

**NORTHBOROUGH 3<sup>RD</sup> ADDITION REPLAT**

**DRAINAGE REPORT**



**POE & ASSOCIATES, INC.**  
**CONSULTING ENGINEERS**  
5940 E. Central, Suite 200 ■ Wichita, KS 67208-4242  
Phone 316/685-4114 ■ FAX 316/685-4444

AUGUST 2007



## Public Works, Engineering Division Final Drainage Plan Submittal Checklist

Reviewer: <u>Timothy R. Austin, P.E.</u>	Date: <u>14 September 2007</u>
Subdivision Name: <u>Northborough 3rd Addition Replat</u>	Location: <u>NW 1/4, Section 7-T27S-R2E</u>
Total Land Area Of Ownership: <u>47.57</u> Acres	
Type: <input type="checkbox"/> Residential <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Recreation <input type="checkbox"/> Municipal <input type="checkbox"/> Other	
Applicant: <u>Berexco, Inc.</u>	Contact: <u>Robert Beren</u> Phone #: <u>                    </u>
Engineer: <u>Poe &amp; Associates, Inc.</u>	Contact: <u>Jason P. Dickman, P.E.</u> Phone # <u>(316) 685-4114</u>

Please check the appropriate box:

I = Included; NA = Non-Applicable; R= Required prior to development  
(If "NA" is checked, an explanation must be entered)

Tab 1. Project Narrative	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Site Location Map, using USGS Map	✓			✓	
B. Discussion of development, existing conditions, and proposed impacts on stormwater, wetland, riparian, and flood plain	✓			✓	
C. Discussion of offsite conditions	✓			✓	
D. Summary of runoff calculations (pre/post development) No increase in peak discharge for all storm series	✓			✓	
E. Narrative description of the type and function of the permanent best management practices that are incorporated into the site design	✓			✓	
F. Copy of the plat	✓			✓	
G. Preliminary grading plan (The final grading plan shall be sealed, signed and dated prior to Engineering receiving the final sanitary sewer plans. One plan sheet and PDF shall be submitted to the Subdivision Engineer.)	✓			✓	
H. Professional Engineer seal, signature and date on cover of report	✓			✓	
I. CD of drainage plan in PDF format (one file) and one paper copy bound with this checklist included behind the cover	✓			✓	

Tab 2. Existing Conditions Runoff Calculations	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Copy of applicable orthophoto showing proposed project boundaries (preferable in color)	✓			✓	
B. Runoff Method (Rational, Hydrograph Method, or other approved methods by Engineering)	✓			✓	
C. Existing topography (no greater than 2-foot contours, 1-foot recommend)	✓			✓	
D. Total Site Area and Total Impervious Area (acres)	✓			✓	
E. Benchmarks used for site control	✓			✓	
F. Streams, creeks, and waterway labeled	✓			✓	
G. Predominant soils from USDA soil surveys, and/or on site soil borings	✓			✓	
H. Location and boundaries of natural features such as wetlands, lakes, and ponds with the normal water elevation noted	✓			✓	
I. Location of existing roads, buildings, parking lots and other impervious areas.	✓			✓	



J. Location of existing utilities (e.g., water, sewer, gas, electric) and easements	✓			✓	
K. Location of existing conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	✓			✓	
L. Flow paths	✓			✓	
M. Location and dimensions of existing channels, bridges or culvert crossings	✓			✓	
N. Existing conditions hydrologic analysis for runoff rates, volumes and velocities showing methodologies used and supporting calculations (2, 5, 10, 25 & 100 year, 24-hour storm events) or Critical Duration	✓			✓	
O. Assumed pre-developed runoff curve numbers	✓			✓	
P. Existing time of concentrations used in calculations	✓			✓	
Q. Evaluate immediate downstream drainage capacity, not to exceed more than 0.25 miles downstream of site	✓			✓	
R. Existing structural elevations (e.g., invert of pipes, manholes, etc.)	✓			✓	
S. Cross-section data for open channels	✓			✓	
T. Ground water elevations, if applicable	✓			✓	

Tab 3. Post-Development Hydrologic Analysis	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Proposed (post-development) conditions hydrologic and hydraulic analysis for runoff rates, volumes, HGL, and velocities showing the methodologies used and supporting calculations for all applicable design storms (2, 5, 10, 25 & 100 year, 24-hour storm events)	✓			✓	
B. Proposed time of concentrations used in calculations	✓			✓	
C. Assumed post-developed runoff curve numbers	✓			✓	
D. Proposed contours for detention facilities (to equal area used in outlet rating curves)	✓			✓	
E. Preliminary sizing calculations for stormwater controls including contributing drainage area, storage, and outlet configuration	✓			✓	
F. Stage-storage-discharge or outlet rating curves and inflow and outflow hydrographs for storage facilities	✓			✓	
G. Final analysis of potential upstream/downstream impact/effects of project, where necessary	✓			✓	
H. Existing and proposed structural elevations (e.g., invert of pipes, manholes, etc.)	✓			✓	
I. Design water surface elevations and normal pool elevation for ponds.	✓			✓	
J. Typical detail for outlet structures, embankments, spillways, grade control structures, conveyance channels, etc. To include height, width, elevation, and/or diameter.	✓			✓	
K. Proposed limits of clearing and grading	✓			✓	
L. Location of existing and proposed roads, buildings, parking lots and other impervious areas.	✓			✓	
M. Location of existing and proposed utilities (e.g., water, sewer) and easements	✓			✓	
N. Location of existing and proposed conveyance systems such as storm drains, inlets, catch basins, channels, swales, and areas of overland flow	✓			✓	
O. Preliminary location and dimensions of proposed channel modifications, such as bridge or culvert crossings	✓			✓	



P. Preliminary selection and location of stormwater controls	✓			✓	
Q. Emergency overflow structure's flow path	✓			✓	
R. Detention facility provides one-foot of freeboard above the HWL and emergency outfall shown (top of berm elevation shown)	✓			✓	
S. The 100-year 24-hour HWL delineated on the plan for detention pond	✓			✓	
T. Lowest opening elevations table on the plat for structures located adjacent to channels or ponds	✓			✓	
U. Stormwater Management Facilities located within a Reserve	✓			✓	
V. Maintenance responsibility of stormwater management facility shall be specified in the platters text. (e.g. HOA, Lot Owners Association, or lot)	✓			✓	
W. Off-site drainage easements or agreements required, where necessary	✓			✓	

Tab 4. Floodplain Submittal	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Provide source of flood profile		✓	No floodplain or floodway limits on site		✓
B. Nearest base flood elevations		✓	No floodplain or floodway limits on site		✓
C. Delineation of pre-developed regulatory floodplain/floodway limits		✓	No floodplain or floodway limits on site		✓
D. Delineation of post-developed regulatory floodplain and floodway limits		✓	No floodplain or floodway limits on site		✓
E. Floodplain boundary determination per elevation (project limits shown)		✓	No floodplain or floodway limits on site		✓
F. Provide source of floodway data table and discharges		✓	No floodplain or floodway limits on site		✓
G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations and flood plain map revisions or required permits		✓	No floodplain or floodway limits on site		✓
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions		✓	No floodplain or floodway limits on site		✓
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)		✓	No floodplain or floodway limits on site		✓
J. Flood plains and floodways located within a Reserve, where necessary		✓	No floodplain or floodway limits on site		✓

Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	Applicant			Engr	
	I/R	NA	Explanation / Location in Plan	I/R	NA
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)		✓	Not Required		✓
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)		✓	Not Required		✓
C. Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.) Shall be included and approved when project modifies the limits of the floodway.		✓	Not Required		✓
D. Kansas Department of Transportation		✓	Not Required		✓
E. Sedgwick County Right-of-way Permit		✓	Not Required		✓

## **Tab 1. Project Narrative**

### **A. Site location map, using USGS Map**

Northborough 3<sup>rd</sup> Addition Replat is a 47.57-acre tract of land located in the northwest quarter of Section 7-T27S-R2E in the City of Wichita, Sedgwick County, Kansas. The site is bounded on the north by 21<sup>st</sup> Street North, on the east by Rock Road, on the south by 13<sup>th</sup> Street North, and on the west by Woodlawn Avenue. See Exhibit 1-1 for USGS Map.

### **B. Discussion of development, existing conditions, and proposed impacts**

The current zoning of this property allows multi-family (MF-18 under CUP DP-67) and general office (GO under CUP DP-67) types of use. It is anticipated that this site will be developed as an office warehouse and residential subdivision. Typically, this type of development will increase the impervious area of the property over the existing land use. Such would be true with this addition. Assumptions for design flows in a multi-family area include an impervious area of up to 65% within the proposed development.

Developed conditions will take advantage of the natural grades over the majority of the site. Detention in the southern portion of Lot 1, Block 1 (see Exhibit 1-3 for plats) will ensure that developed flows are at or below current flows exiting the site. The existing detention area at the same location will be expanded to provide the added storage for the proposed drainage areas. Off-site drainage enters this development from the north and east and into the existing drainage ditch along the east property line. This east ditch shall be extended to the south as part of this development. The west off-site drainage does not currently enter the site. The run-off is directed to an existing ditch to the west of the west line of Lot 11, Block 2. This development will require that the west ditch be re-graded and extended along the south line of the property as all of the west off-site flows combine with the remaining flows just south of this project.

Presently, the site is made up of vacant land with the exception of the existing building at the northwest corner of Lot 1, Block 1. Gypsum Creek drains generally north to south just east of the center of the site and off-site near the center of the south line of the property. A portion of the site drains to the existing detention pond and then the pond discharge and the remainder of the site drains into Gypsum Creek. The northern and eastern run-off then flows through a 20-foot wide flat bottom ditch that also drains to Gypsum Creek. The land has natural slopes ranging from less than 1% to roughly 3%. According to the NRCS Soil Survey, the predominant soil type in this development is a Rosehill Silty Clay series material. The northwestern area of the site contains Goessel Silty Clay material. See Exhibit 1-2 for NRCS Soil Survey map and information showing existing soil types and descriptions.

The site does not contain a platted floodway and the entire area is within Zone X on the FEMA floodway mapping. Refer to Exhibit 1-3 for the Northborough Addition plats, and Exhibit 1-4 for FIRM Panels 0357E and 0359E Wichita, Sedgwick County, Kansas, February 2, 2007. Any impact on storm water shall be addressed in the summary of run-off calculations.

### C. Discussion of off-site conditions

Developed areas surround this site. Commercial uses lie to the east, and residential uses surround the remainder of the area. Small, undeveloped lots border the west line of Lot 11, Block 2 and the south property line. The original, modern land use for the site was a mixture of commercial, residential, and limited-industrial uses.

The overall upstream drainage basin for this area of Gypsum Creek contains less than 183 acres. See Exhibit 1-5 for delineation of the entire drainage basin. Land use within the drainage basin varies from residential, open space, limited industrial, and commercial in character. Upstream, storm water enters the site via a mixture of underground storm sewers and open channel flows. Then, all off-site flows route through the proposed site in a 20-foot wide drainage channel and then south away from this development.

### D. Summary of run-off calculations

Existing Conditions (24-Hour Storm)							
Site	Area	CN	2-Year	5-Year	10-Year	25-Year	100-Year
Off-Site W	12.061	89.1	32.69	44.30	53.00	64.55	81.78
Off-Site NW	4.332	95.0	13.90	17.98	21.02	25.05	31.08
Off-Site N	75.236	87.0	189.30	261.36	315.67	388.05	496.19
Off-Site NE	30.345	87.0	76.35	105.41	127.32	156.51	200.13
Off-Site SE	13.386	87.0	33.68	46.50	56.16	69.04	88.28
E-1	3.961	82.7	4.71	6.80	8.42	10.61	13.92
E-2	5.723	83.0	8.21	11.76	14.53	18.28	23.92
E-3	27.034	83.0	29.03	41.70	51.42	64.64	84.67
E-4	10.854	81.6	21.53	31.46	39.11	49.46	65.11
West Ditch	16.022	-	32.86	44.86	54.10	66.92	86.22
Existing Pond	5.723	82.8	0.00	0.79	3.41	14.34	26.28
East Channel	120.767	-	254.35	357.97	436.45	541.31	698.23
Central Channel	182.932	-	313.63	447.66	549.58	685.98	890.25

Developed Conditions (24-Hour Storm)							
Site	Area	CN	2-Year	5-Year	10-Year	25-Year	100-Year
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Off-Site NE	30.345	87.0	76.35	105.41	127.32	156.51	200.13
Off-Site SE	13.386	87.0	33.68	46.50	56.16	69.04	88.28
DA-1	3.397	92.0	10.09	13.34	15.77	18.99	23.78
DA-2	19.255	91.1	55.61	73.99	87.73	105.98	133.20
DA-3	5.338	92.0	15.85	20.97	24.78	29.84	37.37
DA-4	1.513	92.0	3.61	5.02	6.09	7.53	9.69
DA-5	15.067	84.8	34.83	49.09	59.92	74.42	96.16
DA-6	3.003	92.0	8.92	11.80	13.94	16.78	21.02
Prop. West Ditch	15.458	-	34.96	47.47	56.94	69.62	88.68
Proposed Pond	24.593	-	0.00	0.00	2.16	6.05	21.23
Prop. Channel	182.932	-	308.38	437.36	535.77	668.05	867.36

The 183-acre upstream drainage basin is currently near a fully developed condition and run-off detention occurs for all the areas around this property. With that, the flows used for

calculating off-site run-off to this site do not account for detention. This results in conservative/higher flow rates entering the site. Current off-site flow is used for both the existing and developed conditions. Then, the majority of the off-site flow is routed through a 20'-wide ditch running along the east property line of the project and does not interfere with any on-site drainage until exiting to the south. The current flows for the development, based on existing and proposed conditions are shown in the table above. Detention storage will be provided to reduce developed flows to match the existing flows after the site is fully developed (summary information shown as Hydrograph Return Period Recap attached herewith as Exhibit 1-6). The existing site drainage is set up as four areas as shown on the attached drainage plan, Exhibit 1-7. Proposed drainage is divided into six major areas and further subdivided to route drainage to the proposed storm sewer facilities (see Exhibit 1-7). Routing will be through storm sewers with bypass flows into downstream storm sewers or driving lanes on the site as needed. Run-off from DA-2, DA-3, & DA-4 will be routed to the detention pond in Lot 1, Block 1 as shown on Exhibit 1-7.

Time of concentration for the all off-site areas area is estimated to be 15 minutes based upon a fully developed condition with storm sewer networks routing all flows to the property. On-site  $T_c$  for each existing area is estimated by the TR-55 method. Area E-1 has a  $T_c$  of over 42 minutes, E-2 has an existing  $T_c$  of nearly 38 minutes, E-3 has an existing  $T_c$  of over 60 minutes, and E-4 has an existing  $T_c$  of 15 minutes as it is all channel flows,. The developed  $T_c$  for all areas will be 15 minutes. On-site detention is recommended for the site when developed. Therefore, the added flows from the developed site will be detained to keep post-developed flows at or below the current flows. It is assumed that immediate downstream capacities are adequate for the current existing flows. The final design of on-site drainage systems shall comply with current City of Wichita design criteria.

#### **E. Narrative description of permanent best management practices**

The contractor shall provide stabilized construction entrance prior to any street paving. A buffer of 10 feet of undisturbed native vegetation shall be maintained around perimeter of site where possible. Earthwork stockpiles shall be maintained away from any ponds. Fuel storage and refueling of equipment shall not be allowed around any ponds, drainage channels, or other waterways. Sediment barriers will be placed at storm sewer inlets and rock riprap at outlets. Sediment barriers (type determined by owner or contractor) shall be used to prevent sediment from flowing off site. Disturbed earth shall be stabilized where construction activity ceases for at least 21 days with owner's choice of mulch, temporary seed (Rye grass) during the planting season or other suitable BMP device. BMP devices shall be in place until there is a good stand of grass. Disturbed portions of the site where construction activities permanently cease shall be stabilized with permanent seed no later than 21 days after the last construction activity in that area (during the planting season only). The permanent seed shall consist of fescue or grass chosen by the owner. BMP devices shall be used at back of curb/edge of pavement until vegetation is 75% established.

#### **F. Copy of plat**

Copies of the plats are attached as Exhibit 1-3.

**G. Preliminary grading plan**

A Preliminary Grading Plan is found on Exhibit 1-8.

**H. Professional Engineer Seal**

A signed and dated Professional Engineer's seal is located on the cover of this report.

**I. CD of drainage plan**

A CD of this report in full is attached herewith.

**NORTHBOROUGH 3RD ADDITION REPLAT**

**EXHIBIT 1-1**

**USGS QUADS**

**K-96**

**29TH STREET NORTH**

**T26S  
T27S**

**WOODLAWN AVENUE**

**ROCK ROAD**

**21ST STREET NORTH**

**NORTHBOROUGH 3RD  
ADDITION REPLAT**

**13TH STREET NORTH**

**R1E  
R2E**



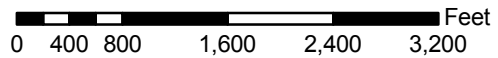
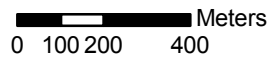
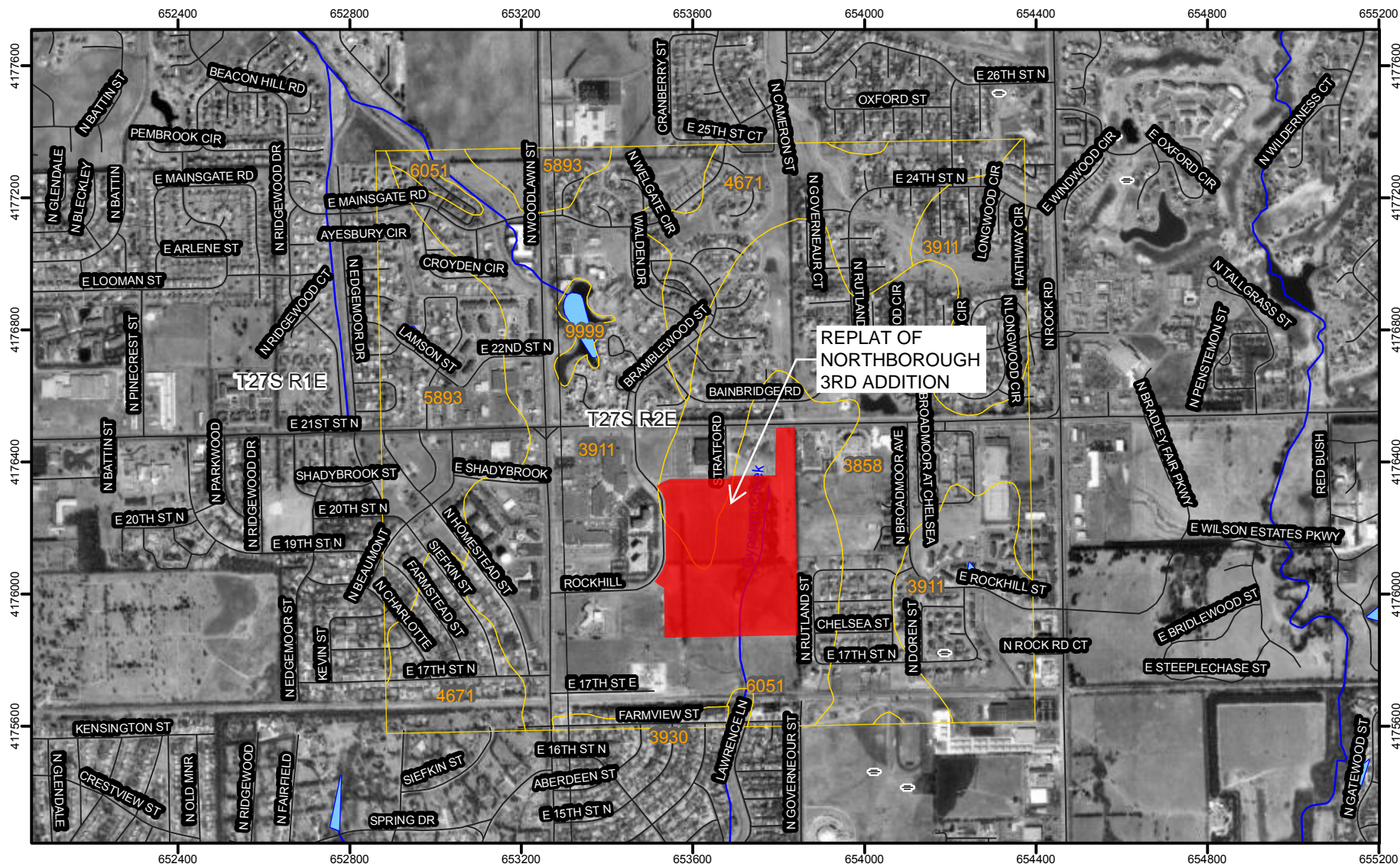
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**NORTHBOROUGH 3RD ADDITION REPLAT**



































**EXHIBIT 1-2**

# SOIL SURVEY OF SEDGWICK COUNTY, KANSAS



# SOIL SURVEY OF SEDGWICK COUNTY, KANSAS

## MAP LEGEND

	Soil Survey Areas
	Soil Map Units
	Roads
	Water
	Hydrography
	Oceans
	Escarpment, bedrock
	Escarpment, non-bedrock
	Gulley
	Levee
	Slope
	Blowout
	Borrow Pit
	Clay Spot
	Depression, closed
	Eroded Spot
	Gravel Pit
	Gravelly Spot
	Gulley
	Lava Flow
	Landfill
	Marsh or Swamp
	Miscellaneous Water
	Rock Outcrop
	Saline Spot
	Sandy Spot
	Slide or Slip
	Sinkhole
	Sodic Spot
	Spoil Area
	Stony Spot
	Very Stony Spot
	Perennial Water
	Wet Spot

## MAP INFORMATION

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>

Coordinate System: UTM Zone 14

Soil Survey Area: Sedgwick County, Kansas

Spatial Version of Data: 1

Soil Map Compilation Scale: 1:24000

Map comprised of aerial images photographed on these dates:  
 10/1/1991; 3/20/1996

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

## Map Unit Legend Summary

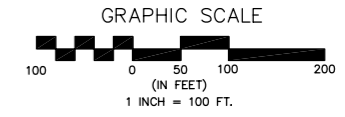
## Sedgwick County, Kansas

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
3858	Goessel silty clay, 1 to 3 percent slopes	180.2	21.0
3911	Rosehill silty clay, 1 to 3 percent slopes	432.5	50.5
3930	Urban land-Irwin complex, 1 to 3 percent slopes	6.1	0.7
4671	Irwin silty clay loam, 1 to 3 percent slopes	118.5	13.8
5893	Farnum loam, 1 to 3 percent slopes	106.1	12.4
6051	Elandco silt loam, frequently flooded	6.6	0.8
9999	Water	6.2	0.7

**NORTHBOROUGH 3RD ADDITION REPLAT**

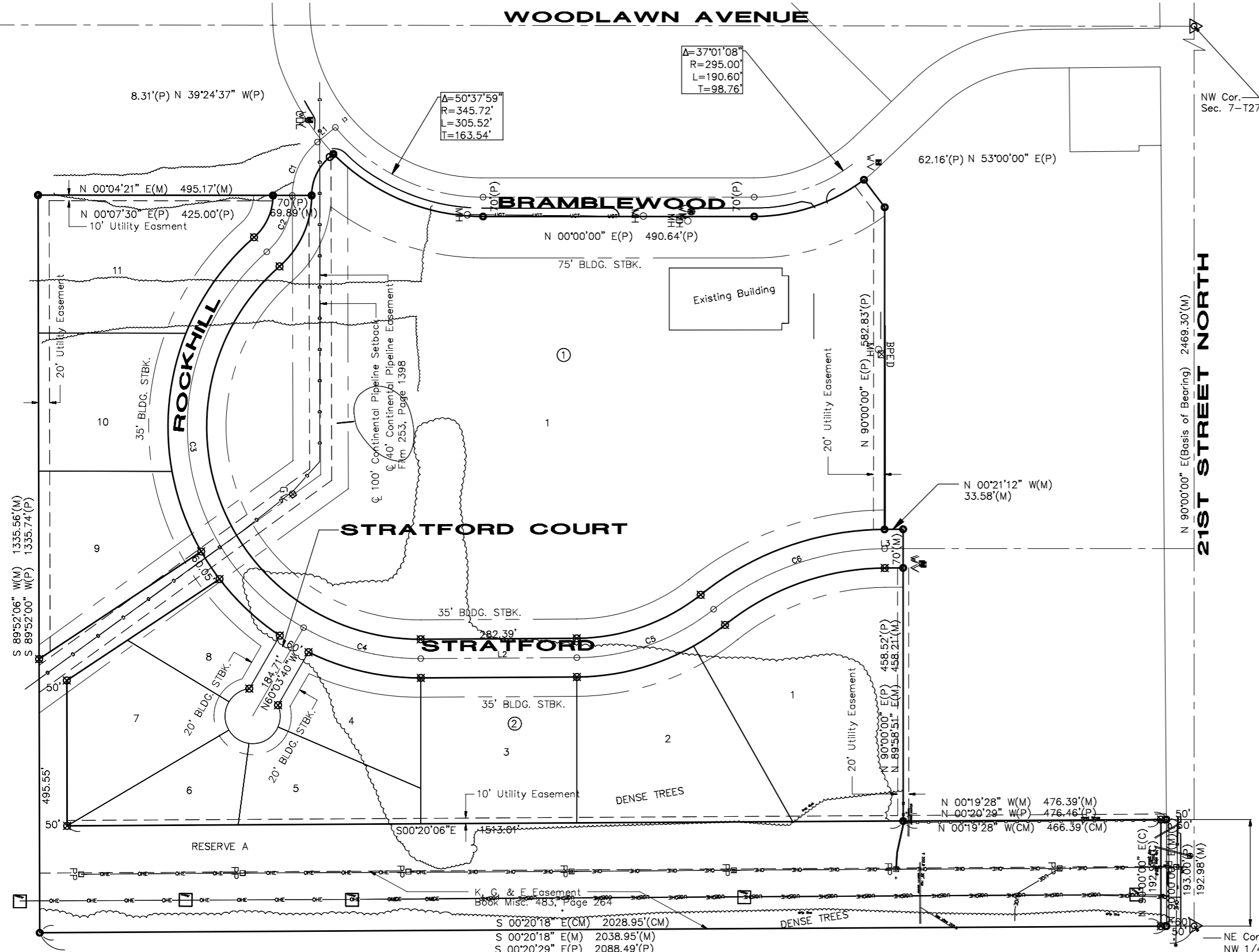
**EXHIBIT 1-3**

**WOODLAWN AVENUE**



**LEGEND**

- (M) = Measured
- (P) = Platted
- = 3/4" Iron Pipe (Found)
- = 1/2" Iron Pipe (Found)
- = 5/8" Rebar w/PEC Cap(Found)
- ⊗ = 5/8" Rebar w/POE Cap(Set)
- ▲ = Section Corner
- ▨ = Asphalt
- BPED = Bell Pedestal
- = Bollard
- ☼ = Cedar
- ⊗ = Cleanout
- ▨ = Concrete
- 129g = Contour Elevation
- ♀ = Fire Hydrant
- ER = Electric Riser
- = Fence
- = Gas
- GM = Gas Meter
- GV = Gas Valve
- ▨ = Gravel
- GP = Guard Post
- ↓ = Guy Anchor
- ↓ = Light Pole
- MB = Mailbox
- MH = Manhole
- = Overhead Electric
- = Overhead Telephone
- PP = Power Pole
- = Sanitary Sewer
- = Shrub
- = Sign
- SWS = Storm Water Sewer
- ☼ = Tree
- CATV = Underground Cable T.V.
- UGE = Underground Electric
- UGT = Underground Telephone
- = Water
- WM = Water Meter
- WV = Water Valve



CURVE					
CURVE	LENGTH	RADIUS	CHORD	CH.BEARING	DELTA
C1	110.52	124.83	106.95	S64°47'15"E	50°43'44"
C2	115.52	135.00	112.03	N65°38'14"W	49°01'45"
C3	798.55	420.00	683.59	N84°24'31"E	108°56'15"
C4	221.93	420.00	219.35	N14°48'09"E	30°16'29"
C5	267.61	400.00	262.65	N19°30'05"W	38°19'59"
C6	334.51	500.00	328.30	S19°30'07"E	38°19'54"

LINE TABLE		
LINE	LENGTH	BEARING
L1	41.87	S39°25'23"E
L2	282.39	N00°20'06"W
L3	33.37	N00°20'10"W

**ONE STEP FINAL PLAT OF  
A REPLAT OF NORTHBOROUGH 3RD ADDITION  
TO WICHITA, SEDGWICK COUNTY, KANSAS  
LOCATED IN THE NW 1/4, SECTION 7, T27S, R2E OF THE 6 P.M.**

I, Kenneth O. Taylor, Civil Engineer in said State and County, do hereby certify that I have surveyed and platted "NORTHBOROUGH", an Addition to Wichita, Sedgwick County, Kansas and that the accompanying plat is a true and correct exhibit of said survey described as follows: The NW 1/4 of Section 7, T27S, R2E of the 6th P.M., Sedgwick County, Kansas except the south 562 feet thereof and except that part of said NW 1/4 platted as Hebrew Congregation Addition to Wichita, Kansas being the north 455 feet of the south 1017 feet of Government Lot 2 in said NW 1/4 of said Section 7.

*Kenneth O. Taylor*, Civil Engineer  
Kenneth O. Taylor

Know all men by these presents that we, Theodore Gore and Rosalyn Gore, husband and wife, Robert M. Beren and Joan S. Beren, husband and wife and Theodore I. Leben and Aileen J. Leben, husband and wife, have caused the land described in the Civil Engineer's certificate to be platted into lots, reserves, blocks, streets and drainage dedications to be known as "NORTHBOROUGH", an Addition to Wichita, Sedgwick County, Kansas. Utility easements as indicated on the plat are hereby granted for the construction and maintenance of all public utilities. Drainage easements and access easements as indicated on the plat are hereby granted. Reserve A, Block 4, Reserve A, Block 5 and Reserve A, Block 6 are reserved for common open space, related community facilities, drainage and utility easements. Reserve B is reserved for landscaping and/or directory signs for the residential area. All abutter's rights of access to or from Woodlawn Avenue, over and across the west line of Lots 1, 2 and 3, Block 1 are hereby granted to the City of Wichita, provided, however, that Lots 1, 2 and 3, Block 1 shall have access to Woodlawn Avenue at two locations each, except over and across the north 40 feet of the west line of said Lot 1, Block 1, such locations to be designated by the City Engineer of the City of Wichita, Kansas. All abutter's rights of access to or from 21st Street, over and across the north line of Lots 1 and 2, Block 1, Lot 1, Block 2 and Lot 1, Block 4 are hereby granted to the City of Wichita, provided, however, that Lots 1 and 2, Block 1 shall have access to 21st Street at two locations each, except over and across the west 40 feet of the north line of said Lot 1, Block 1, such locations to be designated by the City Engineer of the City of Wichita, Kansas. The streets are hereby dedicated to and for the use of the public. The drainage dedications are hereby dedicated to the public for drainage purposes.

*Theodore Gore* Theodore Gore  
*Rosalyn Gore* Rosalyn Gore  
*Robert M. Beren* Robert M. Beren  
*Joan S. Beren* Joan S. Beren  
*Theodore I. Leben* Theodore I. Leben  
*Aileen J. Leben* Aileen J. Leben

State of Kansas, County of Sedgwick, SS

The foregoing instrument was acknowledged before me this 14th day of April, 1976 by Theodore Gore and Rosalyn Gore, husband and wife, Robert M. Beren and Joan S. Beren, husband and wife, and Theodore I. Leben and Aileen J. Leben, husband and wife.

*John G. ...* Notary Public  
My Commission expires: January 4, 1978

This plat of "NORTHBOROUGH", an Addition to Wichita, Sedgwick County, Kansas has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this 15th day of April, 1976.

Wichita-Sedgwick County Metropolitan Area Planning Commission  
By *David Bayouth* Chairman  
*Jack H. Galbraith* Assistant Secretary

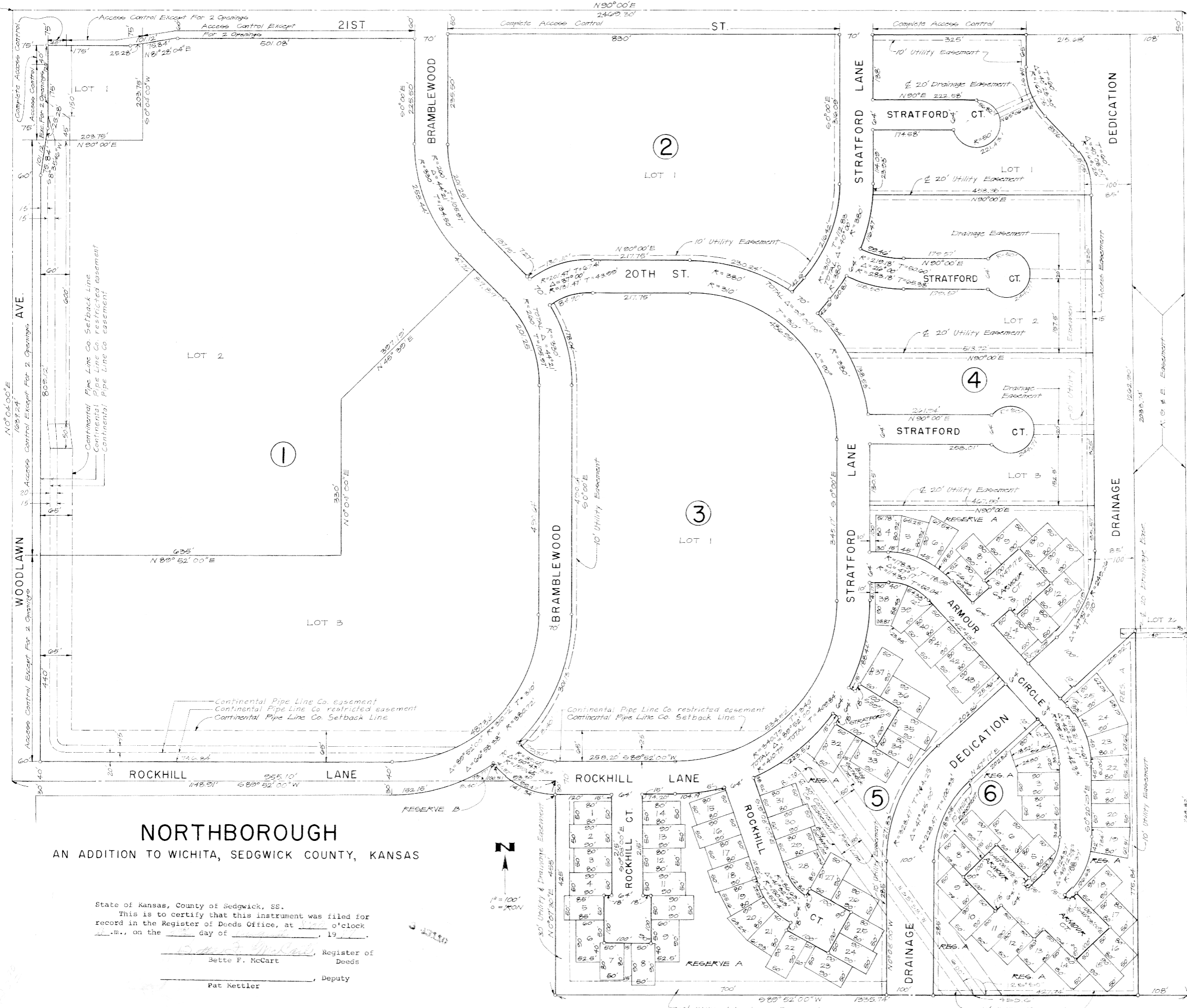
This plat approved and all dedications shown hereon accepted by the Board of City Commissioners of the City of Wichita, Kansas this 19th day of July, 1976.

*Tony Casado* Mayor  
*Donald C. Gisick* City Clerk

This plat approved and all dedications shown hereon accepted by the Board of County Commissioners of Sedgwick County, Kansas this 27th day of August, 1976.

*Tom Scott* Chairman  
*Everett Patrick* Commissioner  
*John Hale* Commissioner

ATTEST:  
*Dorothy K. White* County Clerk  
Entered on transfer record this 8 day of August, 1976.  
*Dorothy K. White* County Clerk



# NORTHBOROUGH

AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

State of Kansas, County of Sedgwick, SS.  
This is to certify that this instrument was filed for record in the Register of Deeds Office, at 10:00 o'clock A.M., on the 15 day of April, 1976.  
*Bette F. McCart*, Register of Deeds  
*Pat Kettler*, Deputy

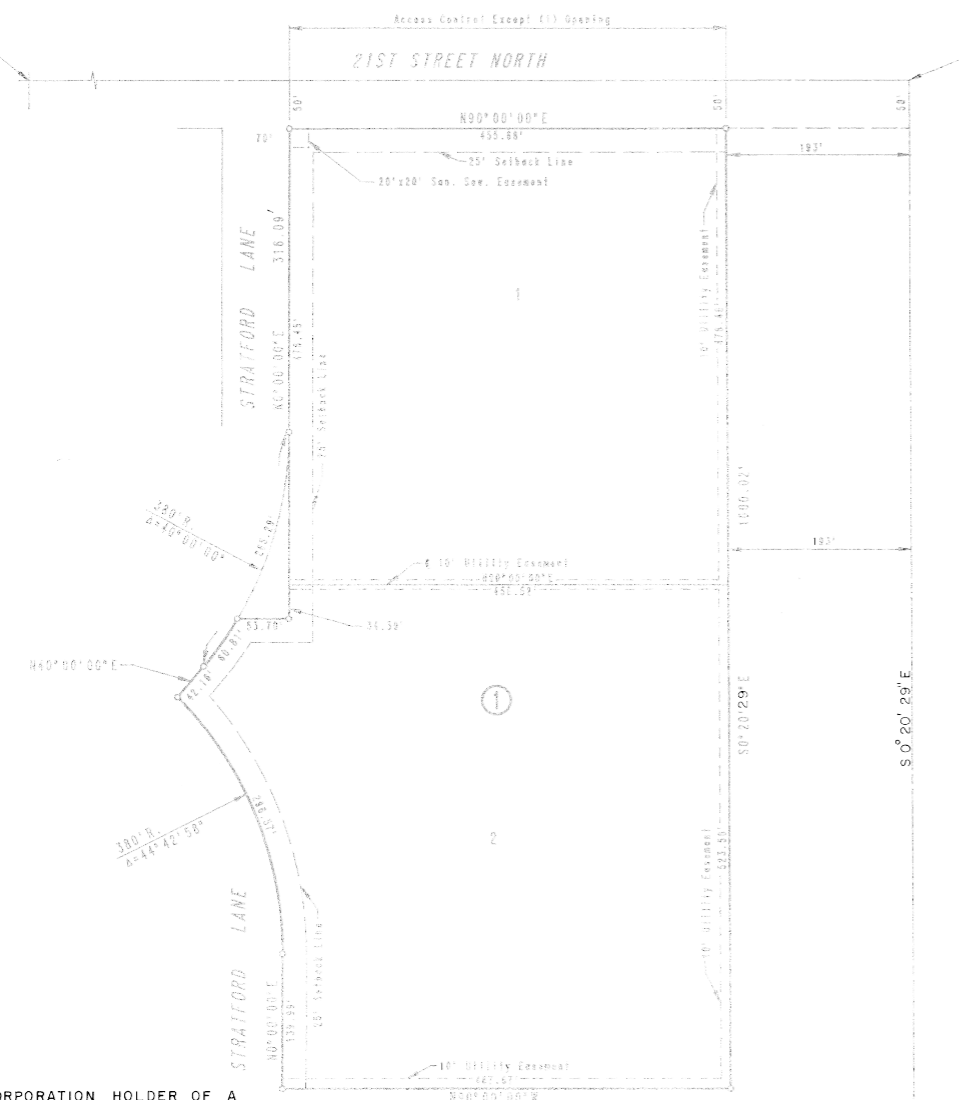


# NORTHBOROUGH 2ND ADDITION

## WICHITA, SEDGWICK COUNTY, KANSAS

N.W. Cor. N.W. 1/4  
Sec. 7, T27S, R2E  
of the 6th P.M.

N.E. Cor. N.W. 1/4  
Sec. 7, T27S, R2E  
of the 6th P.M.



SCALE: 1" = 100'  
Ø = IRON SET

R.W. DISC 45.4' EAST & 45.5' NORTH  
OF INTERSECTION OF WOODLAWN AND  
21ST STREET NORTH.  
ELEV. = 200.65 CITY DATUM

# 829407

S.E. Cor. N.W. 1/4  
Sec. 7, T27S, R2E  
of the 6th P.M.

WE GORE OIL COMPANY, A KANSAS CORPORATION HOLDER OF A MORTGAGE ON THE ABOVE DESCRIBED PROPERTY DO HEREBY CONSENT TO THE PLATTING OF NORTHBOROUGH 2ND ADDITION, WICHITA, SEDGWICK COUNTY, KANSAS

Gene Ferrin VICE-PRESIDENT  
GENE FERRIN

STATE OF KANSAS )  
COUNTY OF SEDGWICK )

BE IT REMEMBERED THAT ON THIS 28th DAY OF July, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME GENE FERRIN VICE-PRESIDENT OF GORE OIL, A KANSAS CORPORATION TO ME PERSONALLY KNOWN TO BE THE SAME PERSON WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGED THE EXECUTION OF SAME, FOR AND ON BEHALF AND AS THE VOLUNTARY ACT AND DEED OF SAID CORPORATION. IN TESTIMONY WHEREOF I HAVE HEREUNTO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Jane E. Mossman NOTARY PUBLIC

MY COMMISSION EXPIRES 20th Feb 1988



20.00

STATE OF KANSAS )  
COUNTY OF SEDGWICK )

I, R. W. LINN, A PROFESSIONAL ENGINEER IN AFORESAID STATE AND COUNTY DO HEREBY CERTIFY THAT ON THIS 8th DAY OF May, 1986, I HAVE CAUSED TO BE SURVEYED AND PLATTED NORTHBOROUGH 2ND ADDITION, WICHITA, SEDGWICK COUNTY, KANSAS, INTO LOTS, A BLOCK, AND A STREET THE SAME BEING A REPLAT OF LOTS 1, 2, AND 3 IN BLOCK 4 AND A PORTION OF THE DRAINAGE DEDICATION ADJOINING LOT 1 ON THE EAST, ALL IN NORTHBOROUGH AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS, MORE PARTICULARLY KNOWN AS A TRACT OF LAND IN THE N.W. 1/4 OF SECTION 7, TOWNSHIP 27 SOUTH, RANGE 2 EAST OF THE 6TH P.M. DESCRIBED AS FOLLOWS: BEGINNING AT THE N.W. CORNER OF LOT 1, BLOCK 4 NORTHBOROUGH, AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS, THENCE BEARING N90°00'00"E ALONG THE NORTH LINE OF SAID LOT 1 EXTENDED A DISTANCE OF 455.66 FEET; THENCE BEARING S0°20'29"E PARALLEL TO THE EAST LINE OF SAID N.W. 1/4 AND ALONG THE EAST LINE OF LOT 2 AND 3 IN SAID BLOCK 4, A DISTANCE OF 1096.02 FEET; THENCE BEARING N89°00'00"W A DISTANCE OF 487.87 FEET TO THE S.W. CORNER OF SAID LOT 3; THENCE BEARING N0°00'00"E ALONG THE WEST LINE OF LOT 3, A DISTANCE OF 139.99 FEET TO THE P.C. OF A CURVE TO THE LEFT HAVING A RADIUS OF 380.00 FEET; THENCE ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 44°42'58" AN ARC DISTANCE OF 288.37 FEET; THENCE BEARING N40°00'00"E A DISTANCE OF 42.18 FEET TO THE P.C. OF A CURVE TO THE LEFT HAVING A RADIUS OF 380.00 FEET; THENCE ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 40°00'00" AN ARC DISTANCE OF 285.29 FEET; THENCE BEARING N0°00'00"E A DISTANCE OF 316.08 FEET TO THE POINT OF BEGINNING

R. W. Linn  
R. W. LINN NO 3684



KNOW ALL MEN BY THESE PRESENTS THAT WE, THE UNDERSIGNED PROPERTY OWNERS OF THE LAND, AS ABOVE SET FORTH IN THE ENGINEER'S CERTIFICATE, HAVE CAUSED THE LAND TO BE SURVEYED AND PLATTED INTO LOTS, A BLOCK, AND A STREET THE SAME TO BE KNOWN AS NORTHBOROUGH 2ND ADDITION, WICHITA, SEDGWICK COUNTY, KANSAS. EASEMENTS AS INDICATED FOR THE CONSTRUCTION AND MAINTENANCE OF PUBLIC UTILITIES ARE HEREBY GRANTED. ALL ADJUTERS' RIGHTS OF ACCESS TO AND FROM 21ST STREET NORTH OVER AND ACROSS THE NORTH LINE OF LOT 1 ARE HEREBY GRANTED TO THE CITY OF WICHITA, PROVIDED HOWEVER THAT LOT 1 SHALL HAVE ACCESS TO 21ST STREET NORTH AT (1) ONE LOCATION, SAID LOCATION TO BE DETERMINED BY THE CITY ENGINEER OF THE CITY OF WICHITA, KANSAS.

ALL PORTIONS OF NORTHBOROUGH AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS WITHIN THE ABOVE DESCRIBED TRACT OF LAND ARE HEREBY VACATED AND REPLATTED BY VIRTUE OF KSA 12-512(B) AMENDED.

CO-EXECUTORS OF THE ESTATE OF THEODORE GORE

Andrew E. Gore ANDREW E. GORE  
Rosalyn W. Gore ROSALYN W. GORE

T. J. LAND & CATTLE COMPANY

Teena Jean Slathin PRESIDENT  
TEENA JEAN SLATHIN

OWNERS:

Robert M. Beren ROBERT M. BEREN  
Joan S. Beren JOAN S. BEREN

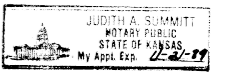
WANDOR CARE OF KANSAS, INC.

BY: Weldon Humphries  
Weldon Humphries  
Senior Vice President

STATE OF KANSAS )  
COUNTY OF SEDGWICK )

BE IT REMEMBERED THAT ON THIS 30th DAY OF May, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME ANDREW E. GORE AND ROSALYN W. GORE, CO-EXECUTORS OF THE ESTATE OF THEODORE GORE TO ME PERSONALLY KNOWN TO BE THE SAME PERSONS WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGED THE EXECUTION OF SAME FOR AND ON BEHALF AND AS THE VOLUNTARY ACT AND DEED OF SAID ESTATE, IN TESTIMONY WHEREOF I HAVE HEREUNTO SET MY HAND AND AFFIXED BY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Judith A. Summitt NOTARY PUBLIC  
MY APPOINTMENT EXPIRES: 11-21-89



STATE OF COLORADO )  
COUNTY OF DENVER )

BE IT REMEMBERED THAT ON THIS 10th DAY OF June, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME TEENA JEAN SLATHIN, PRESIDENT OF T. J. LAND AND CATTLE COMPANY, TO ME PERSONALLY KNOWN TO BE THE SAME PERSONS WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGE THE EXECUTION OF SAME FOR AND ON BEHALF AND AS THE VOLUNTARY ACT AND DEED OF SAID COMPANY, IN TESTIMONY WHEREOF I HAVE HEREUNTO SET MY HAND AND AFFIXED BY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Walter Slathin NOTARY PUBLIC  
MY APPOINTMENT EXPIRES: 11-13-86



STATE OF KANSAS )  
COUNTY OF SEDGWICK )

BE IT REMEMBERED THAT ON THIS 9th DAY OF May, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME ROBERT W. BEREN AND JOAN S. BEREN, TO ME PERSONALLY KNOWN TO BE THE SAME PERSONS WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGE THE EXECUTION OF SAME AS THEIR VOLUNTARY ACT AND DEED, IN TESTIMONY WHEREOF I HAVE HEREUNTO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Judith A. Summitt NOTARY PUBLIC  
MY APPOINTMENT EXPIRES: 11-21-89



STATE OF Howland )  
COUNTY OF Howland )

BE IT REMEMBERED THAT ON THIS 18th DAY OF June, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME Weldon Humphries OF WANDOR CARE OF KANSAS, INC., TO ME PERSONALLY KNOWN TO BE THE SAME PERSON WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGE THE EXECUTION OF SAME FOR AND ON BEHALF AND AS THE VOLUNTARY ACT AND DEED OF SAID WANDOR CARE OF KANSAS, INC., IN TESTIMONY WHEREOF I HAVE HEREUNTO SET MY HAND AND AFFIXED BY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Terrie McManey NOTARY PUBLIC  
MY APPOINTMENT EXPIRES: July 1, 1986



THIS PLAT HAS BEEN SUBMITTED TO AND APPROVED BY THE WICHITA SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION, WICHITA, KANSAS DATED THIS 1st DAY OF May, 1986

David Bayouth VICE-CHAIRMAN  
DAVID BAYOUTH

Michael E. Lindeman SECRETARY  
MICHAEL E. LINDEMAN

THIS PLAT APPROVED AND ALL DEDICATIONS SHOWN HEREON ARE ACCEPTED BY THE CITY COMMISSION OF THE CITY OF WICHITA, KANSAS, DATED THIS 19th DAY OF August, 1986

Tony Casado MAYOR  
TONY CASADO

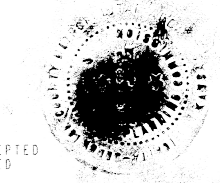
Donald C. Gisick CITY CLERK  
DONALD C. GISICK

ENTERED ON TRANSFER RECORD THIS 27th DAY OF August, 1986

Don Wright COUNTY CLERK  
DON WRIGHT

THIS IS TO CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD IN THE REGISTER OF DEEDS OFFICE AT 1:45 P.M. ON THIS 27th DAY OF AUGUST, 1986.

Ed Resa REGISTER OF DEEDS  
ED RESA



# NORTHBOROUGH 3RD ADDITION WICHITA, SEDGWICK COUNTY, KANSAS

N.W. Cor. Sec. 7,  
T27S, R2E of the 6th P.M.

STATE OF KANSAS )  
COUNTY OF SEDGWICK )

I, R.W. LINN, a PROFESSIONAL ENGINEER in AFORESAID STATE AND COUNTY DO HEREBY CERTIFY THAT ON THIS Jan. 22nd DAY OF 1987, I HAVE CAUSED TO BE SURVEYED AND PLATTED NORTHBOROUGH 3RD ADDITION, WICHITA, SEDGWICK COUNTY, KANSAS, INTO LOTS, BLOCKS, STREETS AND A RESERVE, THE SAME BEING A REPLAT OF BLOCKS 1 AND 3, AND BLOCK 4, EXCEPT LOTS 1, 2 AND 3, ALSO BLOCKS 5 AND 6 AND THE DRAINAGE DEDICATION ALL IN NORTHBOROUGH, AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS, TOGETHER WITH LOT 2, BLOCK 1, NORTHBOROUGH 2ND ADDITION, WICHITA, SEDGWICK COUNTY, KANSAS, MORE PARTICULARLY KNOWN AS A TRACT OF LAND IN THE N.W. 1/4 OF SECTION 7, TOWNSHIP 27 SOUTH, RANGE 2 EAST OF THE 6TH P.M., DESCRIBED AS FOLLOWS: BEGINNING AT THE N.E. CORNER OF LOT 26, BLOCK 6, NORTHBOROUGH, AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS, THENCE BEARING S0°20'20"E ALONG THE EAST LINE OF SAID LOT 26, A DISTANCE OF 238.49 FEET TO THE S.E. CORNER OF SAID LOT 26; THENCE BEARING S0°52'00"W ALONG THE SOUTH LINE OF BLOCKS 6 AND 5, A DISTANCE OF 1335.74 FEET TO THE S.W. CORNER OF BLOCK 5 IN SAID NORTHBOROUGH ADDITION; THENCE BEARING N0°57'30"E A DISTANCE OF 425.00 FEET TO THE N.W. CORNER OF SAID BLOCK 5; THENCE BEARING N0°08'00"W ACROSS ROCKHILL LANE A DISTANCE OF 70.00 FEET TO A POINT IN THE SOUTH LINE OF BLOCK 3, NORTHBOROUGH ADDITION; THENCE NORTHWESTERLY ALONG SAID SOUTH LINE ON A CURVE TO THE RIGHT HAVING A RADIUS OF 89.83 FEET AND A CHORD OF 76.35 FEET BEARING N64°45'13.5"W, THROUGH A CENTRAL ANGLE OF 50°45'33", AN ARC DISTANCE OF 79.53 FEET; THENCE BEARING N39°24'21"W A DISTANCE OF 8.15 FEET TO THE S.W. CORNER OF SAID BLOCK 3; THENCE ON A CURVE TO THE LEFT, ALONG THE EAST R/W OF BRAMBLEWOOD, SAID CURVE HAVING A RADIUS OF 350.72 FEET AND A CHORD OF 293.34 FEET, BEARING N22°39'32"E THROUGH A CENTRAL ANGLE OF 45°19'04", AN ARC DISTANCE OF 301.13 FEET; THENCE BEARING N0°09'00"E ALONG THE EAST R/W OF BRAMBLEWOOD A DISTANCE OF 490.84 FEET TO THE P.C. OF A CURVE TO THE LEFT HAVING A RADIUS OF 139.80 FEET; THENCE ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 44°21'00" AN ARC DISTANCE OF 255.44 FEET; THENCE BEARING N44°21'00"W ALONG THE EAST R/W OF BRAMBLEWOOD A DISTANCE OF 137.15 FEET TO THE P.C. OF A CURVE TO THE RIGHT HAVING A RADIUS OF 260.00 FEET; THENCE ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 44°21'00" AN ARC DISTANCE OF 201.25 FEET; THENCE BEARING N0°09'00"E ALONG THE EAST R/W OF BRAMBLEWOOD A DISTANCE OF 235.50 TO THE N.W. CORNER OF BLOCK 2, IN SAID NORTHBOROUGH ADDITION; THENCE BEARING N90°00'00"E A DISTANCE OF 630.00 FEET TO THE N.E. CORNER OF SAID BLOCK 2; THENCE BEARING S0°09'00"E A DISTANCE OF 476.45 FEET; THENCE BEARING N0°00'00"E ACROSS STRATFORD LANE ALONG THE SOUTH LINE OF LOT 1, BLOCK 1, NORTHBOROUGH 2ND ADDITION A DISTANCE OF 528.32 FEET TO THE SE CORNER OF SAID LOT 1; THENCE BEARING N0°20'29"W A DISTANCE OF 476.46 FEET TO THE N.E. CORNER OF SAID LOT 1; THENCE BEARING N90°00'00"E A DISTANCE OF 193.00 FEET TO THE POINT OF BEGINNING.

R.W. Linn  
N.W. Linn P.E. 3884



KNOW ALL MEN BY THESE PRESENTS THAT WE, THE UNDERSIGNED PROPERTY OWNERS OF THE LAND, AS ABOVE SET FORTH IN THE ENGINEER'S CERTIFICATE, HAVE CAUSED THE LAND TO BE SURVEYED AND PLATTED INTO LOTS, BLOCKS, STREETS AND A RESERVE, THE SAME TO BE KNOWN AS NORTHBOROUGH 3RD ADDITION, WICHITA, SEDGWICK COUNTY, KANSAS. EASTWARD'S 10' BUILDING SETBACK FOR THE CONSTRUCTION AND MAINTENANCE OF PUBLIC UTILITIES, AND DRAINAGE ARE HEREBY GRANTED. THE STREETS ARE HEREBY DEDICATED TO AND FOR THE USE OF THE PUBLIC.

ALL ADJOINING RIGHTS-OF-ACCESS TO AND FROM 21ST STREET NORTH, OVER AND ACROSS THE NORTH LINE OF LOTS 1 AND 2, BLOCK 1 AND NORTH LINE OF RESERVE ARE HEREBY GRANTED TO THE CITY OF WICHITA, PROVIDED HOWEVER THAT LOTS 1 AND 2, BLOCK 1, SHALL HAVE ACCESS TO 21ST STREET AT THREE (3) LOCATIONS, ONE (1) EACH TO LOTS 1 AND 2, AND ONE (1) JOINT ACCESS BETWEEN LOTS 1 AND 2, AS SHOWN. ALL LOCATIONS TO BE DETERMINED BY THE CITY ENGINEER OF THE CITY OF WICHITA, KANSAS. RESERVE "A" SHALL BE MAINTAINED BY THE OWNERS OF LOTS 1 AND 2, BLOCK 2 ACCORDING WITH A DECLARATION OF LAND OWNERS ASSOCIATION AGREEMENT AND SHALL BE RESERVED FOR UTILITIES, DRAINAGE, RETENTION, DETENTION, LANDSCAPING, PEDESTRIAN WAYS AND NON-PERMANENT RECREATIONAL FACILITIES. MINIMUM PAD ELEVATION REQUIRED AS FOLLOWS: LOT 1 AND LOT 2, BLOCK 2 ELEV = 1387.4 MSL.

ALL PORTIONS OF NORTHBOROUGH, AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS, AND NORTHBOROUGH 2ND ADDITION, WICHITA, SEDGWICK COUNTY, KANSAS, WITHIN THE ABOVE DESCRIBED TRACT OF LAND ARE HEREBY VACATED AND REPLATTED BY VIRTUE OF KSA 12-5124(b) AMENDED, 1986.

OWNERS:  
CO-EXECUTORS OF THE ESTATE OF THEODORE GORE:  
Andrew E. Gore Rosalyn M. Gore  
ANDREW E. GORE ROSALYN GORE  
CO-EXECUTOR & INDIVIDUAL OWNER

T.J. LAND & CATTLE COMPANY  
Teena Jean Slatkin, PRESIDENT  
TEENA JEAN SLATKIN

OWNERS:  
Robert W. Beren Joan S. Beren  
ROBERT W. BEREN JOAN S. BEREN

MID KANSAS JEWISH WELFARE FEDERATION, INC.  
Howard N. Marcus  
HOWARD N. MARCUS

STATE OF KANSAS )  
COUNTY OF SEDGWICK )

BE IT REMEMBERED THAT ON THIS 10th DAY OF NOVEMBER, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME HOWARD N. MARCUS OF MID KANSAS JEWISH WELFARE FEDERATION, INC., TO ME PERSONALLY KNOWN TO BE THE SAME PERSON WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGE THE EXECUTION OF SAME FOR AND ON BEHALF AND AS THE VOLUNTARY ACT AND DEED OF SAID FEDERAL JEWISH WELFARE FEDERATION WHEREOF I HAVE HERETO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Sica Clark, NOTARY PUBLIC  
MY APPOINTMENT EXPIRES: 8-12-87  
LISA CLARK

STATE OF KANSAS )  
COUNTY OF SEDGWICK )

BE IT REMEMBERED THAT ON THIS 10th DAY OF NOVEMBER, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME ANDREW E. GORE Co-Executor of the estate of Theodore Gore and Rosalyn W. Gore individual owner TO ME PERSONALLY KNOWN TO BE THE SAME PERSONS WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGE THE EXECUTION OF SAME FOR AND ON BEHALF AND AS THE VOLUNTARY ACT AND DEED OF SAID ESTATE, IN TESTIMONY WHEREOF I HAVE HERETO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Judith A. Summitt, NOTARY PUBLIC  
MY APPOINTMENT EXPIRES: 4-2-89  
JUDITH A. SUMMITT

STATE OF COLORADO )  
COUNTY OF DENVER )

BE IT REMEMBERED THAT ON THIS 4th DAY OF NOVEMBER, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME JEAN SLATKIN, PRESIDENT OF T.J. LAND AND CATTLE COMPANY, TO ME PERSONALLY KNOWN TO BE THE SAME PERSONS WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGE THE EXECUTION OF SAME FOR AND ON BEHALF AND AS THE VOLUNTARY ACT AND DEED OF SAID COMPANY, IN TESTIMONY WHEREOF I HAVE HERETO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Walter Slatkin, NOTARY PUBLIC  
MY APPOINTMENT EXPIRES: NOVEMBER 17, 1986  
WALTER SLATKIN

STATE OF KANSAS )  
COUNTY OF SEDGWICK )

BE IT REMEMBERED THAT ON THIS 10th DAY OF NOVEMBER, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME ROBERT W. BEREN AND JOAN S. BEREN, TO ME PERSONALLY KNOWN TO BE THE SAME PERSONS WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGE THE EXECUTION OF SAME AS THEIR VOLUNTARY ACT AND DEED IN TESTIMONY WHEREOF I HAVE HERETO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Linda Sevier, NOTARY PUBLIC  
MY APPOINTMENT EXPIRES: 4-13-90  
LINDA SEVIER

BE GORE OIL COMPANY, A KANSAS CORPORATION HOLDER OF A MORTGAGE ON THE ABOVE DESCRIBED PROPERTY DO HEREBY CONSENT TO THE PLATTING OF NORTHBOROUGH 3RD ADDITION, WICHITA, SEDGWICK COUNTY, KANSAS.

Gene Ferrin, VICE-PRESIDENT  
GENE FERRIN

STATE OF KANSAS )  
COUNTY OF SEDGWICK )

BE IT REMEMBERED THAT ON THIS 10th DAY OF NOVEMBER, 1986, BEFORE ME, A NOTARY PUBLIC IN AFORESAID STATE AND COUNTY, CAME THE GORE OIL COMPANY (GORE OIL COMPANY) TO ME PERSONALLY KNOWN TO BE THE SAME PERSONS WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGE THE EXECUTION OF SAME FOR AND ON BEHALF AND AS THE VOLUNTARY ACT AND DEED OF SAID COMPANY, IN TESTIMONY WHEREOF I HAVE HERETO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

Judith A. Summitt, NOTARY PUBLIC  
MY APPOINTMENT EXPIRES: 4-2-89  
JUDITH A. SUMMITT

THIS PLAT APPROVED AND ALL DEDICATIONS SHOWN HEREON ARE ACCEPTED BY THE WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION, OF WICHITA, KANSAS, DATED THIS 24th DAY OF July, 1986.

David Blayth, VICE-CHAIRMAN  
DAVID BLAYTH  
Michael E. Lindebarx, SECRETARY  
MICHAEL E. LINDEBARX

THIS PLAT APPROVED AND ALL DEDICATIONS SHOWN HEREON ARE ACCEPTED BY THE CITY COMMISSION OF THE CITY OF WICHITA, KANSAS, DATED THIS 17th DAY OF March, 1987.

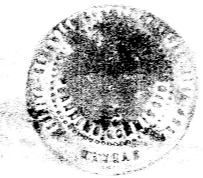
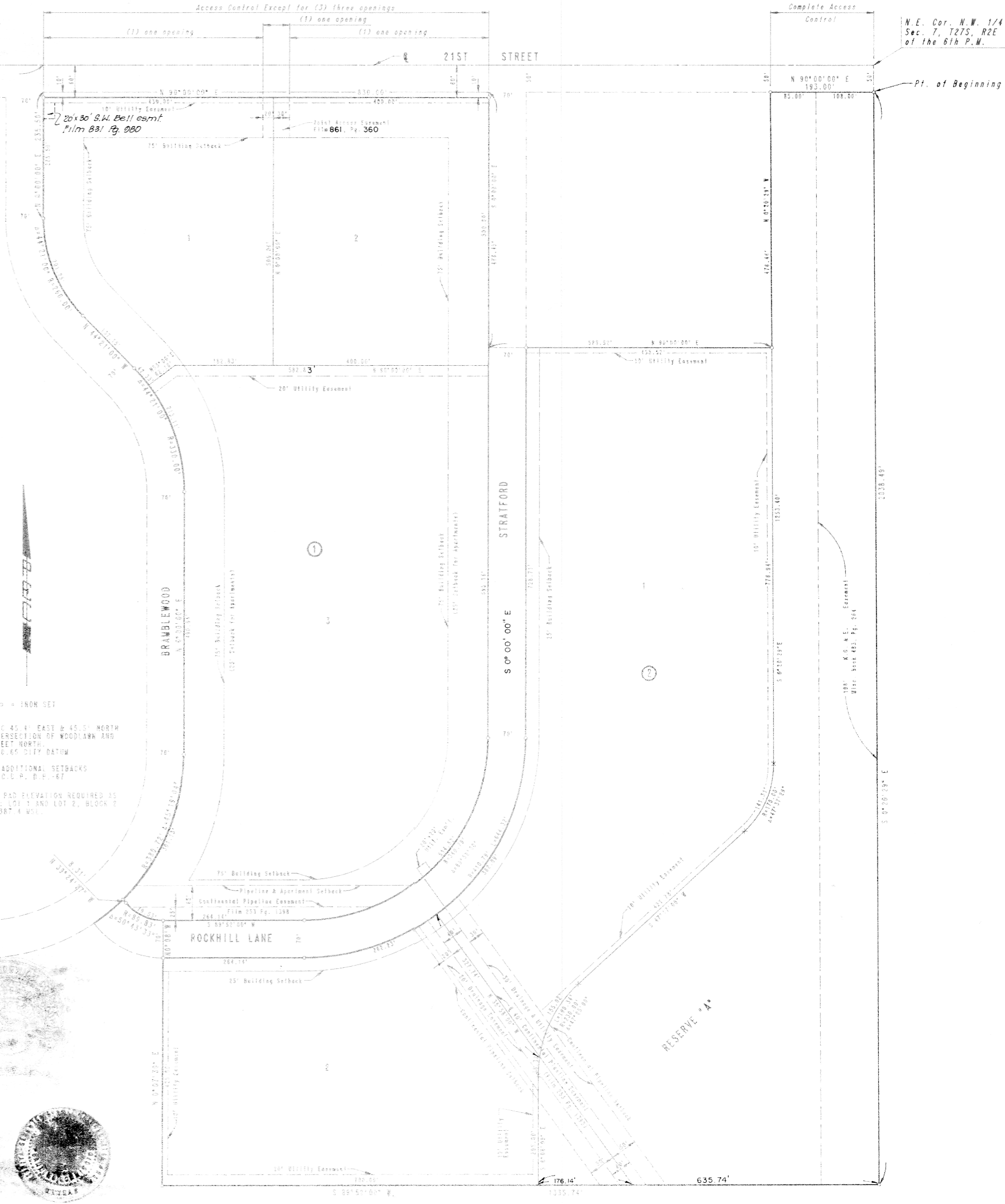
Tony Casado, MAYOR  
DALE REA, DEPUTY CITY CLERK

Dale E. Rea, DEPUTY CITY CLERK  
DALE REA

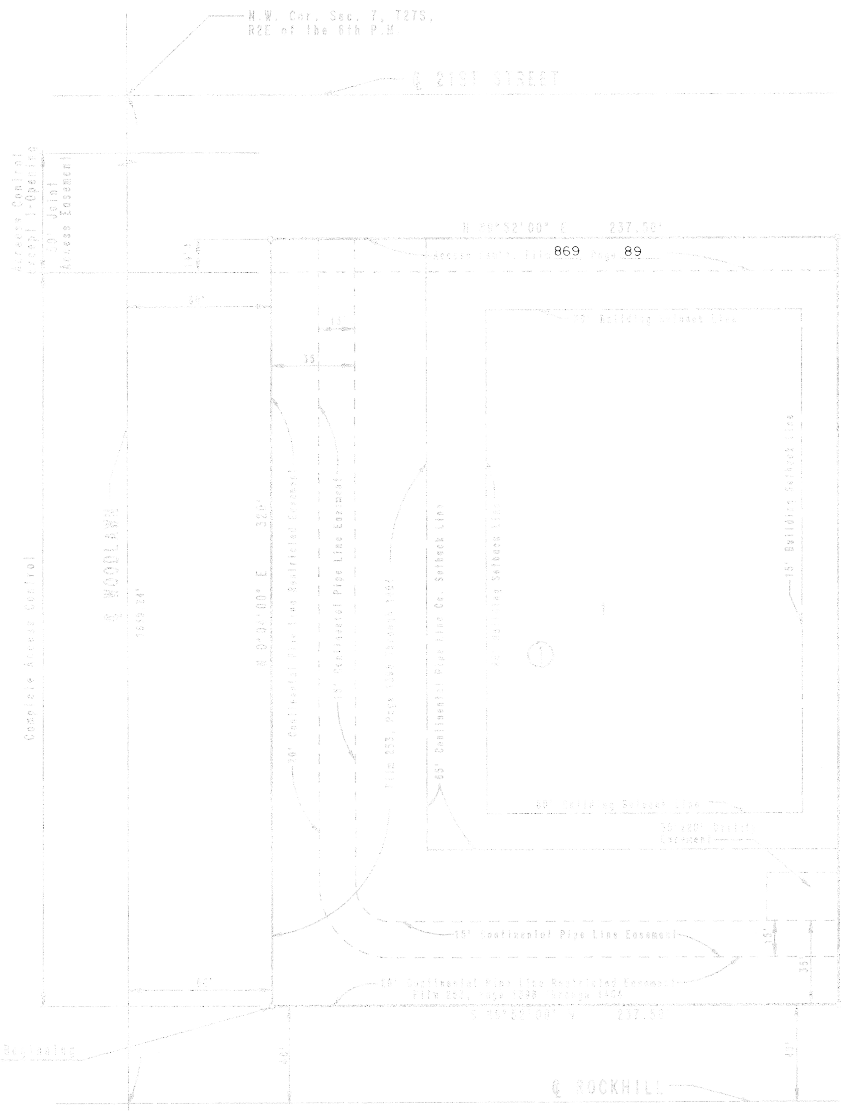
ENTERED ON TRANSFER RECORD THIS 25 DAY OF March, 1987.  
Don Wright, COUNTY CLERK  
DON WRIGHT

THIS IS TO CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD IN THE REGISTER OF DEEDS OFFICE AT 1:32 P.M. ON THIS 25th DAY OF MARCH, 1987.  
Pat Kettler, REGISTER OF DEEDS  
PAT KETTLER

Ed Resa, DEPUTY  
ED RESA



# NORTHBOROUGH 4TH ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS



CITY OF WICHITA S.W. QUARTER 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

STATE OF KANSAS )  
COUNTY OF SEDGWICK )  
I, A.W. LINN, a PROFESSIONAL ENGINEER, do hereby certify that on this 17th day of Feb. 1989, I have caused to be surveyed and plotted for Northborough 4th Addition to Wichita, Sedgwick County, Kansas, into a lot and block, the same being a tract of land in the NW 1/4 of Section 17, Township 22 North, Range 7 East of the 6th P.M. Meridian of a portion of Lot 3, Block 1, Northborough, an addition to Wichita, Sedgwick County, Kansas, and described as: BEGINNING AT THE S.W. CORNER OF LOT 3, BLOCK 1, NORTHBOROUGH, AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS, THENCE BEARING N0°04'00"E ALONG THE WEST LINE OF SAID LOT 3 A DISTANCE OF 80.00 FEET; THENCE BEARING W89°52'00"E PARALLEL WITH THE SOUTH LINE OF SAID LOT 3, A DISTANCE OF 237.50 FEET; THENCE BEARING S89°52'00"E A DISTANCE OF 237.50 FEET TO A POINT IN THE SOUTH SIDE OF SAID LOT 3, HENCE BEARING N89°52'00"E ALONG SAID SOUTH LINE A DISTANCE OF 147.50 FEET TO THE POINT OF BEGINNING.

*A.W. Linn*  
A.W. LINN, P.E. 3684  
KANSAS  
PROFESSIONAL ENGINEER

KNOW ALL MEN BY THESE PRESENTS THAT WE, THE UNDERSIGNED PROPERTY OWNERS OF THE LAND AS ABOVE SET FORTH IN THE ENGINEER'S CERTIFICATE HAVE CAUSED THE SAID TO BE SURVEYED AND PLOTTED INTO 3 LOTS AND BLOCK, THE SAID TO BE SHOWN AS NORTHBOROUGH 4TH ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS, AS ABOVE IS INDICATED FOR THE CONVEYANCE AND MAINTENANCE OF PUBLIC UTILITIES AND HEREBY GRANTED ALL PORTIONS OF LOT 3, BLOCK 1, NORTHBOROUGH, AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS, WITHIN THE ABOVE DESCRIBED TRACT OF LAND ARE HEREBY VACATED AND RELINQUISHED BY VIRTUE OF P.S.A. 17-32203, AMENDED, THE WRITER'S RIGHTS OF ACCESS TO AND FROM WOODLAW OVER THE ADDRESS THE WEST LINE OF BLOCK 1, EXCEPT FOR THE NORTH 14.00 FEET MORE OR LESS TO BE USED FOR A JOINT ACCESS EASEMENT IS HEREBY GRANTED TO THE CITY OF WICHITA.

ORNEY: BRITANNY DEVELOPMENTS COMPANY, A PARTNERSHIP LIMITED PARTNERSHIP BY PUBLIC CORPORATION, GENERAL PARTNER  
*Richard J. Bouckley*  
RICHARD J. BOUCKLEY, PRESIDENT

STATE OF KANSAS )  
COUNTY OF SEDGWICK )  
BE IT REMEMBERED THAT ON THIS 18th day of February 1989, before me a Notary Public in and for the State of Kansas, appeared RICHARD J. BOUCKLEY, PRESIDENT OF BRITANNY DEVELOPMENTS COMPANY, a PARTNERSHIP LIMITED PARTNERSHIP, TO BE PERSONALLY KNOWN TO BE THE SAME PERSON WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGED THE EXECUTION OF SAID INSTRUMENT AND AS THE VOLUNTARY ACT AND DEED OF SAID PARTNERSHIP, IN TESTIMONY WHEREOF I HAVE HERETO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

*Paula S. Baird*  
PAULA S. BAIRD, NOTARY PUBLIC  
STATE OF KANSAS  
My Appl. Exp. 1-27-90  
BY COMMISSION EXPIRES January 21, 1990

WE, FIRST CHICAGO INVESTMENT CORPORATION, A DELAWARE CORPORATION, HOLDER OF A MORTGAGE ON THE ABOVE DESCRIBED PROPERTY, DO HEREBY CONSENT TO THE PLATTING OF NORTHBOROUGH 4TH, AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS.  
*W.J. Huuckler, III*  
W.J. HUUCKLER, III  
Vice President

STATE OF Illinois )  
COUNTY OF DuPage )  
BE IT REMEMBERED THAT ON THIS 19th day of February 1989, before me a Notary Public in and for the State of Illinois, appeared W.J. HUUCKLER, III, OF FIRST CHICAGO INVESTMENT CORPORATION AND EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGED THE EXECUTION OF SAID INSTRUMENT AND AS THE VOLUNTARY ACT AND DEED OF SAID CORPORATION IN TESTIMONY WHEREOF I HAVE HERETO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

*Mary E. Jordan*  
MARY E. JORDAN, NOTARY PUBLIC  
STATE OF ILLINOIS  
MY COMMISSION EXPIRES 12/15/89

WE, THE FIRST NATIONAL BANK OF CHICAGO, A NATIONAL BANKING ASSOCIATION, HOLDER OF A MORTGAGE ON THE ABOVE DESCRIBED PROPERTY, DO HEREBY CONSENT TO THE PLATTING OF NORTHBOROUGH 4TH, AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS.

*Timothy J. Meyer*  
TIMOTHY J. MEYER  
VICE PRESIDENT

STATE OF ILLINOIS )  
COUNTY OF COOK )  
BE IT REMEMBERED THAT ON THIS 23rd day of FEBRUARY 1987, before me a Notary Public in and for the State and County, came TIMOTHY J. MEYER, OF THE FIRST NATIONAL BANK OF CHICAGO, A NATIONAL BANKING ASSOCIATION, TO BE PERSONALLY KNOWN TO BE THE SAME PERSON WHO EXECUTED THE FOREGOING INSTRUMENT OF WRITING AND DULY ACKNOWLEDGED THE EXECUTION OF SAID INSTRUMENT AND AS THE VOLUNTARY ACT AND DEED OF SAID BANK IN TESTIMONY WHEREOF I HAVE HERETO SET MY HAND AND AFFIXED MY NOTARIAL SEAL THE DAY AND YEAR ABOVE WRITTEN.

*Steven Smagur*  
STEVEN SMAGUR, NOTARY PUBLIC  
STATE OF ILLINOIS  
MY COMMISSION EXPIRES 9/8/90

THIS PLAT HAS BEEN SUBMITTED TO AND APPROVED BY THE WICHITA-SEGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION, WICHITA, KANSAS, DATED THIS 5th DAY OF February 1987.

*John J. ...*  
CHAIRMAN  
*Marvin S. Kroat*  
SECRETARY  
MARVIN S. KROAT

THIS PLAT APPROVED AND ALL DEDICATIONS SHOWN HEREON ARE ACCEPTED BY THE CITY COMMISSION OF THE CITY OF WICHITA, KANSAS, DATED THIS 17th DAY OF MARCH 1987.

*Tommy ...*  
MAYOR  
*Dale E. ...*  
DEPUTY CITY CLERK  
DALE E. REA

ENTERED ON TRANSFER RECORD THIS 27th DAY OF MARCH 1987.  
*Patricia Rector*  
PATRICIA RECTOR, COUNTY CLERK

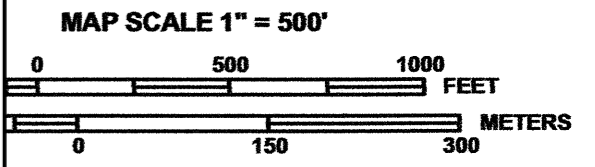
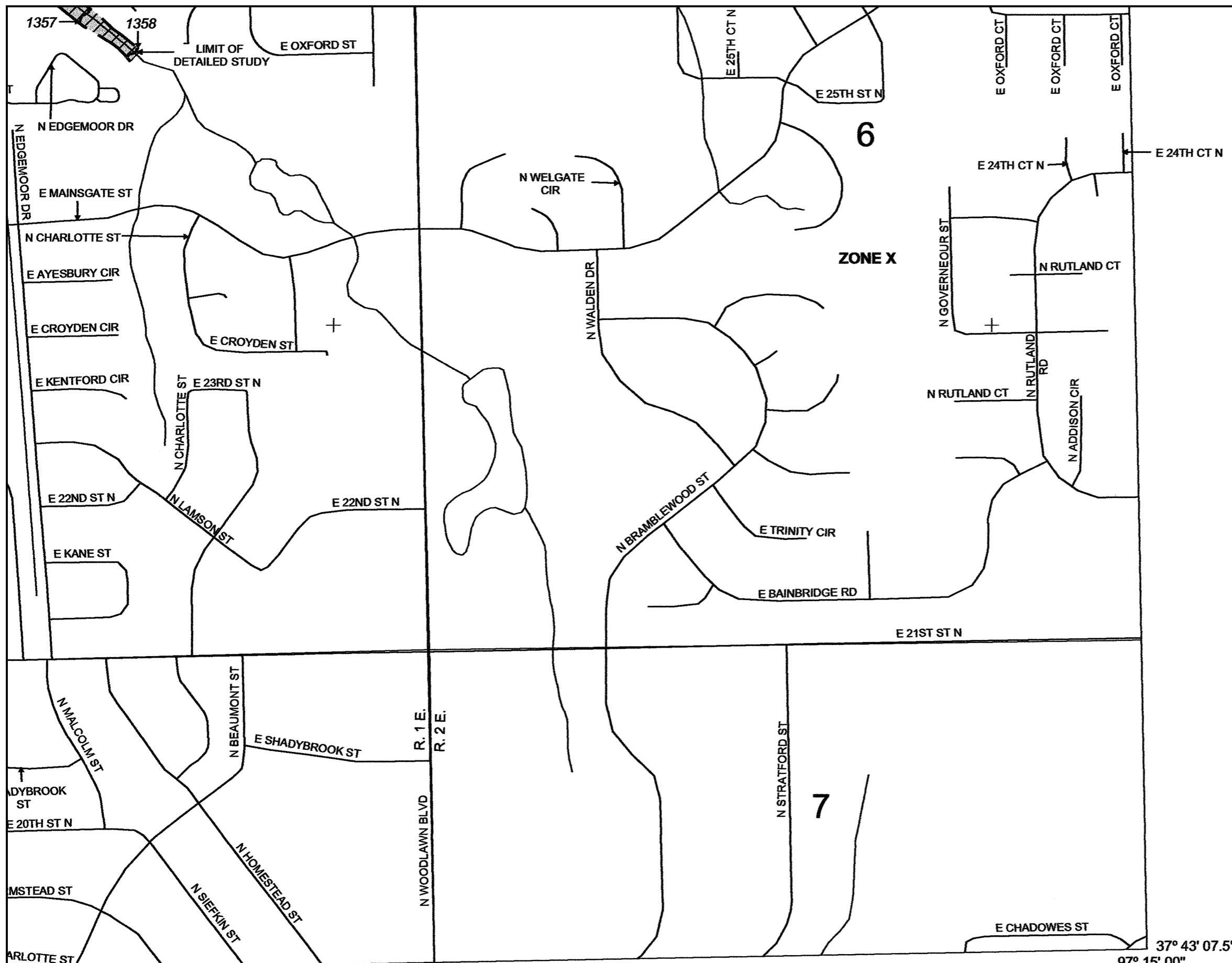
THIS IS TO CERTIFY THAT THIS INSTRUMENT WAS FILED FOR RECORD IN THE REGISTER OF DEEDS OFFICE AT WICHITA, KANSAS, ON THIS 27th DAY OF MARCH 1987.

*Pat Kettler*  
PAT KETTLER, REGISTER OF DEEDS  
Ed Reas, DEPUTY

1000

**NORTHBOROUGH 3RD ADDITION REPLAT**

**EXHIBIT 1-4**



PANEL 0357E

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
**SEDGWICK COUNTY,**  
**KANSAS**  
**AND INCORPORATED AREAS**

PANEL 357 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WICHITA, CITY OF	200328	0357	E

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

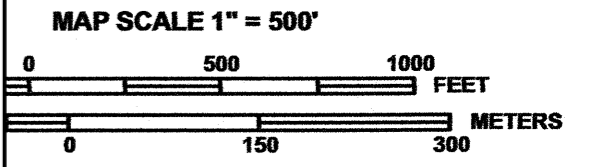
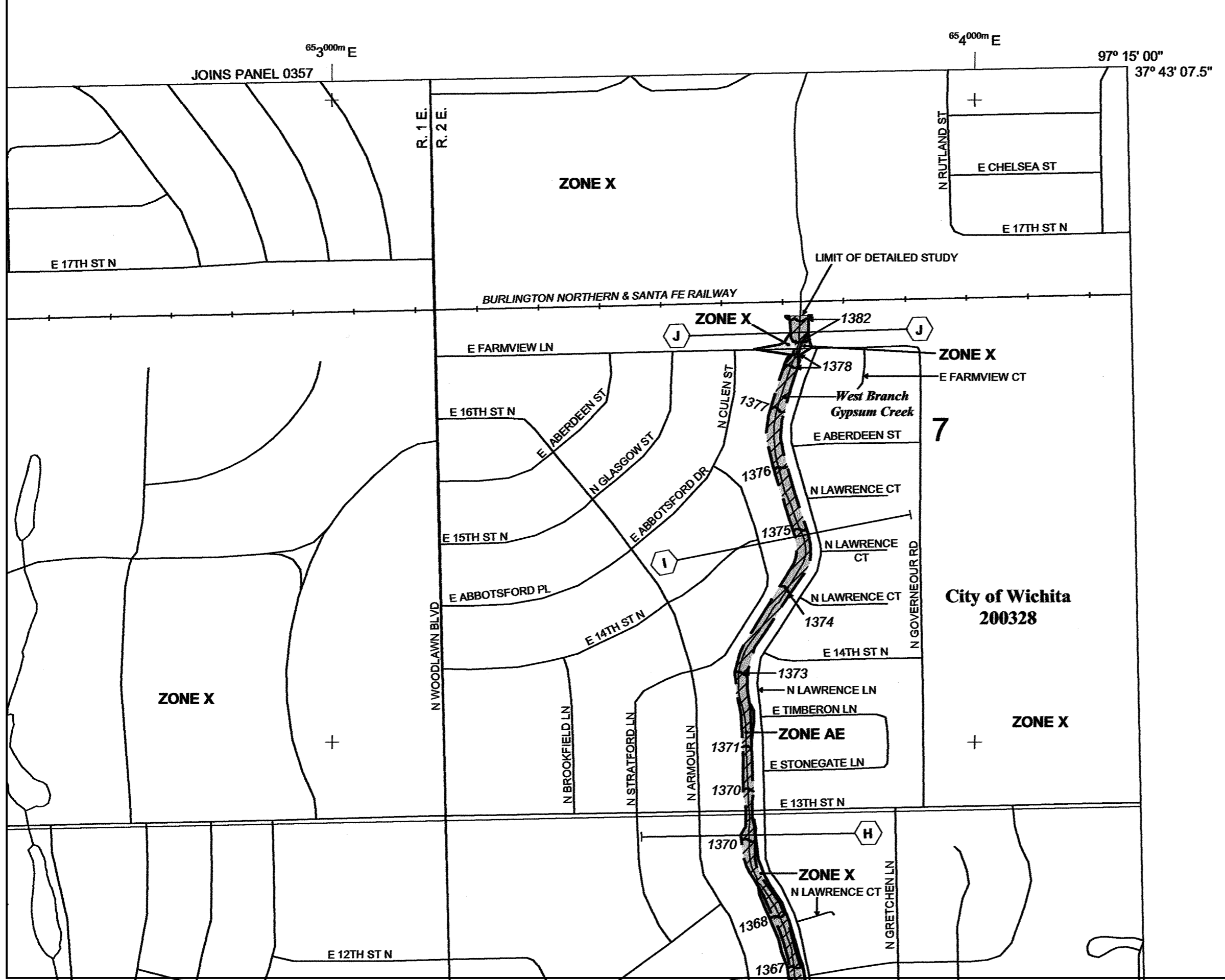


**MAP NUMBER**  
**20173C0357E**  
**EFFECTIVE DATE**  
**FEBRUARY 2, 2007**  
**Federal Emergency Management Agency**

JOINS PANEL 0359

37° 43' 07.5"  
 97° 15' 00"

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)



PANEL 0359E

**FIRM**  
**FLOOD INSURANCE RATE MAP**

**SEDGWICK COUNTY,  
 KANSAS  
 AND INCORPORATED AREAS**

**PANEL 359 OF 700**

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SUFFIX
EASTBOROUGH, CITY OF	200491	0359	E
WICHITA, CITY OF	200328	0359	E

**City of Wichita  
 200328**

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



**MAP NUMBER  
 20173C0359E**

**EFFECTIVE DATE  
 FEBRUARY 2, 2007**

**Federal Emergency Management Agency**

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

**NORTHBOROUGH 3RD ADDITION REPLAT**

**EXHIBIT 1-5**

**USGS QUADS**

**GREENWICH**

**WEBB ROAD**

**ROCK ROAD**

**WOODLAWN AVENUE**

**OLIVER STREET**

**HILLSIDE AVENUE**

**K-96**

**29TH STREET NORTH**

**21ST STREET NORTH**

**13TH STREET NORTH**

**CENTRAL AVENUE**

**T26S**

**T27S**

**TOTAL BASIN AREA =  
182.932 ACRES**

**NORTHBOROUGH 3RD  
ADDITION REPLAT**

**R2E  
R1E**



**POE & ASSOCIATES, INC.**  
**CONSULTING ENGINEERS**

5940 E. Central, Suite 200 Wichita, KS 67208-4242  
Phone 316/685-4114 FAX 316/685-4444

**NORTHBOROUGH 3RD ADDITION REPLAT**

**EXHIBIT 1-6**

# 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	-----	24.04	32.69	-----	44.30	53.00	64.55	73.18	81.78	Off-Site W
2	SCS Runoff	-----	10.82	13.90	-----	17.98	21.02	25.05	28.07	31.08	Off-Site NW
3	SCS Runoff	-----	136.14	189.30	-----	261.36	315.67	388.05	442.20	496.19	Off-Site N
4	SCS Runoff	-----	54.91	76.35	-----	105.41	127.32	156.51	178.35	200.13	Off-Site NE
5	SCS Runoff	-----	24.22	33.68	-----	46.50	56.16	69.04	78.68	88.28	Off-Site SE
6	SCS Runoff	-----	3.280	4.774	-----	6.869	8.494	10.69	12.34	13.99	E-1
7	SCS Runoff	-----	5.709	8.274	-----	11.84	14.62	18.36	21.18	24.01	E-2
8	SCS Runoff	-----	20.14	29.28	-----	41.98	51.70	64.95	74.95	84.98	E-3
9	SCS Runoff	-----	14.79	21.92	-----	31.89	39.57	49.94	57.76	65.59	E-4
10	Combine	1, 6,	25.63	35.12	-----	47.93	57.56	70.39	79.98	89.55	Off-Site W with E-1 to West Ditch
11	Reach	10	24.43	33.97	-----	46.94	56.75	69.87	79.71	89.55	Existing West Ditch
12	Reservoir	7	0.000	0.000	-----	0.815	4.030	14.19	18.60	26.03	E-2 to Existing Pond
13	Combine	2, 3, 4, 9,	216.66	301.47	-----	416.65	503.58	619.55	706.37	792.98	Off-Site NW, N, & NE with E-4
14	Reach	13	178.92	254.69	-----	358.35	436.85	541.72	620.27	698.64	East Channel in E-4
15	Combine	5, 8, 12, 14	208.08	296.30	-----	417.15	508.77	631.27	723.09	814.74	Off-Site SE, E-2, & E-4 with E-3
16	Combine	11, 15	232.47	329.55	-----	462.26	562.76	697.04	797.66	898.46	Combine All
17	Reach	16	217.69	315.00	-----	449.03	550.89	687.18	789.33	891.23	Existing Central Channel

# 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	-----	12.19	15.67	-----	20.27	23.70	28.25	31.65	35.04	Off-Site W1 (0-3)
2	SCS Runoff	-----	3.715	5.057	-----	6.858	8.209	10.00	11.34	12.68	Off-Site W2 (0-2)
3	SCS Runoff	-----	3.522	4.795	-----	6.503	7.783	9.484	10.75	12.02	Off-Site W3 (1)
4	SCS Runoff	-----	3.799	5.750	-----	8.512	10.65	13.56	15.76	17.96	Off-Site W4 (W DT)
5	SCS Runoff	-----	0.927	1.262	-----	1.711	2.048	2.495	2.829	3.162	Off-Site W5 (1)
6	SCS Runoff	-----	9.868	12.68	-----	16.40	19.18	22.86	25.61	28.35	Off-Site NW1 (4)
7	SCS Runoff	-----	0.949	1.219	-----	1.577	1.844	2.198	2.462	2.726	Off-Site NW2 (4)
8	SCS Runoff	-----	136.14	189.30	-----	261.36	315.67	388.05	442.20	496.19	Off-Site N (CH)
9	SCS Runoff	-----	54.91	76.35	-----	105.41	127.32	156.51	178.35	200.13	Off-Site NE (CH)
10	SCS Runoff	-----	24.22	33.68	-----	46.50	56.16	69.04	78.68	88.28	Off-Site SE (CH)
11	SCS Runoff	-----	4.270	5.640	-----	7.460	8.816	10.61	11.96	13.29	DA-1A (1)
12	SCS Runoff	-----	3.368	4.449	-----	5.884	6.954	8.373	9.431	10.49	DA-1B (1)
13	Combine	11, 12	7.638	10.09	-----	13.34	15.77	18.99	21.39	23.78	DA-1 TOTAL
14	SCS Runoff	-----	25.44	33.60	-----	44.44	52.52	63.23	71.23	79.19	DA-2A (Pond)
15	SCS Runoff	-----	1.158	1.753	-----	2.595	3.248	4.133	4.803	5.476	DA-2B (2-1)
16	SCS Runoff	-----	0.219	0.332	-----	0.492	0.615	0.783	0.910	1.038	DA-2C (2-2)
17	SCS Runoff	-----	6.696	8.845	-----	11.70	13.83	16.65	18.75	20.85	DA-2D (2)
18	SCS Runoff	-----	1.779	2.455	-----	3.368	4.054	4.968	5.652	6.333	DA-2E (2)
19	SCS Runoff	-----	2.610	3.448	-----	4.561	5.390	6.489	7.310	8.127	DA-2F (2-4)
20	SCS Runoff	-----	2.732	3.609	-----	4.773	5.641	6.791	7.650	8.505	DA-2G (2-5)
21	SCS Runoff	-----	1.183	1.562	-----	2.066	2.442	2.940	3.312	3.682	DA-2H (2-3)
22	Combine	14, 15, 16, 17,	33.51	44.53	-----	59.22	70.21	84.79	95.69	106.55	DA-2A to DA-2D
23	Combine	18, 19, 20, 21, 22	41.81	55.61	-----	73.99	87.73	105.98	119.61	133.20	DA-2 TOTAL
24	SCS Runoff	-----	3.251	4.295	-----	5.680	6.713	8.082	9.104	10.12	DA-3A (3-2)
25	SCS Runoff	-----	1.338	1.767	-----	2.337	2.762	3.326	3.746	4.165	DA-3B (3-3)
26	SCS Runoff	-----	5.471	7.226	-----	9.557	11.30	13.60	15.32	17.03	DA-3C (3-5)
27	SCS Runoff	-----	1.943	2.566	-----	3.394	4.011	4.829	5.440	6.048	DA-3D (3-4)
28	Combine	24, 25, 26, 27	12.00	15.85	-----	20.97	24.78	29.84	33.61	37.37	DA-3 TOTAL
29	SCS Runoff	-----	1.369	1.809	-----	2.392	2.827	3.404	3.834	4.263	DA-4A (4)
30	SCS Runoff	-----	2.030	2.682	-----	3.547	4.192	5.047	5.685	6.321	DA-4B (4)

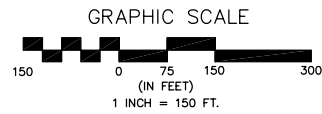
# Hydrograph Return Period Recap

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	
31	Combine	29, 30	3.400	4.491	-----	5.939	7.019	8.451	9.520	10.58	DA-4 TOTAL
32	SCS Runoff	-----	24.44	34.83	-----	49.09	59.92	74.42	85.29	96.16	DA-5 (CH)
33	SCS Runoff	-----	6.752	8.919	-----	11.80	13.94	16.78	18.91	21.02	DA-6 (CH)
34	Combine	1, 2,	15.91	20.73	-----	27.13	31.91	38.25	42.99	47.71	Total for SWD0
35	Combine	3, 12,	6.891	9.244	-----	12.39	14.74	17.86	20.19	22.51	W3 with DA-1B (1-1)
36	Combine	5, 11,	5.197	6.902	-----	9.171	10.86	13.11	14.79	16.46	W5 with DA-1A (1-2)
37	Combine	35, 36	12.09	16.15	-----	21.56	25.60	30.97	34.97	38.96	Total for SWD1
38	Combine	4, 34, 37	31.80	42.63	-----	57.20	68.16	82.77	93.71	104.64	Total to West Ditch
39	Reach	38	24.25	33.09	-----	45.14	54.28	66.55	75.79	85.04	Proposed West Ditch
40	Combine	17, 18,	8.475	11.30	-----	15.07	17.88	21.61	24.40	27.18	DA-2D with DA-2E (2-6)
41	Combine	15, 16, 19, 20, 21, 40	16.38	22.00	-----	29.55	35.21	42.75	48.39	54.01	Total for SWD2
42	Combine	24, 25, 26, 27,	12.00	15.85	-----	20.97	24.78	29.84	33.61	37.37	Total for SWD3
43	Combine	6, 29,	11.24	14.49	-----	18.80	22.00	26.26	29.44	32.61	NW1 with DA-4A (4-2)
44	Combine	7, 30,	2.979	3.901	-----	5.124	6.036	7.245	8.147	9.047	NW2 with DA-4B (4-1)
45	Combine	43, 44	14.22	18.39	-----	23.92	28.04	33.50	37.59	41.66	Total for SWD4
46	Combine	14, 41, 42,	53.82	71.46	-----	94.96	112.52	135.82	153.22	170.57	Total to Pond
47	Reservoir	46	0.000	0.000	-----	0.000	2.155	6.049	12.09	21.23	Proposed Pond
48	Combine	8, 9, 10, 32, 33, 45,	260.68	361.47	-----	498.08	601.05	738.31	841.01	943.44	N, NE, SE, DA-5, DA-6, & SWD4
49	Combine	39, 47, 48	274.52	380.88	-----	525.22	634.15	779.48	888.30	996.90	Route All to Proposed Channel
50	Reach	49	214.31	307.42	-----	436.04	534.19	666.10	765.42	864.87	Proposed Channel

**NORTHBOROUGH 3RD ADDITION REPLAT**

**EXHIBIT 1-7**

# DRAINAGE PLAN FOR A REPLAT OF NORTHBOROUGH 3RD ADDITION WICHITA, SEDGWICK COUNTY, KANSAS

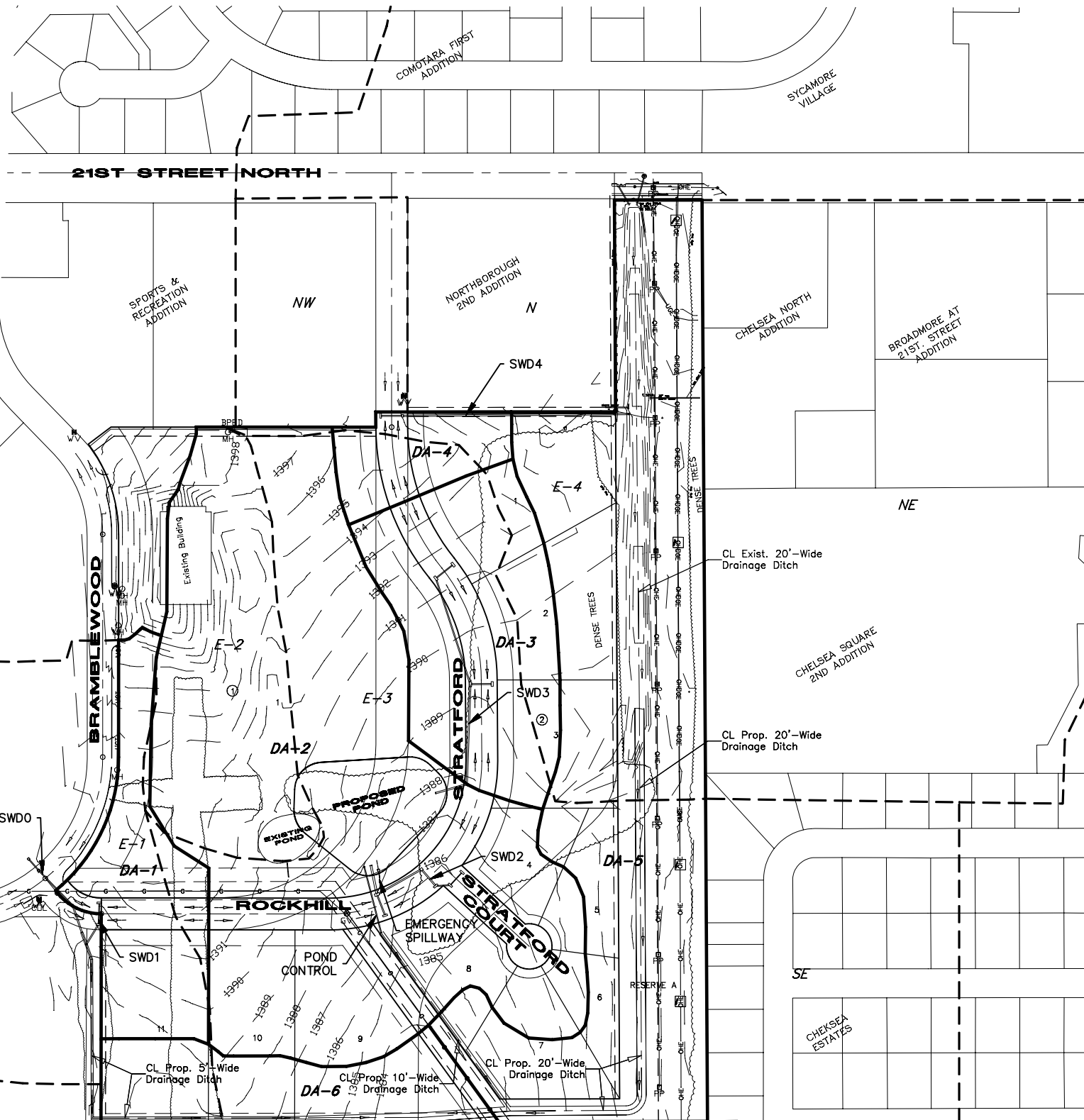


## LEGAL DESCRIPTION

Lot 3, Block 1 and Lots 1-2, Block 2 AND Reserve "A" AND all of that part of Stratford and Rockhill Lane lying south and west of Lot 3, Block 1, Northborough 3rd Addition, Wichita, Sedgwick County, Kansas.

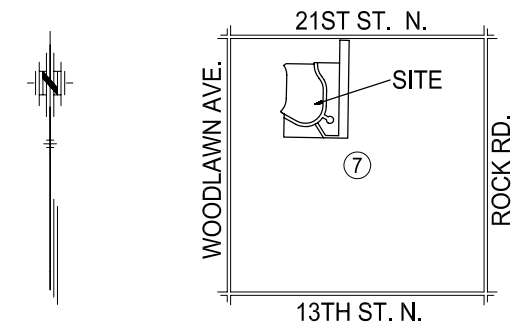
## NOTES

1. Cross-drainage agreement shall be required for any subsequent sub-divisions.
2. Detention ponds shall be required in Lot 1, Block 1, as shown to reduce developed flows within this site.
3. Site grading and drainage plans to be designed by a licensed professional engineer.
4. Minimum Pad Elevation Block 1 = 1390.8 (MSL)  
Minimum Pad Elevation Block 2 = 1387.4 (MSL)
5. Storm sewer easements will be provided only as needed to allow drainage to discharge across adjacent lots.
6. Off-site drainage crosses the north line of the property and into the existing east channel. If the existing drainage pattern is altered, a revised drainage plan must be provided and approved, that indicates how the storm water will be directed across this site.
7. Any revised drainage plan must be approved by the appropriate governing body prior to building permits being issued.
8. Any storm water detention areas shown may be revised when the final plans for the development are completed but the runoff amounts will be at or below the post development discharge rates. The filed final drainage report shows discharge rates and stage/storage/discharge curves for all on-site detention ponds.
9. A detailed grading plan will be provided at the time of development.



## LEGEND

- |        |                            |       |                          |
|--------|----------------------------|-------|--------------------------|
| BPED   | = Bell Pedestal            | MB    | = Mailbox                |
| OC     | = Cleanout                 | MH    | = Manhole                |
| 1298   | = Contour Elevation        | OH-E  | = Overhead Electric      |
| ⊕      | = Fire Hydrant             | OH-T  | = Overhead Telephone     |
| E-1/NW | = Drainage Area (Existing) | PP    | = Power Pole             |
| DA-1   | = Drainage Area (Proposed) | SS-SS | = Sanitary Sewer         |
| ER     | = Electric Riser           | —▲—   | = Sign                   |
| —○—○—  | = Fence                    | SWS   | = Storm Water Sewer      |
| —C—C—  | = Gas                      | CATV  | = Underground Cable T.V. |
| GM     | = Gas Meter                | UGE   | = Underground Electric   |
| GV     | = Gas Valve                | UGT   | = Underground Telephone  |
| GP     | = Guard Post               | —W—W— | = Water                  |
| ↓      | = Guy Anchor               | WM    | = Water Meter            |
| ⊥      | = Light Pole               | WV    | = Water Valve            |



## CALCULATION NOTES

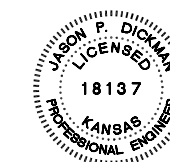
1. Determination of Q's was made using the SCS method.
2. Curve Numbers weighted based on hydrologic soil groups.

Existing Conditions (24-Hour Storm)								
Site	Area	CN	2-Year	5-Year	10-Year	25-Year	100-Year	
Off-Site W	12.061	89.1	32.69	44.30	53.00	64.55	81.78	
Off-Site NW	4.332	95.0	13.90	17.98	21.02	25.05	31.08	
Off-Site N	75.238	87.0	189.30	261.38	315.87	388.05	486.19	
Off-Site NE	30.345	87.0	76.35	105.41	127.32	156.51	200.13	
Off-Site SE	13.386	87.0	33.68	46.50	56.16	69.04	88.28	
E-1	3.981	82.7	4.71	6.80	8.42	10.61	13.92	
E-2	5.723	83.0	8.21	11.76	14.53	18.28	23.92	
E-3	27.034	83.0	29.03	41.70	51.42	64.64	84.67	
E-4	10.854	81.6	21.53	31.46	39.11	49.46	65.11	
West Ditch	18.022	-	32.86	44.86	54.10	66.92	86.22	
Existing Pond	5.723	82.8	0.00	0.79	3.41	14.34	28.28	
East Channel	120.767	-	254.35	357.97	438.45	541.31	688.23	
Central Channel	182.932	-	313.63	447.66	548.58	685.98	890.25	

Developed Conditions (24-Hour Storm)								
Site	Area	CN	2-Year	5-Year	10-Year	25-Year	100-Year	
Off-Site W	12.061	89.1	32.69	44.30	53.00	64.55	81.78	
Off-Site NW	4.332	95.0	13.90	17.98	21.02	25.05	31.08	
Off-Site N	75.238	87.0	189.30	261.38	315.87	388.05	486.19	
Off-Site NE	30.345	87.0	76.35	105.41	127.32	156.51	200.13	
Off-Site SE	13.386	87.0	33.68	46.50	56.16	69.04	88.28	
DA-1	3.397	92.0	10.09	13.34	15.77	19.99	23.78	
DA-2	19.255	91.1	55.61	73.99	87.73	105.98	133.20	
DA-3	5.338	92.0	15.85	20.87	24.78	29.84	37.37	
DA-4	1.513	92.0	3.61	5.02	6.09	7.53	9.69	
DA-5	15.067	84.8	34.83	49.09	59.82	74.42	96.16	
DA-6	3.003	92.0	8.82	11.80	13.94	16.78	21.02	
Prop. West Ditch	15.458	-	34.86	47.47	58.94	69.62	89.68	
Proposed Pond	24.593	-	0.00	0.00	2.16	6.05	21.23	
Prop. Channel	182.932	-	308.38	437.38	535.77	668.05	867.36	

## BENCHMARK

1. City of Wichita B.M. Disk 45.4' East & 45.5' North of CL Intersection of Woodlawn and 21st Street North  
Elev. = 1388.05

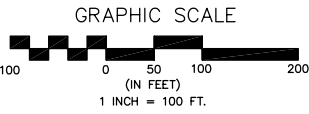
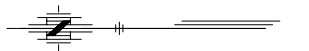


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**NORTHBOROUGH 3RD ADDITION REPLAT**

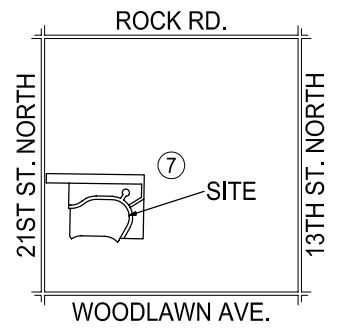
**EXHIBIT 1-8**

# PRELIMINARY LOT GRADING PLAN FOR A REPLAT OF NORTHBOROUGH 3RD ADDITION WICHITA, SEDGWICK COUNTY, KANSAS



## LEGEND

BPED	= Bell Pedestal	—OHE—	= Overhead Electric
○	= Cleanout	—OHT—	= Overhead Telephone
1298	= Contour Elevation	PP	= Power Pole
⋈	= Fire Hydrant	1391.3	= Proposed Grade
ER	= Electric Riser	—SS—	= Sanitary Sewer
—	= Fence	—	= Sign
—G—	= Gas	—SWS—	= Storm Water Sewer
GM	= Gas Meter	—CATV—	= Underground Cable T.V.
GV	= Gas Valve	—UGE—	= Underground Electric
GP	= Guard Post	—UGT—	= Underground Telephone
↓	= Guy Anchor	—W—	= Water
⋈	= Light Pole	WM	= Water Meter
MB	= Mailbox	WV	= Water Valve
MH	= Manhole		



## LEGAL DESCRIPTION

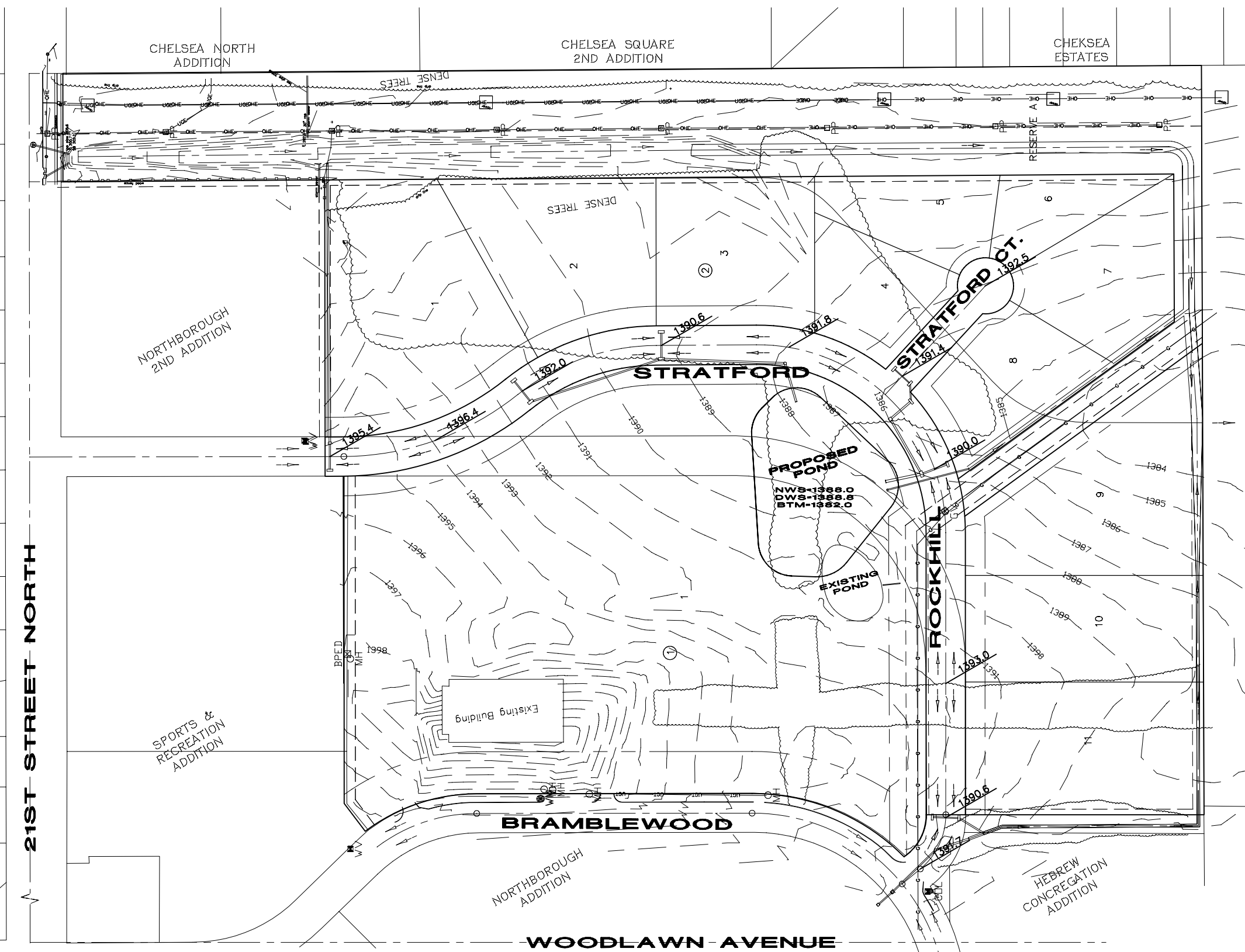
Lot 3, Block 1 and Lots 1-2, Block 2 AND Reserve "A" AND all of that part of Stratford and Rockhill Lane lying south and west of Lot 3, Block 1, Northborough 3rd Addition, Wichita, Sedgwick County, Kansas.

## NOTES

1. A detailed site grading plan will be provided when submitting for building permits.
2. Site grading and drainage plans to be designed by a licensed professional engineer.
3. Match existing grades at all outer property lines.
4. Proposed elevations shown are to center of roadway only.
5. Minimum Pad Elevation Block 1 = 1390.8 (MSL)  
Minimum Pad Elevation Block 2 = 1387.4 (MSL)

## BENCHMARK

1. City of Wichita B.M. Disk 45.4' East & 45.5' North of CL Intersection of Woodlawn and 21st Street North  
Elev. = 1388.05



## **Tab 2. Existing Conditions Run-off Calculations**

### **A. Copy of orthophotograph showing proposed boundaries**

See Exhibit 2-1 for aerial photograph showing proposed site boundaries.

### **B. Run-off method**

The run-off method used to determine storm water flows was the SCS hydrograph method. Supporting data and calculation results are shown on Exhibit 2-2.

### **C. Existing topography**

The existing topography is shown on the drainage plan as seen on Exhibit 1-7.

### **D. Total site area and total impervious area**

The total area of Northborough 3<sup>rd</sup> Addition Replat encompasses just over 47.5 acres. The total impervious area for the developed condition, based on multi-family residential land use, is estimated at 65% of the total site area. Therefore, the total impervious area on this site is estimated at just over 31 acres.

### **E. Benchmarks used for site control**

The benchmarks used for site control are listed on the drainage plan, which is Exhibit 1-7.

### **F. Streams, creeks, and waterways labeled**

Exhibit 1-7 shows any water features within the site.

### **G. Predominate soils from USDA soil surveys**

The predominant soil type is a Rosehill Silty Clay series (3911) material, which is found in the majority of the drainage areas of this site. The area is also made up of a small amount of Goessel Silty Clay (3858) soil material located at the northwest region of the property. See Exhibit 1-2 for NRCS Soil Survey map and information showing existing soil types and descriptions. The Rosehill soil is classified as Hydrologic Group D soil and the Goessel soil is a Hydrologic Group D soil as well. These Hydrologic Groups are used to select curve numbers for the run-off calculations in both the existing and developed conditions.

### **H. Location and boundaries of natural features**

The existing site does not contain wetlands or lakes. A small detention pond is located at the southern end of Lot1, Block 1.

## **I. Location of existing roads, buildings, parking lots, and other impervious areas**

All areas within the platted property are vacant land with good grass cover and various concentrations of dense trees and brush. A concrete wall runs along the entire length of the north line of Lot 1, Block 1. An existing building is located in the northwest quadrant of Lot 1, Block 1, which includes landscaping and parking lots.

## **J. Location of existing utilities**

The site contains an existing gas pipeline within a 40' pipeline easement that runs east along the north side of the proposed Rockhill R/W and then southeast along the east line of Lot 9, Block 2 of the property. Existing waterlines include an 8" line that ends at the north property line and would likely extend along the east R/W line of Stratford. Another 8" waterline currently runs along the east R/W line of Bramblewood, which is also the west line of the property. This line includes fire hydrants and meters at various locations along its path. An existing 8" sanitary sewer line enters the property from the north and then goes west within an easement to about the center of the north line of Lot 1, Block 1. A manhole at this location serves the existing building on-site. Overhead power lines run along the entire length of the east property line and are within a KG&E easement. The above information is shown on the drainage plan, Exhibit 1-7.

## **K. Location of existing conveyance systems**

Flow across the site is currently overland and open channel flow. Most off-site drainage from the north and east enters the 20'-wide ditch along the east line of the property. Various storm sewers drain into this ditch from these off-site areas. Off-site drainage from the west enters a small ditch just outside the west line of Lot 10, Block 2. This west drainage runs through a storm sewer under Bramblewood and ends at a point where Rockhill will extend over it for this development. Finally, a 15" pipe controls the existing pond at the south end of Lot 1, Block 1.

## **L. Flow paths**

The drainage plan (Exhibit 1-7) shows the general flow paths for the site. A slight ridge breaks the flows to the east and the west within the west half of the property. Over eighty percent of the site drains to the south and exits near the center of the south property line. The west area drains into Bramblewood and then enters the west ditch near the southwest corner of the site.

## **M. Location and dimensions of existing channels, bridges or culvert crossings**

The 20'-wide ditch is the only existing channel within this site. Four R.C.P.'s, drain into the 20'-wide ditch at or near its north end. The site also contains a 15" pipe that controls the existing detention pond.

## N. Existing conditions hydrologic analysis

The analysis was completed using the SCS Hydrograph method. The 2, 5, 10, 25, & 100 year, 24-hour storm events were evaluated and the information appears in Exhibit 2-2. The results are summarized in the following table.

Area/Frequency	24-Hour Storm Flows (cfs)				
	2-Year	5-Year	10-Year	25-Year	100-Year
Off-Site W	32.69	44.30	53.00	64.55	81.78
Off-Site NW	13.90	17.98	21.02	25.05	31.08
Off-Site N	189.30	261.36	315.67	388.05	496.19
Off-Site NE	76.35	105.41	127.32	156.51	200.13
Off-Site SE	33.68	46.50	56.16	69.04	88.28
E-1	4.71	6.80	8.42	10.61	13.92
E-2	8.21	11.76	14.53	18.28	23.92
E-3	29.03	41.70	51.42	64.64	84.67
E-4	21.53	31.46	39.11	49.46	65.11
West Ditch	32.86	44.86	54.10	66.92	86.22
Existing Pond	0.00	0.79	3.41	14.34	26.28
East Channel	254.35	357.97	436.45	541.31	698.23
Central Channel	313.63	447.66	549.58	685.98	890.25

## O. Assumed pre-developed run-off curve numbers

For the existing condition, the curve numbers were weighted based on area of their respective hydrologic soil groups and land uses over each site. The results are shown in the table below.

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
W	3911	D	212737	4.884	40.49%	95.0
	3911	D	179180	4.113	34.10%	89.0
	3911	D	133474	3.064	25.40%	80.0
Total			525392	12.061	100.00%	89.1

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
NW	3858	D	188700	4.332	100.00%	95.0
Total			188700	4.332	100.00%	95.0

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
N	3858	D	2396026	55.005	73.11%	87.0
	3911	D	866575	19.894	26.44%	87.0
	4671	D	14673	0.337	0.45%	87.0
Total			3277274	75.236	100.00%	87.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
NE	3858	D	794360	18.236	60.10%	87.0
	3911	D	527452	12.109	39.90%	87.0
Total			1321812	30.345	100.00%	87.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
SE	3858	D	220498	5.062	37.81%	87.0
	3911	D	362607	8.324	62.19%	87.0
Total			583105	13.386	100.00%	87.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
E-1	3911	D	134203	3.081	77.78%	84.0
	3911	D	38349	0.880	22.22%	78.0
Total			172552	3.961	100.00%	82.7

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
E-2	3858	D	140967	3.236	56.55%	84.0
	3911	D	66519	1.527	26.68%	84.0
	3911	D	41791	0.959	16.76%	78.0
Total			249277	5.723	100.00%	83.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
E-3	3858	D	119709	2.748	10.17%	84.0
	3911	D	863209	19.817	73.30%	84.0
	3911	D	194683	4.469	16.53%	78.0
Total			1177601	27.034	100.00%	83.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
E-4	3858	D	9075	0.208	1.92%	84.0
	3911	D	276925	6.357	58.57%	84.0
	3911	D	186819	4.289	39.51%	78.0
Total			472818	10.854	100.00%	81.6

**P. Existing times of concentration used in calculations**

Area	T <sub>c</sub> (min)
Off-Site W	15.0
Off-Site NW	15.0
Off-Site N	15.0
Off-Site NE	15.0
Off-Site SE	15.0
E-1	42.4
E-2	37.9
E-3	60.3
E-4	15.0

**Q. Evaluation of immediate downstream drainage capacity**

The downstream capacity to the south of this site shall be considered adequate to accommodate the existing flows from this site. The capacity will not be a concern since post-developed flows are intended to be less than or equal to the existing flows leaving the site.

**R. Existing structural elevations**

Two R.C.P.'s drain areas north of 21<sup>st</sup> Street North into the north end of the 20'-wide ditch. The east R.C.P. is 54" in diameter and has a flow line of 1388.1 and the east 42" R.C.P. flow line is 1388.7. Also, on the east side of the ditch and 436' south of the north property line, a 30" R.C.P. enters the ditch with a flow line of 1390.3. Then, across to the west side of the ditch, a 24" R.C.P. drains Northborough 2<sup>nd</sup> Addition with a flow line of 1386.8. Finally, a 42" R.C.P. enters the end of the existing ditch from the east at the northwest corner of Chelsea Estates with a flow line of around 1389. The only storm sewer from the west enters the site at the west end of the proposed Rockhill R/W and is a 38"x24" R.C.P.H.E. with a flow line of about 1389.4. The 15" pipe at the existing pond has an upstream flow line of 1390.2 and a downstream flow line of 1389.8 (All elevations are MSL Datum).

**S. Cross-section data for open channels**

A 20'-wide ditch is the only open channel within this site. The typical section has a 20' bottom width and 4:1 side slopes.

**T. Ground water elevations**

The ground water elevation is not a concern for this area.

**NORTHBOROUGH 3RD ADDITION REPLAT**

**EXHIBIT 2-1**

**AERIAL MAP**

**K-96**

**29TH STREET NORTH**

**T26S**

**T27S**

**WOODLAWN AVENUE**

**ROCK ROAD**

**21ST STREET NORTH**

**NORTHBOROUGH 3RD  
ADDITION REPLAT**

**13TH STREET NORTH**

**R1E  
R2E**



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**NORTHBOROUGH 3RD ADDITION REPLAT**

**EXHIBIT 2-2**

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description	
1	SCS Runoff	32.69	6	720	2.317	----	-----	-----	Off-Site W	
2	SCS Runoff	13.90	6	720	1.028	----	-----	-----	Off-Site NW	
3	SCS Runoff	189.30	6	720	13.357	----	-----	-----	Off-Site N	
4	SCS Runoff	76.35	6	720	5.387	----	-----	-----	Off-Site NE	
5	SCS Runoff	33.68	6	720	2.377	----	-----	-----	Off-Site SE	
6	SCS Runoff	4.774	6	744	0.618	----	-----	-----	E-1	
7	SCS Runoff	8.274	6	738	0.956	----	-----	-----	E-2	
8	SCS Runoff	29.28	6	750	4.377	----	-----	-----	E-3	
9	SCS Runoff	21.92	6	720	1.556	----	-----	-----	E-4	
10	Combine	35.12	6	720	2.935	1, 6,	-----	-----	Off-Site W with E-1 to West Ditch	
11	Reach	33.97	6	726	2.935	10	-----	-----	Existing West Ditch	
12	Reservoir	0.000	6	0	0.000	7	1390.16	0.956	E-2 to Existing Pond	
13	Combine	301.47	6	720	21.329	2, 3, 4, 9,	-----	-----	Off-Site NW, N, & NE with E-4	
14	Reach	254.69	6	732	21.329	13	-----	-----	East Channel in E-4	
15	Combine	296.30	6	732	28.082	5, 8, 12, 14	-----	-----	Off-Site SE, E-2, & E-4 with E-3	
16	Combine	329.55	6	732	31.017	11, 15	-----	-----	Combine All	
17	Reach	315.00	6	738	31.017	16	-----	-----	Existing Central Channel	
Northborough Existing.gpw					Return Period: 2 Year			Thursday, Sep 6 2007		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

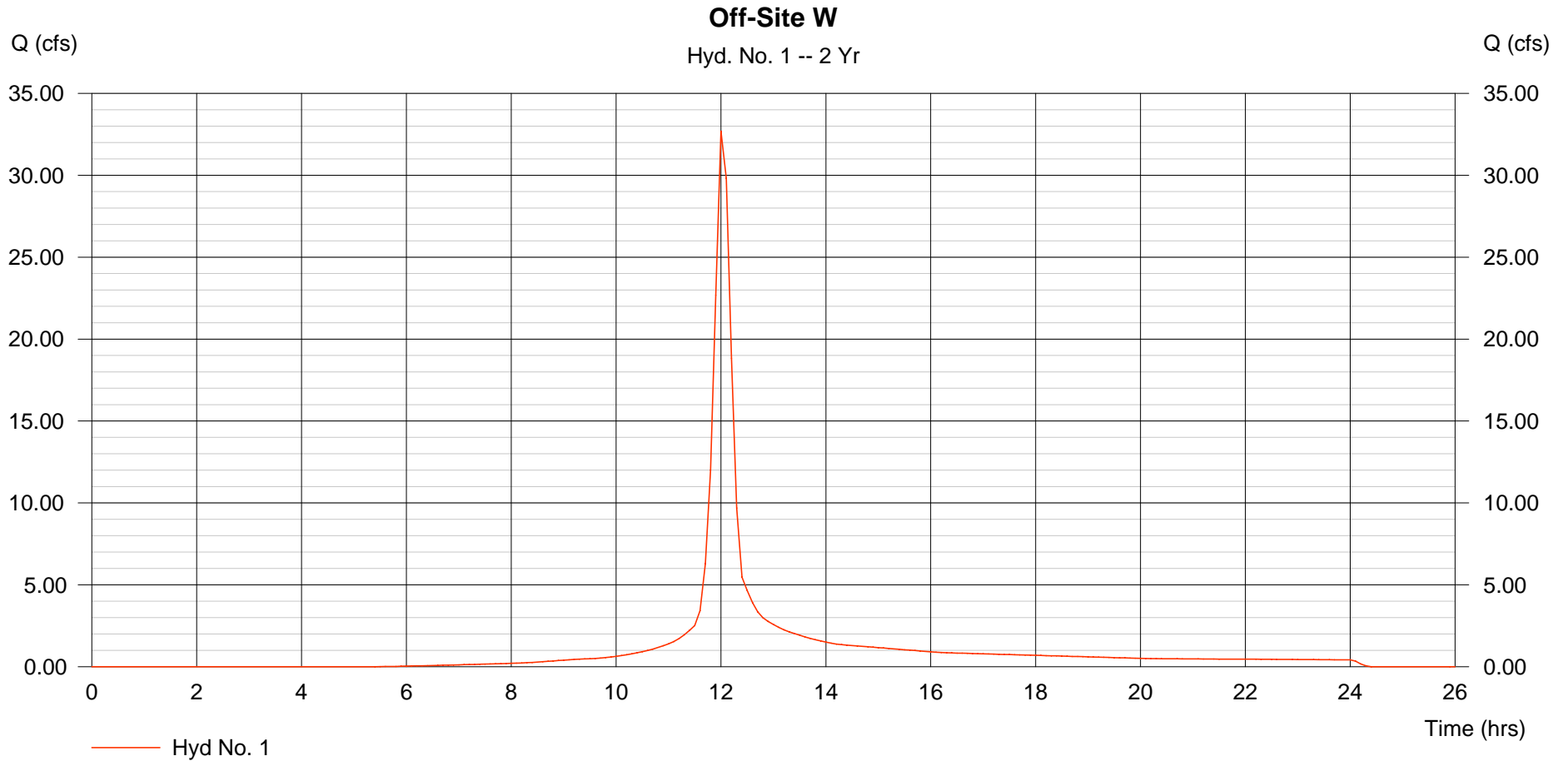
## Hyd. No. 1

Off-Site W

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 12.061 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 32.69 cfs  
Time interval = 6 min  
Curve number = 89.1  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.317 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

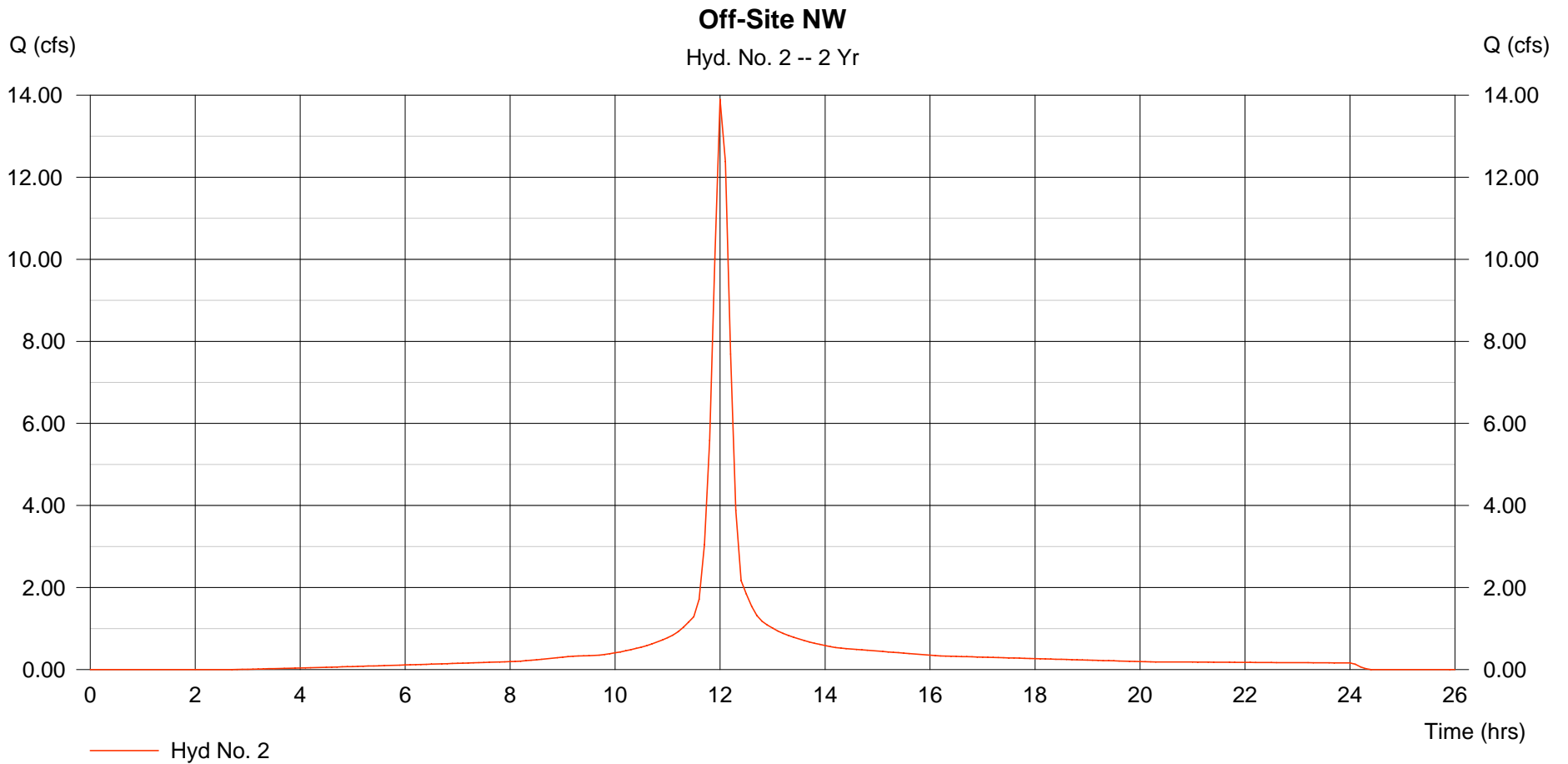
## Hyd. No. 2

Off-Site NW

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 4.332 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 13.90 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.028 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

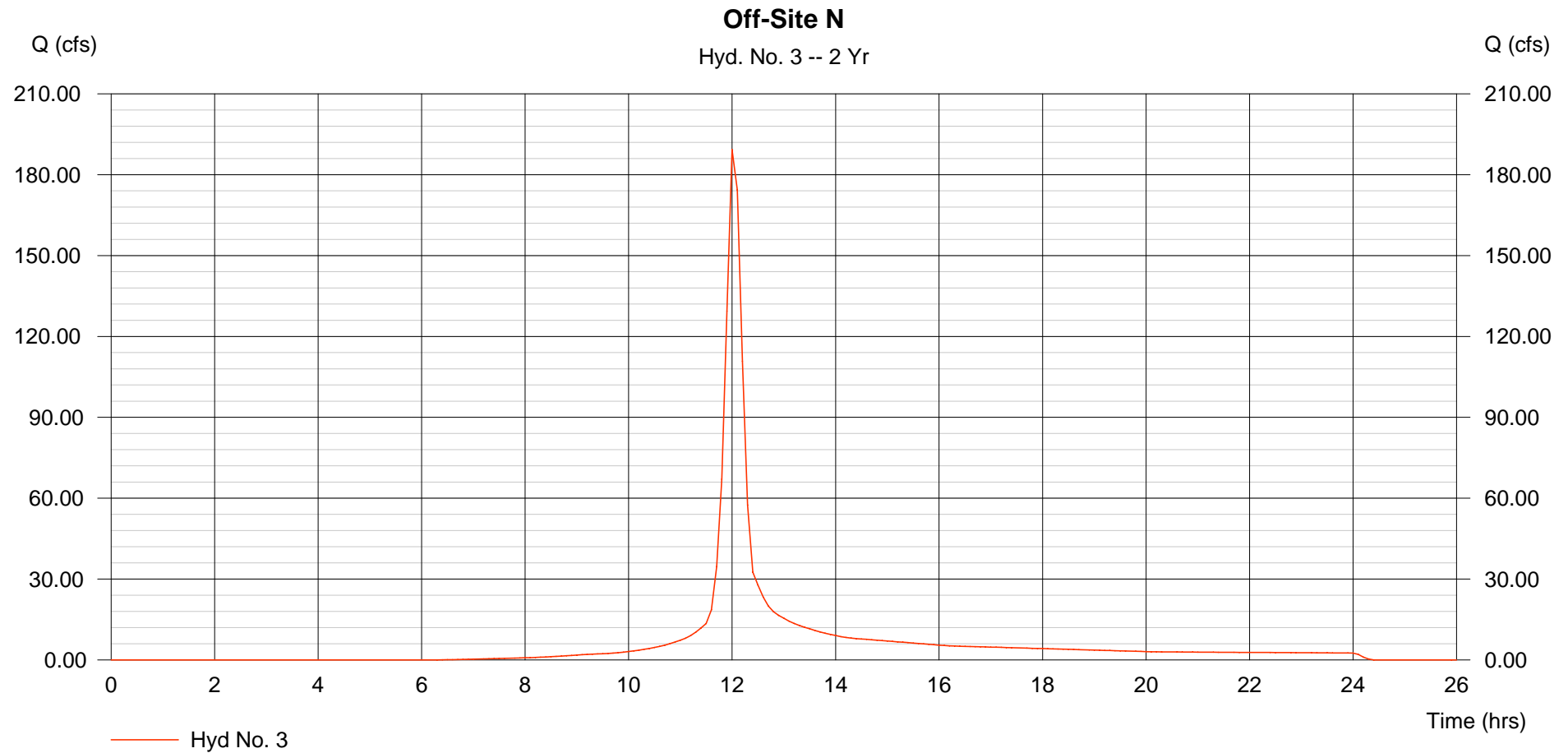
## Hyd. No. 3

Off-Site N

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 189.30 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 13.357 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

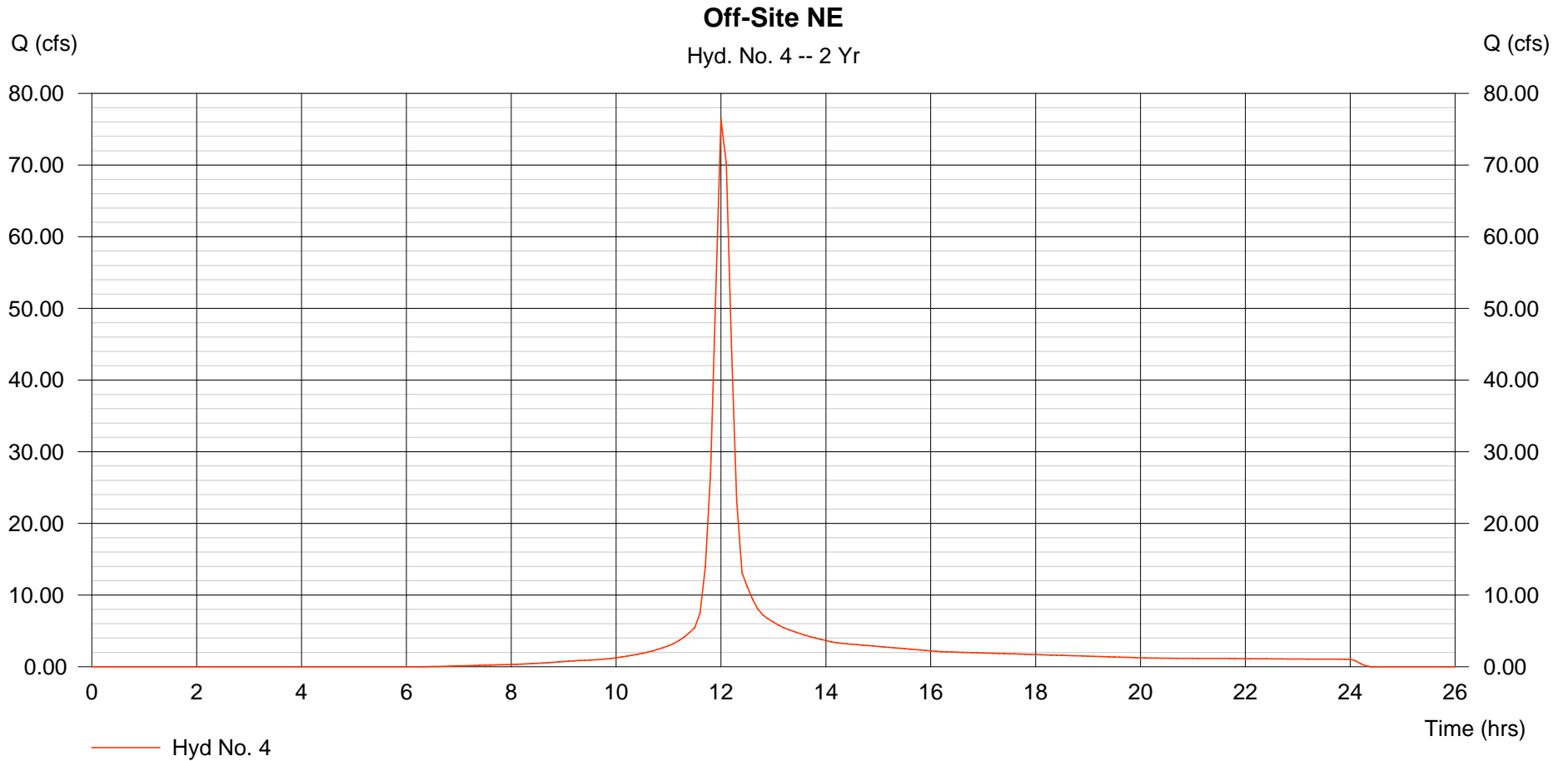
## Hyd. No. 4

Off-Site NE

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 76.35 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 5.387 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

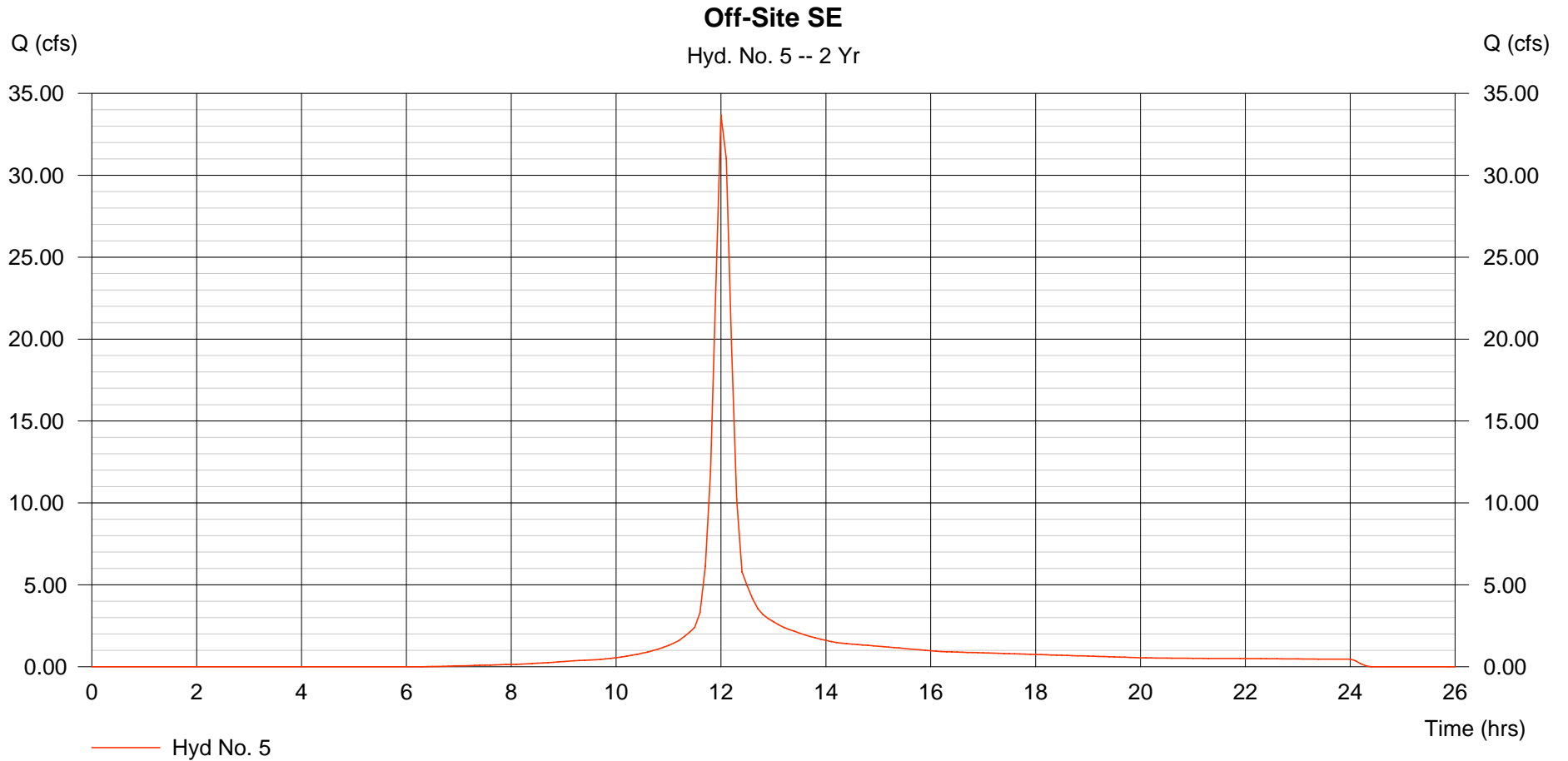
## Hyd. No. 5

Off-Site SE

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 33.68 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.377 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

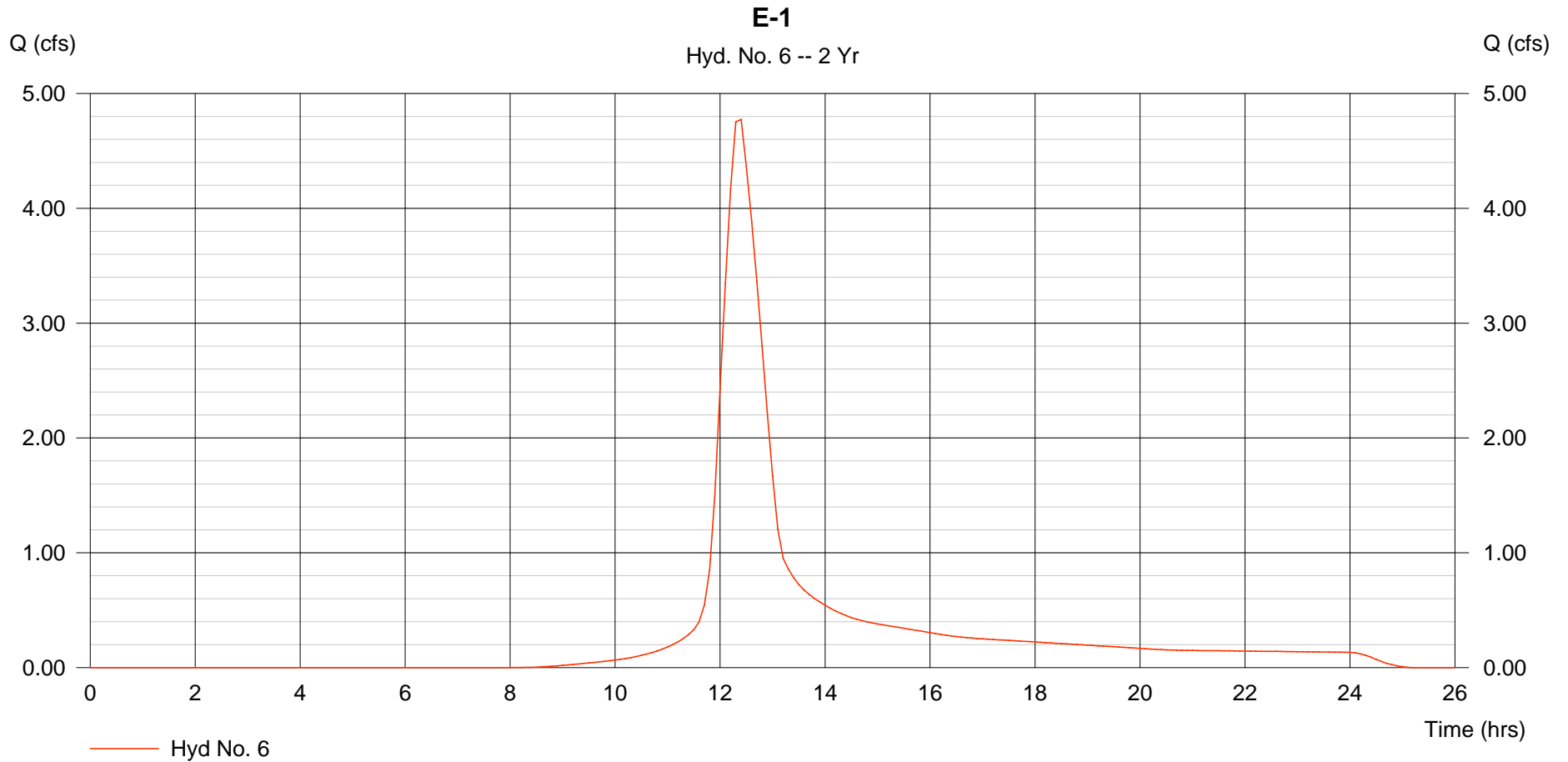
## Hyd. No. 6

E-1

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 3.961 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 4.774 cfs  
Time interval = 6 min  
Curve number = 82.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 42.40 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.618 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 7

E-2

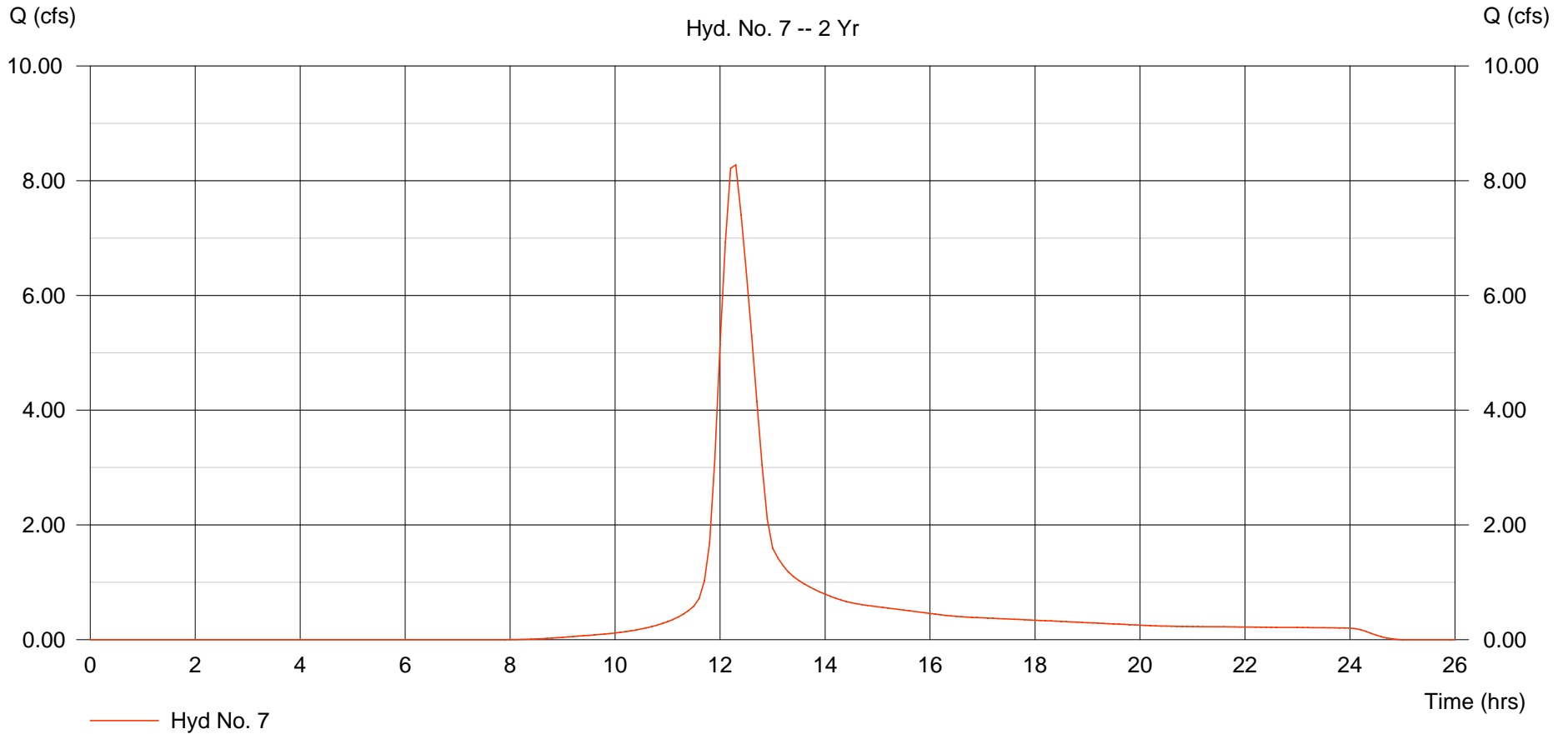
Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 5.723 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 8.274 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 37.90 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.956 acft

### E-2

Hyd. No. 7 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

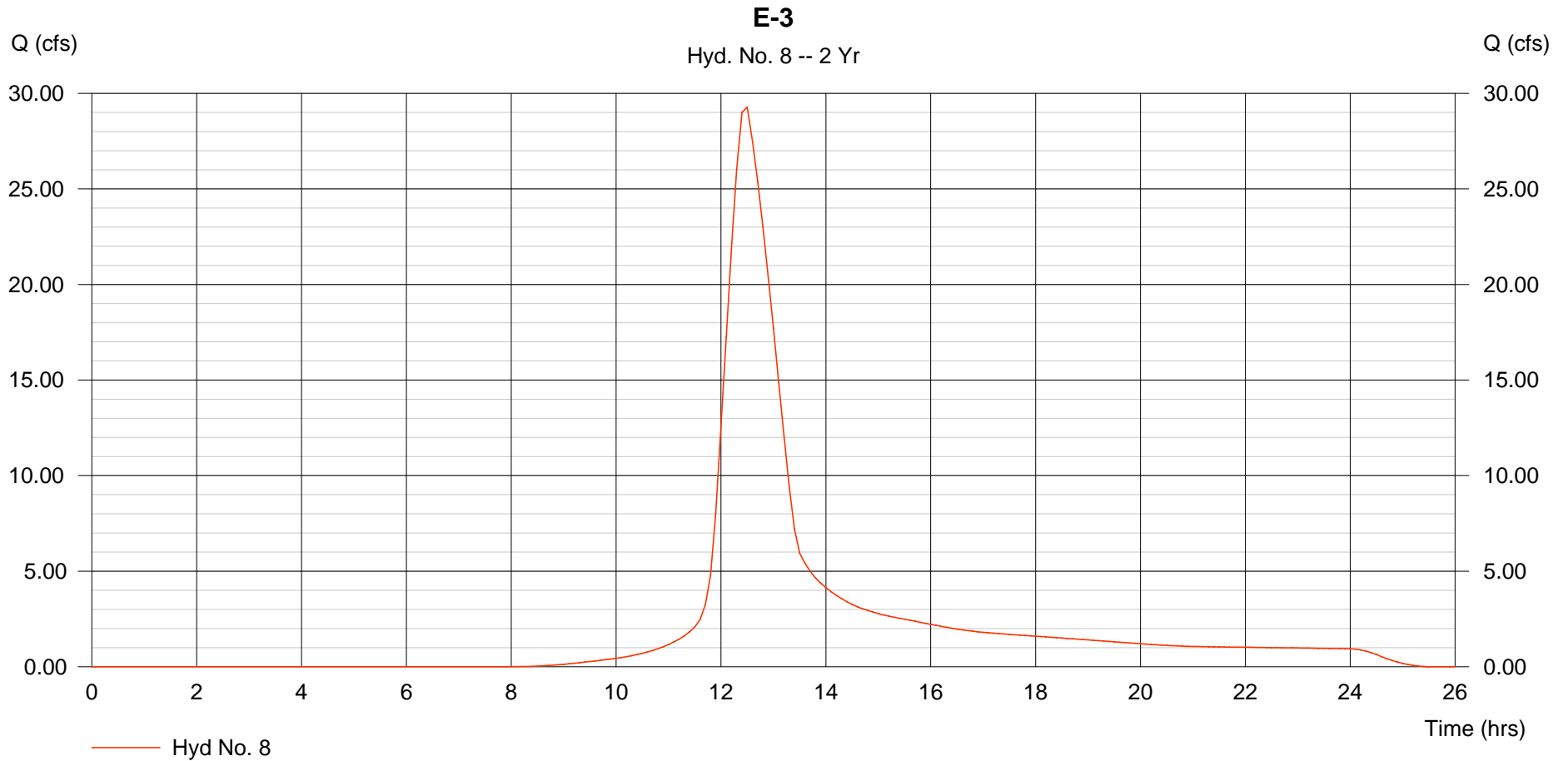
## Hyd. No. 8

E-3

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 27.034 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 29.28 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 60.30 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4.377 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

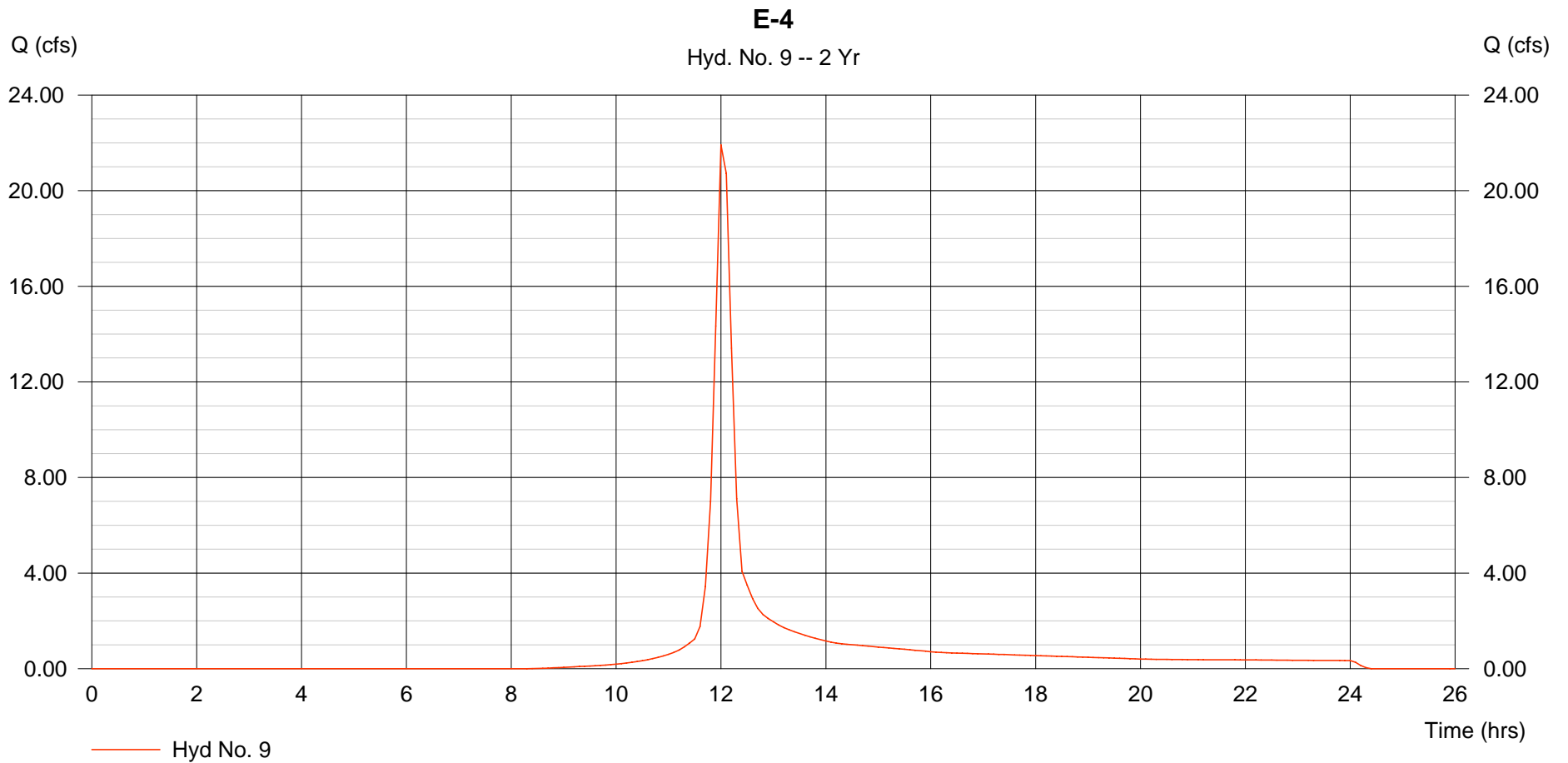
## Hyd. No. 9

E-4

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 10.854 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 21.92 cfs  
Time interval = 6 min  
Curve number = 81.6  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.556 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

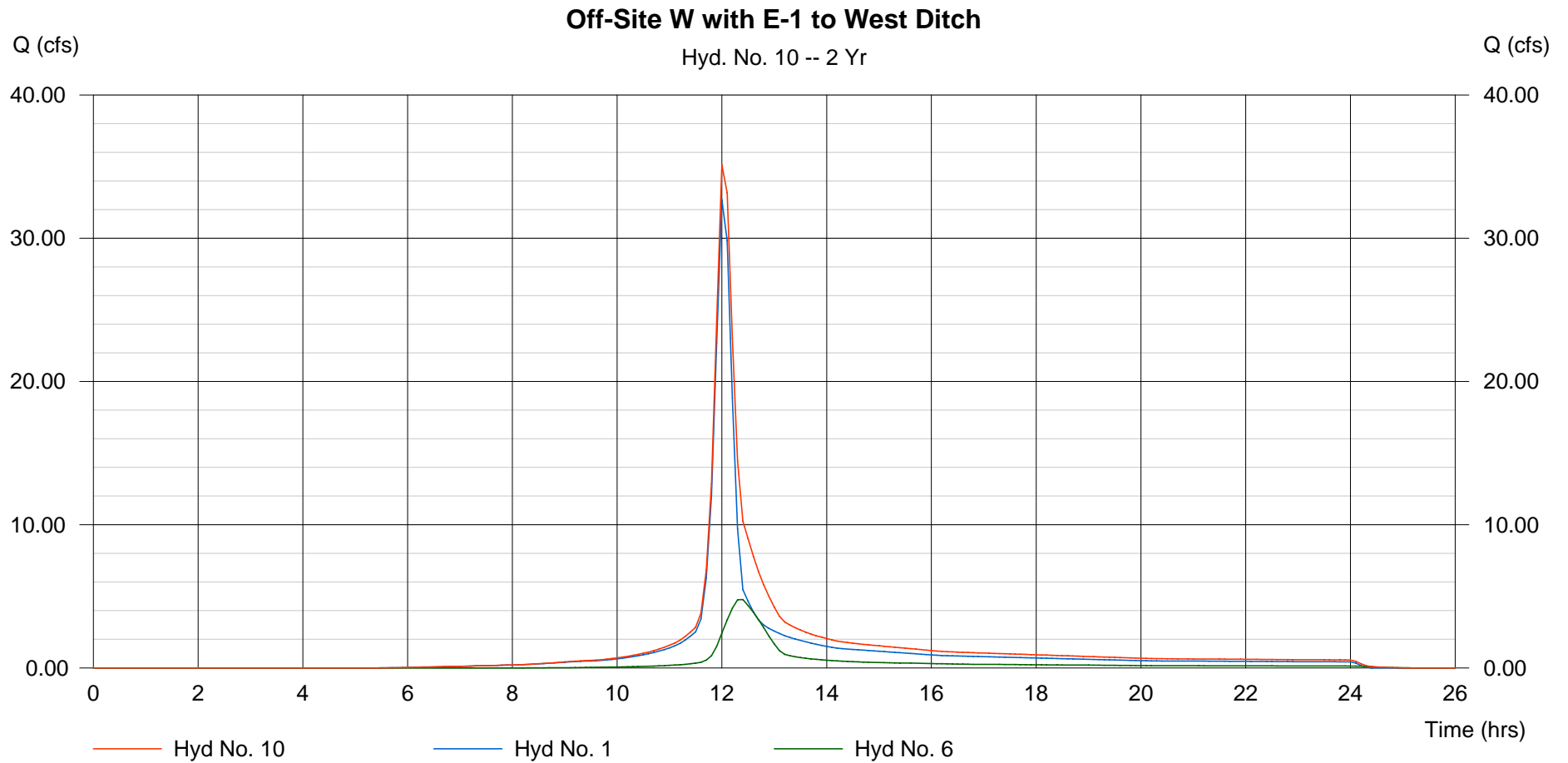
## Hyd. No. 10

Off-Site W with E-1 to West Ditch

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 1, 6

Peak discharge = 35.12 cfs  
Time interval = 6 min

Hydrograph Volume = 2.935 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 11

Exisitng West Ditch

Hydrograph type = Reach  
Storm frequency = 2 yrs  
Inflow hyd. No. = 10  
Reach length = 450.0 ft  
Manning's n = 0.045  
Side slope = 6.0:1  
Rating curve x = 0.743  
Ave. velocity = 1.64 ft/s

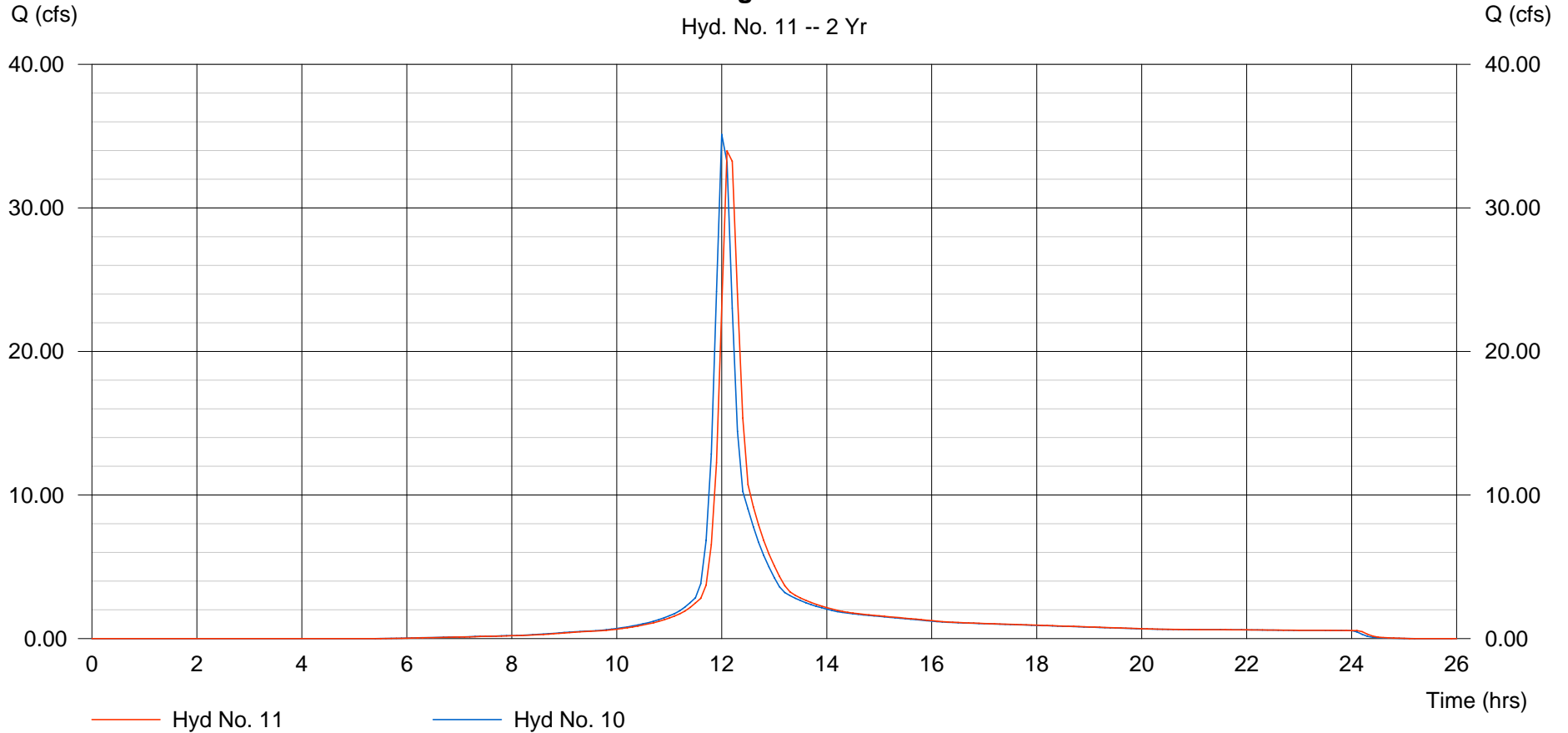
Peak discharge = 33.97 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.4 %  
Bottom width = 5.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.258  
Routing coeff. = 0.9042

Modified Att-Kin routing method used.

Hydrograph Volume = 2.935 acft

### Exisitng West Ditch

Hyd. No. 11 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 12

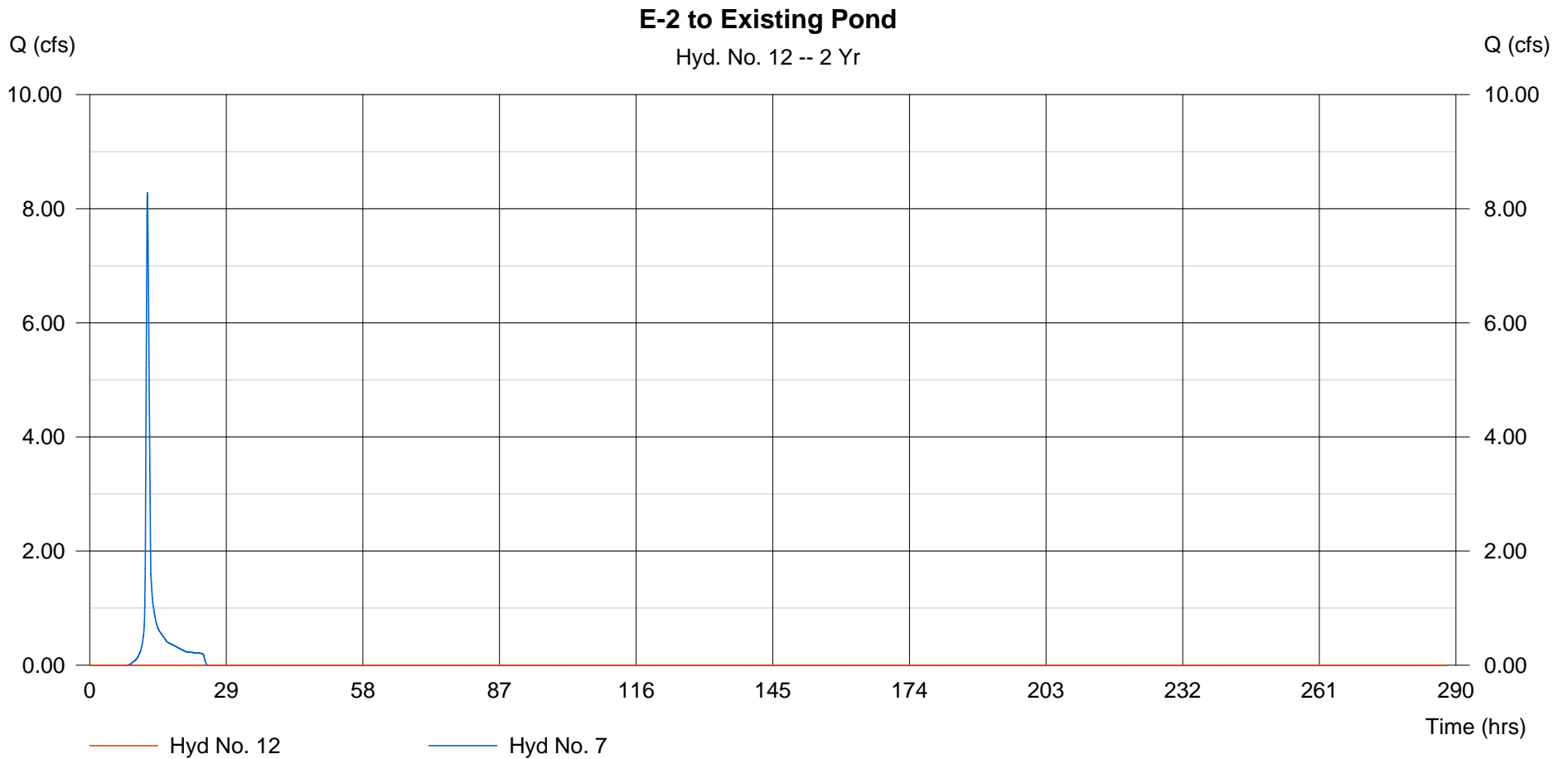
E-2 to Existing Pond

Hydrograph type = Reservoir  
Storm frequency = 2 yrs  
Inflow hyd. No. = 7  
Reservoir name = Existing Pond

Peak discharge = 0.000 cfs  
Time interval = 6 min  
Max. Elevation = 1390.16 ft  
Max. Storage = 0.956 acft

Storage Indication method used.

Hydrograph Volume = 0.000 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

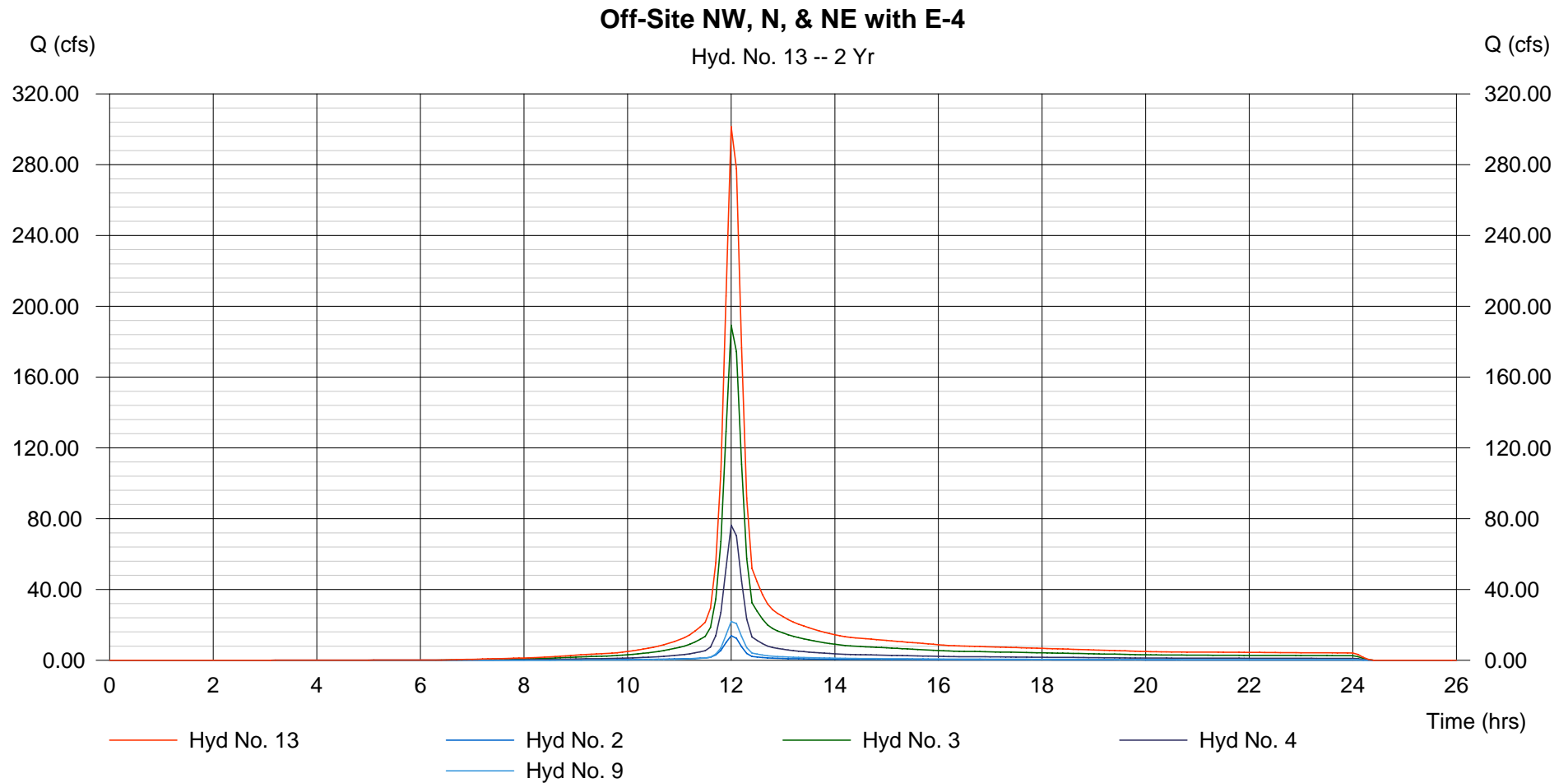
## Hyd. No. 13

Off-Site NW, N, & NE with E-4

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 2, 3, 4, 9

Peak discharge = 301.47 cfs  
Time interval = 6 min

Hydrograph Volume = 21.329 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 14

East Channel in E-4

Hydrograph type = Reach  
Storm frequency = 2 yrs  
Inflow hyd. No. = 13  
Reach length = 1384.8 ft  
Manning's n = 0.040  
Side slope = 4.0:1  
Rating curve x = 0.235  
Ave. velocity = 1.96 ft/s

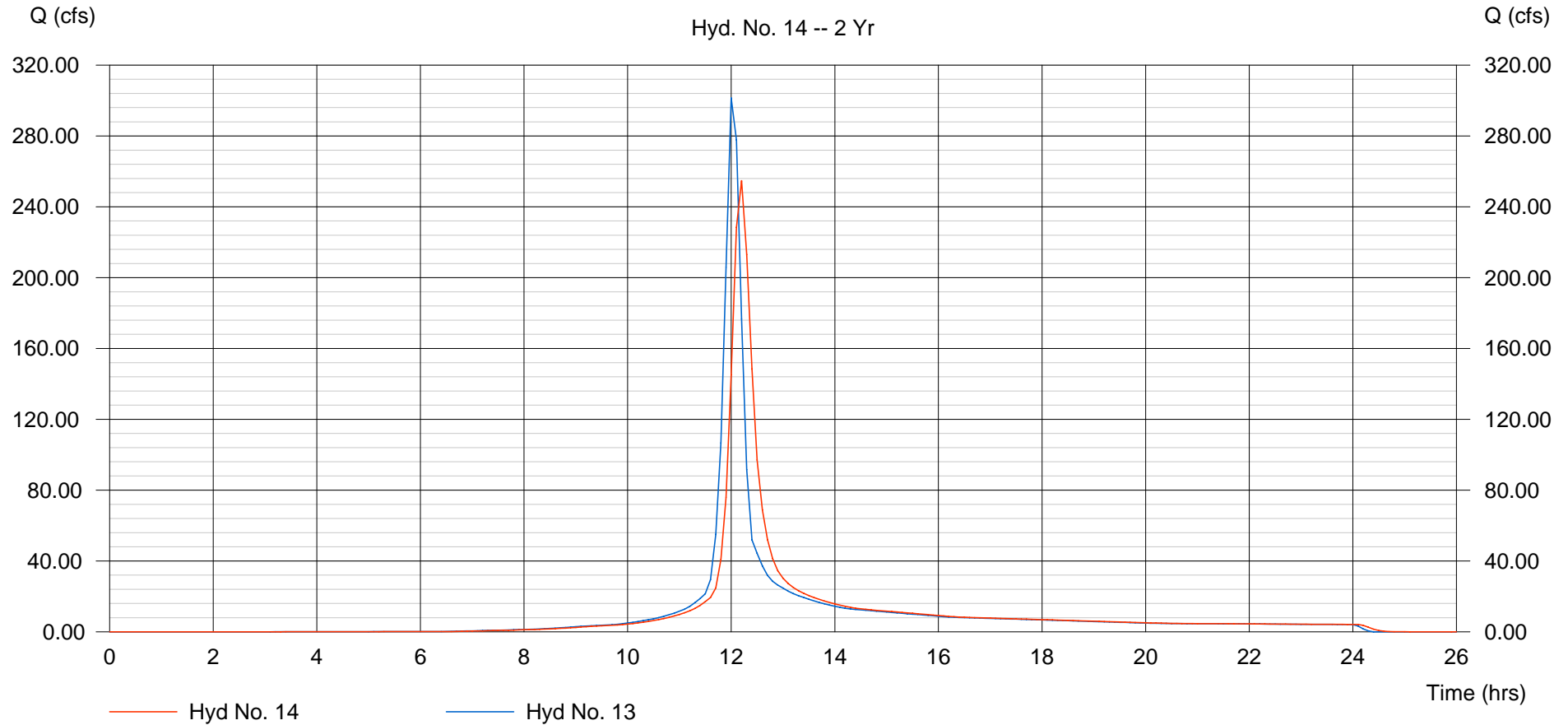
Peak discharge = 254.69 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.422  
Routing coeff. = 0.5327

Modified Att-Kin routing method used.

Hydrograph Volume = 21.329 acft

### East Channel in E-4

Hyd. No. 14 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

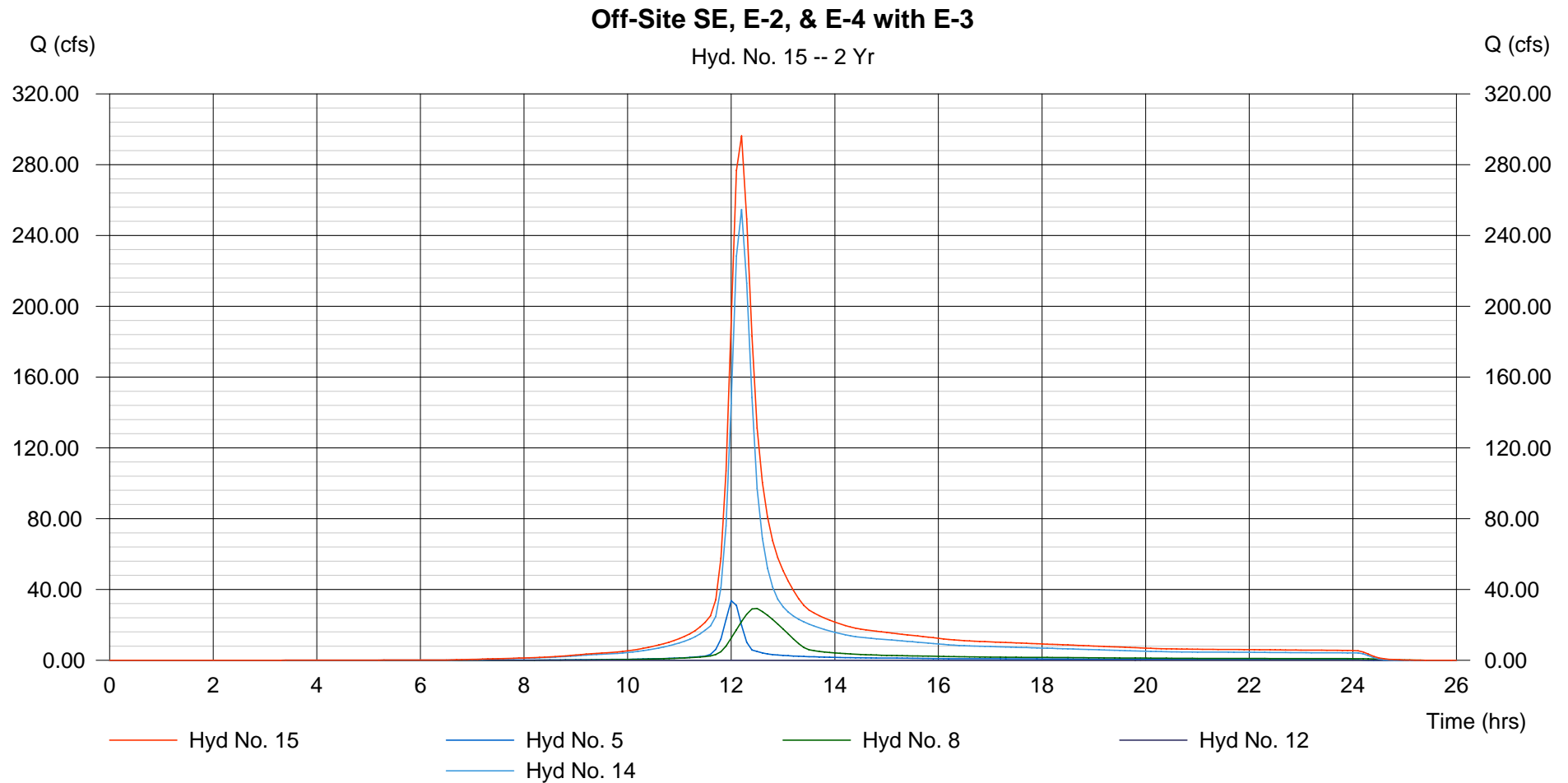
## Hyd. No. 15

Off-Site SE, E-2, & E-4 with E-3

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 5, 8, 12, 14

Peak discharge = 296.30 cfs  
Time interval = 6 min

Hydrograph Volume = 28.082 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

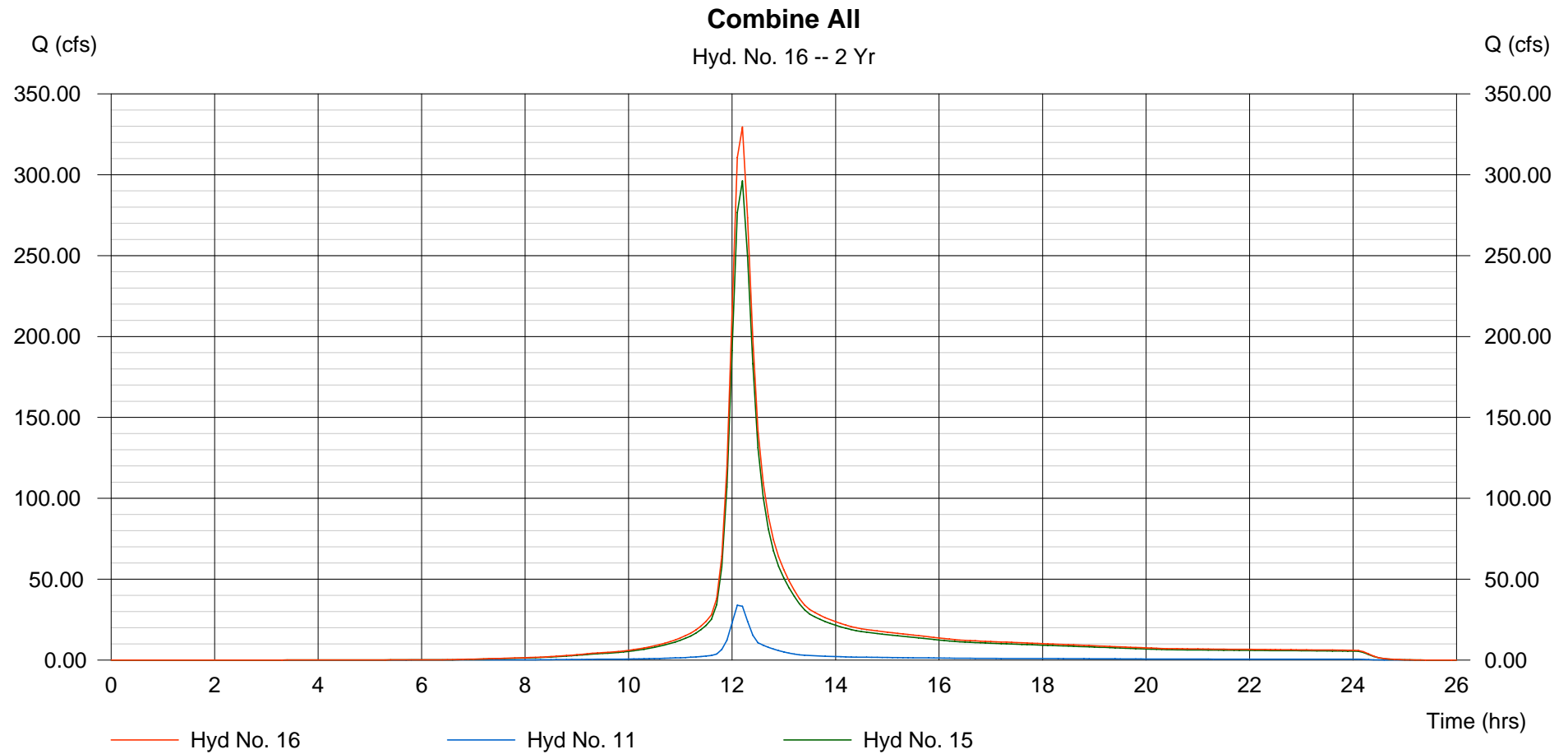
## Hyd. No. 16

Combine All

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 11, 15

Peak discharge = 329.55 cfs  
Time interval = 6 min

Hydrograph Volume = 31.017 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 17

Existing Central Channel

Hydrograph type = Reach  
Storm frequency = 2 yrs  
Inflow hyd. No. = 16  
Reach length = 813.4 ft  
Manning's n = 0.040  
Side slope = 50.0:1  
Rating curve x = 0.350  
Ave. velocity = 1.94 ft/s

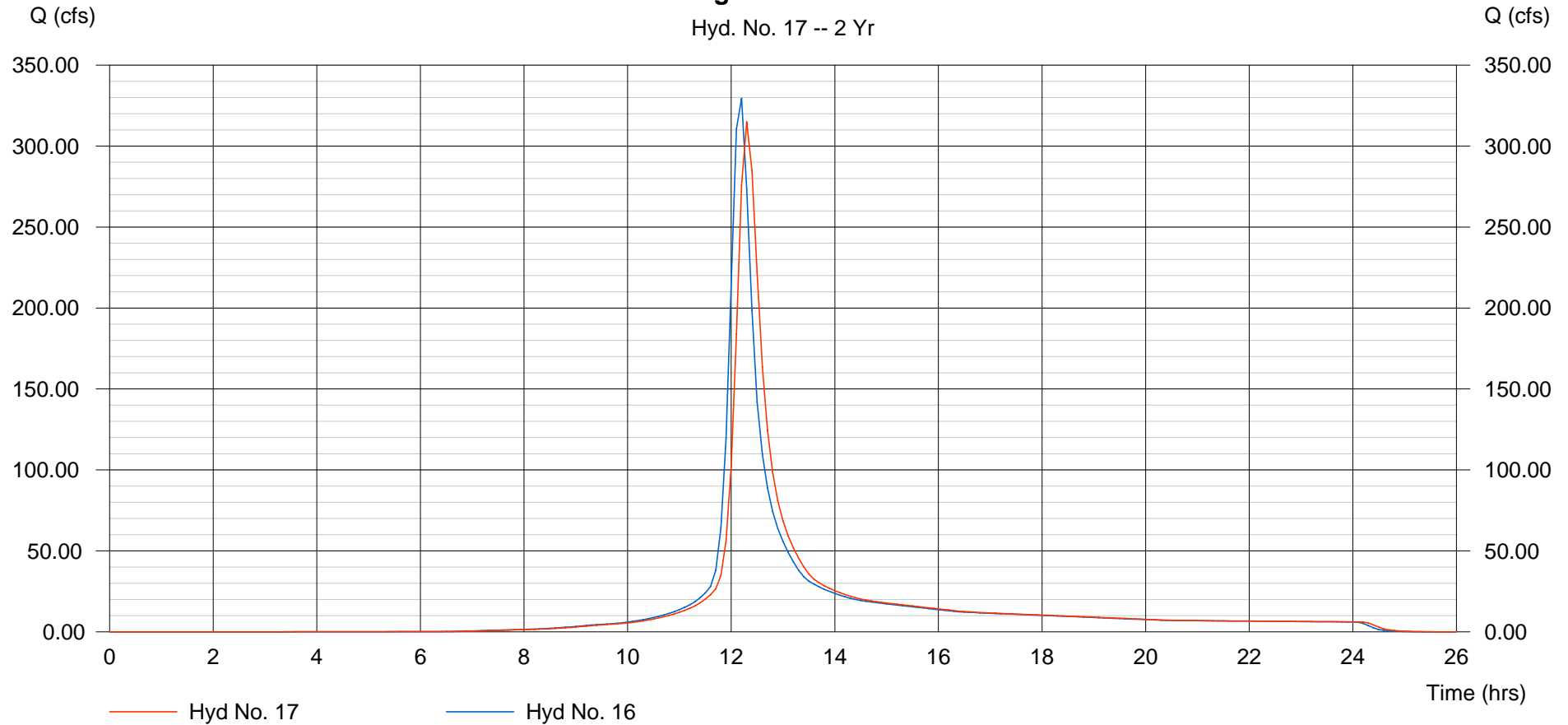
Peak discharge = 315.00 cfs  
Time interval = 6 min  
Section type = Triangular  
Channel slope = 0.3 %  
Bottom width = 0.0 ft  
Max. depth = 0.0 ft  
Rating curve m = 1.333  
Routing coeff. = 0.7276

Modified Att-Kin routing method used.

