PRELIMINARY STORM WATER MANAGEMENT REPORT

FOR

Lee's Summit Senior Community and

Proposed Cap't Warf Subdivision

Lee's Summit, Jackson County, Missouri

PREPARED FOR:

O'REILLY DEVELOPMENT, LLC

5051 S National Ave

SPRINGFIELD, MO 65810

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1 INTRODUCTION

Capt's Warf Subdivision contains the proposed Lots 1 through 4 and an existing detention basin inside Tract 1. Development is proposed inside of Lot 1 and Tract 1, with a proposed Special Use Permit for Lot 1. The existing basin on Tract 1 was built in 1999 with no record of improvement since its construction. Proposed development on Lot 1 is a Continuing Care Retirement Community, henceforth known as Lee's Summit Senior Community, which shall include soil disturbing activities including clearing and grubbing, installation of erosion and sediment controls, grading, installation of underground utilities, and preparation for final seeding, mulching, and landscaping. Proposed public improvements for the development include the extension of utilities including water, sewer, and electric, as well as curb and gutter along the site frontage. Proposed storm sewers shall be constructed along with the installation of curb and gutter.

The purpose of this report is to provide a preliminary review of existing detention basin conditions to confirm the basin can provide comprehensive storm water management for the development of proposed Lots 1 through 4.

2 POST CONSTRUCTION STORMWATER MANAGEMENT

2.1 Analysis Goal

Design Standard(s):

- *Lee's Summit, Missouri Stormwater Discharge Control Regulations (Code of Ordinance Chapter 34 Article 3)*
- *APWA Section 5608.4*
- *MARC/APWA BMP Manual Chapter 6*
- *LS Section 5600 – Storm Drainage Systems and Facilities (revised July 2020)*

The purpose of this analysis is to evaluate the hydrological impact of the proposed development of the Lee's Summit Senior Community and the anticipated development of Lots 2 through 4. The base data has been collected from aerial imagery, historical data and maps, and analyzed based on APWA Section 5608.4 standards. The AWPA Section 5608.4 standards contain the Comprehensive Control Strategy, which specifies the allowable runoff for detention facilities to manage maximum storm water release rates to minimize flooding and water quality extended detention requirements.

The Comprehensive Control Strategy provided the basis for review of the onsite shared detention basin. Existing site conditions indicate all drainage feeds through the detention pond. We understand the basin was constructed to provide detention for development on Lots 1 through 4. It should also be noted that offsite drainage is not subject to water quality treatment or rate control requirements and is conveyed through the detention basin without restriction. However, offsite inflow hydrographs are routed through the basin in the hydraulic model to evaluate total inflow conditions, determine maximum water surface elevations, and confirm outlet and spillway capacity under proposed conditions. The discharge rates set

forth by the APWA were used to determine the allowable and anticipated discharge rates per the area served. The review also includes water quality and extended detention.

2.2 Flood Plain

The Federal Management Agency (FEMA) Flood Boundary and Floodway Map Community Panel Number 29095C0313G classifies all portions of Lee's Summit Senior Living outside of any flood plain. Portions immediately downstream of the Lee's Summit Senior Living development are classified as Zone AE with a 1% annual chance of flooding along the Blue Springs Lake Dam. The referenced FEMA map is available in Appendix A.

2.3 Soils

Soils maps published by the Natural Resources Conservation Service (NRCS) Web Soil Survey were used to categorize soils located at Lee's Summit Senior Living as well as the watershed analysis area. The following table displays the map of soils on the property and within the watershed as well as their hydrological soil group. Appendix A contains the full soil map as well as the soil classifications.

Table 1: Lee's Summit Senior Living Soil Classifications

Soil Type	Hydrological Soil Group	Acres	Percent
Greenton-Urban land complex, 5 to 9 percent slopes	D	0	0.1%
Arisburg-Urban land complex, 1 to 5 percent slopes	D	1.3	3.0%
Oska silty clay loam, 5 to 9 percent slopes, eroded	D	12.3	28.6%
Sharpsburg-Urban land complex, 2 to 5 percent slopes	D	12.3	28.4%
Sharpsburg-Urban land complex, 5 to 9 percent slopes	D	4.9	11.3%
Snead-Urban land complex, 9 to 30 percent slopes	D	9.4	21.8%
Snead-Rock outcrop complex, warm, 14 to 30 percent slopes	D	2.9	6.9%
Totals for Area of Interest		**43.1**	**100%**

2.4 Comprehensive Basin Analysis

The detention basin was designed to match the City of Lee's Summit Comprehensive Basin requirements. Appendix B shows the areas within the watershed that currently flow into the existing basin. The basin has also been reviewed on its ability to allow offsite drainage to pass through.

The detention basin has been evaluated on its capability to meet APWA Section 5608.4 requirements that limit the allowable discharge based on the size of the site. The offsite passthrough and the public street were added to the allowed rate to maintain the flow requirements. The following calculations and table analyze the design of the detention basin per APWA Section 5608.4.

Maximum Allowable Discharge = Offsite Pass Through (cfs) + Flat Rate Discharge (cfs)

Table 2: Allowable Discharge Rates

Design Storm	Rate Allowable per APWA Section 5608.4 (cfs/acre)	Area Served (acres)	**Total Allowed Site Discharge (cfs)**	**Offsite Discharge (cfs)**	**Maximum Allowable Discharge (cfs)**
50% (2-yr)	0.5	23.15	11.58	55.01	66.59
10% (10-yr)	2.0	23.15	46.3	95.02	141.32
1% (100-yr)	3.0	23.15	69.45	168.86	238.31

The existing basin structure was analyzed to evaluate compliance with applicable comprehensive control requirements, including extended detention and allowable flat-rate discharge criteria for the 2-, 10-, and 100-year storm events. Development is assumed on proposed Lots 1 through 4. Runoff hydrographs were developed using the NRCS SCS TR-55 unit hydrograph methodology. Rainfall depths were obtained from NOAA Atlas 14 using the Point Precipitation Frequency Estimates (PFDS) for the project location. A Type II storm distribution with a one-minute computational time step was used. Offsite drainage is not subject to detention or water quality treatment requirements and is conveyed through the basin without restriction.

Appendix C contains all HydraFlow reports that inspect the existing and proposed conditions of the drainage site and detention basin. The 3-year hydrograph was used to run the water quality volume calculations. Based on the existing basin stage elevations, the required water quality volume is 81,312 ft^3.

A site visit was conducted on October 22, 2025, to inspect the current condition of the basin. Visual inspection of the primary outlet structure indicated the structure was originally constructed as a single unit, with a higher riser added at a later date. Cracking is present at the interface between the original structure and the added riser, indicating the connection requires repair. No visual erosion was present at the emergency spillway.

Based on LiDAR and field observations, the existing primary outlet structure consists of a 12-inch pipe with an invert elevation of 882 and a riser with a 14-foot crest length at elevation 889.

The existing emergency spillway has a crest length of 30 feet at an elevation of 890, with the top of dam at elevation 891.8.

An evaluation of existing conditions under the proposed development indicates that the basin does not have sufficient capacity to meet all requirements of APWA Section 5608.4. As a result, improvements to

the outlet structures are recommended. These upgrades include reconstructing the primary outlet riser to an elevation of 886.8, and constructing a secondary outlet structure. Table 3 provides a comparison of the maximum allowable discharge to the total discharge under the proposed conditions to ensure discharge rates are met. Actual basin discharge was evaluated at the downstream study point representing the combined onsite, offsite, and bypass flows.

Table 3: Maximum Allowable Discharge vs. Actual Discharge

Design Storm	**Maximum Allowable Discharge (cfs)**	**Basin Elevation (ft)**	**Actual Basin Discharge (cfs)**
50% (2-yr)	66.59	887.35	27.65
10% (10-yr)	141.32	888.06	79.31
1% (100-yr)	238.31	889.45	105.58

The proposed secondary outlet structure will consist of a 36-inch pipe with an invert elevation of 882 and an 8'' orifice at an elevation of 886, and will be located north of the primary outlet structure, integrated into the basin wall. For HydraFlow modeling purposes, the existing 12-inch pipe and proposed 36-inch pipe were combined into one 38-inch pipe, and the risers were combined into one with a 886.8 crest elevation and 20-foot crest length.

The basin was also evaluated on its ability to hold the water quality storm for the 40-hour extended detention of runoff for the local 90% mean annual event (1.37''/24-hour rainfall). The calculated water quality elevation under proposed conditions is 886.43 with a peak flow rate of 0.87 cfs. Appendix E contains the Hydrograph Report for the 40-hr extended detention, which shows the 90% is not reached until 42 hours.

As shown in Appendix C and D for the proposed conditions, the modeled 100-year maximum water surface elevation for the unclogged condition is 889.5, which is 6'' below the emergency spillway crest. The 100-year maximum water surface elevation for the clogged condition is 890.7, which is 13'' below the top of dam. These results demonstrate that, under proposed conditions, the basin meets the City of Lee's Summit design standards and Comprehensive Control Strategy.

3 STORM SEWER DESIGN

Design Standard(s):

- *Lee's Summit, Missouri Stormwater Discharge Control Regulations (Code of Ordinance Chapter 34 Article 3)*

- *APWA Section 5300*
- *LS Section 5600 – Storm Drainage Systems and Facilities (revised July 2020)*

All storm sewers for the road public improvement project will be public storm sewers. Storm sewer design will be completed to all sections of the Lee's Summit Discharge Control Regulations, KC-APWA Section 5300, and LS Section 5600.

4 EROSION AND SEDIMENT CONTROL AND DESIGN

Design Standard(s):

- *Missouri Department of Natural Resources (MDNR) Protecting Water Quality Field Guide, 2011.*
- *APWA Section 5100*
- *LS Section 5100 – Erosion and Sediment Control*

All erosion and sediment control design parameters will be met to the standards specified by Lee's Summit, Missouri.

5 CONCLUSION

This stormwater detention review was completed to evaluate the impact generated by the public improvements and future site development of Lee's Summit Senior Community on Lot 1, Tract 1, and Lots 2 through 4 in the Capt's Warf Subdivision. The project includes 23.15 acres of anticipated development including both commercial and residential living. The Comprehensive Control Strategy parameters and APWA Section 5608.4 requirements for 40-hour extended detention of water quality as well as flat rate discharge rates for the 2-, 10-, and 100-year storm events have the capacity to be met under the proposed conditions.

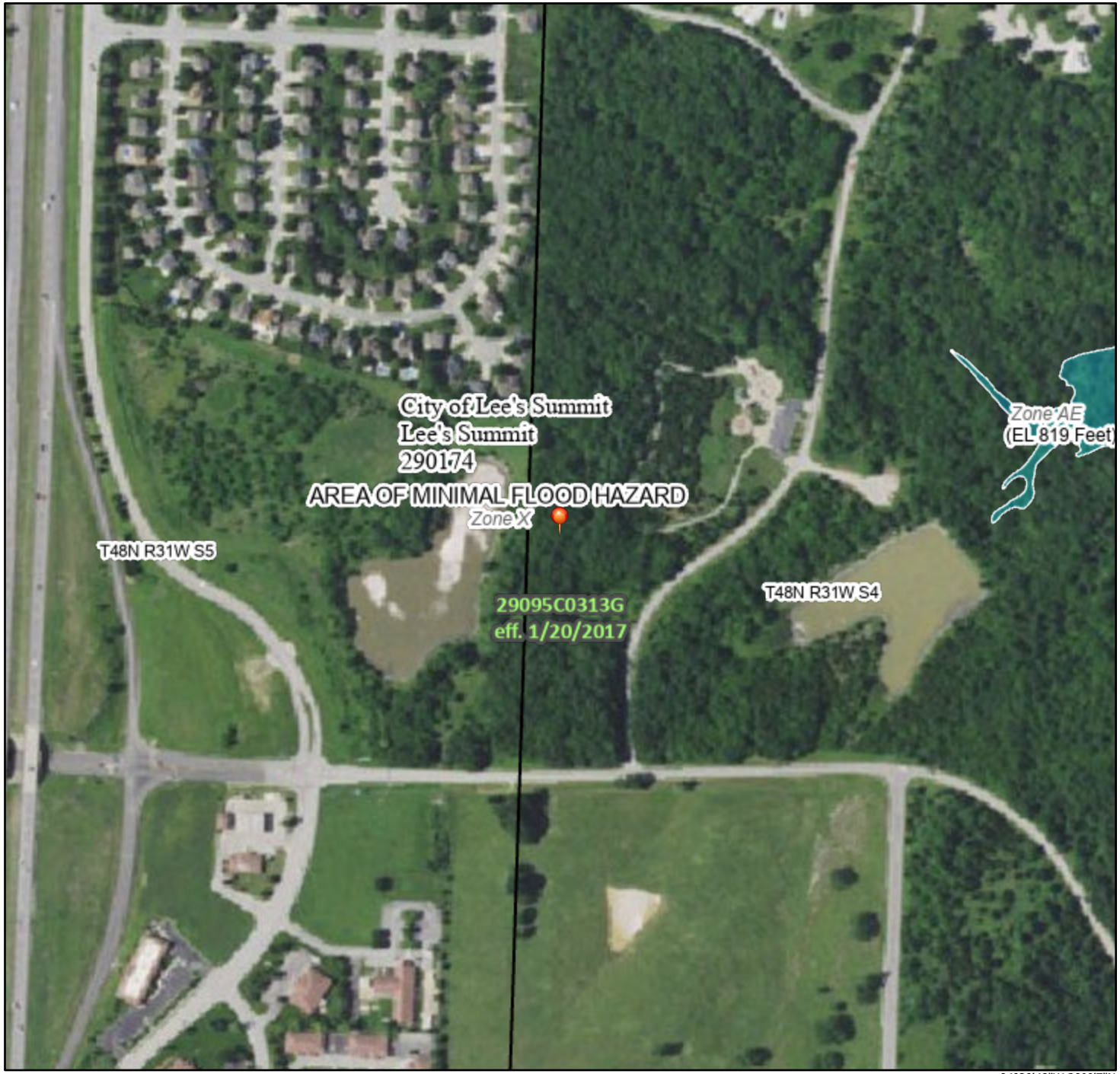
APPENDIX A:

MAPS

National Flood Hazard Layer FIRMette

FEMA

94°21'25"W 39°0'35"N



0 250 500 1,000 1,500 2,000 Feet

1:6,000

94°20'48"W 39°0'7"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

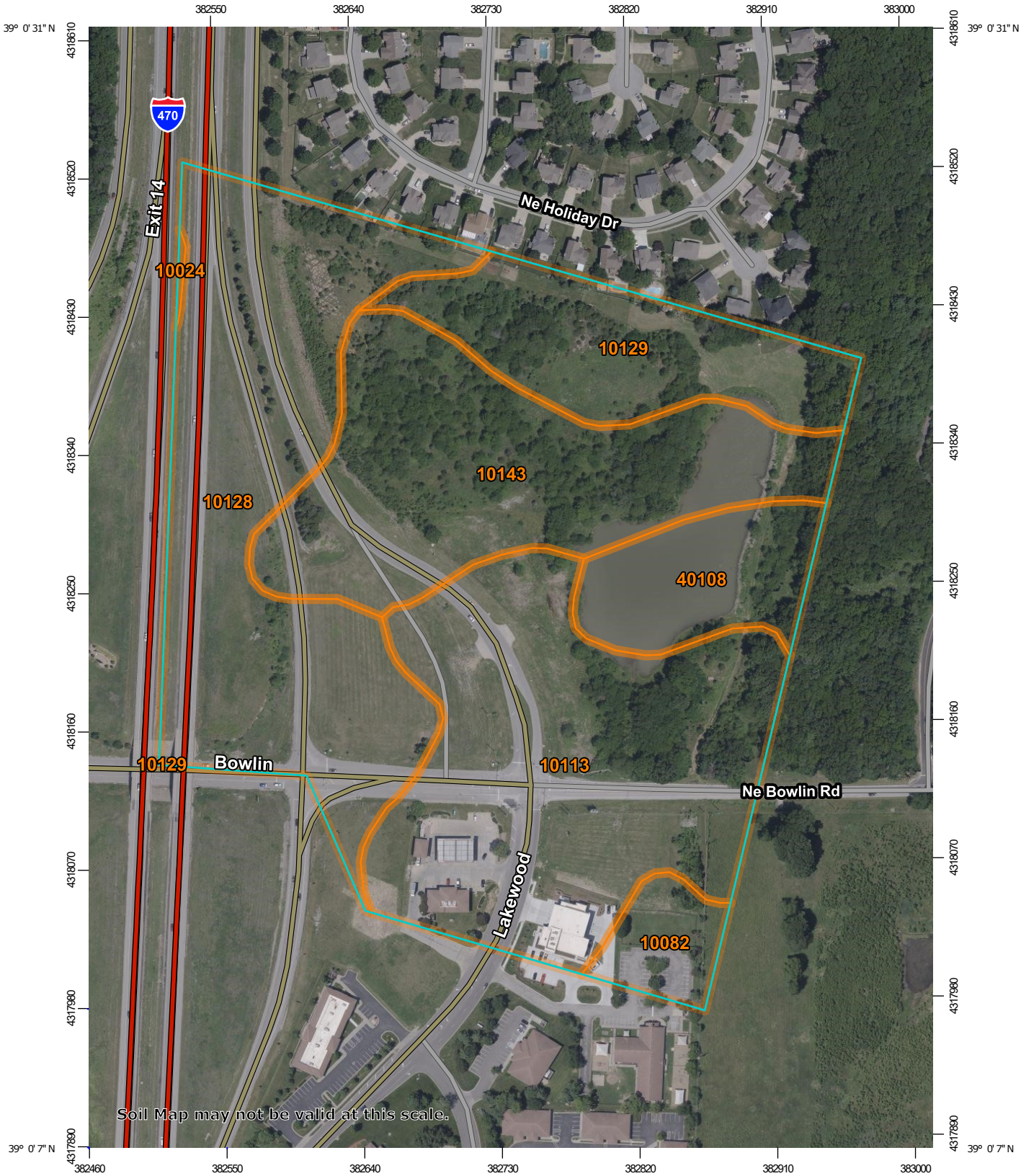
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 12/3/2025 at 6:08 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Map Scale: 1:3,560 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N 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: Jackson County, Missouri
Survey Area Data: Version 28, Sep 2, 2025

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

Date(s) aerial images were photographed: Mar 1, 2024—Jul 1, 2024

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
10024	Greenton-Urban land complex, 5 to 9 percent slopes	0.0	0.1%
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	1.3	3.0%
10113	Oska silty clay loam, 5 to 9 percent slopes, eroded	12.3	28.6%
10128	Sharpsburg-Urban land complex, 2 to 5 percent slopes	12.3	28.4%
10129	Sharpsburg-Urban land complex, 5 to 9 percent slopes	4.9	11.3%
10143	Snead-Urban land complex, 9 to 30 percent slopes	9.4	21.8%
40108	Snead-Rock outcrop complex, warm, 14 to 30 percent slopes	2.9	6.8%
Totals for Area of Interest		**43.2**	**100.0%**

Jackson County, Missouri

10113—Oska silty clay loam, 5 to 9 percent slopes, eroded

Map Unit Setting

National map unit symbol: yrm7
Elevation: 600 to 1,200 feet
Mean annual precipitation: 33 to 43 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 177 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Oska and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Oska

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum

Typical profile

A - 0 to 7 inches: silty clay loam
Bt - 7 to 34 inches: silty clay loam
R - 34 to 80 inches: bedrock

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R106XY075NE - Loamy Upland

Hydric soil rating: No

Minor Components

Sampsel

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Concave
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

Snead, eroded, warm

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

Data Source Information

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 28, Sep 2, 2025

Jackson County, Missouri

10128—Sharpsburg-Urban land complex, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2ql09
Elevation: 1,000 to 1,320 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 155 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sharpsburg and similar soils: 60 percent
Urban land: 35 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sharpsburg

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

A - 0 to 17 inches: silt loam
Bt - 17 to 55 inches: silty clay loam
C - 55 to 60 inches: silty clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 12.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: D
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Interfluves
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Macksburg

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XD860IA - Loess Upland Prairie
Hydric soil rating: No

Data Source Information

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 28, Sep 2, 2025

Jackson County, Missouri

10129—Sharpsburg-Urban land complex, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2ql0b
Elevation: 990 to 1,320 feet
Mean annual precipitation: 33 to 41 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 155 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Sharpsburg and similar soils: 60 percent
Urban land: 35 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sharpsburg

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Typical profile

A - 0 to 7 inches: silt loam
Bt - 7 to 48 inches: silty clay loam
C - 48 to 60 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 35 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: D
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Macksburg

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R108XD860IA - Loess Upland Prairie
Hydric soil rating: No

Lagonda, eroded

Percent of map unit: 2 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: R108XD860IA - Loess Upland Prairie
Hydric soil rating: No

Data Source Information

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 28, Sep 2, 2025

Jackson County, Missouri

10143—Snead-Urban land complex, 9 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2ql0r
Elevation: 700 to 1,200 feet
Mean annual precipitation: 33 to 45 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 177 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Snead and similar soils: 65 percent
Urban land: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Snead

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from calcareous shale

Typical profile

A - 0 to 12 inches: flaggy silty clay loam
Bw - 12 to 40 inches: silty clay
Cr - 40 to 80 inches: bedrock

Properties and qualities

Slope: 9 to 30 percent
Depth to restrictive feature: 39 to 50 inches to paralithic bedrock
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: D
Ecological site: R109XY012MO - Interbedded Sedimentary Backslope Savanna
Hydric soil rating: No

Description of Urban Land

Setting
Landform: Hills
Landform position (two-dimensional): Backslope

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Greenton
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R109XY002MO - Loess Upland Prairie
Hydric soil rating: No

Oska
Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: R106XY075NE - Loamy Upland
Hydric soil rating: No

Data Source Information

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 28, Sep 2, 2025

Jackson County, Missouri

40108—Snead-Rock outcrop complex, warm, 14 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2zccp
Elevation: 670 to 1,130 feet
Mean annual precipitation: 39 to 43 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 185 to 220 days
Farmland classification: Not prime farmland

Map Unit Composition

Snead, warm, and similar soils: 65 percent
Rock outcrop: 20 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Snead, Warm

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from limestone and shale

Typical profile

A - 0 to 10 inches: silty clay loam
Bw - 10 to 20 inches: silty clay
BC - 20 to 24 inches: silty clay
C - 24 to 35 inches: silty clay
Cr - 35 to 45 inches: bedrock

Properties and qualities

Slope: 14 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

Description of Rock Outcrop

Typical profile

R - 0 to 79 inches: bedrock

Properties and qualities

Slope: 14 to 30 percent
Depth to restrictive feature: 0 inches to lithic bedrock
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydric soil rating: No

Minor Components

Norris

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, convex
Across-slope shape: Convex
Ecological site: F109XY025MO - Interbedded Sedimentary Exposed Backslope Woodland
Hydric soil rating: No

Sampsel

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Concave
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: Yes

Oska

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex

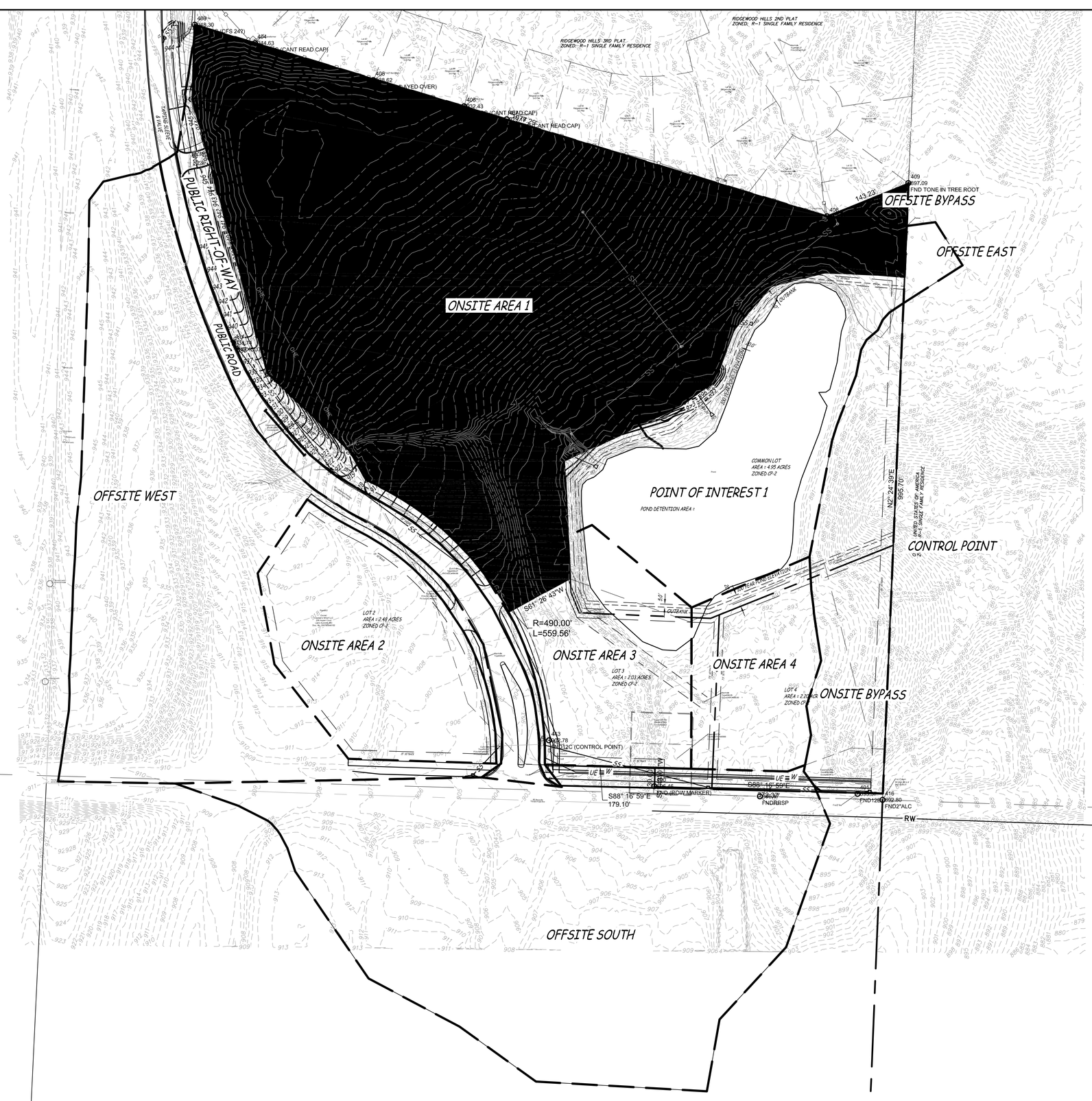
Across-slope shape: Linear
Ecological site: R106XY075NE - Loamy Upland
Hydric soil rating: No

Kennebec, occasionally flooded
Percent of map unit: 2 percent
Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R109XY028MO - Loamy Upland Drainageway Savanna
Hydric soil rating: No

Data Source Information

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 28, Sep 2, 2025

APPENDIX B:
DRAINAGE AREA MAPS



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Date
DECEMBER 22, 2025

Revised

Designed: LM Drawn: LM

DRAINAGE AREA MAP

Sheet
1 of 1

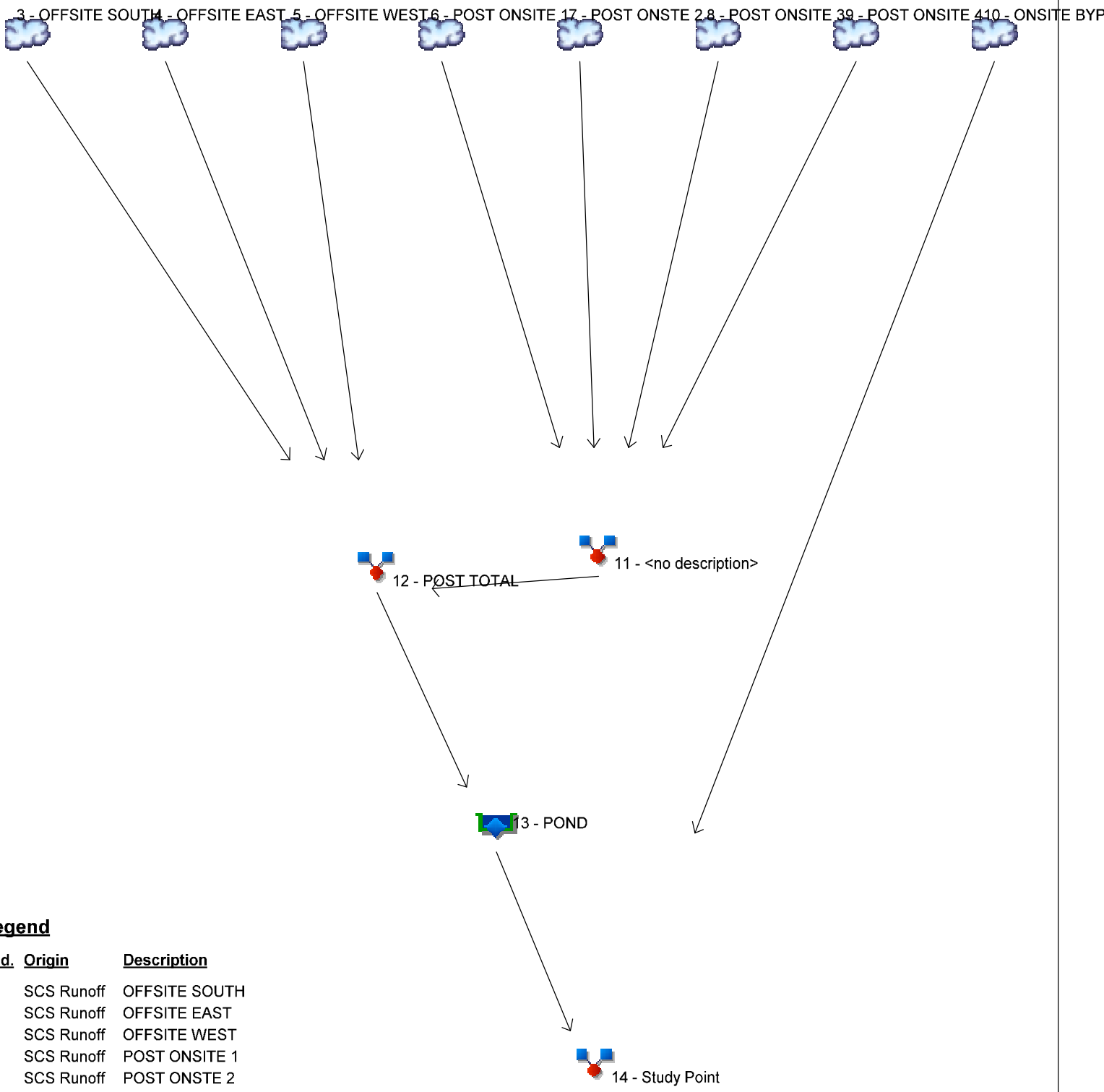
ES&S PROJECT NO. 16803

\\192.168.0.99\PROJECTS\GENERAL PROJECTS\16803-SWD-LEES-SUMMIT-SENIOR-CDS\CAD\16803 DAM PRE.DWG 12/11/2025

APPENDIX C:
HYDRAFLOW REPORT

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
3	SCS Runoff	OFFSITE SOUTH
4	SCS Runoff	OFFSITE EAST
5	SCS Runoff	OFFSITE WEST
6	SCS Runoff	POST ONSITE 1
7	SCS Runoff	POST ONSTE 2
8	SCS Runoff	POST ONSITE 3
9	SCS Runoff	POST ONSITE 4
10	SCS Runoff	ONSITE BYPASS
11	Combine	<no description>
12	Combine	POST TOTAL
13	Reservoir	POND
14	Combine	Study Point

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
3	SCS Runoff	------	-------	31.15	7.987	-------	50.47	-------	-------	85.46	OFFSITE SOUTH
4	SCS Runoff	------	-------	0.648	0.104	-------	1.149	-------	-------	2.073	OFFSITE EAST
5	SCS Runoff	------	-------	23.50	2.842	-------	43.71	-------	-------	81.58	OFFSITE WEST
6	SCS Runoff	------	-------	67.50	17.52	-------	109.08	-------	-------	184.38	POST ONSITE 1
7	SCS Runoff	------	-------	9.440	2.420	-------	15.29	-------	-------	25.90	POST ONSTE 2
8	SCS Runoff	------	-------	9.548	2.478	-------	15.43	-------	-------	26.08	POST ONSITE 3
9	SCS Runoff	------	-------	6.246	1.621	-------	10.09	-------	-------	17.06	POST ONSITE 4
10	SCS Runoff	------	-------	6.447	0.758	-------	12.07	-------	-------	22.62	ONSITE BYPASS
11	Combine	6, 7, 8, 9,	-------	92.05	23.87	-------	148.89	-------	-------	251.83	<no description>
12	Combine	3, 4, 5, 11	-------	143.46	33.73	-------	238.00	-------	-------	410.74	POST TOTAL
13	Reservoir	12	-------	0.000	0.000	-------	1.777	-------	-------	42.02	POND
14	Combine	10, 13	-------	6.447	0.758	-------	12.07	-------	-------	44.05	Study Point

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
3	SCS Runoff	31.15	1	721	82,374	------	------	------	OFFSITE SOUTH
4	SCS Runoff	0.648	1	721	1,645	------	------	------	OFFSITE EAST
5	SCS Runoff	23.50	1	722	63,179	------	------	------	OFFSITE WEST
6	SCS Runoff	67.50	1	718	151,465	------	------	------	POST ONSITE 1
7	SCS Runoff	9.440	1	721	24,965	------	------	------	POST ONSTE 2
8	SCS Runoff	9.548	1	718	21,423	------	------	------	POST ONSITE 3
9	SCS Runoff	6.246	1	718	14,015	------	------	------	POST ONSITE 4
10	SCS Runoff	6.447	1	718	13,647	------	------	------	ONSITE BYPASS
11	Combine	92.05	1	718	211,869	6, 7, 8, 9,	------	------	<no description>
12	Combine	143.46	1	719	359,066	3, 4, 5, 11	------	------	POST TOTAL
13	Reservoir	0.000	1	n/a	0	12	888.49	359,065	POND
14	Combine	6.447	1	718	13,647	10, 13	------	------	Study Point

Hydrograph Report

Hyd. No. 3

OFFSITE SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	31.15 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	82,374 cuft
Drainage area	=	8.150 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	13.40 min
Total precip.	=	3.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(8.200 x 92)] / 8.150

TR55 Tc Worksheet

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

Hyd. No. 3

OFFSITE SOUTH

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 94.3		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 2.10		0.00		0.00		
Travel Time (min)	**= 9.42**	**+**	**0.00**	**+**	**0.00**	**=**	**9.42**
Shallow Concentrated Flow							
Flow length (ft)	= 238.90		0.00		0.00		
Watercourse slope (%)	= 2.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.55		0.00		0.00		
Travel Time (min)	**= 1.56**	**+**	**0.00**	**+**	**0.00**	**=**	**1.56**
Channel Flow							
X sectional flow area (sqft)	= 3.14		19.63		0.00		
Wetted perimeter (ft)	= 6.28		15.71		0.00		
Channel slope (%)	= 3.00		2.60		0.00		
Manning's n-value	= 0.015		0.100		0.015		
Velocity (ft/s)	=10.81						
			2.79				
					0.00		
Flow length (ft)	({0})338.3		308.6		0.0		
Travel Time (min)	**= 0.52**	**+**	**1.84**	**+**	**0.00**	**=**	**2.37**

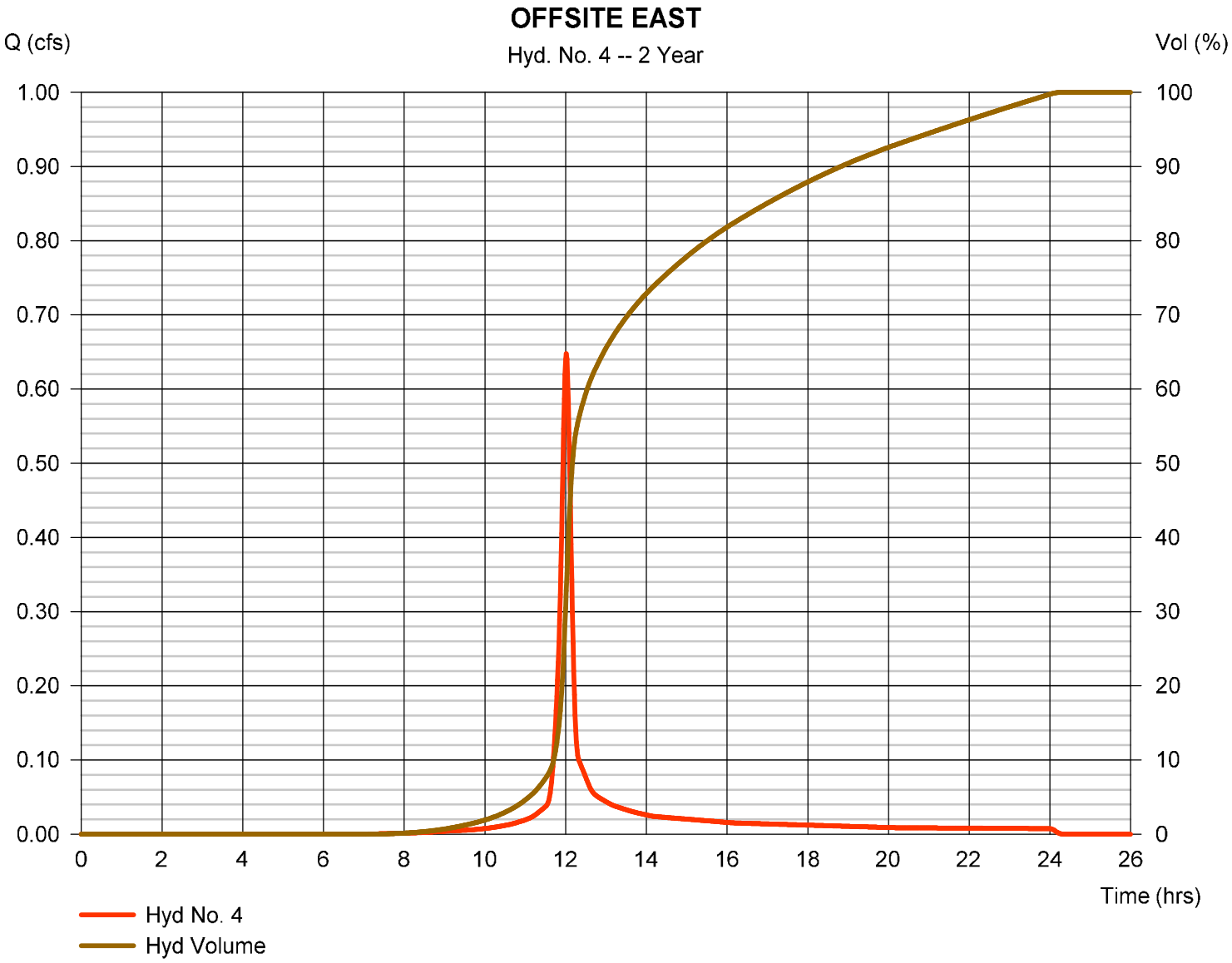
Total Travel Time, Tc ..... 13.40 min

Hydrograph Report

Hyd. No. 4

OFFSITE EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.648 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	1,645 cuft
Drainage area	=	0.210 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.80 min
Total precip.	=	3.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

