

**COSTCO FDP STORMWATER
DRAINAGE STUDY**

EAST VILLAGE
SE QUADRANT OF MO 291 SOUTH AND HWY 50
LEE'S SUMMIT, MO

Prepared For:

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CEC Project 353-308

DECEMBER 2025



Civil & Environmental Consultants, Inc.

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1.0 INTRODUCTION AND METHODOLOGY

1.1 INTRODUCTION

Costco Wholesale is proposing to develop approximately 25.5-acres located at the southeast corner of Highway 50 and State Route 291 in Lee's Summit, Missouri. This 25.5-acre site is also all of Lot 1 of proposed development OLDHAM EAST is known as a tract of land being part of Section 8, Township 47 North, Range 31 West.

This existing site is vacant with minimal large vegetation, and the existing topography is generally sloped from Highway 50 to the South with discharges located near the SW and SE corners of the lot.

The development of this site will require satisfaction of Lee's Summit Stormwater Detention and Water Quality Volume (WQv) Best Management Practices (BMPs) requirements.

The development of this site will include a 166,165 sq. ft. warehouse and 24 pump fueling station. Along with this building, there are 887 parking stalls including 18 ADA compliant parking stalls, a storm water management basin including 2 – Dry Detention Basins and a Wet Detention Basin. Water Quality will be handled with 40 Hour Detention as defined in APWA Section 5600

1.2 FEMA FLOODPLAIN DETERMINATION

The property is located in an Area of Minimal Flood Hazard, Zone X, according to Flood Emergency Management Agency (FEMA) Firm Map Number 29095C0438G, effective January 20, 2017.

See Exhibit B for the FEMA Firm maps which encompass this lot.

1.3 NRCS SOIL CLASSIFICATION

Soil Classifications published by the United States Department of Agriculture/Natural Resources Conservation Service (USDA/NRCS) website for Jackson County, Missouri, Version 27, August 13, 2025, The existing site contains one major soil type:

10082 - Arisburg-Urban Land Complex, 1 to 5 percent slopes
Hydrologic Soils Group (HSG): Type C

See Exhibit C for detailed soils report for the proposed project site.

1.4 METHODOLOGY

The storm water analysis and corresponding design contained within this report was performed in accordance with the current APWA Division V, Section 5600 Stormwater Drainage Systems & Facilities.

The site storm water runoff values were calculated using the SCS method with a Type II Distribution from the USDA TR-55 for the 2yr, 10yr, and 100yr-24hr storm events with AutoCAD Civil 3D Hydraflow Hydrographs extension, 2025. The Allowable release rates for each storm event was based on the rates provided by Lee's Summit (0.5 CFS/Ac for the 2yr, 2.0 CFS/Ac for the 10yr and 3.0 CFS/Ac for the 100yr). The 100yr-24hr storm event was calculated to verify maximum basin ponding in the 100yr-24hr scenario.

The proposed development has been designed to satisfy WQv requirements via the inclusion of a 40 hour detention in all three basins. This BMP and basin have been sized for the total area proposed to be tributary to them including offsite areas.

In this proposed development, the overall drainage patterns are directed to the North, West and East existing outfall locations, and are shown to be a decrease due to the detained flows leaving the detention basin.

2.0 EXISTING CONDITIONS ANALYSIS

2.1 EXISTING CONDITIONS

The project site consists of 25.50 acres. There was originally a large industrial user on this site that has since been raised. The existing project site will be evaluated in its pre-developed condition, with three (3) drainage subareas. The subareas are:

- A. North (1.40 Acres)
- B. West (15.76 Acres)
- C. East. (18.40 Acres)

The north subarea (A) is the smallest of the three subareas 1.40 Acres and consists of a small sliver of land running adjacent to the north property line. The subarea (A) consists mainly of turf with a few trees. The subarea (A) drains via sheet flow to the enclosed storm system located along US 50 Highway.

The West Subarea (B) is located west of the property and runs adjacent to MO S. 291 Highway. Subarea (B) stretches from the north boundary line to a midpoint between SE Oldham Parkway and SE Bailey Road. The subarea consists of 15.76 acres and contributes runoff to the existing enclosed storm sewer system running along Mo S. 291 Highway. Runoff from Subarea (B) is tributary to Oldham Village Retentions System and will be detained onsite prior to entering the existing storm sewer system. The Subarea (B) is tributary to Cedar Creek and makes up part of the Cedar Creek Headwaters.

The East Subarea (C) is located on the southeast portion of the lot and consists of 18.40 acres. The Subarea (C) drains via sheet and shallow concentrated flow to a culvert located under the railroad tracts. The Subarea (C) is tributary to an unnamed branch of Big Creek.

An Existing Drainage Area Map may be found n Exhibit D. Hydraflow Hydrograph software was utilized to calculate SCS Method Peak discharge rates. A complete breakdown of Existing and Poposed hydrographs may be found in Exhibit E. The following table summarize the results of the Existing Conditions analysis.

Table 2.1 Existing Conditions Subarea

Subarea	Area (ac)	curve number	tC (min)
North (A)	1.40	74	8.7
West (B)	15.76	74	14.3
East (C)	18.40	74	19.5

Table 2.2 Existing Conditions Runoff Data: Peak Discharge Rates

Subarea	Q2 (cfs)	Q10 (cfs)	Q(100 (cfs)
North (A)	3.10	5.67	10.55
West (B)	28.95	53.68	100.49
East (C)	28.84	53.82	101.31

Per APWA Section 5608.4 and City of Lee’s Summit criteria, the performance criteria for detention is to provide detention to limit peak flow rates at downstream points of interest to maximum release rates:

- 50% (2 year) storm peak rate less than or equal to 0.5 cfs per site acre
- 10% (10 year) storm peak rate less than or equal to 2.0 cfs per site acre
- 1% (100 year) storm peak rate less than or equal to 3.0 cfs per site acre

Table 2.3 Existing Conditions APWA Allowable Peak Discharge Release Rates

Subarea POI	Onsite area (Acres)	Offsite area (Acres)	Q2 (cfs)	Q10 (cfs)	Q(100 (cfs)
North (A)	1.40	0.00	0.70	2.80	4.20
West (B)	15.76	0.00	7.88	31.52	47.28
East (C)	18.40	0.00	9.20	36.80	55.20

The north (A) subarea consists of a narrow sliver of land adjacent to the northern property line that sheets flows directly to the Right-of-Way of US 50 highway. Due to the size, geometry, and proposed land usage runoff originating from the North (A) subarea will continue to be free released via sheet flow to the enclosed storm sewer system running along US 50 Highway. The proposed North (A) subarea will not create a negative impact (reduced footprint, no hard infrastructure) to the adjacent property and storm sewer system therefore it will not be discussed any further in this report. An accounting of the proposed North (A) subarea will be provided in Tables 3.1 and 3.2 below to confirm our findings.

3.0 PROPOSED CONDITIONS ANALYSIS

The proposed development is planned to consist of a Costco Warehouse and 24 pump fueling station with associated drive aisles and parking stalls. A curve number of 90 was used for this commercial site. The proposed conditions will consist of six (6) subareas. The Original three (3) subareas North, West and East plus three (3) additional subareas Detained Northwest, Detained Southwest and Detained East. Peak discharge rates for all subareas will be combined together at their given Point of Interest to ensure allowable release rates as identified in Table 2.3 are not exceeded. The Three (3) additional subareas contain attenuation systems utilized to reduce proposed peak discharge rates. The West subarea will utilize parallel attenuation systems. The East subarea will utilize one attenuation system. The combined proposed peak discharge rates at each POI will be compared to allowable discharge rates to determine if they meet or exceed the

City’s Comprehensive Control Storm Water Management criteria. The Proposed Drainage Area Map may be found in Exhibit F.

Table 3.1 Proposed Conditions Subarea Data

Subarea	Area (acres)	Composite CN	Tc (min)
North	0.45	90	5.0
Detained Northwest	3.40	90	12.6
Detained Southwest	3.47	90	9.3
West	3.01	90	12.1
Detained East	13.87	90	10.7
East	0.74	90	11.7

Table 3.2 Proposed Conditions Runoff Data: Subarea Peak Discharge Rates

Subarea / POI	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
North	2.10	3.15	4.96
Detained Northwest	11.05	16.6	26.18
Detained Southwest	15.49	23.24	36.60
West	9.09	13.71	21.71
POI West	34.29	51.66	81.61
Detained East	51.58	77.49	122.16
East	2.90	4.36	6.87
POI East	54.48	81.85	129.03

As shown in Table 3.2 above POI West and East will require attenuation of stormwater peak discharge rates to achieve release rates at or below regulatory levels. Data shown in the tables above confirm the North Subarea peak discharge rates will be well below existing peak discharge rates due to reduction in tributary areas therefore there will be no further evaluation of the North (A) Subarea.

4.0 ATTENUATION

Detention Basins are being proposed to attenuate peak discharge rates from the West and East subareas. Two single stage earthen detention basins in parallel are proposed in the West subarea. The basins are referred to as the Northwest and Southwest detention basins for the purposes of this report. The East subarea will utilize one single stage earthen detention basin which is referred to as the East Detention Basin. The East basin consists of a Wet basin and a separate forebay. Following are a list of parameters for each attenuation system.

Designation: Northwest Basin

Type: Earthen Basin
 Side Slopes: 3:1 Max
 Bottom Slope: 2%
 Basin Bottom Elevation: 1041.00
 Basin Top of Berm Elevation: 1047.50 (top crowned for drainage)
 Basin Spillway Crest Width: 50' @ 1045.50
 Basin Volume: 29,541 cf @ 1045.67

Control Structure Effluent Pipe:30" HDPE, FL (In) 1041.00, FL (Out) 1039.90, L=21.3', S=0.50%
 Emergency Spillway: Earthen Broad Crested Weir, Crest Elevation 1045.50, Crest Length 50'

The Attenuation Plans for the West subarea may be found in Exhibit G. See Table 4.1 for a summary of retention basin.

Table 4.1 Proposed Conditions Northwest Retention Basin Data

NW Basin	Peak Q in (cfs)	Tp In (min.)	Peak Q Out (cfs)	Tp Out (min)	Peak W.S.E.	Max. Storage Volume (cf)
2-Year	11.05	721	0.75	775	1044.24	13,769
10-Year	16.60	721	4.17	734	1044.74	19,321
100-Year	28.18	721	17.74	727	1045.24	24,731

As Shown in the table above all proposed peak discharge rates from Subarea Northwest have been attenuated.

Designation: Southwest Basin

Type: Earthen Basin

Side Slopes: 3:1 Max

Bottom Slope: 2%

Basin Bottom Elevation: 1033.00

Basin Top of Berm Elevation:1045.50 (top crowned for drainage)

Basin Spillway Crest Width: 50' @ 1044.00

Basin Volume: 49,619 cf @ 1044.39

Control Structure Effluent Pipe:30" HDPE, FL (In) 1033.00, FL (Out) 1033.00, L=24.5', S=1.0%

Emergency Spillway: Earthen Broad Crested Weir, Crest Elevation 1044.50, Crest Length 50'

The Attenuation Plans for the West subarea may be found in Exhibit G. See Table 4.2 for a summary of retention basin.

Table 4.2 Proposed Conditions Southwest Retention Basin Data

SW Basin	Peak Q in (cfs)	Tp In (min.)	Peak Q Out (cfs)	Tp Out (min)	Peak W.S.E.	Max. Storage Volume (cf)
2-Year	15.49	719	1.07	761	1039.88	17,172
10-Year	23.24	719	1.19	784	1041.49	28,528
100-Year	36.60	719	4.66	737	1043.68	44,427

As Shown in the table above all proposed peak discharge rates from Subarea Northwest have been attenuated.

Designation: East Basin
 Type: Earthen Basin
 Side Slopes: 3:1 Max
 Bottom Slope: 2%
 Basin Bottom Elevation: 1030.85
 Permanent Pool Elevation: 1039.35
 Basin Top of Berm Elevation: 1048.00 (top crowned for drainage)
 Basin Spillway Crest Width: 50' @ 1046.00
 Basin Volume: 217,324, cf @ 1046.88
 Control Structure Effluent Pipe: 30" HDPE, FL (In) 1039.35, FL (Out) 1039.25, L=20.6', S=0.50%
 Emergency Spillway: Earthen Broad Crested Weir, Crest Elevation 1045.00, Crest Length 100'

The Attenuation Plans for the East subarea may be found in Exhibit G. See Table 4.2 for a summary of retention basin.

Table 4.3 Proposed Conditions East Retention Basin Data

East Basin	Peak Q in (cfs)	Tp In (min.)	Peak Q Out (cfs)	Tp Out (min)	Peak W.S.E.	Max. Storage Volume (cf)
2-Year	54.48	720	0.62	1203	1043.73	100,023
10-Year	77.49	720	2.06	902	1045.06	145,904
100-Year	122.16	720	42.20	730	1045.84	173,909

As Shown in the table above all proposed peak discharge rates from Subarea Northwest have been attenuated.

Table 4.4 Proposed Conditions Post Attenuation Point of Interest Peak Discharge Rates

Point of Interest	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
West	10.80	16.46	40.34
East	3.37	4.92	44.57

As shown in the above table the peak discharge rates attributable to the proposed POI West and East have been attenuated below both the Existing and Allowable Peak Discharge Rates as outlined in Tables 2.2 and 2.3 Respectfully.

5.0 40 HOUR EXTENDED DETENTION

In addition to mitigation of peak flow rates, APWA Section 5608.4 also requires 40 hour extended detention of runoff from the local 90% mean annual event (1.37"/24-hour rainfall). The proposed attenuation facility will release the water quality event over a period of 40-72 hours. West (B)

retention basins drain into an existing basin in West Village and have been accounted for in the existing basin. East (C) retention basin will provide extended detention for the East subarea of 14.61 acres. See Exhibit I for 40 hour extended detention calculations for the East (C) Retention Basin.

6.0 WETLAND DETERMINATION

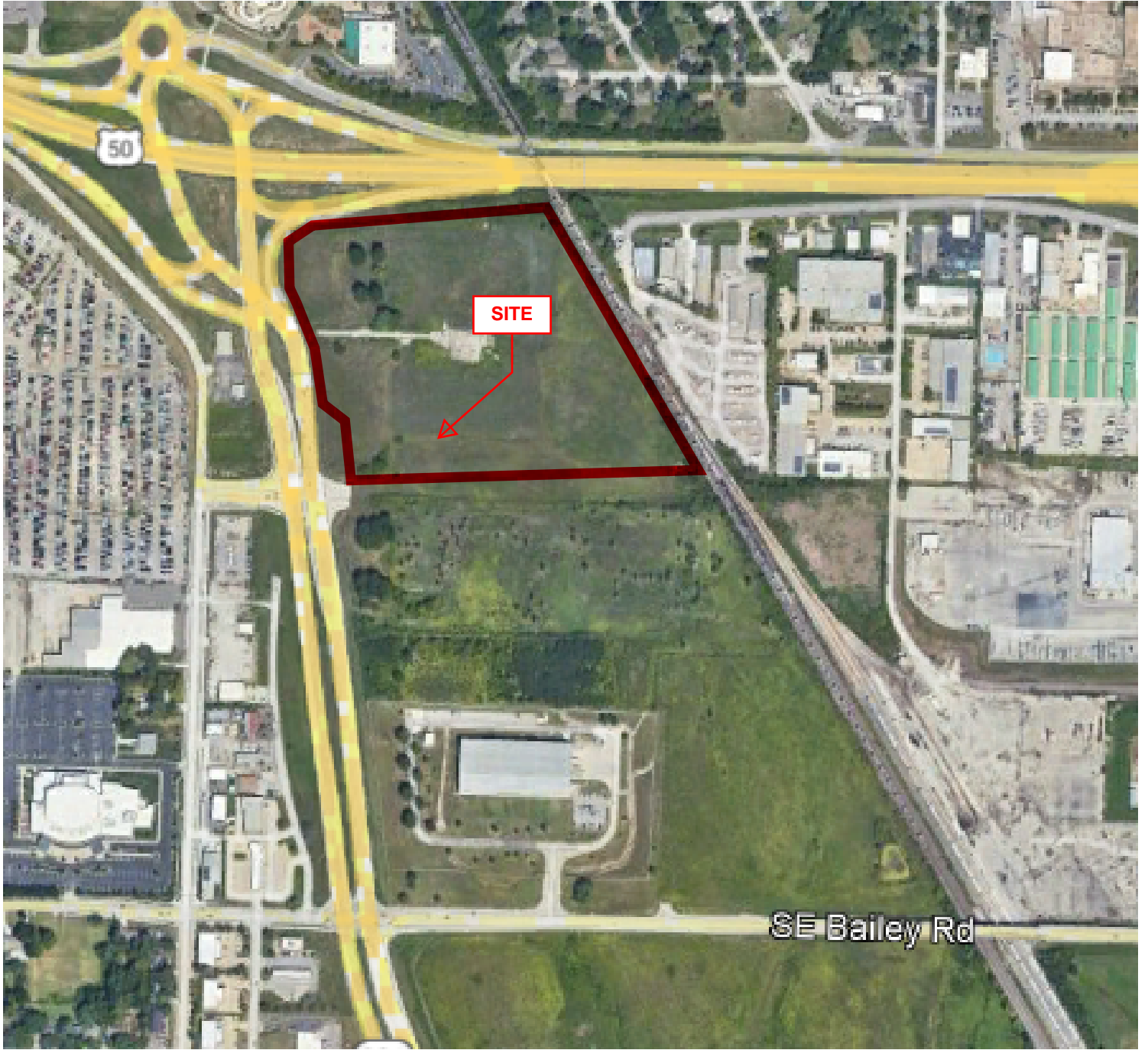
There have been several lengthy conversations with representatives from the United States Army Corp of Engineers (USACE) over the last several months concerning USACE jurisdiction of streams/creeks and wetlands. This site makes up the headwaters for an unnamed tributary of Cedar Creek and Big Creek. The channels located on the site are ephemeral and connected to a non-navigable intrastate water therefore not under United States Army Corp of Engineers (USACE) jurisdiction.

The property is not identified as having wetlands in the National Wetlands Inventory. Based on the site investigation no wetlands appear to be present. Jurisdiction extends to only those “wetlands within a continuous surface connection to bodies that are ‘waters of the united states’ in their own right,” so that they are “indistinguishable” from those waters. See Exhibit K for an aerial phot from the National Wetlands Inventory of the subject property and surrounding area does not contain wetlands as defined by the USACE.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Runoff from the Development will be reduced below both existing and allowable for each Subarea. Attenuation systems are being proposed in the West and East subareas to reduce proposed peak discharge rates. The proposed attenuation systems will reduce all proposed regulatory peak discharge rates below both Existing and Allowable. Proposed peak discharge rates meet or exceed APWA Section 5600 Comprehensive Control Strategy targets. Onsite attenuation utilizing comprehensive control strategy with extended detention as outlined will reduce peak discharge rates downstream. It is the opinion of the Professional Engineer that the proposed stormwater management improvements outlined in the report will help mitigate any potential negative hydraulic impacts onsite and downstream and therefore recommends approval of said improvements and the storm study.

Exhibit A



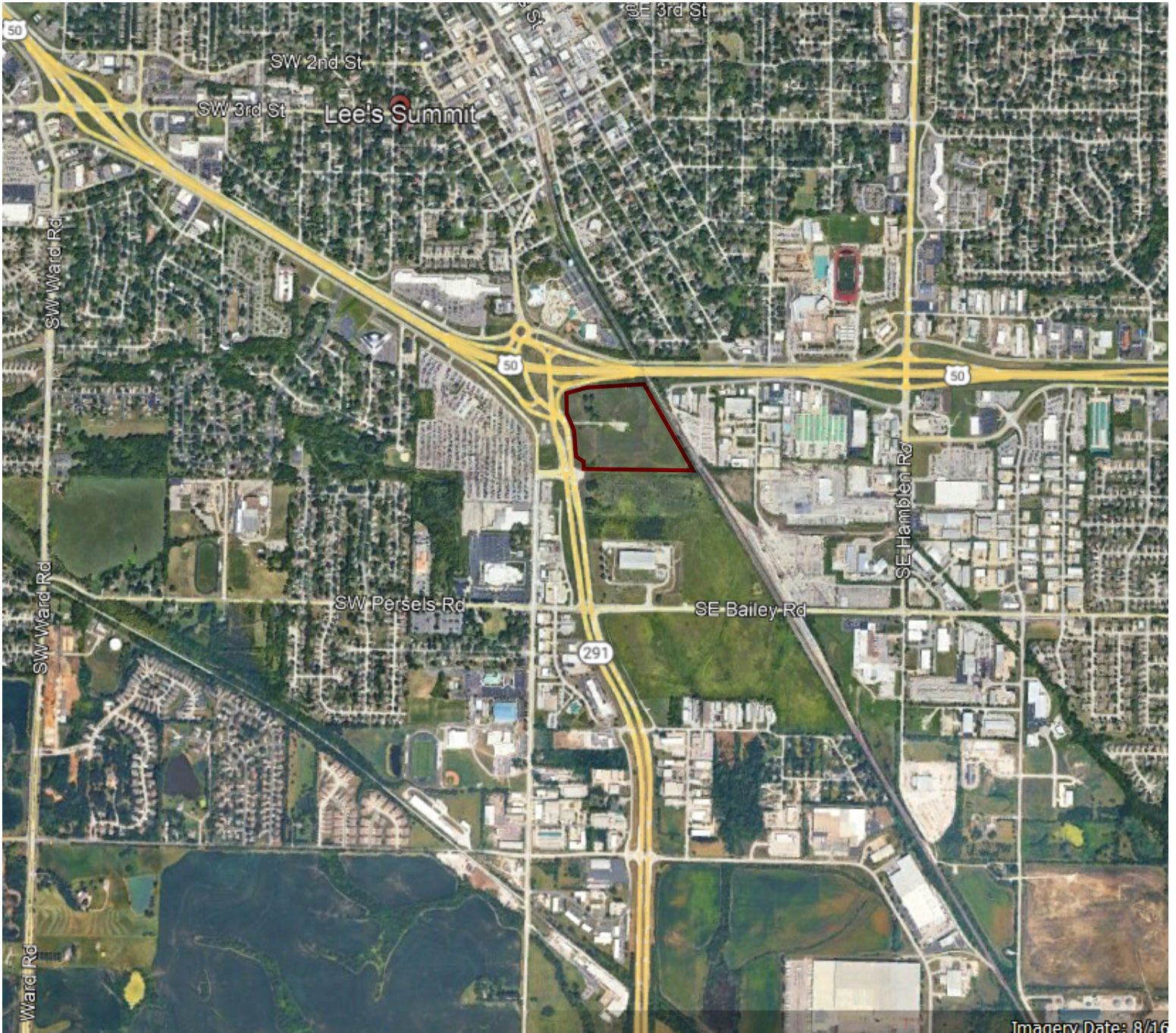
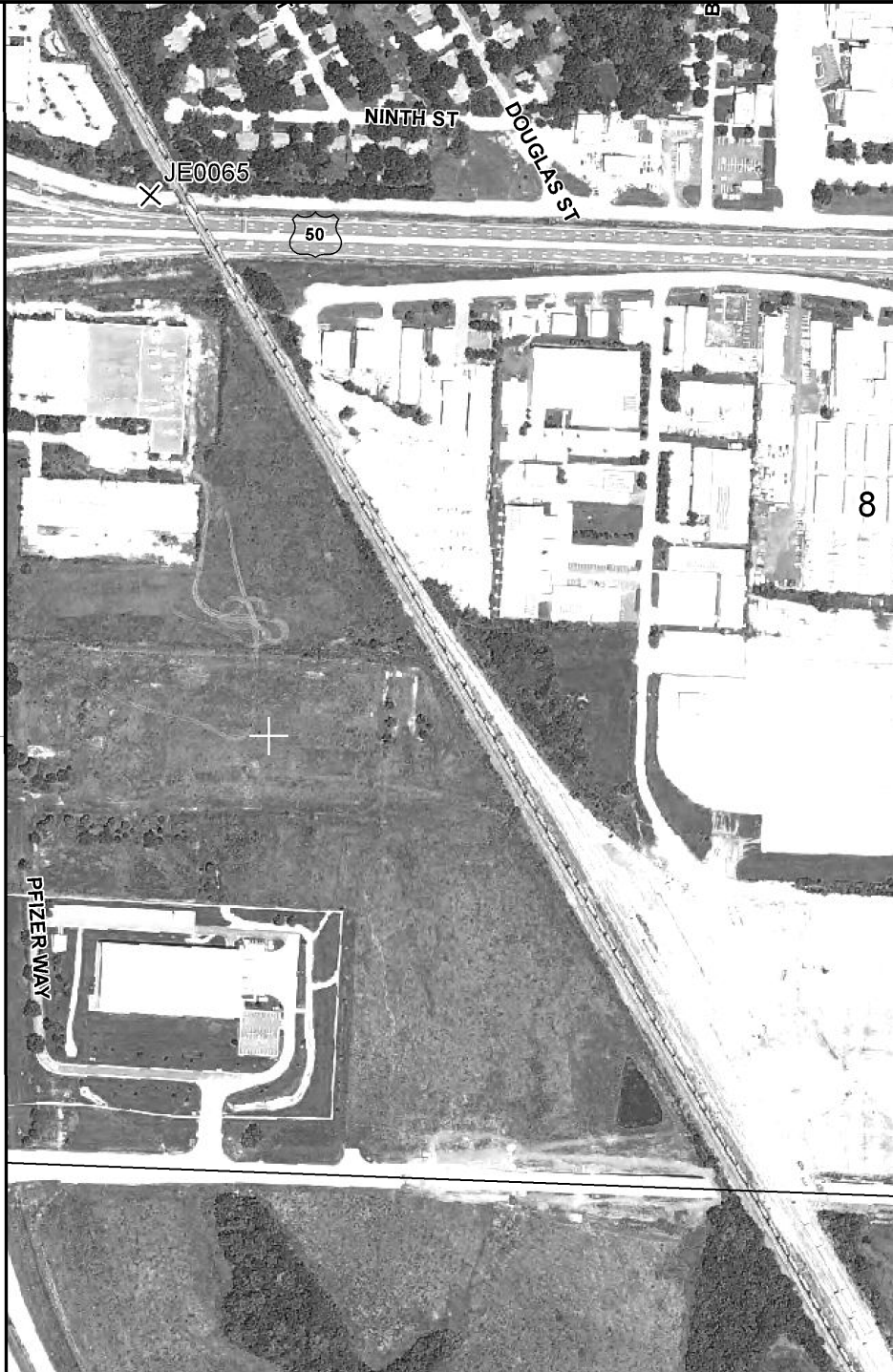


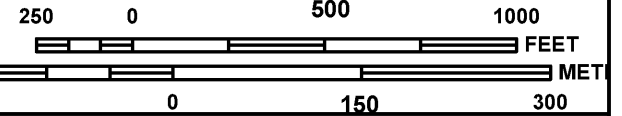
Exhibit B



995000 FT



MAP SCALE 1" = 500'



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0438G

FIRM

FLOOD INSURANCE RATE MAP
JACKSON COUNTY,
MISSOURI
AND INCORPORATED AREAS

PANEL 438 OF 625
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LEE'S SUMMIT, CITY OF	290174	0438	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
29095C0438G
MAP REVISED
JANUARY 20, 2017

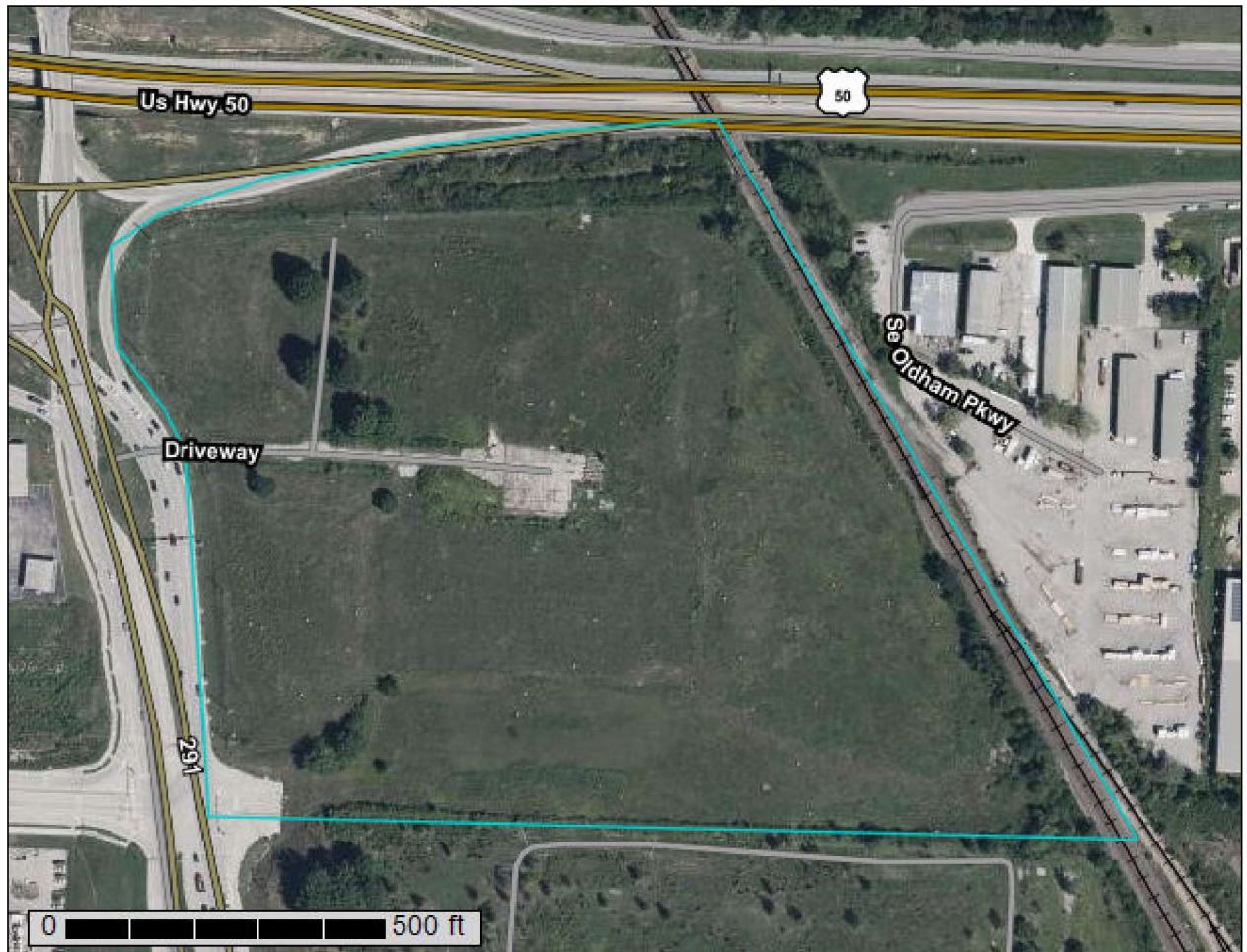
Federal Emergency Management Agency

This is an official FIRMette showing a portion of the above-referenced flood map created from the MSC FIRMette Web tool. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For additional information about how to make sure the map is current, please see the Flood Hazard Mapping Updates Overview Fact Sheet available on the FEMA Flood Map Service Center home page at <https://msc.fema.gov>.

Exhibit C

Custom Soil Resource Report for **Jackson County, Missouri**

Costco - Lees Summit



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

Custom Soil Resource Report

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

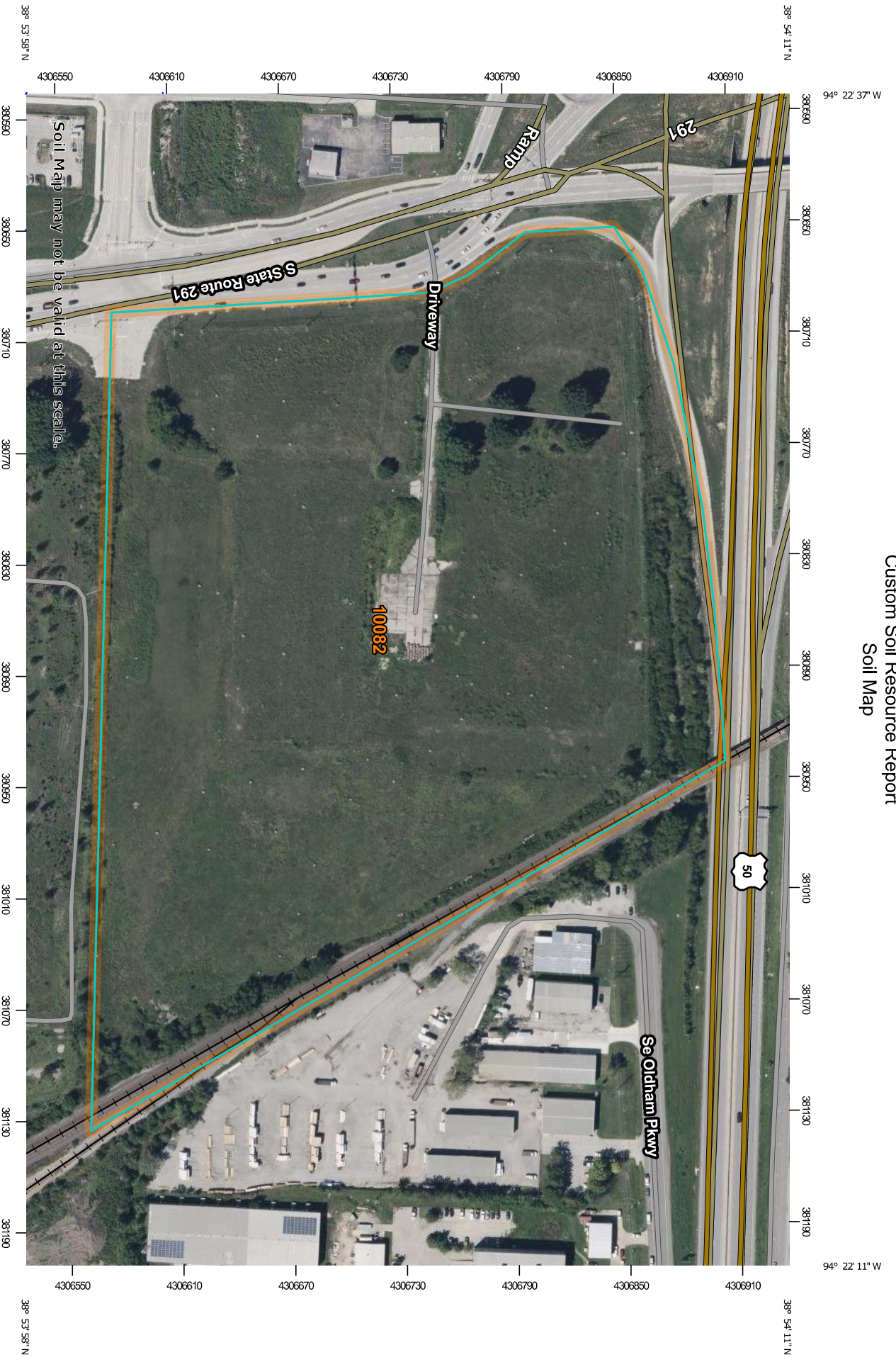
Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

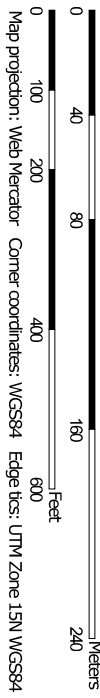
The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map







Soil Map may not be valid at this scale.

Map Scale: 1:2,890 if printed on a landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

MAP LEGEND

	Area of Interest (AOI)		Spoil Area
	Area of Interest (AOI)		Stony Spot
	Soil Map Unit Polygons		Very Stony Spot
	Soil Map Unit Lines		Wet Spot
	Soil Map Unit Points		Other
	Special Point Features		Special Line Features
	Blowout		Streams and Canals
	Borrow Pit		Transportation
	Clay Spot		+++ Rails
	Closed Depression		Interstate Highways
	Gravel Pit		US Routes
	Gravelly Spot		Major Roads
	Landfill		Local Roads
	Lava Flow		Background
	Marsh or swamp		Aerial Photography
	Mine or Quarry		
	Miscellaneous Water		
	Perennial Water		
	Rock Outcrop		
	Saline Spot		
	Sandy Spot		
	Severely Eroded Spot		
	Sinkhole		
	Slide or Slip		
	Sodic Spot		

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 27, Aug 27, 2024

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

Date(s) aerial images were photographed: Aug 30, 2022—Sep 8, 2022

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
10082	Arisburg-Urban land complex, 1 to 5 percent slopes	28.7	100.0%
Totals for Area of Interest		28.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Jackson County, Missouri

10082—Arisburg-Urban land complex, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w7ld
Elevation: 750 to 1,130 feet
Mean annual precipitation: 39 to 45 inches
Mean annual air temperature: 50 to 55 degrees F
Frost-free period: 177 to 220 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Arisburg and similar soils: 61 percent
Urban land: 30 percent
Minor components: 9 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arisburg

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

Ap - 0 to 6 inches: silt loam
A - 6 to 13 inches: silt loam
Bt - 13 to 19 inches: silty clay loam
Btg - 19 to 56 inches: silty clay loam
BCg - 56 to 79 inches: silty clay loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 18 to 30 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 11.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: R107XB007MO - Loess Upland Prairie
Hydric soil rating: No

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydric soil rating: No

Minor Components

Sharpsburg

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: R109XY002MO - Loess Upland Prairie

Hydric soil rating: No

Sampsel

Percent of map unit: 3 percent

Landform: Hills

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

Greenton

Percent of map unit: 3 percent

Landform: Hillslopes

Landform position (two-dimensional): Shoulder

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Ecological site: R109XY002MO - Loess Upland Prairie

Hydric soil rating: No

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Custom Soil Resource Report

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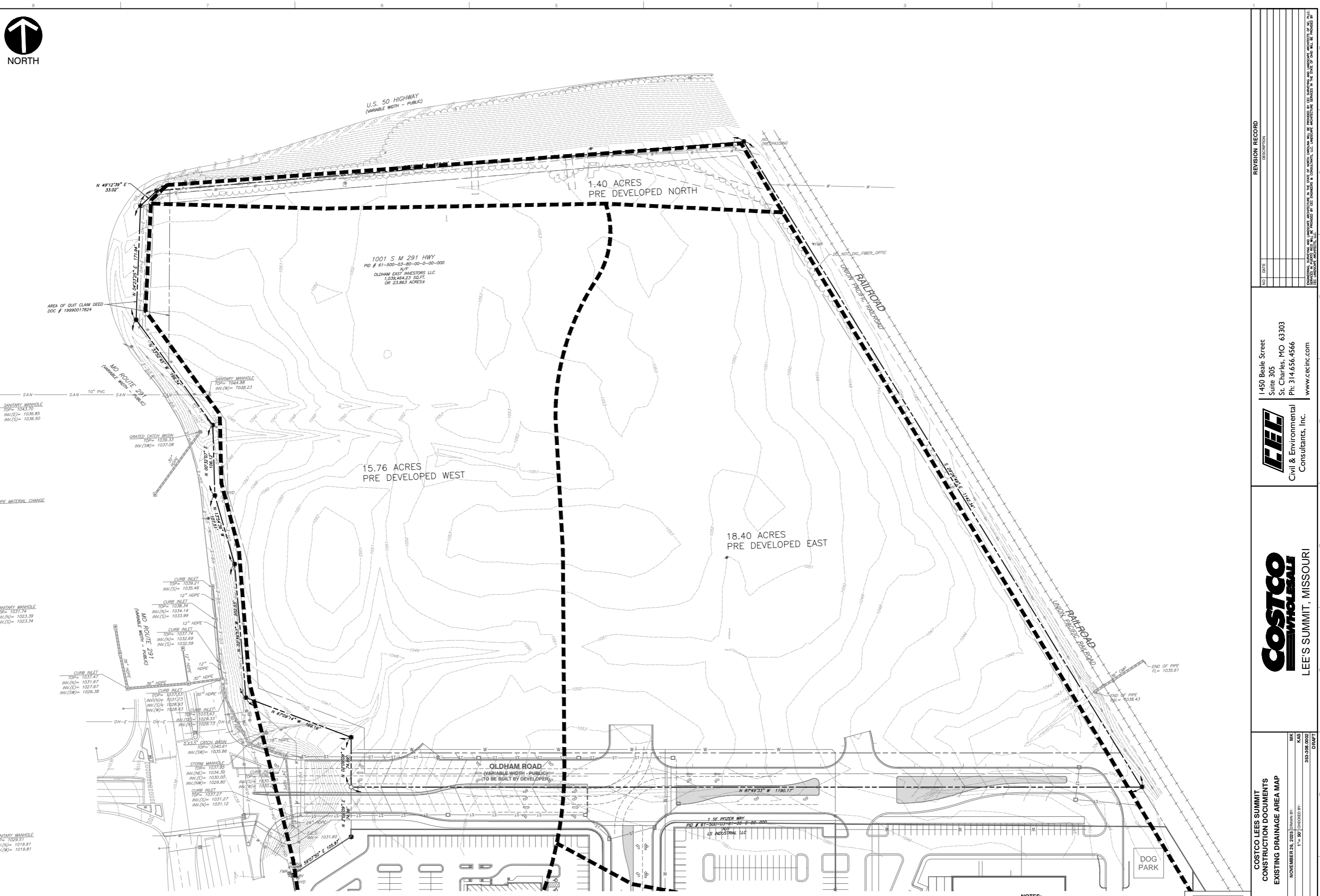
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Exhibit D



NORTH



REFERENCE

EXISTING TOPOGRAPHIC DATA AND FEATURES ARE A COMBINATION OF THE FOLLOWING:

1. ALTA SURVEY DATED 08-20-2025 BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
2. DEVELOPMENT PLANS FOR OLDHAM VILLAGE (BY OTHER)
3. SITE DEVELOPMENT PLANS DATED XXXX BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

NOTE TO CONTRACTOR: PRIOR TO ANY EXCAVATION FOR UNDERGROUND UTILITIES, CONTRACTOR SHALL EXPOSE AND VERIFY LOCATIONS (HORIZONTAL AND VERTICAL) OF ALL EXISTING UTILITIES INCLUDING BUT NOT LIMITED TO GAS, WATER, BROADBAND, PHONE, SANITARY AND STORM SEWERS. ANY CONFLICT SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER AND APPROPRIATE AUTHORITIES.

