DRAINAGE PLAN

LAKESIDE AT THE MOORINGS

TO

WICHITA, SEDGWICK COUNTY, KANSAS

PREPARED BY

13 FEBRUARY 2012

ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

DRAINAGE PLAN
LAKESIDE AT THE MOORINGS

FINAL REPORT

Prepared by Baughman Company, P.A.
13 February 2012

By Trevor R. Kurth, P.E., CFM
N. Brent Wooten, P.E., L.S.

REPORT CONTENTS

EXISTING CONDITIONS

The site is located along Meridian Avenue in between I-235 and 53rd Street North in Wichita, Kansas. The property is bounded on the east by Meridian Avenue, the west by the Wichita-Valley Center Flood Control Levee, north by The Moorings residential development, and to the south by a Sedgwick County Fire Station and church property. The proposed site is approximately 55 acres and is a portion of it is currently platted as The Moorings South Addition.

The site is currently vacant and includes prairie grass and heavily treed areas on the west half of the site. The site is features a high plateau like area on the west half and a flat area on the east. Based on Lidar and the HydroGeodatabase, it appears that the majority of the site drains to the southeast and into the 42nd and Meridian Avenue Right of Way (ROW). A portion of the site drains to the west and into the existing lake system and a portion drains to the south and into the levee system ROW.

There is no FEMA SFHA located on this property as of this report. The drainage patterns as defined above can be seen on the Existing Conditions Exhibit.

PROPOSED CONDITIONS

The property will be platted as a commercial park into approximately 21 lots and multiple reserves. The reserve areas will be used primarily for storm water detention, water quality, and downstream channel protection. Infiltration into the in situ sandy soils will be utilized in this area. The lots will have cross lot access and on-site storm water sewer may be utilized at the time of individual site plans to convey developed runoff to the detention areas.

For a half-scale copy of the Plat, see Exhibit 3.

OFFSITE CONDITIONS

The proposed site primarily drains to the southeast and into the Meridian and 42nd Street ROWs. A double 28"x44" RCP is located at this location which conveys this sites runoff, primarily, to the south and into the Meridian ROW ditch.

A portion of the site drains directly into the adjacent Moorings lake system. Since this lake system is groundwater and has no permanent functioning outlet, an external pump is utilized when the lake levels rise to unfavorable elevations. According to the current property owners and developers of all the surrounding lake properties, the external pump has only been activated 'a couple of times' to draw down the water. The pump discharges directly into the levee system.

The southern tip of the proposed property sheets drains to the southwest and into the levee ponding area where it is eventually conveyed into the levee via a pipe with a flap gate.

There appears to be only one area of offsite runoff encroaching this property. The church property located the north of the site discharges approximately 3 acres of runoff to the northwest corner of the site.

The USGS Quadrangle Sheet can be seen with the site location plotted as Exhibit 1. The Aerial for this area can be viewed as Exhibit 2.

EXISTING CONDITIONS RUNOFF CALCULATIONS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in calculating the existing conditions runoff values.

- STORM SERIES
  - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 100-yr Storm Events Modeled
  - 2-yr Rainfall Depth = 3.5 in
  - 10-yr Rainfall Depth = 5.3 in
  - 100-yr Rainfall Depth = 7.9 in

- FLOW DATA
  - Areas per LIDAR data, USGS Quadrangle Sheet, Aerial Photos, and Site Visits
  - SCS Curve Number used for Existing Flows (CN = 71)
  - Time of Concentration: Lag Method (minimum 15 min)

SITE CHARACTERISTICS

The site consists of approximately 55 acres of currently open space prairie and pasture. The area primarily drains to the southeast and into the street ROW. The west half of the site is heavily treed and partially drains to the existing Moorings lake system.
The existing site characteristics can be seen from the aerial exhibit (Exhibit 2).

EXISTING CONDITIONS HYDROLOGIC ANALYSIS

The site was analyzed for pre-development conditions using the SCS Curve Number Method for the entire series of storm events. A Curve Number (CN) of 71 was used due to the site having primarily Type B soil. According to soil borings done onsite, the soil profile shows clay in the upper 3 feet followed by clayey sand at approximately 5 feet. The CN was based on a soil type B and following the Pre-Developed undisturbed pervious conditions in the Storm Water Manual, a 71 was chosen. The Time of Concentration was calculated using the Lag Method with a minimum Tc of 15 minutes, if needed.

DOWNSTREAM DRAINAGE CAPACITY

As described above, the site flows primarily to the south and east and into the street ROWs. At this point are 2 - 28"x44" RCPs which convey runoff to the south. These pipes, based on HydraFlow Express software (attached) should convey approximately 100 cfs before overtopping the adjacent roadway. It should be noted, this is based on capacity of the pipe sizing with respect to the surrounding elevations. The pipes will likely need cleaned and silt removed from the downstream channel to achieve this full capacity.
There appears to be additional capacity in the adjacent lake as some of the existing runoff flows there currently. Also, portions of this property have been platted as The Moorings South and are currently proposed to drain to this lake system.

POST-DEVELOPMENT HYDROLOGIC ANALYSIS

DRAINAGE METHODS & STANDARDS

The following methods and standards, although not a complete list, were used in developing the drainage and grading plans.

- STORM SERIES
  - 24-hour; 2-yr, 5-yr, 10-yr, 25-yr, 50-yr, 100-yr Storm Events Modeled
  - 1.2" Water Quality Flow modeled as '3-yr event' in HydraFlow
  - Hydrograph Method utilized for Developed Flows
  - CN = 94 (Soil Type B – Commercial District with open space Reserves)
  - Time of Concentration; Lag Method, minimum Tc = 15min

- GRADING CONSTRAINTS
  - One foot freeboard between 100-yr WSE and adjacent lot corner
  - Match all existing perimeter grades

DEVELOPED CONDITIONS HYDROLOGIC ANALYSIS

The site is proposed to be a commercial development with approximately 21 lots and 5 infiltration detention areas. A curve number of 94 was used due to commercial cover in type B soils. Credit was given to the open space of the reserves when calculating the curve number. The site is expected to have approximately 80% cover as opposed to the general 85% due to the large open space infiltration basins.

Please be aware, that the storm listed as the '3-yr event' in the Hydraflow model is actually the 1.2" rainfall water quality event. This is due to the constraints of the programs naming conventions. All the other storm events correspond to their respective years. The Channel Protection volume is generated using the 1-year event.

DETENTION FACILITIES

There are 5 detention facilities proposed for this plat. Each facility will be dry detention due to the elevated levels of groundwater and will feature infiltration into the existing sandy soils. These facilities can achieve the minimum 80% TSS due to the infiltration aspect of the basin. The overall design will closely resemble the infiltration trench as well as the enhanced swale due to the existing sandy soils on site. No under drains are expected at this time due to groundwater elevations and sandy soils. All the basins are expected to have one foot of storage below the outfall pipe elevation. This will allow for maximum infiltration as well as allow plant growth and survival at those elevations. We expect these areas to be vegetated with plants that can withstand standing water after rain events and those that will flourish in wet conditions. We anticipate these to be, but not limited to, plants designated to bioretention areas.

Based on a soil percolation test on site, the soils are expected to infiltrate approximately 2" per hour at approximately 3' in depth. Due to clay soils at the depth of the boring, the test hole was pre-soaked for 28 hours prior to doing the percolation test. After the test, the bore was extended another 1-2' and found a more sandy material than above (see Percolation Test Results, Appendix E).

Each facility and basin is detailed in further below.

- Basin A – Northern Most Detention Facility in Reserve D

  This basin is located at the north end of the proposed property and will accept runoff from the adjoining lots to the south. The basin will be approximately 3' in depth and will infiltrate the WQv as well as the CPv. This basin will discharge all the other events to the west via a 15" RCP and vegetated swale into the existing Moorings lake. This basin is expected to have a minimal discharge of 4 cfs in the 100 year event due to the infiltration rate.

- Basin B – East Detention Facility in Reserve D

  This detention basin will also infiltrate the WQv and will have a minimal discharge (<0.5 cfs) of the CPv. The infiltration basin is approximately 4 feet in depth and will discharge to the south via an 18" RCP and into another infiltration and detention basin (Basin C). This basin is expected to have a discharge of approximately 8.5 cfs in the 100-year storm event.

- Basin C – South East Detention Facility in Reserve E

  This detention basin is located at the southeast corner of the site and will be last detention basin before the runoff is allowed to discharge offsite to the existing pipes under 42nd Street. This basin will be approximately 5 foot deep and will feature 2 – 15" RCPs as outlets to the 42nd Street ROW ditch. This basin will also infiltrate the entire WQv and will minimally discharge the CPv at a rate of 0.3 cfs during the 1 year event. Due to the infiltration of the majority of the CPv, the outflow of the remaining 0.5 cfs will not be spread out over the 24 hour extended detention. This flow and volume generated from the detention outflow is much less than the current volume generated by the existing site, therefore no extended CPv is needed. We anticipate this basin to discharge at an approximate rate of 20 cfs in the 100-year event. This basin, along with Basin B, will over-detain due to developed runoff from the frontage lots draining directly into the Meridian ROW and/or the 42nd ROW

- Basin D – Frontage Runoff

  This area will drain to the Meridian ROW and/or the 42nd ROW and will not be detained. This area, upon site development, is expected to be surface drainage and possibly storm water sewer tying into the Meridian storm sewer system. This area has been accounted for in over-detention of the above referenced basins.

- Basin E – West Detention Facility in Reserve D

  This basin will serve as detention across the entire storm series as well as infiltrate the WQv and CPv. There will be a minimal discharge of CPv, less than 0.5 cfs, during the 1 year event. This basin will discharge to the north and into the existing Moorings Lake. The basin will feature a 15" RCP set at 1 foot above the bottom of the basin. We anticipate this basin to be 5 foot in depth and will have a 100-year discharge of approximately 7 cfs.

- Basin F – South Detention in Reserve C

  This basin is expected to be 3-4 feet in depth and will discharge overland and to the south as does the existing ground. The basin will

be an infiltration basin and will infiltrate the entire WQ and CP storm events. There will be no discharge during these events over the 5 foot wide broadcast weir. We expect the 100-year discharge to be approximately 12 cfs.

DISCHARGE POINTS SUMMARY

The site will continue to utilize the existing discharge locations as the existing runoff patterns portray. The major point is located near the intersection of Meridian and 42nd Street. The pipes at these locations, after development, will have less runoff discharged to them compared to current conditions. This is mainly due to the high infiltration rates of the proposed basins on the site.

The site will continue to discharge into the Moorings Lake after the runoff has been treated per the City of Wichita storm water standards.

The site will still utilize the southwest overland flow for Reserve C.

WATER QUALITY

Water quality will be achieved on the site through the use of the infiltration basins described above. The detention facilities have been sized and designed to allow the volumes to be infiltrated into the existing soils and not discharge. The site has had a percolation test which revealed an approximate infiltration rate of 2" per hour into the surrounding clayey sands. This was at an approximate depth of 30". The detention facilities will likely be deeper than this elevation and will likely be excavated into the more sandy soils.

Lots 2, 3, and 21 are planned to discharge undetained and untreated developed runoff into the adjacent Meridian SWS. These areas have been designed to directly discharge since their respective areas and volumes have been accounted for in the dry percolation areas. Based on the WQv calculations (Appendix D) this entire site will need to provide approximately 4.1 ac-ft of WQV. The detention volumes that will be forced to percolate (located from bottom of the detention to the flow line of the outfall pipes, will provide approximately 4.5 ac-ft of storage. Therefore, the frontage lots as described above will be able to freely discharge into the Meridian ROW SWS untreated.

DOWNSTREAM CHANNEL PROTECTION

Downstream channel protection is also being provided on the site by infiltrating the needed volume in the detention facilities.

POTENTIAL UPSTREAM/DOWNSTREAM IMPACTS

Due to the construction of infiltrating detention areas, and the utilization of the existing outfall pipes and elevations, we do not anticipate any downstream impacts with this development.

The infiltration aspect of this development will help to recharge the groundwater table and help maintain the water level in the adjacent Moorings lake.

SOURCE OF FLOODPLAIN INFORMATION

The site lies within a FEMA Zone X - Unshaded. The location of the property, on FEMA FIRM Panels 195 and 213 of 700 for Sedgwick County, Kansas, effective February 2, 2007, is attached as Exhibit 6.

FEDERAL, STATE, & LOCAL PERMITTING

US ARMY CORPS OF ENGINEERS

There does not appear to be any jurisdictional waters of the US on this site.

KANSAS DEPT OF AGRICULTURE – DWR PERMITTING

There does not appear to be any DWR permitting needed on the proposed site at this time. The areas of discharge do not account for more than 240 acres.

FEMA

There is no mapped floodplain located upon the proposed site. Therefore, no FEMA permitting is expected at this time.

KANSAS DEPT OF TRANSPORTATION

There does not appear to be any KDOT permitting needed on the proposed project.

SEDGWICK COUNTY PERMITTING

The site will continue to discharge into the 42nd Street and Meridian ROWs. Coordination with the County may be needed when developing areas that discharge into these areas.

EXHIBIT 1: Site Location Map

EXHIBIT 2: Aerial Photo Exhibit with Lidar Topography

EXHIBIT 3: Plat – Half Scale

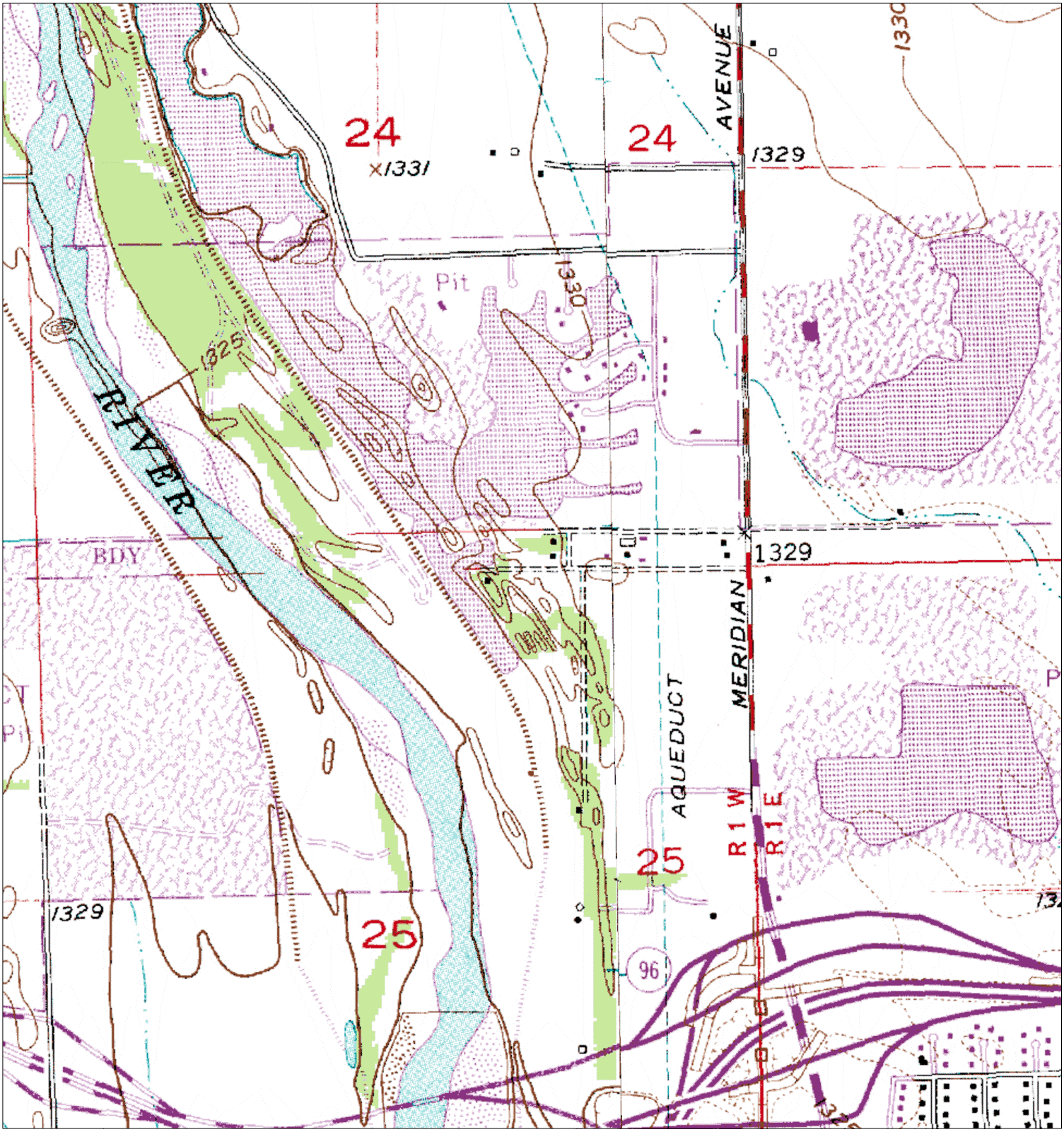
EXHIBIT 4: Drainage Plan – Half Scale

EXHIBIT 5: Floodplain Location (FIRM)

SITE LOCATION MAP

LAKESIDE AT THE MOORINGS

WICHITA, SEDGWICK COUNTY, KANSAS



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SITE LOCATION MAP
LAKESIDE AT THE MOORINGS

07 FEB 2012

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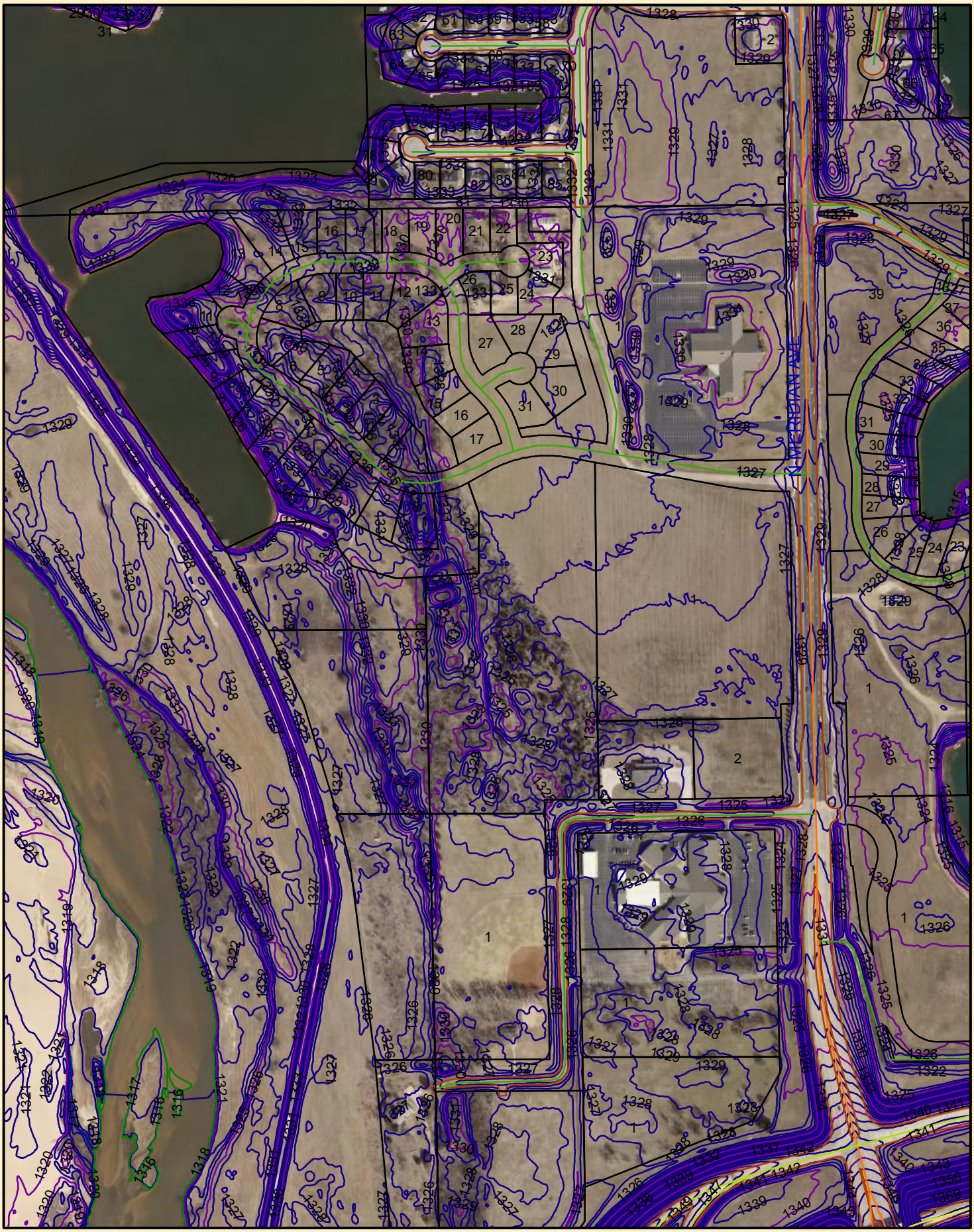

MOORINGS COMMERCIAL

0 100 200 400 Feet

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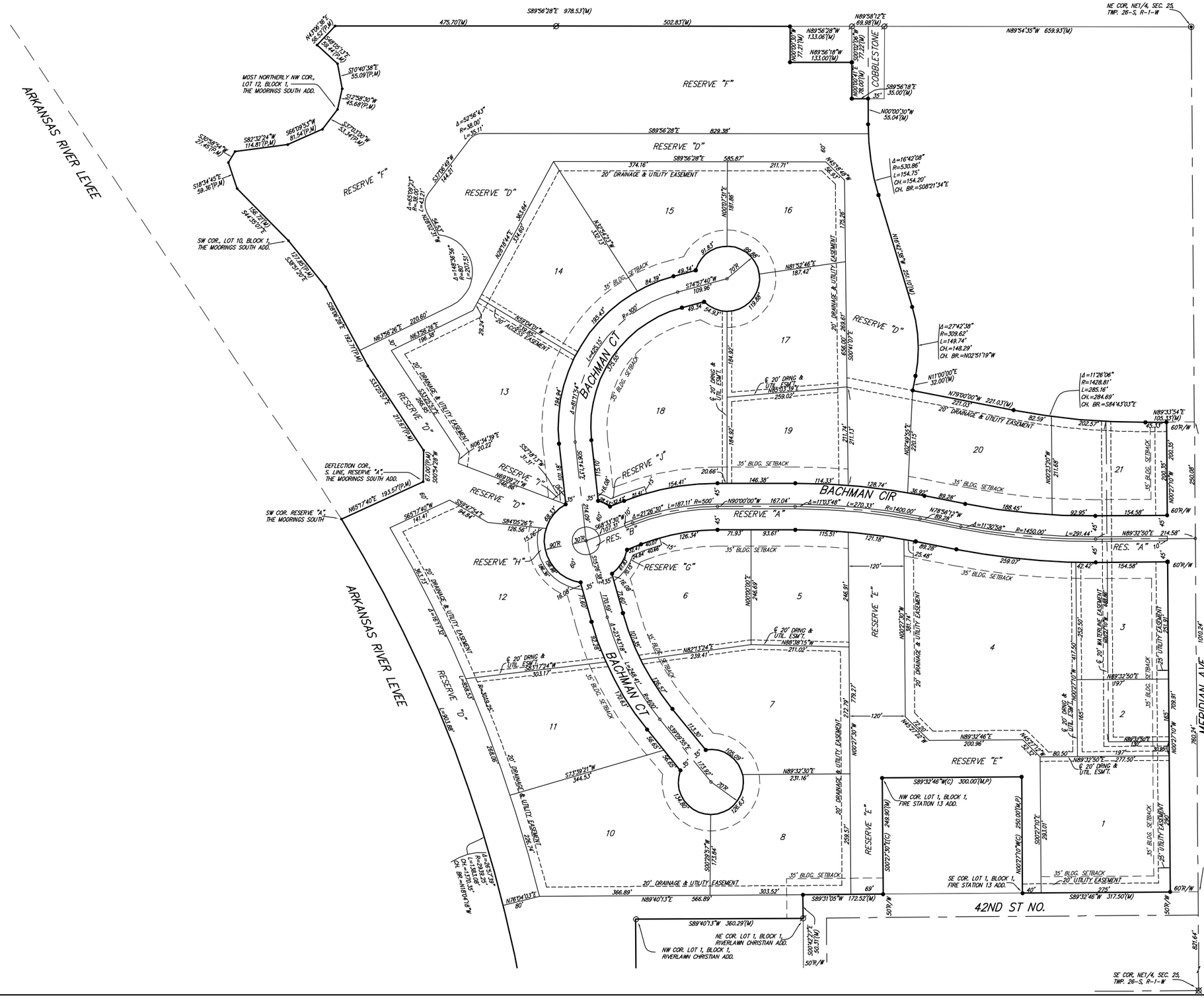
LAKESIDE AT THE MOORINGS

WICHITA, SEDGWICK COUNTY, KANSAS



0 100 200

DATE OF PREPARATION: 6 FEBRUARY 2012

- ● = #4 REBAR W/ "BAUGHMAN" CAP (SET)
- △ = STONE (FOUND)
- ○ = 3/4" IRON (FOUND)
- □ = CONCRETE MONUMENT (FOUND)
- ○ = 1/2" IRON (FOUND)
- ⊠ = 1"x1" SQUARE BAR (FOUND)
- ⊛ = #4 REBAR W/ "MKEC" CAP IN THIMBLE (FOUND)

(M) = MEASURED
(D) = DESCRIBED
(P) = PLATTED
(C) = CALCULATED

MINIMUM BUILDING PAD ELEVATIONS FOR LOWEST OPENING TO THE STRUCTURES		
LOT	BLOCK	ELEVATION NAVD88
1,4,7,8	A	1330.1
9	A	1329.0
10,11,12	A	1330.3
13-16	A	1331.0
17,19, 20	A	1331.1

BENCHMARK:
CITY OF WICHITA BM – NW CORNER OF MERIDIAN AND KEYWEST 59' W. AND 32.3 N. OF CENTERLINE, 11.8' N. CURB LINE. ELEVATION = 1329.82 NAVD88

NOTE:
A drainage plan has been developed for this subdivision and is on file with the City of Wichita, Kansas. Drainage intent shall remain as depicted or as modified with the approval of the City Engineer of the City of Wichita, Kansas. No obstructions which impede the flow of this drainage plan shall be allowed.

LAKESIDE AT THE MOORINGS

6 FEBRUARY 2012

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DRAINAGE PLAN

LAKESIDE AT THE MOORINGS

WICHITA, SEDGWICK COUNTY, KANSAS

DETENTION A (Bottom = 1325.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	26 cfs	0.1 cfs	1326.1
10 yr	40 cfs	1.6 cfs	1326.7
100 yr	61 cfs	3.7 cfs	1327.4

EXISTING POND	
ELEVATION	AREA (sqft)
1325	32000
1326	42000
1327	52000
1328	62000
1329	72000

DETENTION B (Bottom = 1325.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	47 cfs	1.0 cfs	1326.4
10 yr	73 cfs	4.4 cfs	1327.1
100 yr	111 cfs	8.5 cfs	1328.1

EXISTING POND	
ELEVATION	AREA (sqft)
1325	50000
1326	56000
1327	64000
1328	71000
1329	75000

DETENTION C (Bottom = 1325.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	49 cfs	3.5 cfs	1325.4
10 yr	77 cfs	9.0 cfs	1326.2
100 yr	122 cfs	20 cfs	1327.1

EXISTING POND	
ELEVATION	AREA (sqft)
1324	50000
1325	55000
1326	68000
1327	81000
1328	94000

DETENTION E (Bottom = 1324.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	32 cfs	1.6 cfs	1325.7
10 yr	50 cfs	3.7 cfs	1326.4
100 yr	77 cfs	6.9 cfs	1327.3

EXISTING POND	
ELEVATION	AREA (sqft)
1324	24000
1325	33000
1326	41000
1327	49000
1328	58000

DETENTION F (Bottom = 1325.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	14 cfs	0.1 cfs	1326.0
10 yr	19 cfs	3.6 cfs	1326.4
100 yr	34 cfs	12 cfs	1326.9

EXISTING POND	
ELEVATION	AREA (sqft)
1325	22000
1326	25000
1327	28000

EXISTING BASIN
Scale 1:400

LEGEND	
(A)	Basin Labels
—·—·—	Proposed SWS
— · —	Proposed SWS
→	Flow Direction

NOTES: No FEMA SFHA exists on this property as of this date.

The proposed Bio-retention area / dry detention areas will be utilized for WQ, CP, and overall site detention. These areas may incorporate multiple TSS removal features. These areas will be above groundwater and will utilize infiltration into the in situ sandy soils.

Underground SWS is anticipated to be utilized on site per site development.

DRAINAGE PLAN
LAKESIDE AT THE MOORINGS
06 FEB 2012

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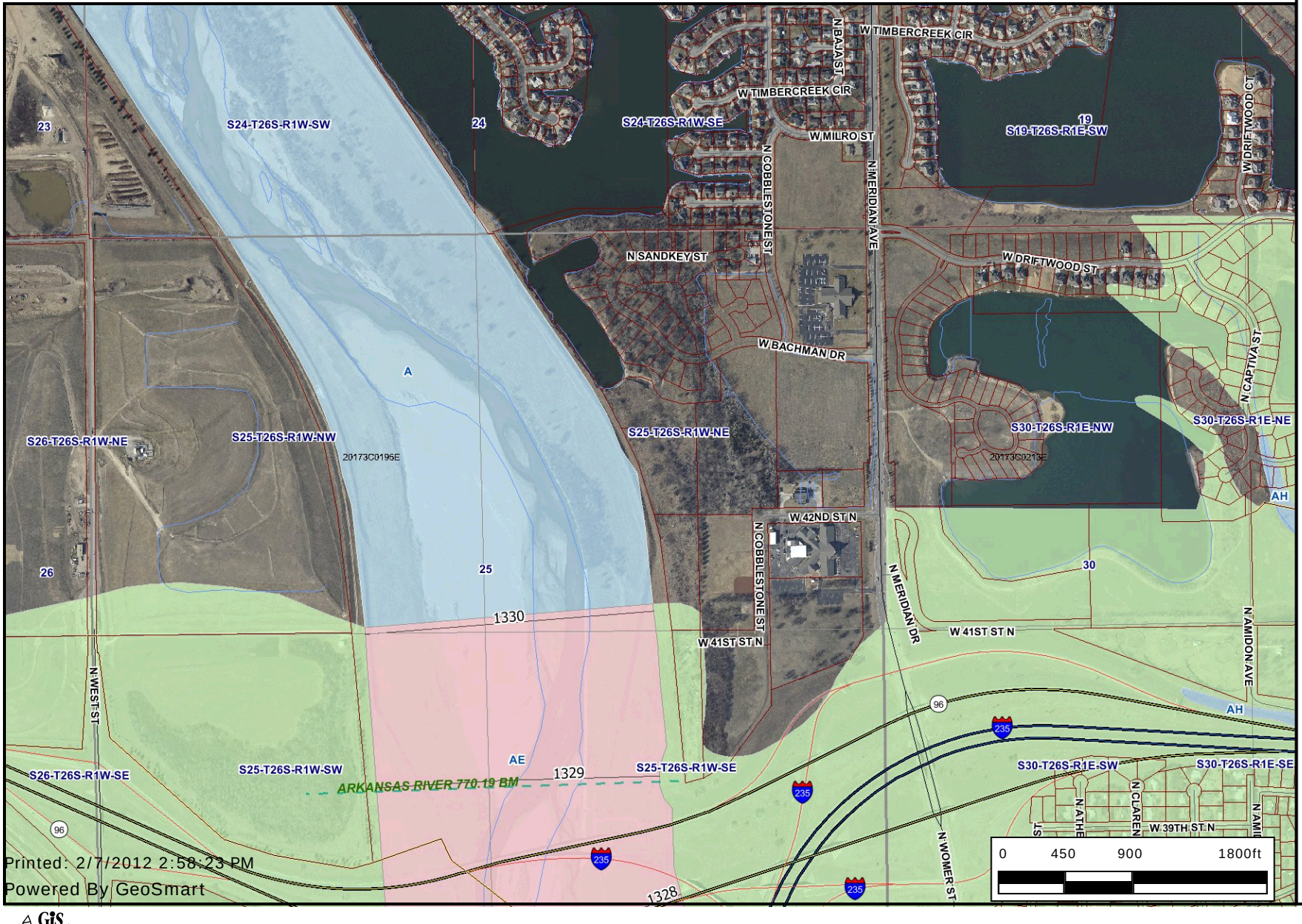
Lakeside at the Moorings

Floodplain Map



City Limit Boundaries
Property Parcels
Base Flood Elevations
Cross Sections
Flood Way
Flood Zones
0.2 PCT ANNUAL CHANCE FLOOD HAZARD
X PROTECTED BY LEVEE
AH;AE;A;AO
FIRM PANELS
City Limits
Small Cities
Sedgwick County
Wichita

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APPENDIX A: USGS Soils Survey

APPENDIX B : HydraFlow Hydrographs
Site Flow and Detention Routing

APPENDIX C : HydraFlow Express
Existing Culverts

APPENDIX D : Water Quality Calculations

APPENDIX E : Percolation Test Results
Geotechnical Services, Inc.

USGS Soils Survey

Hydrologic Soil Group—Sedgwick County, Kansas
(Moorings Commercial)

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Political Features

- Cities

Water Features

- Oceans
- Streams and Canals

Transportation

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

MAP INFORMATION

Map Scale: 1:4,860 if printed on A size (8.5" × 11") sheet.

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 14N NAD83

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

Soil Survey Area: Sedgwick County, Kansas
Survey Area Data: Version 7, Nov 30, 2010

Date(s) aerial images were photographed: 6/20/2006

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.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Sedgwick County, Kansas				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
5896	Nalim-Shellabarger sandy loams, 0 to 1 percent slopes	C	2.3	2.7%
5928	Pratt loamy fine sand, 1 to 5 percent slopes	A	21.5	25.3%
5967	Tabler silty clay loam, 0 to 1 percent slopes	D	15.1	17.8%
6060	Lincoln soils, frequently flooded	A	10.5	12.3%
6224	Canadian fine sandy loam, rarely flooded	B	12.9	15.2%
6244	Elandco silt loam, rarely flooded	B	19.9	23.4%
9999	Water		2.8	3.3%
Totals for Area of Interest			**85.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie.

The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Lower

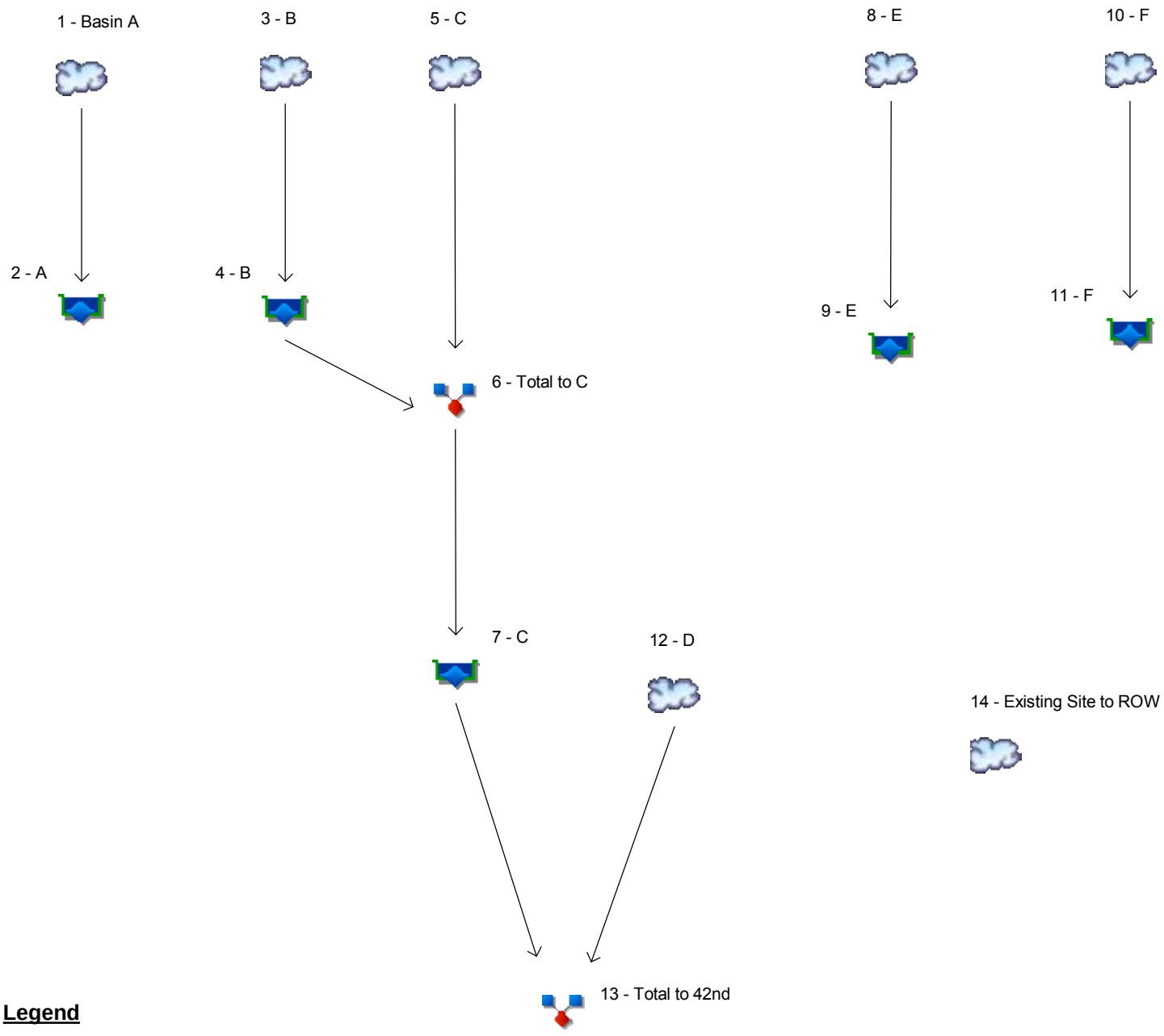
The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

HydraFlow Hydrographs

Site Flow & Detention Routing

Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8



Legend

Hyd.	Origin	Description
1	SCS Runoff	Basin A
2	Reservoir	A
3	SCS Runoff	B
4	Reservoir	B
5	SCS Runoff	C
6	Combine	Total to C
7	Reservoir	C
8	SCS Runoff	E
9	Reservoir	E
10	SCS Runoff	F
11	Reservoir	F
12	SCS Runoff	D
13	Combine	Total to 42nd
14	SCS Runoff	Existing Site to ROW

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	------	19.94	25.82	6.449	34.16	39.96	47.37	53.93	61.29	Basin A
2	Reservoir	1	0.000	0.090	0.000	0.872	1.604	2.504	3.010	3.668	A
3	SCS Runoff	------	36.21	46.89	11.71	62.03	72.55	86.01	97.93	111.28	B
4	Reservoir	3	0.077	0.956	0.000	3.106	4.423	5.226	6.928	8.461	B
5	SCS Runoff	------	38.04	49.27	12.30	65.18	76.23	90.38	102.89	116.93	C
6	Combine	4, 5	38.04	49.27	12.30	65.54	77.37	92.97	106.72	121.77	Total to C
7	Reservoir	6	0.450	2.468	0.000	6.843	8.404	11.43	14.88	19.16	C
8	SCS Runoff	------	24.92	32.28	8.061	42.70	49.95	59.21	67.41	76.61	E
9	Reservoir	8	0.497	1.590	0.000	2.946	3.679	5.106	6.101	6.938	E
10	SCS Runoff	------	11.02	14.27	3.564	18.88	22.08	26.18	29.80	33.87	F
11	Reservoir	10	0.000	0.051	0.000	1.751	3.573	6.261	8.826	11.88	F
12	SCS Runoff	------	13.90	18.01	4.497	23.82	27.86	33.03	37.61	42.74	D
13	Combine	7, 12	13.90	18.04	4.497	25.10	31.22	39.44	45.85	51.98	Total to 42nd
14	SCS Runoff	------	9.014	16.20	0.178	28.37	37.69	50.34	62.05	75.58	Existing Site to ROW

Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

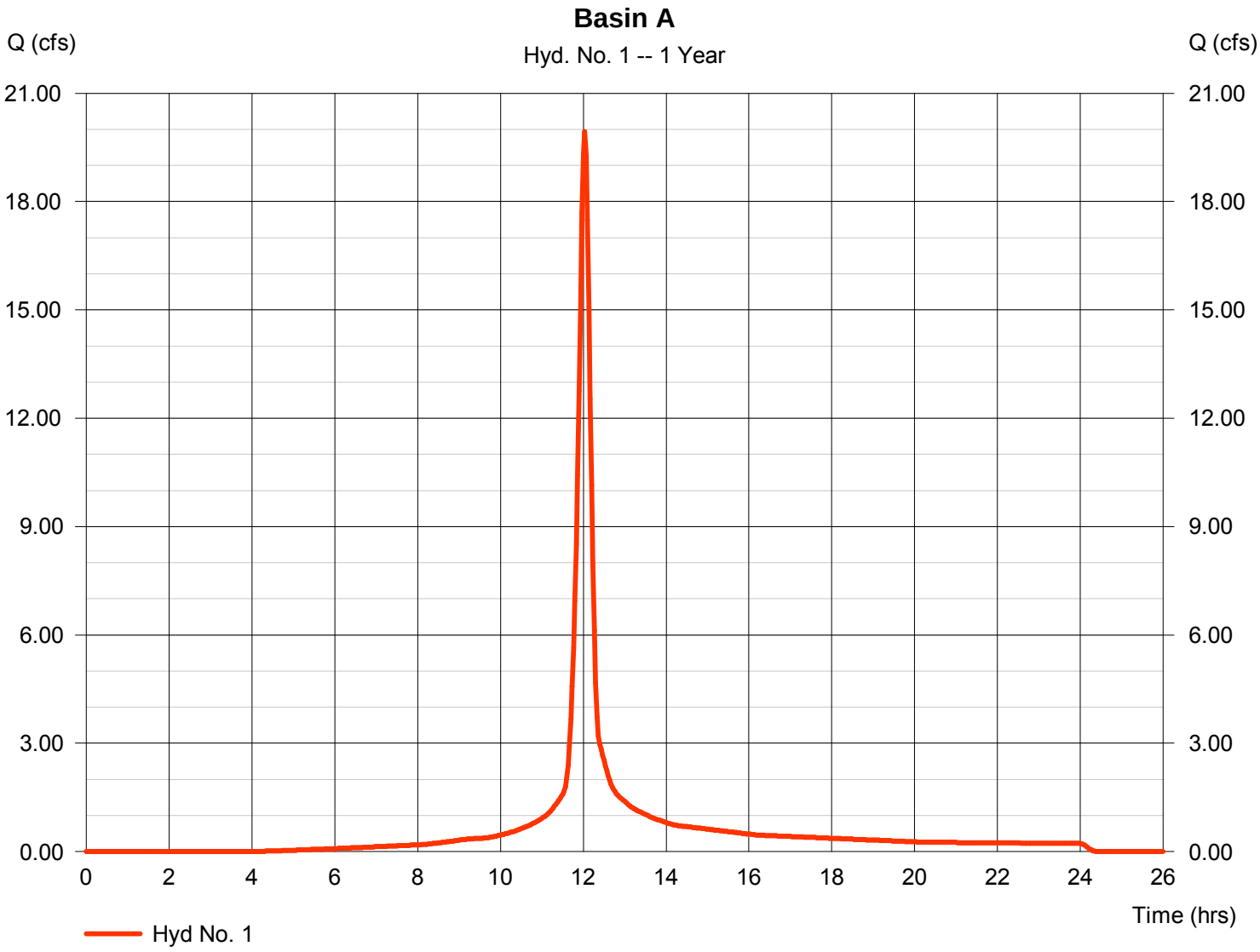
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	19.94	2	722	58,022	------	------	------	Basin A
2	Reservoir	0.000	2	722	0	1	1325.88	32,296	A
3	SCS Runoff	36.21	2	722	105,357	------	------	------	B
4	Reservoir	0.077	2	774	425	3	1326.11	59,818	B
5	SCS Runoff	38.04	2	722	110,701	------	------	------	C
6	Combine	38.04	2	722	111,126	4, 5	------	------	Total to C
7	Reservoir	0.450	2	772	3,162	6	1325.01	63,827	C
8	SCS Runoff	24.92	2	722	72,528	------	------	------	E
9	Reservoir	0.497	2	764	3,811	8	1325.32	40,355	E
10	SCS Runoff	11.02	2	722	32,065	------	------	------	F
11	Reservoir	0.000	2	732	0	10	1325.77	18,065	F
12	SCS Runoff	13.90	2	722	40,463	------	------	------	D
13	Combine	13.90	2	722	43,625	7, 12	------	------	Total to 42nd
14	SCS Runoff	9.014	2	788	115,705	------	------	------	Existing Site to ROW

Hydrograph Report

Hyd. No. 1

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 19.94 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 58,022 cuft
Drainage area	= 7.600 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



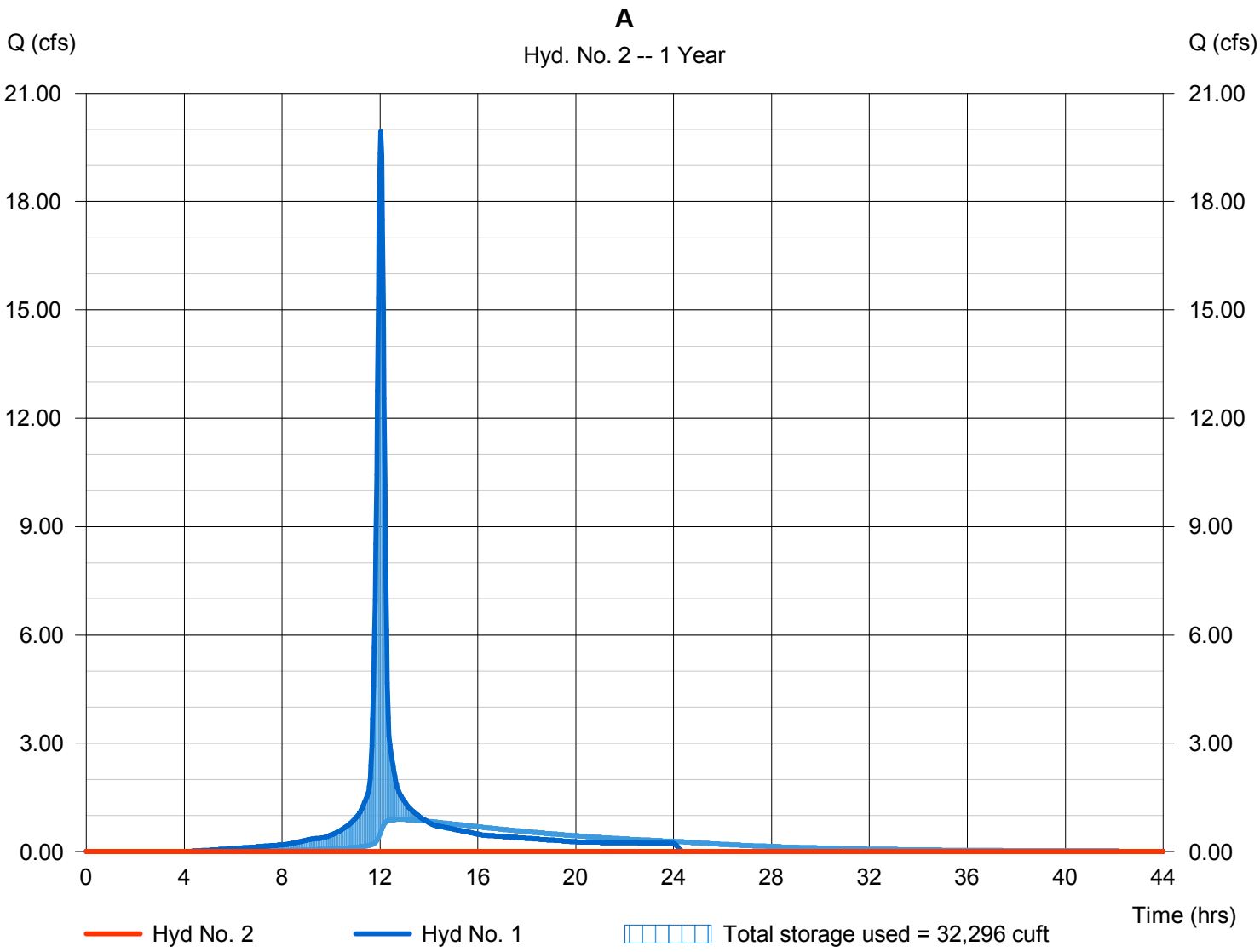
Hydrograph Report

Hyd. No. 2

A

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - Basin A	Max. Elevation	= 1325.88 ft
Reservoir name	= A	Max. Storage	= 32,296 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 1 - A

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1325.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1325.00	32,000	0	0
1.00	1326.00	42,000	36,883	36,883
2.00	1327.00	52,000	46,906	83,790
3.00	1328.00	62,000	56,921	140,711
4.00	1329.00	72,000	66,931	207,642

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)	= 1326.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

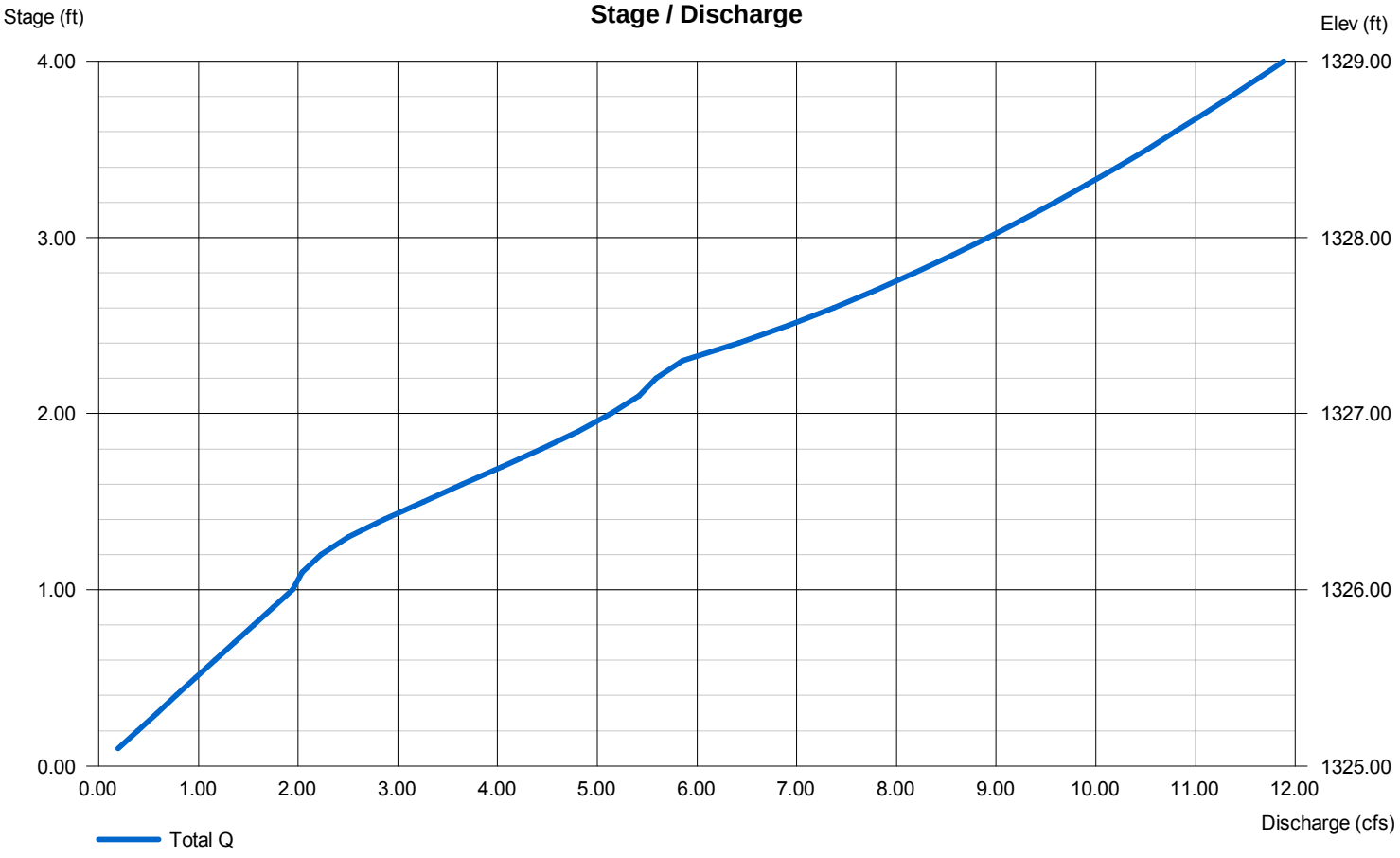
Weir Structures

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

Exfil.(in/hr) = 2.000 (by Contour)

TW Elev. (ft) = 0.00

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

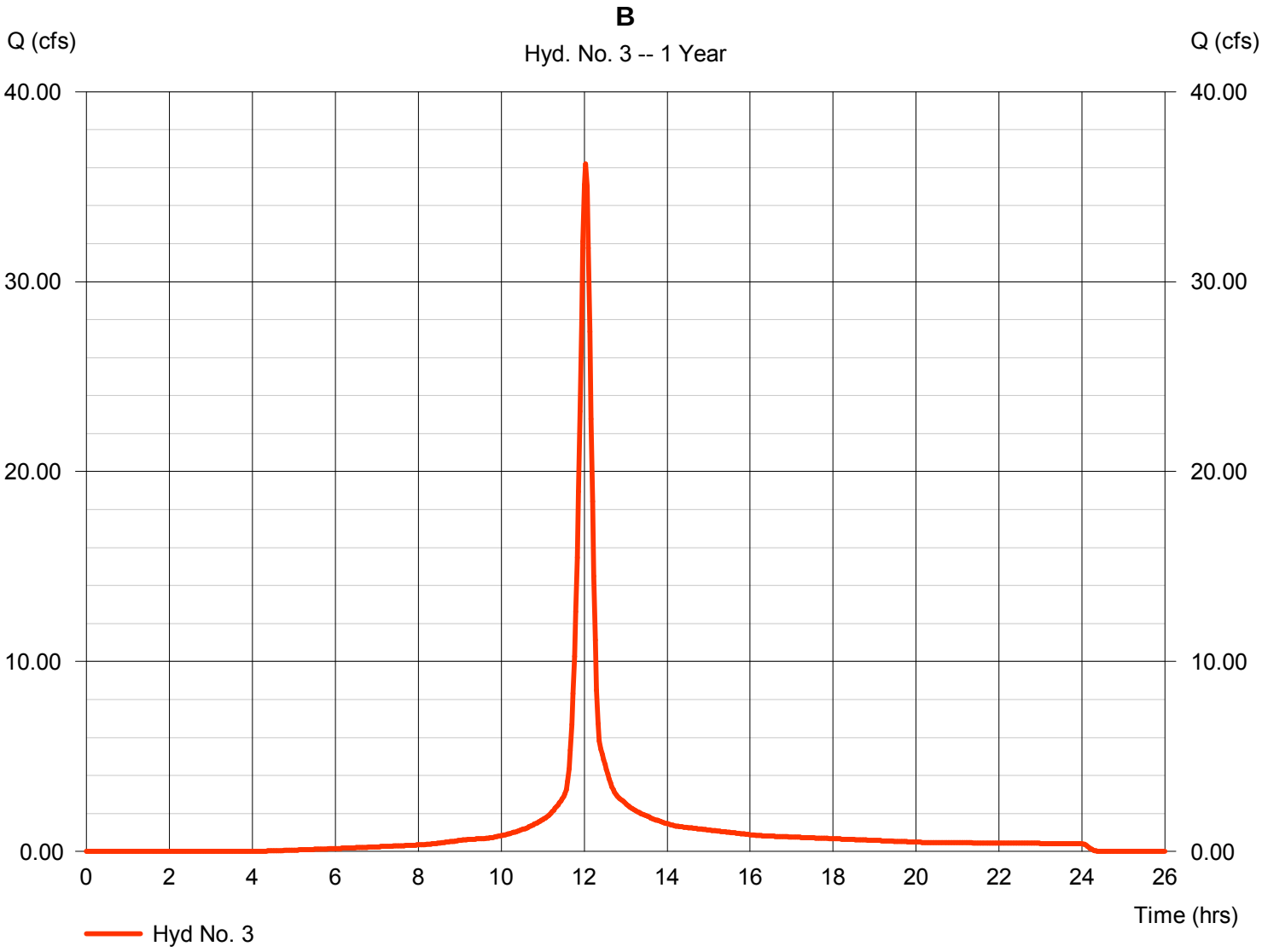


Hydrograph Report

Hyd. No. 3

B

Hydrograph type	= SCS Runoff	Peak discharge	= 36.21 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 105,357 cuft
Drainage area	= 13.800 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



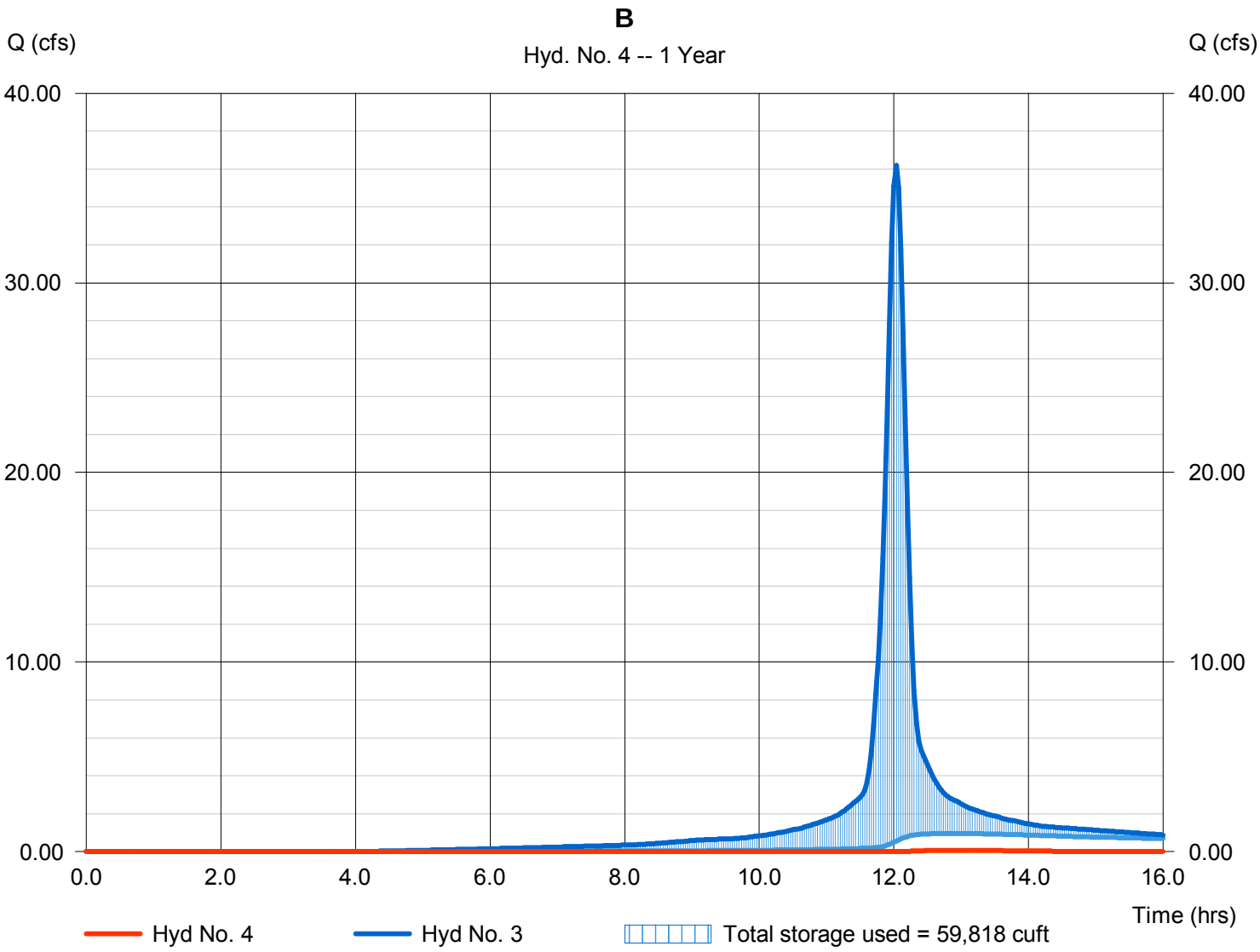
Hydrograph Report

Hyd. No. 4

B

Hydrograph type	= Reservoir	Peak discharge	= 0.077 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.90 hrs
Time interval	= 2 min	Hyd. volume	= 425 cuft
Inflow hyd. No.	= 3 - B	Max. Elevation	= 1326.11 ft
Reservoir name	= B	Max. Storage	= 59,818 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 2 - B

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1325.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1325.00	50,000	0	0
1.00	1326.00	56,000	52,966	52,966
2.00	1327.00	64,000	59,950	112,916
3.00	1328.00	71,000	67,463	180,379
4.00	1329.00	75,000	72,984	253,362

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)	= 1326.00	0.00	0.00	0.00
Length (ft)	= 75.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

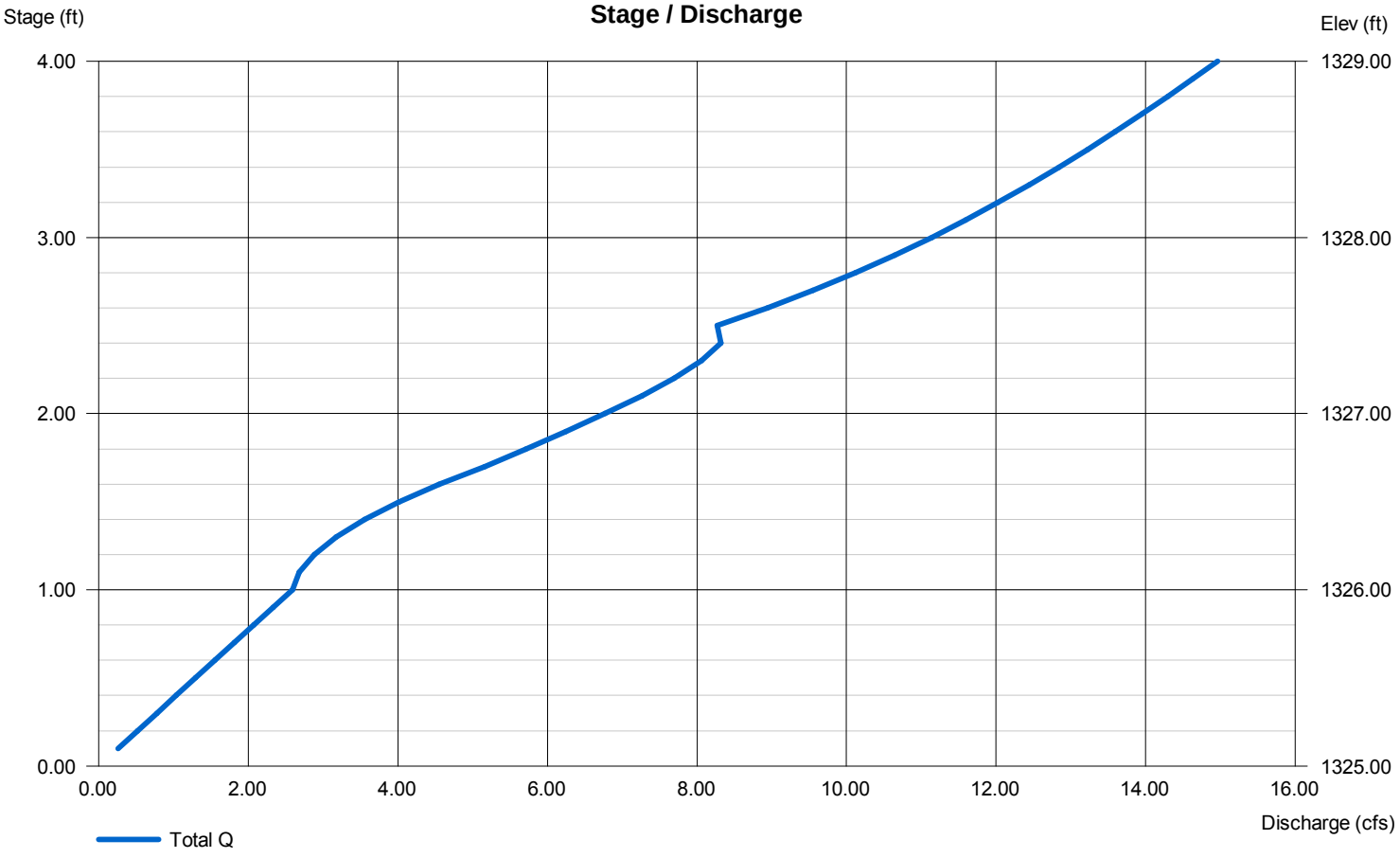
Weir Structures

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

Exfil.(in/hr) = 2.000 (by Contour)

