

PRELIMINARY DRAINAGE REPORT

FOR

KRUG SOUTH ADDITION
Wichita, Kansas

REVISED NOVEMBER 2006
SEPTEMBER 2006

Preliminary Drainage Report for Krug South Addition Wichita, Sedgwick County, Kansas

Location

The site is located in Sedgwick County, Kansas, on the southwest corner of 143rd Street East and 21st Street North. It lies in the northeast quarter of Section 11, Township 27 South, Range 2 East of the Sixth Principal Meridian, Sedgwick County, Kansas. The total site area is approximately 116 acres. The site is bounded by Reeds Cove Addition to the west, 21st Street to the north, and 143rd Street to the east. To the south is the Burlington Northern Railroad. The site is shown on the Andover, Kansas Quadrangle located in Appendix A.

Soils

According to the NRCS (SCS) Sedgwick County Soil Survey (Appendix B), most of the site is in the Rose Hill Series (Rd: silty clay, 1 to 3 percent slopes). The northeast section of the site is in the Irwin Series (Ia: Irwin silty clay loam, with 1 to 3 percent slopes) and a small portion in the southwest corner of the site is in the Clime Series (Ce: Clime silty clay, with 3 to 7 percent slopes). The Hydrological Soil Group (HSG) for the site is "D".

Pre-developed Conditions

Current Development

The site is undeveloped agricultural land.

Current Landform and Slope

A tributary of Fourmile Creek flows northeast to southwest through small portions of the site. Elevations on site vary from roughly 1382 feet on the east edge of the watershed, to 1340 feet in the southwest portion. Watershed slopes vary from 1.2% to 4.0%. The site drains east to west, toward the tributary. There is one pond located in the northwest section of the site.

Current Drainage Conditions

Most of the site is outside Zone A, however, portions of the site along the western boundary extend into Zone A (FIRM Panel 150, Sedgwick County, June 3, 1986) (Appendix C). A small area of Zone B is found in the southwest corner of the site.

A Letter of Map Revision (LOMR) (Case No. 05-07-0176P) was submitted for the Reed's Cove Addition. This LOMR defined the floodplain and floodway through the site (Appendix D).

Upstream of Site

Flows upstream of the site are captured by the tributary and flow into Fourmile Creek. Flows from 143rd Street are captured in a roadside drainage ditch that runs parallel to the east boundary of the site.

Current Runoff Characteristics

The pre and post-project watersheds are outlined in Appendix E. Hydraflow 2005 software by Intellisolve calculated peak flows using the SCS Method and Rational method (results are shown in Appendix F). The site was divided into two separate basins; Basin 1 drains to the channel and pond on the western edge of the site and includes 191 acres of off-site area. Basin 2 drains south; through the central portion of the site. Within each basin watersheds were delineated in order to calculate runoff from the site.

Table 1 shows the breakdown of the pre and post-project basins and watersheds.

Table 1. Pre-project watershed delineation.

Description	Area (acres)	Land Use
Basin 1	267	
Offsite watershed	191	Developed Residential
Watershed 1 (on-site)	17	Undeveloped Agricultural 1-4 % slopes
Watershed 2 (on-site)	59	Undeveloped Agricultural 1-4 % slopes
Basin 2	40	
Watershed 3 (on-site)	18	Undeveloped Agricultural 1-4 % slopes
Watershed 4 (on-site)	22	Undeveloped Agricultural 1-4 % slopes

Basin 1: The SCS method in Hydraflow was used to calculate pre-project flows for Basin 1. A curve number of 81 was used for Watershed 1 and 2, while the Offsite watershed was best represented with a curve number of 88. The FAA method was used to determine the time of concentration for each watershed, calculations are in Appendix G. Table 2 shows the pre-project runoff for the 2, 5, 10 and 100-year design storms for Basin 1.

Table 2. Basin 1 Pre-project runoff.

Description	Runoff (cfs)			
	2-year	5-year	10-year	100-year
Offsite watershed	154	239	308	597
Watershed 1 (on-site)	12	18	25	59
Watershed 2 (on-site)	48	74	95	205
Basin 1	213	330	428	853

Basin 2: The rational method was used to calculate runoff from Basin 2, since the basin was significantly smaller than Basin 1. The FAA method was also used to determine the time of concentration for each watershed in Basin 2. The time of concentration calculations and rational coefficients for Basin 2 are in Appendix G. Table 3 shows the peak-discharge from Basin 2 for the 2, 5, 10 and 100-year storm event.

Table 3. Basin 2 Pre-project runoff.

Description	Runoff (cfs)			
	2-year	5-year	10-year	100-year
Watershed 3 (on-site)	12	16	20	73
Watershed 4 (on-site)	23	29	37	87
Basin 2	34	45	57	156

Post-Developed Condition

Proposed Development

The site will develop into approximately 20 acres of commercial property and 96 acres of residential lots.

Proposed Landform and Slope

Three detention ponds are proposed for the site. The three proposed ponds along with the existing pond will be designed/modified to ensure post-project flow rates are lower than or equal to pre-project flows.

Final slopes in the residential and commercial development have not been determined, but the minimum will be 0.5% within street right-of-way and for commercial development, and 1-2% in backyards (Grading Plan, Appendix H).

Proposed Runoff Characteristics

Basin 1: Watershed 1 and 2 will be developed into residential lots; therefore the post-project curve number for both watersheds is 88. Time of concentration calculations are in Appendix G. The Offsite watershed remains unchanged from pre to post-project. All flow from Watershed 1 will be directed into the channel on the western edge of the site, via overland flow or storm sewer. Runoff from Watershed 2 will be directed either by overland flow or storm sewer into the existing and proposed ponds in the northwest section of the site. The proposed storm sewer layout is shown on the Utility Plan, Appendix I and calculations for the pipe sizing are in Appendix J.

Ponds A and B in the northwest corner of the site will have a normal pool elevation of 1352.0 and a 100-year elevation of 1355.0. These ponds were designed to detain runoff from the Offsite watershed and Watershed 2. Five 5'x8' reinforced concrete boxes will direct flow from Pond A downstream to Pond B. A rectangular weir with a crest length of 18 feet is located at the outlet of Pond B. Table 4 shows the post-project flows from Watershed 1 and 2 and the post-project flow from Basin 1.

Table 4. Basin 1 Post-project runoff.

Description	Runoff (cfs)			
	2-year	5-year	10-year	100-year
Offsite watershed	154	239	308	597
Watershed 1 (on-site)	29	41	49	94
Watershed 2 (on-site)	119	170	251	402
Flow from Basin 1 with detention	212	331	409	812

Basin 2: Watershed 3 and 4 will also be developed into residential lots; the resulting post-project time of concentrations and rational coefficients are in Appendix G. Runoff from Watershed 3 will be directed, via overland flow or storm sewers, to Pond C. Pond C will have a normal pool of 1356.0 and a 100-year elevation of 1358.3 A rectangular weir with a crest length of 10 feet controls flow from Pond C to Pond D downstream. Runoff from Watershed 4 is directed to Pond D. A 15-foot rectangular weir controls flow out of Pond D, offsite. Table 5 shows the post-project flows from Watershed 3 and 4 and the post-project flow from Basin 2.

Table 5. Basin 2 Post-project runoff.

Description	Runoff (cfs)			
	2-year	5-year	10-year	100-year
Watershed 3 (on-site)	22	28	35	89
Watershed 4 (on-site)	23	29	37	97
Flow from Basin 2 with detention	21	27	39	143

Hydraflow runoff calculations, for pre and post-project conditions, and pond sizing calculations are in Appendix F. The proposed Drainage Plan is in Appendix K.

Post-project peak-discharges from both basins will either remain almost identical to or decrease from pre-project flows. Table 6 shows the comparison of pre and post project flows.

Table 6. Comparison of pre and post-project flows.

Description	Runoff (cfs)			
	2-year	5-year	10-year	100-year
Pre-project Basin 1	213	330	428	853
Post-project Basin 1	212	331	409	812
Pre-project Basin 2	34	45	57	156
Post-project Basin 2	21	27	39	143

Additional Flow Structures

Three 5'x8' reinforced concrete boxes are proposed for directing flow under 21st Street and north of the Krug South site.

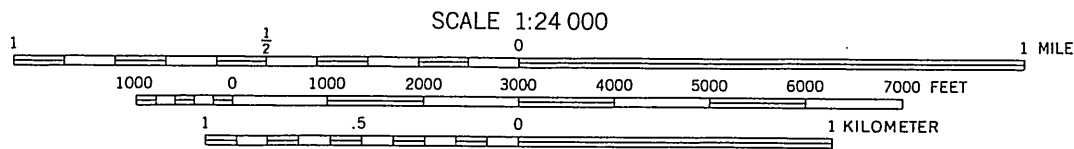
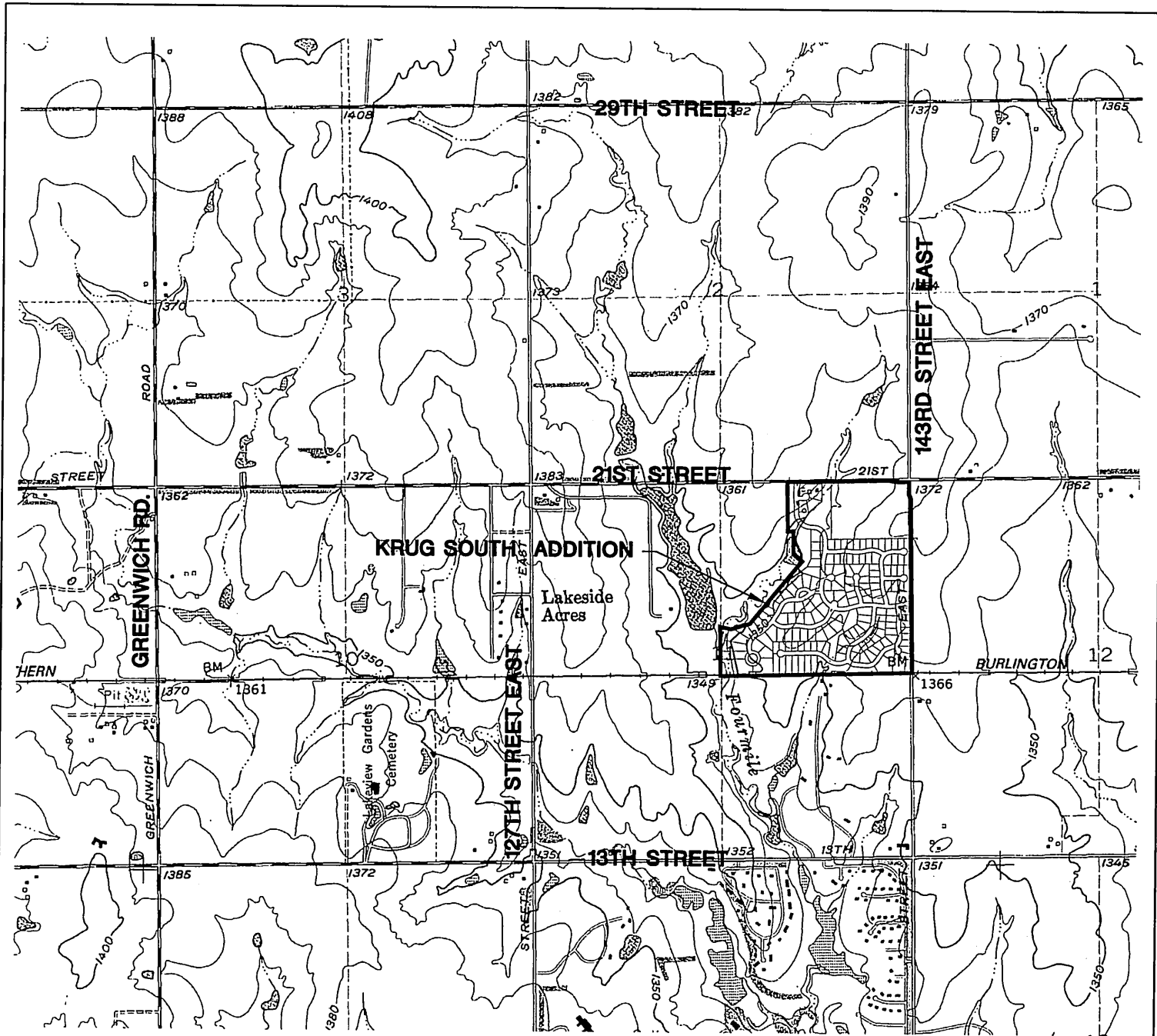
Permits

Permits will be obtained from the Division of Water Resources (DWR) for the floodplain fill and stream obstruction and channel changes. The Army Corps of Engineers will be contacted about wetland issues. A LOMR application will be submitted to FEMA to revise the floodplain and floodway on a portion of the property.

Summary

Krug South Addition is located in Sedgwick County, Kansas, on the southwest corner of 143rd Street East and 21st Street North. Krug South will develop into commercial property and residential lots. The development will include three reserves for ponds. Post-project runoff from the watershed will increase from pre-project flows. The proposed and existing ponds will provide adequate detention and prevent increased peak flows from the site. Storm sewers will carry runoff from streets and yards into the ponds. Based on the studied pre-developed and post-developed conditions, the total flow from the site is reduced by 54 cfs for the 100-year design storm.

Appendix A
Quadrangle



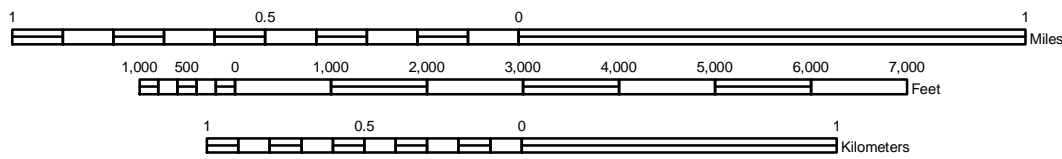
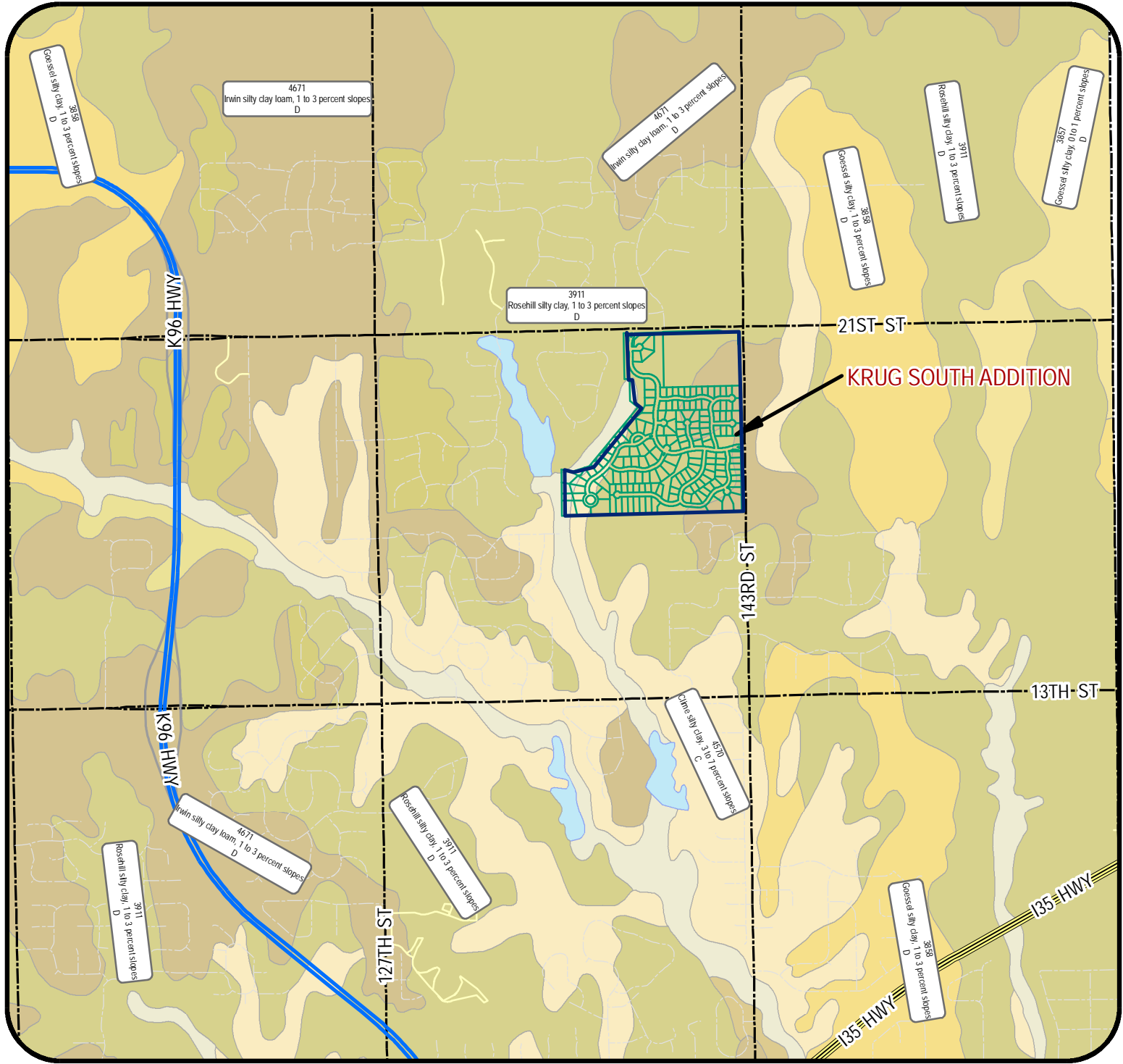
CONTOUR INTERVAL 5 FEET
 NATIONAL GEODETIC VERTICAL DATUM OF 1929



<p>MKEC ENGINEERING CONSULTANTS, INC.</p> <p>411 N. WEBB ROAD WICHITA, KS. 67206 316-684-9600</p>	<p>KRUG SOUTH ADDITION PROJECT NAME</p>		
	<p>USGS GEOLOGICAL SURVEY ANDOVER, KANSAS QUADRANGLE SHEET TITLE</p>		
	<p>TMH DESIGN BY:</p>	<p>CMJ DRAWN BY:</p>	<p>GJA CHECKED BY:</p>
	<p>NOVEMBER 2006 DATE</p>	<p>05291 JOB NO.</p>	<p>1 / 1 SHEET/OF</p>

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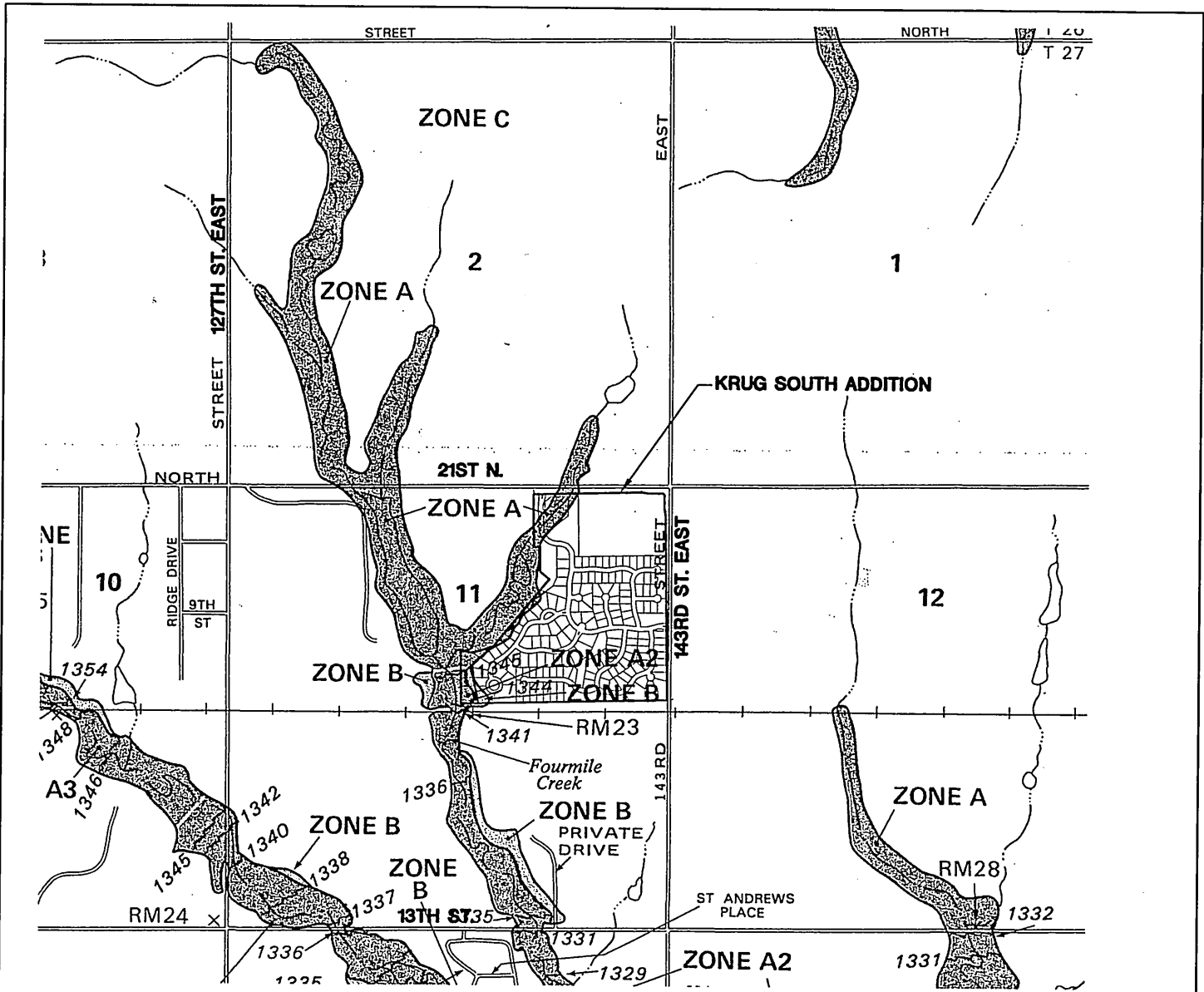
Appendix B
Soil Survey



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Krug South Addition	
Project Name:	
Soil Survey - Sedgwick County, KS	
Sheet Title:	
	KWS
	NOV. 2006
	Date:
Drawn By:	TMH / KLA
Design / Review:	05291
	Job No.:

Appendix C
FIRM / FBFM



NATIONAL FLOOD INSURANCE PROGRAM


FIRM
FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY,
KANSAS
(UNINCORPORATED AREAS)

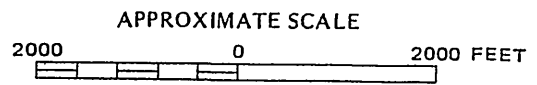
PANEL 150 OF 300

COMMUNITY-PANEL NUMBER
200321 0150 A

EFFECTIVE DATE:
JUNE 3, 1986



Federal Emergency Management Agency



MKEC
ENGINEERING
CONSULTANTS, INC.

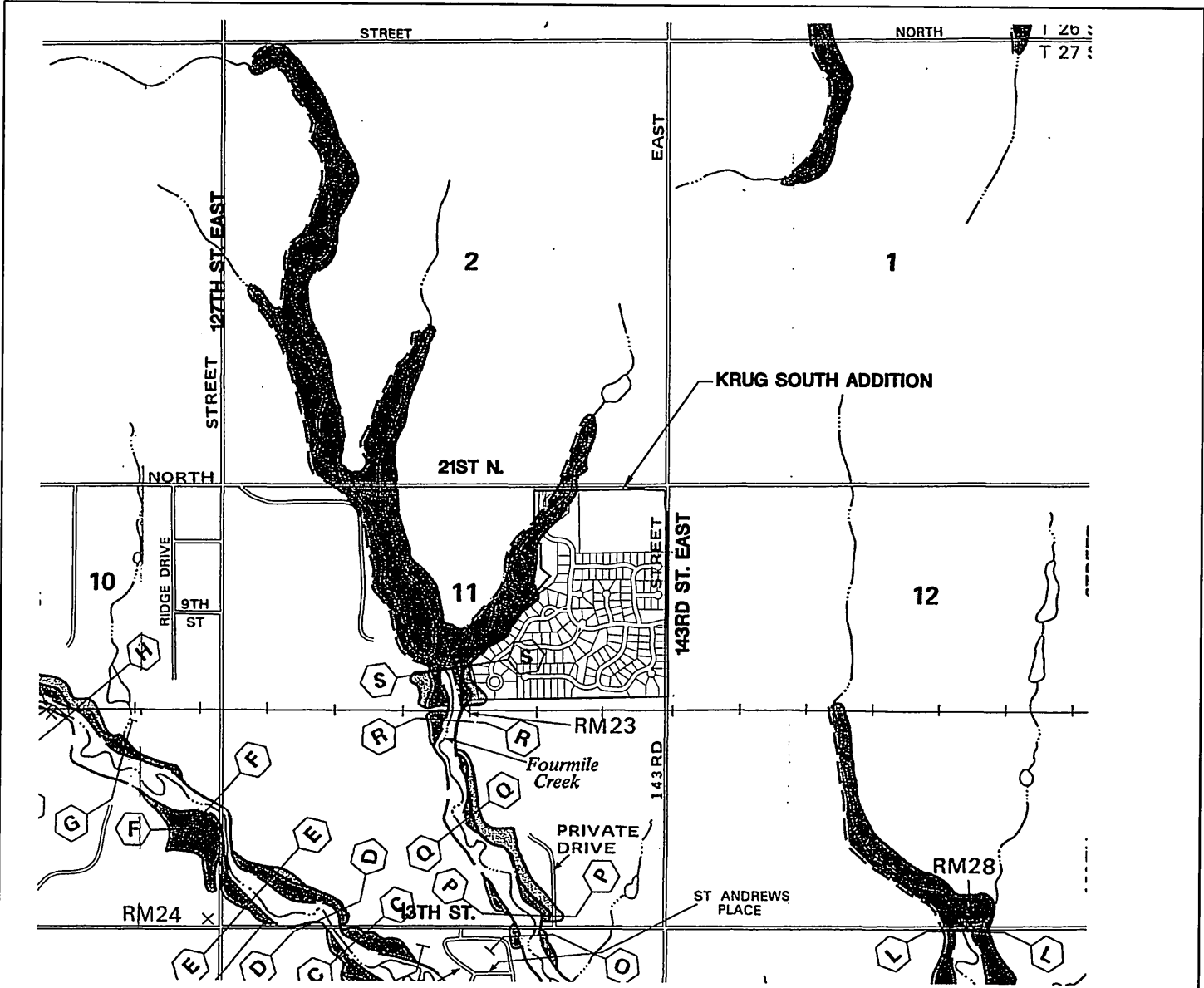
411 N. WEBB ROAD
WICHITA, KS. 67206
316-684-9600

KRUG SOUTH ADDITION
PROJECT NAME

FIRM PANEL 150 OF 300
ANDOVER, KANSAS
SHEET TITLE

DESIGN BY: TMH	DRAWN BY: CMJ	CHECKED BY: GJA
DATE NOVEMBER 2006	JOB NO. 05291	SHEET/OF 1 / 1

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NATIONAL FLOOD INSURANCE PROGRAM


FLOODWAY
FLOOD BOUNDARY AND
FLOODWAY MAP

SEDGWICK
COUNTY,
KANSAS
(UNINCORPORATED AREAS)

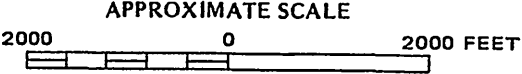
PANEL 150 OF 300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200321 0150

EFFECTIVE DATE:
JUNE 3, 1986



Federal Emergency Management Agency



MKEC
ENGINEERING
CONSULTANTS, INC.

411 N. WEBB ROAD
WICHITA, KS. 67206
316 - 684 - 9600

KRUG SOUTH ADDITION
PROJECT NAME

FBFM PANEL 150 OF 300
ANDOVER, KANSAS
SHEET TITLE

DESIGN BY:	CMJ	GJA
DRAWN BY:	DRAWN BY:	CHECKED BY:
NOVEMBER 2006	05291	1 / 1
DATE	JOB NO.	SHEET/OF

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Appendix D
LOMR



Federal Emergency Management Agency

Washington, D.C. 20472

JAN 30 2006

05194 Copies to: Grog

Kara

File/MB

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Dave Unruh
Chairman, Sedgwick County
Board of Commissioners
525 North Main Street, Suite 320
Wichita, KS 67203

IN REPLY REFER TO:

Case No.: 05-07-0176P
Community Name: Sedgwick County, KS
Community No.: 200321
Effective Date of **MAY 18 2006**
This Revision:

Dear Mr. Unruh:

The Flood Insurance Study report, Flood Insurance Rate Map, and Flood Boundary and Floodway Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Federal Insurance and Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Kansas City, Missouri, at (816) 283-7002, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division

For: Doug Bellomo, P.E., Chief
Hazard Identification Section
Mitigation Division

List of Enclosures:

Letter of Map Revision Determination Document
Annotated Flood Insurance Rate Map
Annotated Flood Boundary and Floodway Map
Annotated Flood Insurance Study Report

cc: Mr. Robert George, CFM
Floodplain Manager
Sedgwick County

Mr. Shawn Bryan, P.E.
Storm Water Engineer
City of Wichita

Mr. Rob Ramseyer
Vice President
Ritchie Associates, Inc.

Mr. Mark Buckingham, P.E.
MKEC Engineering Consultants, Inc.

Mr. Brian L. Glenn, P.E.
Baughman Company, P.A.



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT**

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Sedgwick County Kansas (Unincorporated Areas)	CHANNELIZATION CULVERT FILL WEIR STRUCTURE	HYDROLOGIC ANALYSIS HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 200321		
IDENTIFIER	Rocky Creek Addition	APPROXIMATE LATITUDE & LONGITUDE: 37.719, -97.182 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

FLOODING SOURCES & REVISED REACHES

Fourmile Creek – from approximately 1,530 feet downstream of the Burlington Northern Railroad (BNRR) to approximately 720 feet upstream of 21st Street North

Unnamed Tributary to Fourmile Creek – from its confluence with Fourmile Creek to approximately 170 feet downstream of Williamsgate Road

SUMMARY OF REVISIONS

	Fourmile Creek			Unnamed Tributary to Fourmile Creek		
Effective Flooding:	Zone AE	BFEs*	Floodway	Zone AE	BFEs*	Floodway
Revised Flooding:	Zone AE	BFEs	Floodway	Zone AE	BFEs	Floodway
Increases:	YES	YES	YES	YES	YES	YES
Decreases:	YES	YES	YES	YES	YES	YES

* BFEs – Base Flood Elevations

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 200321 0150 A Date: June 3, 1986 TYPE: FBFM** NO.: 200321 0150 Date: June 3, 1986	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: June 3, 1986 FLOODWAY DATA TABLE PROFILES: 48P and 76P SUMMARY OF DISCHARGES TABLE

* FIRM – Flood Insurance Rate Map; ** FBFM – Flood Boundary and Floodway Map; *** FHBM – Flood Hazard Boundary Map

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Kevin C Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT**

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	Sedgwick County Kansas (Unincorporated Areas)	CHANNELIZATION CULVERT FILL WEIR STRUCTURE	HYDROLOGIC ANALYSIS HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 200321		
IDENTIFIER	Rocky Creek Addition	APPROXIMATE LATITUDE & LONGITUDE: 37.719, -97.182 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

FLOODING SOURCES & REVISED REACHES	Unnamed Tributary 2 to Fourmile Creek – from its confluence with Fourmile Creek to approximately 960 feet upstream of 21st Street North
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SUMMARY OF REVISIONS

Effective Flooding:	Zone A	No BFEs*	No Floodway
Revised Flooding:	Zone AE	BFEs	Floodway
Increases:	YES	YES	YES
Decreases:	NONE	NONE	NONE

* BFEs – Base Flood Elevations

ANNOTATED MAPPING ENCLOSURES			ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM*	NO.: 200321 0150 A	Date: June 3, 1986	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: June 3, 1986 FLOODWAY DATA TABLE PROFILE: 77P SUMMARY OF DISCHARGES TABLE	
TYPE: FBFM**	NO.: 200321 0150	Date: June 3, 1986		

* FIRM – Flood Insurance Rate Map; ** FBFM – Flood Boundary and Floodway Map; *** FHBM – Flood Hazard Boundary Map

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division



Federal Emergency Management Agency
Washington, D.C. 20472

**LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)**

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report, FIRM, and FBFM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the modified channel and culvert rests with your community. We may request that your community submit a description and schedule of channel and culvert maintenance activities.

COMMUNITY REMINDERS

The base (1-percent-annual-chance) flood discharges for Fourmile Creek and Unnamed Tributary to Fourmile Creek were obtained from the LOMR dated September 29, 2005 (Case No. 04-07-526P), without considering subsequent changes in watershed characteristics that could increase flood discharges. The base flood discharges for Unnamed Tributary 2 to Fourmile Creek were obtained from the submitted hydrologic model. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This revision has met our criteria for removing an area from the 1-percent-annual-chance floodplain to reflect the placement of fill. However, we encourage you to require that the lowest adjacent grade and lowest floor (including basement) of any structure placed within the subject area be elevated to or above the Base (1-percent-annual-chance) Flood Elevation.

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Robert G. Bissell
Director, Federal Insurance and Mitigation Division
Federal Emergency Management Agency, Region VII
9221 Ward Parkway, Suite 300
Kansas City, MO 64114
(816) 283-7002

STATUS OF THE COMMUNITY NFIP MAPS

Because the revisions requested in LOMR Case Nos. 04-07-A180P, 05-07-0121P, and 05-07-0176P tie together at Fourmile Creek just downstream of the confluence of Unnamed Tributary 2, the first two cases were merged together with the latter case. Therefore, this revision also includes the revisions requested for LOMR Case Nos. 04-07-A180P and 05-07-0121P.

We are processing a revised FIRM and FIS report for Sedgwick County in our countywide format; therefore, we will not physically revise and republish the FIRM, FBFM, and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the countywide FIRM and FIS report, which present information from the effective FIRMs, FBFMs, and FIS reports for your community and incorporated communities in Sedgwick County, were submitted to your community for review on June 20, 2005. The modifications made by this LOMR will be evaluated and, if appropriate, will be incorporated into the countywide FIRM and FIS report before they become effective.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below.

LOCAL NEWSPAPER

Name: *Derby Daily Reporter*

Dates: 02/09/2006 02/16/2006

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NGVD)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Fourmile Creek	Approximately 1,100 feet downstream of the BNRR	1,338	1,337	0150 A
	Just downstream of Glen Wood Street	1,351	1,349	
Unnamed Tributary to Fourmile Creek	At confluence with Fourmile Creek	1,351	1,349	
	Just downstream of 21st Street North	1,351	1,350	
Unnamed Tributary 2 to Fourmile Creek	At confluence with Fourmile Creek	None	1,344	
	Approximately 960 feet upstream of 21st Street North	None	1,362	

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division

106979 10.3.1.05070176 102IAC

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE UNINCORPORATED AREAS OF SEDGWICK COUNTY, KANSAS, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On June 3, 1986, the Department of Homeland Security's Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the unincorporated areas of Sedgwick County, Kansas, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Division has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified Base Flood Elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A hydraulic analysis was performed to incorporate the effects of construction of the Glen Wood Street culvert along Fourmile Creek; construction of new weirs along Fourmile Creek and Unnamed Tributary to Fourmile Creek; and placement of fill in the floodway fringe and channelization along Fourmile Creek from approximately 1,530 feet downstream of the Burlington Northern Railroad to approximately 720 feet upstream of 21st Street North, along Unnamed Tributary to Fourmile Creek from the confluence with Fourmile Creek to approximately 170 feet downstream of Williamsgate Road, and along Unnamed Tributary 2 to Fourmile Creek from the confluence with Fourmile Creek to approximately 960 feet upstream of 21st Street North. This has resulted in a revised delineation of the regulatory floodways, increases and decreases in SFHA widths, and increased and decreased BFEs for Fourmile Creek and Unnamed Tributary to Fourmile Creek and increases in SFHA width and establishment of BFEs and a regulatory floodway for Unnamed Tributary 2 to Fourmile Creek. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Fourmile Creek:		
Approximately 1,100 feet downstream of Burlington Northern Railroad	1,338	1,337
Just downstream of Glen Wood Street	1,351	1,349
Unnamed Tributary to Fourmile Creek:		
At confluence with Fourmile Creek	1,351	1,349
Just downstream of 21st Street North	1,351	1,350
Unnamed Tributary 2 to Fourmile Creek:		
At confluence with Fourmile Creek	None	1,344
Approximately 960 feet upstream of 21st Street North	None	1,362

*National Geodetic Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Division must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These



modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Division reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Division's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Dave Unruh
Chairman, Sedgwick County
Board of Commissioners
525 North Main Street, Room 320
Wichita, KS 67203

Legend

-  1% annual chance (100-Year) Floodplain
-  0.2% annual chance (500-Year) Floodplain



APPROXIMATE SCALE IN FEET
 2,000 1,000 0 1,000 2,000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
 FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY,
 KANSAS
 (UNINCORPORATED AREAS)

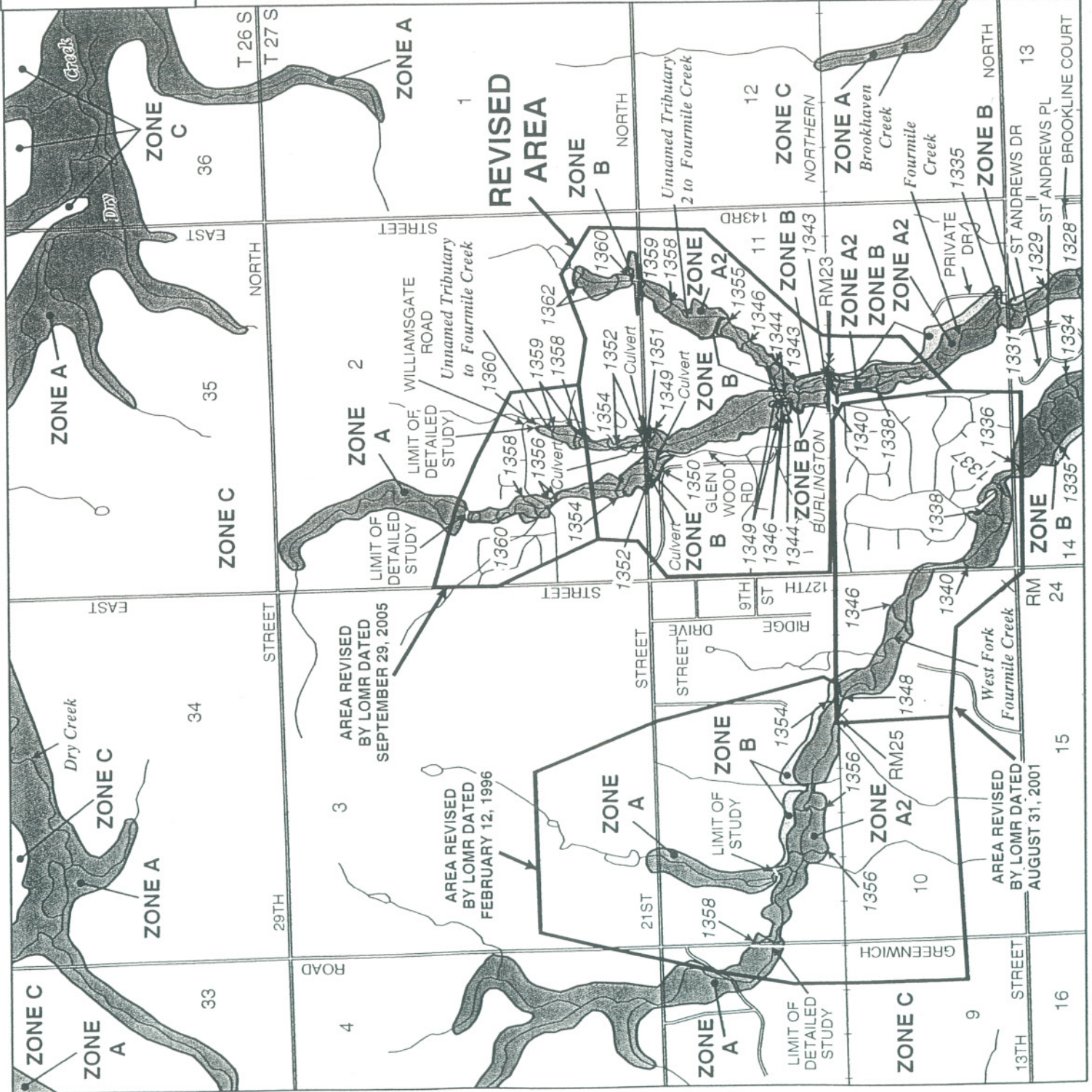
PANEL 150 OF 300
 (SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
 2003210150 A

EFFECTIVE DATE:
 JUNE 3, 1986



Federal Emergency Management Agency



Legend

- 1% annual chance (100-Year) Floodplain
- 1% annual chance (100-Year) Floodway
- 0.2% annual chance (500-Year) Floodplain

APPROXIMATE SCALE IN FEET

2,000 1,000 0 1,000 2,000

NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY FLOOD BOUNDARY AND FLOODWAY MAP

SEDGWICK COUNTY, KANSAS (UNINCORPORATED AREAS)

PANEL 150 OF 300 (SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER 200321 0150

EFFECTIVE DATE: JUNE 3, 1986

Federal Emergency Management Agency



TABLE 1 - SUMMARY OF DISCHARGES (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA SQ MILES	10-YEAR	PEAK DISCHARGES (CFS)		500-YEAR
			50-YEAR	100-YEAR	
MIDDLE BRANCH GYPSUM CREEK At 13th Street	2.2	740	1,090	1,240	1,590
FOURMILE CREEK At county boundary	27.2	11,680	17,390	20,100	26,800
Upstream of confluence of Brookhaven Creek	8.4	3,220	4,760	5,500	7,100
Upstream of confluence of West Fork Fourmile Creek	2.2	1,410	2,070	2,400	3,130
Upstream of confluence of Unnamed Tributary to Fourmile Creek	0.8	467	*	747	925
UNNAMED TRIBUTARY TO FOURMILE CREEK At mouth	0.3	234	*	396	494
UNNAMED TRIBUTARY 2 TO FOURMILE CREEK At mouth	0.4	340	481	547	565
At 21st Street North	0.2	243	343	390	474
REVISED AREA					
WEST FORK FOURMILE CREEK At mouth at Fourmile Creek	4.2	2,110	3,120	3,600	4,770
At 13th Street North	3.2	2,200	3,270	3,780	4,850
BROOKHAVEN CREEK At mouth at Fourmile Creek	4.0	2,470	3,620	4,180	5,420
At Interstate 35	1.8	2,190	3,190	3,780	5,170
MIDDLE FORK CHISHOLM CREEK Upstream of confluence of Tributary M1	11.7	2,980	5,280	6,190	8,920
At 53rd Street North	9.5	2,580	4,570	5,360	7,720
EAST FORK CHISHOLM CREEK At 45th Street North	1.6	860	1,270	1,545	2,240
CENTER DRAIN EAST TRIBUTARY At City of Wichita Corporate Limits	1.5	630	1,010	1,190	1,600

AREA REVISED BY LOMR DATED 09/29/05

*data not available

DATE MAY 10 2006

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)	
FOURMILE CREEK									
A	6354	608 ²	2815	2.9	1290.0	1290.0	1291.0	1.0	
B	7254	248	1497	3.7	1291.1	1291.1	1292.0	0.9	
C	9104	488	3217	1.7	1293.3	1293.3	1294.2	0.9	
D	10,294	187	712	7.7	1293.4	1293.4	1294.4	1.0	
E	10,949	144	562	9.8	1296.6	1296.6	1296.6	0.0	
F	13,009	181	1306	4.2	1302.0	1302.0	1302.5	0.5	
G	15,279	203	1291	4.3	1304.9	1304.9	1305.8	0.9	
H	17,079	195	1094	5.0	1308.2	1308.2	1308.9	0.7	
I	18,379	154	826	6.7	1312.2	1312.2	1312.5	0.3	
J	18,931	158	1524	3.6	1316.8	1316.8	1316.8	0.0	
K	20,111	292	2452	2.2	1317.0	1317.0	1317.3	0.3	
L	21,966	246	1159	4.7	1317.6	1317.6	1318.5	0.9	
M	22,866	253	1325	4.2	1321.6	1321.6	1322.5	0.9	
N	23,766	200	1040	2.3	1322.9	1322.9	1323.9	1.0	
O	25,766	153	723	3.3	1330.4	1330.4	1330.4	0.0	
P	26,047	305	1949	1.2	1335.0	1335.0	1335.0	0.0	
Q	27,847	138	359	6.6	1335.3	1335.3	1335.3	0.0	
R	29,197	120	429	6.1	1339.6	1339.6	1339.0	0.4	
S	29,852	118	635	3.2	1343.3	1343.3	1343.3	0.0	
T	31,409	247	2236	0.7	1349.1	1349.1	1349.1	0.0	
U	32,835	110	603	1.3	1352.3	1352.3	1352.3	0.0	
V	33,623	220	2539	0.3	1354.7	1354.7	1354.7	0.0	
W	34,402	50	148	4.7	1355.9	1355.9	1356.0	0.1	
X	36,069	130	109	6.4	1360.2	1360.2	1360.2	0.0	

¹FEET ABOVE CONFLUENCE WITH SPRING BRANCH

²THIS WIDTH EXTENDS BEYOND COUNTY BOUNDARY

AREA REVISED BY LOMR DATED 09/29/05

FEDERAL EMERGENCY MANAGEMENT AGENCY

SEDGWICK COUNTY, KS
(UNINCORPORATED AREAS)

FLOODWAY DATA

FOURMILE CREEK

TABLE 3

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
Unnamed Tributary to Fourmile Creek								
A	600	85	271	1.5	1351.5	1351.5	1351.5	0.0
B	938	33	66	6.0	1351.7	1351.7	1351.7	0.0
C	1489	52	287	1.4	1353.6	1353.6	1353.6	0.0
D	2011	105	82	5.2	1360.2	1360.2	1360.2	0.0
Unnamed Tributary 2 to Fourmile Creek								
A	1844	39	94	5.8	1355.3	1355.3	1355.3	0.0
B	3274	75	298	1.4	1360.8	1360.8	1361.0	0.2
C	4211	181	312	1.3	1361.7	1361.7	1361.7	0.0

REVISED AREA

REVISED AREA

¹Feet above confluence with Fourmile Creek

FEDERAL EMERGENCY MANAGEMENT AGENCY

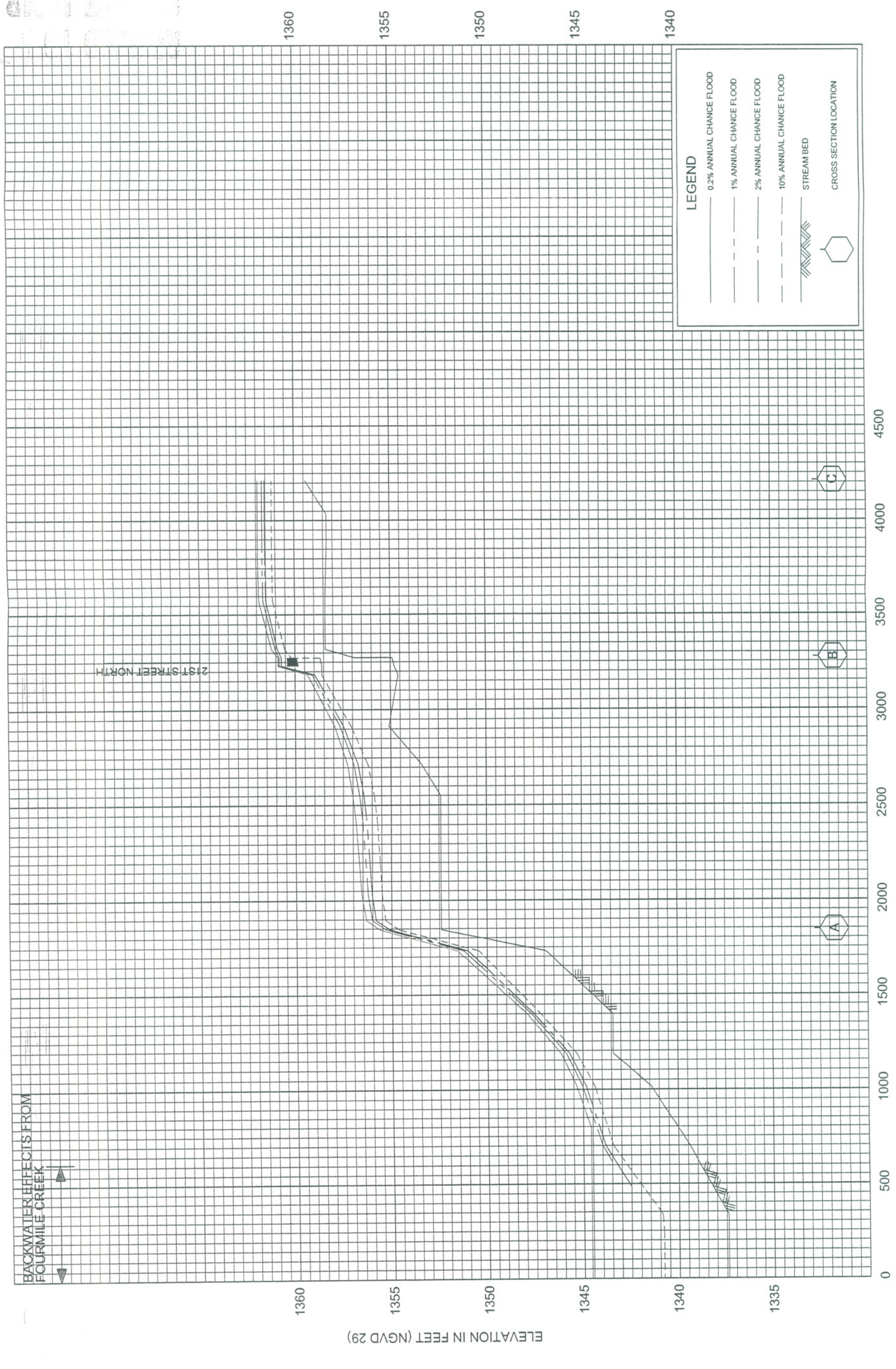
FLOODWAY DATA

**SEDGWICK COUNTY, KS
(UNINCORPORATED AREAS)**

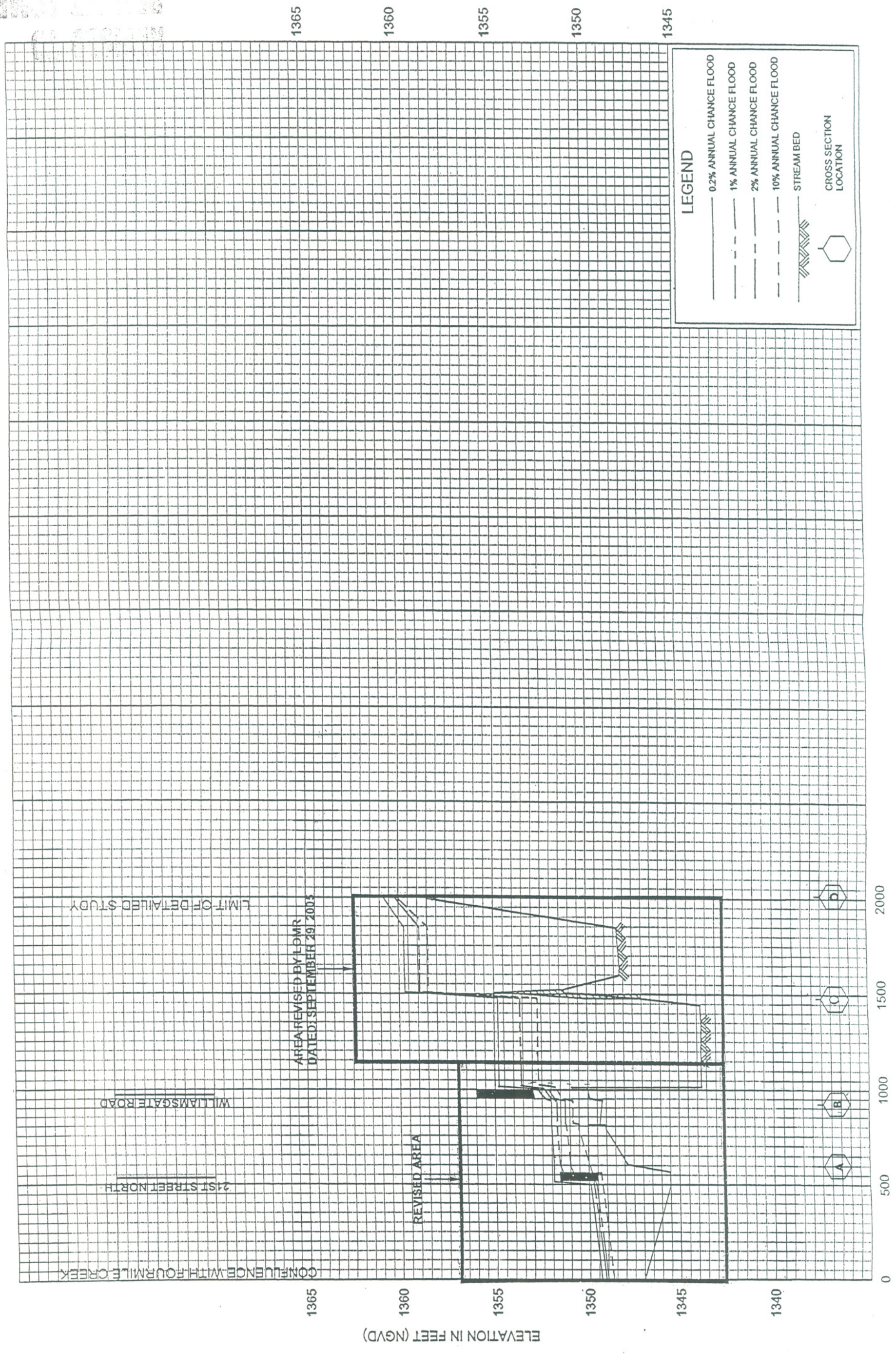
**UNNAMED TRIBUTARY TO FOURMILE CREEK -
UNNAMED TRIBUTARY 2 TO FOURMILE CREEK**

TABLE 3

MAY 18 2006



STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH FOURMILE CREEK



STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH FOURMILE CREEK

ELEVATION IN FEET (NGVD)