Hydrograph Volume = 31.017 acft

### Existing Central Channel

Hyd. No. 17 -- 2 Yr



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description	
1	SCS Runoff	44.30	6	720	3.168	----	-----	-----	Off-Site W	
2	SCS Runoff	17.98	6	720	1.348	----	-----	-----	Off-Site NW	
3	SCS Runoff	261.36	6	720	18.544	----	-----	-----	Off-Site N	
4	SCS Runoff	105.41	6	720	7.479	----	-----	-----	Off-Site NE	
5	SCS Runoff	46.50	6	720	3.299	----	-----	-----	Off-Site SE	
6	SCS Runoff	6.869	6	738	0.886	----	-----	-----	E-1	
7	SCS Runoff	11.84	6	732	1.367	----	-----	-----	E-2	
8	SCS Runoff	41.98	6	750	6.261	----	-----	-----	E-3	
9	SCS Runoff	31.89	6	720	2.250	----	-----	-----	E-4	
10	Combine	47.93	6	720	4.054	1, 6,	-----	-----	Off-Site W with E-1 to West Ditch	
11	Reach	46.94	6	726	4.054	10	-----	-----	Existing West Ditch	
12	Reservoir	0.815	6	888	0.408	7	1390.42	1.015	E-2 to Existing Pond	
13	Combine	416.65	6	720	29.621	2, 3, 4, 9,	-----	-----	Off-Site NW, N, & NE with E-4	
14	Reach	358.35	6	732	29.621	13	-----	-----	East Channel in E-4	
15	Combine	417.15	6	732	39.589	5, 8, 12, 14	-----	-----	Off-Site SE, E-2, & E-4 with E-3	
16	Combine	462.26	6	732	43.642	11, 15	-----	-----	Combine All	
17	Reach	449.03	6	738	43.632	16	-----	-----	Existing Central Channel	
Northborough Existing.gpw					Return Period: 5 Year			Thursday, Sep 6 2007		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

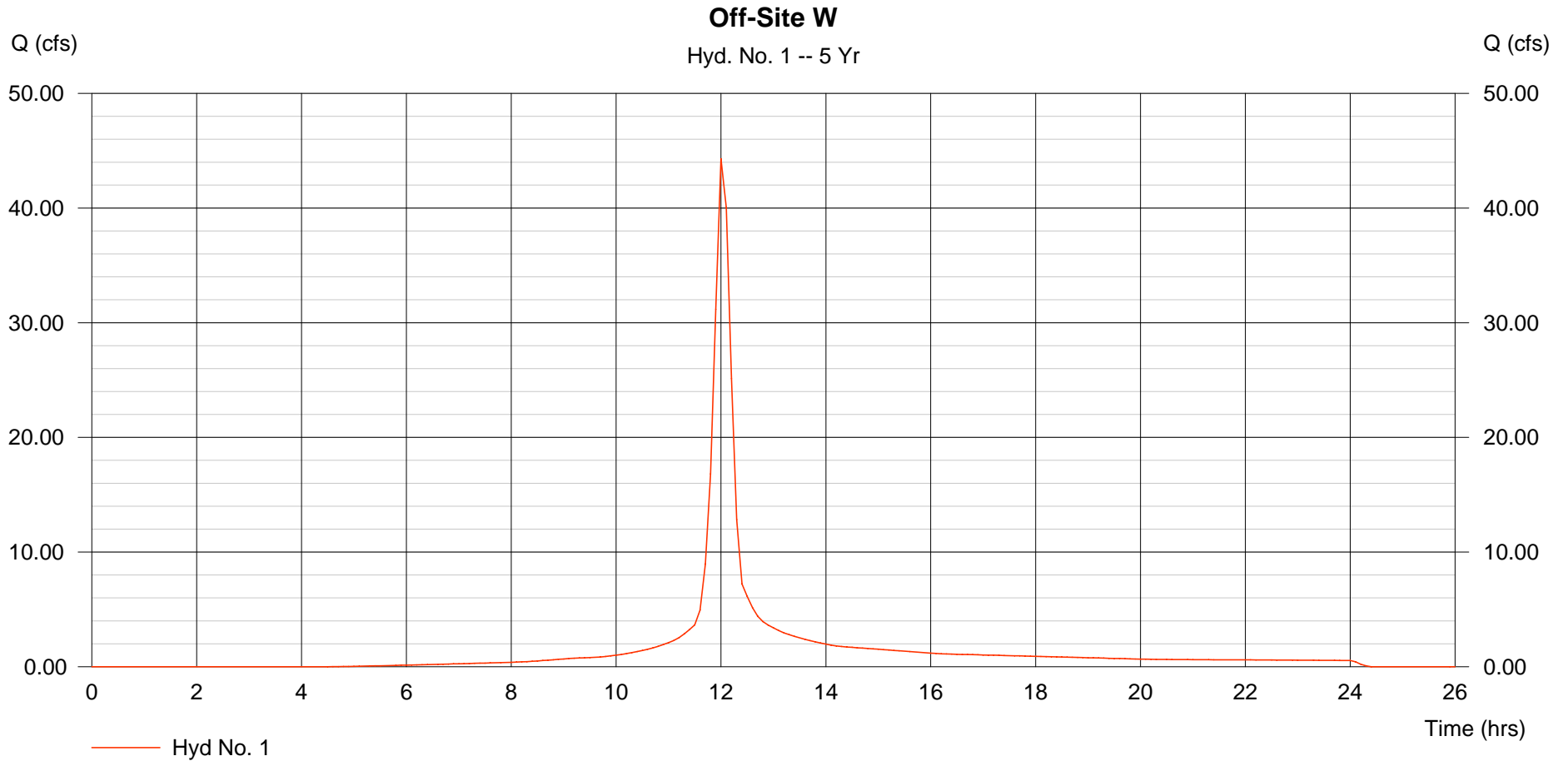
## Hyd. No. 1

Off-Site W

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 12.061 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 44.30 cfs  
Time interval = 6 min  
Curve number = 89.1  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 3.168 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

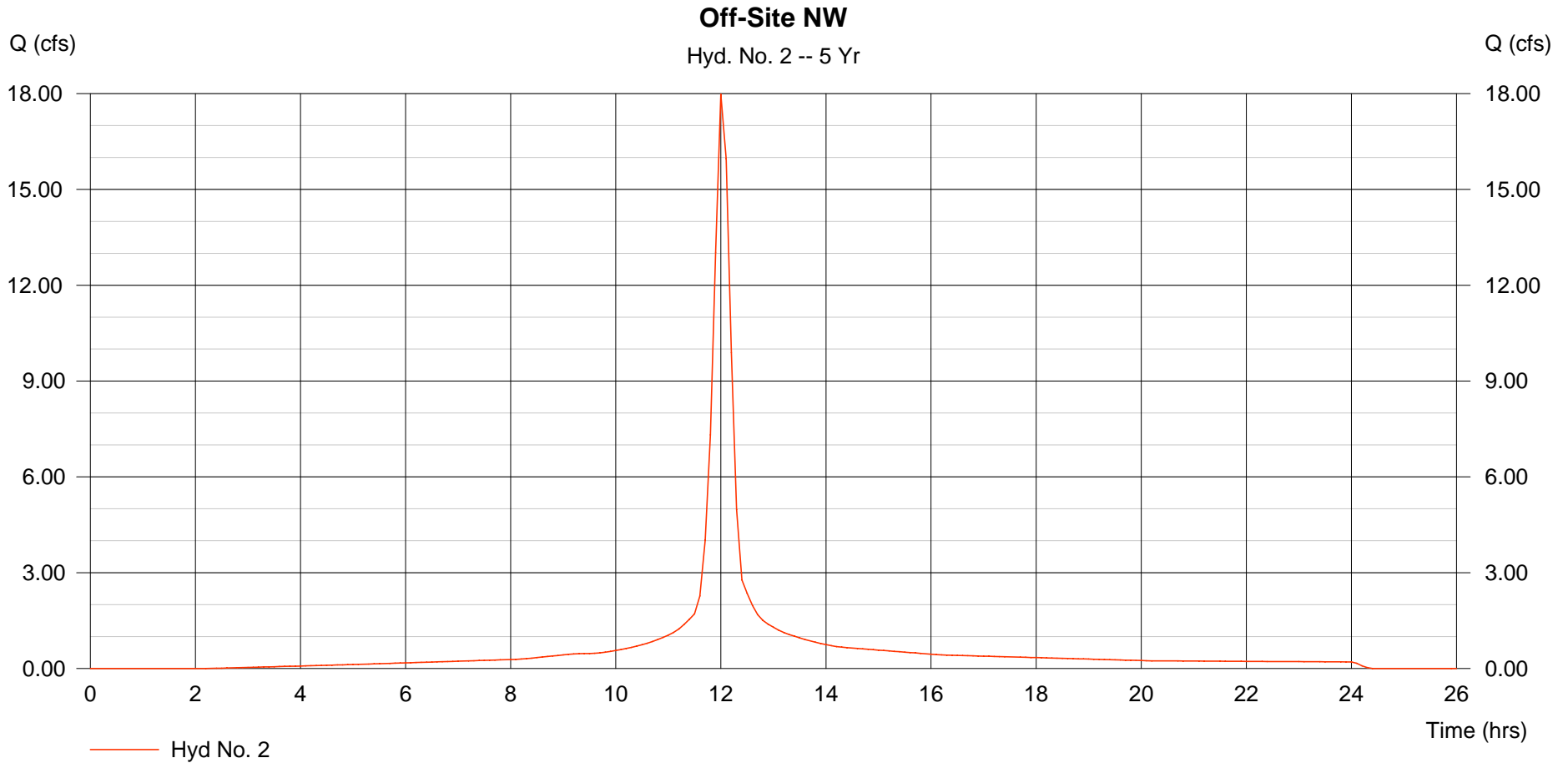
## Hyd. No. 2

Off-Site NW

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 4.332 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 17.98 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.348 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

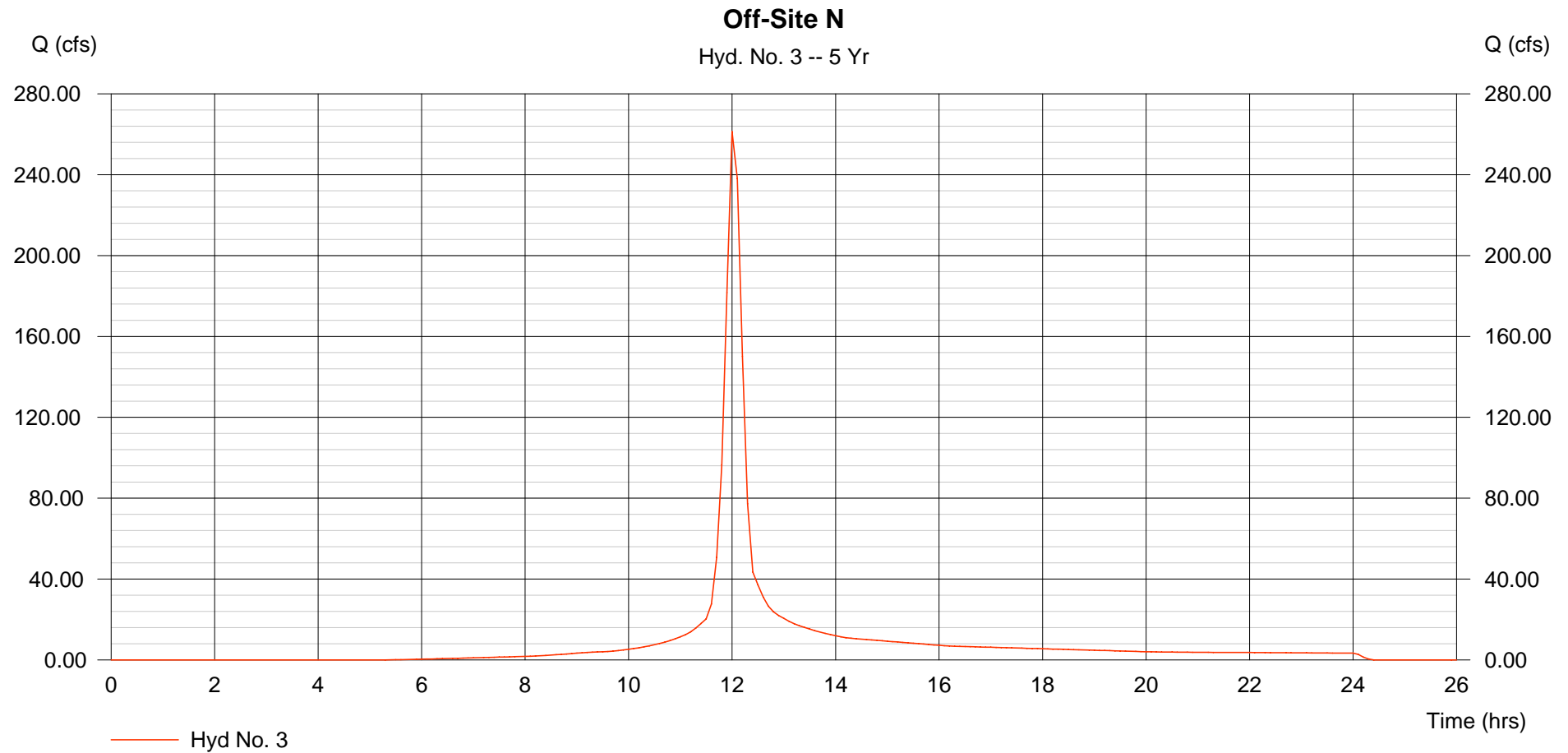
## Hyd. No. 3

Off-Site N

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 261.36 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 18.544 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

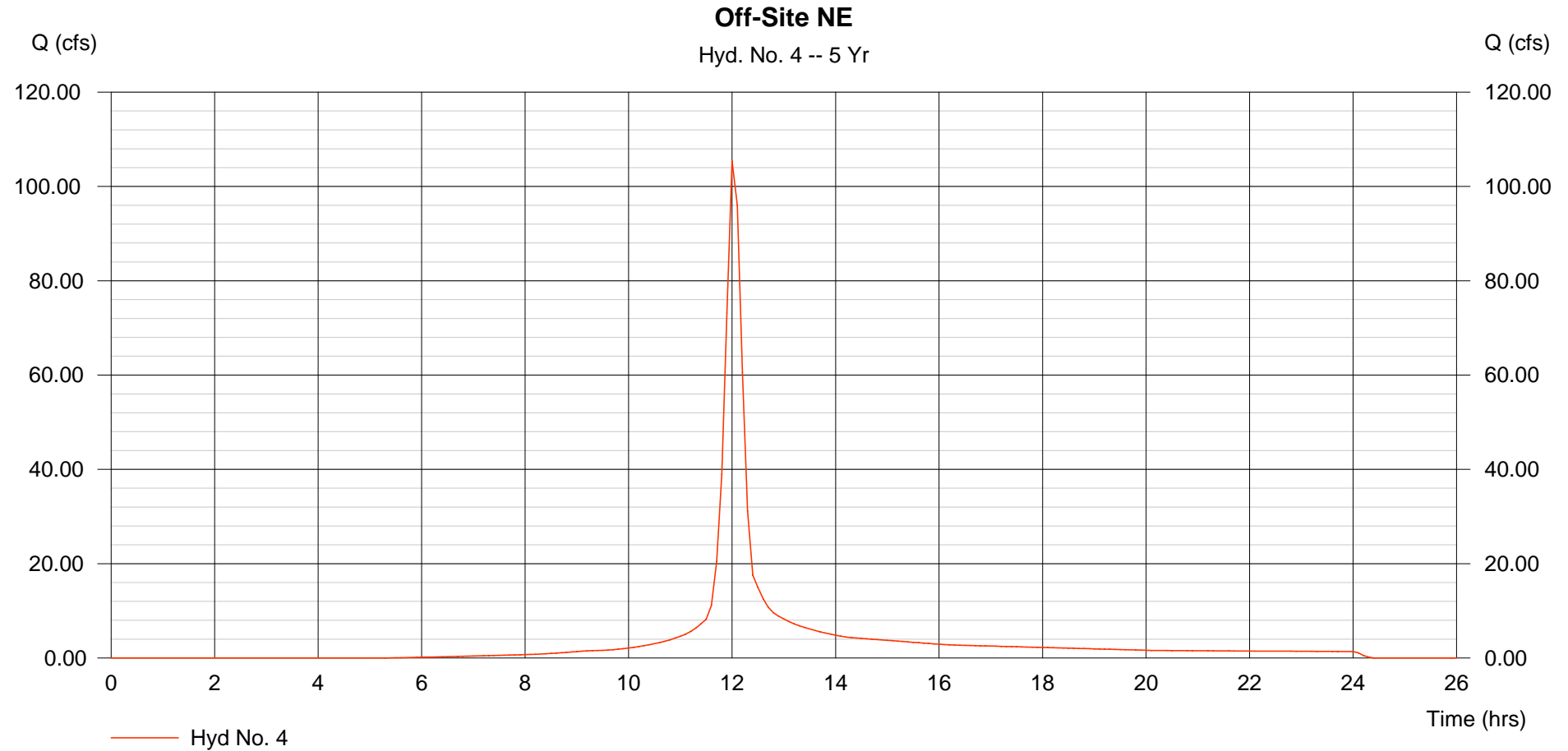
## Hyd. No. 4

Off-Site NE

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 105.41 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 7.479 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

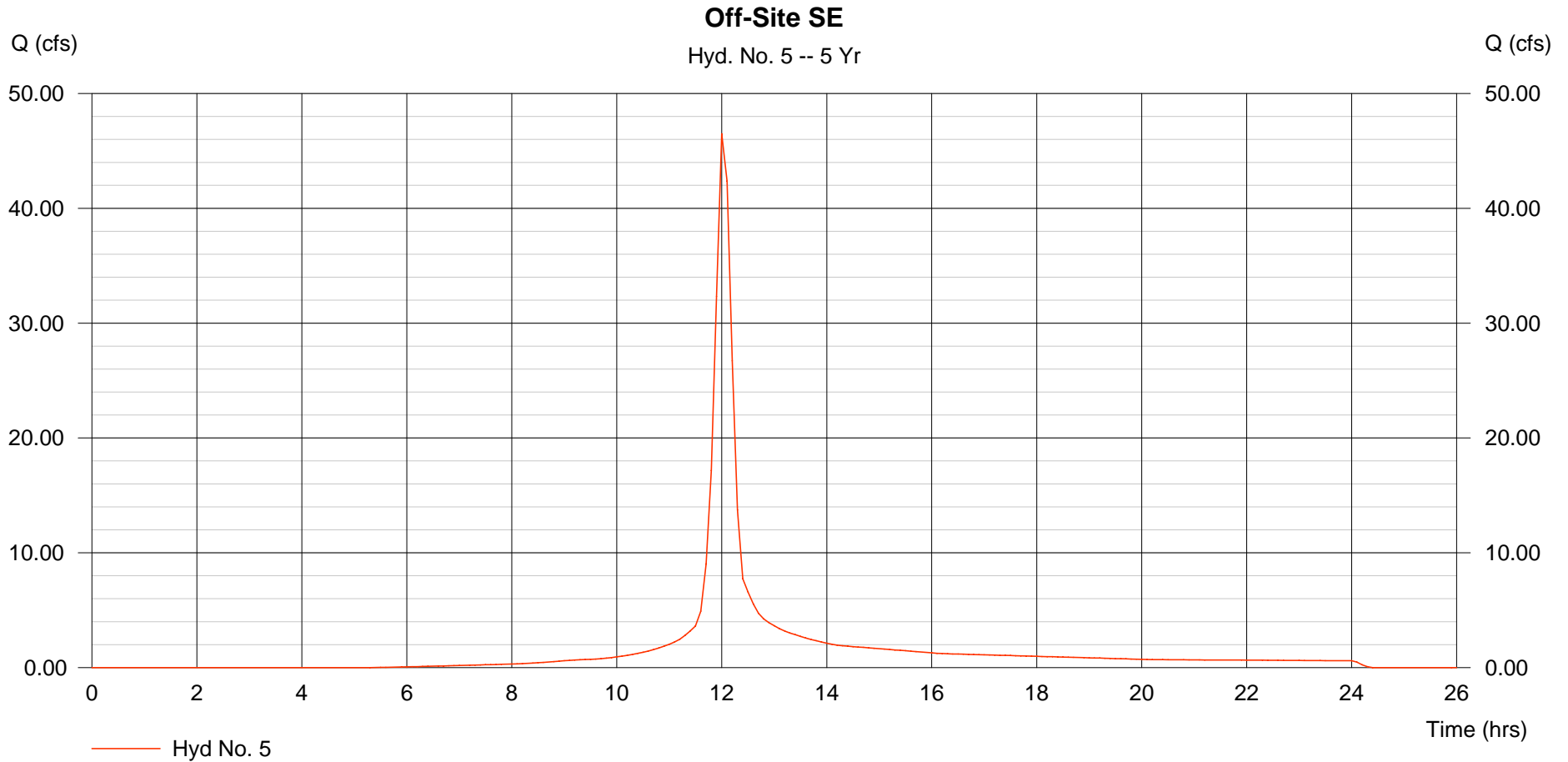
## Hyd. No. 5

Off-Site SE

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 46.50 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 3.299 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

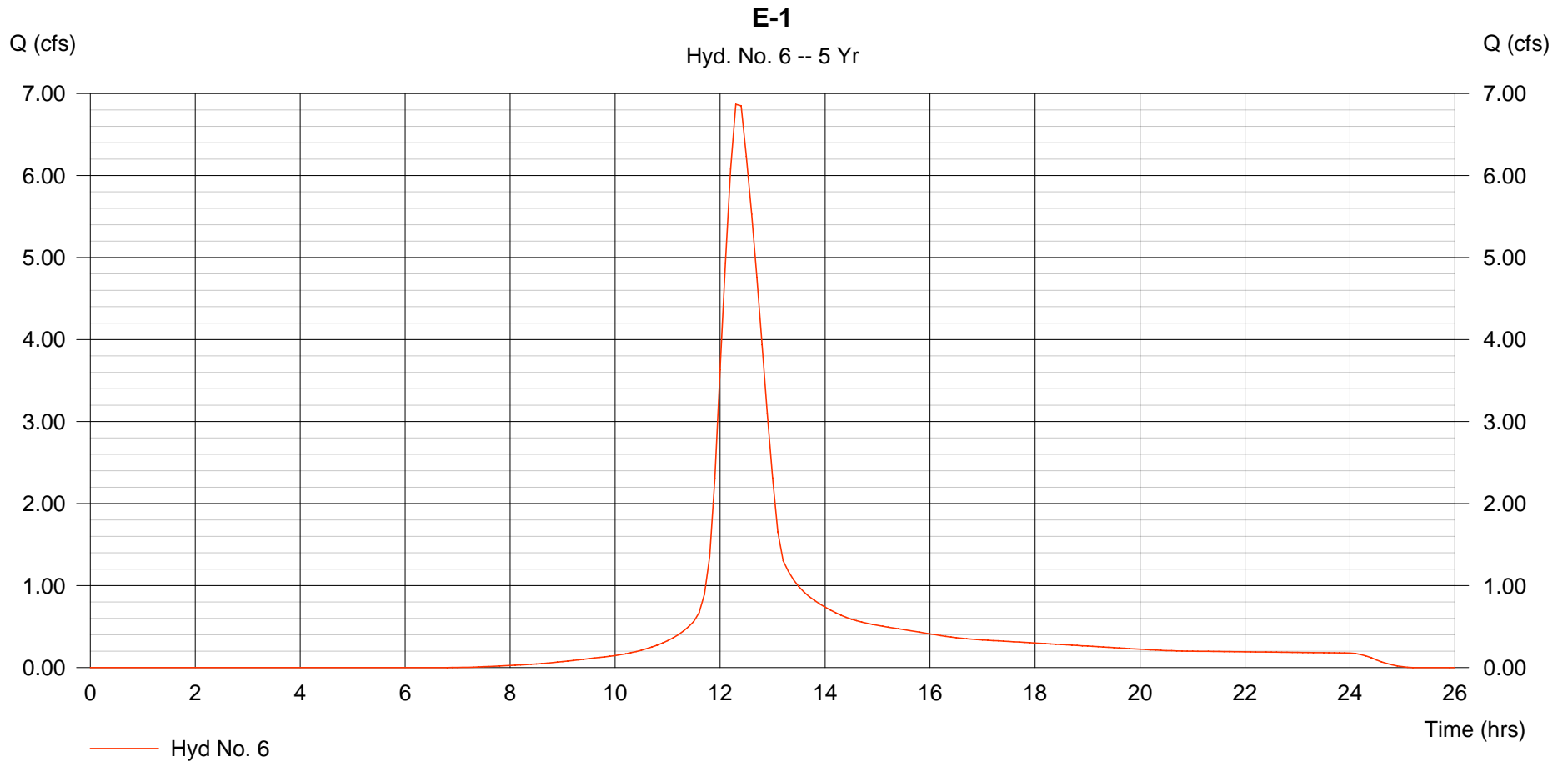
## Hyd. No. 6

E-1

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 3.961 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 6.869 cfs  
Time interval = 6 min  
Curve number = 82.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 42.40 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.886 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

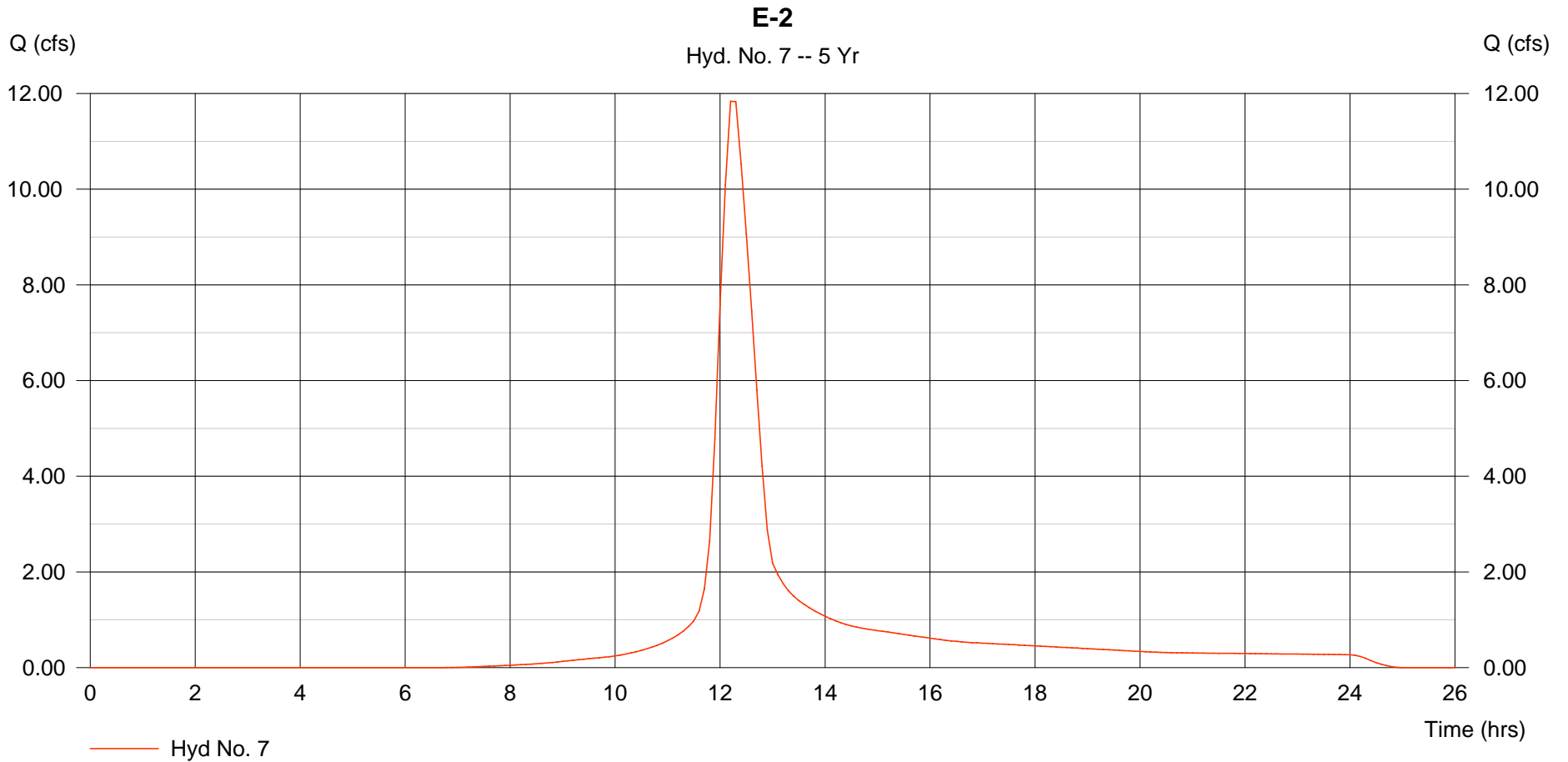
## Hyd. No. 7

E-2

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 5.723 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 11.84 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 37.90 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.367 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 8

E-3

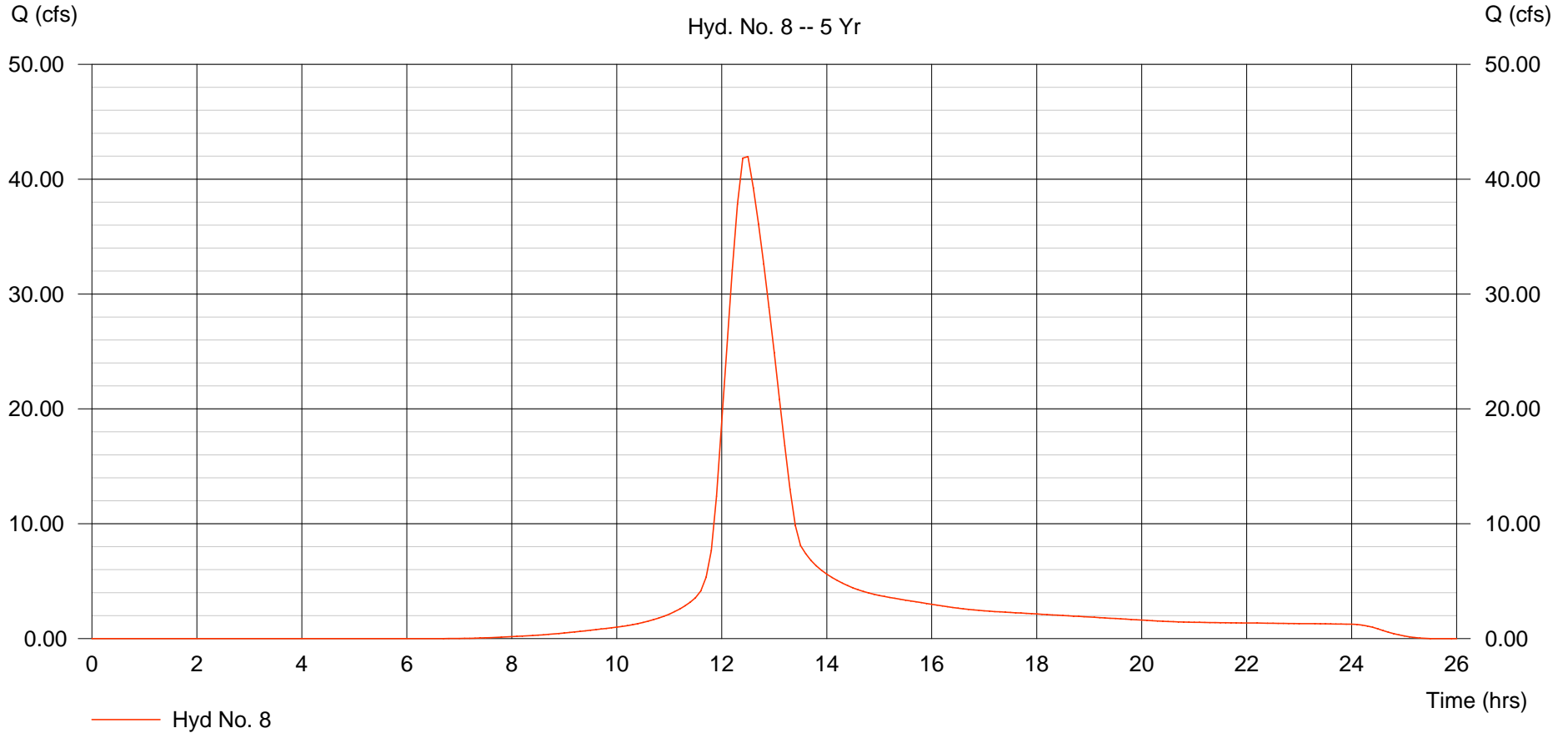
Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 27.034 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 41.98 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 60.30 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 6.261 acft

### E-3

Hyd. No. 8 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

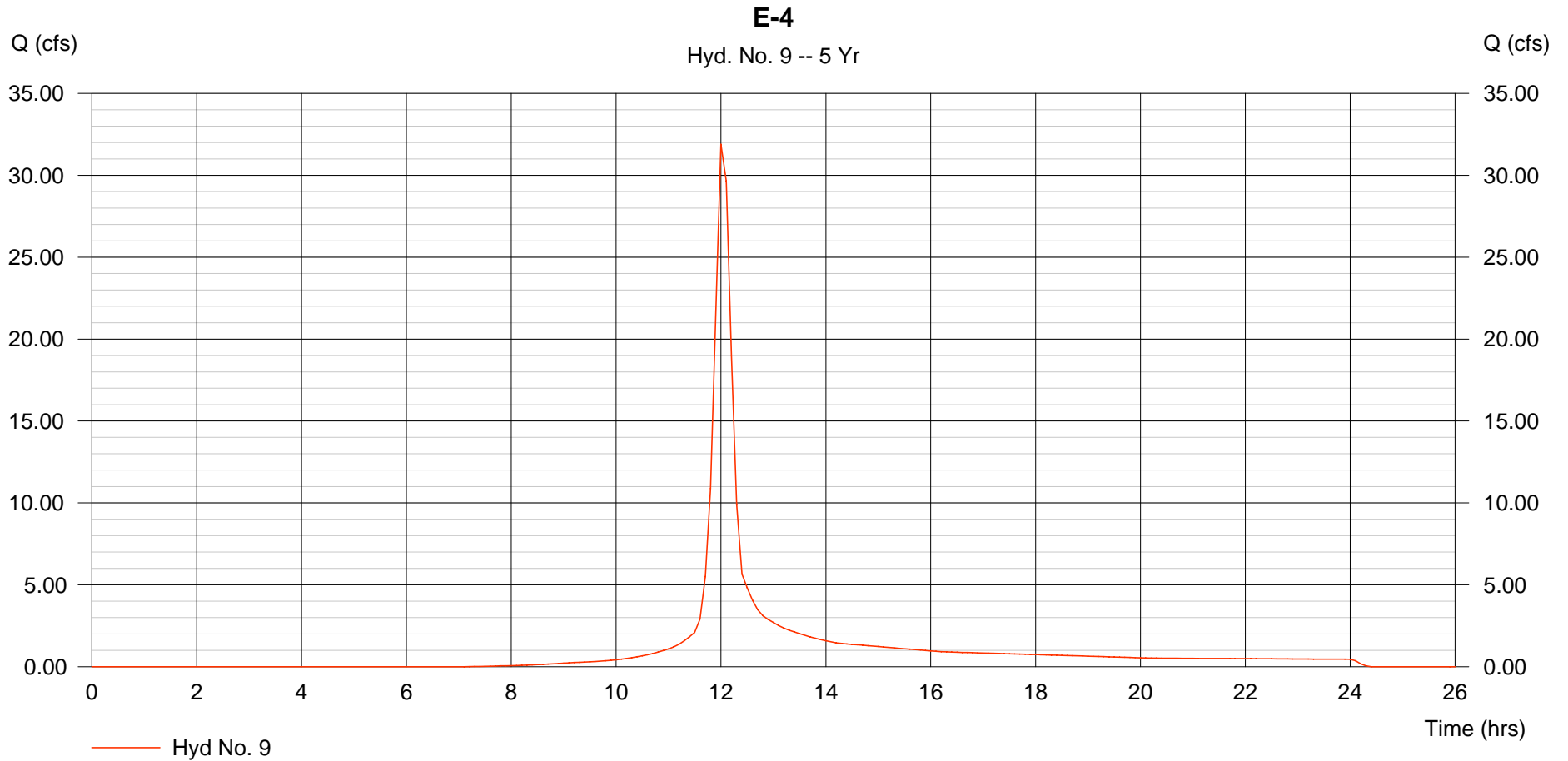
## Hyd. No. 9

E-4

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 10.854 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 31.89 cfs  
Time interval = 6 min  
Curve number = 81.6  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.250 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

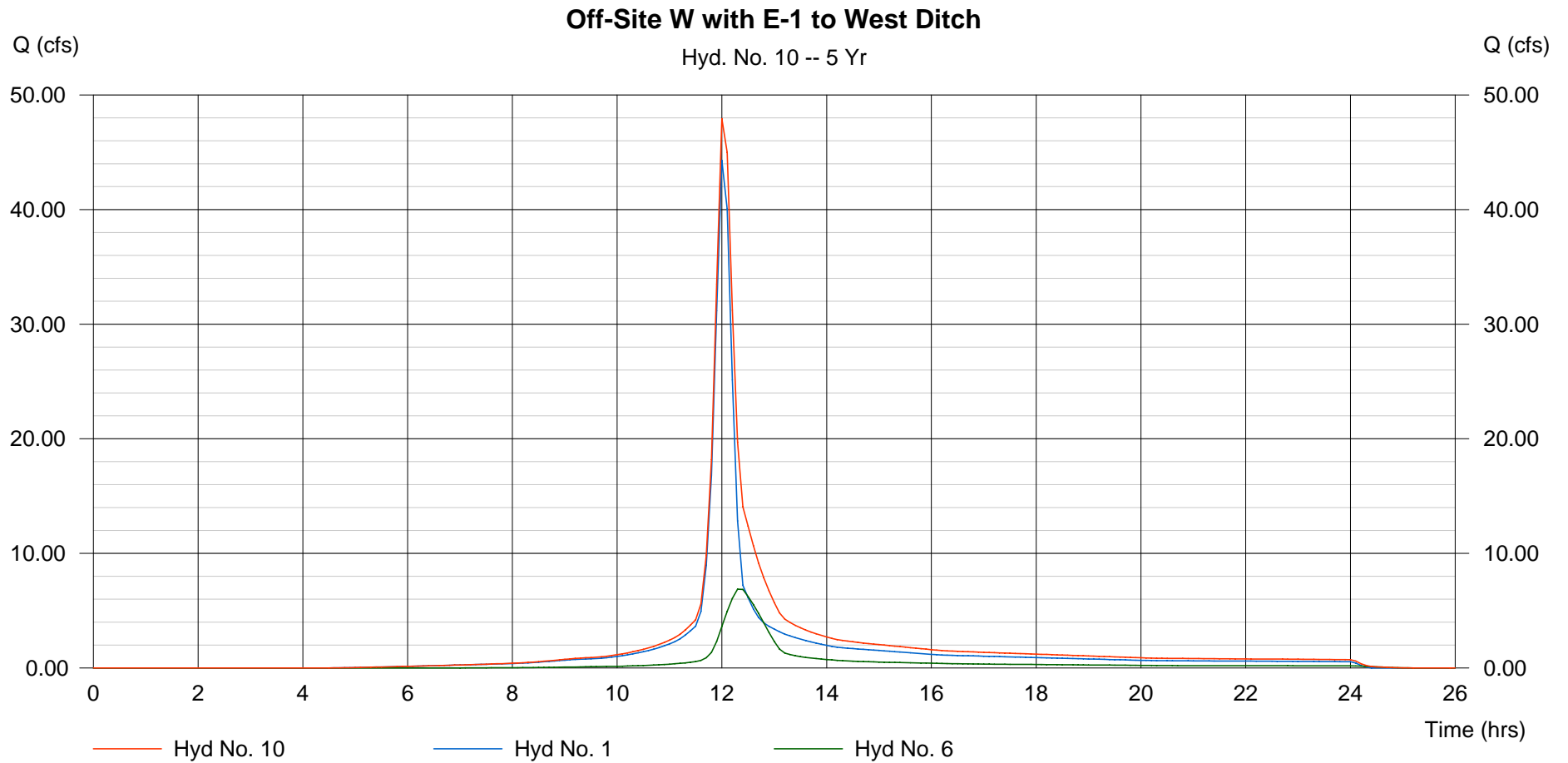
## Hyd. No. 10

Off-Site W with E-1 to West Ditch

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 1, 6

Peak discharge = 47.93 cfs  
Time interval = 6 min

Hydrograph Volume = 4.054 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 11

Exisitng West Ditch

Hydrograph type = Reach  
Storm frequency = 5 yrs  
Inflow hyd. No. = 10  
Reach length = 450.0 ft  
Manning's n = 0.045  
Side slope = 6.0:1  
Rating curve x = 0.743  
Ave. velocity = 1.75 ft/s

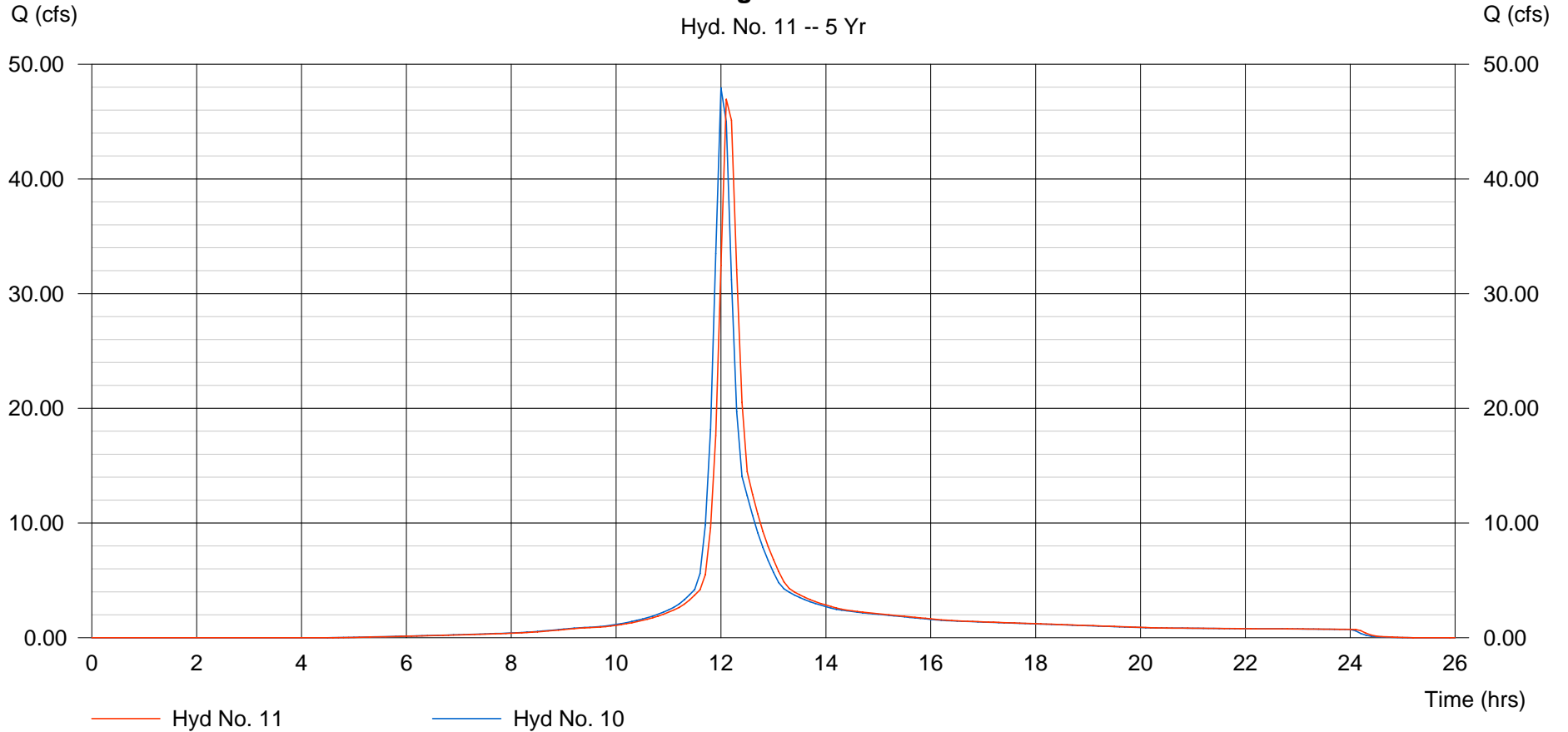
Peak discharge = 46.94 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.4 %  
Bottom width = 5.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.258  
Routing coeff. = 0.9359

Modified Att-Kin routing method used.

Hydrograph Volume = 4.054 acft

### Exisitng West Ditch

Hyd. No. 11 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 12

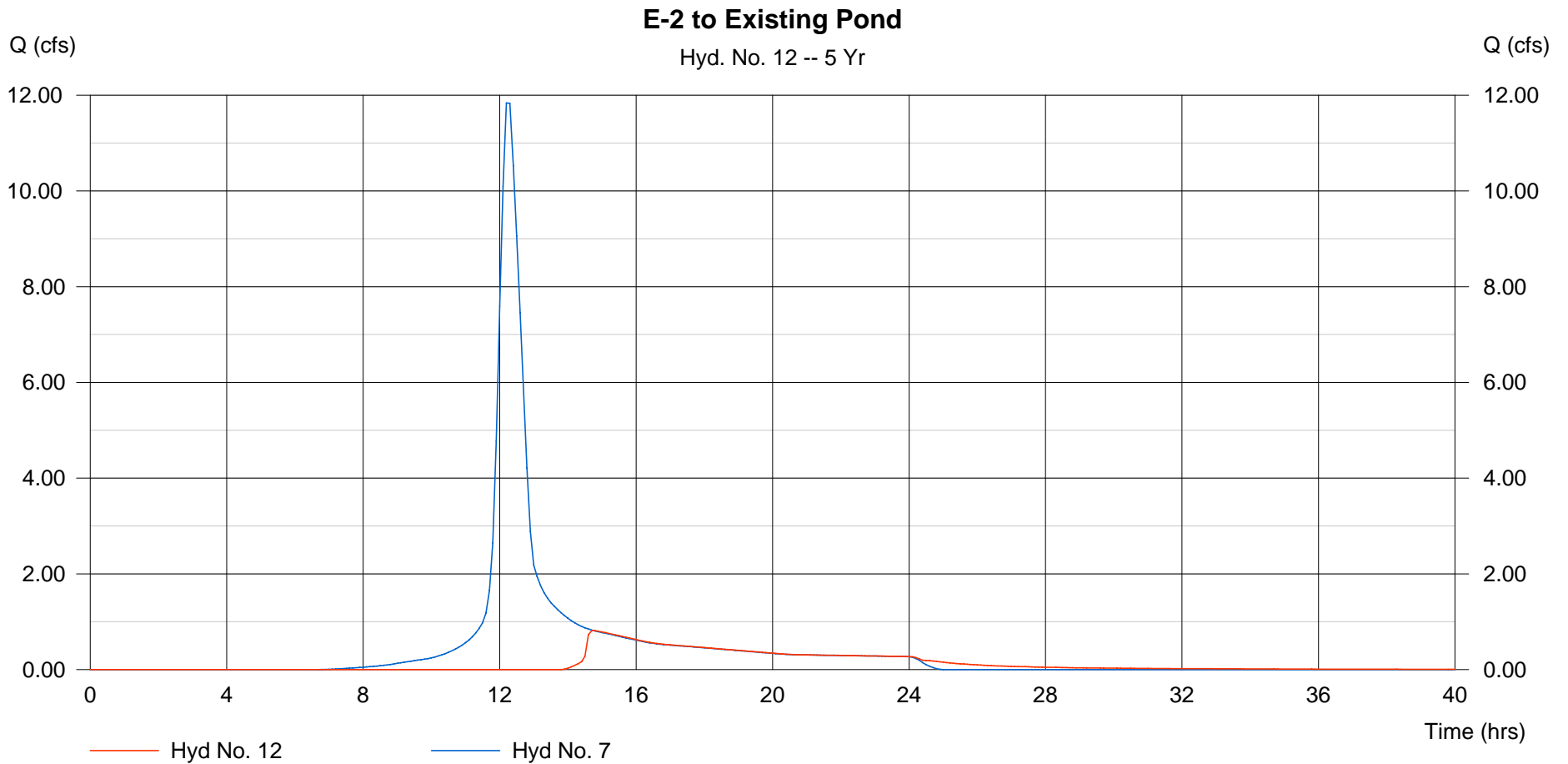
E-2 to Existing Pond

Hydrograph type = Reservoir  
Storm frequency = 5 yrs  
Inflow hyd. No. = 7  
Reservoir name = Existing Pond

Peak discharge = 0.815 cfs  
Time interval = 6 min  
Max. Elevation = 1390.42 ft  
Max. Storage = 1.015 acft

Storage Indication method used.

Hydrograph Volume = 0.408 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

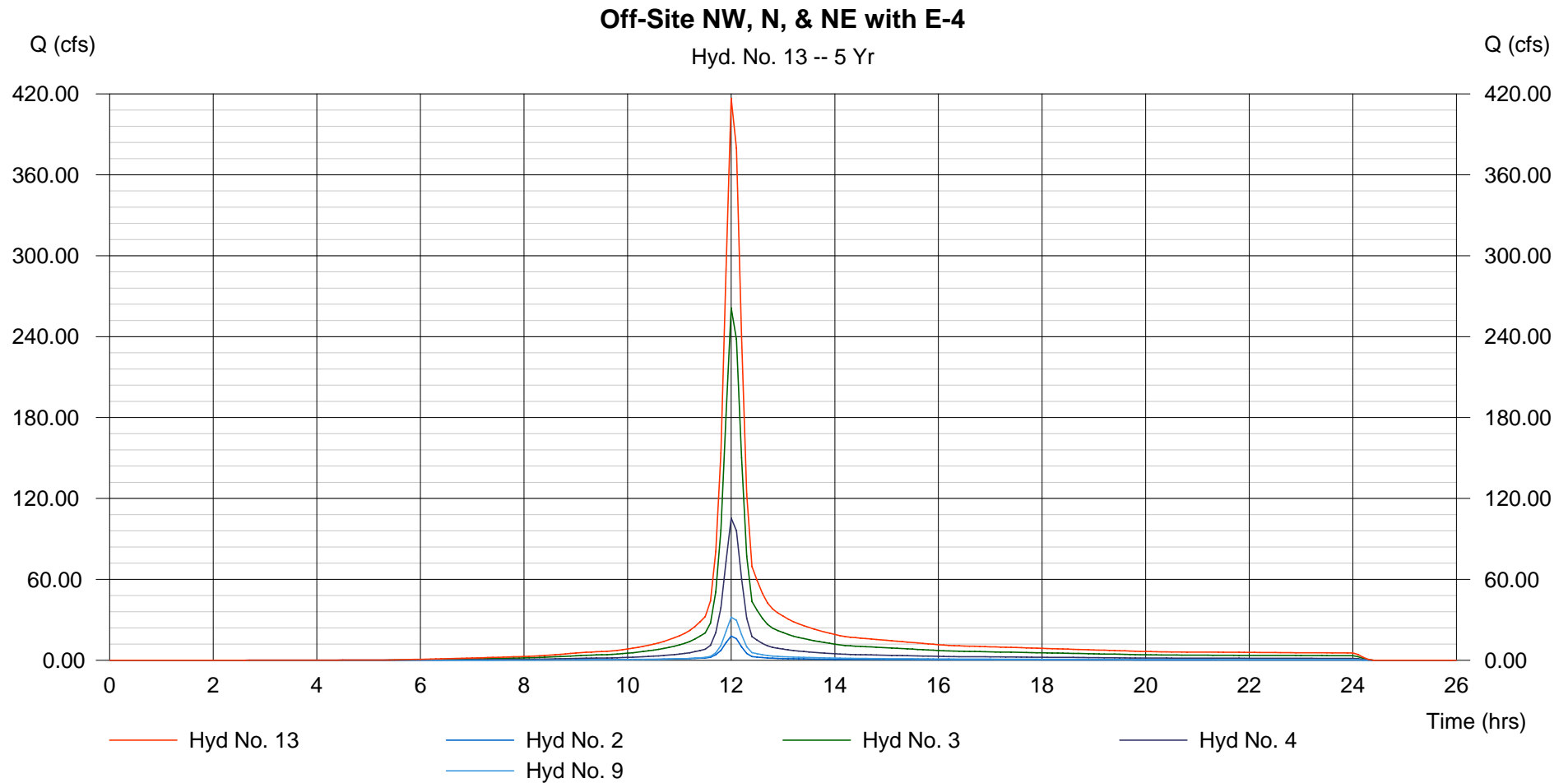
## Hyd. No. 13

Off-Site NW, N, & NE with E-4

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 2, 3, 4, 9

Peak discharge = 416.65 cfs  
Time interval = 6 min

Hydrograph Volume = 29.621 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 14

East Channel in E-4

Hydrograph type = Reach  
Storm frequency = 5 yrs  
Inflow hyd. No. = 13  
Reach length = 1384.8 ft  
Manning's n = 0.040  
Side slope = 4.0:1  
Rating curve x = 0.235  
Ave. velocity = 2.16 ft/s

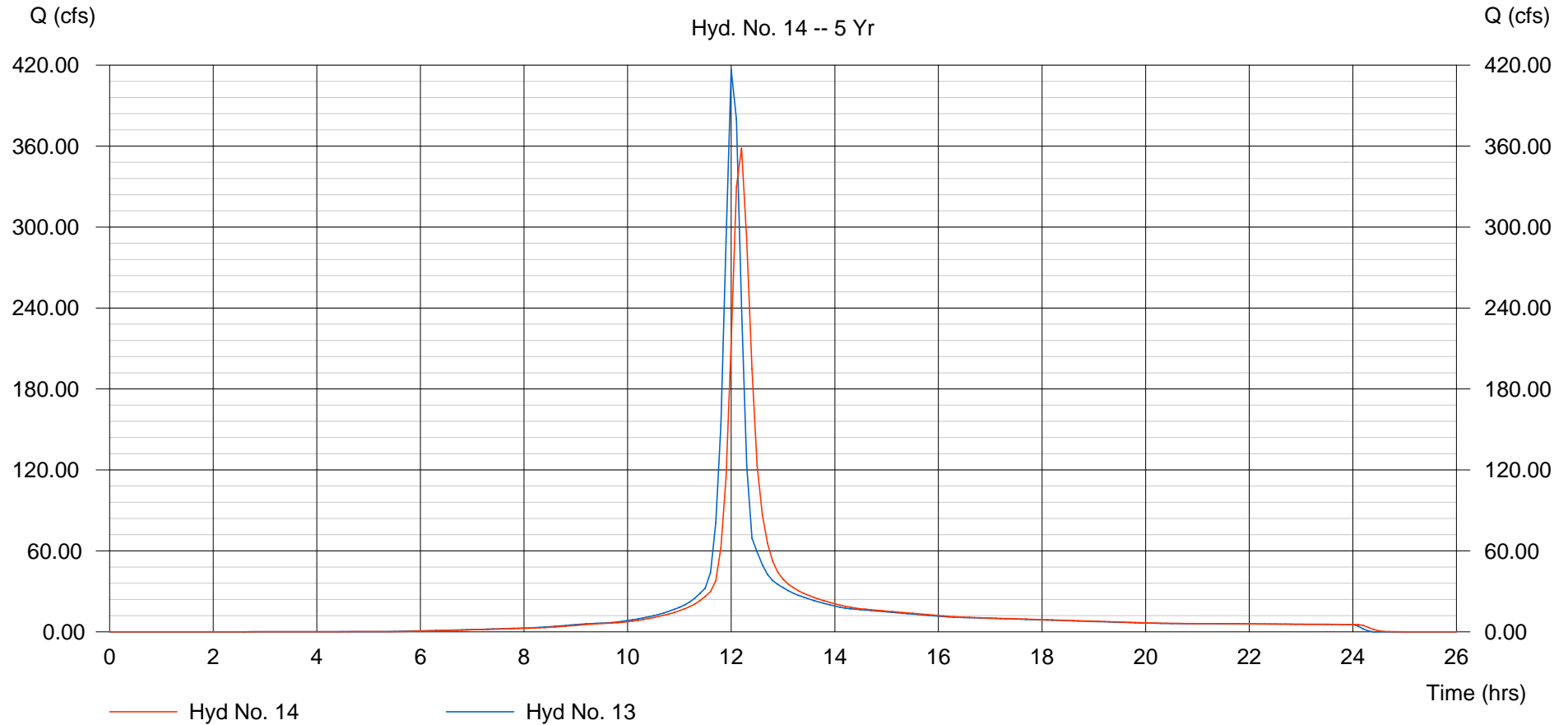
Peak discharge = 358.35 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.422  
Routing coeff. = 0.5710

Modified Att-Kin routing method used.

Hydrograph Volume = 29.621 acft

### East Channel in E-4

Hyd. No. 14 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

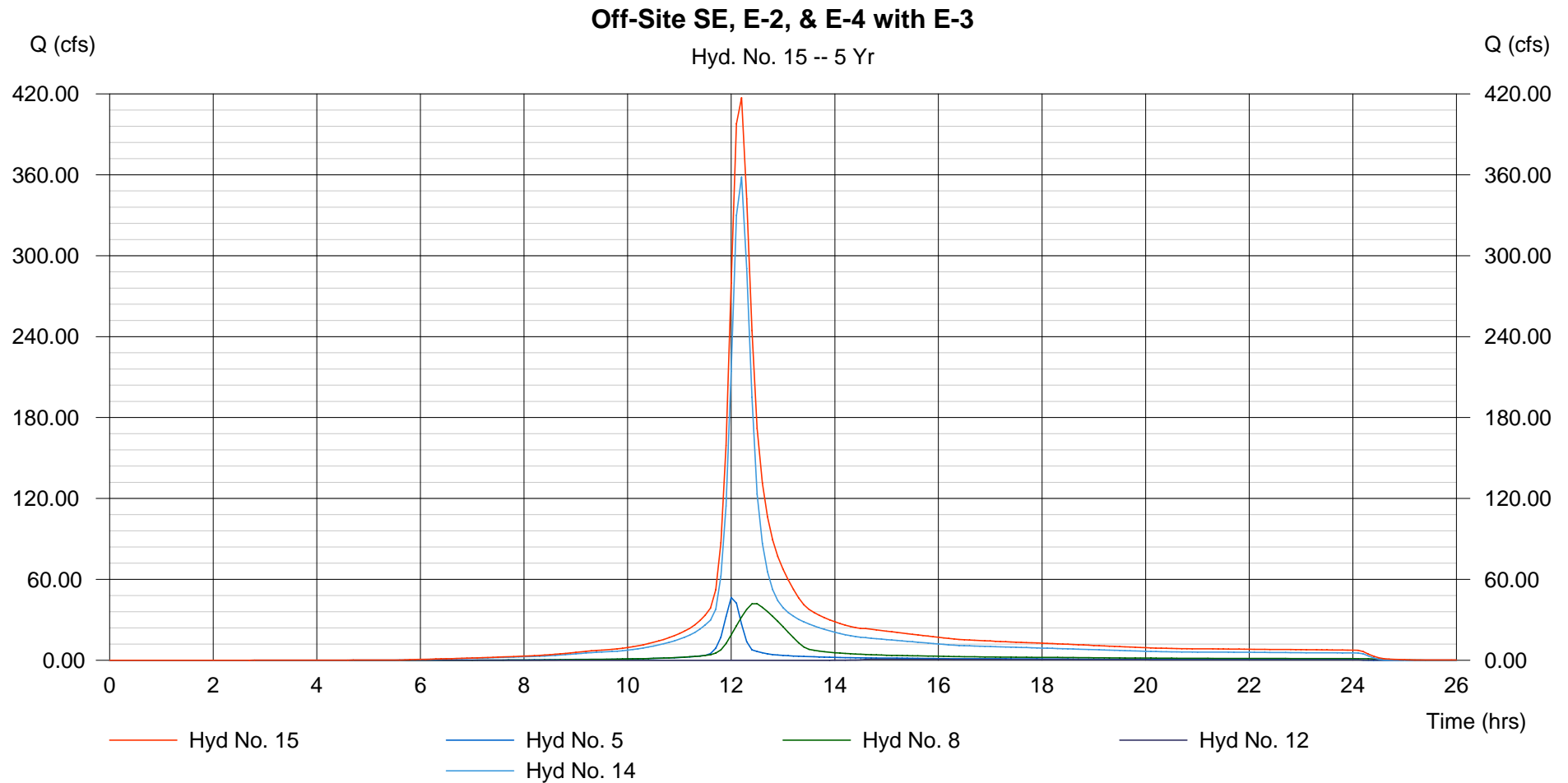
## Hyd. No. 15

Off-Site SE, E-2, & E-4 with E-3

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 5, 8, 12, 14

Peak discharge = 417.15 cfs  
Time interval = 6 min

Hydrograph Volume = 39.589 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

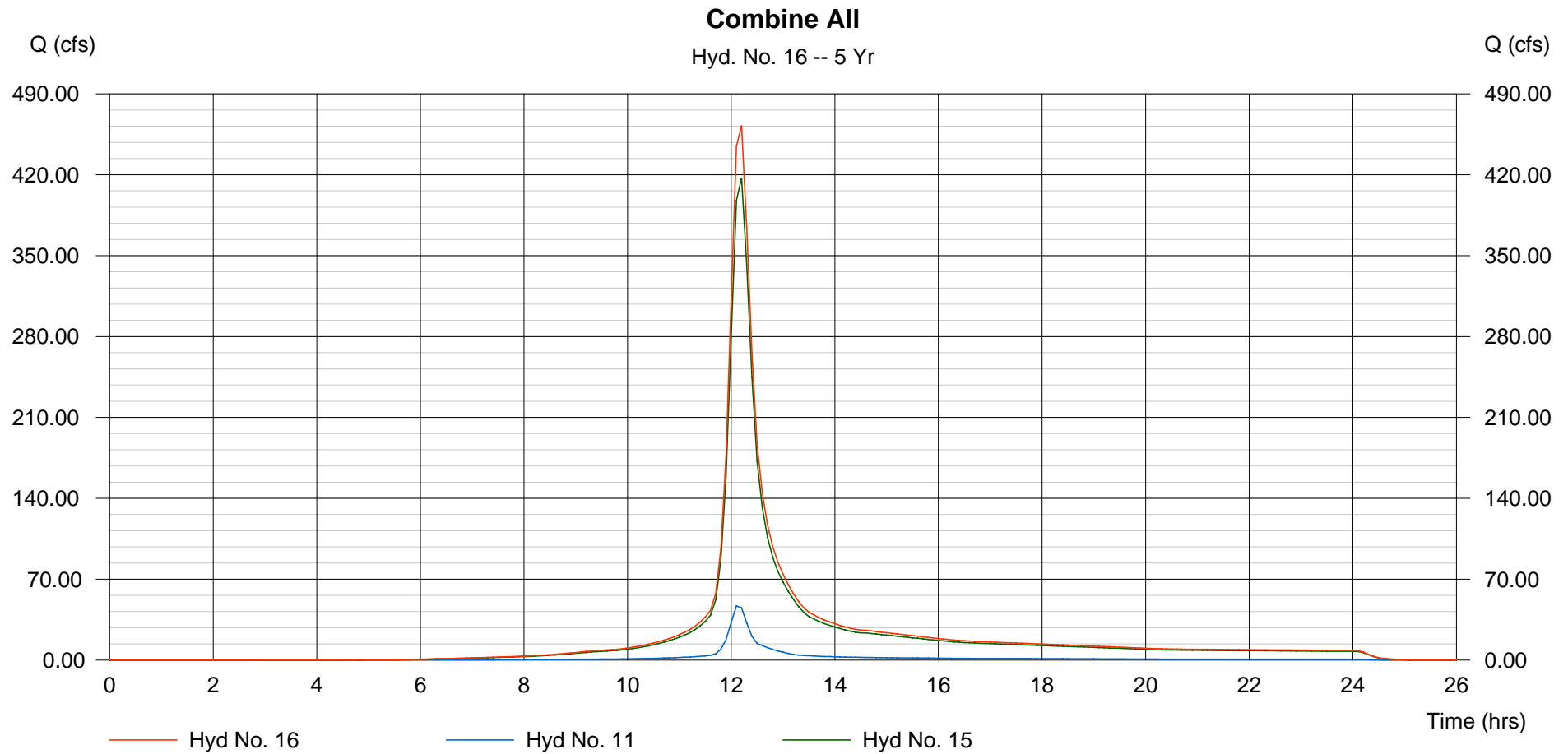
## Hyd. No. 16

Combine All

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 11, 15

Peak discharge = 462.26 cfs  
Time interval = 6 min

Hydrograph Volume = 43.642 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 2:51 PM

## Hyd. No. 17

Existing Central Channel

Hydrograph type = Reach  
Storm frequency = 5 yrs  
Inflow hyd. No. = 16  
Reach length = 813.4 ft  
Manning's n = 0.040  
Side slope = 50.0:1  
Rating curve x = 0.350  
Ave. velocity = 2.11 ft/s

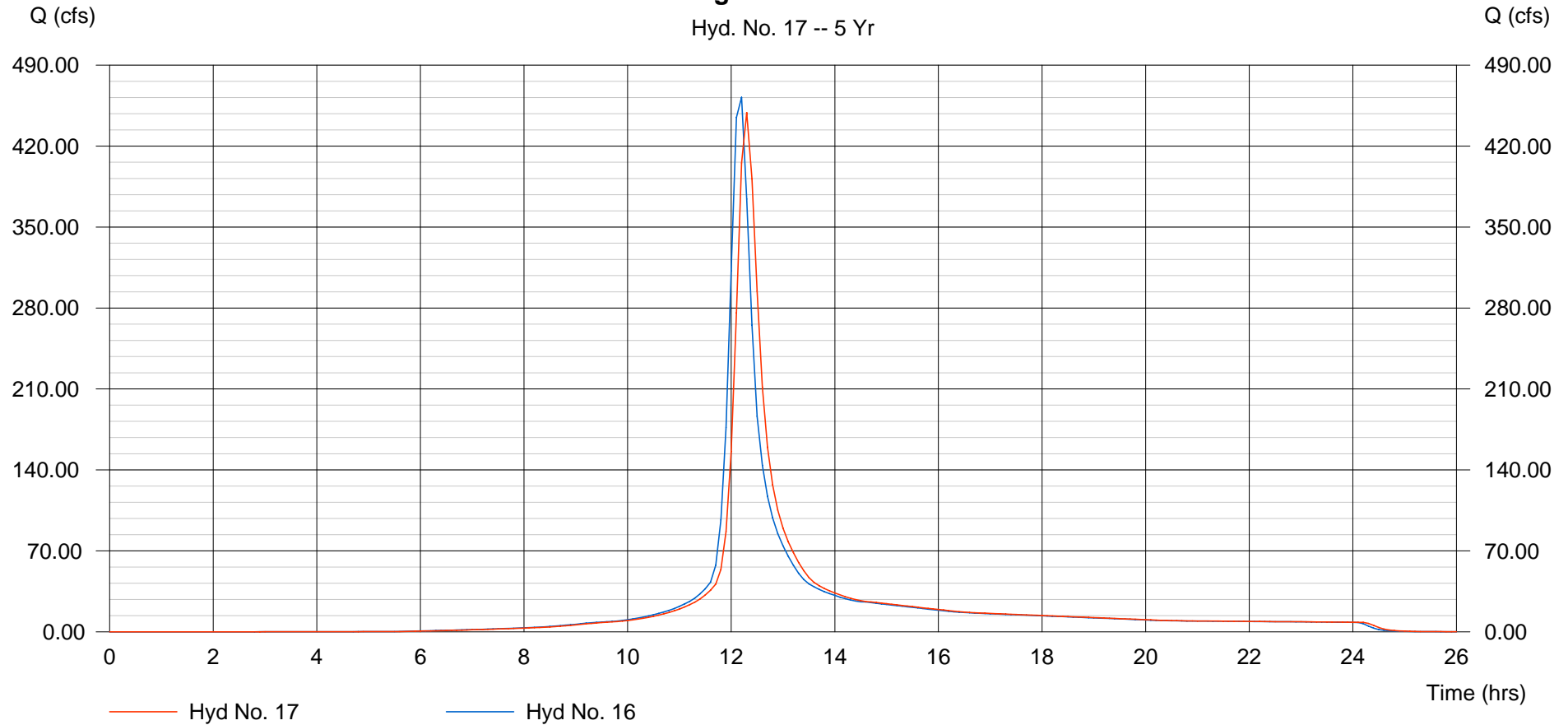
Peak discharge = 449.03 cfs  
Time interval = 6 min  
Section type = Triangular  
Channel slope = 0.3 %  
Bottom width = 0.0 ft  
Max. depth = 0.0 ft  
Rating curve m = 1.333  
Routing coeff. = 0.7672

Modified Att-Kin routing method used.

Hydrograph Volume = 43.632 acft

### Existing Central Channel

Hyd. No. 17 -- 5 Yr



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description	
1	SCS Runoff	53.00	6	720	3.817	----	-----	-----	Off-Site W	
2	SCS Runoff	21.02	6	720	1.590	----	-----	-----	Off-Site NW	
3	SCS Runoff	315.67	6	720	22.522	----	-----	-----	Off-Site N	
4	SCS Runoff	127.32	6	720	9.084	----	-----	-----	Off-Site NE	
5	SCS Runoff	56.16	6	720	4.007	----	-----	-----	Off-Site SE	
6	SCS Runoff	8.494	6	738	1.094	----	-----	-----	E-1	
7	SCS Runoff	14.62	6	732	1.686	----	-----	-----	E-2	
8	SCS Runoff	51.70	6	750	7.724	----	-----	-----	E-3	
9	SCS Runoff	39.57	6	720	2.791	----	-----	-----	E-4	
10	Combine	57.56	6	720	4.911	1, 6,	-----	-----	Off-Site W with E-1 to West Ditch	
11	Reach	56.75	6	726	4.911	10	-----	-----	Existing West Ditch	
12	Reservoir	4.030	6	774	0.728	7	1390.47	1.030	E-2 to Existing Pond	
13	Combine	503.58	6	720	35.987	2, 3, 4, 9,	-----	-----	Off-Site NW, N, & NE with E-4	
14	Reach	436.85	6	732	35.987	13	-----	-----	East Channel in E-4	
15	Combine	508.77	6	732	48.445	5, 8, 12, 14	-----	-----	Off-Site SE, E-2, & E-4 with E-3	
16	Combine	562.76	6	732	53.357	11, 15	-----	-----	Combine All	
17	Reach	550.89	6	738	53.346	16	-----	-----	Existing Central Channel	
Northborough Existing.gpw					Return Period: 10 Year			Thursday, Sep 6 2007		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

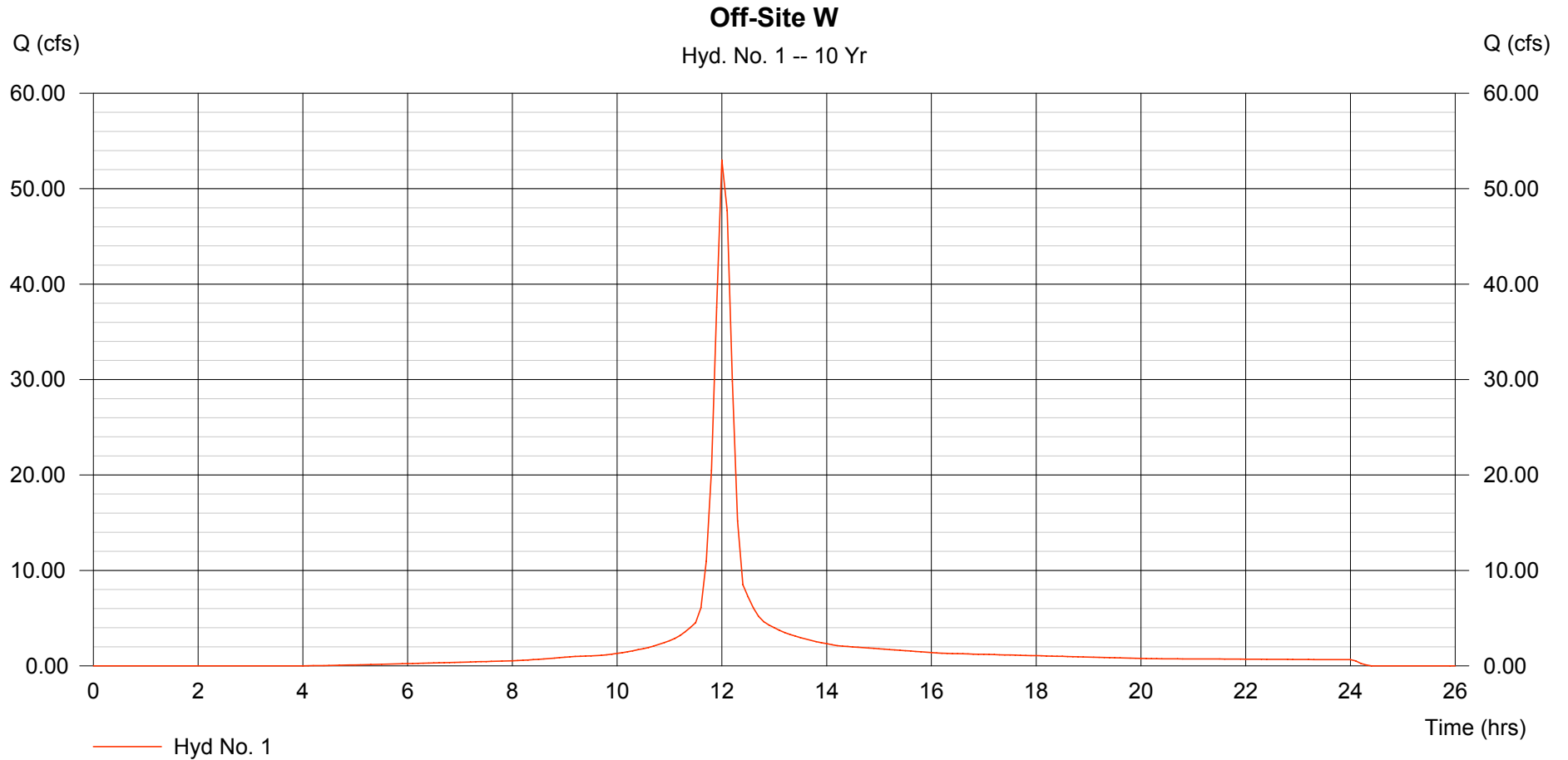
## Hyd. No. 1

Off-Site W

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 12.061 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 53.00 cfs  
Time interval = 6 min  
Curve number = 89.1  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 3.817 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

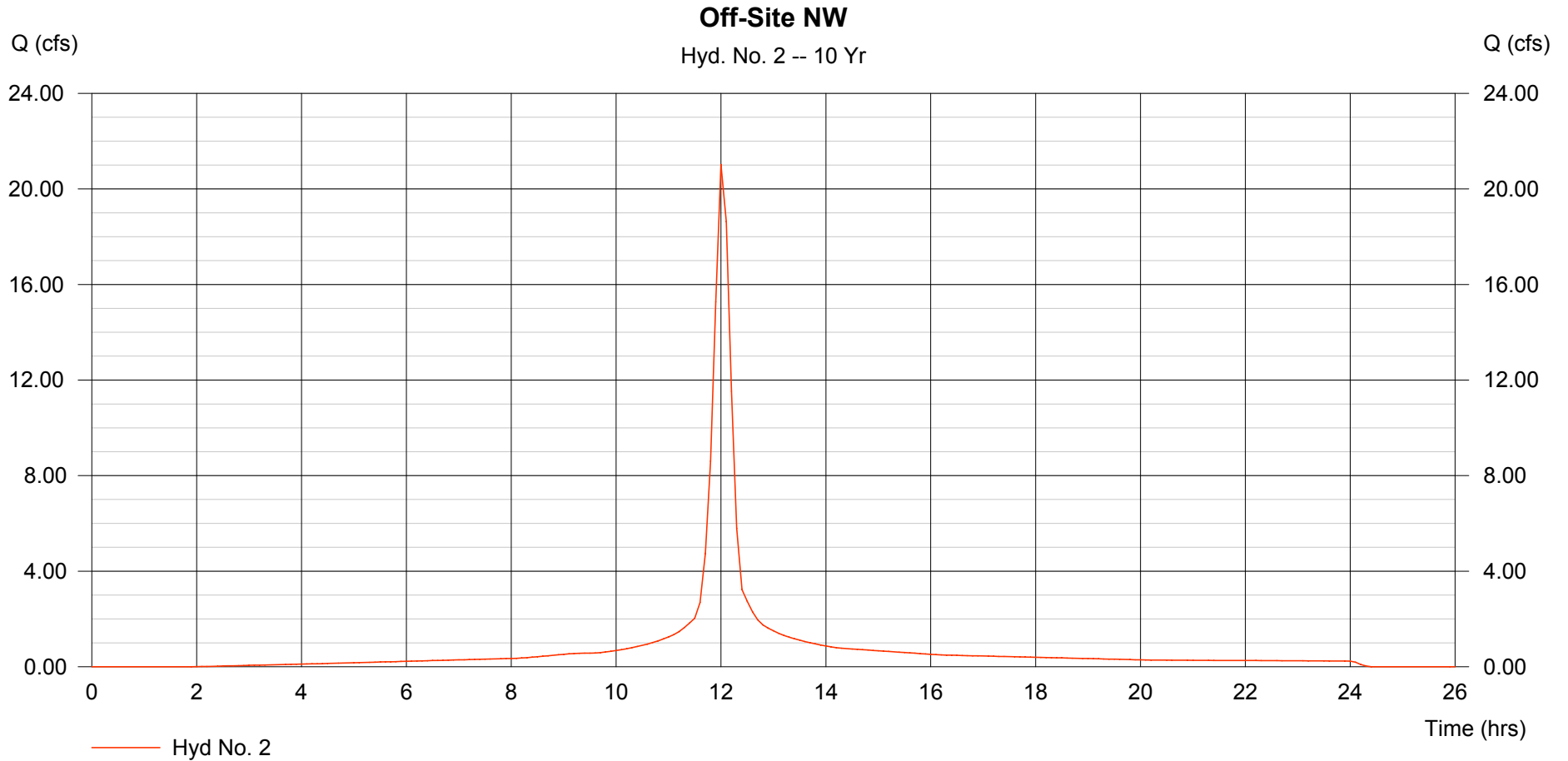
## Hyd. No. 2

Off-Site NW

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 4.332 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 21.02 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.590 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

## Hyd. No. 3

Off-Site N

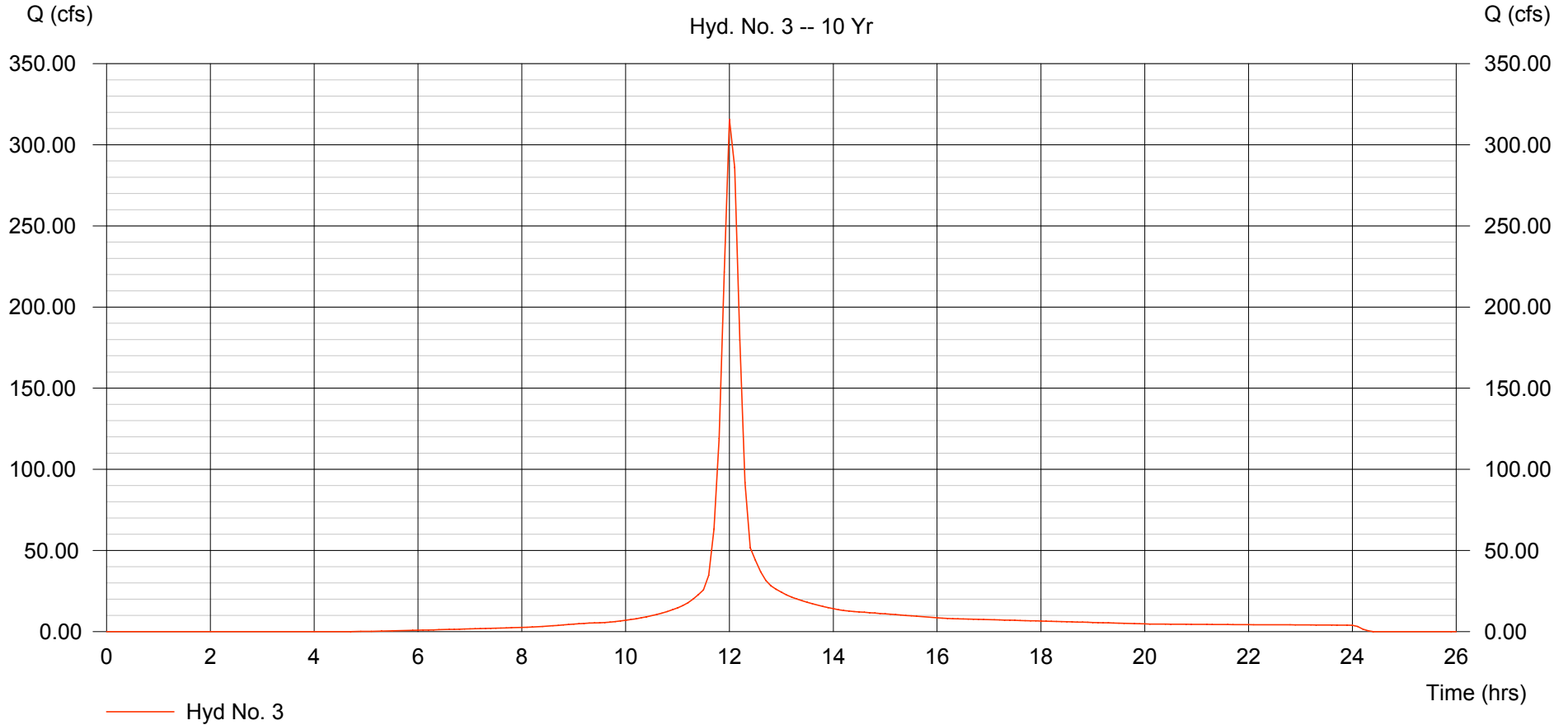
Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 315.67 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 22.522 acft

### Off-Site N

Hyd. No. 3 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

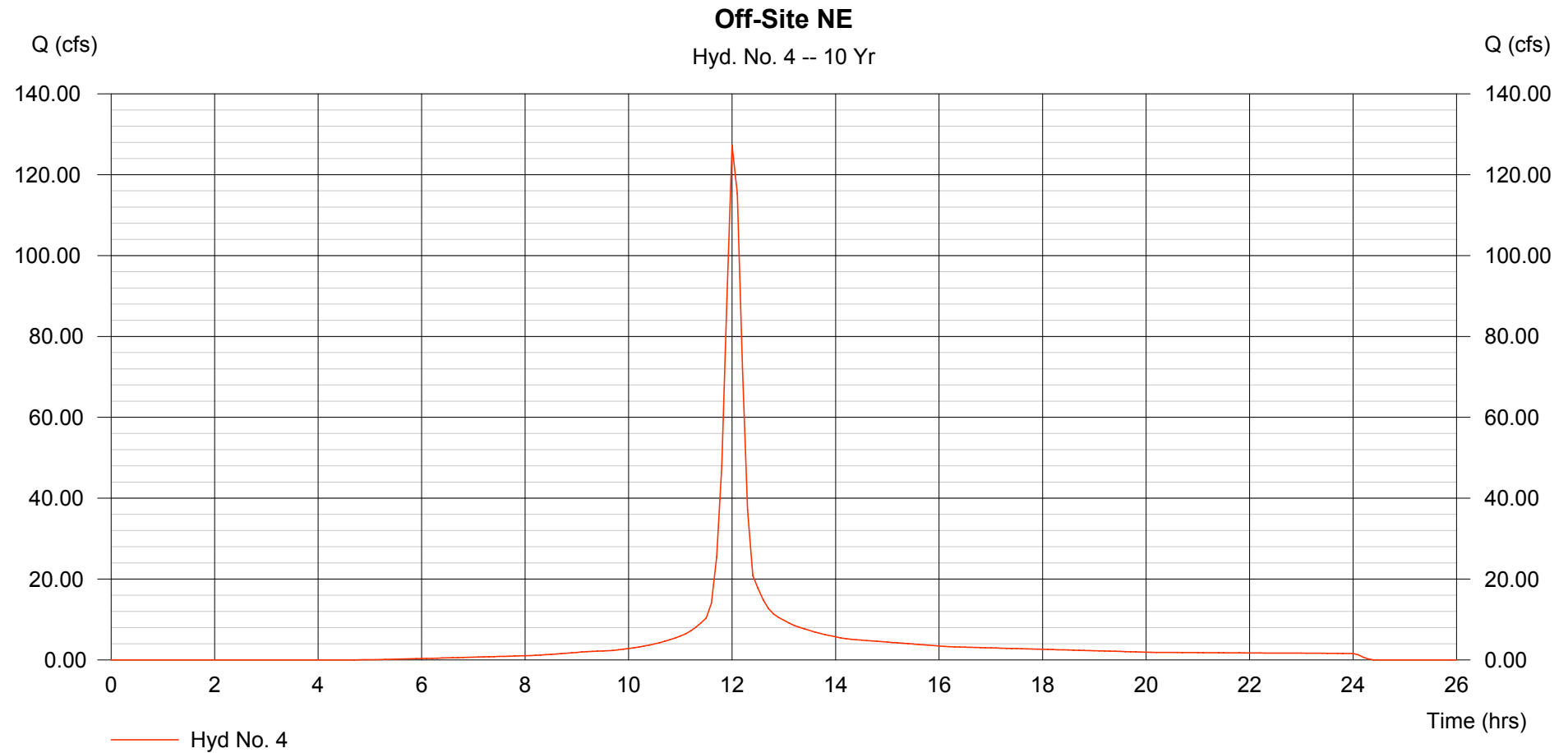
## Hyd. No. 4

Off-Site NE

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 127.32 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 9.084 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

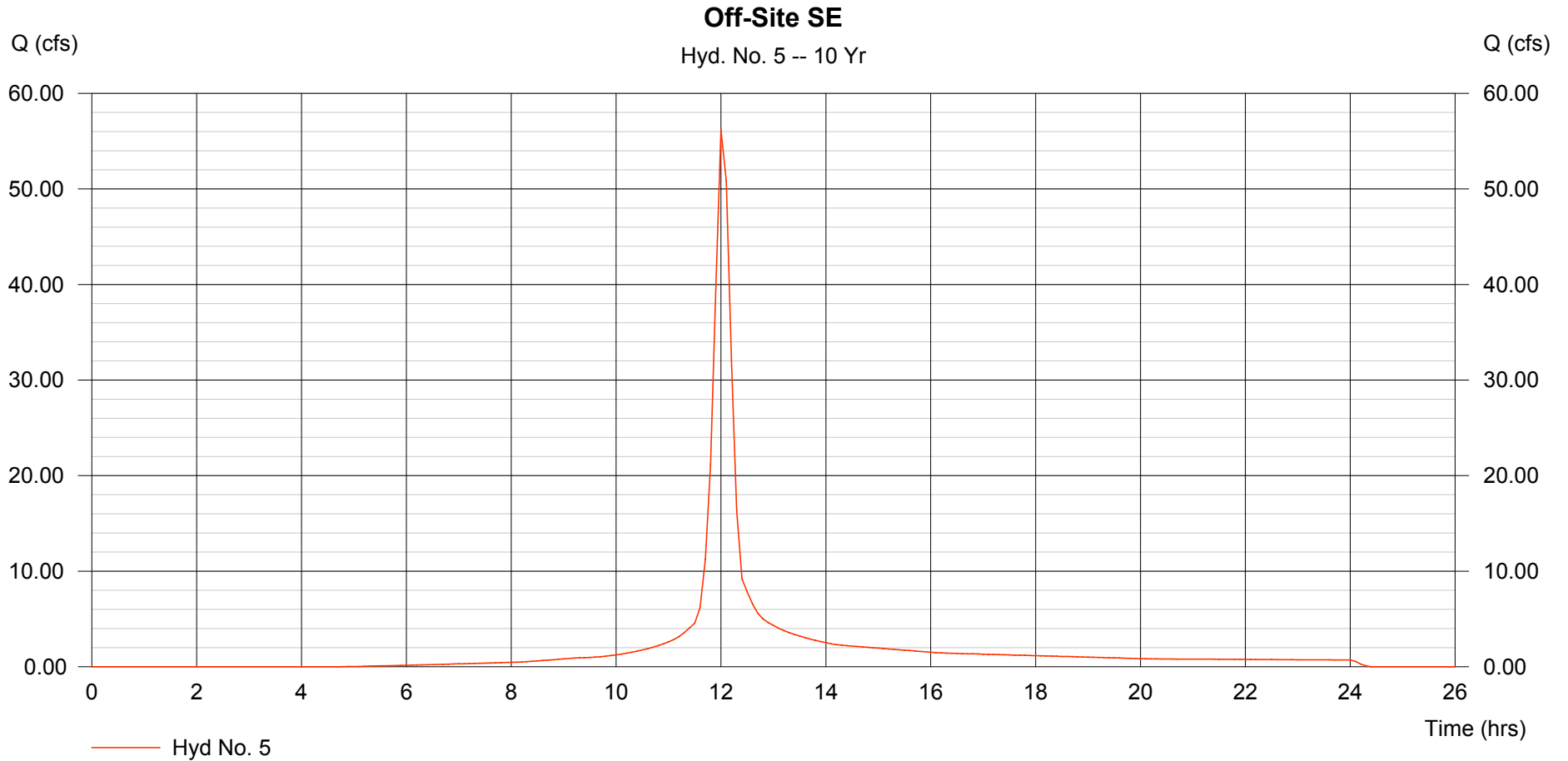
## Hyd. No. 5

Off-Site SE

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 56.16 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4.007 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

## Hyd. No. 6

E-1

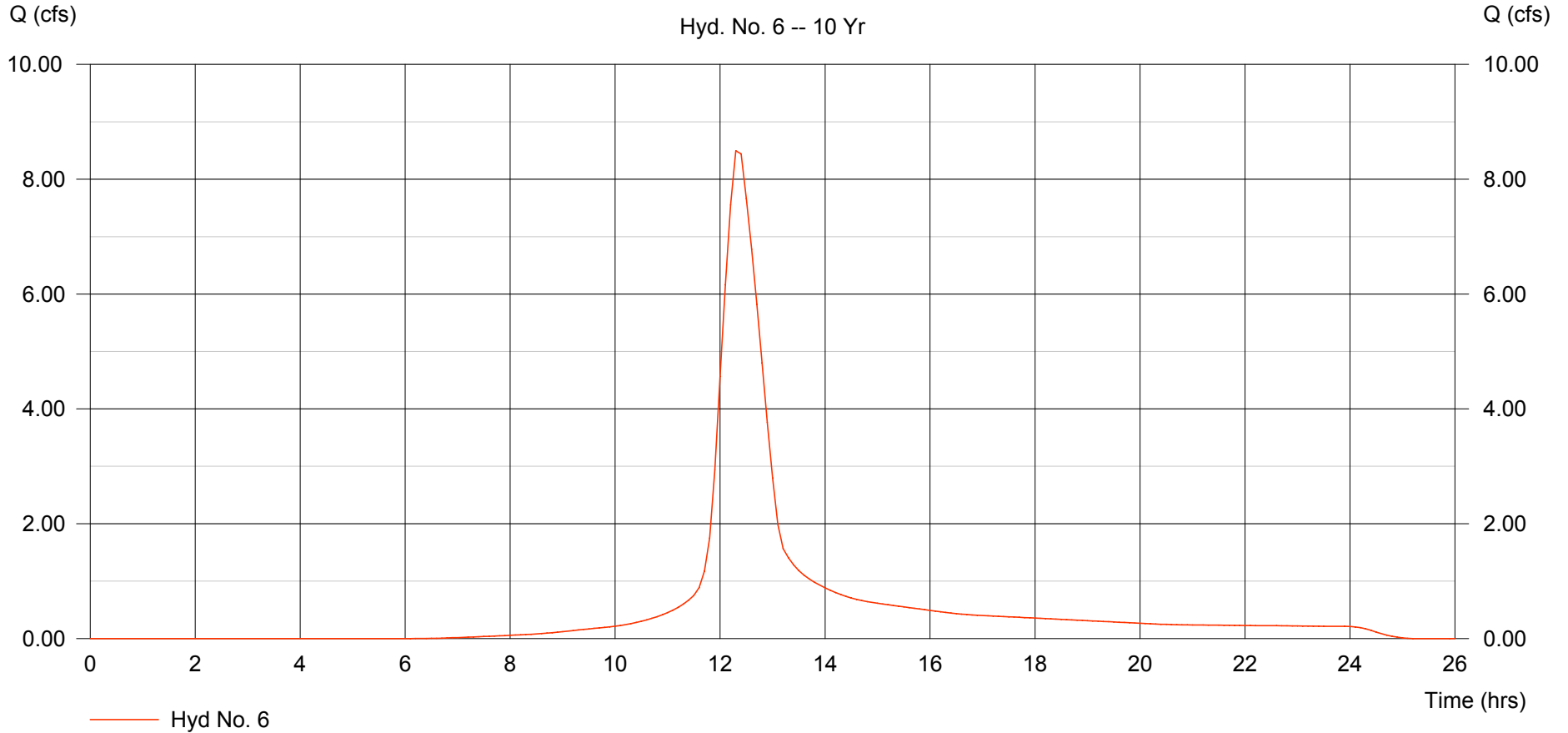
Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 3.961 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 8.494 cfs  
Time interval = 6 min  
Curve number = 82.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 42.40 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.094 acft

### E-1

Hyd. No. 6 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

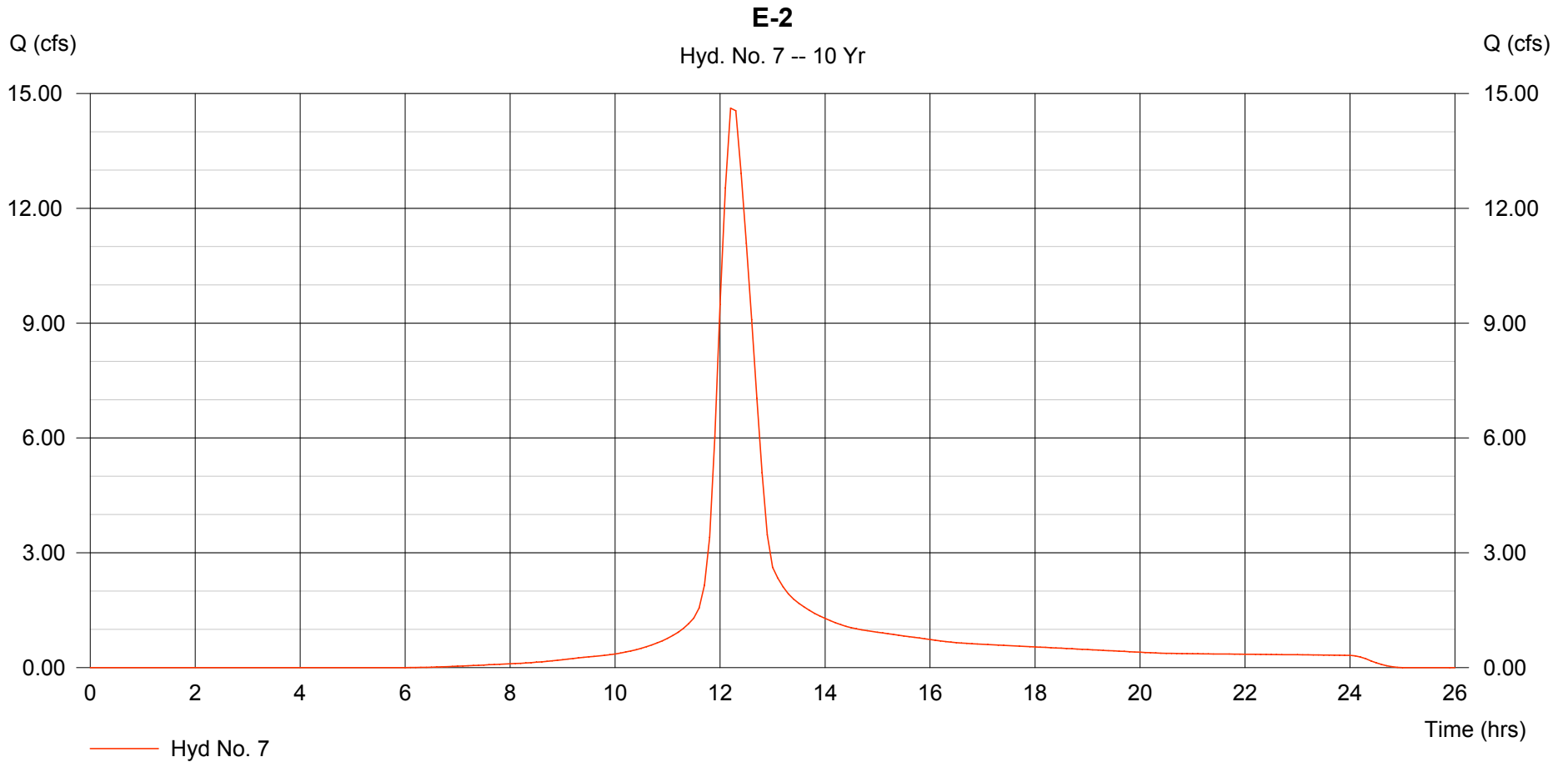
## Hyd. No. 7

E-2

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 5.723 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 14.62 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 37.90 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.686 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

## Hyd. No. 8

E-3

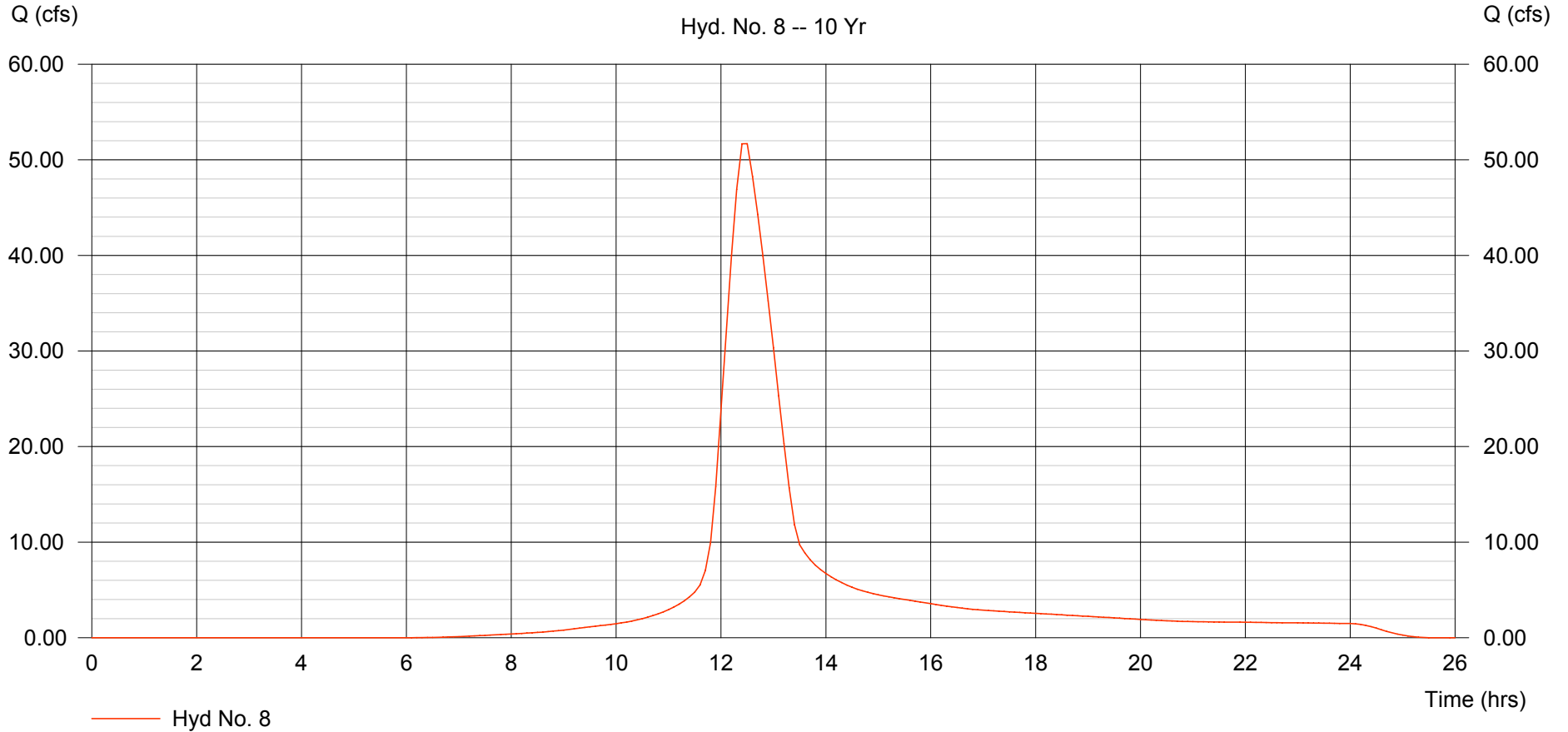
Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 27.034 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 51.70 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 60.30 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 7.724 acft

### E-3

Hyd. No. 8 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

## Hyd. No. 9

E-4

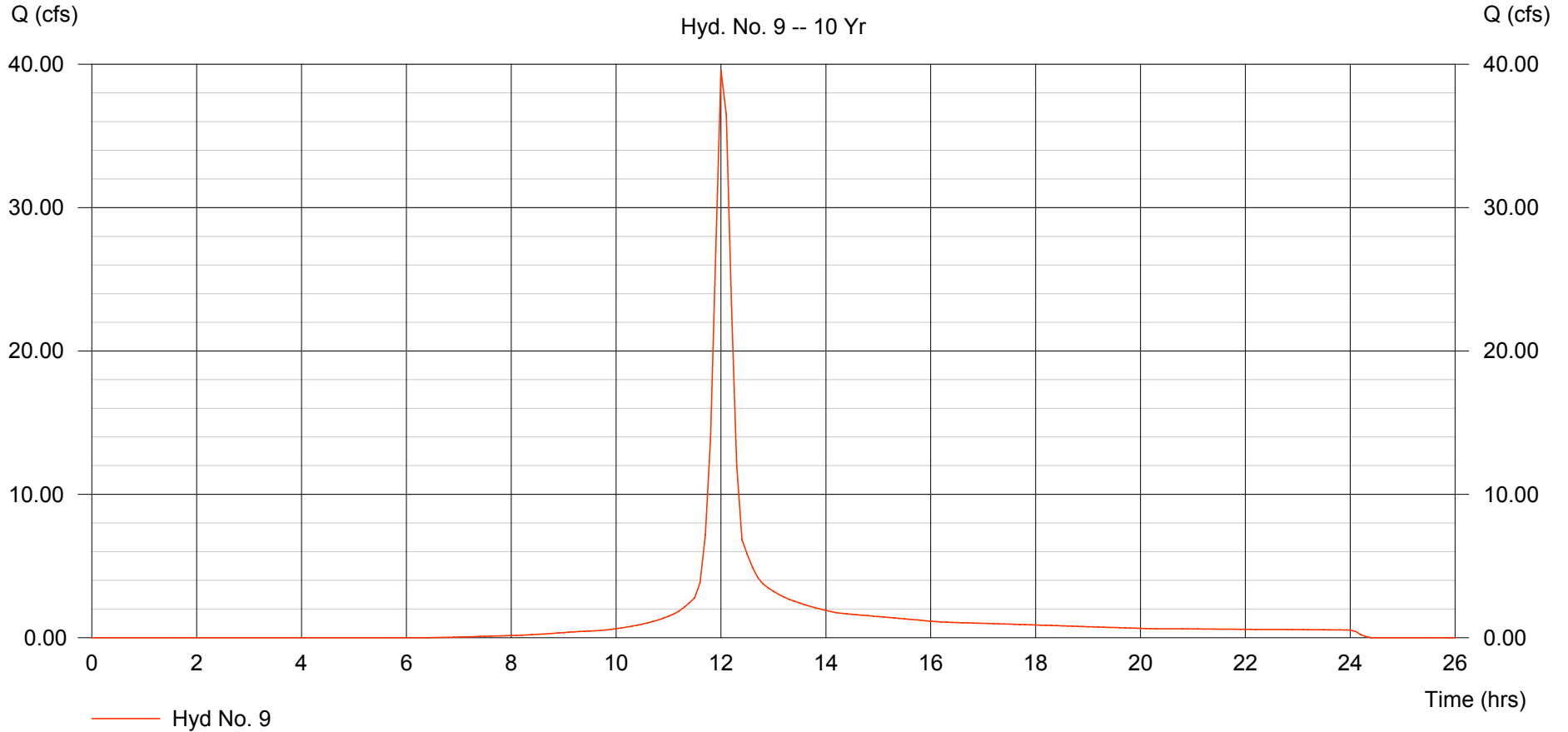
Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 10.854 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 39.57 cfs  
Time interval = 6 min  
Curve number = 81.6  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.791 acft

### E-4

Hyd. No. 9 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

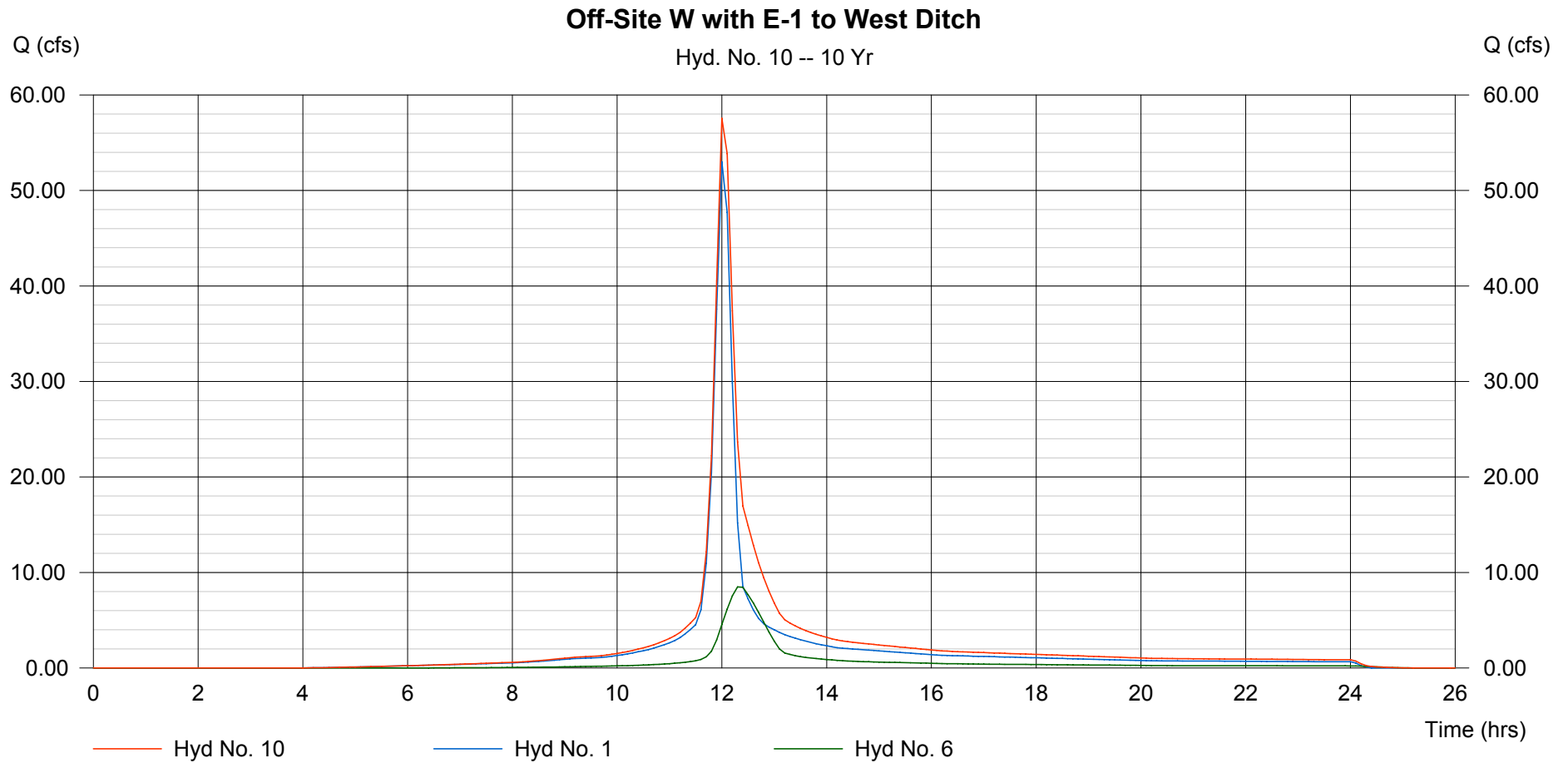
## Hyd. No. 10

Off-Site W with E-1 to West Ditch

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 1, 6

Peak discharge = 57.56 cfs  
Time interval = 6 min

Hydrograph Volume = 4.911 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

## Hyd. No. 11

Exisitng West Ditch

Hydrograph type = Reach  
Storm frequency = 10 yrs  
Inflow hyd. No. = 10  
Reach length = 450.0 ft  
Manning's n = 0.045  
Side slope = 6.0:1  
Rating curve x = 0.743  
Ave. velocity = 1.81 ft/s

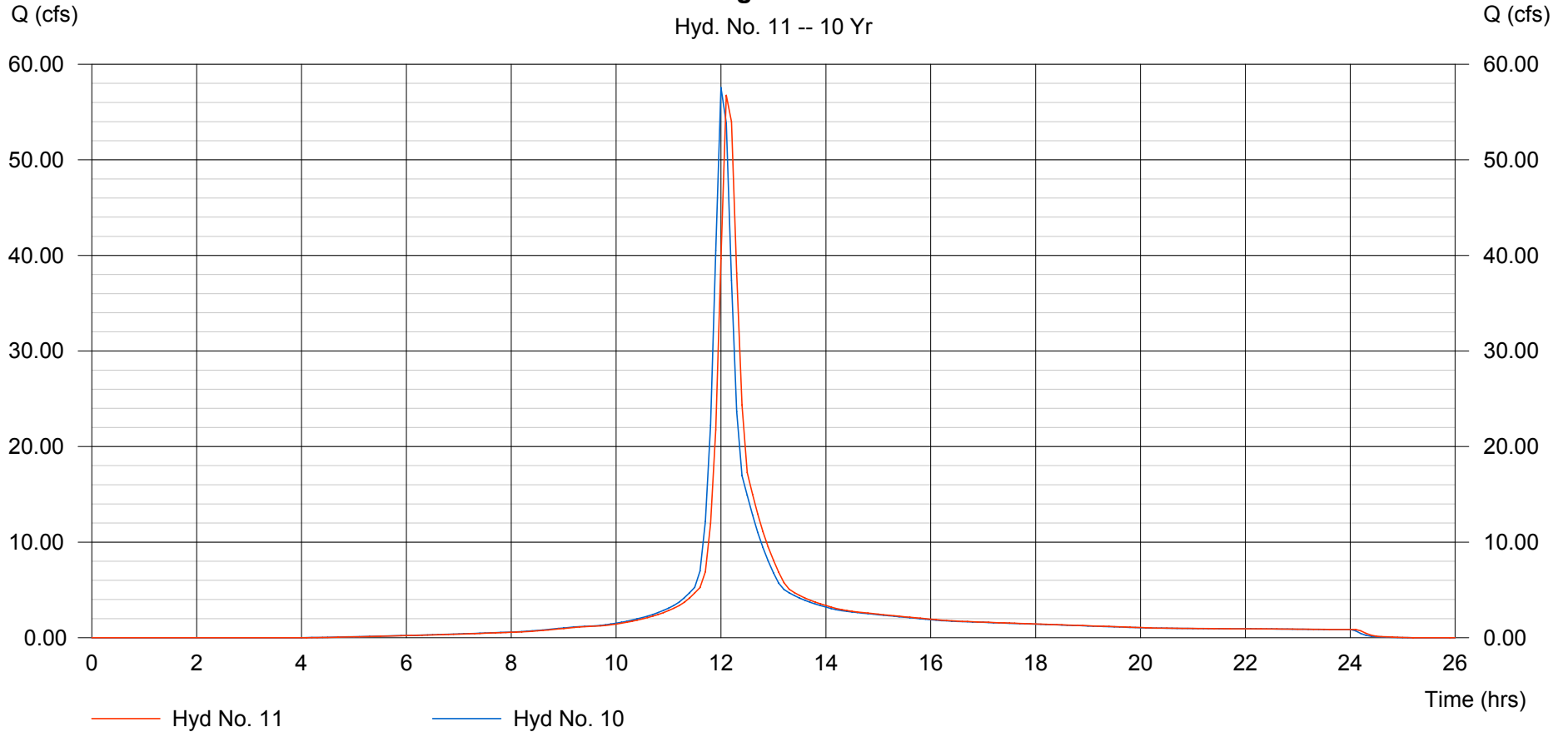
Peak discharge = 56.75 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.4 %  
Bottom width = 5.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.258  
Routing coeff. = 0.9546

Modified Att-Kin routing method used.

Hydrograph Volume = 4.911 acft

### Exisitng West Ditch

Hyd. No. 11 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

## Hyd. No. 12

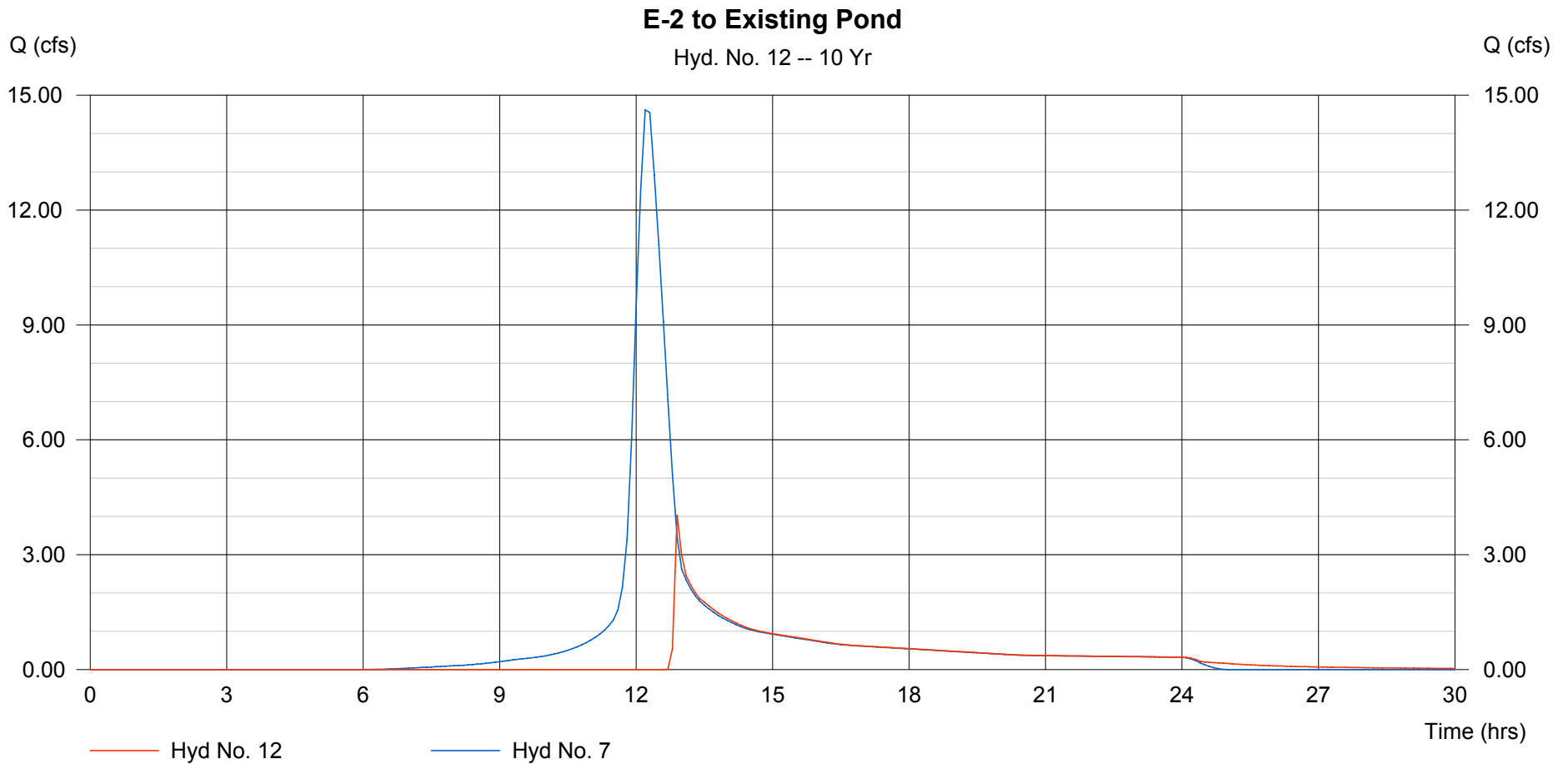
E-2 to Existing Pond

Hydrograph type = Reservoir  
Storm frequency = 10 yrs  
Inflow hyd. No. = 7  
Reservoir name = Existing Pond

Peak discharge = 4.030 cfs  
Time interval = 6 min  
Max. Elevation = 1390.47 ft  
Max. Storage = 1.030 acft

Storage Indication method used.

Hydrograph Volume = 0.728 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

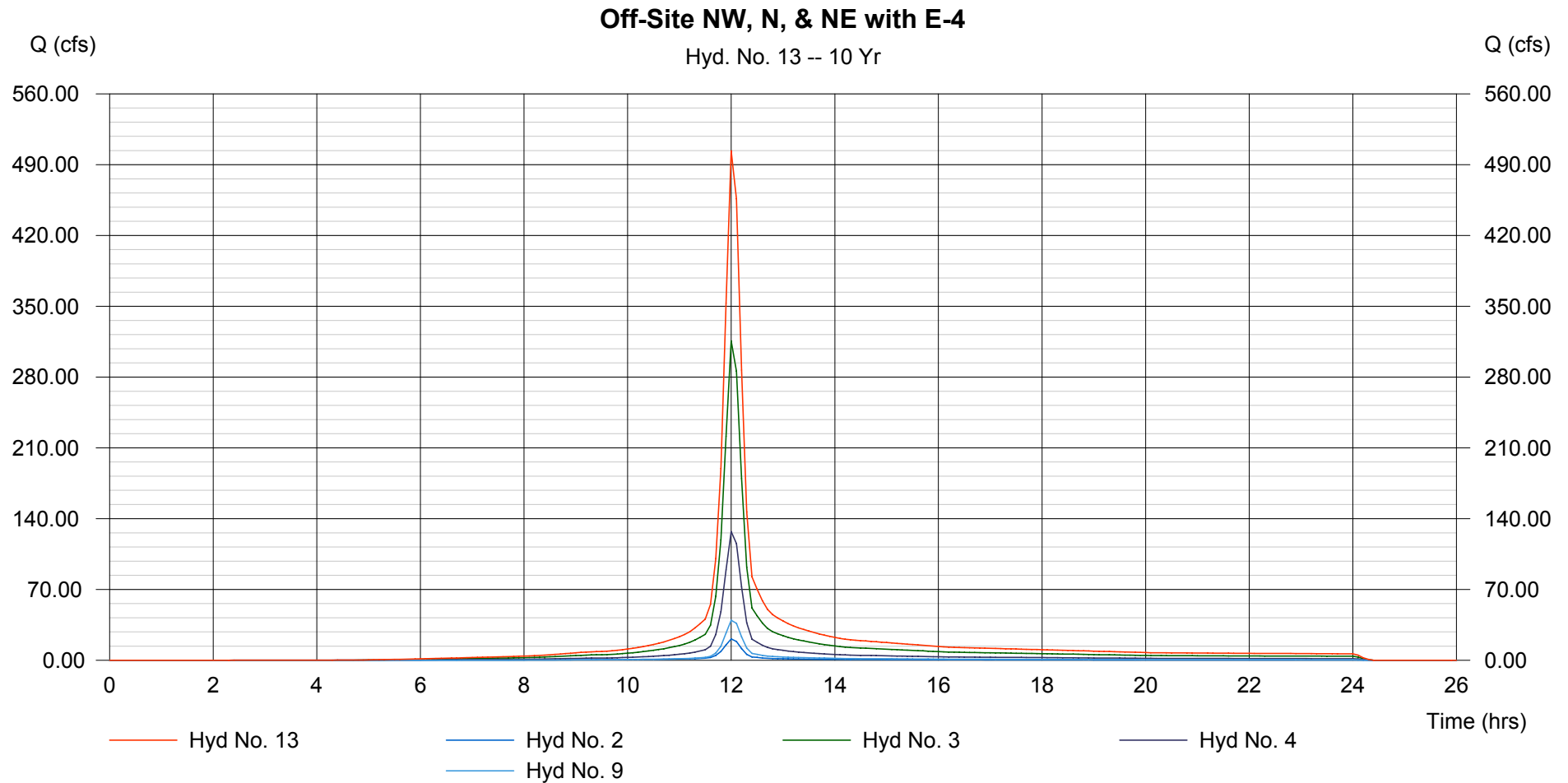
## Hyd. No. 13

Off-Site NW, N, & NE with E-4

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 2, 3, 4, 9

Peak discharge = 503.58 cfs  
Time interval = 6 min

Hydrograph Volume = 35.987 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

## Hyd. No. 14

East Channel in E-4

Hydrograph type = Reach  
Storm frequency = 10 yrs  
Inflow hyd. No. = 13  
Reach length = 1384.8 ft  
Manning's n = 0.040  
Side slope = 4.0:1  
Rating curve x = 0.235  
Ave. velocity = 2.29 ft/s

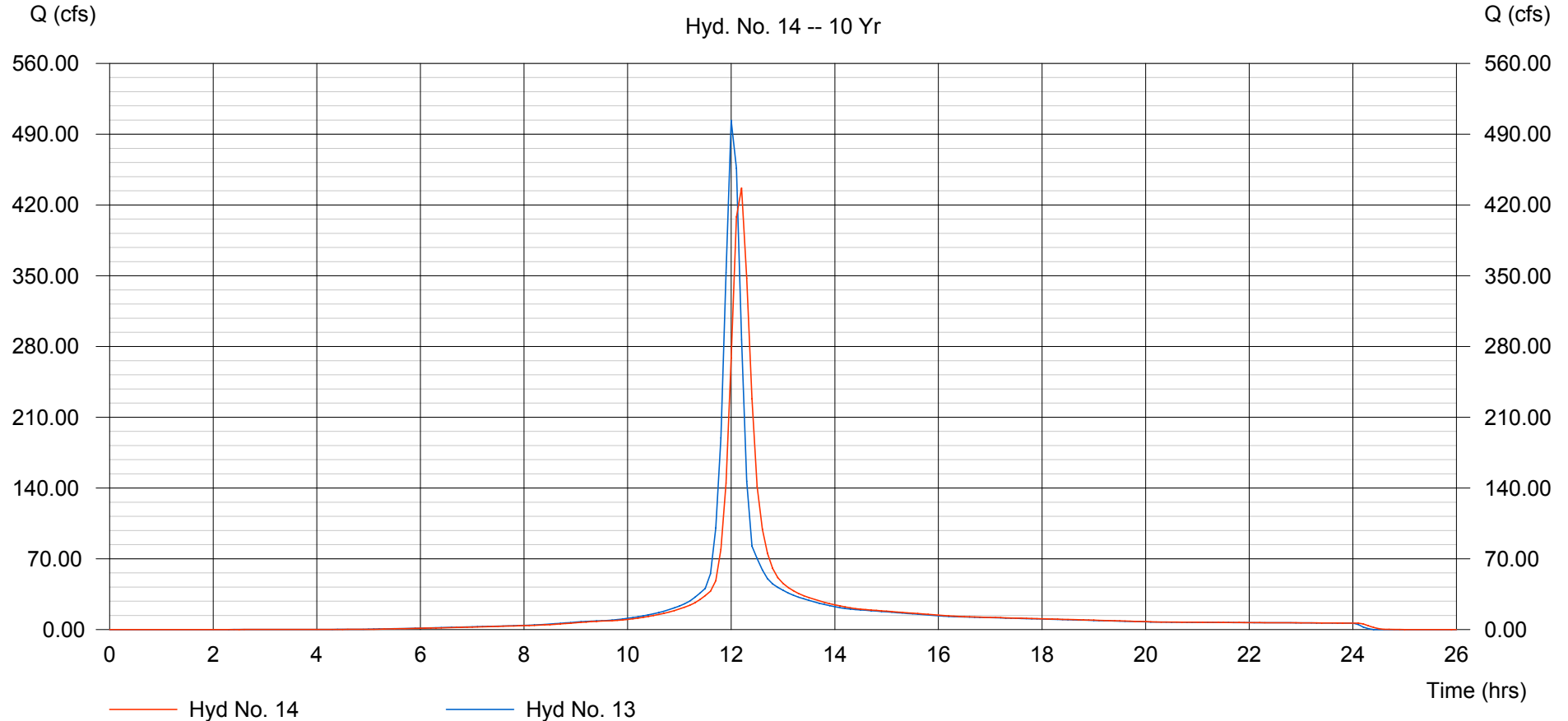
Peak discharge = 436.85 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.422  
Routing coeff. = 0.5942

Modified Att-Kin routing method used.

Hydrograph Volume = 35.987 acft

### East Channel in E-4

Hyd. No. 14 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

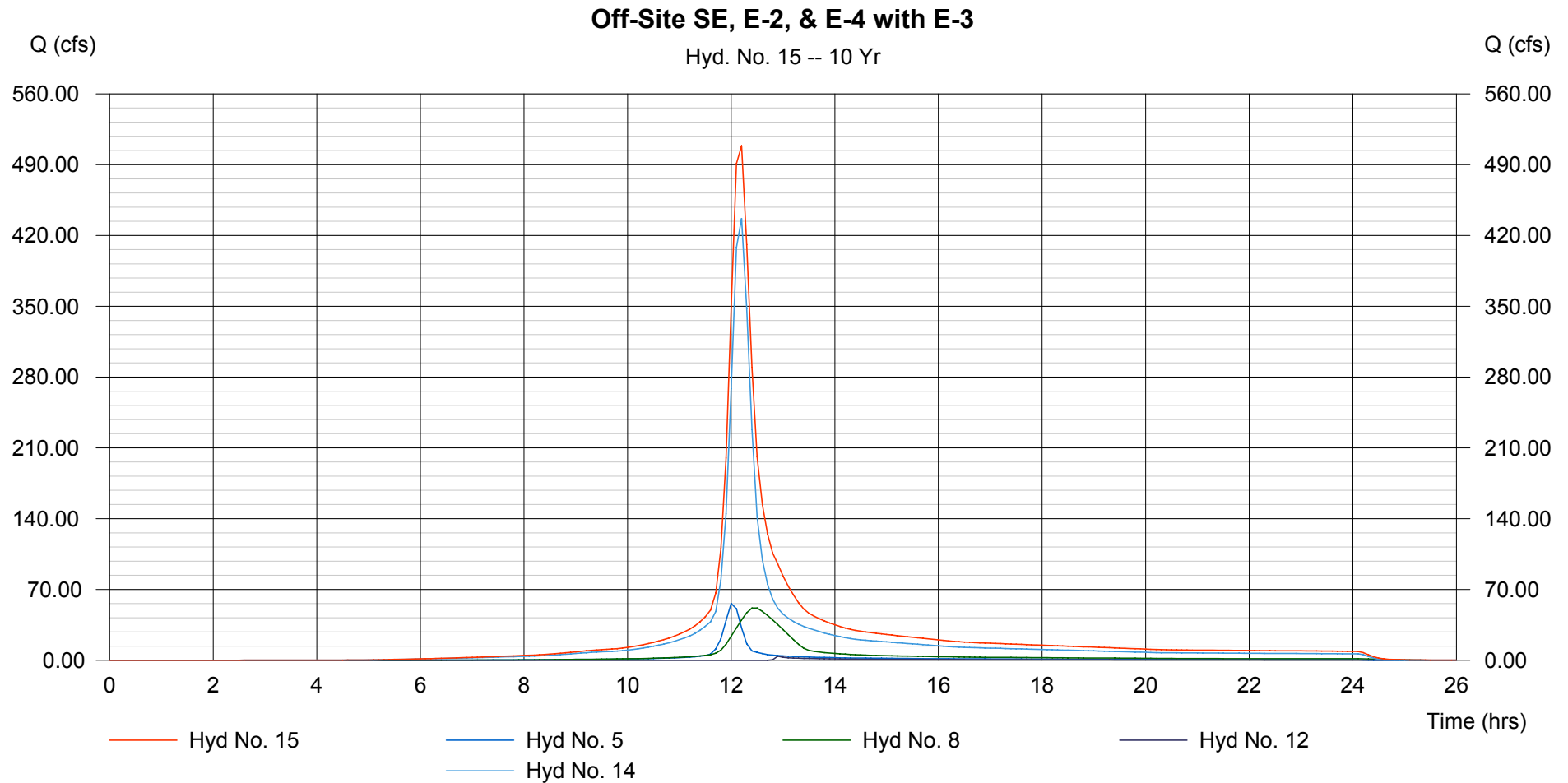
## Hyd. No. 15

Off-Site SE, E-2, & E-4 with E-3

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 5, 8, 12, 14

Peak discharge = 508.77 cfs  
Time interval = 6 min

Hydrograph Volume = 48.445 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

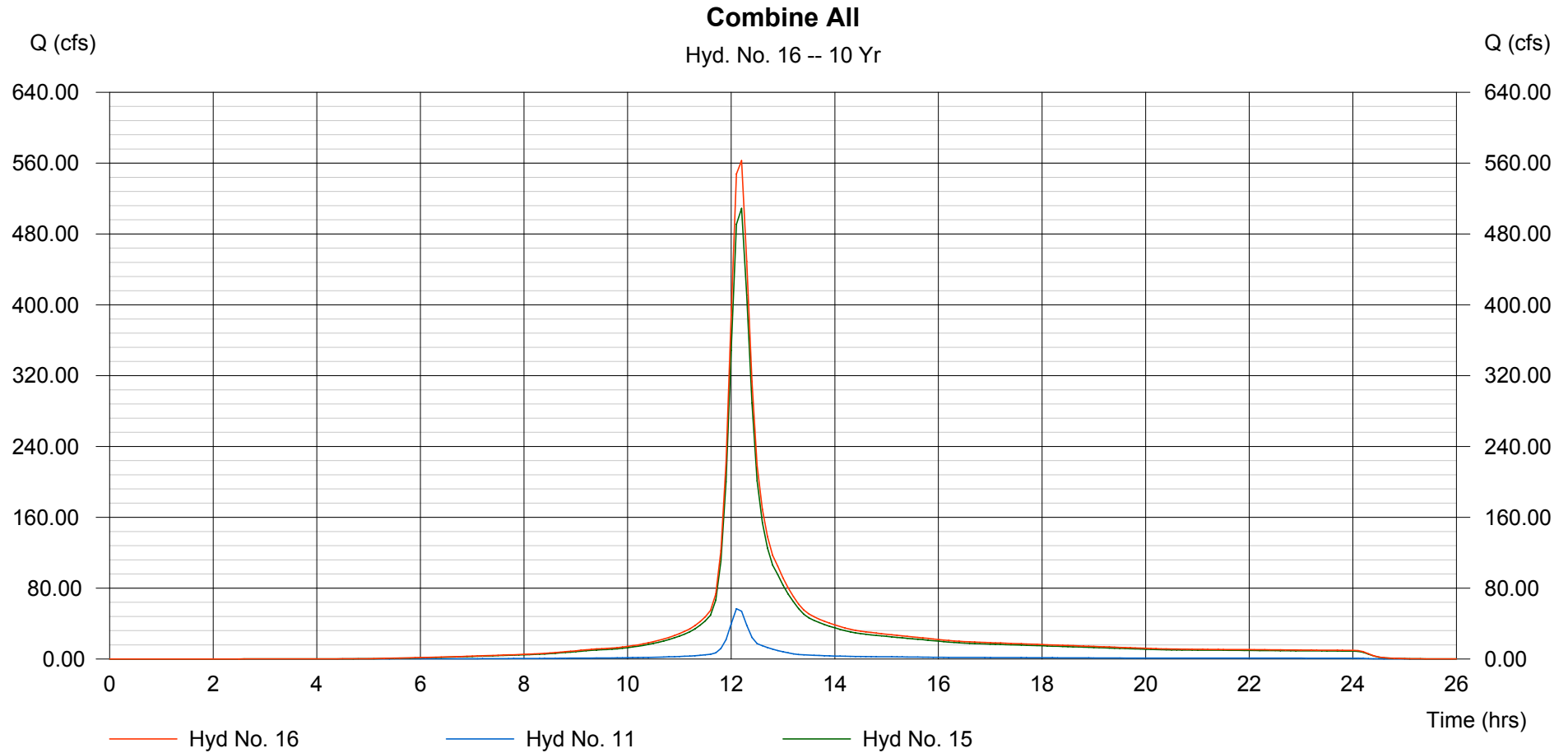
## Hyd. No. 16

Combine All

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 11, 15

Peak discharge = 562.76 cfs  
Time interval = 6 min

Hydrograph Volume = 53.357 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:26 PM

## Hyd. No. 17

Existing Central Channel

Hydrograph type = Reach  
Storm frequency = 10 yrs  
Inflow hyd. No. = 16  
Reach length = 813.4 ft  
Manning's n = 0.040  
Side slope = 50.0:1  
Rating curve x = 0.350  
Ave. velocity = 2.22 ft/s

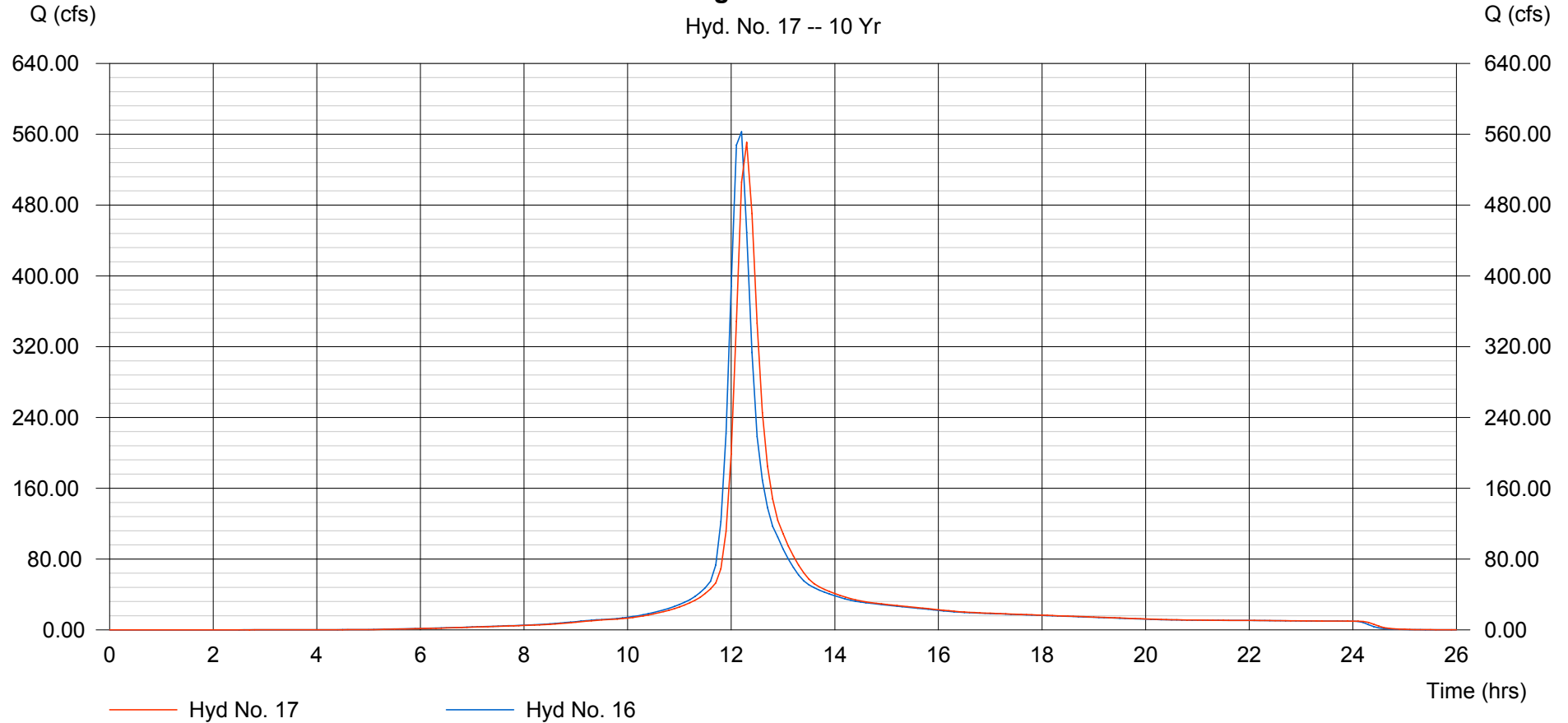
Peak discharge = 550.89 cfs  
Time interval = 6 min  
Section type = Triangular  
Channel slope = 0.3 %  
Bottom width = 0.0 ft  
Max. depth = 0.0 ft  
Rating curve m = 1.333  
Routing coeff. = 0.7906

Modified Att-Kin routing method used.

Hydrograph Volume = 53.346 acft

### Existing Central Channel

Hyd. No. 17 -- 10 Yr



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description	
1	SCS Runoff	64.55	6	720	4.692	---	-----	-----	Off-Site W	
2	SCS Runoff	25.05	6	720	1.912	---	-----	-----	Off-Site NW	
3	SCS Runoff	388.05	6	720	27.903	---	-----	-----	Off-Site N	
4	SCS Runoff	156.51	6	720	11.254	---	-----	-----	Off-Site NE	
5	SCS Runoff	69.04	6	720	4.965	---	-----	-----	Off-Site SE	
6	SCS Runoff	10.69	6	738	1.378	---	-----	-----	E-1	
7	SCS Runoff	18.36	6	732	2.122	---	-----	-----	E-2	
8	SCS Runoff	64.95	6	744	9.720	---	-----	-----	E-3	
9	SCS Runoff	49.94	6	720	3.533	---	-----	-----	E-4	
10	Combine	70.39	6	720	6.070	1, 6,	-----	-----	Off-Site W with E-1 to West Ditch	
11	Reach	69.87	6	726	6.070	10	-----	-----	Existing West Ditch	
12	Reservoir	14.19	6	756	1.163	7	1390.57	1.057	E-2 to Existing Pond	
13	Combine	619.55	6	720	44.602	2, 3, 4, 9,	-----	-----	Off-Site NW, N, & NE with E-4	
14	Reach	541.72	6	732	44.602	13	-----	-----	East Channel in E-4	
15	Combine	631.27	6	732	60.450	5, 8, 12, 14	-----	-----	Off-Site SE, E-2, & E-4 with E-3	
16	Combine	697.04	6	732	66.520	11, 15	-----	-----	Combine All	
17	Reach	687.18	6	738	66.510	16	-----	-----	Existing Central Channel	
Northborough Existing.gpw					Return Period: 25 Year			Friday, Sep 14 2007		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

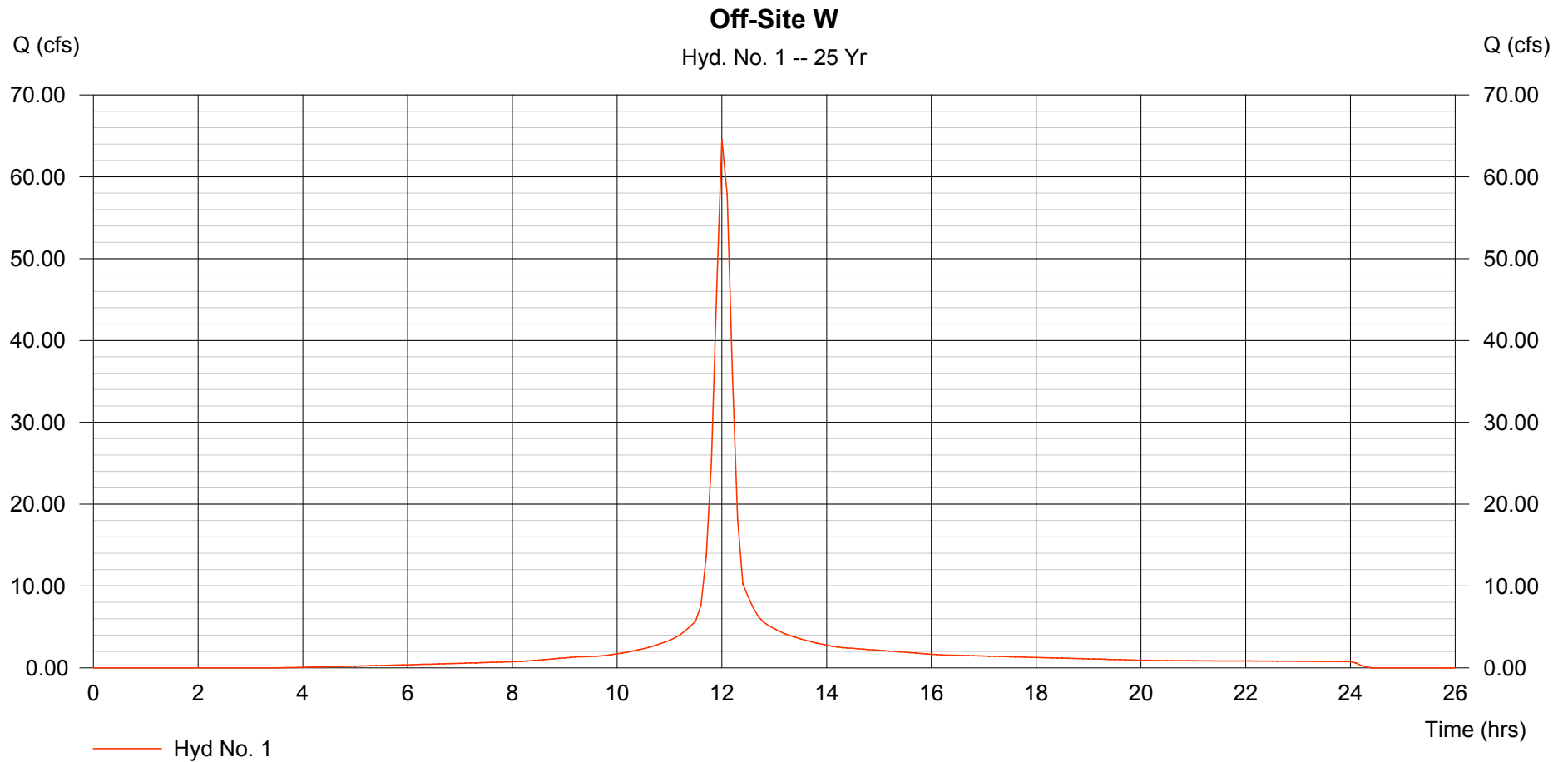
## Hyd. No. 1

Off-Site W

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 12.061 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 64.55 cfs  
Time interval = 6 min  
Curve number = 89.1  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4.692 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

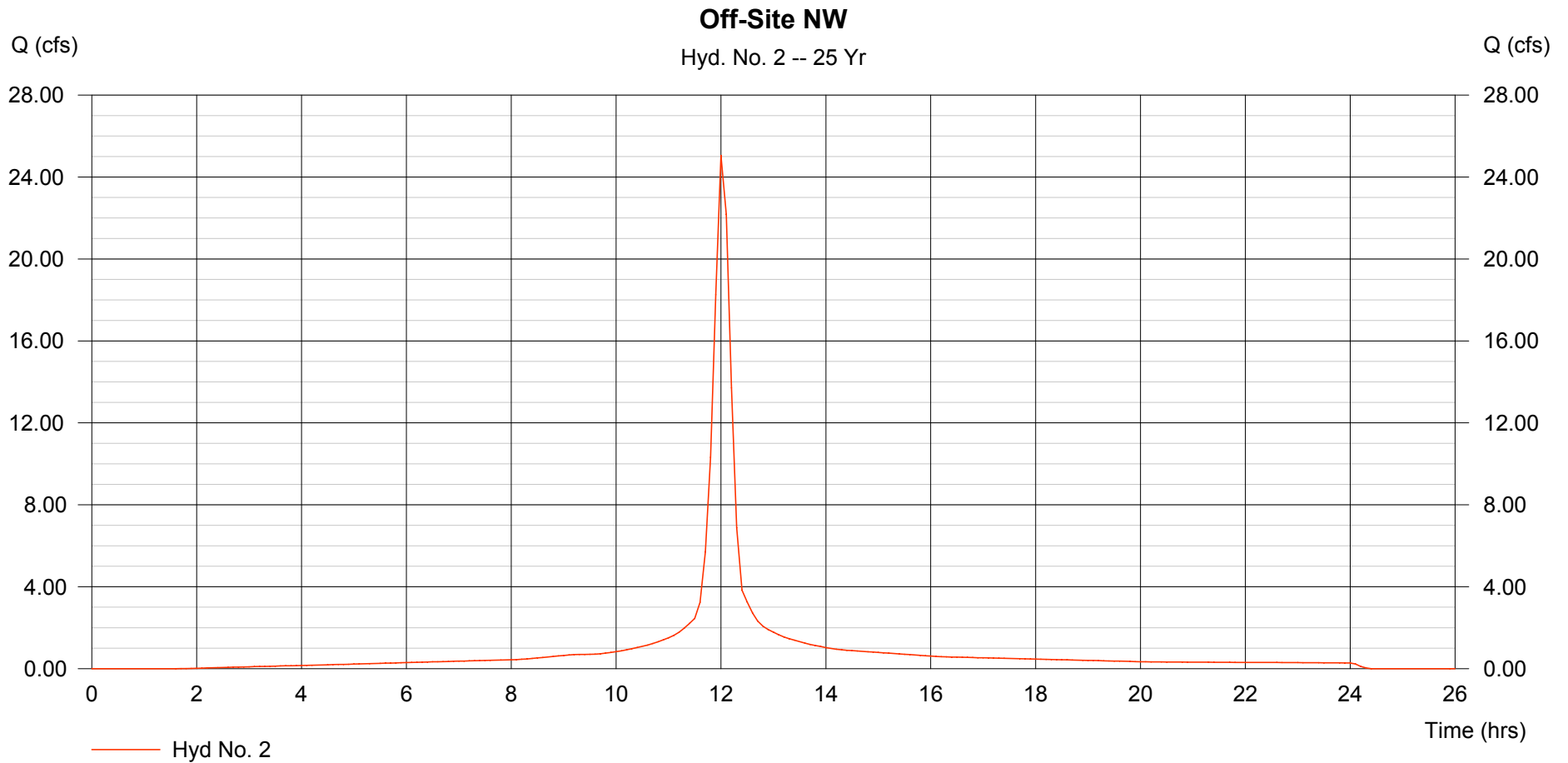
## Hyd. No. 2

Off-Site NW

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 4.332 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 25.05 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.912 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

## Hyd. No. 3

Off-Site N

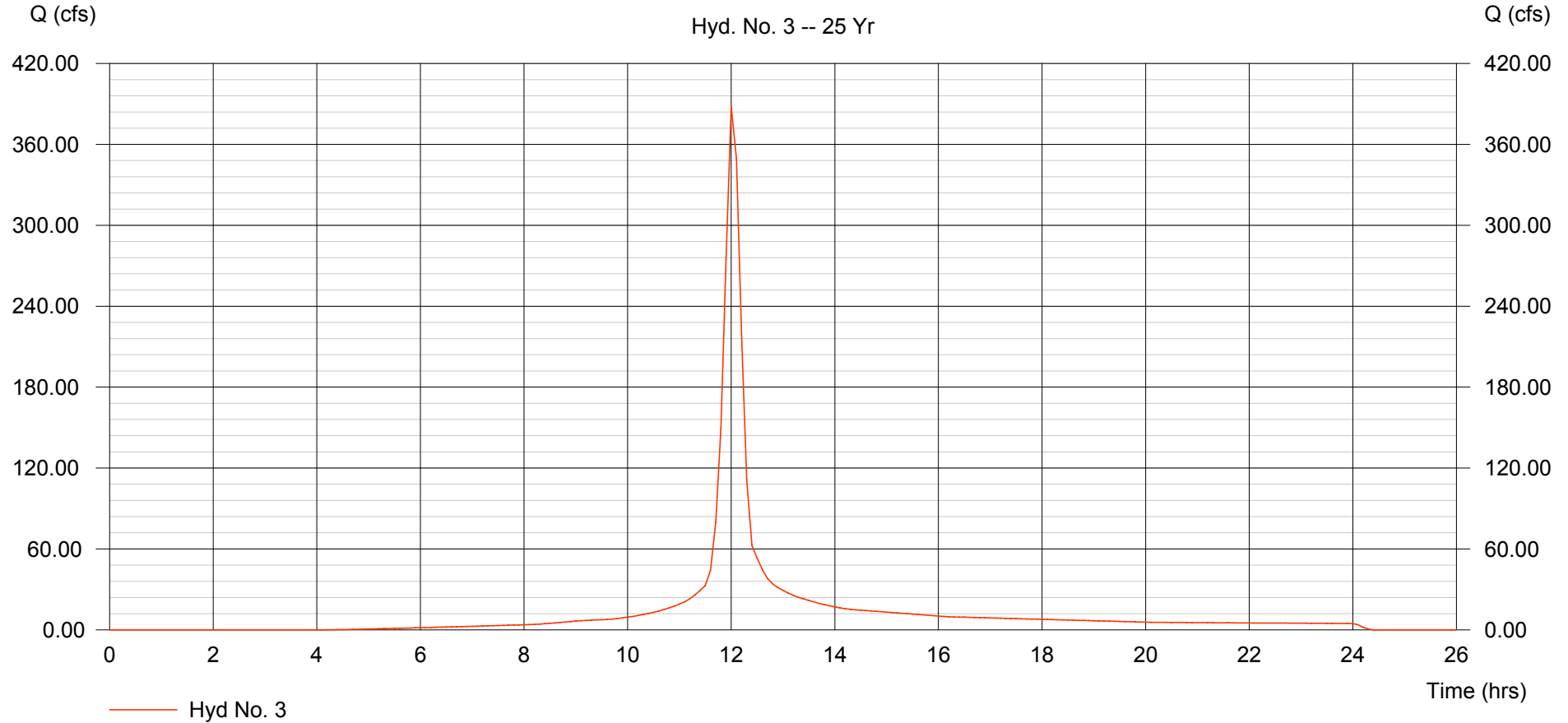
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 388.05 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 27.903 acft

### Off-Site N

Hyd. No. 3 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

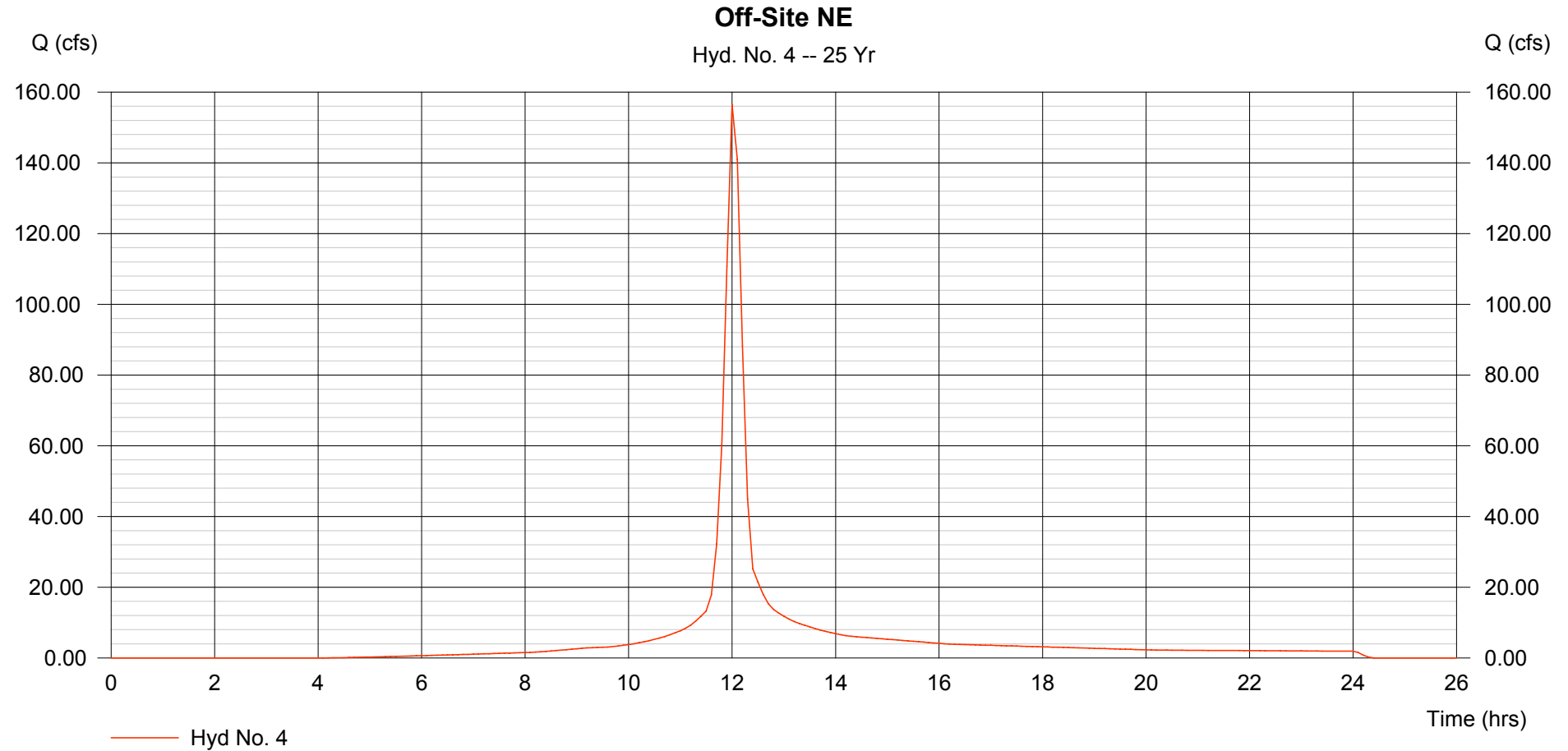
## Hyd. No. 4

Off-Site NE

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 156.51 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 11.254 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

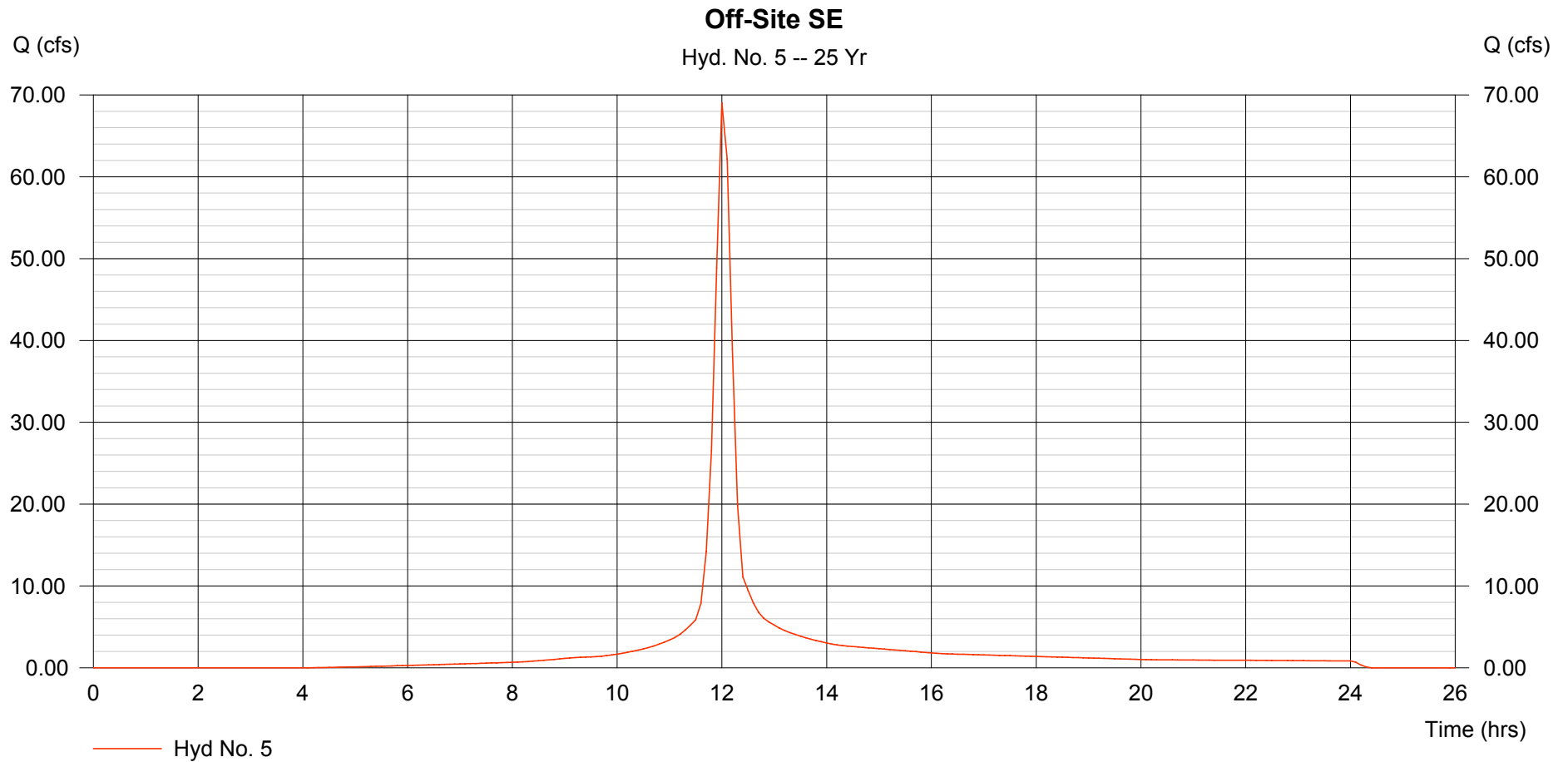
## Hyd. No. 5

Off-Site SE

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 69.04 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4.965 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

## Hyd. No. 6

E-1

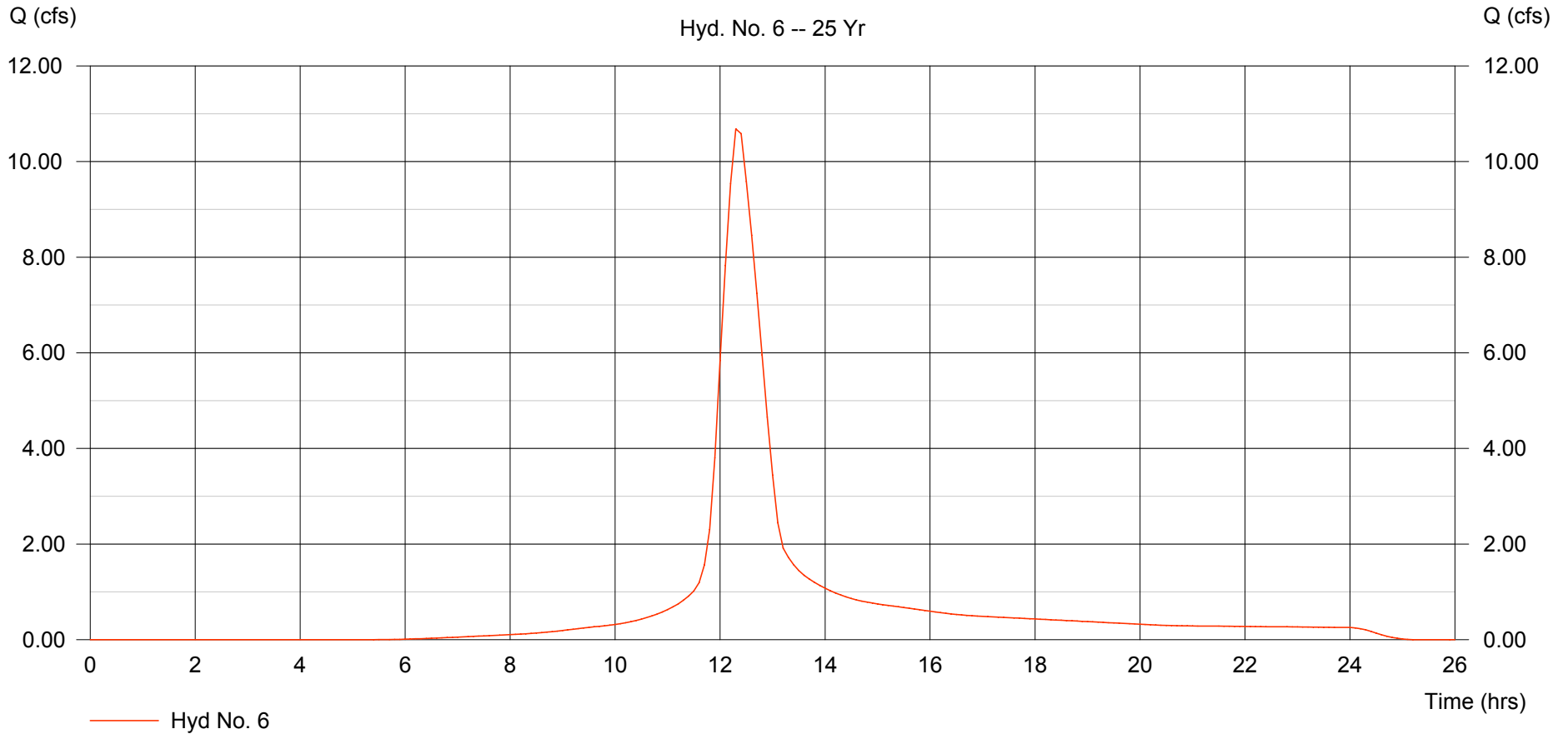
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 3.961 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 10.69 cfs  
Time interval = 6 min  
Curve number = 82.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 42.40 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.378 acft

### E-1

Hyd. No. 6 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

## Hyd. No. 7

E-2

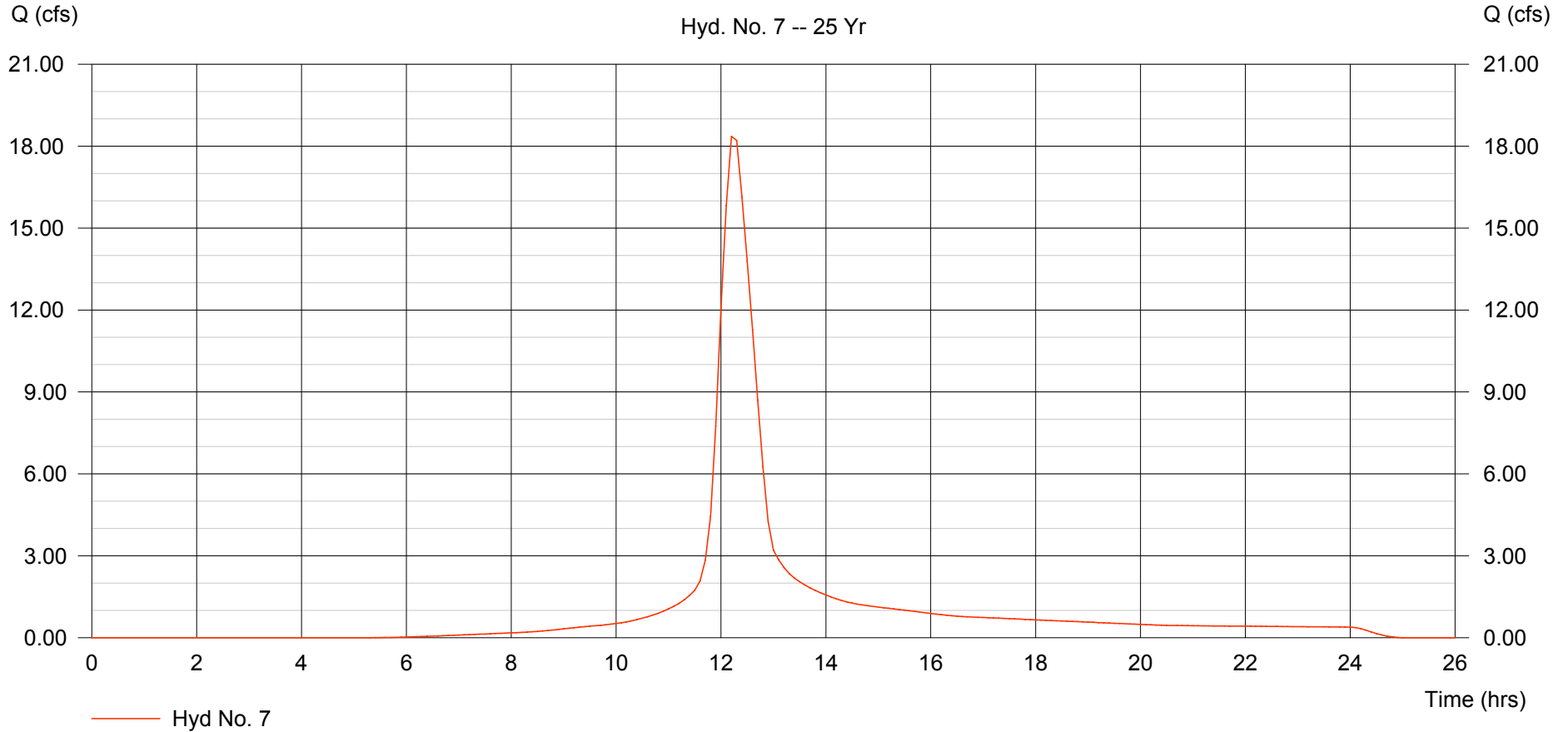
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 5.723 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 18.36 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 37.90 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.122 acft

### E-2

Hyd. No. 7 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

## Hyd. No. 8

E-3

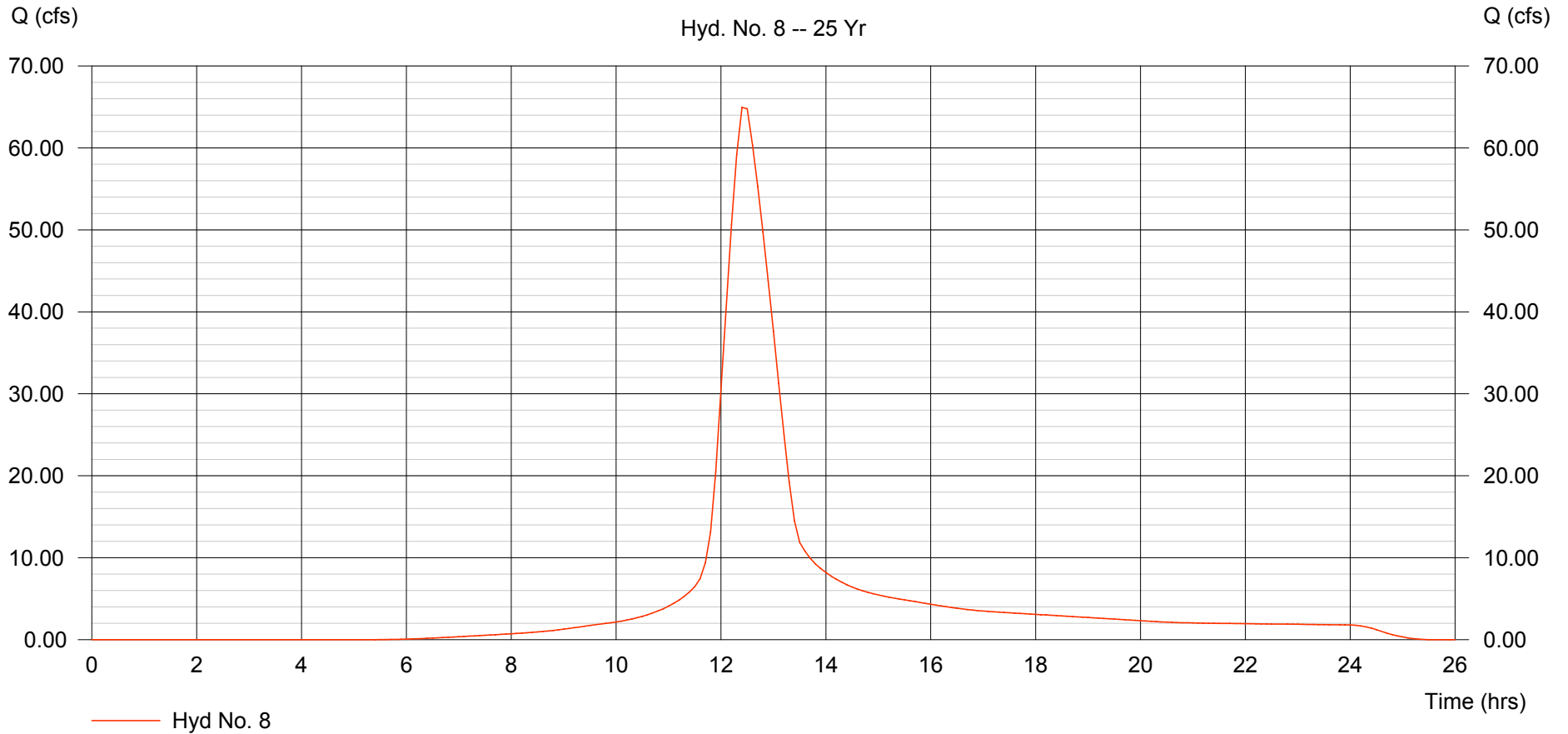
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 27.034 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 64.95 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 60.30 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 9.720 acft

### E-3

Hyd. No. 8 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

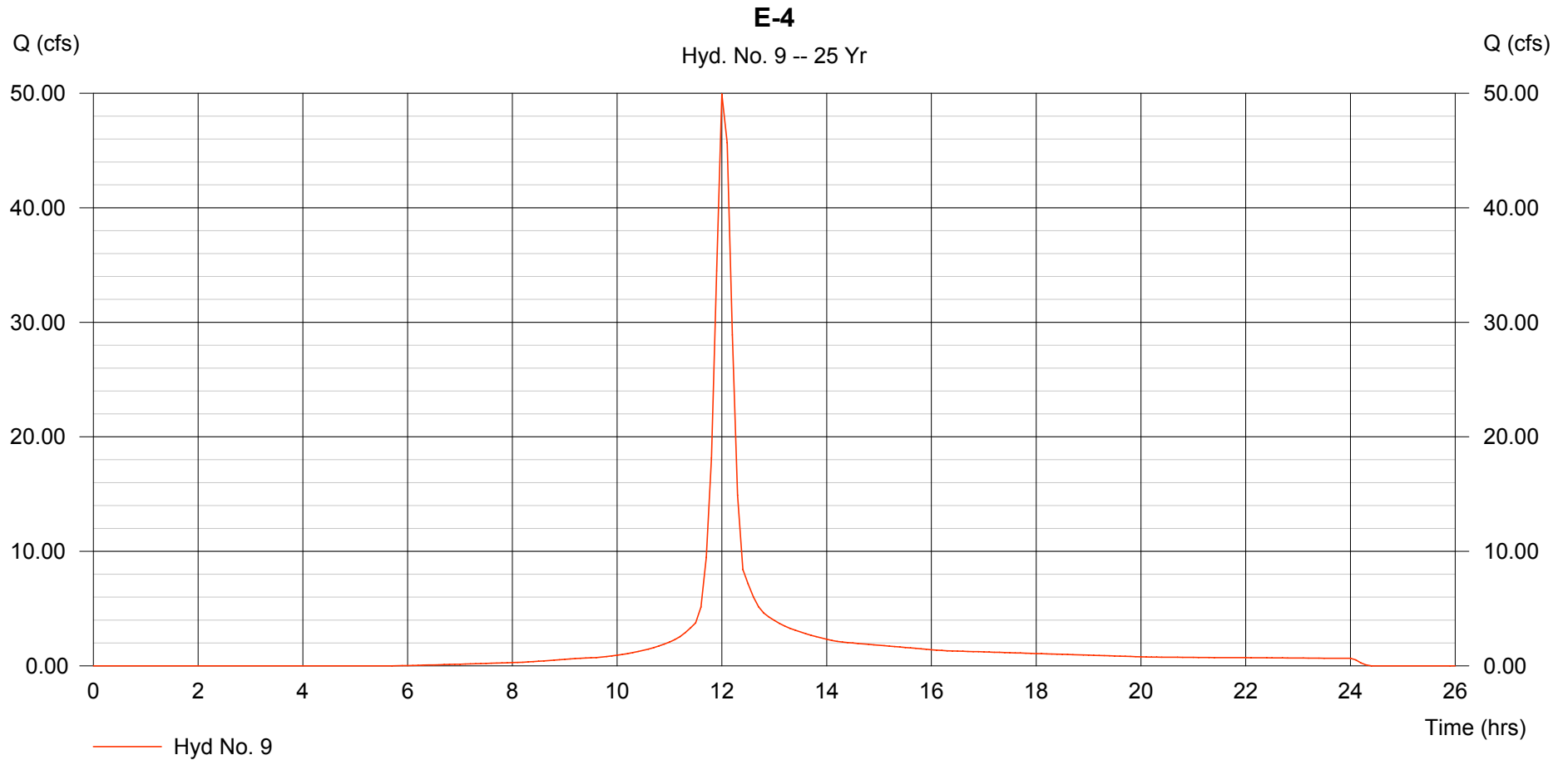
## Hyd. No. 9

E-4

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 10.854 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 49.94 cfs  
Time interval = 6 min  
Curve number = 81.6  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 3.533 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

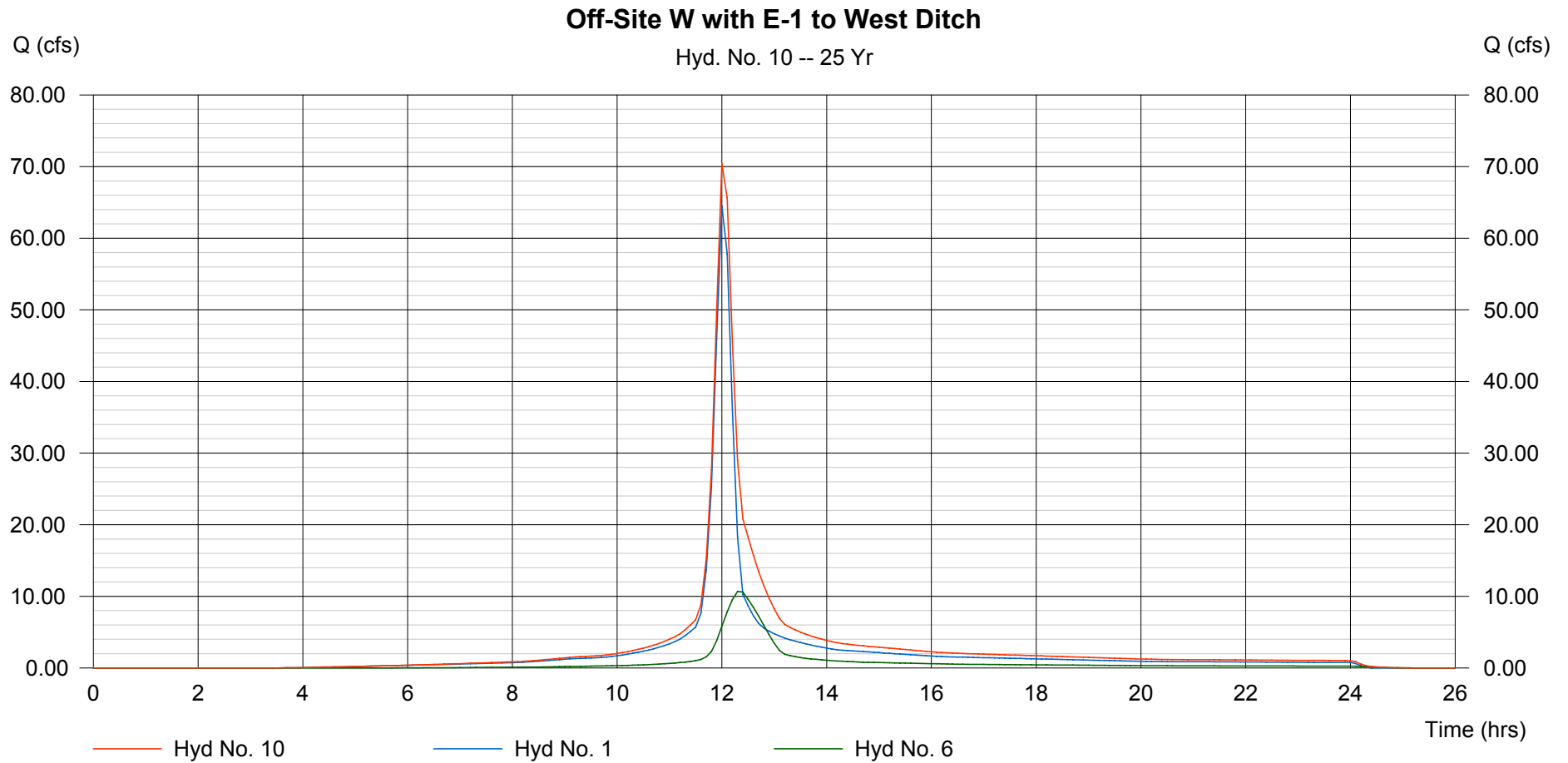
## Hyd. No. 10

Off-Site W with E-1 to West Ditch

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 1, 6

Peak discharge = 70.39 cfs  
Time interval = 6 min

Hydrograph Volume = 6.070 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

## Hyd. No. 11

Exisitng West Ditch

Hydrograph type = Reach  
Storm frequency = 25 yrs  
Inflow hyd. No. = 10  
Reach length = 450.0 ft  
Manning's n = 0.045  
Side slope = 6.0:1  
Rating curve x = 0.743  
Ave. velocity = 1.89 ft/s

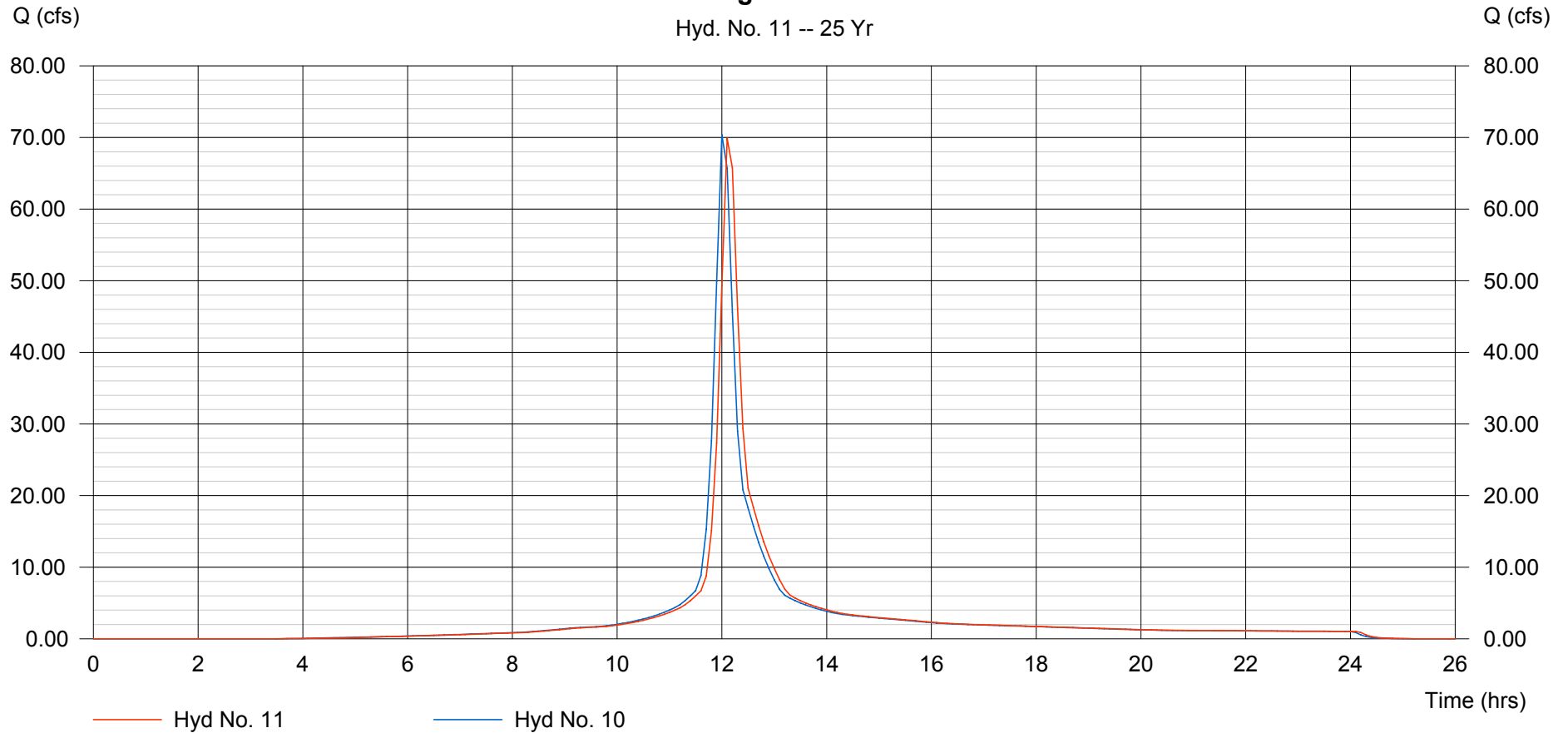
Peak discharge = 69.87 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.4 %  
Bottom width = 5.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.258  
Routing coeff. = 0.9753

Modified Att-Kin routing method used.

Hydrograph Volume = 6.070 acft

### Exisitng West Ditch

Hyd. No. 11 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

## Hyd. No. 12

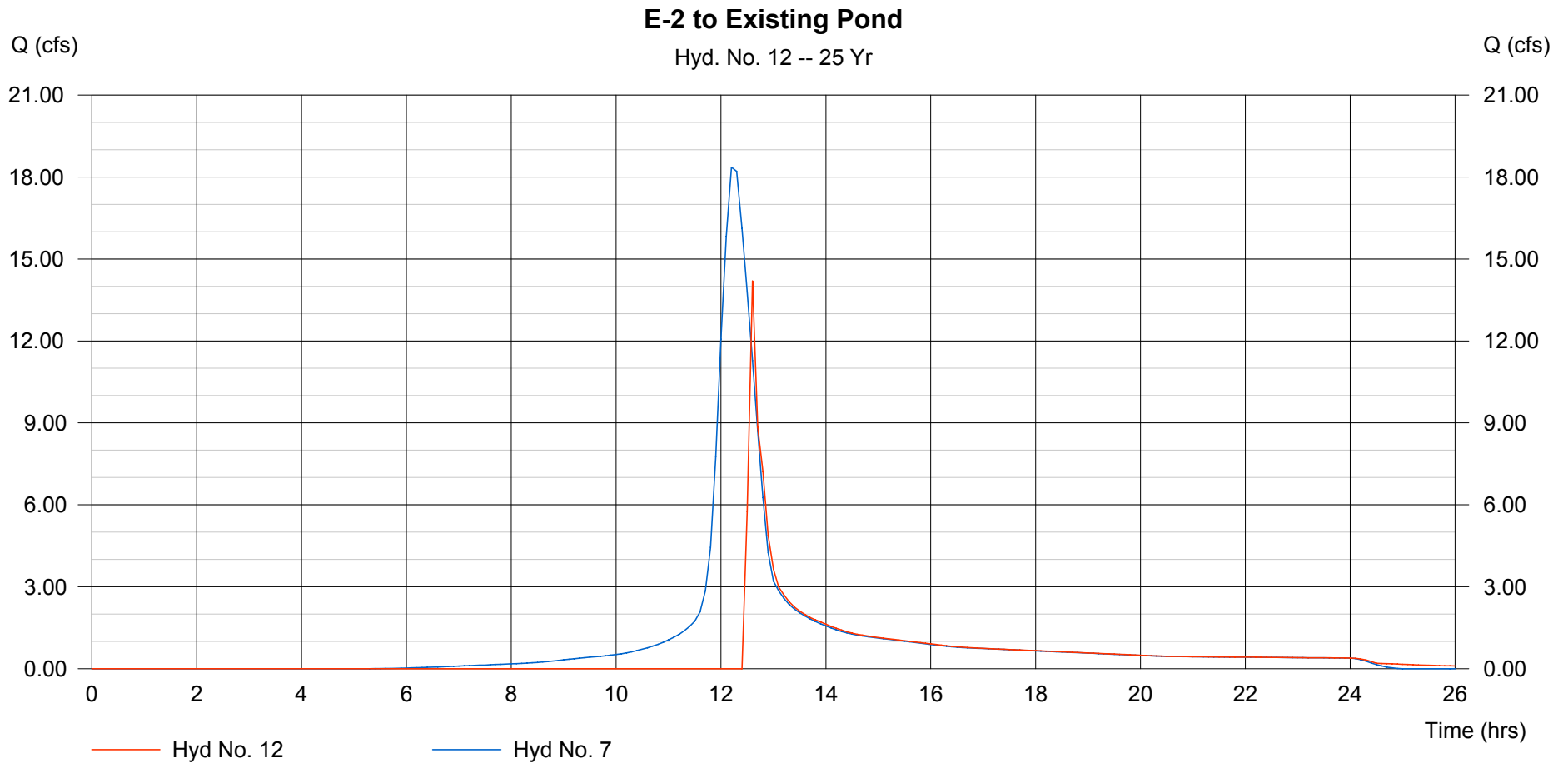
E-2 to Existing Pond

Hydrograph type = Reservoir  
Storm frequency = 25 yrs  
Inflow hyd. No. = 7  
Reservoir name = Existing Pond

Peak discharge = 14.19 cfs  
Time interval = 6 min  
Max. Elevation = 1390.57 ft  
Max. Storage = 1.057 acft

Storage Indication method used.

Hydrograph Volume = 1.163 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

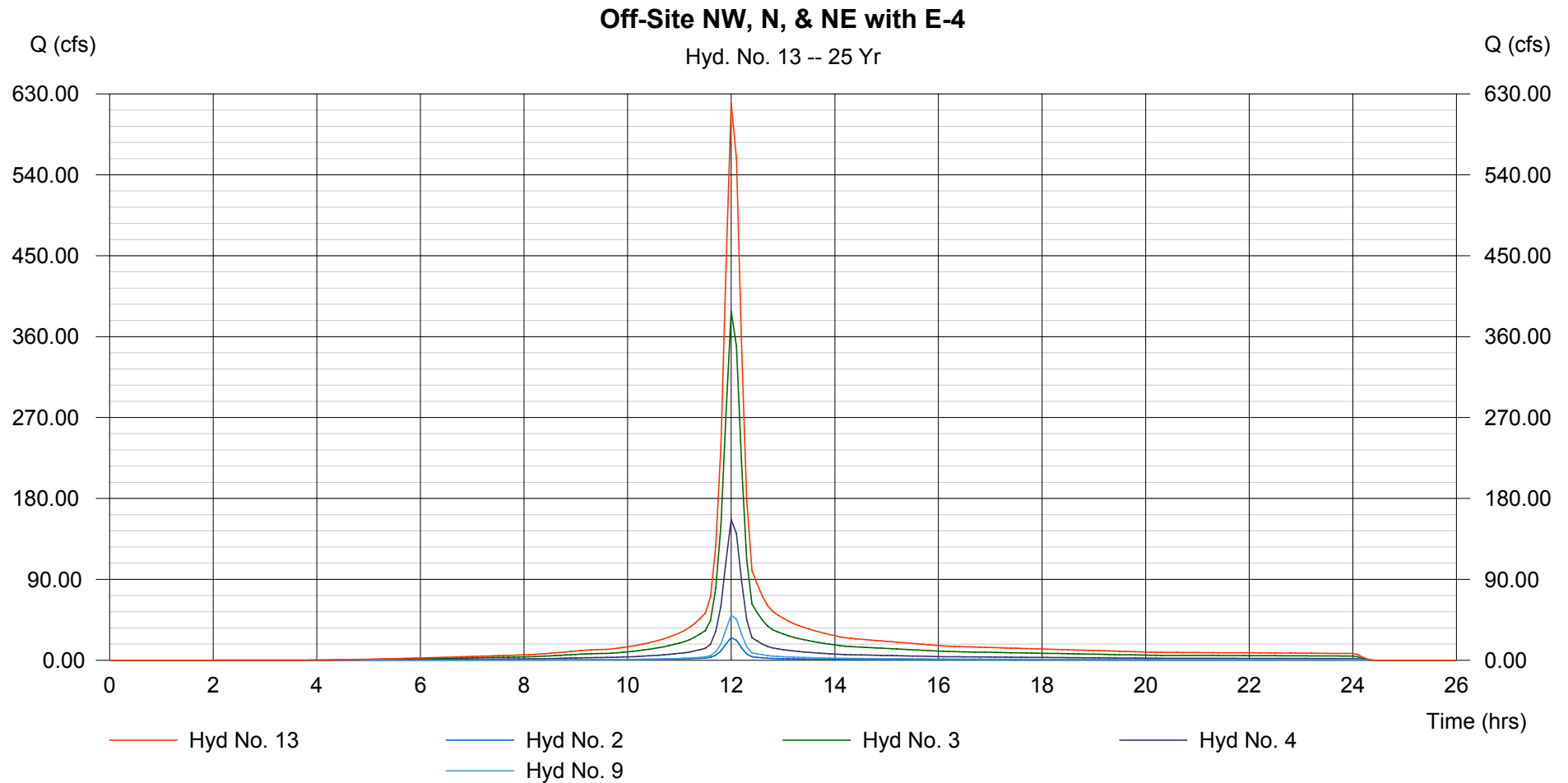
## Hyd. No. 13

Off-Site NW, N, & NE with E-4

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 2, 3, 4, 9

Peak discharge = 619.55 cfs  
Time interval = 6 min

Hydrograph Volume = 44.602 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

## Hyd. No. 14

East Channel in E-4

Hydrograph type = Reach  
Storm frequency = 25 yrs  
Inflow hyd. No. = 13  
Reach length = 1384.8 ft  
Manning's n = 0.040  
Side slope = 4.0:1  
Rating curve x = 0.235  
Ave. velocity = 2.43 ft/s

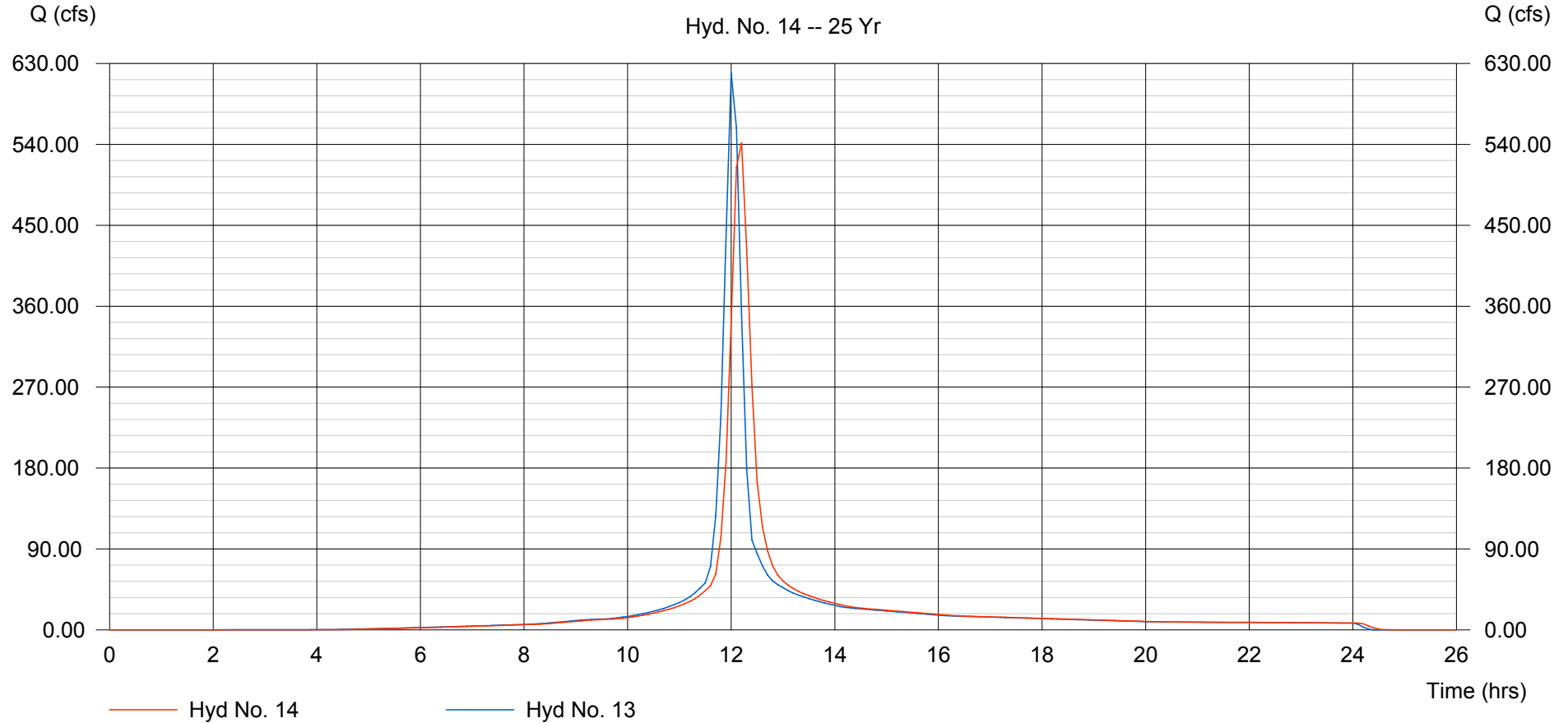
Peak discharge = 541.72 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.422  
Routing coeff. = 0.6202

Modified Att-Kin routing method used.