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

Hyd. No. 4

OFFSITE EAST

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 92.1		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 1.10		0.00		0.00		
Travel Time (min)	**= 11.98**	**+**	**0.00**	**+**	**0.00**	**=**	**11.98**
Shallow Concentrated Flow							
Flow length (ft)	= 111.80		0.00		0.00		
Watercourse slope (%)	= 1.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.22		0.00		0.00		
Travel Time (min)	**= 0.84**	**+**	**0.00**	**+**	**0.00**	**=**	**0.84**
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**

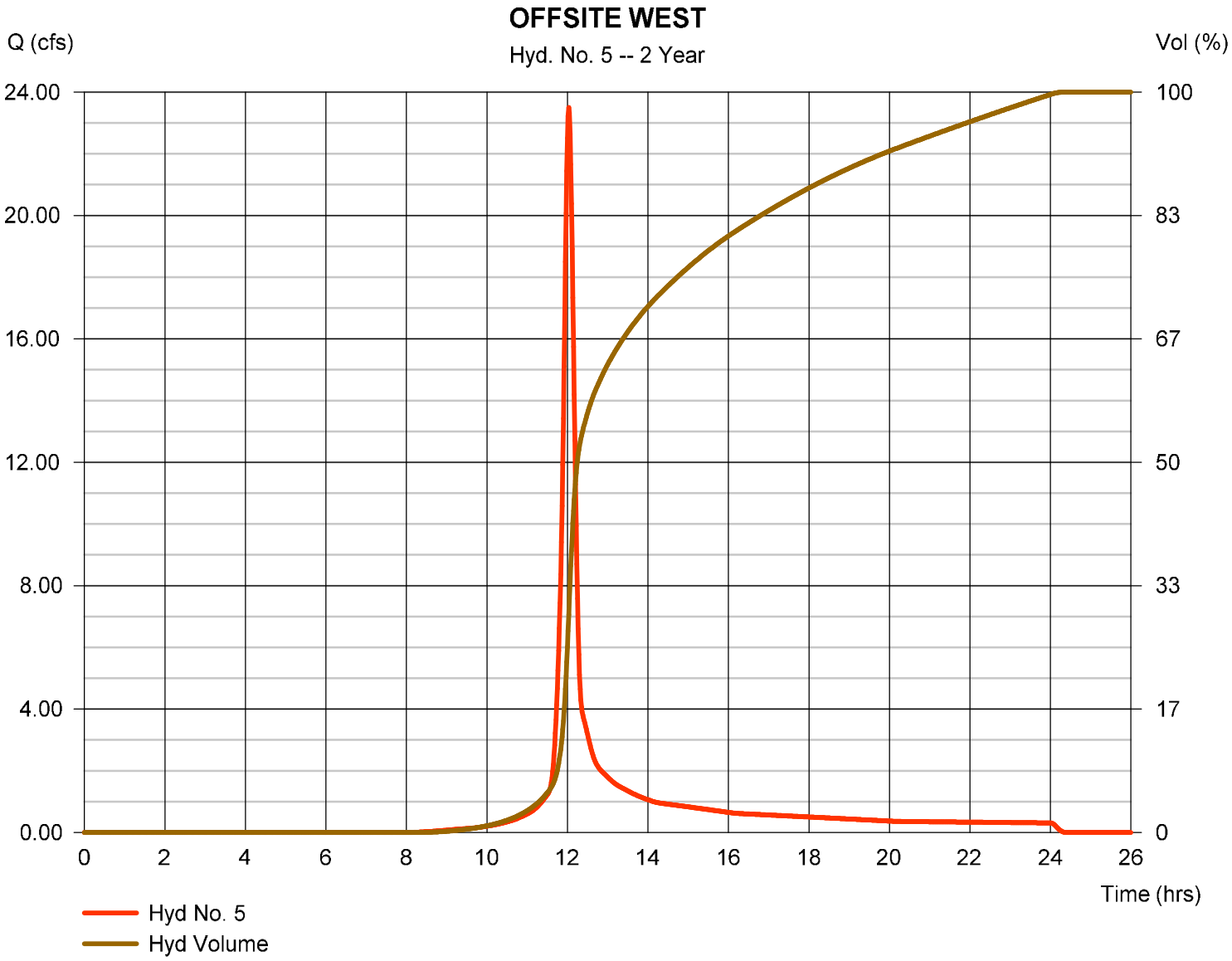
Total Travel Time, Tc ..... 12.80 min

Hydrograph Report

Hyd. No. 5

OFFSITE WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	23.50 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.03 hrs
Time interval	=	1 min	Hyd. volume	=	63,179 cuft
Drainage area	=	8.930 ac	Curve number	=	82
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.10 min
Total precip.	=	3.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

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

Hyd. No. 5

OFFSITE WEST

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 82.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 2.40		0.00		0.00		
Travel Time (min)	**= 7.99**	**+**	**0.00**	**+**	**0.00**	**=**	**7.99**
Shallow Concentrated Flow							
Flow length (ft)	= 519.20		0.00		0.00		
Watercourse slope (%)	= 3.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.02		0.00		0.00		
Travel Time (min)	**= 2.87**	**+**	**0.00**	**+**	**0.00**	**=**	**2.87**
Channel Flow							
X sectional flow area (sqft)	= 3.14		3.14		19.63		
Wetted perimeter (ft)	= 6.28		6.28		15.71		
Channel slope (%)	= 2.40		4.00		1.80		
Manning's n-value	= 0.015		0.015		0.100		
Velocity (ft/s)	=9.67						
			12.49				
					2.32		
Flow length (ft)	({0})706.6		198.2		378.5		
Travel Time (min)	**= 1.22**	**+**	**0.26**	**+**	**2.72**	**=**	**4.20**

Total Travel Time, Tc ..... 15.10 min

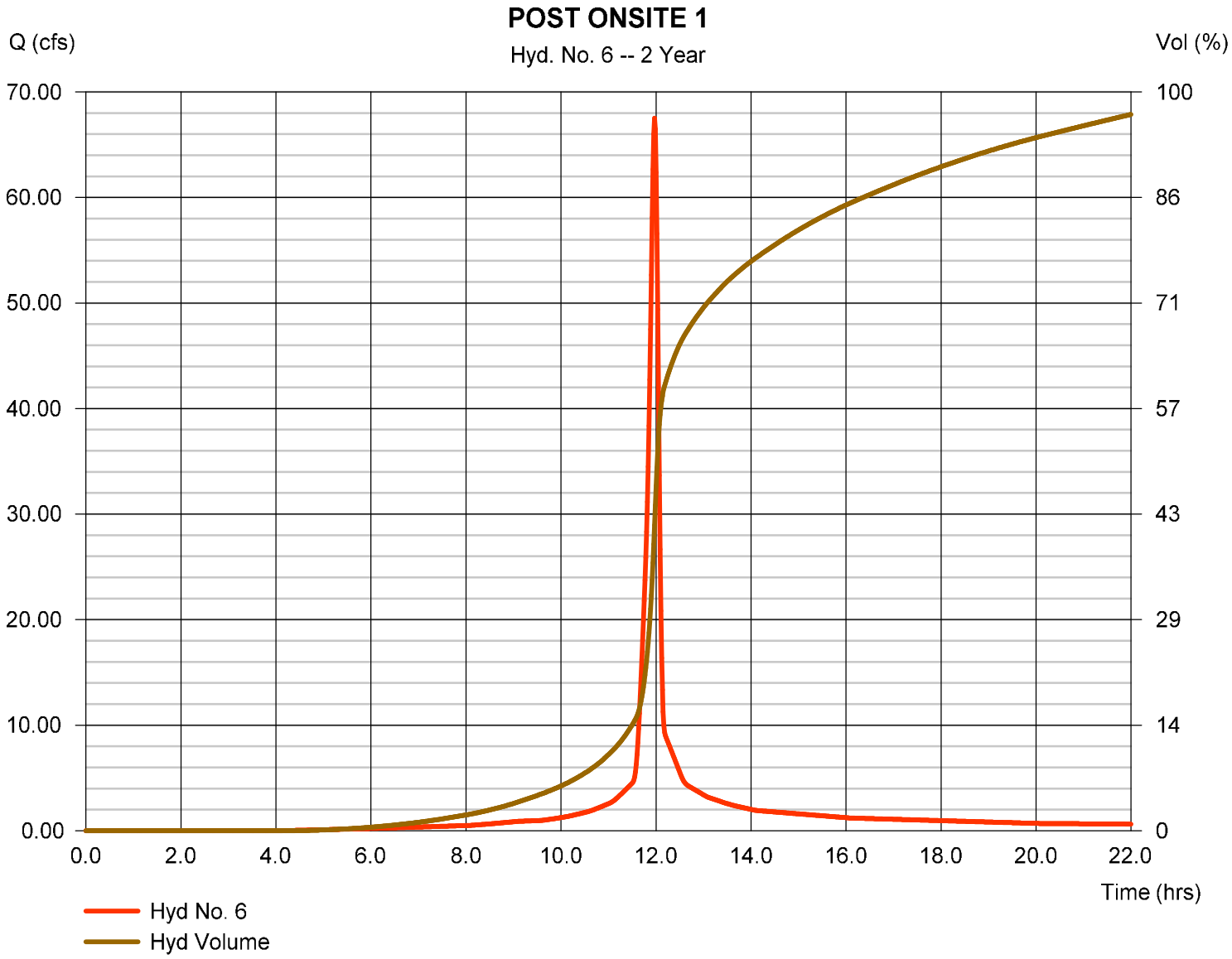
Hydrograph Report

Hyd. No. 6

POST ONSITE 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	67.50 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	151,465 cuft
Drainage area	=	15.130 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.30 min
Total precip.	=	3.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(10.000 x 98) + (5.400 x 80)] / 15.130



TR55 Tc Worksheet

Hyd. No. 6

POST ONSITE 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 75.5		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.30		0.00		0.00		
Travel Time (min)	**= 5.45**	**+**	**0.00**	**+**	**0.00**	**=**	**5.45**
Shallow Concentrated Flow							
Flow length (ft)	= 493.80		0.00		0.00		
Watercourse slope (%)	= 7.70		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.48		0.00		0.00		
Travel Time (min)	**= 1.84**	**+**	**0.00**	**+**	**0.00**	**=**	**1.84**
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 ..... 7.30 min

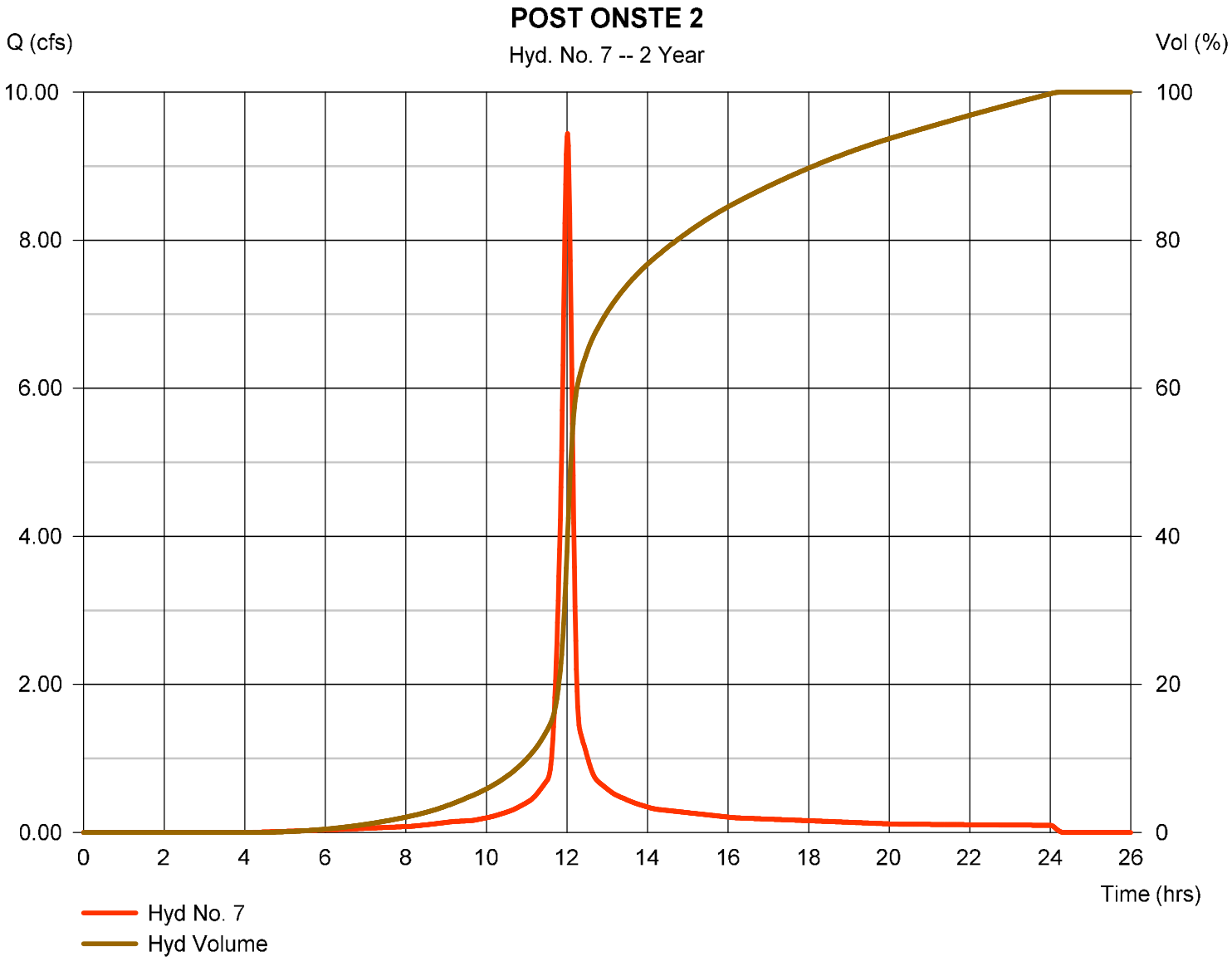
Hydrograph Report

Hyd. No. 7

POST ONSTE 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.440 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	24,965 cuft
Drainage area	=	2.470 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.40 min
Total precip.	=	3.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.600 x 98) + (0.900 x 80)] / 2.470



TR55 Tc Worksheet

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

Hyd. No. 7

POST ONSTE 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 94.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.30		0.00		0.00		
Travel Time (min)	**= 6.49**	**+**	**0.00**	**+**	**0.00**	**=**	**6.49**
Shallow Concentrated Flow							
Flow length (ft)	= 477.70		0.00		0.00		
Watercourse slope (%)	= 3.10		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.84		0.00		0.00		
Travel Time (min)	**= 2.80**	**+**	**0.00**	**+**	**0.00**	**=**	**2.80**
Channel Flow							
X sectional flow area (sqft)	= 3.14		19.60		0.00		
Wetted perimeter (ft)	= 6.28		15.70		0.00		
Channel slope (%)	= 4.00		1.70		0.00		
Manning's n-value	= 0.015		0.100		0.015		
Velocity (ft/s)	=12.49						
			2.25				
					0.00		
Flow length (ft)	({0})198.0		378.5		0.0		
Travel Time (min)	**= 0.26**	**+**	**2.80**	**+**	**0.00**	**=**	**3.06**

Total Travel Time, Tc ..... 12.40 min

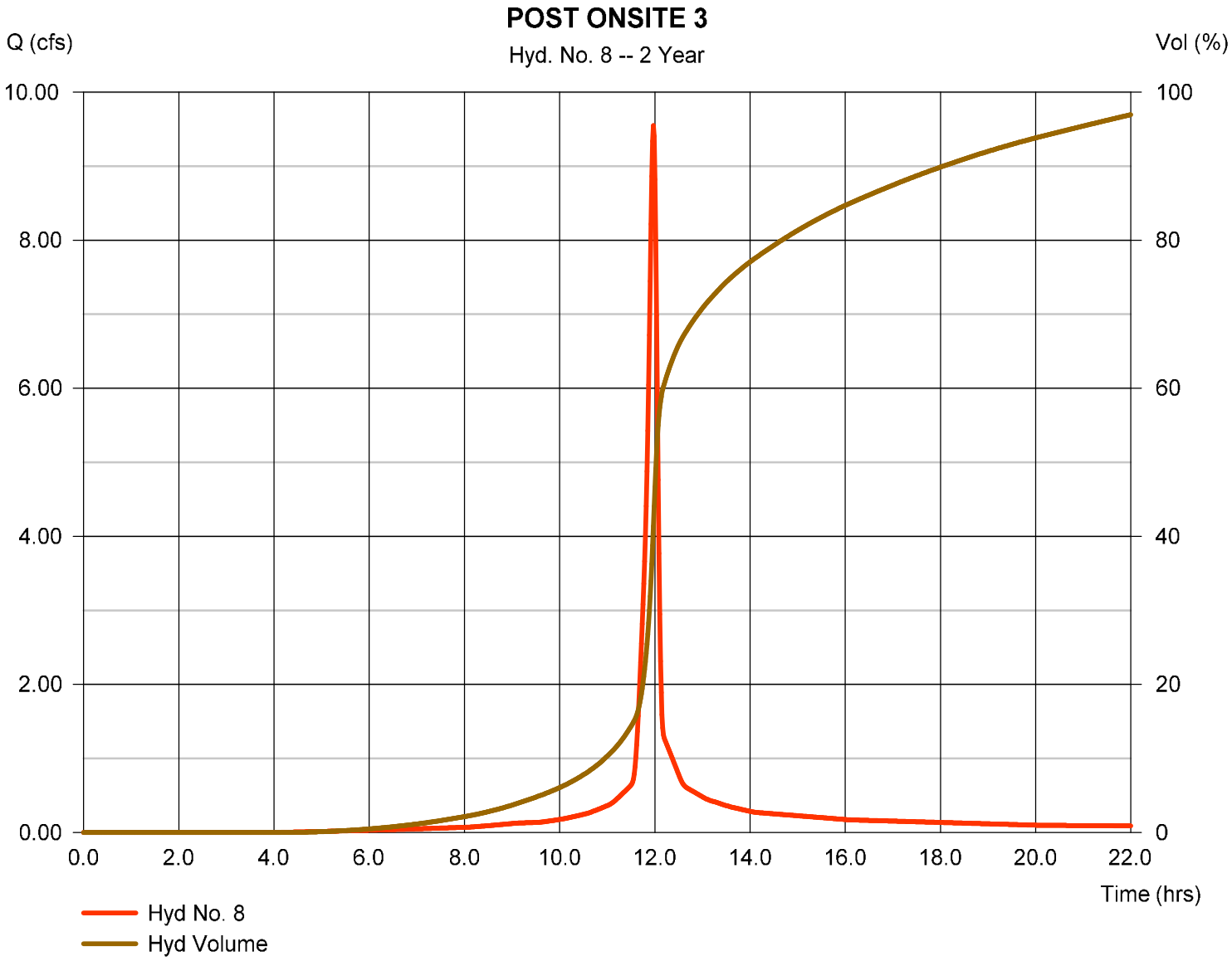
Hydrograph Report

Hyd. No. 8

POST ONSITE 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	9.548 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	21,423 cuft
Drainage area	=	2.140 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	3.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.300 x 98) + (0.700 x 80)] / 2.140



TR55 Tc Worksheet

Hyd. No. 8

POST ONSITE 3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
Travel Time (min)	**= 6.98**	**+**	**0.00**	**+**	**0.00**	**=**	**6.98**
Shallow Concentrated Flow							
Flow length (ft)	= 163.00		0.00		0.00		
Watercourse slope (%)	= 7.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.39		0.00		0.00		
Travel Time (min)	**= 0.62**	**+**	**0.00**	**+**	**0.00**	**=**	**0.62**
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 ..... 7.60 min

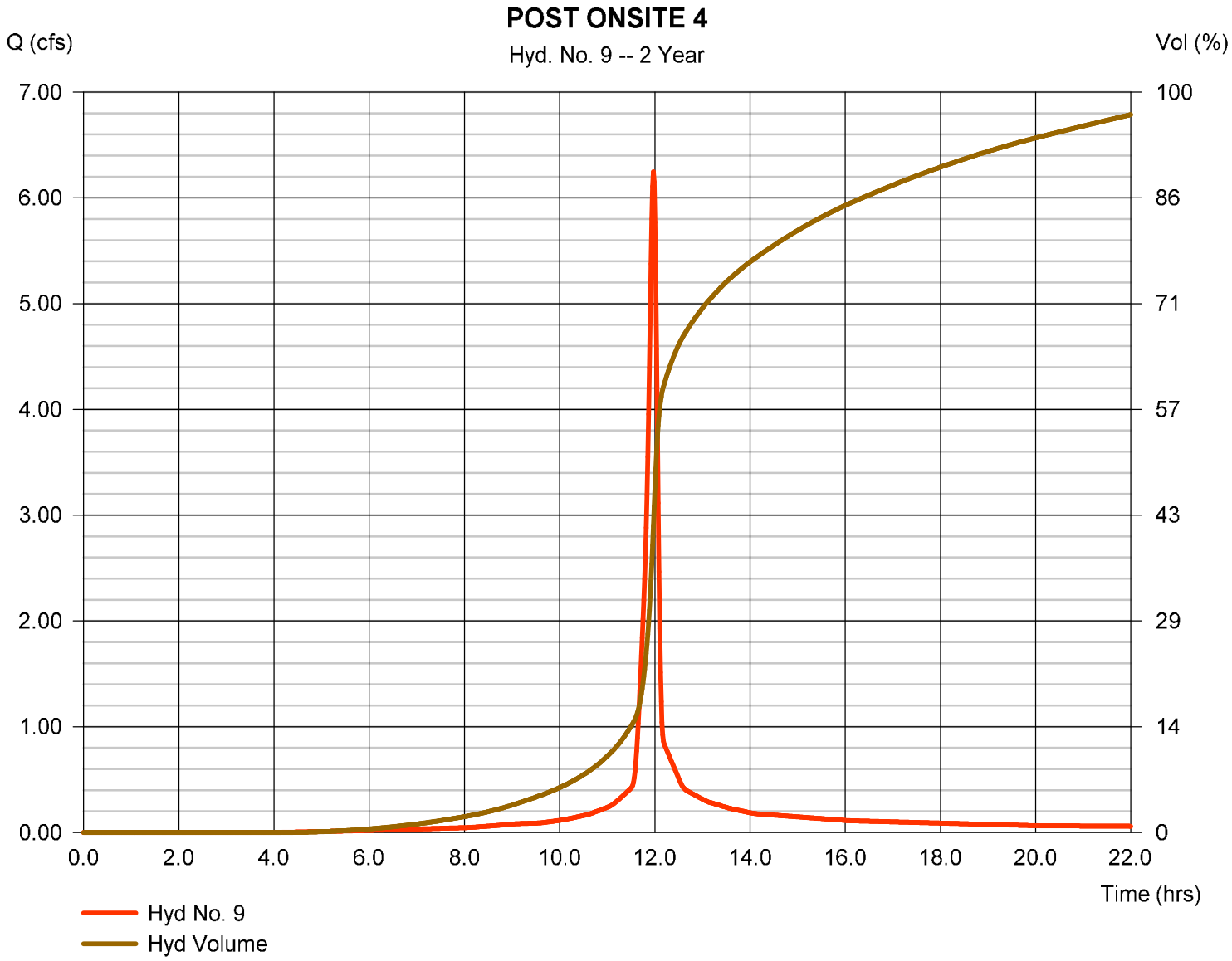
Hydrograph Report

Hyd. No. 9

POST ONSITE 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.246 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	14,015 cuft
Drainage area	=	1.400 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	3.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.900 x 98) + (0.400 x 80)] / 1.400



TR55 Tc Worksheet

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

Hyd. No. 9

POST ONSITE 4

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 93.4		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.30		0.00		0.00		
Travel Time (min)	**= 6.46**	**+**	**0.00**	**+**	**0.00**	**=**	**6.46**
Shallow Concentrated Flow							
Flow length (ft)	= 223.80		0.00		0.00		
Watercourse slope (%)	= 4.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.23		0.00		0.00		
Travel Time (min)	**= 1.16**	**+**	**0.00**	**+**	**0.00**	**=**	**1.16**
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 ..... 7.60 min

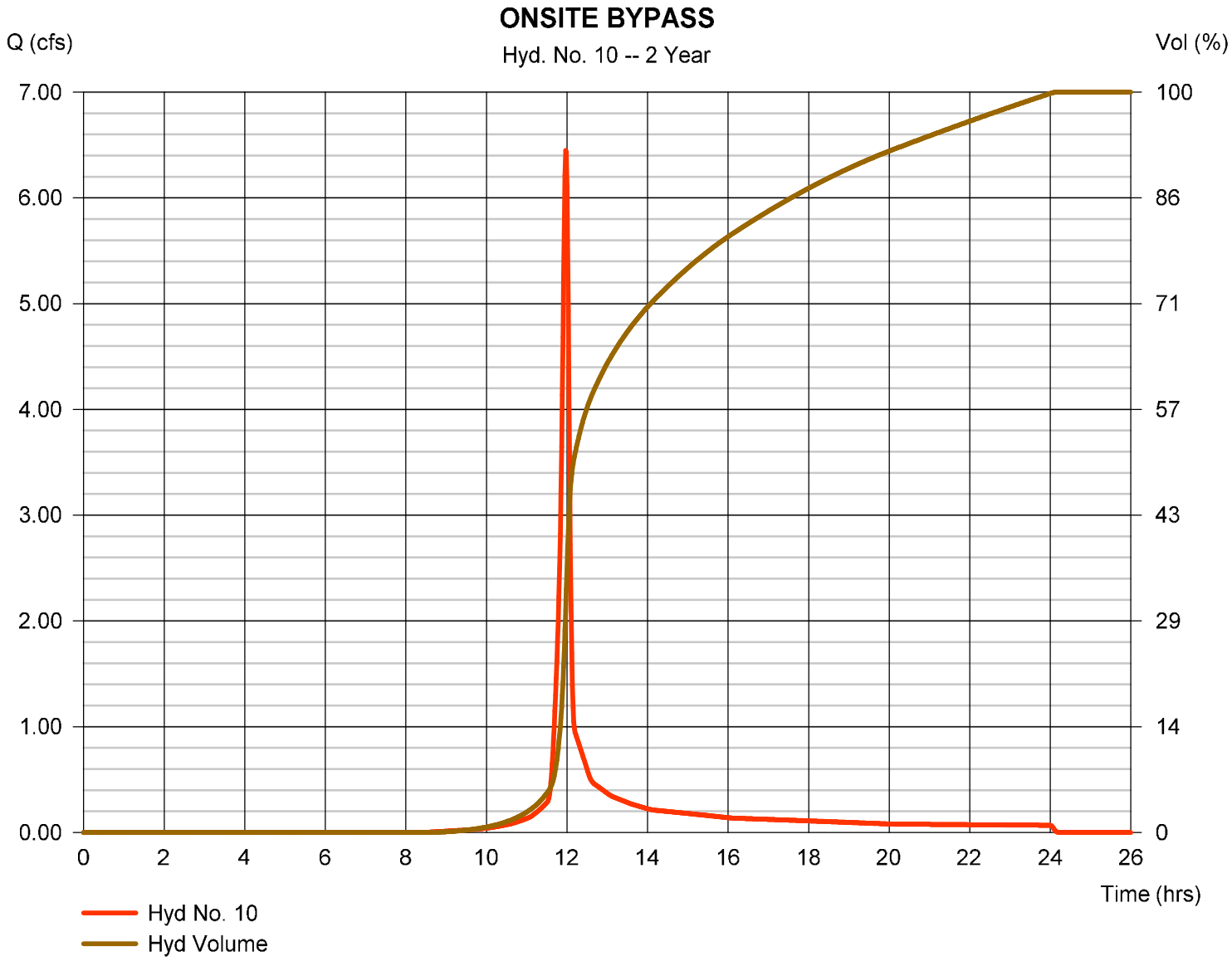
Hydrograph Report

Hyd. No. 10

ONSITE BYPASS

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.447 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	13,647 cuft
Drainage area	=	2.060 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.00 min
Total precip.	=	3.70 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.100 x 98) + (1.900 x 80)] / 2.060



TR55 Tc Worksheet

Hyd. No. 10

ONSITE BYPASS

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 93.7		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.30		0.00		0.00		
Travel Time (min)	**= 6.47**	**+**	**0.00**	**+**	**0.00**	**=**	**6.47**
Shallow Concentrated Flow							
Flow length (ft)	= 61.10		0.00		0.00		
Watercourse slope (%)	= 1.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.91		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**

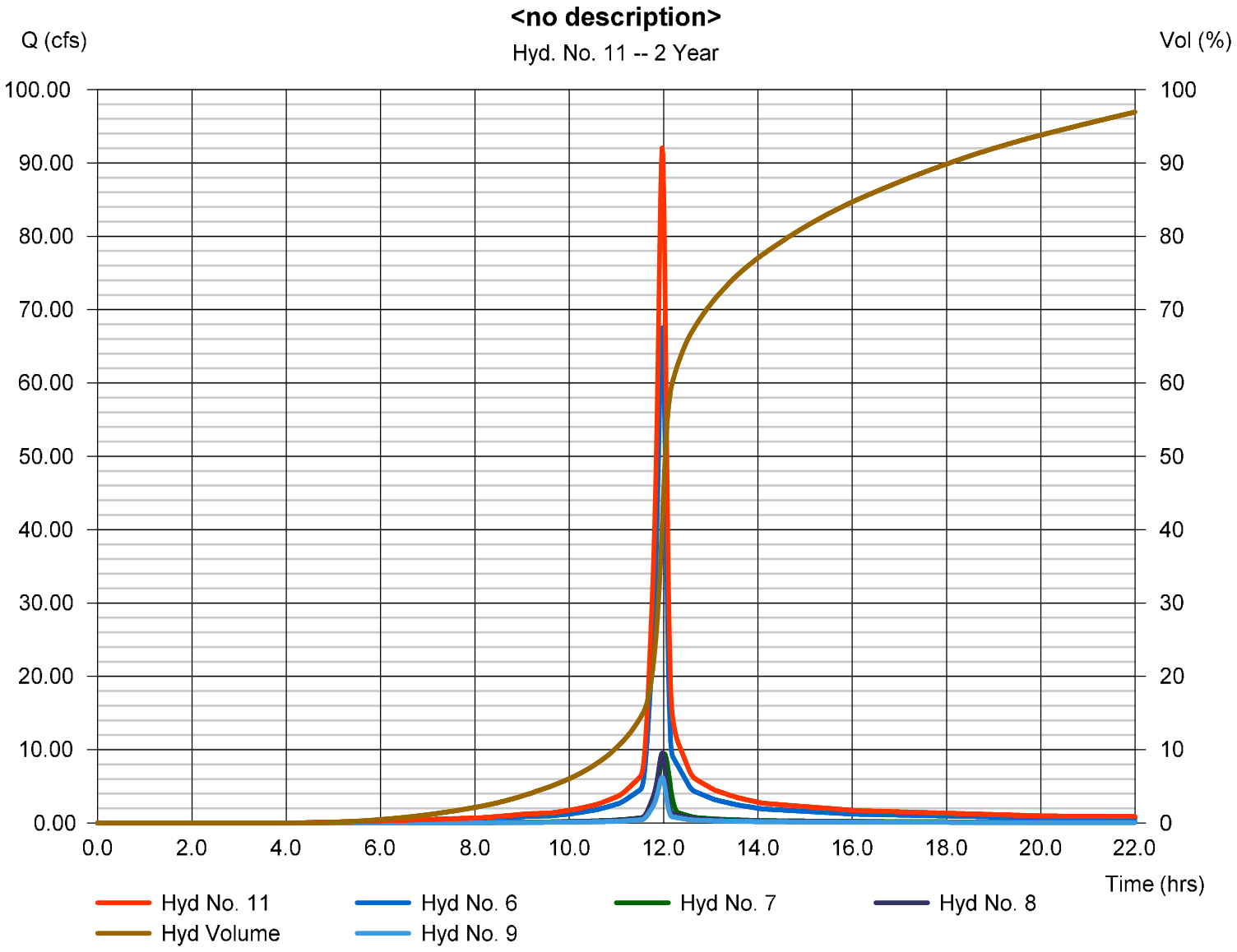
Total Travel Time, Tc ..... 7.00 min

Hydrograph Report

Hyd. No. 11

<no description>

Hydrograph type	= Combine	Peak discharge	= 92.05 cfs
Storm frequency	= 2 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 211,869 cuft
Inflow hyds.	= 6, 7, 8, 9	Contrib. drain. area	= 21.140 ac

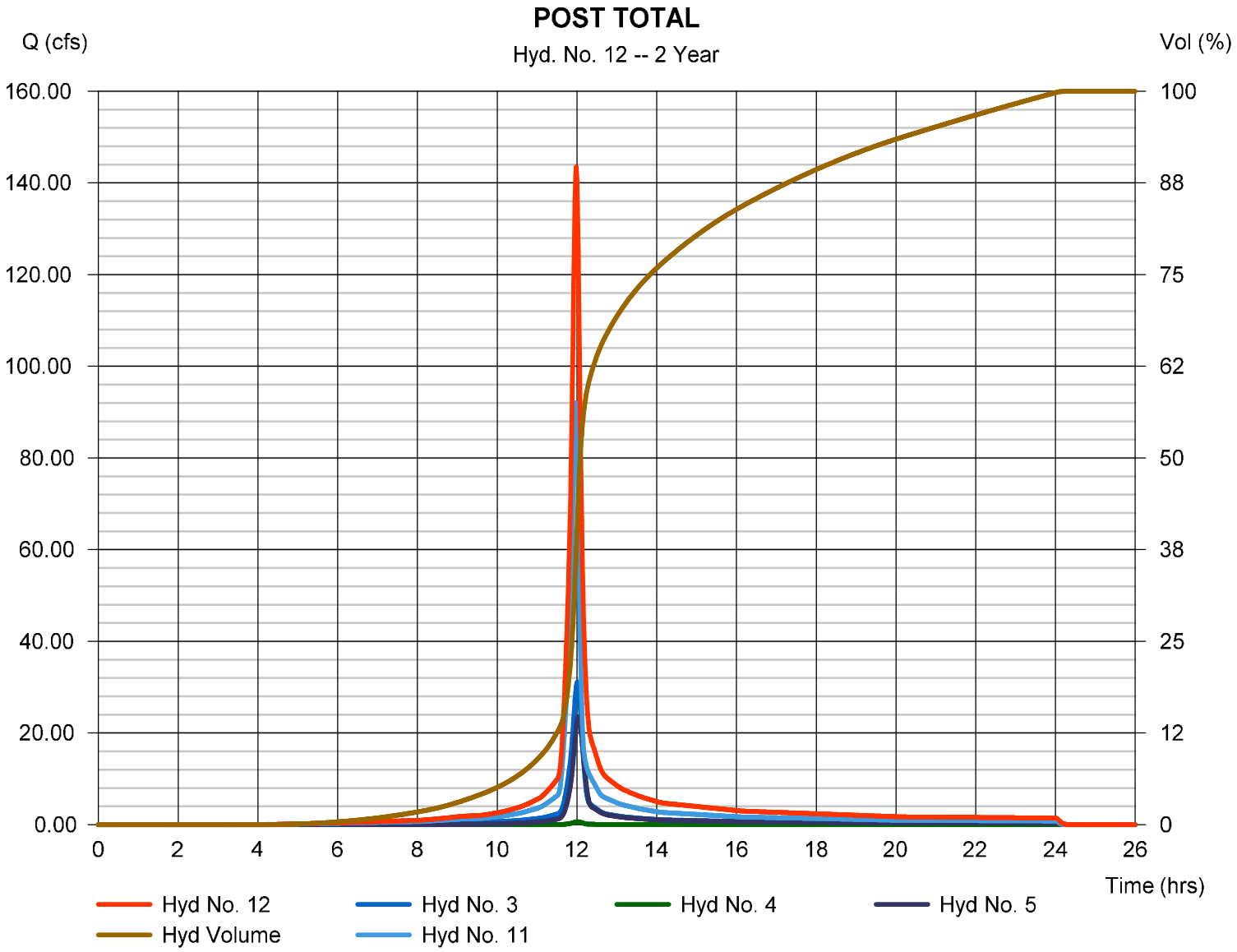


Hydrograph Report

Hyd. No. 12

POST TOTAL

Hydrograph type	=	Combine	Peak discharge	=	143.46 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.98 hrs
Time interval	=	1 min	Hyd. volume	=	359,066 cuft
Inflow hyds.	=	3, 4, 5, 11	Contrib. drain. area	=	17.290 ac



