MACRO STORM WATER DRAINAGE STUDY

East Village

NE & SE Quadrant SE Bailey Road & MO 291 South

Site Acreage: 129.54 Acres

Lee's Summit, MO

PREPARED BY:

ENGINEERING SOLUTIONS
ENGINEERING & SURVEYING
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Prepared On: August 8, 2025

Anthony Philipsheck, PE

Revision

Date	Comment	By

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3. GENERAL INFORMATION

The macro storm study has been prepared to evaluate potential negative downstream hydraulic impacts and propose potential mitigation measures associated with the redevelopment of the proposed Planned Mixed Use Development, East Village. The proposed redevelopment will consist of multi-family communities in addition to multiple commercial and retail establishments. The site is located east of South 291 Highway, west of the railroad tracks and bounded by 50 Highway to the North and SE 16th Street to the south. The proposed master development contains 129.54 acres. The proposed site has been home to multiple developments over time consisting mainly of planned industrial usages. Currently there is one industrial development active on the property which is to be abandoned and demolished. The northwest portion of the property drains west to Oldham Village where it has been accounted for in the Oldham Village Retention System. The Oldham Village system is tributary to Cedar Creek. Property south of Oldham Parkway drains to the south and is tributary to an unnamed branch of Big Creek. The site consists of land located in Sections 17 and 8, Township 47 North, and Range 31 West. See Exhibit A for an aerial view of the site in addition to the site and surrounding area. The proposed grading plan is also included in Exhibit A.

3.1 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 Numbers 29095C0419G and 29095C0438G, effective January 20, 2017.

See Exhibit B for (3) FEMA FIRMette maps which encompass the proposed project site.

3.2 NRCS SOIL CLASSIFICATION

Soil classifications published by the United States Department of Agriculture/National Resources Conservation Service (USDA/NRCS) website for Jackson County, Missouri, Version 27, August 27, 2024. The existing site contains two major soil types:

10082	Arisburg-Urban Land Complex, 1 to 5 Percent Slopes Hydrologic Soils Group (HSG): Type C
10181	Udarents-Urban Land-Sampsel Complex, 5 to 9 Percent Slopes (HSG): Type C

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

4. METHODOLOGY

The Macro Storm Drainage Study has been prepared to evaluate potential hydrologic impacts from the proposed redevelopment and recommend improvements to eliminate any potential negative impacts. The study utilized existing contours to create the Existing Drainage Area Map. The study conforms to the requirements of the City of Lee's Summit, Missouri "Design and Construction Manual" and all applicable codes and criteria referred to therein. If attenuation is to be employed it shall meet the Comprehensive Control Strategy with extended detention as outlined in APWA Section 5600.

Using the above criteria, the proposed site was evaluated using SCS Methods to calculate storm runoff volumes, peak rates of discharge, existing and proposed hydrographs and required storage volumes for attenuation facilities. The analysis contains results for the 2, 10 and 100-year design storms.

5. EXISTING CONDITIONS ANALYSIS

The project site consists of 129.54 acres. There have been several large industrial users that have been housed on the subject property in recent history. The property currently houses one large industrial user. The existing industrial site is to be decommissioned and its existing infrastructure demolished. The existing project site will be evaluated in its pre-developed condition. The site consists of four (4) drainage subareas.

The North subarea is the smallest of the four subareas (1.40 acres) and consists of a small sliver of land running adjacent to the north property line. The North subarea consists of mainly turf with a few trees. The North subarea drains via sheet flow to the enclosed storm system located along US 50 Highway. The West subarea is located on the west side of the property and runs adjacent to MO S. 291 Highway. The subarea stretches from the north boundary to a midway point between SE Oldham Parkway and SE Bailey Road. The subarea consist of 15.76 acres and contributes runoff to the existing enclosed storm sewer system running along MO S. 291 Highway. Runoff from the West subarea is tributary to the Oldham Village Retention System and was accounted for in that design. The west subarea is tributary to Cedar Creek and makes up part of the Cedar Creek Headwaters. The East subarea is located in the northeast portion of the property and consists of 18.40 acres. The East subarea drains via sheet and shallow concentrated flow to a culvert located under the railroad tracks. The East subarea is tributary to an unnamed branch of Big Creek. The South subarea is by far the largest subarea on the property consisting of 93.98 acres in addition to two offsite tributaries of 17.91 and 5.64 acres contributing from the Southeast and Southwest, respectively, for a total tributary area to POI South of 117.53 acres. The South Offsite subarea consists mainly of railroad and street right-of-way with a small portion of green space on a developed lot. A curve number of 82 was utilized for the offsite area. The South subarea drains via sheet, shallow concentrated and channelized flow to the south where runoff is collected by dual culverts at SE 16th Street for further conveyance downstream. The drainage patterns appear to be segmented due to past developments and SE Bailey Road which bisects the South subarea. The South Subarea is also tributary to Big Creek and makes up part of the Big Creek Headwaters.

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

Table 5.1 Existing Conditions Subarea

Subarea	Area (ac.)	Curve Number	Tc (min)
North	1.40	74	8.7
West	15.76	74	14.3
East	18.40	74	19.5
South	117.53	76	42.3

Table 5.2 Existing Conditions Runoff Data: Peak Discharge Rates

Subarea	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
North	3.10	5.67	10.55
West	28.95	53.68	100.49
East	28.84	53.82	101.31
South	120.39	219.62	406.40

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% storm peak rate less than or equal to 0.5 cfs per site acre
- 10% storm peak rate less than or equal to 2.0 cfs per site acre
- 1% storm peak rate less than or equal to 3.0 cfs per site acre

The South subarea is the only subarea that has offsite runoff draining to it. The allowable offsite contribution was determined by the area ratio method. The allowable offsite peak discharge is the product of the ratio of offsite area to onsite area multiplied by a given storms existing peak discharge rate. The allowable peak discharge rate is the sum of the offsite allowable plus the onsite allowable per APWA Section 5608.4. See allowable 100-year peak discharge rate calculation below.

Example (100-YR): [(23.55 / 117.53 x 406.40) + (93.98 x 3.0)] = 363.37 cfs

Table 5.3 Existing Conditions APWA Allowable Peak Discharge Release Rates

POI	Onsite Area (ac.)	Offsite Area (ac.)	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
North	1.40	0	0.70	2.80	4.20
West	15.76	0	7.88	31.52	47.28
East	18.40	0	9.20	36.80	55.20
South	93.98	23.55	71.11	231.97	363.37

The North subarea consists of a long narrow sliver of land adjacent to the north property line that sheet 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 subarea will continue to be free released via sheet flow to the enclosed storm sewer running along US 50 Highway. The proposed North 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 Subarea will be provided in Tables 6.1 and 6.2 below to confirm our findings.

6. PROPOSED CONDITIONS ANALYSIS

The proposed development is planned to consist of both commercial and multi-family residential usages. A composite curve number for each Subarea was determined based upon proposed usage. A curve number of 88 was used for multi-family and 94 for commercial. The proposed conditions for the project site will consist of ten (10) subareas. The original four (4) subareas North, West, East and South plus five (5) additional subareas Detained Northwest, Detained Southwest, Detained East, Detained South 1, Detained South 2 and Detained South 3. 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 5.3 are not exceeded. The five 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 South subarea will utilize three attenuation systems in series. The South subarea will be designed to free release large portions of downstream runoff south of SE Bailey Road and attenuate the majority of upstream runoff north of SE Bailey Road helping maximize attenuation in the South subarea. 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 Map may be found in Exhibit F.

Table 6.1 Proposed Conditions Subarea Data

Subarea	Area (ac.)	Composite CN	Tc (min)
North	0.45	90	5.0
Detained Northwest	5.73	90	12.6
Detained Southwest	5.07	90	9.3
West	3.01	90	12.1
Detained East	9.87	90	10.7
East	0.74	90	11.7
Detained South (1)	13.70	90	18.5
Detained South (2)	21.26	90	19.3
*Detained South (3)	84.61	88	27.0
South	8.59	78	11.8

*Detained South (3) Includes Offsite Southeast and Southwest Subareas

Table 6.2 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	20.82	31.29	49.35
Detained Southwest	20.77	31.17	49.10
West	10.94	16.44	25.92
POI West	52.05	78.22	123.33
Detained East	38.69	58.12	91.62
East	2.90	4.36	6.87
POI East	41.59	62.48	98.49
Detained South (1)	43.01	64.84	102.63
Detained South (2)	64.19	96.82	153.36
Detained South (3)	203.77	315.10	508.51
South	20.10	34.97	62.14
POI South	317.25	490.29	791.36

As shown in Table 6.2 above POI West, East and South will all require attenuation of storm runoff 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 area therefore there will be no further evaluation of the North subarea.

6.1. 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 being proposed in the West Subarea. The basins are referred to as the Northwest and the Southwest Detention Basins for the purposes of this report. The East subarea will utilize one single stage earthen detention basin referred to as the East Detention Basin. Both the West and East basins are being designed by another consultant and their design report will be included in this Macro Storm Study as Exhibit L. The South subarea will utilize three (3) earthen retention basins to attenuate peak discharge rates. This section will focus on the design of the South subarea attenuation system which includes Retention Basin (1) most northerly, Retention Basin (2) centrally located and Retention Basin (3) near the southern

property boundary. South Retention Basins 1 and 2 are in series. Following are a list of design parameters for the attenuation system.

Designation: South Retention Basin (1)
Type: Earthen Basin
Side Slopes: 3:1 Max.
Bottom Slope: 2%
Basin Bottom Elevation: 1027.50
Permanent Pool Elevation: 1034.00
Basin Top Berm Elevation: 1044.00 (Top crowned for drainage)
Basin Spillway Crest Width: 150' @ 1042.00
Basin Volume: 483,392 cf @ 1044.00
Control Structure Effluent Pipe: 15" HDPE, FL (In) = 1034.00, FL (Out) = 1,033.45, L=55.50', S=1.00%
Emergency Spillway: Earthen Broad Crested Weir, Crest Elevation=1042.00, Crest Length=150'
Consecutive 100-YR Q=102.63 cfs, Emergency Spillway HGL=1042.41, Freeboard=1.59'
Sediment Storage Required: 5-Year Accumulated per APWA Figure 5608-1 = 80 x 13.70 x 5 = 5,480 cf
Sediment Storage Provided: Bottom = 1027.50, Depth = 0.50', V = 20,932 cf @ El = 1028.00

The Attenuation Plans for the South subarea may be found in Exhibit G. Emergency spillway calculations may be found in Exhibit H. See Table 6.3 for a summary of retention basin data.

Table 6.3 Proposed Conditions South Retention Basin (1) Data

	Peak Q In (cfs)	Tp In (min.)	Peak Q Out (cfs)	Tp Out (min)	Peak W.S.E.	Max. Storage Vol. (cf)
South Basin (1)						
2-Year	43.01	724	6.54	748	1035.85	66,186
10-Year	64.84	723	8.66	752	1036.78	103,056
100-Year	102.63	723	11.30	757	1038.28	168,609

As shown in the table above all proposed peak discharge rates from Subarea Detained South (1) have been attenuated.

Designation: South Retention Basin (2)
Type: Earthen Basin
Side Slopes: 3:1 Max.
Bottom Slope: 2%
Basin Bottom Elevation: 1024.50
Permanent Pool Elevation: 1031.00
Basin Top Berm Elevation: 1039.00 (Top crowned for drainage)
Basin Spillway Crest Width: 150' at 1037.00
Basin Volume: 796,653 cf @ 1039.00
Control Structure Effluent Pipe: 18" HDPE, FL (In) = 1031.00, FL (Out) = 1,029.71, L=129.00', S=1.00%
Emergency Spillway: Earthen Broad Crested Weir, Crest Elevation=1037.00, Crest Length=150'
Consecutive 100-YR Q=255.99 cfs, Emergency Spillway HGL=1037.76, Freeboard=1.24'
Sediment Storage Required: 5-Year Accumulated per APWA Figure 5608-1 = 80 x 21.26 x 5 = 8,504 cf
Sediment Storage Provided: Bottom = 1024.50, Depth = 0.50', V = 32,000 cf @ El = 1025.00

See Table 6.4 for a summary of retention basin data.

Table 6.4 Proposed Conditions South Retention Basin (2) Data

	Peak Q In (cfs)	Tp In (min.)	Peak Q Out (cfs)	Tp Out (min)	Peak W.S.E.	Max. Storage Vol. (cf)
South Basin (2)						
2-Year	69.09	725	6.21	812	1033.04	176,006
10-Year	103.75	725	9.84	902	1033.87	253,286
100-Year	162.41	725	14.38	911	1035.45	407,515

As shown in the table above all proposed peak discharge rates from Subarea Detained South (2) have been attenuated.

Designation: South Retention Basin (3)
Type: Earthen Basin
Side Slopes: 3:1 Max.
Bottom Slope: 2%
Basin Bottom Elevation: 996.50
Permanent Pool Elevation: 1003.00
Basin Top Berm Elevation: 1012.00 (Top crowned 2% for drainage)
Basin Spillway Crest Width: 300' @ 1010.25
Basin Retention Volume: 1,442,522 cf from 1003.00 to 1012.00 (Normal Pool to Top Dam)
Control Structure: (3) 8'x6' Precast Concrete Box with Interior 6" Baffle/Weir Wall
Baffle Wall Orifice: (1) 8" Dia. Orifice (WQv Orifice) Screened
Weir Wall Crest Elevation: 1005.75, L = 24'
Control Structure Top Elevation: 1010.00
Control Structure Emergency Overflow: N/A – Solid Top
Control Structure Influent Pipe: 60" HDPE, FL (In) = 1003.00, FL (Out) = 1002.90, L=14.50', S= 0.69%
Control Structure Effluent Pipe: 60" HDPE, FL (In) = 1002.70, FL (Out) = 1002.40, L=44.50', S=0.67%
Emergency Spillway: Earthen Broad Crested Weir, Crest Elevation=1010.00, Crest Length=300'
Consecutive 100-YR Q=508.51 cfs, Emergency Spillway HGL=1011.00, Freeboard=1.00'
Sediment Storage Required: 5-Year Accumulated per APWA Figure 5608-1 = 80 x 61.06 x 5 = 24,424 cf
Sediment Storage Provided: Bottom = 996.50, Depth = 0.50', V = 25,000 cf @ El = 997.00

The permanent pool shall be 6' deep with an additional 0.50'of sedimentation allowance. The pond will not support fish which requires a minimum 10' of depth plus sedimentation allowance. See Table 6.5 for a summary of retention basin data.

Table 6.5 Proposed Conditions South Retention Basin (3) Data

	Peak Q In (cfs)	Tp In (min.)	Peak Q Out (cfs)	Tp Out (min)	Peak W.S.E.	Max. Storage Vol. (cf)
South Basin (3)						
2-Year	203.77	729	22.90	778	1006.16	452,987
10-Year	315.10	729	65.87	756	1007.38	644,856
100-Year	508.51	729	173.01	750	1009.44	984,804

As shown in the table above all proposed peak discharge rates from Subarea South Detained (3) have been attenuated. See Table 6.6 below for a summary of proposed peak discharge rates at POI South which consists of combined subareas post detained South Detained (1), South Detained (2), South Detained (3) and South.

Table 6.6 Proposed Conditions Post Attenuation Point of Interest Peak Discharge Rates

Point of Interest	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
South	29.15	77.98	193.24

As shown in the above table all peak discharge rates attributable to Proposed POI South have been attenuated below both Existing and Allowable Peak Discharge rates as outlined in Tables 5.2 and 5.3, respectively.

Table 6.7 below provides a comparison of runoff data between Proposed, Existing and Allowable Conditions for the Proposed Development.

Table 6.7 Point of Interest Discharge Comparison

POI	Condition	Q2 (cfs)	Q10 (cfs)	Q100 (cfs)
South	Proposed	29.15	77.98	193.24
	Existing	120.39	219.62	406.40
	Difference	-91.24	-141.64	-213.16
	Allowable	71.11	231.97	363.37
	Difference	-41.96	-153.99	-170.13

All proposed peak discharge rates as shown in Table 6.7 will be significantly below allowable providing flexibility for FDPs.

7. 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. South Retention Basin (3) will provide extended detention for the entire South Subarea of 93.98 acres. See Exhibit I for 40 hour extended detention calculations for South Retention Basin (3).

8. STREAM BUFFER DETERMINATION

Stream buffers are provided for natural streams which contain wide swaths of riparian area consisting of mature trees and steep slopes. The buffer is formed to protect the natural stream and surrounding property from stream encroachment of permanent hard surface development and other construction activities. One factor used to determine if a natural stream requires a buffer is tributary area. The regulatory threshold according to APWA is 40 acres. The South subarea is the only tributary on the property that is large enough to potentially constitute the requirement of a natural stream buffer setback. The South subarea was subdivided in accordance with its natural drainage flow paths. Four (4) subareas were delineated with the following designations and associated tributary areas; "A" – 8.40 acres, "B" – 43.90 acres, "C" – 20.50 acres and "D" 33.90 acres. See Exhibit J Stream Buffer Map for a depiction of the South subarea and its corresponding tributary areas contributing to natural drainage ways. Drainage Area "B" meets the minimum tributary area criteria for stream preservation and buffer zones, however, the stream characteristics for all channels are highly eroded with minimal vegetation and limited stabilization. The natural/unimproved drainage ways located within the South subarea have limited stream characteristics and present a severe erosion potential which would be magnified with additional hard infrastructure upstream. The development of this area will create a series of detention/BMP facilities that will serve the overall watershed by limiting erosion and providing improved storm water quality. We recommend eliminating the existing unimproved drainage ways for an enclosed sewer system with multiple detention/BMP facilities.

9. WETLAND DETERMINATION

We have had several lengthy conversations with representatives from the United States Army Corp of Engineers (USACE) over the last several months for various projects concerning USACE jurisdiction of streams/creeks and wetlands. Mrs. Danielle Brunin with USACE Regulatory Branch in Kansas City, Missouri has been especially gracious in helping us better understand and determine potential USACE jurisdictional waters. The property in question makes up the headwaters for an unnamed tributary of Cedar Creek and Big Creek. The channels located on the property 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 site investigations no wetlands appear to be present. Jurisdiction extends to only those "wetlands with 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 photo from the National Wetlands Inventory of the subject property and surrounding area. The main branch of Big Creek is identified as Riverine in the National Wetlands Inventory. It is our opinion that the subject property does not contain wetlands as defined by the USACE.

10. CONCLUSIONS & RECOMMENDATIONS

Runoff from the Development will be reduced below both existing and allowable for each Subarea. Attenuation systems are being proposed in the West, East and South 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 storm water 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.

11. EXHIBITS

- **Exhibit A**
  - **Aerial View of Site**
  - **Aerial View of Site & Surrounding Area**
  - **Overall Site Plan**
- **Exhibit B**
  - **FEMA FIRMette**
- **Exhibit C**
  - **NRCS Soils Report**
- **Exhibit D**
  - **Existing Drainage Area Map**
- **Exhibit E**
  - **Hydraflow Hydrograph Report**
- **Exhibit F**
  - **Proposed Drainage Area Map**
- **Exhibit G**
  - **Retention Basin Plans**
- **Exhibit H**
  - **Emergency Spillway Calculations**
- **Exhibit I**
  - **40 Hour Extended Detention Calculations**
- **Exhibit J**
  - **Stream Buffer Map**
- **Exhibit K**
  - **Aerial Photo National Wetlands Inventory**
- **Exhibit L**
  - **East & West Detention Basin Data (By Others)**

Exhibit A

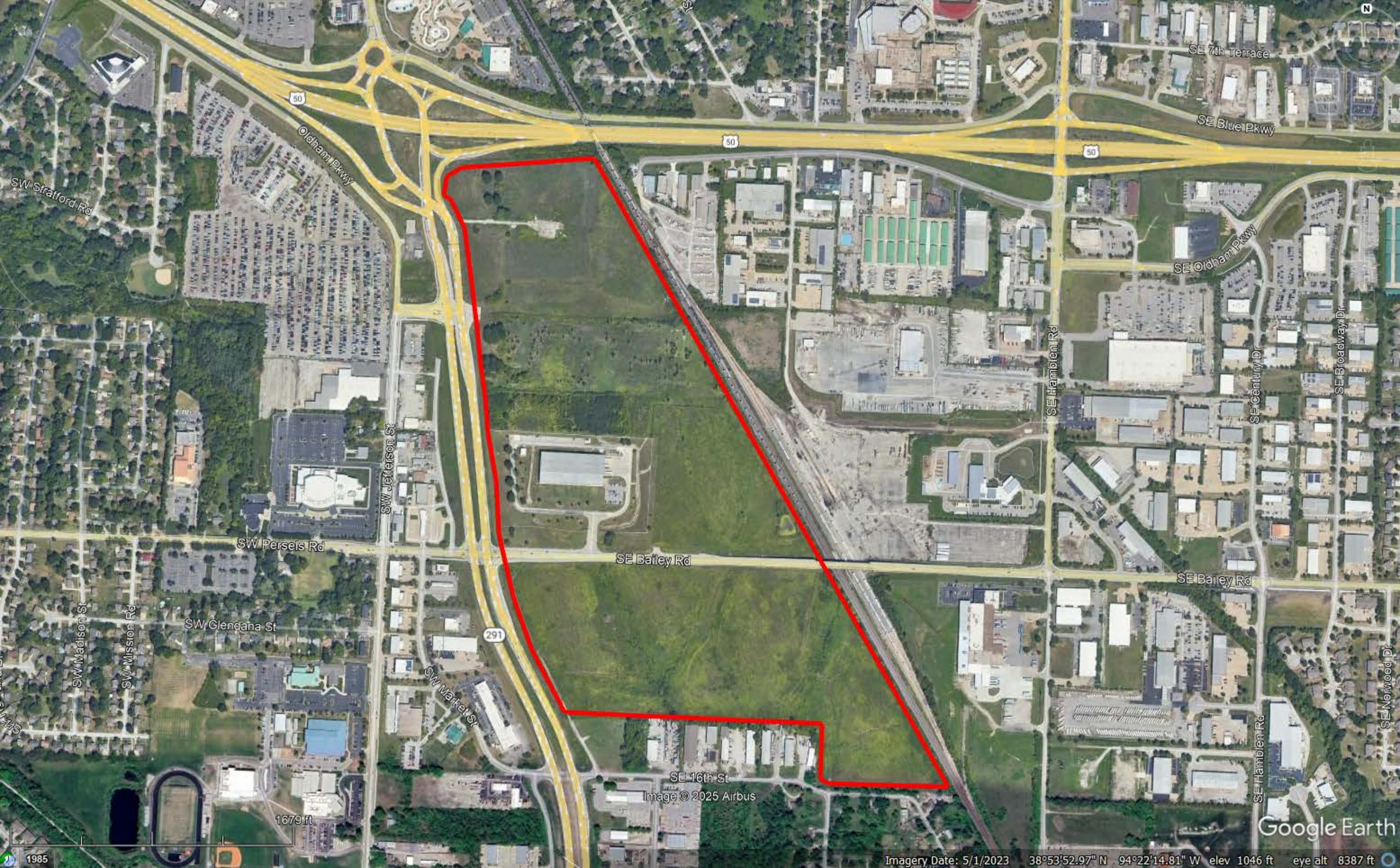
Aerial View of Site

&

Aerial View of Surrounding Area

&

Overall Site Plan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SW Market St
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SE 16th St
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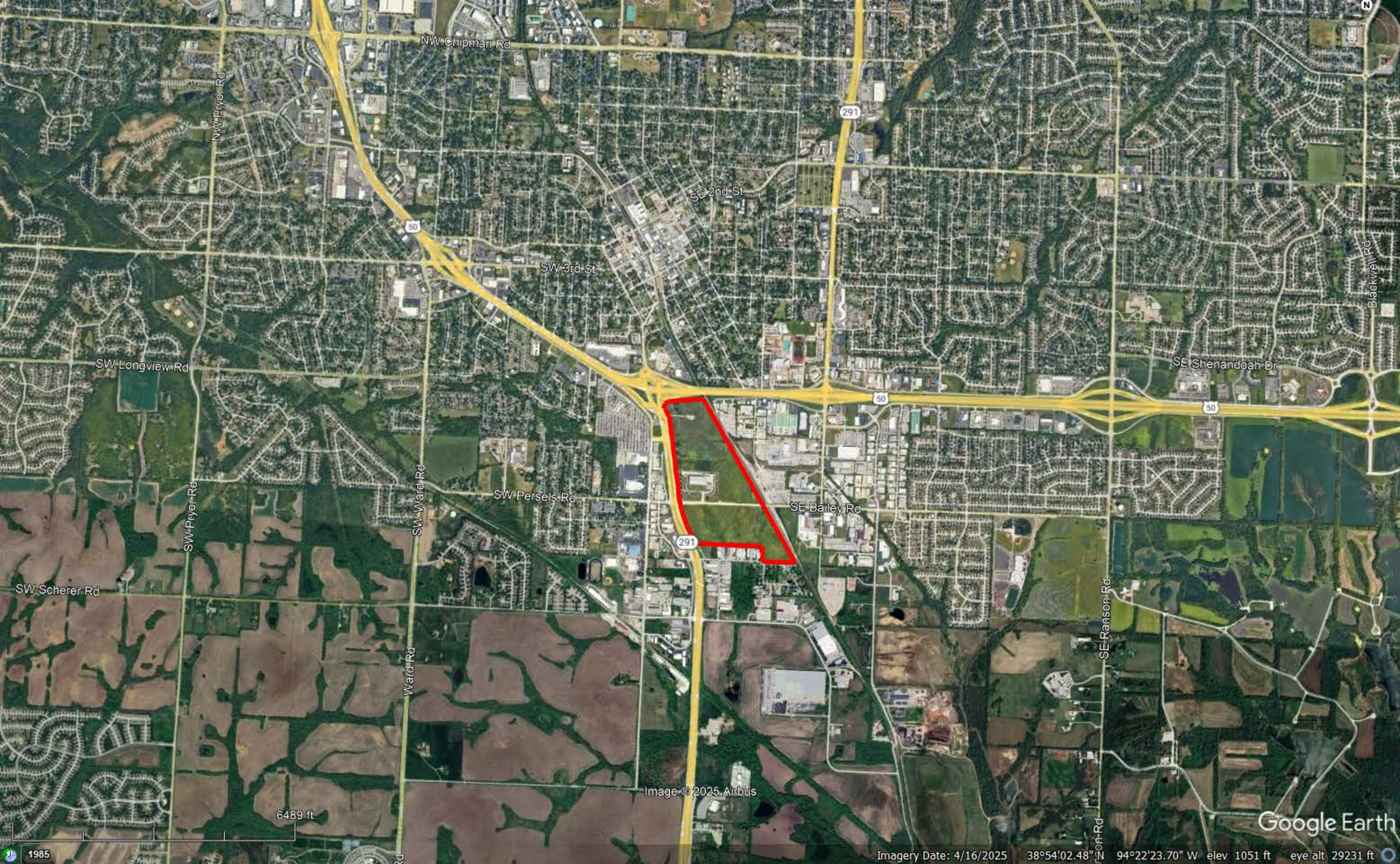
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SW 3rd St
SW Longview Rd
SE Shenandoah Dr
Blackwell Rd
SW Pryor Rd
SW Ward Rd
SW Persels Rd
SE Bailey Rd
SW Scherer Rd
Ward Rd
SE Ranson Rd
Image © 2025 Airbus
6489 ft
1985
Google Earth
Imagery Date: 4/16/2025 38°54'02.48" N 94°22'23.70" W elev 1051 ft eye alt 29231 ft

OLDHAM EAST
Preliminary Development Plan
Lots 1-20 & Tracts A-F
Section 8, Township 47 North, Range 31 West
LEE'S SUMMIT, JACKSON COUNTY, MISSOURI

ENGINEERING SOLUTIONS
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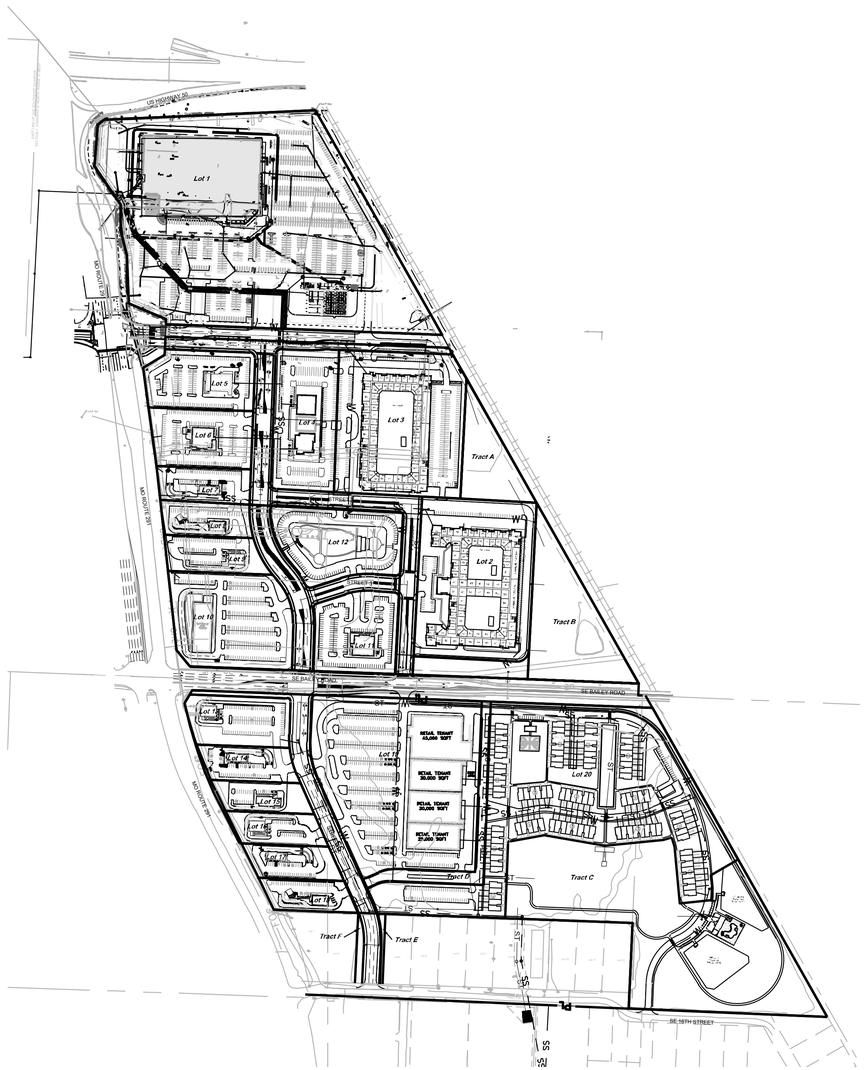
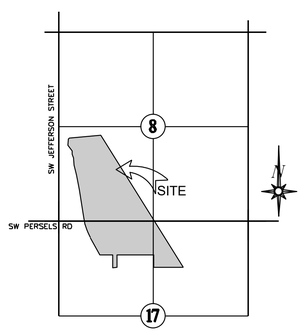
PLAT BOUNDARY DESCRIPTION

A tract of land being located in Section 8, Township 47, Range 31, Lee's Summit, Jackson County Missouri, being more particularly described as follows:
Commencing at the West Quarter Corner of said Section 8; thence S39°06'20"E, a distance of 432.30 feet to the Point of Beginning; thence N87°22'59"E, a distance of 887.22 feet; thence S29°26'48"E, a distance of 4364.19 feet; thence N87°32'36"W, a distance of 832.39 feet; thence N2°36'22"E, a distance of 358.00 feet; thence N87°52'58"W, a distance of 1020.00 feet; thence S2°36'22"W, a distance of 351.96 feet; thence N87°32'36"W, a distance of 130.00 feet; thence N2°36'22"E, a distance of 352.30 feet; thence N87°49'19"W, a distance of 354.48 feet; thence N26°00'24"W, a distance of 554.06 feet; thence along a curve to the right tangent to the preceding course and having a radius of 1784.86 feet, an arc distance of 392.00 feet; thence N8°42'31"W, a distance of 223.70 feet; thence N6°08'25"W, a distance of 776.55 feet; thence N7°51'56"W, a distance of 415.60 feet; thence N1°22'27"W, a distance of 276.50 feet; thence N2°39'11"W, a distance of 182.40 feet; thence N2°46'58"W, a distance of 19.63 feet; thence N13°58'37"W, a distance of 107.56 feet; thence N01°31'06"E, a distance of 106.21; thence N33°51'20"W, a distance of 196.19 feet; thence N41°18'11"E, a distance of 171.83 feet; thence N49°44'28"E, a distance of 33.44 feet to the Point of Beginning.
Containing 5,642,939.32 Sq. Ft. or 129.55 Acres±



Current Zoning: PMIX - Planned Mixed Use
Proposed Zoning: PMIX - Planned Mixed Use



LOCATION MAP
SECTION 8&17-T47N-R31W

North

0 100' 200' 400'

Preliminary Development Plan
SCALE: 1" = 200'

INDEX OF SHEETS:

Site Improvement Notes

Sanitary Sewer Improvements
– The site will utilize the existing sanitary sewer on the east side of SE M 291 HWY.

Water Main Improvements
– The existing 16" water main located on the east side of SE M 291 HWY.

Storm Sewer
– Enclosed pipe systems and inlets will collected and convey the onsite storm water runoff and direct it toward the existing public storm sewer system.

Storm Water Detention
– The site will utilize onsite storm detention

Common Area
– POA will be responsible for all maintenance

LEGEND:

Existing Underground Power	UGP
Existing Conc. Curb & Gutter	
Existing Wood Fence	X
Existing Gas Main	GAS
Existing Water Main	X-W/M-
Existing Storm Sewer	X-STM-
Existing Sanitary Sewer	X-SAN-
Existing Underground Telephone	UGT
Existing Overhead Power	OHE
Proposed Storm Sewer	ST
Proposed Sanitary Sewer	SS
Proposed Underground Power	UGT
Proposed Gas Service	GAS
Proposed 8" D.I.P. Water	W
Proposed Electrical Service	UGP

ALL PAVING ON THE PARKING LOT WILL COMPLY WITH THE UNIFIED DEVELOPMENT ORDINANCE ARTICLE 8 IN TERMS OF PAVING THICKNESS AND BASE

OIL - GAS WELLS
ACCORDING TO EDWARD ALTON MAY JR'S ENVIRONMENTAL IMPACT STUDY OF ABANDONED OIL AND GAS WELLS IN LEE'S SUMMIT, MISSOURI IN 1995, THERE ARE NOT OIL AND GAS WELLS WITHIN 185 FEET OF THE PROPERTY AS SURVEYED HEREON.

SURVEY AND PLAT NOTES:
THE SUBJECT PROPERTY SURVEYED LIES WITHIN A FLOOD ZONE DESIGNATED ZONE (X), AREAS LOCATED OUTSIDE THE 100 YEAR FLOOD PLAIN, PER F.E.M.A. MAP, COMMUNITY PANEL NO. 29095C0419G EFFECTIVE DATE: JANUARY 20, 2017.

UTILITY COMPANIES:

THE FOLLOWING LIST OF UTILITY COMPANIES IS PROVIDED FOR INFORMATION ONLY. WE DO NOT OFFER ANY GUARANTEE OR WARRANTY THAT THIS LIST IS COMPLETE OR ACCURATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING ALL UTILITY COMPANIES THAT MAY BE AFFECTED BY THE PROPOSED CONSTRUCTION AND VERIFYING THE ACTUAL LOCATION OF EACH UTILITY LINE. THE CONTRACTOR SHALL NOTIFY ENGINEERING SOLUTIONS AT 816.623.9888 OF ANY CONFLICT WITH PROPOSED IMPROVEMENTS.

EVERGY ~ 298-1196
MISSOURI GAS ENERGY ~ 756-5261
SOUTHWESTERN BELL TELEPHONE ~ 761-5011
COMCAST CABLE ~ 795-1100
WILLIAMS PIPELINE ~ 422-6300
CITY OF LEE'S SUMMIT PUBLIC WORKS ~ 969-1800
CITY OF LEE'S SUMMIT PUBLIC WORKS INSPECTIONS ~ 969-1800
CITY OF LEE'S SUMMIT WATER UTILITIES ~ 969-1900
MISSOURI ONE CALL (DIG RITE) ~ 1-800-344-7483

GENERAL NOTES:

1 ~ ALL CONSTRUCTION SHALL CONFORM TO THE CITY OF LEE'S SUMMIT DESIGN AND CONSTRUCTION MANUAL AS ADOPTED BY ORDINANCE 5813.
2 ~ ALL REQUIRED EASEMENTS WITHIN THE BOUNDARY OF THIS PROJECT SHALL BE PROVIDED BY SEPARATE DOCUMENT
3 ~ ANY REQUIRED EASEMENT LOCATED OUTSIDE OF THE BOUNDARY OF THIS PROJECT SHALL BE PROVIDED FOR BY SEPARATE INSTRUMENT PRIOR TO ISSUANCE OF CONSTRUCTION PERMITS.
4 ~ THE CONTRACTOR SHALL CONTACT THE CITY'S DEVELOPMENT SERVICES ENGINEERING INSPECTORS 48 HOURS PRIOR TO ANY LAND DISTURBANCE WORK AT (816) 969-1200.
5 ~ THE CONTRACTOR SHALL NOTIFY ENGINEERING SOLUTIONS AT 816.623.9888 OF ANY CONFLICT WITH THE IMPROVEMENTS PROPOSED BY THESE PLANS AND SITE CONDITIONS.
6 ~ THE CONTRACTOR SHALL NOTIFY THE CITY ENGINEER AND OBTAIN THE APPROPRIATE BLASTING PERMITS FOR A REQUIRED BLASTING. IF BLASTING IS ALLOWED, ALL BLASTING SHALL CONFORM TO STATE REGULATIONS AND LOCAL ORDINANCES.

Professional Registration
Missouri
Engineering 2006002186-D
Surveying 2005008319-D
Kansas
Engineering E-1695
Surveying LS-218
Oklahoma
Engineering 6254
Nebraska
Engineering CA2821

East Village
Lee's Summit, Jackson County, Missouri

Project: OLDHAM EAST
Issue Date: August 8, 2025

PRELIMINARY DEVELOPMENT PLAN
Preliminary Development Plans for:
East Village
Lee's Summit, Jackson County, Missouri

STATE OF MISSOURI
MATTHEW J. SCHLICHT
NUMBER 2006019708
PROFESSIONAL ENGINEER

Matthew J. Schlicht
MO PE 2006019708
KS PE 19071
OK PE 25226
NE PE E-14335

REVISIONS

C.100

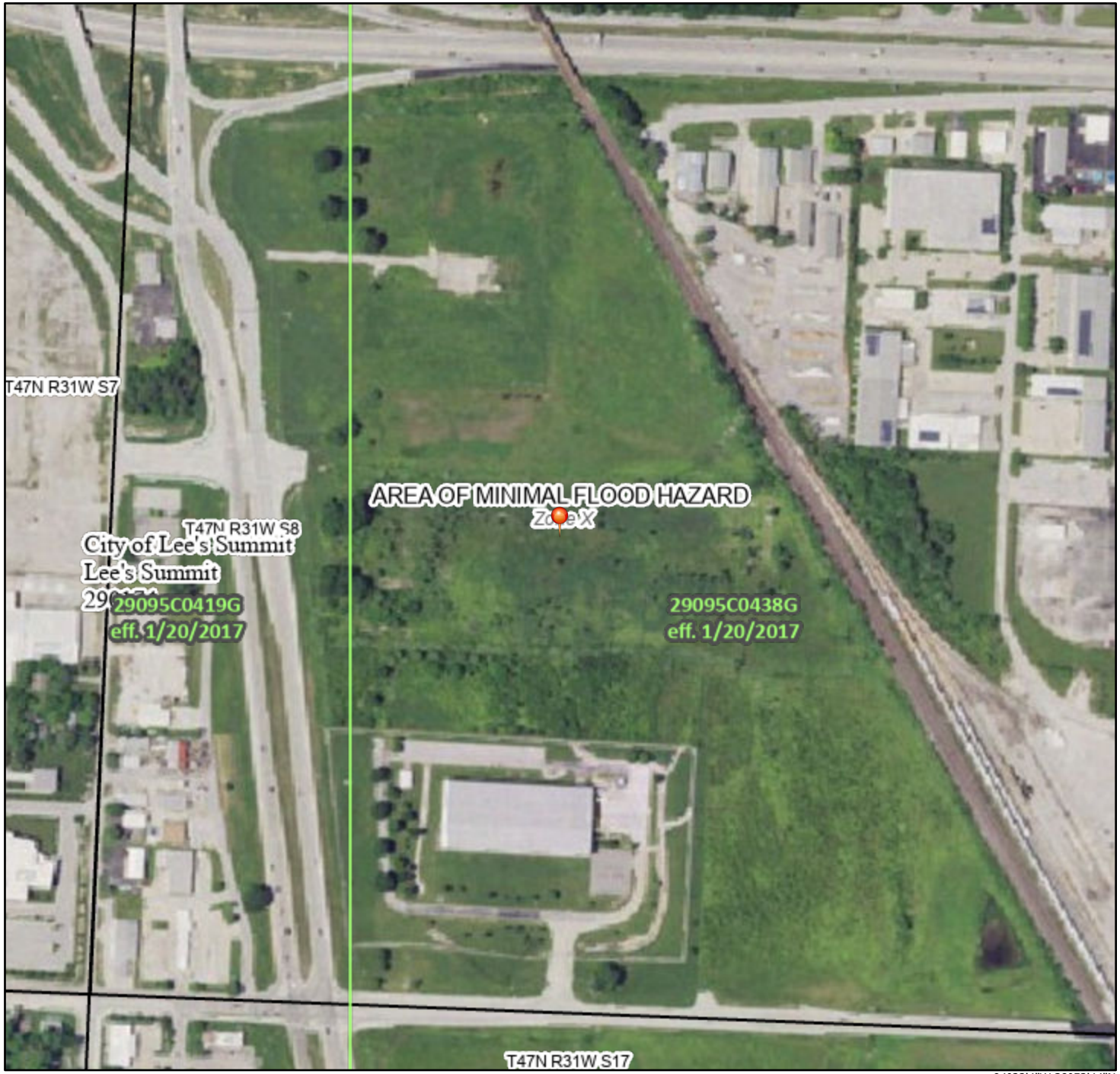
Exhibit B

FEMA FIRMette

National Flood Hazard Layer FIRMette

FEMA

94°22'42"W 38°54'12"N



94°22'4"W 38°53'44"N

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

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

N

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

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

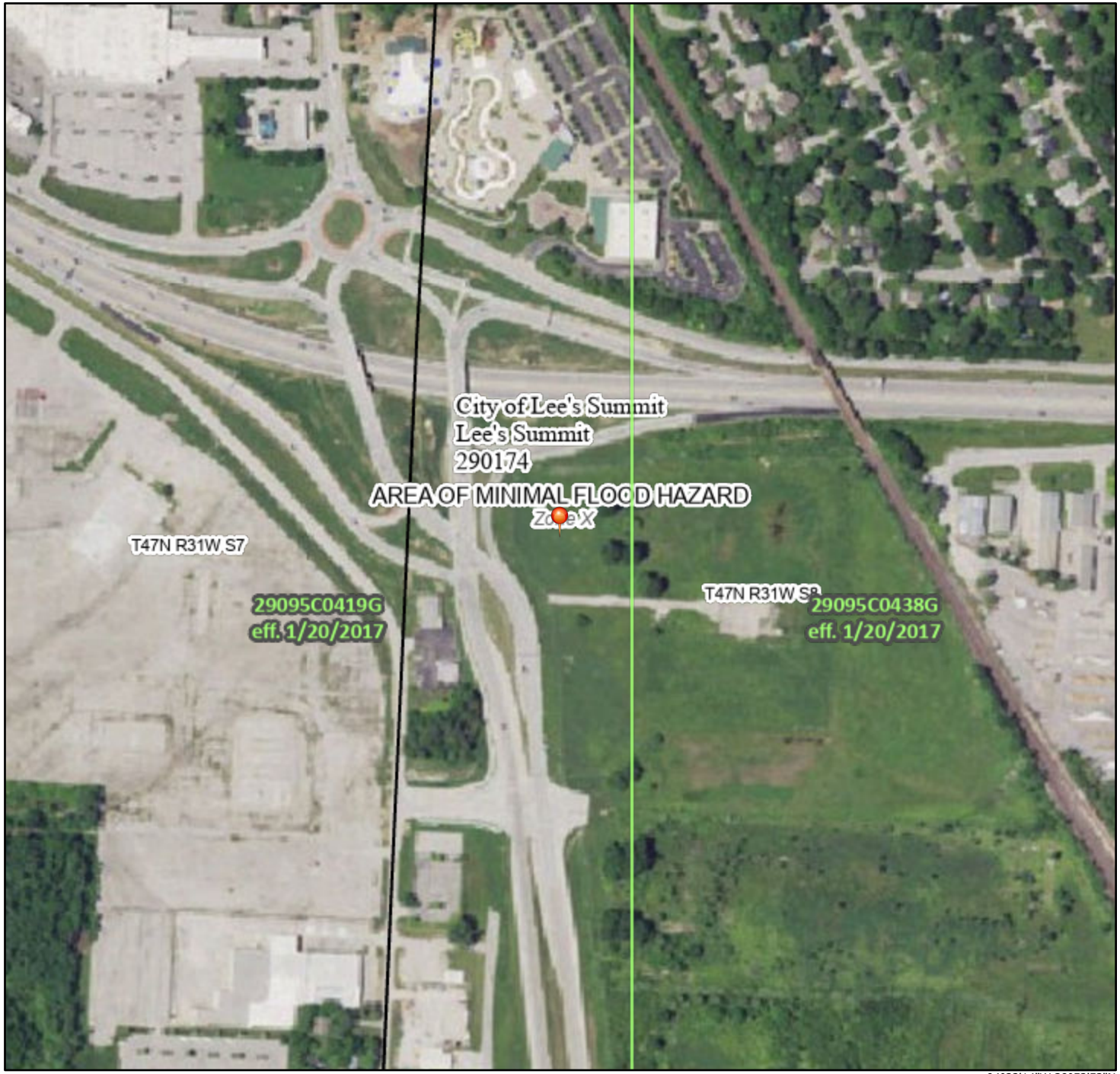
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 8/5/2025 at 3:23 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

National Flood Hazard Layer FIRMette

FEMA

94°22'51"W 38°54'21"N



94°22'14"W 38°53'53"N

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

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

N

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

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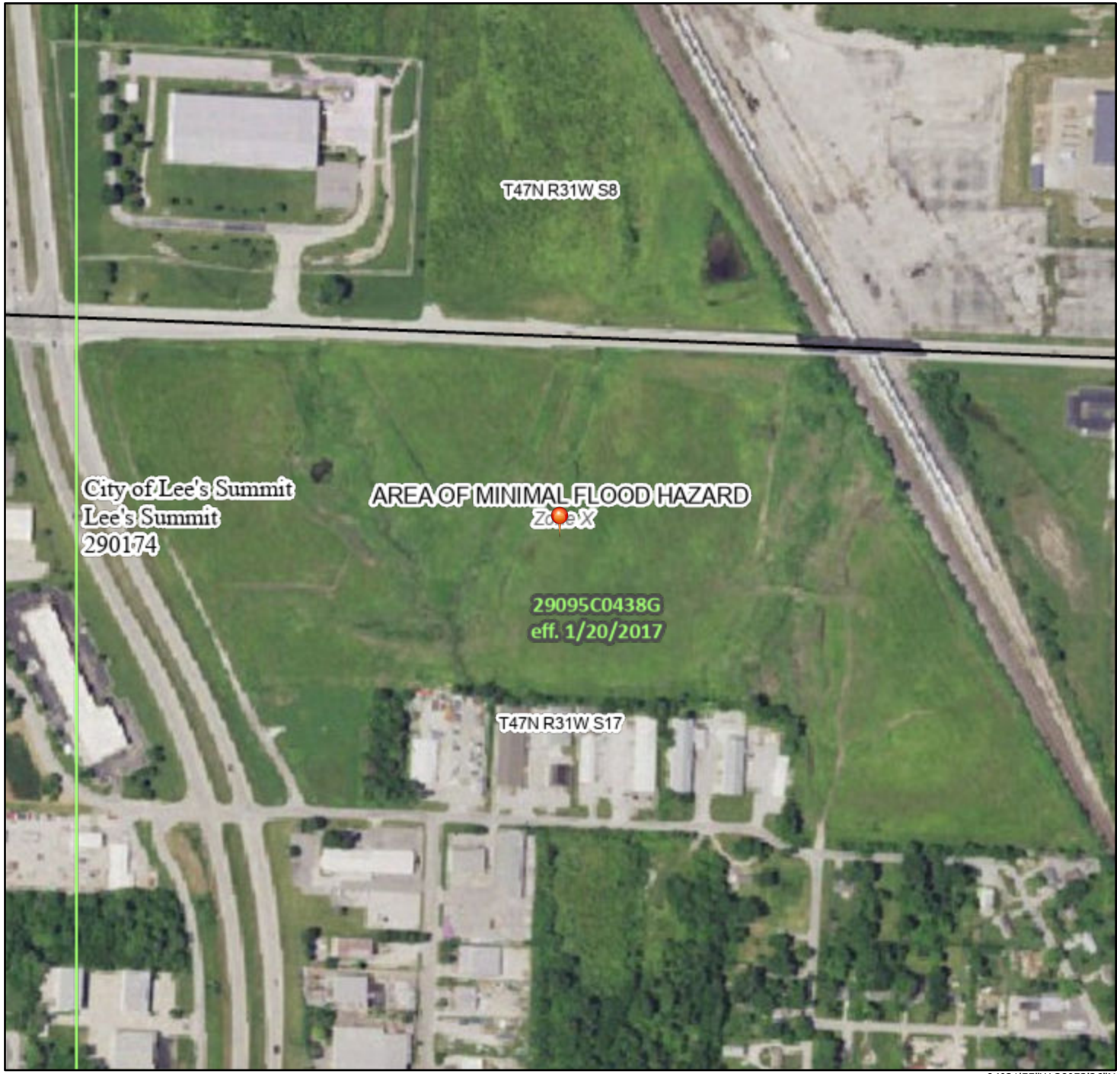
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory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

National Flood Hazard Layer FIRMette

FEMA

94°22'32"W 38°53'54"N



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

1:6,000

94°21'55"W 38°53'26"N

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
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- Profile Baseline
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MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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

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

Exhibit C

NRCS Soils Report

United States Department of Agriculture

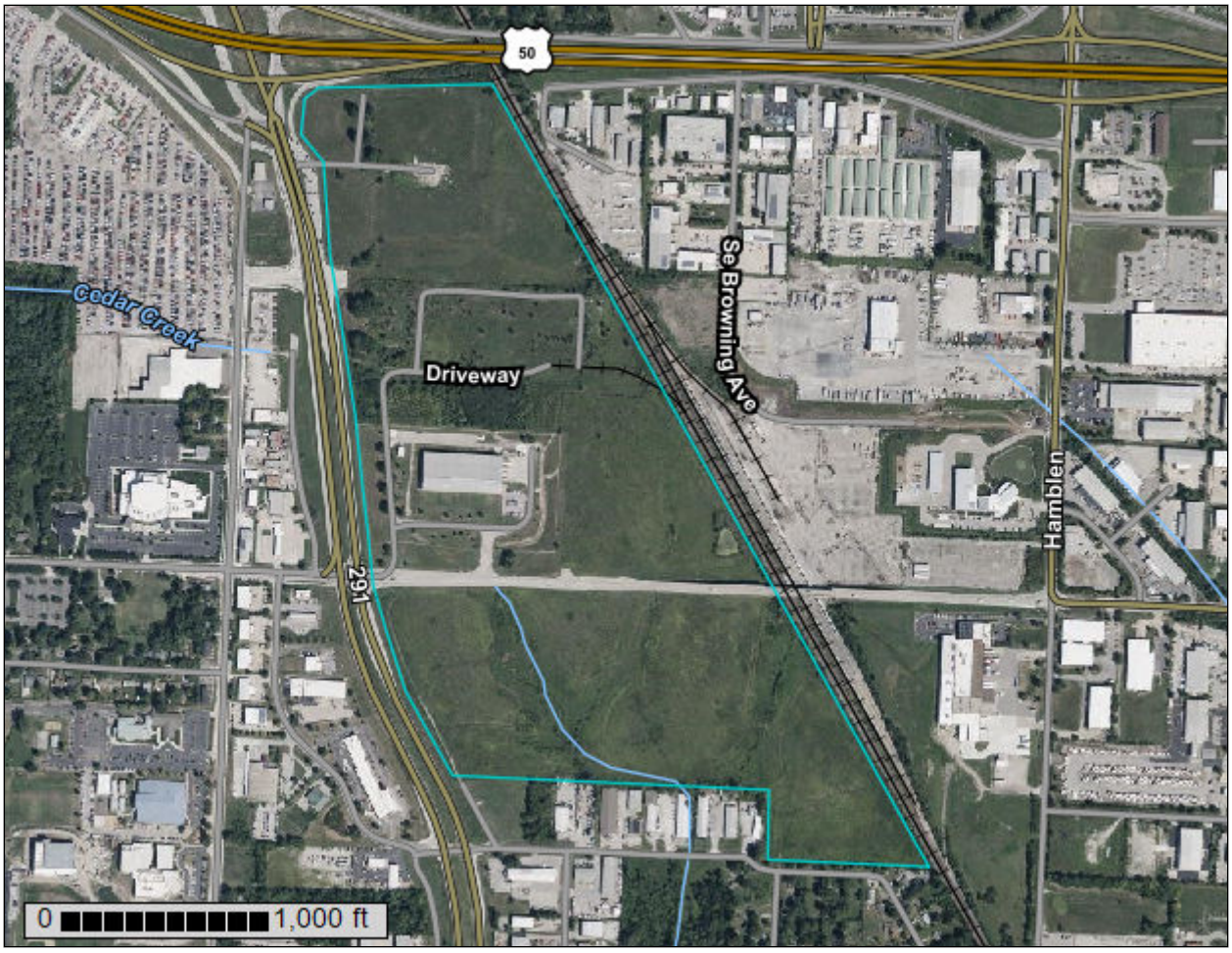
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Jackson County, Missouri

OLDHAM EAST



August 5, 2025

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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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Contents

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

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.