Hydrograph Volume = 44.602 acft

### East Channel in E-4

Hyd. No. 14 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

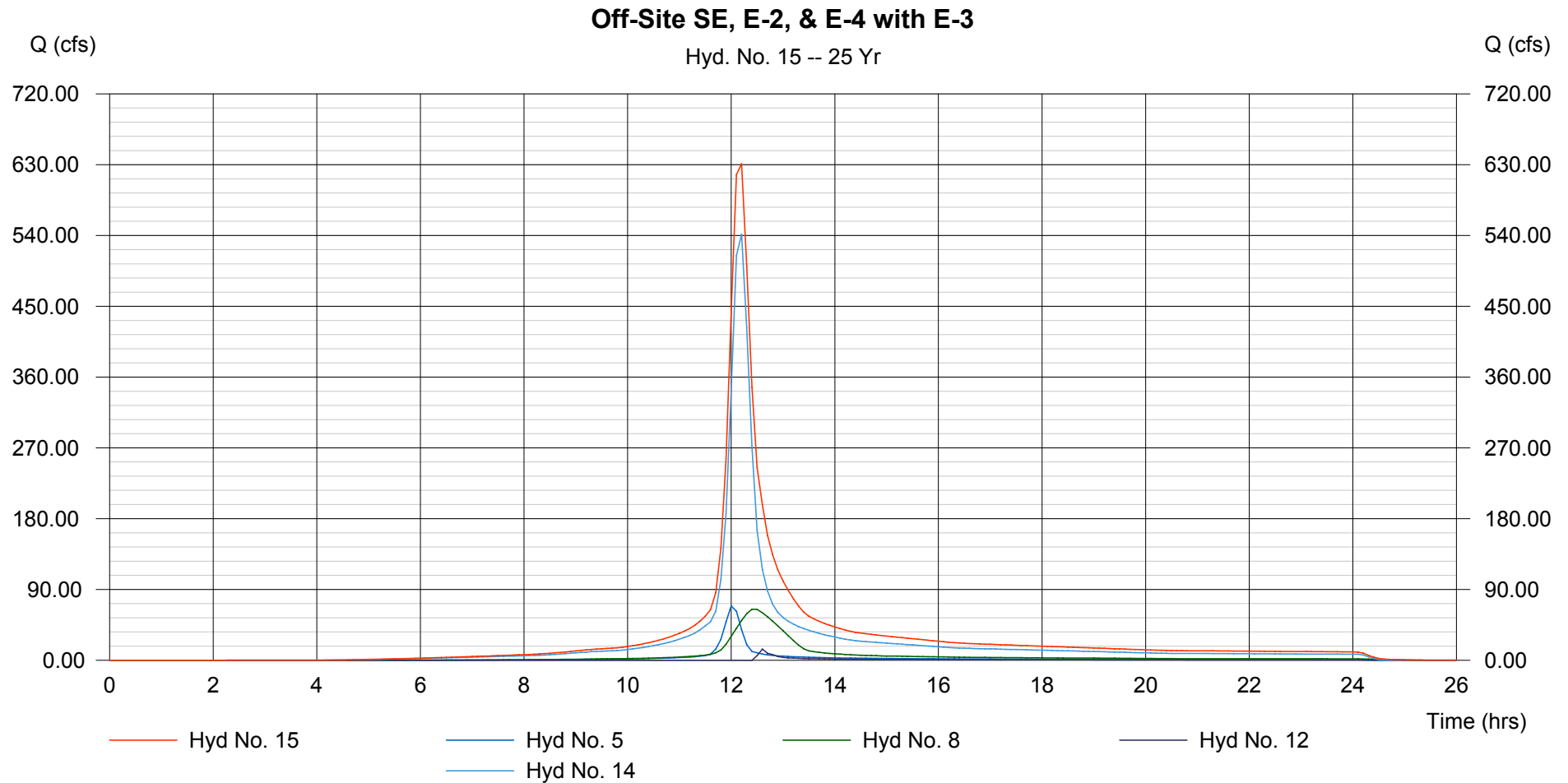
## Hyd. No. 15

Off-Site SE, E-2, & E-4 with E-3

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 5, 8, 12, 14

Peak discharge = 631.27 cfs  
Time interval = 6 min

Hydrograph Volume = 60.450 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

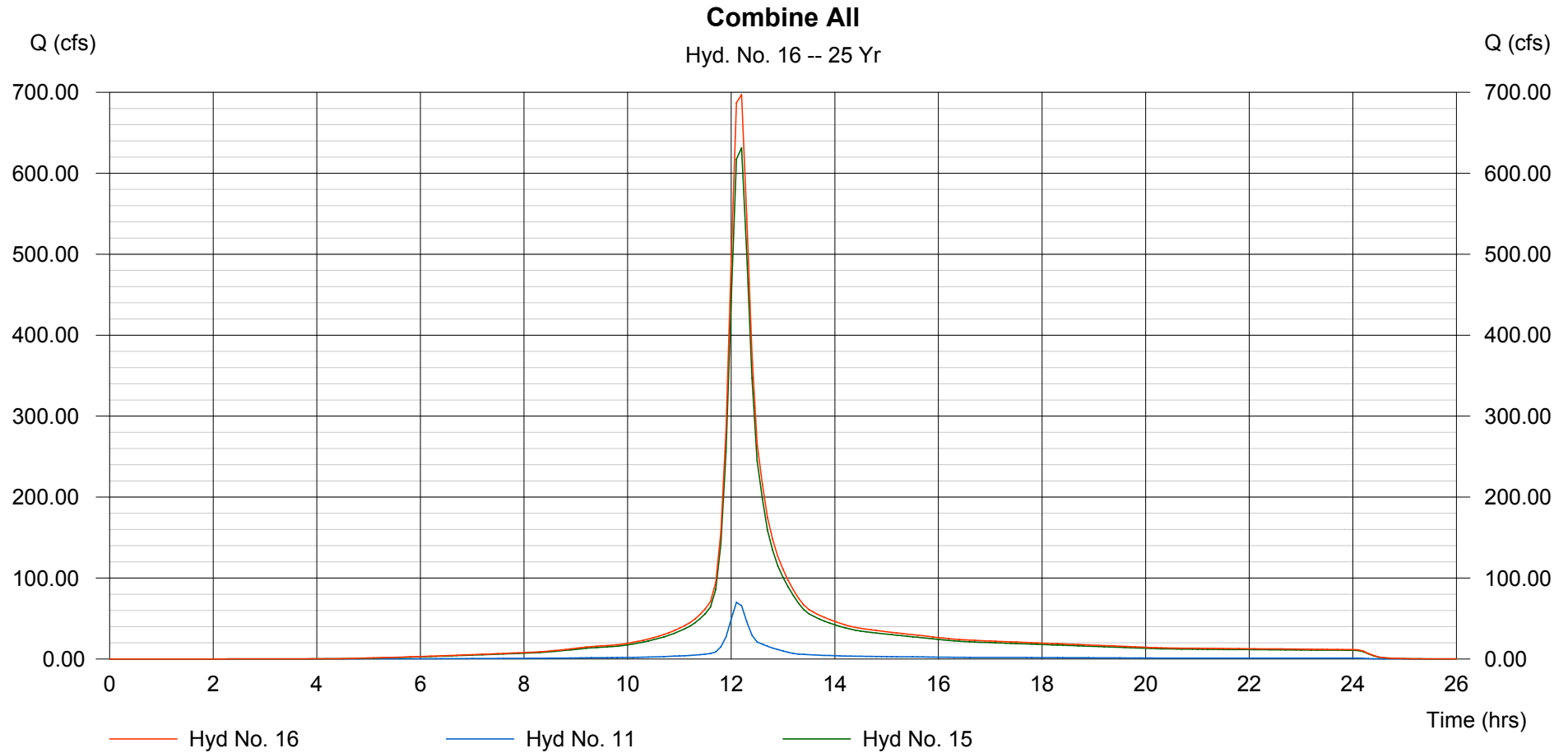
## Hyd. No. 16

Combine All

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 11, 15

Peak discharge = 697.04 cfs  
Time interval = 6 min

Hydrograph Volume = 66.520 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:28 PM

## Hyd. No. 17

Existing Central Channel

Hydrograph type = Reach  
Storm frequency = 25 yrs  
Inflow hyd. No. = 16  
Reach length = 813.4 ft  
Manning's n = 0.040  
Side slope = 50.0:1  
Rating curve x = 0.350  
Ave. velocity = 2.34 ft/s

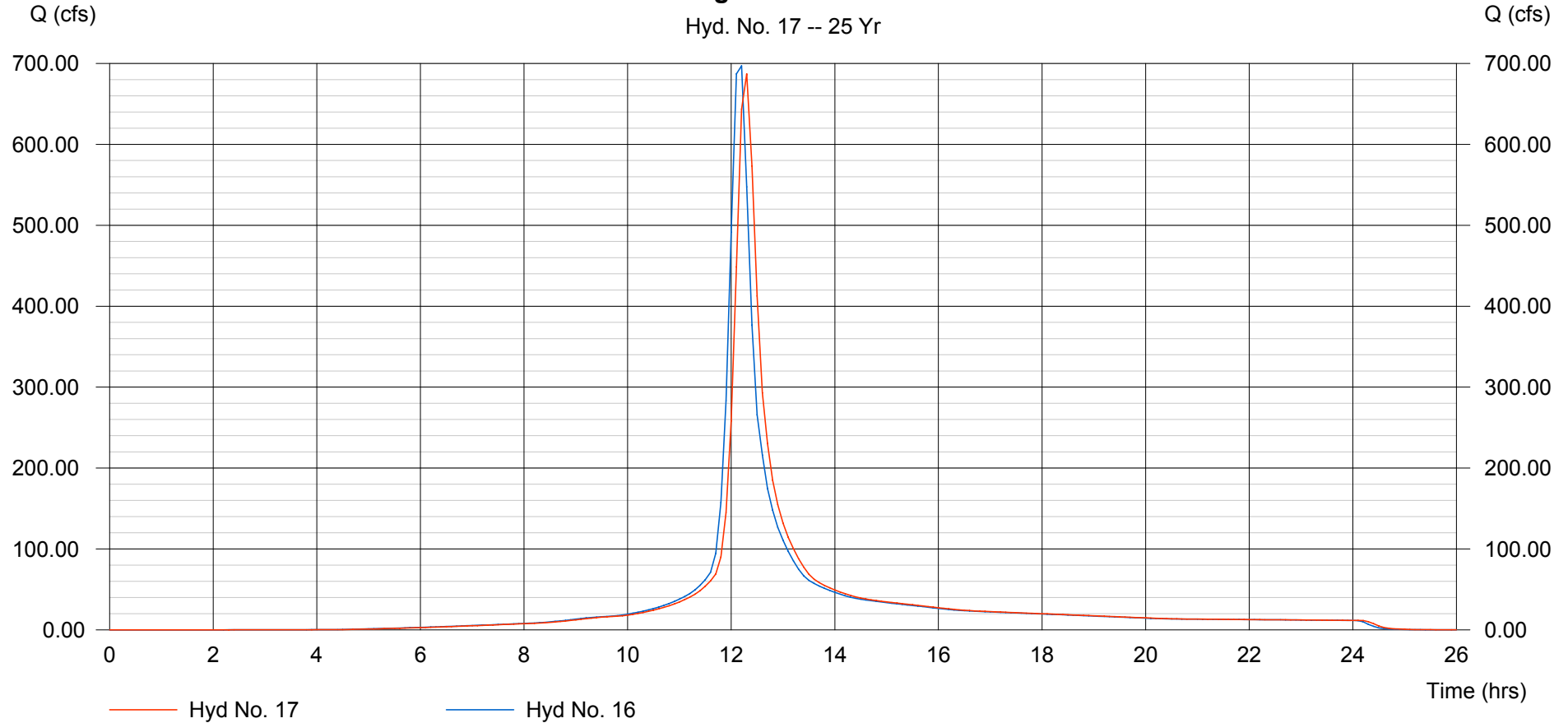
Peak discharge = 687.18 cfs  
Time interval = 6 min  
Section type = Triangular  
Channel slope = 0.3 %  
Bottom width = 0.0 ft  
Max. depth = 0.0 ft  
Rating curve m = 1.333  
Routing coeff. = 0.8163

Modified Att-Kin routing method used.

Hydrograph Volume = 66.510 acft

### Existing Central Channel

Hyd. No. 17 -- 25 Yr



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description	
1	SCS Runoff	81.78	6	720	6.016	---	-----	-----	Off-Site W	
2	SCS Runoff	31.08	6	720	2.397	---	-----	-----	Off-Site NW	
3	SCS Runoff	496.19	6	720	36.081	---	-----	-----	Off-Site N	
4	SCS Runoff	200.13	6	720	14.552	---	-----	-----	Off-Site NE	
5	SCS Runoff	88.28	6	720	6.419	---	-----	-----	Off-Site SE	
6	SCS Runoff	13.99	6	738	1.814	---	-----	-----	E-1	
7	SCS Runoff	24.01	6	732	2.790	---	-----	-----	E-2	
8	SCS Runoff	84.98	6	744	12.779	---	-----	-----	E-3	
9	SCS Runoff	65.59	6	720	4.673	---	-----	-----	E-4	
10	Combine	89.55	6	720	7.831	1, 6,	-----	-----	Off-Site W with E-1 to West Ditch	
11	Reach	89.55	6	726	7.830	10	-----	-----	Existing West Ditch	
12	Reservoir	26.03	6	744	1.831	7	1390.66	1.081	E-2 to Existing Pond	
13	Combine	792.98	6	720	57.703	2, 3, 4, 9,	-----	-----	Off-Site NW, N, & NE with E-4	
14	Reach	698.64	6	732	57.703	13	-----	-----	East Channel in E-4	
15	Combine	814.74	6	732	78.732	5, 8, 12, 14	-----	-----	Off-Site SE, E-2, & E-4 with E-3	
16	Combine	898.46	6	726	86.563	11, 15	-----	-----	Combine All	
17	Reach	891.23	6	738	86.552	16	-----	-----	Existing Central Channel	
Northborough Existing.gpw					Return Period: 100 Year			Friday, Sep 14 2007		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

## Hyd. No. 1

Off-Site W

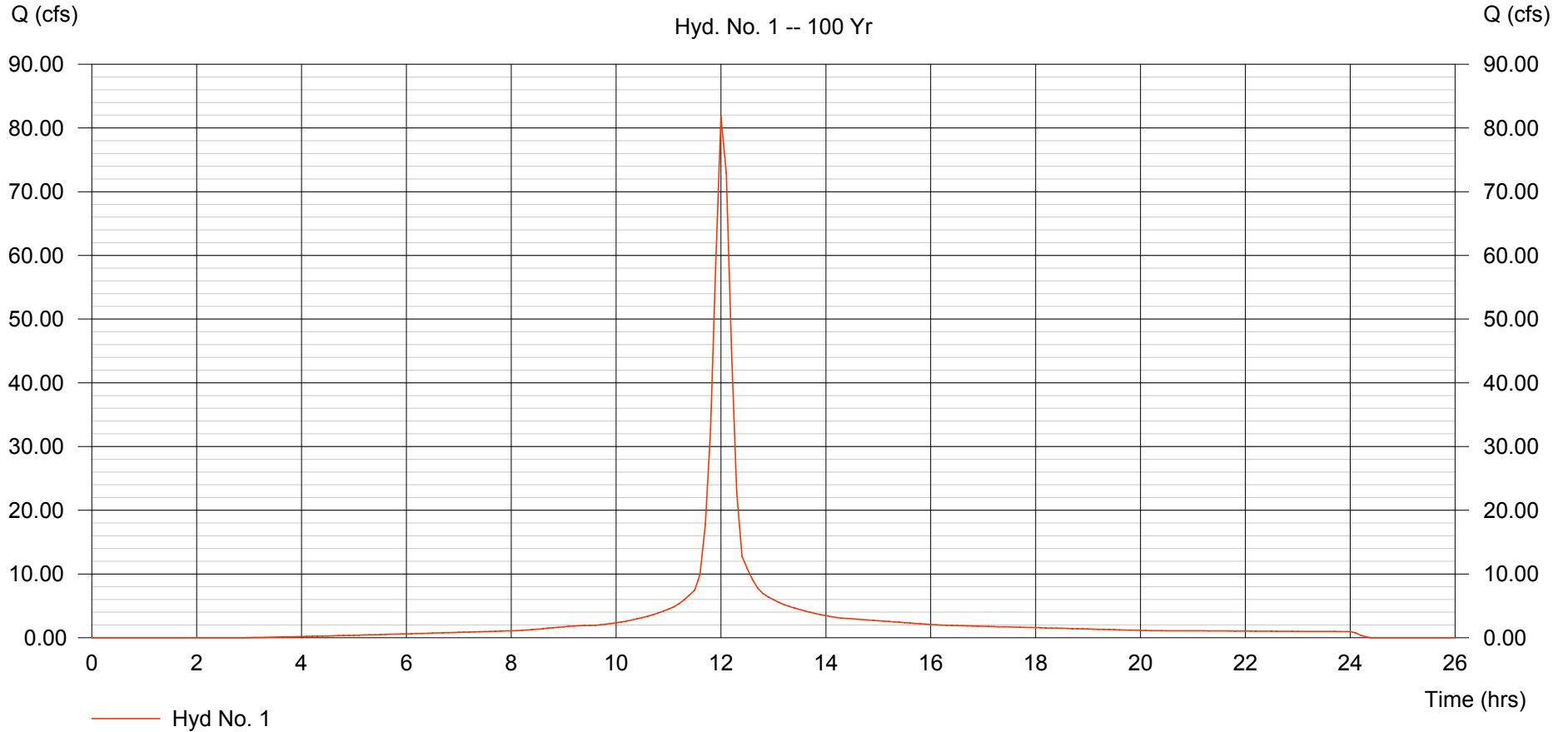
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 12.061 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 81.78 cfs  
Time interval = 6 min  
Curve number = 89.1  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 6.016 acft

### Off-Site W

Hyd. No. 1 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

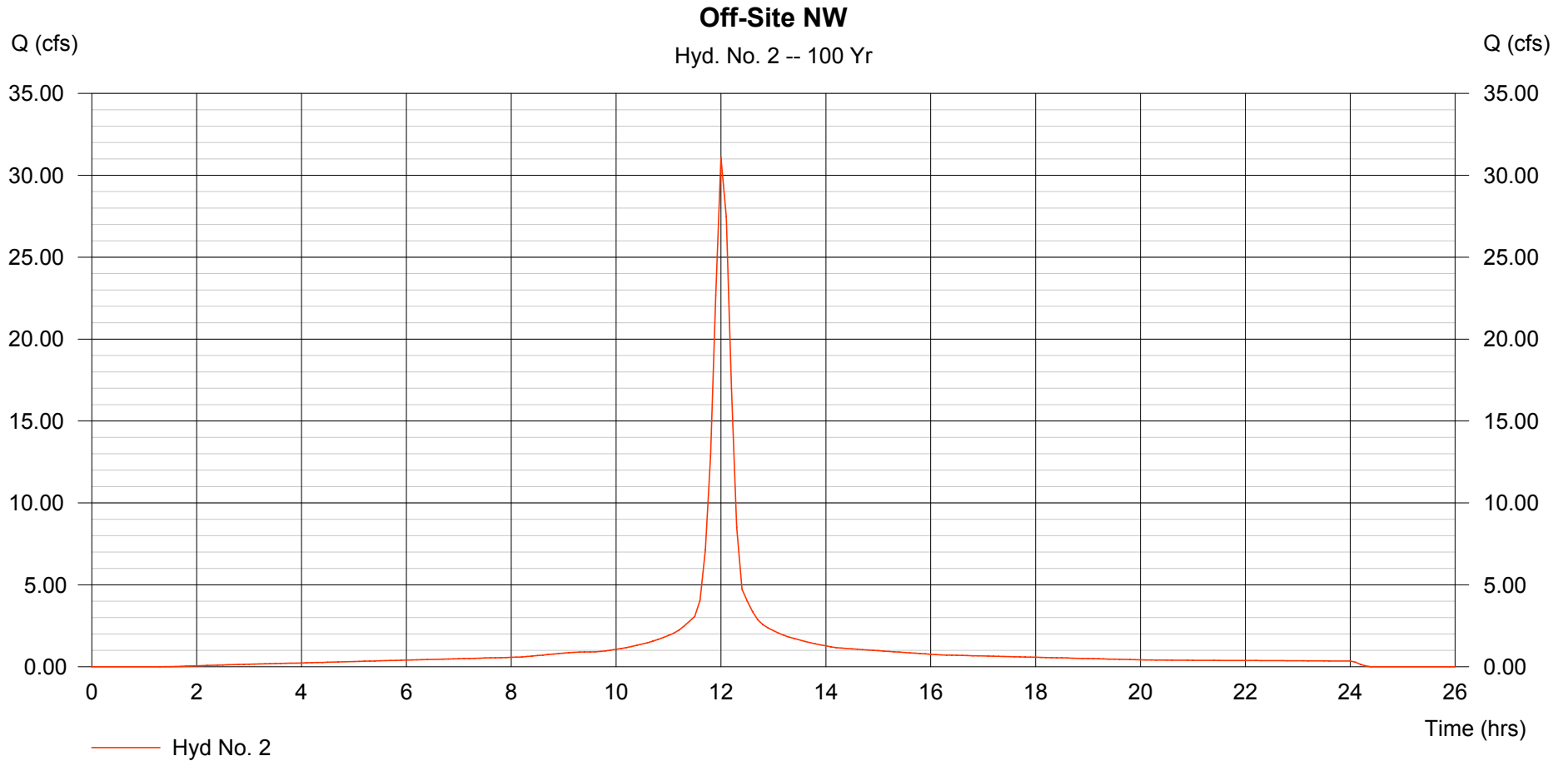
## Hyd. No. 2

Off-Site NW

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 4.332 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 31.08 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.397 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

## Hyd. No. 3

Off-Site N

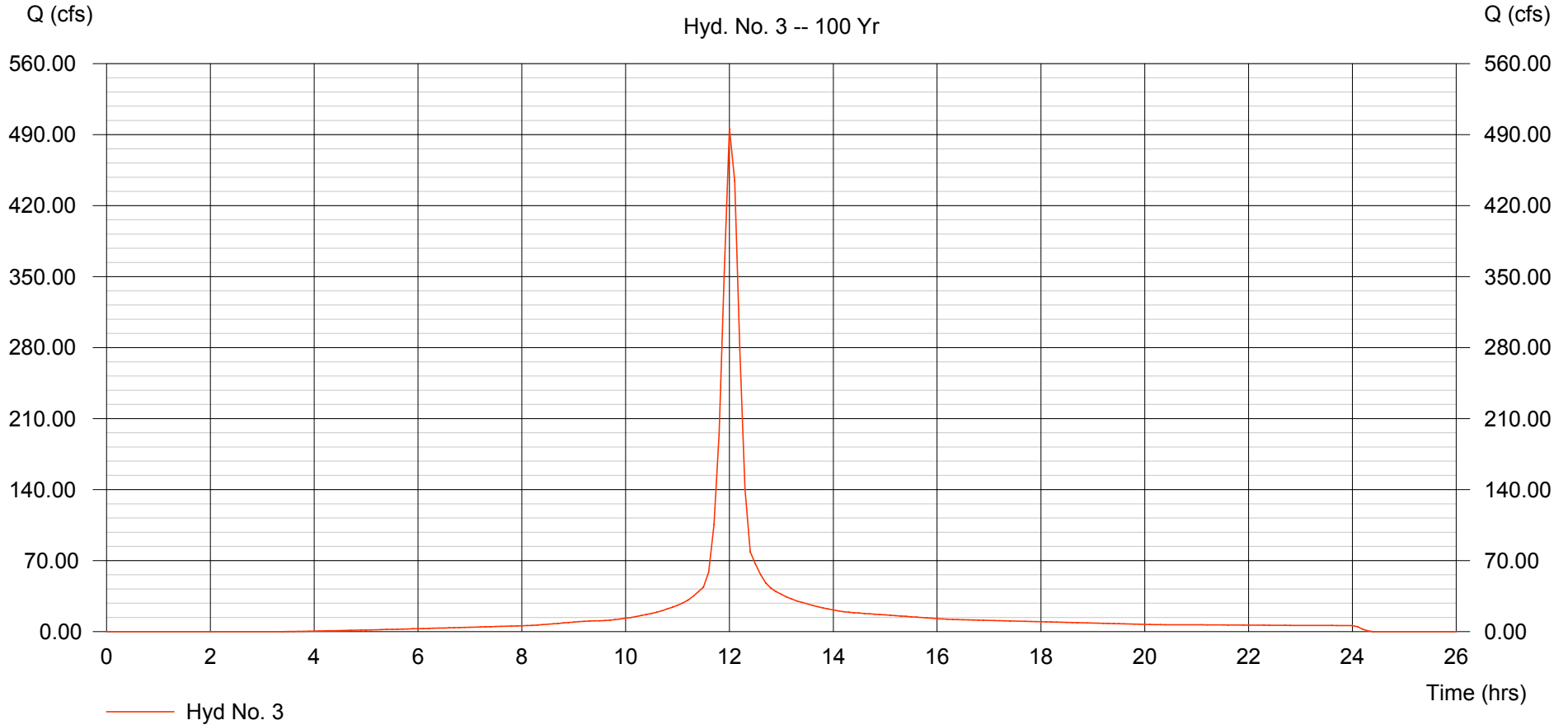
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 496.19 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 36.081 acft

### Off-Site N

Hyd. No. 3 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

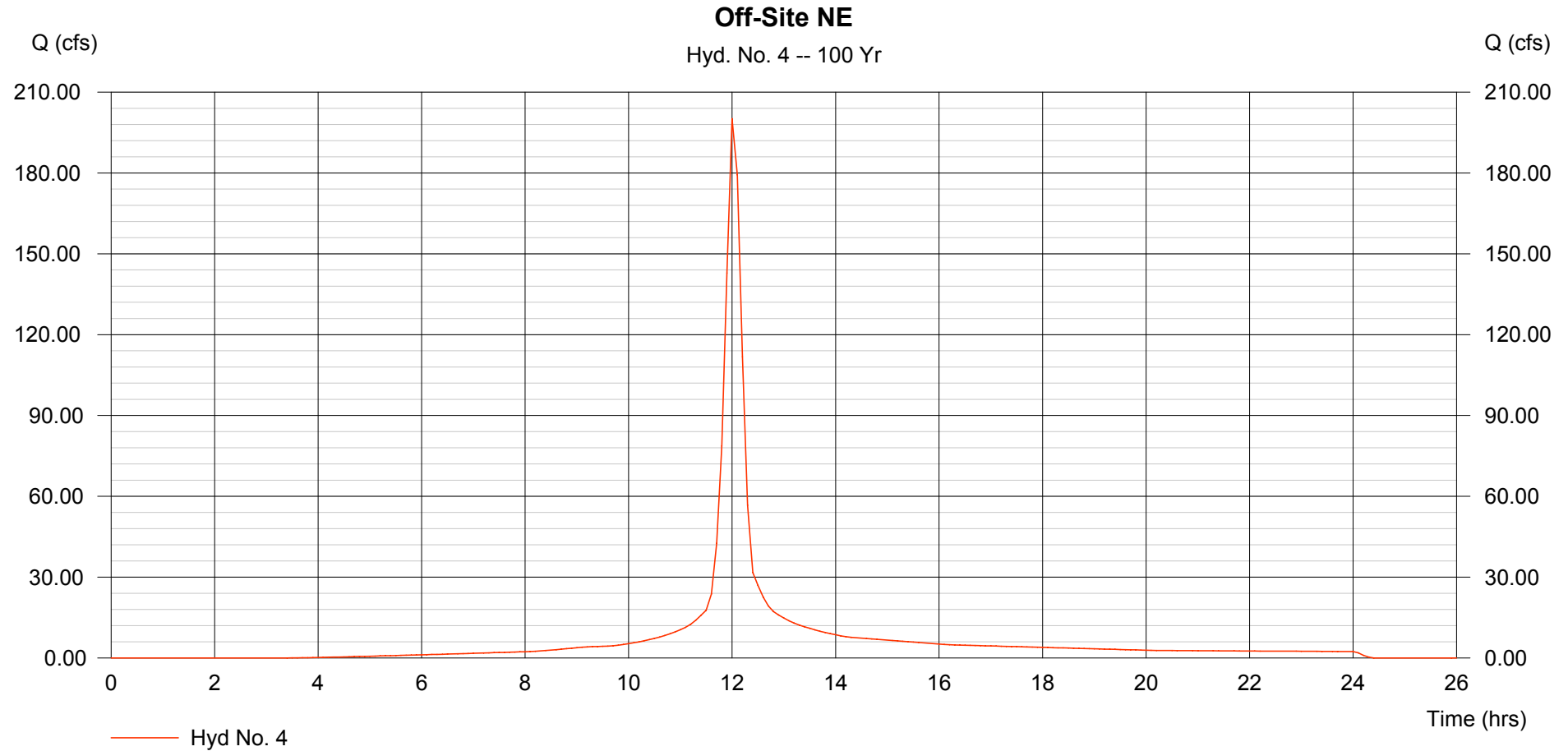
## Hyd. No. 4

Off-Site NE

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 200.13 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 14.552 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

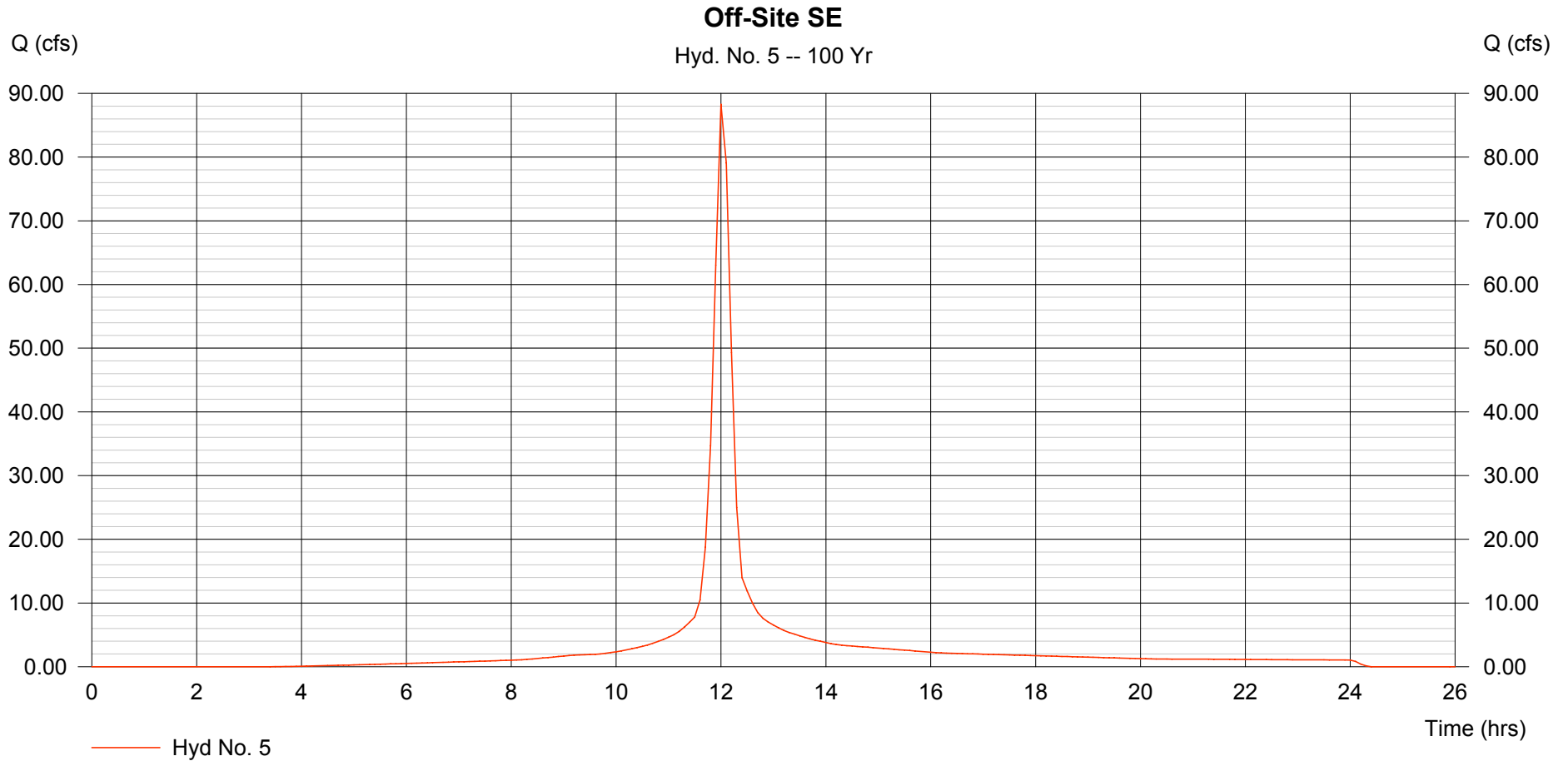
## Hyd. No. 5

Off-Site SE

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 88.28 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 6.419 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

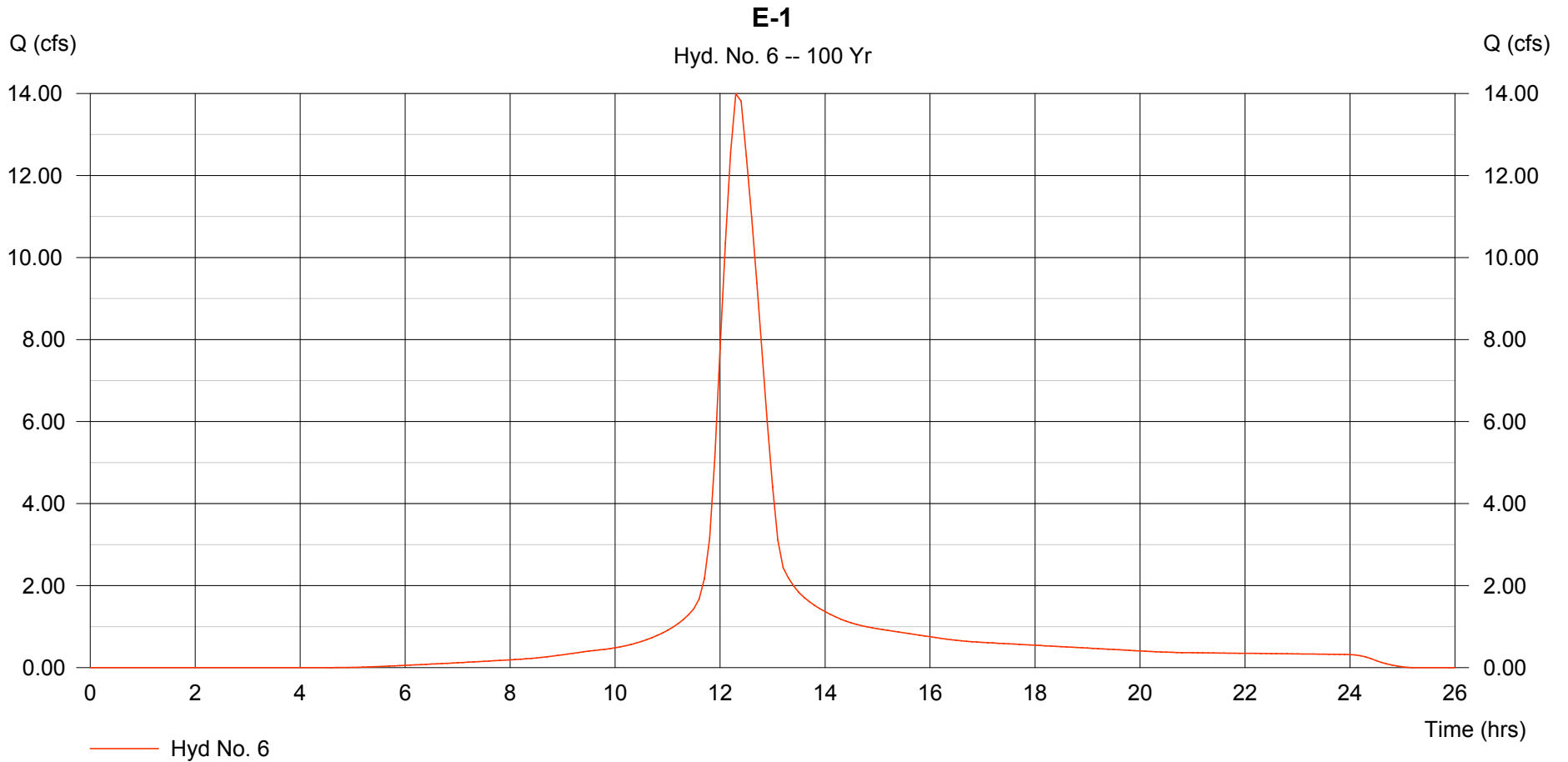
## Hyd. No. 6

E-1

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 3.961 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 13.99 cfs  
Time interval = 6 min  
Curve number = 82.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 42.40 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.814 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

## Hyd. No. 7

E-2

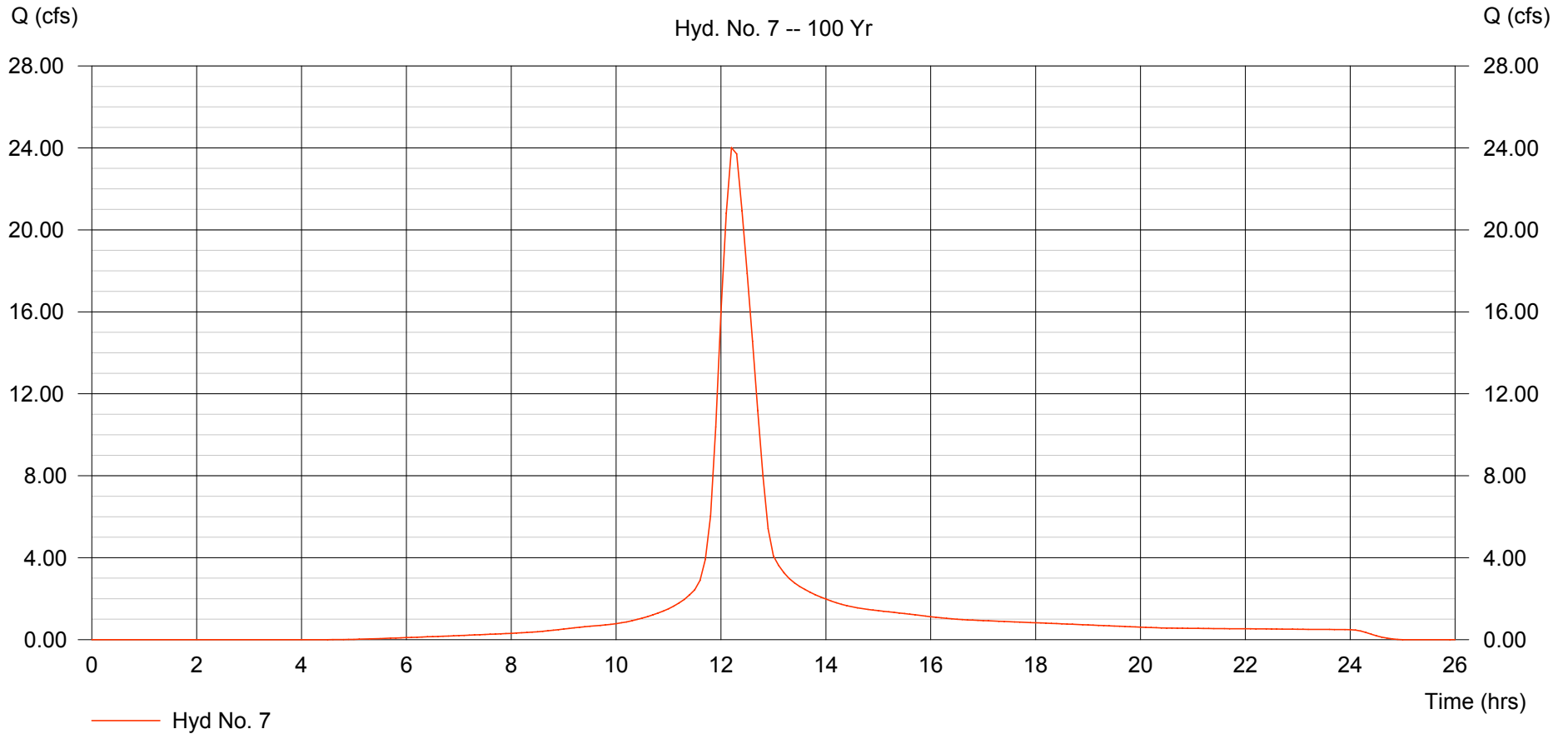
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 5.723 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 24.01 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 37.90 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.790 acft

### E-2

Hyd. No. 7 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

## Hyd. No. 8

E-3

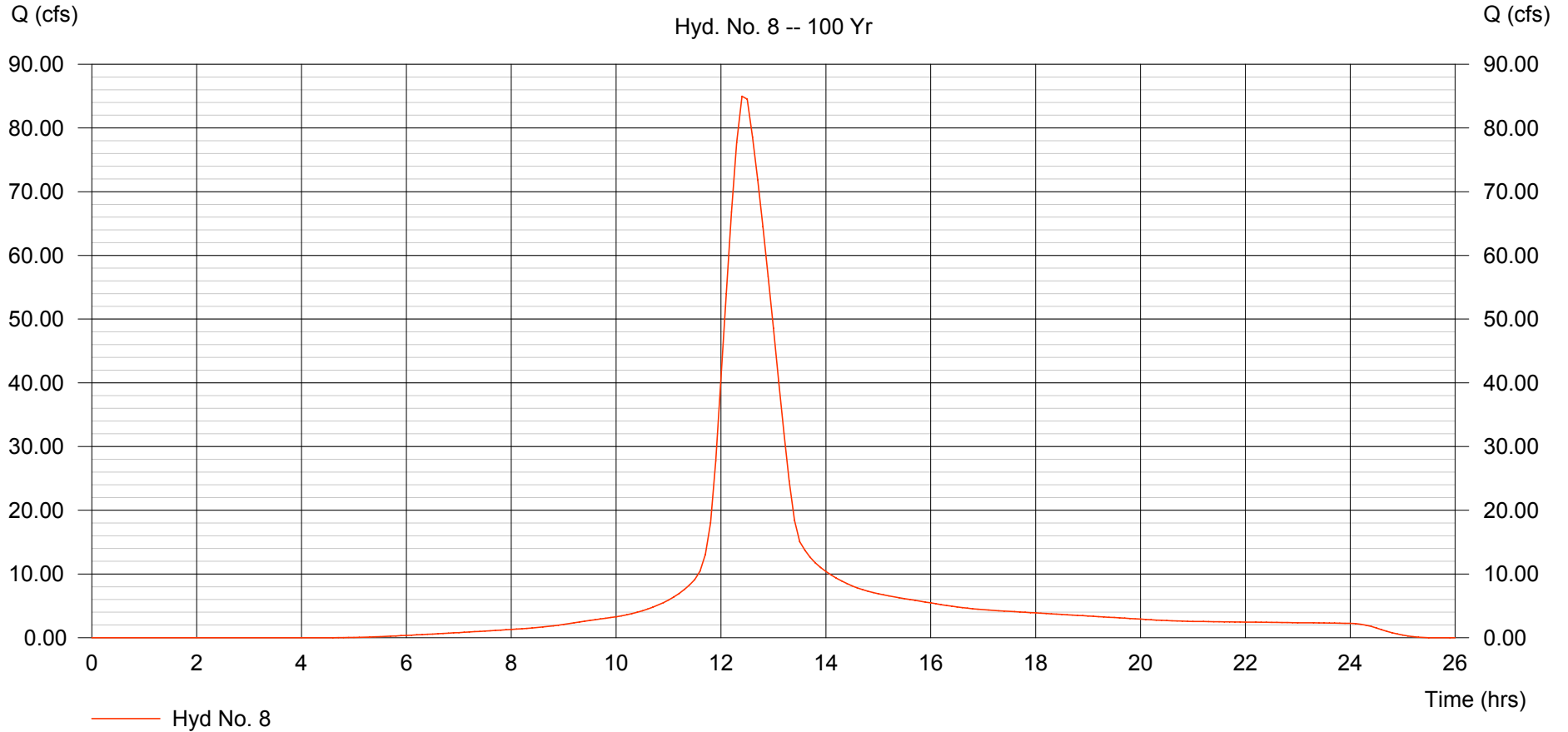
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 27.034 ac  
Basin Slope = 0.0 %  
Tc method = TR55  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 84.98 cfs  
Time interval = 6 min  
Curve number = 83  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 60.30 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 12.779 acft

### E-3

Hyd. No. 8 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

## Hyd. No. 9

E-4

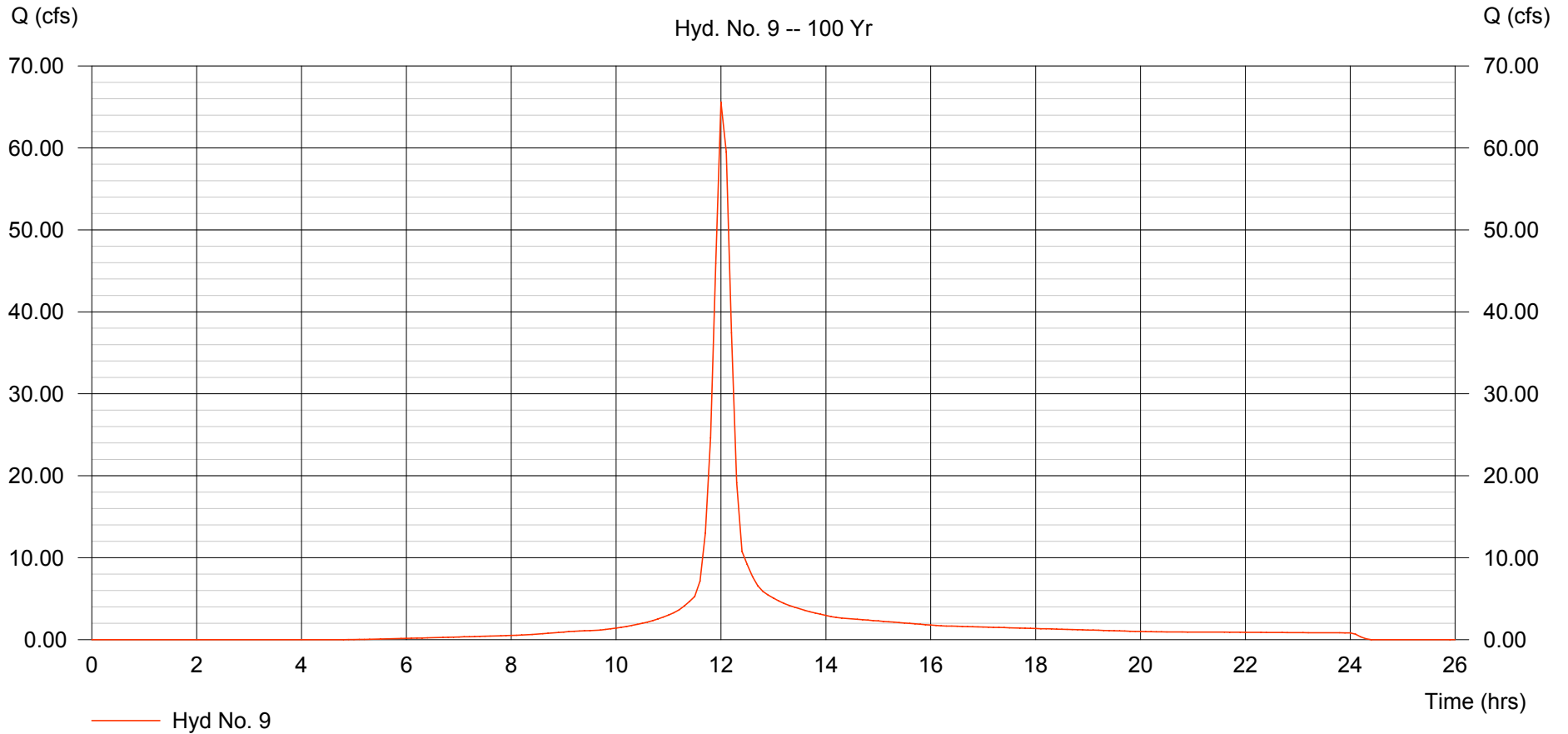
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 10.854 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 65.59 cfs  
Time interval = 6 min  
Curve number = 81.6  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4.673 acft

### E-4

Hyd. No. 9 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:29 PM

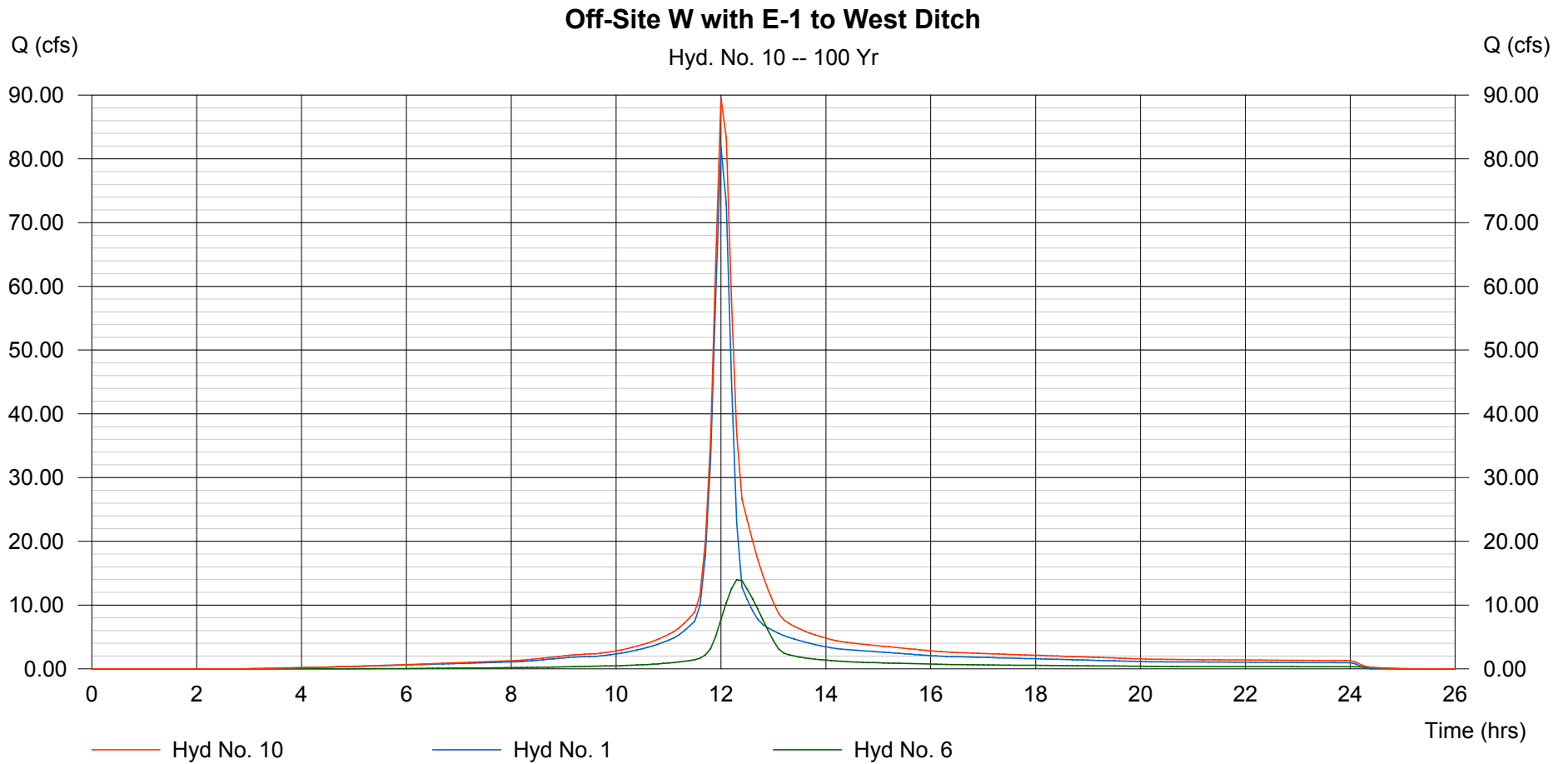
## Hyd. No. 10

Off-Site W with E-1 to West Ditch

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 1, 6

Peak discharge = 89.55 cfs  
Time interval = 6 min

Hydrograph Volume = 7.831 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:30 PM

## Hyd. No. 11

Exisitng West Ditch

Hydrograph type = Reach  
Storm frequency = 100 yrs  
Inflow hyd. No. = 10  
Reach length = 450.0 ft  
Manning's n = 0.045  
Side slope = 6.0:1  
Rating curve x = 0.743  
Ave. velocity = 1.99 ft/s

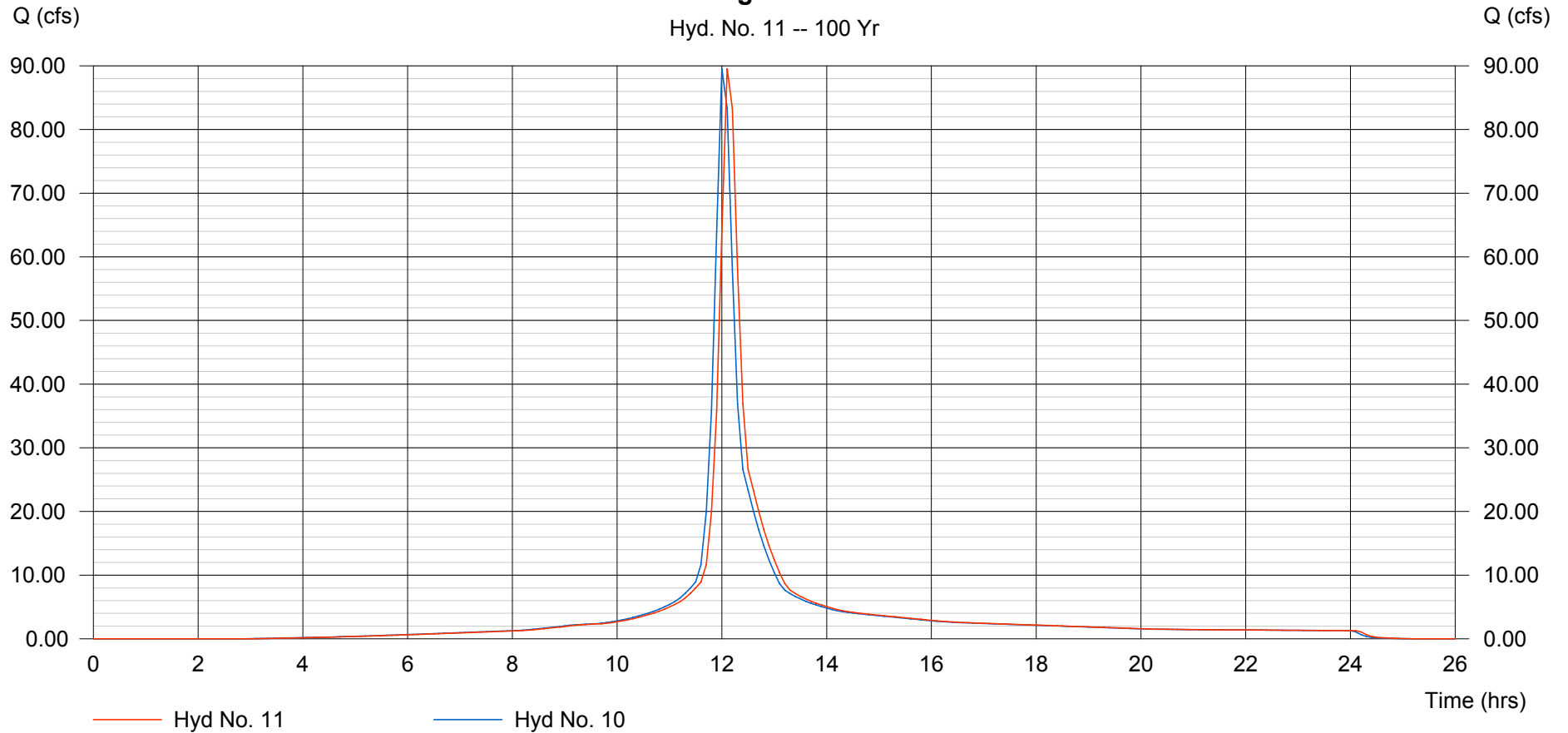
Peak discharge = 89.55 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.4 %  
Bottom width = 5.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.258  
Routing coeff. = 1.0000

Modified Att-Kin routing method used.

Hydrograph Volume = 7.830 acft

### Exisitng West Ditch

Hyd. No. 11 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:30 PM

## Hyd. No. 12

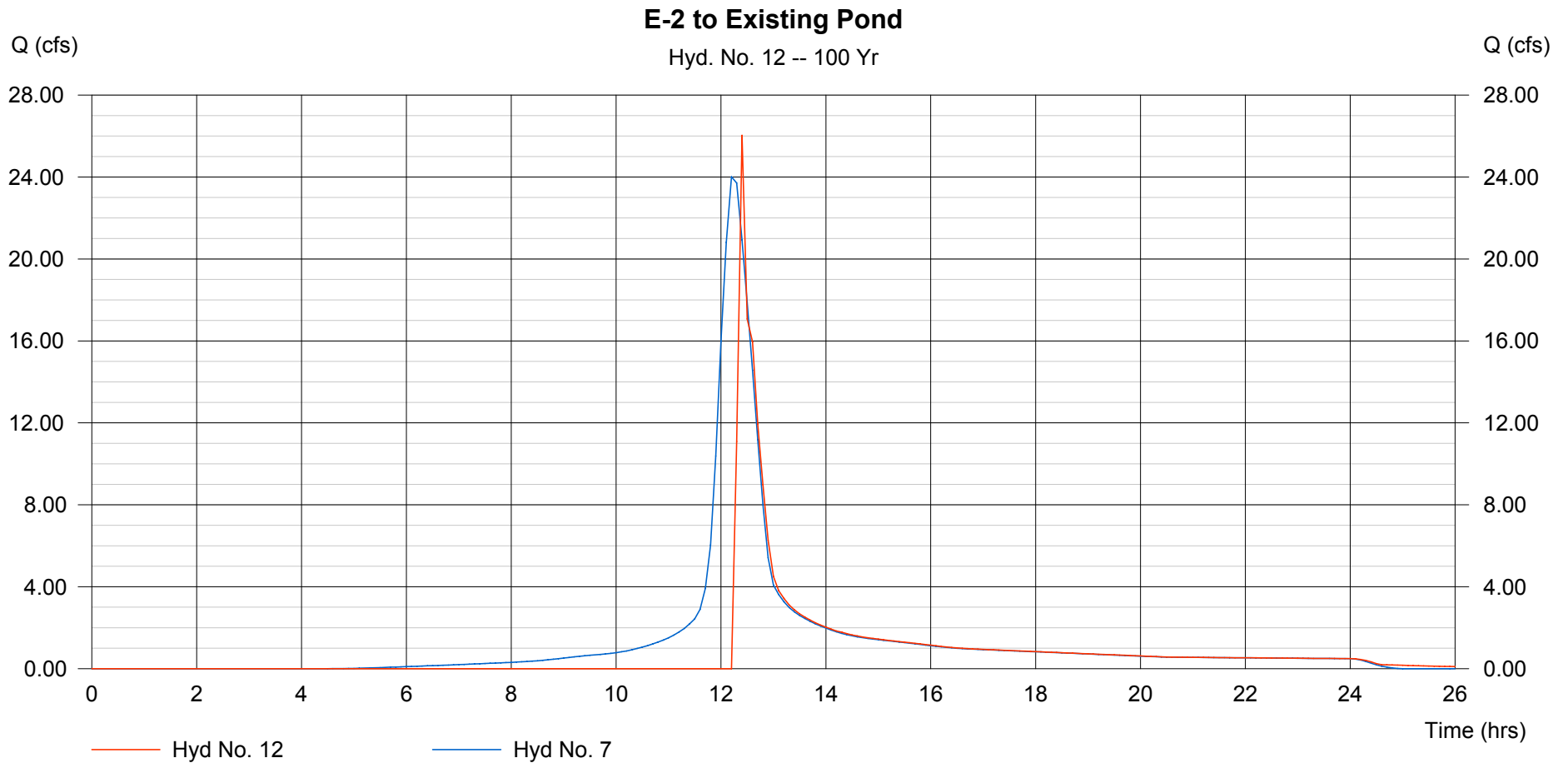
E-2 to Existing Pond

Hydrograph type = Reservoir  
Storm frequency = 100 yrs  
Inflow hyd. No. = 7  
Reservoir name = Existing Pond

Peak discharge = 26.03 cfs  
Time interval = 6 min  
Max. Elevation = 1390.66 ft  
Max. Storage = 1.081 acft

Storage Indication method used.

Hydrograph Volume = 1.831 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:30 PM

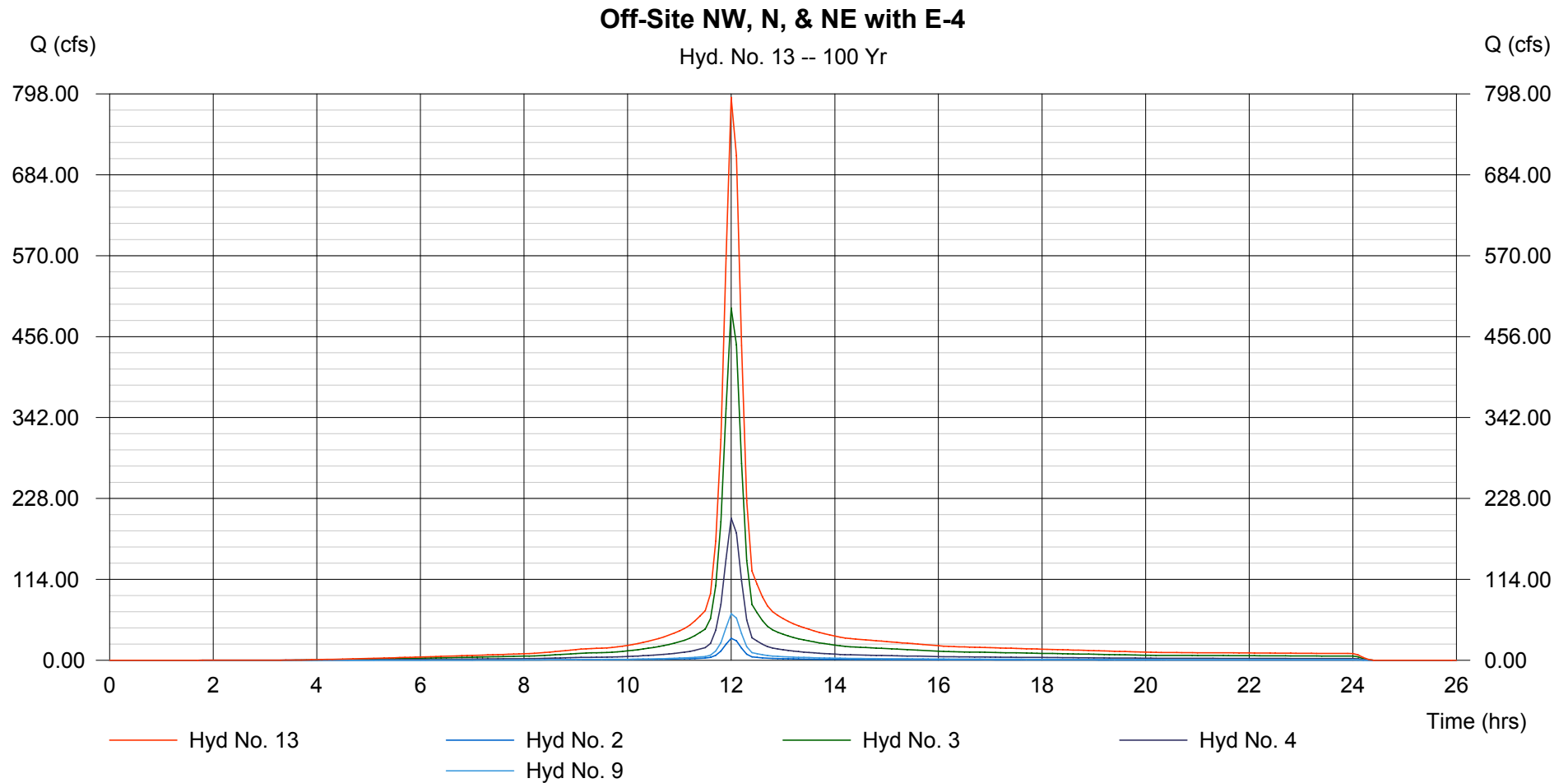
## Hyd. No. 13

Off-Site NW, N, & NE with E-4

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 2, 3, 4, 9

Peak discharge = 792.98 cfs  
Time interval = 6 min

Hydrograph Volume = 57.703 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:30 PM

## Hyd. No. 14

East Channel in E-4

Hydrograph type = Reach  
Storm frequency = 100 yrs  
Inflow hyd. No. = 13  
Reach length = 1384.8 ft  
Manning's n = 0.040  
Side slope = 4.0:1  
Rating curve x = 0.235  
Ave. velocity = 2.62 ft/s

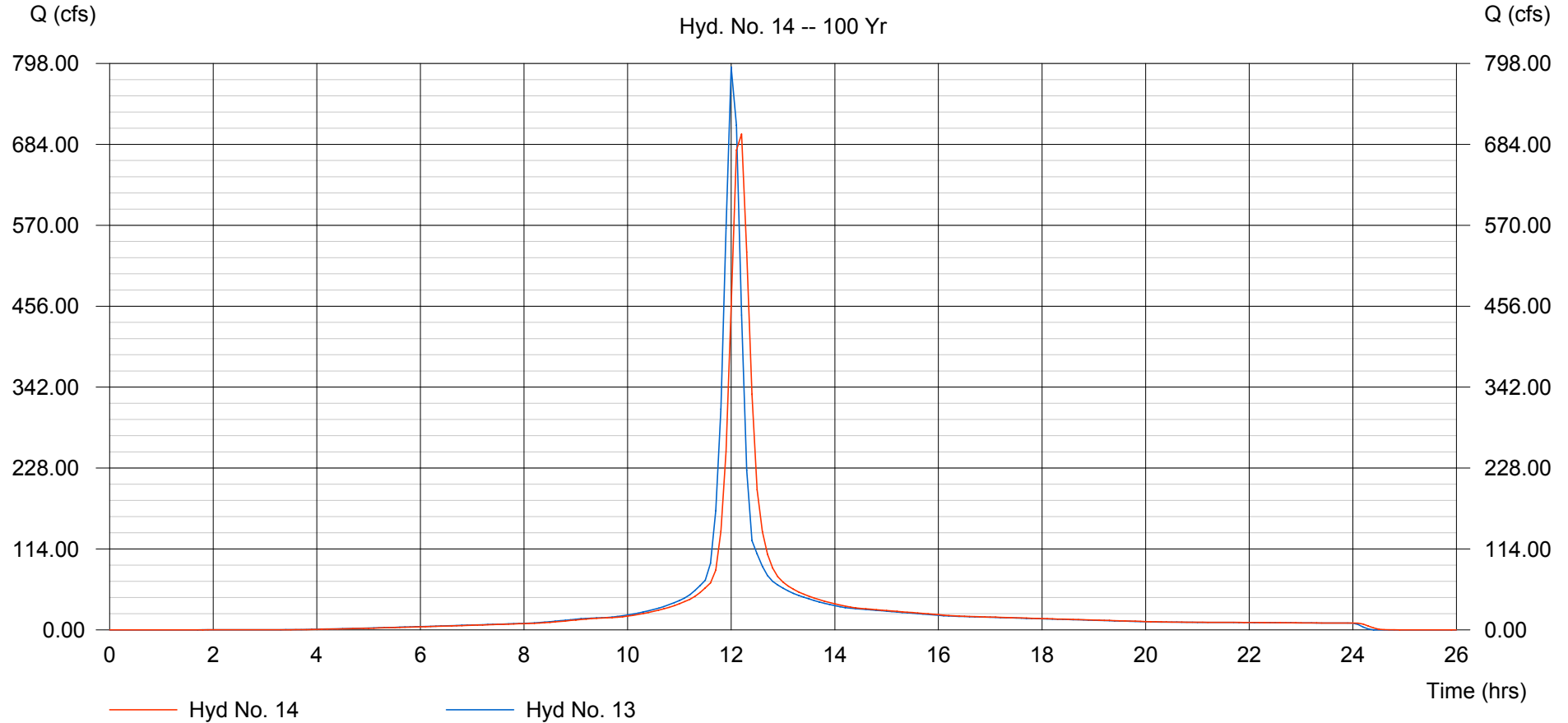
Peak discharge = 698.64 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 3.0 ft  
Rating curve m = 1.422  
Routing coeff. = 0.6520

Modified Att-Kin routing method used.

Hydrograph Volume = 57.703 acft

### East Channel in E-4

Hyd. No. 14 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:30 PM

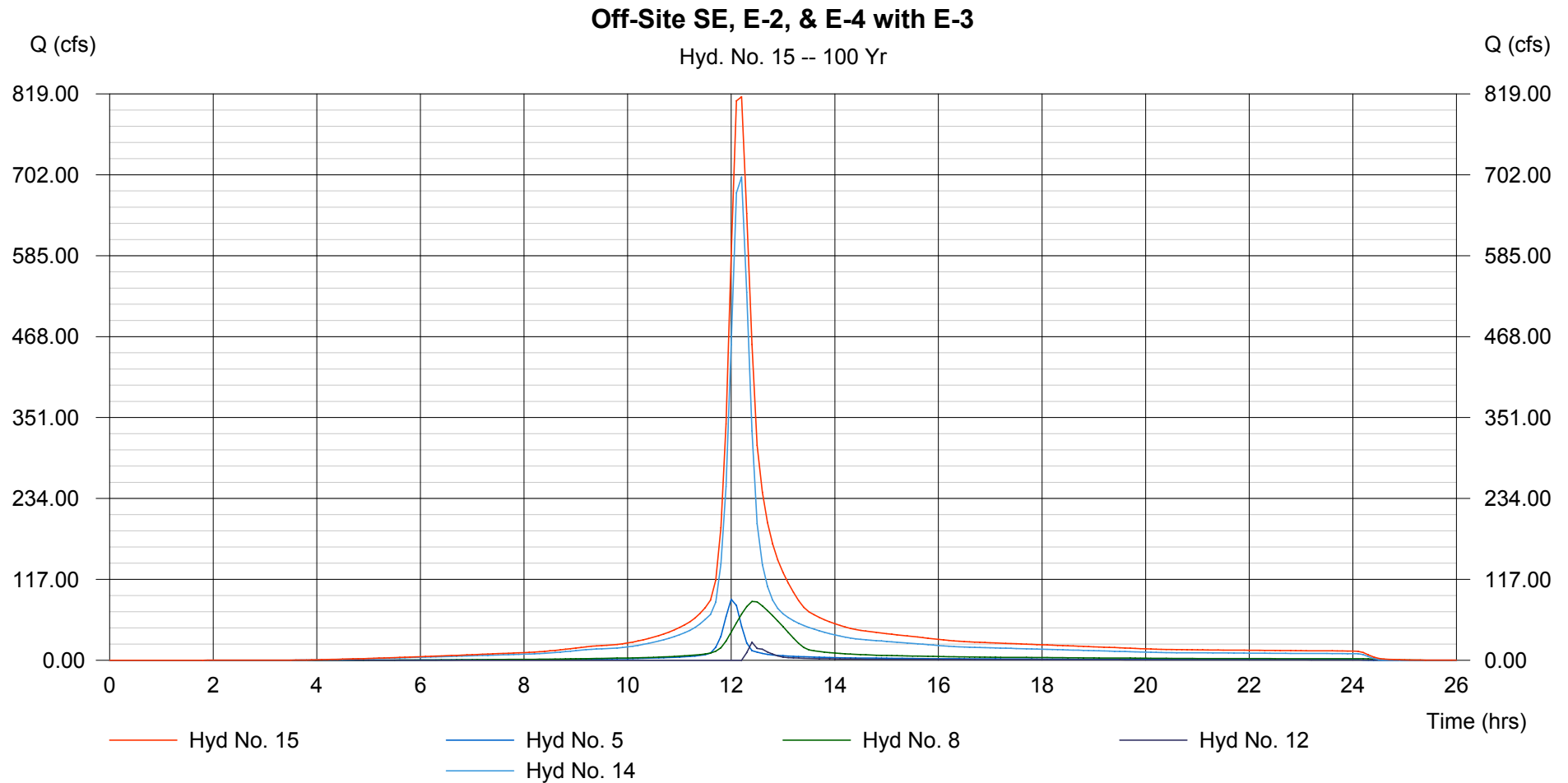
## Hyd. No. 15

Off-Site SE, E-2, & E-4 with E-3

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 5, 8, 12, 14

Peak discharge = 814.74 cfs  
Time interval = 6 min

Hydrograph Volume = 78.732 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:30 PM

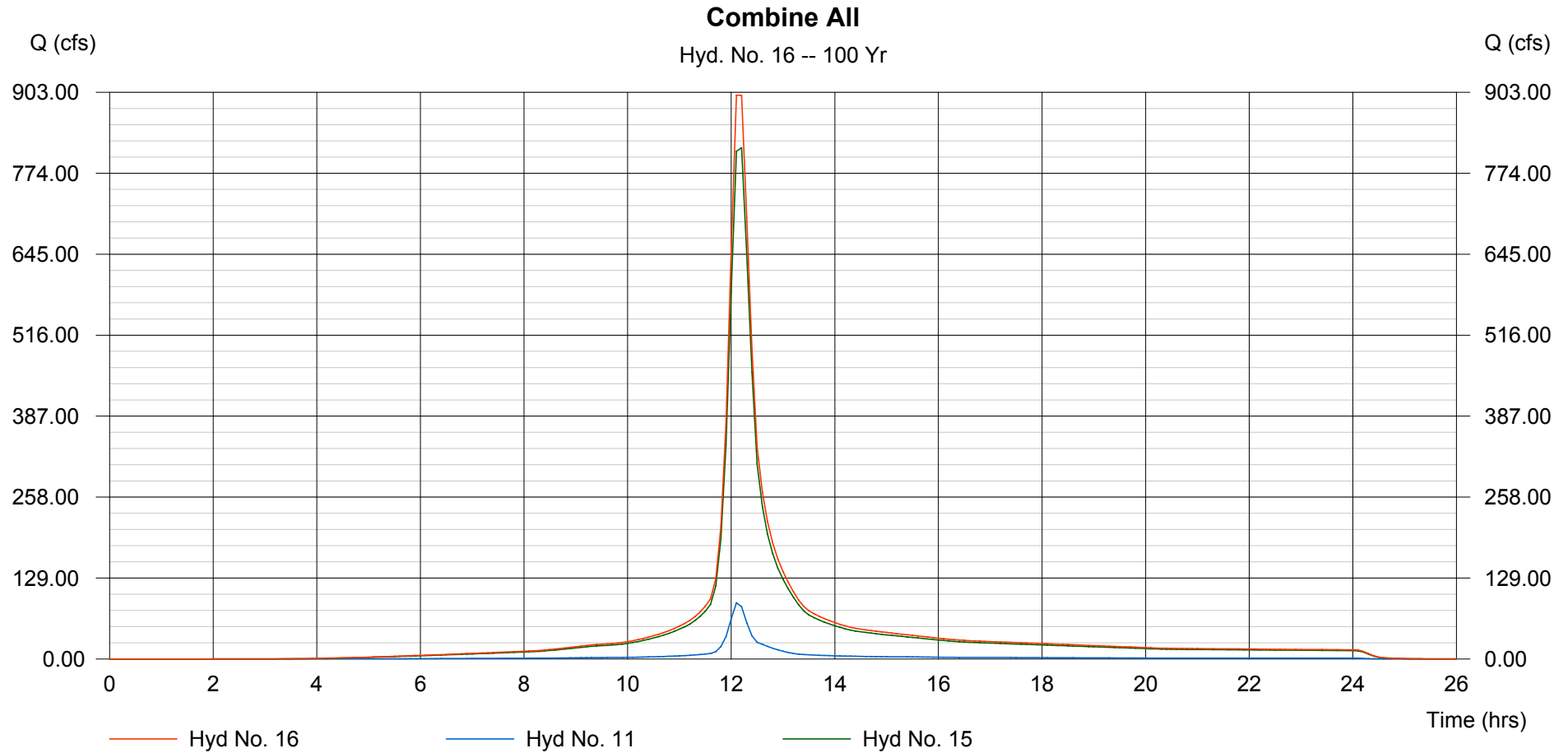
## Hyd. No. 16

Combine All

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 11, 15

Peak discharge = 898.46 cfs  
Time interval = 6 min

Hydrograph Volume = 86.563 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Friday, Sep 14 2007, 1:30 PM

## Hyd. No. 17

Existing Central Channel

Hydrograph type = Reach  
Storm frequency = 100 yrs  
Inflow hyd. No. = 16  
Reach length = 813.4 ft  
Manning's n = 0.040  
Side slope = 50.0:1  
Rating curve x = 0.350  
Ave. velocity = 2.49 ft/s

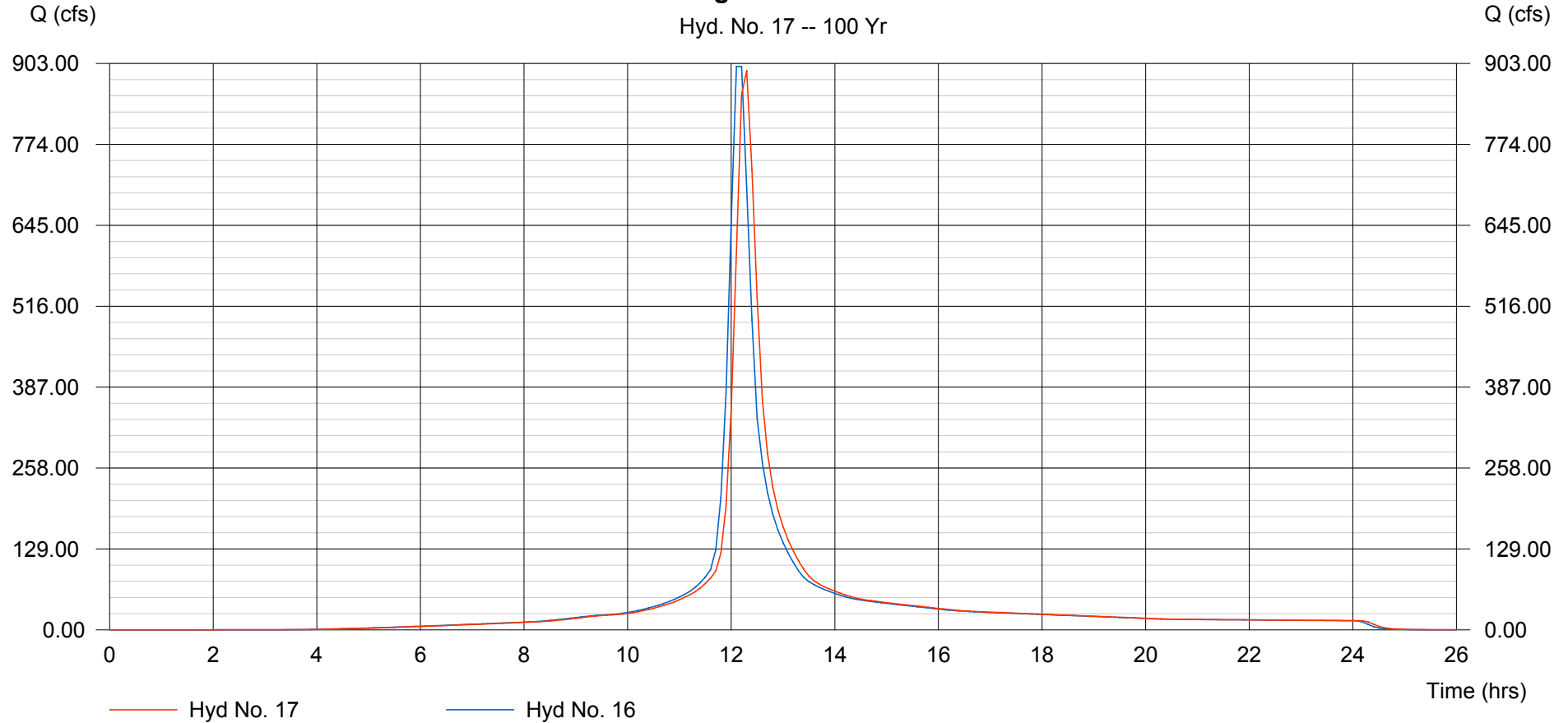
Peak discharge = 891.23 cfs  
Time interval = 6 min  
Section type = Triangular  
Channel slope = 0.3 %  
Bottom width = 0.0 ft  
Max. depth = 0.0 ft  
Rating curve m = 1.333  
Routing coeff. = 0.8471

Modified Att-Kin routing method used.

Hydrograph Volume = 86.552 acft

### Existing Central Channel

Hyd. No. 17 -- 100 Yr



# Pond Report

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:3 PM

## Pond No. 1 - Existing Pond

### Pond Data

Bottom LxW = 82.0 x 75.0 ft      Side slope = 3.0:1      Bottom elev. = 1385.40 ft      Depth = 8.00 ft

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1385.40	6,150	0.000	0.000
0.40	1385.80	6,533	0.058	0.058
0.80	1386.20	6,927	0.062	0.120
1.20	1386.60	7,332	0.065	0.185
1.60	1387.00	7,749	0.069	0.255
2.00	1387.40	8,178	0.073	0.328
2.40	1387.80	8,618	0.077	0.405
2.80	1388.20	9,070	0.081	0.486
3.20	1388.60	9,533	0.085	0.572
3.60	1389.00	10,008	0.090	0.661
4.00	1389.40	10,494	0.094	0.755
4.40	1389.80	10,992	0.099	0.854
4.80	1390.20	11,501	0.103	0.957
5.20	1390.60	12,022	0.108	1.065
5.60	1391.00	12,554	0.113	1.178
6.00	1391.40	13,098	0.118	1.296
6.40	1391.80	13,653	0.123	1.419
6.80	1392.20	14,220	0.128	1.547
7.20	1392.60	14,799	0.133	1.680
7.60	1393.00	15,389	0.139	1.818
8.00	1393.40	15,990	0.144	1.963

### Culvert / Orifice Structures

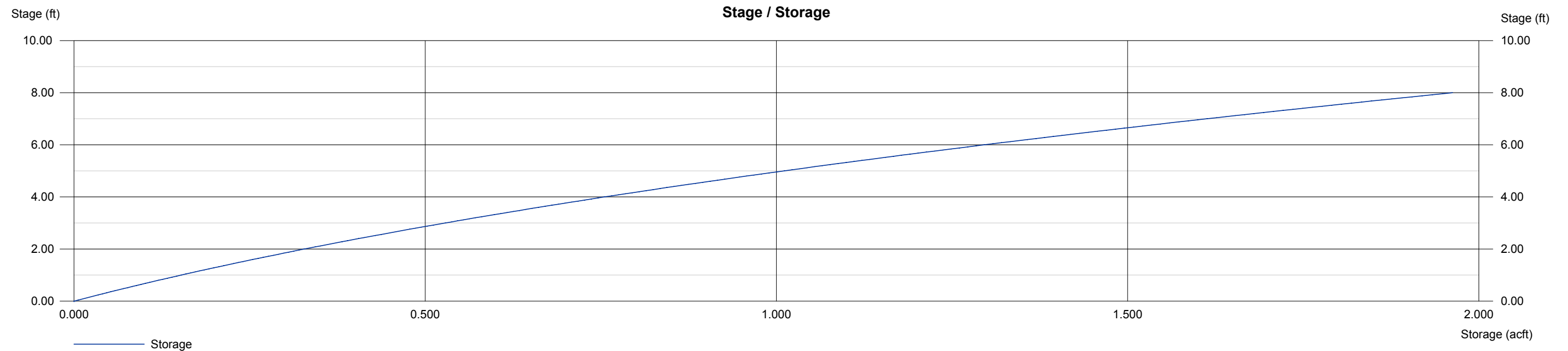
	[A]	[B]	[C]	[D]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1390.20	0.00	0.00	0.00
Length (ft)	= 30.72	0.00	0.00	0.00
Slope (%)	= 1.30	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 75.00	0.00	0.00	0.00
Crest El. (ft)	= 1390.40	0.00	0.00	0.00
Weir Coeff.	= 2.60	4.40	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Wet area) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



# Pond Report

## Pond No. 1 - Existing Pond

### Pond Data

Bottom LxW = 82.0 x 75.0 ft      Side slope = 3.0:1      Bottom elev. = 1385.40 ft      Depth = 8.00 ft

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1385.40	6,150	0.000	0.000
0.40	1385.80	6,533	0.058	0.058
0.80	1386.20	6,927	0.062	0.120
1.20	1386.60	7,332	0.065	0.185
1.60	1387.00	7,749	0.069	0.255
2.00	1387.40	8,178	0.073	0.328
2.40	1387.80	8,618	0.077	0.405
2.80	1388.20	9,070	0.081	0.486
3.20	1388.60	9,533	0.085	0.572
3.60	1389.00	10,008	0.090	0.661
4.00	1389.40	10,494	0.094	0.755
4.40	1389.80	10,992	0.099	0.854
4.80	1390.20	11,501	0.103	0.957
5.20	1390.60	12,022	0.108	1.065
5.60	1391.00	12,554	0.113	1.178
6.00	1391.40	13,098	0.118	1.296
6.40	1391.80	13,653	0.123	1.419
6.80	1392.20	14,220	0.128	1.547
7.20	1392.60	14,799	0.133	1.680
7.60	1393.00	15,389	0.139	1.818
8.00	1393.40	15,990	0.144	1.963

### Culvert / Orifice Structures

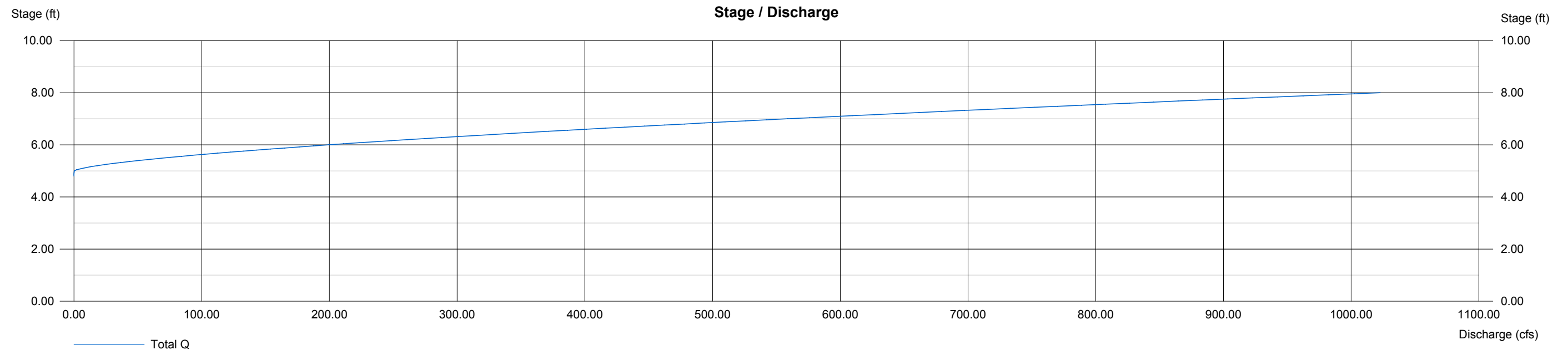
	[A]	[B]	[C]	[D]
Rise (in)	= 15.00	0.00	0.00	0.00
Span (in)	= 15.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1390.20	0.00	0.00	0.00
Length (ft)	= 30.72	0.00	0.00	0.00
Slope (%)	= 1.30	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 75.00	0.00	0.00	0.00
Crest El. (ft)	= 1390.40	0.00	0.00	0.00
Weir Coeff.	= 2.60	4.40	0.00	0.00
Weir Type	= Broad	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Wet area) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control.



### Tab 3. Post-Development Hydrologic Analysis

#### A. Proposed conditions hydrologic and hydraulic analysis

The analysis was completed using the SCS Hydrograph method. The 2, 5, 10, 25, & 100 year, 24-hour storm events were evaluated. The information appears in Exhibit 3-1. The results are summarized in the following table.

Area/Frequency	24-Hour Storm Flows (cfs)				
	2-Year	5-Year	10-Year	25-Year	100-Year
Off-Site W	32.69	44.30	53.00	64.55	81.78
Off-Site NW	13.90	17.98	21.02	25.05	31.08
Off-Site N	189.30	261.36	315.67	388.05	496.19
Off-Site NE	76.35	105.41	127.32	156.51	200.13
Off-Site SE	33.68	46.50	56.16	69.04	88.28
DA-1	10.09	13.34	15.77	18.99	23.78
DA-2	55.61	73.99	87.73	105.98	133.20
DA-3	15.85	20.97	24.78	29.84	37.37
DA-4	3.61	5.02	6.09	7.53	9.69
DA-5	34.83	49.09	59.92	74.42	96.16
DA-6	8.92	11.80	13.94	16.78	21.02
Prop. West Ditch	34.96	47.47	56.94	69.62	88.68
Proposed Pond	0.00	0.00	2.16	6.05	21.23
Prop. Channel	308.38	437.36	535.77	668.05	867.36

#### B. Proposed times of concentration used in calculations

Area	T <sub>c</sub> (min)
Off-Site W	15.0
Off-Site NW	15.0
Off-Site N	15.0
Off-Site NE	15.0
Off-Site SE	15.0
DA-1	15.0
DA-2	15.0
DA-3	15.0
DA-4	15.0
DA-5	15.0
DA-6	15.0
Prop. West Ditch	15.0
Proposed Pond	15.0
Prop. Channel	15.0

### C. Assumed post-developed run-off curve numbers

For the developed condition, the curve numbers were weighted based on area of their respective hydrologic soil groups and land uses over each site. The results are shown in the table below.

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
W1	3911	D	212737	4.884	100.00%	95.0
Total			212737	4.884	100.00%	95.0

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
W2	3911	D	81527	1.872	100.00%	89.0
Total			81527	1.872	100.00%	89.0

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
W3	3911	D	77316	1.775	100.00%	89.0
Total			77316	1.775	100.00%	89.0

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
W4	3911	D	133474	3.064	100.00%	80.0
Total			133474	3.064	100.00%	80.0

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
W5	3911	D	20337	0.467	100.00%	89.0
Total			20337	0.467	100.00%	89.0

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
NW1	3858	D	172155	3.952	100.00%	95.0
Total			172155	3.952	100.00%	95.0

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
NW2	3858	D	16545	0.380	100.00%	95.0
Total			16545	0.380	100.00%	95.0

Area	Soil	Hydrologic Group	Area		Percent of Areas Total	CURVE NUMBER Existing
			Square Feet	Acres		
N	3858	D	2396026	55.005	73.11%	87.0
	3911	D	866575	19.894	26.44%	87.0
	4671	D	14673	0.337	0.45%	87.0
Total			3277274	75.236	100.00%	87.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
NE	3858	D	794360	18.236	60.10%	87.0
	3911	D	527452	12.109	39.90%	87.0
Total			1321812	30.345	100.00%	87.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
SE	3858	D	220498	5.062	37.81%	87.0
	3911	D	362607	8.324	62.19%	87.0
Total			583105	13.386	100.00%	87.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-1A	3911	D	82740	1.899	100.00%	92.0
Total			82740	1.899	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-1B	3911	D	65244	1.498	100.00%	92.0
Total			65244	1.498	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-1	-	-	147984	3.397	100.00%	92.0
Total			147984	3.397	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-2A	3858	D	239700	5.503	48.64%	92.0
	3911	D	253102	5.810	51.36%	92.0
Total			492802	11.313	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-2B	3911	D	40692	0.934	100.00%	80.0
Total			40692	0.934	100.00%	80.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-2C	3911	D	7693	0.177	100.00%	80.0
Total			7693	0.177	100.00%	80.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-2D	3911	D	129730	2.978	100.00%	92.0
Total			129730	2.978	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-2E	3911	D	14866	0.341	35.89%	80.0
	3911	D	26553	0.610	64.11%	92.0
Total			41419	0.951	100.00%	87.7

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-2F	3911	D	50554	1.161	100.00%	92.0
Total			50554	1.161	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-2G	3911	D	52924	1.215	100.00%	92.0
Total			52924	1.215	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-2H	3911	D	22912	0.526	100.00%	92.0
Total			22912	0.526	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-2	-	-	838727	19.255	100.00%	91.1
Total			838727	19.255	100.00%	91.1

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-3A	3911	D	62984	1.446	100.00%	92.0
Total			62984	1.446	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-3B	3858	D	1570	0.036	6.06%	92.0
	3911	D	24345	0.559	93.94%	92.0
Total			25915	0.595	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-3C	3911	D	106002	2.433	100.00%	92.0
Total			106002	2.433	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-3D	3911	D	37630	0.864	100.00%	92.0
Total			37630	0.864	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-3	-	-	232530	5.338	100.00%	92.0
Total			232530	5.338	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-4A	3858	D	24278	0.557	91.50%	92.0
	3911	D	2256	0.052	8.50%	92.0
Total			26534	0.609	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-4B	3858	D	4200	0.096	10.67%	92.0
	3911	D	35152	0.807	89.33%	92.0
Total			39352	0.903	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-4	-	-	65886	1.513	100.00%	92.0
Total			65886	1.513	100.00%	92.0

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-5	3911	D	264372	6.069	40.28%	92.0
	3911	D	391935	8.998	59.72%	80.0
Total			656307	15.067	100.00%	84.8

Area	Soil	Hydrologic Group	Area		Percent of Areas	CURVE NUMBER
			Square Feet	Acres	Total	Existing
DA-6	3911	D	130814	3.003	100.00%	92.0
Total			130814	3.003	100.00%	92.0

#### D. Proposed contours for detention facilities

The proposed detention area is shown on the drainage plan, Exhibit 1-7. The pond shall be excavated to a bottom elevation of 1382. Also, the side slopes of the pond will be no steeper than 3:1 up to the normal water surface at 1388 with a 10:1 slope for the first foot below normal water. The required area at the normal water level needs to equal 63,816 square feet. All slopes above the normal water shall be no steeper than 4:1.

#### E. Preliminary sizing calculations for storm water controls

Sizing for all storm water controls is shown in Exhibit 3-2.

#### **F. Stage-storage-discharge curve and inflow/outflow hydrographs for storage facilities**

Storage facility calculations and results are found in Exhibit 3-1.

#### **G. Final analysis of potential upstream/downstream impacts**

No relevant impacts are noted from this analysis. Off-site flows that enter the site are already detained. The proposed flows will be less than or equal to the existing flows leaving the site.

#### **H. Existing and proposed structural elevations**

Existing structures are discussed in Tab 2, Section R. Preliminary storm sewer networks are evaluated in Exhibit 3-2. However, any additional storm sewer designs shall comply with the latest City of Wichita design criteria to convey added site run-off to any proposed on-site detention areas and through control structures with discharge rates at or below those existing prior to any development. The detention pond design includes a riser structure and a 24" pipe outlet with an upstream flow line of 1384, and overflow beyond that will be modeled as a 20' broad-crested weir (emergency spillway) with an elevation of 1388.8. The proposed minimum pad elevations on the site shall be set at least two feet above the 100-year design water surface elevation of detention facilities for any given drainage area unless a higher base flood elevation exists within the same site. The detention areas are shown on the drainage plan, Exhibit 1-7.

#### **I. Design water surface elevations and normal pool elevations for ponds**

The detention area shall be designed as a retention pond, being controlled by a riser pipe and overflow weirs as noted above. Normal pool elevation for the pond shall be 1388. Running the 100-year design storm through the pond gives a design-water surface elevation of 1388.8 for the pond.

#### **J. Typical details for structures**

The control structure for the pond will be made from reinforced concrete with a minimum 28-day strength of 4,000 psi. The 24" R.C.P. shall be protected at the downstream end with rip-rap. The emergency spillway shall be a grassed Cipoletti weir with a maximum of 4:1 side slopes.

#### **K. Proposed limits of clearing and grading**

Clearing and grading shall be done throughout the site and will be established upon submittal for building construction.

#### **L. Location of existing and proposed impervious areas**

Any existing impervious areas are shown on the drainage plan. The proposed impervious areas will be delineated with final construction plans, but will not exceed 65% of the total site area as per design calculations.

#### **M. Location of existing and proposed utilities and easements**

The drainage plan shows the location of existing utilities as listed in Tab 2, Section J. The plat (Exhibit 1-3) shows any existing easements, which may be the location for any future utilities.

#### **N. Location of existing and proposed conveyance systems**

Existing conveyance systems are discussed in Tab 2, Section K. Specific storm sewer networks are shown in Exhibit 3-2. Any future storm sewer designs shall comply with the latest City of Wichita design criteria to convey added site run-off to any proposed on-site detention areas and through control structures with discharge rates at or below those rates existing prior to any development.

#### **O. Preliminary location and dimensions of proposed channel modifications**

This development will extend the existing 20'-wide ditch to the south end of the property inside Reserve A.

#### **P. Preliminary selection and location of storm water controls**

Storm water controls will include appropriate curb/drop inlets and pipe networks at locations to be finalized as part of the construction plans. All preliminary layouts are shown in Exhibit 3-2. When these networks are needed, they will convey the five-year storm event and may be routed to detention facilities designed as part of this drainage plan. Any sump locations in specific drainage areas will have flows routed overland to low points and carried through the remainder of the system. Storm sewers in sump locations may also be designed to carry flows from a larger storm event. Other controls will include any pond control structures as discussed above in sections H through J.

#### **Q. Emergency overflow structure's flow path**

The emergency overflow for the detention areas will route any flows, beyond the 100-year rates, to the proposed weirs as shown on the drainage plan, Exhibit 1-7.

#### **R. Detention facility freeboard**

All detention facilities will have a minimum of one foot of freeboard above the design-water surface elevation.

**S. The 100-year, 24-hour High Water Line**

The HWL elevation for the proposed detention pond is 1388.8.

**T. Lowest opening elevation table**

The lowest opening elevation table is shown on the drainage plan, Exhibit 1-7. Also, all buildings will be at least 2 feet above the HWL elevation for each respective detention area.

**U. Storm water management facilities located within a reserve**

This site contains a platted reserve as shown on the plat, Exhibit 1-3.

**V. Maintenance responsibility of storm water management facilities**

The maintenance of storm water management facilities shall be the responsibility of the owner and shall be transferred to new owner upon the sale of any part thereof.

**W. Off-site drainage easements or agreements**

No off-site drainage easements or agreements will be required for this development.

**NORTHBOROUGH 3RD ADDITION REPLAT**

**EXHIBIT 3-1**

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	15.67	6	720	1.159	---	----	----	Off-Site W1 (0-3)
2	SCS Runoff	5.057	6	720	0.358	---	----	----	Off-Site W2 (0-2)
3	SCS Runoff	4.795	6	720	0.340	---	----	----	Off-Site W3 (1)
4	SCS Runoff	5.750	6	720	0.411	---	----	----	Off-Site W4 (W DT)
5	SCS Runoff	1.262	6	720	0.089	---	----	----	Off-Site W5 (1)
6	SCS Runoff	12.68	6	720	0.938	---	----	----	Off-Site NW1 (4)
7	SCS Runoff	1.219	6	720	0.090	---	----	----	Off-Site NW2 (4)
8	SCS Runoff	189.30	6	720	13.357	---	----	----	Off-Site N (CH)
9	SCS Runoff	76.35	6	720	5.387	---	----	----	Off-Site NE (CH)
10	SCS Runoff	33.68	6	720	2.377	---	----	----	Off-Site SE (CH)
11	SCS Runoff	5.640	6	720	0.405	---	----	----	DA-1A (1)
12	SCS Runoff	4.449	6	720	0.320	---	----	----	DA-1B (1)
13	Combine	10.09	6	720	0.725	11, 12	----	----	DA-1 TOTAL
14	SCS Runoff	33.60	6	720	2.415	---	----	----	DA-2A (Pond)
15	SCS Runoff	1.753	6	720	0.125	---	----	----	DA-2B (2-1)
16	SCS Runoff	0.332	6	720	0.024	---	----	----	DA-2C (2-2)
17	SCS Runoff	8.845	6	720	0.636	---	----	----	DA-2D (2)
18	SCS Runoff	2.455	6	720	0.173	---	----	----	DA-2E (2)
19	SCS Runoff	3.448	6	720	0.248	---	----	----	DA-2F (2-4)
20	SCS Runoff	3.609	6	720	0.259	---	----	----	DA-2G (2-5)
21	SCS Runoff	1.562	6	720	0.112	---	----	----	DA-2H (2-3)
22	Combine	44.53	6	720	3.200	14, 15, 16, 17,	----	----	DA-2A to DA-2D
23	Combine	55.61	6	720	3.993	18, 19, 20, 21, 22	----	----	DA-2 TOTAL
24	SCS Runoff	4.295	6	720	0.309	---	----	----	DA-3A (3-2)
25	SCS Runoff	1.767	6	720	0.127	---	----	----	DA-3B (3-3)
26	SCS Runoff	7.226	6	720	0.519	---	----	----	DA-3C (3-5)
27	SCS Runoff	2.566	6	720	0.184	---	----	----	DA-3D (3-4)
28	Combine	15.85	6	720	1.140	24, 25, 26, 27	----	----	DA-3 TOTAL
29	SCS Runoff	1.809	6	720	0.130	---	----	----	DA-4A (4)
30	SCS Runoff	2.682	6	720	0.193	---	----	----	DA-4B (4)

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
31	Combine	4.491	6	720	0.323	29, 30	-----	-----	DA-4 TOTAL
32	SCS Runoff	34.83	6	720	2.457	---	-----	-----	DA-5 (CH)
33	SCS Runoff	8.919	6	720	0.641	---	-----	-----	DA-6 (CH)
34	Combine	20.73	6	720	1.517	1, 2,	-----	-----	Total for SWD0
35	Combine	9.244	6	720	0.660	3, 12,	-----	-----	W3 with DA-1B (1-1)
36	Combine	6.902	6	720	0.495	5, 11,	-----	-----	W5 with DA-1A (1-2)
37	Combine	16.15	6	720	1.154	35, 36	-----	-----	Total for SWD1
38	Combine	42.63	6	720	3.082	4, 34, 37	-----	-----	Total to West Ditch
39	Reach	33.09	6	732	3.082	38	-----	-----	Proposed West Ditch
40	Combine	11.30	6	720	0.809	17, 18,	-----	-----	DA-2D with DA-2E (2-6)
41	Combine	22.00	6	720	1.578	15, 16, 19, 20, 21, 40	-----	-----	Total for SWD2
42	Combine	15.85	6	720	1.140	24, 25, 26, 27,	-----	-----	Total for SWD3
43	Combine	14.49	6	720	1.068	6, 29,	-----	-----	NW1 with DA-4A (4-2)
44	Combine	3.901	6	720	0.283	7, 30,	-----	-----	NW2 with DA-4B (4-1)
45	Combine	18.39	6	720	1.351	43, 44	-----	-----	Total for SWD4
46	Combine	71.46	6	720	5.132	14, 41, 42,	-----	-----	Total to Pond
47	Reservoir	0.000	6	0	0.000	46	1386.67	5.132	Proposed Pond
48	Combine	361.47	6	720	25.570	8, 9, 10, 32, 33, 45,	-----	-----	N, NE, SE, DA-5, DA-6, & SWD4
49	Combine	380.07	6	720	28.652	39, 47, 48	-----	-----	Route All to Proposed Channel
50	Reach	306.56	6	732	28.652	49	-----	-----	Proposed Channel

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 1

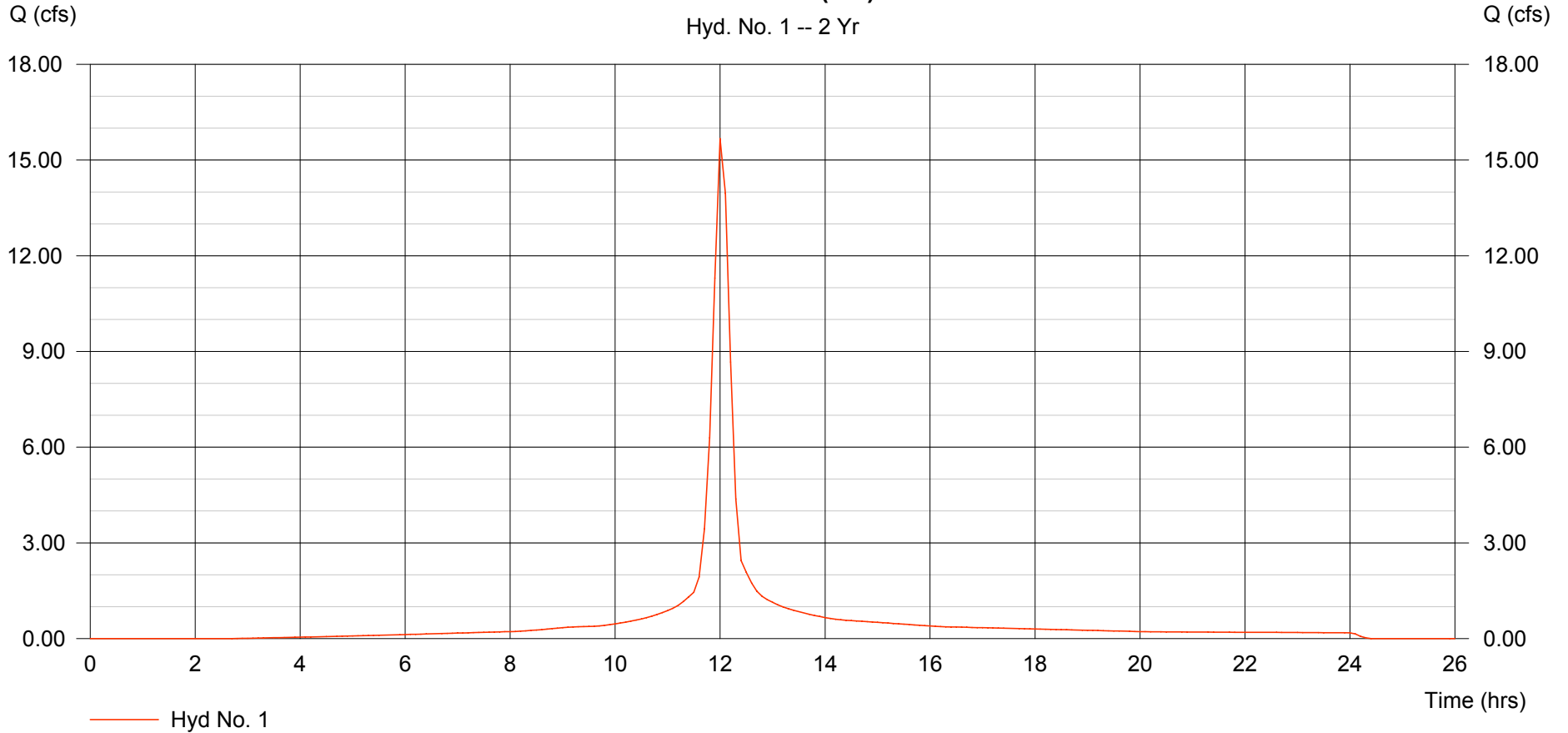
Off-Site W1 (0-3)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 4.884 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 15.67 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.159 acft

**Off-Site W1 (0-3)**  
Hyd. No. 1 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 2

Off-Site W2 (0-2)

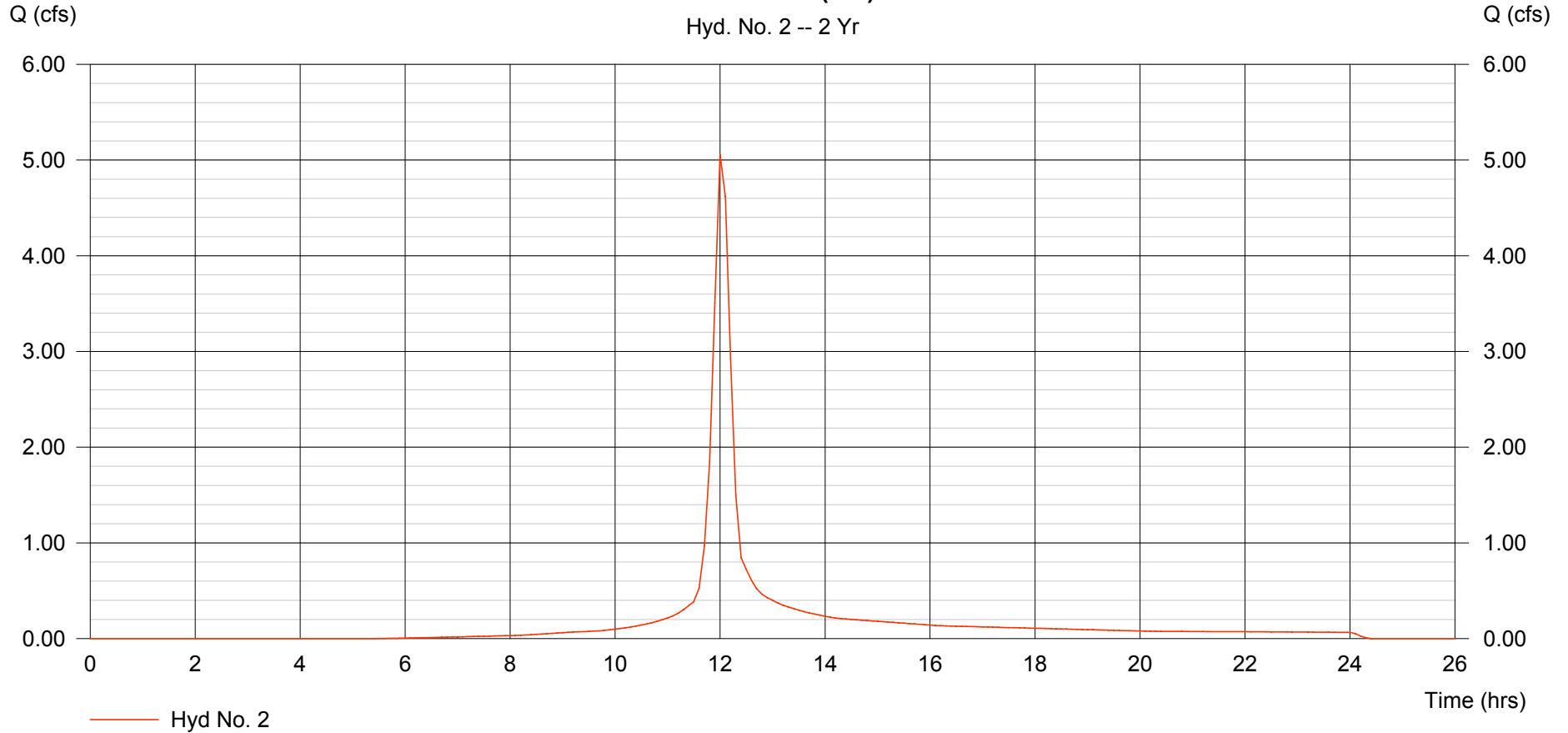
Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 1.872 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 5.057 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.358 acft

### Off-Site W2 (0-2)

Hyd. No. 2 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 3

Off-Site W3 (1)

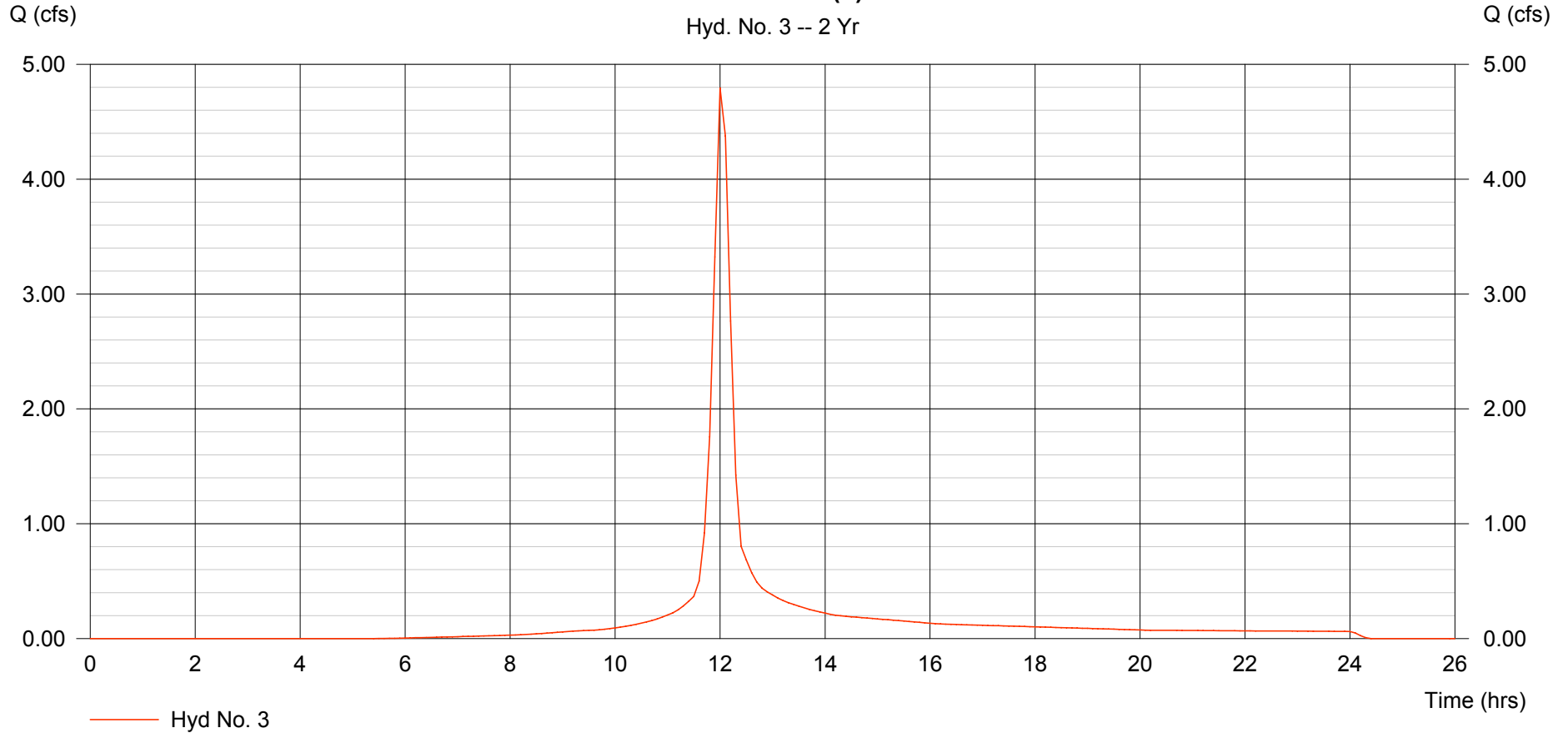
Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 1.775 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 4.795 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.340 acft

### Off-Site W3 (1)

Hyd. No. 3 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 4

Off-Site W4 (W DT)

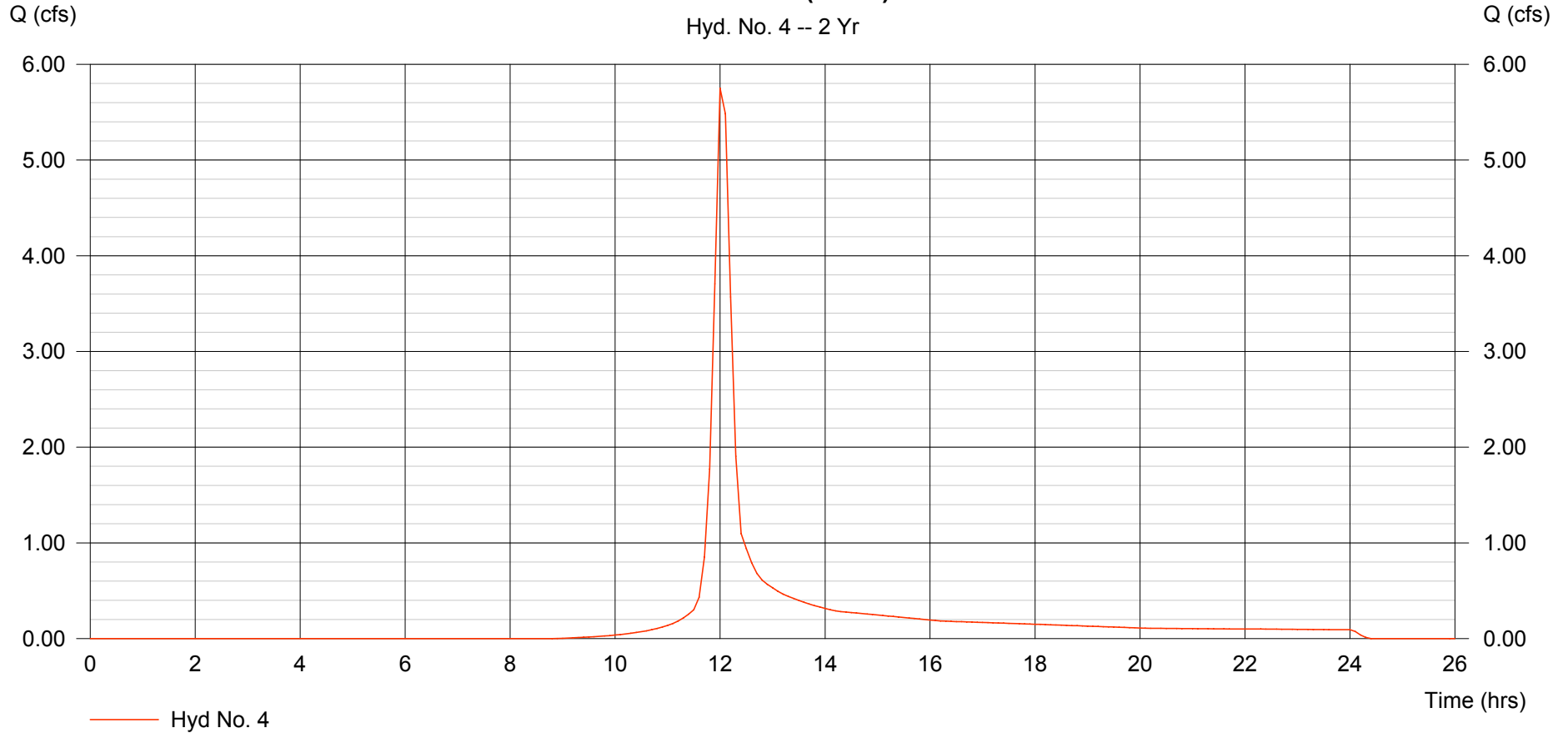
Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 3.064 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 5.750 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.411 acft

### Off-Site W4 (W DT)

Hyd. No. 4 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 5

Off-Site W5 (1)

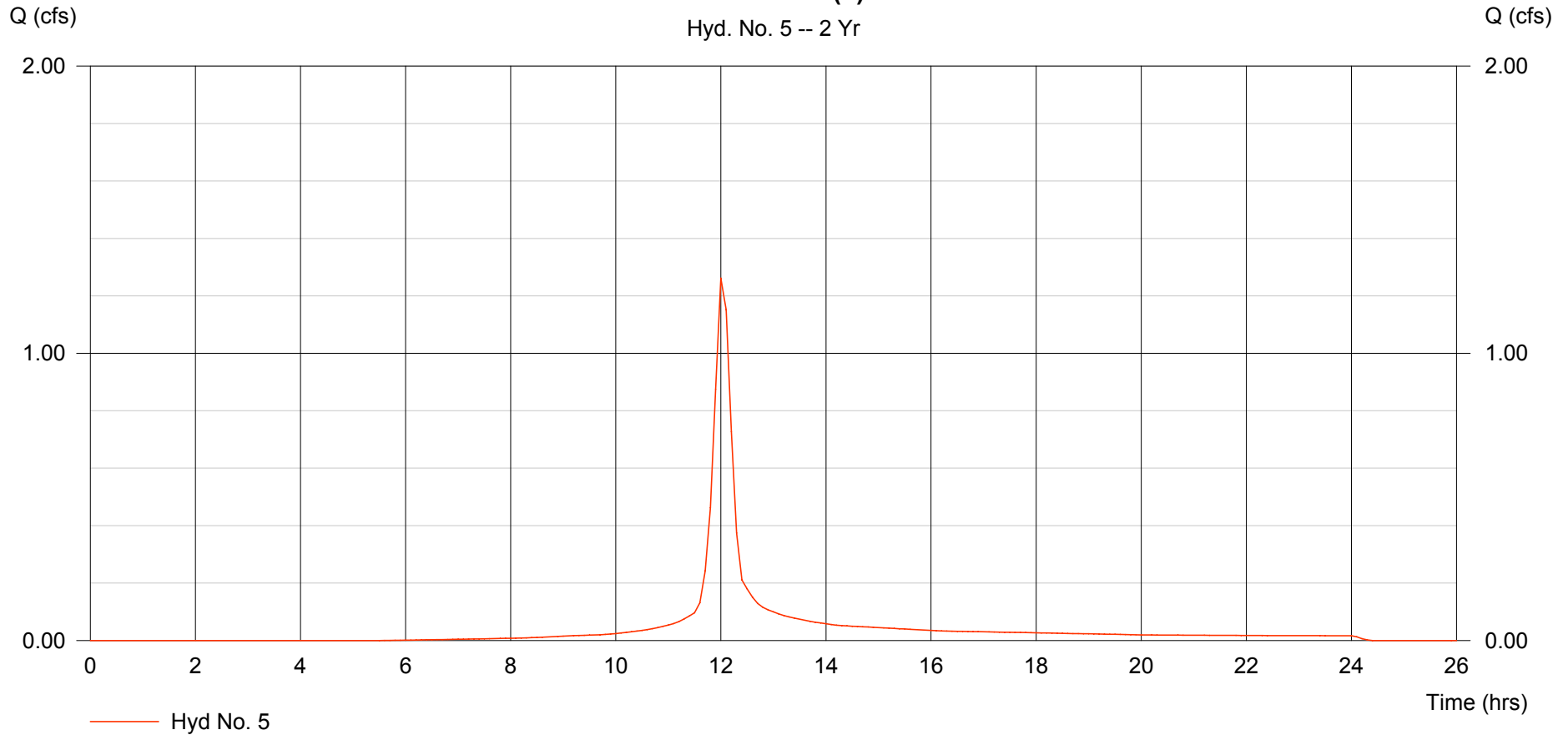
Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.467 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 1.262 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.089 acft

### Off-Site W5 (1)

Hyd. No. 5 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 6

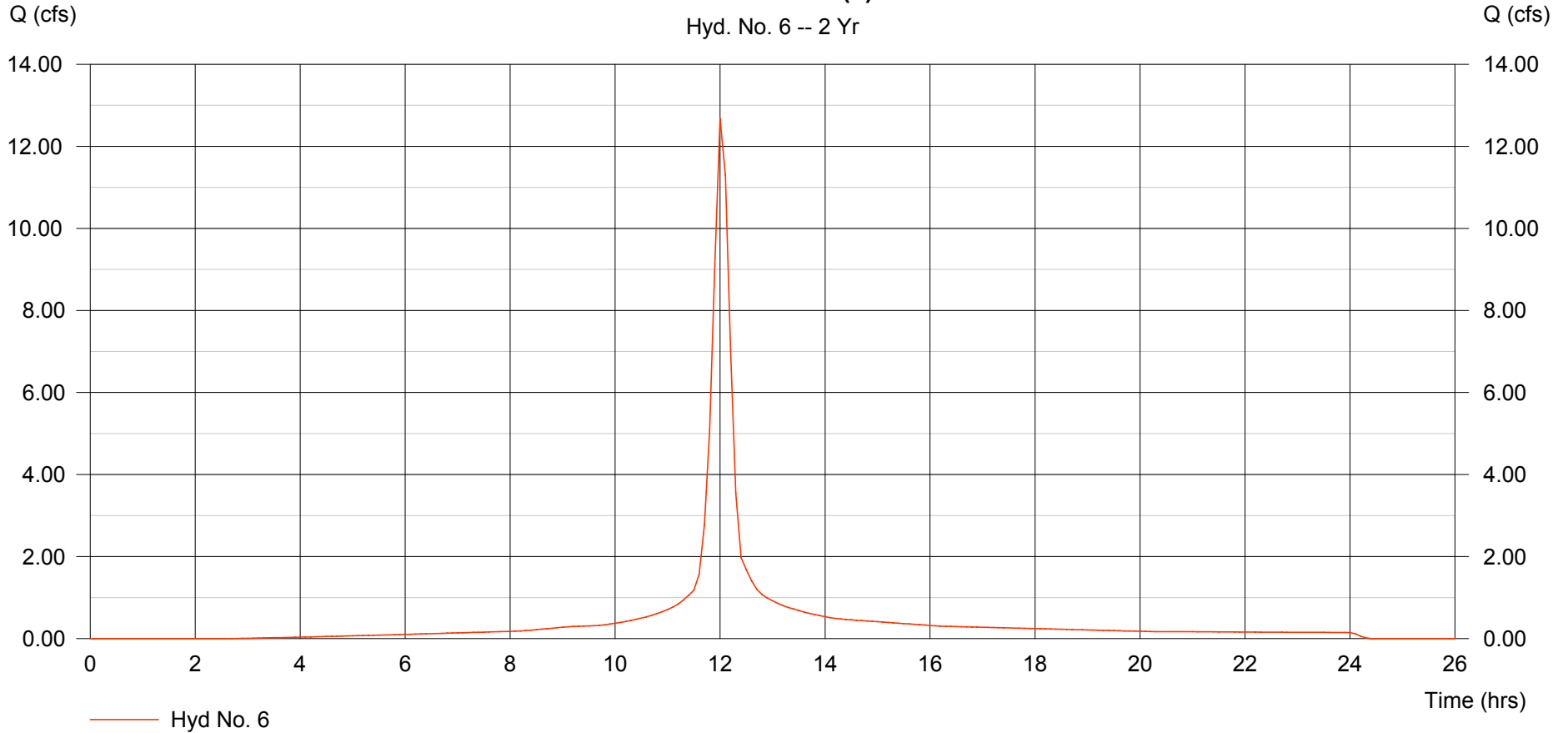
Off-Site NW1 (4)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 3.952 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 12.68 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.938 acft

**Off-Site NW1 (4)**  
Hyd. No. 6 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 7

Off-Site NW2 (4)

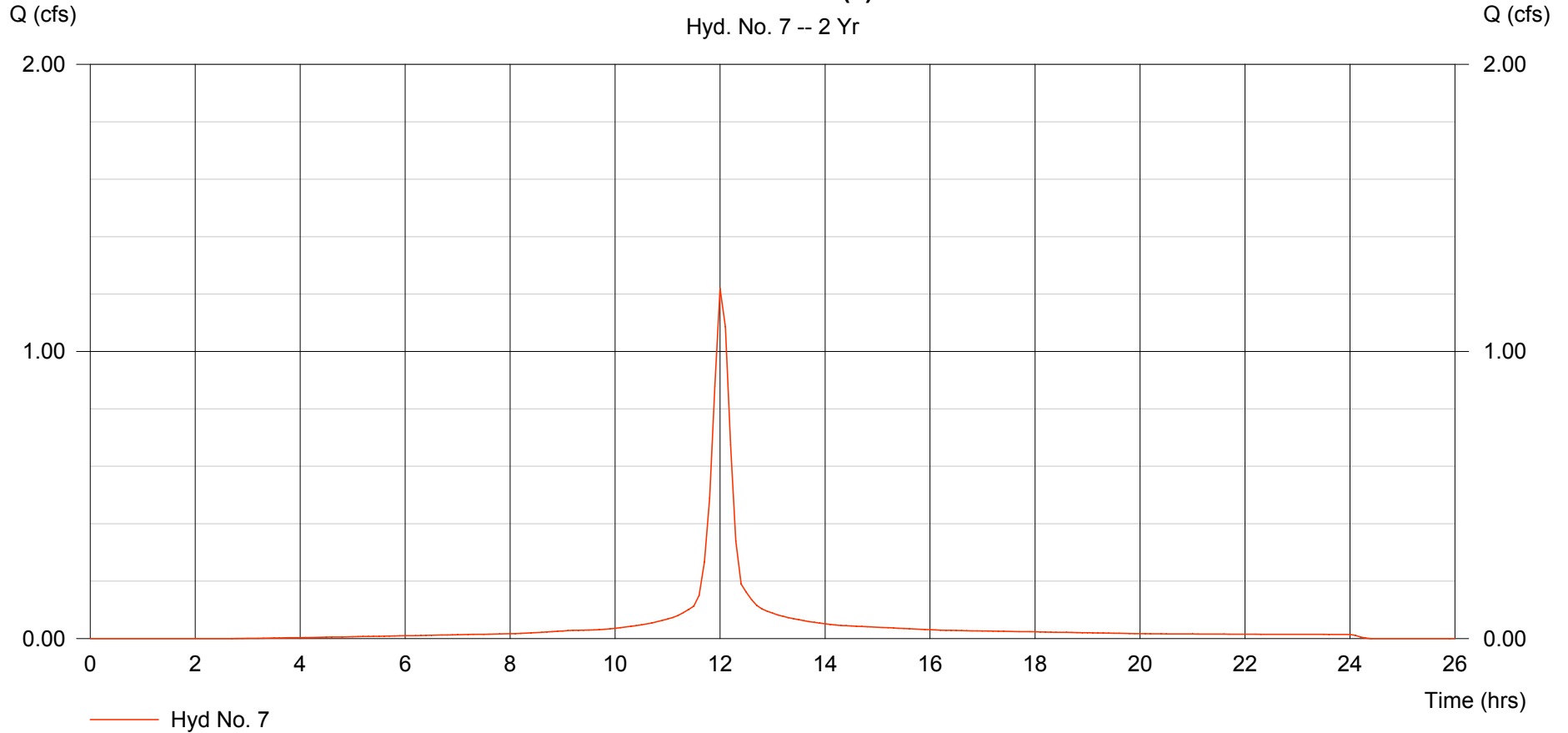
Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.380 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 1.219 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.090 acft

### Off-Site NW2 (4)

Hyd. No. 7 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 8

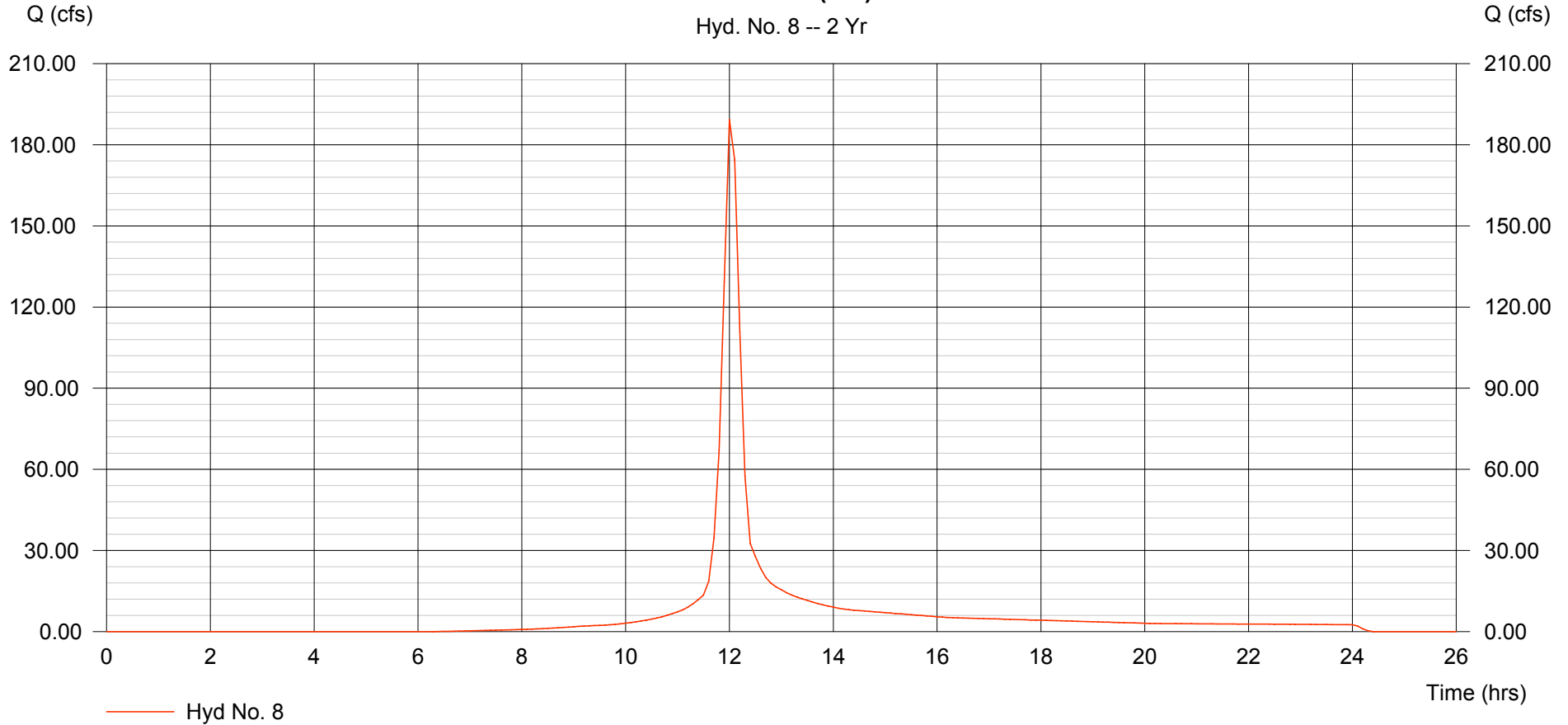
Off-Site N (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 189.30 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 13.357 acft

Off-Site N (CH)  
Hyd. No. 8 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 9

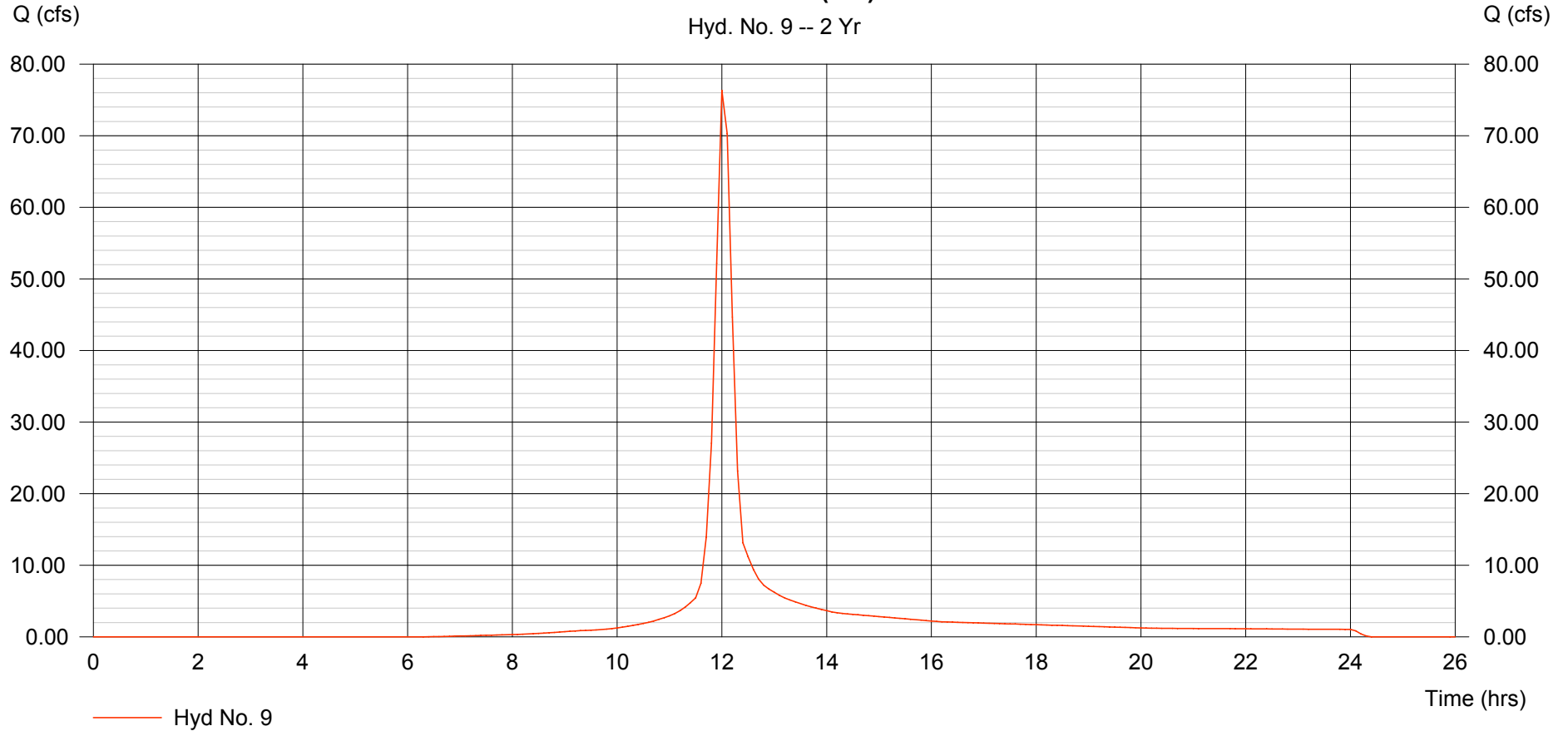
Off-Site NE (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 76.35 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 5.387 acft

**Off-Site NE (CH)**  
Hyd. No. 9 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 10

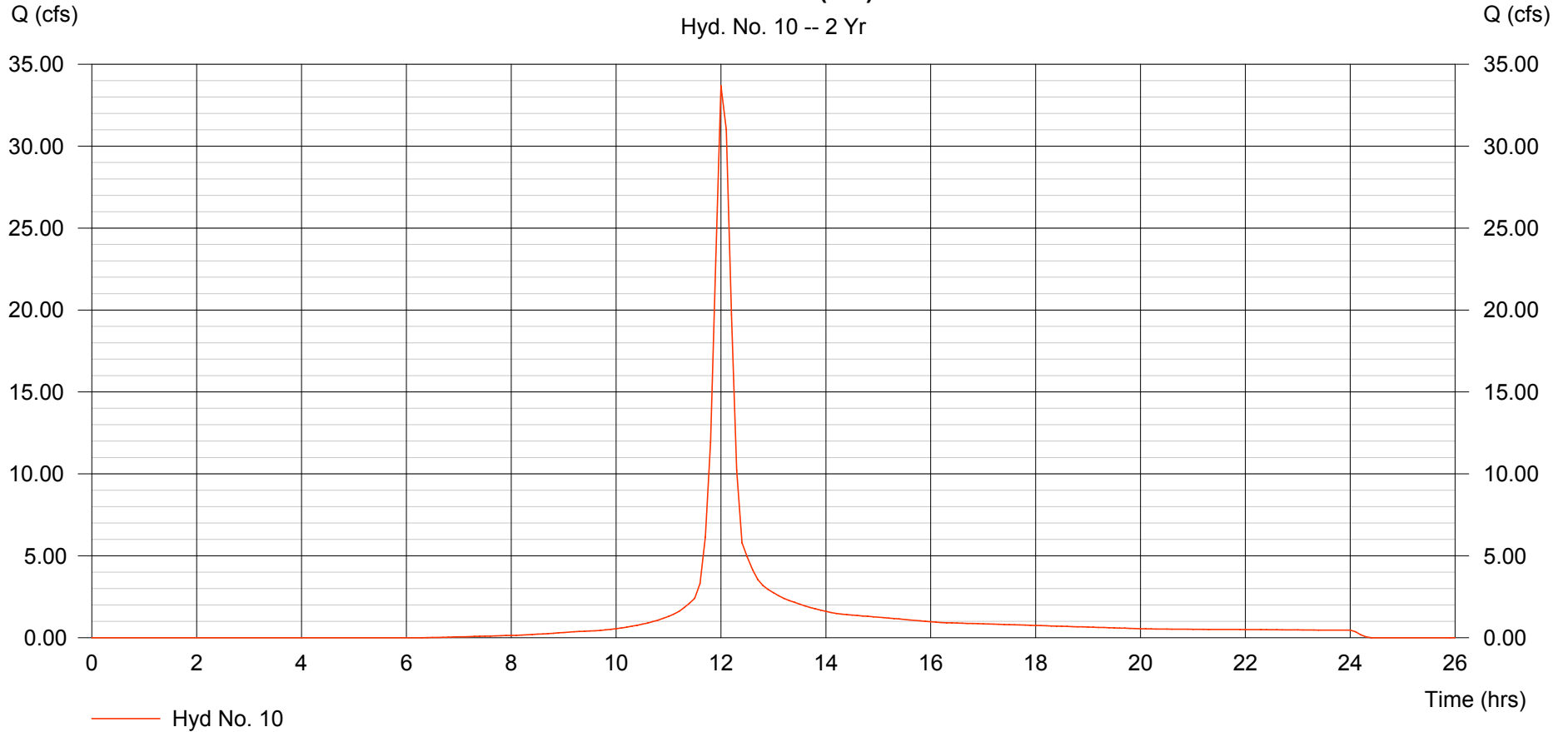
Off-Site SE (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 33.68 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.377 acft

**Off-Site SE (CH)**  
Hyd. No. 10 -- 2 Yr



# Hydrograph Plot

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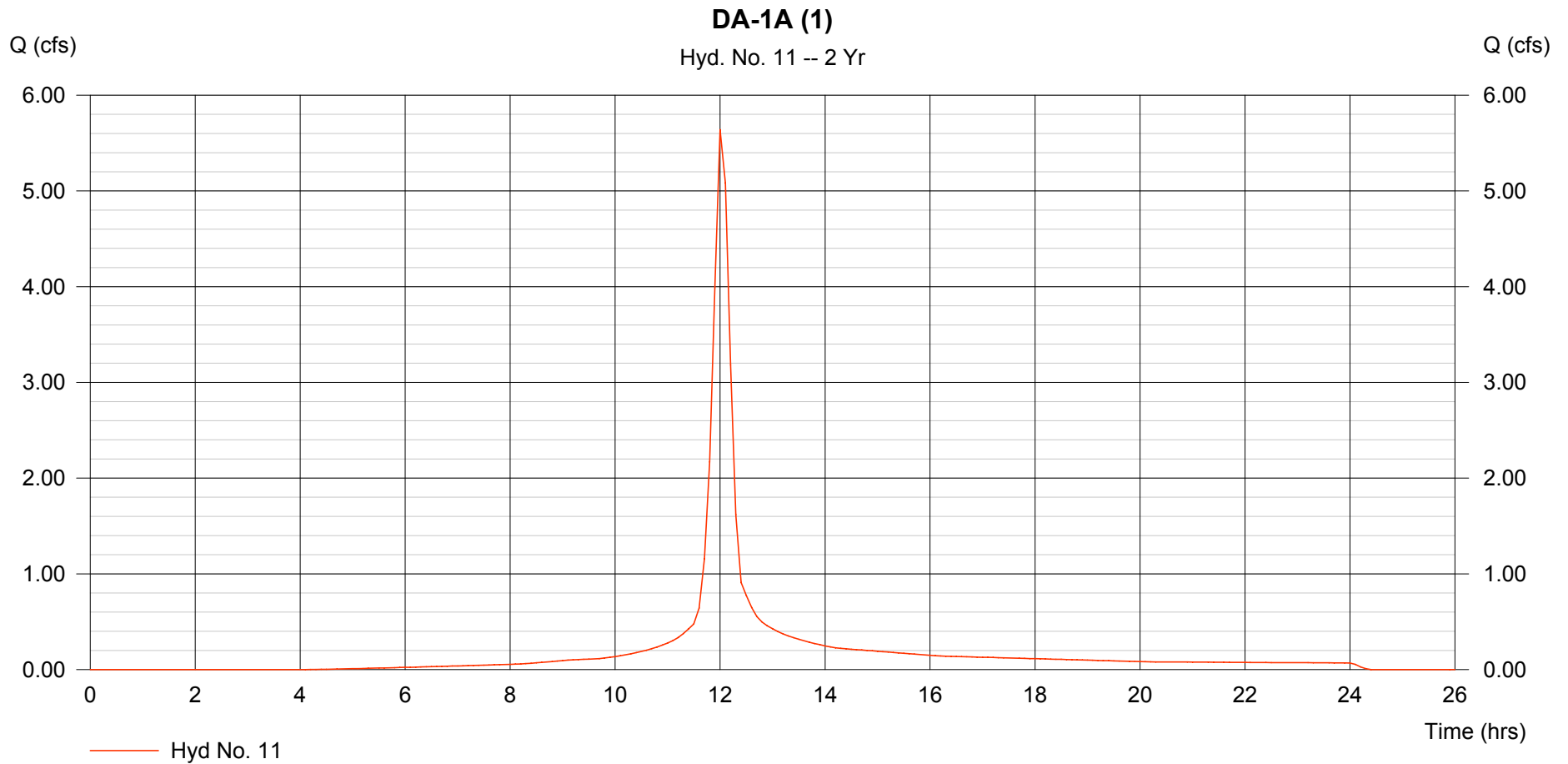
## Hyd. No. 11

DA-1A (1)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 1.899 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 5.640 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.405 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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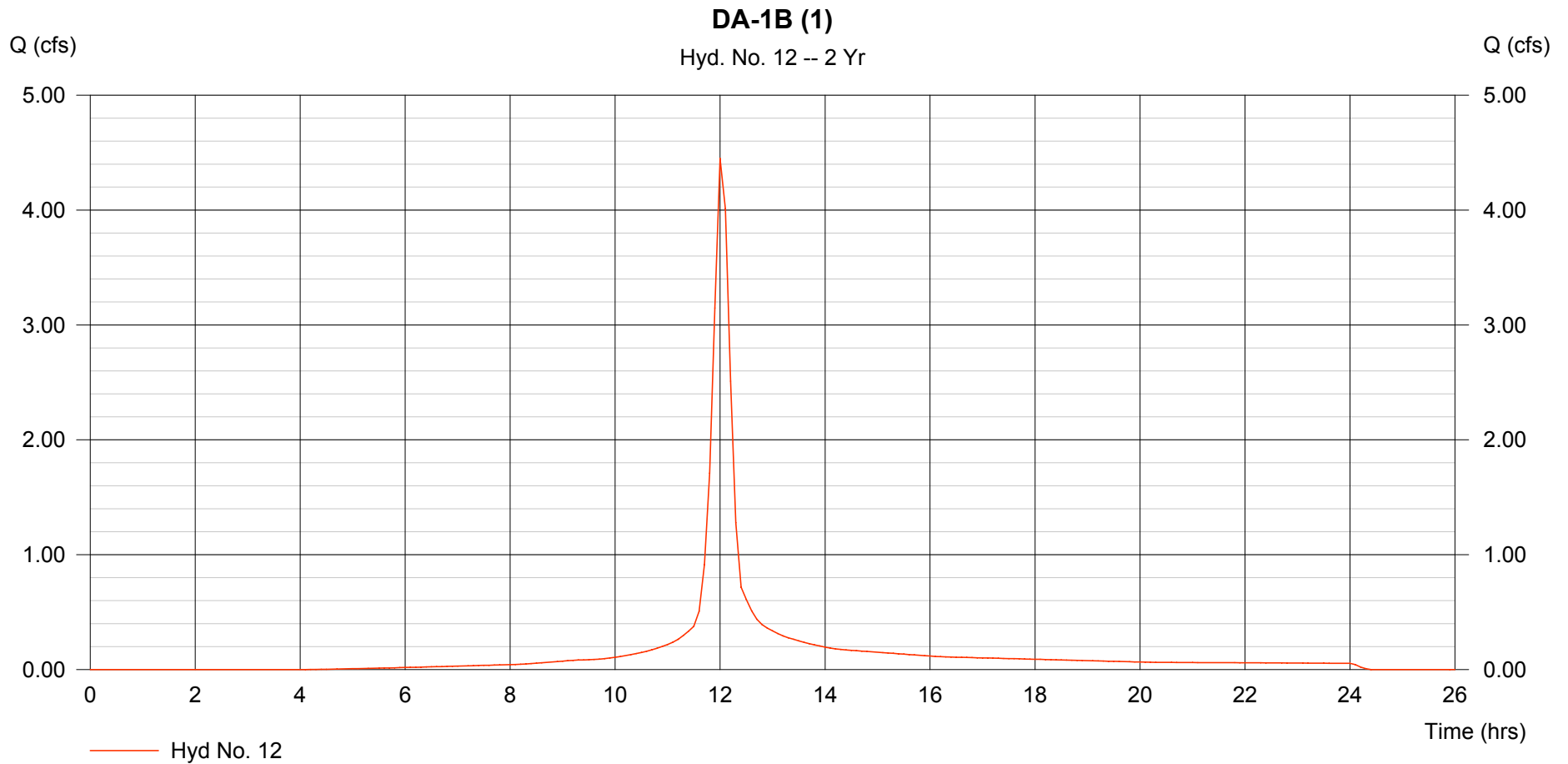
## Hyd. No. 12

DA-1B (1)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 1.498 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 4.449 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.320 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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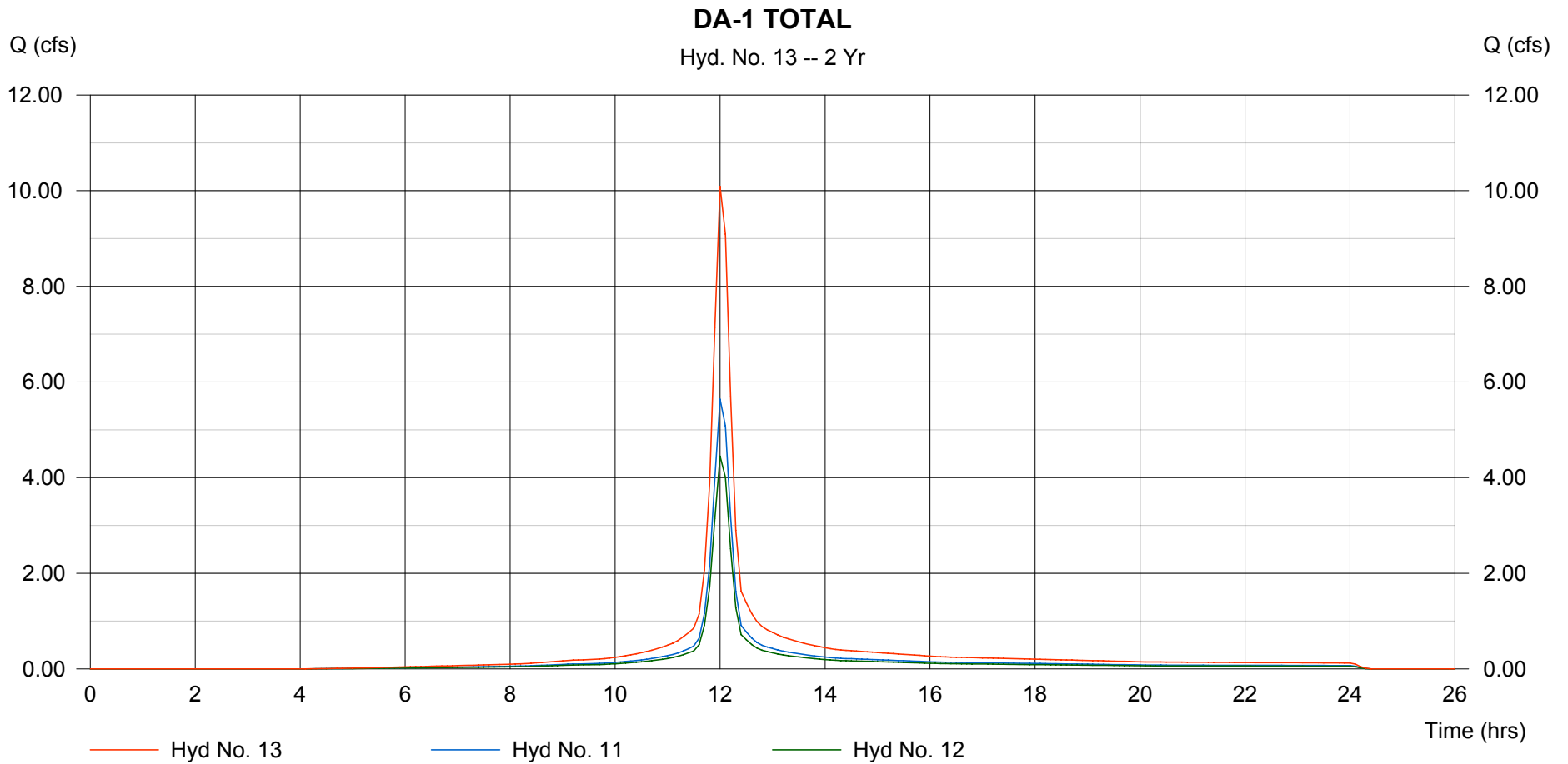
## Hyd. No. 13

DA-1 TOTAL

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 11, 12

Peak discharge = 10.09 cfs  
Time interval = 6 min

Hydrograph Volume = 0.725 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

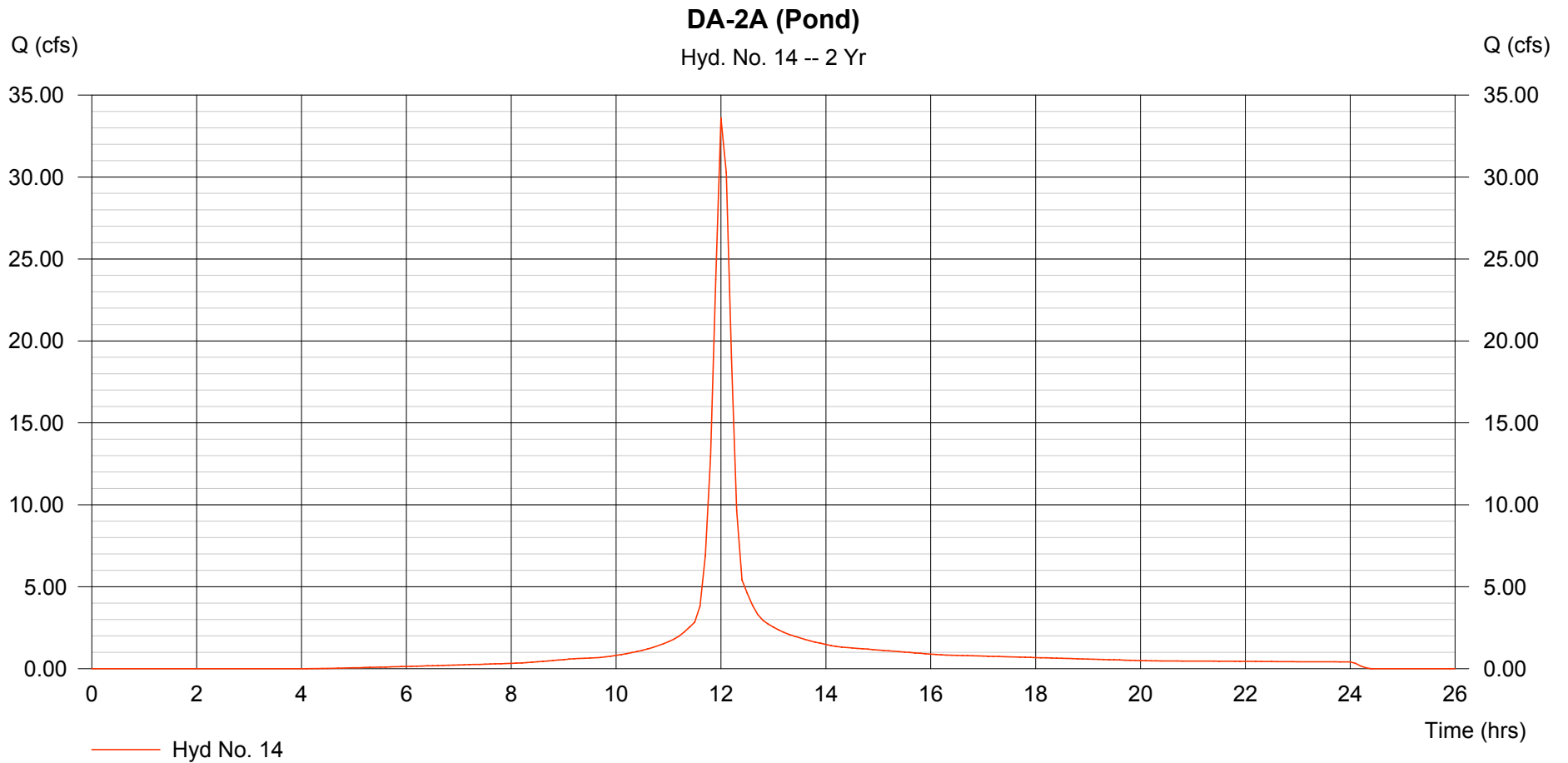
## Hyd. No. 14

DA-2A (Pond)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 11.313 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 33.60 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.415 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 15

DA-2B (2-1)

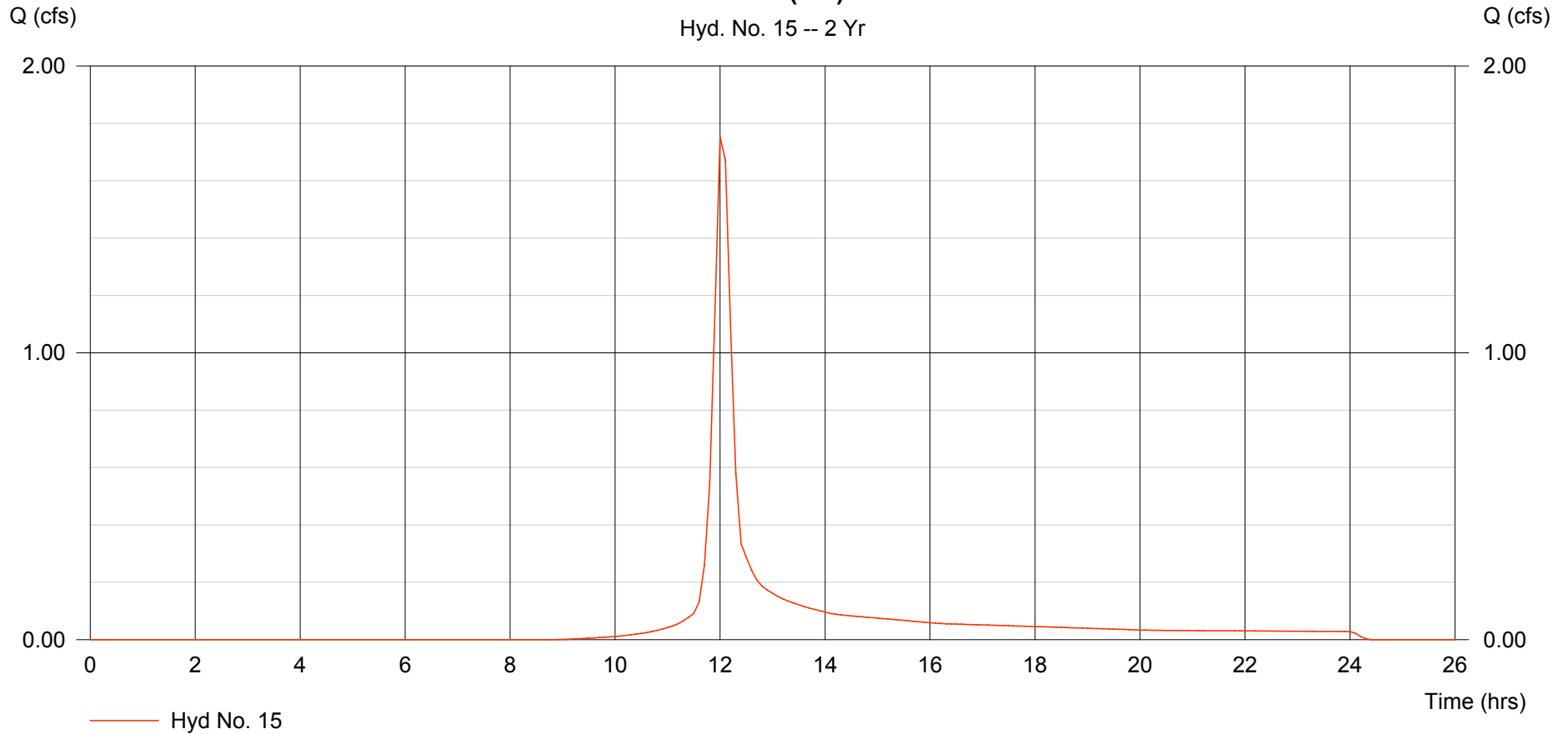
Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.934 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 1.753 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.125 acft

### DA-2B (2-1)

Hyd. No. 15 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 16

DA-2C (2-2)

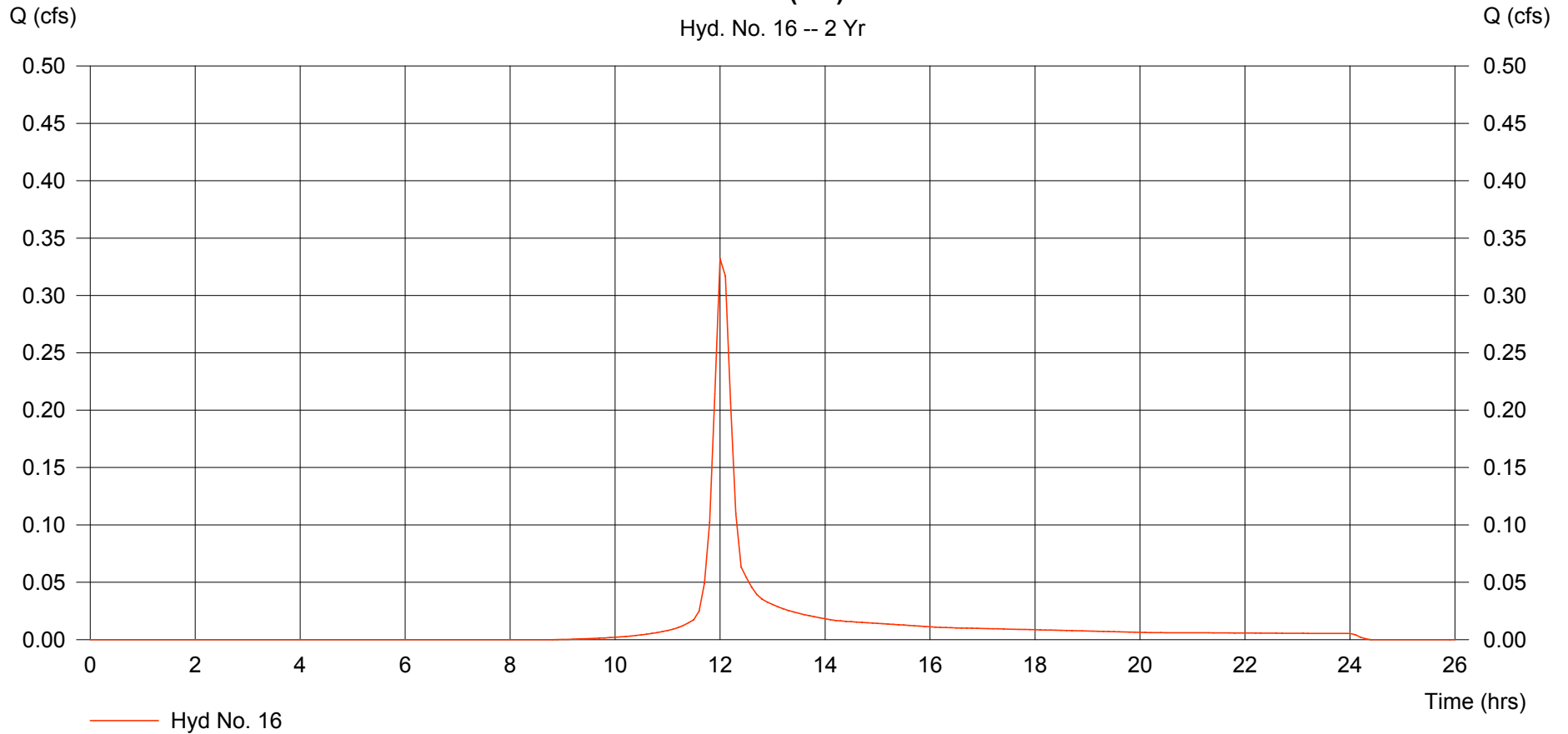
Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.177 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 0.332 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.024 acft

### DA-2C (2-2)

Hyd. No. 16 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

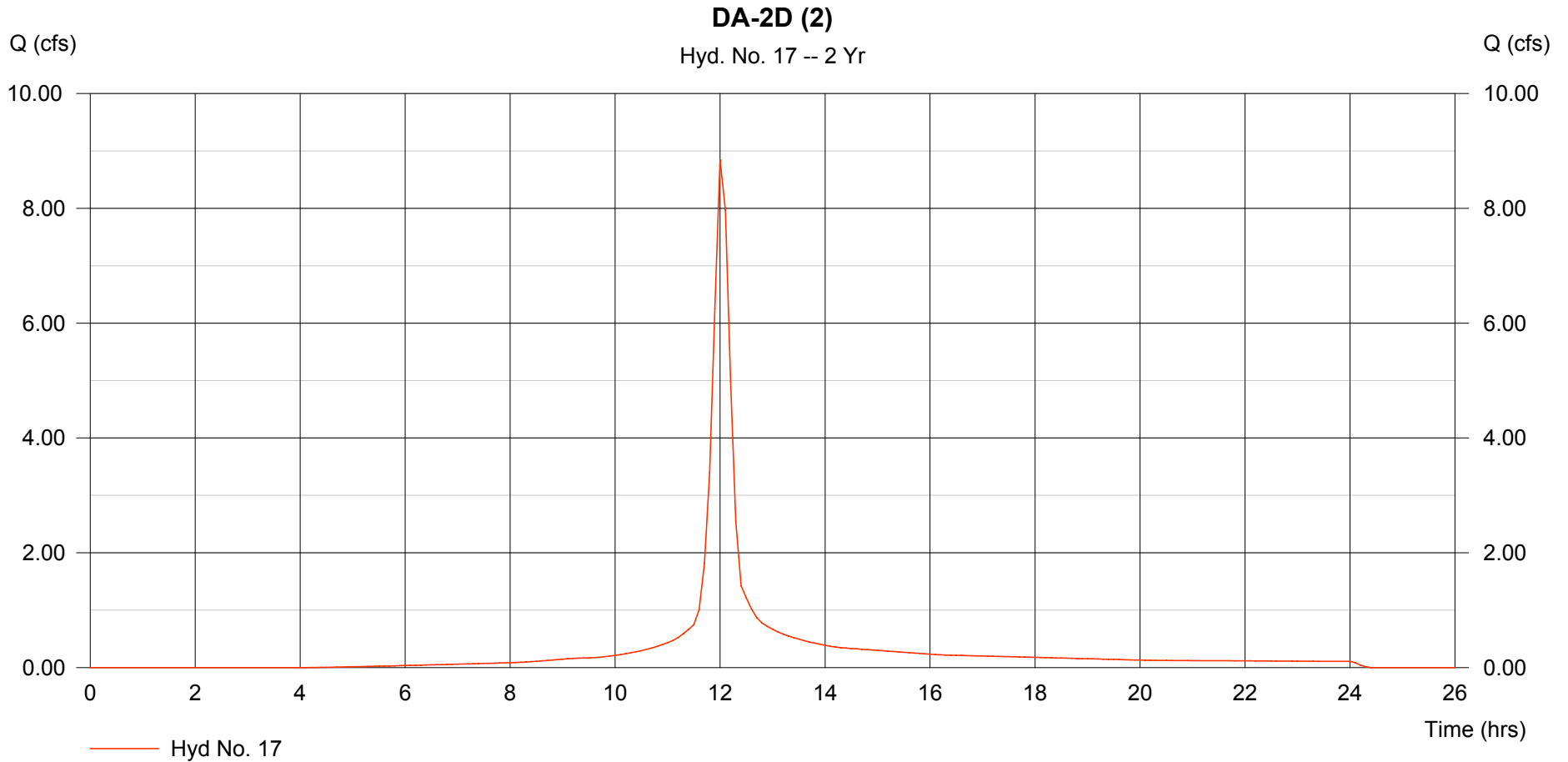
## Hyd. No. 17

DA-2D (2)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 2.978 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 8.845 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.636 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

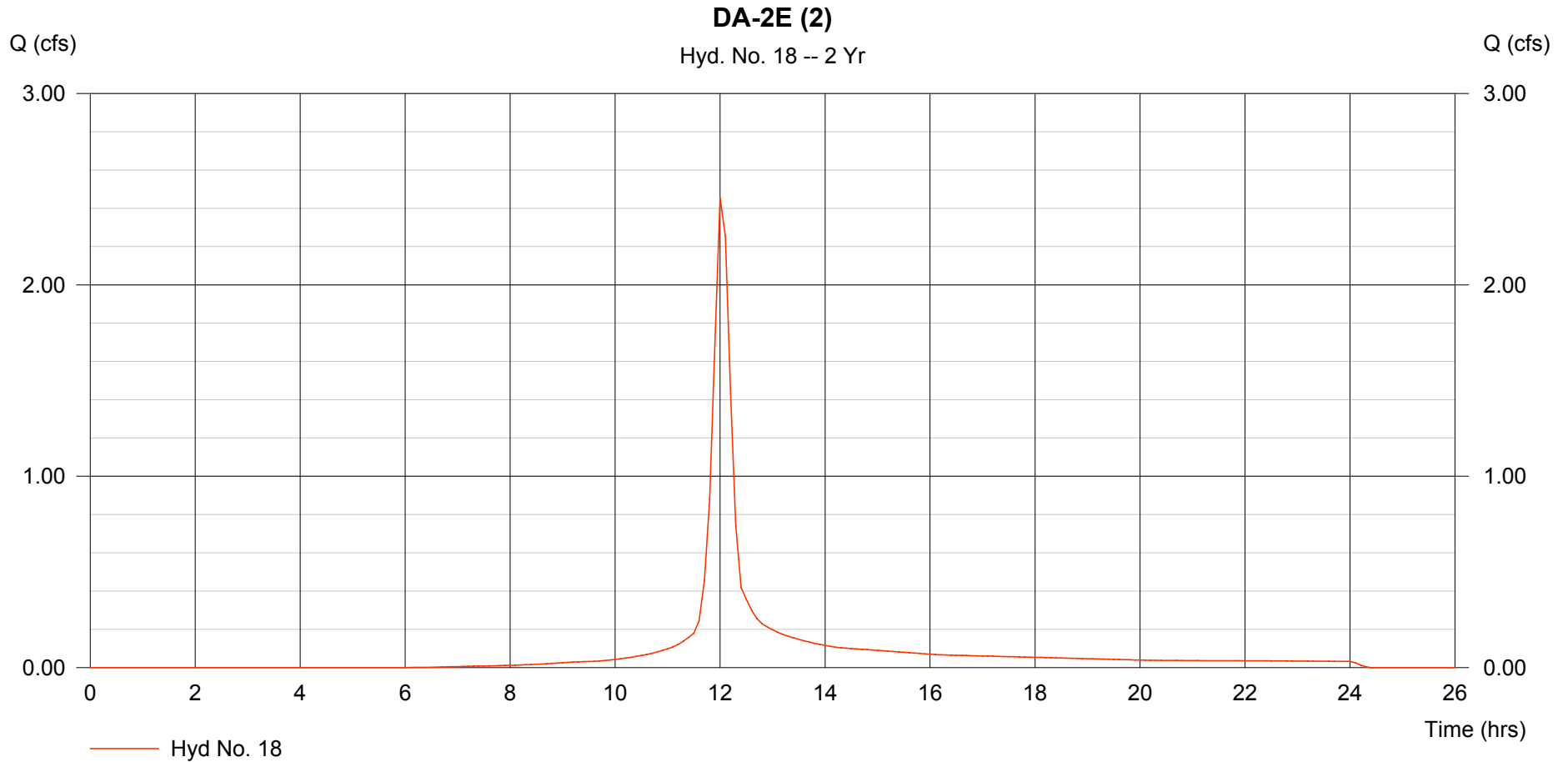
## Hyd. No. 18

DA-2E (2)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.951 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 2.455 cfs  
Time interval = 6 min  
Curve number = 87.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.173 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

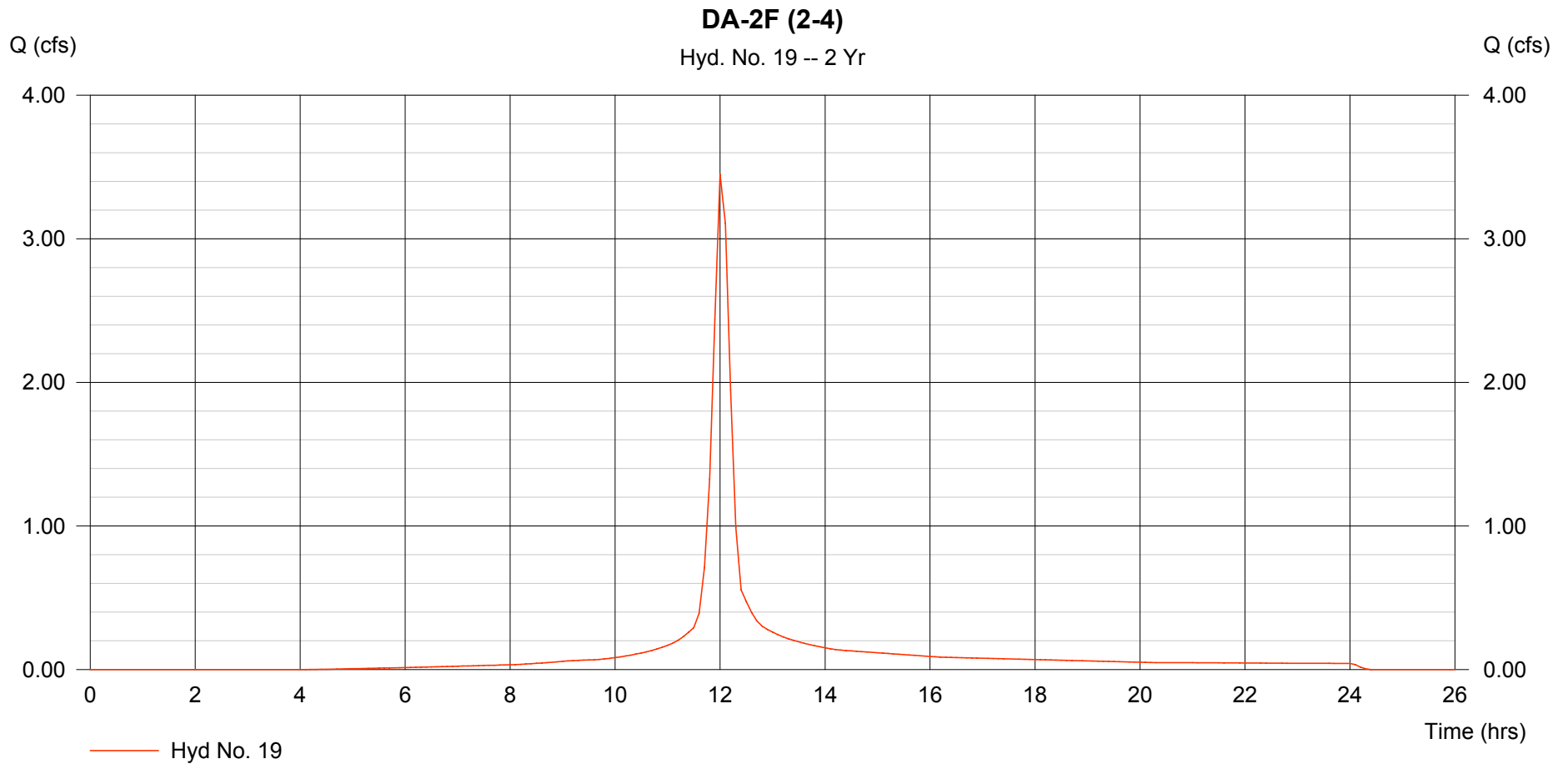
## Hyd. No. 19

DA-2F (2-4)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 1.161 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 3.448 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.248 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 20

DA-2G (2-5)

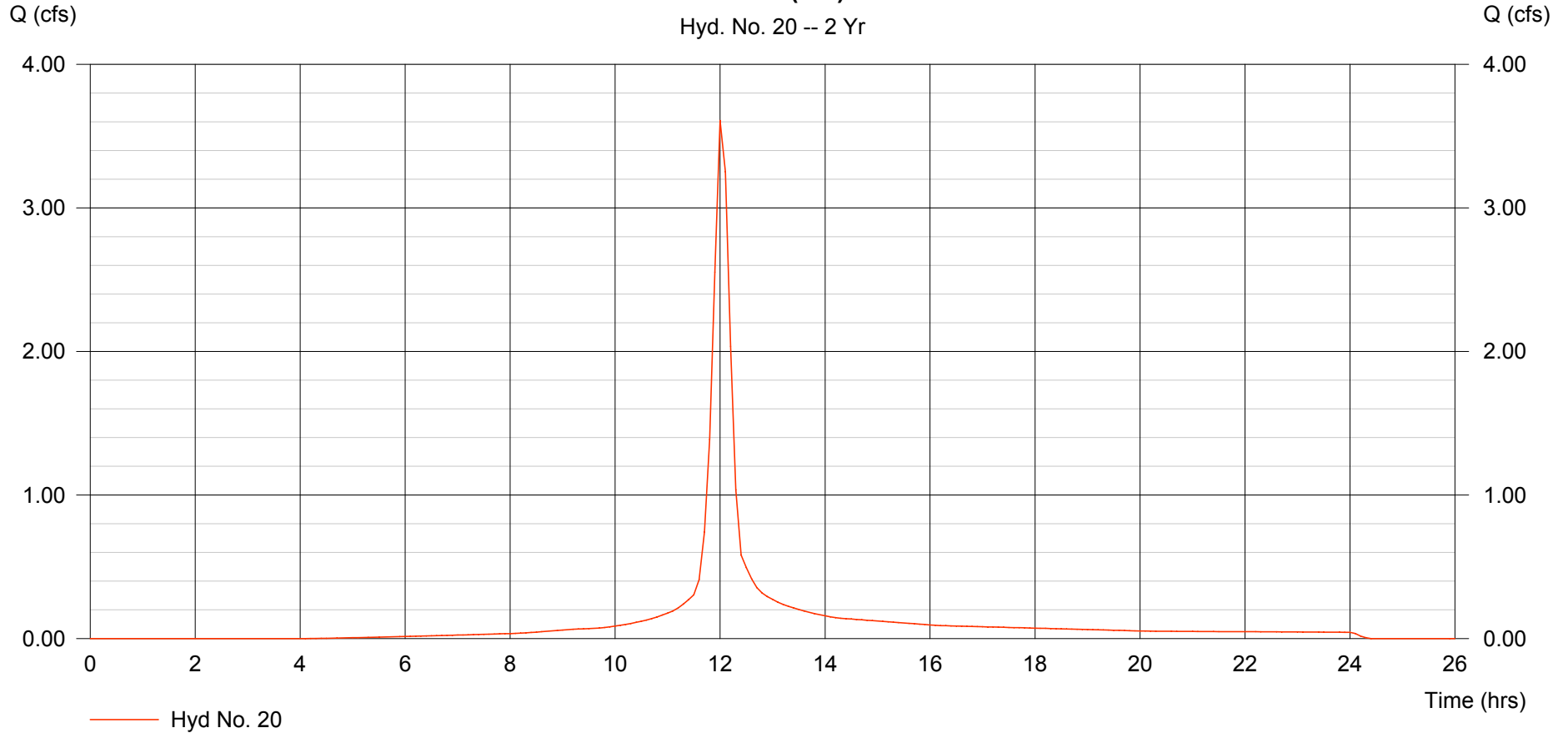
Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 1.215 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 3.609 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.259 acft

### DA-2G (2-5)

Hyd. No. 20 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

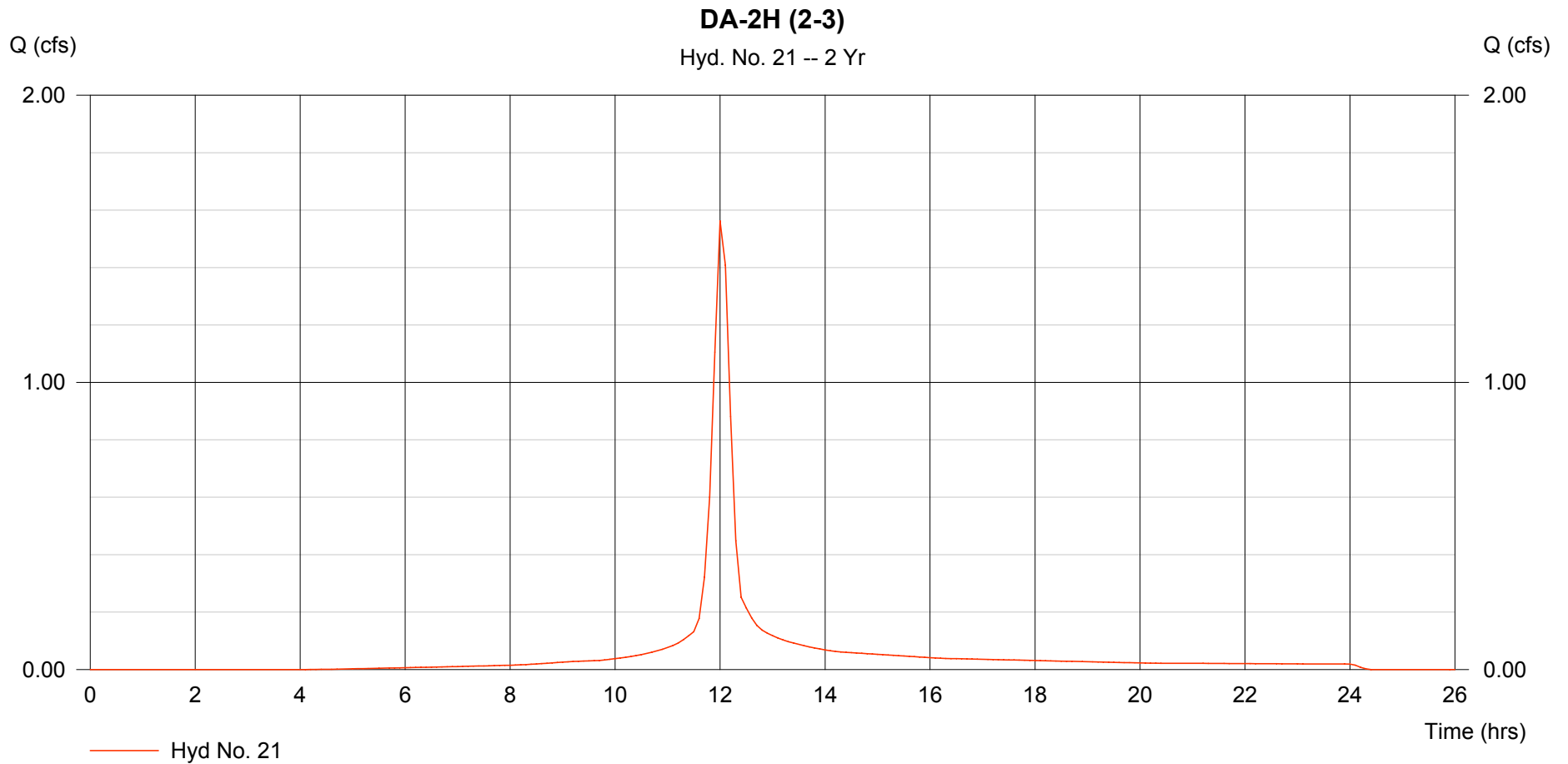
## Hyd. No. 21

DA-2H (2-3)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.526 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 1.562 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.112 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

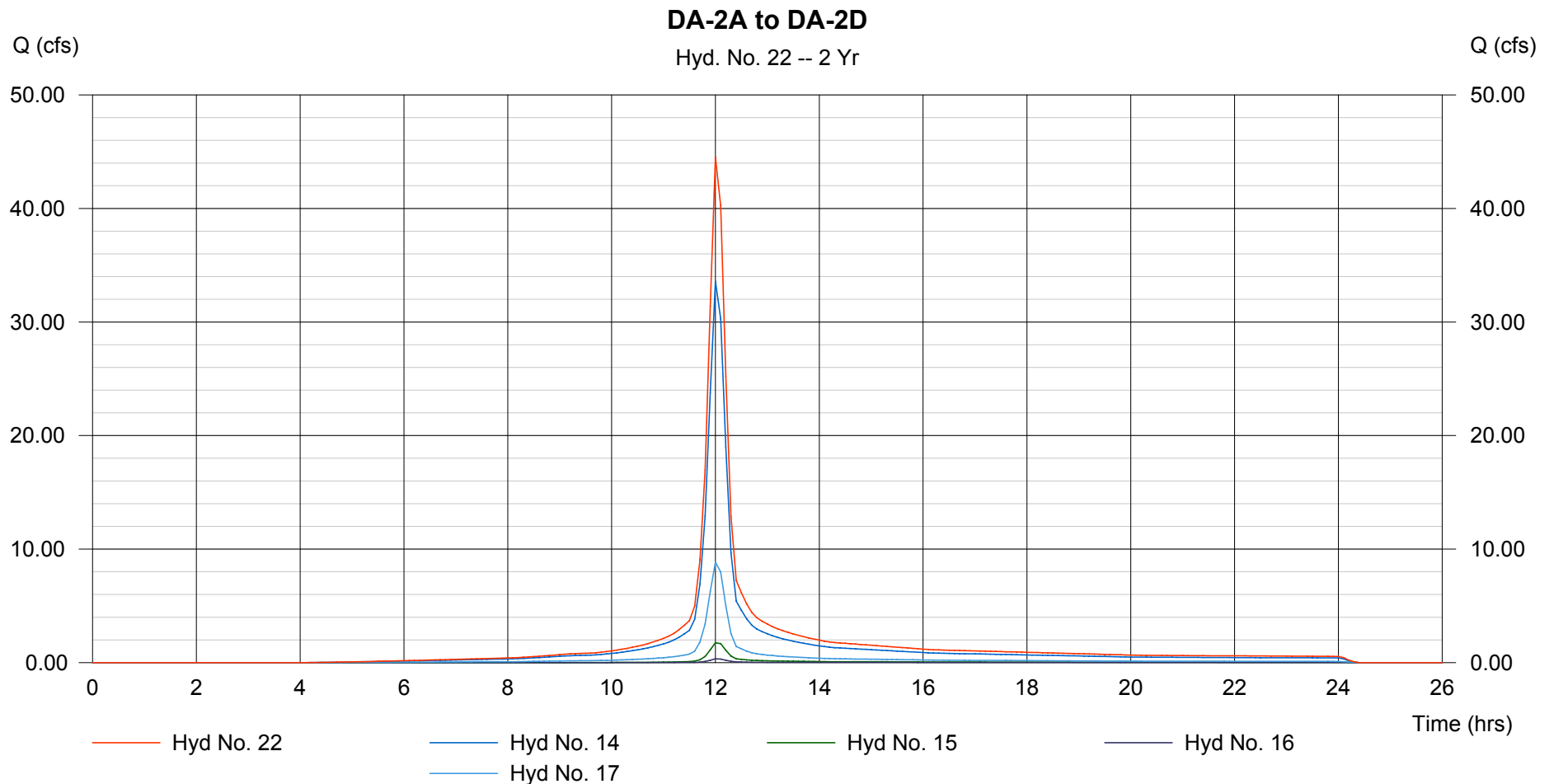
## Hyd. No. 22

DA-2A to DA-2D

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 14, 15, 16, 17

Peak discharge = 44.53 cfs  
Time interval = 6 min

Hydrograph Volume = 3.200 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

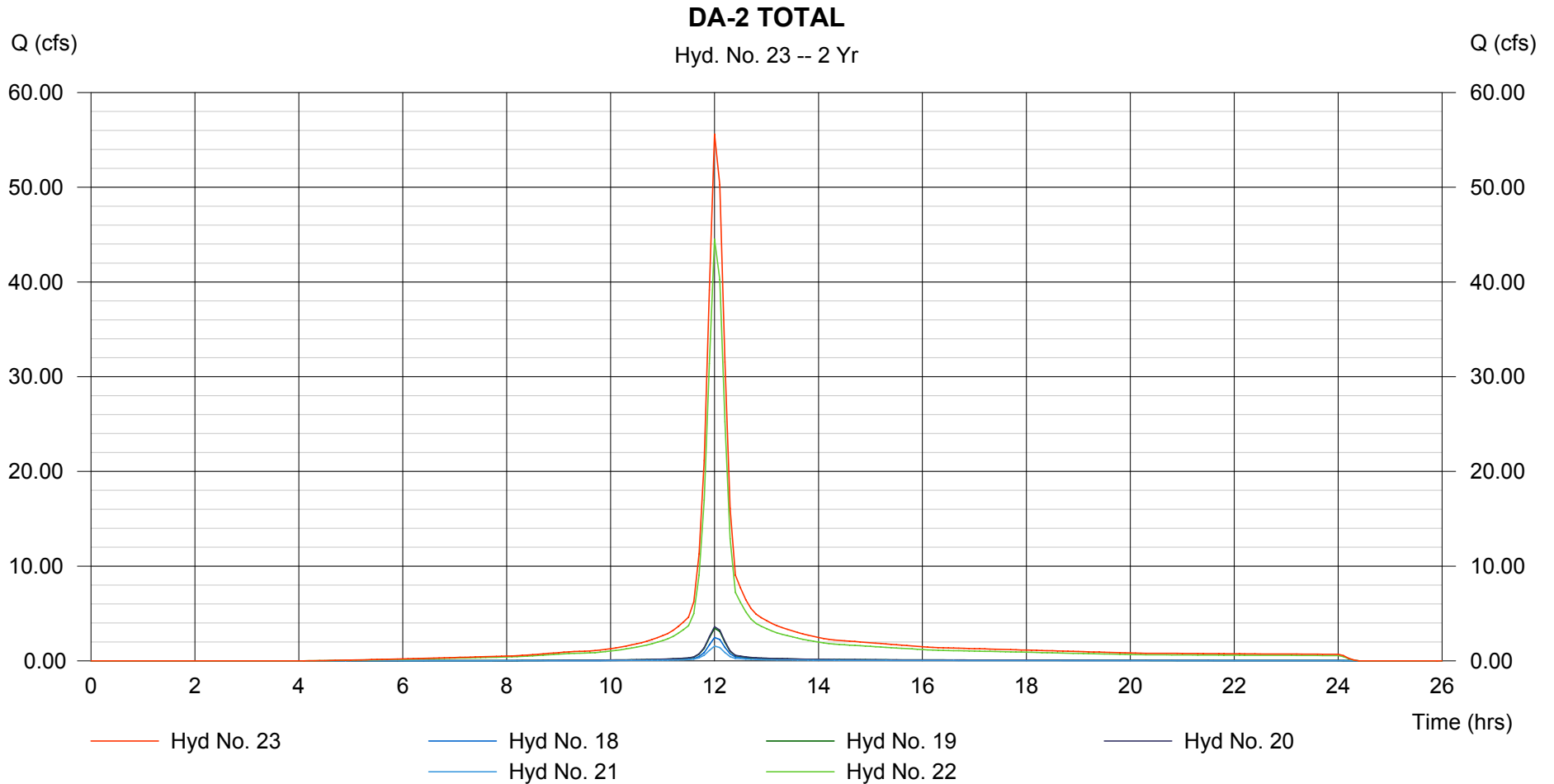
## Hyd. No. 23

DA-2 TOTAL

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 18, 19, 20, 21, 22

Peak discharge = 55.61 cfs  
Time interval = 6 min

Hydrograph Volume = 3.993 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

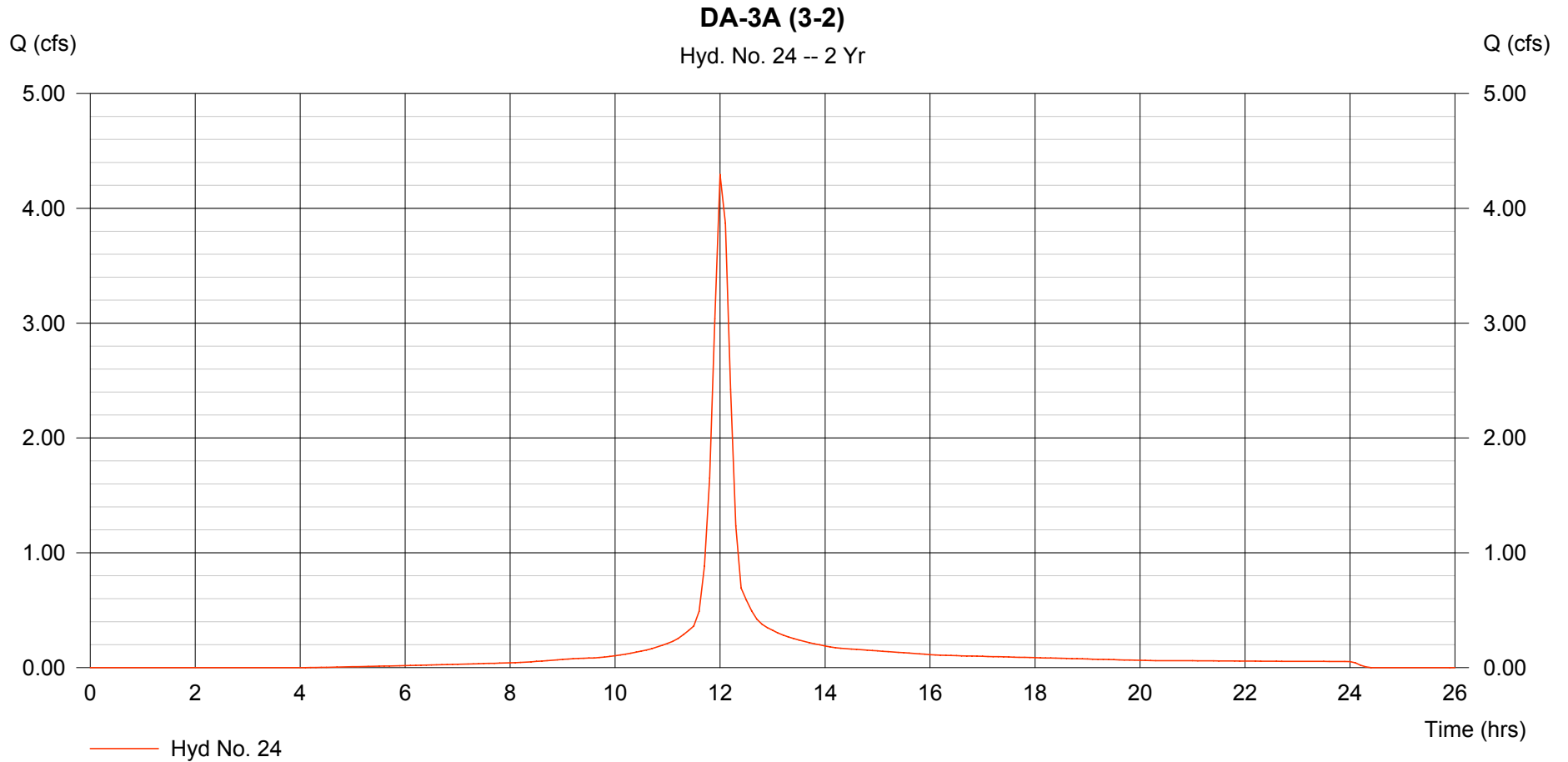
## Hyd. No. 24

DA-3A (3-2)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 1.446 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 4.295 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.309 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