NOTES:

1. CONTRACTOR SHALL REFER TO OTHER PLANS WITHIN THIS CONSTRUCTION SET FOR OTHER PERTINENT INFORMATION. IT IS NOT THE ENGINEER'S INTENT THAT ANY SINGLE PLAN SHEET IN THIS SET OF DOCUMENTS FULLY DEPICT ALL WORK ASSOCIATED WITH THIS PROJECT.

SCALE IN FEET
0 50 100
DANIEL R. KOZIATEK
(MO PE# 2004017198)

DRAFT

80% SET
NOT FOR
CONSTRUCTION

NO.	DATE	REVISION RECORD DESCRIPTION

1450 Beale Street
Suite 305
St. Charles, MO 63303
Ph: 314.656.4566
www.ccecinc.com

CCEC
Civil & Environmental
Consultants, Inc.

COSTCO WHOLESALE
LEE'S SUMMIT, MISSOURI

**COSTCO LEE'S SUMMIT
CONSTRUCTION DOCUMENTS
EXISTING DRAINAGE AREA MAP**

NOVEMBER 26, 2025 DRAWN BY: MK
1" = 50' CHECKED BY: KAS
PROJECT NO: 313-300-0202
APPROVED BY: DRAFT

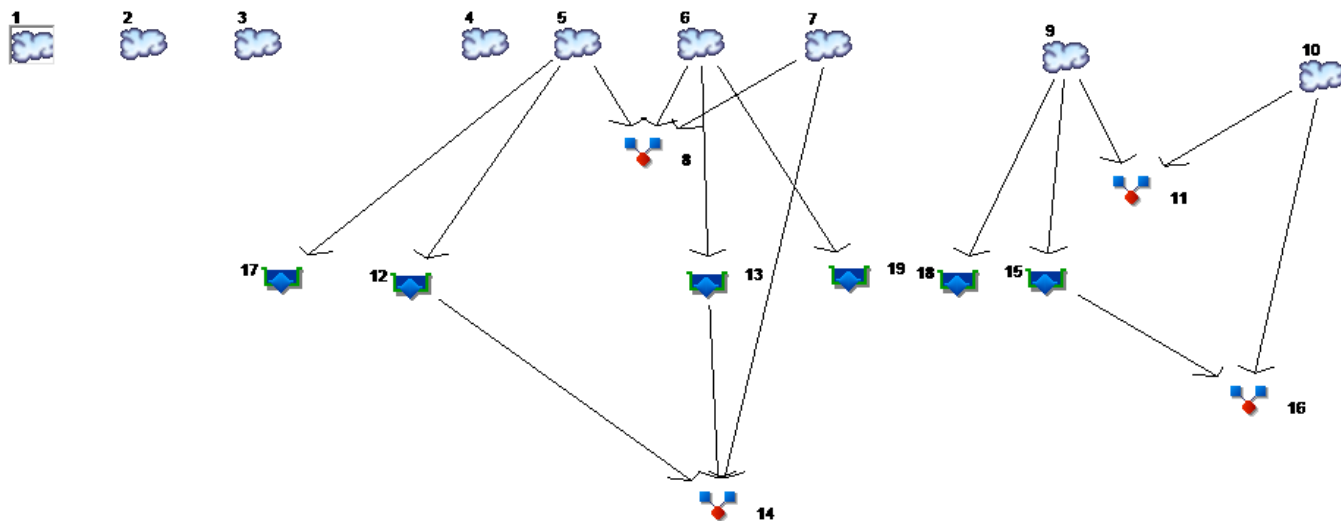
DRAWING NO.:
C401

SHEET 12 OF 32

Exhibit E

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024



Legend

Hyd. Origin	Description
1	SCS Runoff EX NORTH
2	SCS Runoff EX WEST
3	SCS Runoff EX EAST
4	SCS Runoff PROP NORTH
5	SCS Runoff DETAINED NORTHWEST
6	SCS Runoff DETAINED SOUTHWEST
7	SCS Runoff WEST
8	Combine POI WEST
9	SCS Runoff DETAINED EAST
10	SCS Runoff EAST
11	Combine POI EAST
12	Reservoir ROUTED DET NORTHWEST
13	Reservoir ROUTED DET SOUTHWEST
14	Combine POI WEST ATTENUATED
15	Reservoir ROUTED DET SOUTH EAST
16	Combine POI EAST ATTENUATED
17	Reservoir NORTHWEST OVERFLOW
18	Reservoir SOUTHEAST OVERFLOW
19	Reservoir SOUTHWEST OVERFLOW

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Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	-----	-----	3.101	-----	-----	5.673	-----	-----	10.55	EX NORTH
2	SCS Runoff	-----	-----	28.95	-----	-----	53.68	-----	-----	100.49	EX WEST
3	SCS Runoff	-----	-----	28.84	-----	-----	53.82	-----	-----	101.31	EX EAST
4	SCS Runoff	-----	-----	2.104	-----	-----	3.153	-----	-----	4.959	PROP NORTH
5	SCS Runoff	-----	-----	11.05	-----	-----	16.60	-----	-----	26.18	DETAINED NORTHWEST
6	SCS Runoff	-----	-----	15.49	-----	-----	23.24	-----	-----	36.60	DETAINED SOUTHWEST
7	SCS Runoff	-----	-----	9.088	-----	-----	13.71	-----	-----	21.71	WEST
8	Combine	5, 6, 7	-----	34.29	-----	-----	51.66	-----	-----	81.61	POI WEST
9	SCS Runoff	-----	-----	51.58	-----	-----	77.49	-----	-----	122.16	DETAINED EAST
10	SCS Runoff	-----	-----	2.900	-----	-----	4.358	-----	-----	6.869	EAST
11	Combine	9, 10	-----	54.48	-----	-----	81.85	-----	-----	129.03	POI EAST
12	Reservoir	5	-----	0.747	-----	-----	4.168	-----	-----	17.74	ROUTED DET NORTHWEST
13	Reservoir	6	-----	1.070	-----	-----	1.194	-----	-----	4.661	ROUTED DET SOUTHWEST
14	Combine	7, 12, 13	-----	10.80	-----	-----	16.46	-----	-----	40.34	POI WEST ATTENUATED
15	Reservoir	9	-----	0.620	-----	-----	2.062	-----	-----	42.20	ROUTED DET SOUTH EAST
16	Combine	10, 15	-----	3.365	-----	-----	4.924	-----	-----	44.57	POI EAST ATTENUATED
17	Reservoir	5	-----	10.56	-----	-----	15.94	-----	-----	25.62	NORTHWEST OVERFLOW
18	Reservoir	9	-----	41.97	-----	-----	65.67	-----	-----	107.95	SOUTHEAST OVERFLOW
19	Reservoir	6	-----	15.11	-----	-----	22.70	-----	-----	35.78	SOUTHWEST OVERFLOW

Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

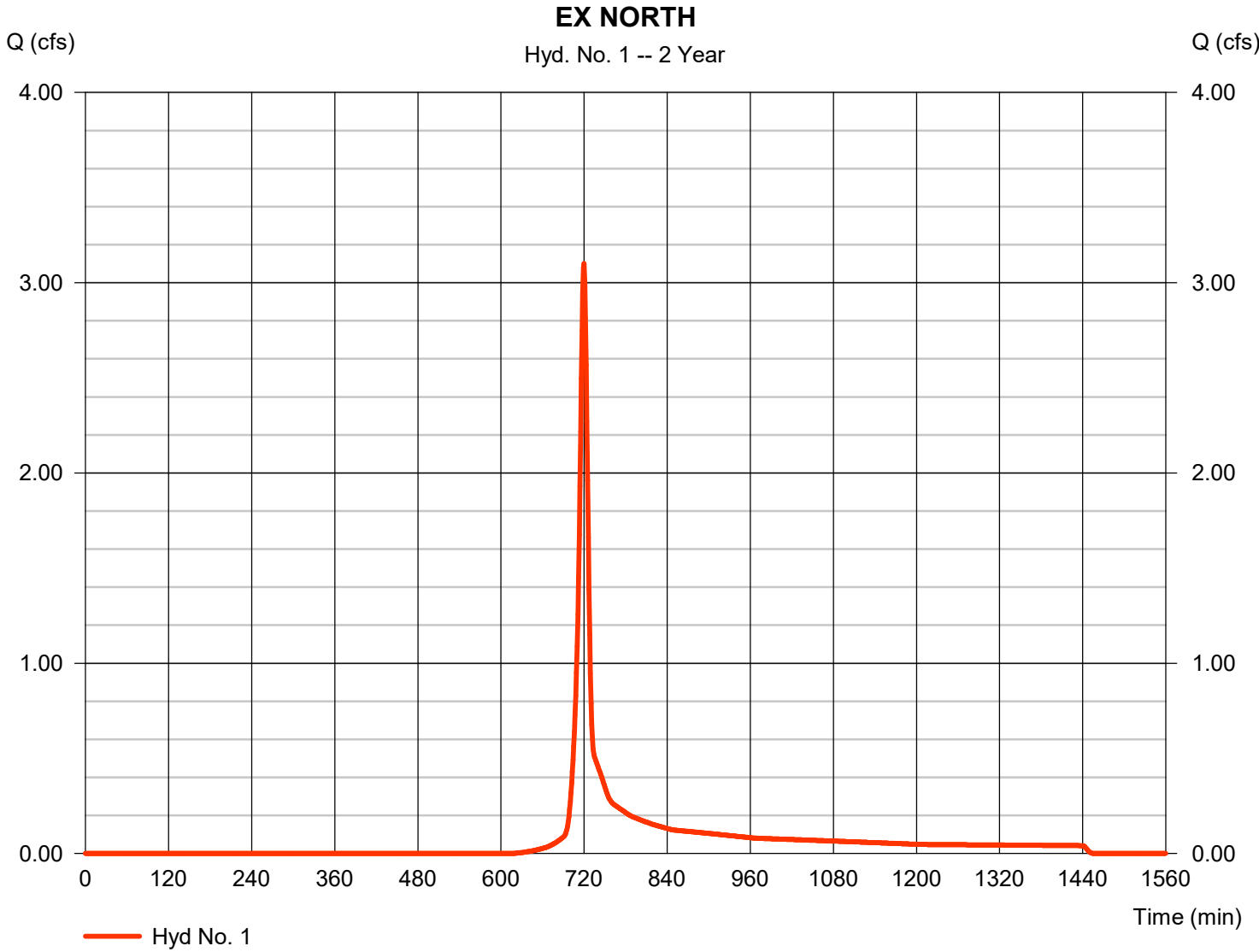
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.101	1	720	7,048	----	----	----	EX NORTH
2	SCS Runoff	28.95	1	723	79,344	----	----	----	EX WEST
3	SCS Runoff	28.84	1	726	92,635	----	----	----	EX EAST
4	SCS Runoff	2.104	1	717	4,456	----	----	----	PROP NORTH
5	SCS Runoff	11.05	1	721	28,733	----	----	----	DETAINED NORTHWEST
6	SCS Runoff	15.49	1	719	36,295	----	----	----	DETAINED SOUTHWEST
7	SCS Runoff	9.088	1	725	28,901	----	----	----	WEST
8	Combine	34.29	1	720	93,929	5, 6, 7	----	----	POI WEST
9	SCS Runoff	51.58	1	720	128,616	----	----	----	DETAINED EAST
10	SCS Runoff	2.900	1	720	7,232	----	----	----	EAST
11	Combine	54.48	1	720	135,848	9, 10	----	----	POI EAST
12	Reservoir	0.747	1	775	28,733	5	1044.24	13,769	ROUTED DET NORTHWEST
13	Reservoir	1.070	1	761	36,292	6	1039.88	17,172	ROUTED DET SOUTHWEST
14	Combine	10.80	1	725	93,926	7, 12, 13	----	----	POI WEST ATTENUATED
15	Reservoir	0.620	1	1203	76,832	9	1043.73	100,023	ROUTED DET SOUTH EAST
16	Combine	3.365	1	720	84,065	10, 15	----	----	POI EAST ATTENUATED
17	Reservoir	10.56	1	723	28,733	5	1045.67	29,541	NORTHWEST OVERFLOW
18	Reservoir	41.97	1	724	128,615	9	1046.47	199,496	SOUTHEAST OVERFLOW
19	Reservoir	15.11	1	720	36,295	6	1044.16	47,982	SOUTHWEST OVERFLOW

Hydrograph Report

Hyd. No. 1

EX NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 3.101 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 7,048 cuft
Drainage area	= 1.400 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.70 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

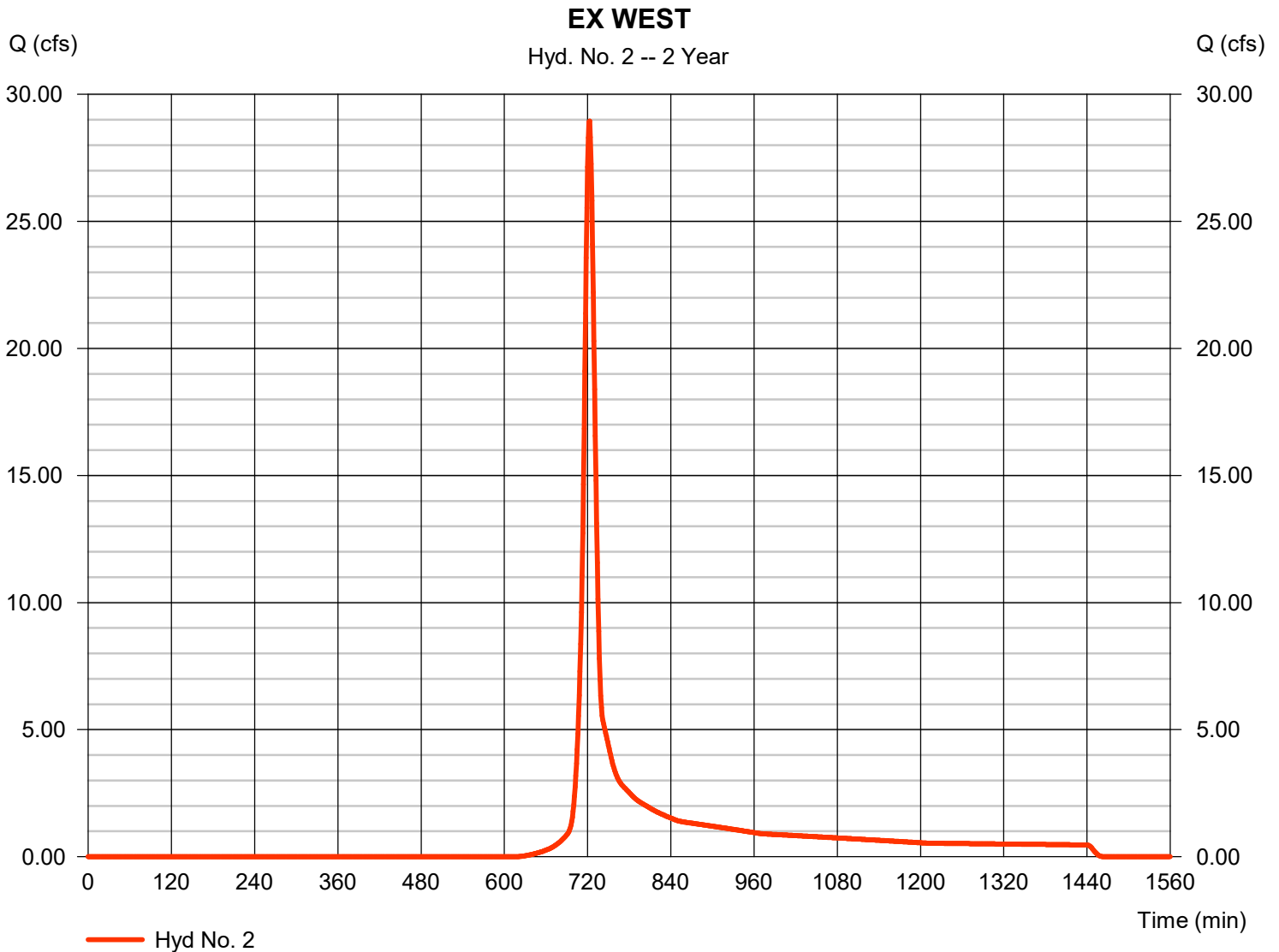


Hydrograph Report

Hyd. No. 2

EX WEST

Hydrograph type	= SCS Runoff	Peak discharge	= 28.95 cfs
Storm frequency	= 2 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 79,344 cuft
Drainage area	= 15.760 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.30 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

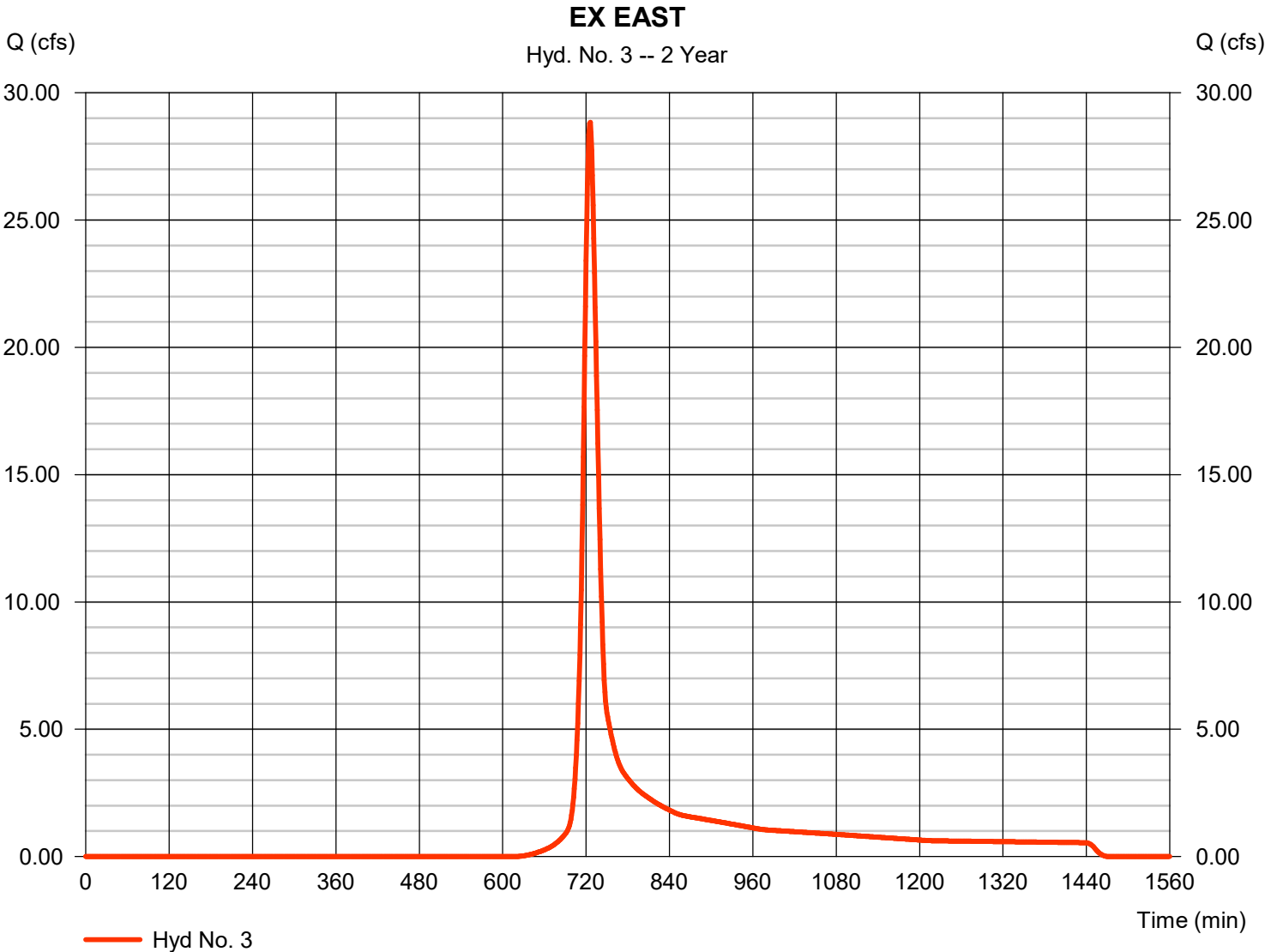


Hydrograph Report

Hyd. No. 3

EX EAST

Hydrograph type	= SCS Runoff	Peak discharge	= 28.84 cfs
Storm frequency	= 2 yrs	Time to peak	= 726 min
Time interval	= 1 min	Hyd. volume	= 92,635 cuft
Drainage area	= 18.400 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.50 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

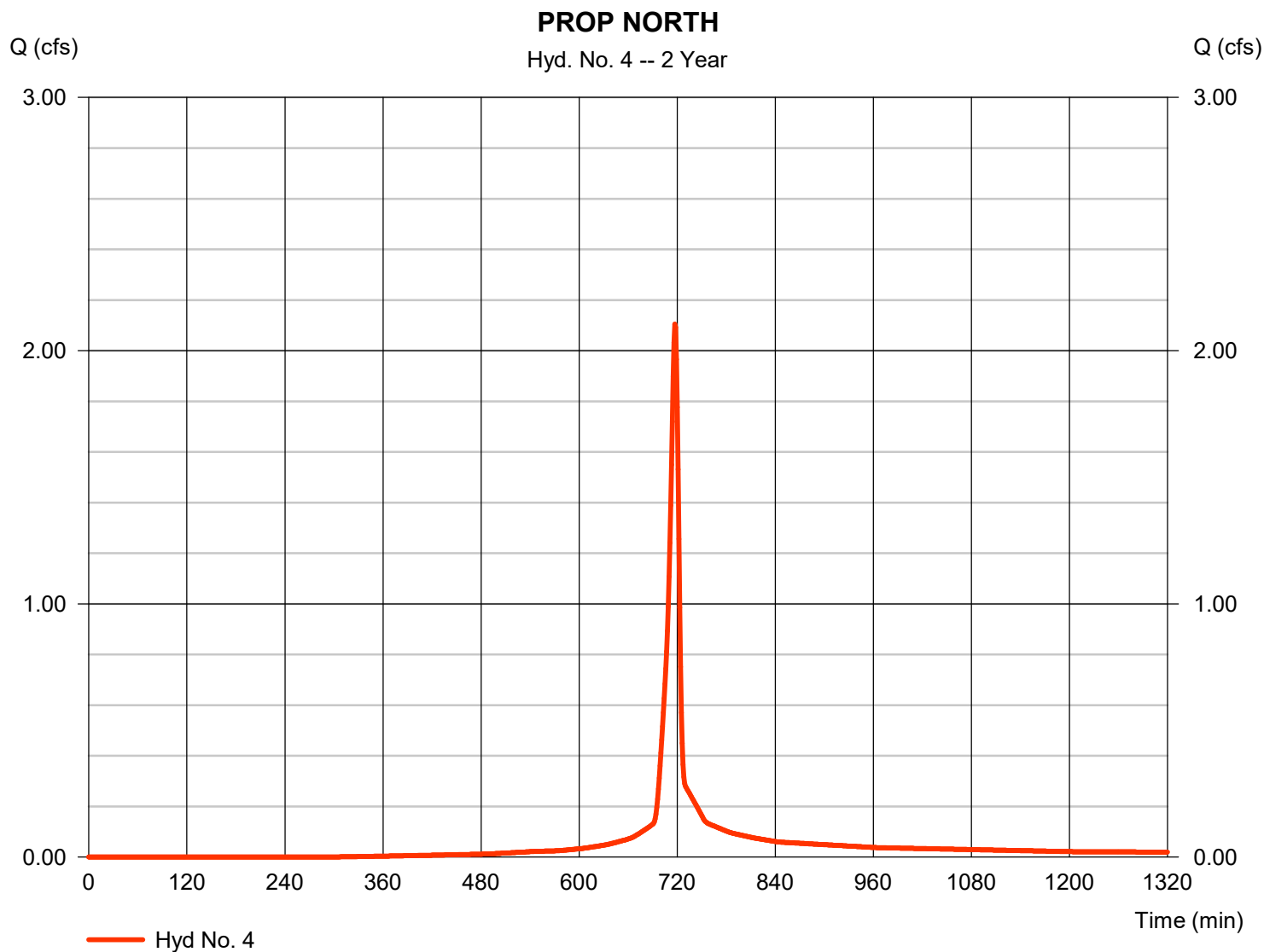
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 4

PROP NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 2.104 cfs
Storm frequency	= 2 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 4,456 cuft
Drainage area	= 0.450 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

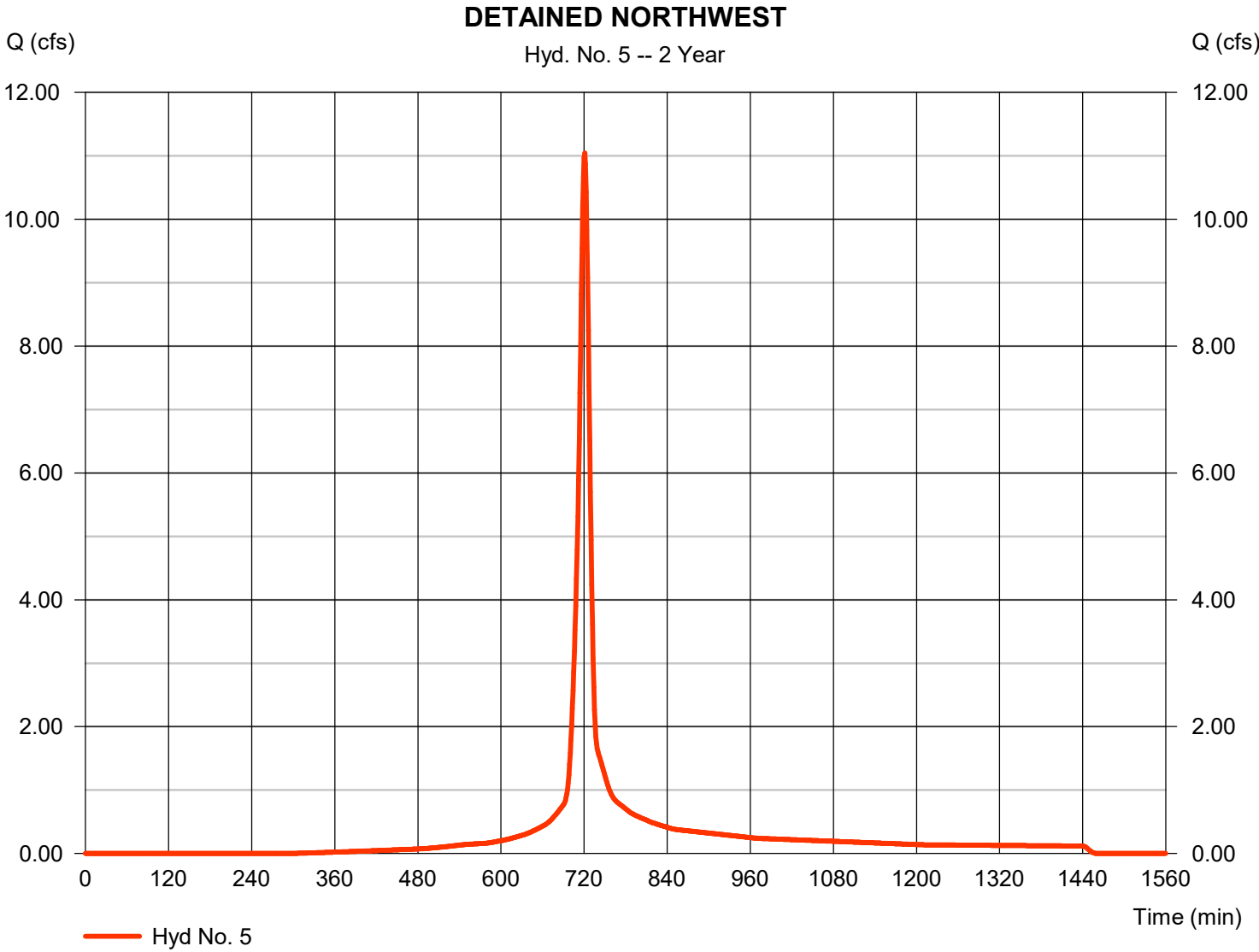


Hydrograph Report

Hyd. No. 5

DETAINED NORTHWEST

Hydrograph type	= SCS Runoff	Peak discharge	= 11.05 cfs
Storm frequency	= 2 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 28,733 cuft
Drainage area	= 3.040 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.60 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

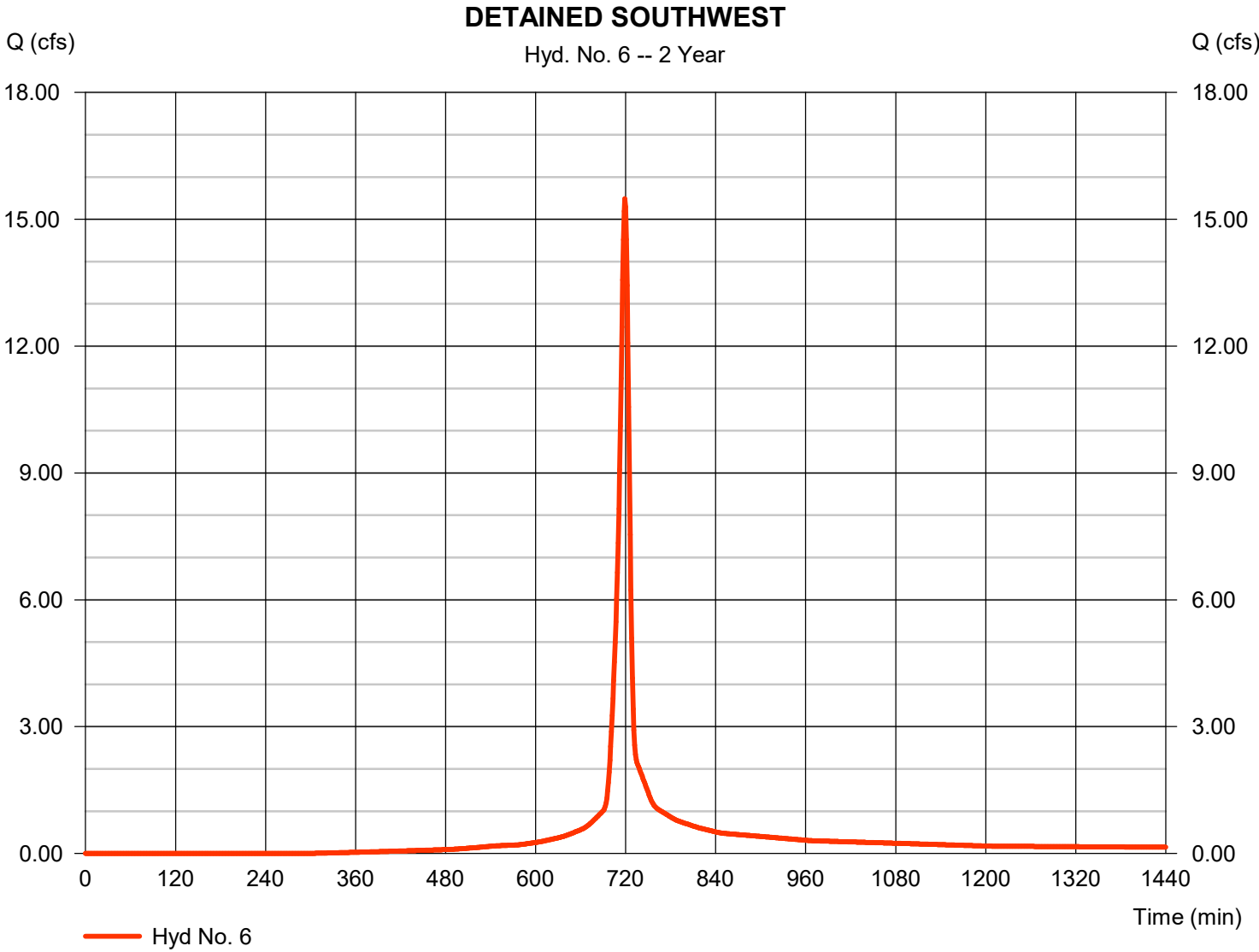


Hydrograph Report

Hyd. No. 6

DETAINED SOUTHWEST

Hydrograph type	= SCS Runoff	Peak discharge	= 15.49 cfs
Storm frequency	= 2 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 36,295 cuft
Drainage area	= 3.780 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.30 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

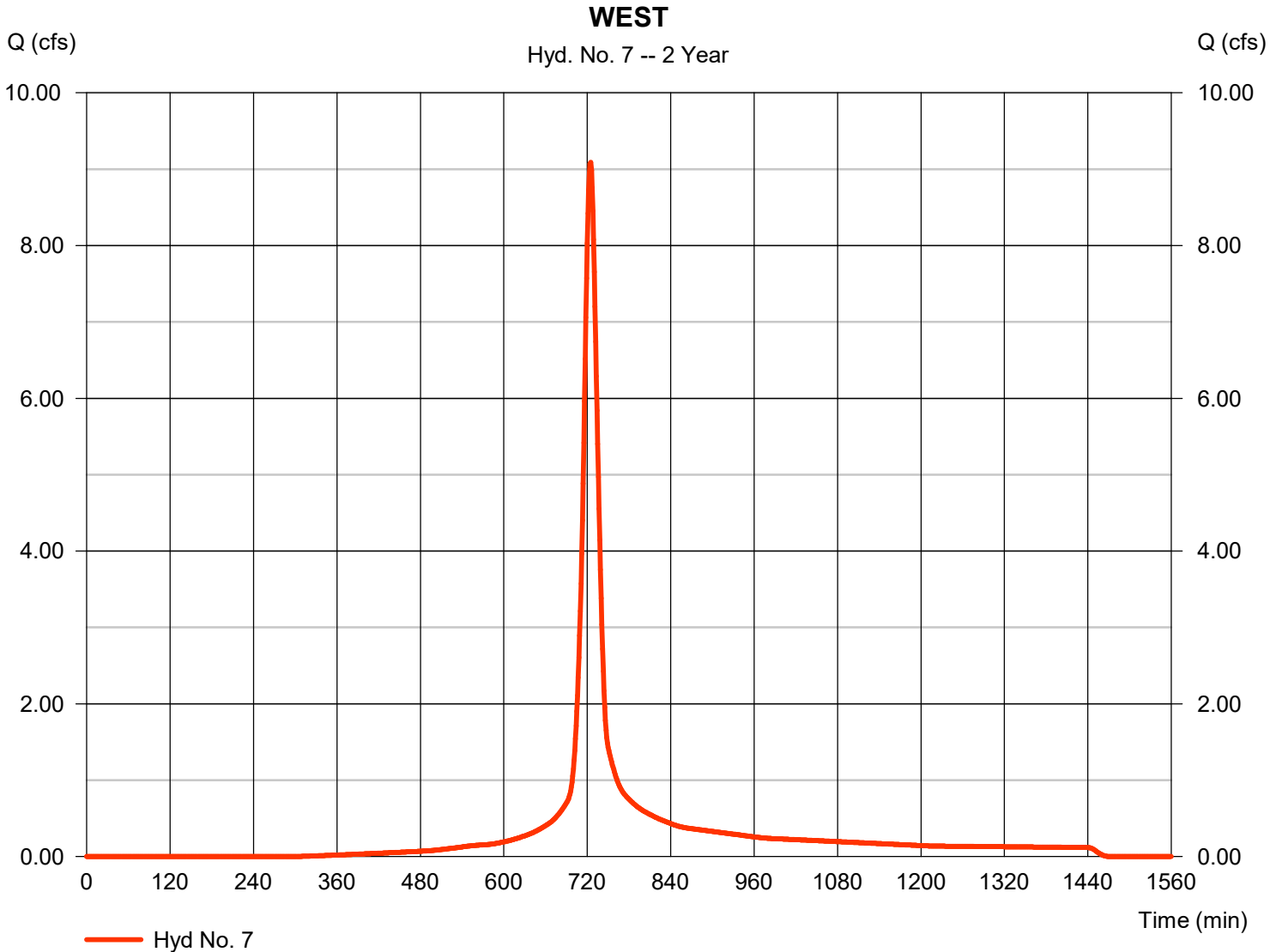
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 7

WEST

Hydrograph type	= SCS Runoff	Peak discharge	= 9.088 cfs
Storm frequency	= 2 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 28,901 cuft
Drainage area	= 3.010 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.00 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

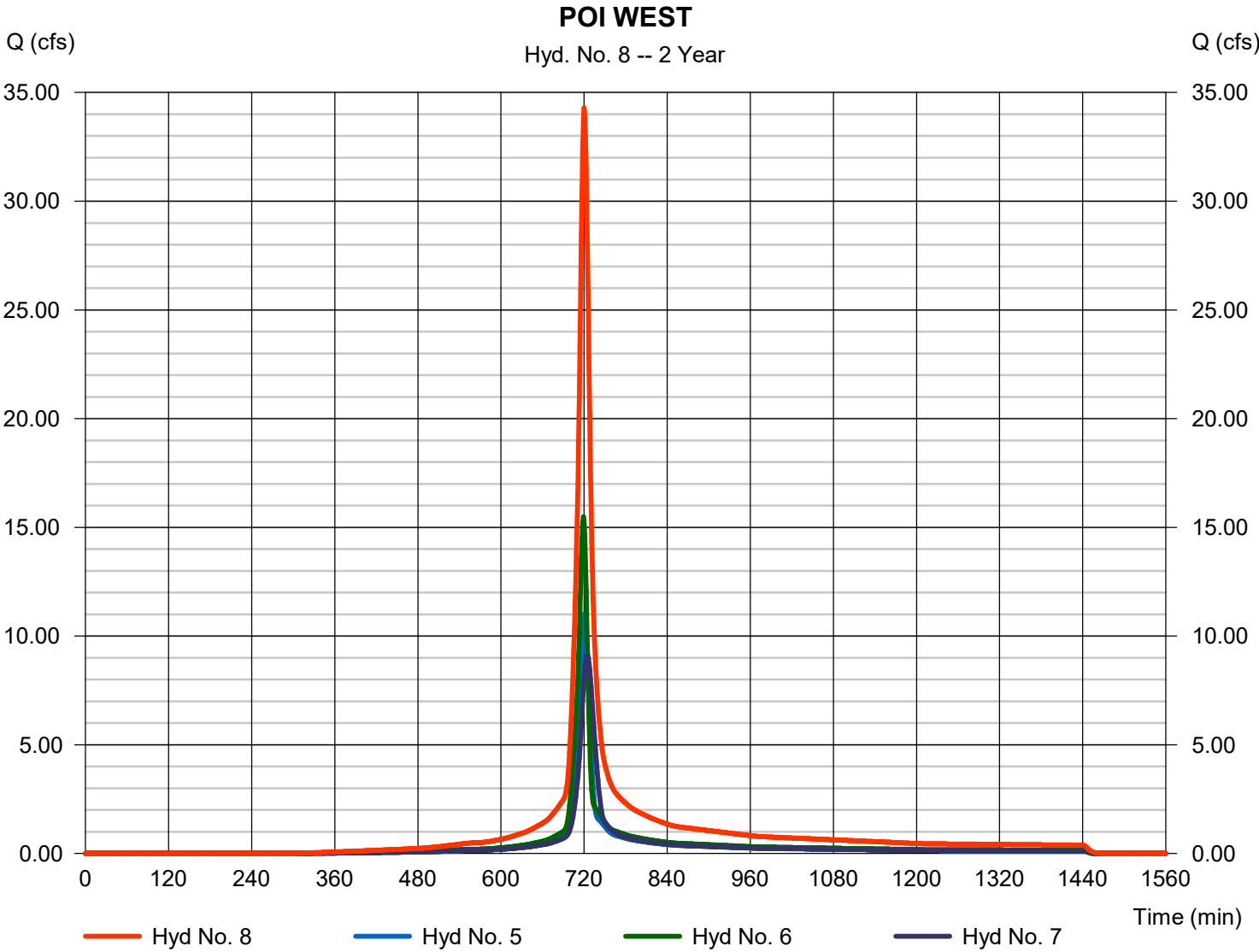
Tuesday, 12 / 2 / 2025

Hyd. No. 8

POI WEST

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 5, 6, 7

Peak discharge = 34.29 cfs
Time to peak = 720 min
Hyd. volume = 93,929 cuft
Contrib. drain. area = 9.830 ac