CONFLUENCE WITH FOURMILE CREEK

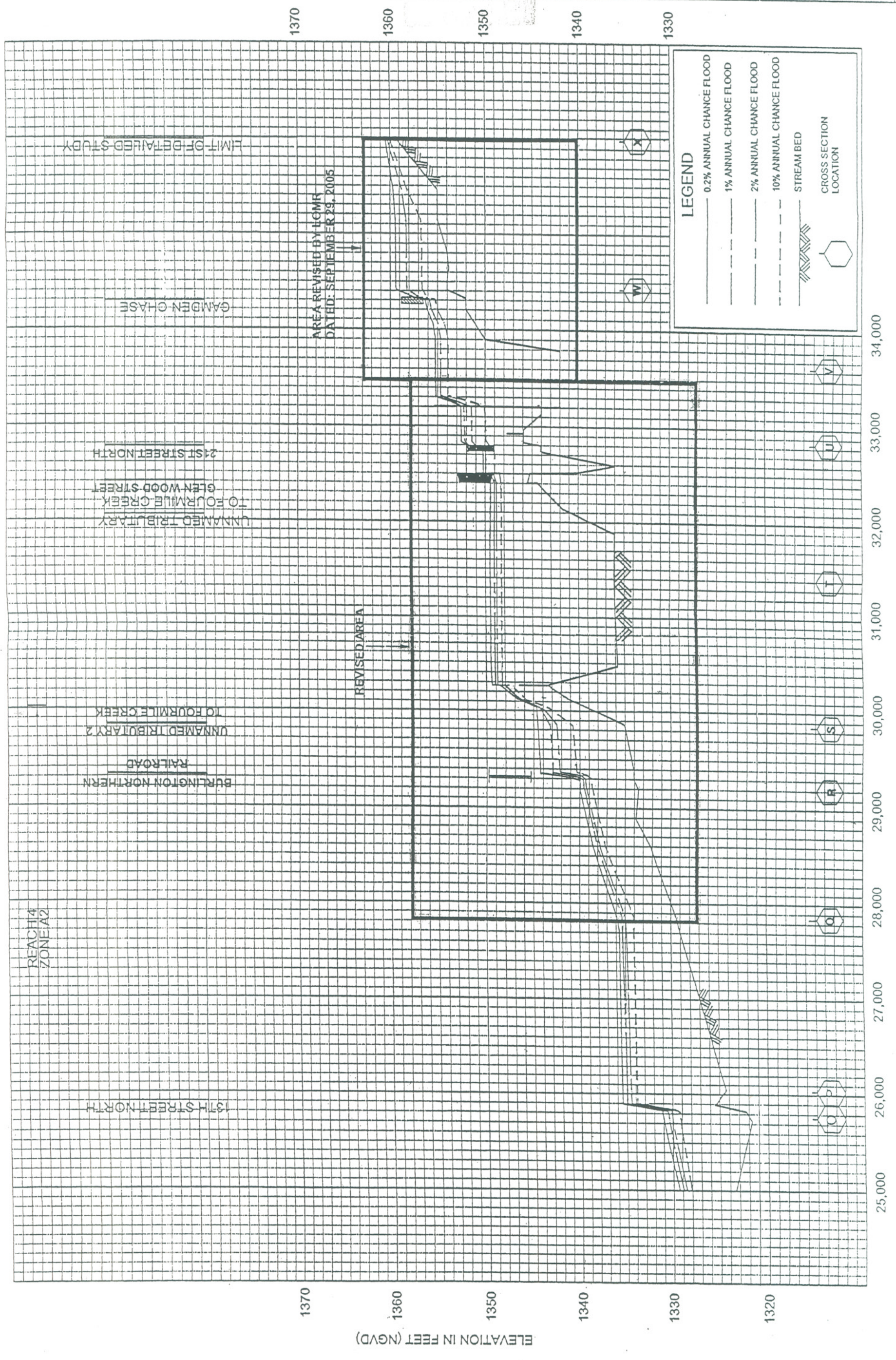
21ST STREET NORTH

WILLIAMSGATE ROAD

AREA REVISED BY LOMR
DATED: SEPTEMBER 29, 2005

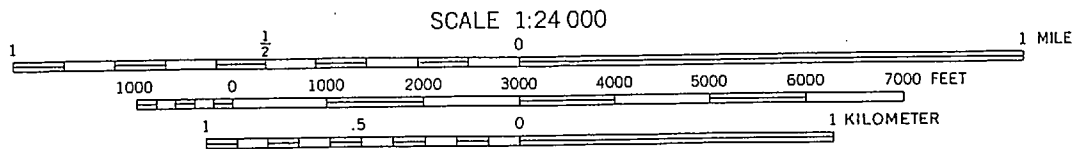
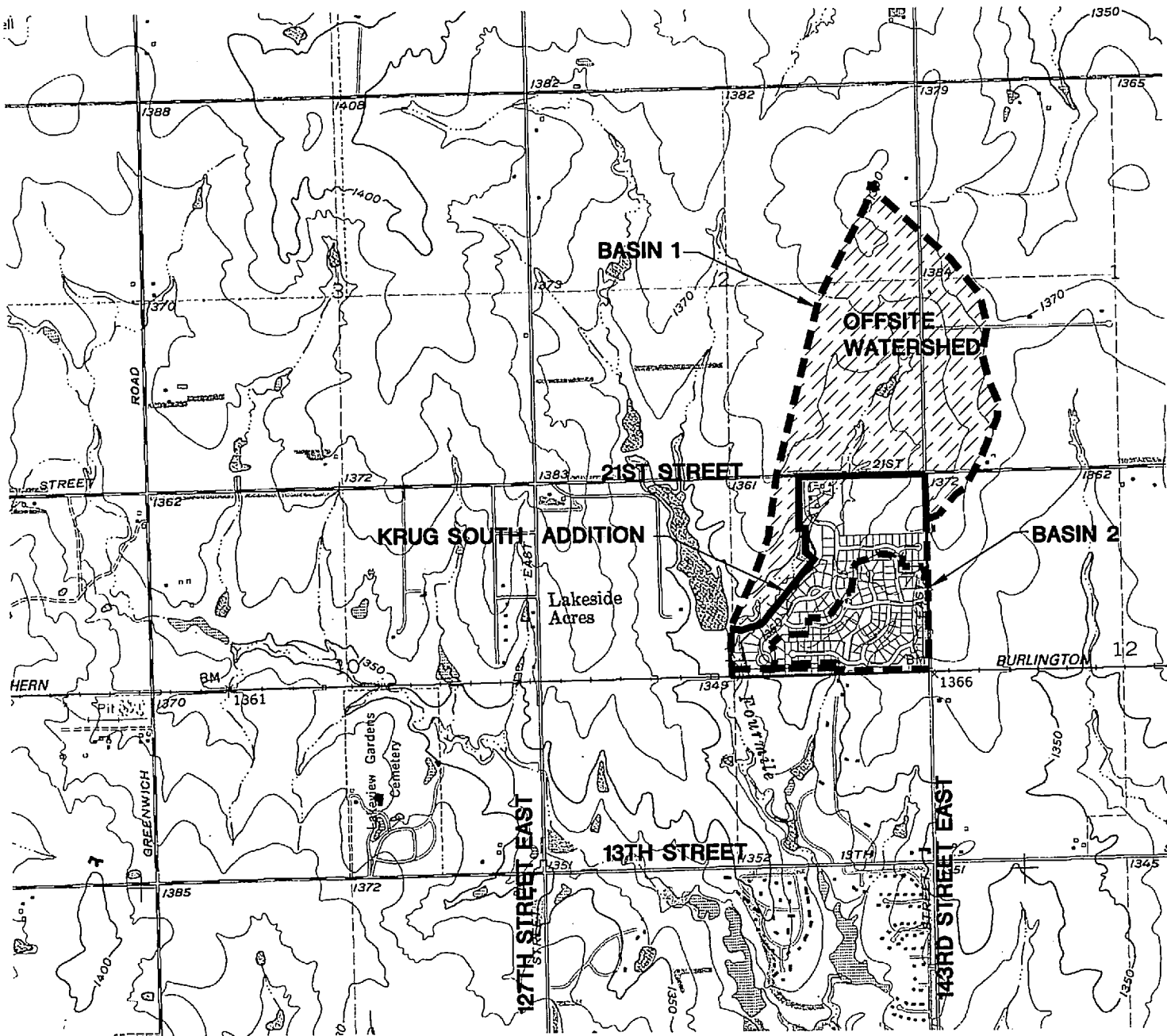
LIMIT OF DETAILED STUDY

REVISED AREA



STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SPRING BRANCH

Appendix E
Pre and Post-Project Watershed Boundary



SCALE 1:24 000
 CONTOUR INTERVAL 5 FEET
 NATIONAL GEODETIC VERTICAL DATUM OF 1929



**NOTE: SEE DRAWING 2
 FOR ONSITE
 WATERSHEDS**

MKEC
 ENGINEERING
 CONSULTANTS, INC.

411 N. WEBB ROAD
 WICHITA, KS. 67206
 316-684-9600

KRUG SOUTH ADDITION

PROJECT NAME

**PRE-POST-PROJECT WATERSHED MAP
 ANDOVER, KANSAS QUADRANGLE**

SHEET TITLE

TMH
 DESIGN BY:

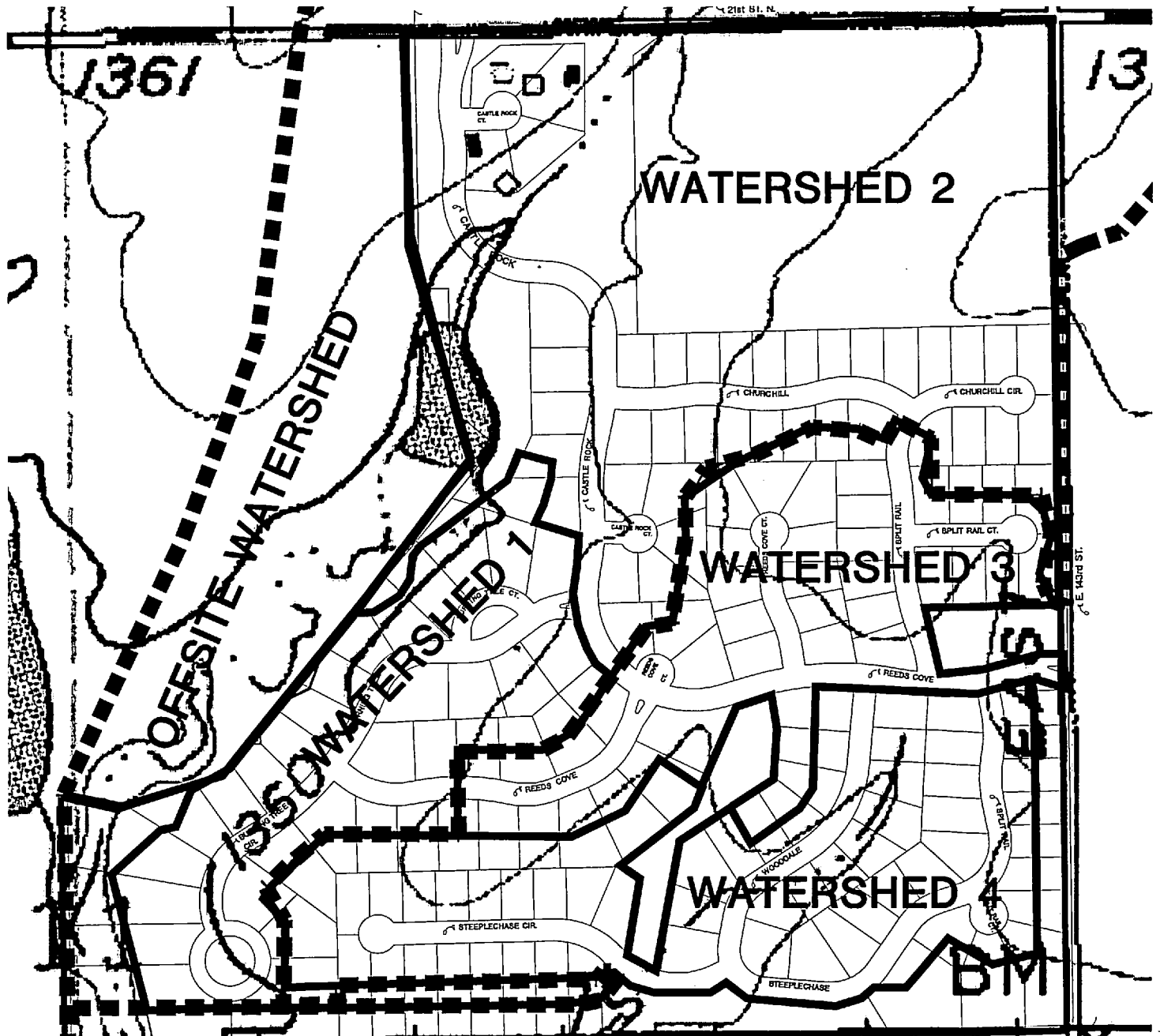
CMJ
 DRAWN BY:

GJA
 CHECKED BY:

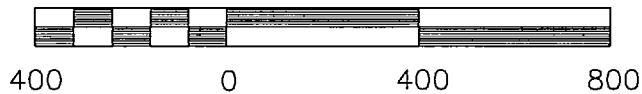
NOVEMBER 2006
 DATE

05291
 JOB NO.

1 / 2
 SHEET/OF



SCALE: 1" = 400'



J:\Civil\05291\dwg\drng\POST_drawing2.dwg

MKEC
ENGINEERING
CONSULTANTS, INC.

411 N. WEBB ROAD
WICHITA, K.S. 67206
316-684-9600

KRUG SOUTH ADDITION

PROJECT NAME

DRAWING 2

ANDOVER, KANSAS QUADRANGLE

SHEET TITLE

TMH

DESIGN BY.

CMJ

DRAWN BY.

GJA

CHECKED BY.

NOVEMBER 2006

DATE

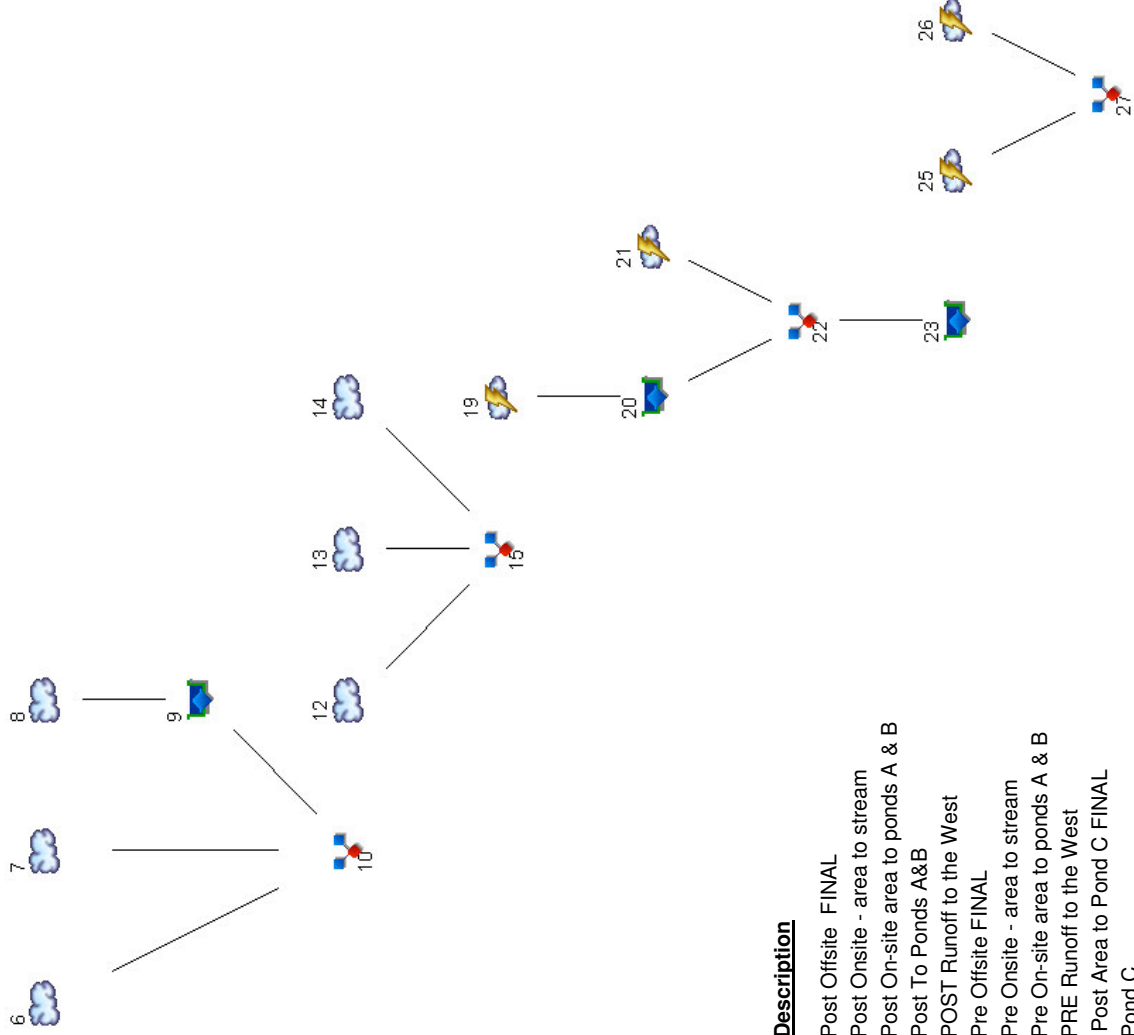
05291

JOB NO.

2 / 2

SHEET/OF

Appendix F
Hydraflow Hydrographs



Legend

Hyd.	Origin	Description
6	SCS Runoff	Post Offsite FINAL
7	SCS Runoff	Post Onsite - area to stream
8	SCS Runoff	Post On-site area to ponds A & B
9	Reservoir	Post To Ponds A&B
10	Combine	POST Runoff to the West
12	SCS Runoff	Pre Offsite FINAL
13	SCS Runoff	Pre Onsite - area to stream
14	SCS Runoff	Pre On-site area to ponds A & B
15	Combine	PRE Runoff to the West
19	Rational	Post Area to Pond C FINAL
20	Reservoir	Pond C
21	Rational	Post Area to Pond D
22	Combine	Area to Pond D and flow from Pond C
23	Reservoir	POST Runoff to South
25	Rational	Pre Area to Pond C FINAL
26	Rational	Pre Area to Pond D
27	Combine	PRE Runoff to South

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

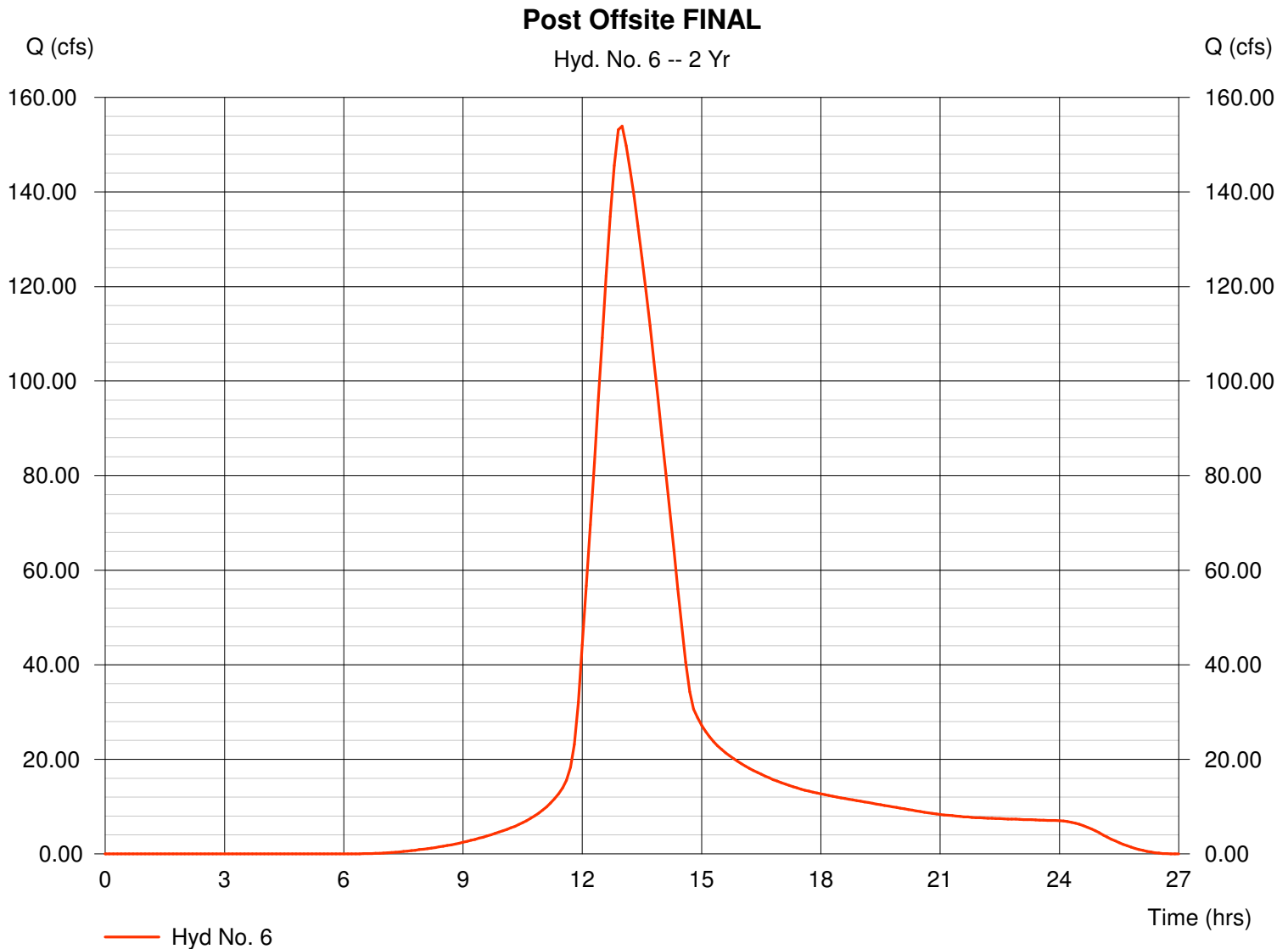
Hyd. No. 6

Post Offsite FINAL

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 191.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 153.94 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 7000 ft
Time of conc. (Tc) = 106.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 35.413 acft



Hydrograph Plot

Hyd. No. 7

Post Onsite - area to stream

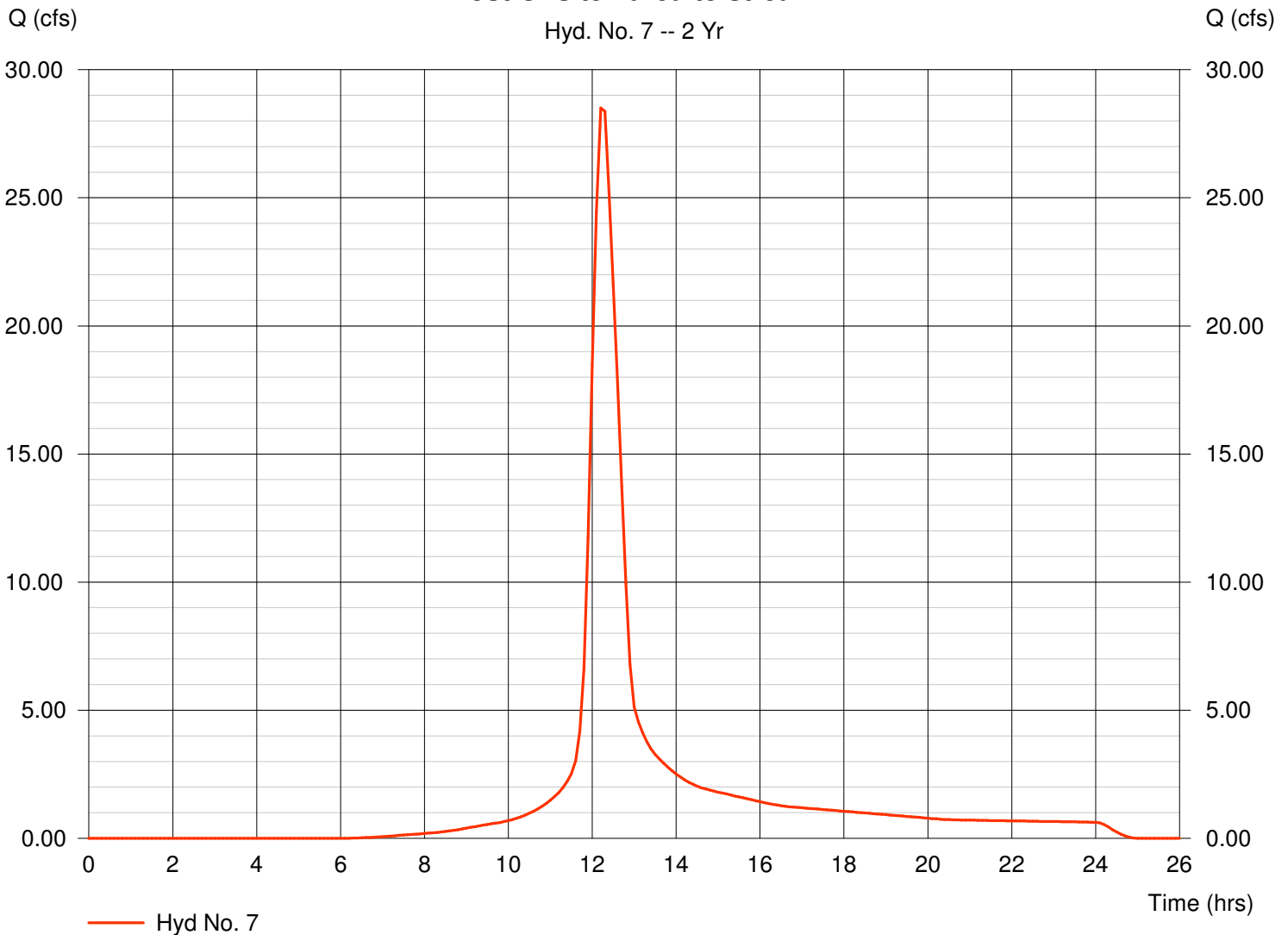
Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 17.000 ac
Basin Slope = 0.2 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 28.50 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 461 ft
Time of conc. (Tc) = 38.60 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 3.288 acft

Post Onsite - area to stream

Hyd. No. 7 -- 2 Yr



Hydrograph Plot

Hyd. No. 8

Post On-site area to ponds A & B

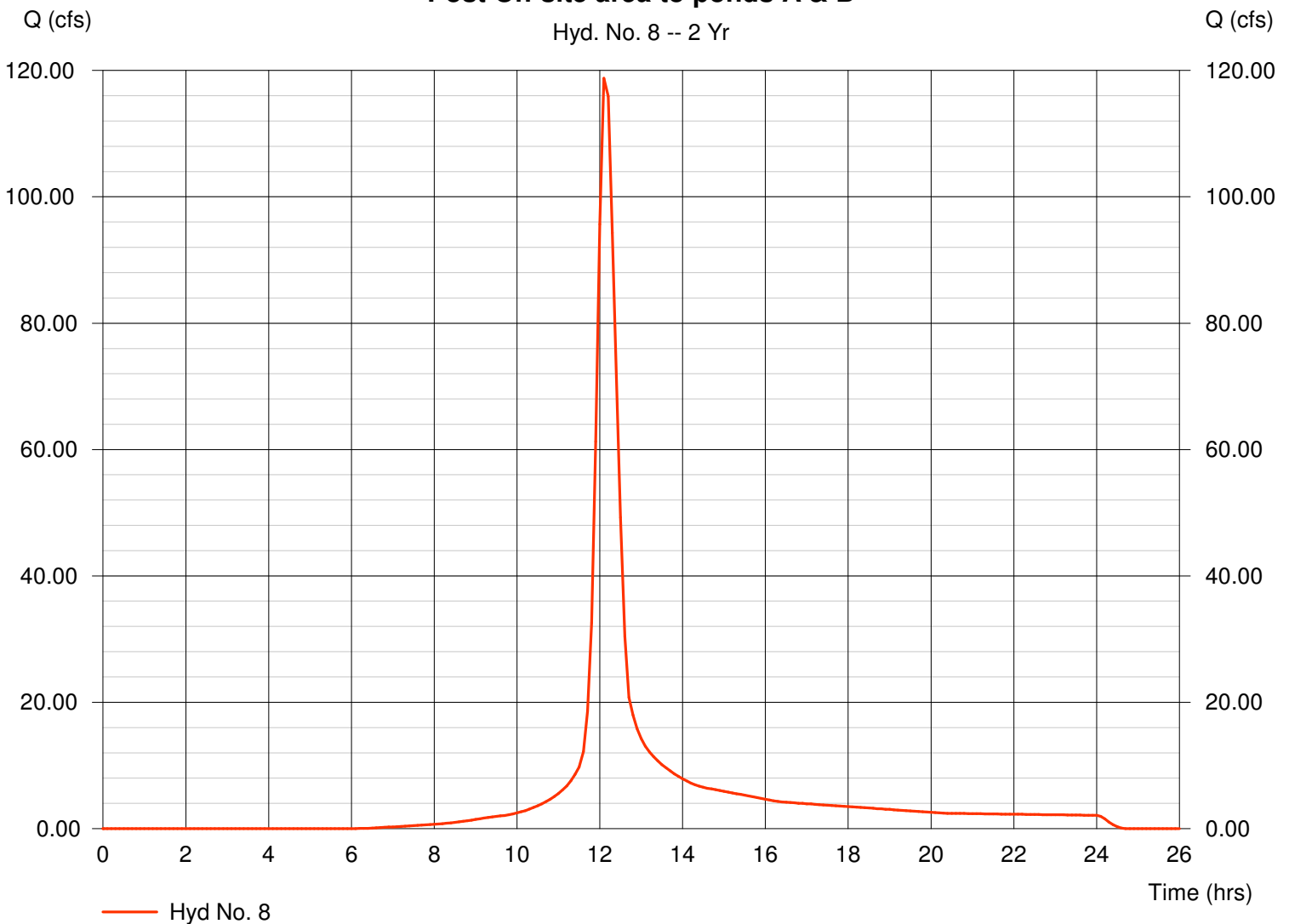
Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 59.000 ac
Basin Slope = 1.5 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 118.76 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 610 ft
Time of conc. (Tc) = 23.40 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 11.065 acft

Post On-site area to ponds A & B

Hyd. No. 8 -- 2 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

Hyd. No. 9

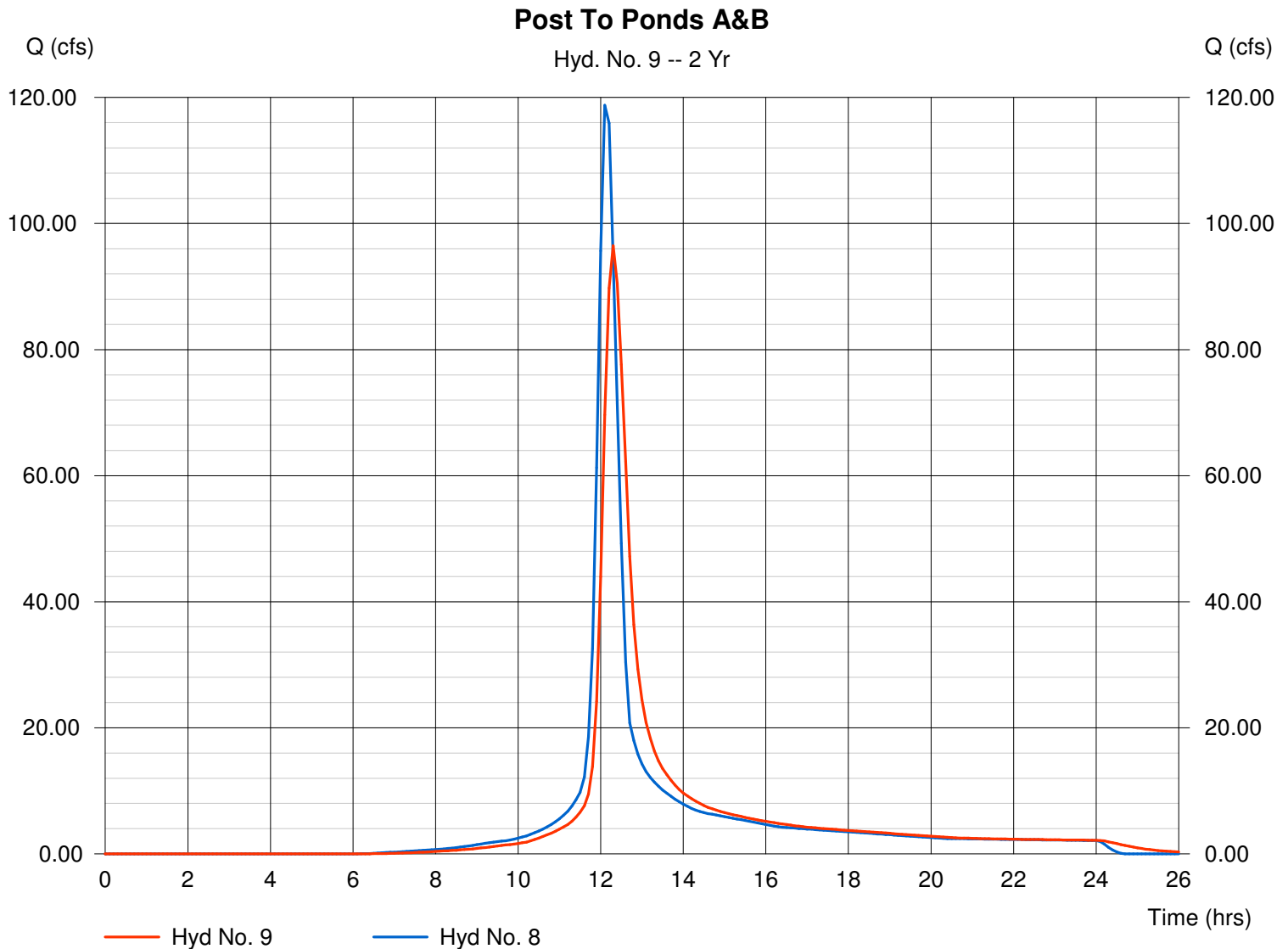
Post To Ponds A&B

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 8
Reservoir name = Ponds A & B

Peak discharge = 96.50 cfs
Time interval = 6 min
Max. Elevation = 1353.37 ft
Max. Storage = 1.939 acft

Storage Indication method used.

Hydrograph Volume = 11.065 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

Pond No. 9 - Ponds A & B

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	1352.00	56,228	0.000	0.000
1.00	1353.00	63,009	1.369	1.369
2.00	1354.00	70,098	1.528	2.897
3.00	1355.00	77,436	1.693	4.590
4.00	1356.00	85,001	1.865	6.454
5.00	1357.00	92,780	2.041	8.495
6.00	1358.00	103,774	2.256	10.751
7.00	1359.00	108,987	2.442	13.193

Culvert / Orifice Structures

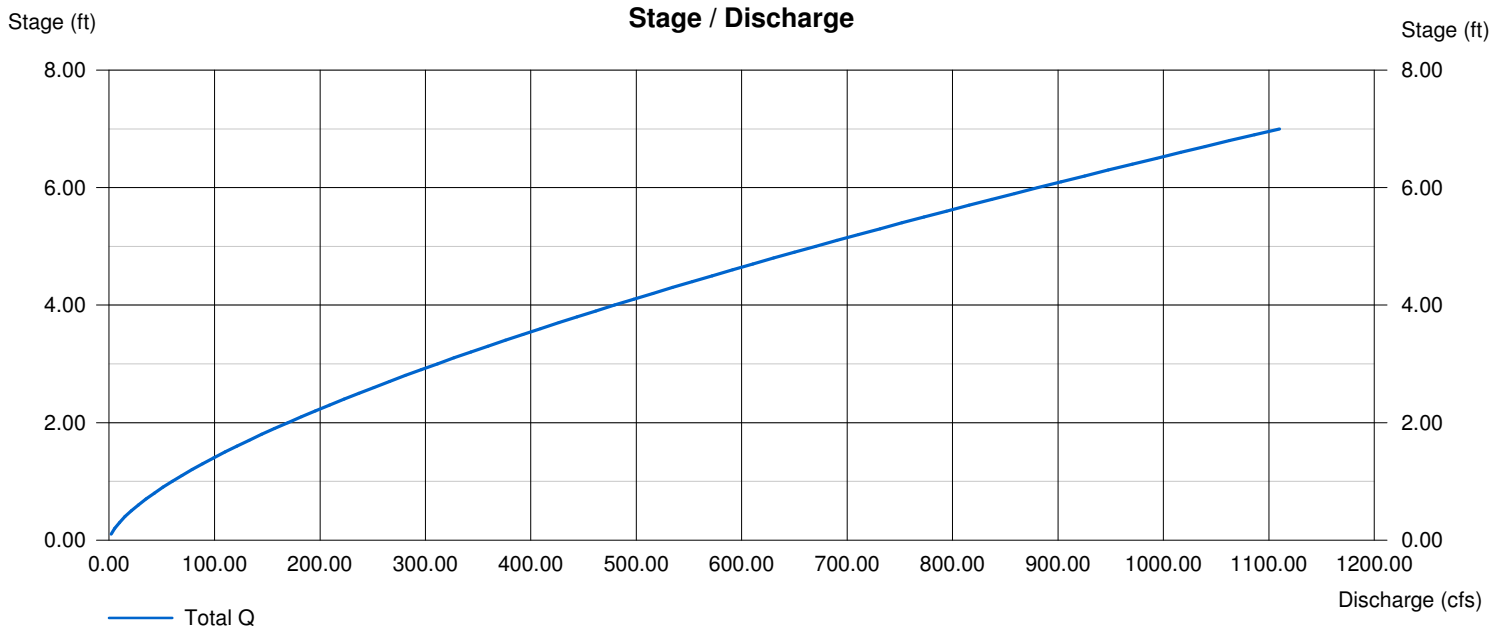
	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 18.00	0.00	0.00	0.00
Crest El. (ft)	= 1352.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	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.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

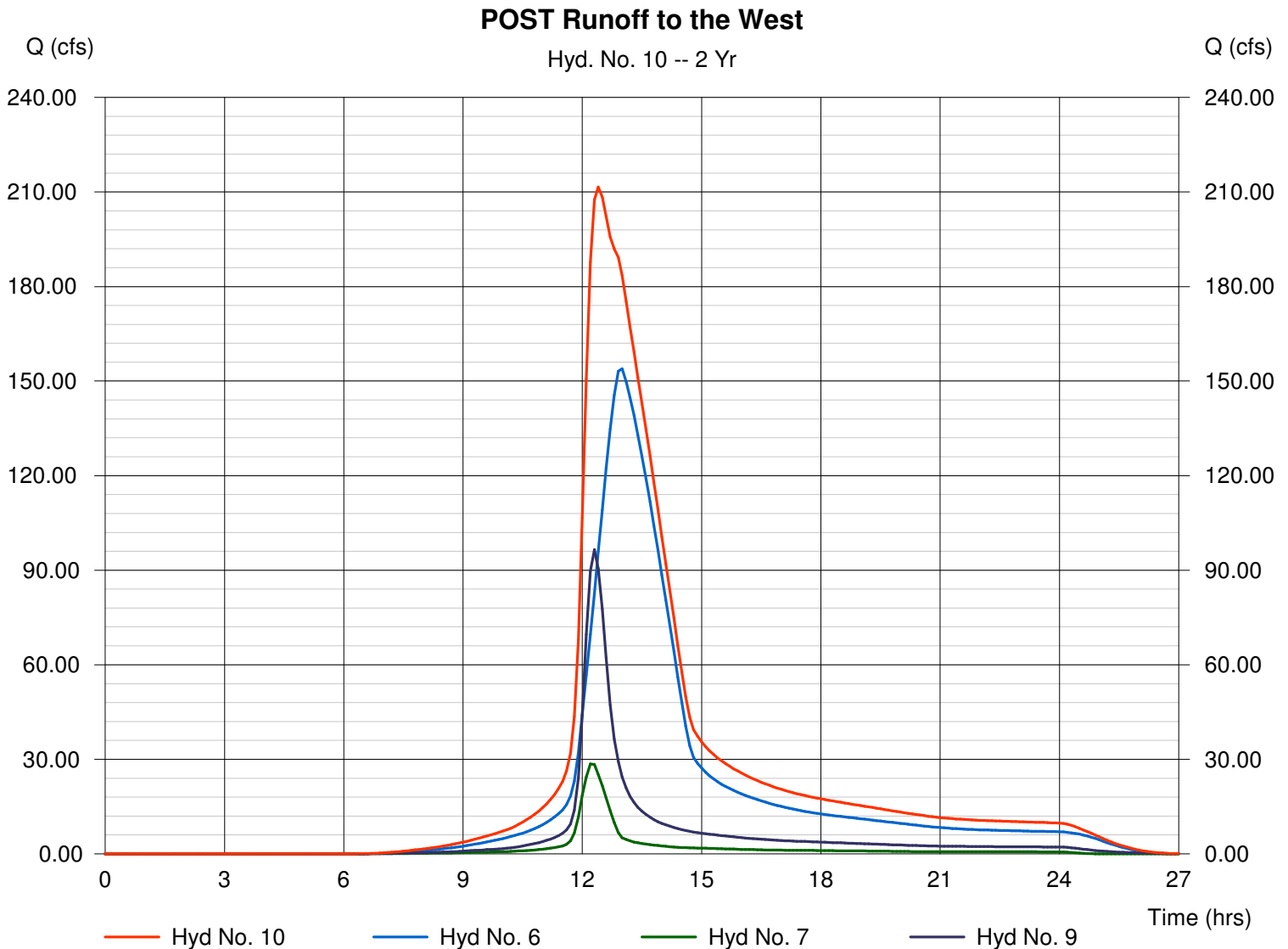
Hyd. No. 10

POST Runoff to the West

Hydrograph type = Combine
Storm frequency = 2 yrs
Inflow hyds. = 6, 7, 9

Peak discharge = 211.60 cfs
Time interval = 6 min

Hydrograph Volume = 49.765 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

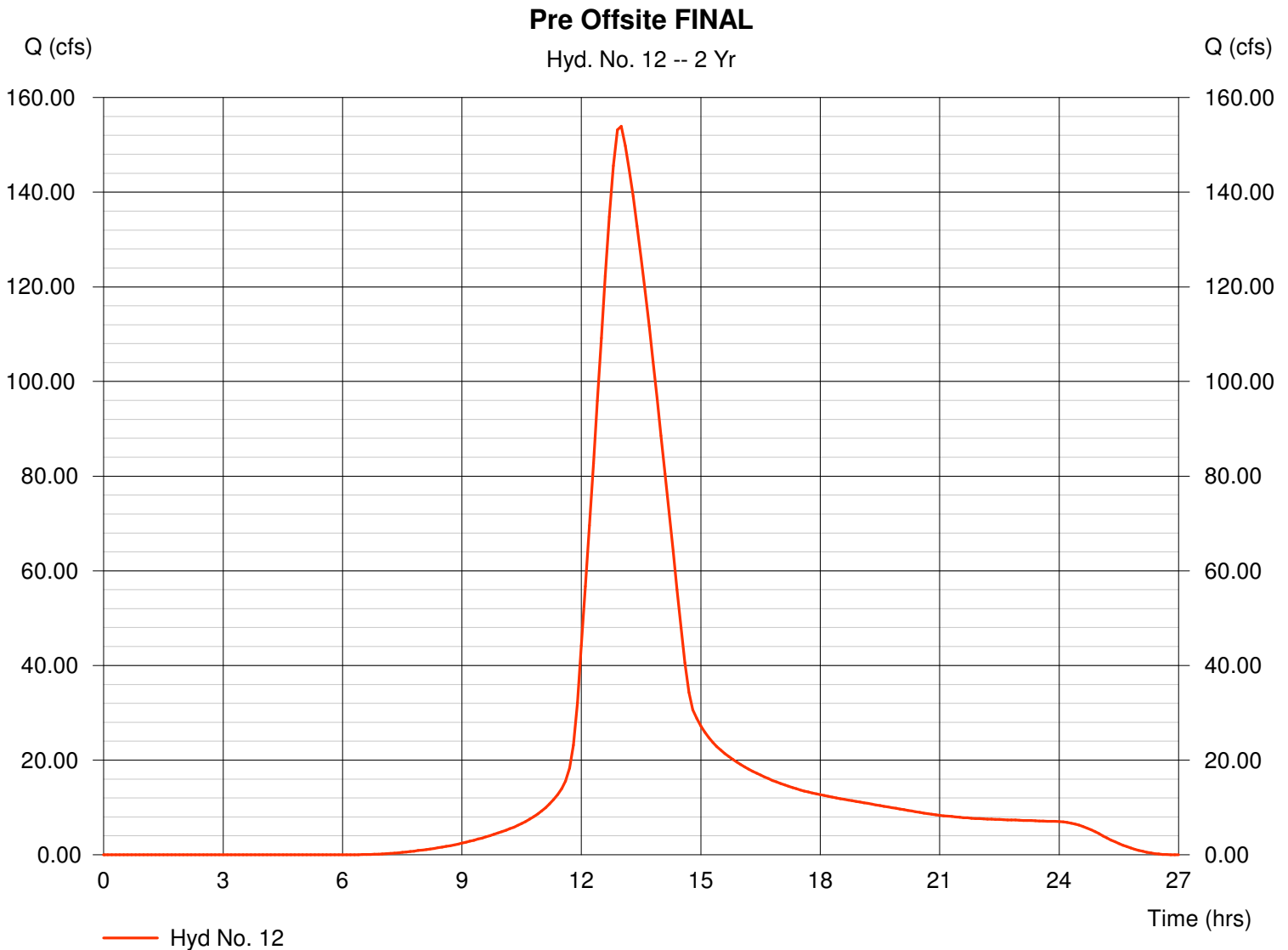
Hyd. No. 12

Pre Offsite FINAL

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 191.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 153.94 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 7000 ft
Time of conc. (Tc) = 106.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 35.413 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

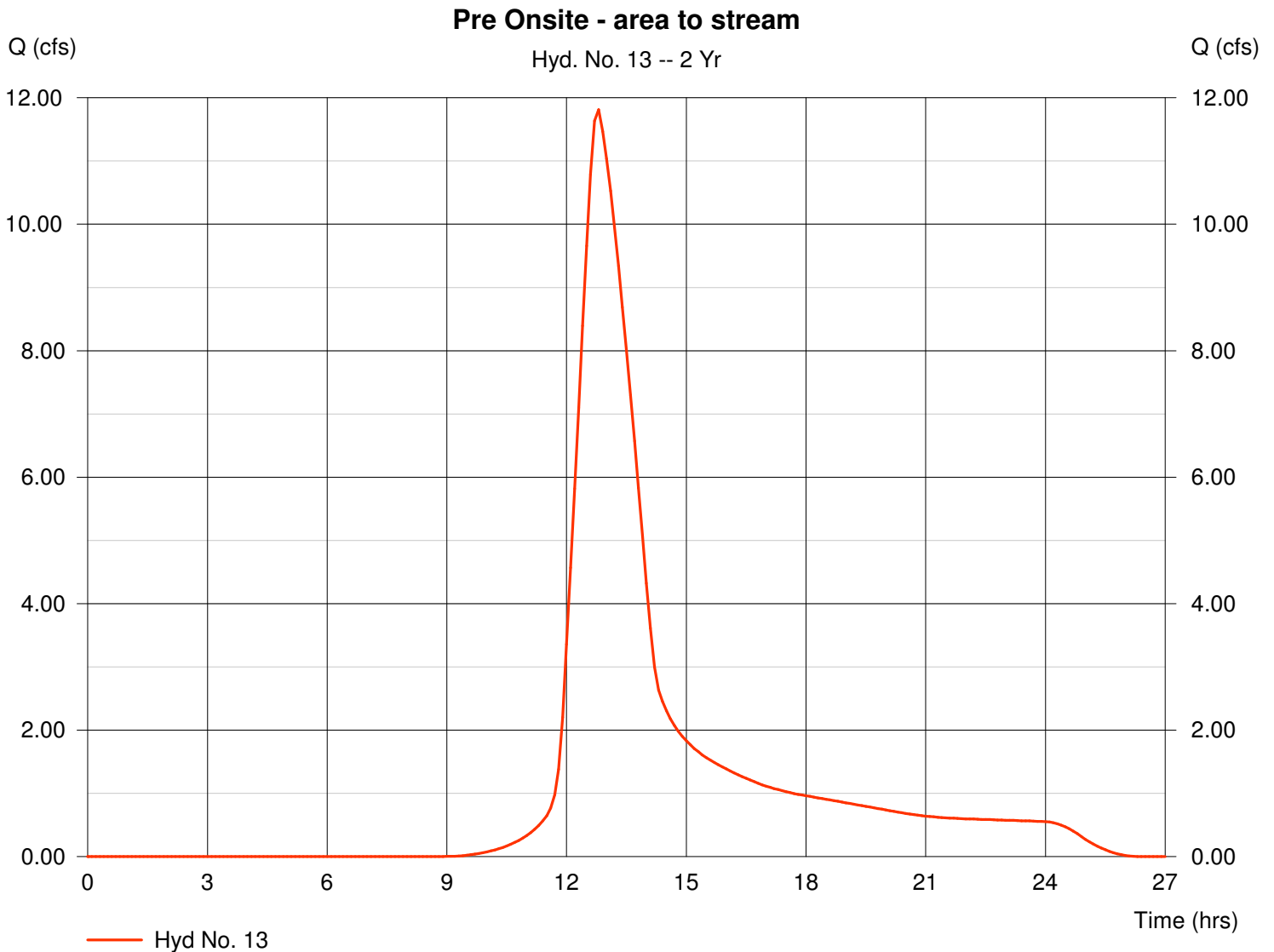
Hyd. No. 13

Pre Onsite - area to stream

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 17.000 ac
Basin Slope = 0.4 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 11.81 cfs
Time interval = 6 min
Curve number = 81
Hydraulic length = 2348 ft
Time of conc. (Tc) = 90.40 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 2.398 acft



Hydrograph Plot

Hyd. No. 14

Pre On-site area to ponds A & B

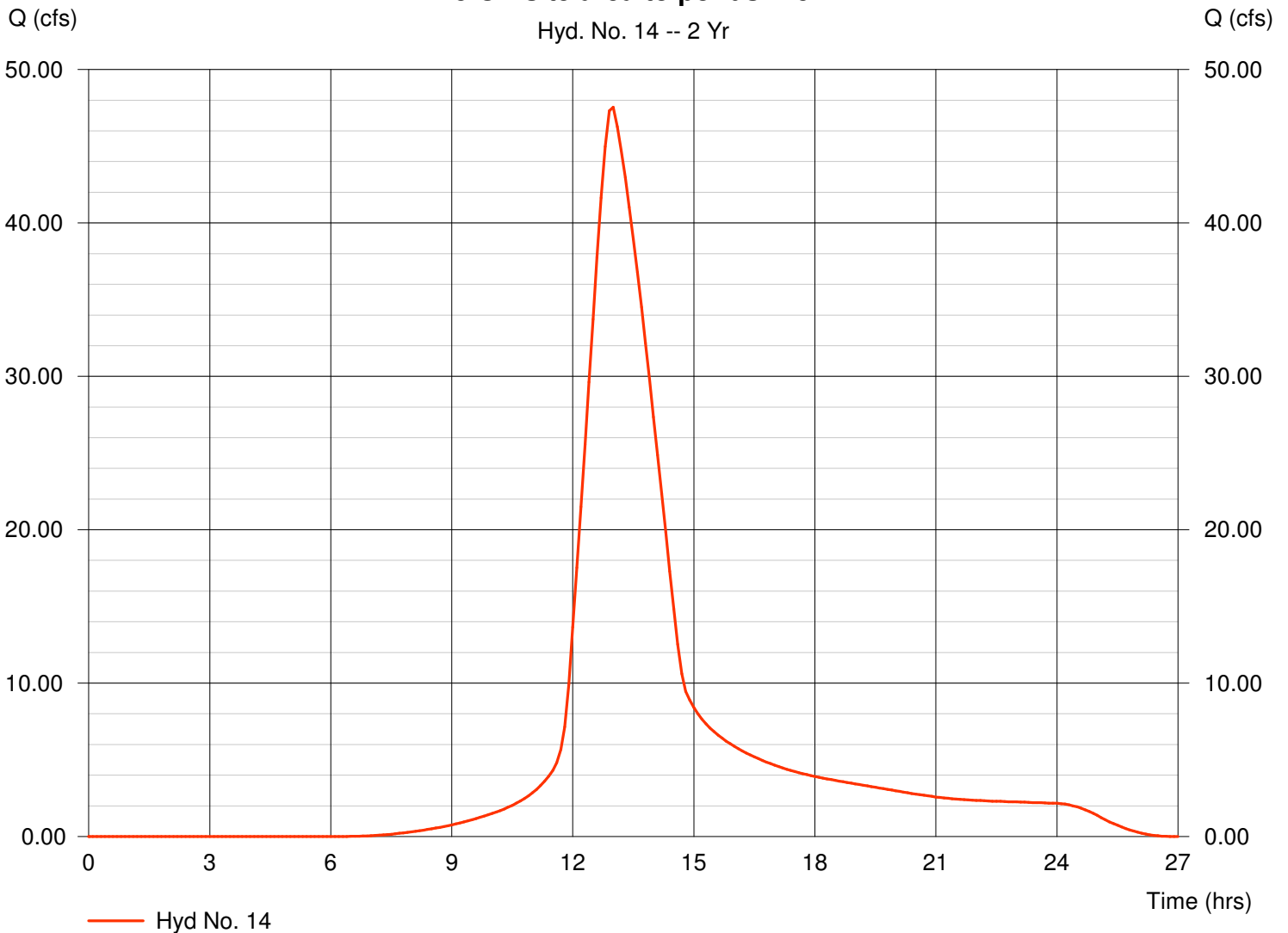
Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Drainage area = 59.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 47.55 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 4203 ft
Time of conc. (Tc) = 101.80 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 10.939 acft