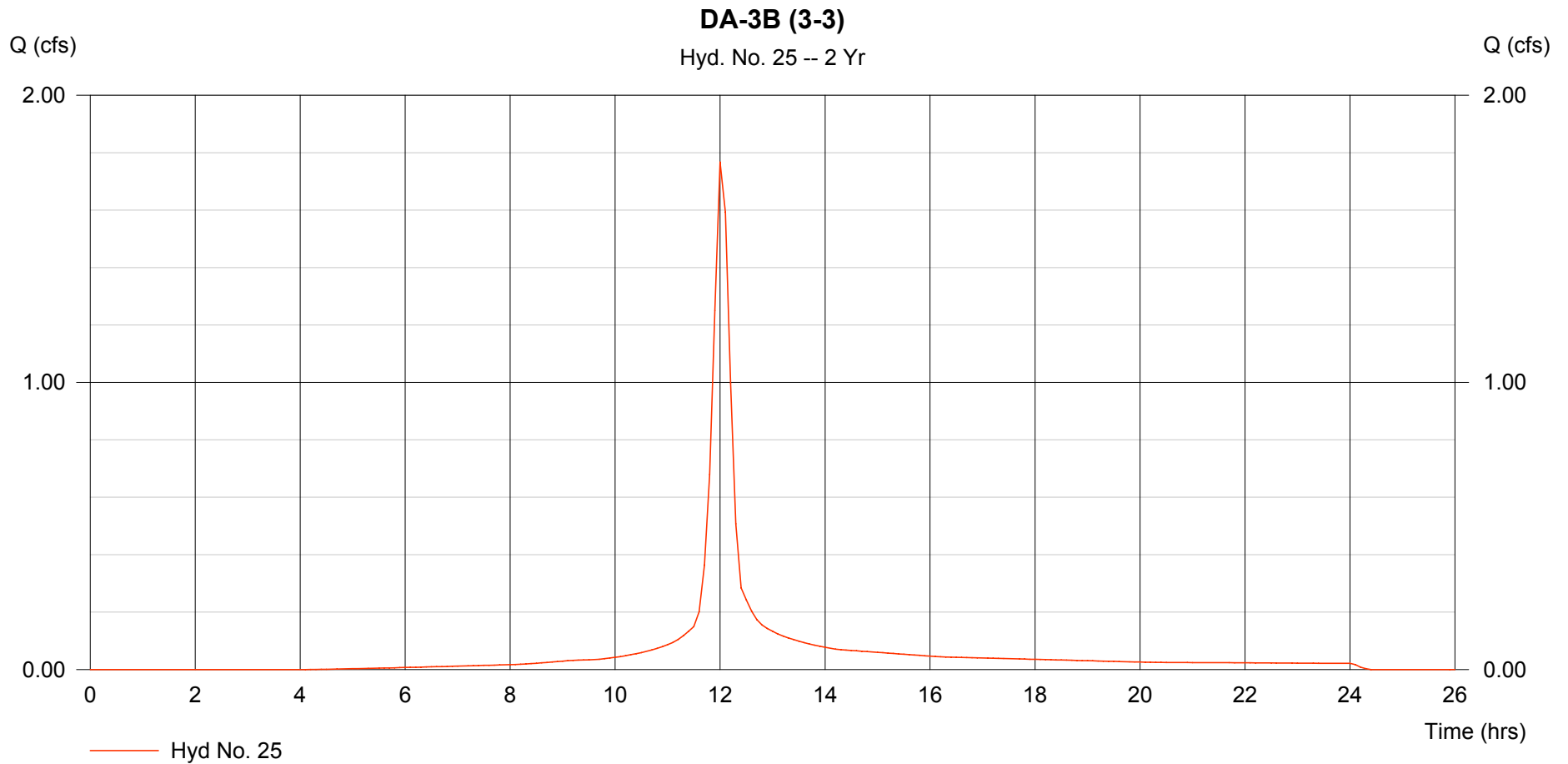
## Hyd. No. 25

DA-3B (3-3)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.595 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 1.767 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.127 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

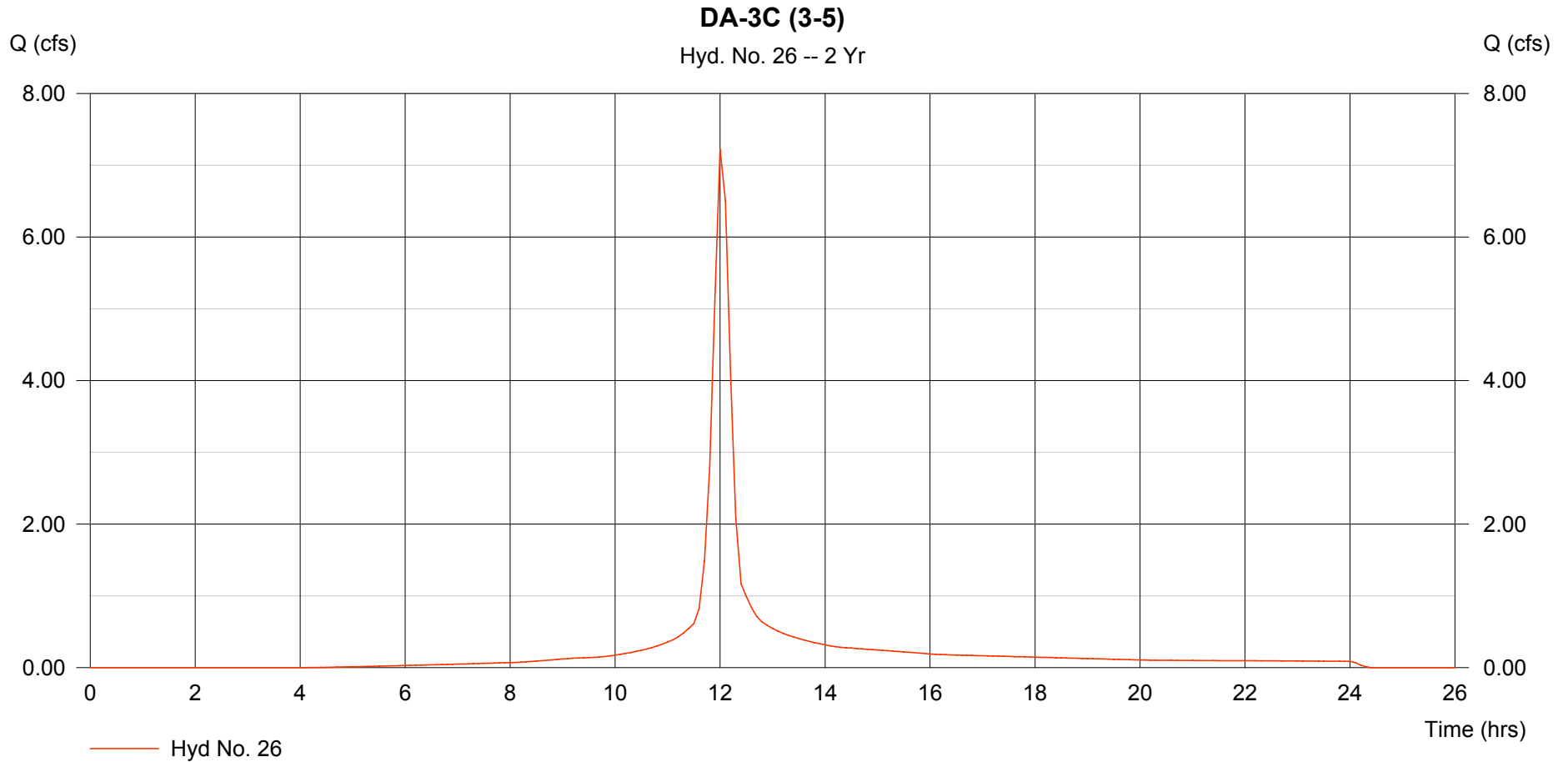
## Hyd. No. 26

DA-3C (3-5)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 2.433 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 7.226 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.519 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

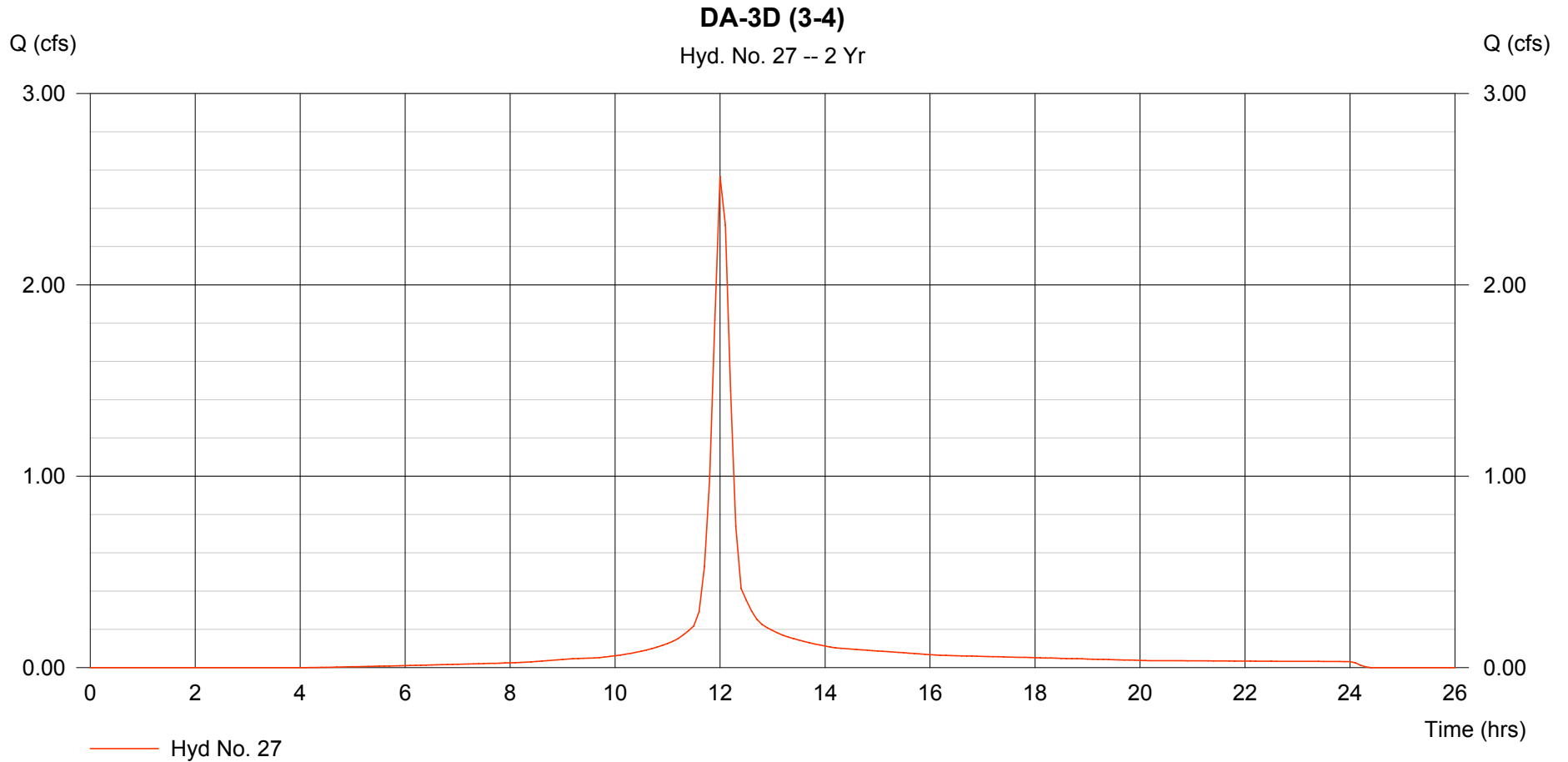
## Hyd. No. 27

DA-3D (3-4)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.864 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 2.566 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.184 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

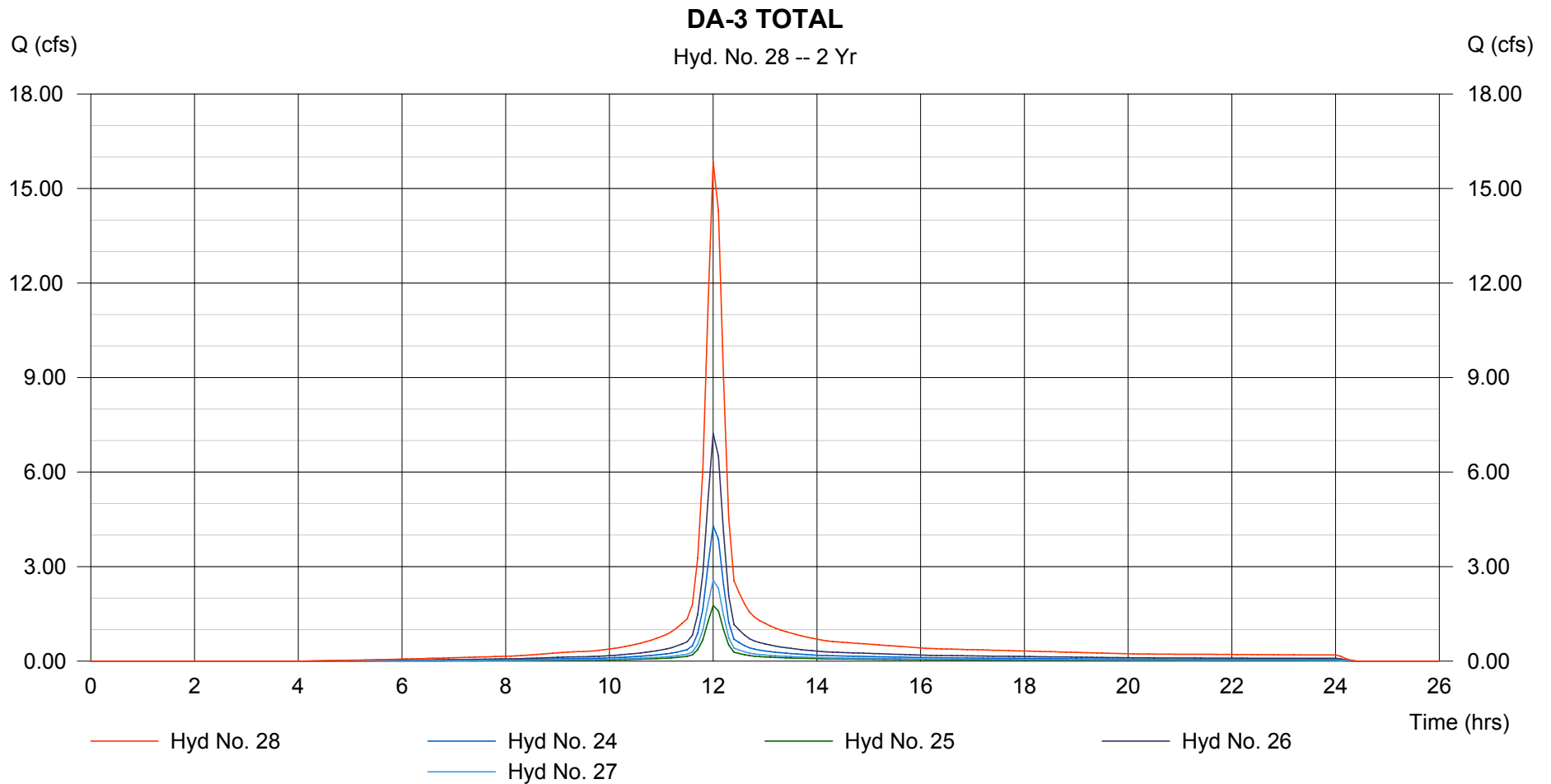
## Hyd. No. 28

DA-3 TOTAL

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 15.85 cfs  
Time interval = 6 min

Hydrograph Volume = 1.140 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

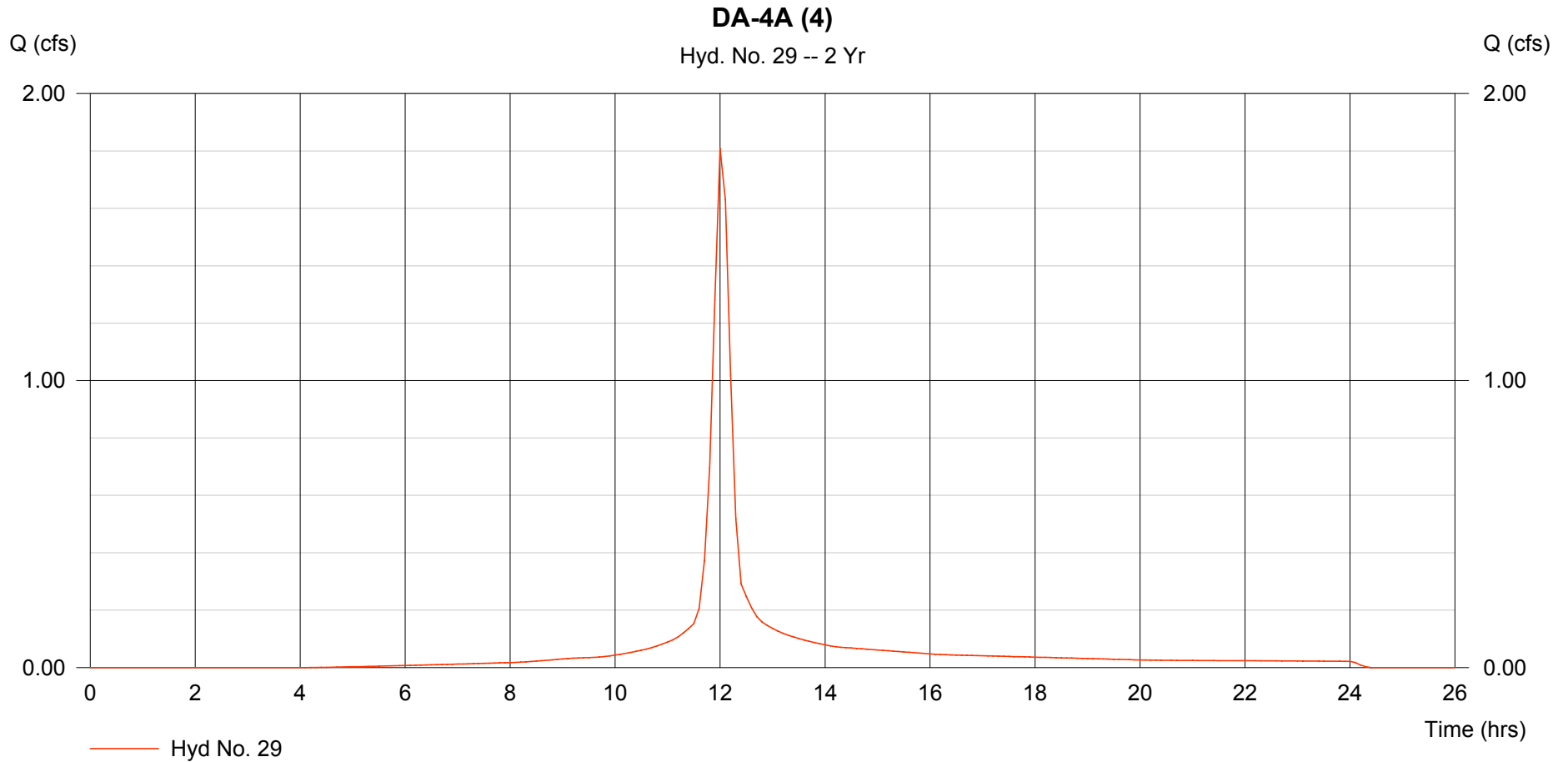
## Hyd. No. 29

DA-4A (4)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.609 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 1.809 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.130 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

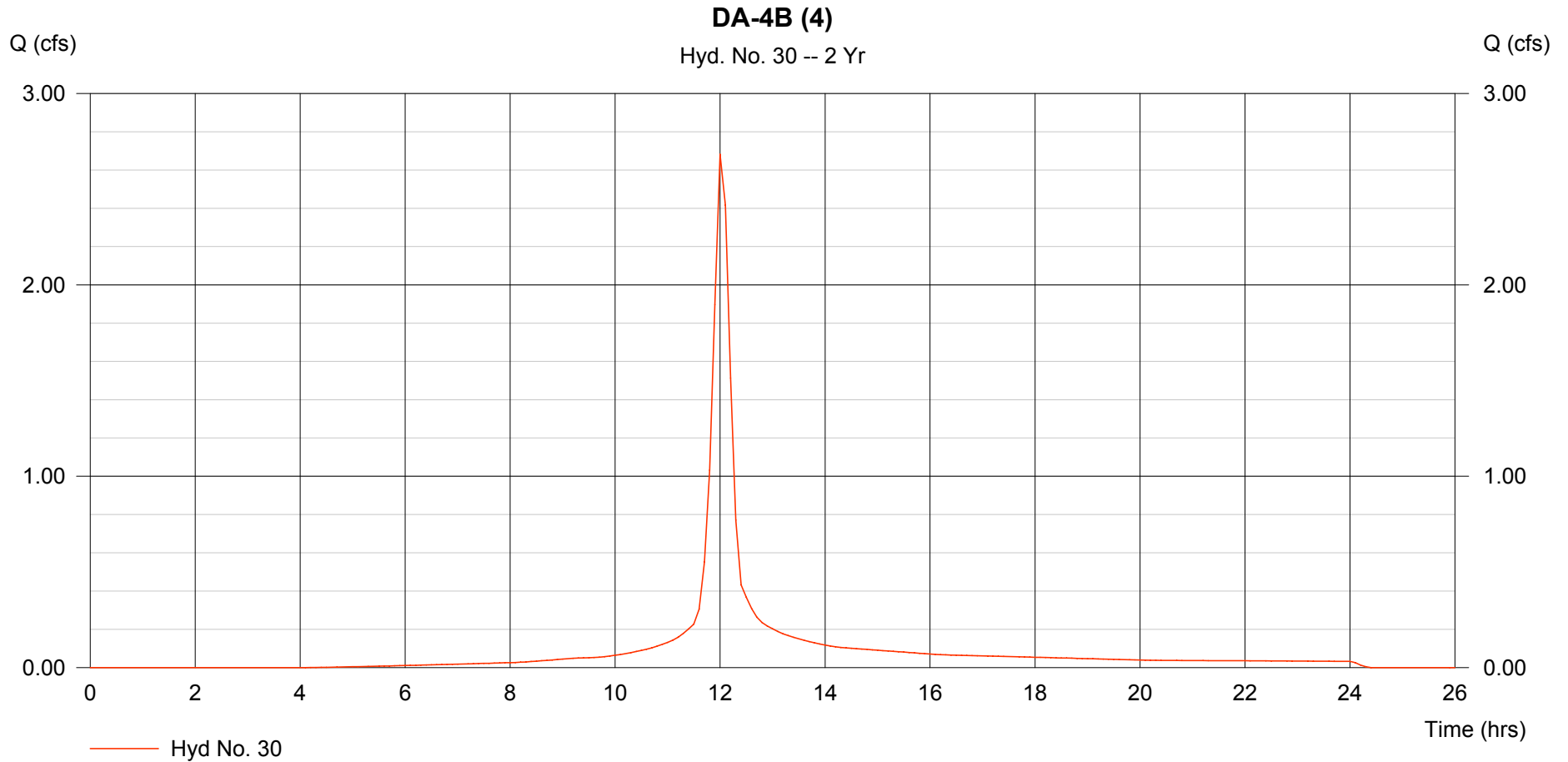
## Hyd. No. 30

DA-4B (4)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 0.903 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 2.682 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.193 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

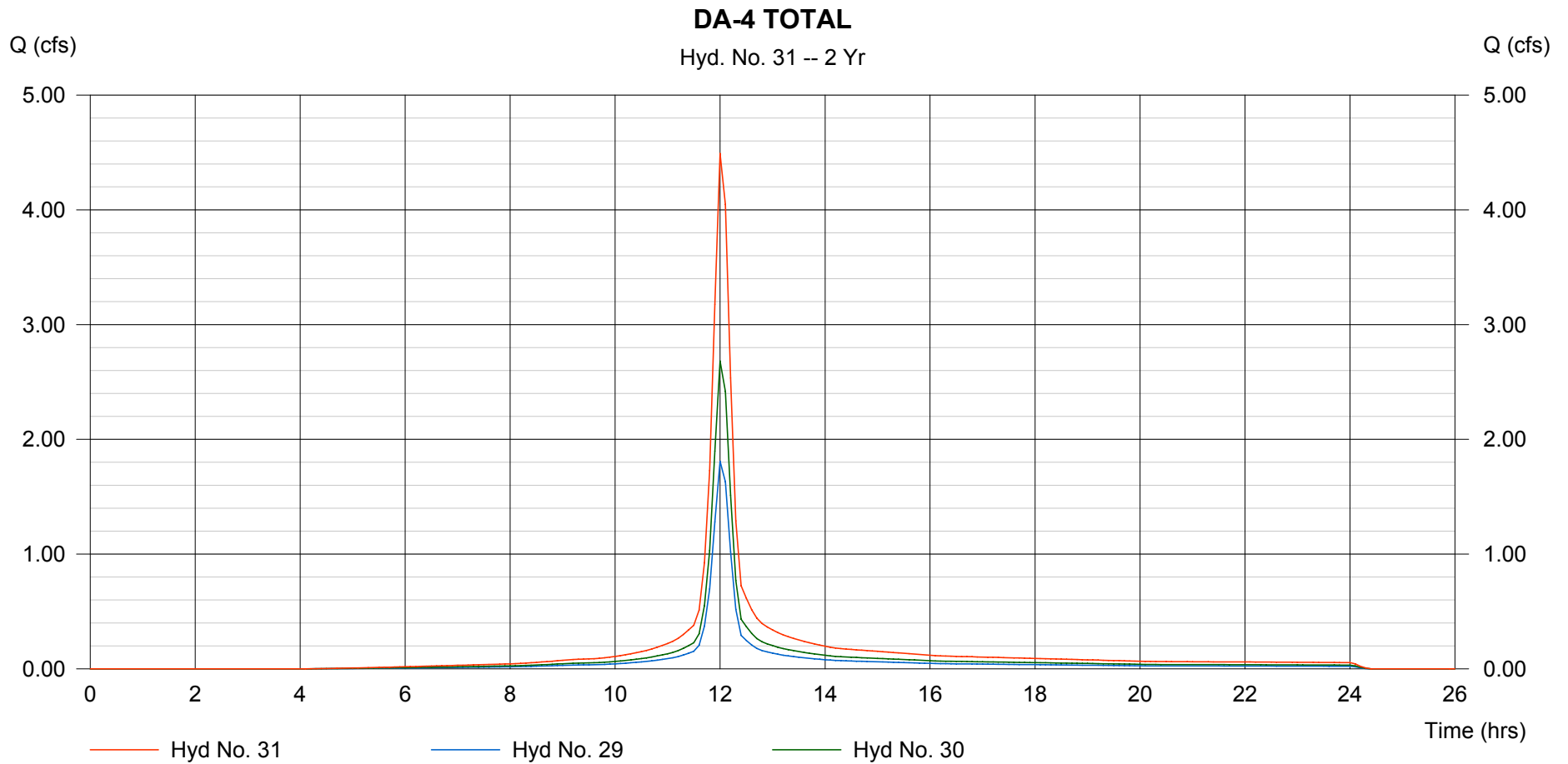
## Hyd. No. 31

DA-4 TOTAL

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 29, 30

Peak discharge = 4.491 cfs  
Time interval = 6 min

Hydrograph Volume = 0.323 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

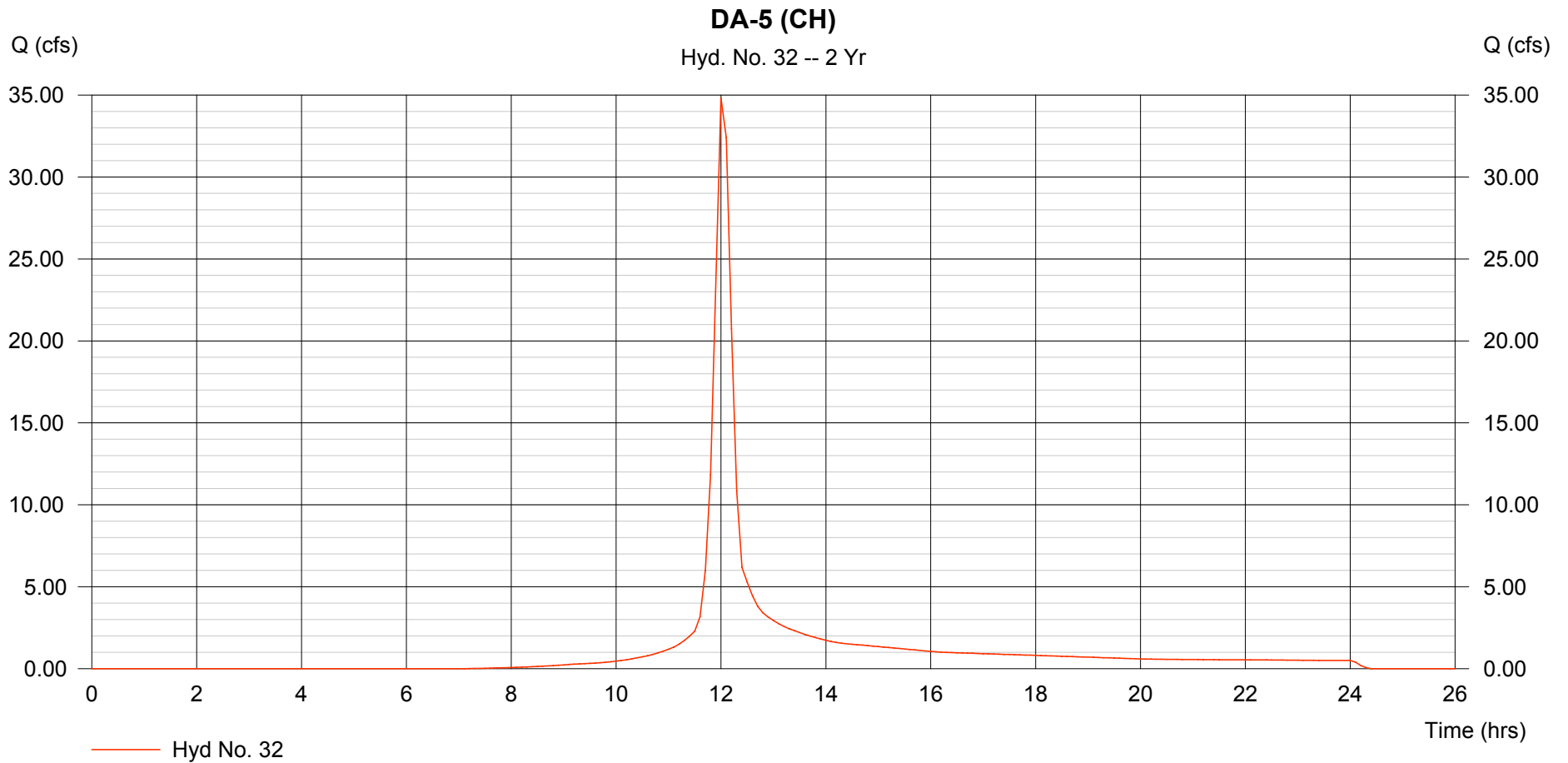
## Hyd. No. 32

DA-5 (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 15.067 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 34.83 cfs  
Time interval = 6 min  
Curve number = 84.8  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.457 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

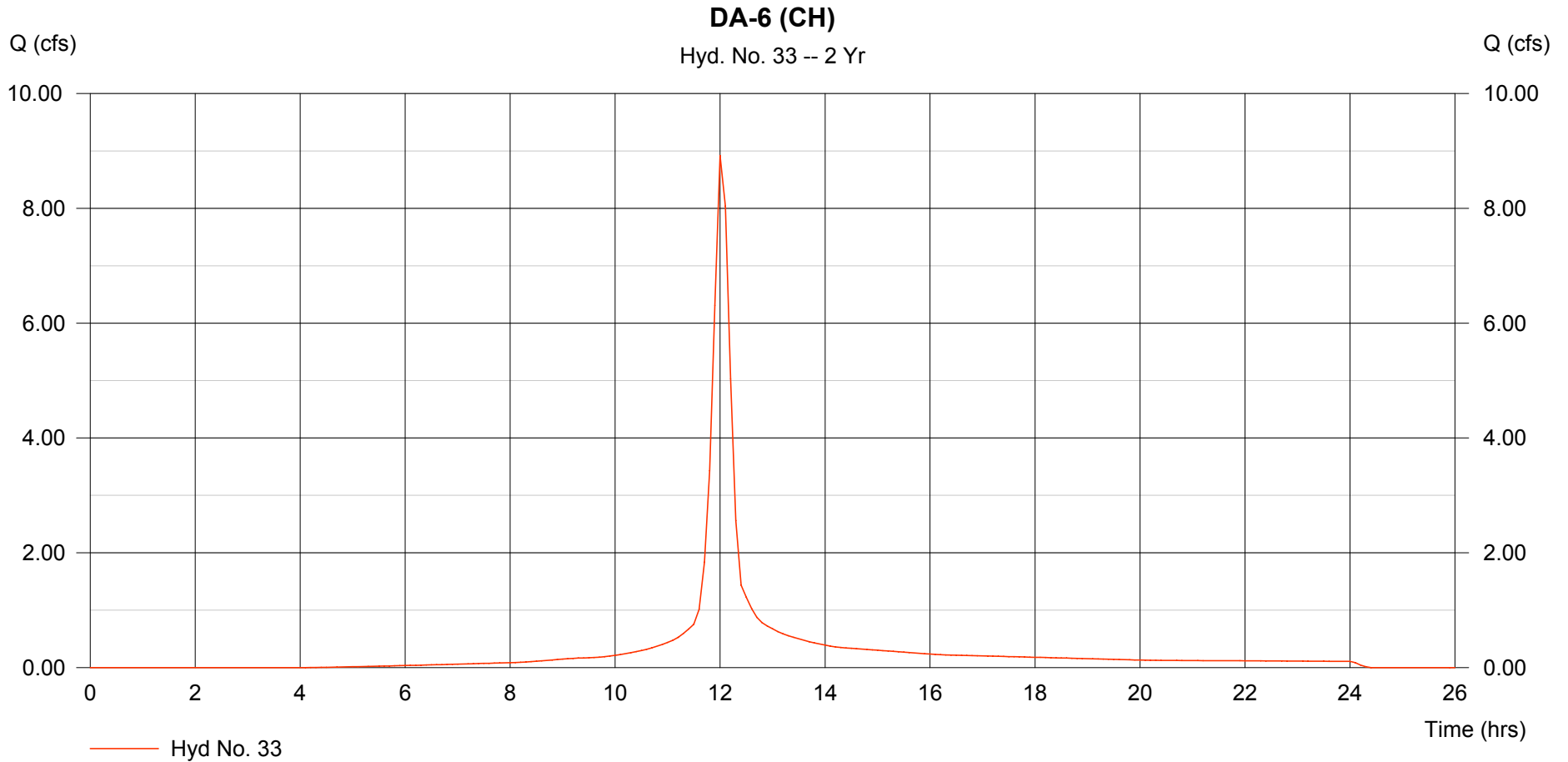
## Hyd. No. 33

DA-6 (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 2 yrs  
Drainage area = 3.003 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 3.60 in  
Storm duration = 24 hrs

Peak discharge = 8.919 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.641 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

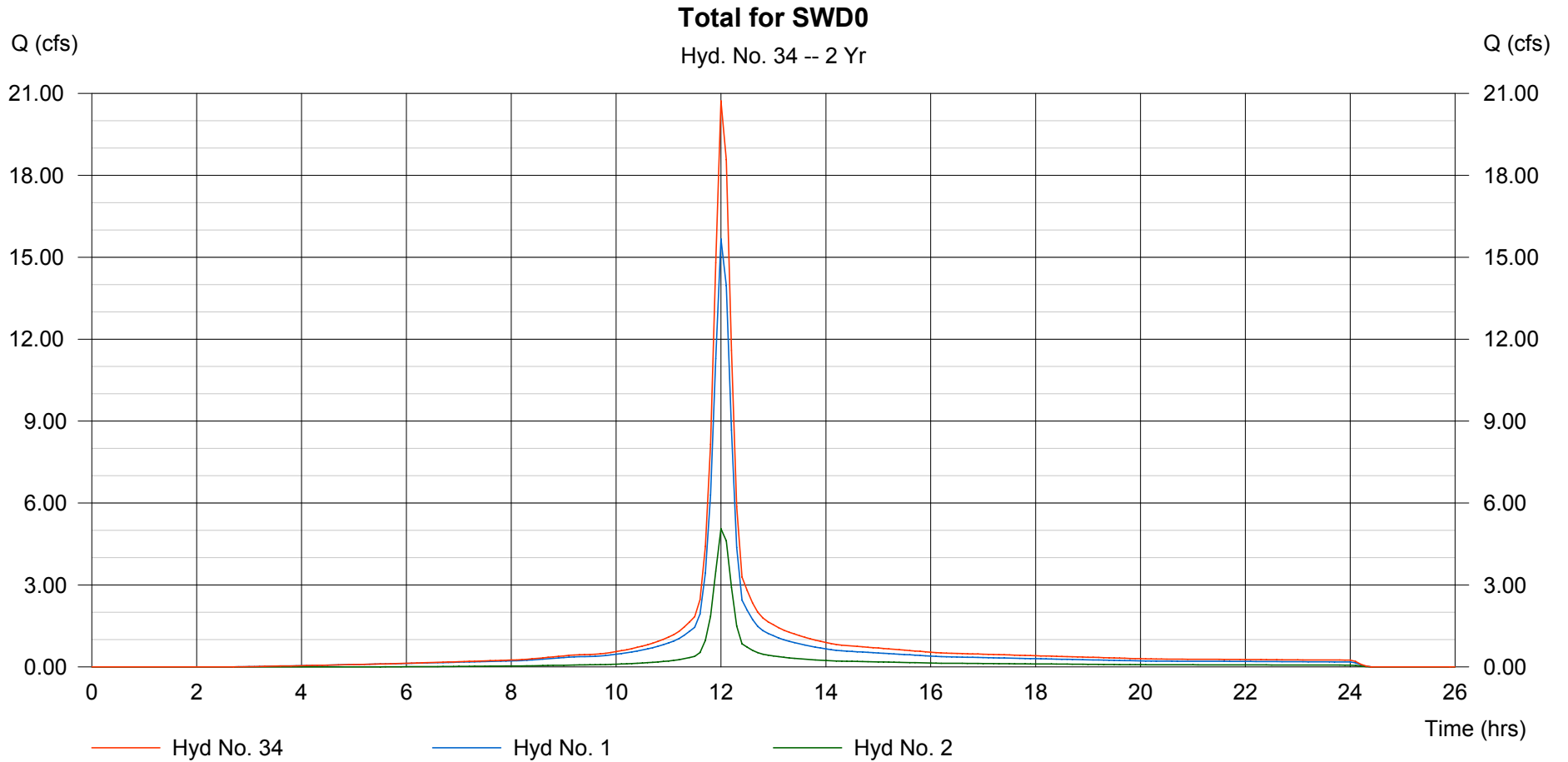
## Hyd. No. 34

Total for SWD0

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 1, 2

Peak discharge = 20.73 cfs  
Time interval = 6 min

Hydrograph Volume = 1.517 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

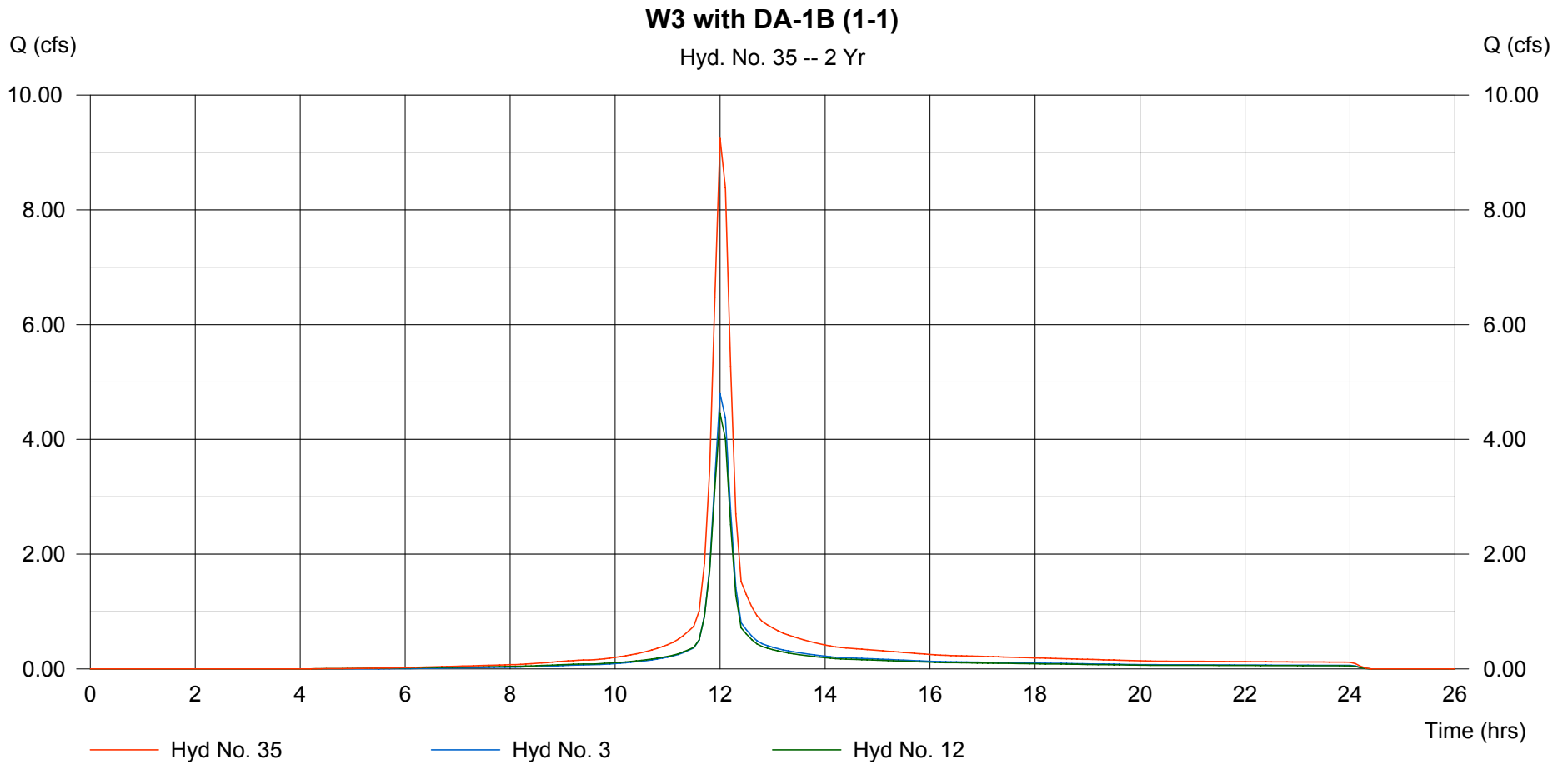
## Hyd. No. 35

W3 with DA-1B (1-1)

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 3, 12

Peak discharge = 9.244 cfs  
Time interval = 6 min

Hydrograph Volume = 0.660 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

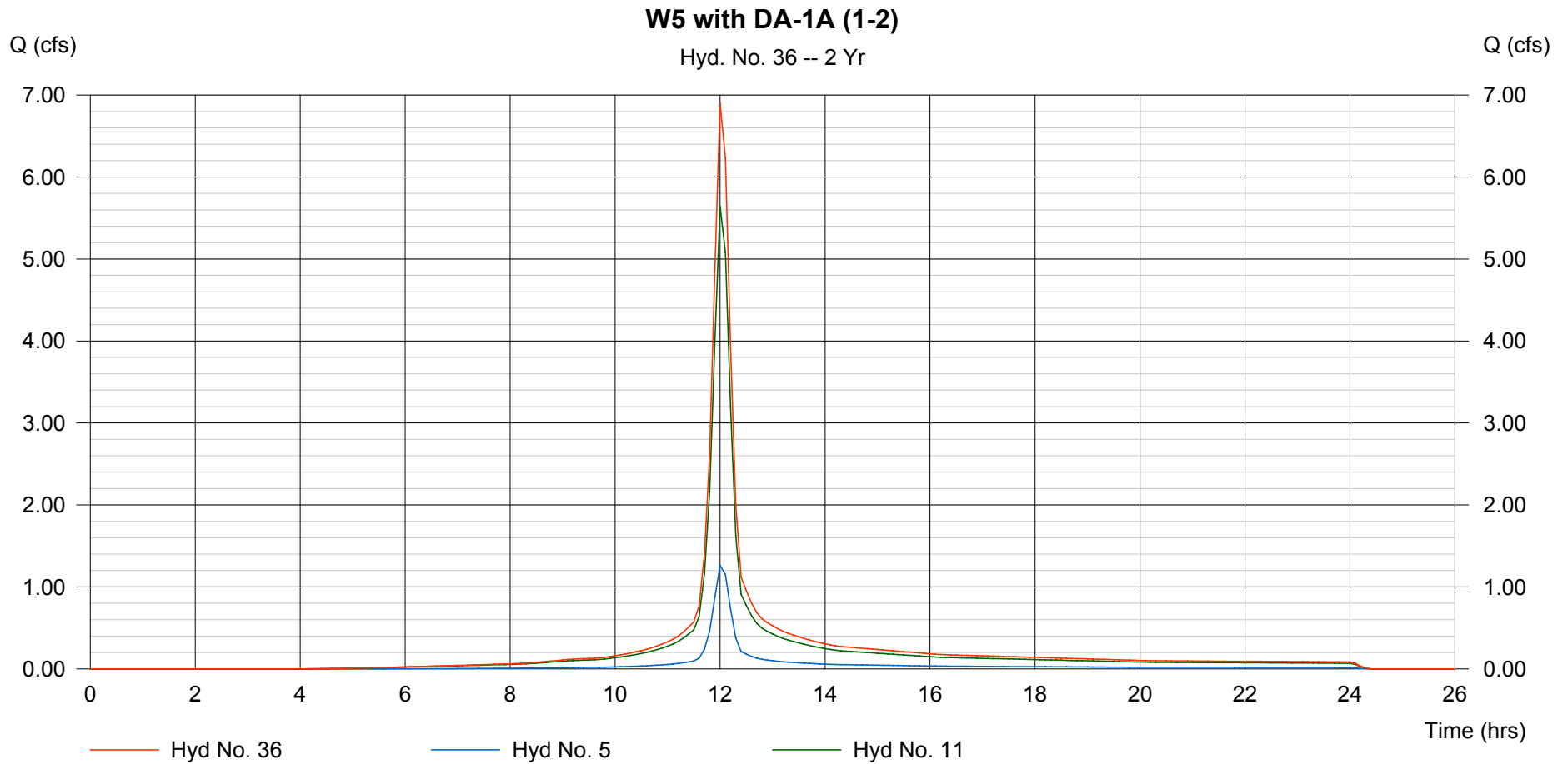
## Hyd. No. 36

W5 with DA-1A (1-2)

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 5, 11

Peak discharge = 6.902 cfs  
Time interval = 6 min

Hydrograph Volume = 0.495 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

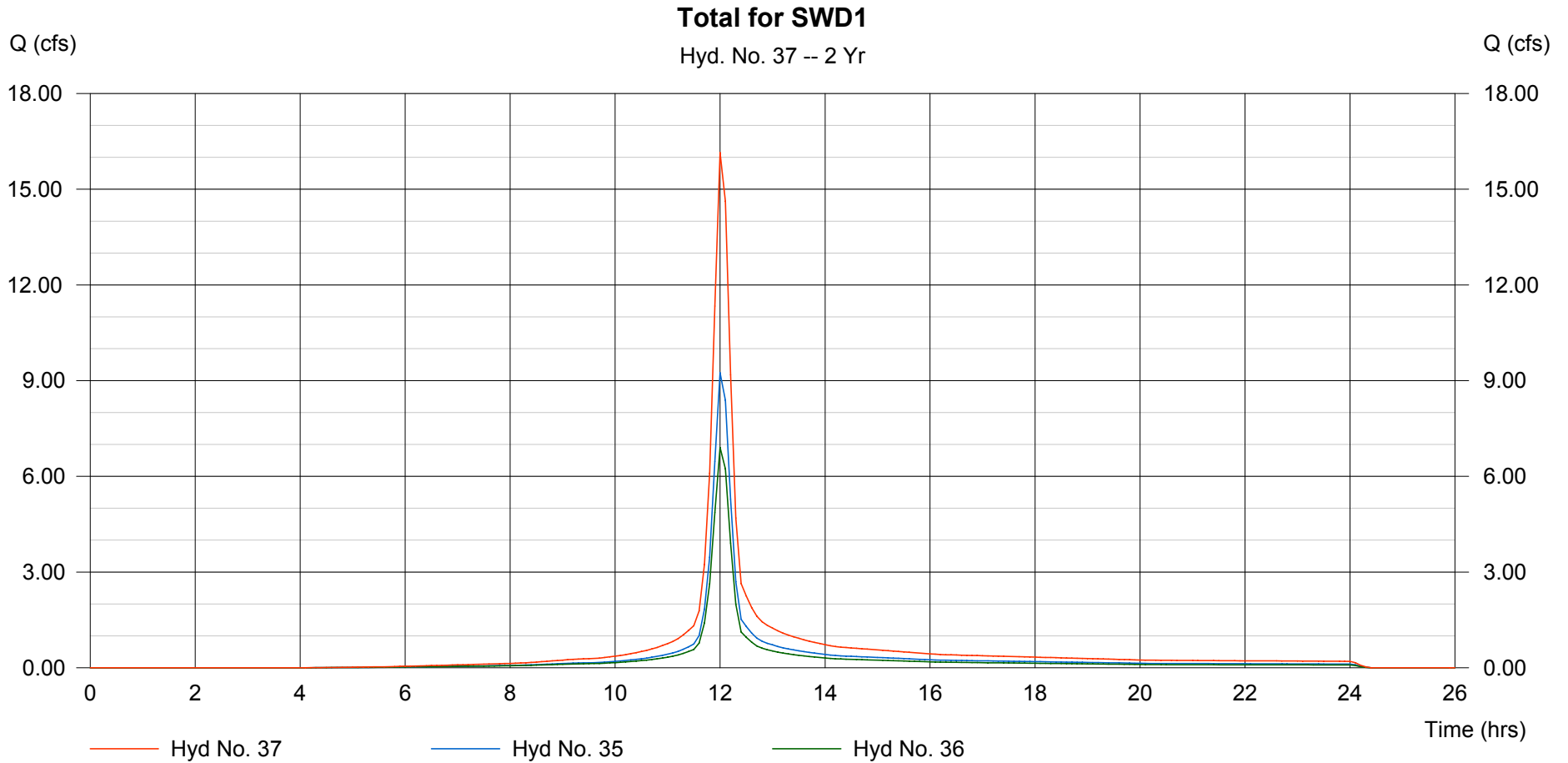
## Hyd. No. 37

Total for SWD1

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 35, 36

Peak discharge = 16.15 cfs  
Time interval = 6 min

Hydrograph Volume = 1.154 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

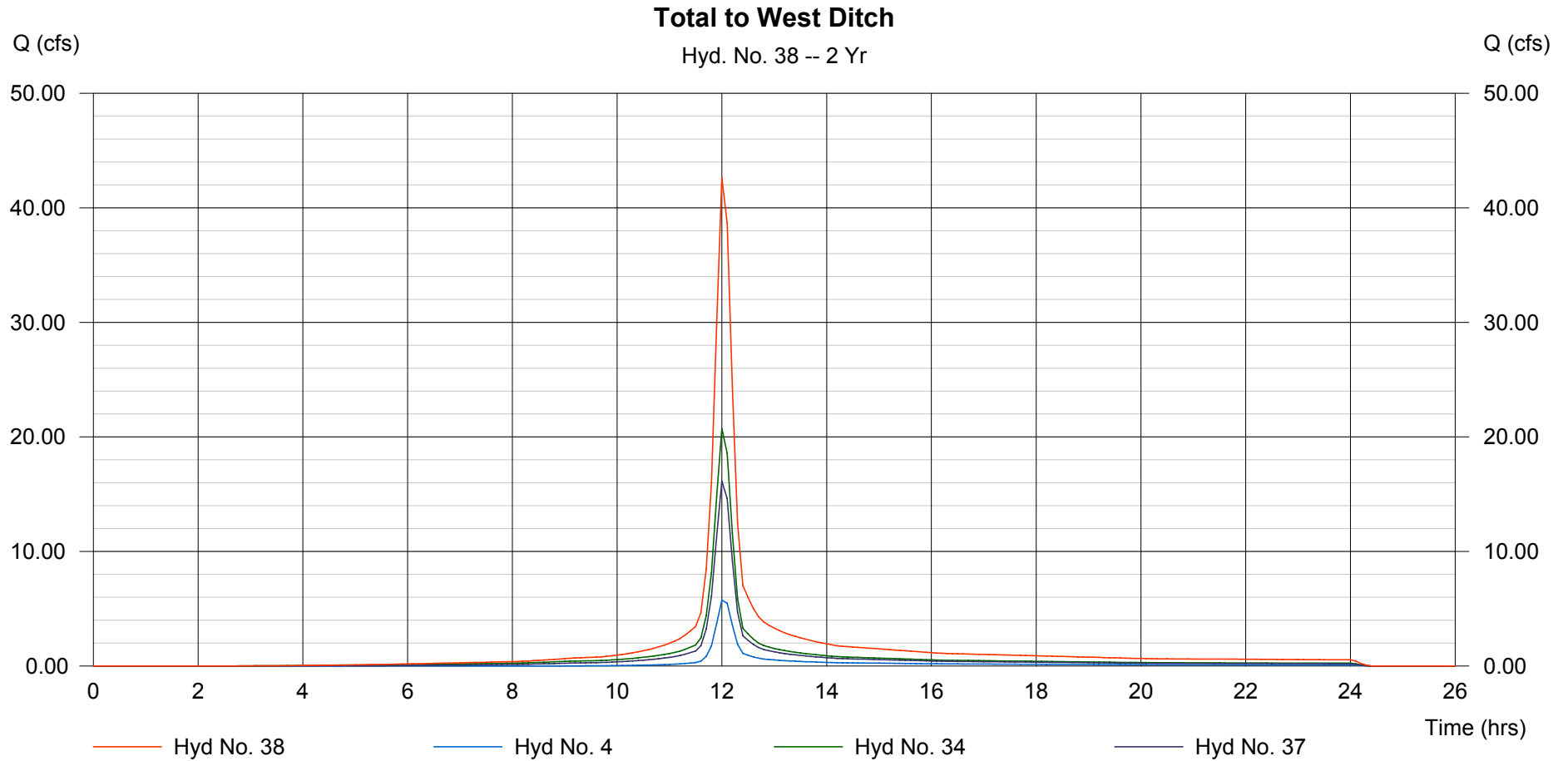
## Hyd. No. 38

Total to West Ditch

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 4, 34, 37

Peak discharge = 42.63 cfs  
Time interval = 6 min

Hydrograph Volume = 3.082 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 39

Proposed West Ditch

Hydrograph type = Reach  
Storm frequency = 2 yrs  
Inflow hyd. No. = 38  
Reach length = 1202.1 ft  
Manning's n = 0.050  
Side slope = 4.0:1  
Rating curve x = 0.720  
Ave. velocity = 1.50 ft/s

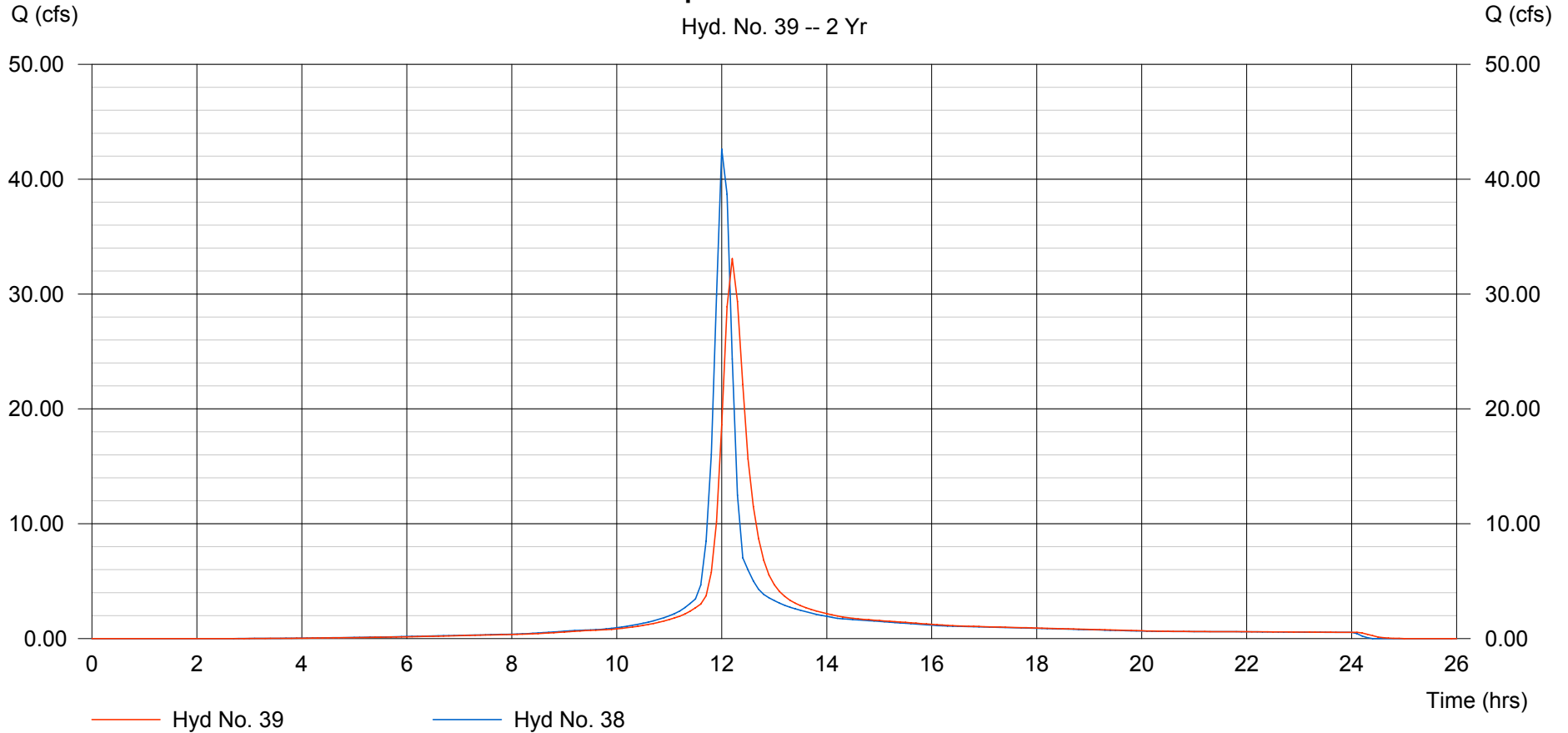
Peak discharge = 33.09 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.5 %  
Bottom width = 5.0 ft  
Max. depth = 1.5 ft  
Rating curve m = 1.218  
Routing coeff. = 0.4287

Modified Att-Kin routing method used.

Hydrograph Volume = 3.082 acft

### Proposed West Ditch

Hyd. No. 39 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

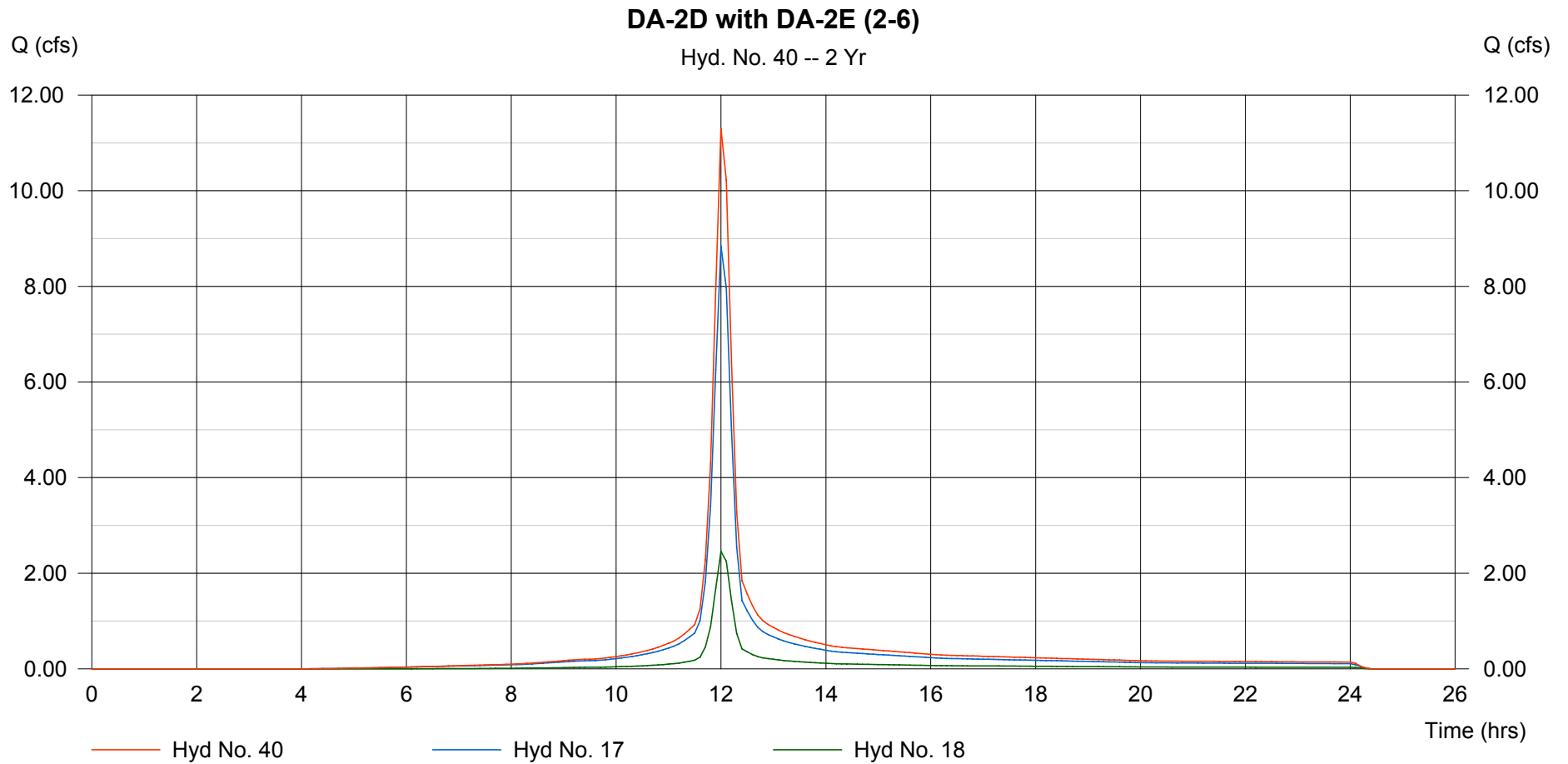
## Hyd. No. 40

DA-2D with DA-2E (2-6)

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 17, 18

Peak discharge = 11.30 cfs  
Time interval = 6 min

Hydrograph Volume = 0.809 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

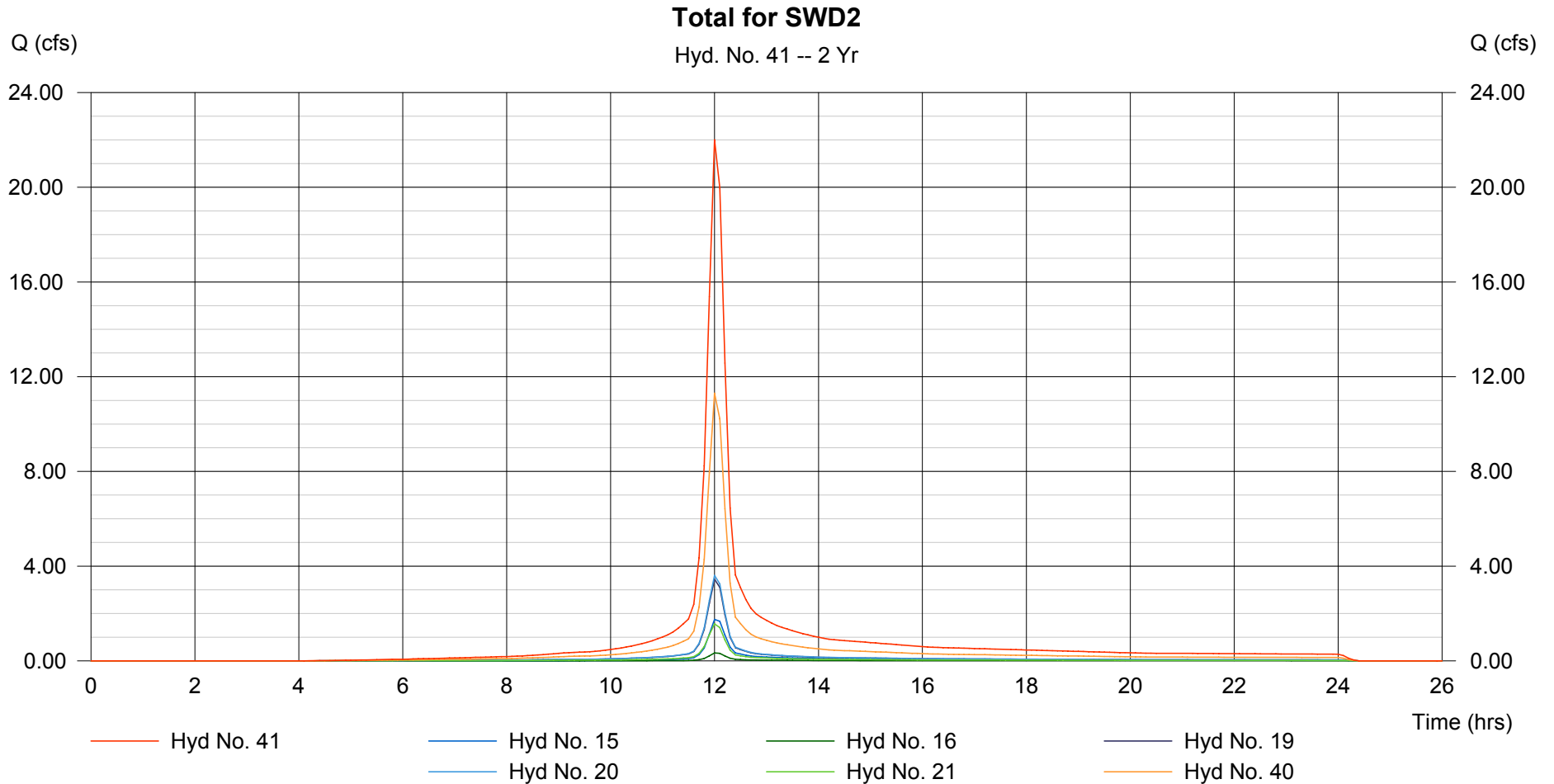
## Hyd. No. 41

Total for SWD2

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 15, 16, 19, 20, 21, 40

Peak discharge = 22.00 cfs  
Time interval = 6 min

Hydrograph Volume = 1.578 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

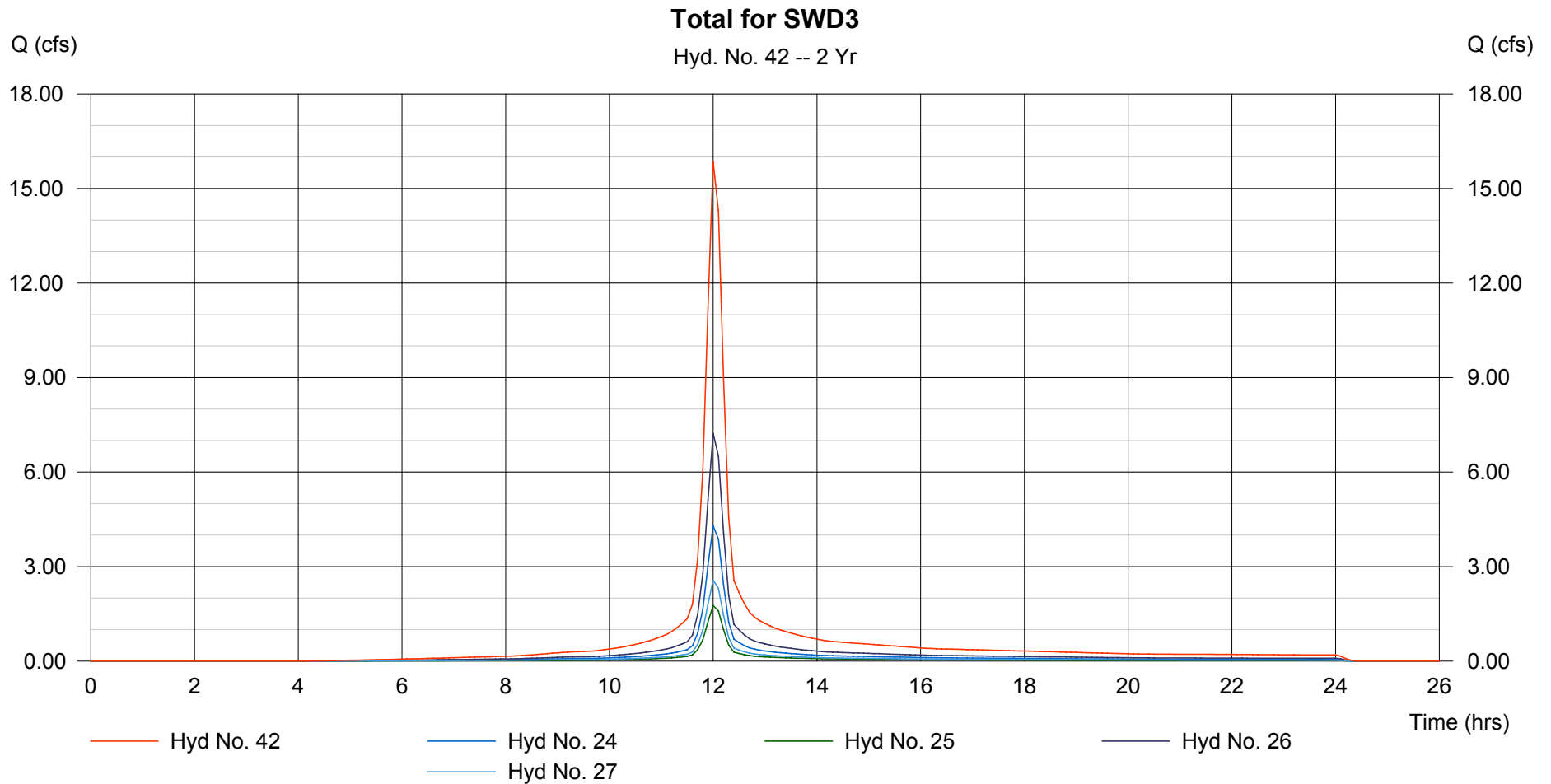
## Hyd. No. 42

Total for SWD3

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 15.85 cfs  
Time interval = 6 min

Hydrograph Volume = 1.140 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

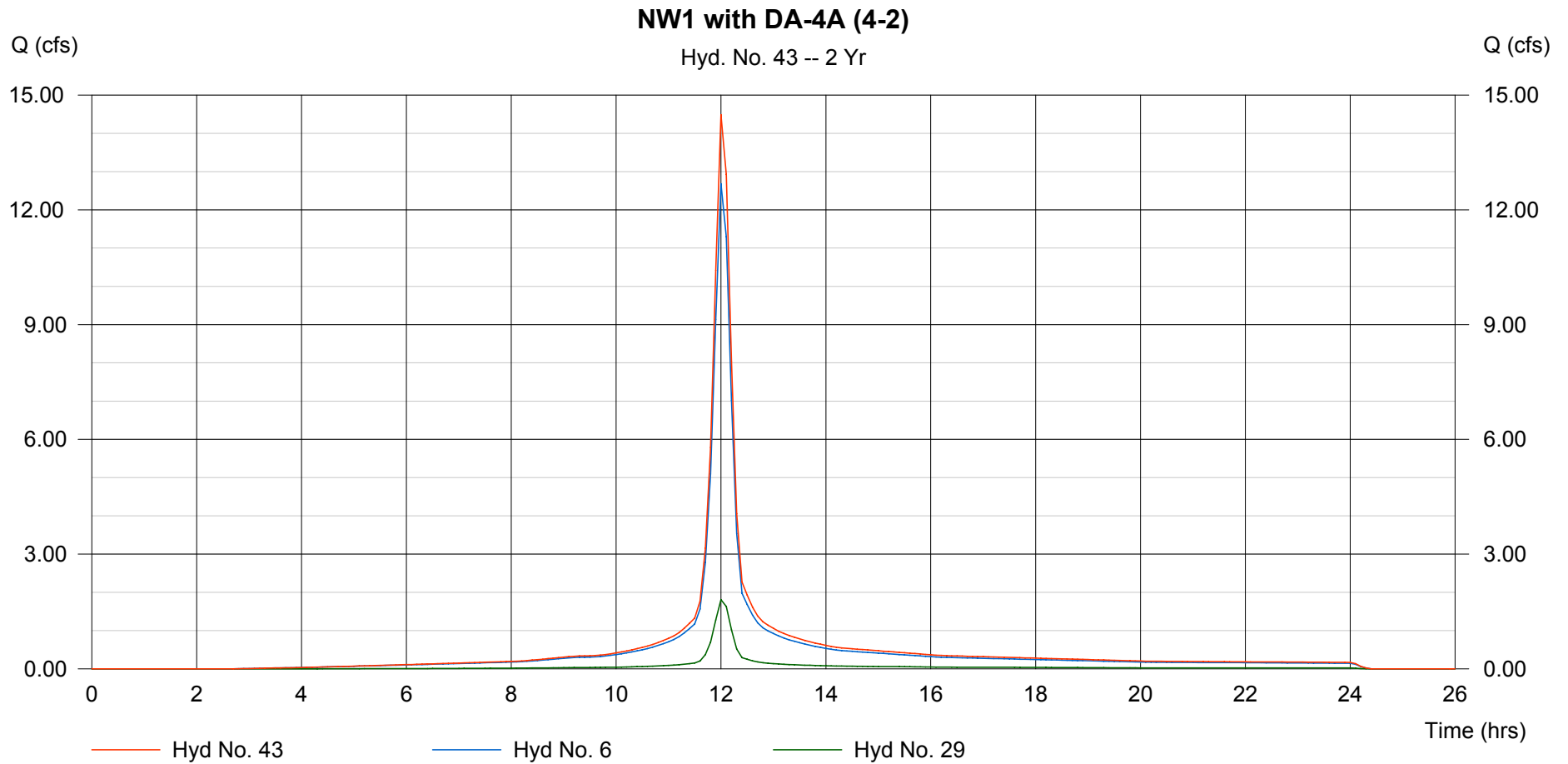
## Hyd. No. 43

NW1 with DA-4A (4-2)

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 6, 29

Peak discharge = 14.49 cfs  
Time interval = 6 min

Hydrograph Volume = 1.068 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

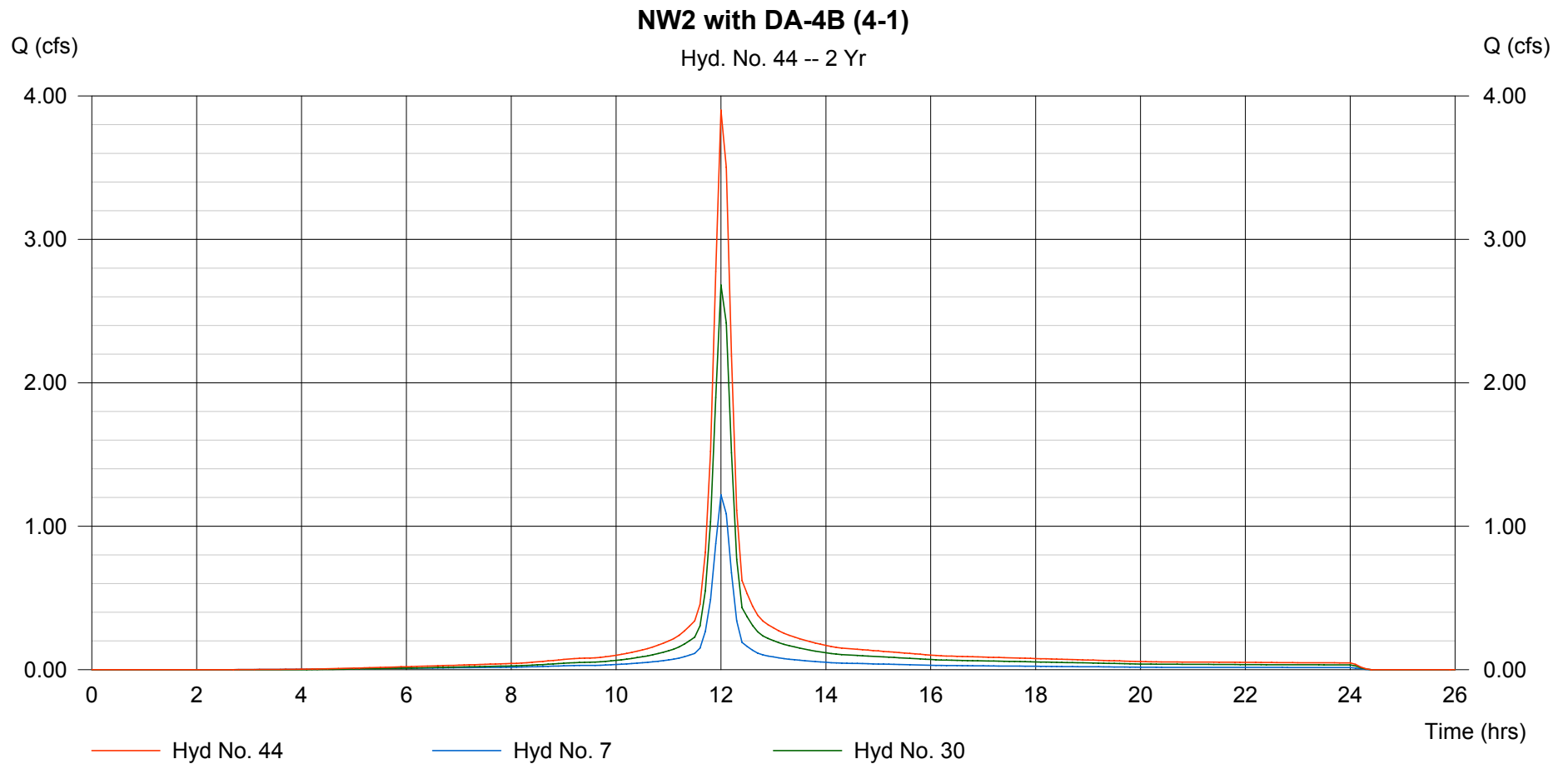
## Hyd. No. 44

NW2 with DA-4B (4-1)

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 7, 30

Peak discharge = 3.901 cfs  
Time interval = 6 min

Hydrograph Volume = 0.283 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

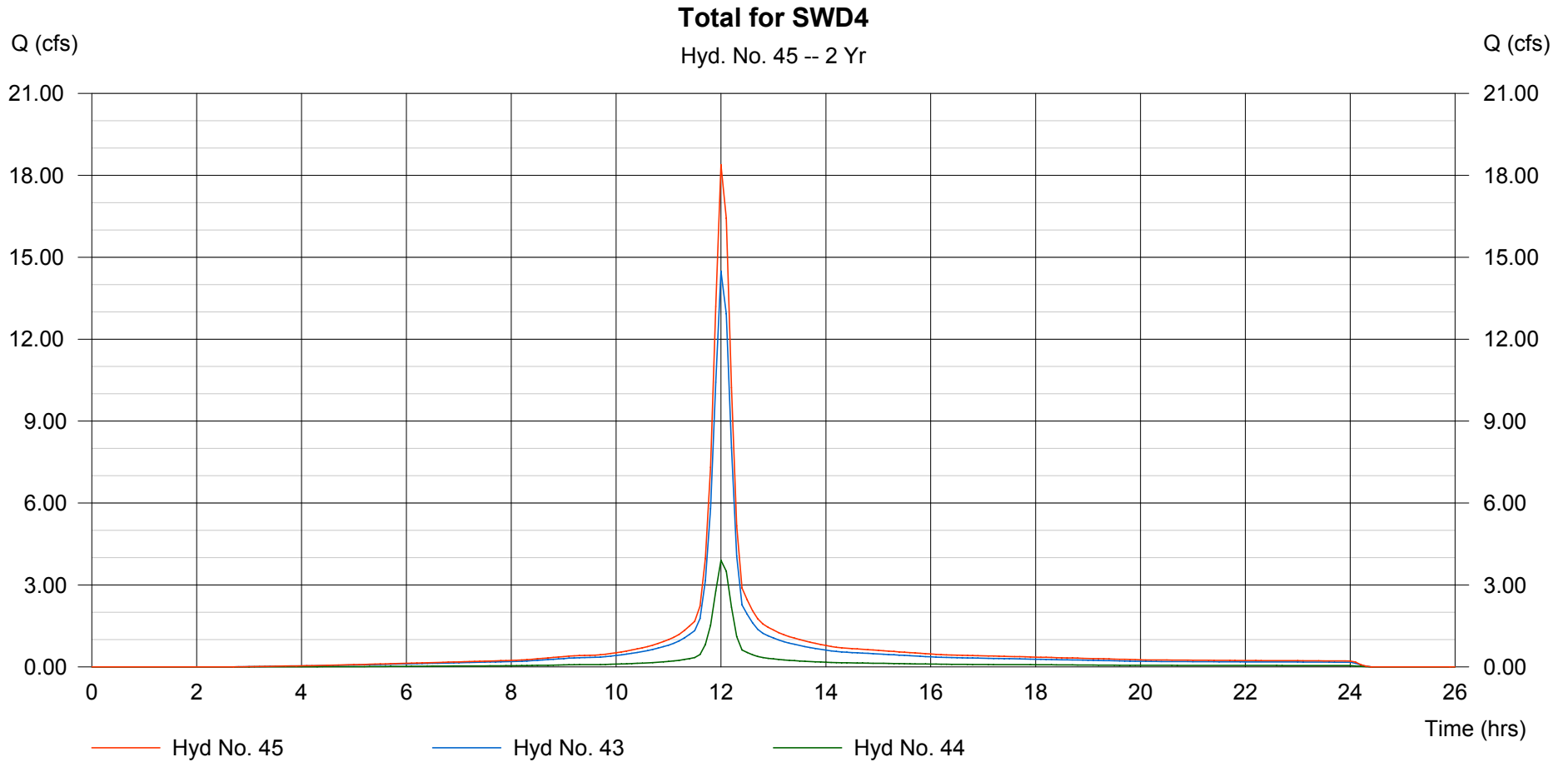
## Hyd. No. 45

Total for SWD4

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 43, 44

Peak discharge = 18.39 cfs  
Time interval = 6 min

Hydrograph Volume = 1.351 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

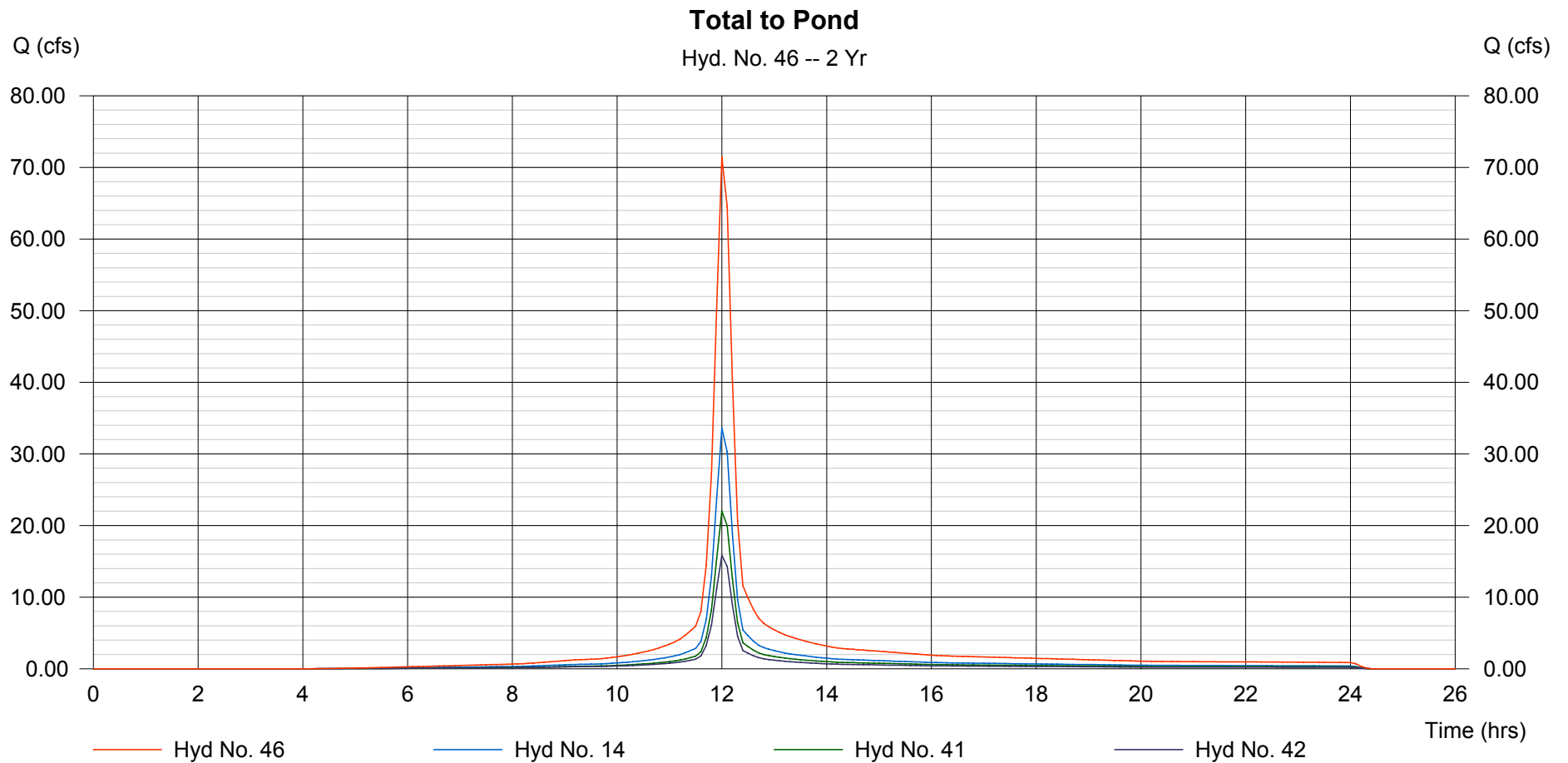
## Hyd. No. 46

Total to Pond

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 14, 41, 42

Peak discharge = 71.46 cfs  
Time interval = 6 min

Hydrograph Volume = 5.132 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 47

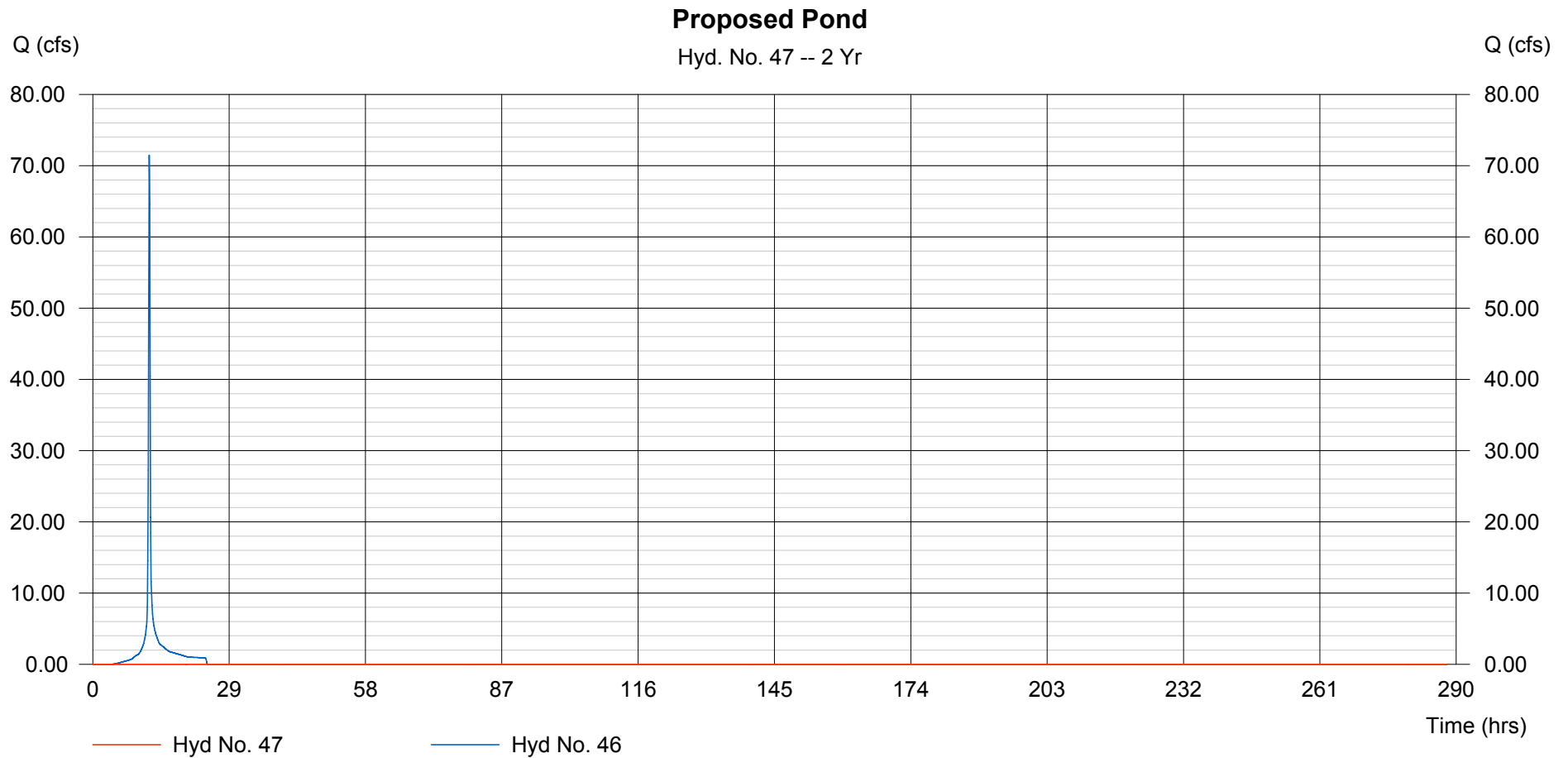
Proposed Pond

Hydrograph type = Reservoir  
Storm frequency = 2 yrs  
Inflow hyd. No. = 46  
Reservoir name = Proposed Pond

Peak discharge = 0.000 cfs  
Time interval = 6 min  
Max. Elevation = 1386.67 ft  
Max. Storage = 5.132 acft

Storage Indication method used.

Hydrograph Volume = 0.000 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 48

N, NE, SE, DA-5, DA-6, & SWD4

Hydrograph type = Combine

Storm frequency = 2 yrs

Inflow hyds. = 8, 9, 10, 32, 33, 45

Peak discharge

= 361.47 cfs

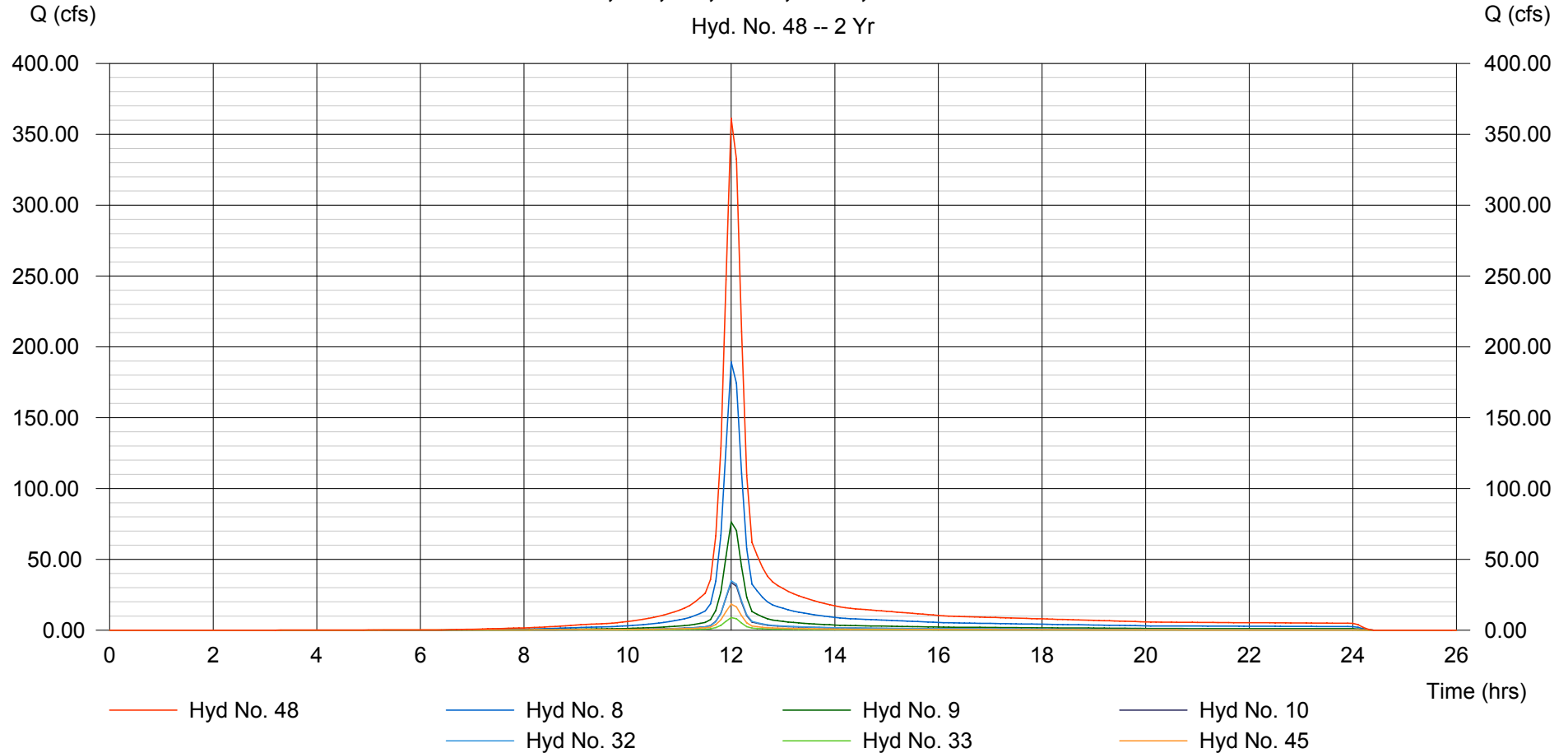
Time interval

= 6 min

Hydrograph Volume = 25.570 acft

### N, NE, SE, DA-5, DA-6, & SWD4

Hyd. No. 48 -- 2 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

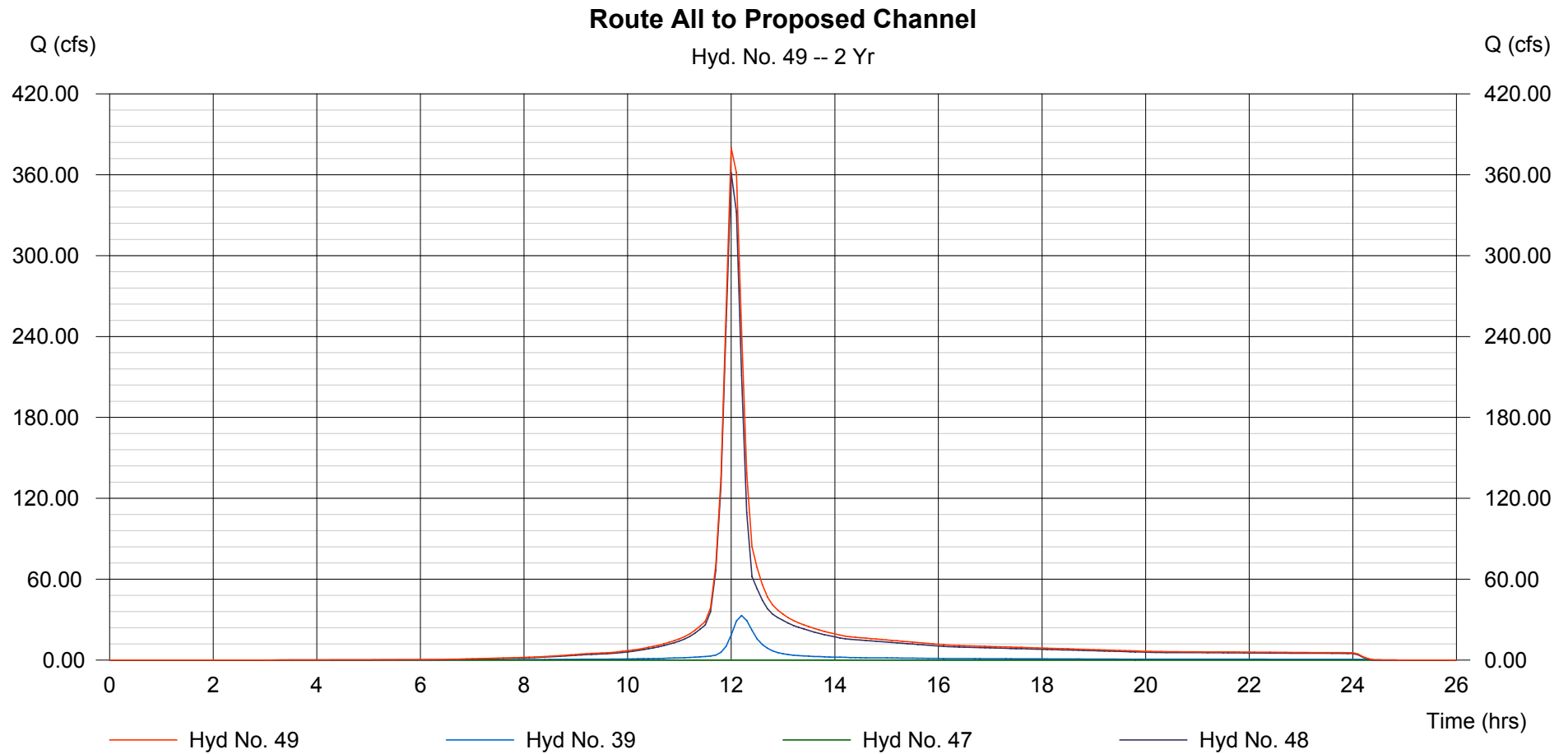
## Hyd. No. 49

Route All to Proposed Channel

Hydrograph type = Combine  
Storm frequency = 2 yrs  
Inflow hyds. = 39, 47, 48

Peak discharge = 380.07 cfs  
Time interval = 6 min

Hydrograph Volume = 28.652 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:28 PM

## Hyd. No. 50

Proposed Channel

Hydrograph type = Reach  
Storm frequency = 2 yrs  
Inflow hyd. No. = 49  
Reach length = 2296.0 ft  
Manning's n = 0.030  
Side slope = 4.0:1  
Rating curve x = 0.301  
Ave. velocity = 2.59 ft/s

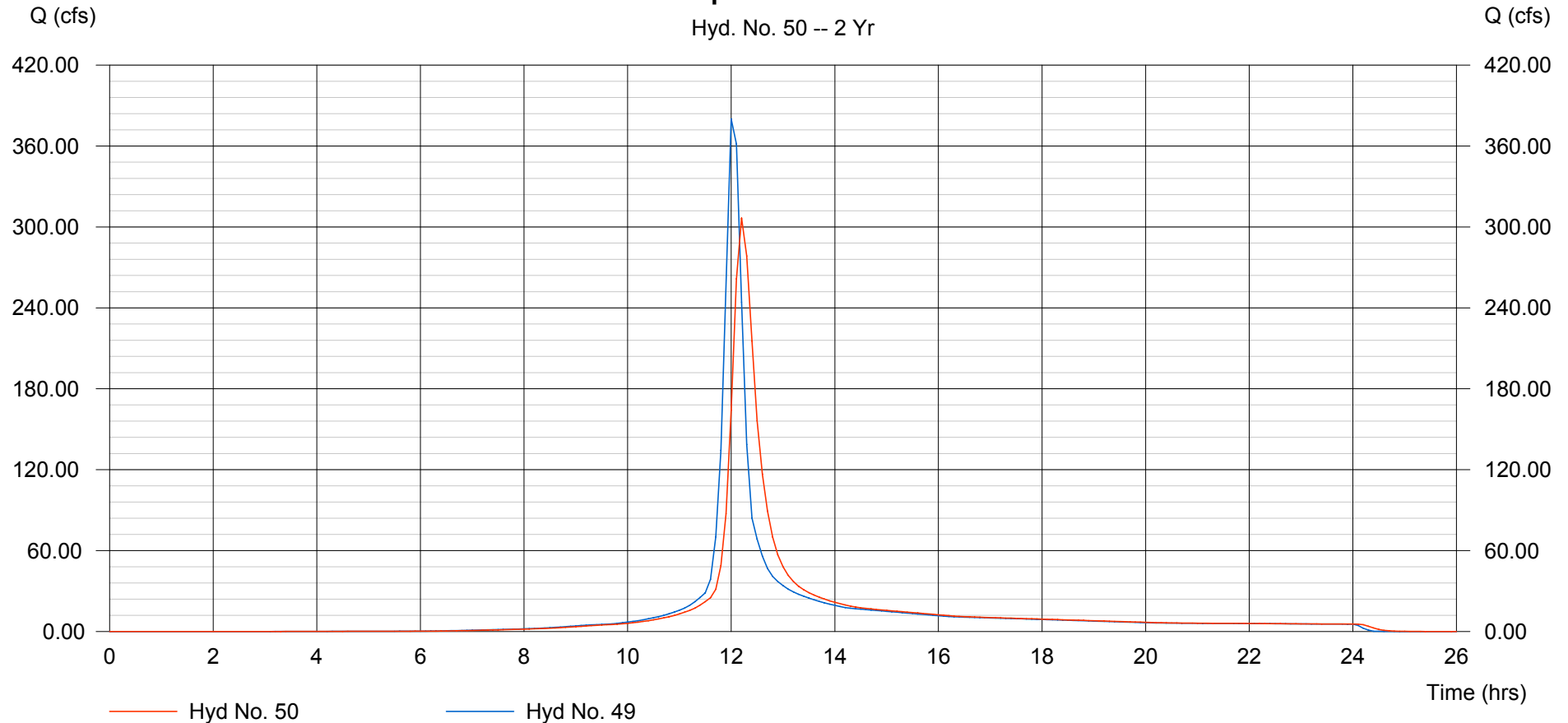
Peak discharge = 306.56 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 4.0 ft  
Rating curve m = 1.432  
Routing coeff. = 0.4509

Modified Att-Kin routing method used.

Hydrograph Volume = 28.652 acft

### Proposed Channel

Hyd. No. 50 -- 2 Yr



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	20.27	6	720	1.520	---	----	----	Off-Site W1 (0-3)
2	SCS Runoff	6.858	6	720	0.490	---	----	----	Off-Site W2 (0-2)
3	SCS Runoff	6.503	6	720	0.465	---	----	----	Off-Site W3 (1)
4	SCS Runoff	8.512	6	720	0.601	---	----	----	Off-Site W4 (W DT)
5	SCS Runoff	1.711	6	720	0.122	---	----	----	Off-Site W5 (1)
6	SCS Runoff	16.40	6	720	1.230	---	----	----	Off-Site NW1 (4)
7	SCS Runoff	1.577	6	720	0.118	---	----	----	Off-Site NW2 (4)
8	SCS Runoff	261.36	6	720	18.544	---	----	----	Off-Site N (CH)
9	SCS Runoff	105.41	6	720	7.479	---	----	----	Off-Site NE (CH)
10	SCS Runoff	46.50	6	720	3.299	---	----	----	Off-Site SE (CH)
11	SCS Runoff	7.460	6	720	0.543	---	----	----	DA-1A (1)
12	SCS Runoff	5.884	6	720	0.428	---	----	----	DA-1B (1)
13	Combine	13.34	6	720	0.971	11, 12	----	----	DA-1 TOTAL
14	SCS Runoff	44.44	6	720	3.235	---	----	----	DA-2A (Pond)
15	SCS Runoff	2.595	6	720	0.183	---	----	----	DA-2B (2-1)
16	SCS Runoff	0.492	6	720	0.035	---	----	----	DA-2C (2-2)
17	SCS Runoff	11.70	6	720	0.852	---	----	----	DA-2D (2)
18	SCS Runoff	3.368	6	720	0.239	---	----	----	DA-2E (2)
19	SCS Runoff	4.561	6	720	0.332	---	----	----	DA-2F (2-4)
20	SCS Runoff	4.773	6	720	0.347	---	----	----	DA-2G (2-5)
21	SCS Runoff	2.066	6	720	0.150	---	----	----	DA-2H (2-3)
22	Combine	59.22	6	720	4.305	14, 15, 16, 17,	----	----	DA-2A to DA-2D
23	Combine	73.99	6	720	5.374	18, 19, 20, 21, 22	----	----	DA-2 TOTAL
24	SCS Runoff	5.680	6	720	0.414	---	----	----	DA-3A (3-2)
25	SCS Runoff	2.337	6	720	0.170	---	----	----	DA-3B (3-3)
26	SCS Runoff	9.557	6	720	0.696	---	----	----	DA-3C (3-5)
27	SCS Runoff	3.394	6	720	0.247	---	----	----	DA-3D (3-4)
28	Combine	20.97	6	720	1.526	24, 25, 26, 27	----	----	DA-3 TOTAL
29	SCS Runoff	2.392	6	720	0.174	---	----	----	DA-4A (4)
30	SCS Runoff	3.547	6	720	0.258	---	----	----	DA-4B (4)

Northborough Proposed.gpw

Return Period: 5 Year

Thursday, Sep 6 2007

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description	
31	Combine	5.939	6	720	0.432	29, 30	-----	-----	DA-4 TOTAL	
32	SCS Runoff	49.09	6	720	3.467	---	-----	-----	DA-5 (CH)	
33	SCS Runoff	11.80	6	720	0.859	---	-----	-----	DA-6 (CH)	
34	Combine	27.13	6	720	2.010	1, 2,	-----	-----	Total for SWD0	
35	Combine	12.39	6	720	0.893	3, 12,	-----	-----	W3 with DA-1B (1-1)	
36	Combine	9.171	6	720	0.665	5, 11,	-----	-----	W5 with DA-1A (1-2)	
37	Combine	21.56	6	720	1.559	35, 36	-----	-----	Total for SWD1	
38	Combine	57.20	6	720	4.170	4, 34, 37	-----	-----	Total to West Ditch	
39	Reach	45.14	6	732	4.170	38	-----	-----	Proposed West Ditch	
40	Combine	15.07	6	720	1.091	17, 18,	-----	-----	DA-2D with DA-2E (2-6)	
41	Combine	29.55	6	720	2.139	15, 16, 19, 20, 21, 40	-----	-----	Total for SWD2	
42	Combine	20.97	6	720	1.526	24, 25, 26, 27,	-----	-----	Total for SWD3	
43	Combine	18.80	6	720	1.404	6, 29,	-----	-----	NW1 with DA-4A (4-2)	
44	Combine	5.124	6	720	0.377	7, 30,	-----	-----	NW2 with DA-4B (4-1)	
45	Combine	23.92	6	720	1.781	43, 44	-----	-----	Total for SWD4	
46	Combine	94.96	6	720	6.901	14, 41, 42,	-----	-----	Total to Pond	
47	Reservoir	0.000	6	0	0.000	46	1388.00	6.901	Proposed Pond	
48	Combine	498.08	6	720	35.428	8, 9, 10, 32, 33, 45,	-----	-----	N, NE, SE, DA-5, DA-6, & SWD4	
49	Combine	524.13	6	720	39.598	39, 47, 48	-----	-----	Route All to Proposed Channel	
50	Reach	434.85	6	732	39.598	49	-----	-----	Proposed Channel	
Northborough Proposed.gpw					Return Period: 5 Year			Thursday, Sep 6 2007		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 1

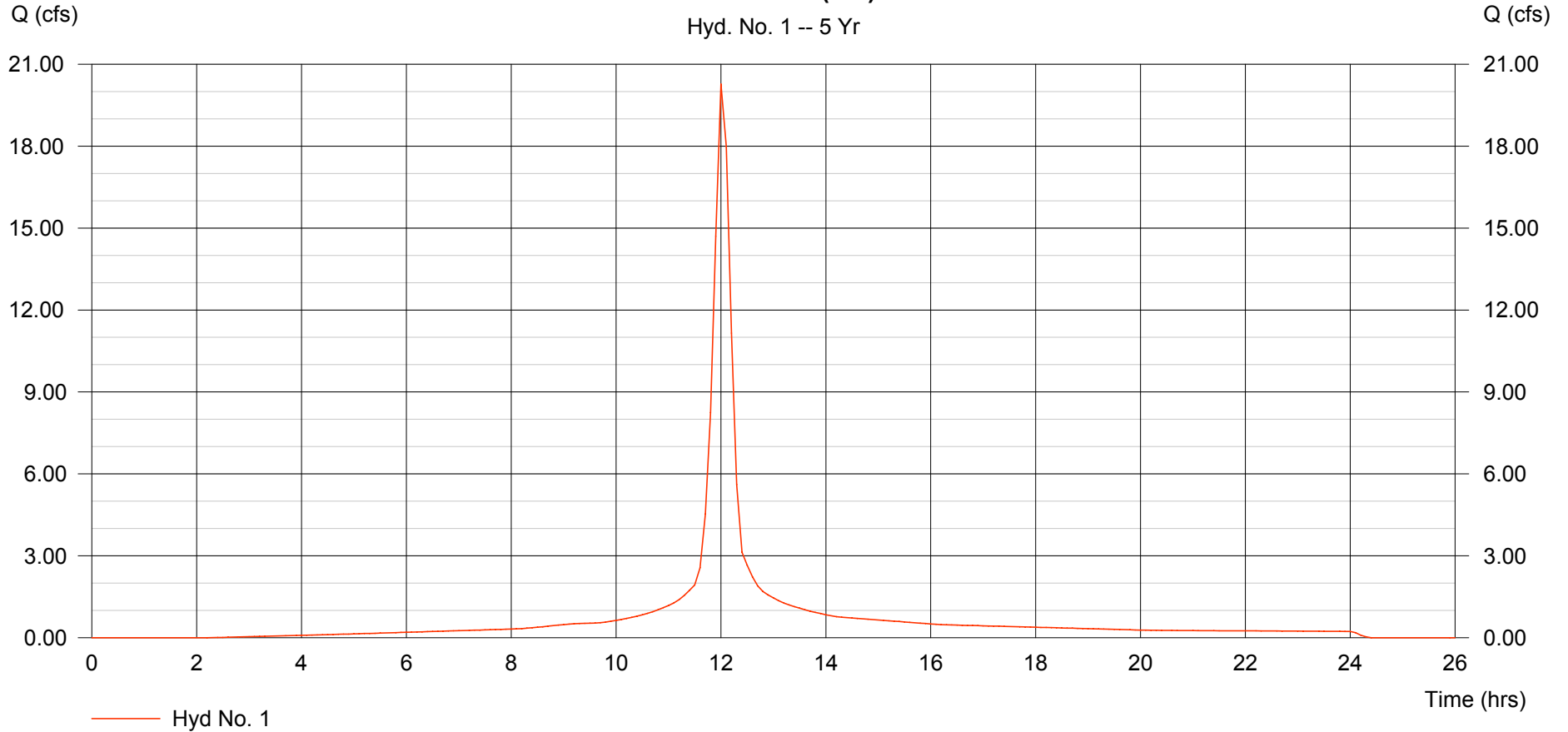
Off-Site W1 (0-3)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 4.884 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 20.27 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.520 acft

**Off-Site W1 (0-3)**  
Hyd. No. 1 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

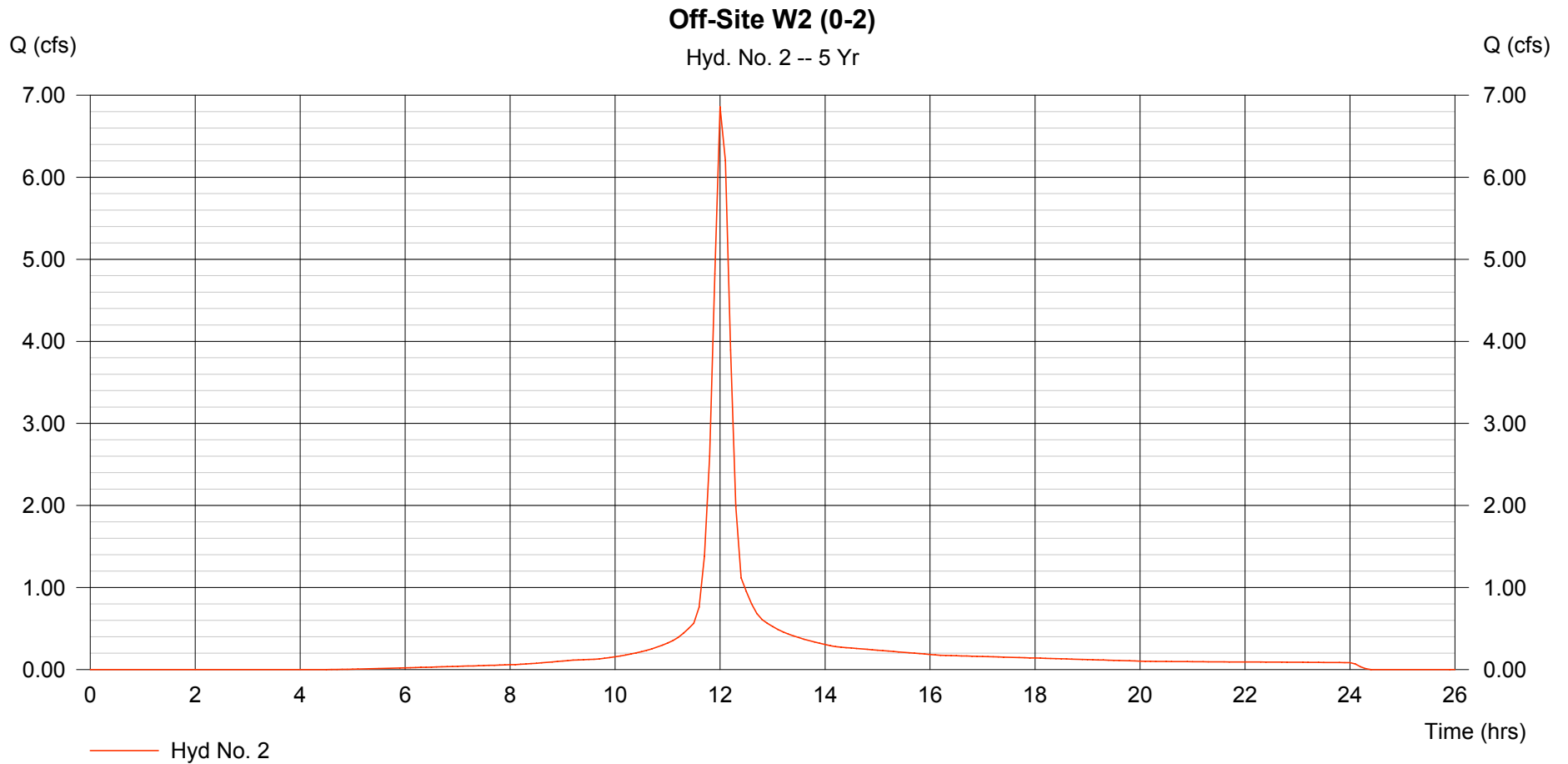
## Hyd. No. 2

Off-Site W2 (0-2)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 1.872 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 6.858 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.490 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

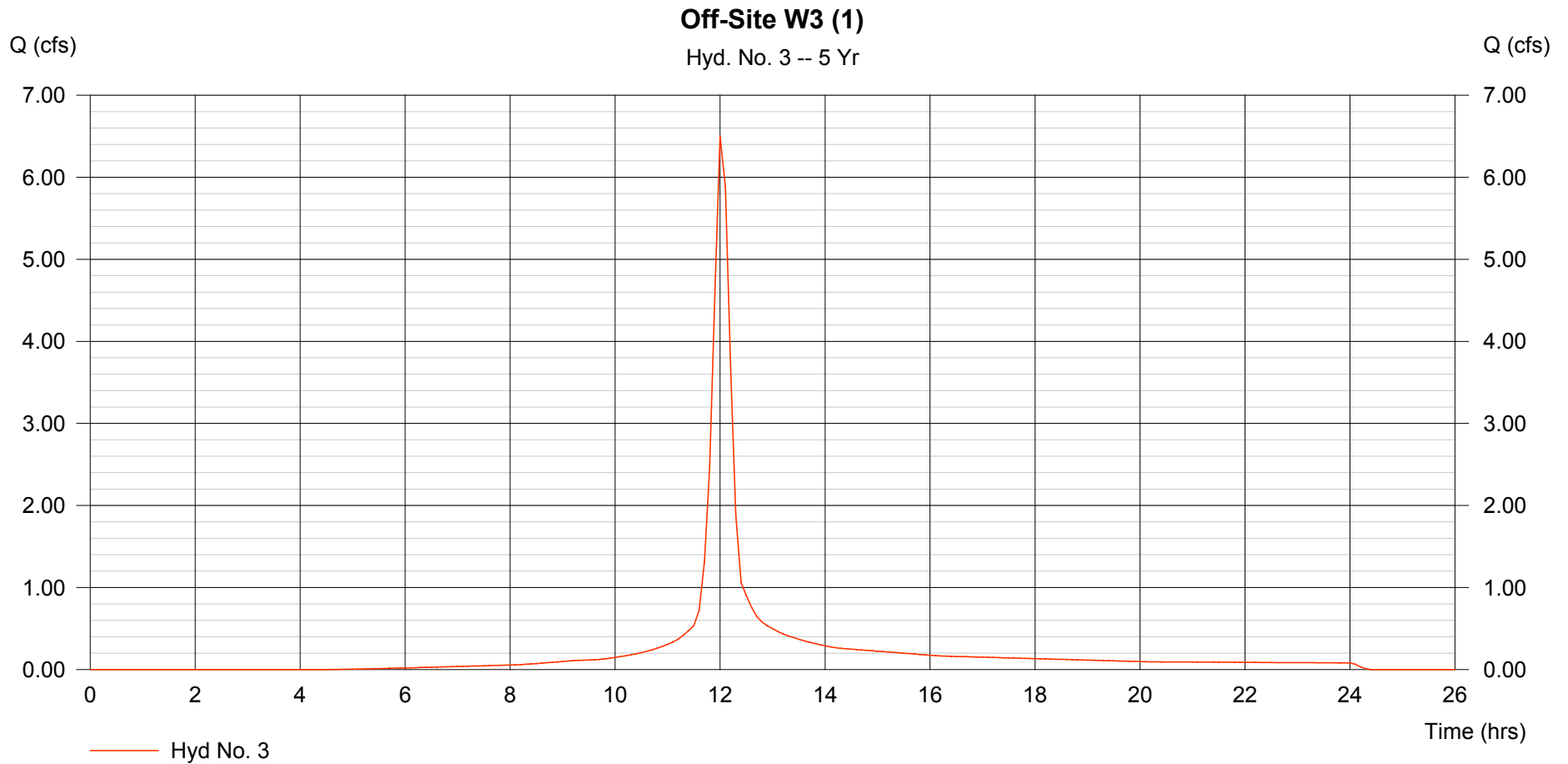
## Hyd. No. 3

Off-Site W3 (1)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 1.775 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 6.503 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.465 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 4

Off-Site W4 (W DT)

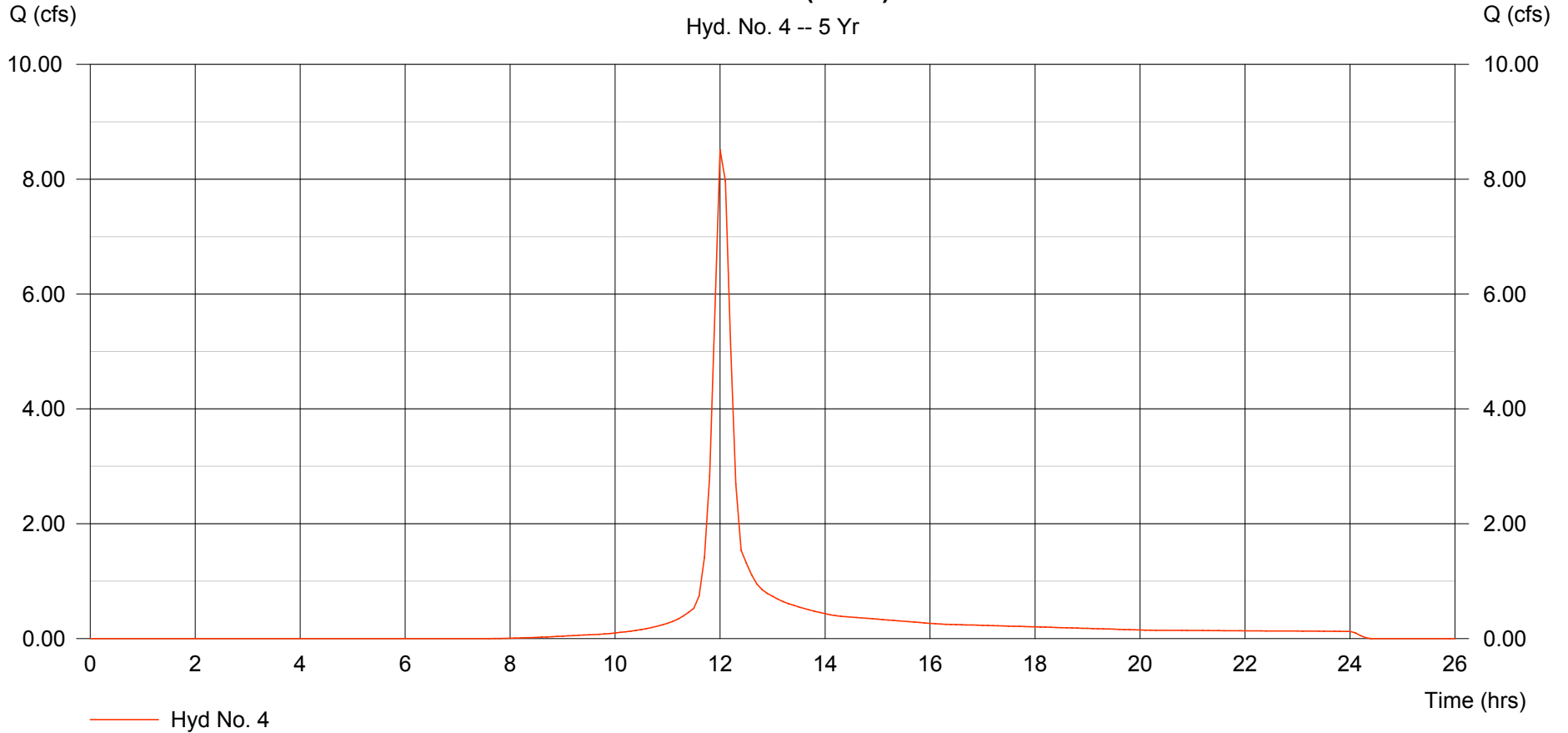
Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 3.064 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 8.512 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.601 acft

### Off-Site W4 (W DT)

Hyd. No. 4 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

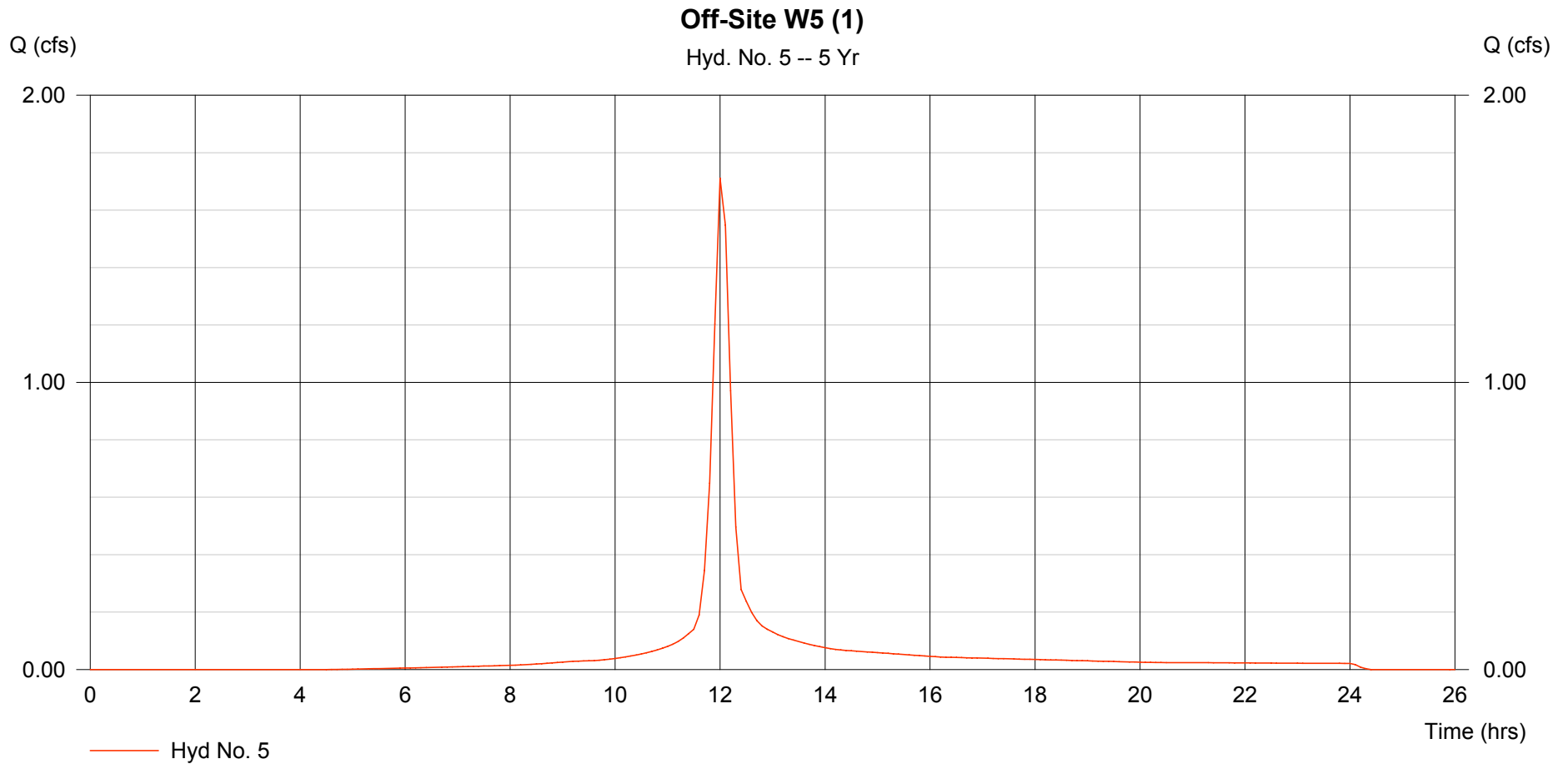
## Hyd. No. 5

Off-Site W5 (1)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.467 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 1.711 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.122 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

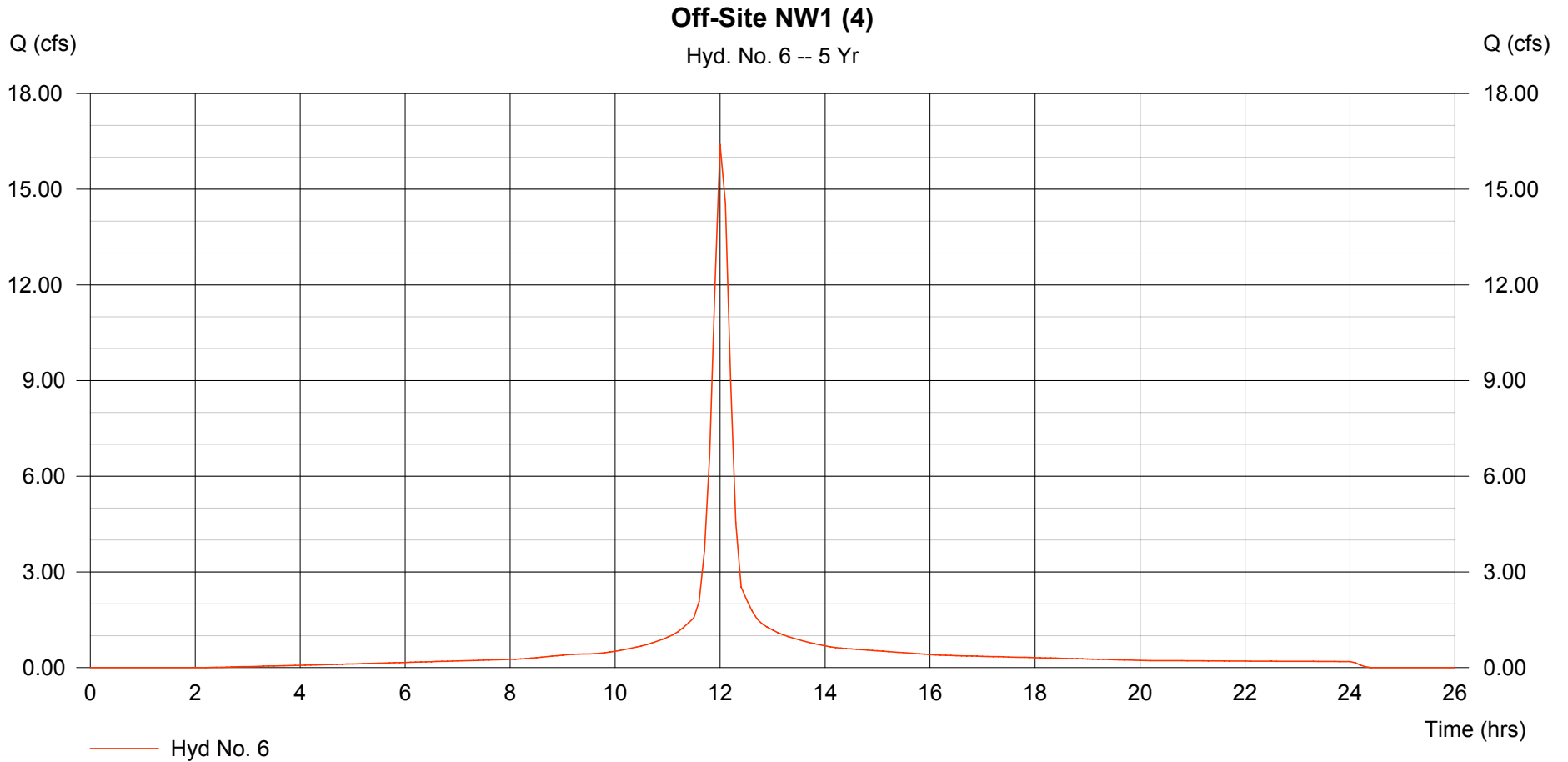
## Hyd. No. 6

Off-Site NW1 (4)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 3.952 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 16.40 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.230 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 7

Off-Site NW2 (4)

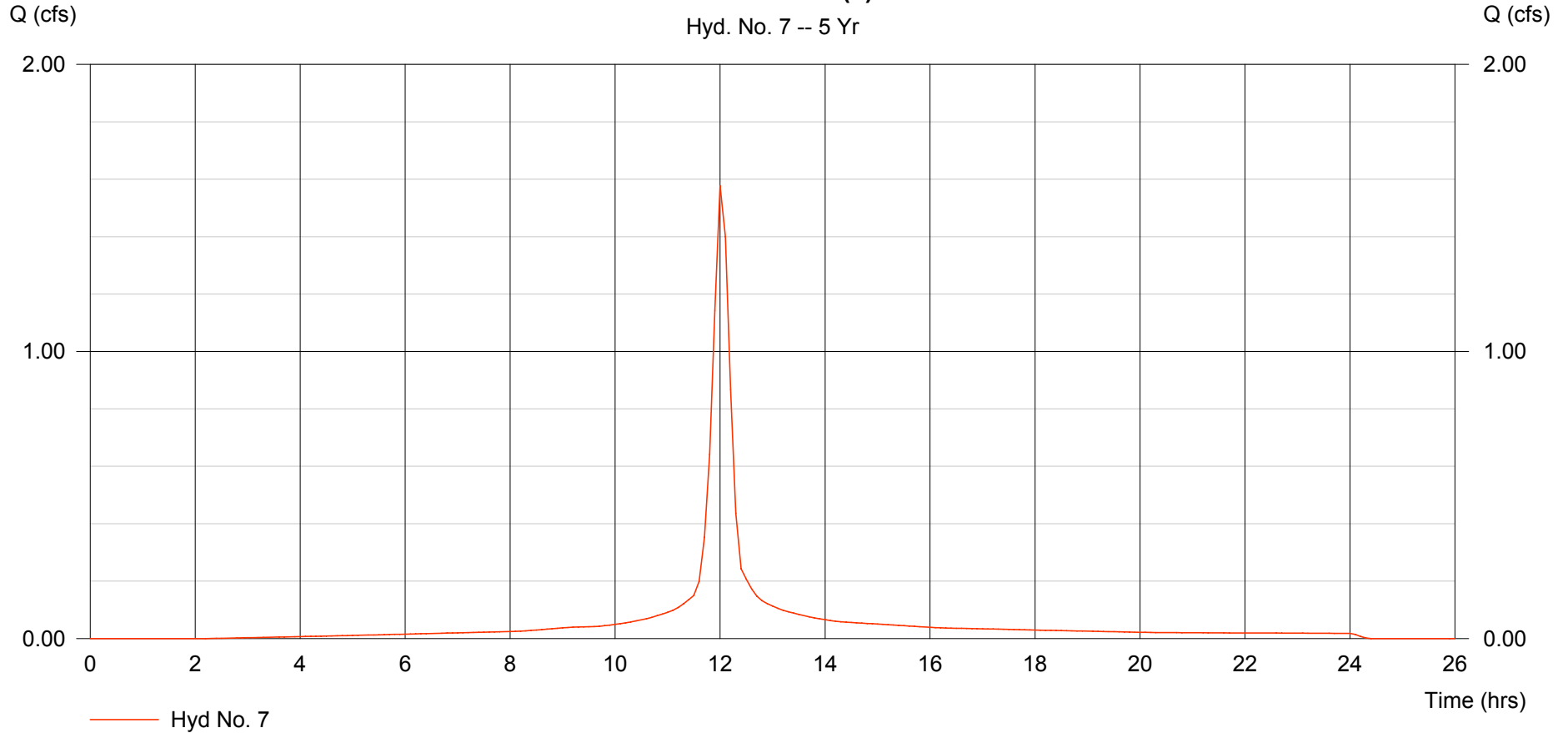
Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.380 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 1.577 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.118 acft

### Off-Site NW2 (4)

Hyd. No. 7 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 8

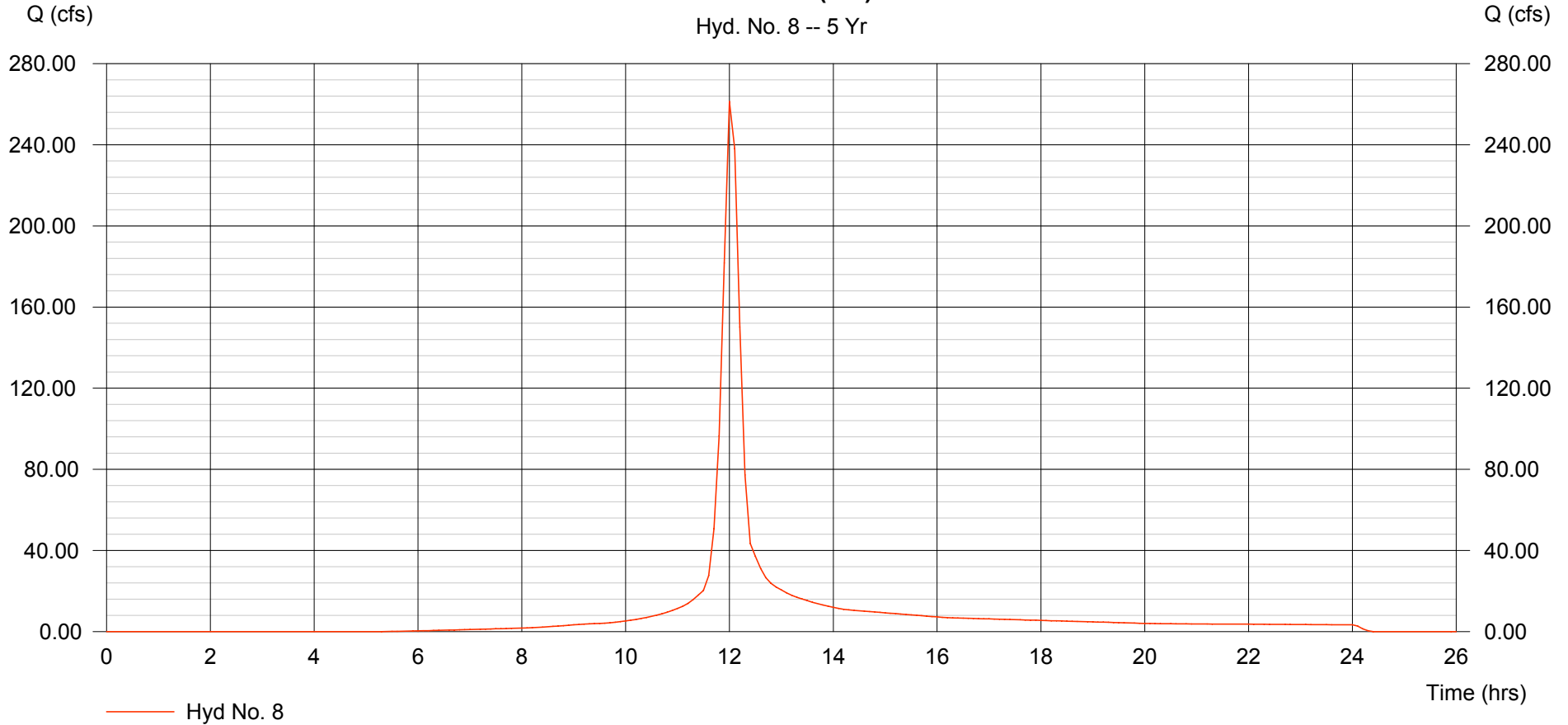
Off-Site N (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 261.36 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 18.544 acft

Off-Site N (CH)  
Hyd. No. 8 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 9

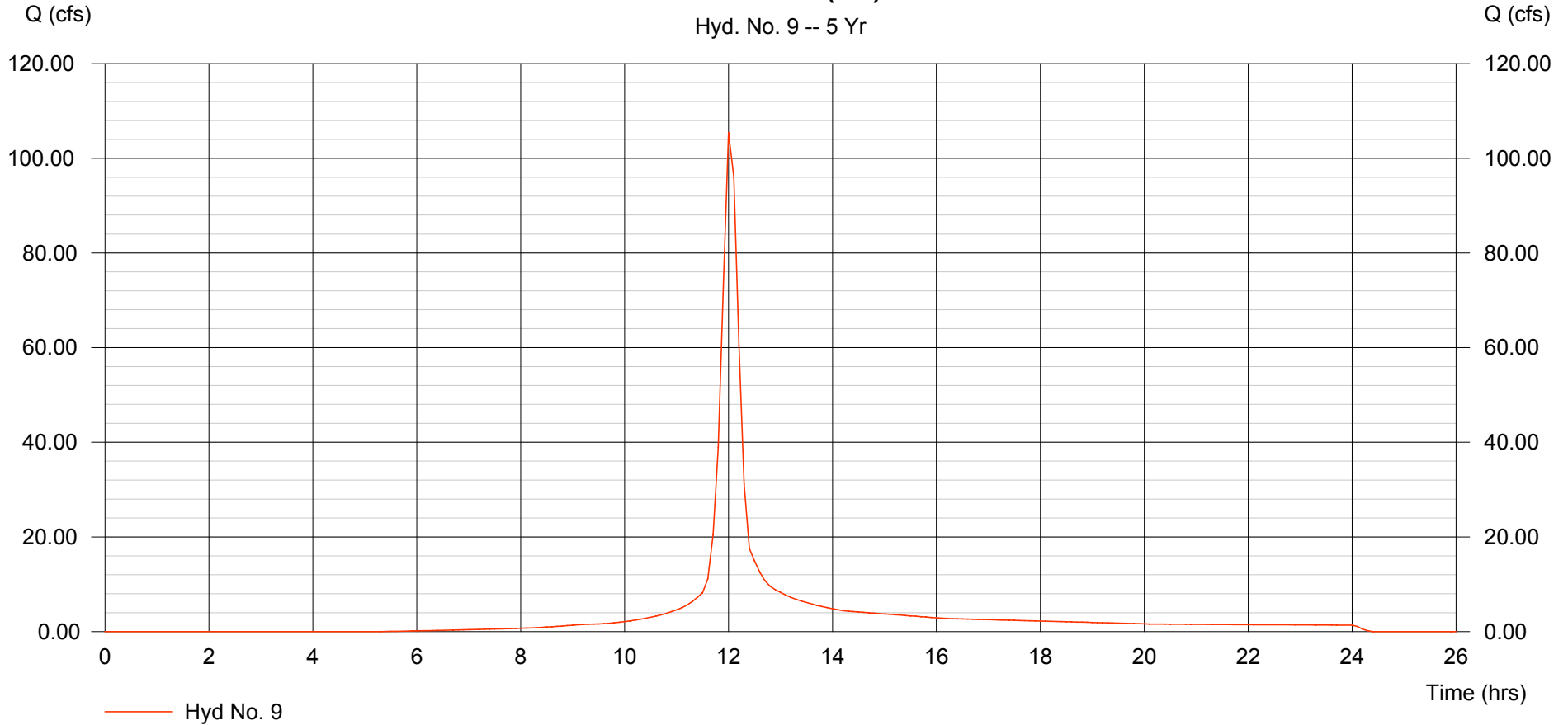
Off-Site NE (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 105.41 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 7.479 acft

**Off-Site NE (CH)**  
Hyd. No. 9 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 10

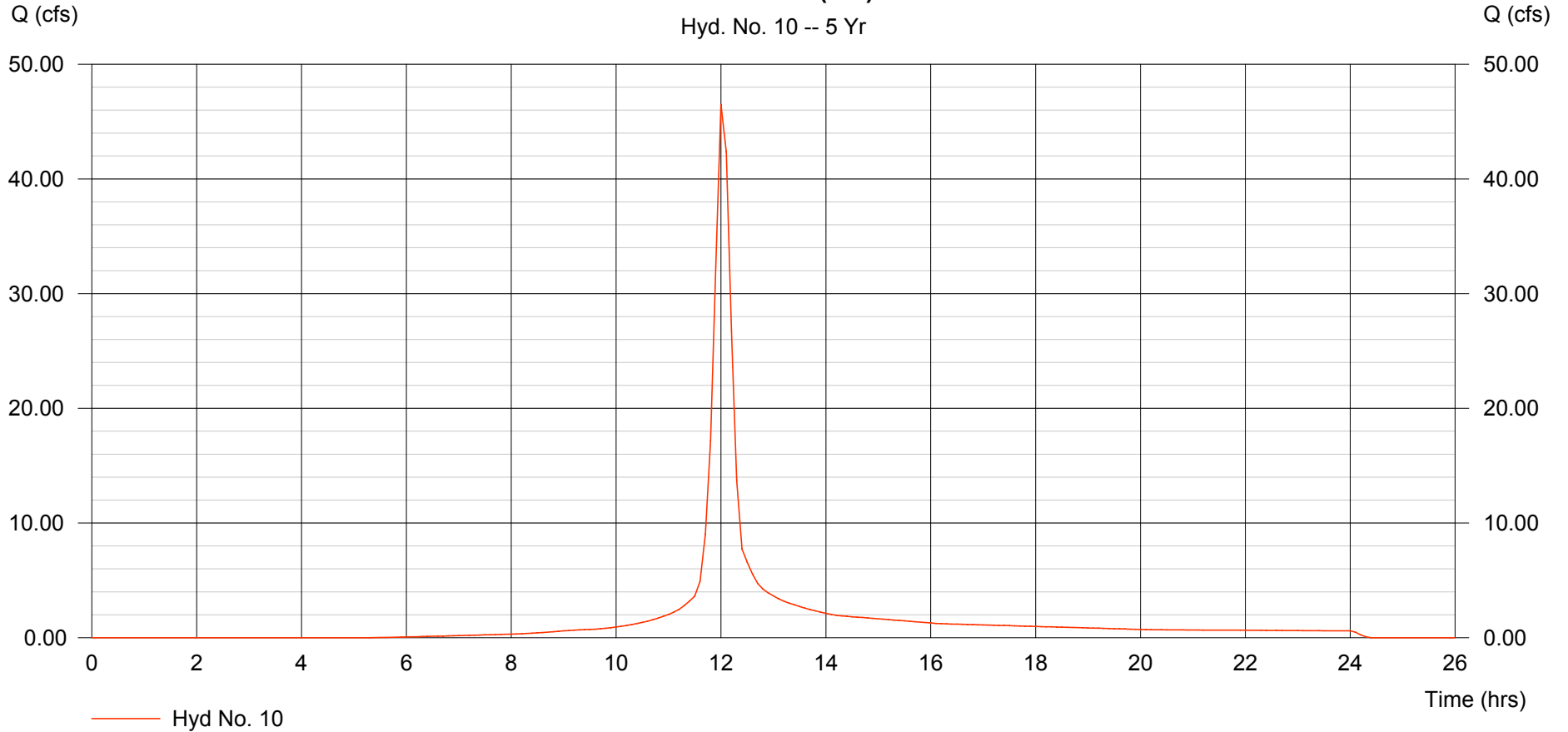
Off-Site SE (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 46.50 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 3.299 acft

**Off-Site SE (CH)**  
Hyd. No. 10 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

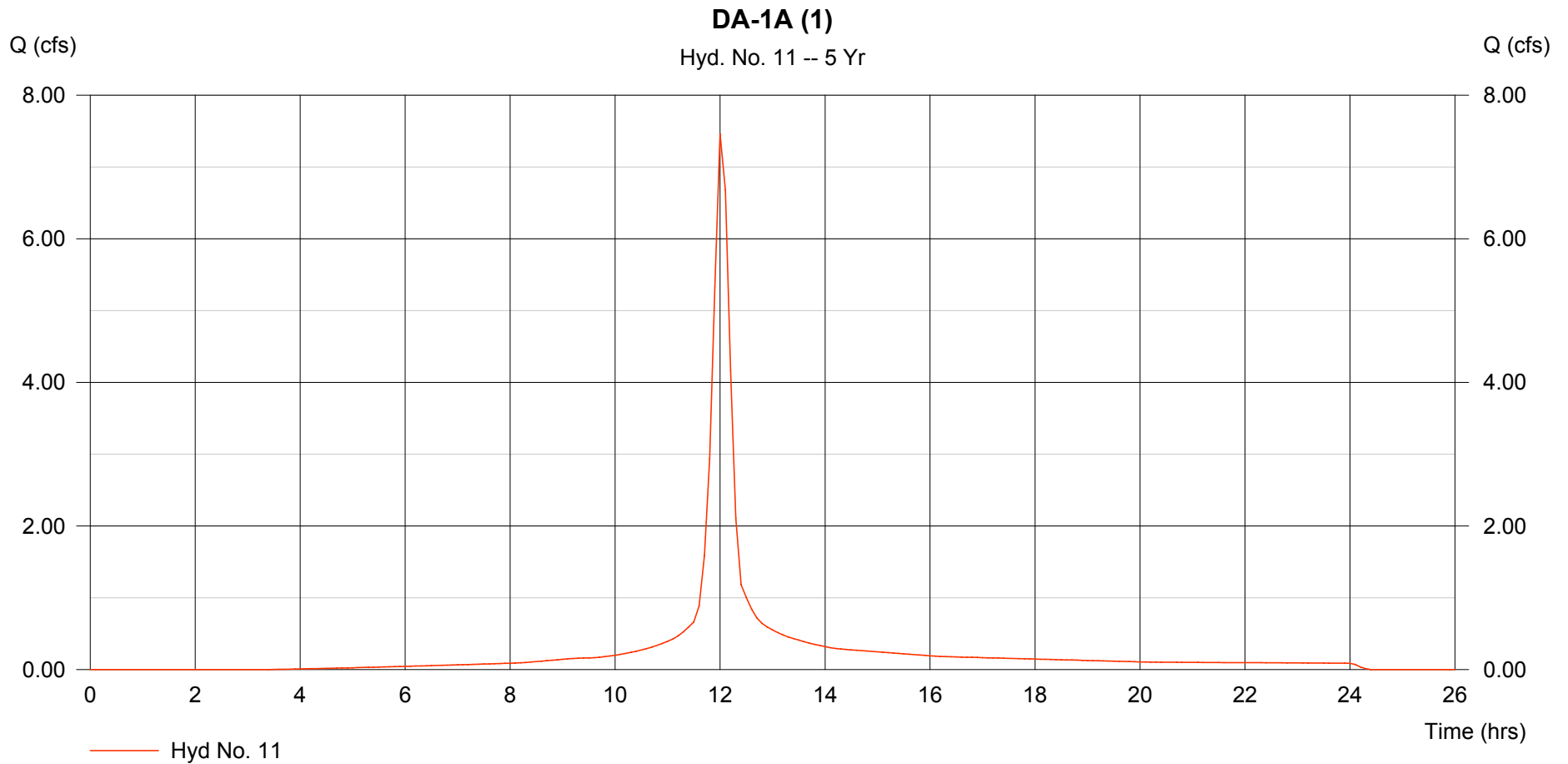
## Hyd. No. 11

DA-1A (1)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 1.899 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 7.460 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.543 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

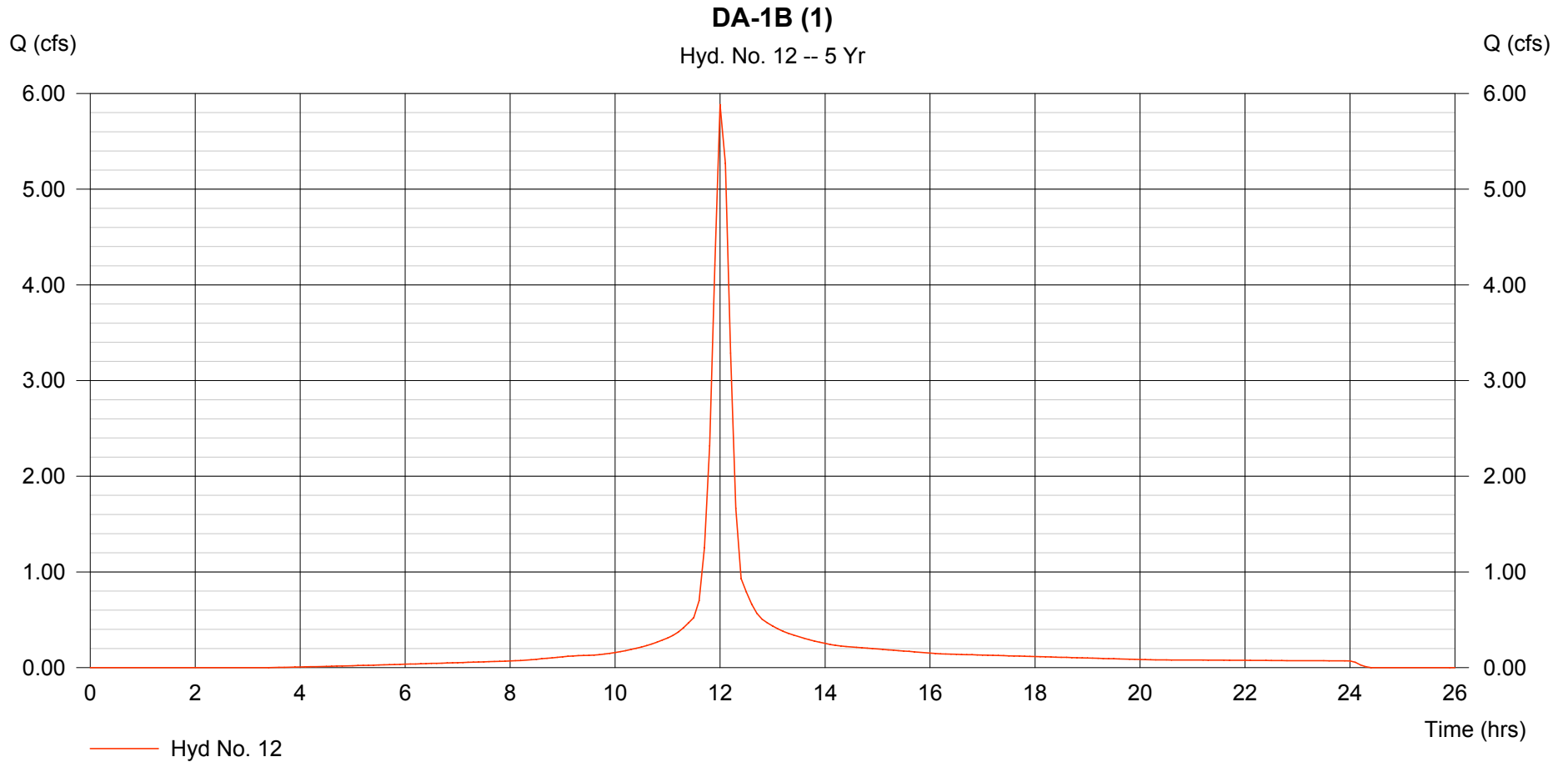
## Hyd. No. 12

DA-1B (1)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 1.498 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 5.884 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.428 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

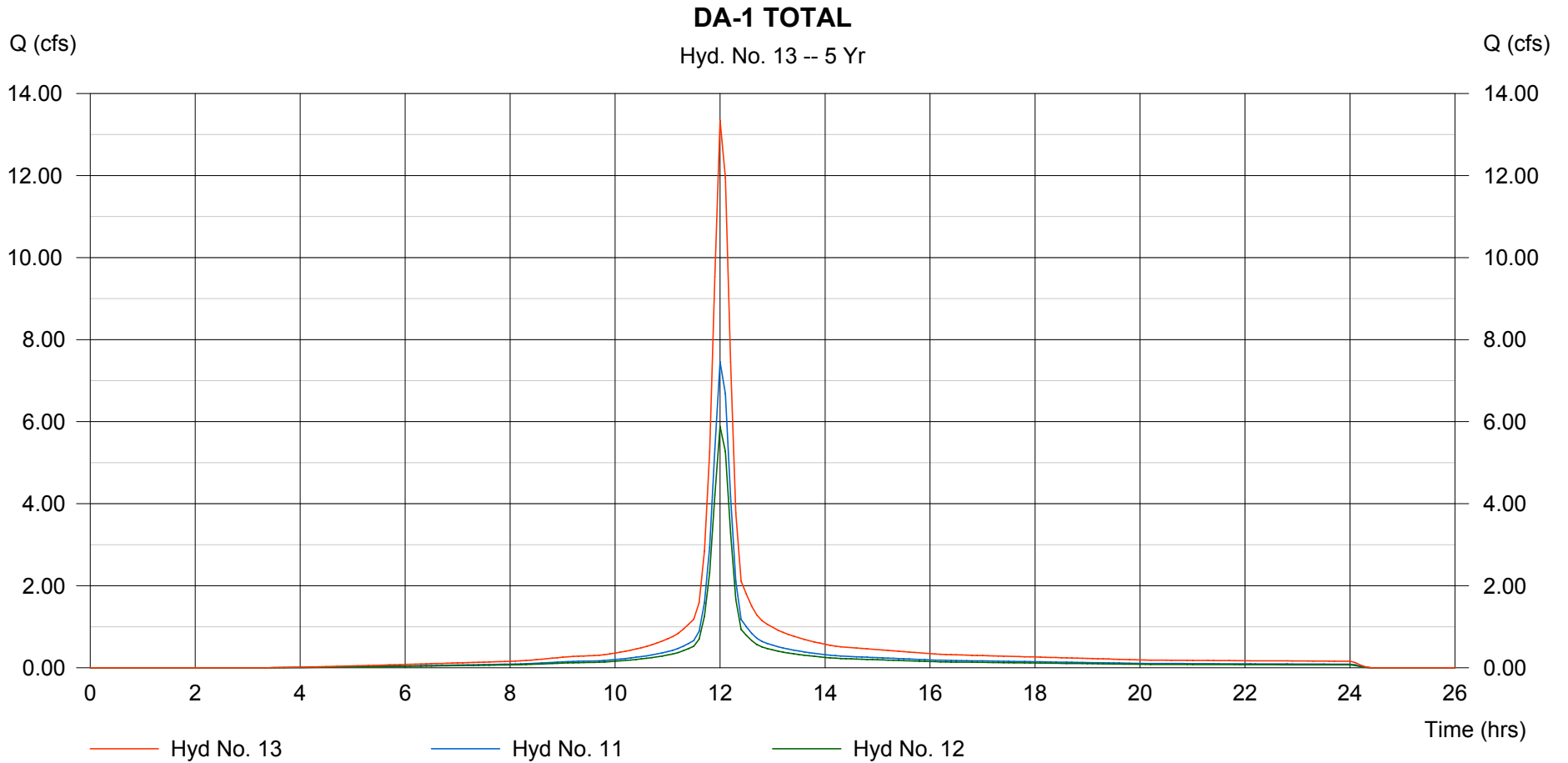
## Hyd. No. 13

DA-1 TOTAL

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 11, 12

Peak discharge = 13.34 cfs  
Time interval = 6 min

Hydrograph Volume = 0.971 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

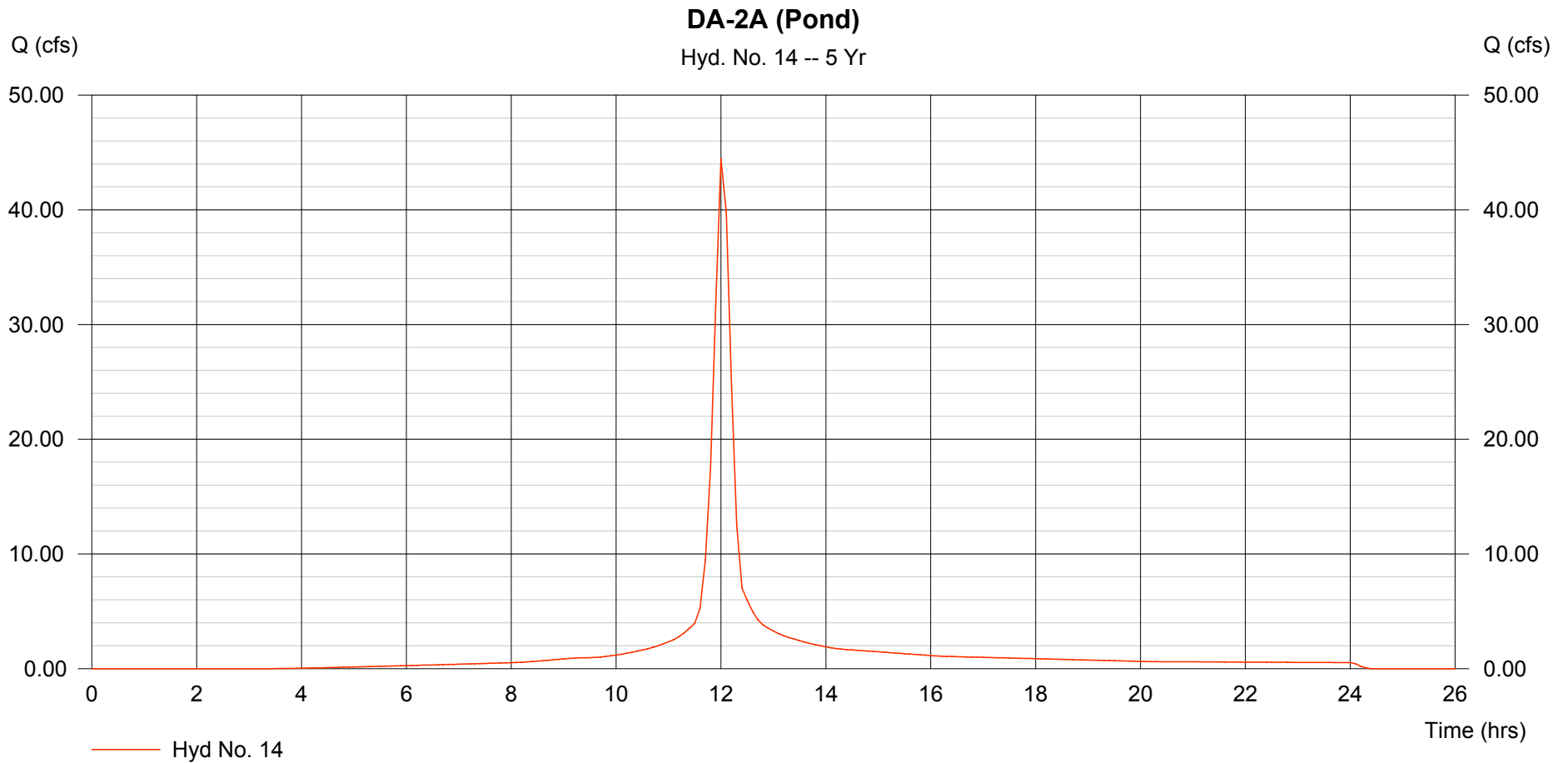
## Hyd. No. 14

DA-2A (Pond)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 11.313 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 44.44 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 3.235 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

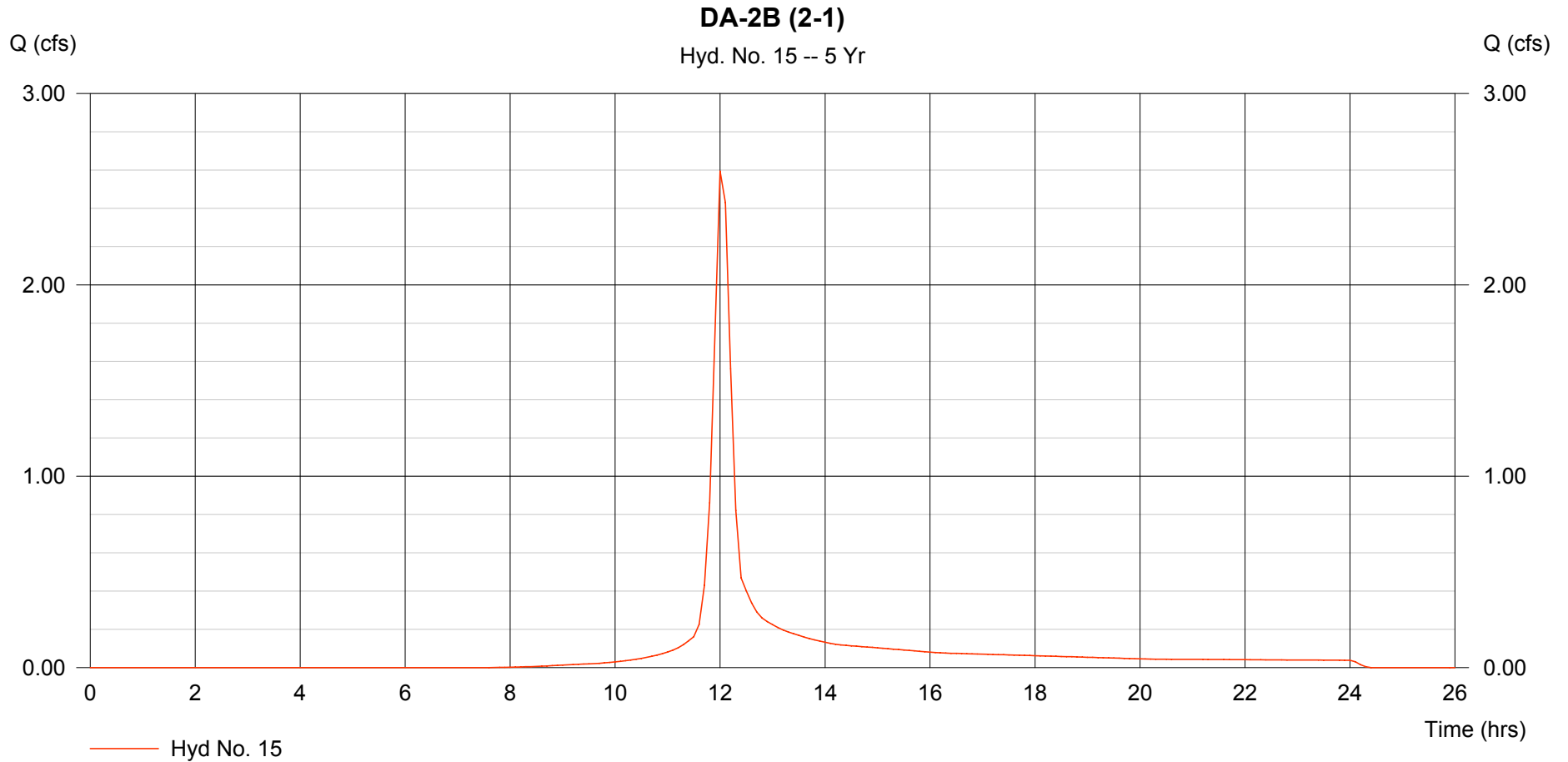
## Hyd. No. 15

DA-2B (2-1)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.934 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 2.595 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.183 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

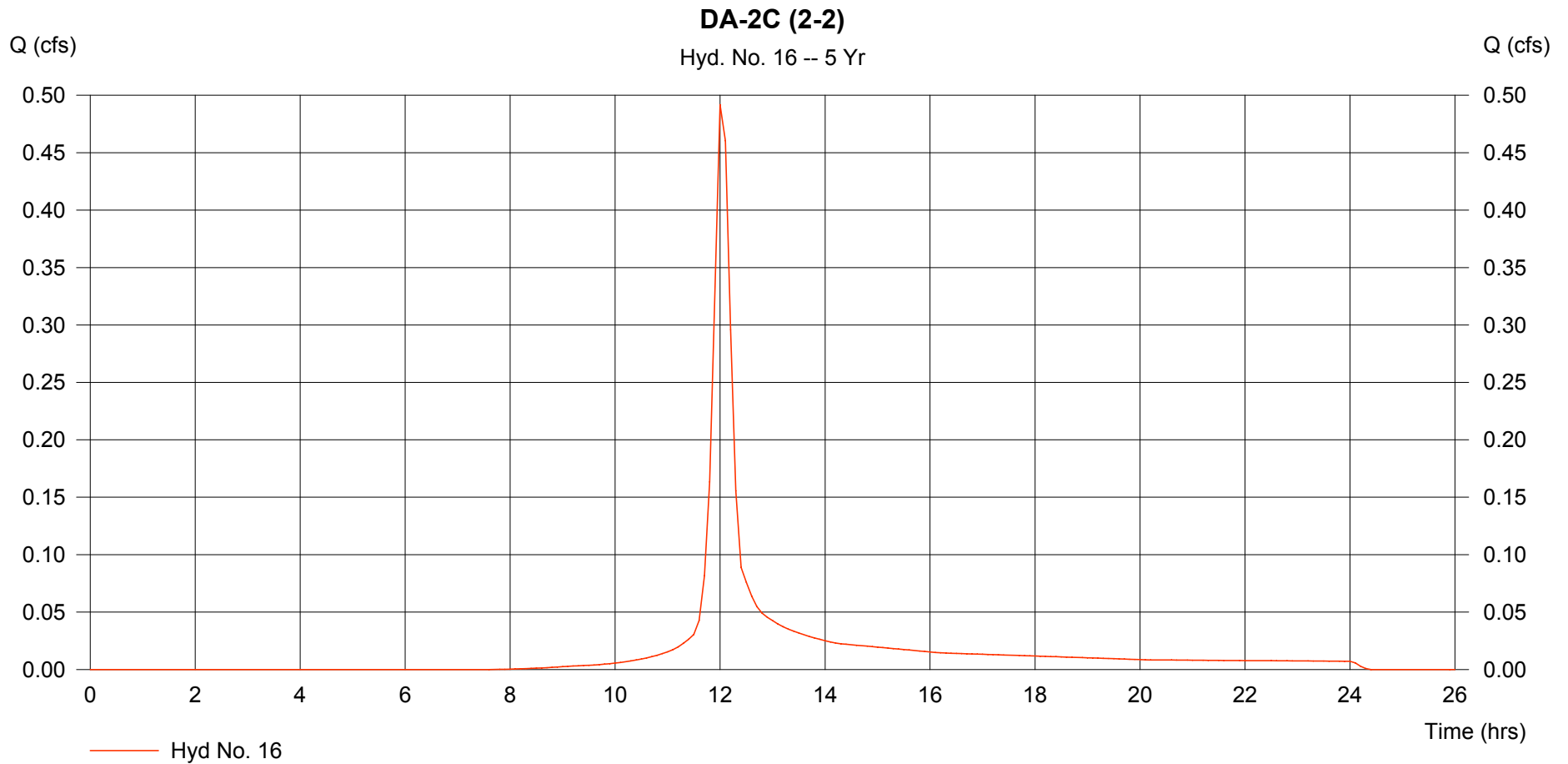
## Hyd. No. 16

DA-2C (2-2)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.177 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 0.492 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.035 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

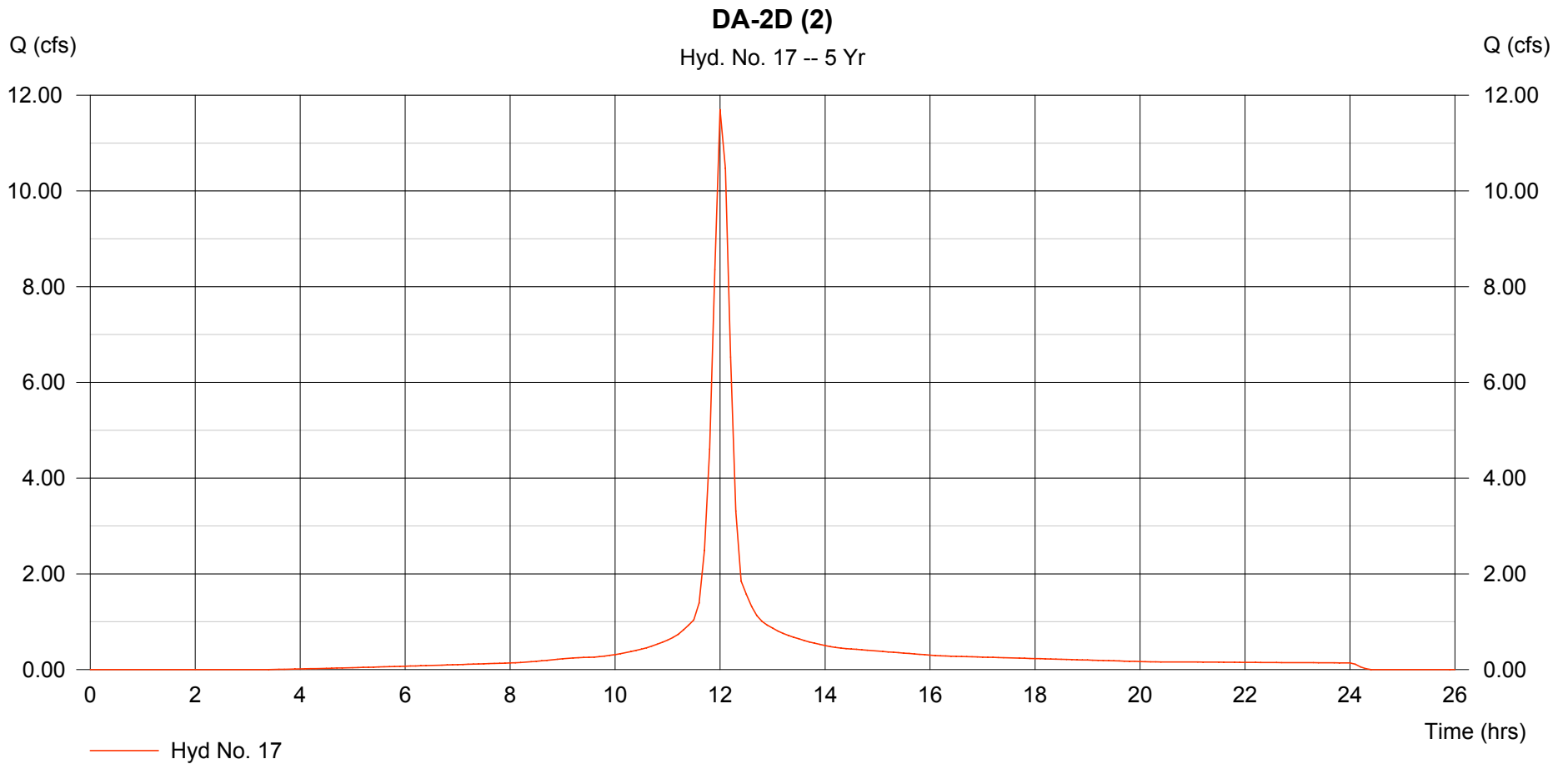
## Hyd. No. 17

DA-2D (2)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 2.978 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 11.70 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.852 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

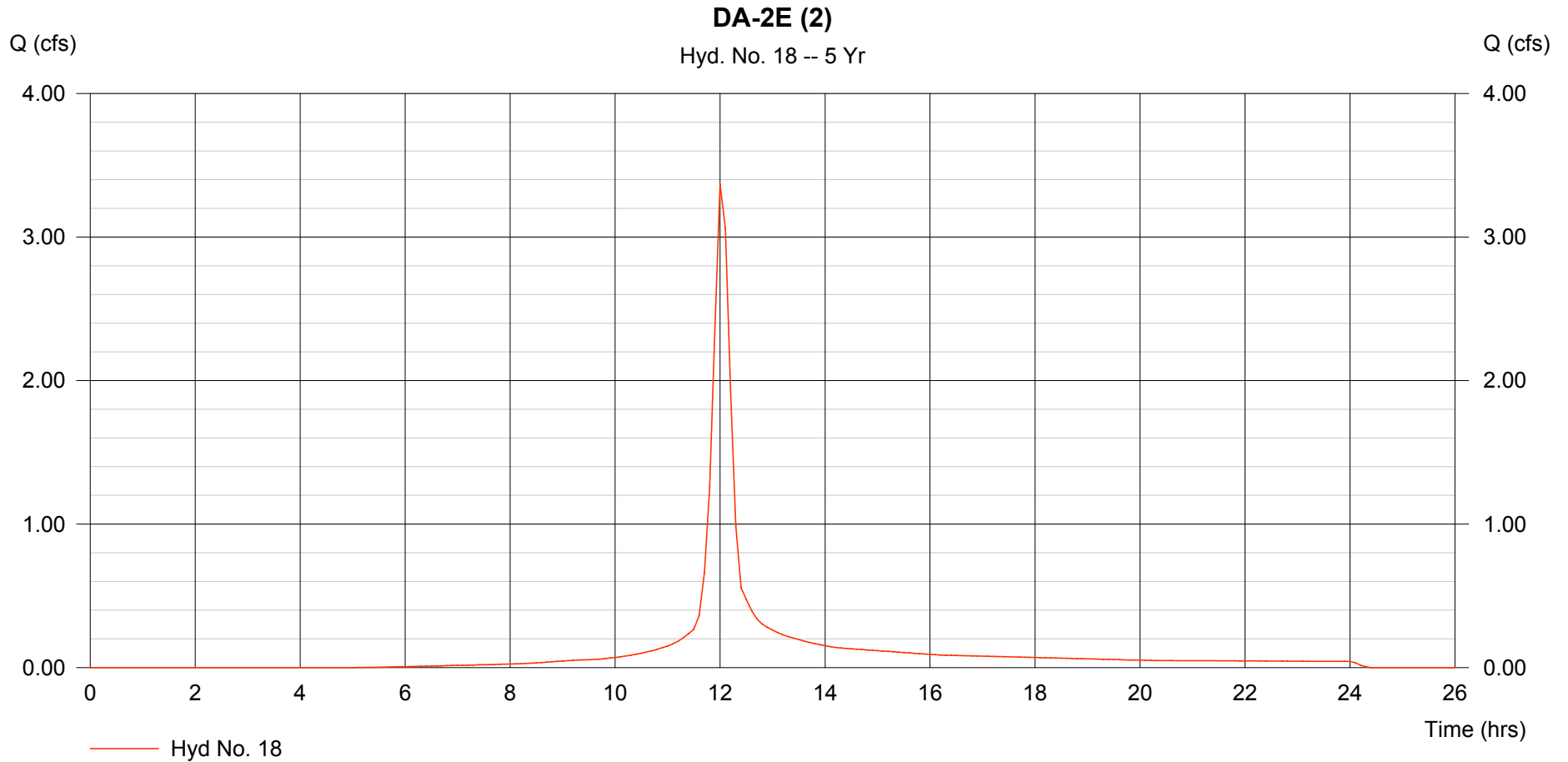
## Hyd. No. 18

DA-2E (2)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.951 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 3.368 cfs  
Time interval = 6 min  
Curve number = 87.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.239 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

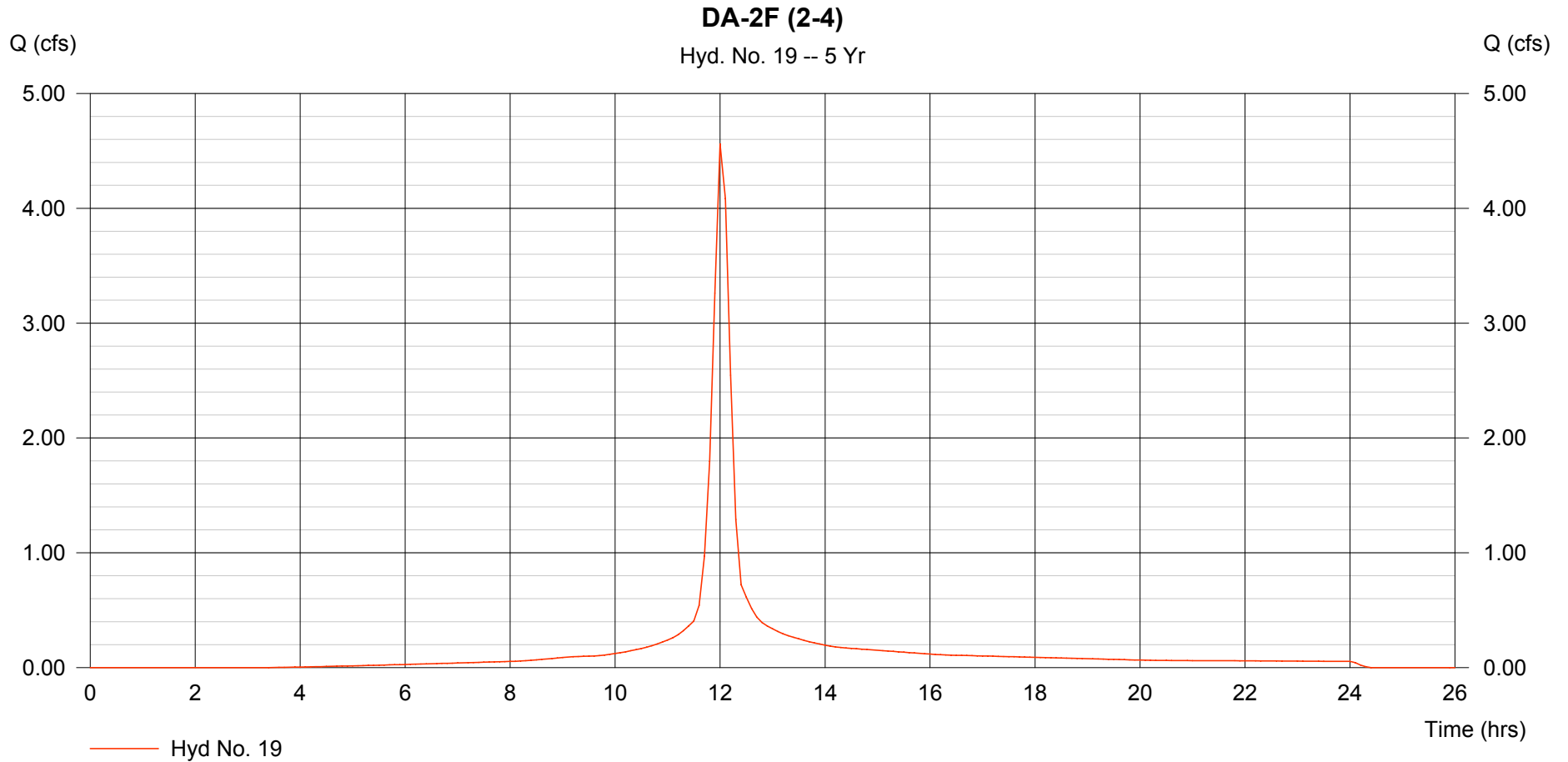
## Hyd. No. 19

DA-2F (2-4)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 1.161 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 4.561 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.332 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

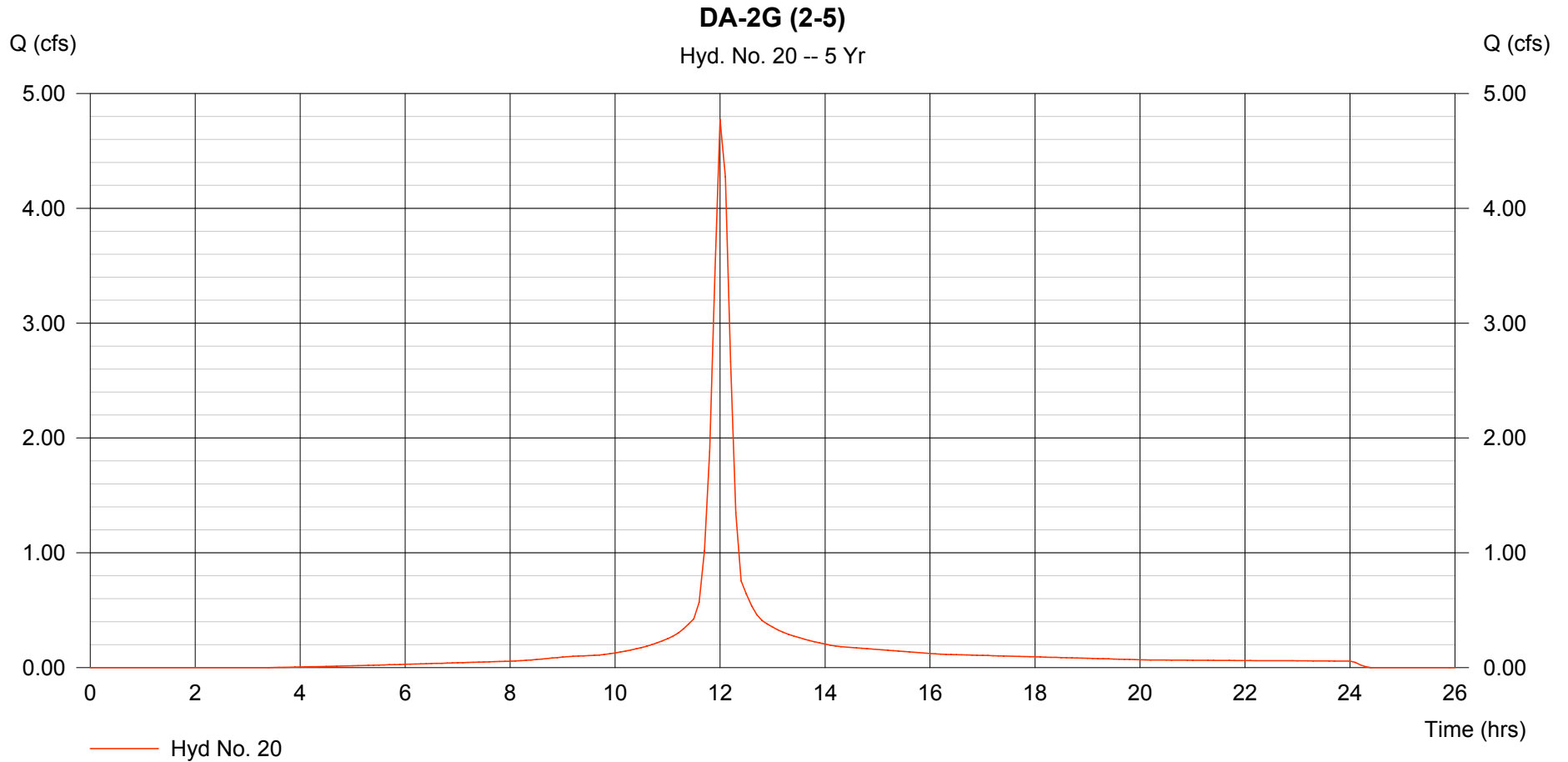
## Hyd. No. 20

DA-2G (2-5)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 1.215 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 4.773 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.347 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