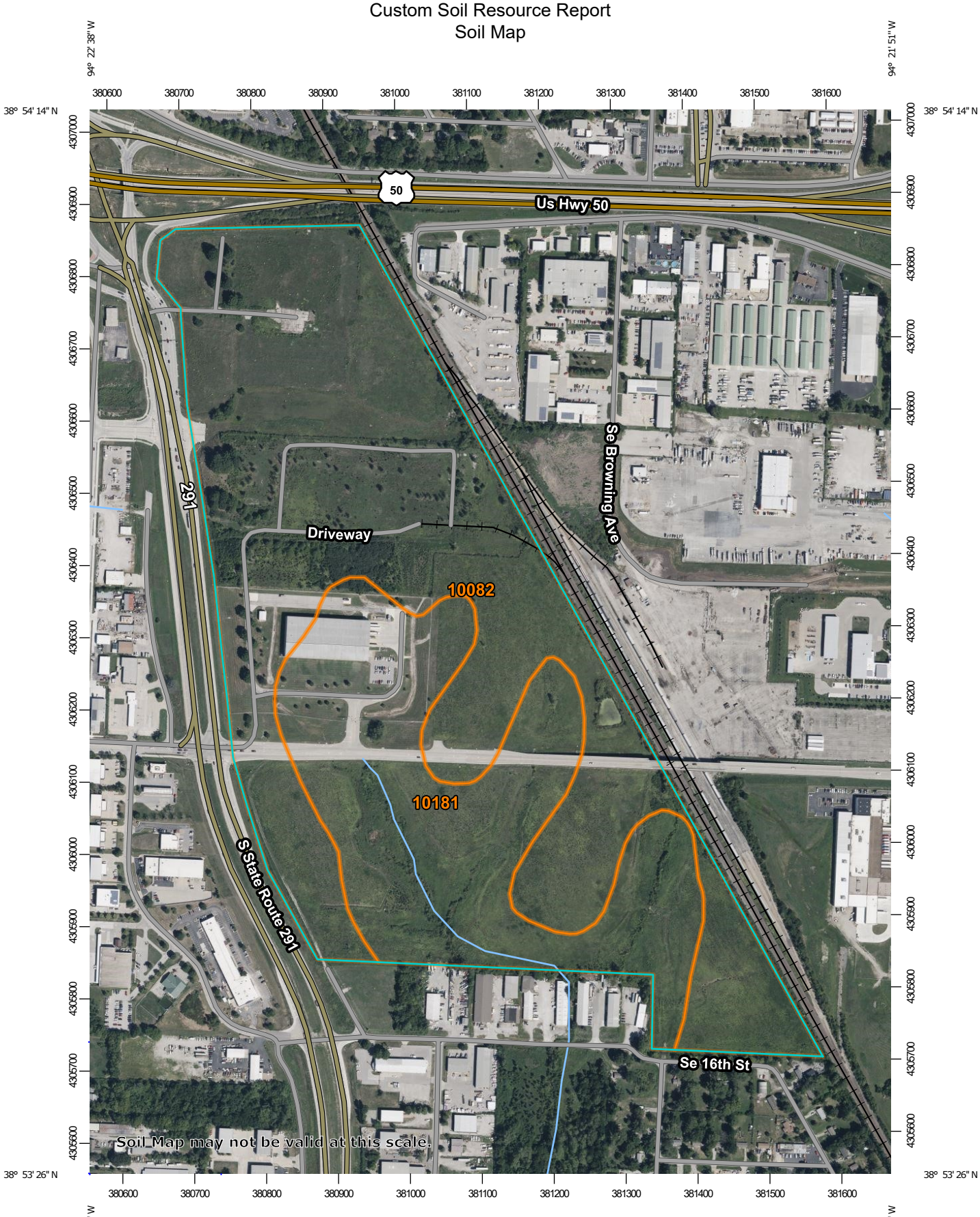
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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



Map Scale: 1:7,180 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 100 200 400 600

Feet
0 300 600 1200 1800

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Jackson County, Missouri
Survey Area Data: Version 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	84.8	66.0%
10181	Udarents-Urban land-Sampsel complex, 5 to 9 percent slopes	43.7	34.0%
Totals for Area of Interest		**128.6**	**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.

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

10181—Udarents-Urban land-Sampsel complex, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 1n85g
Elevation: 600 to 900 feet
Mean annual precipitation: 33 to 43 inches
Mean annual air temperature: 50 to 57 degrees F
Frost-free period: 175 to 220 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Udarents and similar soils: 46 percent
Urban land: 39 percent
Sampsel and similar soils: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udarents

Setting

Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Mine spoil or earthy fill

Typical profile

C1 - 0 to 5 inches: silt loam
C2 - 5 to 80 inches: silty clay loam

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.14 to 0.57 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R107XB002MO - Deep Loess Upland Prairie
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Hillslopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Across-slope shape: Convex

Interpretive groups

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

Description of Sampsel

Setting

Landform: Hillslopes
Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from shale

Typical profile

Ap - 0 to 13 inches: silty clay loam
Bt - 13 to 80 inches: silty clay

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 18 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: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C/D
Ecological site: R109XY010MO - Interbedded Sedimentary Upland Savanna
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Exhibit D

Existing Drainage Area Map

North

GRAPHIC SCALE
0 75' 150' 300'

EXISTING DRAINAGE MAP

SCALE: 1" = 150'

SUBAREA SOUTHEAST (OFFSITE) 17.91 AC.

SE Bailey Road

SE 16th Street

POI SOUTH

PROPOSED PROPERTY BOUNDARY OLDHAM EAST

US 50 Hwy

POI EAST

PROPOSED DRAINAGE BOUNDARY TYP.

SUBAREA SOUTH 93.98 AC.

SUBAREA NORTH 1.40 AC.

SUBAREA EAST 18.40 AC.

POI NORTH

SUBAREA SOUTHWEST (OFFSITE) 5.64 AC.

MO S. 291 Hwy

SUBAREA WEST 15.76 AC.

US 50 Hwy

MO S. 291 Hwy

SE Oldham Parkway

POI WEST

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Surveying 2005008319-D
Kansas
Engineering E-1695
Surveying LS-218
Oklahoma
Engineering 6254
Nebraska
Engineering CA2821

East Village
Lee's Summit, Jackson County, Missouri

Project: OLDHAM EAST
Issue Date: August 8, 2025

Existing Drainage Map
Preliminary Development Plans for:
East Village
Lee's Summit, Jackson County, Missouri

STATE OF MISSOURI
MATTHEW J. SCHLICHT
NUMBER
PROFESSIONAL ENGINEER

Matthew J. Schlicht
MO PE 2006019708
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NE PE E-14335

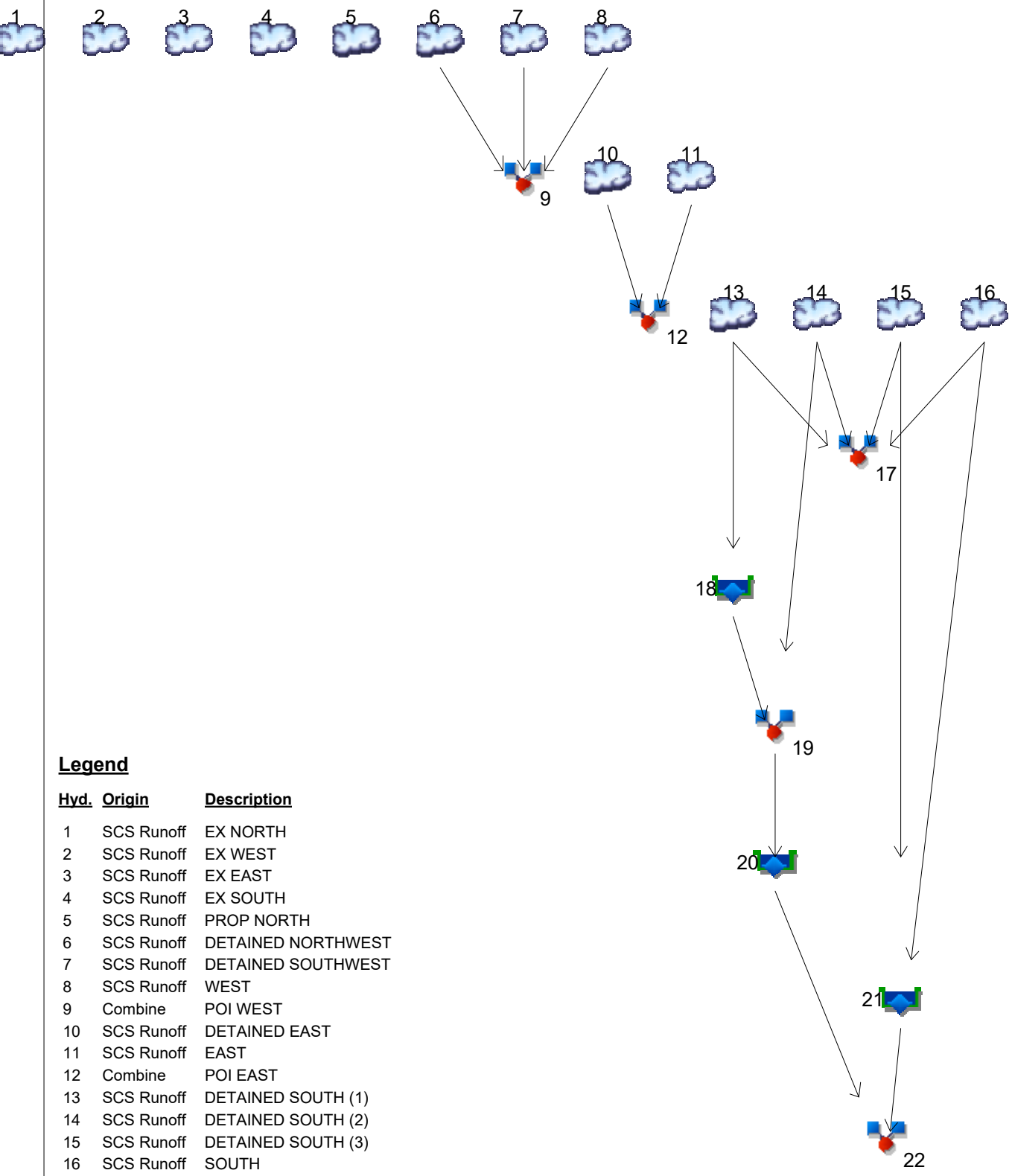
REVISIONS

EXHIBIT

Exhibit E

Hydraflow Hydrograph Report

Watershed Model Schematic



Legend

Hyd.	Origin	Description
1	SCS Runoff	EX NORTH
2	SCS Runoff	EX WEST
3	SCS Runoff	EX EAST
4	SCS Runoff	EX SOUTH
5	SCS Runoff	PROP NORTH
6	SCS Runoff	DETAINED NORTHWEST
7	SCS Runoff	DETAINED SOUTHWEST
8	SCS Runoff	WEST
9	Combine	POI WEST
10	SCS Runoff	DETAINED EAST
11	SCS Runoff	EAST
12	Combine	POI EAST
13	SCS Runoff	DETAINED SOUTH (1)
14	SCS Runoff	DETAINED SOUTH (2)
15	SCS Runoff	DETAINED SOUTH (3)
16	SCS Runoff	SOUTH
17	Combine	POI SOUTH
18	Reservoir	ROUTED DET SOUTH (1)
19	Combine	ROUTED (1) + DETAINED SOUTH (2)
20	Reservoir	ROUTED HYD NO. 19
21	Reservoir	ROUTED DET SOUTH (3)
22	Combine	POI SOUTH ATTENUATED

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)							Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
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	------	-------	120.39	-------	-------	219.62	-------	-------	406.40	EX SOUTH
5	SCS Runoff	------	-------	2.104	-------	-------	3.153	-------	-------	4.959	PROP NORTH
6	SCS Runoff	------	-------	20.82	-------	-------	31.29	-------	-------	49.35	DETAINED NORTHWEST
7	SCS Runoff	------	-------	20.77	-------	-------	31.17	-------	-------	49.10	DETAINED SOUTHWEST
8	SCS Runoff	------	-------	10.94	-------	-------	16.44	-------	-------	25.92	WEST
9	Combine	6, 7, 8	-------	52.05	-------	-------	78.22	-------	-------	123.33	POI WEST
10	SCS Runoff	------	-------	38.69	-------	-------	58.12	-------	-------	91.62	DETAINED EAST
11	SCS Runoff	------	-------	2.900	-------	-------	4.358	-------	-------	6.869	EAST
12	Combine	10, 11	-------	41.59	-------	-------	62.48	-------	-------	98.49	POI EAST
13	SCS Runoff	------	-------	43.01	-------	-------	64.84	-------	-------	102.63	DETAINED SOUTH (1)
14	SCS Runoff	------	-------	64.19	-------	-------	96.82	-------	-------	153.36	DETAINED SOUTH (2)
15	SCS Runoff	------	-------	203.77	-------	-------	315.10	-------	-------	508.51	DETAINED SOUTH (3)
16	SCS Runoff	------	-------	20.10	-------	-------	34.97	-------	-------	62.14	SOUTH
17	Combine	13, 14, 15, 16	-------	317.25	-------	-------	490.29	-------	-------	791.36	POI SOUTH
18	Reservoir	13	-------	6.535	-------	-------	8.663	-------	-------	11.30	ROUTED DET SOUTH (1)
19	Combine	14, 18	-------	69.09	-------	-------	103.75	-------	-------	162.41	ROUTED (1) + DETAINED SOUTH (
20	Reservoir	19	-------	6.211	-------	-------	9.843	-------	-------	14.38	ROUTED HYD NO. 19
21	Reservoir	15	-------	22.90	-------	-------	65.87	-------	-------	173.01	ROUTED DET SOUTH (3)
22	Combine	16, 20, 21	-------	29.15	-------	-------	77.98	-------	-------	193.24	POI SOUTH ATTENUATED

Hydrograph Summary Report

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

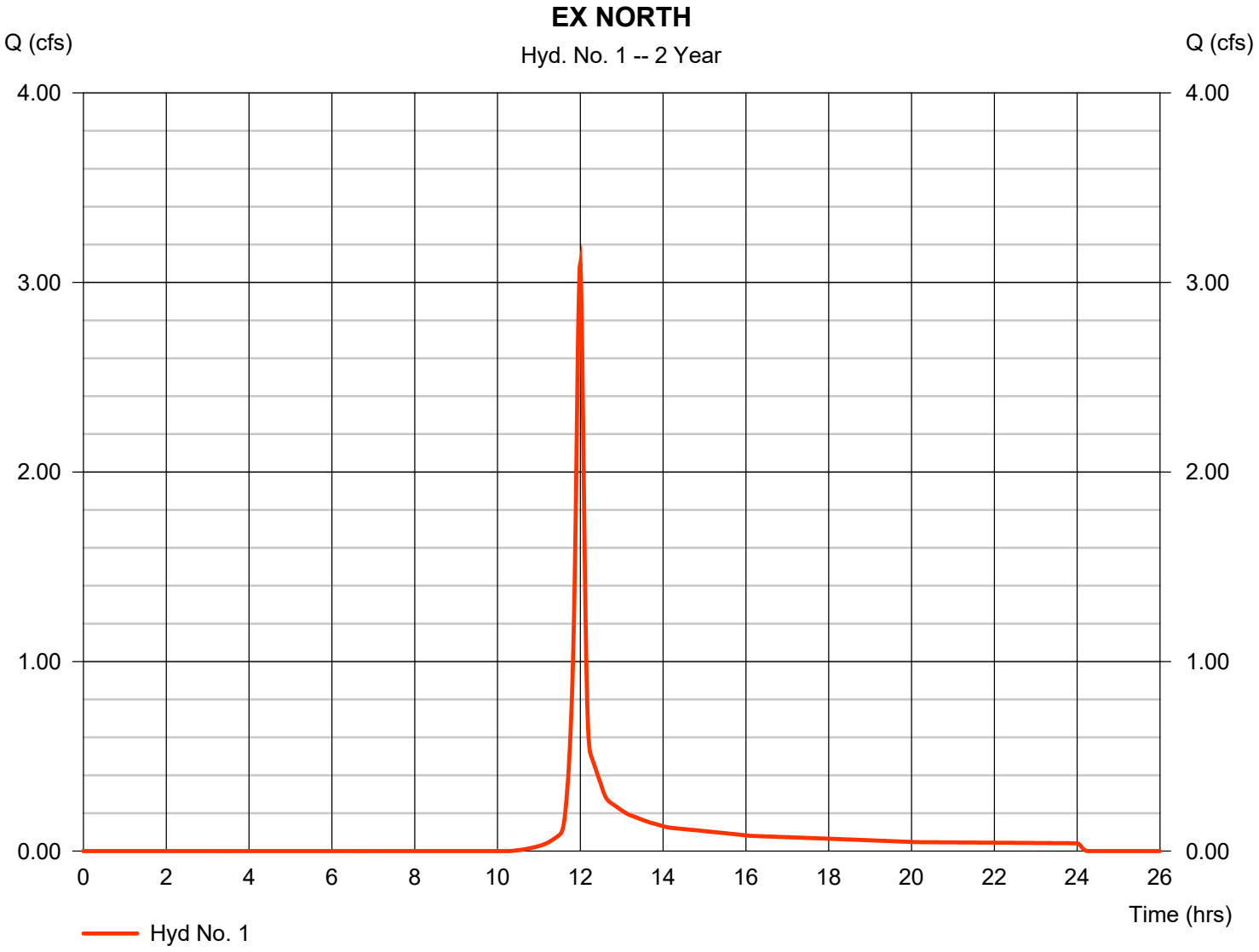
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	3.101	1	720	7,048	------	------	------	EX NORTH
2	SCS Runoff	28.95	1	723	79,344	------	------	------	EX WEST
3	SCS Runoff	28.84	1	726	92,635	------	------	------	EX EAST
4	SCS Runoff	120.39	1	739	620,286	------	------	------	EX SOUTH
5	SCS Runoff	2.104	1	717	4,456	------	------	------	PROP NORTH
6	SCS Runoff	20.82	1	721	54,159	------	------	------	DETAINED NORTHWEST
7	SCS Runoff	20.77	1	719	48,681	------	------	------	DETAINED SOUTHWEST
8	SCS Runoff	10.94	1	721	28,450	------	------	------	WEST
9	Combine	52.05	1	720	131,289	6, 7, 8	------	------	POI WEST
10	SCS Runoff	38.69	1	720	96,462	------	------	------	DETAINED EAST
11	SCS Runoff	2.900	1	720	7,232	------	------	------	EAST
12	Combine	41.59	1	720	103,694	10, 11	------	------	POI EAST
13	SCS Runoff	43.01	1	724	130,050	------	------	------	DETAINED SOUTH (1)
14	SCS Runoff	64.19	1	725	204,133	------	------	------	DETAINED SOUTH (2)
15	SCS Runoff	203.77	1	729	761,749	------	------	------	DETAINED SOUTH (3)
16	SCS Runoff	20.10	1	721	50,914	------	------	------	SOUTH
17	Combine	317.25	1	726	1,146,848	13, 14, 15, 16	------	------	POI SOUTH
18	Reservoir	6.535	1	748	127,999	13	1035.85	66,186	ROUTED DET SOUTH (1)
19	Combine	69.09	1	725	332,133	14, 18	------	------	ROUTED (1) + DETAINED SOUTH (
20	Reservoir	6.211	1	912	260,903	19	1033.04	176,006	ROUTED HYD NO. 19
21	Reservoir	22.90	1	778	561,886	15	1006.16	452,987	ROUTED DET SOUTH (3)
22	Combine	29.15	1	779	873,703	16, 20, 21	------	------	POI SOUTH ATTENUATED

Hydrograph Report

Hyd. No. 1

EX NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.101 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
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

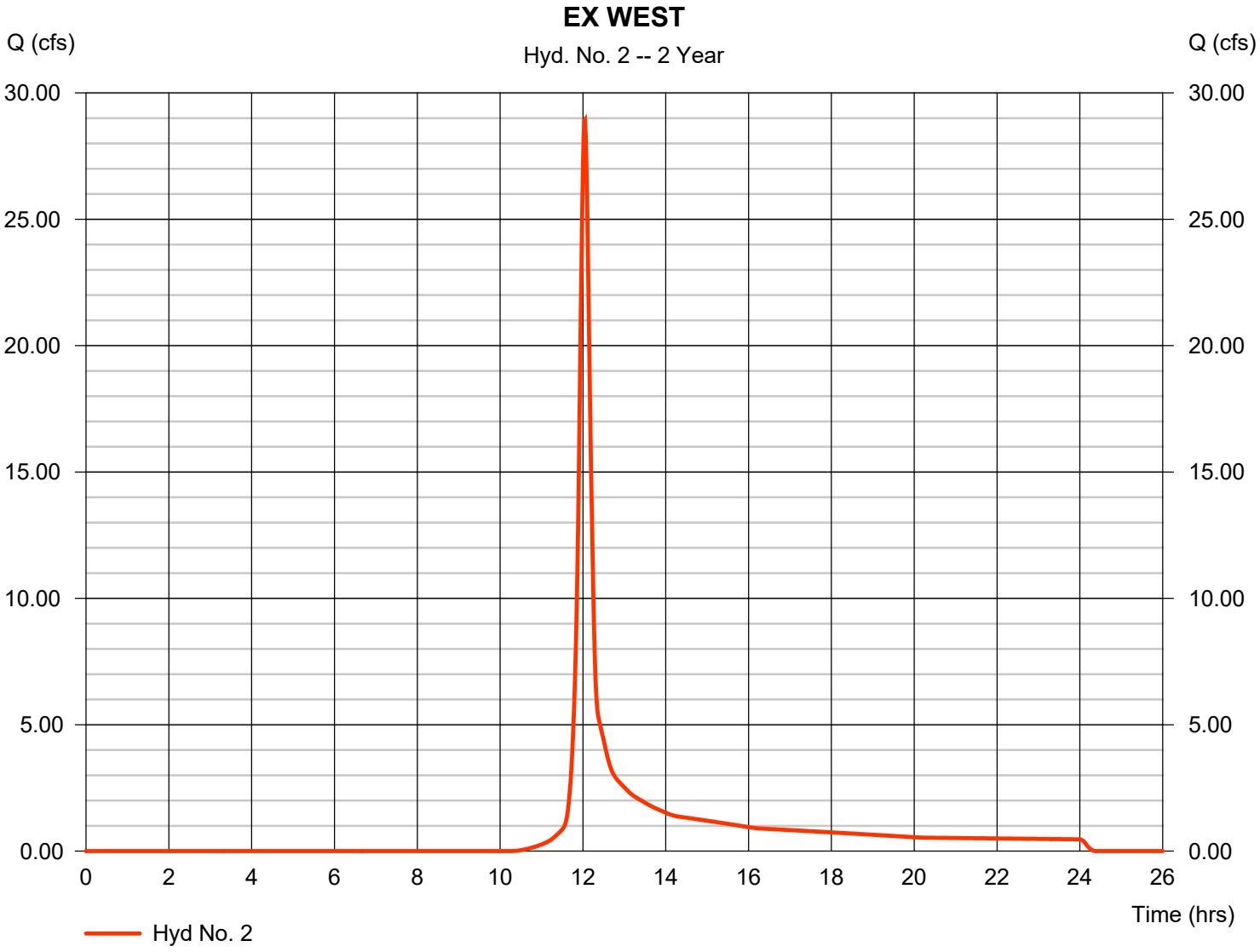


Hydrograph Report

Hyd. No. 2

EX WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.95 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.05 hrs
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

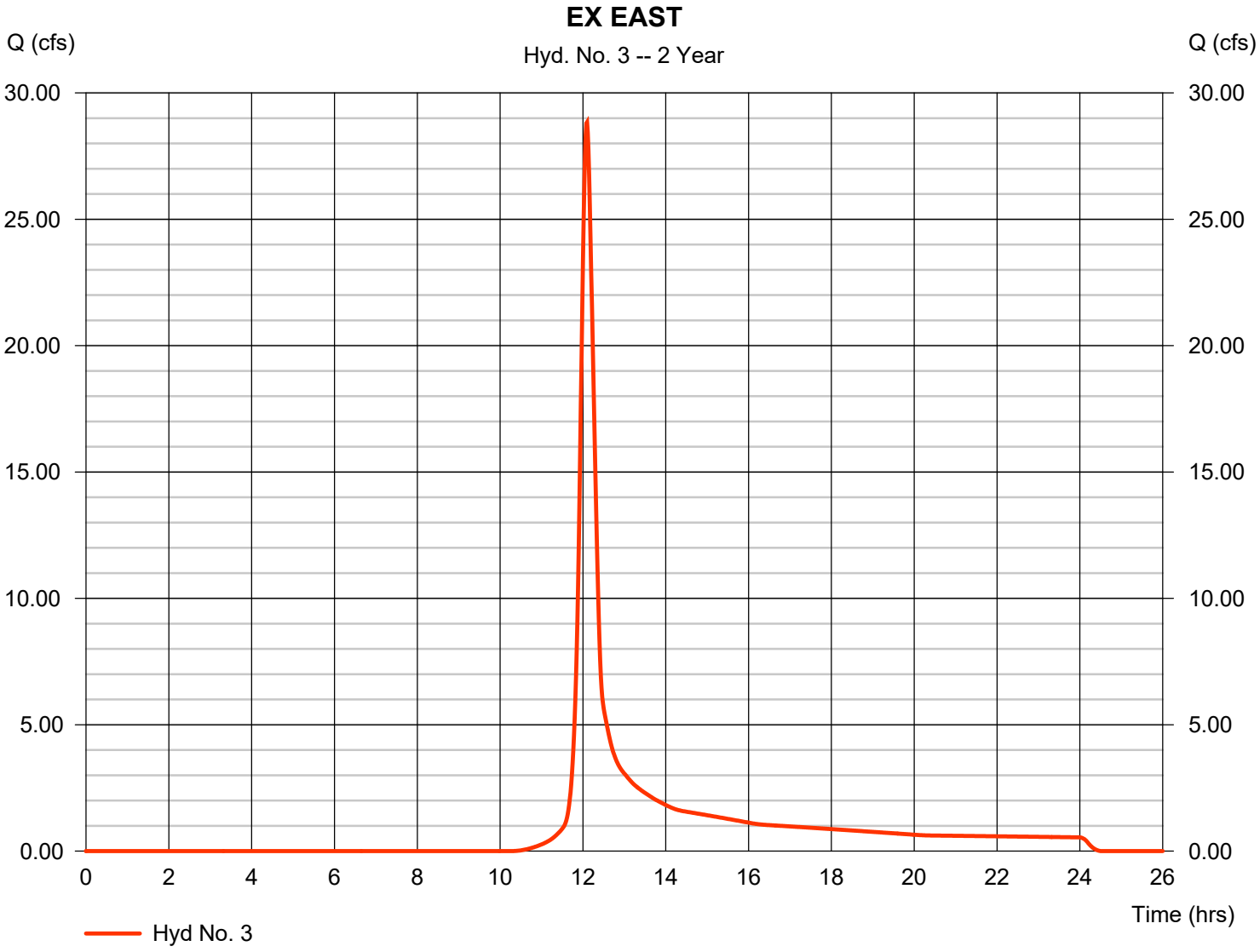


Hydrograph Report

Hyd. No. 3

EX EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	28.84 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
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

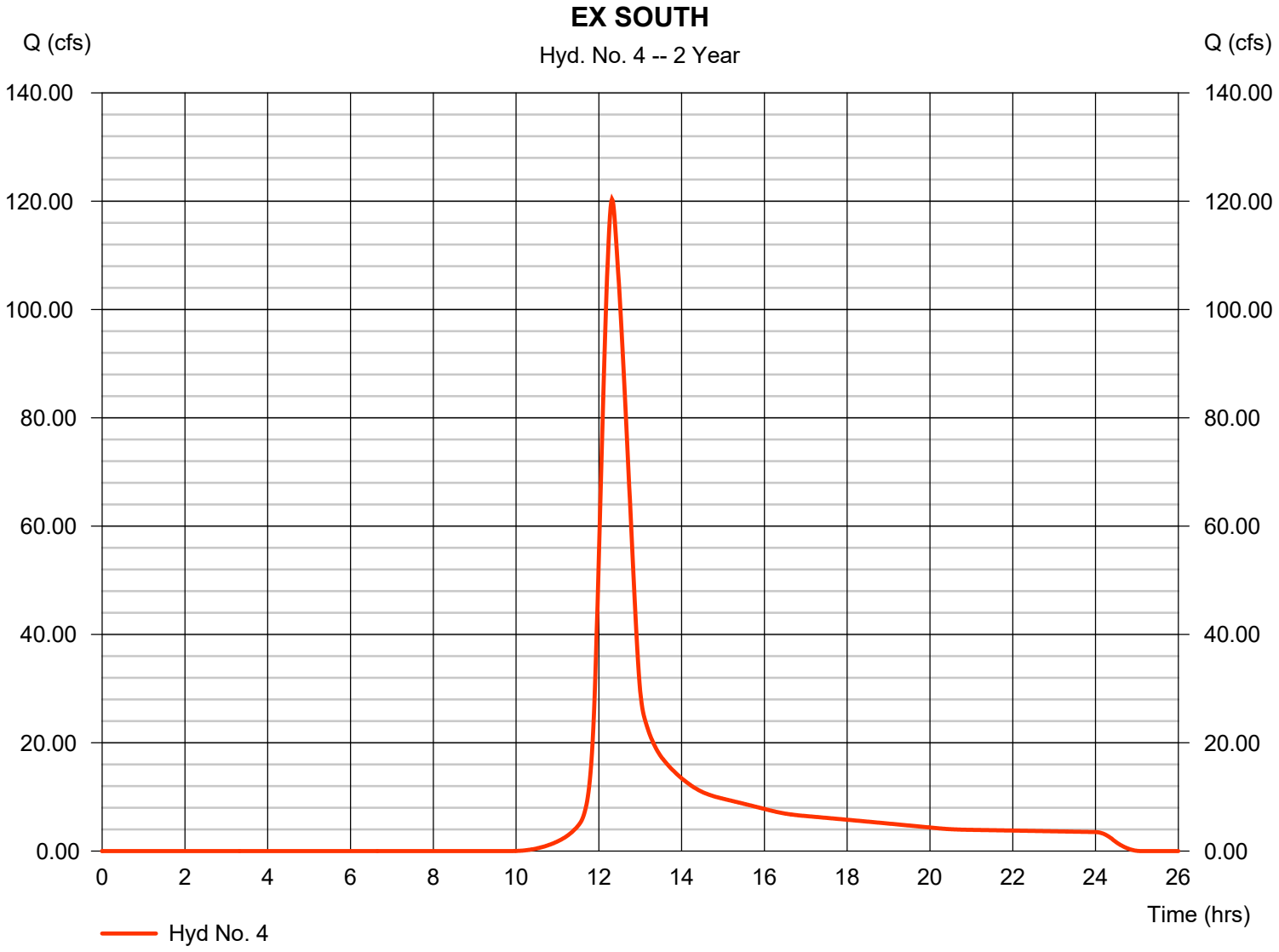


Hydrograph Report

Hyd. No. 4

EX SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	120.39 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.32 hrs
Time interval	=	1 min	Hyd. volume	=	620,286 cuft
Drainage area	=	111.890 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	41.50 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

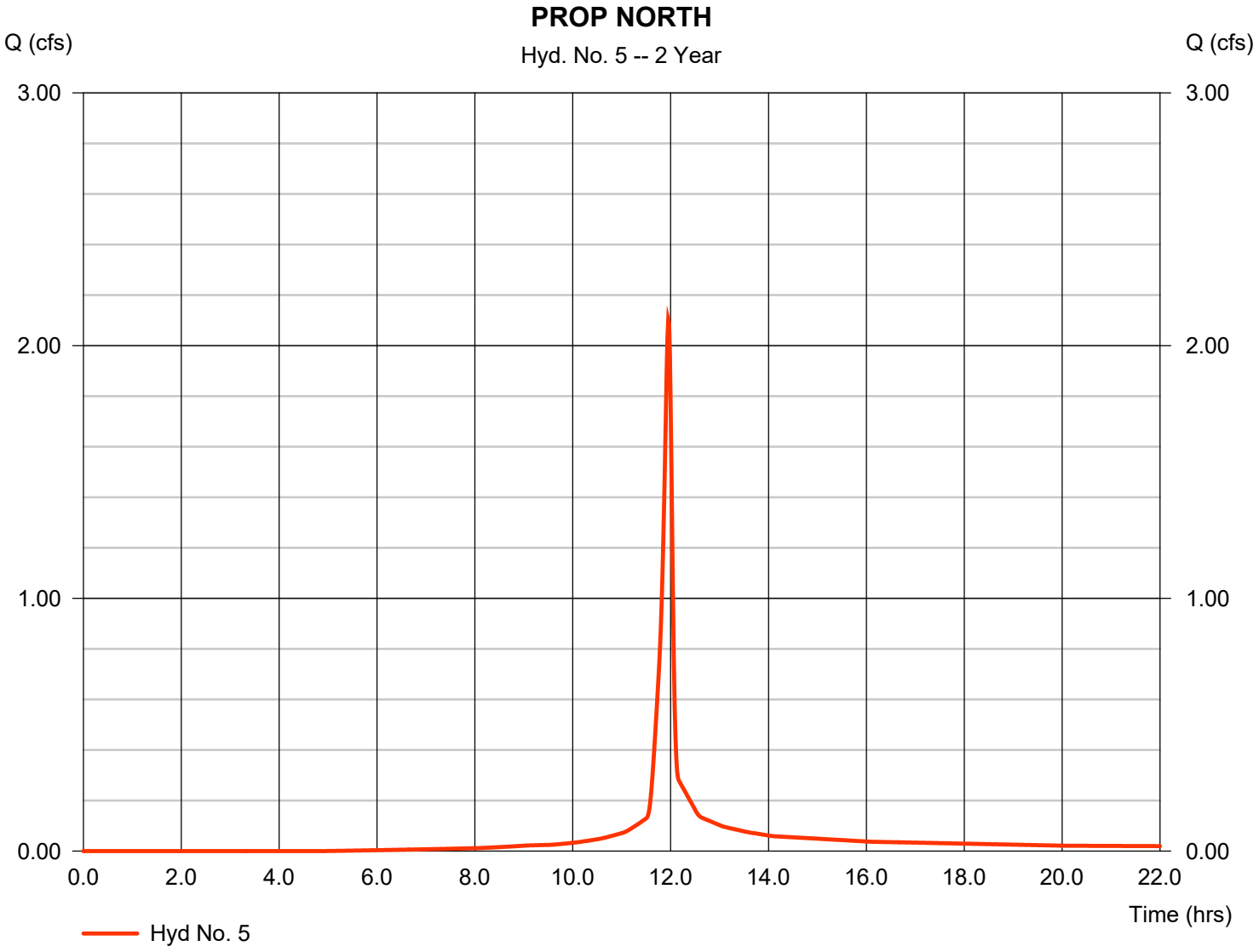


Hydrograph Report

Hyd. No. 5

PROP NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.104 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.95 hrs
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

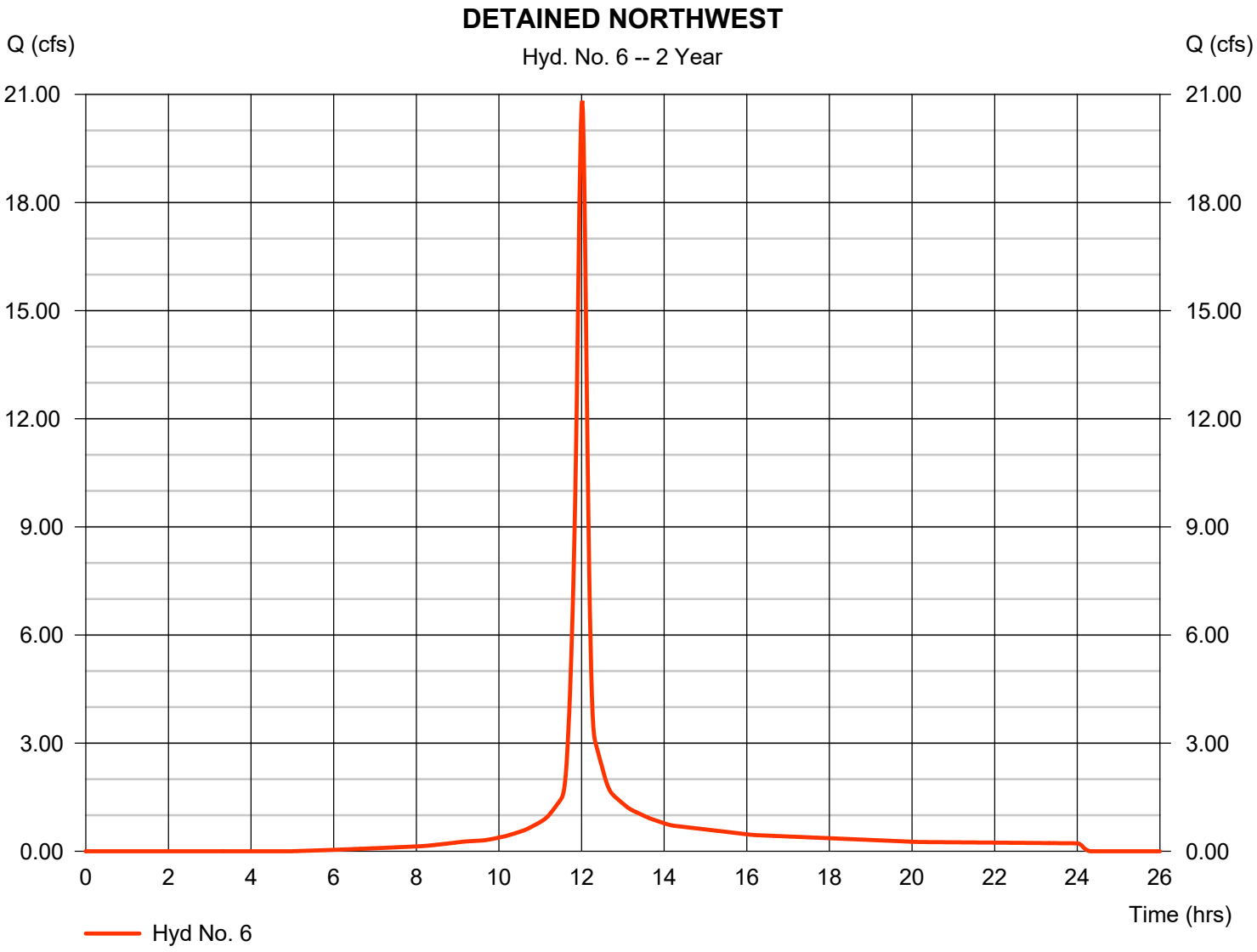


Hydrograph Report

Hyd. No. 6

DETAINED NORTHWEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.82 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	54,159 cuft
Drainage area	=	5.730 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

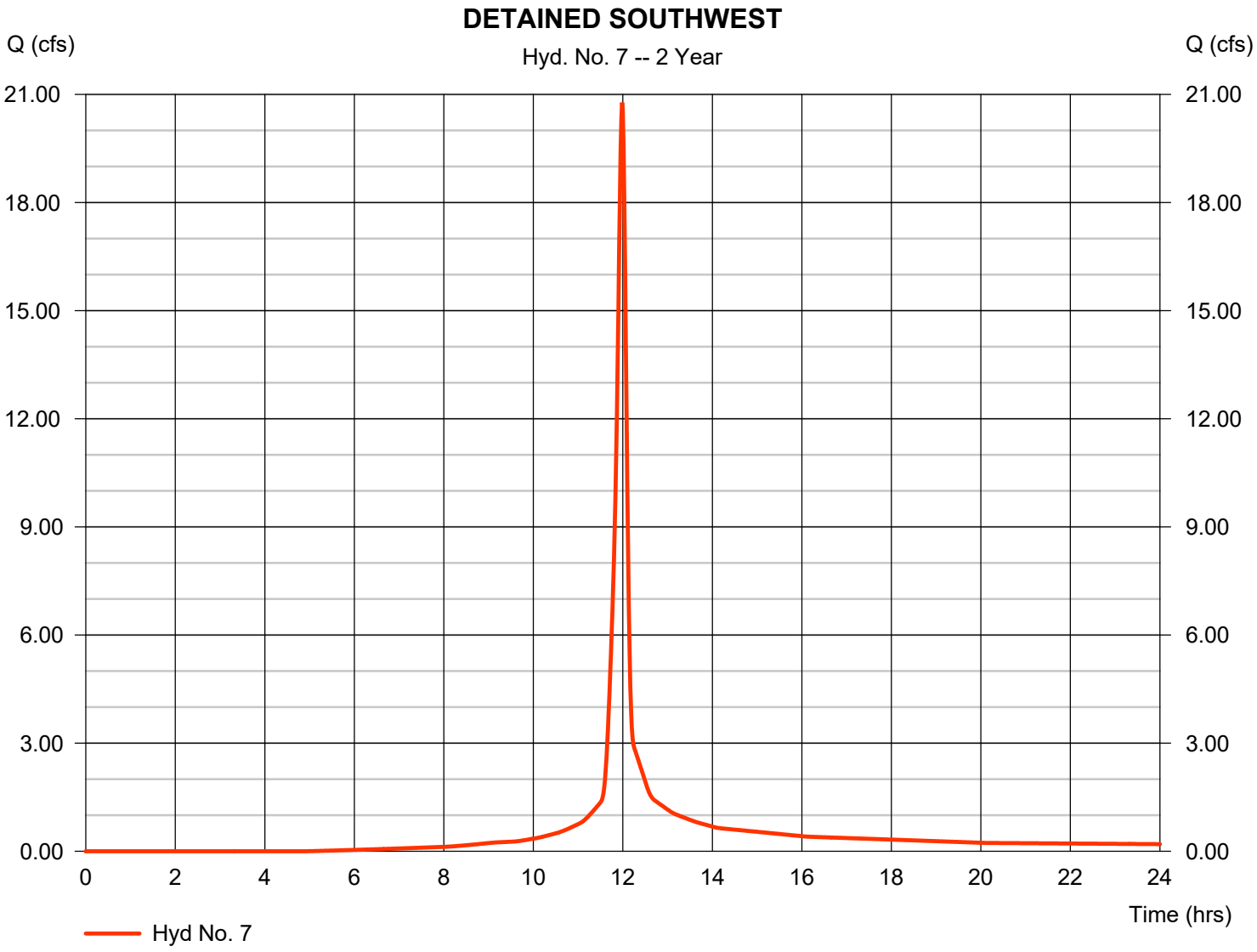


Hydrograph Report

Hyd. No. 7

DETAINED SOUTHWEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.77 cfs
Storm frequency	=	2 yrs	Time to peak	=	11.98 hrs
Time interval	=	1 min	Hyd. volume	=	48,681 cuft
Drainage area	=	5.070 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