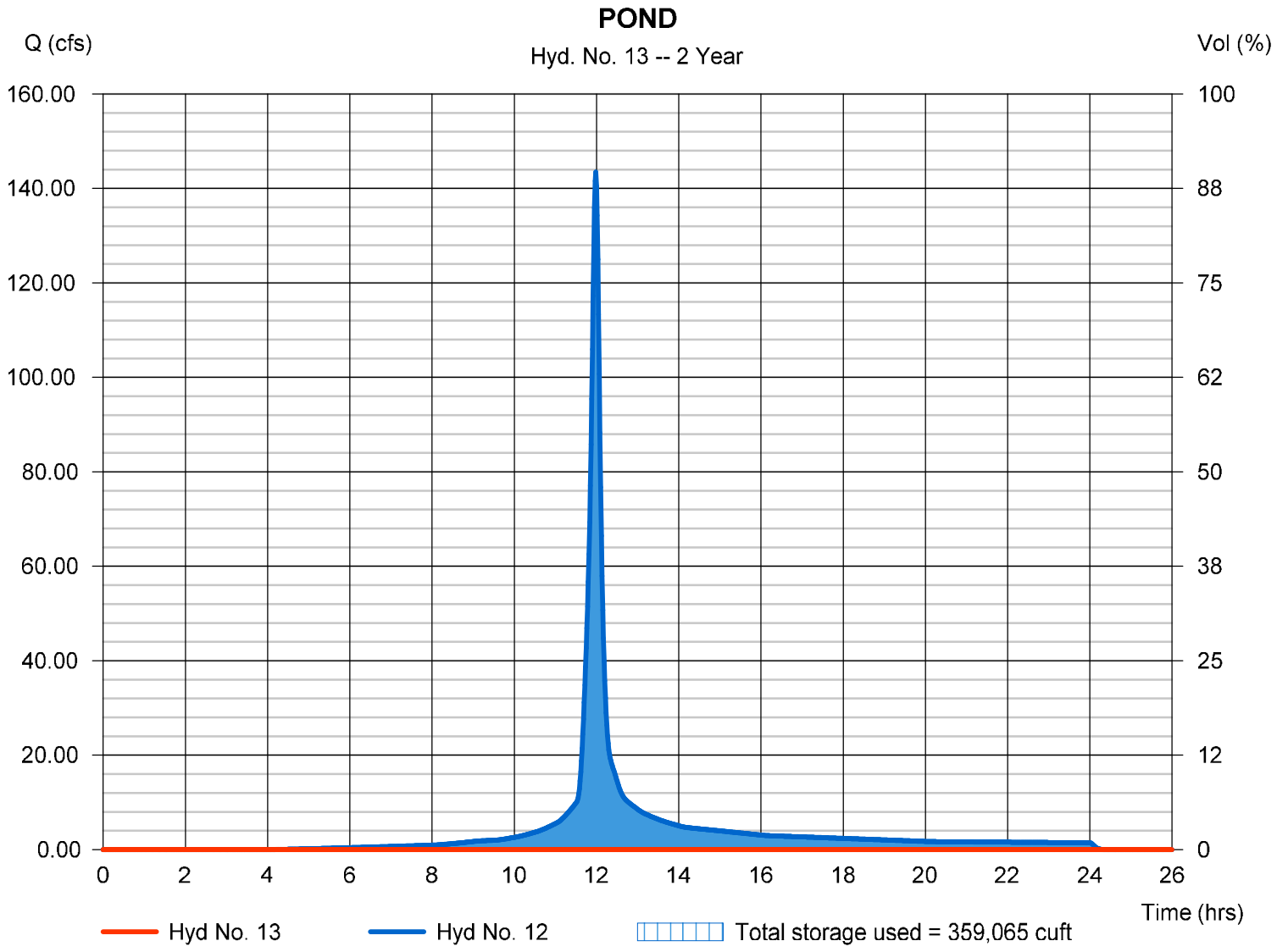
Hydrograph Report

Hyd. No. 13

POND

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	2 yrs	Time to peak	=	n/a
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	12 - POST TOTAL	Max. Elevation	=	888.49 ft
Reservoir name	=	<New Pond>	Max. Storage	=	359,065 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - <New Pond>

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 886.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	886.00	137,861	0	0
1.00	887.00	142,796	140,329	140,329
2.00	888.00	147,789	145,293	285,621
3.00	889.00	152,840	150,315	435,936
4.00	890.00	157,948	155,394	591,330
5.00	891.80	163,113	160,531	751,860

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 38.00	8.00	0.00	0.00
Span (in)	= 38.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 882.00	886.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 5.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	Inactive	Inactive	30.00
Crest El. (ft)	= 886.83	0.00	0.00	890.00
Weir Coeff.	= 3.33	3.33	3.33	2.60
Weir Type	= 1	---	---	Broad
Multi-Stage	= Yes	No	Yes	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

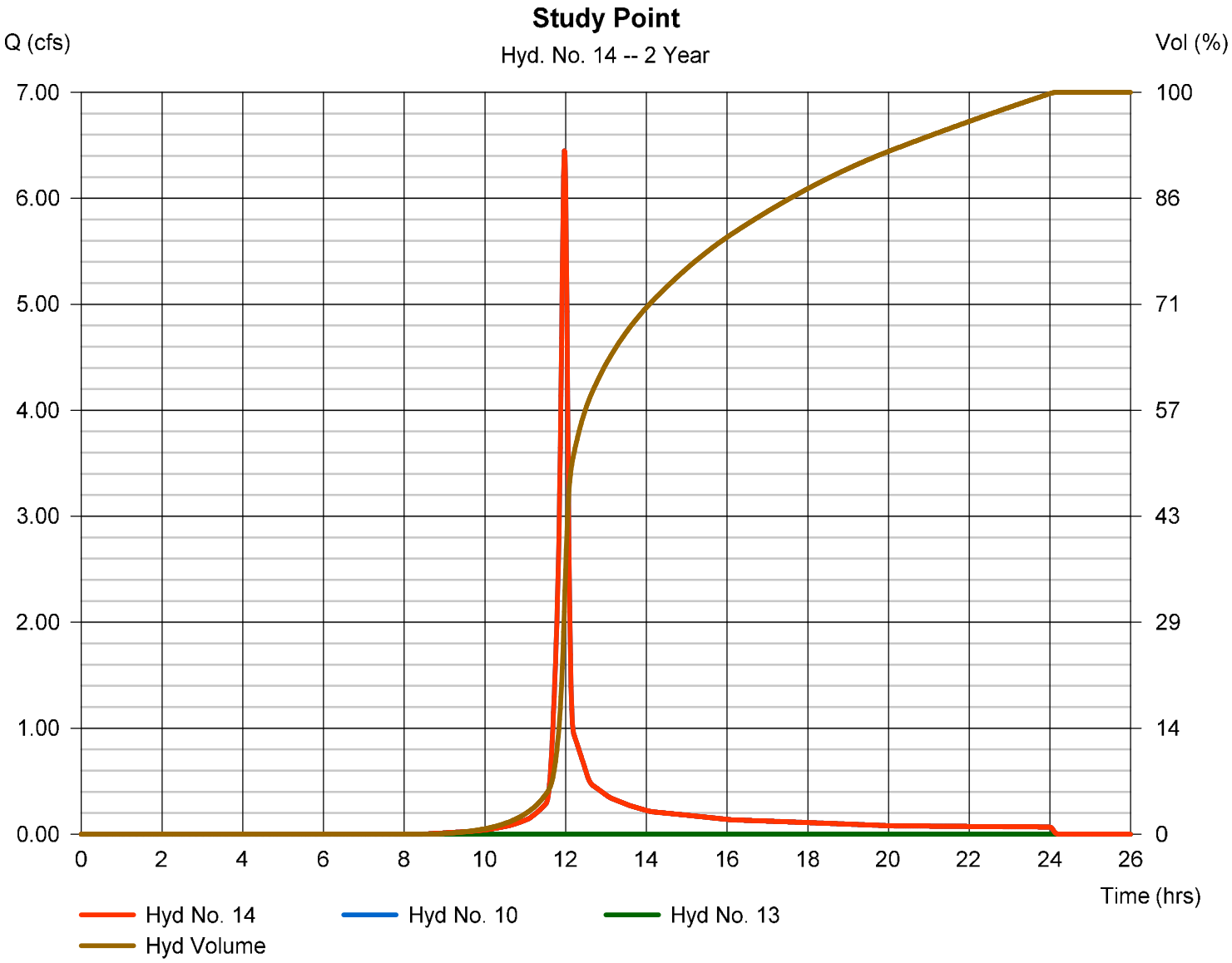
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	886.00	0.00	0.00	---	---	0.00	---	---	0.00	---	---	0.000
1.00	140,329	887.00	58.94 ic	1.37 ic	---	---	4.67	---	---	0.00	---	---	6.040
2.00	285,621	888.00	73.88 ic	1.32 ic	---	---	72.56 s	---	---	0.00	---	---	73.88
3.00	435,936	889.00	87.09 ic	0.63 ic	---	---	86.44 s	---	---	0.00	---	---	87.07
4.00	591,330	890.00	95.60 ic	0.41 ic	---	---	95.15 s	---	---	0.00	---	---	95.56
5.00	751,860	891.80	108.54 ic	0.25 ic	---	---	108.13 s	---	---	188.36	---	---	296.75

Hydrograph Report

Hyd. No. 14

Study Point

Hydrograph type	=	Combine	Peak discharge	=	6.447 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	13,647 cuft
Inflow hyds.	=	10, 13	Contrib. drain. area	=	2.060 ac



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
3	SCS Runoff	7.987	1	721	20,169	------	------	------	OFFSITE SOUTH
4	SCS Runoff	0.104	1	722	279	------	------	------	OFFSITE EAST
5	SCS Runoff	2.842	1	723	8,987	------	------	------	OFFSITE WEST
6	SCS Runoff	17.52	1	718	37,087	------	------	------	POST ONSITE 1
7	SCS Runoff	2.420	1	721	6,113	------	------	------	POST ONSTE 2
8	SCS Runoff	2.478	1	718	5,246	------	------	------	POST ONSITE 3
9	SCS Runoff	1.621	1	718	3,432	------	------	------	POST ONSITE 4
10	SCS Runoff	0.758	1	719	1,823	------	------	------	ONSITE BYPASS
11	Combine	23.87	1	719	51,877	6, 7, 8, 9,	------	------	<no description>
12	Combine	33.73	1	719	81,313	3, 4, 5, 11	------	------	POST TOTAL
13	Reservoir	0.000	1	n/a	0	12	886.58	81,312	POND
14	Combine	0.758	1	719	1,823	10, 13	------	------	Study Point

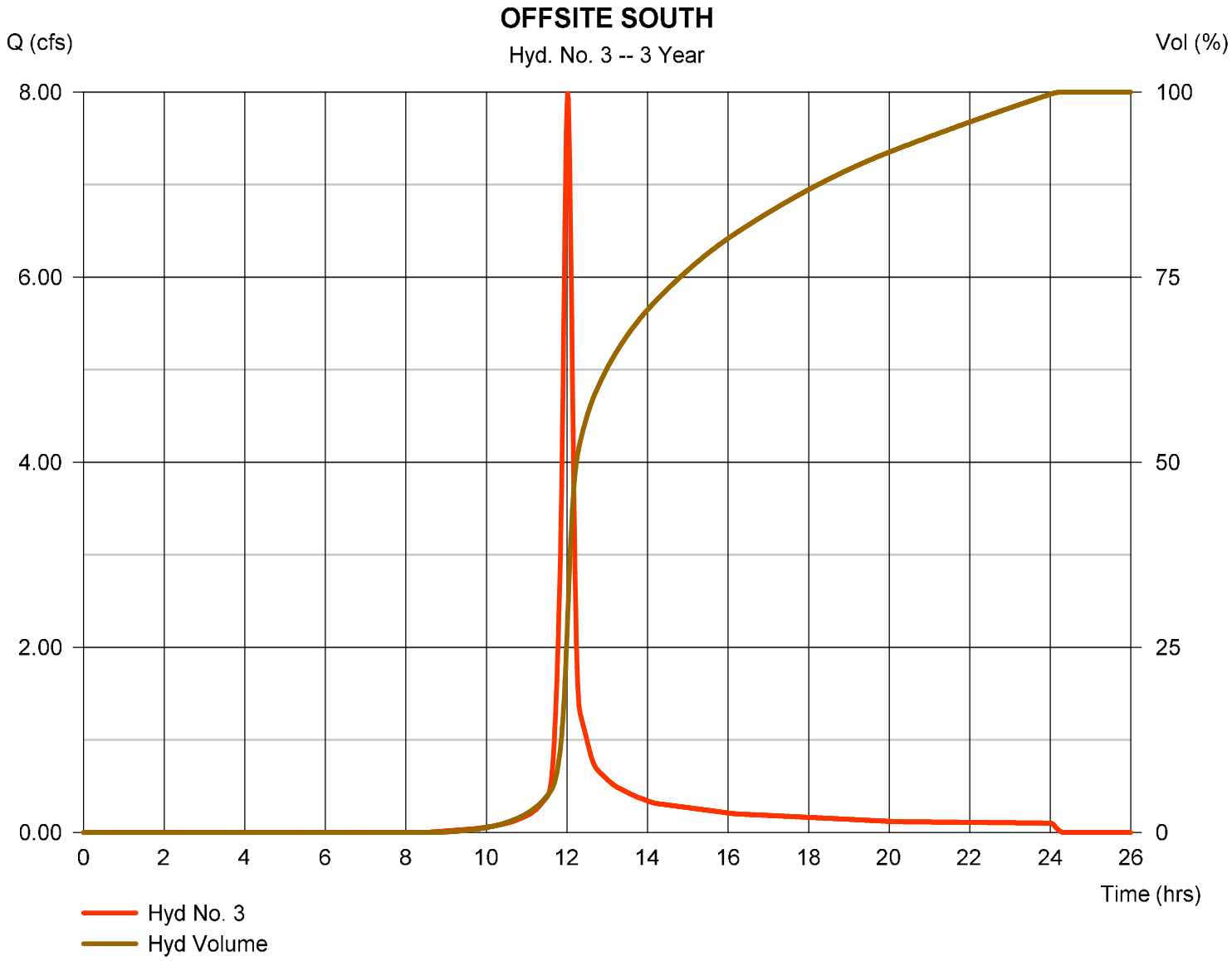
Hydrograph Report

Hyd. No. 3

OFFSITE SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	7.987 cfs
Storm frequency	=	3 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	20,169 cuft
Drainage area	=	8.150 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	13.40 min
Total precip.	=	1.37 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(8.200 x 92)] / 8.150

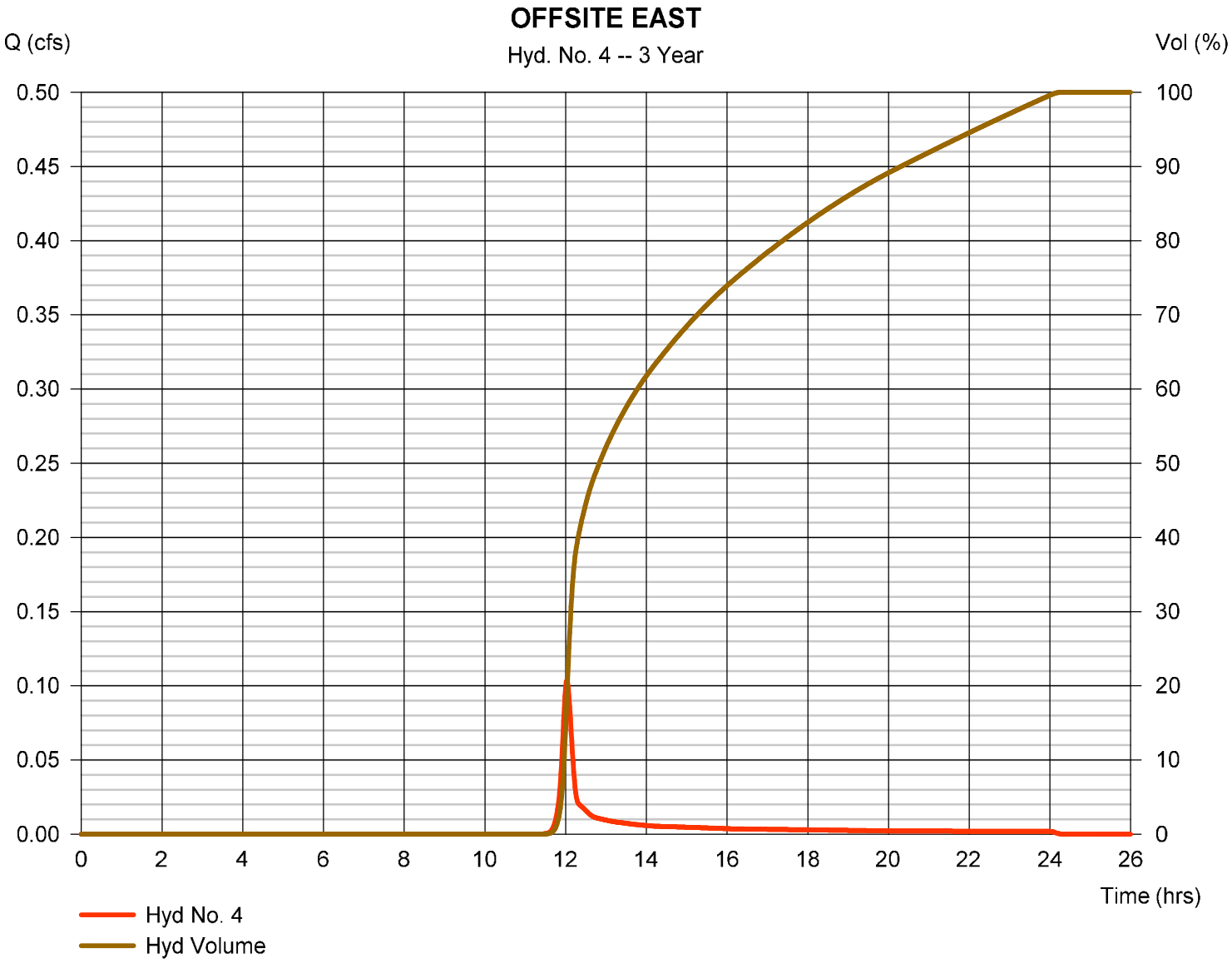


Hydrograph Report

Hyd. No. 4

OFFSITE EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.104 cfs
Storm frequency	=	3 yrs	Time to peak	=	12.03 hrs
Time interval	=	1 min	Hyd. volume	=	279 cuft
Drainage area	=	0.210 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.80 min
Total precip.	=	1.37 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

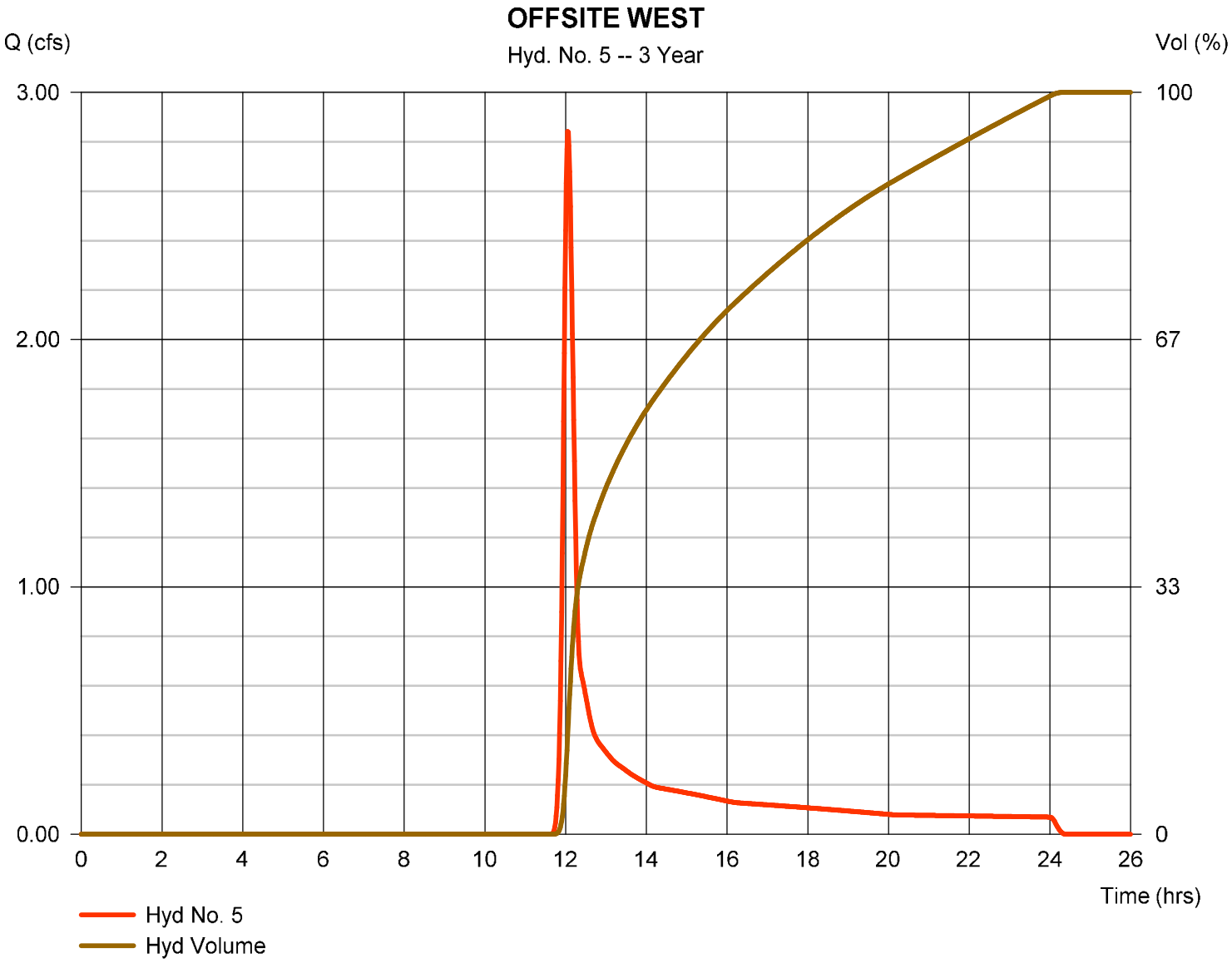


Hydrograph Report

Hyd. No. 5

OFFSITE WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.842 cfs
Storm frequency	=	3 yrs	Time to peak	=	12.05 hrs
Time interval	=	1 min	Hyd. volume	=	8,987 cuft
Drainage area	=	8.930 ac	Curve number	=	82
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.10 min
Total precip.	=	1.37 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



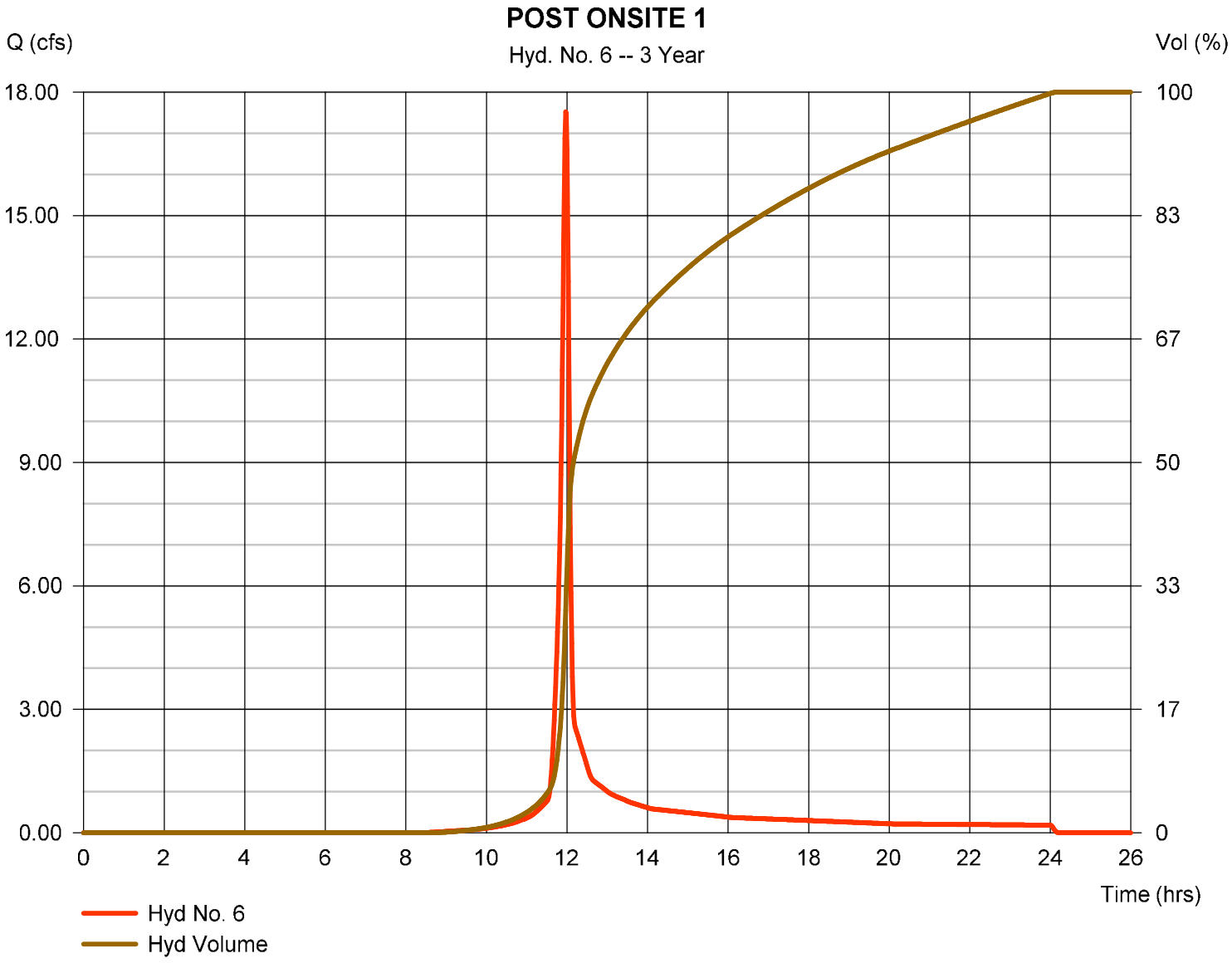
Hydrograph Report

Hyd. No. 6

POST ONSITE 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.52 cfs
Storm frequency	=	3 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	37,087 cuft
Drainage area	=	15.130 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.30 min
Total precip.	=	1.37 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(10.000 x 98) + (5.400 x 80)] / 15.130



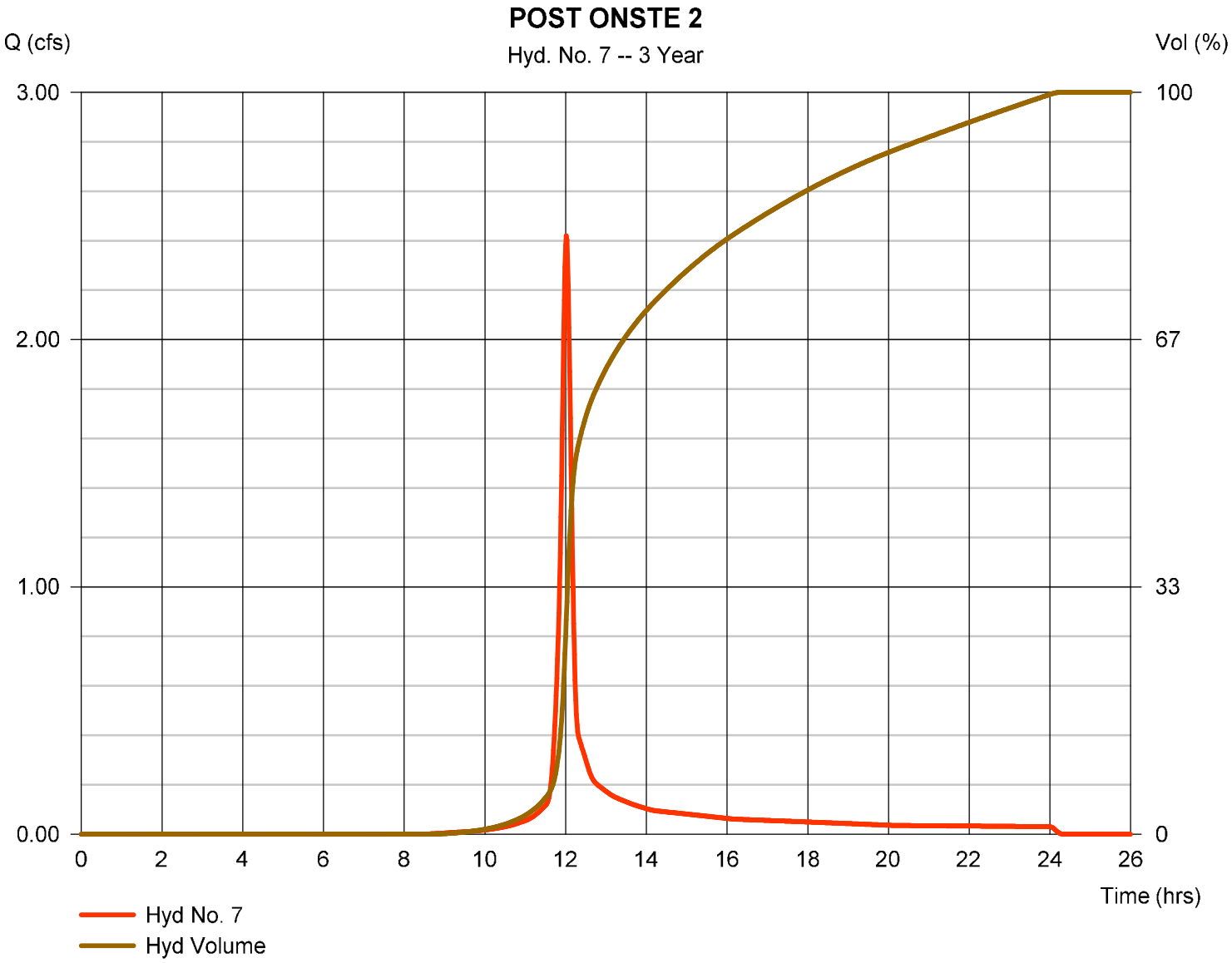
Hydrograph Report

Hyd. No. 7

POST ONSTE 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.420 cfs
Storm frequency	=	3 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	6,113 cuft
Drainage area	=	2.470 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.40 min
Total precip.	=	1.37 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.600 x 98) + (0.900 x 80)] / 2.470



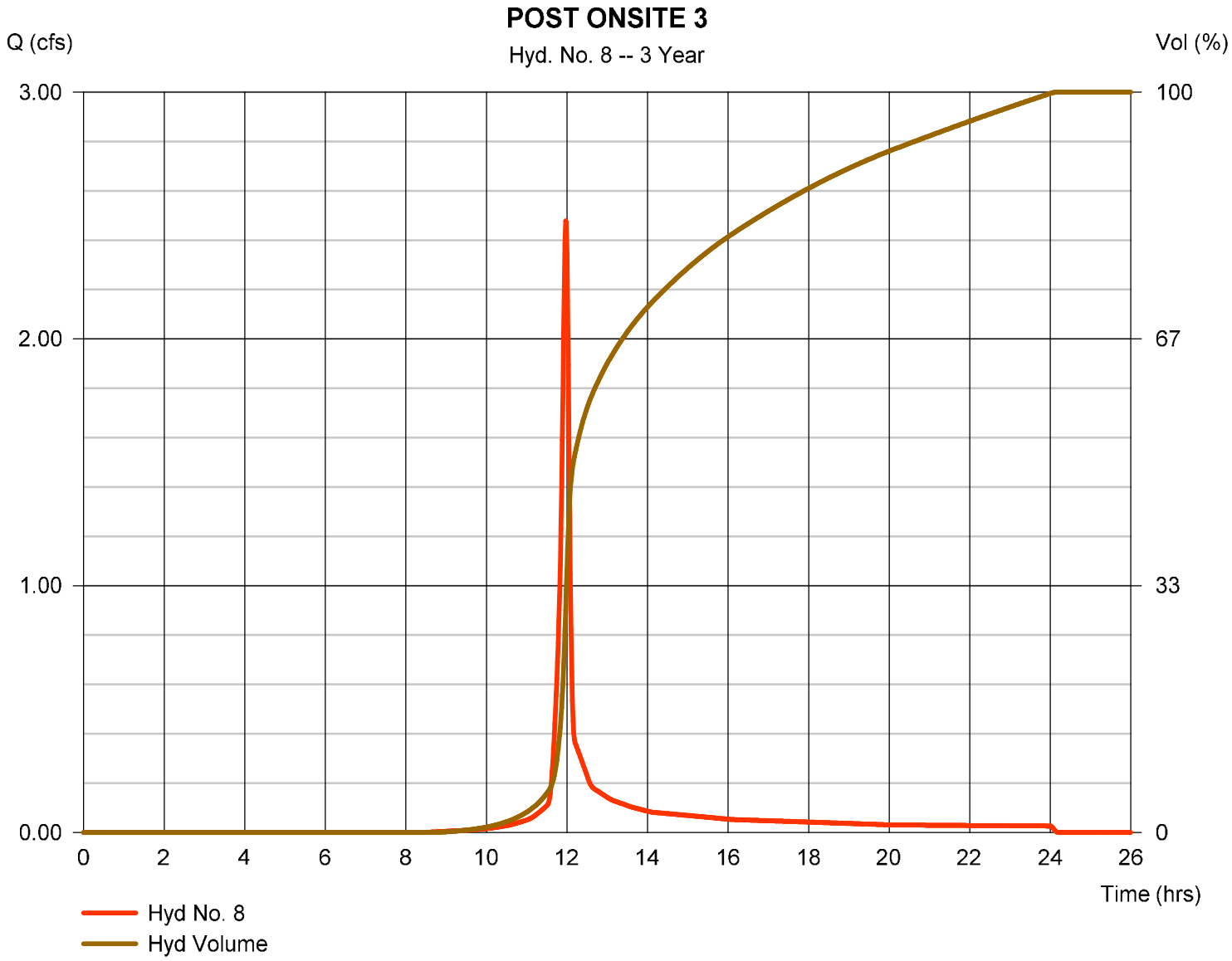
Hydrograph Report

Hyd. No. 8

POST ONSITE 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.478 cfs
Storm frequency	=	3 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	5,246 cuft
Drainage area	=	2.140 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	1.37 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.300 x 98) + (0.700 x 80)] / 2.140



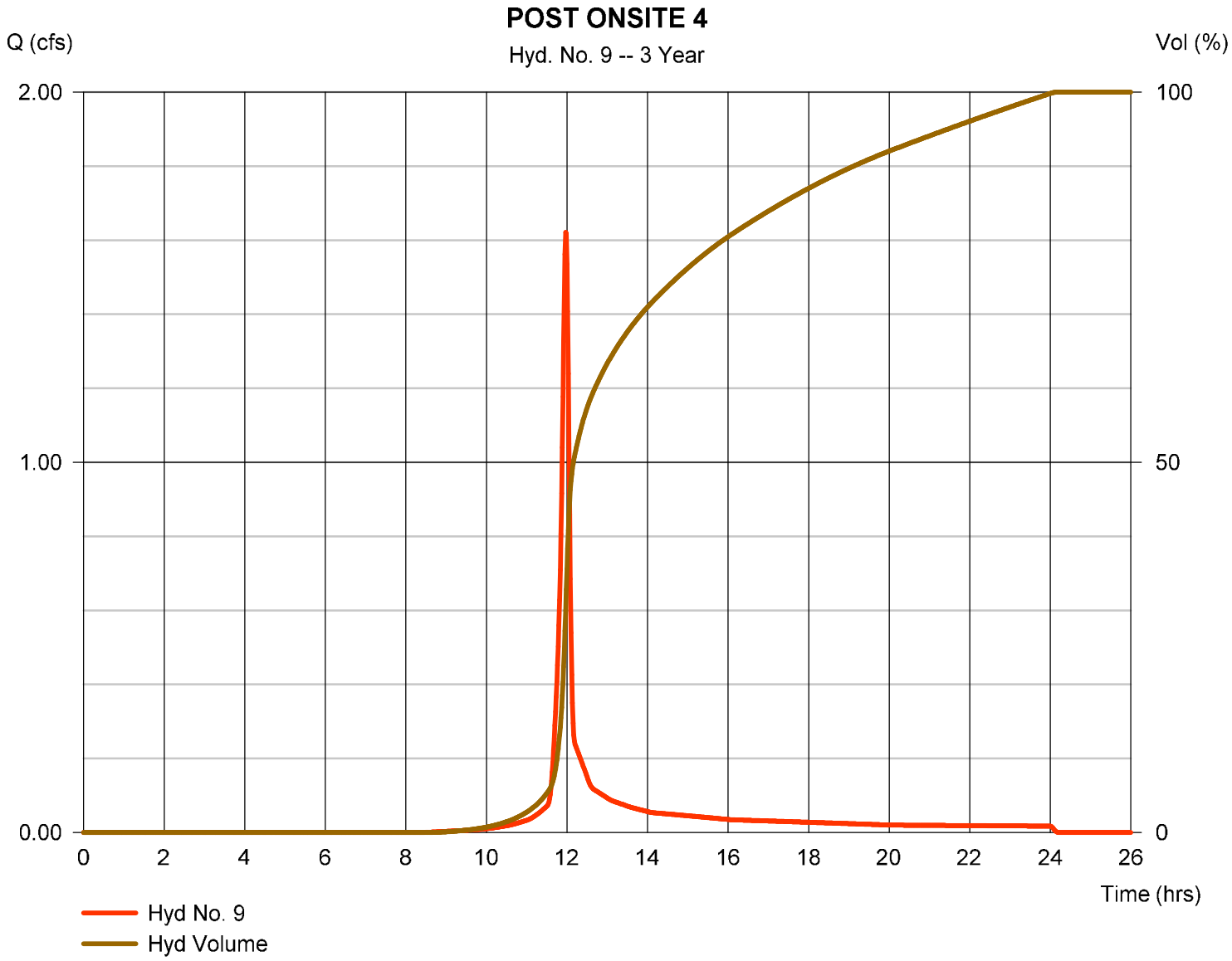
Hydrograph Report

Hyd. No. 9

POST ONSITE 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.621 cfs
Storm frequency	=	3 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	3,432 cuft
Drainage area	=	1.400 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	1.37 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.900 x 98) + (0.400 x 80)] / 1.400