Pre On-site area to ponds A & B

Hyd. No. 14 -- 2 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

Hyd. No. 15

PRE Runoff to the West

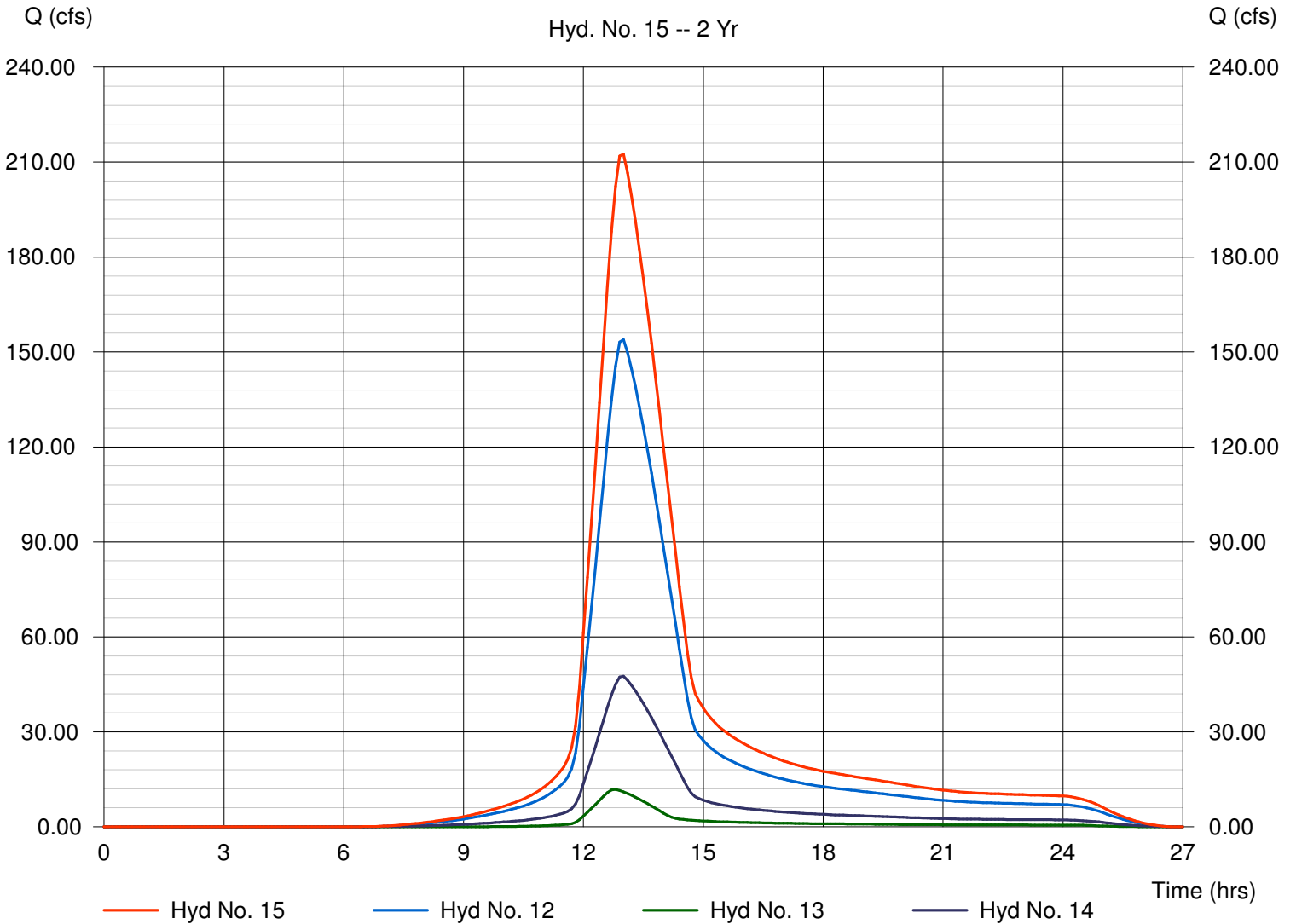
Hydrograph type = Combine
Storm frequency = 2 yrs
Inflow hyds. = 12, 13, 14

Peak discharge = 212.53 cfs
Time interval = 6 min

Hydrograph Volume = 48.749 acft

PRE Runoff to the West

Hyd. No. 15 -- 2 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

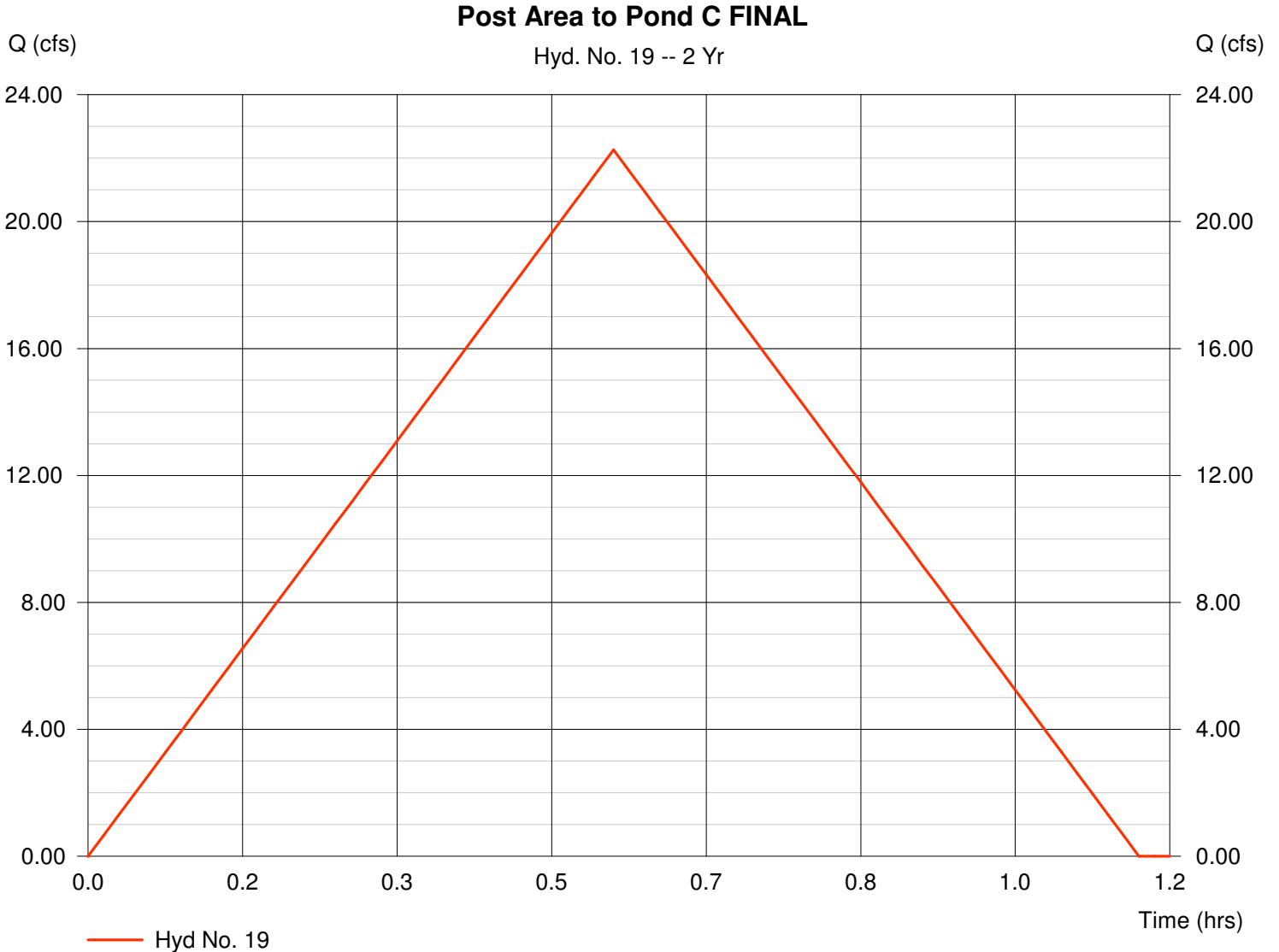
Hyd. No. 19

Post Area to Pond C FINAL

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 18.000 ac
Intensity = 2.473 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 22.26 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 34.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1.043 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

Hyd. No. 20

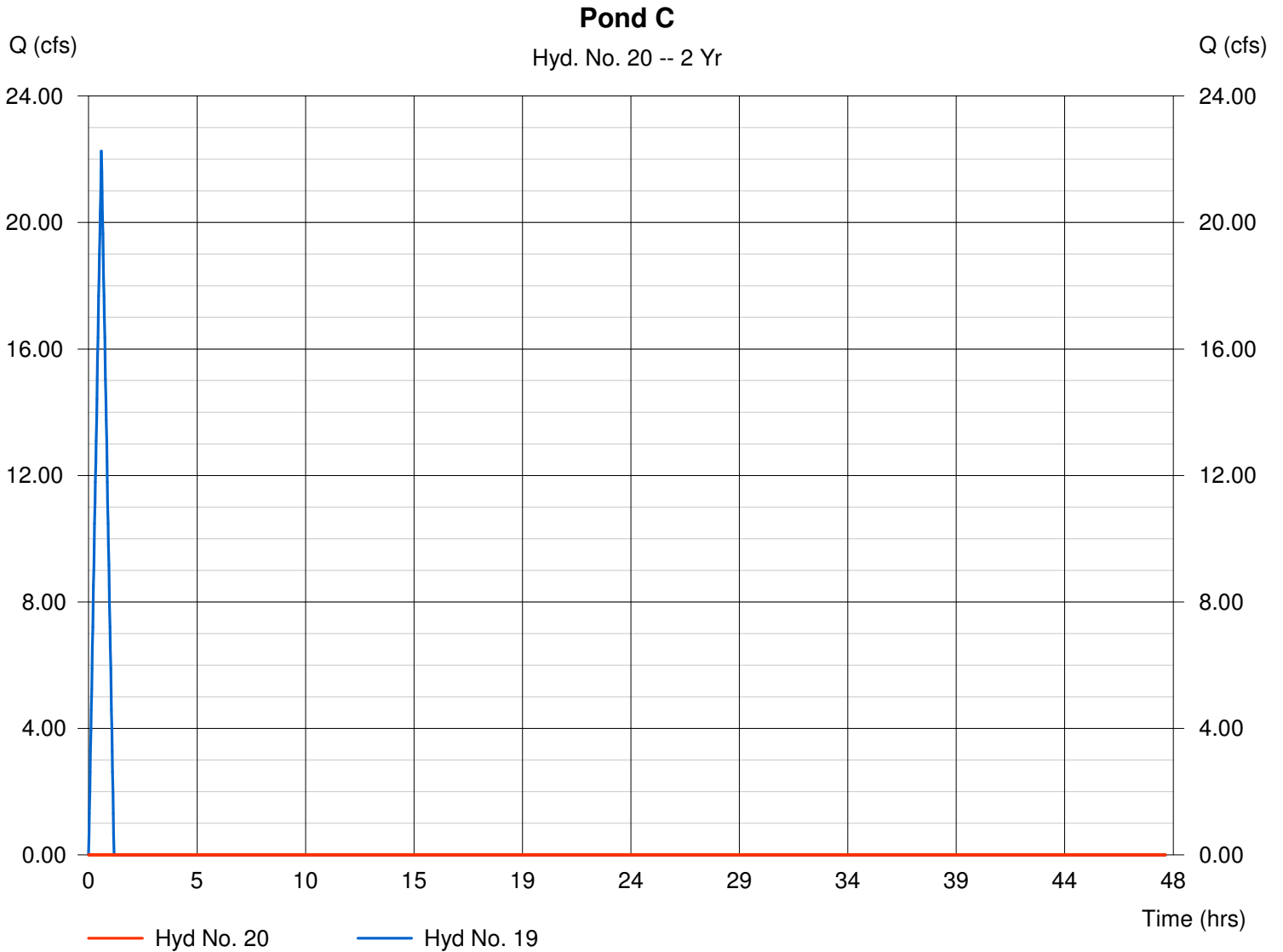
Pond C

Hydrograph type = Reservoir
Storm frequency = 2 yrs
Inflow hyd. No. = 19
Reservoir name = FINAL Pond C2

Peak discharge = 0.000 cfs
Time interval = 1 min
Max. Elevation = 1357.79 ft
Max. Storage = 1.043 acft

Storage Indication method used.

Hydrograph Volume = 0.000 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

Pond No. 11 - FINAL Pond C2

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	1356.00	22,938	0.000	0.000
1.00	1357.00	25,532	0.556	0.556
2.00	1358.00	28,233	0.617	1.173
3.00	1359.00	31,037	0.680	1.854

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

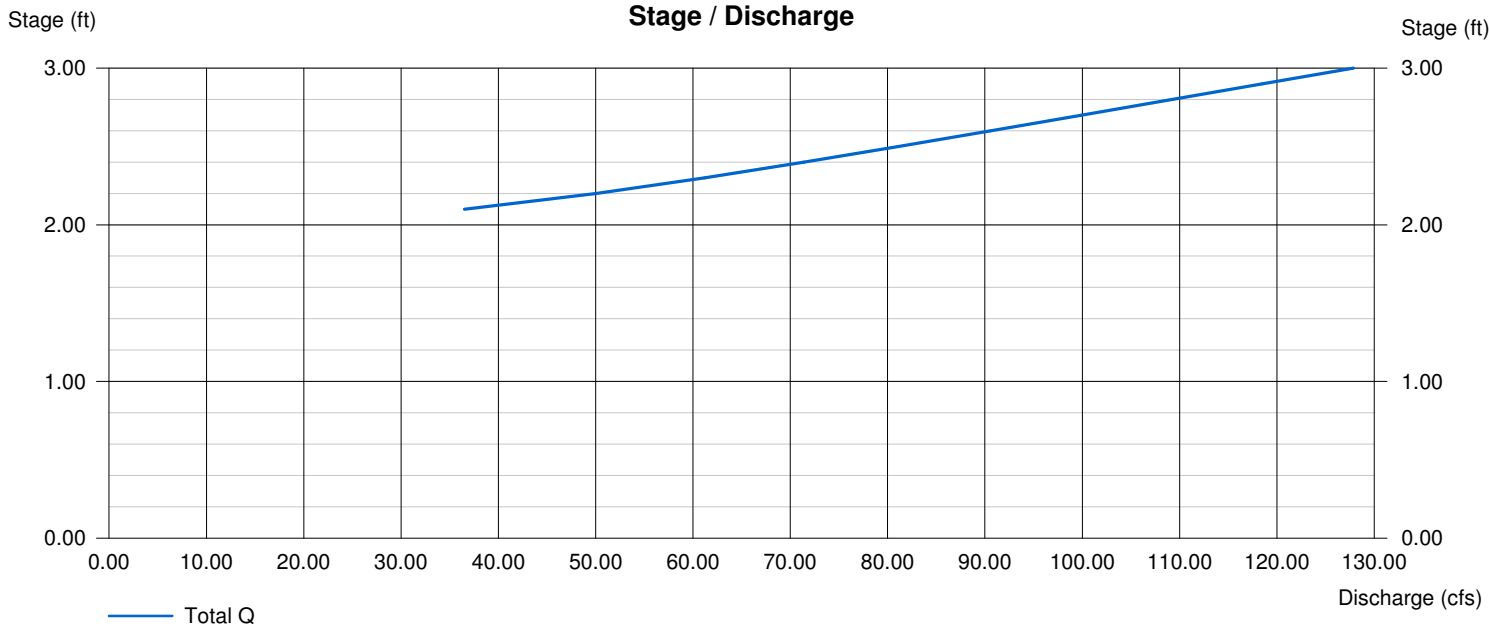
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 1356.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 1358.00 ft

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

Stage / Discharge



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

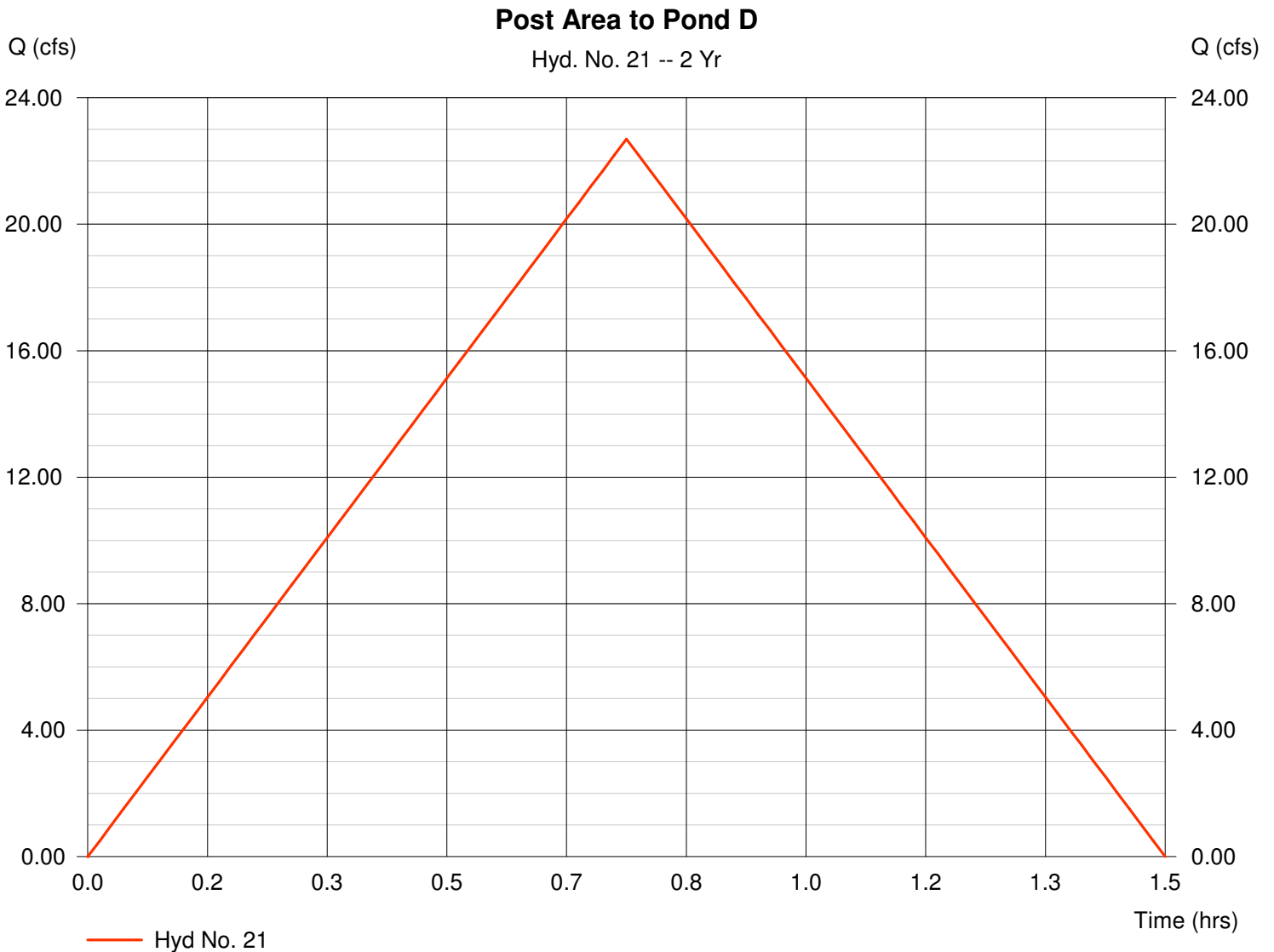
Hyd. No. 21

Post Area to Pond D

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 22.000 ac
Intensity = 2.063 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 22.69 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 45.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1.407 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

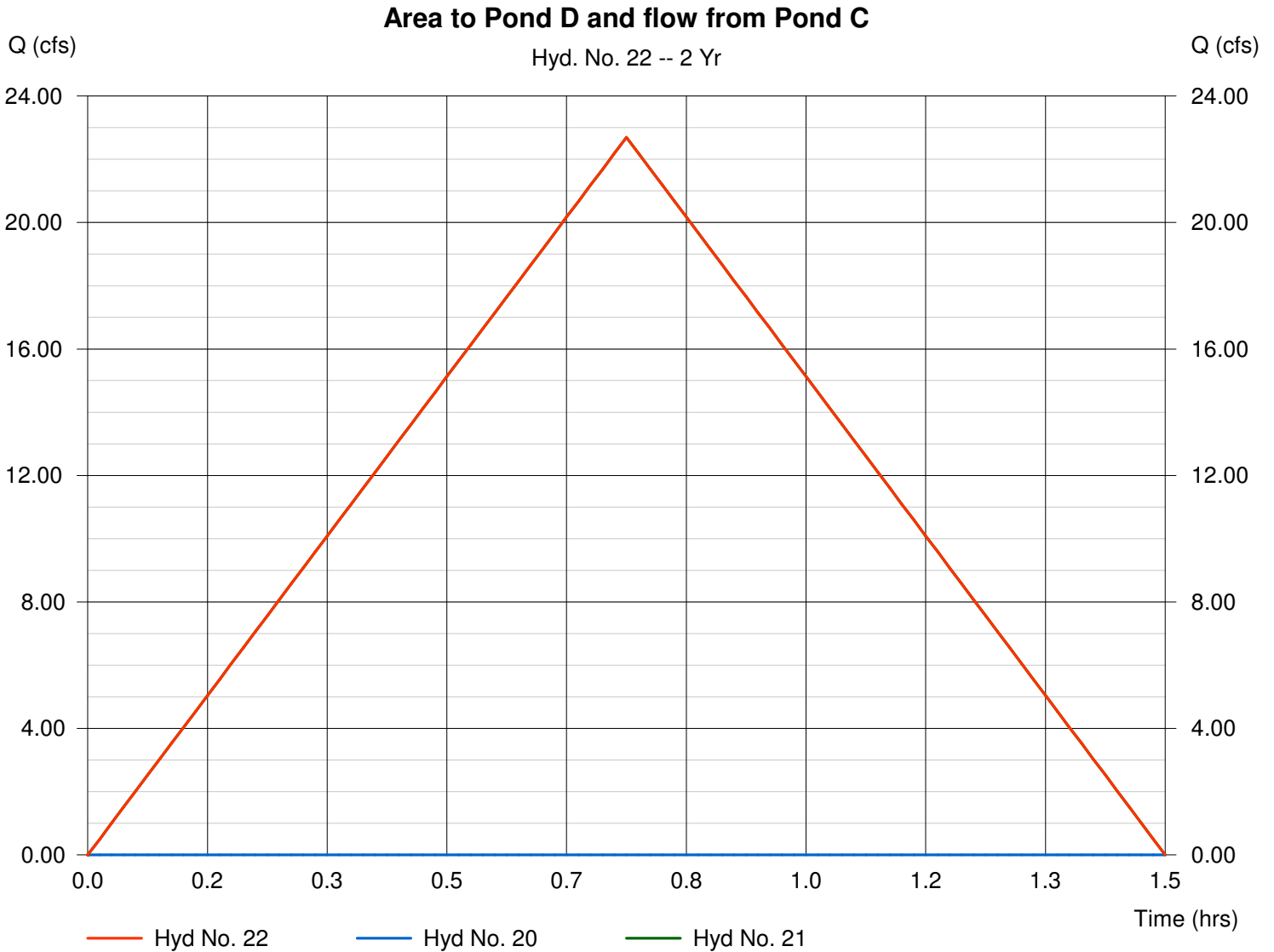
Hyd. No. 22

Area to Pond D and flow from Pond C

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

Peak discharge = 22.69 cfs
Time interval = 1 min

Hydrograph Volume = 1.407 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

Hyd. No. 23

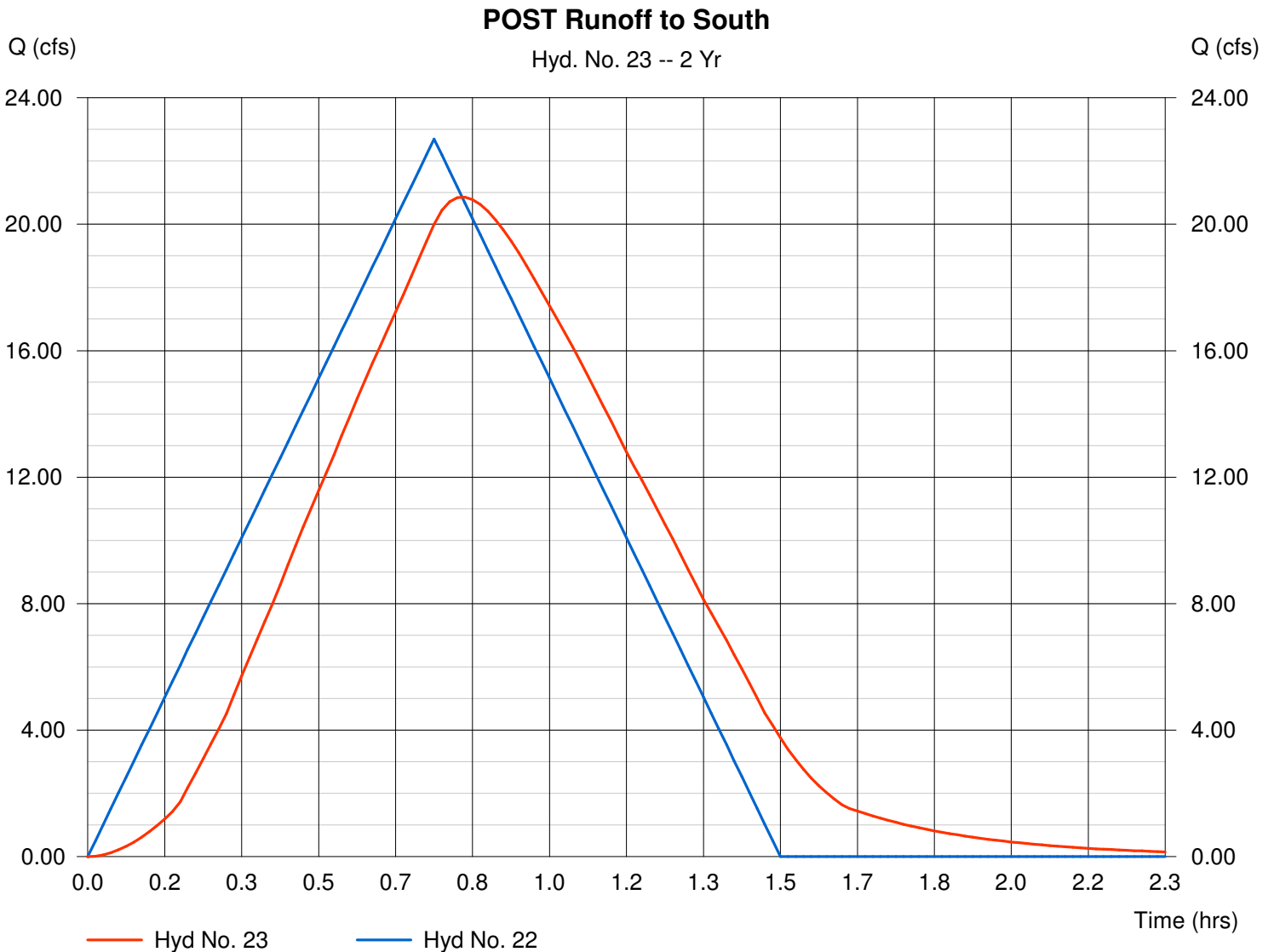
POST Runoff to South

Hydrograph type = Reservoir
 Storm frequency = 2 yrs
 Inflow hyd. No. = 22
 Reservoir name = FINAL Pond D2

Peak discharge = 20.86 cfs
 Time interval = 1 min
 Max. Elevation = 1355.56 ft
 Max. Storage = 0.214 acft

Storage Indication method used.

Hydrograph Volume = 1.407 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

Pond No. 12 - FINAL Pond D2

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	1355.00	14,751	0.000	0.000
1.00	1356.00	18,623	0.383	0.383
2.00	1357.00	22,616	0.473	0.856
3.00	1358.00	26,731	0.566	1.423

Culvert / Orifice Structures

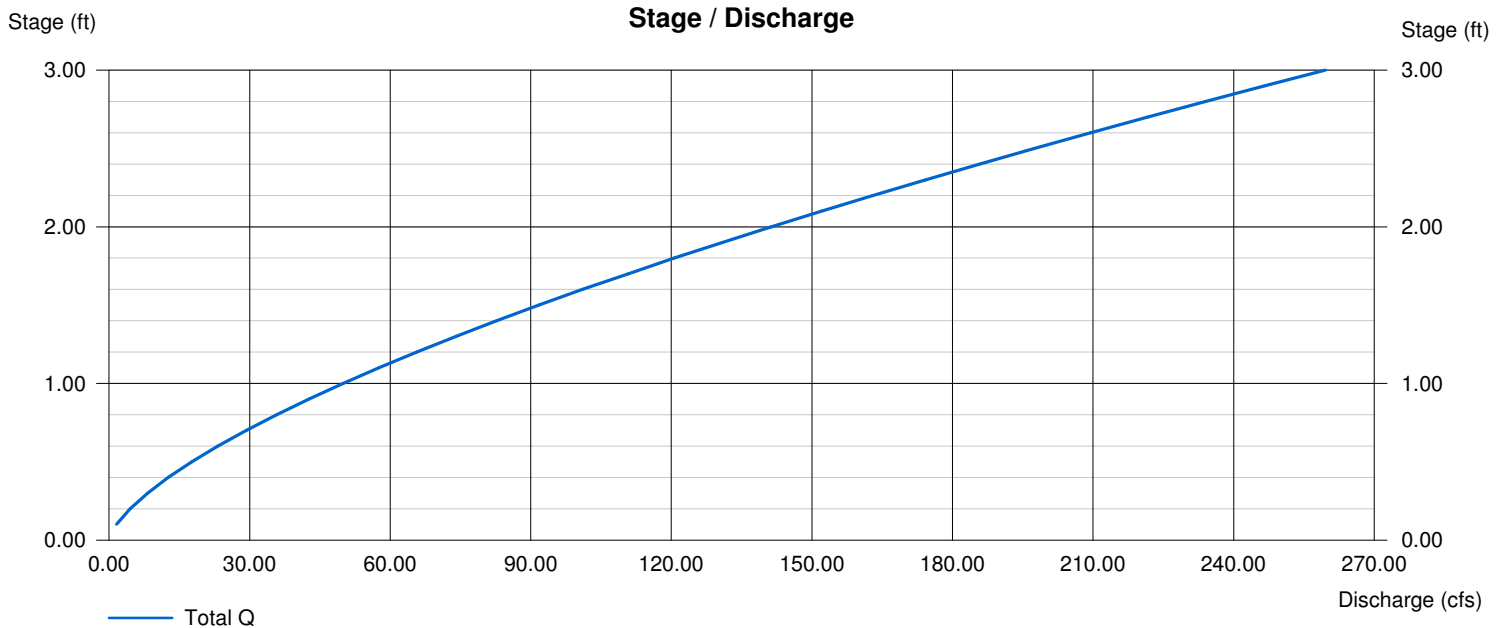
	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	0.00	0.00	0.00
Crest El. (ft)	= 1355.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	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.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

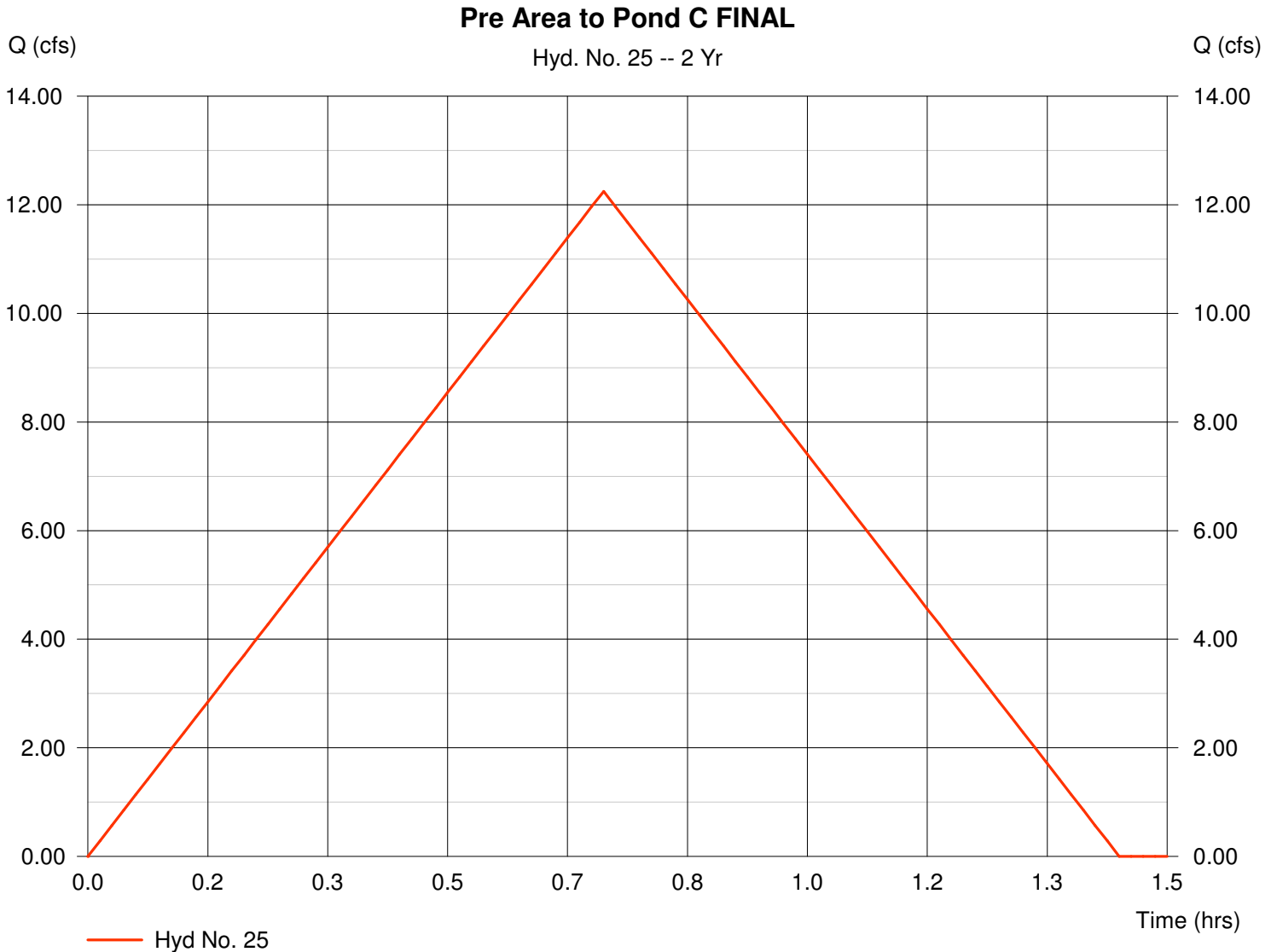
Hyd. No. 25

Pre Area to Pond C FINAL

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 18.000 ac
Intensity = 2.127 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 12.25 cfs
Time interval = 1 min
Runoff coeff. = 0.32
Tc by User = 43.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 0.725 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

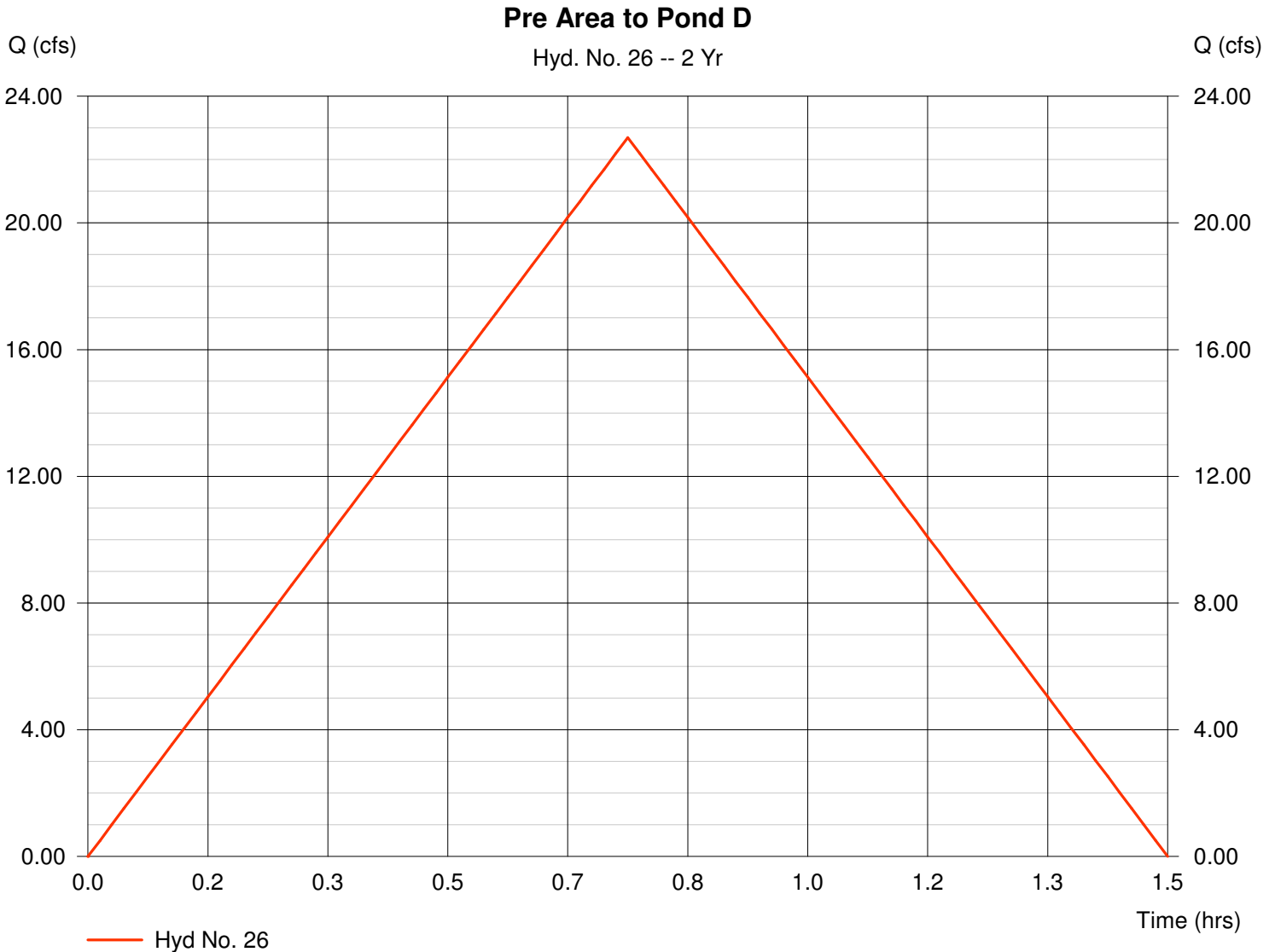
Hyd. No. 26

Pre Area to Pond D

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 22.000 ac
Intensity = 2.063 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 22.69 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 45.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1.407 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:7 PM

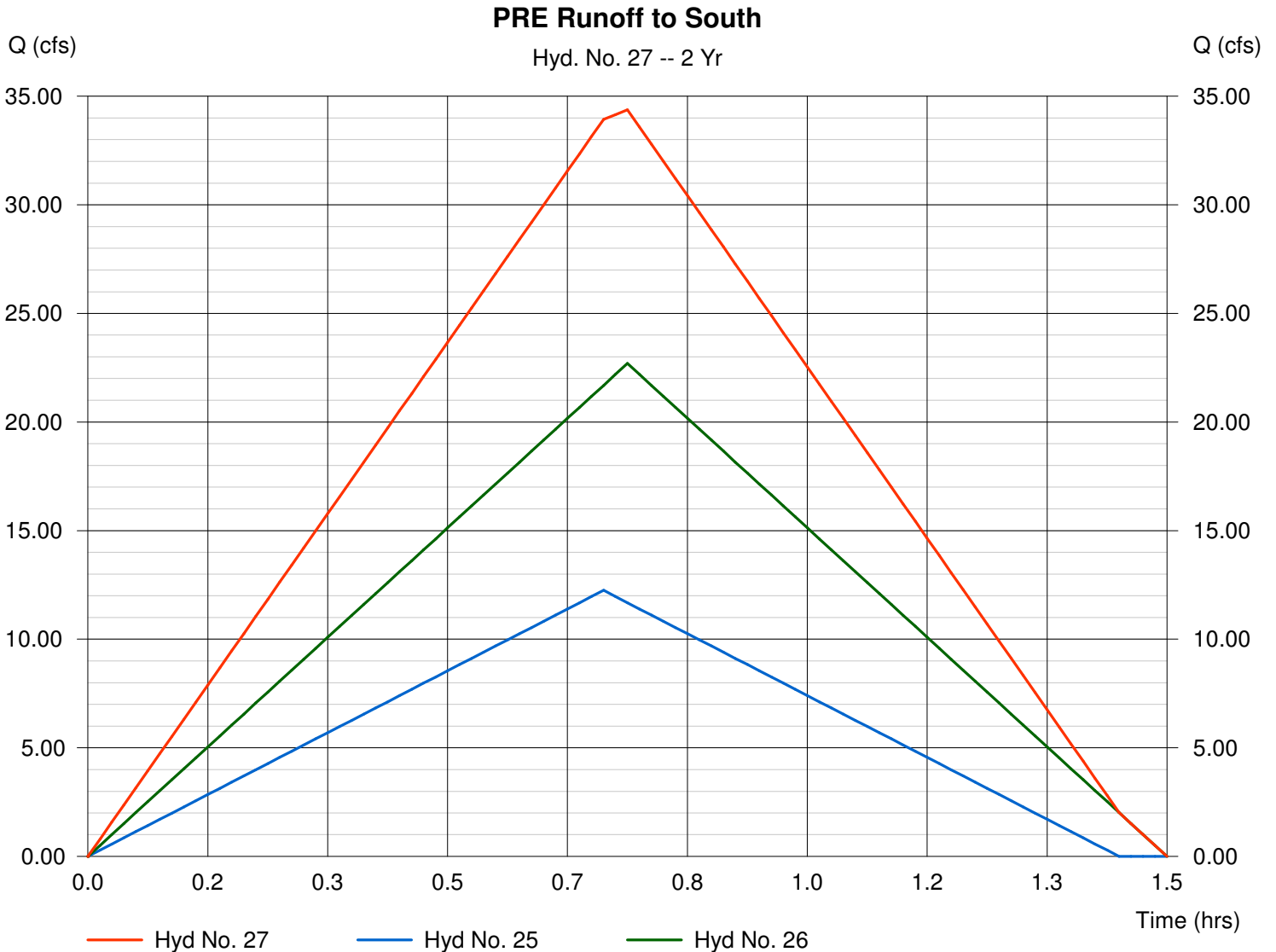
Hyd. No. 27

PRE Runoff to South

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

Peak discharge = 34.37 cfs
Time interval = 1 min

Hydrograph Volume = 2.132 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

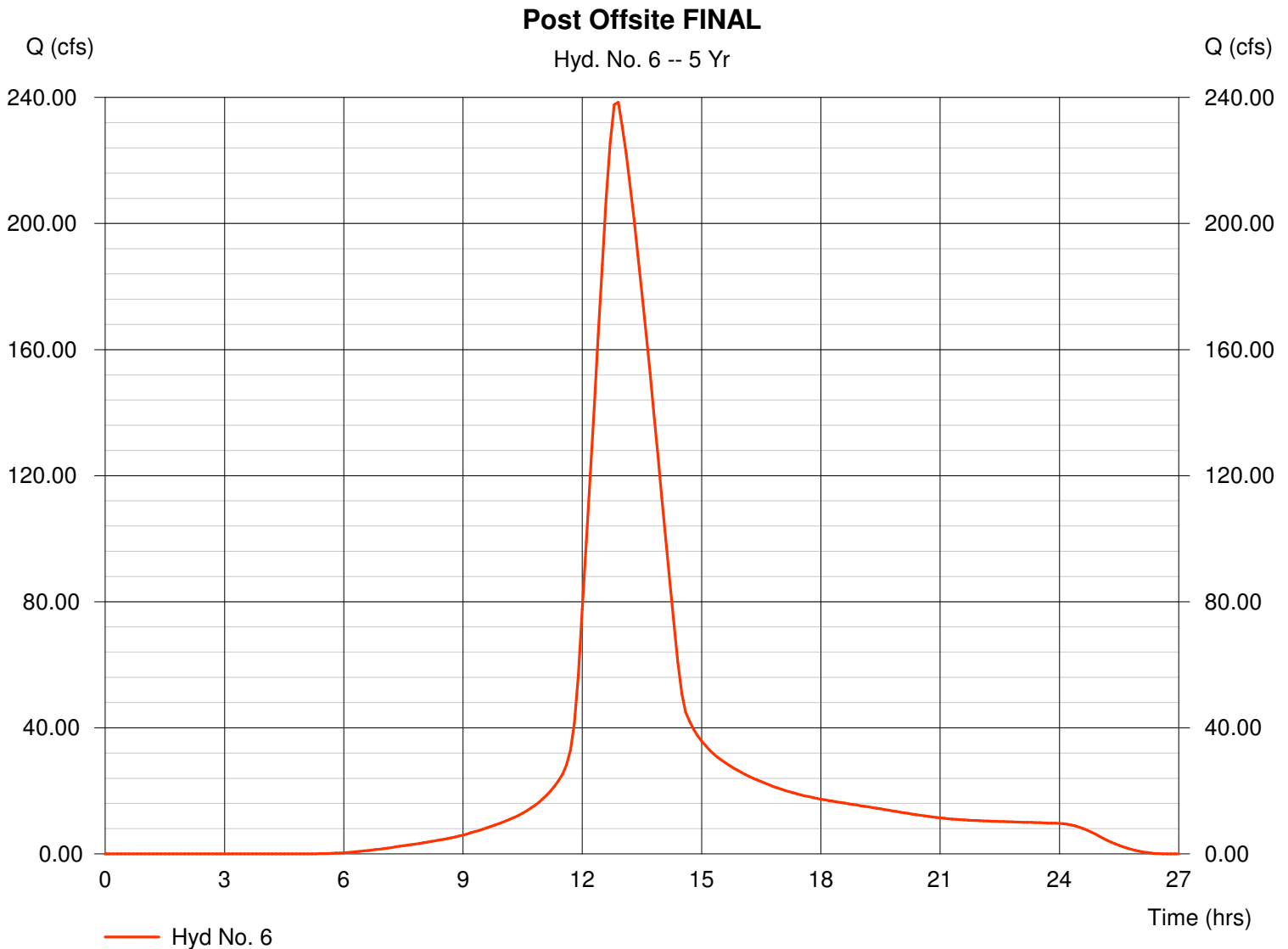
Hyd. No. 6

Post Offsite FINAL

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Drainage area = 191.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 238.47 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 7000 ft
Time of conc. (Tc) = 100.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 52.268 acft



Hydrograph Plot

Hyd. No. 7

Post Onsite - area to stream

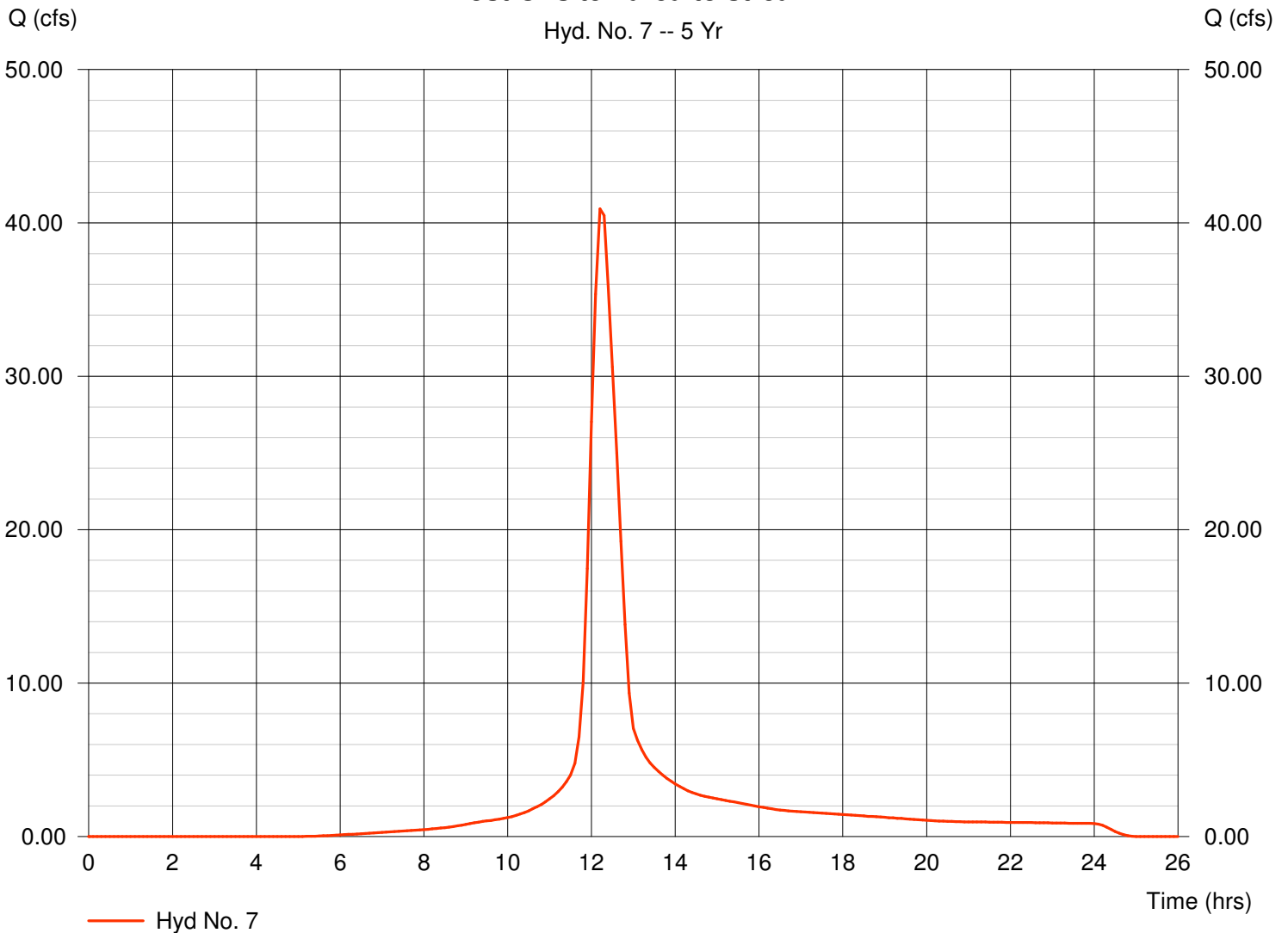
Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Drainage area = 17.000 ac
Basin Slope = 0.2 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 40.92 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 461 ft
Time of conc. (Tc) = 36.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 4.738 acft

Post Onsite - area to stream

Hyd. No. 7 -- 5 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Hyd. No. 8

Post On-site area to ponds A & B

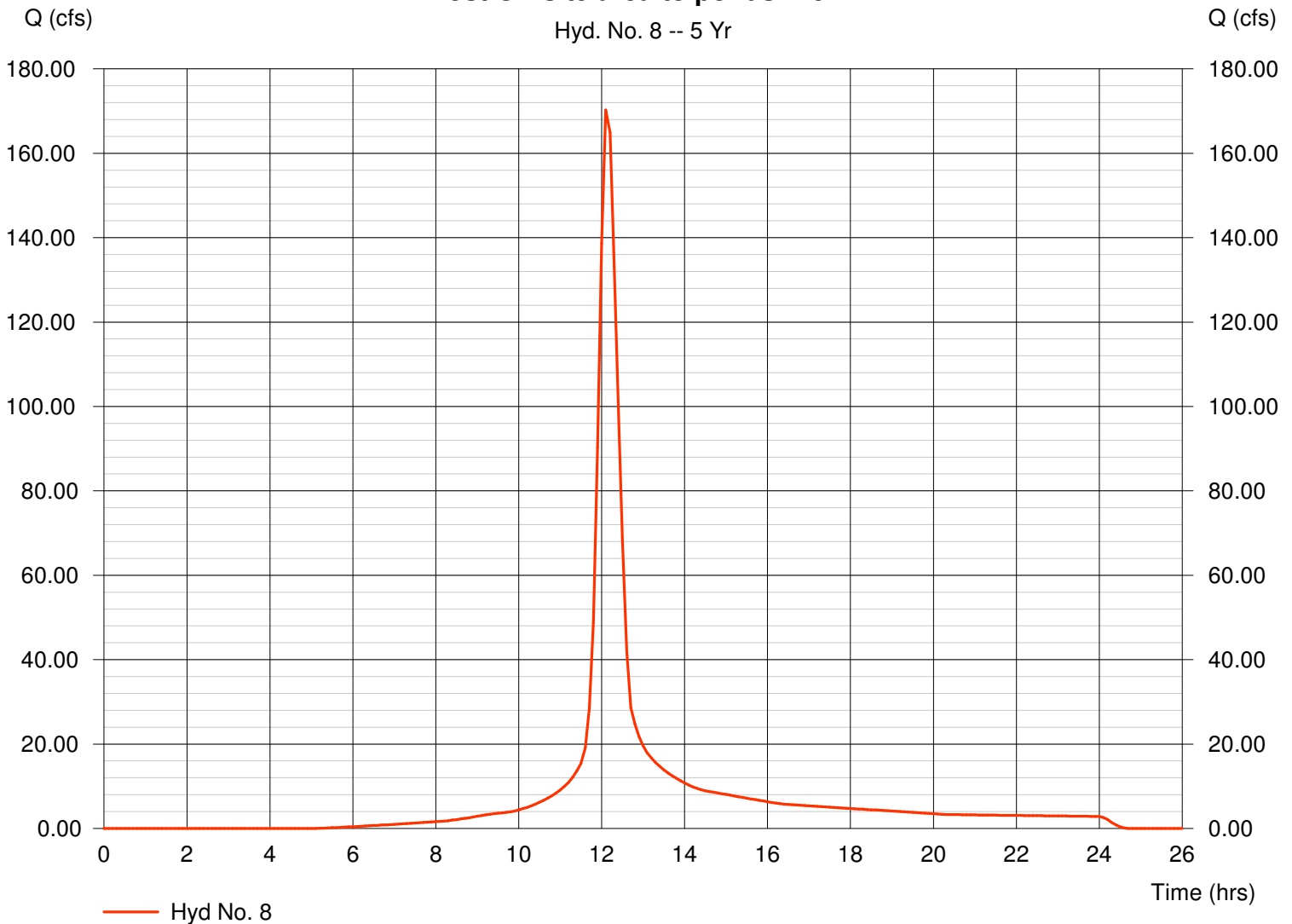
Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Drainage area = 59.000 ac
Basin Slope = 1.5 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 170.26 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 610 ft
Time of conc. (Tc) = 21.90 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 15.946 acft

Post On-site area to ponds A & B

Hyd. No. 8 -- 5 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Hyd. No. 9

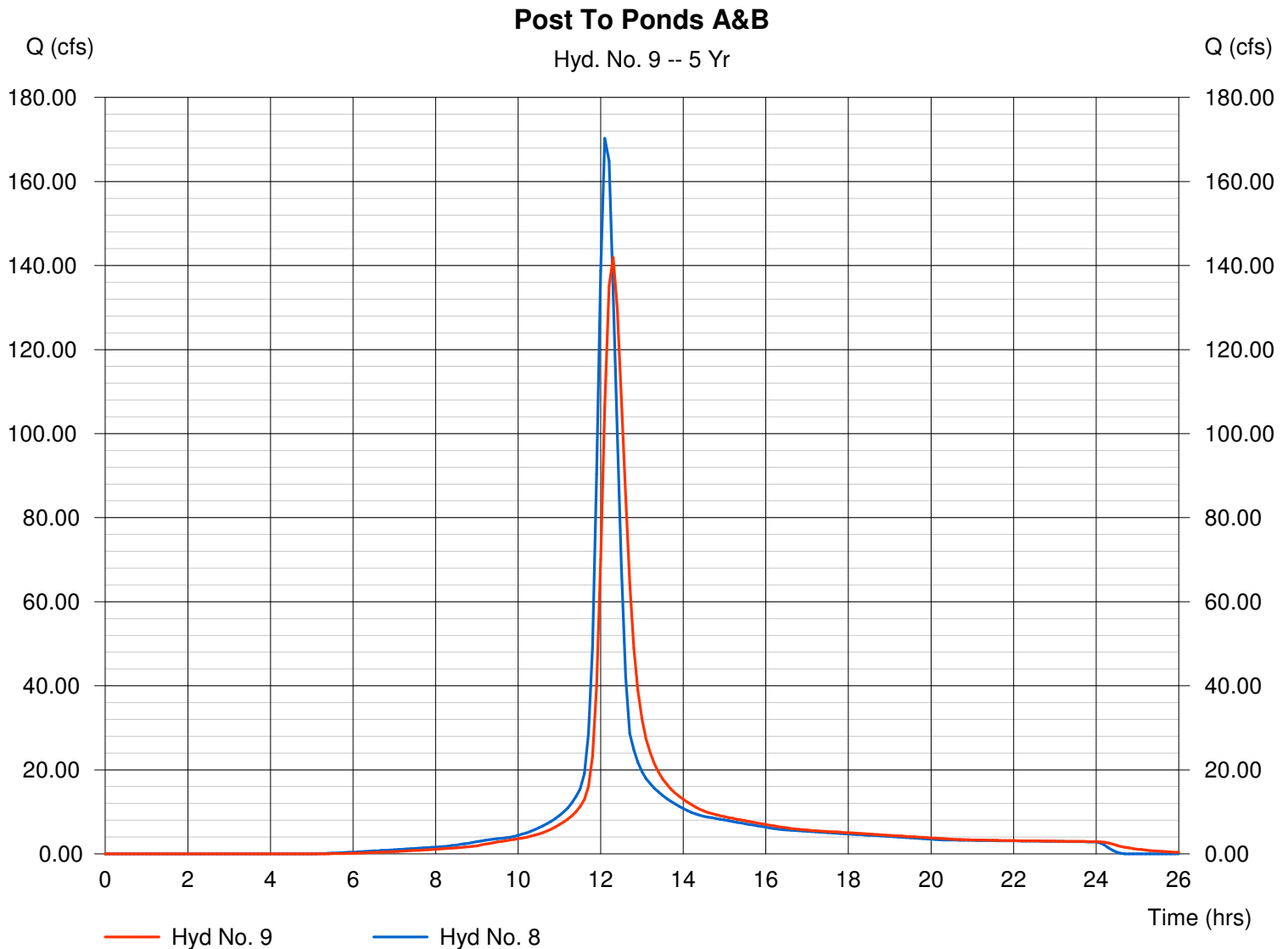
Post To Ponds A&B

Hydrograph type = Reservoir
Storm frequency = 5 yrs
Inflow hyd. No. = 8
Reservoir name = Ponds A & B

Peak discharge = 141.97 cfs
Time interval = 6 min
Max. Elevation = 1353.78 ft
Max. Storage = 2.556 acft

Storage Indication method used.