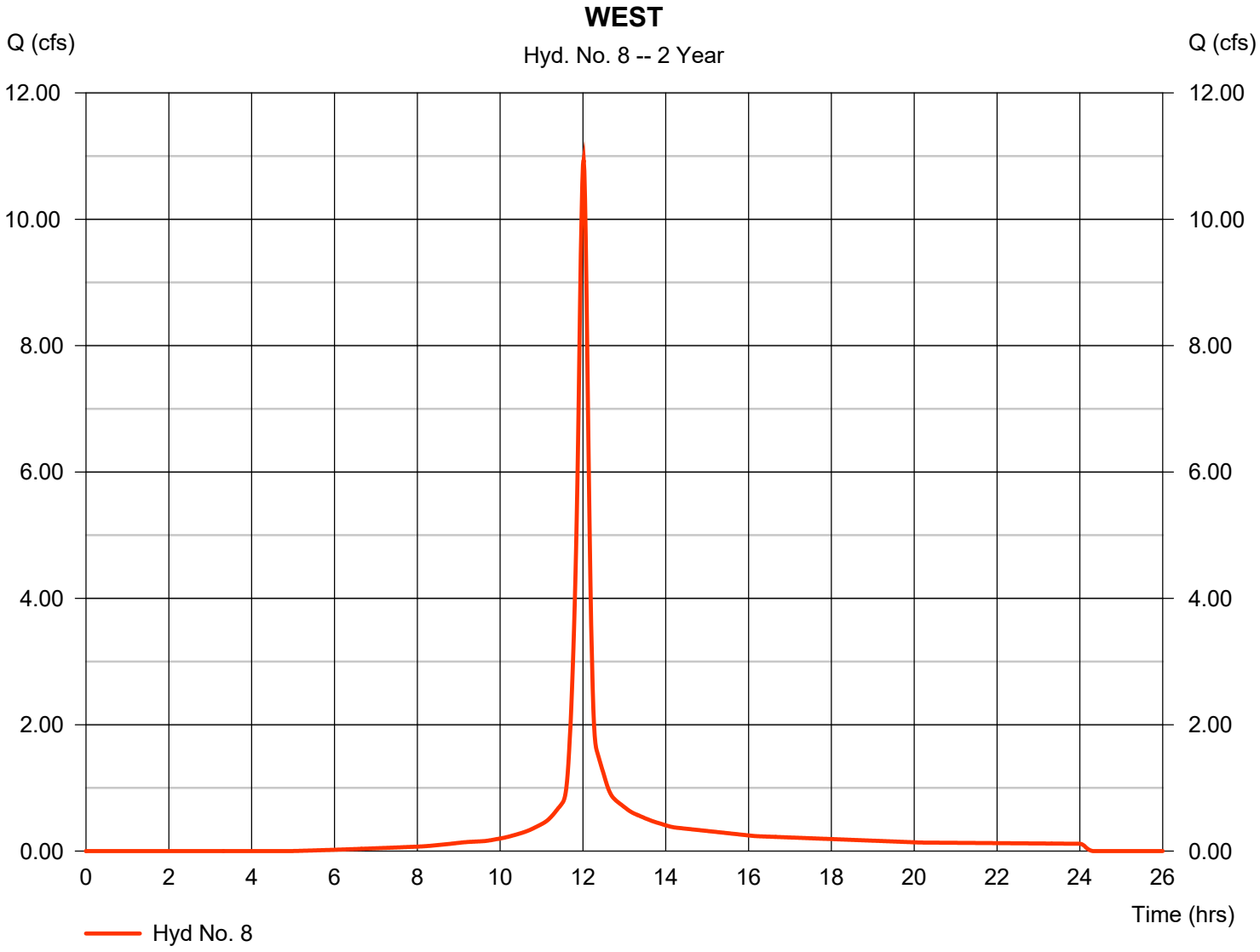


Hydrograph Report

Hyd. No. 8

WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.94 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	28,450 cuft
Drainage area	=	3.010 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.10 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

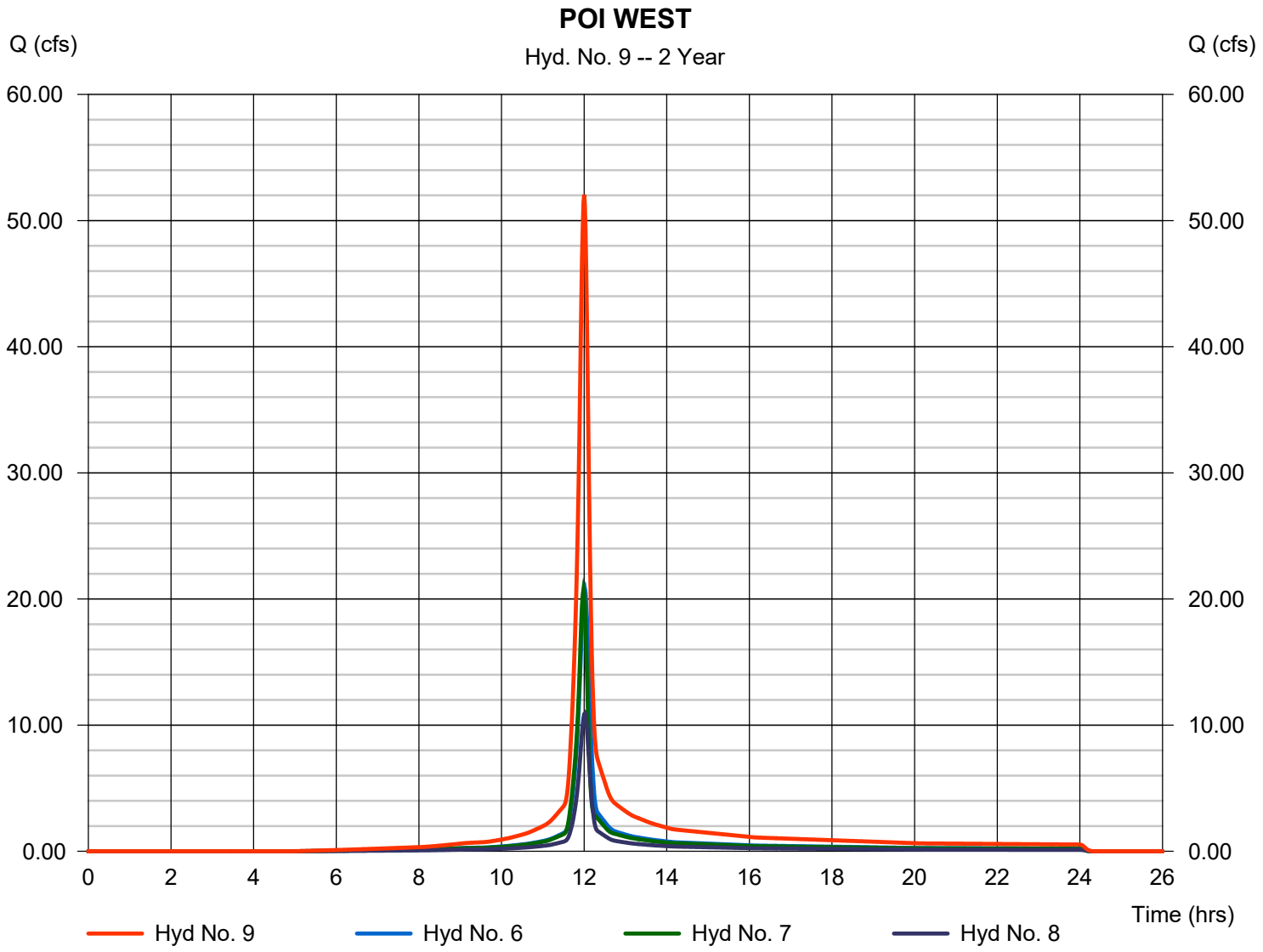


Hydrograph Report

Hyd. No. 9

POI WEST

Hydrograph type	=	Combine	Peak discharge	=	52.05 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	131,289 cuft
Inflow hyds.	=	6, 7, 8	Contrib. drain. area	=	13.810 ac

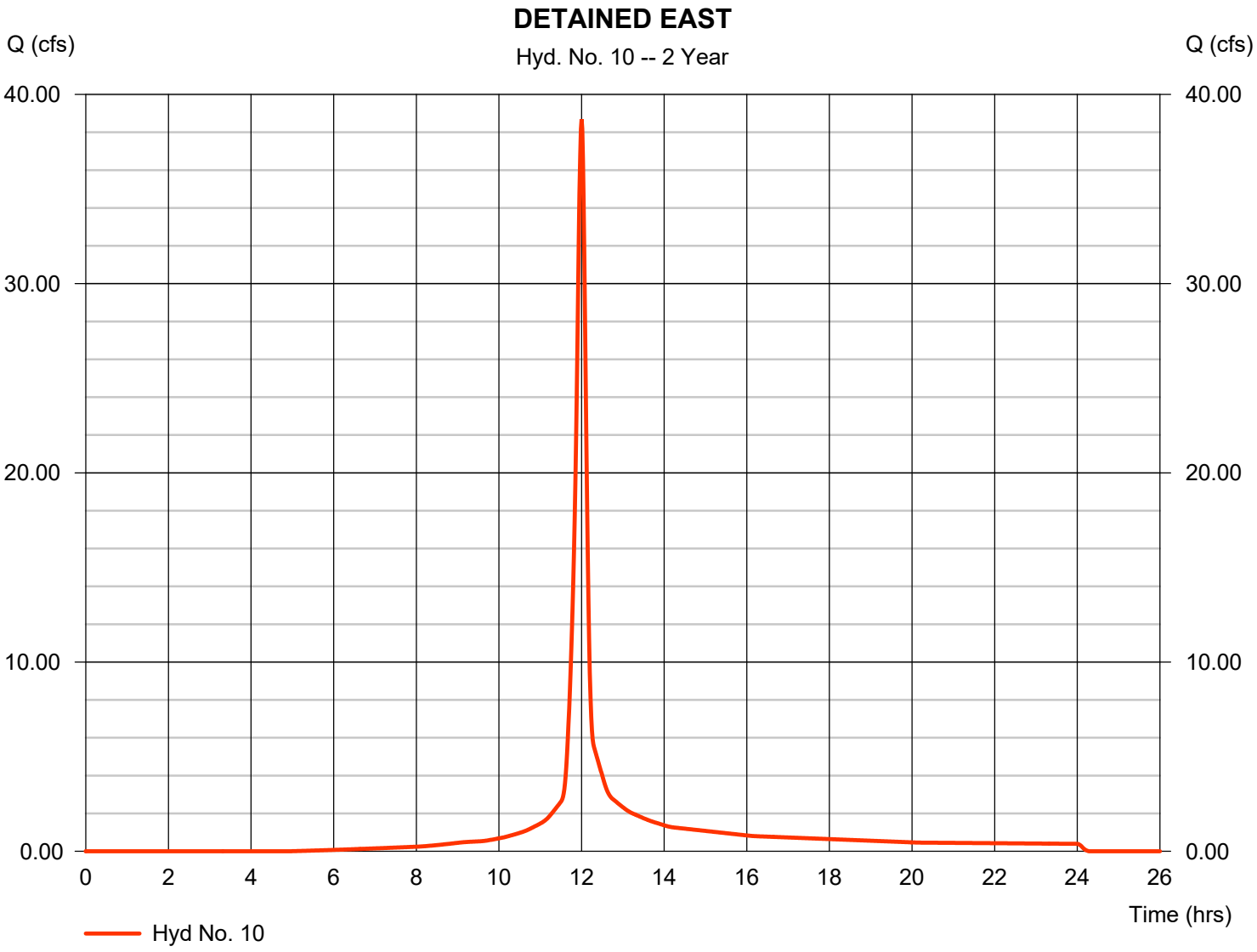


Hydrograph Report

Hyd. No. 10

DETAINED EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	38.69 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	96,462 cuft
Drainage area	=	9.870 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

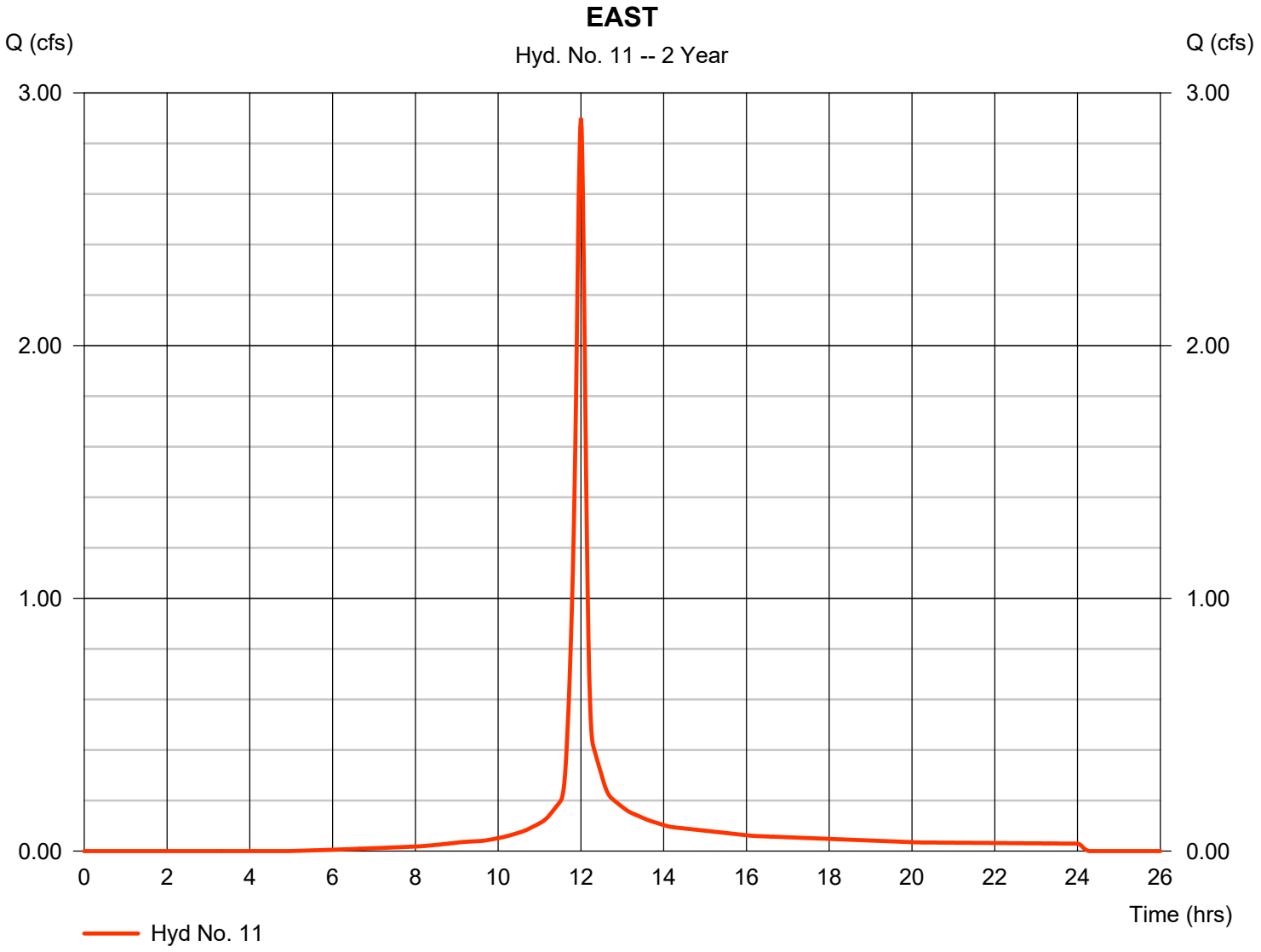


Hydrograph Report

Hyd. No. 11

EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	2.900 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
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

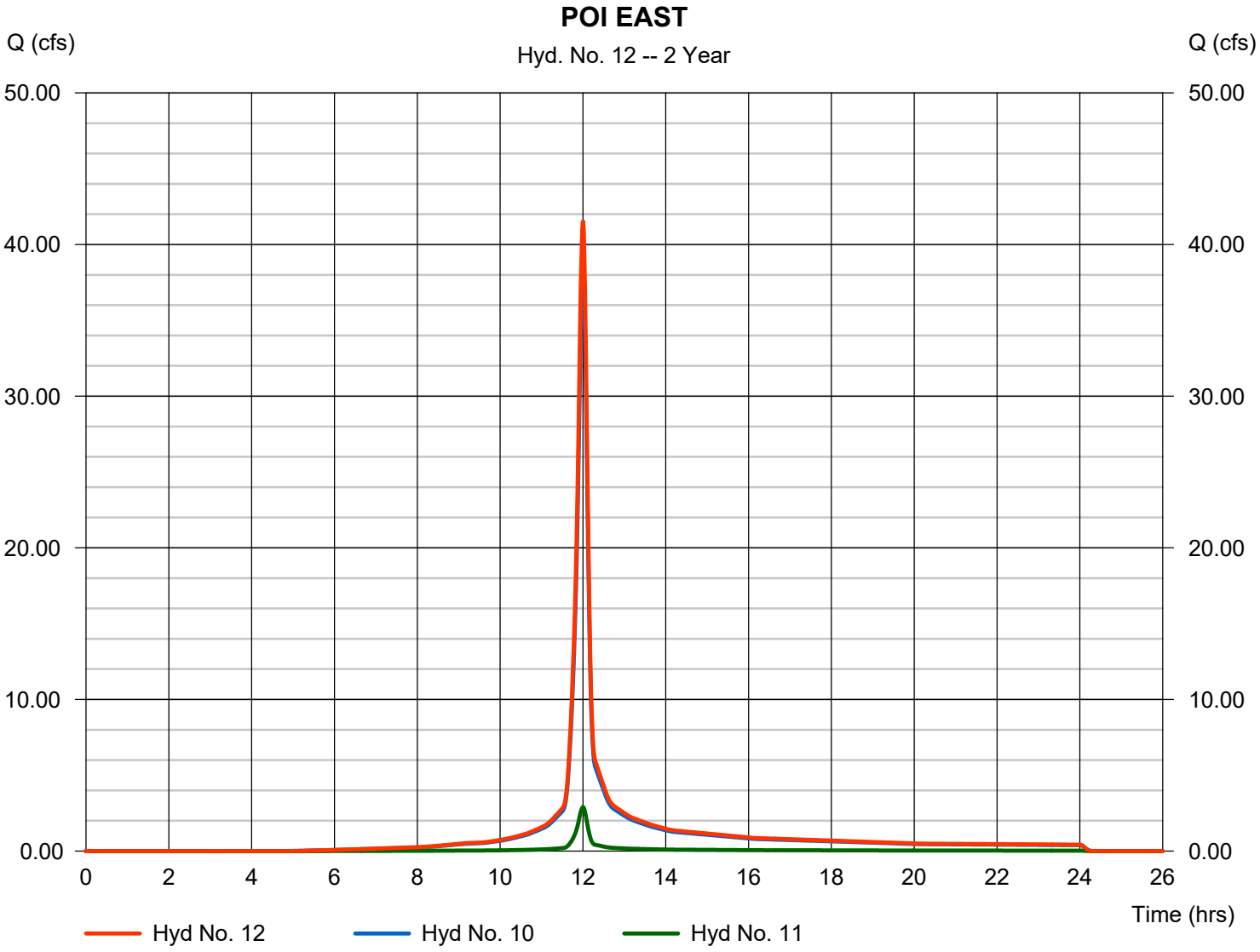


Hydrograph Report

Hyd. No. 12

POI EAST

Hydrograph type	=	Combine	Peak discharge	=	41.59 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	103,694 cuft
Inflow hyds.	=	10, 11	Contrib. drain. area	=	10.610 ac

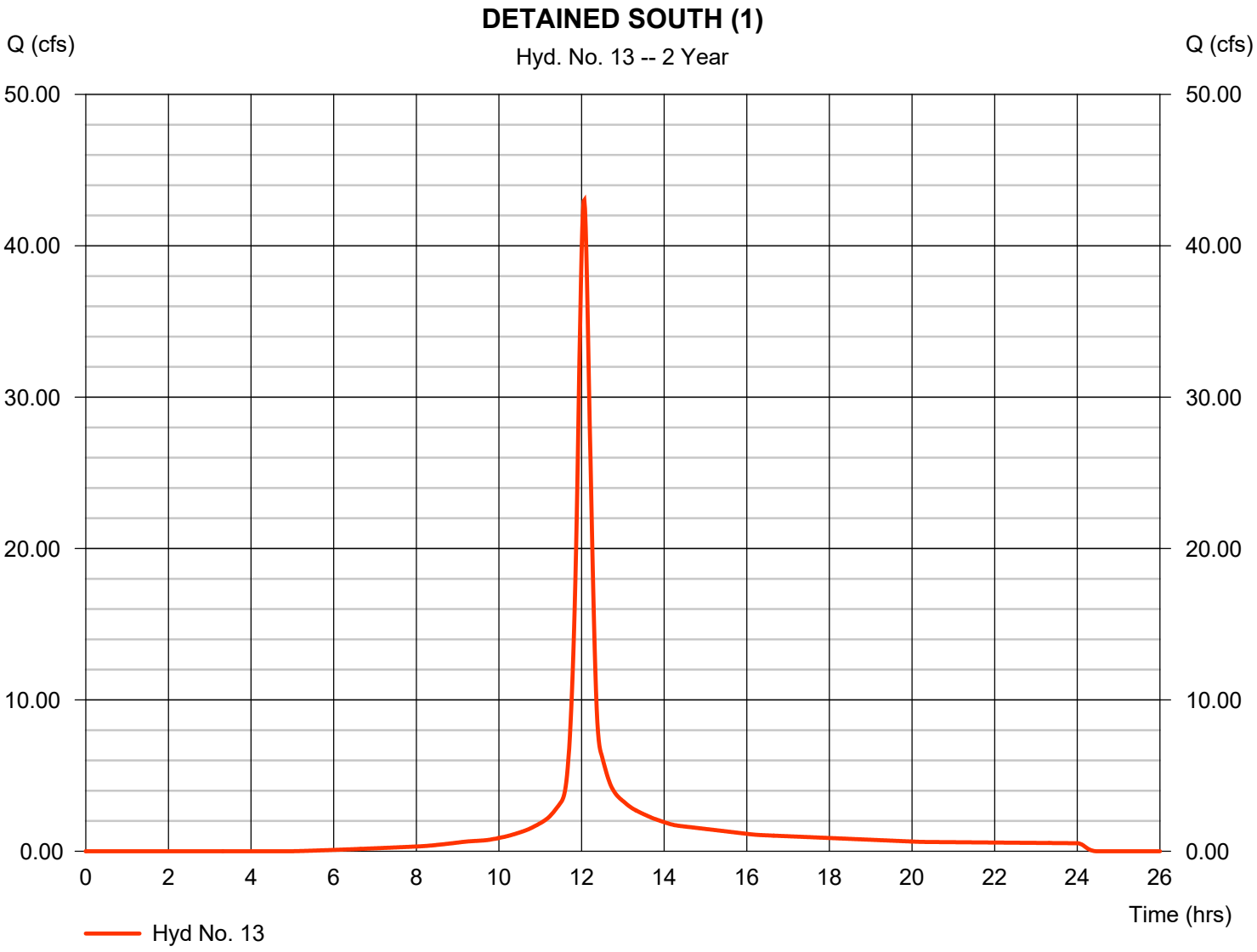


Hydrograph Report

Hyd. No. 13

DETAINED SOUTH (1)

Hydrograph type	=	SCS Runoff	Peak discharge	=	43.01 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.07 hrs
Time interval	=	1 min	Hyd. volume	=	130,050 cuft
Drainage area	=	13.700 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.50 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

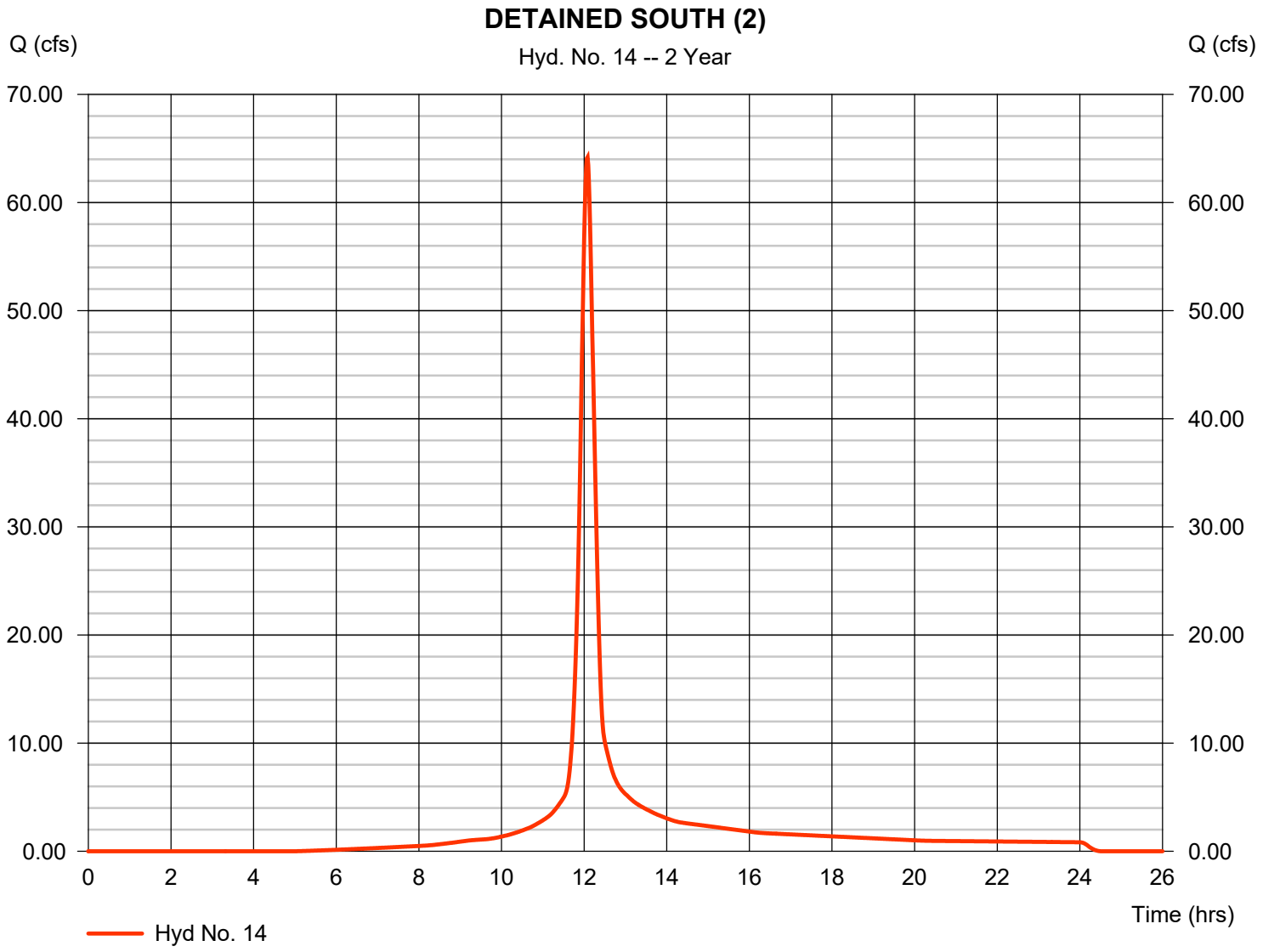


Hydrograph Report

Hyd. No. 14

DETAINED SOUTH (2)

Hydrograph type	=	SCS Runoff	Peak discharge	=	64.19 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.08 hrs
Time interval	=	1 min	Hyd. volume	=	204,133 cuft
Drainage area	=	21.260 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.30 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

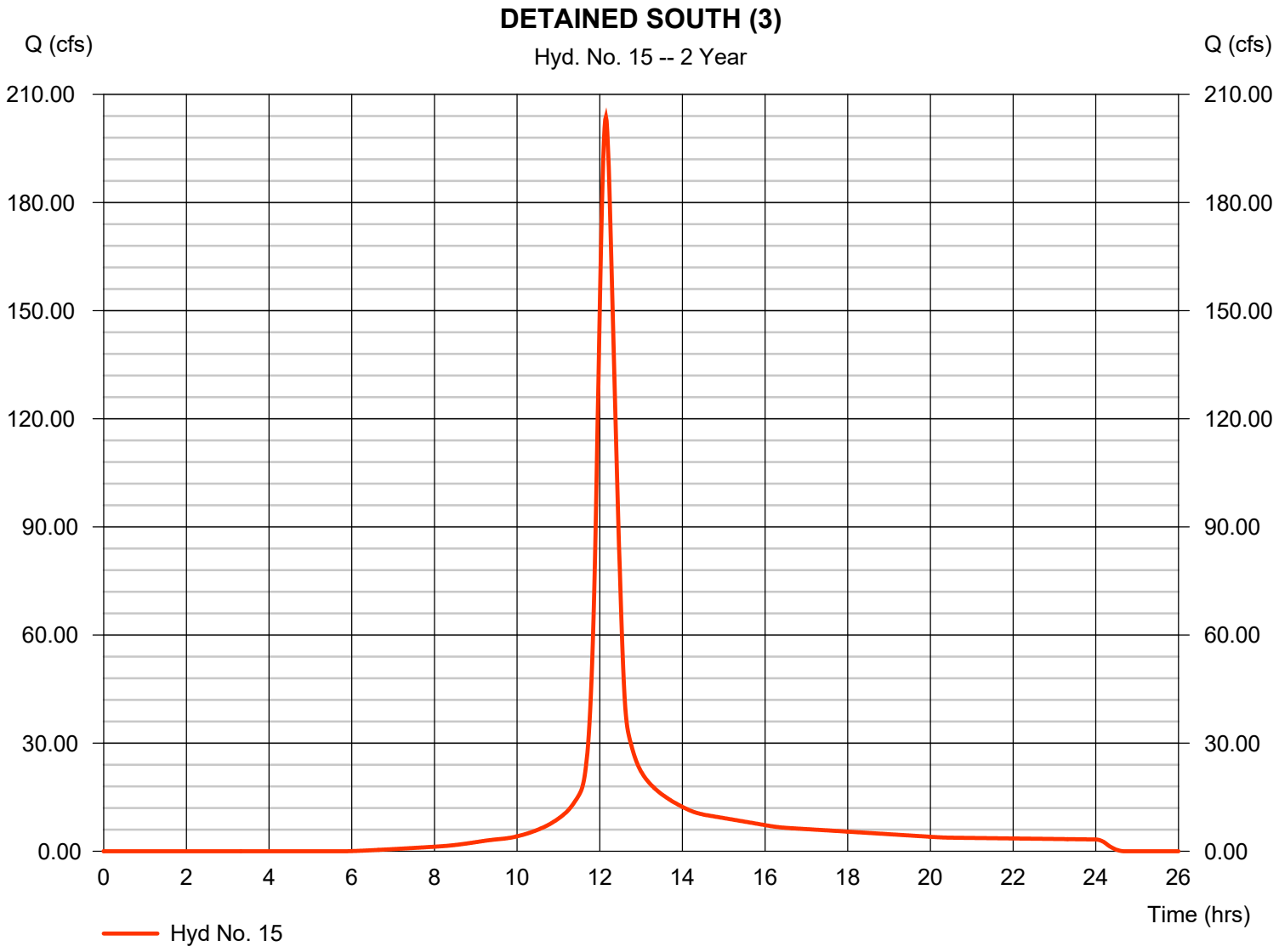


Hydrograph Report

Hyd. No. 15

DETAINED SOUTH (3)

Hydrograph type	=	SCS Runoff	Peak discharge	=	203.77 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.15 hrs
Time interval	=	1 min	Hyd. volume	=	761,749 cuft
Drainage area	=	84.610 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	27.00 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

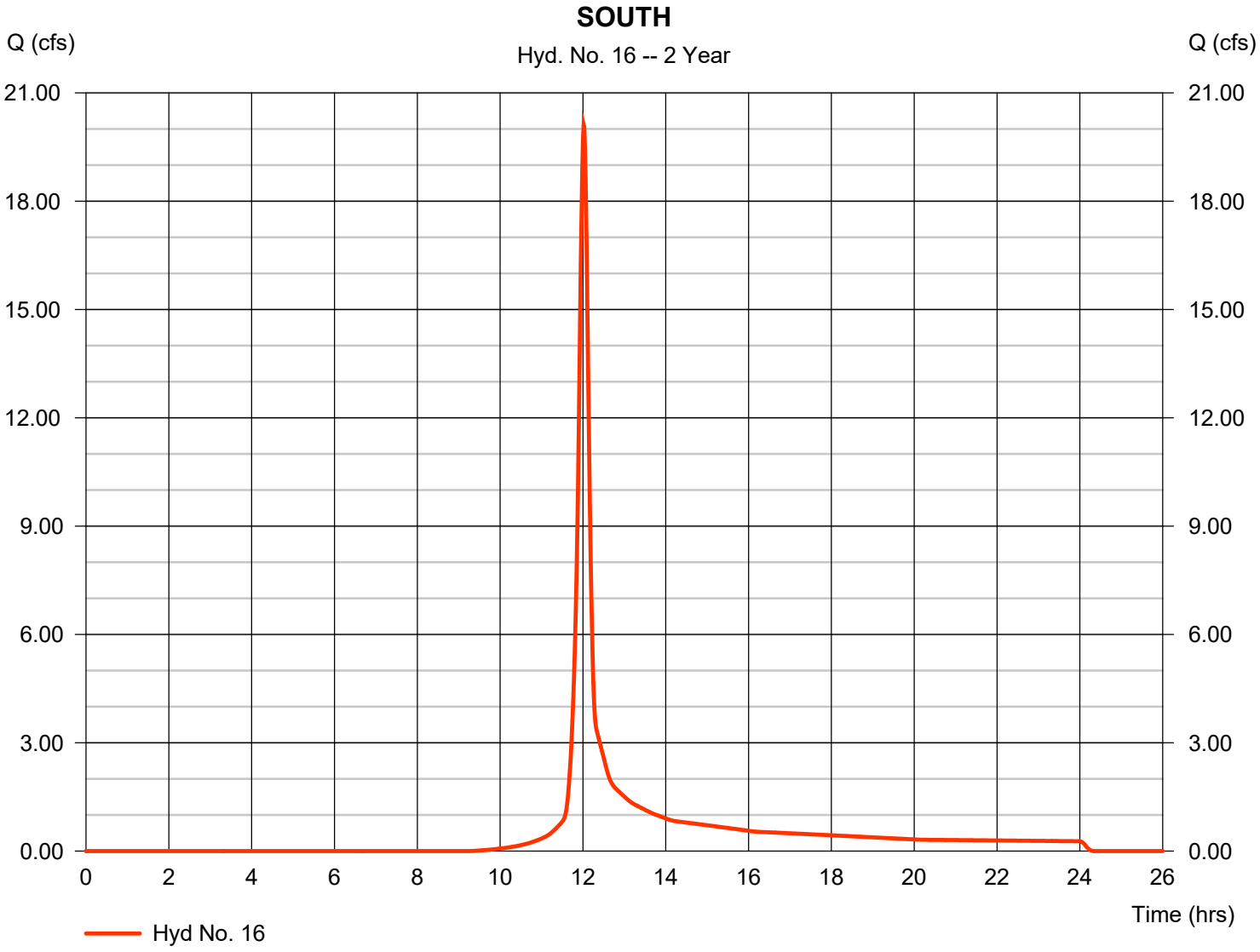


Hydrograph Report

Hyd. No. 16

SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	20.10 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	50,914 cuft
Drainage area	=	8.590 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.80 min
Total precip.	=	3.71 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

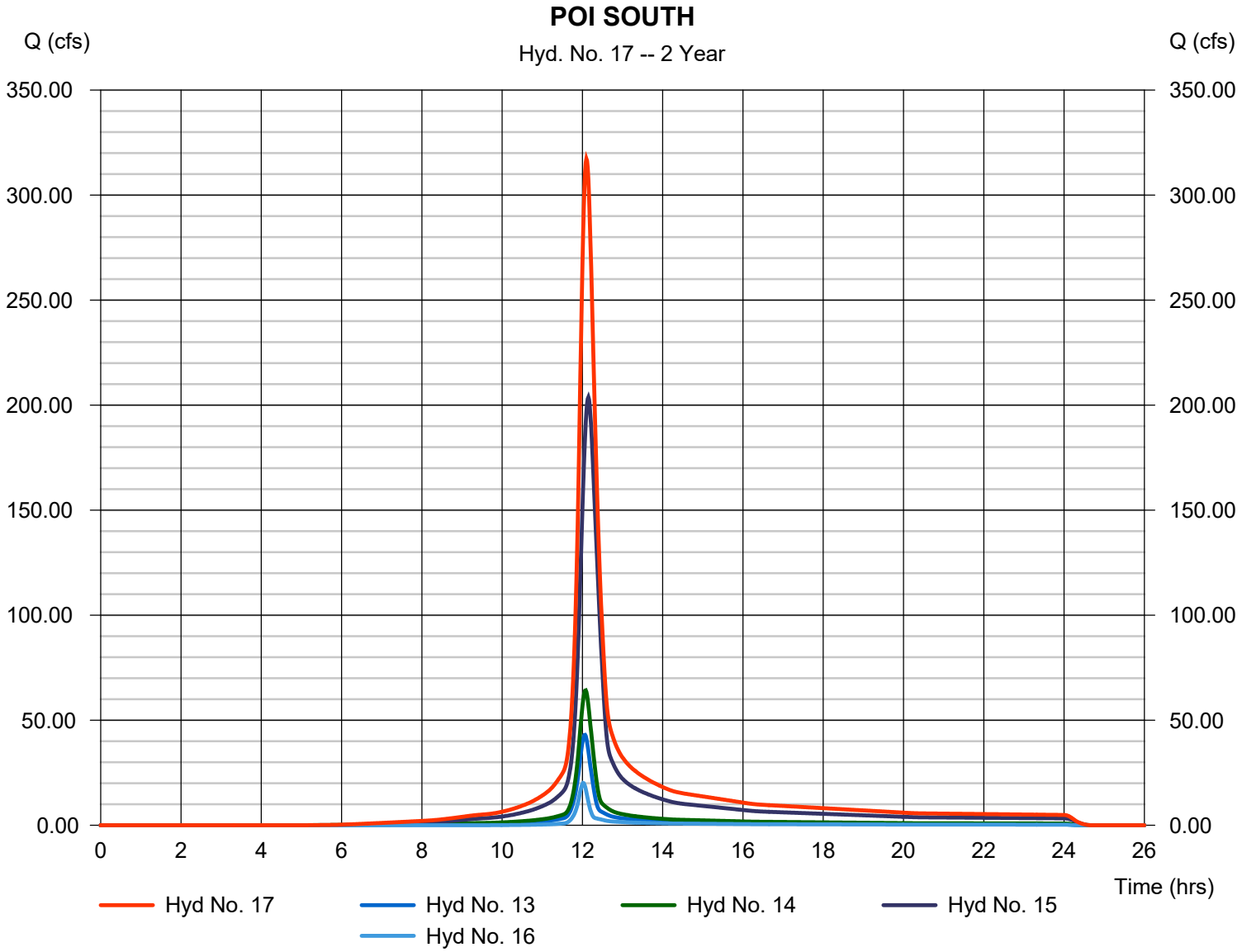


Hydrograph Report

Hyd. No. 17

POI SOUTH

Hydrograph type	=	Combine	Peak discharge	=	317.25 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.10 hrs
Time interval	=	1 min	Hyd. volume	=	1,146,848 cuft
Inflow hyds.	=	13, 14, 15, 16	Contrib. drain. area	=	128.160 ac



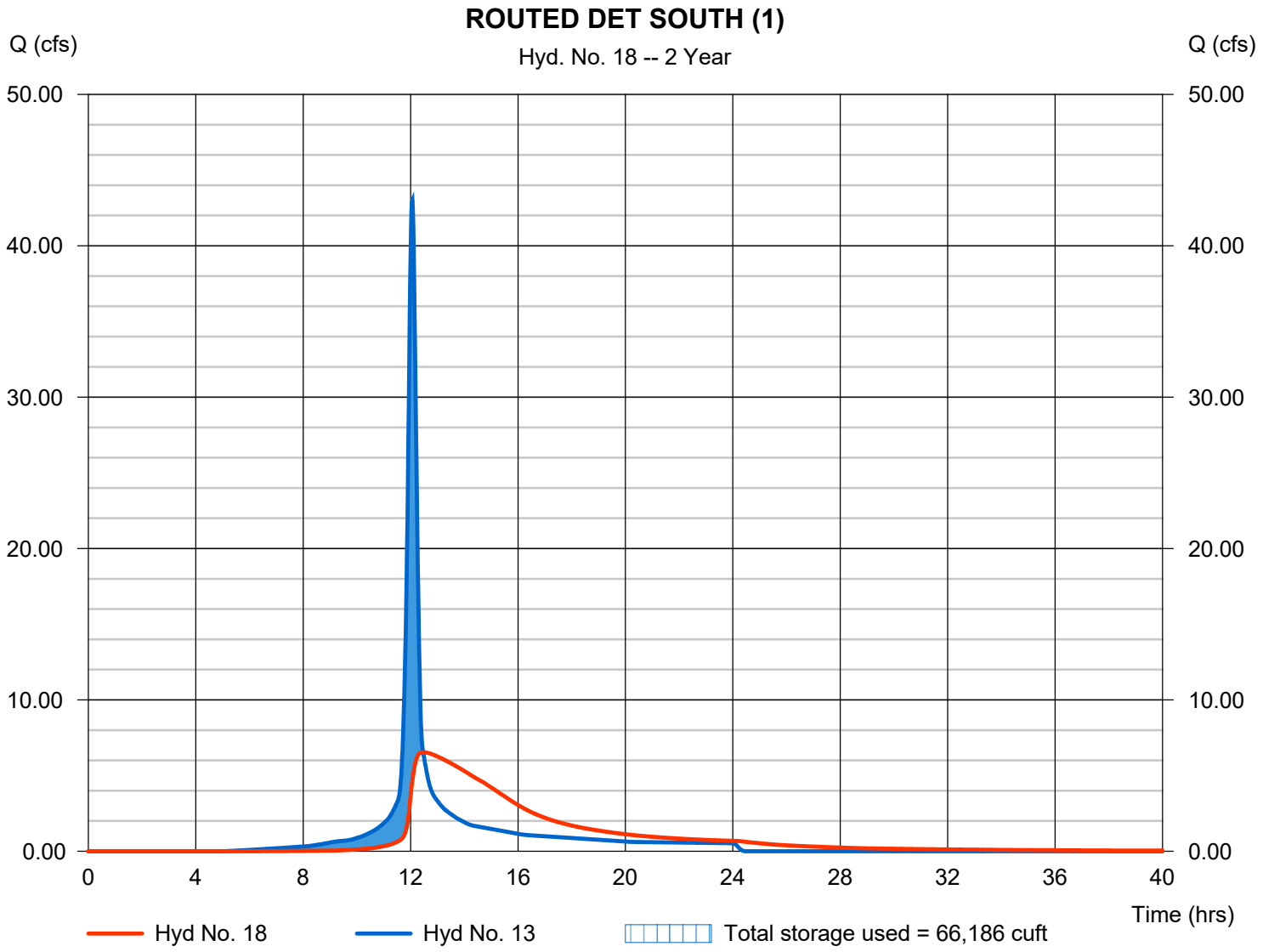
Hydrograph Report

Hyd. No. 18

ROUTED DET SOUTH (1)

Hydrograph type	=	Reservoir	Peak discharge	=	6.535 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.47 hrs
Time interval	=	1 min	Hyd. volume	=	127,999 cuft
Inflow hyd. No.	=	13 - DETAINED SOUTH (1)	Max. Elevation	=	1035.85 ft
Reservoir name	=	South Retention Basin (1)	Max. Storage	=	66,186 cuft

Storage Indication method used.



