Preliminary Drainage Report for Monarch Landing Addition
Wichita, Sedgwick County, Kansas

Location

The site is located in unincorporated Sedgwick County, with anticipated annexation by the City of Wichita, Kansas. The site is in the Southeast Quarter of Section 1, Township 29 South, Range 2 East or more commonly the northwest corner of 159th Street East and 21st Street North. Undeveloped land borders the site to the north, east, and west. The total site area is approximately 122 acres. The site is shown on the Quadrangle Map located in Appendix A.

Soils

Soils throughout the Monarch Landing Addition have been classified as Rosehill silty clays, 1 to 3% slopes Goesell silty clay 0 to 1% slopes and according to the NRCS (SCS) Sedgwick & Butler County Soils Survey (Appendix B). The Hydrologic Soil Group used to select runoff coefficients is "D".

Pre-Project Conditions

Development

The site is undeveloped open space. The primary land use is agricultural.

Landform and Slope

Slopes across the site range from 1-5%. The site drains to all sides of the proposed site from the top of the hill near the center of the site. Elevations across the site range from 1376 in the center of the site to 1364 on the south side of the project site at the culvert crossing under 21st Street North.

Drainage Conditions

The site is not located in any designated floodplain according to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM). The site is shown in Zone X, areas outside of 100-year flooding. FIRM Panels 200321 0150A Sedgwick County, Kansas & 200037 0165C Butler County, Kansas, unincorporated area, June 3, 1986 & June 20, 2001, Appendix C.

Runoff Characteristics

Basin A drains 38.1 acres south into an engineered swale running parallel to 21st Street North then south offsite through an existing 3x4 RCB culvert under the road.

Runoff from basin B drains 34.0 acres to the west into an SCS waterway west of the site near the northwest corner of the school parcel.

Basin C includes 36.9 acres that flow offsite to the north into an SCS waterway north of the site.

Basin D includes 13.1 acres that flow offsite to the east near the section's east quarter corner. Current facilities include a 12" CMP under 159th Street (unpaved).

Basin E includes 9.7 acres that flow from the site's southwest corner into a ditch parallel to 21st Street North.

The existing basin boundaries are shown in Appendix D.

The five pre-project basins were analyzed in Hydraflow Hydrographs 2004. The drainage basins were modeled using the SCS Method with a 24-hour Type 2 design storm. The basin was modeled to represent the undeveloped conditions using a curve number of 80. Time of Concentration was calculated using the FAA method in an Excel Spreadsheet, Appendix E.

Calculations of the pre-project runoff for each watershed can be found in Appendix F. Pre-project flows from the site are shown in Table 1.

Table 1: Pre-Project Runoff.

Description	Design Storm Flows (cfs)			
	2-Yr	**5-Yr**	**10-Yr**	**100-Yr**
A	34.0	53.2	66.2	115.3
B	24.5	38.2	47.6	83.0
C	37.2	58.1	72.3	126.3
D	15.7	24.4	30.3	52.9
E	11.7	18.2	22.6	39.5

Developed Conditions

Development

The current plat will be developed for residential use with 1/4 acre and 1/3 acre lots. Future plats for the project will be designated as the second ddition The southwest corner of the project site is proposed for an elementary school and the south east corner of the site will be zoned for commercial use. Detention will be provided in appropriate areas of the site. The plat for Monarch Landing Addition includes residential areas only as shown in Appendix H.

Landform and Slope

Developed slopes will be 0.5% minimum and 3:1 maximum in the detention ponds. A preliminary grading plan is included in Appendix G. Final elevations of the lots will also be determined during final design.

Drainage Conditions

Watershed boundaries at the site will change slightly as the area is developed. The proposed basin boundaries are shown on the Drainage and Utility Plans in Appendix H. The total of the overall basin areas will be the same area as pre-project conditions. Detention ponds will be provided to keep post-project flows at or below the pre-project flows at each discharge location.