Hydrograph Volume = 15.946 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Pond No. 9 - Ponds A & B

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	1352.00	56,228	0.000	0.000
1.00	1353.00	63,009	1.369	1.369
2.00	1354.00	70,098	1.528	2.897
3.00	1355.00	77,436	1.693	4.590
4.00	1356.00	85,001	1.865	6.454
5.00	1357.00	92,780	2.041	8.495
6.00	1358.00	103,774	2.256	10.751
7.00	1359.00	108,987	2.442	13.193

Culvert / Orifice Structures

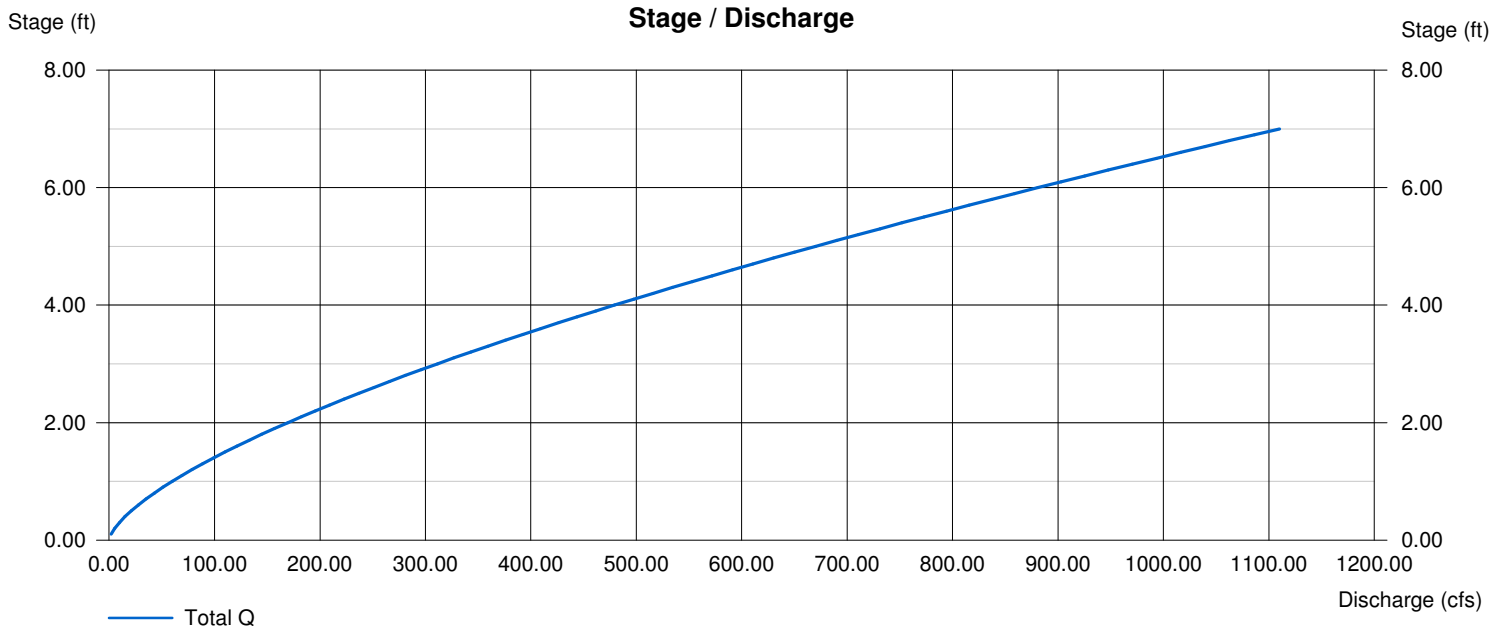
	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 18.00	0.00	0.00	0.00
Crest El. (ft)	= 1352.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	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.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 10

POST Runoff to the West

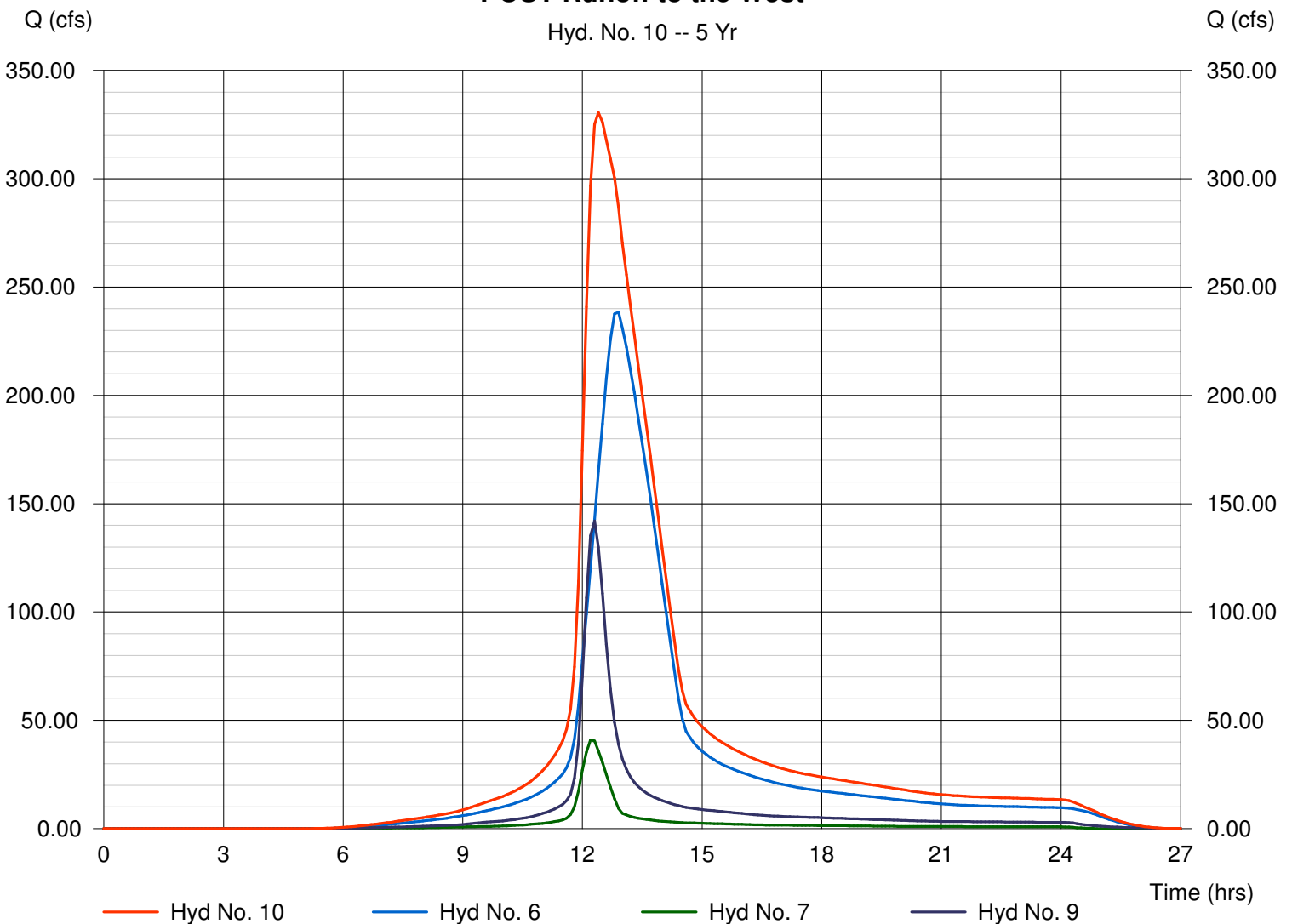
Hydrograph type = Combine
Storm frequency = 5 yrs
Inflow hyds. = 6, 7, 9

Peak discharge = 330.56 cfs
Time interval = 6 min

Hydrograph Volume = 72.952 acft

POST Runoff to the West

Hyd. No. 10 -- 5 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

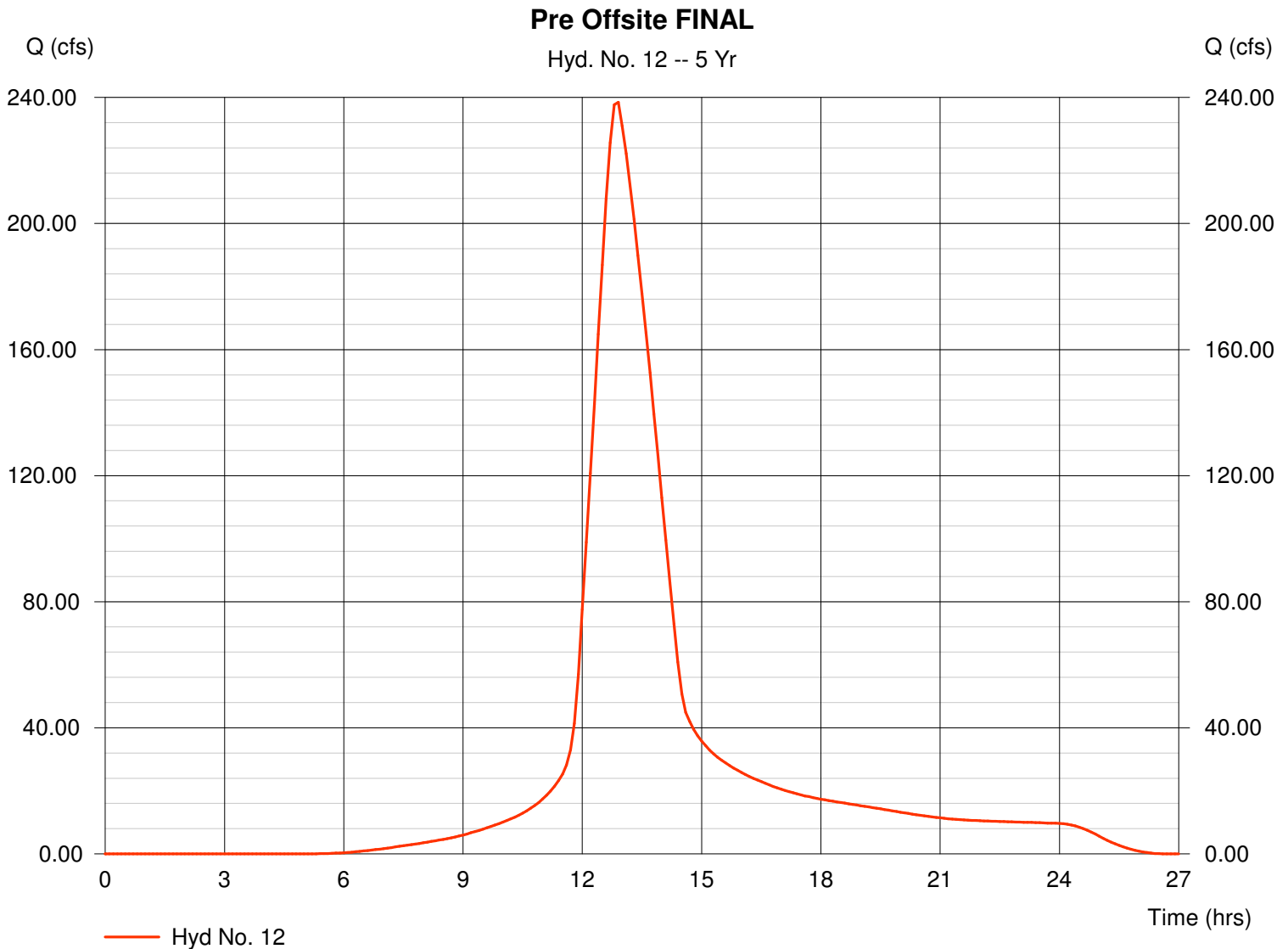
Hyd. No. 12

Pre Offsite FINAL

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Drainage area = 191.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 238.47 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 7000 ft
Time of conc. (Tc) = 100.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 52.268 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Hyd. No. 13

Pre Onsite - area to stream

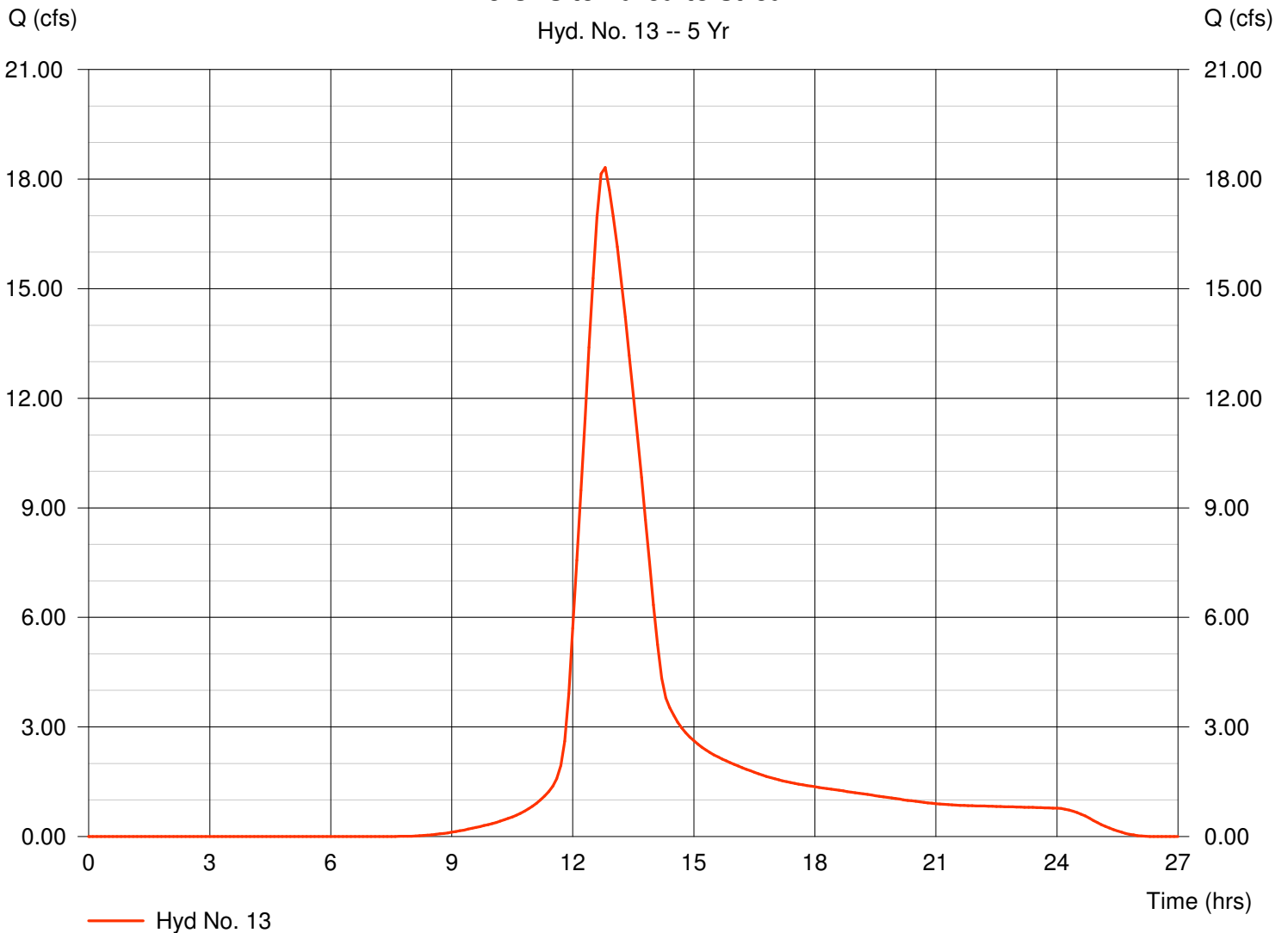
Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Drainage area = 17.000 ac
Basin Slope = 0.4 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 18.32 cfs
Time interval = 6 min
Curve number = 81
Hydraulic length = 2348 ft
Time of conc. (Tc) = 84.60 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 3.671 acft

Pre Onsite - area to stream

Hyd. No. 13 -- 5 Yr



Hydrograph Plot

Hyd. No. 14

Pre On-site area to ponds A & B

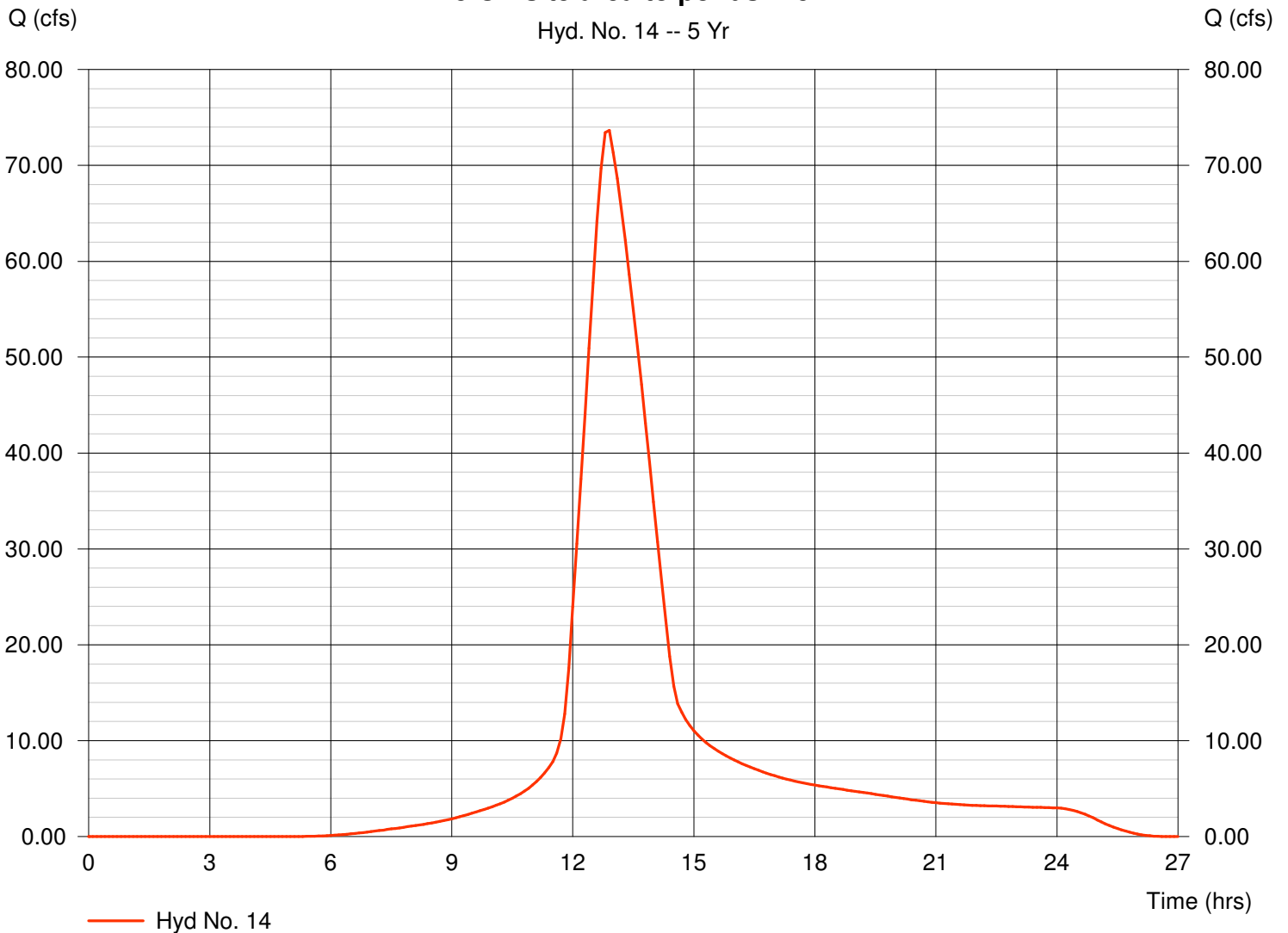
Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Drainage area = 59.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 73.66 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 4203 ft
Time of conc. (Tc) = 95.30 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 16.145 acft

Pre On-site area to ponds A & B

Hyd. No. 14 -- 5 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 15

PRE Runoff to the West

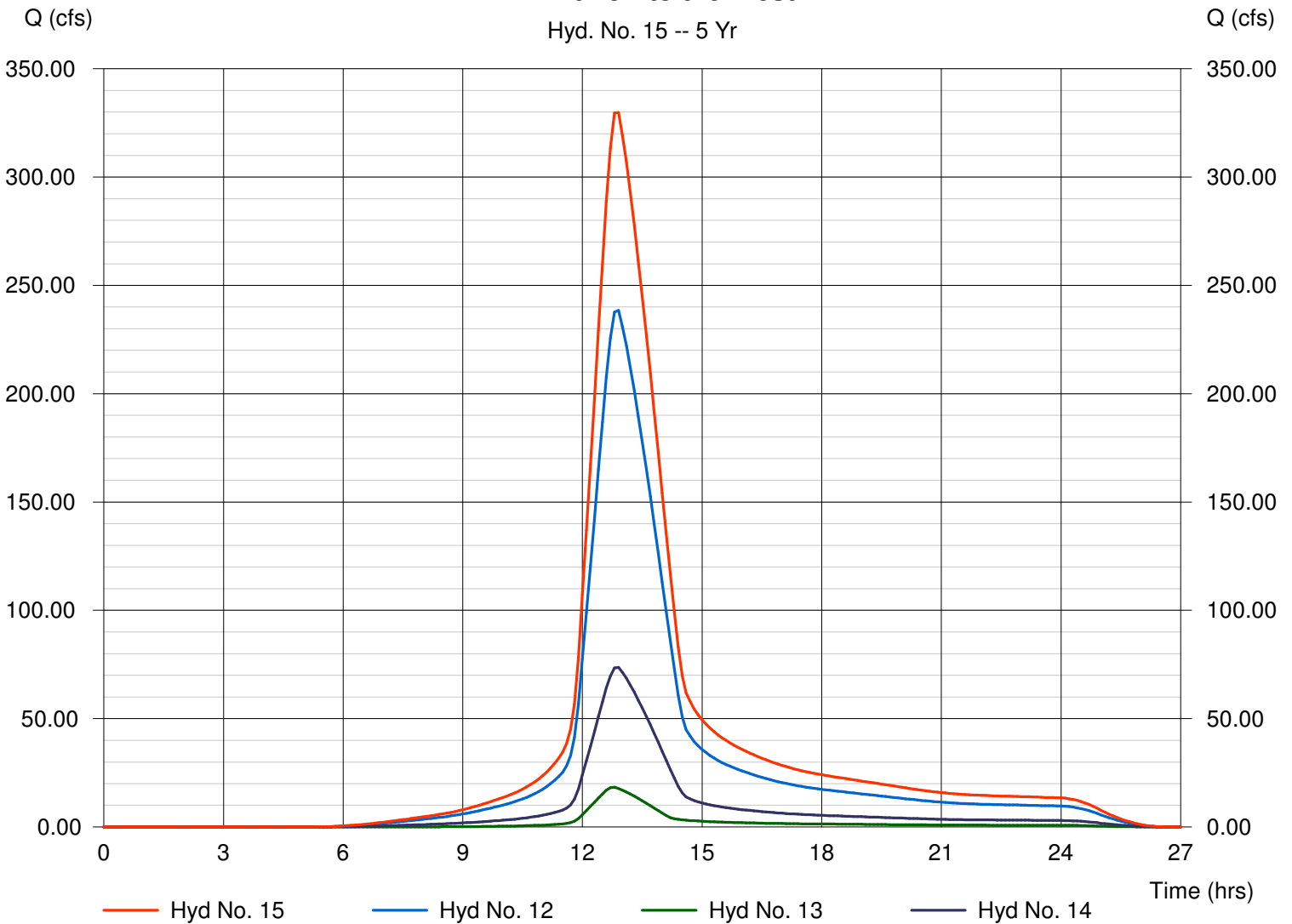
Hydrograph type = Combine
Storm frequency = 5 yrs
Inflow hyds. = 12, 13, 14

Peak discharge = 329.85 cfs
Time interval = 6 min

Hydrograph Volume = 72.084 acft

PRE Runoff to the West

Hyd. No. 15 -- 5 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 19

Post Area to Pond C FINAL

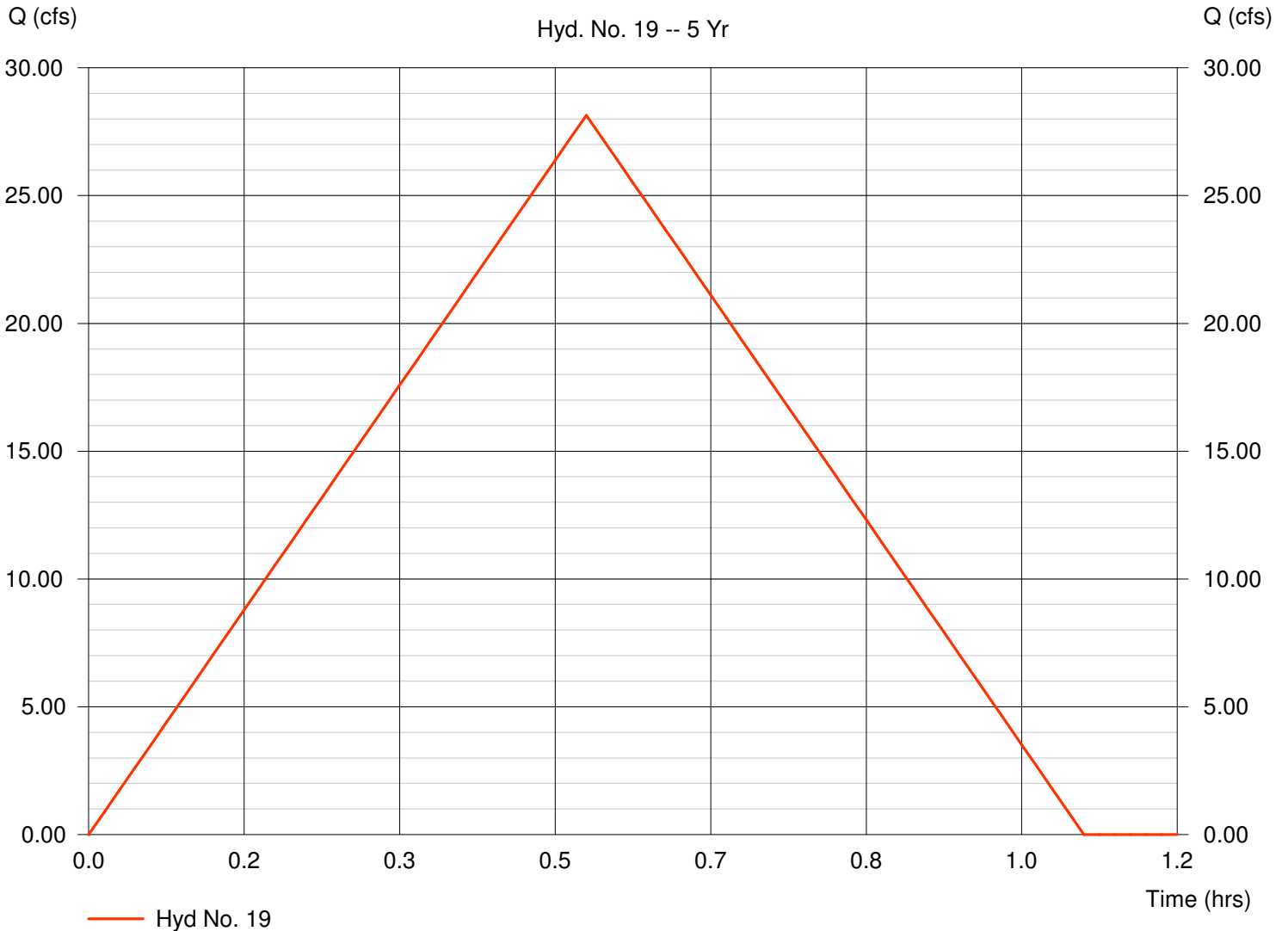
Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 18.000 ac
Intensity = 3.127 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 28.14 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 32.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1.240 acft

Post Area to Pond C FINAL

Hyd. No. 19 -- 5 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 20

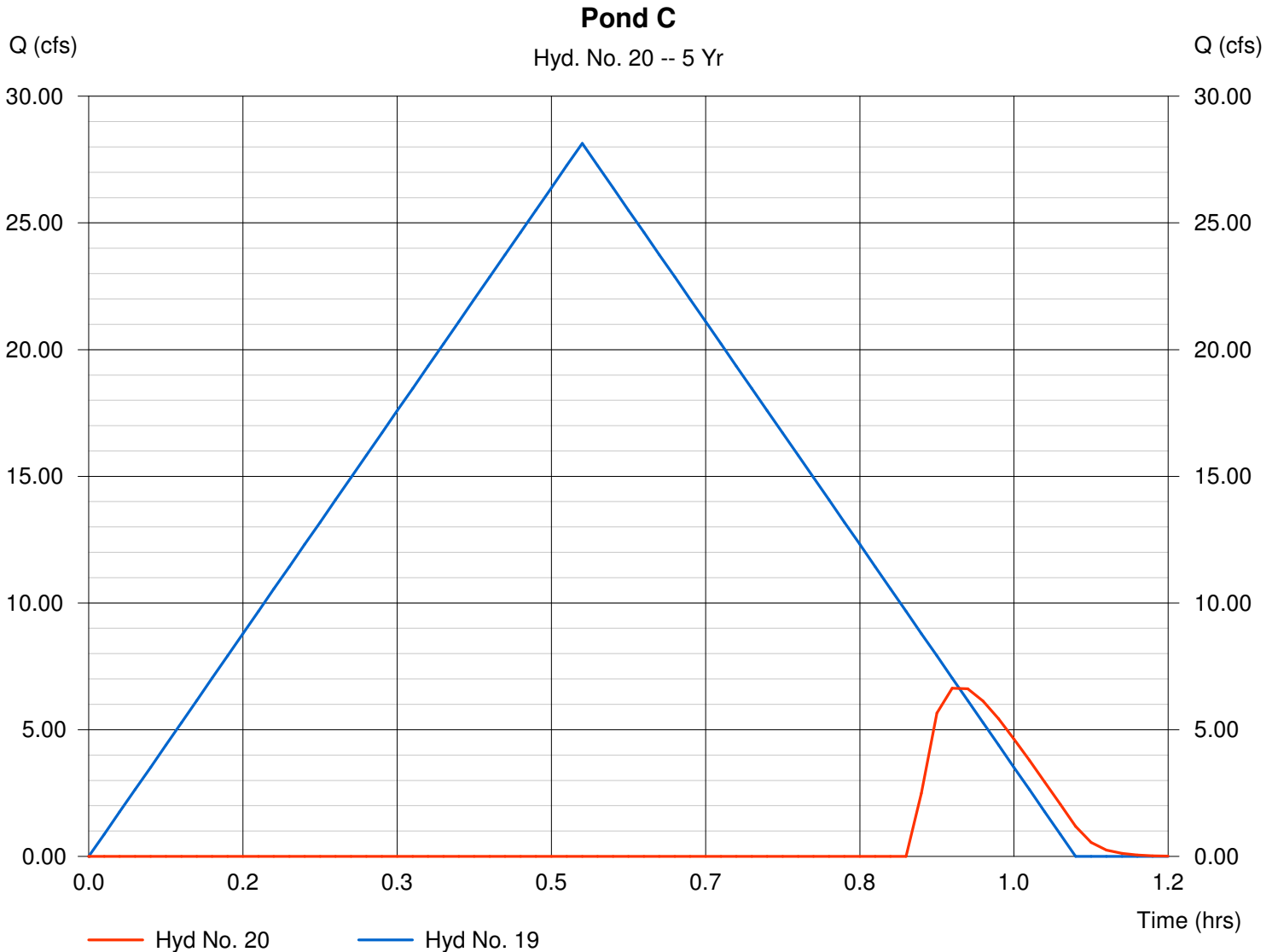
Pond C

Hydrograph type = Reservoir
Storm frequency = 5 yrs
Inflow hyd. No. = 19
Reservoir name = FINAL Pond C2

Peak discharge = 6.638 cfs
Time interval = 1 min
Max. Elevation = 1358.02 ft
Max. Storage = 1.186 acft

Storage Indication method used.

Hydrograph Volume = 0.067 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Pond No. 11 - FINAL Pond C2

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	1356.00	22,938	0.000	0.000
1.00	1357.00	25,532	0.556	0.556
2.00	1358.00	28,233	0.617	1.173
3.00	1359.00	31,037	0.680	1.854

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

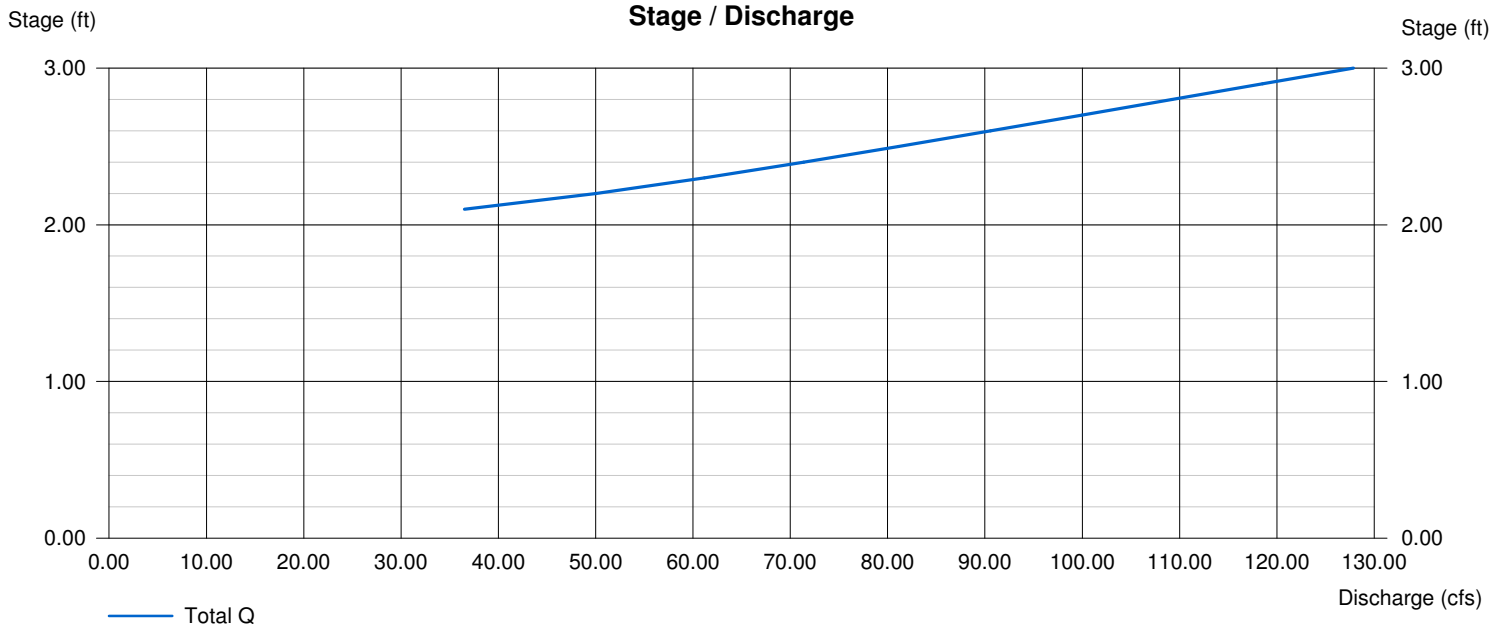
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 1356.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 1358.00 ft

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

Stage / Discharge



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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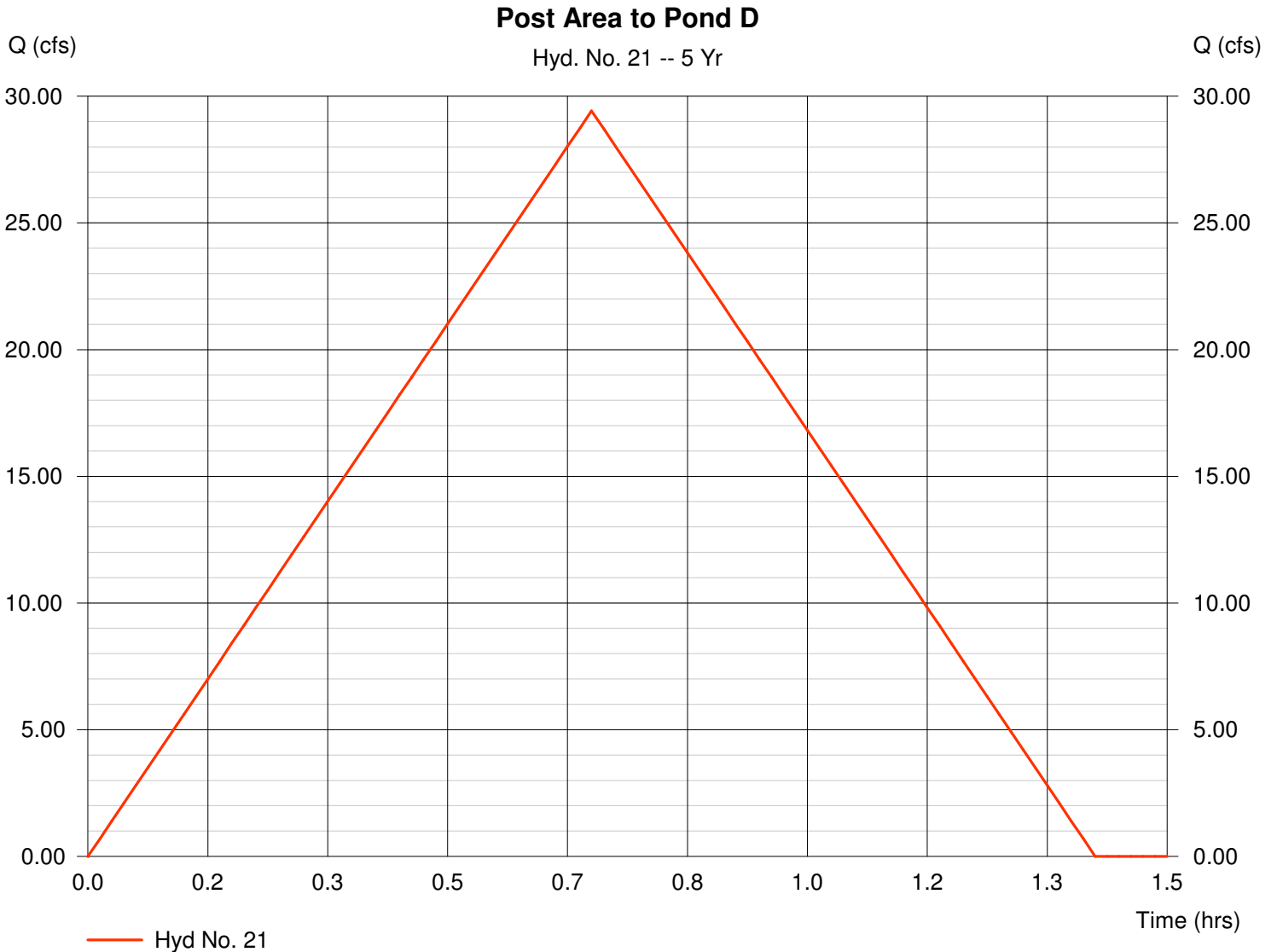
Hyd. No. 21

Post Area to Pond D

Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 22.000 ac
Intensity = 2.675 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 29.42 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 42.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1.702 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

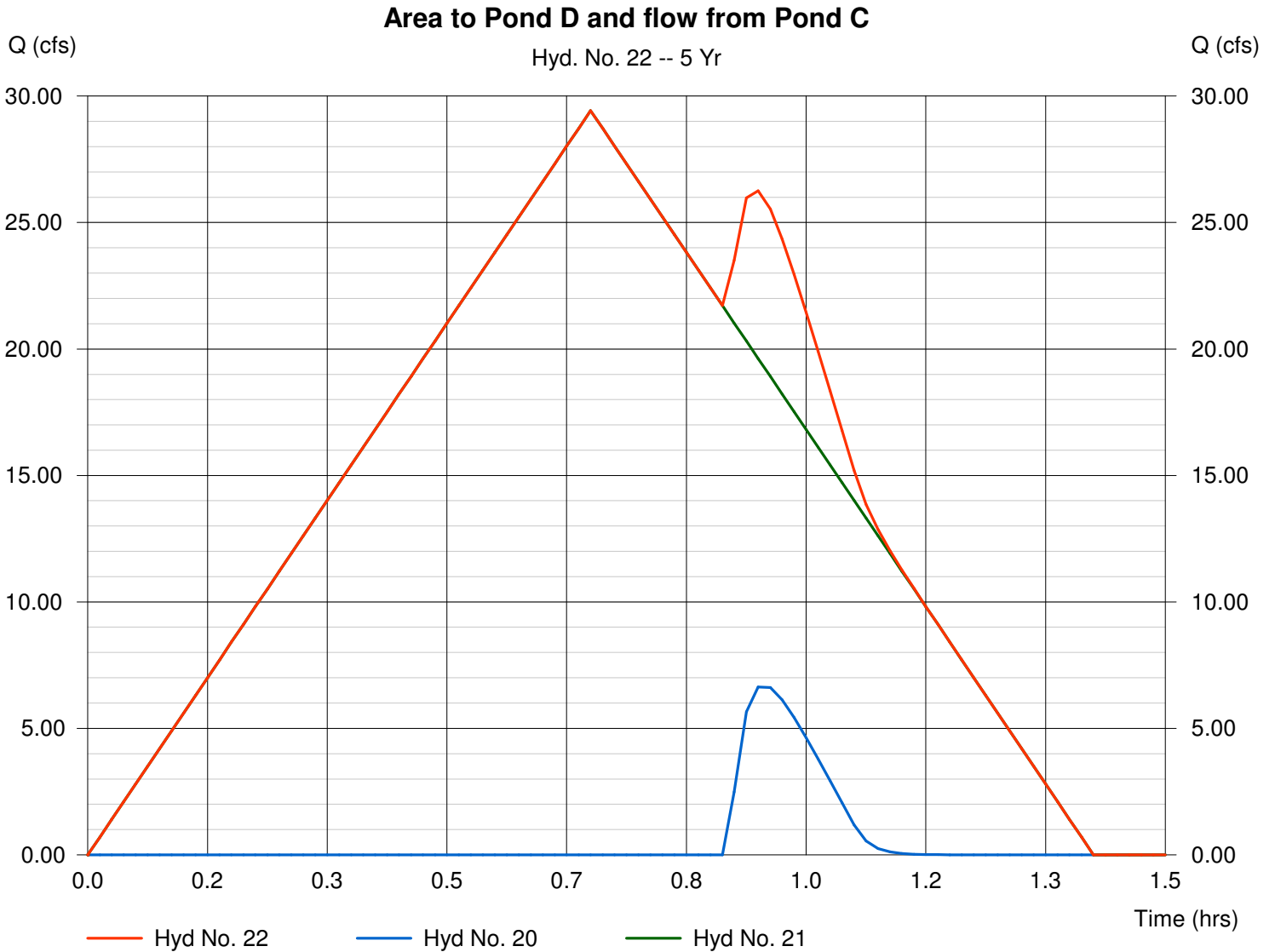
Hyd. No. 22

Area to Pond D and flow from Pond C

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

Peak discharge = 29.42 cfs
Time interval = 1 min

Hydrograph Volume = 1.769 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Hyd. No. 23

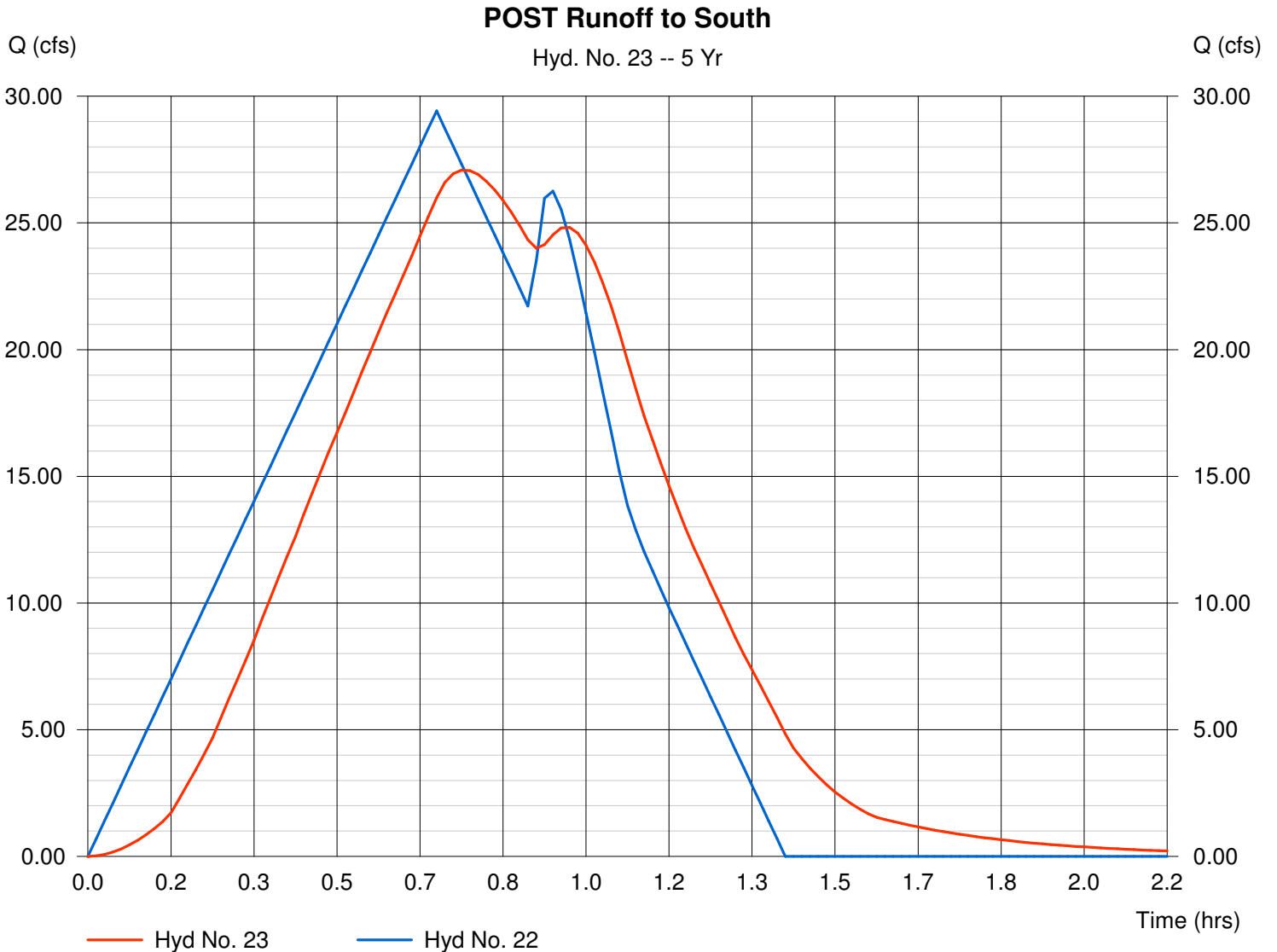
POST Runoff to South

Hydrograph type = Reservoir
Storm frequency = 5 yrs
Inflow hyd. No. = 22
Reservoir name = FINAL Pond D2

Peak discharge = 27.09 cfs
Time interval = 1 min
Max. Elevation = 1355.66 ft
Max. Storage = 0.254 acft

Storage Indication method used.

Hydrograph Volume = 1.769 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Pond No. 12 - FINAL Pond D2

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	1355.00	14,751	0.000	0.000
1.00	1356.00	18,623	0.383	0.383
2.00	1357.00	22,616	0.473	0.856
3.00	1358.00	26,731	0.566	1.423

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

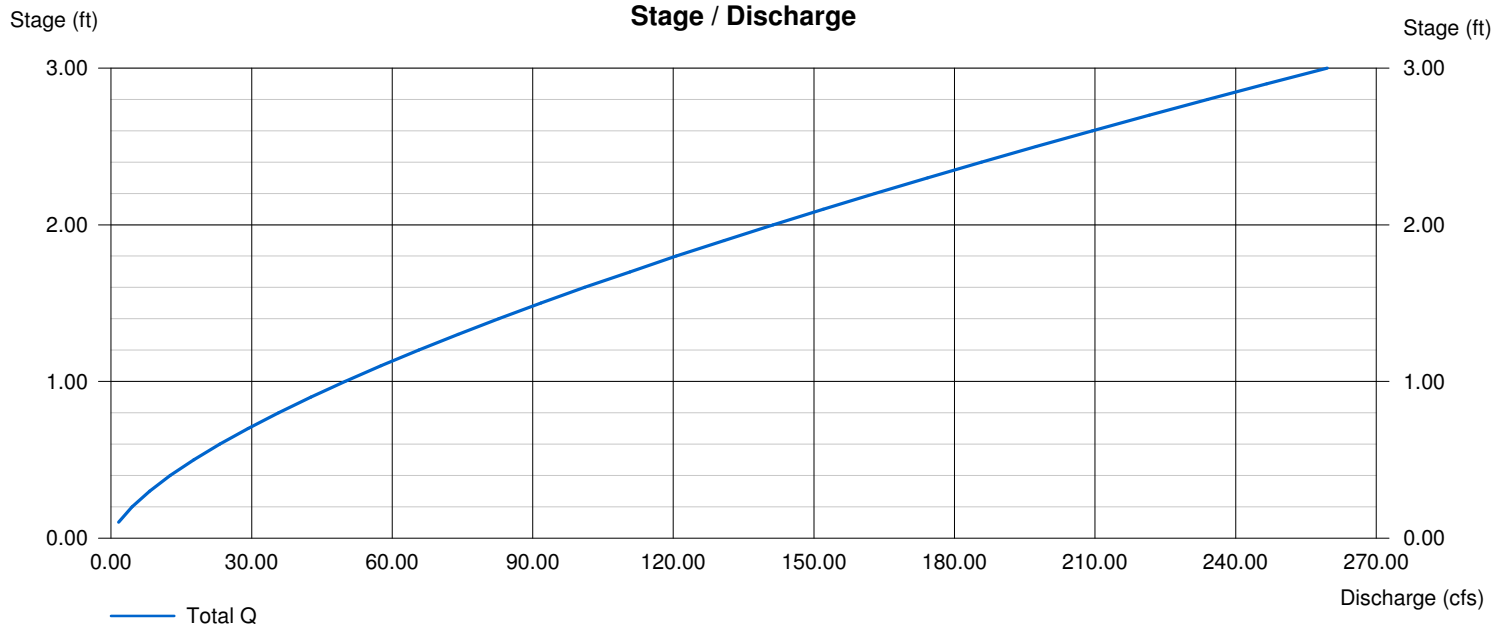
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	0.00	0.00	0.00
Crest El. (ft)	= 1355.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	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.