Pond Report

Pond No. 3 - South Retention Basin (1)

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1034.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1034.00	33,091	0	0
1.00	1035.00	35,878	34,485	34,485
2.00	1036.00	38,778	37,328	71,813
3.00	1037.00	41,790	40,284	112,097
4.00	1038.00	44,912	43,351	155,448
5.00	1039.00	48,102	46,507	201,955
6.00	1040.00	51,350	49,726	251,681
7.00	1041.00	54,654	53,002	304,683
8.00	1042.00	58,014	56,334	361,017
9.00	1043.00	61,431	59,723	420,739
10.00	1044.00	63,874	62,653	483,392

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1034.00	0.00	0.00	0.00
Length (ft)	= 55.50	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	n/a
N-Value	= .010	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 150.00	0.00	0.00	0.00
Crest El. (ft)	= 1042.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

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

TW Elev. (ft) = 0.00

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

Stage / Storage / Discharge Table

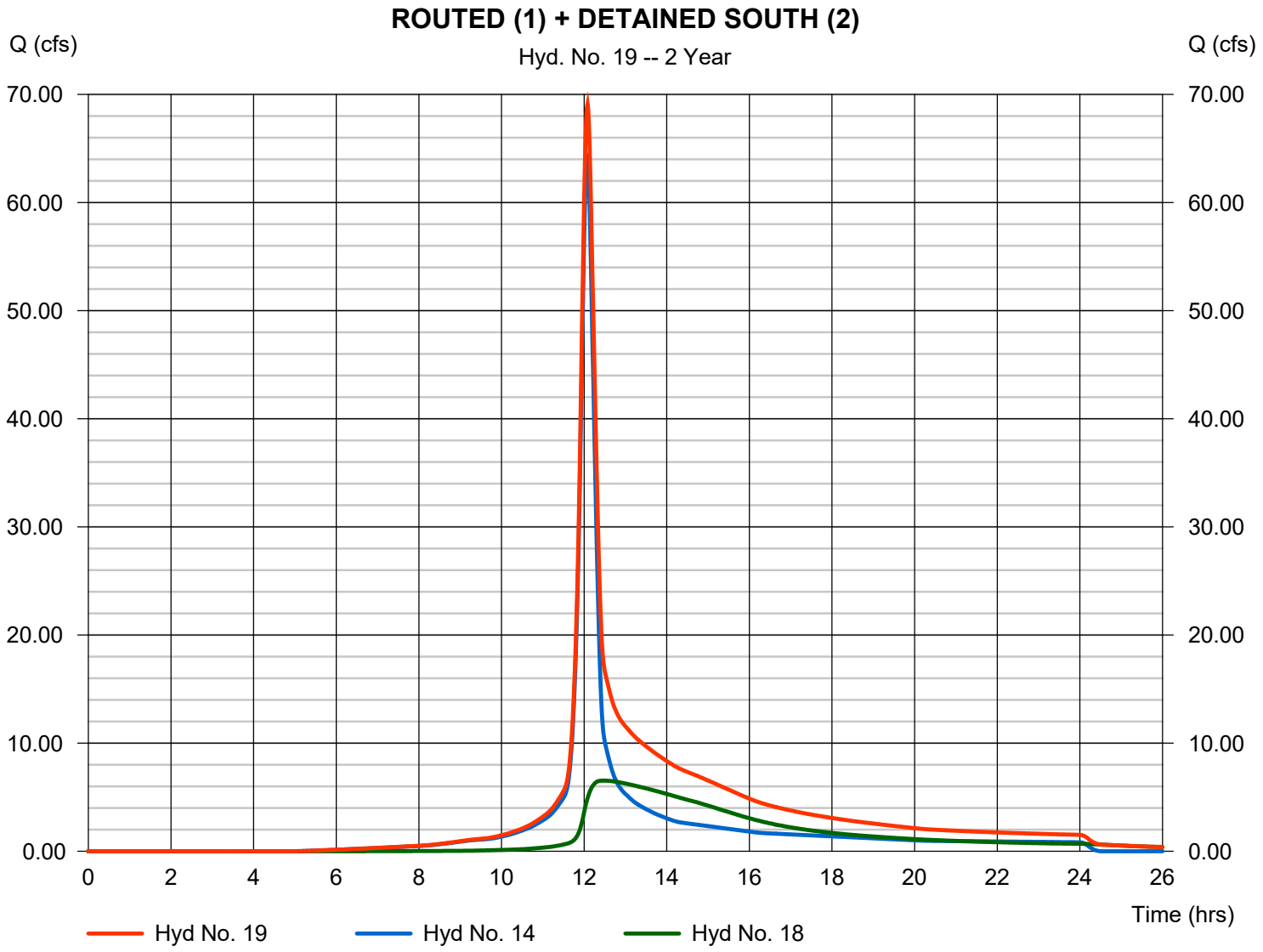
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1034.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.00	34,485	1035.00	3.58 ic	---	---	---	0.00	---	---	---	---	---	3.584
2.00	71,813	1036.00	6.93 ic	---	---	---	0.00	---	---	---	---	---	6.928
3.00	112,097	1037.00	9.11 ic	---	---	---	0.00	---	---	---	---	---	9.105
4.00	155,448	1038.00	10.85 ic	---	---	---	0.00	---	---	---	---	---	10.85
5.00	201,955	1039.00	12.36 ic	---	---	---	0.00	---	---	---	---	---	12.36
6.00	251,681	1040.00	13.70 ic	---	---	---	0.00	---	---	---	---	---	13.70
7.00	304,683	1041.00	14.92 ic	---	---	---	0.00	---	---	---	---	---	14.92
8.00	361,017	1042.00	16.04 ic	---	---	---	0.00	---	---	---	---	---	16.04
9.00	420,739	1043.00	17.10 ic	---	---	---	390.00	---	---	---	---	---	407.10
10.00	483,392	1044.00	18.09 ic	---	---	---	1103.09	---	---	---	---	---	1121.18

Hydrograph Report

Hyd. No. 19

ROUTED (1) + DETAINED SOUTH (2)

Hydrograph type	=	Combine	Peak discharge	=	69.09 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.08 hrs
Time interval	=	1 min	Hyd. volume	=	332,133 cuft
Inflow hyds.	=	14, 18	Contrib. drain. area	=	21.260 ac



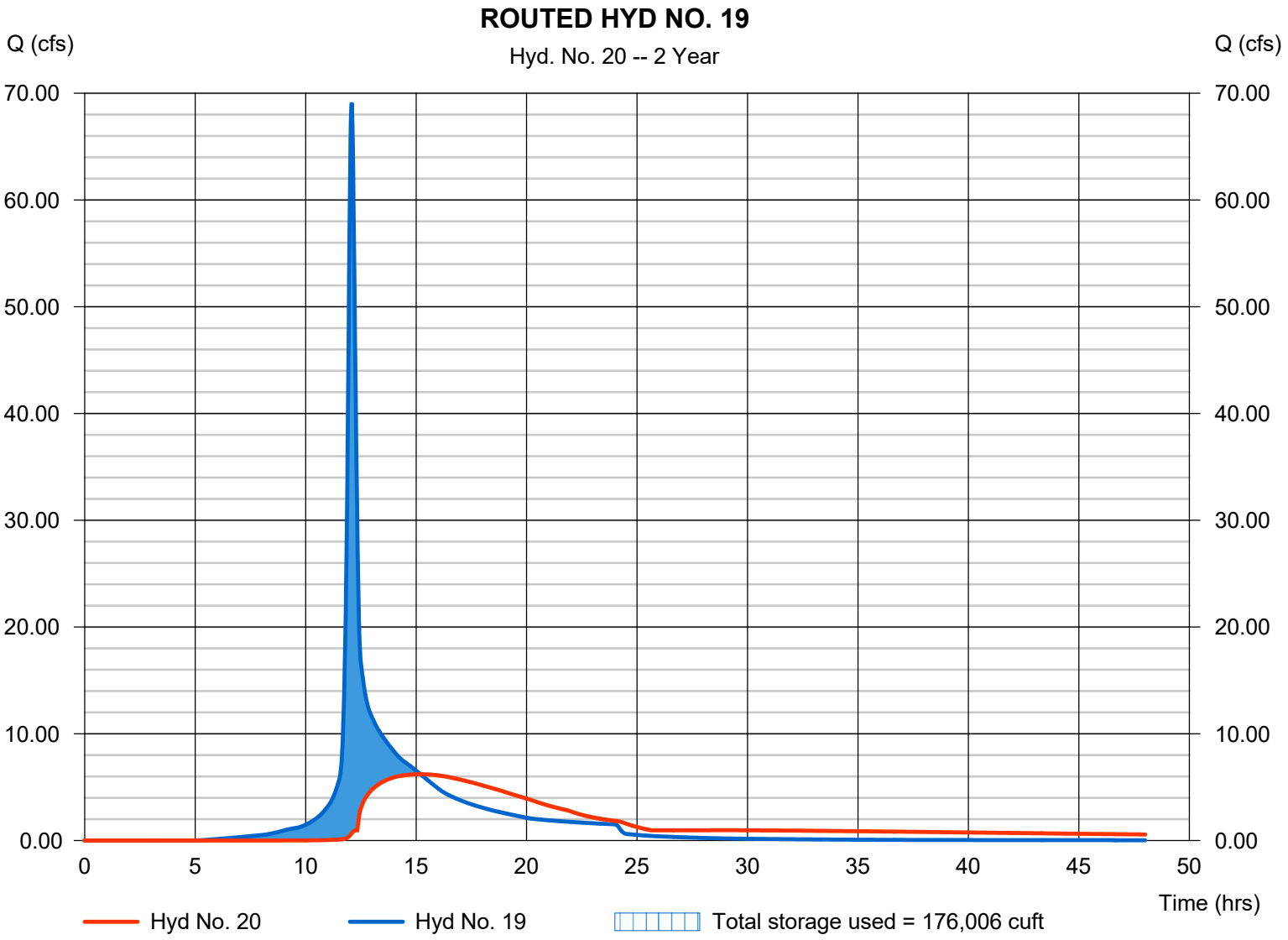
Hydrograph Report

Hyd. No. 20

ROUTED HYD NO. 19

Hydrograph type	=	Reservoir	Peak discharge	=	6.211 cfs
Storm frequency	=	2 yrs	Time to peak	=	15.20 hrs
Time interval	=	1 min	Hyd. volume	=	260,903 cuft
Inflow hyd. No.	=	19 - ROUTED (1) + DETAINED/OUTLET (2)	Max. Elevation	=	1033.04 ft
Reservoir name	=	South Retention Basin (2)	Max. Storage	=	176,006 cuft

Storage Indication method used.



Pond Report

Pond No. 2 - South Retention Basin (2)

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1031.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1031.00	81,870	0	0
1.00	1032.00	86,098	83,984	83,984
2.00	1033.00	90,420	88,259	172,243
3.00	1034.00	94,838	92,629	264,872
4.00	1035.00	99,351	97,095	361,967
5.00	1036.00	103,957	101,654	463,621
6.00	1037.00	108,628	106,293	569,913
7.00	1038.00	113,356	110,992	680,905
8.00	1039.00	118,140	115,748	796,653

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 18.00	0.00	0.00	0.00
Span (in)	= 18.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1031.00	0.00	0.00	0.00
Length (ft)	= 129.00	0.00	0.00	0.00
Slope (%)	= 0.01	0.00	0.00	n/a
N-Value	= .010	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 150.00	0.00	0.00	0.00
Crest El. (ft)	= 1037.00	0.00	0.00	0.00
Weir Coeff.	= 2.60	3.33	3.33	3.33
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1031.00	0.00	---	---	---	0.00	---	---	---	---	---	0.000
1.00	83,984	1032.00	0.71 oc	---	---	---	0.00	---	---	---	---	---	0.706
2.00	172,243	1033.00	5.99 oc	---	---	---	0.00	---	---	---	---	---	5.985
3.00	264,872	1034.00	10.28 oc	---	---	---	0.00	---	---	---	---	---	10.28
4.00	361,967	1035.00	13.25 oc	---	---	---	0.00	---	---	---	---	---	13.25
5.00	463,621	1036.00	15.66 oc	---	---	---	0.00	---	---	---	---	---	15.66
6.00	569,913	1037.00	17.75 oc	---	---	---	0.00	---	---	---	---	---	17.75
7.00	680,905	1038.00	19.62 oc	---	---	---	390.00	---	---	---	---	---	409.62
8.00	796,653	1039.00	21.33 oc	---	---	---	1103.09	---	---	---	---	---	1124.41

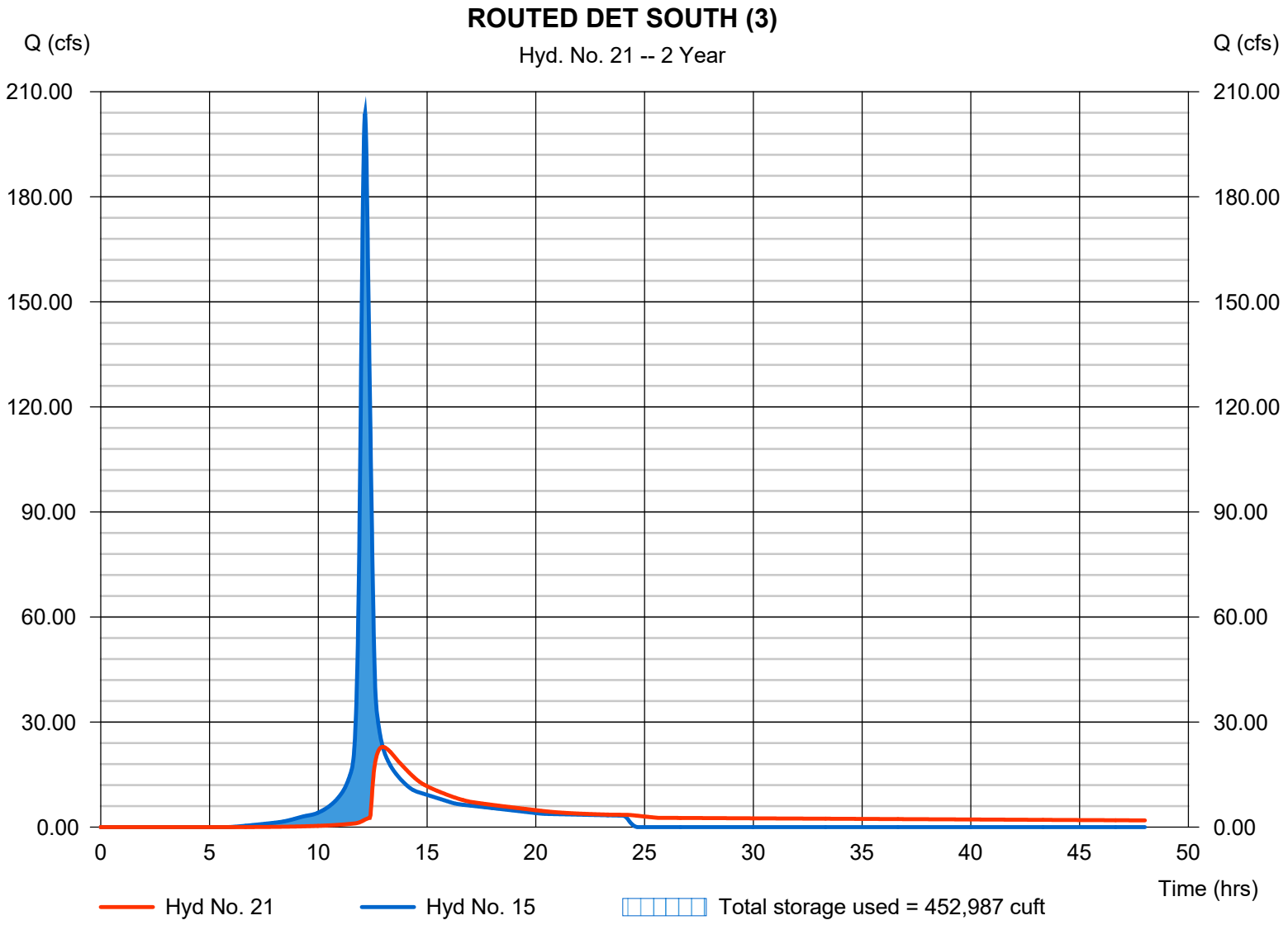
Hydrograph Report

Hyd. No. 21

ROUTED DET SOUTH (3)

Hydrograph type	=	Reservoir	Peak discharge	=	22.90 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.97 hrs
Time interval	=	1 min	Hyd. volume	=	561,886 cuft
Inflow hyd. No.	=	15 - DETAINED SOUTH (3)	Max. Elevation	=	1006.16 ft
Reservoir name	=	South Retention Basin (3)	Max. Storage	=	452,987 cuft

Storage Indication method used.



Pond Report

Pond No. 1 - South Retention Basin (3)

Pond Data

Contours -User-defined contour areas. Average end area method used for volume calculation. Begining Elevation = 1003.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1003.00	134,585	0	0
1.00	1004.00	140,150	137,368	137,368
2.00	1005.00	145,775	142,963	280,330
3.00	1006.00	151,456	148,616	428,946
4.00	1007.00	157,194	154,325	583,271
5.00	1008.00	162,989	160,092	743,362
6.00	1009.00	168,840	165,915	909,277
7.00	1010.00	174,747	171,794	1,081,070
8.00	1011.00	180,712	177,730	1,258,800
9.00	1012.00	186,732	183,722	1,442,522

Culvert / Orifice Structures

	[A]	[B]	[C]	[PrfRsr]
Rise (in)	= 60.00	8.00	0.00	0.00
Span (in)	= 60.00	8.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1002.70	1002.80	0.00	0.00
Length (ft)	= 44.50	0.00	0.00	0.00
Slope (%)	= 0.67	0.00	0.00	n/a
N-Value	= .010	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	Yes	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 24.00	300.00	0.00	0.00
Crest El. (ft)	= 1005.75	1010.00	0.00	0.00
Weir Coeff.	= 3.33	2.60	3.33	3.33
Weir Type	= Rect	Broad	---	---
Multi-Stage	= Yes	No	No	No
Exfil.(in/hr)	= 0.000 (by Wet area)			
TW Elev. (ft)	= 0.00			

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

Stage / Storage / Discharge Table

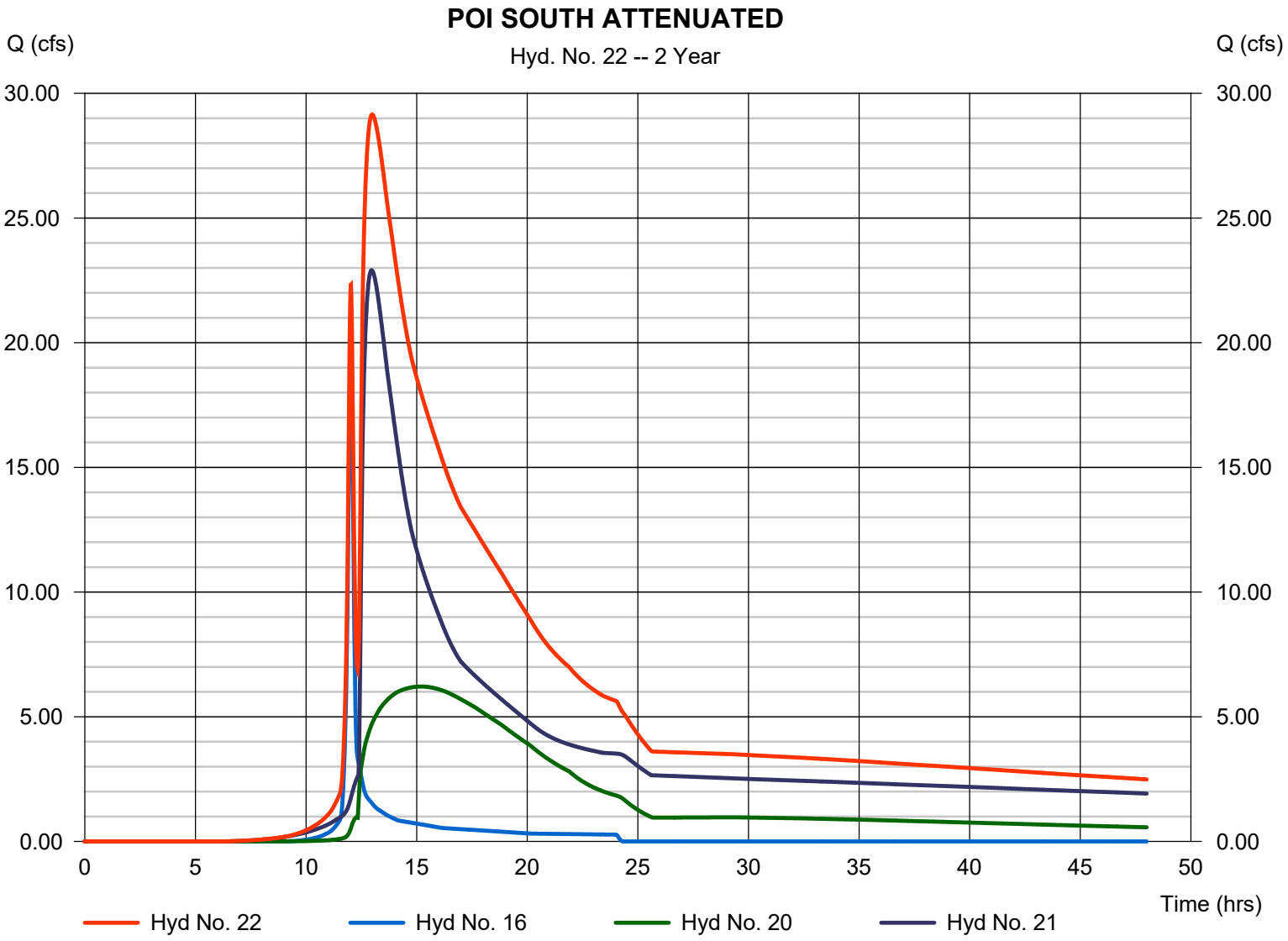
Stage ft	Storage cuft	Elevation ft	Clv A cfs	Clv B cfs	Clv C cfs	PrfRsr cfs	Wr A cfs	Wr B cfs	Wr C cfs	Wr D cfs	Exfil cfs	User cfs	Total cfs
0.00	0	1003.00	0.00	0.00	---	---	0.00	0.00	---	---	---	---	0.000
1.00	137,368	1004.00	1.62 ic	1.56 ic	---	---	0.00	0.00	---	---	---	---	1.565
2.00	280,330	1005.00	2.41 ic	2.27 ic	---	---	0.00	0.00	---	---	---	---	2.269
3.00	428,946	1006.00	12.58 oc	2.44 ic	---	---	9.99	0.00	---	---	---	---	12.43
4.00	583,271	1007.00	60.89 oc	0.70 ic	---	---	60.19 s	0.00	---	---	---	---	60.89
5.00	743,362	1008.00	89.37 oc	0.49 ic	---	---	88.84 s	0.00	---	---	---	---	89.33
6.00	909,277	1009.00	151.83 oc	0.57 ic	---	---	151.23 s	0.00	---	---	---	---	151.80
7.00	1,081,070	1010.00	196.92 oc	0.54 ic	---	---	196.31 s	0.00	---	---	---	---	196.85
8.00	1,258,800	1011.00	226.06 ic	0.48 ic	---	---	225.55 s	780.00	---	---	---	---	1006.03
9.00	1,442,522	1012.00	245.40 ic	0.41 ic	---	---	244.90 s	2206.17	---	---	---	---	2451.49

Hydrograph Report

Hyd. No. 22

POI SOUTH ATTENUATED

Hydrograph type	=	Combine	Peak discharge	=	29.15 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.98 hrs
Time interval	=	1 min	Hyd. volume	=	873,703 cuft
Inflow hyds.	=	16, 20, 21	Contrib. drain. area	=	8.590 ac



Hydrograph Summary Report

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

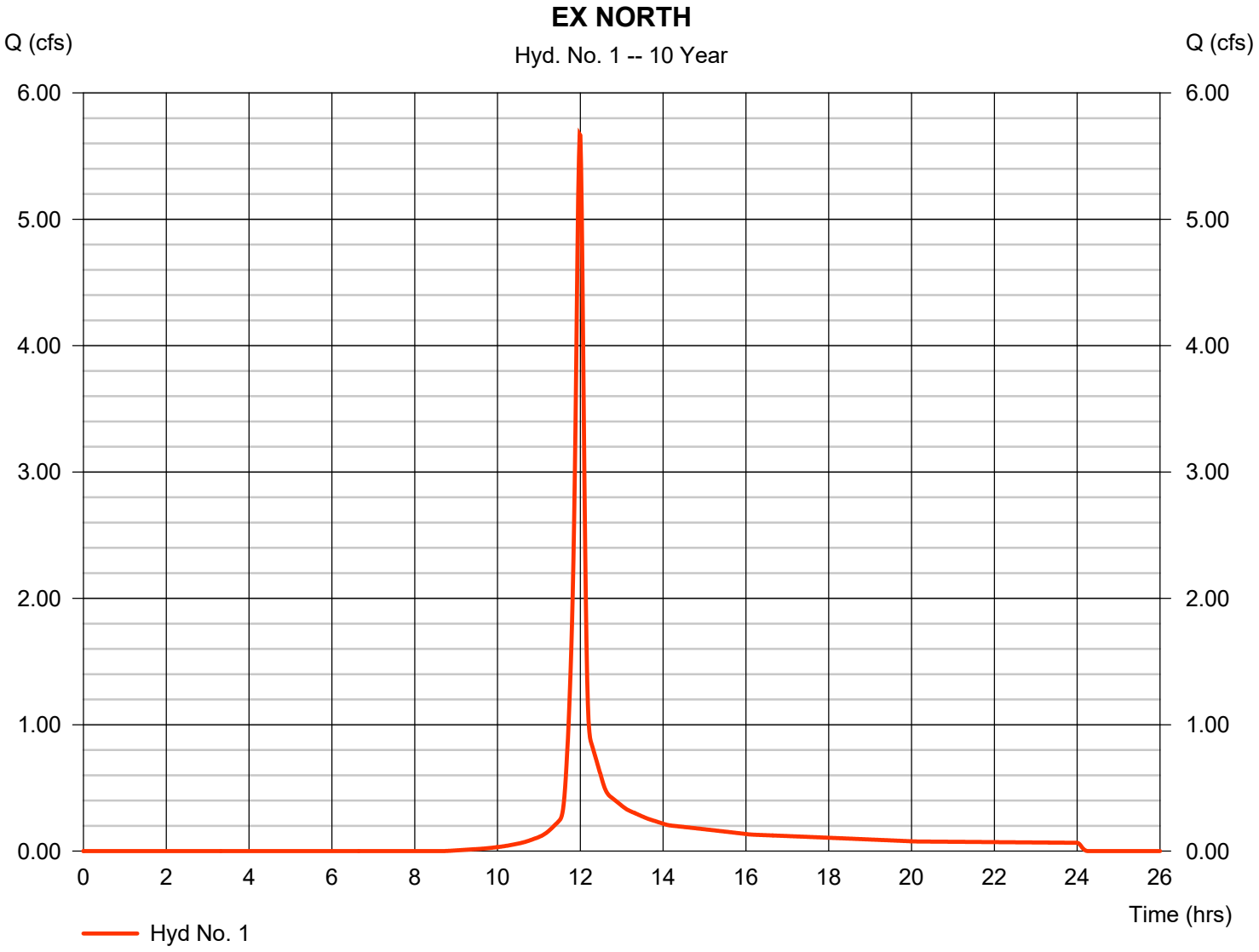
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	5.673	1	719	12,831	------	------	------	EX NORTH
2	SCS Runoff	53.68	1	722	144,441	------	------	------	EX WEST
3	SCS Runoff	53.82	1	725	168,636	------	------	------	EX EAST
4	SCS Runoff	219.62	1	739	1,102,615	------	------	------	EX SOUTH
5	SCS Runoff	3.153	1	717	6,855	------	------	------	PROP NORTH
6	SCS Runoff	31.29	1	721	83,321	------	------	------	DETAINED NORTHWEST
7	SCS Runoff	31.17	1	719	74,894	------	------	------	DETAINED SOUTHWEST
8	SCS Runoff	16.44	1	721	43,769	------	------	------	WEST
9	Combine	78.22	1	720	201,984	6, 7, 8	------	------	POI WEST
10	SCS Runoff	58.12	1	720	148,403	------	------	------	DETAINED EAST
11	SCS Runoff	4.358	1	720	11,126	------	------	------	EAST
12	Combine	62.48	1	720	159,530	10, 11	------	------	POI EAST
13	SCS Runoff	64.84	1	723	200,077	------	------	------	DETAINED SOUTH (1)
14	SCS Runoff	96.82	1	724	314,053	------	------	------	DETAINED SOUTH (2)
15	SCS Runoff	315.10	1	729	1,194,560	------	------	------	DETAINED SOUTH (3)
16	SCS Runoff	34.97	1	721	88,470	------	------	------	SOUTH
17	Combine	490.29	1	726	1,797,159	13, 14, 15, 16	------	------	POI SOUTH
18	Reservoir	8.663	1	752	197,924	13	1036.78	103,056	ROUTED DET SOUTH (1)
19	Combine	103.75	1	725	511,978	14, 18	------	------	ROUTED (1) + DETAINED SOUTH (
20	Reservoir	9.843	1	902	437,786	19	1033.87	253,286	ROUTED HYD NO. 19
21	Reservoir	65.87	1	756	991,644	15	1007.38	644,856	ROUTED DET SOUTH (3)
22	Combine	77.98	1	753	1,517,901	16, 20, 21	------	------	POI SOUTH ATTENUATED

Hydrograph Report

Hyd. No. 1

EX NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	5.673 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.98 hrs
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

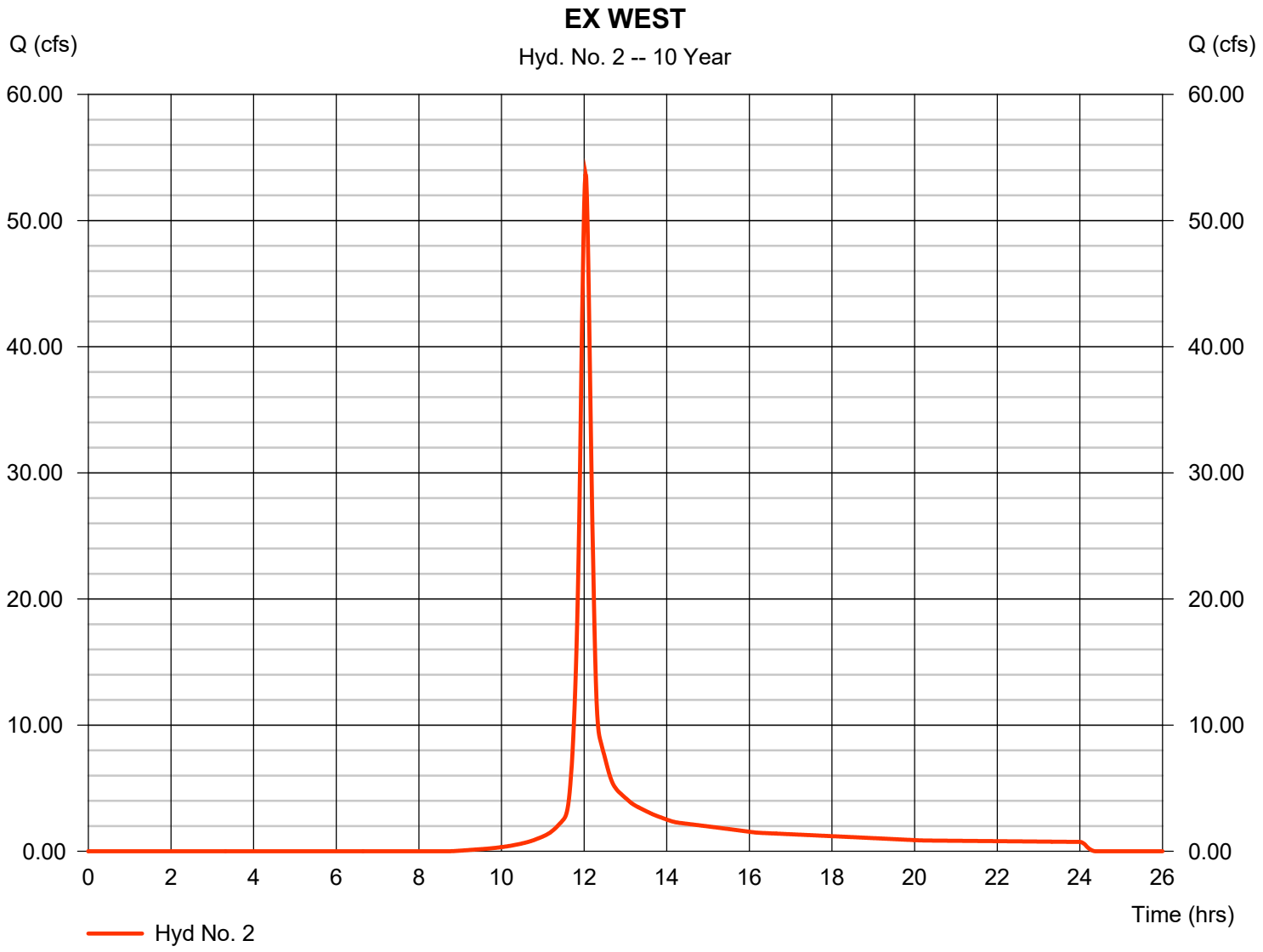


Hydrograph Report

Hyd. No. 2

EX WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	53.68 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
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

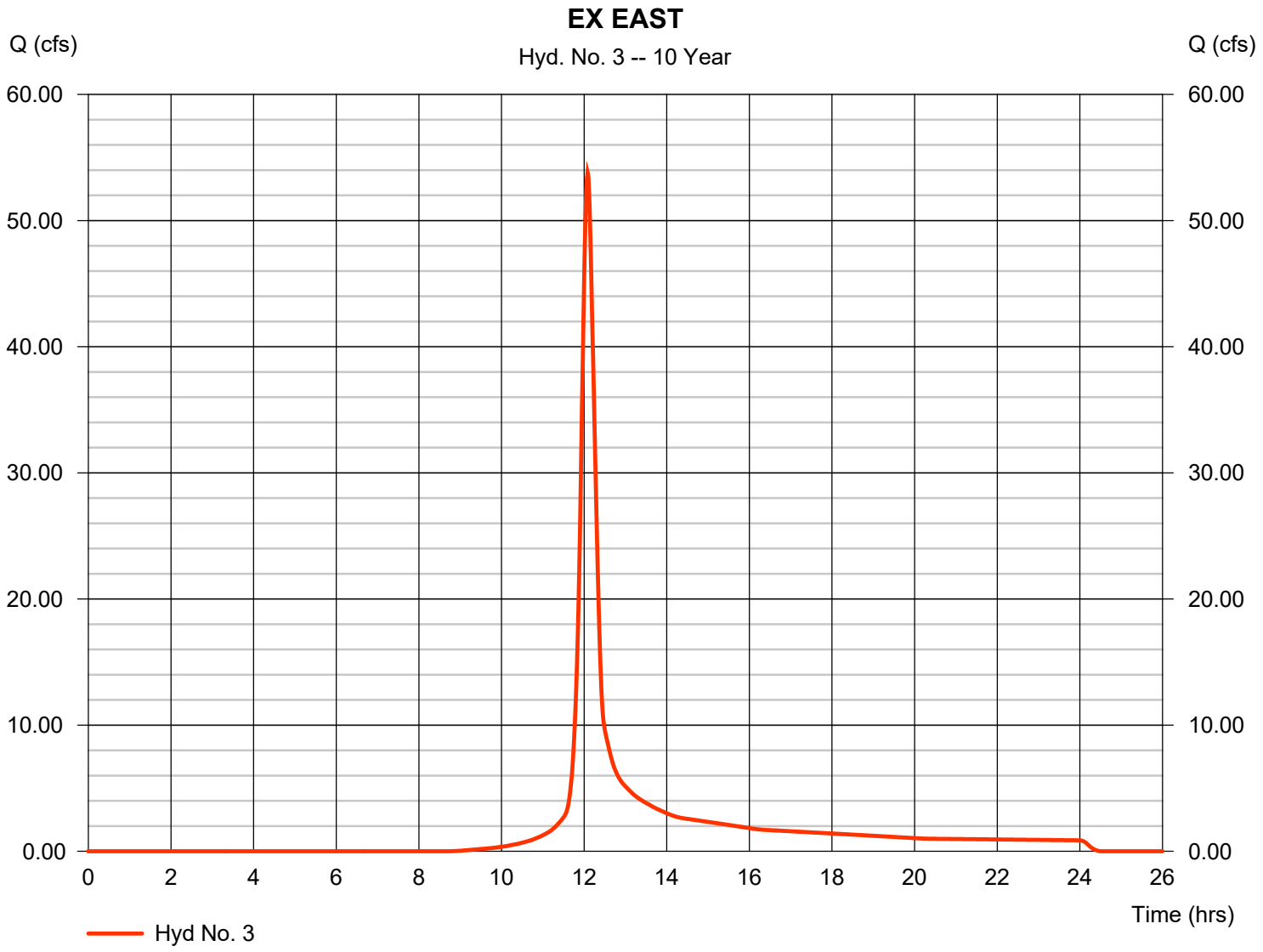


Hydrograph Report

Hyd. No. 3

EX EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	53.82 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.08 hrs
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

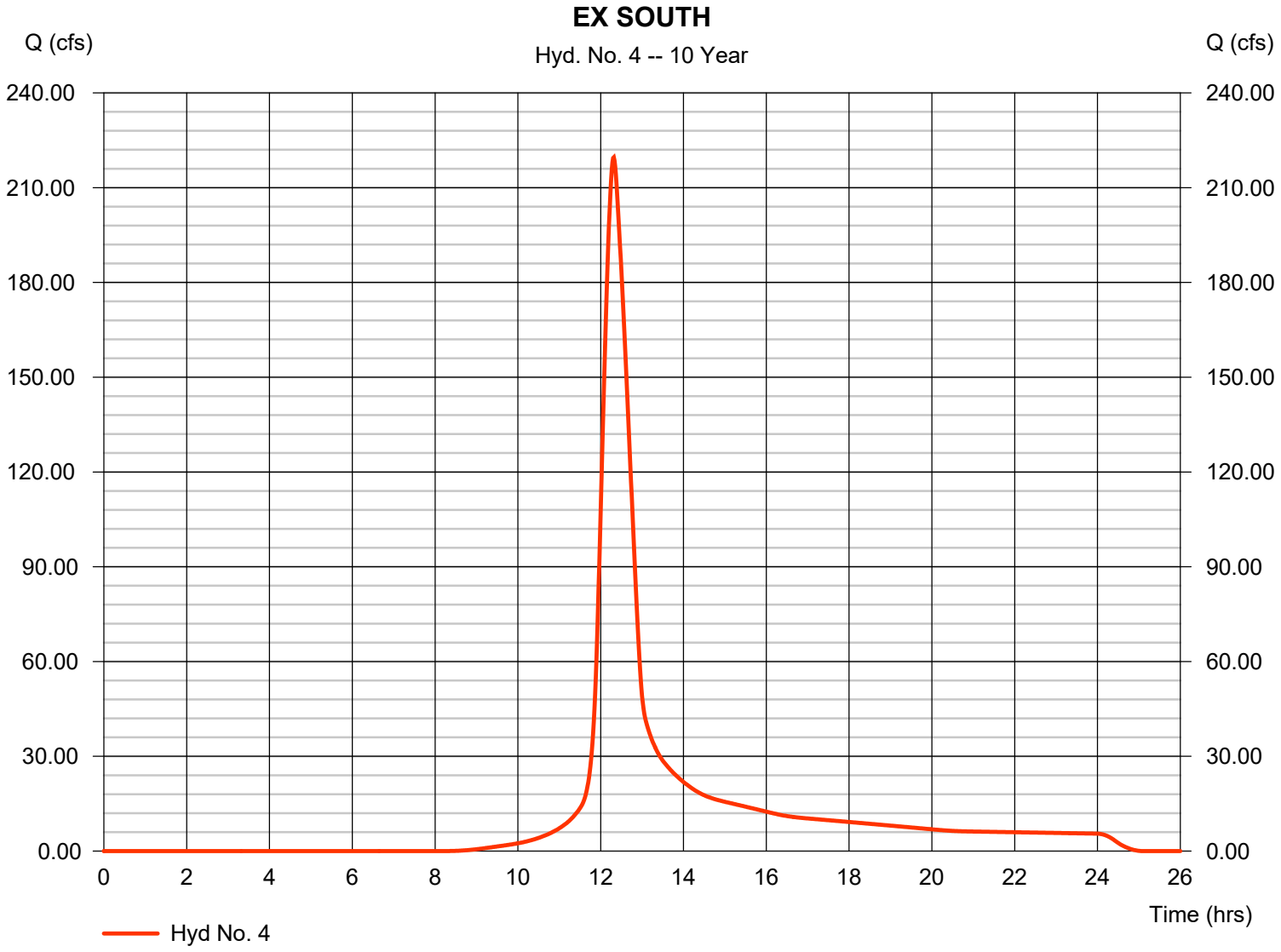


Hydrograph Report

Hyd. No. 4

EX SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	219.62 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.32 hrs
Time interval	=	1 min	Hyd. volume	=	1,102,615 cuft
Drainage area	=	111.890 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	41.50 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

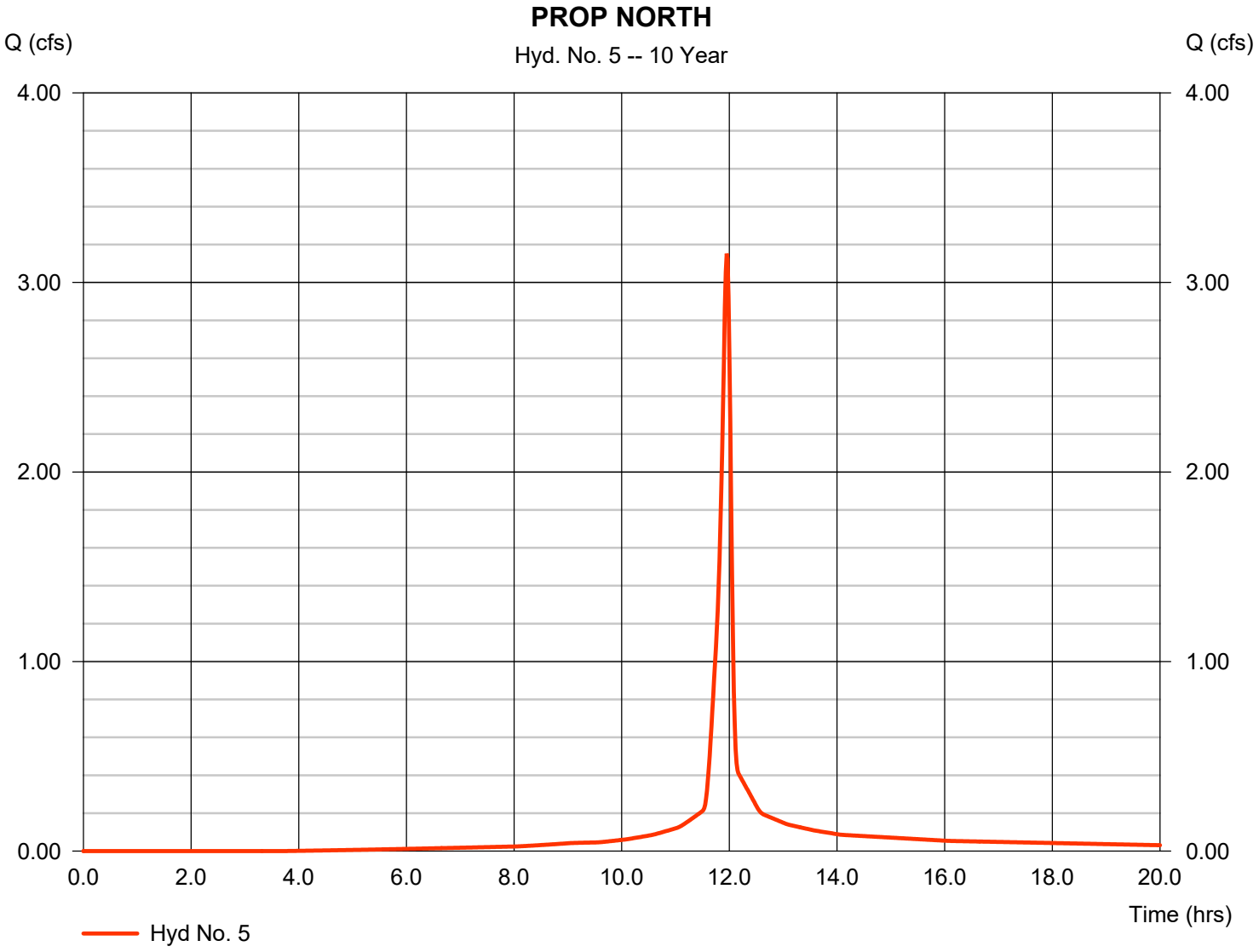


Hydrograph Report

Hyd. No. 5

PROP NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	3.153 cfs
Storm frequency	=	10 yrs	Time to peak	=	11.95 hrs
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

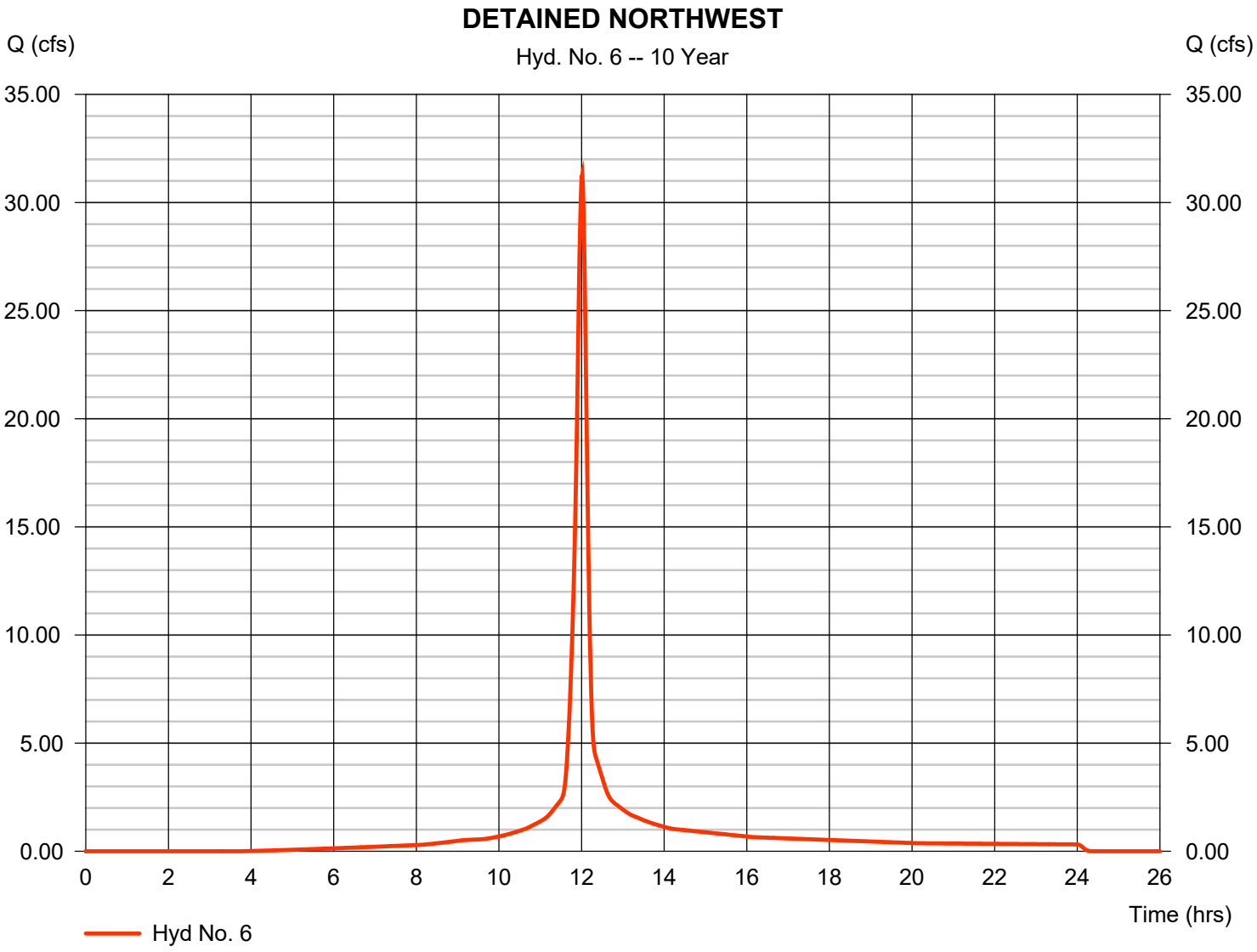


Hydrograph Report

Hyd. No. 6

DETAINED NORTHWEST

Hydrograph type	= SCS Runoff	Peak discharge	= 31.29 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.02 hrs
Time interval	= 1 min	Hyd. volume	= 83,321 cuft
Drainage area	= 5.730 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

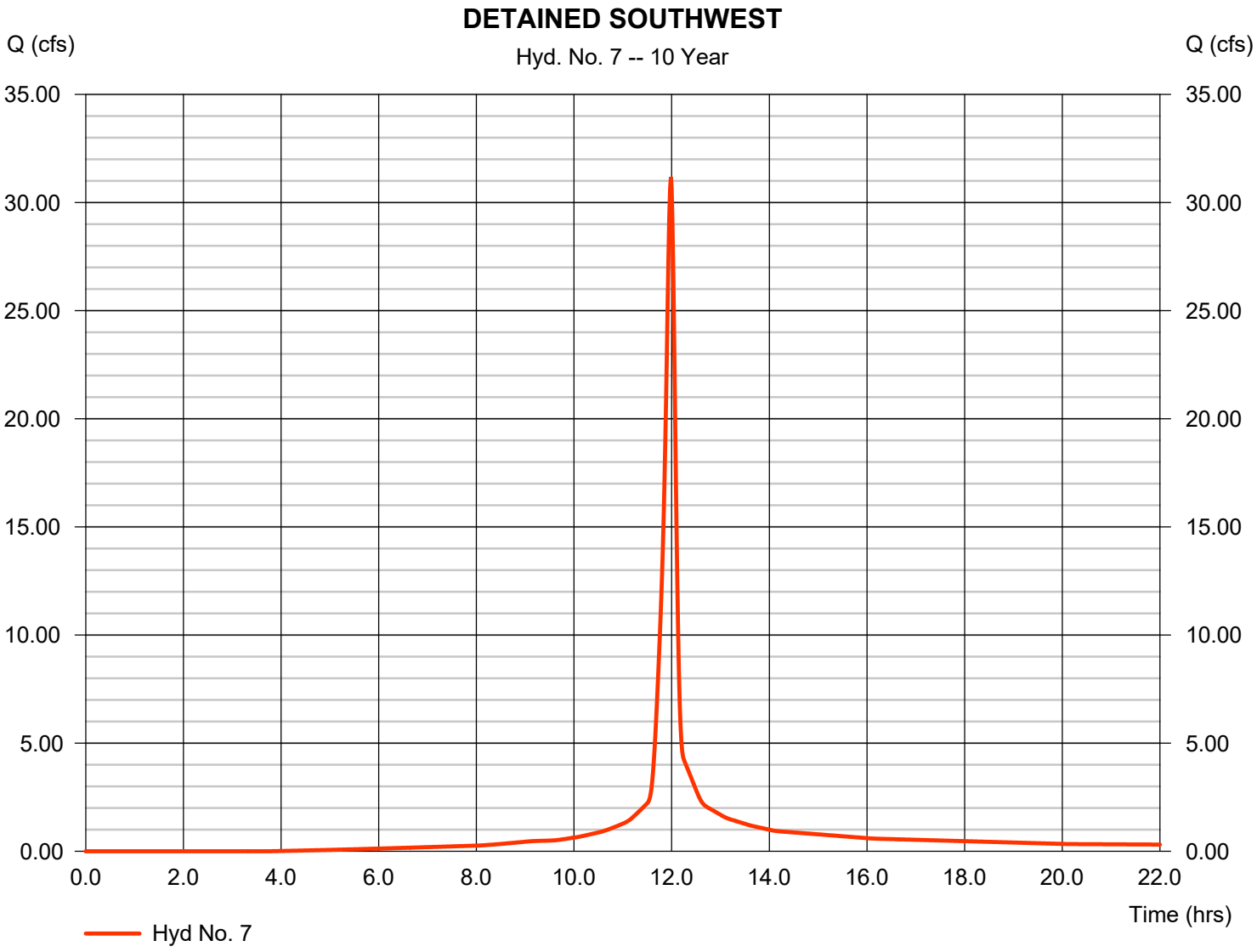


Hydrograph Report

Hyd. No. 7

DETAINED SOUTHWEST

Hydrograph type	= SCS Runoff	Peak discharge	= 31.17 cfs
Storm frequency	= 10 yrs	Time to peak	= 11.98 hrs
Time interval	= 1 min	Hyd. volume	= 74,894 cuft
Drainage area	= 5.070 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

