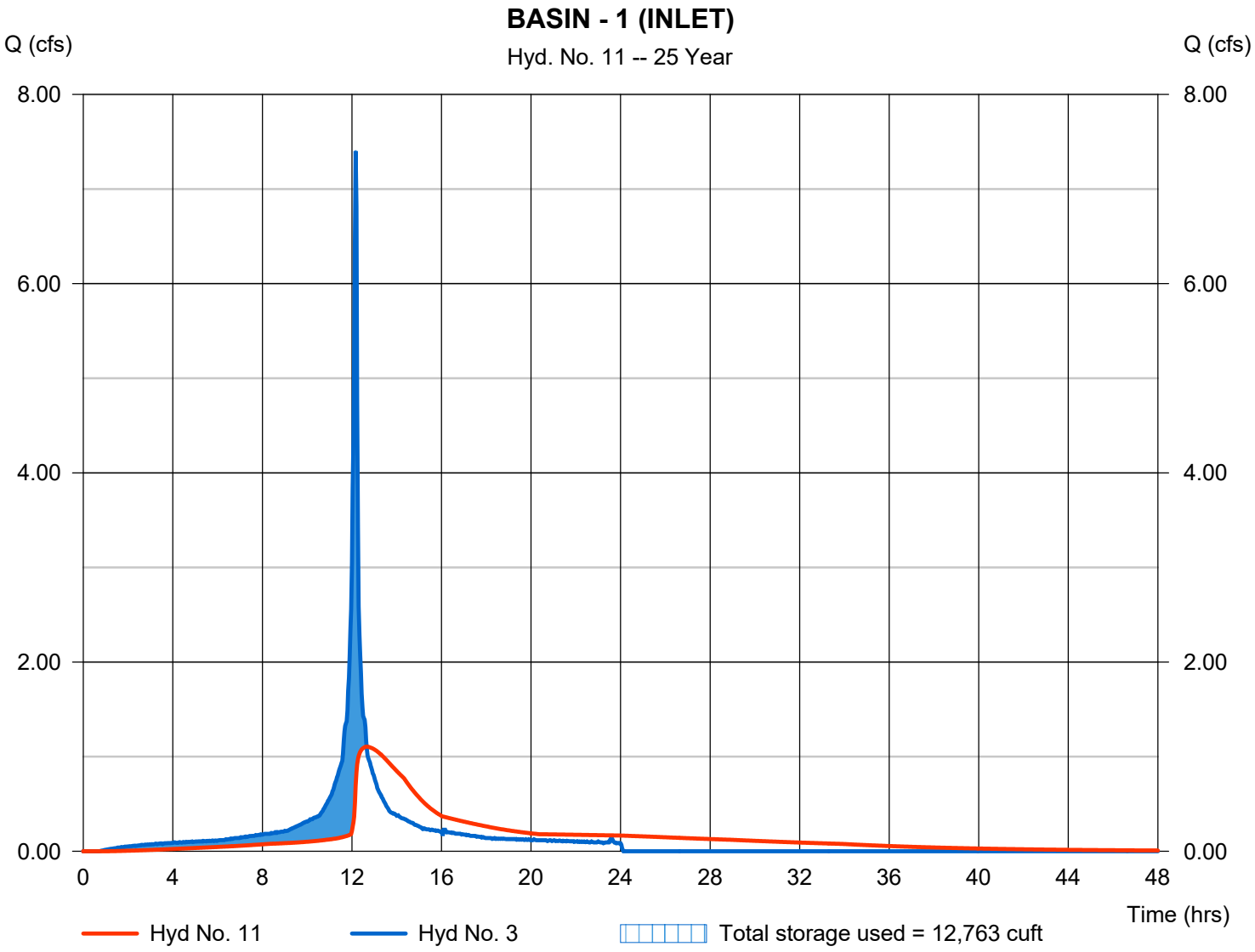
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® 2019 by Autodesk, Inc. v2020 Tuesday, 09 / 29 / 2020