TW Elev. (ft) = 0.00

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

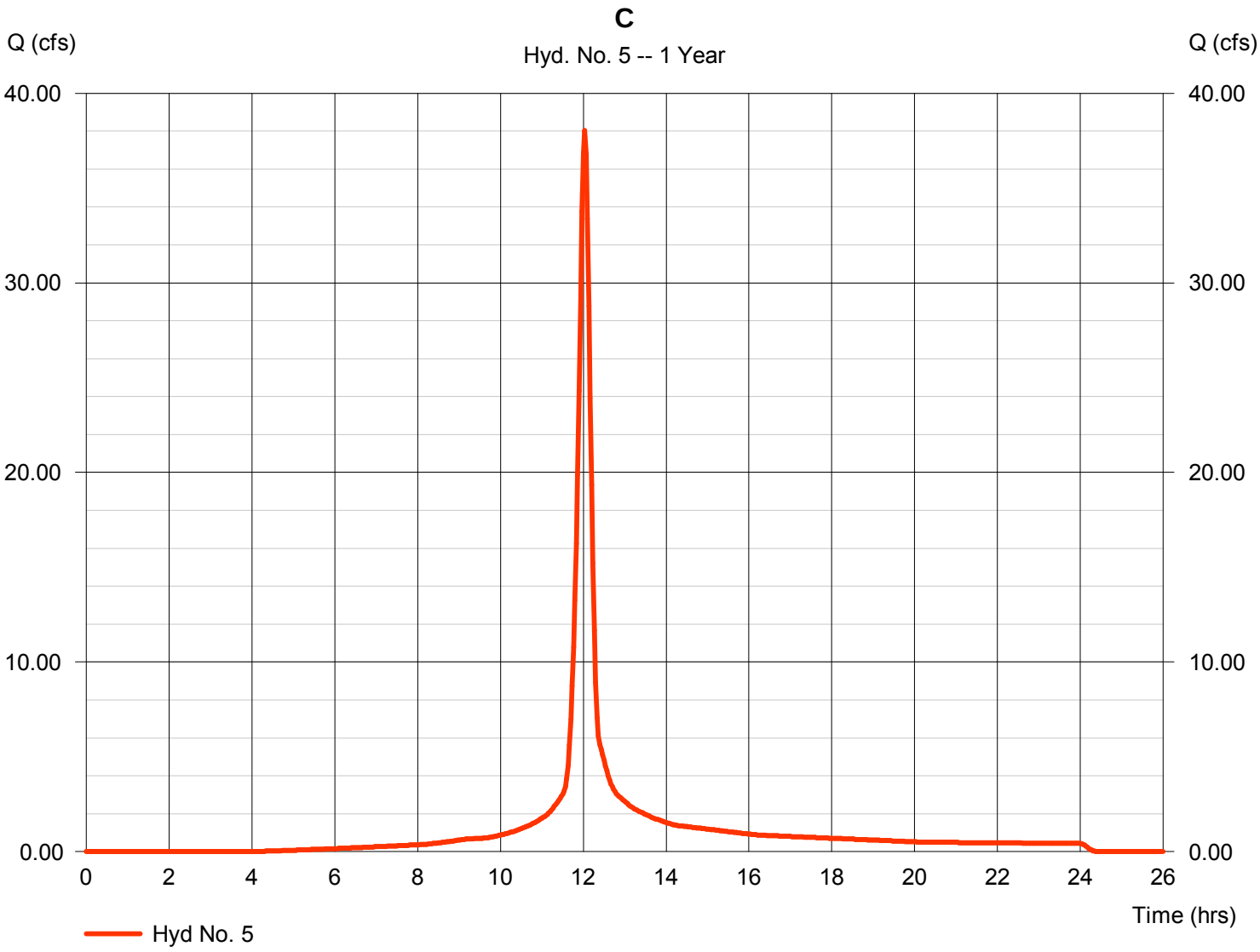


Hydrograph Report

Hyd. No. 5

C

Hydrograph type	= SCS Runoff	Peak discharge	= 38.04 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 110,701 cuft
Drainage area	= 14.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

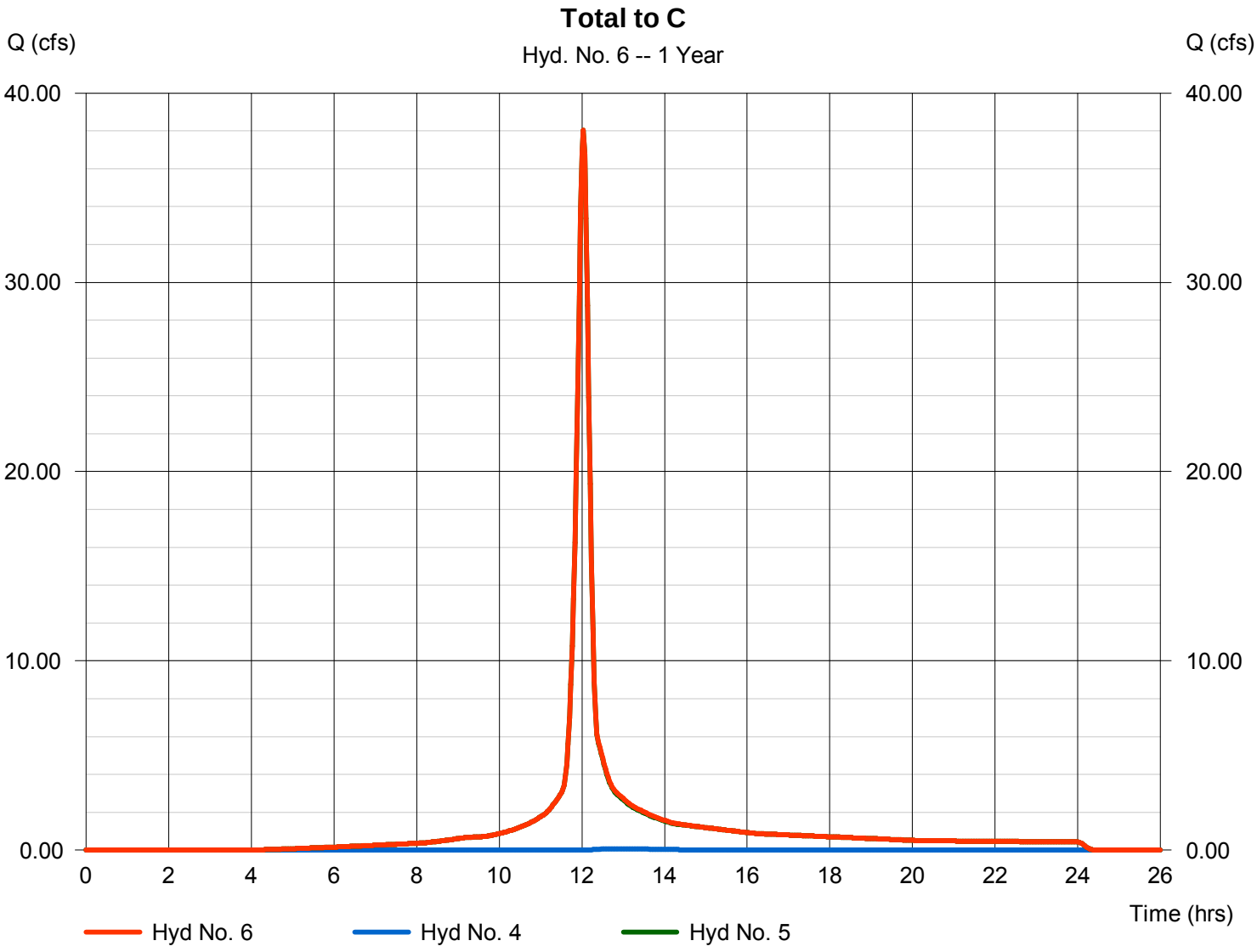


Hydrograph Report

Hyd. No. 6

Total to C

Hydrograph type	= Combine	Peak discharge	= 38.04 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 111,126 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 14.500 ac



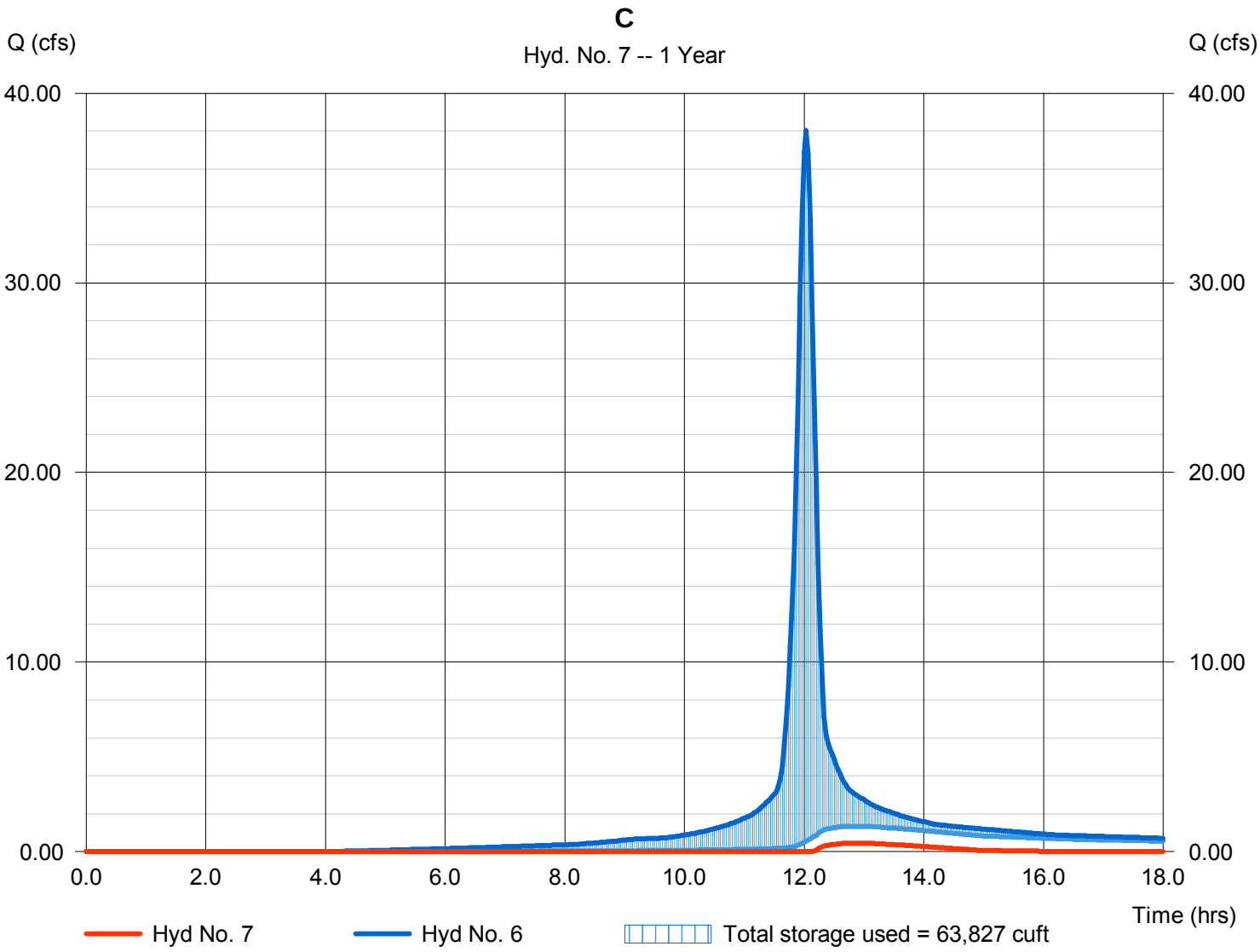
Hydrograph Report

Hyd. No. 7

C

Hydrograph type	= Reservoir	Peak discharge	= 0.450 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.87 hrs
Time interval	= 2 min	Hyd. volume	= 3,162 cuft
Inflow hyd. No.	= 6 - Total to C	Max. Elevation	= 1325.01 ft
Reservoir name	= C	Max. Storage	= 63,827 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 3 - C

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1323.80 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1323.80	50,000	0	0
1.20	1325.00	55,000	62,970	62,970
2.20	1326.00	68,000	61,379	124,349
3.20	1327.00	81,000	74,398	198,747
4.20	1328.00	94,000	87,411	286,157

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	= 2	0	0	0
Invert El. (ft)	= 1324.80	0.00	0.00	0.00
Length (ft)	= 200.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

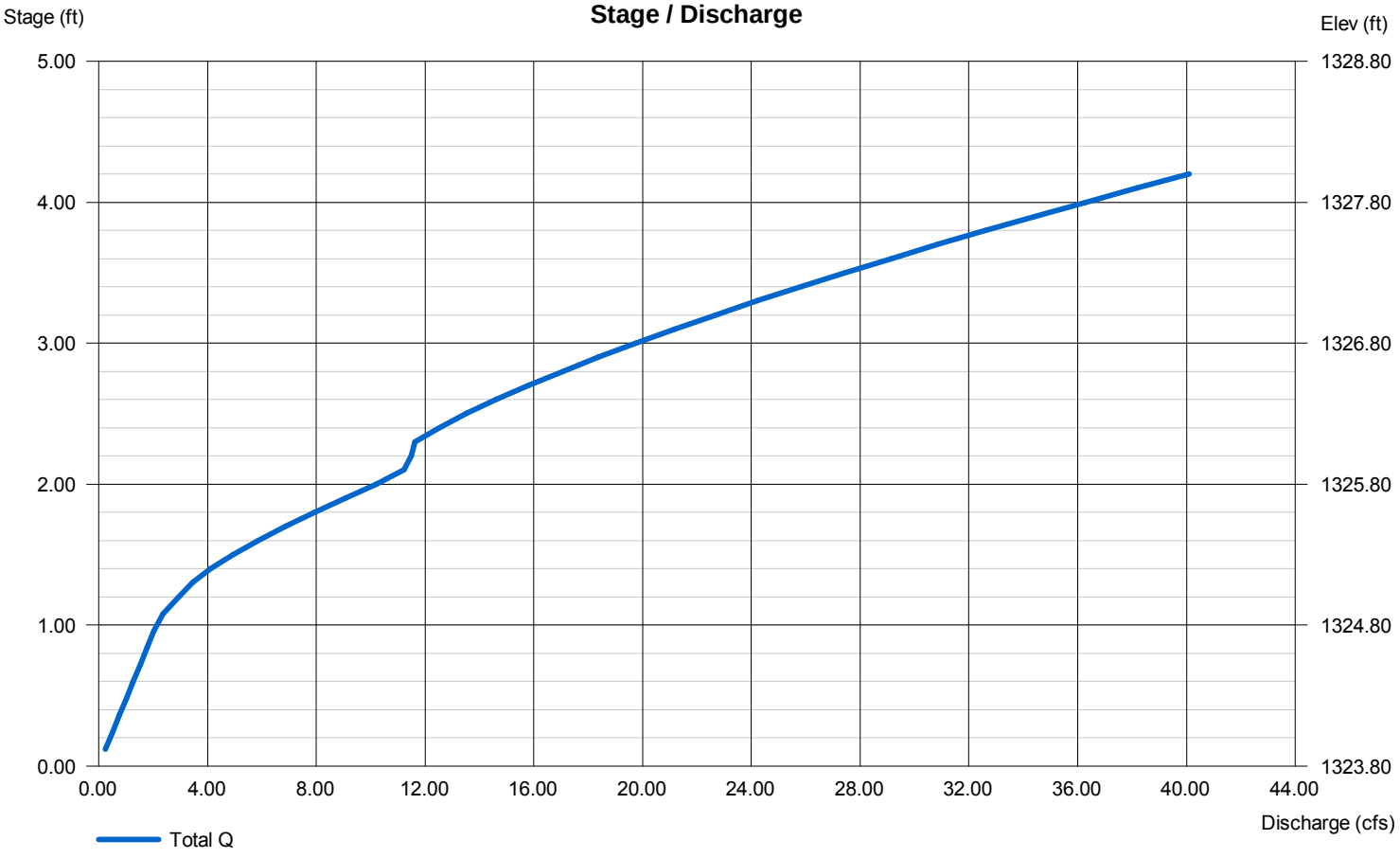
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.00	0.00	0.00	0.00
Crest El. (ft)	= 1326.00	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) = 2.000 (by Contour)

TW Elev. (ft) = 0.00

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

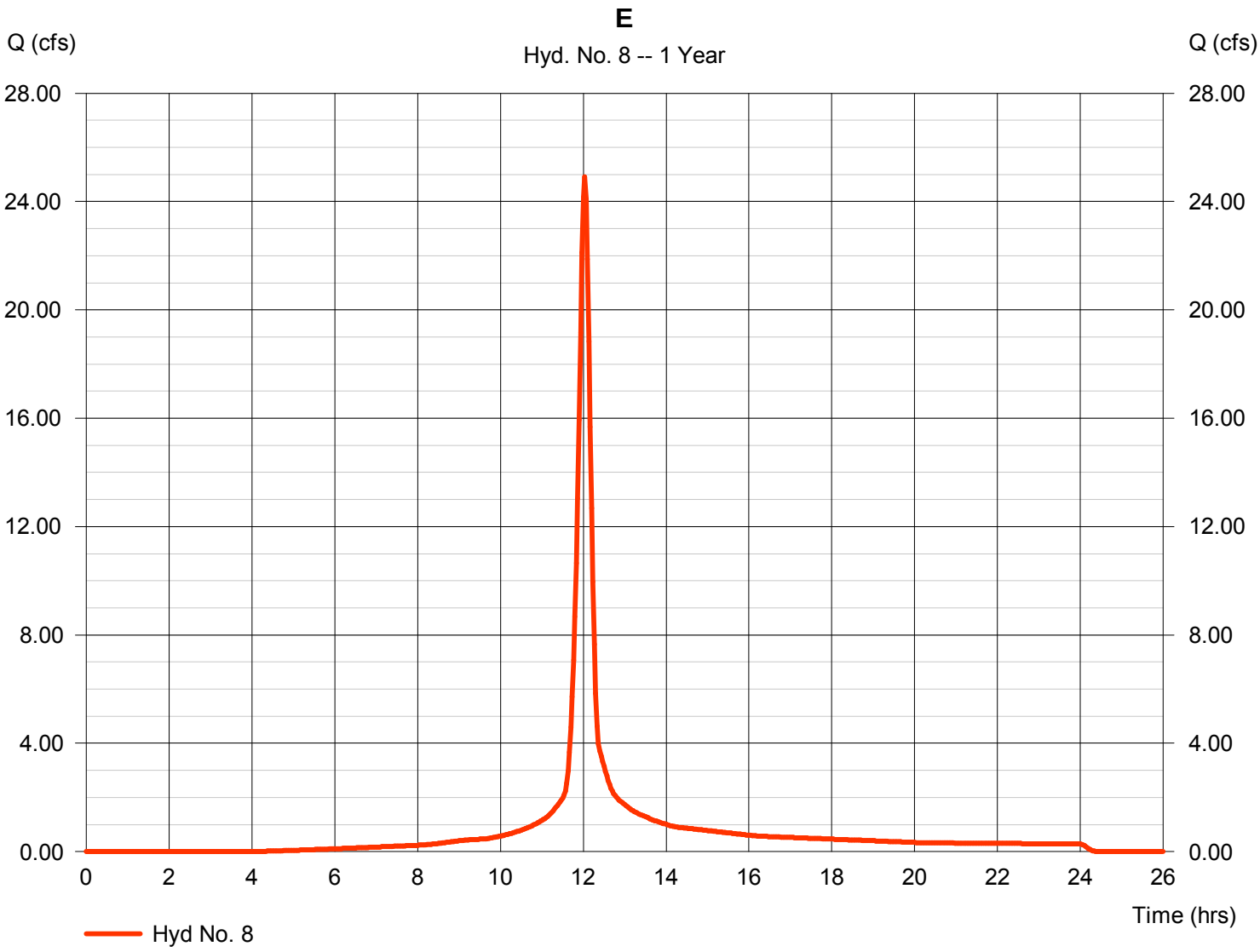


Hydrograph Report

Hyd. No. 8

E

Hydrograph type	= SCS Runoff	Peak discharge	= 24.92 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 72,528 cuft
Drainage area	= 9.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



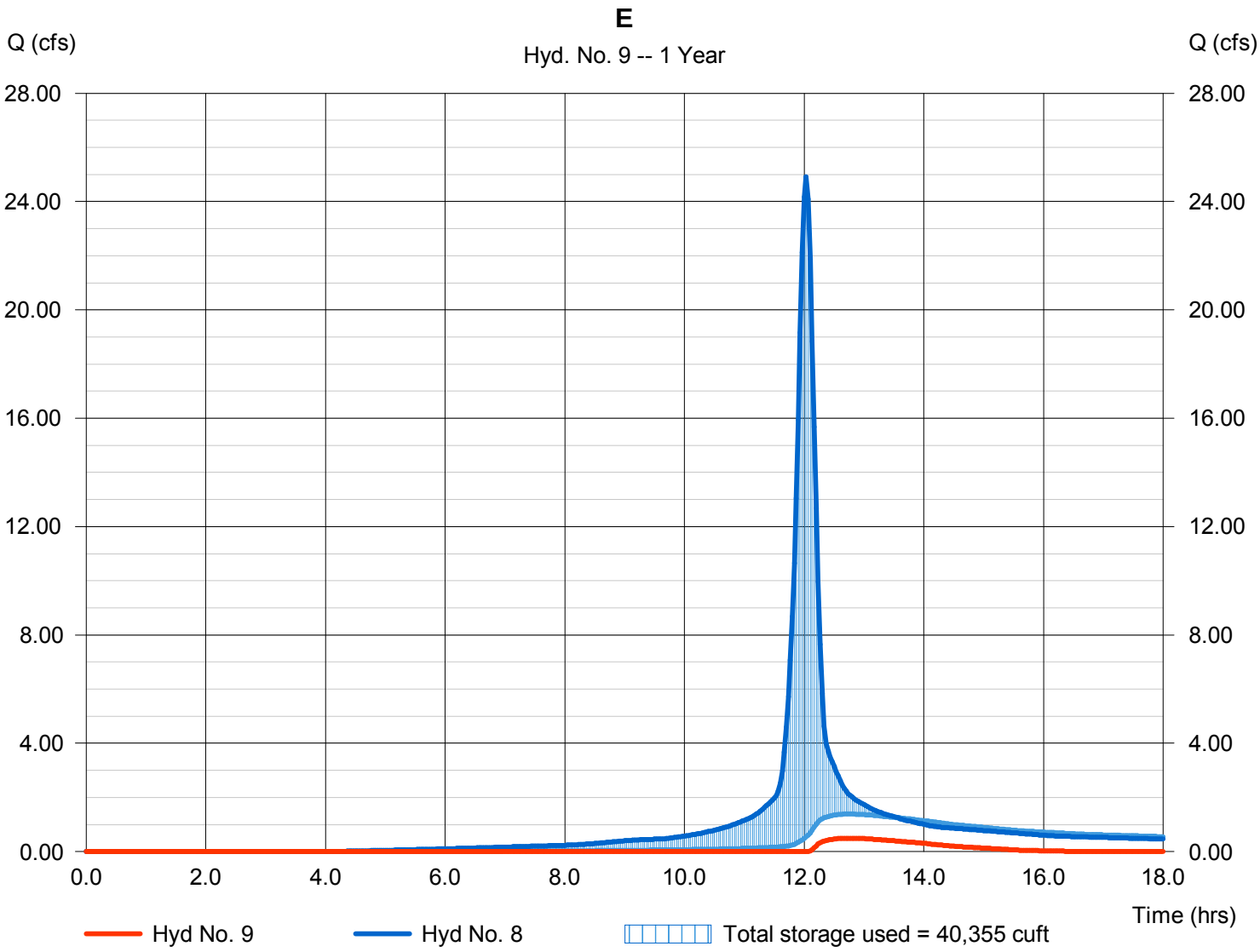
Hydrograph Report

Hyd. No. 9

E

Hydrograph type	= Reservoir	Peak discharge	= 0.497 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 3,811 cuft
Inflow hyd. No.	= 8 - E	Max. Elevation	= 1325.32 ft
Reservoir name	= E	Max. Storage	= 40,355 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 4 - E

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1324.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1324.00	24,000	0	0
1.00	1325.00	33,000	28,378	28,378
2.00	1326.00	41,000	36,924	65,302
3.00	1327.00	49,000	44,936	110,238
4.00	1328.00	58,000	53,431	163,670

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)	= 1325.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	n/a
N-Value	= .013	.013	.013	n/a
Orifice Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

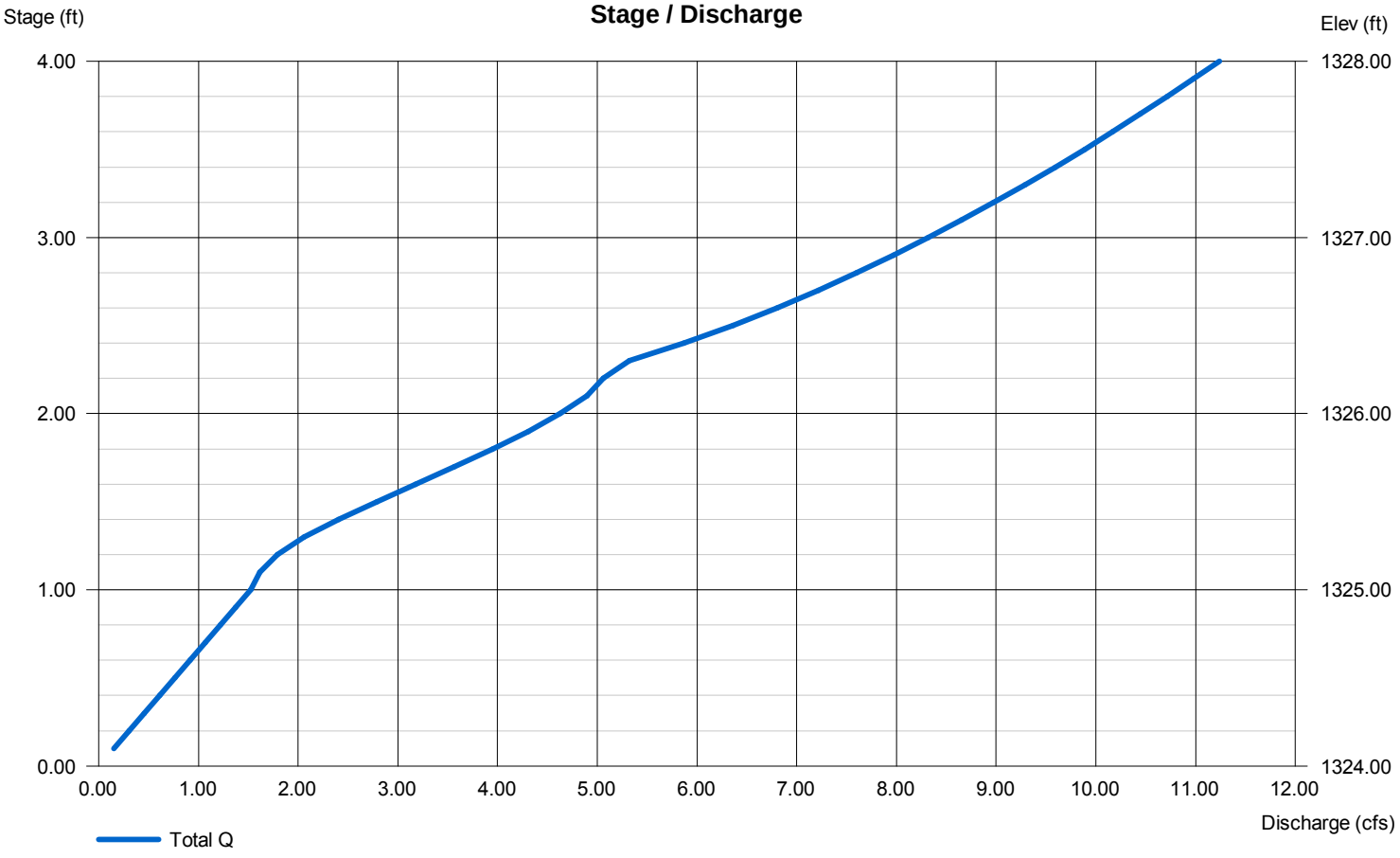
Weir Structures

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

Exfil.(in/hr) = 2.000 (by Contour)

TW Elev. (ft) = 0.00

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

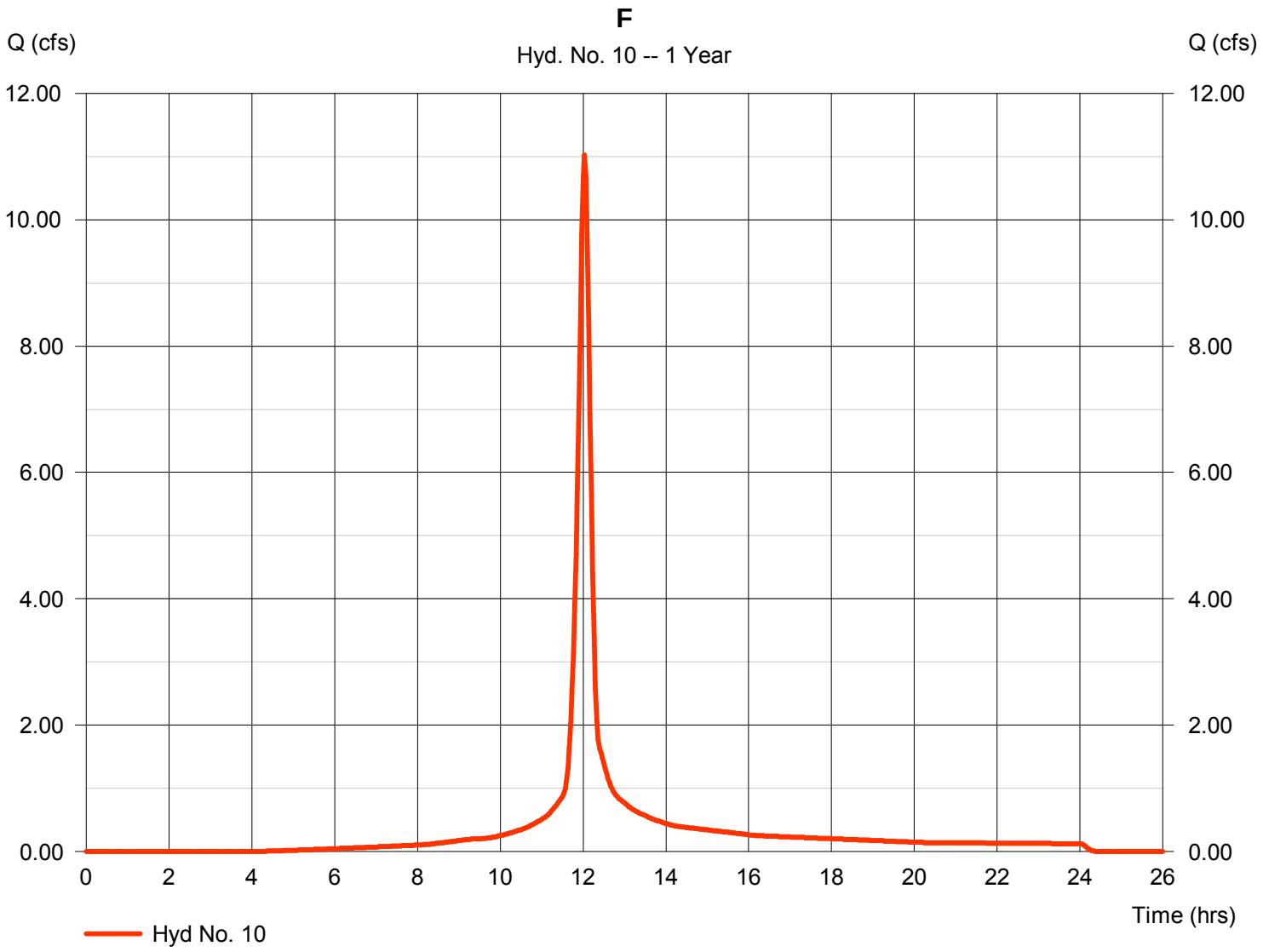


Hydrograph Report

Hyd. No. 10

F

Hydrograph type	= SCS Runoff	Peak discharge	= 11.02 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 32,065 cuft
Drainage area	= 4.200 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



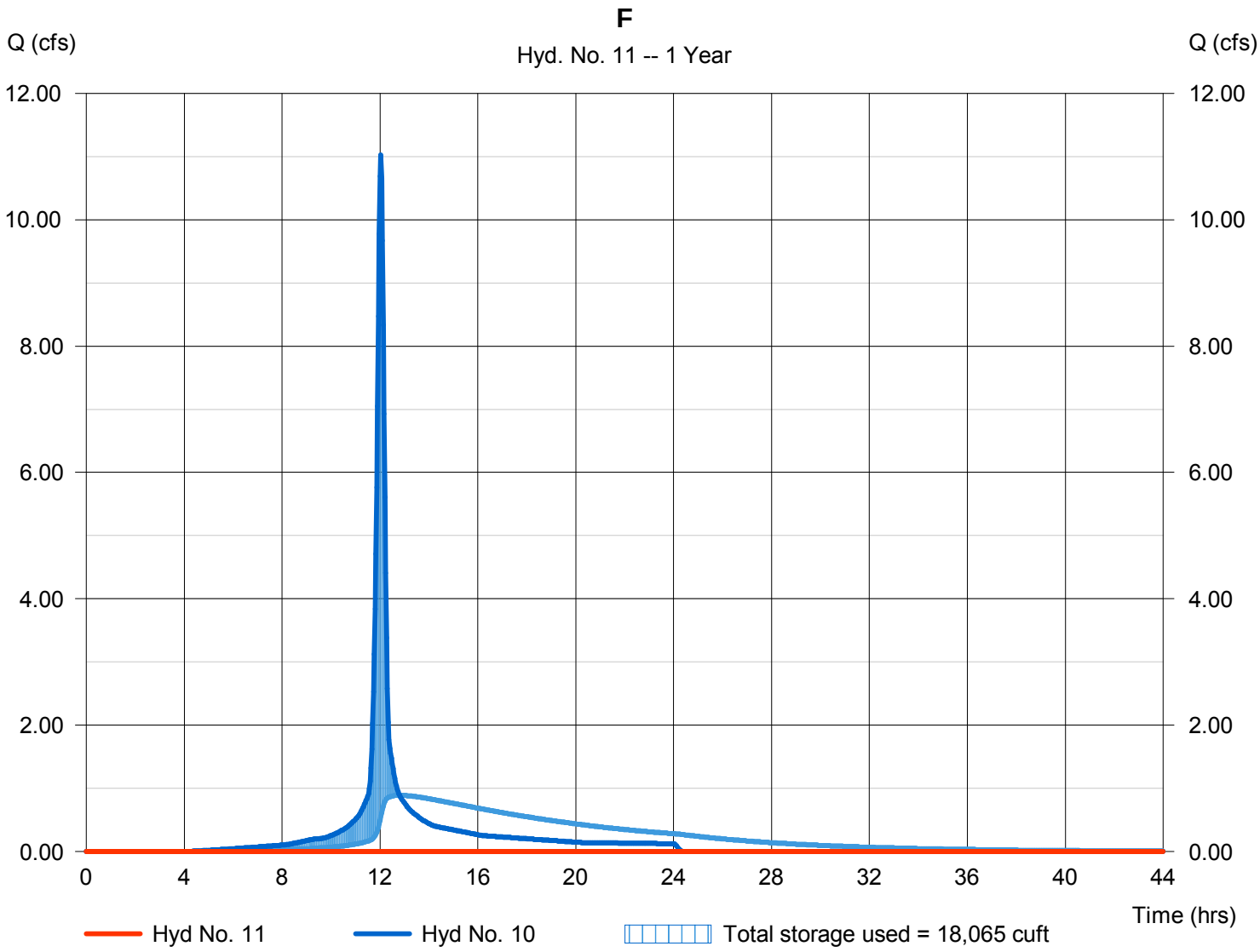
Hydrograph Report

Hyd. No. 11

F

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.20 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 10 - F	Max. Elevation	= 1325.77 ft
Reservoir name	= F	Max. Storage	= 18,065 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Pond Report

Pond No. 5 - F

Pond Data

Contours - User-defined contour areas. Conic method used for volume calculation. Begining Elevation = 1325.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (cuft)	Total storage (cuft)
0.00	1325.00	22,000	0	0
1.00	1326.00	25,000	23,482	23,482
2.00	1327.00	28,000	26,483	49,965

Culvert / Orifice Structures

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

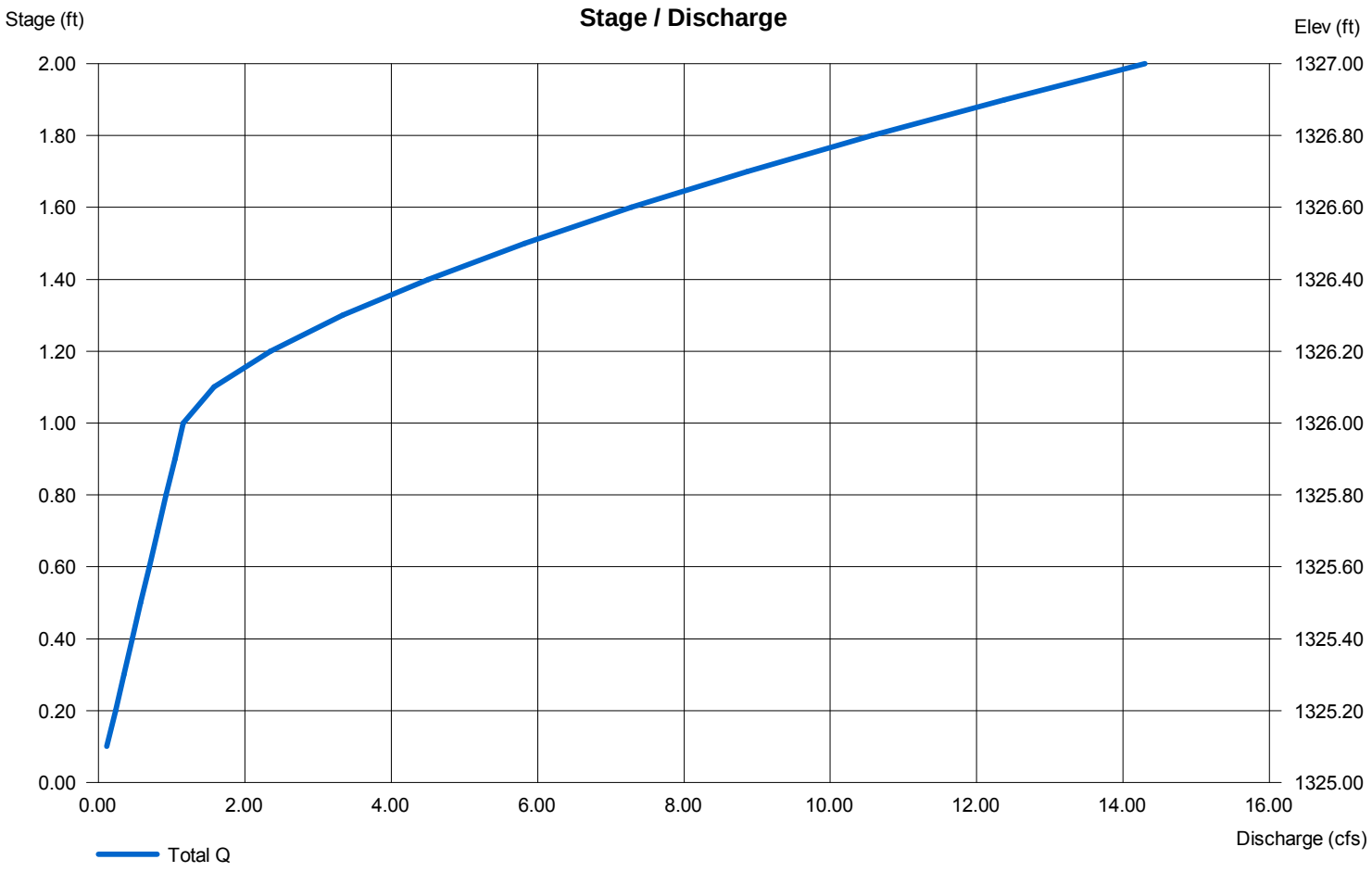
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	0.00	0.00
Crest El. (ft)	= 1326.00	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) = 2.000 (by Contour)

TW Elev. (ft) = 0.00

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

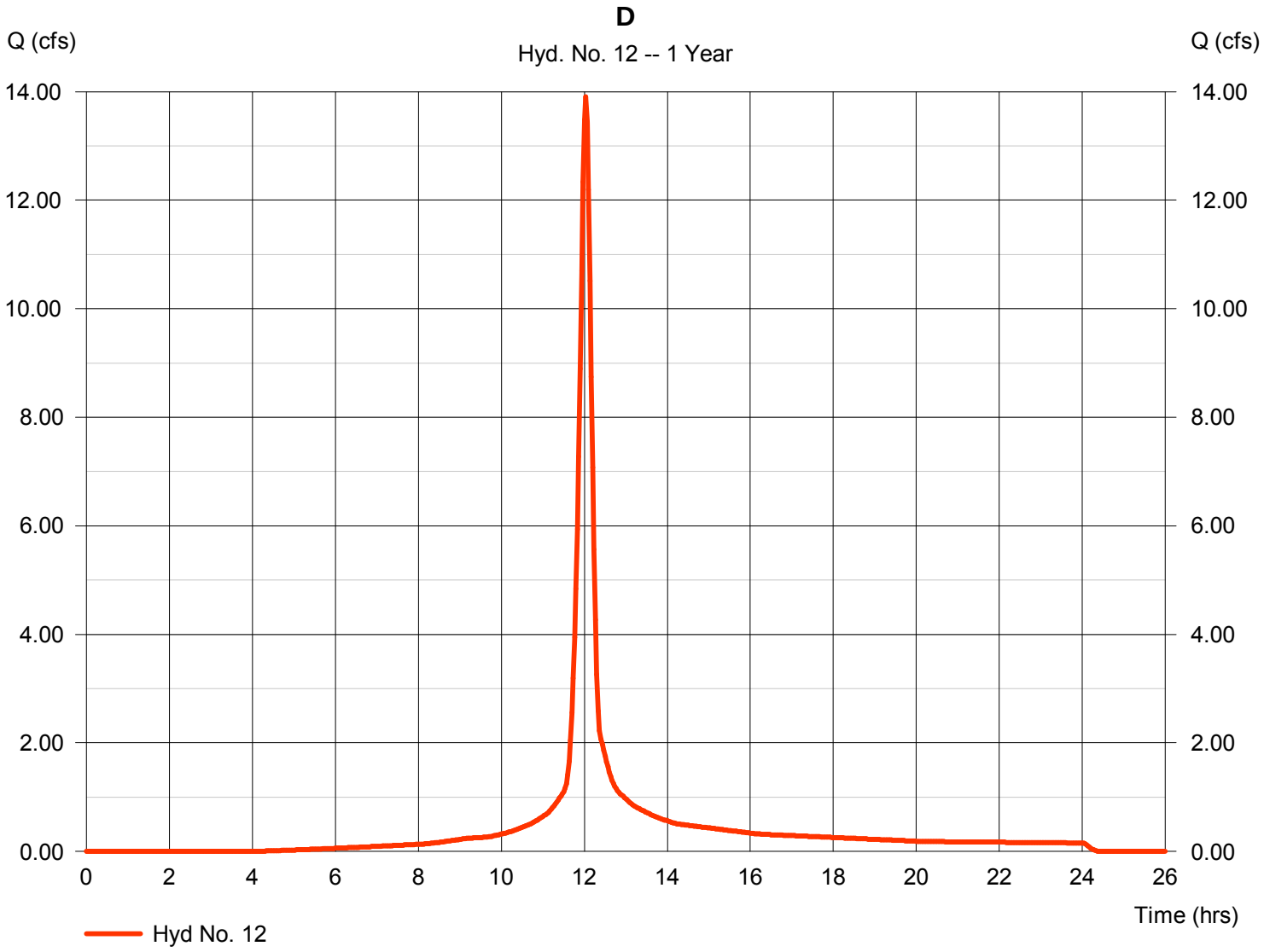


Hydrograph Report

Hyd. No. 12

D

Hydrograph type	= SCS Runoff	Peak discharge	= 13.90 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 40,463 cuft
Drainage area	= 5.300 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

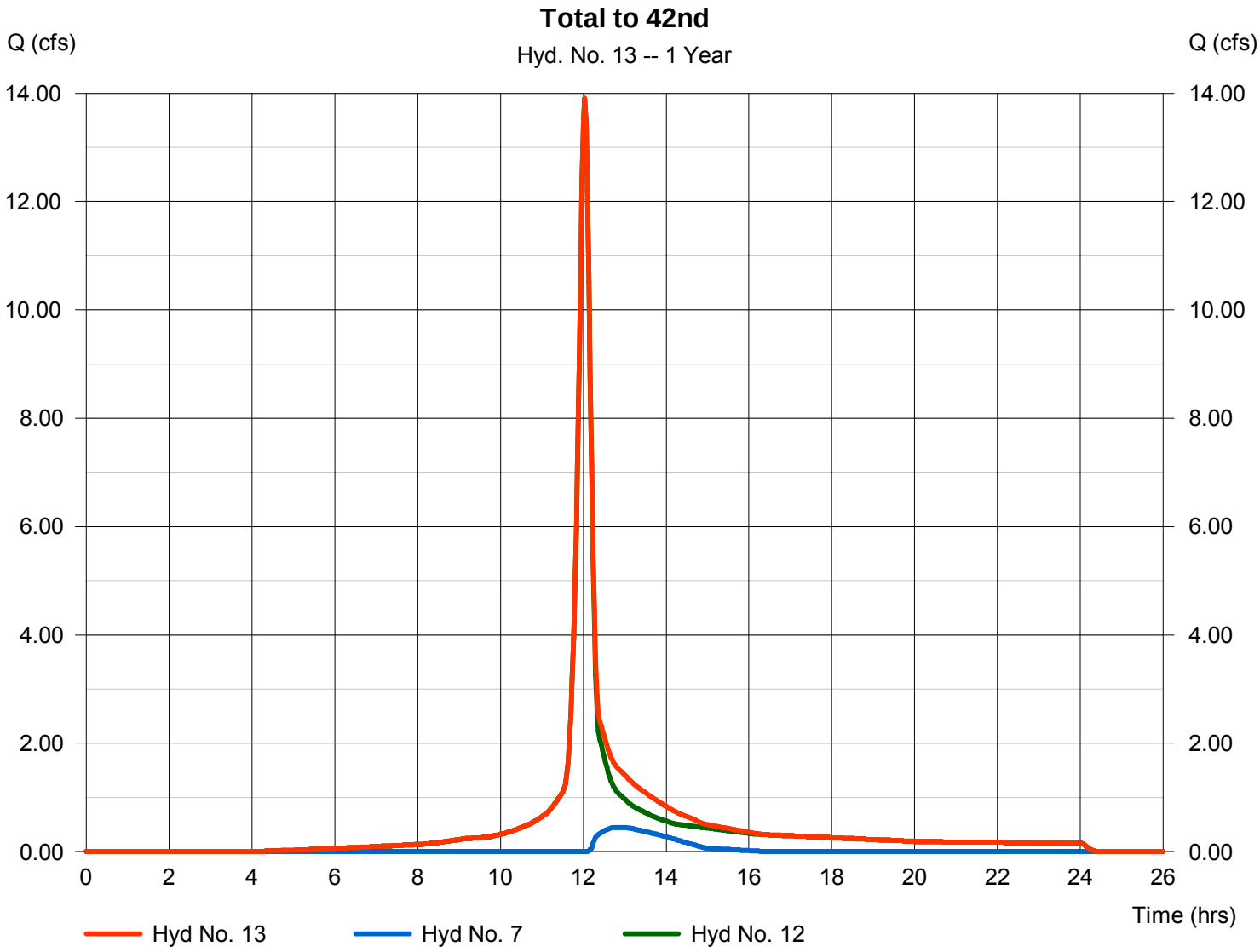


Hydrograph Report

Hyd. No. 13

Total to 42nd

Hydrograph type	= Combine	Peak discharge	= 13.90 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 43,625 cuft
Inflow hyds.	= 7, 12	Contrib. drain. area	= 5.300 ac

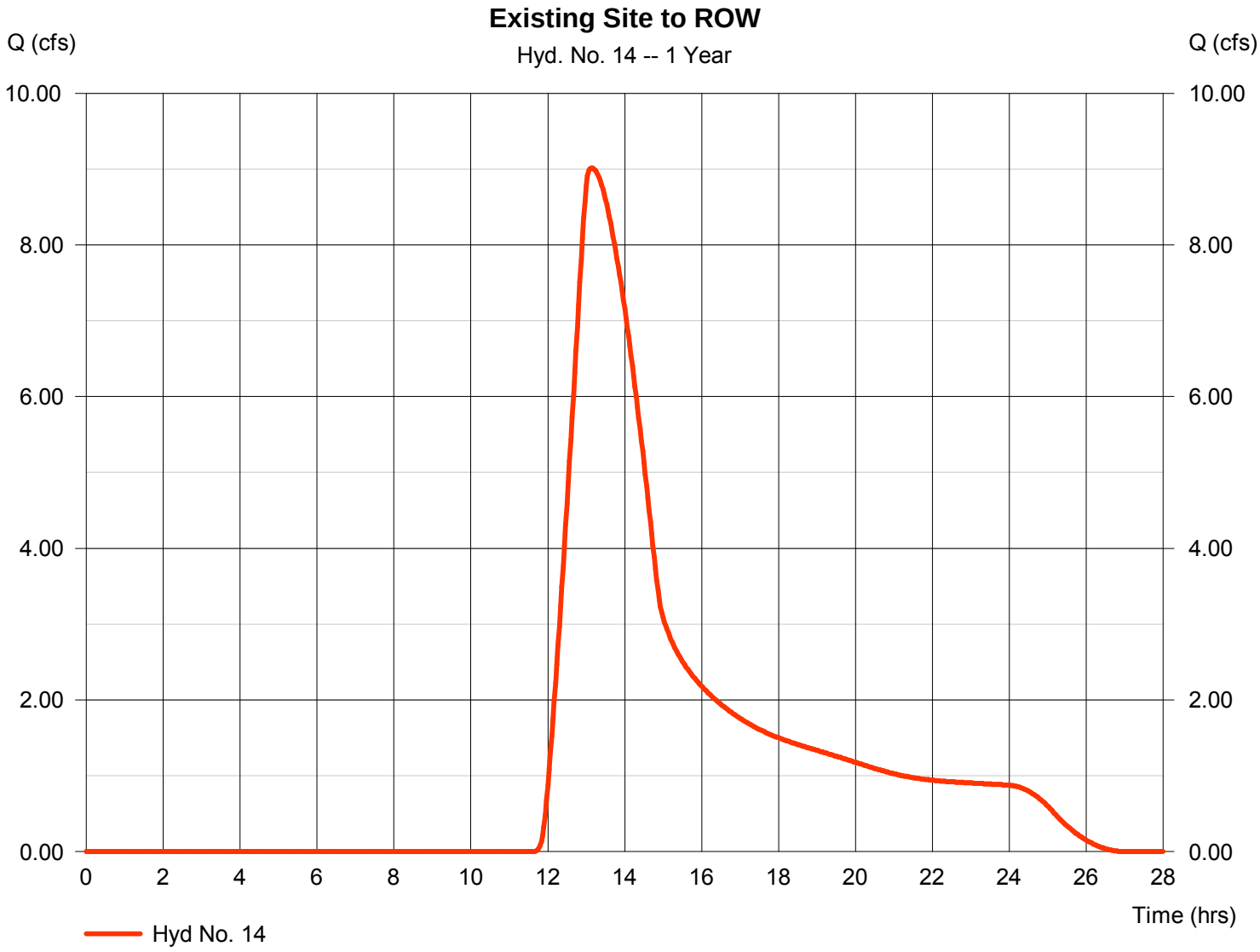


Hydrograph Report

Hyd. No. 14

Existing Site to ROW

Hydrograph type	= SCS Runoff	Peak discharge	= 9.014 cfs
Storm frequency	= 1 yrs	Time to peak	= 13.13 hrs
Time interval	= 2 min	Hyd. volume	= 115,705 cuft
Drainage area	= 49.000 ac	Curve number	= 71
Basin Slope	= 0.6 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 114.60 min
Total precip.	= 2.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

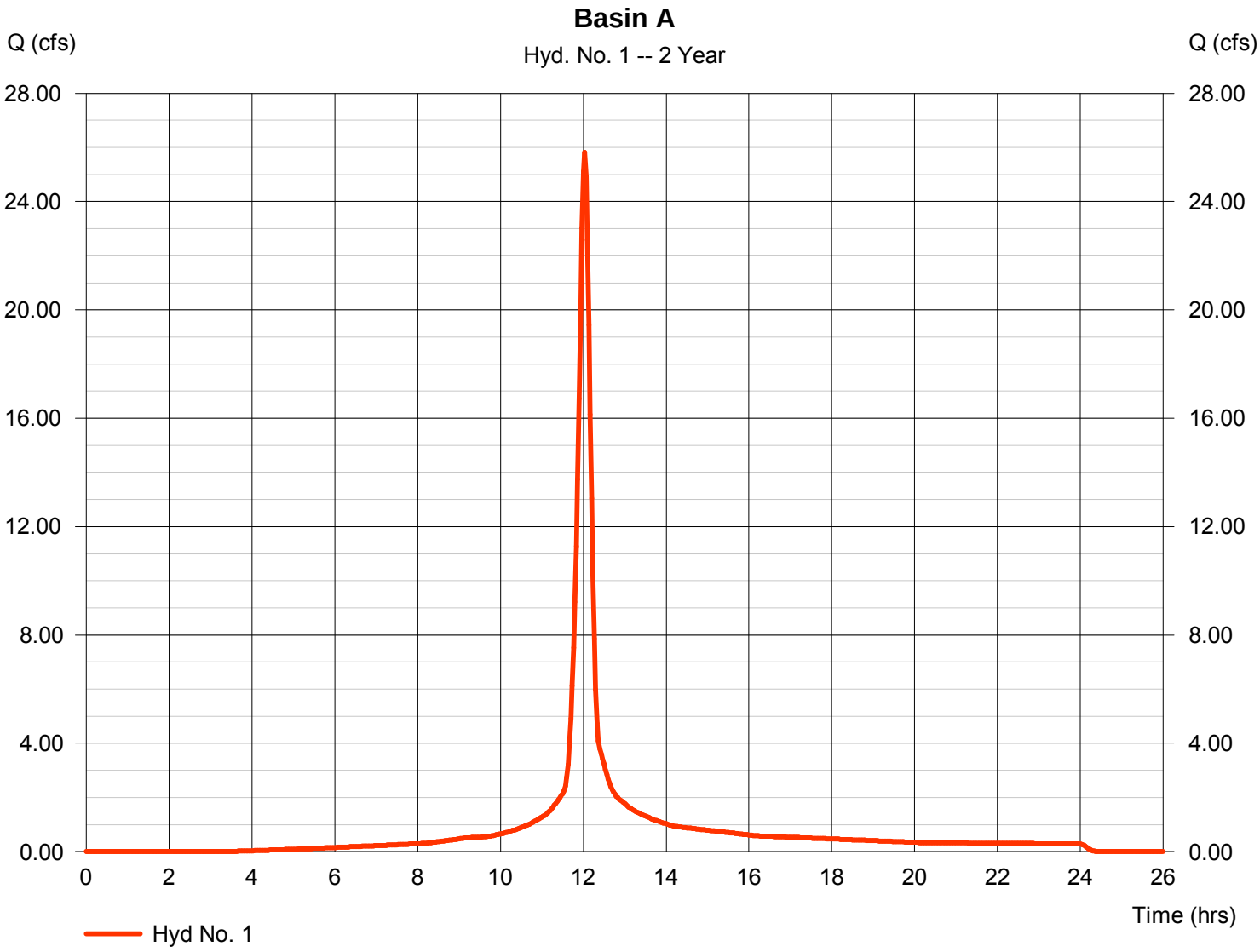
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	25.82	2	722	76,274	------	------	------	Basin A
2	Reservoir	0.090	2	766	475	1	1326.13	42,884	A
3	SCS Runoff	46.89	2	722	138,497	------	------	------	B
4	Reservoir	0.956	2	768	8,701	3	1326.43	78,919	B
5	SCS Runoff	49.27	2	722	145,522	------	------	------	C
6	Combine	49.27	2	722	154,223	4, 5	------	------	Total to C
7	Reservoir	2.468	2	764	23,738	6	1325.33	83,224	C
8	SCS Runoff	32.28	2	722	95,342	------	------	------	E
9	Reservoir	1.590	2	756	14,644	8	1325.65	52,256	E
10	SCS Runoff	14.27	2	722	42,151	------	------	------	F
11	Reservoir	0.051	2	764	92	10	1326.01	23,810	F
12	SCS Runoff	18.01	2	722	53,191	------	------	------	D
13	Combine	18.04	2	722	76,929	7, 12	------	------	Total to 42nd
14	SCS Runoff	16.20	2	784	189,904	------	------	------	Existing Site to ROW

Hydrograph Report

Hyd. No. 1

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 25.82 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 76,274 cuft
Drainage area	= 7.600 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



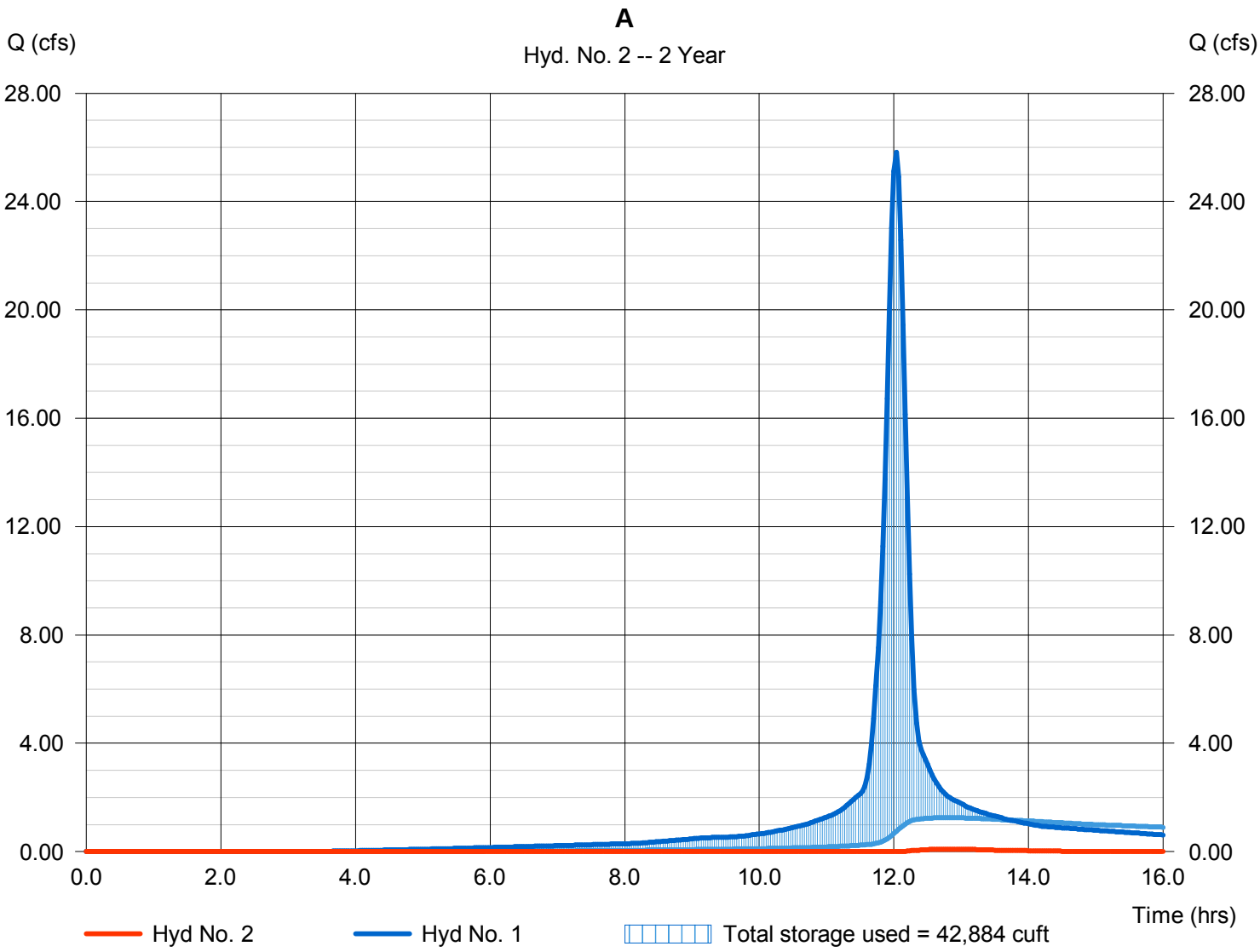
Hydrograph Report

Hyd. No. 2

A

Hydrograph type	= Reservoir	Peak discharge	= 0.090 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.77 hrs
Time interval	= 2 min	Hyd. volume	= 475 cuft
Inflow hyd. No.	= 1 - Basin A	Max. Elevation	= 1326.13 ft
Reservoir name	= A	Max. Storage	= 42,884 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

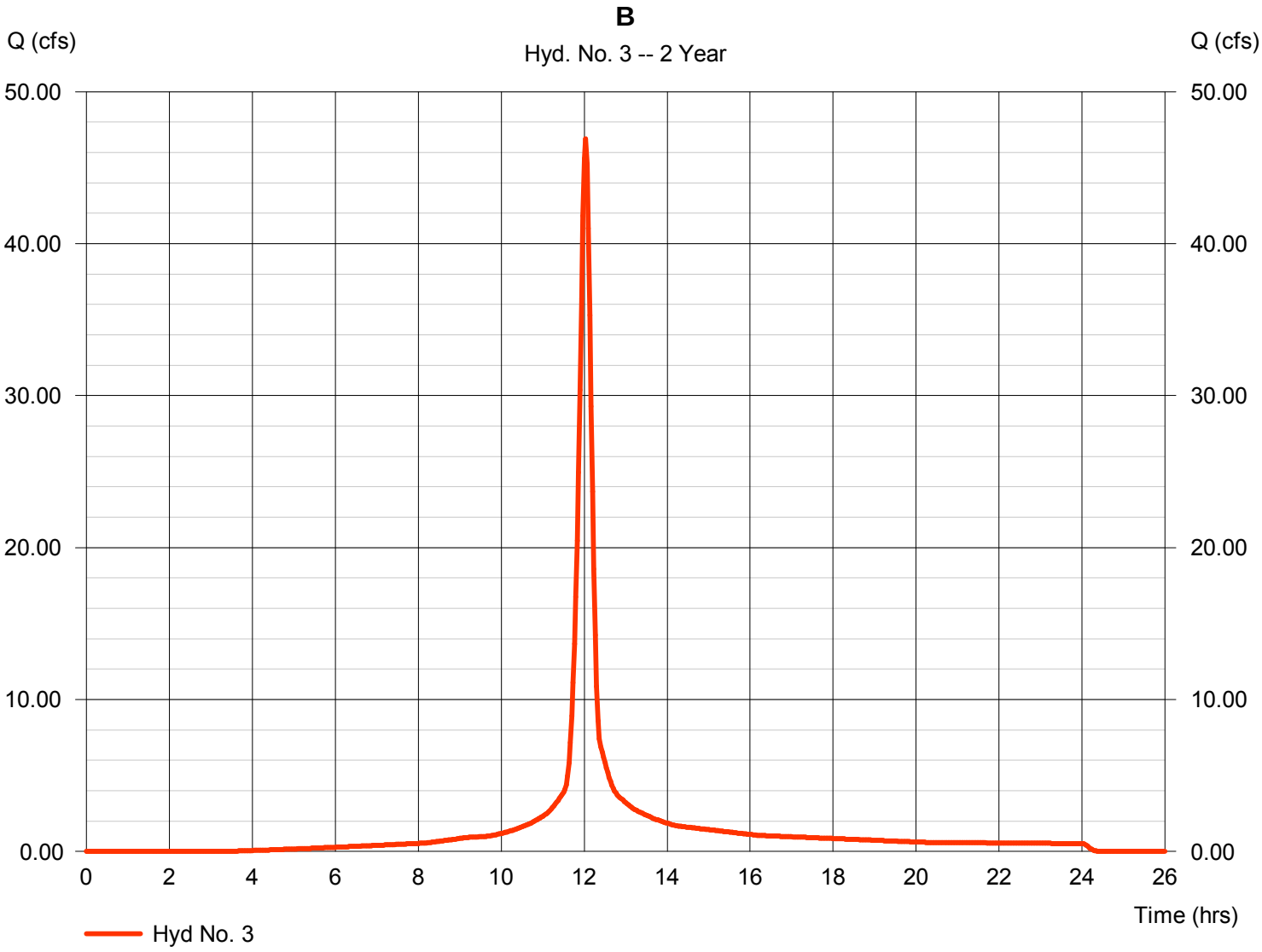


Hydrograph Report

Hyd. No. 3

B

Hydrograph type	= SCS Runoff	Peak discharge	= 46.89 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 138,497 cuft
Drainage area	= 13.800 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



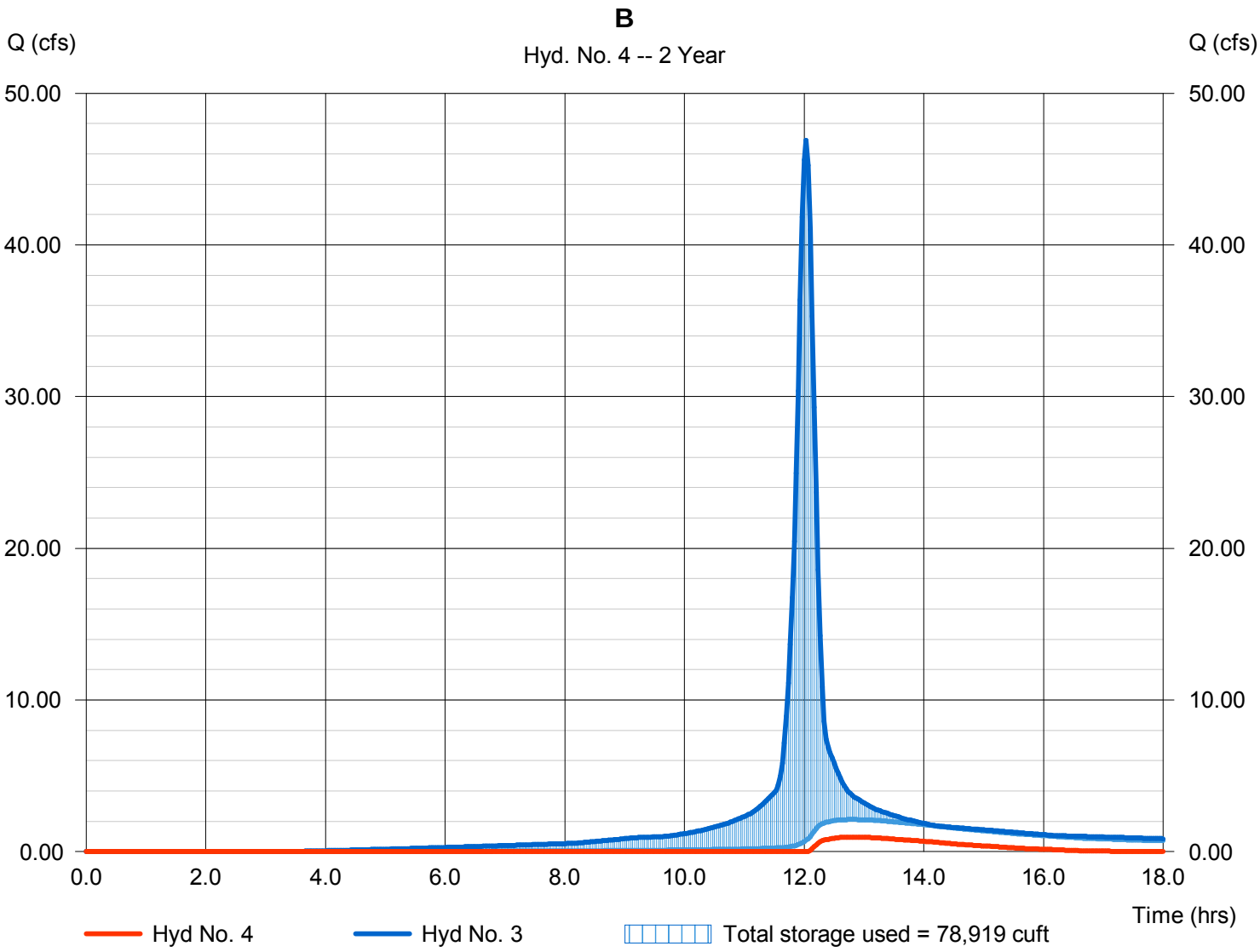
Hydrograph Report

Hyd. No. 4

B

Hydrograph type	= Reservoir	Peak discharge	= 0.956 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.80 hrs
Time interval	= 2 min	Hyd. volume	= 8,701 cuft
Inflow hyd. No.	= 3 - B	Max. Elevation	= 1326.43 ft
Reservoir name	= B	Max. Storage	= 78,919 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