Hydrograph Report

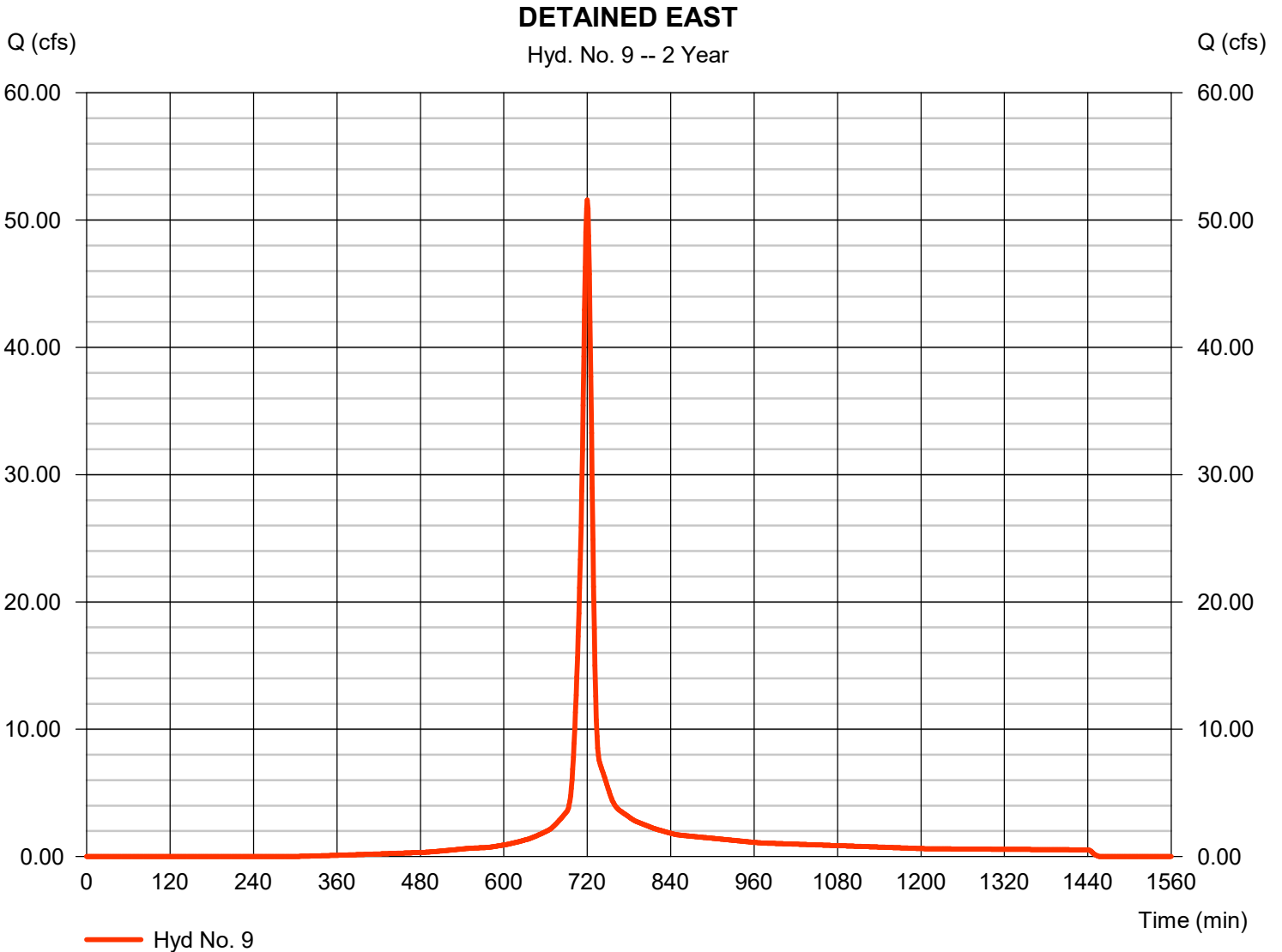
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 9

DETAINED EAST

Hydrograph type	= SCS Runoff	Peak discharge	= 51.58 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 128,616 cuft
Drainage area	= 13.160 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.70 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

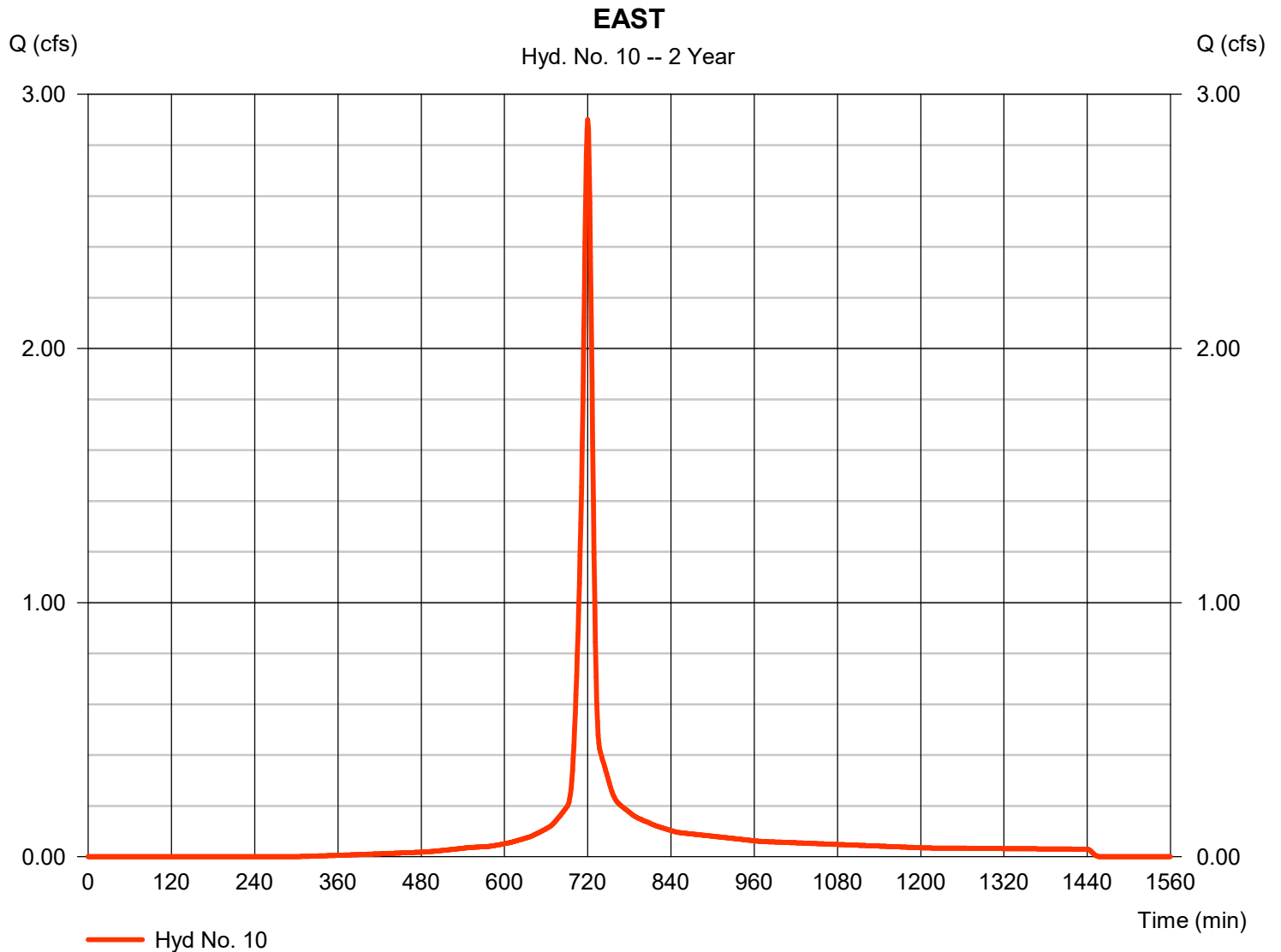
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 10

EAST

Hydrograph type	= SCS Runoff	Peak discharge	= 2.900 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 7,232 cuft
Drainage area	= 0.740 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.70 min
Total precip.	= 3.71 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

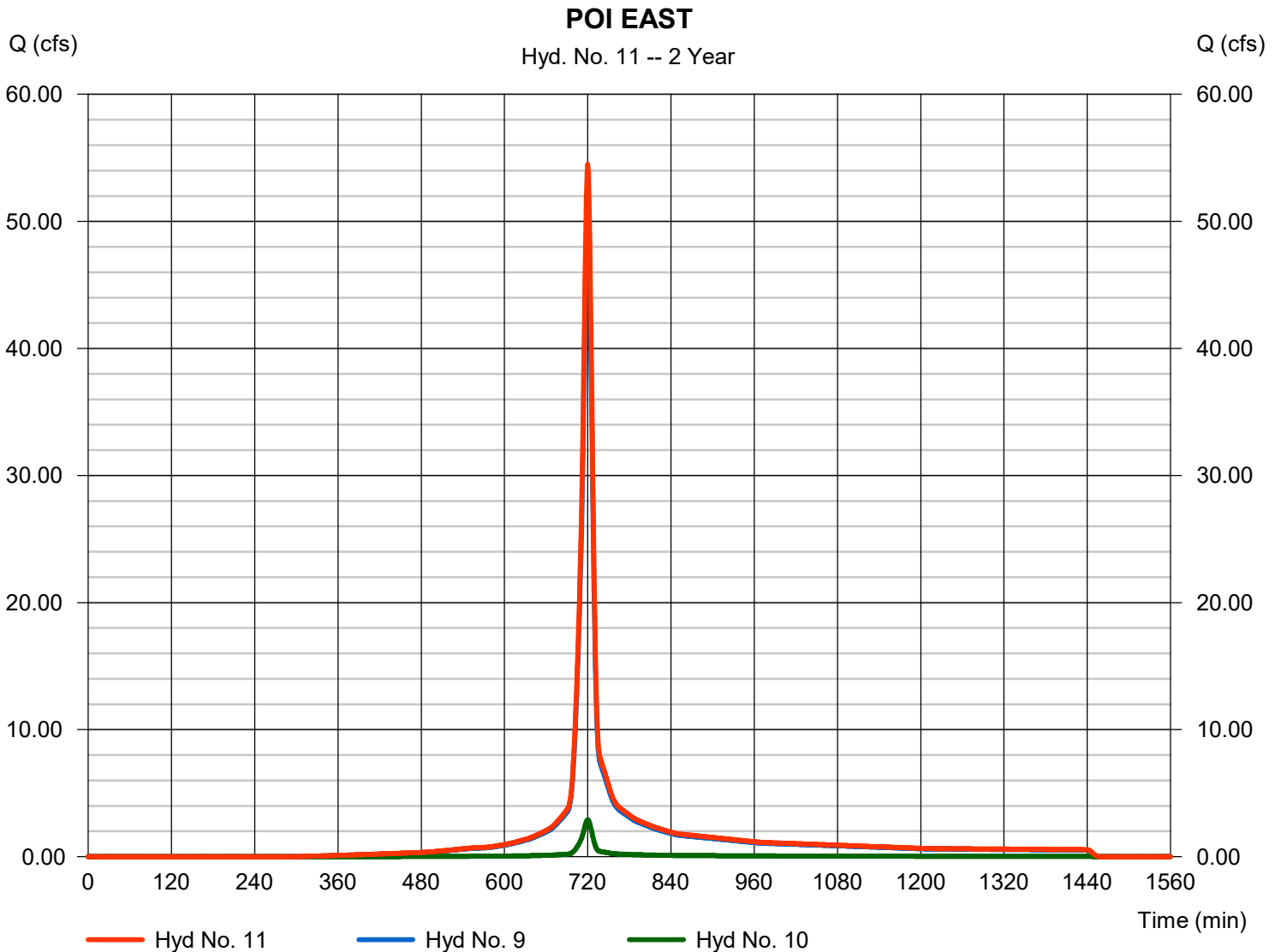
Tuesday, 12 / 2 / 2025

Hyd. No. 11

POI EAST

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 9, 10

Peak discharge = 54.48 cfs
Time to peak = 720 min
Hyd. volume = 135,848 cuft
Contrib. drain. area = 13.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

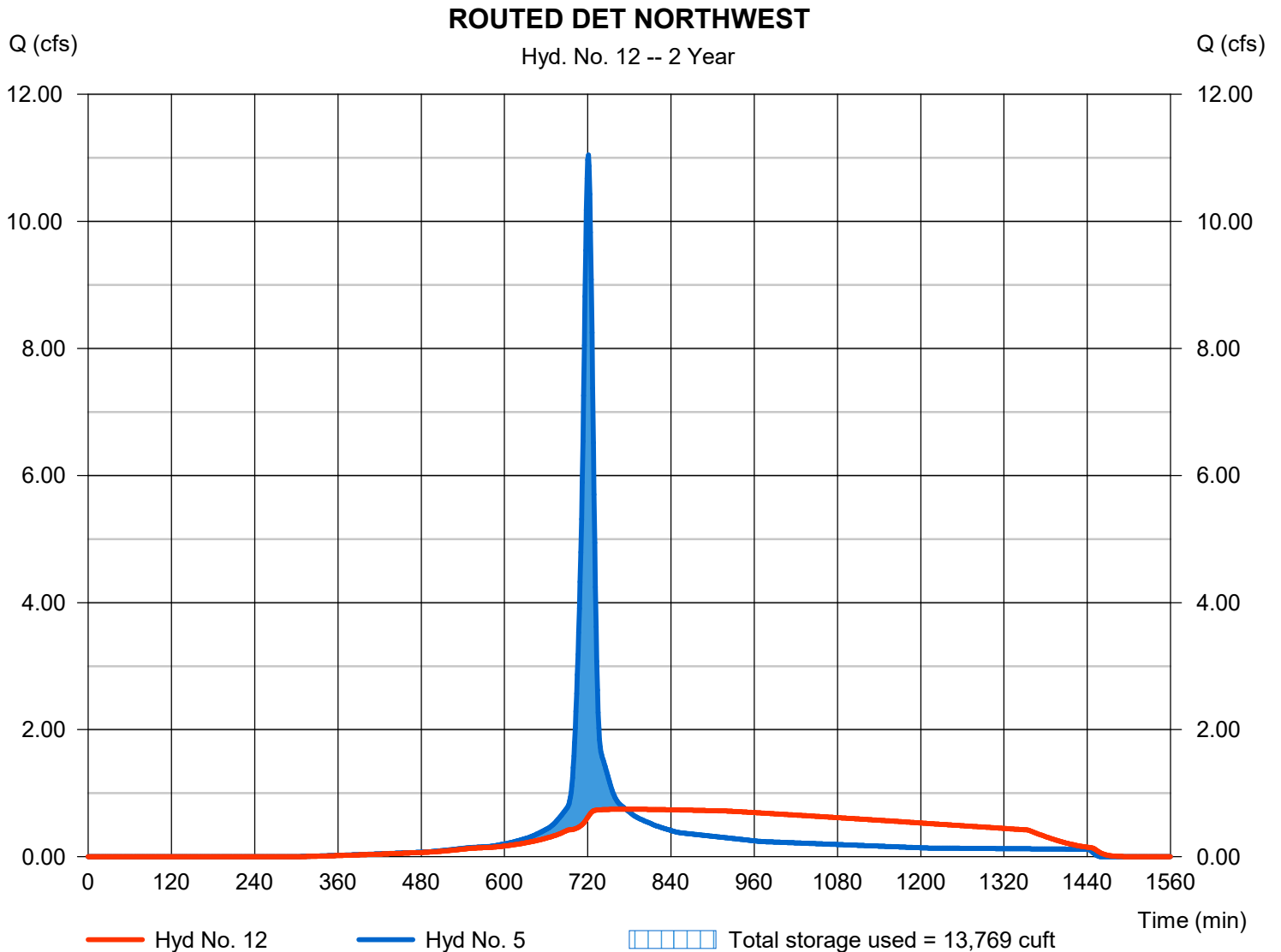
Tuesday, 12 / 2 / 2025

Hyd. No. 12

ROUTED DET NORTHWEST

Hydrograph type	= Reservoir	Peak discharge	= 0.747 cfs
Storm frequency	= 2 yrs	Time to peak	= 775 min
Time interval	= 1 min	Hyd. volume	= 28,733 cuft
Inflow hyd. No.	= 5 - DETAINED NORTHWEST	Max. Elevation	= 1044.24 ft
Reservoir name	= NORTHWEST BASIN	Max. Storage	= 13,769 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

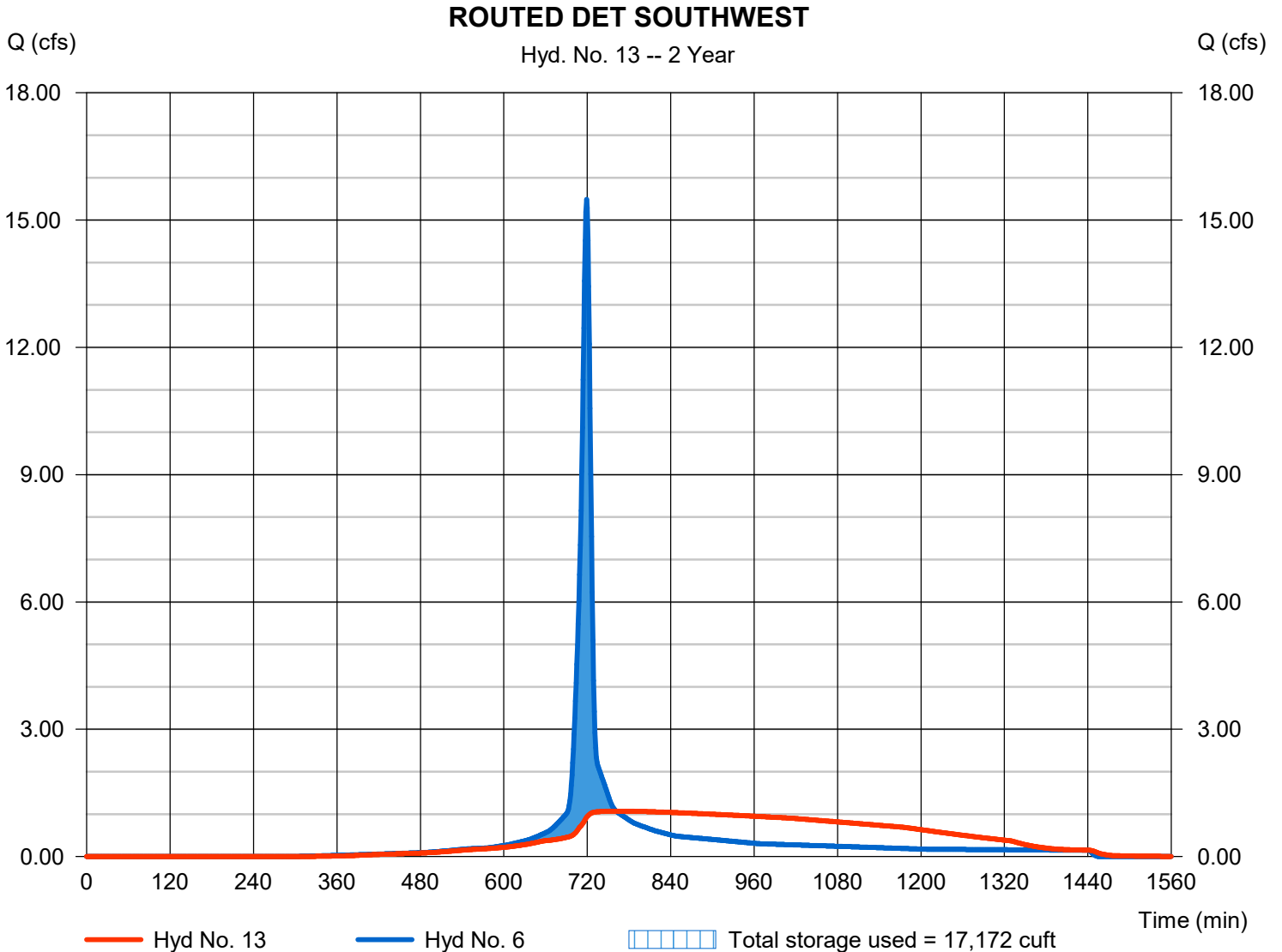
Tuesday, 12 / 2 / 2025

Hyd. No. 13

ROUTED DET SOUTHWEST

Hydrograph type	= Reservoir	Peak discharge	= 1.070 cfs
Storm frequency	= 2 yrs	Time to peak	= 761 min
Time interval	= 1 min	Hyd. volume	= 36,292 cuft
Inflow hyd. No.	= 6 - DETAINED SOUTHWEST	Max. Elevation	= 1039.88 ft
Reservoir name	= SOUTHWEST BASIN	Max. Storage	= 17,172 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

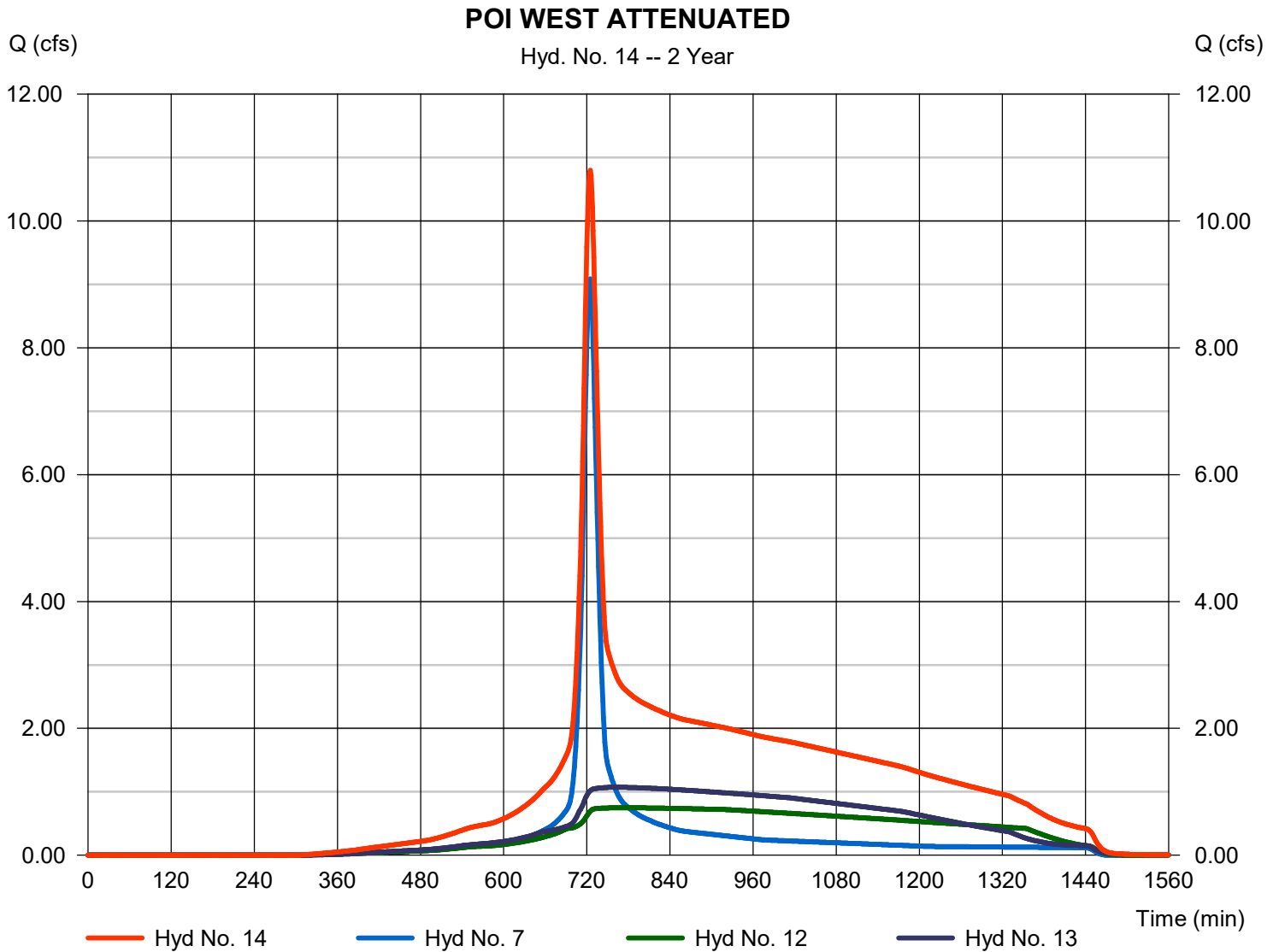
Tuesday, 12 / 2 / 2025

Hyd. No. 14

POI WEST ATTENUATED

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 7, 12, 13

Peak discharge = 10.80 cfs
Time to peak = 725 min
Hyd. volume = 93,926 cuft
Contrib. drain. area = 3.010 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

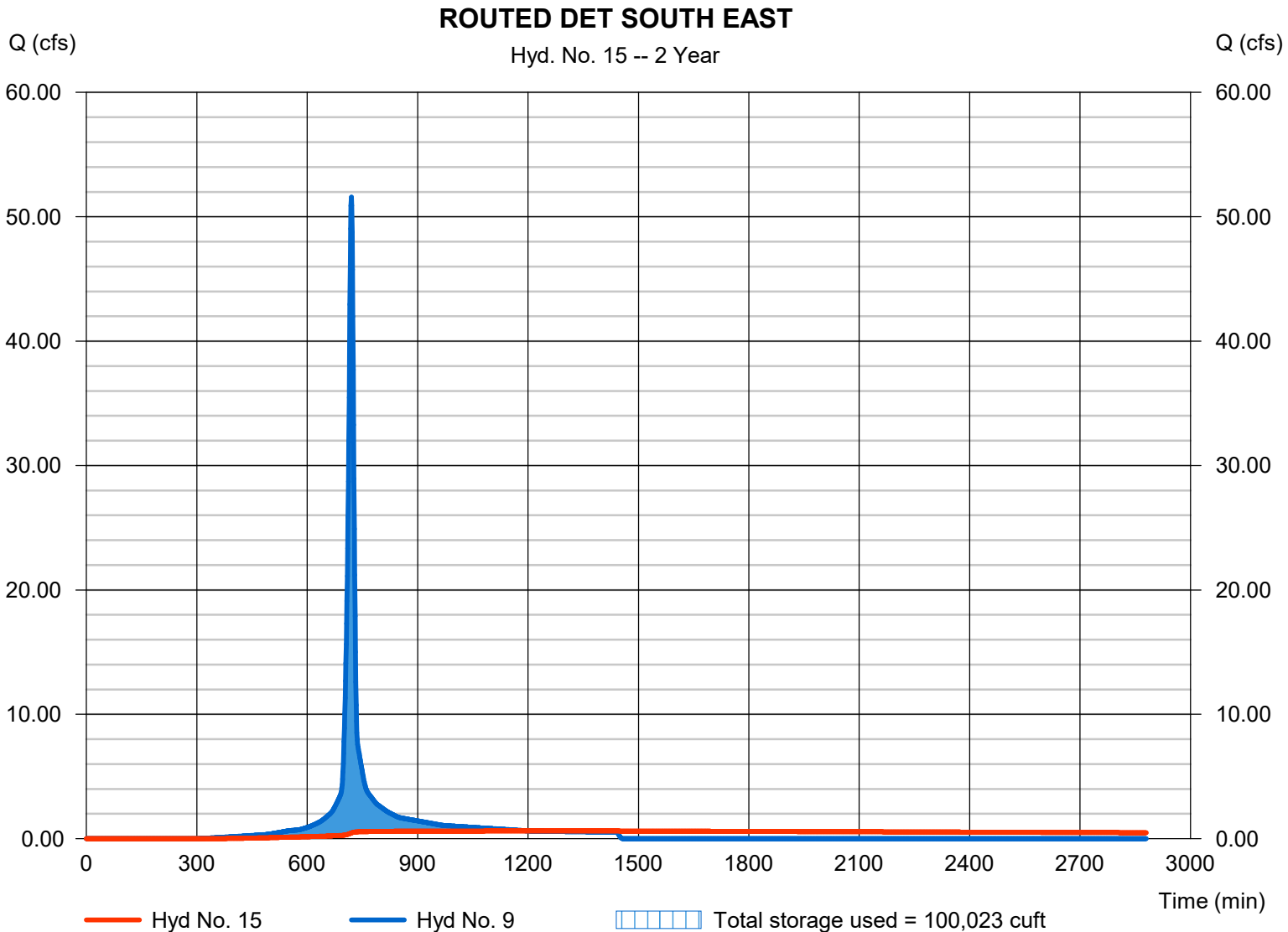
Tuesday, 12 / 2 / 2025

Hyd. No. 15

ROUTED DET SOUTH EAST

Hydrograph type	= Reservoir	Peak discharge	= 0.620 cfs
Storm frequency	= 2 yrs	Time to peak	= 1203 min
Time interval	= 1 min	Hyd. volume	= 76,832 cuft
Inflow hyd. No.	= 9 - DETAINED EAST	Max. Elevation	= 1043.73 ft
Reservoir name	= SOUTHEAST BASIN	Max. Storage	= 100,023 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

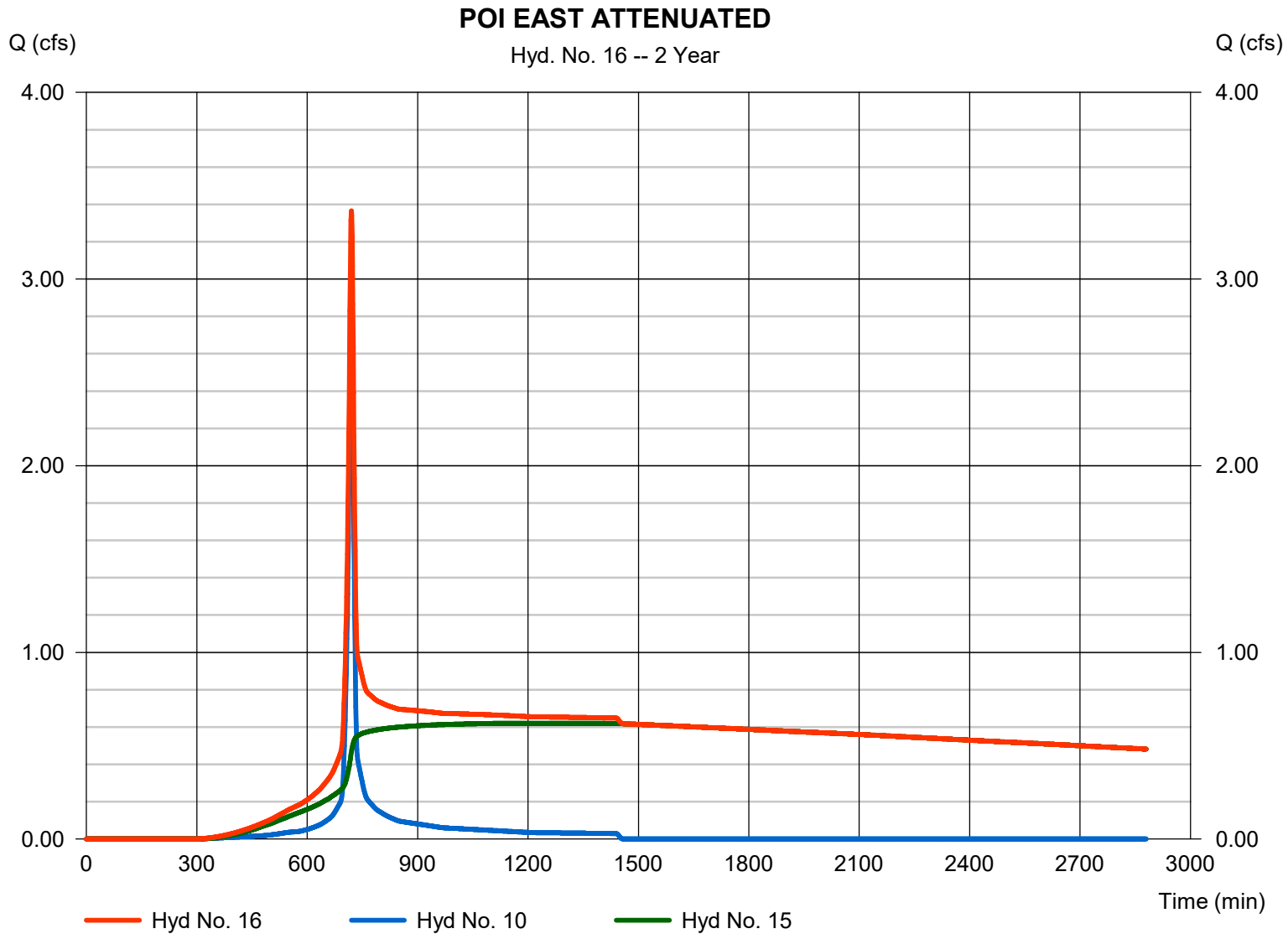
Tuesday, 12 / 2 / 2025

Hyd. No. 16

POI EAST ATTENUATED

Hydrograph type = Combine
Storm frequency = 2 yrs
Time interval = 1 min
Inflow hyds. = 10, 15

Peak discharge = 3.365 cfs
Time to peak = 720 min
Hyd. volume = 84,065 cuft
Contrib. drain. area = 0.740 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

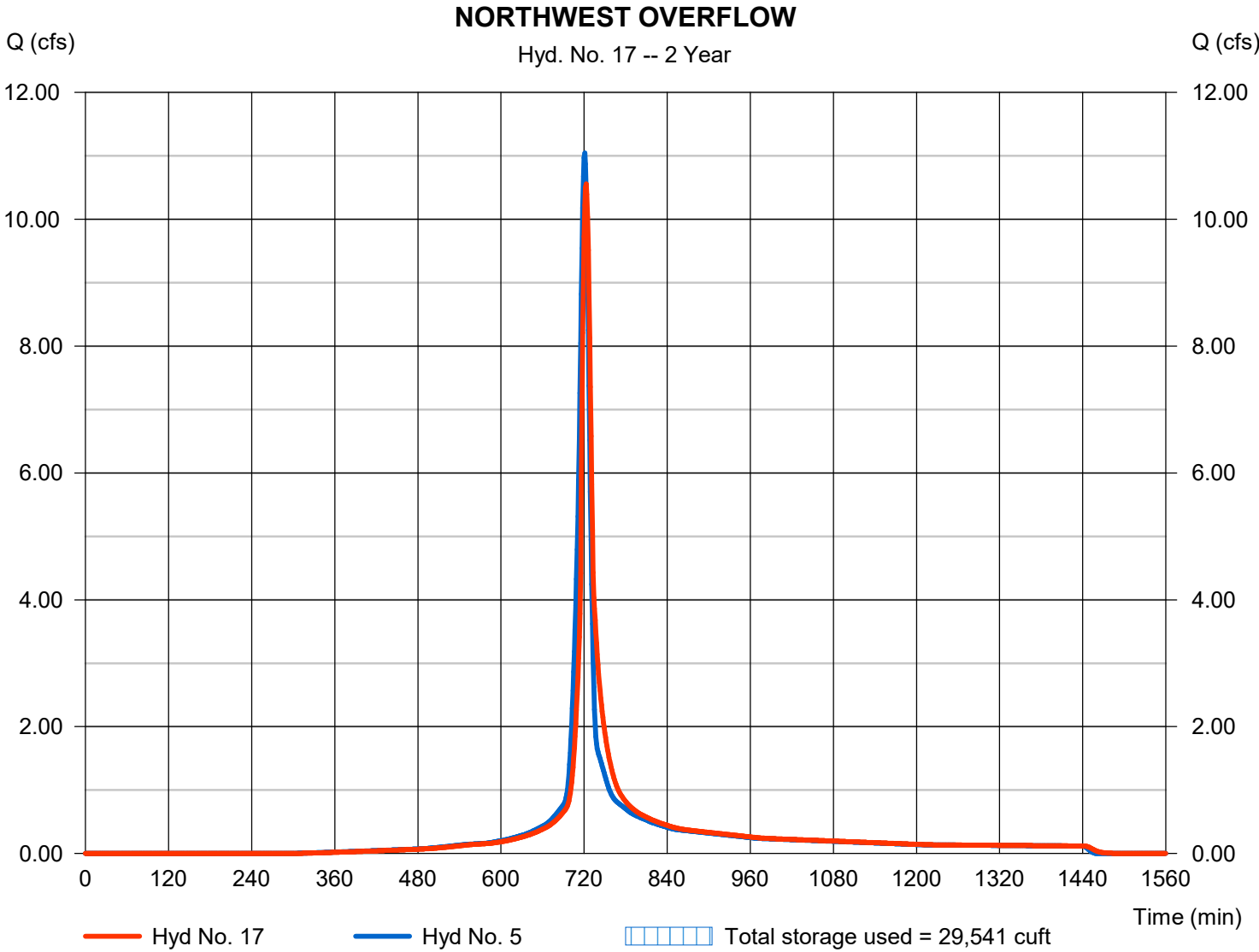
Tuesday, 12 / 2 / 2025

Hyd. No. 17

NORTHWEST OVERFLOW

Hydrograph type	= Reservoir	Peak discharge	= 10.56 cfs
Storm frequency	= 2 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 28,733 cuft
Inflow hyd. No.	= 5 - DETAINED NORTHWEST	Max. Elevation	= 1045.67 ft
Reservoir name	= NORTHWEST BASIN - LFB	Max. Storage	= 29,541 cuft

Storage Indication method used. Wet pond routing start elevation = 1045.40 ft.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

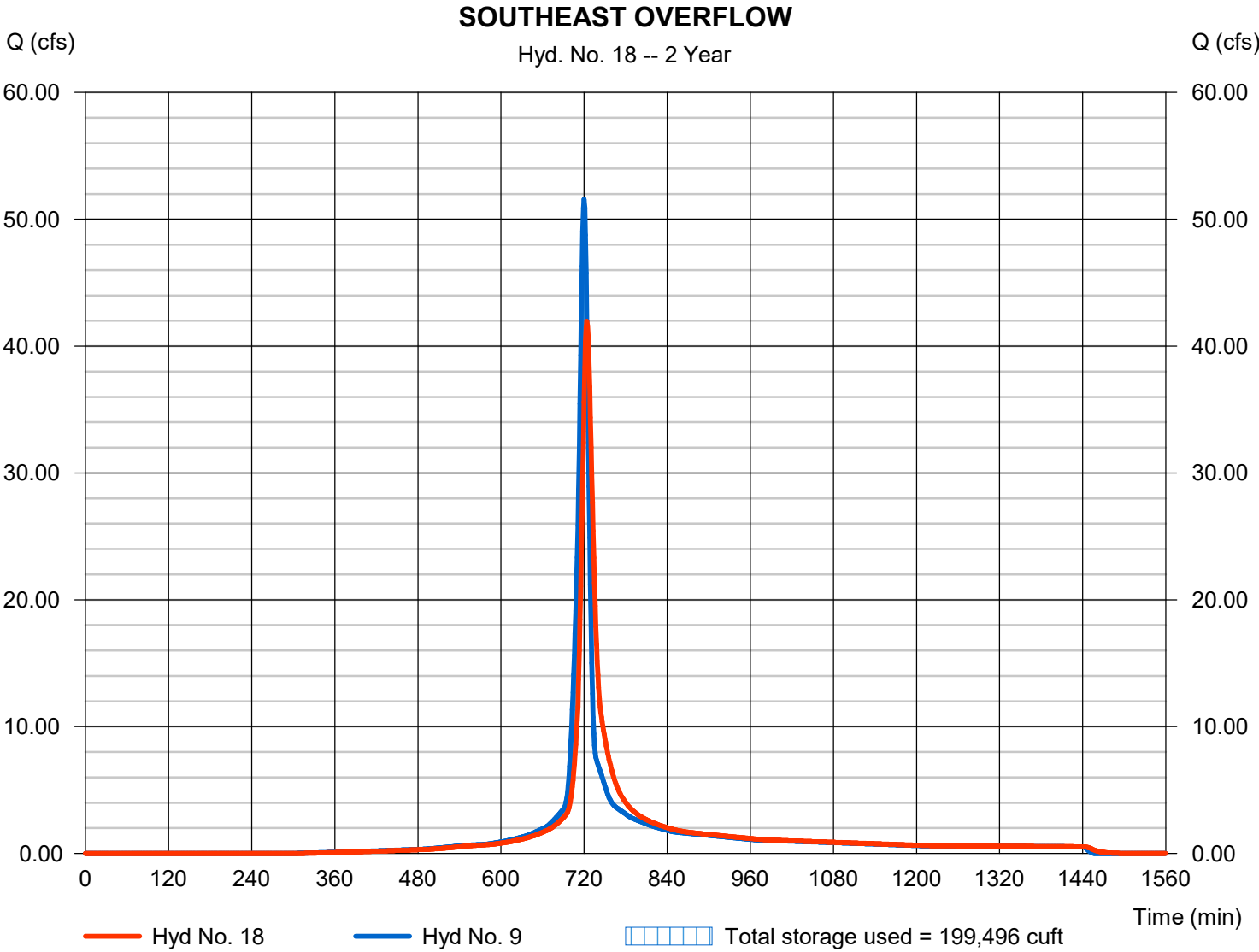
Tuesday, 12 / 2 / 2025

Hyd. No. 18

SOUTHEAST OVERFLOW

Hydrograph type	= Reservoir	Peak discharge	= 41.97 cfs
Storm frequency	= 2 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 128,615 cuft
Inflow hyd. No.	= 9 - DETAINED EAST	Max. Elevation	= 1046.47 ft
Reservoir name	= SOUTHEAST BASIN - LFB	Max. Storage	= 199,496 cuft

Storage Indication method used. Wet pond routing start elevation = 1046.00 ft.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