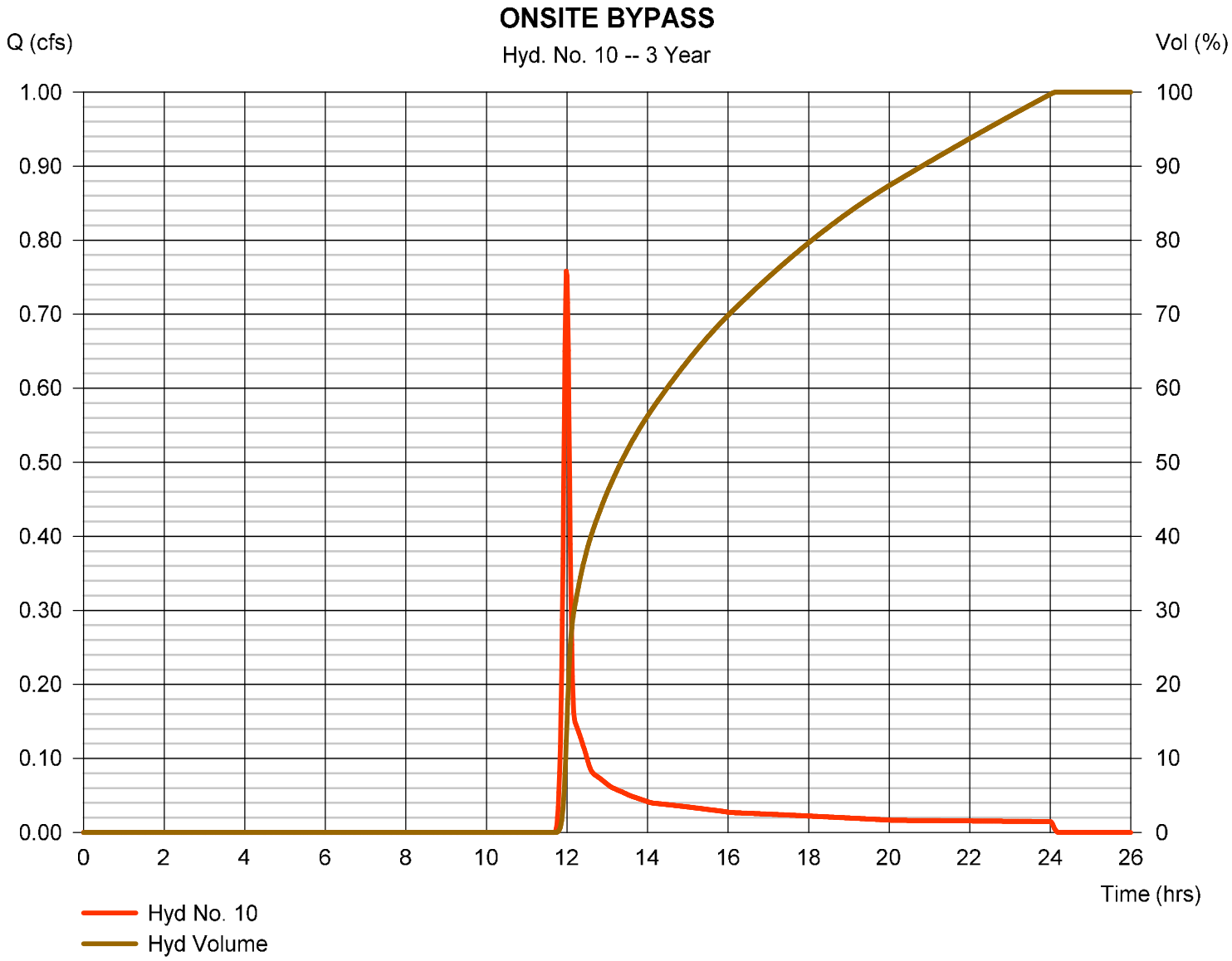
Hydrograph Report

Hyd. No. 10

ONSITE BYPASS

Hydrograph type	=	SCS Runoff	Peak discharge	=	0.758 cfs
Storm frequency	=	3 yrs	Time to peak	=	11.98 hrs
Time interval	=	1 min	Hyd. volume	=	1,823 cuft
Drainage area	=	2.060 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.00 min
Total precip.	=	1.37 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.100 x 98) + (1.900 x 80)] / 2.060

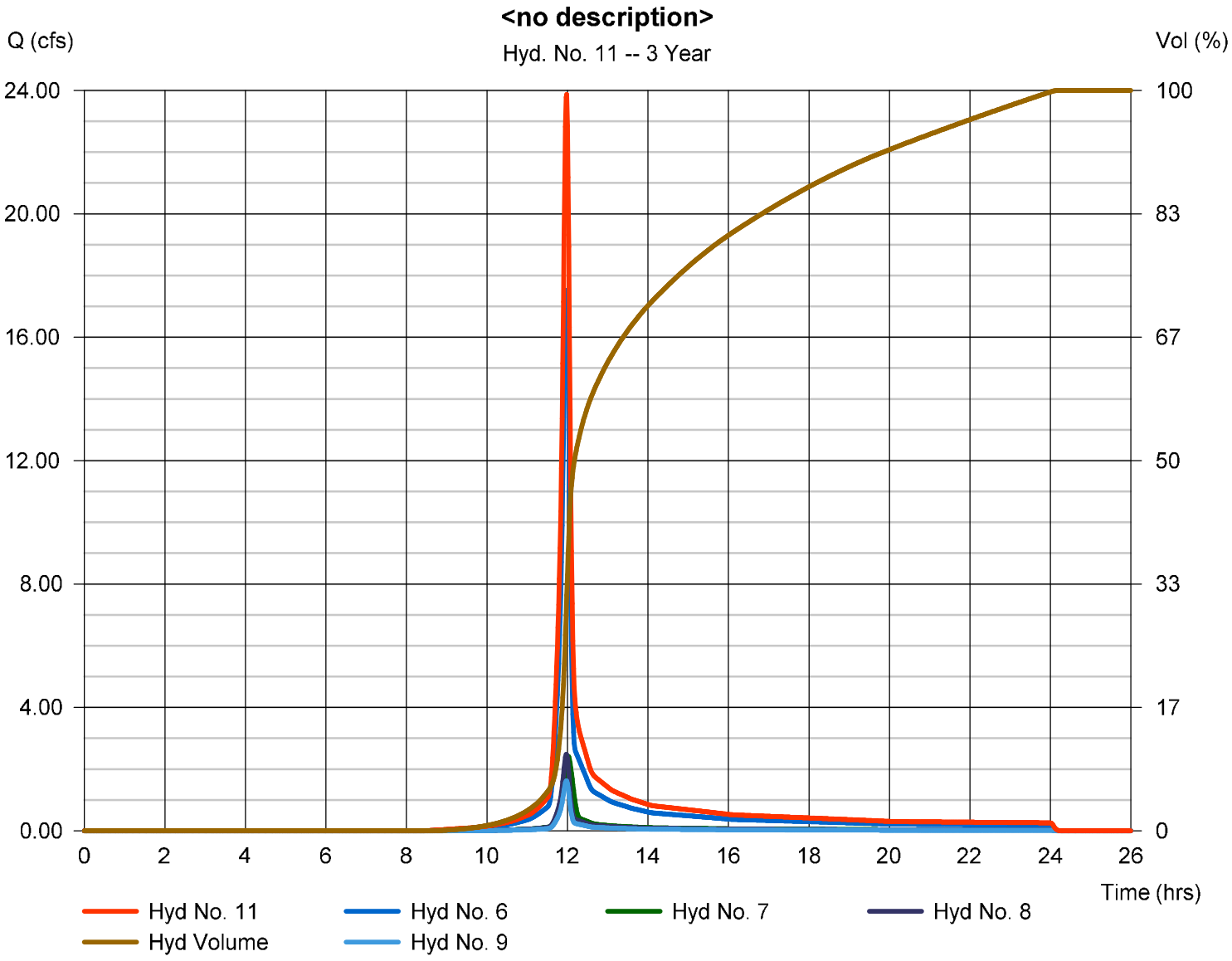


Hydrograph Report

Hyd. No. 11

<no description>

Hydrograph type	= Combine	Peak discharge	= 23.87 cfs
Storm frequency	= 3 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 51,877 cuft
Inflow hyds.	= 6, 7, 8, 9	Contrib. drain. area	= 21.140 ac

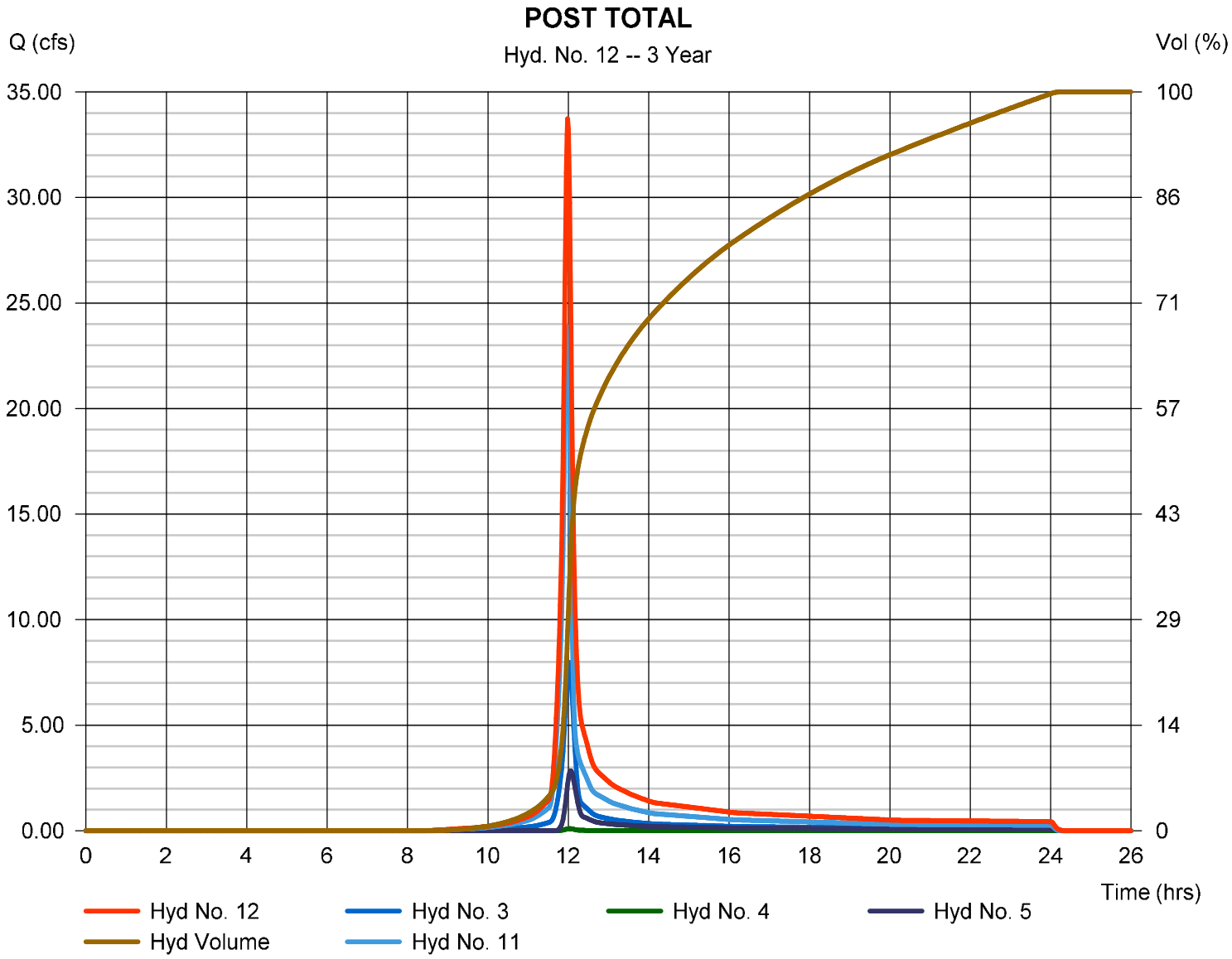


Hydrograph Report

Hyd. No. 12

POST TOTAL

Hydrograph type	=	Combine	Peak discharge	=	33.73 cfs
Storm frequency	=	3 yrs	Time to peak	=	11.98 hrs
Time interval	=	1 min	Hyd. volume	=	81,313 cuft
Inflow hyds.	=	3, 4, 5, 11	Contrib. drain. area	=	17.290 ac



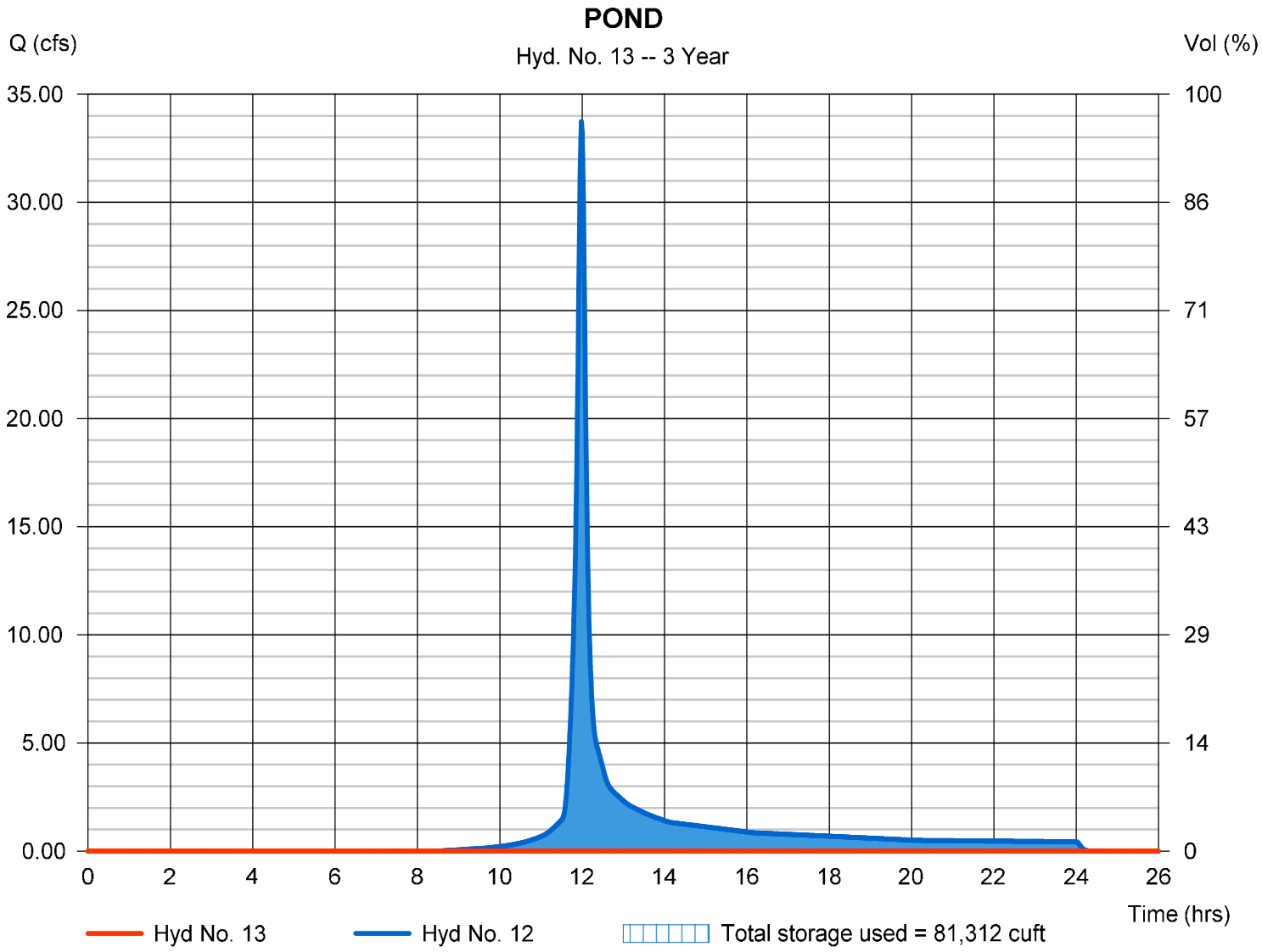
Hydrograph Report

Hyd. No. 13

POND

Hydrograph type	=	Reservoir	Peak discharge	=	0.000 cfs
Storm frequency	=	3 yrs	Time to peak	=	n/a
Time interval	=	1 min	Hyd. volume	=	0 cuft
Inflow hyd. No.	=	12 - POST TOTAL	Max. Elevation	=	886.58 ft
Reservoir name	=	<New Pond>	Max. Storage	=	81,312 cuft

Storage Indication method used.

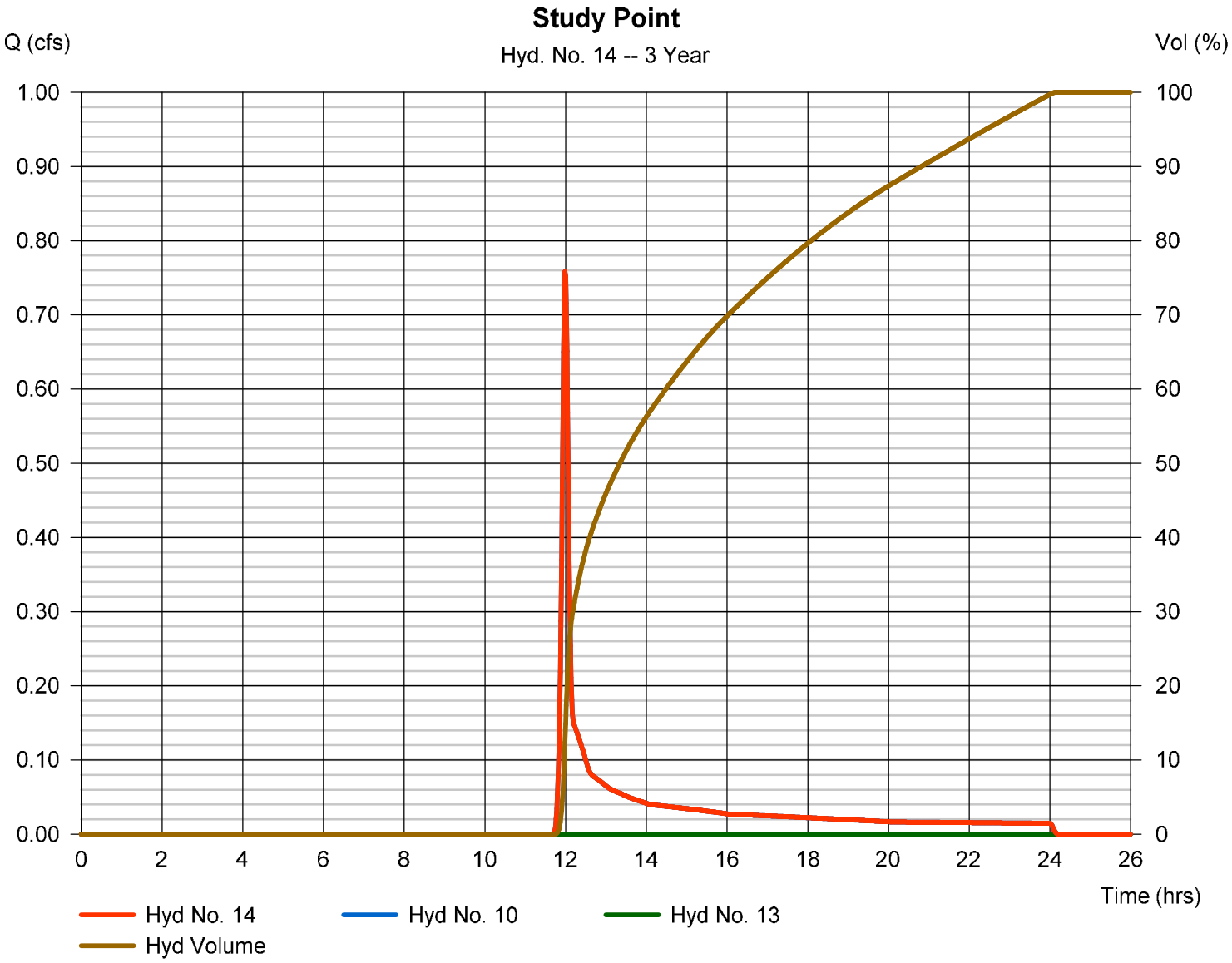


Hydrograph Report

Hyd. No. 14

Study Point

Hydrograph type	=	Combine	Peak discharge	=	0.758 cfs
Storm frequency	=	3 yrs	Time to peak	=	11.98 hrs
Time interval	=	1 min	Hyd. volume	=	1,823 cuft
Inflow hyds.	=	10, 13	Contrib. drain. area	=	2.060 ac



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
3	SCS Runoff	50.47	1	721	137,622	------	------	------	OFFSITE SOUTH
4	SCS Runoff	1.149	1	721	2,982	------	------	------	OFFSITE EAST
5	SCS Runoff	43.71	1	722	118,852	------	------	------	OFFSITE WEST
6	SCS Runoff	109.08	1	718	253,055	------	------	------	POST ONSITE 1
7	SCS Runoff	15.29	1	721	41,709	------	------	------	POST ONSTE 2
8	SCS Runoff	15.43	1	718	35,792	------	------	------	POST ONSITE 3
9	SCS Runoff	10.09	1	718	23,416	------	------	------	POST ONSITE 4
10	SCS Runoff	12.07	1	718	26,001	------	------	------	ONSITE BYPASS
11	Combine	148.89	1	718	353,972	6, 7, 8, 9,	------	------	<no description>
12	Combine	238.00	1	719	613,428	3, 4, 5, 11	------	------	POST TOTAL
13	Reservoir	1.777	1	1444	22,092	12	890.07	602,900	POND
14	Combine	12.07	1	718	48,093	10, 13	------	------	Study Point

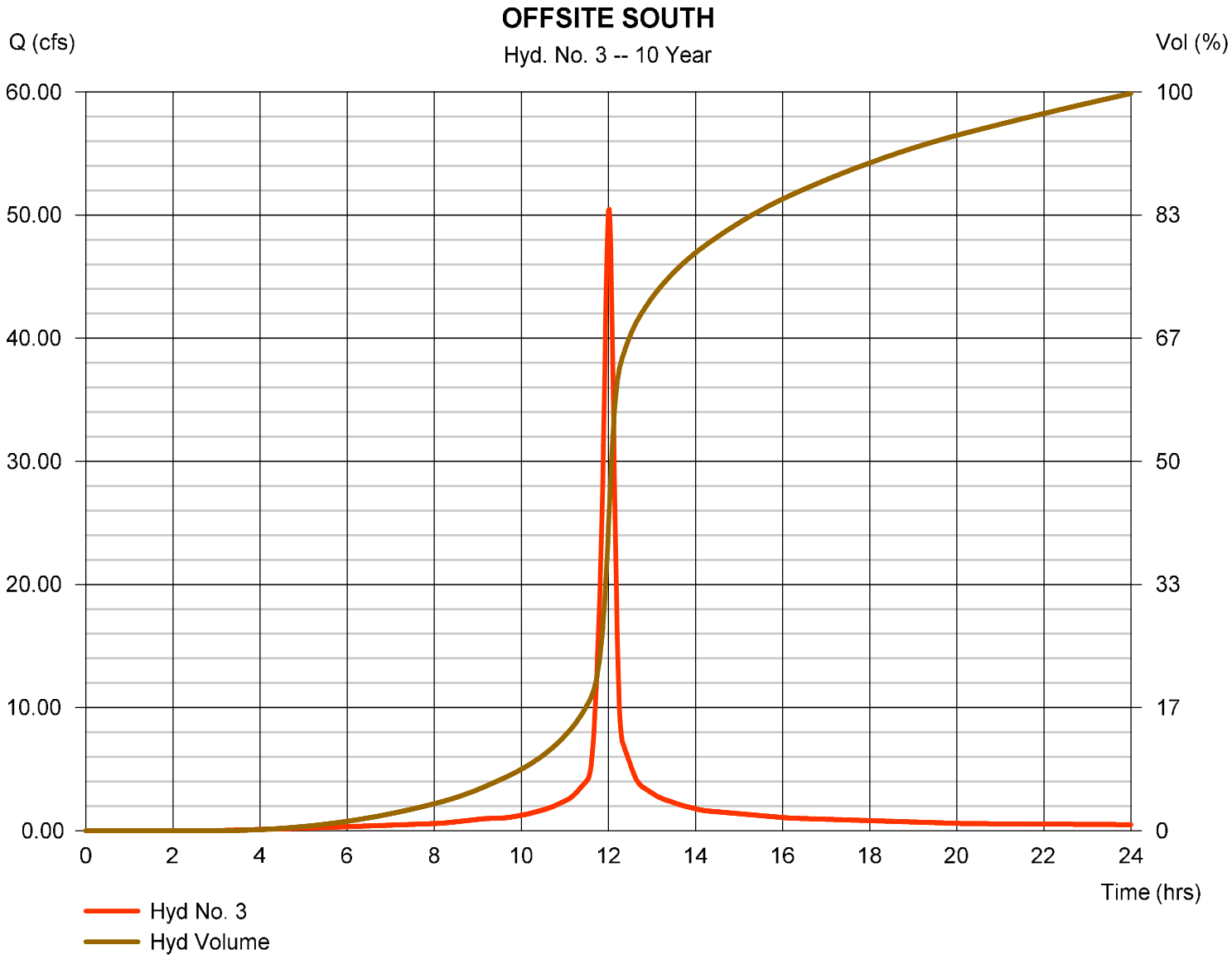
Hydrograph Report

Hyd. No. 3

OFFSITE SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	50.47 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	137,622 cuft
Drainage area	=	8.150 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	13.40 min
Total precip.	=	5.65 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(8.200 x 92)] / 8.150

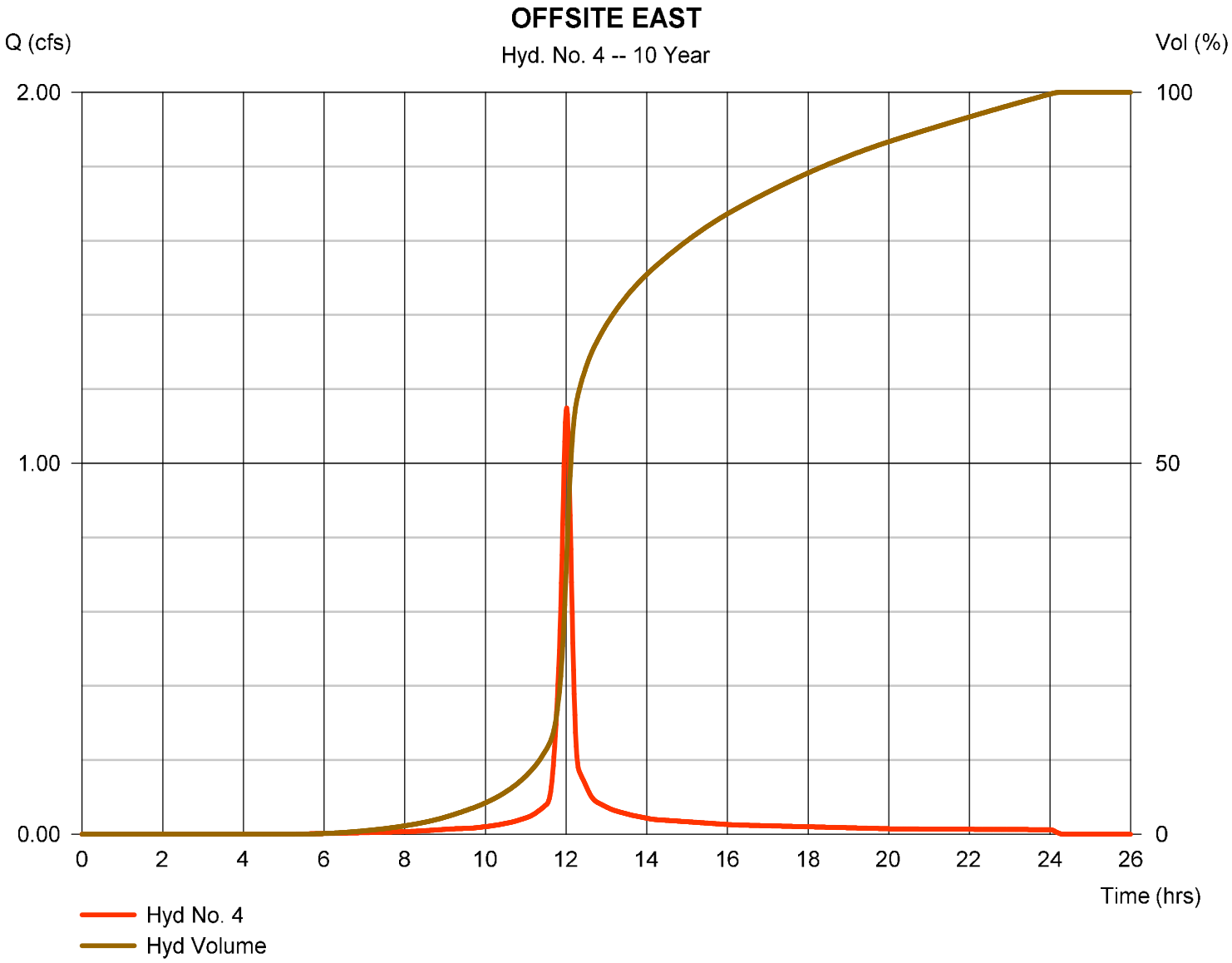


Hydrograph Report

Hyd. No. 4

OFFSITE EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	1.149 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	2,982 cuft
Drainage area	=	0.210 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.80 min
Total precip.	=	5.65 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

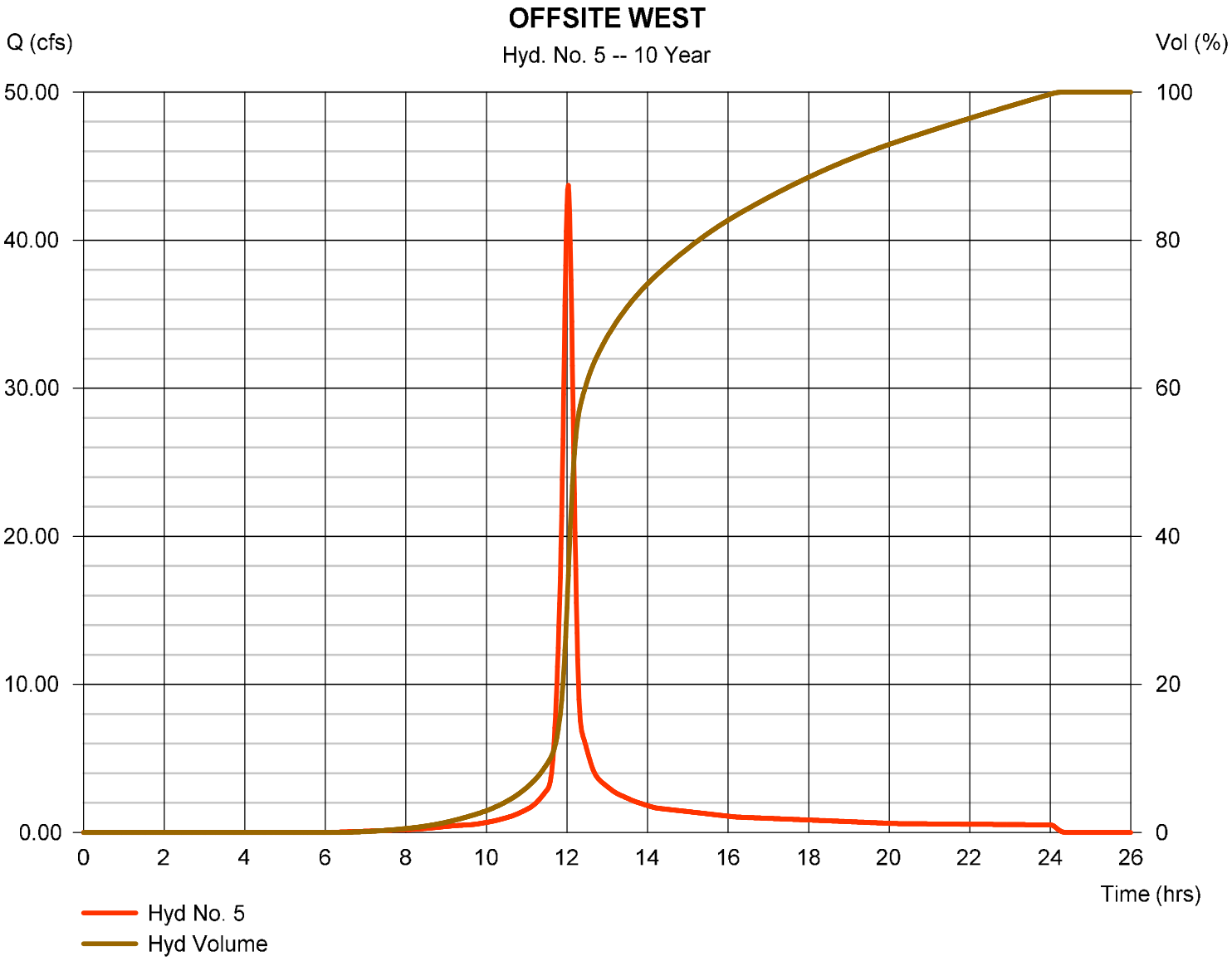


Hydrograph Report

Hyd. No. 5

OFFSITE WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	43.71 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	1 min	Hyd. volume	=	118,852 cuft
Drainage area	=	8.930 ac	Curve number	=	82
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.10 min
Total precip.	=	5.65 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



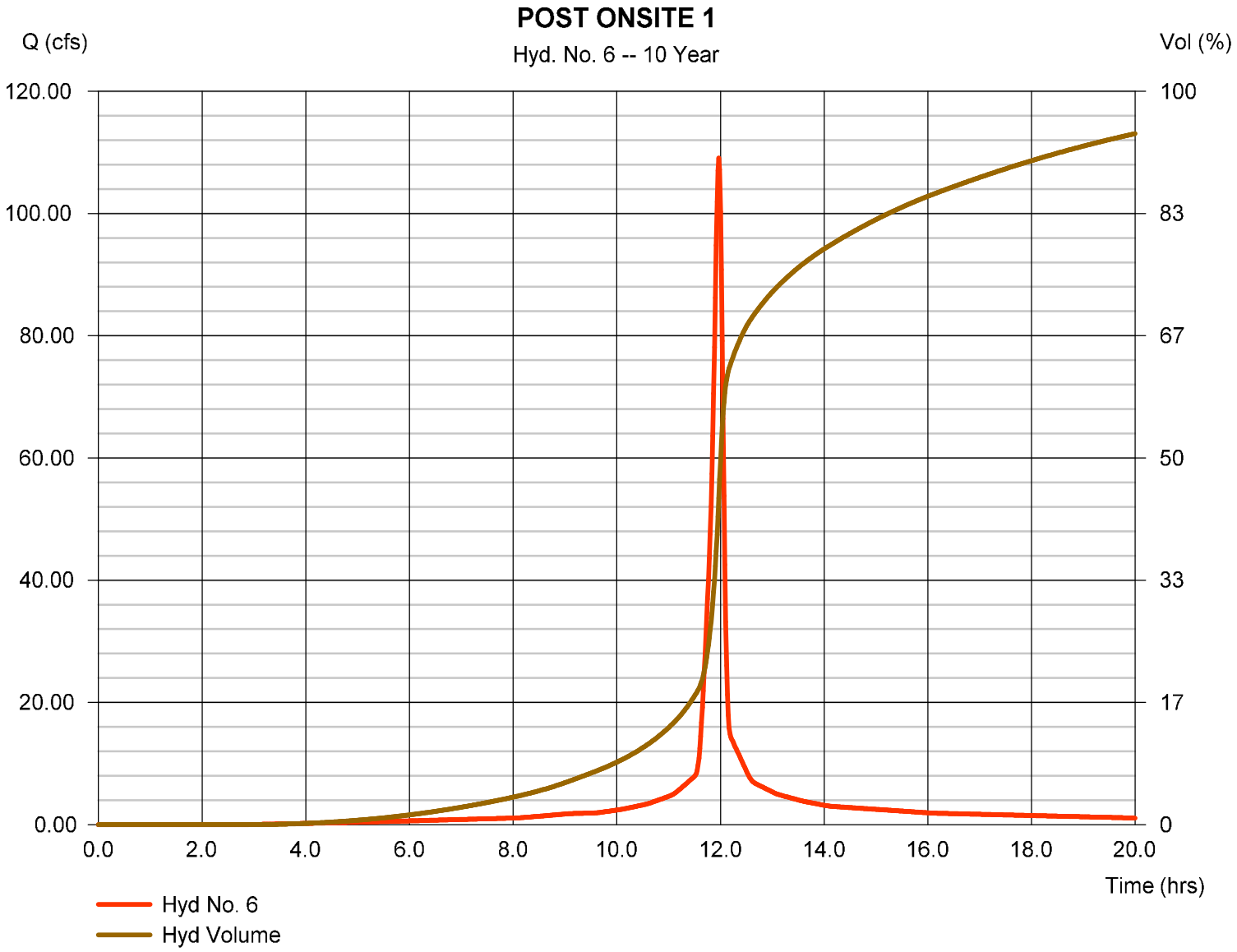
Hydrograph Report

Hyd. No. 6

POST ONSITE 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	109.08 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	253,055 cuft
Drainage area	=	15.130 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.30 min
Total precip.	=	5.65 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(10.000 x 98) + (5.400 x 80)] / 15.130