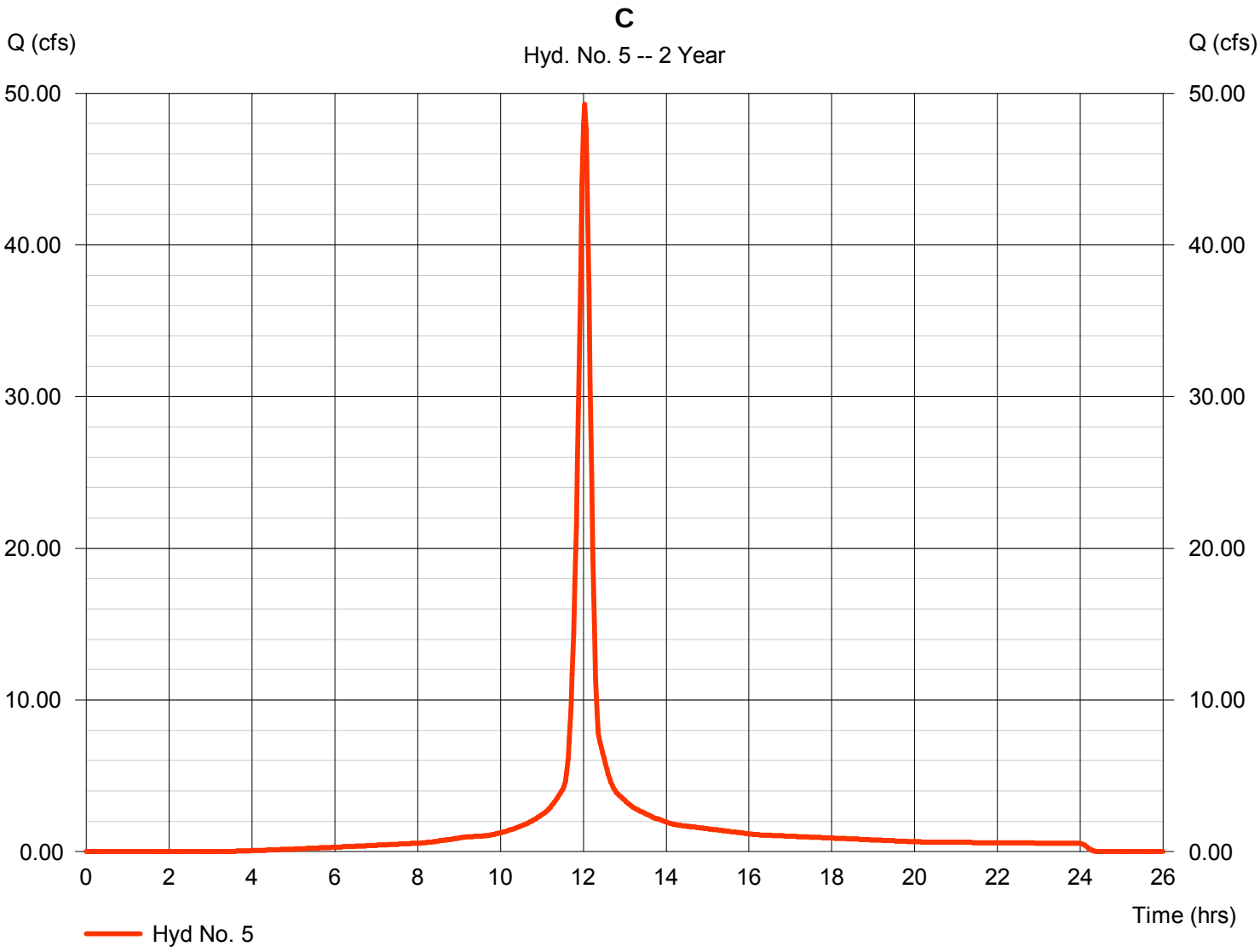


Hydrograph Report

Hyd. No. 5

C

Hydrograph type	=	SCS Runoff	Peak discharge	=	49.27 cfs
Storm frequency	=	2 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	145,522 cuft
Drainage area	=	14.500 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	3.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

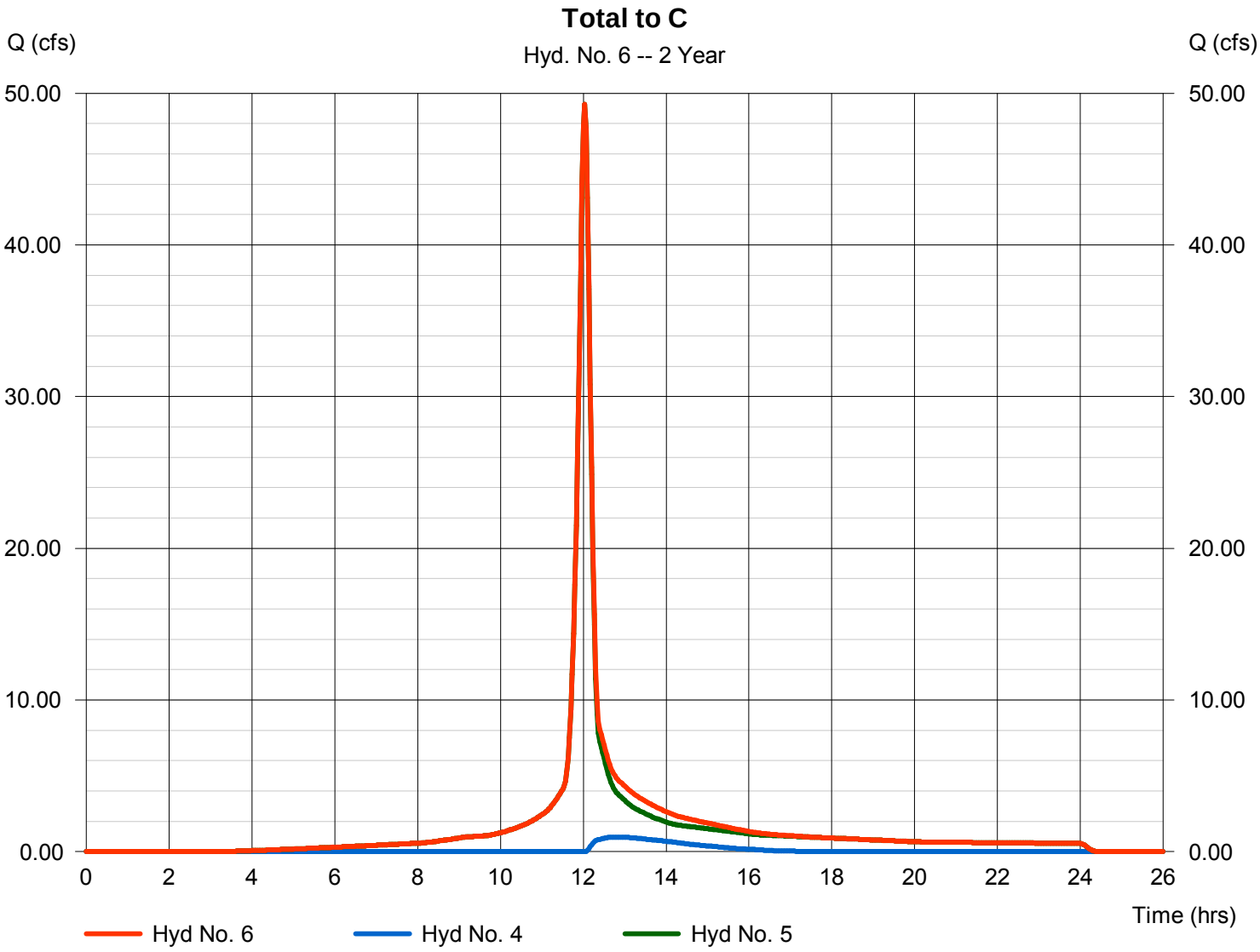


Hydrograph Report

Hyd. No. 6

Total to C

Hydrograph type	= Combine	Peak discharge	= 49.27 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 154,223 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 14.500 ac



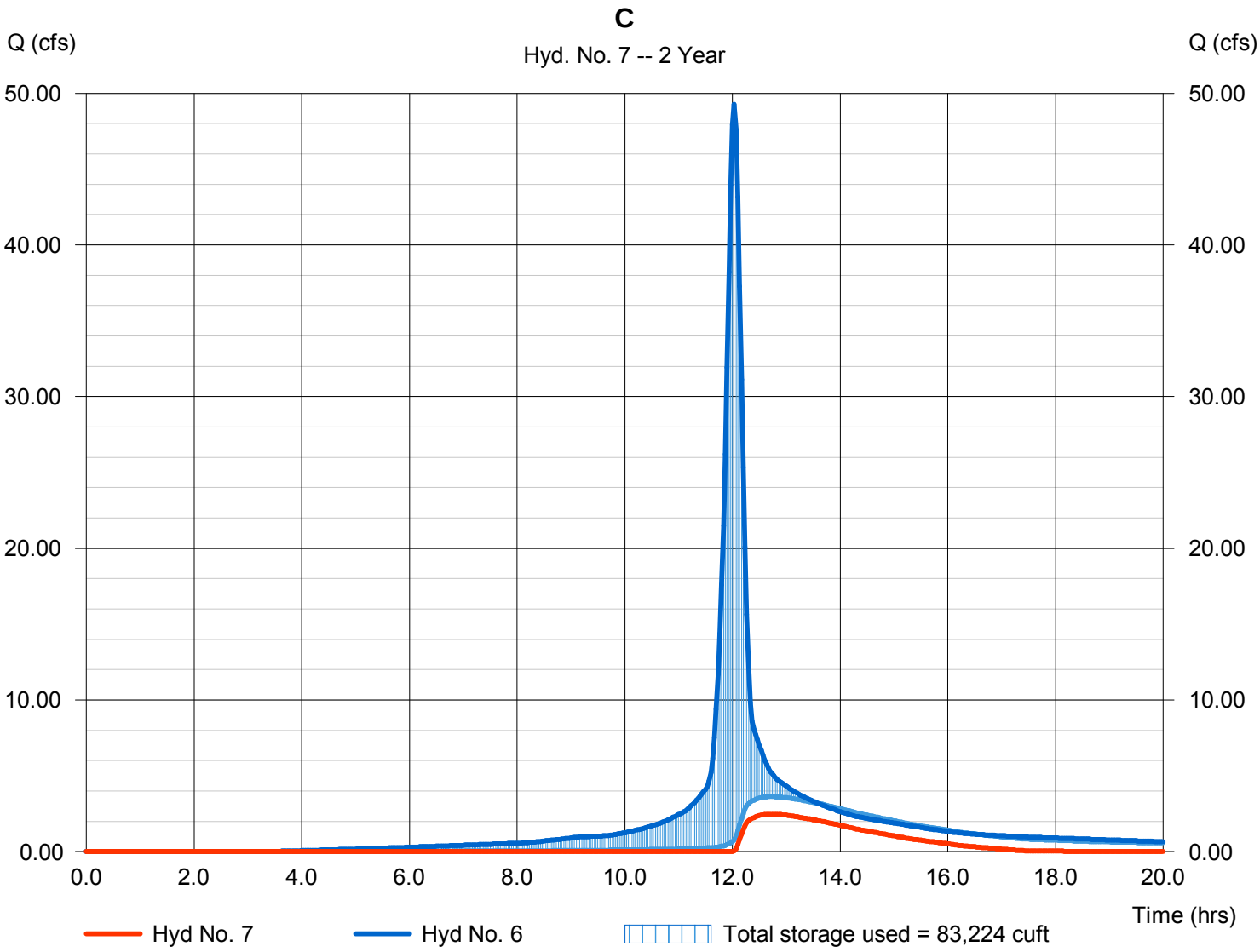
Hydrograph Report

Hyd. No. 7

C

Hydrograph type	= Reservoir	Peak discharge	= 2.468 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 23,738 cuft
Inflow hyd. No.	= 6 - Total to C	Max. Elevation	= 1325.33 ft
Reservoir name	= C	Max. Storage	= 83,224 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

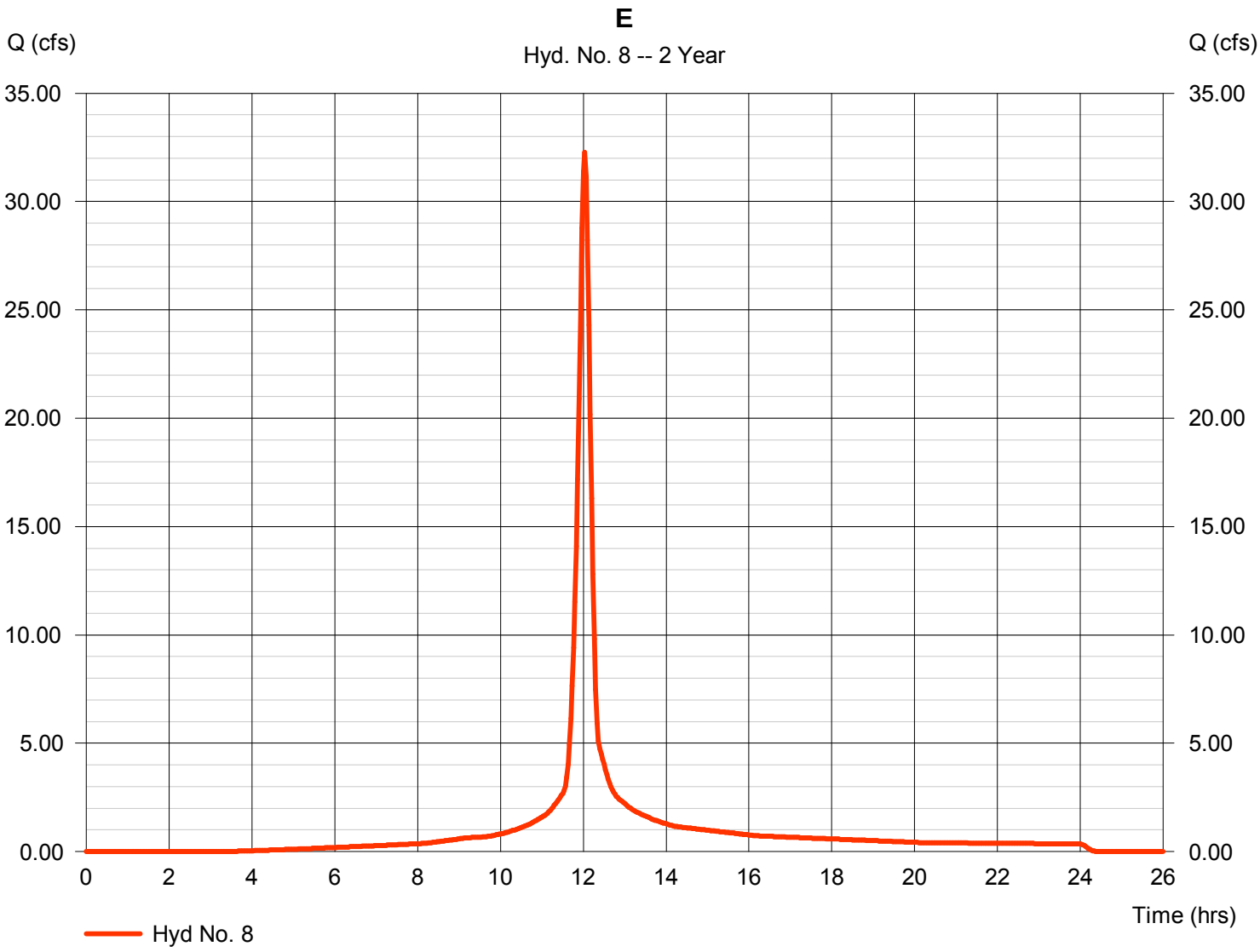


Hydrograph Report

Hyd. No. 8

E

Hydrograph type	= SCS Runoff	Peak discharge	= 32.28 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 95,342 cuft
Drainage area	= 9.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



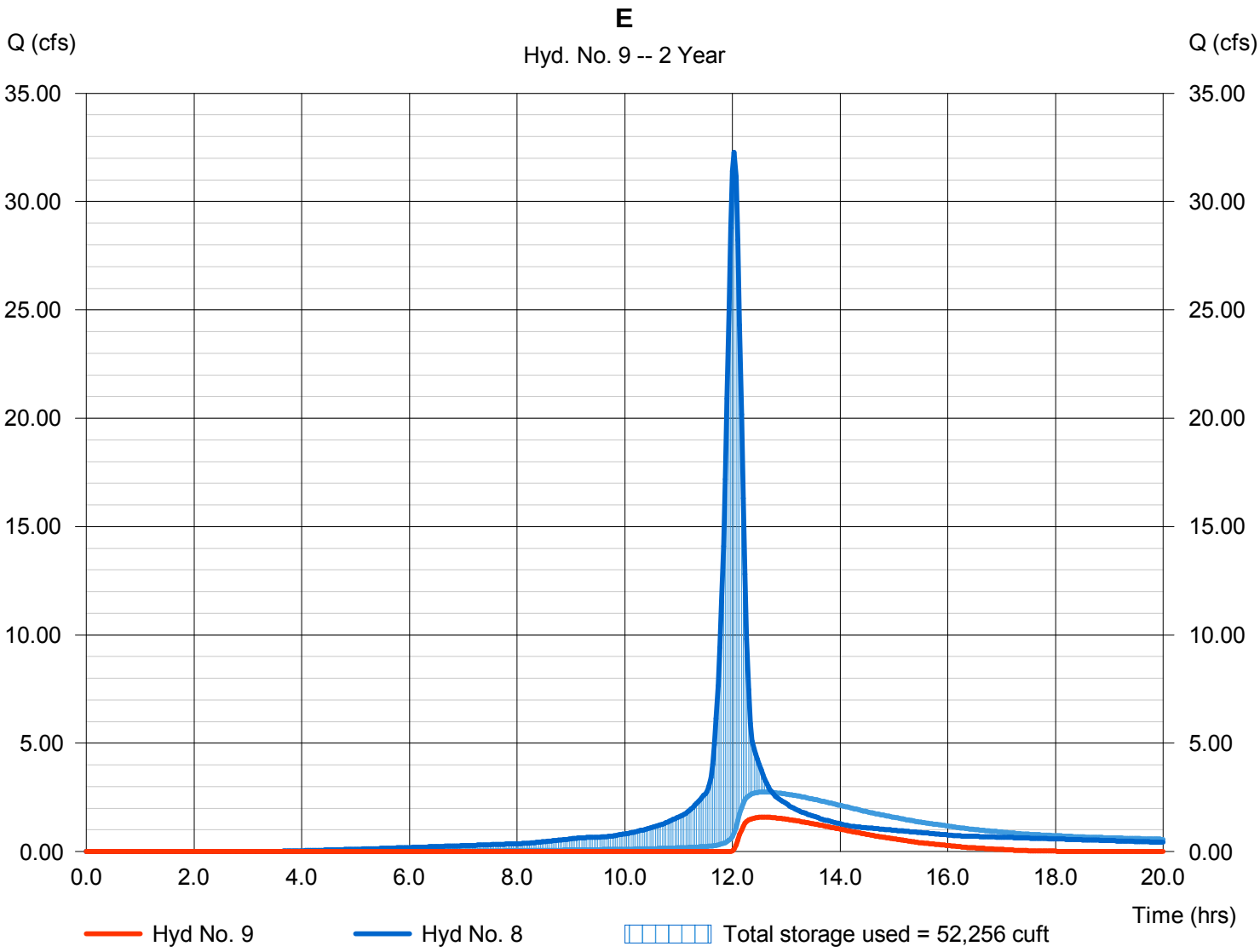
Hydrograph Report

Hyd. No. 9

E

Hydrograph type	= Reservoir	Peak discharge	= 1.590 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 14,644 cuft
Inflow hyd. No.	= 8 - E	Max. Elevation	= 1325.65 ft
Reservoir name	= E	Max. Storage	= 52,256 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

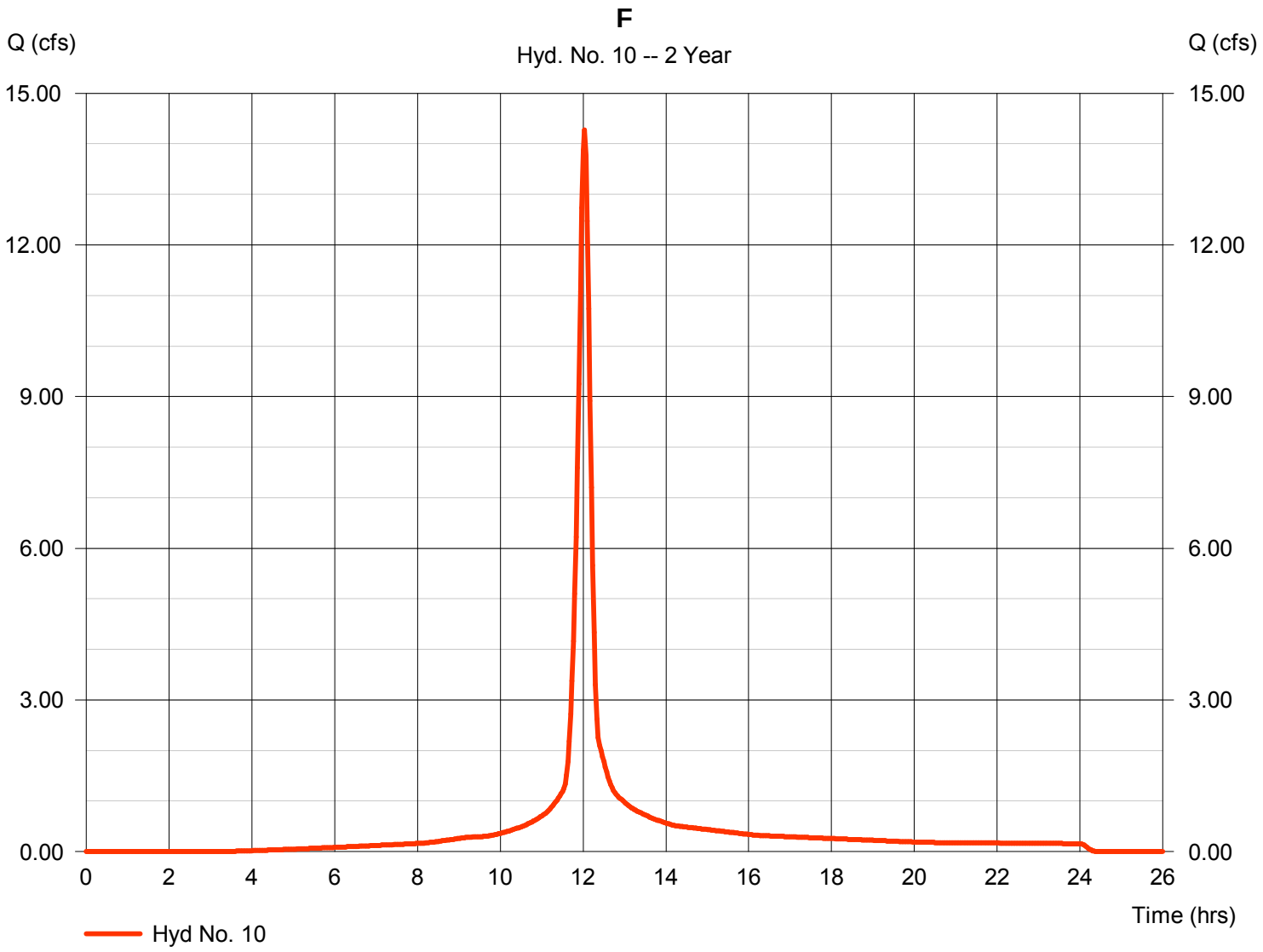


Hydrograph Report

Hyd. No. 10

F

Hydrograph type	= SCS Runoff	Peak discharge	= 14.27 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 42,151 cuft
Drainage area	= 4.200 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



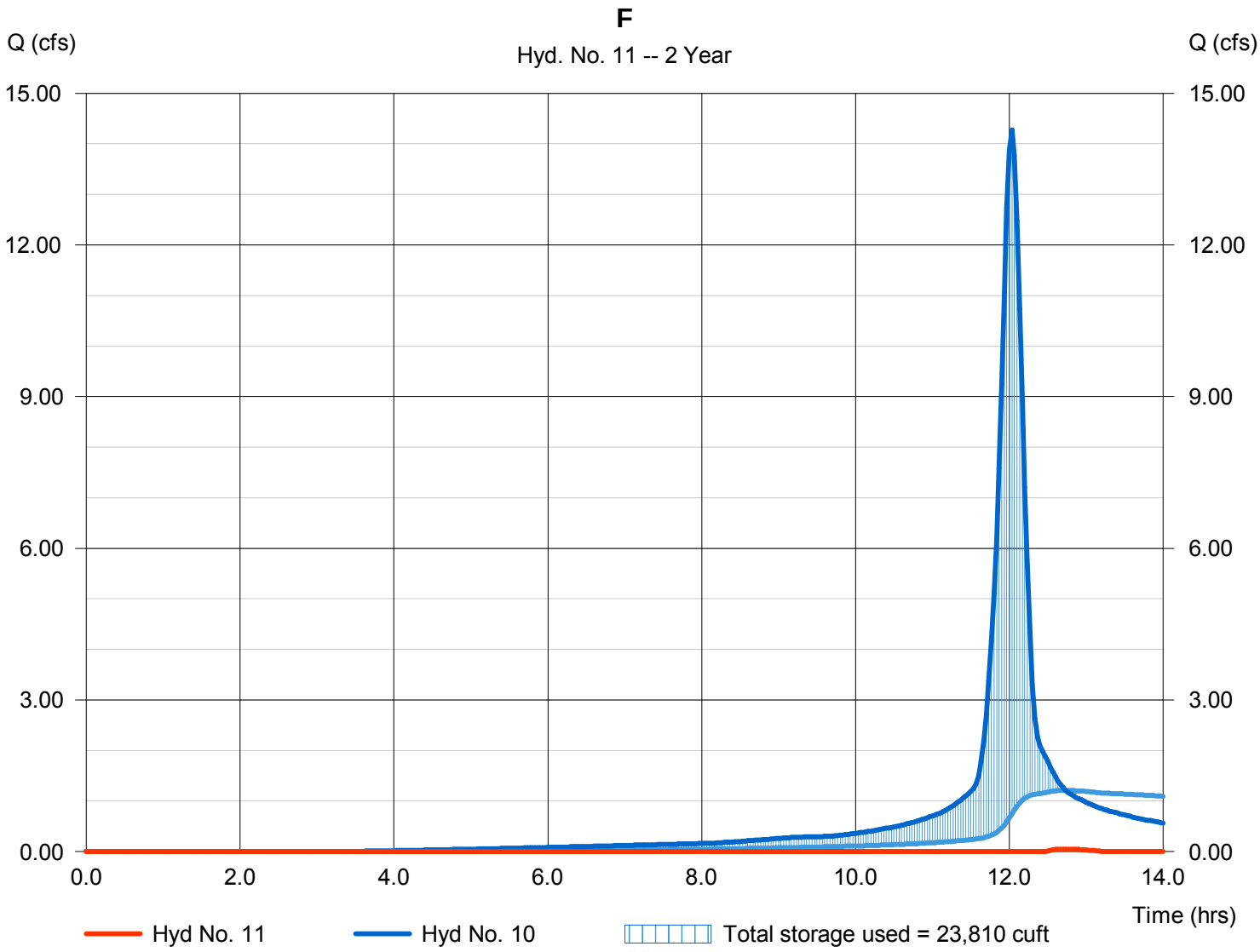
Hydrograph Report

Hyd. No. 11

F

Hydrograph type	= Reservoir	Peak discharge	= 0.051 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.73 hrs
Time interval	= 2 min	Hyd. volume	= 92 cuft
Inflow hyd. No.	= 10 - F	Max. Elevation	= 1326.01 ft
Reservoir name	= F	Max. Storage	= 23,810 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

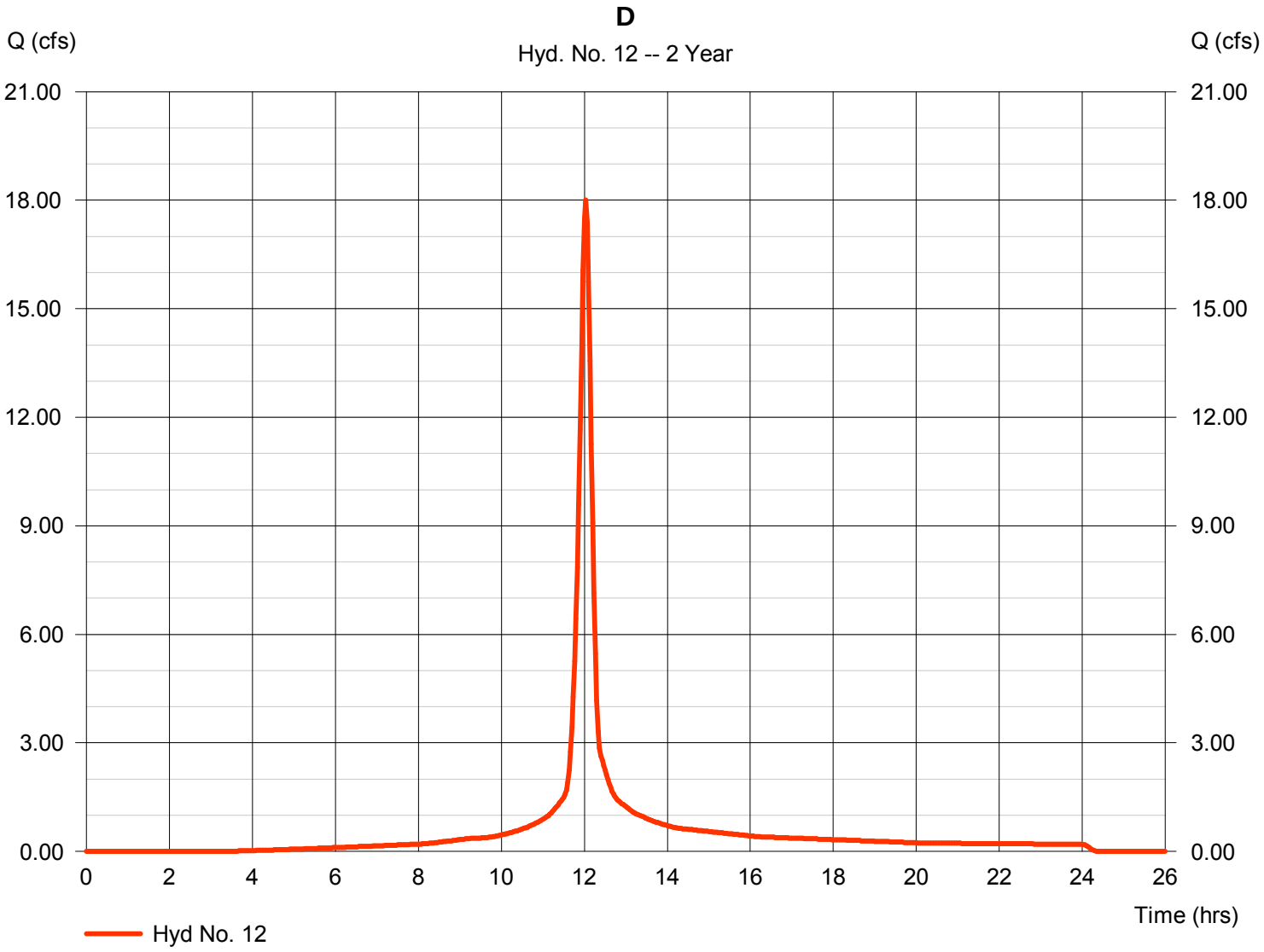


Hydrograph Report

Hyd. No. 12

D

Hydrograph type	= SCS Runoff	Peak discharge	= 18.01 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 53,191 cuft
Drainage area	= 5.300 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

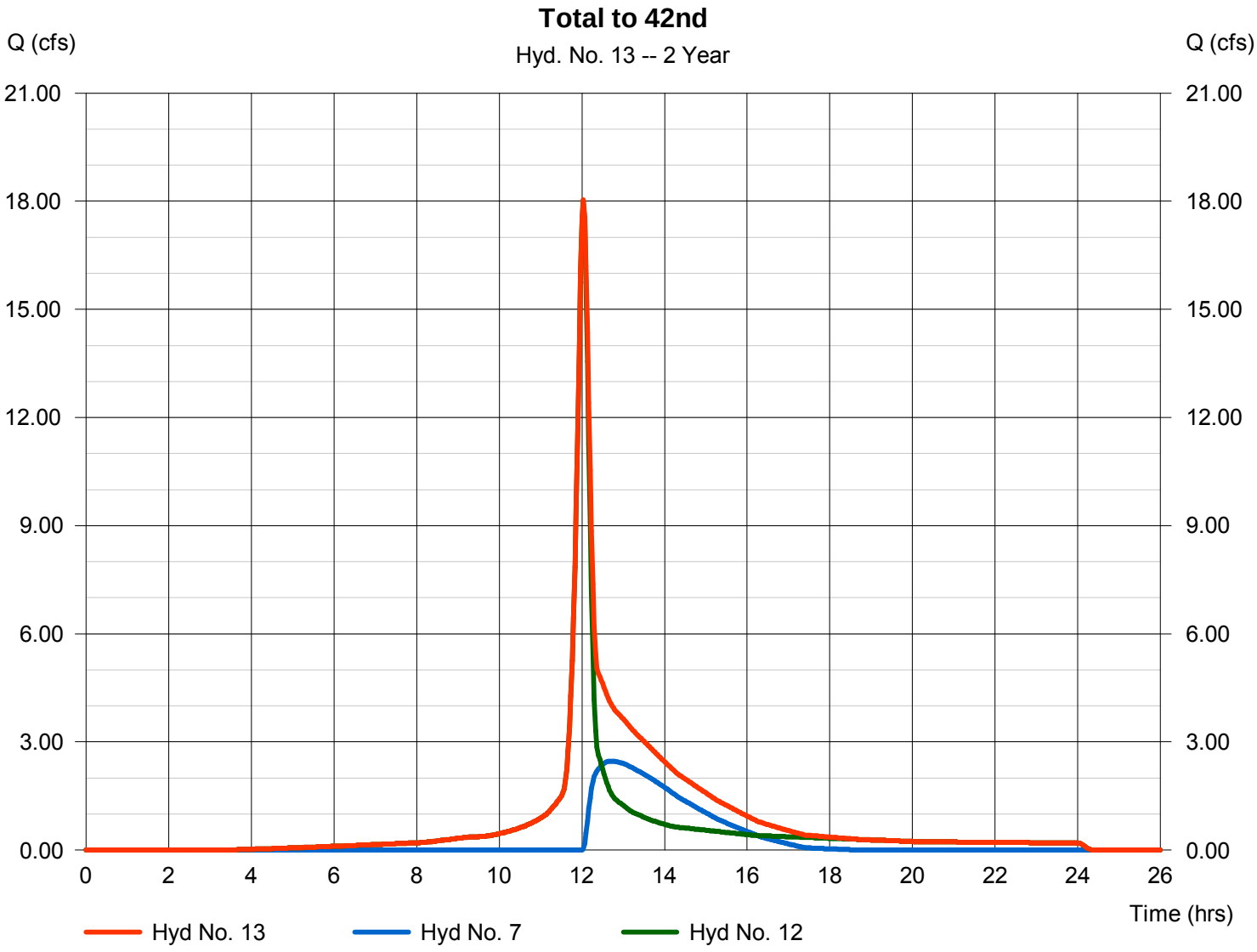


Hydrograph Report

Hyd. No. 13

Total to 42nd

Hydrograph type	= Combine	Peak discharge	= 18.04 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 76,929 cuft
Inflow hyds.	= 7, 12	Contrib. drain. area	= 5.300 ac

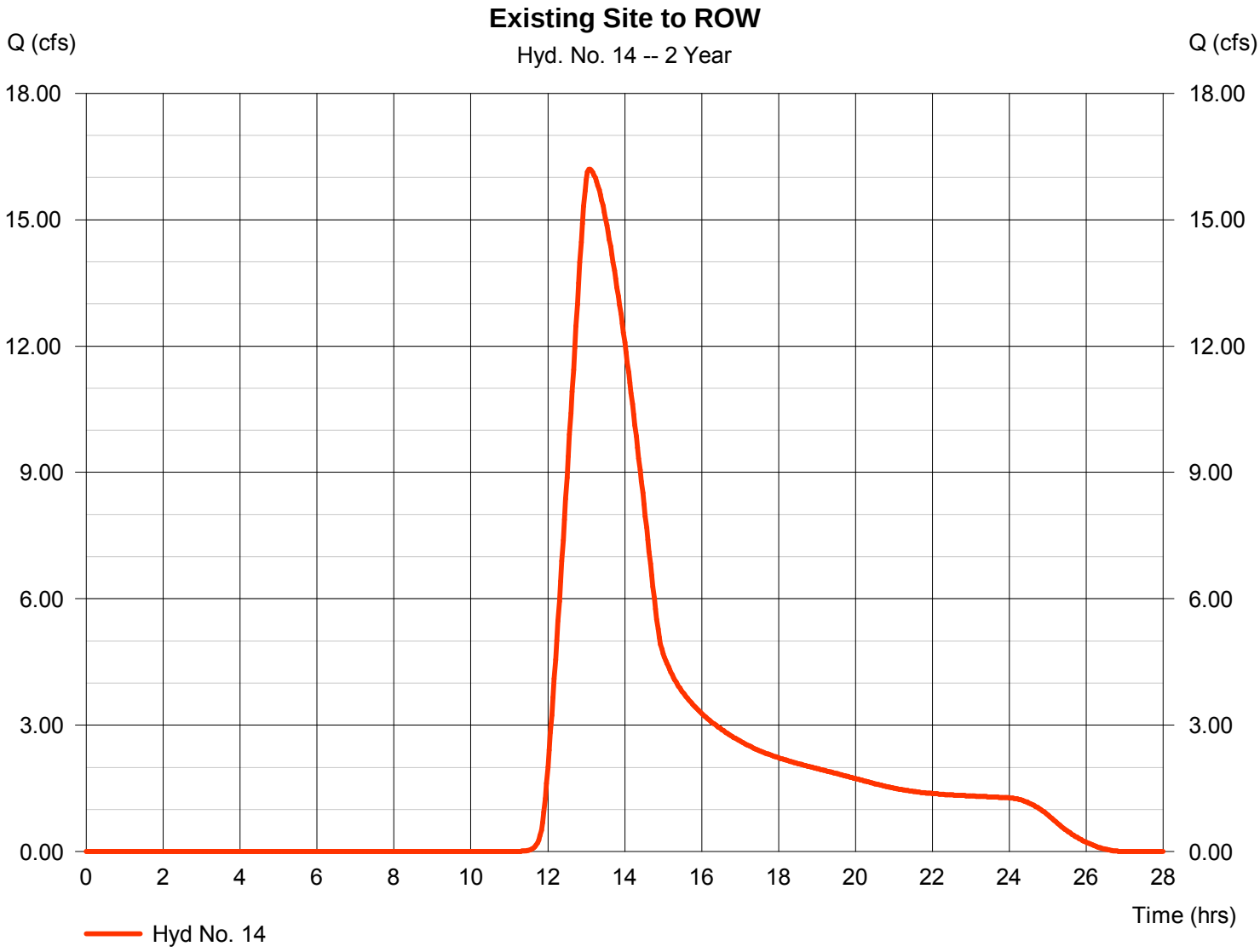


Hydrograph Report

Hyd. No. 14

Existing Site to ROW

Hydrograph type	= SCS Runoff	Peak discharge	= 16.20 cfs
Storm frequency	= 2 yrs	Time to peak	= 13.07 hrs
Time interval	= 2 min	Hyd. volume	= 189,904 cuft
Drainage area	= 49.000 ac	Curve number	= 71
Basin Slope	= 0.6 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 114.60 min
Total precip.	= 3.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

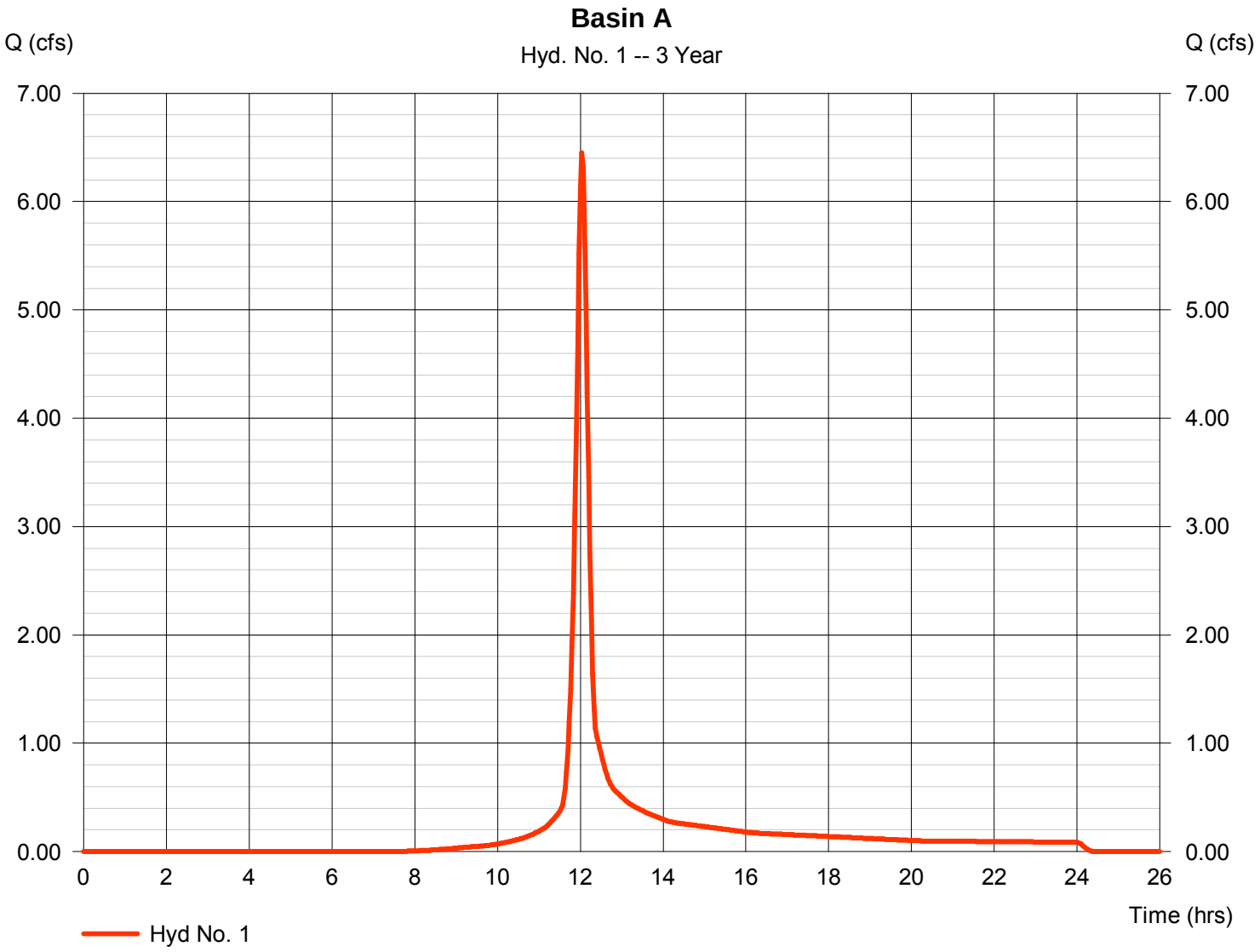
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	6.449	2	722	18,081	------	------	------	Basin A
2	Reservoir	0.000	2	784	0	1	1325.26	9,609	A
3	SCS Runoff	11.71	2	722	32,832	------	------	------	B
4	Reservoir	0.000	2	730	0	3	1325.33	17,688	B
5	SCS Runoff	12.30	2	722	34,497	------	------	------	C
6	Combine	12.30	2	722	34,497	4, 5	------	------	Total to C
7	Reservoir	0.000	2	728	0	6	1324.17	19,250	C
8	SCS Runoff	8.061	2	722	22,602	------	------	------	E
9	Reservoir	0.000	2	992	0	8	1324.42	11,964	E
10	SCS Runoff	3.564	2	722	9,992	------	------	------	F
11	Reservoir	0.000	2	724	0	10	1325.23	5,377	F
12	SCS Runoff	4.497	2	722	12,609	------	------	------	D
13	Combine	4.497	2	722	12,609	7, 12	------	------	Total to 42nd
14	SCS Runoff	0.178	2	906	5,865	------	------	------	Existing Site to ROW

Hydrograph Report

Hyd. No. 1

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 6.449 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 18,081 cuft
Drainage area	= 7.600 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



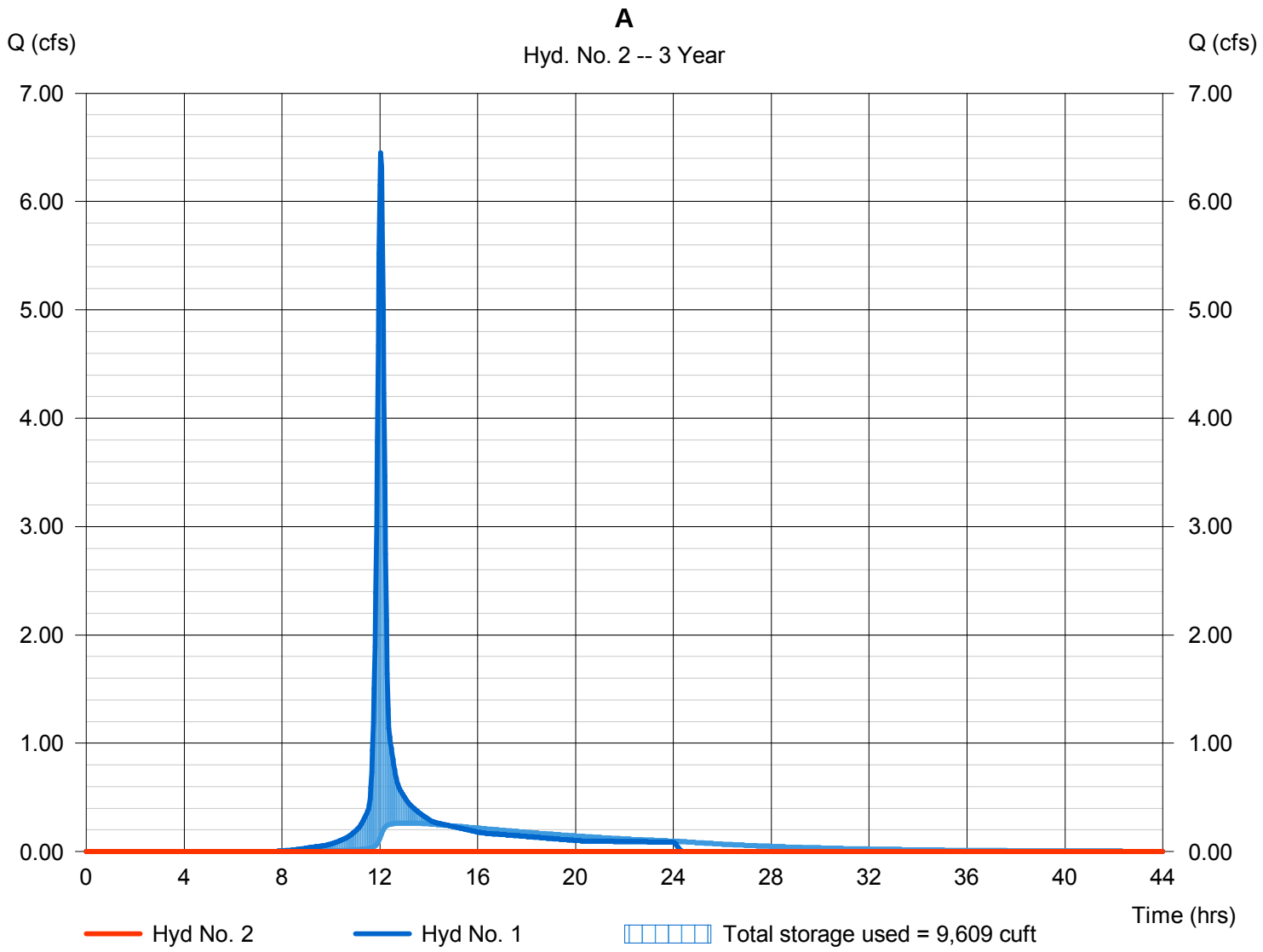
Hydrograph Report

Hyd. No. 2

A

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 13.07 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 1 - Basin A	Max. Elevation	= 1325.26 ft
Reservoir name	= A	Max. Storage	= 9,609 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

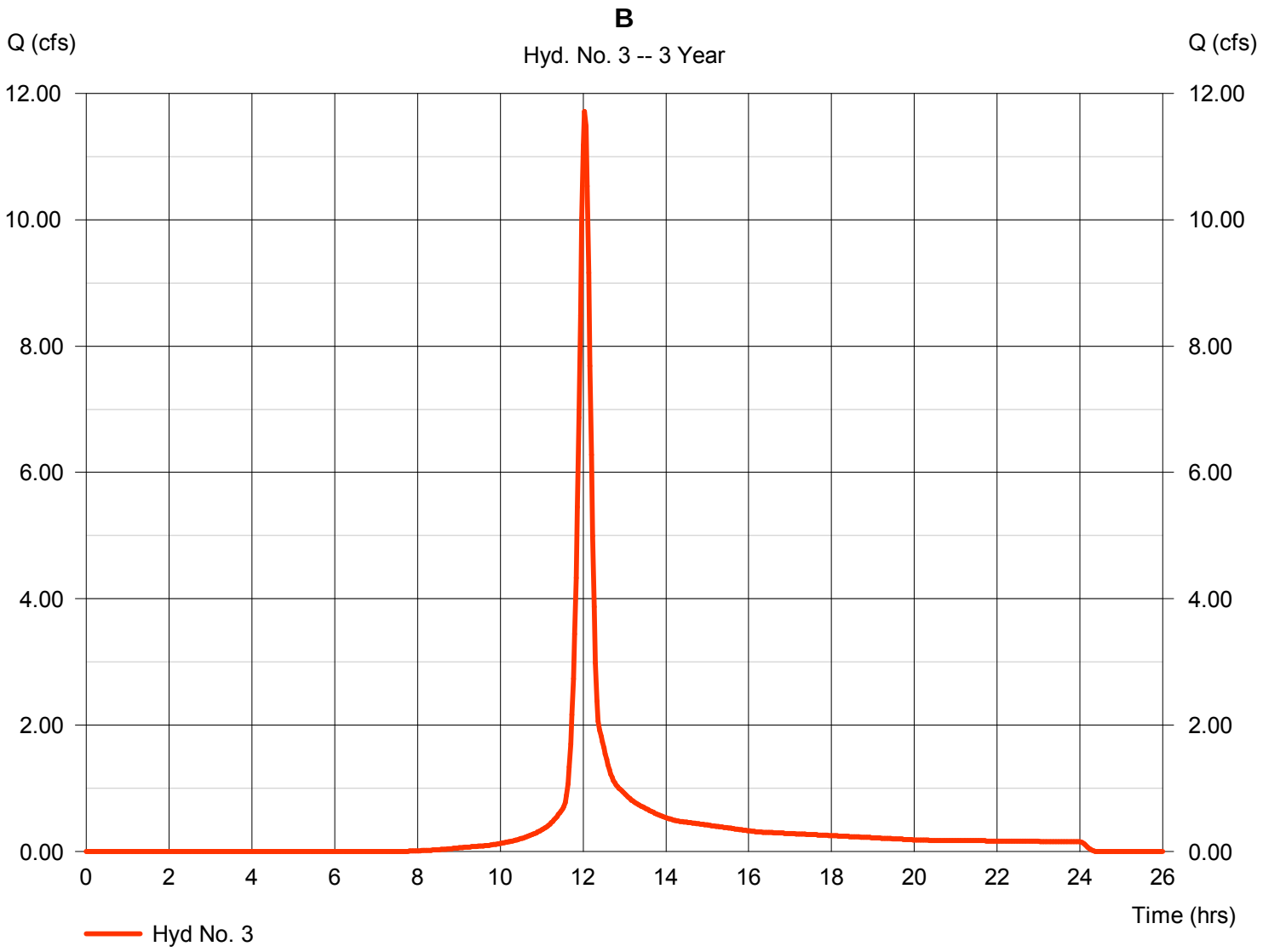


Hydrograph Report

Hyd. No. 3

B

Hydrograph type	=	SCS Runoff	Peak discharge	=	11.71 cfs
Storm frequency	=	3 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	32,832 cuft
Drainage area	=	13.800 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	1.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



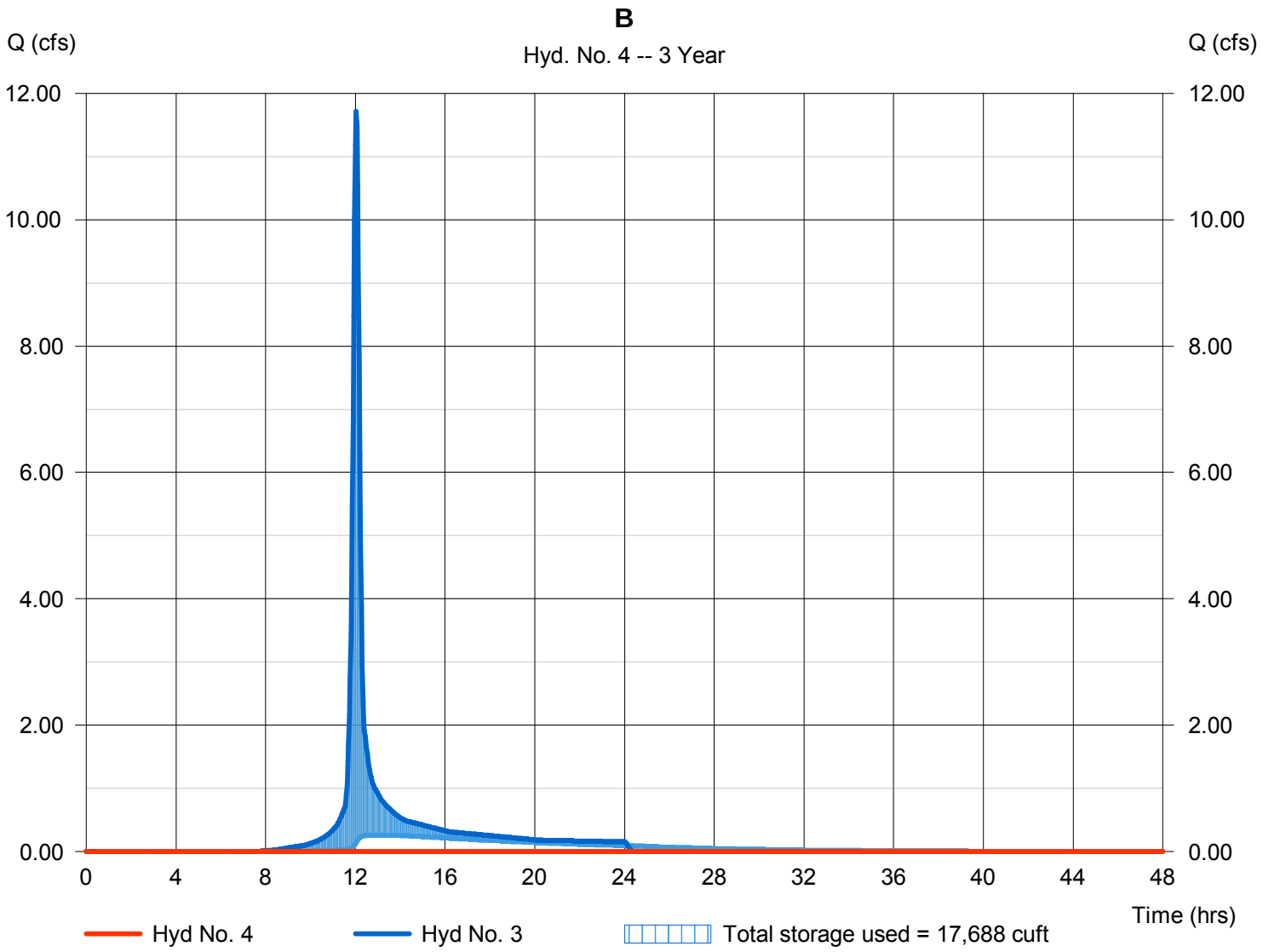
Hydrograph Report

Hyd. No. 4

B

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.17 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 3 - B	Max. Elevation	= 1325.33 ft
Reservoir name	= B	Max. Storage	= 17,688 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

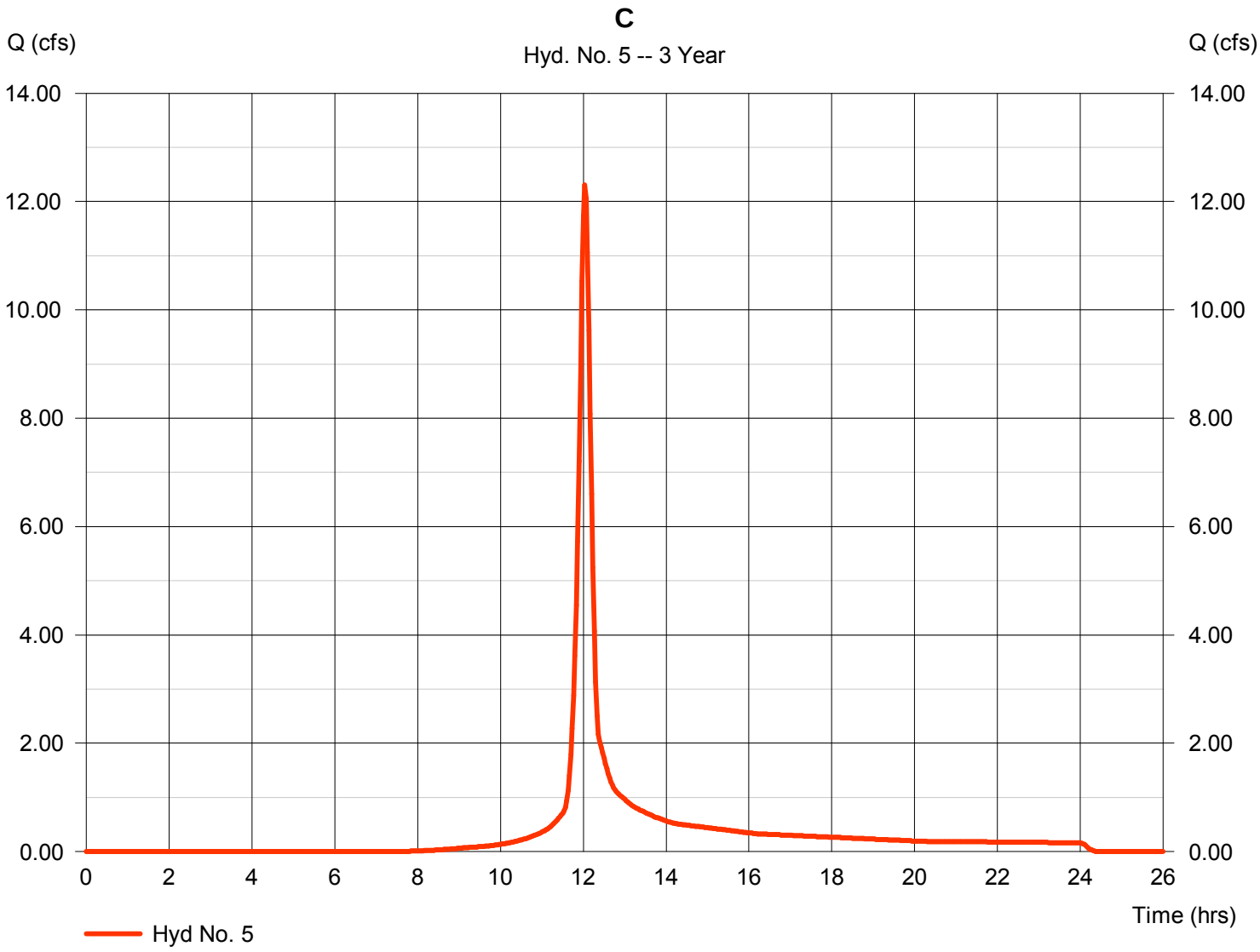


Hydrograph Report

Hyd. No. 5

C

Hydrograph type	= SCS Runoff	Peak discharge	= 12.30 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 34,497 cuft
Drainage area	= 14.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

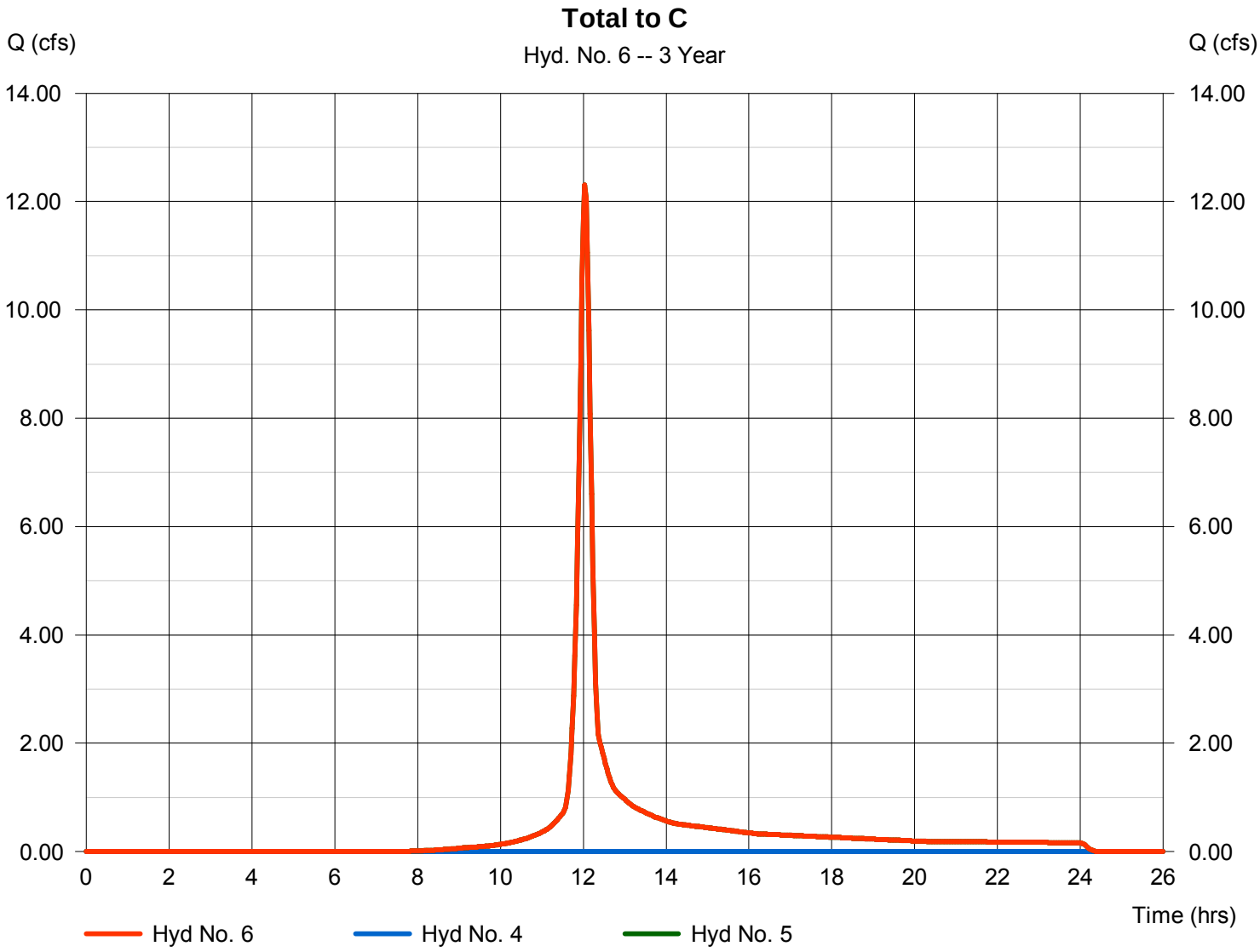


Hydrograph Report

Hyd. No. 6

Total to C

Hydrograph type	= Combine	Peak discharge	= 12.30 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 34,497 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 14.500 ac