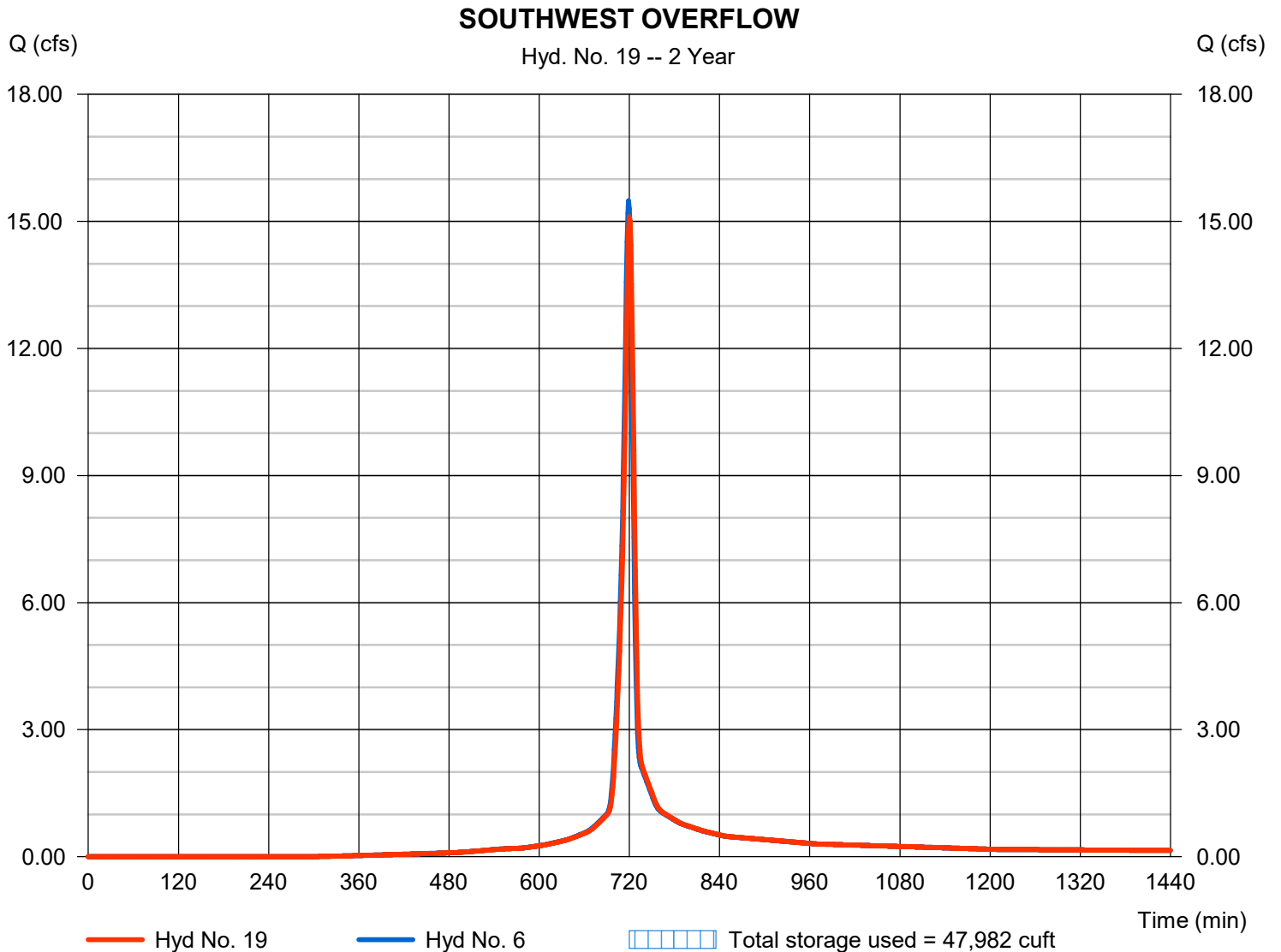
Tuesday, 12 / 2 / 2025

Hyd. No. 19

SOUTHWEST OVERFLOW

Hydrograph type	= Reservoir	Peak discharge	= 15.11 cfs
Storm frequency	= 2 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 36,295 cuft
Inflow hyd. No.	= 6 - DETAINED SOUTHWEST	Max. Elevation	= 1044.16 ft
Reservoir name	= SOUTHWEST BASIN - LFB	Max. Storage	= 47,982 cuft

Storage Indication method used. Wet pond routing start elevation = 1044.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.673	1	719	12,831	----	----	----	EX NORTH
2	SCS Runoff	53.68	1	722	144,441	----	----	----	EX WEST
3	SCS Runoff	53.82	1	725	168,636	----	----	----	EX EAST
4	SCS Runoff	3.153	1	717	6,855	----	----	----	PROP NORTH
5	SCS Runoff	16.60	1	721	44,205	----	----	----	DETAINED NORTHWEST
6	SCS Runoff	23.24	1	719	55,838	----	----	----	DETAINED SOUTHWEST
7	SCS Runoff	13.71	1	724	44,464	----	----	----	WEST
8	Combine	51.66	1	720	144,507	5, 6, 7	----	----	POI WEST
9	SCS Runoff	77.49	1	720	197,871	----	----	----	DETAINED EAST
10	SCS Runoff	4.358	1	720	11,126	----	----	----	EAST
11	Combine	81.85	1	720	208,998	9, 10	----	----	POI EAST
12	Reservoir	4.168	1	734	44,205	5	1044.74	19,321	ROUTED DET NORTHWEST
13	Reservoir	1.194	1	784	55,836	6	1041.49	28,528	ROUTED DET SOUTHWEST
14	Combine	16.46	1	729	144,504	7, 12, 13	----	----	POI WEST ATTENUATED
15	Reservoir	2.062	1	902	109,901	9	1045.06	145,904	ROUTED DET SOUTH EAST
16	Combine	4.924	1	720	121,028	10, 15	----	----	POI EAST ATTENUATED
17	Reservoir	15.94	1	723	44,205	5	1045.74	30,225	NORTHWEST OVERFLOW
18	Reservoir	65.67	1	723	197,870	9	1046.63	206,643	SOUTHEAST OVERFLOW
19	Reservoir	22.70	1	720	55,838	6	1044.25	48,583	SOUTHWEST OVERFLOW

Hydrograph Report

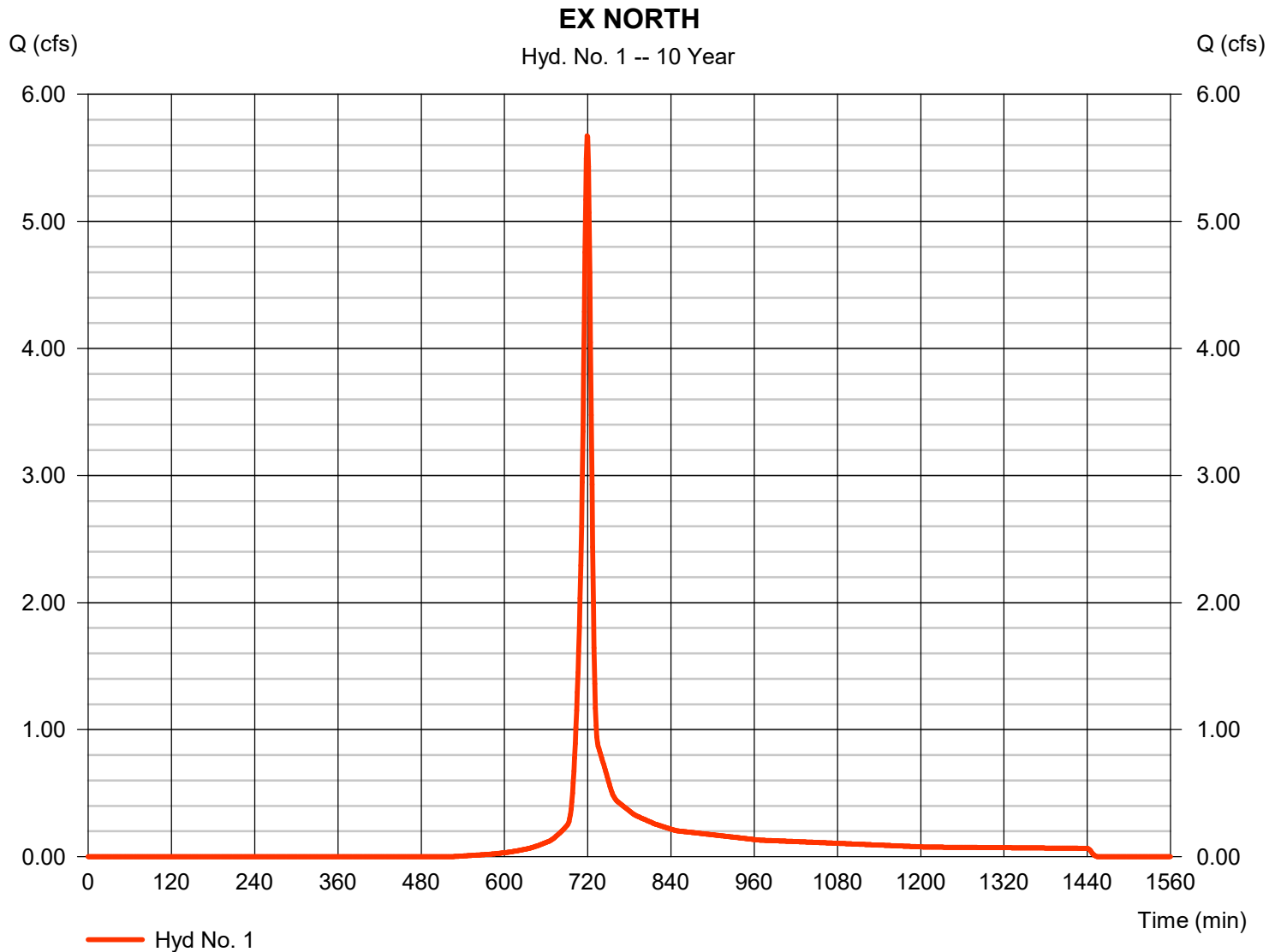
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 1

EX NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 5.673 cfs
Storm frequency	= 10 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 12,831 cuft
Drainage area	= 1.400 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.70 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

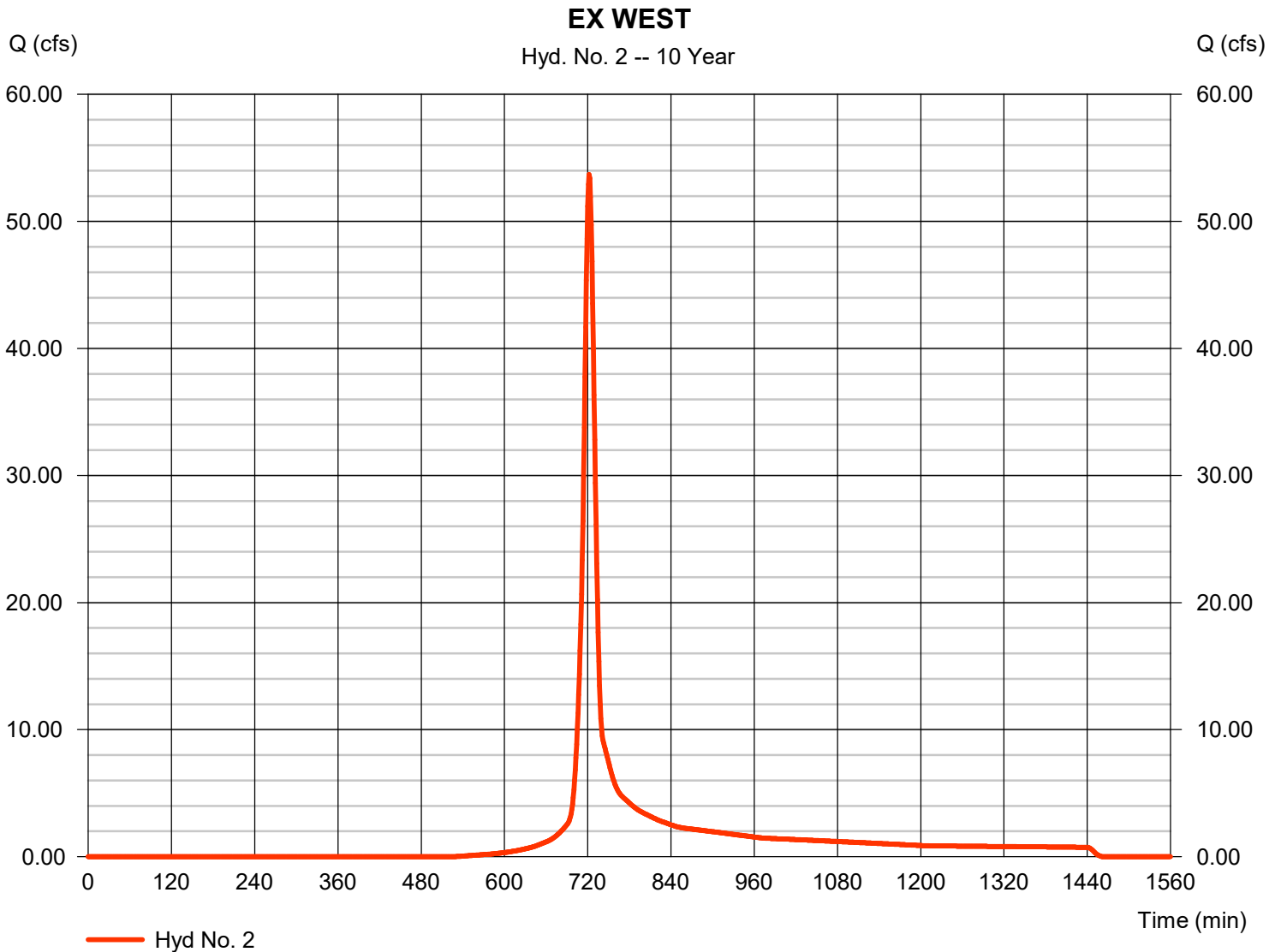
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 2

EX WEST

Hydrograph type	= SCS Runoff	Peak discharge	= 53.68 cfs
Storm frequency	= 10 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 144,441 cuft
Drainage area	= 15.760 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.30 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

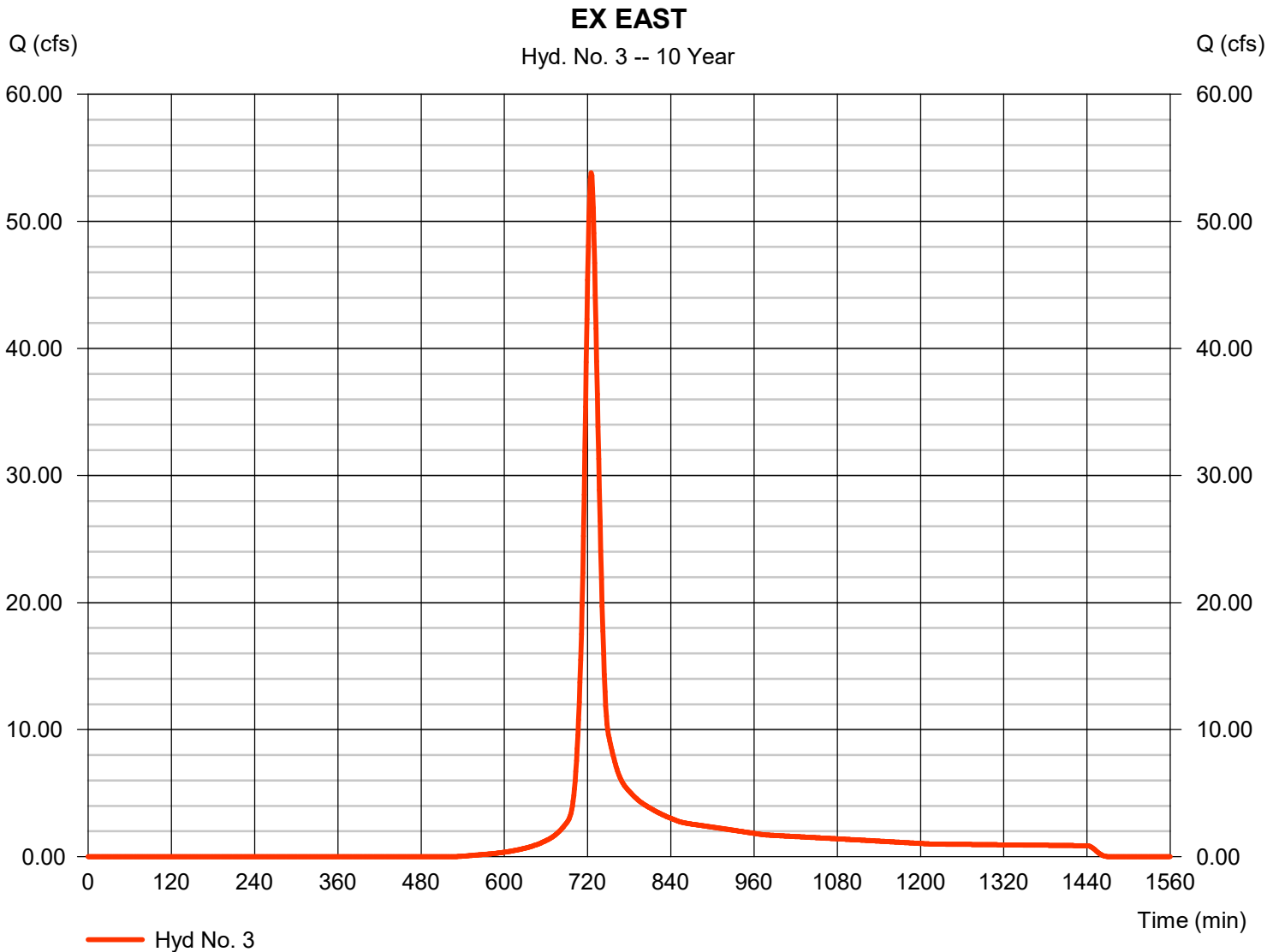
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 3

EX EAST

Hydrograph type	= SCS Runoff	Peak discharge	= 53.82 cfs
Storm frequency	= 10 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 168,636 cuft
Drainage area	= 18.400 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.50 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

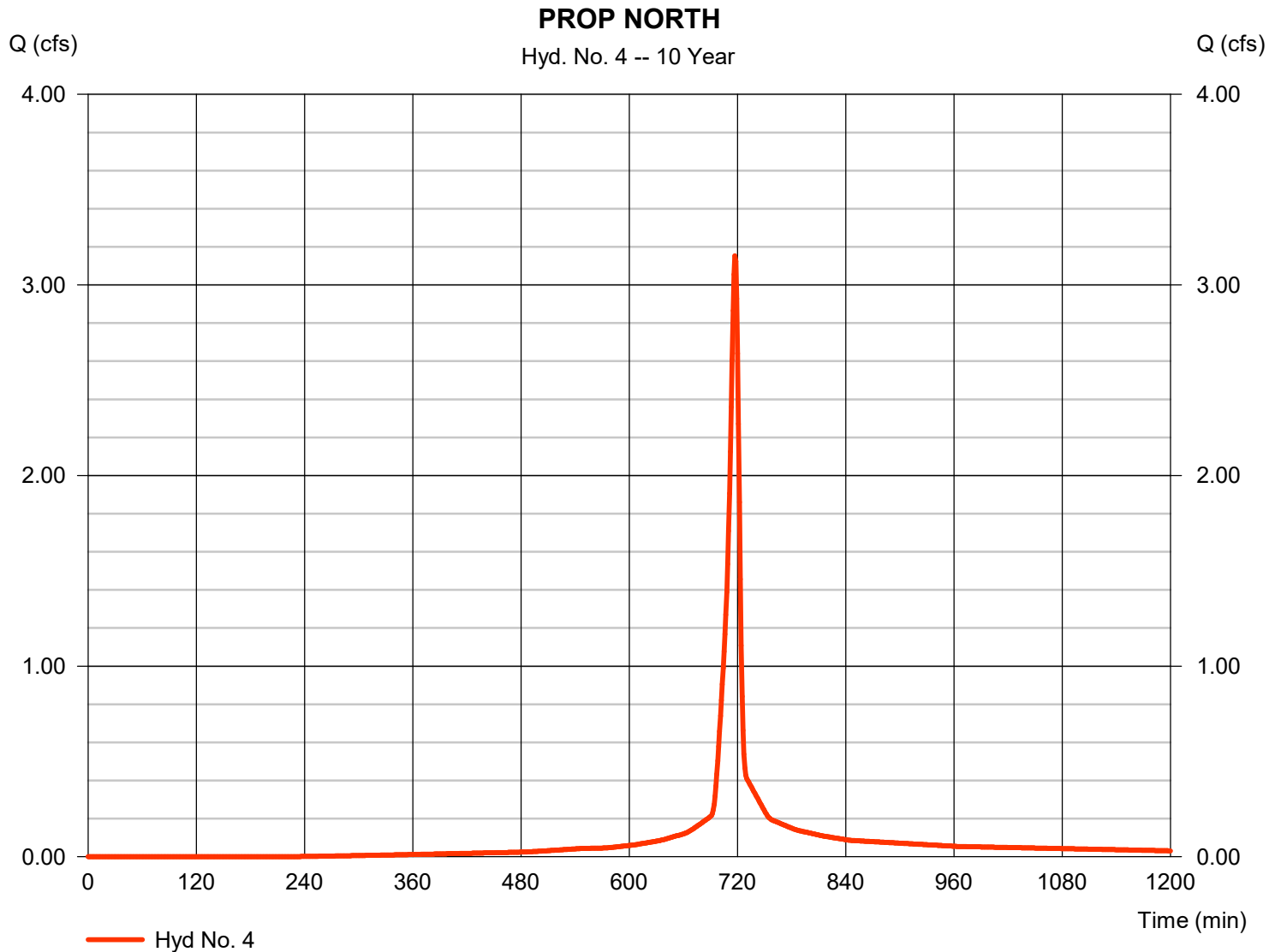
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 4

PROP NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 3.153 cfs
Storm frequency	= 10 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 6,855 cuft
Drainage area	= 0.450 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

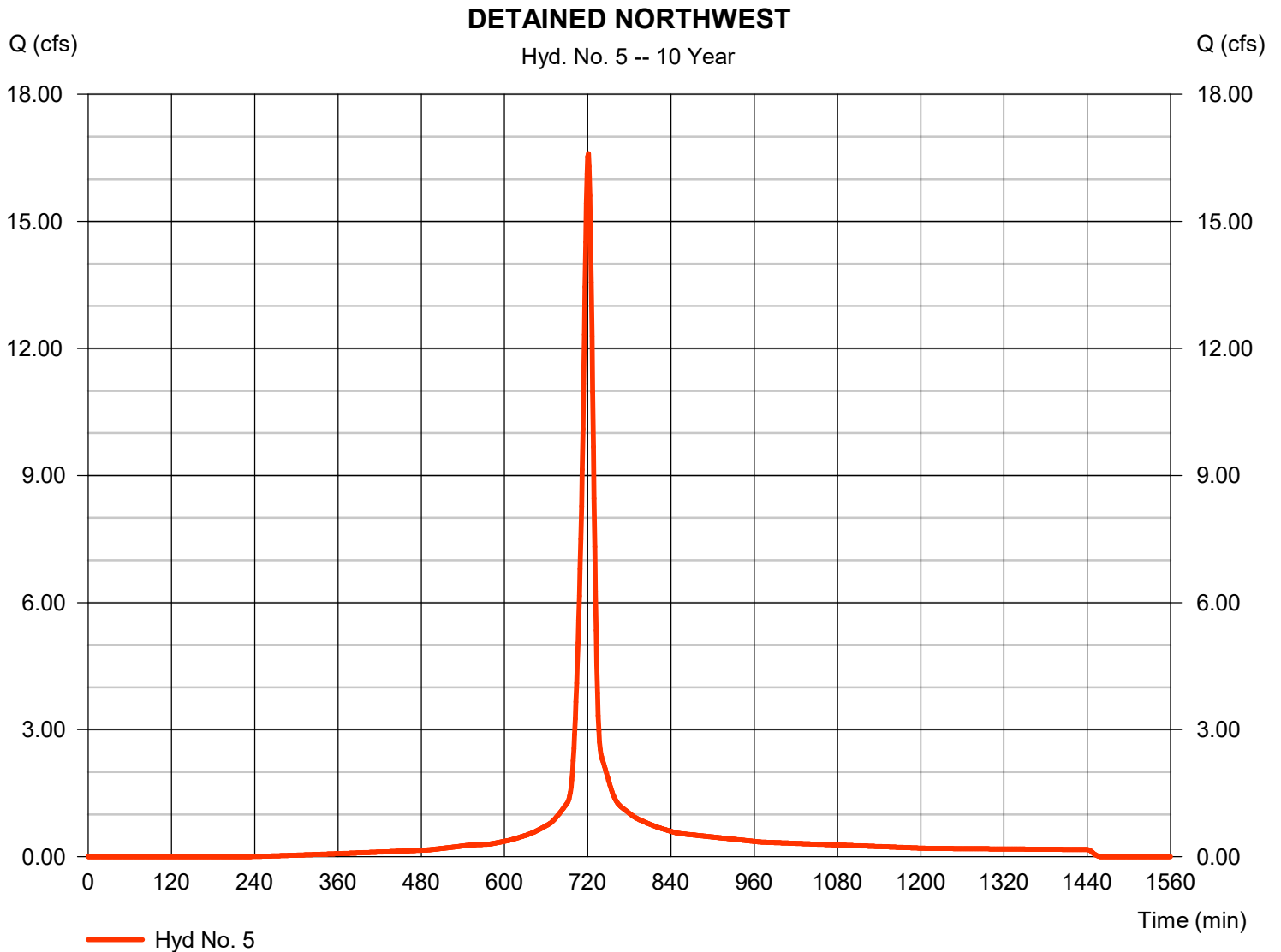
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 5

DETAINED NORTHWEST

Hydrograph type	= SCS Runoff	Peak discharge	= 16.60 cfs
Storm frequency	= 10 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 44,205 cuft
Drainage area	= 3.040 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.60 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

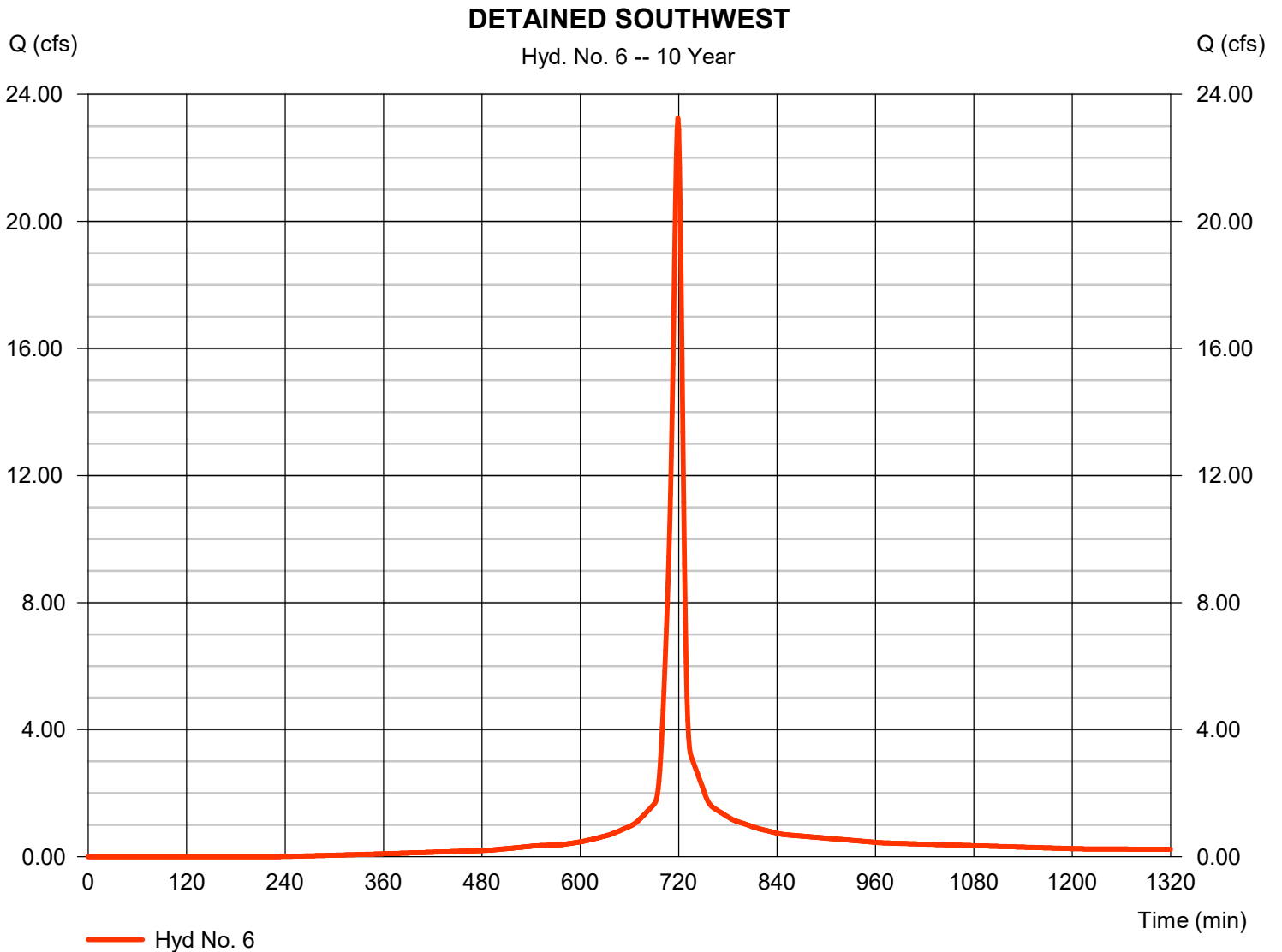
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 6

DETAINED SOUTHWEST

Hydrograph type	= SCS Runoff	Peak discharge	= 23.24 cfs
Storm frequency	= 10 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 55,838 cuft
Drainage area	= 3.780 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.30 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

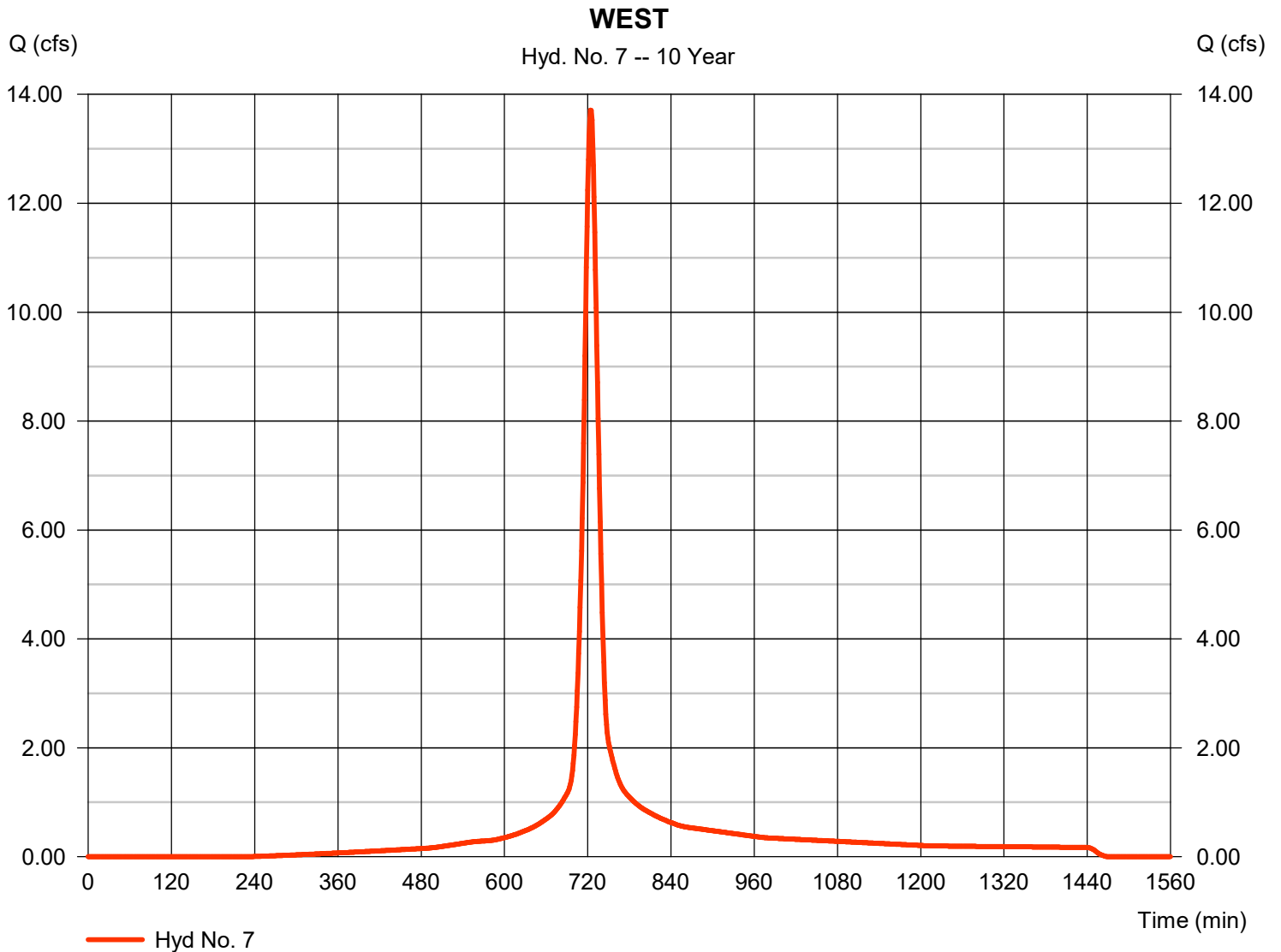
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 7

WEST

Hydrograph type	= SCS Runoff	Peak discharge	= 13.71 cfs
Storm frequency	= 10 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 44,464 cuft
Drainage area	= 3.010 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

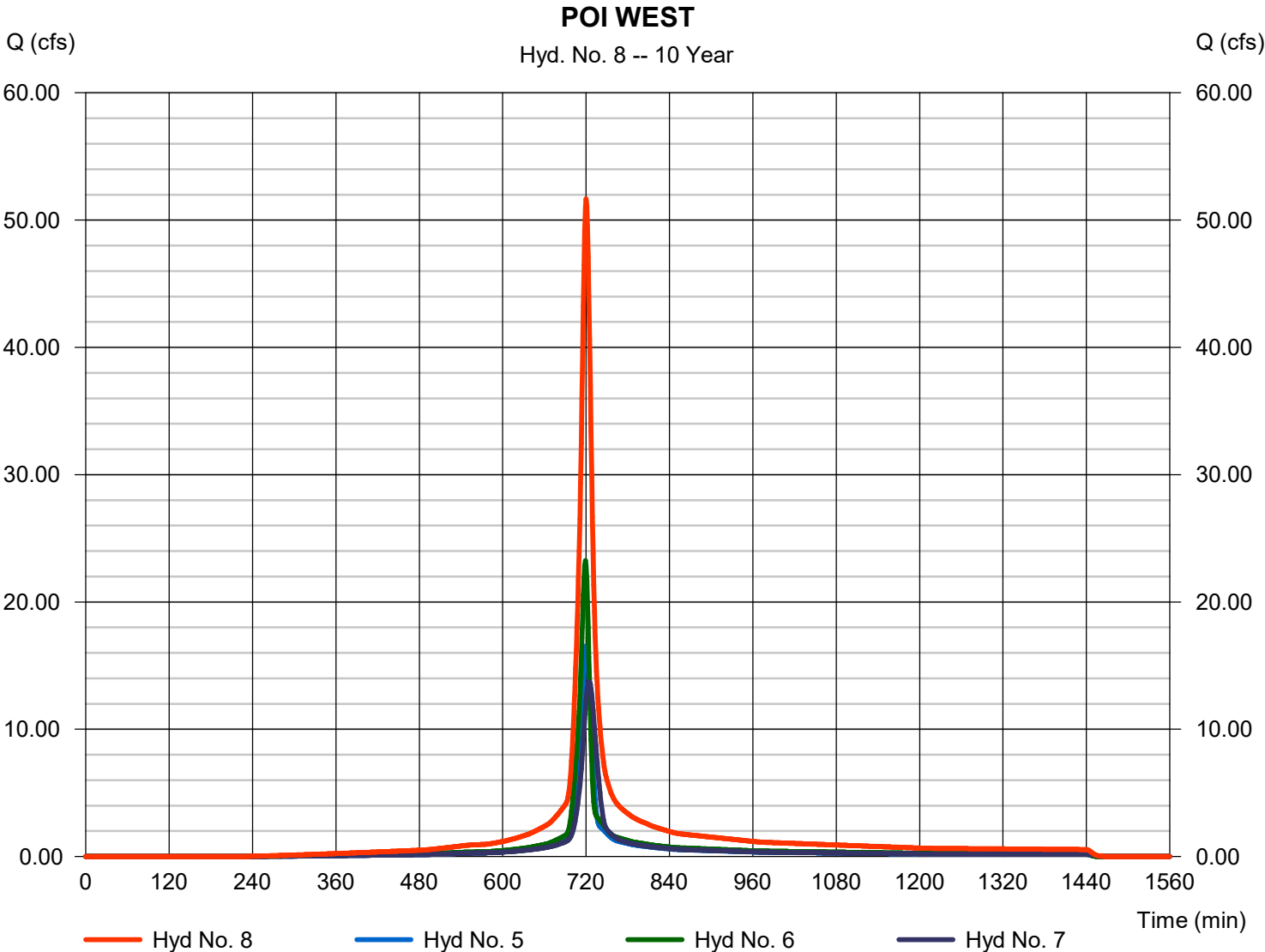
Tuesday, 12 / 2 / 2025

Hyd. No. 8

POI WEST

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 5, 6, 7

Peak discharge = 51.66 cfs
Time to peak = 720 min
Hyd. volume = 144,507 cuft
Contrib. drain. area = 9.830 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

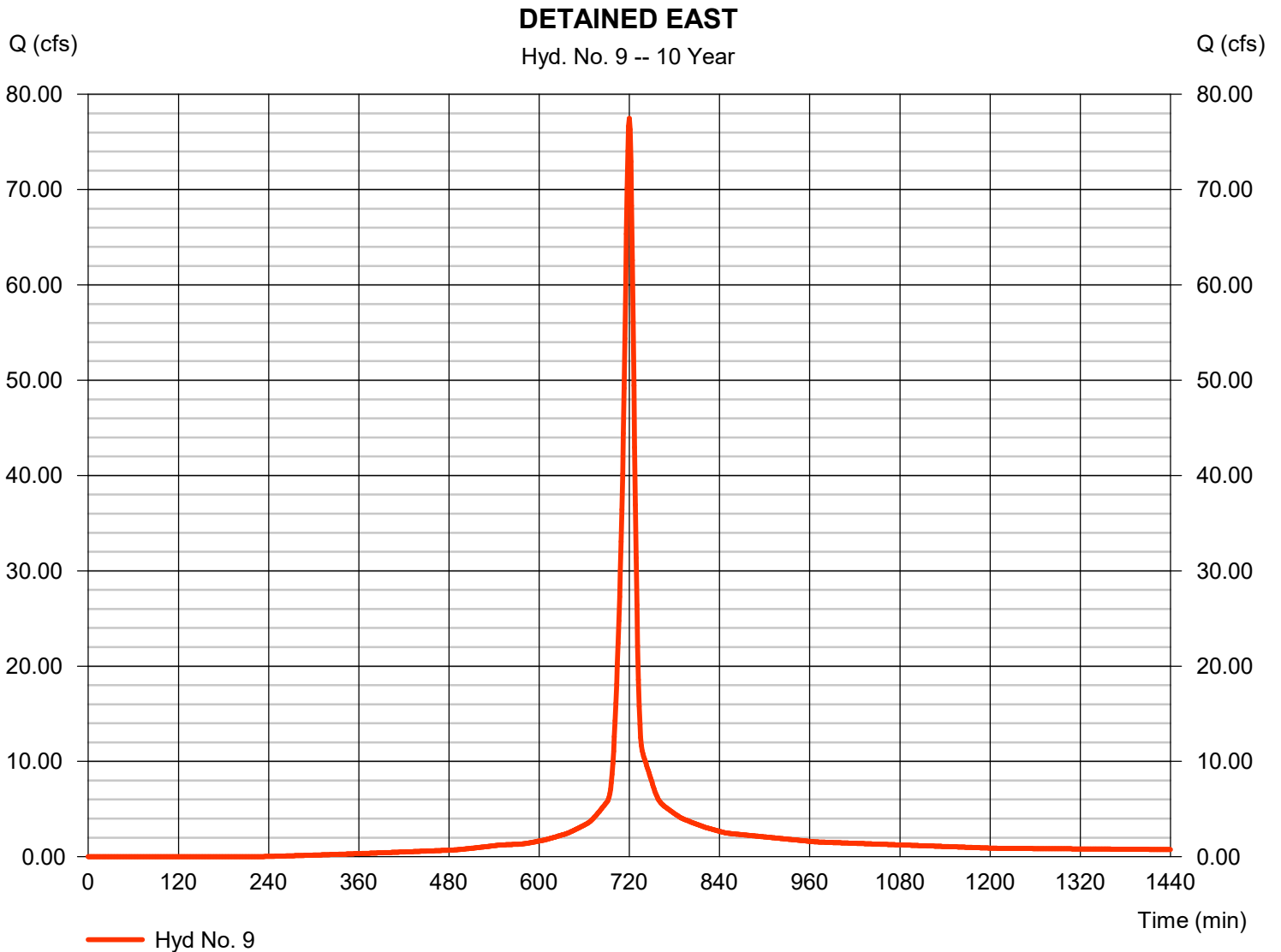
Tuesday, 12 / 2 / 2025

Hyd. No. 9

DETAINED EAST

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 1 min
Drainage area = 13.160 ac
Basin Slope = 0.0 %
Tc method = User
Total precip. = 5.20 in
Storm duration = 24 hrs

Peak discharge = 77.49 cfs
Time to peak = 720 min
Hyd. volume = 197,871 cuft
Curve number = 90
Hydraulic length = 0 ft
Time of conc. (Tc) = 10.70 min
Distribution = Type II
Shape factor = 484