Calculations of the post-project runoff for each major watershed can be found in Appendix F and peak flow rates for each watershed are shown in Table 2.

Table 2: Post-Project Runoff.

Description	Design Storm Flows (cfs)			
	2-Yr	**5-Yr**	**10-Yr**	**100-Yr**
A	31.7	47.5	59.1	101.1
B	21.7	35.3	43.1	69.9
C	33.1	50.1	61.5	118.4
D	15.1	22.8	28.0	47.4
E	10.5	14.1	16.5	24.9

Runoff Characteristics

Watershed A has been divided into 3 sub-basins in the post-project conditions. Watersheds A1 and A2 flow into separate detention basins designed to keep peak flow rates after full development at or below the pre-project values. The detention ponds will discharge to the south into temporary ditches across the future commercial phase parcel to the culvert under 21st Street.

Discharges south of 21st Street from Watershed A will be controlled by the detention facilities rather than by the existing culvert. Proposed improvements to 21st Street will include enlarging the culvert to allow predictable tailwater conditions for the detention facility discharge structures.

Drainage Basin B has been separated into two sub-basins. Watershed B1 in the residential area will be oversized to reduce detention requirements on the school property. A small dry detention facility (B2) will be provided to reduce peak flow rates from the school property and a portion of the residential area so that the combined discharge to the SCS waterway west remains at or below current values for the range of design storms considered.

Drainage Basin C has been broken into two sub-basins to separate areas that will flow to the detention facility from those that will leave the site without detention under the post-project drainage patterns.

Drainage Basin D will flow to a proposed detention facility near the east entrance to the project just north of Keystone.

Drainage Basin E will leave the project site without detention. Watershed areas for this basin has been reduced so that the post-project peak flow rates remain at or below current values for the range of design storms considered.

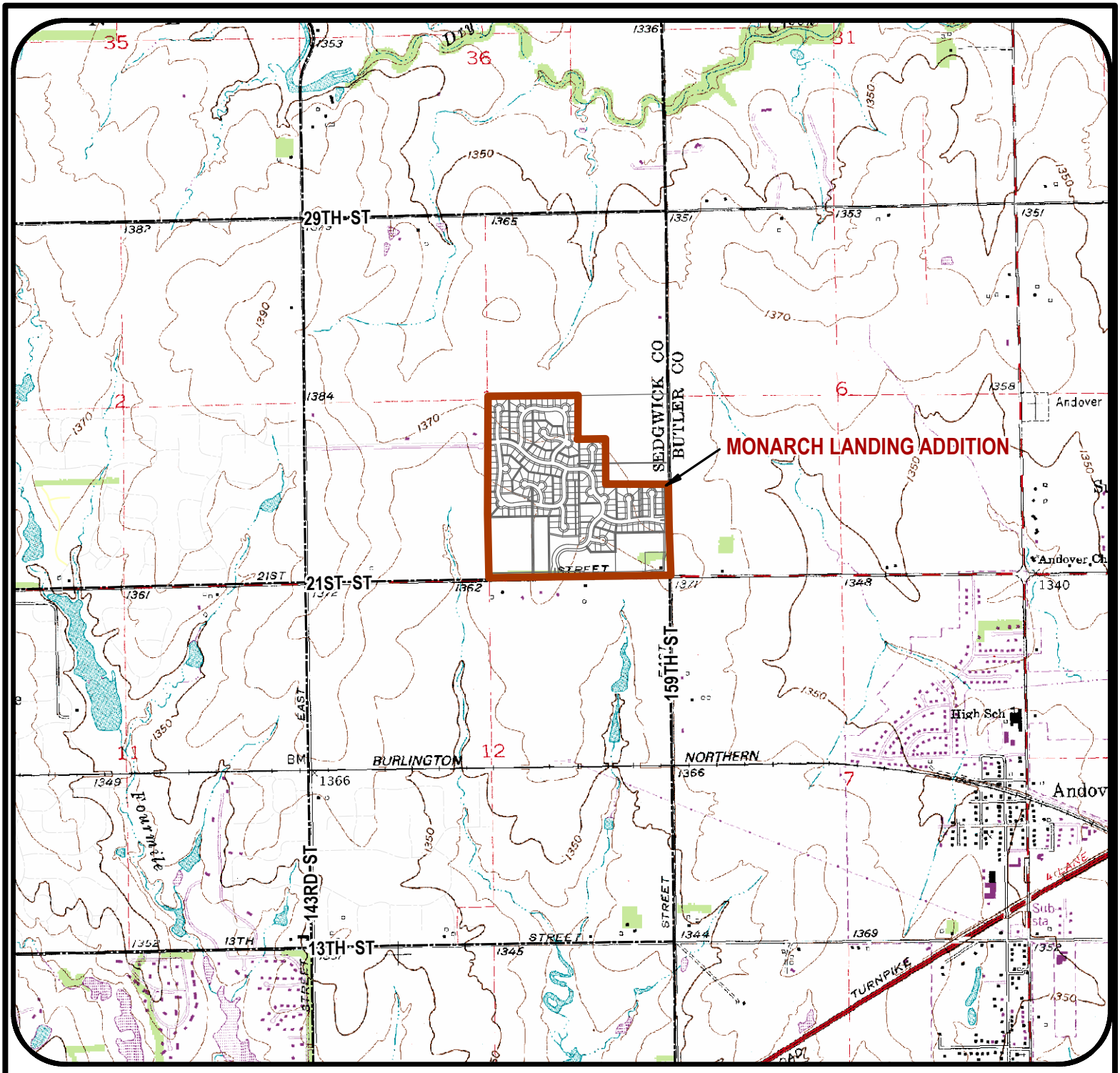
The detention areas were modeled in Hydraflow Hydrographs and have been sized for the 100-year event. Calculations for each pond can be found in Appendix F. A stormwater sewer system (SWS) layout has also been designed to carry site runoff to each of the detention basins. The SWS pipe sizes will be designed at a later stage in the design process.