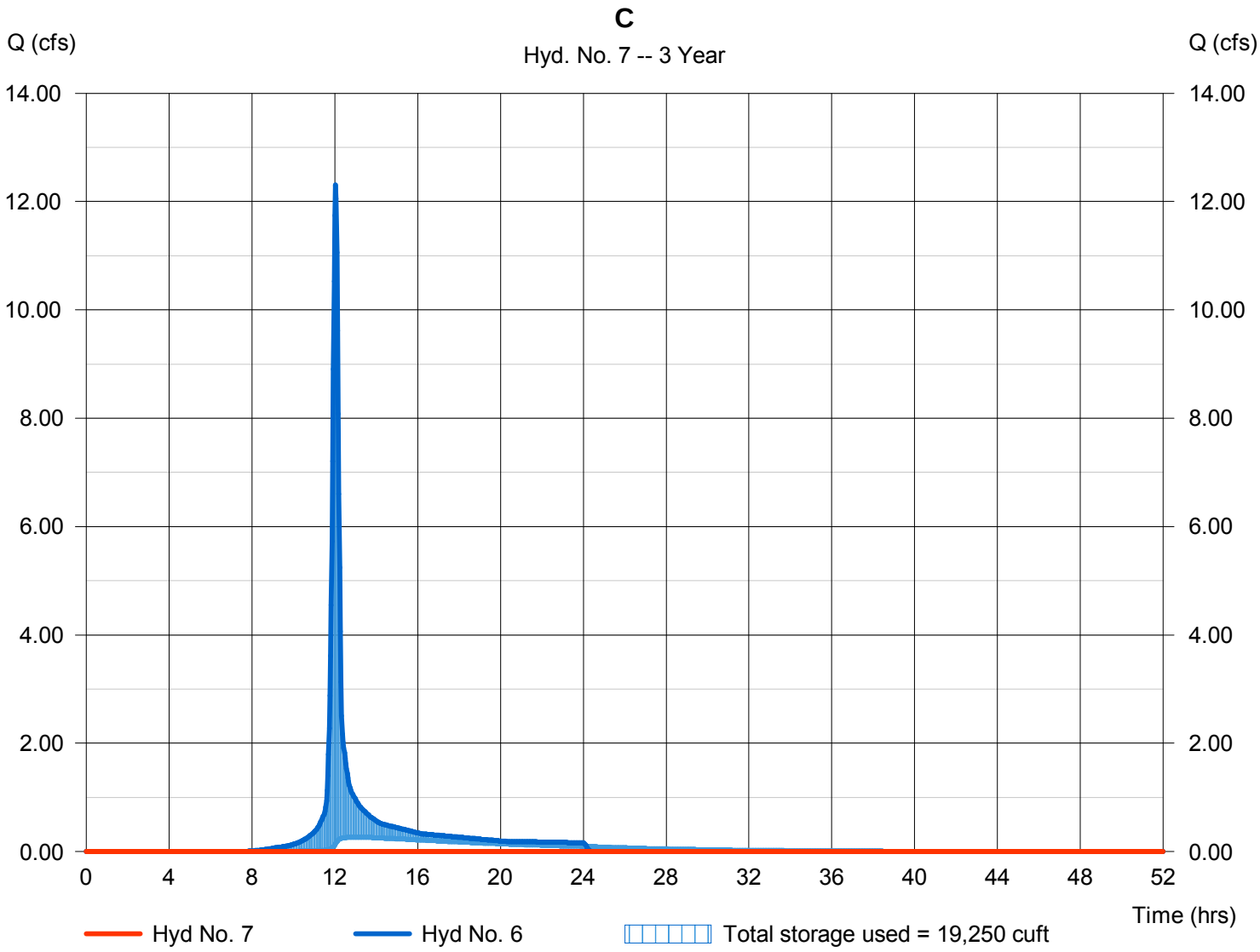
Hydrograph Report

Hyd. No. 7

C

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 6 - Total to C	Max. Elevation	= 1324.17 ft
Reservoir name	= C	Max. Storage	= 19,250 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

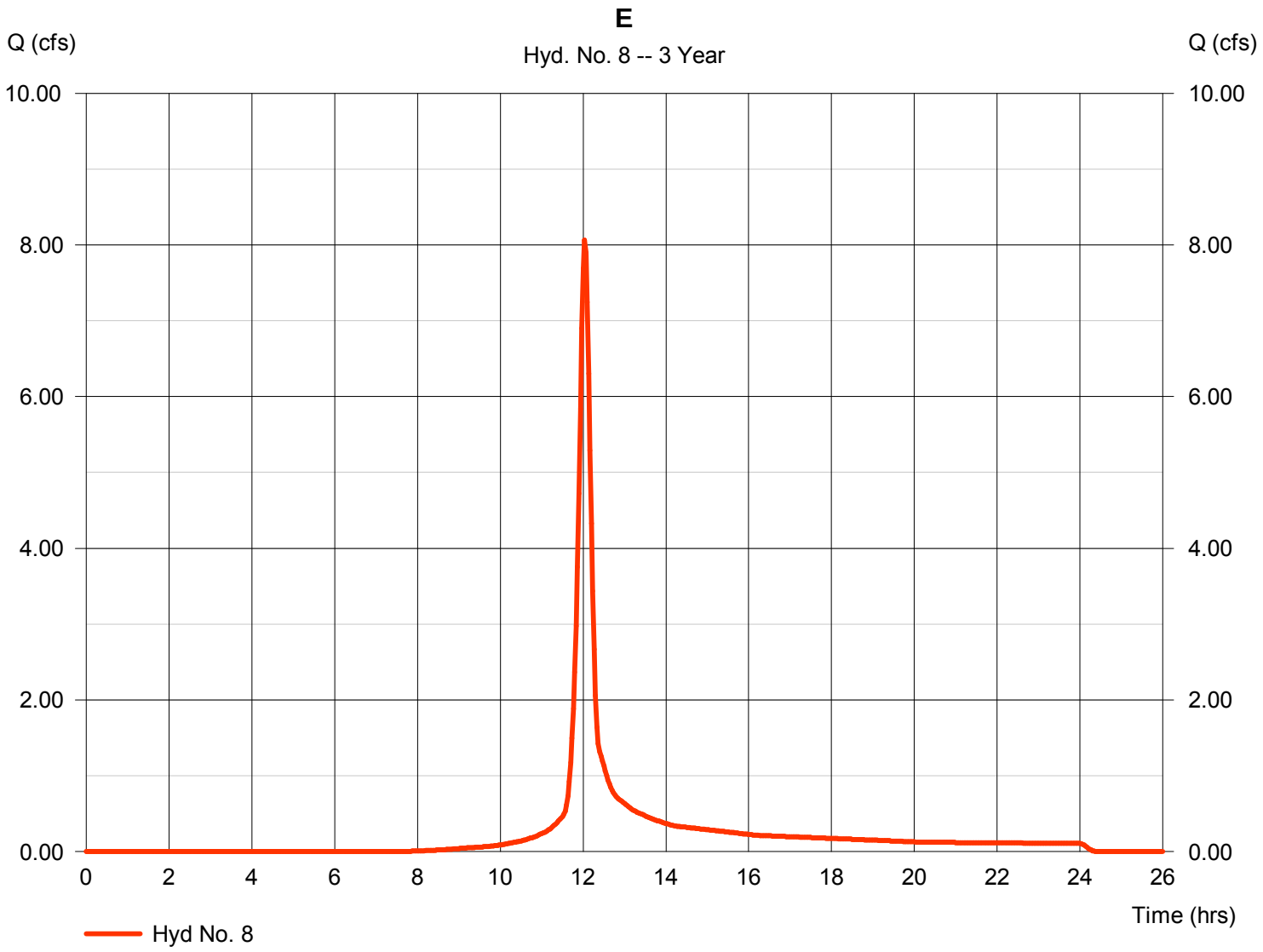


Hydrograph Report

Hyd. No. 8

E

Hydrograph type	= SCS Runoff	Peak discharge	= 8.061 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 22,602 cuft
Drainage area	= 9.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



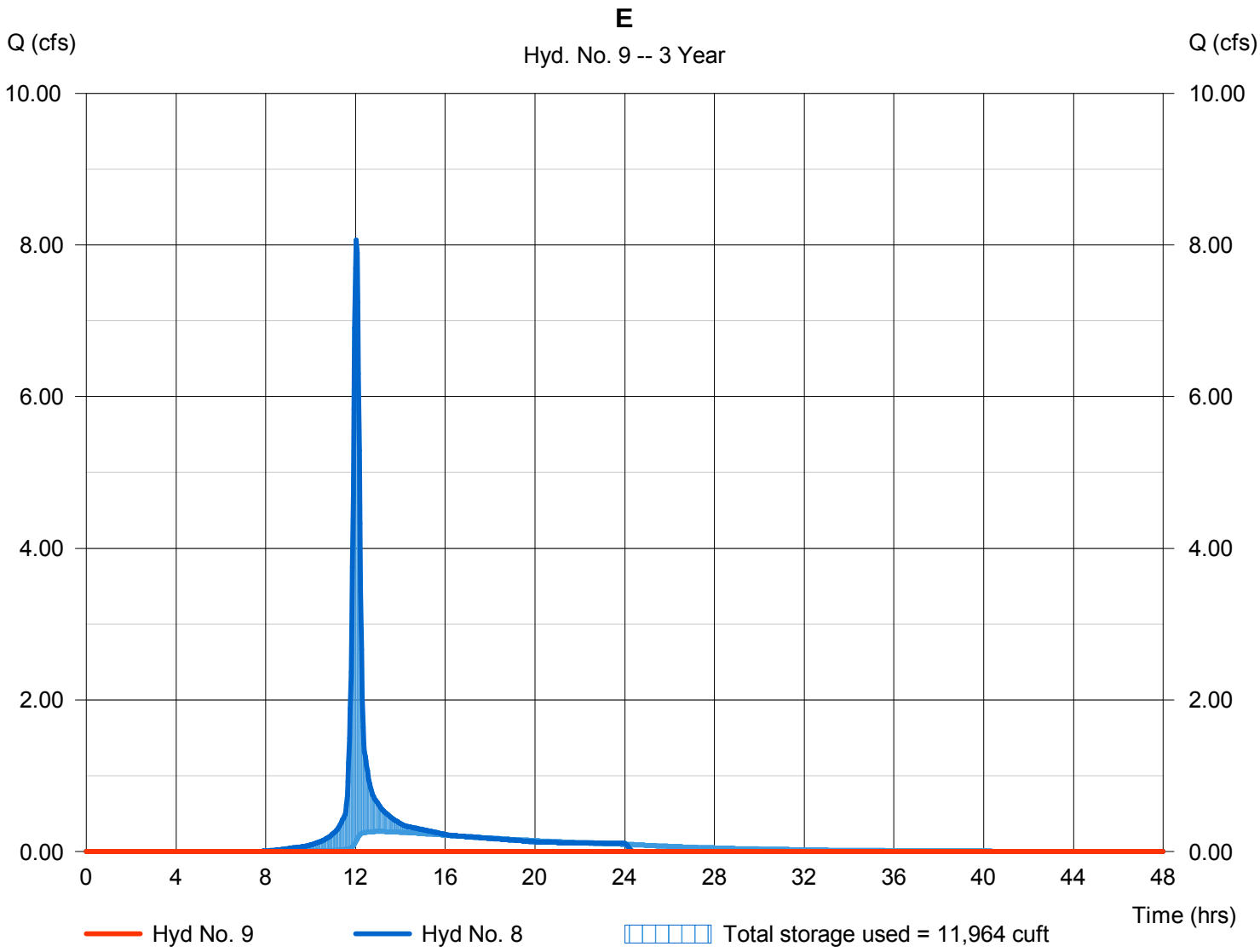
Hydrograph Report

Hyd. No. 9

E

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 16.53 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 8 - E	Max. Elevation	= 1324.42 ft
Reservoir name	= E	Max. Storage	= 11,964 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

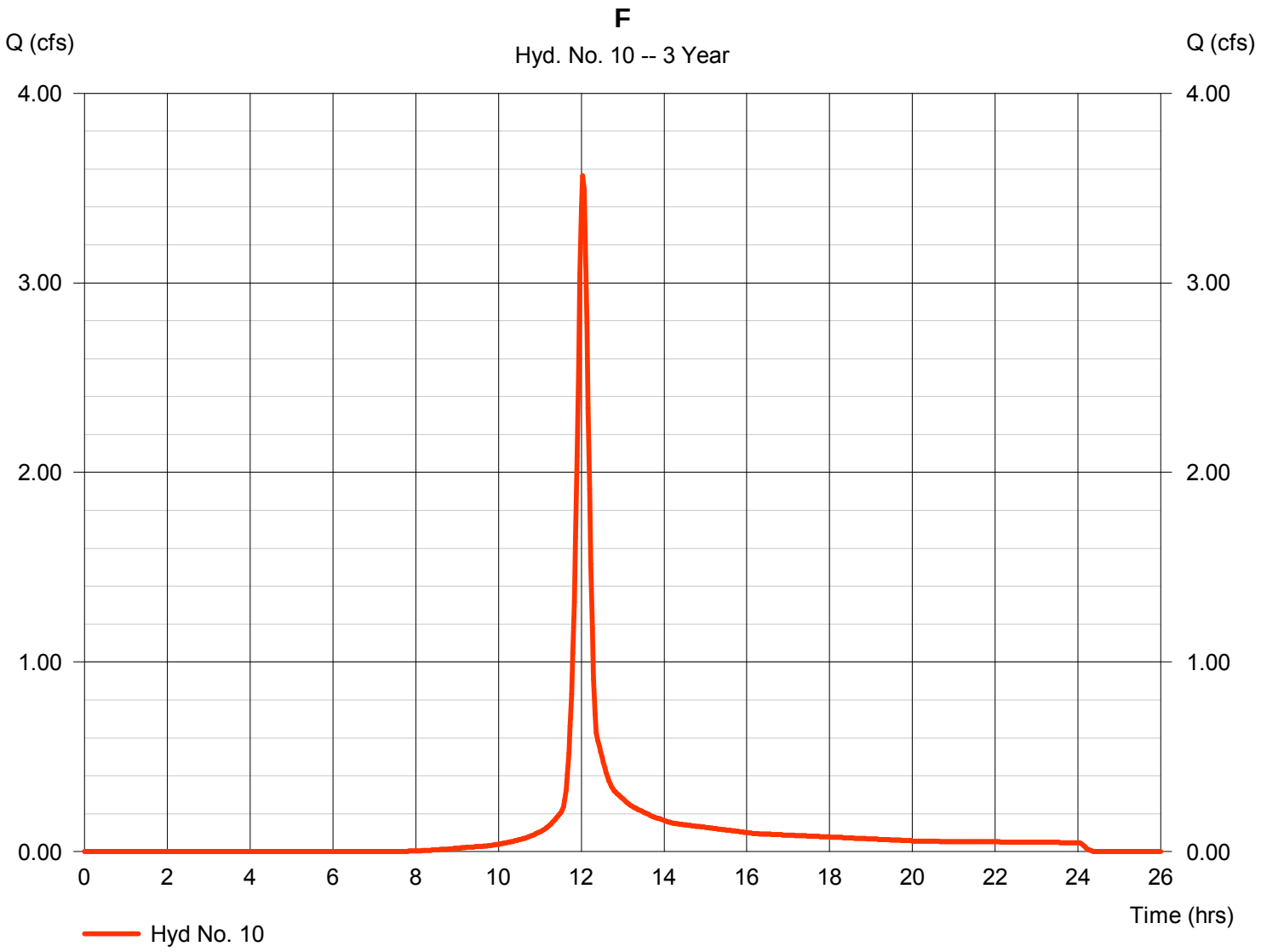


Hydrograph Report

Hyd. No. 10

F

Hydrograph type	= SCS Runoff	Peak discharge	= 3.564 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 9,992 cuft
Drainage area	= 4.200 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



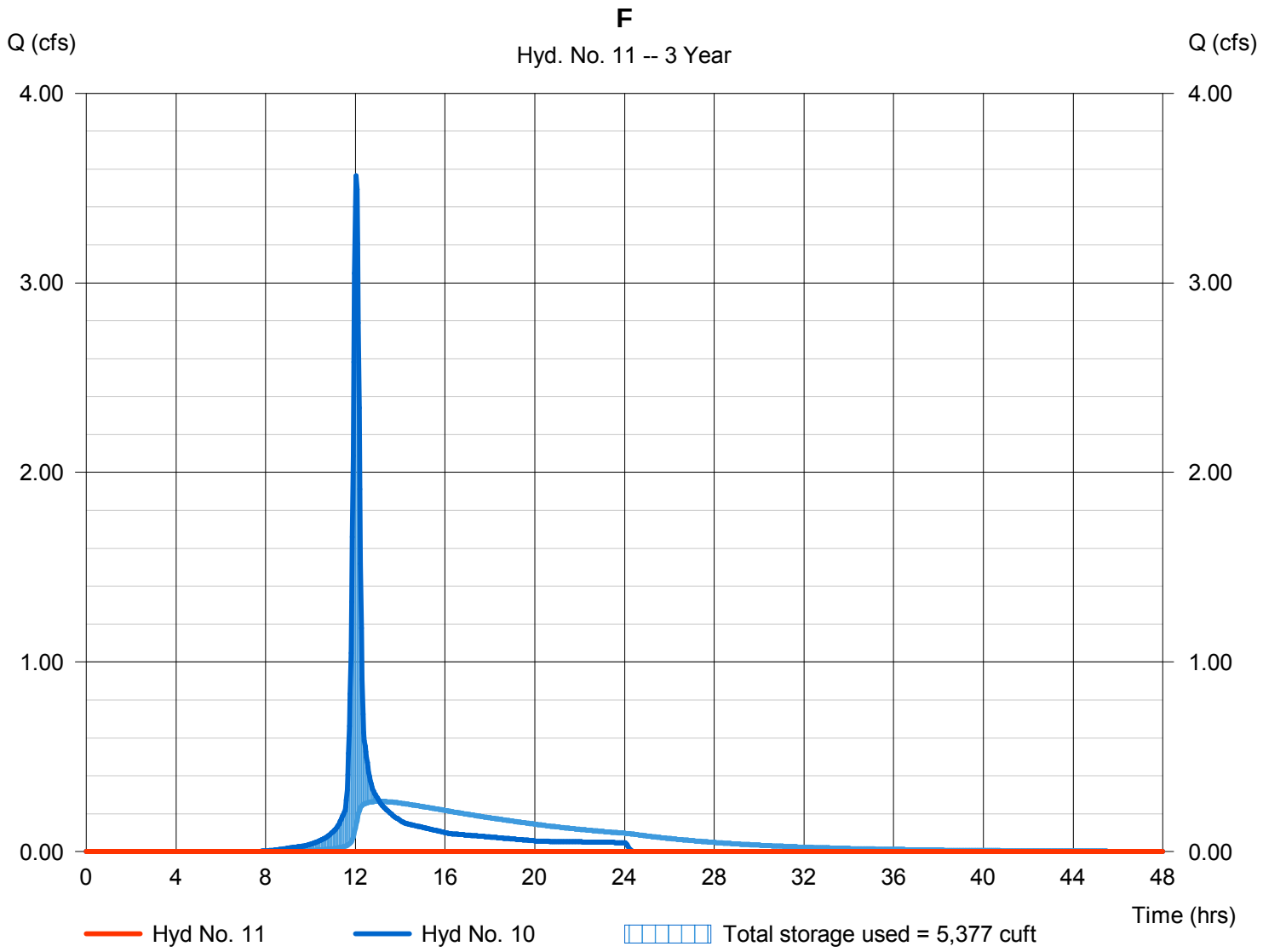
Hydrograph Report

Hyd. No. 11

F

Hydrograph type	= Reservoir	Peak discharge	= 0.000 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 0 cuft
Inflow hyd. No.	= 10 - F	Max. Elevation	= 1325.23 ft
Reservoir name	= F	Max. Storage	= 5,377 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

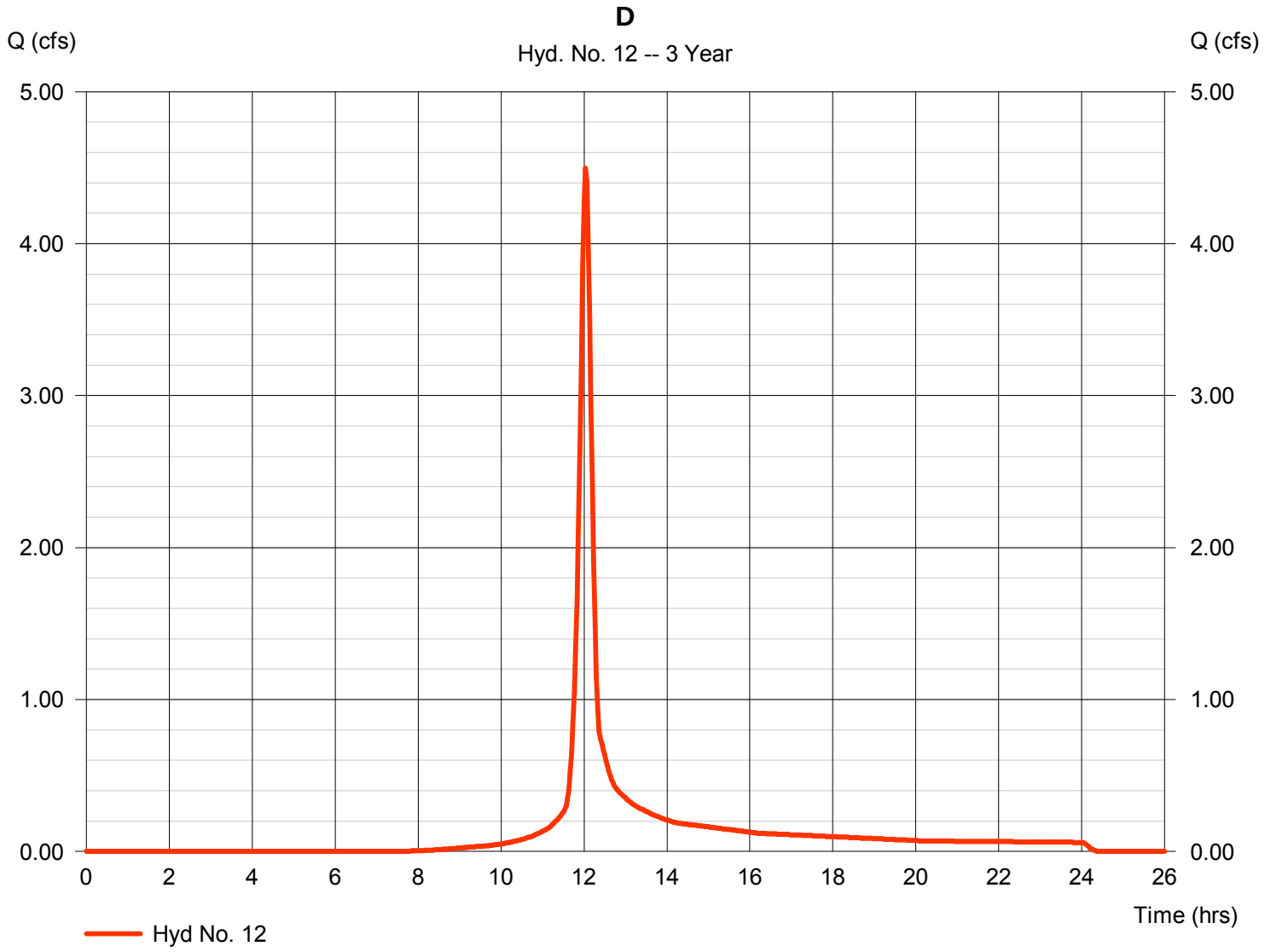


Hydrograph Report

Hyd. No. 12

D

Hydrograph type	= SCS Runoff	Peak discharge	= 4.497 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 12,609 cuft
Drainage area	= 5.300 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

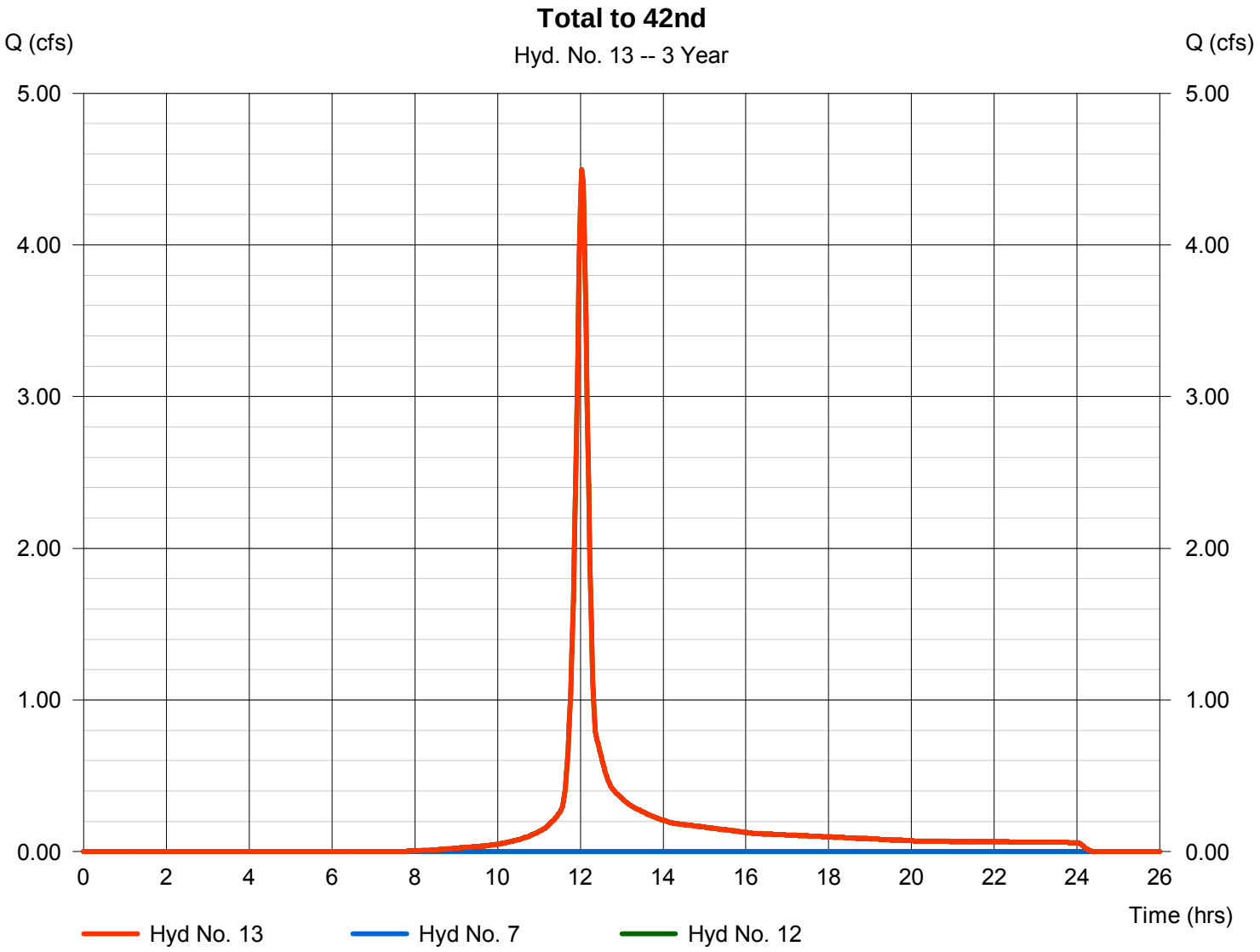


Hydrograph Report

Hyd. No. 13

Total to 42nd

Hydrograph type	= Combine	Peak discharge	= 4.497 cfs
Storm frequency	= 3 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 12,609 cuft
Inflow hyds.	= 7, 12	Contrib. drain. area	= 5.300 ac

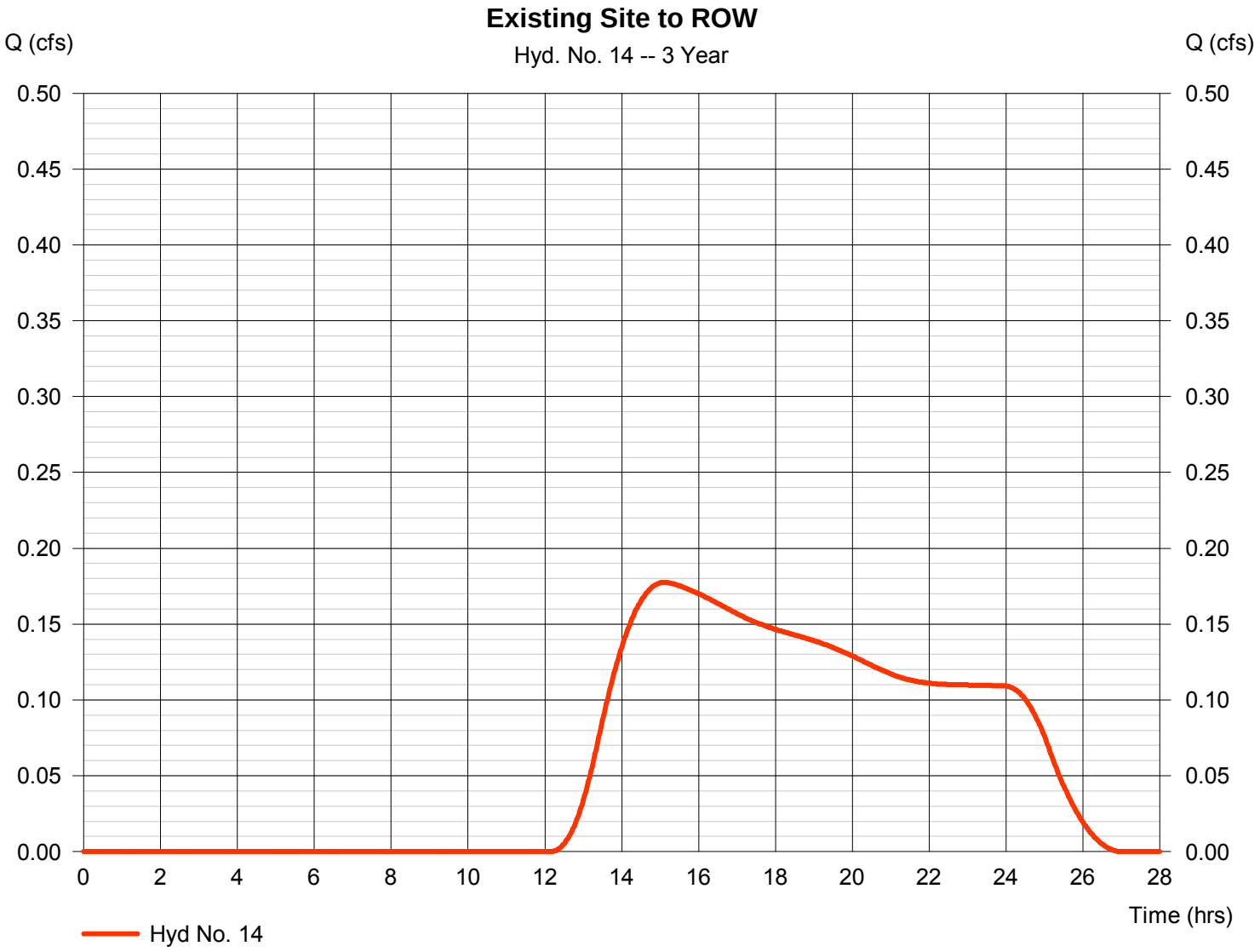


Hydrograph Report

Hyd. No. 14

Existing Site to ROW

Hydrograph type	= SCS Runoff	Peak discharge	= 0.178 cfs
Storm frequency	= 3 yrs	Time to peak	= 15.10 hrs
Time interval	= 2 min	Hyd. volume	= 5,865 cuft
Drainage area	= 49.000 ac	Curve number	= 71
Basin Slope	= 0.6 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 114.60 min
Total precip.	= 1.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

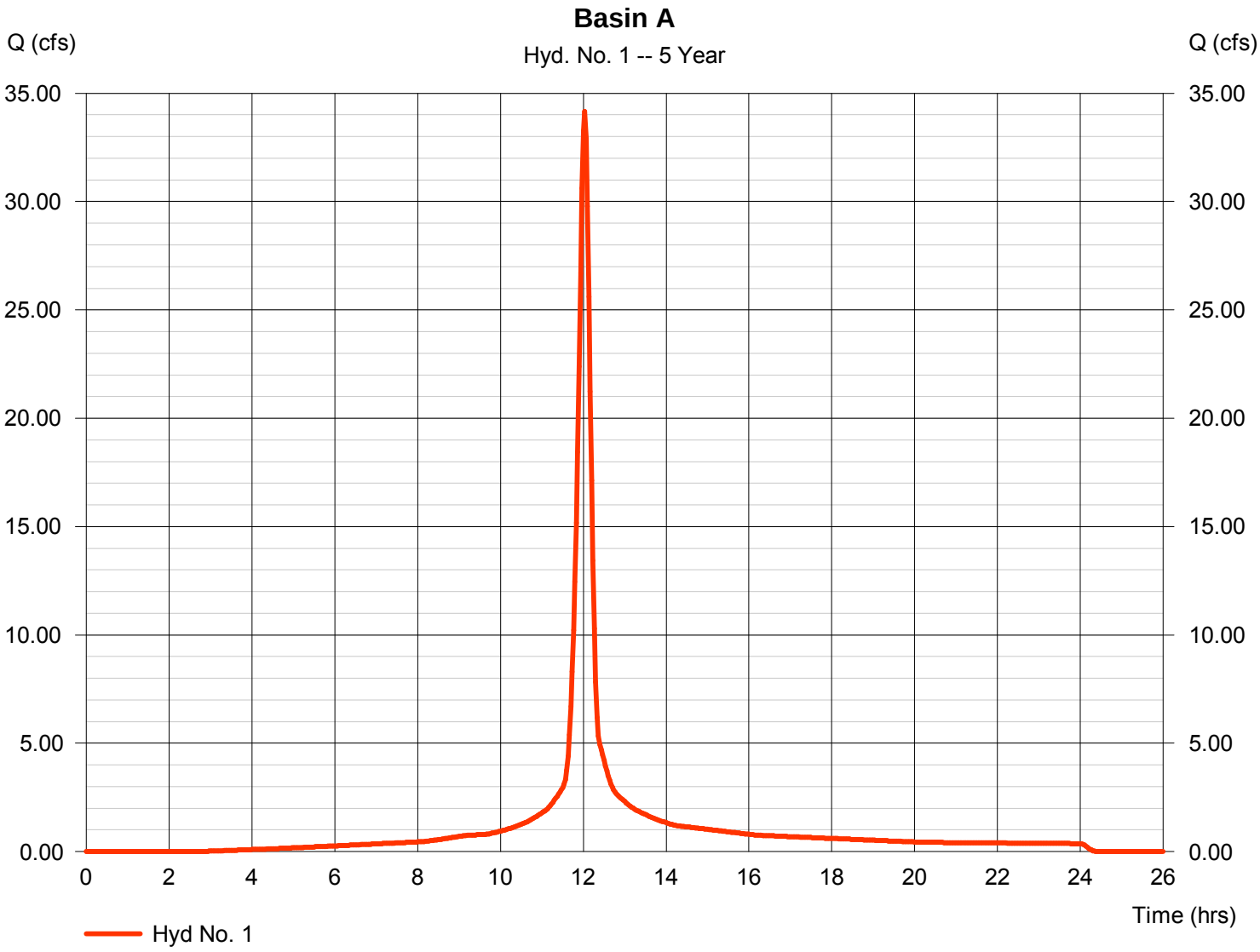
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	34.16	2	722	102,627	------	------	------	Basin A
2	Reservoir	0.872	2	762	7,450	1	1326.44	57,559	A
3	SCS Runoff	62.03	2	722	186,348	------	------	------	B
4	Reservoir	3.106	2	758	33,269	3	1326.86	104,302	B
5	SCS Runoff	65.18	2	722	195,801	------	------	------	C
6	Combine	65.54	2	722	229,070	4, 5	------	------	Total to C
7	Reservoir	6.843	2	756	75,338	6	1325.77	110,191	C
8	SCS Runoff	42.70	2	722	128,283	------	------	------	E
9	Reservoir	2.946	2	752	33,996	8	1326.09	69,467	E
10	SCS Runoff	18.88	2	722	56,715	------	------	------	F
11	Reservoir	1.751	2	742	7,299	10	1326.26	30,380	F
12	SCS Runoff	23.82	2	722	71,569	------	------	------	D
13	Combine	25.10	2	722	146,906	7, 12	------	------	Total to 42nd
14	SCS Runoff	28.37	2	784	311,771	------	------	------	Existing Site to ROW

Hydrograph Report

Hyd. No. 1

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 34.16 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 102,627 cuft
Drainage area	= 7.600 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



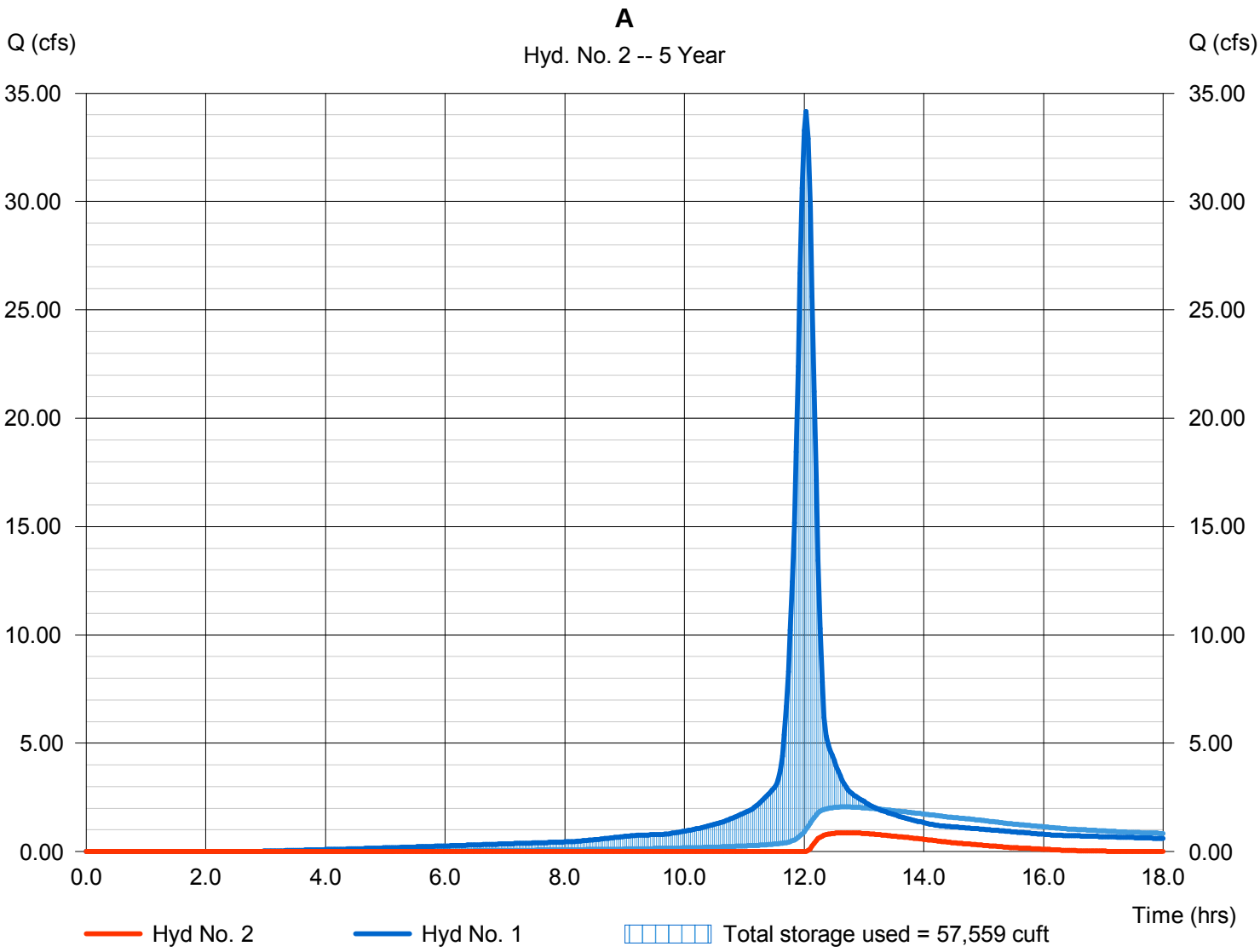
Hydrograph Report

Hyd. No. 2

A

Hydrograph type	= Reservoir	Peak discharge	= 0.872 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.70 hrs
Time interval	= 2 min	Hyd. volume	= 7,450 cuft
Inflow hyd. No.	= 1 - Basin A	Max. Elevation	= 1326.44 ft
Reservoir name	= A	Max. Storage	= 57,559 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

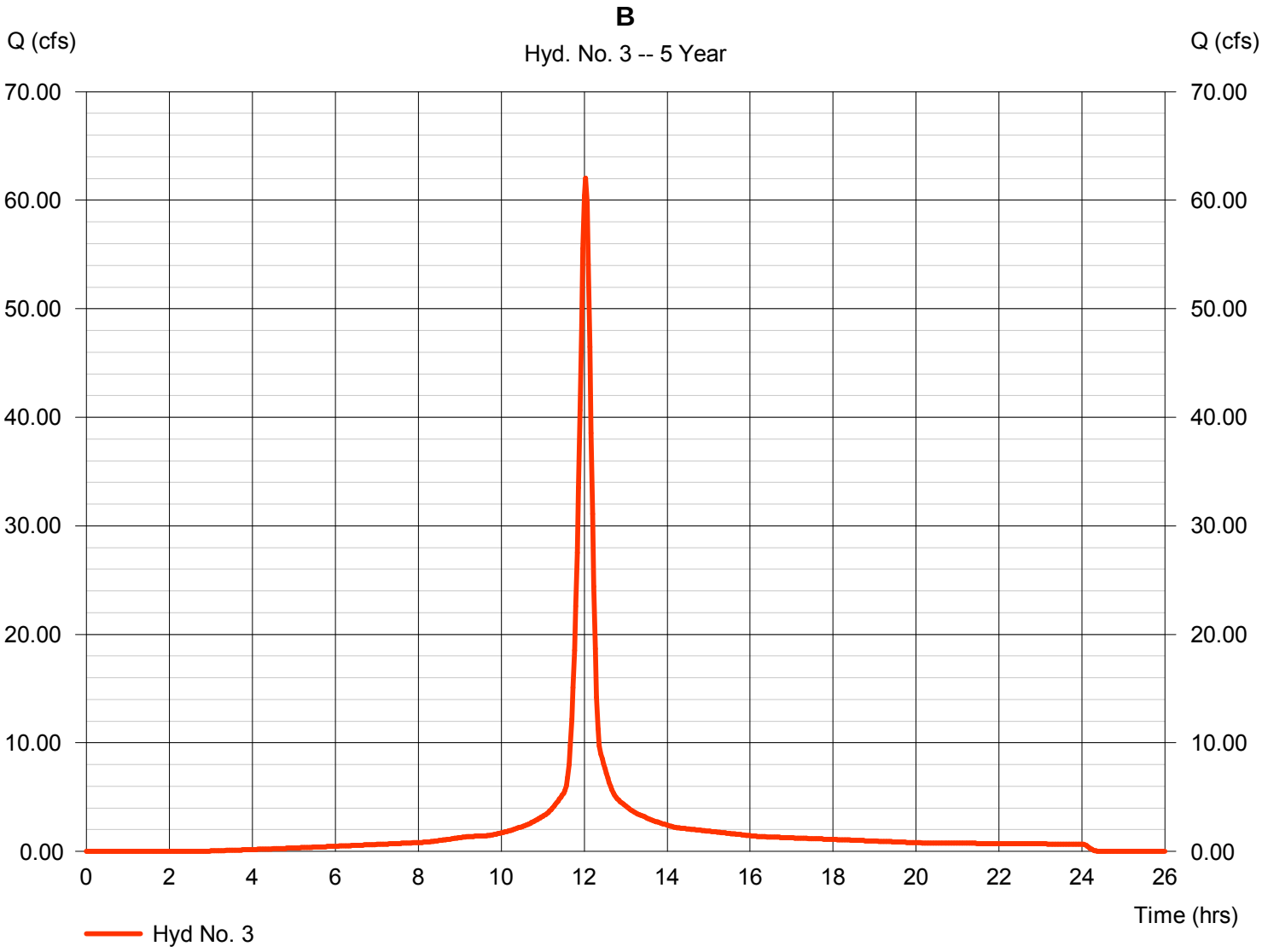


Hydrograph Report

Hyd. No. 3

B

Hydrograph type	=	SCS Runoff	Peak discharge	=	62.03 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	186,348 cuft
Drainage area	=	13.800 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	4.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



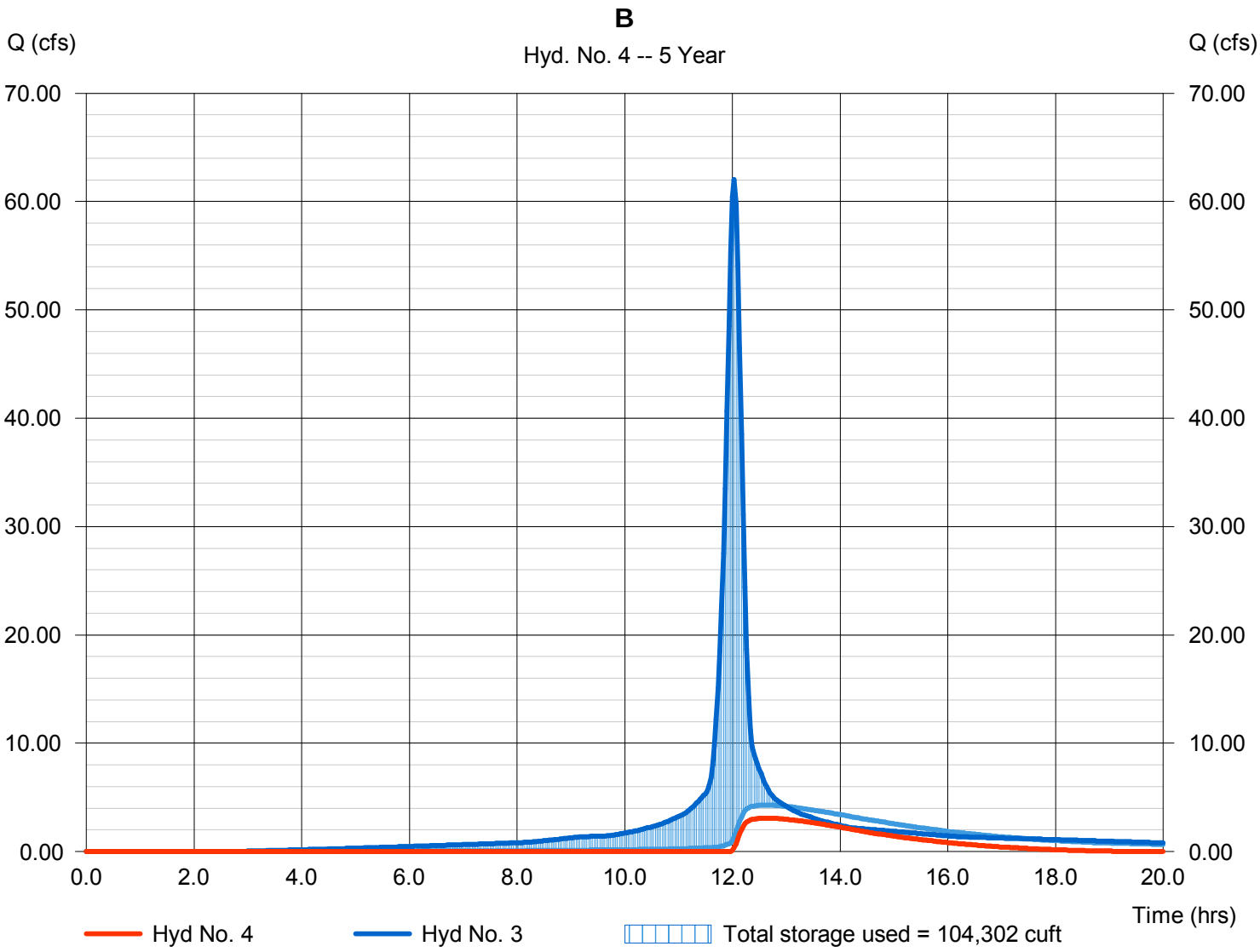
Hydrograph Report

Hyd. No. 4

B

Hydrograph type	= Reservoir	Peak discharge	= 3.106 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.63 hrs
Time interval	= 2 min	Hyd. volume	= 33,269 cuft
Inflow hyd. No.	= 3 - B	Max. Elevation	= 1326.86 ft
Reservoir name	= B	Max. Storage	= 104,302 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

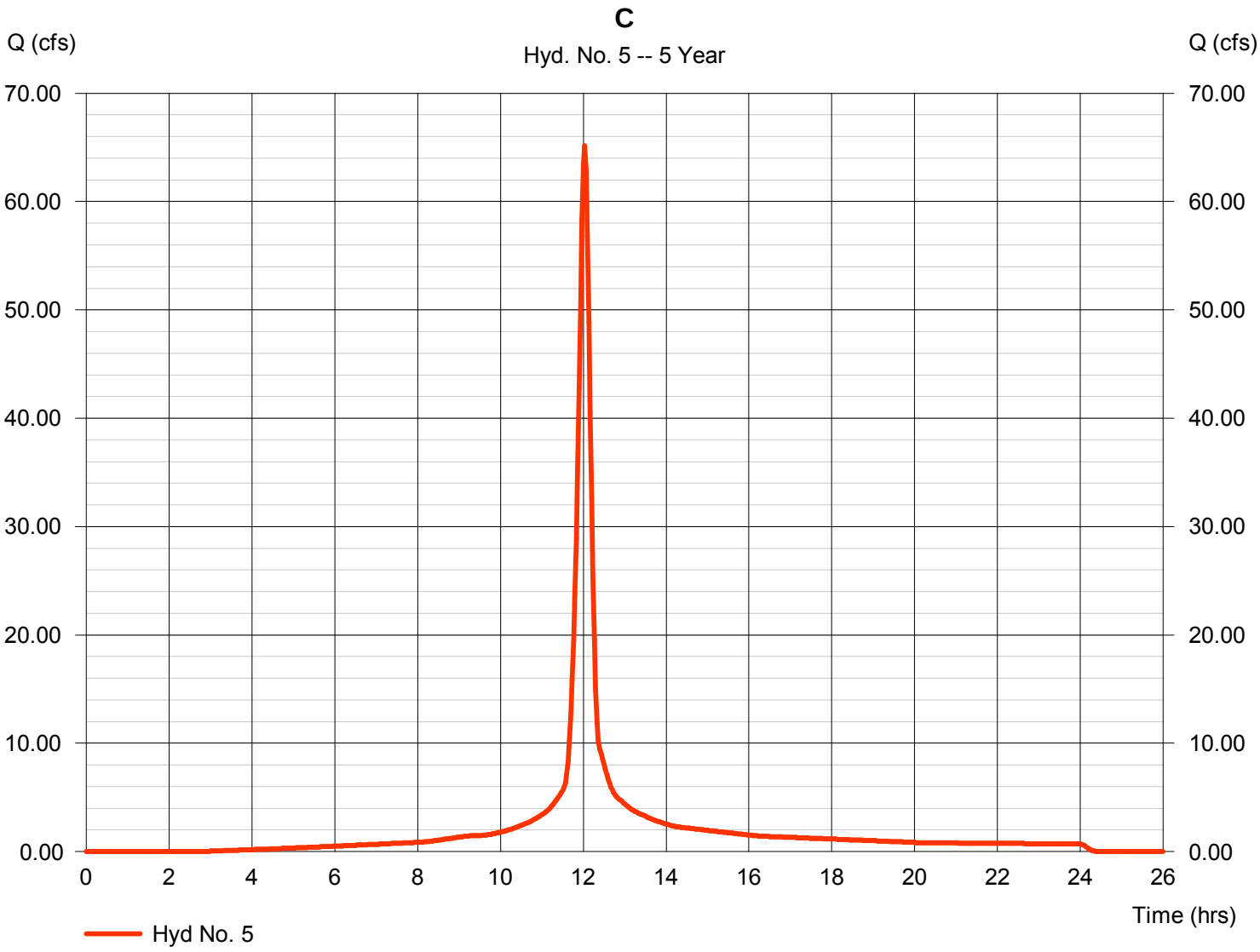


Hydrograph Report

Hyd. No. 5

C

Hydrograph type	=	SCS Runoff	Peak discharge	=	65.18 cfs
Storm frequency	=	5 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	195,801 cuft
Drainage area	=	14.500 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	4.50 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

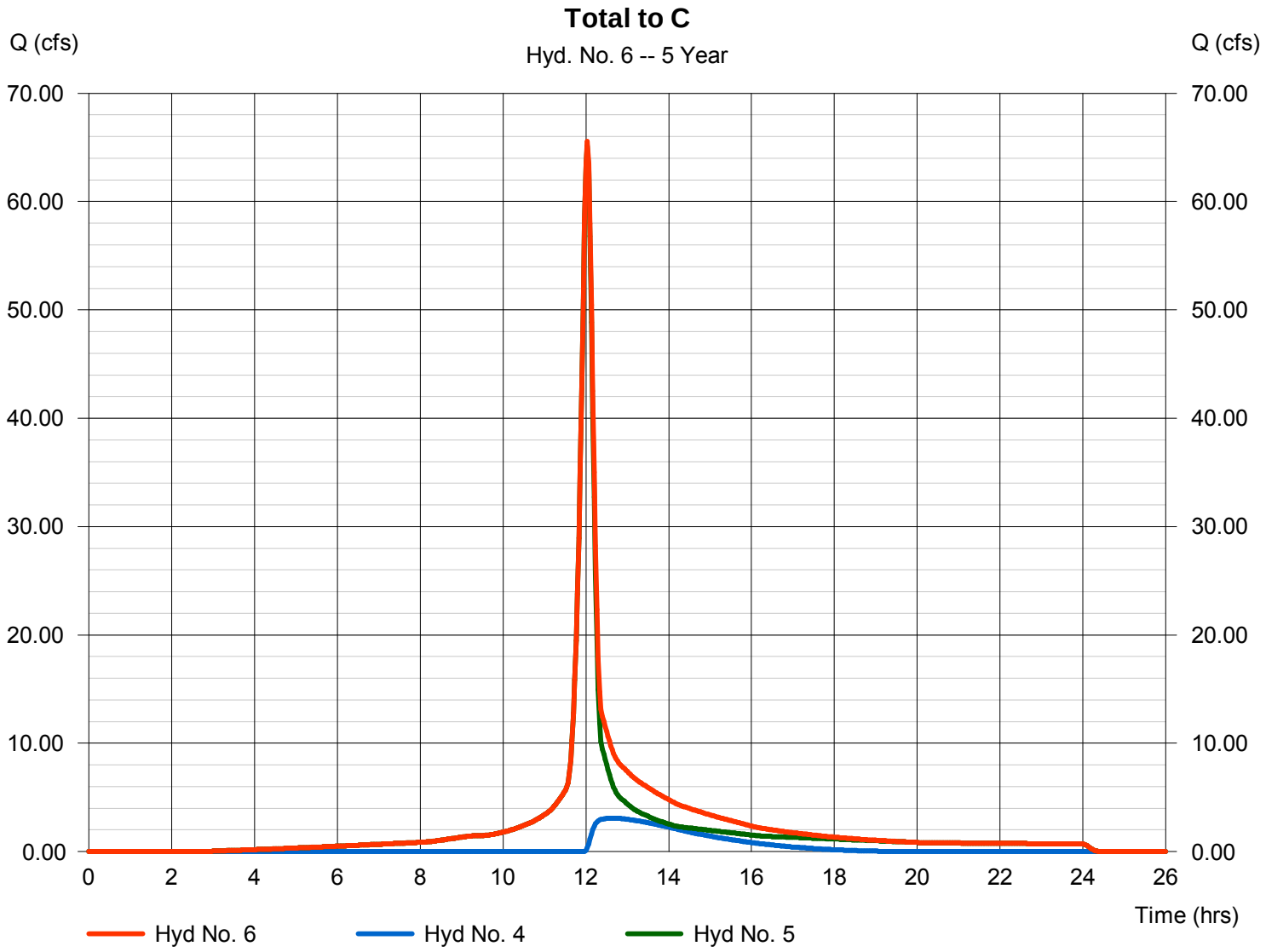


Hydrograph Report

Hyd. No. 6

Total to C

Hydrograph type	= Combine	Peak discharge	= 65.54 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 229,070 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 14.500 ac



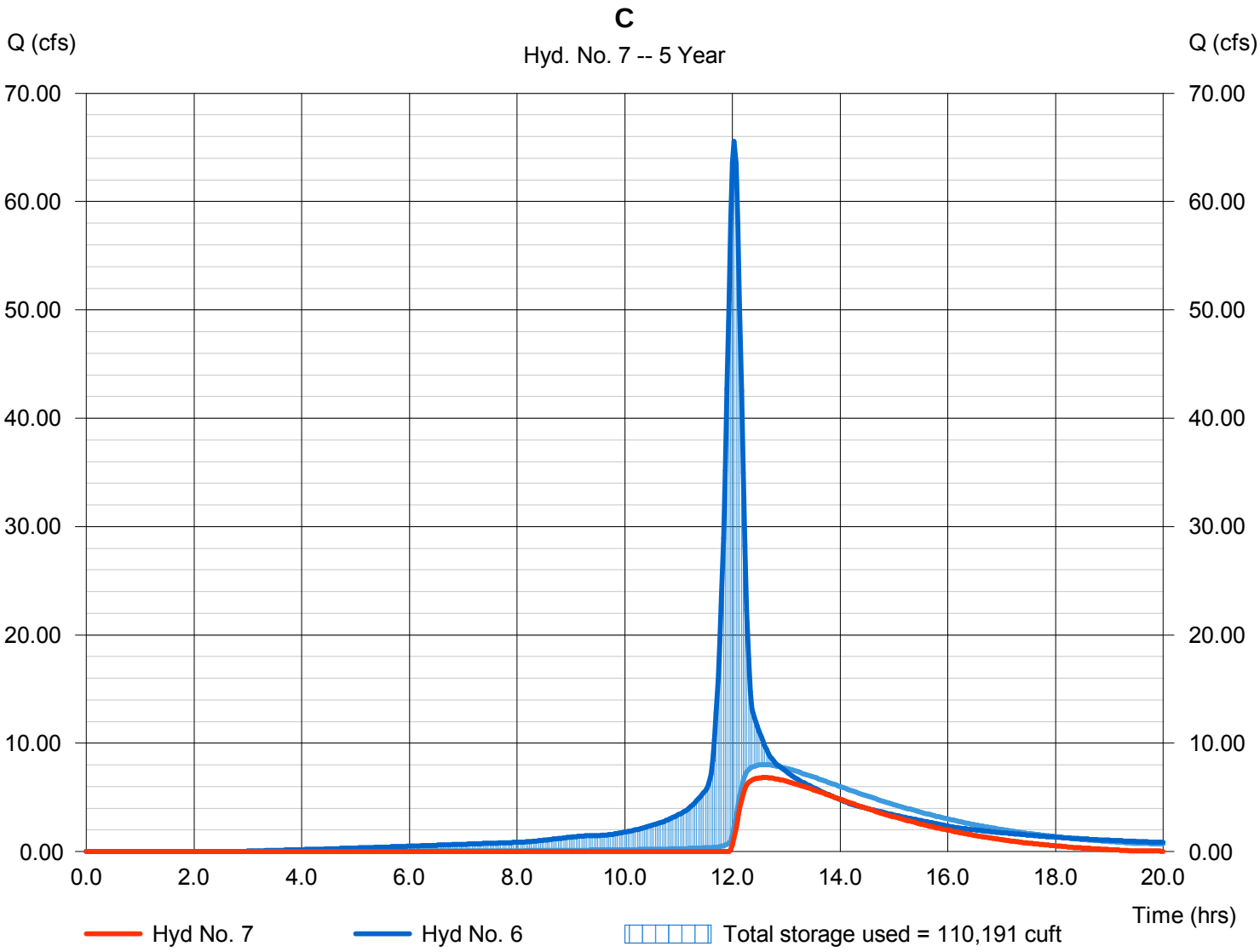
Hydrograph Report

Hyd. No. 7

C

Hydrograph type	= Reservoir	Peak discharge	= 6.843 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 75,338 cuft
Inflow hyd. No.	= 6 - Total to C	Max. Elevation	= 1325.77 ft
Reservoir name	= C	Max. Storage	= 110,191 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

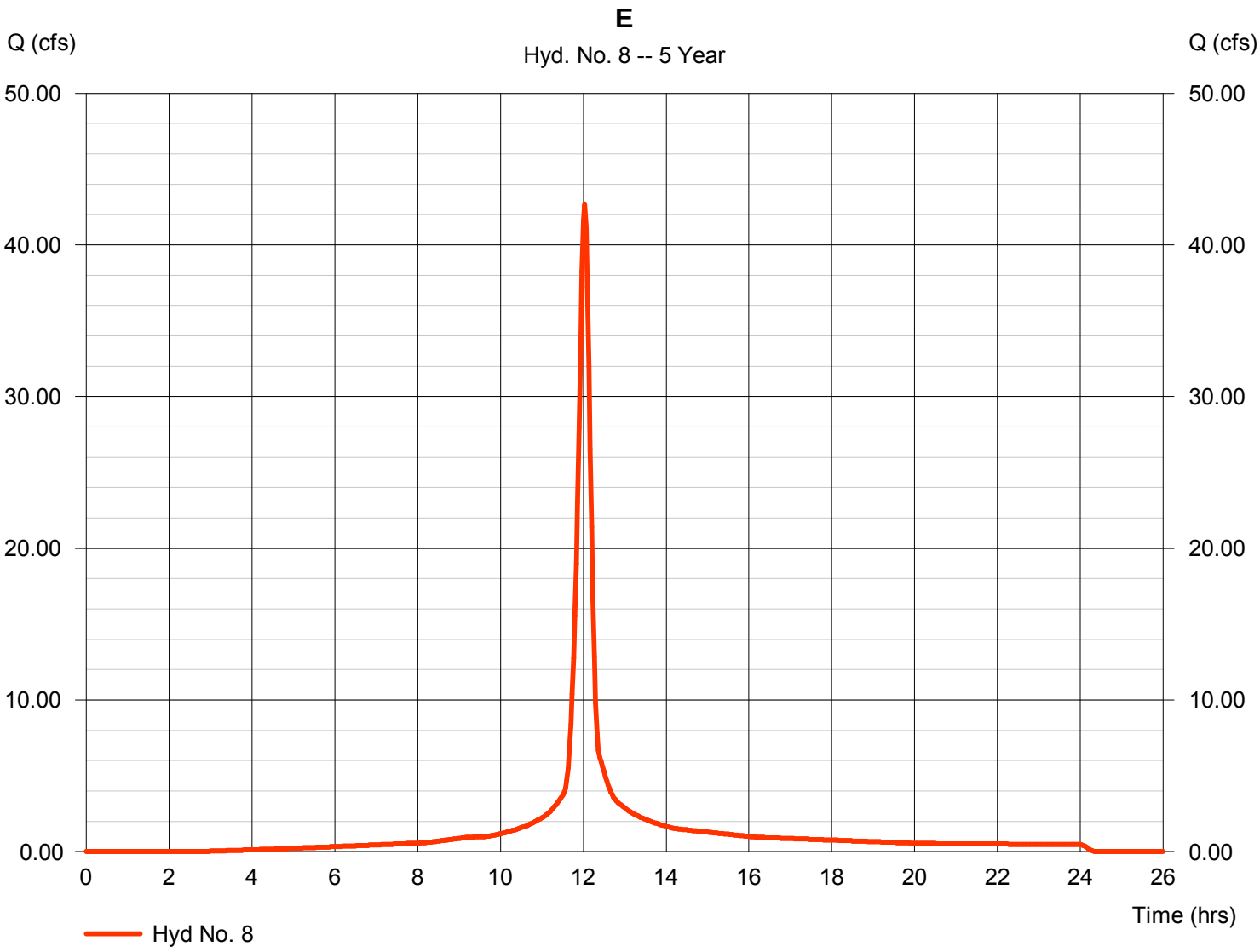


Hydrograph Report

Hyd. No. 8

E

Hydrograph type	= SCS Runoff	Peak discharge	= 42.70 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 128,283 cuft
Drainage area	= 9.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