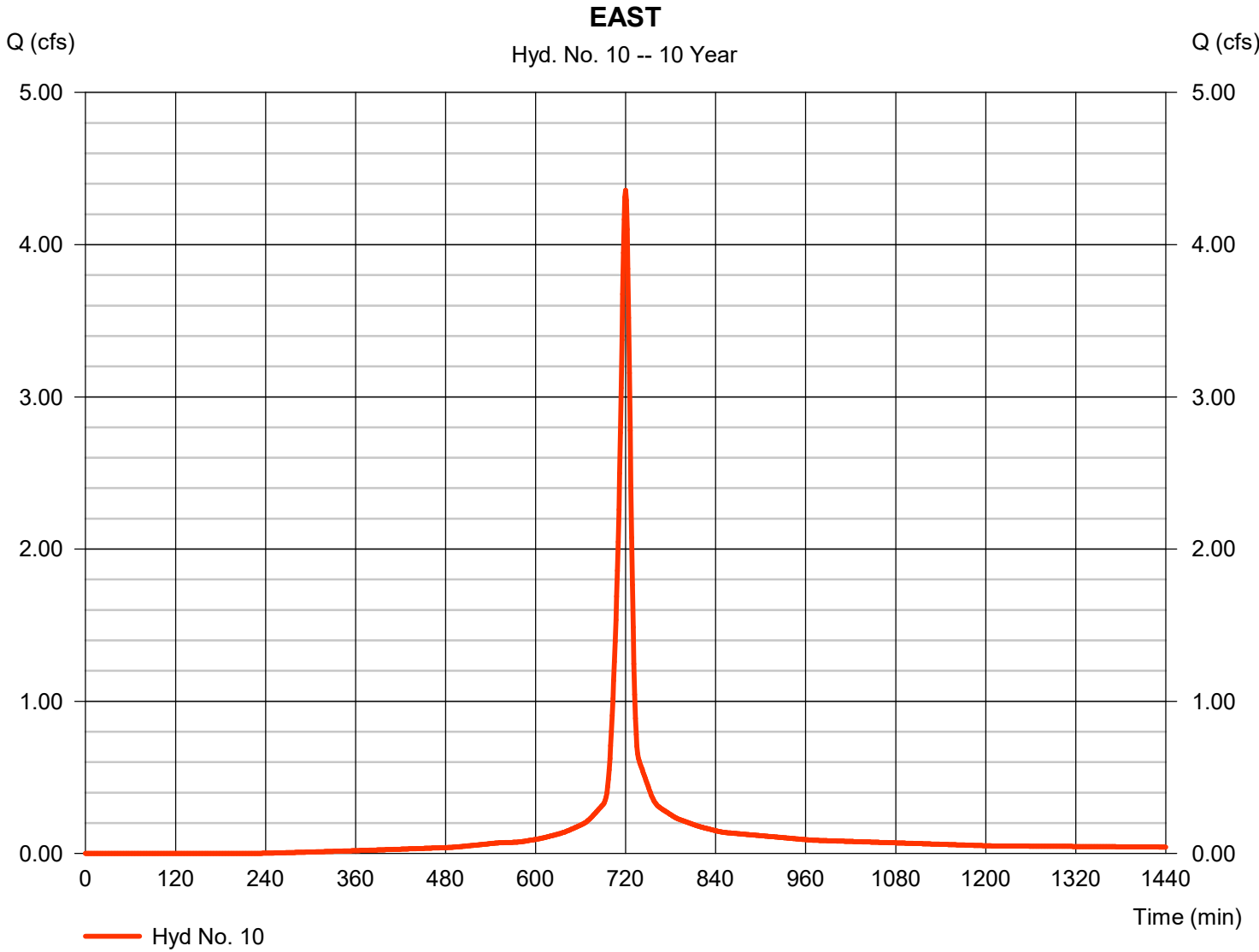


Hydrograph Report

Hyd. No. 10

EAST

Hydrograph type	= SCS Runoff	Peak discharge	= 4.358 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 11,126 cuft
Drainage area	= 0.740 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.70 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

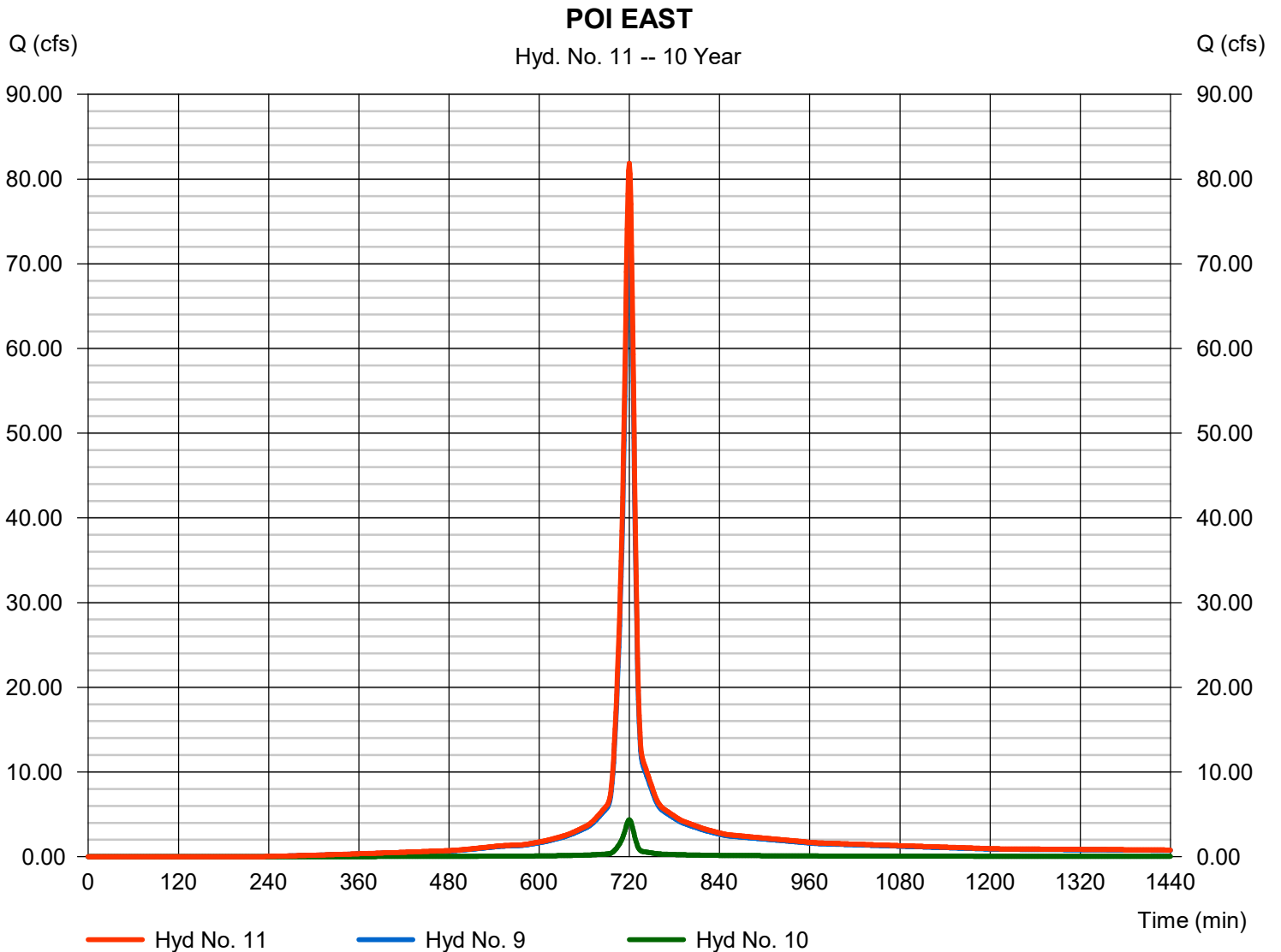
Tuesday, 12 / 2 / 2025

Hyd. No. 11

POI EAST

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 9, 10

Peak discharge = 81.85 cfs
Time to peak = 720 min
Hyd. volume = 208,998 cuft
Contrib. drain. area = 13.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

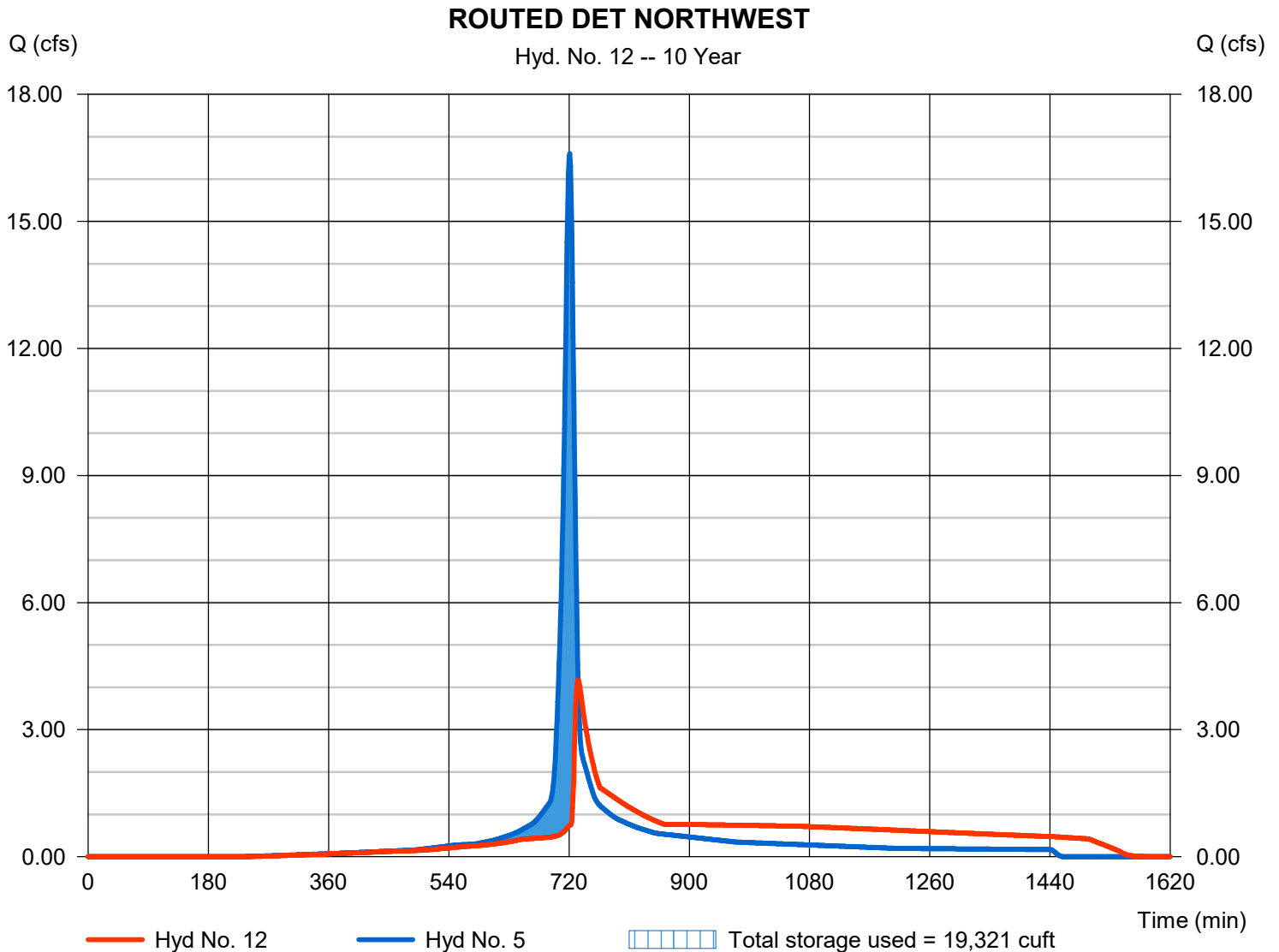
Tuesday, 12 / 2 / 2025

Hyd. No. 12

ROUTED DET NORTHWEST

Hydrograph type	= Reservoir	Peak discharge	= 4.168 cfs
Storm frequency	= 10 yrs	Time to peak	= 734 min
Time interval	= 1 min	Hyd. volume	= 44,205 cuft
Inflow hyd. No.	= 5 - DETAINED NORTHWEST	Max. Elevation	= 1044.74 ft
Reservoir name	= NORTHWEST BASIN	Max. Storage	= 19,321 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

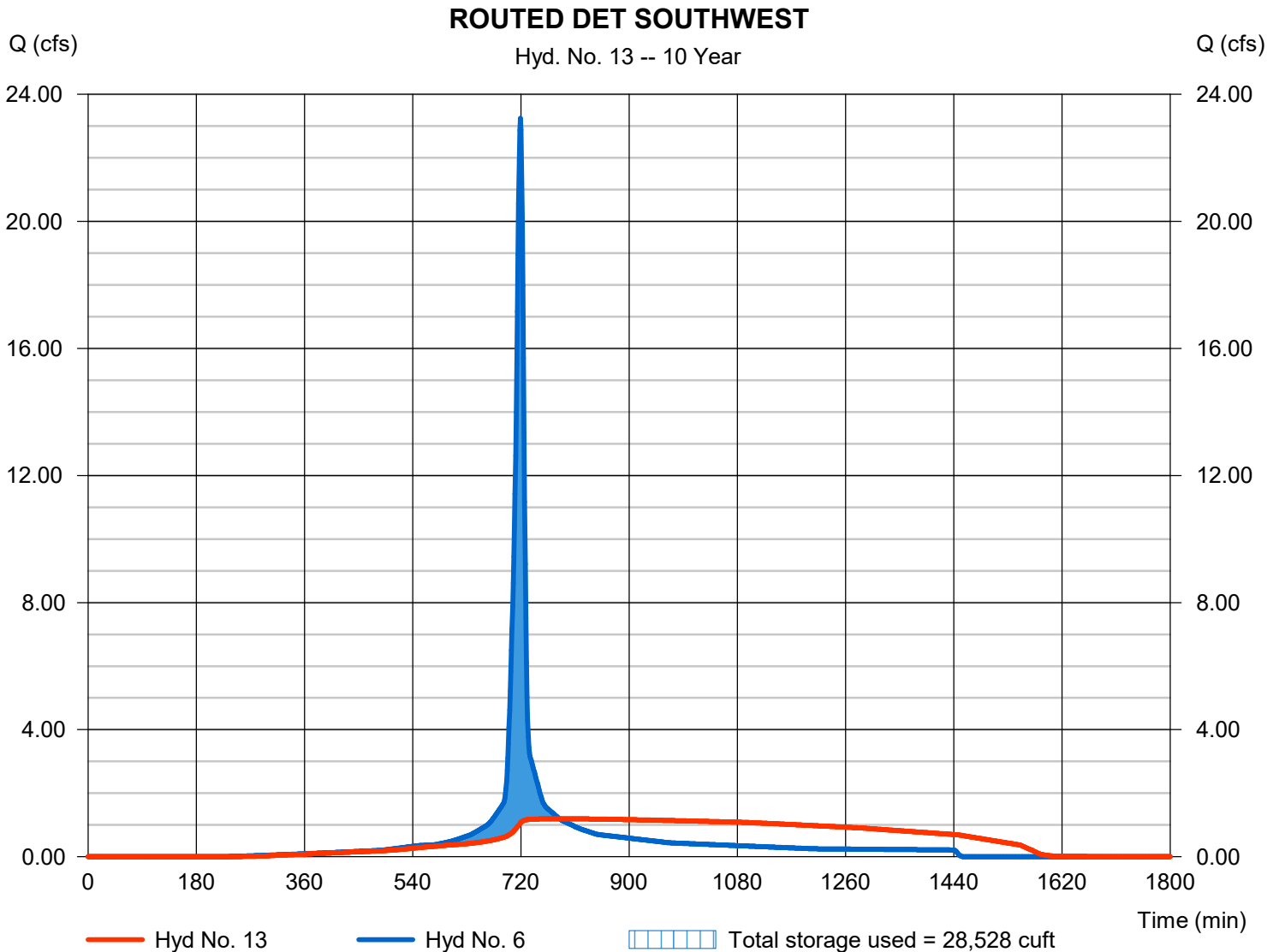
Tuesday, 12 / 2 / 2025

Hyd. No. 13

ROUTED DET SOUTHWEST

Hydrograph type	= Reservoir	Peak discharge	= 1.194 cfs
Storm frequency	= 10 yrs	Time to peak	= 784 min
Time interval	= 1 min	Hyd. volume	= 55,836 cuft
Inflow hyd. No.	= 6 - DETAINED SOUTHWEST	Max. Elevation	= 1041.49 ft
Reservoir name	= SOUTHWEST BASIN	Max. Storage	= 28,528 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

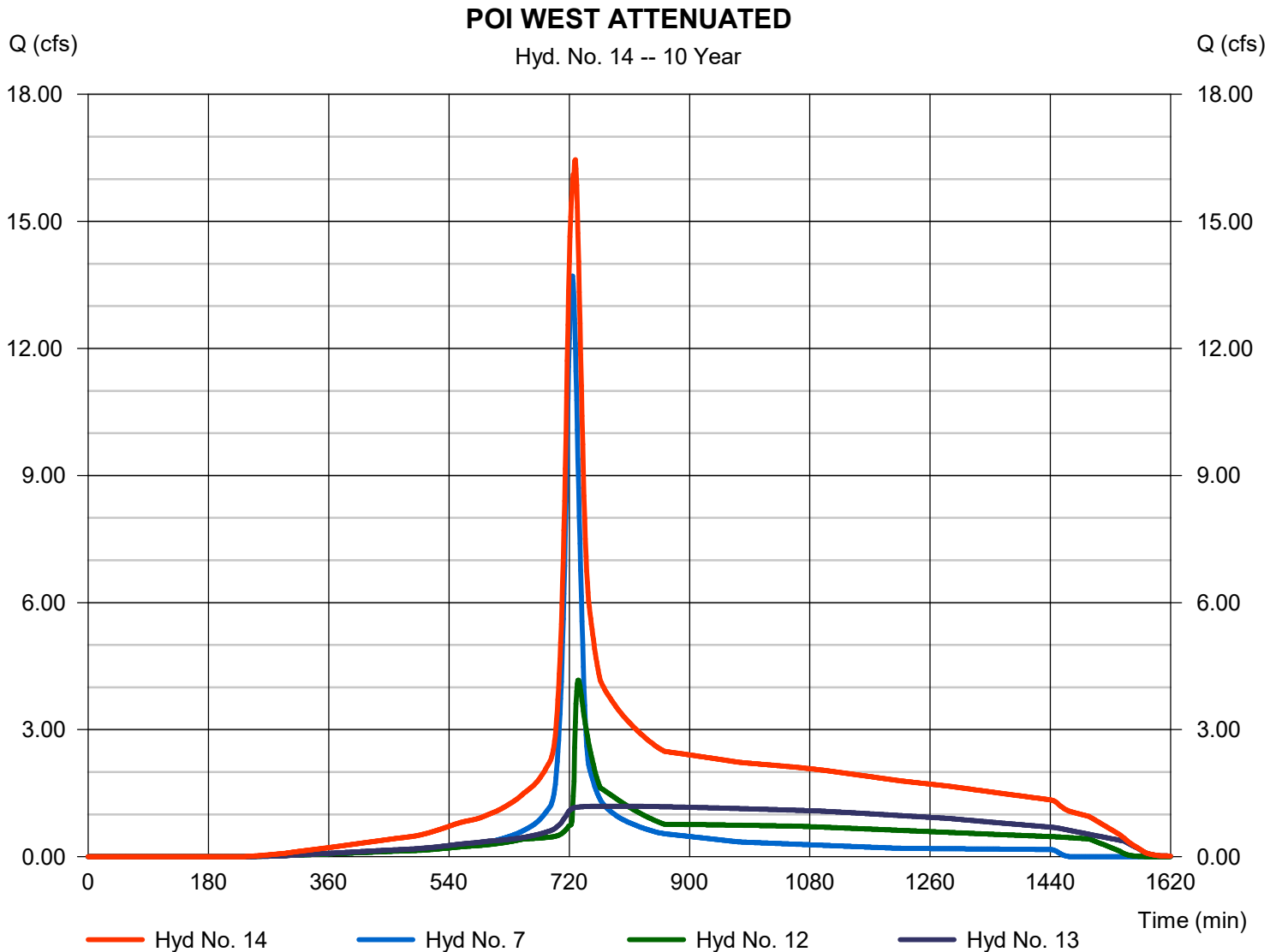
Tuesday, 12 / 2 / 2025

Hyd. No. 14

POI WEST ATTENUATED

Hydrograph type = Combine
 Storm frequency = 10 yrs
 Time interval = 1 min
 Inflow hyds. = 7, 12, 13

Peak discharge = 16.46 cfs
 Time to peak = 729 min
 Hyd. volume = 144,504 cuft
 Contrib. drain. area = 3.010 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

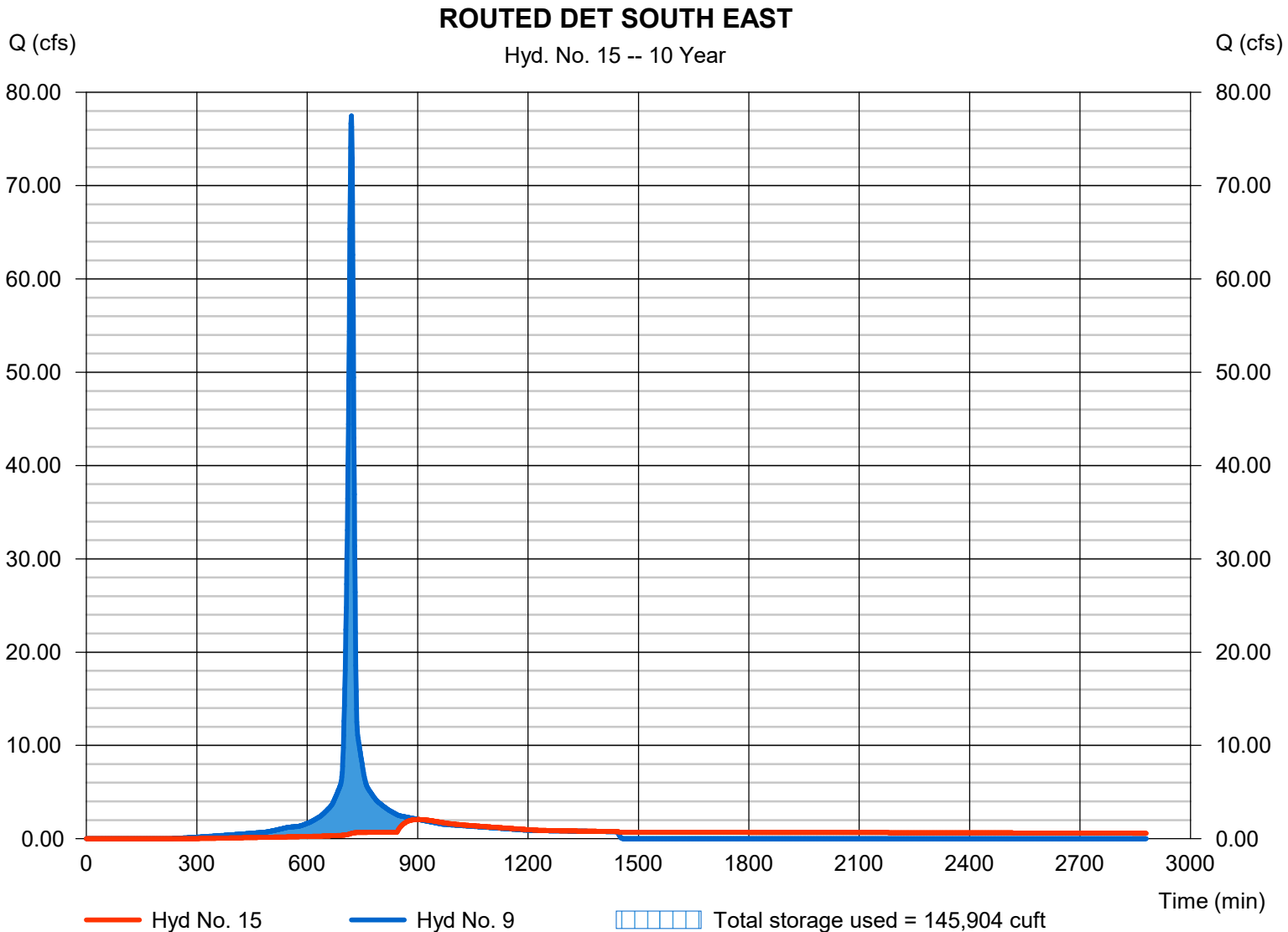
Tuesday, 12 / 2 / 2025

Hyd. No. 15

ROUTED DET SOUTH EAST

Hydrograph type	= Reservoir	Peak discharge	= 2.062 cfs
Storm frequency	= 10 yrs	Time to peak	= 902 min
Time interval	= 1 min	Hyd. volume	= 109,901 cuft
Inflow hyd. No.	= 9 - DETAINED EAST	Max. Elevation	= 1045.06 ft
Reservoir name	= SOUTHEAST BASIN	Max. Storage	= 145,904 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

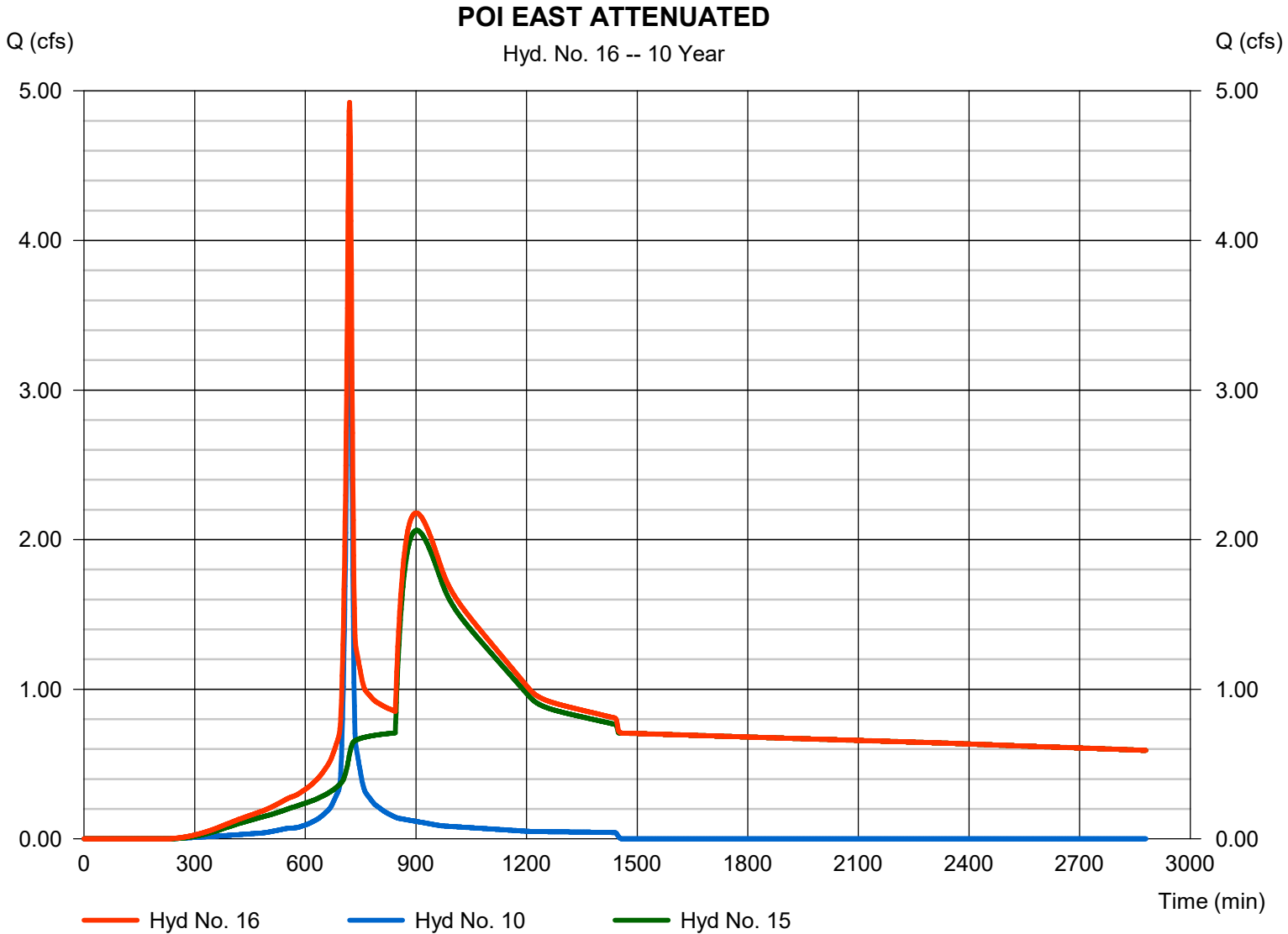
Tuesday, 12 / 2 / 2025

Hyd. No. 16

POI EAST ATTENUATED

Hydrograph type = Combine
Storm frequency = 10 yrs
Time interval = 1 min
Inflow hyds. = 10, 15

Peak discharge = 4.924 cfs
Time to peak = 720 min
Hyd. volume = 121,028 cuft
Contrib. drain. area = 0.740 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

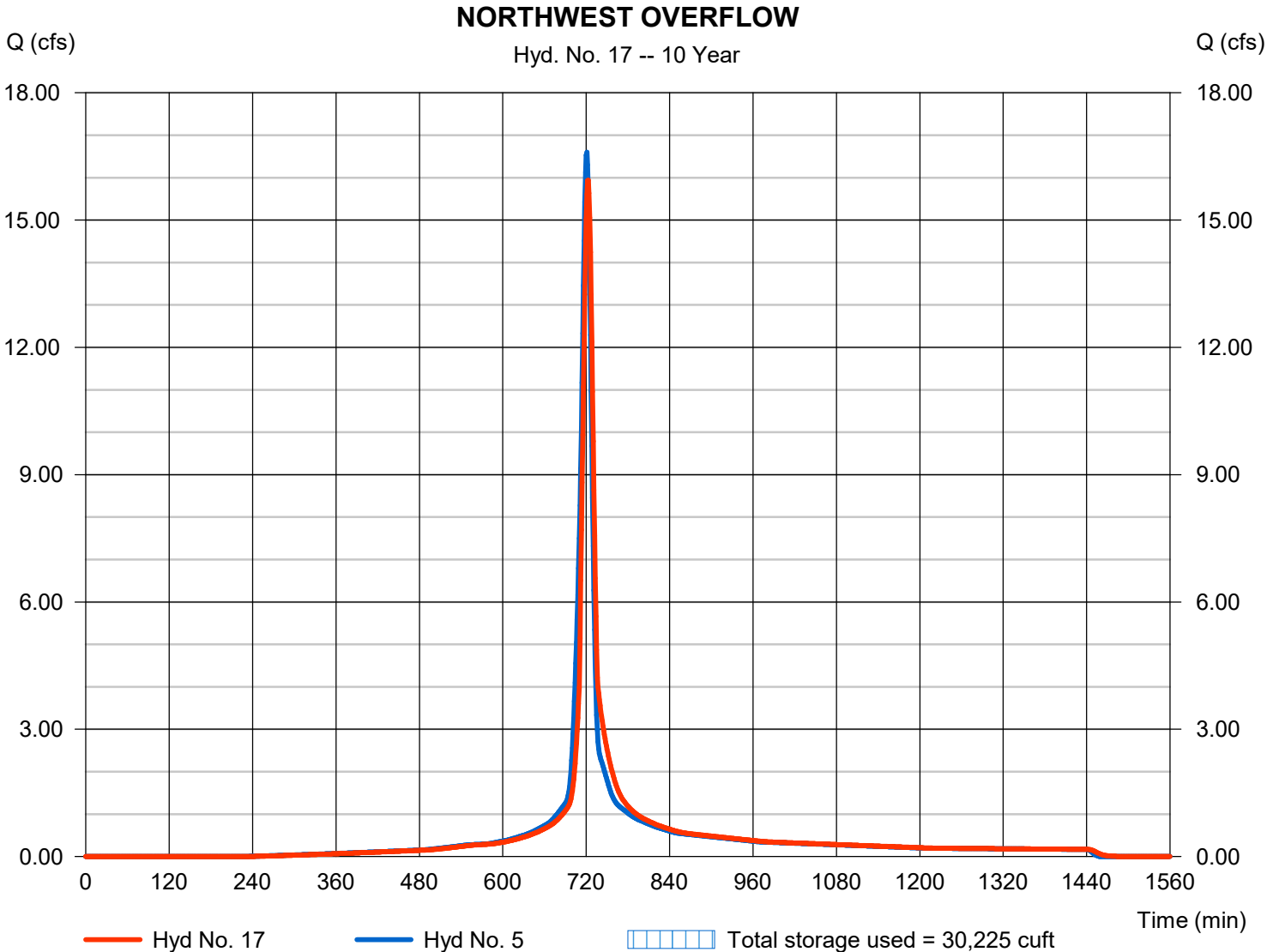
Tuesday, 12 / 2 / 2025

Hyd. No. 17

NORTHWEST OVERFLOW

Hydrograph type	= Reservoir	Peak discharge	= 15.94 cfs
Storm frequency	= 10 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 44,205 cuft
Inflow hyd. No.	= 5 - DETAINED NORTHWEST	Max. Elevation	= 1045.74 ft
Reservoir name	= NORTHWEST BASIN - LFB	Max. Storage	= 30,225 cuft

Storage Indication method used. Wet pond routing start elevation = 1045.40 ft.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

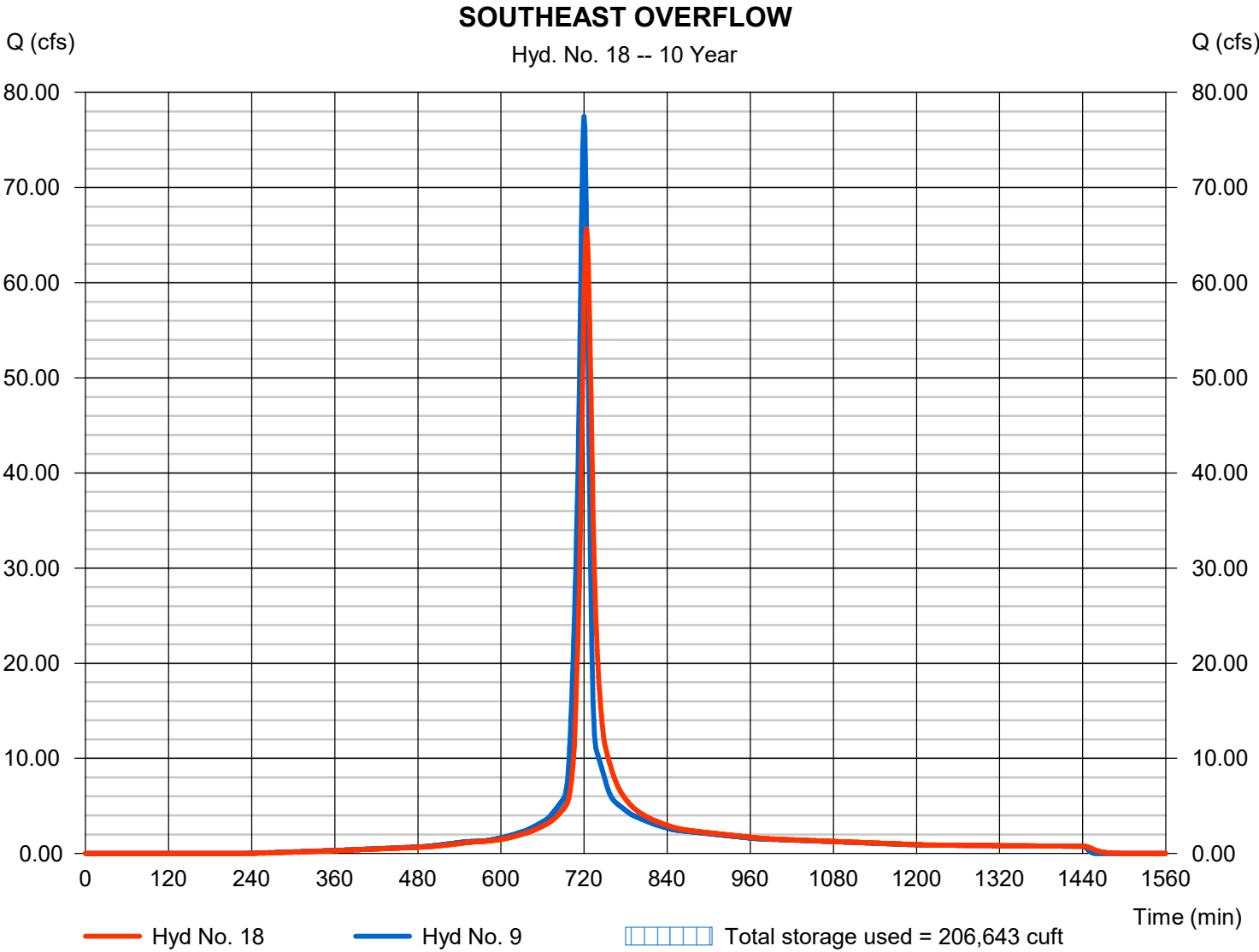
Tuesday, 12 / 2 / 2025

Hyd. No. 18

SOUTHEAST OVERFLOW

Hydrograph type	= Reservoir	Peak discharge	= 65.67 cfs
Storm frequency	= 10 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 197,870 cuft
Inflow hyd. No.	= 9 - DETAINED EAST	Max. Elevation	= 1046.63 ft
Reservoir name	= SOUTHEAST BASIN - LFB	Max. Storage	= 206,643 cuft

Storage Indication method used. Wet pond routing start elevation = 1046.00 ft.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

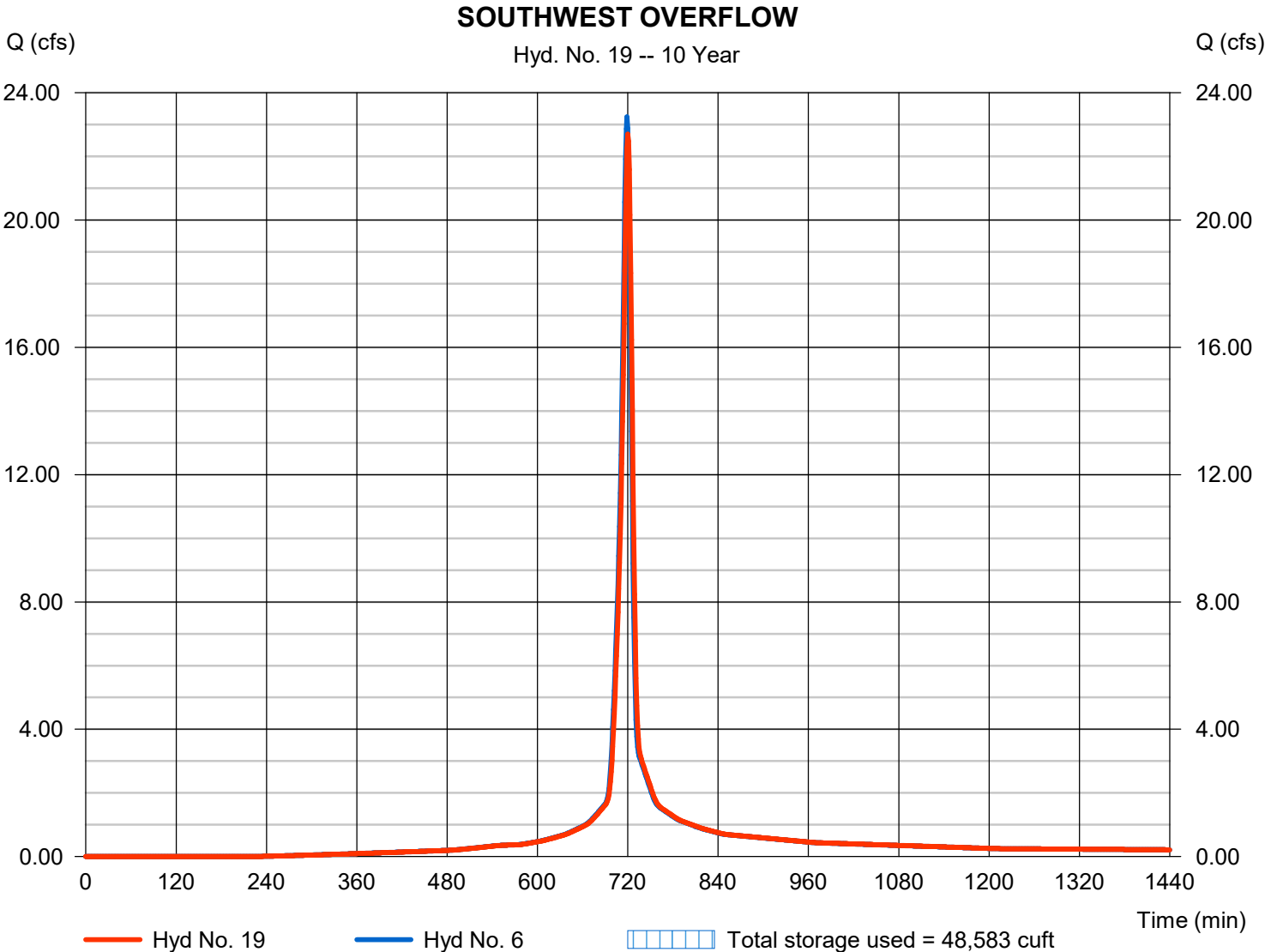
Tuesday, 12 / 2 / 2025

Hyd. No. 19

SOUTHWEST OVERFLOW

Hydrograph type	= Reservoir	Peak discharge	= 22.70 cfs
Storm frequency	= 10 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 55,838 cuft
Inflow hyd. No.	= 6 - DETAINED SOUTHWEST	Max. Elevation	= 1044.25 ft
Reservoir name	= SOUTHWEST BASIN - LFB	Max. Storage	= 48,583 cuft

Storage Indication method used. Wet pond routing start elevation = 1044.00 ft.