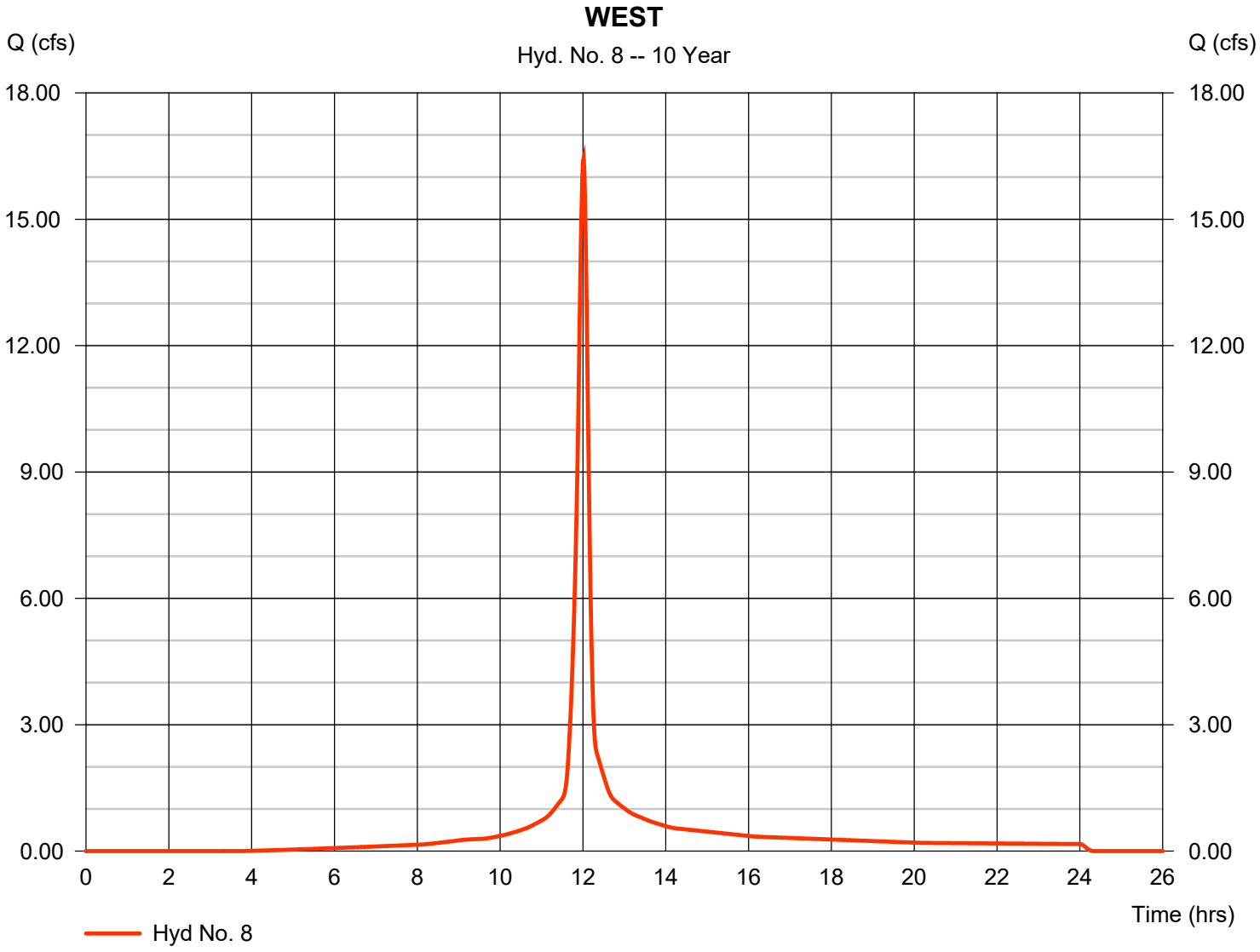


Hydrograph Report

Hyd. No. 8

WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	16.44 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	43,769 cuft
Drainage area	=	3.010 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.10 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

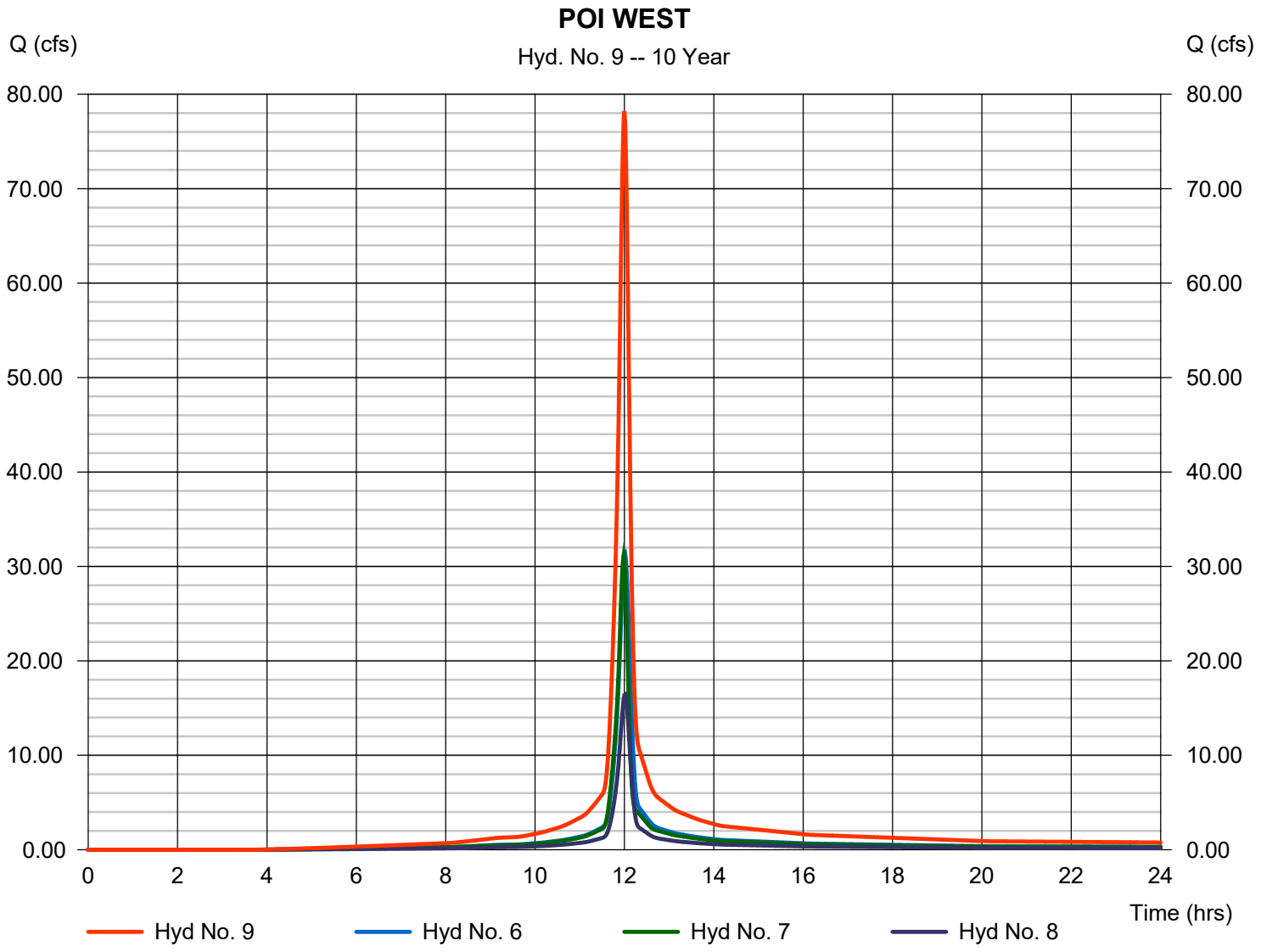


Hydrograph Report

Hyd. No. 9

POI WEST

Hydrograph type	=	Combine	Peak discharge	=	78.22 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	201,984 cuft
Inflow hyds.	=	6, 7, 8	Contrib. drain. area	=	13.810 ac

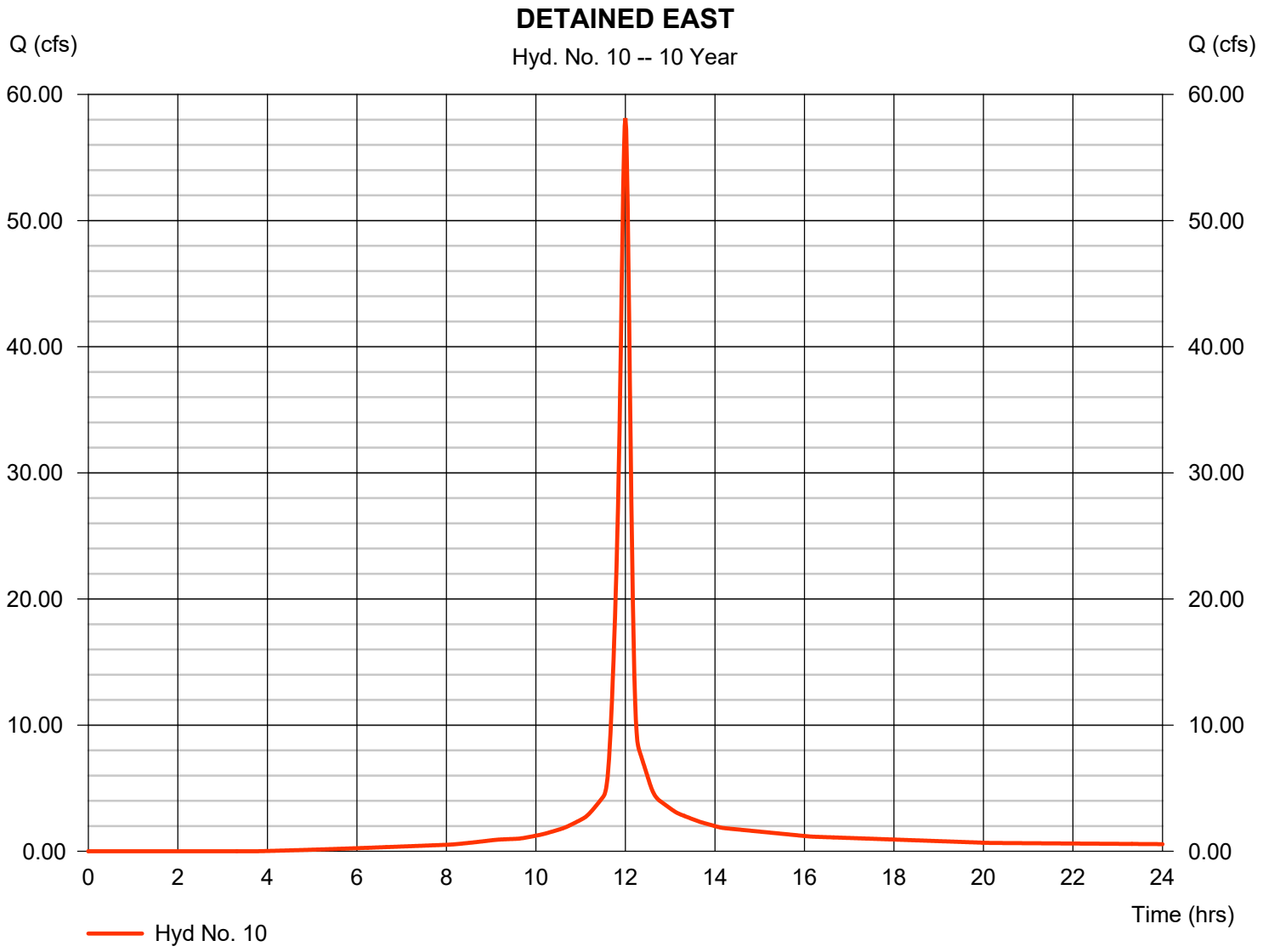


Hydrograph Report

Hyd. No. 10

DETAINED EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	58.12 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	148,403 cuft
Drainage area	=	9.870 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	10.70 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

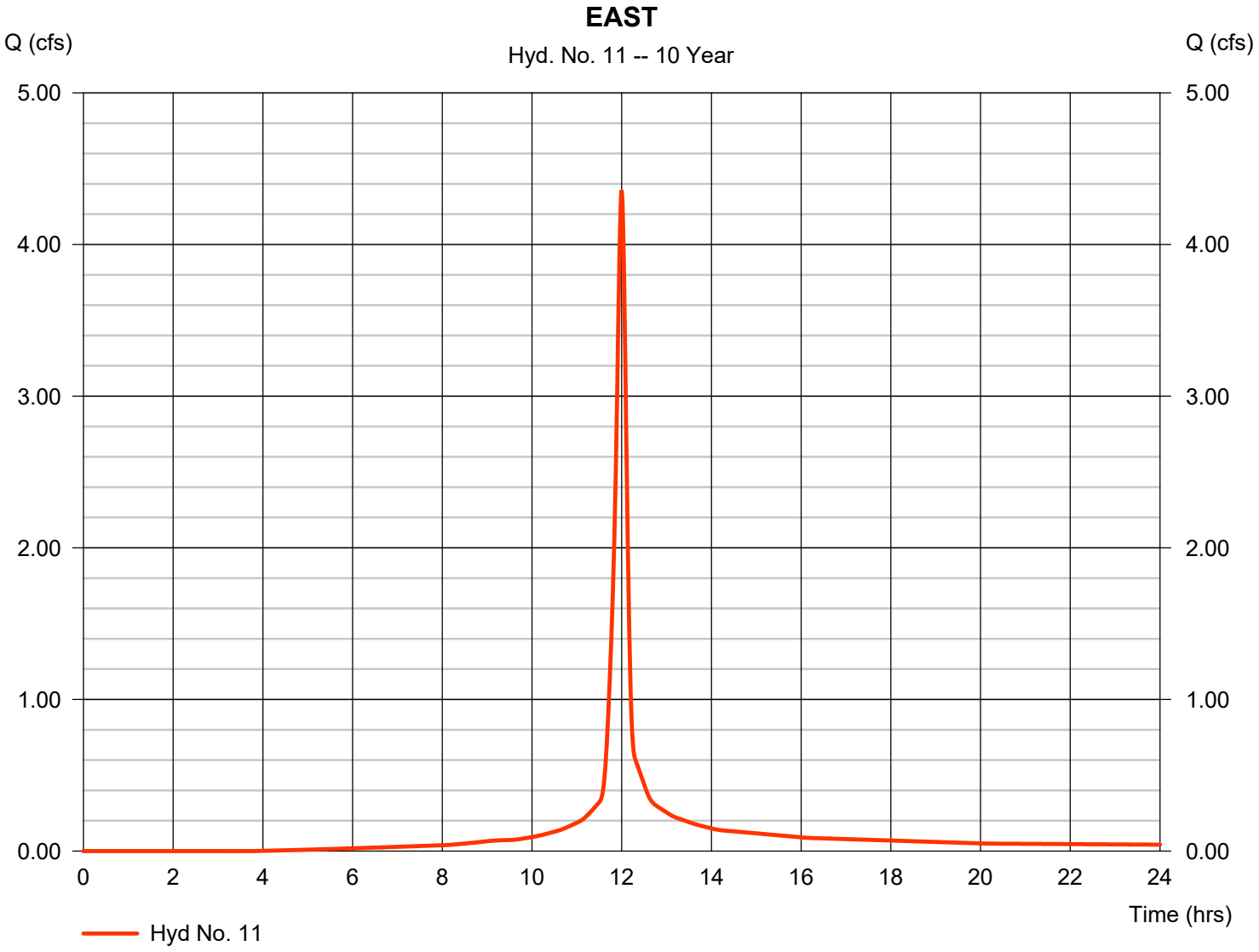


Hydrograph Report

Hyd. No. 11

EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	4.358 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
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

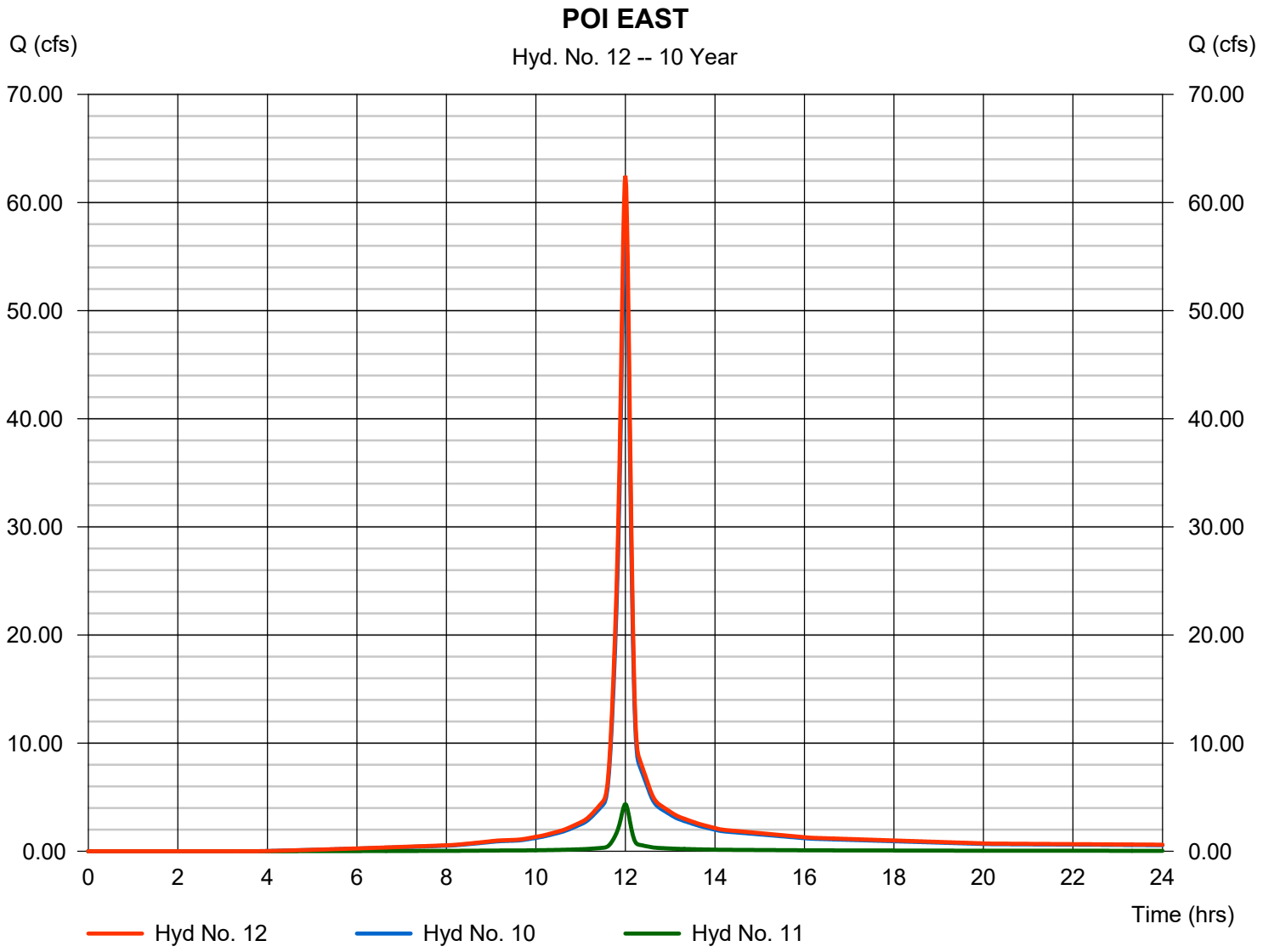


Hydrograph Report

Hyd. No. 12

POI EAST

Hydrograph type	=	Combine	Peak discharge	=	62.48 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	159,530 cuft
Inflow hyds.	=	10, 11	Contrib. drain. area	=	10.610 ac

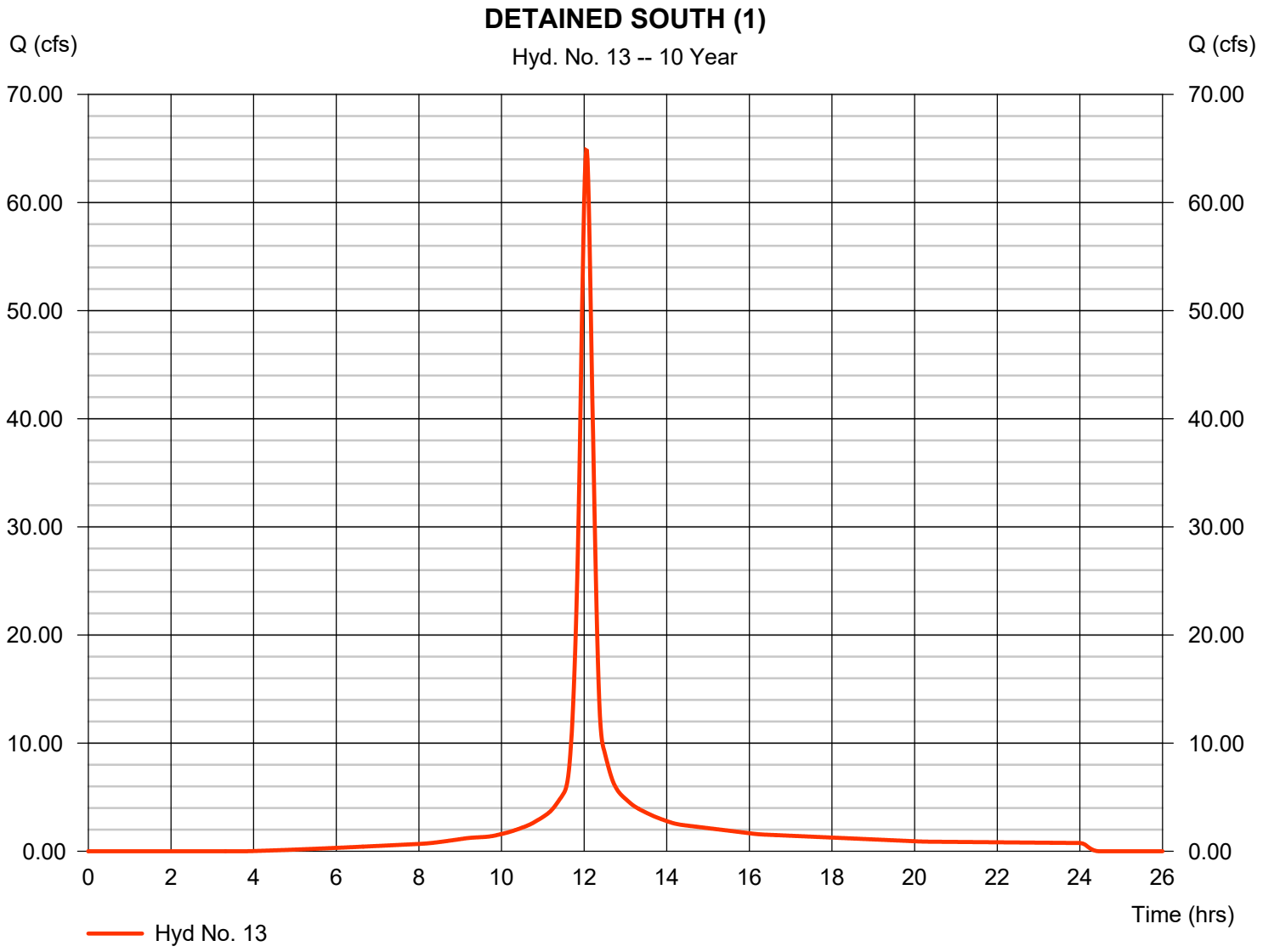


Hydrograph Report

Hyd. No. 13

DETAINED SOUTH (1)

Hydrograph type	=	SCS Runoff	Peak discharge	=	64.84 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.05 hrs
Time interval	=	1 min	Hyd. volume	=	200,077 cuft
Drainage area	=	13.700 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.50 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

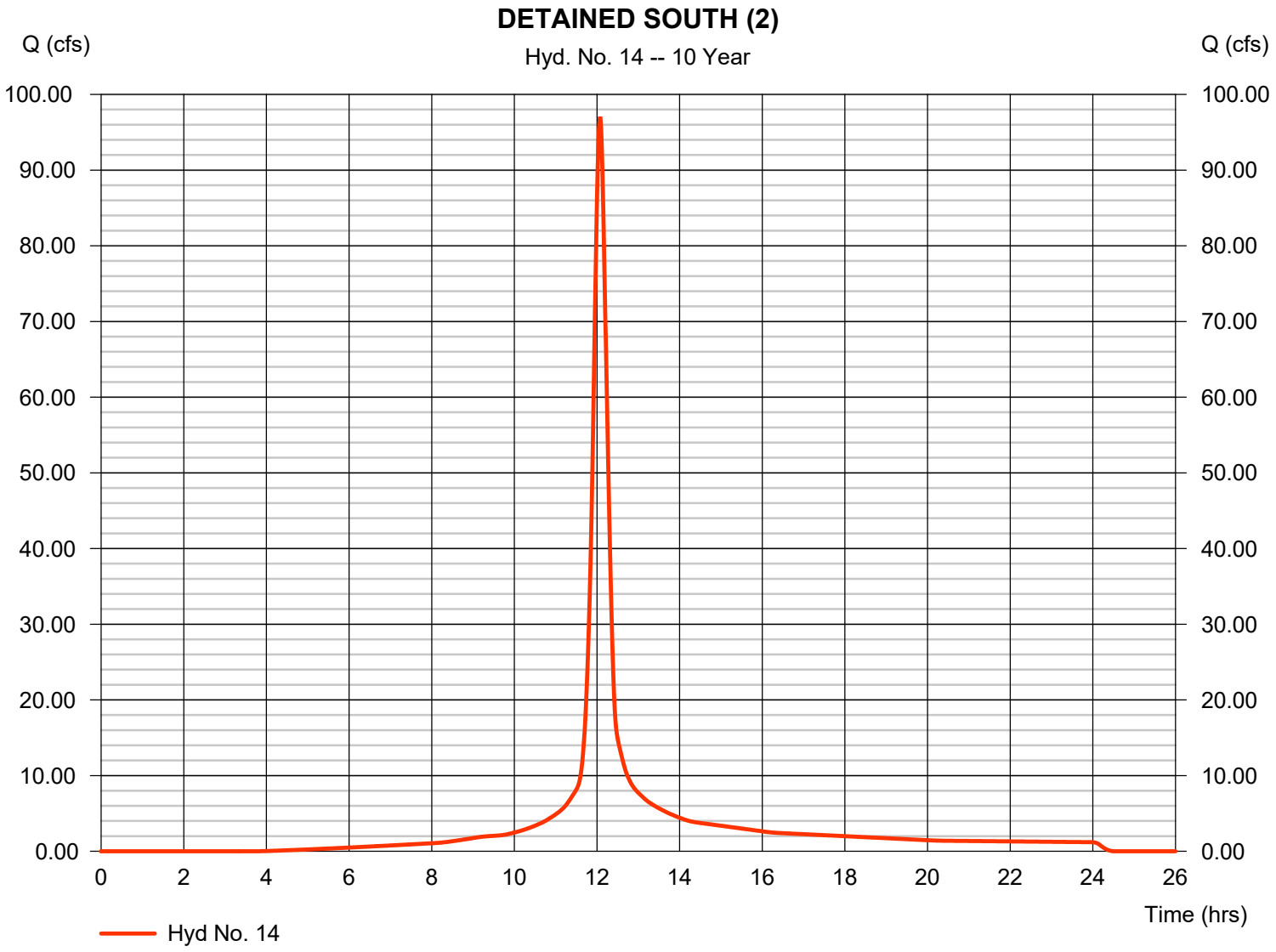


Hydrograph Report

Hyd. No. 14

DETAINED SOUTH (2)

Hydrograph type	=	SCS Runoff	Peak discharge	=	96.82 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.07 hrs
Time interval	=	1 min	Hyd. volume	=	314,053 cuft
Drainage area	=	21.260 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.30 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

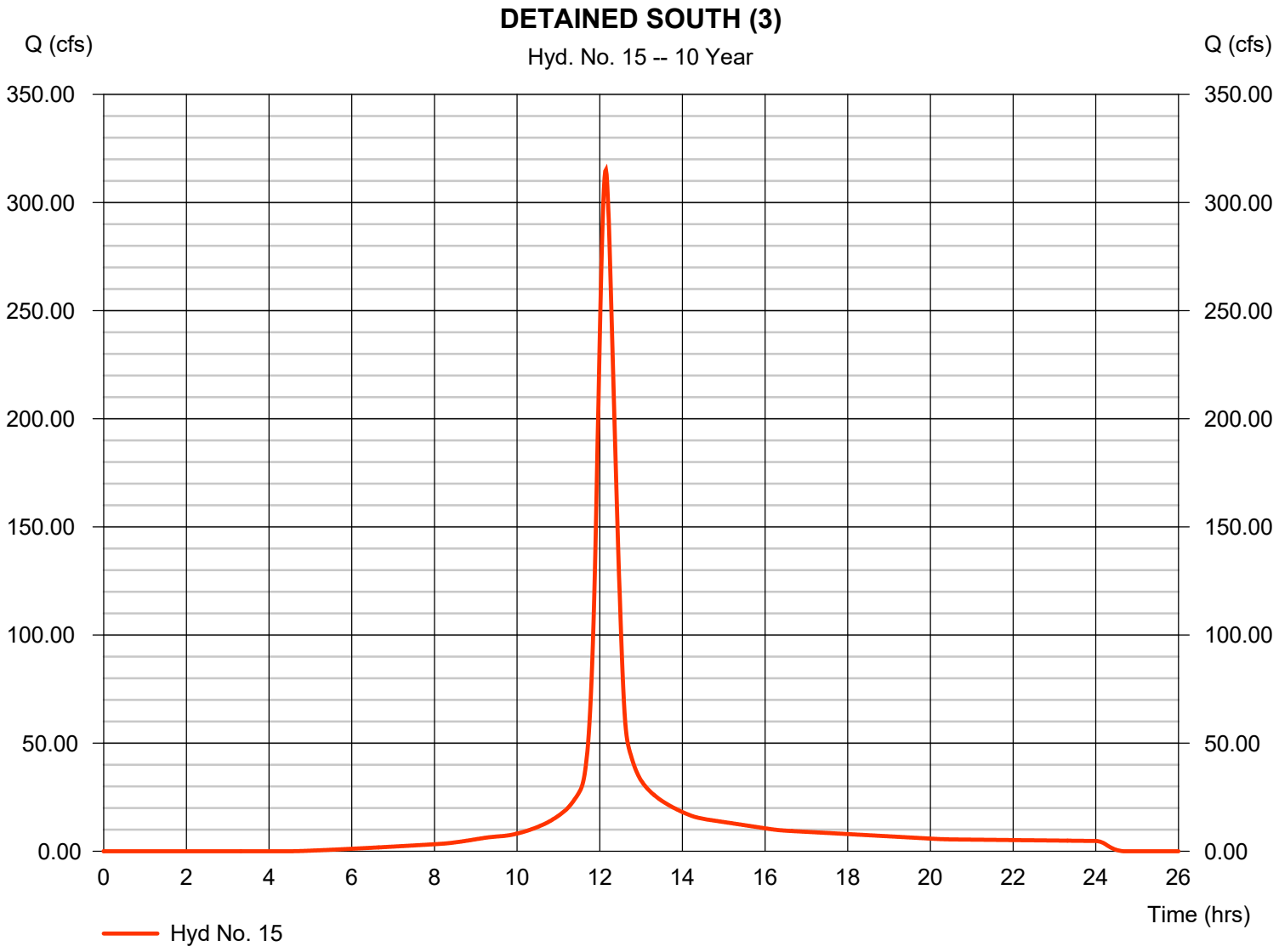


Hydrograph Report

Hyd. No. 15

DETAINED SOUTH (3)

Hydrograph type	=	SCS Runoff	Peak discharge	=	315.10 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.15 hrs
Time interval	=	1 min	Hyd. volume	=	1,194,560 cuft
Drainage area	=	84.610 ac	Curve number	=	88
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	27.00 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

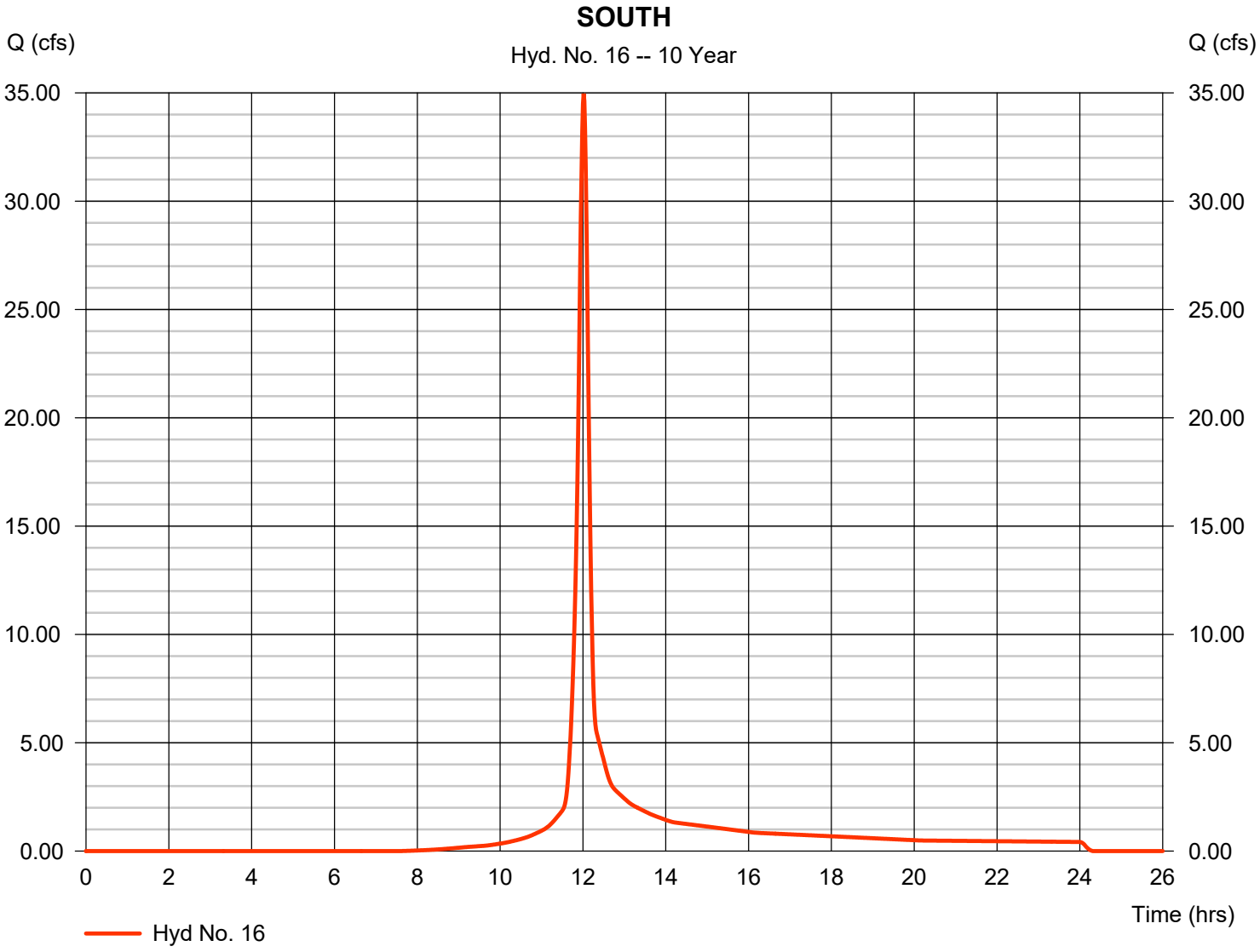


Hydrograph Report

Hyd. No. 16

SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	34.97 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	88,470 cuft
Drainage area	=	8.590 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.80 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

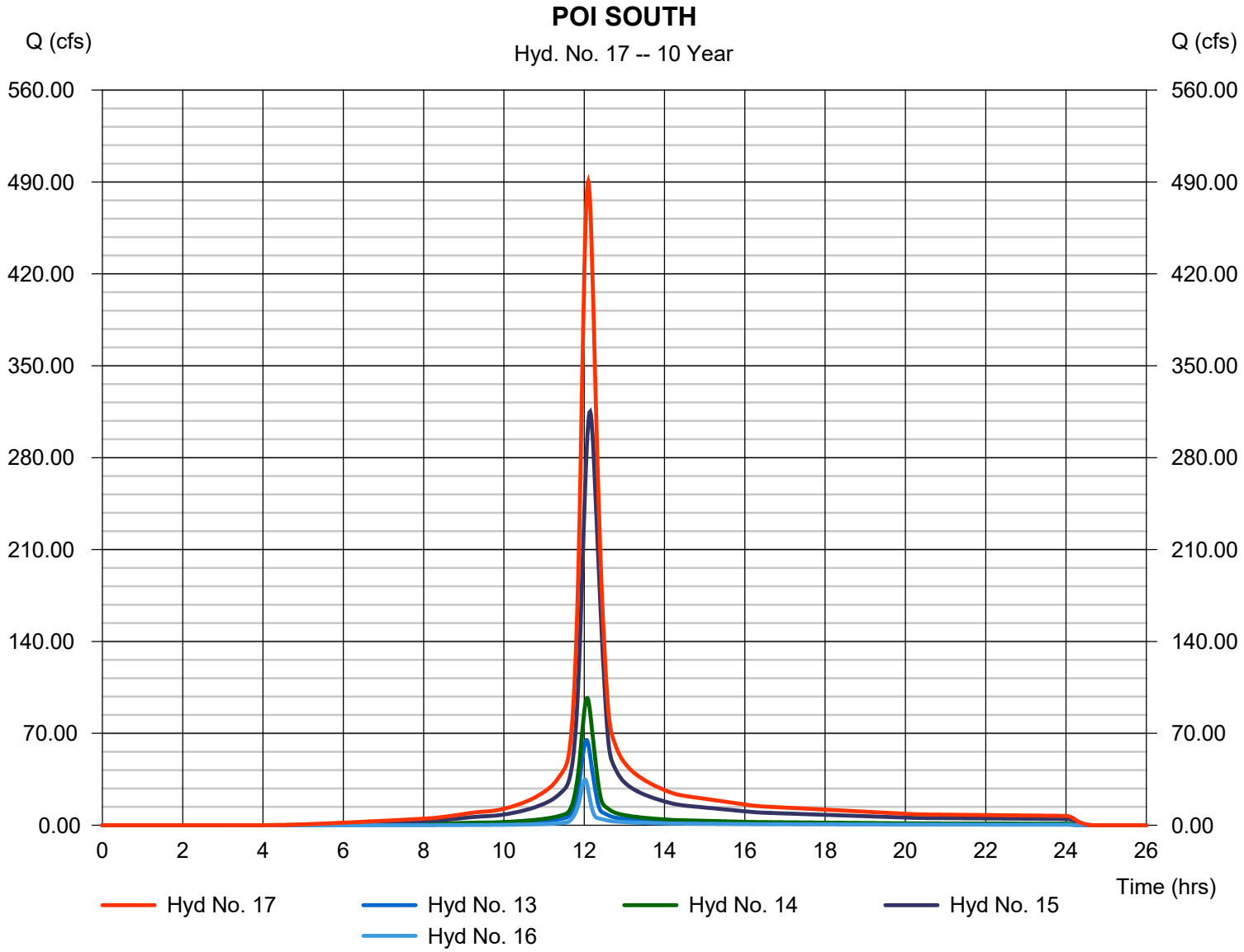


Hydrograph Report

Hyd. No. 17

POI SOUTH

Hydrograph type	=	Combine	Peak discharge	=	490.29 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.10 hrs
Time interval	=	1 min	Hyd. volume	=	1,797,159 cuft
Inflow hyds.	=	13, 14, 15, 16	Contrib. drain. area	=	128.160 ac



Hydrograph Report

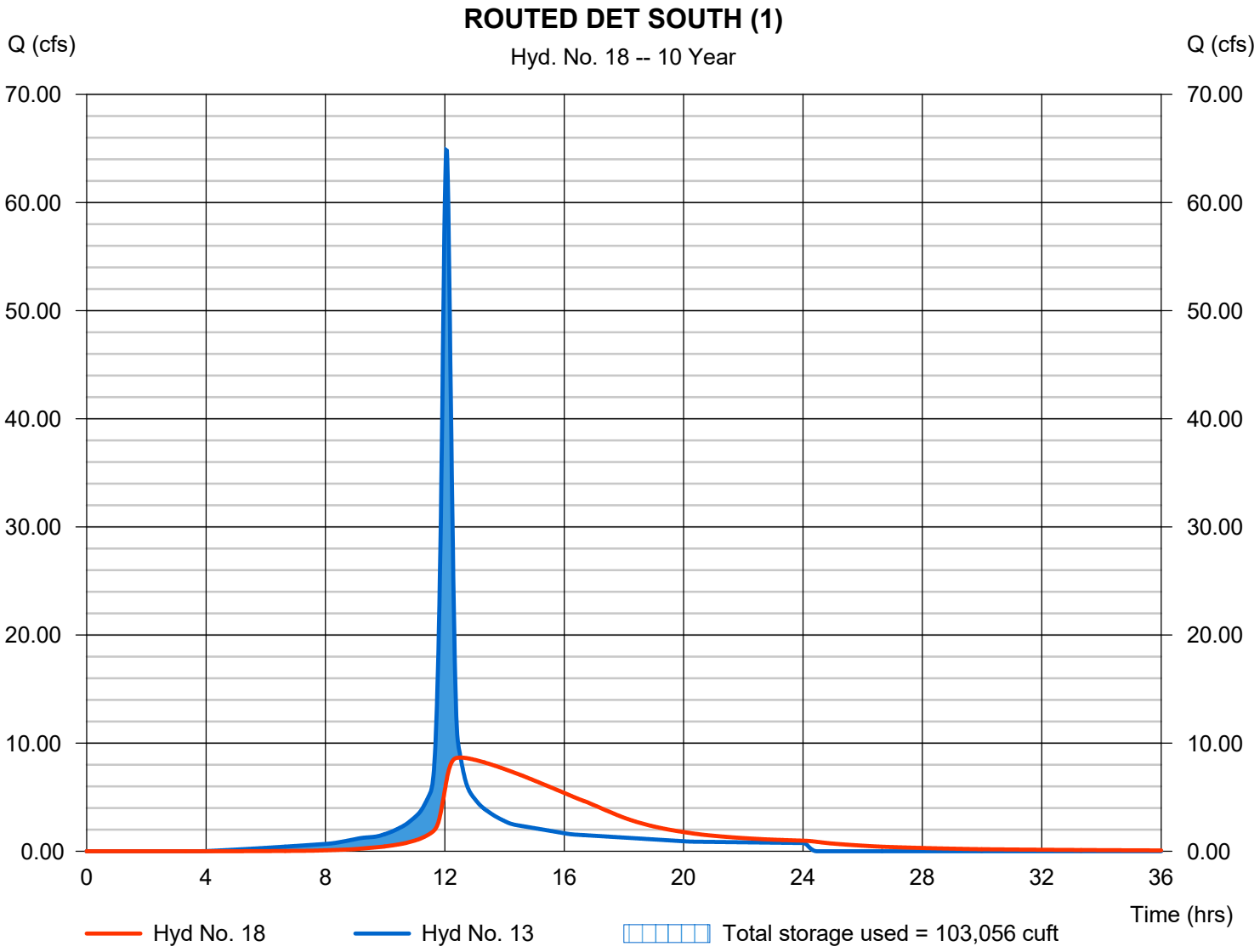
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Sunday, 08 / 10 / 2025

Hyd. No. 18

ROUTED DET SOUTH (1)

Hydrograph type	=	Reservoir	Peak discharge	=	8.663 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.53 hrs
Time interval	=	1 min	Hyd. volume	=	197,924 cuft
Inflow hyd. No.	=	13 - DETAINED SOUTH (1)	Max. Elevation	=	1036.78 ft
Reservoir name	=	South Retention Basin (1)	Max. Storage	=	103,056 cuft

Storage Indication method used.