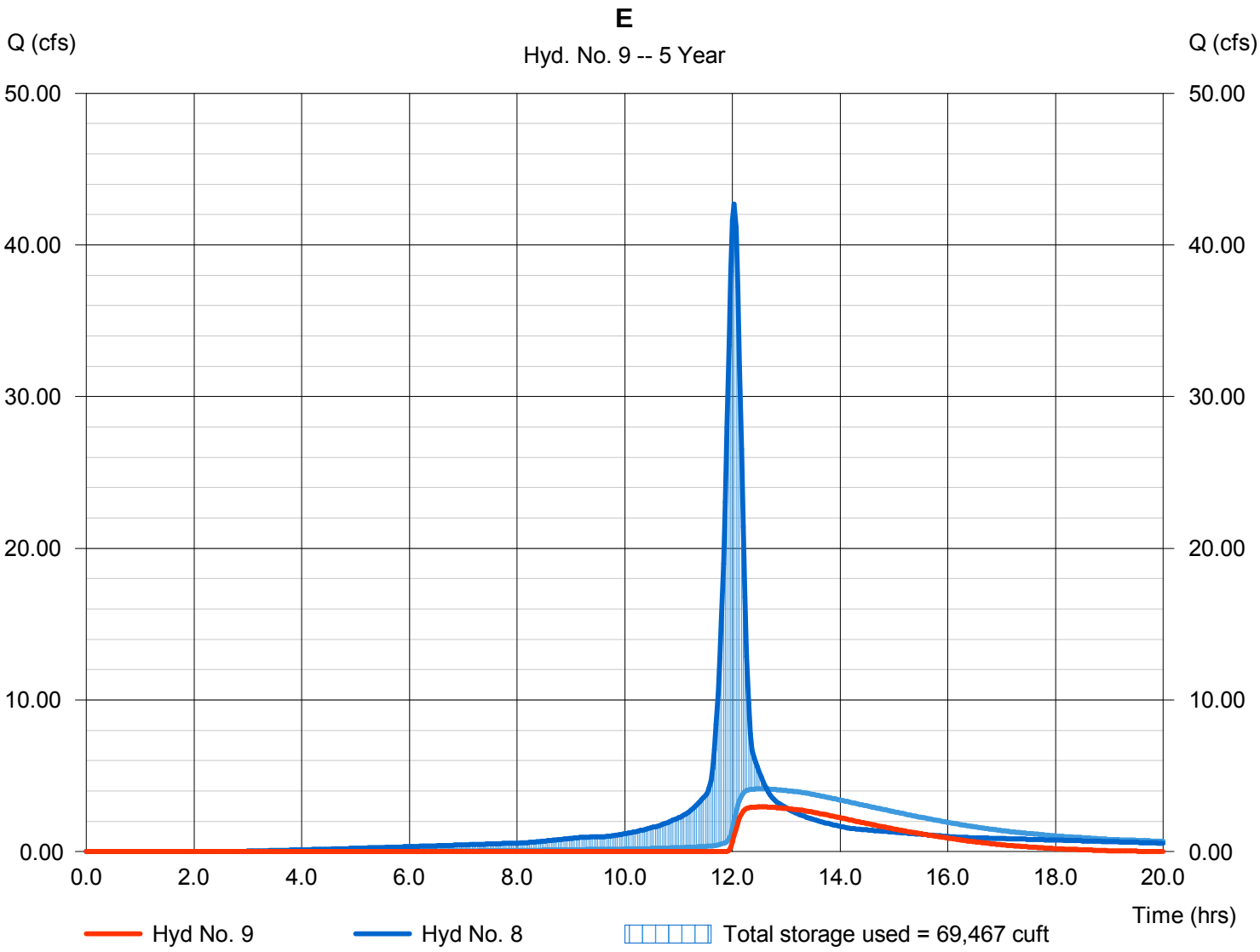
Hydrograph Report

Hyd. No. 9

E

Hydrograph type	= Reservoir	Peak discharge	= 2.946 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 33,996 cuft
Inflow hyd. No.	= 8 - E	Max. Elevation	= 1326.09 ft
Reservoir name	= E	Max. Storage	= 69,467 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

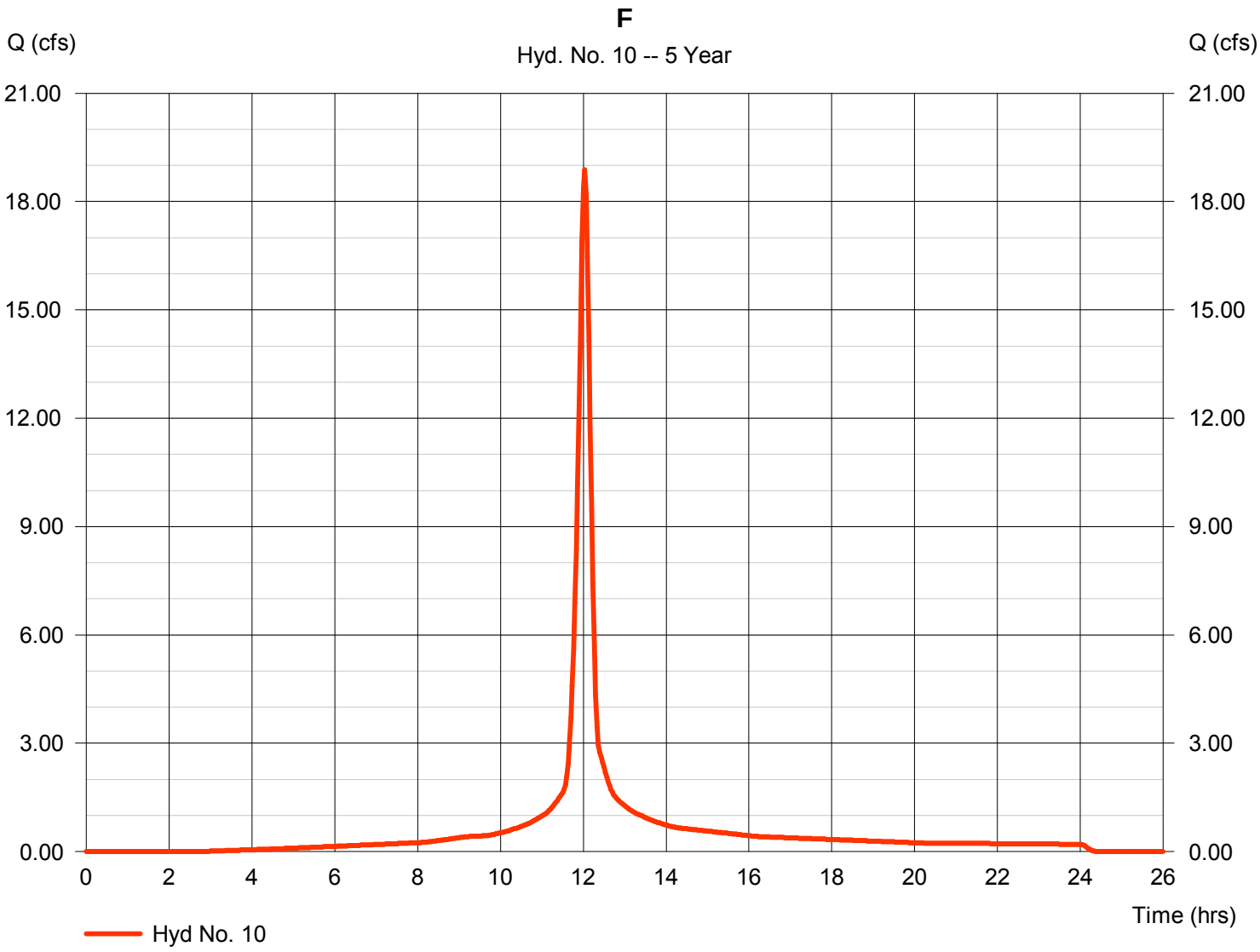


Hydrograph Report

Hyd. No. 10

F

Hydrograph type	= SCS Runoff	Peak discharge	= 18.88 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 56,715 cuft
Drainage area	= 4.200 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



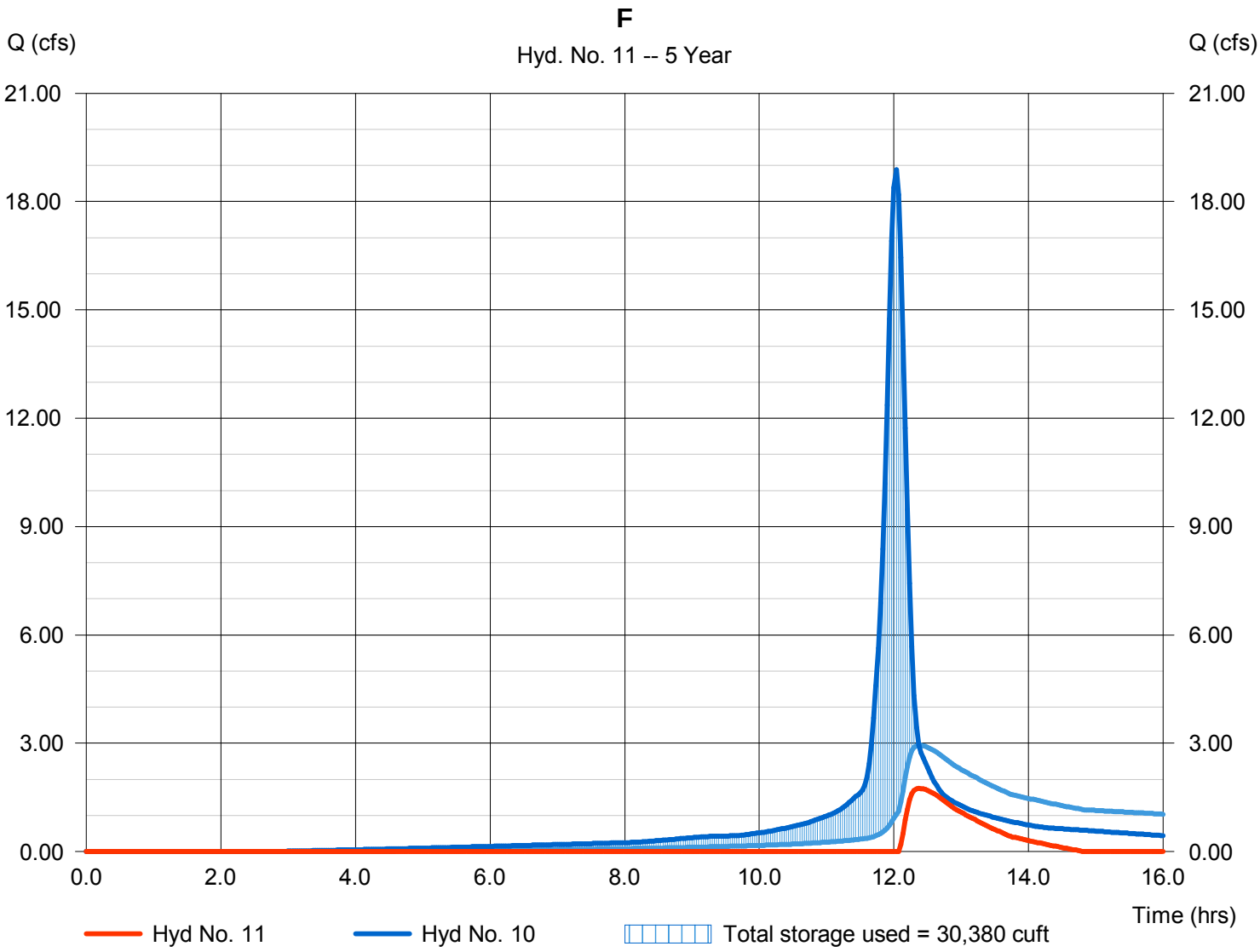
Hydrograph Report

Hyd. No. 11

F

Hydrograph type	= Reservoir	Peak discharge	= 1.751 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.37 hrs
Time interval	= 2 min	Hyd. volume	= 7,299 cuft
Inflow hyd. No.	= 10 - F	Max. Elevation	= 1326.26 ft
Reservoir name	= F	Max. Storage	= 30,380 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

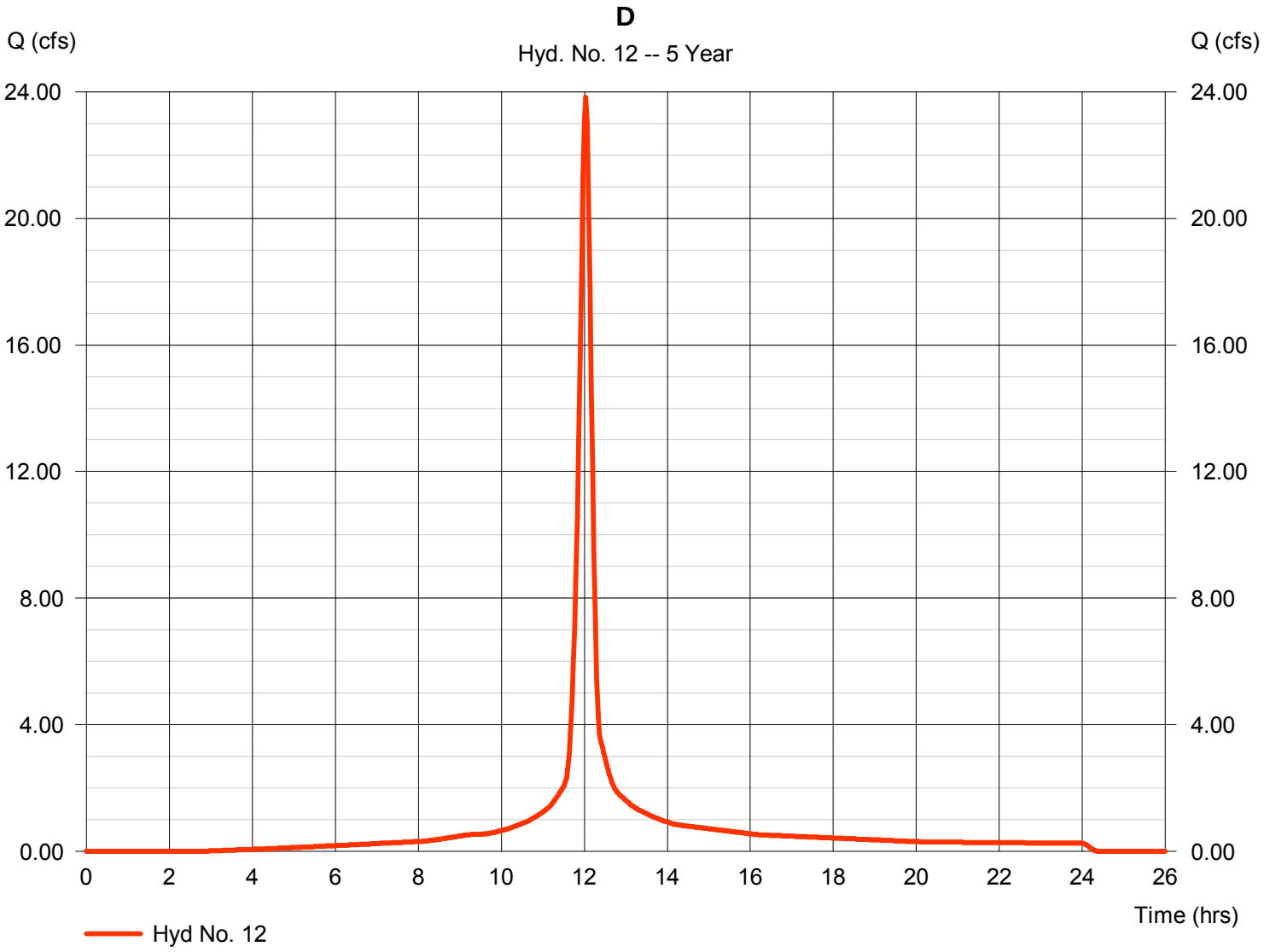


Hydrograph Report

Hyd. No. 12

D

Hydrograph type	= SCS Runoff	Peak discharge	= 23.82 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 71,569 cuft
Drainage area	= 5.300 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

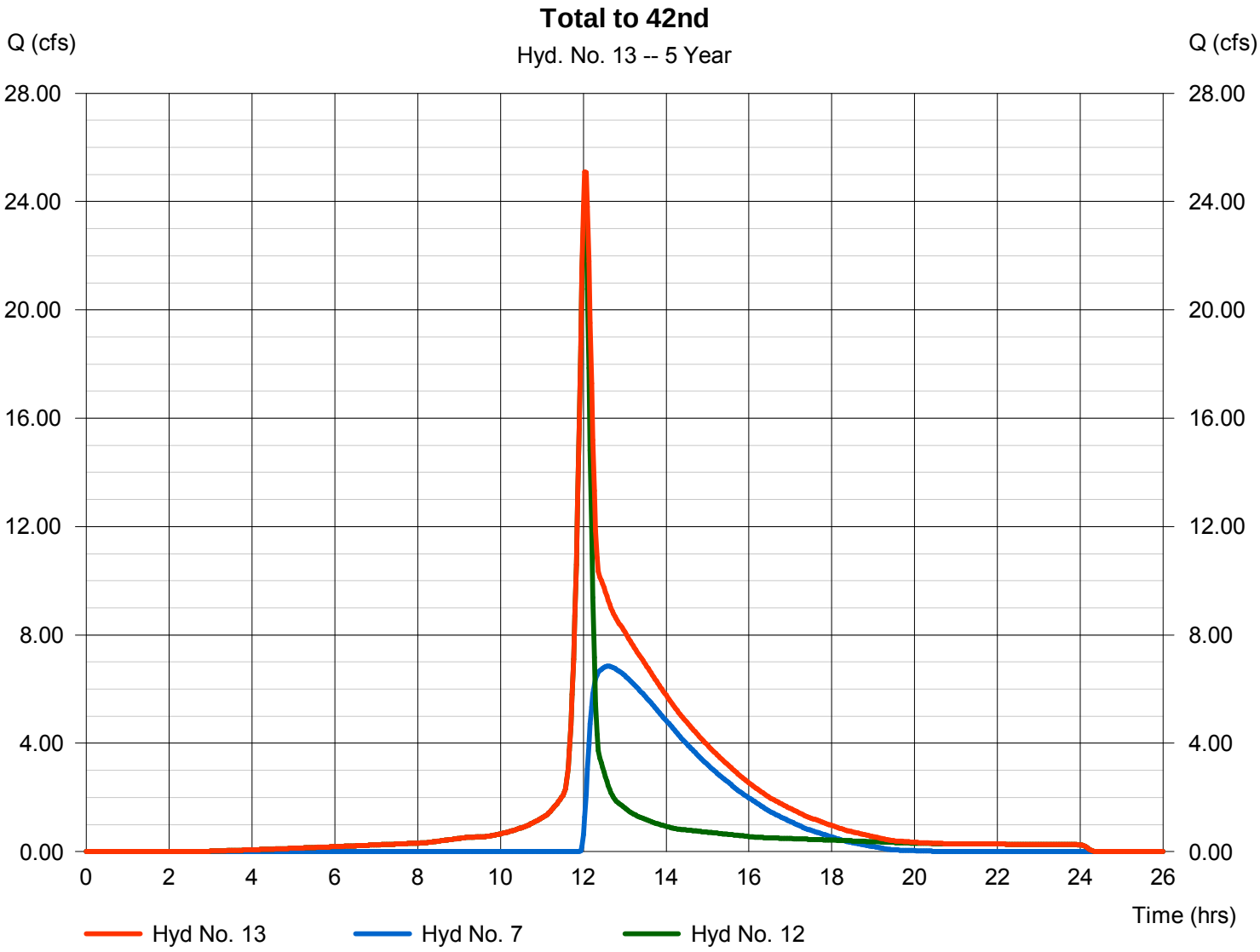


Hydrograph Report

Hyd. No. 13

Total to 42nd

Hydrograph type	= Combine	Peak discharge	= 25.10 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 146,906 cuft
Inflow hyds.	= 7, 12	Contrib. drain. area	= 5.300 ac

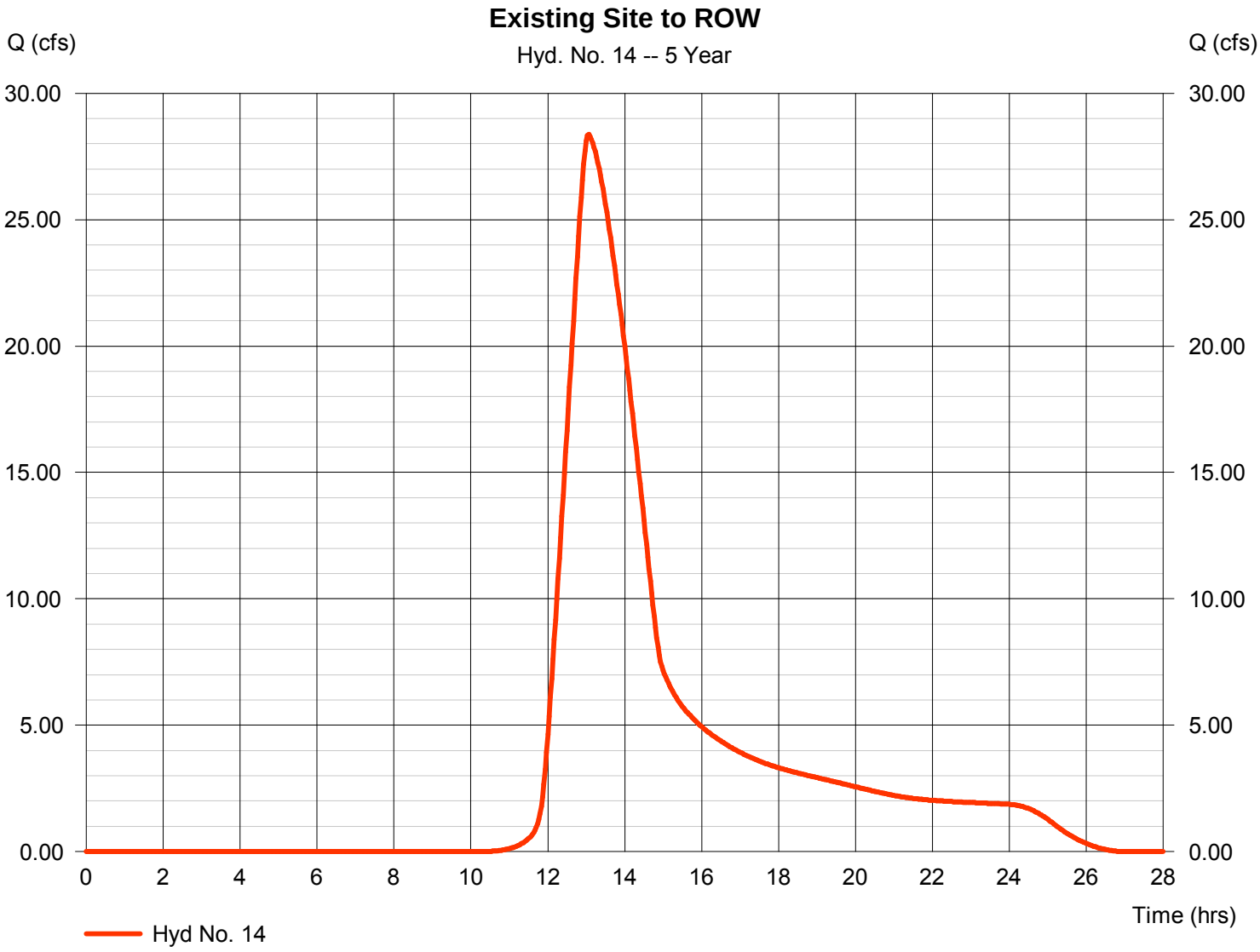


Hydrograph Report

Hyd. No. 14

Existing Site to ROW

Hydrograph type	= SCS Runoff	Peak discharge	= 28.37 cfs
Storm frequency	= 5 yrs	Time to peak	= 13.07 hrs
Time interval	= 2 min	Hyd. volume	= 311,771 cuft
Drainage area	= 49.000 ac	Curve number	= 71
Basin Slope	= 0.6 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 114.60 min
Total precip.	= 4.50 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

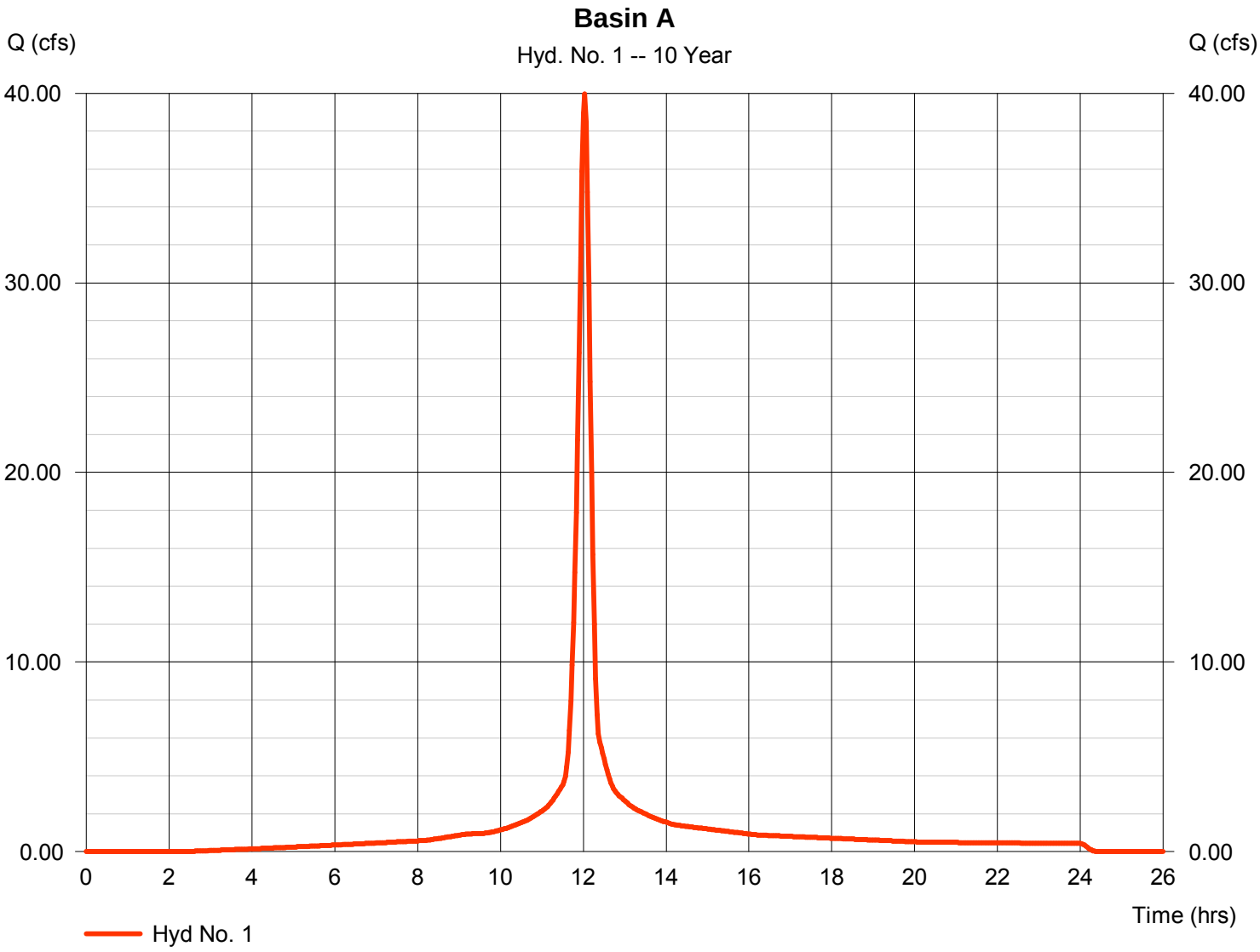
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	39.96	2	722	121,187	------	------	------	Basin A
2	Reservoir	1.604	2	758	15,773	1	1326.65	67,401	A
3	SCS Runoff	72.55	2	722	220,050	------	------	------	B
4	Reservoir	4.423	2	756	53,810	3	1327.14	122,264	B
5	SCS Runoff	76.23	2	722	231,213	------	------	------	C
6	Combine	77.37	2	722	285,022	4, 5	------	------	Total to C
7	Reservoir	8.404	2	758	117,269	6	1326.08	130,555	C
8	SCS Runoff	49.95	2	722	151,484	------	------	------	E
9	Reservoir	3.679	2	752	48,402	8	1326.37	82,003	E
10	SCS Runoff	22.08	2	722	66,972	------	------	------	F
11	Reservoir	3.573	2	738	13,970	10	1326.42	34,654	F
12	SCS Runoff	27.86	2	722	84,512	------	------	------	D
13	Combine	31.22	2	724	201,781	7, 12	------	------	Total to 42nd
14	SCS Runoff	37.69	2	784	405,040	------	------	------	Existing Site to ROW

Hydrograph Report

Hyd. No. 1

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 39.96 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 121,187 cuft
Drainage area	= 7.600 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



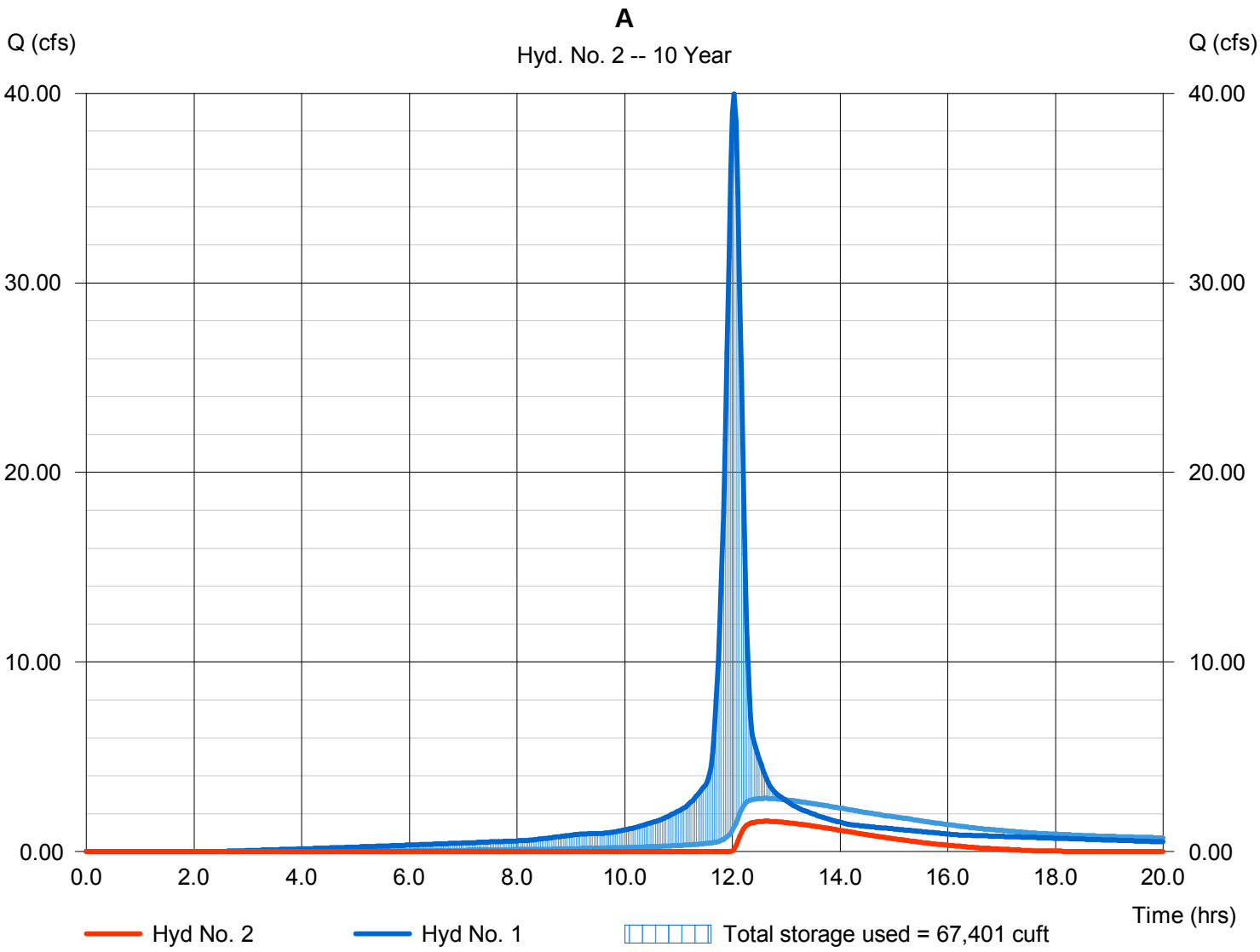
Hydrograph Report

Hyd. No. 2

A

Hydrograph type	= Reservoir	Peak discharge	= 1.604 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.63 hrs
Time interval	= 2 min	Hyd. volume	= 15,773 cuft
Inflow hyd. No.	= 1 - Basin A	Max. Elevation	= 1326.65 ft
Reservoir name	= A	Max. Storage	= 67,401 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

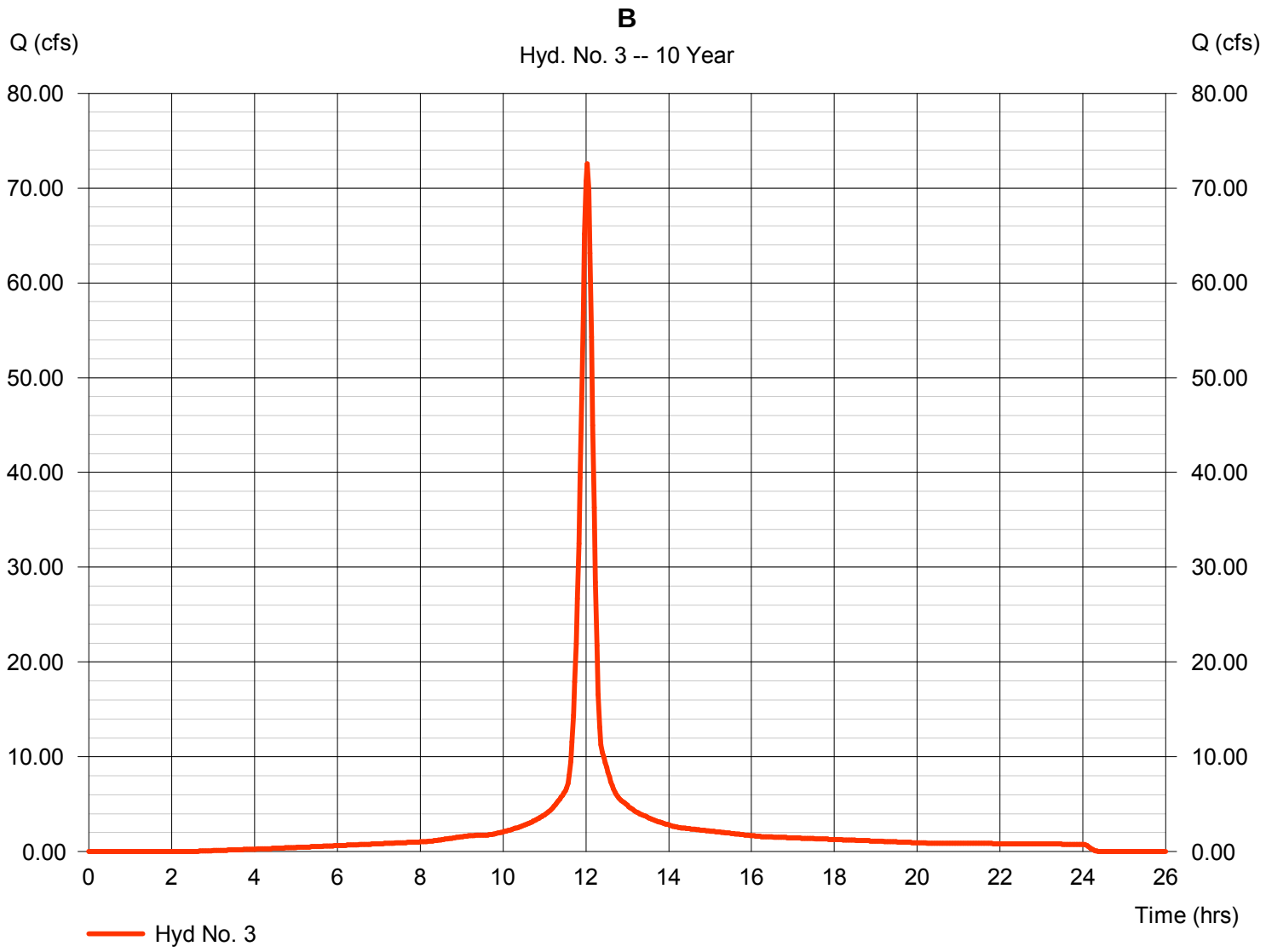


Hydrograph Report

Hyd. No. 3

B

Hydrograph type	=	SCS Runoff	Peak discharge	=	72.55 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	220,050 cuft
Drainage area	=	13.800 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



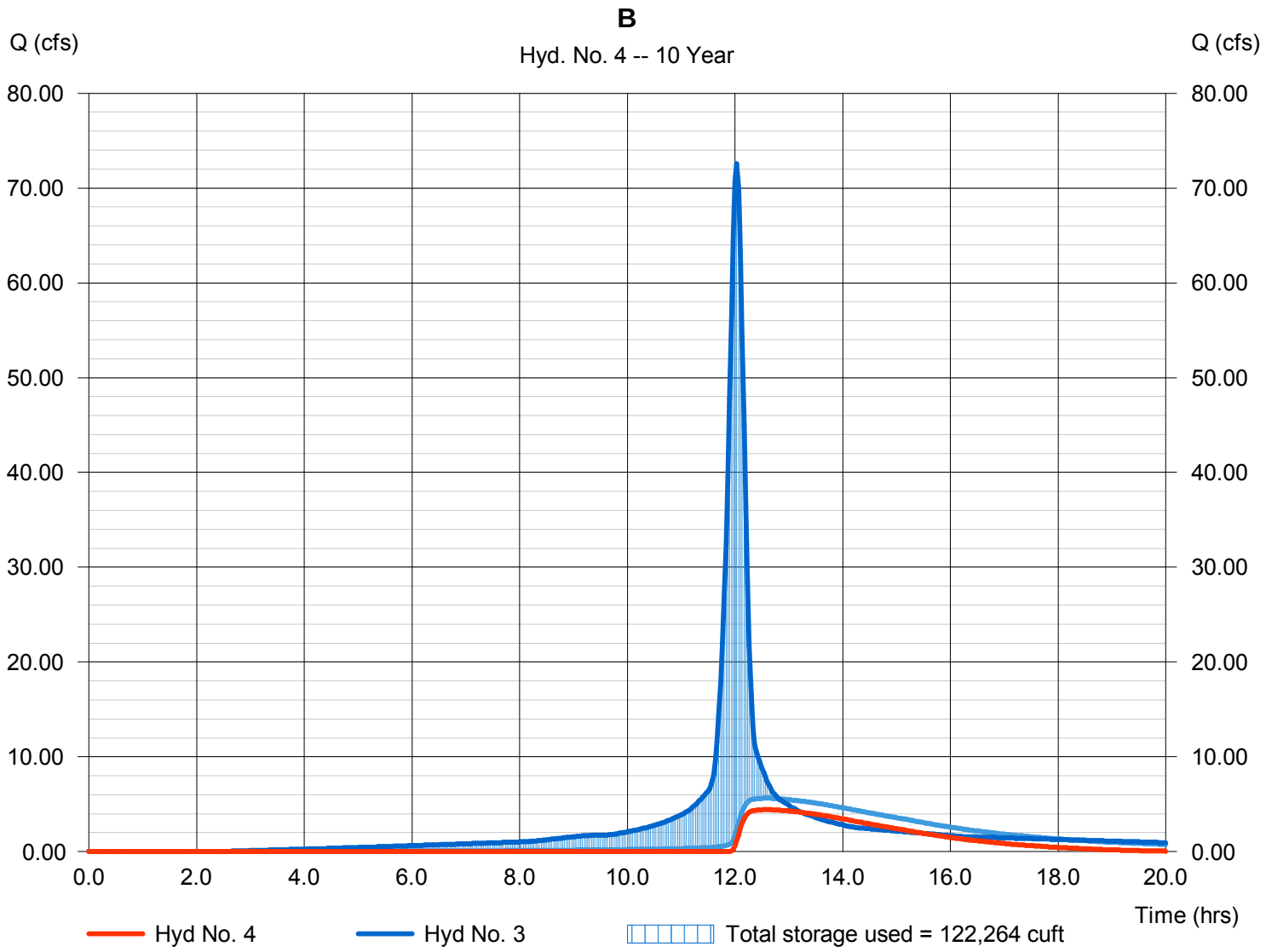
Hydrograph Report

Hyd. No. 4

B

Hydrograph type	= Reservoir	Peak discharge	= 4.423 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 53,810 cuft
Inflow hyd. No.	= 3 - B	Max. Elevation	= 1327.14 ft
Reservoir name	= B	Max. Storage	= 122,264 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

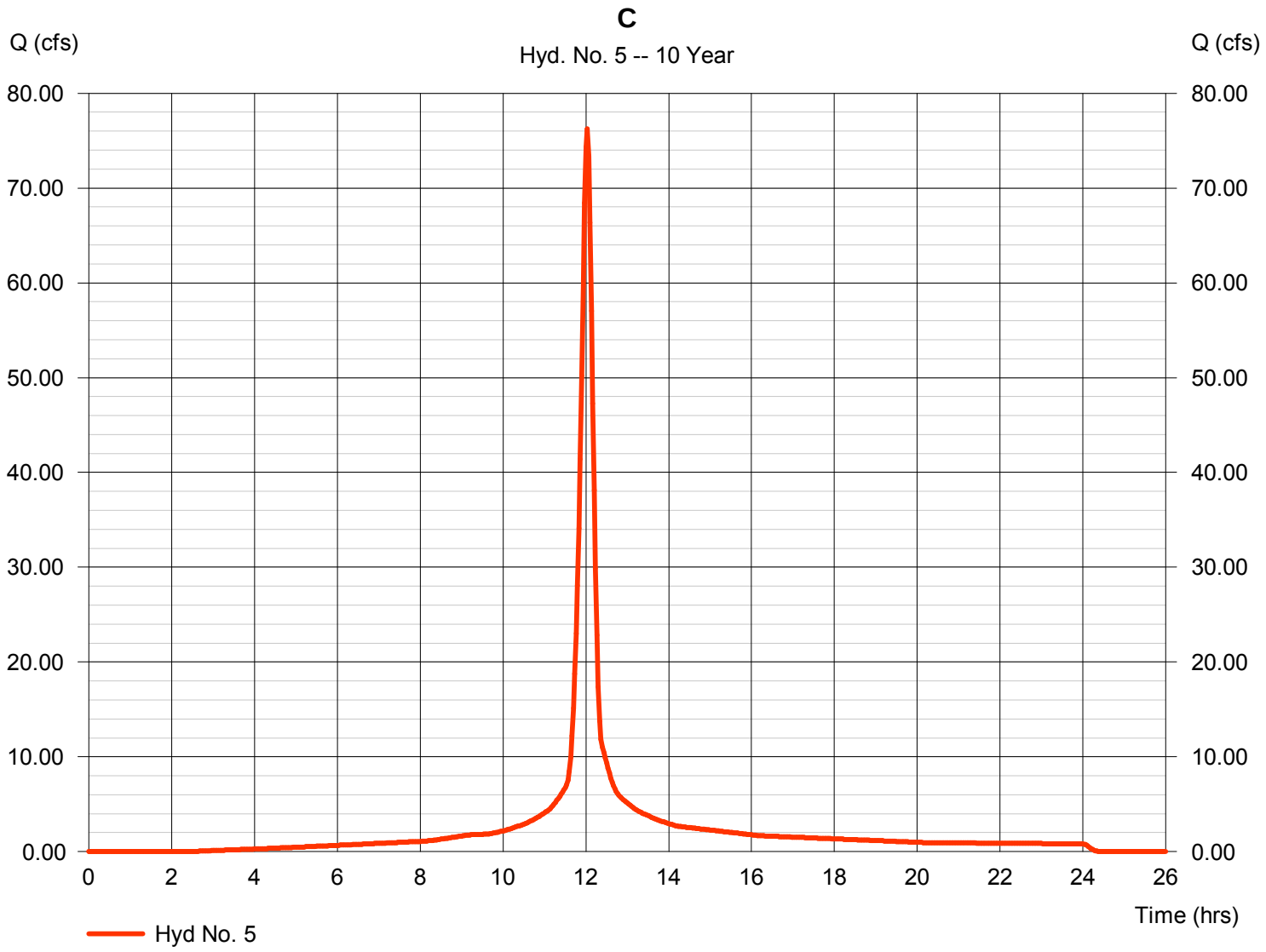


Hydrograph Report

Hyd. No. 5

C

Hydrograph type	=	SCS Runoff	Peak discharge	=	76.23 cfs
Storm frequency	=	10 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	231,213 cuft
Drainage area	=	14.500 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	5.20 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

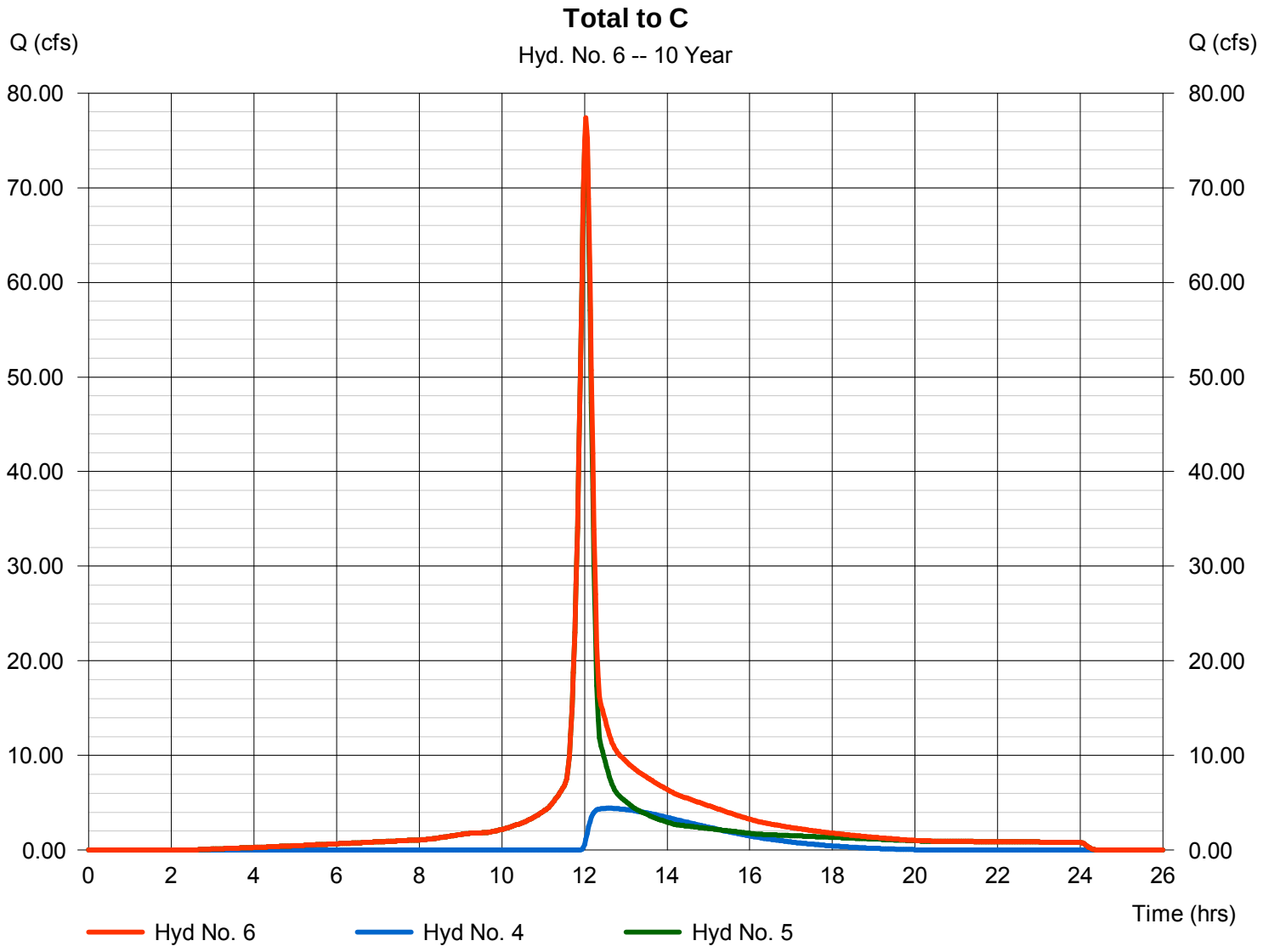


Hydrograph Report

Hyd. No. 6

Total to C

Hydrograph type	= Combine	Peak discharge	= 77.37 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 285,022 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 14.500 ac



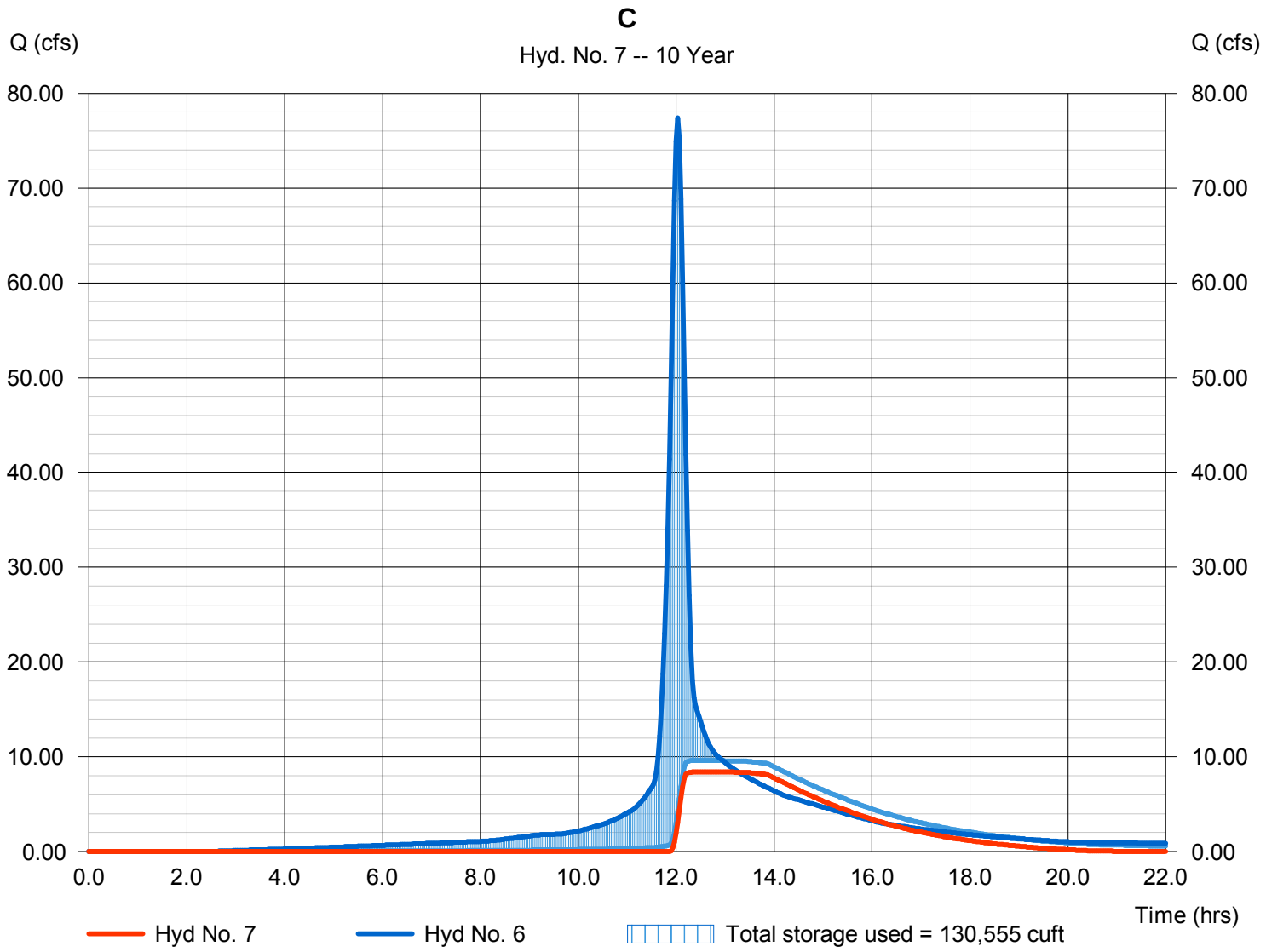
Hydrograph Report

Hyd. No. 7

C

Hydrograph type	= Reservoir	Peak discharge	= 8.404 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.63 hrs
Time interval	= 2 min	Hyd. volume	= 117,269 cuft
Inflow hyd. No.	= 6 - Total to C	Max. Elevation	= 1326.08 ft
Reservoir name	= C	Max. Storage	= 130,555 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

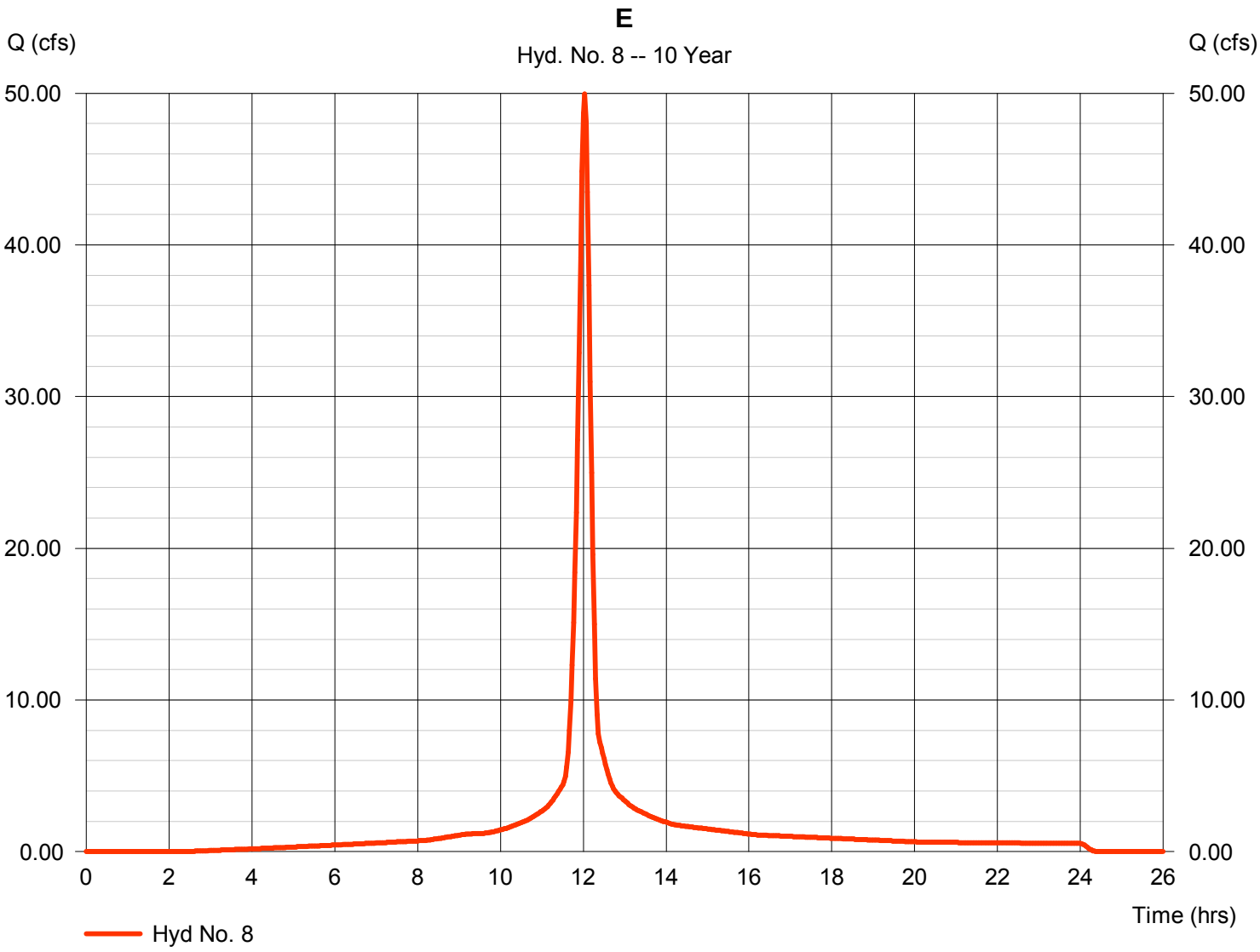


Hydrograph Report

Hyd. No. 8

E

Hydrograph type	= SCS Runoff	Peak discharge	= 49.95 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 151,484 cuft
Drainage area	= 9.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



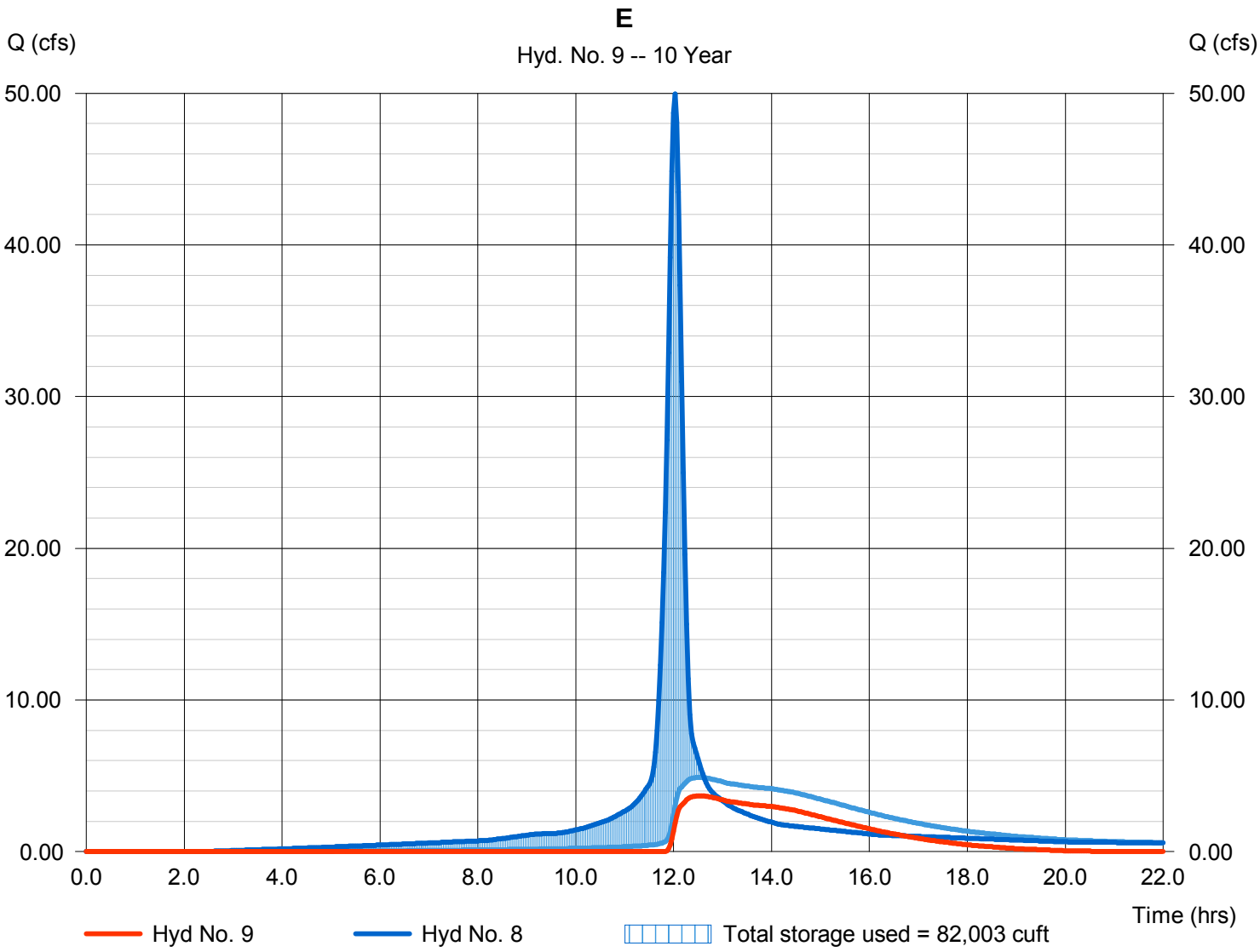
Hydrograph Report

Hyd. No. 9

E

Hydrograph type	= Reservoir	Peak discharge	= 3.679 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 48,402 cuft
Inflow hyd. No.	= 8 - E	Max. Elevation	= 1326.37 ft
Reservoir name	= E	Max. Storage	= 82,003 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

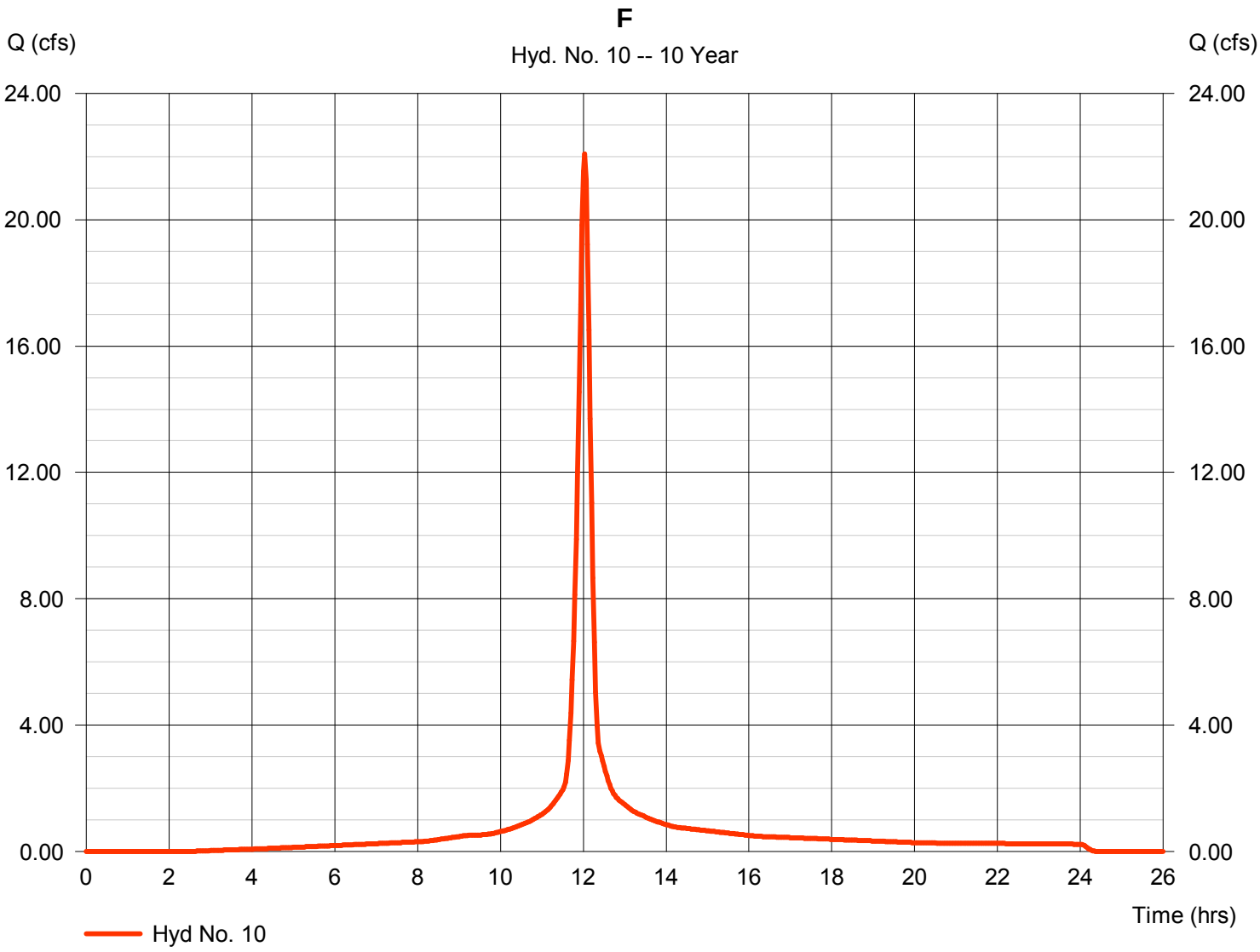


Hydrograph Report

Hyd. No. 10

F

Hydrograph type	= SCS Runoff	Peak discharge	= 22.08 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 66,972 cuft
Drainage area	= 4.200 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



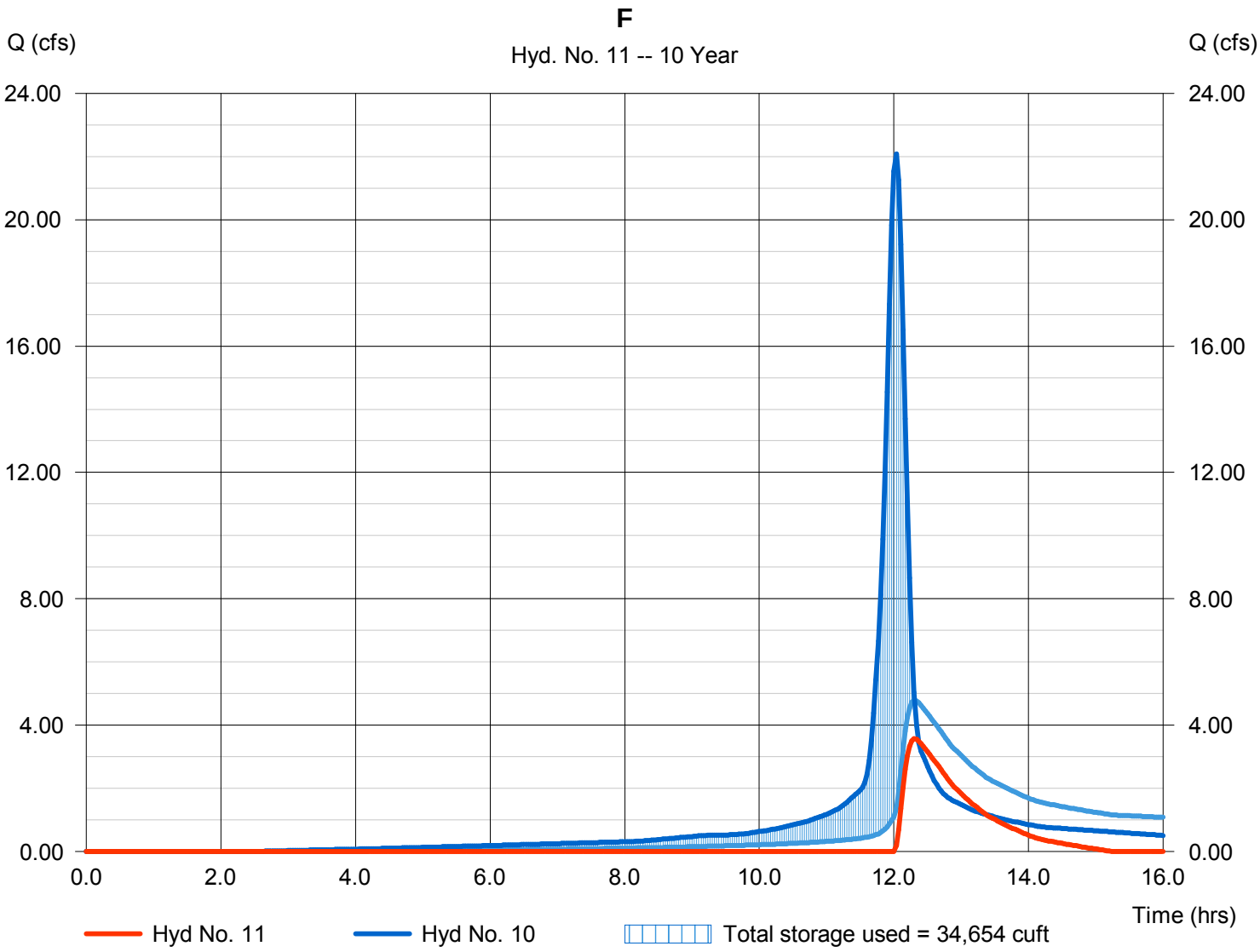
Hydrograph Report

Hyd. No. 11

F

Hydrograph type	= Reservoir	Peak discharge	= 3.573 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.30 hrs
Time interval	= 2 min	Hyd. volume	= 13,970 cuft
Inflow hyd. No.	= 10 - F	Max. Elevation	= 1326.42 ft
Reservoir name	= F	Max. Storage	= 34,654 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