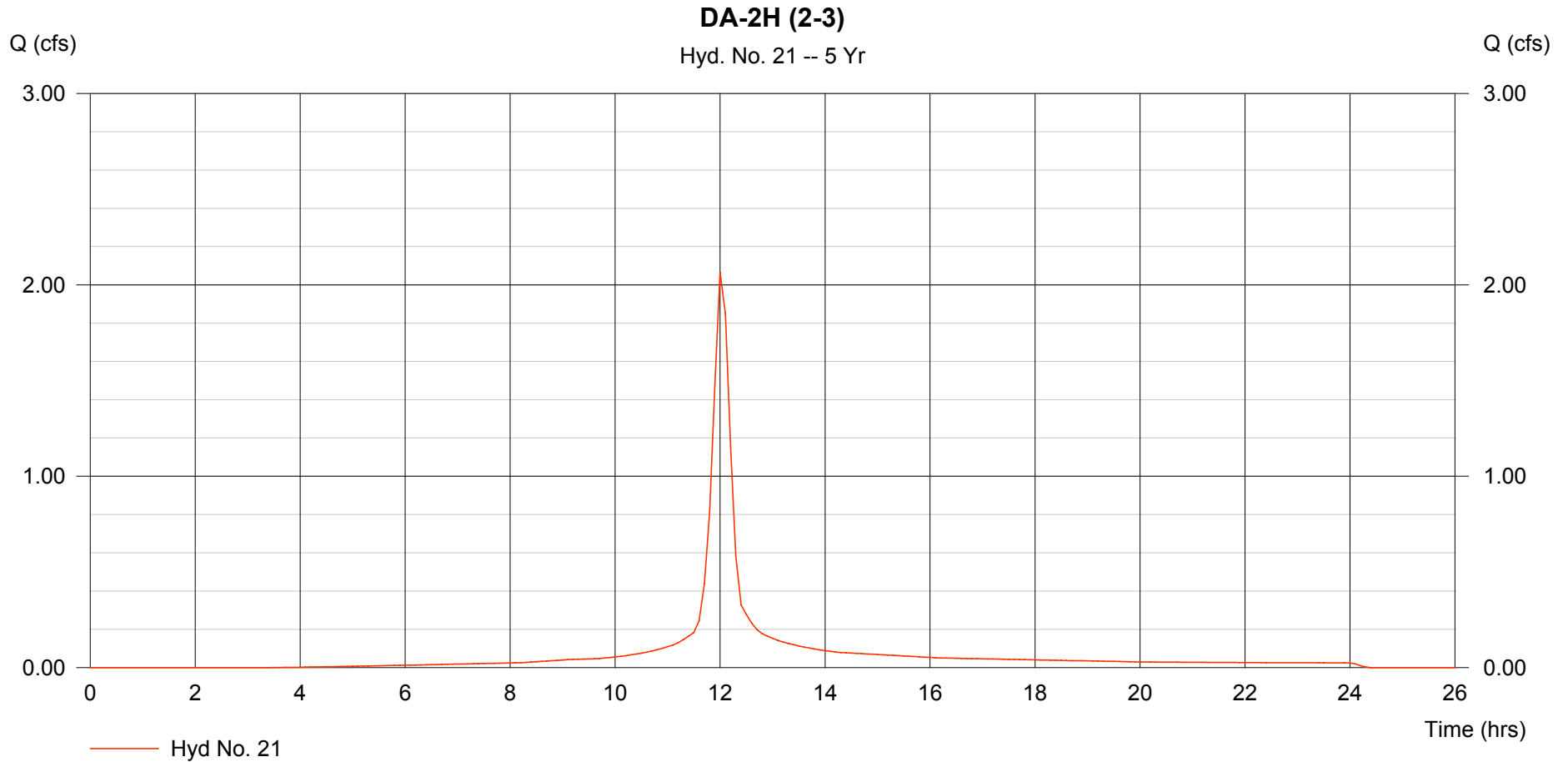
## Hyd. No. 21

DA-2H (2-3)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.526 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 2.066 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.150 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

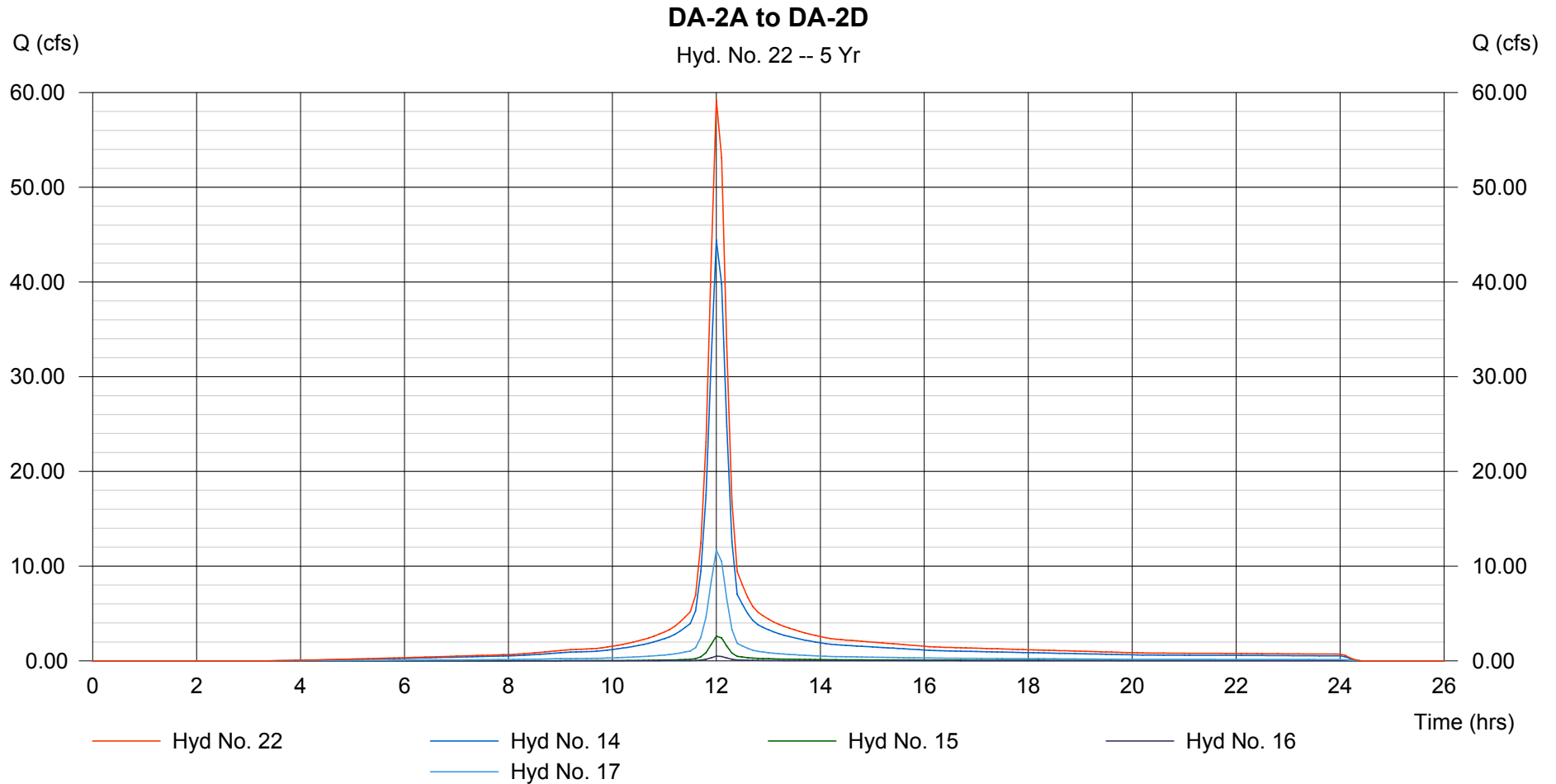
## Hyd. No. 22

DA-2A to DA-2D

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 14, 15, 16, 17

Peak discharge = 59.22 cfs  
Time interval = 6 min

Hydrograph Volume = 4.305 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

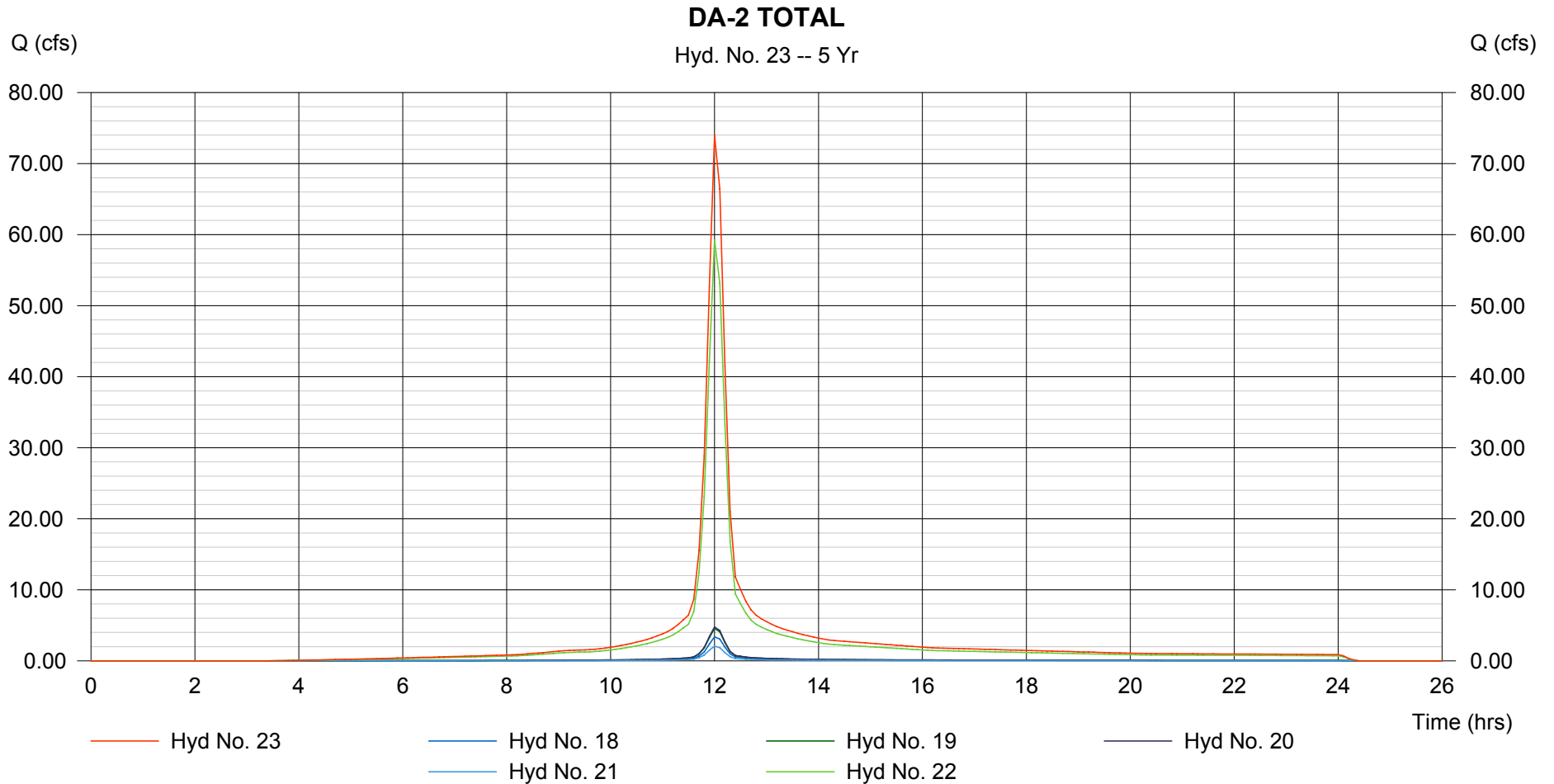
## Hyd. No. 23

DA-2 TOTAL

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 18, 19, 20, 21, 22

Peak discharge = 73.99 cfs  
Time interval = 6 min

Hydrograph Volume = 5.374 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 24

DA-3A (3-2)

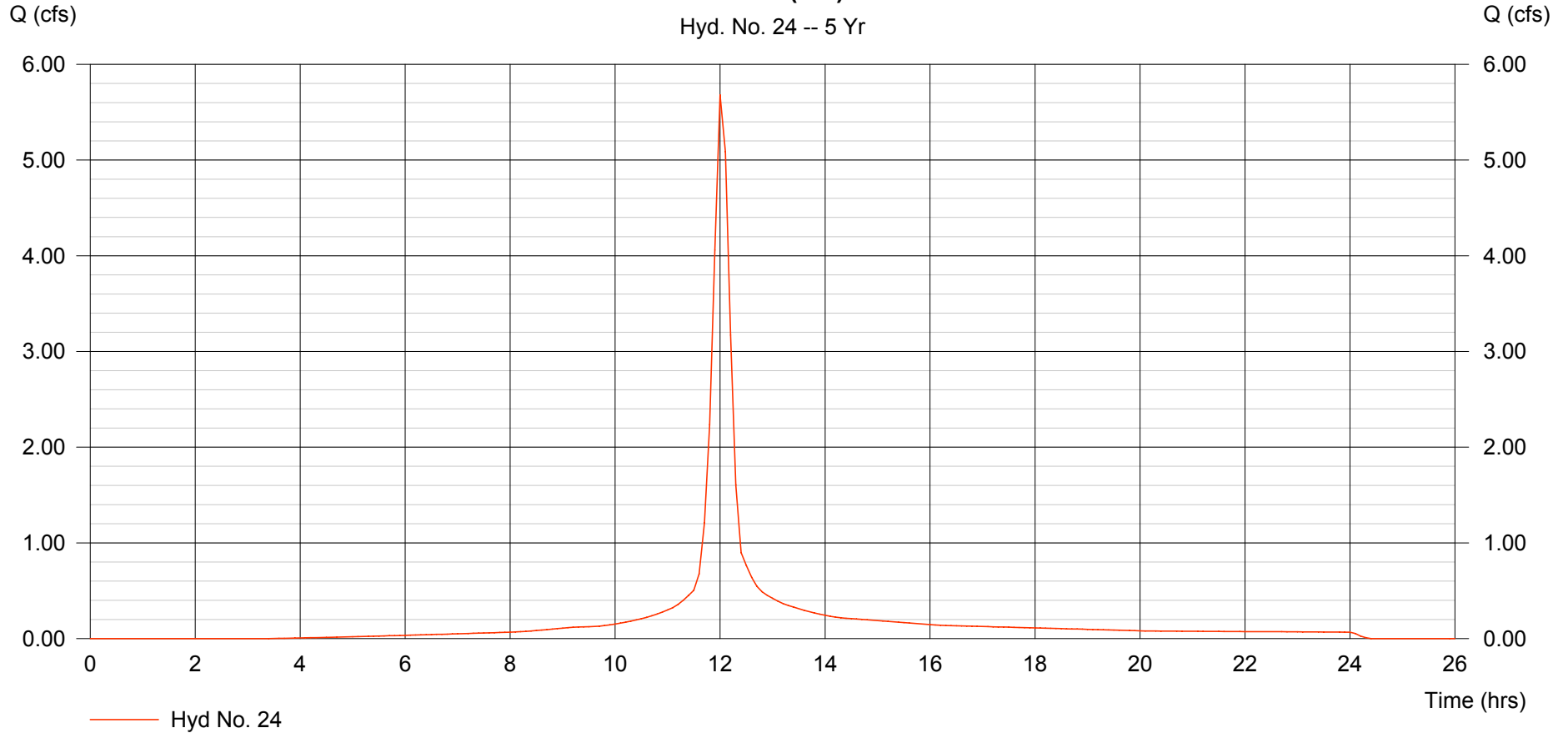
Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 1.446 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 5.680 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.414 acft

### DA-3A (3-2)

Hyd. No. 24 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

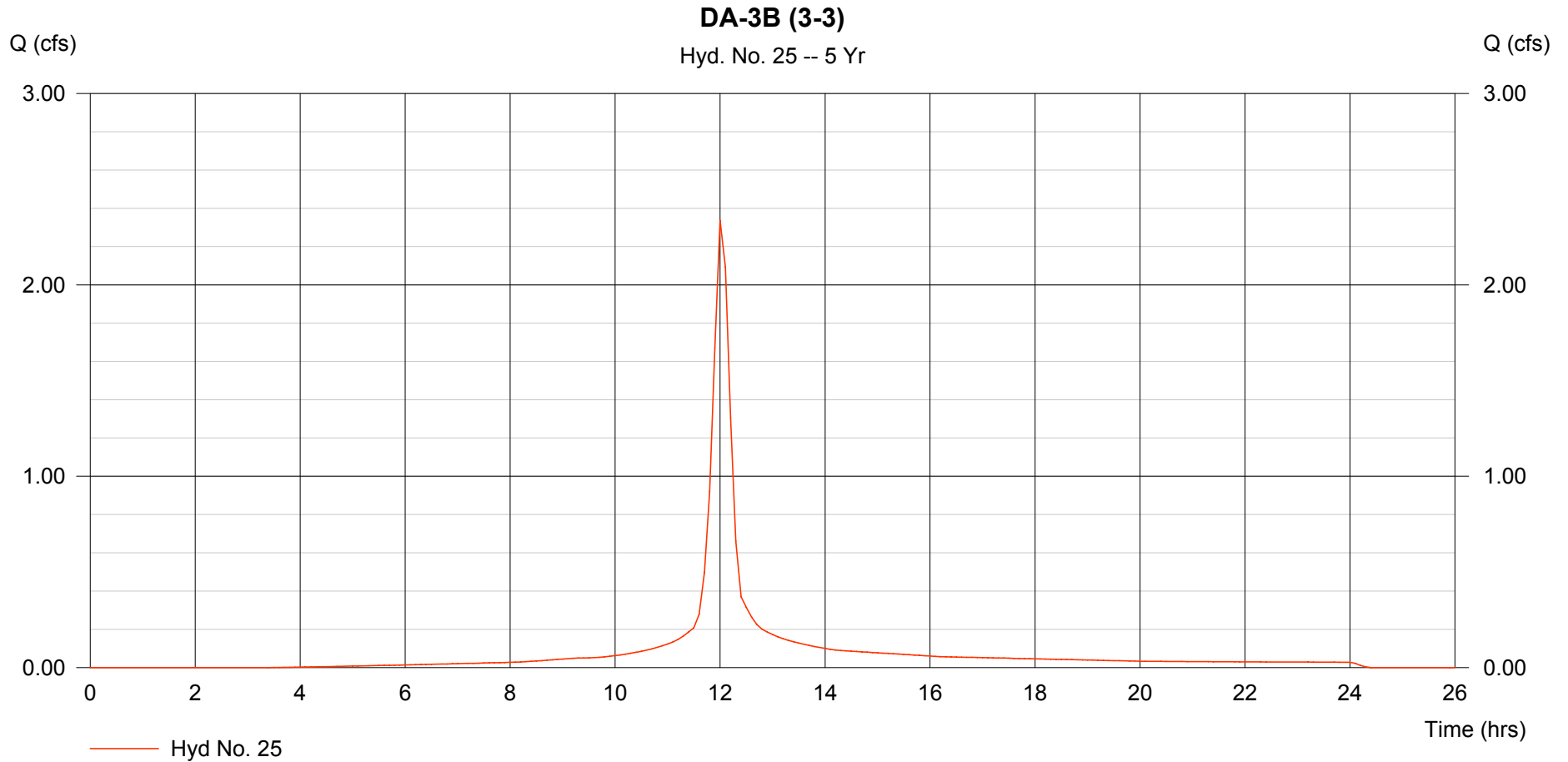
## Hyd. No. 25

DA-3B (3-3)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.595 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 2.337 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.170 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

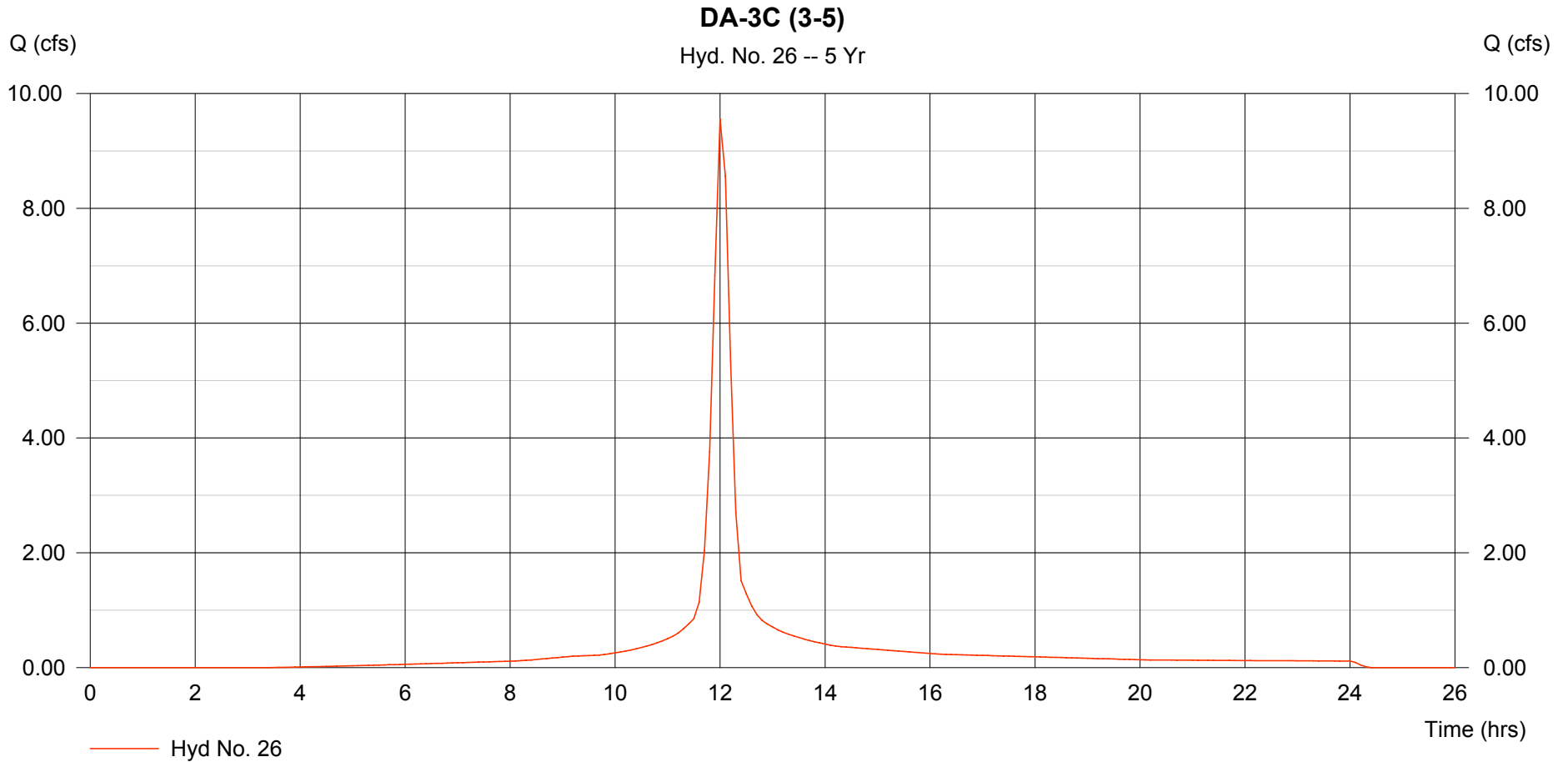
## Hyd. No. 26

DA-3C (3-5)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 2.433 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 9.557 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.696 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 27

DA-3D (3-4)

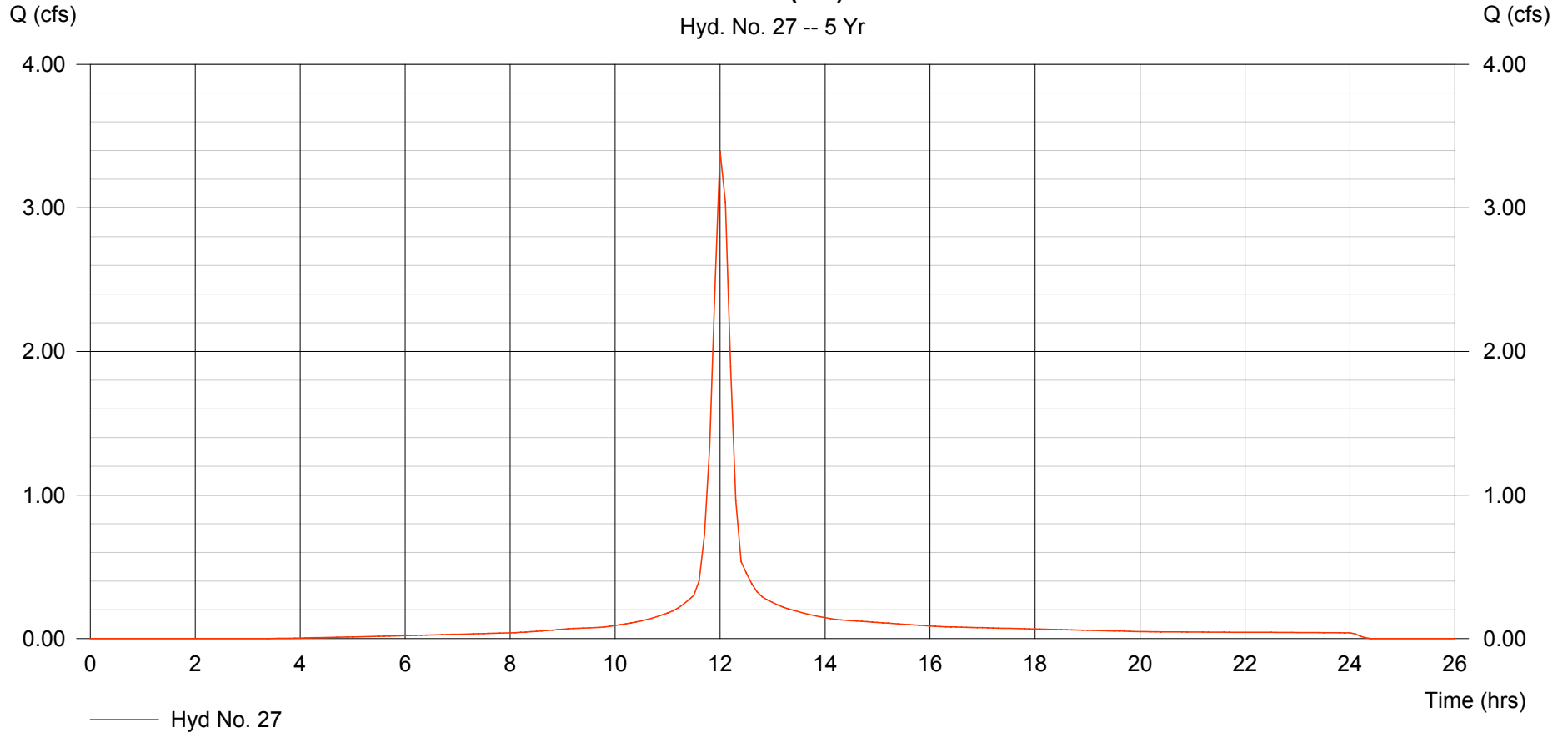
Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.864 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 3.394 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.247 acft

### DA-3D (3-4)

Hyd. No. 27 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

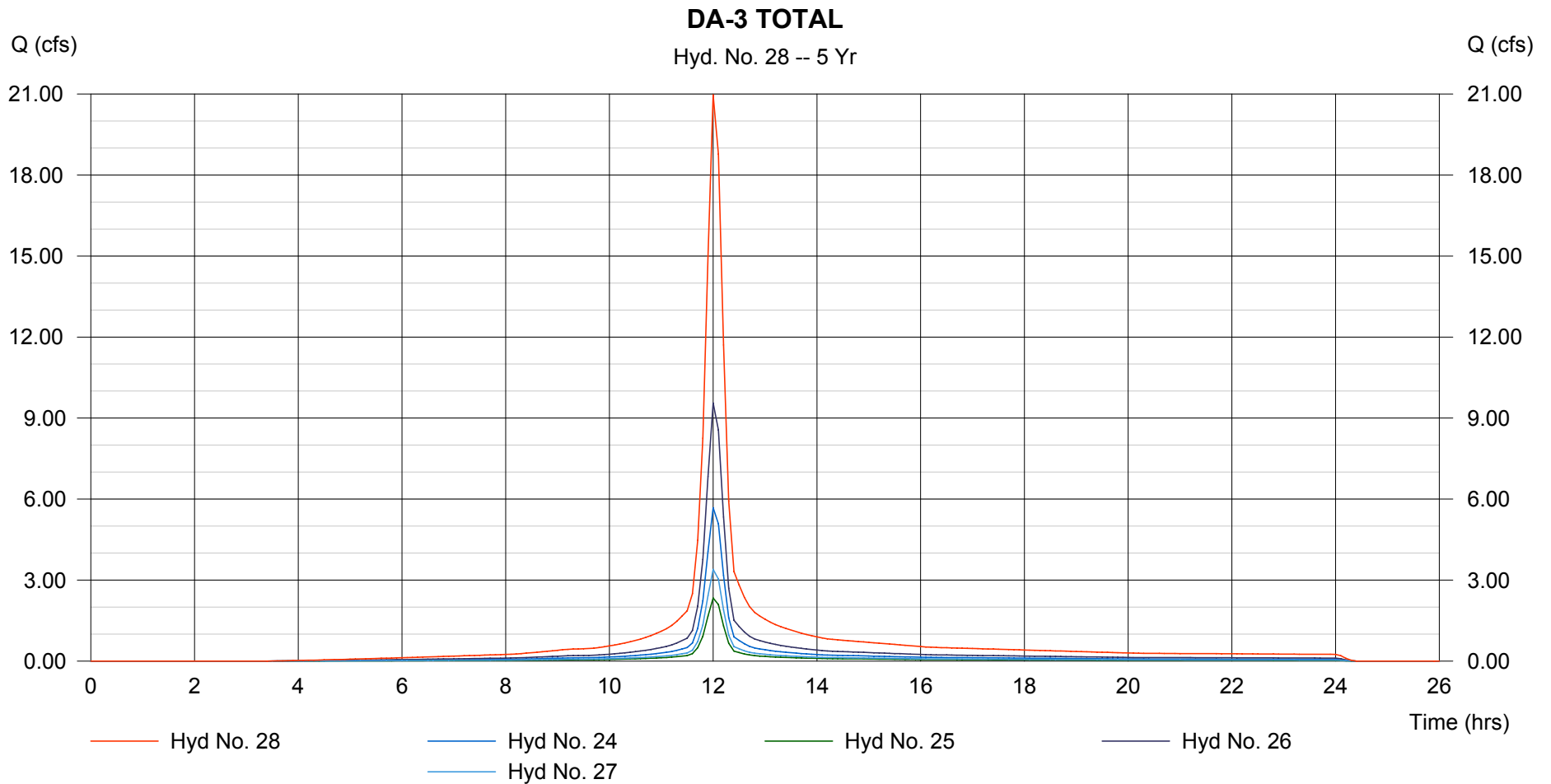
## Hyd. No. 28

DA-3 TOTAL

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 20.97 cfs  
Time interval = 6 min

Hydrograph Volume = 1.526 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

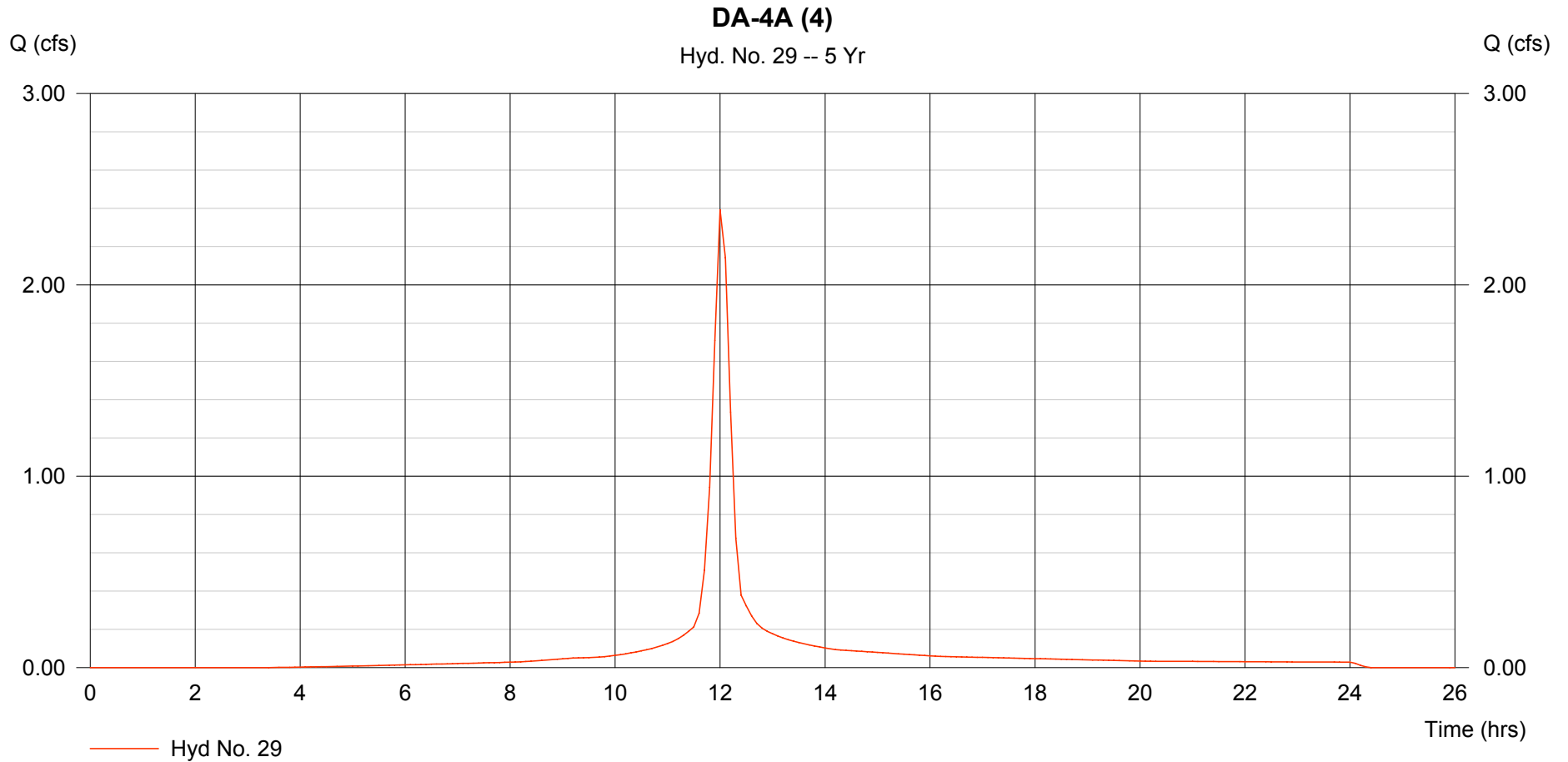
## Hyd. No. 29

DA-4A (4)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.609 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 2.392 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.174 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

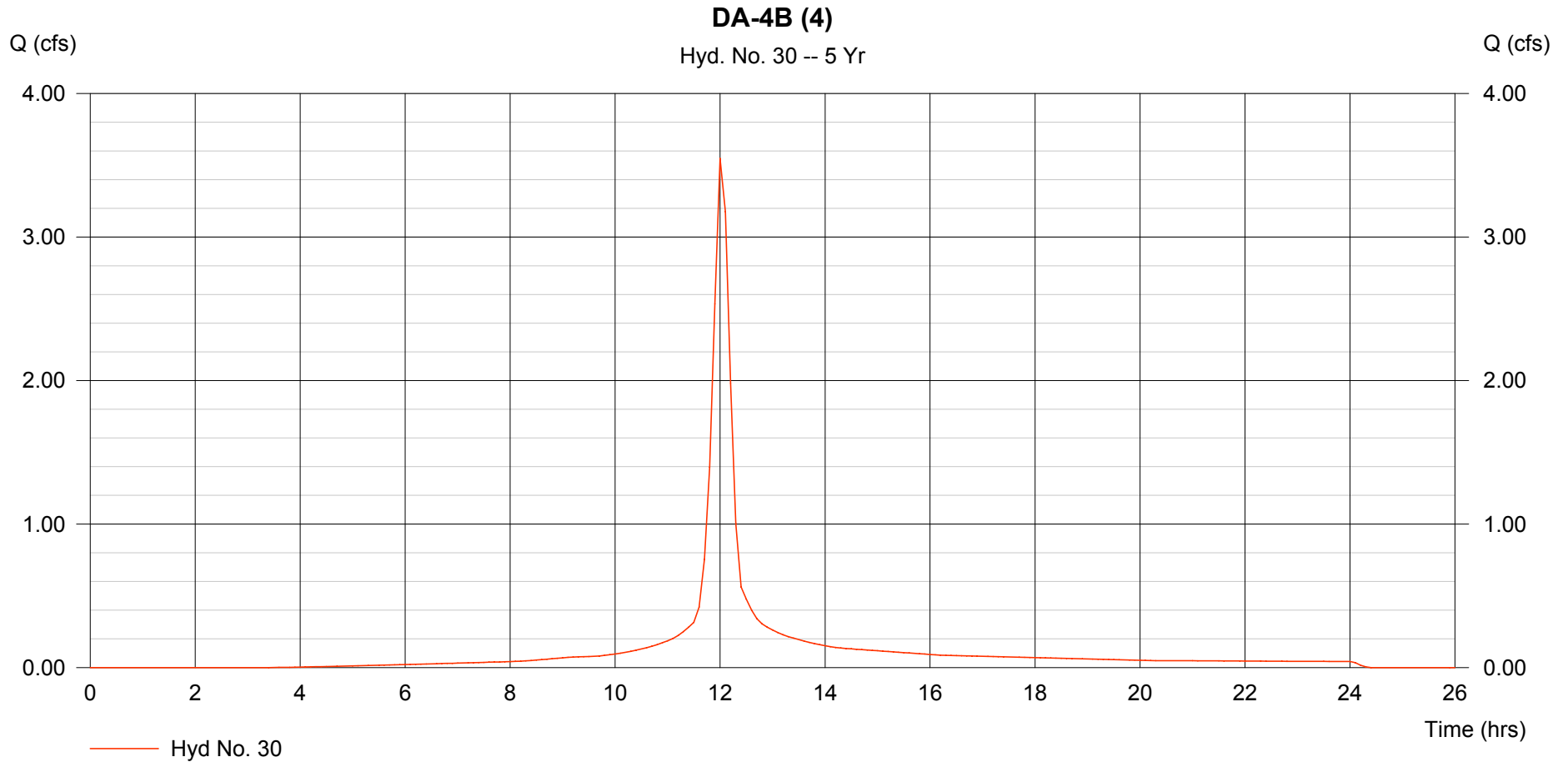
## Hyd. No. 30

DA-4B (4)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 0.903 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 3.547 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.258 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

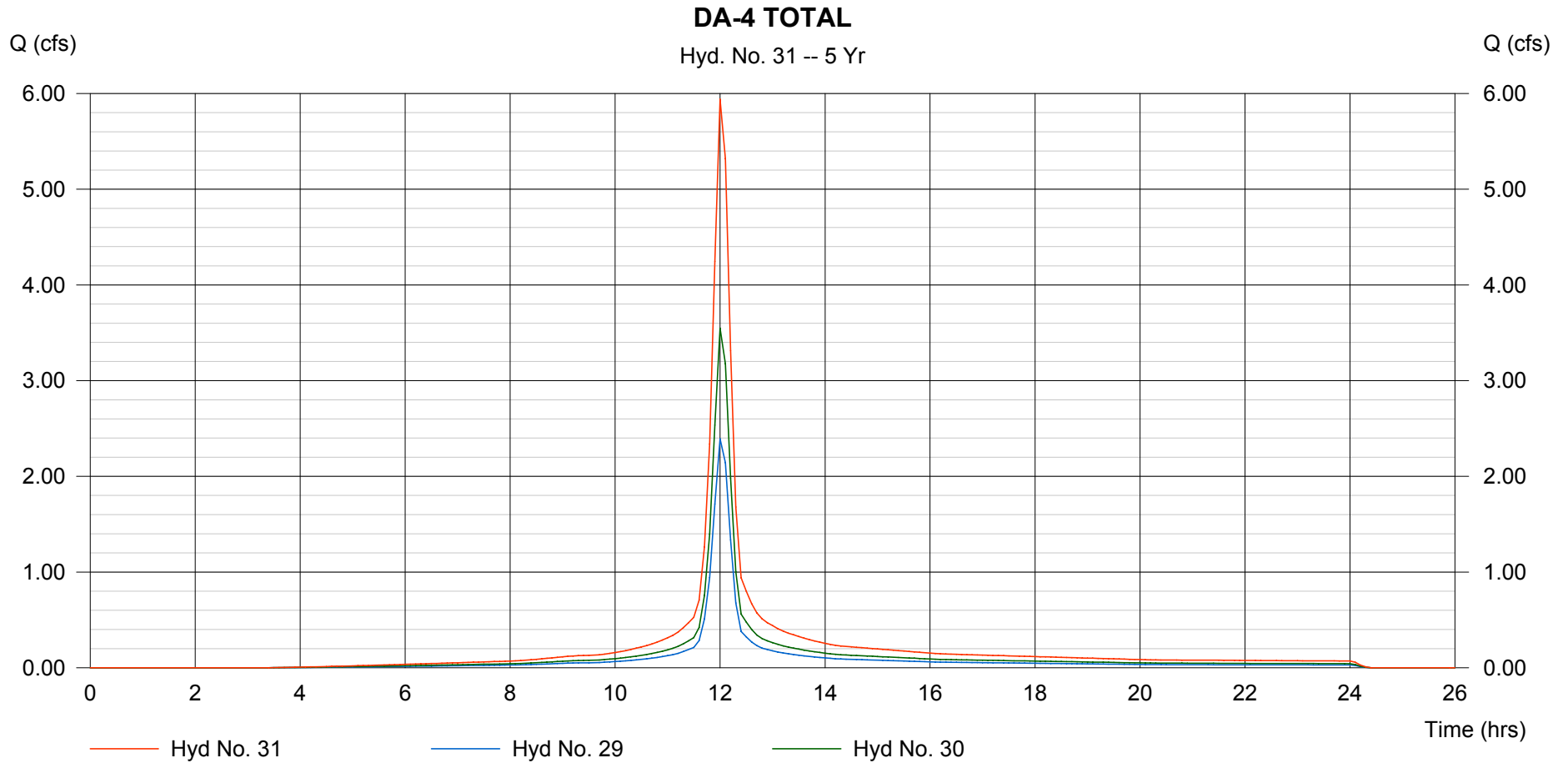
## Hyd. No. 31

DA-4 TOTAL

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 29, 30

Peak discharge = 5.939 cfs  
Time interval = 6 min

Hydrograph Volume = 0.432 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

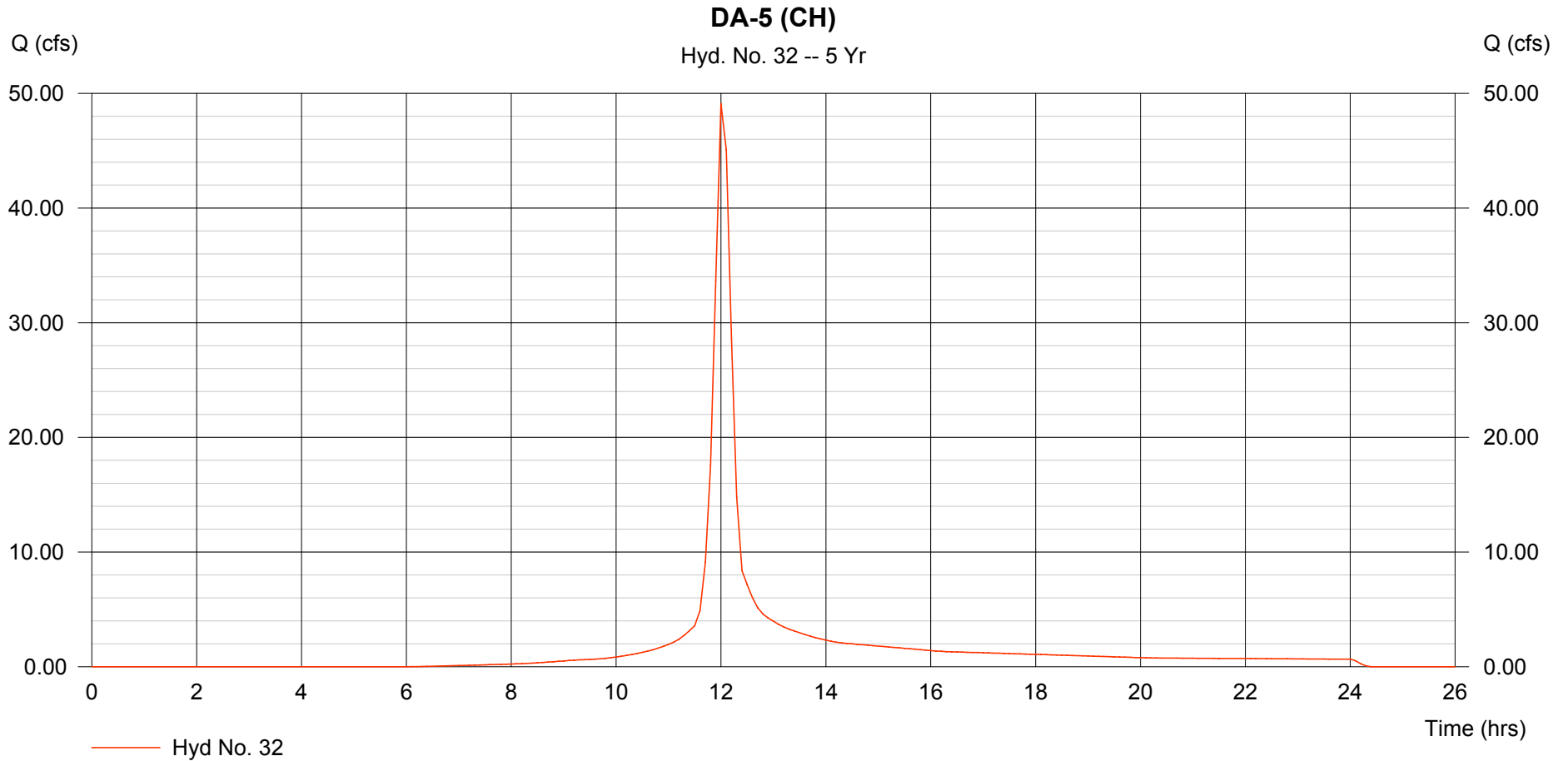
## Hyd. No. 32

DA-5 (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 15.067 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 49.09 cfs  
Time interval = 6 min  
Curve number = 84.8  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 3.467 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

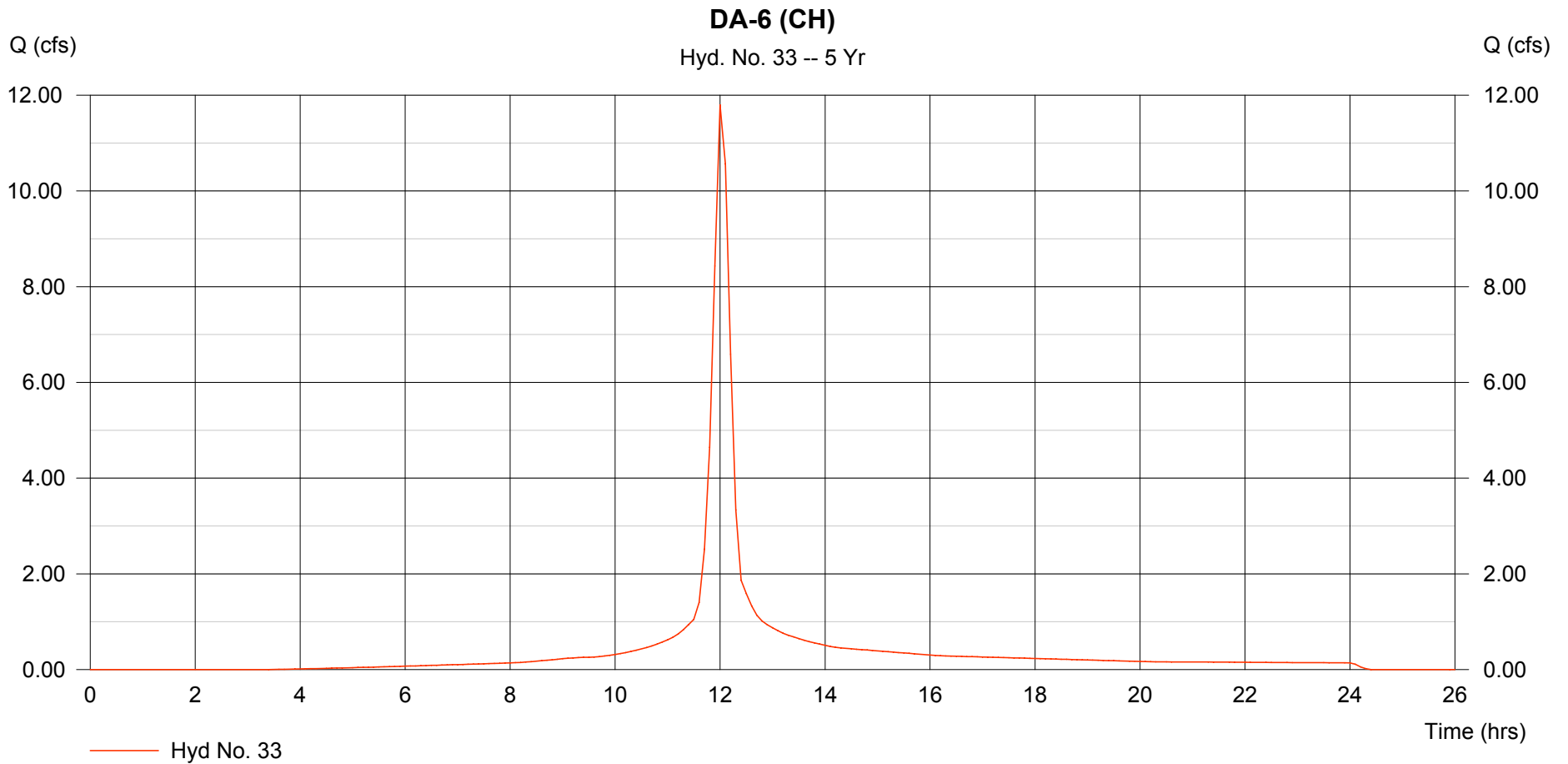
## Hyd. No. 33

DA-6 (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 5 yrs  
Drainage area = 3.003 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 4.56 in  
Storm duration = 24 hrs

Peak discharge = 11.80 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.859 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

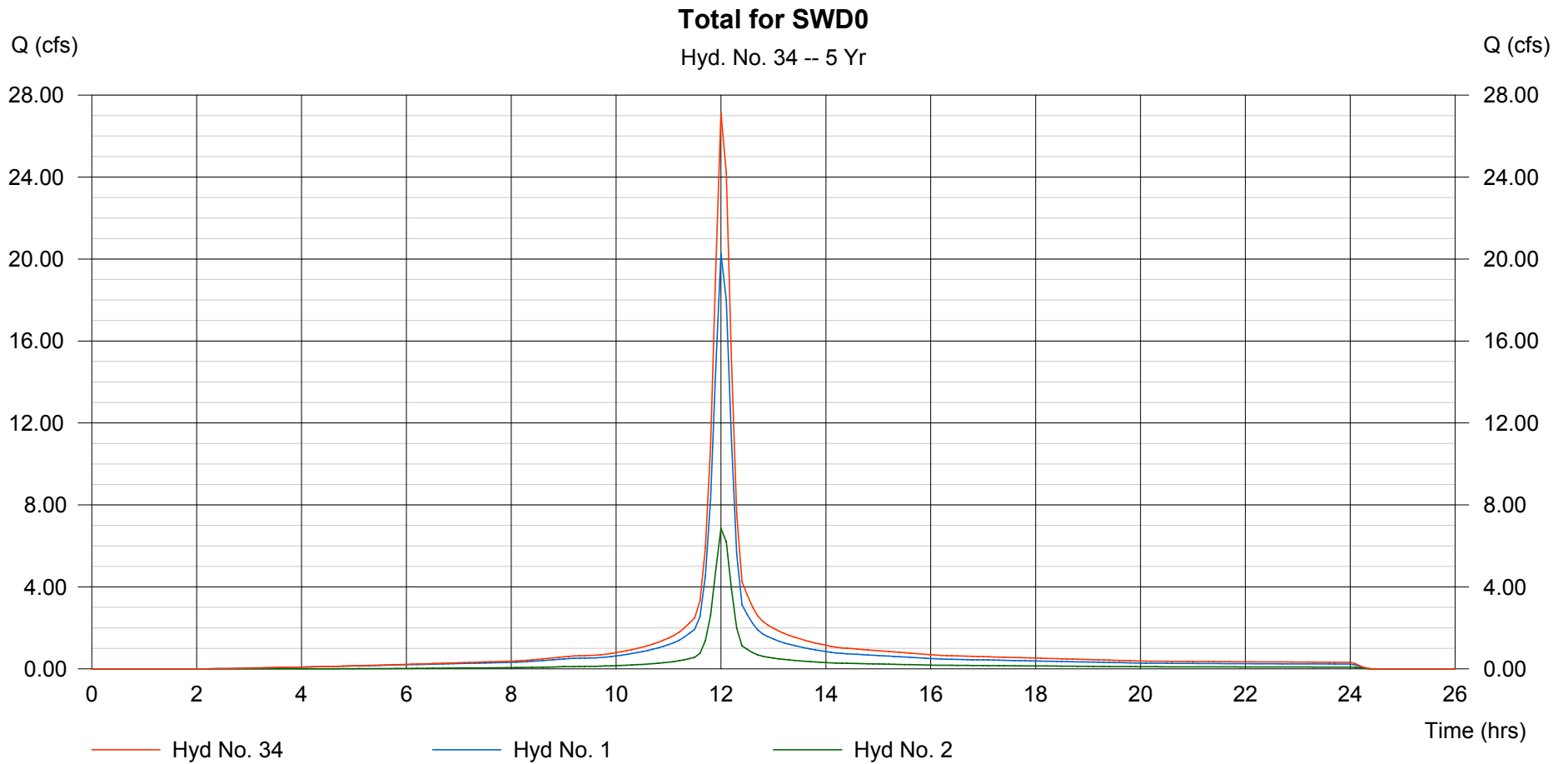
## Hyd. No. 34

Total for SWD0

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 1, 2

Peak discharge = 27.13 cfs  
Time interval = 6 min

Hydrograph Volume = 2.010 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

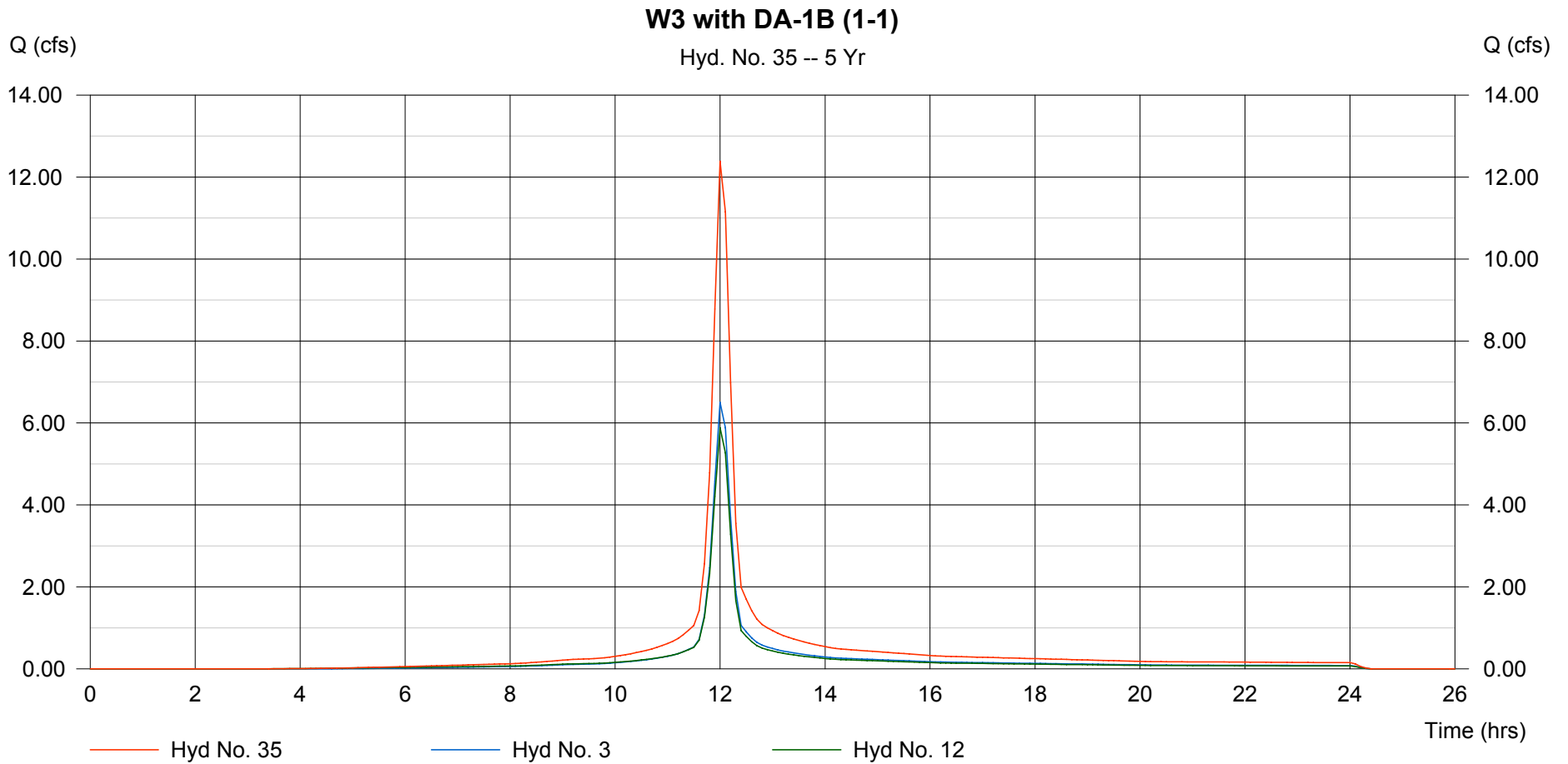
## Hyd. No. 35

W3 with DA-1B (1-1)

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 3, 12

Peak discharge = 12.39 cfs  
Time interval = 6 min

Hydrograph Volume = 0.893 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

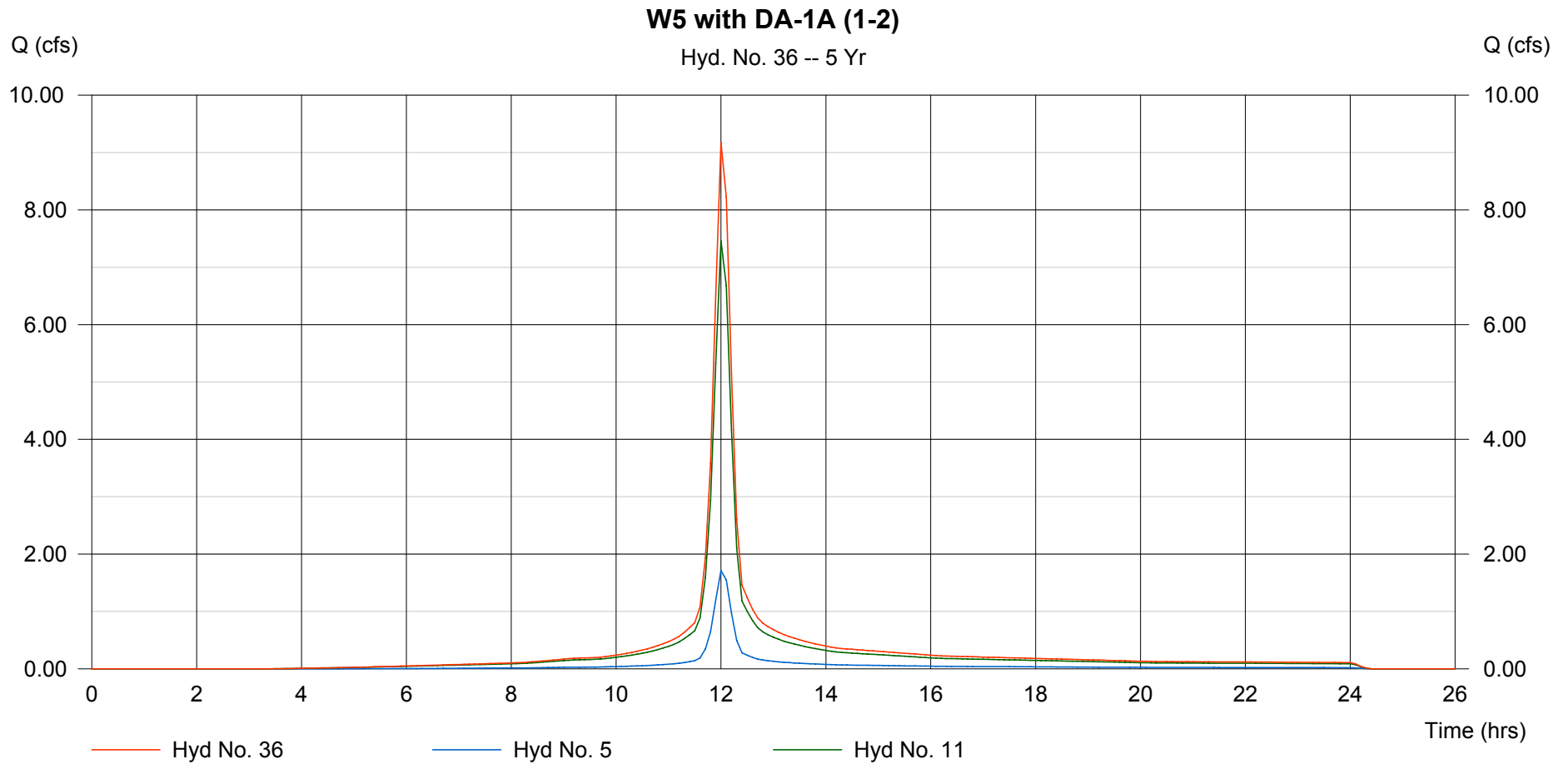
## Hyd. No. 36

W5 with DA-1A (1-2)

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 5, 11

Peak discharge = 9.171 cfs  
Time interval = 6 min

Hydrograph Volume = 0.665 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

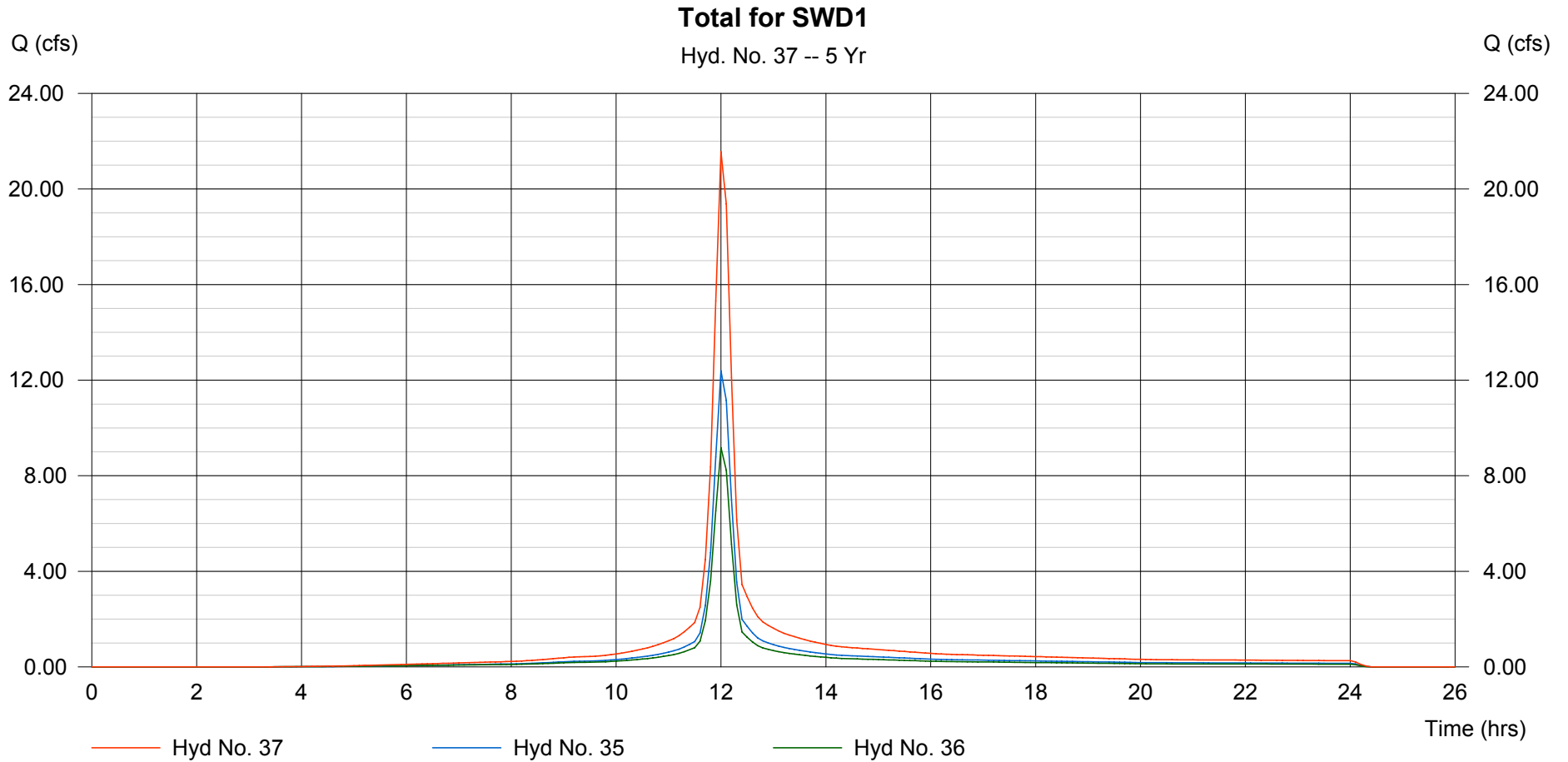
## Hyd. No. 37

Total for SWD1

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 35, 36

Peak discharge = 21.56 cfs  
Time interval = 6 min

Hydrograph Volume = 1.559 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

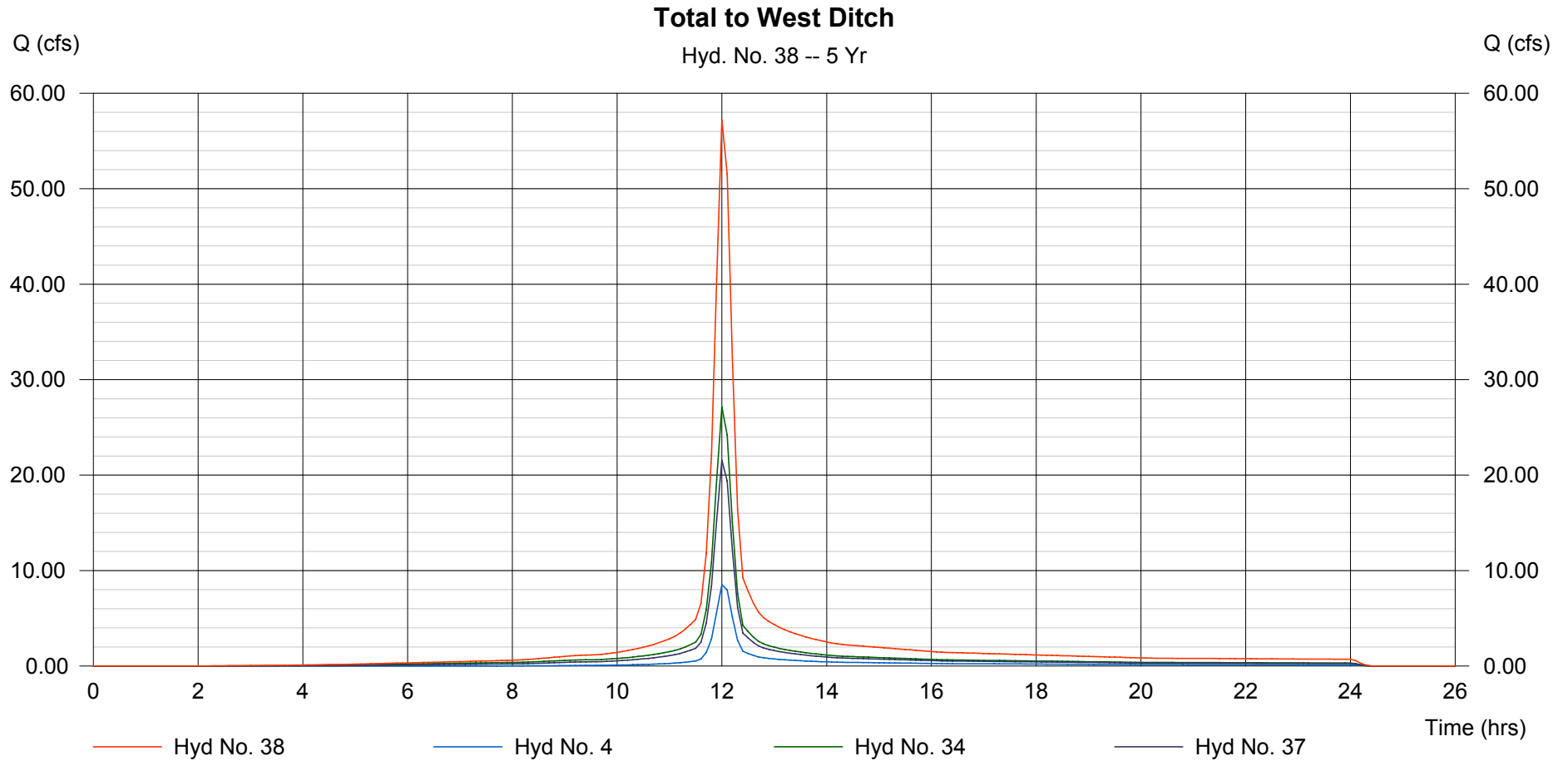
## Hyd. No. 38

Total to West Ditch

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 4, 34, 37

Peak discharge = 57.20 cfs  
Time interval = 6 min

Hydrograph Volume = 4.170 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 39

Proposed West Ditch

Hydrograph type = Reach  
Storm frequency = 5 yrs  
Inflow hyd. No. = 38  
Reach length = 1202.1 ft  
Manning's n = 0.050  
Side slope = 4.0:1  
Rating curve x = 0.720  
Ave. velocity = 1.58 ft/s

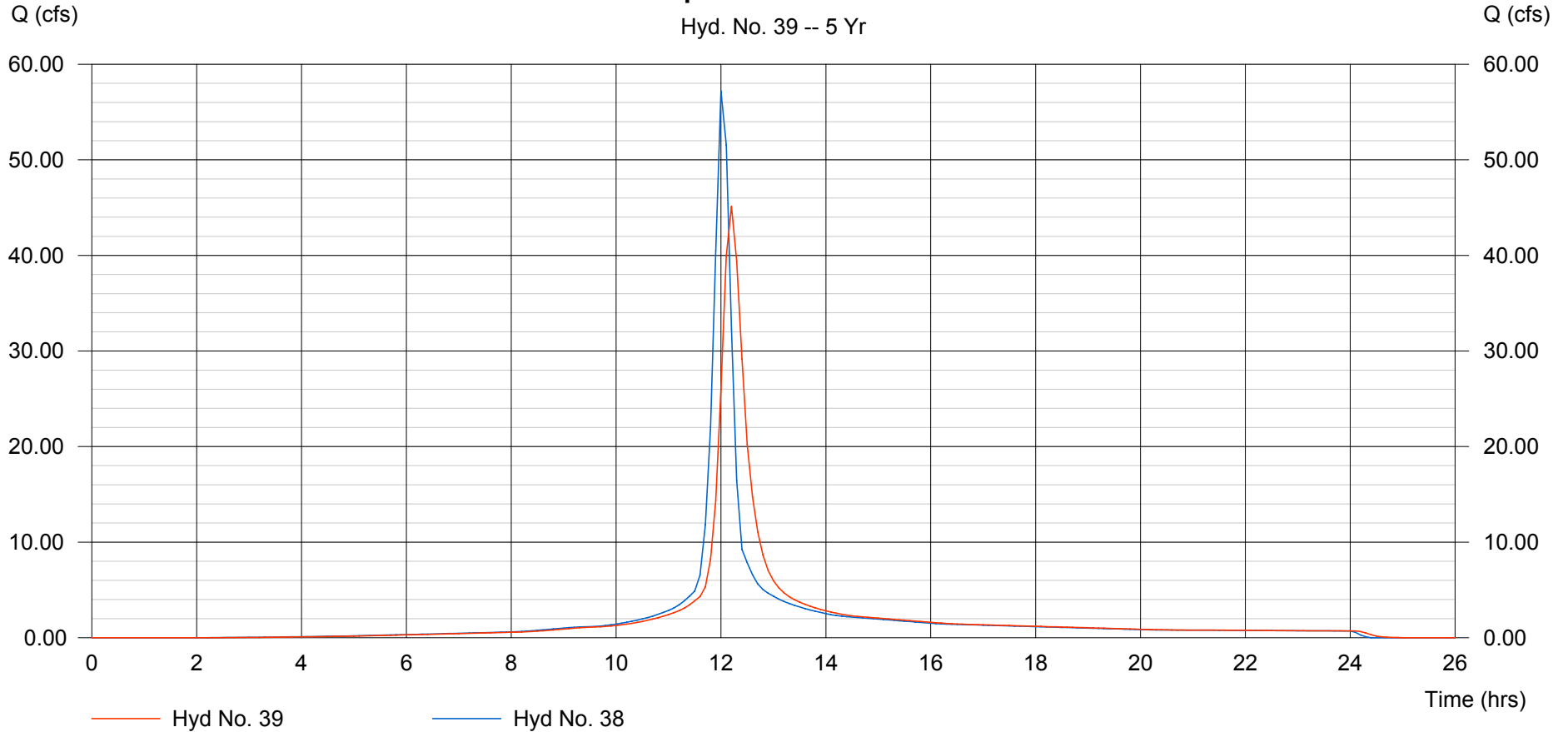
Peak discharge = 45.14 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.5 %  
Bottom width = 5.0 ft  
Max. depth = 1.5 ft  
Rating curve m = 1.218  
Routing coeff. = 0.4467

Modified Att-Kin routing method used.

Hydrograph Volume = 4.170 acft

### Proposed West Ditch

Hyd. No. 39 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

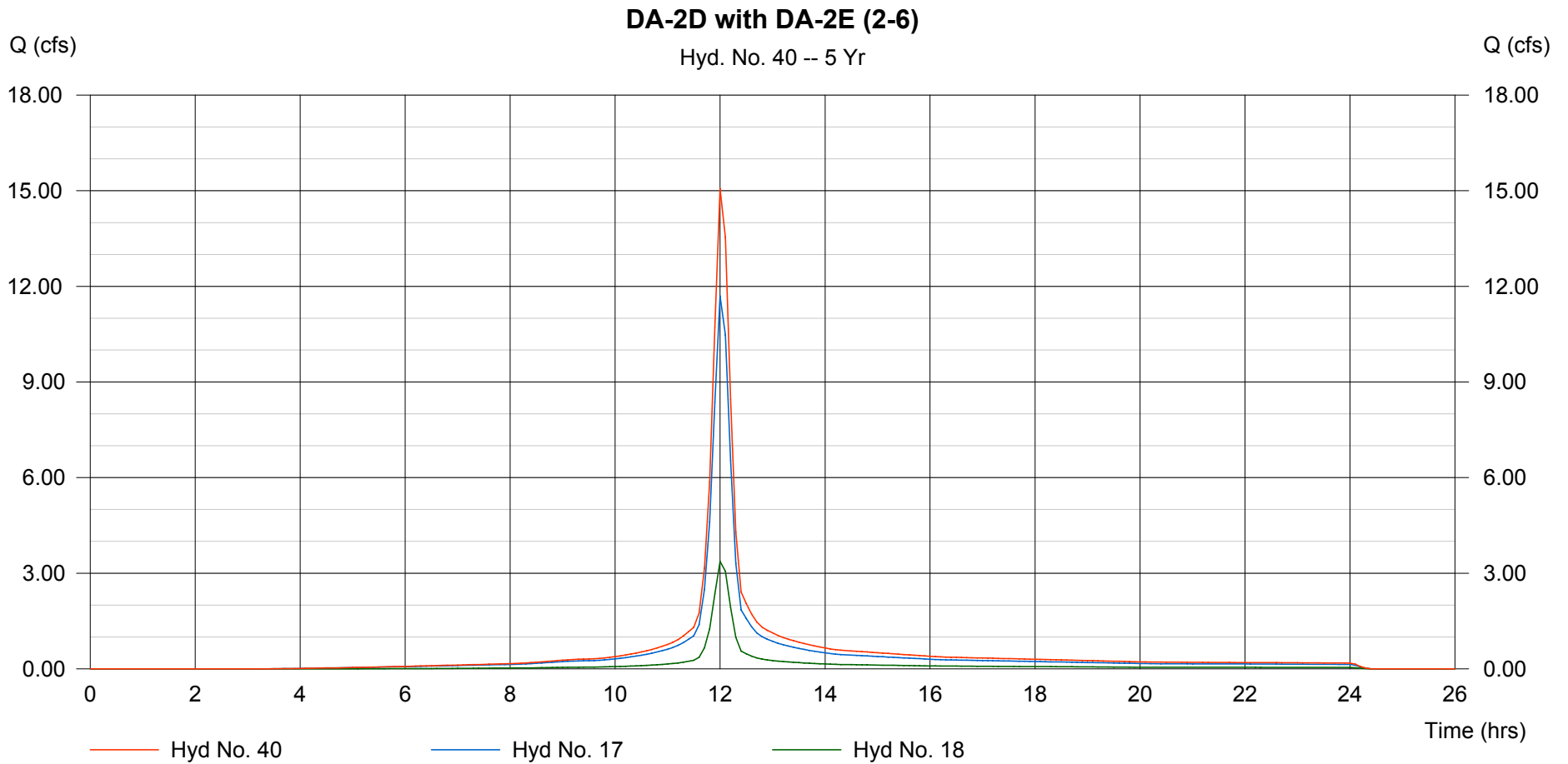
## Hyd. No. 40

DA-2D with DA-2E (2-6)

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 17, 18

Peak discharge = 15.07 cfs  
Time interval = 6 min

Hydrograph Volume = 1.091 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

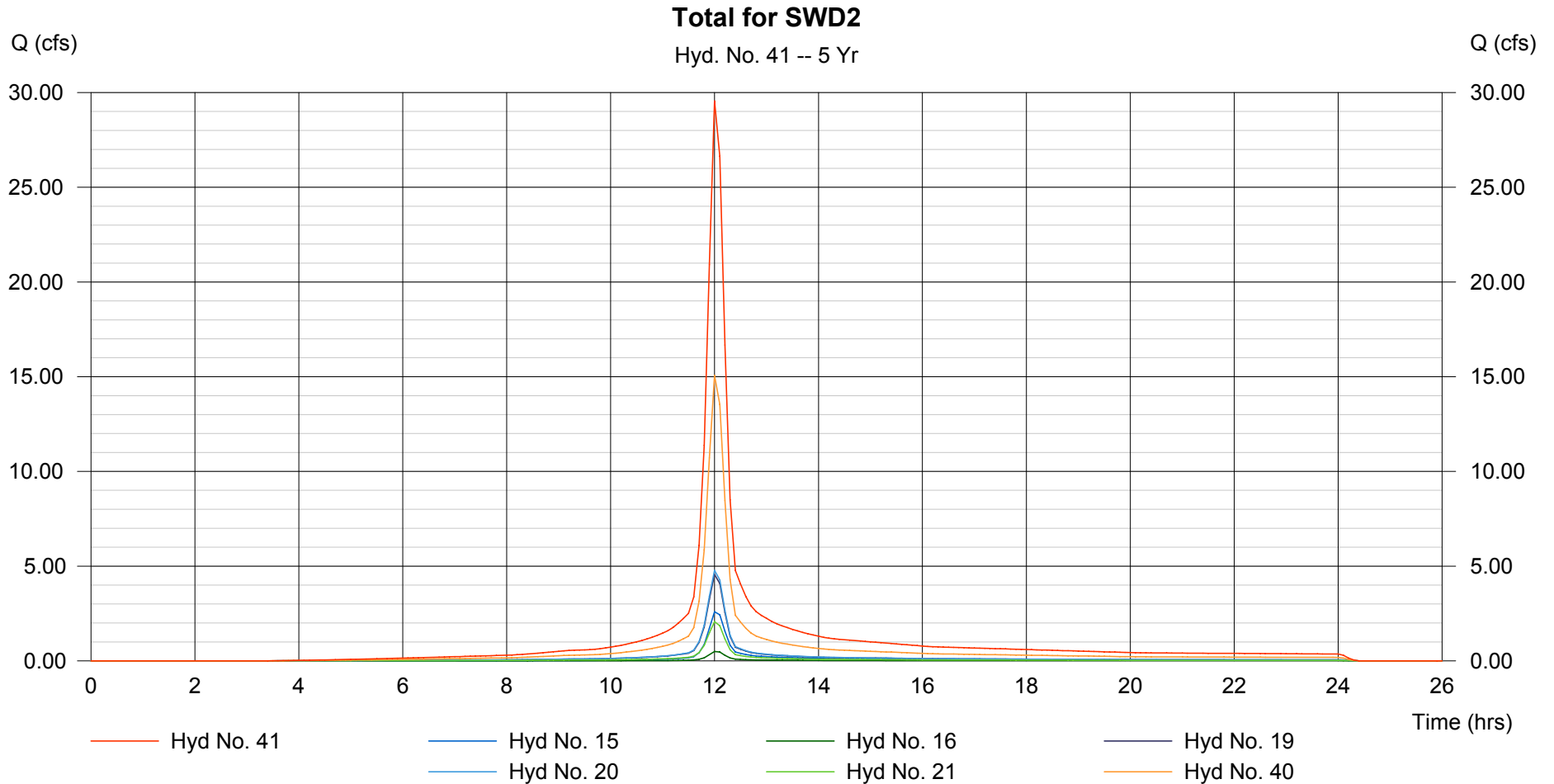
## Hyd. No. 41

Total for SWD2

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 15, 16, 19, 20, 21, 40

Peak discharge = 29.55 cfs  
Time interval = 6 min

Hydrograph Volume = 2.139 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

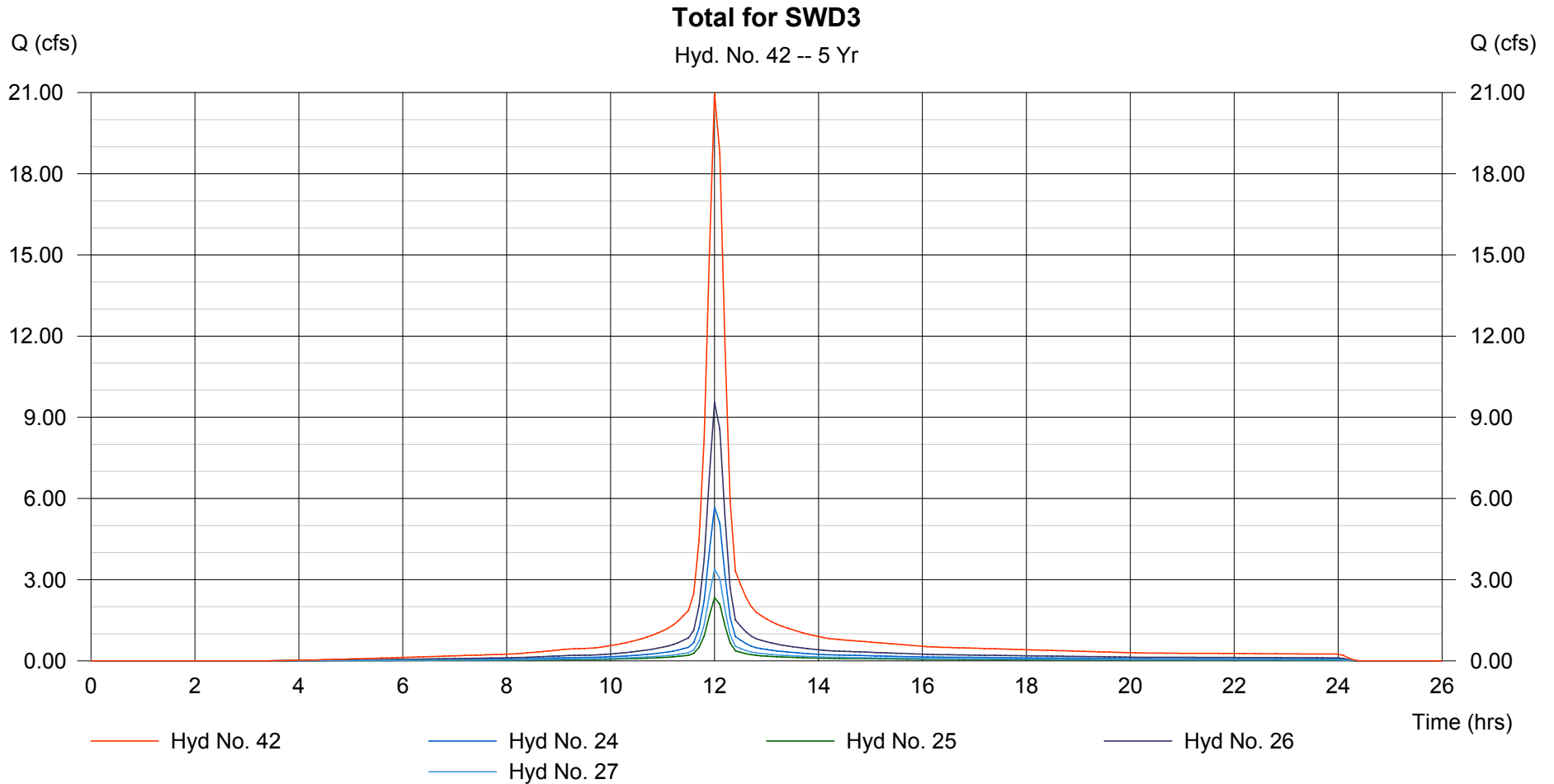
## Hyd. No. 42

Total for SWD3

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 20.97 cfs  
Time interval = 6 min

Hydrograph Volume = 1.526 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

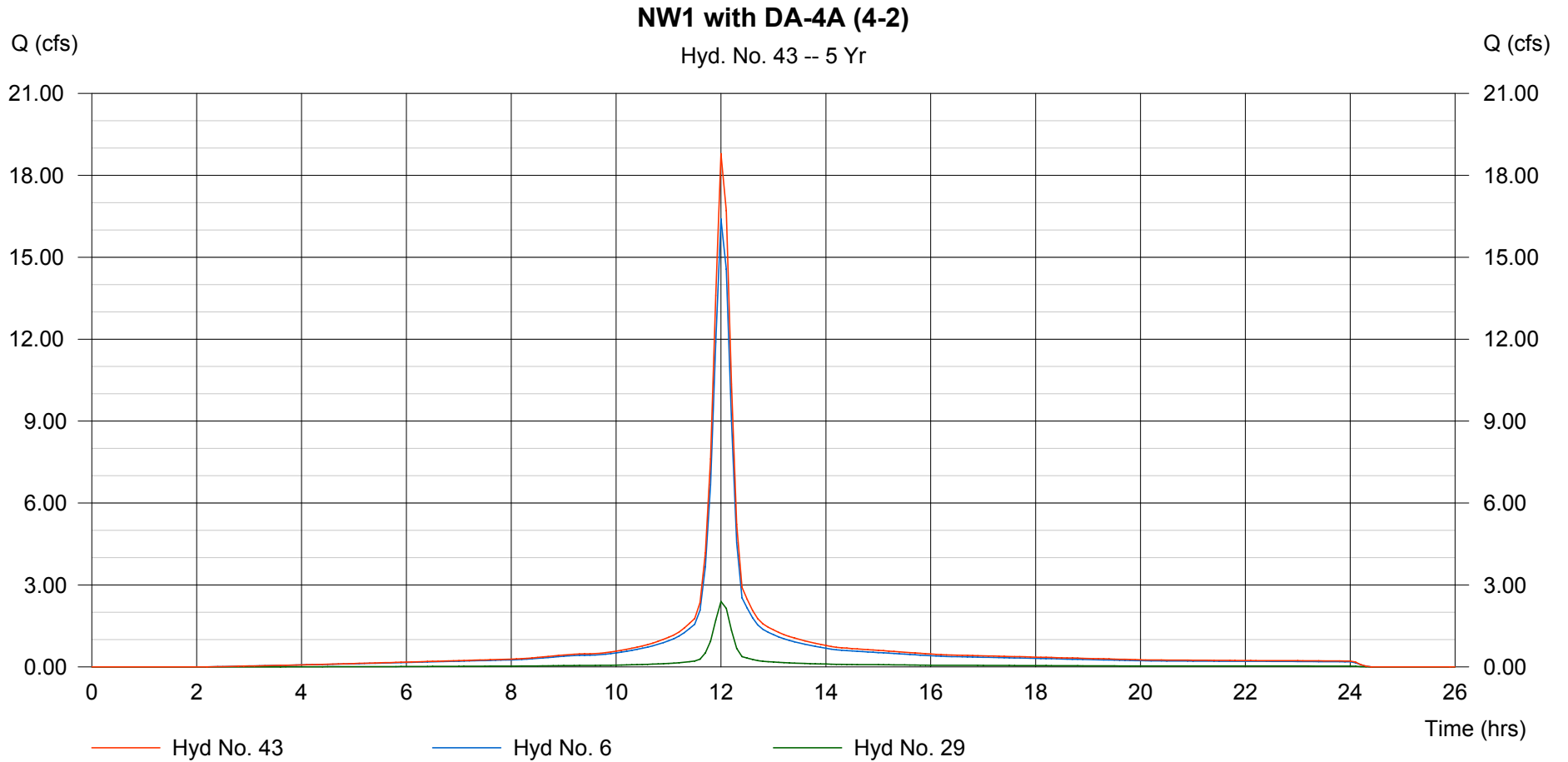
## Hyd. No. 43

NW1 with DA-4A (4-2)

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 6, 29

Peak discharge = 18.80 cfs  
Time interval = 6 min

Hydrograph Volume = 1.404 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

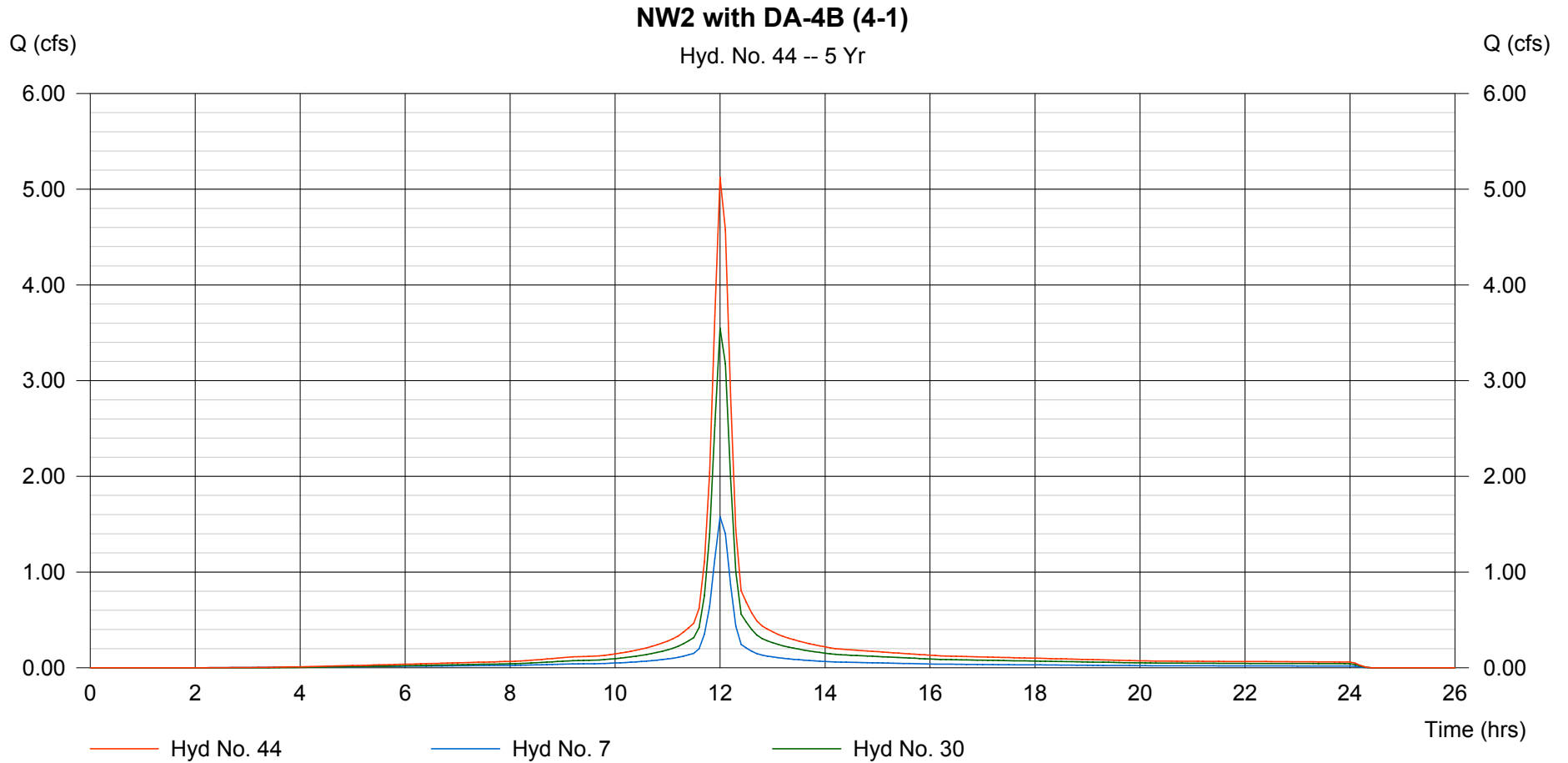
## Hyd. No. 44

NW2 with DA-4B (4-1)

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 7, 30

Peak discharge = 5.124 cfs  
Time interval = 6 min

Hydrograph Volume = 0.377 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

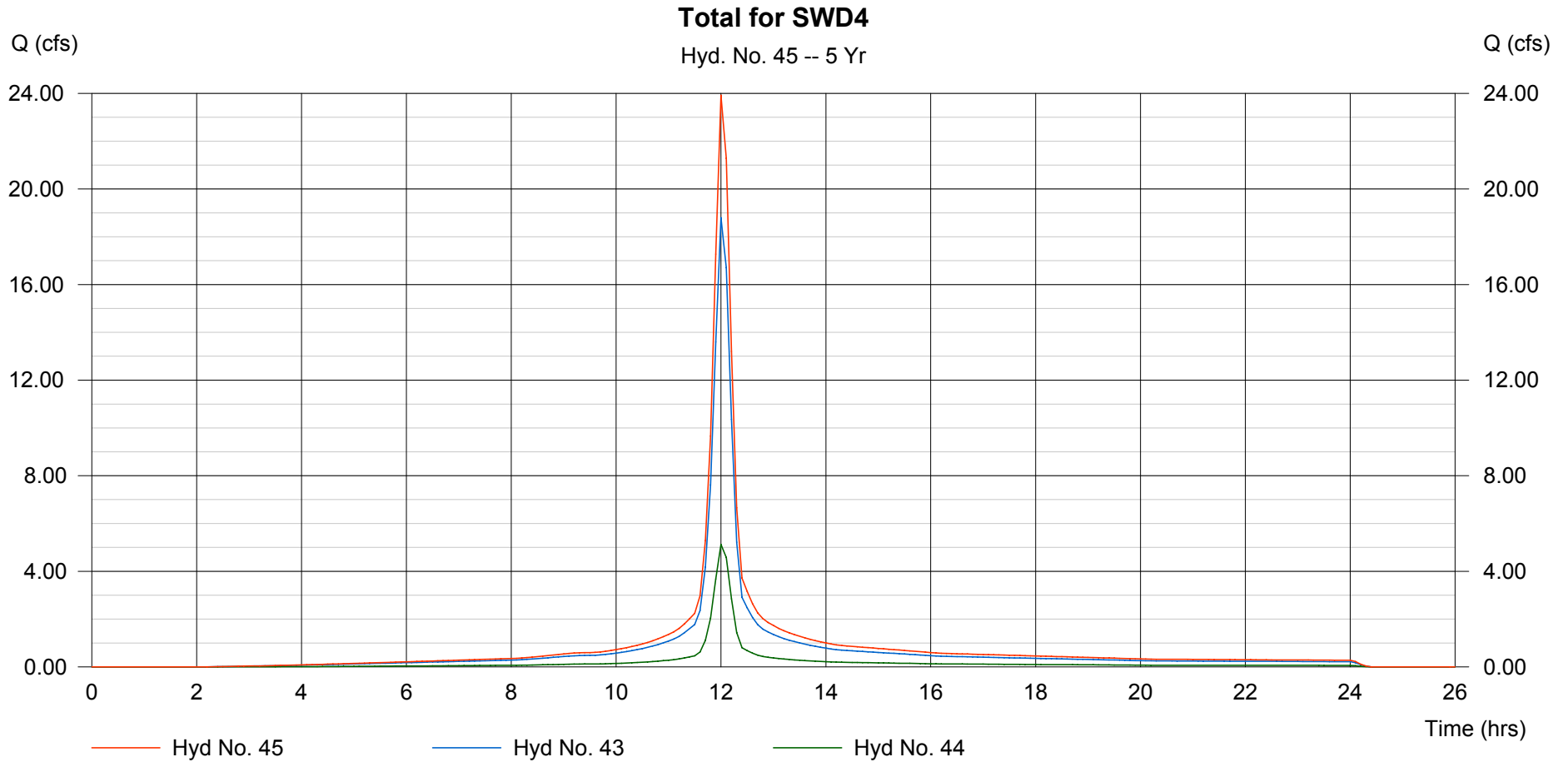
## Hyd. No. 45

Total for SWD4

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 43, 44

Peak discharge = 23.92 cfs  
Time interval = 6 min

Hydrograph Volume = 1.781 acft



# Hydrograph Plot

100

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

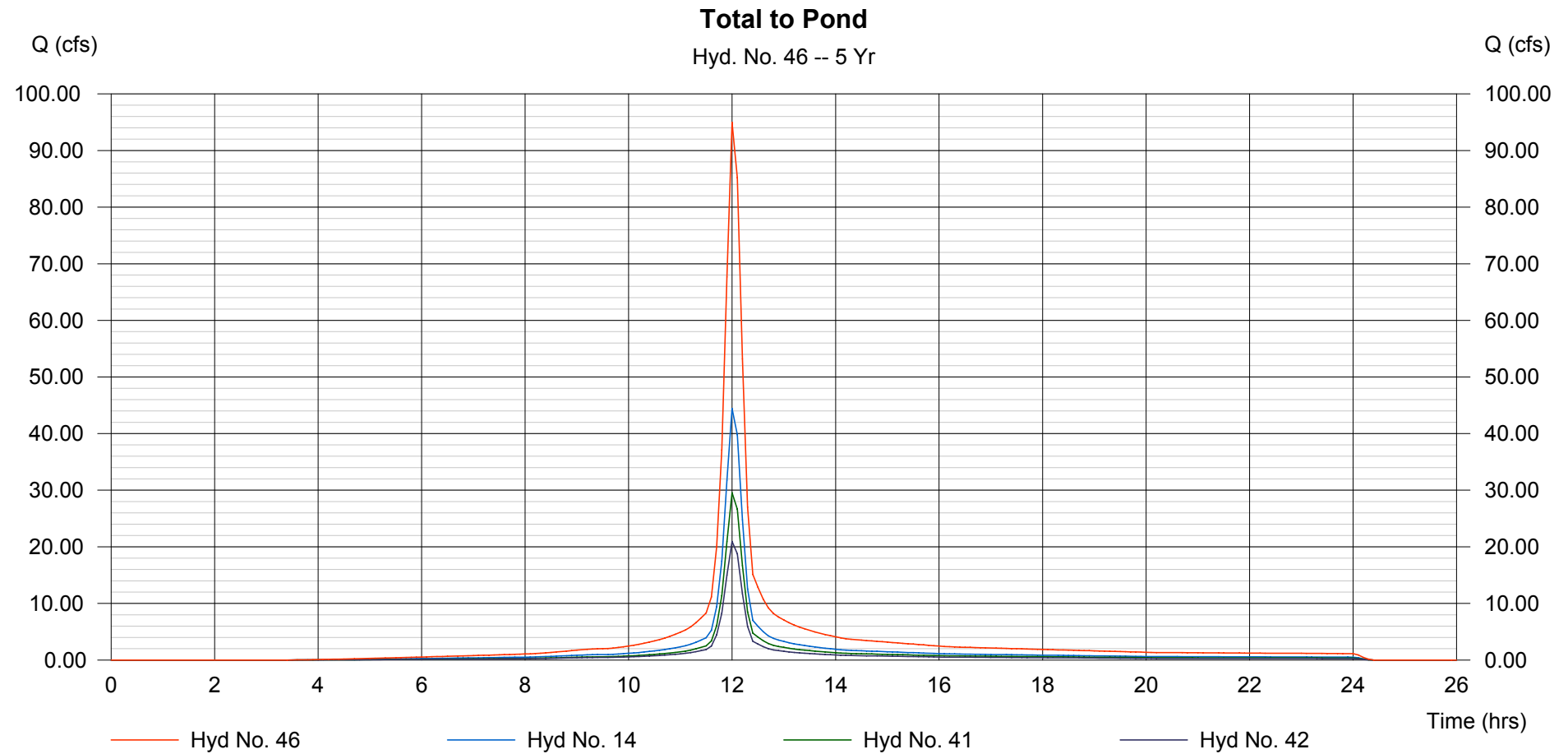
## Hyd. No. 46

Total to Pond

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 14, 41, 42

Peak discharge = 94.96 cfs  
Time interval = 6 min

Hydrograph Volume = 6.901 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 47

Proposed Pond

Hydrograph type = Reservoir  
Storm frequency = 5 yrs  
Inflow hyd. No. = 46  
Reservoir name = Proposed Pond

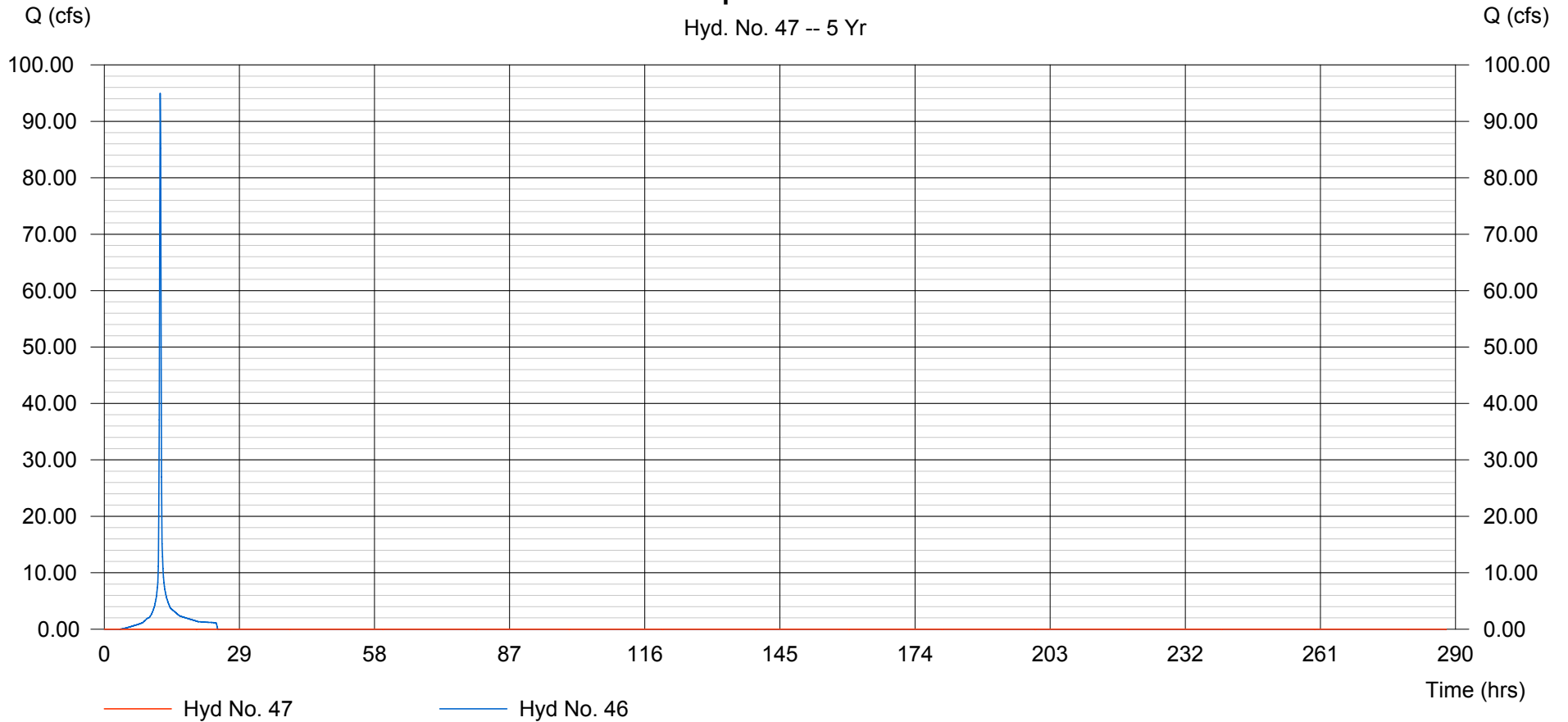
Peak discharge = 0.000 cfs  
Time interval = 6 min  
Max. Elevation = 1388.00 ft  
Max. Storage = 6.901 acft

Storage Indication method used.

Hydrograph Volume = 0.000 acft

### Proposed Pond

Hyd. No. 47 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 48

N, NE, SE, DA-5, DA-6, & SWD4

Hydrograph type = Combine

Storm frequency = 5 yrs

Inflow hyds. = 8, 9, 10, 32, 33, 45

Peak discharge

= 498.08 cfs

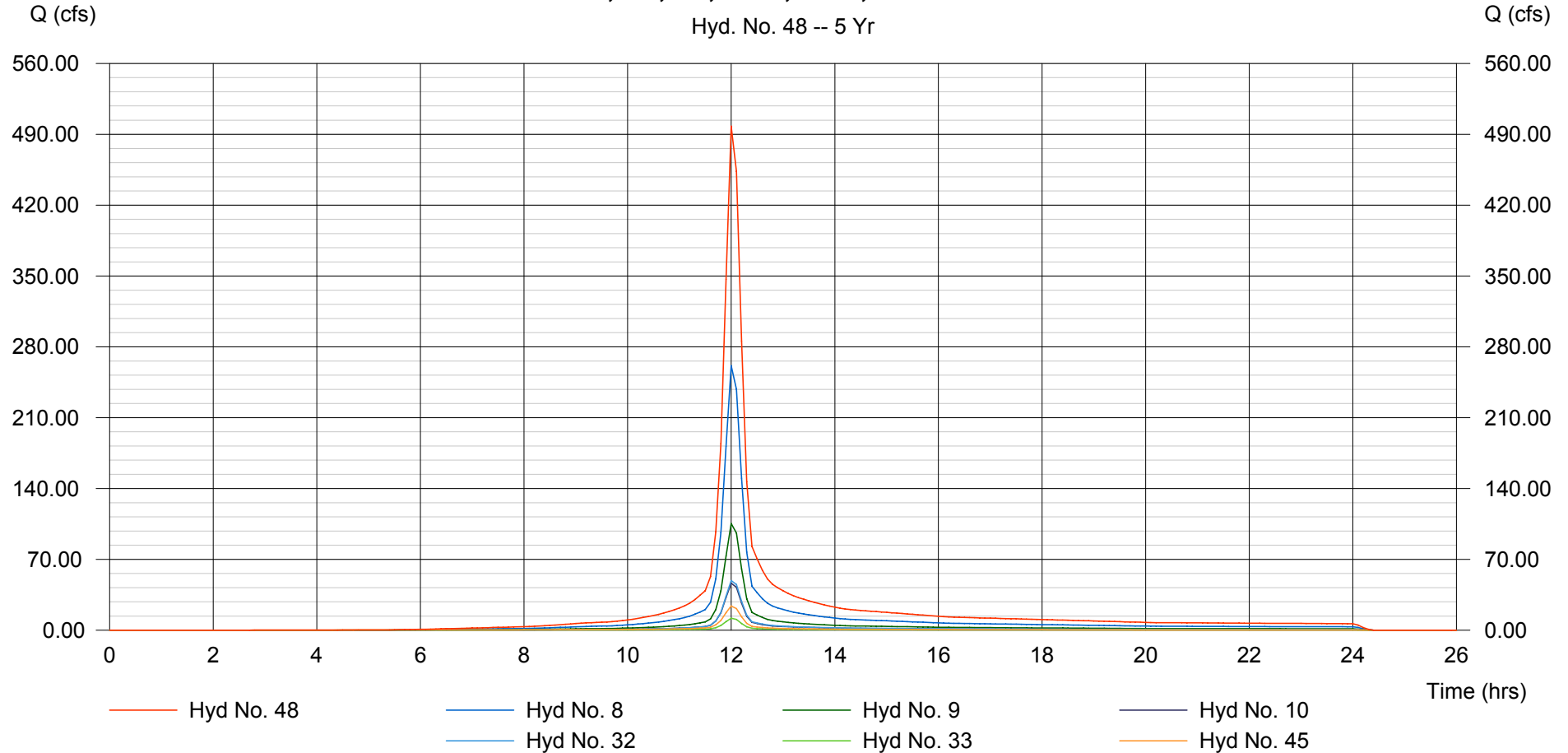
Time interval

= 6 min

Hydrograph Volume = 35.428 acft

### N, NE, SE, DA-5, DA-6, & SWD4

Hyd. No. 48 -- 5 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

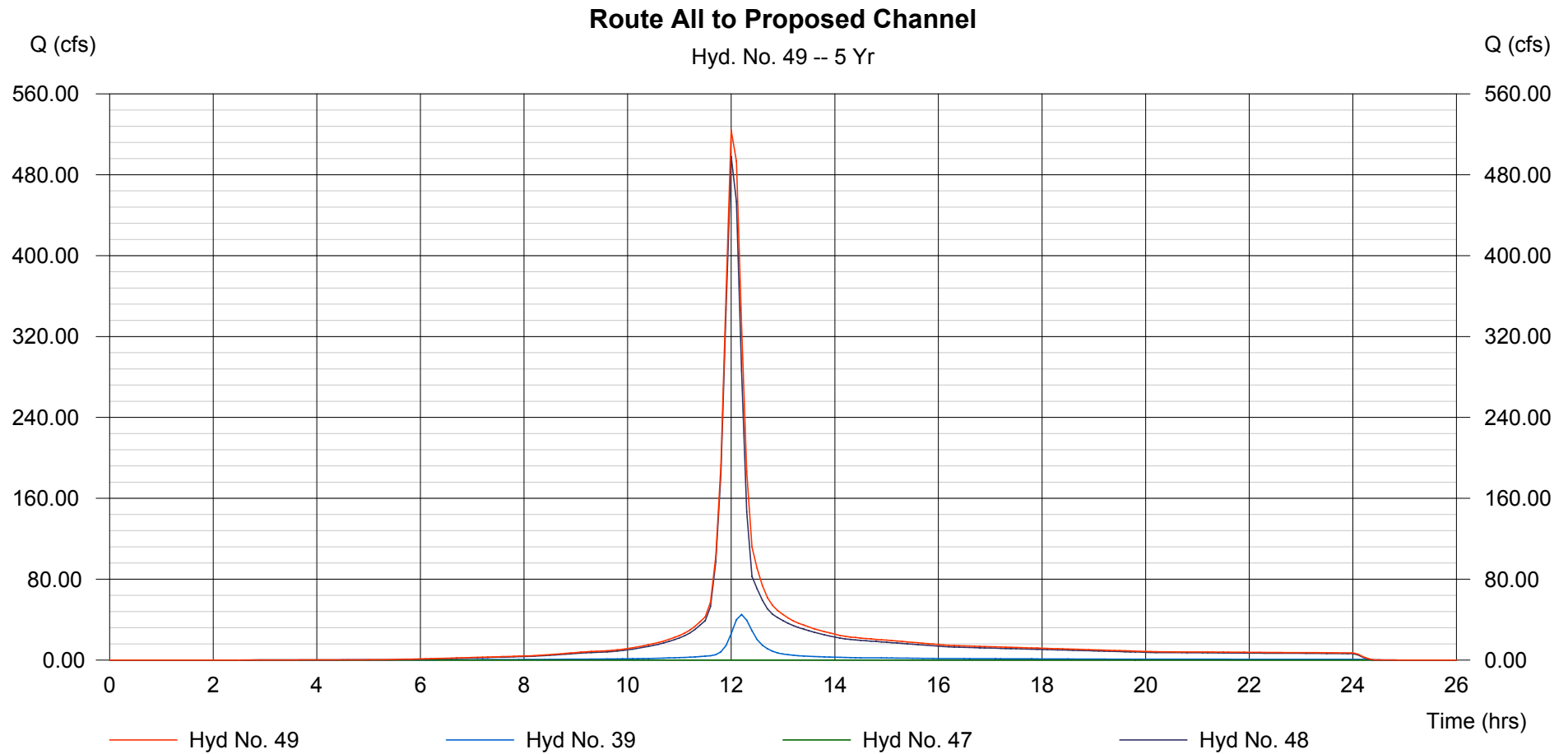
## Hyd. No. 49

Route All to Proposed Channel

Hydrograph type = Combine  
Storm frequency = 5 yrs  
Inflow hyds. = 39, 47, 48

Peak discharge = 524.13 cfs  
Time interval = 6 min

Hydrograph Volume = 39.598 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:29 PM

## Hyd. No. 50

Proposed Channel

Hydrograph type = Reach  
Storm frequency = 5 yrs  
Inflow hyd. No. = 49  
Reach length = 2296.0 ft  
Manning's n = 0.030  
Side slope = 4.0:1  
Rating curve x = 0.301  
Ave. velocity = 2.86 ft/s

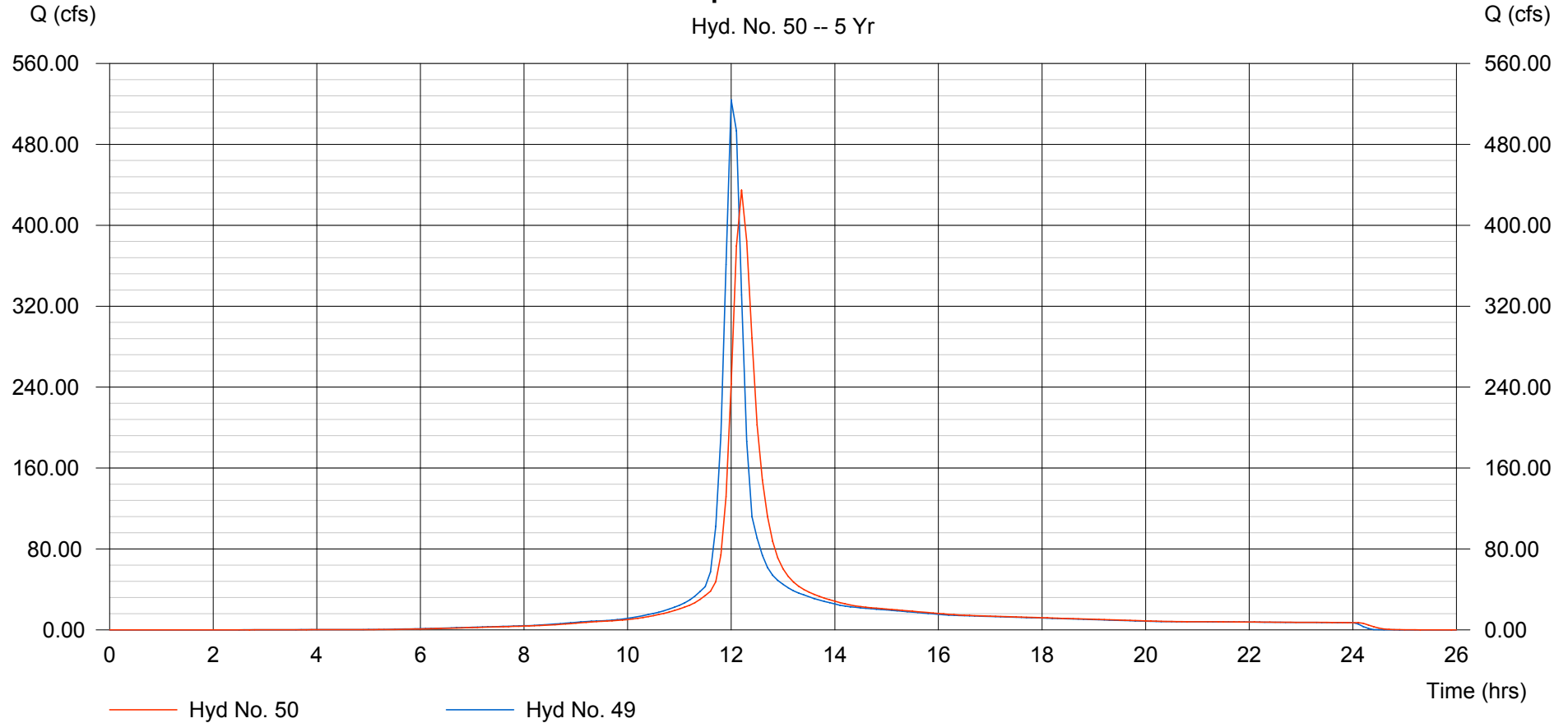
Peak discharge = 434.85 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 4.0 ft  
Rating curve m = 1.432  
Routing coeff. = 0.4857

Modified Att-Kin routing method used.

Hydrograph Volume = 39.598 acft

### Proposed Channel

Hyd. No. 50 -- 5 Yr



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	23.70	6	720	1.792	---	----	----	Off-Site W1 (0-3)
2	SCS Runoff	8.209	6	720	0.591	---	----	----	Off-Site W2 (0-2)
3	SCS Runoff	7.783	6	720	0.560	---	----	----	Off-Site W3 (1)
4	SCS Runoff	10.65	6	720	0.751	---	----	----	Off-Site W4 (W DT)
5	SCS Runoff	2.048	6	720	0.147	---	----	----	Off-Site W5 (1)
6	SCS Runoff	19.18	6	720	1.450	---	----	----	Off-Site NW1 (4)
7	SCS Runoff	1.844	6	720	0.139	---	----	----	Off-Site NW2 (4)
8	SCS Runoff	315.67	6	720	22.522	---	----	----	Off-Site N (CH)
9	SCS Runoff	127.32	6	720	9.084	---	----	----	Off-Site NE (CH)
10	SCS Runoff	56.16	6	720	4.007	---	----	----	Off-Site SE (CH)
11	SCS Runoff	8.816	6	720	0.647	---	----	----	DA-1A (1)
12	SCS Runoff	6.954	6	720	0.511	---	----	----	DA-1B (1)
13	Combine	15.77	6	720	1.158	11, 12	----	----	DA-1 TOTAL
14	SCS Runoff	52.52	6	720	3.856	---	----	----	DA-2A (Pond)
15	SCS Runoff	3.248	6	720	0.229	---	----	----	DA-2B (2-1)
16	SCS Runoff	0.615	6	720	0.043	---	----	----	DA-2C (2-2)
17	SCS Runoff	13.83	6	720	1.015	---	----	----	DA-2D (2)
18	SCS Runoff	4.054	6	720	0.290	---	----	----	DA-2E (2)
19	SCS Runoff	5.390	6	720	0.396	---	----	----	DA-2F (2-4)
20	SCS Runoff	5.641	6	720	0.414	---	----	----	DA-2G (2-5)
21	SCS Runoff	2.442	6	720	0.179	---	----	----	DA-2H (2-3)
22	Combine	70.21	6	720	5.144	14, 15, 16, 17,	----	----	DA-2A to DA-2D
23	Combine	87.73	6	720	6.423	18, 19, 20, 21, 22	----	----	DA-2 TOTAL
24	SCS Runoff	6.713	6	720	0.493	---	----	----	DA-3A (3-2)
25	SCS Runoff	2.762	6	720	0.203	---	----	----	DA-3B (3-3)
26	SCS Runoff	11.30	6	720	0.829	---	----	----	DA-3C (3-5)
27	SCS Runoff	4.011	6	720	0.295	---	----	----	DA-3D (3-4)
28	Combine	24.78	6	720	1.820	24, 25, 26, 27	----	----	DA-3 TOTAL
29	SCS Runoff	2.827	6	720	0.208	---	----	----	DA-4A (4)
30	SCS Runoff	4.192	6	720	0.308	---	----	----	DA-4B (4)

Northborough Proposed.gpw

Return Period: 10 Year

Thursday, Sep 6 2007

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description	
31	Combine	7.019	6	720	0.515	29, 30	-----	-----	DA-4 TOTAL	
32	SCS Runoff	59.92	6	720	4.247	---	-----	-----	DA-5 (CH)	
33	SCS Runoff	13.94	6	720	1.024	---	-----	-----	DA-6 (CH)	
34	Combine	31.91	6	720	2.383	1, 2,	-----	-----	Total for SWD0	
35	Combine	14.74	6	720	1.071	3, 12,	-----	-----	W3 with DA-1B (1-1)	
36	Combine	10.86	6	720	0.795	5, 11,	-----	-----	W5 with DA-1A (1-2)	
37	Combine	25.60	6	720	1.866	35, 36	-----	-----	Total for SWD1	
38	Combine	68.16	6	720	5.000	4, 34, 37	-----	-----	Total to West Ditch	
39	Reach	54.28	6	732	5.000	38	-----	-----	Proposed West Ditch	
40	Combine	17.88	6	720	1.305	17, 18,	-----	-----	DA-2D with DA-2E (2-6)	
41	Combine	35.21	6	720	2.567	15, 16, 19, 20, 21, 40	-----	-----	Total for SWD2	
42	Combine	24.78	6	720	1.820	24, 25, 26, 27,	-----	-----	Total for SWD3	
43	Combine	22.00	6	720	1.658	6, 29,	-----	-----	NW1 with DA-4A (4-2)	
44	Combine	6.036	6	720	0.447	7, 30,	-----	-----	NW2 with DA-4B (4-1)	
45	Combine	28.04	6	720	2.105	43, 44	-----	-----	Total for SWD4	
46	Combine	112.52	6	720	8.242	14, 41, 42,	-----	-----	Total to Pond	
47	Reservoir	2.155	6	1086	1.341	46	1388.16	7.138	Proposed Pond	
48	Combine	601.05	6	720	42.988	8, 9, 10, 32, 33, 45,	-----	-----	N, NE, SE, DA-5, DA-6, & SWD4	
49	Combine	632.84	6	720	49.329	39, 47, 48	-----	-----	Route All to Proposed Channel	
50	Reach	532.75	6	732	49.328	49	-----	-----	Proposed Channel	
Northborough Proposed.gpw					Return Period: 10 Year			Thursday, Sep 6 2007		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

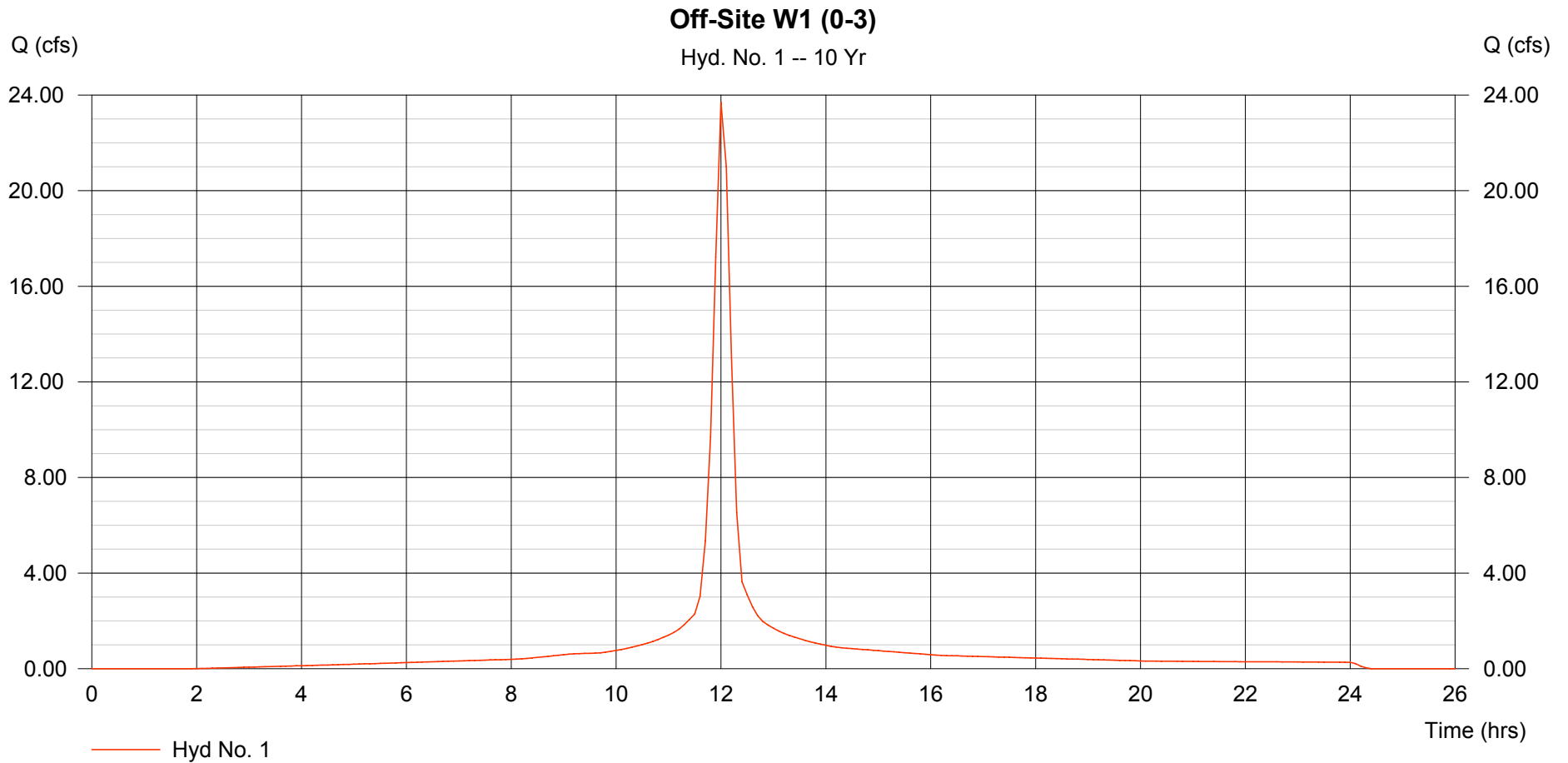
## Hyd. No. 1

Off-Site W1 (0-3)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 4.884 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 23.70 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.792 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 2

Off-Site W2 (0-2)

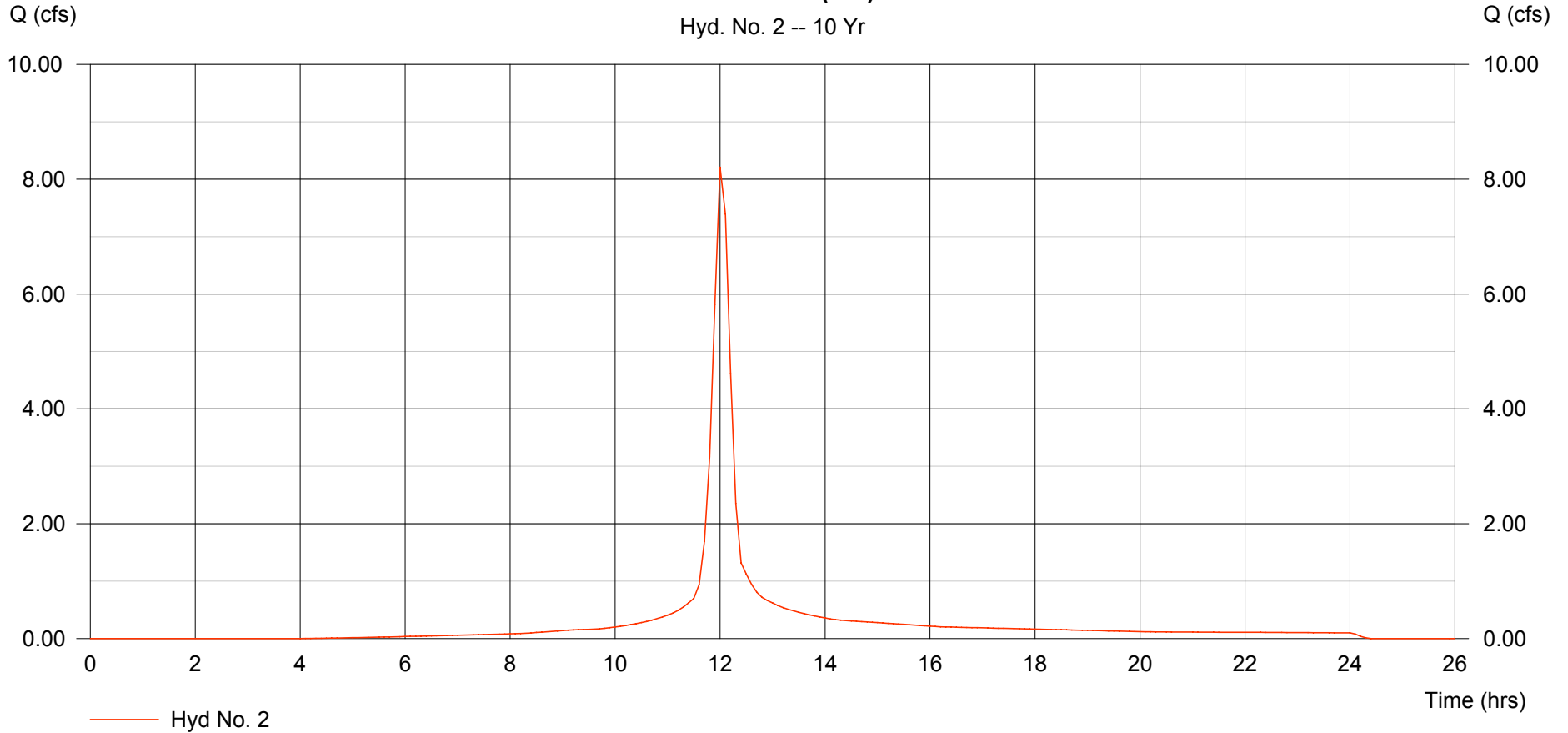
Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 1.872 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 8.209 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.591 acft

### Off-Site W2 (0-2)

Hyd. No. 2 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

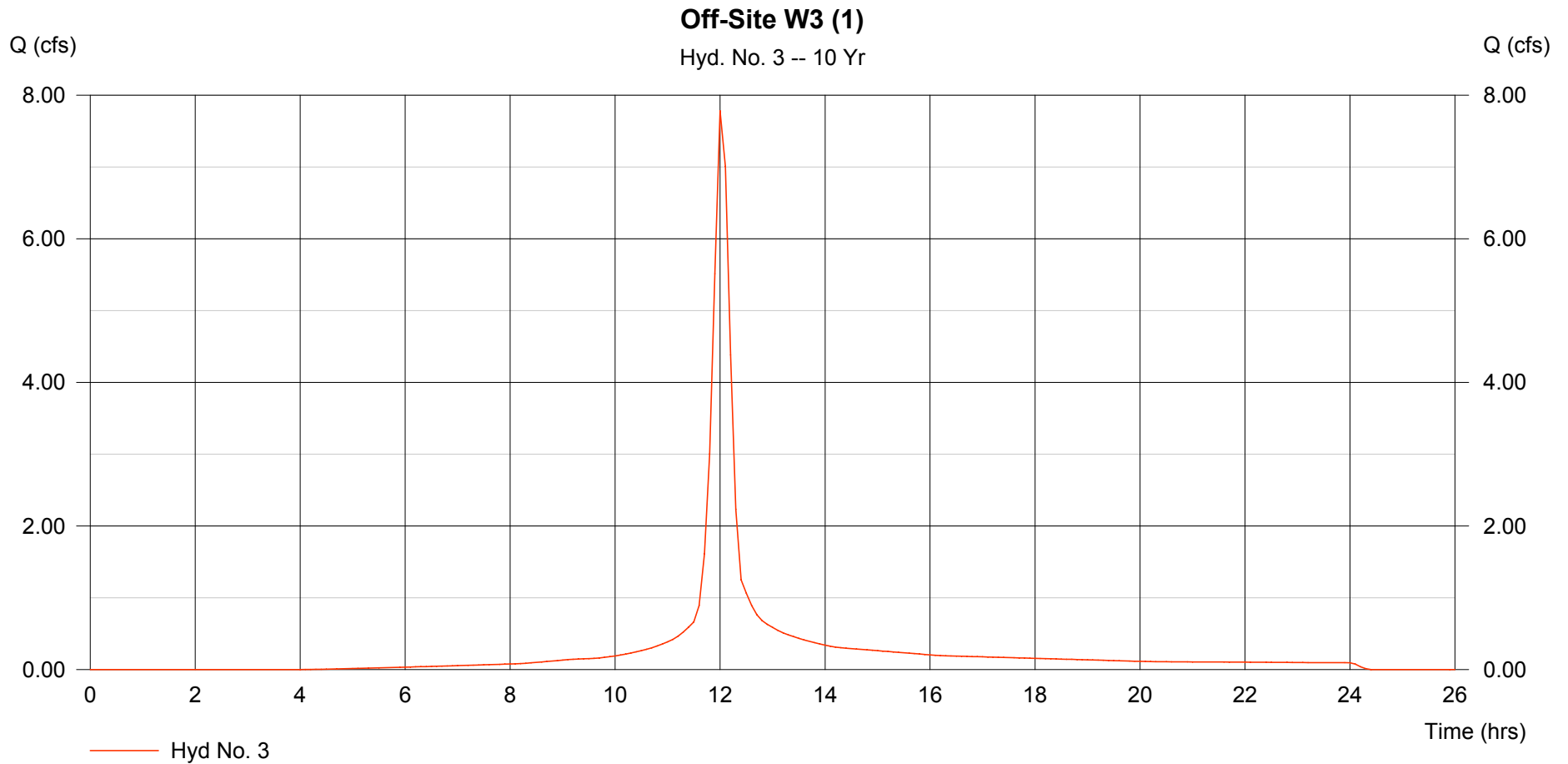
## Hyd. No. 3

Off-Site W3 (1)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 1.775 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 7.783 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.560 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 4

Off-Site W4 (W DT)

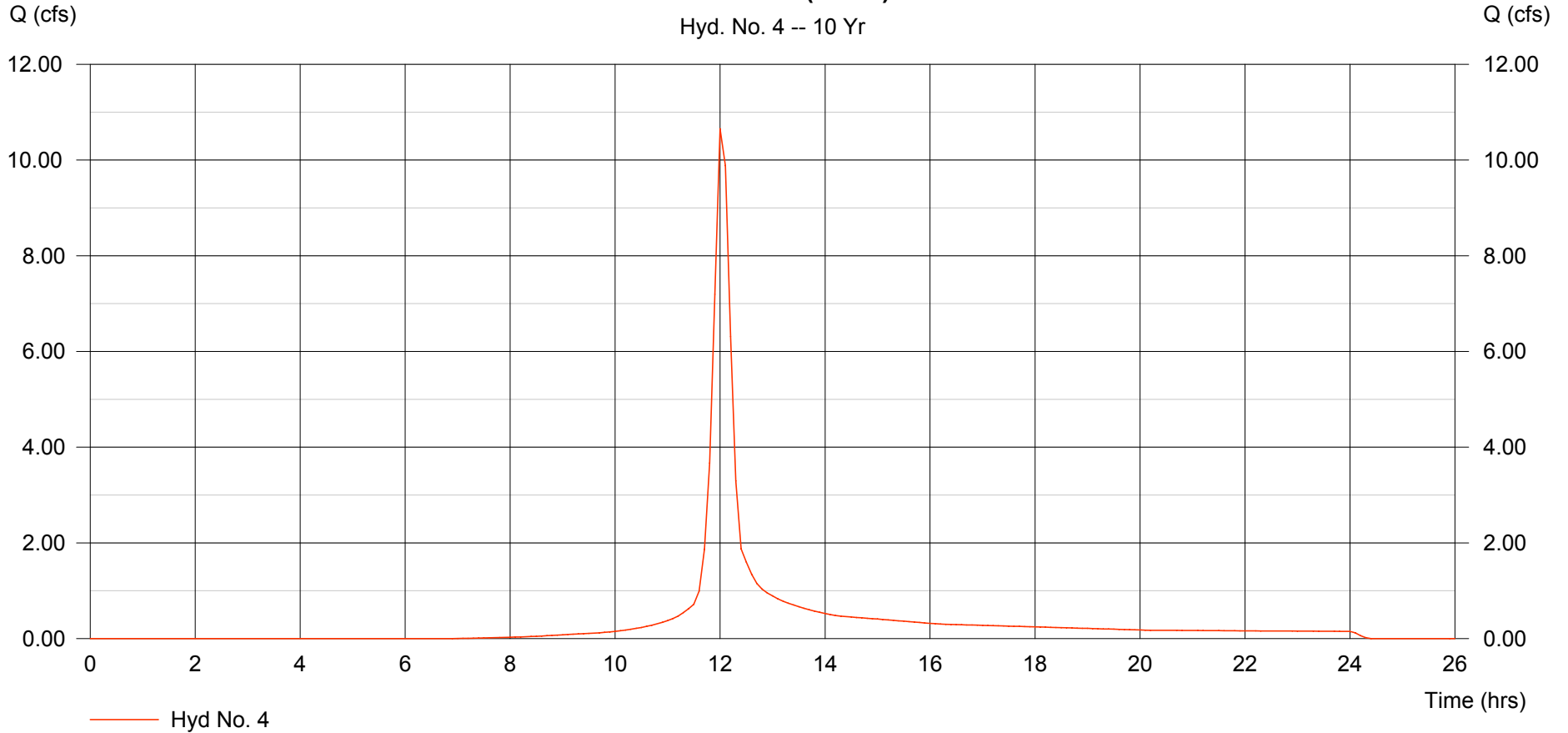
Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 3.064 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 10.65 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.751 acft

### Off-Site W4 (W DT)

Hyd. No. 4 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

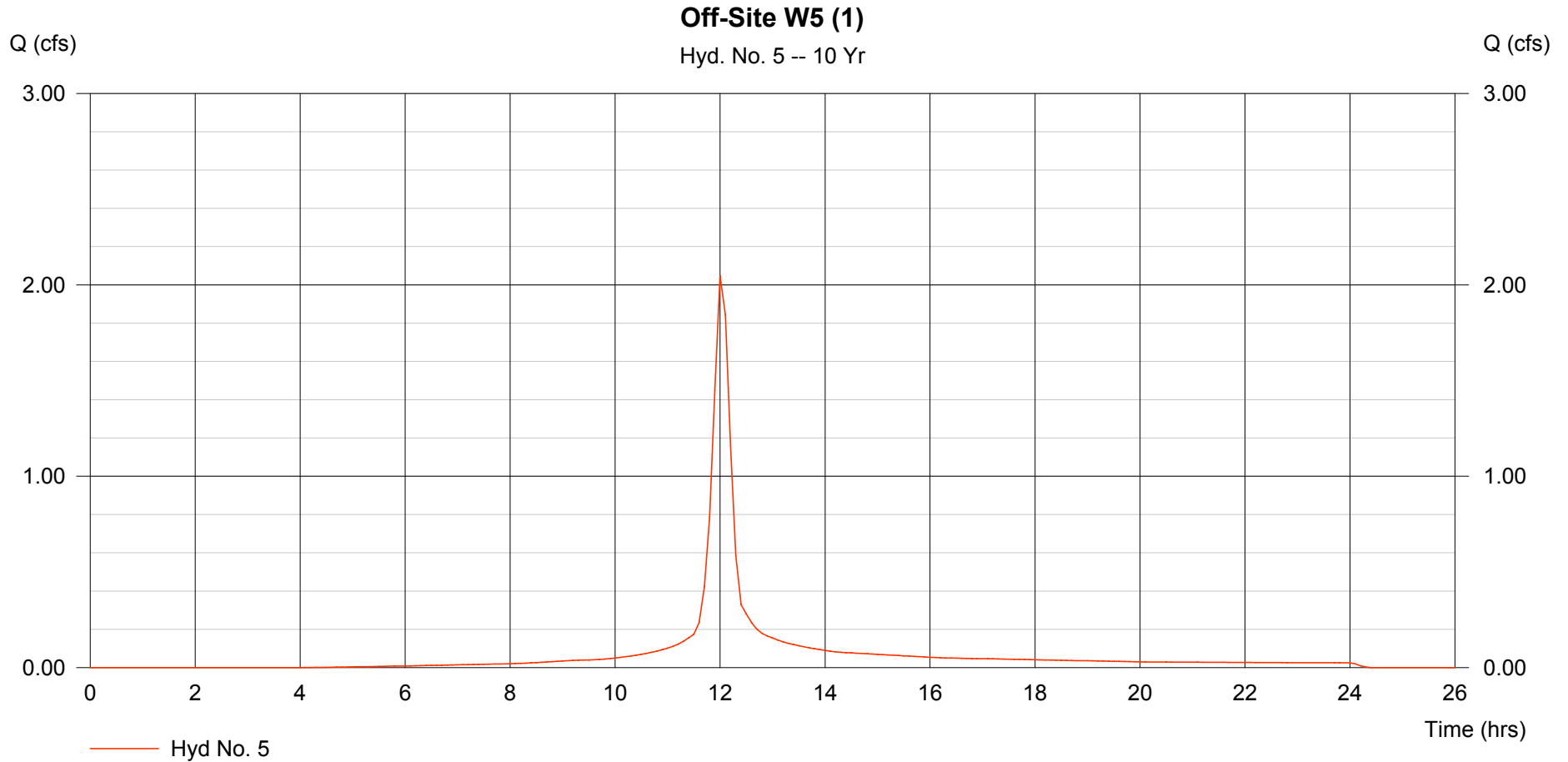
## Hyd. No. 5

Off-Site W5 (1)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.467 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 2.048 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.147 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 6

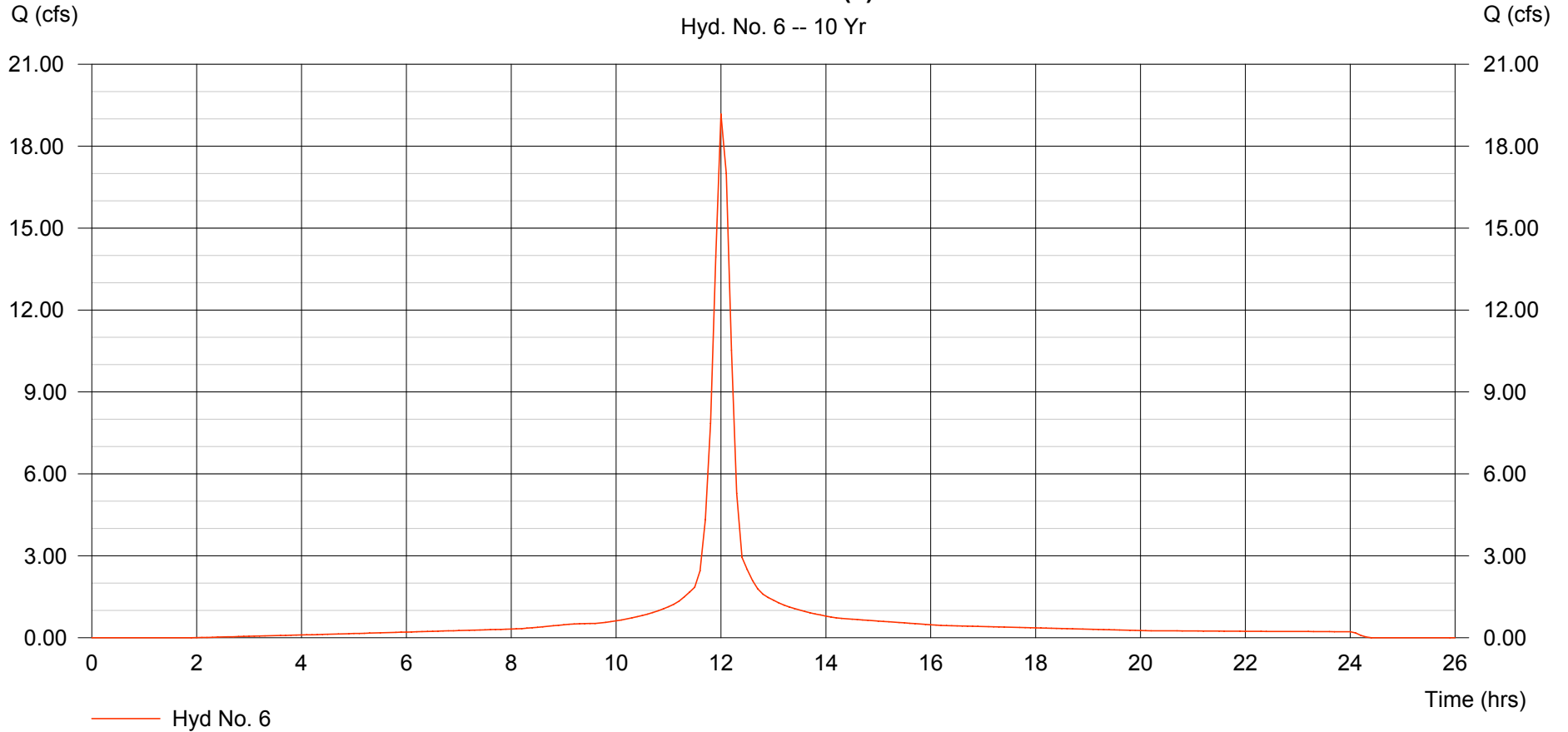
Off-Site NW1 (4)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 3.952 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 19.18 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.450 acft

**Off-Site NW1 (4)**  
Hyd. No. 6 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 7

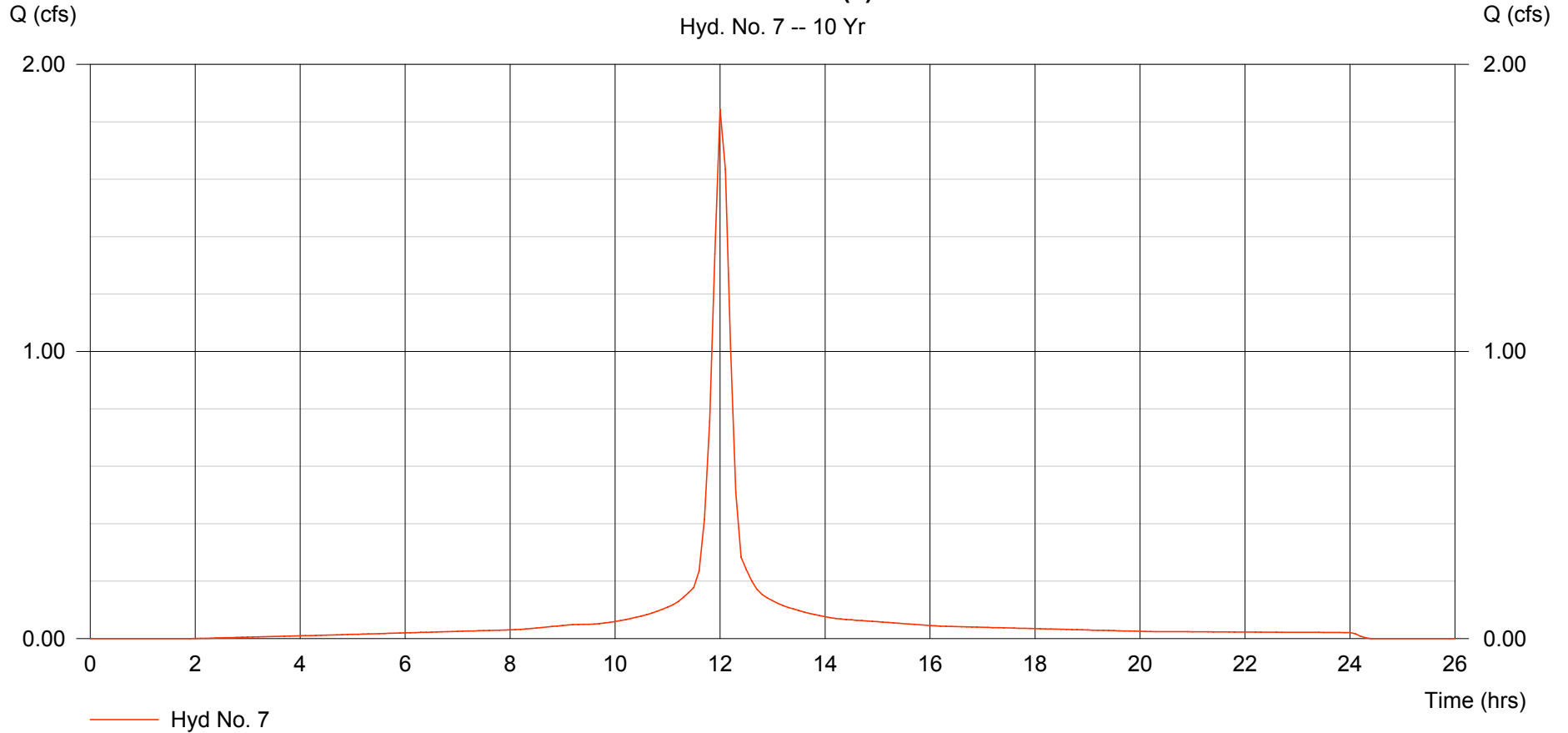
Off-Site NW2 (4)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.380 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 1.844 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.139 acft

**Off-Site NW2 (4)**  
Hyd. No. 7 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 8

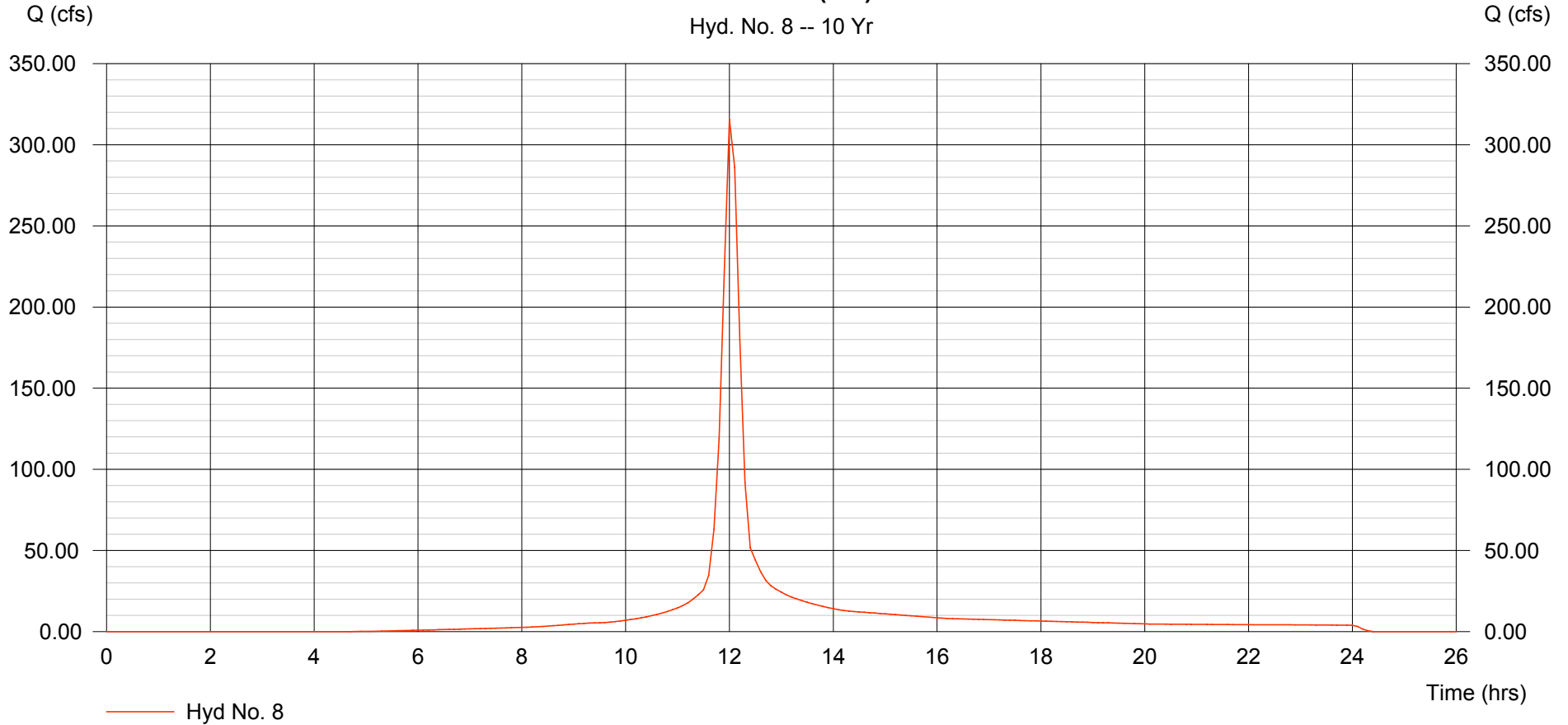
Off-Site N (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 315.67 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 22.522 acft

**Off-Site N (CH)**  
Hyd. No. 8 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 9

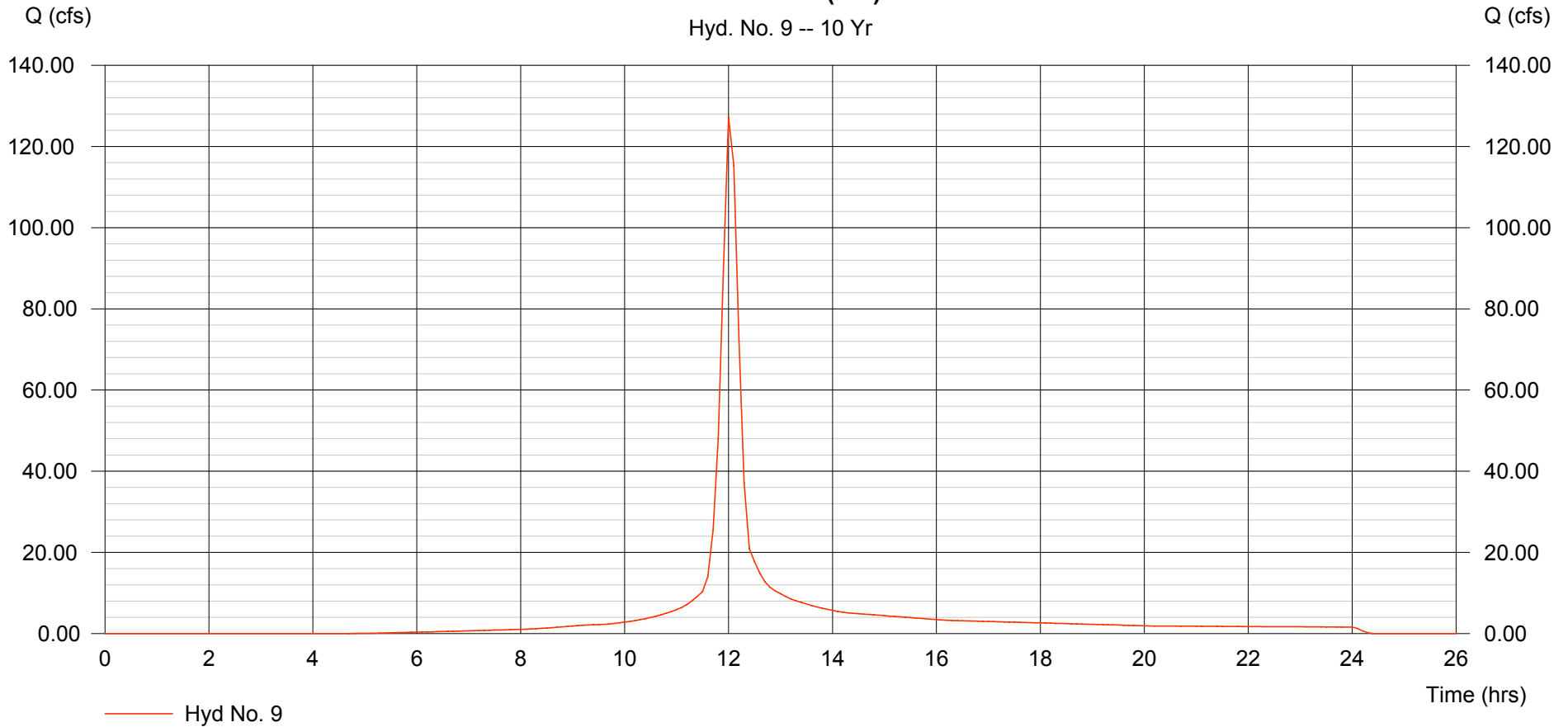
Off-Site NE (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 127.32 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 9.084 acft

**Off-Site NE (CH)**  
Hyd. No. 9 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 10

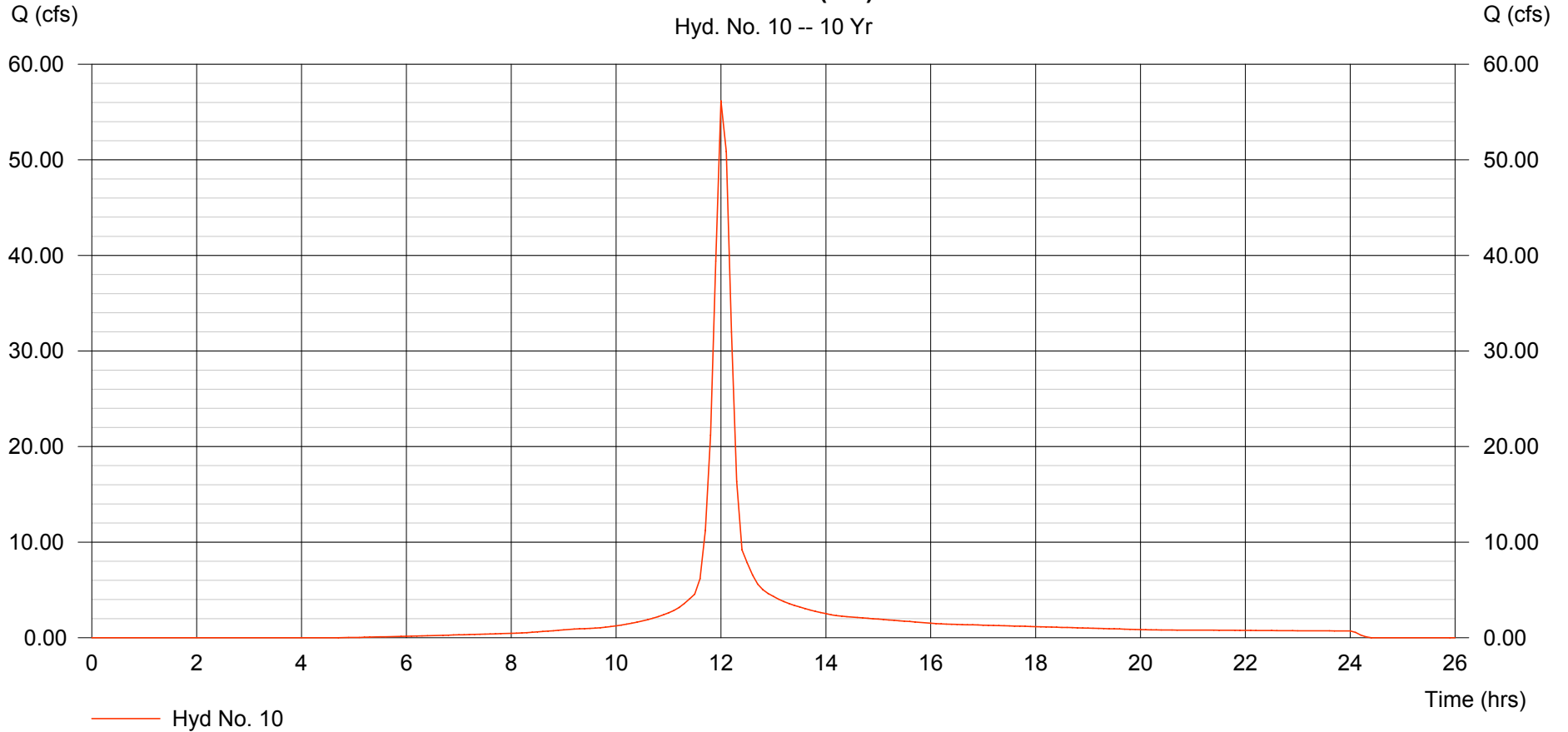
Off-Site SE (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 56.16 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4.007 acft

**Off-Site SE (CH)**  
Hyd. No. 10 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

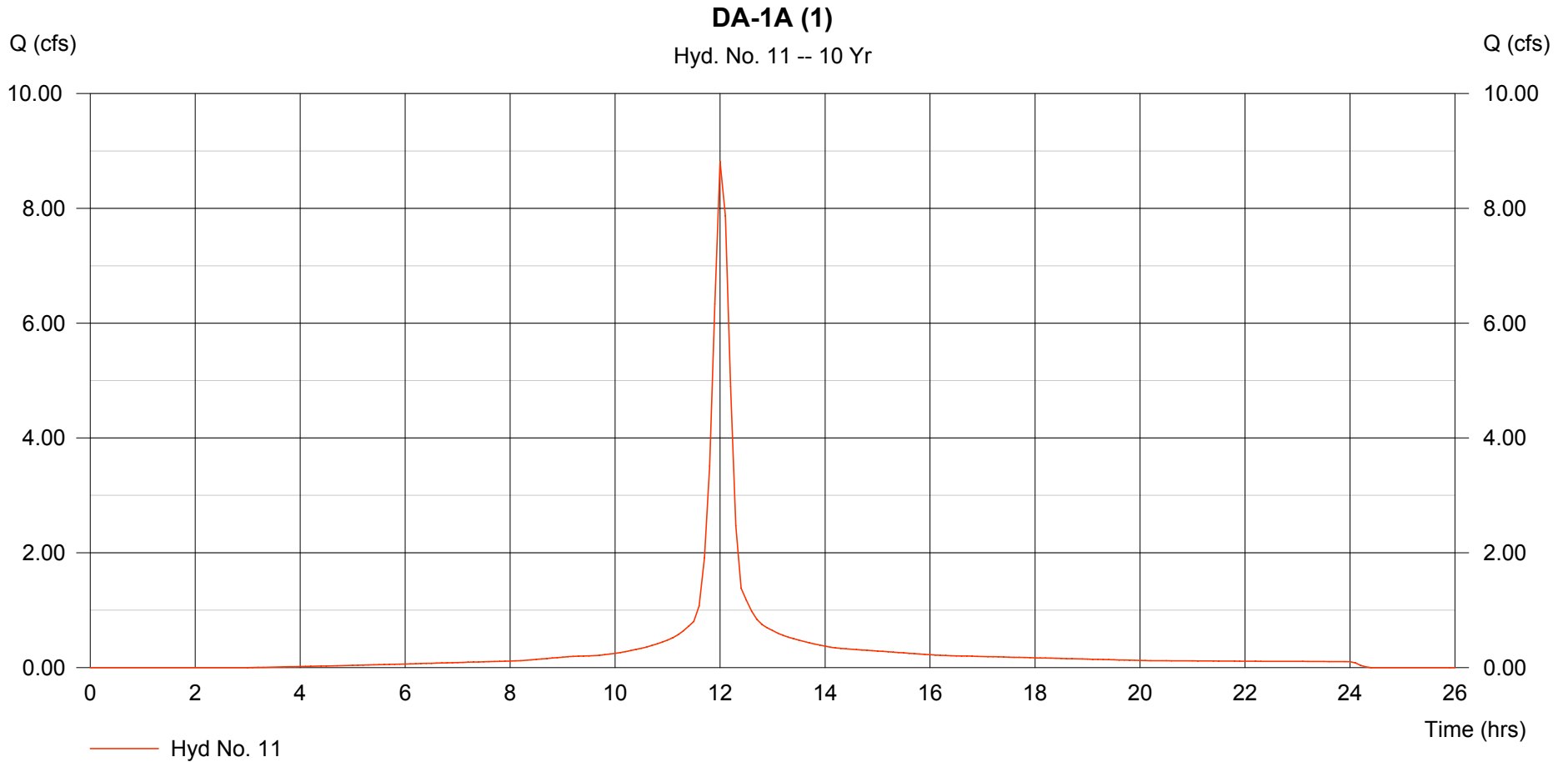
## Hyd. No. 11

DA-1A (1)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 1.899 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 8.816 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.647 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

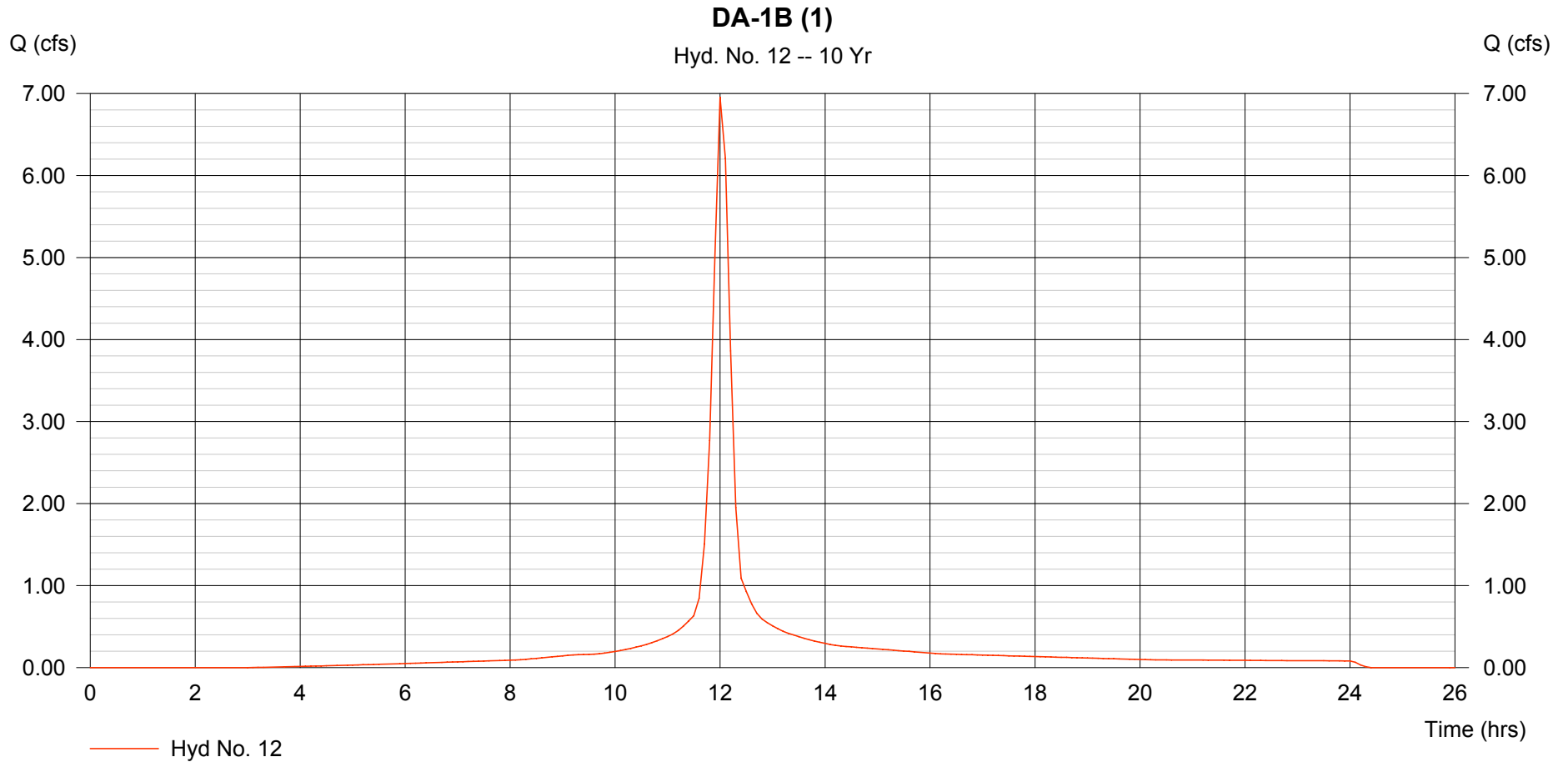
## Hyd. No. 12

DA-1B (1)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 1.498 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 6.954 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.511 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

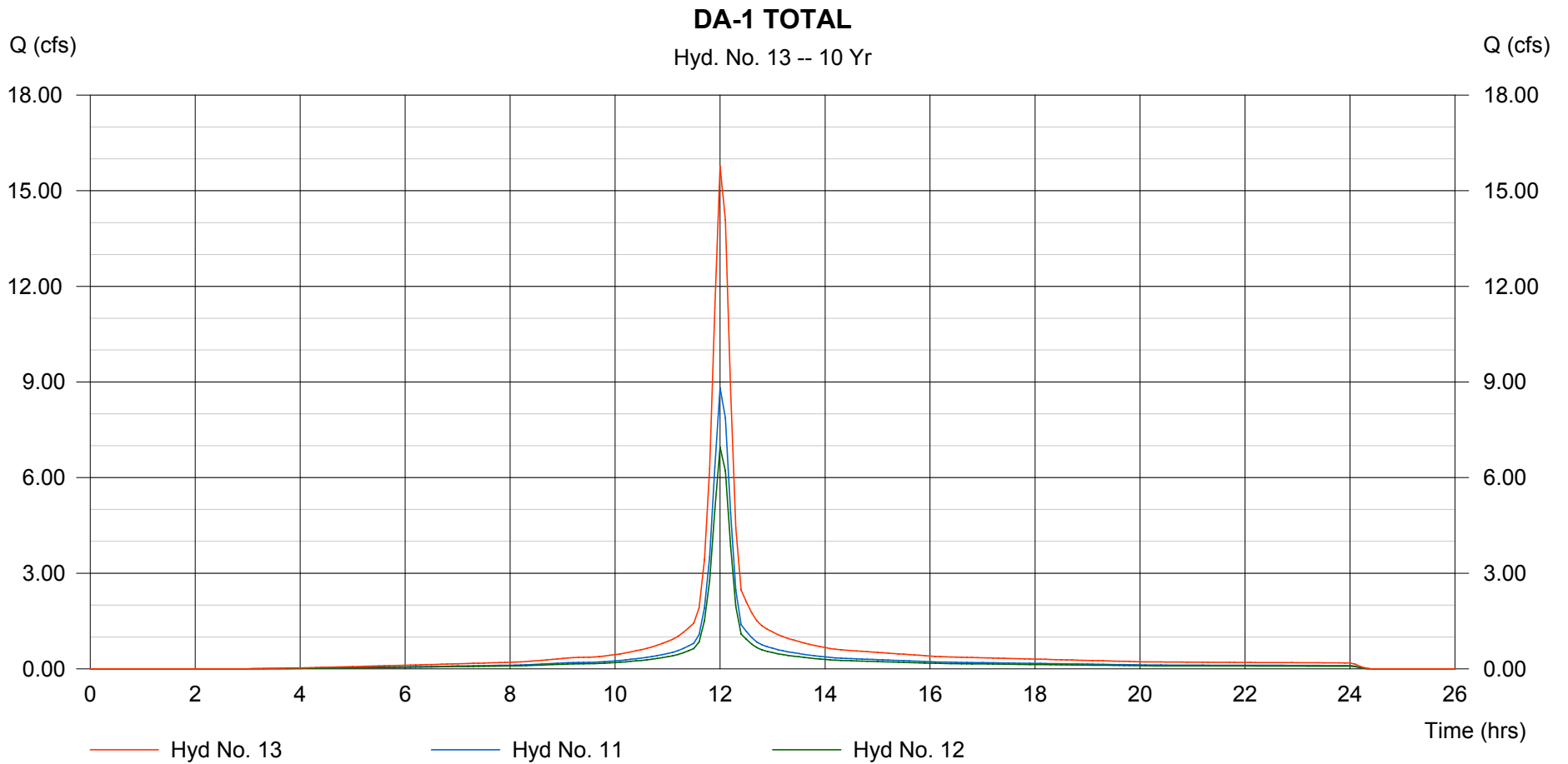
## Hyd. No. 13

DA-1 TOTAL

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 11, 12

Peak discharge = 15.77 cfs  
Time interval = 6 min

Hydrograph Volume = 1.158 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 14

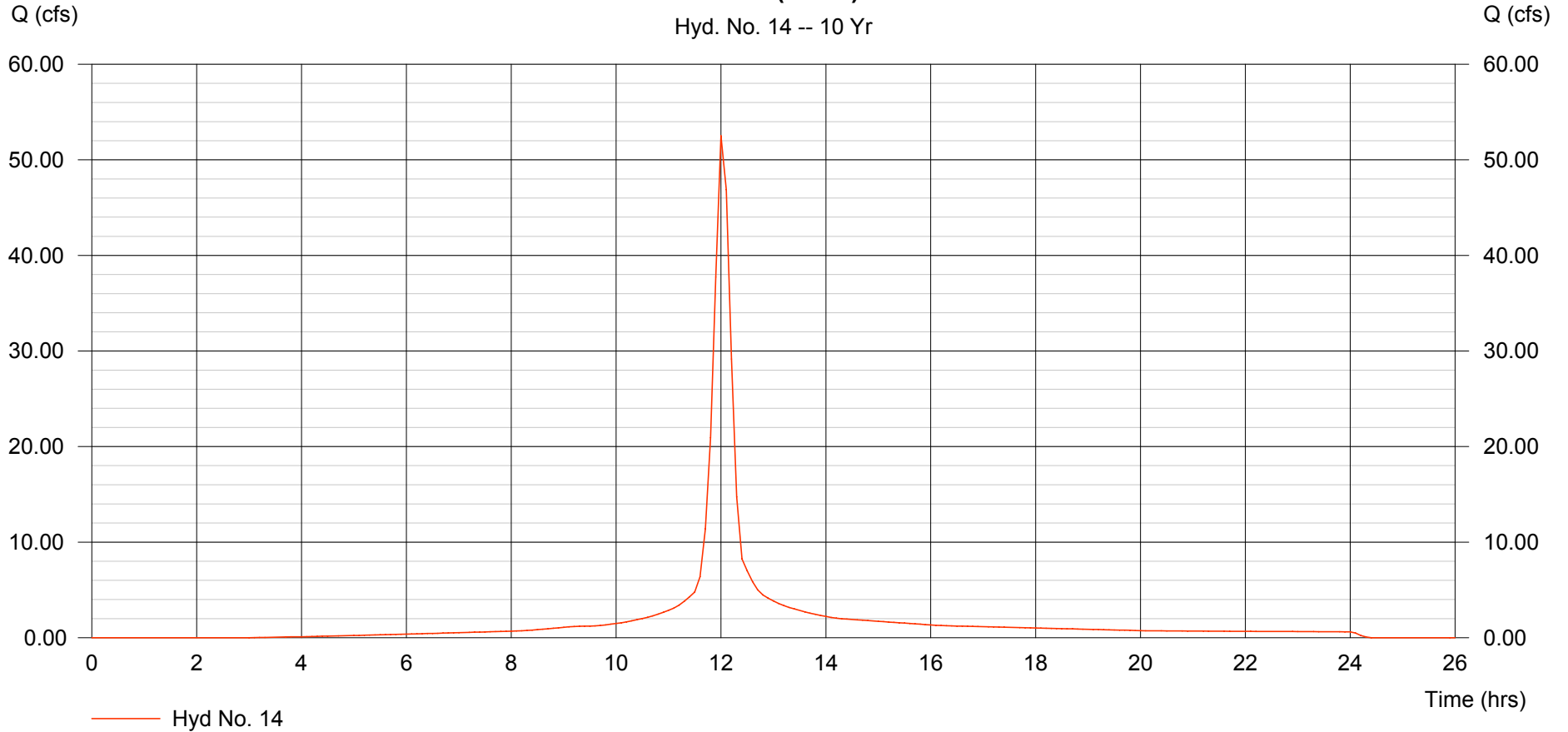
DA-2A (Pond)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 11.313 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 52.52 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 3.856 acft

**DA-2A (Pond)**  
Hyd. No. 14 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

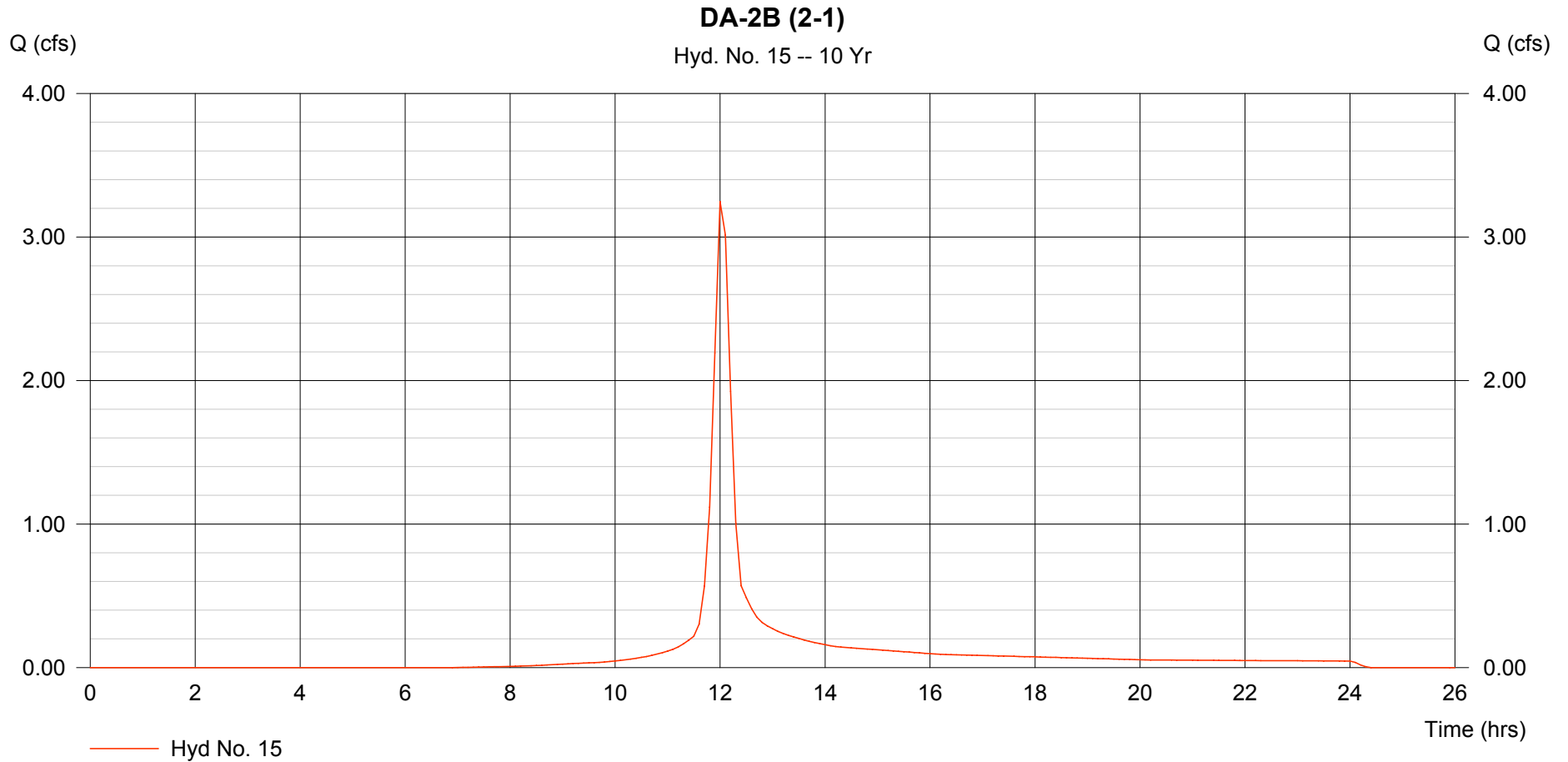
## Hyd. No. 15

DA-2B (2-1)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.934 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 3.248 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.229 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 16

DA-2C (2-2)

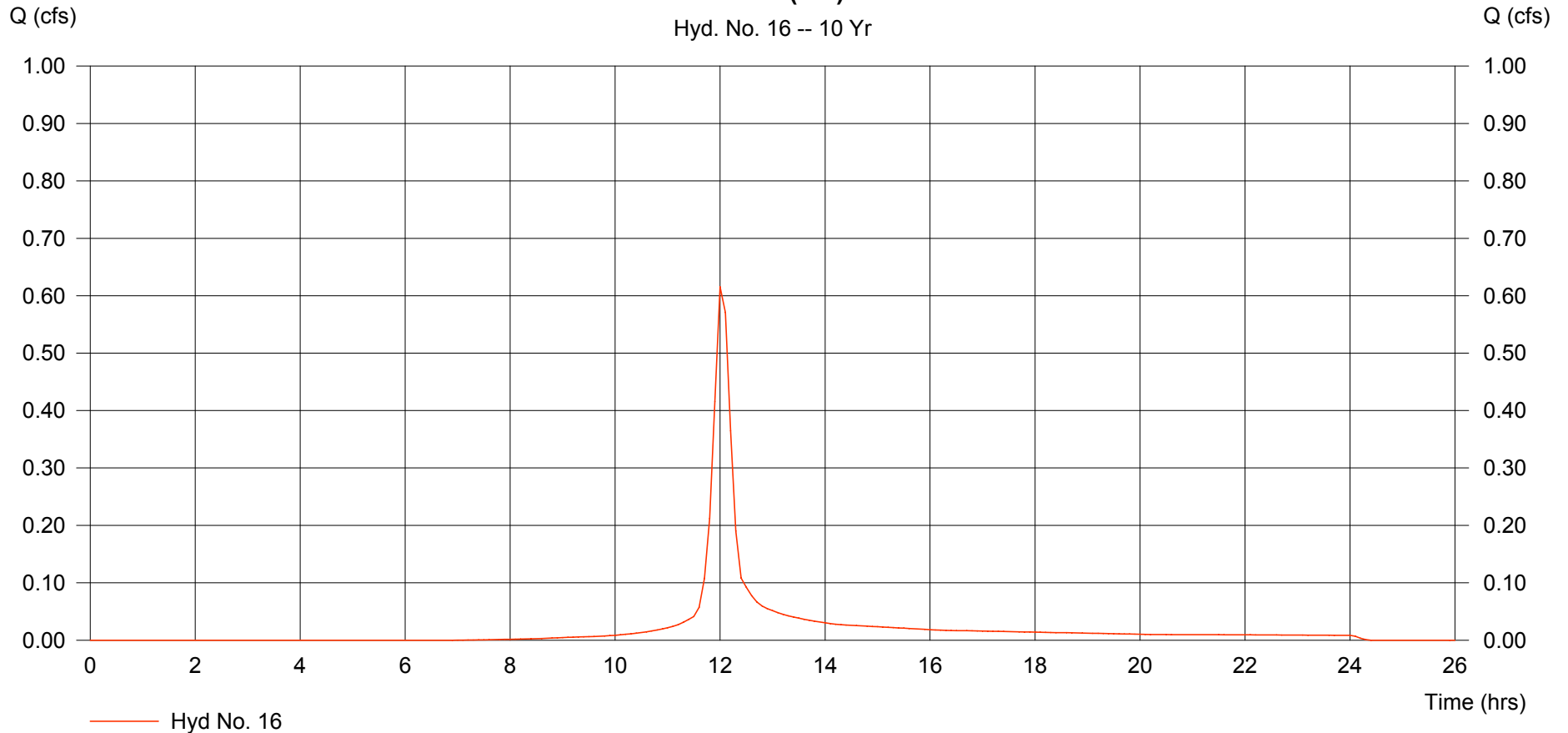
Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.177 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 0.615 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.043 acft

### DA-2C (2-2)

Hyd. No. 16 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

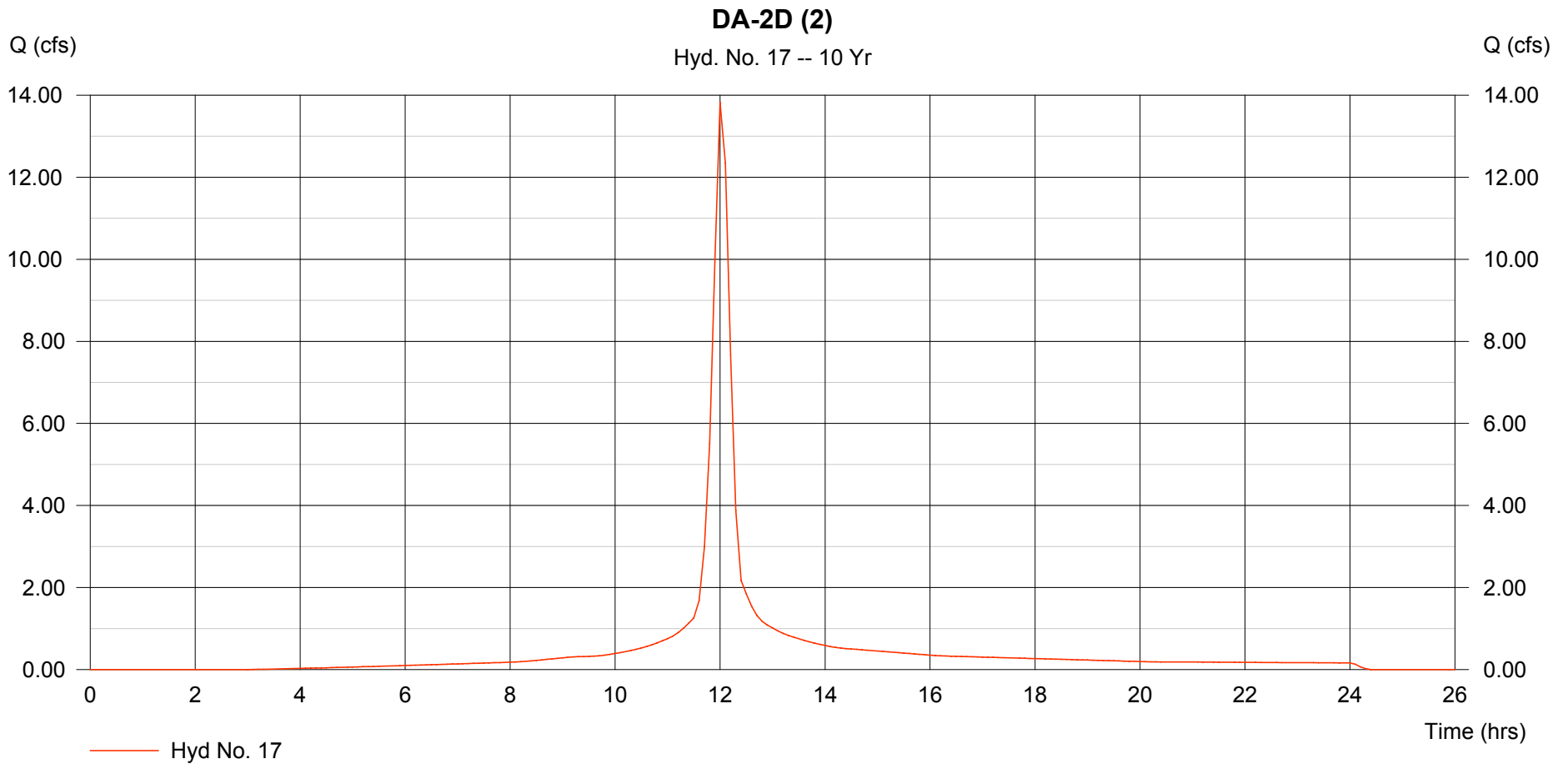
## Hyd. No. 17

DA-2D (2)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 2.978 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 13.83 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.015 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

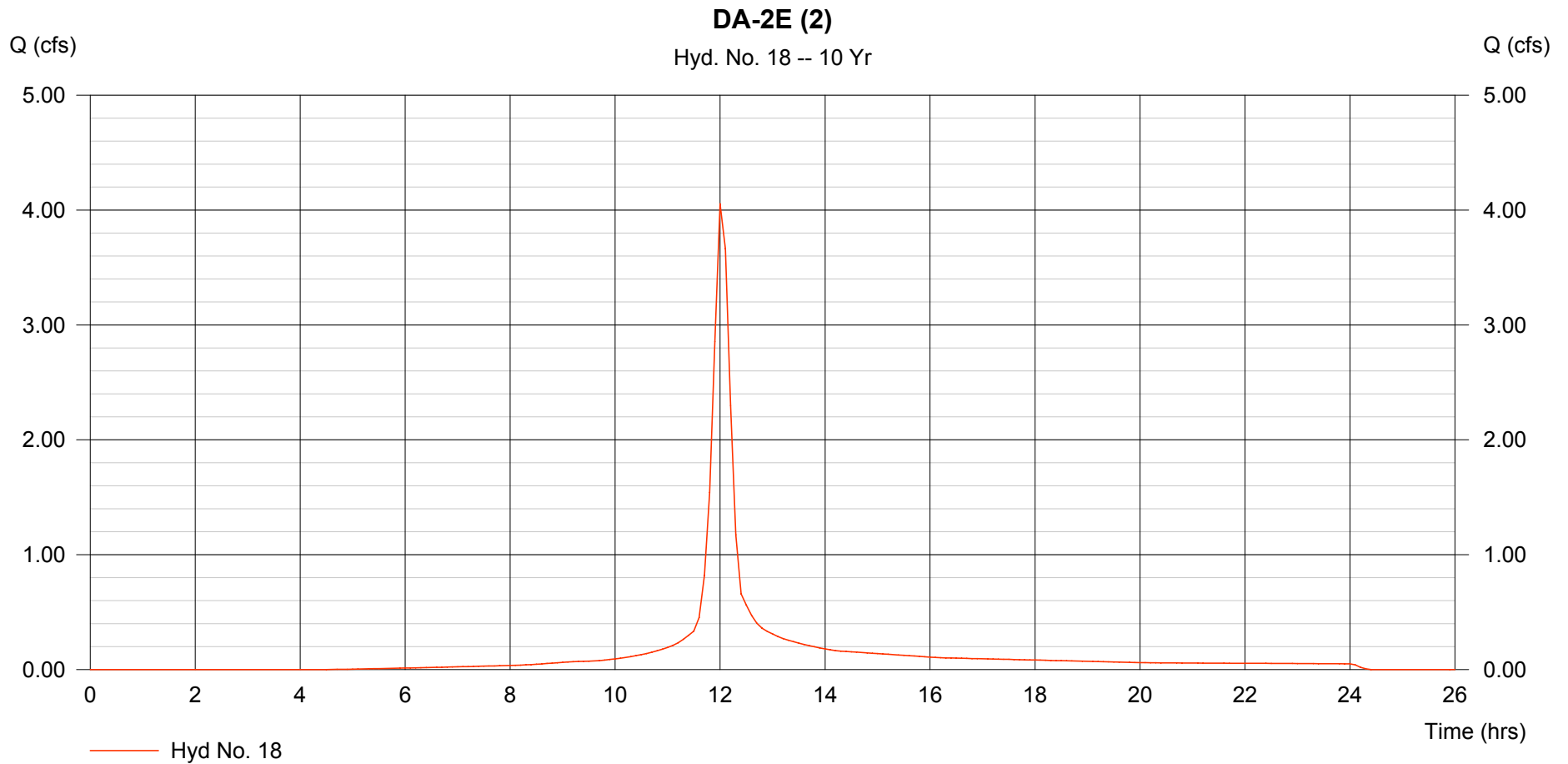
## Hyd. No. 18

DA-2E (2)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.951 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 4.054 cfs  
Time interval = 6 min  
Curve number = 87.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.290 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