Hydrograph Summary Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

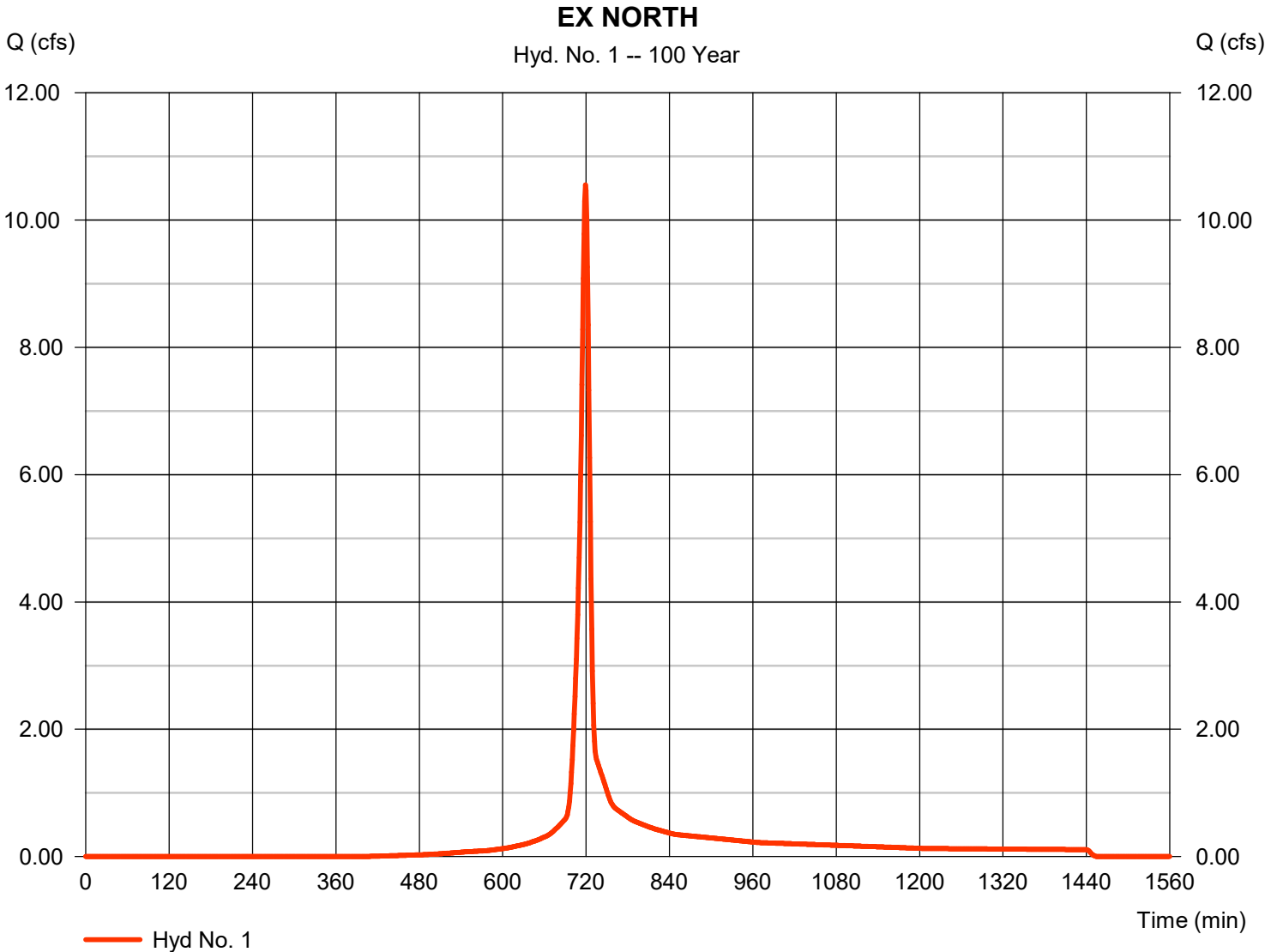
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	10.55	1	719	24,125	-----	-----	-----	EX NORTH
2	SCS Runoff	100.49	1	722	271,582	-----	-----	-----	EX WEST
3	SCS Runoff	101.31	1	725	317,075	-----	-----	-----	EX EAST
4	SCS Runoff	4.959	1	717	11,133	-----	-----	-----	PROP NORTH
5	SCS Runoff	26.18	1	721	71,789	-----	-----	-----	DETAINED NORTHWEST
6	SCS Runoff	36.60	1	719	90,681	-----	-----	-----	DETAINED SOUTHWEST
7	SCS Runoff	21.71	1	724	72,209	-----	-----	-----	WEST
8	Combine	81.61	1	720	234,680	5, 6, 7	-----	-----	POI WEST
9	SCS Runoff	122.16	1	720	321,343	-----	-----	-----	DETAINED EAST
10	SCS Runoff	6.869	1	720	18,069	-----	-----	-----	EAST
11	Combine	129.03	1	720	339,413	9, 10	-----	-----	POI EAST
12	Reservoir	17.74	1	727	71,789	5	1045.24	24,731	ROUTED DET NORTHWEST
13	Reservoir	4.661	1	737	90,679	6	1043.68	44,427	ROUTED DET SOUTHWEST
14	Combine	40.34	1	726	234,677	7, 12, 13	-----	-----	POI WEST ATTENUATED
15	Reservoir	42.20	1	730	232,997	9	1045.84	173,909	ROUTED DET SOUTH EAST
16	Combine	44.57	1	729	251,066	10, 15	-----	-----	POI EAST ATTENUATED
17	Reservoir	25.62	1	722	71,789	5	1045.83	31,294	NORTHWEST OVERFLOW
18	Reservoir	107.95	1	723	321,343	9	1046.88	217,324	SOUTHEAST OVERFLOW
19	Reservoir	35.78	1	720	90,681	6	1044.39	49,619	SOUTHWEST OVERFLOW

Hydrograph Report

Hyd. No. 1

EX NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 10.55 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 24,125 cuft
Drainage area	= 1.400 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 8.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

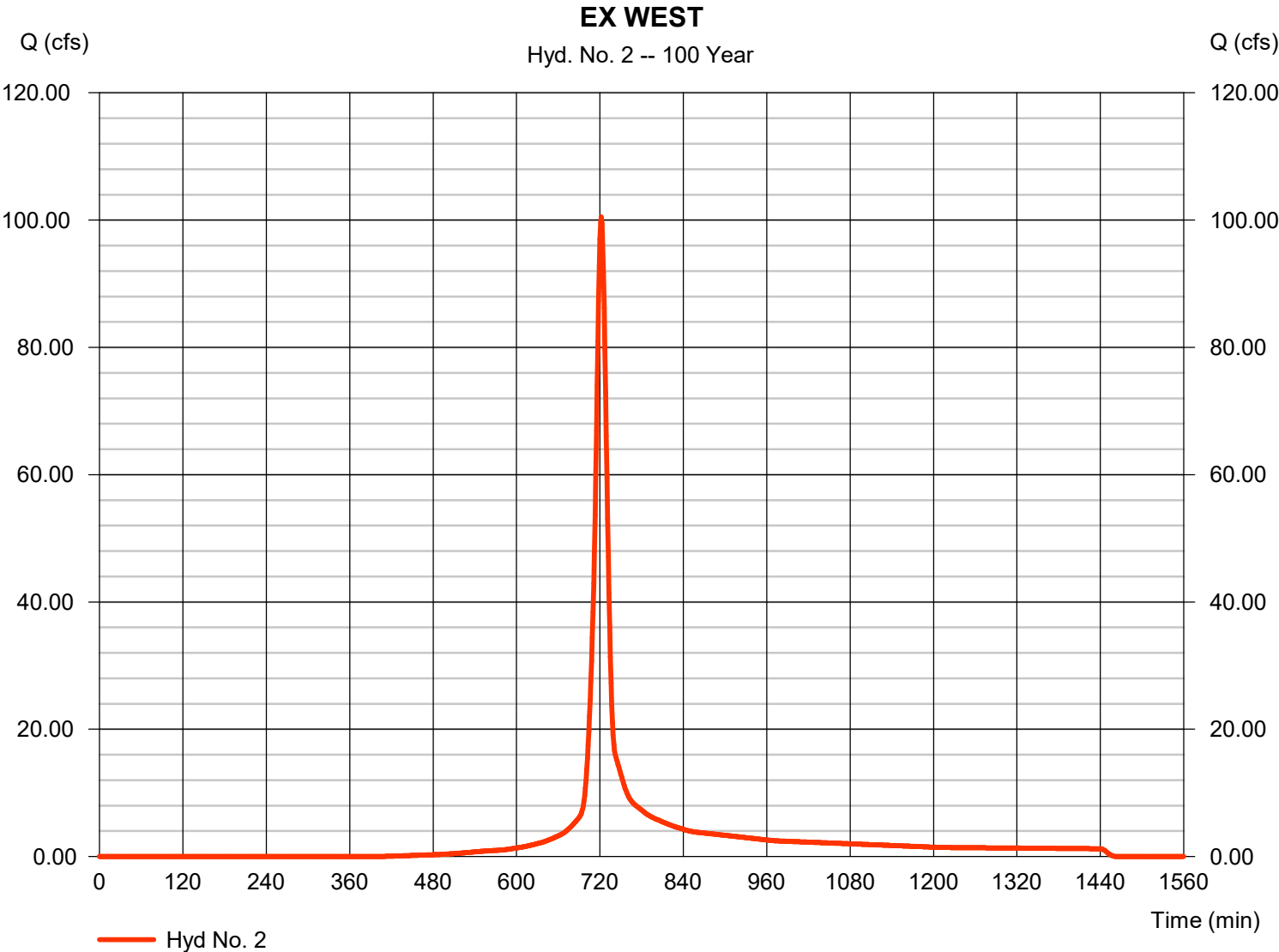
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 2

EX WEST

Hydrograph type	= SCS Runoff	Peak discharge	= 100.49 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 271,582 cuft
Drainage area	= 15.760 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 14.30 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

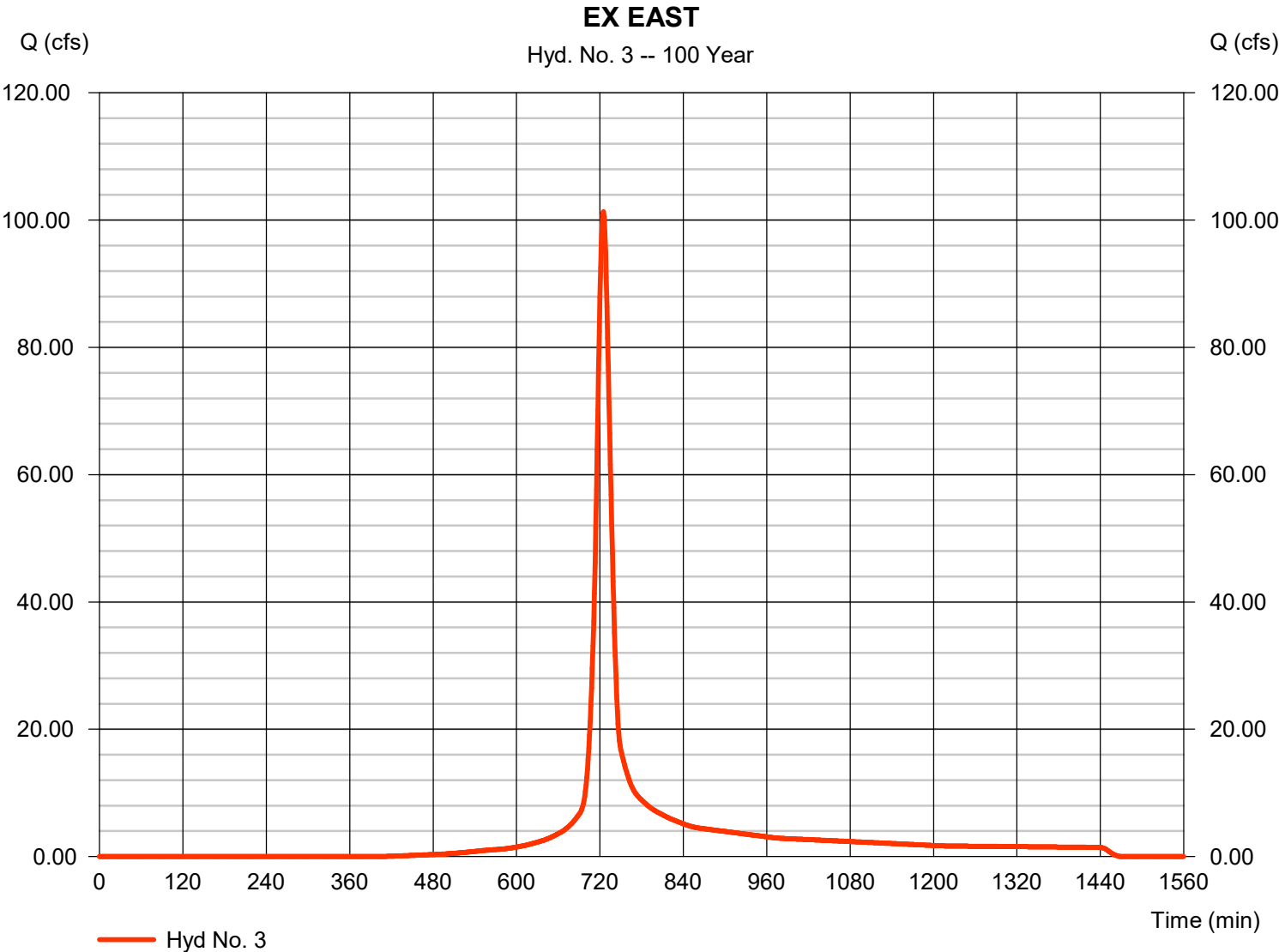
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 3

EX EAST

Hydrograph type	= SCS Runoff	Peak discharge	= 101.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 725 min
Time interval	= 1 min	Hyd. volume	= 317,075 cuft
Drainage area	= 18.400 ac	Curve number	= 74
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 19.50 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

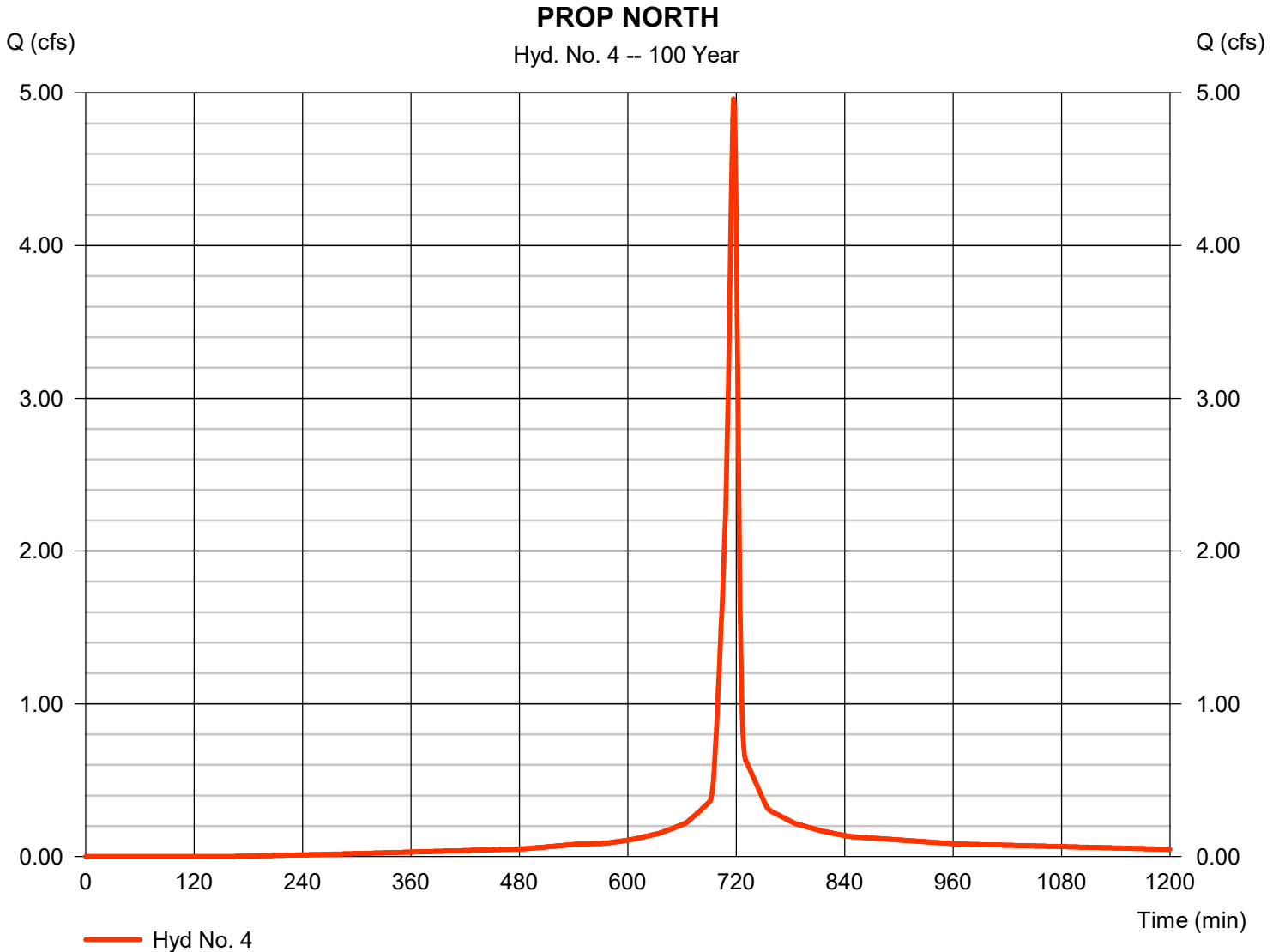
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 4

PROP NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 4.959 cfs
Storm frequency	= 100 yrs	Time to peak	= 717 min
Time interval	= 1 min	Hyd. volume	= 11,133 cuft
Drainage area	= 0.450 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 5.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

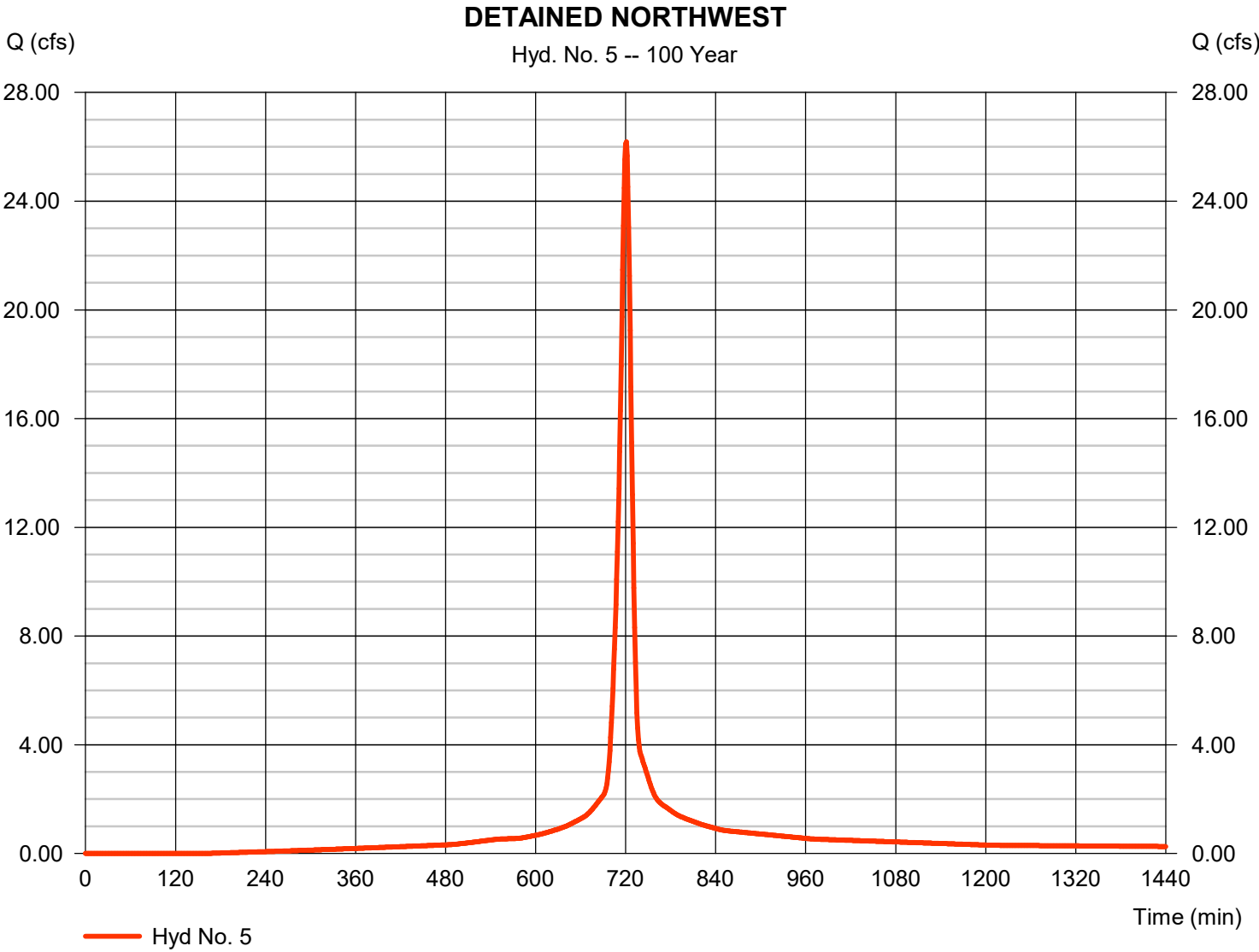


Hydrograph Report

Hyd. No. 5

DETAINED NORTHWEST

Hydrograph type	= SCS Runoff	Peak discharge	= 26.18 cfs
Storm frequency	= 100 yrs	Time to peak	= 721 min
Time interval	= 1 min	Hyd. volume	= 71,789 cuft
Drainage area	= 3.040 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 12.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

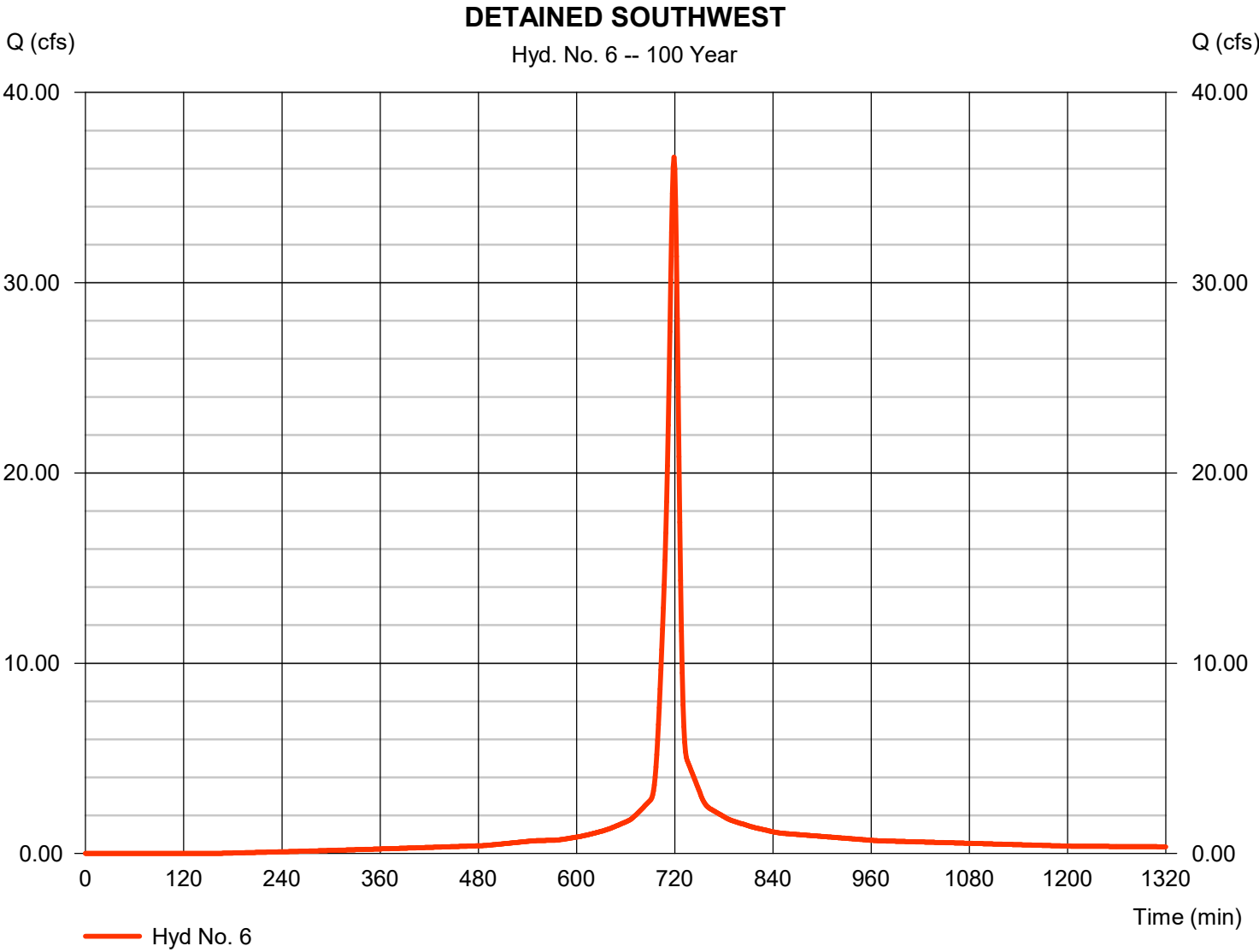


Hydrograph Report

Hyd. No. 6

DETAINED SOUTHWEST

Hydrograph type	= SCS Runoff	Peak discharge	= 36.60 cfs
Storm frequency	= 100 yrs	Time to peak	= 719 min
Time interval	= 1 min	Hyd. volume	= 90,681 cuft
Drainage area	= 3.780 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 9.30 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

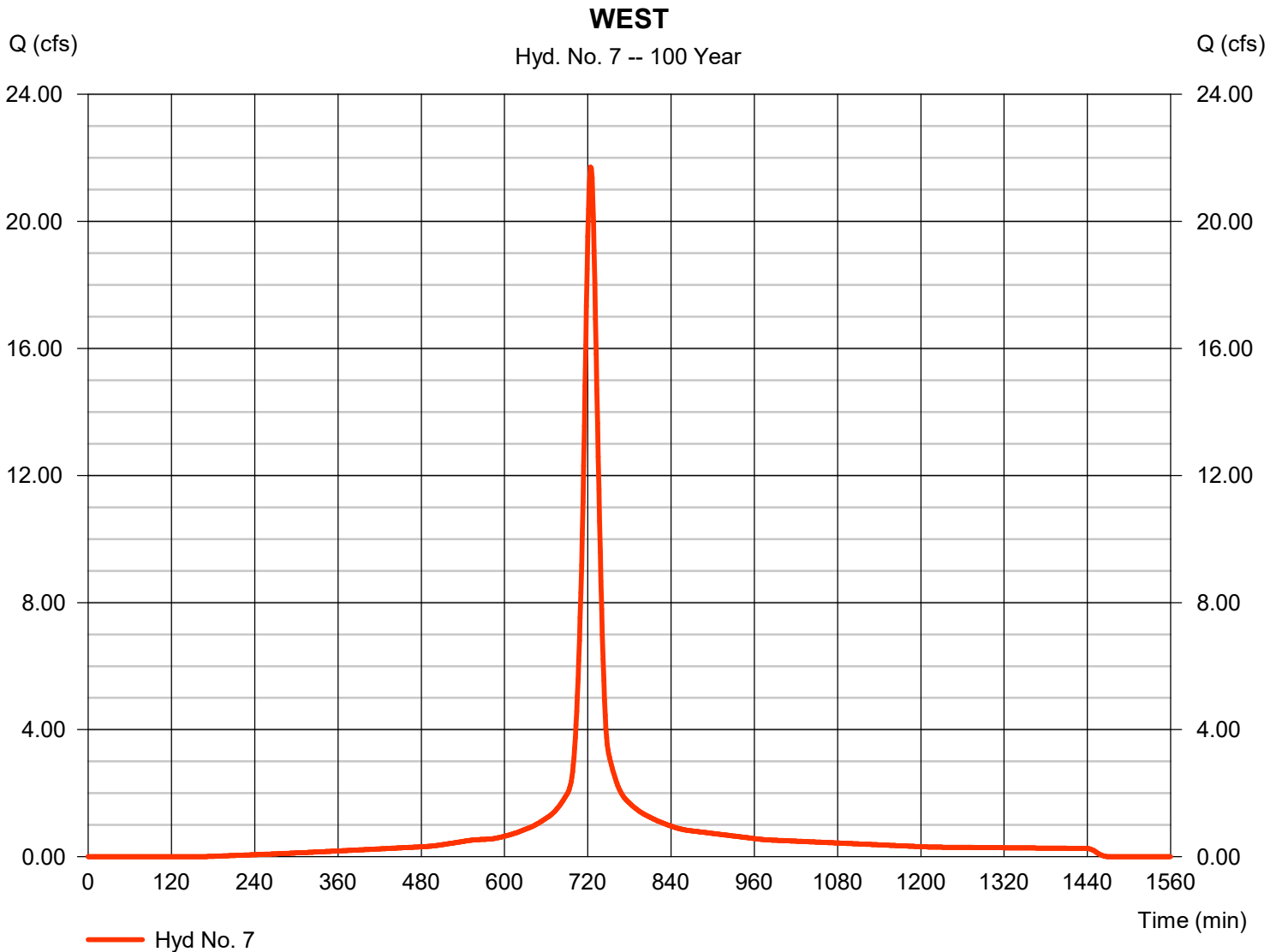
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 7

WEST

Hydrograph type	= SCS Runoff	Peak discharge	= 21.71 cfs
Storm frequency	= 100 yrs	Time to peak	= 724 min
Time interval	= 1 min	Hyd. volume	= 72,209 cuft
Drainage area	= 3.010 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 20.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

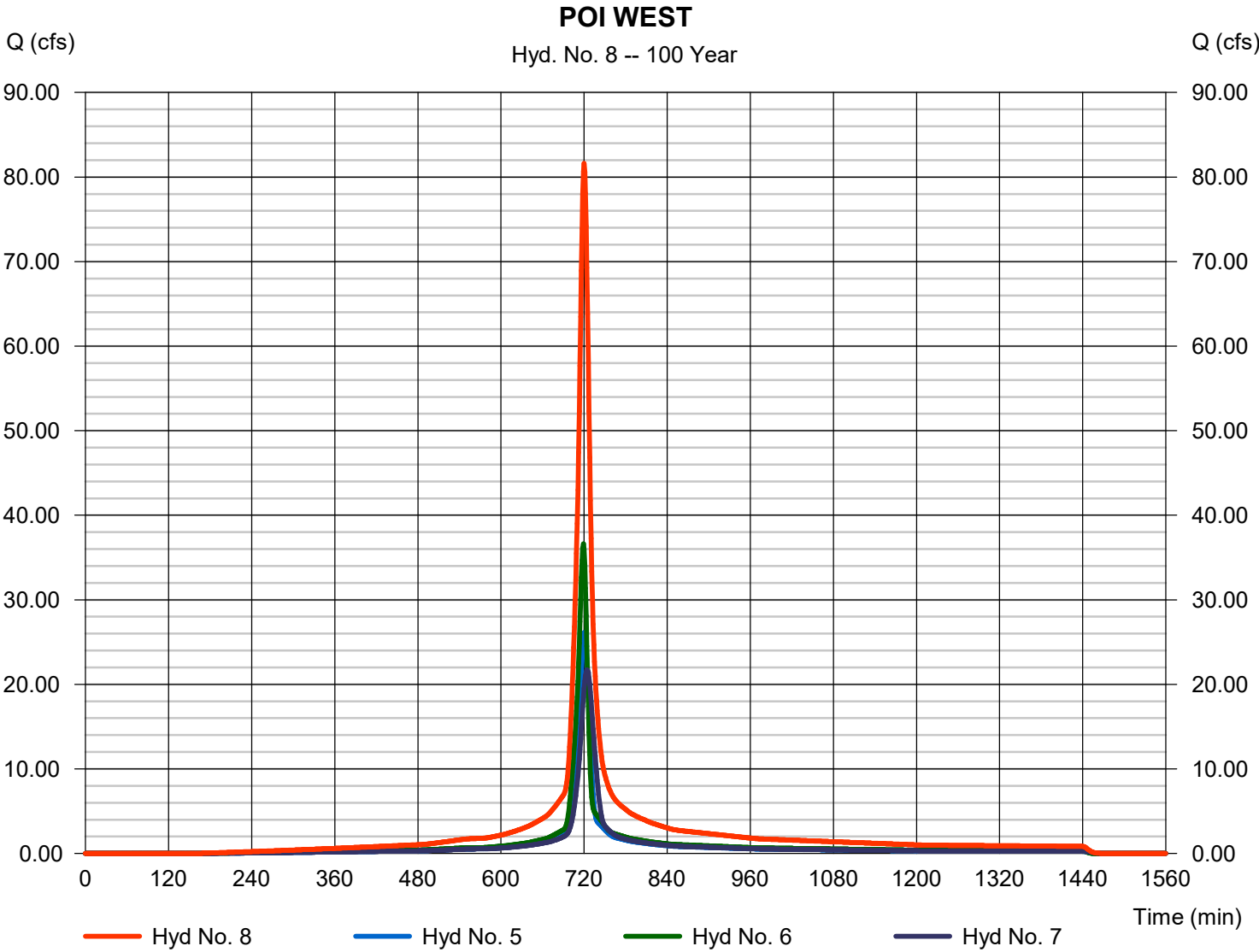
Tuesday, 12 / 2 / 2025

Hyd. No. 8

POI WEST

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 5, 6, 7

Peak discharge = 81.61 cfs
Time to peak = 720 min
Hyd. volume = 234,680 cuft
Contrib. drain. area = 9.830 ac



Hydrograph Report

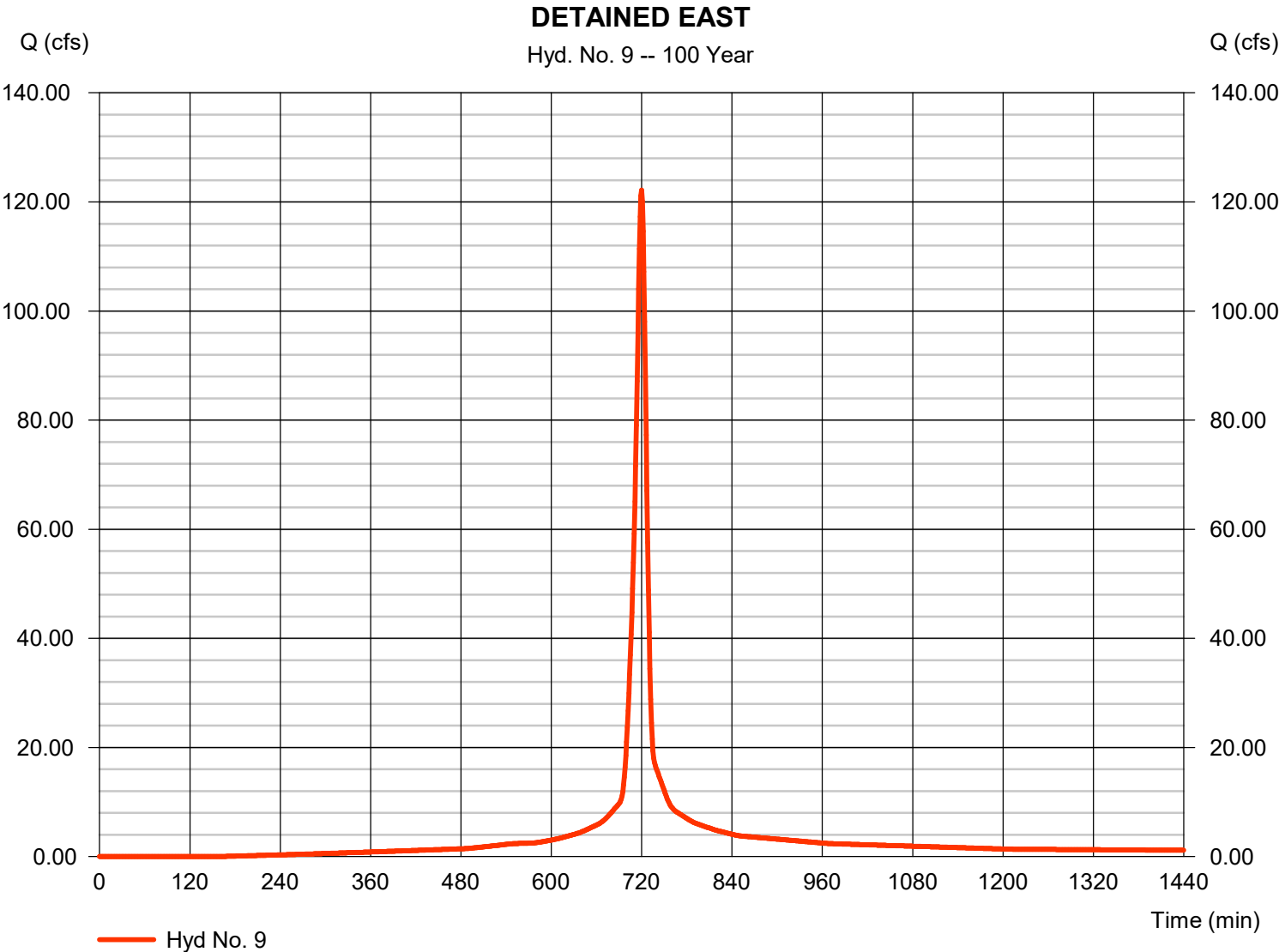
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 9

DETAINED EAST

Hydrograph type	= SCS Runoff	Peak discharge	= 122.16 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 321,343 cuft
Drainage area	= 13.160 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 10.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

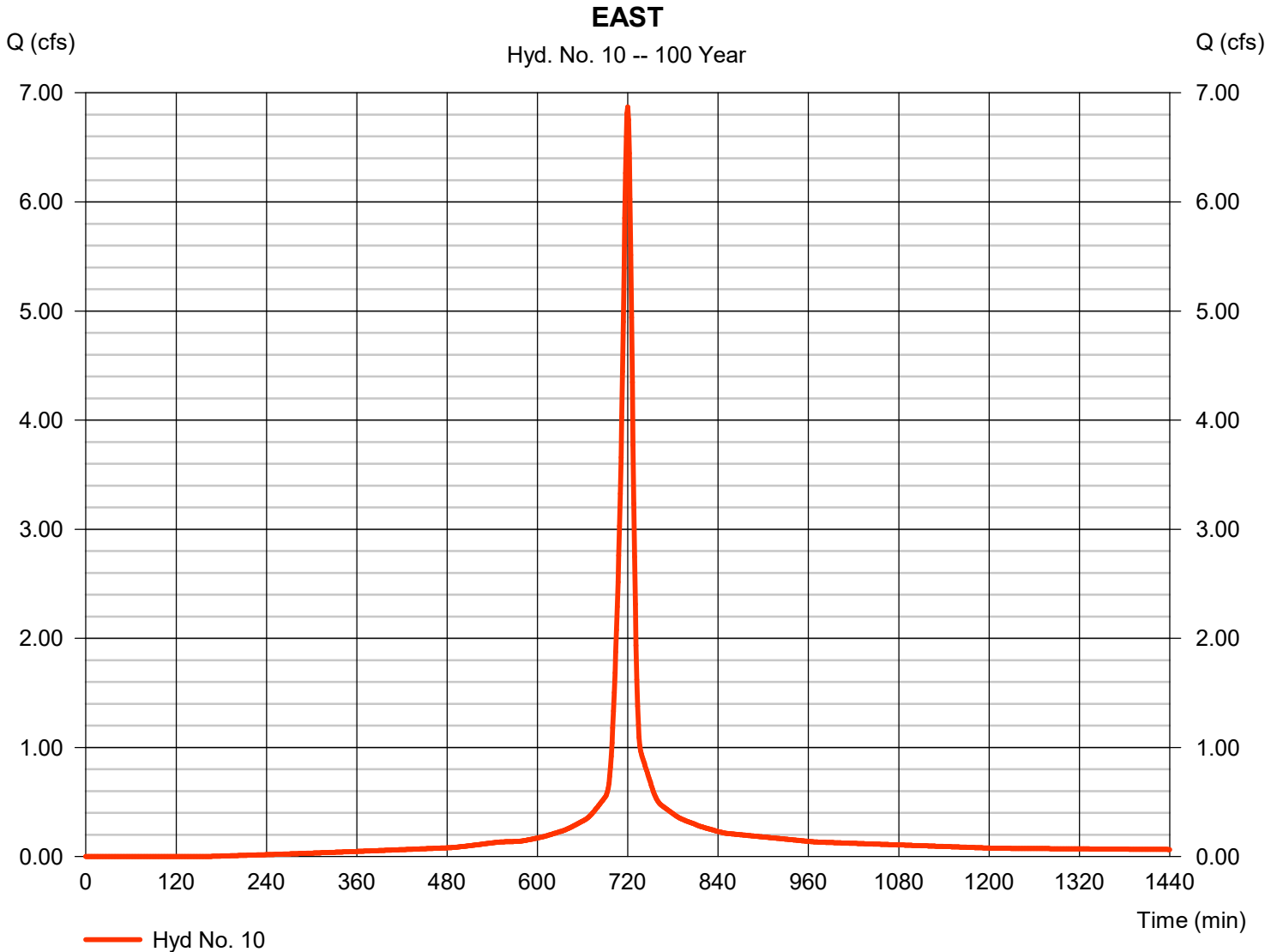


Hydrograph Report

Hyd. No. 10

EAST

Hydrograph type	= SCS Runoff	Peak discharge	= 6.869 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 18,069 cuft
Drainage area	= 0.740 ac	Curve number	= 90
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 11.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

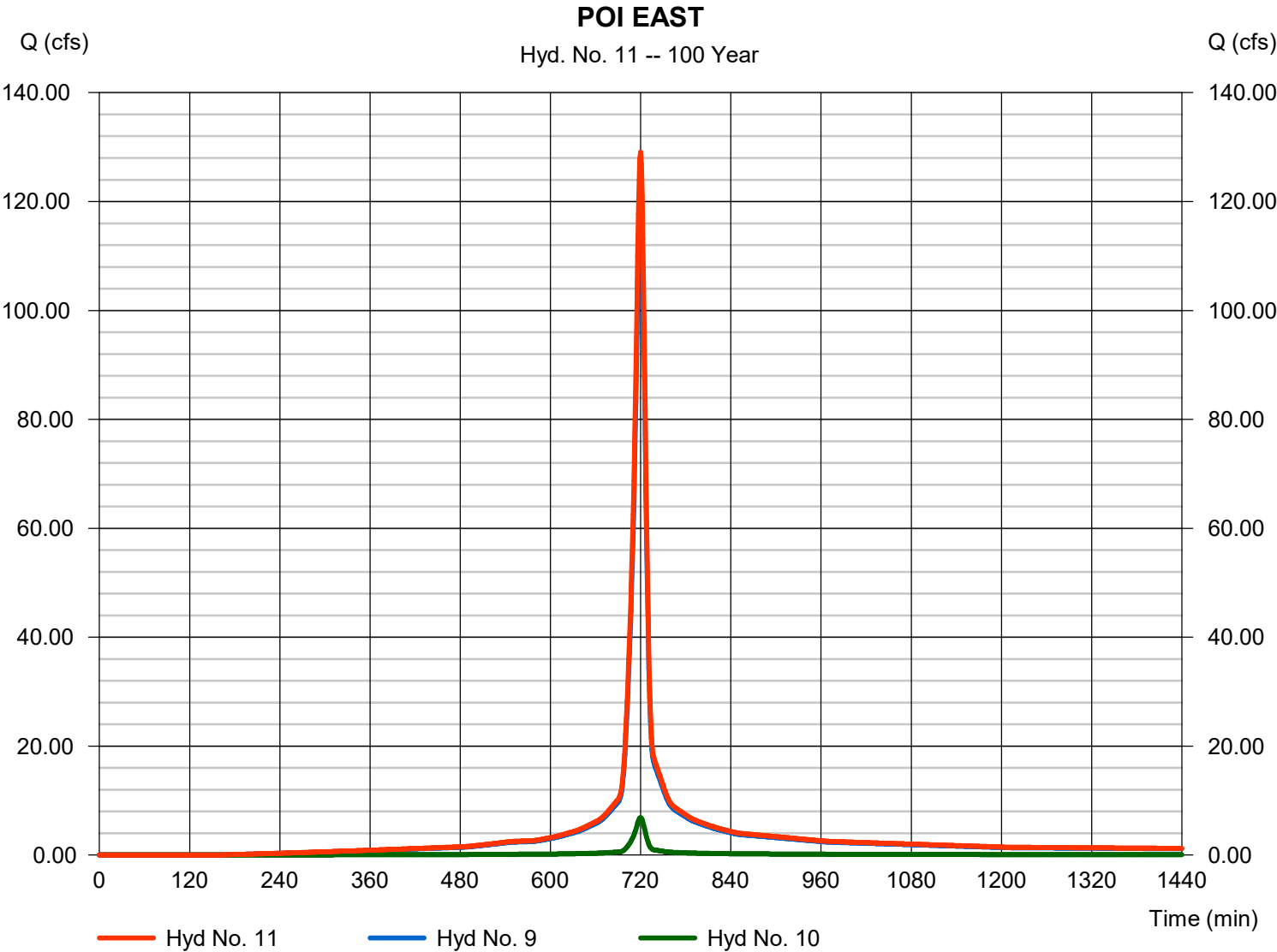
Tuesday, 12 / 2 / 2025

Hyd. No. 11

POI EAST

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 9, 10

Peak discharge = 129.03 cfs
Time to peak = 720 min
Hyd. volume = 339,413 cuft
Contrib. drain. area = 13.900 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