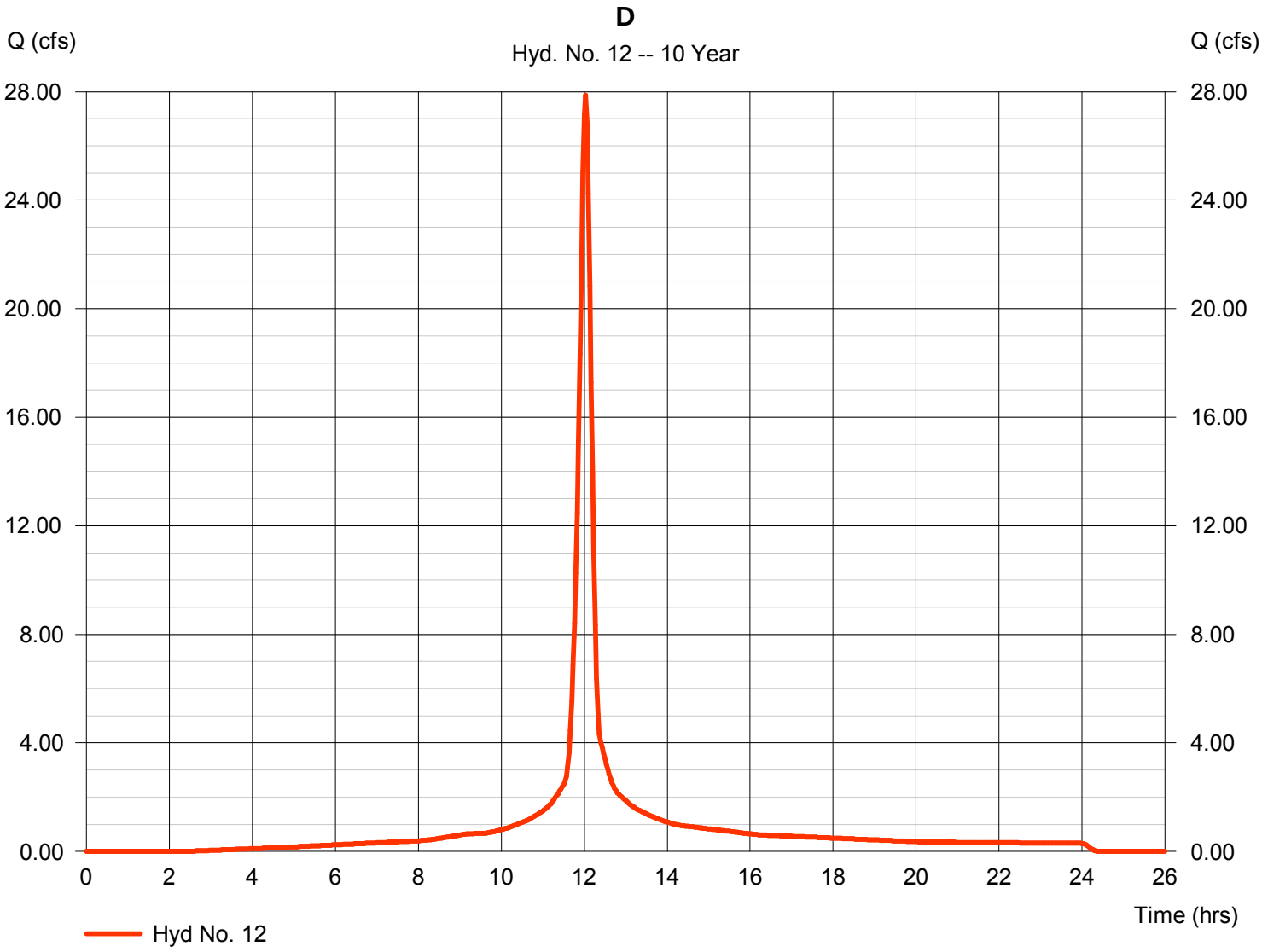


Hydrograph Report

Hyd. No. 12

D

Hydrograph type	= SCS Runoff	Peak discharge	= 27.86 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 84,512 cuft
Drainage area	= 5.300 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

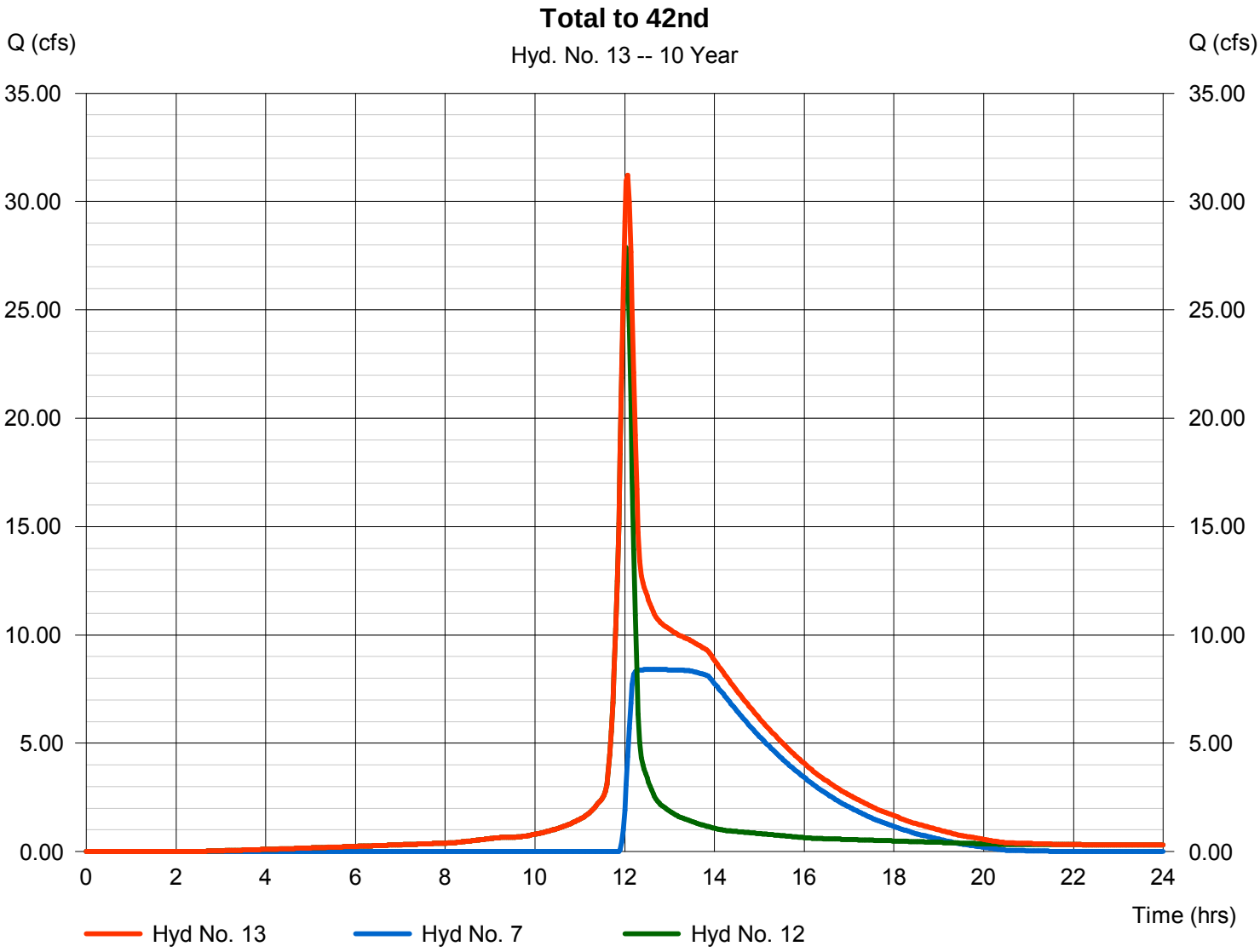


Hydrograph Report

Hyd. No. 13

Total to 42nd

Hydrograph type	= Combine	Peak discharge	= 31.22 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 201,781 cuft
Inflow hyds.	= 7, 12	Contrib. drain. area	= 5.300 ac

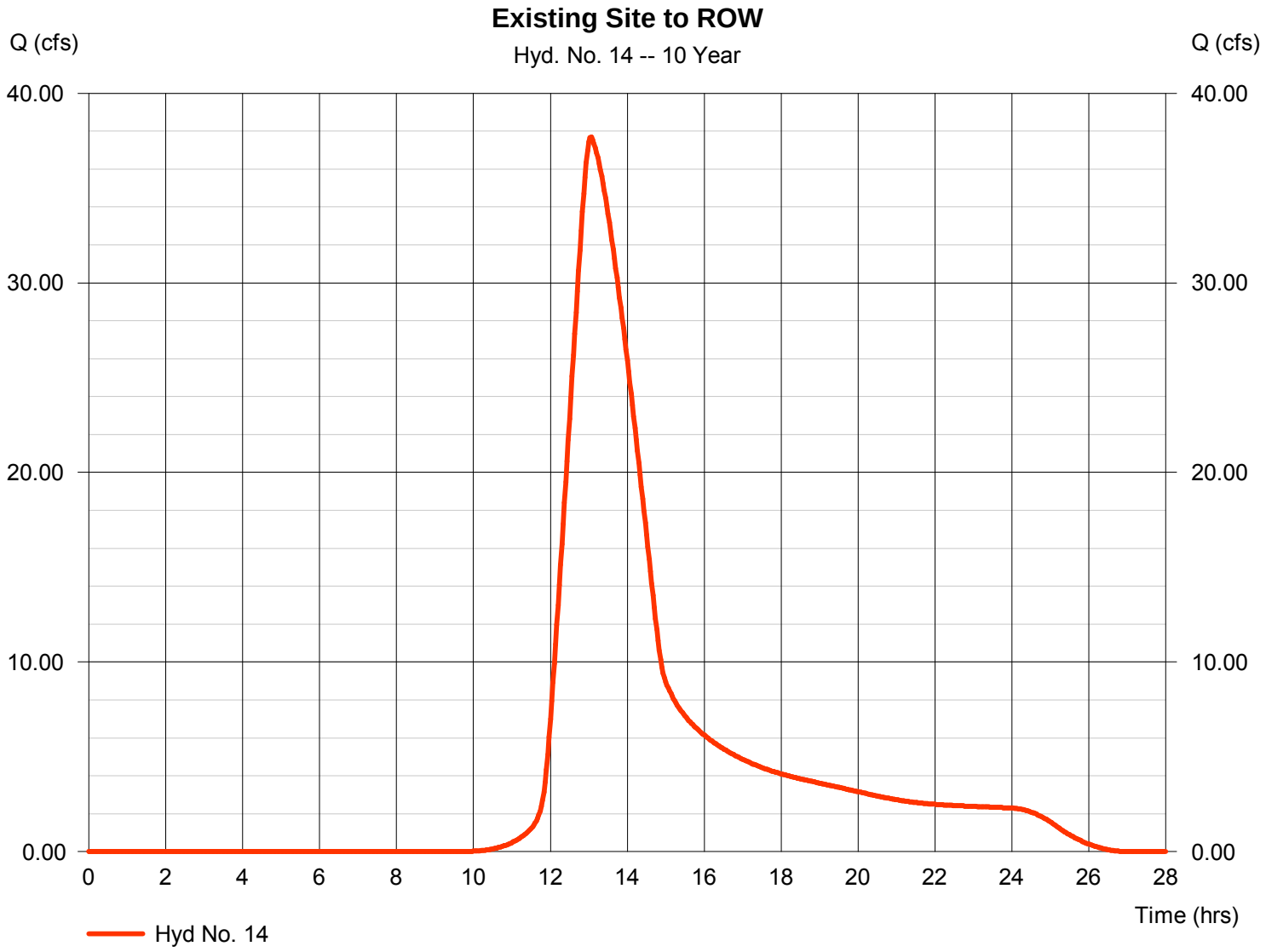


Hydrograph Report

Hyd. No. 14

Existing Site to ROW

Hydrograph type	= SCS Runoff	Peak discharge	= 37.69 cfs
Storm frequency	= 10 yrs	Time to peak	= 13.07 hrs
Time interval	= 2 min	Hyd. volume	= 405,040 cuft
Drainage area	= 49.000 ac	Curve number	= 71
Basin Slope	= 0.6 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 114.60 min
Total precip.	= 5.20 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

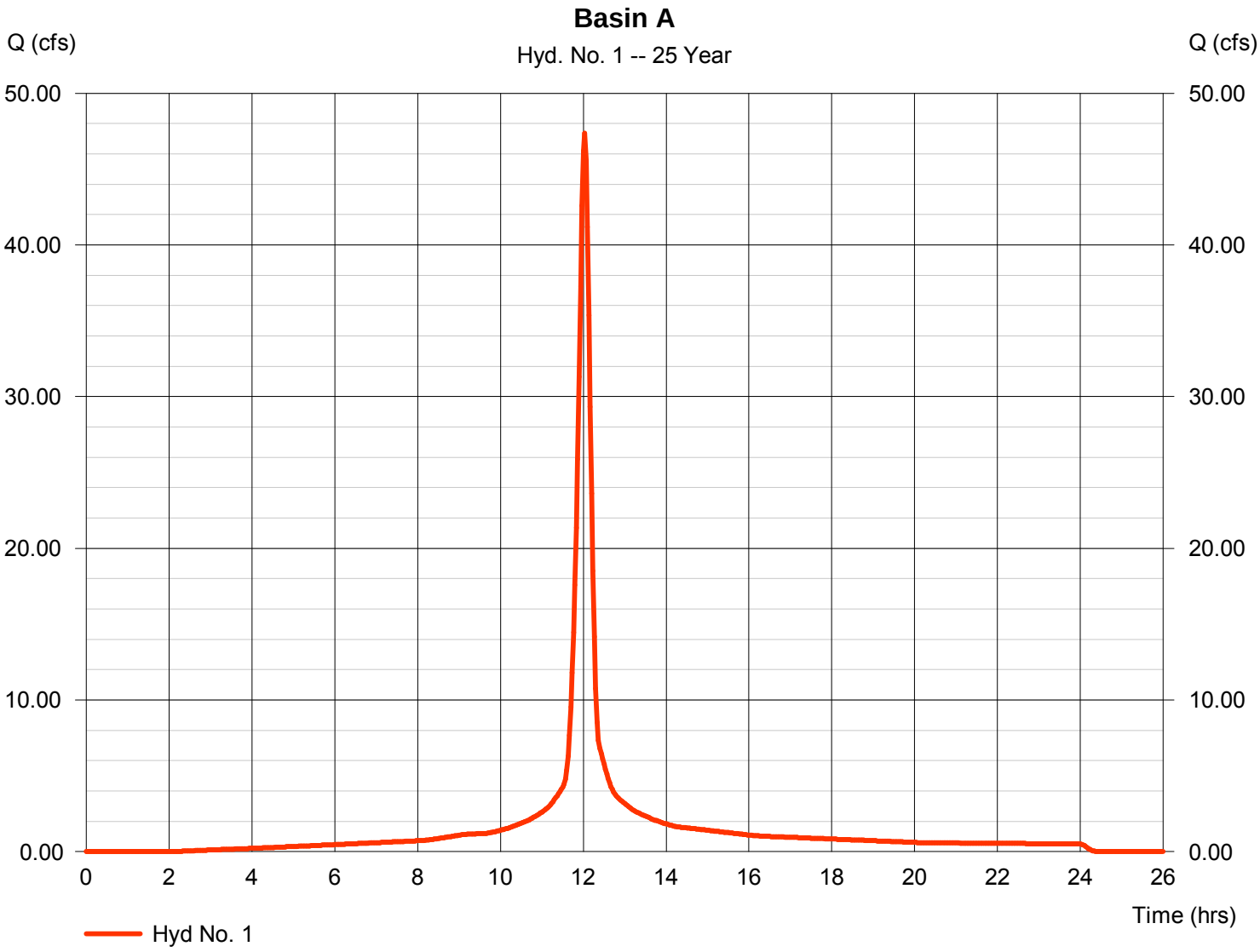
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	47.37	2	722	145,134	------	------	------	Basin A
2	Reservoir	2.504	2	756	28,278	1	1326.92	80,047	A
3	SCS Runoff	86.01	2	722	263,534	------	------	------	B
4	Reservoir	5.226	2	804	81,537	3	1327.50	146,676	B
5	SCS Runoff	90.38	2	722	276,901	------	------	------	C
6	Combine	92.97	2	722	358,438	4, 5	------	------	Total to C
7	Reservoir	11.43	2	754	173,730	6	1326.42	155,416	C
8	SCS Runoff	59.21	2	722	181,418	------	------	------	E
9	Reservoir	5.106	2	750	68,557	8	1326.71	97,358	E
10	SCS Runoff	26.18	2	722	80,206	------	------	------	F
11	Reservoir	6.261	2	736	23,070	10	1326.61	39,745	F
12	SCS Runoff	33.03	2	722	101,212	------	------	------	D
13	Combine	39.44	2	724	274,942	7, 12	------	------	Total to 42nd
14	SCS Runoff	50.34	2	782	531,919	------	------	------	Existing Site to ROW

Hydrograph Report

Hyd. No. 1

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 47.37 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 145,134 cuft
Drainage area	= 7.600 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



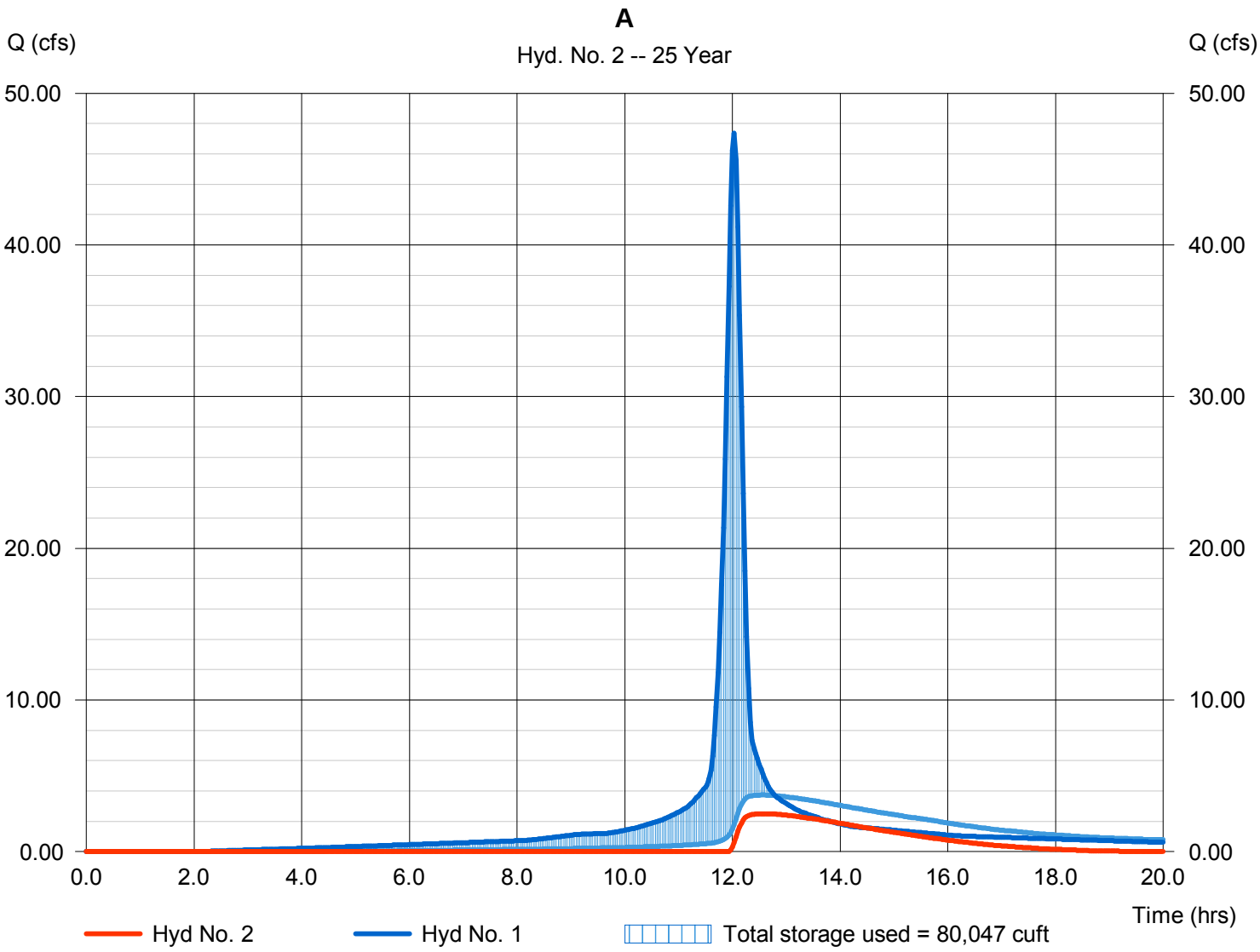
Hydrograph Report

Hyd. No. 2

A

Hydrograph type	= Reservoir	Peak discharge	= 2.504 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 28,278 cuft
Inflow hyd. No.	= 1 - Basin A	Max. Elevation	= 1326.92 ft
Reservoir name	= A	Max. Storage	= 80,047 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

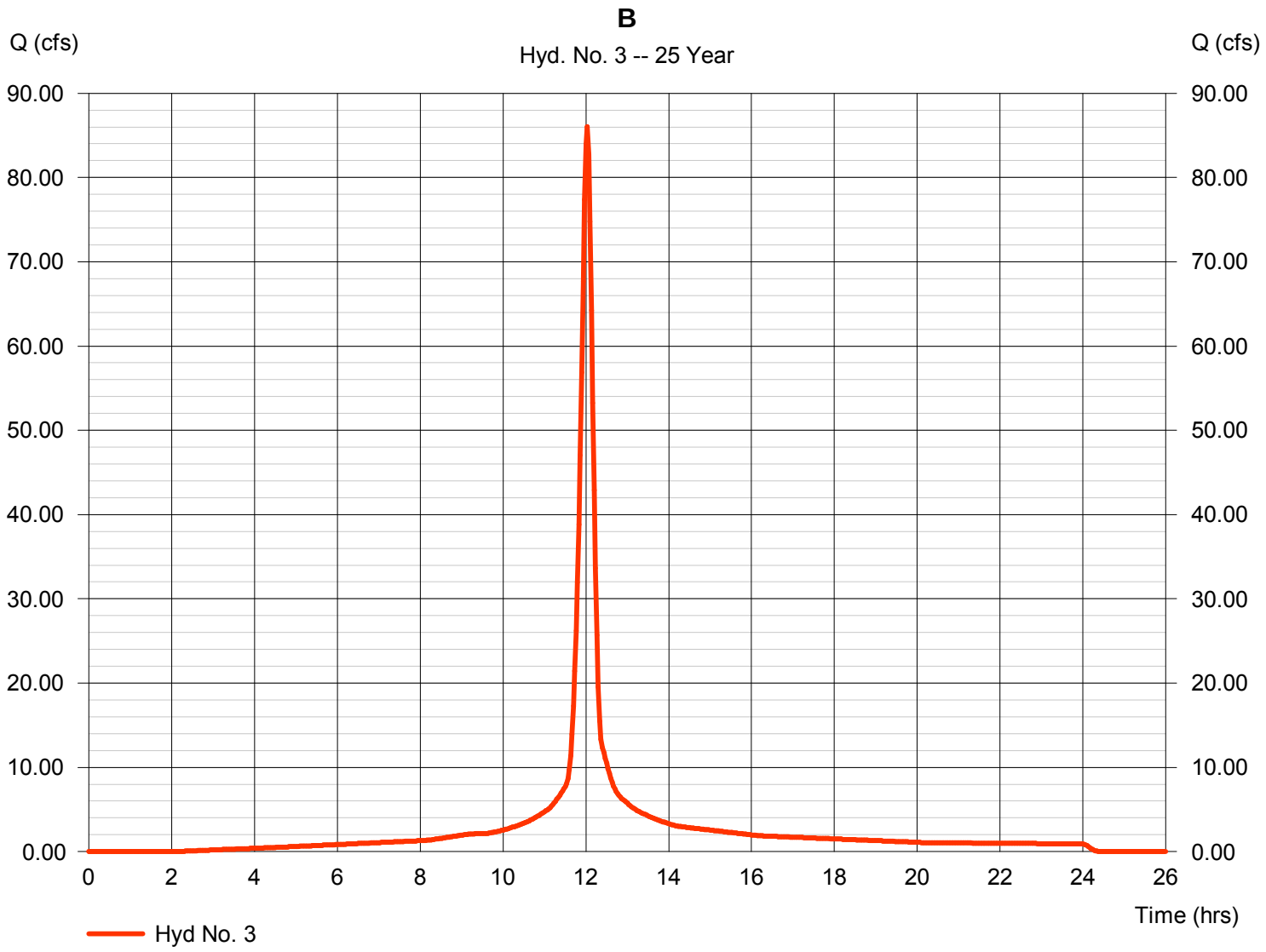


Hydrograph Report

Hyd. No. 3

B

Hydrograph type	= SCS Runoff	Peak discharge	= 86.01 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 263,534 cuft
Drainage area	= 13.800 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



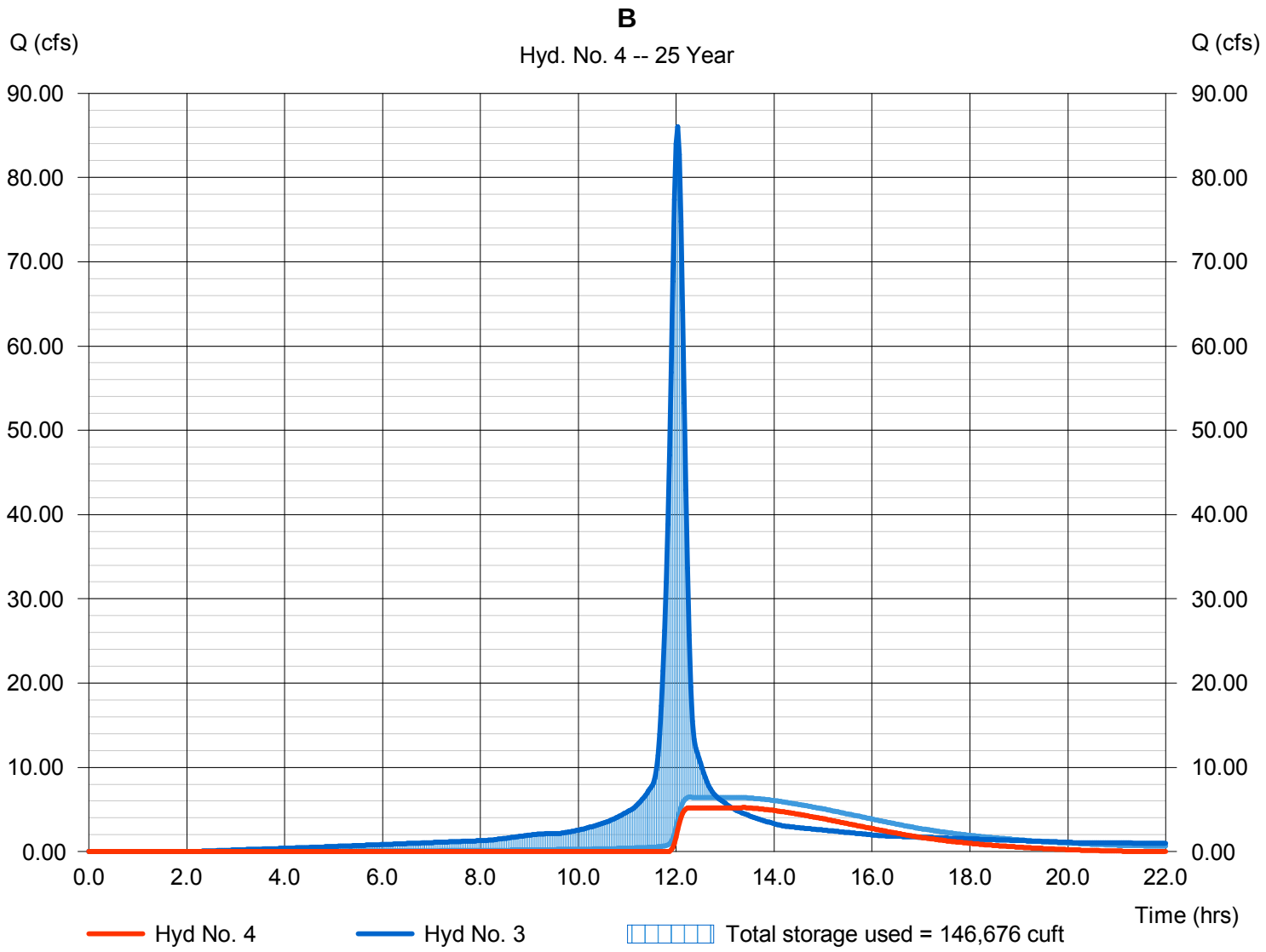
Hydrograph Report

Hyd. No. 4

B

Hydrograph type	= Reservoir	Peak discharge	= 5.226 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.40 hrs
Time interval	= 2 min	Hyd. volume	= 81,537 cuft
Inflow hyd. No.	= 3 - B	Max. Elevation	= 1327.50 ft
Reservoir name	= B	Max. Storage	= 146,676 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

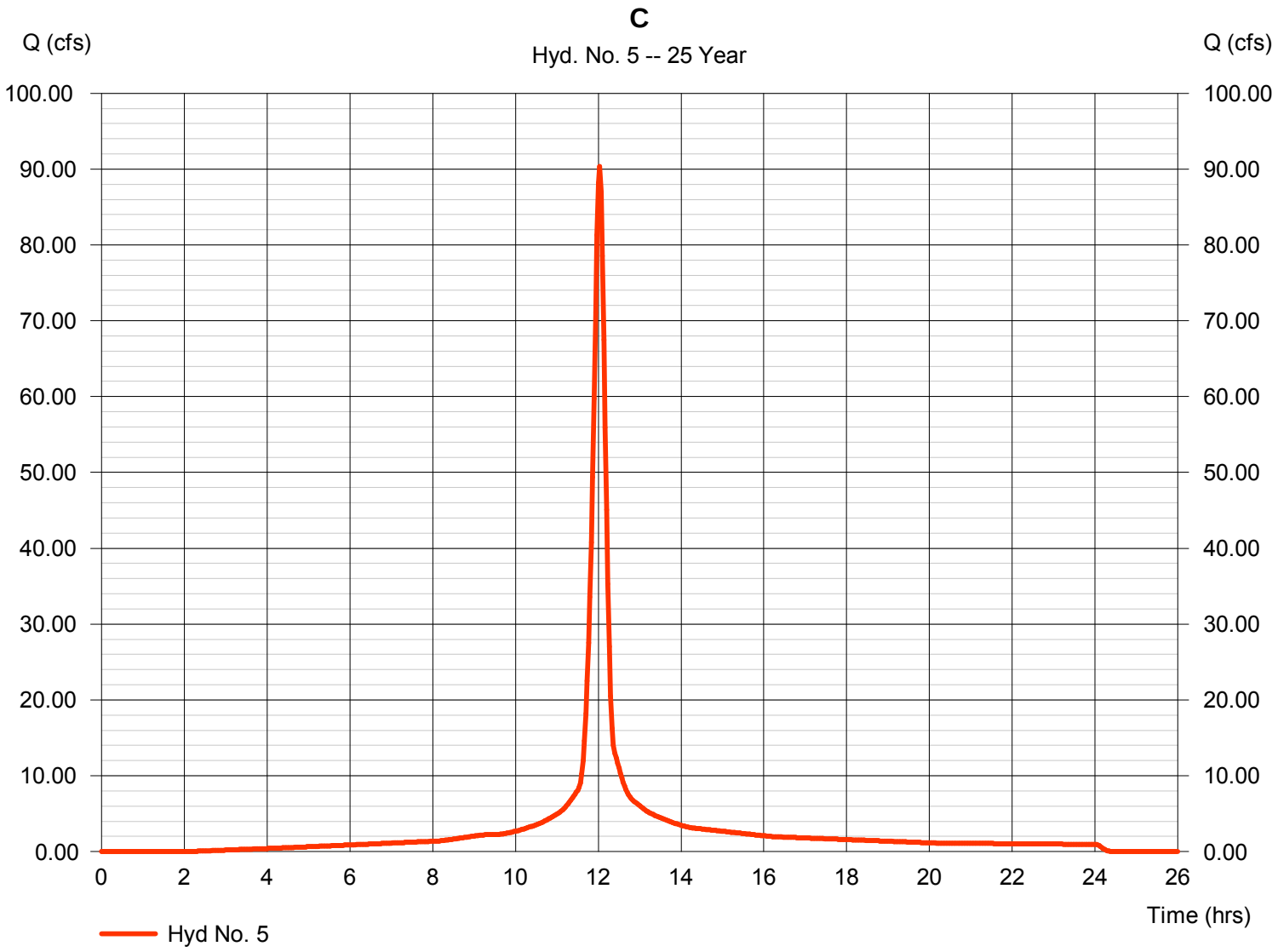


Hydrograph Report

Hyd. No. 5

C

Hydrograph type	=	SCS Runoff	Peak discharge	=	90.38 cfs
Storm frequency	=	25 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	276,901 cuft
Drainage area	=	14.500 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	6.10 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

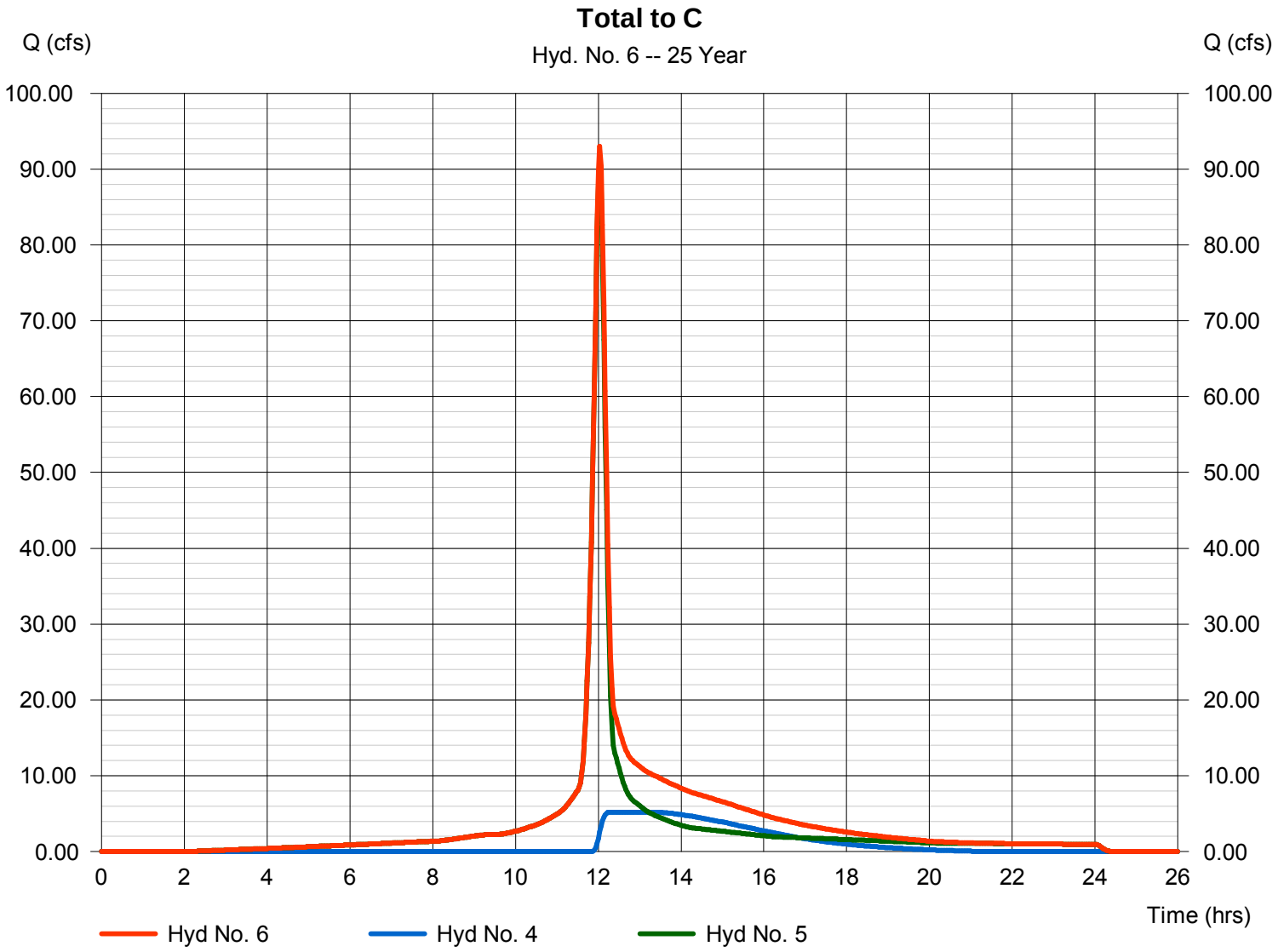


Hydrograph Report

Hyd. No. 6

Total to C

Hydrograph type	= Combine	Peak discharge	= 92.97 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 358,438 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 14.500 ac



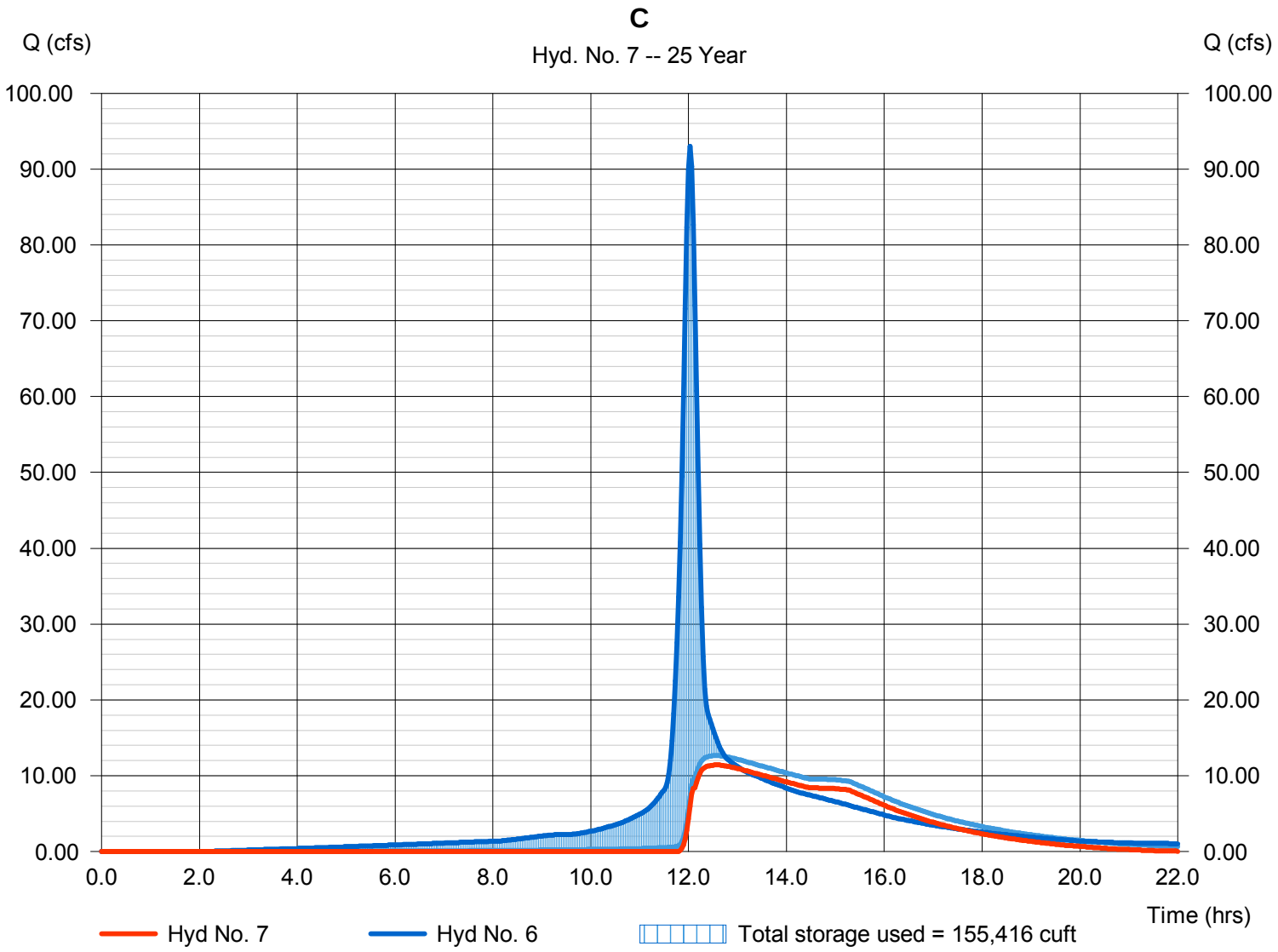
Hydrograph Report

Hyd. No. 7

C

Hydrograph type	= Reservoir	Peak discharge	= 11.43 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.57 hrs
Time interval	= 2 min	Hyd. volume	= 173,730 cuft
Inflow hyd. No.	= 6 - Total to C	Max. Elevation	= 1326.42 ft
Reservoir name	= C	Max. Storage	= 155,416 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

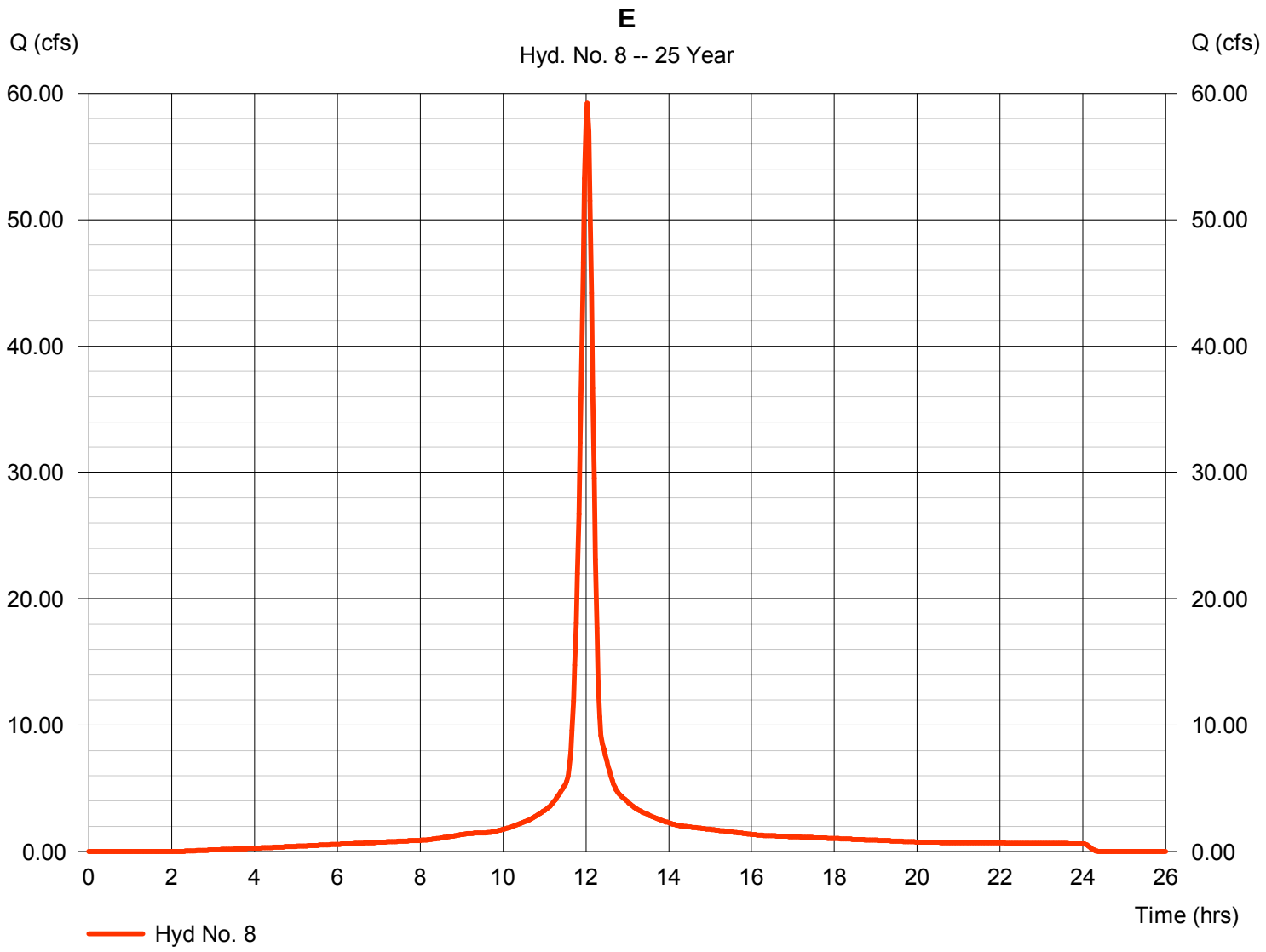


Hydrograph Report

Hyd. No. 8

E

Hydrograph type	= SCS Runoff	Peak discharge	= 59.21 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 181,418 cuft
Drainage area	= 9.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



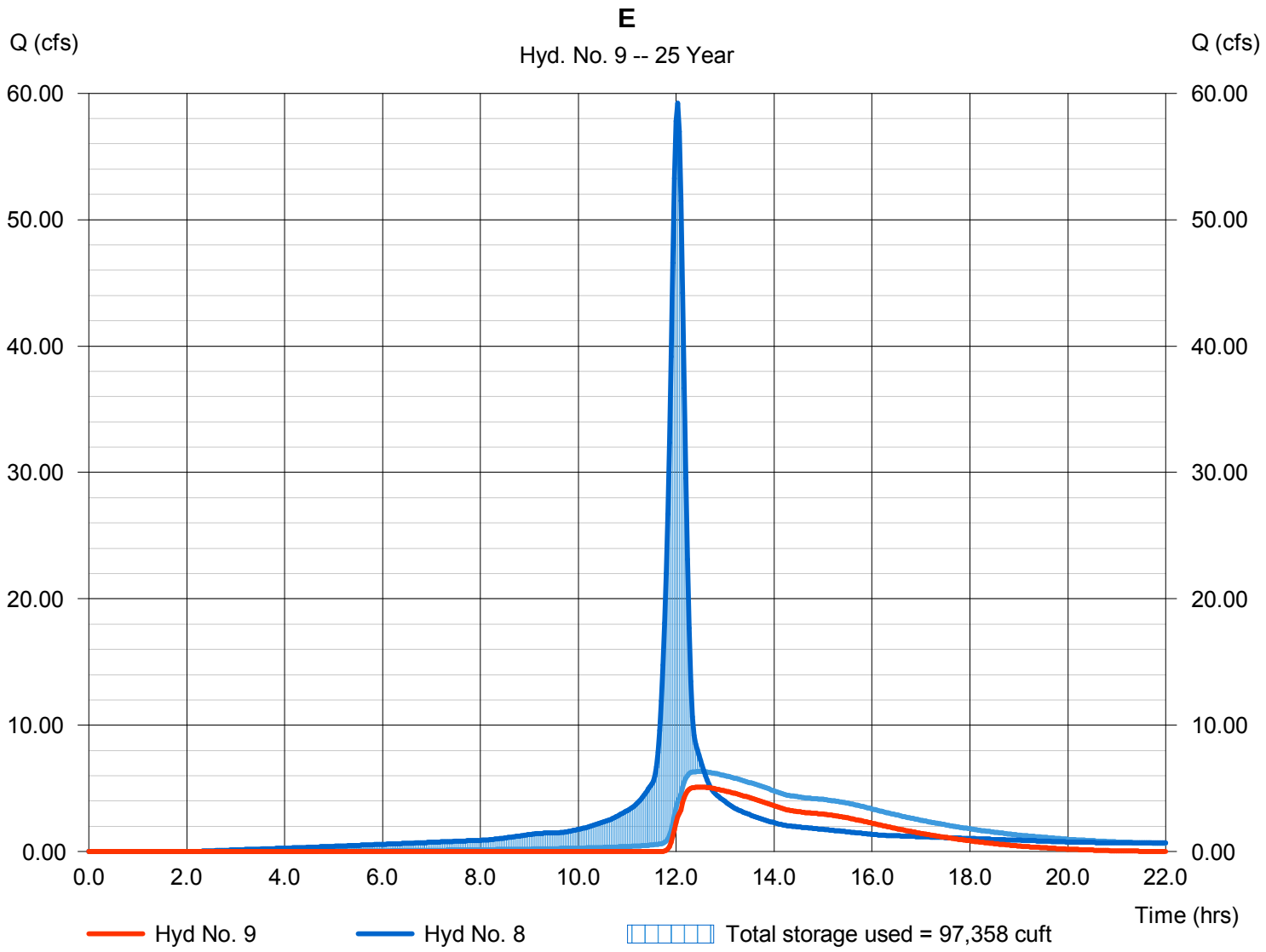
Hydrograph Report

Hyd. No. 9

E

Hydrograph type	= Reservoir	Peak discharge	= 5.106 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.50 hrs
Time interval	= 2 min	Hyd. volume	= 68,557 cuft
Inflow hyd. No.	= 8 - E	Max. Elevation	= 1326.71 ft
Reservoir name	= E	Max. Storage	= 97,358 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

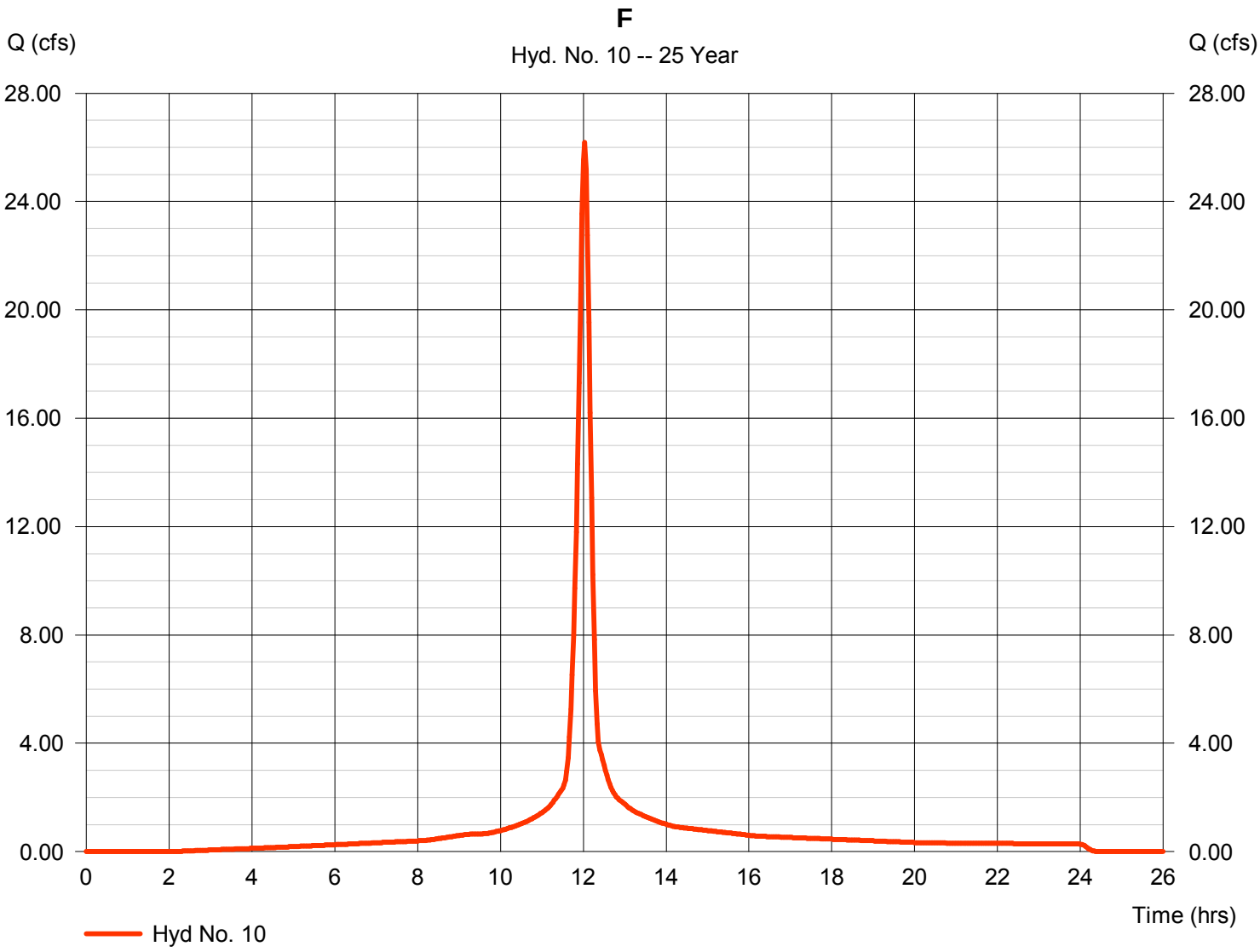


Hydrograph Report

Hyd. No. 10

F

Hydrograph type	= SCS Runoff	Peak discharge	= 26.18 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 80,206 cuft
Drainage area	= 4.200 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



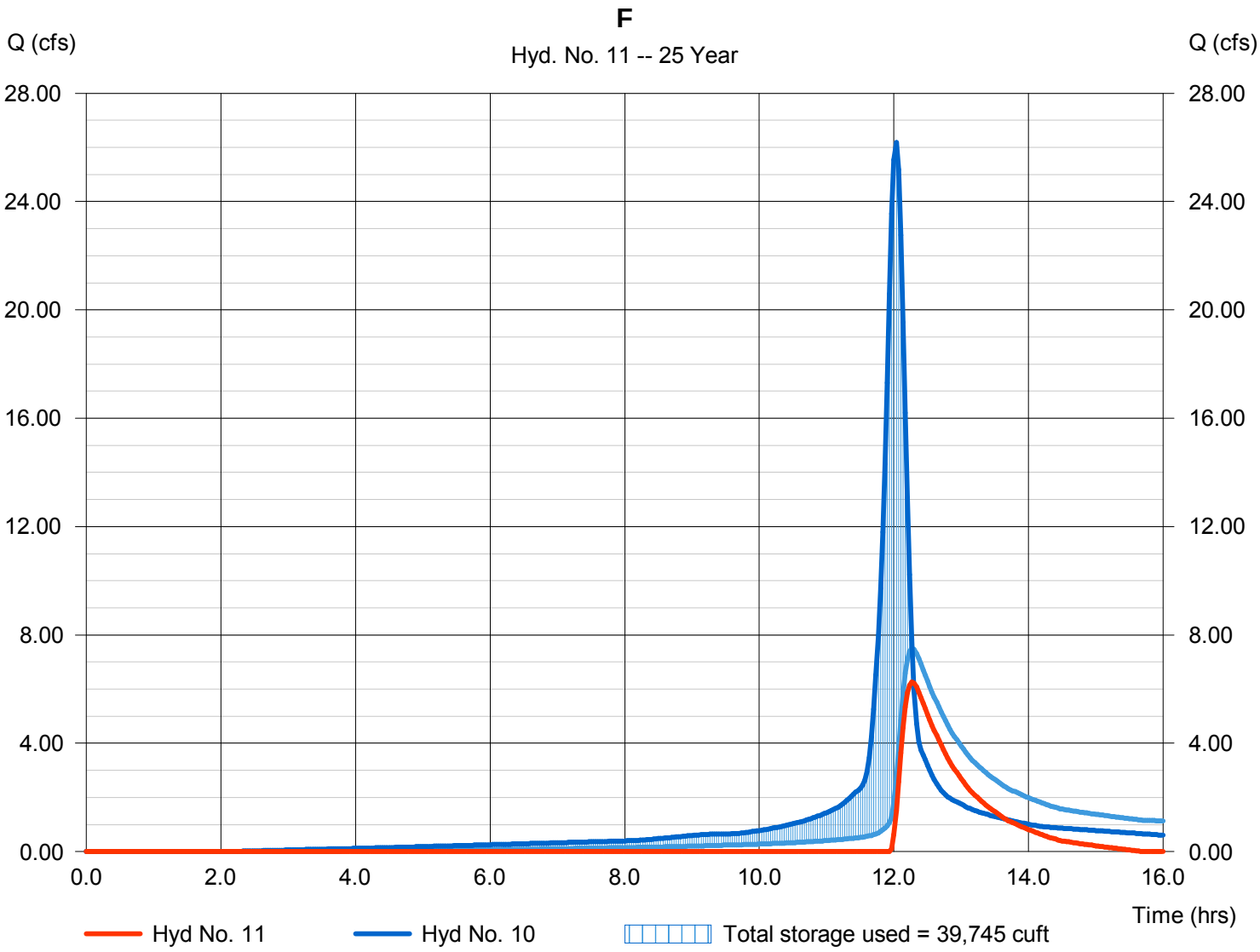
Hydrograph Report

Hyd. No. 11

F

Hydrograph type	= Reservoir	Peak discharge	= 6.261 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 23,070 cuft
Inflow hyd. No.	= 10 - F	Max. Elevation	= 1326.61 ft
Reservoir name	= F	Max. Storage	= 39,745 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

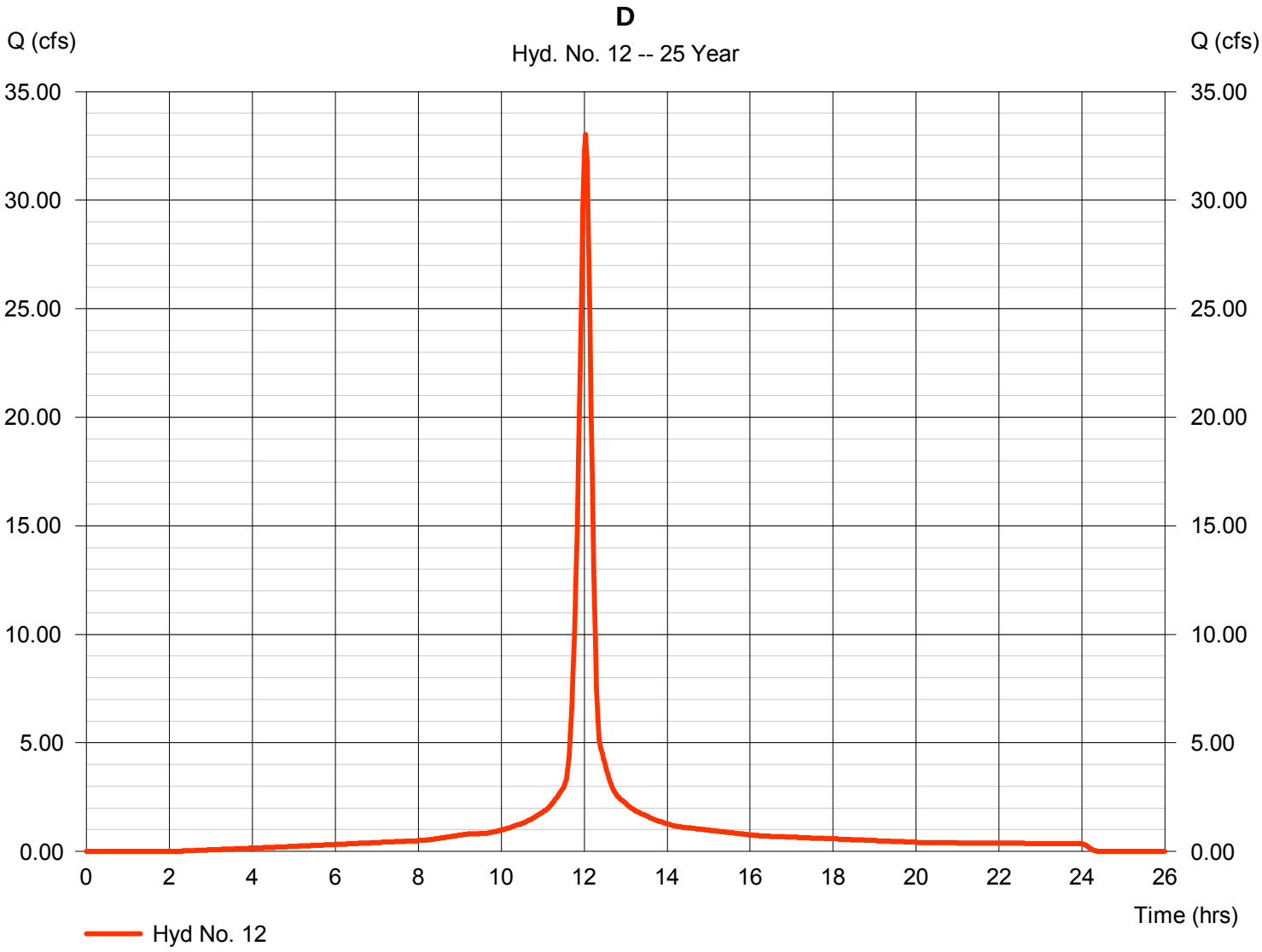


Hydrograph Report

Hyd. No. 12

D

Hydrograph type	= SCS Runoff	Peak discharge	= 33.03 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 101,212 cuft
Drainage area	= 5.300 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

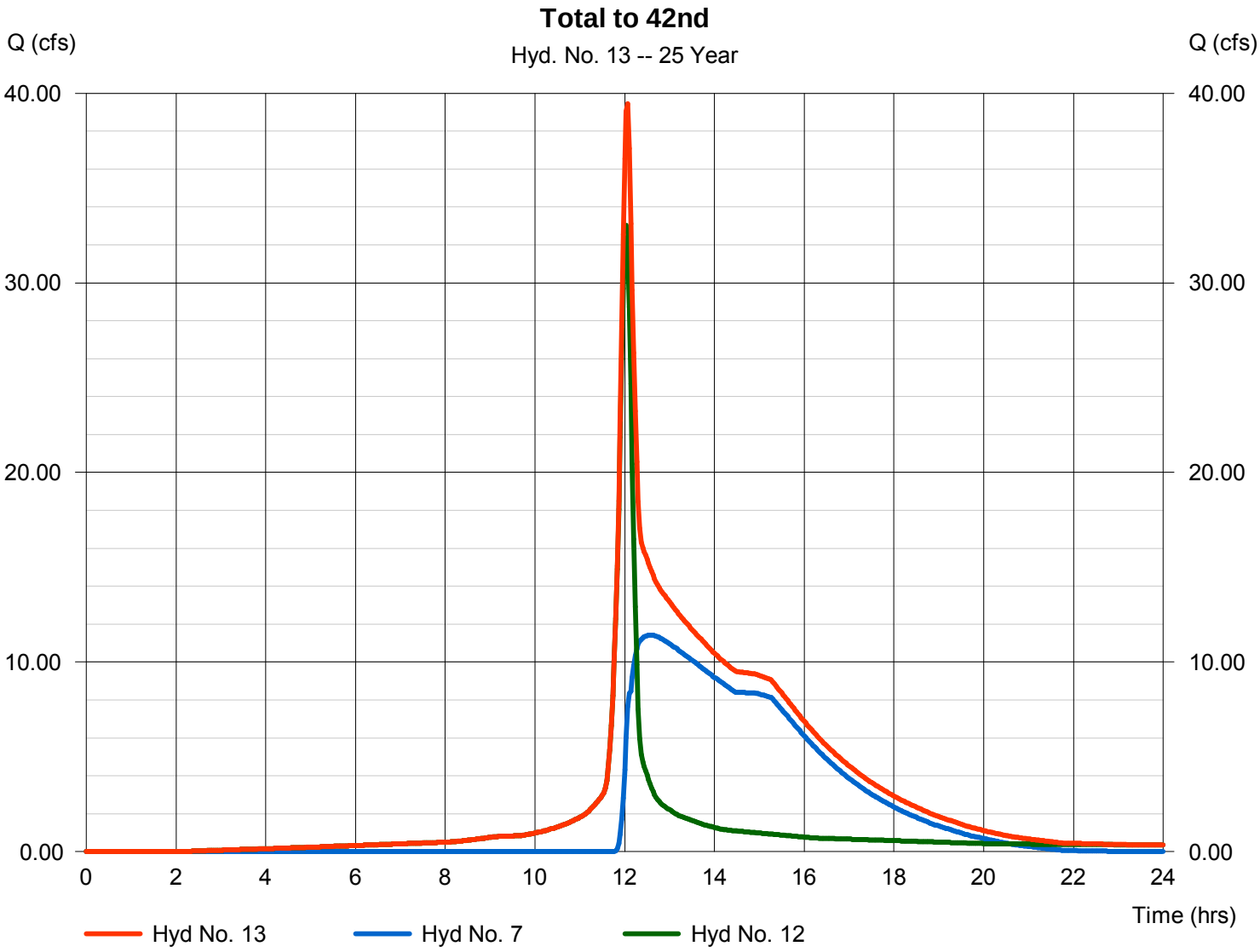


Hydrograph Report

Hyd. No. 13

Total to 42nd

Hydrograph type	= Combine	Peak discharge	= 39.44 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 274,942 cuft
Inflow hyds.	= 7, 12	Contrib. drain. area	= 5.300 ac