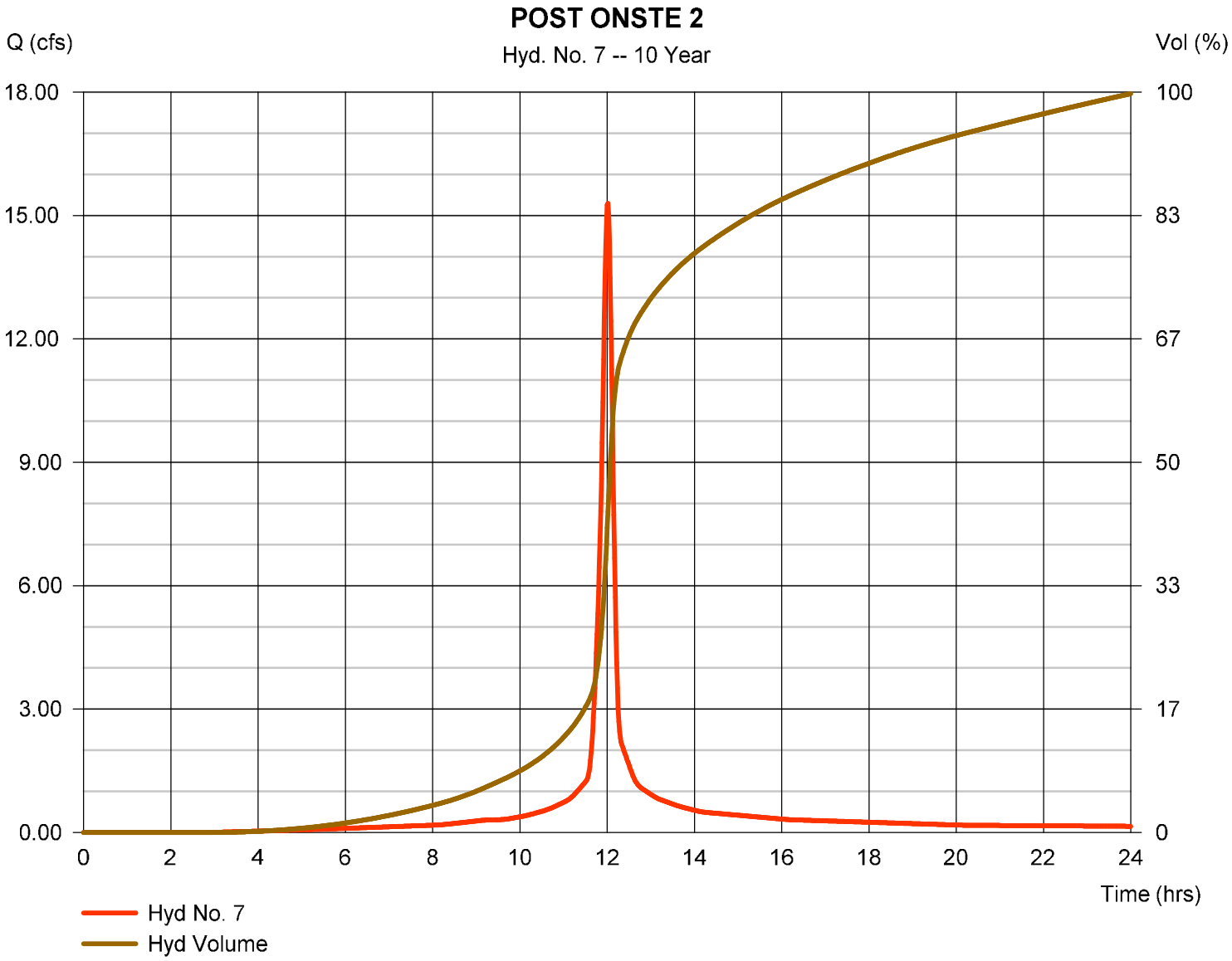
Hydrograph Report

Hyd. No. 7

POST ONSTE 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	15.29 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	41,709 cuft
Drainage area	=	2.470 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.40 min
Total precip.	=	5.65 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.600 x 98) + (0.900 x 80)] / 2.470



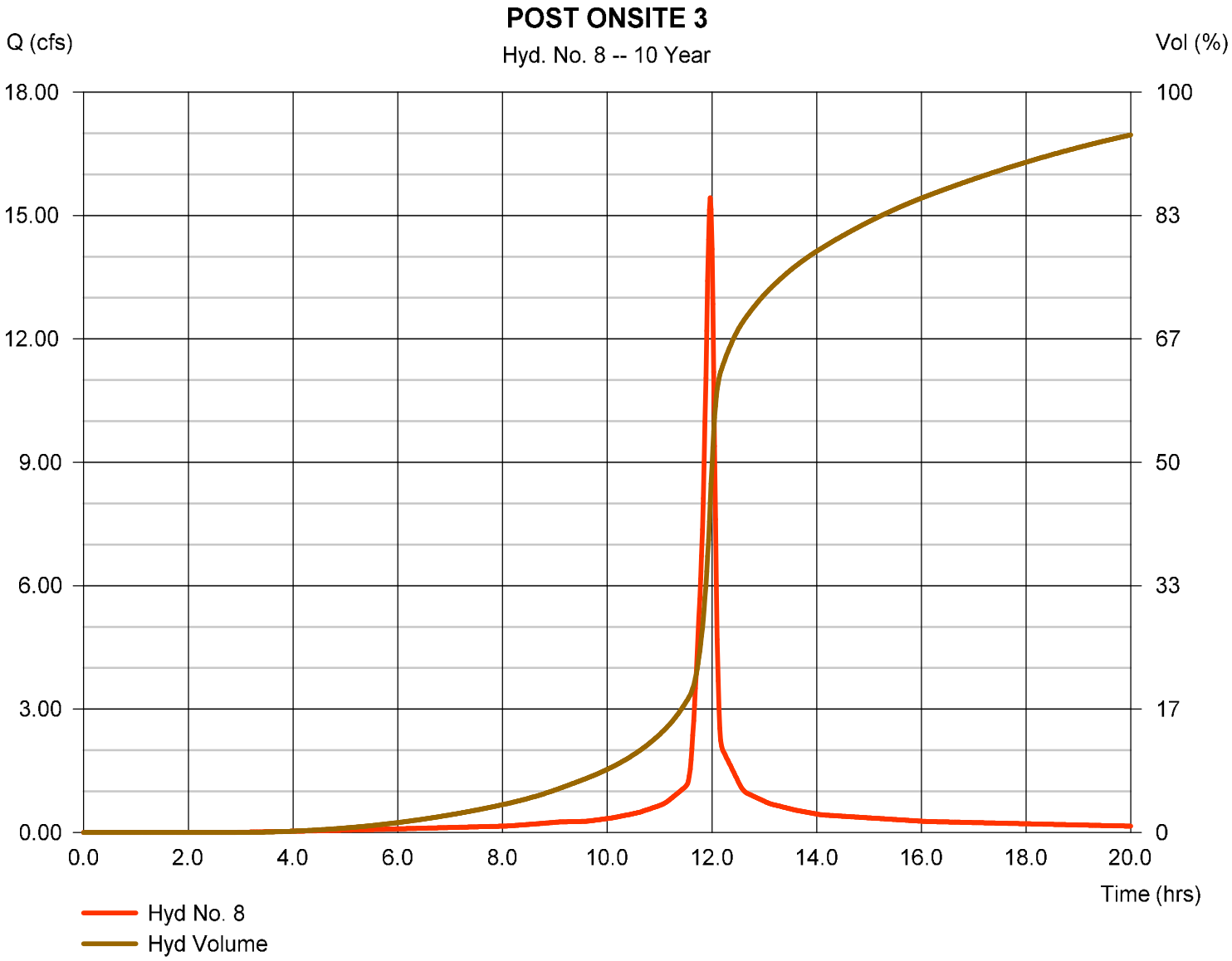
Hydrograph Report

Hyd. No. 8

POST ONSITE 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	15.43 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	35,792 cuft
Drainage area	=	2.140 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	5.65 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.300 x 98) + (0.700 x 80)] / 2.140



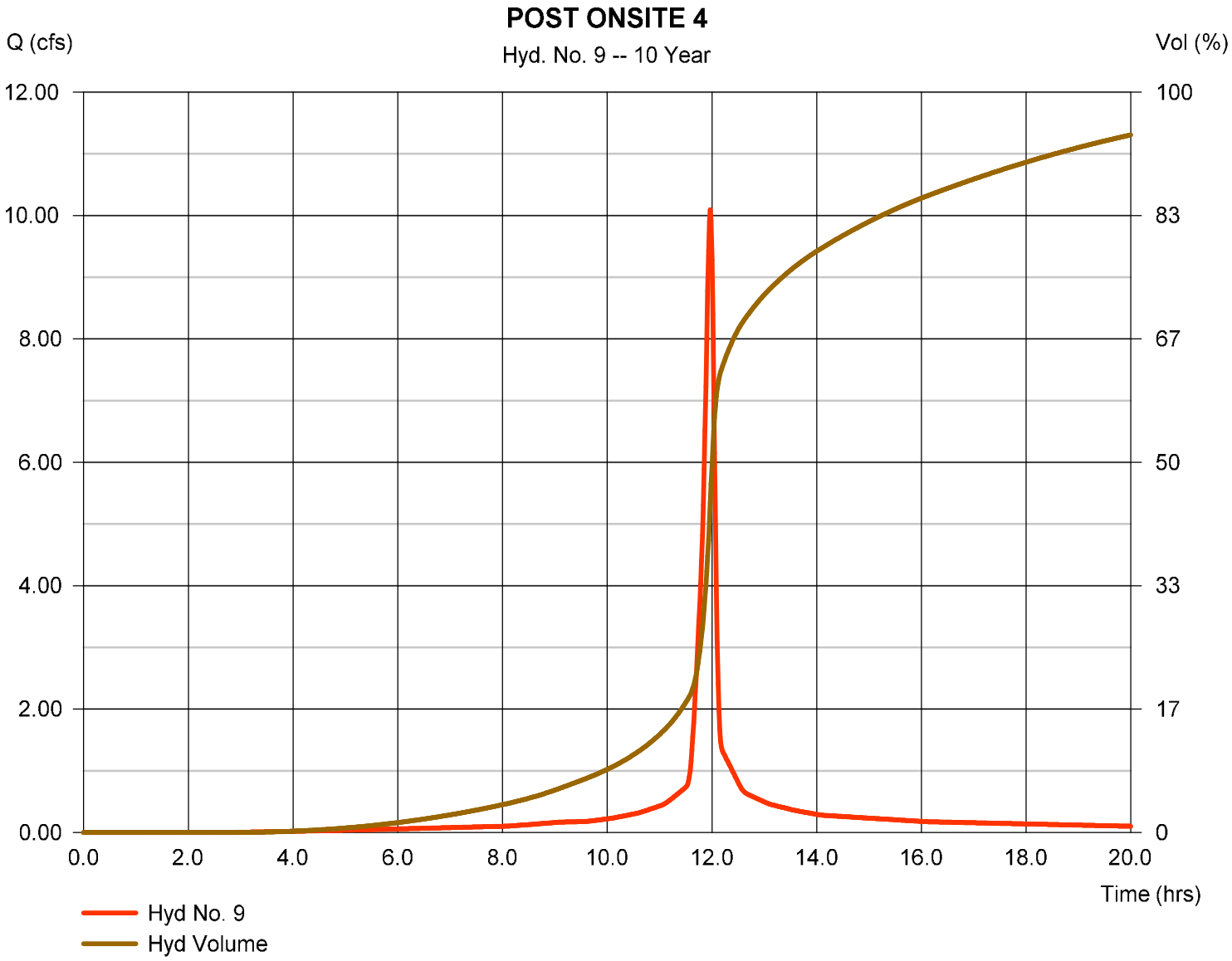
Hydrograph Report

Hyd. No. 9

POST ONSITE 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.09 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	23,416 cuft
Drainage area	=	1.400 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	5.65 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.900 x 98) + (0.400 x 80)] / 1.400



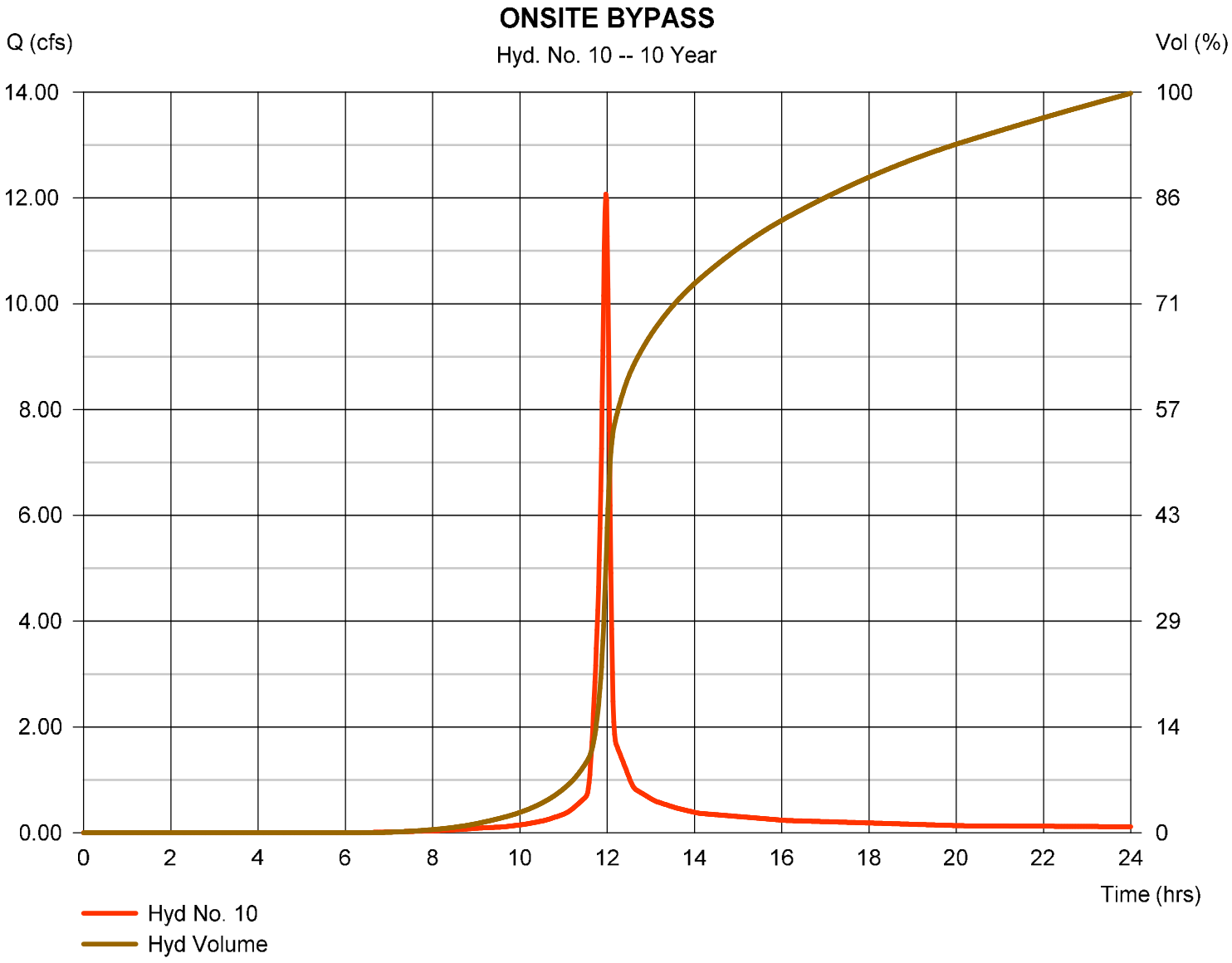
Hydrograph Report

Hyd. No. 10

ONSITE BYPASS

Hydrograph type	=	SCS Runoff	Peak discharge	=	12.07 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	26,001 cuft
Drainage area	=	2.060 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.00 min
Total precip.	=	5.65 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.100 x 98) + (1.900 x 80)] / 2.060

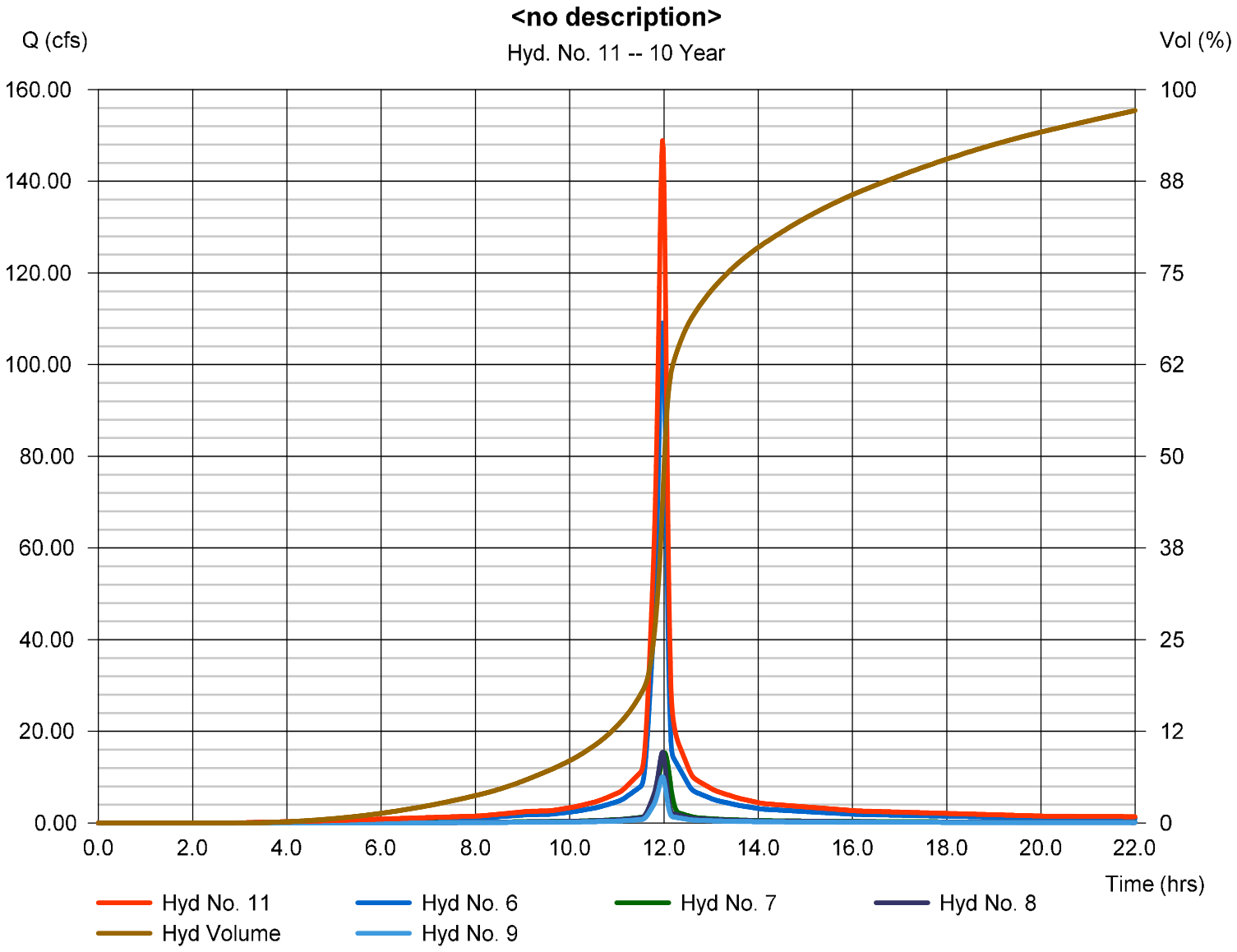


Hydrograph Report

Hyd. No. 11

<no description>

Hydrograph type	= Combine	Peak discharge	= 148.89 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 353,972 cuft
Inflow hyds.	= 6, 7, 8, 9	Contrib. drain. area	= 21.140 ac

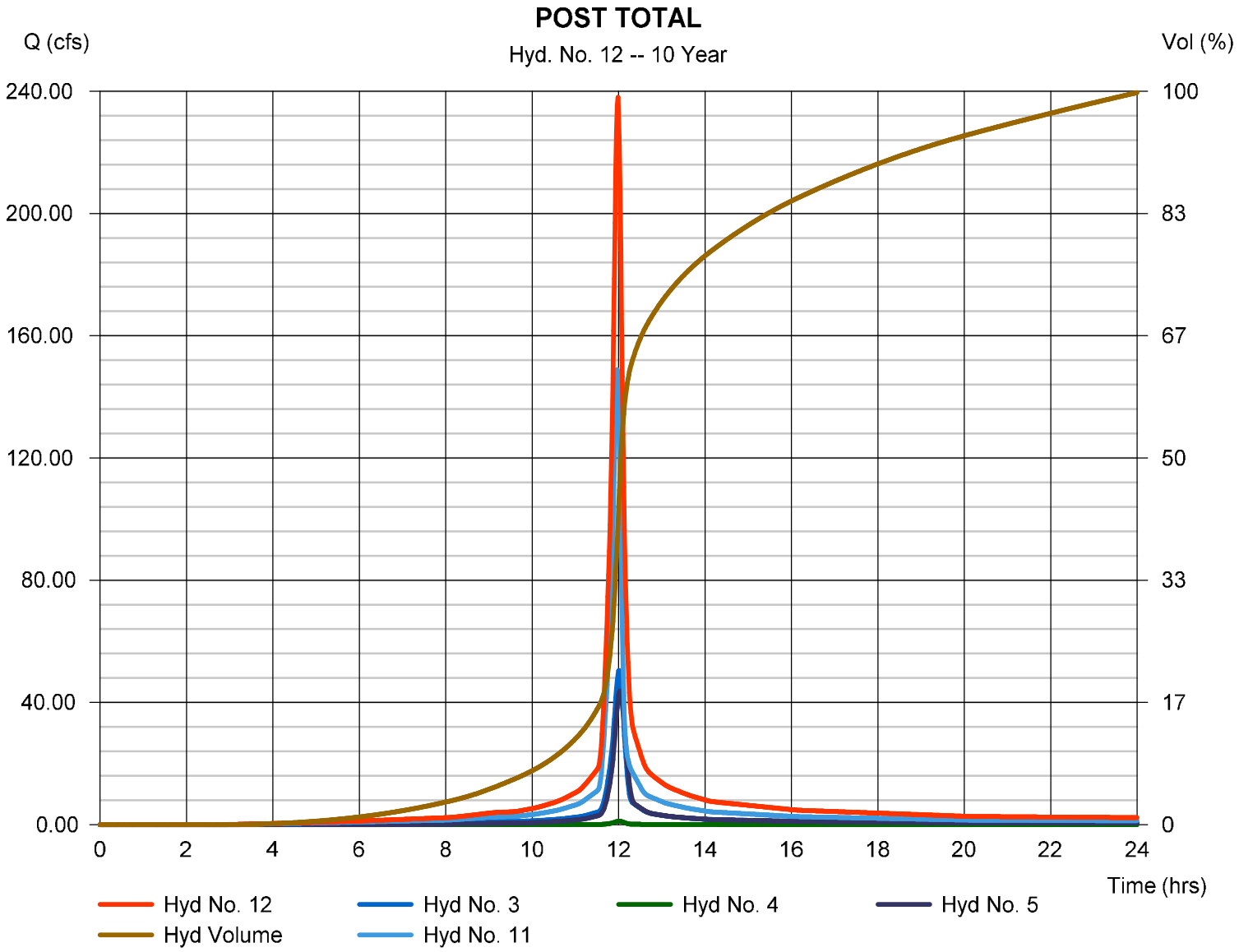


Hydrograph Report

Hyd. No. 12

POST TOTAL

Hydrograph type	= Combine	Peak discharge	= 238.00 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 613,428 cuft
Inflow hyds.	= 3, 4, 5, 11	Contrib. drain. area	= 17.290 ac



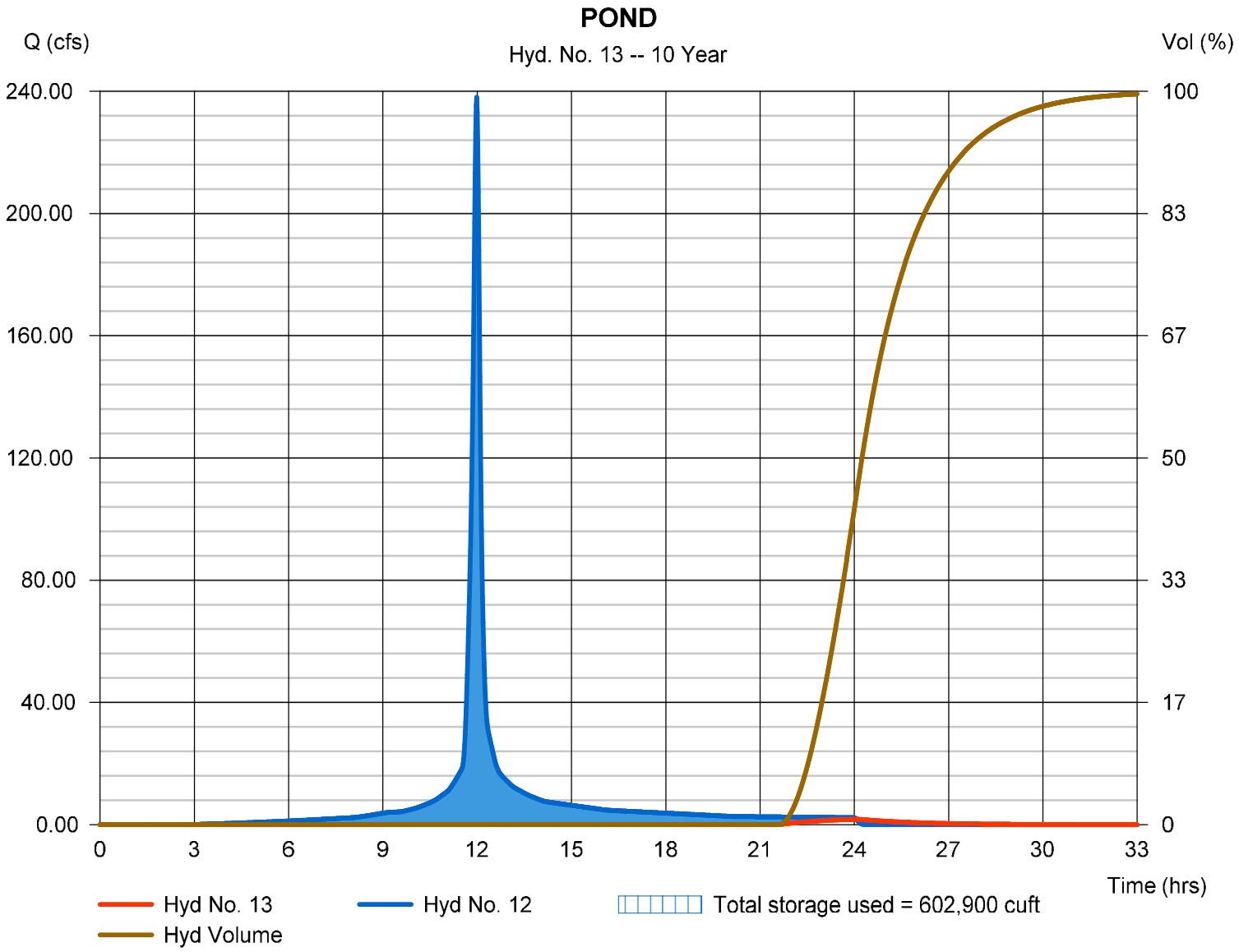
Hydrograph Report

Hyd. No. 13

POND

Hydrograph type	=	Reservoir	Peak discharge	=	1.777 cfs
Storm frequency	=	10 yrs	Time to peak	=	24.07 hrs
Time interval	=	1 min	Hyd. volume	=	22,092 cuft
Inflow hyd. No.	=	12 - POST TOTAL	Max. Elevation	=	890.07 ft
Reservoir name	=	<New Pond>	Max. Storage	=	602,900 cuft

Storage Indication method used.

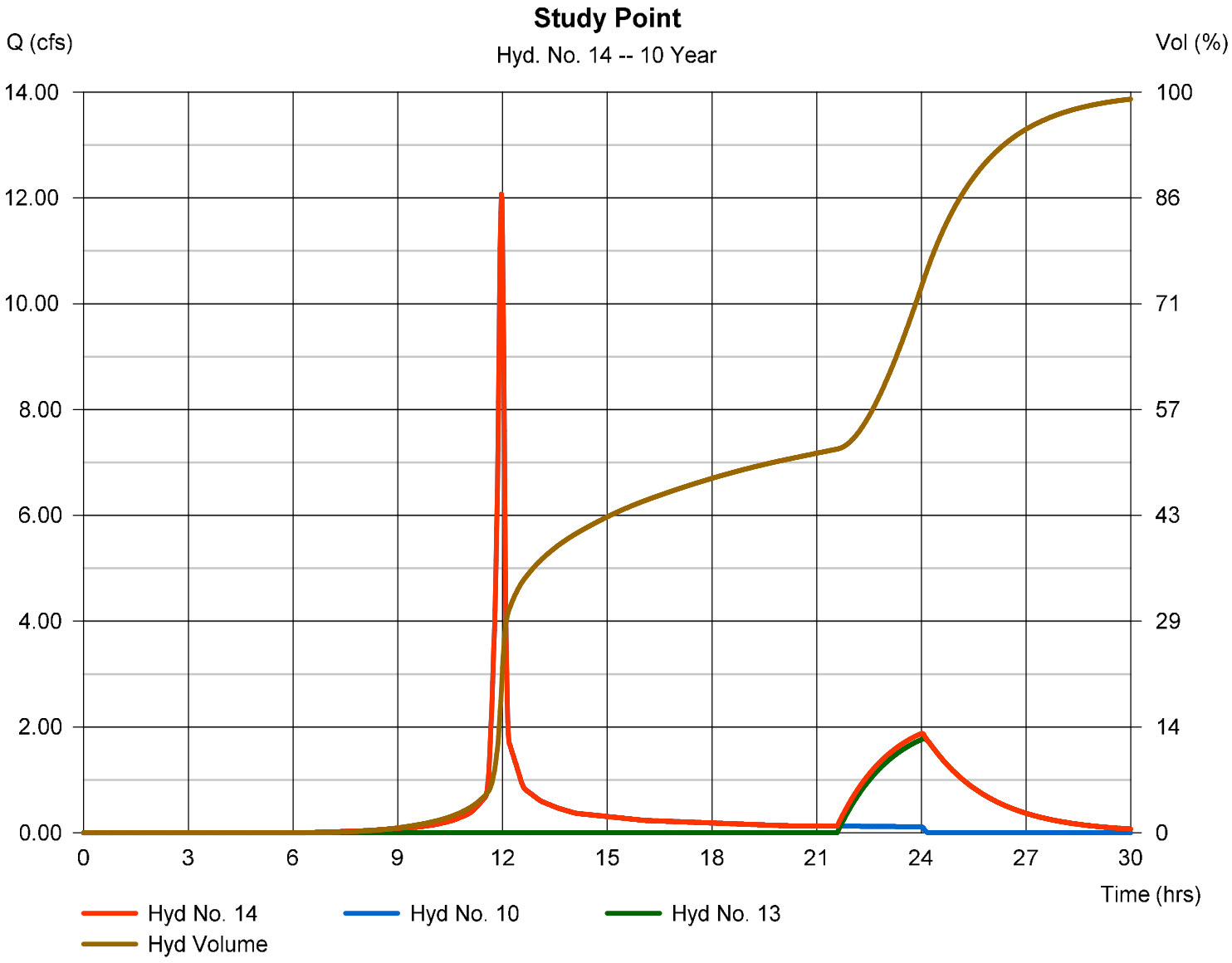


Hydrograph Report

Hyd. No. 14

Study Point

Hydrograph type	= Combine	Peak discharge	= 12.07 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 48,093 cuft
Inflow hyds.	= 10, 13	Contrib. drain. area	= 2.060 ac



Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
3	SCS Runoff	85.46	1	721	240,918	------	------	------	OFFSITE SOUTH
4	SCS Runoff	2.073	1	721	5,564	------	------	------	OFFSITE EAST
5	SCS Runoff	81.58	1	722	228,340	------	------	------	OFFSITE WEST
6	SCS Runoff	184.38	1	718	442,989	------	------	------	POST ONSITE 1
7	SCS Runoff	25.90	1	721	73,014	------	------	------	POST ONSTE 2
8	SCS Runoff	26.08	1	718	62,657	------	------	------	POST ONSITE 3
9	SCS Runoff	17.06	1	718	40,990	------	------	------	POST ONSITE 4
10	SCS Runoff	22.62	1	718	50,454	------	------	------	ONSITE BYPASS
11	Combine	251.83	1	718	619,651	6, 7, 8, 9,	------	------	<no description>
12	Combine	410.74	1	719	1,094,472	3, 4, 5, 11	------	------	POST TOTAL
13	Reservoir	42.02	1	748	503,137	12	890.66	697,496	POND
14	Combine	44.05	1	747	553,591	10, 13	------	------	Study Point

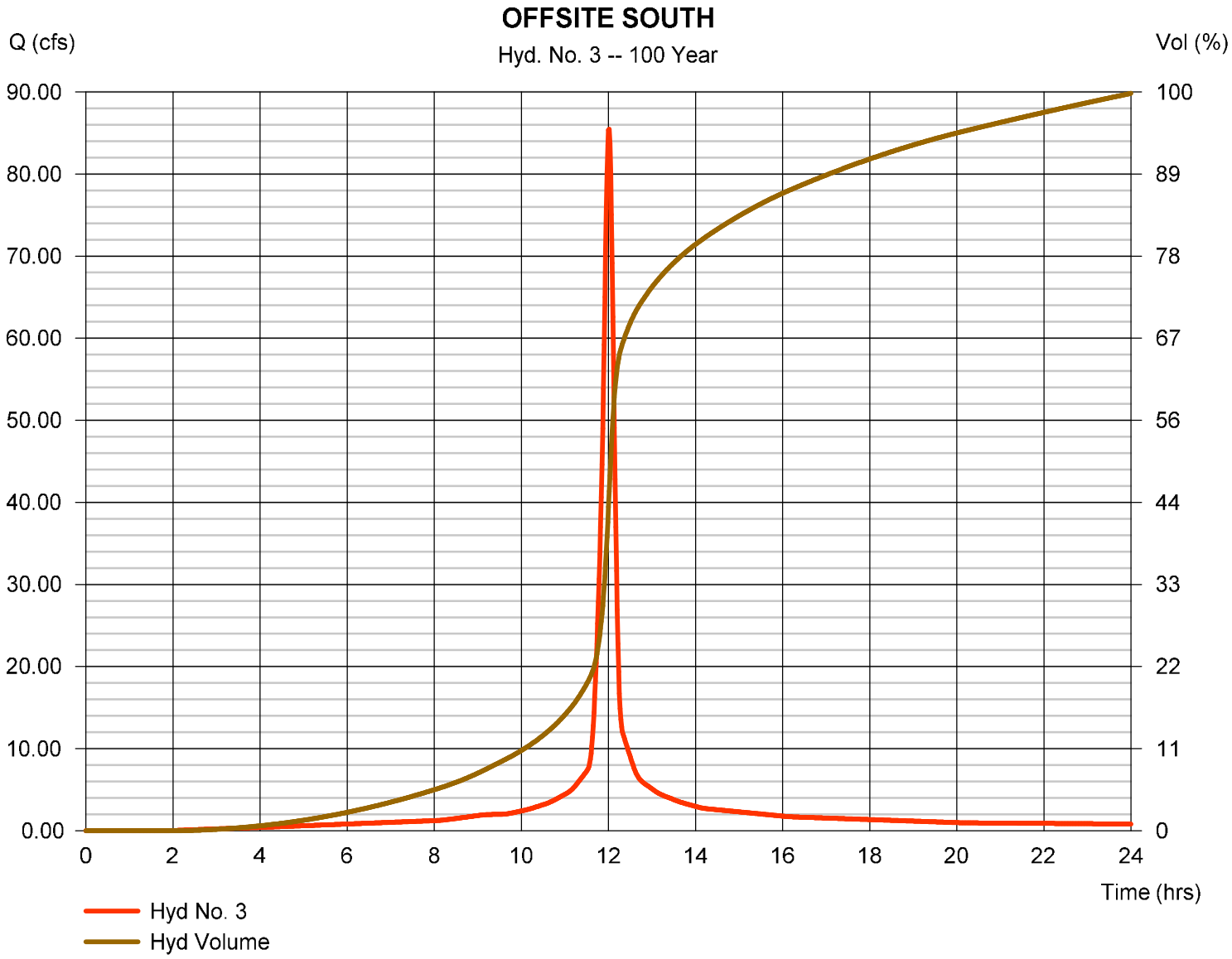
Hydrograph Report

Hyd. No. 3

OFFSITE SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	85.46 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	240,918 cuft
Drainage area	=	8.150 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	13.40 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(8.200 x 92)] / 8.150

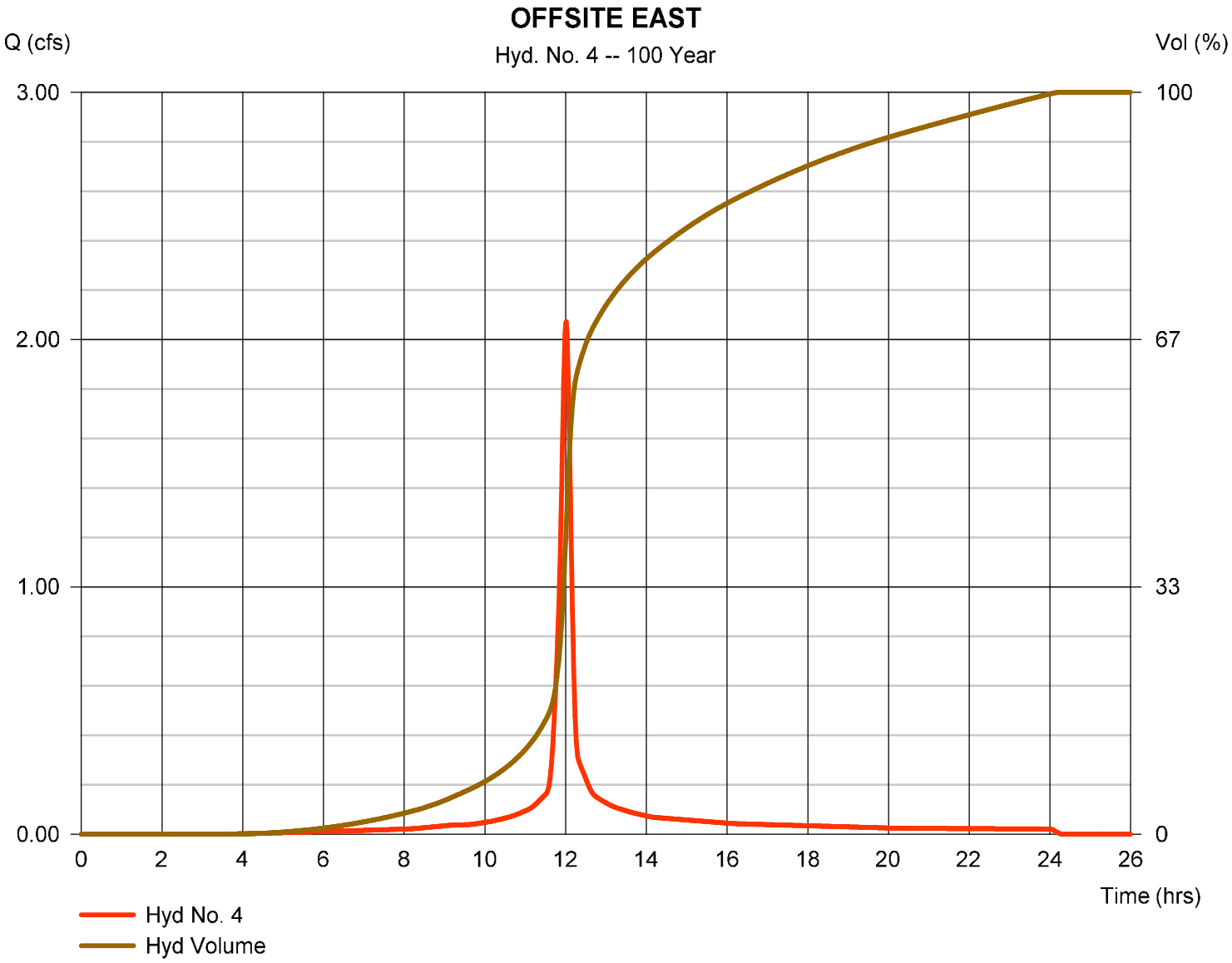


Hydrograph Report

Hyd. No. 4

OFFSITE EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.073 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	5,564 cuft
Drainage area	=	0.210 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.80 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