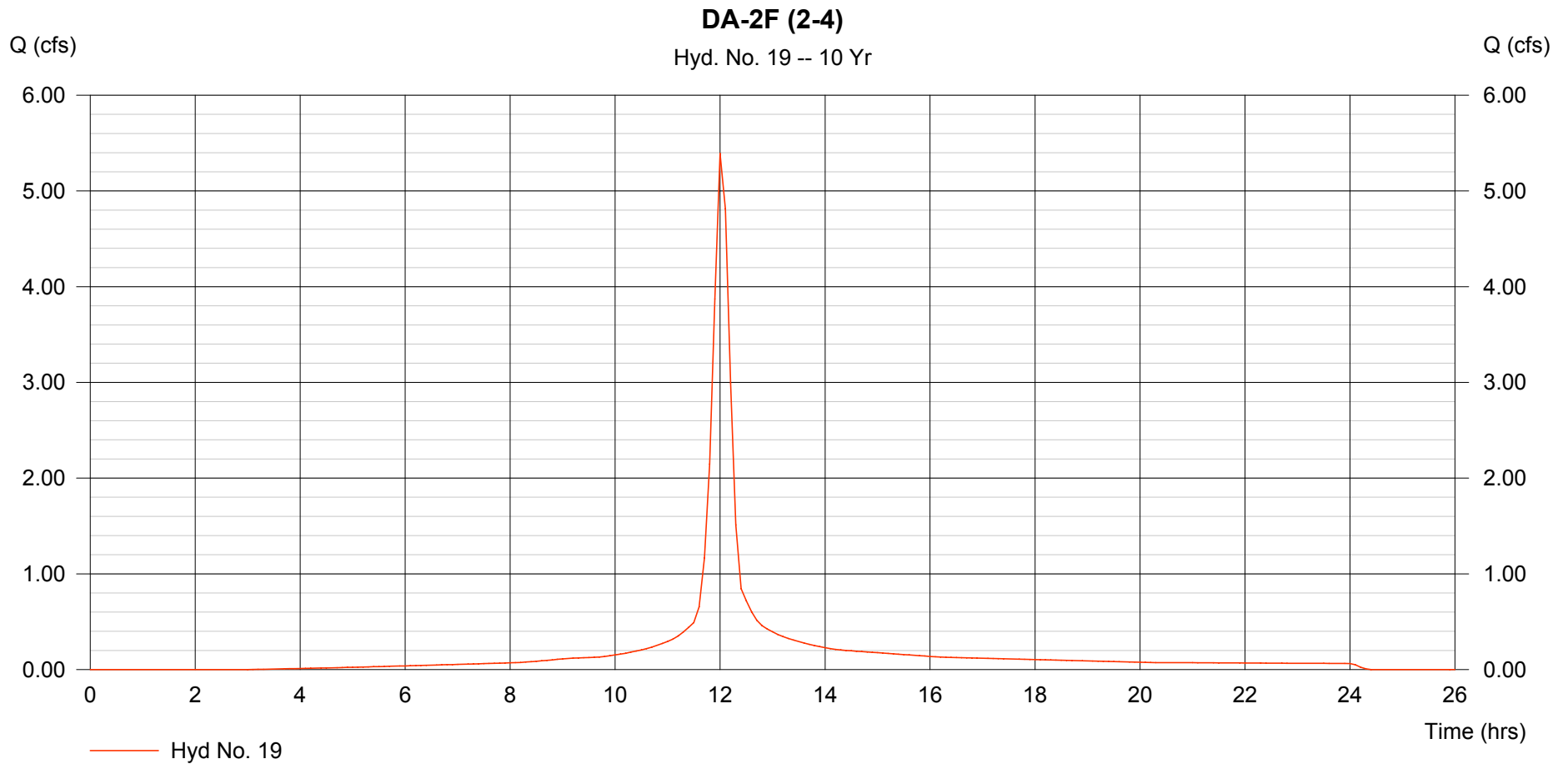
## Hyd. No. 19

DA-2F (2-4)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 1.161 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 5.390 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.396 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

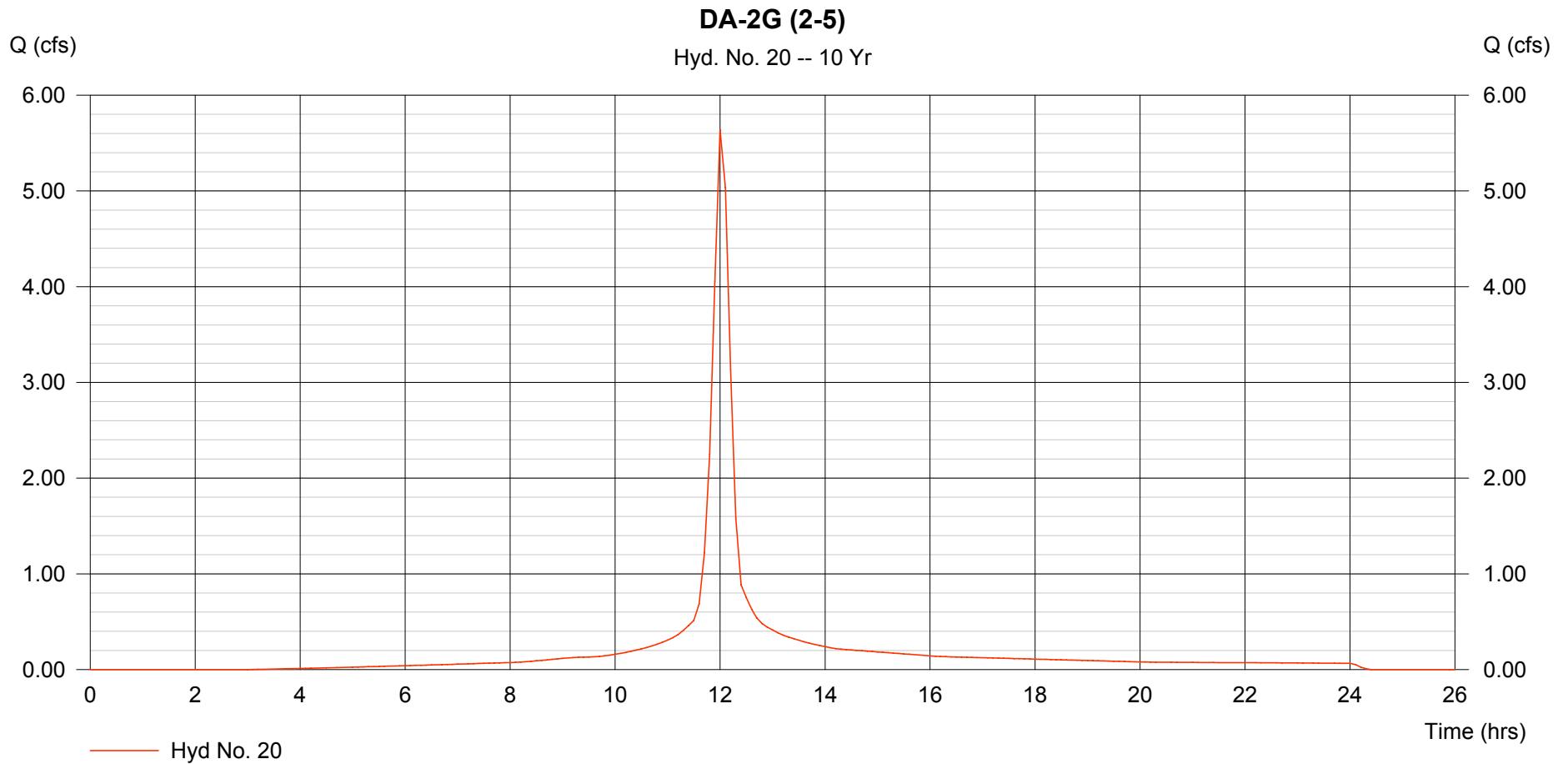
## Hyd. No. 20

DA-2G (2-5)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 1.215 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 5.641 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.414 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

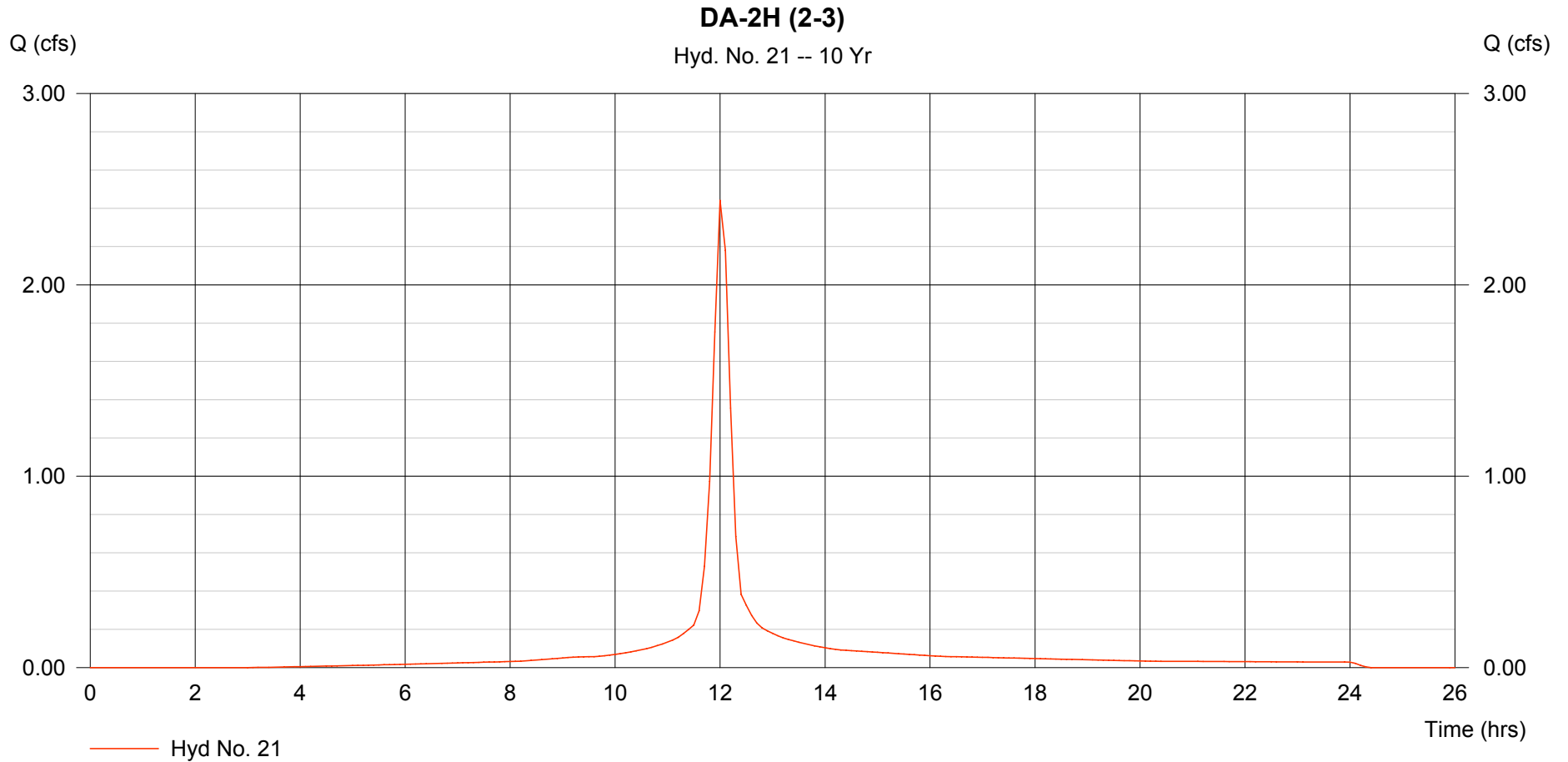
## Hyd. No. 21

DA-2H (2-3)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.526 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 2.442 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.179 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

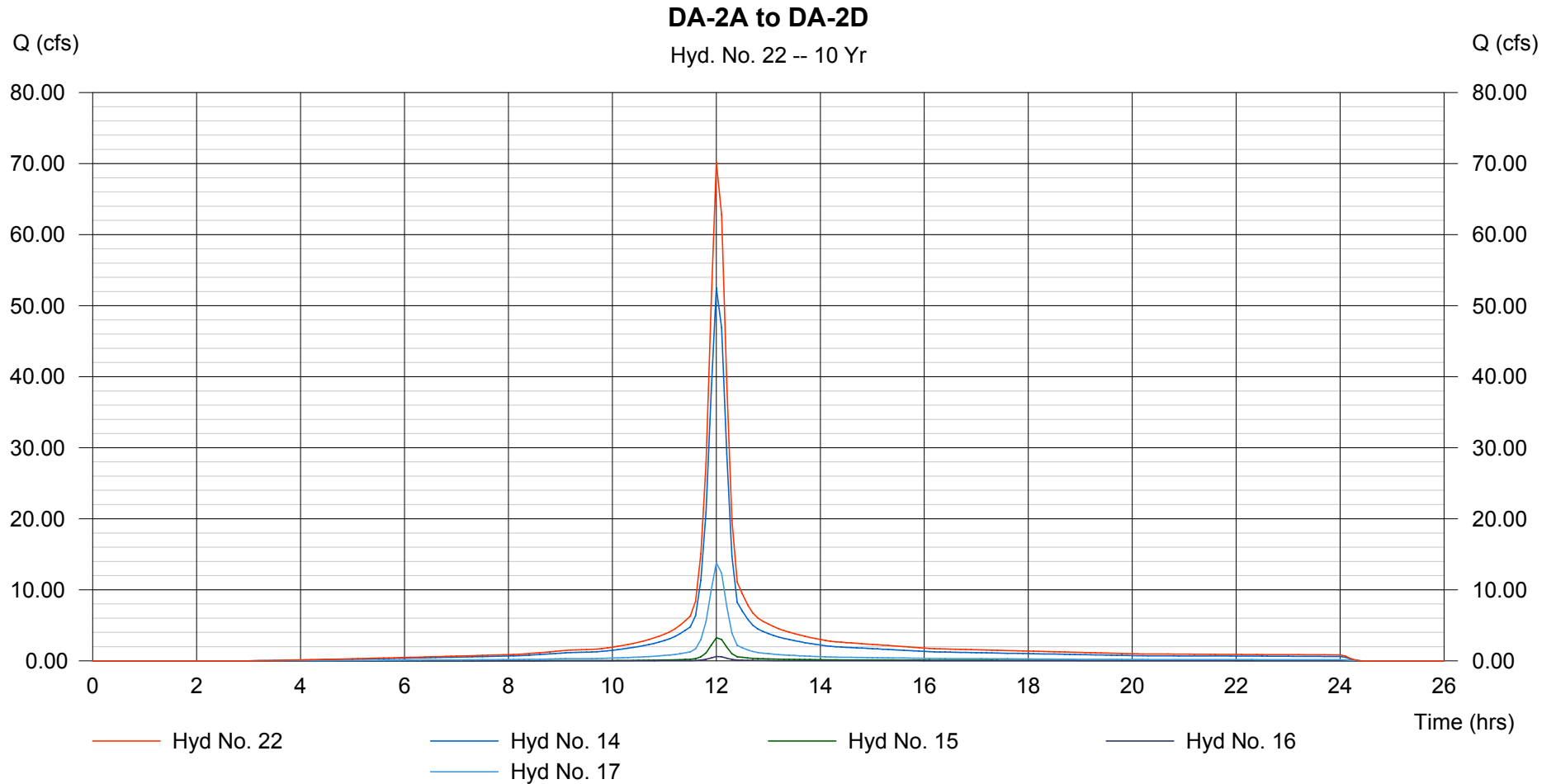
## Hyd. No. 22

DA-2A to DA-2D

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 14, 15, 16, 17

Peak discharge = 70.21 cfs  
Time interval = 6 min

Hydrograph Volume = 5.144 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

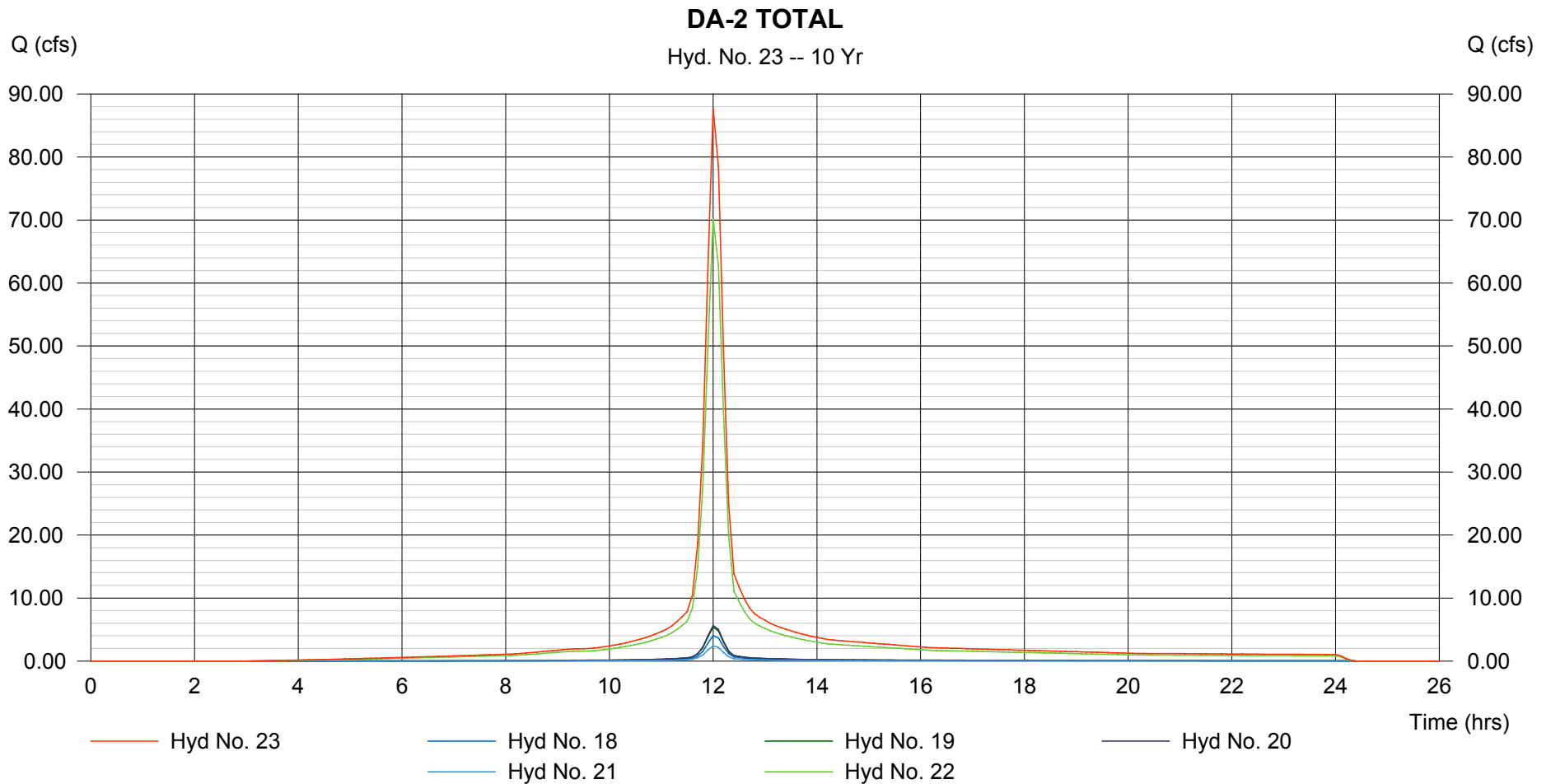
## Hyd. No. 23

DA-2 TOTAL

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 18, 19, 20, 21, 22

Peak discharge = 87.73 cfs  
Time interval = 6 min

Hydrograph Volume = 6.423 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

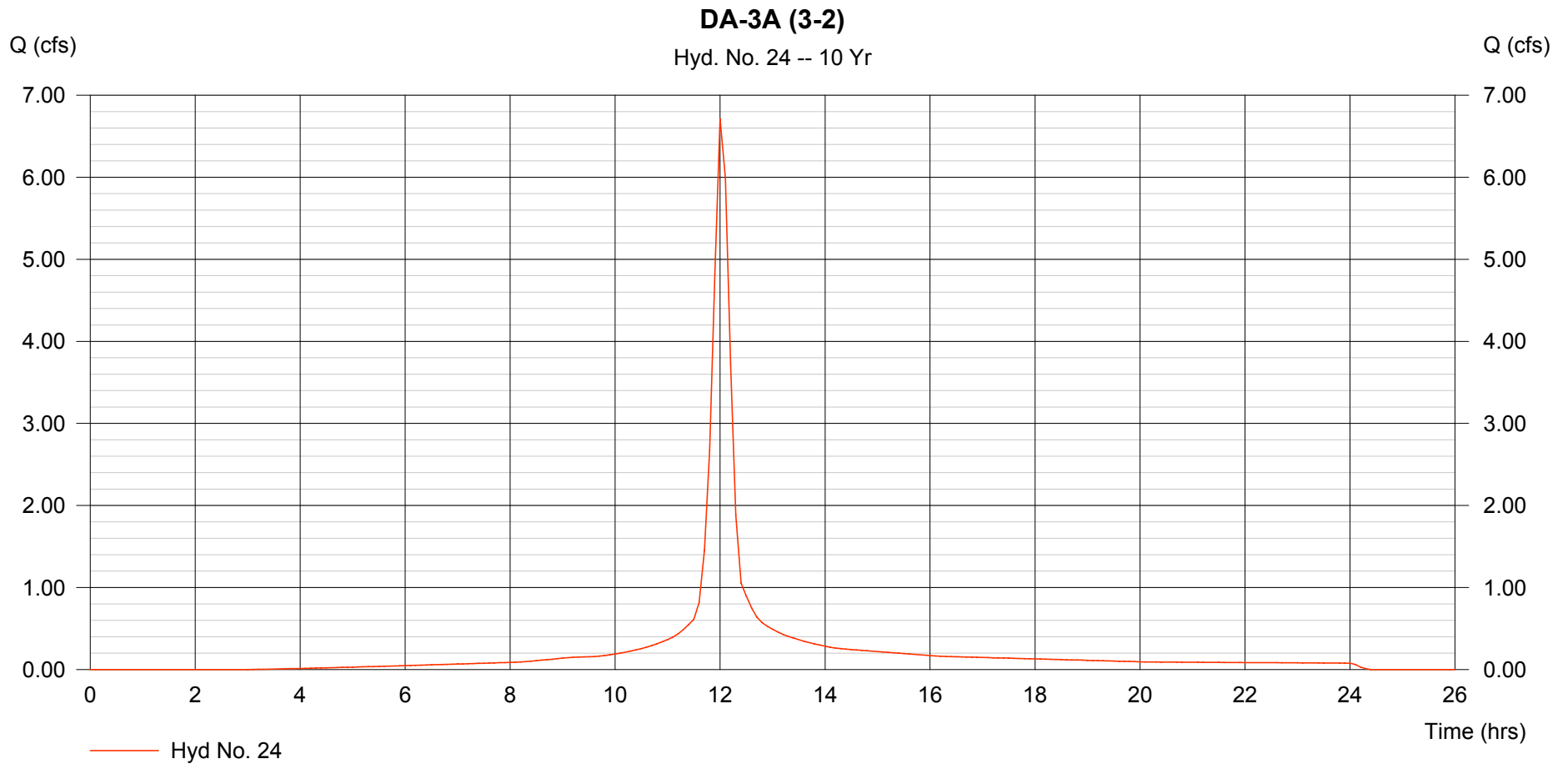
## Hyd. No. 24

DA-3A (3-2)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 1.446 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 6.713 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.493 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

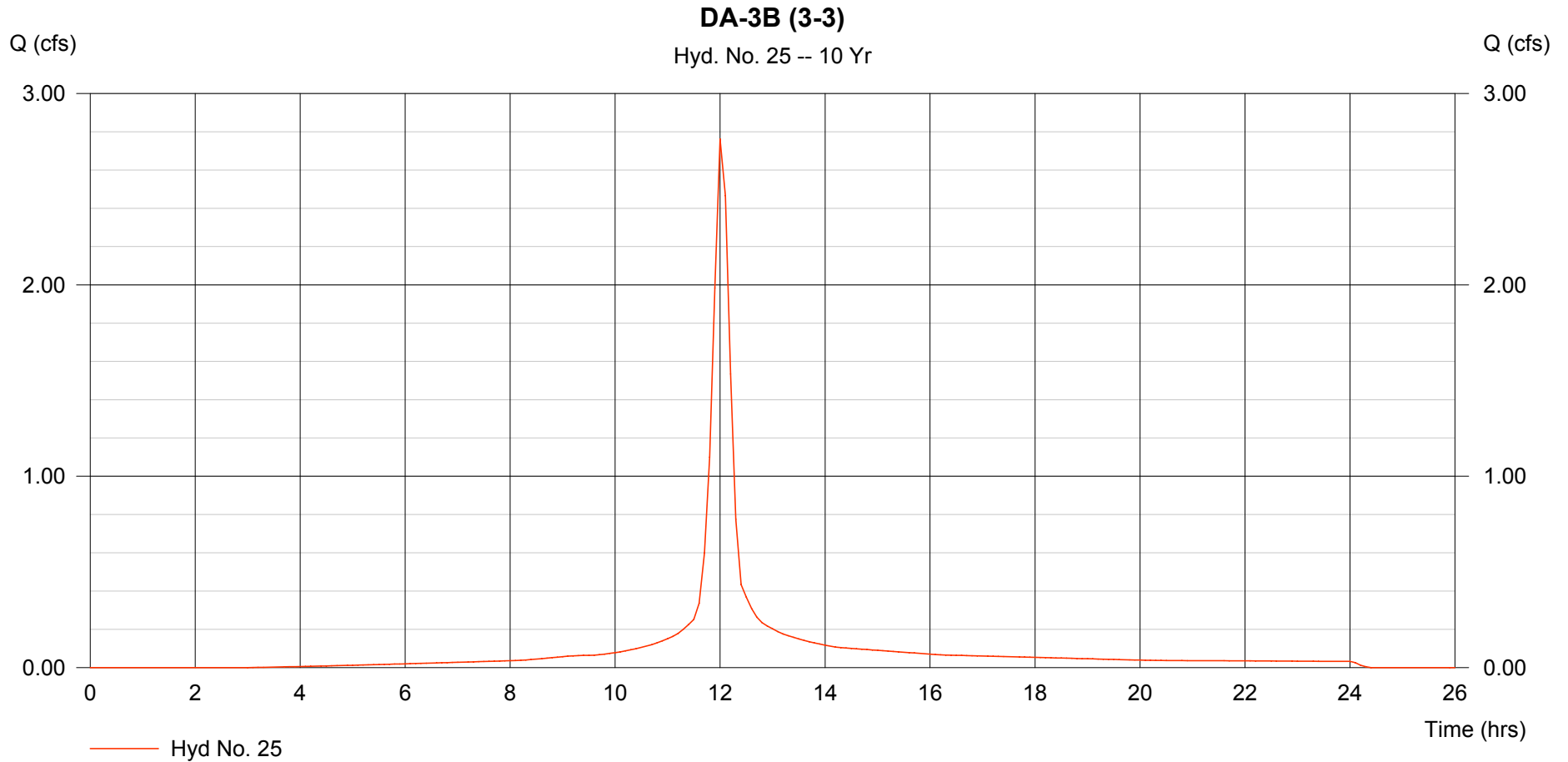
## Hyd. No. 25

DA-3B (3-3)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.595 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 2.762 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.203 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

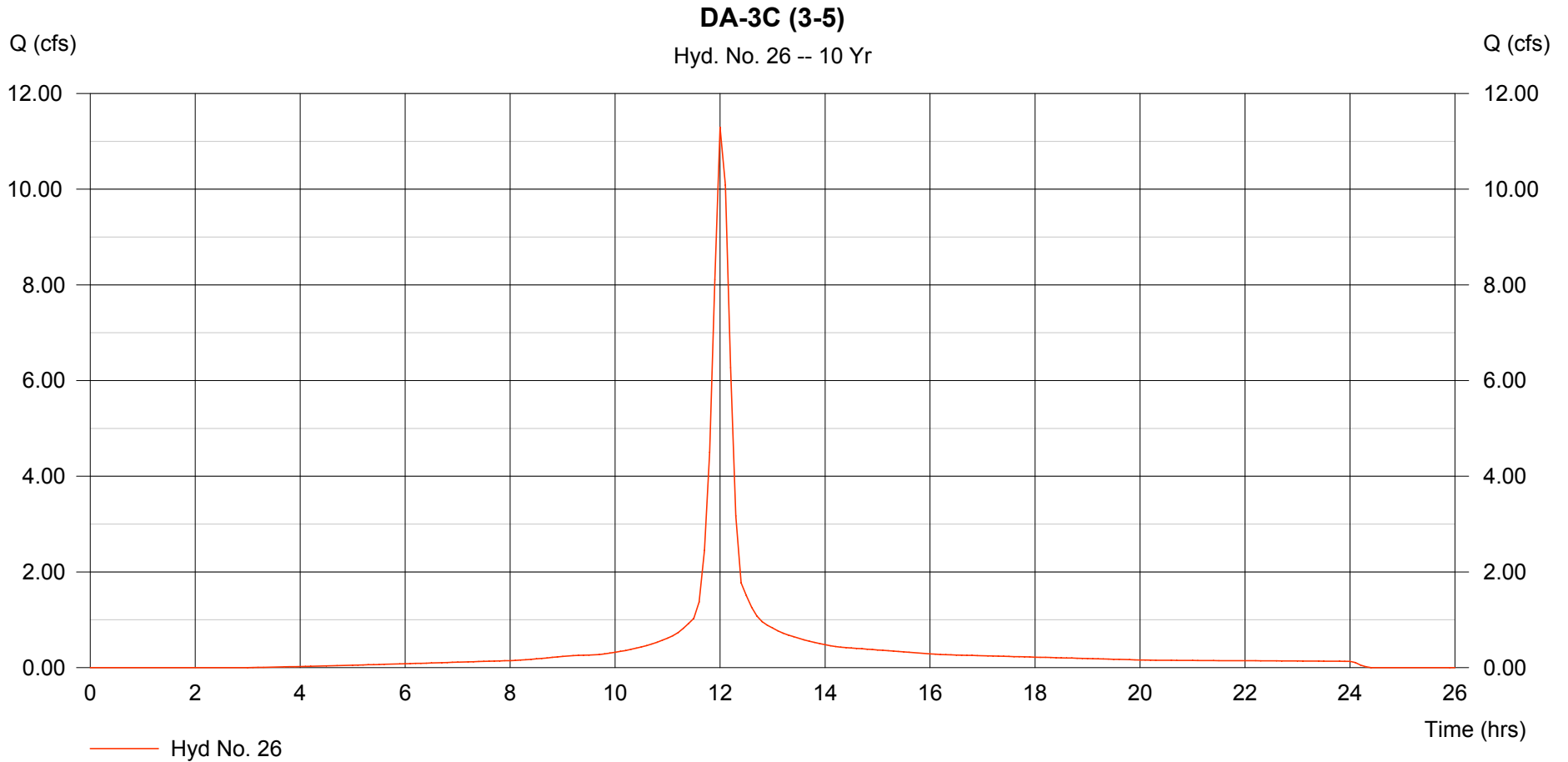
## Hyd. No. 26

DA-3C (3-5)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 2.433 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 11.30 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.829 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

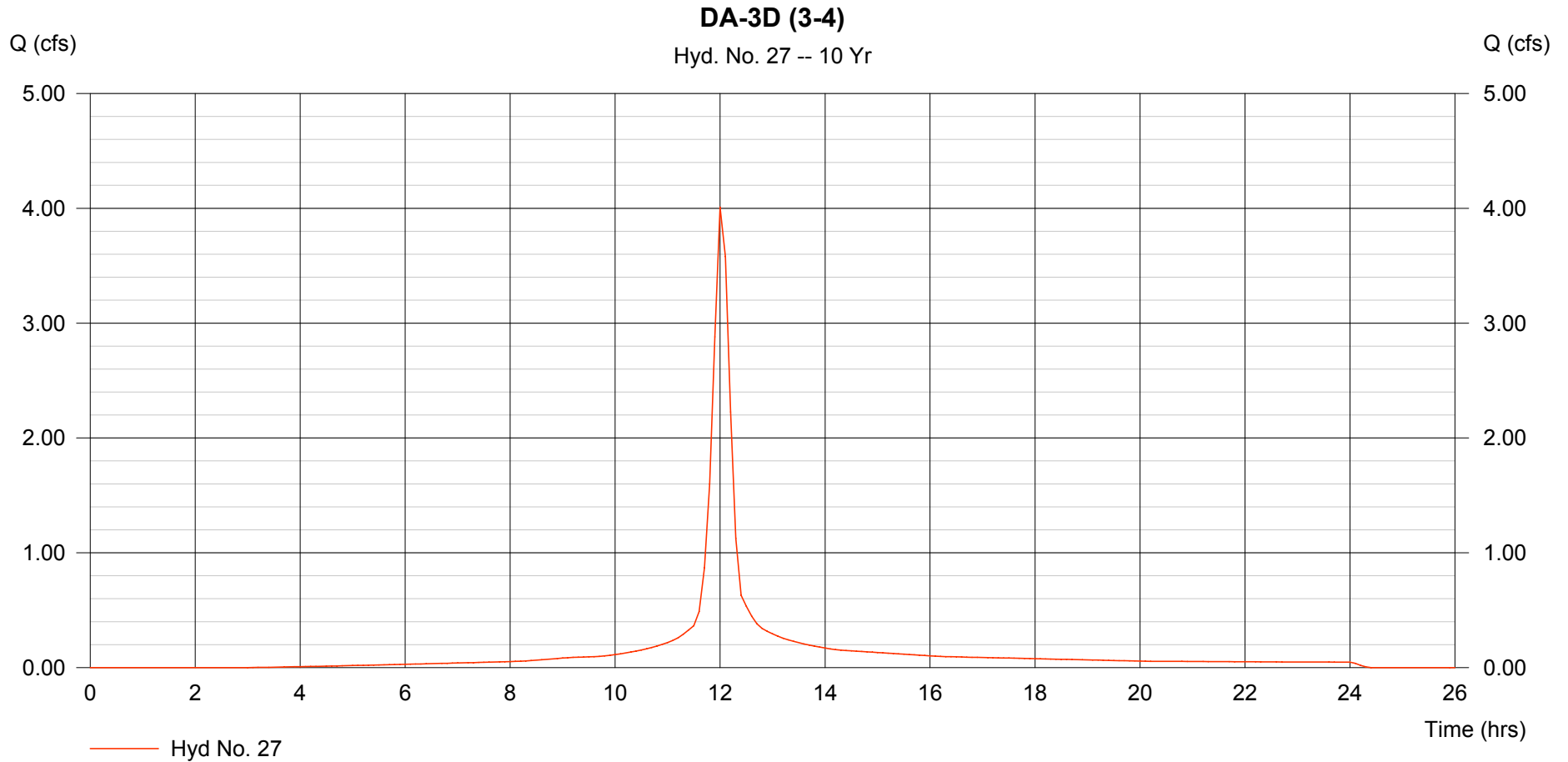
## Hyd. No. 27

DA-3D (3-4)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.864 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 4.011 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.295 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

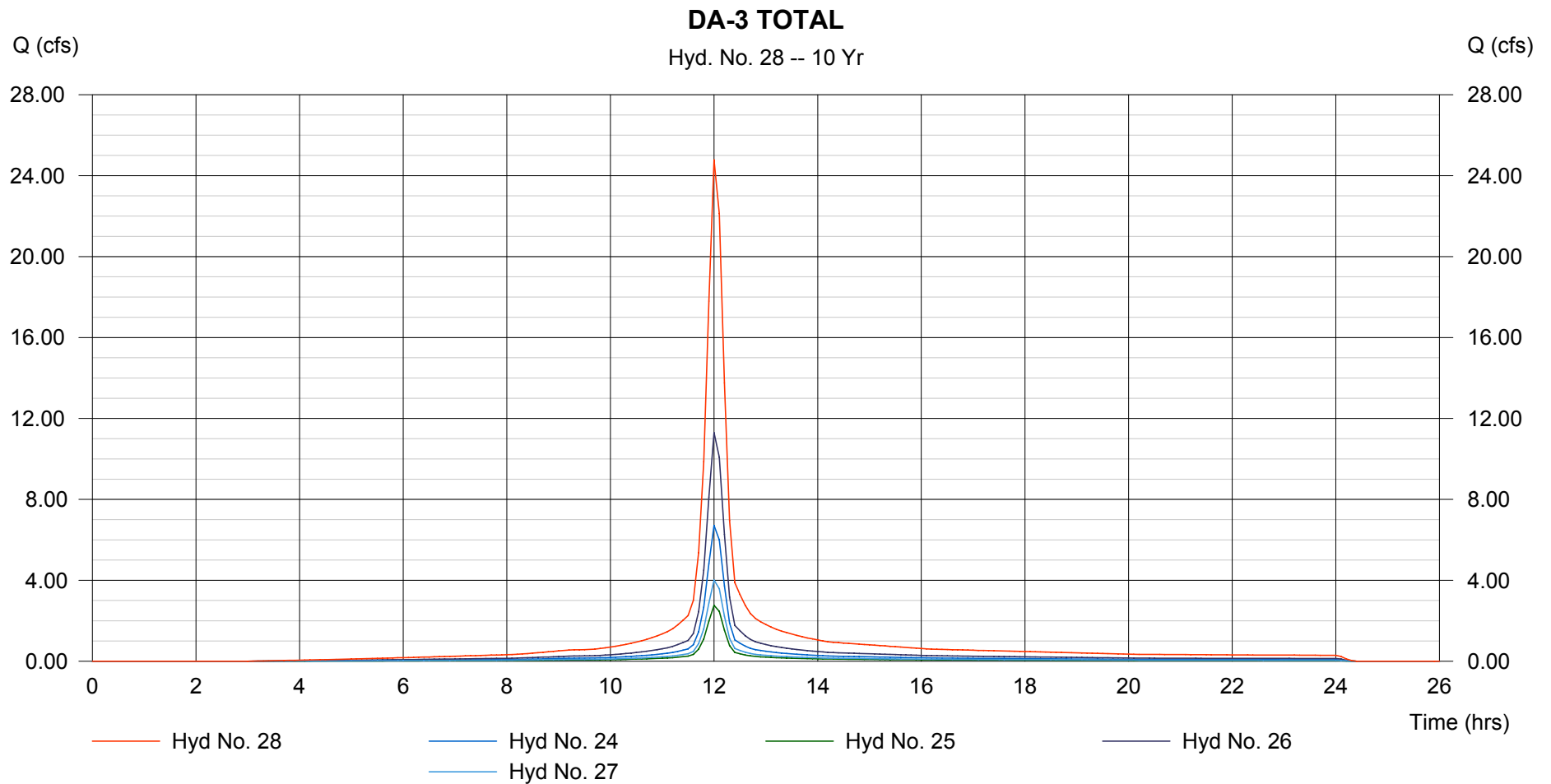
## Hyd. No. 28

DA-3 TOTAL

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 24.78 cfs  
Time interval = 6 min

Hydrograph Volume = 1.820 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

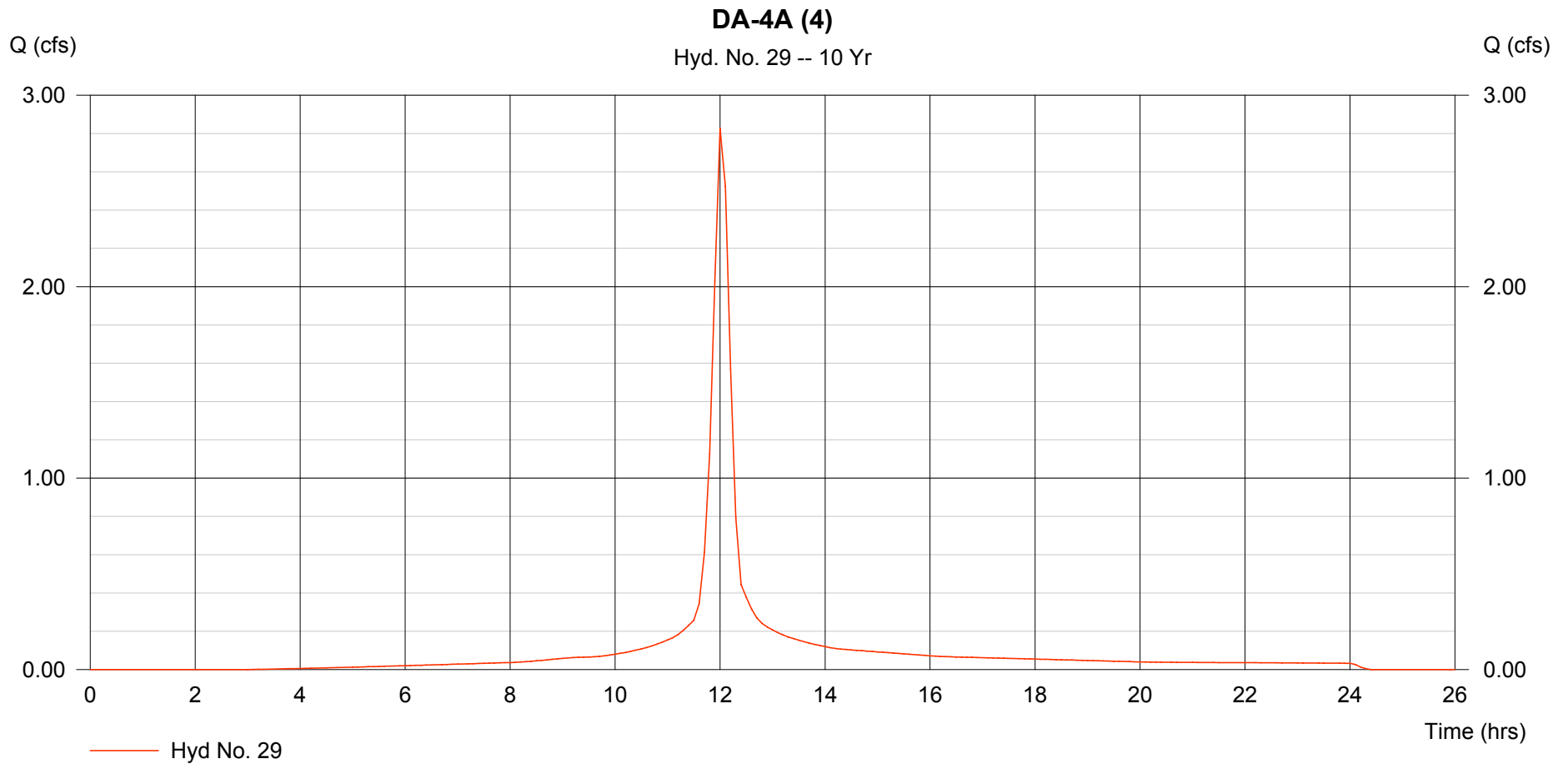
## Hyd. No. 29

DA-4A (4)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.609 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 2.827 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.208 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

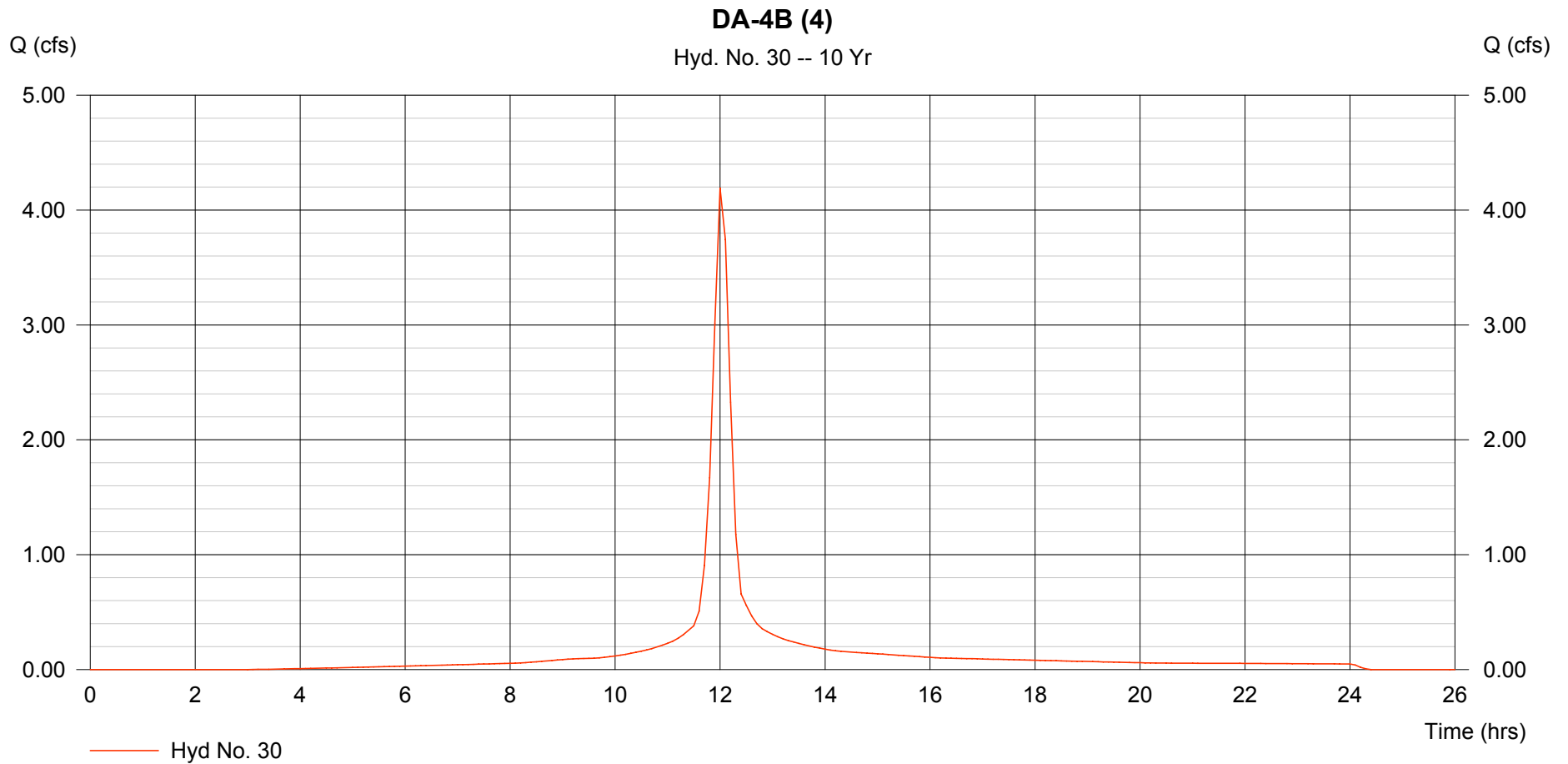
## Hyd. No. 30

DA-4B (4)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 0.903 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 4.192 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.308 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

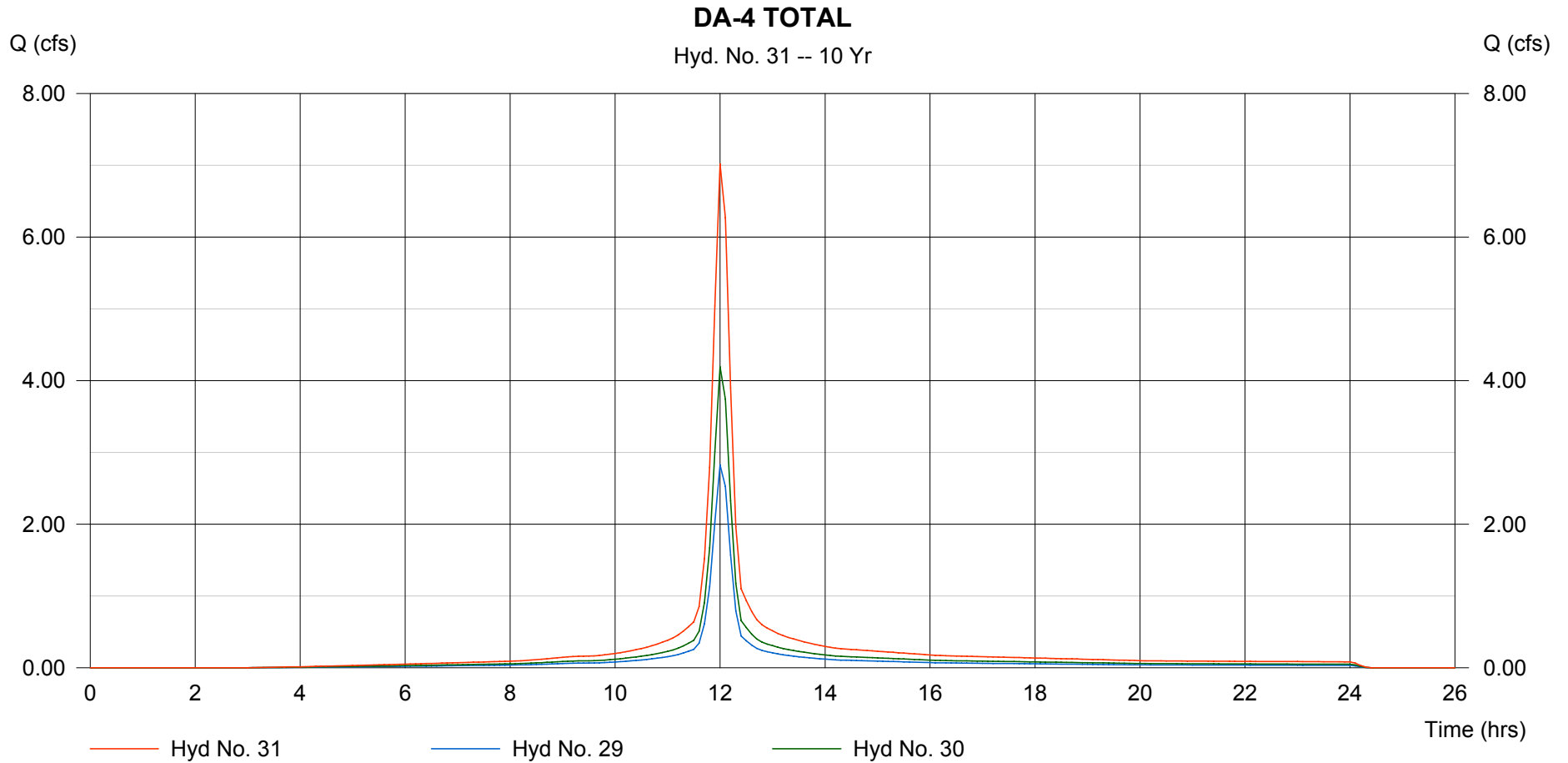
## Hyd. No. 31

DA-4 TOTAL

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 29, 30

Peak discharge = 7.019 cfs  
Time interval = 6 min

Hydrograph Volume = 0.515 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

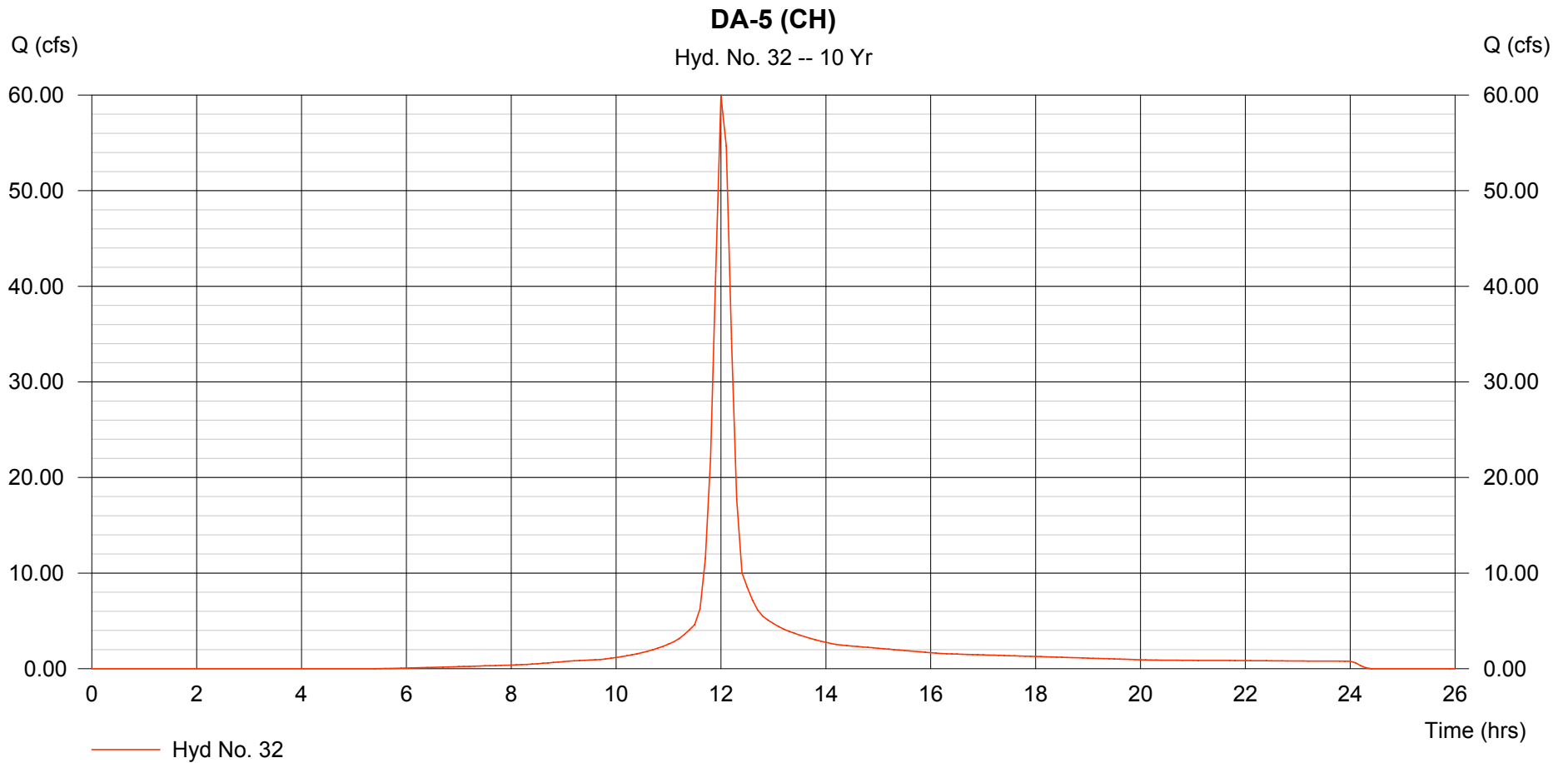
## Hyd. No. 32

DA-5 (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 15.067 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 59.92 cfs  
Time interval = 6 min  
Curve number = 84.8  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4.247 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

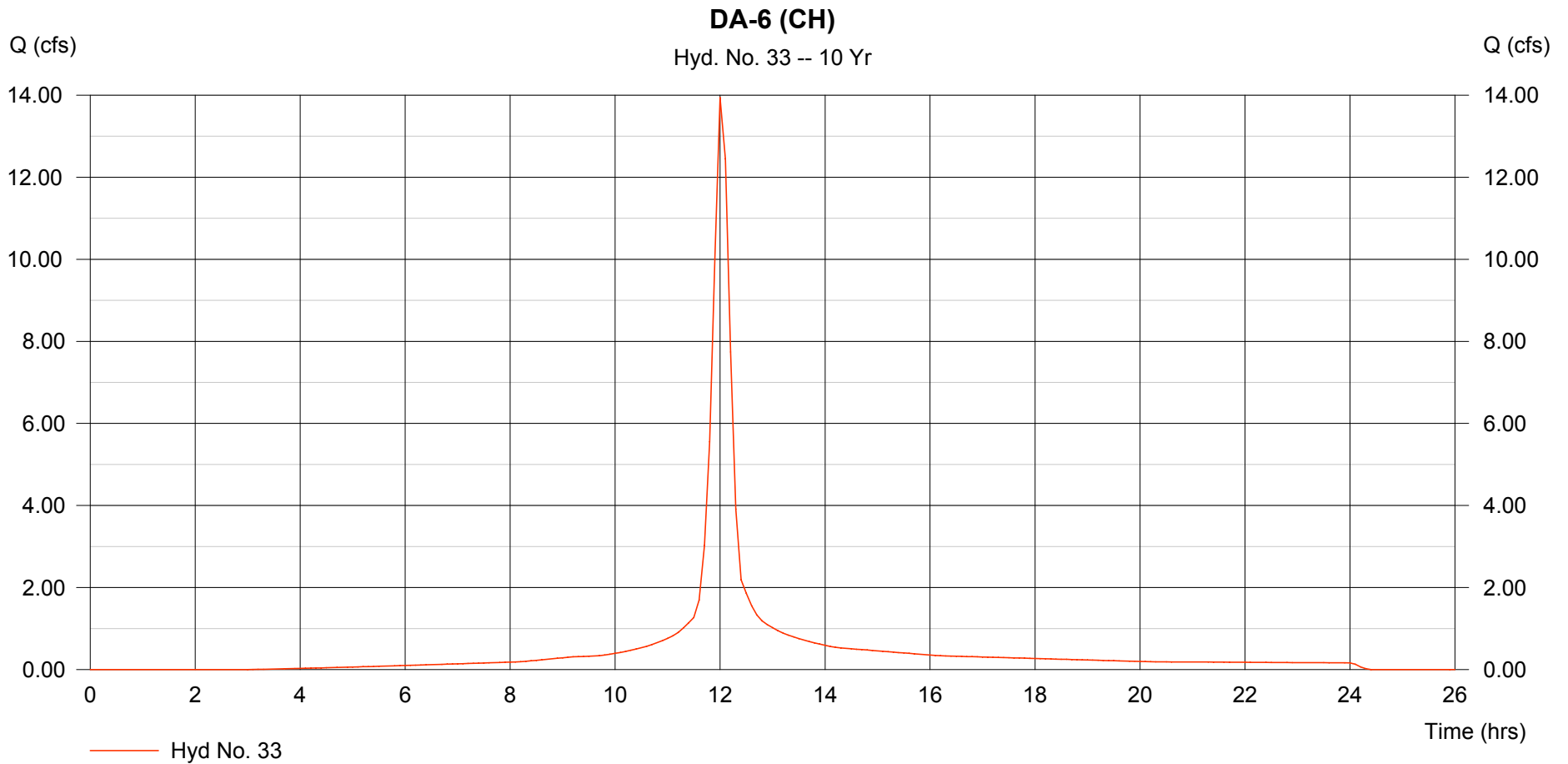
## Hyd. No. 33

DA-6 (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 10 yrs  
Drainage area = 3.003 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 5.28 in  
Storm duration = 24 hrs

Peak discharge = 13.94 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.024 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

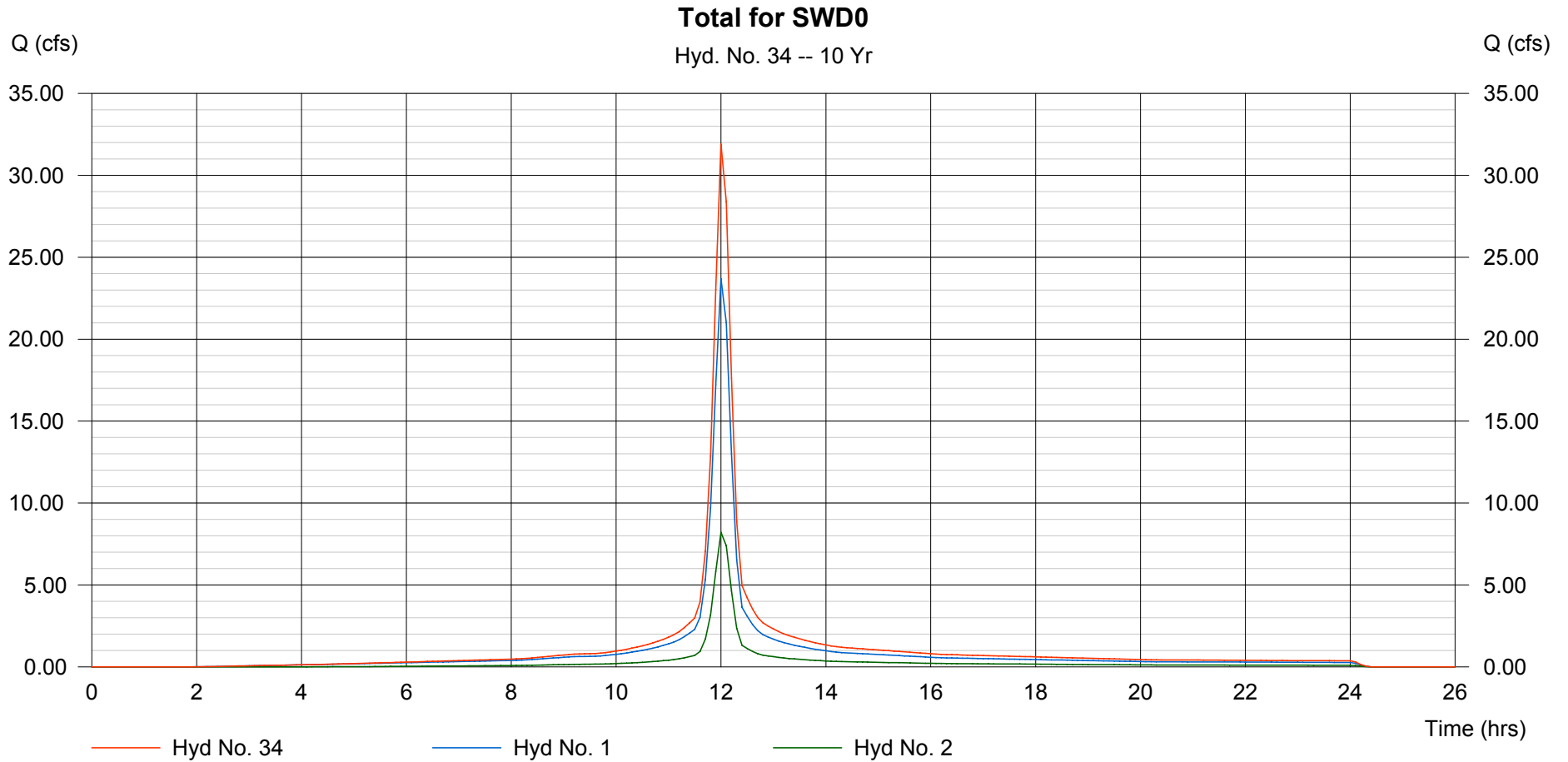
## Hyd. No. 34

Total for SWD0

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 1, 2

Peak discharge = 31.91 cfs  
Time interval = 6 min

Hydrograph Volume = 2.383 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

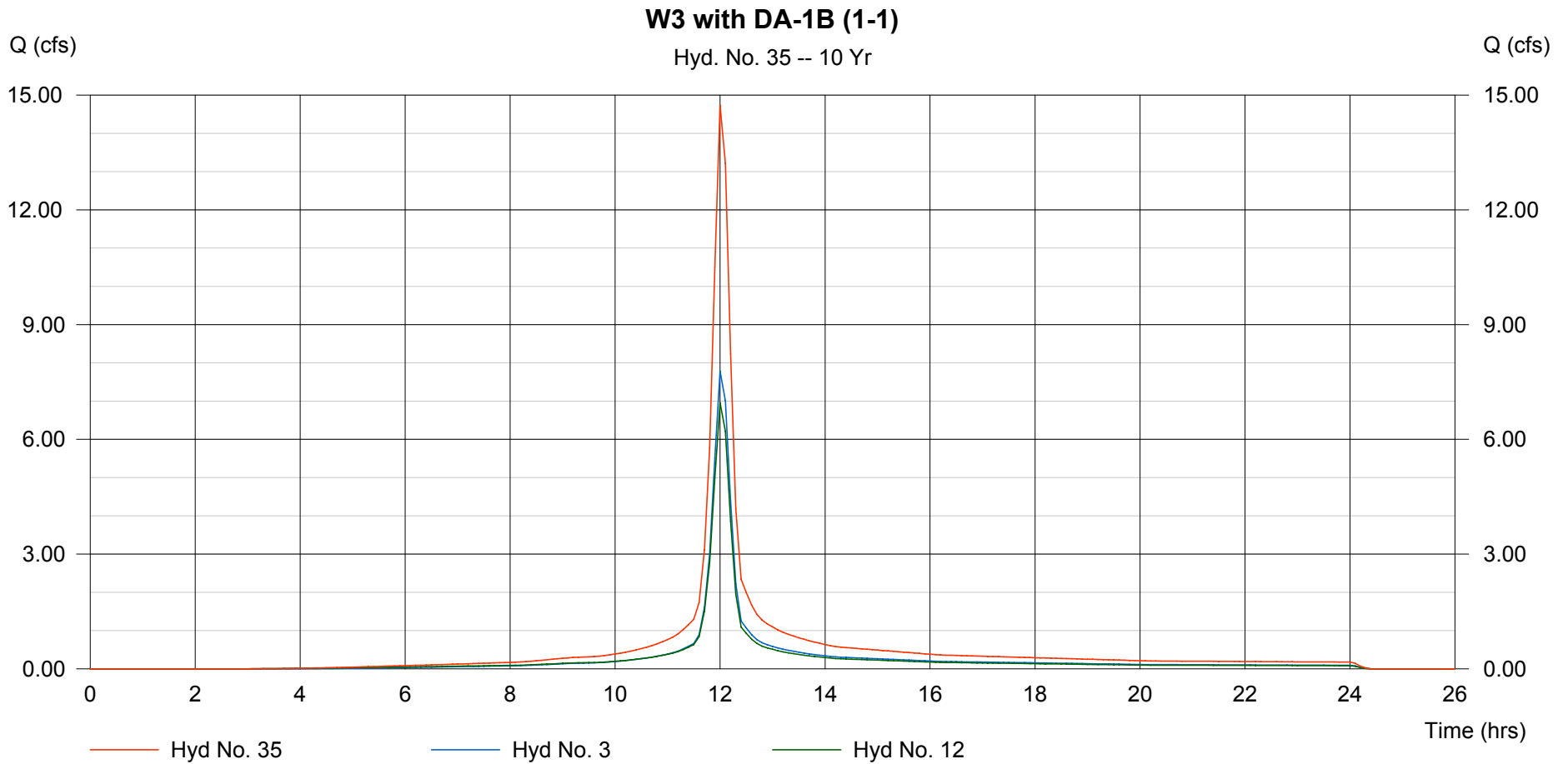
## Hyd. No. 35

W3 with DA-1B (1-1)

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 3, 12

Peak discharge = 14.74 cfs  
Time interval = 6 min

Hydrograph Volume = 1.071 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

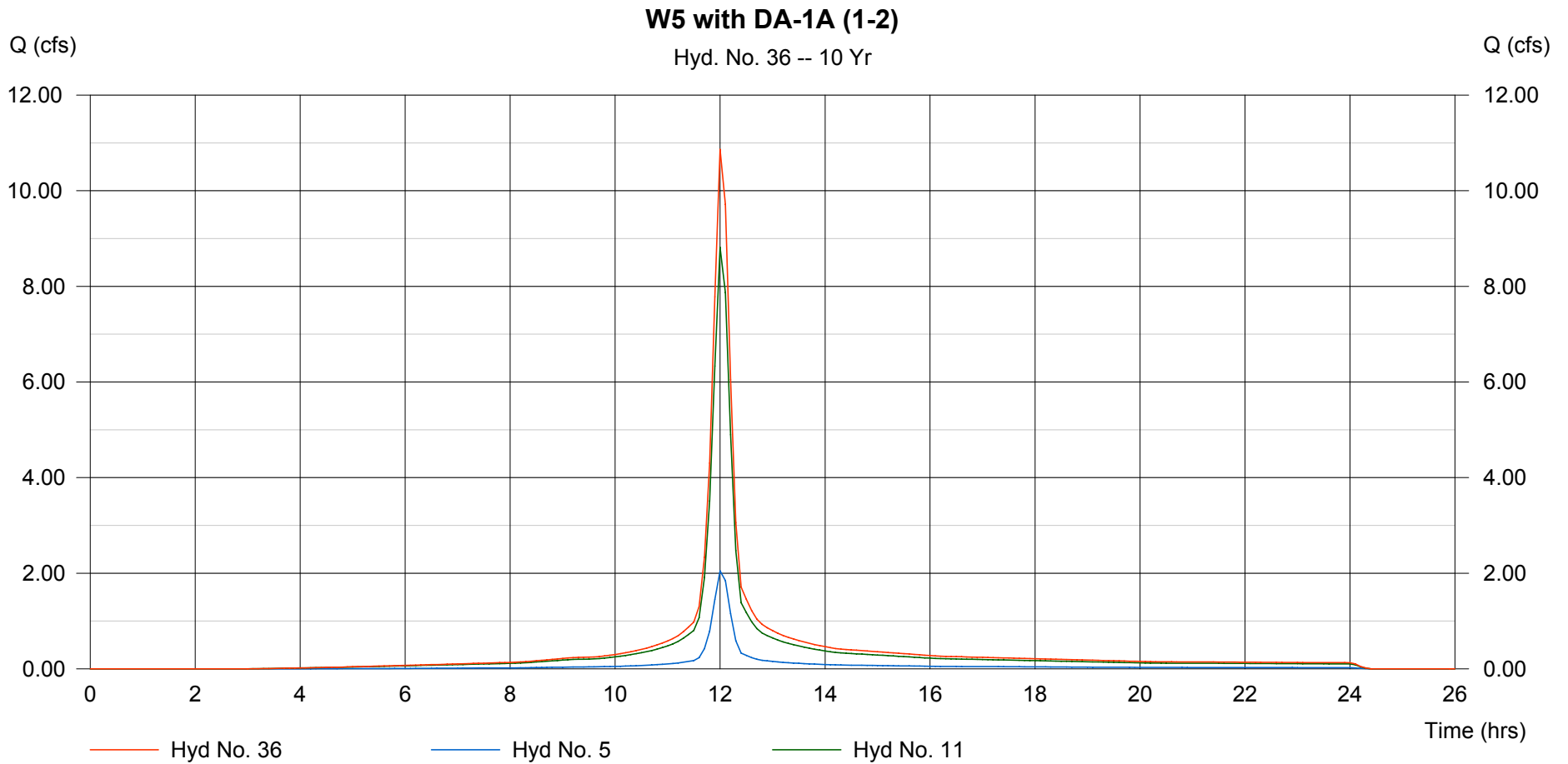
## Hyd. No. 36

W5 with DA-1A (1-2)

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 5, 11

Peak discharge = 10.86 cfs  
Time interval = 6 min

Hydrograph Volume = 0.795 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

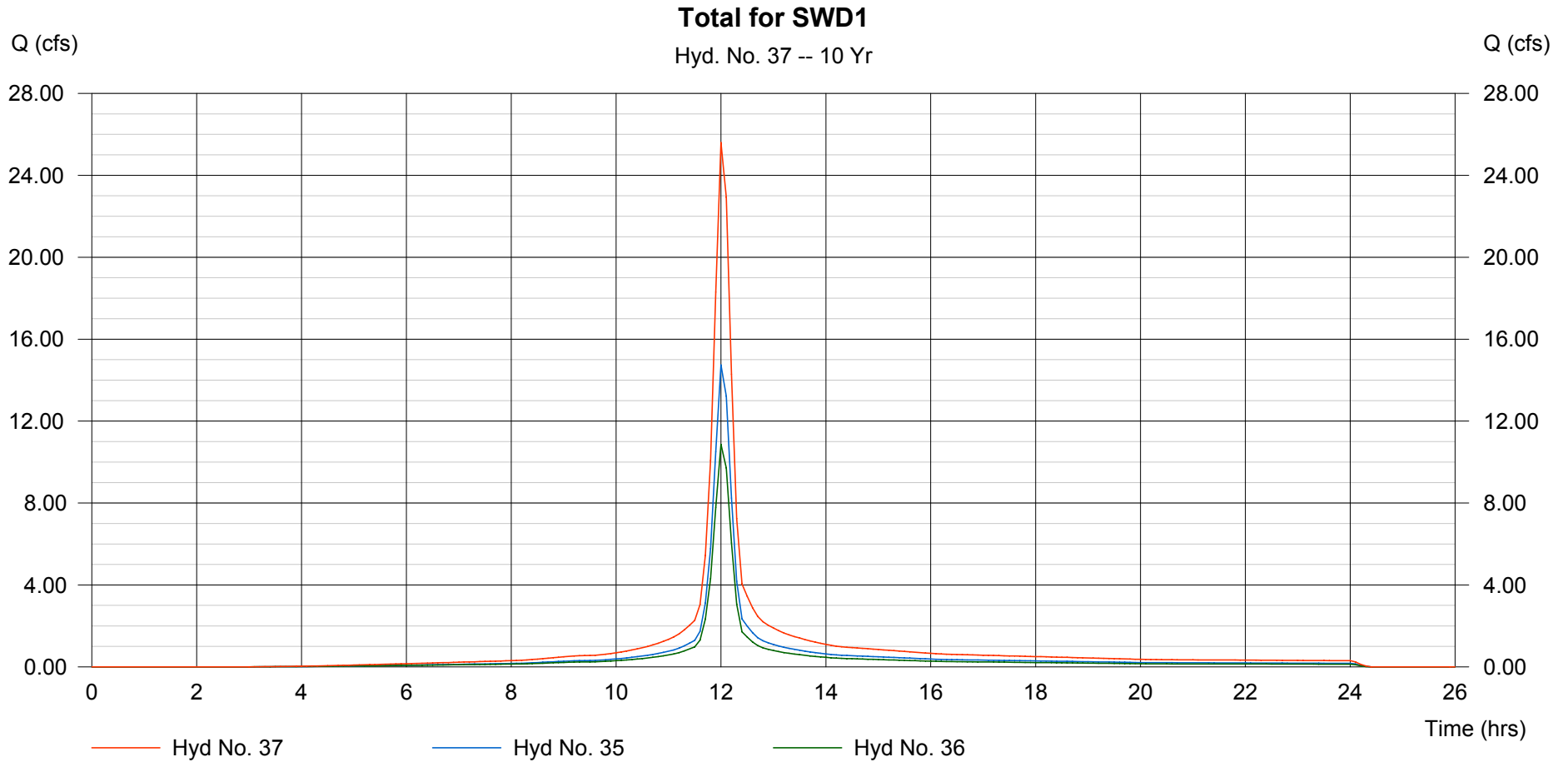
## Hyd. No. 37

Total for SWD1

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 35, 36

Peak discharge = 25.60 cfs  
Time interval = 6 min

Hydrograph Volume = 1.866 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

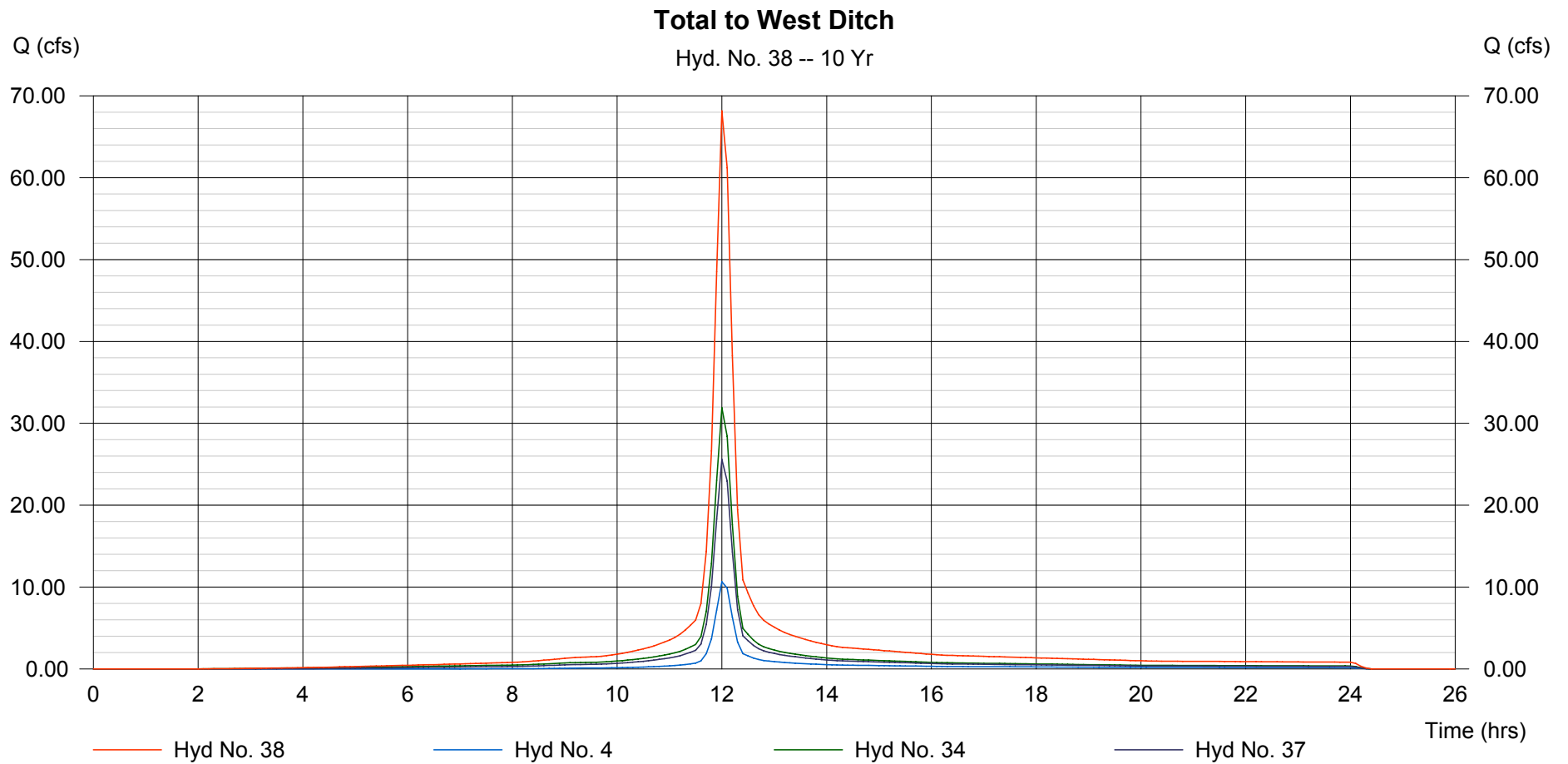
## Hyd. No. 38

Total to West Ditch

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 4, 34, 37

Peak discharge = 68.16 cfs  
Time interval = 6 min

Hydrograph Volume = 5.000 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 39

Proposed West Ditch

Hydrograph type = Reach  
Storm frequency = 10 yrs  
Inflow hyd. No. = 38  
Reach length = 1202.1 ft  
Manning's n = 0.050  
Side slope = 4.0:1  
Rating curve x = 0.720  
Ave. velocity = 1.63 ft/s

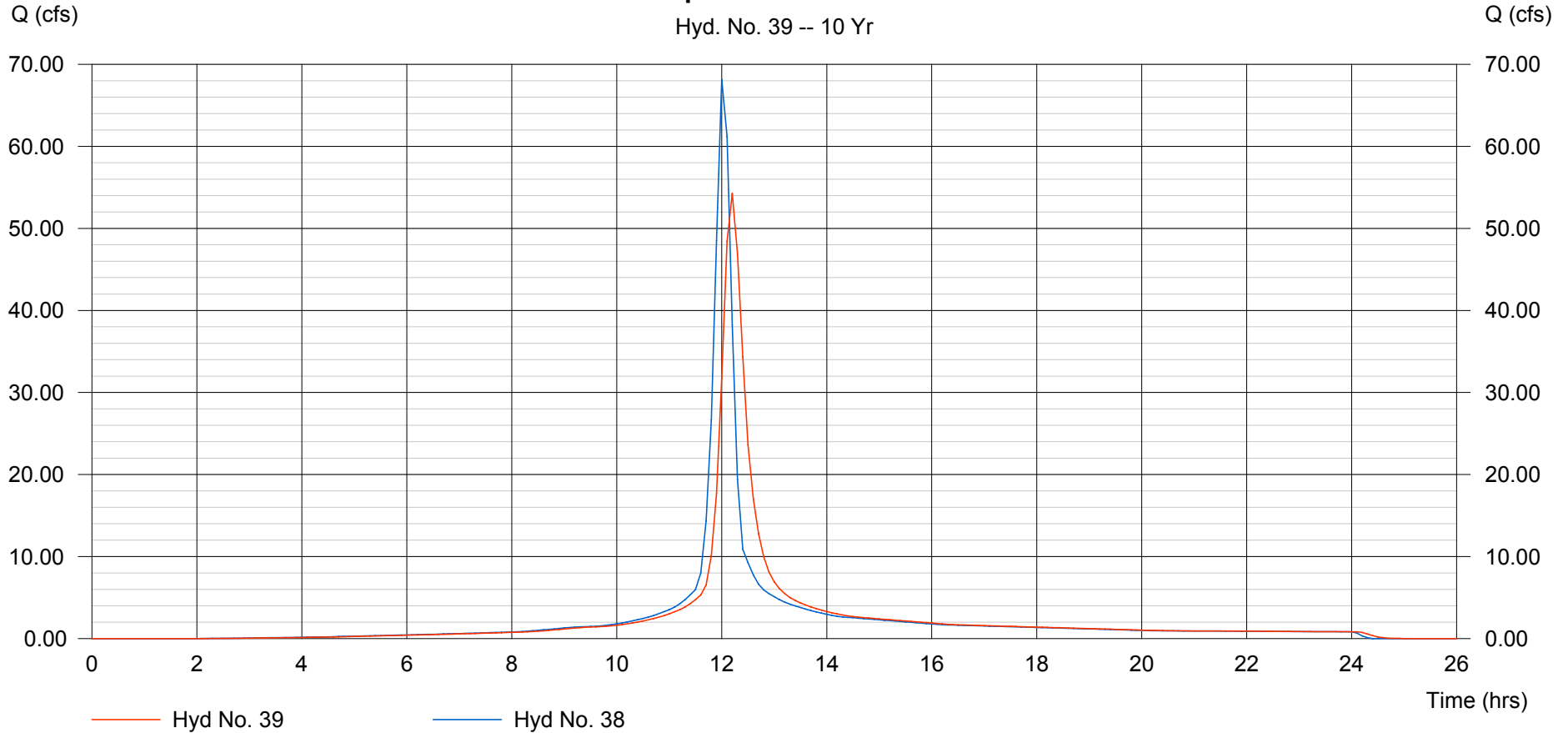
Peak discharge = 54.28 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.5 %  
Bottom width = 5.0 ft  
Max. depth = 1.5 ft  
Rating curve m = 1.218  
Routing coeff. = 0.4576

Modified Att-Kin routing method used.

Hydrograph Volume = 5.000 acft

### Proposed West Ditch

Hyd. No. 39 -- 10 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

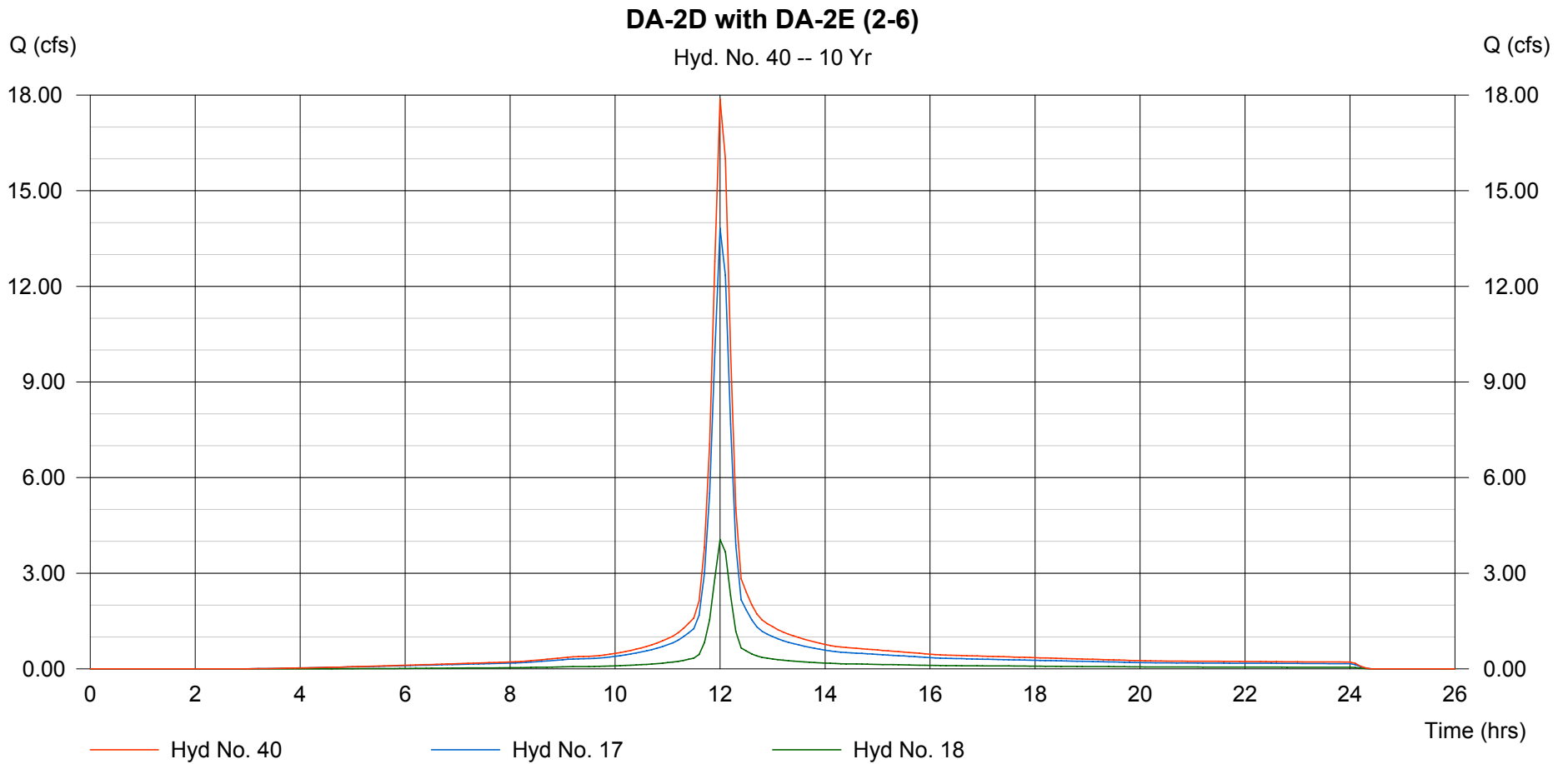
## Hyd. No. 40

DA-2D with DA-2E (2-6)

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 17, 18

Peak discharge = 17.88 cfs  
Time interval = 6 min

Hydrograph Volume = 1.305 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

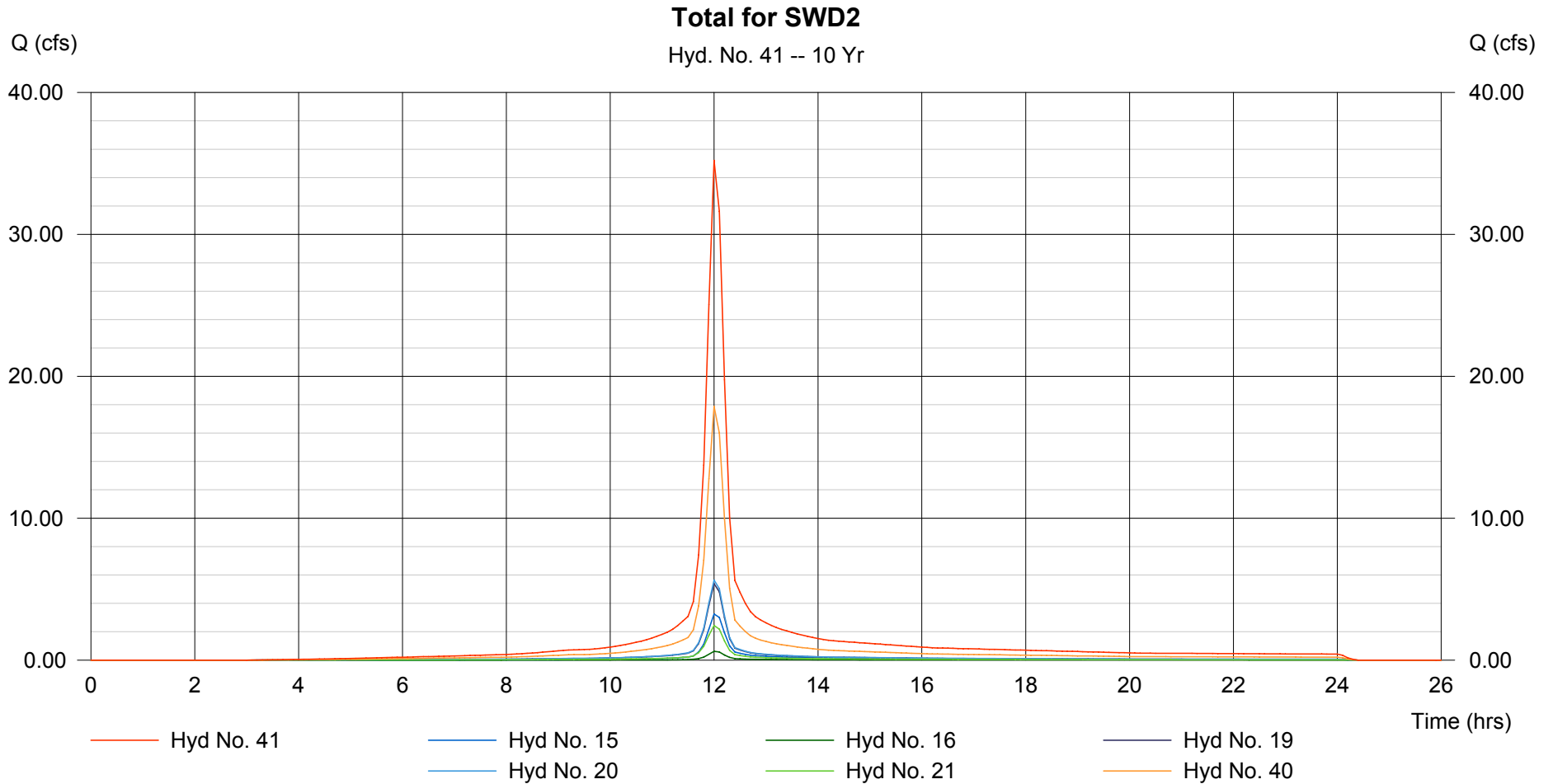
## Hyd. No. 41

Total for SWD2

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 15, 16, 19, 20, 21, 40

Peak discharge = 35.21 cfs  
Time interval = 6 min

Hydrograph Volume = 2.567 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

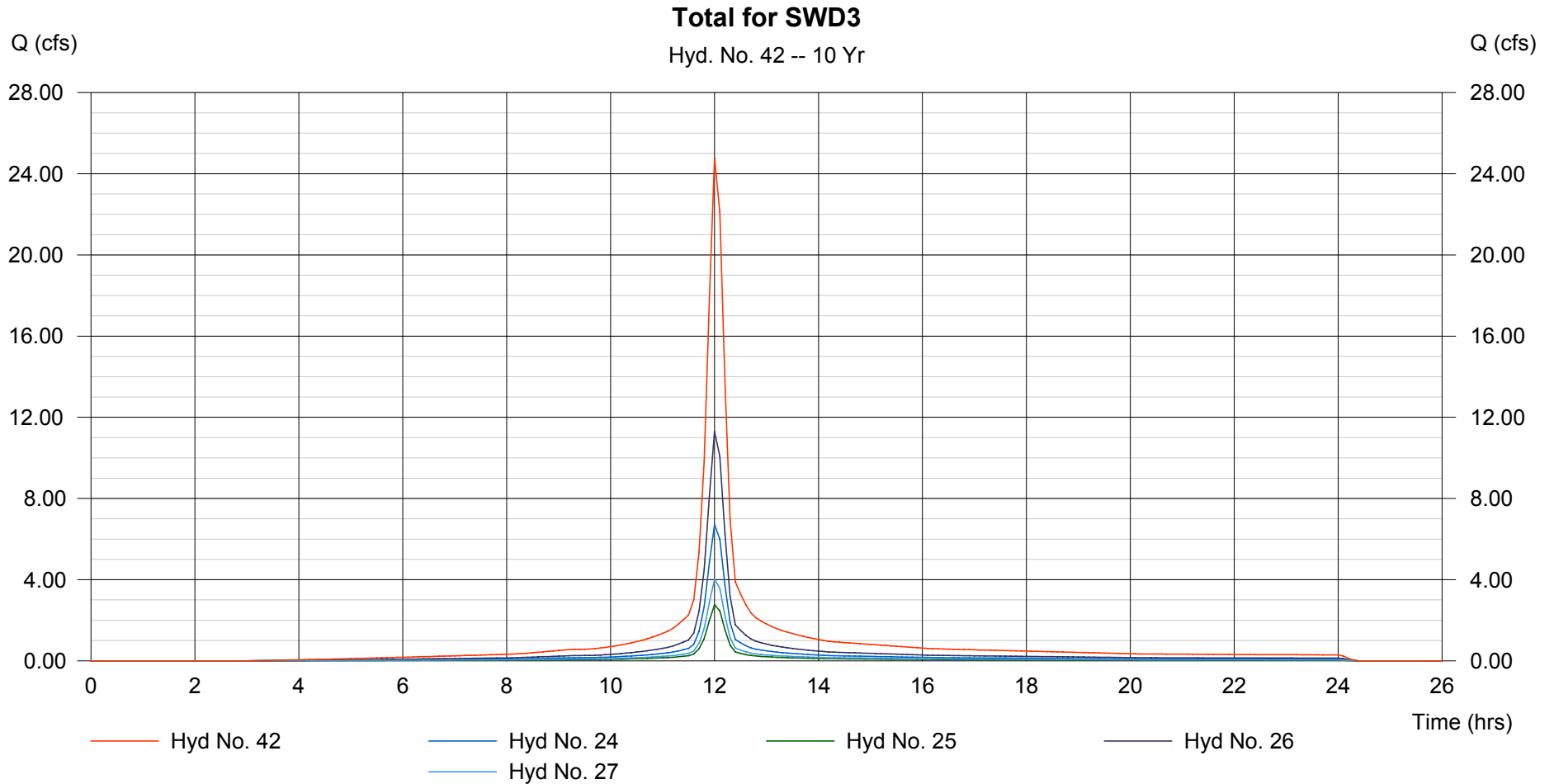
## Hyd. No. 42

Total for SWD3

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 24.78 cfs  
Time interval = 6 min

Hydrograph Volume = 1.820 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

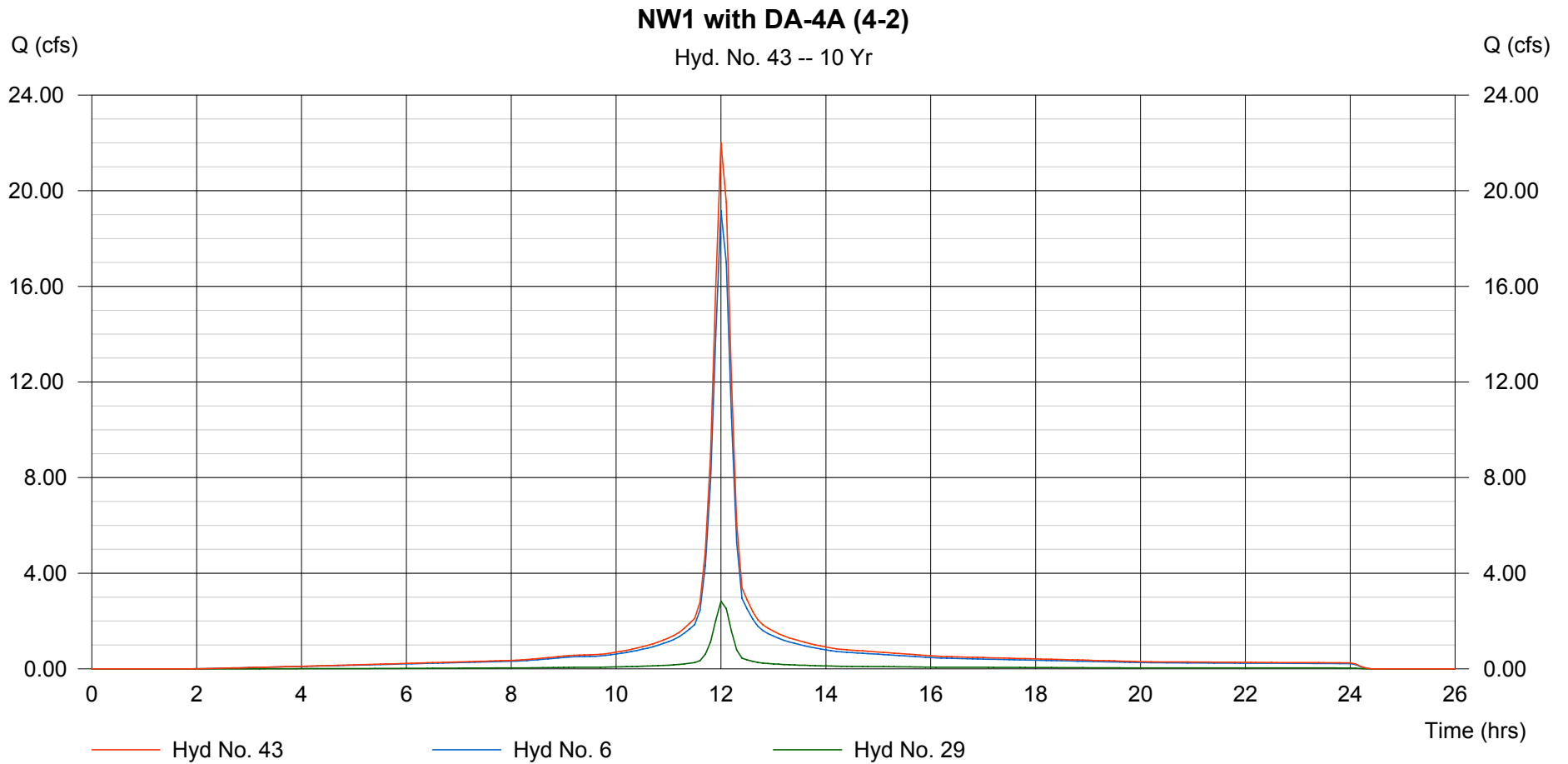
## Hyd. No. 43

NW1 with DA-4A (4-2)

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 6, 29

Peak discharge = 22.00 cfs  
Time interval = 6 min

Hydrograph Volume = 1.658 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

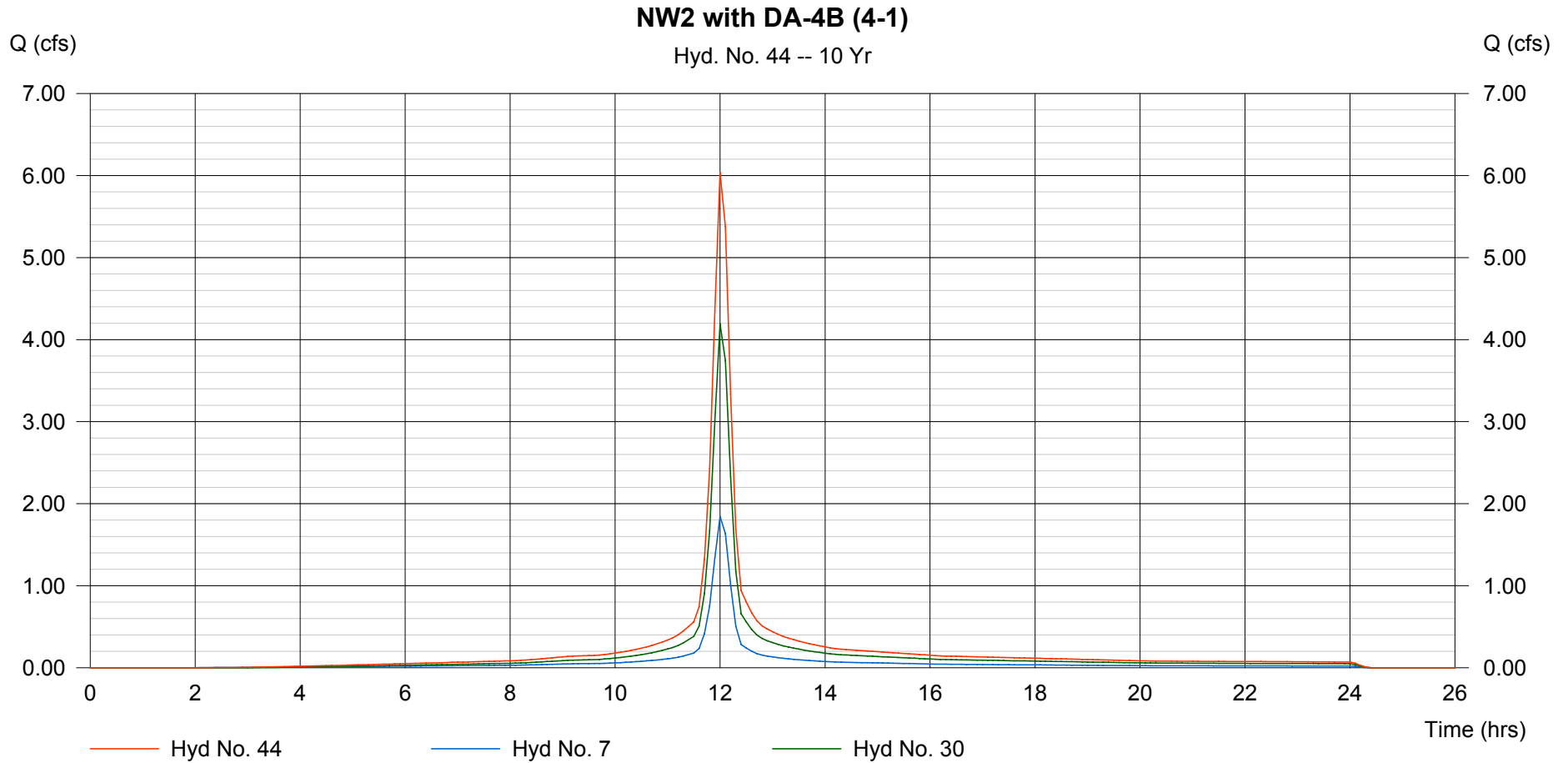
## Hyd. No. 44

NW2 with DA-4B (4-1)

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 7, 30

Peak discharge = 6.036 cfs  
Time interval = 6 min

Hydrograph Volume = 0.447 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

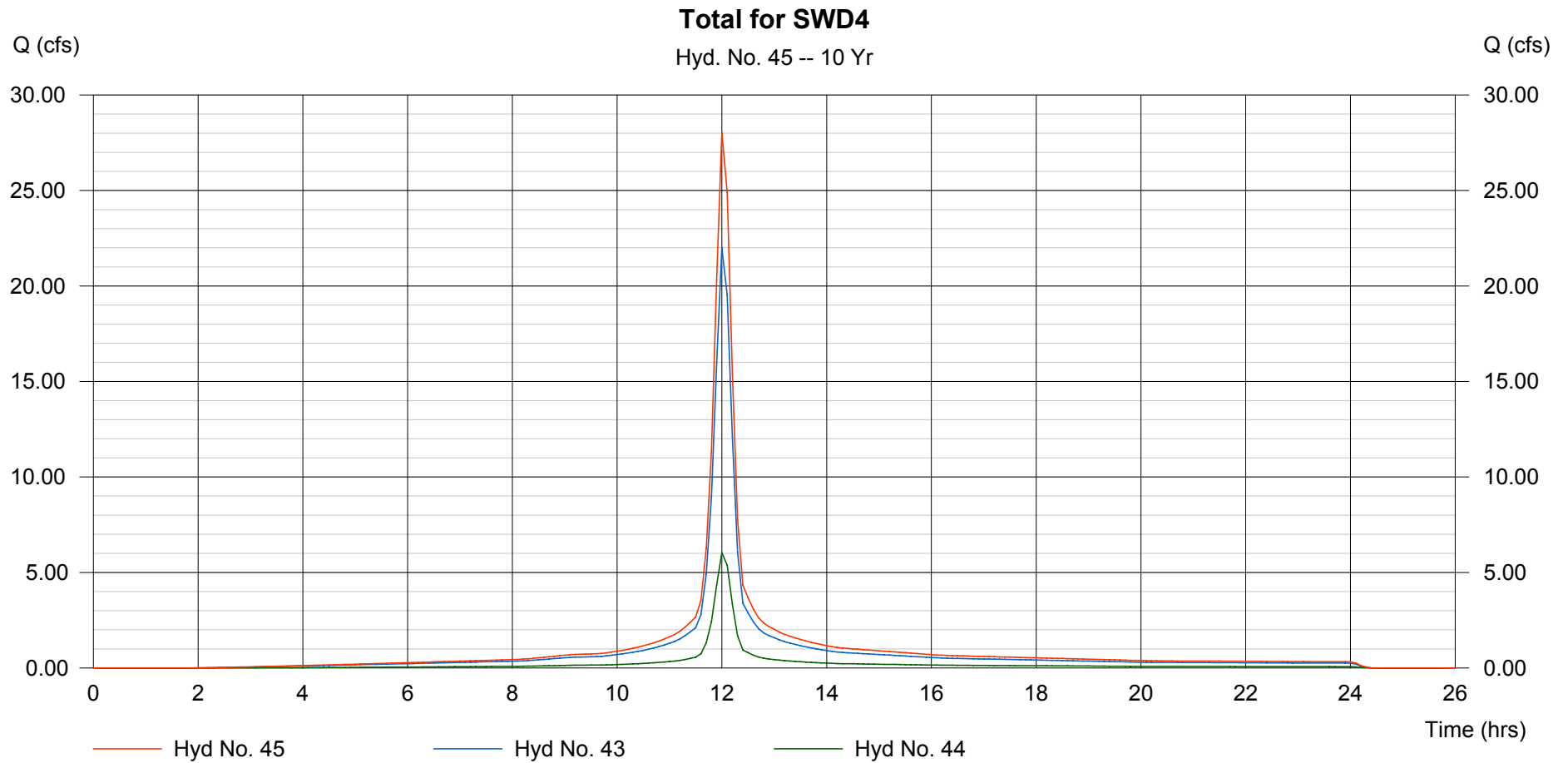
## Hyd. No. 45

Total for SWD4

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 43, 44

Peak discharge = 28.04 cfs  
Time interval = 6 min

Hydrograph Volume = 2.105 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

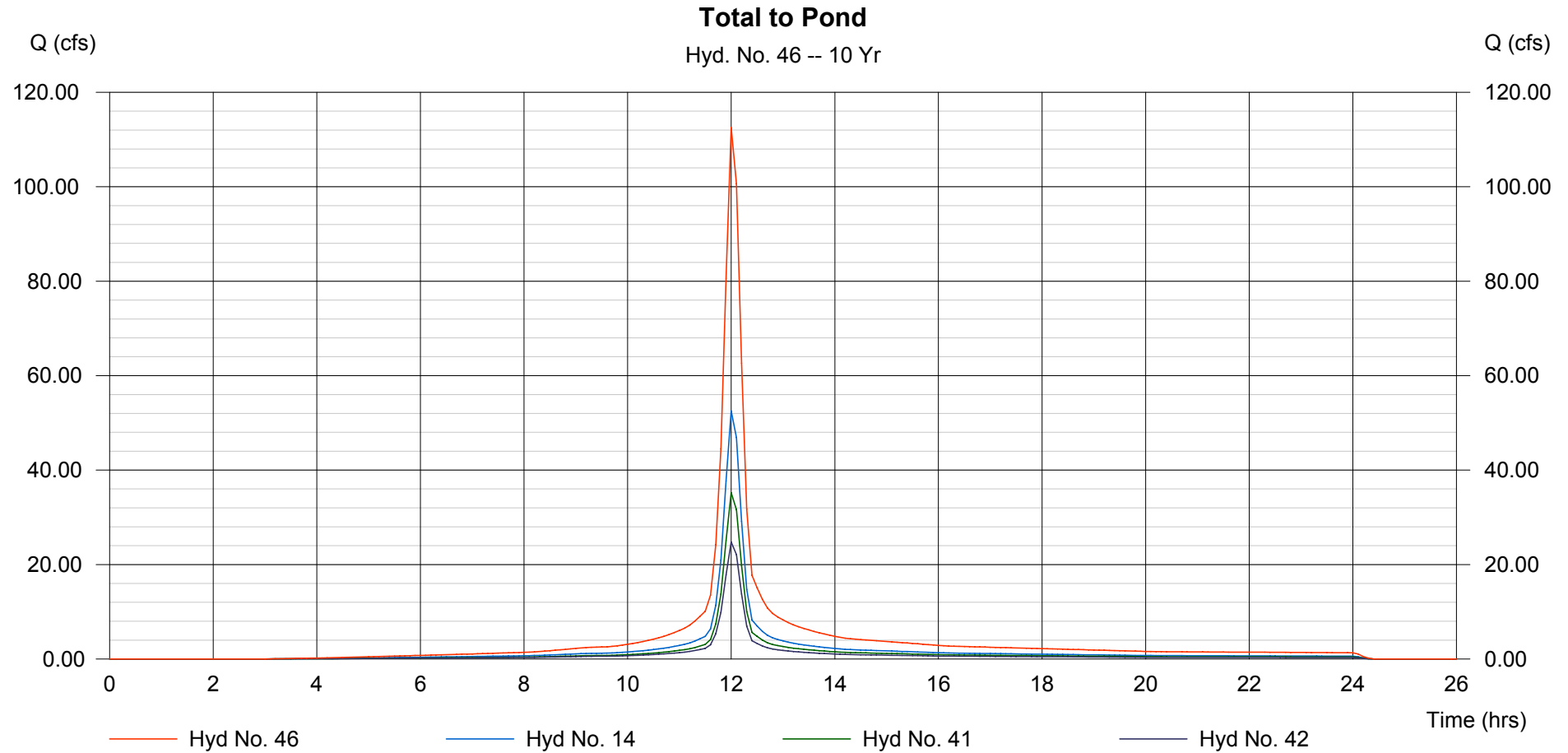
## Hyd. No. 46

Total to Pond

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 14, 41, 42

Peak discharge = 112.52 cfs  
Time interval = 6 min

Hydrograph Volume = 8.242 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 47

Proposed Pond

Hydrograph type = Reservoir  
Storm frequency = 10 yrs  
Inflow hyd. No. = 46  
Reservoir name = Proposed Pond

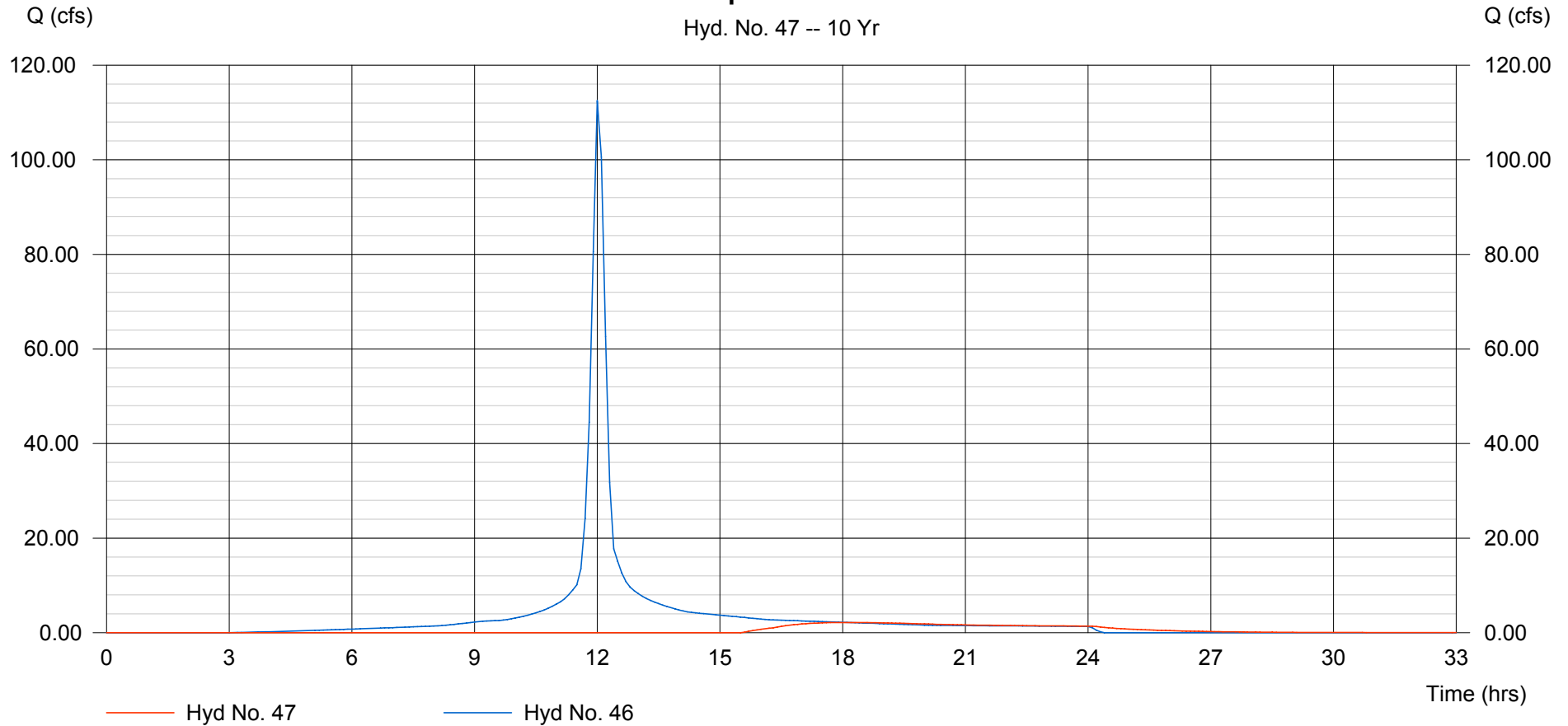
Peak discharge = 2.155 cfs  
Time interval = 6 min  
Max. Elevation = 1388.16 ft  
Max. Storage = 7.138 acft

Storage Indication method used.

Hydrograph Volume = 1.341 acft

### Proposed Pond

Hyd. No. 47 -- 10 Yr





# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

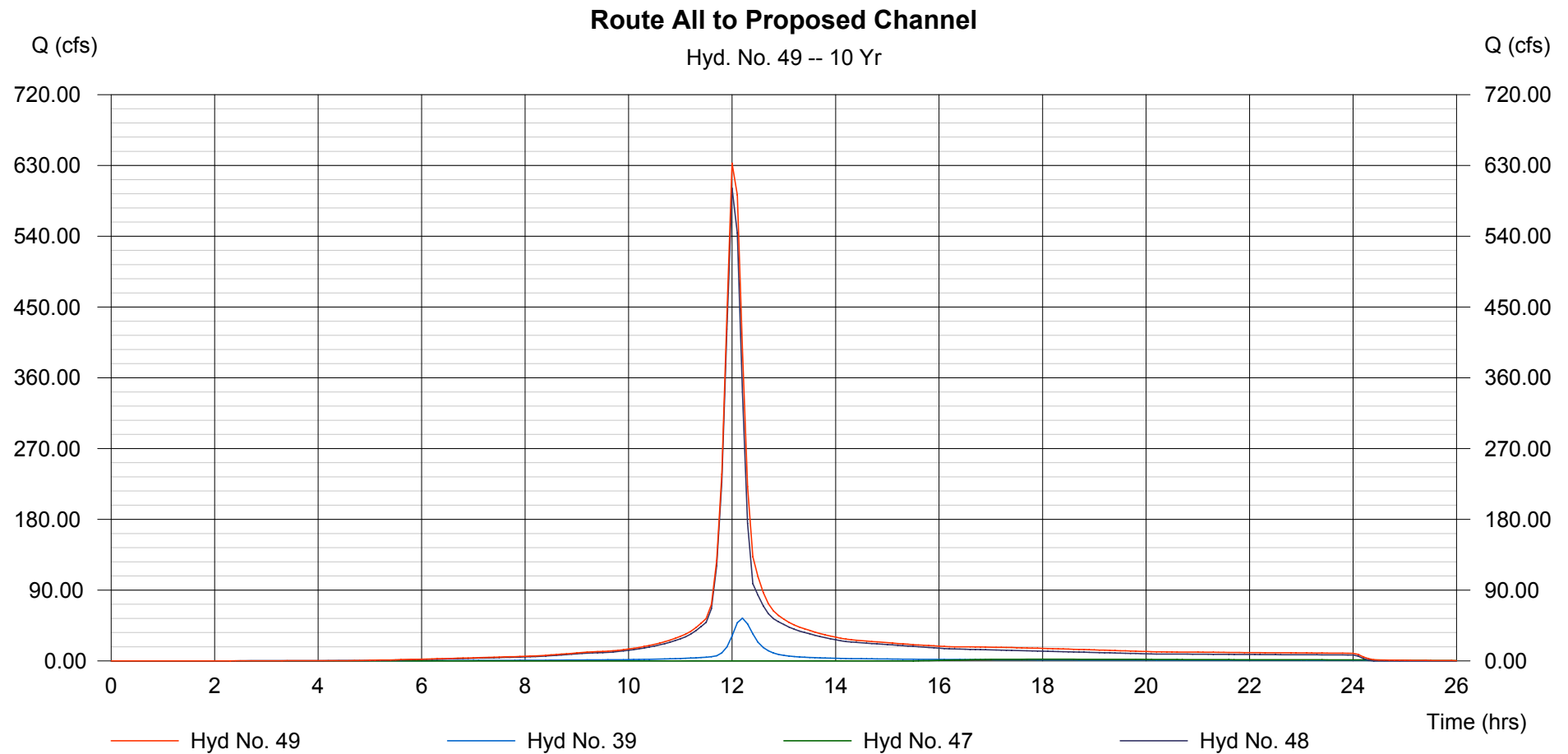
## Hyd. No. 49

Route All to Proposed Channel

Hydrograph type = Combine  
Storm frequency = 10 yrs  
Inflow hyds. = 39, 47, 48

Peak discharge = 632.84 cfs  
Time interval = 6 min

Hydrograph Volume = 49.329 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:30 PM

## Hyd. No. 50

Proposed Channel

Hydrograph type = Reach  
Storm frequency = 10 yrs  
Inflow hyd. No. = 49  
Reach length = 2296.0 ft  
Manning's n = 0.030  
Side slope = 4.0:1  
Rating curve x = 0.301  
Ave. velocity = 3.02 ft/s

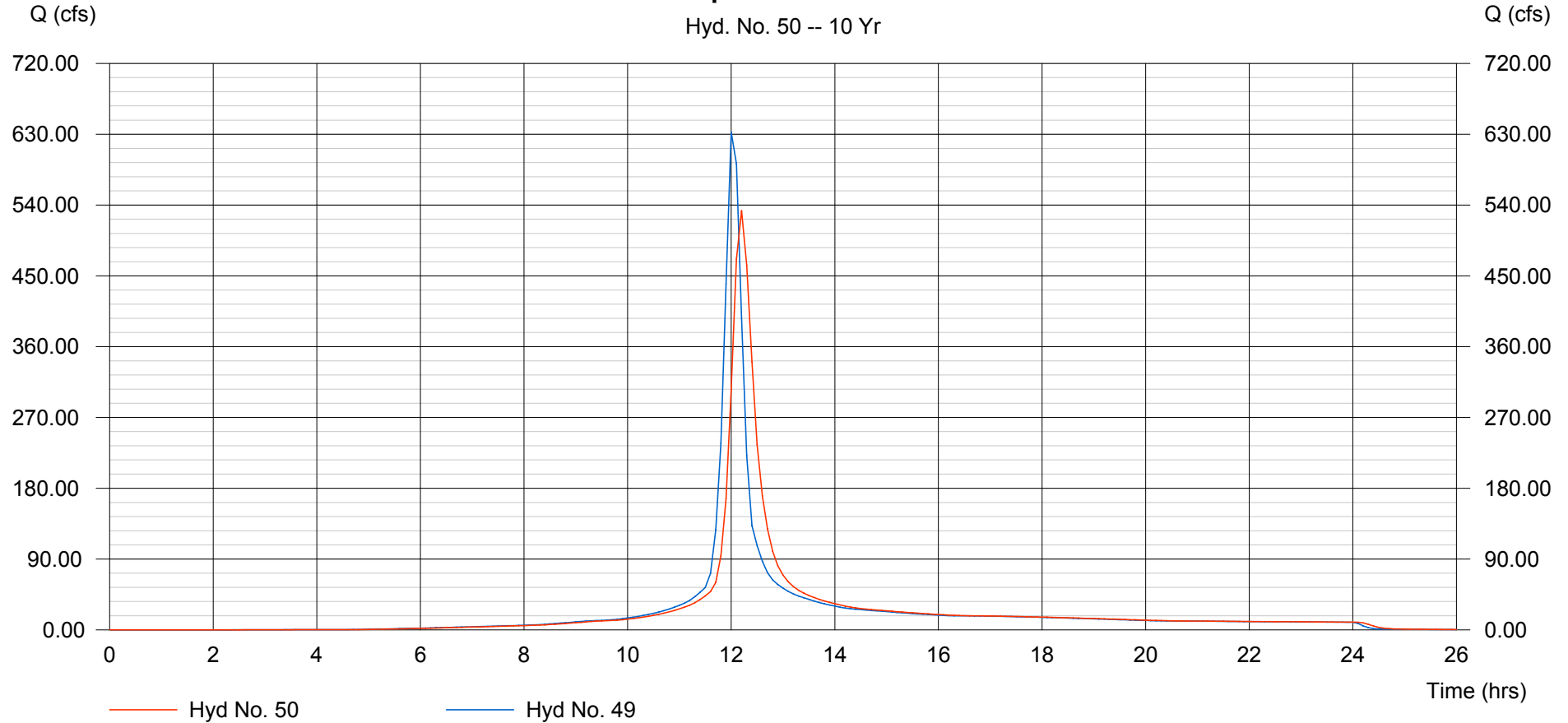
Peak discharge = 532.75 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 4.0 ft  
Rating curve m = 1.432  
Routing coeff. = 0.5069

Modified Att-Kin routing method used.

Hydrograph Volume = 49.328 acft

### Proposed Channel

Hyd. No. 50 -- 10 Yr



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	28.25	6	720	2.156	---	----	----	Off-Site W1 (0-3)
2	SCS Runoff	10.00	6	720	0.727	---	----	----	Off-Site W2 (0-2)
3	SCS Runoff	9.484	6	720	0.689	---	----	----	Off-Site W3 (1)
4	SCS Runoff	13.56	6	720	0.957	---	----	----	Off-Site W4 (W DT)
5	SCS Runoff	2.495	6	720	0.181	---	----	----	Off-Site W5 (1)
6	SCS Runoff	22.86	6	720	1.744	---	----	----	Off-Site NW1 (4)
7	SCS Runoff	2.198	6	720	0.168	---	----	----	Off-Site NW2 (4)
8	SCS Runoff	388.05	6	720	27.903	---	----	----	Off-Site N (CH)
9	SCS Runoff	156.51	6	720	11.254	---	----	----	Off-Site NE (CH)
10	SCS Runoff	69.04	6	720	4.965	---	----	----	Off-Site SE (CH)
11	SCS Runoff	10.61	6	720	0.787	---	----	----	DA-1A (1)
12	SCS Runoff	8.373	6	720	0.621	---	----	----	DA-1B (1)
13	Combine	18.99	6	720	1.408	11, 12	----	----	DA-1 TOTAL
14	SCS Runoff	63.23	6	720	4.689	---	----	----	DA-2A (Pond)
15	SCS Runoff	4.133	6	720	0.292	---	----	----	DA-2B (2-1)
16	SCS Runoff	0.783	6	720	0.055	---	----	----	DA-2C (2-2)
17	SCS Runoff	16.65	6	720	1.234	---	----	----	DA-2D (2)
18	SCS Runoff	4.968	6	720	0.358	---	----	----	DA-2E (2)
19	SCS Runoff	6.489	6	720	0.481	---	----	----	DA-2F (2-4)
20	SCS Runoff	6.791	6	720	0.504	---	----	----	DA-2G (2-5)
21	SCS Runoff	2.940	6	720	0.218	---	----	----	DA-2H (2-3)
22	Combine	84.79	6	720	6.271	14, 15, 16, 17,	----	----	DA-2A to DA-2D
23	Combine	105.98	6	720	7.832	18, 19, 20, 21, 22	----	----	DA-2 TOTAL
24	SCS Runoff	8.082	6	720	0.599	---	----	----	DA-3A (3-2)
25	SCS Runoff	3.326	6	720	0.247	---	----	----	DA-3B (3-3)
26	SCS Runoff	13.60	6	720	1.008	---	----	----	DA-3C (3-5)
27	SCS Runoff	4.829	6	720	0.358	---	----	----	DA-3D (3-4)
28	Combine	29.84	6	720	2.213	24, 25, 26, 27	----	----	DA-3 TOTAL
29	SCS Runoff	3.404	6	720	0.252	---	----	----	DA-4A (4)
30	SCS Runoff	5.047	6	720	0.374	---	----	----	DA-4B (4)

Northborough Proposed.gpw

Return Period: 25 Year

Thursday, Sep 6 2007

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description	
31	Combine	8.451	6	720	0.627	29, 30	-----	-----	DA-4 TOTAL	
32	SCS Runoff	74.42	6	720	5.306	---	-----	-----	DA-5 (CH)	
33	SCS Runoff	16.78	6	720	1.245	---	-----	-----	DA-6 (CH)	
34	Combine	38.25	6	720	2.882	1, 2,	-----	-----	Total for SWD0	
35	Combine	17.86	6	720	1.310	3, 12,	-----	-----	W3 with DA-1B (1-1)	
36	Combine	13.11	6	720	0.968	5, 11,	-----	-----	W5 with DA-1A (1-2)	
37	Combine	30.97	6	720	2.278	35, 36	-----	-----	Total for SWD1	
38	Combine	82.77	6	720	6.118	4, 34, 37	-----	-----	Total to West Ditch	
39	Reach	66.55	6	732	6.118	38	-----	-----	Proposed West Ditch	
40	Combine	21.61	6	720	1.593	17, 18,	-----	-----	DA-2D with DA-2E (2-6)	
41	Combine	42.75	6	720	3.143	15, 16, 19, 20, 21, 40	-----	-----	Total for SWD2	
42	Combine	29.84	6	720	2.213	24, 25, 26, 27,	-----	-----	Total for SWD3	
43	Combine	26.26	6	720	1.997	6, 29,	-----	-----	NW1 with DA-4A (4-2)	
44	Combine	7.245	6	720	0.542	7, 30,	-----	-----	NW2 with DA-4B (4-1)	
45	Combine	33.50	6	720	2.539	43, 44	-----	-----	Total for SWD4	
46	Combine	135.82	6	720	10.044	14, 41, 42,	-----	-----	Total to Pond	
47	Reservoir	6.049	6	834	3.143	46	1388.32	7.383	Proposed Pond	
48	Combine	738.31	6	720	53.211	8, 9, 10, 32, 33, 45,	-----	-----	N, NE, SE, DA-5, DA-6, & SWD4	
49	Combine	777.88	6	720	62.473	39, 47, 48	-----	-----	Route All to Proposed Channel	
50	Reach	664.33	6	732	62.471	49	-----	-----	Proposed Channel	
Northborough Proposed.gpw					Return Period: 25 Year			Thursday, Sep 6 2007		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 1

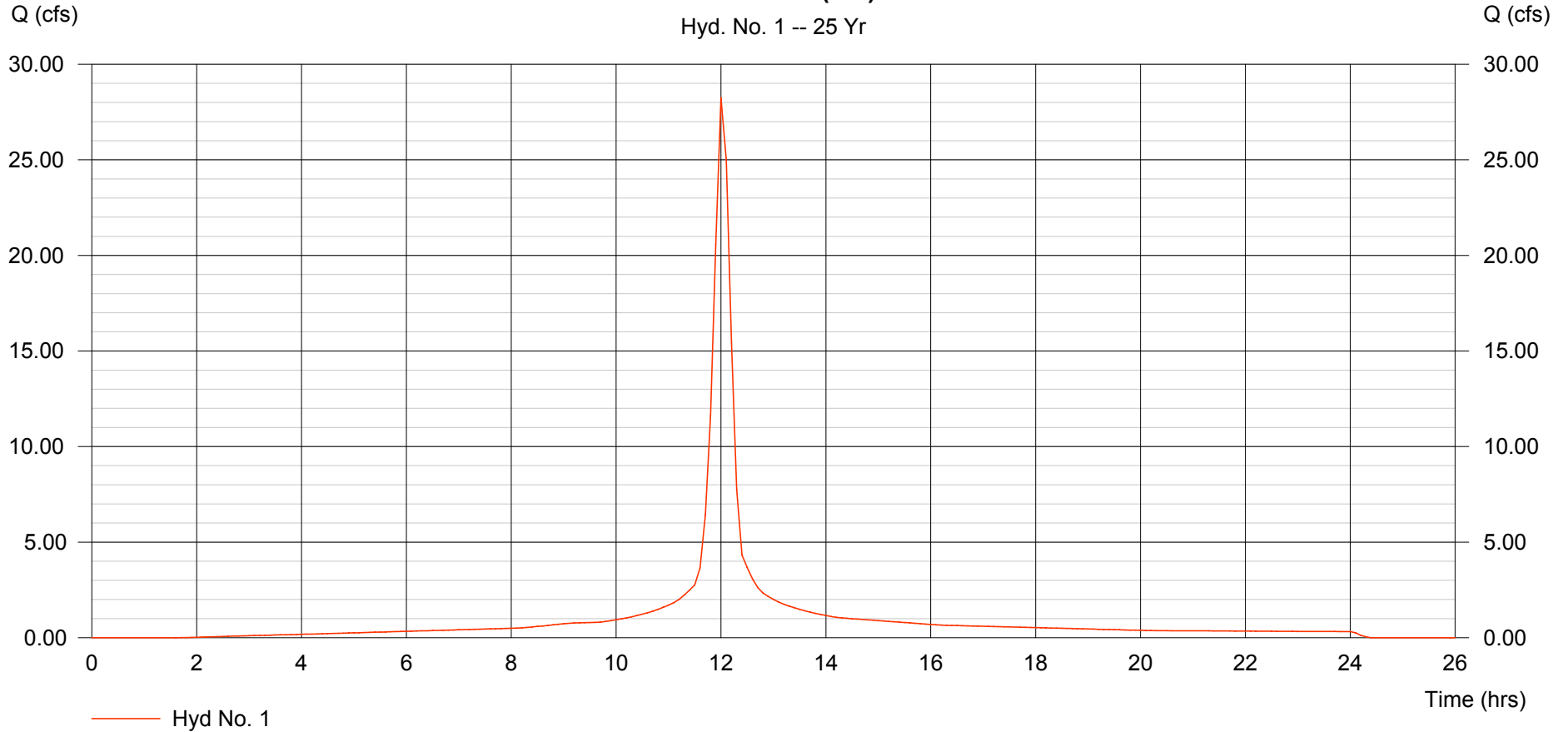
Off-Site W1 (0-3)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 4.884 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 28.25 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.156 acft

**Off-Site W1 (0-3)**  
Hyd. No. 1 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 2

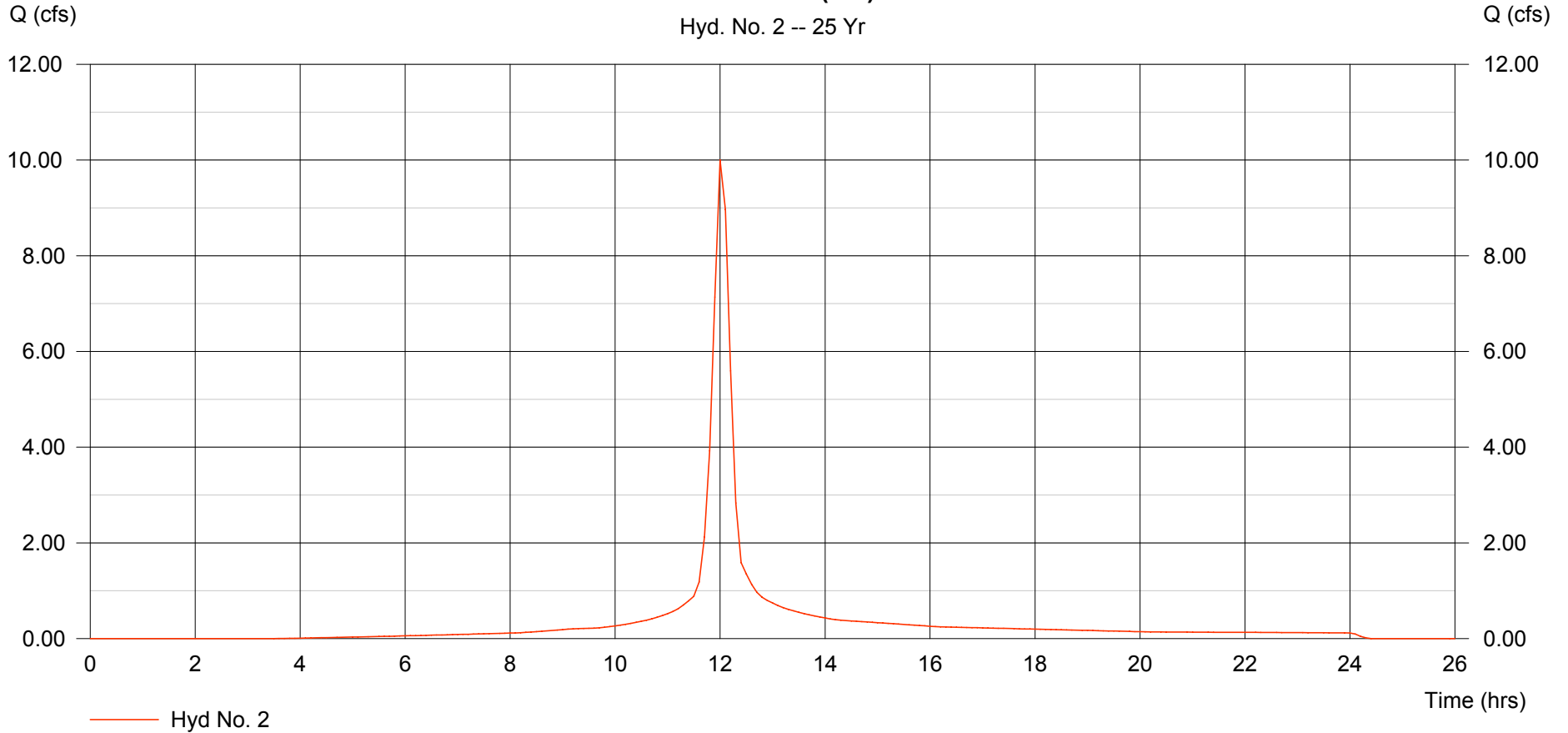
Off-Site W2 (0-2)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 1.872 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 10.00 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.727 acft

**Off-Site W2 (0-2)**  
Hyd. No. 2 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

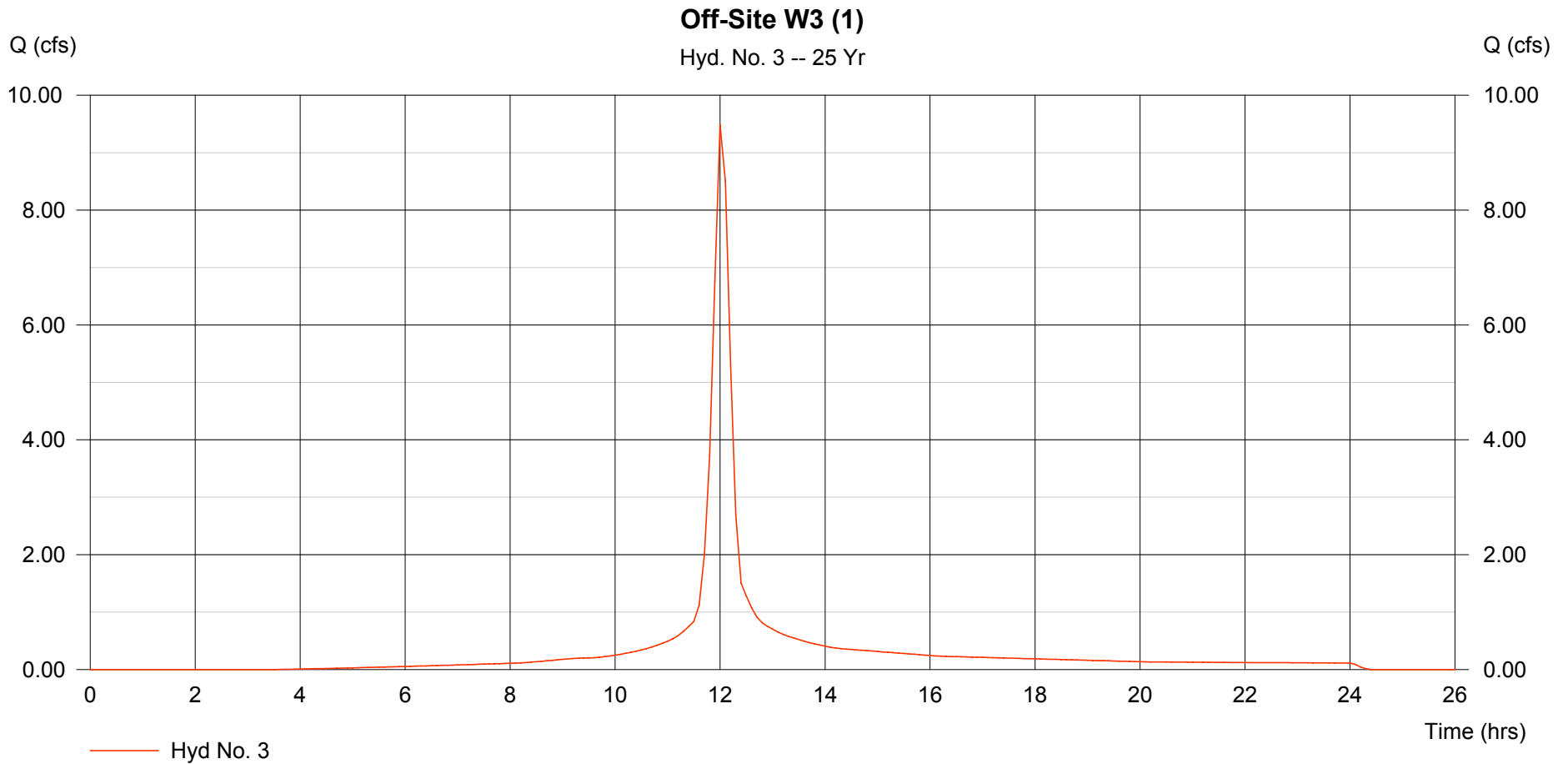
## Hyd. No. 3

Off-Site W3 (1)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 1.775 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 9.484 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.689 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 4

Off-Site W4 (W DT)

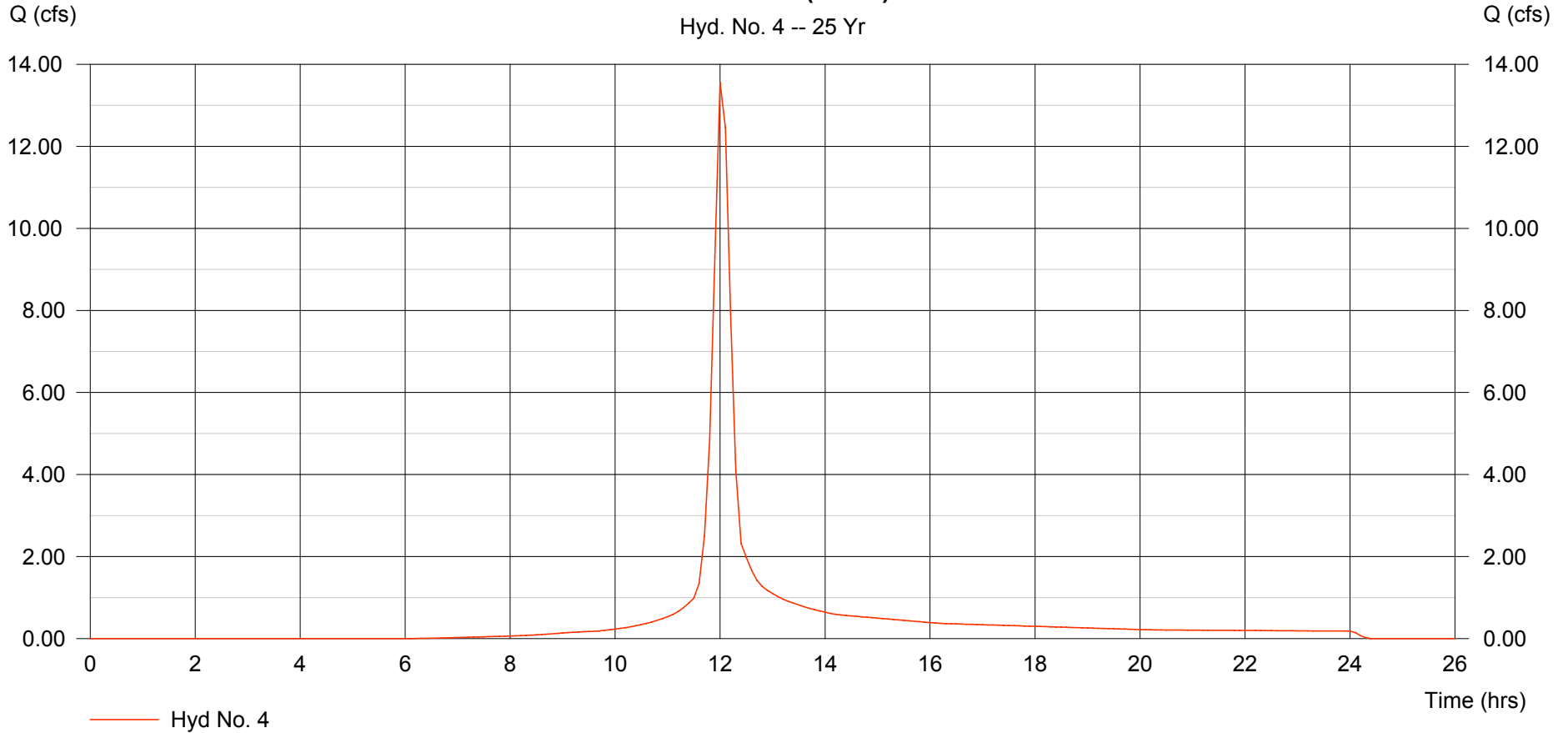
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 3.064 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 13.56 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.957 acft

### Off-Site W4 (W DT)

Hyd. No. 4 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

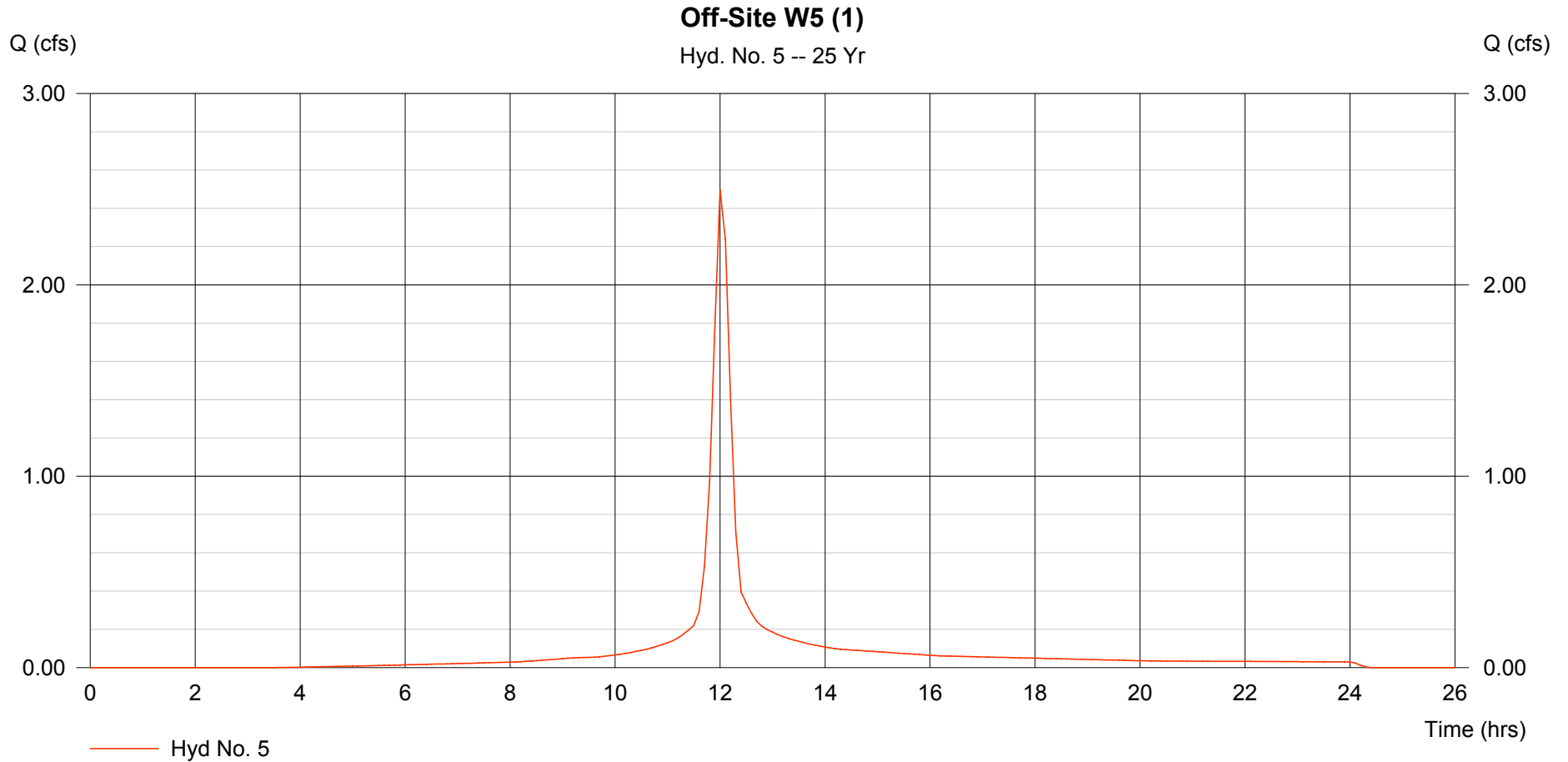
## Hyd. No. 5

Off-Site W5 (1)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.467 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 2.495 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.181 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 6

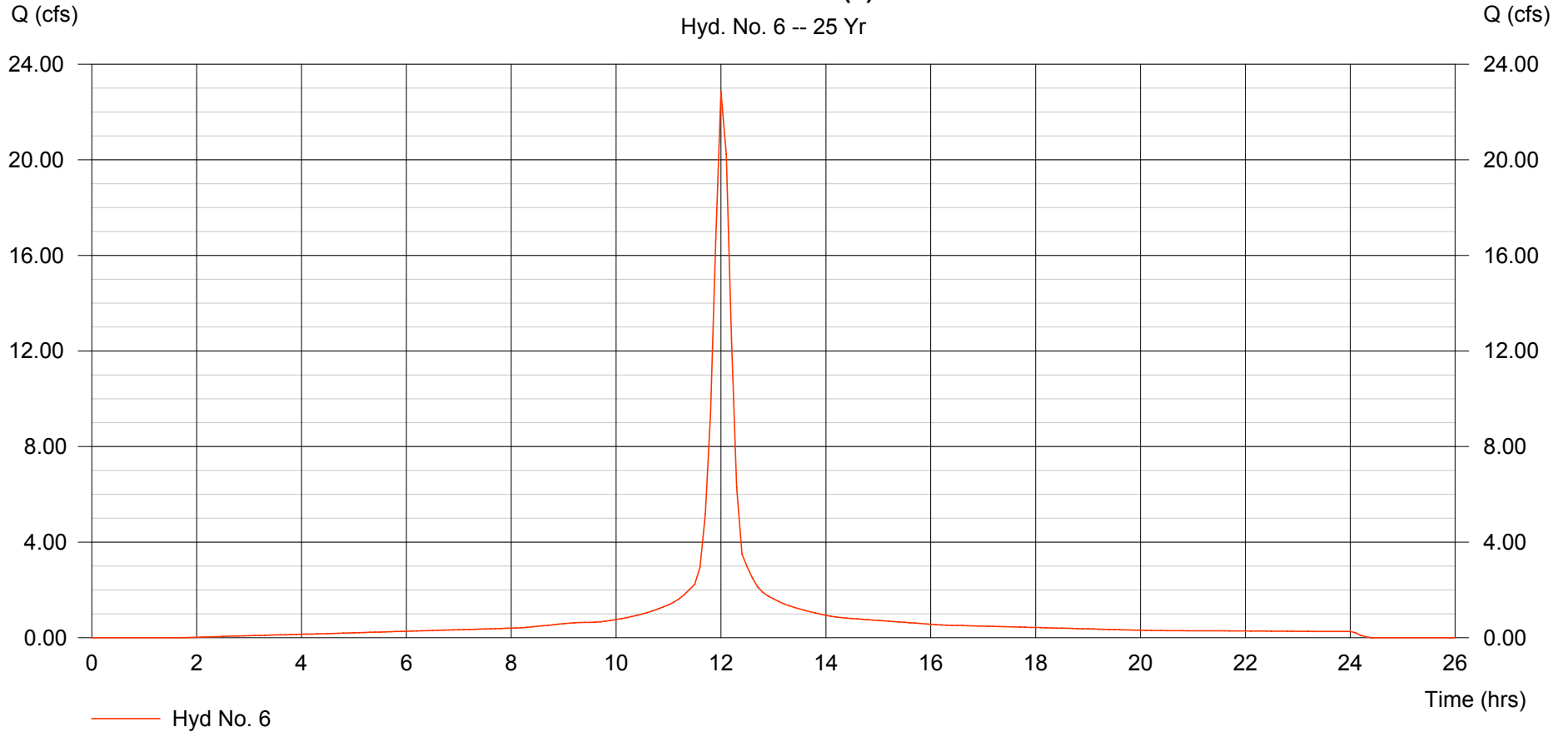
Off-Site NW1 (4)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 3.952 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 22.86 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.744 acft

**Off-Site NW1 (4)**  
Hyd. No. 6 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 7

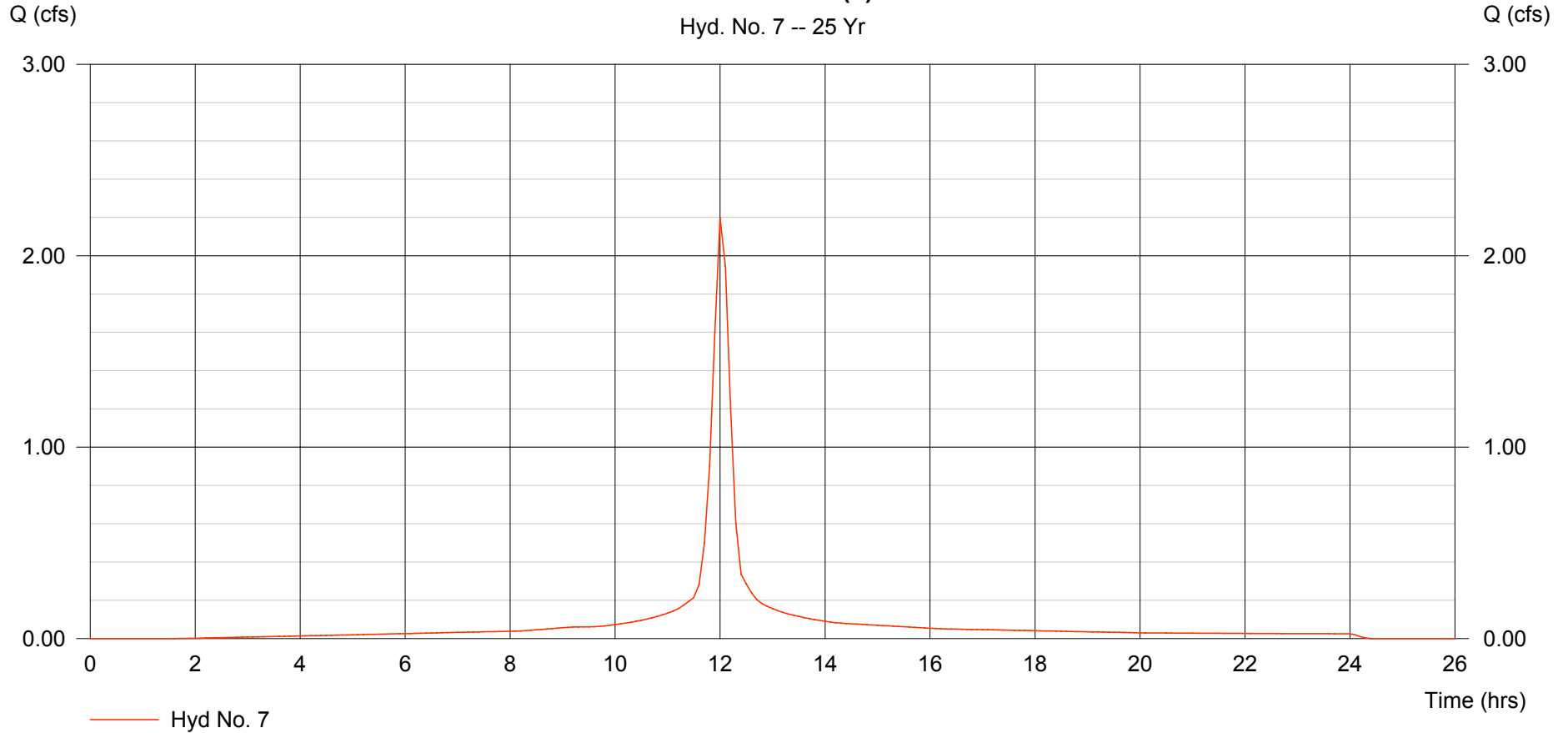
Off-Site NW2 (4)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.380 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 2.198 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.168 acft

**Off-Site NW2 (4)**  
Hyd. No. 7 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 8

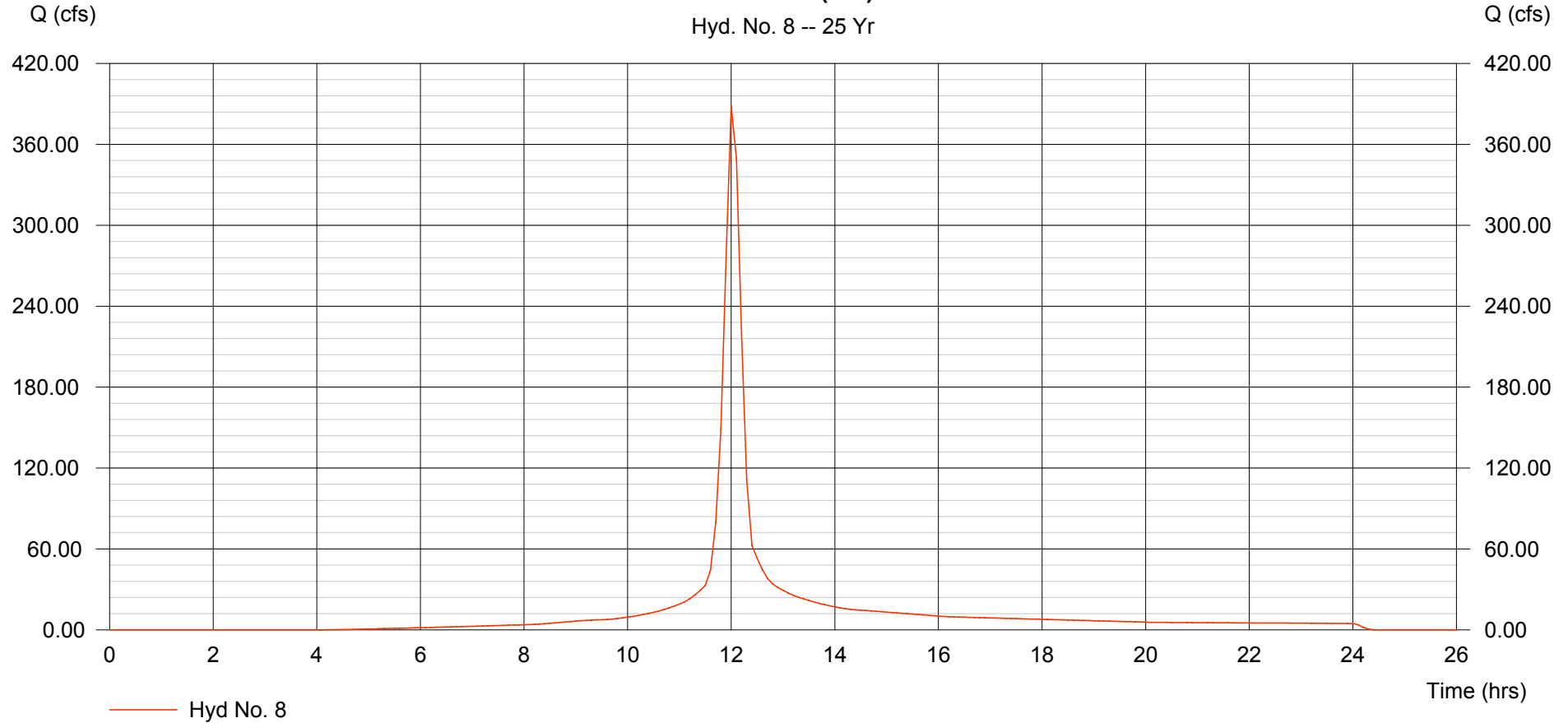
Off-Site N (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 388.05 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 27.903 acft

**Off-Site N (CH)**  
Hyd. No. 8 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 9

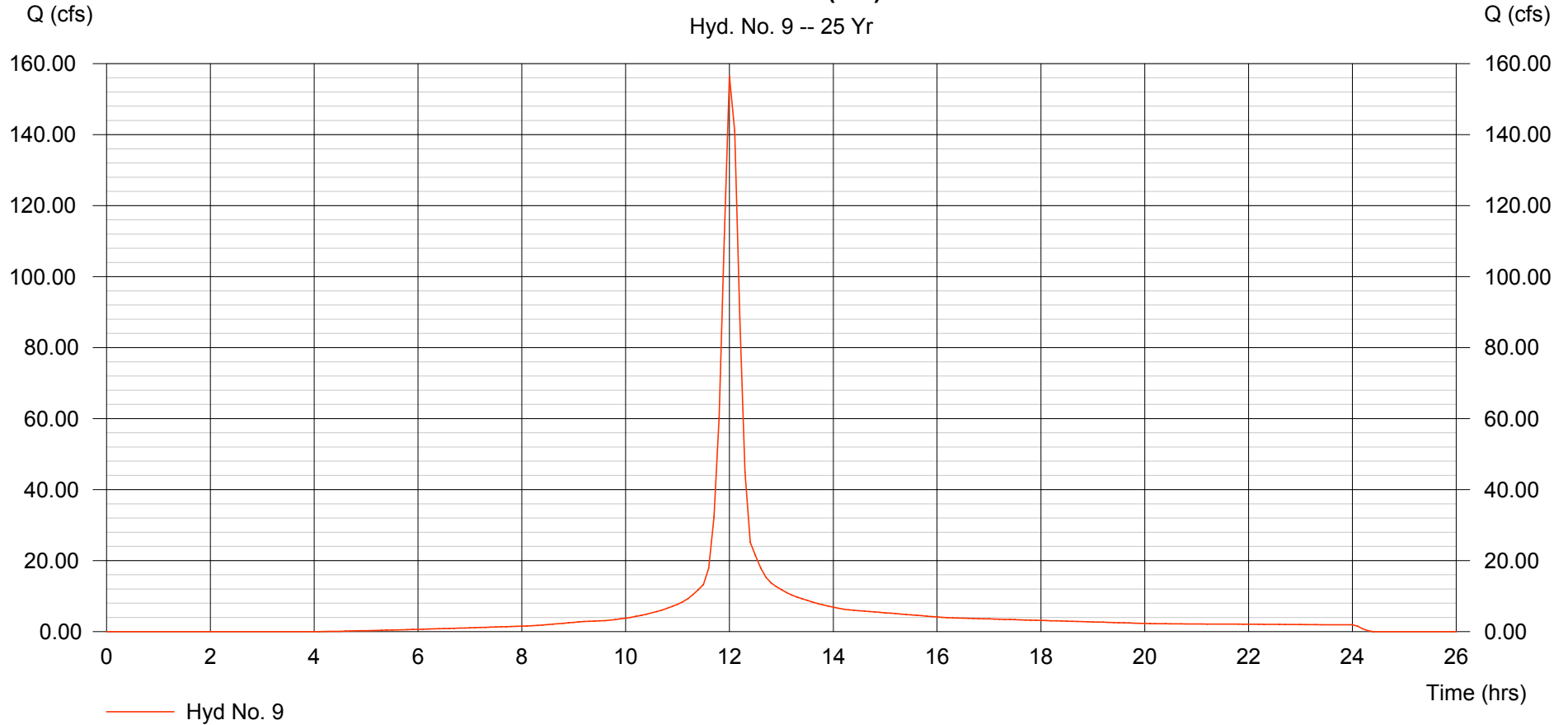
Off-Site NE (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 156.51 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 11.254 acft

**Off-Site NE (CH)**  
Hyd. No. 9 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 10

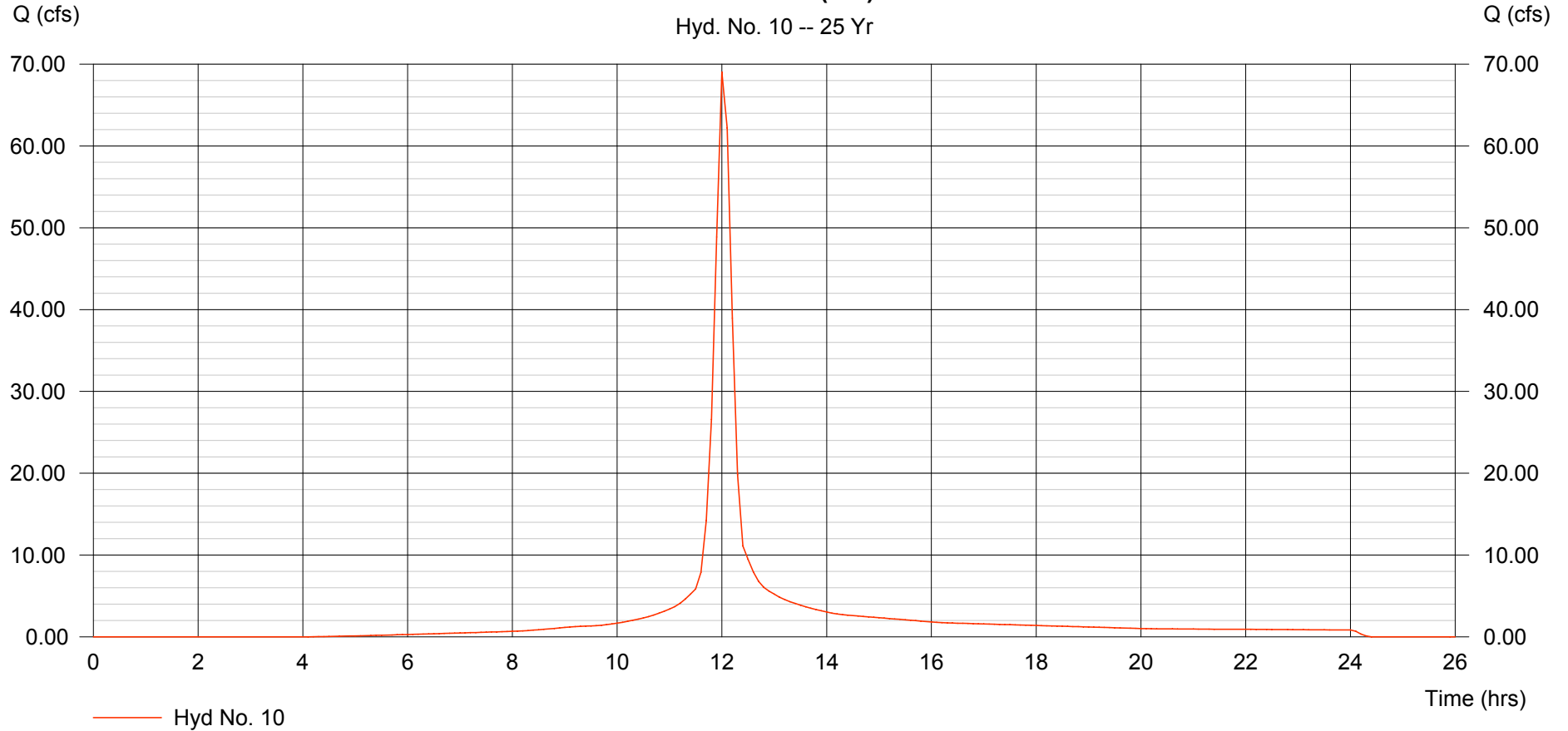
Off-Site SE (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 69.04 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4.965 acft

**Off-Site SE (CH)**  
Hyd. No. 10 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

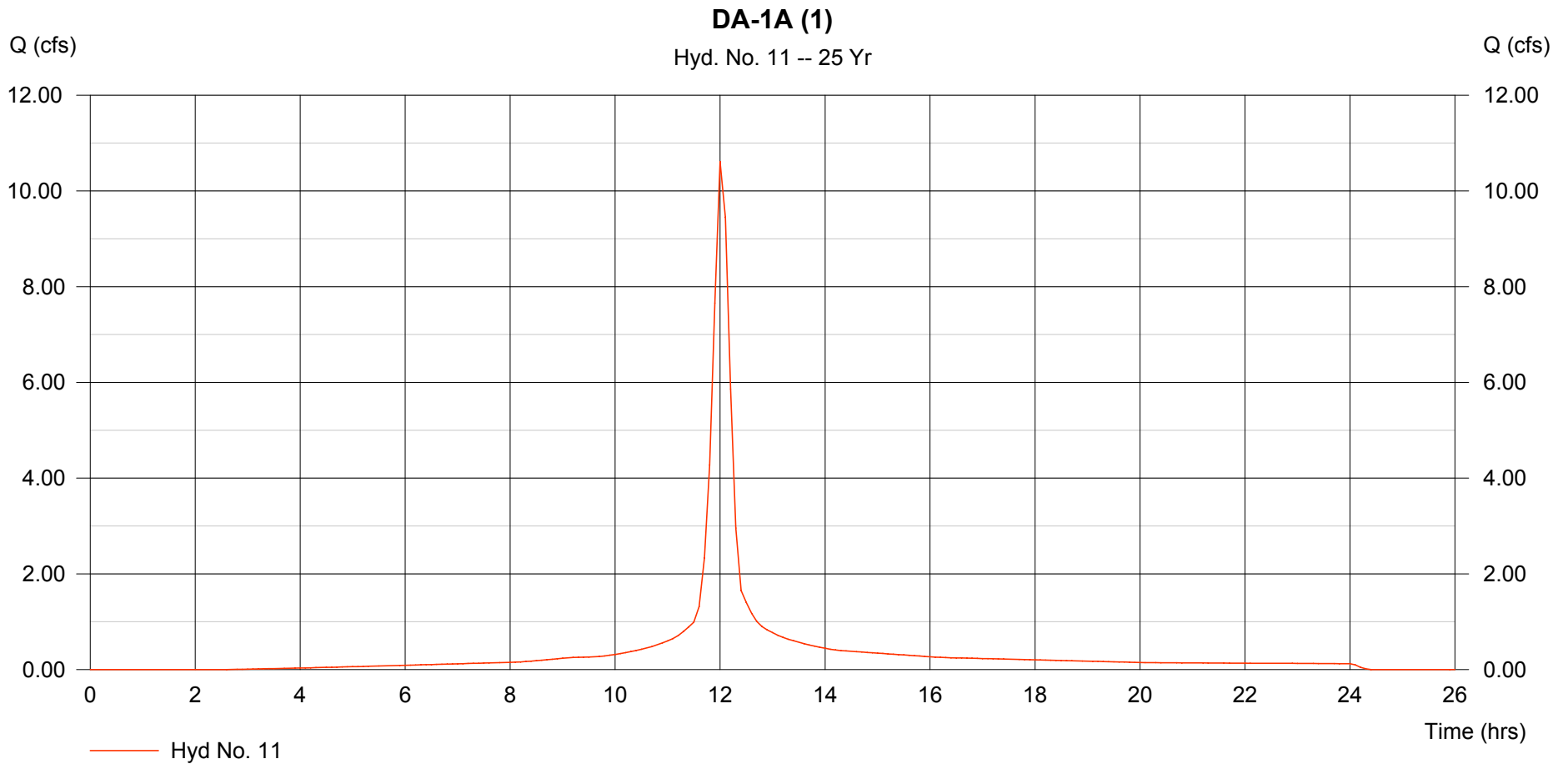
## Hyd. No. 11

DA-1A (1)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 1.899 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 10.61 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.787 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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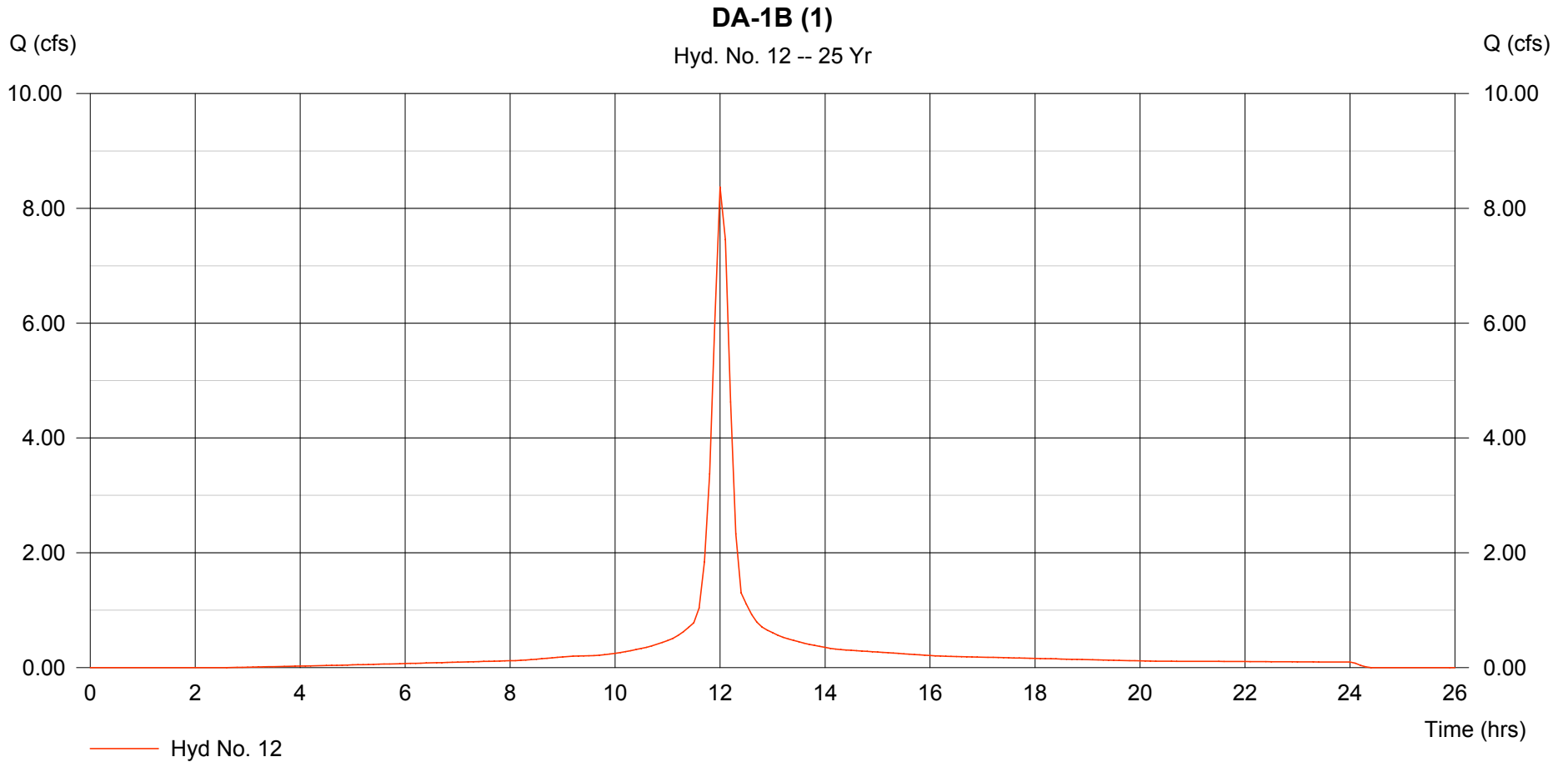
## Hyd. No. 12

DA-1B (1)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 1.498 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 8.373 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.621 acft



# Hydrograph Plot

171

Hydraflow Hydrographs by Intelisolve

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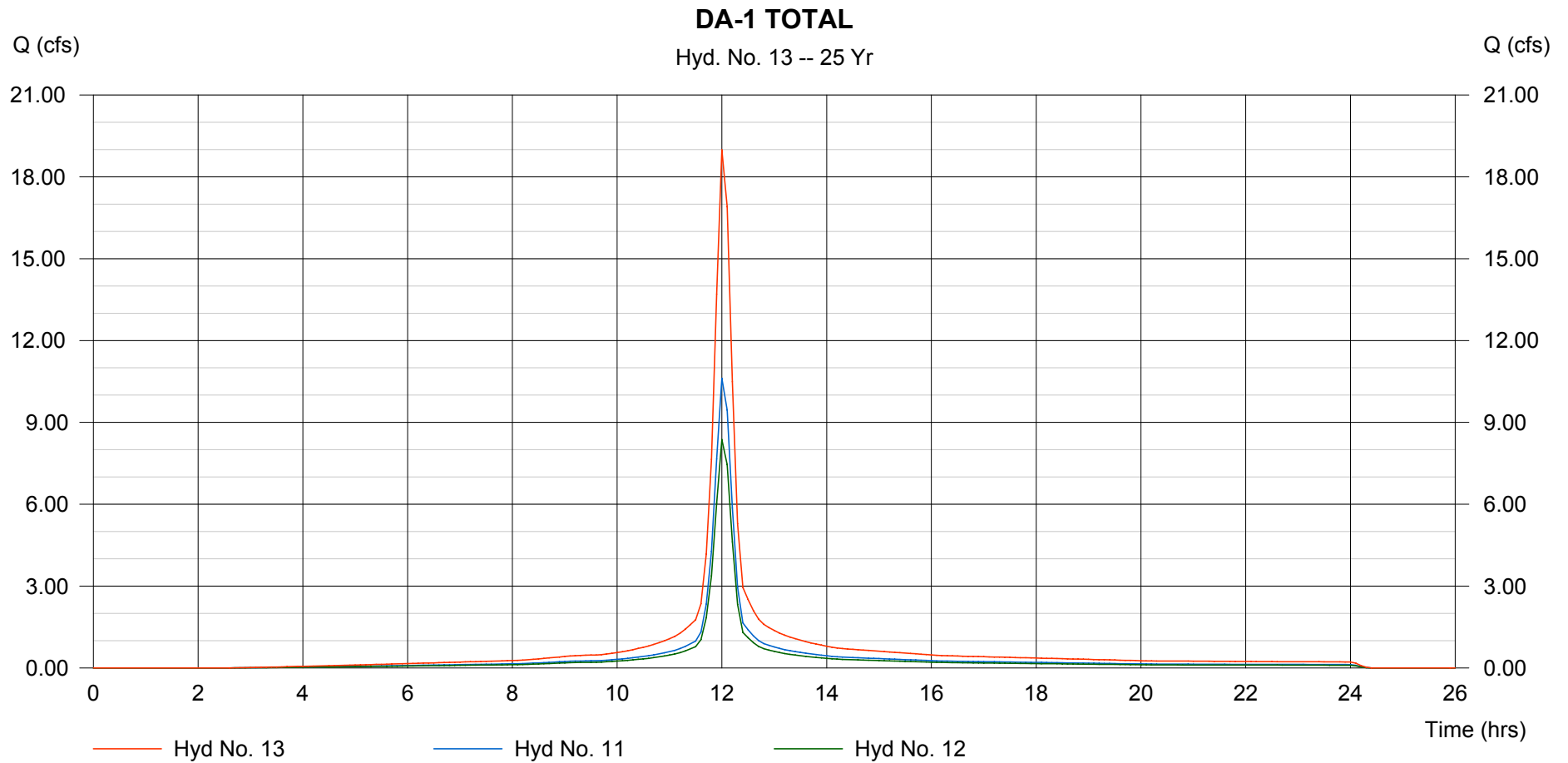
## Hyd. No. 13

DA-1 TOTAL

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 11, 12

Peak discharge = 18.99 cfs  
Time interval = 6 min

Hydrograph Volume = 1.408 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 14

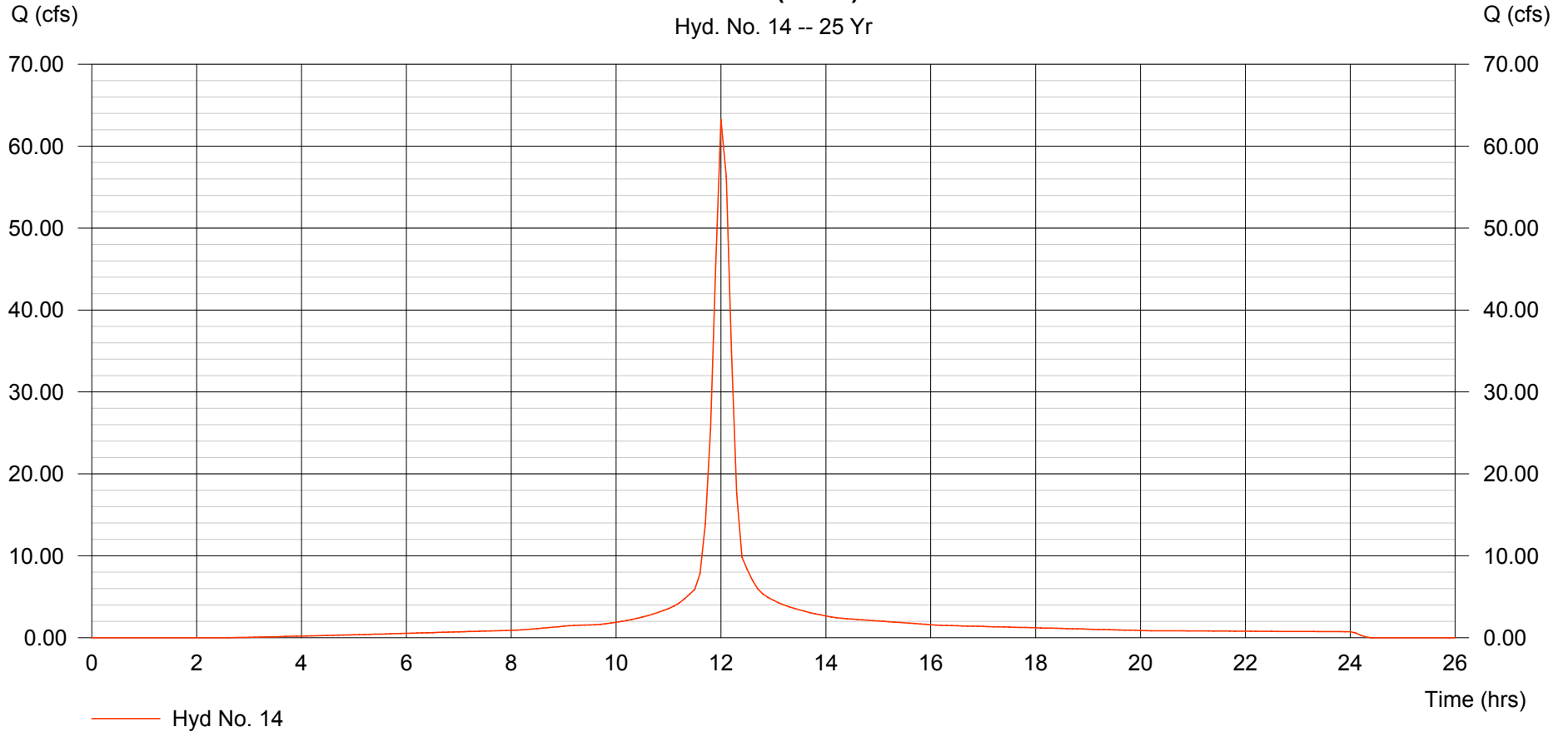
DA-2A (Pond)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 11.313 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 63.23 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 4.689 acft

**DA-2A (Pond)**  
Hyd. No. 14 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 15

DA-2B (2-1)

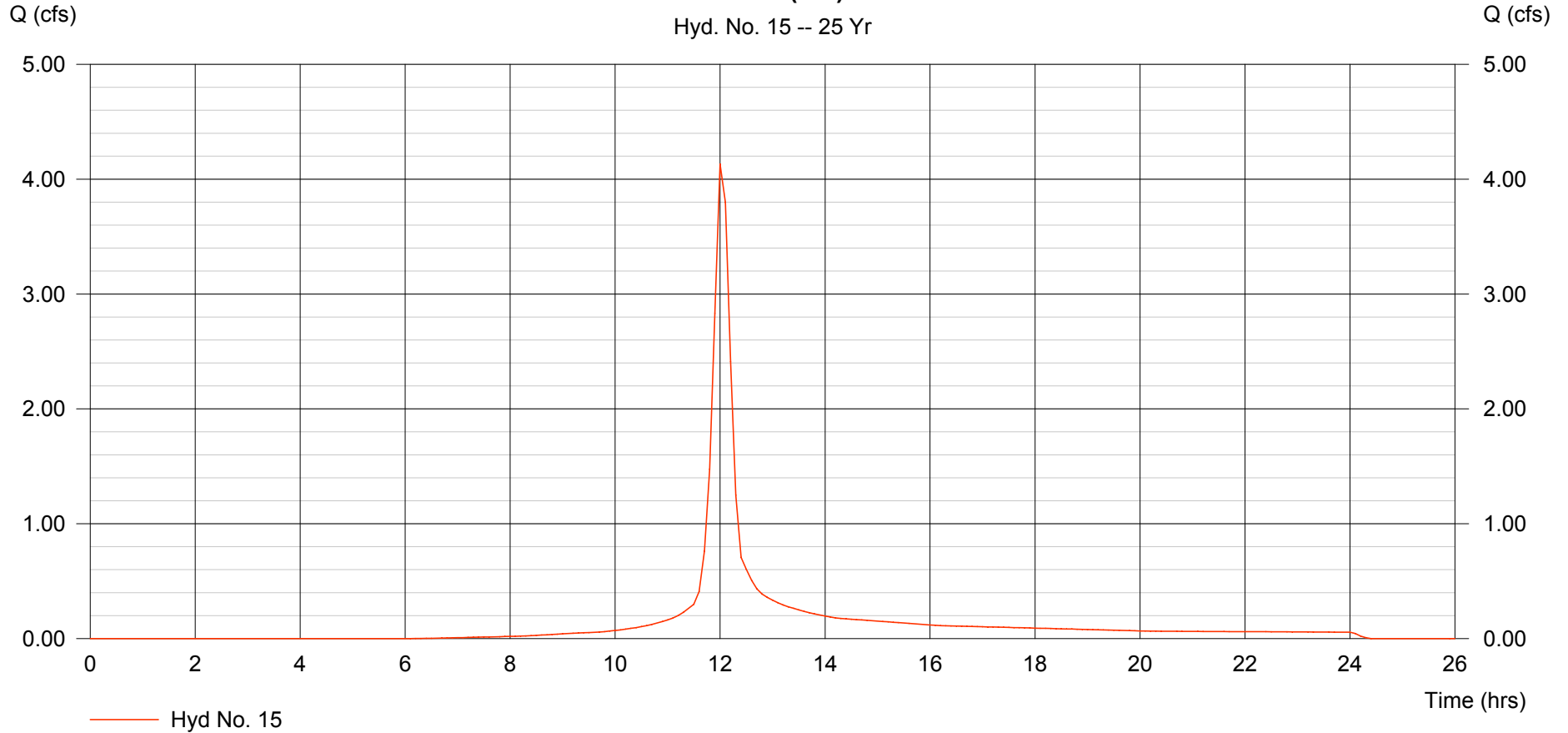
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.934 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 4.133 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.292 acft

### DA-2B (2-1)

Hyd. No. 15 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 16

DA-2C (2-2)

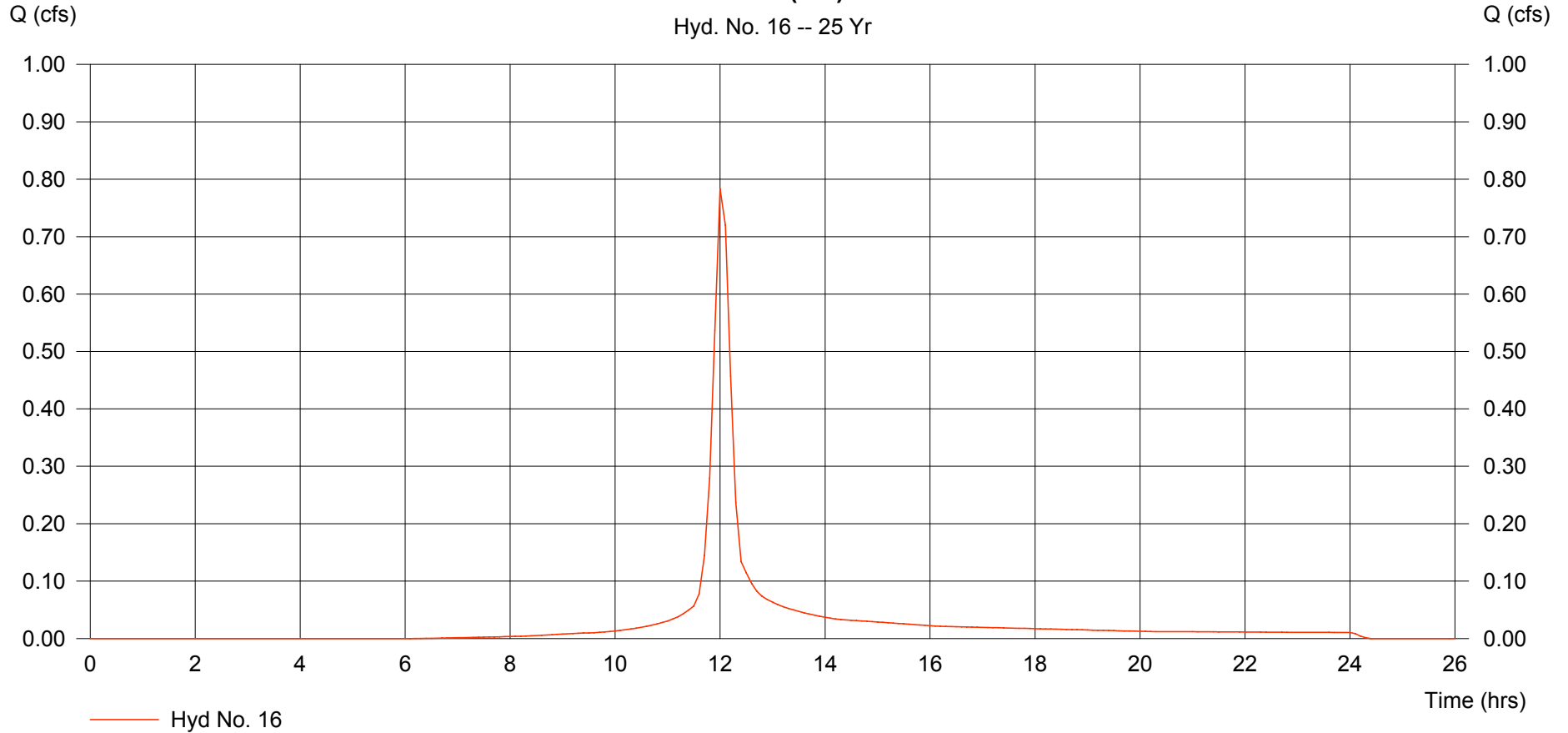
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.177 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 0.783 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.055 acft