Stage / Discharge



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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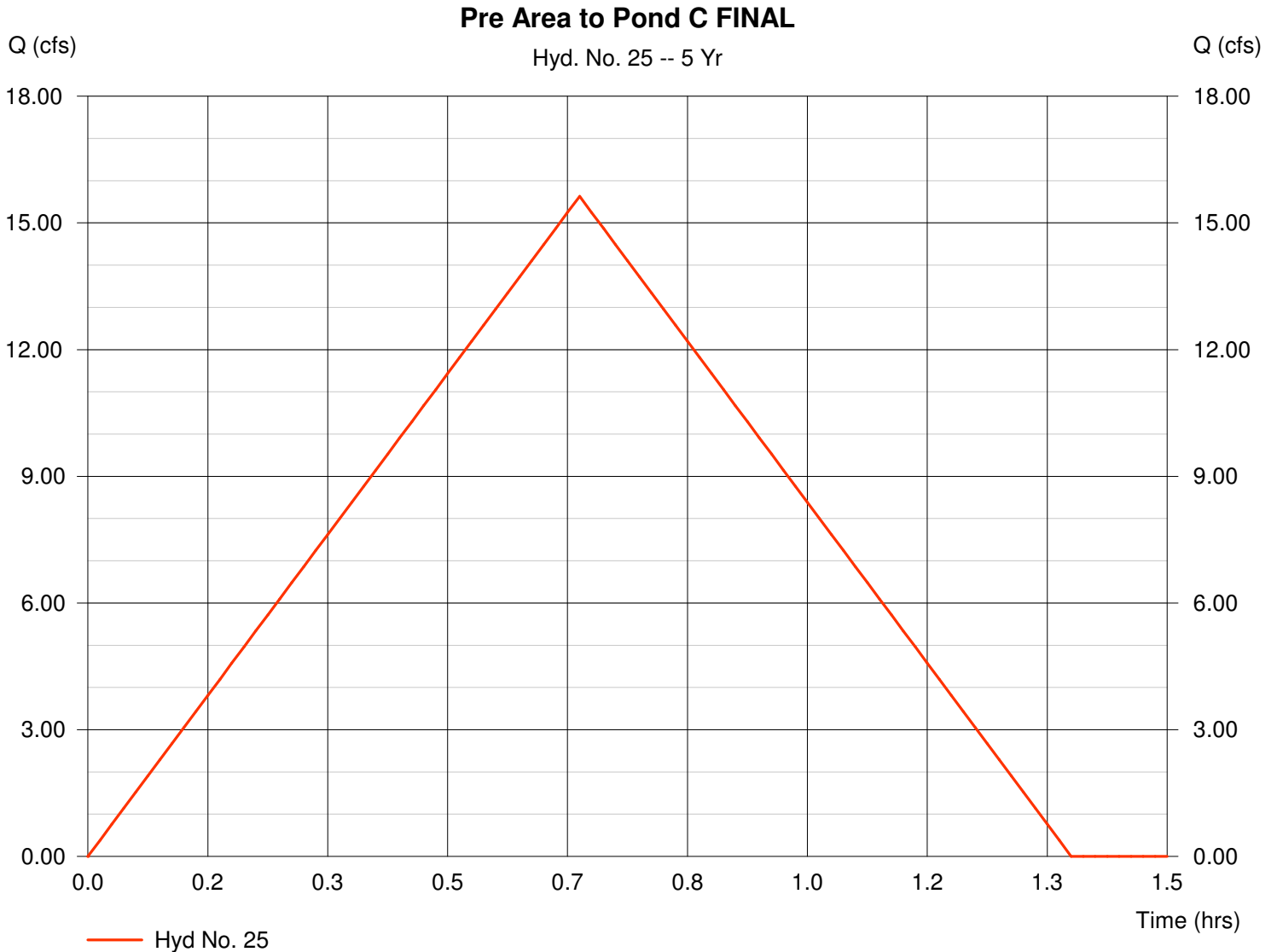
Hyd. No. 25

Pre Area to Pond C FINAL

Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 18.000 ac
Intensity = 2.713 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 15.63 cfs
Time interval = 1 min
Runoff coeff. = 0.32
Tc by User = 41.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 0.883 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

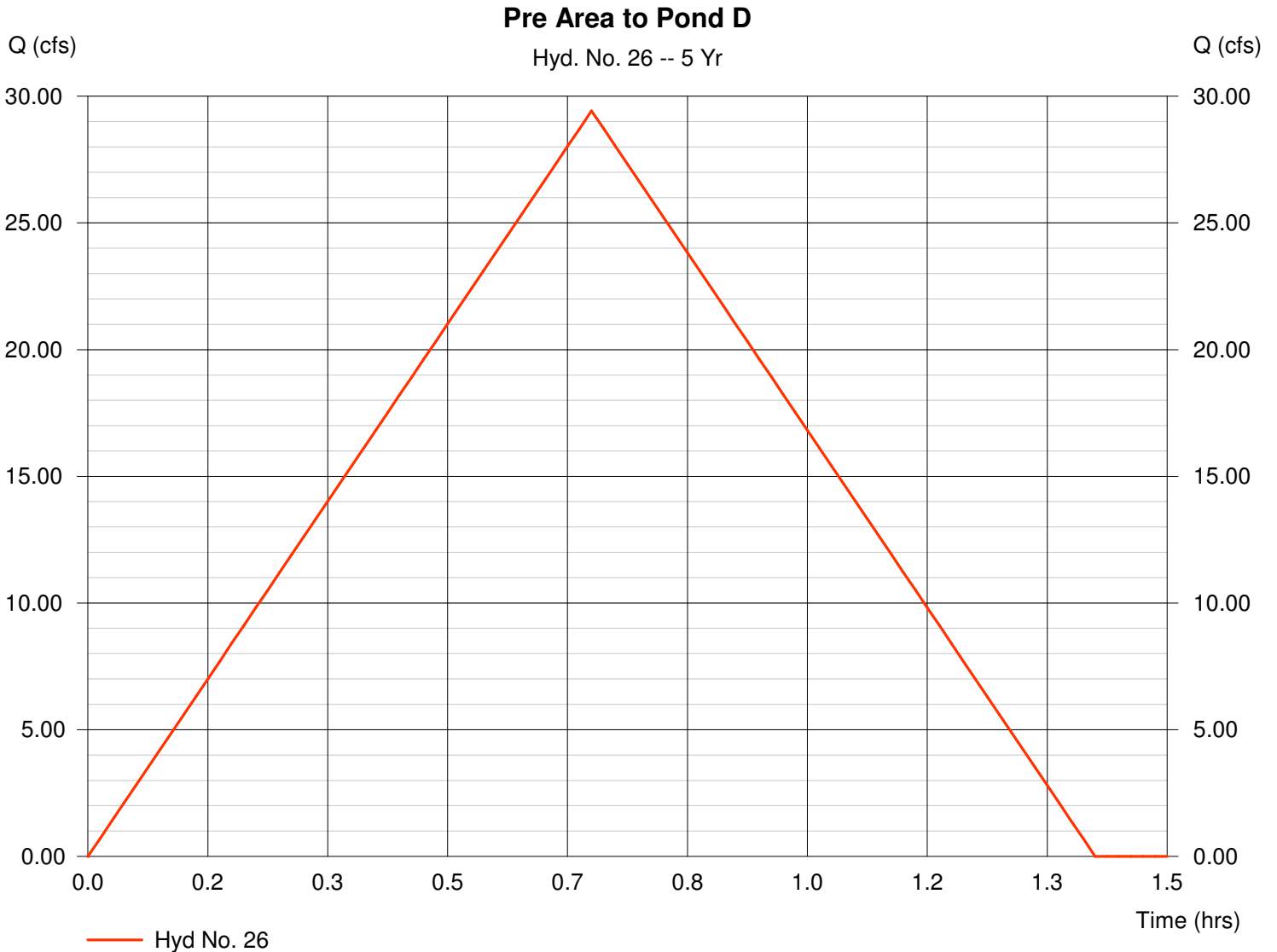
Hyd. No. 26

Pre Area to Pond D

Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 22.000 ac
Intensity = 2.675 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 29.42 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 42.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1.702 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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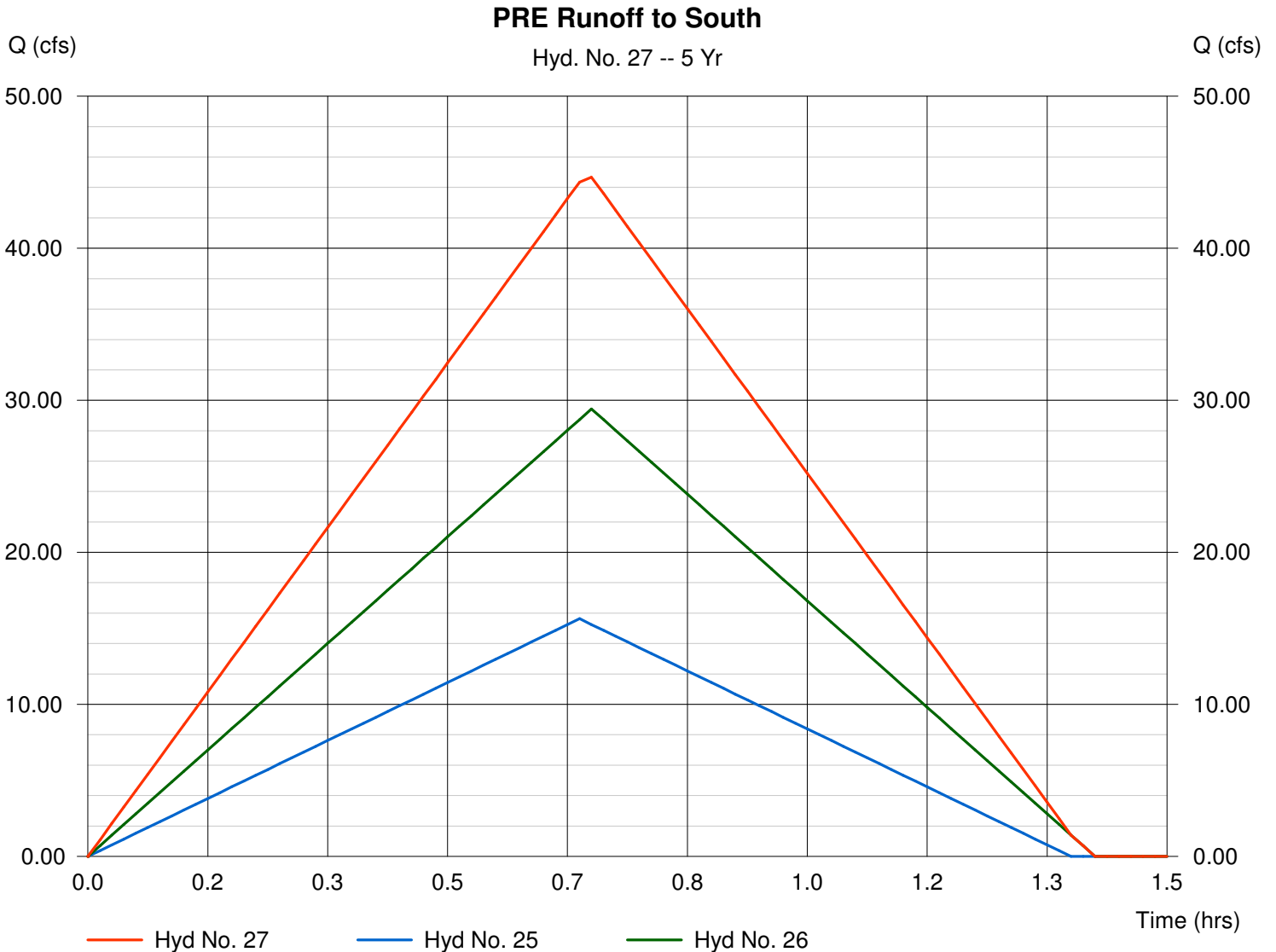
Hyd. No. 27

PRE Runoff to South

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

Peak discharge = 44.67 cfs
Time interval = 1 min

Hydrograph Volume = 2.585 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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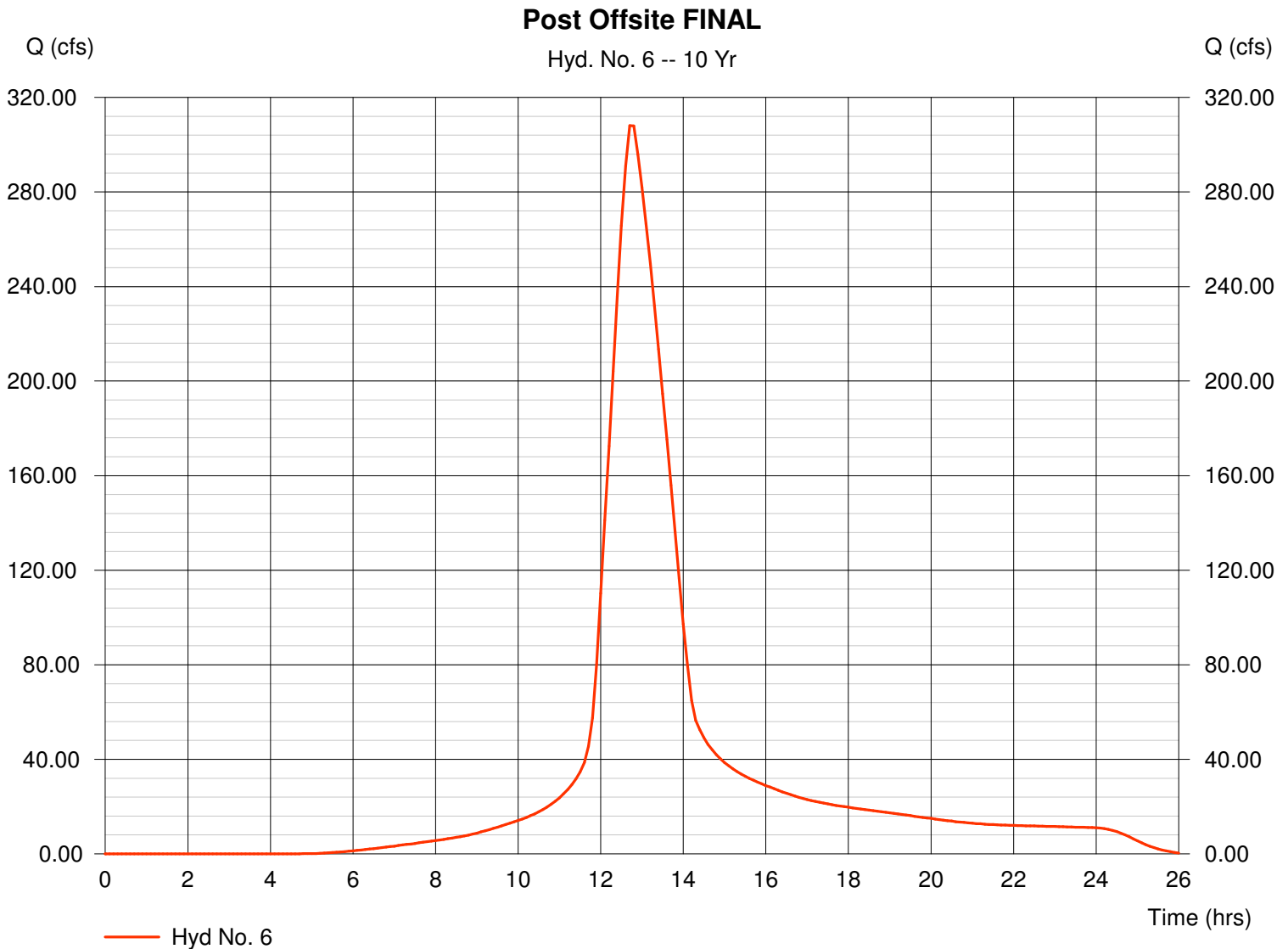
Hyd. No. 6

Post Offsite FINAL

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 191.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 308.00 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 7000 ft
Time of conc. (Tc) = 85.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 62.185 acft



Hydrograph Plot

Hyd. No. 7

Post Onsite - area to stream

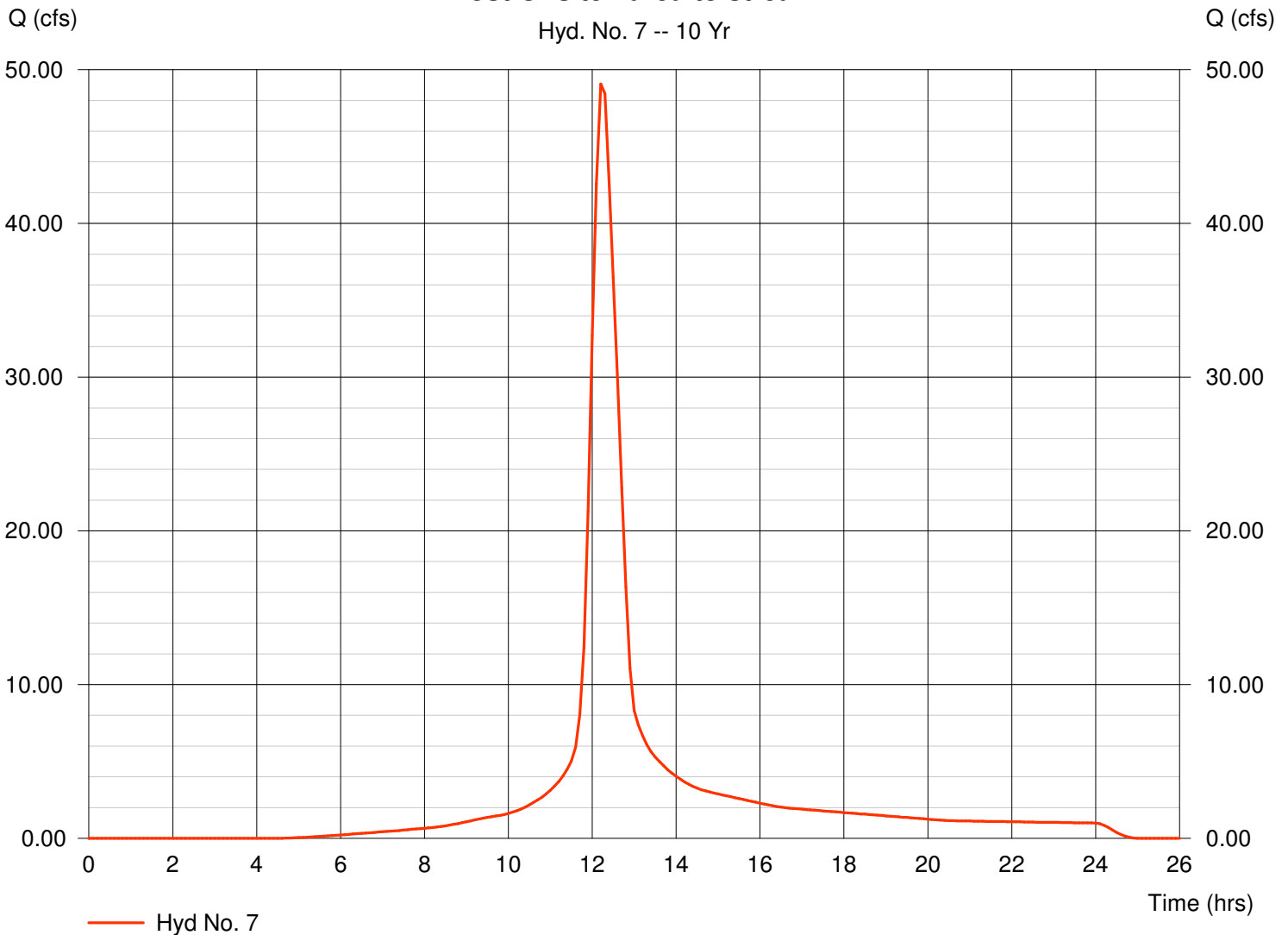
Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 17.000 ac
Basin Slope = 0.2 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 49.08 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 461 ft
Time of conc. (Tc) = 31.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 5.708 acft

Post Onsite - area to stream

Hyd. No. 7 -- 10 Yr



Hydrograph Plot

Hyd. No. 8

Post On-site area to ponds A & B

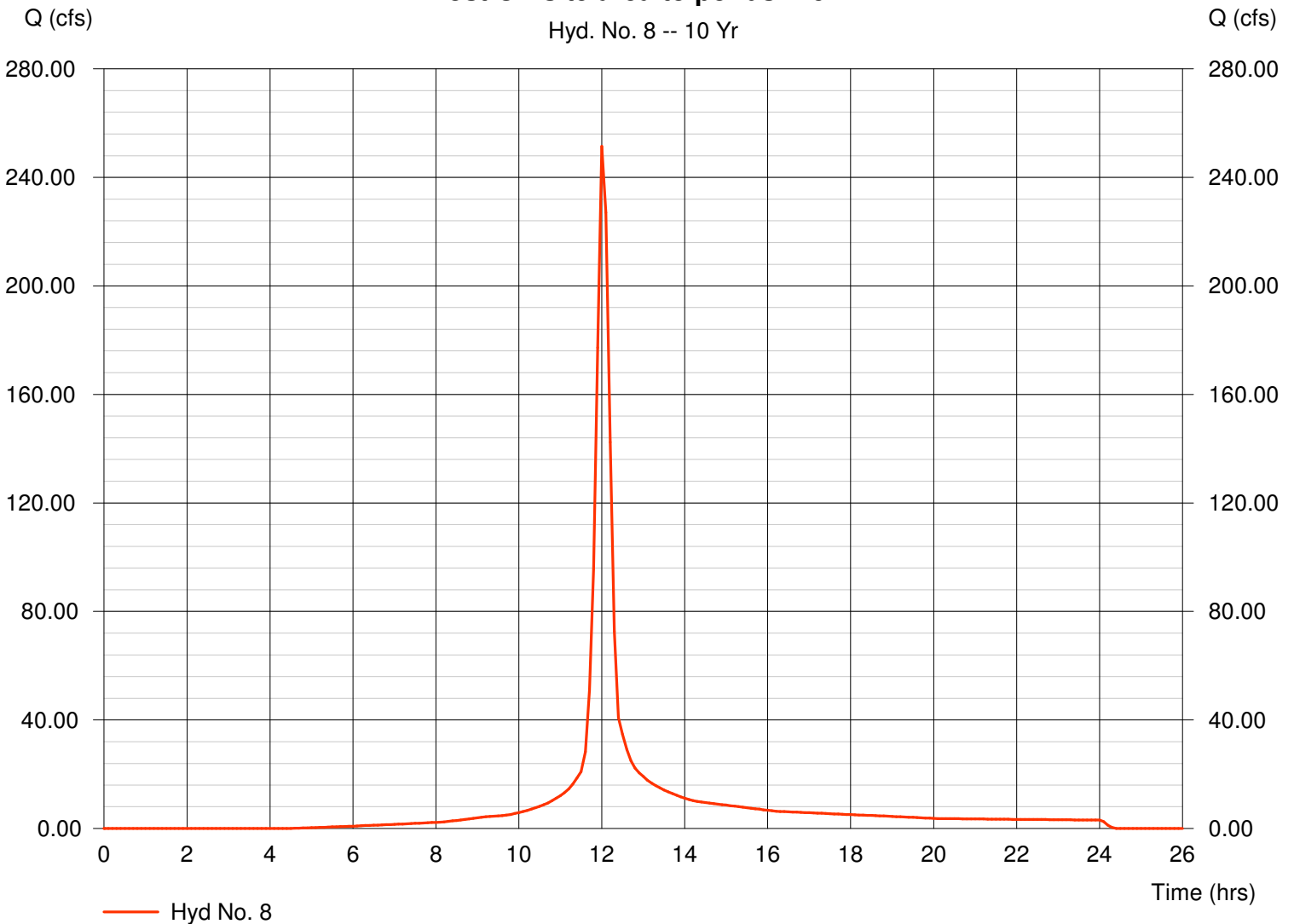
Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 59.000 ac
Basin Slope = 1.5 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 251.44 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 610 ft
Time of conc. (Tc) = 18.70 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 18.008 acft

Post On-site area to ponds A & B

Hyd. No. 8 -- 10 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Hyd. No. 9

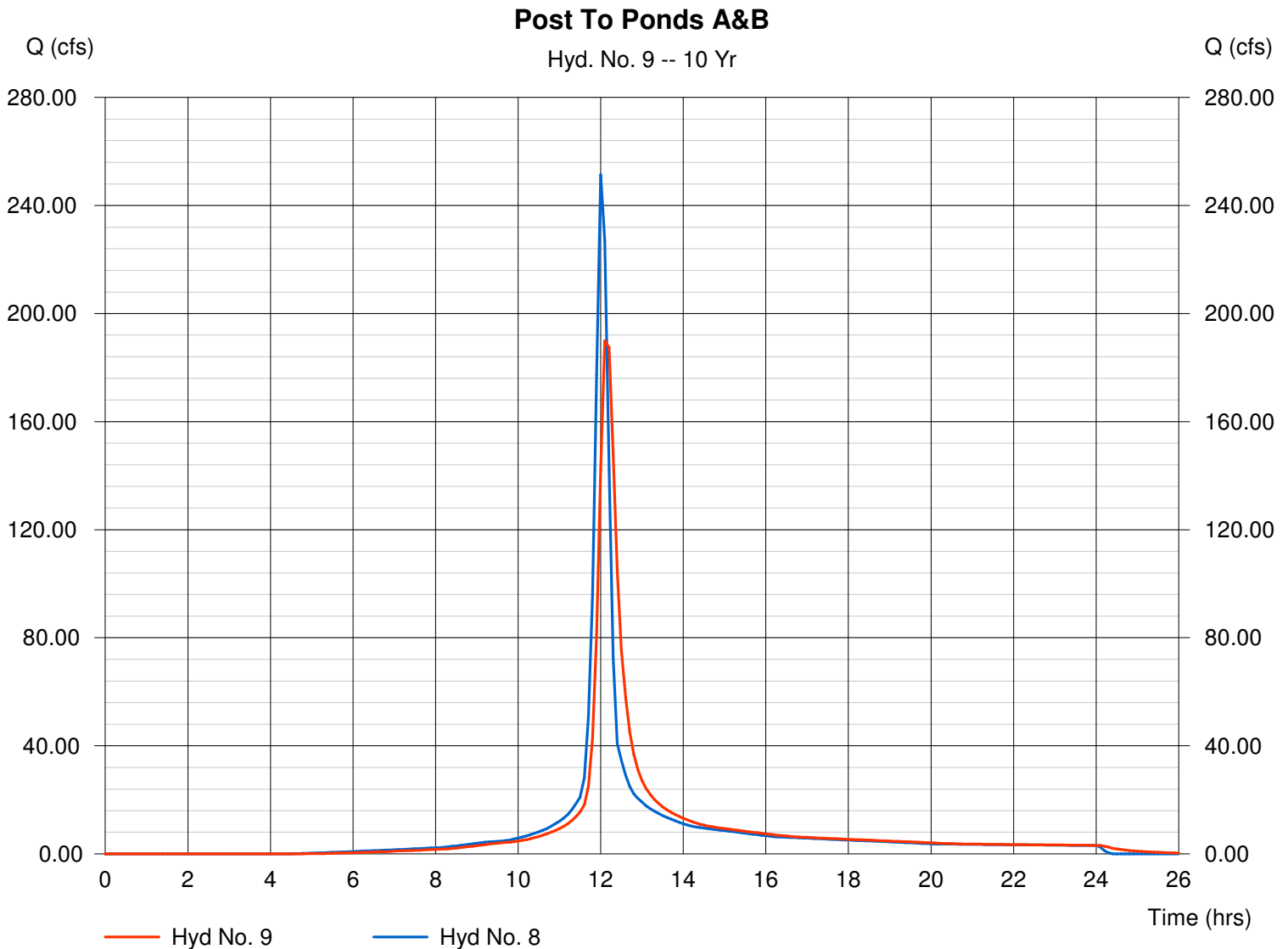
Post To Ponds A&B

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 8
Reservoir name = Ponds A & B

Peak discharge = 189.97 cfs
Time interval = 6 min
Max. Elevation = 1354.16 ft
Max. Storage = 3.163 acft

Storage Indication method used.

Hydrograph Volume = 18.008 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Pond No. 9 - Ponds A & B

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	1352.00	56,228	0.000	0.000
1.00	1353.00	63,009	1.369	1.369
2.00	1354.00	70,098	1.528	2.897
3.00	1355.00	77,436	1.693	4.590
4.00	1356.00	85,001	1.865	6.454
5.00	1357.00	92,780	2.041	8.495
6.00	1358.00	103,774	2.256	10.751
7.00	1359.00	108,987	2.442	13.193

Culvert / Orifice Structures

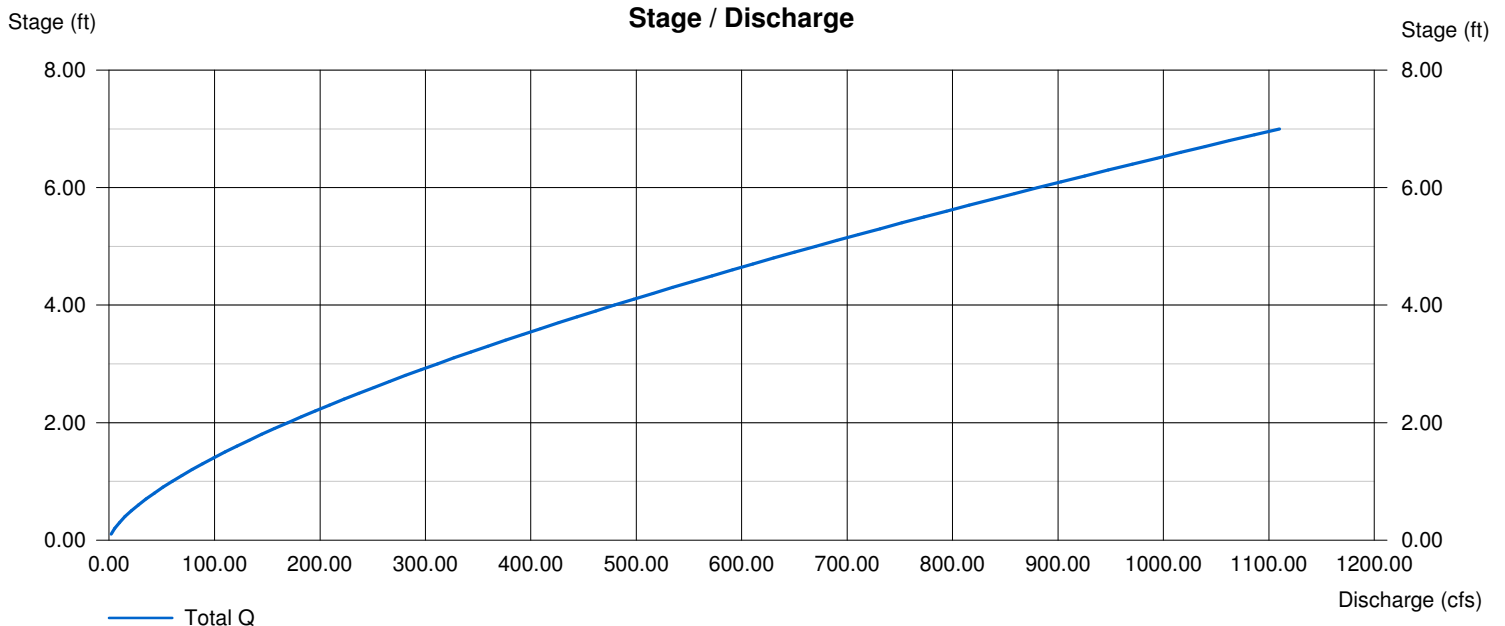
	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 18.00	0.00	0.00	0.00
Crest El. (ft)	= 1352.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	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.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 10

POST Runoff to the West

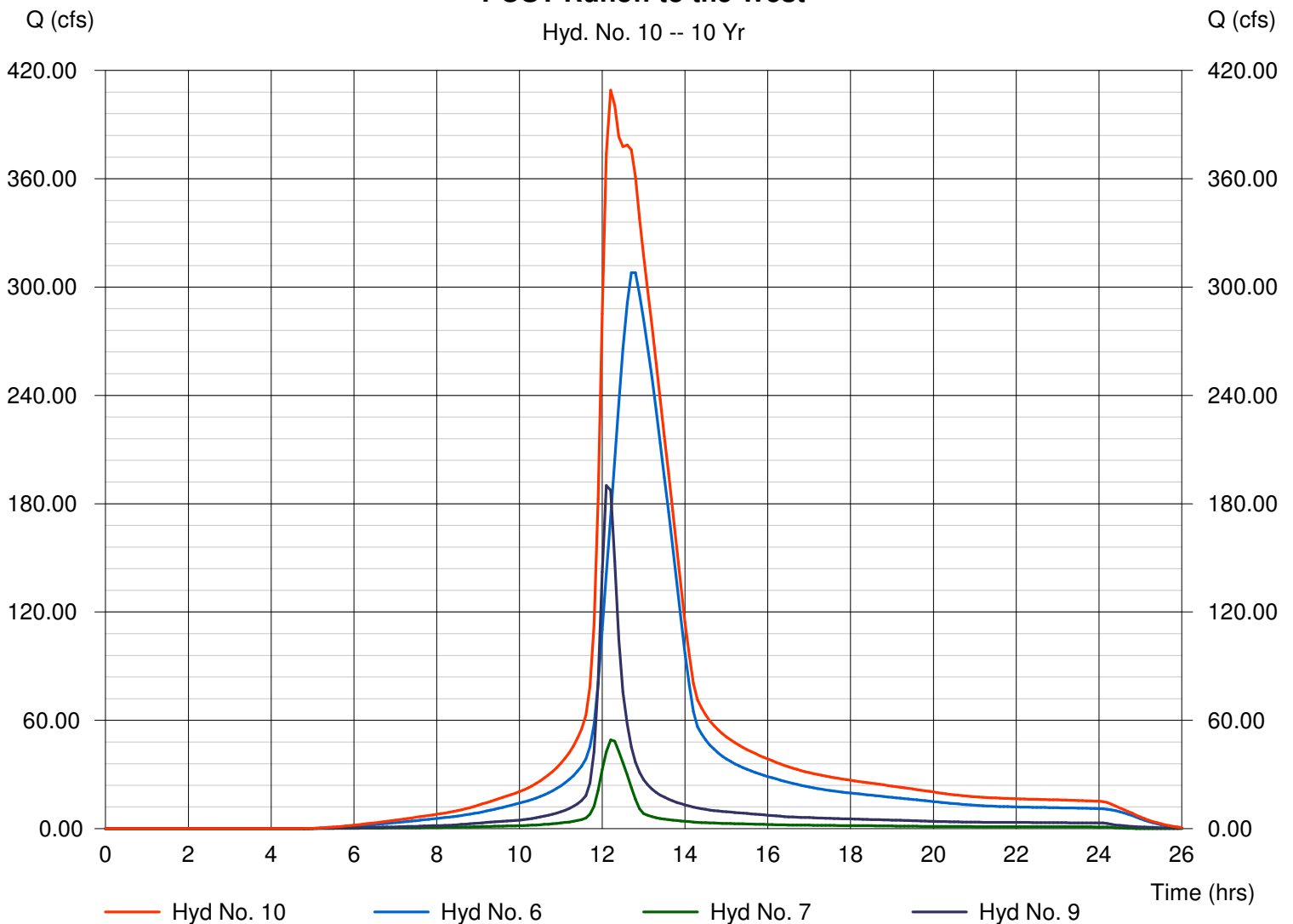
Hydrograph type = Combine
Storm frequency = 10 yrs
Inflow hyds. = 6, 7, 9

Peak discharge = 409.03 cfs
Time interval = 6 min

Hydrograph Volume = 85.901 acft

POST Runoff to the West

Hyd. No. 10 -- 10 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

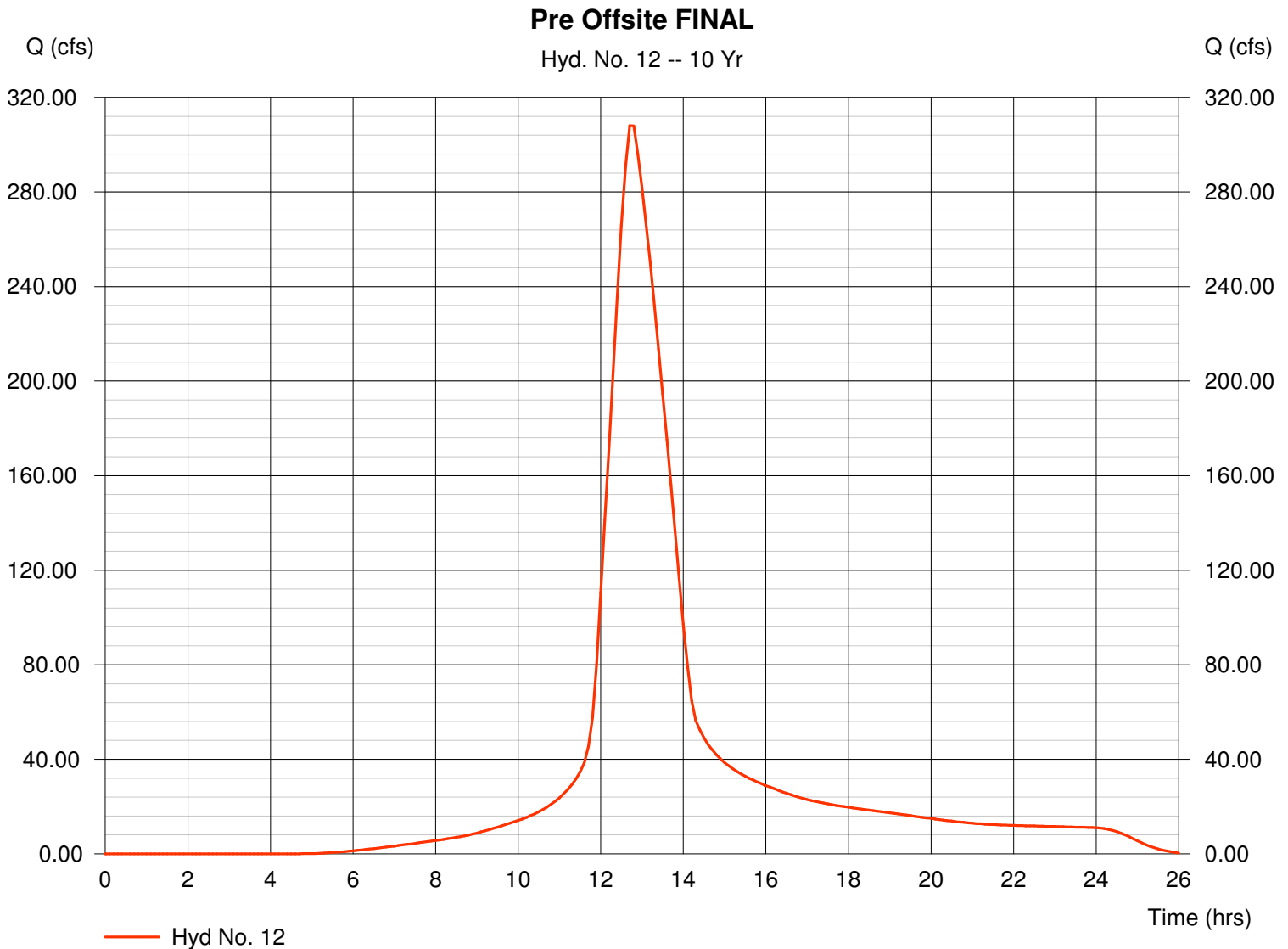
Hyd. No. 12

Pre Offsite FINAL

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 191.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 308.00 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 7000 ft
Time of conc. (Tc) = 85.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 62.185 acft



Hydrograph Plot

Hyd. No. 13

Pre Onsite - area to stream

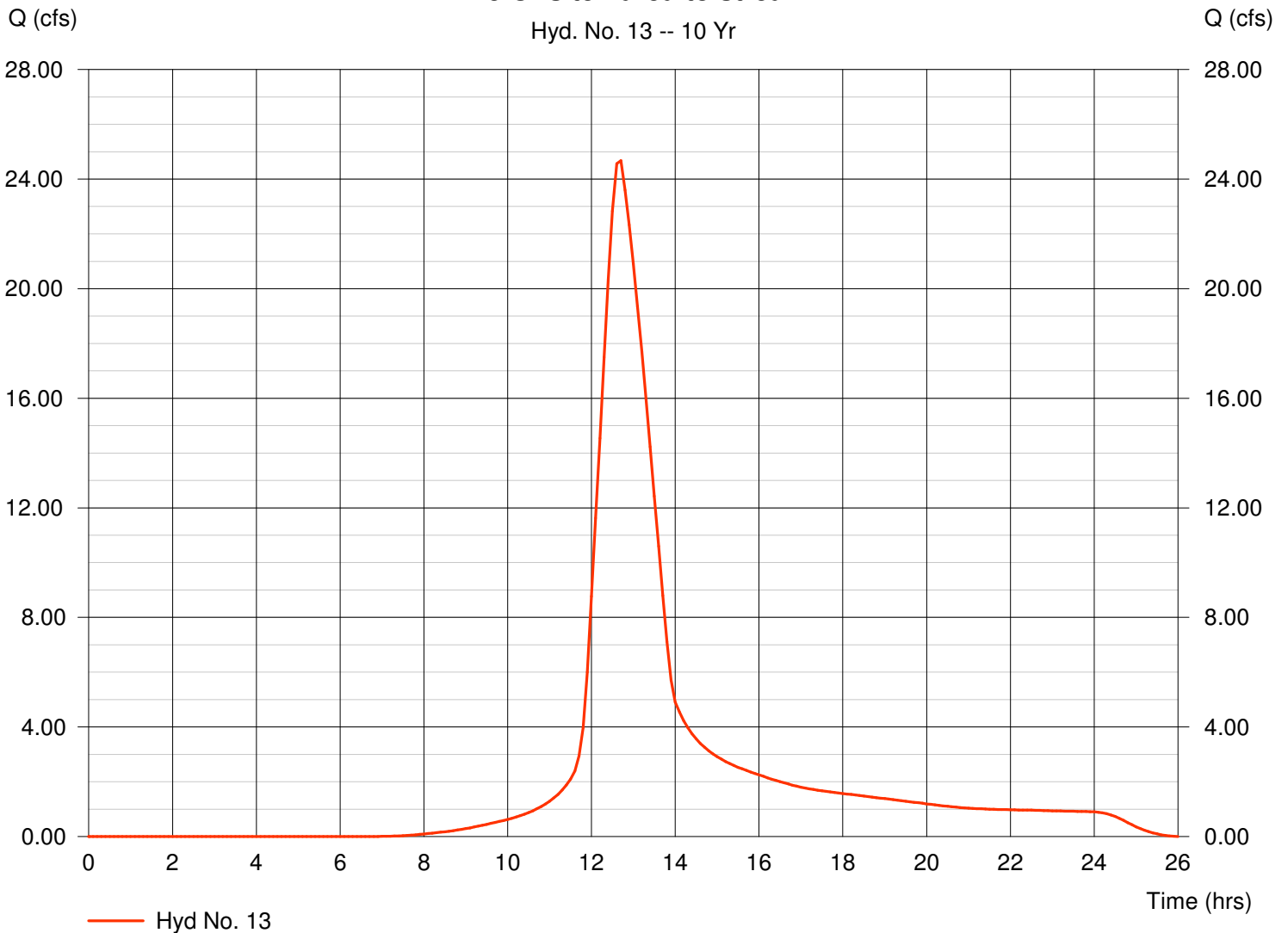
Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 17.000 ac
Basin Slope = 0.4 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 24.68 cfs
Time interval = 6 min
Curve number = 81
Hydraulic length = 2348 ft
Time of conc. (Tc) = 73.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 4.473 acft

Pre Onsite - area to stream

Hyd. No. 13 -- 10 Yr



Hydrograph Plot

Hyd. No. 14

Pre On-site area to ponds A & B

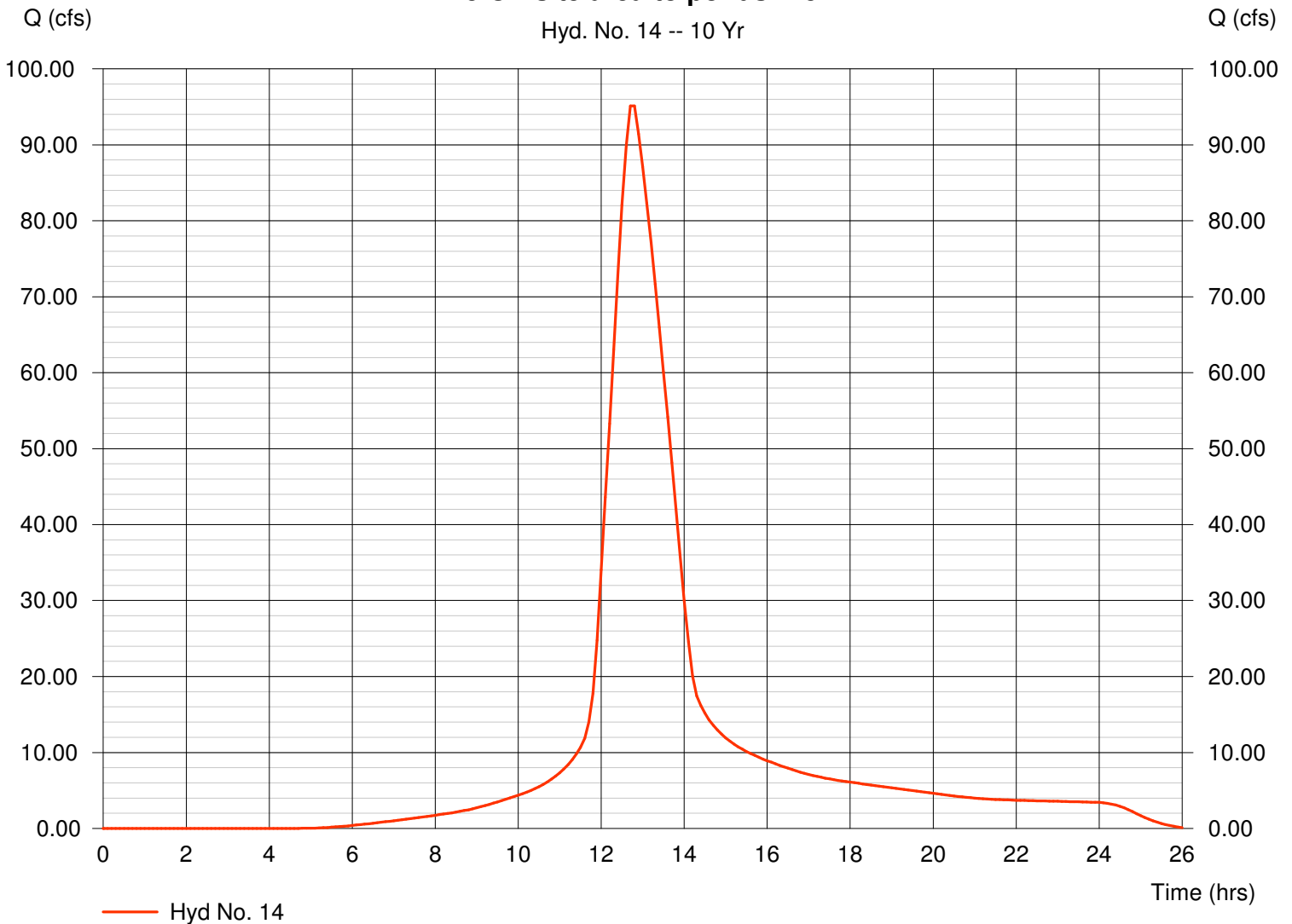
Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Drainage area = 59.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 95.14 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 4203 ft
Time of conc. (Tc) = 82.30 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 19.209 acft

Pre On-site area to ponds A & B

Hyd. No. 14 -- 10 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 15

PRE Runoff to the West

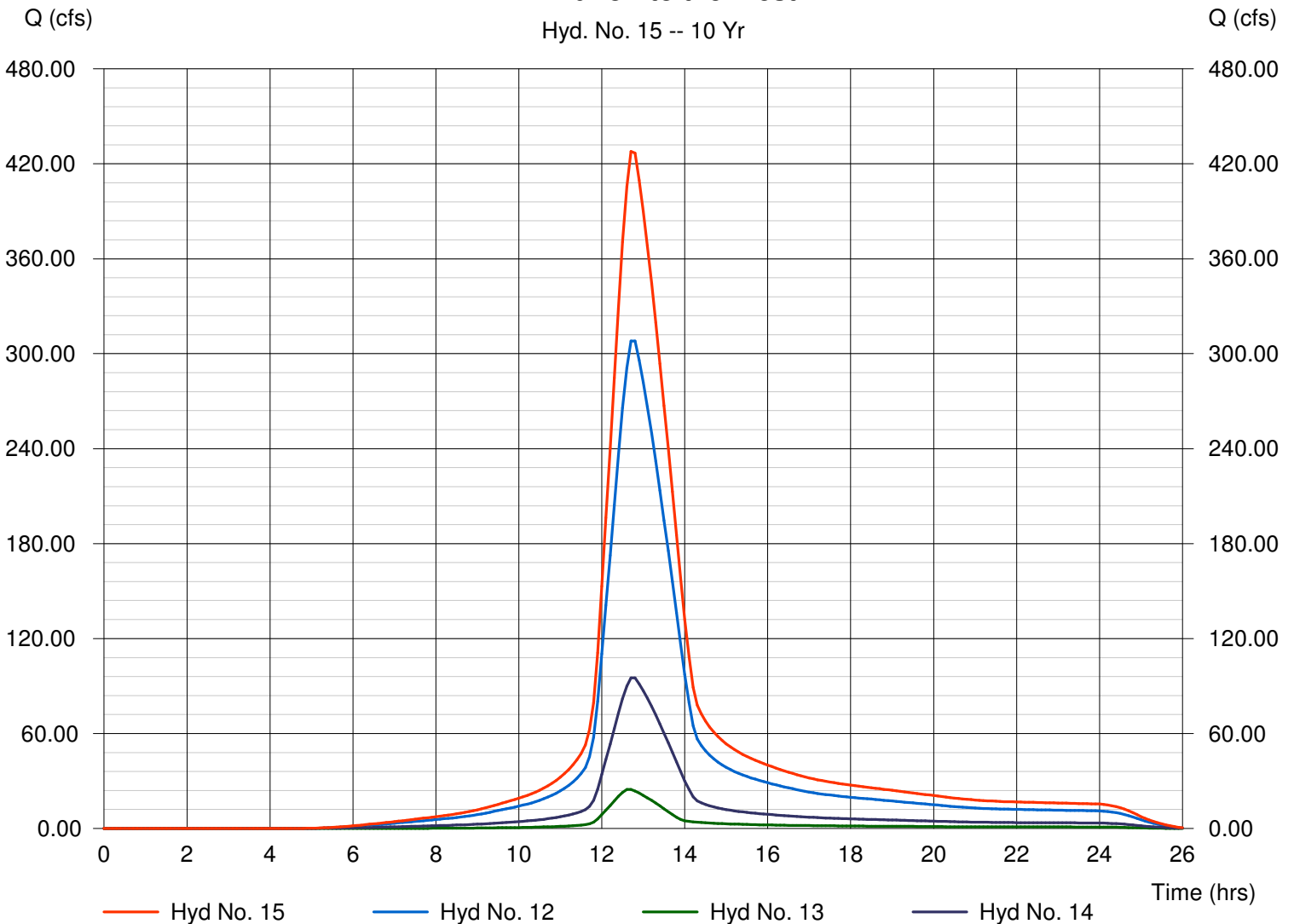
Hydrograph type = Combine
Storm frequency = 10 yrs
Inflow hyds. = 12, 13, 14

Peak discharge = 427.82 cfs
Time interval = 6 min

Hydrograph Volume = 85.866 acft

PRE Runoff to the West

Hyd. No. 15 -- 10 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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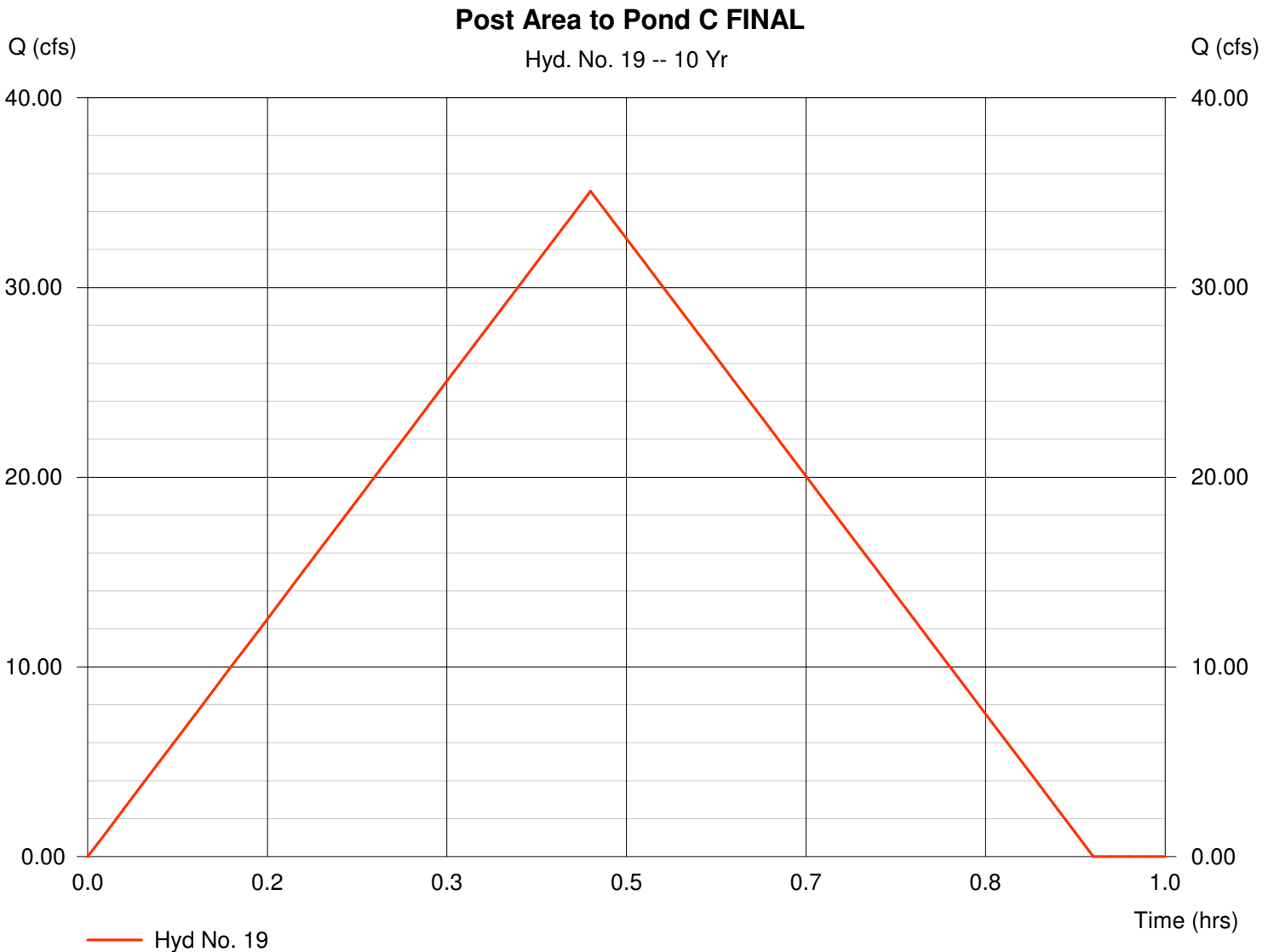
Hyd. No. 19

Post Area to Pond C FINAL

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 18.000 ac
Intensity = 3.898 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 35.08 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 28.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1.353 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 20

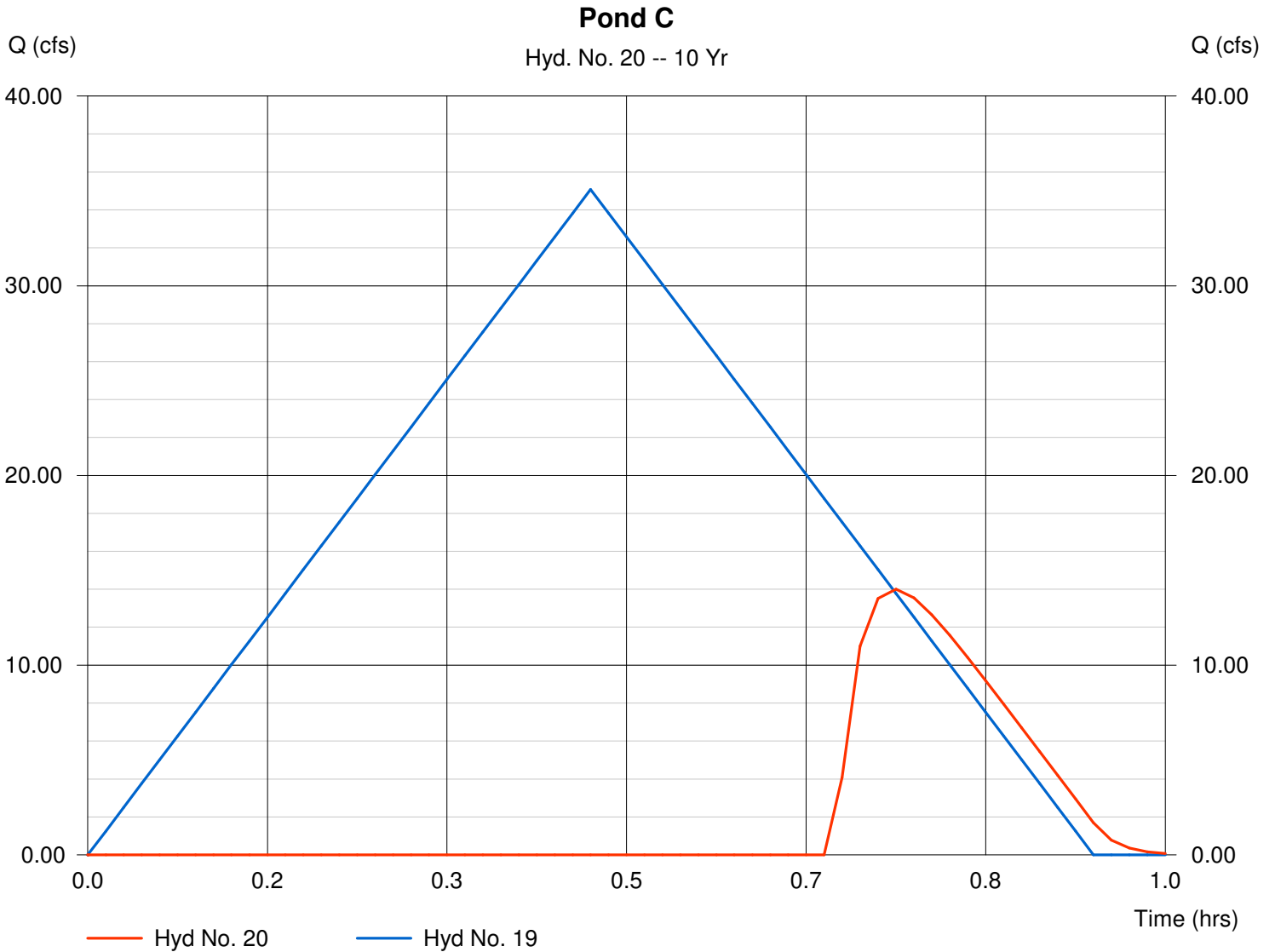
Pond C

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 19
Reservoir name = FINAL Pond C2

Peak discharge = 14.00 cfs
Time interval = 1 min
Max. Elevation = 1358.04 ft
Max. Storage = 1.200 acft

Storage Indication method used.