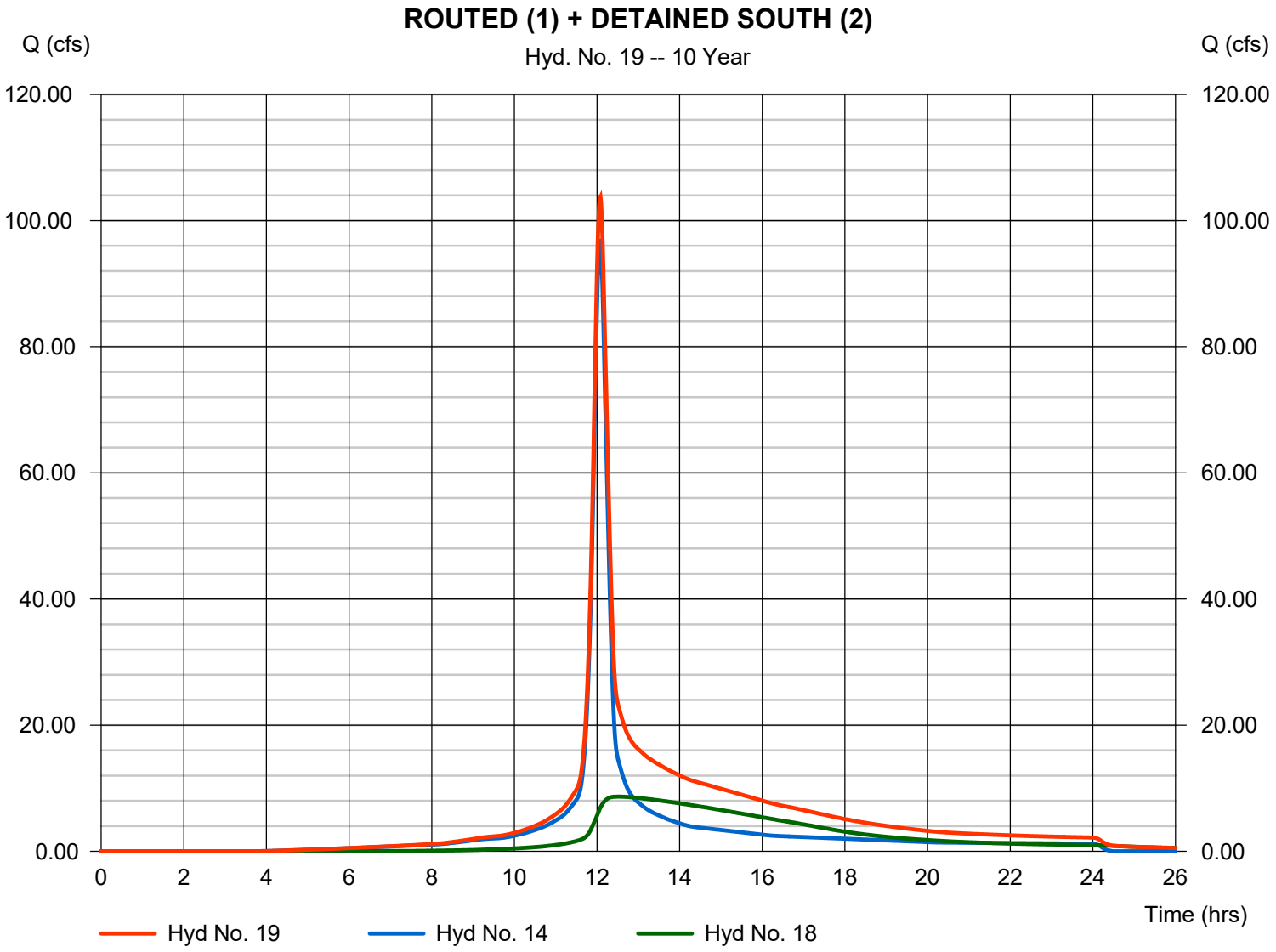


Hydrograph Report

Hyd. No. 19

ROUTED (1) + DETAINED SOUTH (2)

Hydrograph type	=	Combine	Peak discharge	=	103.75 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.08 hrs
Time interval	=	1 min	Hyd. volume	=	511,978 cuft
Inflow hyds.	=	14, 18	Contrib. drain. area	=	21.260 ac



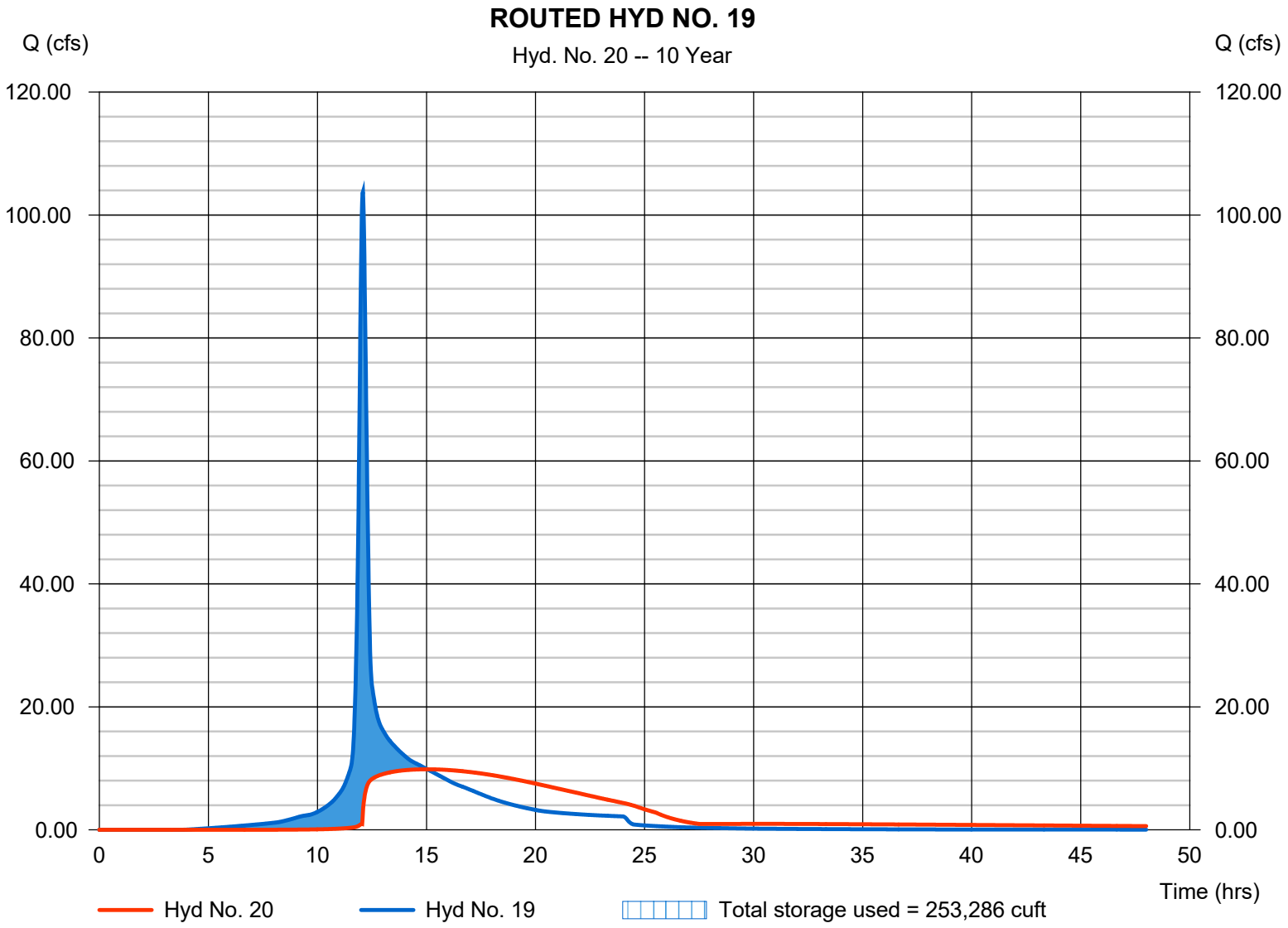
Hydrograph Report

Hyd. No. 20

ROUTED HYD NO. 19

Hydrograph type	=	Reservoir	Peak discharge	=	9.843 cfs
Storm frequency	=	10 yrs	Time to peak	=	15.03 hrs
Time interval	=	1 min	Hyd. volume	=	437,786 cuft
Inflow hyd. No.	=	19 - ROUTED (1) + DETAINED/OUTLET (2)	Max. Elevation	=	1033.87 ft
Reservoir name	=	South Retention Basin (2)	Max. Storage	=	253,286 cuft

Storage Indication method used.



Hydrograph Report

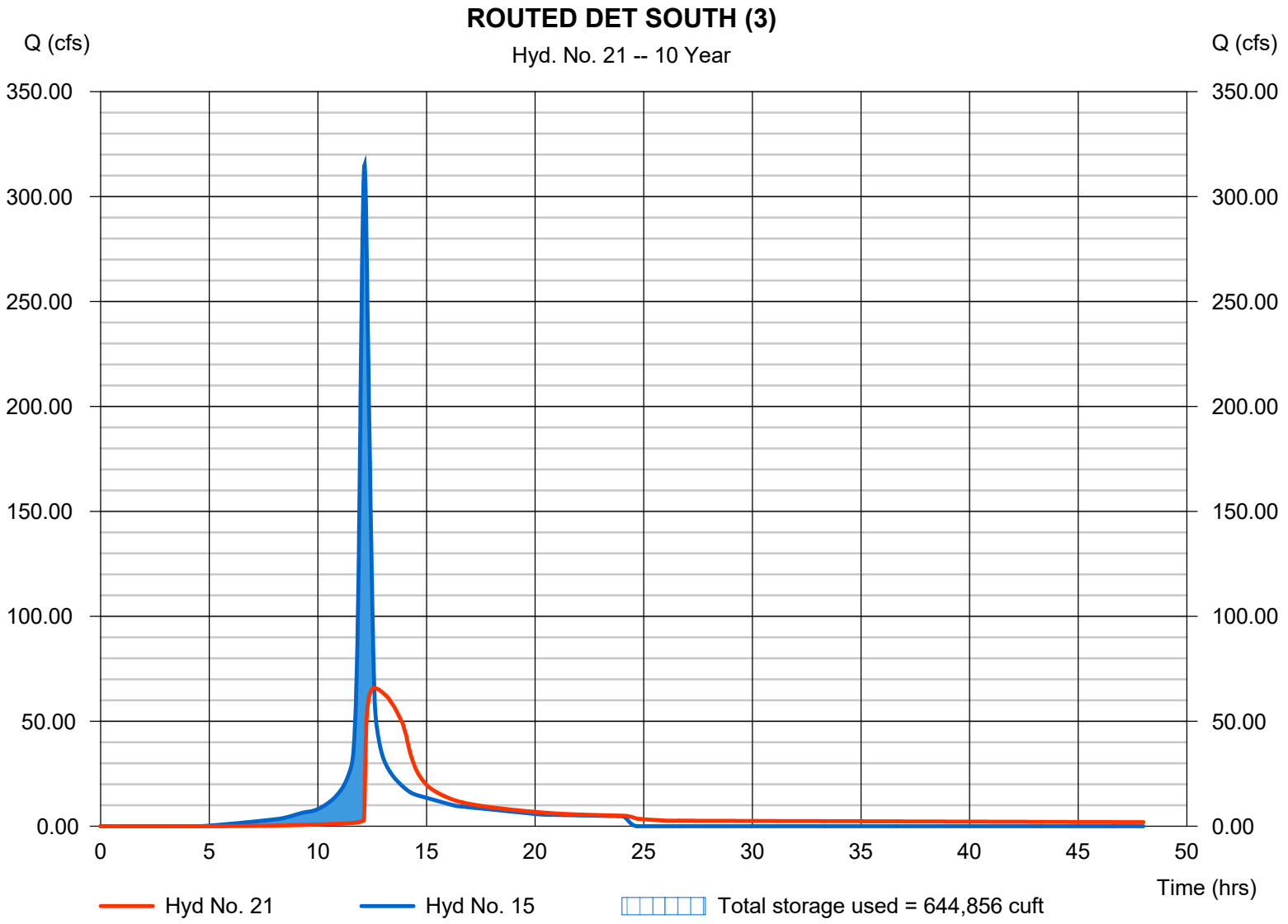
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Sunday, 08 / 10 / 2025

Hyd. No. 21

ROUTED DET SOUTH (3)

Hydrograph type	=	Reservoir	Peak discharge	=	65.87 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.60 hrs
Time interval	=	1 min	Hyd. volume	=	991,644 cuft
Inflow hyd. No.	=	15 - DETAINED SOUTH (3)	Max. Elevation	=	1007.38 ft
Reservoir name	=	South Retention Basin (3)	Max. Storage	=	644,856 cuft

Storage Indication method used.

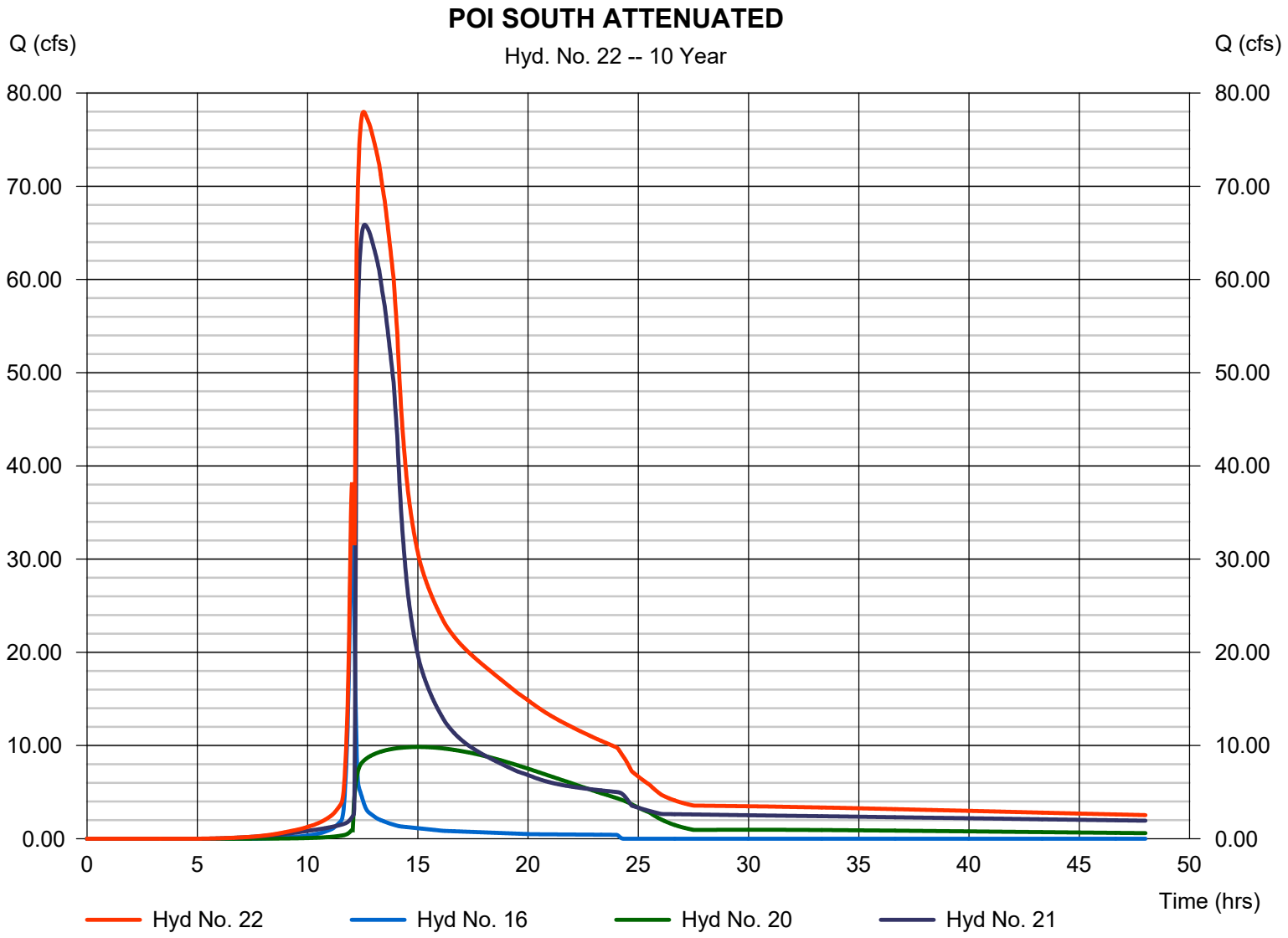


Hydrograph Report

Hyd. No. 22

POI SOUTH ATTENUATED

Hydrograph type	=	Combine	Peak discharge	=	77.98 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.55 hrs
Time interval	=	1 min	Hyd. volume	=	1,517,901 cuft
Inflow hyds.	=	16, 20, 21	Contrib. drain. area	=	8.590 ac



Hydrograph Summary Report

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

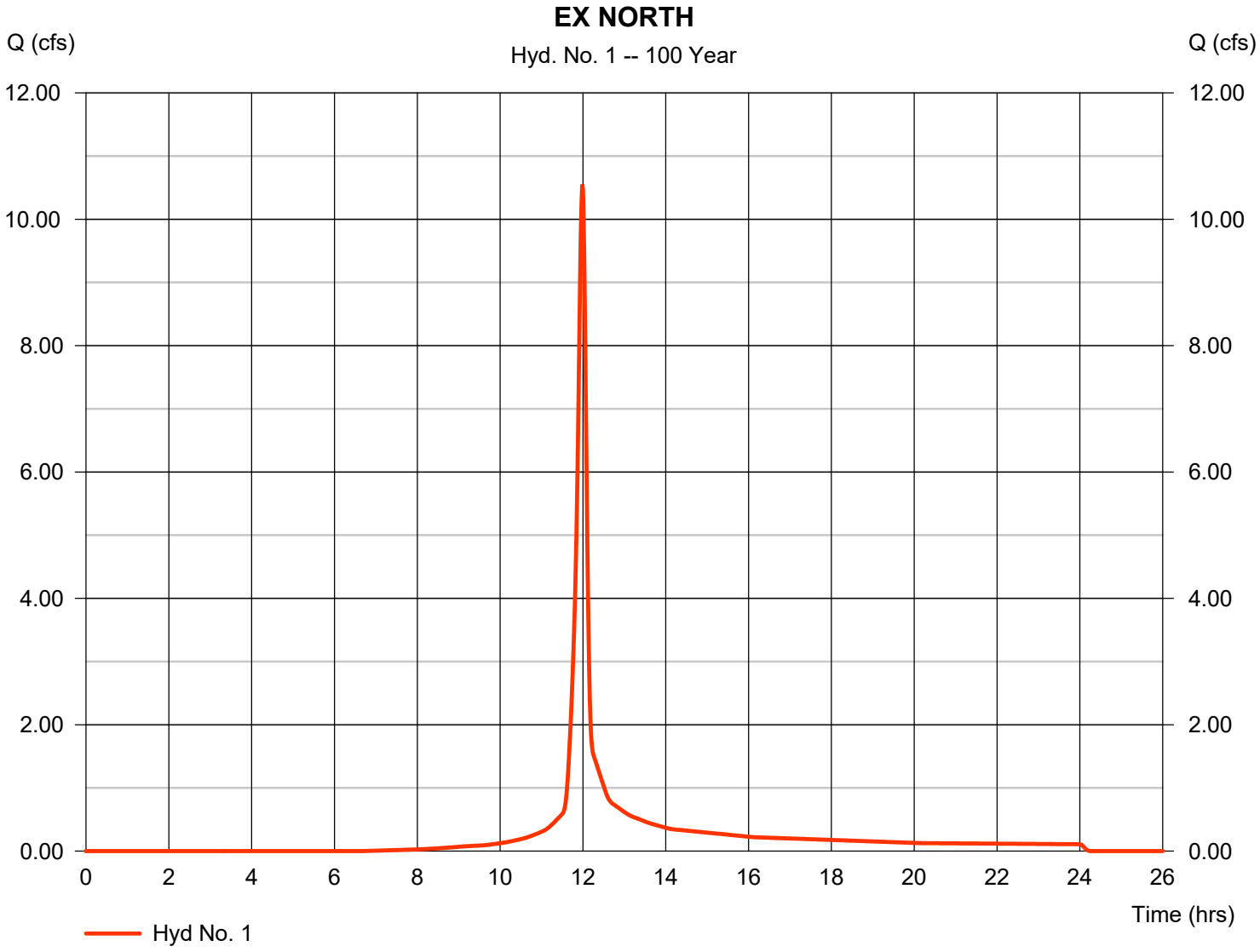
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	10.55	1	719	24,125	------	------	------	EX NORTH
2	SCS Runoff	100.49	1	722	271,582	------	------	------	EX WEST
3	SCS Runoff	101.31	1	725	317,075	------	------	------	EX EAST
4	SCS Runoff	406.40	1	738	2,031,258	------	------	------	EX SOUTH
5	SCS Runoff	4.959	1	717	11,133	------	------	------	PROP NORTH
6	SCS Runoff	49.35	1	721	135,314	------	------	------	DETAINED NORTHWEST
7	SCS Runoff	49.10	1	719	121,628	------	------	------	DETAINED SOUTHWEST
8	SCS Runoff	25.92	1	721	71,081	------	------	------	WEST
9	Combine	123.33	1	720	328,023	6, 7, 8	------	------	POI WEST
10	SCS Runoff	91.62	1	720	241,007	------	------	------	DETAINED EAST
11	SCS Runoff	6.869	1	720	18,069	------	------	------	EAST
12	Combine	98.49	1	720	259,077	10, 11	------	------	POI EAST
13	SCS Runoff	102.63	1	723	324,925	------	------	------	DETAINED SOUTH (1)
14	SCS Runoff	153.36	1	724	510,023	------	------	------	DETAINED SOUTH (2)
15	SCS Runoff	508.51	1	729	1,972,592	------	------	------	DETAINED SOUTH (3)
16	SCS Runoff	62.14	1	721	159,809	------	------	------	SOUTH
17	Combine	791.36	1	726	2,967,350	13, 14, 15, 16	------	------	POI SOUTH
18	Reservoir	11.30	1	757	322,647	13	1038.28	168,609	ROUTED DET SOUTH (1)
19	Combine	162.41	1	725	832,670	14, 18	------	------	ROUTED (1) + DETAINED SOUTH (
20	Reservoir	14.38	1	911	751,942	19	1035.45	407,515	ROUTED HYD NO. 19
21	Reservoir	173.01	1	750	1,766,502	15	1009.44	984,804	ROUTED DET SOUTH (3)
22	Combine	193.24	1	749	2,678,250	16, 20, 21	------	------	POI SOUTH ATTENUATED

Hydrograph Report

Hyd. No. 1

EX NORTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	10.55 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.98 hrs
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

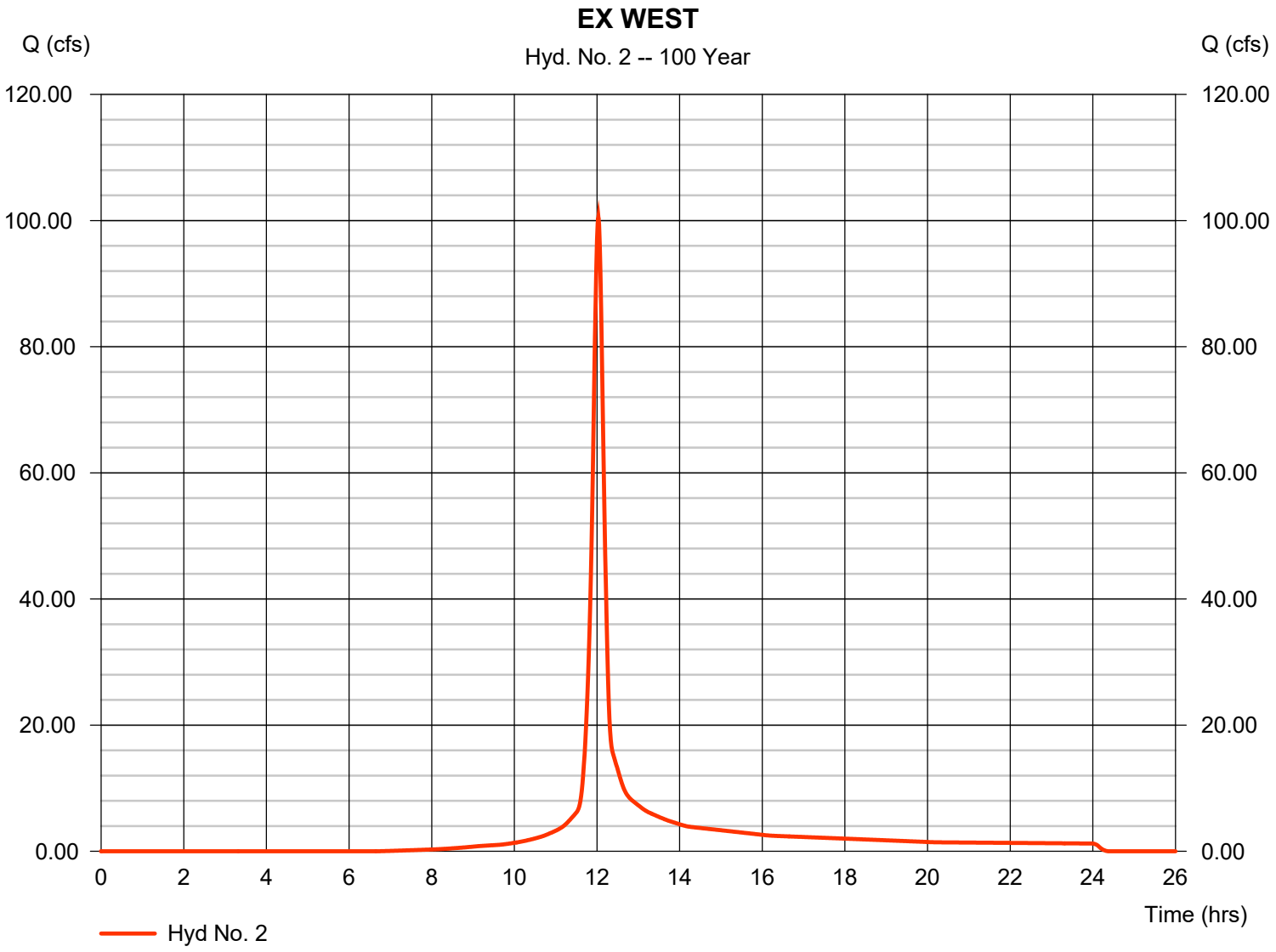


Hydrograph Report

Hyd. No. 2

EX WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	100.49 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
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

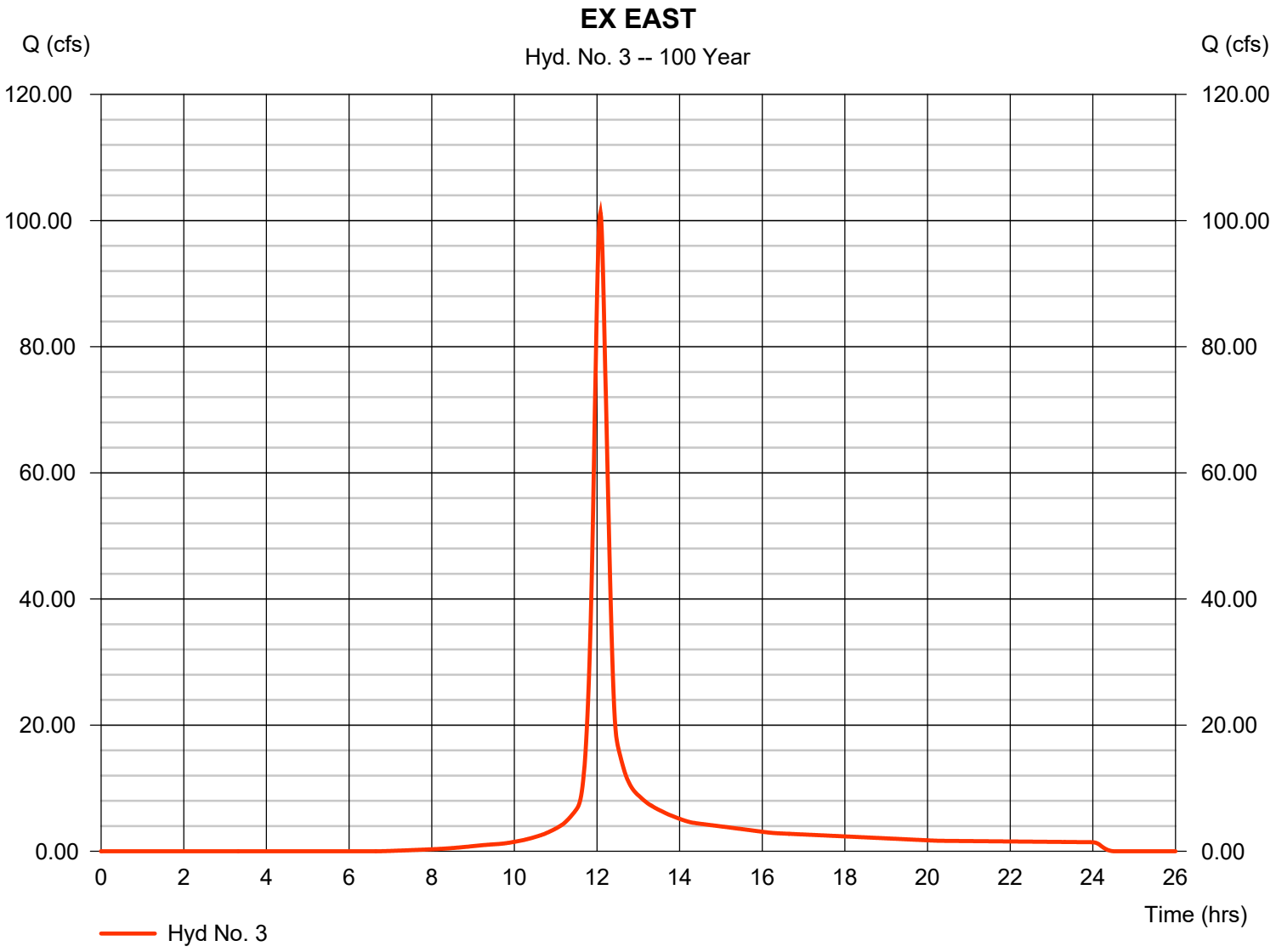


Hydrograph Report

Hyd. No. 3

EX EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	101.31 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.08 hrs
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

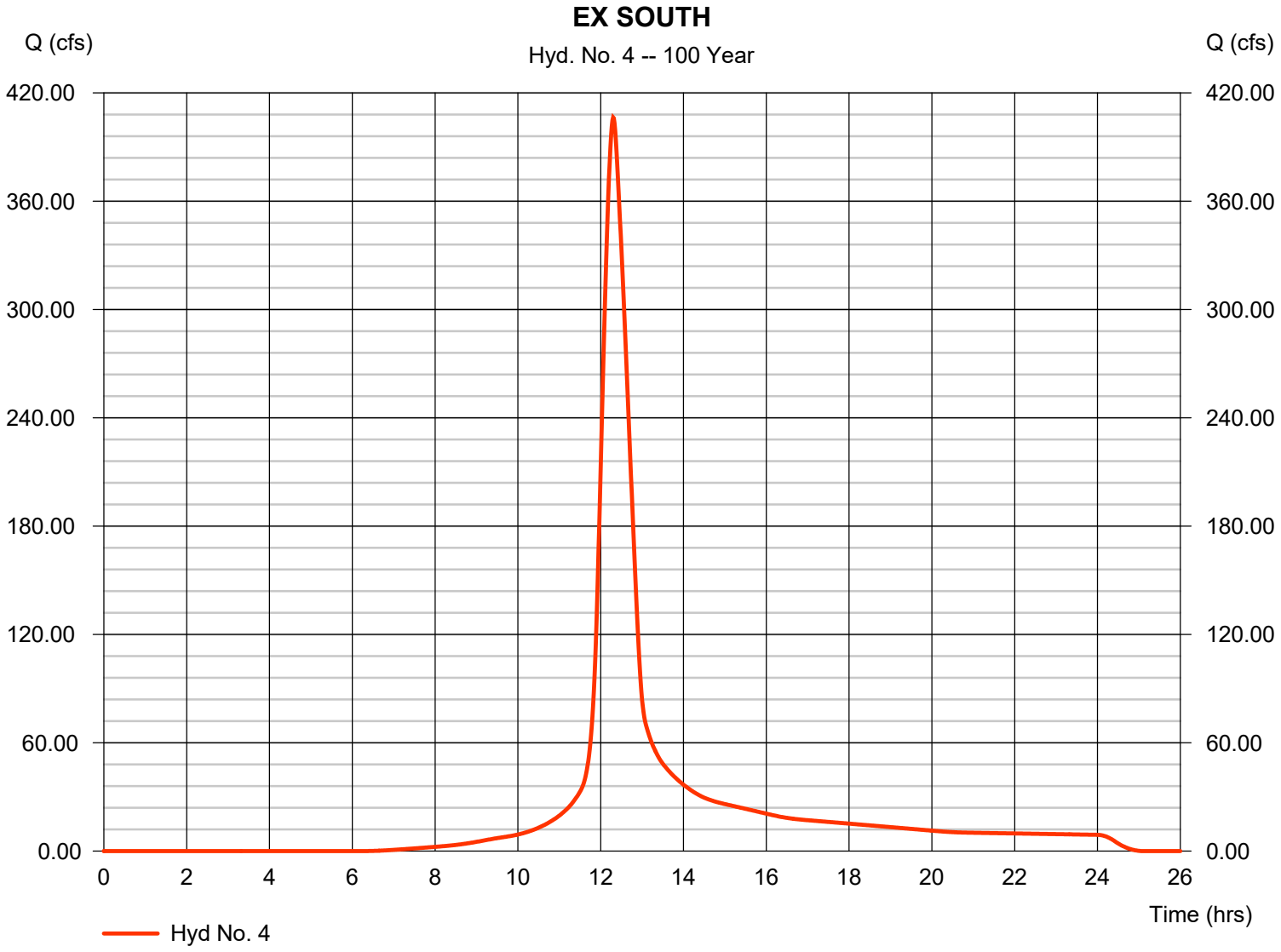


Hydrograph Report

Hyd. No. 4

EX SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	406.40 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.30 hrs
Time interval	=	1 min	Hyd. volume	=	2,031,258 cuft
Drainage area	=	111.890 ac	Curve number	=	76
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	41.50 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

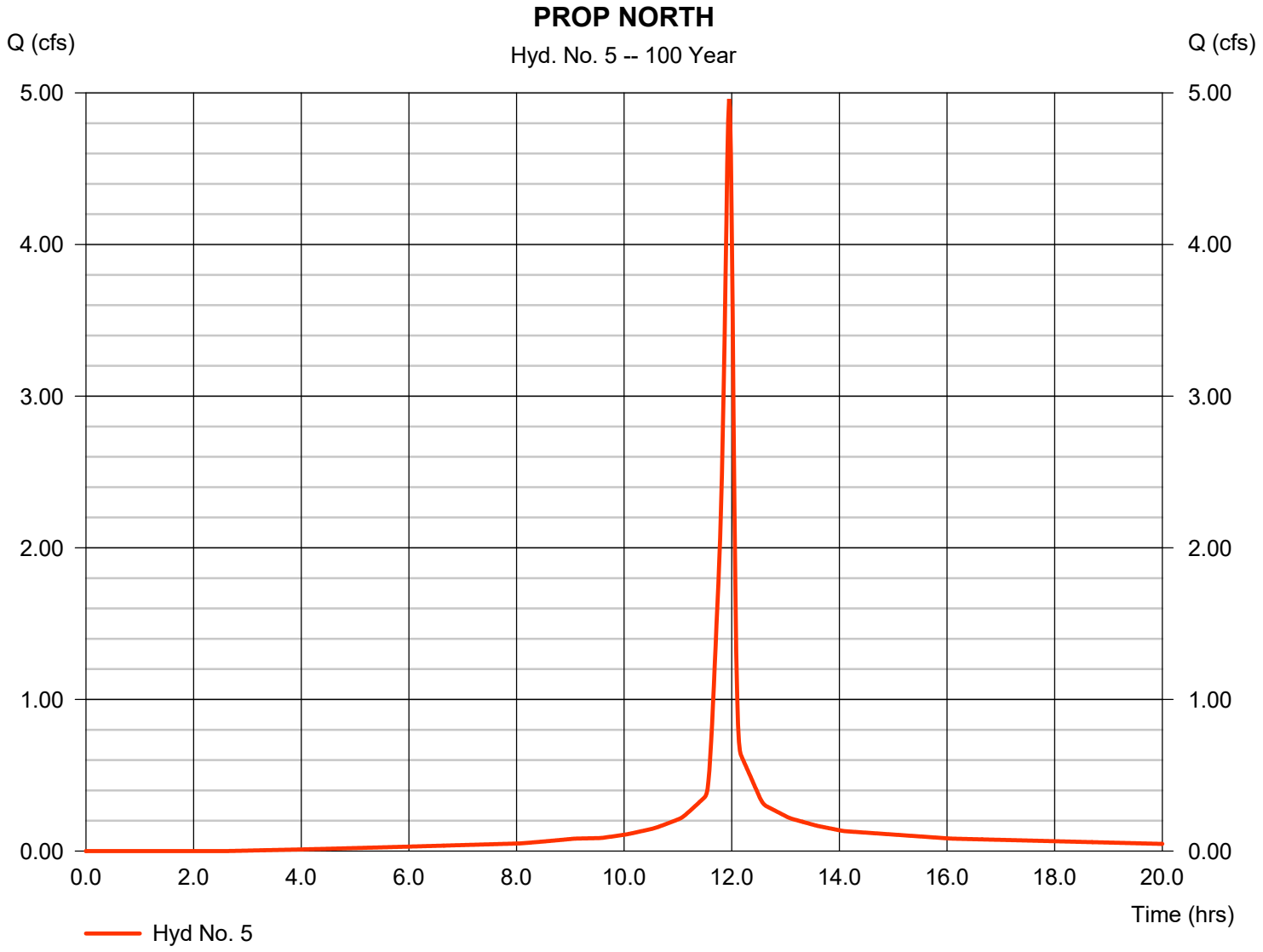


Hydrograph Report

Hyd. No. 5

PROP NORTH

Hydrograph type	= SCS Runoff	Peak discharge	= 4.959 cfs
Storm frequency	= 100 yrs	Time to peak	= 11.95 hrs
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

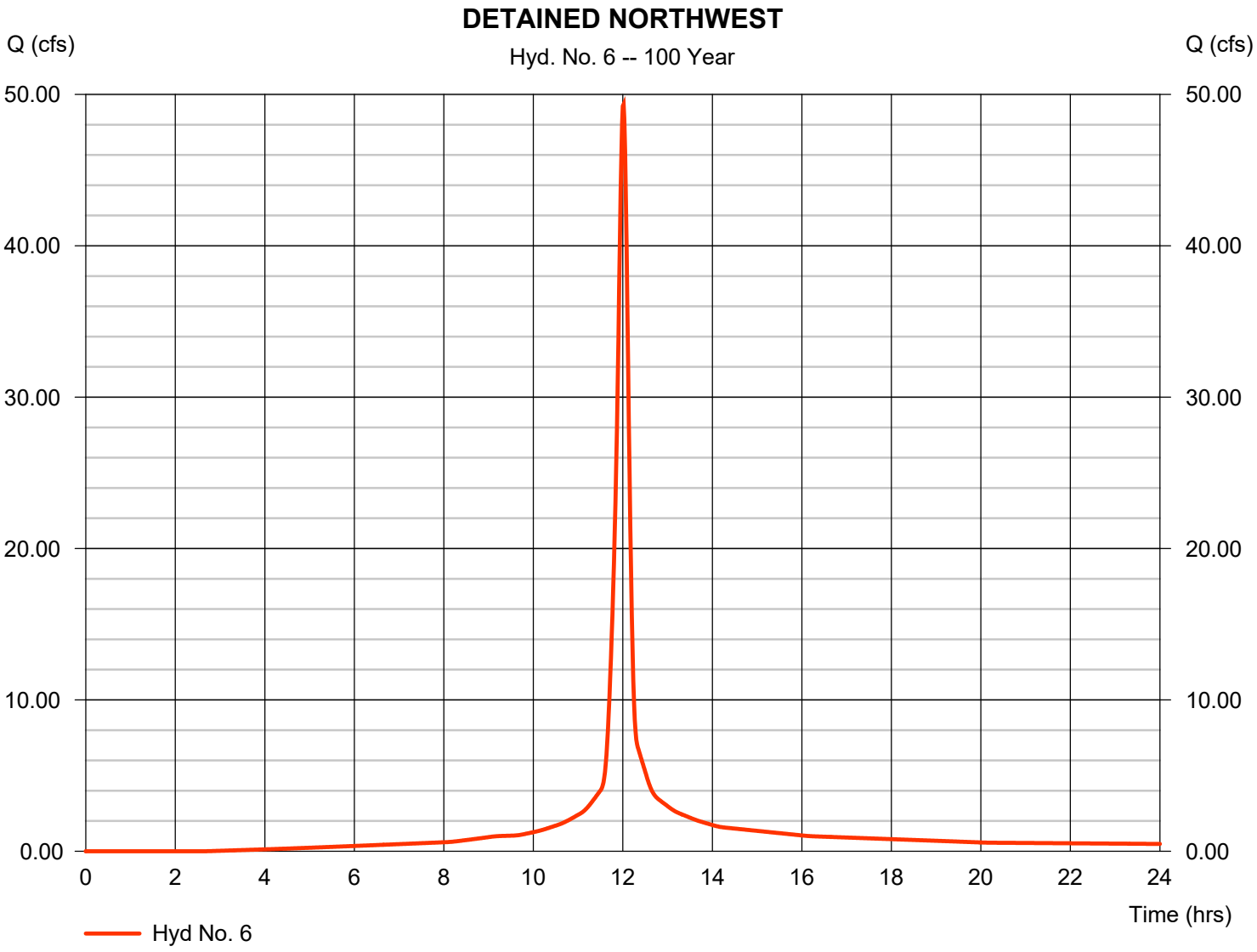


Hydrograph Report

Hyd. No. 6

DETAINED NORTHWEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	49.35 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	135,314 cuft
Drainage area	=	5.730 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

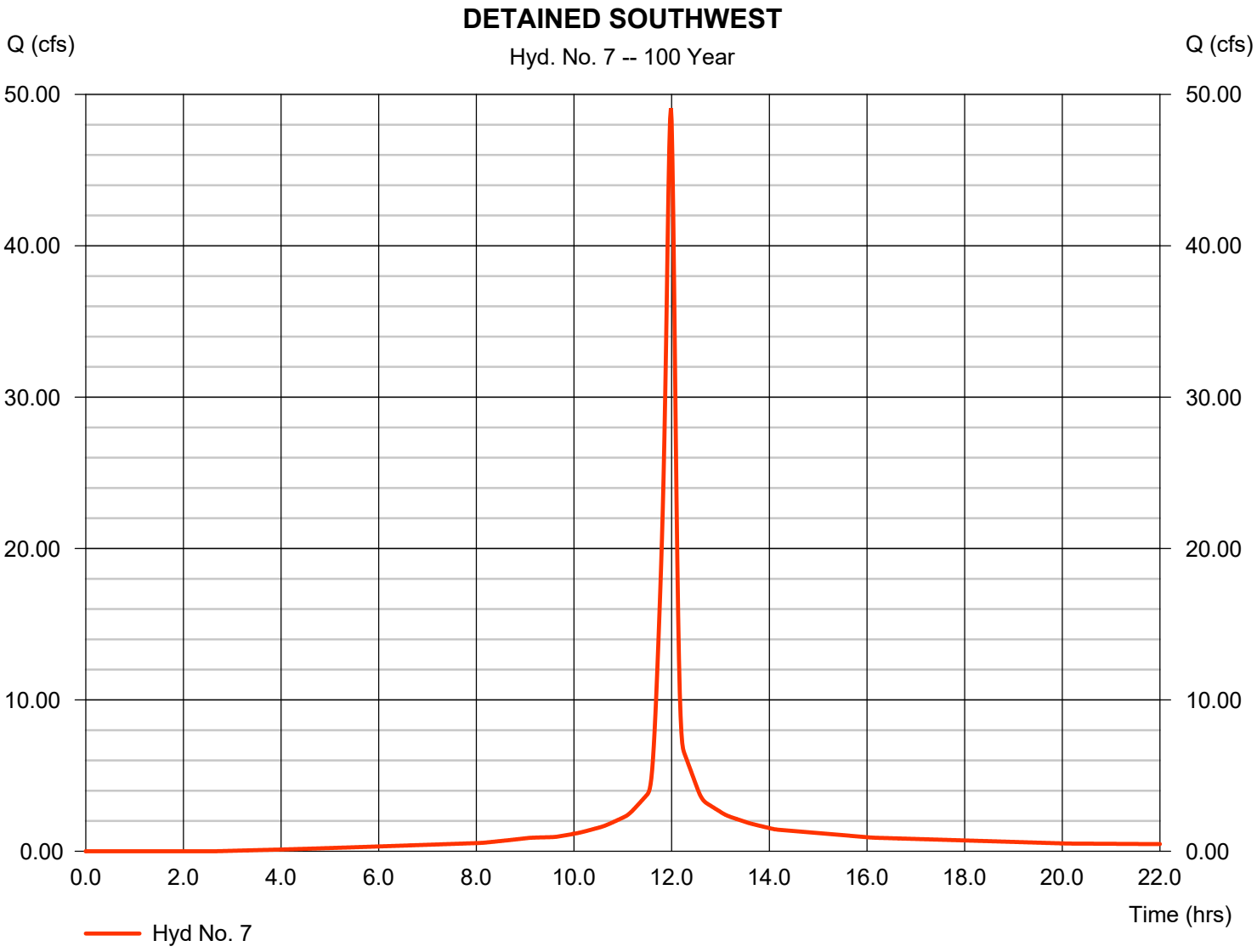


Hydrograph Report

Hyd. No. 7

DETAINED SOUTHWEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	49.10 cfs
Storm frequency	=	100 yrs	Time to peak	=	11.98 hrs
Time interval	=	1 min	Hyd. volume	=	121,628 cuft
Drainage area	=	5.070 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

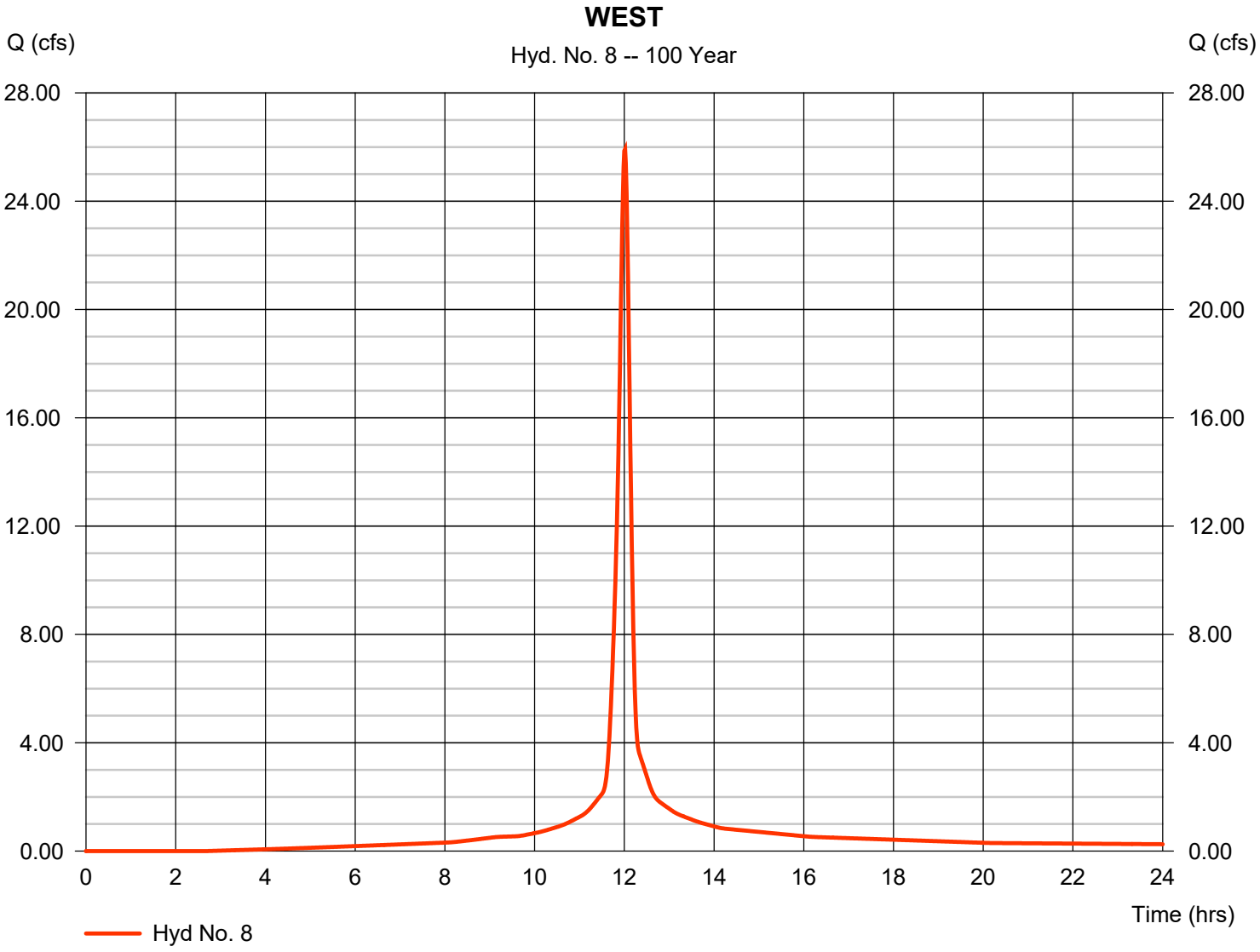


Hydrograph Report

Hyd. No. 8

WEST

Hydrograph type	=	SCS Runoff	Peak discharge	=	25.92 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	71,081 cuft
Drainage area	=	3.010 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	12.10 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