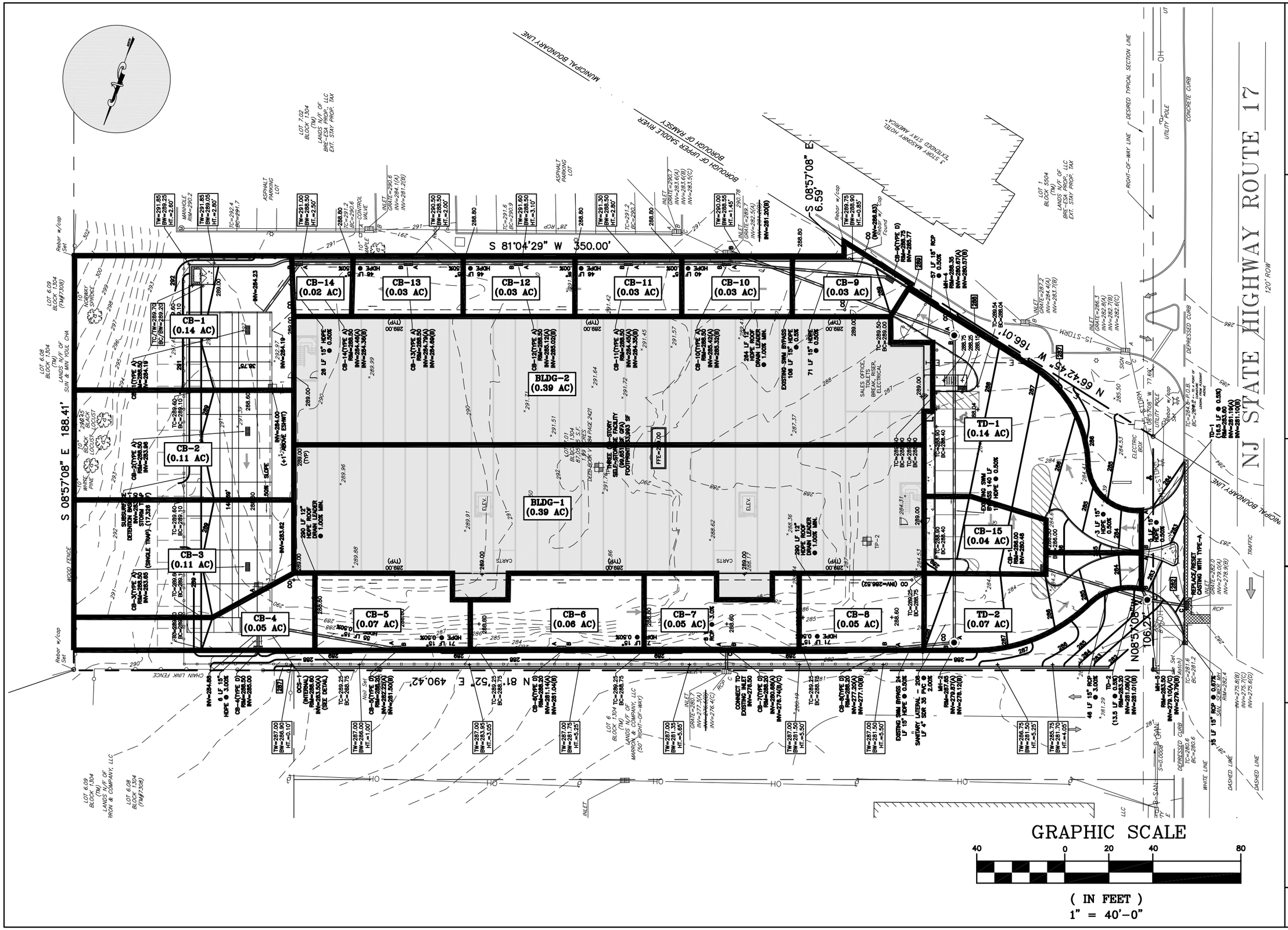
Hyd. No. 11

BASIN - 1 (INLET)

Hydrograph type	=	Reservoir	Peak discharge	=	1.106 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.67 hrs
Time interval	=	2 min	Hyd. volume	=	25,834 cuft
Inflow hyd. No.	=	3 - PR-DA-1A Combined	Max. Elevation	=	286.08 ft
Reservoir name	=	DET. BASIN - 1 (INLET)	Max. Storage	=	12,763 cuft

Storage Indication method used.





L2A LAND DESIGN LLC
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ENGLEWOOD, NJ 07631
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New Jersey Certificate of Authorization No. 24GA28130900

10/1/2020

Michael E. Dipple, P.E. DATE

NJ Professional Engineer #24GE04081200

WARNING: *COPIES OF THIS PLAN NOT BEARING THE ENGINEER'S INKED SEAL OVER THE PROFESSIONAL SIGNATURE IS NOT AN AUTHORIZED OFFICIAL COPY*

PROJECT:

PROPOSED SELF-STORAGE FACILITY
100 N.J.S.H. ROUTE 17 NORTH
BOROUGH OF UPPER SADDLE RIVER, BERGEN COUNTY, NJ

BLOCK: 1304; LOT: 7.01
TAX MAP: 13

DRAWING TITLE:

INLET DRAINAGE AREA MAP

SCALE:	REFER TO PLAN
DATE	1/17/2020
DESIGNED:	TEC
APPROVED:	MED
L2A PROJ. No.:	1901.161
DRAWING No.:	DA-03

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PIPE SIZING CALCULATIONS

PROJECT NAME: Proposed Proposed Self-Storage Facility

LOCATION: Upper Saddle River, NJ

D E S I G N P A R A M E T E R

RAINFALL I-D-F CURVE: New Jersey

STORM INTENSITY: 25 Year
(Enter 10 or 25)

TYPE OF STORM PIPE: HDPE

C VALUE - IMPERVIOUS: 0.95

C VALUE - PERVIOUS: 0.30

JOB NO.: 1901.161
SHEET 1 OF 1
COMPUTED BY: TEC
CHECKED BY: MED
FILE NAME: Pipe Calc Table
LAST REV. DATE: 10-1-2020

STRUCTURE		Area (acres) to Upper Structure		(Coeff. x Area)	Sum	Time of Concentration (Minutes)				Q - FLOW (CFS)		P I P E P A R A M E T E R S									
Upper	Lower	Imperv.	Pervious	cA	cA	Inlet	Pipe	Total	"i"	Design q	Capacity Q	Manning's "n"	Size (In.)	Actual Vel f/s	Velocity Full f/s	Slope %	Length (ft)	Fall (ft)	Invert Upper	Invert Lower	Top/Rim Elev.
CB-4	BASIN	0.03	0.02	0.03	0.03	6.00	0.00	6.00	7.4	**0.3**	**12.1**	0.012	15	3.5	9.9	3.00	6				
BLDG-1	BASIN	0.39	0.00	0.37	0.37	6.00	0.00	6.00	7.4	**2.7**	**3.9**	0.012	12	5.3	4.9	1.00	290				
BLDG-2	BASIN	0.39	0.00	0.37	0.37	6.00	0.00	6.00	7.4	**2.7**	**3.9**	0.012	12	5.3	4.9	1.00	264				
CB-9	CB-10	0.03	0.00	0.03	0.03	6.00	0.00	6.00	7.4	**0.2**	**4.9**	0.012	15	1.5	4.0	0.50	71				
CB-10	CB-11	0.03	0.00	0.03	0.06	6.00	0.78	6.78	7.2	**0.4**	**7.0**	0.012	15	2.6	5.7	1.00	40				
CB-11	CB-12	0.03	0.00	0.03	0.09	6.00	0.26	7.04	7.1	**0.6**	**7.0**	0.012	15	3.0	5.7	1.00	46				
CB-12	CB-13	0.03	0.00	0.03	0.11	6.00	0.25	7.30	7.1	**0.8**	**4.9**	0.012	15	2.7	4.0	0.50	46				
CB-13	CB-14	0.03	0.00	0.03	0.14	6.00	0.28	7.58	7.0	**1.0**	**4.9**	0.012	15	3.0	4.0	0.50	46				
CB-14	BASIN	0.02	0.00	0.02	0.16	6.00	0.25	7.83	7.0	**1.1**	**4.9**	0.012	15	3.1	4.0	0.50	26				
OCS-1	CB-5	0.00	0.00	0.00	0.00	6.00	0.00	6.00	7.4	**1.1**	**4.9**	0.012	15	3.0	4.0	0.50	55				
CB-5	CB-6	0.07	0.00	0.07	0.07	6.00	0.30	6.30	7.3	**1.6**	**4.9**	0.012	15	3.4	4.0	0.50	71				
CB-6	CB-7	0.06	0.00	0.06	0.12	6.00	0.35	6.65	7.2	**2.0**	**4.9**	0.012	15	3.7	4.0	0.50	71				
CB-8	CB-7	0.05	0.00	0.05	0.05	6.00	0.00	6.00	7.4	**0.4**	**4.9**	0.012	15	1.8	4.0	0.50	71				
CB-7	EXIST	0.05	0.00	0.05	0.22	6.00	0.32	6.97	7.2	**2.7**	**11.2**	0.013	15	7.1	9.1	3.00	8				
CB-15	MH-5	0.04	0.00	0.04	0.04	6.00	0.00	6.00	7.4	**0.3**	**12.1**	0.012	15	3.6	9.9	3.00	46				
TD-1	TD-2	0.13	0.01	0.13	0.13	6.00	0.00	6.00	7.4	**0.9**	**4.9**	0.012	15	2.9	4.0	0.50	3				
TD-2	MH-5	0.06	0.01	0.06	0.19	6.00	0.02	6.02	7.4	**1.4**	**4.9**	0.012	15	3.3	4.0	0.50	5				
MH-5	EXIST	0.00	0.00	0.00	0.22	6.00	0.03	6.04	7.4	**1.7**	**5.3**	0.013	15	3.6	4.3	0.67	15				