Hydrograph Volume = 0.180 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

Pond No. 11 - FINAL Pond C2

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	1356.00	22,938	0.000	0.000
1.00	1357.00	25,532	0.556	0.556
2.00	1358.00	28,233	0.617	1.173
3.00	1359.00	31,037	0.680	1.854

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

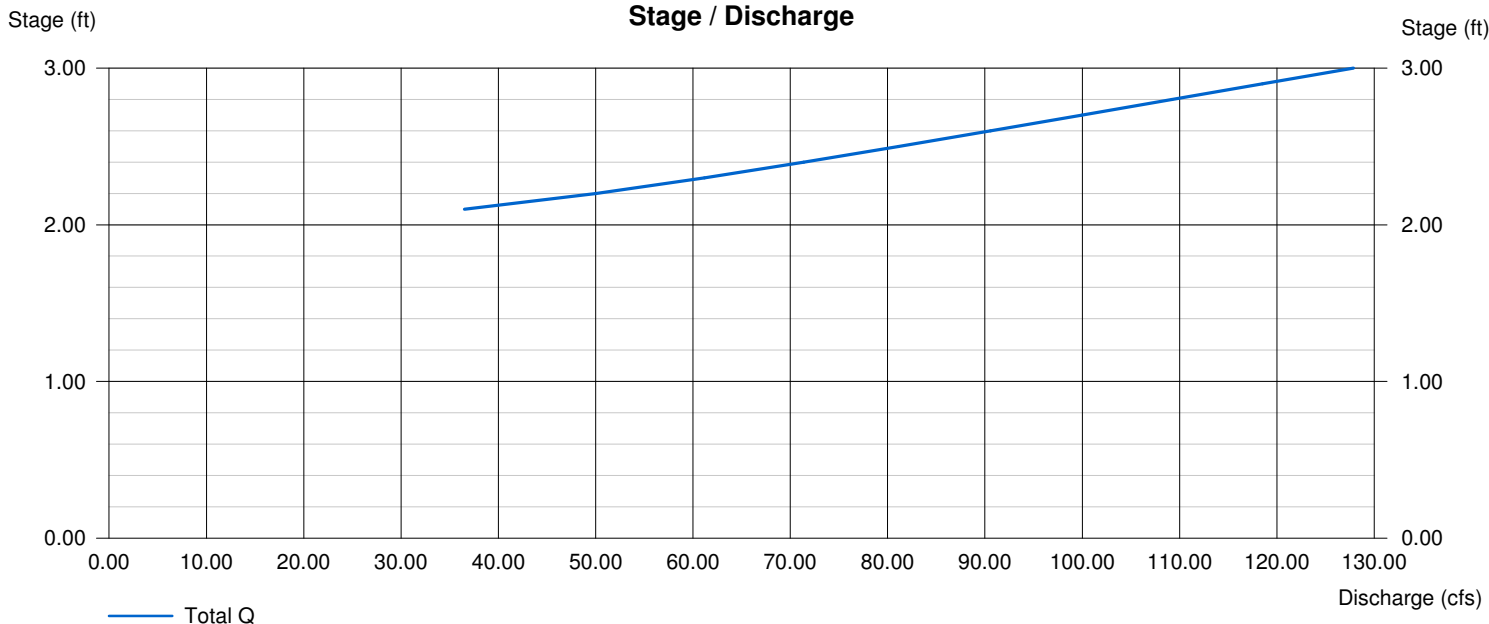
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 1356.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 1358.00 ft

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

Stage / Discharge



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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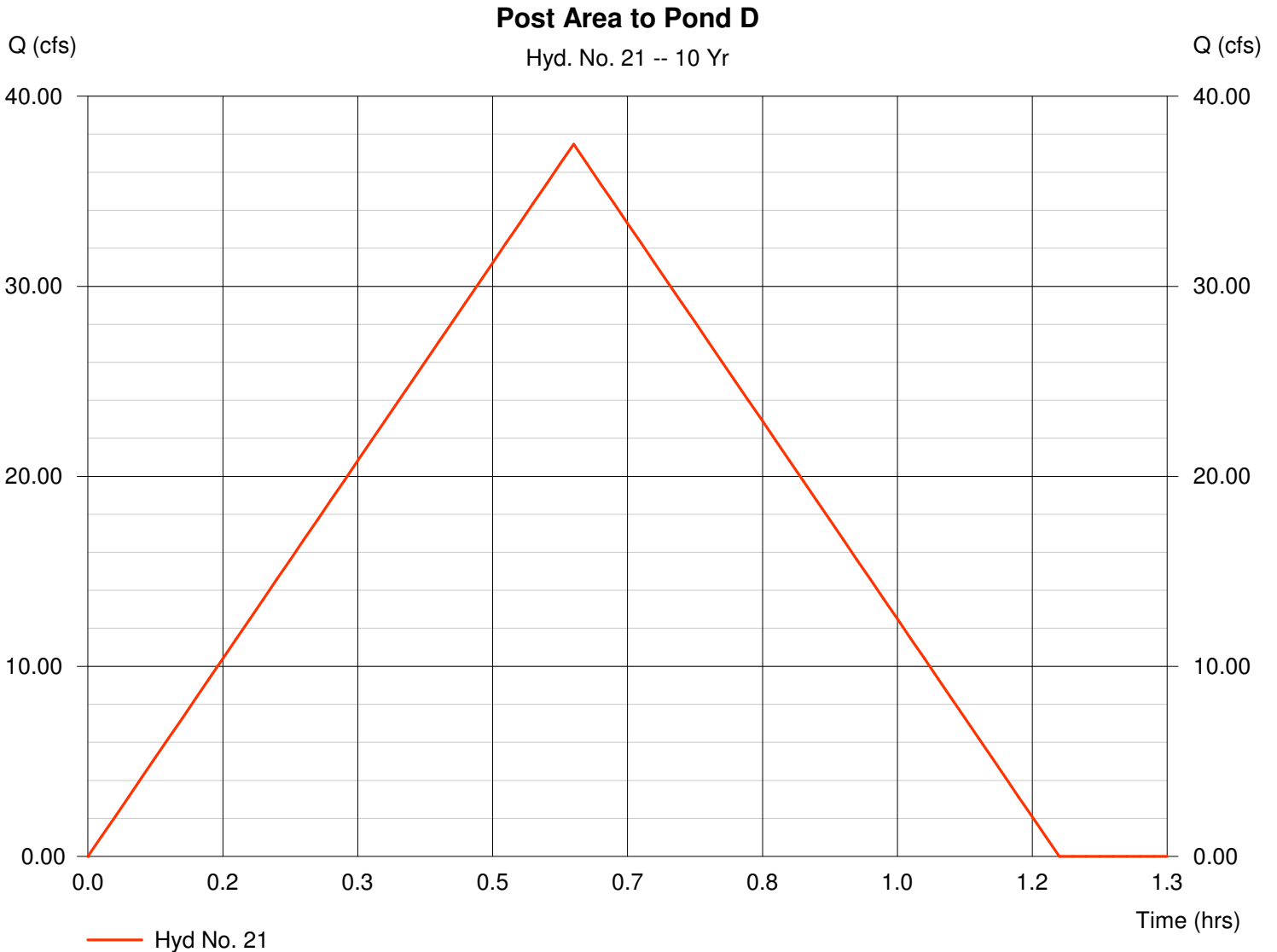
Hyd. No. 21

Post Area to Pond D

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 22.000 ac
Intensity = 3.407 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 37.48 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 36.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1.859 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 22

Area to Pond D and flow from Pond C

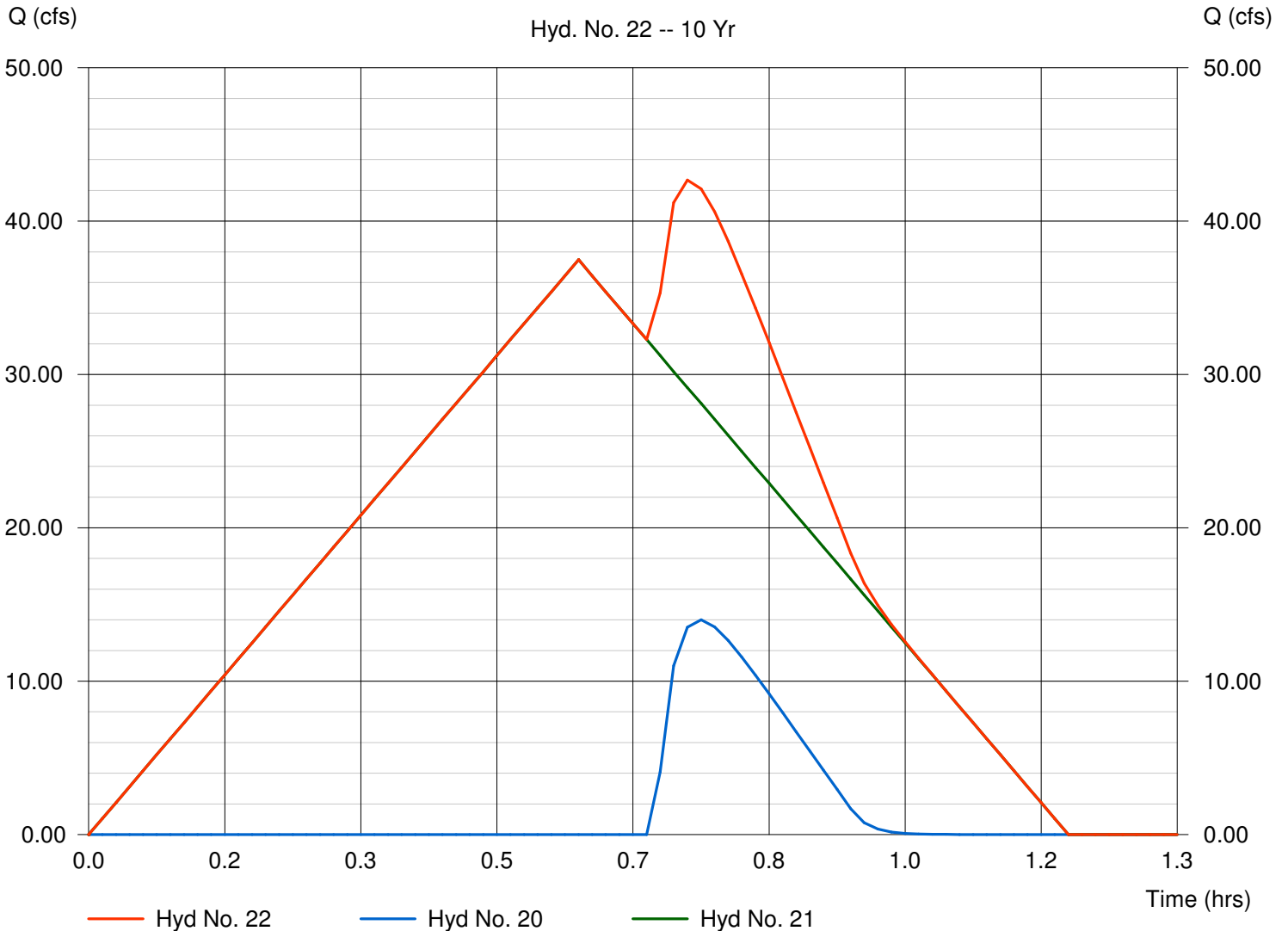
Hydrograph type = Combine
Storm frequency = 10 yrs
Inflow hyds. = 20, 21

Peak discharge = 42.67 cfs
Time interval = 1 min

Hydrograph Volume = 2.038 acft

Area to Pond D and flow from Pond C

Hyd. No. 22 -- 10 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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Hyd. No. 23

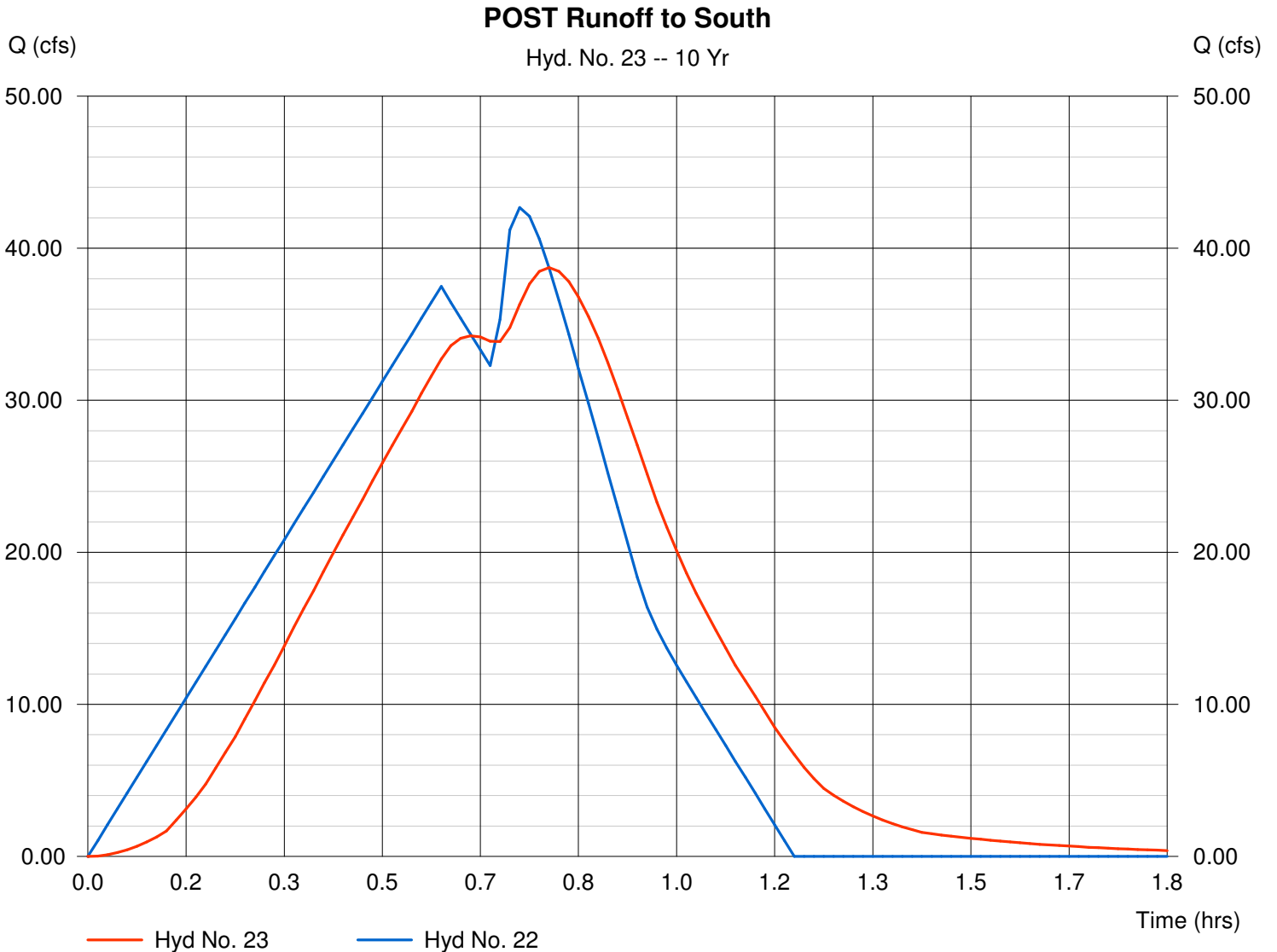
POST Runoff to South

Hydrograph type = Reservoir
Storm frequency = 10 yrs
Inflow hyd. No. = 22
Reservoir name = FINAL Pond D2

Peak discharge = 38.73 cfs
Time interval = 1 min
Max. Elevation = 1355.84 ft
Max. Storage = 0.323 acft

Storage Indication method used.

Hydrograph Volume = 2.038 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

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Pond No. 12 - FINAL Pond D2

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	1355.00	14,751	0.000	0.000
1.00	1356.00	18,623	0.383	0.383
2.00	1357.00	22,616	0.473	0.856
3.00	1358.00	26,731	0.566	1.423

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

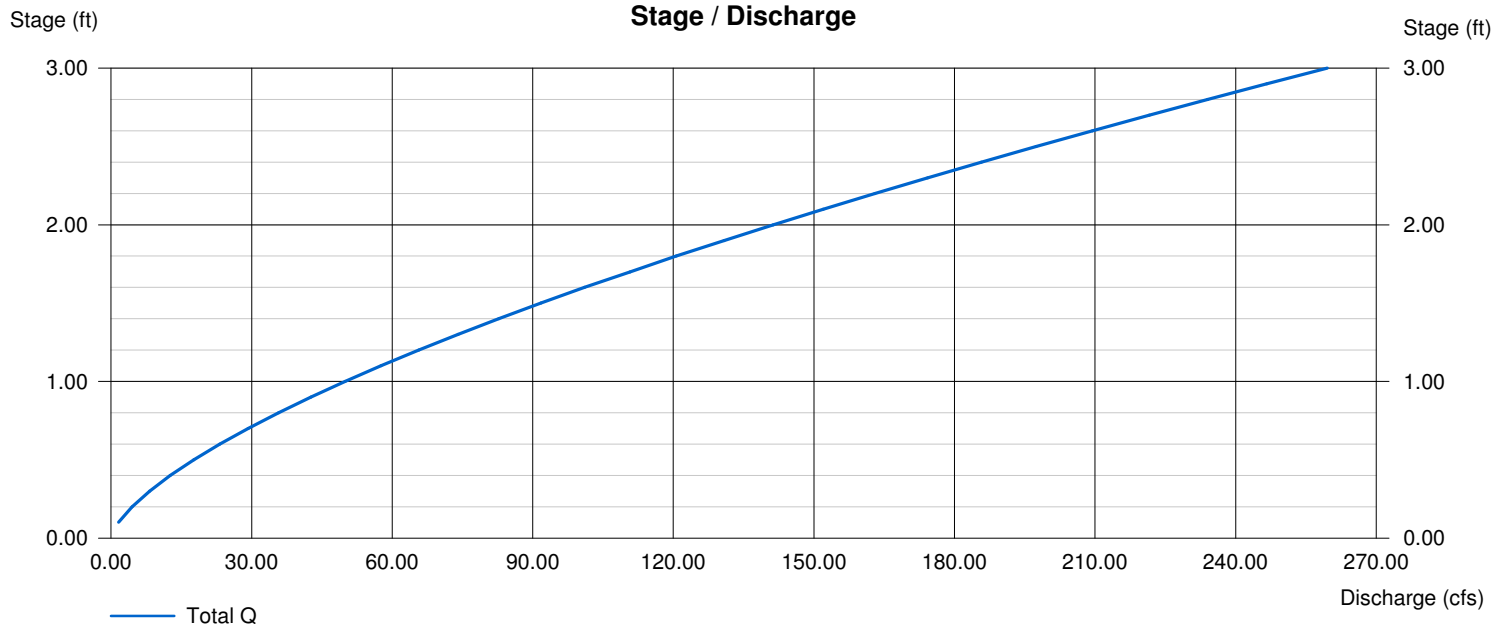
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	0.00	0.00	0.00
Crest El. (ft)	= 1355.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	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.

Stage / Discharge



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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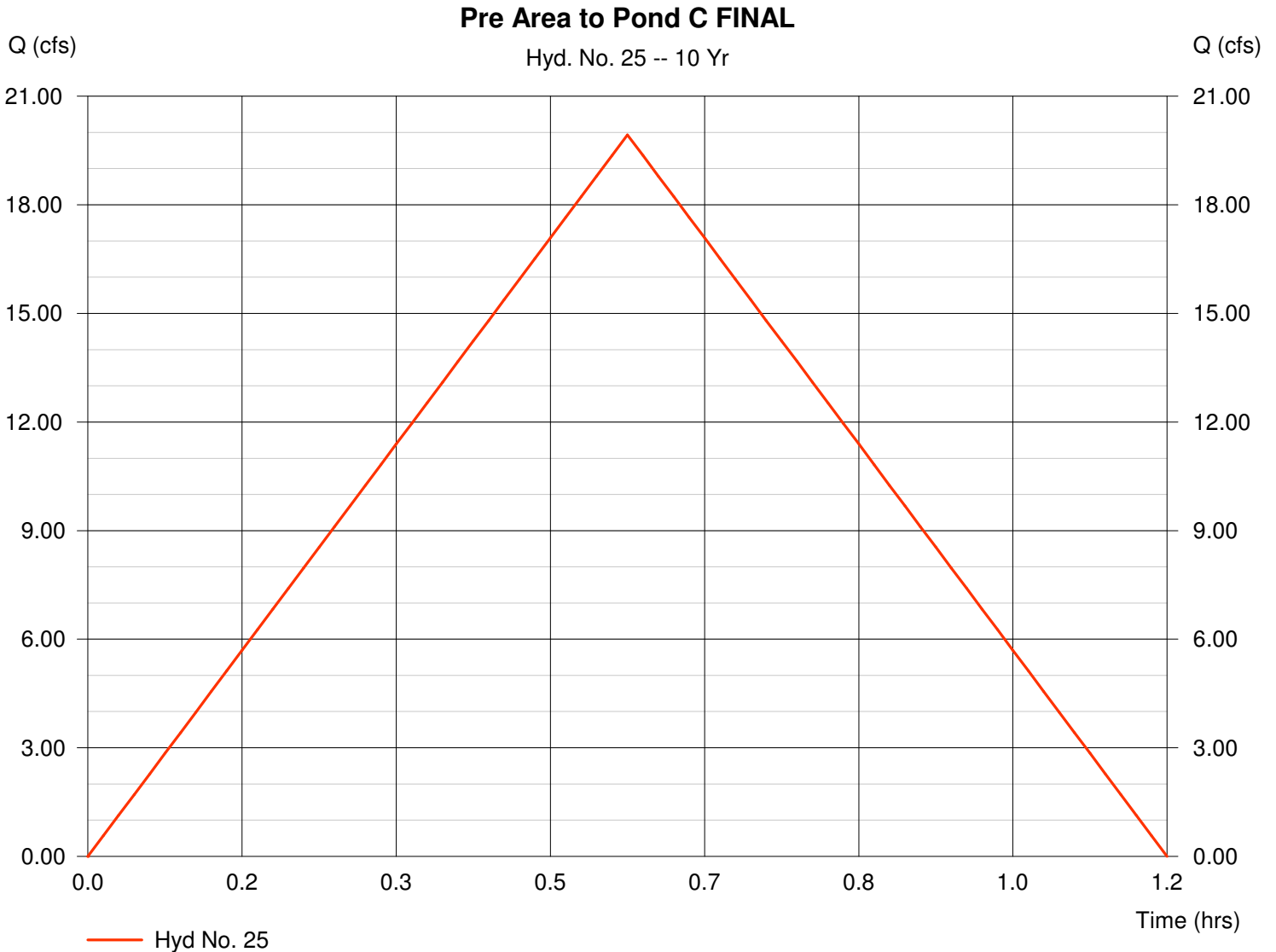
Hyd. No. 25

Pre Area to Pond C FINAL

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 18.000 ac
Intensity = 3.461 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 19.93 cfs
Time interval = 1 min
Runoff coeff. = 0.32
Tc by User = 35.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 0.961 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

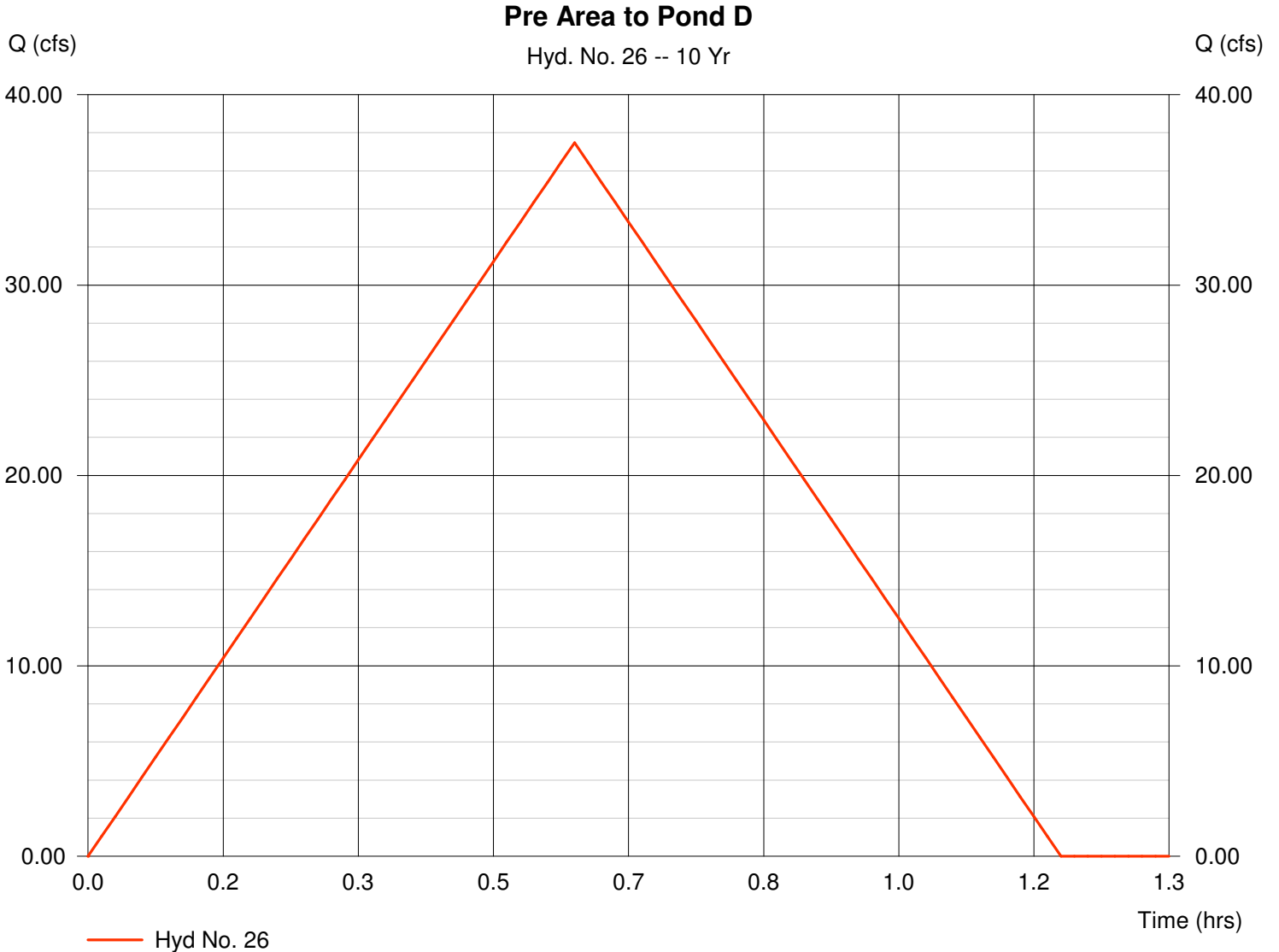
Hyd. No. 26

Pre Area to Pond D

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 22.000 ac
Intensity = 3.407 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 37.48 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 36.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1.859 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:8 PM

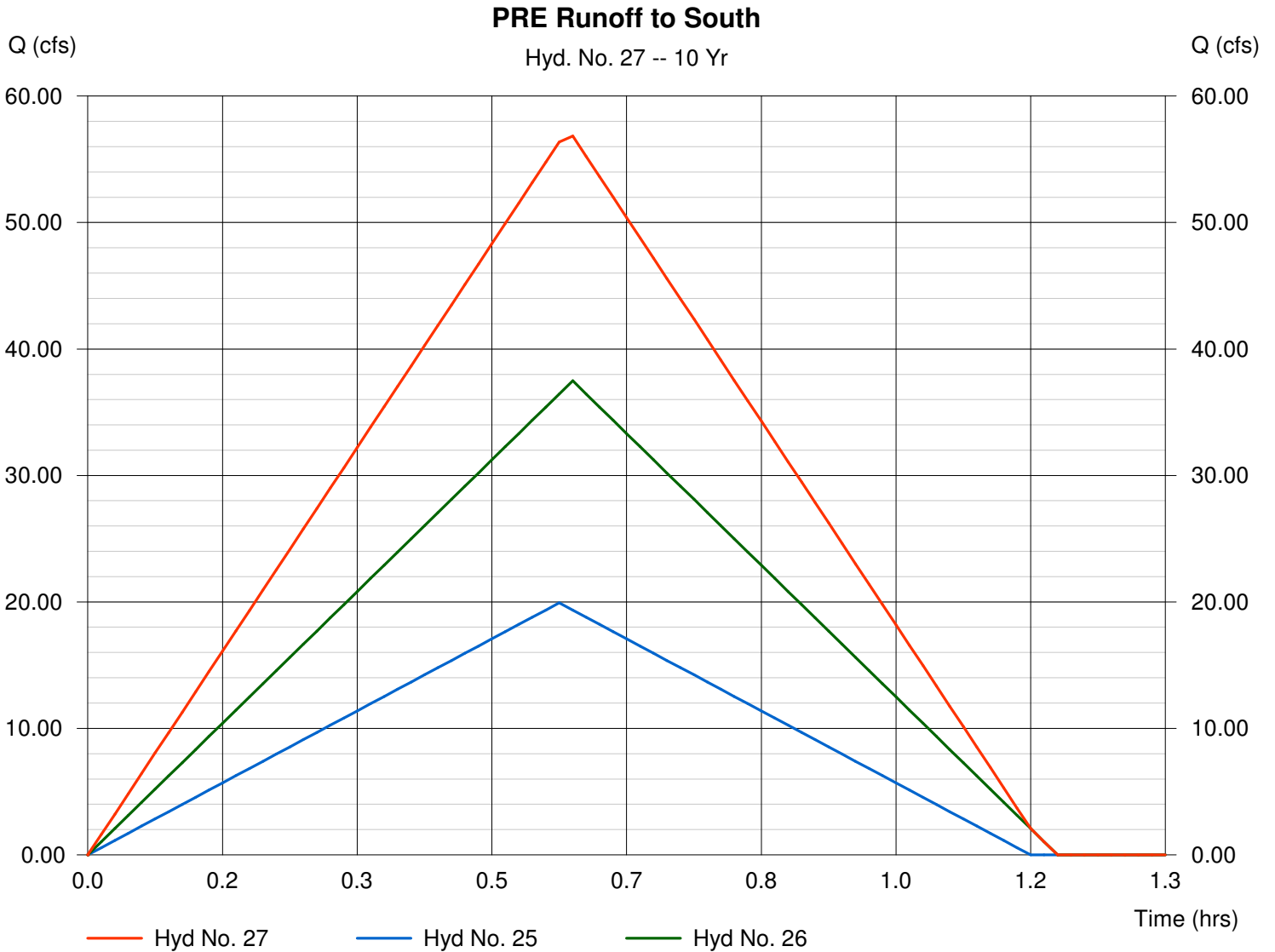
Hyd. No. 27

PRE Runoff to South

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

Peak discharge = 56.84 cfs
Time interval = 1 min

Hydrograph Volume = 2.819 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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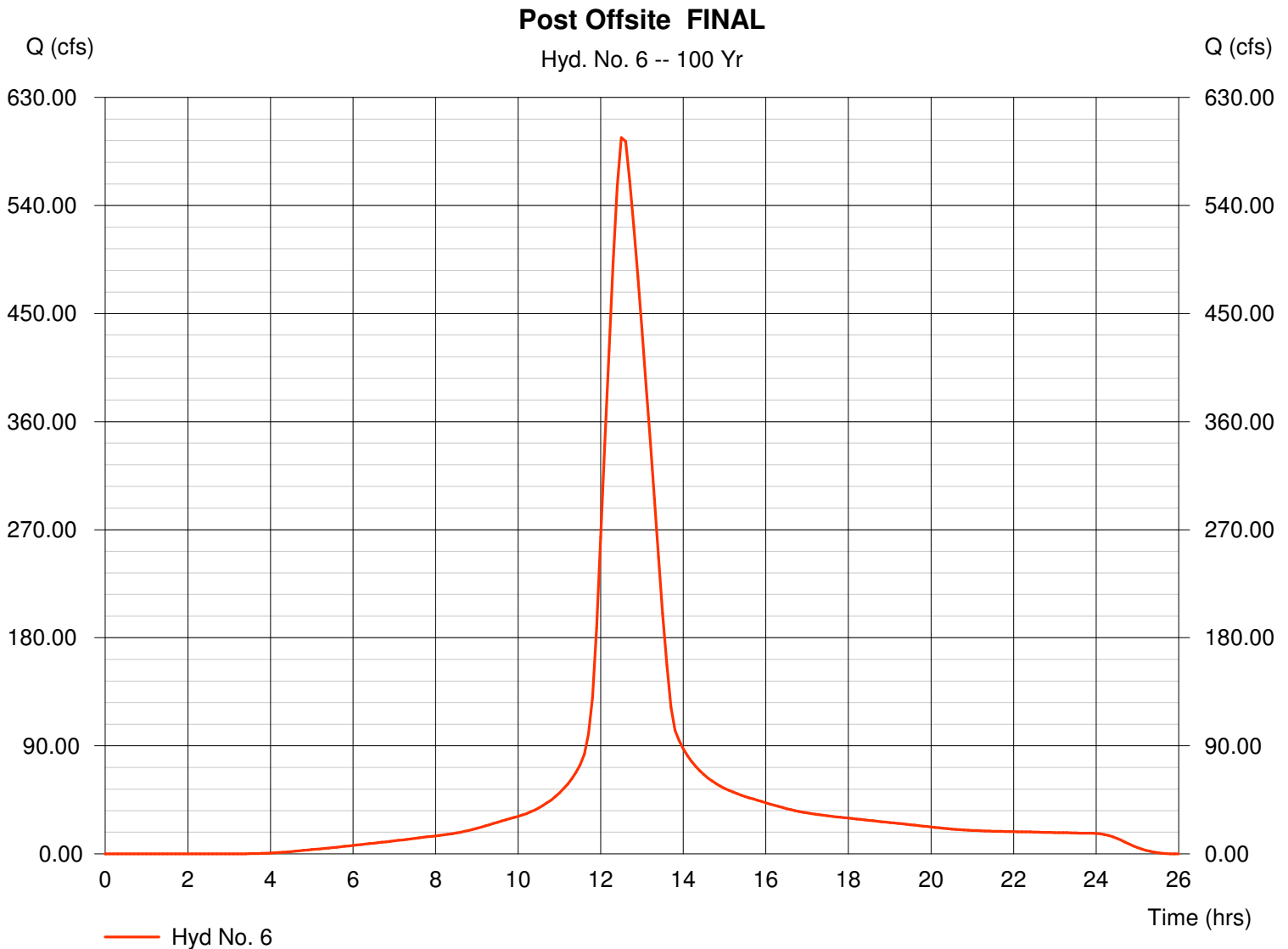
Hyd. No. 6

Post Offsite FINAL

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 191.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 596.66 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 7000 ft
Time of conc. (Tc) = 61.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 103.245 acft



Hydrograph Plot

Hyd. No. 7

Post Onsite - area to stream

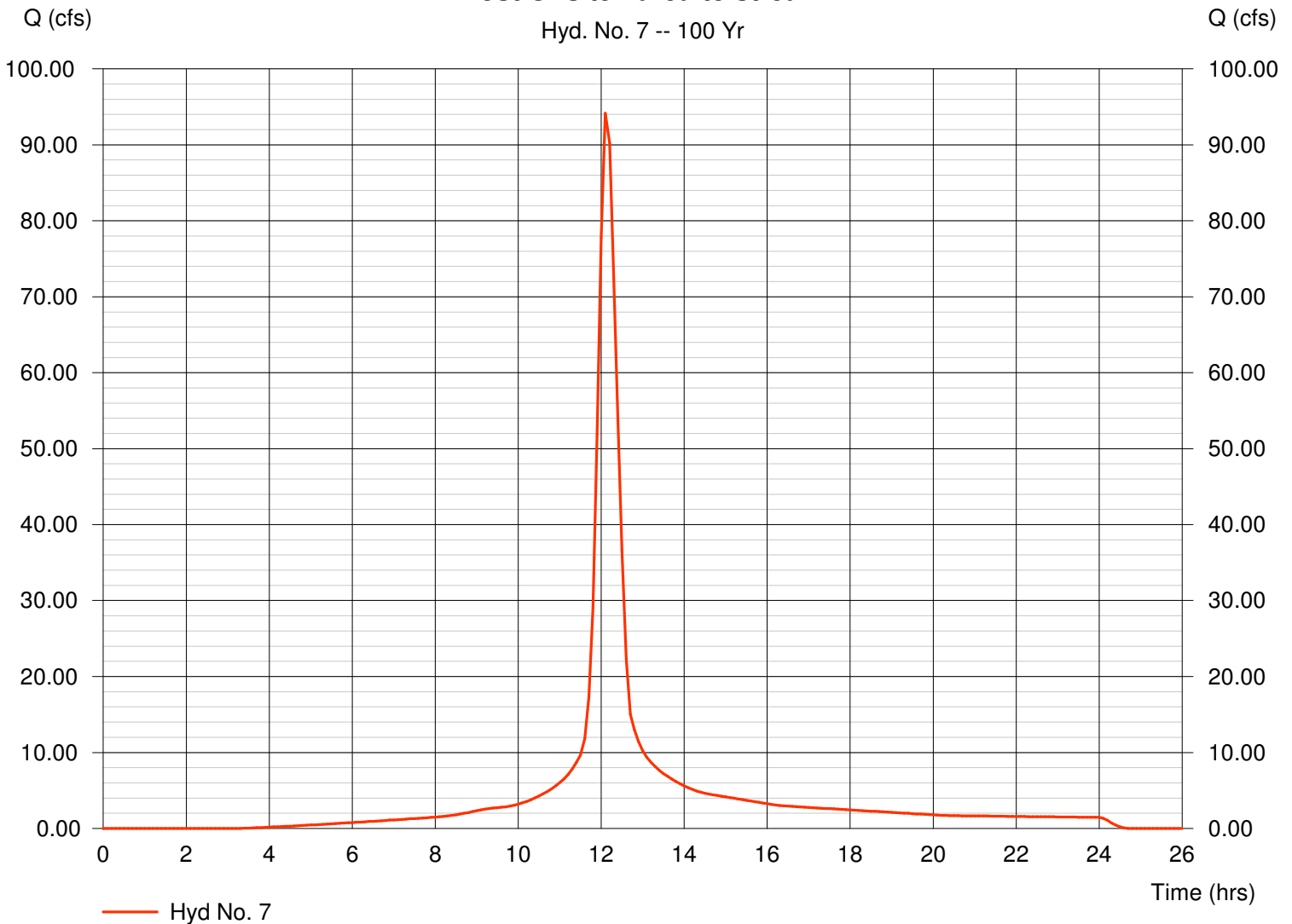
Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 17.000 ac
Basin Slope = 0.2 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 94.15 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 461 ft
Time of conc. (Tc) = 21.90 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 9.028 acft

Post Onsite - area to stream

Hyd. No. 7 -- 100 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Hyd. No. 8

Post On-site area to ponds A & B

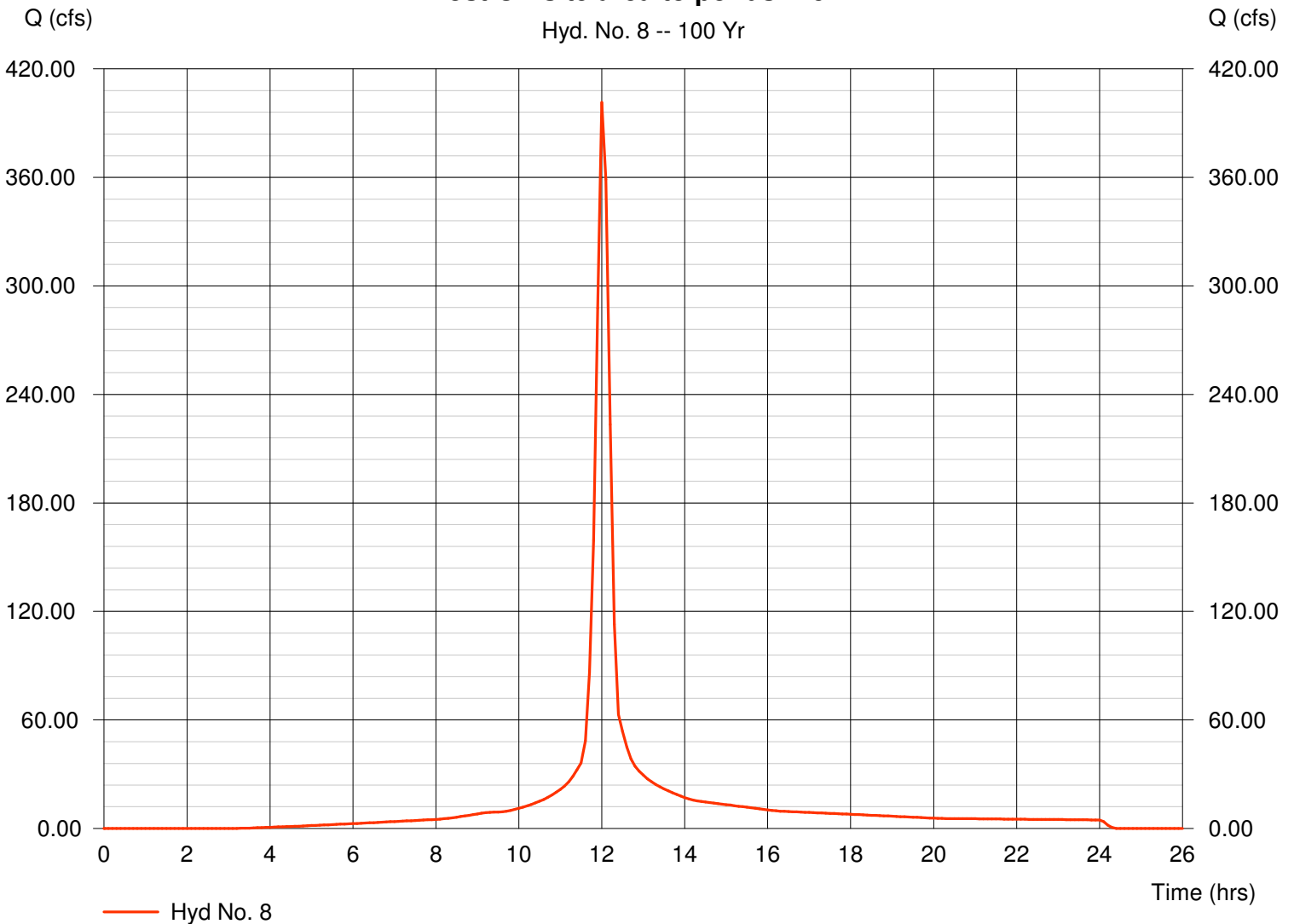
Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 59.000 ac
Basin Slope = 1.5 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 401.48 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 610 ft
Time of conc. (Tc) = 15.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 29.375 acft

Post On-site area to ponds A & B

Hyd. No. 8 -- 100 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Hyd. No. 9

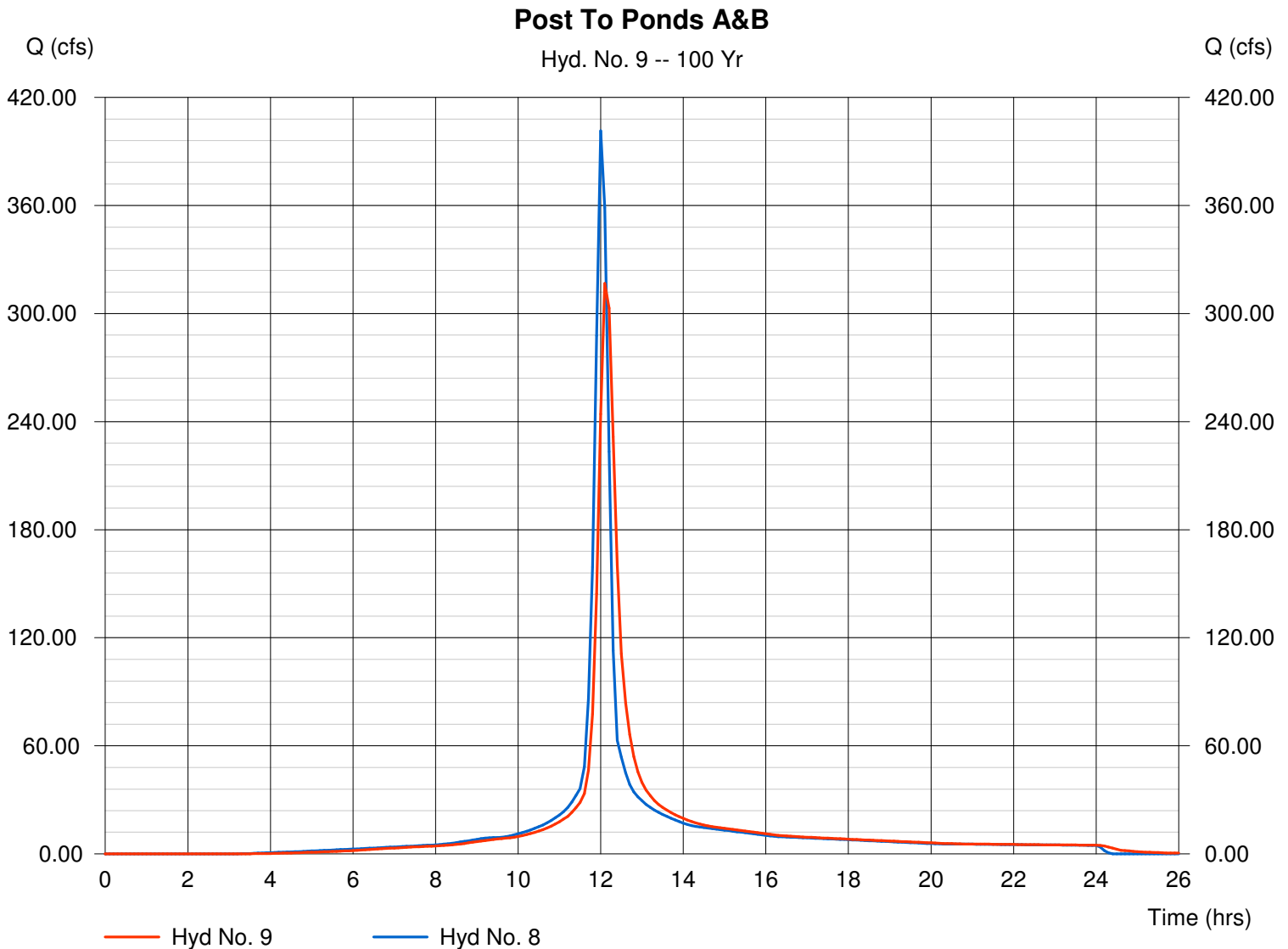
Post To Ponds A&B

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 8
Reservoir name = Ponds A & B

Peak discharge = 316.75 cfs
Time interval = 6 min
Max. Elevation = 1355.03 ft
Max. Storage = 4.653 acft

Storage Indication method used.