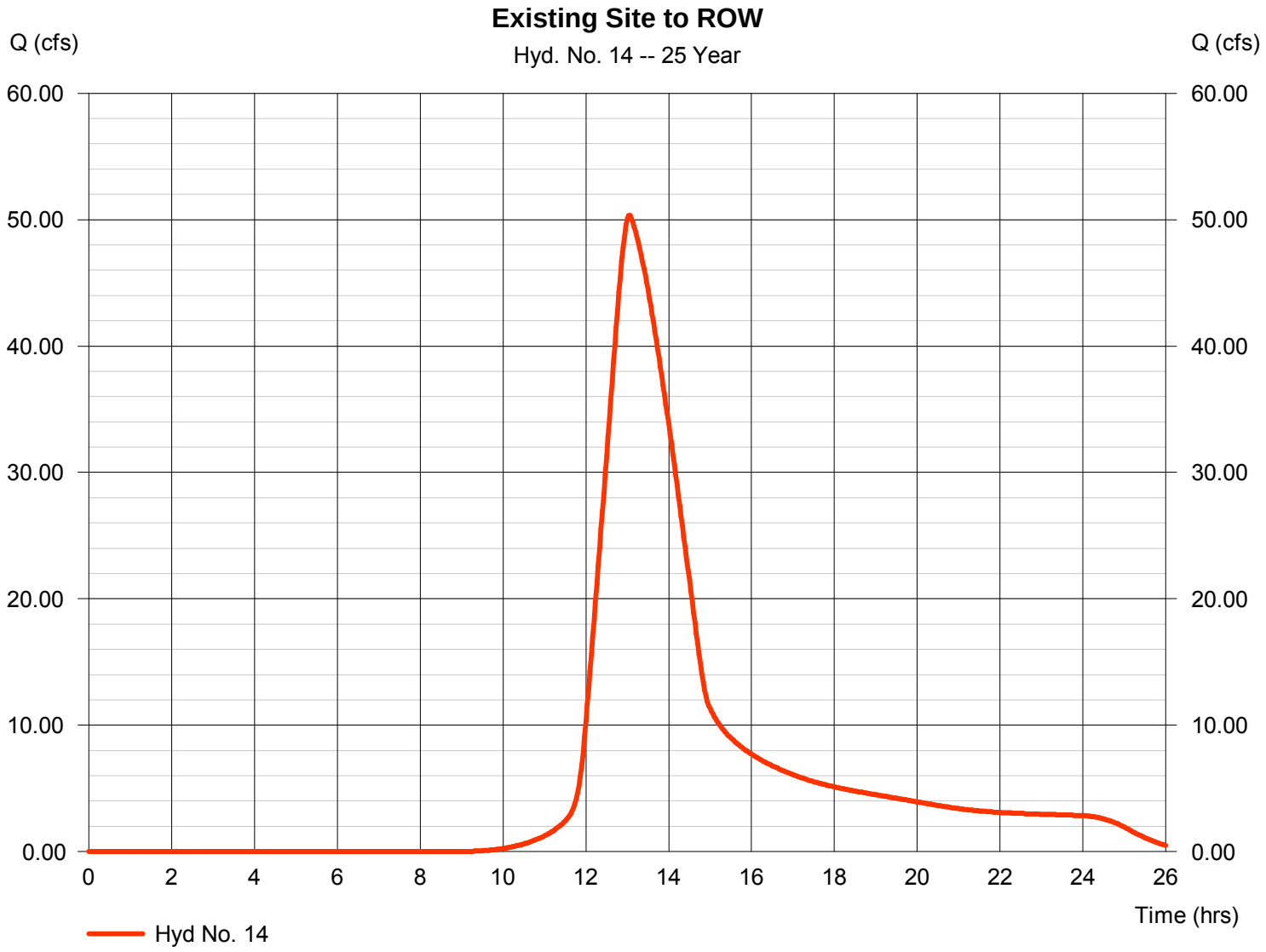


Hydrograph Report

Hyd. No. 14

Existing Site to ROW

Hydrograph type	= SCS Runoff	Peak discharge	= 50.34 cfs
Storm frequency	= 25 yrs	Time to peak	= 13.03 hrs
Time interval	= 2 min	Hyd. volume	= 531,919 cuft
Drainage area	= 49.000 ac	Curve number	= 71
Basin Slope	= 0.6 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 114.60 min
Total precip.	= 6.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

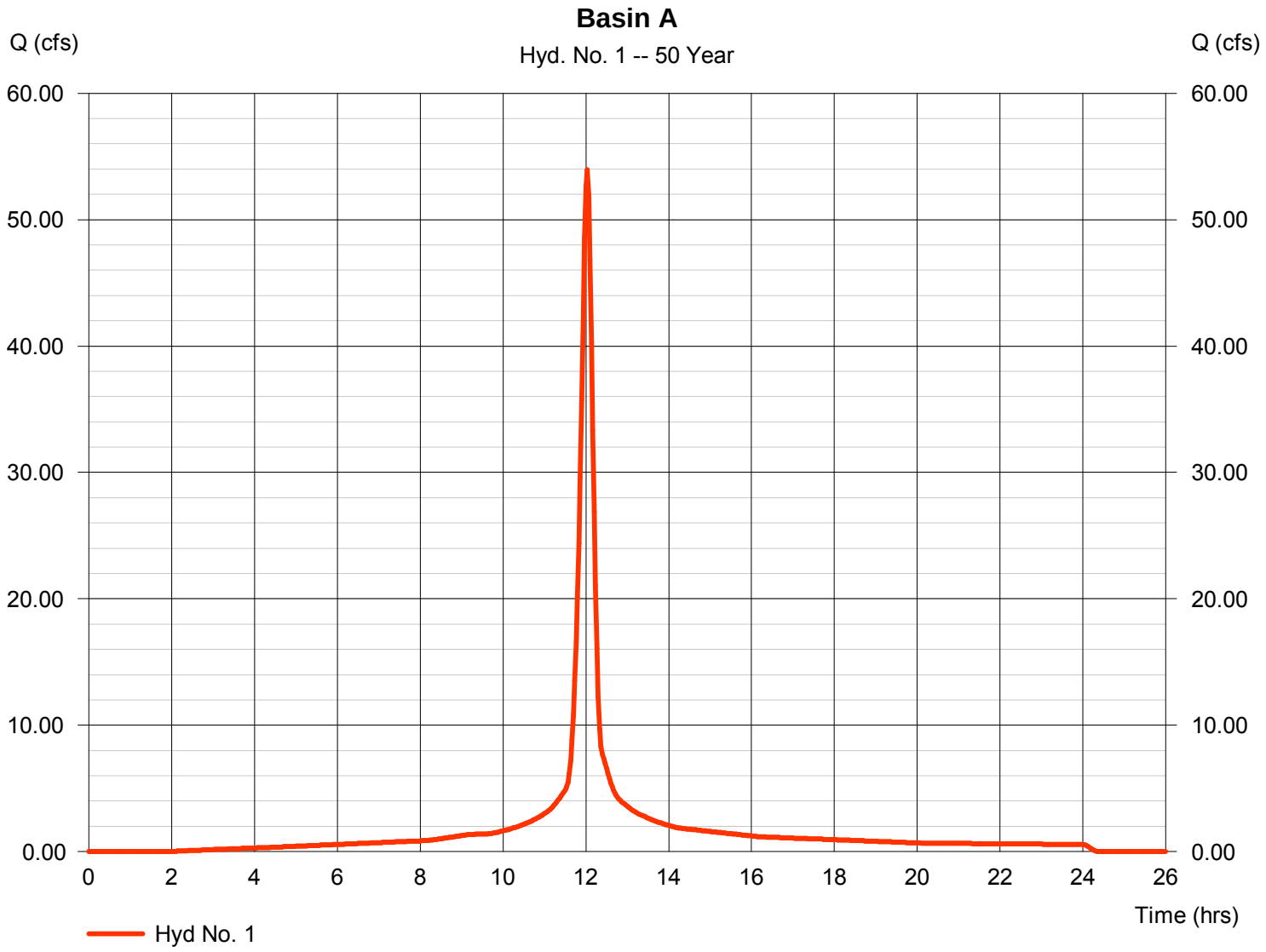
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	53.93	2	722	166,474	------	------	------	Basin A
2	Reservoir	3.010	2	756	40,145	1	1327.14	91,636	A
3	SCS Runoff	97.93	2	722	302,282	------	------	------	B
4	Reservoir	6.928	2	756	107,673	3	1327.81	167,363	B
5	SCS Runoff	102.89	2	722	317,615	------	------	------	C
6	Combine	106.72	2	722	425,289	4, 5	------	------	Total to C
7	Reservoir	14.88	2	752	227,392	6	1326.71	176,861	C
8	SCS Runoff	67.41	2	722	208,093	------	------	------	E
9	Reservoir	6.101	2	750	87,187	8	1327.02	111,214	E
10	SCS Runoff	29.80	2	722	91,999	------	------	------	F
11	Reservoir	8.826	2	736	31,433	10	1326.77	43,926	F
12	SCS Runoff	37.61	2	722	116,094	------	------	------	D
13	Combine	45.85	2	722	343,486	7, 12	------	------	Total to 42nd
14	SCS Runoff	62.05	2	782	649,722	------	------	------	Existing Site to ROW

Hydrograph Report

Hyd. No. 1

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 53.93 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 166,474 cuft
Drainage area	= 7.600 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



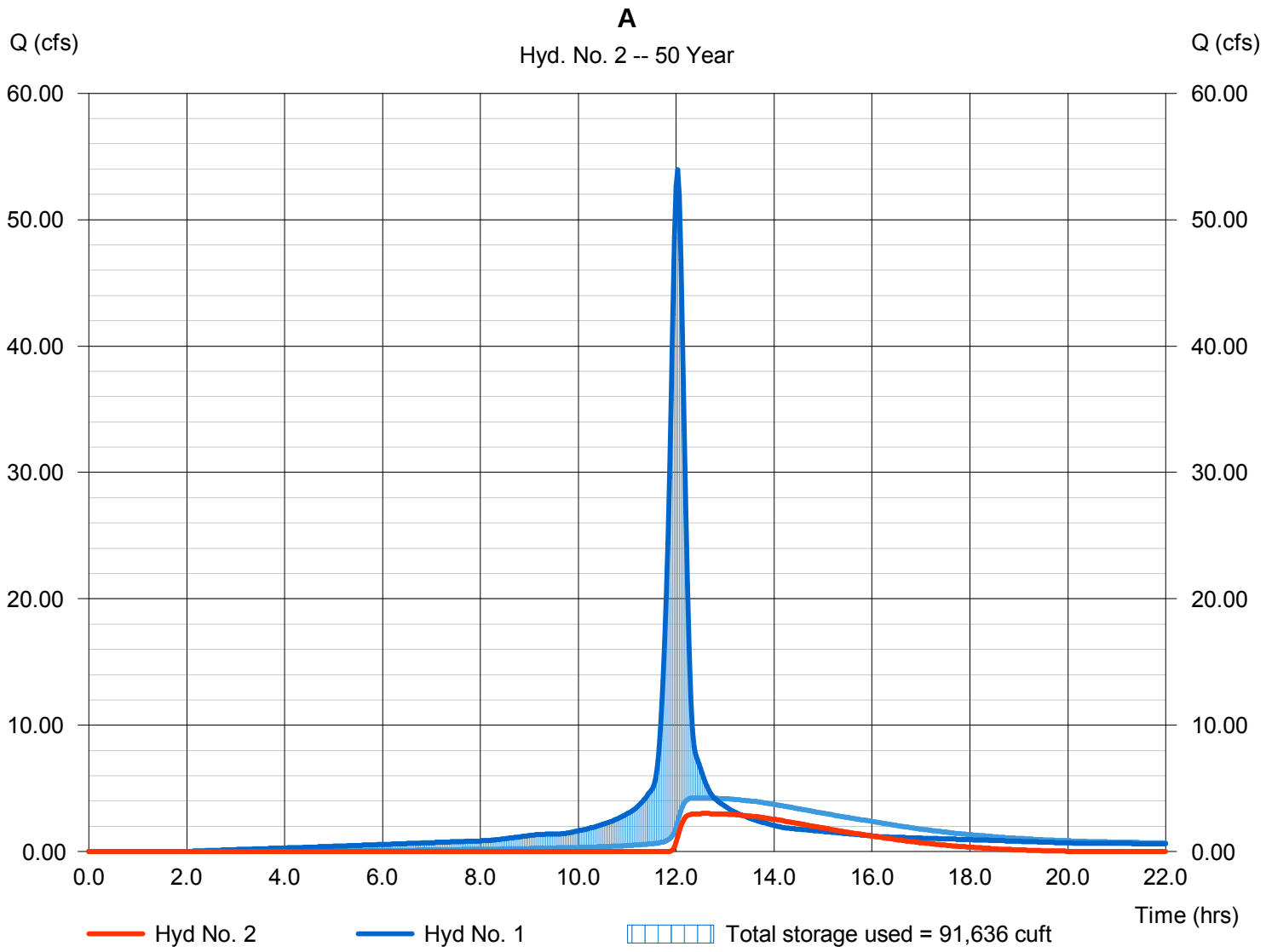
Hydrograph Report

Hyd. No. 2

A

Hydrograph type	= Reservoir	Peak discharge	= 3.010 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 40,145 cuft
Inflow hyd. No.	= 1 - Basin A	Max. Elevation	= 1327.14 ft
Reservoir name	= A	Max. Storage	= 91,636 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

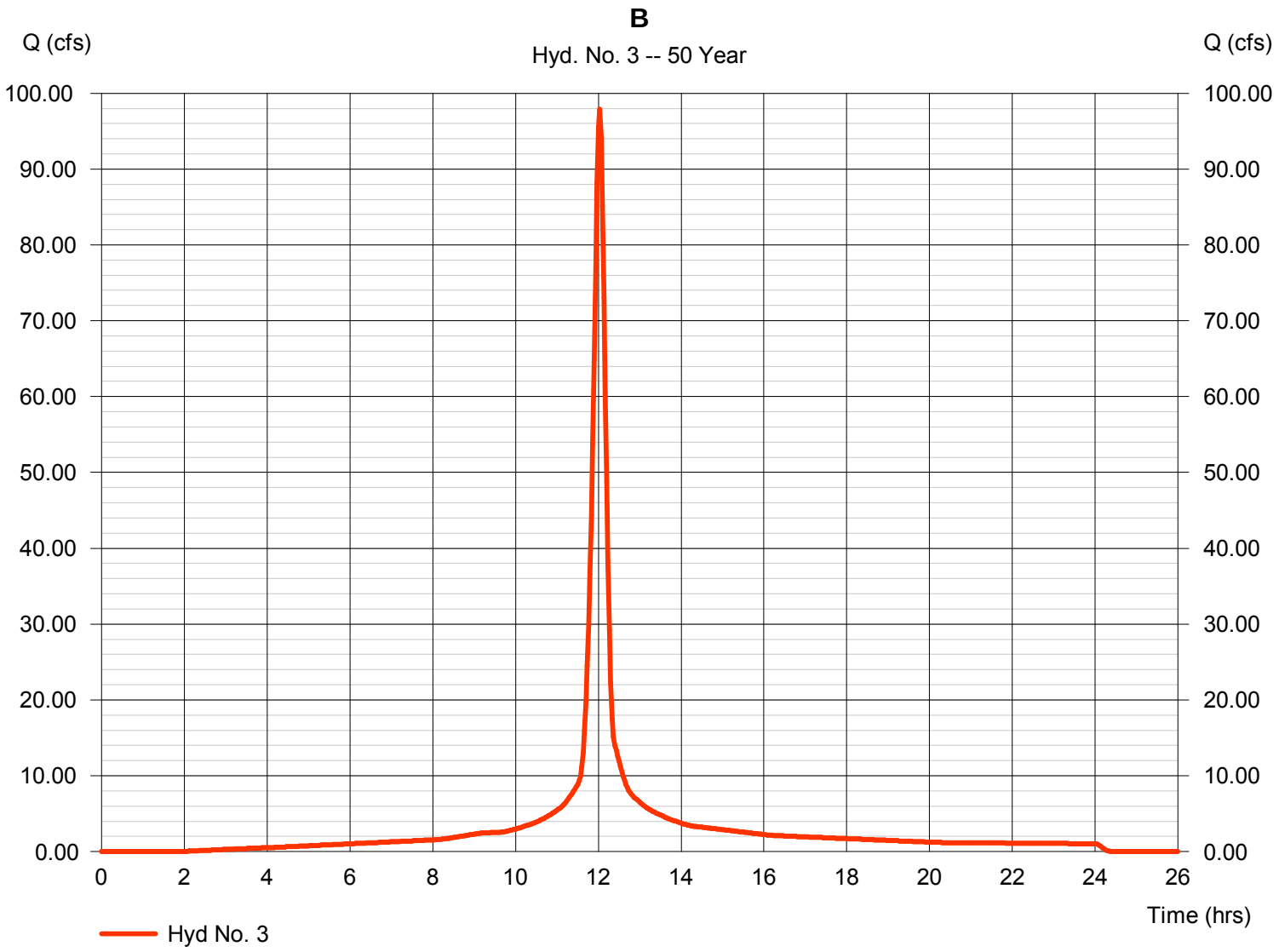


Hydrograph Report

Hyd. No. 3

B

Hydrograph type	= SCS Runoff	Peak discharge	= 97.93 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 302,282 cuft
Drainage area	= 13.800 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



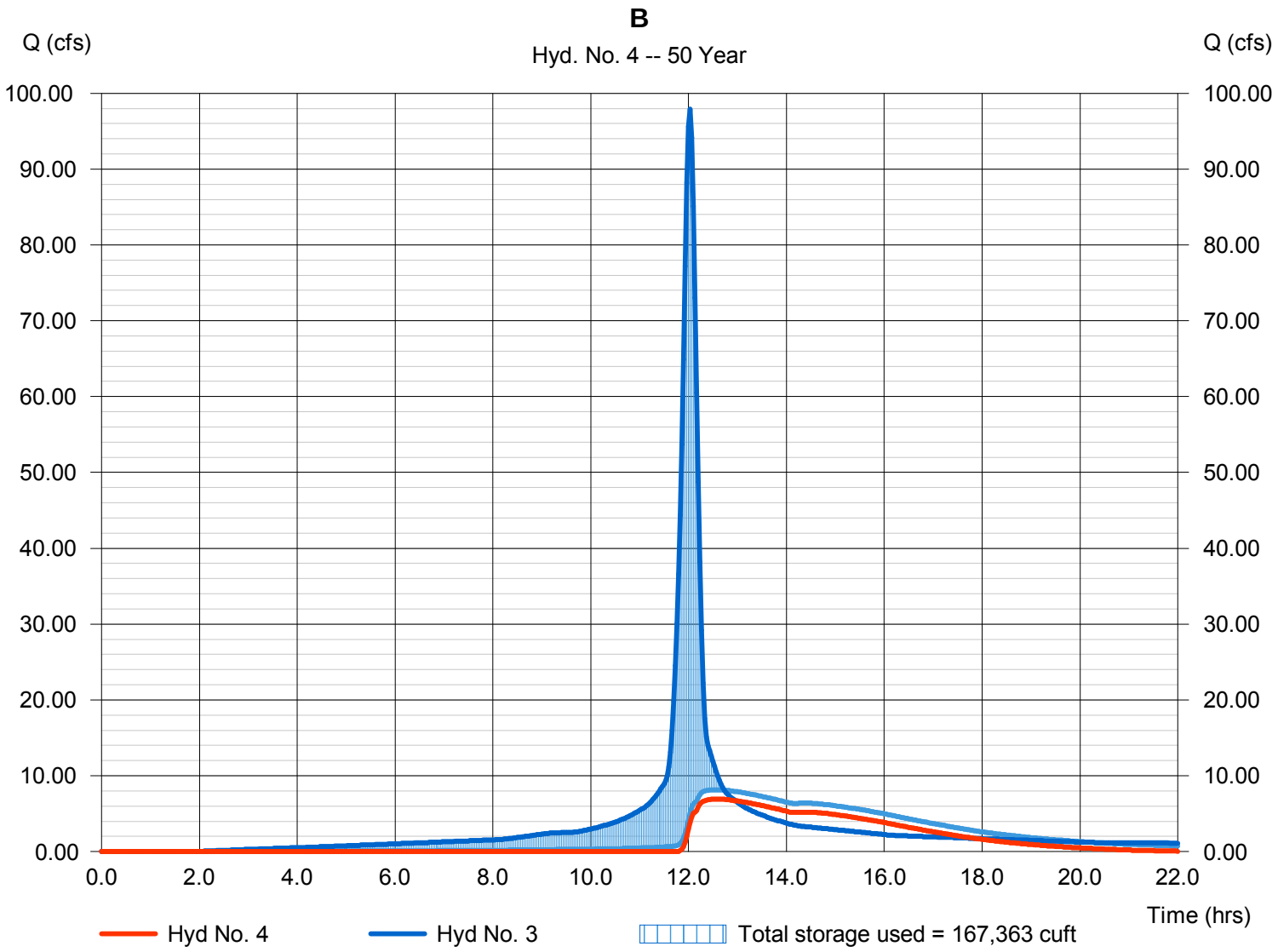
Hydrograph Report

Hyd. No. 4

B

Hydrograph type	= Reservoir	Peak discharge	= 6.928 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 107,673 cuft
Inflow hyd. No.	= 3 - B	Max. Elevation	= 1327.81 ft
Reservoir name	= B	Max. Storage	= 167,363 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

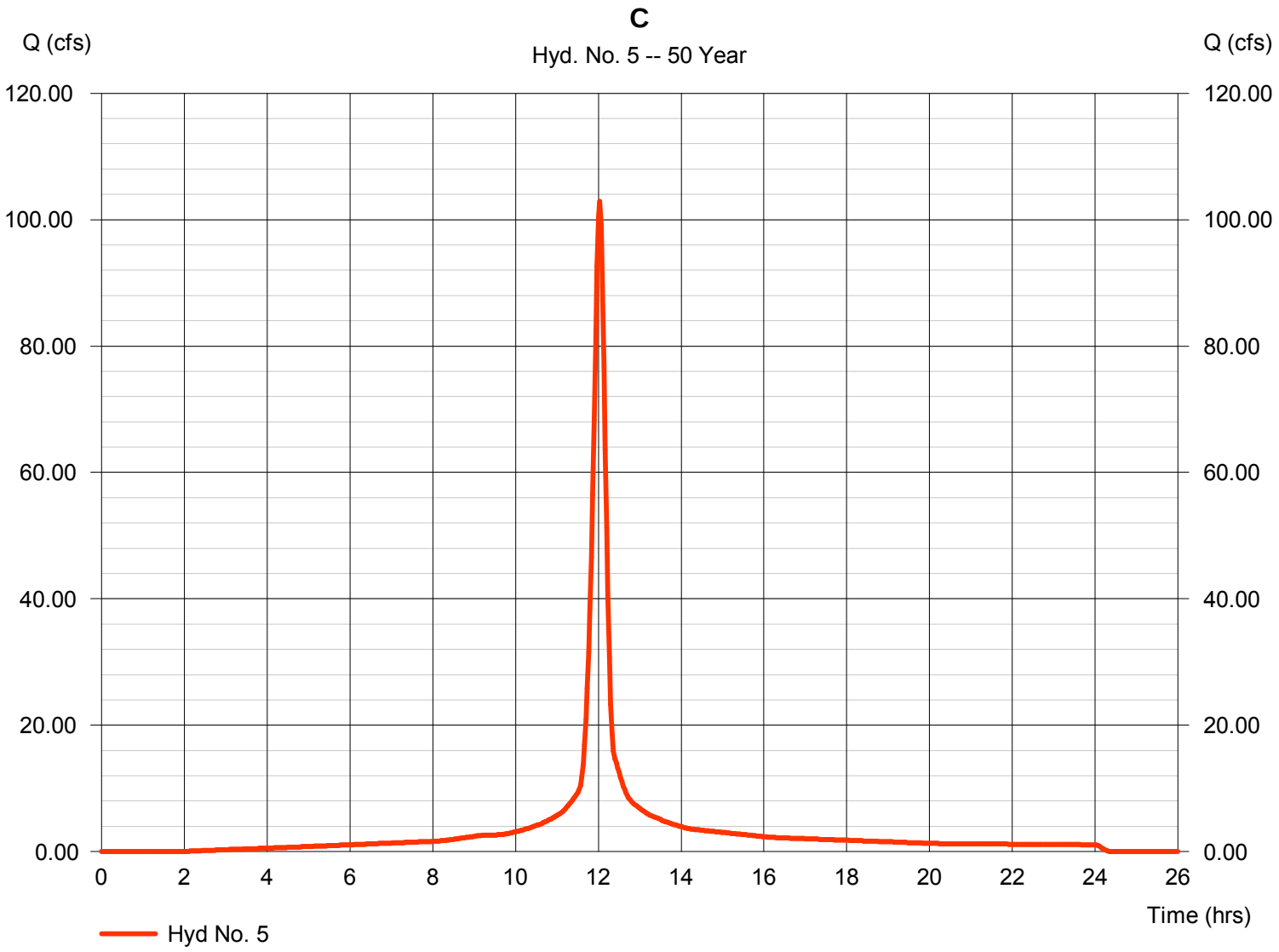


Hydrograph Report

Hyd. No. 5

C

Hydrograph type	=	SCS Runoff	Peak discharge	=	102.89 cfs
Storm frequency	=	50 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	317,615 cuft
Drainage area	=	14.500 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	6.90 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

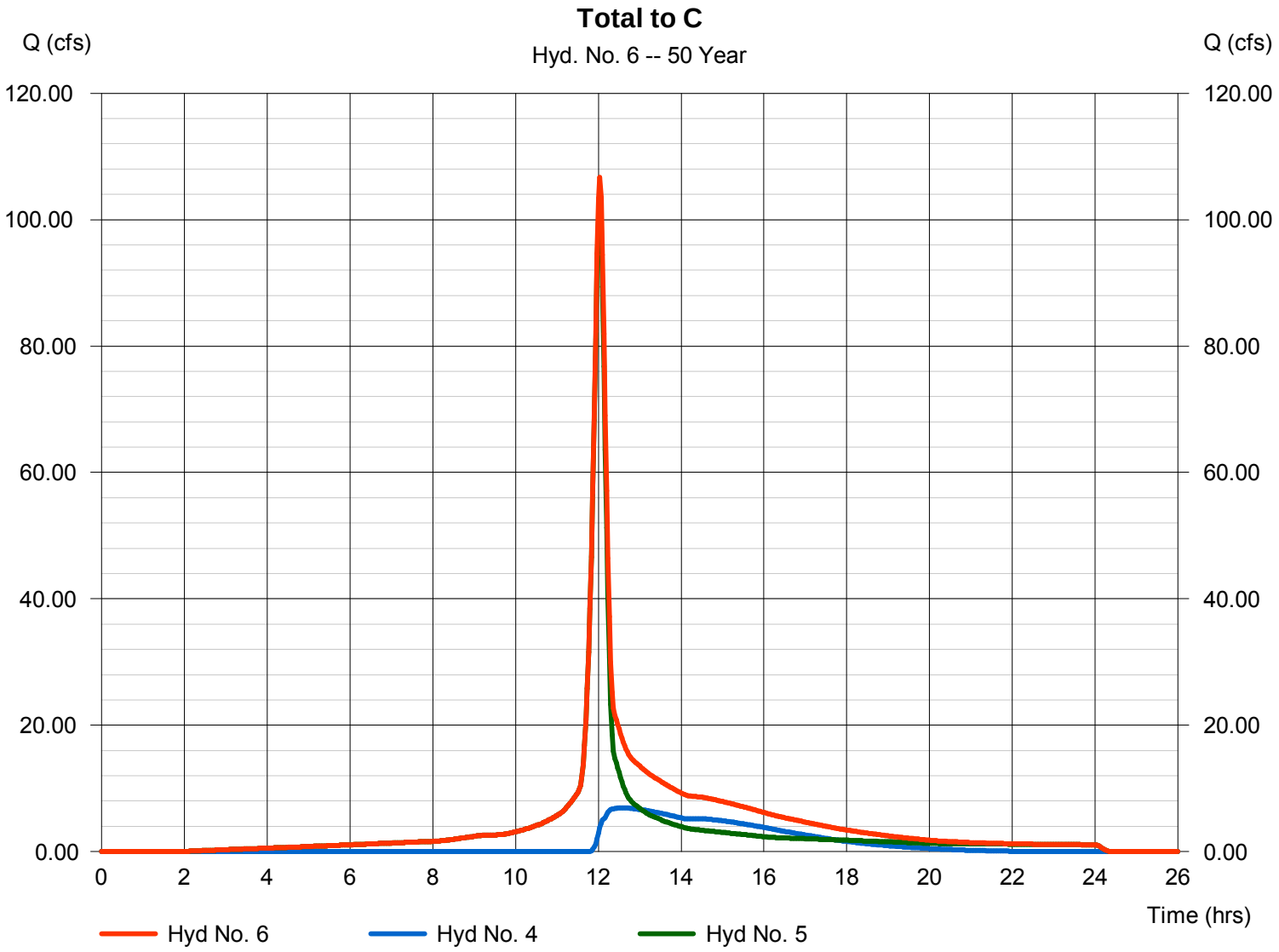


Hydrograph Report

Hyd. No. 6

Total to C

Hydrograph type	= Combine	Peak discharge	= 106.72 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 425,289 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 14.500 ac



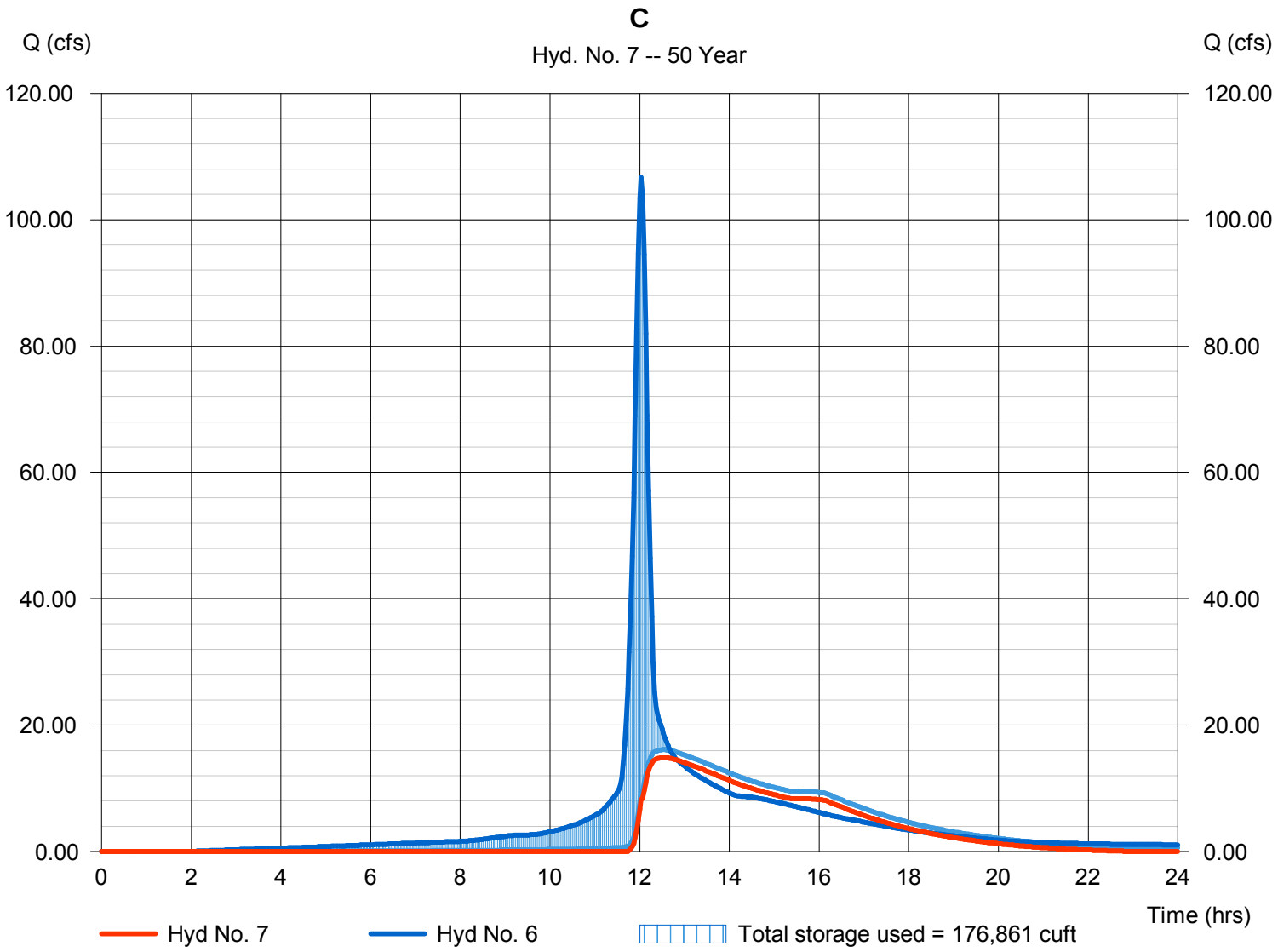
Hydrograph Report

Hyd. No. 7

C

Hydrograph type	= Reservoir	Peak discharge	= 14.88 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.53 hrs
Time interval	= 2 min	Hyd. volume	= 227,392 cuft
Inflow hyd. No.	= 6 - Total to C	Max. Elevation	= 1326.71 ft
Reservoir name	= C	Max. Storage	= 176,861 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

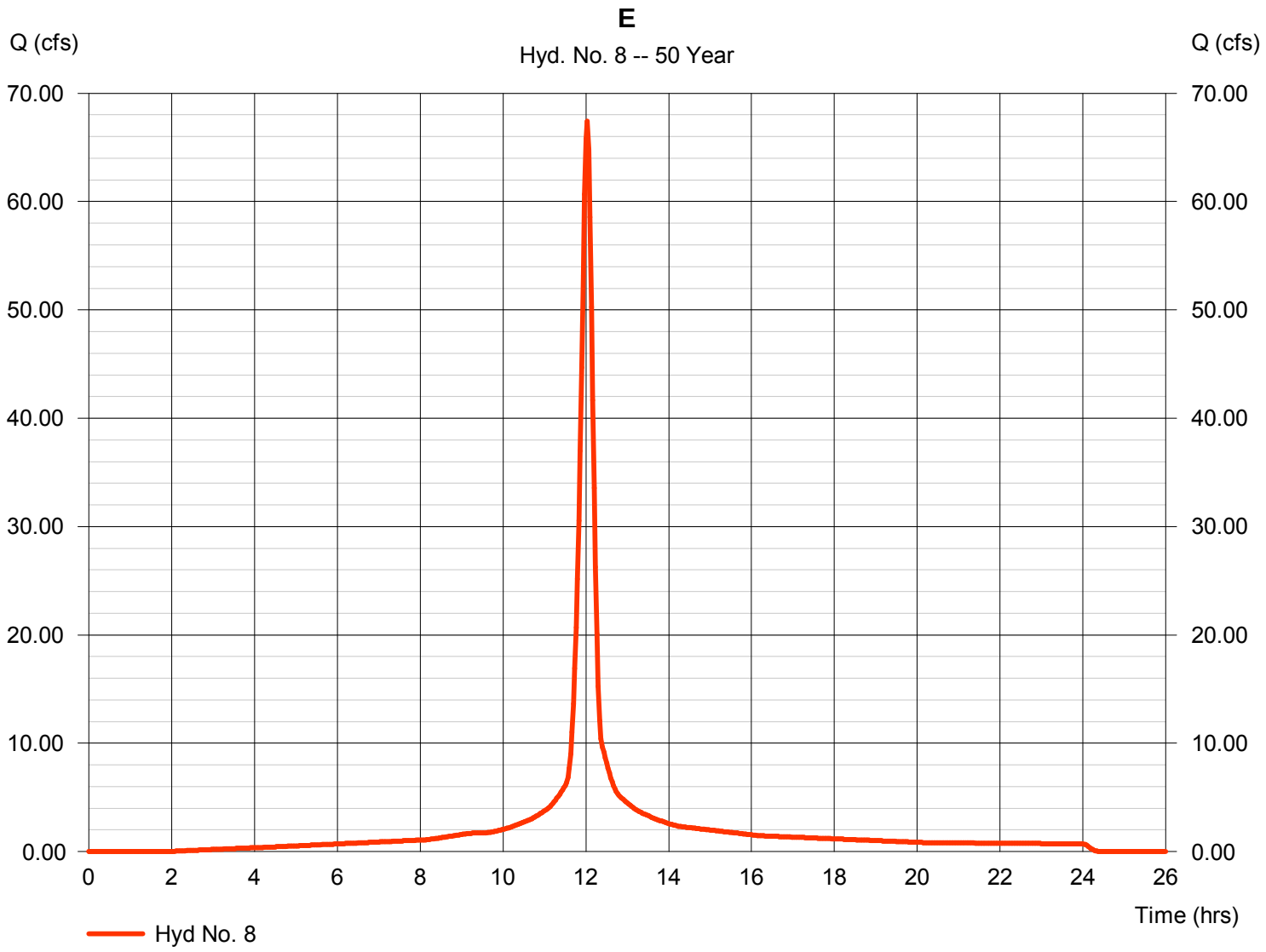


Hydrograph Report

Hyd. No. 8

E

Hydrograph type	= SCS Runoff	Peak discharge	= 67.41 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 208,093 cuft
Drainage area	= 9.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



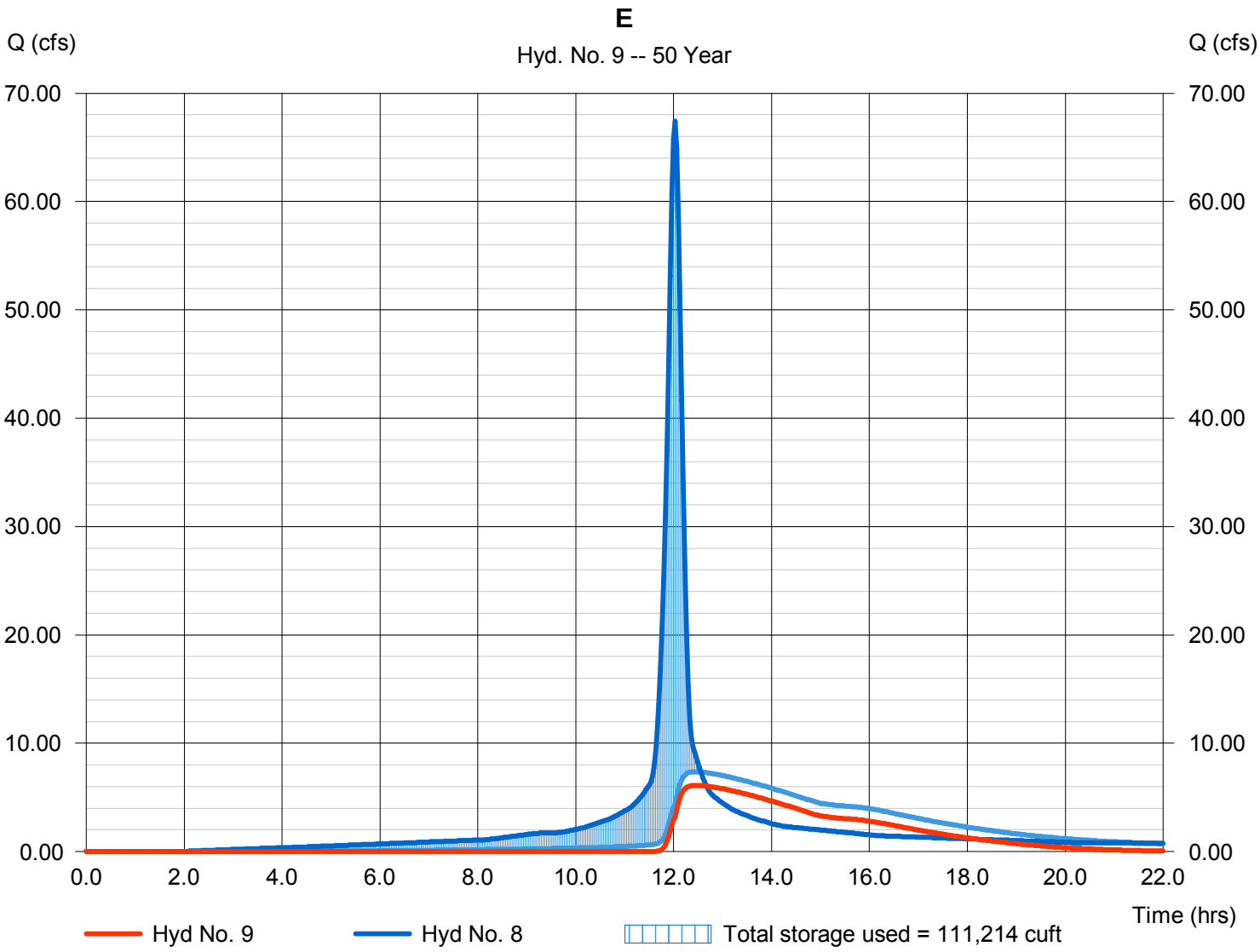
Hydrograph Report

Hyd. No. 9

E

Hydrograph type	= Reservoir	Peak discharge	= 6.101 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.50 hrs
Time interval	= 2 min	Hyd. volume	= 87,187 cuft
Inflow hyd. No.	= 8 - E	Max. Elevation	= 1327.02 ft
Reservoir name	= E	Max. Storage	= 111,214 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

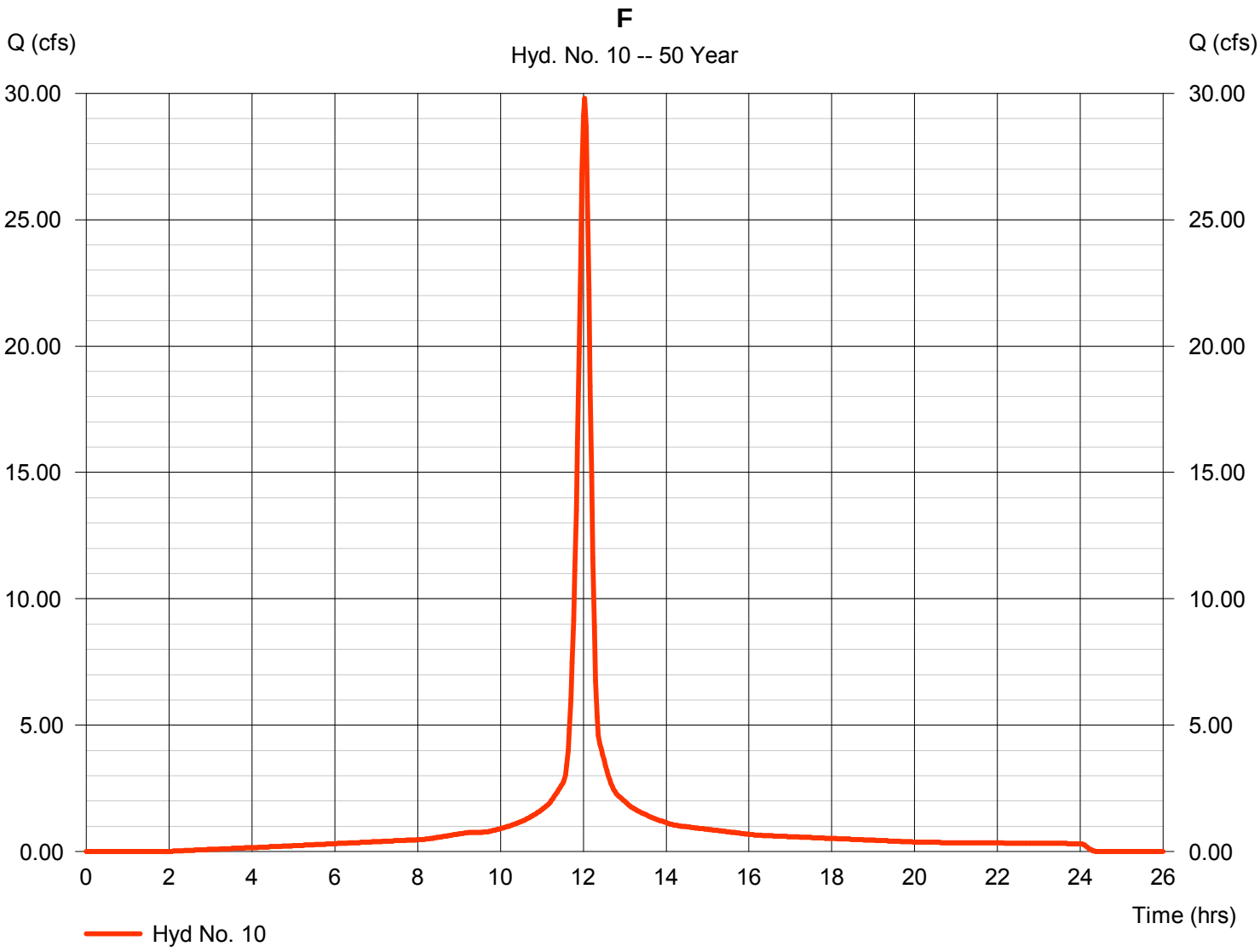


Hydrograph Report

Hyd. No. 10

F

Hydrograph type	= SCS Runoff	Peak discharge	= 29.80 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 91,999 cuft
Drainage area	= 4.200 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



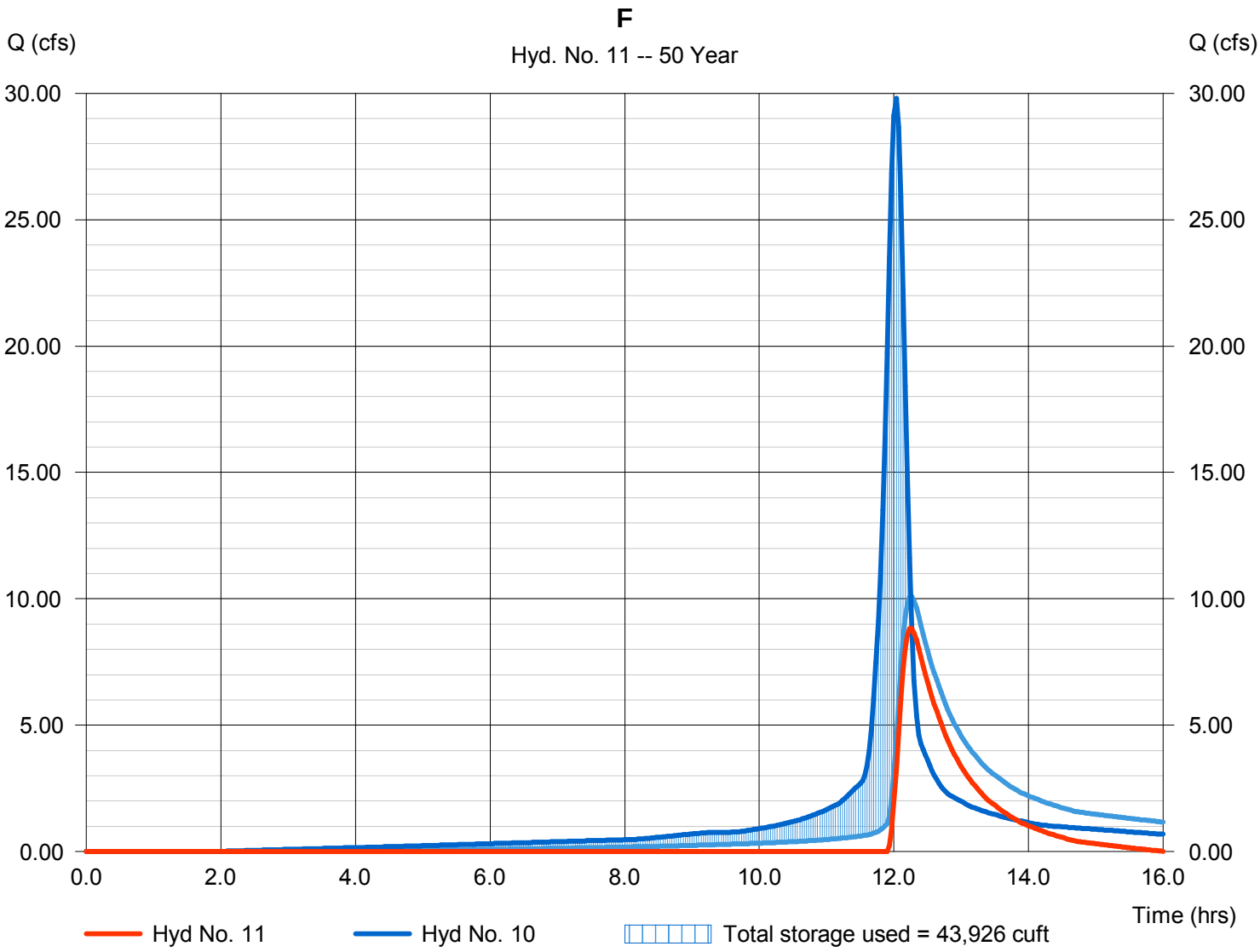
Hydrograph Report

Hyd. No. 11

F

Hydrograph type	= Reservoir	Peak discharge	= 8.826 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.27 hrs
Time interval	= 2 min	Hyd. volume	= 31,433 cuft
Inflow hyd. No.	= 10 - F	Max. Elevation	= 1326.77 ft
Reservoir name	= F	Max. Storage	= 43,926 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

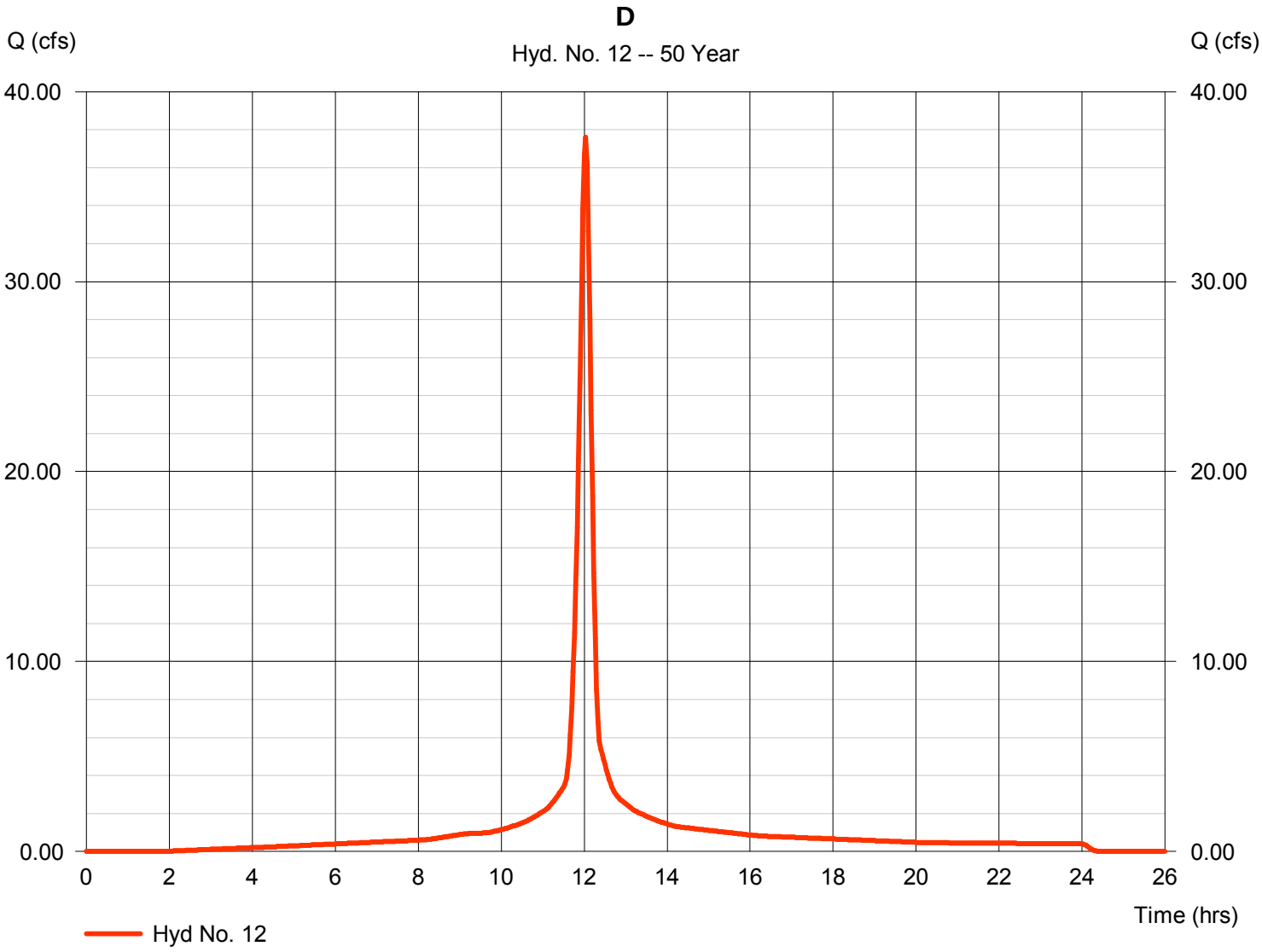


Hydrograph Report

Hyd. No. 12

D

Hydrograph type	= SCS Runoff	Peak discharge	= 37.61 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 116,094 cuft
Drainage area	= 5.300 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

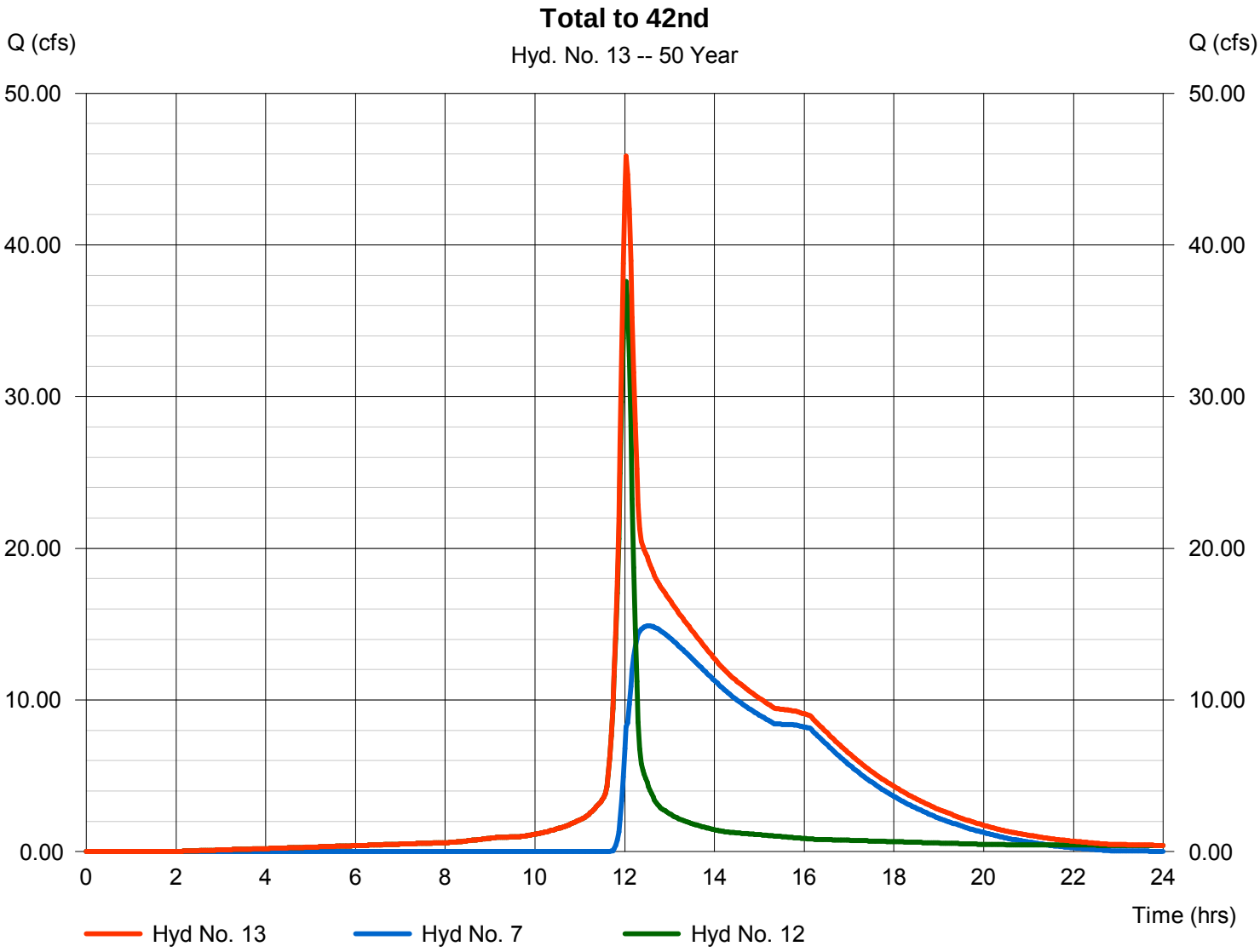


Hydrograph Report

Hyd. No. 13

Total to 42nd

Hydrograph type	= Combine	Peak discharge	= 45.85 cfs
Storm frequency	= 50 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 343,486 cuft
Inflow hyds.	= 7, 12	Contrib. drain. area	= 5.300 ac

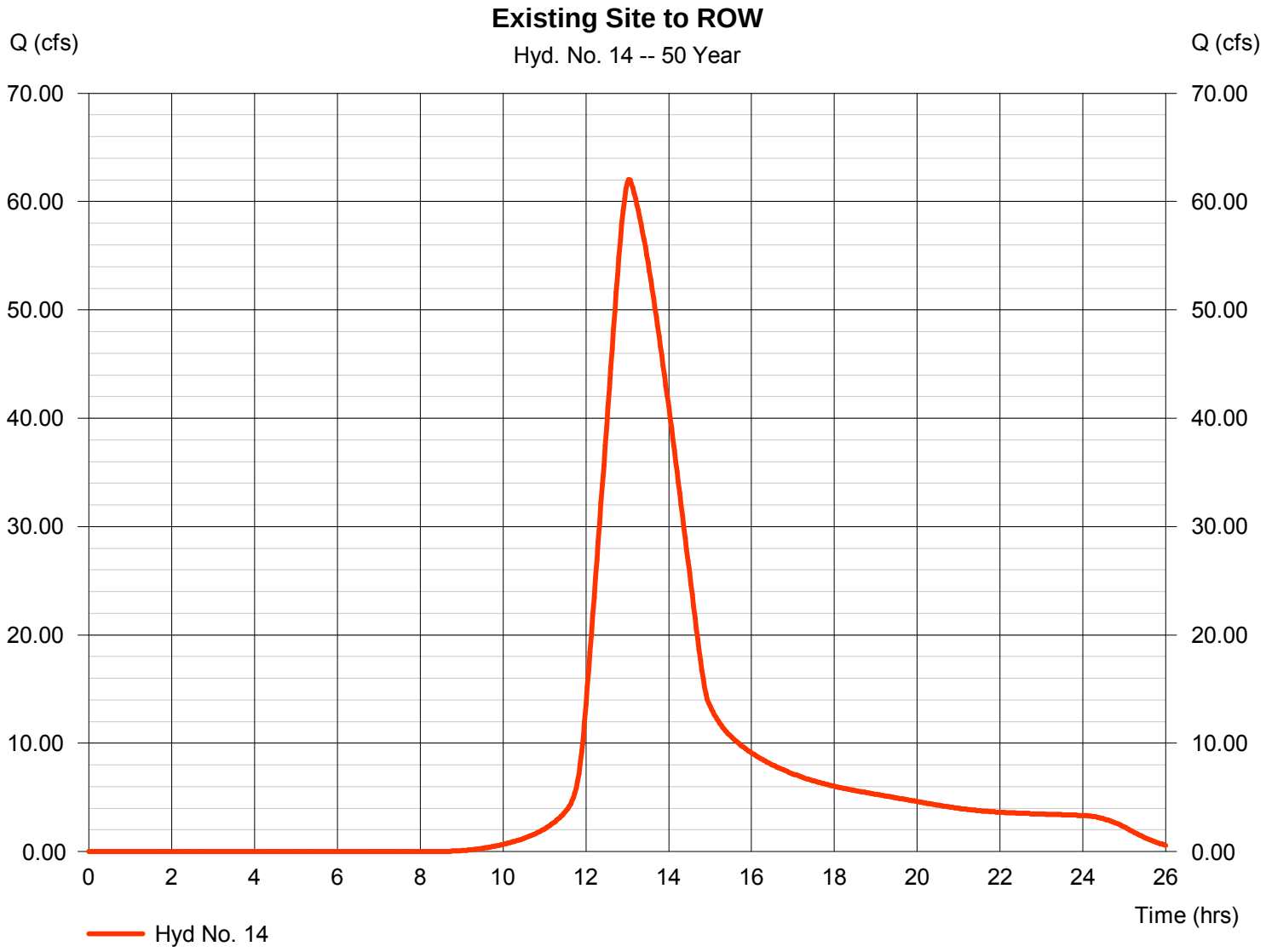


Hydrograph Report

Hyd. No. 14

Existing Site to ROW

Hydrograph type	= SCS Runoff	Peak discharge	= 62.05 cfs
Storm frequency	= 50 yrs	Time to peak	= 13.03 hrs
Time interval	= 2 min	Hyd. volume	= 649,722 cuft
Drainage area	= 49.000 ac	Curve number	= 71
Basin Slope	= 0.6 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 114.60 min
Total precip.	= 6.90 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. v8

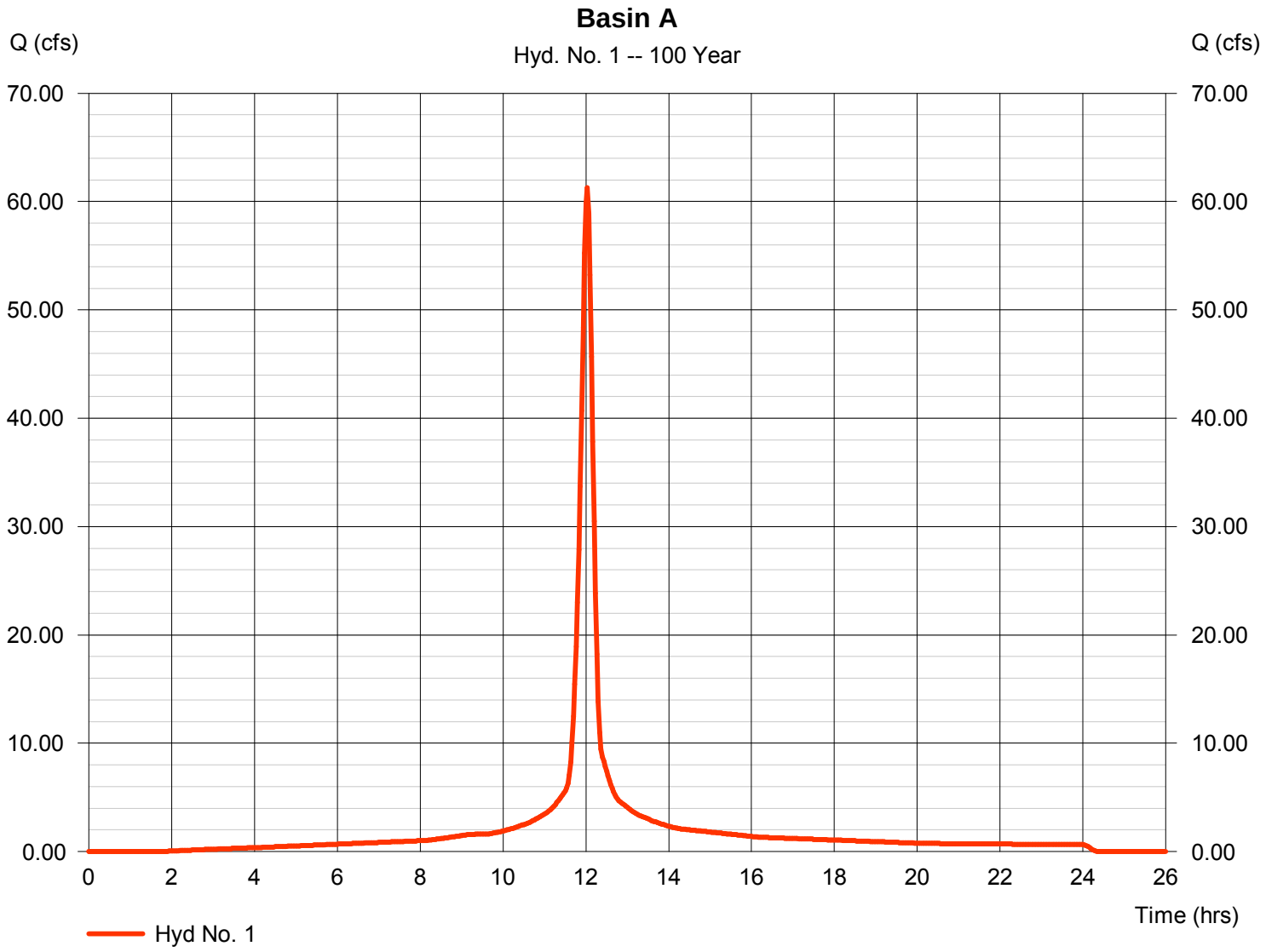
Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	61.29	2	722	190,523	------	------	------	Basin A
2	Reservoir	3.668	2	756	53,959	1	1327.37	104,821	A
3	SCS Runoff	111.28	2	722	345,949	------	------	------	B
4	Reservoir	8.461	2	754	138,672	3	1328.14	190,765	B
5	SCS Runoff	116.93	2	722	363,497	------	------	------	C
6	Combine	121.77	2	722	502,169	4, 5	------	------	Total to C
7	Reservoir	19.16	2	750	290,896	6	1327.02	200,095	C
8	SCS Runoff	76.61	2	722	238,153	------	------	------	E
9	Reservoir	6.938	2	750	108,707	8	1327.32	127,152	E
10	SCS Runoff	33.87	2	722	105,289	------	------	------	F
11	Reservoir	11.88	2	734	41,051	10	1326.94	48,403	F
12	SCS Runoff	42.74	2	722	132,864	------	------	------	D
13	Combine	51.98	2	724	423,761	7, 12	------	------	Total to 42nd
14	SCS Runoff	75.58	2	782	786,574	------	------	------	Existing Site to ROW

Hydrograph Report

Hyd. No. 1

Basin A

Hydrograph type	= SCS Runoff	Peak discharge	= 61.29 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 190,523 cuft
Drainage area	= 7.600 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