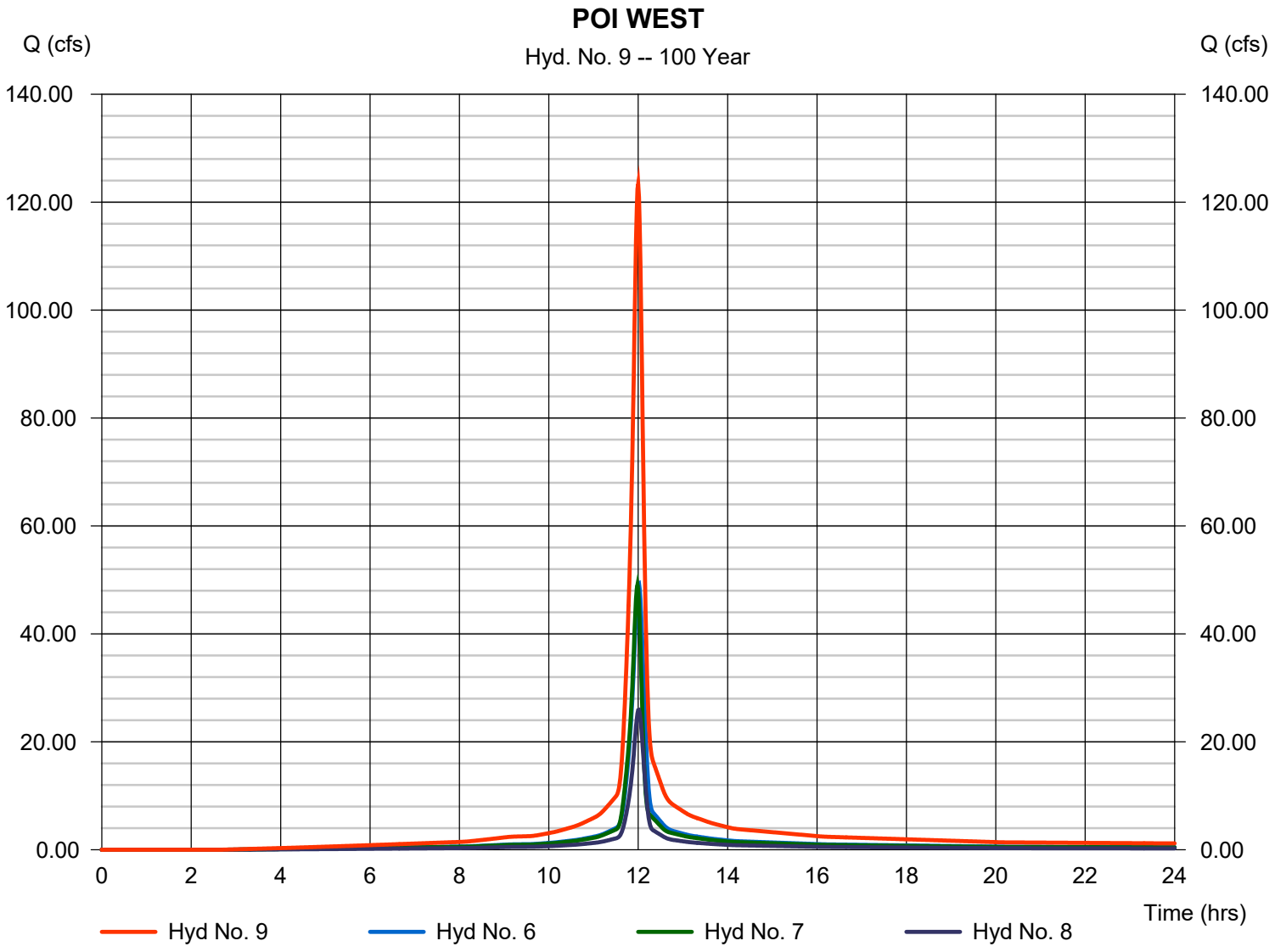


Hydrograph Report

Hyd. No. 9

POI WEST

Hydrograph type	=	Combine	Peak discharge	=	123.33 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	328,023 cuft
Inflow hyds.	=	6, 7, 8	Contrib. drain. area	=	13.810 ac

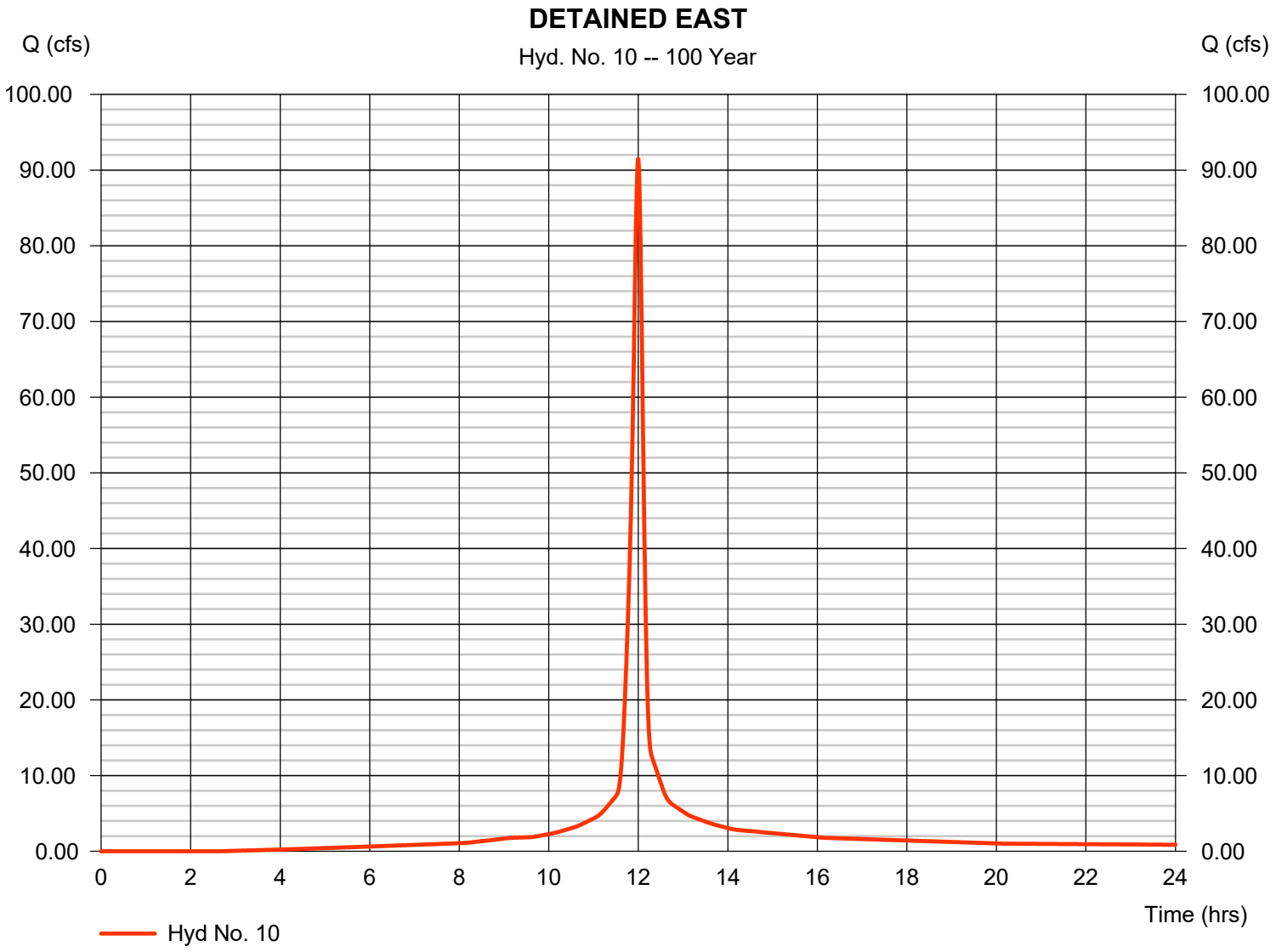


Hydrograph Report

Hyd. No. 10

DETAINED EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	91.62 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	241,007 cuft
Drainage area	=	9.870 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

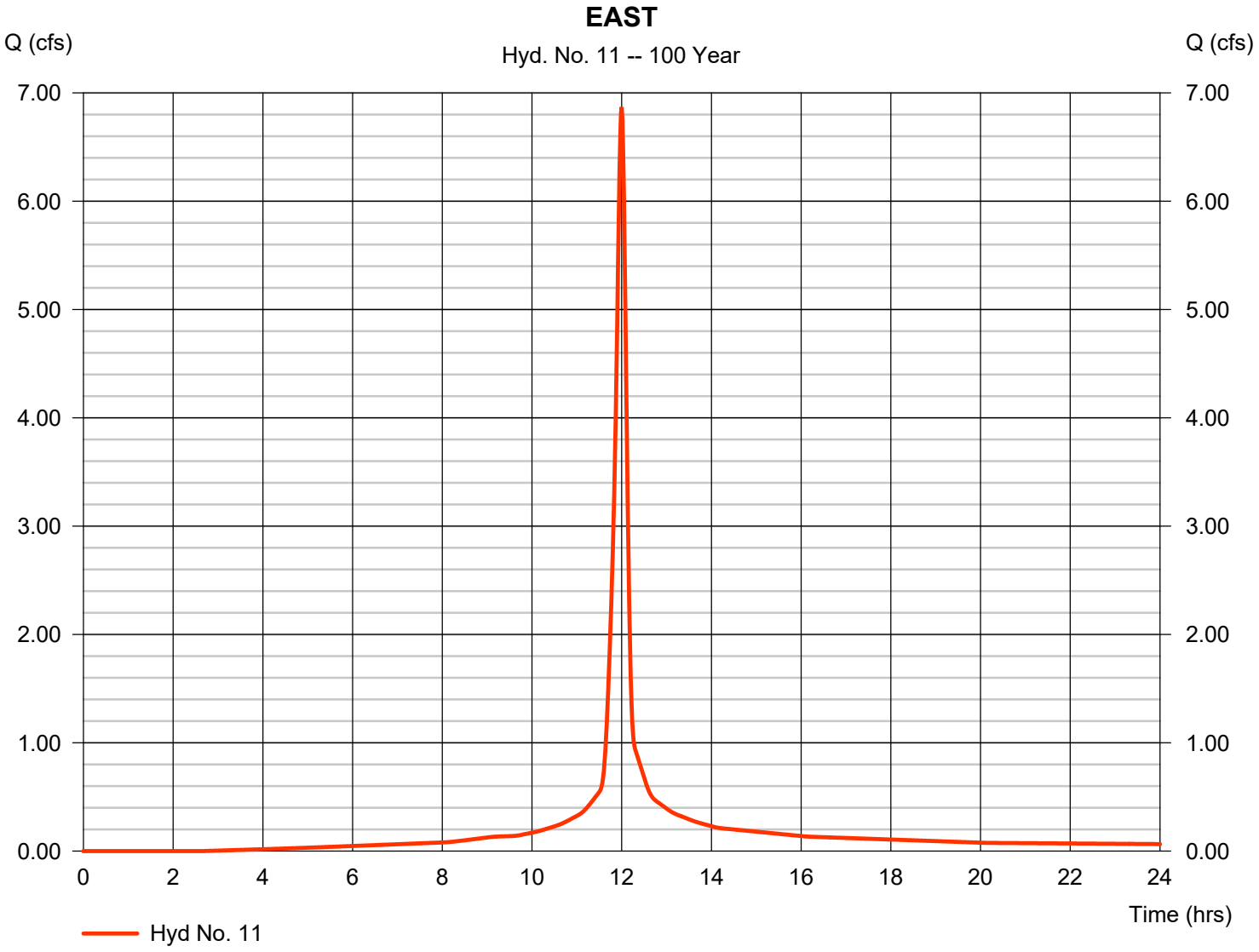


Hydrograph Report

Hyd. No. 11

EAST

Hydrograph type	=	SCS Runoff	Peak discharge	=	6.869 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
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

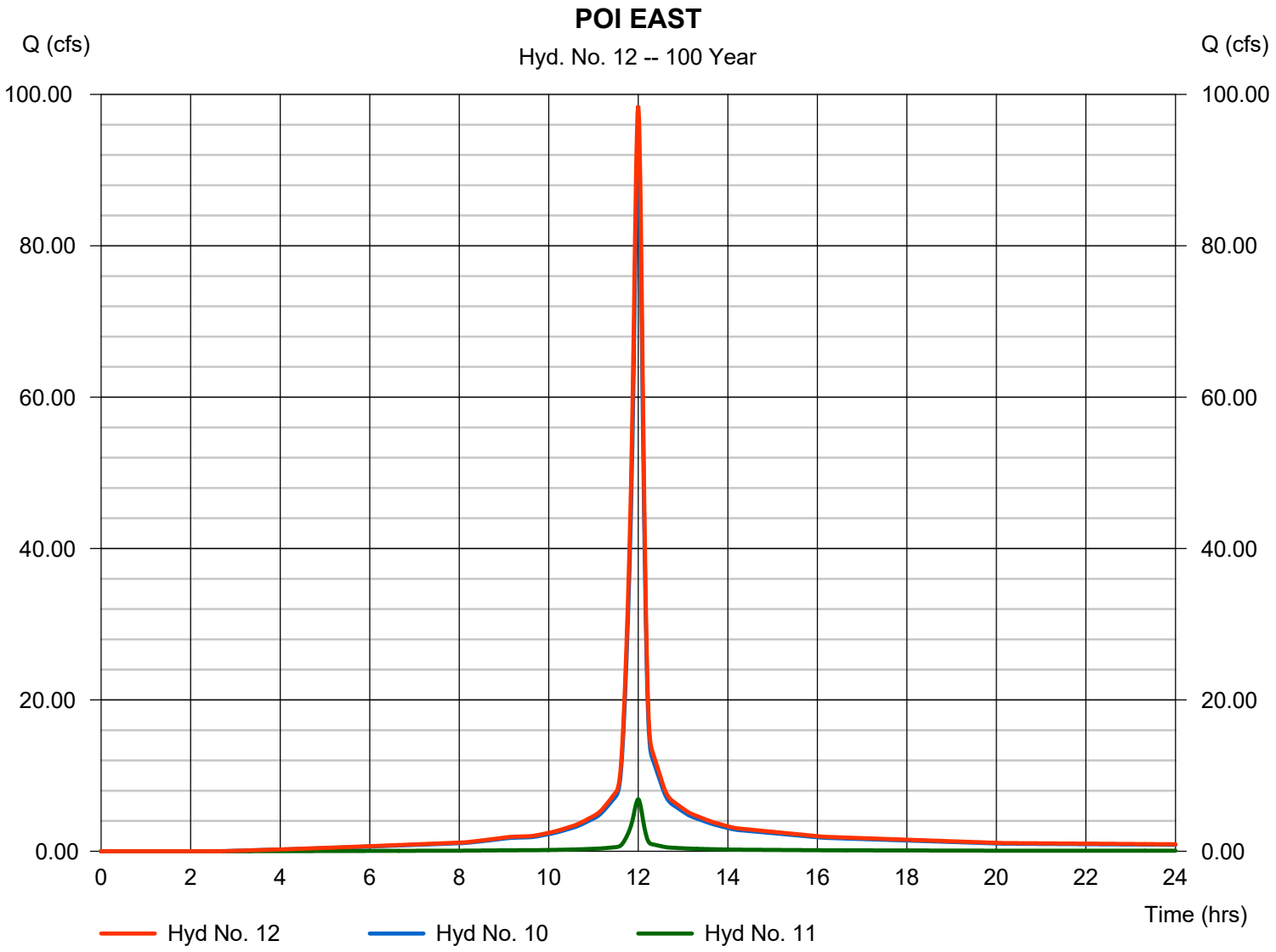


Hydrograph Report

Hyd. No. 12

POI EAST

Hydrograph type	=	Combine	Peak discharge	=	98.49 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.00 hrs
Time interval	=	1 min	Hyd. volume	=	259,077 cuft
Inflow hyds.	=	10, 11	Contrib. drain. area	=	10.610 ac

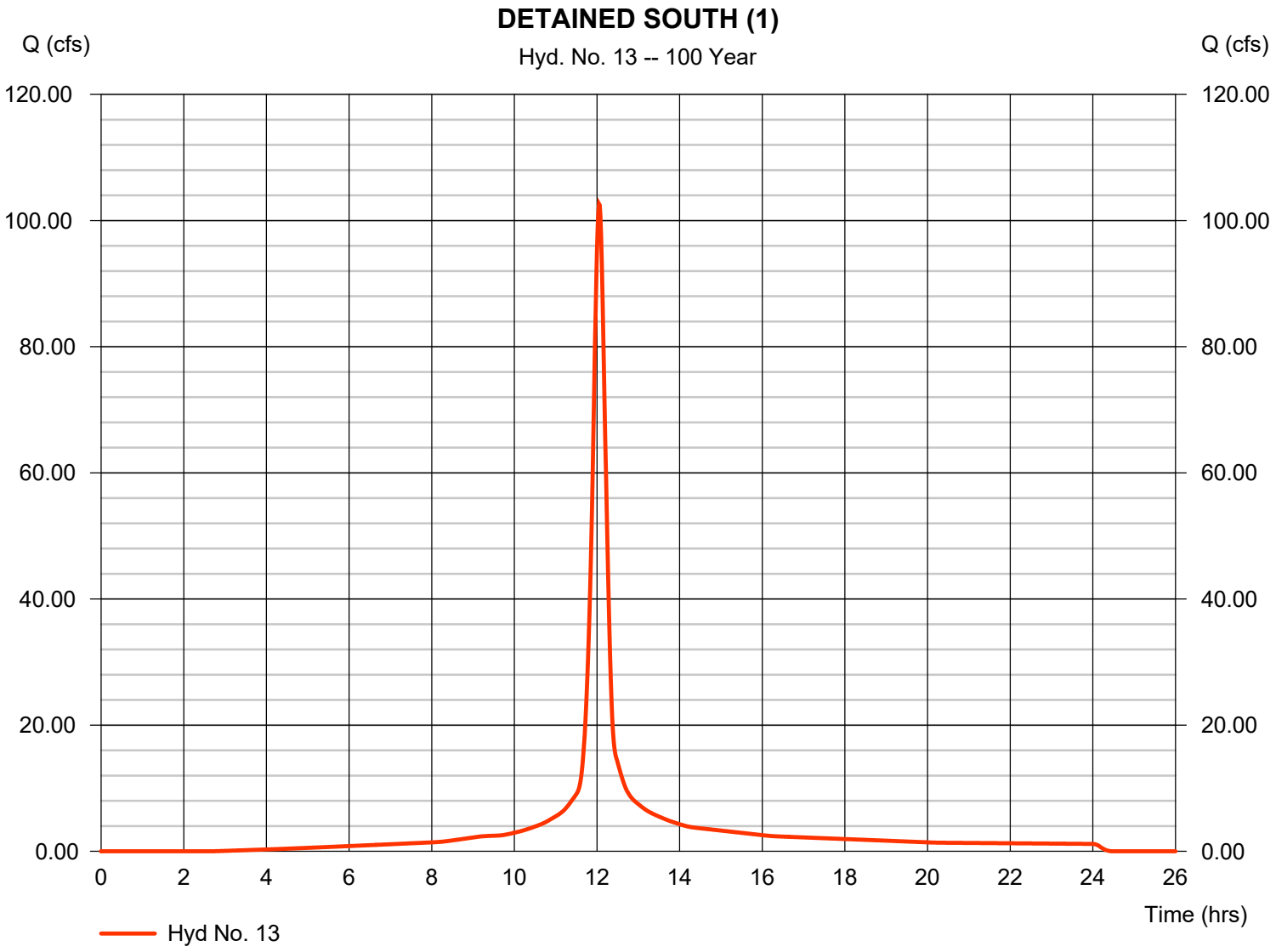


Hydrograph Report

Hyd. No. 13

DETAINED SOUTH (1)

Hydrograph type	=	SCS Runoff	Peak discharge	=	102.63 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.05 hrs
Time interval	=	1 min	Hyd. volume	=	324,925 cuft
Drainage area	=	13.700 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	18.50 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

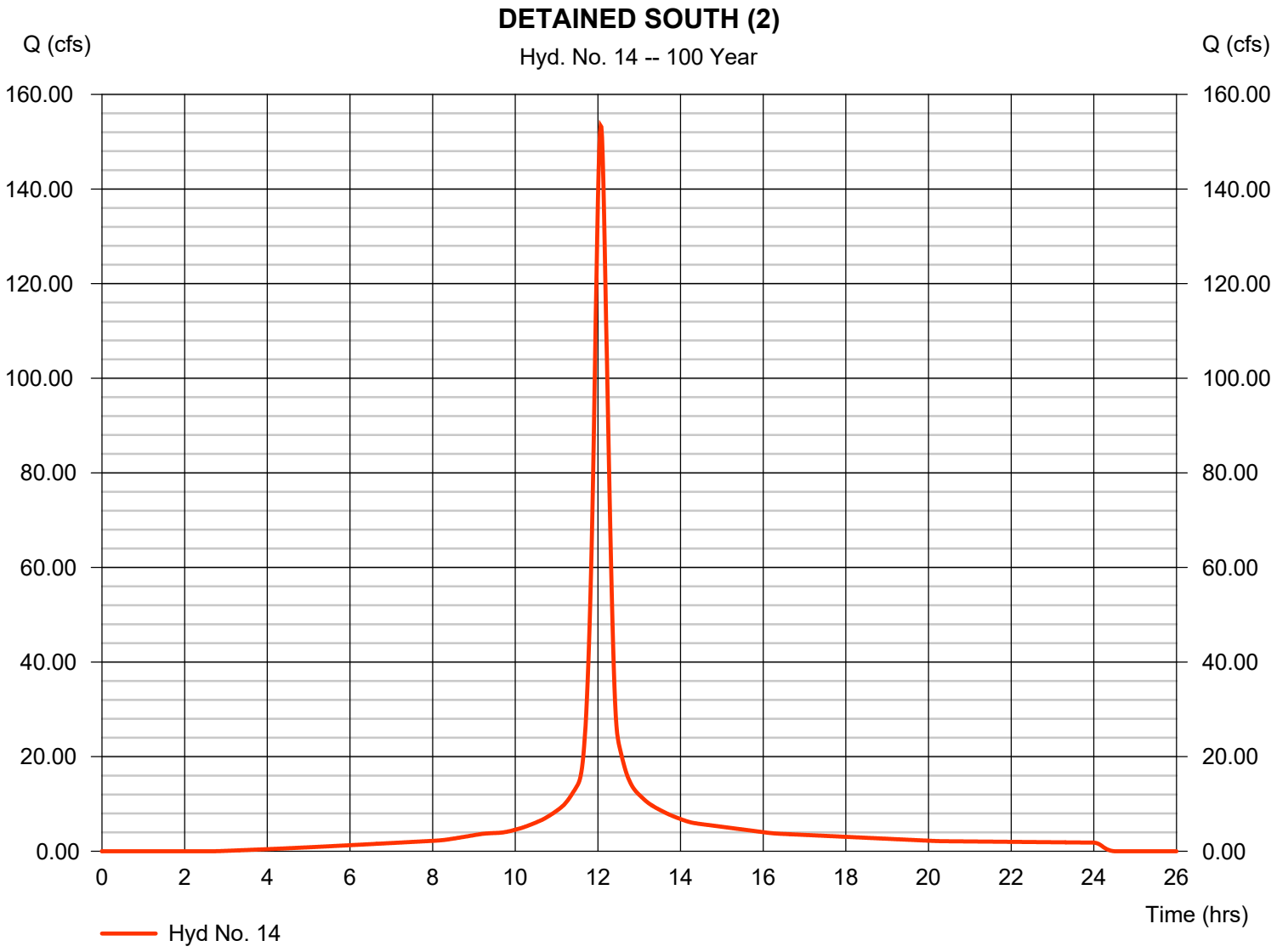


Hydrograph Report

Hyd. No. 14

DETAINED SOUTH (2)

Hydrograph type	=	SCS Runoff	Peak discharge	=	153.36 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.07 hrs
Time interval	=	1 min	Hyd. volume	=	510,023 cuft
Drainage area	=	21.260 ac	Curve number	=	90
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	19.30 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

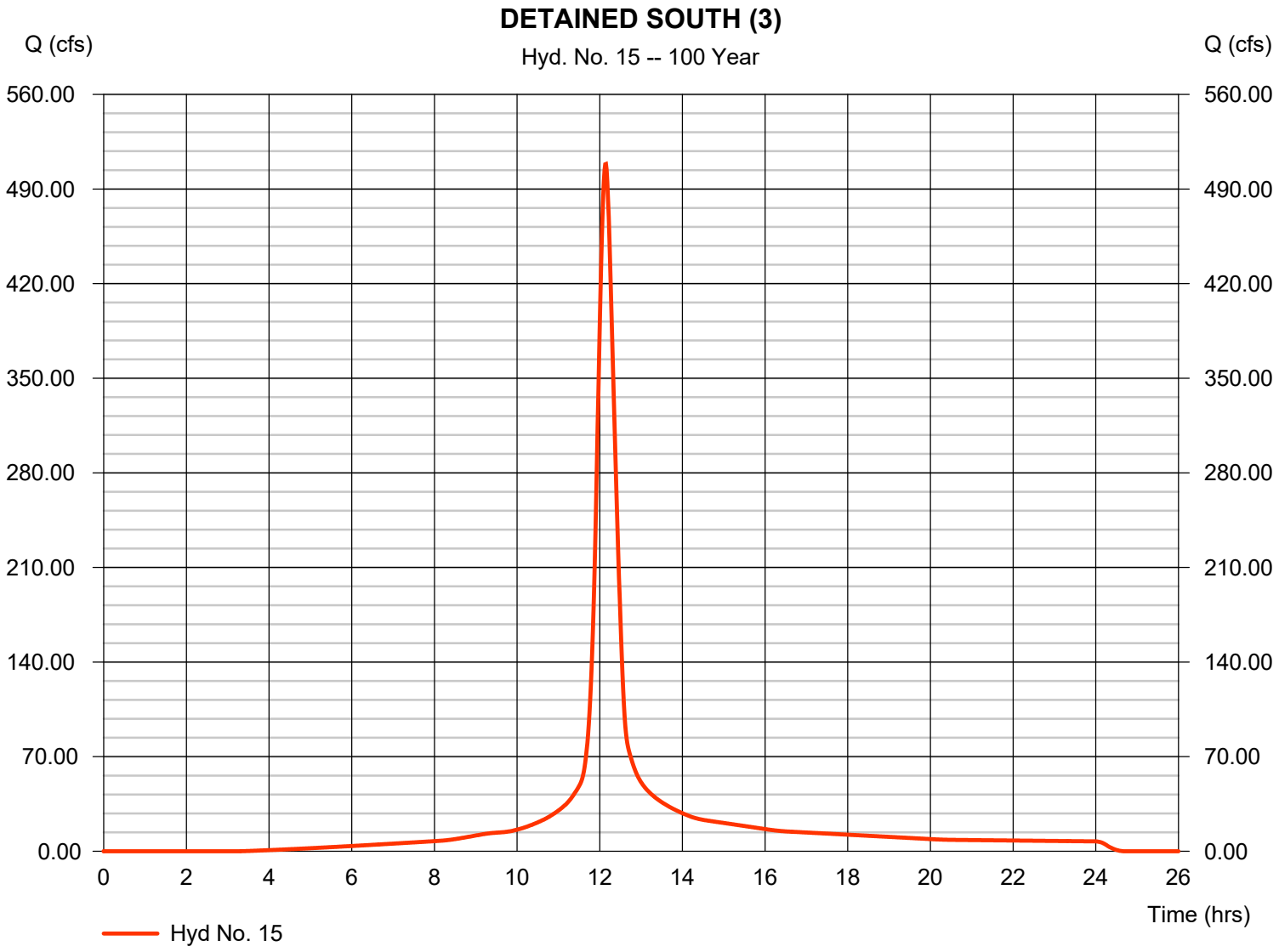


Hydrograph Report

Hyd. No. 15

DETAINED SOUTH (3)

Hydrograph type	= SCS Runoff	Peak discharge	= 508.51 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.15 hrs
Time interval	= 1 min	Hyd. volume	= 1,972,592 cuft
Drainage area	= 84.610 ac	Curve number	= 88
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 27.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

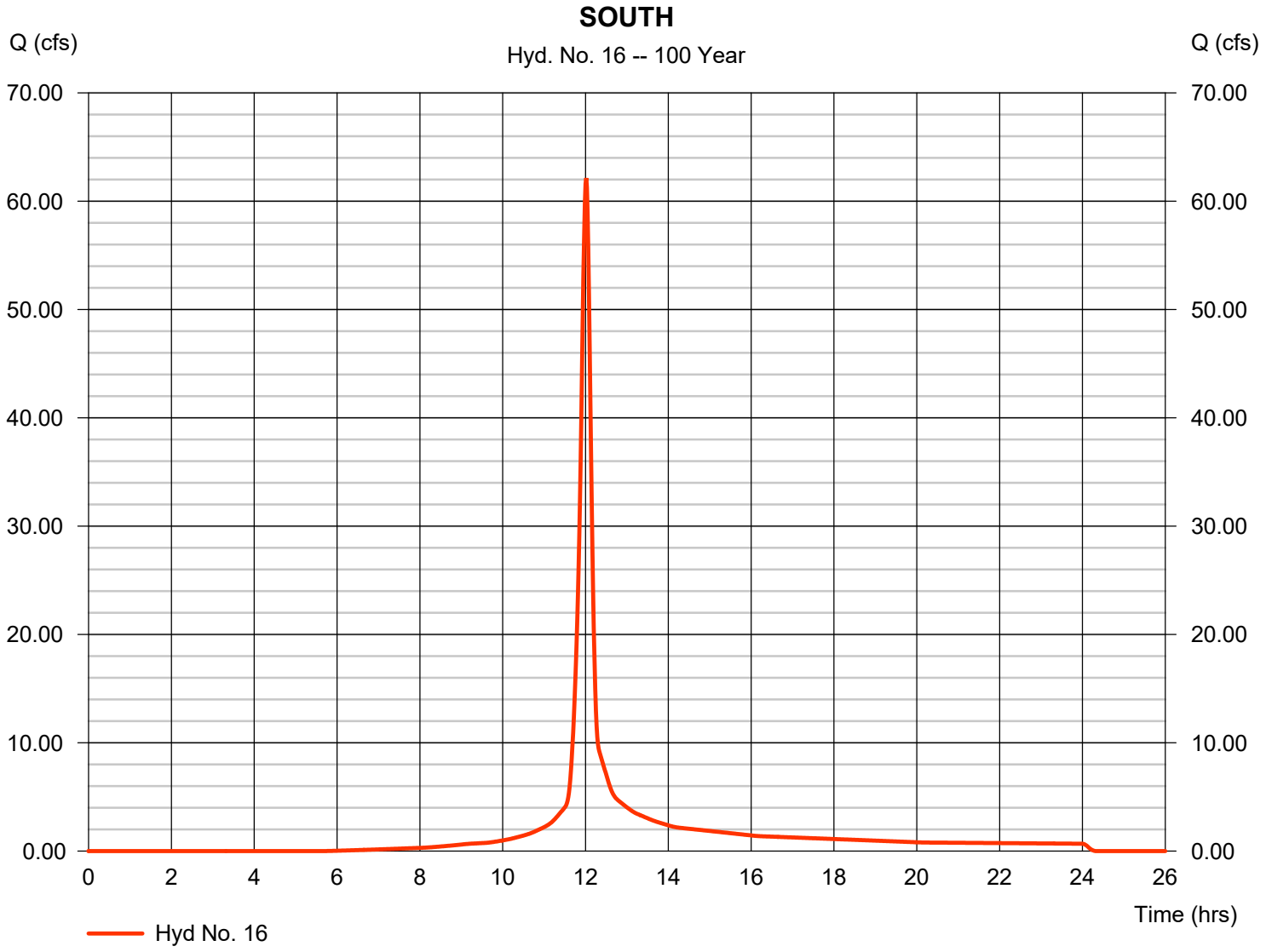


Hydrograph Report

Hyd. No. 16

SOUTH

Hydrograph type	=	SCS Runoff	Peak discharge	=	62.14 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.02 hrs
Time interval	=	1 min	Hyd. volume	=	159,809 cuft
Drainage area	=	8.590 ac	Curve number	=	78
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	11.80 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

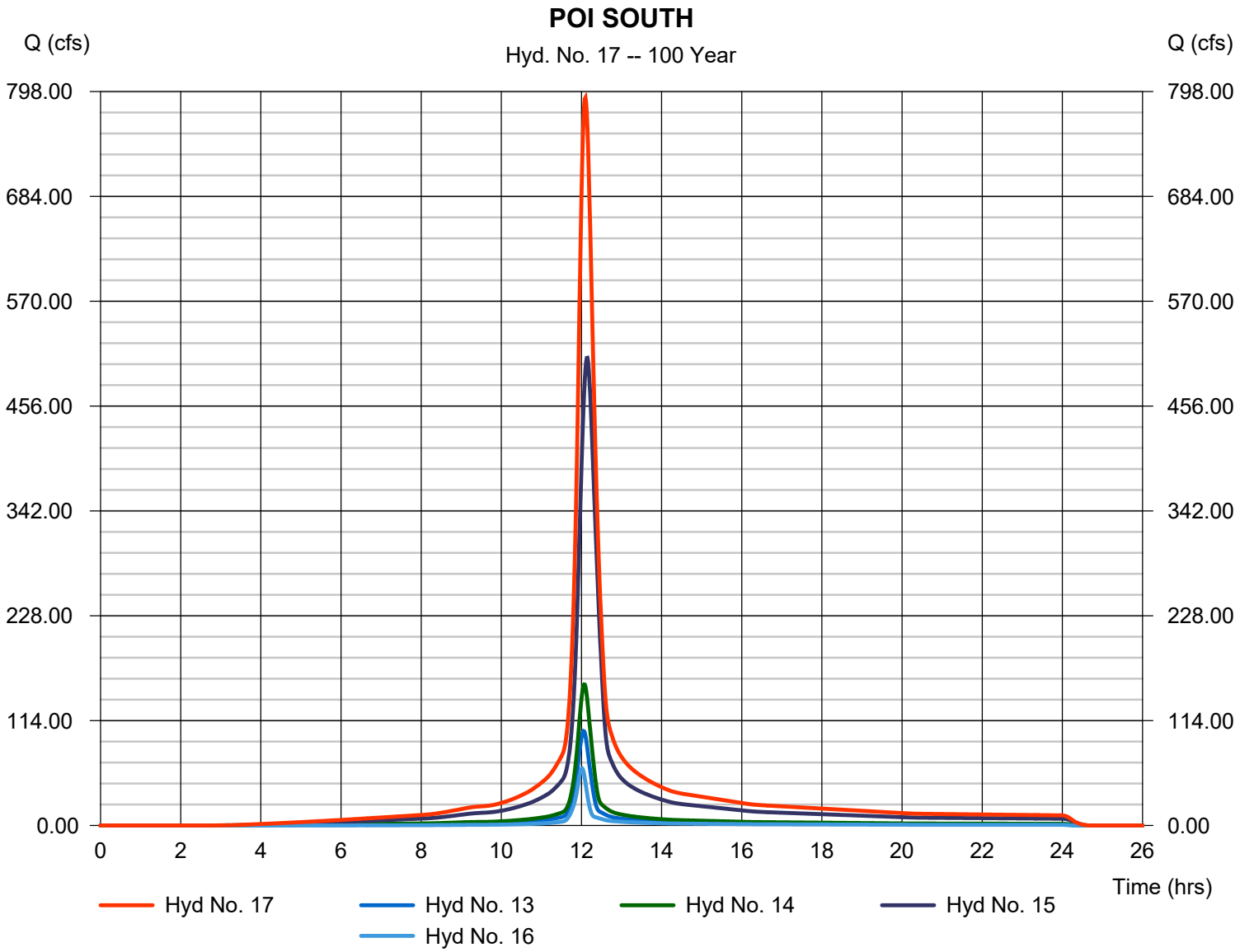


Hydrograph Report

Hyd. No. 17

POI SOUTH

Hydrograph type	=	Combine	Peak discharge	=	791.36 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.10 hrs
Time interval	=	1 min	Hyd. volume	=	2,967,350 cuft
Inflow hyds.	=	13, 14, 15, 16	Contrib. drain. area	=	128.160 ac



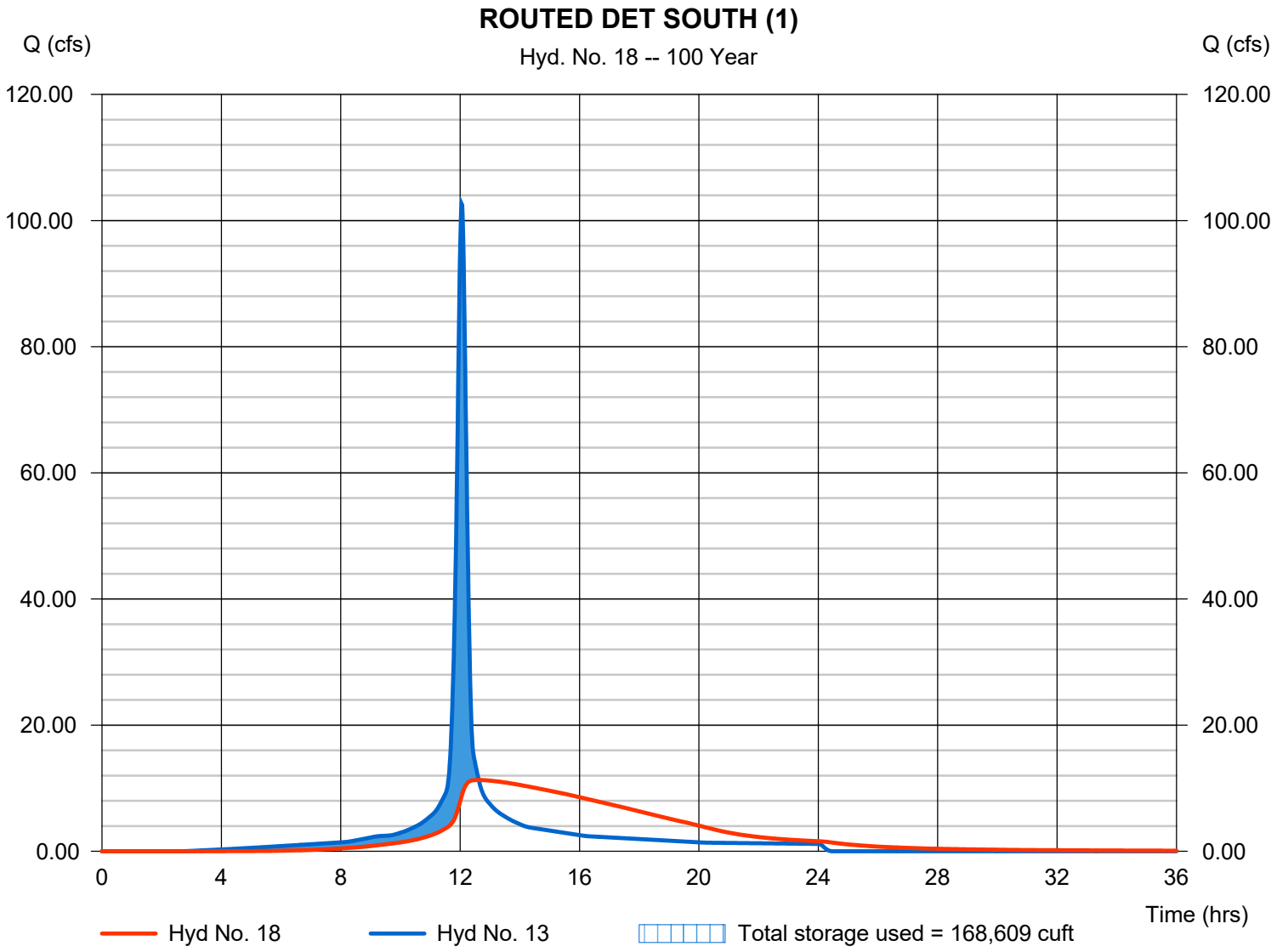
Hydrograph Report

Hyd. No. 18

ROUTED DET SOUTH (1)

Hydrograph type	=	Reservoir	Peak discharge	=	11.30 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.62 hrs
Time interval	=	1 min	Hyd. volume	=	322,647 cuft
Inflow hyd. No.	=	13 - DETAINED SOUTH (1)	Max. Elevation	=	1038.28 ft
Reservoir name	=	South Retention Basin (1)	Max. Storage	=	168,609 cuft

Storage Indication method used.

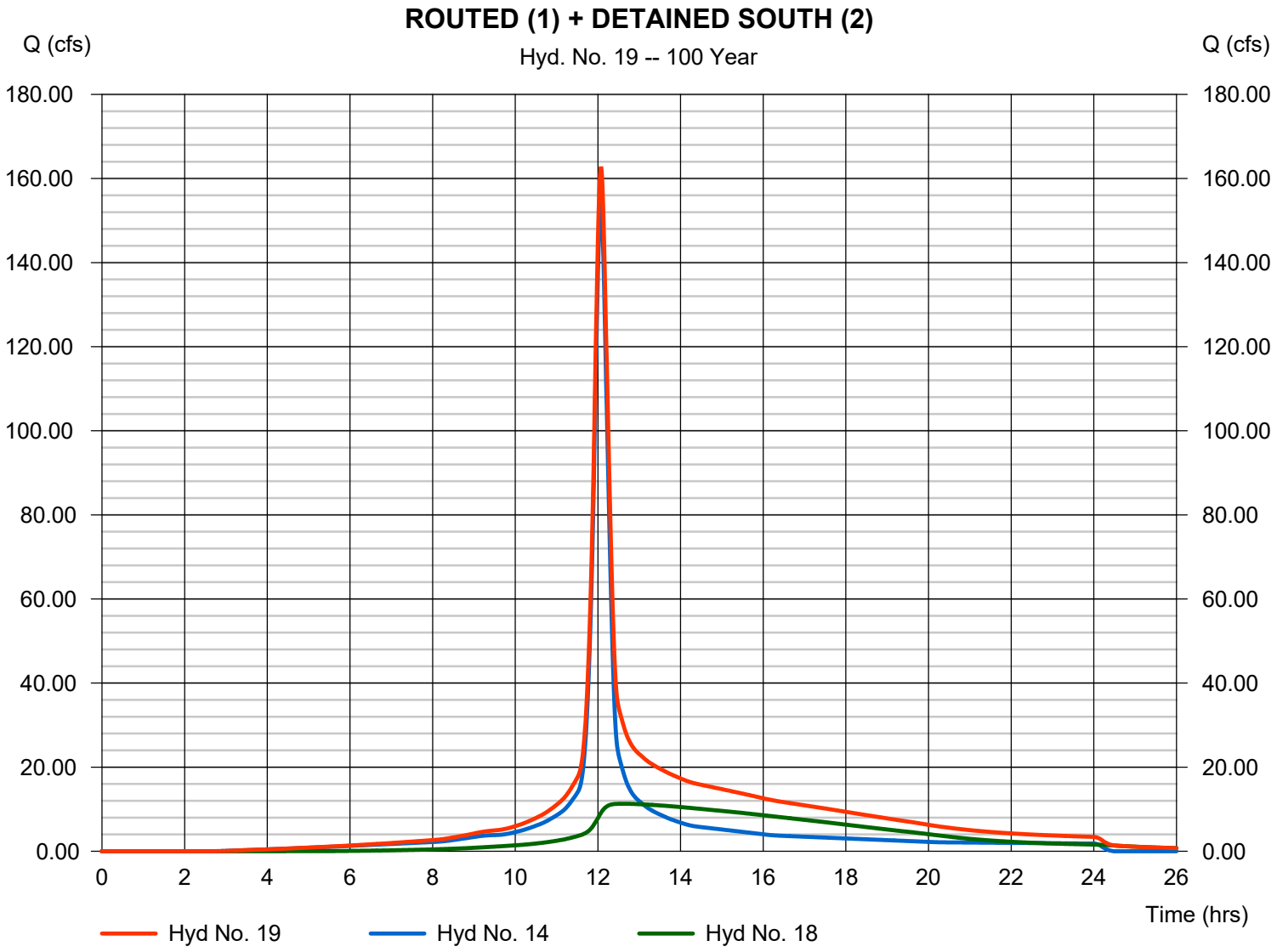


Hydrograph Report

Hyd. No. 19

ROUTED (1) + DETAINED SOUTH (2)

Hydrograph type	=	Combine	Peak discharge	=	162.41 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.08 hrs
Time interval	=	1 min	Hyd. volume	=	832,670 cuft
Inflow hyds.	=	14, 18	Contrib. drain. area	=	21.260 ac



Hydrograph Report

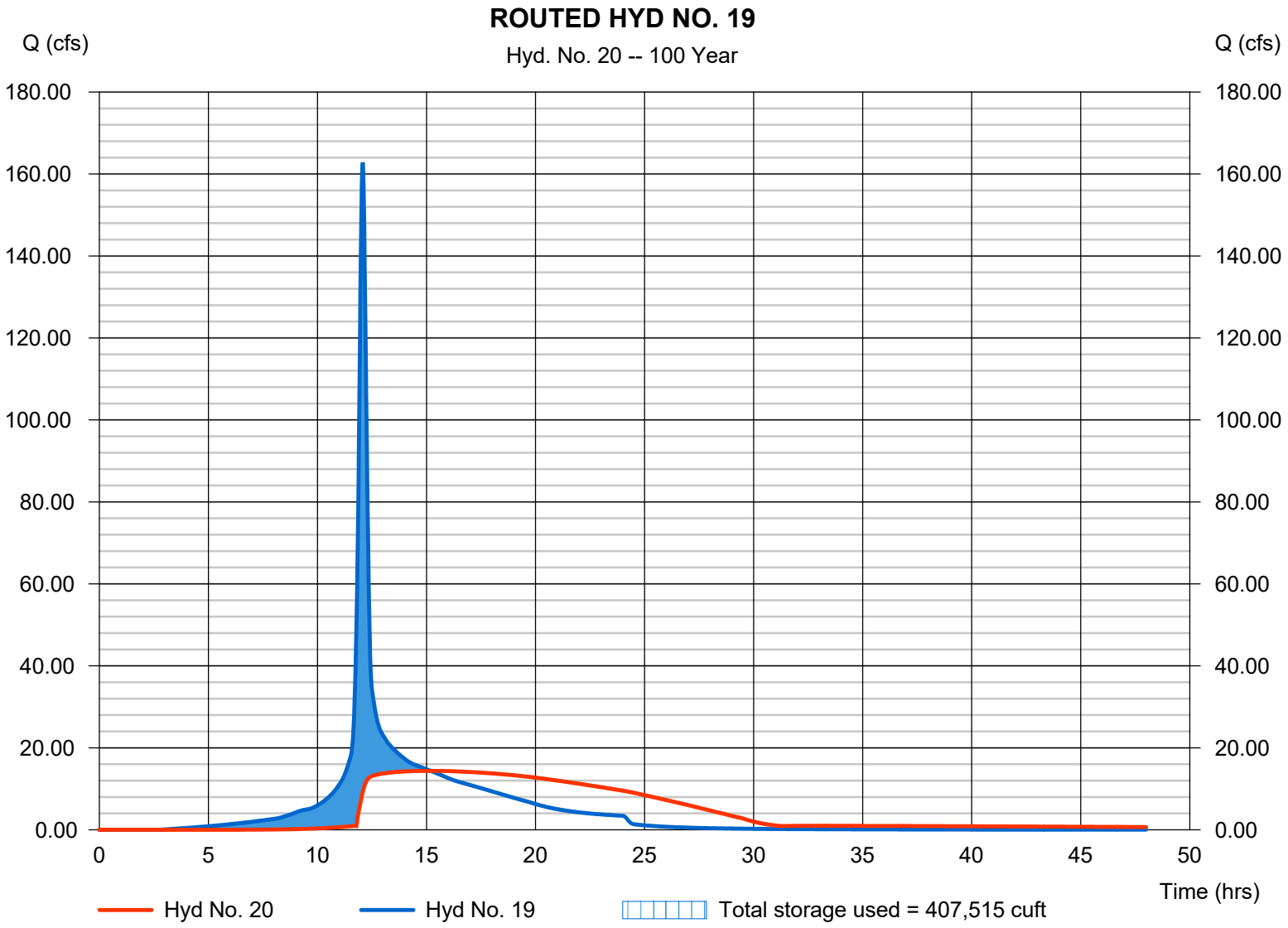
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2023 Sunday, 08 / 10 / 2025

Hyd. No. 20

ROUTED HYD NO. 19

Hydrograph type	=	Reservoir	Peak discharge	=	14.38 cfs
Storm frequency	=	100 yrs	Time to peak	=	15.18 hrs
Time interval	=	1 min	Hyd. volume	=	751,942 cuft
Inflow hyd. No.	=	19 - ROUTED (1) + DETAINED/OUTLET (2)	Max. Elevation	=	1035.45 ft
Reservoir name	=	South Retention Basin (2)	Max. Storage	=	407,515 cuft

Storage Indication method used.