Hydrograph Volume = 29.374 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Pond No. 9 - Ponds A & B

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	1352.00	56,228	0.000	0.000
1.00	1353.00	63,009	1.369	1.369
2.00	1354.00	70,098	1.528	2.897
3.00	1355.00	77,436	1.693	4.590
4.00	1356.00	85,001	1.865	6.454
5.00	1357.00	92,780	2.041	8.495
6.00	1358.00	103,774	2.256	10.751
7.00	1359.00	108,987	2.442	13.193

Culvert / Orifice Structures

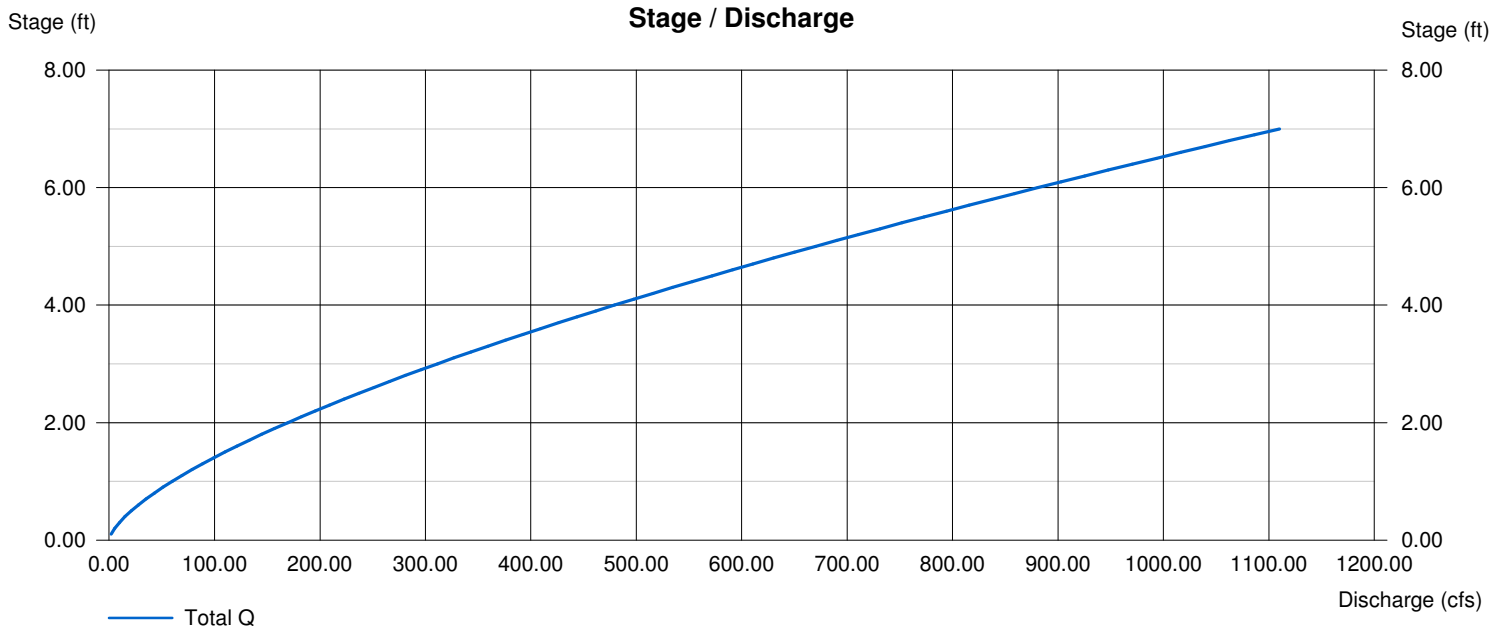
	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 18.00	0.00	0.00	0.00
Crest El. (ft)	= 1352.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	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.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Hyd. No. 10

POST Runoff to the West

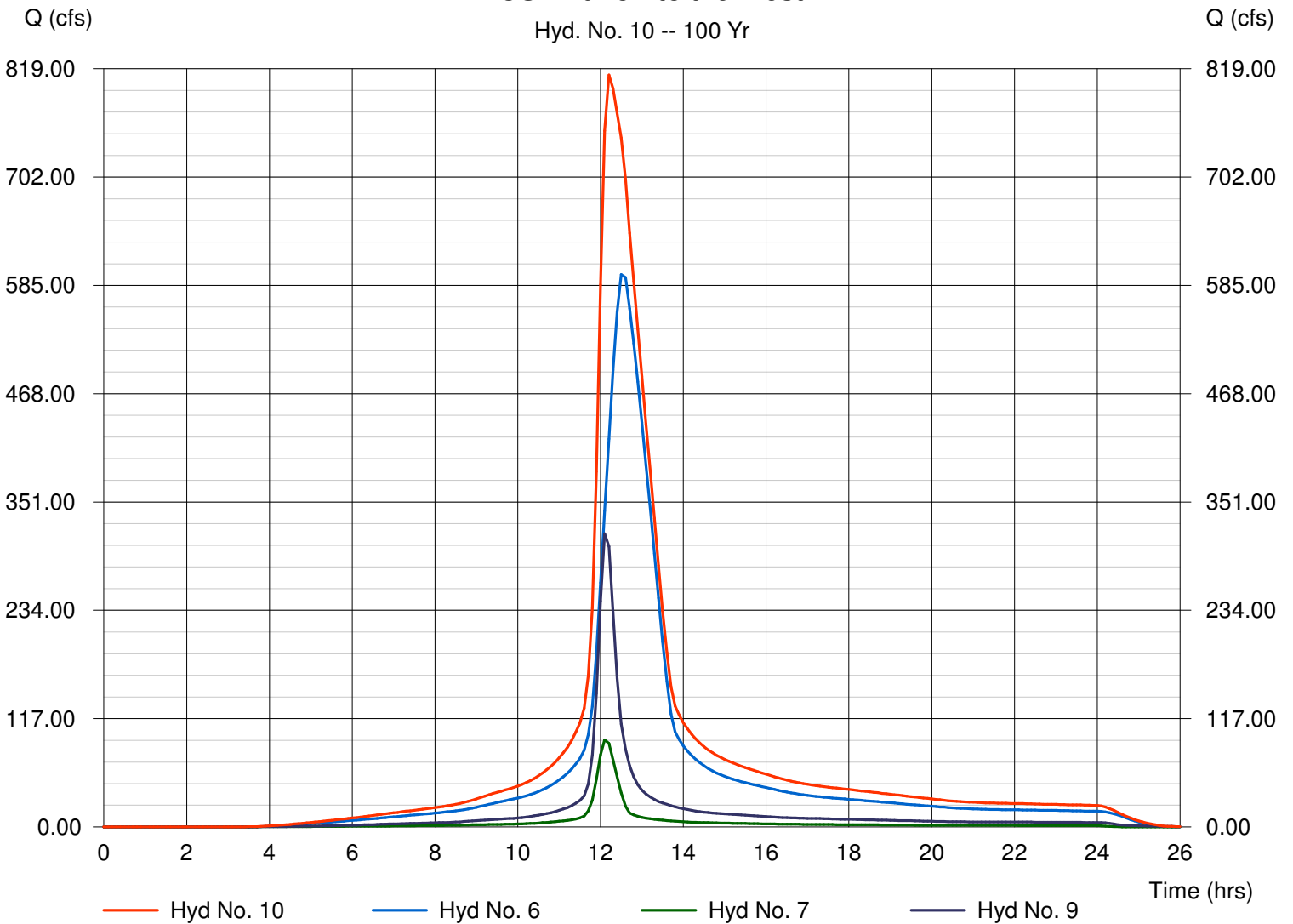
Hydrograph type = Combine
Storm frequency = 100 yrs
Inflow hyds. = 6, 7, 9

Peak discharge = 812.41 cfs
Time interval = 6 min

Hydrograph Volume = 141.647 acft

POST Runoff to the West

Hyd. No. 10 -- 100 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

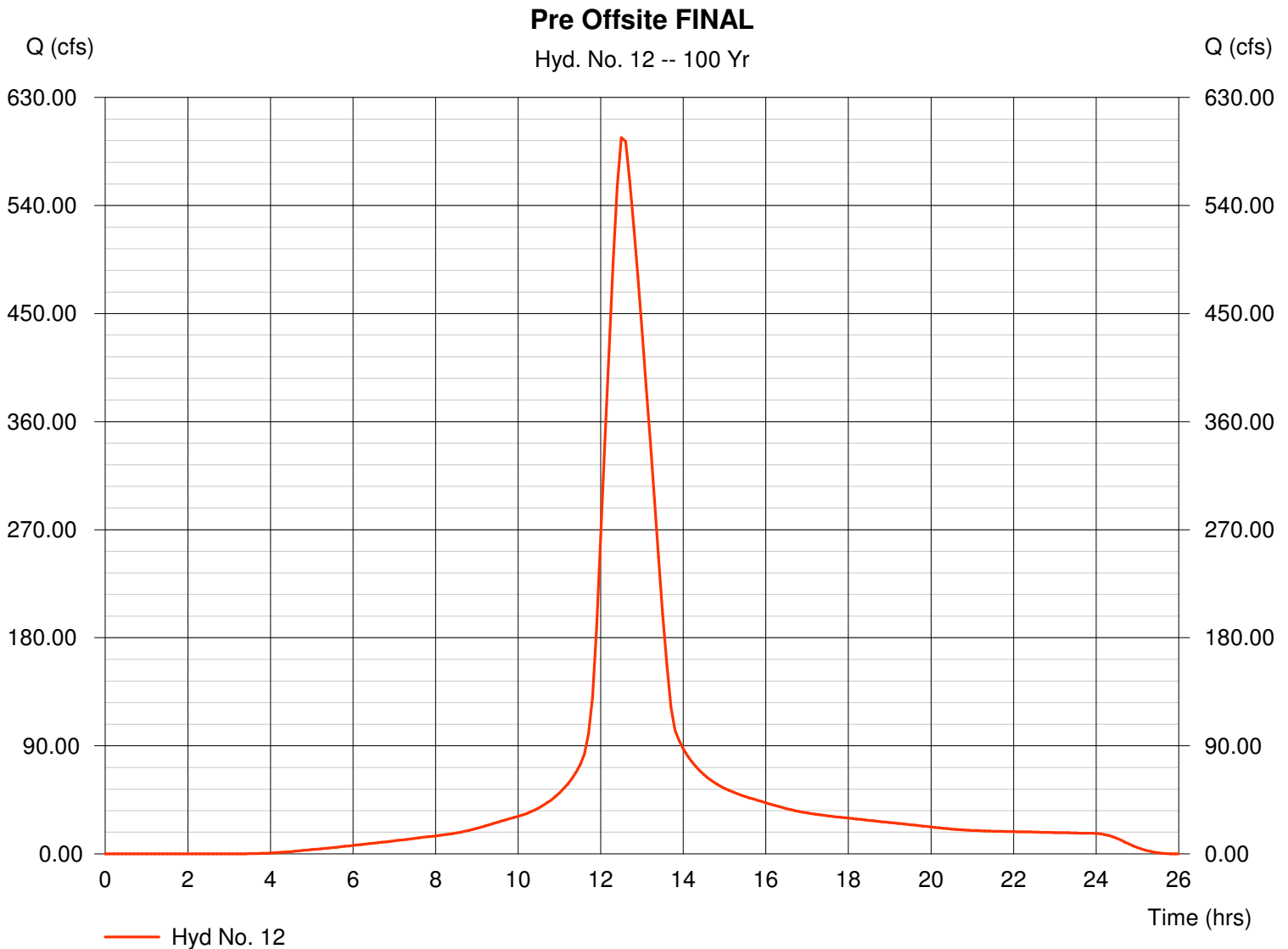
Hyd. No. 12

Pre Offsite FINAL

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 191.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 596.66 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 7000 ft
Time of conc. (Tc) = 61.00 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 103.245 acft



Hydrograph Plot

Hyd. No. 13

Pre Onsite - area to stream

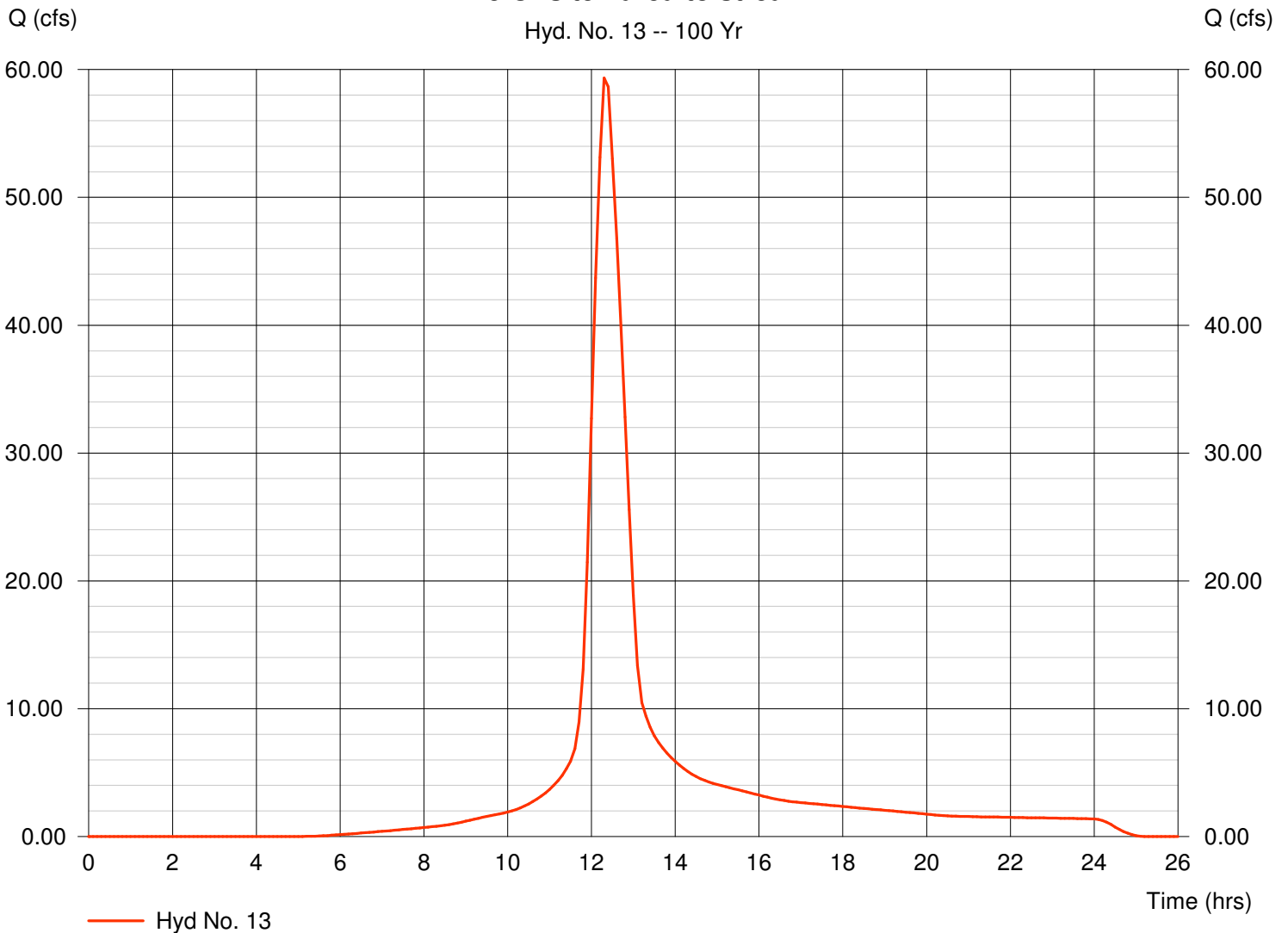
Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 17.000 ac
Basin Slope = 0.4 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 59.33 cfs
Time interval = 6 min
Curve number = 81
Hydraulic length = 2348 ft
Time of conc. (Tc) = 49.80 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 7.671 acft

Pre Onsite - area to stream

Hyd. No. 13 -- 100 Yr



Hydrograph Plot

Hyd. No. 14

Pre On-site area to ponds A & B

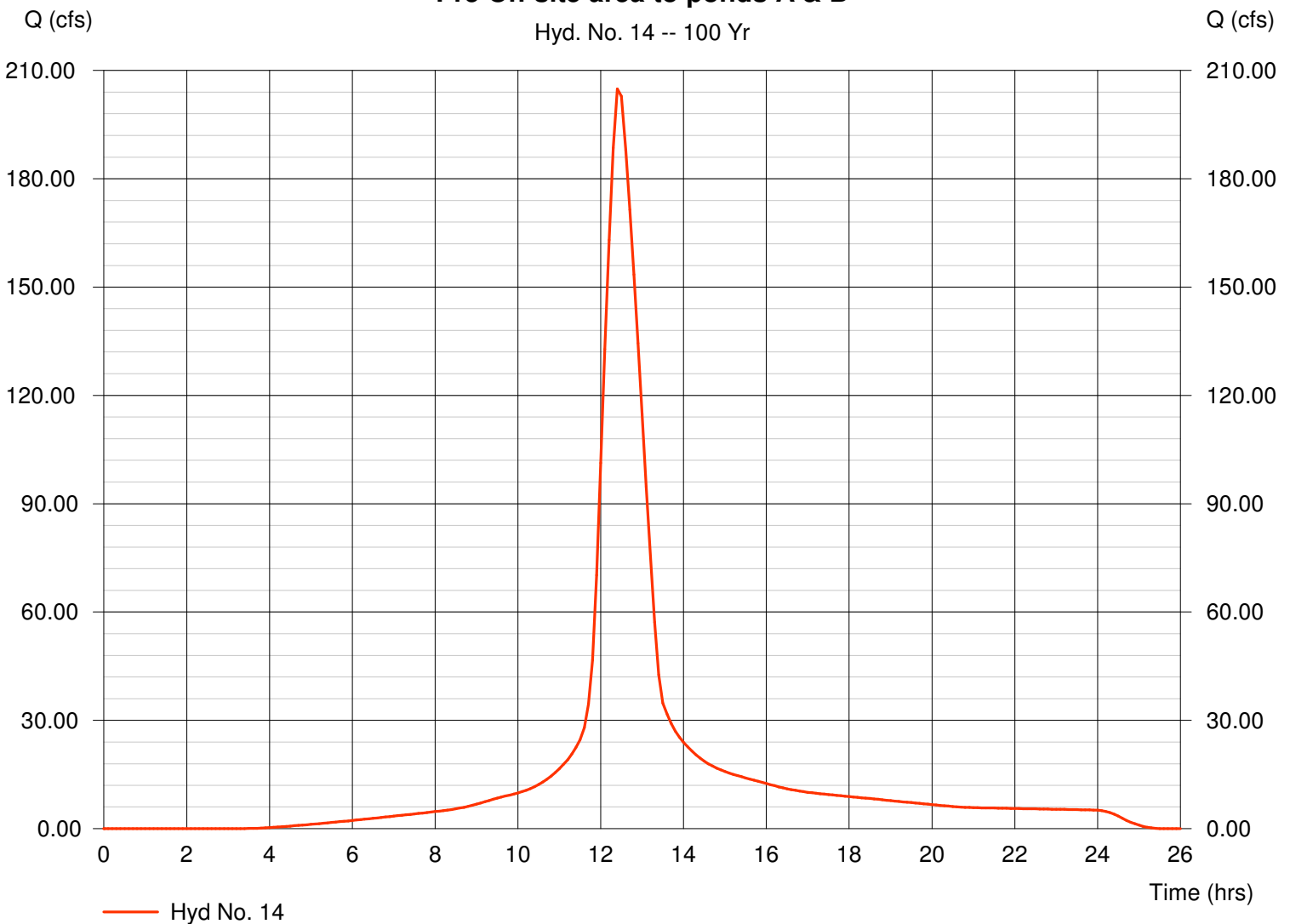
Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Drainage area = 59.000 ac
Basin Slope = 0.7 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 204.89 cfs
Time interval = 6 min
Curve number = 88
Hydraulic length = 4203 ft
Time of conc. (Tc) = 56.10 min
Distribution = Type II
Shape factor = 484

Hydrograph Volume = 31.333 acft

Pre On-site area to ponds A & B

Hyd. No. 14 -- 100 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Hyd. No. 15

PRE Runoff to the West

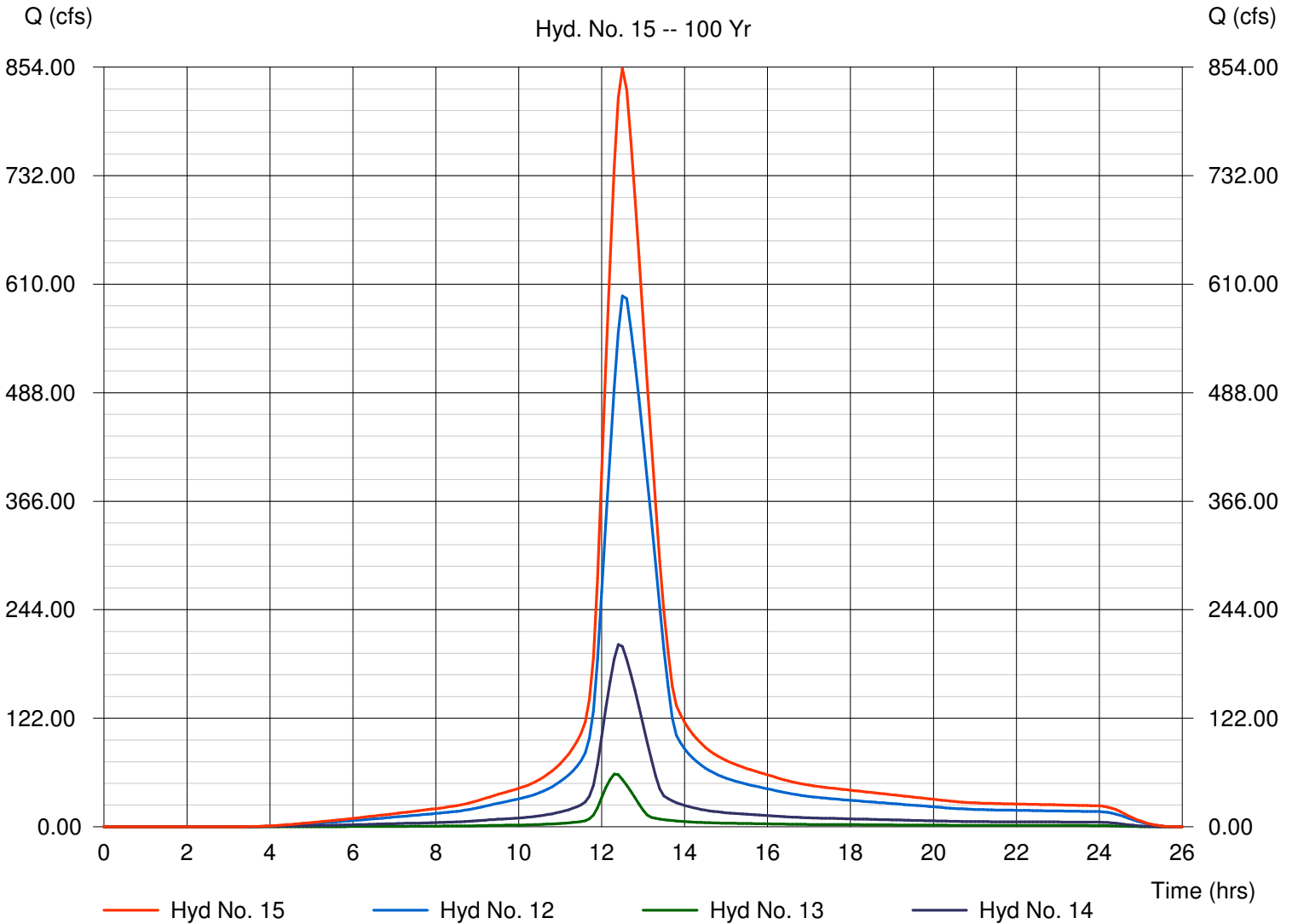
Hydrograph type = Combine
Storm frequency = 100 yrs
Inflow hyds. = 12, 13, 14

Peak discharge = 852.54 cfs
Time interval = 6 min

Hydrograph Volume = 142.249 acft

PRE Runoff to the West

Hyd. No. 15 -- 100 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

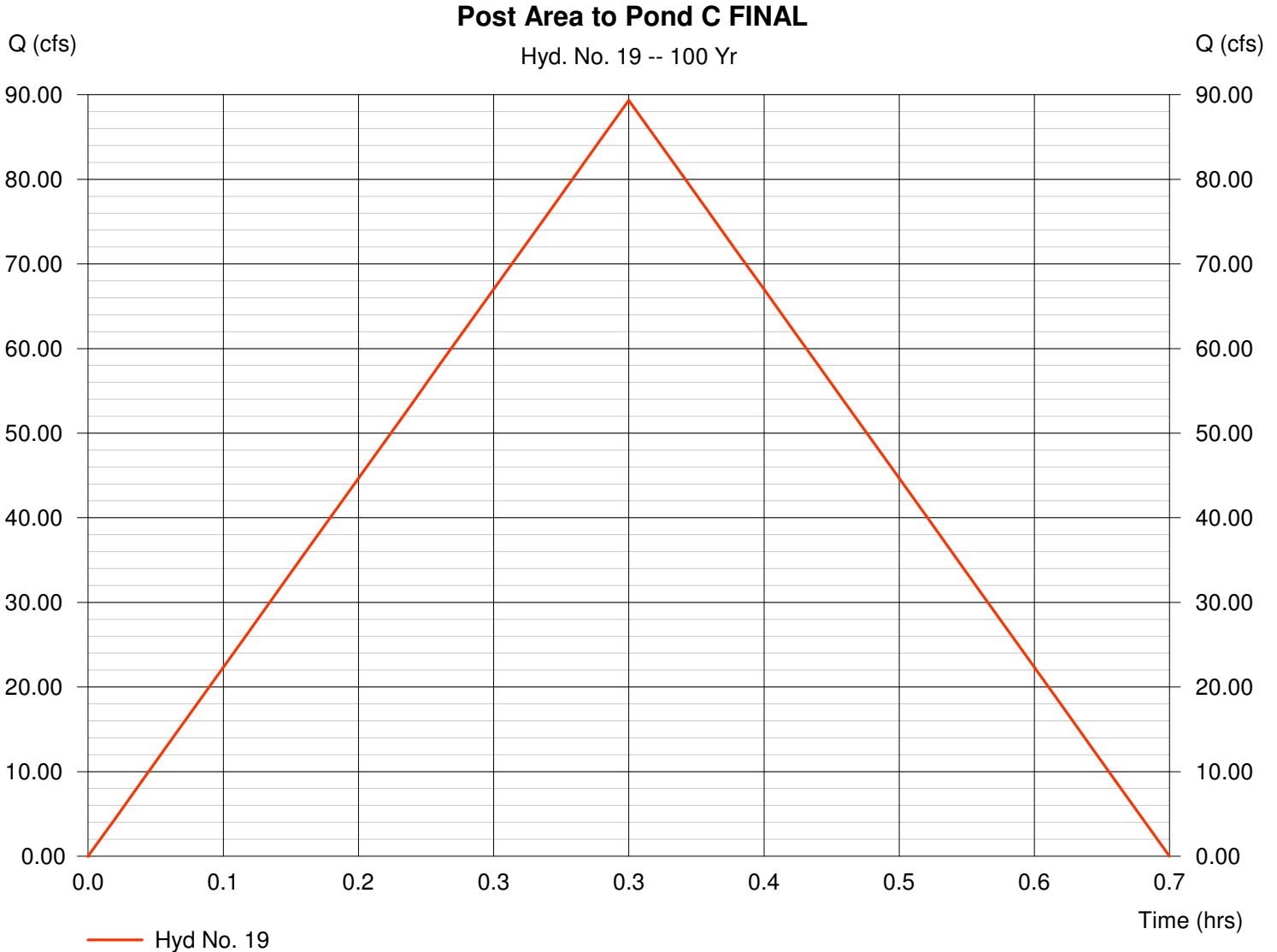
Hyd. No. 19

Post Area to Pond C FINAL

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 18.000 ac
Intensity = 6.530 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 89.33 cfs
Time interval = 1 min
Runoff coeff. = 0.76
Tc by User = 20.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2.461 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Hyd. No. 20

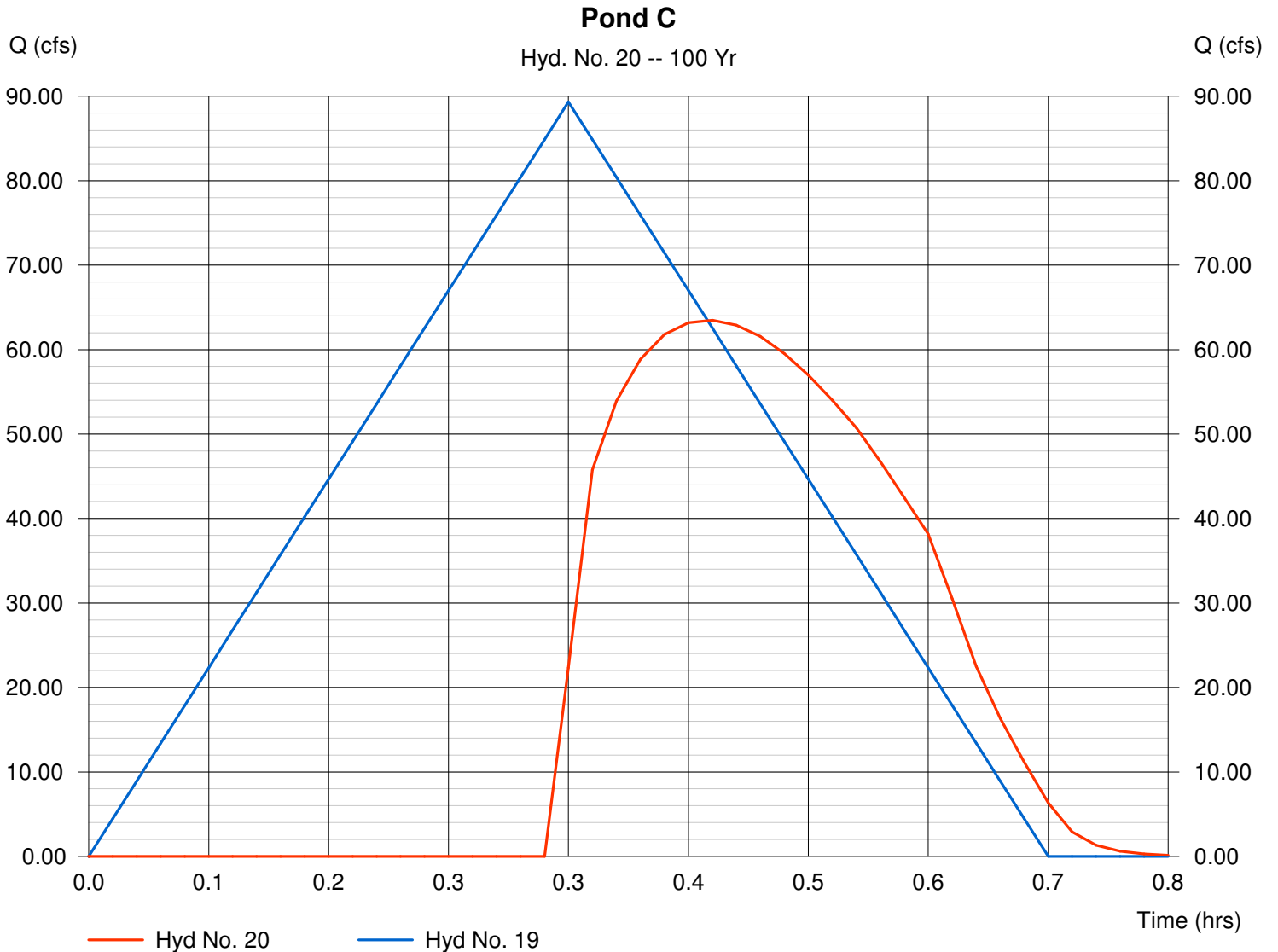
Pond C

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 19
Reservoir name = Pond C2

Peak discharge = 63.49 cfs
Time interval = 1 min
Max. Elevation = 1358.32 ft
Max. Storage = 1.393 acft

Storage Indication method used.

Hydrograph Volume = 1.287 acft



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Pond No. 11 - Pond C2

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	1356.00	22,938	0.000	0.000
1.00	1357.00	25,532	0.556	0.556
2.00	1358.00	28,233	0.617	1.173
3.00	1359.00	31,037	0.680	1.854

Culvert / Orifice Structures

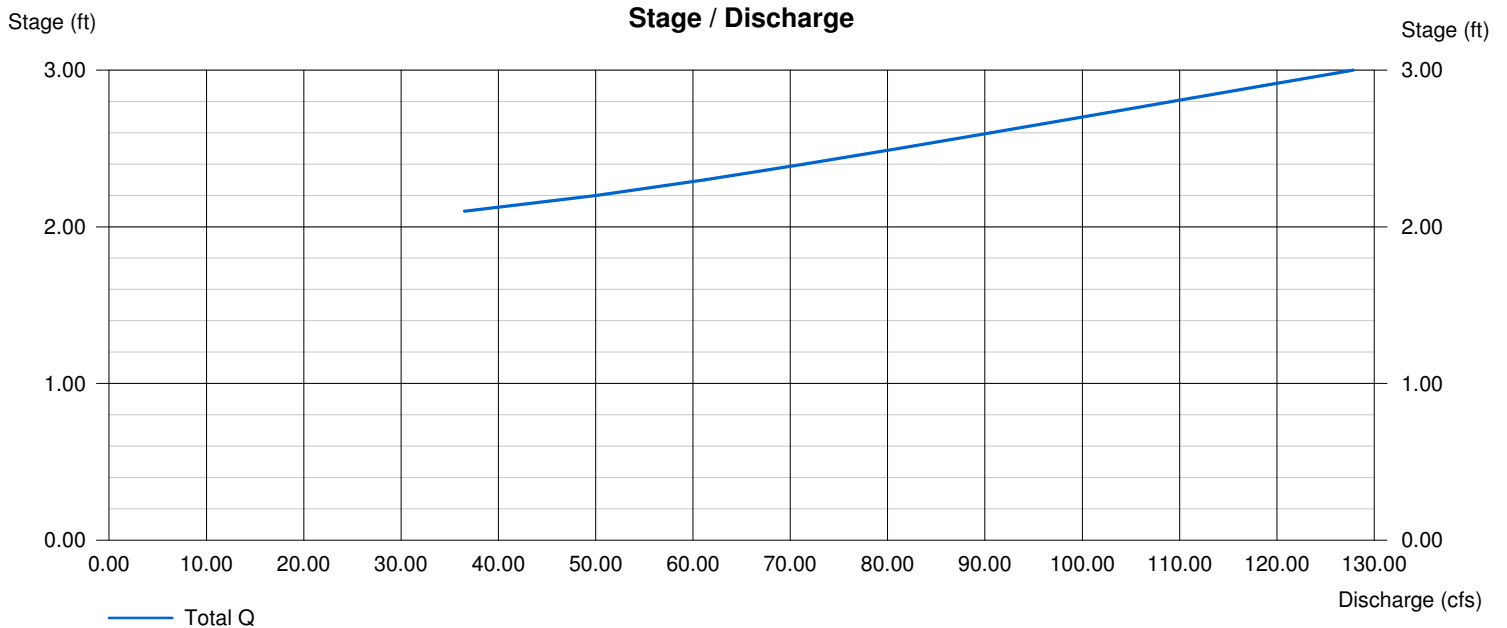
	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 10.00	0.00	0.00	0.00
Crest El. (ft)	= 1356.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

Exfiltration = 0.000 in/hr (Contour) Tailwater Elev. = 1358.00 ft

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



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Hyd. No. 21

Post Area to Pond D

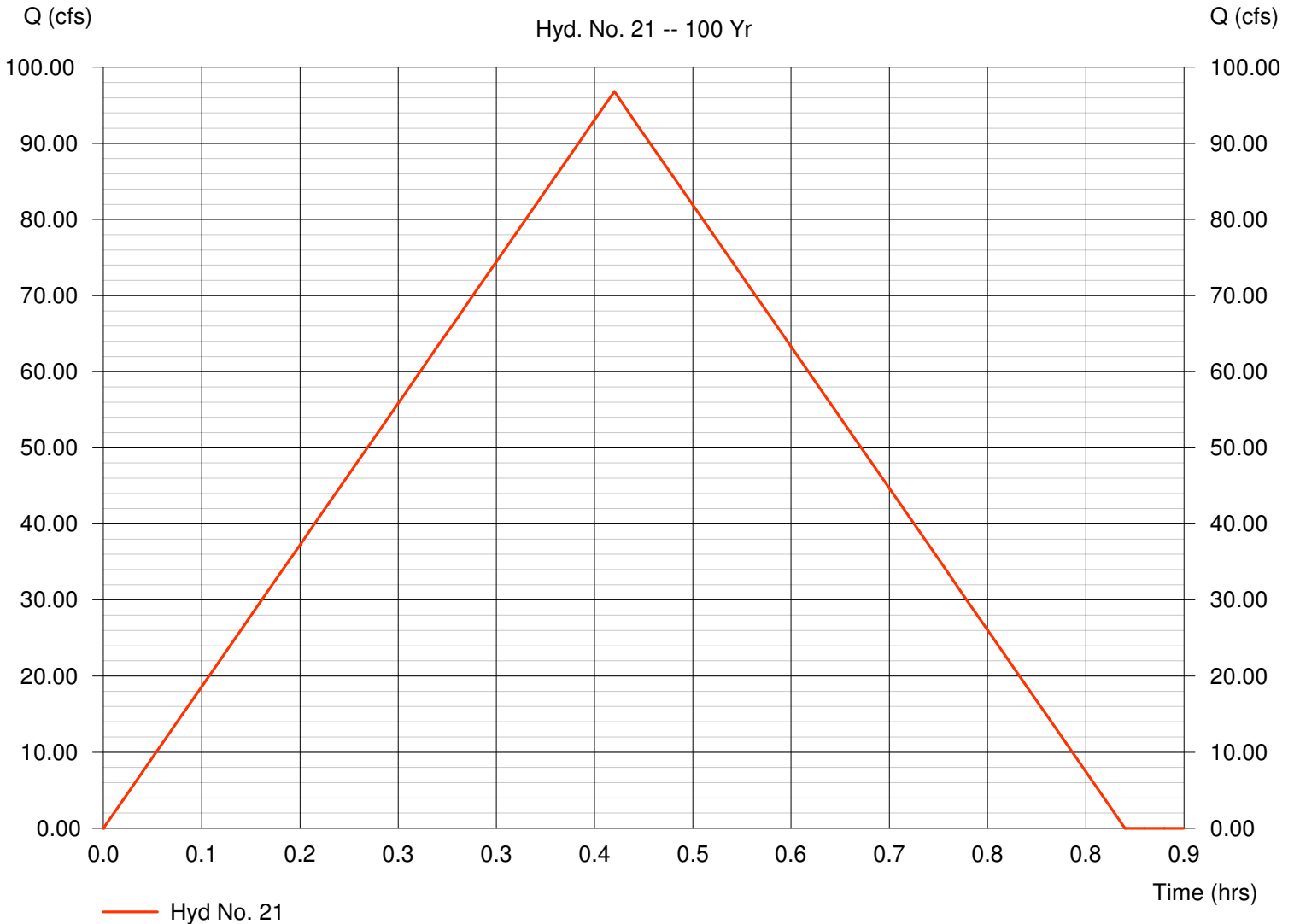
Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 22.000 ac
Intensity = 5.789 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 96.80 cfs
Time interval = 1 min
Runoff coeff. = 0.76
Tc by User = 26.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 3.467 acft

Post Area to Pond D

Hyd. No. 21 -- 100 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Hyd. No. 22

Area to Pond D and flow from Pond C

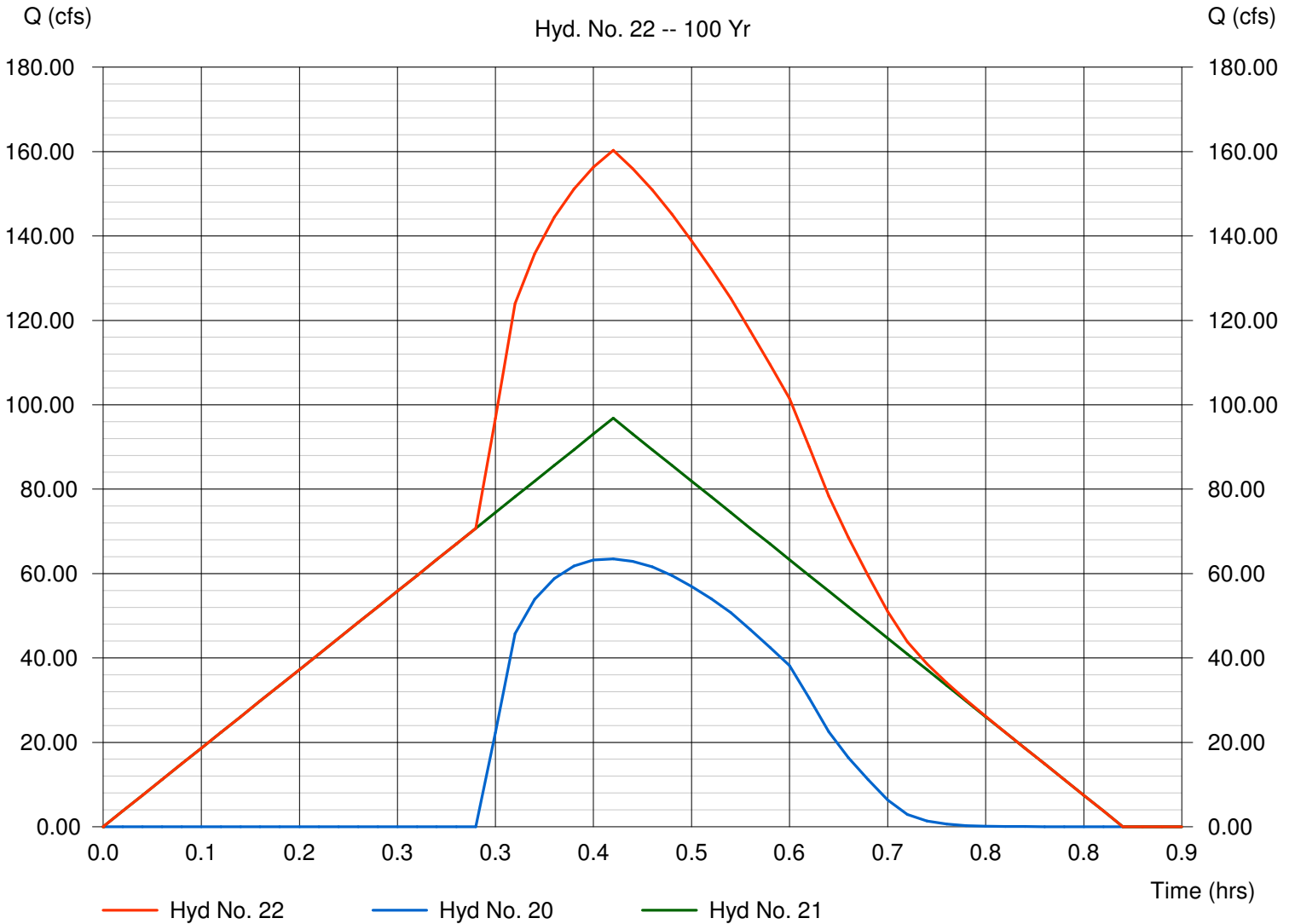
Hydrograph type = Combine
Storm frequency = 100 yrs
Inflow hyds. = 20, 21

Peak discharge = 160.28 cfs
Time interval = 1 min

Hydrograph Volume = 4.754 acft

Area to Pond D and flow from Pond C

Hyd. No. 22 -- 100 Yr



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Hyd. No. 23

POST Runoff to South

Hydrograph type = Reservoir
Storm frequency = 100 yrs
Inflow hyd. No. = 22
Reservoir name = Pond D2

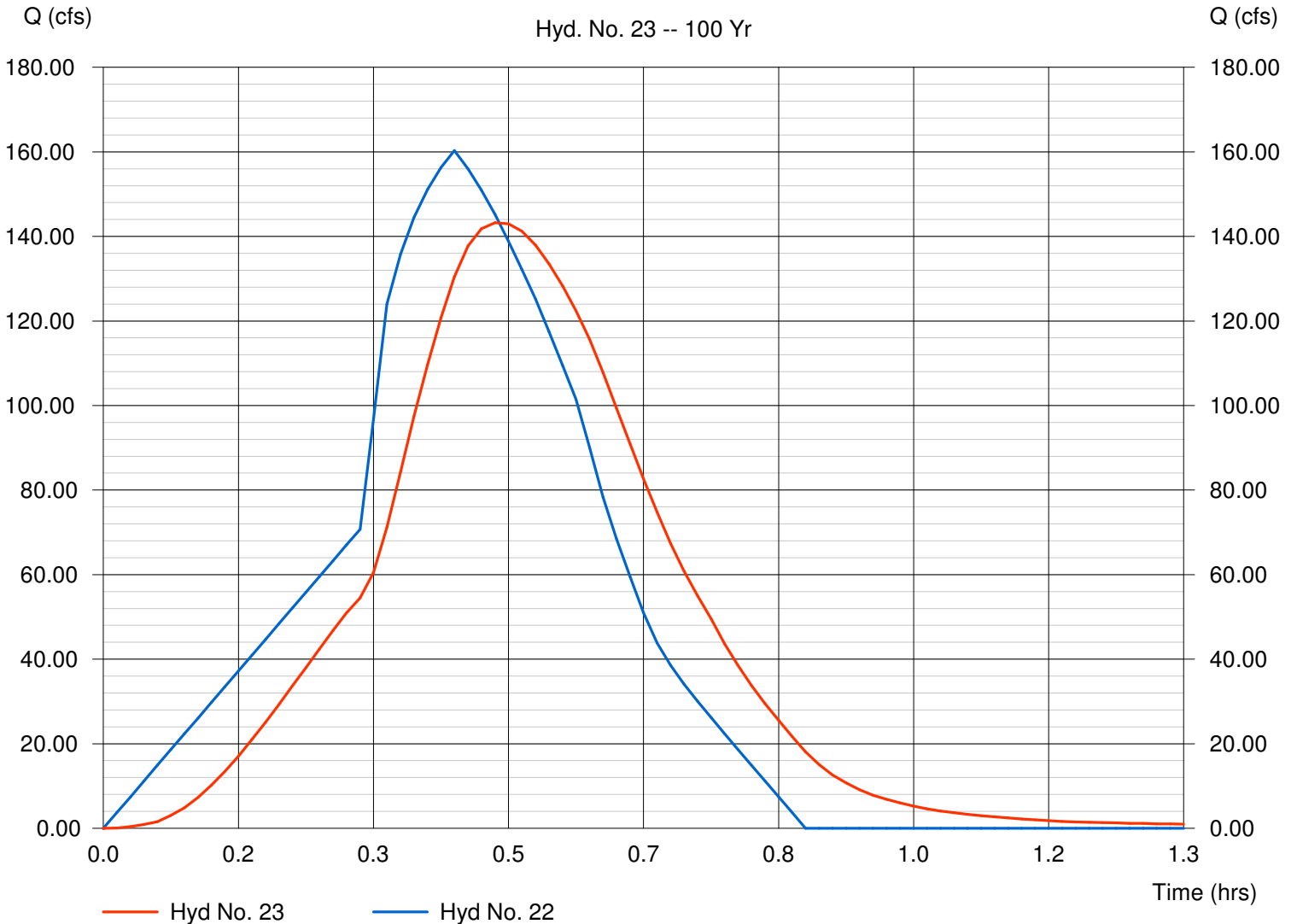
Peak discharge = 143.26 cfs
Time interval = 1 min
Max. Elevation = 1357.02 ft
Max. Storage = 0.867 acft

Storage Indication method used.

Hydrograph Volume = 4.754 acft

POST Runoff to South

Hyd. No. 23 -- 100 Yr



Pond Report

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Pond No. 12 - Pond D2

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	1355.00	14,751	0.000	0.000
1.00	1356.00	18,623	0.383	0.383
2.00	1357.00	22,616	0.473	0.856
3.00	1358.00	26,731	0.566	1.423

Culvert / Orifice Structures

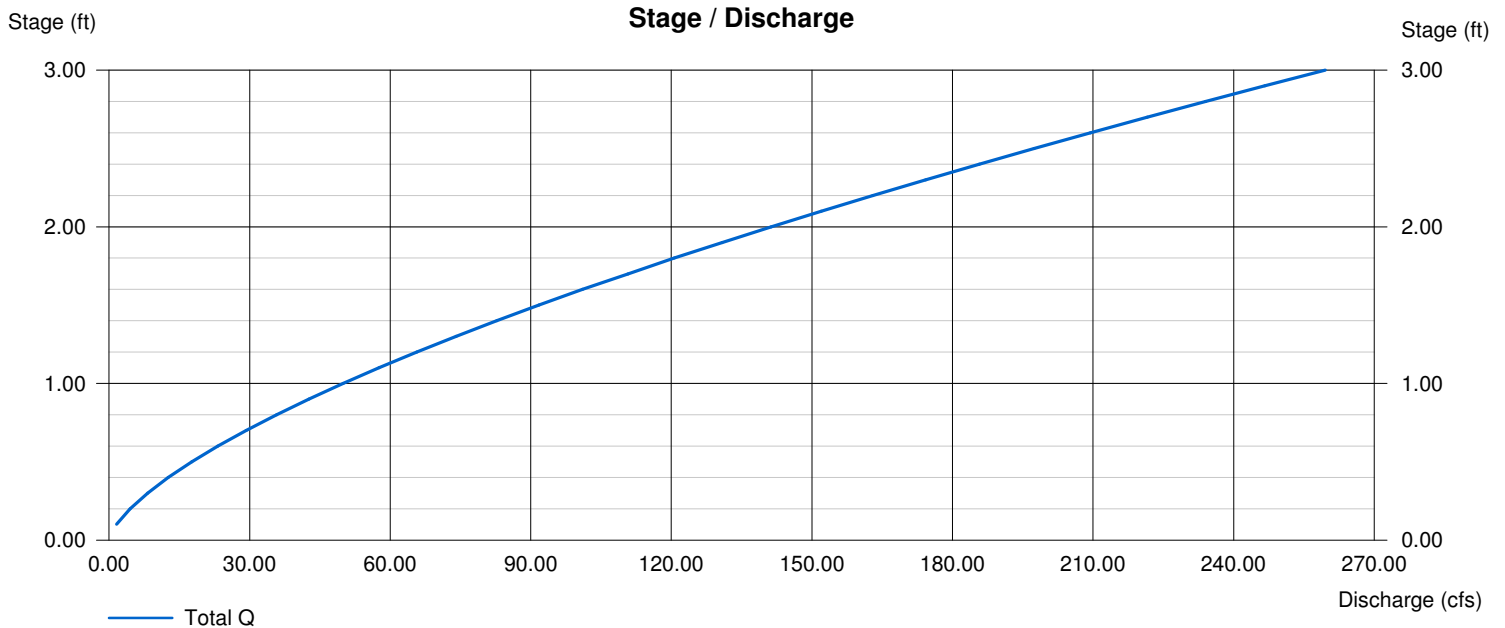
	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .000	.000	.000	.000
Orif. Coeff.	= 0.00	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 15.00	0.00	0.00	0.00
Crest El. (ft)	= 1355.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	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.