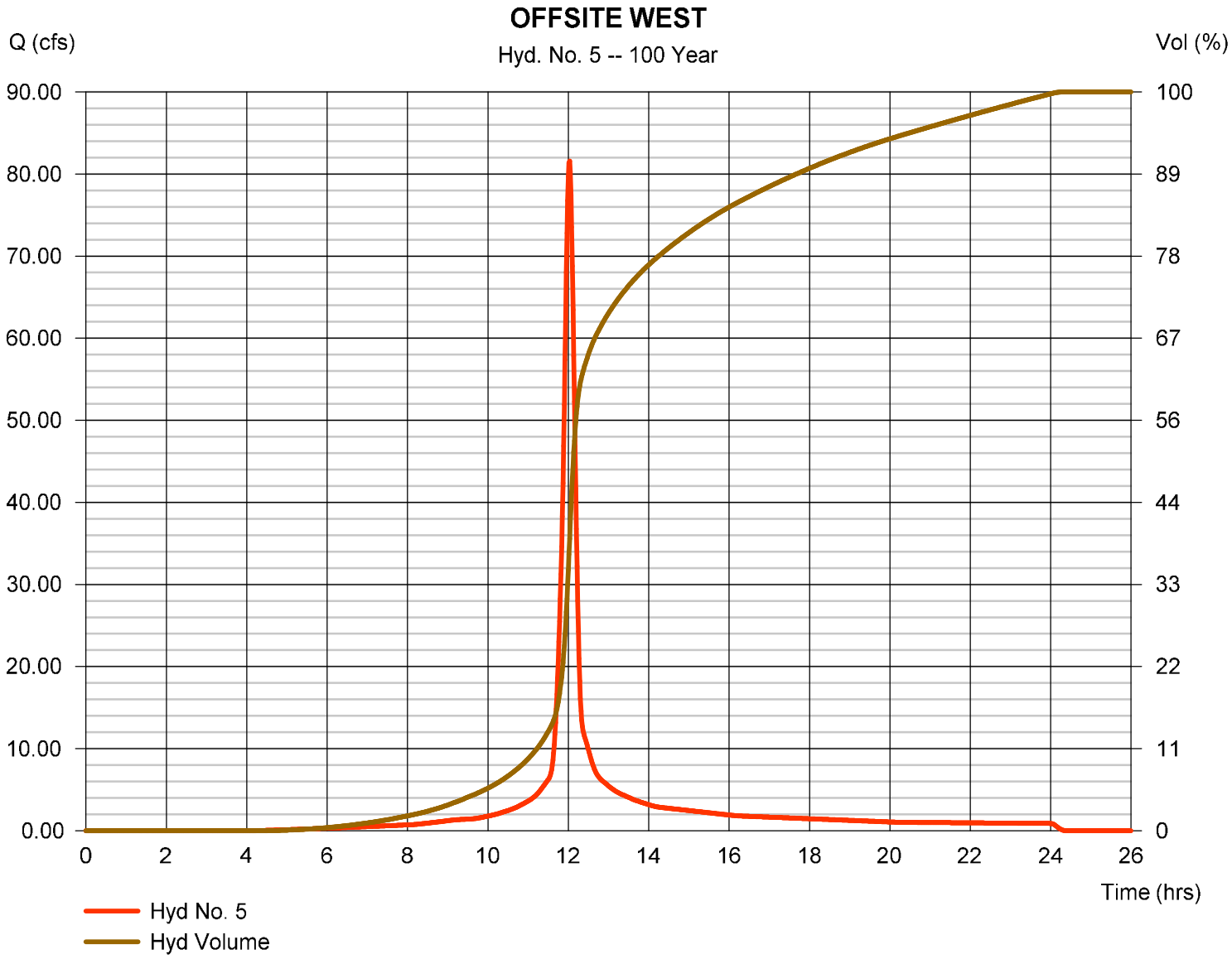


Hydrograph Report

Hyd. No. 5

OFFSITE WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	81.58 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	1 min	Hyd. volume	=	228,340 cuft
Drainage area	=	8.930 ac	Curve number	=	82
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.10 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



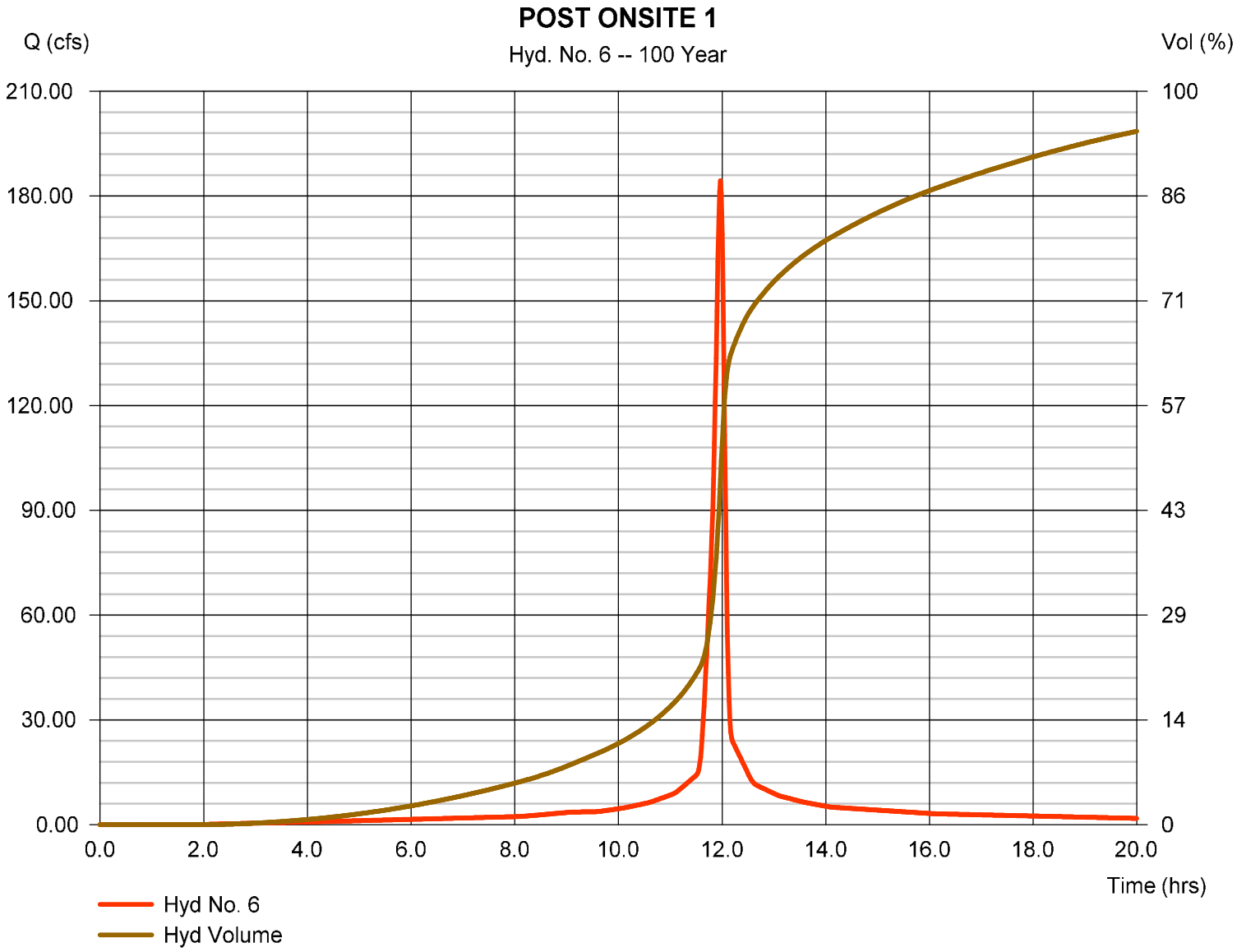
Hydrograph Report

Hyd. No. 6

POST ONSITE 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	184.38 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	442,989 cuft
Drainage area	=	15.130 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.30 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(10.000 x 98) + (5.400 x 80)] / 15.130



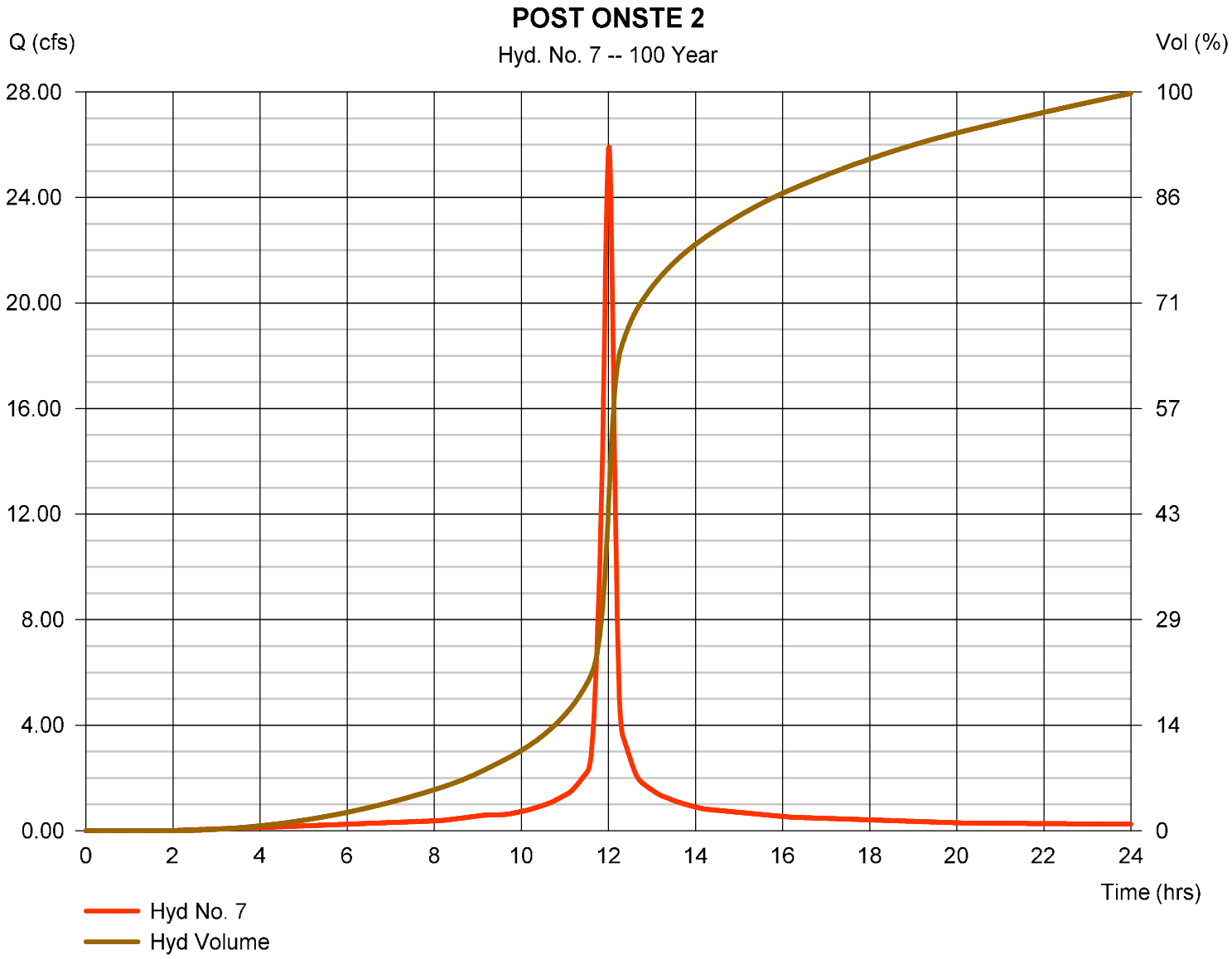
Hydrograph Report

Hyd. No. 7

POST ONSTE 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.90 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	73,014 cuft
Drainage area	=	2.470 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.40 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.600 x 98) + (0.900 x 80)] / 2.470



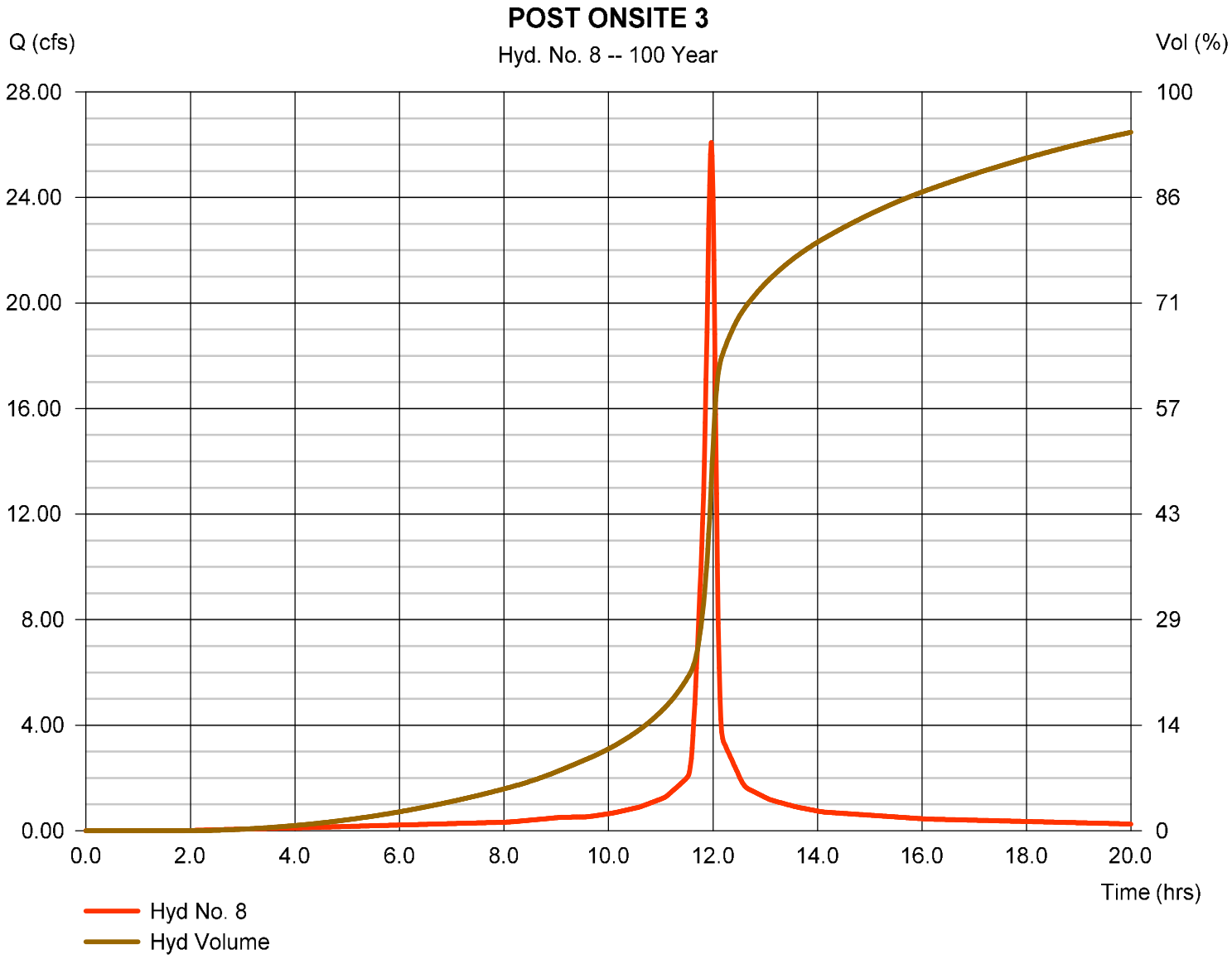
Hydrograph Report

Hyd. No. 8

POST ONSITE 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	26.08 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	62,657 cuft
Drainage area	=	2.140 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.300 x 98) + (0.700 x 80)] / 2.140



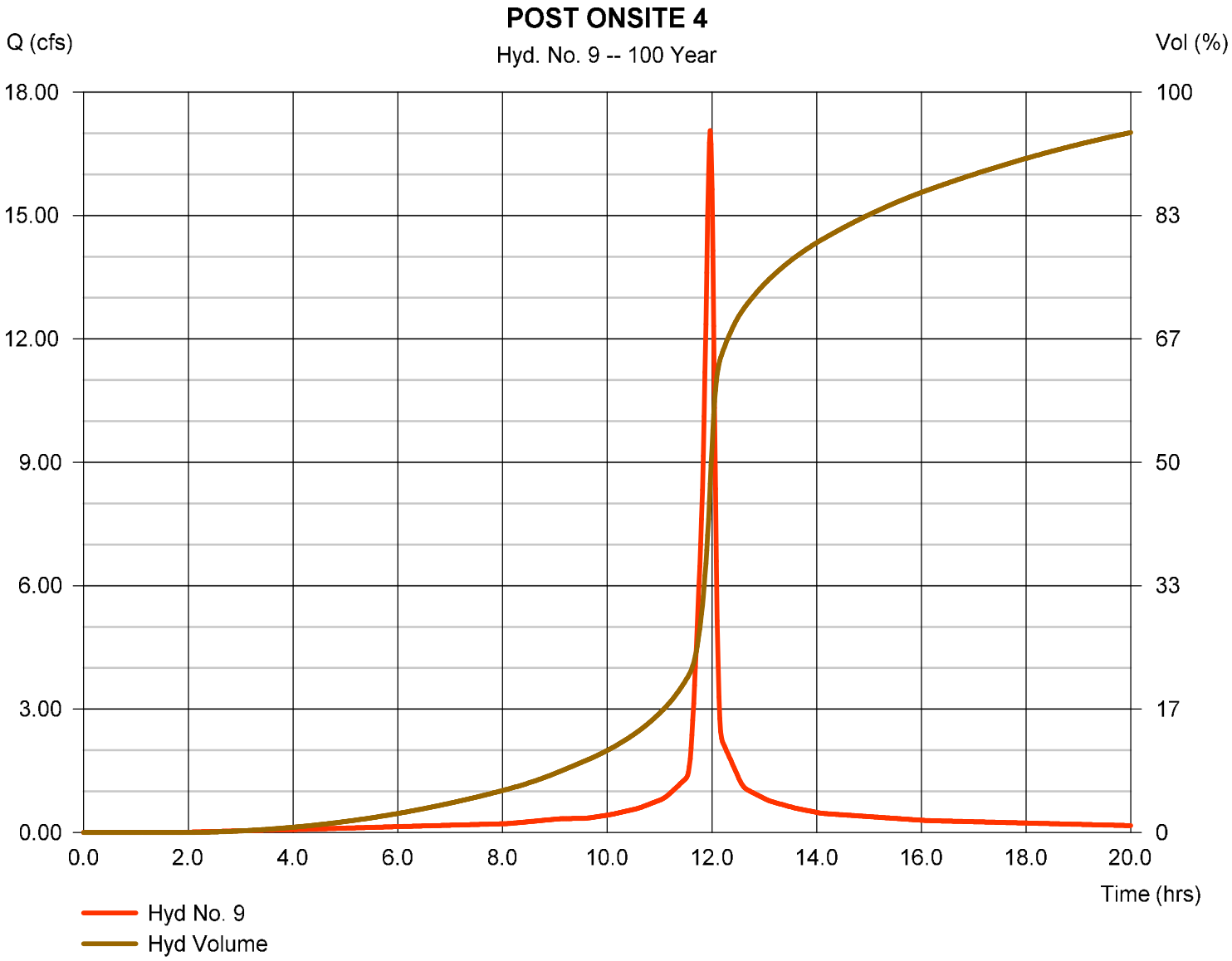
Hydrograph Report

Hyd. No. 9

POST ONSITE 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.06 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	40,990 cuft
Drainage area	=	1.400 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.900 x 98) + (0.400 x 80)] / 1.400



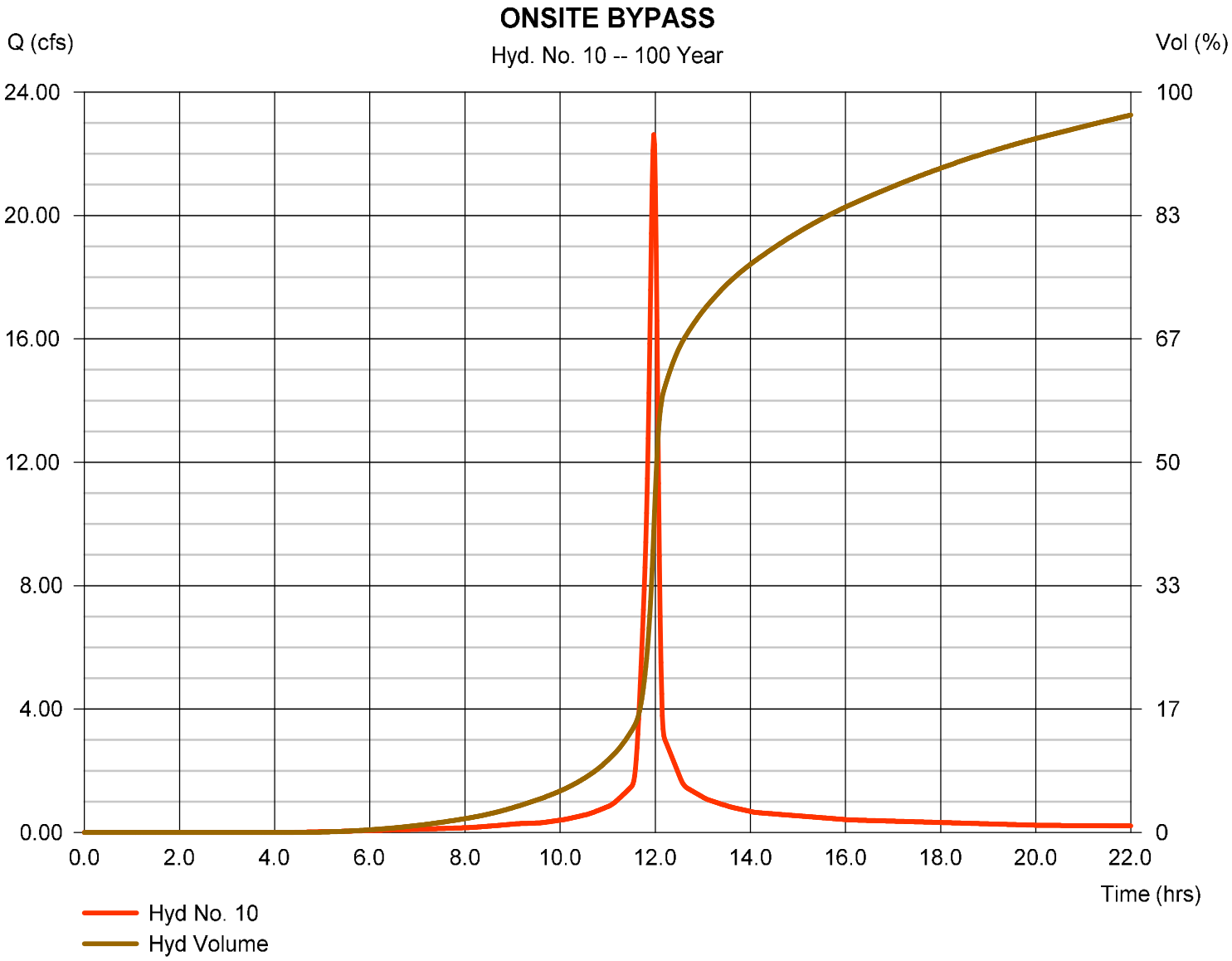
Hydrograph Report

Hyd. No. 10

ONSITE BYPASS

Hydrograph type	=	SCS Runoff	Peak discharge	=	22.62 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	50,454 cuft
Drainage area	=	2.060 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.00 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.100 x 98) + (1.900 x 80)] / 2.060

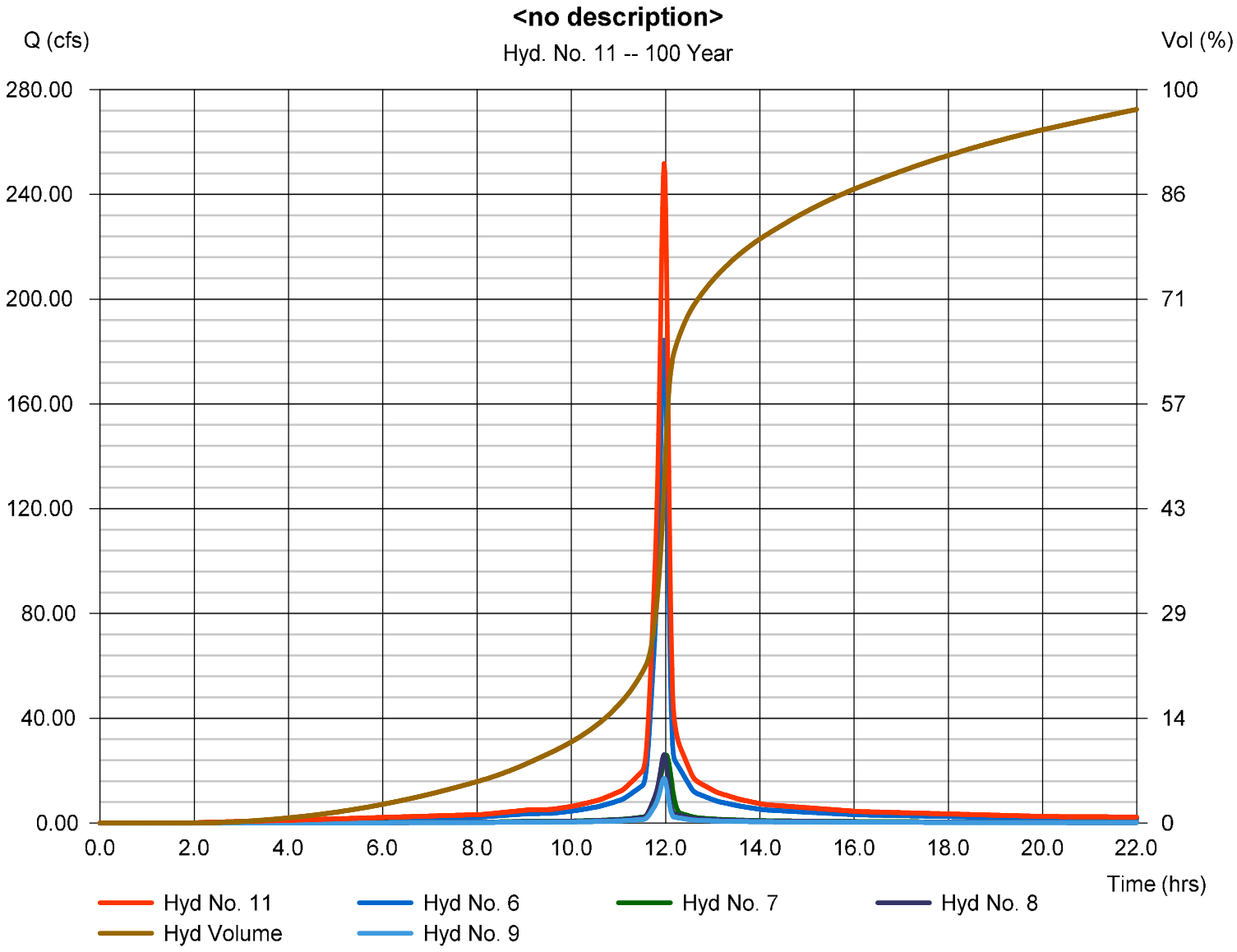


Hydrograph Report

Hyd. No. 11

<no description>

Hydrograph type	= Combine	Peak discharge	= 251.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 619,651 cuft
Inflow hyds.	= 6, 7, 8, 9	Contrib. drain. area	= 21.140 ac

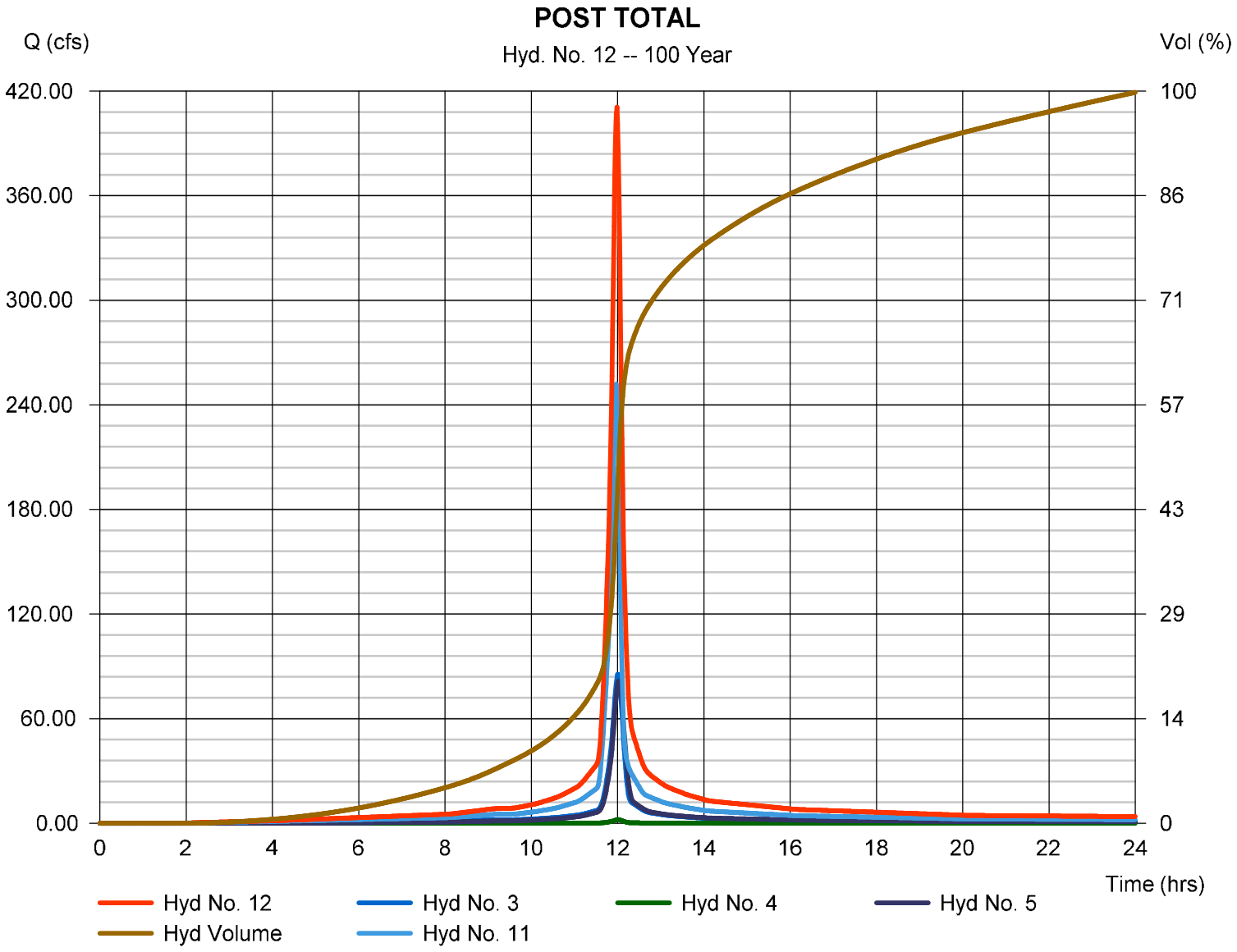


Hydrograph Report

Hyd. No. 12

POST TOTAL

Hydrograph type	= Combine	Peak discharge	= 410.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 1,094,472 cuft
Inflow hyds.	= 3, 4, 5, 11	Contrib. drain. area	= 17.290 ac



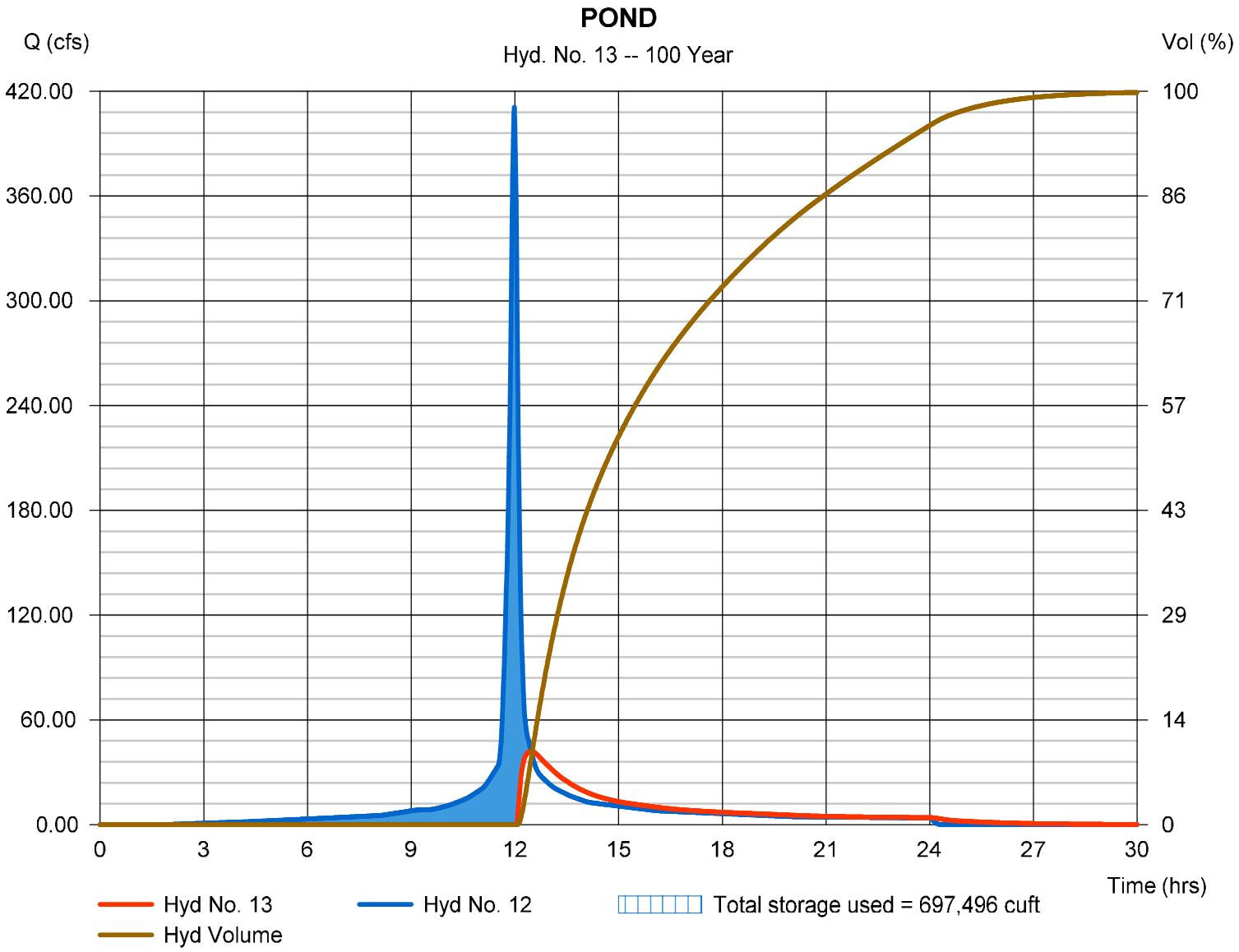
Hydrograph Report

Hyd. No. 13

POND

Hydrograph type	= Reservoir	Peak discharge	= 42.02 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.47 hrs
Time interval	= 1 min	Hyd. volume	= 503,137 cuft
Inflow hyd. No.	= 12 - POST TOTAL	Max. Elevation	= 890.66 ft
Reservoir name	= <New Pond>	Max. Storage	= 697,496 cuft

Storage Indication method used.