### DA-2C (2-2)

Hyd. No. 16 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

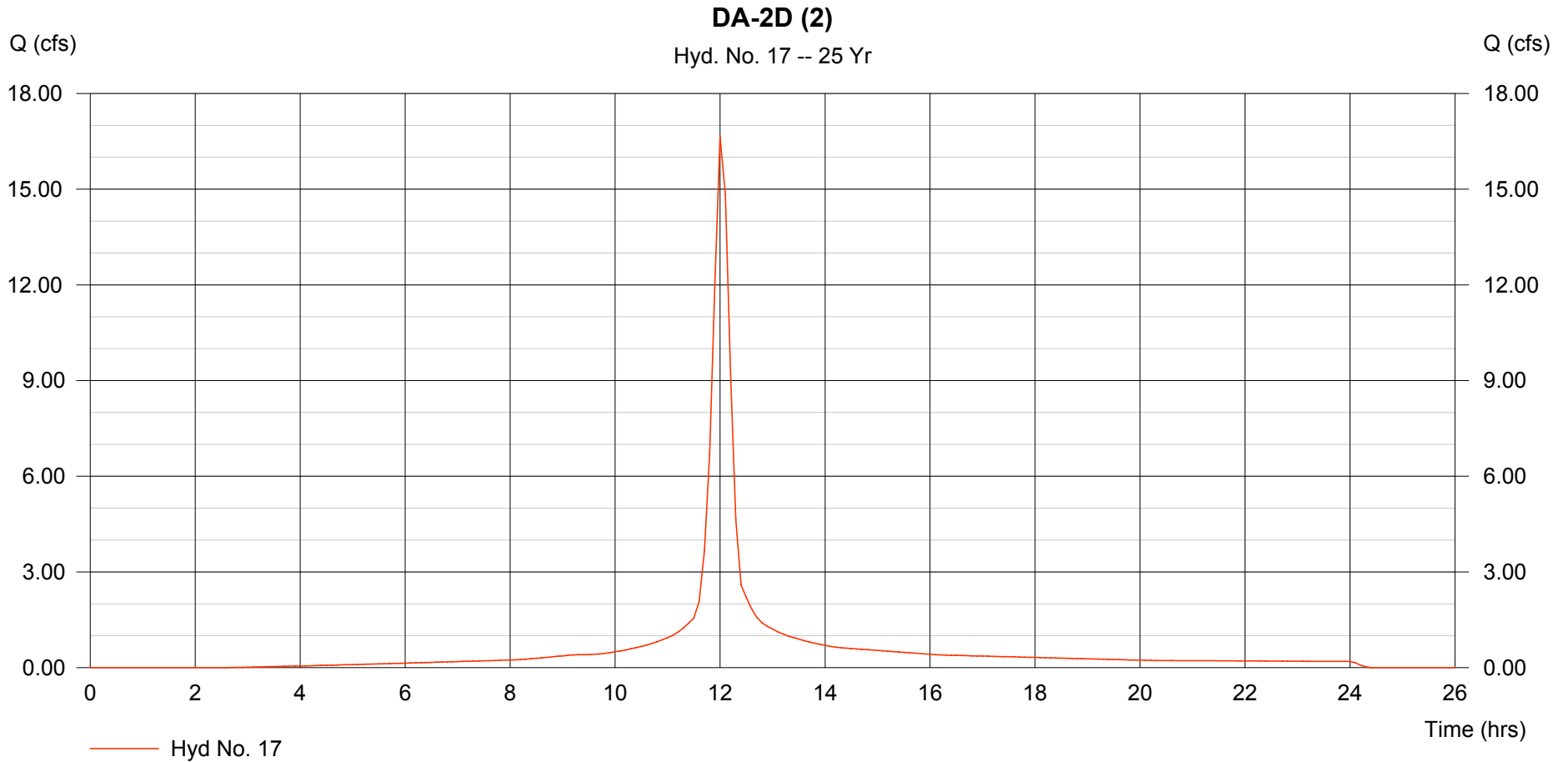
## Hyd. No. 17

DA-2D (2)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 2.978 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 16.65 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.234 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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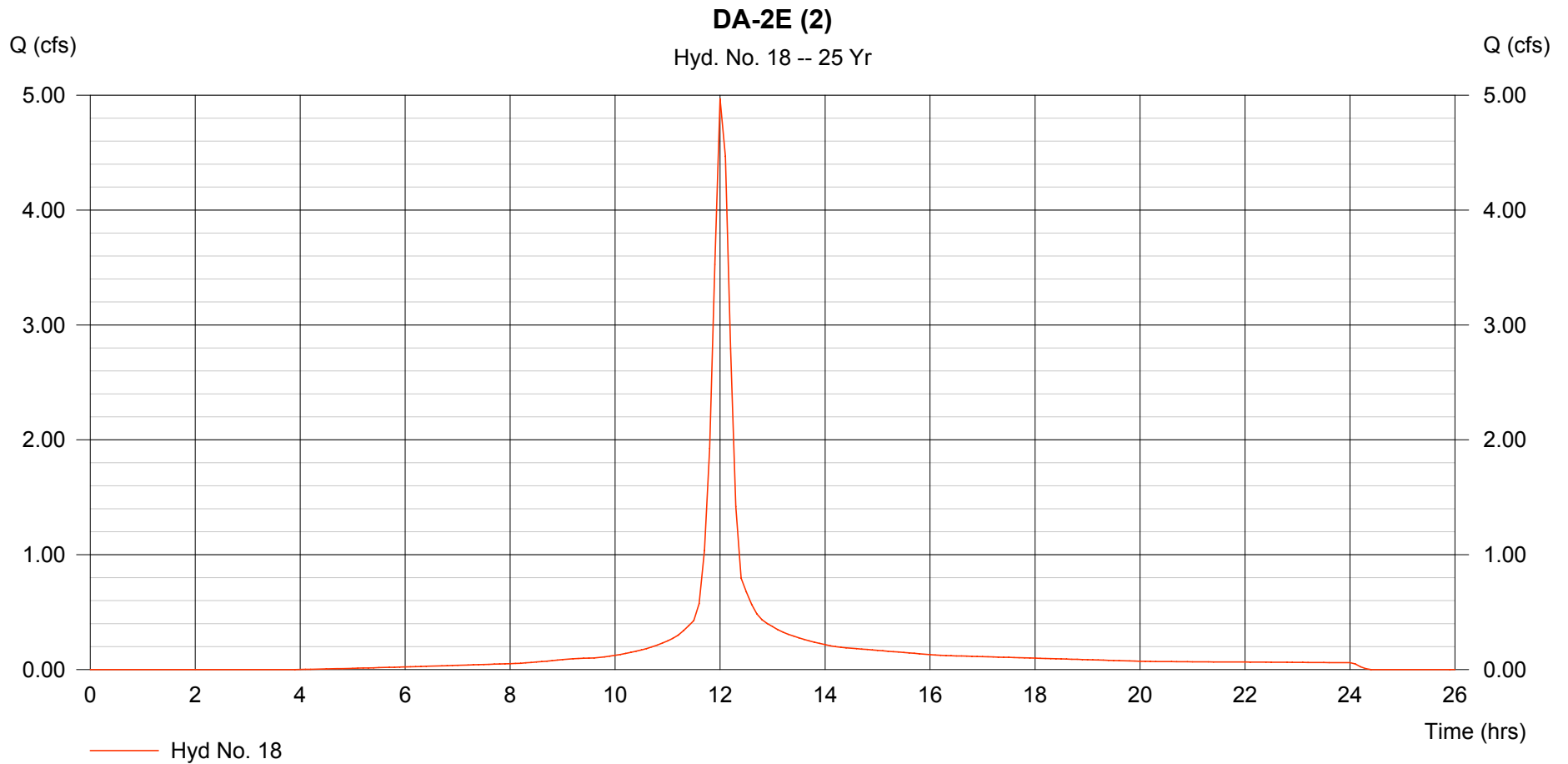
## Hyd. No. 18

DA-2E (2)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.951 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 4.968 cfs  
Time interval = 6 min  
Curve number = 87.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.358 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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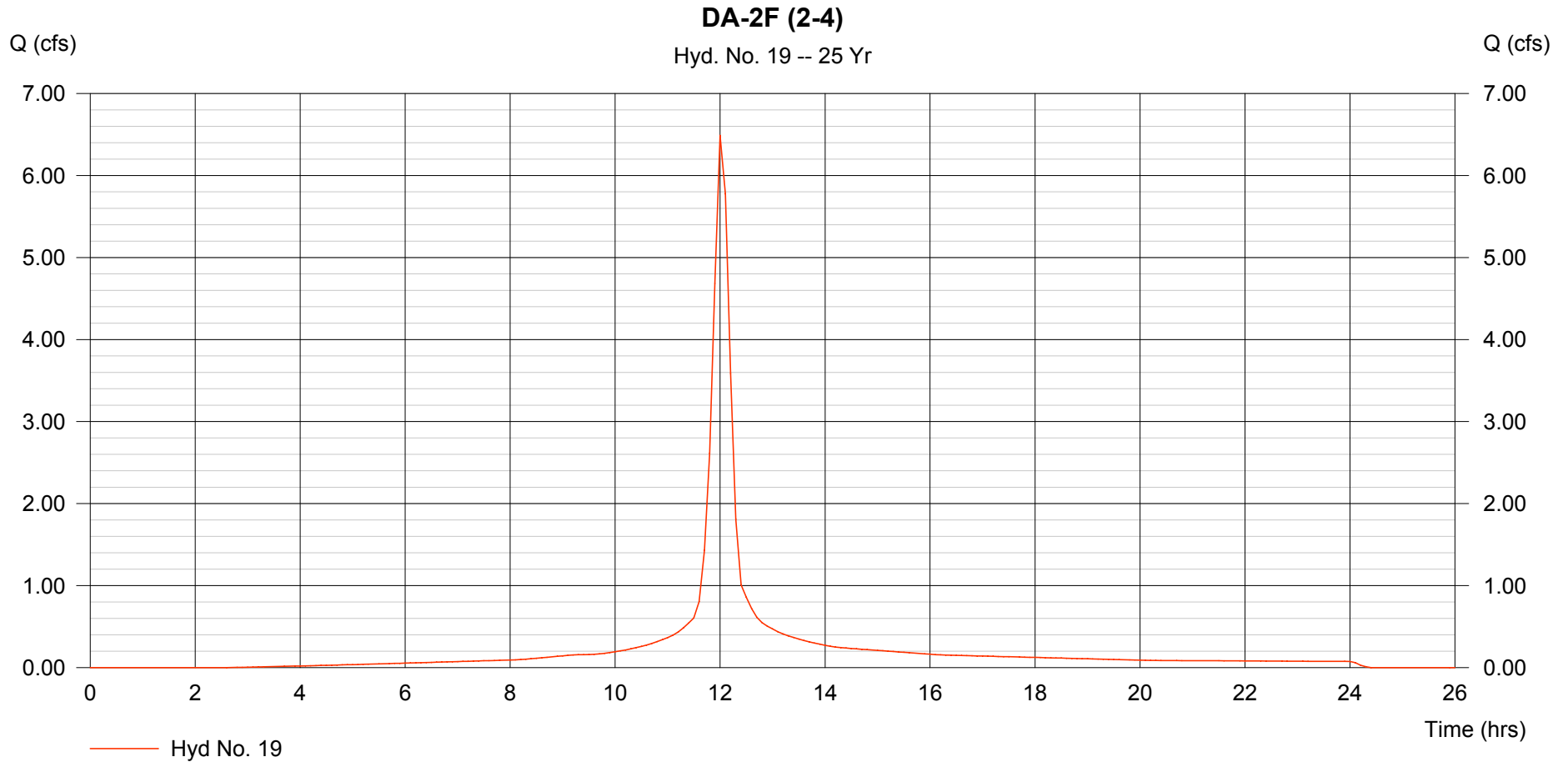
## Hyd. No. 19

DA-2F (2-4)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 1.161 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 6.489 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.481 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

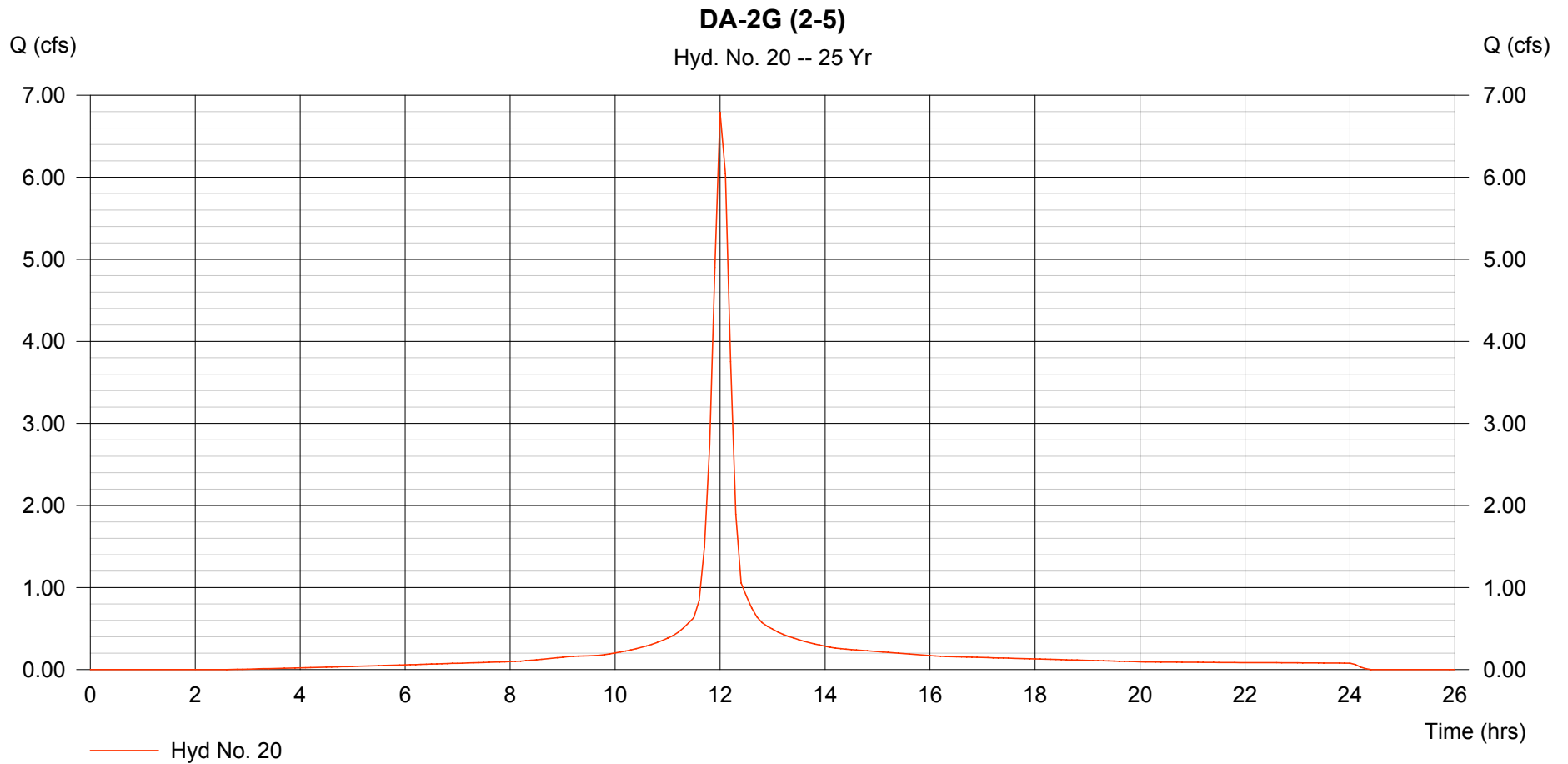
## Hyd. No. 20

DA-2G (2-5)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 1.215 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 6.791 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.504 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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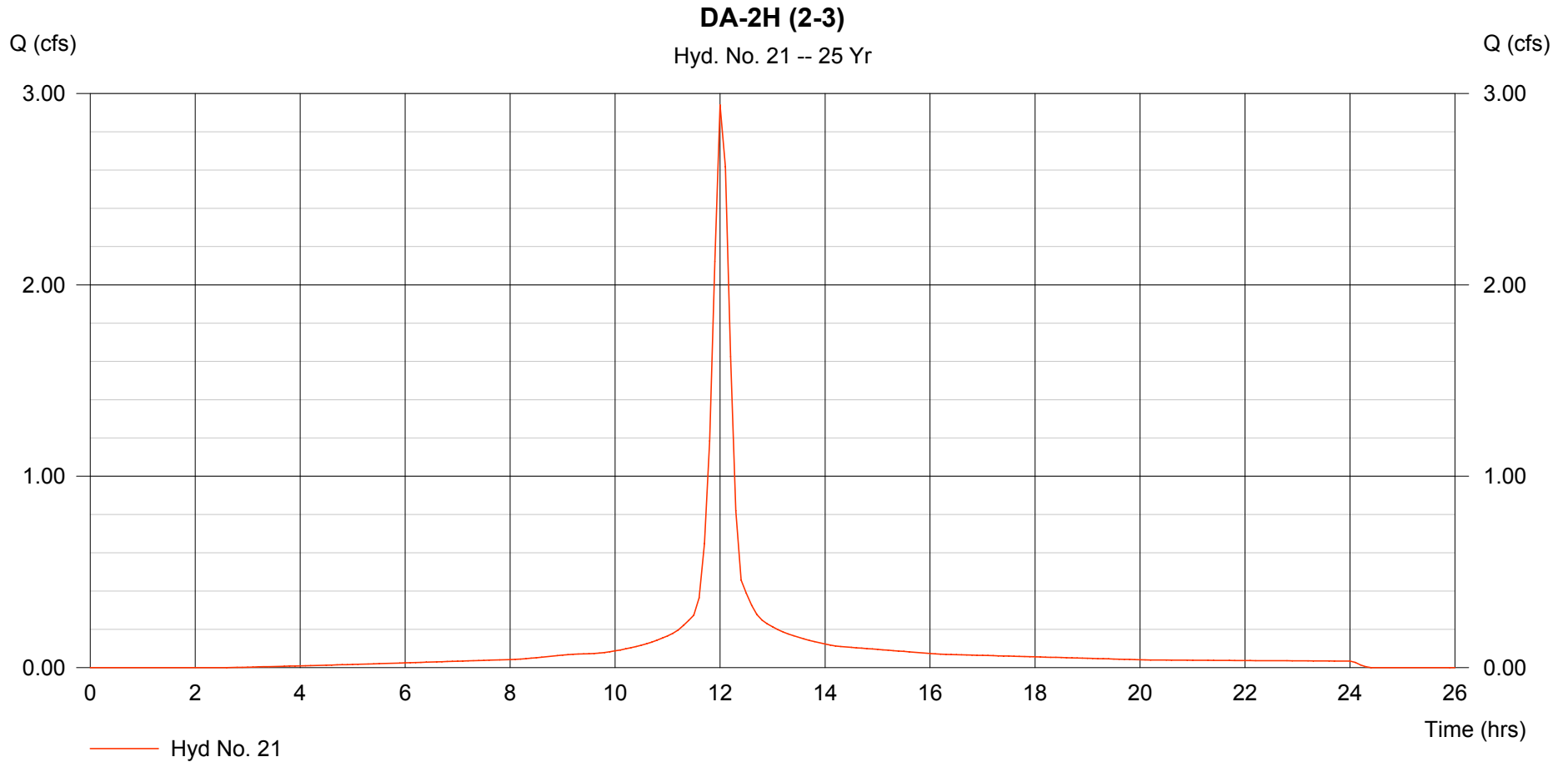
## Hyd. No. 21

DA-2H (2-3)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.526 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 2.940 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.218 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

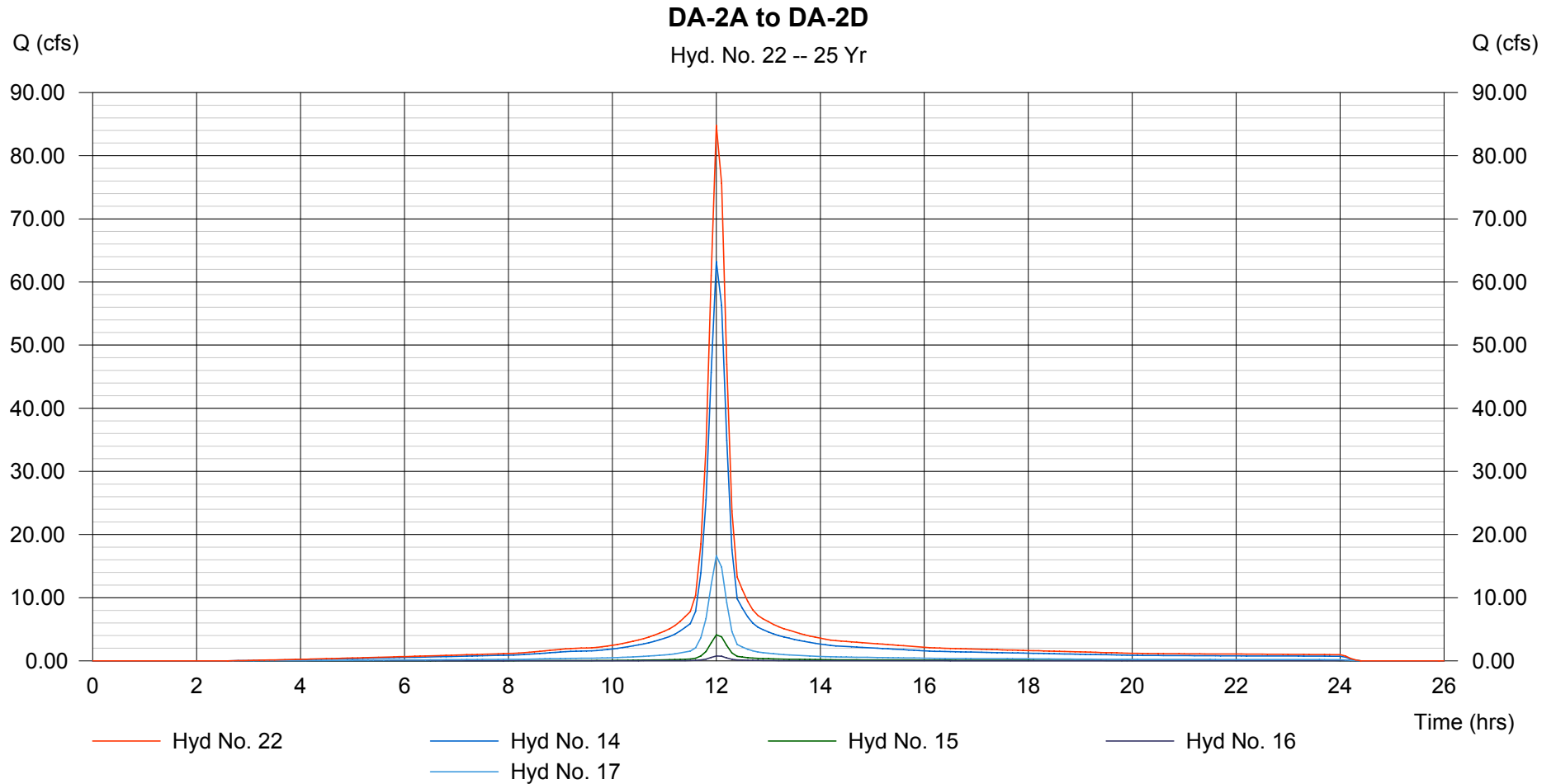
## Hyd. No. 22

DA-2A to DA-2D

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 14, 15, 16, 17

Peak discharge = 84.79 cfs  
Time interval = 6 min

Hydrograph Volume = 6.271 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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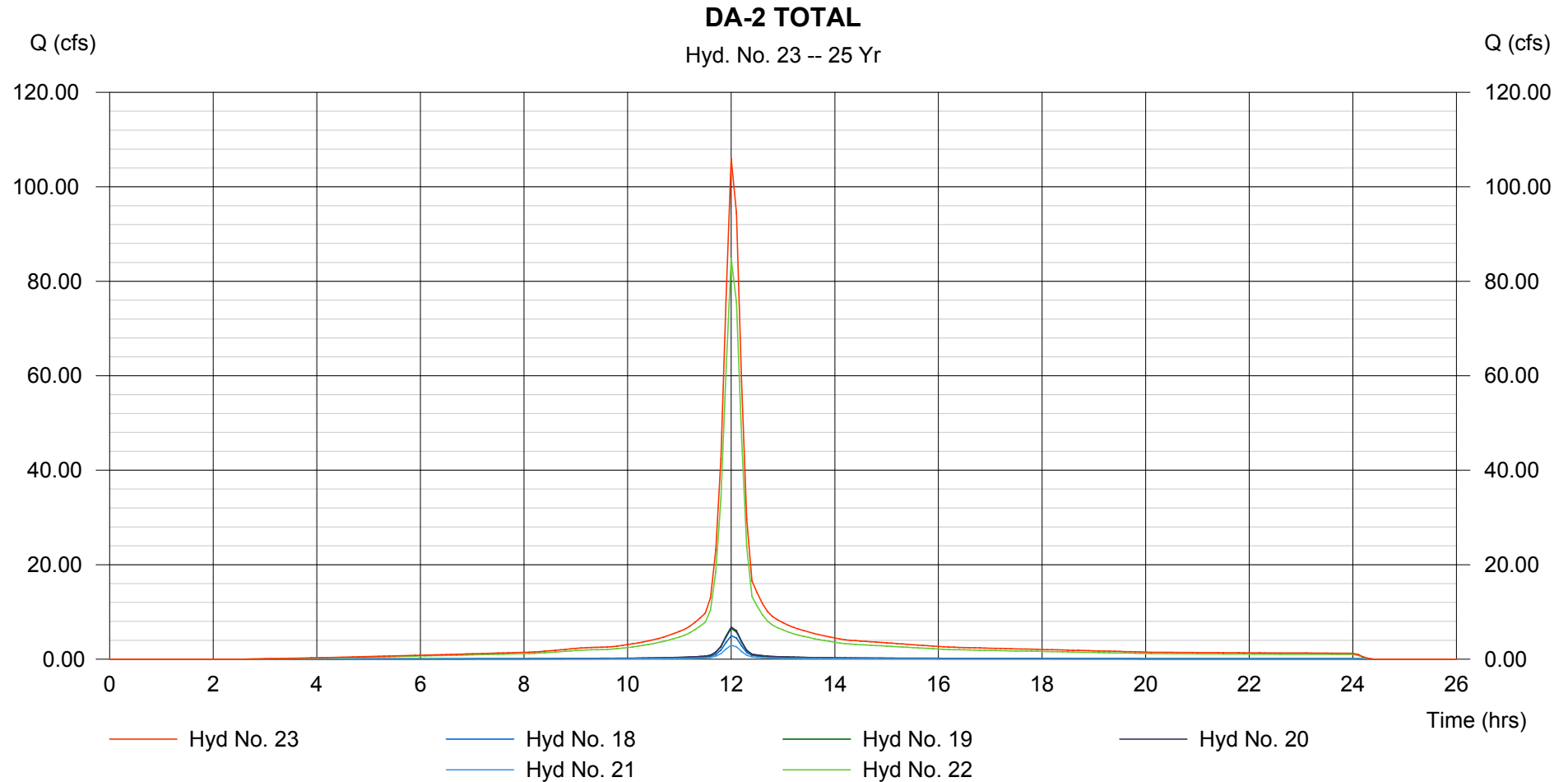
## Hyd. No. 23

DA-2 TOTAL

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 18, 19, 20, 21, 22

Peak discharge = 105.98 cfs  
Time interval = 6 min

Hydrograph Volume = 7.832 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

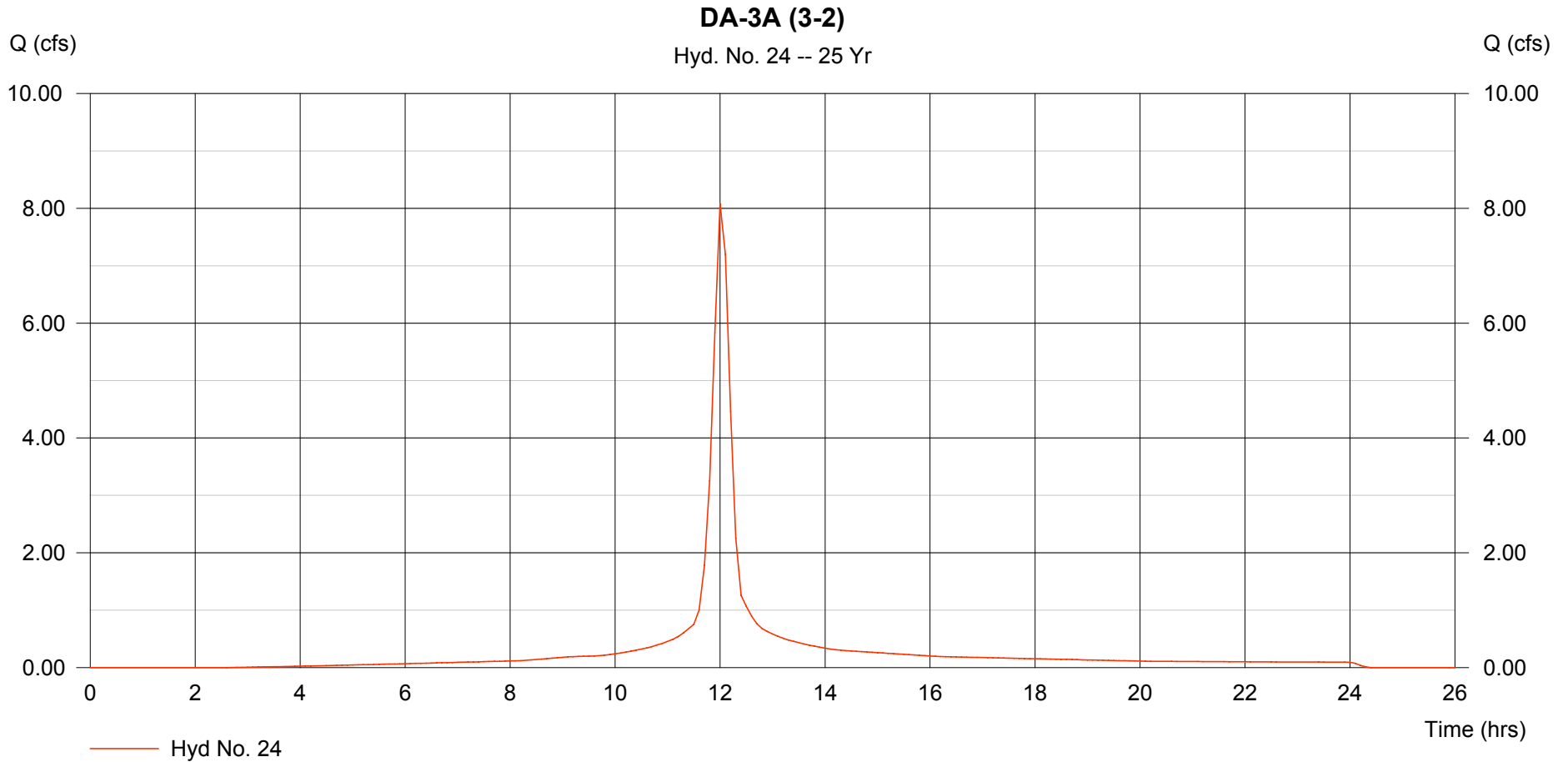
## Hyd. No. 24

DA-3A (3-2)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 1.446 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 8.082 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.599 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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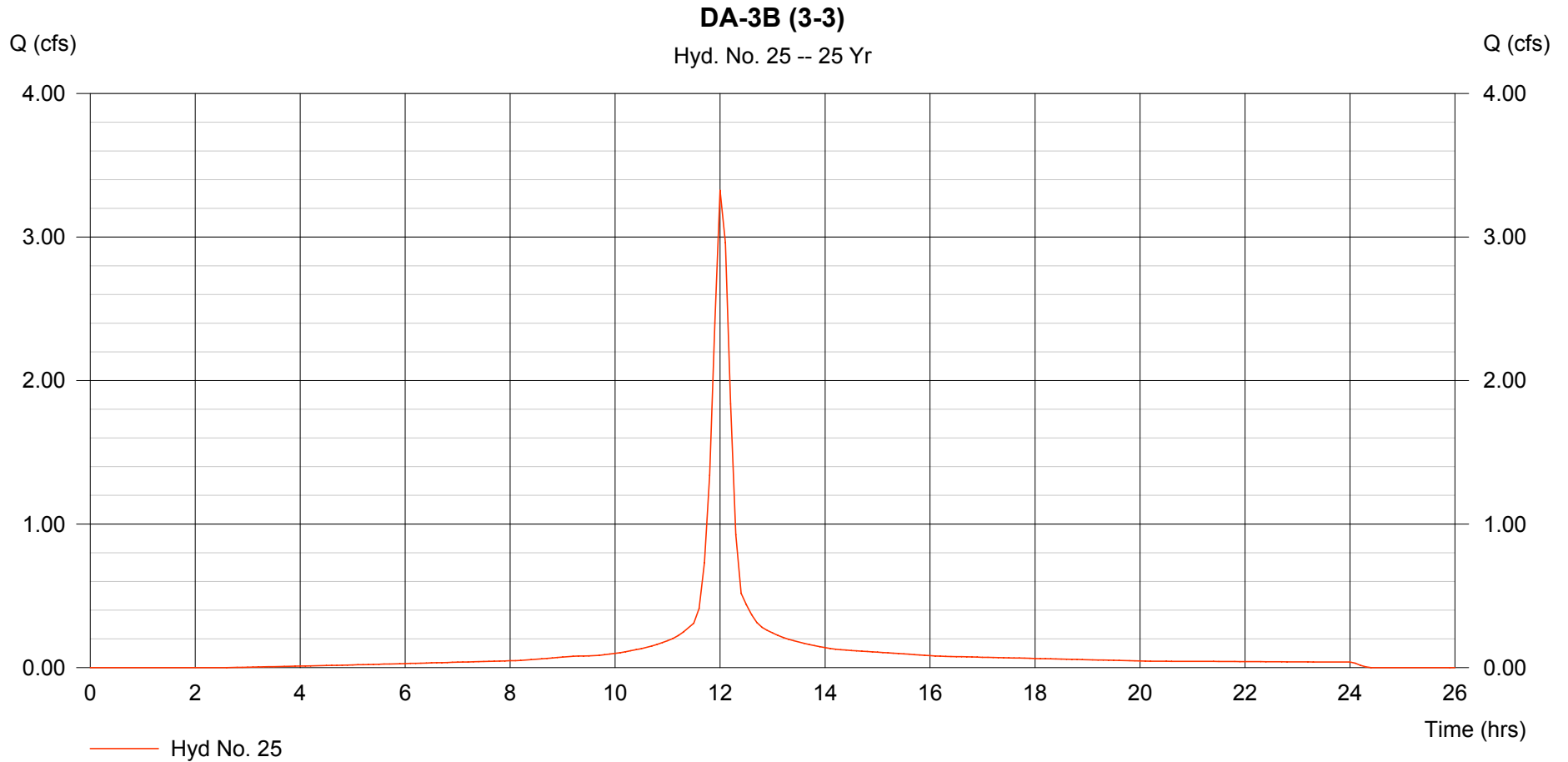
## Hyd. No. 25

DA-3B (3-3)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.595 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 3.326 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.247 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 26

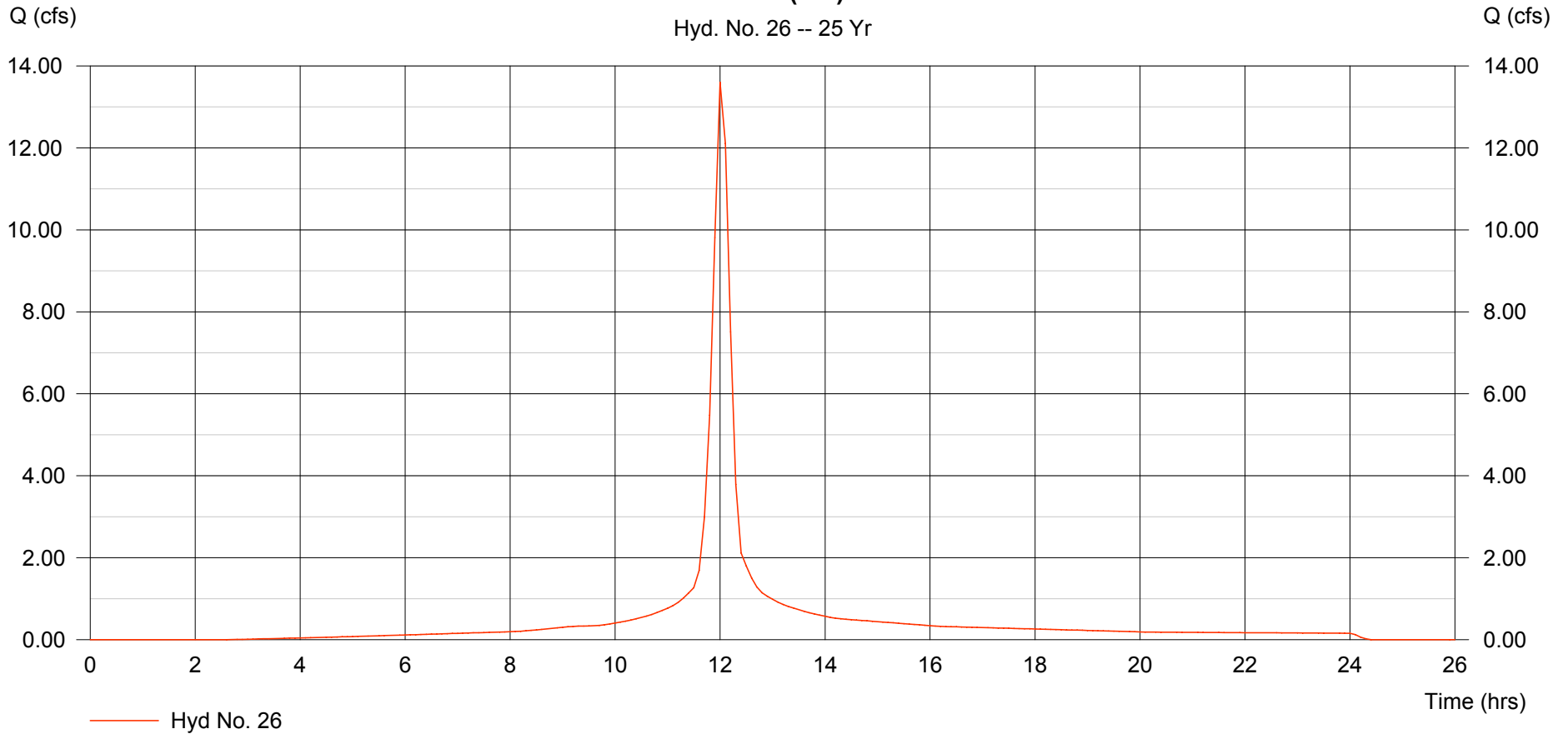
DA-3C (3-5)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 2.433 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 13.60 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.008 acft

**DA-3C (3-5)**  
Hyd. No. 26 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 27

DA-3D (3-4)

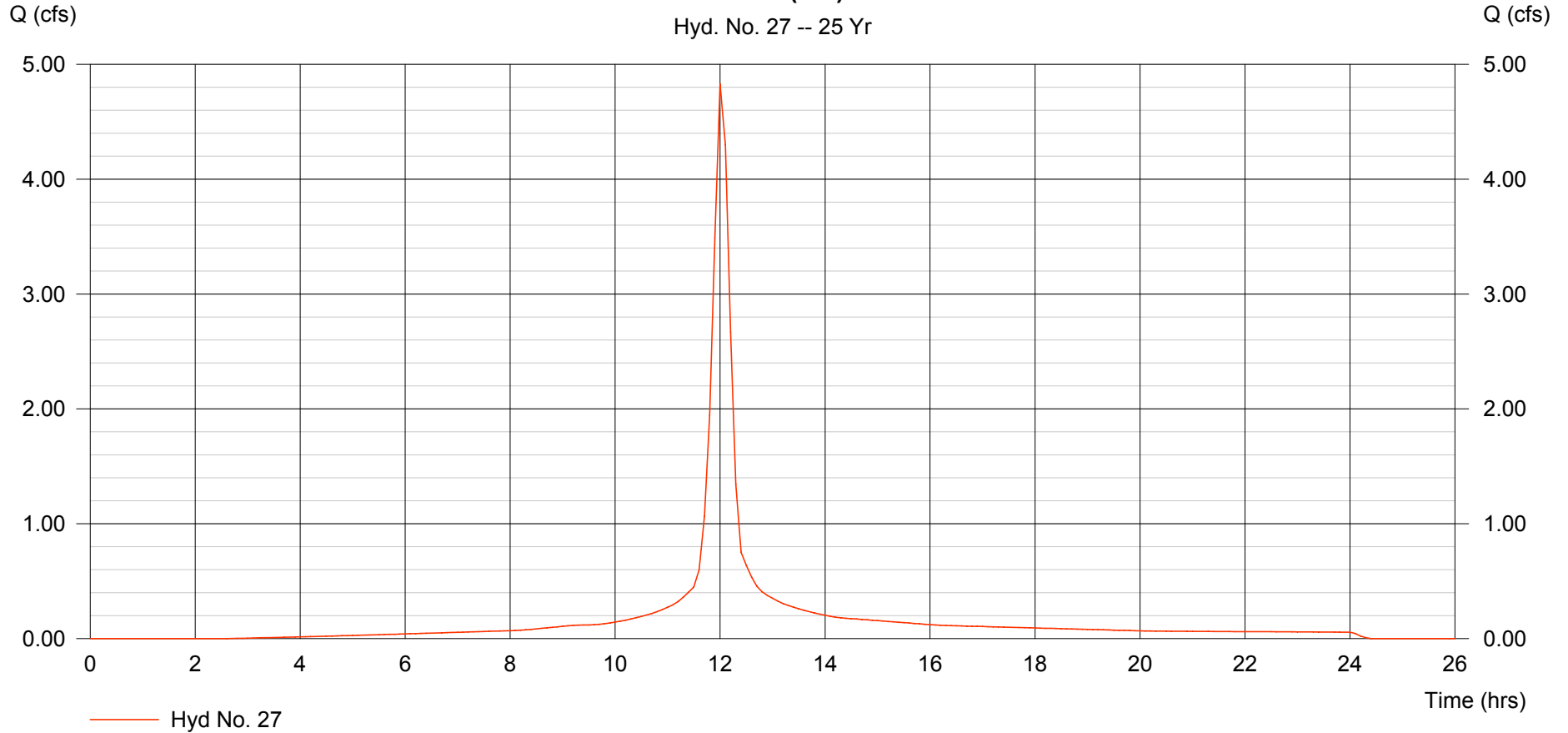
Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.864 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 4.829 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.358 acft

### DA-3D (3-4)

Hyd. No. 27 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

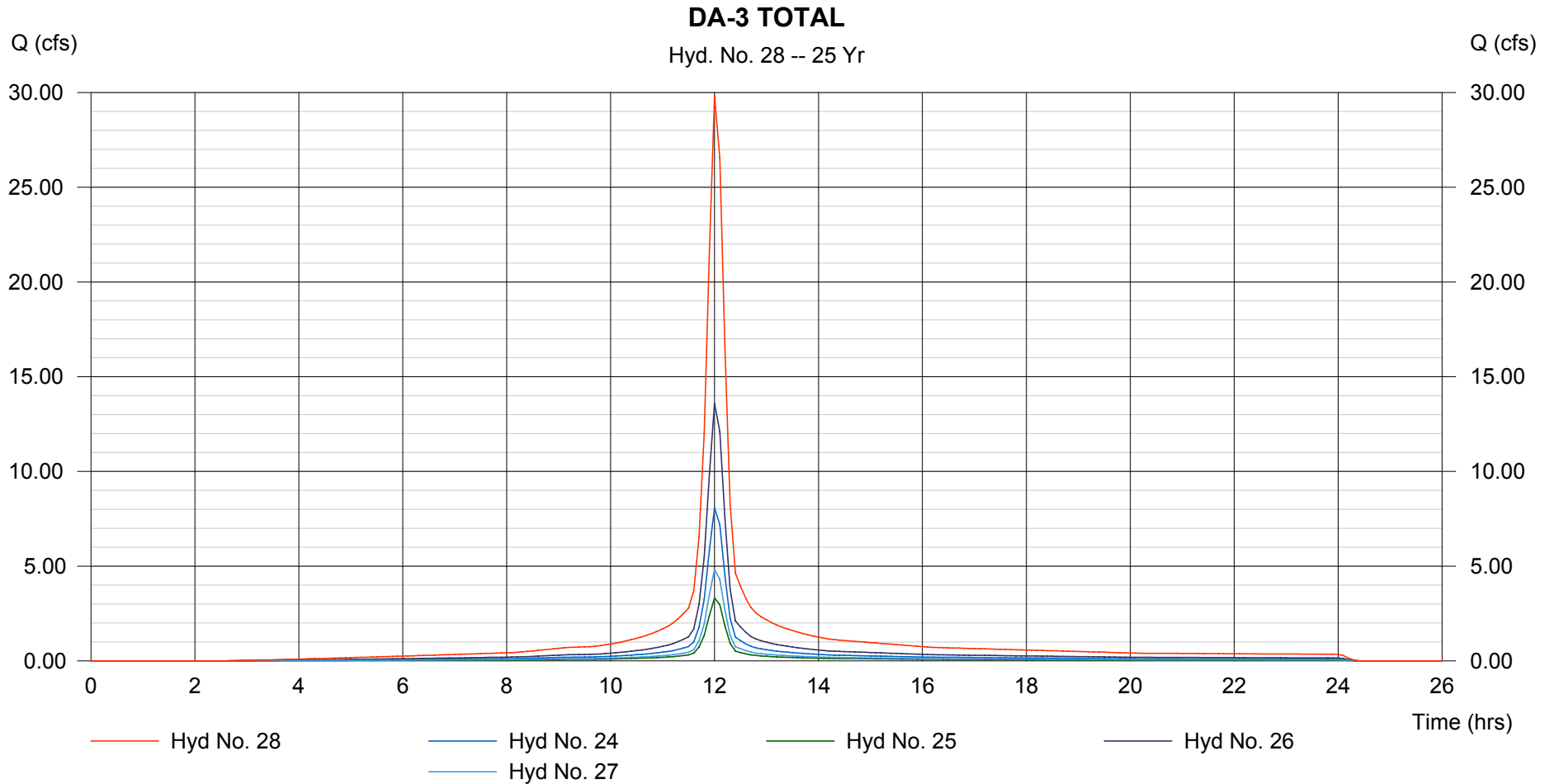
## Hyd. No. 28

DA-3 TOTAL

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 29.84 cfs  
Time interval = 6 min

Hydrograph Volume = 2.213 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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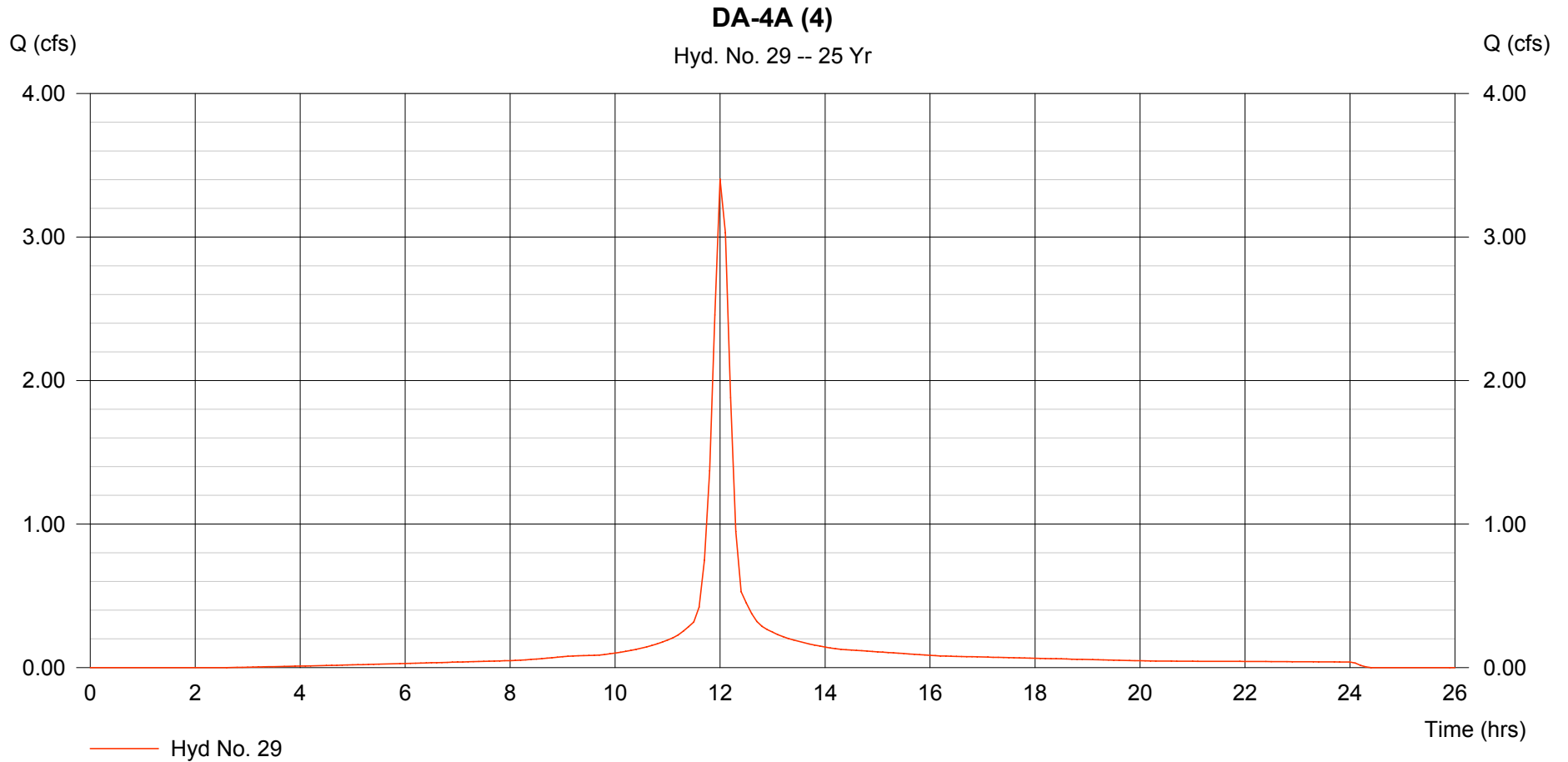
## Hyd. No. 29

DA-4A (4)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.609 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 3.404 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.252 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

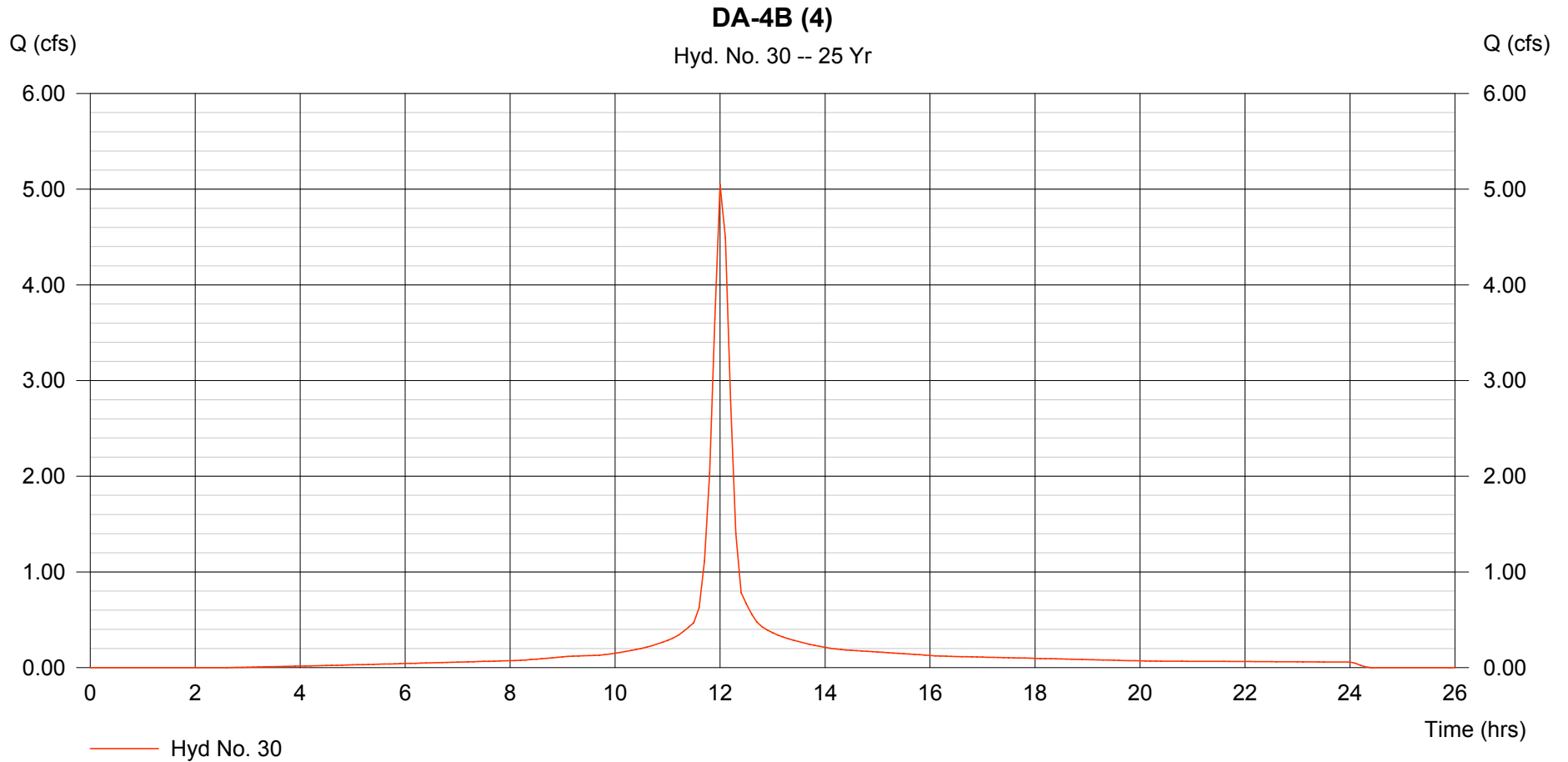
## Hyd. No. 30

DA-4B (4)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 0.903 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 5.047 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.374 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

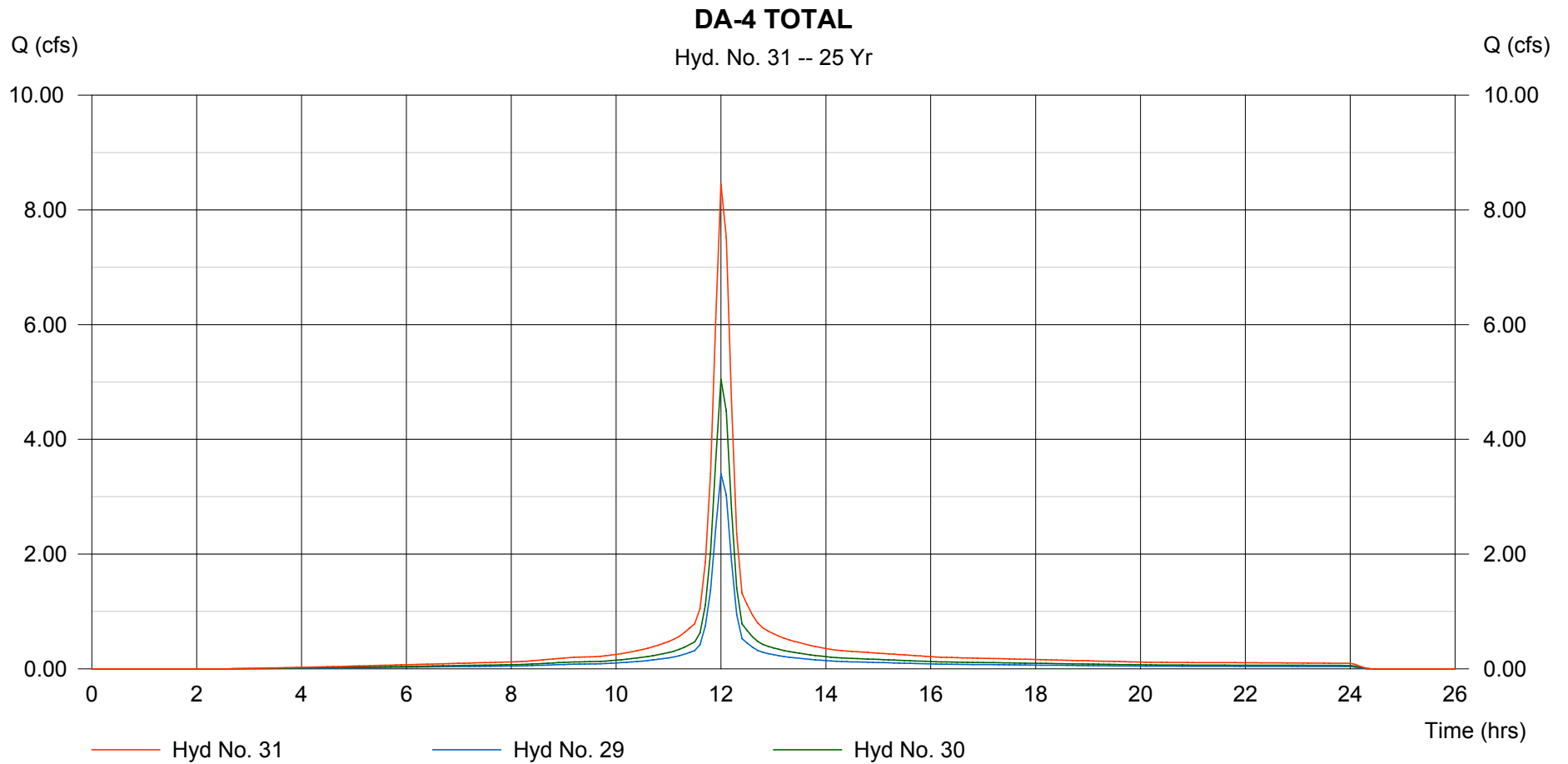
## Hyd. No. 31

DA-4 TOTAL

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 29, 30

Peak discharge = 8.451 cfs  
Time interval = 6 min

Hydrograph Volume = 0.627 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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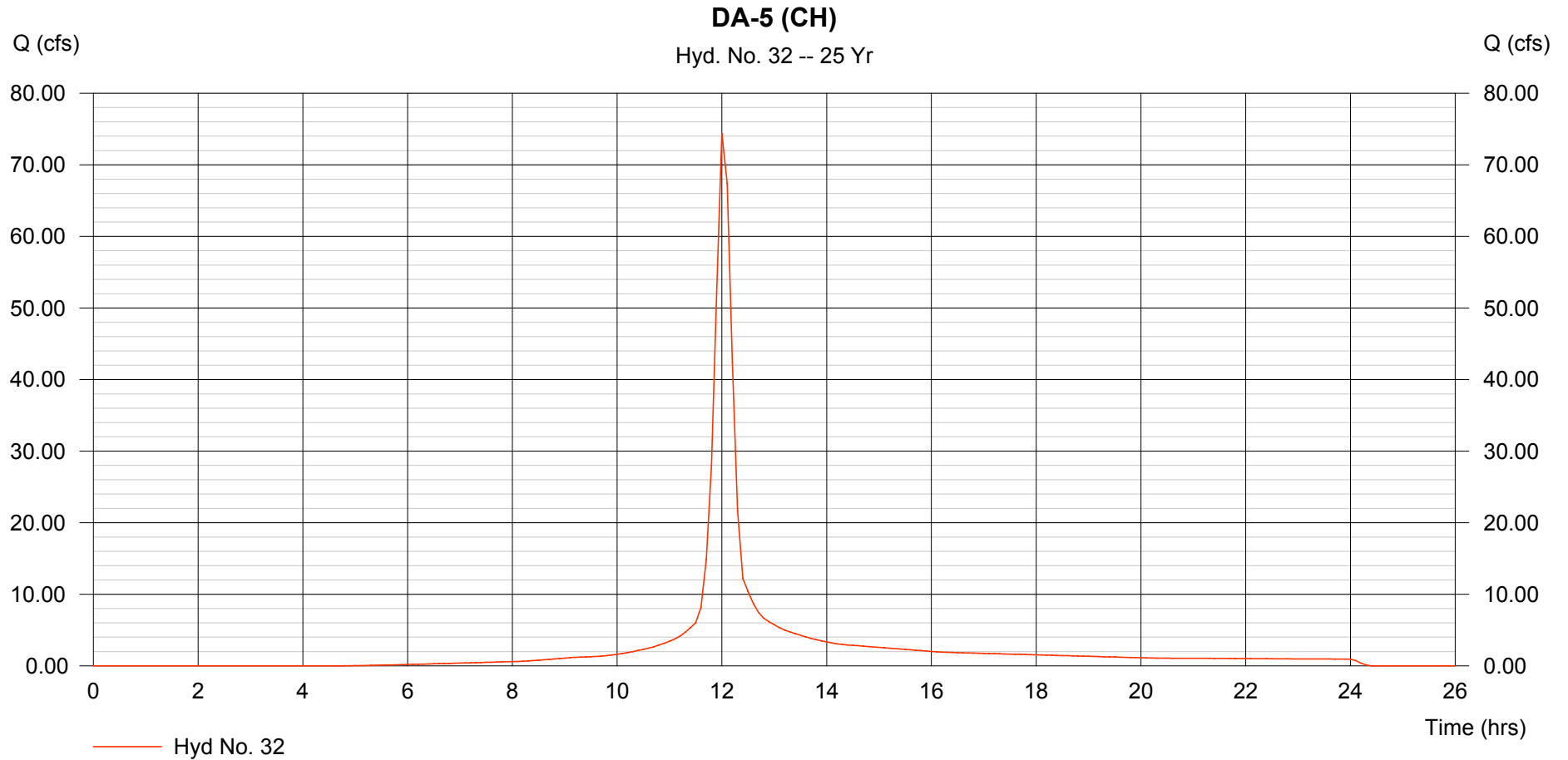
## Hyd. No. 32

DA-5 (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 15.067 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 74.42 cfs  
Time interval = 6 min  
Curve number = 84.8  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 5.306 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

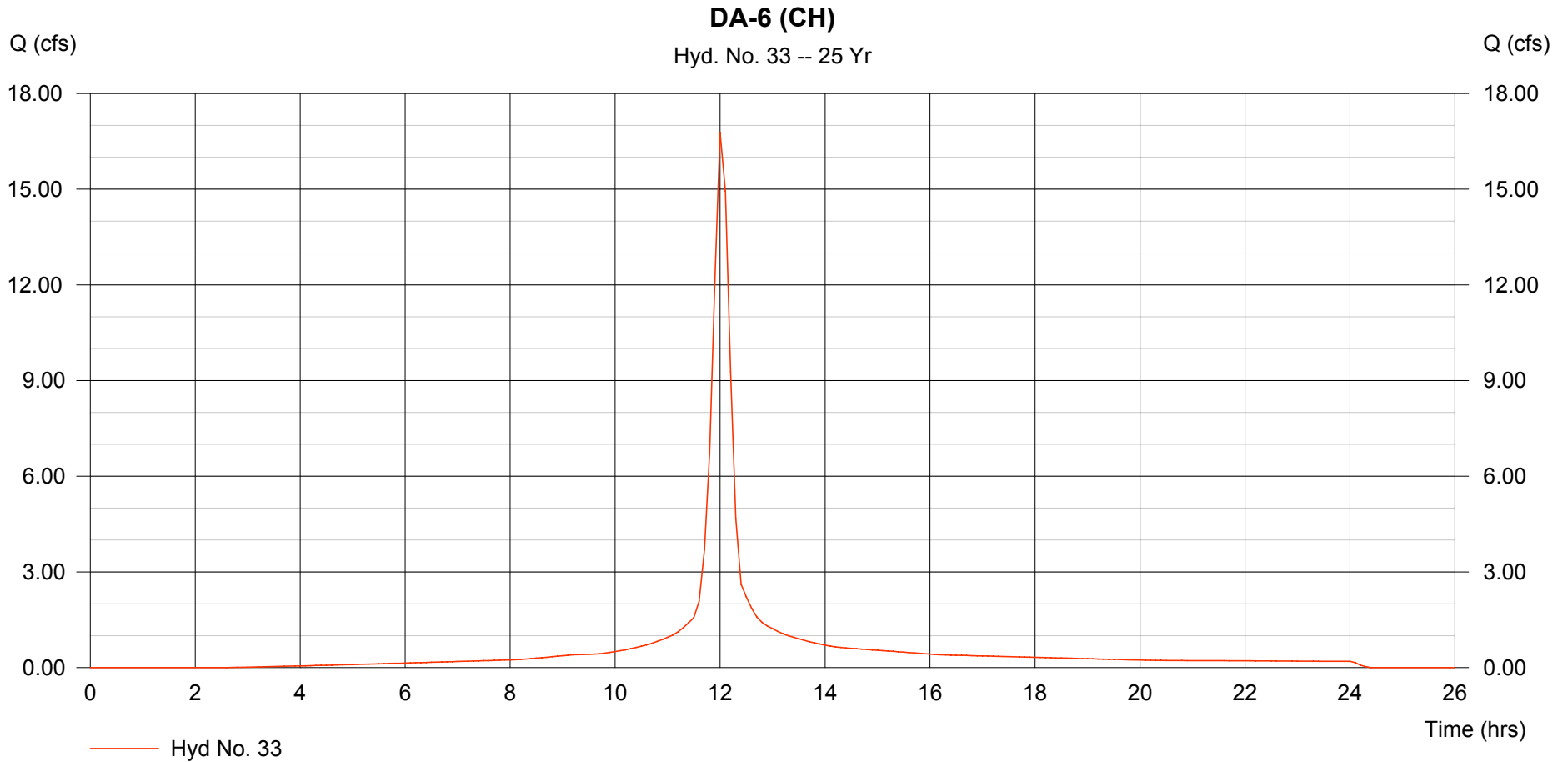
## Hyd. No. 33

DA-6 (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 25 yrs  
Drainage area = 3.003 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 6.24 in  
Storm duration = 24 hrs

Peak discharge = 16.78 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.245 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

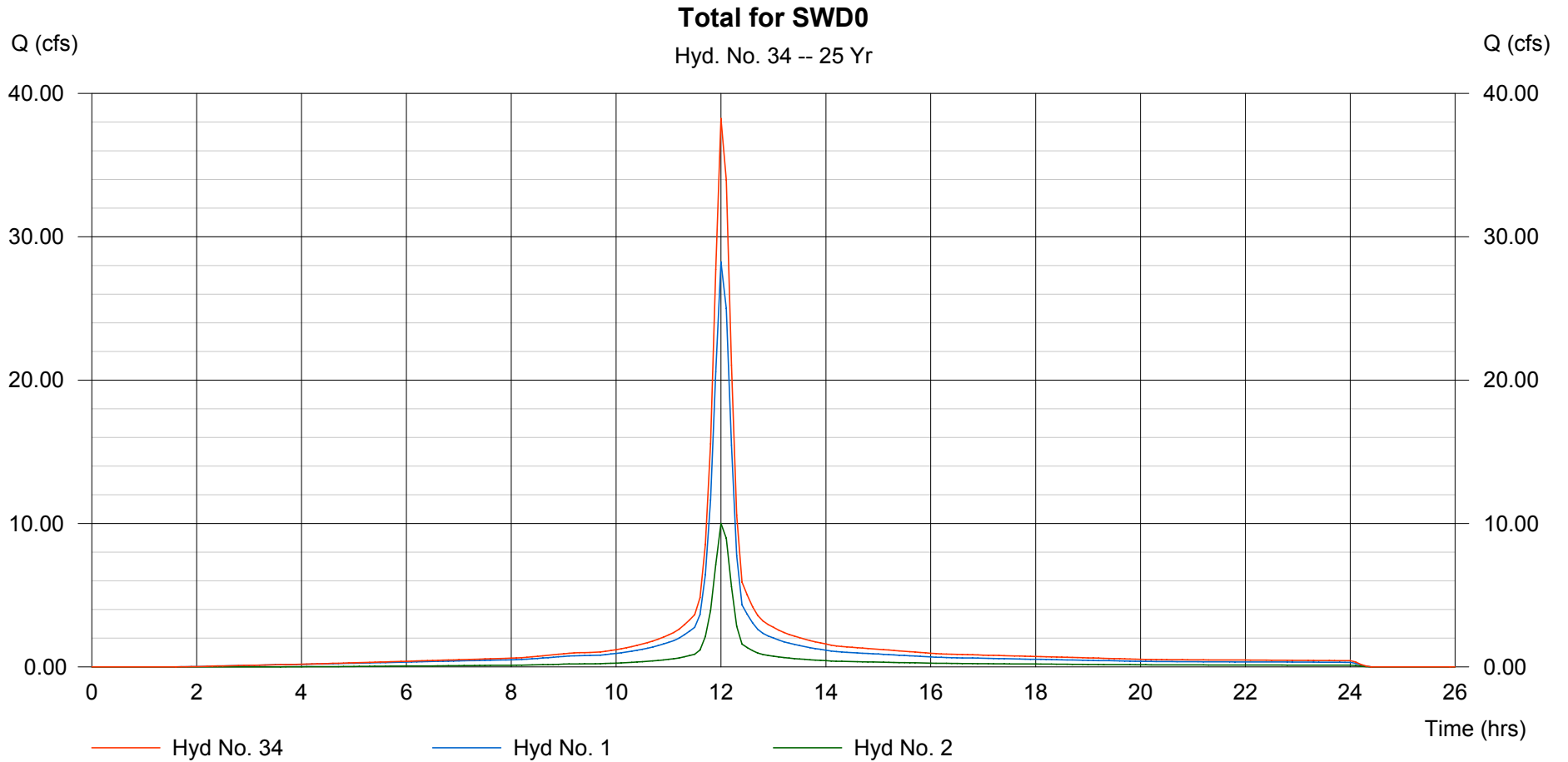
## Hyd. No. 34

Total for SWD0

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 1, 2

Peak discharge = 38.25 cfs  
Time interval = 6 min

Hydrograph Volume = 2.882 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

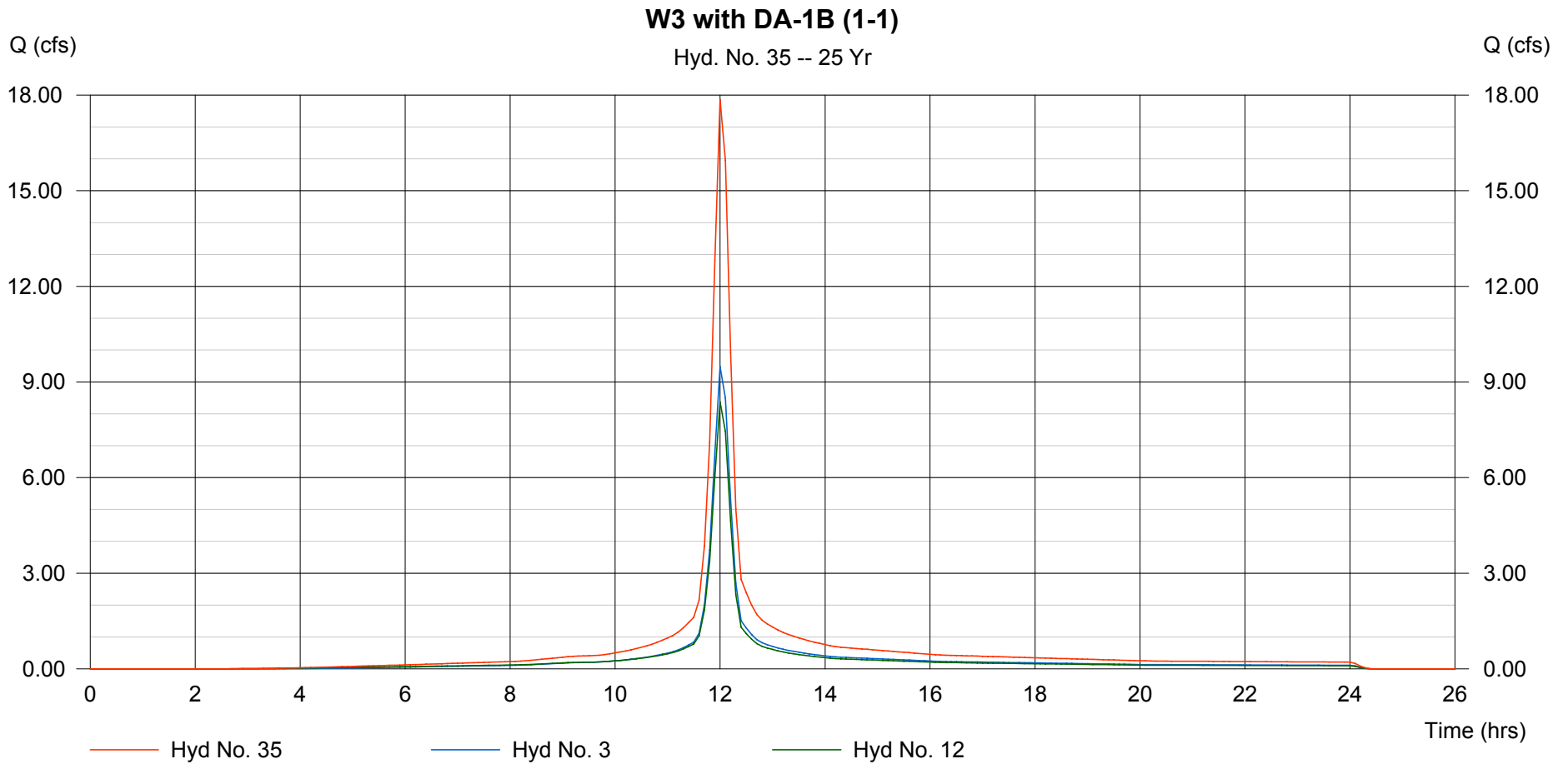
## Hyd. No. 35

W3 with DA-1B (1-1)

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 3, 12

Peak discharge = 17.86 cfs  
Time interval = 6 min

Hydrograph Volume = 1.310 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

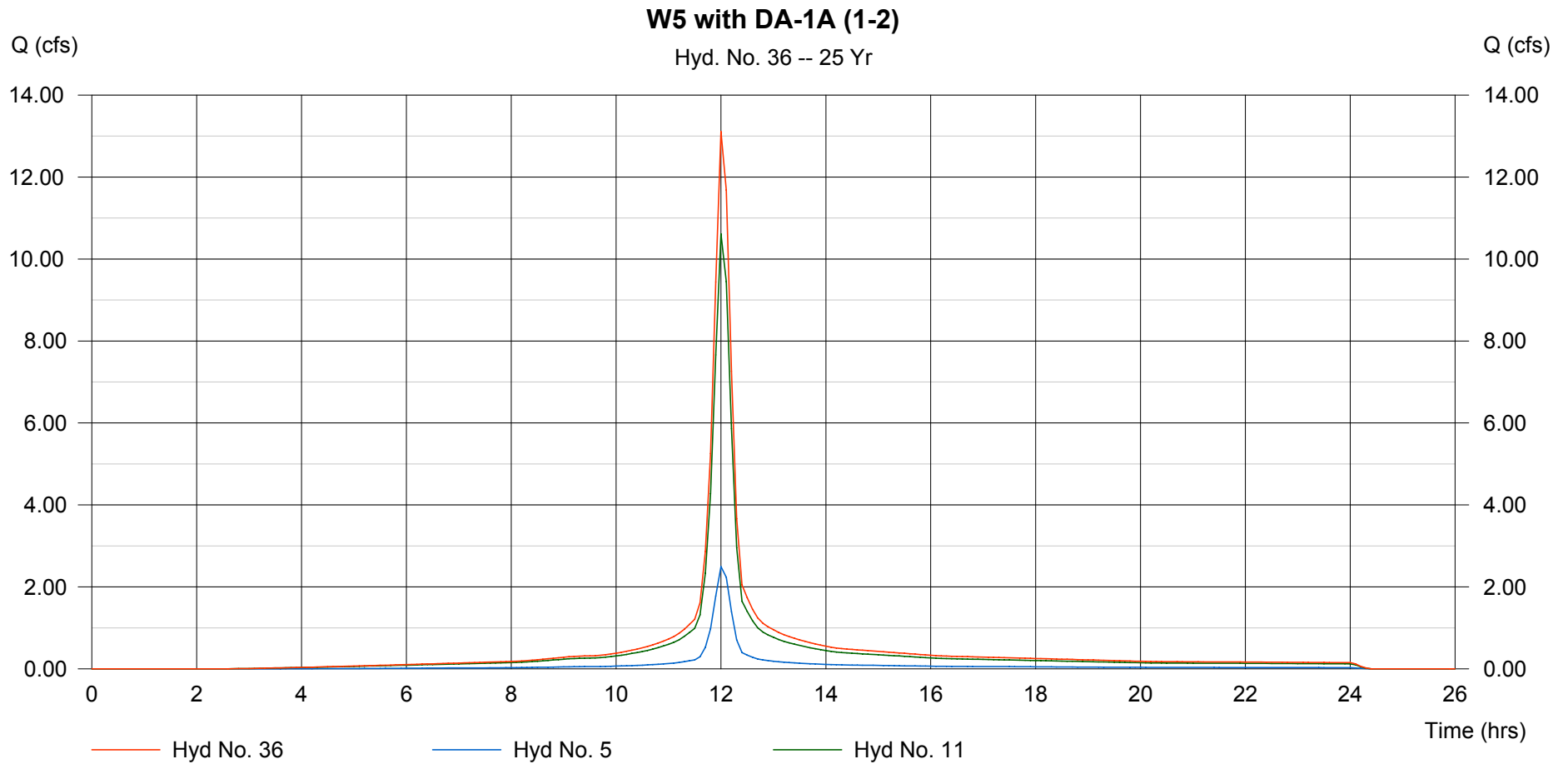
## Hyd. No. 36

W5 with DA-1A (1-2)

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 5, 11

Peak discharge = 13.11 cfs  
Time interval = 6 min

Hydrograph Volume = 0.968 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

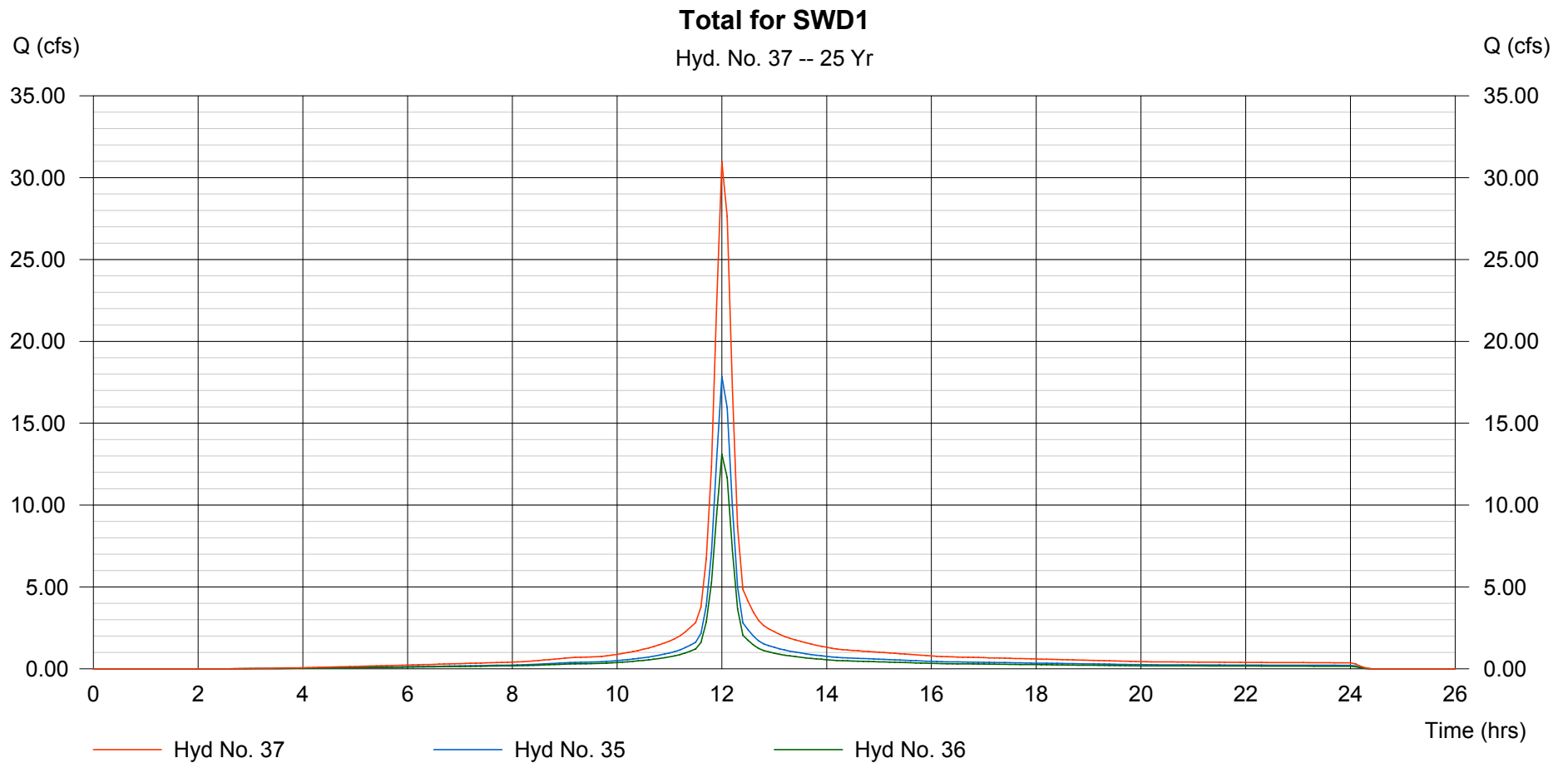
## Hyd. No. 37

Total for SWD1

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 35, 36

Peak discharge = 30.97 cfs  
Time interval = 6 min

Hydrograph Volume = 2.278 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

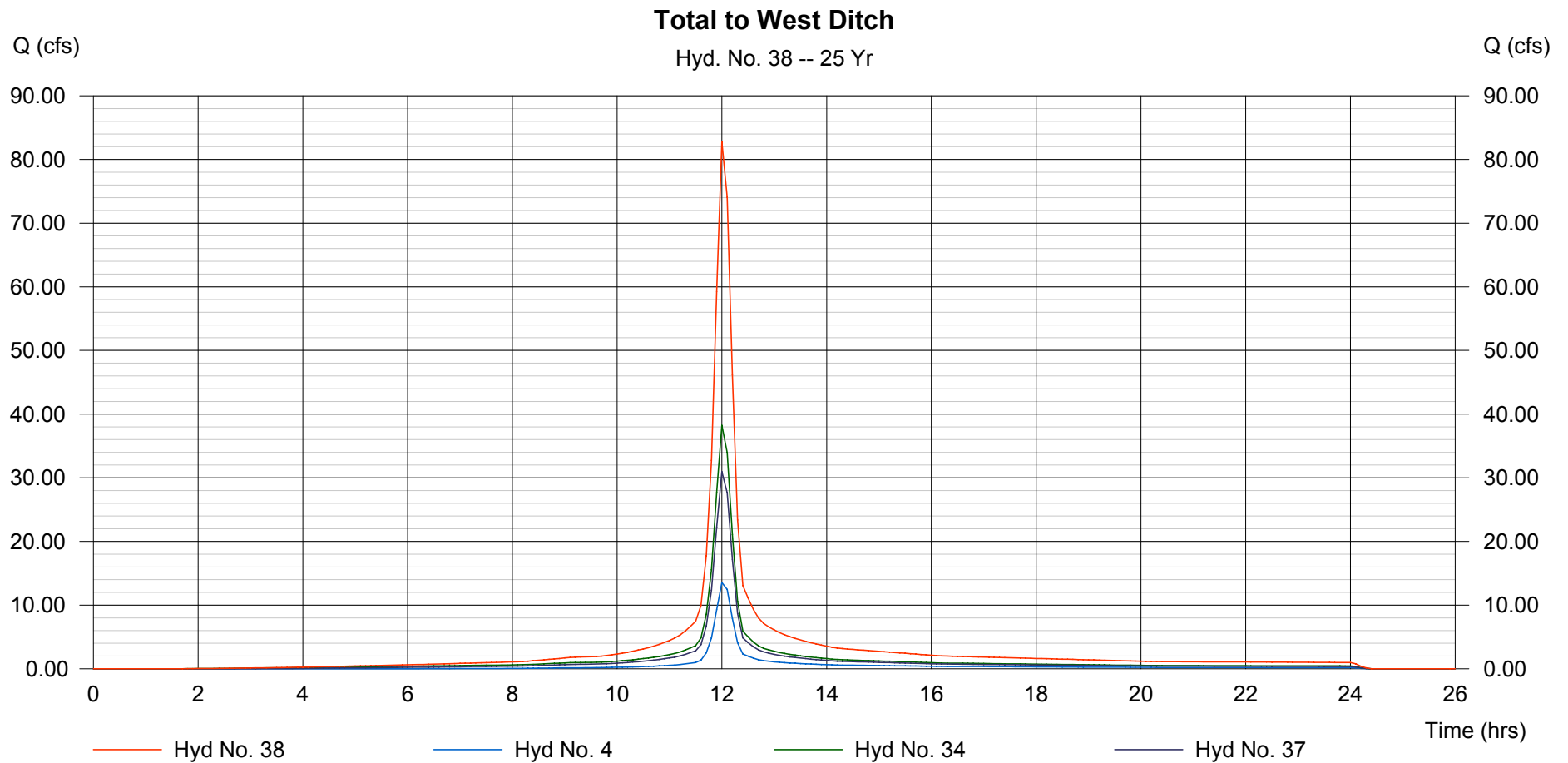
## Hyd. No. 38

Total to West Ditch

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 4, 34, 37

Peak discharge = 82.77 cfs  
Time interval = 6 min

Hydrograph Volume = 6.118 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 39

Proposed West Ditch

Hydrograph type = Reach  
Storm frequency = 25 yrs  
Inflow hyd. No. = 38  
Reach length = 1202.1 ft  
Manning's n = 0.050  
Side slope = 4.0:1  
Rating curve x = 0.720  
Ave. velocity = 1.68 ft/s

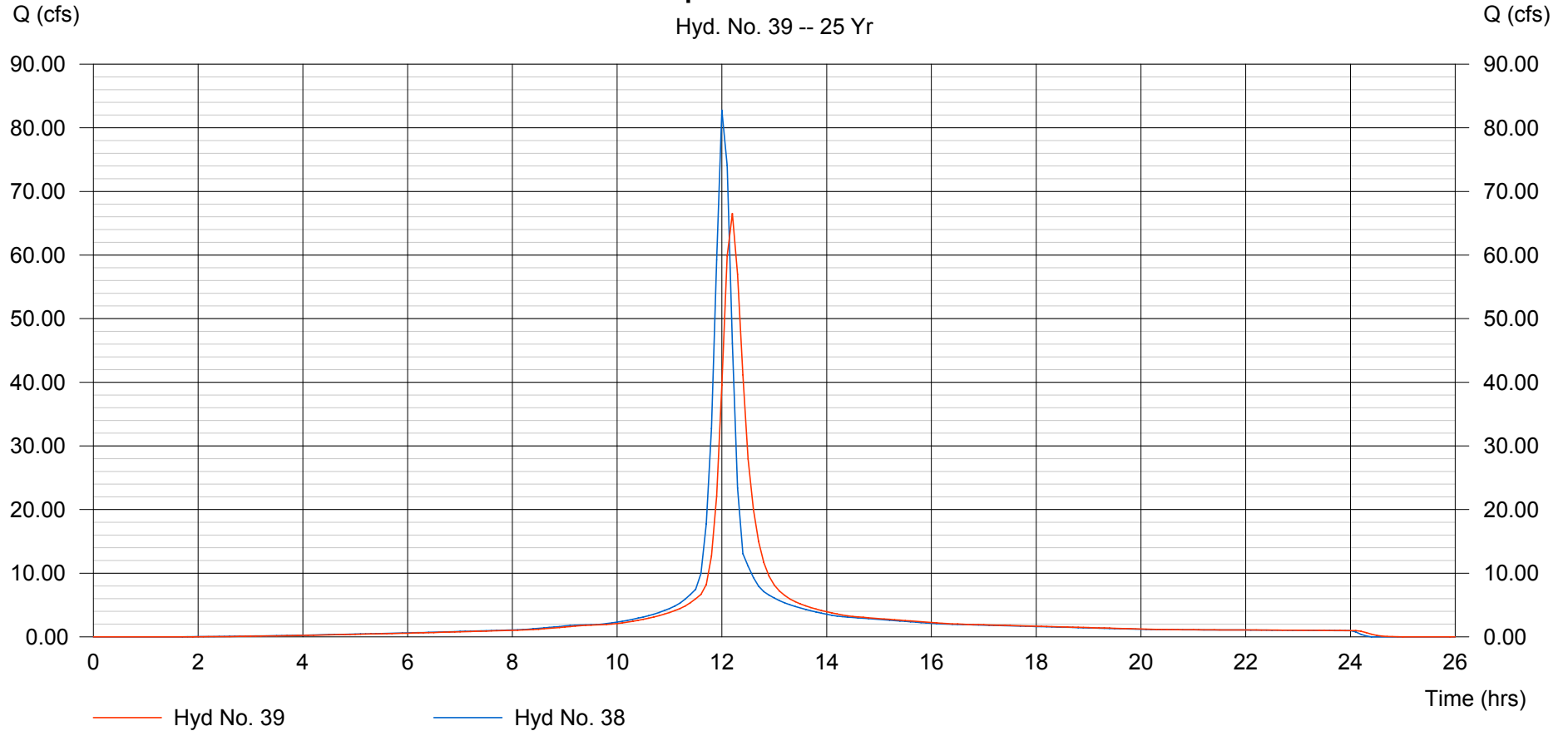
Peak discharge = 66.55 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.5 %  
Bottom width = 5.0 ft  
Max. depth = 1.5 ft  
Rating curve m = 1.218  
Routing coeff. = 0.4700

Modified Att-Kin routing method used.

Hydrograph Volume = 6.118 acft

### Proposed West Ditch

Hyd. No. 39 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

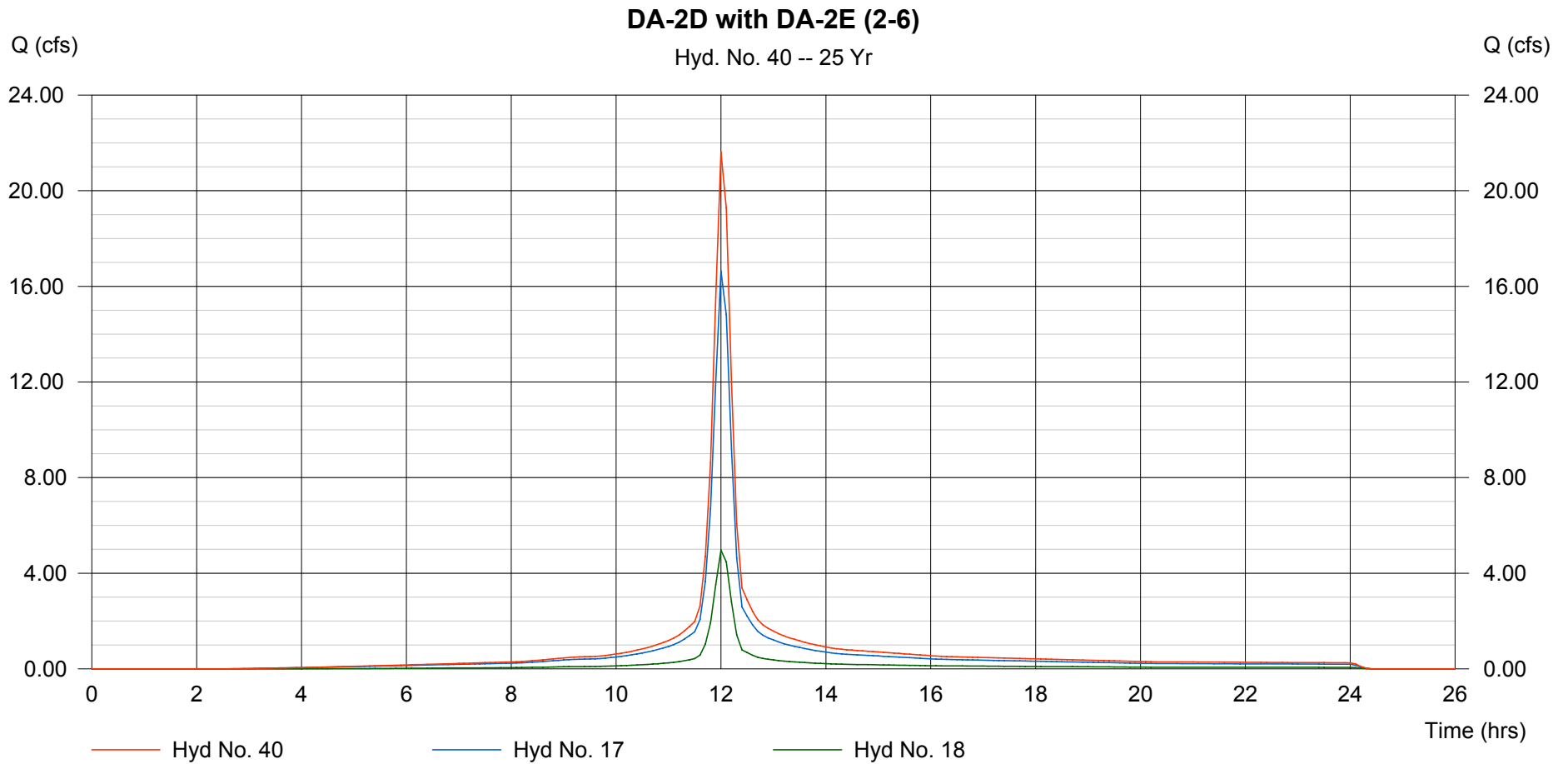
## Hyd. No. 40

DA-2D with DA-2E (2-6)

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 17, 18

Peak discharge = 21.61 cfs  
Time interval = 6 min

Hydrograph Volume = 1.593 acft





# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

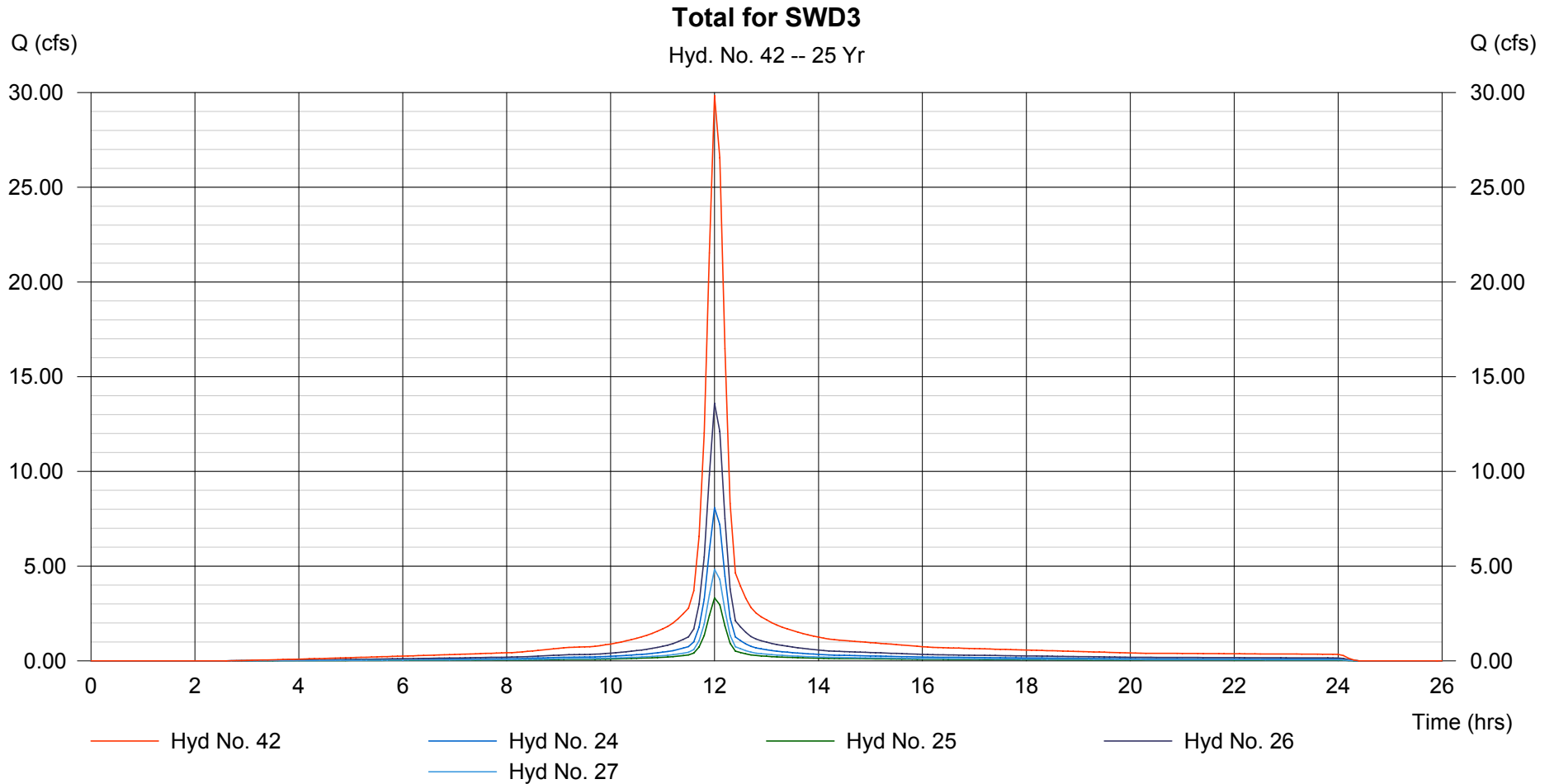
## Hyd. No. 42

Total for SWD3

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 29.84 cfs  
Time interval = 6 min

Hydrograph Volume = 2.213 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

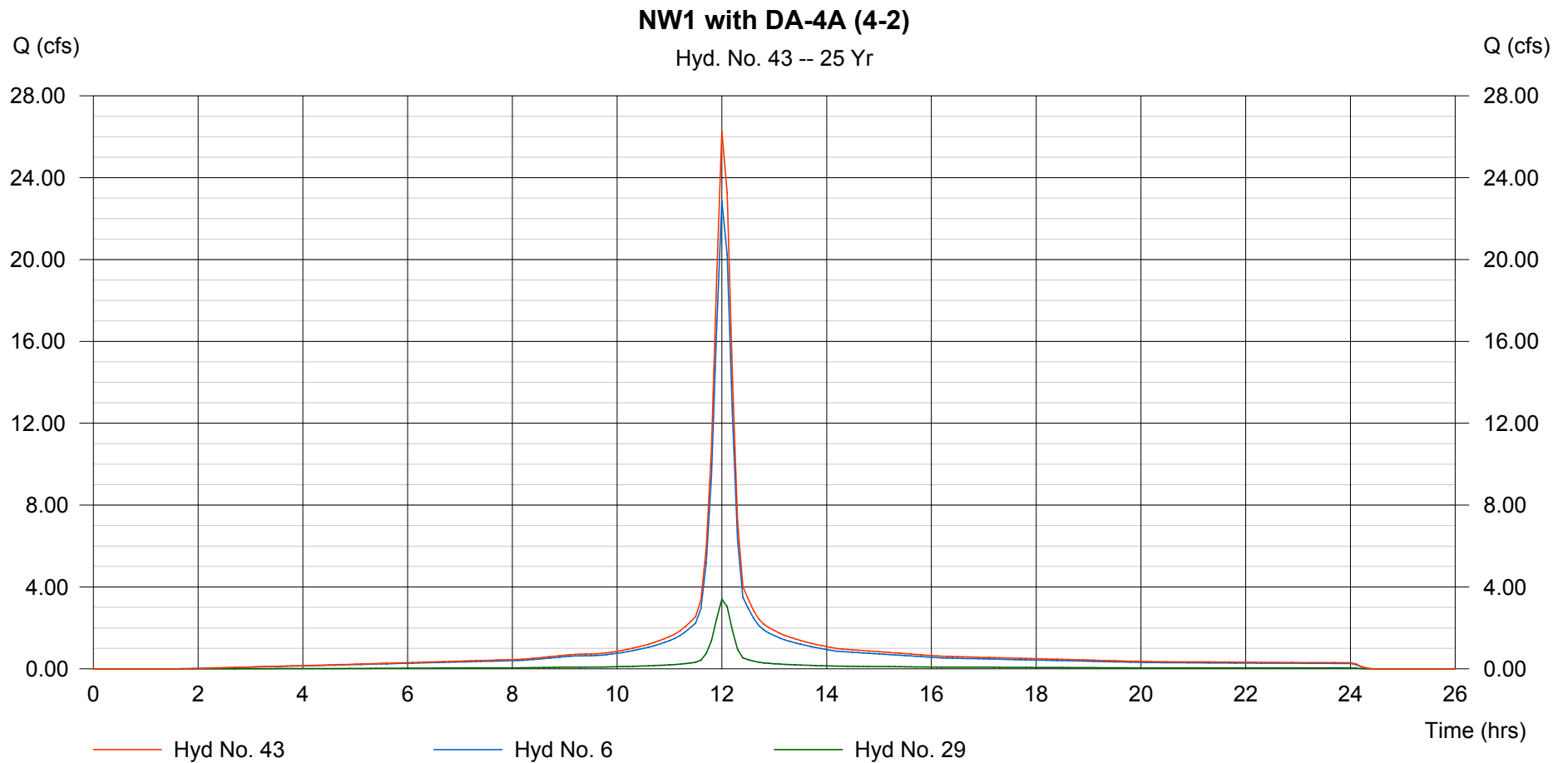
## Hyd. No. 43

NW1 with DA-4A (4-2)

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 6, 29

Peak discharge = 26.26 cfs  
Time interval = 6 min

Hydrograph Volume = 1.997 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

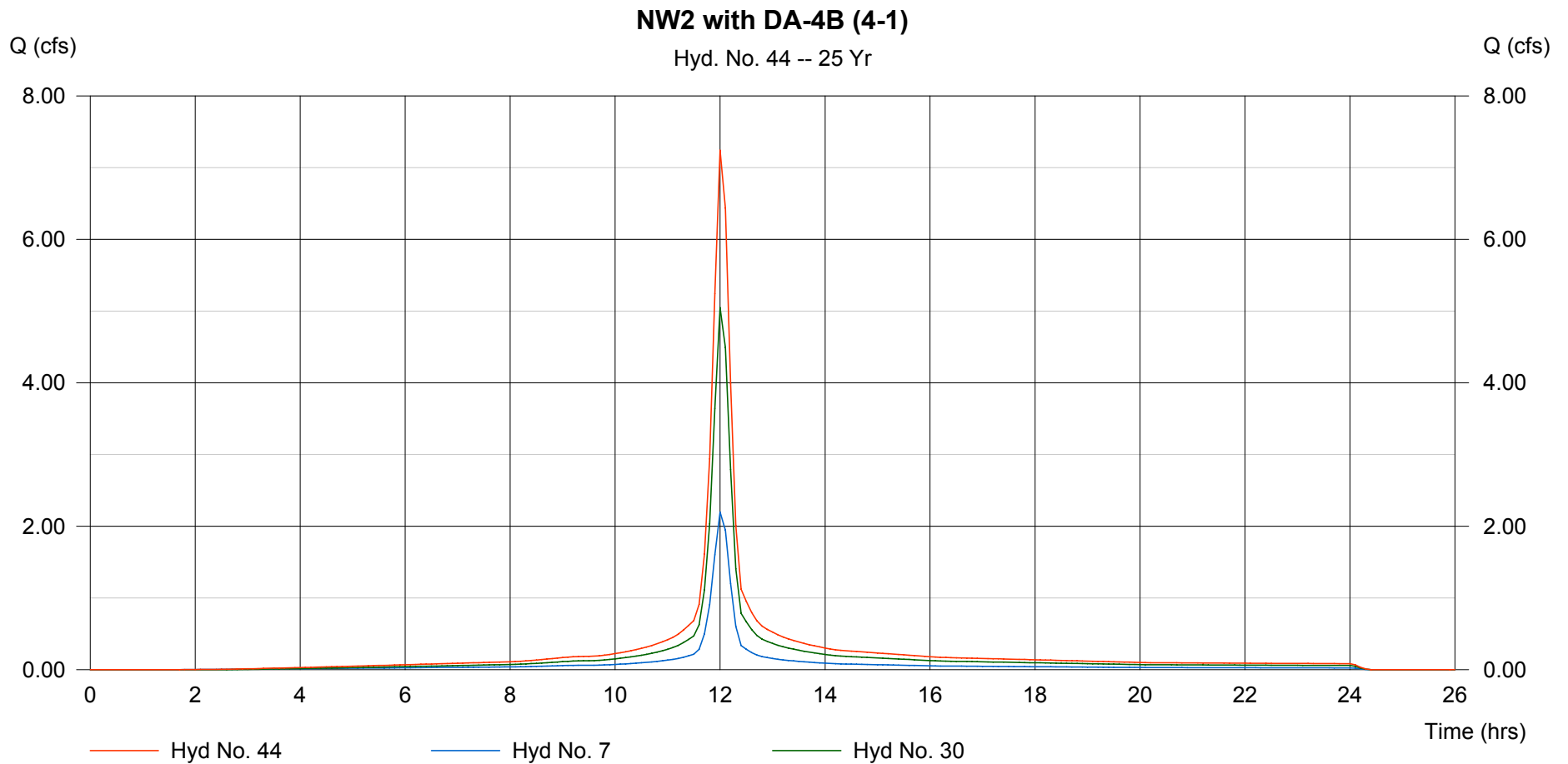
## Hyd. No. 44

NW2 with DA-4B (4-1)

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 7, 30

Peak discharge = 7.245 cfs  
Time interval = 6 min

Hydrograph Volume = 0.542 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

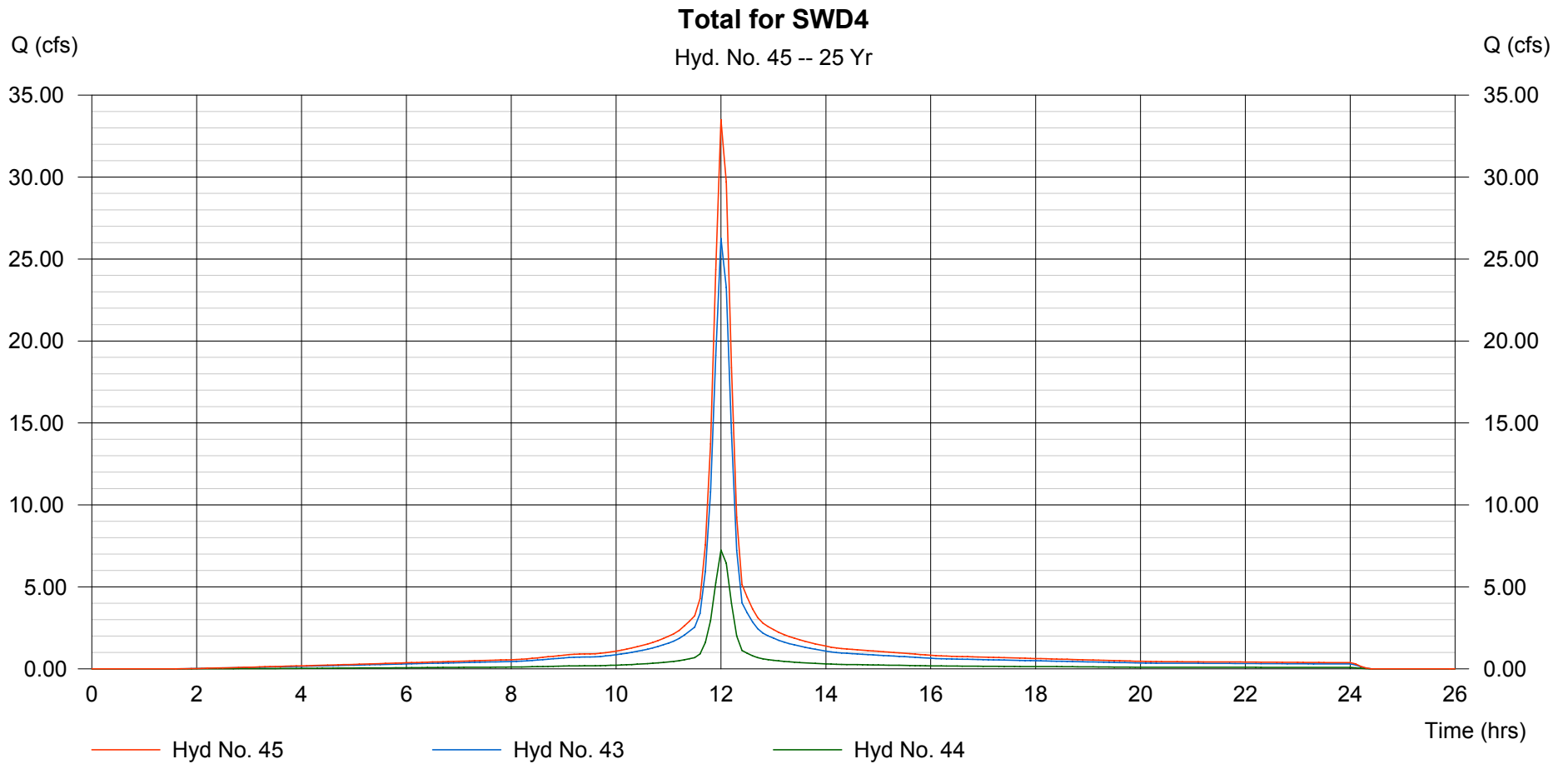
## Hyd. No. 45

Total for SWD4

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 43, 44

Peak discharge = 33.50 cfs  
Time interval = 6 min

Hydrograph Volume = 2.539 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

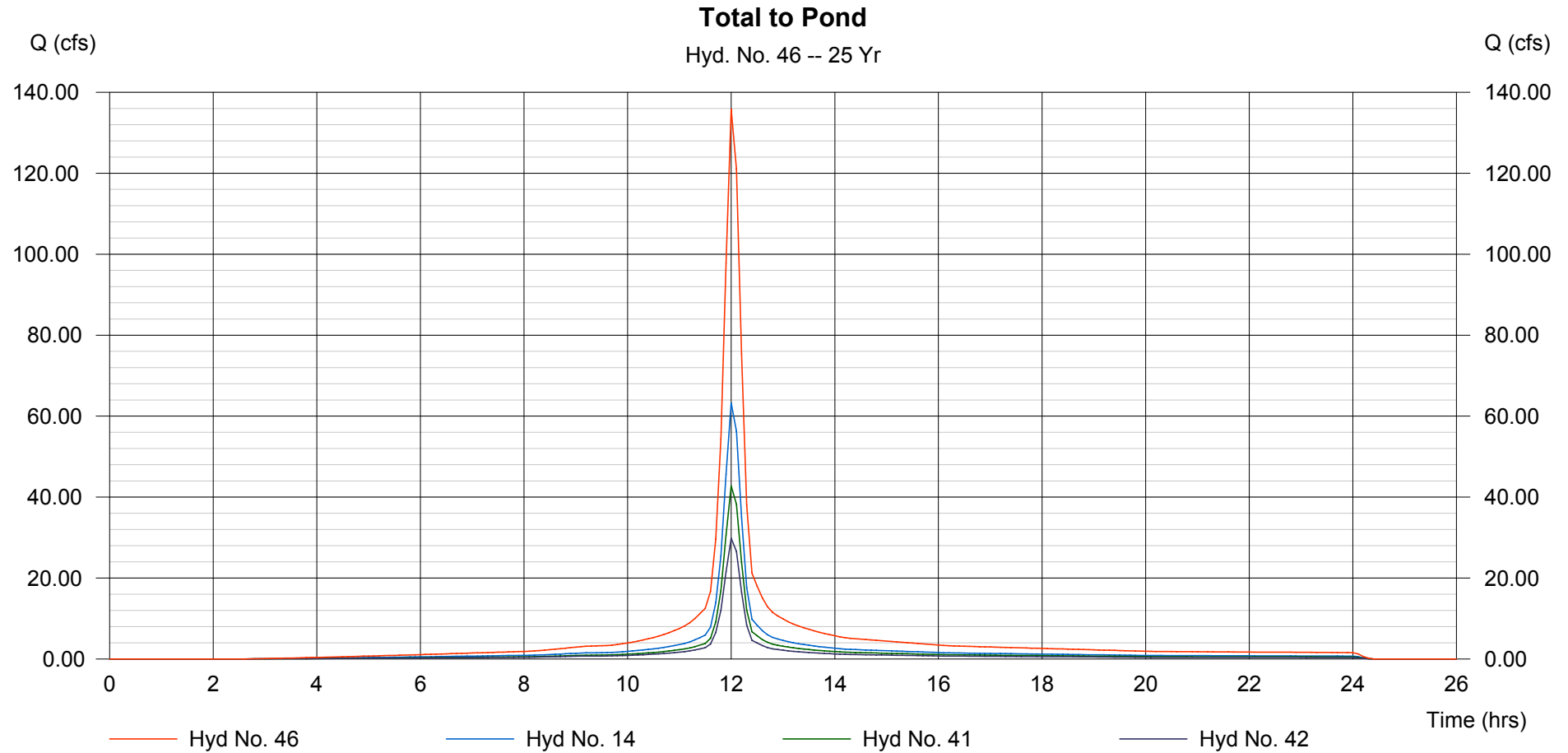
## Hyd. No. 46

Total to Pond

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 14, 41, 42

Peak discharge = 135.82 cfs  
Time interval = 6 min

Hydrograph Volume = 10.044 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 47

Proposed Pond

Hydrograph type = Reservoir  
Storm frequency = 25 yrs  
Inflow hyd. No. = 46  
Reservoir name = Proposed Pond

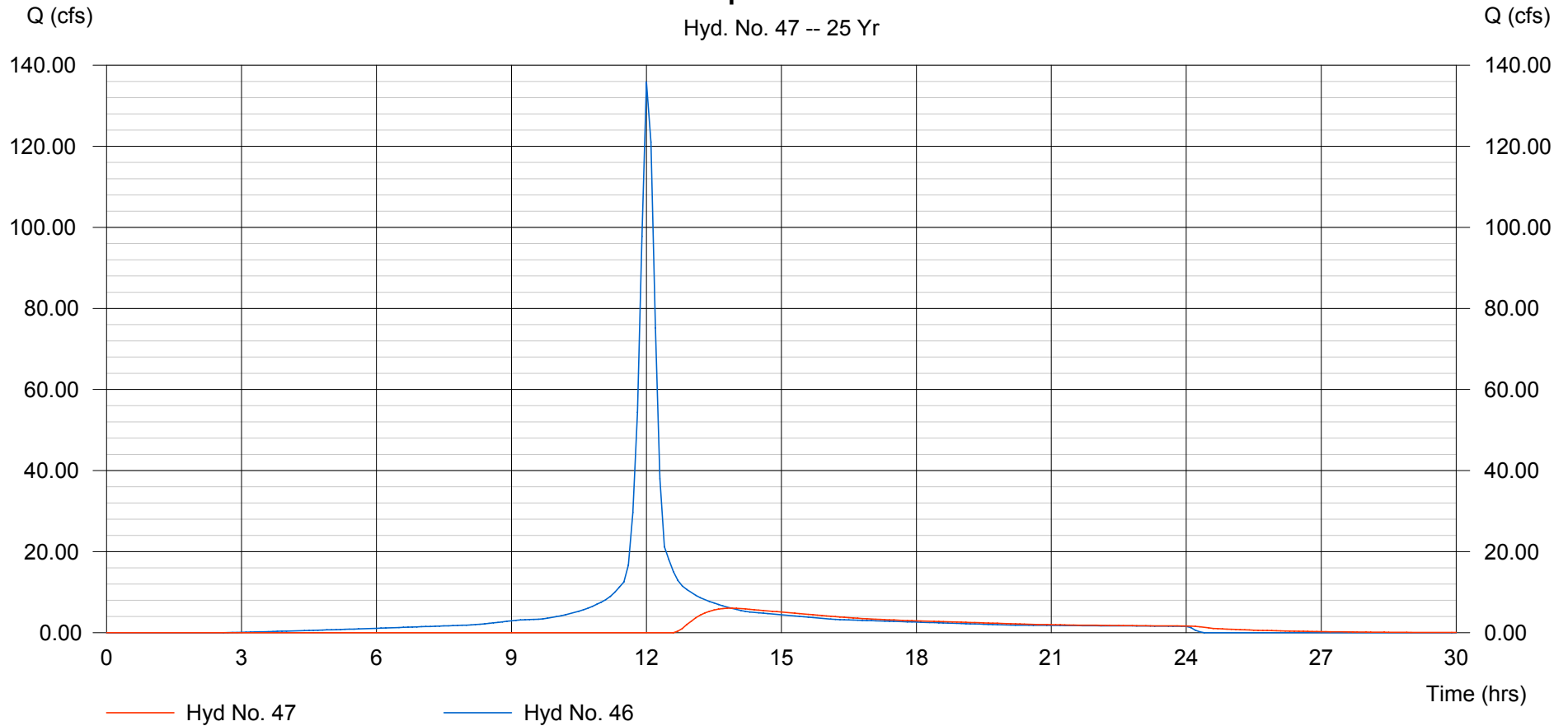
Peak discharge = 6.049 cfs  
Time interval = 6 min  
Max. Elevation = 1388.32 ft  
Max. Storage = 7.383 acft

Storage Indication method used.

Hydrograph Volume = 3.143 acft

### Proposed Pond

Hyd. No. 47 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 48

N, NE, SE, DA-5, DA-6, & SWD4

Hydrograph type = Combine

Storm frequency = 25 yrs

Inflow hyds. = 8, 9, 10, 32, 33, 45

Peak discharge

= 738.31 cfs

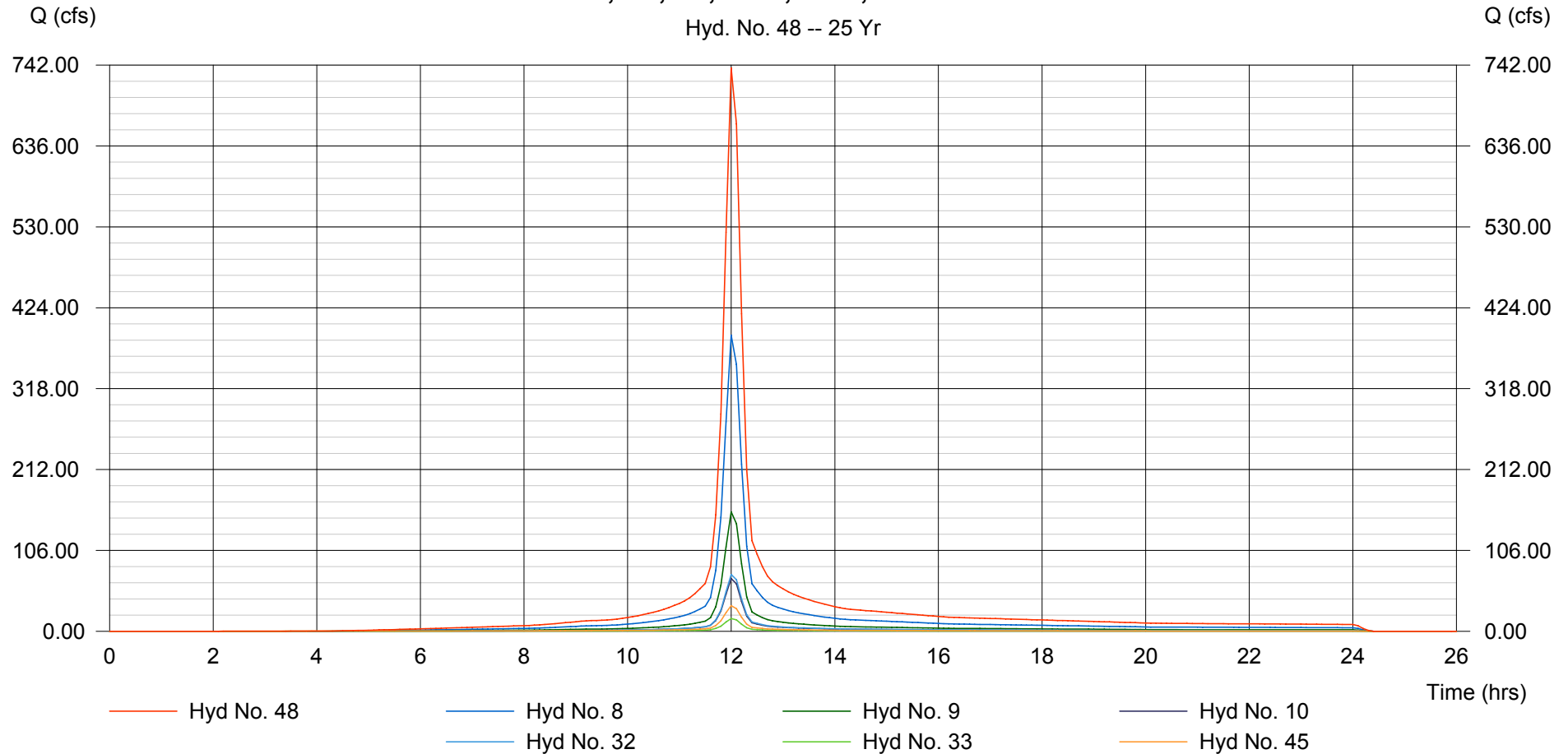
Time interval

= 6 min

Hydrograph Volume = 53.211 acft

### N, NE, SE, DA-5, DA-6, & SWD4

Hyd. No. 48 -- 25 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

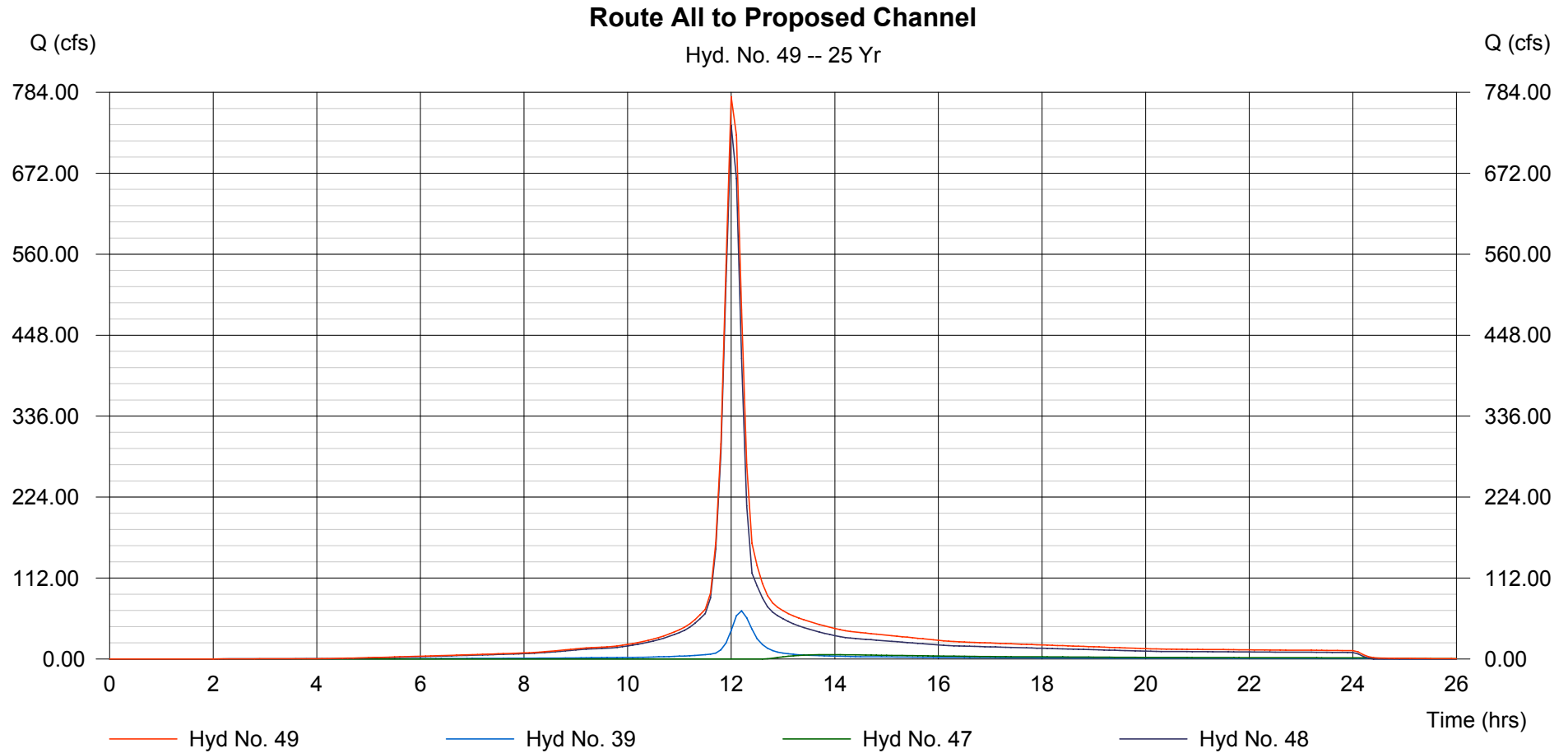
## Hyd. No. 49

Route All to Proposed Channel

Hydrograph type = Combine  
Storm frequency = 25 yrs  
Inflow hyds. = 39, 47, 48

Peak discharge = 777.88 cfs  
Time interval = 6 min

Hydrograph Volume = 62.473 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 50

Proposed Channel

Hydrograph type = Reach  
Storm frequency = 25 yrs  
Inflow hyd. No. = 49  
Reach length = 2296.0 ft  
Manning's n = 0.030  
Side slope = 4.0:1  
Rating curve x = 0.301  
Ave. velocity = 3.22 ft/s

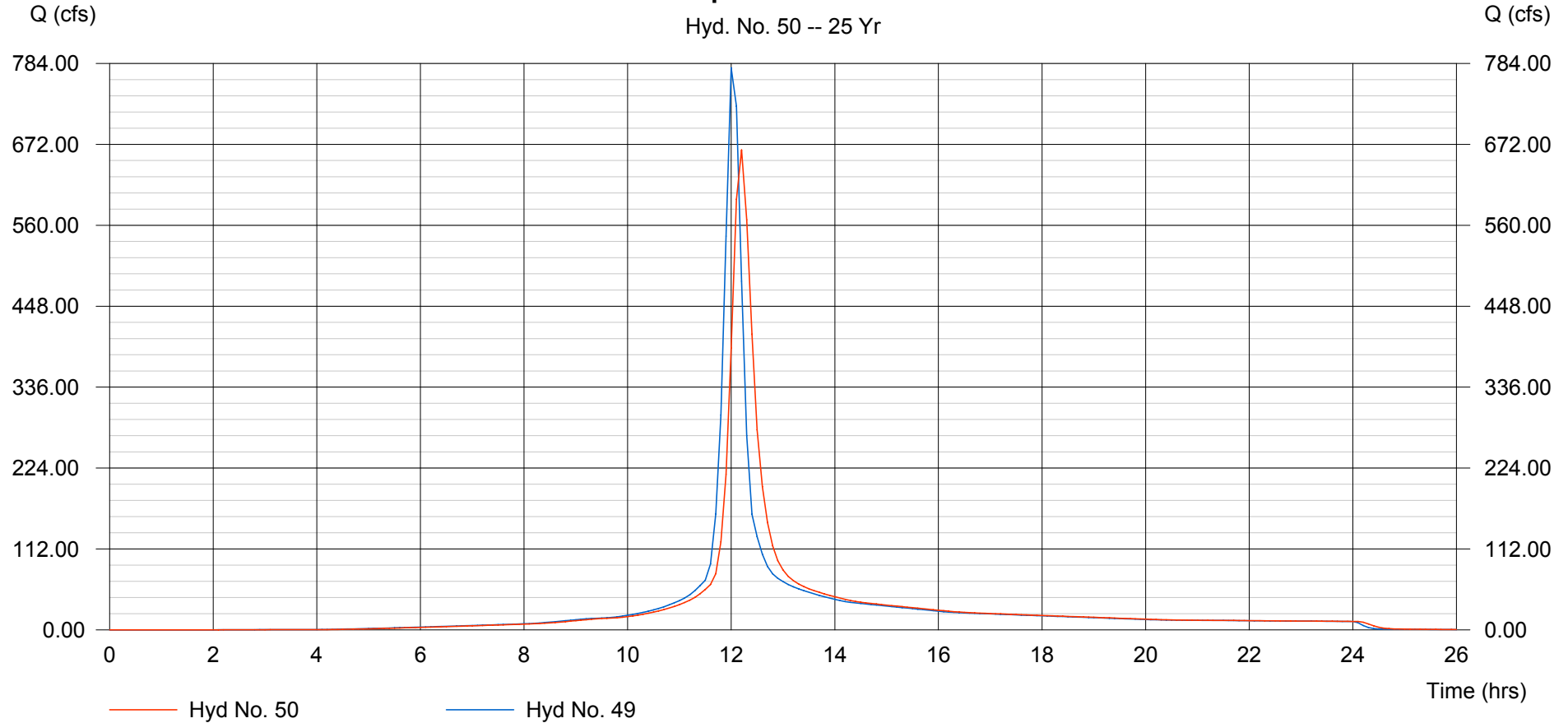
Peak discharge = 664.33 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 4.0 ft  
Rating curve m = 1.432  
Routing coeff. = 0.5308

Modified Att-Kin routing method used.

Hydrograph Volume = 62.471 acft

### Proposed Channel

Hyd. No. 50 -- 25 Yr



# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	35.04	6	720	2.702	---	----	----	Off-Site W1 (0-3)
2	SCS Runoff	12.68	6	720	0.932	---	----	----	Off-Site W2 (0-2)
3	SCS Runoff	12.02	6	720	0.884	---	----	----	Off-Site W3 (1)
4	SCS Runoff	17.96	6	720	1.275	---	----	----	Off-Site W4 (W DT)
5	SCS Runoff	3.162	6	720	0.233	---	----	----	Off-Site W5 (1)
6	SCS Runoff	28.35	6	720	2.187	---	----	----	Off-Site NW1 (4)
7	SCS Runoff	2.726	6	720	0.210	---	----	----	Off-Site NW2 (4)
8	SCS Runoff	496.19	6	720	36.081	---	----	----	Off-Site N (CH)
9	SCS Runoff	200.13	6	720	14.552	---	----	----	Off-Site NE (CH)
10	SCS Runoff	88.28	6	720	6.419	---	----	----	Off-Site SE (CH)
11	SCS Runoff	13.29	6	720	0.998	---	----	----	DA-1A (1)
12	SCS Runoff	10.49	6	720	0.787	---	----	----	DA-1B (1)
13	Combine	23.78	6	720	1.785	11, 12	----	----	DA-1 TOTAL
14	SCS Runoff	79.19	6	720	5.945	---	----	----	DA-2A (Pond)
15	SCS Runoff	5.476	6	720	0.389	---	----	----	DA-2B (2-1)
16	SCS Runoff	1.038	6	720	0.074	---	----	----	DA-2C (2-2)
17	SCS Runoff	20.85	6	720	1.565	---	----	----	DA-2D (2)
18	SCS Runoff	6.333	6	720	0.462	---	----	----	DA-2E (2)
19	SCS Runoff	8.127	6	720	0.610	---	----	----	DA-2F (2-4)
20	SCS Runoff	8.505	6	720	0.639	---	----	----	DA-2G (2-5)
21	SCS Runoff	3.682	6	720	0.276	---	----	----	DA-2H (2-3)
22	Combine	106.55	6	720	7.973	14, 15, 16, 17,	----	----	DA-2A to DA-2D
23	Combine	133.20	6	720	9.960	18, 19, 20, 21, 22	----	----	DA-2 TOTAL
24	SCS Runoff	10.12	6	720	0.760	---	----	----	DA-3A (3-2)
25	SCS Runoff	4.165	6	720	0.313	---	----	----	DA-3B (3-3)
26	SCS Runoff	17.03	6	720	1.279	---	----	----	DA-3C (3-5)
27	SCS Runoff	6.048	6	720	0.454	---	----	----	DA-3D (3-4)
28	Combine	37.37	6	720	2.805	24, 25, 26, 27	----	----	DA-3 TOTAL
29	SCS Runoff	4.263	6	720	0.320	---	----	----	DA-4A (4)
30	SCS Runoff	6.321	6	720	0.475	---	----	----	DA-4B (4)

Northborough Proposed.gpw

Return Period: 100 Year

Thursday, Sep 6 2007

# Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description	
31	Combine	10.58	6	720	0.795	29, 30	-----	-----	DA-4 TOTAL	
32	SCS Runoff	96.16	6	720	6.923	---	-----	-----	DA-5 (CH)	
33	SCS Runoff	21.02	6	720	1.578	---	-----	-----	DA-6 (CH)	
34	Combine	47.71	6	720	3.635	1, 2,	-----	-----	Total for SWD0	
35	Combine	22.51	6	720	1.671	3, 12,	-----	-----	W3 with DA-1B (1-1)	
36	Combine	16.46	6	720	1.230	5, 11,	-----	-----	W5 with DA-1A (1-2)	
37	Combine	38.96	6	720	2.902	35, 36	-----	-----	Total for SWD1	
38	Combine	104.64	6	720	7.811	4, 34, 37	-----	-----	Total to West Ditch	
39	Reach	85.04	6	732	7.811	38	-----	-----	Proposed West Ditch	
40	Combine	27.18	6	720	2.027	17, 18,	-----	-----	DA-2D with DA-2E (2-6)	
41	Combine	54.01	6	720	4.015	15, 16, 19, 20, 21, 40	-----	-----	Total for SWD2	
42	Combine	37.37	6	720	2.805	24, 25, 26, 27,	-----	-----	Total for SWD3	
43	Combine	32.61	6	720	2.507	6, 29,	-----	-----	NW1 with DA-4A (4-2)	
44	Combine	9.047	6	720	0.685	7, 30,	-----	-----	NW2 with DA-4B (4-1)	
45	Combine	41.66	6	720	3.192	43, 44	-----	-----	Total for SWD4	
46	Combine	170.57	6	720	12.765	14, 41, 42,	-----	-----	Total to Pond	
47	Reservoir	21.23	6	750	5.864	46	1388.82	8.130	Proposed Pond	
48	Combine	943.44	6	720	68.746	8, 9, 10, 32, 33, 45,	-----	-----	N, NE, SE, DA-5, DA-6, & SWD4	
49	Combine	994.89	6	720	82.420	39, 47, 48	-----	-----	Route All to Proposed Channel	
50	Reach	862.61	6	732	82.419	49	-----	-----	Proposed Channel	
Northborough Proposed.gpw					Return Period: 100 Year			Thursday, Sep 6 2007		

# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 1

Off-Site W1 (0-3)

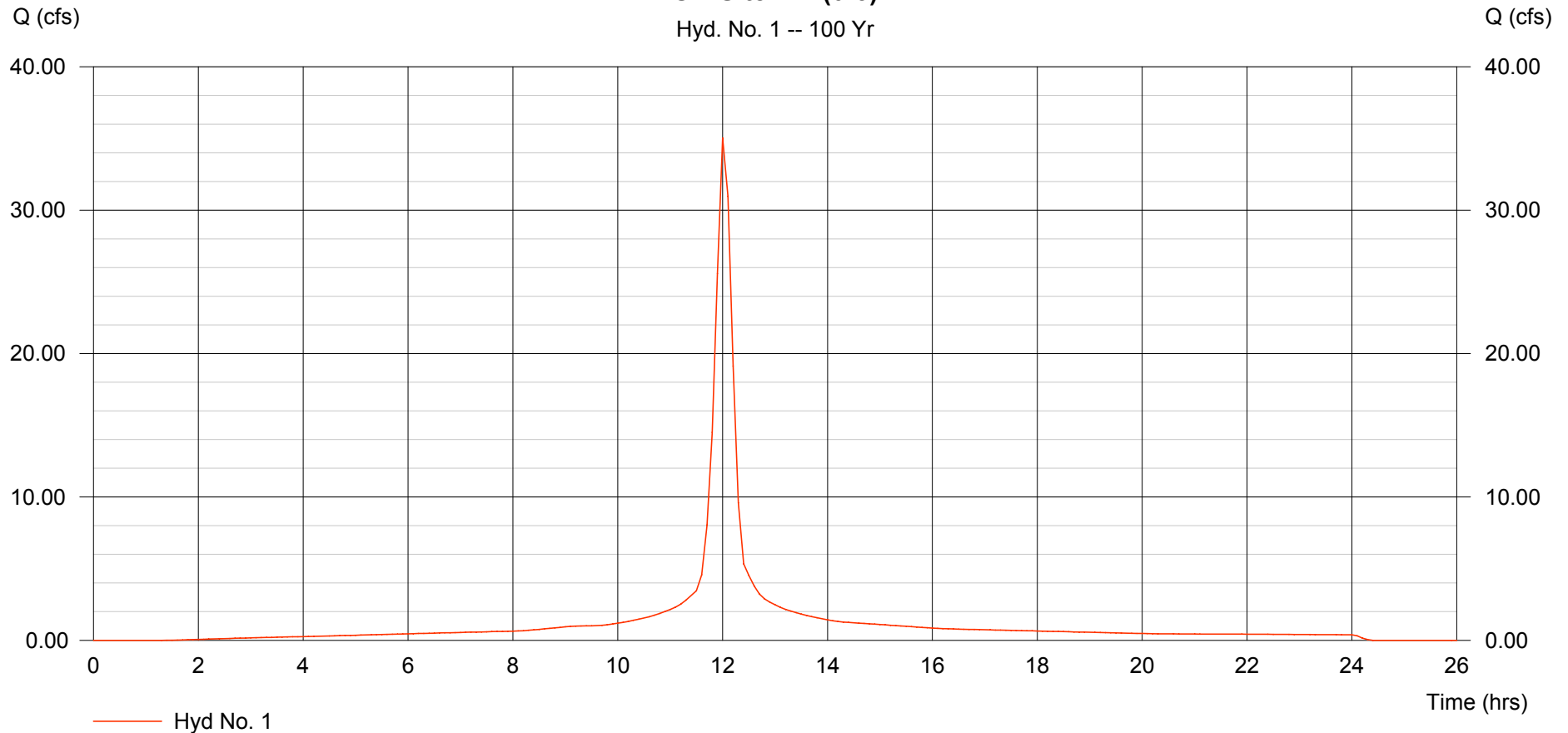
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 4.884 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 35.04 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.702 acft

### Off-Site W1 (0-3)

Hyd. No. 1 -- 100 Yr



# Hydrograph Plot

## Hyd. No. 2

Off-Site W2 (0-2)

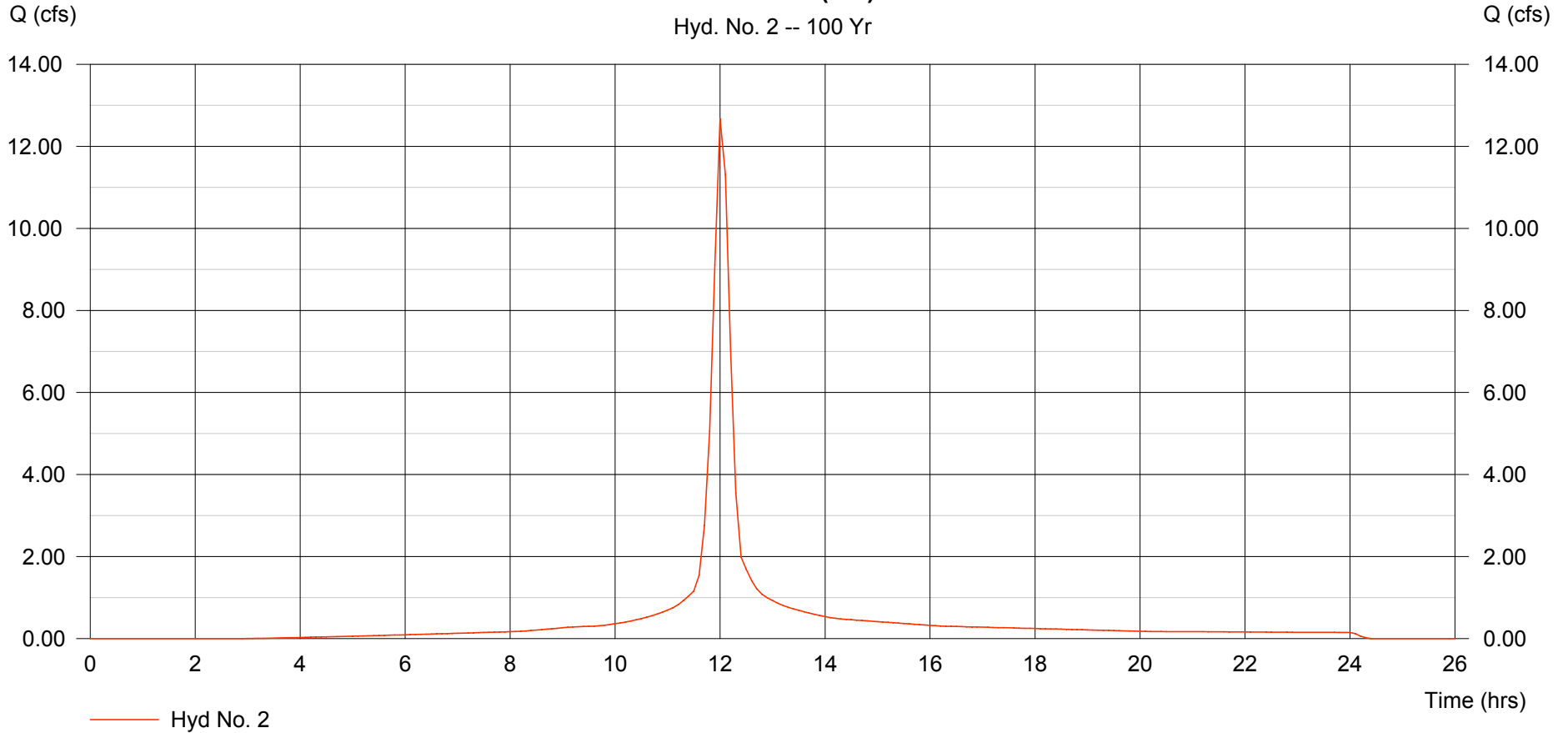
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 1.872 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 12.68 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.932 acft

### Off-Site W2 (0-2)

Hyd. No. 2 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

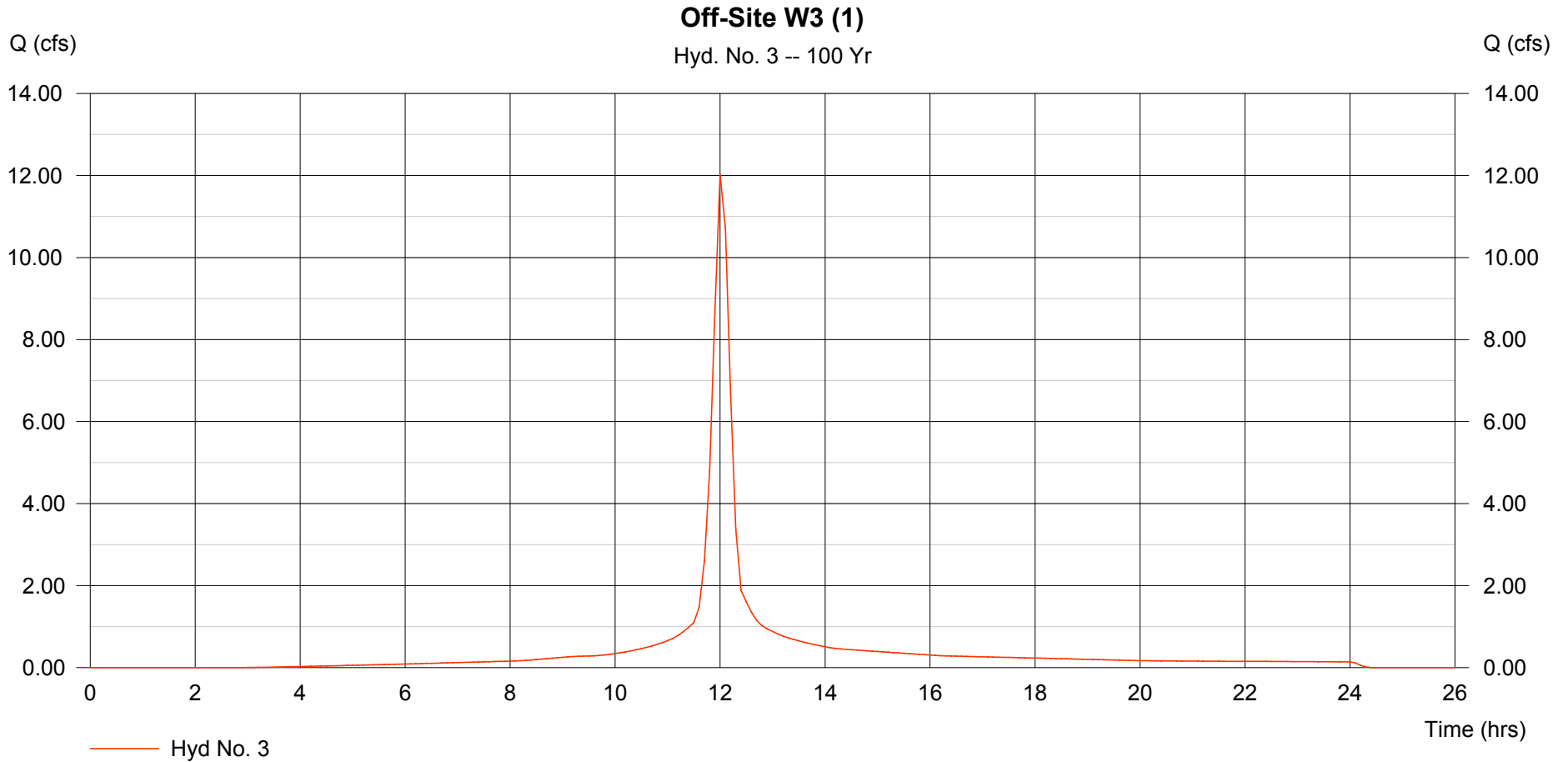
## Hyd. No. 3

Off-Site W3 (1)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 1.775 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 12.02 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.884 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 4

Off-Site W4 (W DT)

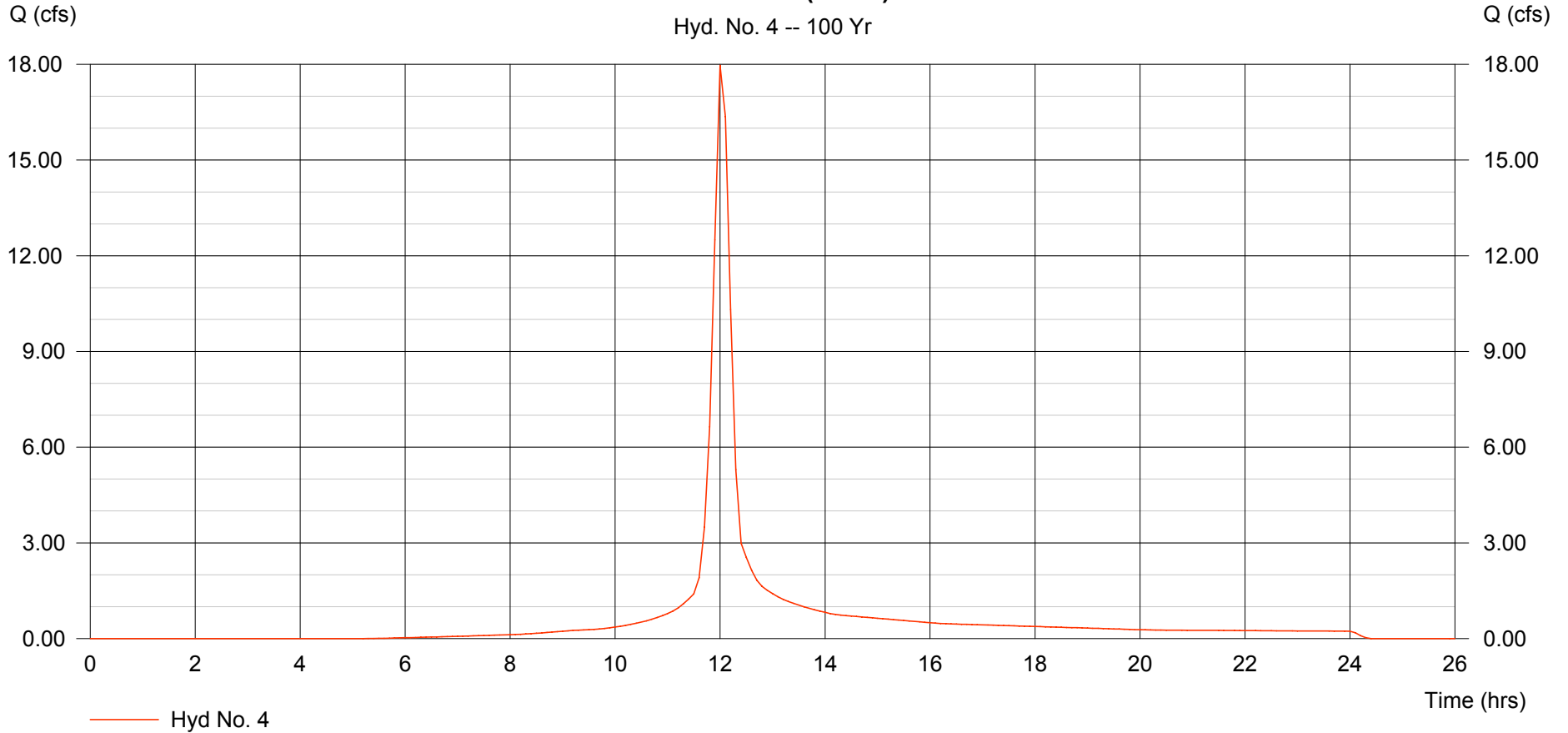
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 3.064 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 17.96 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.275 acft

### Off-Site W4 (W DT)

Hyd. No. 4 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 5

Off-Site W5 (1)

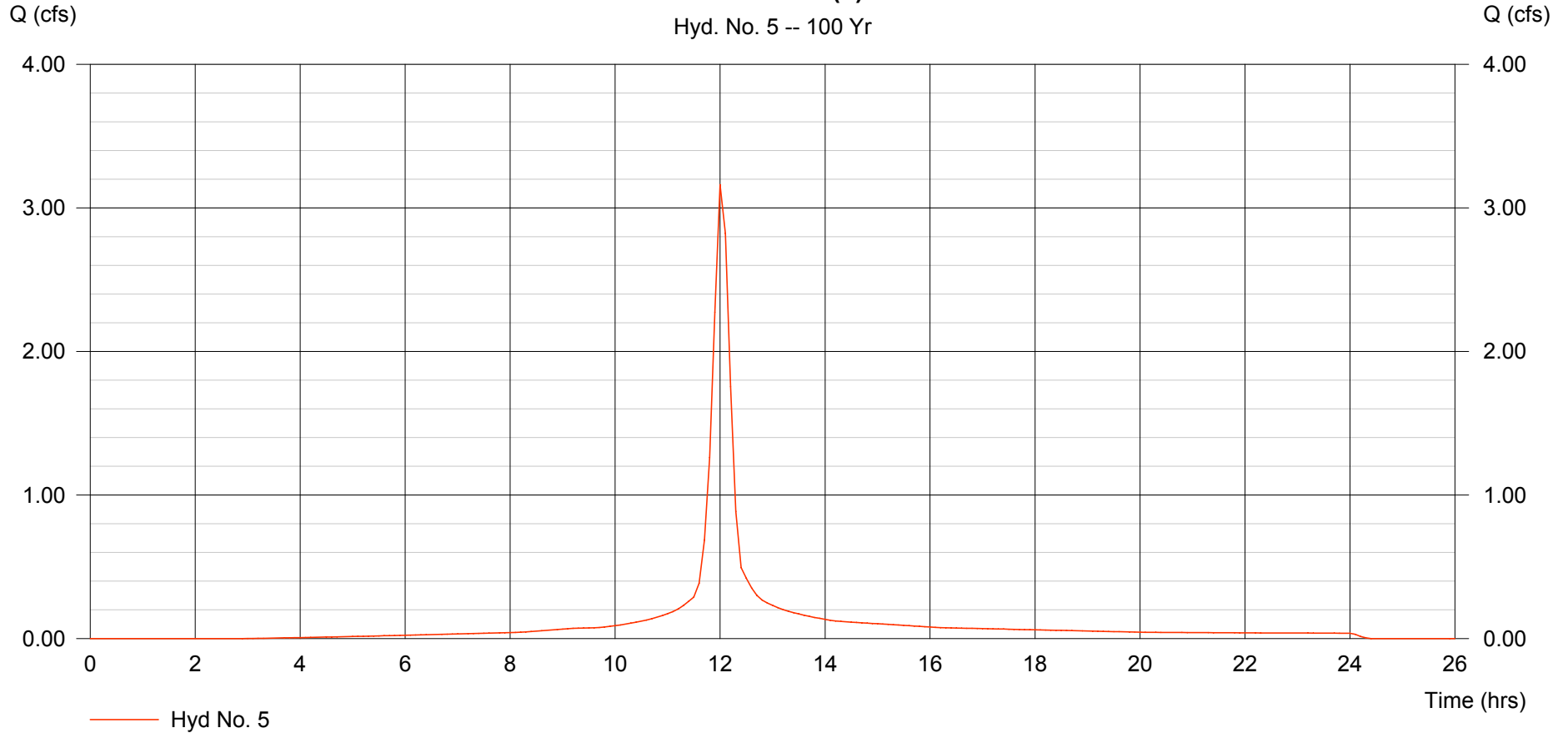
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.467 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 3.162 cfs  
Time interval = 6 min  
Curve number = 89  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.233 acft

### Off-Site W5 (1)

Hyd. No. 5 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

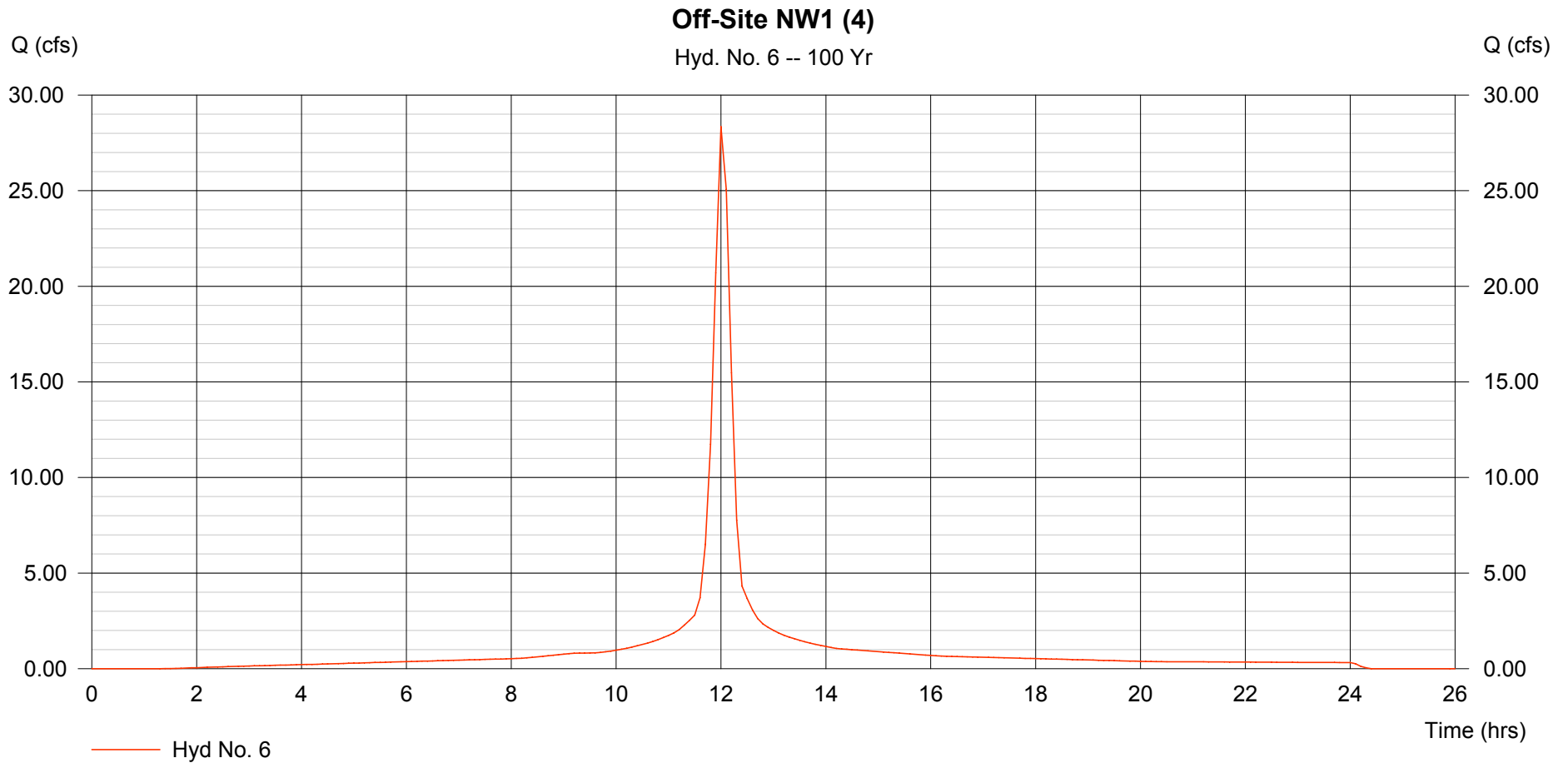
## Hyd. No. 6

Off-Site NW1 (4)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 3.952 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 28.35 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 2.187 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

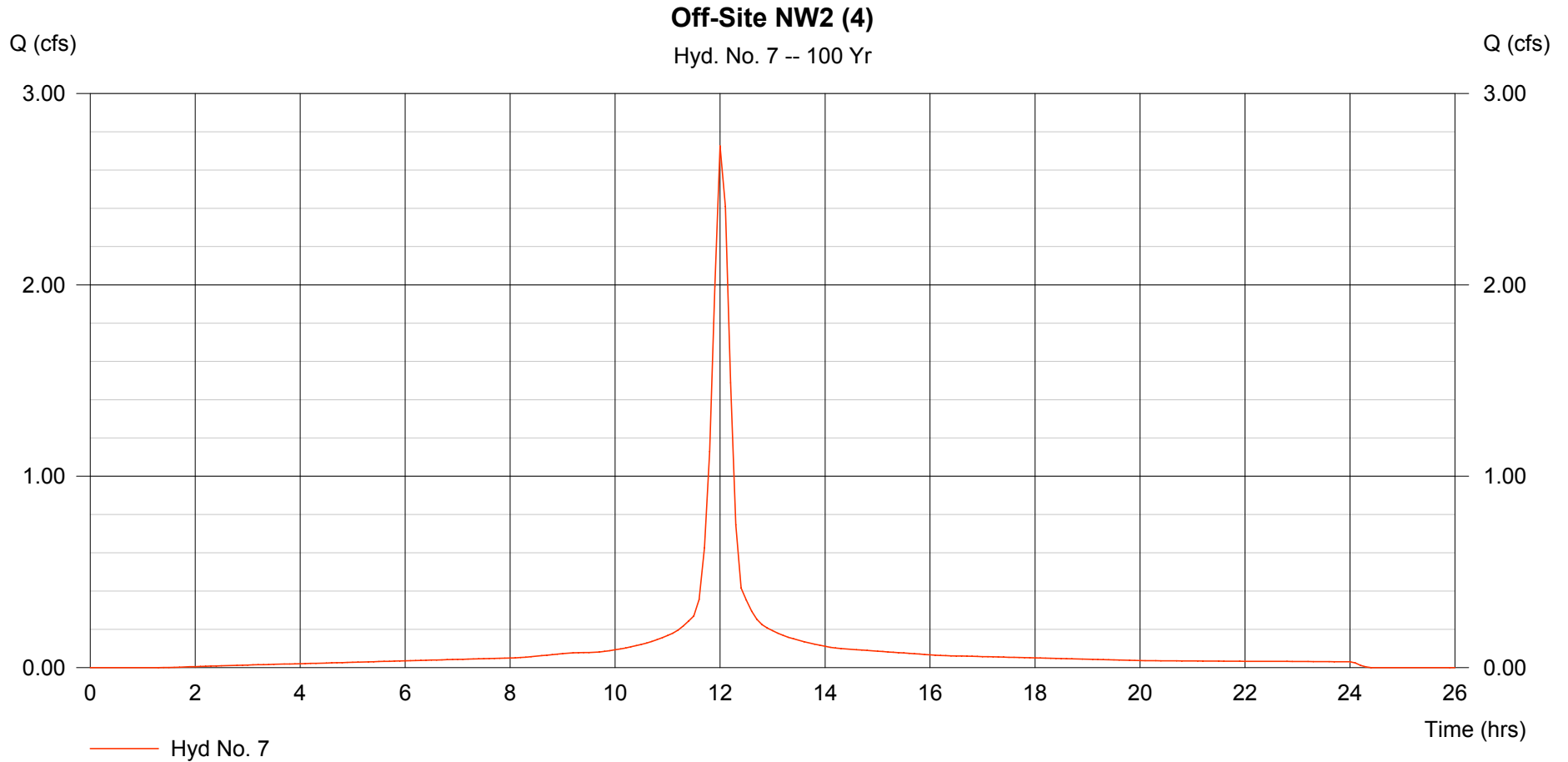
## Hyd. No. 7

Off-Site NW2 (4)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.380 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 2.726 cfs  
Time interval = 6 min  
Curve number = 95  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.210 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 8

Off-Site N (CH)

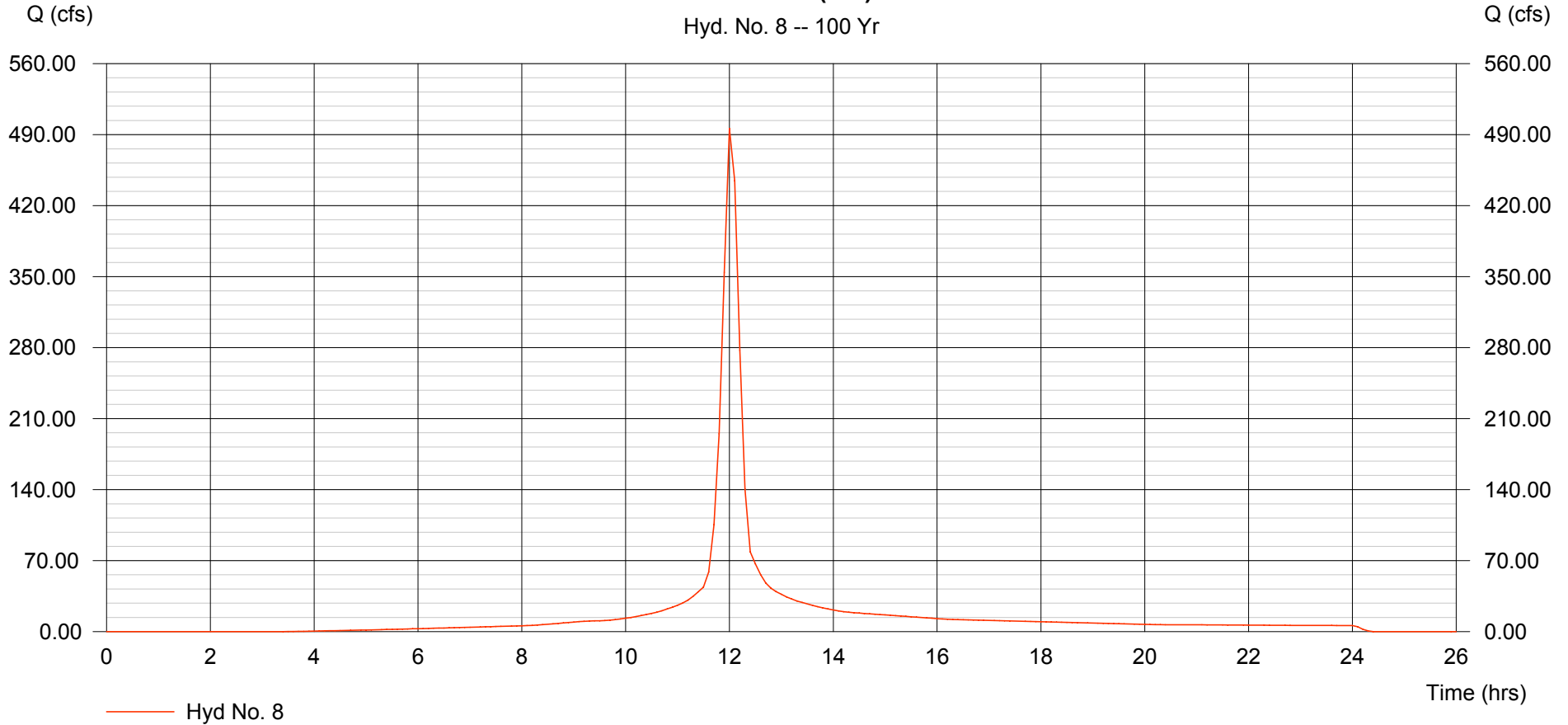
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 75.236 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 496.19 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 36.081 acft

### Off-Site N (CH)

Hyd. No. 8 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 9

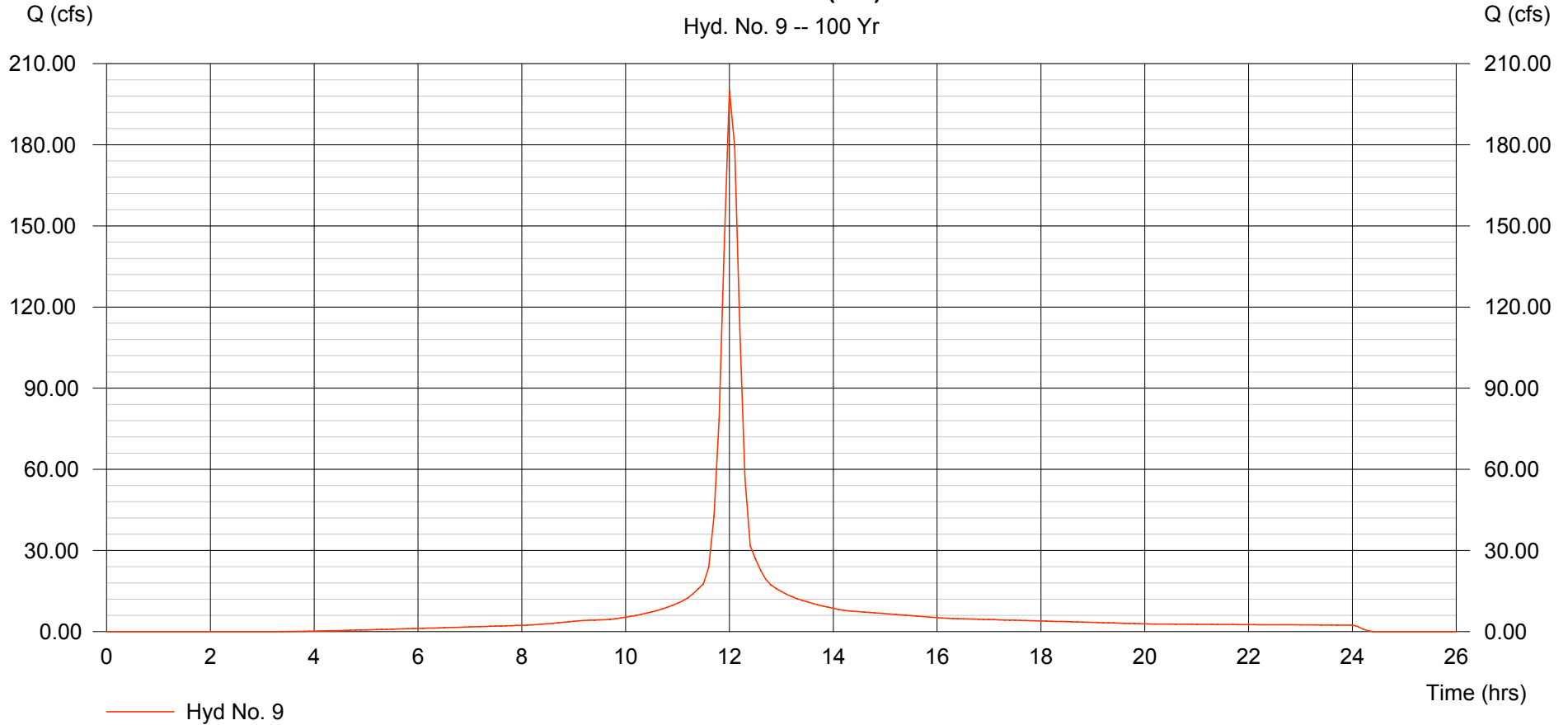
Off-Site NE (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 30.345 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 200.13 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 14.552 acft

**Off-Site NE (CH)**  
Hyd. No. 9 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 10

Off-Site SE (CH)

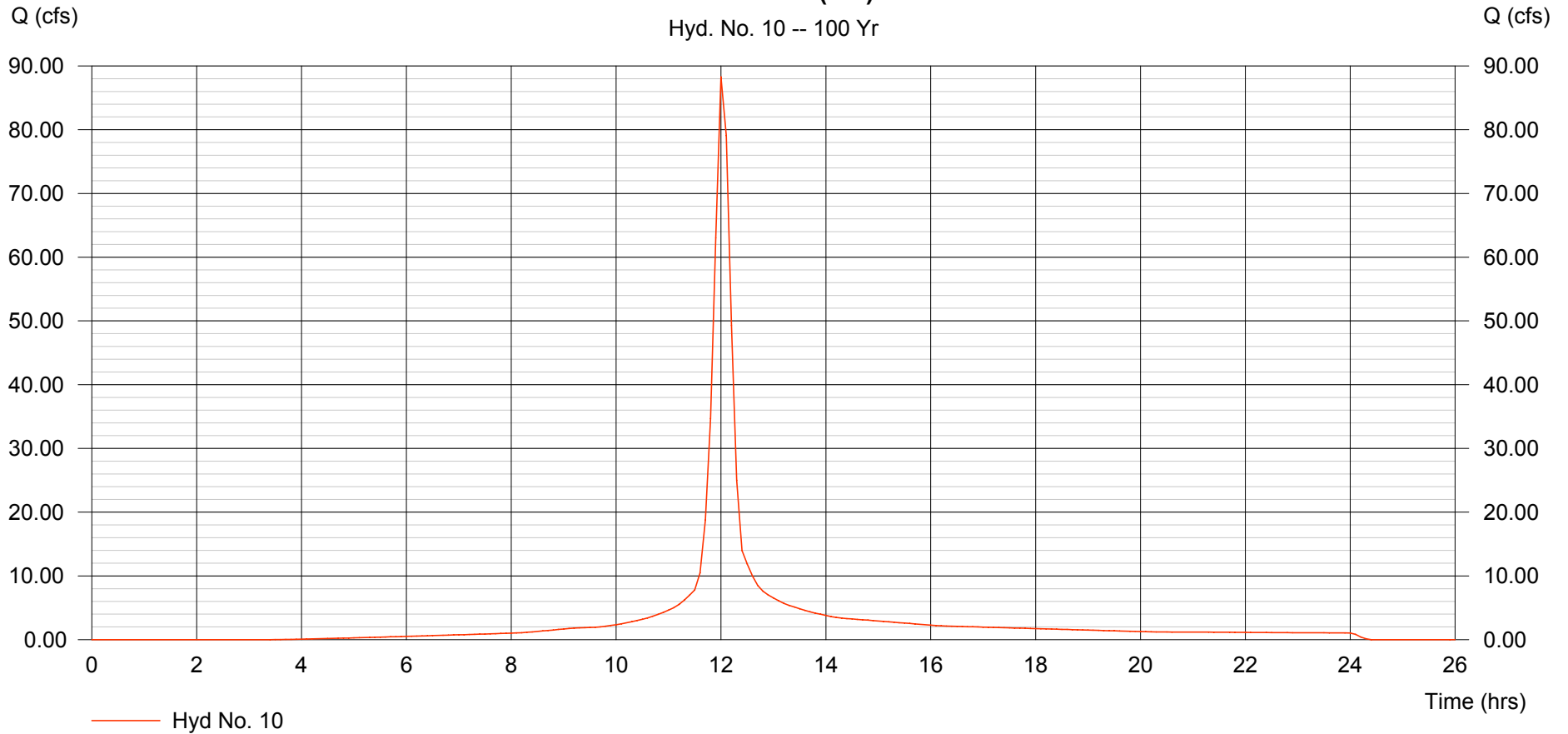
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 13.386 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 88.28 cfs  
Time interval = 6 min  
Curve number = 87  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 6.419 acft

### Off-Site SE (CH)

Hyd. No. 10 -- 100 Yr



# Hydrograph Plot

221

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

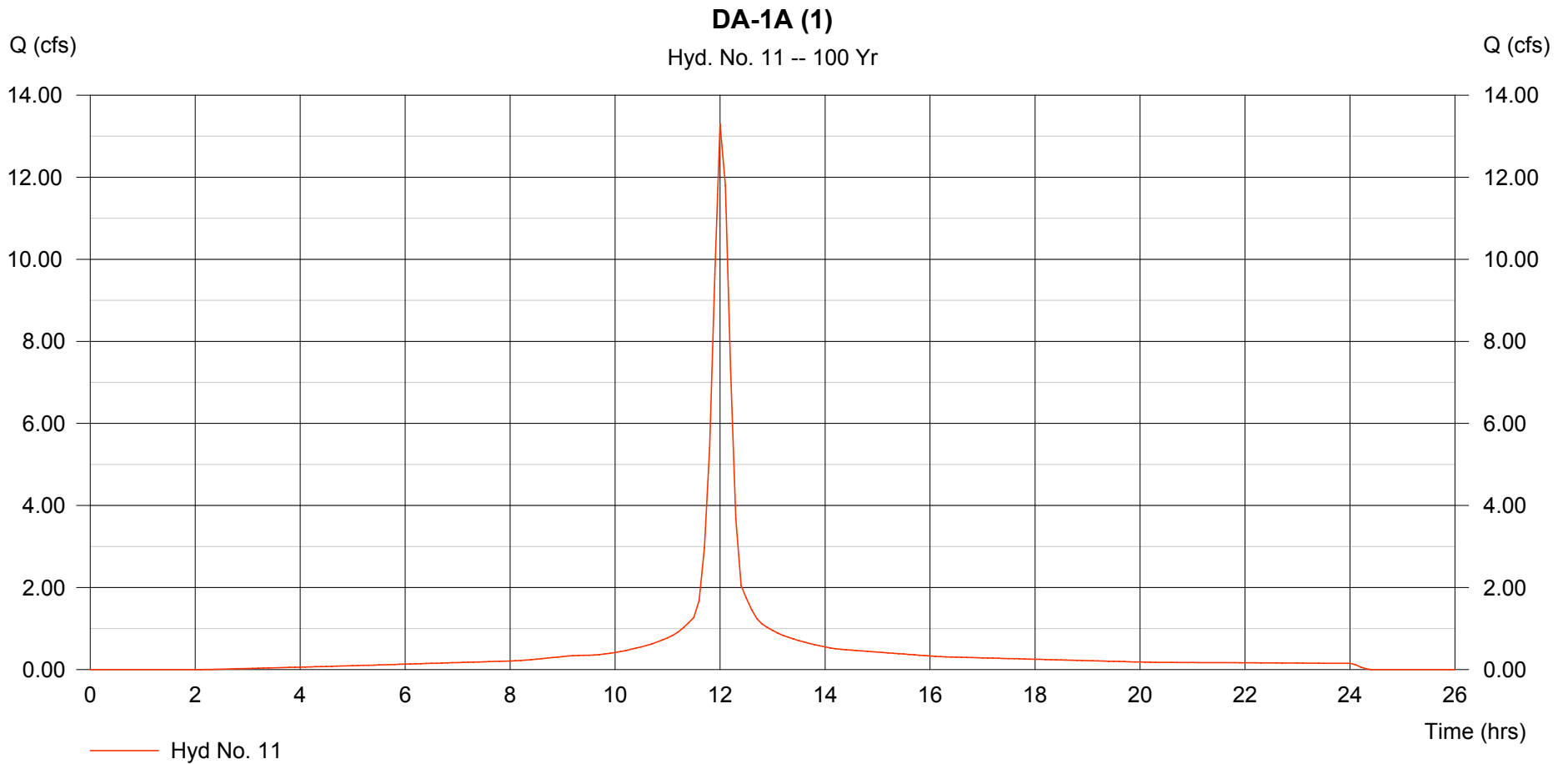
## Hyd. No. 11

DA-1A (1)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 1.899 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 13.29 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.998 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

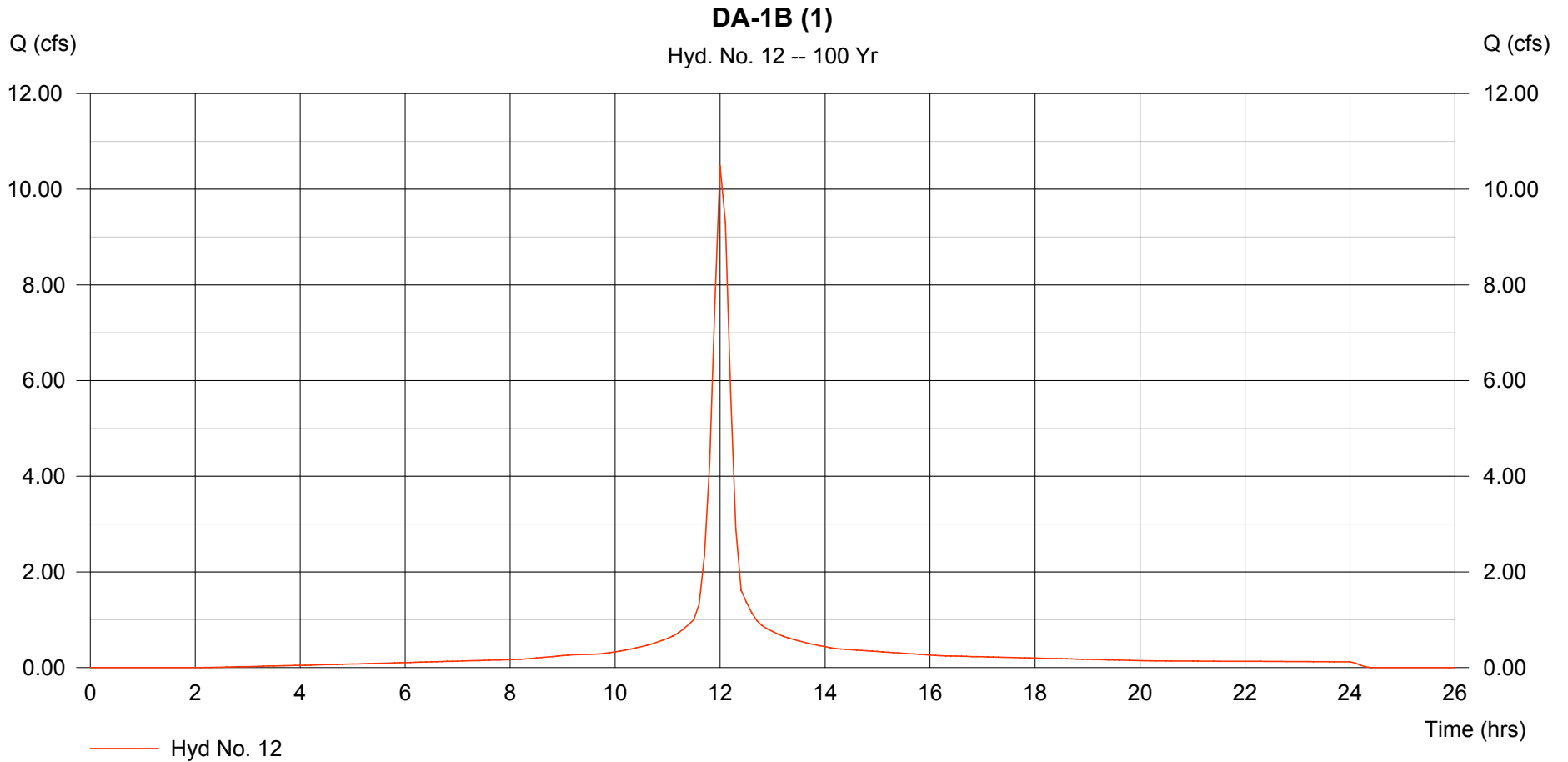
## Hyd. No. 12

DA-1B (1)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 1.498 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 10.49 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.787 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

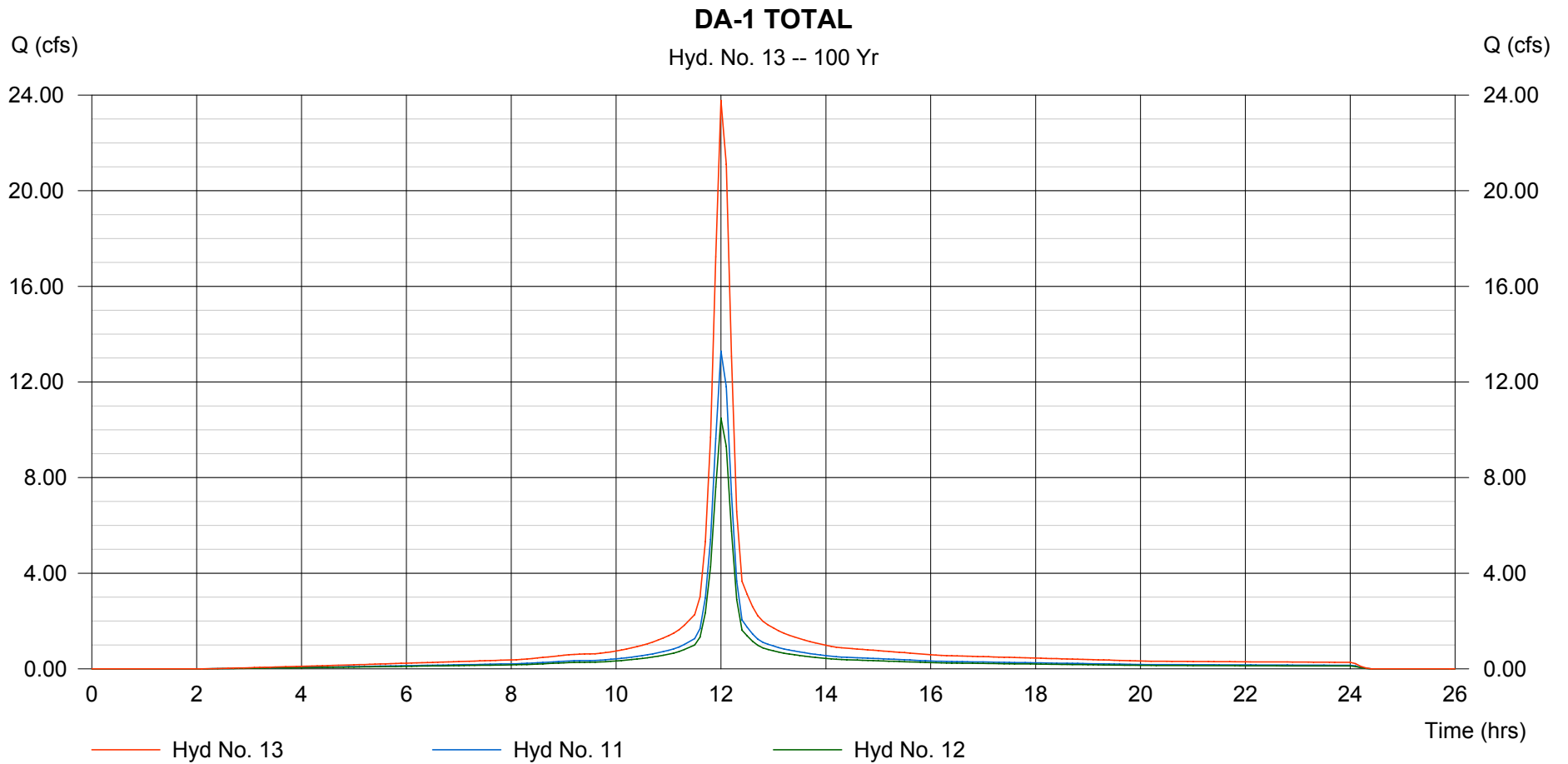
## Hyd. No. 13

DA-1 TOTAL

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 11, 12

Peak discharge = 23.78 cfs  
Time interval = 6 min

Hydrograph Volume = 1.785 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

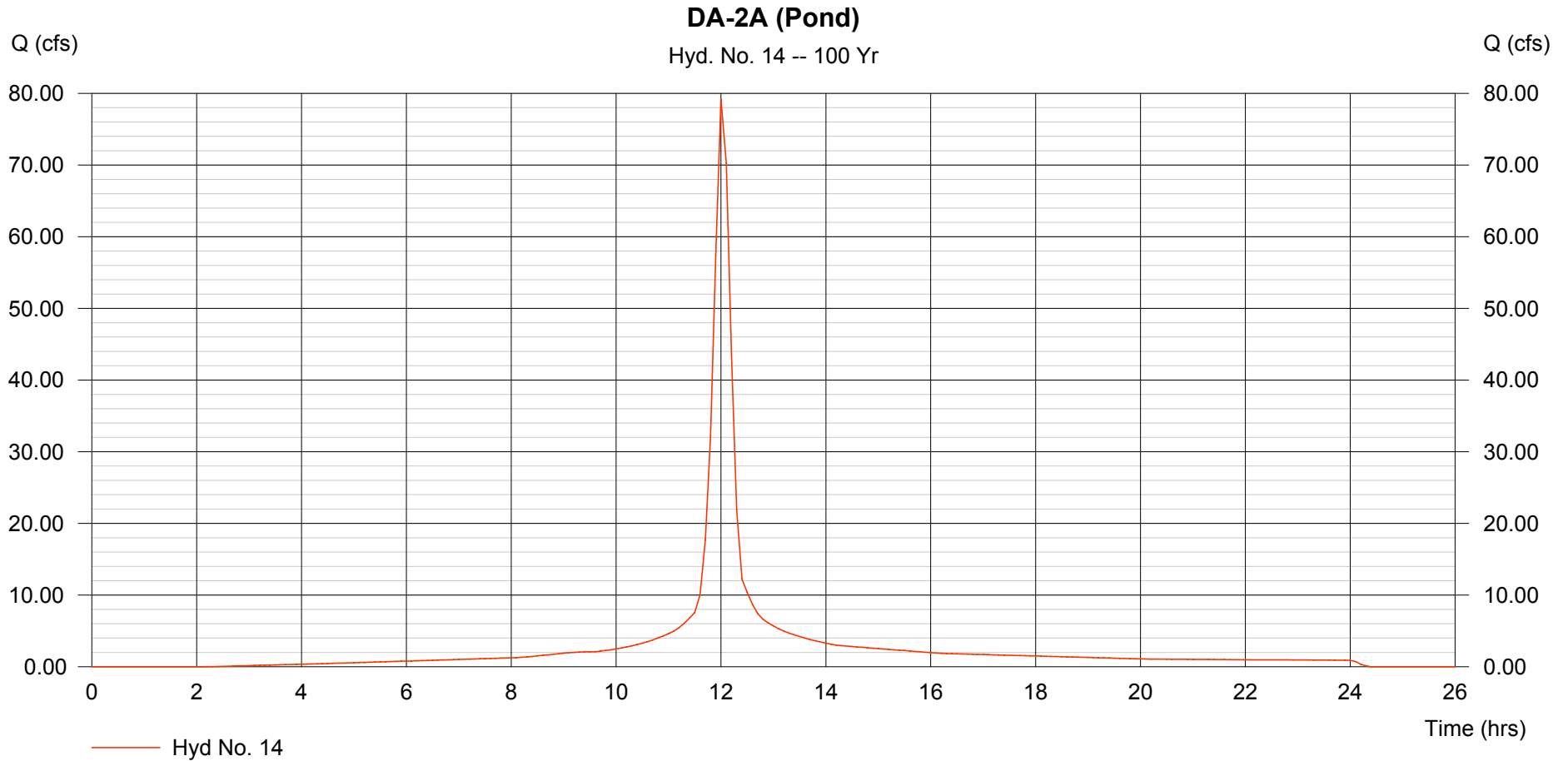
## Hyd. No. 14

DA-2A (Pond)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 11.313 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 79.19 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 5.945 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 15

DA-2B (2-1)

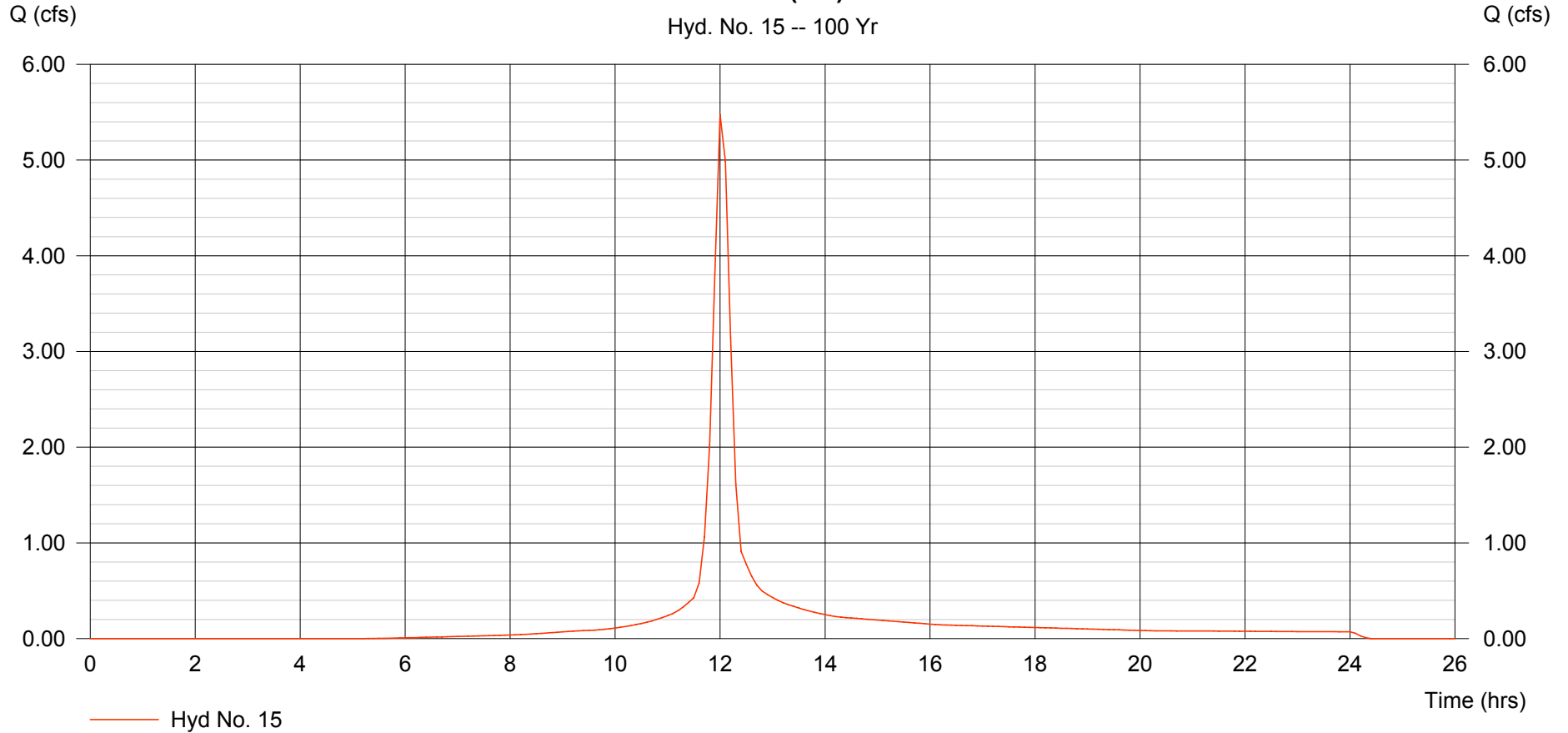
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.934 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 5.476 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.389 acft

### DA-2B (2-1)

Hyd. No. 15 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

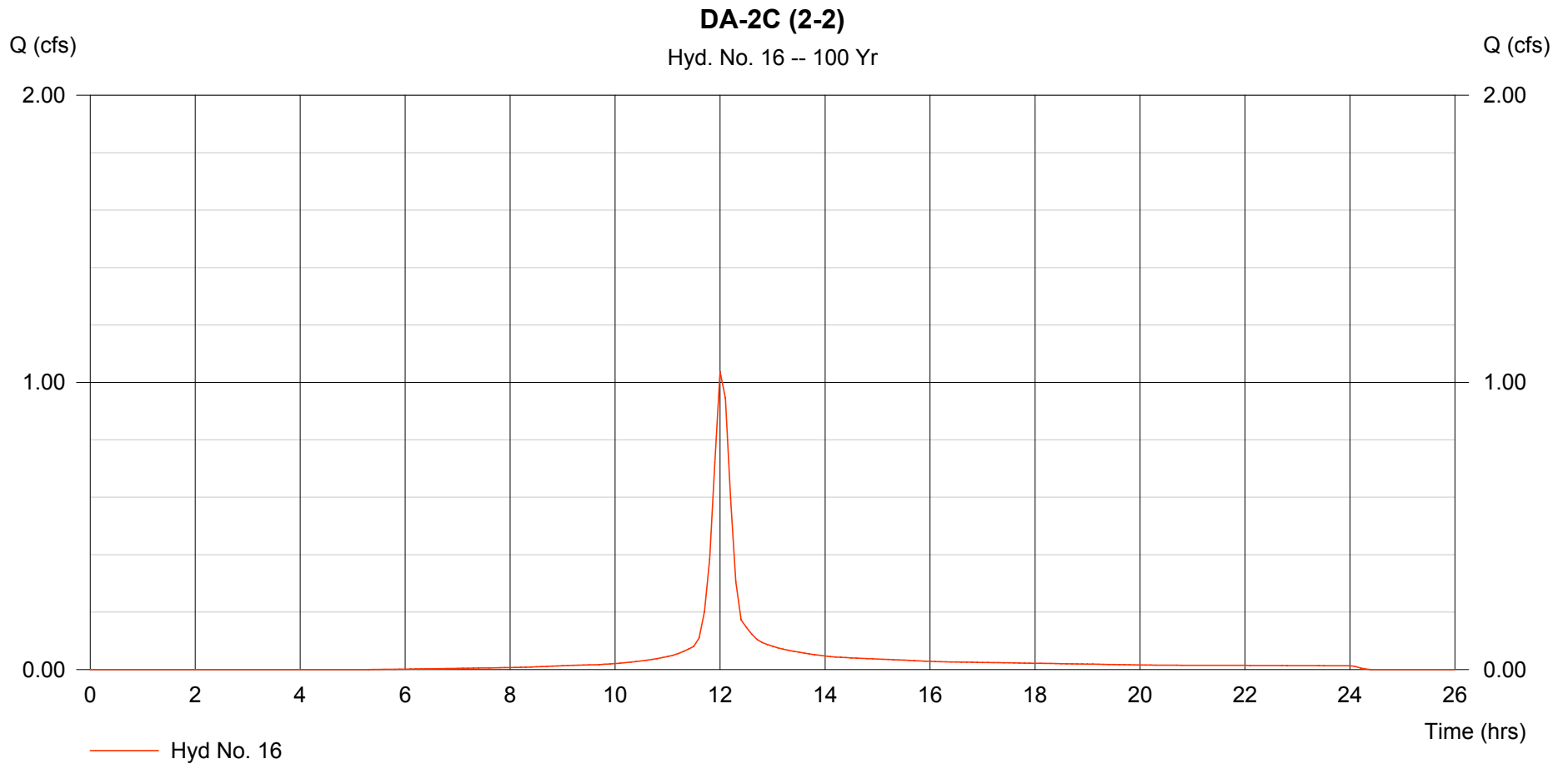
## Hyd. No. 16

DA-2C (2-2)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.177 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 1.038 cfs  
Time interval = 6 min  
Curve number = 80  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.074 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