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

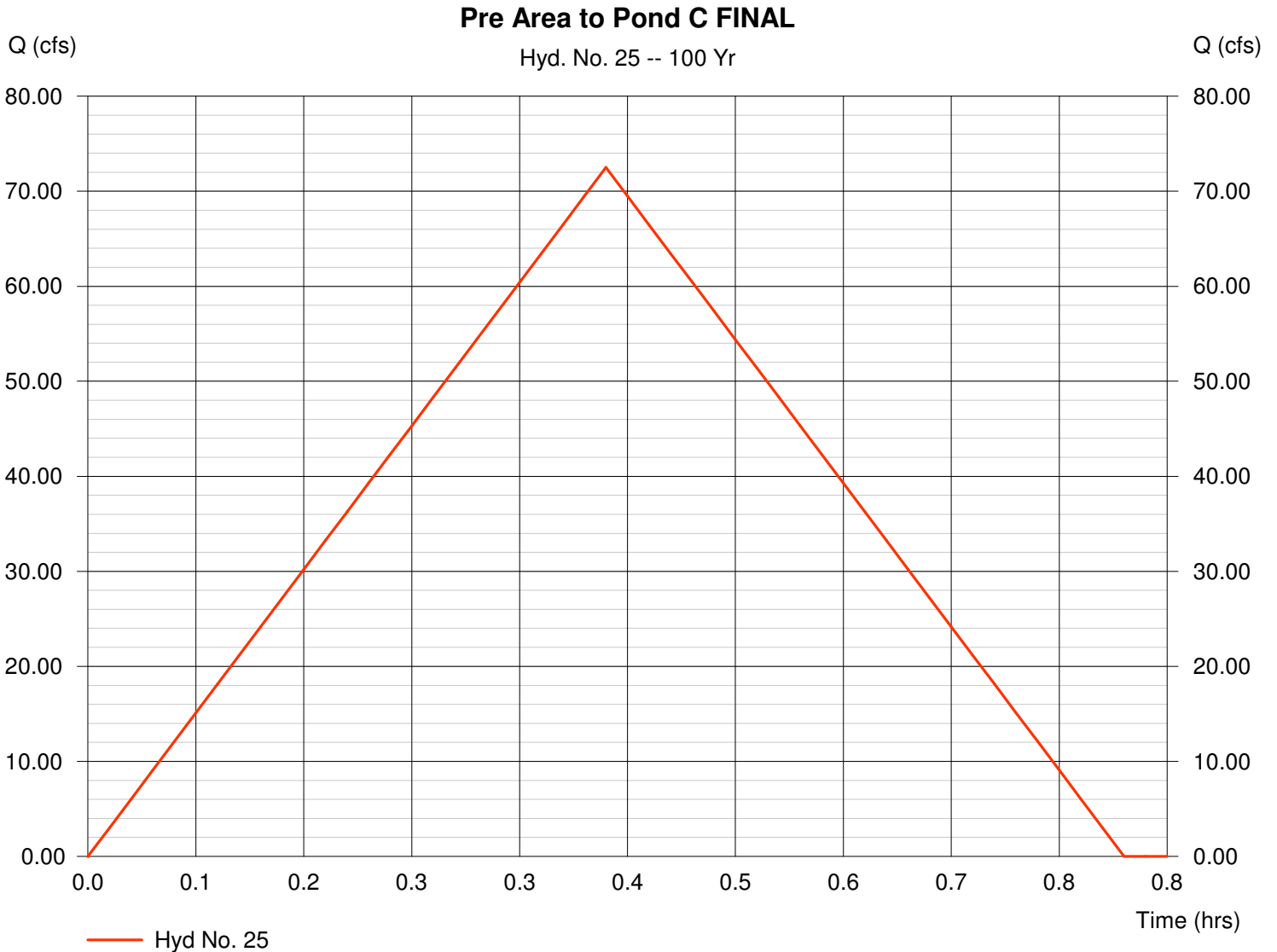
Hyd. No. 25

Pre Area to Pond C FINAL

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 18.000 ac
Intensity = 6.012 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 72.51 cfs
Time interval = 1 min
Runoff coeff. = 0.67
Tc by User = 24.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2.397 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

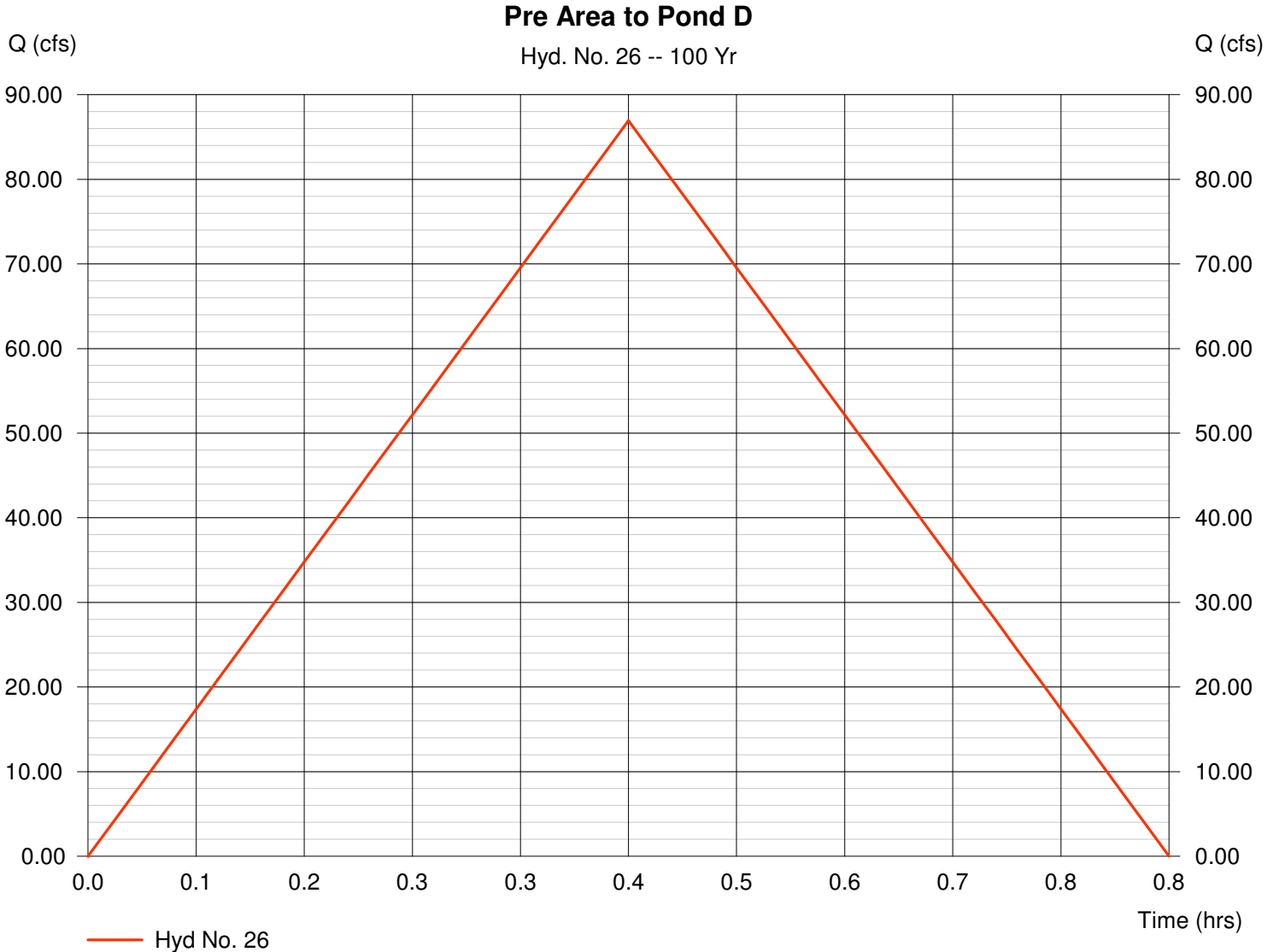
Hyd. No. 26

Pre Area to Pond D

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 22.000 ac
Intensity = 5.898 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 86.94 cfs
Time interval = 1 min
Runoff coeff. = 0.67
Tc by User = 25.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2.994 acft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Nov 20 2006, 3:9 PM

Hyd. No. 27

PRE Runoff to South

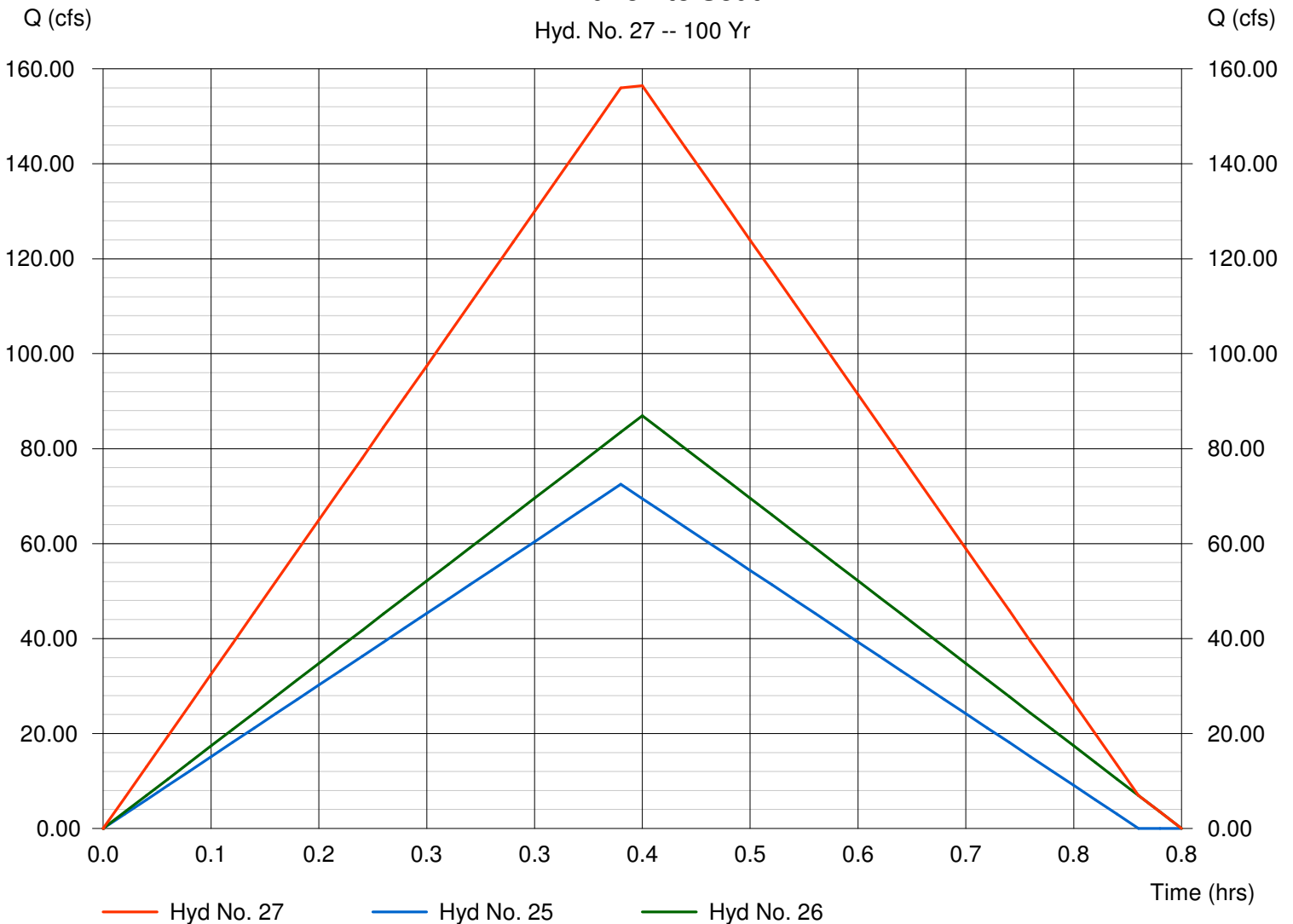
Hydrograph type = Combine
Storm frequency = 100 yrs
Inflow hyds. = 25, 26

Peak discharge = 156.42 cfs
Time interval = 1 min

Hydrograph Volume = 5.391 acft

PRE Runoff to South

Hyd. No. 27 -- 100 Yr



Appendix G
Rational Coefficients and Time of Concentration Calculations

TIME OF CONCENTRATION CALCULATIONS BY THE FAA METHOD

Krug South
Wichita, Kansas

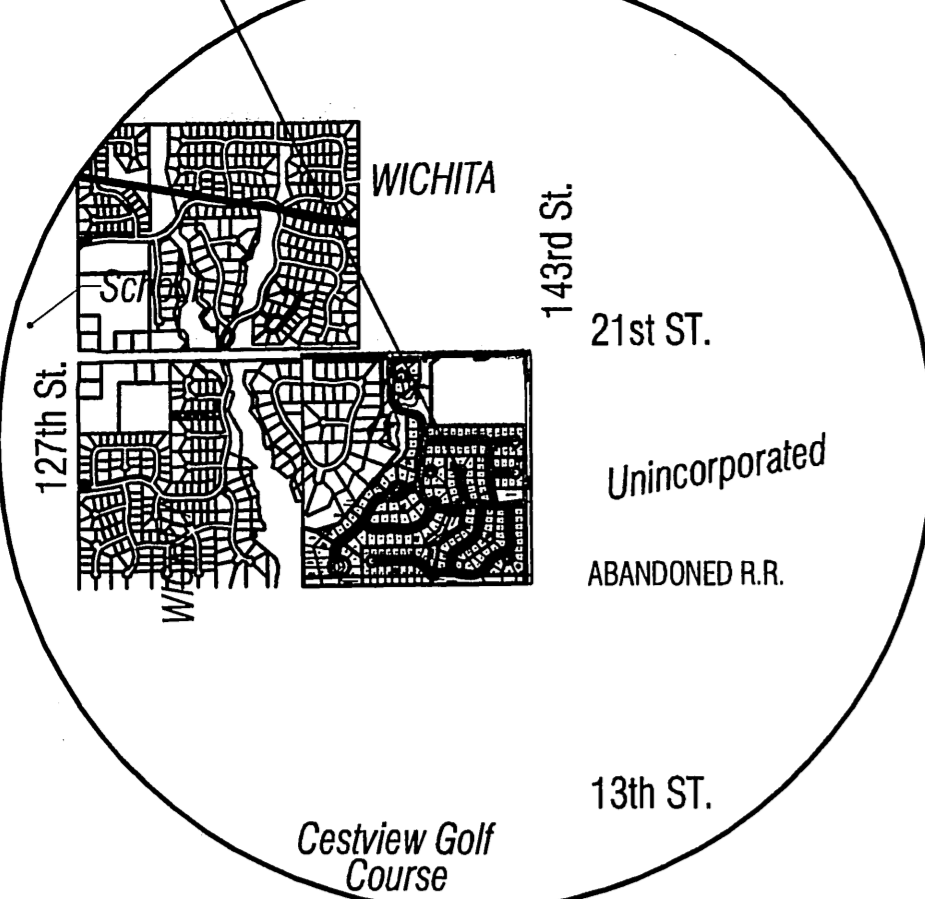
$$T_c = \frac{(1.1-C)L^{1/2}}{100 S^{1/3}}$$

Area Name	Land Use	Soil Group	Maximum Elevation	Minimum Elevation	Length (ft)	Rational Runoff Coefficient, C			Time of Concentration (min.), Tc				
						2-Year	5-Year	10-Year	2-Year	5-Year	10-Year		
BASIN 1													
Pre-Project													
Watershed 1 - to stream	Agricultural - Pasture - Slopes 1-4%	D	1,360	1,350	2,348	0.32	0.37	0.47	0.67	90.4	84.6	73.0	49.8
Watershed 2 - to Ponds A&B	Agricultural - Pasture - Slopes 1-4%	D	1,380	1,350	4,203	0.32	0.37	0.47	0.67	101.8	95.3	82.3	56.1
Pre and Post-project Offiste watershed	Residential - 1/4 Acre	D	1390.0	1340.0	7000	0.47	0.51	0.60	0.74	106.0	100.0	85	61
Post-Project													
Watershed 1 - to stream	Residential - 1/4 Acre	D	1,350	1,349	461	0.50	0.54	0.62	0.76	38.6	36.0	30.9	21.9
Watershed 2 - to Ponds A&B	Residential - 1/4 Acre	D	1,361	1,352	610	0.50	0.54	0.62	0.76	23.4	21.9	18.7	15.0
BASIN 2													
Pre-Project													
Watershed 3 - to Pond C	Agricultural - Pasture - Slopes 1-4%	D	1,375	1,360	1,139	0.32	0.37	0.47	0.67	43.2	40.5	34.9	23.8
Watershed 4 - to Pond D	Agricultural - Pasture - Slopes 1-4%	D	1,365	1,350	1,186	0.32	0.37	0.47	0.67	44.7	41.8	36.1	24.6
Post-Project													
Watershed 3 - to Pond C	Residential - 1/4 Acre	D	1,376	1,361	1,186	0.50	0.54	0.62	0.76	34.4	32.1	27.5	19.5
Watershed 4 - to Pond D	Residential - 1/4 Acre	D	1,366	1,360	1,134	0.50	0.54	0.62	0.76	45.0	42.0	36.0	25.5

Appendix H
Grading Plan

Appendix I
Utility Plan

PLAT LOCATION



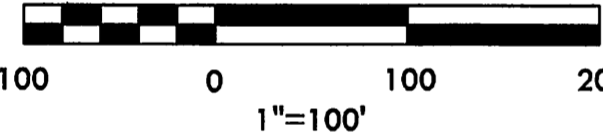
VICINITY MAP

LEGEND

- CONIFEROUS TREE
- DECIDUOUS TREE
- SIGN
- POWER POLE
- ELECTRIC BOX
- LIGHT POLE
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- SECTION CORNER
- BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UNDERGROUND ELEC.
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE

LEGAL DESCRIPTION

A tract of land located in the Northeast One-Quarter of Section 11, Township 27 South, Range 2 East of the Sixth Principal Meridian, Sedgwick County, Kansas and being more particularly described as follows: COMMENCING at the Northeast corner of said Northeast One-Quarter, thence along the East line of said Northeast One-Quarter, on a Kansas coordinate system 1983 south zone bearing of S00°32'00", a distance of 850.00 feet to the POINT OF BEGINNING; thence continuing south on said East line, S00°33'20", a distance of 181.132 feet to the Southeast corner of said Northeast One-Quarter; thence along the south line of said Northeast One-Quarter, S88°39'21"W, a distance of 2643.28 feet to the Southwest corner of said Northeast One-Quarter; thence along the west line of said Northeast One-Quarter, N00°57'48"W, a distance of 665.78 feet to a point on a southerly line of Reeds Cove 3rd Addition, Wichita, Sedgwick County, Kansas, as recorded on DCC# PLM-PG# 28373853 in the Sedgwick County Register of Deeds office; thence along the southerly and easterly lines of said addition through the following seven courses: S77°31'17"E, a distance of 149.26 feet; N73°29'13"E, a distance of 269.96 feet; N39°30'04"E, a distance of 1100.06 feet; N50°29'57"W, a distance of 190.00 feet; N00°59'12"W, a distance of 509.98 feet; S88°37'30"W, a distance of 73.00 feet; N00°57'50"W, a distance of 720.00 feet to a point on the North line of said Northeast One-Quarter; thence N88°37'33"E, along said North line, a distance of 563.62 feet; thence S00°23'20"E, parallel with the East line of said Northeast One-Quarter, a distance of 850.00 feet; thence N88°37'33"E, parallel with the North line of said Northeast One-Quarter, a distance of 1153.19 feet to the POINT OF BEGINNING, TOGETHER WITH, beginning at the Northeast corner of said Northeast One-Quarter, thence along the East line of said Northeast One-Quarter, on a Kansas coordinate system 1983 south zone bearing of S 00 degree 33'20" E, a distance of 850.00 feet; thence S 88°37'33" W, parallel with the North line of said Northeast One-Quarter, a distance of 1153.19 feet; thence N 00°53'20" W, parallel with the East line of said Northeast One-Quarter, a distance of 850.00 feet to a point on the North line of said Northeast One-Quarter; thence along said North line, N 88°37'33" E, a distance of 1153.19 feet to the POINT OF BEGINNING. Said tract contains 116.488 acres more or less.



BENCH MARKS

- BM 1 RAILROAD SPIKE IN SOUTH FACE OF POWER POLE 3RD. POWER POLE WEST OF 143RD. STREET SOUTH SIDE OF 21ST. STREET. Elev. = 1362.18 (NGVD 29) 174.78 (City Datum)
- BM 2 RAILROAD SPIKE IN SOUTH FACE OF POWER POLE FIRST POWERPOLE WEST OF 143RD. STREET SOUTH SIDE OF 21ST. STREET. Elev. = 1370.29(NGVD 29) 182.89 (City Datum)

NOTES

1. GEOGRAPHY: Located in the northeast Wichita in an area rapidly transitioning from agricultural uses into suburban residential. The property has access to K-96 via 21st Street. Existing surrounding land uses include suburban residential, rural residential, private schools, and agriculture production.
2. LOT TOTAL 268 (264-Residential, 4-Commercial)
3. ANNEXATION: Presently unincorporated, to be annexed with platting.
4. EXISTING/PROPOSED USES: Agricultural and vacant rural residential
5. ZONING: Existing - "SF-20" Proposed - SF-5 and CUP
6. PLAT AREA: Gross - 116.448 acres
7. SURVEY DATE: Sept., 2006 (by MKEC)
8. PUBLIC UTILITIES: Municipal sanitary sewer shall extended to the site from the west southwest. Municipal water is available along 21st. St.
9. ACCESS CONTROLS: As shown
10. RESERVES: All reserves are planned for irrigation, landscaping, monuments, drainage, sidewalks and utilities in designated areas. Some reserves shall be platted for floodplain, and or floodways.
11. FLOOD: According to FEMA FIRM Community Unit Panel 200321 0150A, Effective Date June 3rd, 1986; this property lies within flood zone "C", "areas of minimal flooding," and westerly portions lie within flood zone "A", "A2", and "B". LOWEST OPENING TO BE DETERMINED AT THE TIME OF FINAL PLATTING.
12. DRAINAGE: A drainage report shall accompany this plat. The property lies within a branch of Four Mile Creek drainage basin. A LOMA is expected to accompany the development.



SW. Cor., NE 1/4, Sec. 11, T27S, R2E, 6th P.M. Fnd. roll in stone

100' right of way easement in favor of Kansas Electric Light & Power Co. No. 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. Fnd. 12.31.02

SE. Cor., NE 1/4, Sec. 11, T27S, R2E, 6th P.M. Fnd. 1/2" w/ PEC cop

MKEC ENGINEERING CONSULTANTS, INC.
 411 N. WEBB ROAD WICHITA, K.S. 67206 316-684-9600

KRUG SOUTH ADDITION
 PROJECT NAME

UTILITY PLAN
 SHEET TITLE

DESIGN BY: **TMH** DRAWN BY: **KWS** CHECKED BY: **GJA**

DATE: **SEPTEMBER 2006** JOB NO. **05291** SHEET OF **1 / 1**

Appendix J
Stormwater Sewer Pipe Sizing Calculations

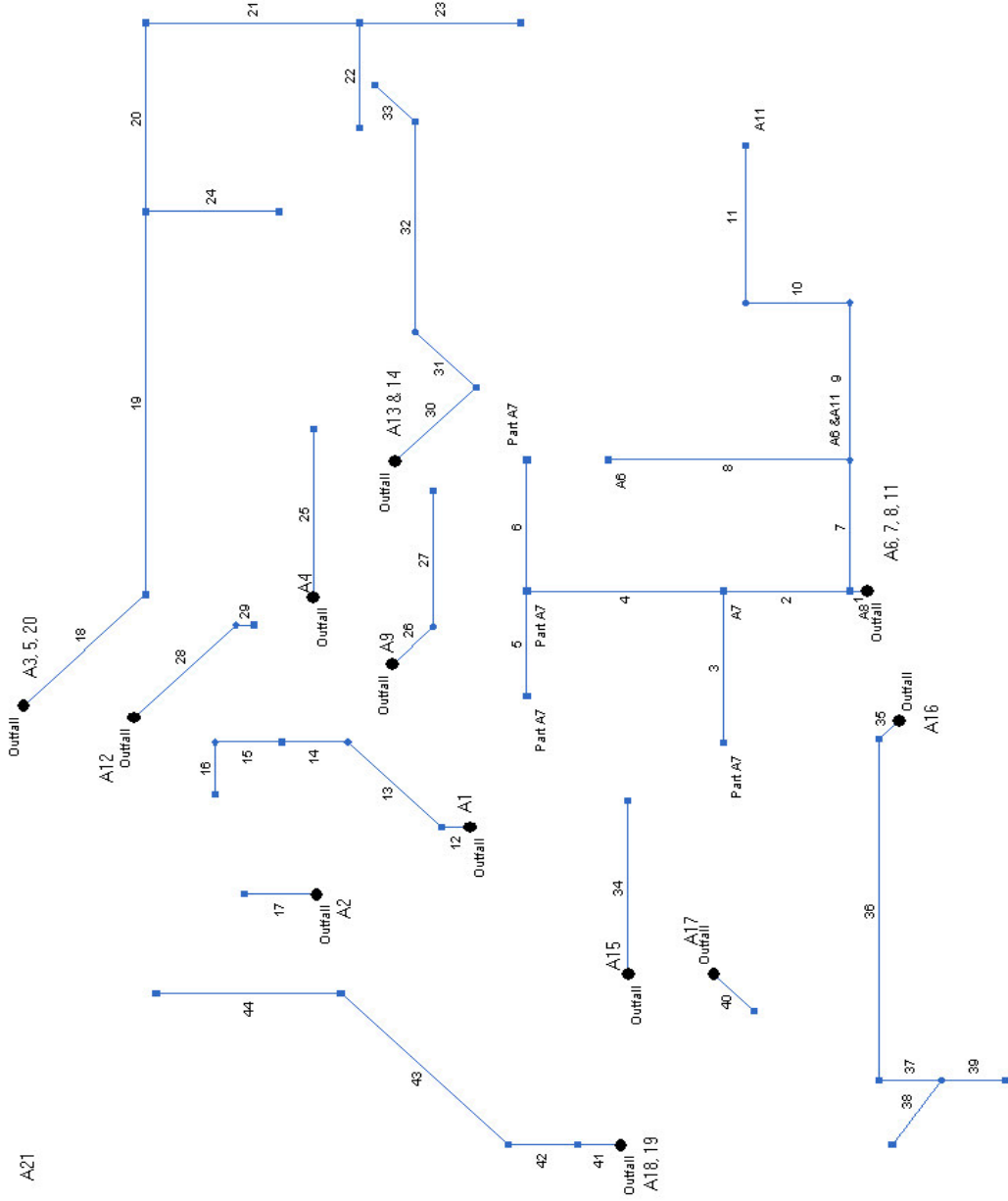
PIPE SIZING - TIME OF CONCENTRATION CALCULATIONS BY THE FAA METHOD

Krug South
Wichita, Kansas

$$T_c = \frac{(1.1-C)L^{1/2}}{100 S^{1/3}}$$

Area Name	Land Use	Soil Group	Maximum Elevation	Minimum Elevation	Flow Length (L)	Rational Runoff Coefficient, C				Time of Concentration (min), T _c				
						2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	
A1	Residential - 1/4 Acre	D	1,360	1,358	150	0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	
A2	Residential - 1/4 Acre	D	1,361	1,352	610	0.50	0.54	0.62	0.76	23.4	21.9	18.7	15.0	
A3	Residential - 1/4 Acre	D				0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	
A4	Residential - 1/4 Acre	D	1,372	1,360	550	0.50	0.54	0.62	0.76	19.5	18.2	15.6	15.0	
A5	Residential - 1/4 Acre	D	1,377	1,375	370	0.50	0.54	0.62	0.76	25.5	23.8	20.4	15.0	
A6	Residential - 1/4 Acre	D				0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	
A7	Residential - 1/4 Acre	D				0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	
A8	Residential - 1/4 Acre	D	1,376	1,361	1,186	0.50	0.54	0.62	0.76	34.4	32.1	27.5	19.5	
A9	Residential - 1/4 Acre	D				0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	
A11	Residential - 1/4 Acre	D				0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	
A12	Residential - 1/4 Acre	D	1,361	1,353	484	0.50	0.54	0.62	0.76	20.1	18.8	16.1	15.0	
A13	Residential - 1/4 Acre	D				0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	
A14	Residential - 1/4 Acre	D	1,362	1,353	369	0.50	0.54	0.62	0.76	15.4	15.0	15.0	15.0	
A15	Residential - 1/4 Acre	D	1,350	1,349	461	0.50	0.54	0.62	0.76	38.6	36.0	30.9	21.9	
A16	Residential - 1/4 Acre	D				0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	
A17	Residential - 1/4 Acre	D	1,359	1,354	786	0.50	0.54	0.62	0.76	35.2	32.9	28.2	19.9	
A18	Residential - 1/4 Acre	D	1,366	1,360	1,134	0.50	0.54	0.62	0.76	45.0	42.0	36.0	25.5	
A19	Residential - 1/4 Acre	D				0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	
A20	Residential - 1/4 Acre	D				0.50	0.54	0.62	0.76	15.0	15.0	15.0	15.0	

Hydraflow Plan View



Storm Sewer 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)	HGL Junct (ft)	Dns line No.
1	A6, 7, 8, 11	23.65	36 c	30.0	1358.00	1358.04	0.133	1360.38	1360.42	0.36	1360.78	End
2		8.71	18 c	220.0	1358.04	1358.74	0.318	1360.78*	1362.29*	0.57	1362.86	1
3		1.92	12 c	290.0	1358.74	1360.34	0.552	1363.14*	1363.99*	0.09	1364.09	2
4		5.49	18 c	340.0	1358.74	1359.83	0.321	1363.09*	1364.02*	0.34	1364.36	2
5		1.92	12 c	200.0	1359.83	1360.93	0.550	1364.41*	1365.00*	0.09	1365.09	4
6		1.92	12 c	250.0	1359.83	1361.21	0.552	1364.41*	1365.14*	0.09	1365.24	4
7		5.55	18 c	250.0	1358.04	1358.84	0.320	1360.87*	1361.57*	0.15	1361.72	1
8		2.85	12 c	420.0	1358.84	1361.15	0.550	1361.72*	1364.41*	0.20	1364.61	7
9		3.07	12 c	300.0	1358.84	1360.49	0.550	1361.72*	1363.95*	0.24	1364.19	7
10		3.14	12 c	180.0	1360.49	1361.48	0.550	1364.19*	1365.59*	0.25	1365.84	9
11		3.25	12 c	300.0	1361.48	1363.13	0.550	1365.84*	1368.34*	0.27	1368.60	10
12	A1	1.98	12 c	50.0	1356.90	1357.18	0.560	1357.54	1357.82	0.24	1358.06	End
13		1.39	12 c	230.0	1357.18	1358.45	0.552	1358.23	1358.95	0.14	1359.10	12
14		1.42	12 c	115.0	1358.45	1359.08	0.548	1359.24	1359.59	0.10	1359.69	13
15		0.75	12 c	115.0	1359.08	1359.71	0.548	1359.87	1360.08	0.12	1360.21	14
16		0.79	12 c	100.0	1359.71	1360.26	0.550	1360.31	1360.64	n/a	1360.64	15
17	A2	4.29	15 c	125.0	1356.90	1357.40	0.400	1357.99	1358.49	0.22	1358.71	End
18	A3, 5, 20	8.42	18 c	300.0	1356.90	1357.86	0.320	1358.40*	1360.33*	0.40	1360.73	End
19		7.97	18 c	730.0	1357.86	1360.20	0.321	1360.77*	1364.98*	0.47	1365.45	18
20		3.92	15 c	360.0	1360.20	1361.64	0.400	1365.61*	1366.93*	0.24	1367.17	19
21		2.93	12 c	370.0	1361.64	1363.68	0.551	1367.17*	1369.68*	0.33	1370.01	20
22		1.08	12 c	200.0	1363.68	1364.78	0.550	1370.20*	1370.38*	0.03	1370.41	21
23		1.08	12 c	280.0	1363.68	1365.22	0.550	1370.20*	1370.45*	0.03	1370.48	21
24		3.83	15 c	230.0	1361.64	1362.56	0.400	1365.61*	1366.42*	0.15	1366.58	19
25	A4	8.04	18 c	320.0	1356.20	1357.22	0.319	1357.70*	1359.57*	0.32	1359.90	End
26	A9	0.89	12 c	100.0	1353.30	1353.85	0.550	1353.70	1354.25	0.11	1354.36	End
27		0.98	12 c	260.0	1353.85	1355.28	0.550	1354.47	1355.70	n/a	1355.70 j	26
28	A12	7.01	18 c	250.0	1347.70	1348.50	0.320	1349.20*	1350.31*	0.18	1350.50	End
29		7.03	18 c	30.0	1348.50	1348.60	0.333	1350.50*	1350.63*	0.25	1350.88	28
30	A13, 14	8.89	18 c	200.0	1345.00	1345.64	0.320	1346.50*	1347.94*	0.59	1348.53	End
31		3.47	12 c	150.0	1345.64	1346.47	0.553	1348.62*	1350.04*	0.23	1350.27	30
32		3.62	12 c	400.0	1346.47	1348.67	0.550	1350.27*	1354.40*	0.37	1354.77	31

KrugS_residential_SWS Number of lines: 44 Run Date: 11-20-2006

NOTES: c = cir; e = ellip; b = box; Return period = 2 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.

Storm Sewer 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)	HGL Junct (ft)	Dns line No.
33		1.85	12 c	100.0	1348.67	1349.22	0.550	1355.01*	1355.28*	0.09	1355.37	32
34	A15	4.67	15 c	330.0	1344.00	1345.32	0.400	1345.25*	1346.98*	0.23	1347.20	End
35	A16	6.68	18 c	50.0	1358.00	1358.16	0.320	1359.50	1359.66	0.25	1359.91	End
36		5.50	18 c	650.0	1358.16	1360.24	0.320	1359.98	1361.74	0.23	1361.96	35
37		3.73	15 c	110.0	1360.24	1360.68	0.400	1361.97*	1362.34*	0.14	1362.48	36
38		1.92	12 c	150.0	1360.68	1361.51	0.553	1362.53*	1362.97*	0.09	1363.07	37
39		1.92	12 c	110.0	1360.68	1361.29	0.555	1362.53*	1362.85*	0.09	1362.95	37
40	A17	4.58	15 c	100.0	1358.00	1358.40	0.400	1359.25*	1359.75*	0.22	1359.97	End
41	A18, 19	13.08	24 c	75.0	1357.00	1357.16	0.213	1359.00*	1359.25*	0.13	1359.39	End
42		4.63	15 c	120.0	1357.16	1357.64	0.400	1359.43*	1360.05*	0.25	1360.30	41
43		3.23	12 c	410.0	1357.64	1359.90	0.551	1360.30*	1363.67*	0.30	1363.97	42
44		1.73	12 c	320.0	1359.90	1361.66	0.550	1364.16*	1364.92*	0.08	1364.99	43
KrugS_residential_SWS							Number of lines: 44			Run Date: 11-20-2006		
NOTES: c = cir; e = ellip; b = box; Return period = 2 Yrs. ; *Surcharged (HGL above crown). ; j - Line contains hyd. jump.												

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	30.0	-90.0	Curb	0.00	10.95	0.50	34.0	1358.00	0.13	1358.04	36	Cir	0.013	1.50	0.00	A6, 7, 8, 11
2	1	220.0	0.0	Genr	0.00	1.00	0.50	15.0	1358.04	0.32	1358.74	18	Cir	0.013	1.50	1360.74	
3	2	290.0	-90.0	Curb	0.00	1.00	0.50	15.0	1358.74	0.55	1360.34	12	Cir	0.013	1.00	1361.84	
4	2	340.0	0.0	Genr	0.00	1.00	0.50	15.0	1358.74	0.32	1359.83	18	Cir	0.013	2.25	0.00	
5	4	200.0	-90.0	Genr	0.00	1.00	0.50	15.0	1359.83	0.55	1360.93	12	Cir	0.013	1.00	0.00	
6	4	250.0	90.0	Genr	0.00	1.00	0.50	15.0	1359.83	0.55	1361.21	12	Cir	0.013	1.00	0.00	
7	1	250.0	90.0	MH	0.00	0.00	0.00	0.0	1358.04	0.32	1358.84	18	Cir	0.013	1.00	0.00	
8	7	420.0	-90.0	Genr	0.00	1.48	0.50	15.0	1358.84	0.55	1361.15	12	Cir	0.013	1.00	0.00	
9	7	300.0	-0.1	MH	0.00	0.00	0.00	0.0	1358.84	0.55	1360.49	12	Cir	0.013	1.00	0.00	
10	9	180.0	-90.0	MH	0.00	0.00	0.00	0.0	1360.49	0.55	1361.48	12	Cir	0.013	1.00	0.00	
11	10	300.0	90.0	Genr	0.00	1.69	0.50	15.0	1361.48	0.55	1363.13	12	Cir	0.013	1.00	0.00	A1
12	End	50.0	-90.0	Genr	0.00	0.41	0.50	15.0	1356.90	0.56	1357.18	12	Cir	0.013	1.13	0.00	
13	12	230.0	45.0	MH	0.00	0.00	0.00	0.0	1357.18	0.55	1358.45	12	Cir	0.013	0.75	0.00	
14	13	115.0	-45.0	Genr	0.00	0.41	0.50	15.0	1358.45	0.55	1359.08	12	Cir	0.013	0.50	0.00	
15	14	115.0	0.0	MH	0.00	0.00	0.00	0.0	1359.08	0.55	1359.71	12	Cir	0.013	1.00	0.00	
16	15	100.0	-90.0	Genr	0.00	0.41	0.50	15.0	1359.71	0.55	1360.26	12	Cir	0.013	1.00	0.00	
17	End	125.0	-90.0	Curb	0.00	2.76	0.50	23.0	1356.90	0.40	1357.40	15	Cir	0.013	1.00	0.00	A2
18	End	300.0	45.0	Genr	0.00	0.66	0.50	15.0	1356.90	0.32	1357.86	18	Cir	0.013	1.13	0.00	A3, 5, 20
19	18	730.0	-45.0	Genr	0.00	0.66	0.50	15.0	1357.86	0.32	1360.20	18	Cir	0.013	1.50	0.00	
20	19	360.0	0.0	Genr	0.00	0.66	0.50	15.0	1360.20	0.40	1361.64	15	Cir	0.013	1.50	0.00	
21	20	370.0	90.0	Genr	0.00	0.56	0.50	15.0	1361.64	0.55	1363.68	12	Cir	0.013	1.50	0.00	

KrugS_residential_SWS

Number of lines: 44

Date: 11-20-2006

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)	
22	21	200.0	90.0	Genr	0.00	0.56	0.50	15.0	1363.68	0.55	1364.78	12	Cir	0.013	1.00	0.00
23	21	280.0	0.0	Genr	0.00	0.56	0.50	15.0	1363.68	0.55	1365.22	12	Cir	0.013	1.00	0.00
24	19	230.0	90.0	Curb	0.00	2.64	0.50	26.0	1361.64	0.40	1362.56	15	Cir	0.013	1.00	0.00
25	End	320.0	0.0	Curb	0.00	4.80	0.50	20.0	1356.20	0.32	1357.22	18	Cir	0.013	1.00	0.00
26	End	100.0	45.0	MH	0.00	0.00	0.00	0.0	1353.30	0.55	1353.85	12	Cir	0.013	0.75	0.00
27	26	260.0	-45.0	Genr	0.00	0.51	0.50	15.0	1353.85	0.55	1355.28	12	Cir	0.013	1.00	0.00
28	End	250.0	45.0	MH	0.00	0.00	0.00	0.0	1347.70	0.32	1348.50	18	Cir	0.013	0.75	0.00
29	28	30.0	45.0	Curb	0.00	4.20	0.50	20.0	1348.50	0.33	1348.60	18	Cir	0.013	1.00	0.00
30	End	200.0	45.0	Curb	0.00	3.08	0.50	15.0	1345.00	0.32	1345.64	18	Cir	0.013	1.50	0.00
31	30	150.0	-90.0	MH	0.00	0.00	0.00	0.0	1345.64	0.55	1346.47	12	Cir	0.013	0.75	0.00
32	31	400.0	45.0	Genr	0.00	0.96	0.50	15.0	1346.47	0.55	1348.67	12	Cir	0.013	1.13	0.00
33	32	100.0	-45.0	Genr	0.00	0.96	0.50	15.0	1348.67	0.55	1349.22	12	Cir	0.013	1.00	0.00
34	End	330.0	0.0	Curb	0.00	4.12	0.50	39.0	1344.00	0.40	1345.32	15	Cir	0.013	1.00	0.00
35	End	50.0	-135.0	Genr	0.00	1.00	0.50	15.0	1358.00	0.32	1358.16	18	Cir	0.013	1.13	0.00
36	35	650.0	-45.0	Genr	0.00	1.00	0.50	15.0	1358.16	0.32	1360.24	18	Cir	0.013	1.50	0.00
37	36	110.0	-90.0	MH	0.00	0.00	0.00	0.0	1360.24	0.40	1360.68	15	Cir	0.013	1.00	0.00
38	37	150.0	125.0	Genr	0.00	1.00	0.50	15.0	1360.68	0.55	1361.51	12	Cir	0.013	1.00	0.00
39	37	110.0	0.0	Genr	0.00	1.00	0.50	15.0	1360.68	0.55	1361.29	12	Cir	0.013	1.00	0.00
40	End	100.0	135.0	Curb	0.00	3.77	0.50	35.0	1358.00	0.40	1358.40	15	Cir	0.013	1.00	0.00
41	End	75.0	-90.0	Curb	0.00	9.98	0.50	45.0	1357.00	0.21	1357.16	24	Cir	0.013	0.50	0.00
42	41	120.0	0.0	Genr	0.00	0.90	0.50	15.0	1357.16	0.40	1357.64	15	Cir	0.013	1.13	0.00
KrugS_residential_SWS													Number of lines: 44	Date: 11-20-2006		

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)	
43	42	410.0	45.0	Genr	0.00	0.90	0.50	15.0	1357.64	0.55	1359.90	12	Cir	0.013	1.13	0.00
44	43	320.0	-45.0	Genr	0.00	0.90	0.50	15.0	1359.90	0.55	1361.66	12	Cir	0.013	1.00	0.00
<p>KrugS_residential_SWS Number of lines: 44 Date: 11-20-2006</p>																

Storm Sewer Tabulation

Station	Line	To Line	Len (ft)	Drng Area (ac)		Rnoff coeff (C)	Area x C		Tc (min)		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev (ft)		HGL Elev (ft)		Grnd / Rim Elev (ft)		Line ID
				Incr	Total		Incr	Total	Inlet	Syst					Size (in)	Slope (%)	Up	Dn	Up	Dn	Up	Dn	
1	End		30.0	10.95	19.12	0.50	5.48	9.56	34.0	34.0	2.5	23.65	24.37	3.93	36	0.13	1358.04	1358.00	1360.42	1360.38	0.00	0.00	A6, 7, 8, 11
2	1		220.0	1.00	5.00	0.50	0.50	2.50	15.0	18.5	3.5	8.71	5.92	4.93	18	0.32	1358.74	1358.04	1362.29	1360.78	1360.74	0.00	
3	2		290.0	1.00	1.00	0.50	0.50	0.50	15.0	15.0	3.8	1.92	2.65	2.45	12	0.55	1360.34	1358.74	1363.99	1363.14	1361.84	1360.74	
4	2		340.0	1.00	3.00	0.50	0.50	1.50	15.0	16.7	3.7	5.49	5.95	3.11	18	0.32	1359.83	1358.74	1364.02	1363.09	0.00	1360.74	
5	4		200.0	1.00	1.00	0.50	0.50	0.50	15.0	15.0	3.8	1.92	2.64	2.45	12	0.55	1360.93	1359.83	1365.00	1364.41	0.00	0.00	
6	4		250.0	1.00	1.00	0.50	0.50	0.50	15.0	15.0	3.8	1.92	2.65	2.45	12	0.55	1361.21	1359.83	1365.14	1364.41	0.00	0.00	
7	1		250.0	0.00	3.17	0.00	0.00	1.59	0.0	18.3	3.5	5.55	5.94	3.14	18	0.32	1358.84	1358.04	1361.57	1360.87	0.00	0.00	
8	7		420.0	1.48	1.48	0.50	0.74	0.74	15.0	15.0	3.8	2.85	2.64	3.63	12	0.55	1361.15	1358.84	1364.41	1361.72	0.00	0.00	
9	7		300.0	0.00	1.69	0.00	0.00	0.85	0.0	17.0	3.6	3.07	2.64	3.91	12	0.55	1360.49	1358.84	1363.95	1361.72	0.00	0.00	
10	9		180.0	0.00	1.69	0.00	0.00	0.85	0.0	16.2	3.7	3.14	2.64	4.00	12	0.55	1361.48	1360.49	1365.59	1364.19	0.00	0.00	
11	10		300.0	1.69	1.69	0.50	0.85	0.85	15.0	15.0	3.8	3.25	2.64	4.14	12	0.55	1363.13	1361.48	1368.34	1365.84	0.00	0.00	
12	End		50.0	0.41	1.23	0.50	0.21	0.62	15.0	21.6	3.2	1.98	2.67	3.72	12	0.56	1357.18	1356.90	1357.82	1357.54	0.00	0.00	A1
13	12		230.0	0.00	0.82	0.00	0.00	0.41	0.0	19.6	3.4	1.39	2.65	2.64	12	0.55	1358.45	1357.18	1358.95	1358.23	0.00	0.00	
14	13		115.0	0.41	0.82	0.50	0.21	0.41	15.0	18.6	3.5	1.42	2.64	2.85	12	0.55	1359.08	1358.45	1359.59	1359.24	0.00	0.00	
15	14		115.0	0.00	0.41	0.00	0.00	0.21	0.0	16.7	3.7	0.75	2.64	1.98	12	0.55	1359.71	1359.08	1360.08	1359.87	0.00	0.00	
16	15		100.0	0.41	0.41	0.50	0.21	0.21	15.0	15.0	3.8	0.79	2.64	2.25	12	0.55	1360.26	1359.71	1360.64	1360.31	0.00	0.00	
17	End		125.0	2.76	2.76	0.50	1.38	1.38	23.0	23.0	3.1	4.29	4.08	3.78	15	0.40	1357.40	1356.90	1358.49	1357.99	0.00	0.00	A2
18	End		300.0	0.66	6.30	0.50	0.33	3.15	15.0	29.9	2.7	8.42	5.94	4.77	18	0.32	1357.86	1356.90	1360.33	1358.40	0.00	0.00	A3, 5, 20
19	18		730.0	0.66	5.64	0.50	0.33	2.82	15.0	27.2	2.8	7.97	5.95	4.51	18	0.32	1360.20	1357.86	1364.98	1360.77	0.00	0.00	
20	19		360.0	0.66	2.34	0.50	0.33	1.17	15.0	20.0	3.4	3.92	4.08	3.19	15	0.40	1361.64	1360.20	1366.93	1365.61	0.00	0.00	
21	20		370.0	0.56	1.68	0.50	0.28	0.84	15.0	18.4	3.5	2.93	2.64	3.74	12	0.55	1363.68	1361.64	1369.68	1367.17	0.00	0.00	
Number of lines: 44															Run Date: 11-20-2006								

KrugS_residential_SWS

NOTES: Intensity = 76.31 / (Inlet time + 14.30) ^ 0.88; Return period = 2 Yrs.

Storm Sewer Tabulation

Station	Line To Line	Len (ft)	Drng Area (ac)		Rnoff coeff (C)	Area x C		Tc (min)		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev (ft)		HGL Elev (ft)		Grnd / Rim Elev (ft)		Line ID
			Incr	Total		Incr	Total	Inlet	Syst					Size (in)	Slope (%)	Up	Dn	Up	Dn	Up	Dn	
22	21	200.0	0.56	0.56	0.50	0.28	0.28	15.0	15.0	3.8	1.08	2.64	1.37	12	0.55	1364.78	1363.68	1370.38	1370.20	0.00	0.00	
23	21	280.0	0.56	0.56	0.50	0.28	0.28	15.0	15.0	3.8	1.08	2.64	1.37	12	0.55	1365.22	1363.68	1370.45	1370.20	0.00	0.00	
24	19	230.0	2.64	2.64	0.50	1.32	1.32	26.0	26.0	2.9	3.83	4.08	3.12	15	0.40	1362.56	1361.64	1366.42	1365.61	0.00	0.00	
25	End	320.0	4.80	4.80	0.50	2.40	2.40	20.0	20.0	3.3	8.04	5.93	4.55	18	0.32	1357.22	1356.20	1359.57	1357.70	0.00	0.00	A4
26	End	100.0	0.00	0.51	0.00	0.00	0.26	0.0	18.5	3.5	0.89	2.64	3.02	12	0.55	1353.85	1353.30	1354.25	1353.70	0.00	0.00	A9
27	26	260.0	0.51	0.51	0.50	0.26	0.26	15.0	15.0	3.8	0.98	2.64	2.52	12	0.55	1355.28	1353.85	1355.70	1354.47	0.00	0.00	
28	End	250.0	0.00	4.20	0.00	0.00	2.10	0.0	20.1	3.3	7.01	5.94	3.97	18	0.32	1348.50	1347.70	1350.31	1349.20	0.00	0.00	A12
29	28	30.0	4.20	4.20	0.50	2.10	2.10	20.0	20.0	3.3	7.03	6.06	3.98	18	0.33	1348.60	1348.50	1350.63	1350.50	0.00	0.00	
30	End	200.0	3.08	5.00	0.50	1.54	2.50	15.0	17.7	3.6	8.89	5.94	5.03	18	0.32	1345.64	1345.00	1347.94	1346.50	0.00	0.00	A13, 14
31	30	150.0	0.00	1.92	0.00	0.00	0.96	0.0	17.1	3.6	3.47	2.65	4.42	12	0.55	1346.47	1345.64	1350.04	1348.62	0.00	0.00	
32	31	400.0	0.96	1.92	0.50	0.48	0.96	15.0	15.7	3.8	3.62	2.64	4.61	12	0.55	1348.67	1346.47	1354.40	1350.27	0.00	0.00	
33	32	100.0	0.96	0.96	0.50	0.48	0.48	15.0	15.0	3.8	1.85	2.64	2.35	12	0.55	1349.22	1348.67	1355.28	1355.01	0.00	0.00	
34	End	330.0	4.12	4.12	0.50	2.06	2.06	39.0	39.0	2.3	4.67	4.08	3.81	15	0.40	1345.32	1344.00	1346.98	1345.25	0.00	0.00	A15
35	End	50.0	1.00	4.00	0.50	0.50	2.00	15.0	20.1	3.3	6.68	5.94	3.78	18	0.32	1358.16	1358.00	1359.66	1359.50	0.00	0.00	A16
36	35	650.0	1.00	3.00	0.50	0.50	1.50	15.0	16.6	3.7	5.50	5.94	3.12	18	0.32	1360.24	1358.16	1361.74	1359.98	0.00	0.00	
37	36	110.0	0.00	2.00	0.00	0.00	1.00	0.0	16.0	3.7	3.73	4.08	3.04	15	0.40	1360.68	1360.24	1362.34	1361.97	0.00	0.00	
38	37	150.0	1.00	1.00	0.50	0.50	0.50	15.0	15.0	3.8	1.92	2.65	2.45	12	0.55	1361.51	1360.68	1362.97	1362.53	0.00	0.00	
39	37	110.0	1.00	1.00	0.50	0.50	0.50	15.0	15.0	3.8	1.92	2.65	2.45	12	0.55	1361.29	1360.68	1362.85	1362.53	0.00	0.00	
40	End	100.0	3.77	3.77	0.50	1.89	1.89	35.0	35.0	2.4	4.58	4.08	3.73	15	0.40	1358.40	1358.00	1359.75	1359.25	0.00	0.00	A17
41	End	75.0	9.98	12.68	0.50	4.99	6.34	45.0	45.0	2.1	13.08	10.45	4.16	24	0.21	1357.16	1357.00	1359.25	1359.00	0.00	0.00	A18, 19
42	41	120.0	0.90	2.70	0.50	0.45	1.35	15.0	19.1	3.4	4.63	4.08	3.78	15	0.40	1357.64	1357.16	1360.05	1359.43	0.00	0.00	
Krugs_residential_SWS														Number of lines: 44				Run Date: 11-20-2006				

NOTES: Intensity = 76.31 / (Inlet time + 14.30) ^ 0.88; Return period = 2 Yrs.

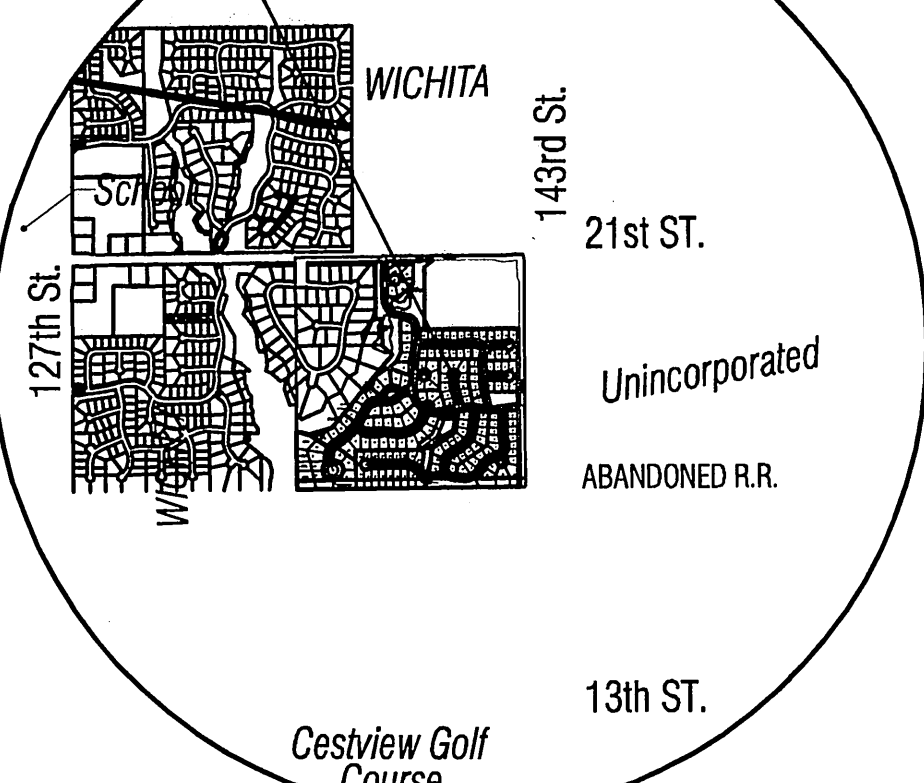
Storm Sewer Tabulation

Station Line	To Line	Len (ft)	Drng Area (ac)		Rnoff coeff (C)	Area x C		Tc		Rain (l) (in/hr)	Total flow (cfs)	Cap full (cfs)	Vel (ft/s)	Pipe		Invert Elev		HGL Elev		Grnd / Rim Elev		Line ID
			Incr	Total		Inlet (min)	Syst (min)	Size (in)	Slope (%)					Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	Up (ft)	Dn (ft)	
43	42	410.0	0.90	1.80	0.50	0.45	0.90	15.0	17.4	3.6	3.23	2.64	4.11	12	0.55	1359.90	1357.64	1363.67	1360.30	0.00	0.00	
44	43	320.0	0.90	0.90	0.50	0.45	0.45	15.0	15.0	3.8	1.73	2.64	2.21	12	0.55	1361.66	1359.90	1364.92	1364.16	0.00	0.00	
KrugS_residential_SWS														Number of lines: 44		Run Date: 11-20-2006						

NOTES: Intensity = 76.31 / (Inlet time + 14.30) ^ 0.88; Return period = 2 Yrs.

Appendix K
Drainage Plan

PLAT LOCATION



VICINITY MAP

NW. Cor. NE 1/4, Sec. 11,
T27S, R2E, 6th P.M.
Fnd. 3/4" Pipe

BENCH MARKS

- BM 1 RAILROAD SPIKE IN SOUTH FACE OF POWER POLE 3RD. POWER POLE WEST OF 143RD. STREET SOUTH SIDE OF 21ST. STREET. Elev. = 1362.18 (NGVD 29) 17.478 (City Datum)
- BM 2 RAILROAD SPIKE IN SOUTH FACE OF POWER POLE FIRST POWERPOLE WEST OF 143RD. STREET SOUTH SIDE OF 21ST. STREET Elev. = 1370.29(NGVD 29) 182.89 (City Datum)

NOTES

1. GEOGRAPHY: Located in the northeast Wichita in an area rapidly transitioning from agricultural uses into suburban residential. The property has access to K-96 via 21st Street. Existing surrounding land uses include suburban residential, rural residential, private schools, and agriculture production.
2. LOT TOTAL - 268 (264-Residential, 4-Commercial)
3. ANNEXATION: Presently unincorporated, to be annexed with platting.
4. EXISTING/PROPOSED USES: Agricultural and vacant rural residential
5. ZONING: Existing - "SF-20" Proposed - SF-5 and CUP
6. PLAT AREA: Gross - 116.448 acres
7. SURVEY DATE: Sept., 2006 (by MKEC)
8. PUBLIC UTILITIES: Municipal sanitary sewer shall be extended to the site from the west southwest. Municipal water is available along 21st. St.
9. ACCESS CONTROLS: As shown
10. RESERVES: All reserves are platted for irrigation, landscaping, monuments, drainage, sidewalks and utilities in designated areas. Some reserves shall be platted for floodplain, and or floodways.
11. FLOOD: According to FEMA FIRM Community Unit Panel 200321 0150A, Effective Date June 3rd, 1986; this property lies within flood zone "C", "areas of minimal flooding," and westerly portions lie within flood zone "A", "A2", and "B". LOWEST OPENING TO BE DETERMINED AT THE TIME OF FINAL PLATTING.
12. DRAINAGE: A drainage report shall accompany this plat. The property lies within a branch of Four Mile Creek drainage basin. A LOMA is expected to accompany the development.

LEGEND

- CONIFEROUS TREE
- DECIDUOUS TREE
- SIGN
- POWER POLE
- ELECTRIC BOX
- LIGHT POLE
- FIRE HYDRANT
- WATER VALVE
- WATER METER
- SECTION CORNER
- BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UNDERGROUND ELEC.
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW

LEGAL DESCRIPTION

A tract of land located in the Northeast One-Quarter of Section 11, Township 27 South, Range 2 East of the Sixth Principal Meridian, Sedgewick County, Kansas and being more particularly described as follows: COMMENCING at the Northeast corner of said Northeast One-Quarter; thence along the East line of said Northeast One-Quarter, on a Kansas coordinate system 1983 south zone bearing of S00°53'20"E, a distance of 850.00 feet to the POINT OF BEGINNING; thence continuing south on said East line, S00°53'20"E, a distance of 1811.32 feet to the Southeast corner of said Northeast One-Quarter; thence along the south line of said Northeast One-Quarter, S88°39'21"W, a distance of 2643.28 feet to the Southwest corner of said Northeast One-Quarter; thence along the west line of said Northeast One-Quarter, N00°57'48"W, a distance of 665.78 feet to a point on a southerly line of Reeds Cove 3rd Addition, Wichita, Sedgewick County, Kansas, as recorded on DCC#/PLM-763 28373853 in the Sedgewick County Register of Deeds office; thence along the southerly and easterly lines of said addition through the following seven courses; S77°33'17"E, a distance of 149.26 feet; N73°29'13"E, a distance of 269.96 feet; N39°30'04"E, a distance of 1100.06 feet; N50°29'57"W, a distance of 150.00 feet; N00°59'12"W, a distance of 309.98 feet; S88°37'34"W, a distance of 75.00 feet; N00°57'58"W, a distance of 720.00 feet to a point on the North line of said Northeast One-Quarter; thence N88°37'33"E, along said North line, a distance of 563.62 feet; thence S00°53'20"E, parallel with the East line of said Northeast One-Quarter, a distance of 850.00 feet; thence N88°37'33"E, parallel with the North line of said Northeast One-Quarter, a distance of 1153.19 feet to the POINT OF BEGINNING, TOGETHER WITH, beginning at the Northeast corner of said Northeast One-Quarter; thence along the East line of said Northeast One-Quarter, on a Kansas coordinate system 1983 south zone bearing of S 00 degree 53'20", a distance of 850.00 feet; thence S 88°37'33" W, parallel with the North line of said Northeast One-Quarter, a distance of 1153.19 feet; thence N 00°53'20" W, parallel with the East line of said Northeast One-Quarter, a distance of 850.00 feet to a point on the North line of said Northeast One-Quarter; thence along said North line, N 88°37'33" E, a distance of 1153.19 feet to the POINT OF BEGINNING. Said tract contains 116.448 acres more or less.



1"=100'

NE. Cor. NE 1/4, Sec. 11,
T27S, R2E, 6th P.M.
Fnd. 3/4" w/ cop

SE. Cor. NE 1/4, Sec. 11,
T27S, R2E, 6th P.M.
Fnd. 3/4" w/ PEC cop

MKEC
ENGINEERING
CONSULTANTS, INC.

KRUG SOUTH ADDITION
PROJECT NAME

DRAINAGE PLAN
SHEET TITLE

411 N. WEBB ROAD
WICHITA, K.S. 67206
316-684-9600

TMH
DESIGN BY:

KWS/CMJ
DRAWN BY:

GJA
CHECKED BY:

NOVEMBER 2006
DATE

05291
JOB NO.

1 / 1
SHEET/OF

J:\Civil\05291\Drawg\Drawg\05291.DWG 09/29/2006 01:13:02 PM CST