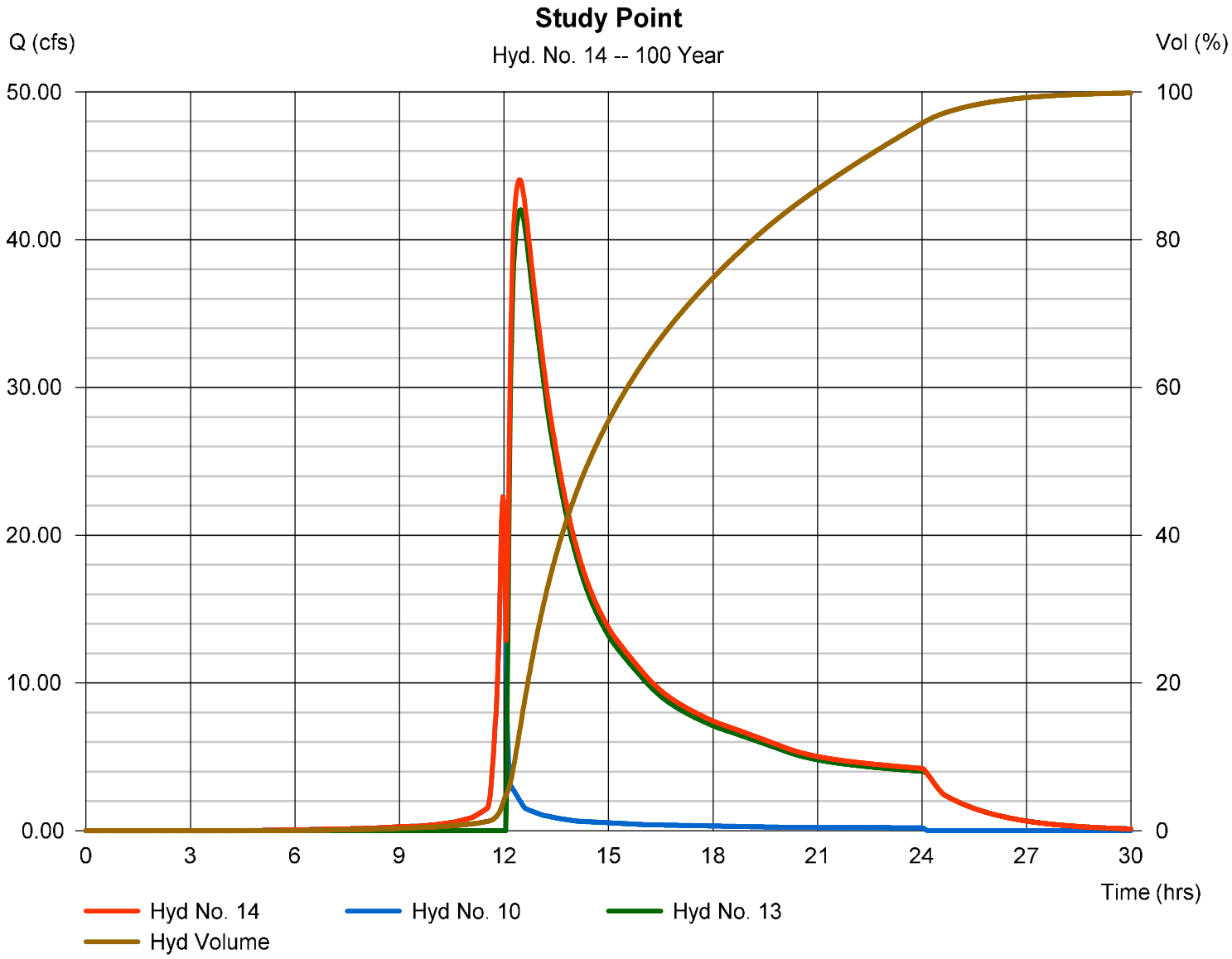


Hydrograph Report

Hyd. No. 14

Study Point

Hydrograph type	=	Combine	Peak discharge	=	44.05 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.45 hrs
Time interval	=	1 min	Hyd. volume	=	553,591 cuft
Inflow hyds.	=	10, 13	Contrib. drain. area	=	2.060 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	22.7358	4.5000	0.6795	--------
2	25.0557	4.1000	0.6658	--------
3	31.8256	5.9000	0.6995	--------
5	30.1342	4.0000	0.6571	--------
10	34.3040	3.9000	0.6511	--------
25	37.9465	3.4000	0.6308	--------
50	41.7403	3.3000	0.6230	--------
100	44.4699	2.9000	0.6110	--------

File name: Storm Inlet Design.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.92	3.69	3.02	2.59	2.28	2.05	1.87	1.72	1.60	1.50	1.42	1.34
2	5.76	4.30	3.52	3.01	2.66	2.39	2.18	2.01	1.87	1.76	1.66	1.57
3	5.99	4.60	3.80	3.27	2.89	2.60	2.37	2.19	2.04	1.91	1.80	1.70
5	7.11	5.32	4.35	3.73	3.30	2.97	2.71	2.51	2.34	2.19	2.07	1.96
10	8.26	6.18	5.06	4.34	3.84	3.46	3.16	2.92	2.73	2.56	2.41	2.29
25	9.91	7.38	6.04	5.19	4.60	4.15	3.80	3.52	3.28	3.09	2.92	2.77
50	11.17	8.33	6.82	5.87	5.20	4.70	4.31	3.99	3.73	3.51	3.32	3.15
100	12.58	9.32	7.63	6.56	5.82	5.26	4.82	4.47	4.18	3.94	3.72	3.54

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

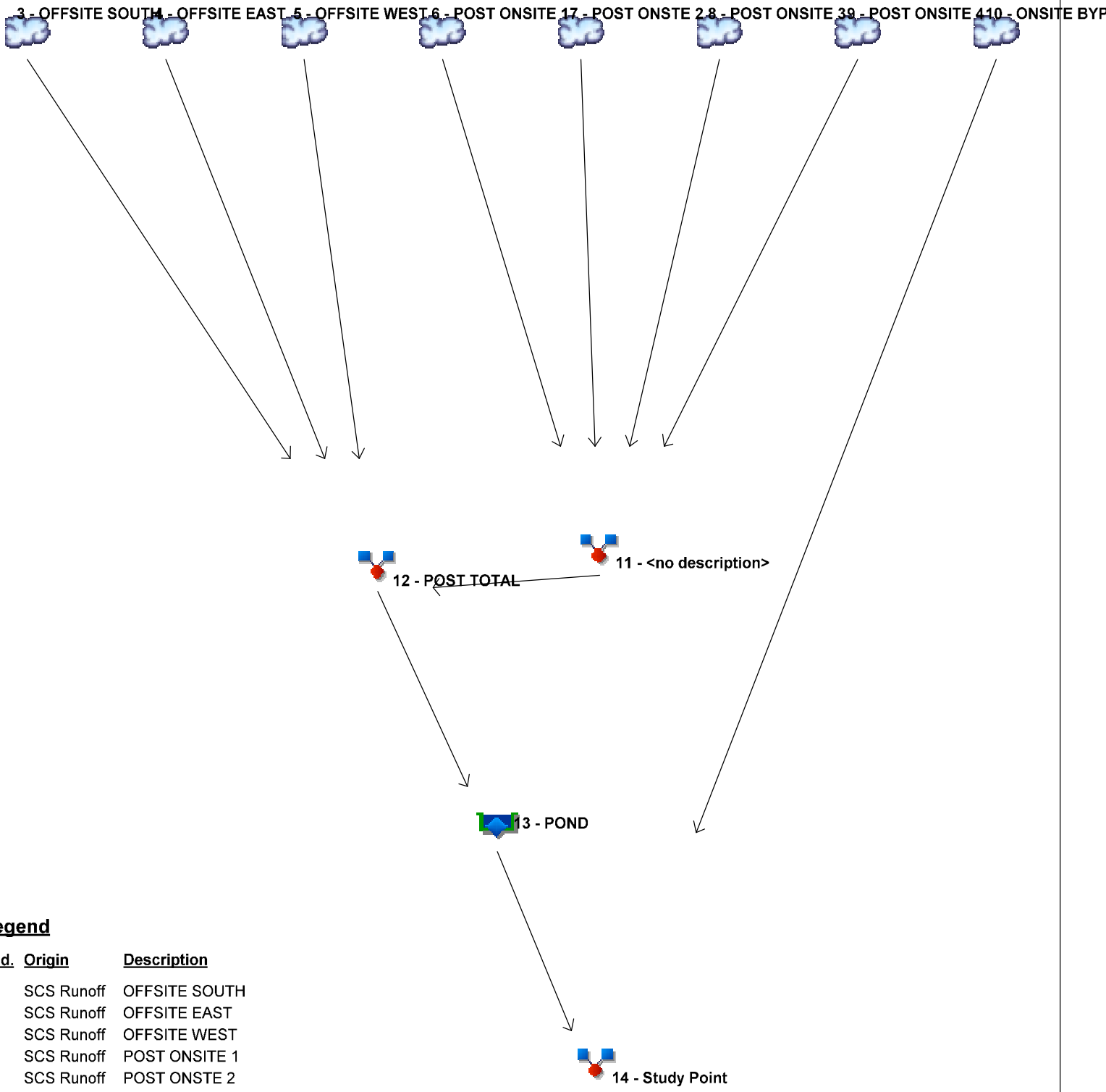
Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.70	1.37	3.30	5.65	5.77	6.80	9.24
SCS 6-Hr	0.00	2.66	0.00	0.00	4.02	0.00	0.00	6.46
Huff-1st	0.00	0.00	0.00	2.75	0.00	5.38	6.50	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	0.00	5.25	6.00	0.00

Hydraflow Table of Contents

APPENDIX D:
HYDRAFLOW REPORT FOR 100-YR CLOGGED EVENT

Watershed Model Schematic

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



Legend

Hyd.	Origin	Description
3	SCS Runoff	OFFSITE SOUTH
4	SCS Runoff	OFFSITE EAST
5	SCS Runoff	OFFSITE WEST
6	SCS Runoff	POST ONSITE 1
7	SCS Runoff	POST ONSTE 2
8	SCS Runoff	POST ONSITE 3
9	SCS Runoff	POST ONSITE 4
10	SCS Runoff	ONSITE BYPASS
11	Combine	<no description>
12	Combine	POST TOTAL
13	Reservoir	POND
14	Combine	Study Point

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
3	SCS Runoff	------	-------	31.15	7.987	-------	50.47	-------	-------	85.46	OFFSITE SOUTH
4	SCS Runoff	------	-------	0.648	0.104	-------	1.149	-------	-------	2.073	OFFSITE EAST
5	SCS Runoff	------	-------	23.50	2.842	-------	43.71	-------	-------	81.58	OFFSITE WEST
6	SCS Runoff	------	-------	67.50	17.52	-------	109.08	-------	-------	184.38	POST ONSITE 1
7	SCS Runoff	------	-------	9.440	2.420	-------	15.29	-------	-------	25.90	POST ONSTE 2
8	SCS Runoff	------	-------	9.548	2.478	-------	15.43	-------	-------	26.08	POST ONSITE 3
9	SCS Runoff	------	-------	6.246	1.621	-------	10.09	-------	-------	17.06	POST ONSITE 4
10	SCS Runoff	------	-------	6.447	0.758	-------	12.07	-------	-------	22.62	ONSITE BYPASS
11	Combine	6, 7, 8, 9,	-------	92.05	23.87	-------	148.89	-------	-------	251.83	<no description>
12	Combine	3, 4, 5, 11	-------	143.46	33.73	-------	238.00	-------	-------	410.74	POST TOTAL
13	Reservoir	12	-------	0.000	0.000	-------	1.777	-------	-------	42.02	POND
14	Combine	10, 13	-------	6.447	0.758	-------	12.07	-------	-------	44.05	Study Point

Hydrograph Summary Report

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

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
3	SCS Runoff	85.46	1	721	240,918	------	------	------	OFFSITE SOUTH
4	SCS Runoff	2.073	1	721	5,564	------	------	------	OFFSITE EAST
5	SCS Runoff	81.58	1	722	228,340	------	------	------	OFFSITE WEST
6	SCS Runoff	184.38	1	718	442,989	------	------	------	POST ONSITE 1
7	SCS Runoff	25.90	1	721	73,014	------	------	------	POST ONSTE 2
8	SCS Runoff	26.08	1	718	62,657	------	------	------	POST ONSITE 3
9	SCS Runoff	17.06	1	718	40,990	------	------	------	POST ONSITE 4
10	SCS Runoff	22.62	1	718	50,454	------	------	------	ONSITE BYPASS
11	Combine	251.83	1	718	619,651	6, 7, 8, 9,	------	------	<no description>
12	Combine	410.74	1	719	1,094,472	3, 4, 5, 11	------	------	POST TOTAL
13	Reservoir	42.02	1	748	503,137	12	890.66	697,496	POND
14	Combine	44.05	1	747	553,591	10, 13	------	------	Study Point

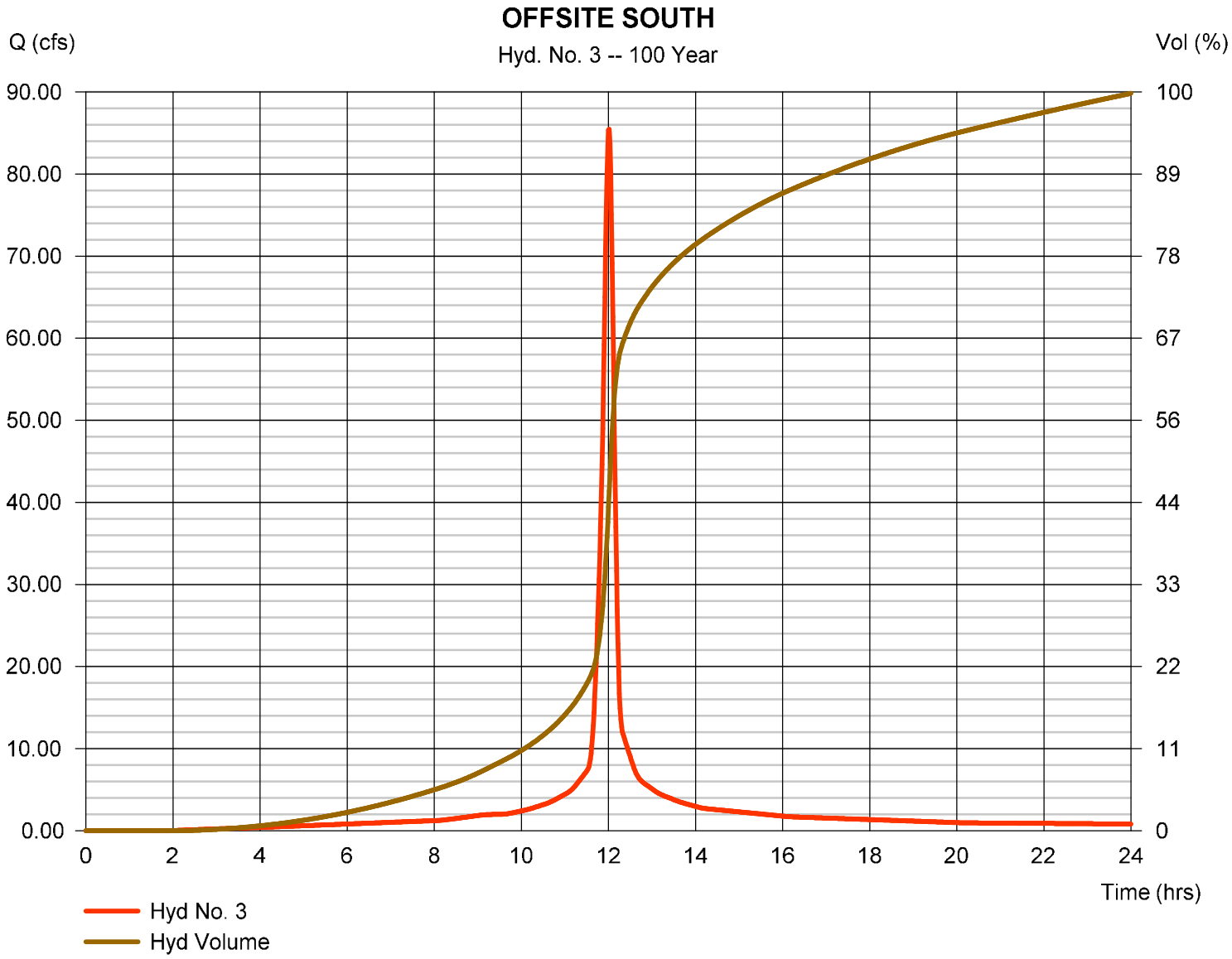
Hydrograph Report

Hyd. No. 3

OFFSITE SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	85.46 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	240,918 cuft
Drainage area	=	8.150 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	13.40 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(8.200 x 92)] / 8.150



TR55 Tc Worksheet

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

Hyd. No. 3

OFFSITE SOUTH

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 94.3		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 2.10		0.00		0.00		
Travel Time (min)	**= 9.42**	**+**	**0.00**	**+**	**0.00**	**=**	**9.42**
Shallow Concentrated Flow							
Flow length (ft)	= 238.90		0.00		0.00		
Watercourse slope (%)	= 2.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.55		0.00		0.00		
Travel Time (min)	**= 1.56**	**+**	**0.00**	**+**	**0.00**	**=**	**1.56**
Channel Flow							
X sectional flow area (sqft)	= 3.14		19.63		0.00		
Wetted perimeter (ft)	= 6.28		15.71		0.00		
Channel slope (%)	= 3.00		2.60		0.00		
Manning's n-value	= 0.015		0.100		0.015		
Velocity (ft/s)	=10.81						
			2.79				
					0.00		
Flow length (ft)	({0})338.3		308.6		0.0		
Travel Time (min)	**= 0.52**	**+**	**1.84**	**+**	**0.00**	**=**	**2.37**

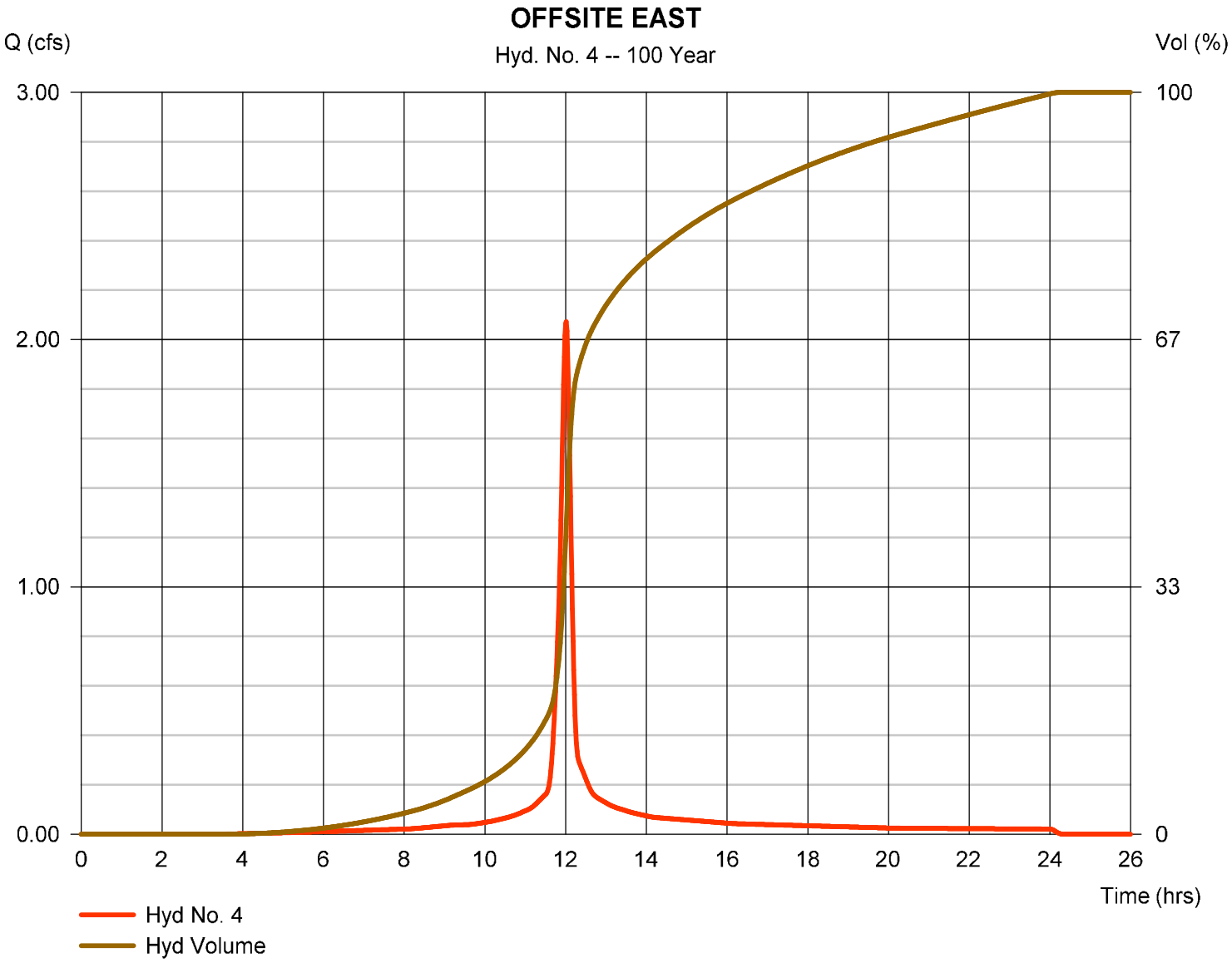
Total Travel Time, Tc ..... 13.40 min

Hydrograph Report

Hyd. No. 4

OFFSITE EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.073 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	5,564 cuft
Drainage area	=	0.210 ac	Curve number	=	85
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.80 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

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

Hyd. No. 4

OFFSITE EAST

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 92.1		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 1.10		0.00		0.00		
Travel Time (min)	**= 11.98**	**+**	**0.00**	**+**	**0.00**	**=**	**11.98**
Shallow Concentrated Flow							
Flow length (ft)	= 111.80		0.00		0.00		
Watercourse slope (%)	= 1.90		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.22		0.00		0.00		
Travel Time (min)	**= 0.84**	**+**	**0.00**	**+**	**0.00**	**=**	**0.84**
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**

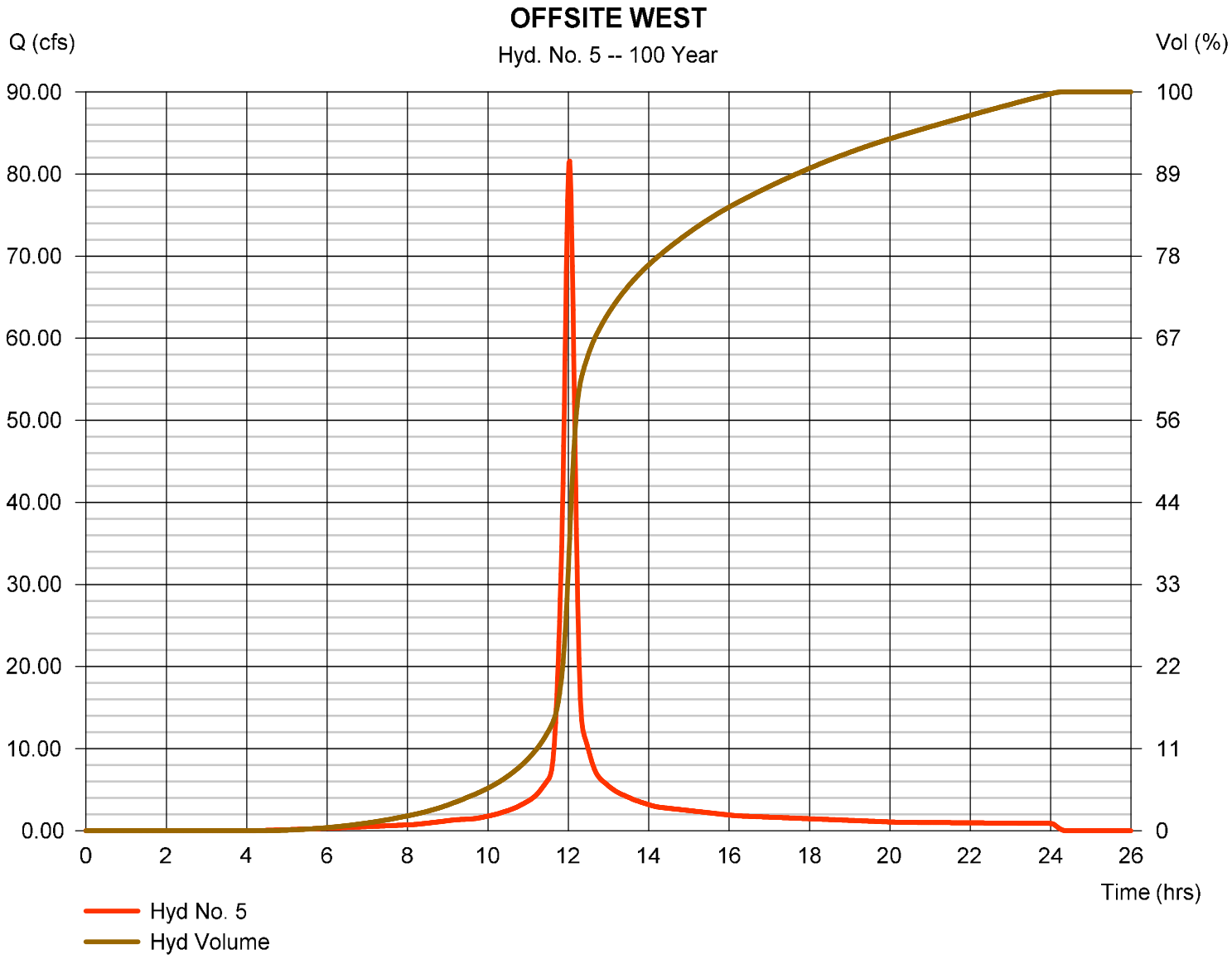
Total Travel Time, Tc ..... 12.80 min

Hydrograph Report

Hyd. No. 5

OFFSITE WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	81.58 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	1 min	Hyd. volume	=	228,340 cuft
Drainage area	=	8.930 ac	Curve number	=	82
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	15.10 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



TR55 Tc Worksheet

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

Hyd. No. 5

OFFSITE WEST

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 82.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 2.40		0.00		0.00		
Travel Time (min)	**= 7.99**	**+**	**0.00**	**+**	**0.00**	**=**	**7.99**
Shallow Concentrated Flow							
Flow length (ft)	= 519.20		0.00		0.00		
Watercourse slope (%)	= 3.50		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.02		0.00		0.00		
Travel Time (min)	**= 2.87**	**+**	**0.00**	**+**	**0.00**	**=**	**2.87**
Channel Flow							
X sectional flow area (sqft)	= 3.14		3.14		19.63		
Wetted perimeter (ft)	= 6.28		6.28		15.71		
Channel slope (%)	= 2.40		4.00		1.80		
Manning's n-value	= 0.015		0.015		0.100		
Velocity (ft/s)	=9.67						
			12.49				
					2.32		
Flow length (ft)	({0})706.6		198.2		378.5		
Travel Time (min)	**= 1.22**	**+**	**0.26**	**+**	**2.72**	**=**	**4.20**

Total Travel Time, Tc ..... 15.10 min

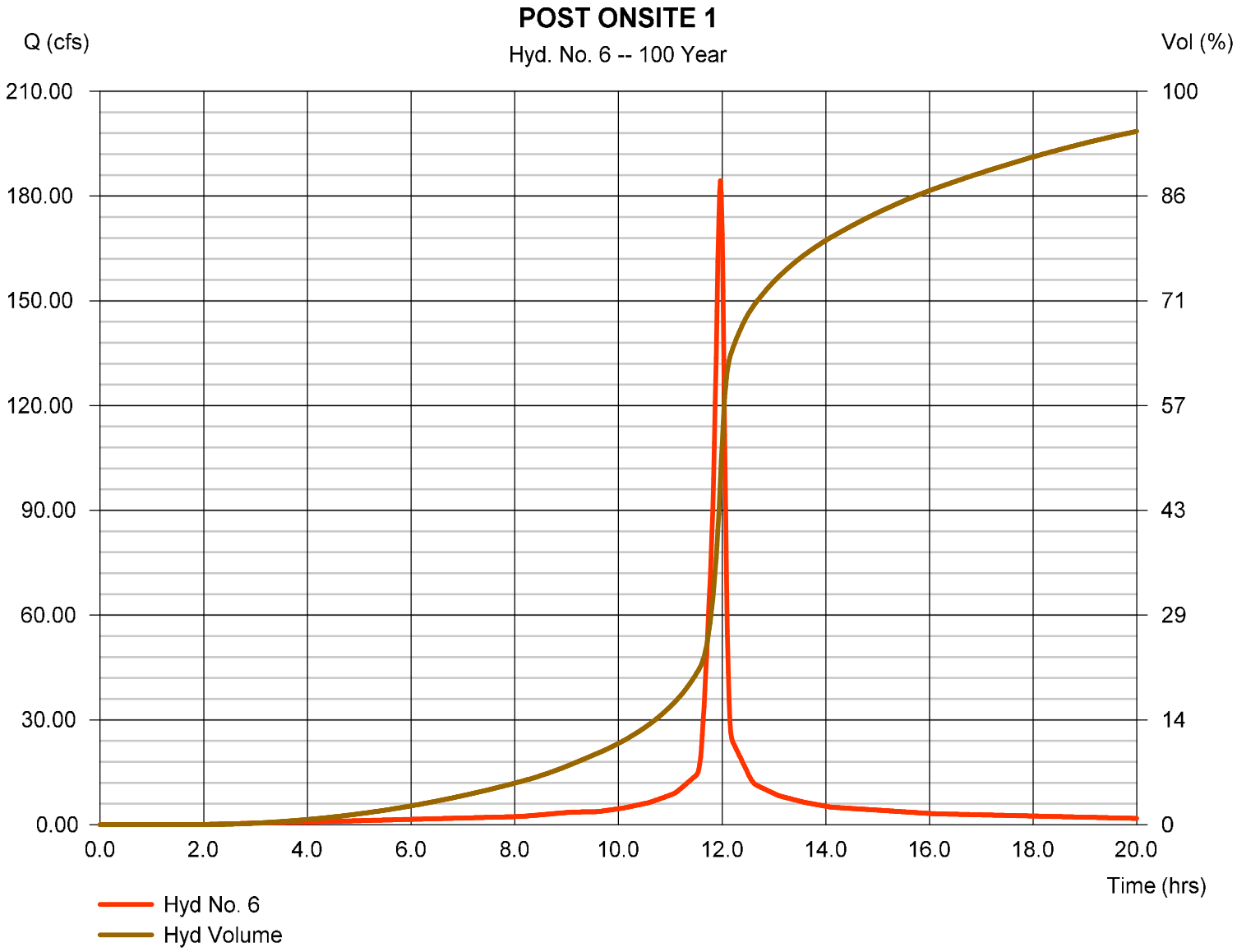
Hydrograph Report

Hyd. No. 6

POST ONSITE 1

Hydrograph type	=	SCS Runoff	Peak discharge	=	184.38 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	442,989 cuft
Drainage area	=	15.130 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.30 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(10.000 x 98) + (5.400 x 80)] / 15.130



TR55 Tc Worksheet

Hyd. No. 6

POST ONSITE 1

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 75.5		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.30		0.00		0.00		
Travel Time (min)	**= 5.45**	**+**	**0.00**	**+**	**0.00**	**=**	**5.45**
Shallow Concentrated Flow							
Flow length (ft)	= 493.80		0.00		0.00		
Watercourse slope (%)	= 7.70		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.48		0.00		0.00		
Travel Time (min)	**= 1.84**	**+**	**0.00**	**+**	**0.00**	**=**	**1.84**
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 ..... 7.30 min

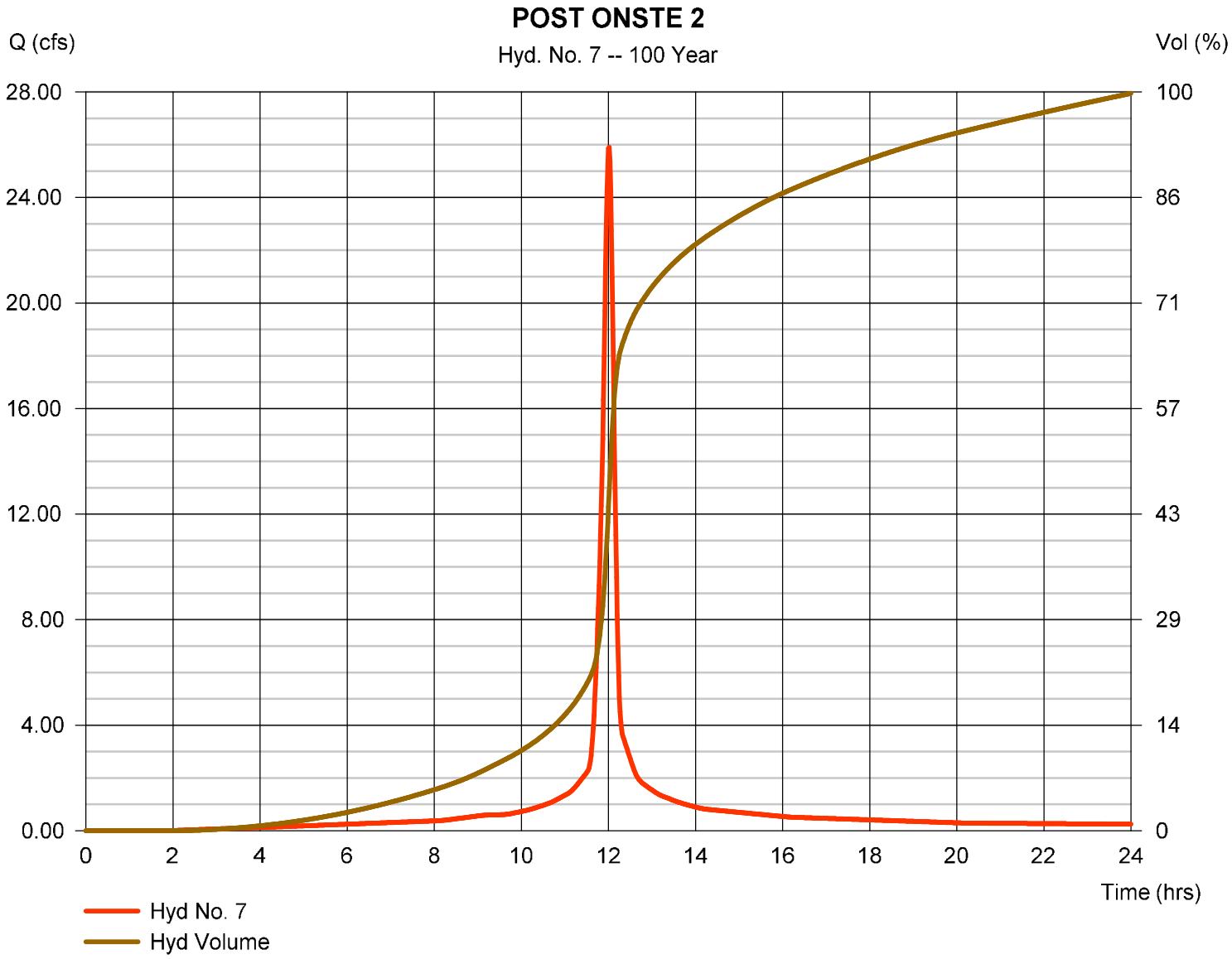
Hydrograph Report

Hyd. No. 7

POST ONSTE 2

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.90 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	73,014 cuft
Drainage area	=	2.470 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	12.40 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.600 x 98) + (0.900 x 80)] / 2.470



TR55 Tc Worksheet

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

Hyd. No. 7

POST ONSTE 2

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 94.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.30		0.00		0.00		
Travel Time (min)	**= 6.49**	**+**	**0.00**	**+**	**0.00**	**=**	**6.49**
Shallow Concentrated Flow							
Flow length (ft)	= 477.70		0.00		0.00		
Watercourse slope (%)	= 3.10		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=2.84		0.00		0.00		
Travel Time (min)	**= 2.80**	**+**	**0.00**	**+**	**0.00**	**=**	**2.80**
Channel Flow							
X sectional flow area (sqft)	= 3.14		19.60		0.00		
Wetted perimeter (ft)	= 6.28		15.70		0.00		
Channel slope (%)	= 4.00		1.70		0.00		
Manning's n-value	= 0.015		0.100		0.015		
Velocity (ft/s)	=12.49						
			2.25				
					0.00		
Flow length (ft)	({0})198.0		378.5		0.0		
Travel Time (min)	**= 0.26**	**+**	**2.80**	**+**	**0.00**	**=**	**3.06**

Total Travel Time, Tc ..... 12.40 min

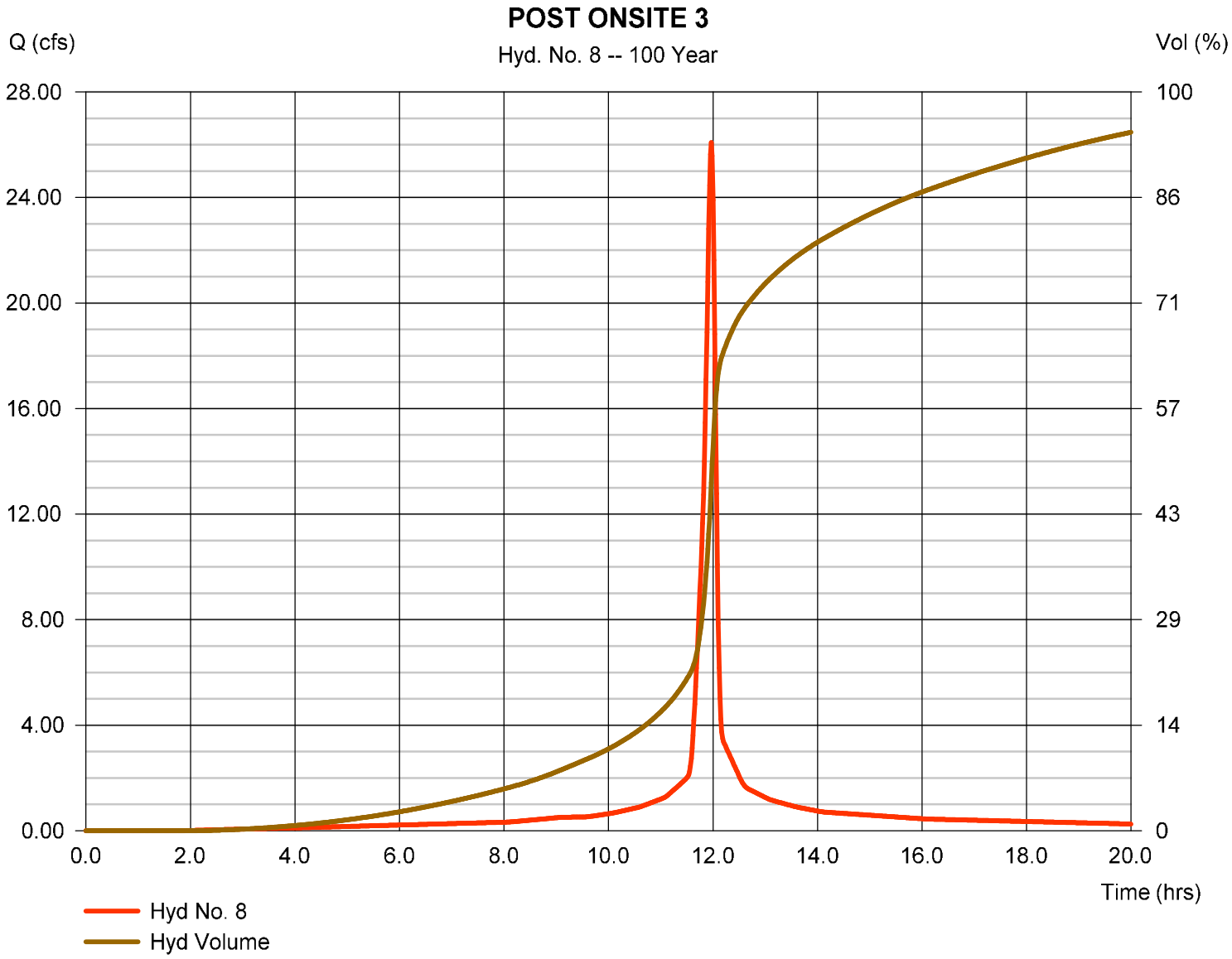
Hydrograph Report

Hyd. No. 8

POST ONSITE 3

Hydrograph type	=	SCS Runoff	Peak discharge	=	26.08 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	62,657 cuft
Drainage area	=	2.140 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(1.300 x 98) + (0.700 x 80)] / 2.140