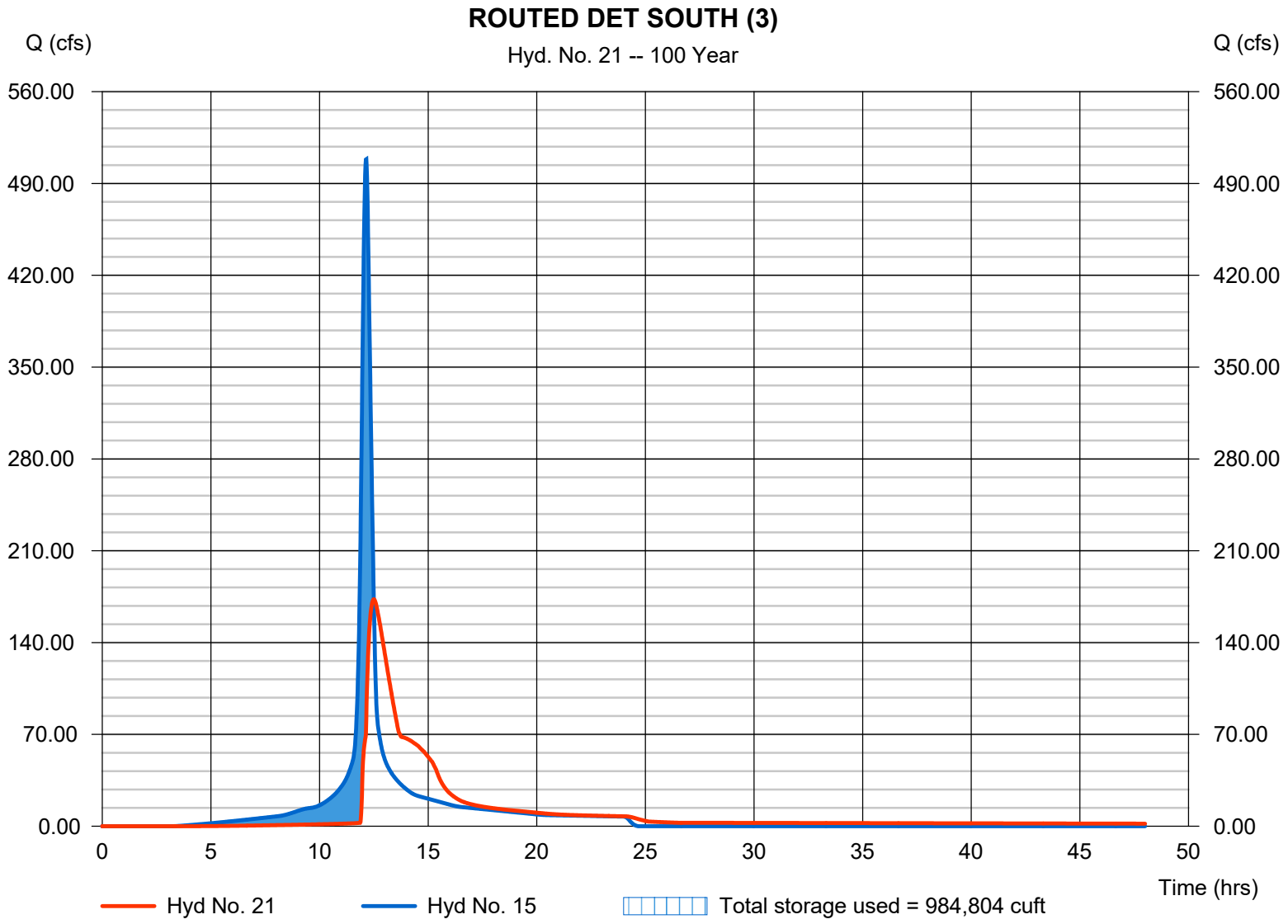
Hydrograph Report

Hyd. No. 21

ROUTED DET SOUTH (3)

Hydrograph type	=	Reservoir	Peak discharge	=	173.01 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.50 hrs
Time interval	=	1 min	Hyd. volume	=	1,766,502 cuft
Inflow hyd. No.	=	15 - DETAINED SOUTH (3)	Max. Elevation	=	1009.44 ft
Reservoir name	=	South Retention Basin (3)	Max. Storage	=	984,804 cuft

Storage Indication method used.

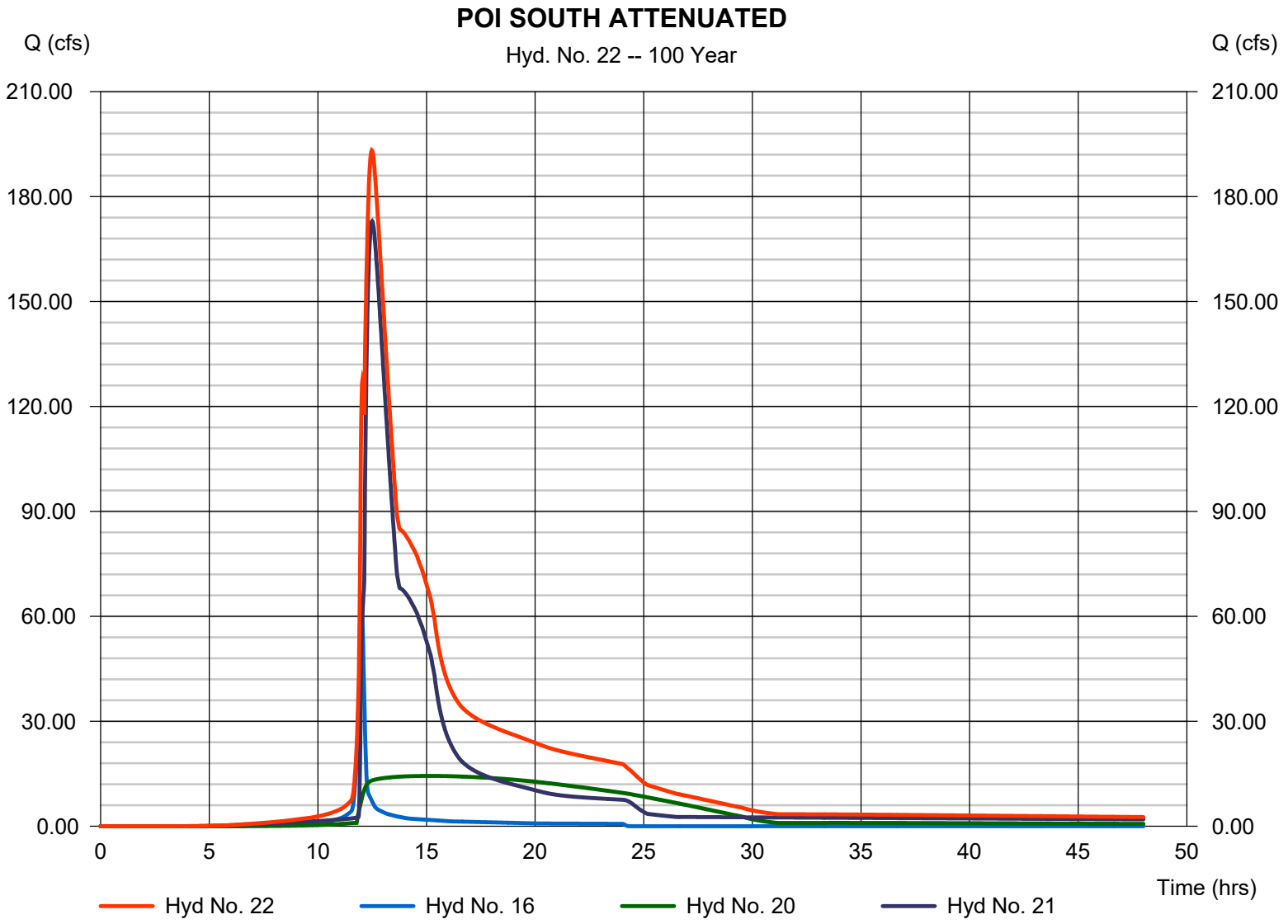


Hydrograph Report

Hyd. No. 22

POI SOUTH ATTENUATED

Hydrograph type	=	Combine	Peak discharge	=	193.24 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.48 hrs
Time interval	=	1 min	Hyd. volume	=	2,678,250 cuft
Inflow hyds.	=	16, 20, 21	Contrib. drain. area	=	8.590 ac



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	0.0000	0.0000	0.0000	--------
2	79.5706	15.0000	0.8977	--------
3	0.0000	0.0000	0.0000	--------
5	100.0945	17.1000	0.8850	--------
10	90.6951	15.4000	0.8336	--------
25	112.5419	15.8000	0.8190	--------
50	135.5891	16.1000	0.8156	--------
100	160.7297	16.8000	0.8186	--------

File name: APWA 2011 K.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	5.41	4.42	3.76	3.27	2.90	2.61	2.37	2.18	2.02	1.88	1.76	1.65
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6.47	5.40	4.65	4.09	3.66	3.31	3.03	2.79	2.59	2.42	2.27	2.14
10	7.34	6.12	5.27	4.64	4.16	3.77	3.46	3.19	2.97	2.78	2.62	2.47
25	9.37	7.86	6.80	6.01	5.40	4.91	4.51	4.18	3.89	3.65	3.44	3.25
50	11.27	9.48	8.22	7.28	6.55	5.96	5.48	5.08	4.74	4.44	4.19	3.96
100	12.90	10.89	9.47	8.40	7.57	6.90	6.35	5.89	5.50	5.16	4.86	4.60

Tc = time in minutes. Values may exceed 60.

Precip. file name: C:\AP\Hydraflow\Town Centre LSMO.pcp

Storm Distribution	Rainfall Precipitation Table (in)							
	1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr
SCS 24-hour	1.37	3.71	0.00	3.30	5.20	6.00	6.80	7.80
SCS 6-Hr	0.00	1.80	0.00	0.00	2.60	0.00	0.00	4.00
Huff-1st	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Huff-2nd	2.49	3.10	0.00	4.01	4.64	5.52	6.21	6.90
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	1.55	0.00	2.75	4.00	5.38	6.50	8.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Hydraflow Table of Contents Z:\acad\OLDHAM EAST\STORM\Storm Study 250808\EAST VILLAGE 250810.gpw

Exhibit F

Proposed Drainage Area Map

North

GRAPHIC SCALE
0 75' 150' 300'

PROPOSED DRAINAGE MAP

SCALE: 1" = 150'

SUBAREA SOUTHEAST (OFFSITE) 17.91 AC.

SUBAREA SOUTH 8.59 AC.

SE 16th Street

SE Bailey Road

POI SOUTH

POI EAST

SUBAREA EAST 0.74AC.

SUBAREA NORTH 0.45 AC.

POI NORTH

SUBAREA DETAINED EAST 9.87 AC.

SUBAREA DETAINED NORTHWEST 5.73 AC.

SUBAREA DETAINED SOUTHWEST 5.07 AC.

SUBAREA WEST 3.01 AC.

POI WEST

SUBAREA DETAINED SOUTH (1) 13.70 AC.

SUBAREA DETAINED SOUTH (2) 21.26 AC.

PROPOSED DRAINAGE BOUNDARY TYP.

SUBAREA DETAINED SOUTH (3) 61.06 AC. ONSITE 23.55 AC. OFFSITE 84.61 AC. TOTAL

RETAIL TENANT 45,000 SQFT

RETAIL TENANT 30,000 SQFT

RETAIL TENANT 30,000 SQFT

RETAIL TENANT 25,000 SQFT

PROPOSED PROPERTY BOUNDARY OLDHAM EAST

SUBAREA SOUTHWEST (OFFSITE) 5.64 AC.

US 50 Hwy

MO S. 291 Hwy

SE Oldham Parkway

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Surveying 2005008319-D
Kansas
Engineering E-1695
Surveying LS-218
Oklahoma
Engineering 6254
Nebraska
Engineering CA2821

East Village
Lee's Summit, Jackson County, Missouri

Project: OLDHAM EAST

Issue Date: August 8, 2025

Proposed Drainage Map
Preliminary Development Plans for:
East Village
Lee's Summit, Jackson County, Missouri

STATE OF MISSOURI
MATTHEW J. SCHLICHT
NUMBER PE-2006019708
PROFESSIONAL ENGINEER

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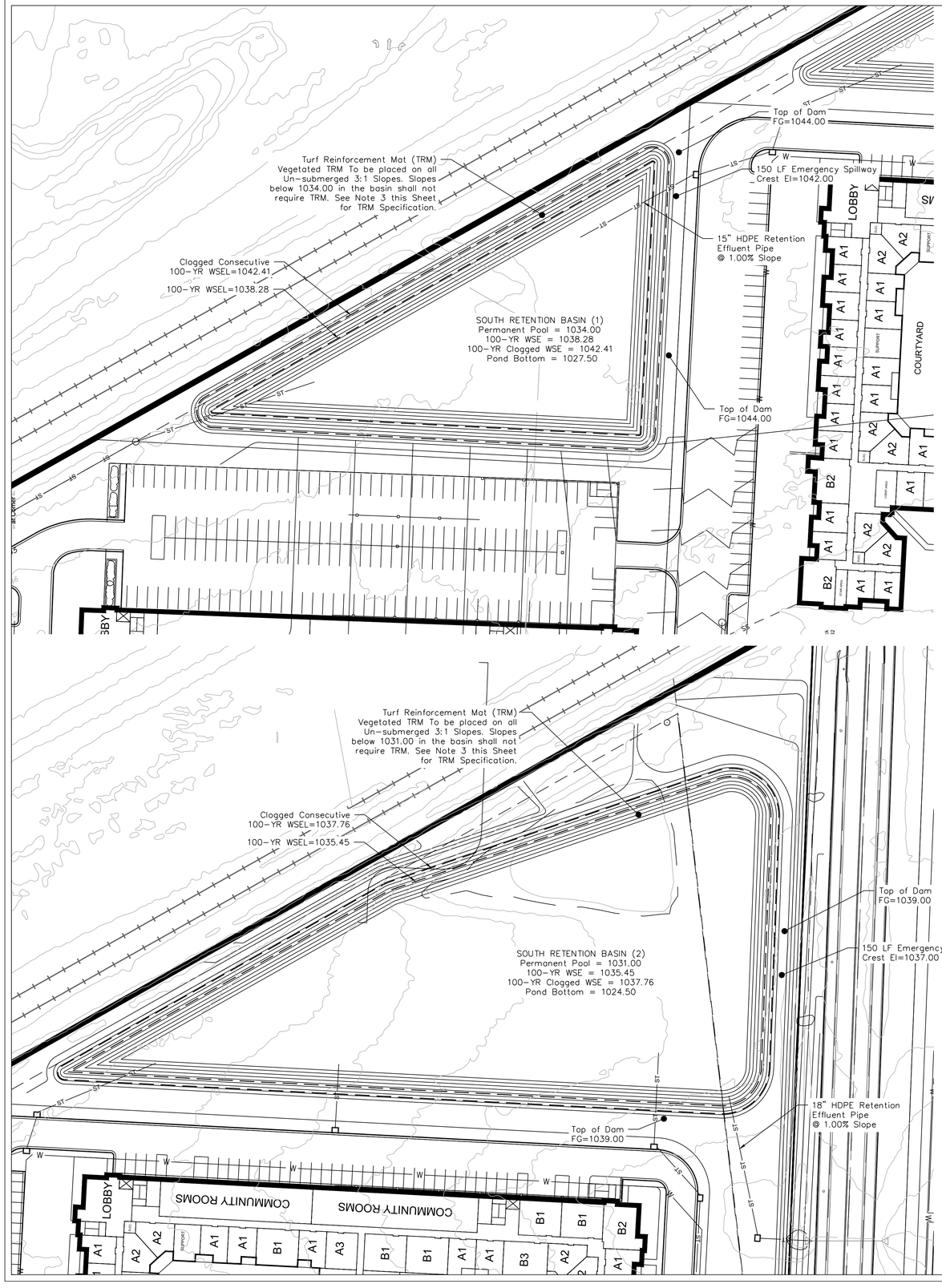
NE PE E-14335

REVISIONS

EXHIBIT

Exhibit G

Retention Basin Plans



North

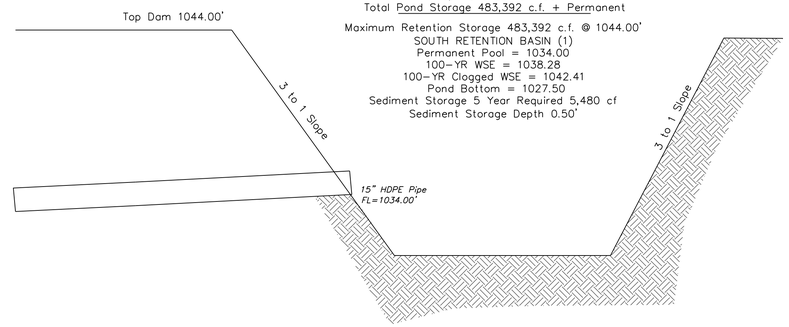
0 25' 50' 100'

SOUTH RETENTION BASIN (1)

SCALE: 1" = 50'

NOTES:

1. THE BASIN SHALL BE CONSTRUCTED WITH THE 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.



Top Pond EL 1044.00'
Total Pond Storage 483,392 c.f. + Permanent
Maximum Retention Storage 483,392 c.f. @ 1044.00'
SOUTH RETENTION BASIN (1)
Permanent Pool = 1034.00
100-YR WSE = 1038.28
100-YR Clogged WSE = 1042.41
Pond Bottom = 1027.50
Sediment Storage 5 Year Required 5,480 cf
Sediment Storage Depth 0.50'

SECTION VIEW – SOUTH BASIN (1)

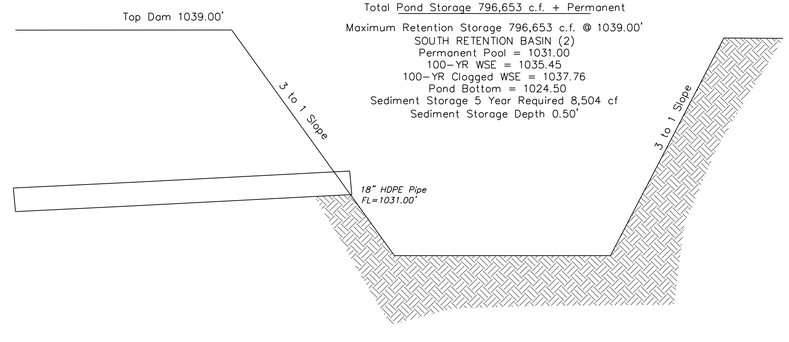
N.T.S.

North

0 25' 50' 100'

SOUTH RETENTION BASIN (2)

SCALE: 1" = 50'



Top Pond EL 1039.00'
Total Pond Storage 796,653 c.f. + Permanent
Maximum Retention Storage 796,653 c.f. @ 1039.00'
SOUTH RETENTION BASIN (2)
Permanent Pool = 1031.00
100-YR WSE = 1035.45
100-YR Clogged WSE = 1037.76
Pond Bottom = 1024.50
Sediment Storage 5 Year Required 8,504 cf
Sediment Storage Depth 0.50'

SECTION VIEW – SOUTH BASIN (2)

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East Village
Lee's Summit, Jackson County, Missouri

Project: OLDHAM EAST
Issue Date: August 8, 2025

South Retention Basins (1) & (2)
Preliminary Development Plans for:
East Village
Lee's Summit, Jackson County, Missouri

STATE OF MISSOURI
MATTHEW J. SCHLICHT
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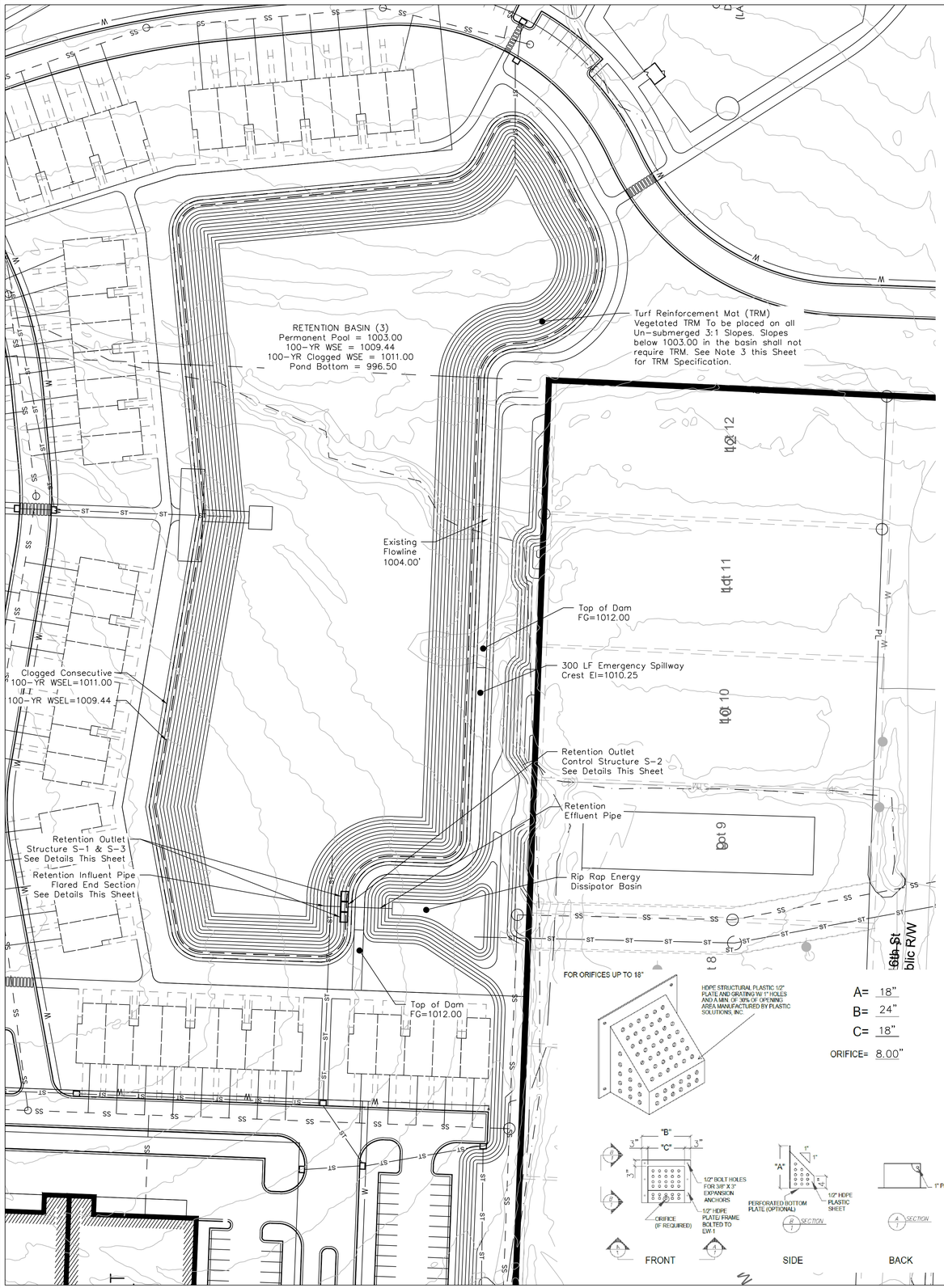
NE PE E-14335

REVISIONS

EXHIBIT



North

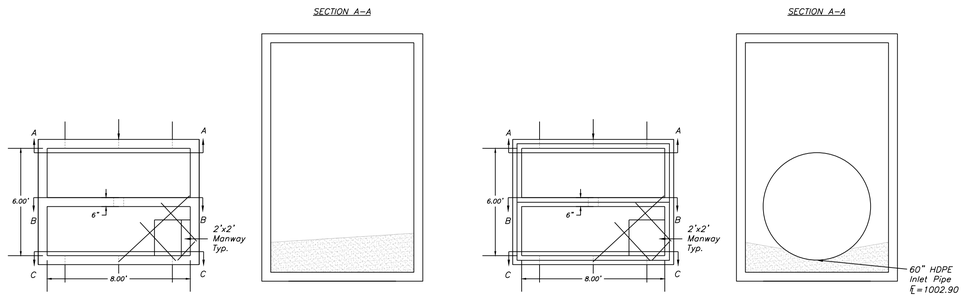
0 25' 50' 100'

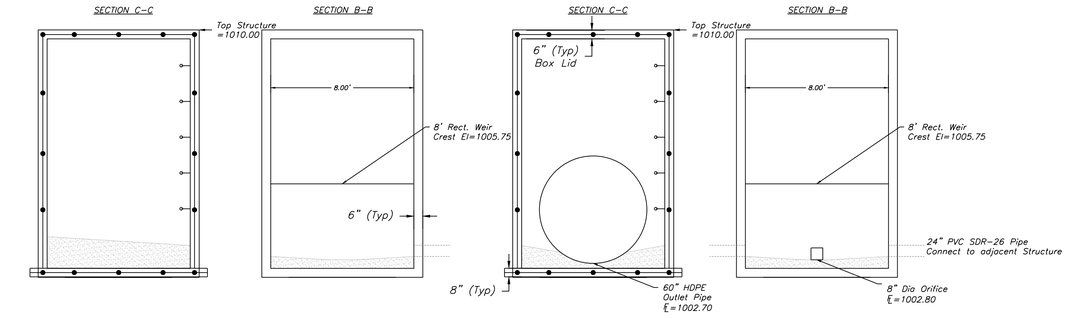
SOUTH RETENTION BASIN (3)

SCALE: 1" = 50'

NOTES:
1. THE BASIN SHALL BE CONSTRUCTED WITH THE 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.

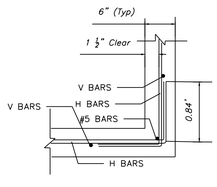
Outlet Structure Notes:
1. Locate ring and cover outlet on blank wall per detail
2. Use ¾" Chamfer on all exposed concrete corners
3. Floor of inlet grouted and shaped to match pipe invert to provide smooth flow
4. Steps required at 16" o.c.
5. Boxouts will not be allowed to project through the corners of the structure
6. The minimum reinforcing shall be 1 H-Bar over a cast-in-place pipe and 2 H-Bars over a precast boxout
7. 10" opening is required on retention basin side of all outlet structures
8. Precast lids shall be pinned, sealed with non-shrinkable grout and removable for future maintenance
9. For Ring and Cover see the stormwater approved product list





CONTROL STRUCTURE - BASIN (3) S2 & S3

1/4" = 1'-0"



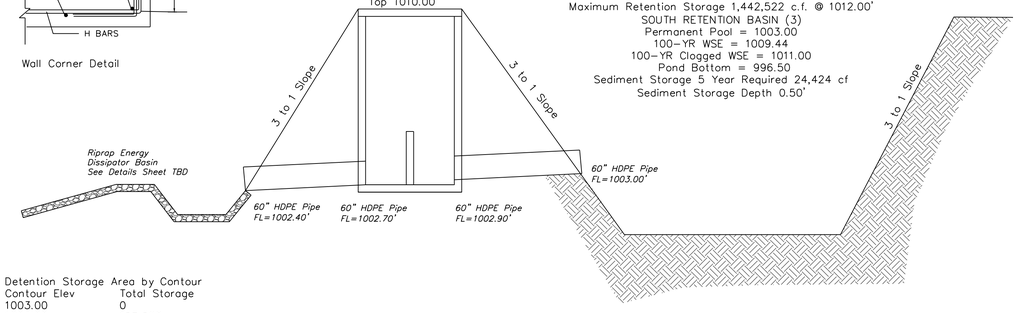
CONTROL STRUCTURE - BASIN (3) S1

1/4" = 1'-0"

Control Structure Notes:
1. Control Structure depicted is an 8'x6' precast box.
2. The adjacent boxes shall not contain the 6.27" Rectangular Orifice.
3. Both adjacent structures shall have 24" diameter leveler pipes installed to center box upstream and downstream of the weir wall at FL elevation 1002.70 to 1002.60
4. Install trash rack per manufacturer's recommendations.

Top Pond EL 1012.00'
Total Pond Storage 1,442,522 c.f. + Permanent

Maximum Retention Storage 1,442,522 c.f. @ 1012.00'
SOUTH RETENTION BASIN (3)
Permanent Pool = 1003.00
100-YR WSE = 1009.44
100-YR Clogged WSE = 1011.00
Pond Bottom = 996.50
Sediment Storage 5 Year Required 24,424 cf
Sediment Storage Depth 0.50'



Detention Storage Area by Contour

Contour Elev	Total Storage
1003.00	0
1004.00	137,368
1005.00	280,330
1006.00	428,946
1007.00	583,271
1008.00	743,362
1009.00	909,277
1010.00	1,081,070
1011.00	1,258,800
1012.00	1,442,522

SECTION VIEW - SOUTH BASIN (3)

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East Village
Lee's Summit, Jackson County, Missouri

Project: OLDHAM EAST
Issue Date: August 8, 2025

South Retention Basin (3)
Preliminary Development Plans for:
East Village
Lee's Summit, Jackson County, Missouri

STATE OF MISSOURI
MATTHEW J. SCHLICHT
NUMBER 2006019708
PROFESSIONAL ENGINEER

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NE PE E-14335

REVISIONS

EXHIBIT

Exhibit H

Emergency Spillway Calculations

Weir Report

South Retention Basin (1) - Emergency Spillway

Rectangular Weir

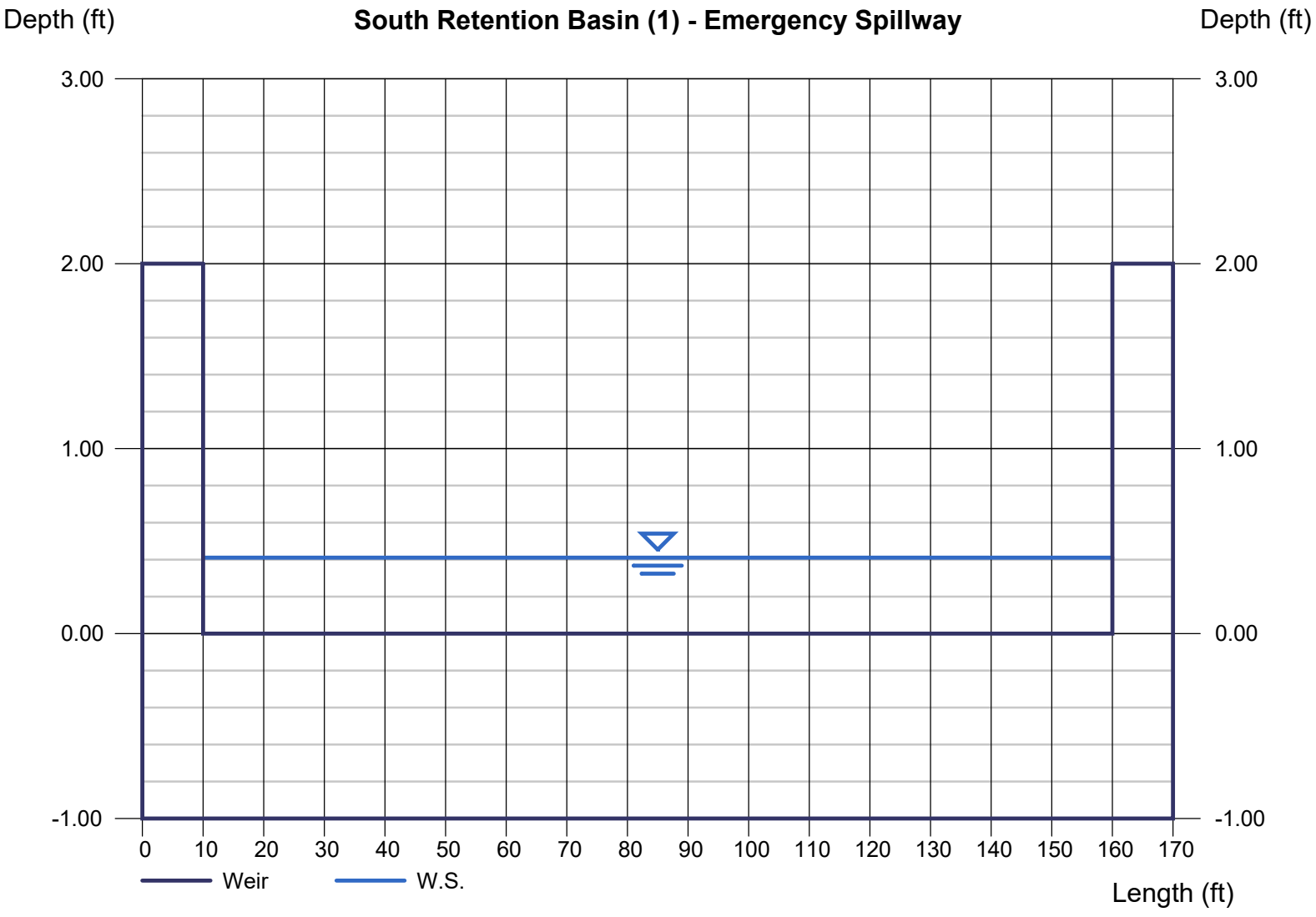
Crest	= Broad
Bottom Length (ft)	= 150.00
Total Depth (ft)	= 2.00

Calculations

Weir Coeff. Cw	= 2.60
Compute by:	Known Q
Known Q (cfs)	= 102.63

Highlighted

Depth (ft)	= 0.41
Q (cfs)	= 102.63
Area (sqft)	= 61.57
Velocity (ft/s)	= 1.67
Top Width (ft)	= 150.00



Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Sunday, Aug 10 2025

South Retention Basin (2) - Emergency Spillway

Rectangular Weir

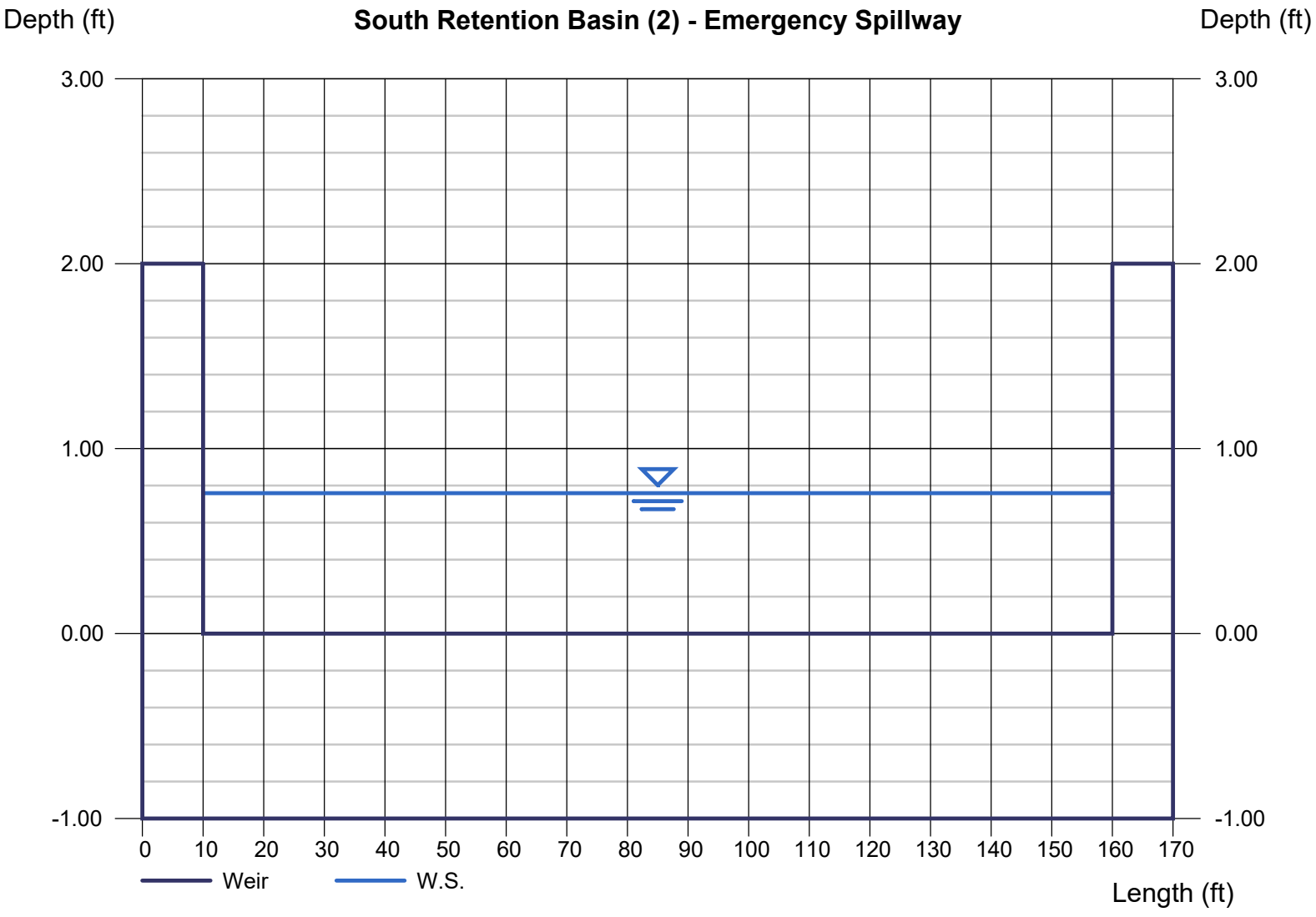
Crest	= Broad
Bottom Length (ft)	= 150.00
Total Depth (ft)	= 2.00

Calculations

Weir Coeff. Cw	= 2.60
Compute by:	Known Q
Known Q (cfs)	= 257.99

Highlighted

Depth (ft)	= 0.76
Q (cfs)	= 257.99
Area (sqft)	= 113.87
Velocity (ft/s)	= 2.27
Top Width (ft)	= 150.00



Weir Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Aug 8 2025

South Retention Basin (3) - Emergency Spillway

Rectangular Weir

Crest	= Broad
Bottom Length (ft)	= 300.00
Total Depth (ft)	= 1.75

Calculations

Weir Coeff. Cw	= 2.60
Compute by:	Known Q
Known Q (cfs)	= 508.51

Highlighted

Depth (ft)	= 0.75
Q (cfs)	= 508.51
Area (sqft)	= 225.53
Velocity (ft/s)	= 2.25
Top Width (ft)	= 300.00

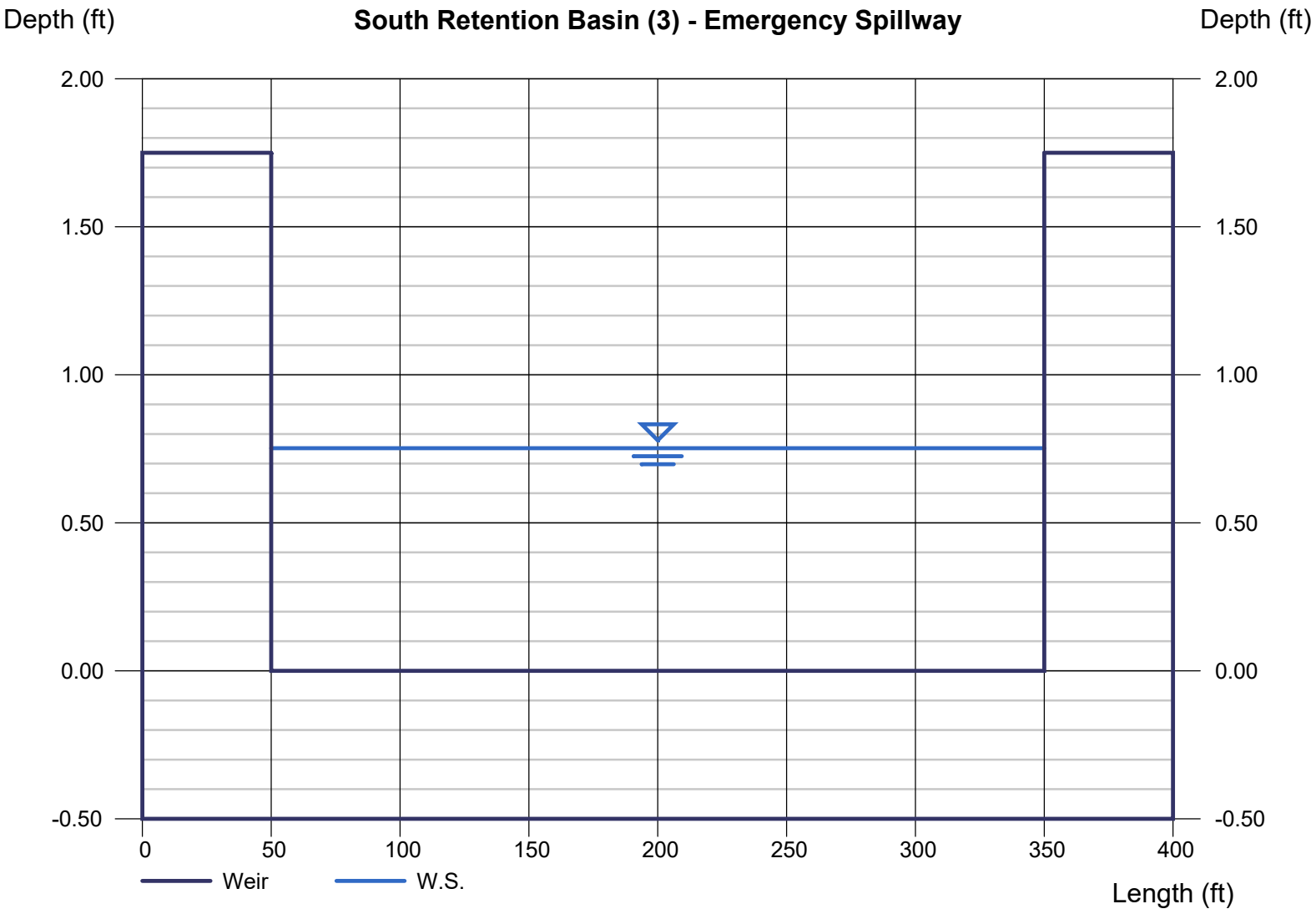


Exhibit I

40 Hour Extended Detention Calculations

Calculate Water Quality for Storm Study

Project: East Village (Retention Basin South (3)) Date: 8-8-2025

To Calculate: WQv = P * Rv * A

P (in) =	1.37
P (ft) =	0.11
Impervious Area (sq. ft.) =	2,661,072.53
Total Area (sq. ft.) =	4,093,768.80
Impervious Area (ac) =	61.09
Total Area (acre) =	93.98

Enter data in these Fields
Unit Conversions
1 Acre = 43,560 Sq. Ft.

Rv = (0.05 * 0.009(I)) =	0.65
Percent Impervious (I) =	66.67
WQ_v (cu. ft.) =	303,806
WQ_v (ac. ft.) =	6.974

Pond Volume

Elevation	Area (Sq. Ft.)	Volume (Cu. Ft.)
1,003	134,585	0
1,004	140,150	137,368
1,005	145,775	280,330
1,006	151,456	428,946
1,007	157,194	583,271
1,008	162,989	743,362
1,009	168,840	909,277
1,010	174,747	1,081,070
1,011	180,712	1,258,800
1,012	186,732	1,442,522

40 HOUR DETENTION CALC.

To Calculate: 40 Hour Detention (EDDB)

I. Basin Water Quality Storage Volume

Step 1) Tributary area To EDDB, A_t (ac) =	A_T (ac) =	93.98
Step 2) Calculate WQ_v using Sec. 6 (ac-ft) =	WQ_v (ac. ft.)=	6.974
Step 3) Add 20 Percent to Step 2.	V_{design} (ac-ft) =	8.369

II.a. Water Quality Outlet Type

Step 1) Set water quality outlet type
Type 1 = single orifice
Type 2 = perforated riser or plate
Type 3 = v-notch weir

Outlet Type = 1

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

IIb. Water Quality Outlet, Single Orifice

Step 1) Depth of water quality volume at outlet	Z_{WQ} (ft) =	2.16	See Below to Calc. Z_{WQ}
Step 2) Average Head of water volume over invert of Orifice	H_{WQ} (ft) =	1.08	
Step 3) Average Water quality outflow rate	Q_{WQ} (cfs) =	2.110	
Step 4) Set value of orifice discharge coefficient	C0 (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_0 (in) =	8.39	8.387185926
(if orifice dia. < 4 inches, use outlet type 2 or 3)			

To Calculate Z_{WQ} (ft) interpolate from Storm Study (Sheet 13)

Elevation 1 =	1005.00	Storage 1 =	280,330.00
Elevation X =		Storage X =	303,805.78
Elevation 2 =	1006.00	Storage 2 =	428,946.00

		Elevation X =	1005.16
Lowest Elevation of Pond =	1003.00		
Elevation X =	1005.16	996.55	

Z_{WQ} (ft) = 2.16

Recommended Method: Single Orifice

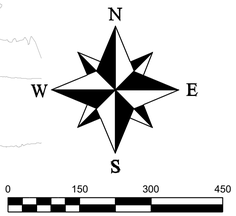
Exhibit J

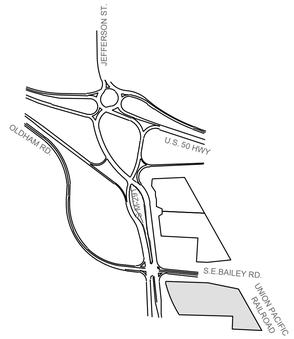
Stream Buffer Exhibit

Drainage Areas

Section 7, Township 47 North, Range 31 West

Lees Summit, Jackson County, Missouri





VICINITY MAP

LEGEND

These standard symbols will

be found in the drawing.

- Set 1/2" Rear & Cap(LS-2005008319-D)
- Found Survey Monument (As Noted)
- Exception Document Location
- Existing Fence Line - Chain Link
- Existing Water Line
- Existing Sanitary Sewer Main
- Existing Storm Sewer
- Existing Gas Line
- Existing Underground Telephone
- Existing Underground Electric

ID	Drainage Area	Use
A	8.40 Acres	Vacant Ground / Roadway
B	43.9 Acres	Vacant Ground / Roadway / Warehouse w/ Parking
C	20.5 Acres	Vacant Ground
D	33.9 Acres	Vacant Ground / Railroad Right of Way

Stream Characteristics

-Eroded drainage channels with minimal vegetation and limited stabilization

Stream Buffer Approach

-APWA Section 5605.3 "Stream Preservation and Buffer Zones" is intended to protect natural streams and adjacent areas. The drainage areas located within the site have limited stream characteristics and present a severe erosion potential.

-The development of this area will create a series of detention and BMP facilities that will serve the overall watershed with improved storm water and erosion controls.

REVISIONS

DATE	

Stream Buffer Map
Section 7, Township 47 North, Range 31 West
Lees Summit, Jackson County, Missouri

Drainage Areas

SHEET	SECTION	TOWNSHIP	RANGE
1 OF 1	7	47N	31W
DRAWN BY		SCALE	
M. Schlicht, PLS, PE		1"=100'	

COUNTY	Jackson
JOB NO.	Dotson Market Place
DATE OF PREPARATION	November 9, 2024

PROFESSIONAL SEAL

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Exhibit K

Aerial Photo National Wetlands Inventory

Measure

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

1:9,028
38.896 | -94.386

U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov | MARC/local jurisdictions, Maxar | Esri Comm...

POWERED BY esri

Exhibit L

East and West Detention Basin Data
(By Others)