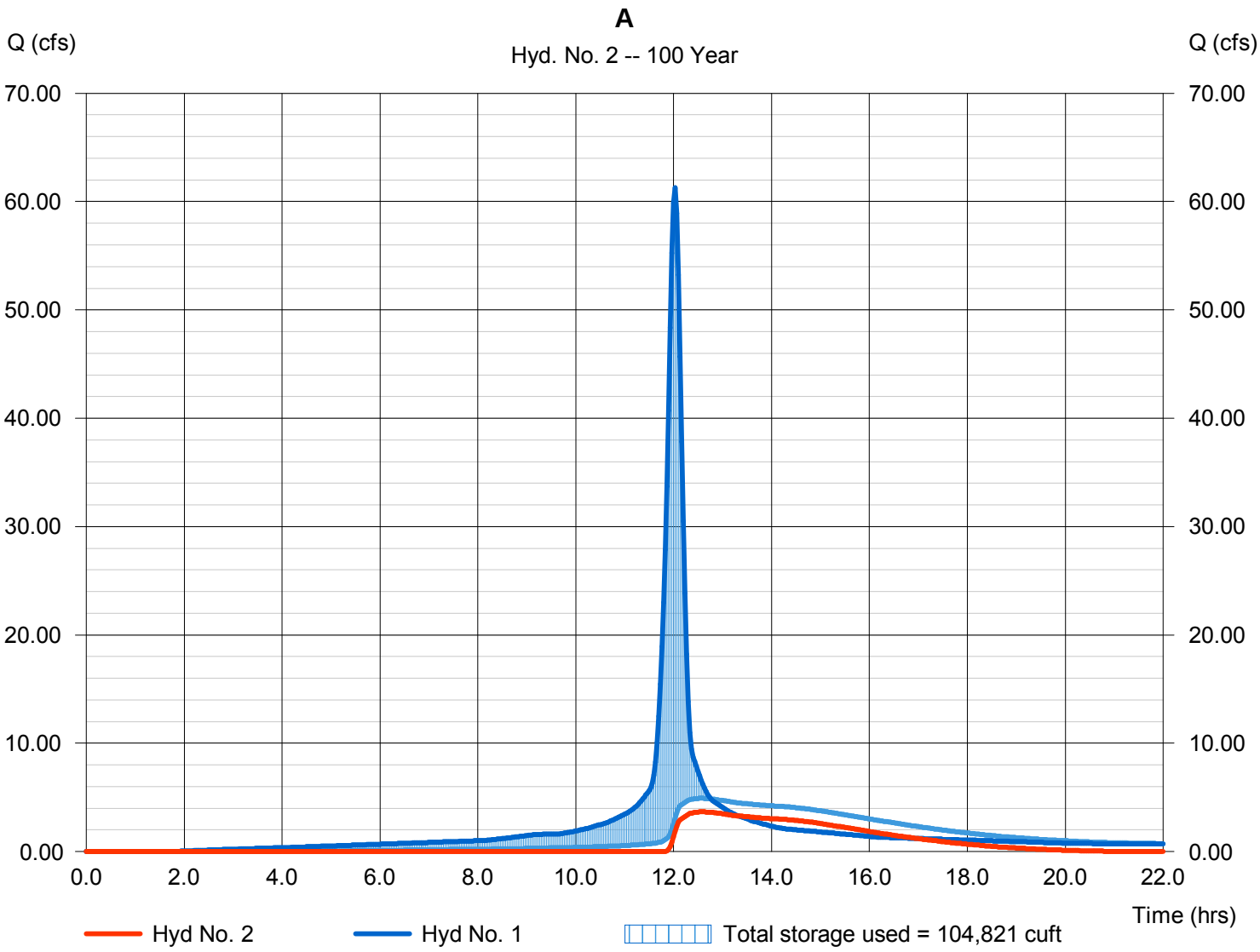
Hydrograph Report

Hyd. No. 2

A

Hydrograph type	= Reservoir	Peak discharge	= 3.668 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.60 hrs
Time interval	= 2 min	Hyd. volume	= 53,959 cuft
Inflow hyd. No.	= 1 - Basin A	Max. Elevation	= 1327.37 ft
Reservoir name	= A	Max. Storage	= 104,821 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

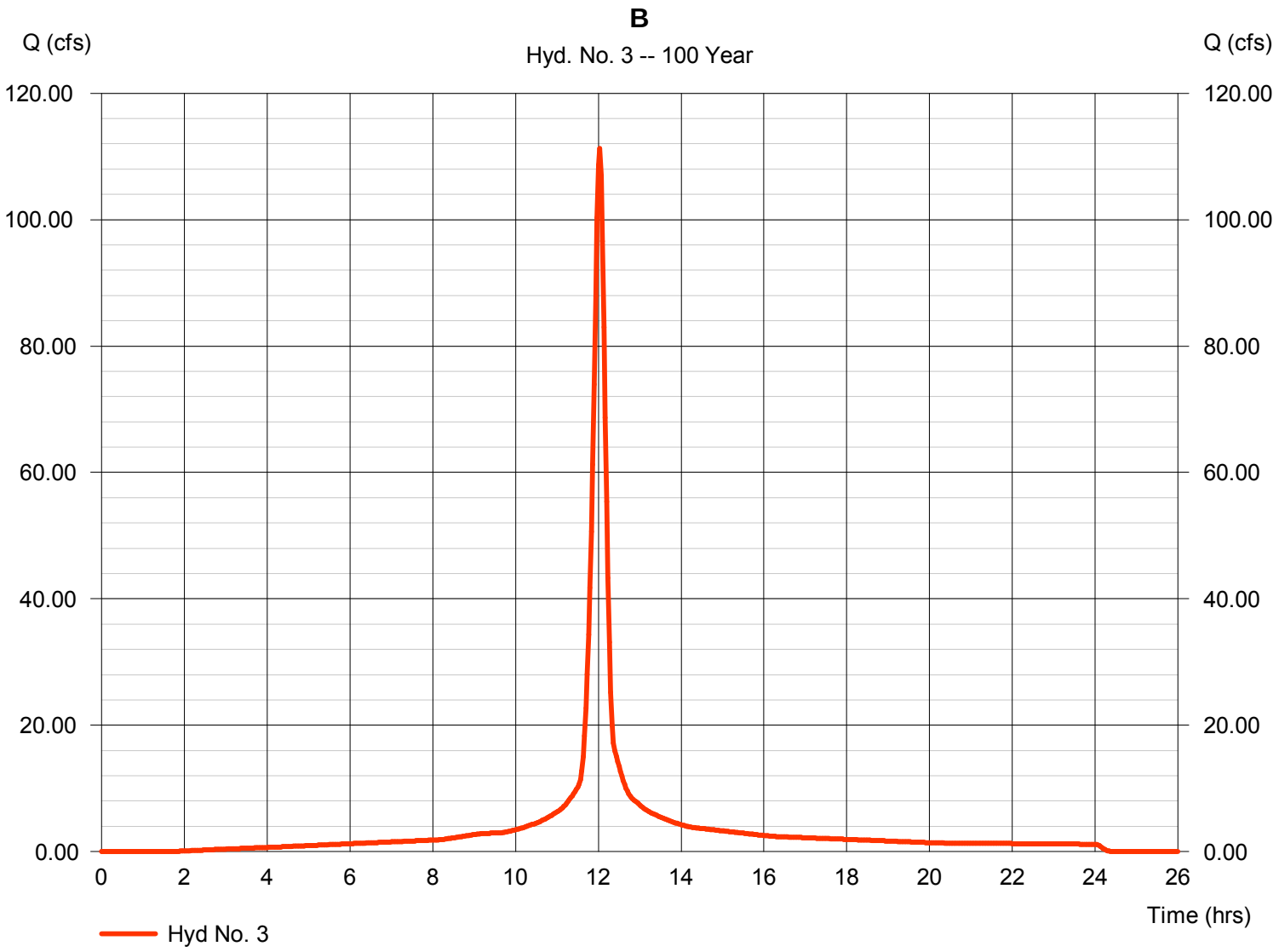


Hydrograph Report

Hyd. No. 3

B

Hydrograph type	=	SCS Runoff	Peak discharge	=	111.28 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	345,949 cuft
Drainage area	=	13.800 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



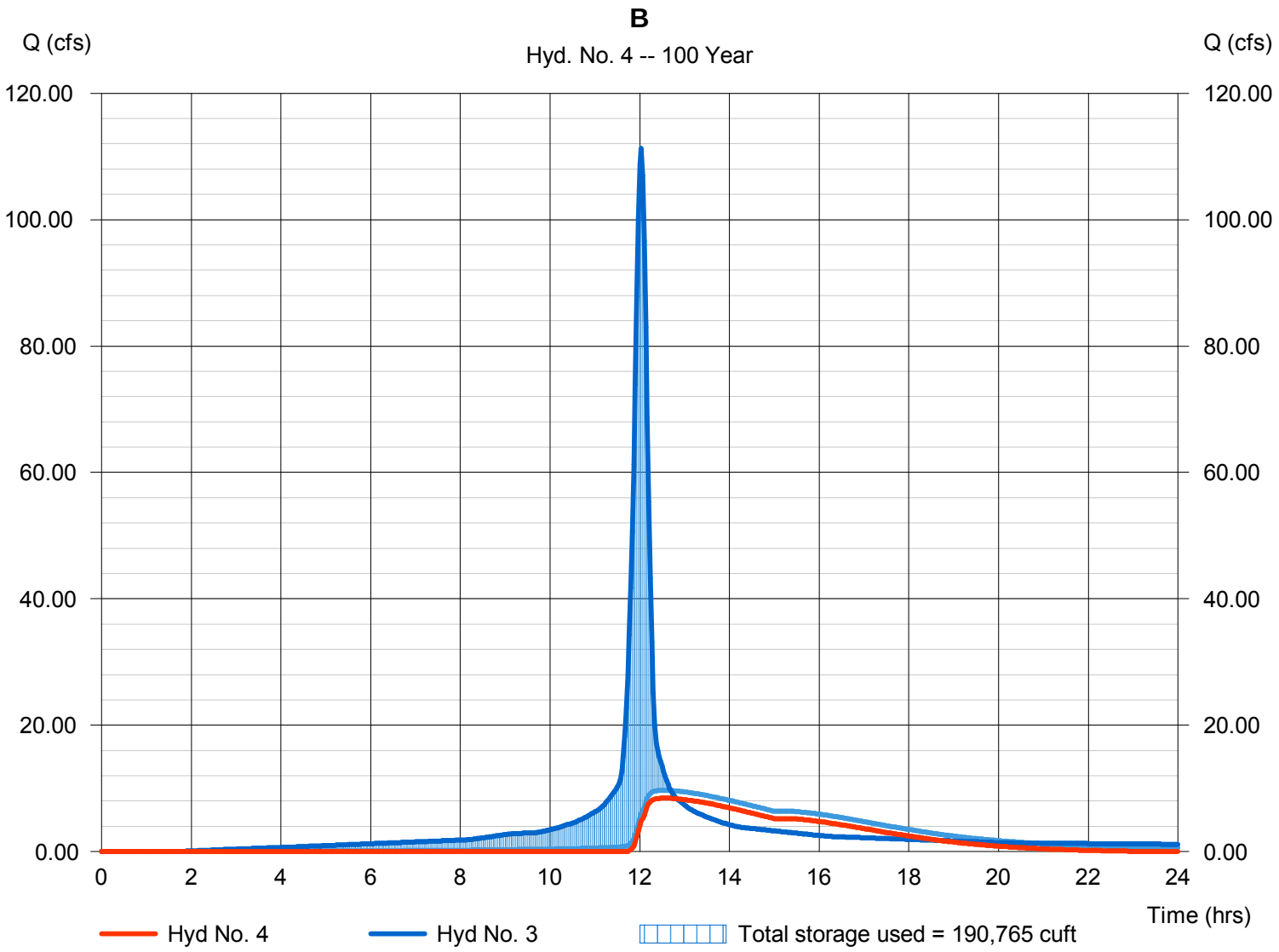
Hydrograph Report

Hyd. No. 4

B

Hydrograph type	= Reservoir	Peak discharge	= 8.461 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.57 hrs
Time interval	= 2 min	Hyd. volume	= 138,672 cuft
Inflow hyd. No.	= 3 - B	Max. Elevation	= 1328.14 ft
Reservoir name	= B	Max. Storage	= 190,765 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

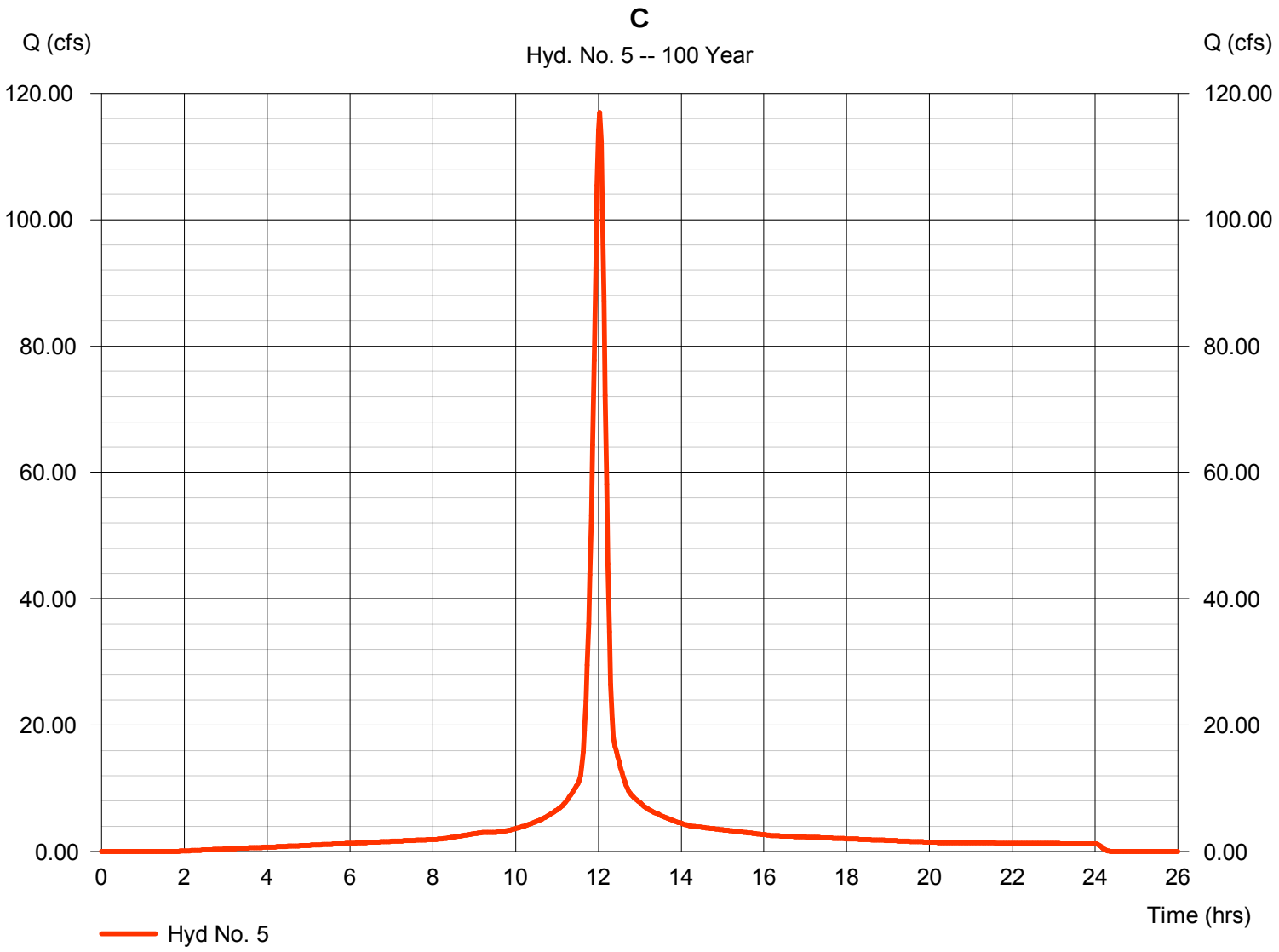


Hydrograph Report

Hyd. No. 5

C

Hydrograph type	=	SCS Runoff	Peak discharge	=	116.93 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	363,497 cuft
Drainage area	=	14.500 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484

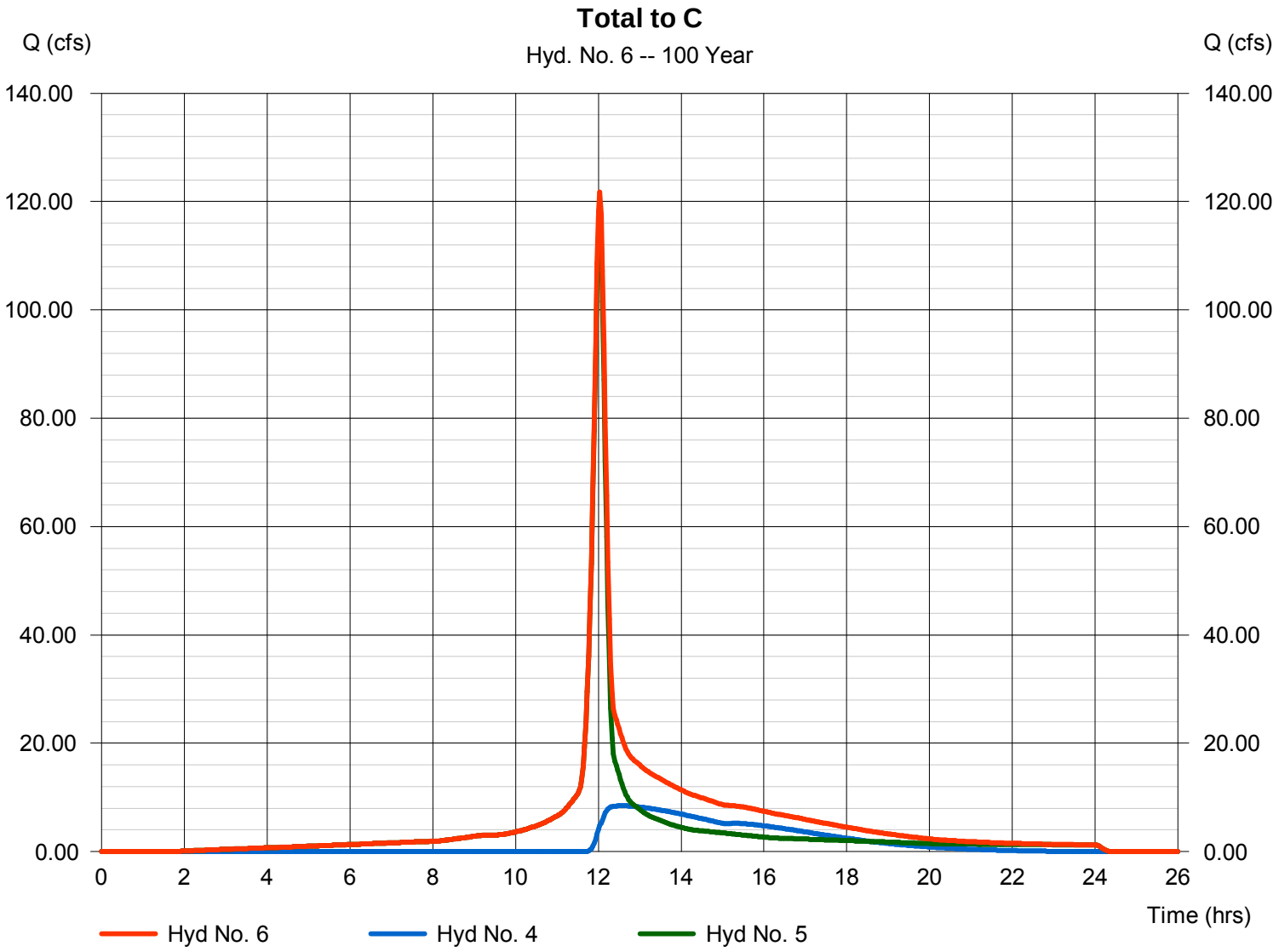


Hydrograph Report

Hyd. No. 6

Total to C

Hydrograph type	= Combine	Peak discharge	= 121.77 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 502,169 cuft
Inflow hyds.	= 4, 5	Contrib. drain. area	= 14.500 ac



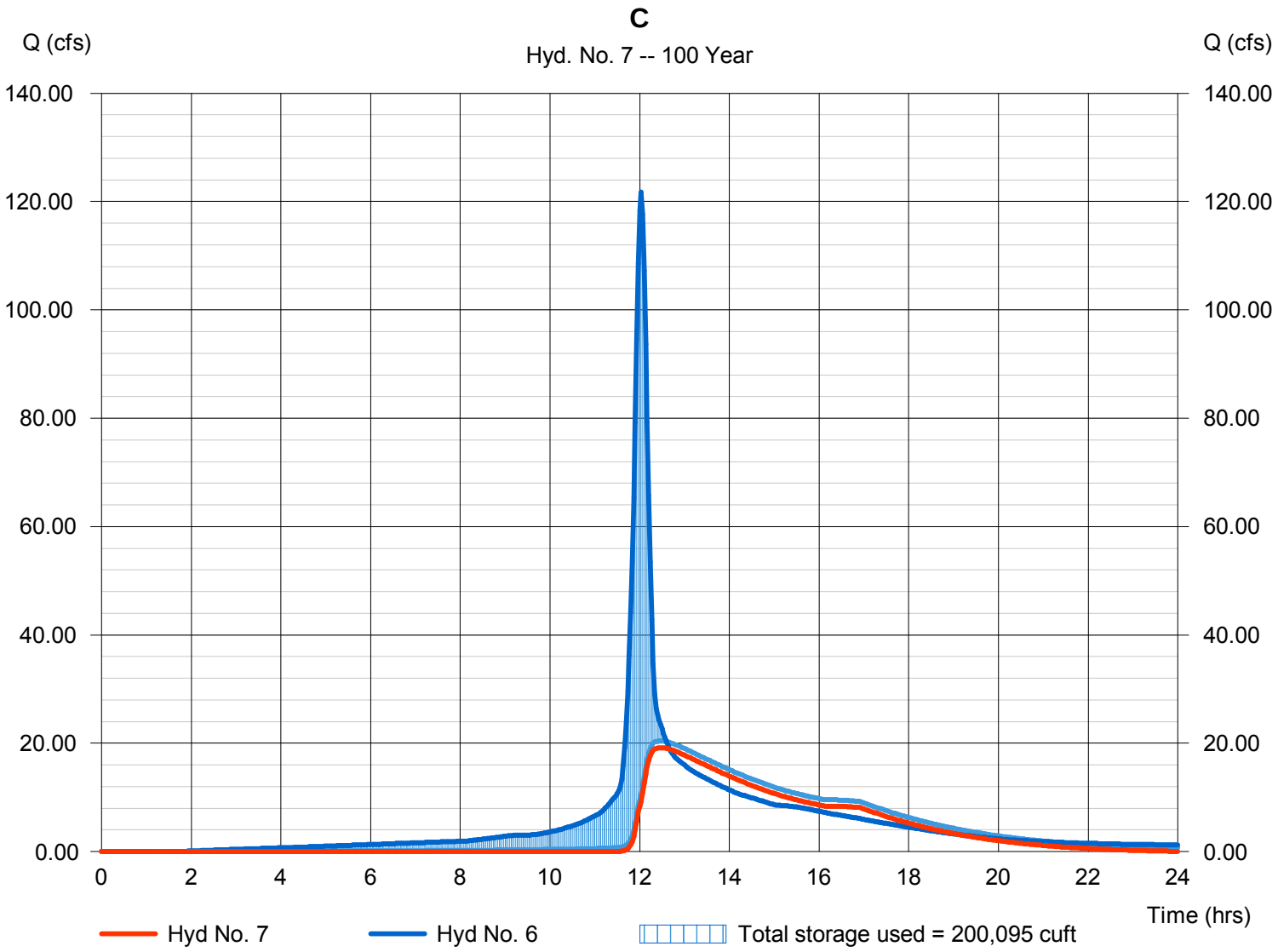
Hydrograph Report

Hyd. No. 7

C

Hydrograph type	= Reservoir	Peak discharge	= 19.16 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.50 hrs
Time interval	= 2 min	Hyd. volume	= 290,896 cuft
Inflow hyd. No.	= 6 - Total to C	Max. Elevation	= 1327.02 ft
Reservoir name	= C	Max. Storage	= 200,095 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

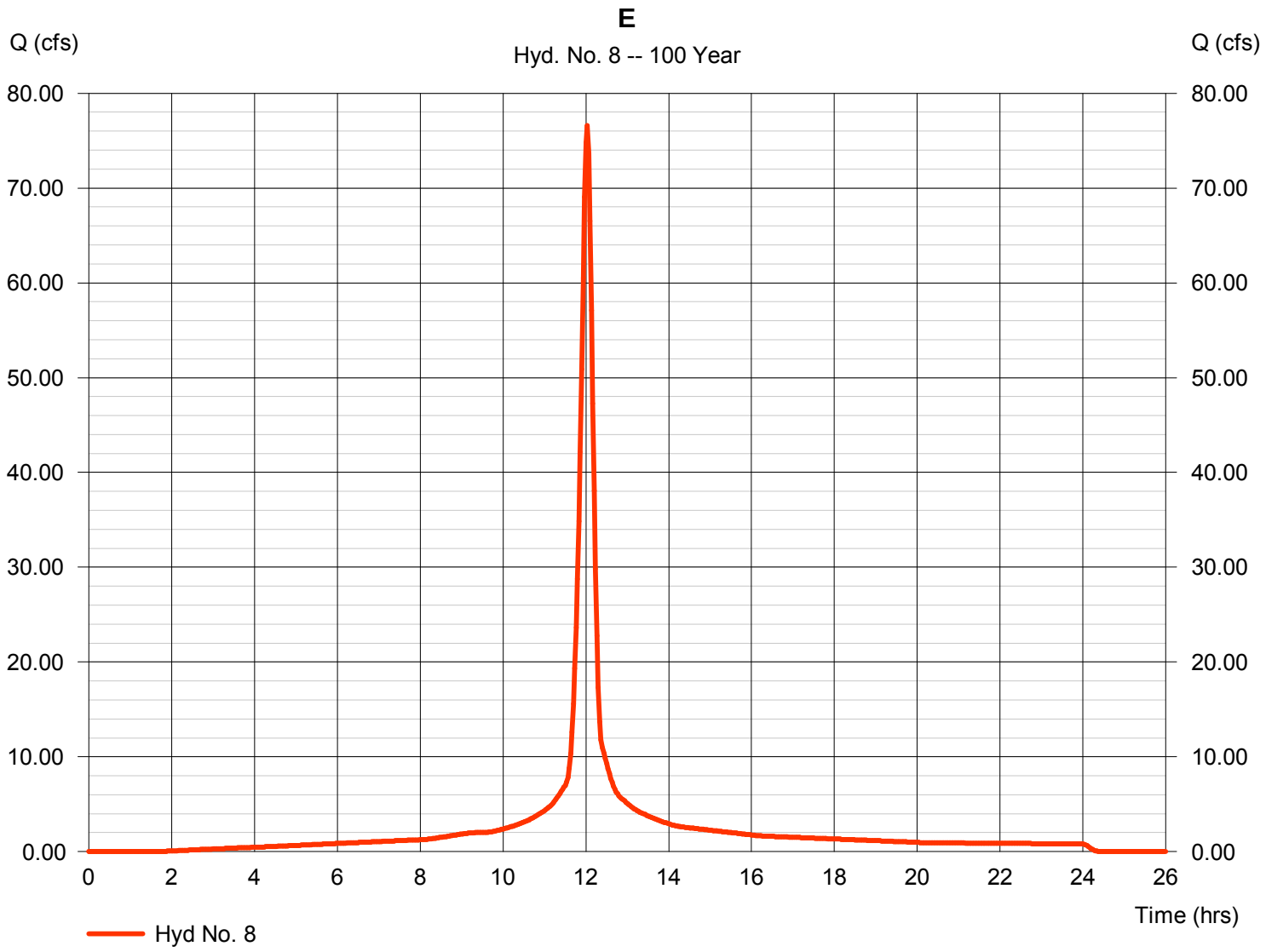


Hydrograph Report

Hyd. No. 8

E

Hydrograph type	= SCS Runoff	Peak discharge	= 76.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 238,153 cuft
Drainage area	= 9.500 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



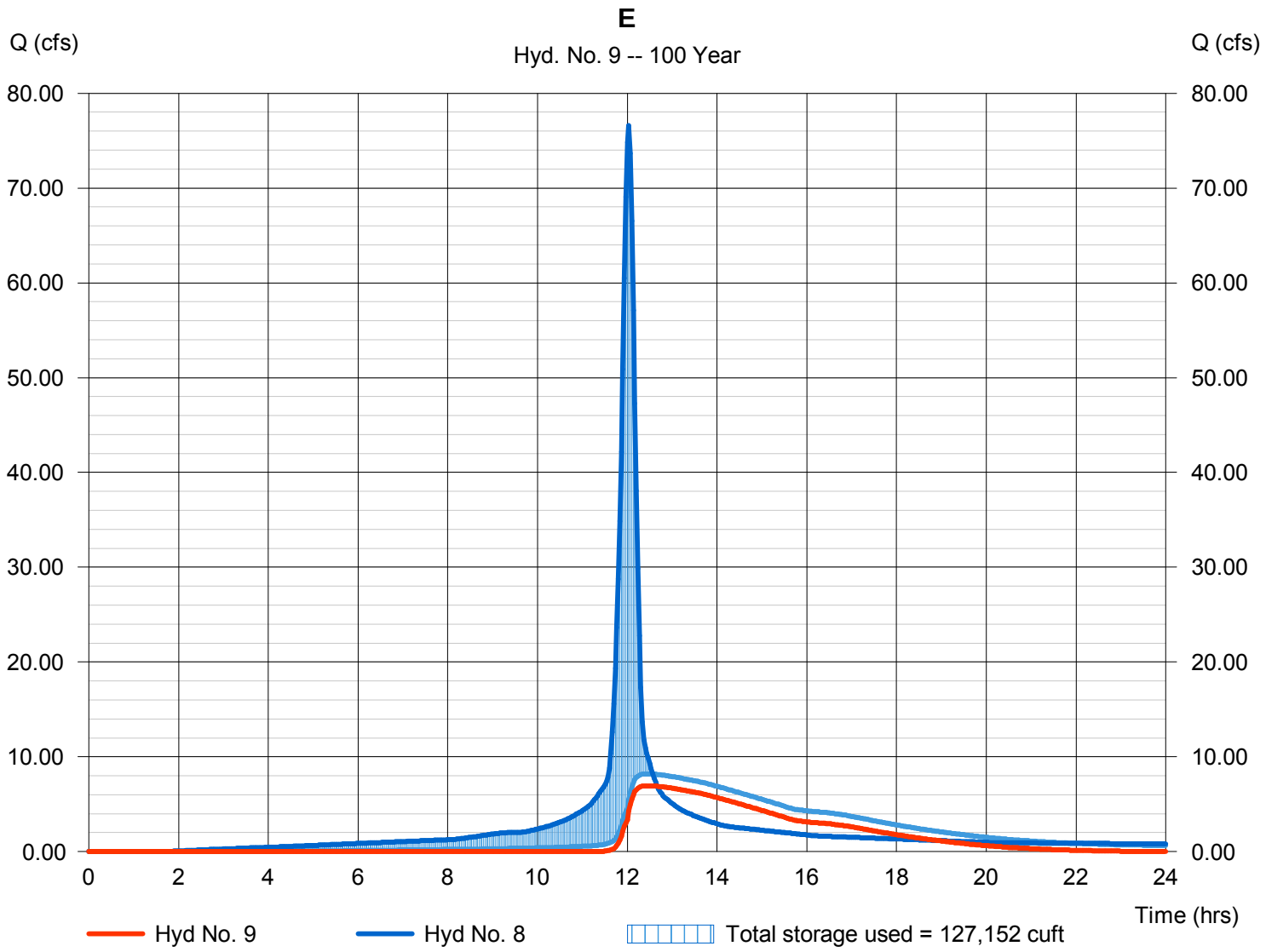
Hydrograph Report

Hyd. No. 9

E

Hydrograph type	=	Reservoir	Peak discharge	=	6.938 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.50 hrs
Time interval	=	2 min	Hyd. volume	=	108,707 cuft
Inflow hyd. No.	=	8 - E	Max. Elevation	=	1327.32 ft
Reservoir name	=	E	Max. Storage	=	127,152 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

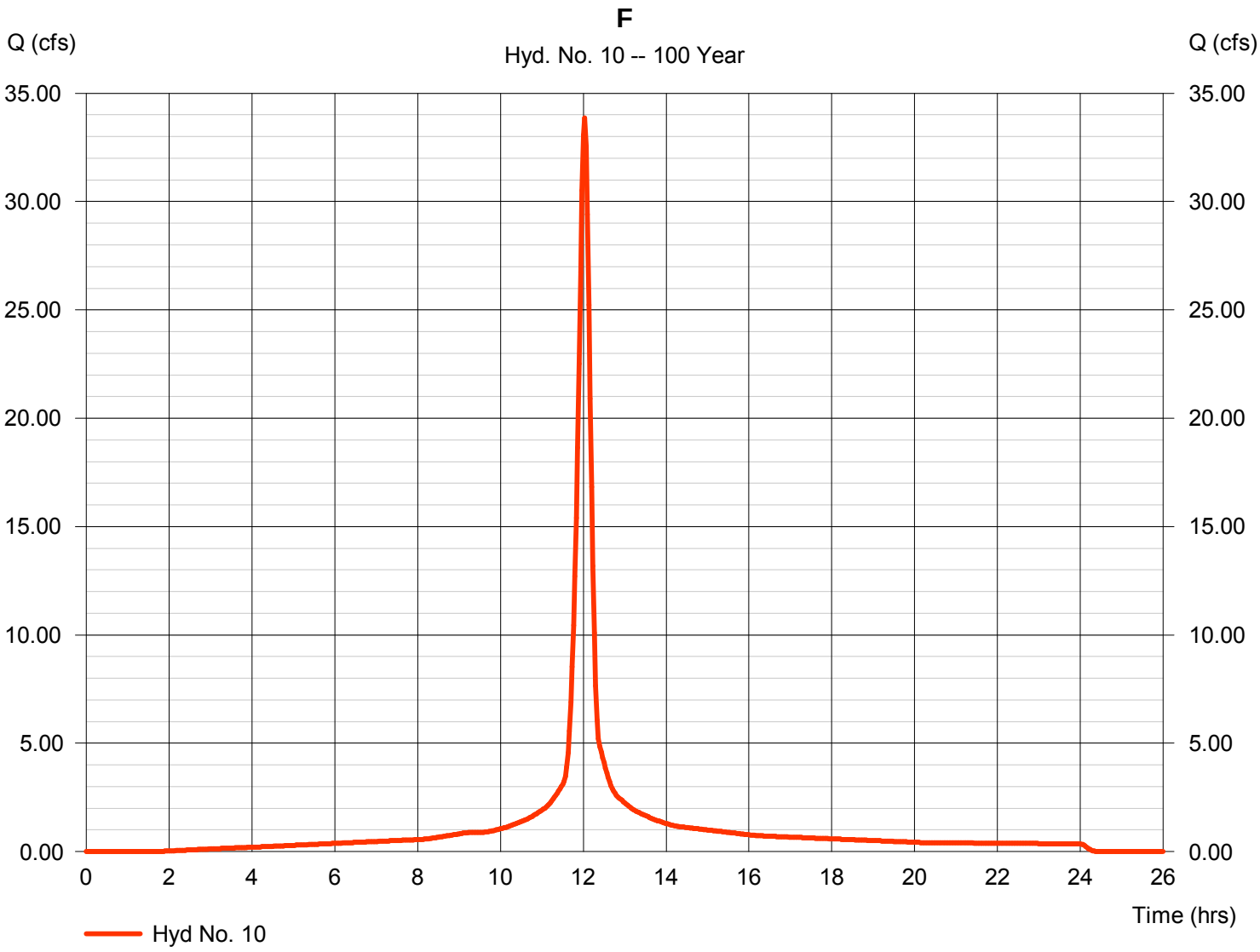


Hydrograph Report

Hyd. No. 10

F

Hydrograph type	=	SCS Runoff	Peak discharge	=	33.87 cfs
Storm frequency	=	100 yrs	Time to peak	=	12.03 hrs
Time interval	=	2 min	Hyd. volume	=	105,289 cuft
Drainage area	=	4.200 ac	Curve number	=	94
Basin Slope	=	0.0 %	Hydraulic length	=	0 ft
Tc method	=	User	Time of conc. (Tc)	=	15.00 min
Total precip.	=	7.80 in	Distribution	=	Type II
Storm duration	=	24 hrs	Shape factor	=	484



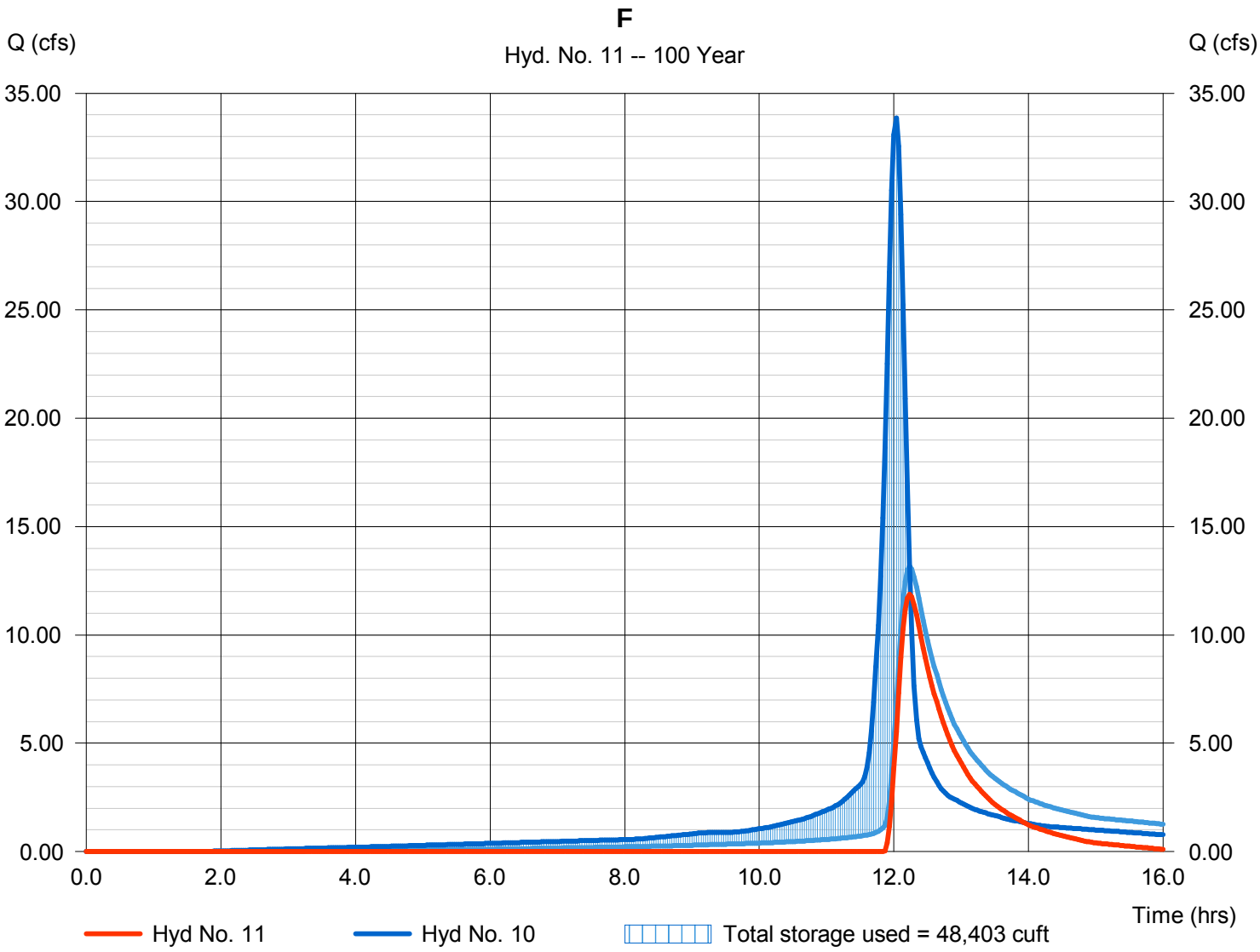
Hydrograph Report

Hyd. No. 11

F

Hydrograph type	= Reservoir	Peak discharge	= 11.88 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.23 hrs
Time interval	= 2 min	Hyd. volume	= 41,051 cuft
Inflow hyd. No.	= 10 - F	Max. Elevation	= 1326.94 ft
Reservoir name	= F	Max. Storage	= 48,403 cuft

Storage Indication method used. Exfiltration extracted from Outflow.

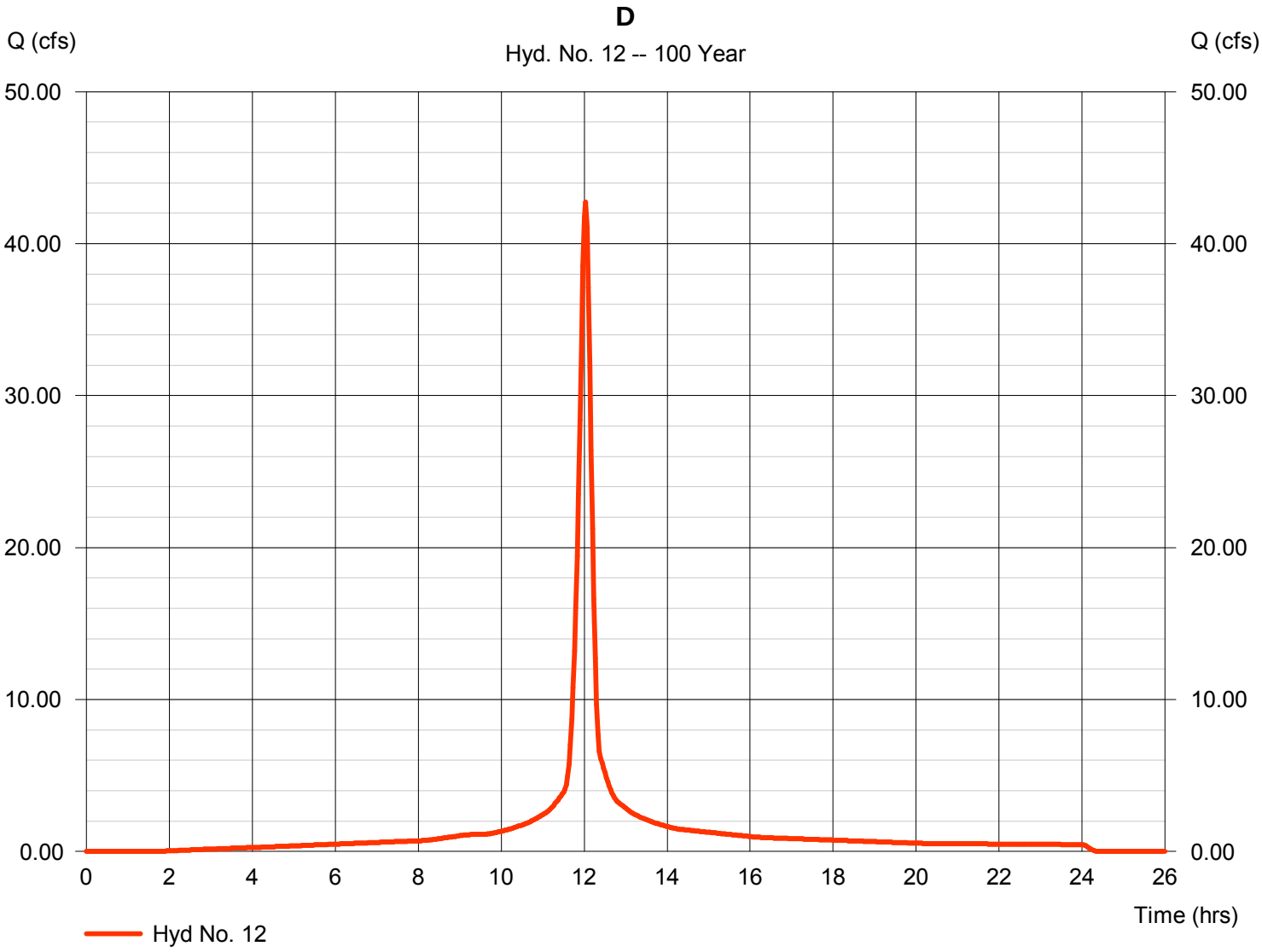


Hydrograph Report

Hyd. No. 12

D

Hydrograph type	= SCS Runoff	Peak discharge	= 42.74 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.03 hrs
Time interval	= 2 min	Hyd. volume	= 132,864 cuft
Drainage area	= 5.300 ac	Curve number	= 94
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= User	Time of conc. (Tc)	= 15.00 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

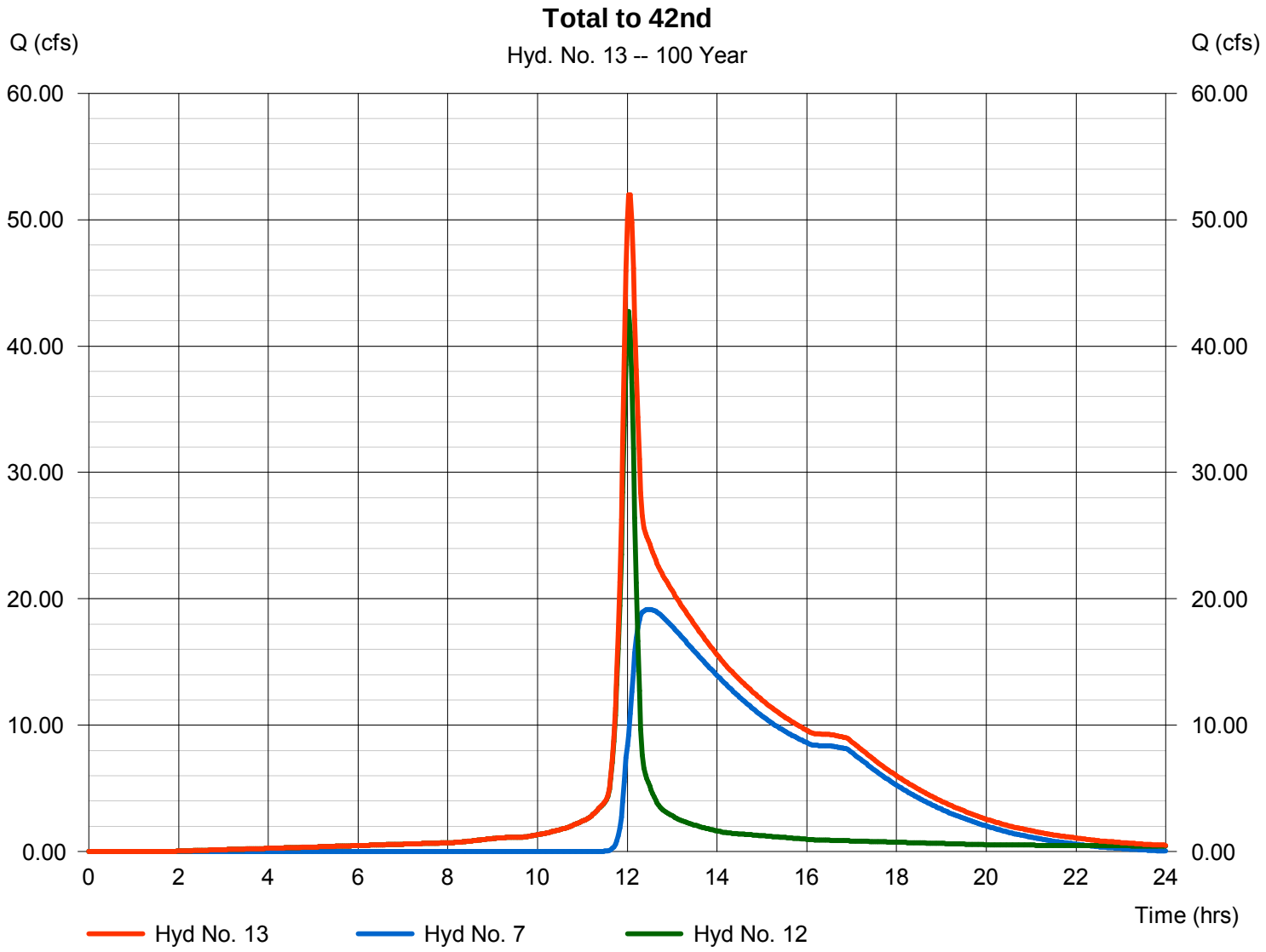


Hydrograph Report

Hyd. No. 13

Total to 42nd

Hydrograph type	= Combine	Peak discharge	= 51.98 cfs
Storm frequency	= 100 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 423,761 cuft
Inflow hyds.	= 7, 12	Contrib. drain. area	= 5.300 ac

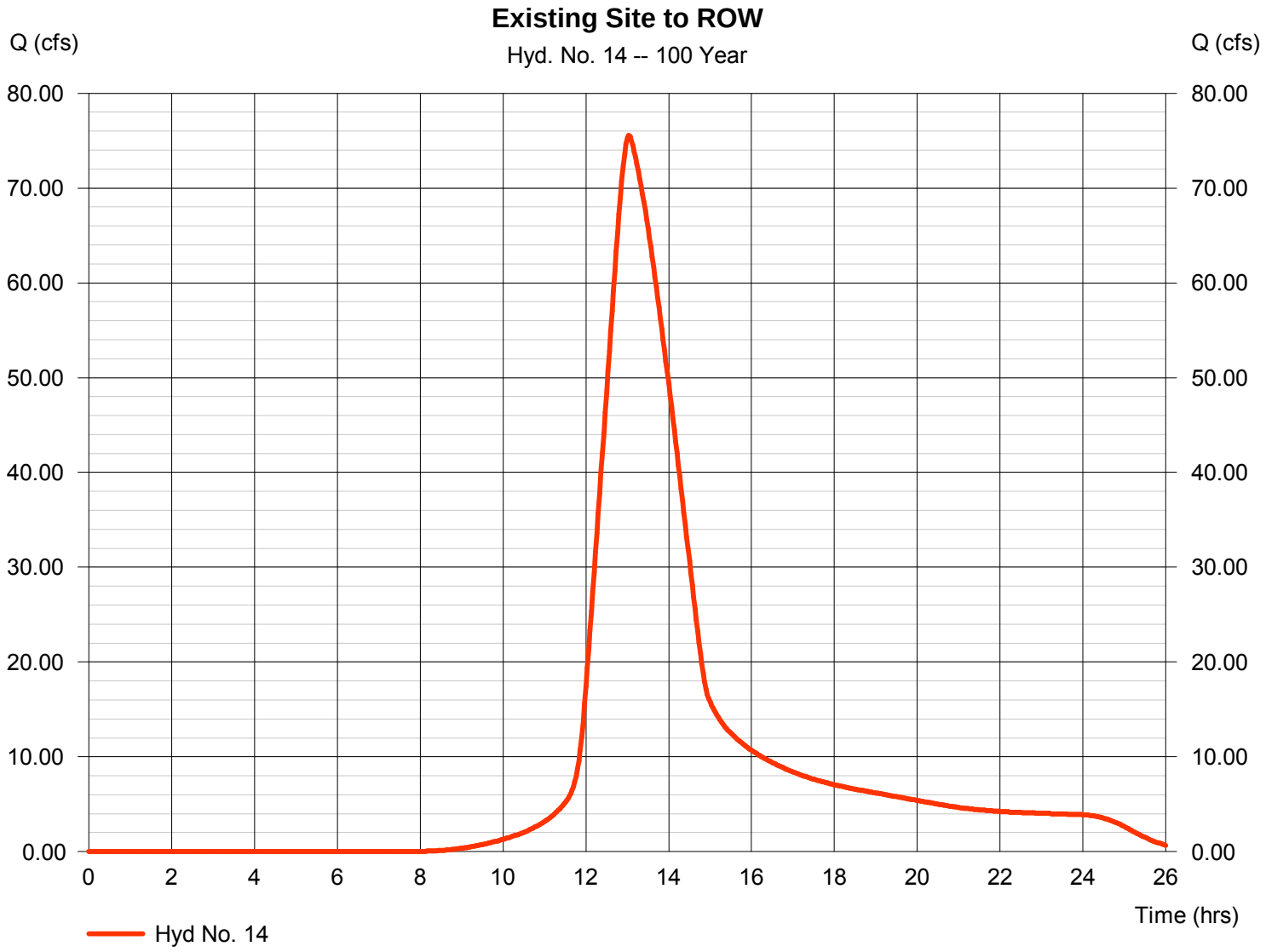


Hydrograph Report

Hyd. No. 14

Existing Site to ROW

Hydrograph type	= SCS Runoff	Peak discharge	= 75.58 cfs
Storm frequency	= 100 yrs	Time to peak	= 13.03 hrs
Time interval	= 2 min	Hyd. volume	= 786,574 cuft
Drainage area	= 49.000 ac	Curve number	= 71
Basin Slope	= 0.6 %	Hydraulic length	= 2600 ft
Tc method	= LAG	Time of conc. (Tc)	= 114.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484



Hydraflow Rainfall Report

Return Period (Yrs)	Intensity-Duration-Frequency Equation Coefficients (FHA)			
	B	D	E	(N/A)
1	27.8967	9.8000	0.7047	--------
2	76.3137	14.3000	0.8844	--------
3	1.2000	0.1000	0.0000	--------
5	52.6224	11.2000	0.7497	--------
10	55.1841	11.1000	0.7229	--------
25	60.7012	11.1000	0.7068	--------
50	66.9222	11.3000	0.7004	--------
100	62.2794	10.1000	0.6624	--------

File name: wich_IDF.IDF

Intensity = B / (Tc + D)^E

Return Period (Yrs)	Intensity Values (in/hr)											
	5 min	10	15	20	25	30	35	40	45	50	55	60
1	4.18	3.40	2.90	2.55	2.29	2.08	1.91	1.78	1.66	1.56	1.48	1.40
2	5.57	4.54	3.85	3.35	2.97	2.67	2.43	2.23	2.06	1.92	1.80	1.69
3	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20
5	6.52	5.33	4.55	3.99	3.57	3.24	2.97	2.75	2.57	2.41	2.27	2.15
10	7.40	6.09	5.22	4.60	4.13	3.76	3.46	3.21	3.00	2.82	2.67	2.53
25	8.51	7.03	6.05	5.35	4.81	4.39	4.05	3.76	3.52	3.32	3.14	2.98
50	9.47	7.86	6.78	6.00	5.41	4.94	4.56	4.24	3.98	3.75	3.55	3.37
100	10.31	8.53	7.37	6.53	5.90	5.40	5.00	4.66	4.37	4.13	3.92	3.73

Tc = time in minutes. Values may exceed 60.

Precip. file name: wich_24hr.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	2.80	3.50	1.20	4.50	5.20	6.10	6.90	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	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-3rd	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-4th	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Huff-Indy	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Custom	0.00	1.75	0.00	2.80	3.90	5.25	6.00	7.10

Hydraflow Table of Contents

25 - Year

50 - Year

100 - Year

HydraFlow Express

Existing Culverts

Culvert Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2011 by Autodesk, Inc. Tuesday, Feb 7 2012

Ell Culvert

Invert Elev Dn (ft)	= 1323.30
Pipe Length (ft)	= 45.00
Slope (%)	= 0.22
Invert Elev Up (ft)	= 1323.40
Rise (in)	= 28.0
Shape	= Ell
Span (in)	= 44.0
No. Barrels	= 2
n-Value	= 0.013
Inlet Edge	= 0
Coeff. K,M,c,Y,k	= 0.0045, 2, 0.0317, 0.69, 0.5

Embankment

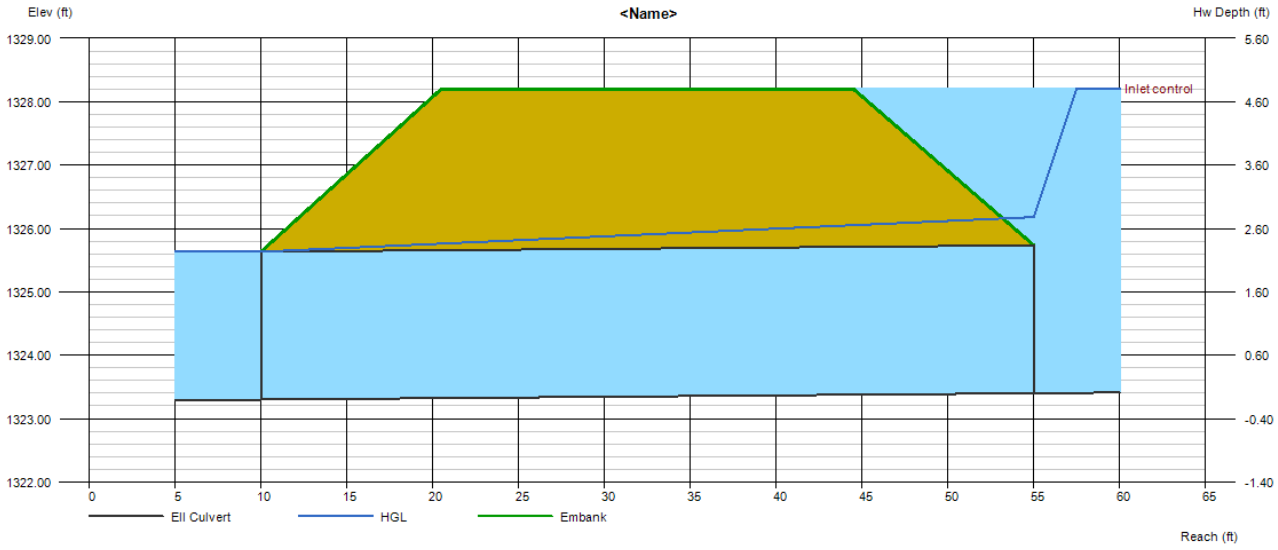
Top Elevation (ft)	= 1328.20
Top Width (ft)	= 24.00
Crest Width (ft)	= 20.00

Calculations

Qmin (cfs)	= 10.00
Qmax (cfs)	= 200.00
Tailwater Elev (ft)	= (dc+D)/2

Highlighted

Qtotal (cfs)	= 135.00
Qpipe (cfs)	= 135.00
Qovertop (cfs)	= 0.00
Veloc Dn (ft/s)	= 10.05
Veloc Up (ft/s)	= 10.05
HGL Dn (ft)	= 1325.63
HGL Up (ft)	= 1326.18
Hw Elev (ft)	= 1328.21
Hw/D (ft)	= 2.06
Flow Regime	= Inlet Control



Water Quality Calculations

Moorings Commercial Water Quality Data & Computations
Completed by: trk
Date: 2/13/2012

Notes & Assumptions:
1

Basin	Area	Effect
A	7.6	
B	13.8	
C	14.5	
D	5.3	
E	9.5	
F	4.2	
Total	50.7	

Impervious Cover %	0.85
Hydrologic Soil Group C	Rv Values
Undisturbed Woods	R_{VU} = 0.03
Turf/ Disturbed Soils	R_{VD} = 0.20
Impervious Cover	R_{VI} = 0.95

Equations
$WQ_V = R_V*A/10$
$R_V = R_{VU}*U+R_{VD}*D+R_{VI}*I$
U = undisturbed/total area
D = dist. perv./total area
I = impervious/total area

	Drainage Basin Area	Pond Area	Treatment Area	Undisturbed Area	Disturbed Pervious	Impervious Area
Basin	Acre	Acre	Acre	Acre	Acre	Acre
A	7.6	1.2	6.4	0.0	1.0	5.4
B	13.8	1.3	12.5	0.0	1.9	10.6
C	14.5	1.9	12.6	0.0	1.9	10.7
D	5.3	0.0	5.3	0.0	0.8	4.5
E	9.5	0.9	8.6	0.0	1.3	7.3
F	4.2	0.6	3.6	0.0	0.5	3.1
Totals:	54.9	5.9	49.0	0.0	7.4	41.7

Calculations			
U	D	I	Totals
0.00	0.15	0.85	1.0

Pond Volume Below Static Pool						
	Static Area		Pond Bottom Area		Depth	Volume
Basin	Sq.Ft.	Acre	Sq. Ft.	Acre	Feet	Acre-Ft.
A	**42000**	**0.96**	**32000**	**0.73**	**1**	0.8
B	**56000**	**1.29**	**50000**	**1.15**	**1**	1.2
C	**55000**	**1.26**	**56000**	**1.29**	**1**	1.3
D	**0**	**0.00**	**0**	**0.00**	**0**	0.0
E	**33000**	**0.76**	**24000**	**0.55**	**1**	0.7
F	**25000**	**0.57**	**22000**	**0.51**	**1**	0.5
Totals:		4.8		4.2		4.5

Pond Volume > WQv		
Pond	WQv	Check
4.5	4.1	**Yes**

Calculations		
Rv	Area	WQv
	Acres	Acre-Ft.
0.8	49.0	4.1

Percolation Test Results

Geotechnical Services, Inc.

GSI Geotechnical Services, Inc.
Superior service...practical solutions

4503 E. 47th St. S.
Wichita, KS 67210
(316) 554-0725 tel
(316) 554-0744 fax
www.gsinetwork.com

January 6, 2012

Trevor Kurth, P.E.
Baughman Company, P.A.
315 Ellis
Wichita, KS 67211

RE: Moorings Commercial Percolation Test
North Meridian Avenue
Wichita, Kansas
GSI Project 117435

Dear Mr. Kurth:

At your request, representatives of Geotechnical Services Inc. (GSI) performed a percolation test for the referenced project. The test was performed at the location indicated on the attached site plan.

On December 29, 2011 we advanced an 8-inch diameter hole to a depth of 30 inches. The hole was presoaked for 28 hours prior to performing the percolation test. The percolation test was performed by measuring the drop in the water level during a 30 minute period. A total of 6 measurements were taken over an elapsed time of 3 hours. The test results are provided below.

TABLE 1 – PERCOLATION TEST DATA

Trial No.	1	2	3	4	5	6
Start Time	3:20	3:50	4:20	4:50	5:20	5:50
End Time	3:50	4:20	4:50	5:20	5:50	6:20
Elapsed Time (min)	30	30	30	30	30	30
Drop in Water (in)	1	1	1	1	1	1

Based on this data, the percolation rate for this location averages 1 inch of drop per 30 minutes.

At the conclusion of the percolation test, the boring was extended to a depth of 54 inches below existing grade to prepare a soil profile. The general profile is as follows:

0" to 12"	Dark brown topsoil
12" to 48"	Light brown silty clay
48" to 54"	Light brown silty sand

Please contact our office should you have any questions regarding this testing or if we may be of service.

Respectfully,
Geotechnical Services Inc.

David A. Edwards, P.E.
Senior Vice President

Thomas C. Kettler, Jr., P.E.
Project Engineer

DAE/TCK/de

Enclosure: Percolation Test Location Plan

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W DRIFTWOOD CIR
N COBBLESTONE ST
W DRIFTWOOD ST
N SANDKEY CT
N SANDKEY ST
N MERIDIAN AVE
W BACHMAN DR
N WATERFORD ST
PERC TEST
APPROX 4-5' DEPTH
700'
700'
W 42ND ST N
N COBBLESTONE ST
N
W
E
S
MOORINGS COMMERCIAL
0 75 150 300
Feet
Baughman
ENGINEERING | SURVEYING | PLANNING
LANDSCAPE ARCHITECTURE

Drainage Plan

1:100 Scale

DRAINAGE PLAN

LAKESIDE AT THE MOORINGS

WICHITA, SEDGWICK COUNTY, KANSAS

VICINITY MAP
SEC. 24, T26S, R1W
SEC. 25, T26S, R1W

0 100 200

DATE OF PREPARATION: 10 OCTOBER 2011
DATE OF TOPOGRAPHY: 30 SEPTEMBER 2010
CONTOUR INTERVALS = 1 FOOT
CONTOURS PROVIDED BY SEDGWICK COUNTY, KANSAS (NAVD88)

DETENTION A (Bottom = 1325.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	26 cfs	0.1 cfs	1326.1
10 yr	40 cfs	1.6 cfs	1326.7
100 yr	61 cfs	3.7 cfs	1327.4

EXISTING POND	
ELEVATION	AREA (sq ft)
1325	32000
1326	42000
1327	52000
1328	62000
1329	72000

DETENTION B (Bottom = 1325.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	47 cfs	1.0 cfs	1326.4
10 yr	73 cfs	4.4 cfs	1327.1
100 yr	111 cfs	8.5 cfs	1328.1

EXISTING POND	
ELEVATION	AREA (sq ft)
1325	50000
1326	56000
1327	64000
1328	71000
1329	75000

DETENTION C (Bottom = 1325.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	49 cfs	3.5 cfs	1325.4
10 yr	77 cfs	9.0 cfs	1326.2
100 yr	122 cfs	20 cfs	1327.1

EXISTING POND	
ELEVATION	AREA (sq ft)
1324	50000
1325	55000
1326	68000
1327	81000
1328	94000

DETENTION E (Bottom = 1324.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	32 cfs	1.6 cfs	1325.7
10 yr	50 cfs	3.7 cfs	1326.4
100 yr	77 cfs	6.9 cfs	1327.3

EXISTING POND	
ELEVATION	AREA (sq ft)
1324	24000
1325	33000
1326	41000
1327	49000
1328	58000

DETENTION F (Bottom = 1325.0)			
STAGE	INFLOW	OUTFLOW	ELEVATION
2 yr	14 cfs	0.1 cfs	1326.0
10 yr	19 cfs	3.6 cfs	1326.4
100 yr	34 cfs	12 cfs	1326.9

EXISTING POND	
ELEVATION	AREA (sq ft)
1325	22000
1326	25000
1327	28000

EXISTING BASIN
Scale 1:400

LEGEND	
(A)	Basin Labels
	Proposed SWS
	Proposed SWS
	Flow Direction

NOTES: No FEMA SFHA exists on this property as of this date.

The proposed Bio-retention area / dry detention areas will be utilized for WQ, CP, and overall site detention. These areas may incorporate multiple TSS removal features. These areas will be above groundwater and will utilize infiltration into the in situ sandy soils.

Underground SWS is anticipated to be utilized on site per site development.

DRAINAGE PLAN
LAKESIDE AT THE MOORINGS
06 FEB 2012

Baughman Company, P.A.
315 Elm St. Wichita, KS 67211 P 316.262.7271 F 316.262.0149
Baughman ENGINEERING | SURVEYING | PLANNING | LANDSCAPE ARCHITECTURE

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