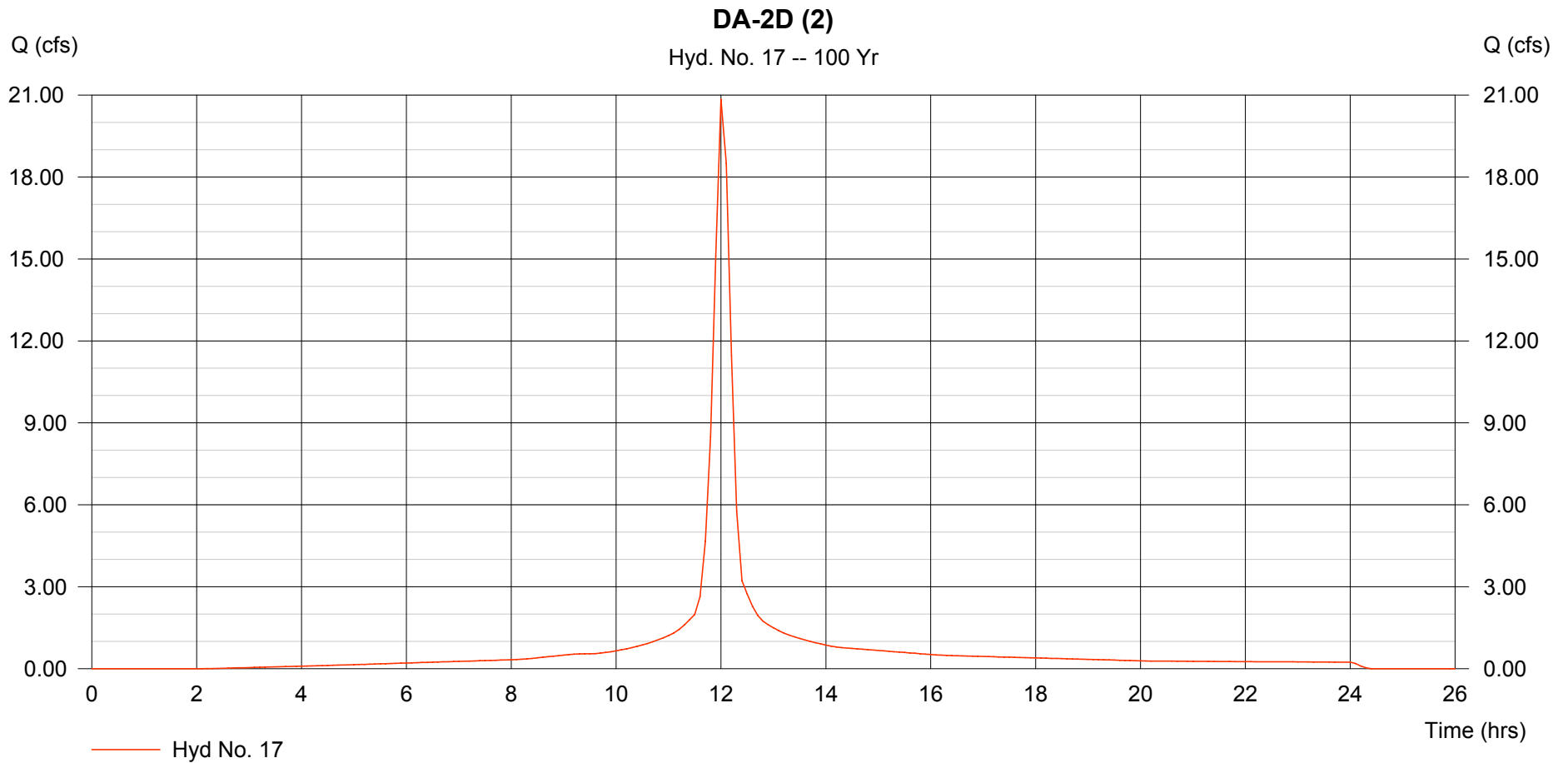
## Hyd. No. 17

DA-2D (2)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 2.978 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 20.85 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.565 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

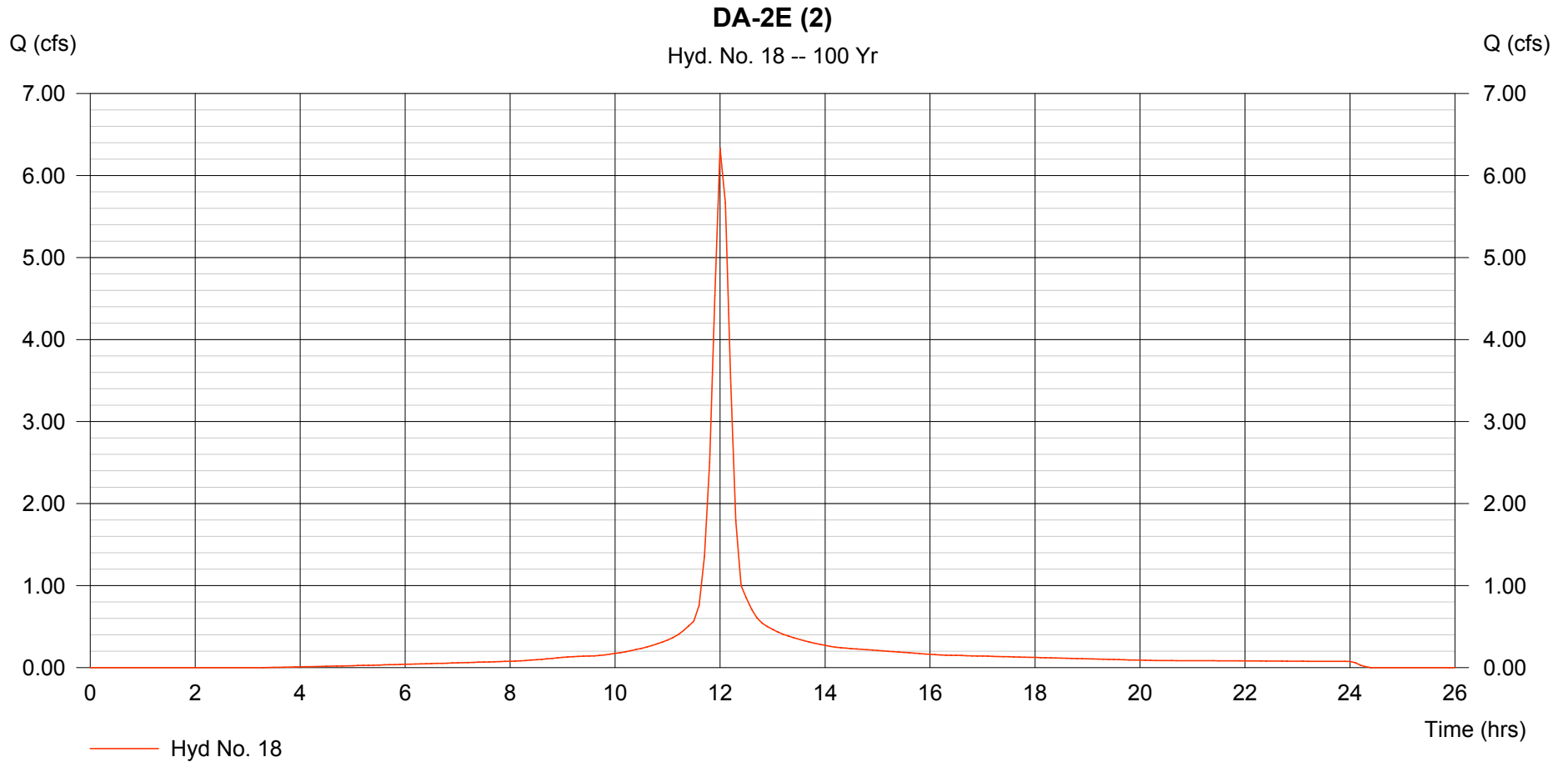
## Hyd. No. 18

DA-2E (2)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.951 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 6.333 cfs  
Time interval = 6 min  
Curve number = 87.7  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.462 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

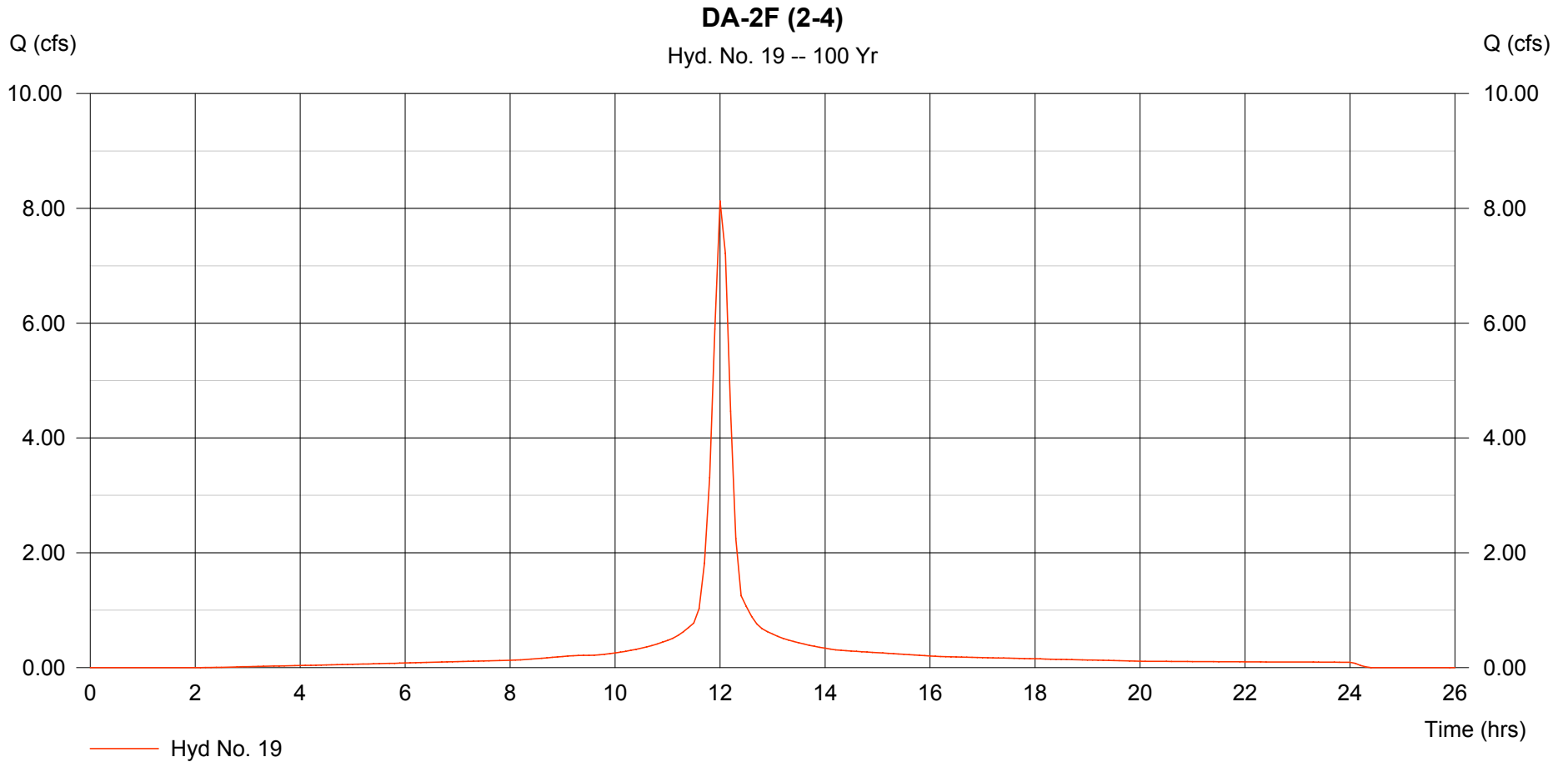
## Hyd. No. 19

DA-2F (2-4)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 1.161 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 8.127 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.610 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 20

DA-2G (2-5)

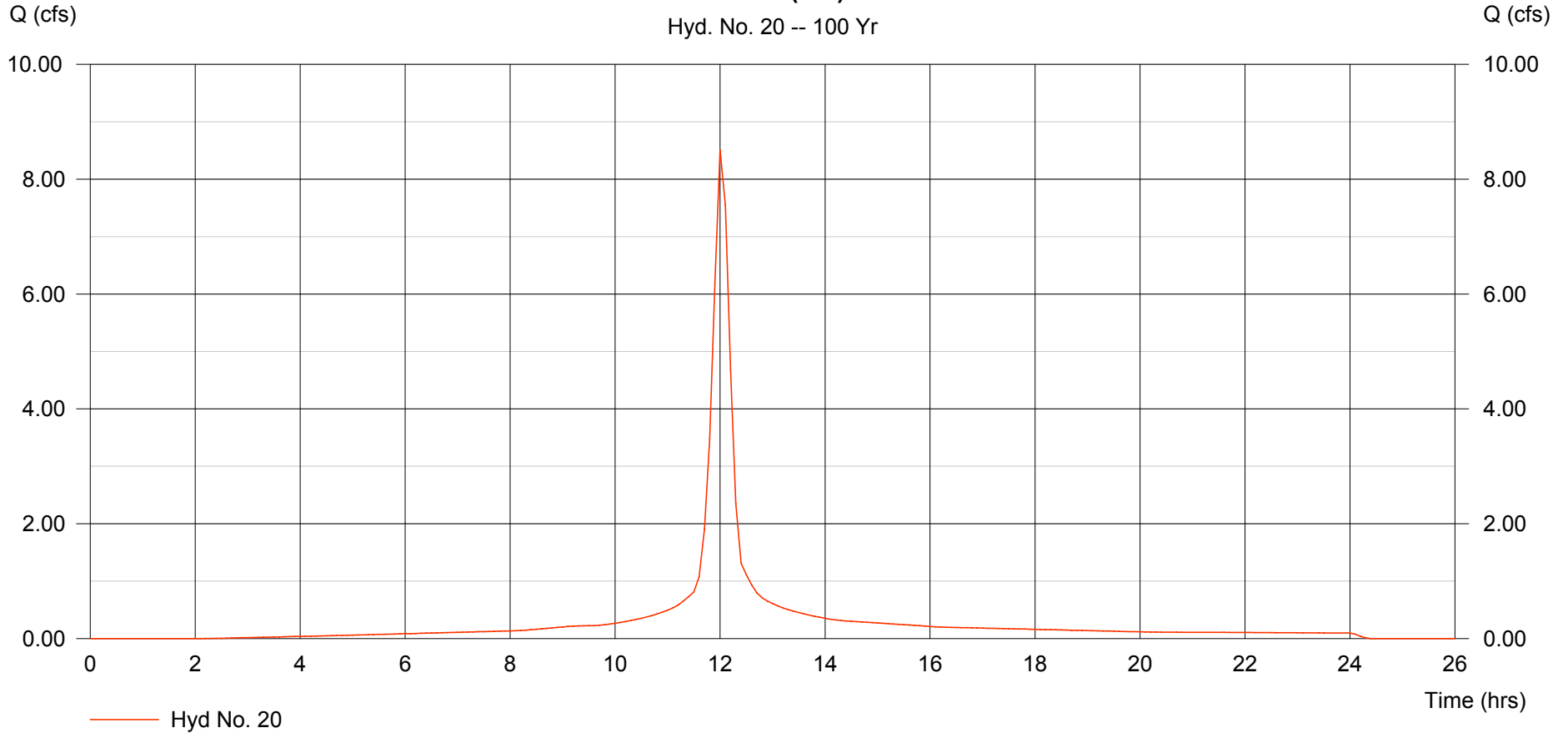
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 1.215 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 8.505 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.639 acft

### DA-2G (2-5)

Hyd. No. 20 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 21

DA-2H (2-3)

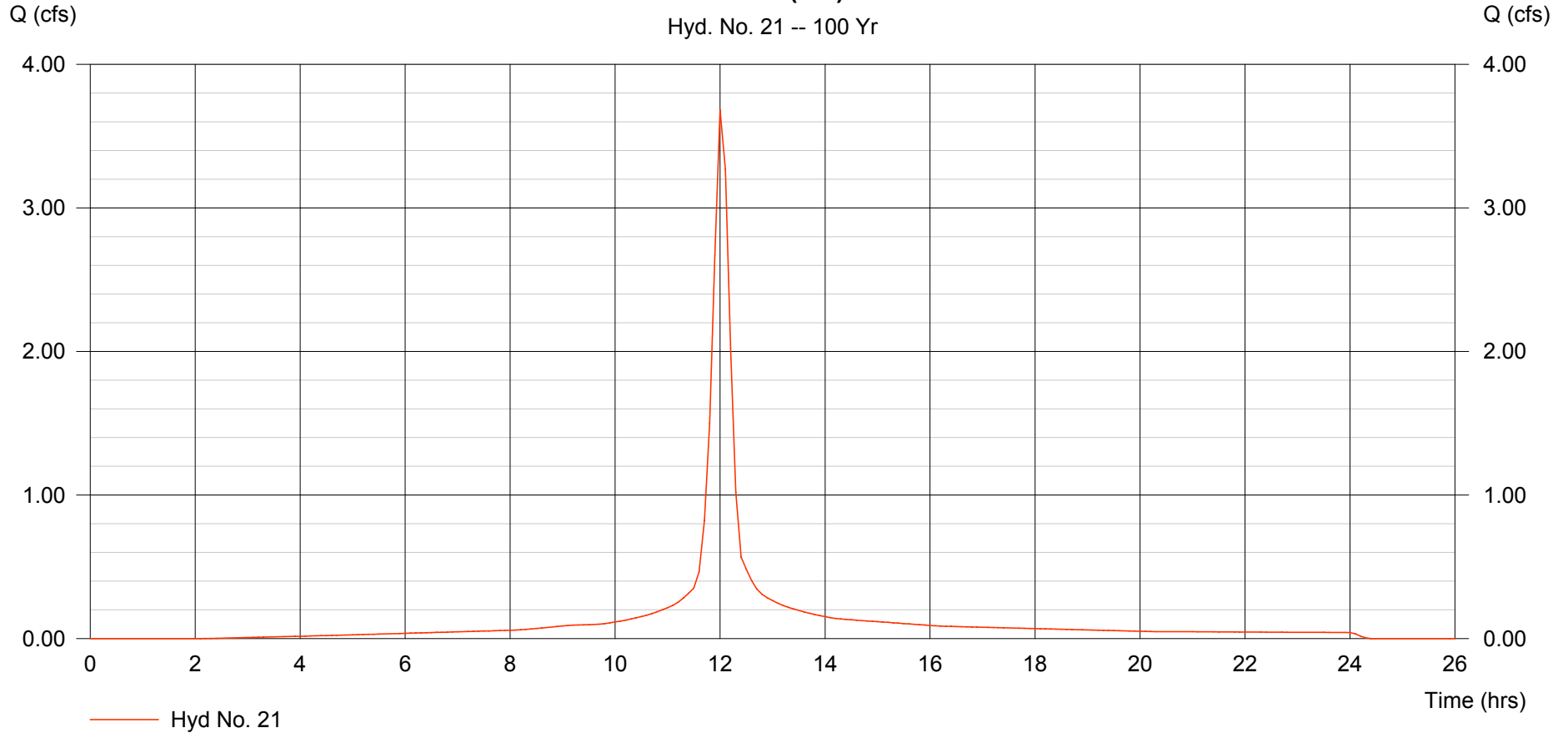
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.526 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 3.682 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.276 acft

### DA-2H (2-3)

Hyd. No. 21 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 22

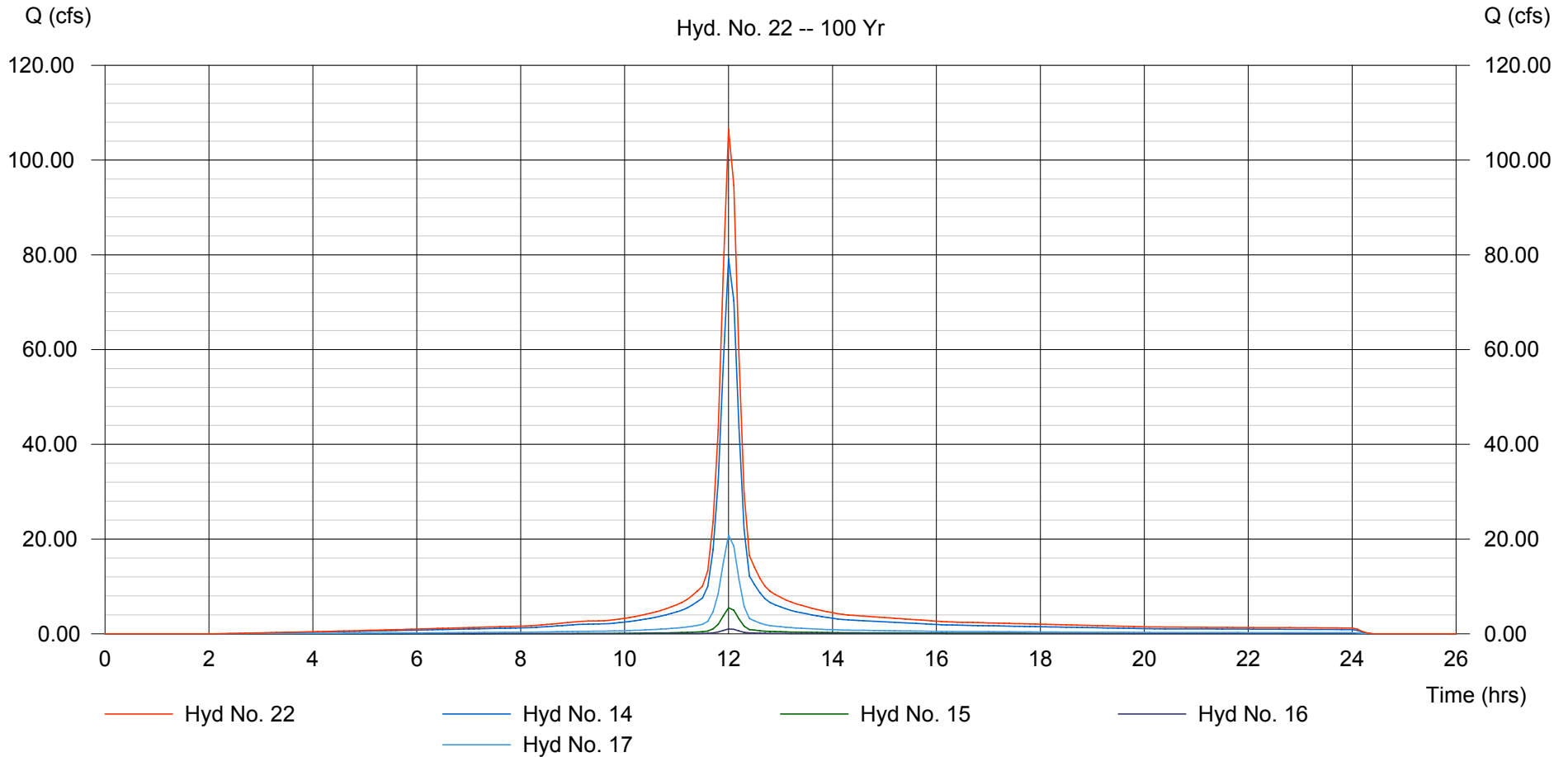
DA-2A to DA-2D

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 14, 15, 16, 17

Peak discharge = 106.55 cfs  
Time interval = 6 min

Hydrograph Volume = 7.973 acft

**DA-2A to DA-2D**  
Hyd. No. 22 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

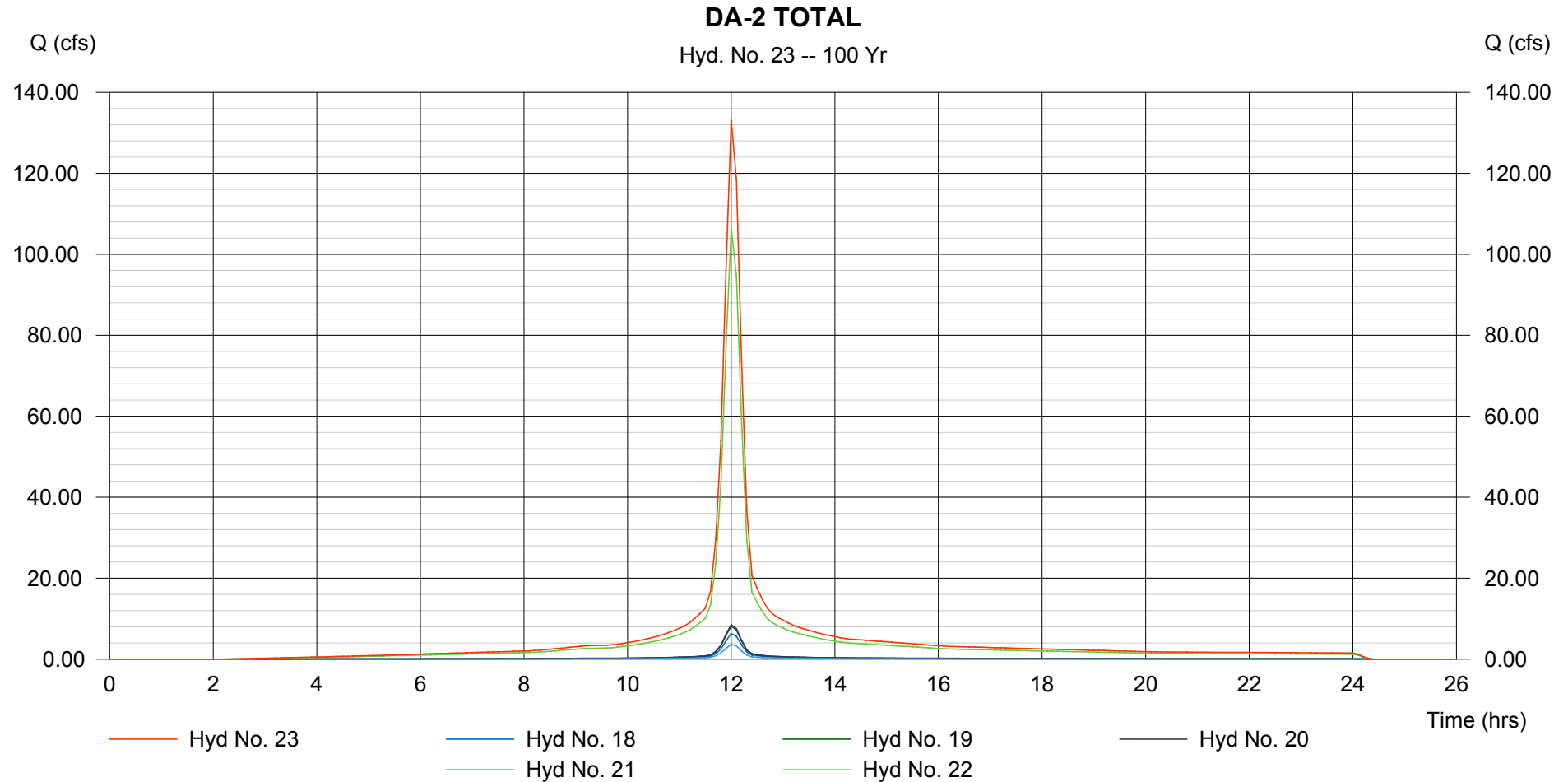
## Hyd. No. 23

DA-2 TOTAL

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 18, 19, 20, 21, 22

Peak discharge = 133.20 cfs  
Time interval = 6 min

Hydrograph Volume = 9.960 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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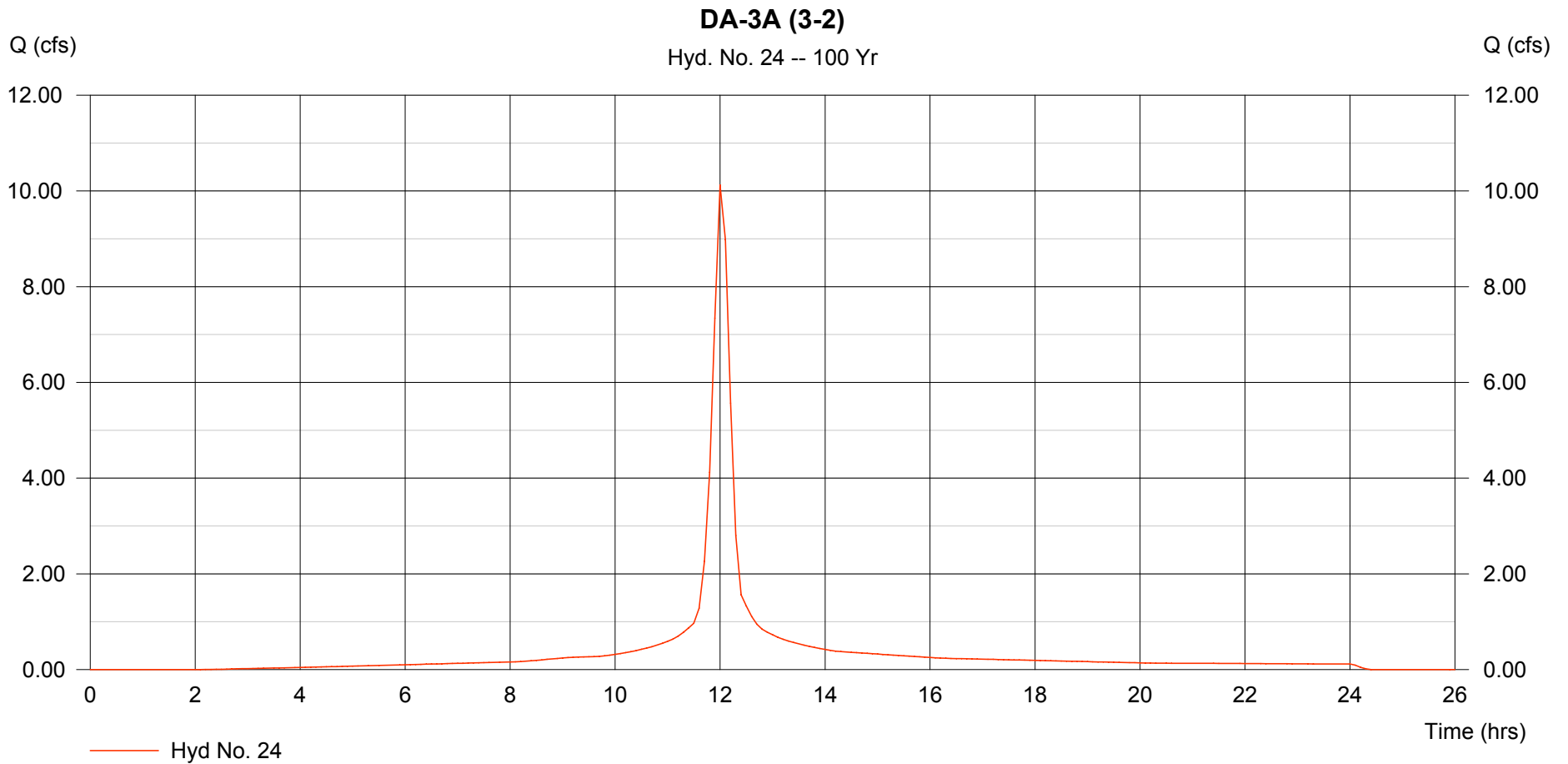
## Hyd. No. 24

DA-3A (3-2)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 1.446 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 10.12 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.760 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 25

DA-3B (3-3)

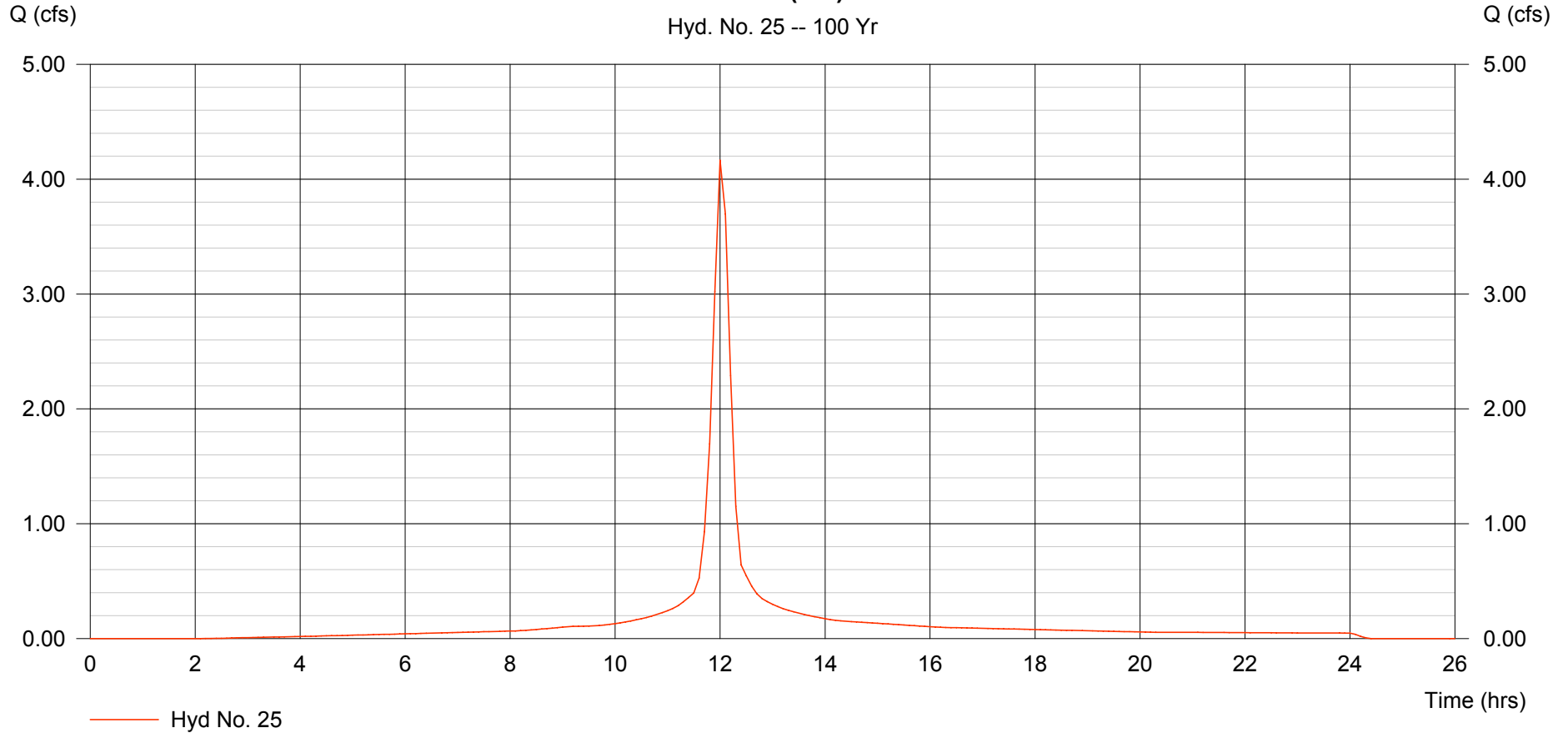
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.595 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 4.165 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.313 acft

### DA-3B (3-3)

Hyd. No. 25 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

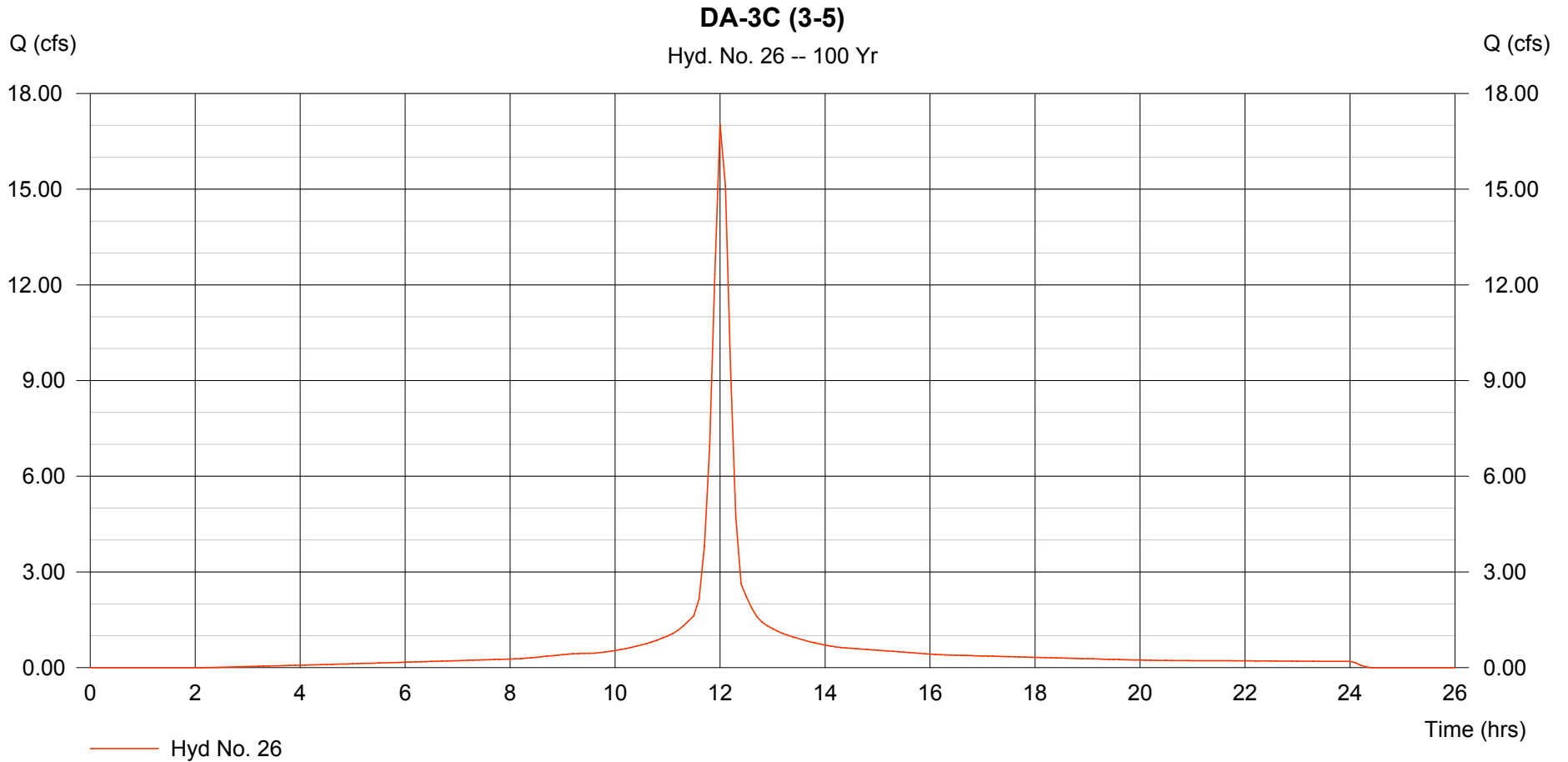
## Hyd. No. 26

DA-3C (3-5)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 2.433 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 17.03 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.279 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

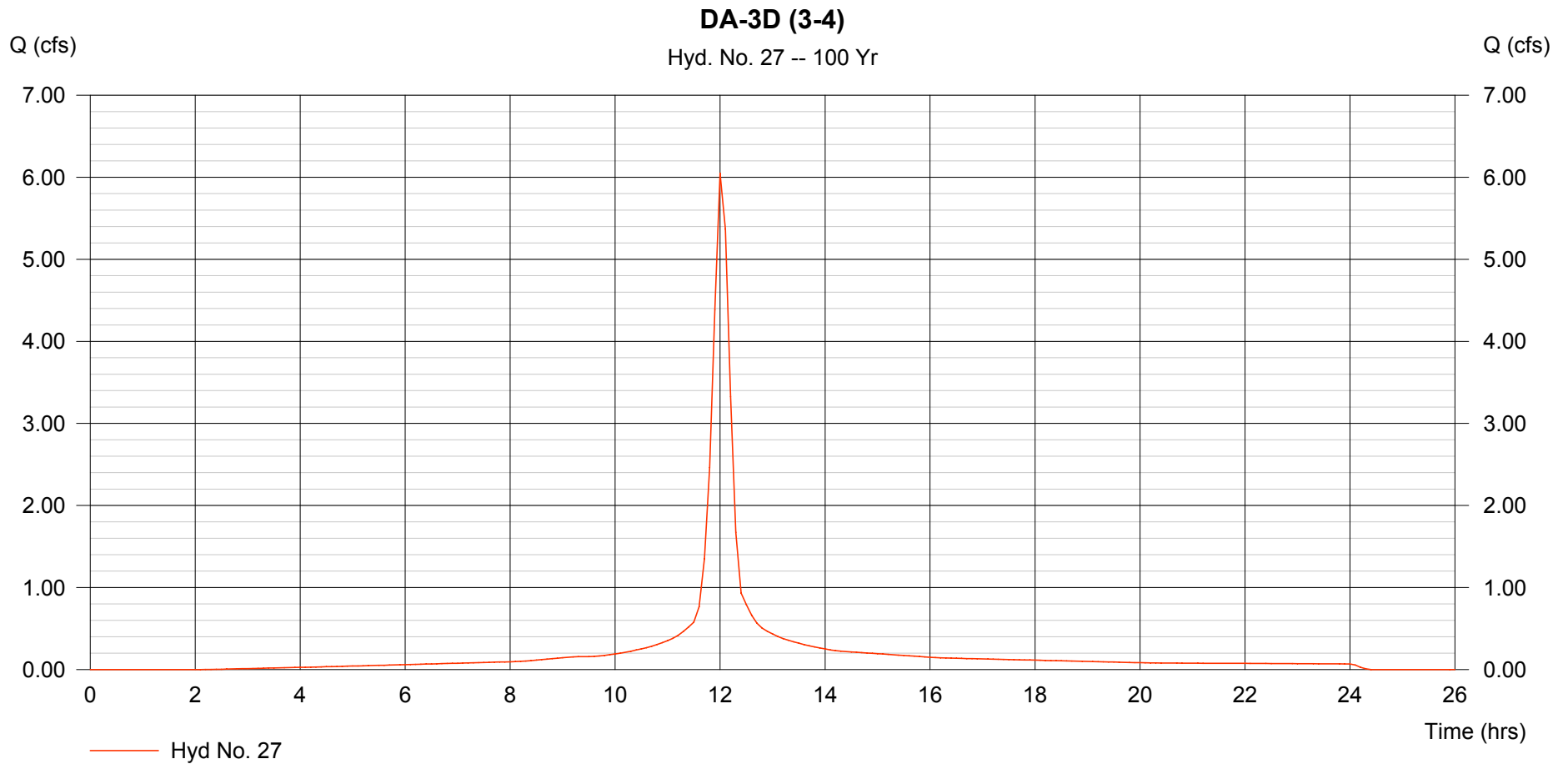
## Hyd. No. 27

DA-3D (3-4)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.864 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 6.048 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.454 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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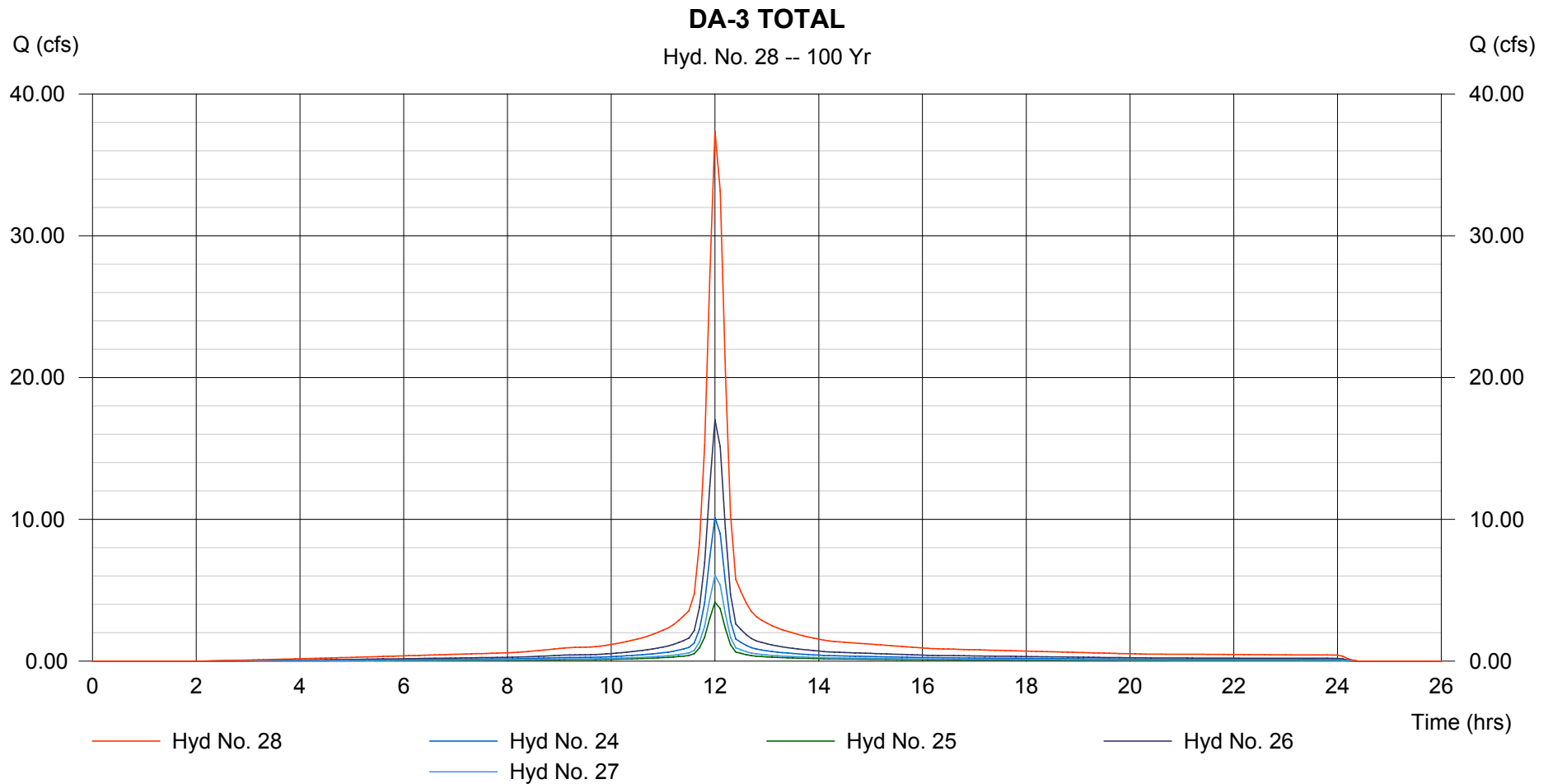
## Hyd. No. 28

DA-3 TOTAL

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 37.37 cfs  
Time interval = 6 min

Hydrograph Volume = 2.805 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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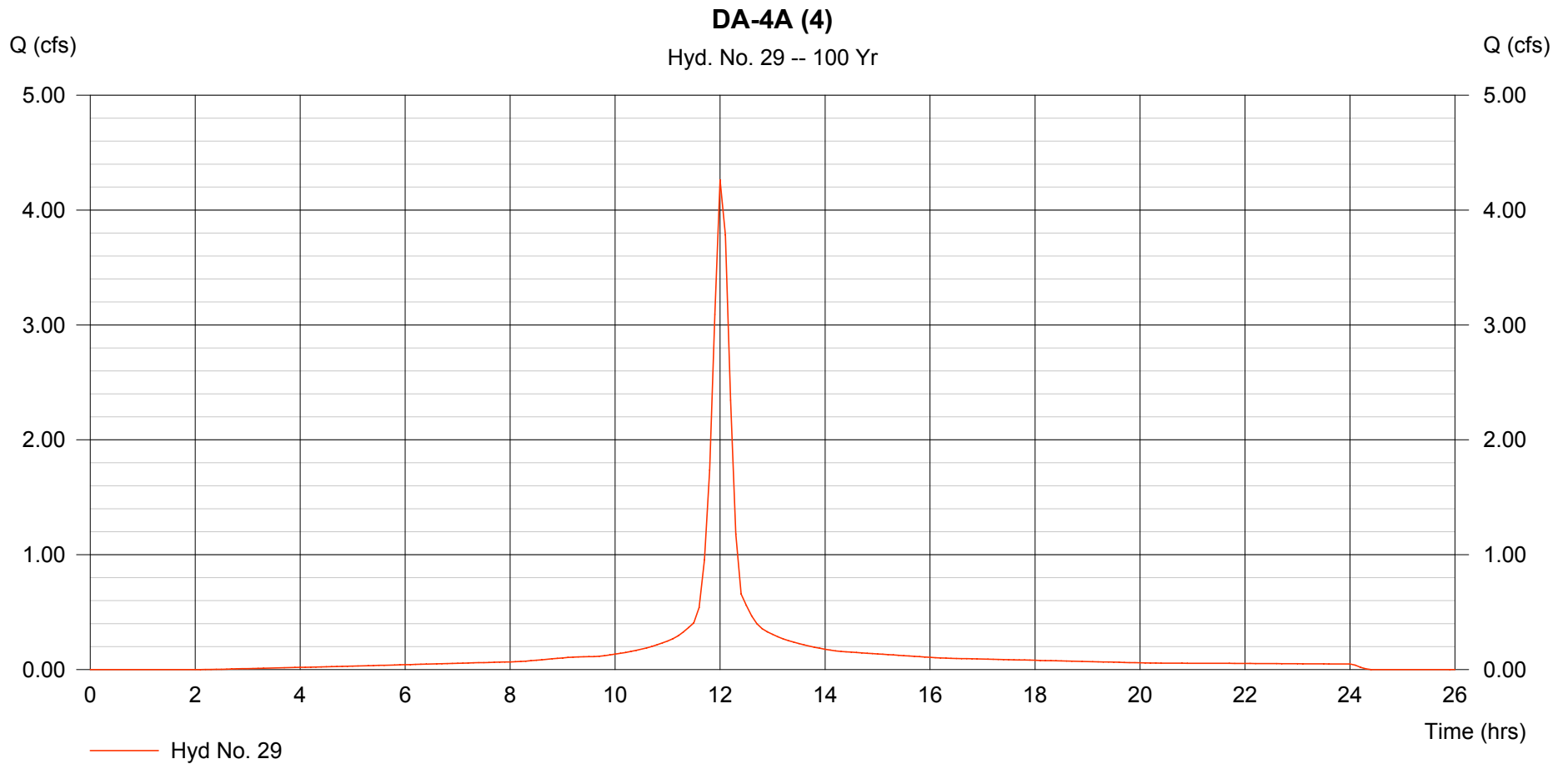
## Hyd. No. 29

DA-4A (4)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.609 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 4.263 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.320 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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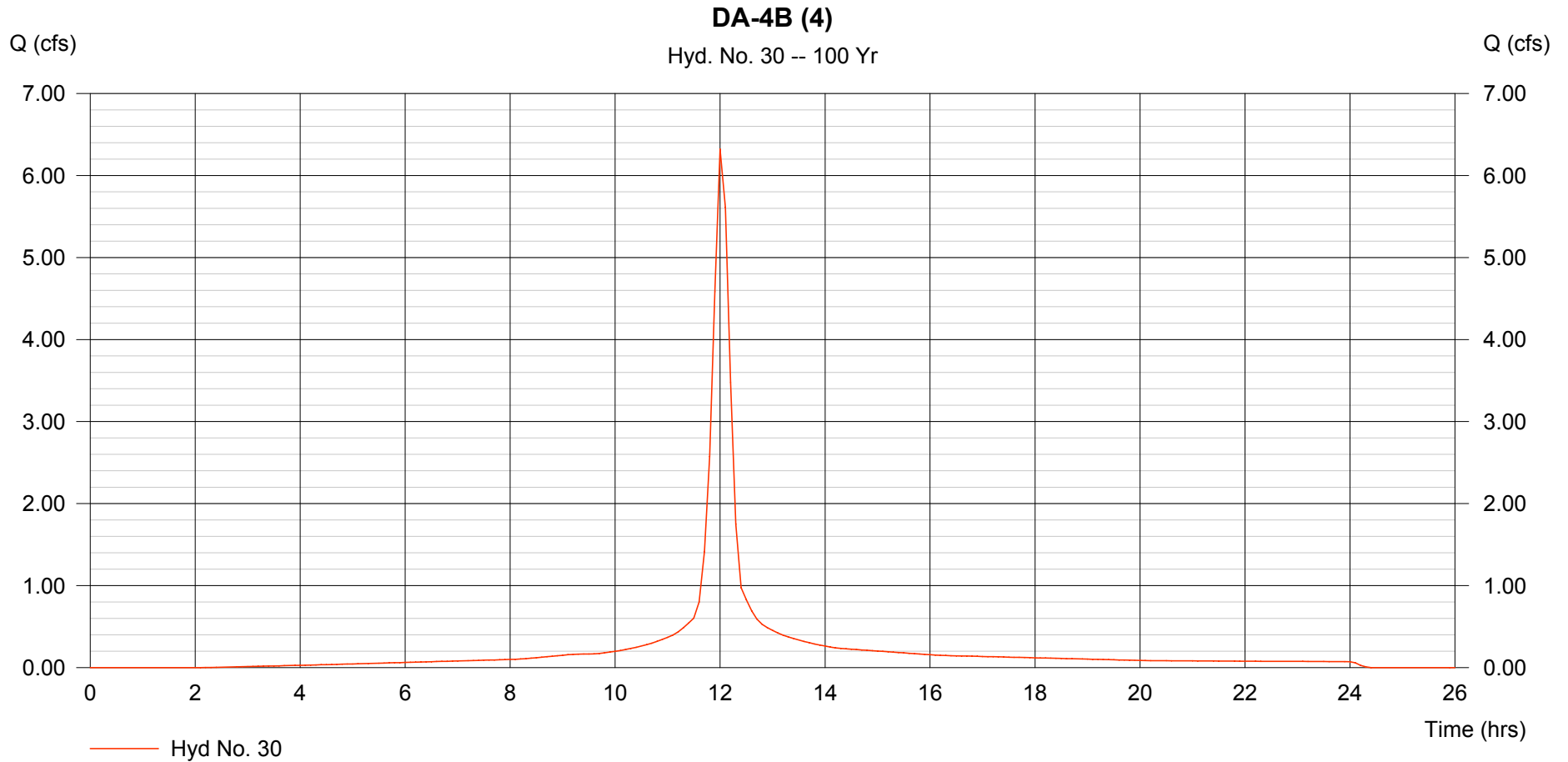
## Hyd. No. 30

DA-4B (4)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 0.903 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 6.321 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 0.475 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

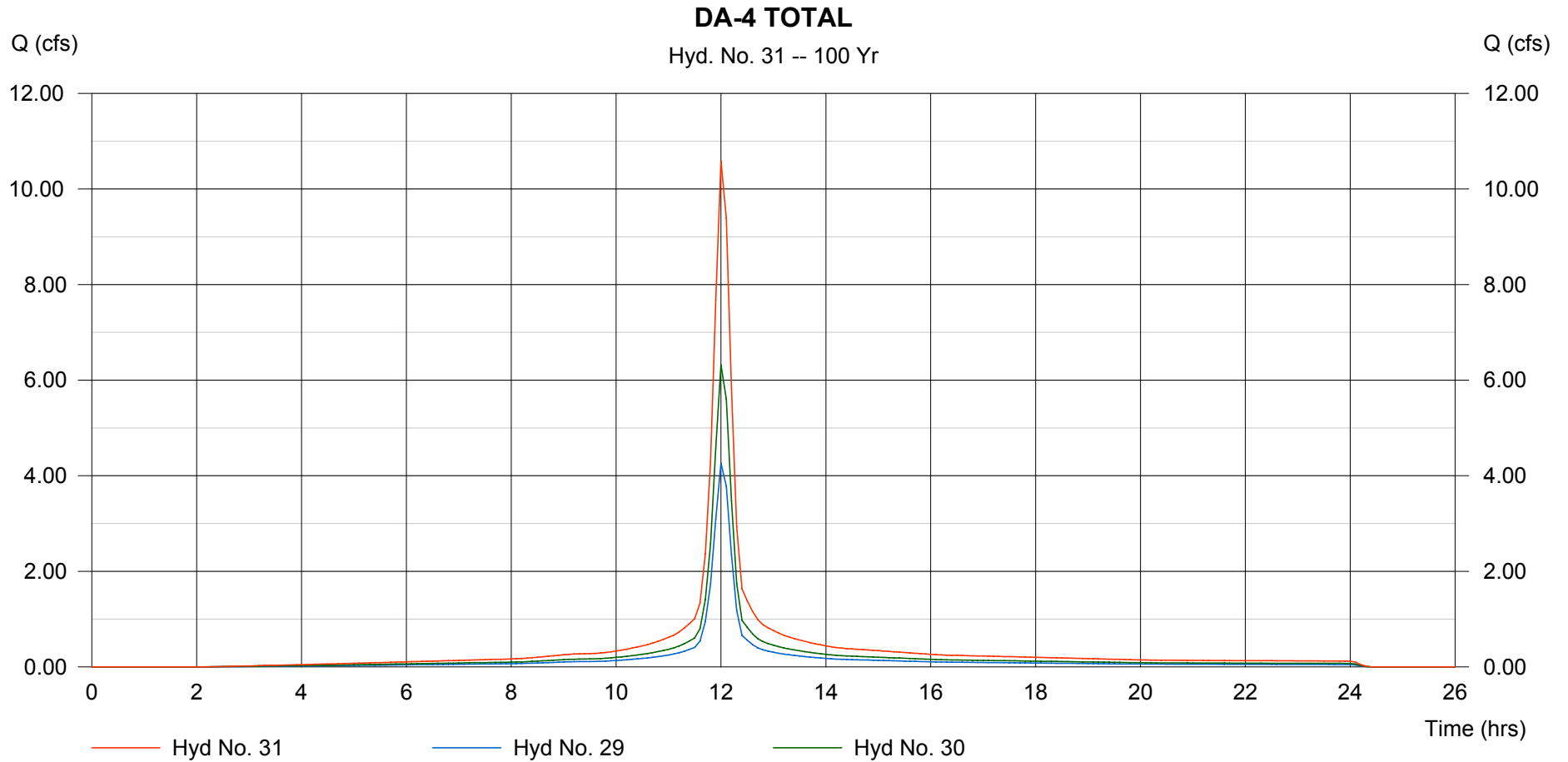
## Hyd. No. 31

DA-4 TOTAL

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 29, 30

Peak discharge = 10.58 cfs  
Time interval = 6 min

Hydrograph Volume = 0.795 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 32

DA-5 (CH)

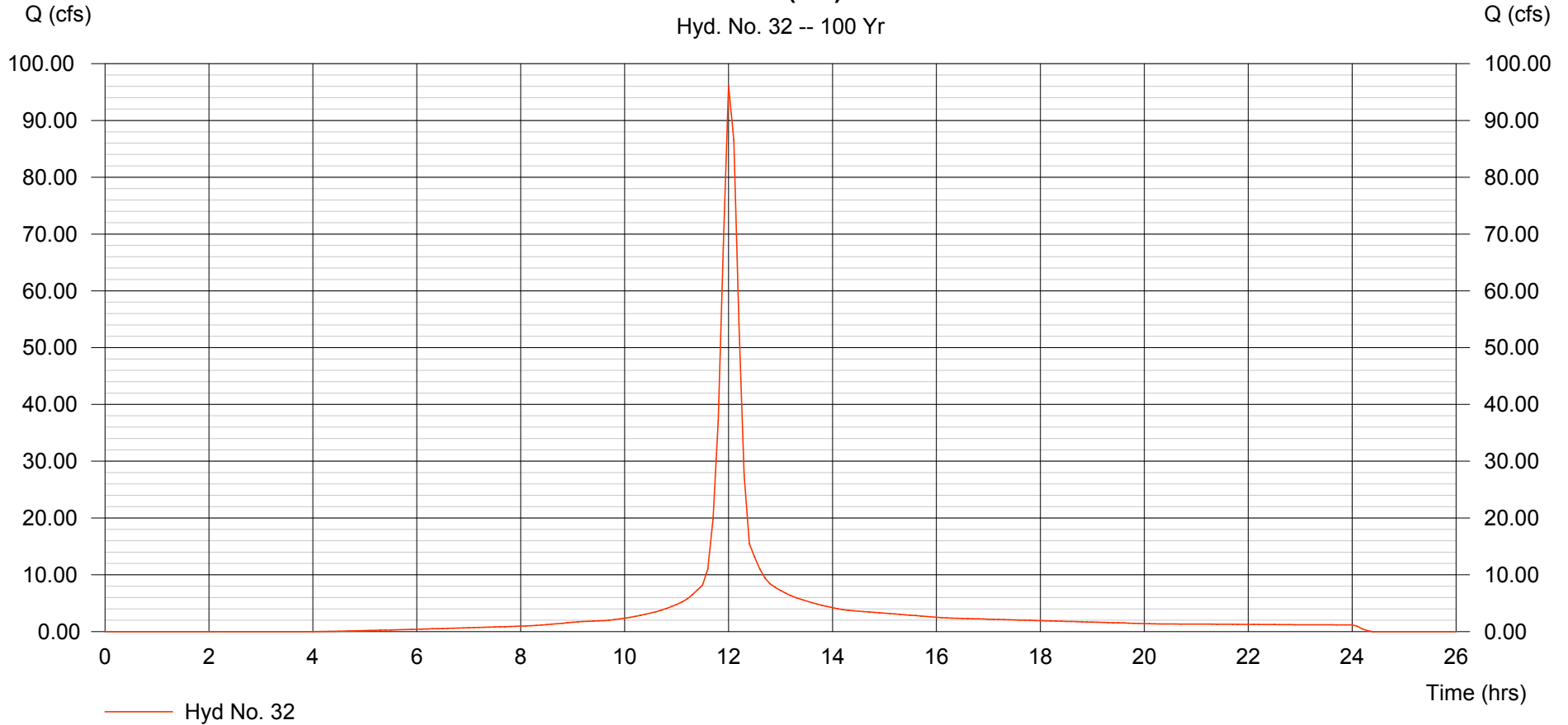
Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 15.067 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 96.16 cfs  
Time interval = 6 min  
Curve number = 84.8  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 6.923 acft

### DA-5 (CH)

Hyd. No. 32 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

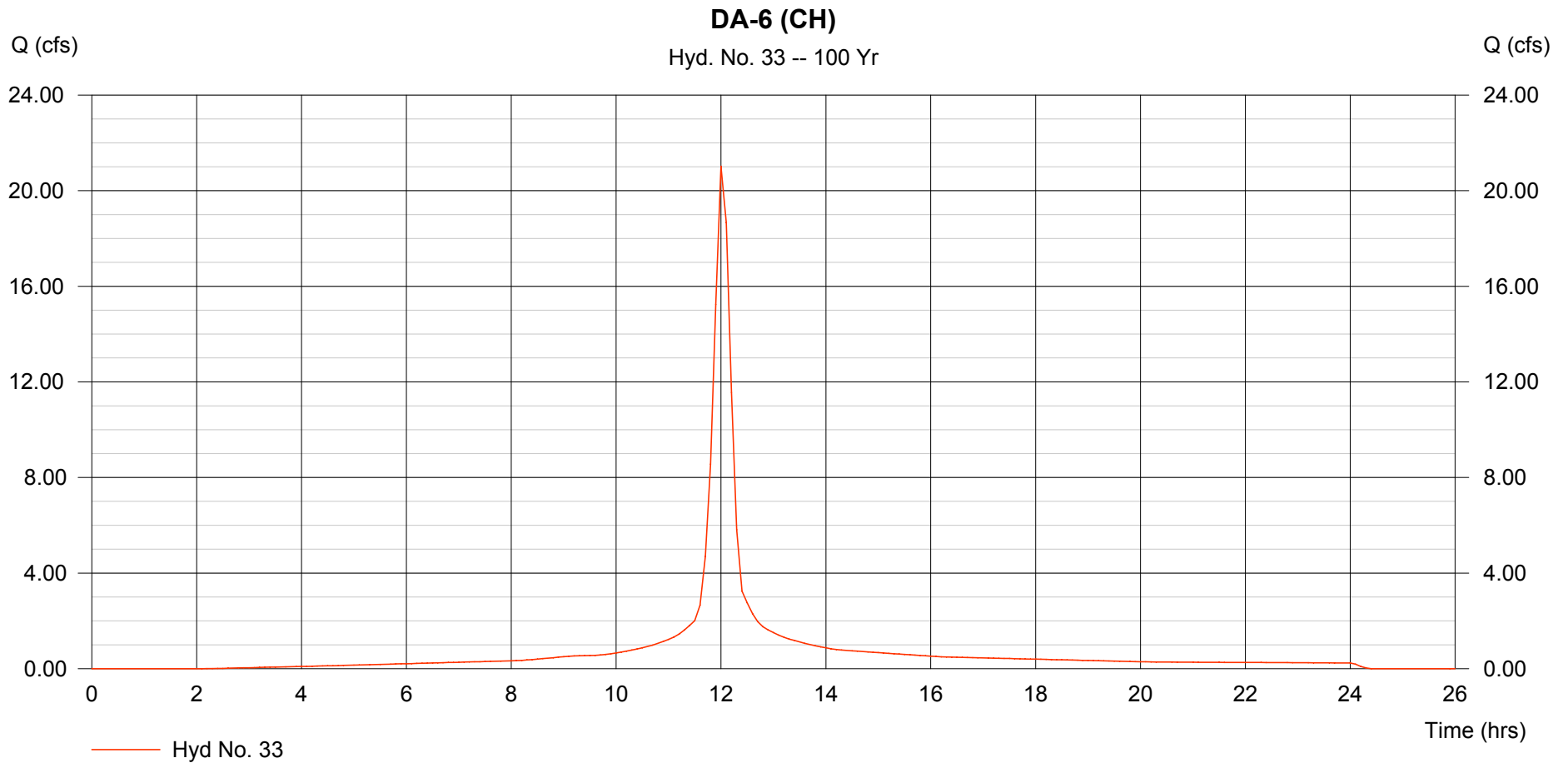
## Hyd. No. 33

DA-6 (CH)

Hydrograph type = SCS Runoff  
Storm frequency = 100 yrs  
Drainage area = 3.003 ac  
Basin Slope = 0.0 %  
Tc method = USER  
Total precip. = 7.68 in  
Storm duration = 24 hrs

Peak discharge = 21.02 cfs  
Time interval = 6 min  
Curve number = 92  
Hydraulic length = 0 ft  
Time of conc. (Tc) = 15.00 min  
Distribution = Type II  
Shape factor = 484

Hydrograph Volume = 1.578 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

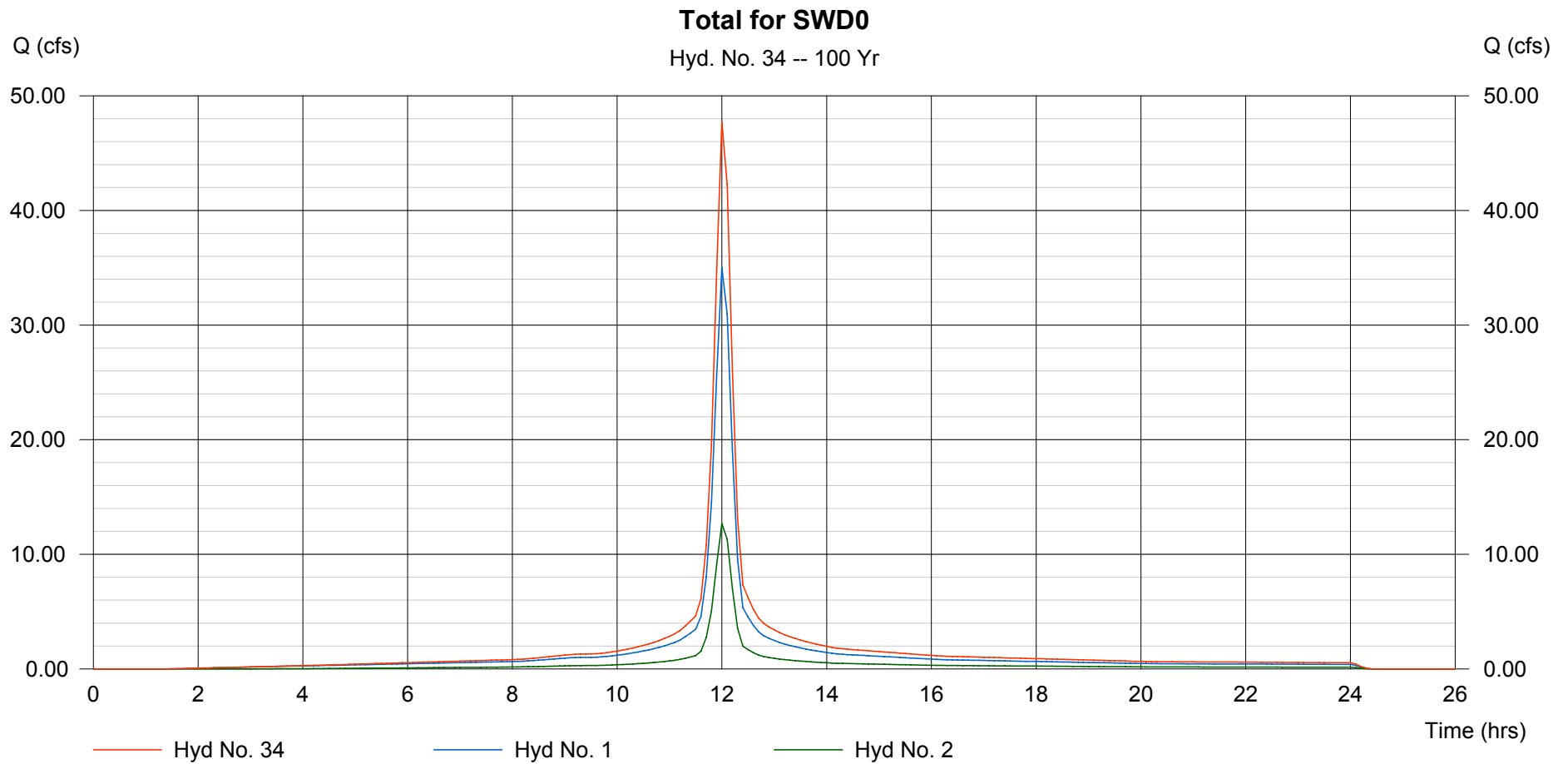
## Hyd. No. 34

Total for SWD0

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 1, 2

Peak discharge = 47.71 cfs  
Time interval = 6 min

Hydrograph Volume = 3.635 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

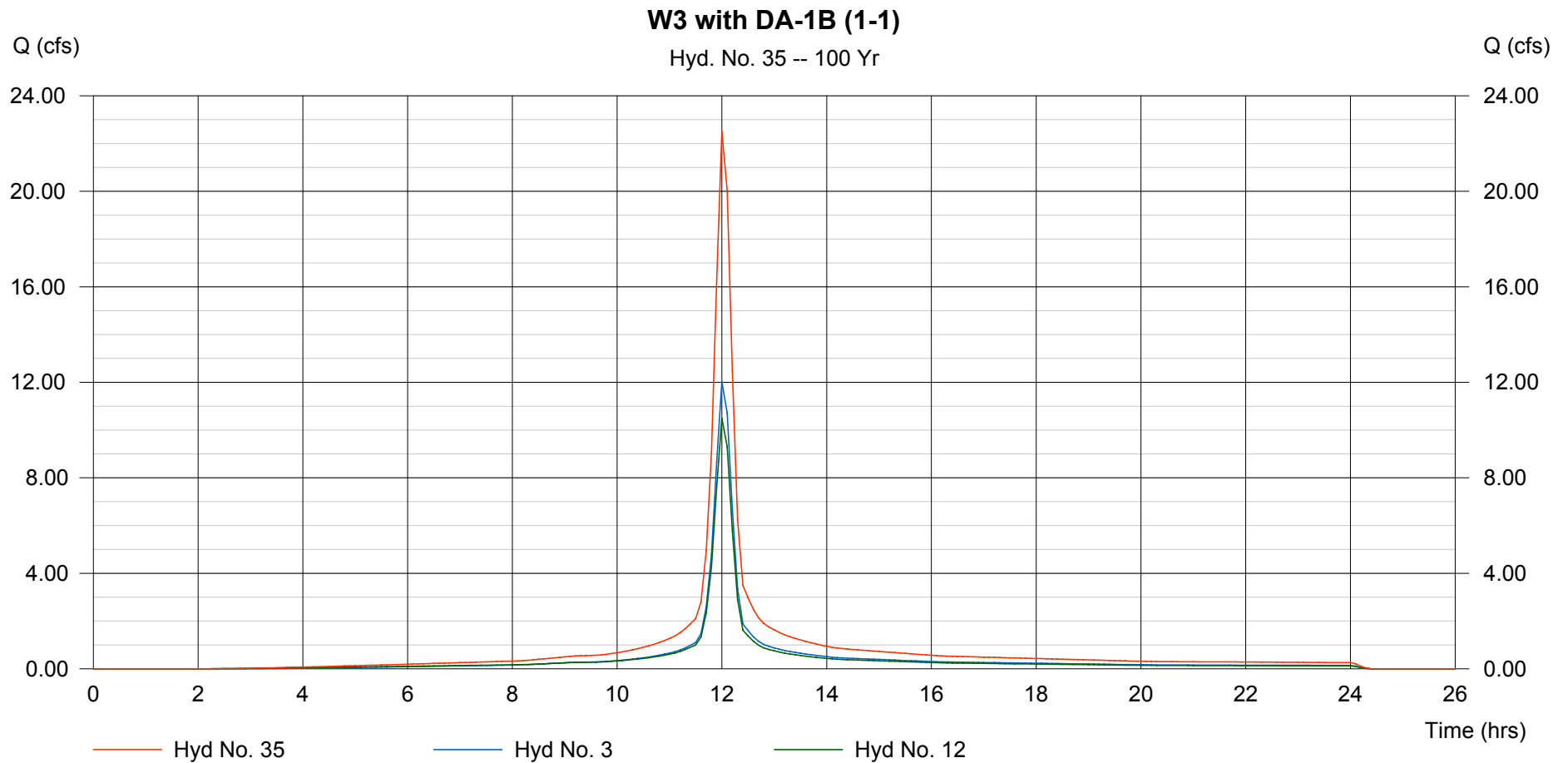
## Hyd. No. 35

W3 with DA-1B (1-1)

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 3, 12

Peak discharge = 22.51 cfs  
Time interval = 6 min

Hydrograph Volume = 1.671 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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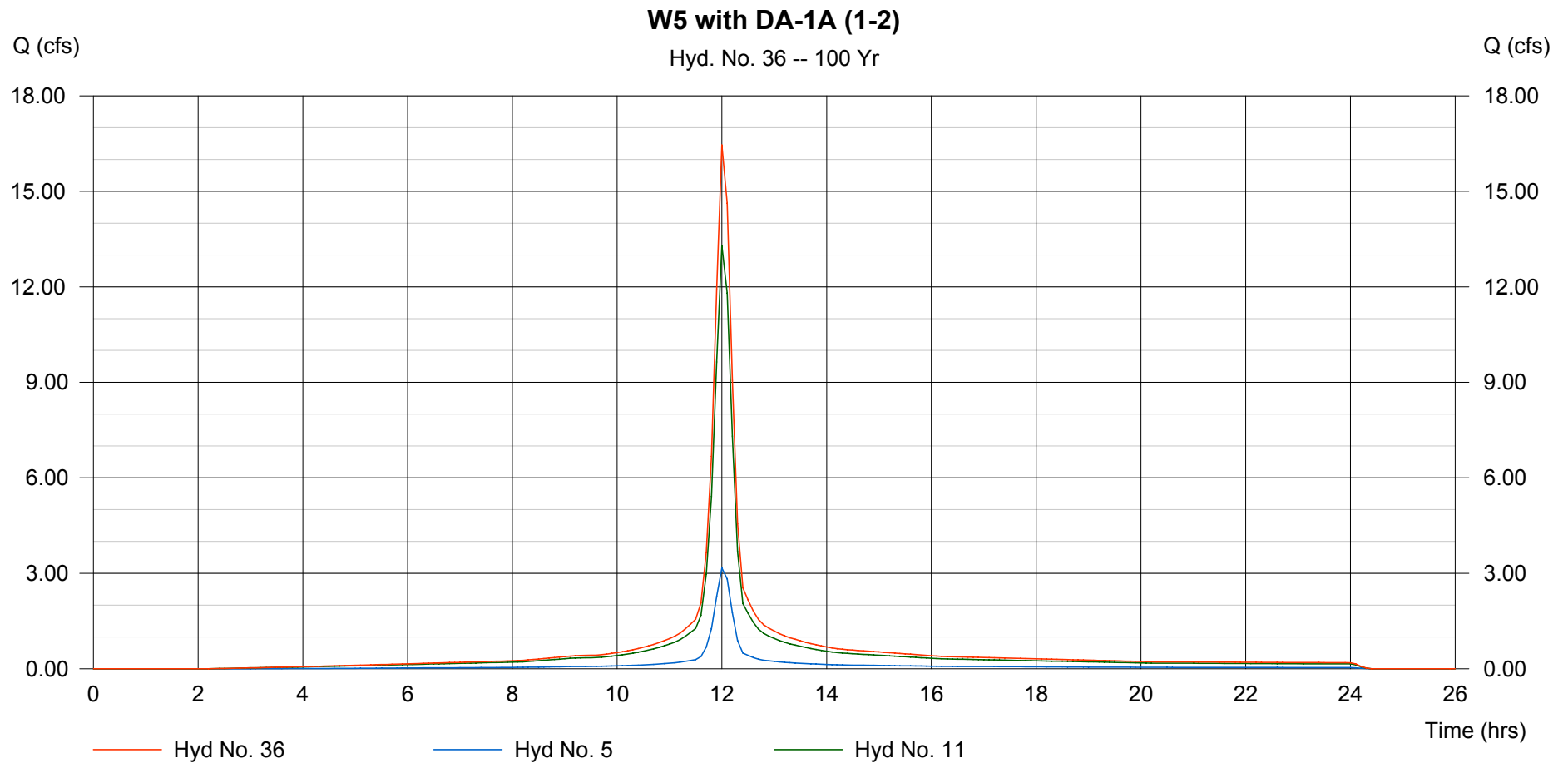
## Hyd. No. 36

W5 with DA-1A (1-2)

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 5, 11

Peak discharge = 16.46 cfs  
Time interval = 6 min

Hydrograph Volume = 1.230 acft



# Hydrograph Plot

247

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

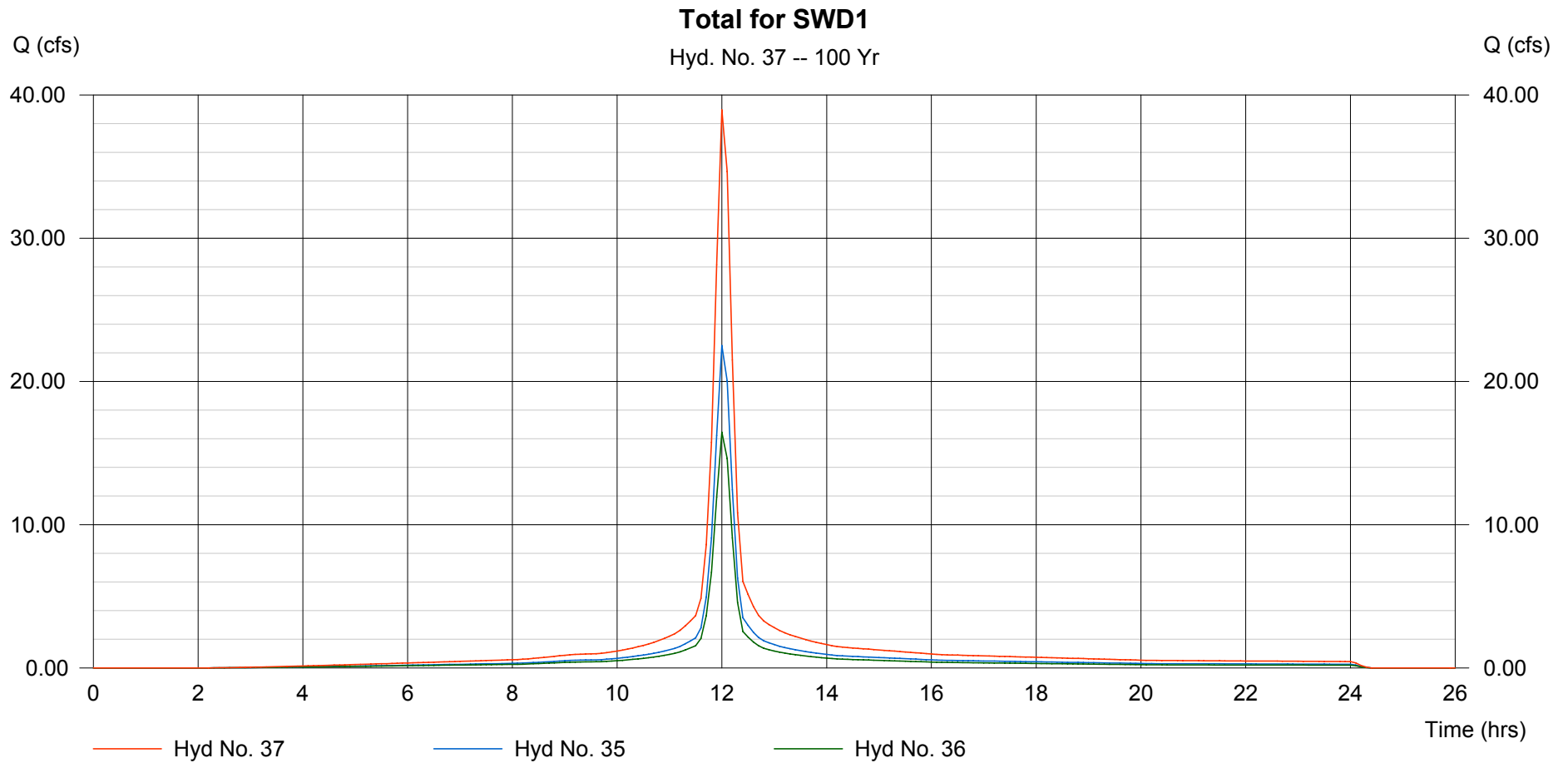
## Hyd. No. 37

Total for SWD1

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 35, 36

Peak discharge = 38.96 cfs  
Time interval = 6 min

Hydrograph Volume = 2.902 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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## Hyd. No. 38

Total to West Ditch

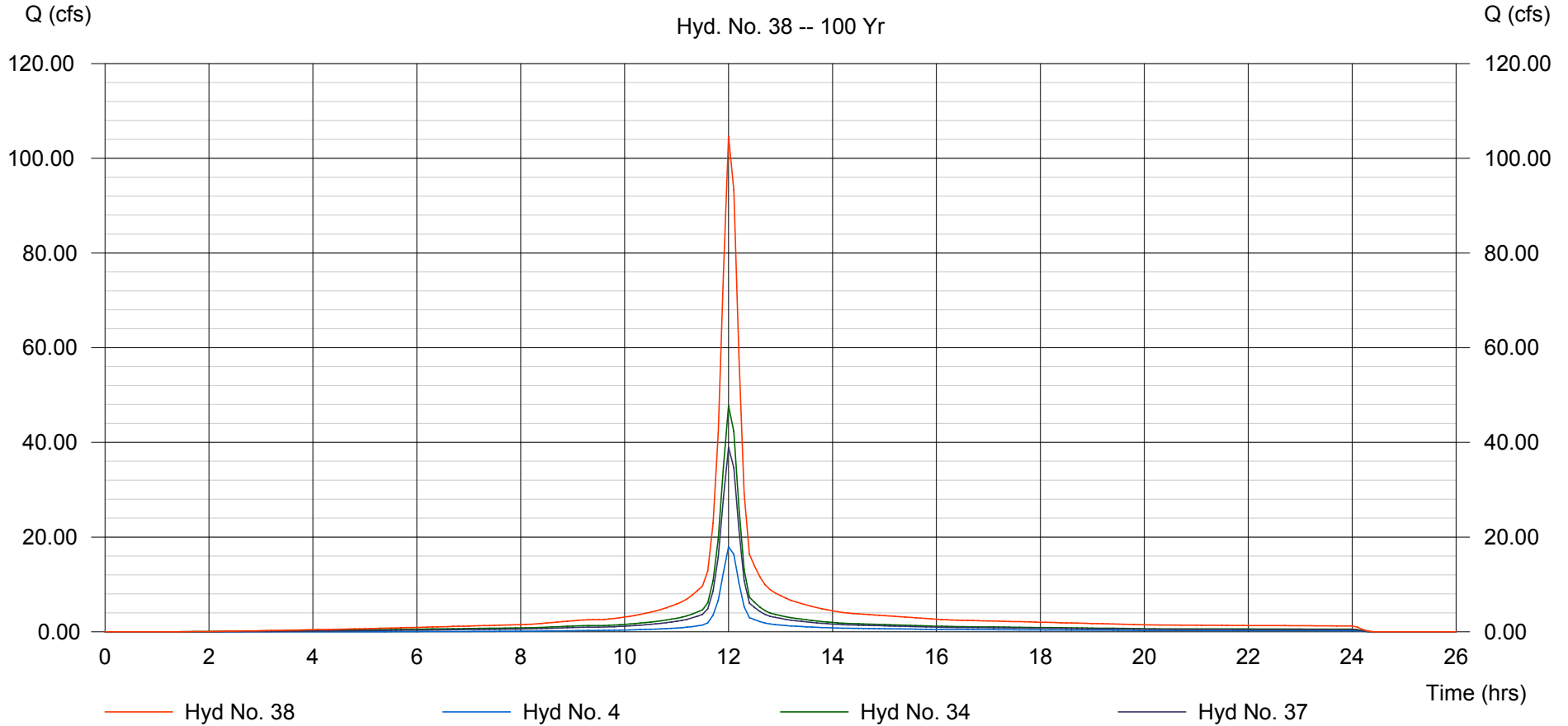
Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 4, 34, 37

Peak discharge = 104.64 cfs  
Time interval = 6 min

Hydrograph Volume = 7.811 acft

### Total to West Ditch

Hyd. No. 38 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 39

Proposed West Ditch

Hydrograph type = Reach  
Storm frequency = 100 yrs  
Inflow hyd. No. = 38  
Reach length = 1202.1 ft  
Manning's n = 0.050  
Side slope = 4.0:1  
Rating curve x = 0.720  
Ave. velocity = 1.76 ft/s

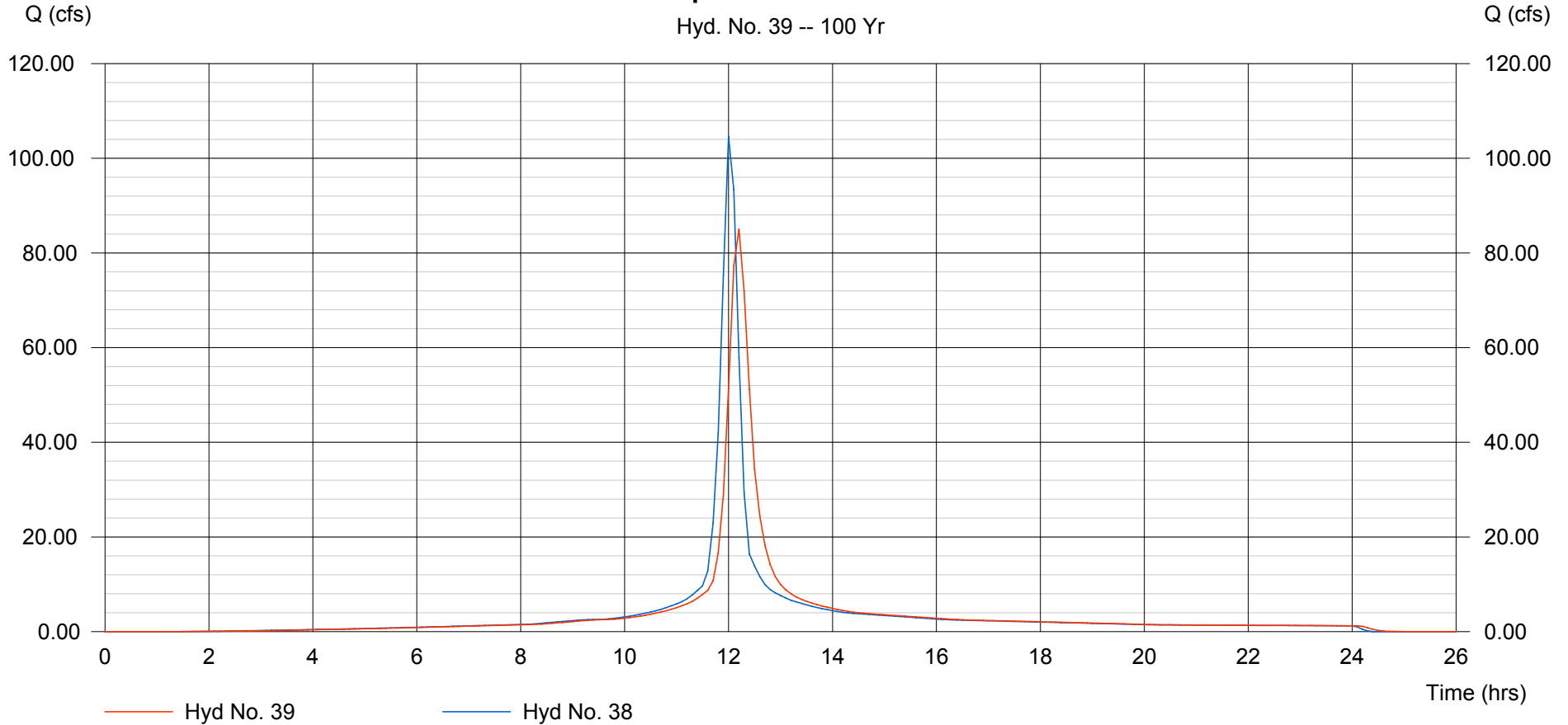
Peak discharge = 85.04 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.5 %  
Bottom width = 5.0 ft  
Max. depth = 1.5 ft  
Rating curve m = 1.218  
Routing coeff. = 0.4853

Modified Att-Kin routing method used.

Hydrograph Volume = 7.811 acft

### Proposed West Ditch

Hyd. No. 39 -- 100 Yr



# Hydrograph Plot

250

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

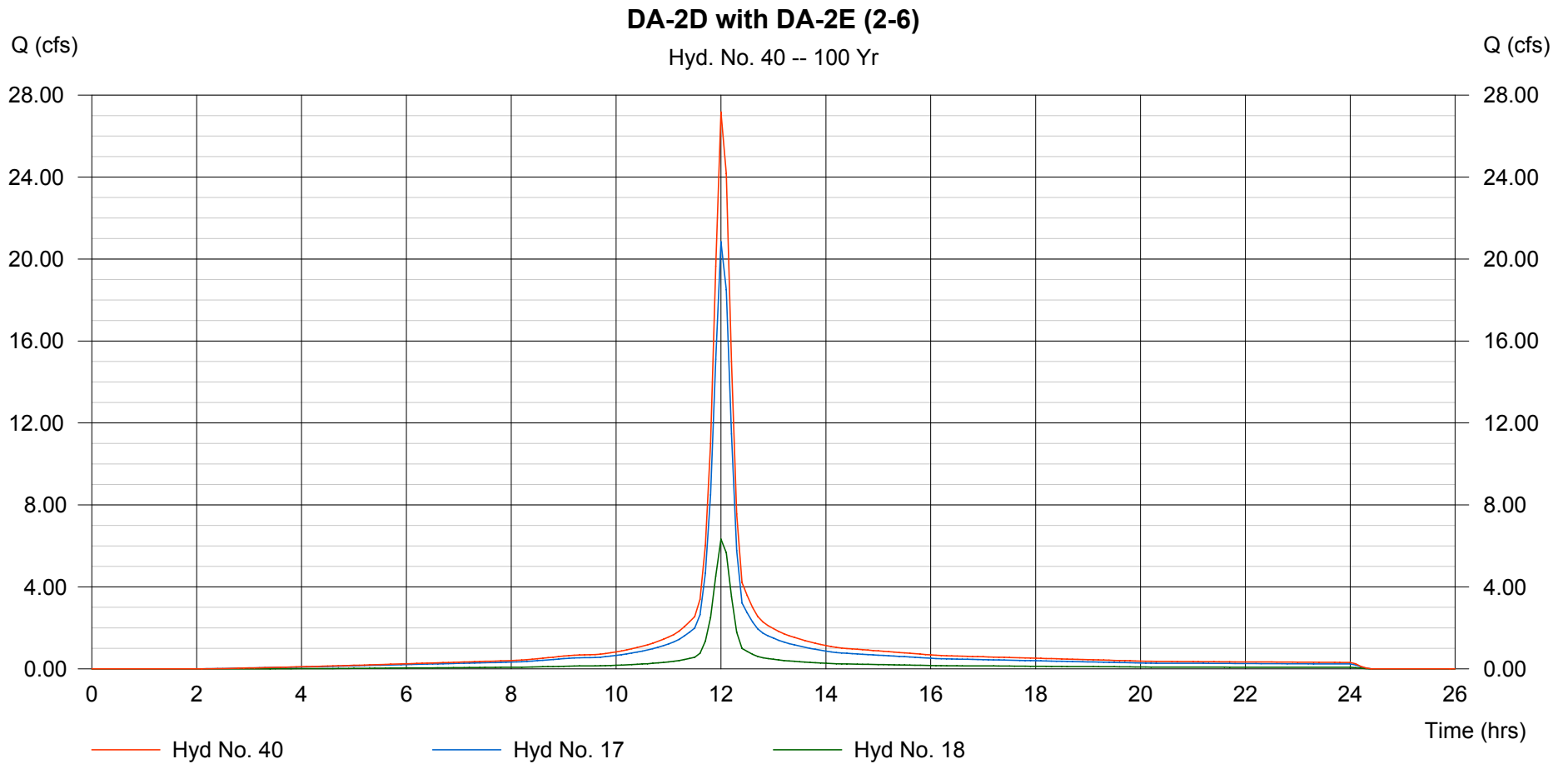
## Hyd. No. 40

DA-2D with DA-2E (2-6)

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 17, 18

Peak discharge = 27.18 cfs  
Time interval = 6 min

Hydrograph Volume = 2.027 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

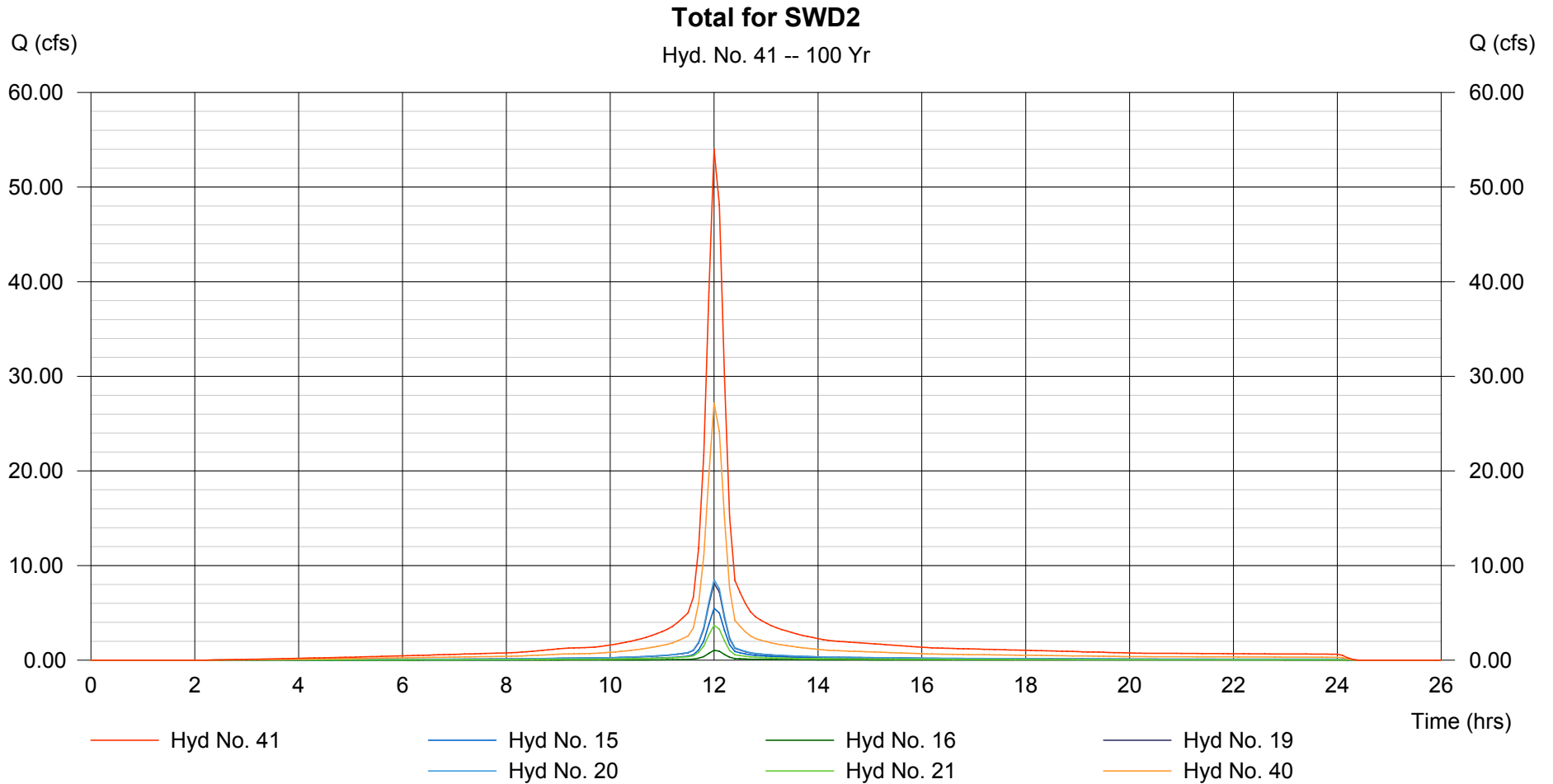
## Hyd. No. 41

Total for SWD2

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 15, 16, 19, 20, 21, 40

Peak discharge = 54.01 cfs  
Time interval = 6 min

Hydrograph Volume = 4.015 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

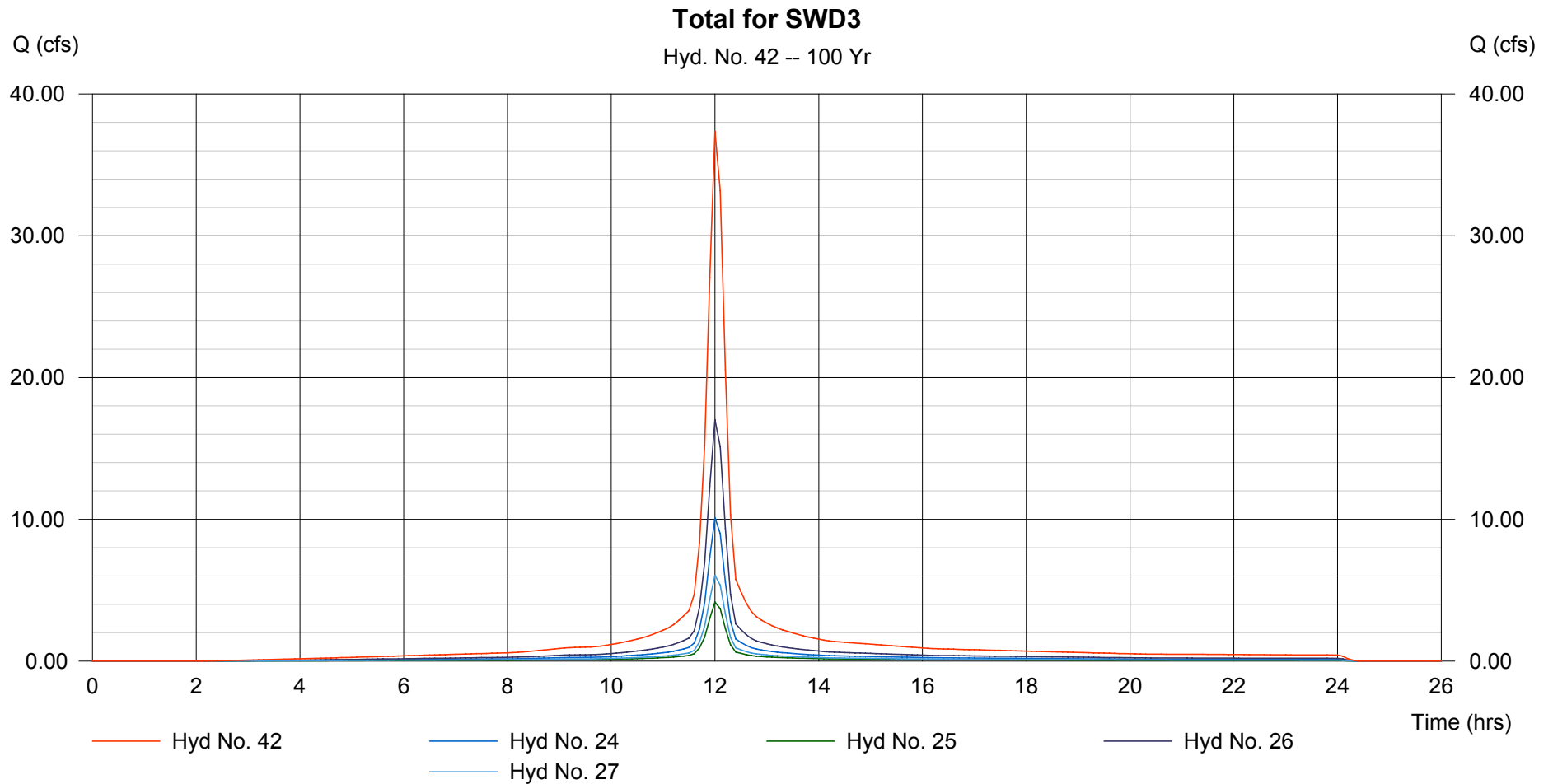
## Hyd. No. 42

Total for SWD3

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 24, 25, 26, 27

Peak discharge = 37.37 cfs  
Time interval = 6 min

Hydrograph Volume = 2.805 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

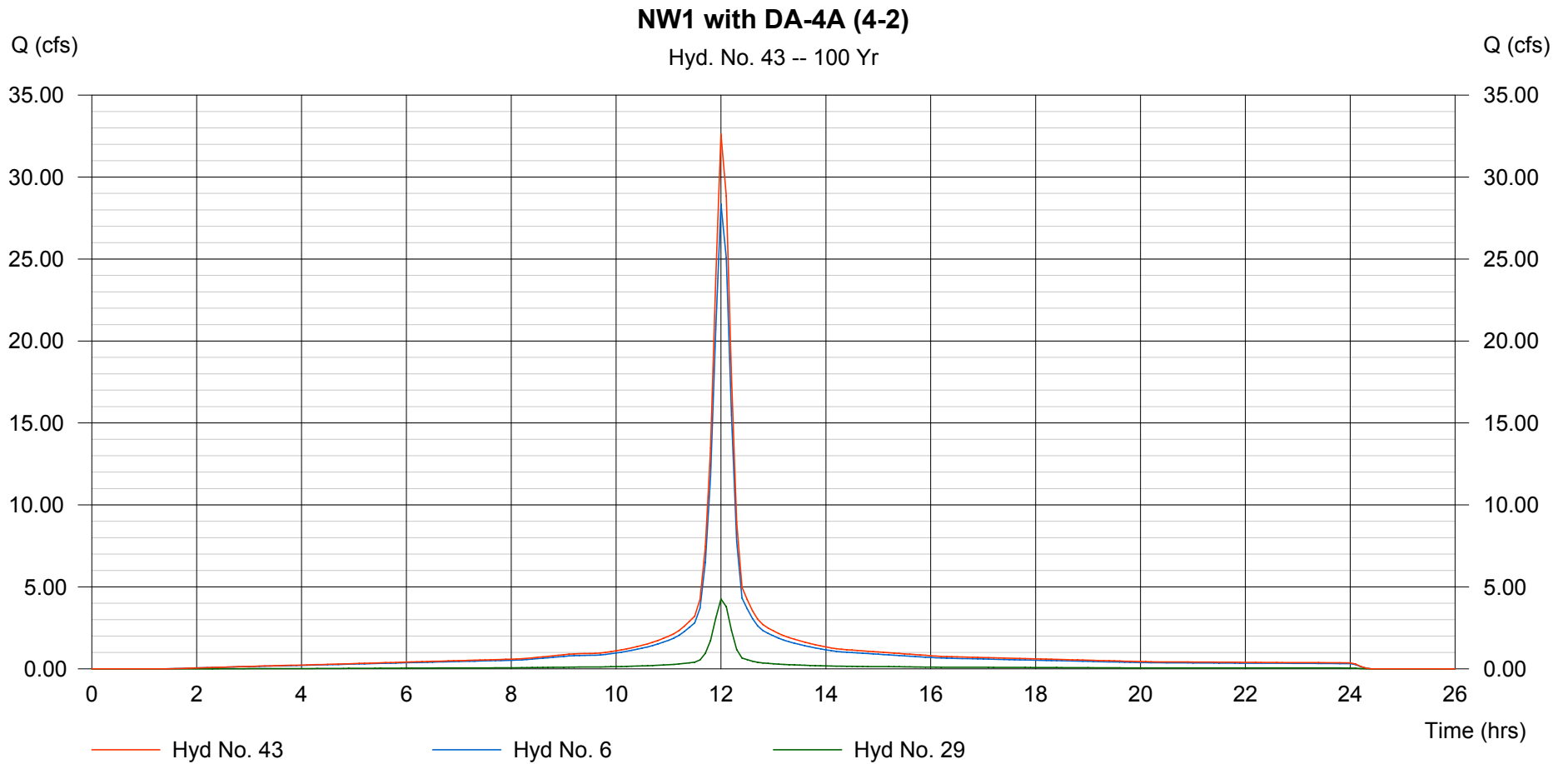
## Hyd. No. 43

NW1 with DA-4A (4-2)

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 6, 29

Peak discharge = 32.61 cfs  
Time interval = 6 min

Hydrograph Volume = 2.507 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

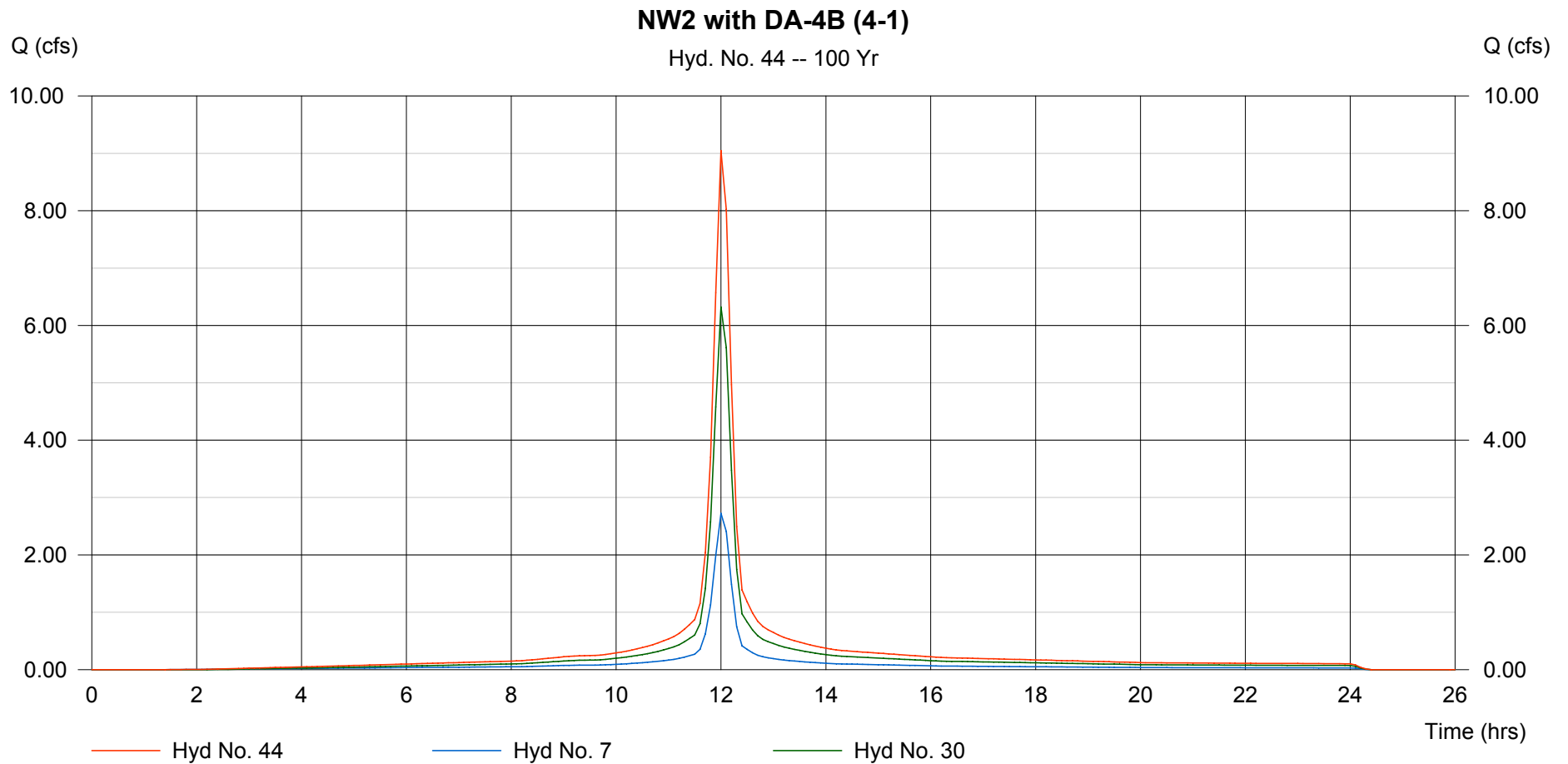
## Hyd. No. 44

NW2 with DA-4B (4-1)

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 7, 30

Peak discharge = 9.047 cfs  
Time interval = 6 min

Hydrograph Volume = 0.685 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

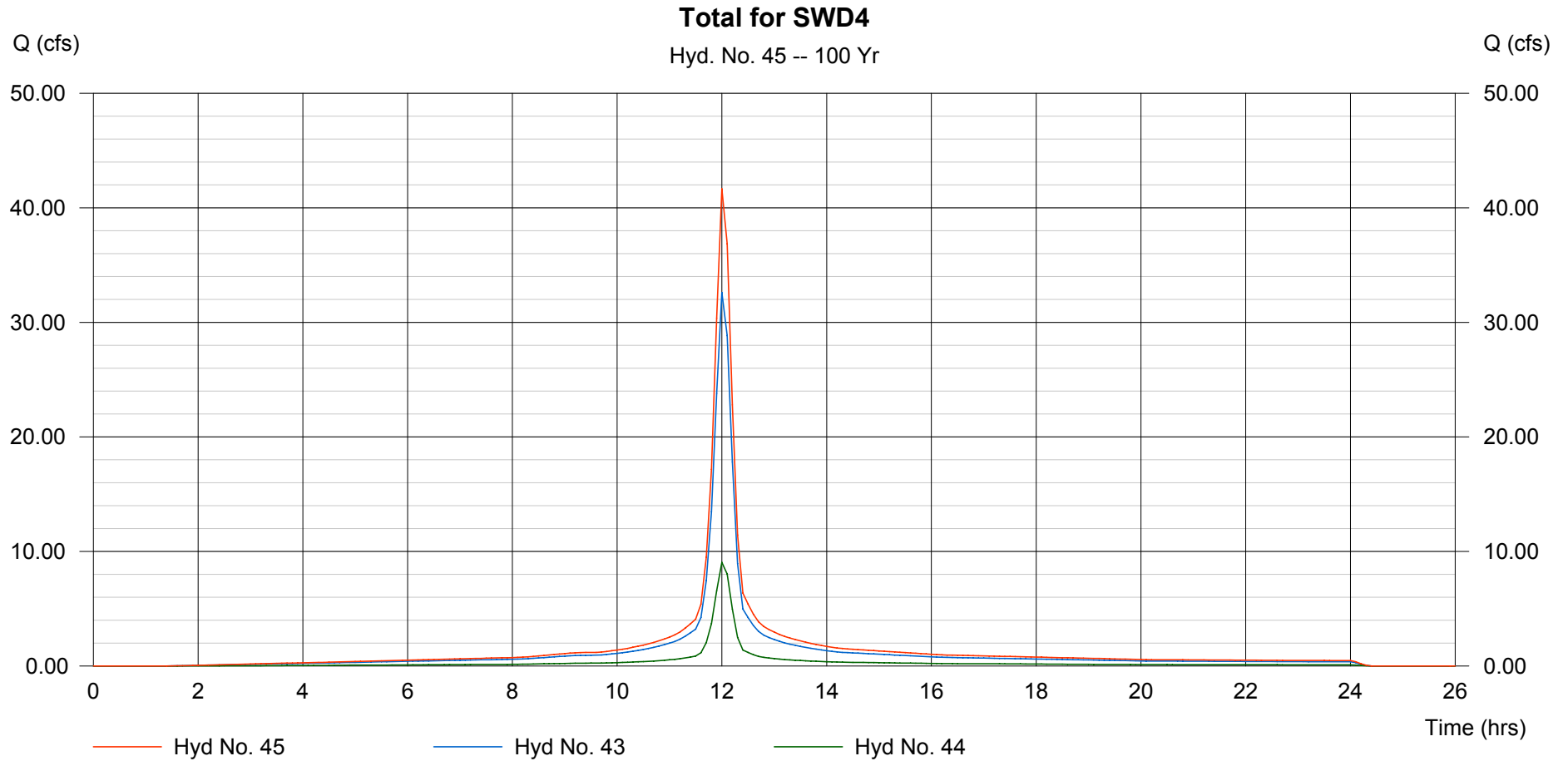
## Hyd. No. 45

Total for SWD4

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 43, 44

Peak discharge = 41.66 cfs  
Time interval = 6 min

Hydrograph Volume = 3.192 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

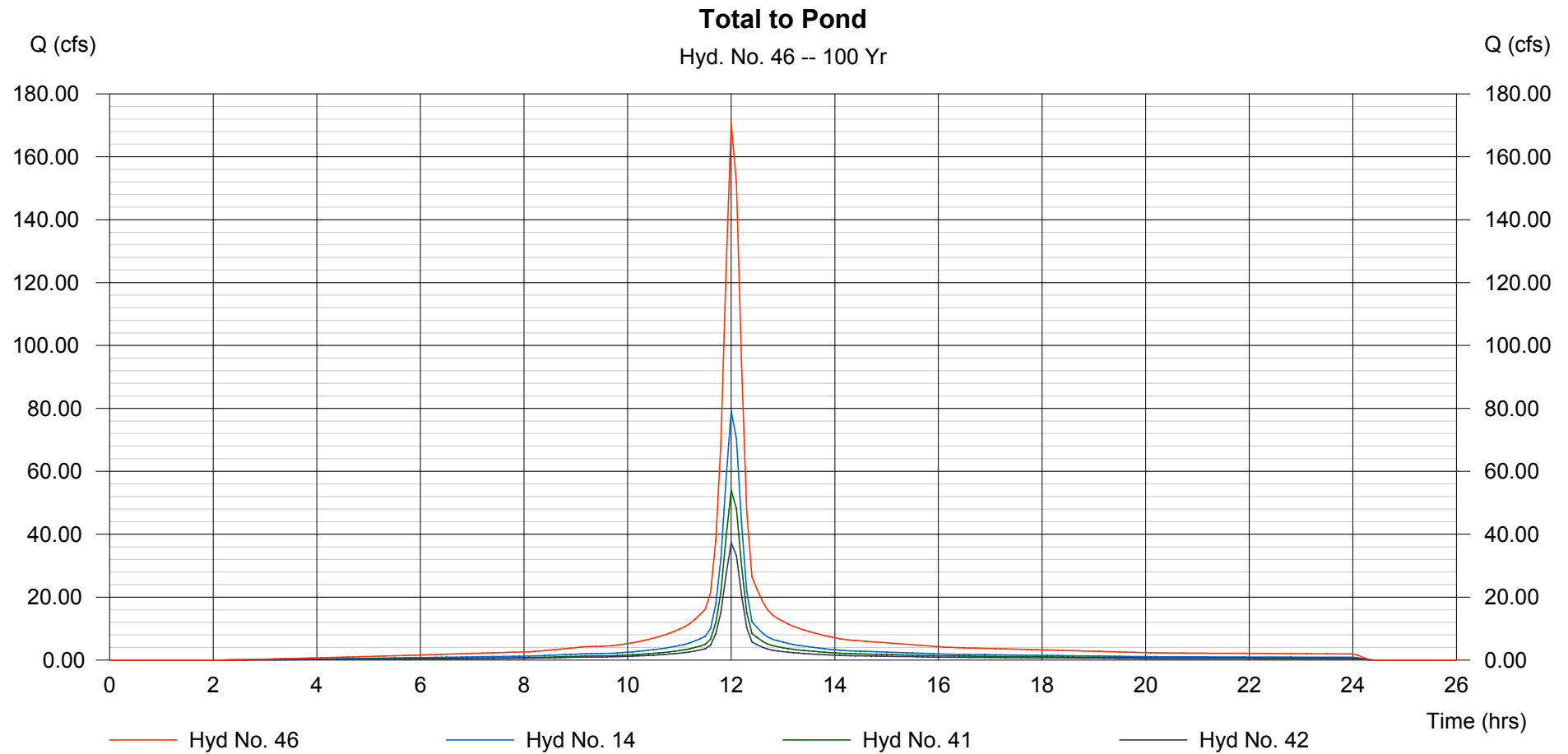
## Hyd. No. 46

Total to Pond

Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 14, 41, 42

Peak discharge = 170.57 cfs  
Time interval = 6 min

Hydrograph Volume = 12.765 acft



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 47

Proposed Pond

Hydrograph type = Reservoir  
Storm frequency = 100 yrs  
Inflow hyd. No. = 46  
Reservoir name = Proposed Pond

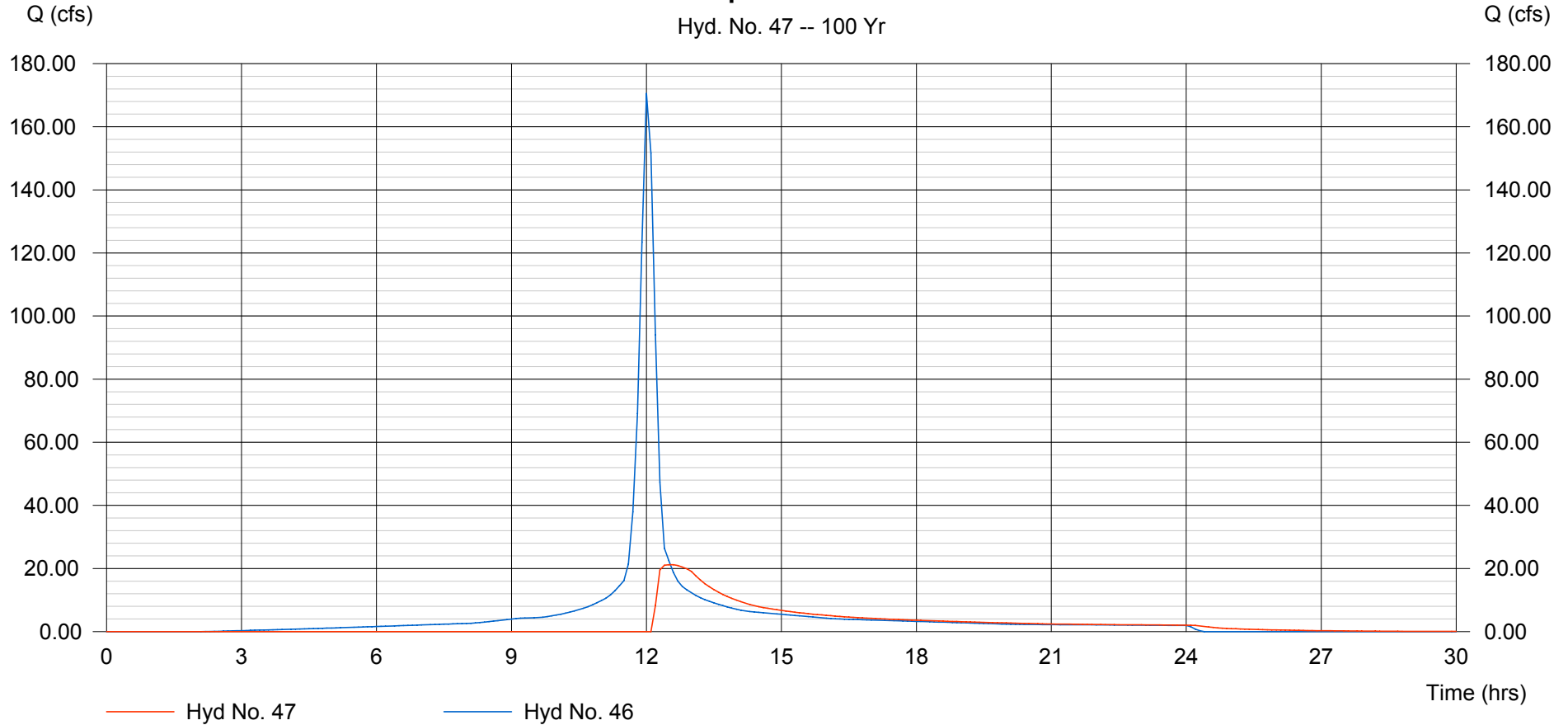
Peak discharge = 21.23 cfs  
Time interval = 6 min  
Max. Elevation = 1388.82 ft  
Max. Storage = 8.130 acft

Storage Indication method used.

Hydrograph Volume = 5.864 acft

### Proposed Pond

Hyd. No. 47 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 48

N, NE, SE, DA-5, DA-6, & SWD4

Hydrograph type = Combine

Storm frequency = 100 yrs

Inflow hyds. = 8, 9, 10, 32, 33, 45

Peak discharge

= 943.44 cfs

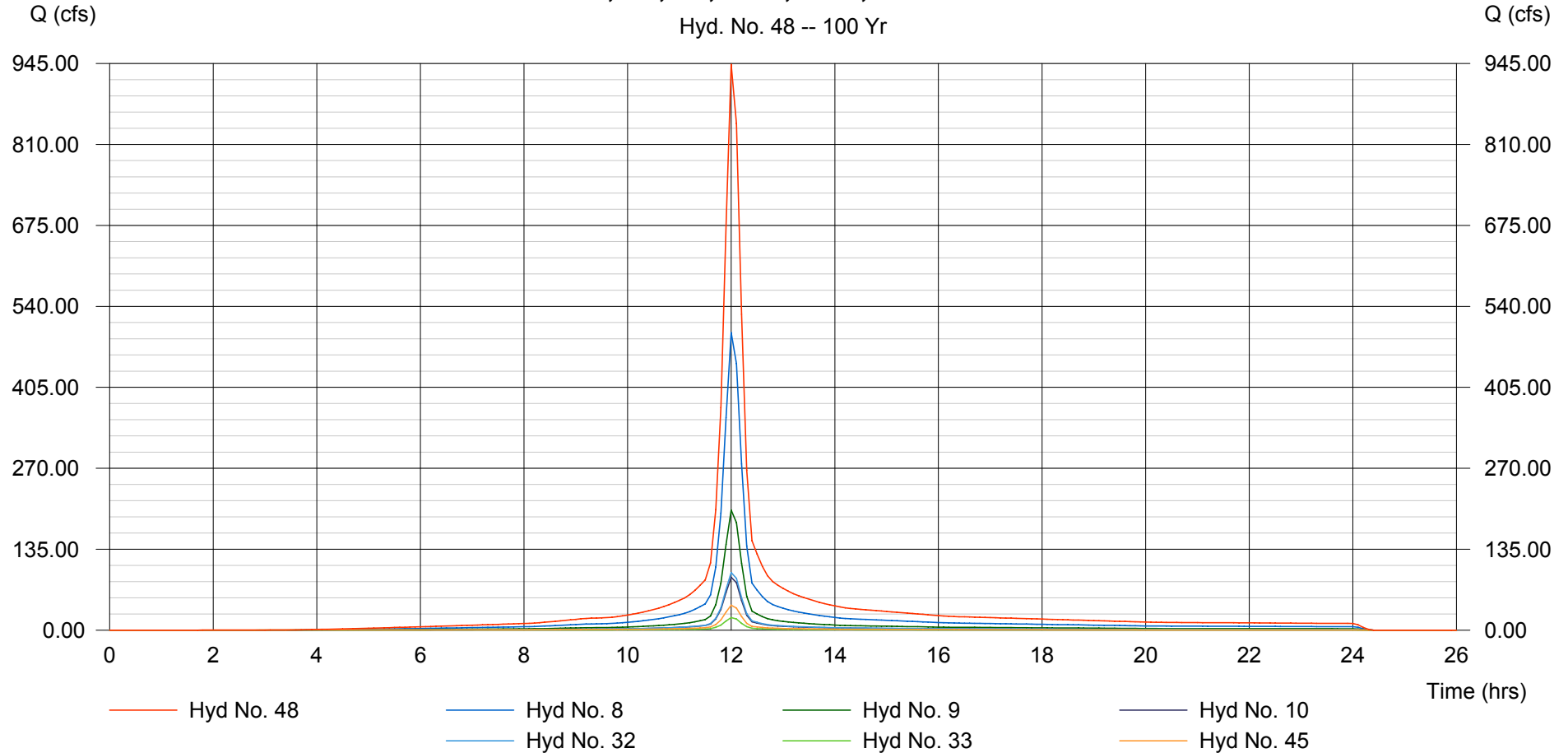
Time interval

= 6 min

Hydrograph Volume = 68.746 acft

### N, NE, SE, DA-5, DA-6, & SWD4

Hyd. No. 48 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 49

Route All to Proposed Channel

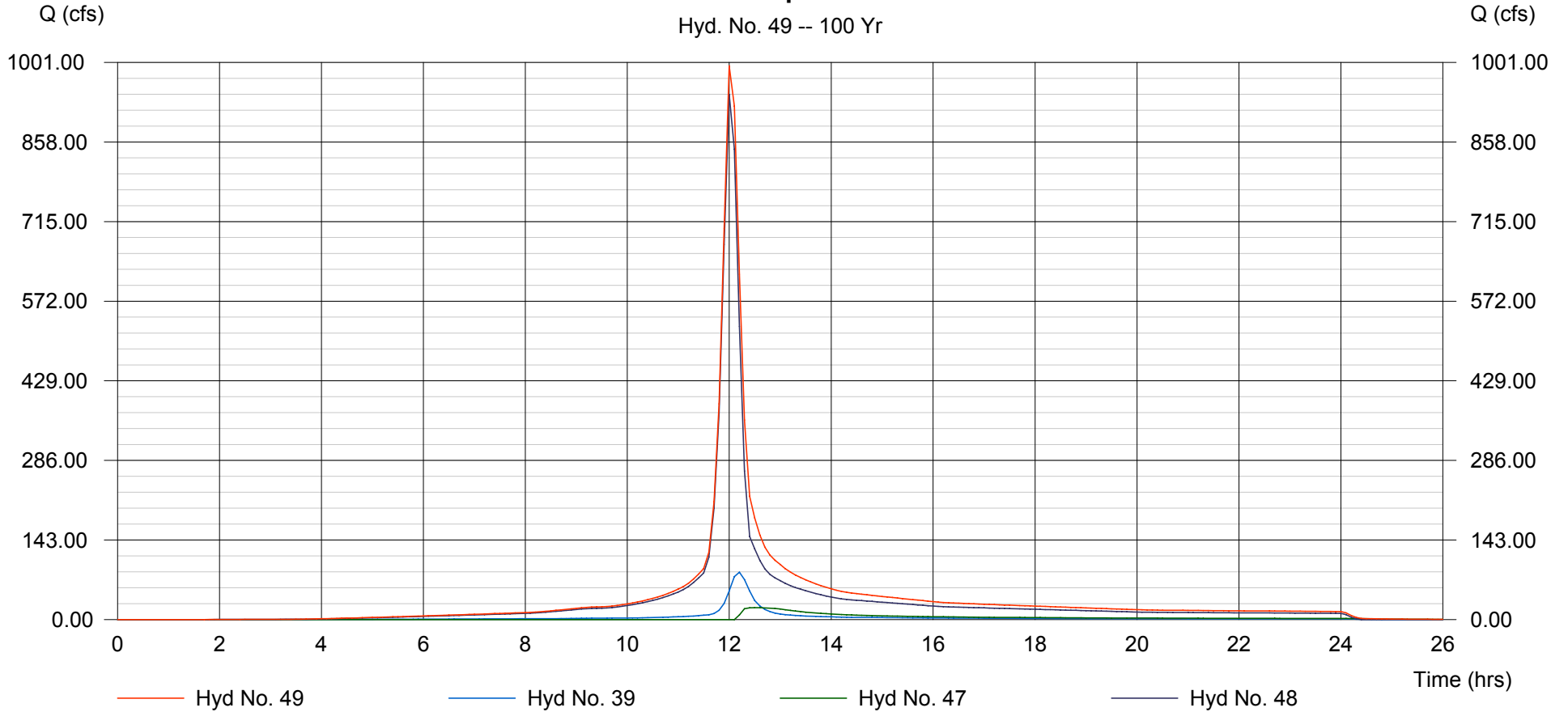
Hydrograph type = Combine  
Storm frequency = 100 yrs  
Inflow hyds. = 39, 47, 48

Peak discharge = 994.89 cfs  
Time interval = 6 min

Hydrograph Volume = 82.420 acft

### Route All to Proposed Channel

Hyd. No. 49 -- 100 Yr



# Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:31 PM

## Hyd. No. 50

Proposed Channel

Hydrograph type = Reach  
Storm frequency = 100 yrs  
Inflow hyd. No. = 49  
Reach length = 2296.0 ft  
Manning's n = 0.030  
Side slope = 4.0:1  
Rating curve x = 0.301  
Ave. velocity = 3.47 ft/s

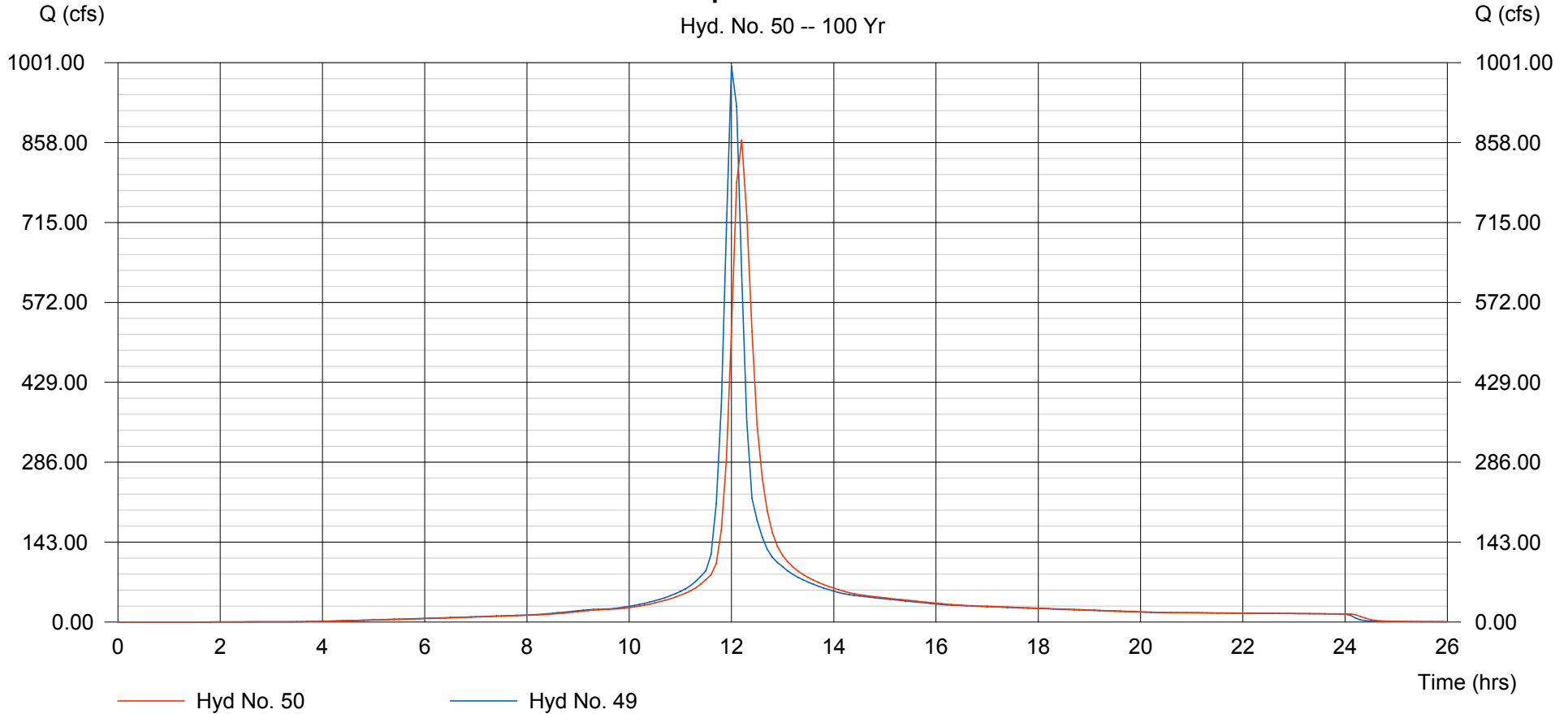
Peak discharge = 862.61 cfs  
Time interval = 6 min  
Section type = Trapezoidal  
Channel slope = 0.2 %  
Bottom width = 20.0 ft  
Max. depth = 4.0 ft  
Rating curve m = 1.432  
Routing coeff. = 0.5602

Modified Att-Kin routing method used.

Hydrograph Volume = 82.419 acft

### Proposed Channel

Hyd. No. 50 -- 100 Yr



# Pond Report

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:33 PM

## Pond No. 1 - Proposed Pond

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1382.00	42,111	0.000	0.000
1.00	1383.00	44,508	0.994	0.994
2.00	1384.00	46,962	1.050	2.044
3.00	1385.00	49,472	1.107	3.151
4.00	1386.00	52,039	1.165	4.316
5.00	1387.00	54,663	1.225	5.541
6.00	1388.00	63,816	1.360	6.901
7.00	1389.00	67,653	1.509	8.410
8.00	1390.00	71,591	1.598	10.008
9.00	1391.00	75,629	1.690	11.698

### Culvert / Orifice Structures

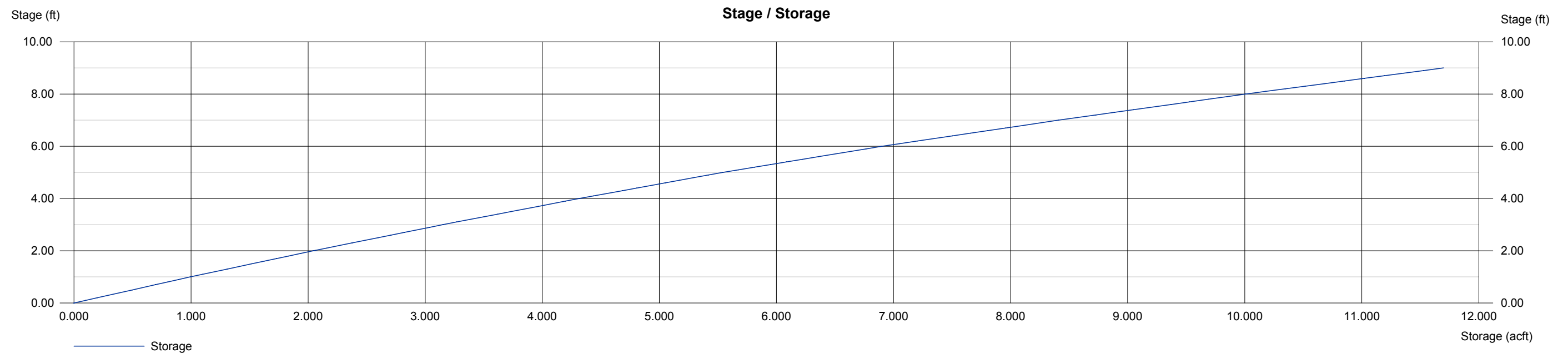
	[A]	[B]	[C]	[D]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1384.00	0.00	0.00	0.00
Length (ft)	= 150.00	0.00	0.00	0.00
Slope (%)	= 0.01	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	20.00	0.00	0.00
Crest El. (ft)	= 1388.00	1388.94	0.00	0.00
Weir Coeff.	= 3.33	2.60	0.00	0.00
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



# Pond Report

Hydraflow Hydrographs by Intelisolve

Thursday, Sep 6 2007, 3:33 PM

## Pond No. 1 - Proposed Pond

### Pond Data

Pond storage is based on known contour areas. Average end area method used.

### Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1382.00	42,111	0.000	0.000
1.00	1383.00	44,508	0.994	0.994
2.00	1384.00	46,962	1.050	2.044
3.00	1385.00	49,472	1.107	3.151
4.00	1386.00	52,039	1.165	4.316
5.00	1387.00	54,663	1.225	5.541
6.00	1388.00	63,816	1.360	6.901
7.00	1389.00	67,653	1.509	8.410
8.00	1390.00	71,591	1.598	10.008
9.00	1391.00	75,629	1.690	11.698

### Culvert / Orifice Structures

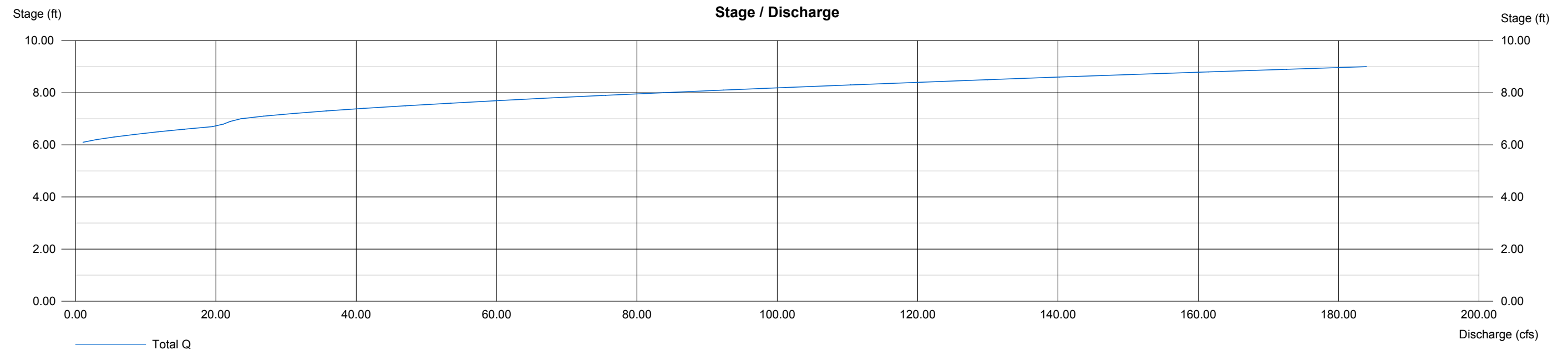
	[A]	[B]	[C]	[D]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1384.00	0.00	0.00	0.00
Length (ft)	= 150.00	0.00	0.00	0.00
Slope (%)	= 0.01	0.00	0.00	0.00
N-Value	= .013	.013	.013	.013
Orif. Coeff.	= 0.60	0.60	0.60	0.60
Multi-Stage	= n/a	No	No	No

### Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	20.00	0.00	0.00
Crest El. (ft)	= 1388.00	1388.94	0.00	0.00
Weir Coeff.	= 3.33	2.60	0.00	0.00
Weir Type	= Riser	Broad	---	---
Multi-Stage	= Yes	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 0.00 ft

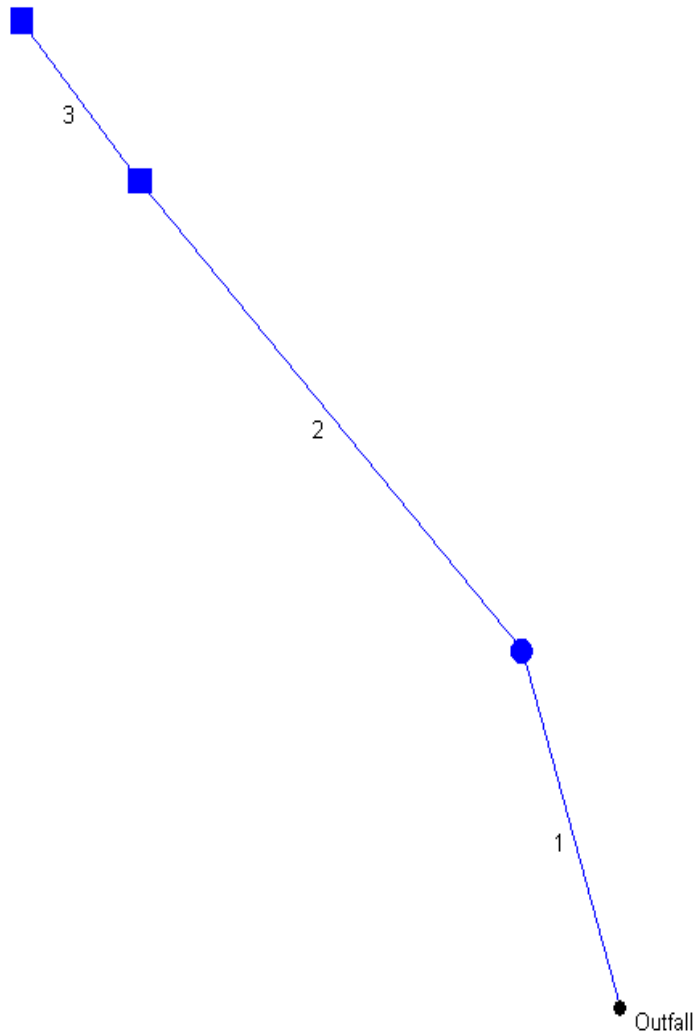
Note: Culvert/Orifice outflows have been analyzed under inlet and outlet control. Weir riser checked for orifice conditions.



**NORTHBOROUGH 3RD ADDITION REPLAT**

**EXHIBIT 3-2**

# Hydraflow Plan View



Project file: SWD0.stm

IDF file: SedgwickCo.IDF

No. Lines: 3

09-07-2007

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	63.0	-107.0	MH	0.00	0.00	0.00	0.0	1384.50	1.40	1385.38	36	Cir	0.013	0.45	1390.90	
2	1	107.0	-25.1	Curb	5.06	0.00	0.00	0.0	1386.38	1.00	1387.45	24 38	Ellip	0.013	0.50	1391.30	
3	2	35.0	2.7	DrGrt	15.67	0.00	0.00	0.0	1387.65	1.00	1388.00	24	Cir	0.013	1.00	1392.50	
Project File: SWD0 2-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 3				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		20.73	36 c	63.0	1384.50	1385.38	1.397	1385.95	1386.83	0.26	End
2		20.73	24 x 38 e	107.0	1386.38	1387.45	1.000	1387.18*	1390.17*	0.13	1
3		15.67	24 c	35.0	1387.65	1388.00	1.000	1390.30*	1390.47*	0.39	2

Project File: SWD0 2-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 3

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 2 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		5.06*	0.00	5.06	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.66	10.40	0.48	10.40	2.00	Off
3		15.67*	0.00	15.67	0.00	DrGrt	0.0	0.00	5.20	4.00	4.00	Sag	4.00	0.020	0.020	0.000	0.57	61.42	0.57	61.42	0.0	Off

Project File: SWD0 2-Year.stm	I-D-F File: SedgwickCo.IDF	Total number of lines: 3	Run Date: 09-07-2007
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NOTES: Inlet N-Values = 0.016 ; Intensity = 51.03 / (Inlet time + 10.80) ^ 0.80; Return period = 2 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	63.0	-107.0	MH	0.00	0.00	0.00	0.0	1384.50	1.40	1385.38	36	Cir	0.013	0.45	1390.90	
2	1	107.0	-25.1	Curb	6.86	0.00	0.00	0.0	1386.38	1.00	1387.45	24 38	Ellip	0.013	0.50	1391.30	
3	2	35.0	2.7	DrGrt	20.27	0.00	0.00	0.0	1387.65	1.00	1388.00	24	Cir	0.013	1.00	1392.50	
Project File: SWD0 5-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 3				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		27.13	36 c	63.0	1384.50	1385.38	1.397	1386.16	1387.04	0.32	End
2		27.13	24 x 38 e	107.0	1386.38	1387.45	1.000	1387.38*	1389.94*	0.23	1
3		20.27	24 c	35.0	1387.65	1388.00	1.000	1390.17*	1390.45*	0.65	2

Project File: SWD0 5-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 3

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		6.86*	0.00	6.86	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.69	11.47	0.51	11.47	2.00	Off
3		20.27*	0.00	20.27	0.00	DrGrt	0.0	0.00	5.20	4.00	4.00	Sag	4.00	0.020	0.020	0.000	0.68	72.17	0.68	72.17	0.0	Off

Project File: SWD0 5-Year.stm      I-D-F File: SedgwickCo.IDF      Total number of lines: 3      Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.016 ; Intensity = 66.04 / (Inlet time + 12.90) ^ 0.80; Return period = 5 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	63.0	-107.0	MH	0.00	0.00	0.00	0.0	1384.50	1.40	1385.38	36	Cir	0.013	0.45	1390.90	
2	1	107.0	-25.1	Curb	8.21	0.00	0.00	0.0	1386.38	1.00	1387.45	24 38	Ellip	0.013	0.50	1391.30	
3	2	35.0	2.7	DrGrt	23.70	0.00	0.00	0.0	1387.65	1.00	1388.00	24	Cir	0.013	1.00	1392.50	
Project File: SWD0 10-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 3				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		31.91	36 c	63.0	1384.50	1385.38	1.397	1386.30	1387.18	0.36	End
2		31.91	24 x 38 e	107.0	1386.38	1387.45	1.000	1387.58*	1389.62*	0.32	1
3		23.70	24 c	35.0	1387.65	1388.00	1.000	1389.94*	1390.32*	0.88	2

Project File: SWD0 10-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 3

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		8.21*	0.00	8.21	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.80	15.23	0.62	15.23	2.00	Off
3		23.70*	0.00	23.70	0.00	DrGrt	0.0	0.00	5.20	4.00	4.00	Sag	4.00	0.020	0.020	0.000	0.76	79.67	0.76	79.67	0.0	Off

Project File: SWD0 10-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 3

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.016 ; Intensity = 81.20 / (Inlet time + 14.50) ^ 0.81; Return period = 10 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	63.0	-107.0	MH	0.00	0.00	0.00	0.0	1384.50	1.40	1385.38	36	Cir	0.013	0.45	1390.90	
2	1	107.0	-25.1	Curb	10.00	0.00	0.00	0.0	1386.38	1.00	1387.45	24 38	Ellip	0.013	0.50	1391.30	
3	2	35.0	2.7	DrGrt	28.25	0.00	0.00	0.0	1387.65	1.00	1388.00	24	Cir	0.013	1.00	1392.50	
Project File: SWD0 25-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 3				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		38.25	36 c	63.0	1384.50	1385.38	1.397	1386.47	1387.35	0.42	End
2		38.25	24 x 38 e	107.0	1386.38	1387.45	1.000	1387.77	1388.55	1.46	1
3		28.25	24 c	35.0	1387.65	1388.00	1.000	1390.01*	1390.56*	1.26	2

Project File: SWD0 25-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 3

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 25 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		10.00*	0.00	10.00	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.98	21.25	0.80	21.25	2.00	Off
3		28.25*	0.00	28.25	0.00	DrGrt	0.0	0.00	5.20	4.00	4.00	Sag	4.00	0.020	0.020	0.000	1.02	106.22	1.02	106.22	0.0	Off

Project File: SWD0 25-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 3

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.016 ; Intensity = 100.26 / (Inlet time + 15.90) ^ 0.81; Return period = 25 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	63.0	-107.0	MH	0.00	0.00	0.00	0.0	1384.50	1.40	1385.38	36	Cir	0.013	0.45	1390.90	
2	1	107.0	-25.1	Curb	12.68	0.00	0.00	0.0	1386.38	1.00	1387.45	24 38	Ellip	0.013	0.50	1391.30	
3	2	35.0	2.7	DrGrt	35.04	0.00	0.00	0.0	1387.65	1.00	1388.00	24	Cir	0.013	1.00	1392.50	
Project File: SWD0 100-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 3				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		47.72	36 c	63.0	1384.50	1385.38	1.397	1386.70	1387.58	0.52	End
2		47.72	24 x 38 e	107.0	1386.38	1387.45	1.000	1388.10	1389.15	0.88	1
3		35.04	24 c	35.0	1387.65	1388.00	1.000	1390.03*	1390.87*	1.93	2

Project File: SWD0 100-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 3

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 100 Yrs.; \* Indicates surcharge condition.

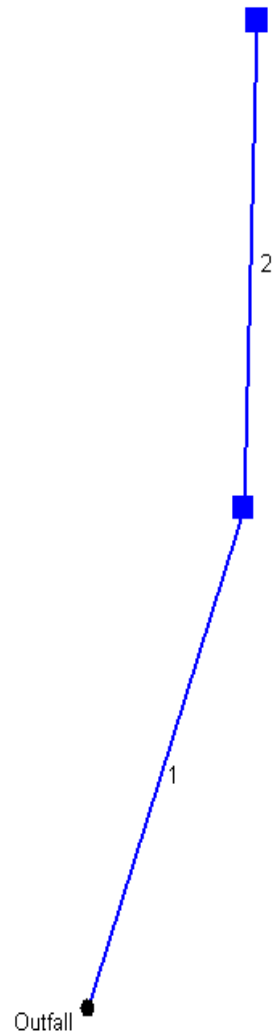
# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		12.68*	0.00	12.68	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	1.32	32.48	1.14	32.48	2.00	Off
3		35.04*	0.00	35.04	0.00	DrGrt	0.0	0.00	5.20	4.00	4.00	Sag	4.00	0.020	0.020	0.000	1.57	161.26	1.57	161.26	0.0	Off

Project File: SWD0 100-Year.stm	I-D-F File: SedgwickCo.IDF	Total number of lines: 3	Run Date: 09-07-2007
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NOTES: Inlet N-Values = 0.016 ; Intensity = 126.77 / (Inlet time + 17.20) ^ 0.81; Return period = 100 Yrs. ; \* Indicates Known Q added

# Hydraflow Plan View



# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	52.0	-70.9	Curb	9.24	0.00	0.00	0.0	1385.50	1.44	1386.25	30	Cir	0.013	0.70	1390.73	
2	1	48.0	-17.3	Curb	6.90	0.00	0.00	0.0	1386.75	1.00	1387.23	24	Cir	0.013	1.00	1390.73	
Project File: SWD1 2-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.	
1		16.15	30 c	52.0	1385.50	1386.25	1.442	1386.84	1387.59	0.39	End	
2		6.90	24 c	48.0	1386.75	1387.23	1.000	1387.99	1388.16	0.36	1	
Project File: SWD1 2-Year.stm		IDF File: SedgwickCo.IDF			Total No. Lines: 2			Run Date: 09-07-2007				
NOTES: c = circular; e = elliptical; b = box; Return period = 2 Yrs.; * Indicates surcharge condition.												

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		9.24*	0.00	9.24	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.69	11.54	0.51	11.54	2.00	Off
2		6.90*	0.00	6.90	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.65	10.23	0.47	10.23	2.00	Off

Project File: SWD1 2-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 2

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.016 ; Intensity = 51.03 / (Inlet time + 10.80) ^ 0.80; Return period = 2 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	52.0	-70.9	Curb	12.39	0.00	0.00	0.0	1385.50	1.44	1386.25	30	Cir	0.013	0.70	1390.73	
2	1	48.0	-17.3	Curb	9.17	0.00	0.00	0.0	1386.75	1.00	1387.23	24	Cir	0.013	1.00	1390.73	
Project File: SWD1 5-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		21.56	30 c	52.0	1385.50	1386.25	1.442	1387.05	1387.80	0.49	End
2		9.17	24 c	48.0	1386.75	1387.23	1.000	1388.30	1388.30	0.44	1

Project File: SWD1 5-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 2

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		12.39*	0.00	12.39	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.77	14.05	0.59	14.05	2.00	Off
2		9.17*	0.00	9.17	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.72	12.37	0.54	12.37	2.00	Off

Project File: SWD1 5-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 2

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.016 ; Intensity = 66.04 / (Inlet time + 12.90) ^ 0.80; Return period = 5 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	52.0	-70.9	Curb	14.74	0.00	0.00	0.0	1385.50	1.44	1386.25	30	Cir	0.013	0.70	1390.73	
2	1	48.0	-17.3	Curb	10.86	0.00	0.00	0.0	1386.75	1.00	1387.23	24	Cir	0.013	1.00	1390.73	
Project File: SWD1 10-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		25.60	30 c	52.0	1385.50	1386.25	1.442	1387.19	1387.94	0.57	End
2		10.86	24 c	48.0	1386.75	1387.23	1.000	1388.51	1388.42	0.49	1

Project File: SWD1 10-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 2

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		14.74*	0.00	14.74	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.82	15.78	0.64	15.78	2.00	Off
2		10.86*	0.00	10.86	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.76	13.85	0.58	13.85	2.00	Off

Project File: SWD1 10-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 2

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.016 ; Intensity = 81.20 / (Inlet time + 14.50) ^ 0.81; Return period = 10 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	52.0	-70.9	Curb	17.86	0.00	0.00	0.0	1385.50	1.44	1386.25	30	Cir	0.013	0.70	1390.73	
2	1	48.0	-17.3	Curb	13.11	0.00	0.00	0.0	1386.75	1.00	1387.23	24	Cir	0.013	1.00	1390.73	
Project File: SWD1 25-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		30.97	30 c	52.0	1385.50	1386.25	1.442	1387.36	1388.11	0.68	End
2		13.11	24 c	48.0	1386.75	1387.23	1.000	1388.79	1388.87	0.35	1

Project File: SWD1 25-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 2

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 25 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		17.86*	0.00	17.86	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.88	17.95	0.71	17.95	2.00	Off
2		13.11*	0.00	13.11	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.67	10.71	0.49	10.71	2.00	Off

Project File: SWD1 25-Year.stm	I-D-F File: SedgwickCo.IDF	Total number of lines: 2	Run Date: 09-07-2007
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NOTES: Inlet N-Values = 0.016 ; Intensity = 100.26 / (Inlet time + 15.90) ^ 0.81; Return period = 25 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	52.0	-70.9	Curb	22.51	0.00	0.00	0.0	1385.50	1.44	1386.25	30	Cir	0.013	0.70	1390.73	
2	1	48.0	-17.3	Curb	16.46	0.00	0.00	0.0	1386.75	1.00	1387.23	24	Cir	0.013	1.00	1390.73	
Project File: SWD1 100-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		38.97	30 c	52.0	1385.50	1386.25	1.442	1387.59	1388.34	0.86	End
2		16.46	24 c	48.0	1386.75	1387.23	1.000	1389.20*	1389.45*	0.43	1

Project File: SWD1 100-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 2

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 100 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		22.51*	0.00	22.51	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.74	13.18	0.56	13.18	2.00	Off
2		16.46*	0.00	16.46	0.00	Curb	4.0	10.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.80	15.29	0.63	15.29	2.00	Off

Project File: SWD1 100-Year.stm

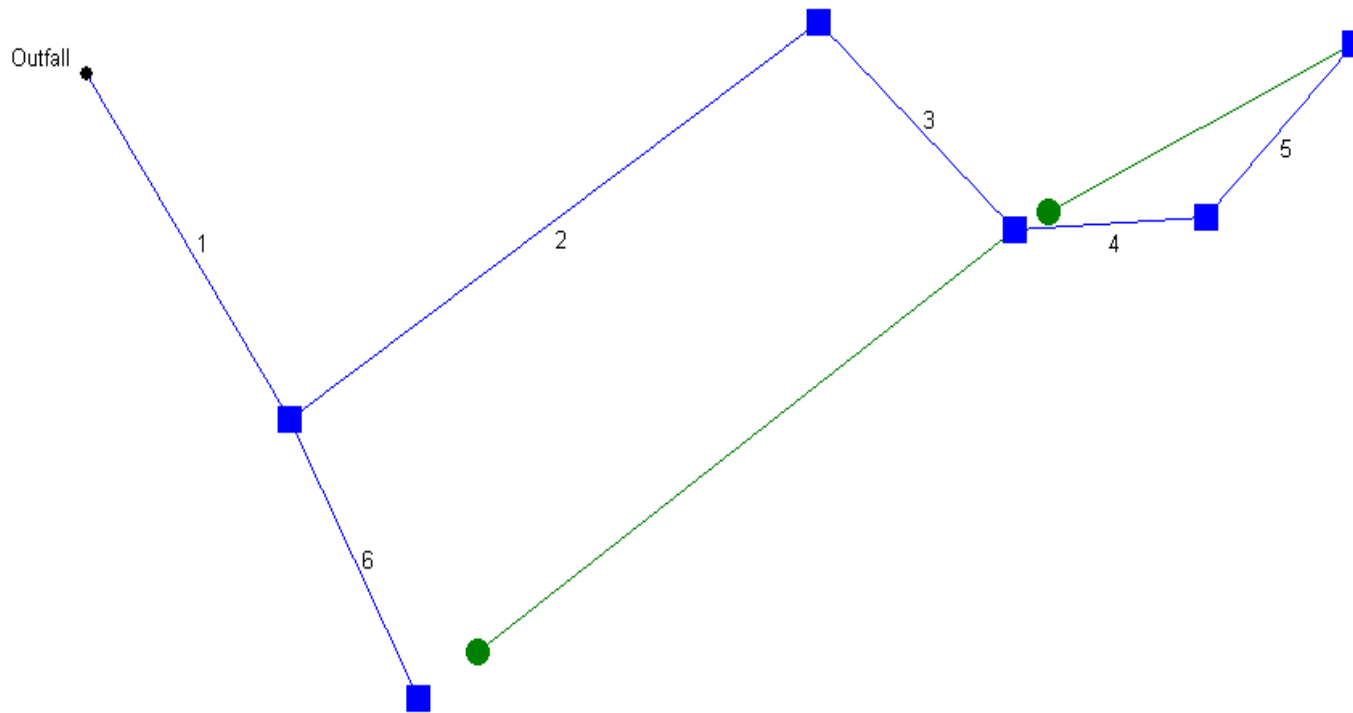
I-D-F File: SedgwickCo.IDF

Total number of lines: 2

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.016 ; Intensity = 126.77 / (Inlet time + 17.20) ^ 0.81; Return period = 100 Yrs. ; \* Indicates Known Q added

# Hydraflow Plan View



# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	66.0	56.7	Curb	1.75	0.00	0.00	0.0	1383.00	2.45	1384.62	48	Cir	0.013	1.50	1391.96	
2	1	113.0	-90.7	Curb	0.33	0.00	0.00	0.0	1385.62	1.00	1386.75	36	Cir	0.013	1.50	1392.95	
3	2	48.0	77.6	Curb	1.56	0.00	0.00	0.0	1387.25	1.00	1387.73	30	Cir	0.013	1.10	1392.95	
4	3	34.0	-47.2	Curb	3.45	0.00	0.00	0.0	1388.23	1.00	1388.57	24	Cir	0.013	1.10	1393.45	
5	4	38.0	-42.7	Curb	3.61	0.00	0.00	0.0	1389.07	1.00	1389.45	18	Cir	0.013	1.00	1392.45	
6	1	50.0	6.2	Curb	11.30	0.00	0.00	0.0	1386.33	2.00	1387.33	30	Cir	0.013	1.00	1391.96	
Project File: SWD2 2-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 6				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		22.00	48 c	66.0	1383.00	1384.62	2.455	1384.39	1386.01	0.75	End
2		8.95	36 c	113.0	1385.62	1386.75	1.000	1386.76	1387.70	0.50	1
3		8.62	30 c	48.0	1387.25	1387.73	1.000	1388.20	1388.71	0.40	2
4		7.06	24 c	34.0	1388.23	1388.57	1.000	1389.11	1389.51	0.40	3
5		3.61	18 c	38.0	1389.07	1389.45	1.000	1389.92	1390.18	0.28	4
6		11.30	30 c	50.0	1386.33	1387.33	2.000	1387.08	1388.63	0.30	1

Project File: SWD2 2-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 6

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 2 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		1.75*	0.00	1.75	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.46	4.07	0.28	4.01	2.00	Off
2		0.33*	0.00	0.33	0.00	Curb	4.0	5.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.20	1.77	0.16	2.30	2.00	1
3		1.56*	0.77	2.33	0.00	Curb	4.0	15.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.40	3.54	0.33	5.58	2.00	6
4		3.45*	0.00	3.09	0.36	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.47	4.16	0.38	7.21	2.00	3
5		3.61*	0.00	3.20	0.41	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.48	4.46	0.39	7.41	2.00	3
6		11.30*	0.00	11.30	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.74	13.21	0.56	13.21	2.00	Off

Project File: SWD2 2-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 6

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 51.03 / (Inlet time + 10.80) ^ 0.80; Return period = 2 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	66.0	56.7	Curb	2.60	0.00	0.00	0.0	1383.00	2.45	1384.62	48	Cir	0.013	1.50	1391.96	
2	1	113.0	-90.7	Curb	0.49	0.00	0.00	0.0	1385.62	1.00	1386.75	36	Cir	0.013	1.50	1392.95	
3	2	48.0	77.6	Curb	2.07	0.00	0.00	0.0	1387.25	1.00	1387.73	30	Cir	0.013	1.10	1392.95	
4	3	34.0	-47.2	Curb	4.56	0.00	0.00	0.0	1388.23	1.00	1388.57	24	Cir	0.013	1.10	1393.45	
5	4	38.0	-42.7	Curb	4.77	0.00	0.00	0.0	1389.07	1.00	1389.45	18	Cir	0.013	1.00	1392.45	
6	1	50.0	6.2	Curb	15.07	0.00	0.00	0.0	1386.33	2.00	1387.33	30	Cir	0.013	1.00	1391.96	
Project File: SWD2 5-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 6				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		29.56	48 c	66.0	1383.00	1384.62	2.455	1384.61	1386.23	0.91	End
2		11.89	36 c	113.0	1385.62	1386.75	1.000	1387.14	1387.85	0.60	1
3		11.40	30 c	48.0	1387.25	1387.73	1.000	1388.45	1388.86	0.48	2
4		9.33	24 c	34.0	1388.23	1388.57	1.000	1389.34	1389.65	0.50	3
5		4.77	18 c	38.0	1389.07	1389.45	1.000	1390.15	1390.28	0.35	4
6		15.07	30 c	50.0	1386.33	1387.33	2.000	1387.20	1388.96	0.31	1

Project File: SWD2 5-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 6

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		2.60*	0.02	2.62	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.49	4.96	0.32	4.96	2.00	Off
2		0.49*	0.00	0.47	0.02	Curb	4.0	5.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.23	2.04	0.19	2.67	2.00	1
3		2.07*	1.64	3.71	0.00	Curb	4.0	15.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.48	4.46	0.39	7.54	2.00	6
4		4.56*	0.00	3.78	0.78	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.52	5.80	0.42	8.48	2.00	3
5		4.77*	0.00	3.91	0.87	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.53	6.13	0.43	8.71	2.00	3
6		15.07*	0.00	15.07	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.83	16.02	0.65	16.02	2.00	Off

Project File: SWD2 5-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 6

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 66.04 / (Inlet time + 12.90) ^ 0.80; Return period = 5 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	66.0	56.7	Curb	3.25	0.00	0.00	0.0	1383.00	2.45	1384.62	48	Cir	0.013	1.50	1391.96	
2	1	113.0	-90.7	Curb	0.62	0.00	0.00	0.0	1385.62	1.00	1386.75	36	Cir	0.013	1.50	1392.95	
3	2	48.0	77.6	Curb	2.44	0.00	0.00	0.0	1387.25	1.00	1387.73	30	Cir	0.013	1.10	1392.95	
4	3	34.0	-47.2	Curb	5.39	0.00	0.00	0.0	1388.23	1.00	1388.57	24	Cir	0.013	1.10	1393.45	
5	4	38.0	-42.7	Curb	5.64	0.00	0.00	0.0	1389.07	1.00	1389.45	18	Cir	0.013	1.00	1392.45	
6	1	50.0	6.2	Curb	17.88	0.00	0.00	0.0	1386.33	2.00	1387.33	30	Cir	0.013	1.00	1391.96	
Project File: SWD2 10-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 6				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		35.22	48 c	66.0	1383.00	1384.62	2.455	1384.76	1386.38	1.03	End
2		14.09	36 c	113.0	1385.62	1386.75	1.000	1387.40	1387.95	0.67	1
3		13.47	30 c	48.0	1387.25	1387.73	1.000	1388.62	1388.96	0.54	2
4		11.03	24 c	34.0	1388.23	1388.57	1.000	1389.50	1389.75	0.56	3
5		5.64	18 c	38.0	1389.07	1389.45	1.000	1390.31	1390.36	0.40	4
6		17.88	30 c	50.0	1386.33	1387.33	2.000	1387.40	1388.74	0.61	1
Project File: SWD2 10-Year.stm			IDF File: SedgwickCo.IDF			Total No. Lines: 6			Run Date: 09-07-2007		
NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; * Indicates surcharge condition.											

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		3.25*	0.05	3.30	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.52	5.79	0.34	5.79	2.00	Off
2		0.62*	0.00	0.57	0.05	Curb	4.0	5.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.25	2.21	0.20	2.92	2.00	1
3		2.44*	2.41	4.79	0.06	Curb	4.0	15.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.53	6.13	0.43	8.78	2.00	6
4		5.39*	0.00	4.24	1.15	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.55	6.80	0.44	9.28	2.00	3
5		5.64*	0.00	4.38	1.26	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.56	7.13	0.45	9.51	2.00	3
6		17.88*	0.06	17.94	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.89	18.00	0.71	18.00	2.00	Off

Project File: SWD2 10-Year.stm      I-D-F File: SedgwickCo.IDF      Total number of lines: 6      Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 81.20 / (Inlet time + 14.50) ^ 0.81; Return period = 10 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	66.0	56.7	Curb	4.13	0.00	0.00	0.0	1383.00	2.45	1384.62	48	Cir	0.013	1.50	1391.96	
2	1	113.0	-90.7	Curb	0.78	0.00	0.00	0.0	1385.62	1.00	1386.75	36	Cir	0.013	1.50	1392.95	
3	2	48.0	77.6	Curb	2.94	0.00	0.00	0.0	1387.25	1.00	1387.73	30	Cir	0.013	1.10	1392.95	
4	3	34.0	-47.2	Curb	6.49	0.00	0.00	0.0	1388.23	1.00	1388.57	24	Cir	0.013	1.10	1393.45	
5	4	38.0	-42.7	Curb	6.79	0.00	0.00	0.0	1389.07	1.00	1389.45	18	Cir	0.013	1.00	1392.45	
6	1	50.0	6.2	Curb	21.61	0.00	0.00	0.0	1386.33	2.00	1387.33	30	Cir	0.013	1.00	1391.96	
Project File: SWD2 25-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 6				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		42.75	48 c	66.0	1383.00	1384.62	2.455	1384.93	1386.55	1.18	End
2		17.00	36 c	113.0	1385.62	1386.75	1.000	1387.73	1388.06	0.76	1
3		16.22	30 c	48.0	1387.25	1387.73	1.000	1388.82	1389.08	0.62	2
4		13.28	24 c	34.0	1388.23	1388.57	1.000	1389.70	1389.86	0.66	3
5		6.79	18 c	38.0	1389.07	1389.45	1.000	1390.52	1390.55	0.37	4
6		21.61	30 c	50.0	1386.33	1387.33	2.000	1387.73	1388.88	0.71	1

Project File: SWD2 25-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 6

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 25 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		4.13*	0.10	4.23	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.55	6.84	0.37	6.84	2.00	Off
2		0.78*	0.00	0.68	0.10	Curb	4.0	5.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.27	2.39	0.22	3.19	2.00	1
3		2.94*	3.54	6.09	0.39	Curb	4.0	15.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.58	7.80	0.47	10.21	2.00	6
4		6.49*	0.00	4.80	1.69	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.58	7.80	0.47	10.21	2.00	3
5		6.79*	0.00	4.94	1.85	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.59	8.13	0.48	10.44	2.00	3
6		21.61*	0.39	22.00	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.73	12.71	0.55	12.71	2.00	Off

Project File: SWD2 25-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 6

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 100.26 / (Inlet time + 15.90) ^ 0.81; Return period = 25 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	66.0	56.7	Curb	5.48	0.00	0.00	0.0	1383.00	2.45	1384.62	48	Cir	0.013	1.50	1391.96	
2	1	113.0	-90.7	Curb	1.04	0.00	0.00	0.0	1385.62	1.00	1386.75	36	Cir	0.013	1.50	1392.95	
3	2	48.0	77.6	Curb	3.68	0.00	0.00	0.0	1387.25	1.00	1387.73	30	Cir	0.013	1.10	1392.95	
4	3	34.0	-47.2	Curb	8.13	0.00	0.00	0.0	1388.23	1.00	1388.57	24	Cir	0.013	1.10	1393.45	
5	4	38.0	-42.7	Curb	8.51	0.00	0.00	0.0	1389.07	1.00	1389.45	18	Cir	0.013	1.00	1392.45	
6	1	50.0	6.2	Curb	27.18	0.00	0.00	0.0	1386.33	2.00	1387.33	30	Cir	0.013	1.00	1391.96	
Project File: SWD2 100-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 6				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		54.01	48 c	66.0	1383.00	1384.62	2.455	1385.17	1386.79	1.40	End
2		21.35	36 c	113.0	1385.62	1386.75	1.000	1388.19	1388.22	0.89	1
3		20.31	30 c	48.0	1387.25	1387.73	1.000	1389.12	1389.24	0.74	2
4		16.63	24 c	34.0	1388.23	1388.57	1.000	1389.98	1390.01	0.80	3
5		8.51	18 c	38.0	1389.07	1389.45	1.000	1390.82*	1391.07*	0.36	4
6		27.18	30 c	50.0	1386.33	1387.33	2.000	1388.19	1389.07	0.86	1

Project File: SWD2 100-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 6

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 100 Yrs.; \* Indicates surcharge condition.

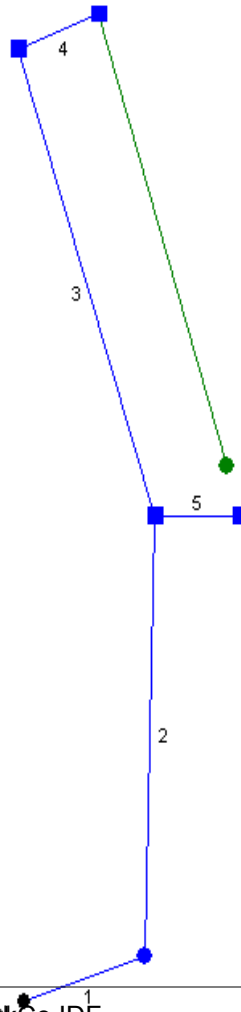
# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		5.48*	0.20	5.67	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.60	8.32	0.42	8.32	2.00	Off
2		1.04*	0.00	0.84	0.20	Curb	4.0	5.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.30	2.65	0.25	3.53	2.00	1
3		3.68*	5.40	7.82	1.26	Curb	4.0	15.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.65	10.13	0.53	12.01	2.00	6
4		8.13*	0.00	5.54	2.59	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.63	9.46	0.51	11.41	2.00	3
5		8.51*	0.00	5.69	2.81	Curb	4.0	10.00	0.00	0.00	0.00	0.005	4.17	0.113	0.030	0.013	0.64	9.80	0.52	11.64	2.00	3
6		27.18*	1.26	28.44	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.93	19.38	0.75	19.38	2.00	Off

Project File: SWD2 100-Year.stm      I-D-F File: SedgwickCo.IDF      Total number of lines: 6      Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 126.77 / (Inlet time + 17.20) ^ 0.81; Return period = 100 Yrs. ; \* Indicates Known Q added

# Hydraflow Plan View



Project file: SWD3.stm

IDF file: Sedgwick Co.IDF

No. Lines: 5

09-07-2007

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	71.0	-18.5	MH	0.00	0.00	0.00	0.0	1384.00	1.79	1385.27	36	Cir	0.013	0.85	1393.78	
2	1	221.0	-70.0	Curb	4.30	0.00	0.00	0.0	1385.47	0.50	1386.58	36	Cir	0.013	1.50	1391.59	
3	2	246.0	-19.5	Curb	1.77	0.00	0.00	0.0	1387.08	0.70	1388.81	30	Cir	0.013	1.50	1393.29	
4	3	48.0	86.4	Curb	2.57	0.00	0.00	0.0	1389.31	1.00	1389.79	24	Cir	0.013	1.00	1393.29	
5	2	48.0	88.5	Curb	7.23	0.00	0.00	0.0	1387.08	1.00	1387.56	30	Cir	0.013	1.00	1391.59	
Project File: SWD3 2-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 5				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		15.85	36 c	71.0	1384.00	1385.27	1.789	1385.27	1386.54	0.41	End
2		15.85	36 c	221.0	1385.47	1386.58	0.502	1386.95	1387.85	0.72	1
3		4.33	30 c	246.0	1387.08	1388.81	0.703	1388.57	1389.51	0.35	2
4		2.57	24 c	48.0	1389.31	1389.79	1.000	1389.86	1390.36	0.19	3
5		7.23	30 c	48.0	1387.08	1387.56	1.000	1388.57	1388.46	0.32	2
Project File: SWD3 2-Year.stm			IDF File: SedgwickCo.IDF			Total No. Lines: 5			Run Date: 09-07-2007		
NOTES: c = circular; e = elliptical; b = box; Return period = 2 Yrs.; * Indicates surcharge condition.											

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		4.30*	0.02	4.32	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.55	6.93	0.37	6.93	2.00	Off
3		1.77*	0.00	1.74	0.02	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.35	3.10	0.29	4.18	2.00	2
4		2.57*	0.00	2.40	0.17	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.41	3.63	0.33	5.61	2.00	5
5		7.23*	0.17	7.40	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.64	9.94	0.46	9.94	2.00	Off

Project File: SWD3 2-Year.stm      I-D-F File: SedgwickCo.IDF      Total number of lines: 5      Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 51.03 / (Inlet time + 10.80) ^ 0.80; Return period = 2 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	71.0	-18.5	MH	0.00	0.00	0.00	0.0	1384.00	1.79	1385.27	36	Cir	0.013	0.85	1393.78	
2	1	221.0	-70.0	Curb	5.68	0.00	0.00	0.0	1385.47	0.50	1386.58	36	Cir	0.013	1.50	1391.59	
3	2	246.0	-19.5	Curb	2.34	0.00	0.00	0.0	1387.08	0.70	1388.81	30	Cir	0.013	1.50	1393.29	
4	3	48.0	86.4	Curb	3.39	0.00	0.00	0.0	1389.31	1.00	1389.79	24	Cir	0.013	1.00	1393.29	
5	2	48.0	88.5	Curb	9.56	0.00	0.00	0.0	1387.08	1.00	1387.56	30	Cir	0.013	1.00	1391.59	
Project File: SWD3 5-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 5				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		20.97	36 c	71.0	1384.00	1385.27	1.789	1385.46	1386.73	0.50	End
2		20.97	36 c	221.0	1385.47	1386.58	0.502	1387.23	1388.04	0.88	1
3		5.73	30 c	246.0	1387.08	1388.81	0.703	1388.92	1389.61	0.42	2
4		3.39	24 c	48.0	1389.31	1389.79	1.000	1390.03	1390.44	0.23	3
5		9.56	30 c	48.0	1387.08	1387.56	1.000	1388.92	1388.87	0.21	2

Project File: SWD3 5-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 5

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		5.68*	0.12	5.80	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.60	8.45	0.42	8.45	2.00	Off
3		2.34*	0.00	2.22	0.12	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.39	3.45	0.32	5.21	2.00	2
4		3.39*	0.00	2.97	0.42	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.45	3.98	0.37	6.74	2.00	5
5		9.56*	0.42	9.98	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.71	12.15	0.53	12.15	2.00	Off

Project File: SWD3 5-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 5

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 66.04 / (Inlet time + 12.90) ^ 0.80; Return period = 5 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	71.0	-18.5	MH	0.00	0.00	0.00	0.0	1384.00	1.79	1385.27	36	Cir	0.013	0.85	1393.78	
2	1	221.0	-70.0	Curb	6.71	0.00	0.00	0.0	1385.47	0.50	1386.58	36	Cir	0.013	1.50	1391.59	
3	2	246.0	-19.5	Curb	2.76	0.00	0.00	0.0	1387.08	0.70	1388.81	30	Cir	0.013	1.50	1393.29	
4	3	48.0	86.4	Curb	4.01	0.00	0.00	0.0	1389.31	1.00	1389.79	24	Cir	0.013	1.00	1393.29	
5	2	48.0	88.5	Curb	11.30	0.00	0.00	0.0	1387.08	1.00	1387.56	30	Cir	0.013	1.00	1391.59	
Project File: SWD3 10-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 5				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		24.79	36 c	71.0	1384.00	1385.27	1.789	1385.59	1386.86	0.56	End
2		24.79	36 c	221.0	1385.47	1386.58	0.502	1387.42	1388.17	0.99	1
3		6.77	30 c	246.0	1387.08	1388.81	0.703	1389.16	1389.68	0.46	2
4		4.01	24 c	48.0	1389.31	1389.79	1.000	1390.14	1390.50	0.25	3
5		11.30	30 c	48.0	1387.08	1387.56	1.000	1389.16	1389.13	0.19	2

Project File: SWD3 10-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 5

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No		
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)	
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.00	0.0	Off
2		6.71*	0.22	6.94	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.63	9.52	0.45	9.52	2.00	Off	
3		2.76*	0.00	2.54	0.22	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.42	3.72	0.34	5.88	2.00	2	
4		4.01*	0.00	3.35	0.66	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.48	4.46	0.39	7.48	2.00	5	
5		11.30*	0.66	11.96	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.76	13.72	0.58	13.72	2.00	Off	

Project File: SWD3 10-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 5

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 81.20 / (Inlet time + 14.50) ^ 0.81; Return period = 10 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	71.0	-18.5	MH	0.00	0.00	0.00	0.0	1384.00	1.79	1385.27	36	Cir	0.013	0.85	1393.78	
2	1	221.0	-70.0	Curb	8.08	0.00	0.00	0.0	1385.47	0.50	1386.58	36	Cir	0.013	1.50	1391.59	
3	2	246.0	-19.5	Curb	3.33	0.00	0.00	0.0	1387.08	0.70	1388.81	30	Cir	0.013	1.50	1393.29	
4	3	48.0	86.4	Curb	4.83	0.00	0.00	0.0	1389.31	1.00	1389.79	24	Cir	0.013	1.00	1393.29	
5	2	48.0	88.5	Curb	13.60	0.00	0.00	0.0	1387.08	1.00	1387.56	30	Cir	0.013	1.00	1391.59	
Project File: SWD3 25-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 5				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		29.84	36 c	71.0	1384.00	1385.27	1.789	1385.74	1387.01	0.65	End
2		29.84	36 c	221.0	1385.47	1386.58	0.502	1387.66	1388.32	1.15	1
3		8.16	30 c	246.0	1387.08	1388.81	0.703	1389.47	1389.77	0.52	2
4		4.83	24 c	48.0	1389.31	1389.79	1.000	1390.29	1390.57	0.28	3
5		13.60	30 c	48.0	1387.08	1387.56	1.000	1389.47	1389.46	0.18	2

Project File: SWD3 25-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 5

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 25 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		8.08*	0.40	8.48	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.67	10.90	0.49	10.90	2.00	Off
3		3.33*	0.00	2.93	0.40	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.45	3.98	0.37	6.68	2.00	2
4		4.83*	0.00	3.82	1.01	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.51	5.46	0.42	8.34	2.00	5
5		13.60*	1.01	14.61	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.82	15.69	0.64	15.69	2.00	Off

Project File: SWD3 25-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 5

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 100.26 / (Inlet time + 15.90) ^ 0.81; Return period = 25 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	71.0	-18.5	MH	0.00	0.00	0.00	0.0	1384.00	1.79	1385.27	36	Cir	0.013	0.85	1393.78	
2	1	221.0	-70.0	Curb	10.12	0.00	0.00	0.0	1385.47	0.50	1386.58	36	Cir	0.013	1.50	1391.59	
3	2	246.0	-19.5	Curb	4.17	0.00	0.00	0.0	1387.08	0.70	1388.81	30	Cir	0.013	1.50	1393.29	
4	3	48.0	86.4	Curb	6.05	0.00	0.00	0.0	1389.31	1.00	1389.79	24	Cir	0.013	1.00	1393.29	
5	2	48.0	88.5	Curb	17.03	0.00	0.00	0.0	1387.08	1.00	1387.56	30	Cir	0.013	1.00	1391.59	
Project File: SWD3 100-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 5				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		37.36	36 c	71.0	1384.00	1385.27	1.789	1385.95	1387.22	0.78	End
2		37.36	36 c	221.0	1385.47	1386.58	0.502	1388.00	1388.56	1.32	1
3		10.21	30 c	246.0	1387.08	1388.81	0.703	1389.89	1390.07	0.40	2
4		6.05	24 c	48.0	1389.31	1389.79	1.000	1390.47	1390.66	0.33	3
5		17.03	30 c	48.0	1387.08	1387.56	1.000	1389.89	1389.96	0.19	2
Project File: SWD3 100-Year.stm			IDF File: SedgwickCo.IDF			Total No. Lines: 5			Run Date: 09-07-2007		
NOTES: c = circular; e = elliptical; b = box; Return period = 100 Yrs.; * Indicates surcharge condition.											

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		0.00	0.00	0.00	0.00	MH	0.0	0.00	0.00	0.00	0.00	Sag	0.00	0.000	0.000	0.000	0.00	0.00	0.00	0.00	0.0	Off
2		10.12*	0.72	10.84	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.73	12.85	0.55	12.85	2.00	Off
3		4.17*	0.00	3.44	0.72	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.49	4.80	0.40	7.64	2.00	2
4		6.05*	0.00	4.43	1.62	Curb	4.0	10.00	0.00	0.00	0.00	0.006	4.17	0.113	0.030	0.013	0.55	6.80	0.45	9.41	2.00	5
5		17.03*	1.62	18.65	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.90	18.47	0.72	18.47	2.00	Off

Project File: SWD3 100-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 5

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 126.77 / (Inlet time + 17.20) ^ 0.81; Return period = 100 Yrs. ; \* Indicates Known Q added

# Hydraflow Plan View



# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	498.0	-180.0	Curb	3.90	0.00	0.00	0.0	1387.50	0.69	1390.95	36	Cir	0.013	0.50	1395.43	
2	1	48.0	0.0	Curb	14.49	0.00	0.00	0.0	1391.45	1.00	1391.93	30	Cir	0.013	1.00	1395.43	
Project File: SWD4 2-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		18.39	36 c	498.0	1387.50	1390.95	0.693	1388.87	1392.32	0.27	End
2		14.49	30 c	48.0	1391.45	1391.93	1.000	1392.58	1393.20	0.52	1

Project File: SWD4 2-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 2

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 2 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		3.90*	0.00	3.90	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.61	8.74	0.43	8.74	2.00	Off
2		14.49*	0.00	14.49	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.81	15.60	0.63	15.60	2.00	1

Project File: SWD4 2-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 2

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 51.03 / (Inlet time + 10.80) ^ 0.80; Return period = 2 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	498.0	-180.0	Curb	5.12	0.00	0.00	0.0	1387.50	0.69	1390.95	36	Cir	0.013	0.50	1395.43	
2	1	48.0	0.0	Curb	18.80	0.00	0.00	0.0	1391.45	1.00	1391.93	30	Cir	0.013	1.00	1395.43	
Project File: SWD4 5-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		23.92	36 c	498.0	1387.50	1390.95	0.693	1389.06	1392.51	0.32	End
2		18.80	30 c	48.0	1391.45	1391.93	1.000	1392.83	1393.38	0.63	1

Project File: SWD4 5-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 2

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 5 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		5.12*	0.00	5.12	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.66	10.49	0.48	10.49	2.00	Off
2		18.80*	0.00	18.80	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.65	10.03	0.47	10.03	2.00	Off

Project File: SWD4 5-Year.stm	I-D-F File: SedgwickCo.IDF	Total number of lines: 2	Run Date: 09-07-2007
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NOTES: Inlet N-Values = 0.013 ; Intensity = 66.04 / (Inlet time + 12.90) ^ 0.80; Return period = 5 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert EI Dn (ft)	Line slope (%)	Invert EI Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim EI (ft)	
1	End	498.0	-180.0	Curb	6.04	0.00	0.00	0.0	1387.50	0.69	1390.95	36	Cir	0.013	0.50	1395.43	
2	1	48.0	0.0	Curb	22.00	0.00	0.00	0.0	1391.45	1.00	1391.93	30	Cir	0.013	1.00	1395.43	
Project File: SWD4 10-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		28.04	36 c	498.0	1387.50	1390.95	0.693	1389.19	1392.64	0.36	End
2		22.00	30 c	48.0	1391.45	1391.93	1.000	1393.00	1393.50	0.72	1

Project File: SWD4 10-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 2

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 10 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		6.04*	0.00	6.04	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.70	11.71	0.52	11.71	2.00	Off
2		22.00*	0.00	22.00	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.73	12.71	0.55	12.71	2.00	Off

Project File: SWD4 10-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 2

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 81.20 / (Inlet time + 14.50) ^ 0.81; Return period = 10 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	498.0	-180.0	Curb	7.25	0.00	0.00	0.0	1387.50	0.69	1390.95	36	Cir	0.013	0.50	1395.43	
2	1	48.0	0.0	Curb	26.26	0.00	0.00	0.0	1391.45	1.00	1391.93	30	Cir	0.013	1.00	1395.43	
Project File: SWD4 25-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		33.51	36 c	498.0	1387.50	1390.95	0.693	1389.35	1392.80	0.42	End
2		26.26	30 c	48.0	1391.45	1391.93	1.000	1393.22	1393.64	0.83	1

Project File: SWD4 25-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 2

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 25 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		7.25*	0.00	7.25	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.72	12.47	0.54	12.47	2.00	Off
2		26.26*	0.00	26.26	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.85	16.93	0.67	16.93	2.00	Off

Project File: SWD4 25-Year.stm

I-D-F File: SedgwickCo.IDF

Total number of lines: 2

Run Date: 09-07-2007

NOTES: Inlet N-Values = 0.013 ; Intensity = 100.26 / (Inlet time + 15.90) ^ 0.81; Return period = 25 Yrs. ; \* Indicates Known Q added

# Hydraflow Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line type	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	498.0	-180.0	Curb	9.05	0.00	0.00	0.0	1387.50	0.69	1390.95	36	Cir	0.013	0.50	1395.43	
2	1	48.0	0.0	Curb	32.61	0.00	0.00	0.0	1391.45	1.00	1391.93	30	Cir	0.013	1.00	1395.43	
Project File: SWD4 100-Year.stm						IDF File: SedgwickCo.IDF						Total number of lines: 2				Date: 09-07-2007	

# Hydraflow Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	Dns line No.
1		41.66	36 c	498.0	1387.50	1390.95	0.693	1389.56	1393.01	0.51	End
2		32.61	30 c	48.0	1391.45	1391.93	1.000	1393.51	1393.84	1.02	1

Project File: SWD4 100-Year.stm

IDF File: SedgwickCo.IDF

Total No. Lines: 2

Run Date: 09-07-2007

NOTES: c = circular; e = elliptical; b = box; Return period = 100 Yrs.; \* Indicates surcharge condition.

# Hydraflow Inlet Report

Line No	Inlet ID	Q = CIA (cfs)	Q carry (cfs)	Q capt (cfs)	Q byp (cfs)	Junc type	Curb Inlet		Grate Inlet			Gutter						Inlet			Byp line No	
							Ht (in)	L (ft)	area (sqft)	L (ft)	W (ft)	So (ft/ft)	W (ft)	Sw (ft/ft)	Sx (ft/ft)	n	depth (ft)	spread (ft)	depth (ft)	spread (ft)		Dep (in)
1		9.05*	0.00	9.05	0.00	Curb	4.0	5.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	0.88	17.90	0.70	17.90	2.00	Off
2		32.61*	0.00	32.61	0.00	Curb	4.0	15.00	0.00	0.00	0.00	Sag	4.17	0.113	0.030	0.000	1.08	24.60	0.90	24.60	2.00	Off

Project File: SWD4 100-Year.stm	I-D-F File: SedgwickCo.IDF	Total number of lines: 2	Run Date: 09-07-2007
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NOTES: Inlet N-Values = 0.013 ; Intensity = 126.77 / (Inlet time + 17.20) ^ 0.81; Return period = 100 Yrs. ; \* Indicates Known Q added

## **Tab 4. Floodplain Submittal**

### **A. Source of flood profile**

The flood profile is not applicable to this development.

### **B. Nearest base flood elevations**

The base flood elevations are shown off-site on FEMA maps, Exhibit 1-4.

### **C. Delineation of pre-developed regulatory floodplain/floodway limits**

Limits of pre-developed floodplain/floodway limits are off-site (see Exhibit 1-4).

### **D. Delineation of post-developed regulatory floodplain/floodway limits**

The limits of post-developed floodplain/floodway limits are not applicable to this development. The existing regulatory limits will not be changed.

### **E. Floodplain boundary determination per elevation**

Not applicable to this development.

### **F. Provide source of floodway data table and discharges**

Not applicable to this development.

### **G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies**

Not applicable to this development.

### **H. Provide regulatory floodway and four natural profile models (10, 50, 100, & 500-yr) for existing and future watershed conditions**

Not applicable to this development.

### **I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties**

Not applicable to this development.

### **J. Floodplains and floodways located within a Reserve**

Not applicable to this development.

**Tab 5. Federal, State, and Local Permits**

**A. US Army Corps of Engineers – Regulatory Program Permits**

Not applicable to this development.

**B. Kansas Department of Agriculture – Division of Water Resources Permits**

Not applicable to this development.

**C. Federal Emergency Management Agency (FEMA) Letter of Map Changes**

Not applicable to this development.

**D. Kansas Department of Transportation**

Not applicable to this development.

**E. Sedgwick County Right-of-Way Permit**

Not applicable to this development.