TR55 Tc Worksheet

Hyd. No. 8

POST ONSITE 3

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 100.0		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.00		0.00		0.00		
Travel Time (min)	**= 6.98**	**+**	**0.00**	**+**	**0.00**	**=**	**6.98**
Shallow Concentrated Flow							
Flow length (ft)	= 163.00		0.00		0.00		
Watercourse slope (%)	= 7.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=4.39		0.00		0.00		
Travel Time (min)	**= 0.62**	**+**	**0.00**	**+**	**0.00**	**=**	**0.62**
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 ..... 7.60 min

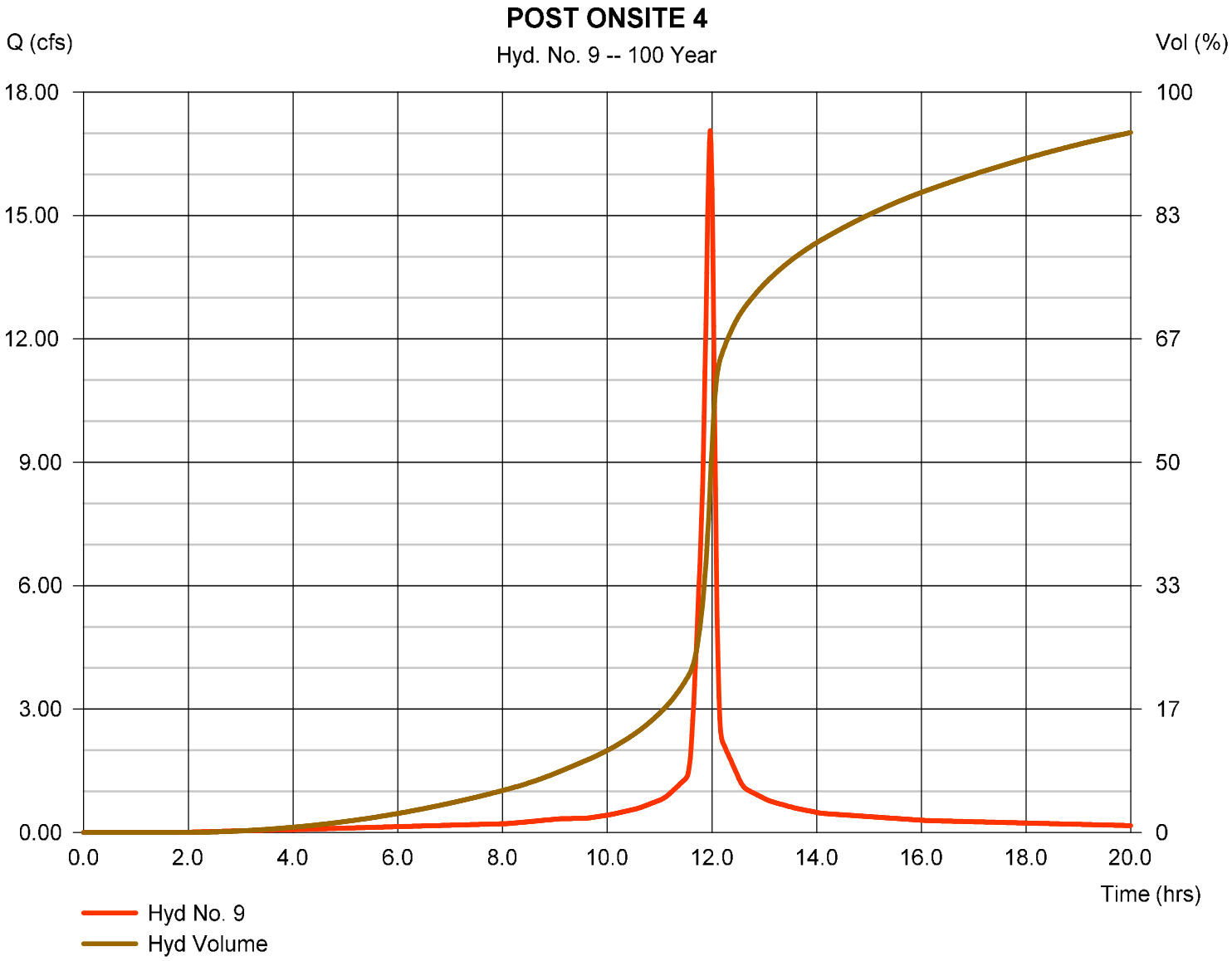
Hydrograph Report

Hyd. No. 9

POST ONSITE 4

Hydrograph type	=	SCS Runoff	Peak discharge	=	17.06 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	40,990 cuft
Drainage area	=	1.400 ac	Curve number	=	92*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.60 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.900 x 98) + (0.400 x 80)] / 1.400



TR55 Tc Worksheet

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

Hyd. No. 9

POST ONSITE 4

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 93.4		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.30		0.00		0.00		
Travel Time (min)	**= 6.46**	**+**	**0.00**	**+**	**0.00**	**=**	**6.46**
Shallow Concentrated Flow							
Flow length (ft)	= 223.80		0.00		0.00		
Watercourse slope (%)	= 4.00		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=3.23		0.00		0.00		
Travel Time (min)	**= 1.16**	**+**	**0.00**	**+**	**0.00**	**=**	**1.16**
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 ..... 7.60 min

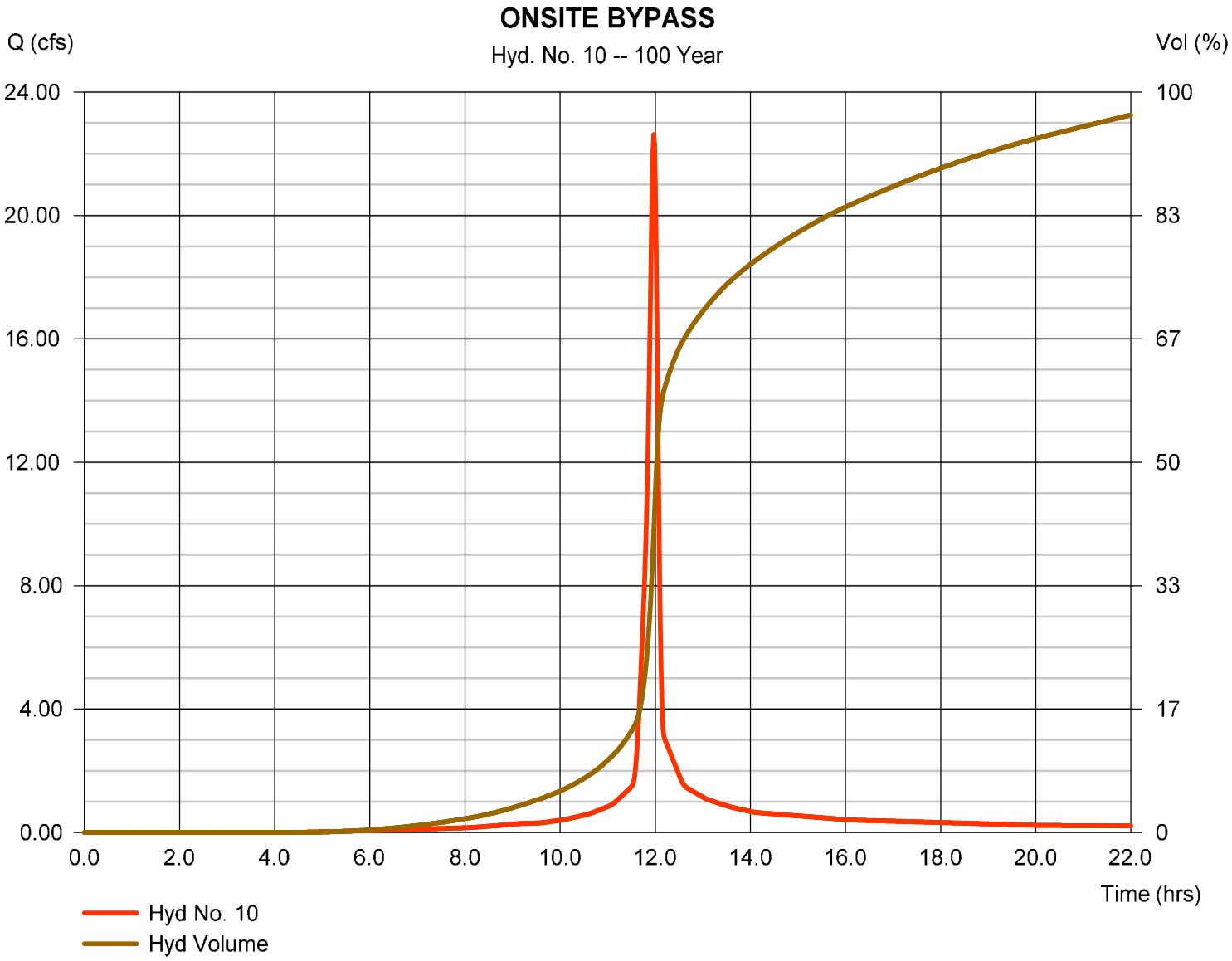
Hydrograph Report

Hyd. No. 10

ONSITE BYPASS

Hydrograph type	=	SCS Runoff	Peak discharge	=	22.62 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.97 hrs
Time interval	=	1 min	Hyd. volume	=	50,454 cuft
Drainage area	=	2.060 ac	Curve number	=	81*
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	TR55	Time of conc. (Tc)	=	7.00 min
Total precip.	=	9.24 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

* Composite (Area/CN) = [(0.100 x 98) + (1.900 x 80)] / 2.060



TR55 Tc Worksheet

Hyd. No. 10

ONSITE BYPASS

Description	A		B		C		Totals
Sheet Flow							
Manning's n-value	= 0.170		0.011		0.011		
Flow length (ft)	= 93.7		0.0		0.0		
Two-year 24-hr precip. (in)	= 3.70		0.00		0.00		
Land slope (%)	= 5.30		0.00		0.00		
Travel Time (min)	**= 6.47**	**+**	**0.00**	**+**	**0.00**	**=**	**6.47**
Shallow Concentrated Flow							
Flow length (ft)	= 61.10		0.00		0.00		
Watercourse slope (%)	= 1.40		0.00		0.00		
Surface description	= Unpaved		Paved		Paved		
Average velocity (ft/s)	=1.91		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**

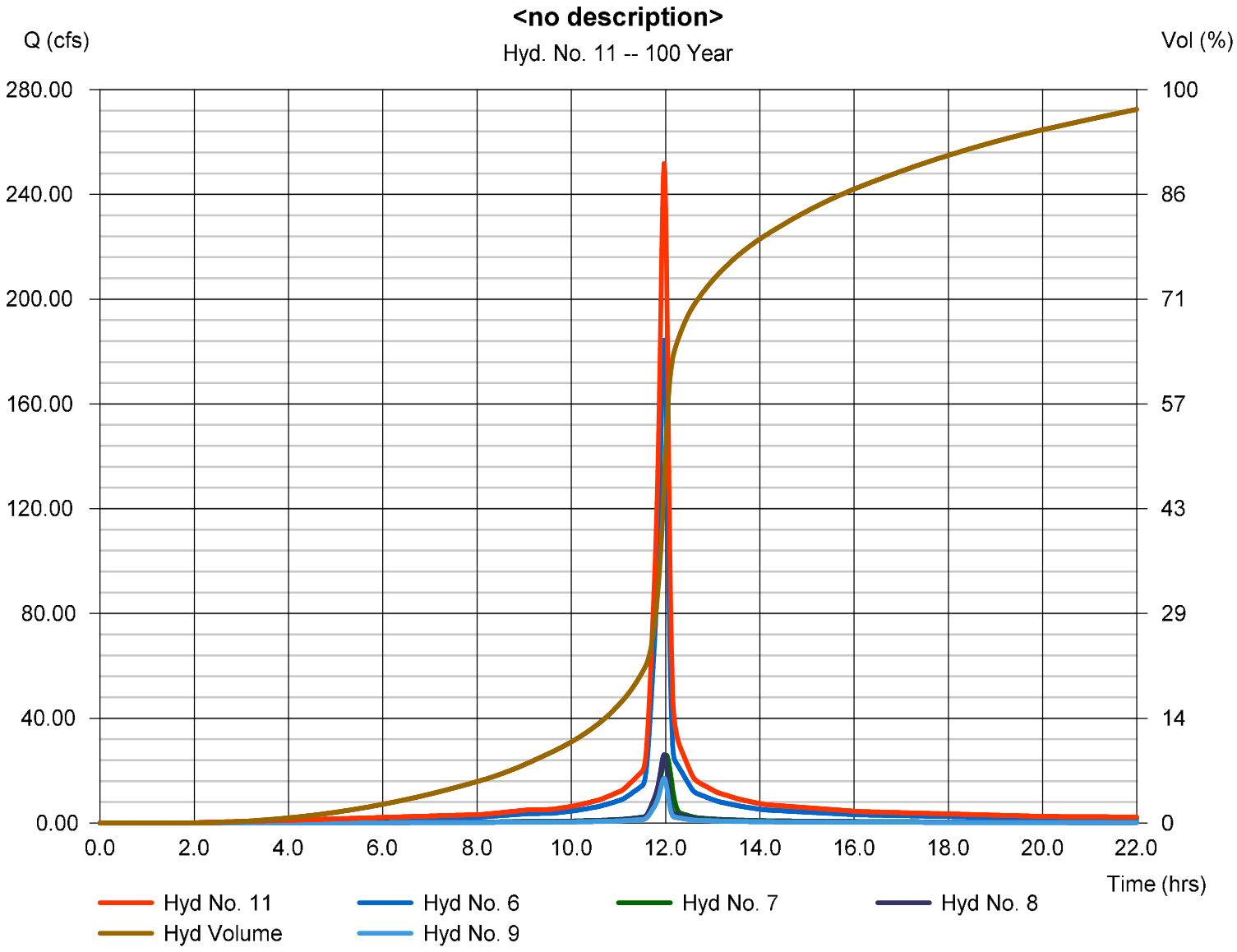
Total Travel Time, Tc ..... 7.00 min

Hydrograph Report

Hyd. No. 11

<no description>

Hydrograph type	= Combine	Peak discharge	= 251.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.97 hrs
Time interval	= 1 min	Hyd. volume	= 619,651 cuft
Inflow hyds.	= 6, 7, 8, 9	Contrib. drain. area	= 21.140 ac

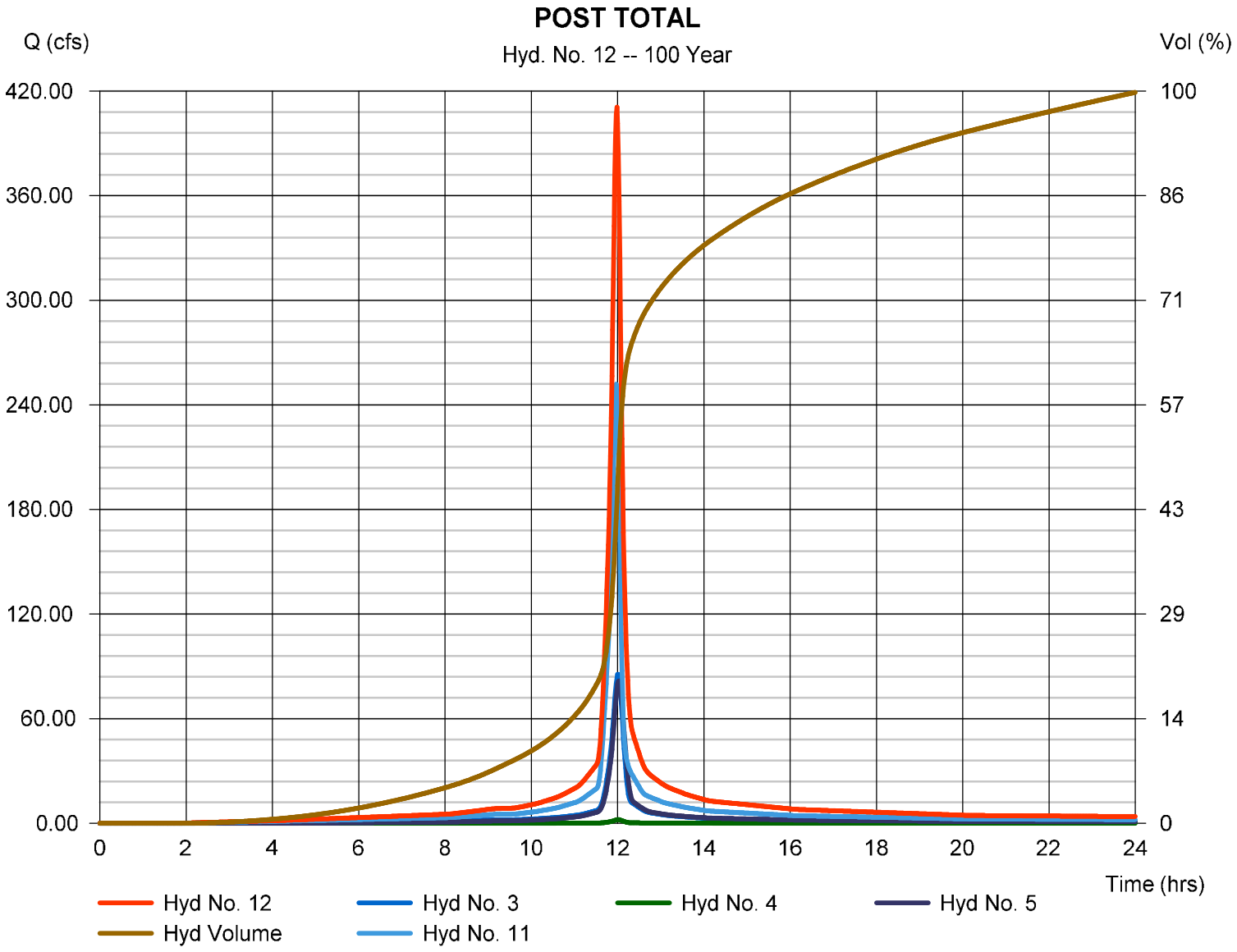


Hydrograph Report

Hyd. No. 12

POST TOTAL

Hydrograph type	= Combine	Peak discharge	= 410.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 1,094,472 cuft
Inflow hyds.	= 3, 4, 5, 11	Contrib. drain. area	= 17.290 ac



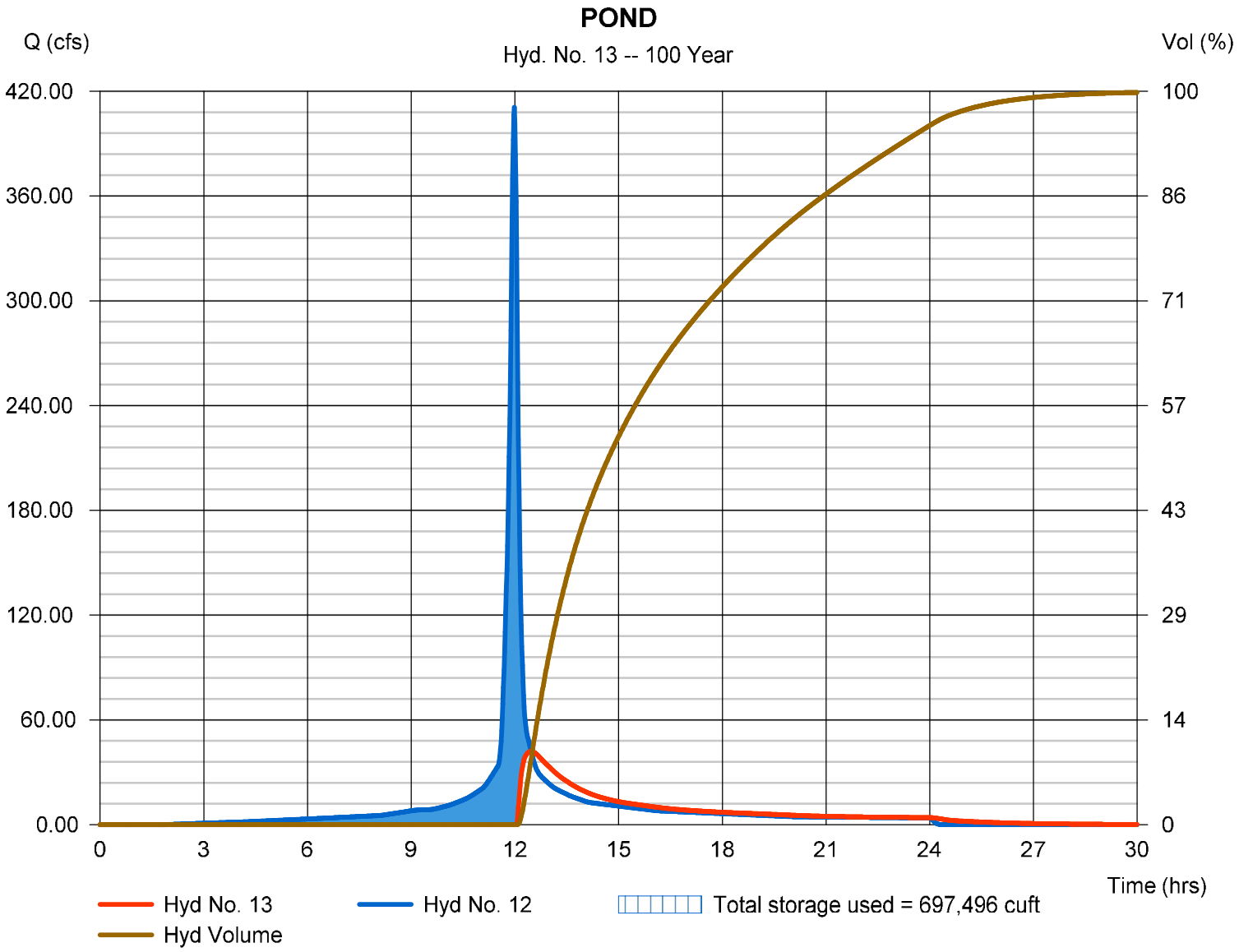
Hydrograph Report

Hyd. No. 13

POND

Hydrograph type	= Reservoir	Peak discharge	= 42.02 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.47 hrs
Time interval	= 1 min	Hyd. volume	= 503,137 cuft
Inflow hyd. No.	= 12 - POST TOTAL	Max. Elevation	= 890.66 ft
Reservoir name	= <New Pond>	Max. Storage	= 697,496 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - <New Pond>

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 886.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	886.00	137,861	0	0
1.00	887.00	142,796	140,329	140,329
2.00	888.00	147,789	145,293	285,621
3.00	889.00	152,840	150,315	435,936
4.00	890.00	157,948	155,394	591,330
5.00	891.80	163,113	160,531	751,860

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	Inactive	Inactive	0.00	0.00
Span (in)	= 38.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 882.00	886.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 5.00	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	Inactive	Inactive	Inactive	30.00
Crest El. (ft)	= 886.83	0.00	0.00	890.00
Weir Coeff.	= 3.33	3.33	3.33	2.60
Weir Type	= 1	---	---	Broad
Multi-Stage	= Yes	No	Yes	No

Exfil.(in/hr) = 0.000 (by Contour)

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

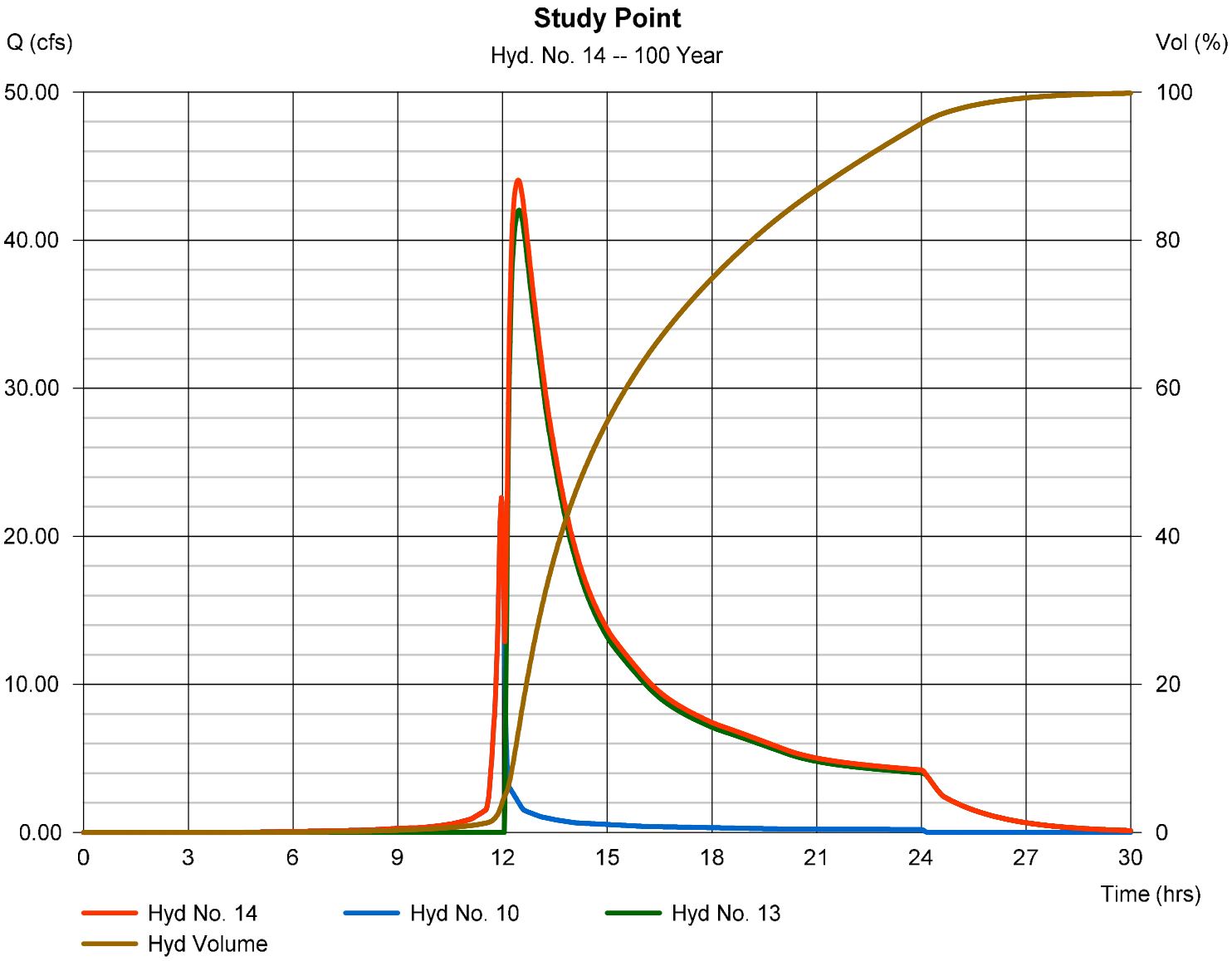
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	886.00	0.00	0.00	---	---	0.00	---	---	0.00	---	---	0.000
1.00	140,329	887.00	0.00	0.00	---	---	0.00	---	---	0.00	---	---	0.000
2.00	285,621	888.00	0.00	0.00	---	---	0.00	---	---	0.00	---	---	0.000
3.00	435,936	889.00	0.00	0.00	---	---	0.00	---	---	0.00	---	---	0.000
4.00	591,330	890.00	0.00	0.00	---	---	0.00	---	---	0.00	---	---	0.000
5.00	751,860	891.80	0.00	0.00	---	---	0.00	---	---	188.36	---	---	188.36

Hydrograph Report

Hyd. No. 14

Study Point

Hydrograph type	=	Combine	Peak discharge	=	44.05 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.45 hrs
Time interval	=	1 min	Hyd. volume	=	553,591 cuft
Inflow hyds.	=	10, 13	Contrib. drain. area	=	2.060 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	22.7358	4.5000	0.6795	--------
2	25.0557	4.1000	0.6658	--------
3	31.8256	5.9000	0.6995	--------
5	30.1342	4.0000	0.6571	--------
10	34.3040	3.9000	0.6511	--------
25	37.9465	3.4000	0.6308	--------
50	41.7403	3.3000	0.6230	--------
100	44.4699	2.9000	0.6110	--------

File name: Storm Inlet Design.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.92	3.69	3.02	2.59	2.28	2.05	1.87	1.72	1.60	1.50	1.42	1.34
2	5.76	4.30	3.52	3.01	2.66	2.39	2.18	2.01	1.87	1.76	1.66	1.57
3	5.99	4.60	3.80	3.27	2.89	2.60	2.37	2.19	2.04	1.91	1.80	1.70
5	7.11	5.32	4.35	3.73	3.30	2.97	2.71	2.51	2.34	2.19	2.07	1.96
10	8.26	6.18	5.06	4.34	3.84	3.46	3.16	2.92	2.73	2.56	2.41	2.29
25	9.91	7.38	6.04	5.19	4.60	4.15	3.80	3.52	3.28	3.09	2.92	2.77
50	11.17	8.33	6.82	5.87	5.20	4.70	4.31	3.99	3.73	3.51	3.32	3.15
100	12.58	9.32	7.63	6.56	5.82	5.26	4.82	4.47	4.18	3.94	3.72	3.54

Tc = time in minutes. Values may exceed 60.

Precip. file name: Sample.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	0.00	3.70	1.37	3.30	5.65	5.77	6.80	9.24
SCS 6-Hr	0.00	2.66	0.00	0.00	4.02	0.00	0.00	6.46
Huff-1st	0.00	0.00	0.00	2.75	0.00	5.38	6.50	0.00
Huff-2nd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	0.00	0.00	2.80	0.00	5.25	6.00	0.00

Hydraflow Table of Contents

APPENDIX E:
HYDROGRAPH REPORT FOR 40-HR EXTENDED DETENTION

Hydrograph Report

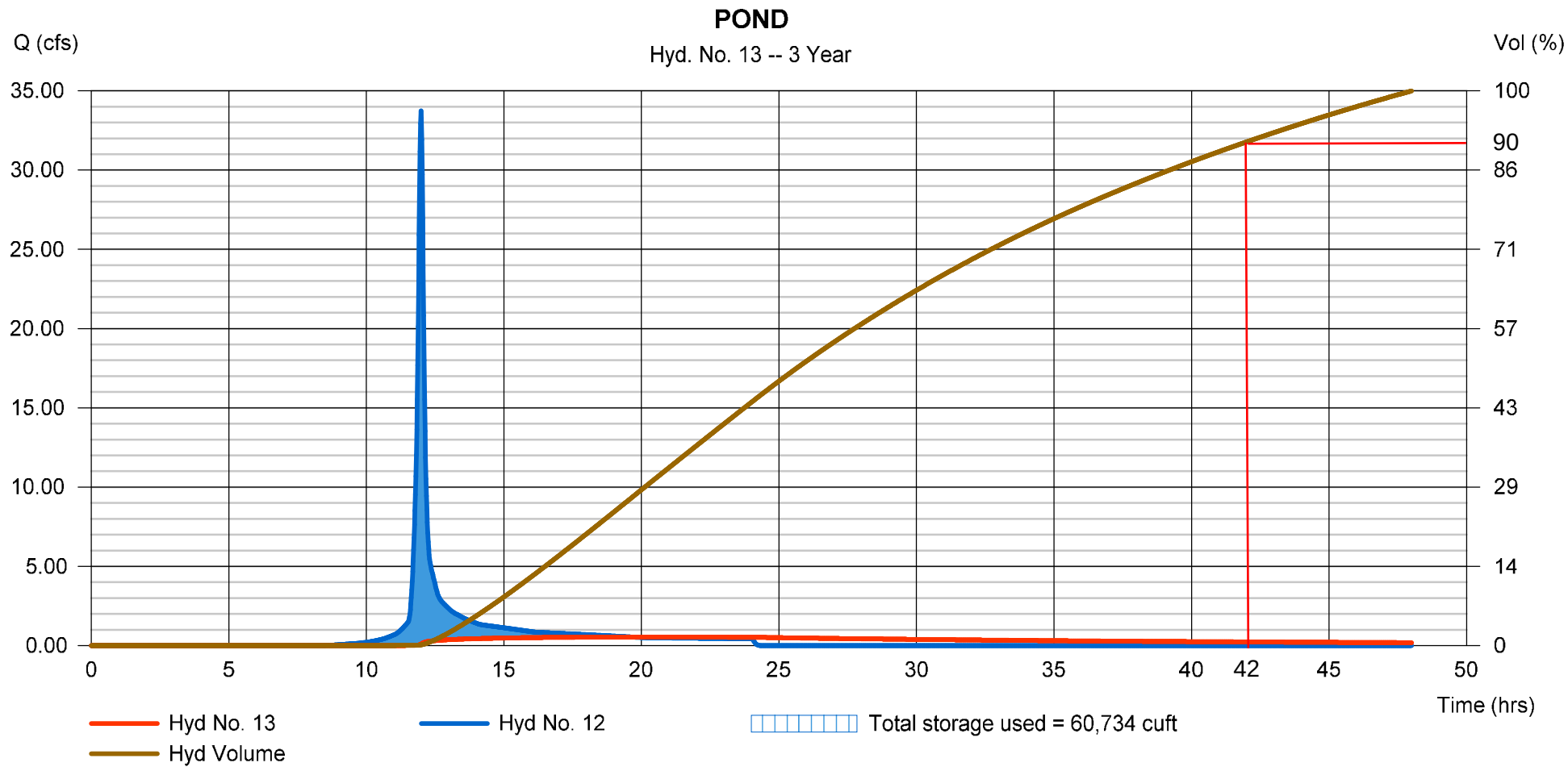
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 — Friday, 01 / 23 / 2026

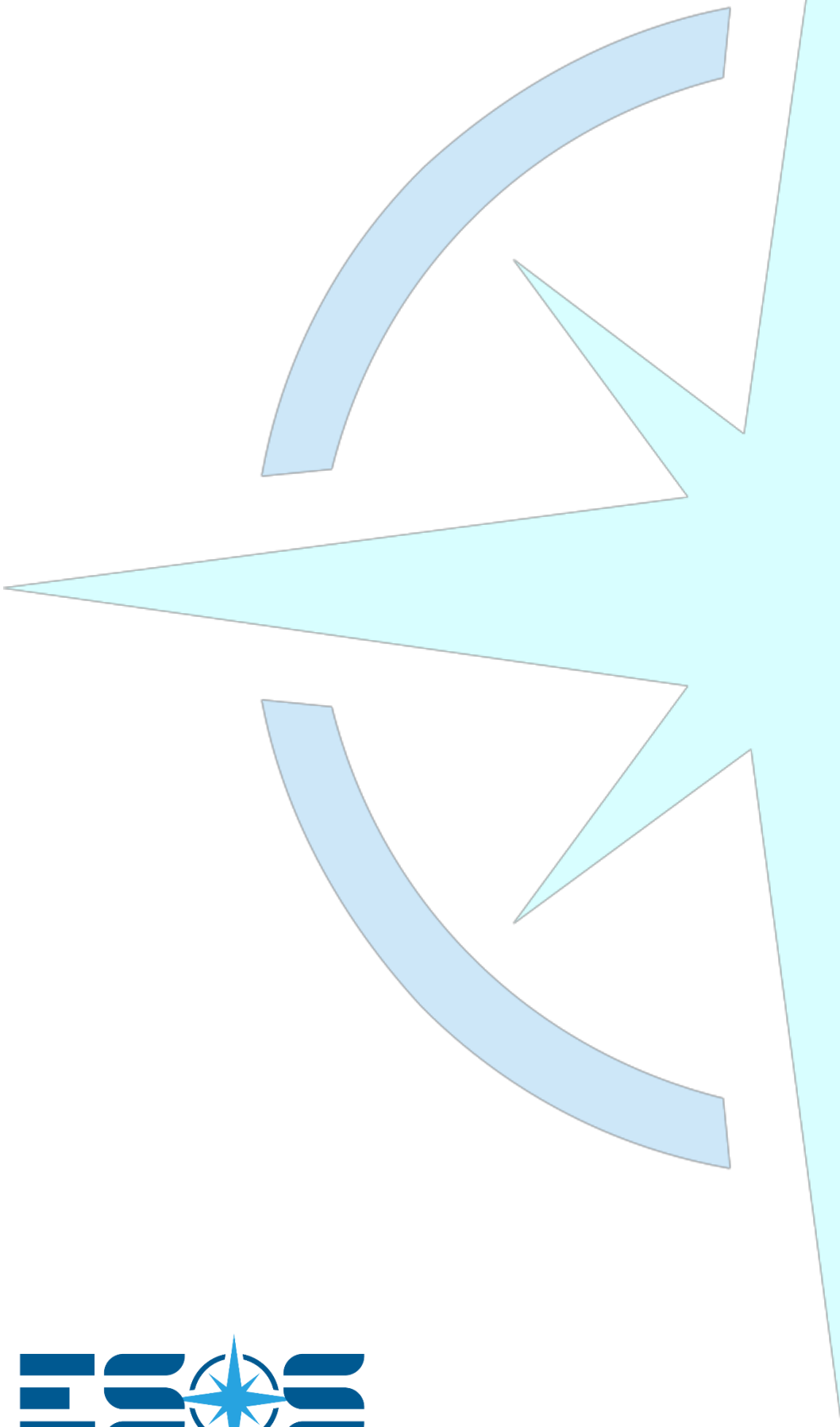
Hyd. No. 13

POND

Hydrograph type	= Reservoir	Peak discharge	= 0.540 cfs
Storm frequency	= 3 yrs	Time to peak	= 19.65 hrs
Time interval	= 1 min	Hyd. volume	= 48,718 cuft
Inflow hyd. No.	= 12 - POST TOTAL	Max. Elevation	= 886.43 ft
Reservoir name	= <New Pond>	Max. Storage	= 60,734 cuft

Storage Indication method used.





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