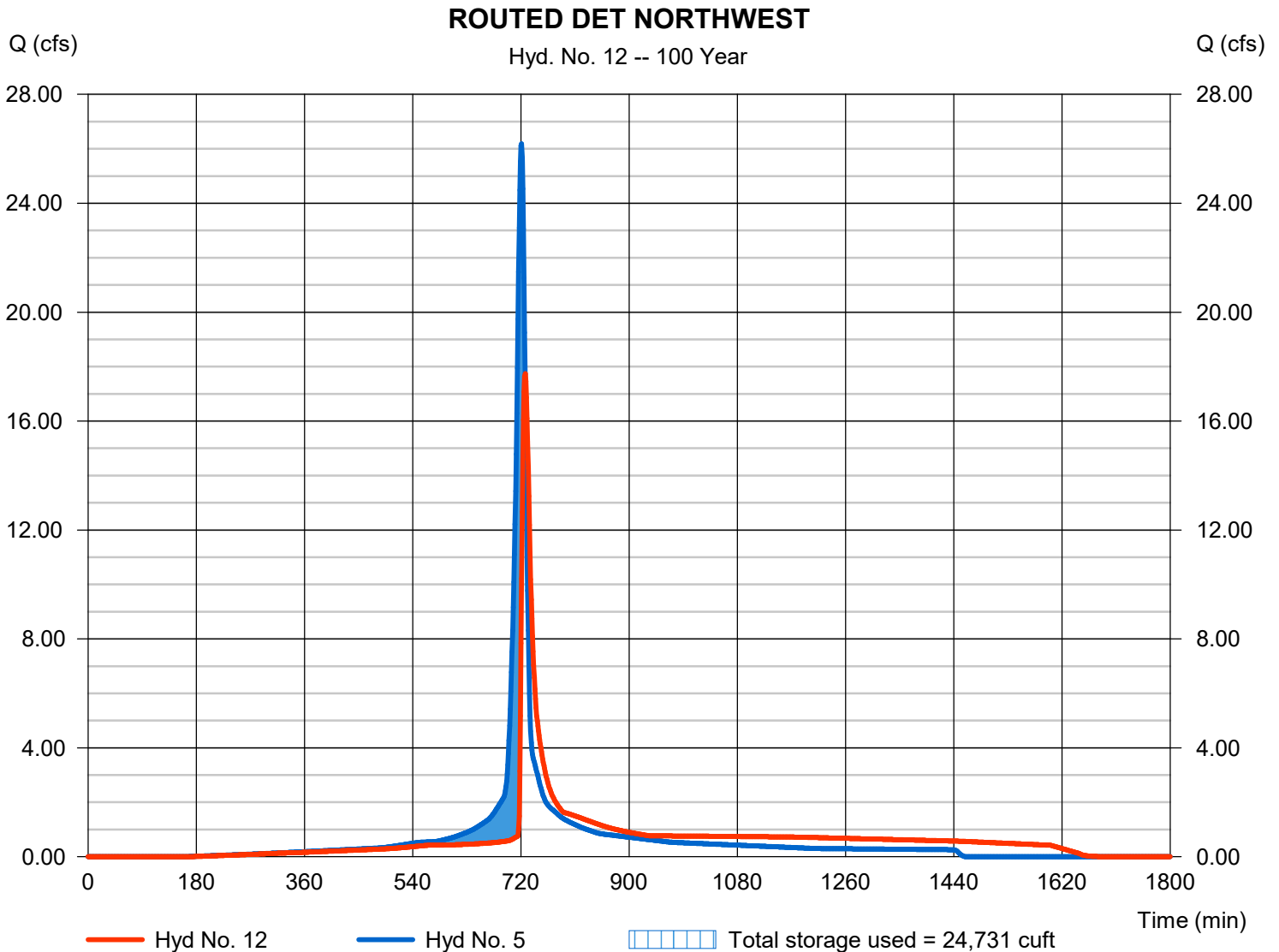
Tuesday, 12 / 2 / 2025

Hyd. No. 12

ROUTED DET NORTHWEST

Hydrograph type	= Reservoir	Peak discharge	= 17.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 727 min
Time interval	= 1 min	Hyd. volume	= 71,789 cuft
Inflow hyd. No.	= 5 - DETAINED NORTHWEST	Max. Elevation	= 1045.24 ft
Reservoir name	= NORTHWEST BASIN	Max. Storage	= 24,731 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

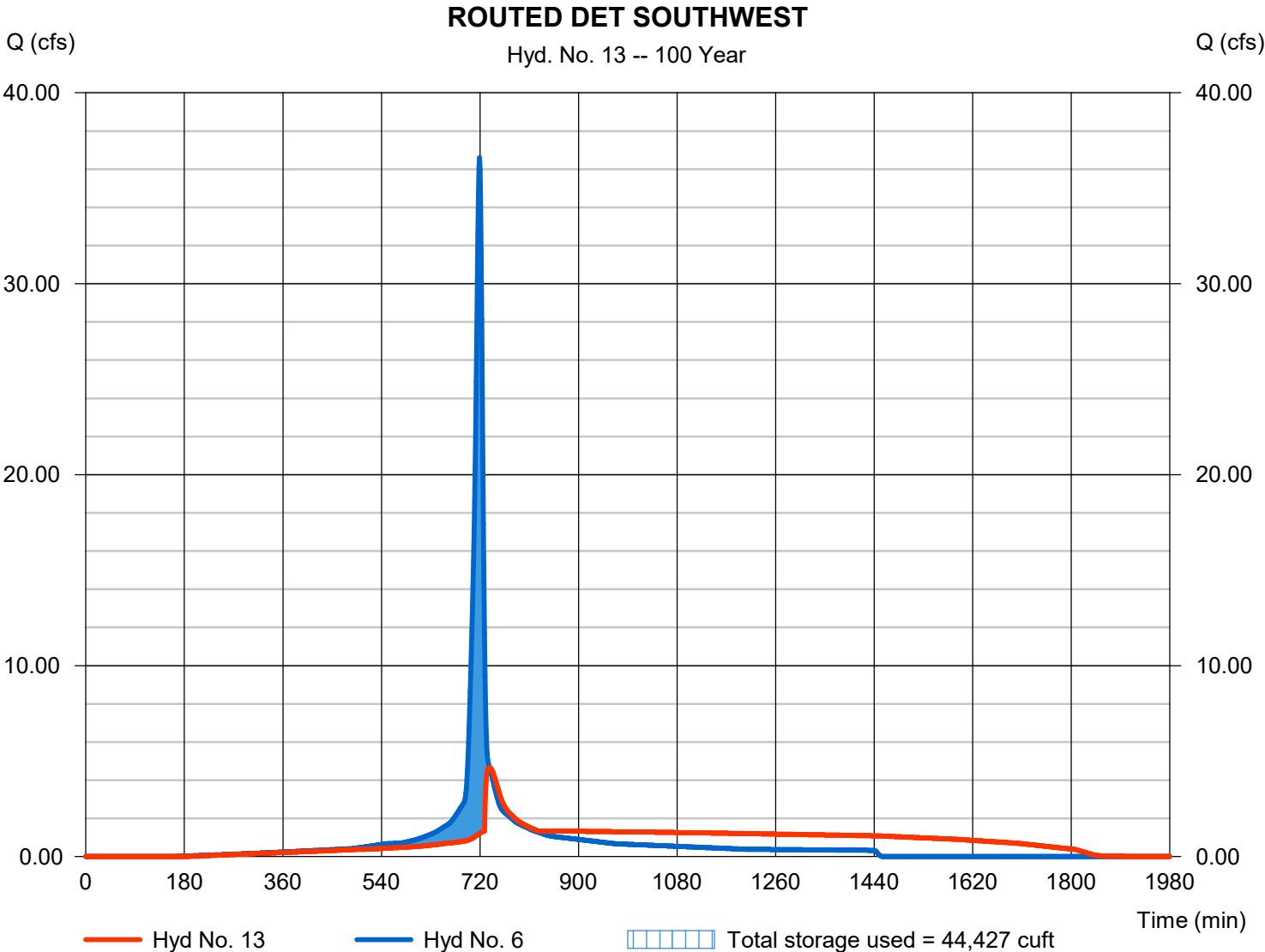
Tuesday, 12 / 2 / 2025

Hyd. No. 13

ROUTED DET SOUTHWEST

Hydrograph type	= Reservoir	Peak discharge	= 4.661 cfs
Storm frequency	= 100 yrs	Time to peak	= 737 min
Time interval	= 1 min	Hyd. volume	= 90,679 cuft
Inflow hyd. No.	= 6 - DETAINED SOUTHWEST	Max. Elevation	= 1043.68 ft
Reservoir name	= SOUTHWEST BASIN	Max. Storage	= 44,427 cuft

Storage Indication method used.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

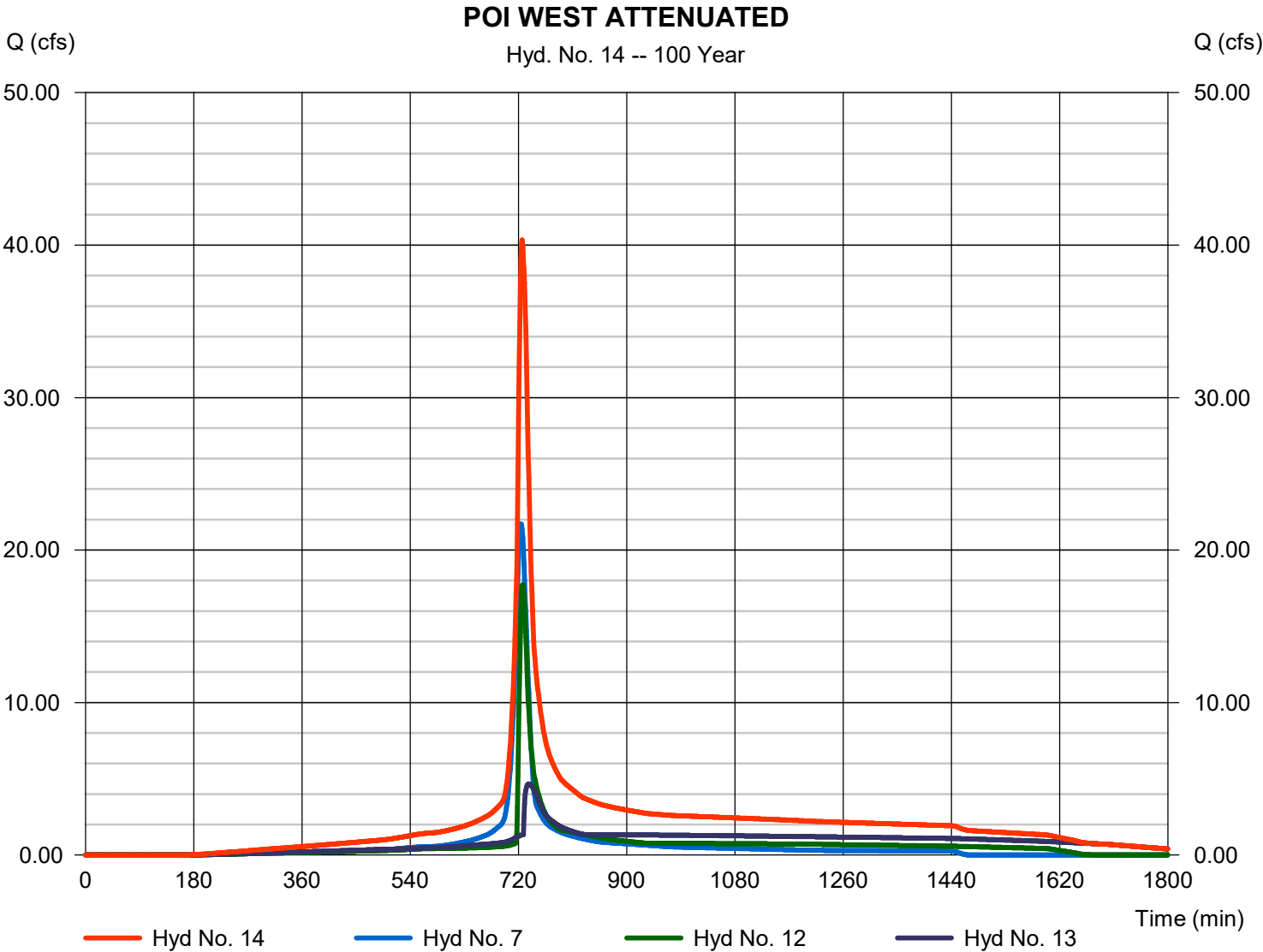
Tuesday, 12 / 2 / 2025

Hyd. No. 14

POI WEST ATTENUATED

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 7, 12, 13

Peak discharge = 40.34 cfs
Time to peak = 726 min
Hyd. volume = 234,677 cuft
Contrib. drain. area = 3.010 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 15

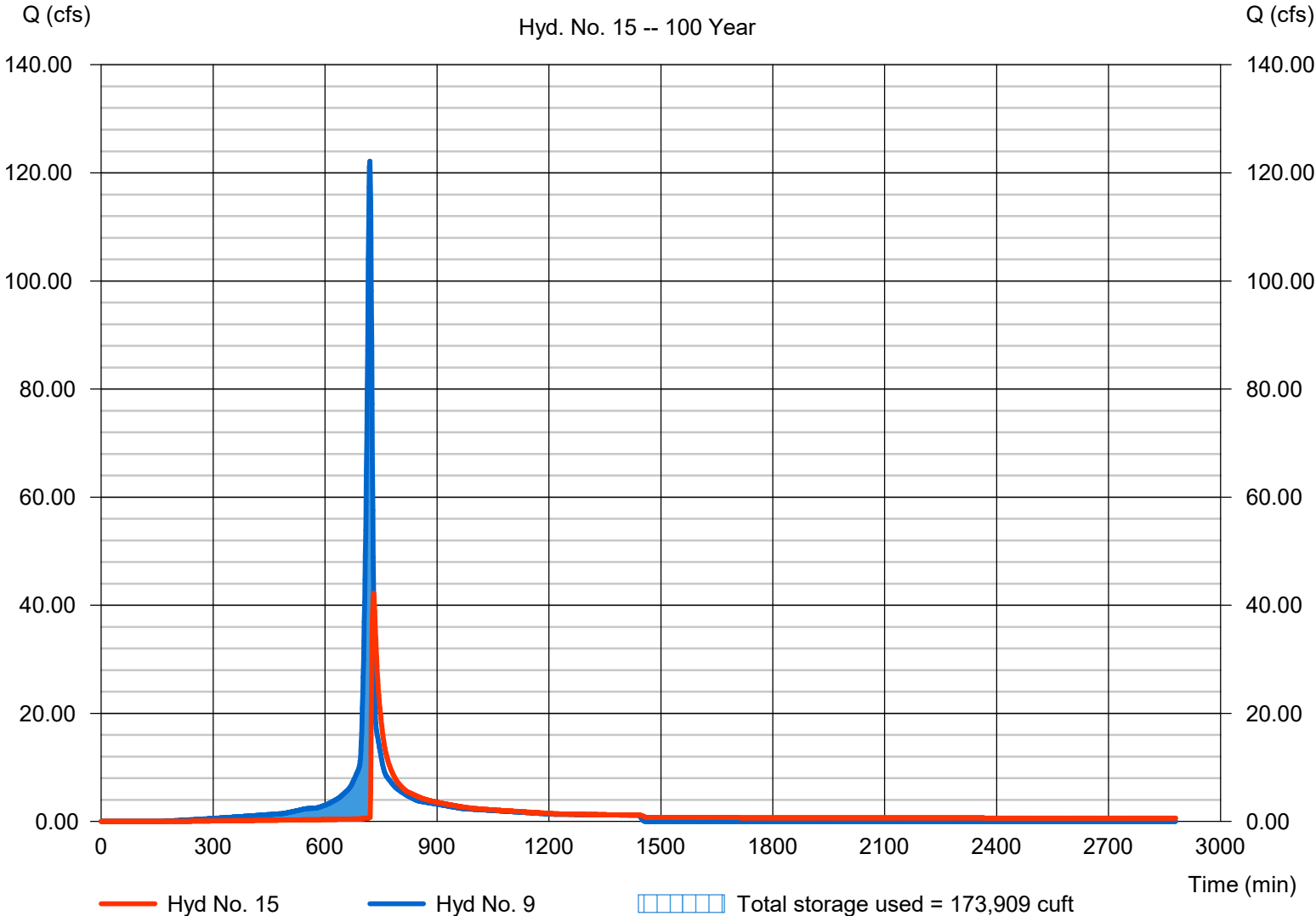
ROUTED DET SOUTH EAST

Hydrograph type	= Reservoir	Peak discharge	= 42.20 cfs
Storm frequency	= 100 yrs	Time to peak	= 730 min
Time interval	= 1 min	Hyd. volume	= 232,997 cuft
Inflow hyd. No.	= 9 - DETAINED EAST	Max. Elevation	= 1045.84 ft
Reservoir name	= SOUTHEAST BASIN	Max. Storage	= 173,909 cuft

Storage Indication method used.

ROUTED DET SOUTH EAST

Hyd. No. 15 -- 100 Year



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

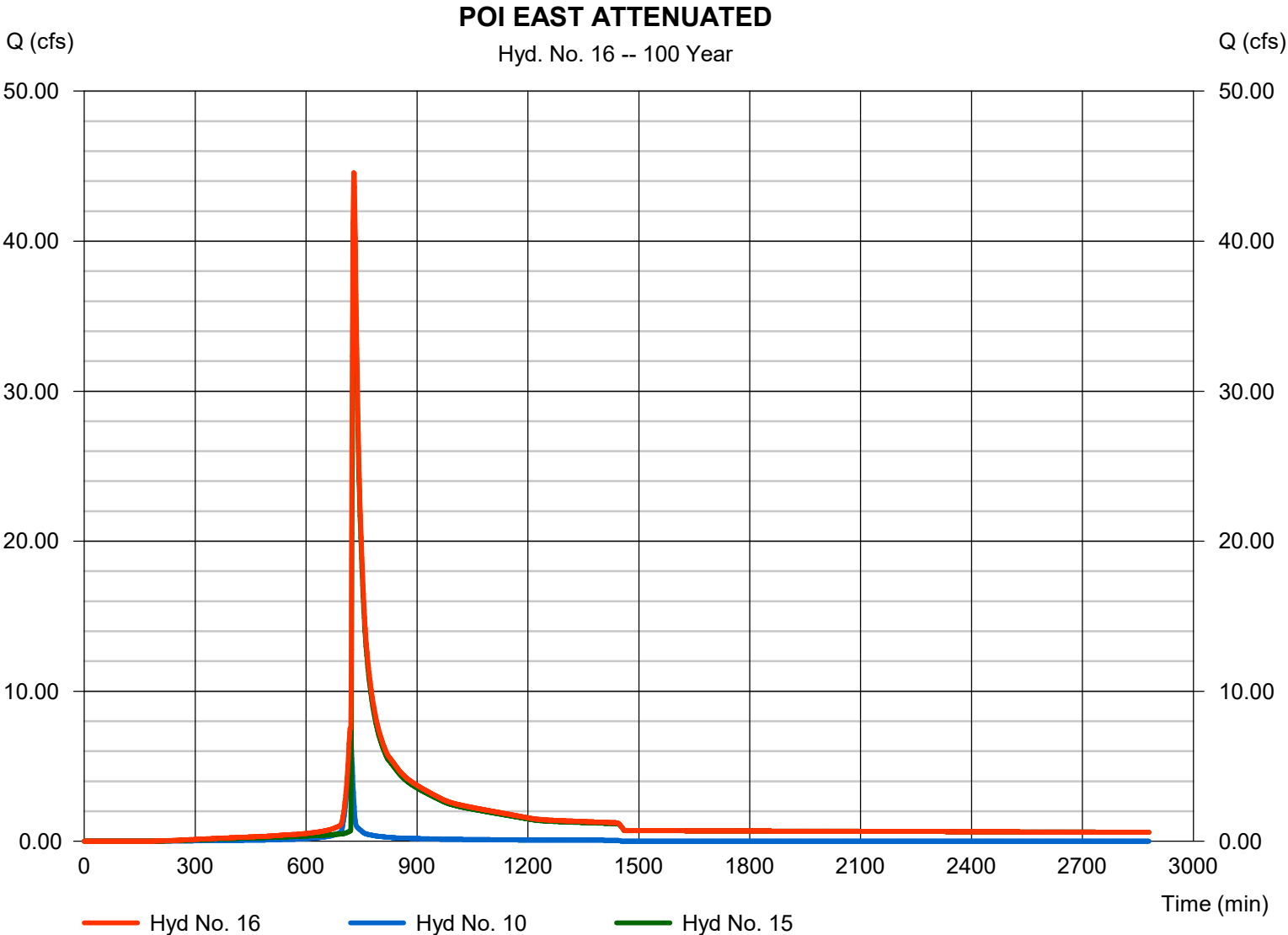
Tuesday, 12 / 2 / 2025

Hyd. No. 16

POI EAST ATTENUATED

Hydrograph type = Combine
Storm frequency = 100 yrs
Time interval = 1 min
Inflow hyds. = 10, 15

Peak discharge = 44.57 cfs
Time to peak = 729 min
Hyd. volume = 251,066 cuft
Contrib. drain. area = 0.740 ac



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

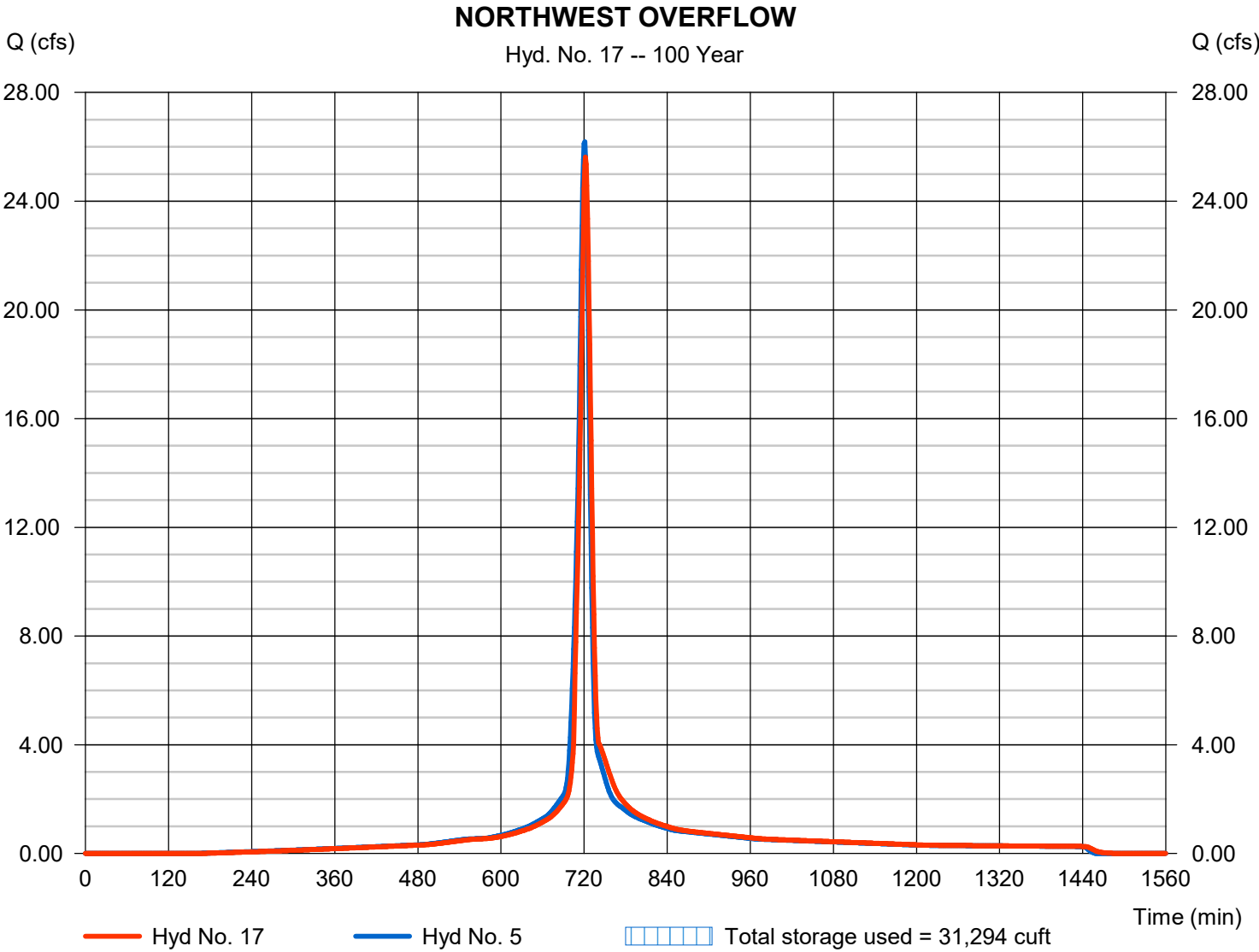
Tuesday, 12 / 2 / 2025

Hyd. No. 17

NORTHWEST OVERFLOW

Hydrograph type	= Reservoir	Peak discharge	= 25.62 cfs
Storm frequency	= 100 yrs	Time to peak	= 722 min
Time interval	= 1 min	Hyd. volume	= 71,789 cuft
Inflow hyd. No.	= 5 - DETAINED NORTHWEST	Max. Elevation	= 1045.83 ft
Reservoir name	= NORTHWEST BASIN - LFB	Max. Storage	= 31,294 cuft

Storage Indication method used. Wet pond routing start elevation = 1045.40 ft.



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 18

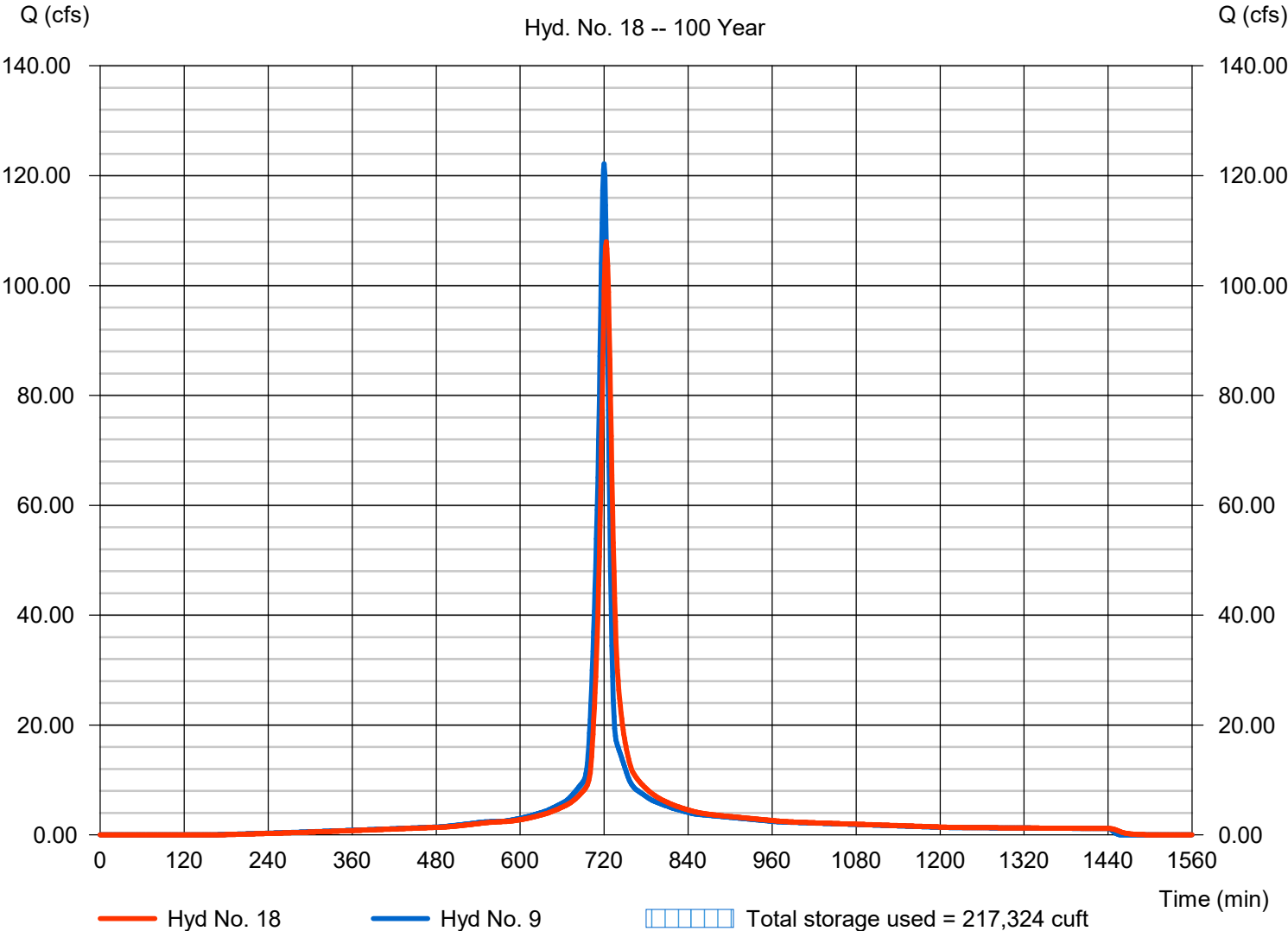
SOUTHEAST OVERFLOW

Hydrograph type	= Reservoir	Peak discharge	= 107.95 cfs
Storm frequency	= 100 yrs	Time to peak	= 723 min
Time interval	= 1 min	Hyd. volume	= 321,343 cuft
Inflow hyd. No.	= 9 - DETAINED EAST	Max. Elevation	= 1046.88 ft
Reservoir name	= SOUTHEAST BASIN - LFB	Max. Storage	= 217,324 cuft

Storage Indication method used. Wet pond routing start elevation = 1046.00 ft.

SOUTHEAST OVERFLOW

Hyd. No. 18 -- 100 Year



Hydrograph Report

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2024

Tuesday, 12 / 2 / 2025

Hyd. No. 19

SOUTHWEST OVERFLOW

Hydrograph type	= Reservoir	Peak discharge	= 35.78 cfs
Storm frequency	= 100 yrs	Time to peak	= 720 min
Time interval	= 1 min	Hyd. volume	= 90,681 cuft
Inflow hyd. No.	= 6 - DETAINED SOUTHWEST	Max. Elevation	= 1044.39 ft
Reservoir name	= SOUTHWEST BASIN - LFB	Max. Storage	= 49,619 cuft

Storage Indication method used. Wet pond routing start elevation = 1044.00 ft.

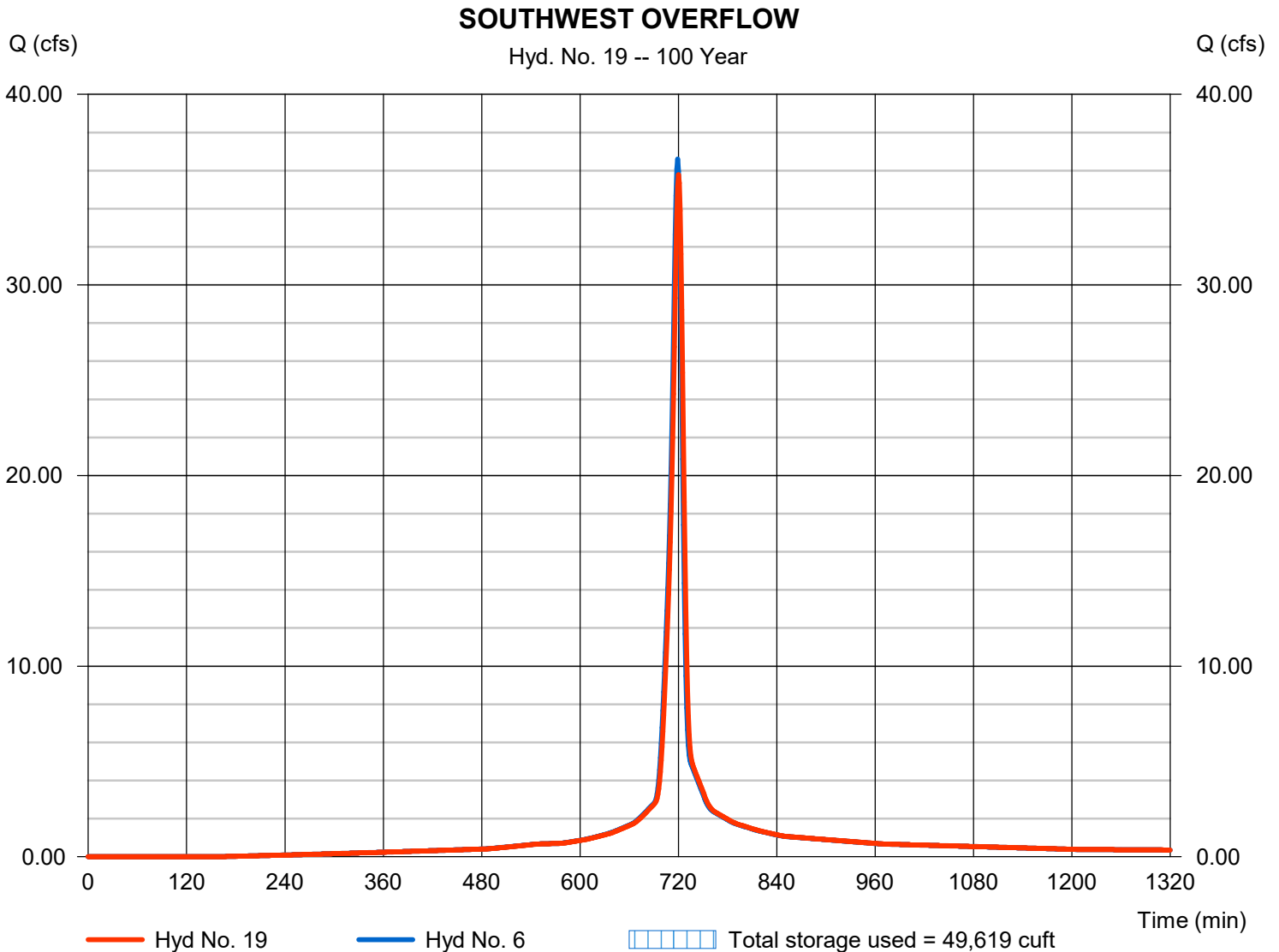
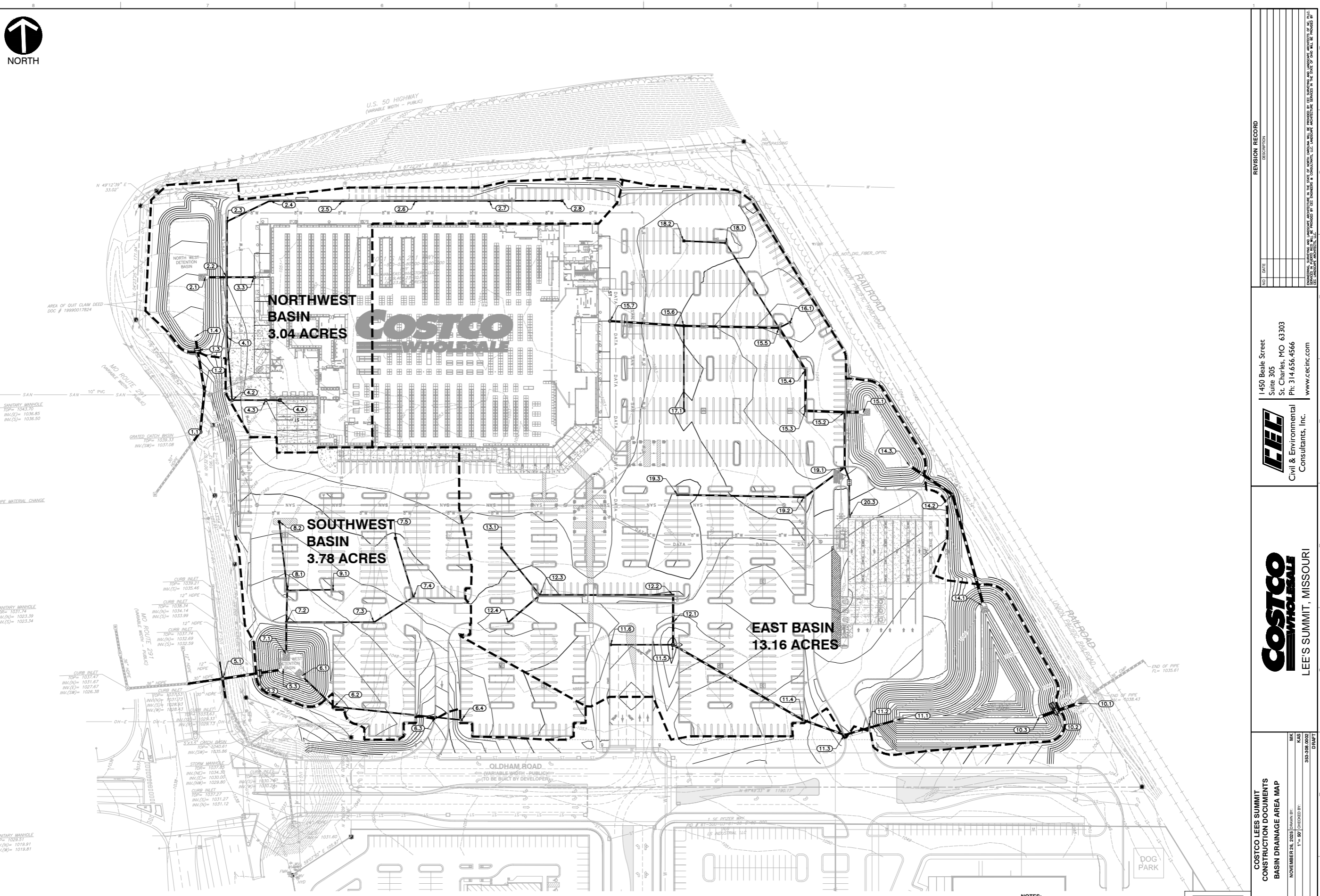


Exhibit F



REFERENCE

- EXISTING TOPOGRAPHIC DATA AND FEATURES ARE A COMBINATION OF THE FOLLOWING:
- 1. ALTA SURVEY DATED 08-20-2025 BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC.
- 2. DEVELOPMENT PLANS FOR OLDHAM VILLAGE (BY OTHER)
- 3. SITE DEVELOPMENT PLANS DATED XXXX BY CIVIL & ENVIRONMENTAL CONSULTANTS, INC.

NOTE TO CONTRACTOR: PRIOR TO ANY EXCAVATION FOR UNDERGROUND UTILITIES, CONTRACTOR SHALL EXPOSE AND VERIFY LOCATIONS (HORIZONTAL AND VERTICAL) OF ALL EXISTING UTILITIES INCLUDING BUT NOT LIMITED TO GAS, WATER, BROADBAND, PHONE, SANITARY AND STORM SEWERS. ANY CONFLICT SHALL BE REPORTED IMMEDIATELY TO THE ENGINEER AND APPROPRIATE AUTHORITIES.

NOTES:

- 1. CONTRACTOR SHALL REFER TO OTHER PLANS WITHIN THIS CONSTRUCTION SET FOR OTHER PERTINENT INFORMATION. IT IS NOT THE ENGINEER'S INTENT THAT ANY SINGLE PLAN SHEET IN THIS SET OF DOCUMENTS FULLY DEPICT ALL WORK ASSOCIATED WITH THIS PROJECT.



DANIEL R. KOZIATEK
(MO PE# 2004017198)

DRAFT

80% SET
NOT FOR
CONSTRUCTION



811 or 1-800-344-7483
http://missouri-811.org

NO.	DATE	REVISION	DESCRIPTION

1450 Beale Street
Suite 305
St. Charles, MO 63303
Ph: 314.656.4566
www.ccecinc.com



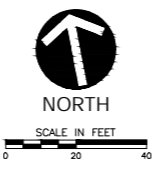
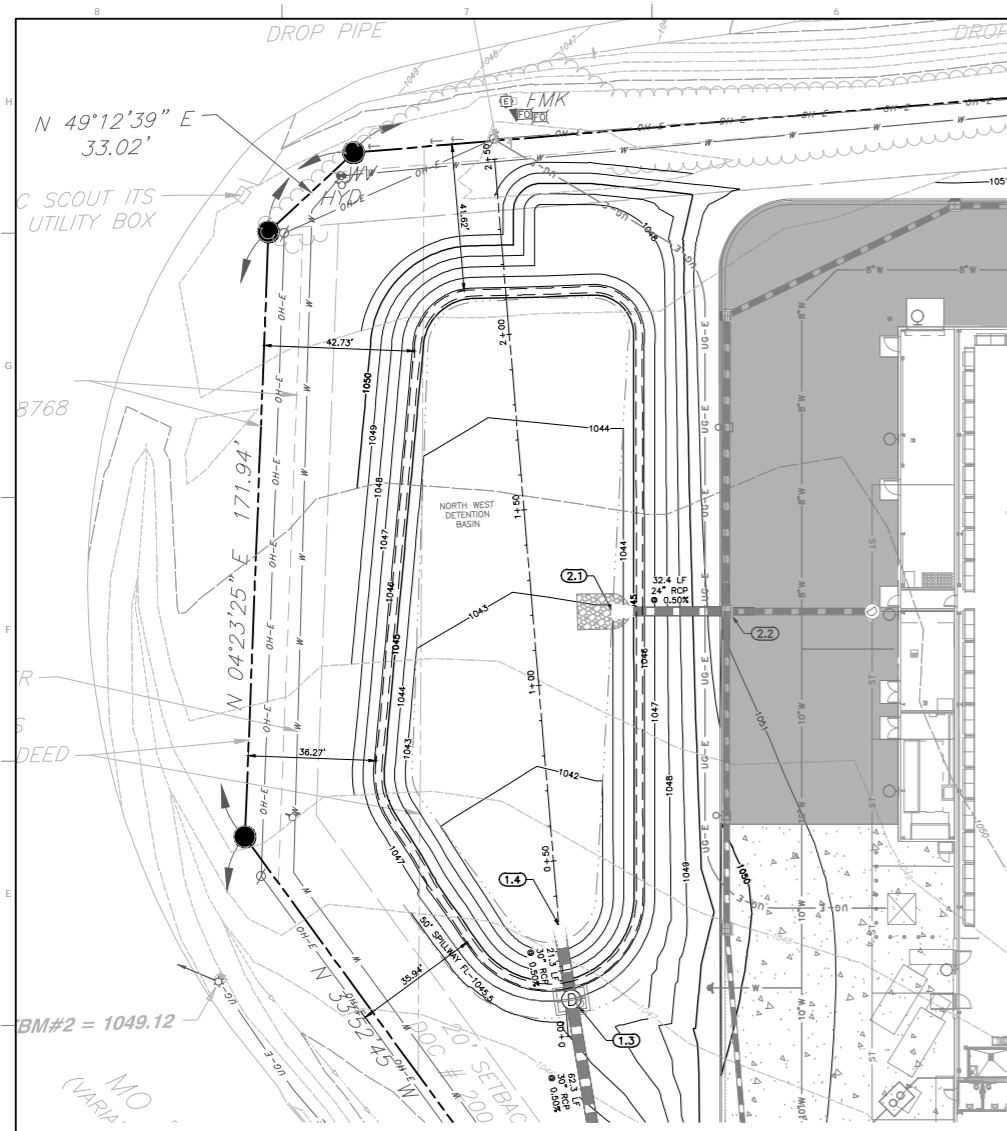
**COSTCO LEE'S SUMMIT
CONSTRUCTION DOCUMENTS
BASIN DRAINAGE AREA MAP**

NOVEMBER 26, 2025 DRAWN BY: MK
KAS
PROJECT NO: 313-300-002
1" = 50'
DRAFT

DRAWING NO.:
C405

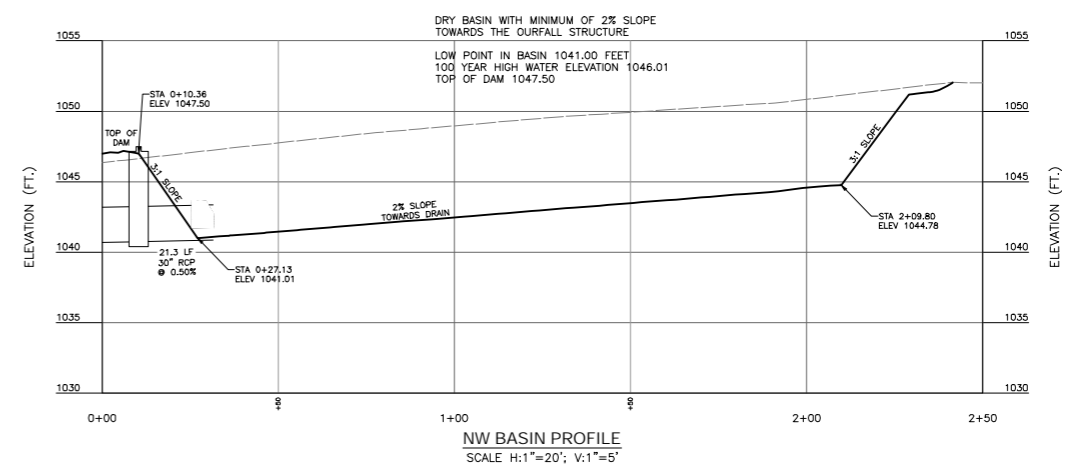
SHEET 16 OF 32

Exhibit G

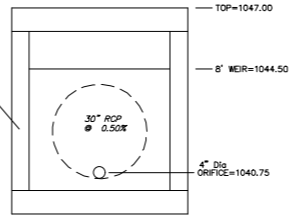


NORTHWEST DETENTION BASIN

- NOTES:
 1. THE BASIN SHALL BE CONSTRUCTED WITH EROSION AND SEDIMENT CONTROL MEASURES.
 2. AN AS-BUILT DETENTION BASIN PLAN SHALL BE SUBMITTED AND ACCEPTED PRIOR TO ISSUANCE OF A CERTIFICATE OF SUBSTANTIAL COMPLETION, WITH AS-BUILT VERSUS PROPOSED STORAGE.
 3. TURF REINFORCEMENT MAT SHALL BE NORTH AMERICAN GREEN EXONET OR APPROVED EQUAL. TRM TO BE VEGETATED.
 4. TRASH RACK TO BE INSTALLED AT EACH LOW FLOW ORIFICE. (SEE DETAIL.)



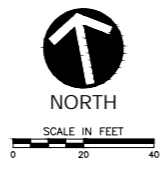
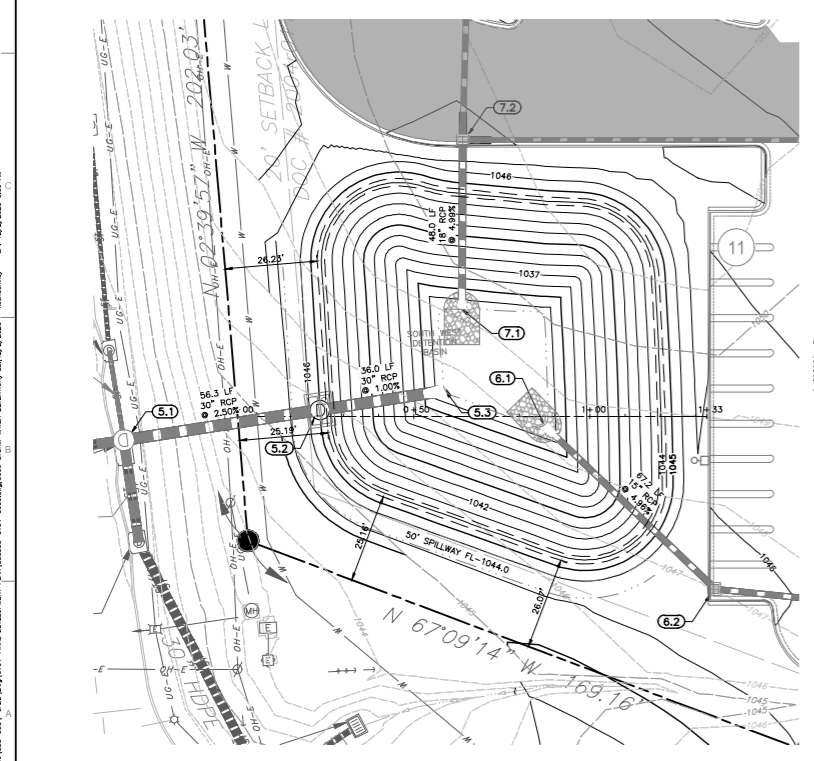
TOP OF DAM 1047.00
HIGHWATER ELEVATIONS
100 YR OVERFLOW - 1045.84
10 YR - 1045.24
2 YR - 1044.24



PRODUCT ID	MATERIAL	COATING	WEIGHT
LPG-10-P	ASTM A36 MILD STEEL	N/A	25 LBS.
LPG-10-G	ASTM A36 MILD STEEL	GALVANIZED	25 LBS.
LPG-10-PC	ASTM A36 MILD STEEL	POWDER COAT	25 LBS.
LPG-10-SS	304 STAINLESS STEEL	N/A	25 LBS.
LPG-10-AL	6061-T6 ALUMINUM	N/A	9 LBS.

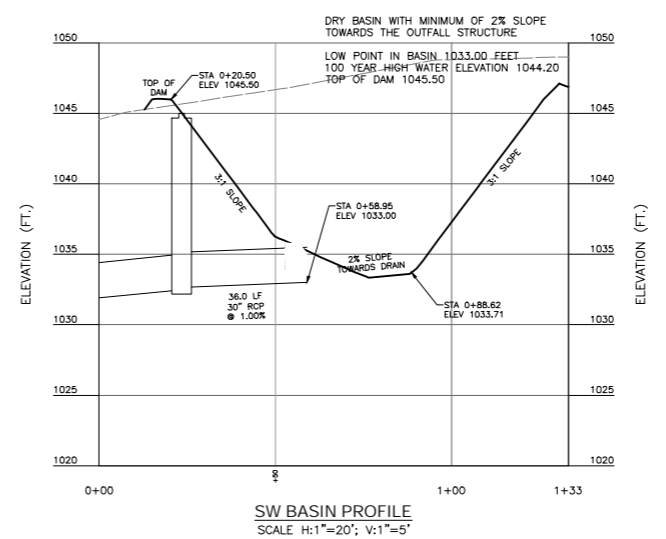
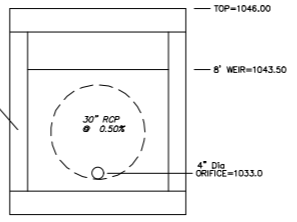
TRASHRACKS.COM
A DIVISION OF J.R.HBE

LPG-10
10" PIPE GUARD GRATE
MADE IN THE U.S.A.



SOUTHWEST DETENTION BASIN

TOP OF DAM 1046.00
HIGHWATER ELEVATIONS
100 YR OVERFLOW - 1044.43
10 YR - 1043.88
2 YR - 1039.88



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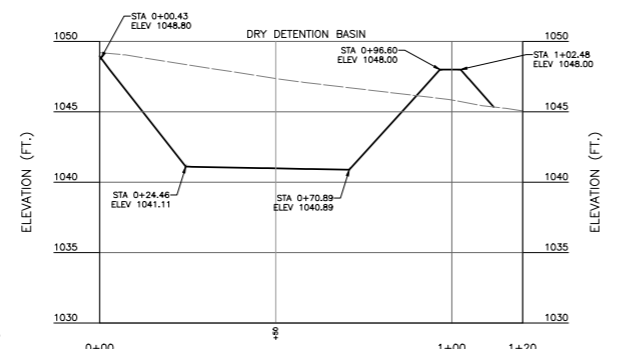
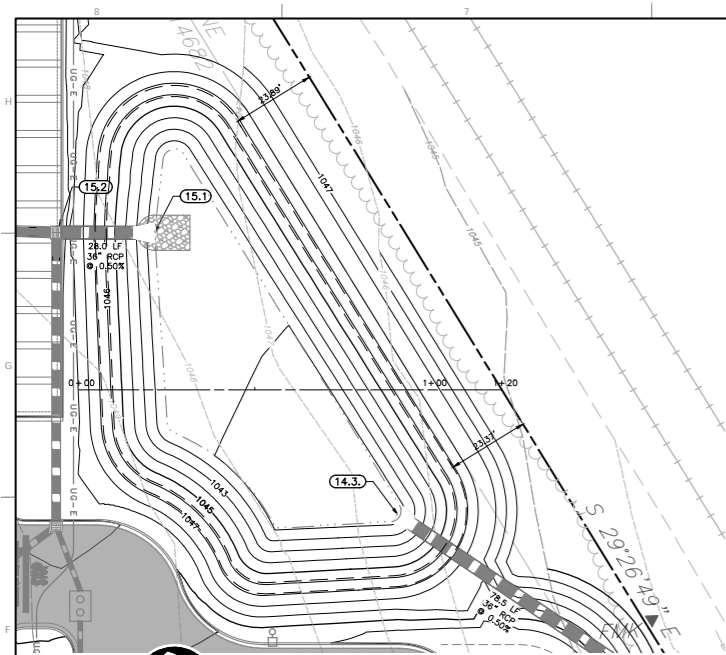
LEE'S
Civil & Environmental Consultants, Inc.

COSTCO WHOLESALE
LEE'S SUMMIT, MISSOURI

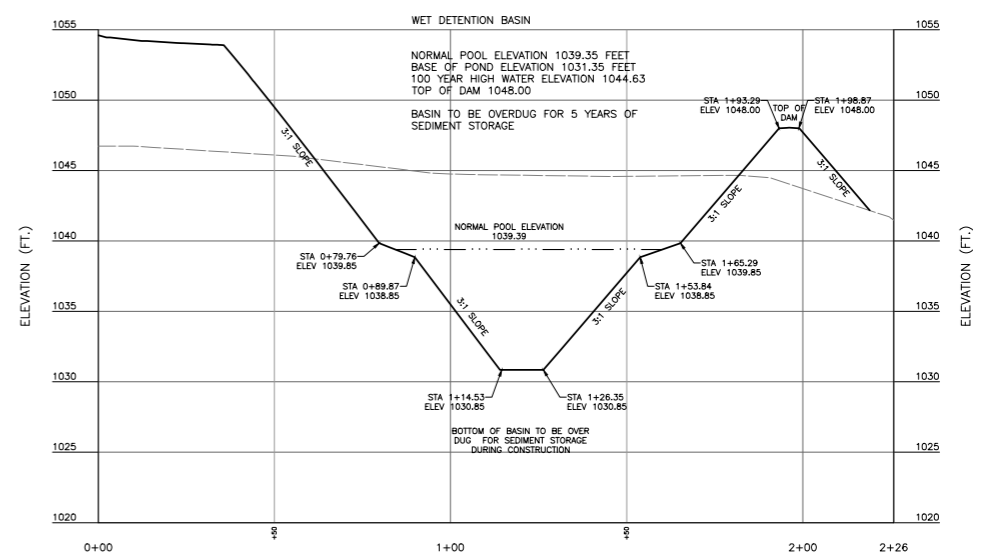
FINAL DEVELOPMENT PLAN
STORM WATER DETENTION

DWG NO.: C600
DATE: DECEMBER 1, 2025
DRAWN BY: KAS
CHECKED BY: KAS
PROJECT NO.: 353-308.0002
APPROVED BY: [Signature]

DRAWING NO.: **C600**
SHEET 09 OF 15



SE BASIN 2 PROFILE
SCALE H:1"=20'; V:1"=5'



SE BASIN PROFILE
SCALE H:1"=20'; V:1"=5'

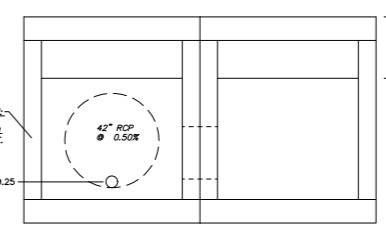
SOUTHEAST DETENTION BASIN

- NOTES:
1. THE BASIN SHALL BE CONSTRUCTED WITH EROSION AND SEDIMENT CONTROL MEASURES.
 2. AN AS-BUILT DETENTION BASIN PLAN SHALL BE SUBMITTED AND ACCEPTED PRIOR TO ISSUANCE OF A CERTIFICATE OF SUBSTANTIAL COMPLETION WITH AS-BUILT VERSUS PROPOSED STORAGE.
 3. TURF REINFORCEMENT MAT SHALL BE NORTH AMERICAN GREEN ERONET OR APPROVED EQUAL. TRM TO BE VEGETATED. NO MAT REQUIRED BELOW NORMAL POOL ELEVATION.
 4. TRASH RACK TO BE INSTALLED AT EACH LOW FLOW ORIFICE. (SEE DETAIL).

TOP OF DAM 1048.00
HIGHWATER ELEVATIONS

100 YR OVERFLOW	1046.96
100 YR	1045.83
10 YR	1045.06
2 YR	1043.73
WATER QUALITY ELEVATION	1041.70

OUTFALL NOTE:
OUTFALL STRUCTURE SHALL BE REINFORCED CONCRETE.



OUTFALL STRUCTURE 10.2
8'x6' BOX STRUCTURE

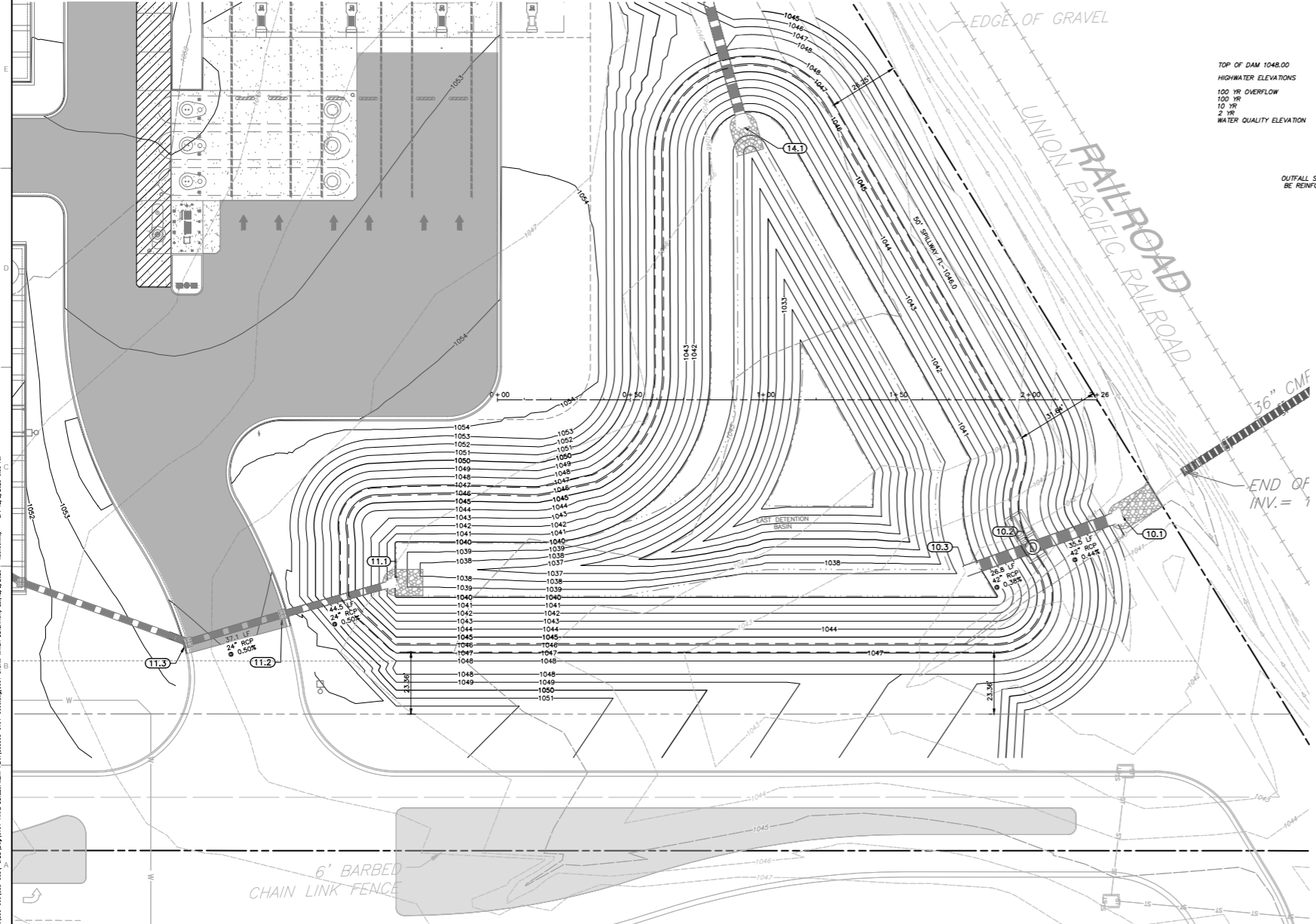
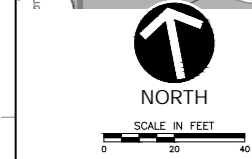
- CONTROL STRUCTURE NOTES
1. CONTROL STRUCTURE TO BE 8'x6' PRECAST BOX
 2. THE ADJACENT BOX SHALL NOT CONTAIN THE 3.4" DIAMETER ORIFICE
 3. THE ADJACENT BOX SHALL HAVE A 24" DIAMETER LEVELER PIPE INSTALLED TO MAIN BOX UPSTREAM AND DOWNSTREAM OF THE WEIR WALL
 4. INSTALL TRASH RACK PER MANUFACTURERS SPECIFICATIONS

PRODUCT ID	MATERIAL	COATING	WEIGHT
LPG-10-P	ASTM A36 MILD STEEL	N/A	25 LBS.
LPG-10-O	ASTM A36 MILD STEEL	GALVANIZED	25 LBS.
LPG-10-PC	ASTM A36 MILD STEEL	POWDER COAT	25 LBS.
LPG-10-SS	304 STAINLESS STEEL	N/A	25 LBS.
LPG-10-AL	6061-T6 ALUMINUM	N/A	9 LBS.

CUSTOM SIZES AVAILABLE
OPTIONS: HINGED ACCESS

TRASHRACKS.COM
A DIVISION OF J.R.HBE

MODEL: **LPG-10**
10" PIPE GUARD GRATE
MADE IN THE U.S.A.



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FINAL DEVELOPMENT PLAN
STORM WATER DETENTION

DRAWING NO.: **C601**

SHEET 10 OF 15

DATE	BY	CHECKED BY
DECEMBER 1, 2025	KAS	KAS

PROJECT NO.: 353-300-0202
DRAWN BY: KAS
CHECKED BY: T-50

Exhibit H

Weir Report

NORTHWEST EMERGENCY OVERFLOW

Rectangular Weir

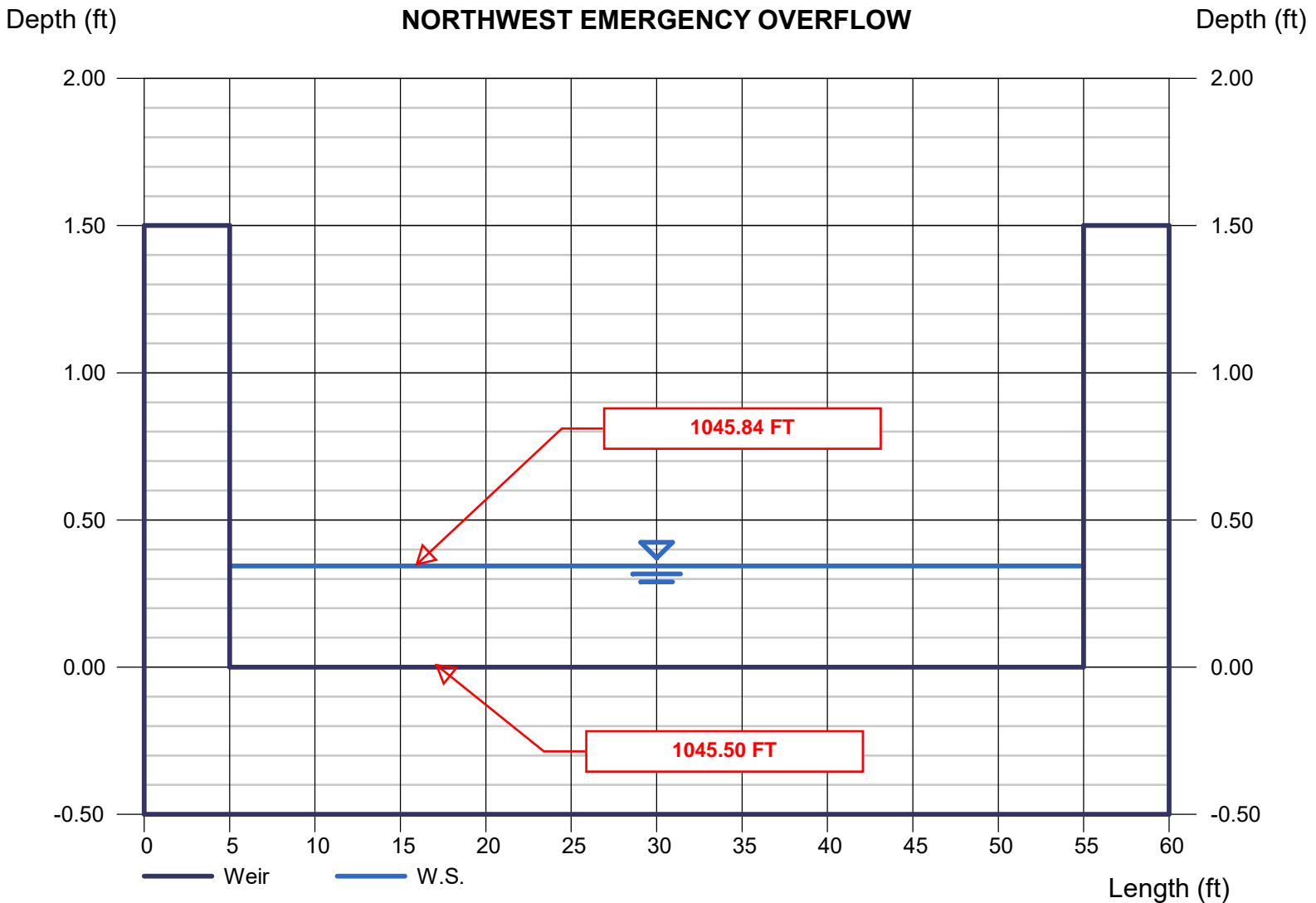
Crest = Broad
Bottom Length (ft) = 50.00
Total Depth (ft) = 1.50

Highlighted

Depth (ft) = 0.34
Q (cfs) = 26.18
Area (sqft) = 17.17
Velocity (ft/s) = 1.52
Top Width (ft) = 50.00

Calculations

Weir Coeff. Cw = 2.60
Compute by: Known Q
Known Q (cfs) = 26.18



Weir Report

SOUTHWEST EMERGENCY OVERFLOW

Rectangular Weir

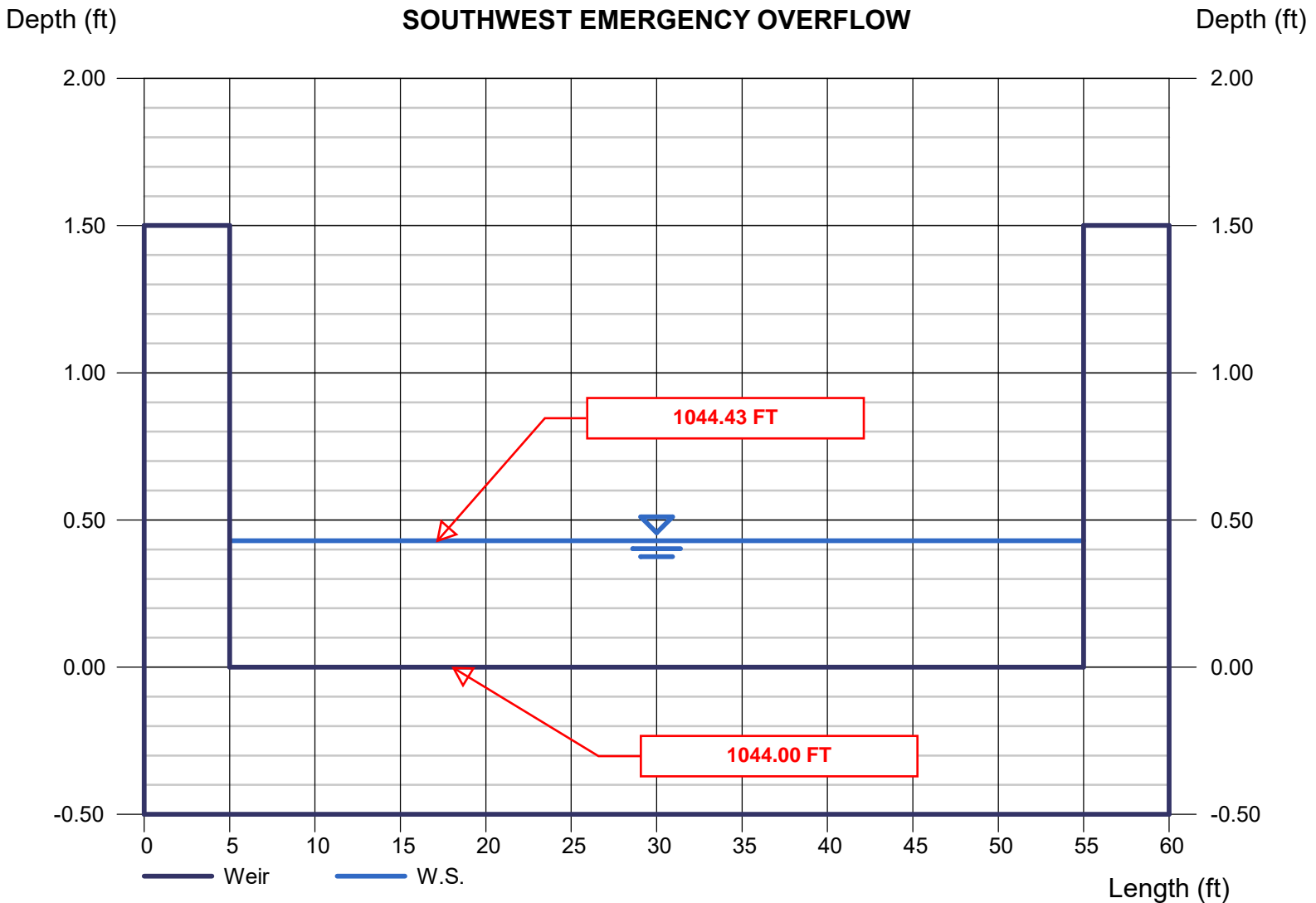
Crest = Broad
Bottom Length (ft) = 50.00
Total Depth (ft) = 1.50

Highlighted

Depth (ft) = 0.43
Q (cfs) = 36.60
Area (sqft) = 21.47
Velocity (ft/s) = 1.70
Top Width (ft) = 50.00

Calculations

Weir Coeff. Cw = 2.60
Compute by: Known Q
Known Q (cfs) = 36.60



Weir Report

EAST EMERGENCY OVERFLOW

Rectangular Weir

Crest = Broad
Bottom Length (ft) = 50.00
Total Depth (ft) = 1.50

Highlighted

Depth (ft) = 0.96
Q (cfs) = 122.16
Area (sqft) = 47.97
Velocity (ft/s) = 2.55
Top Width (ft) = 50.00

Calculations

Weir Coeff. Cw = 2.60
Compute by: Known Q
Known Q (cfs) = 122.16

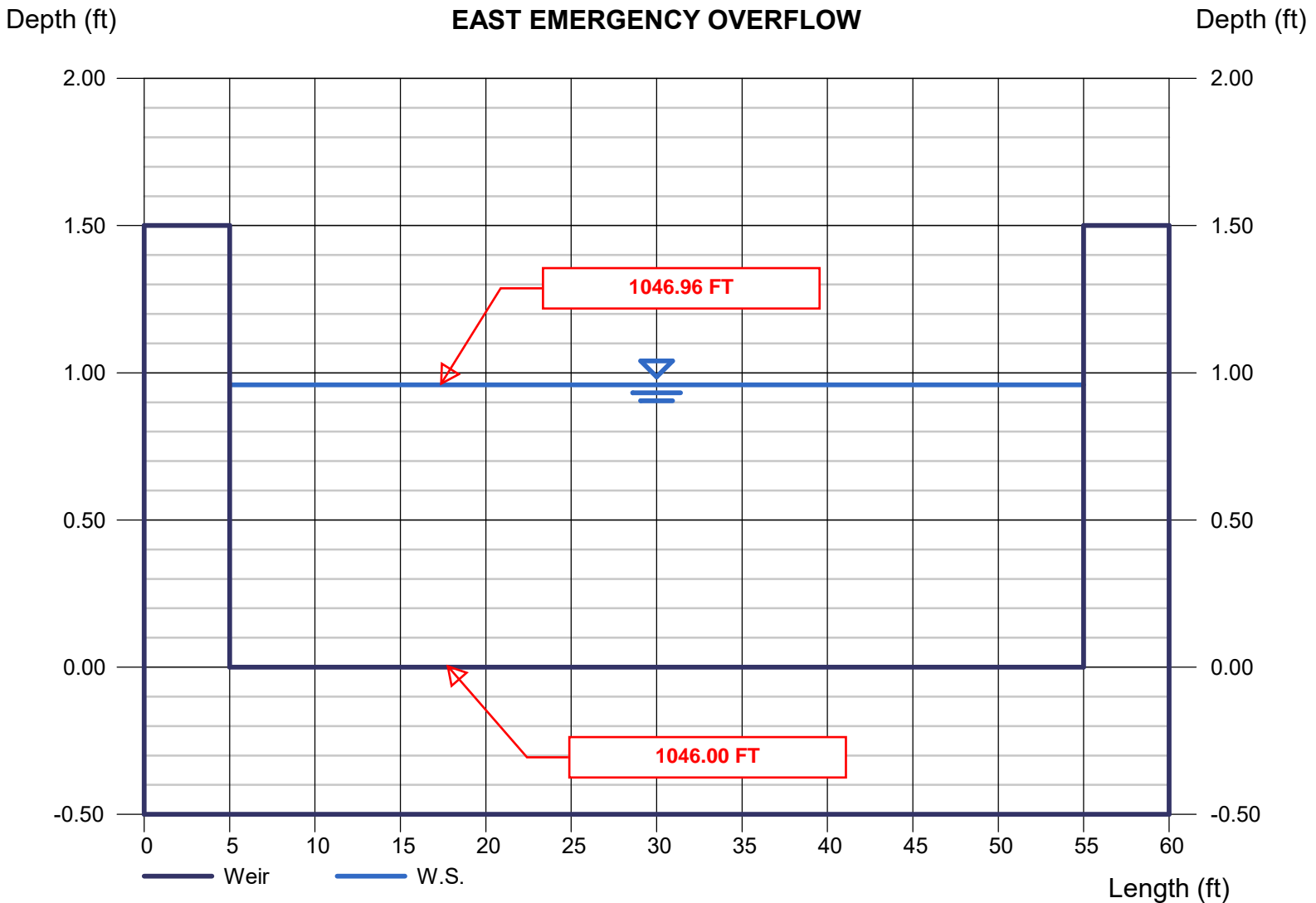


Exhibit I

Calculate Water Quality for Storm Study - SE Basin

Costco Lee's Summit (Southeast Basin)

Date: 09/18/2025

To Calculate: $WQc = P * Rv * A$

P (in)	1.37
P (ft)	0.11
Impervious Area (Sq Ft)	430,371.00
Total Area (Sq Ft)	542,322.00
Impervious Area (Ac)	9.88
Total Area (Ac)	12.45
$Rv = (0.05 * 0.009 (I))$	0.76
Percent Impervious (I)	79.36
WQv (cu ft)	47,316.38
WQv (Ac. Ft)	1.086

Pond Volume

Elevation	Area (Sq Ft)	Volume (Cu FT)	Volume Cu Ft
1039.35	13,410		
1039.85	16,120	7,383	7,383
1040	16,445	2,442	9,825
1041	20,343	18,394	28,219
1042	25,315	22,829	51,048
1044	28,595	53,910	104,958
1046	46,800	75,395	180,353

40 HOUR DETENTION CALCULATION

To Calculate:

40 Hour Detention (EDDB)

I. Basin Water Storage Volume

Step 1) Tributary Area to EDDB, A (Ac)	At (Ac) =	12.45
Step 2) Calculate WQv, using Sec. 6 (Ac-Ft)	WQv (Ac-Ft) =	1.086
Step 3) Add 20 Percent to Step 2.	Vdesign (Ac-Ft) =	1.303

II.a. Water Quality Outlet Type

Step 1) Set Water Quality Outlet Type	Outlet Type =	1
Type 1 = single orifice		
Type 2 = perforated riser or plate		
Type 3 = v-notch weir		

Step 2) Proceed to Step IIb, IIc, or IId based on selection

IId. Water Quality Outlet, Single Orifice

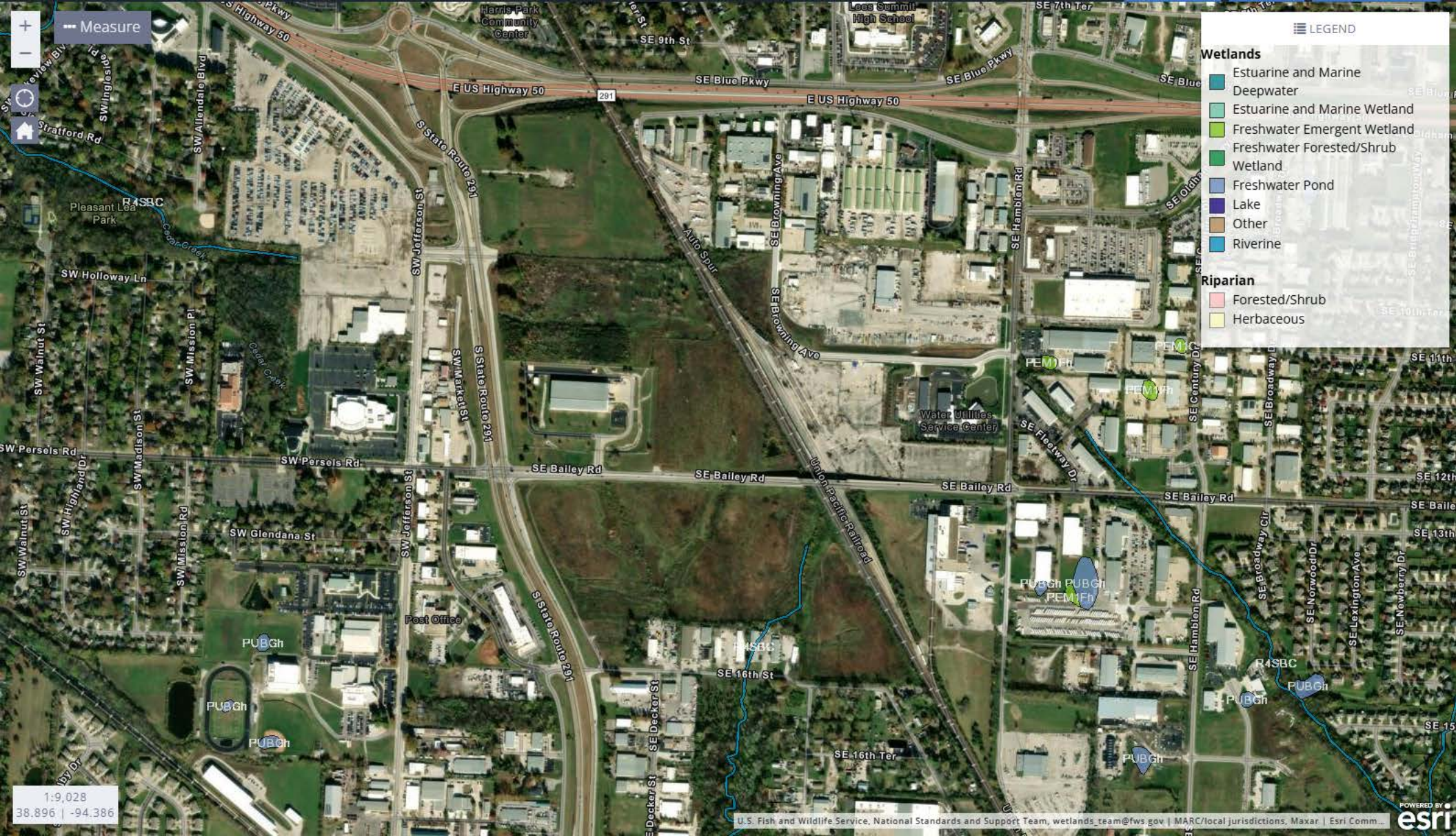
Step 1) Depth of Water Quality Volume at Outlet	Zwq (Ft)	2.86	See Below to Calc Zwq
Step 2) Average Head of Water Volume over invert of Orifice	Hwq (ft)	1.43	
Step 3) Average Water Quality Flow Rate	Qwq (CFS)	0.394	(Wqv / 40 Hr Converted to CFS)
Step 4) Orifice discharge coefficient	C (unitless)	0.66	
a) 0.66 when thickness of riser/weir plate < orifice dia			
b.) 0.80 when thickness of riser/weir plate > orifice dia			
Step 5) Water Quality Outlet Orifice Dia.	D (in)	3.4	

(if orifice dia. < 4 inches, use outlet type 2 or 3)

To Calculate Zwq (ft) interpolate from Storm

Elevation 1 =	1,042.00	Storage 1 =	51,047.88
Elevation X =		Storage X =	56,779.65
Elevation 2 =	1,044.00	Storage 2 =	104,957.88
		Elevation X =	1042.21
Lowest Elevation of Pond =	1,039.35		
Elevation X =	1,042.21		
Zwq (ft) =	2.86		

Exhibit J



LEGEND

Wetlands

- Estuarine and Marine
- Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

Riparian

- Forested/Shrub
- Herbaceous

Measure



1:9,028
38.896 | -94.386