Two figures included in Appendix H show the drainage plan and the utility plan. Preliminary inlet and pipe sizes along with design flow rates for the 2-year event are shown in the spreadsheet included as Appendix I.

Summary

The 122-acre site will develop as residential lots, commercial/office space and an elementary school. The current plat includes only residential lots. Detention ponds identified in this plat are coordinated with future overall land use and will keep the discharge from each watershed below the pre-project levels. Minimum pads for this addition have been established based on the 100-year water surface elevation and are shown on the final plat. Storm water sewer for residential areas of the site are sized to carry the 2-year design event.

Appendix A
Quadrangle Map



1 0.5 0 1 Miles

1,000 500 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometers

N W E S

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MONARCH LANDING ADDITION

Project Name:

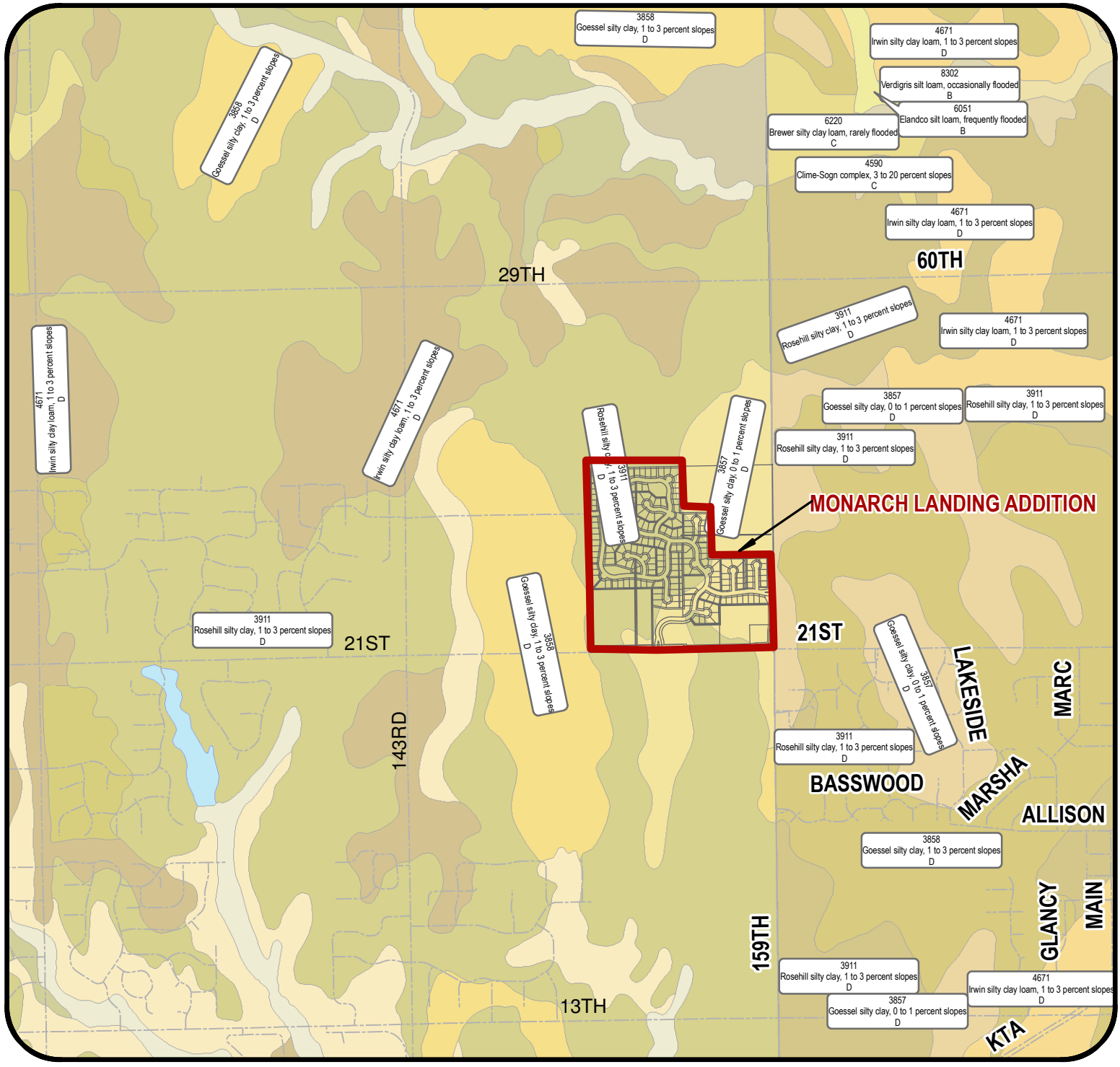
USGS - Sedgwick & Bulter County, KS

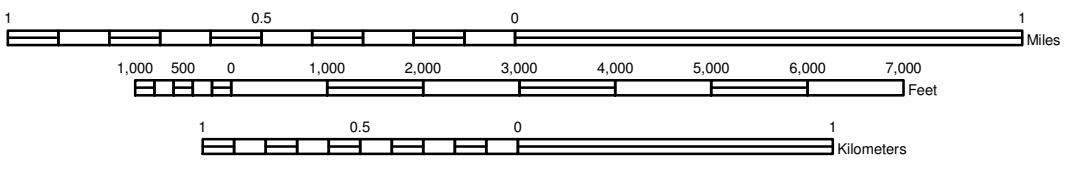
Sheet Title:

MKEC ENGINEERING CONSULTANTS, INC.

KWS	SEPT. 2006
Drawn By:	Date:
TM	06201
Design / Review:	Job No.:

Appendix B
NRCS Soils Map





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MONARCH LANDING ADDITION

Project Name:

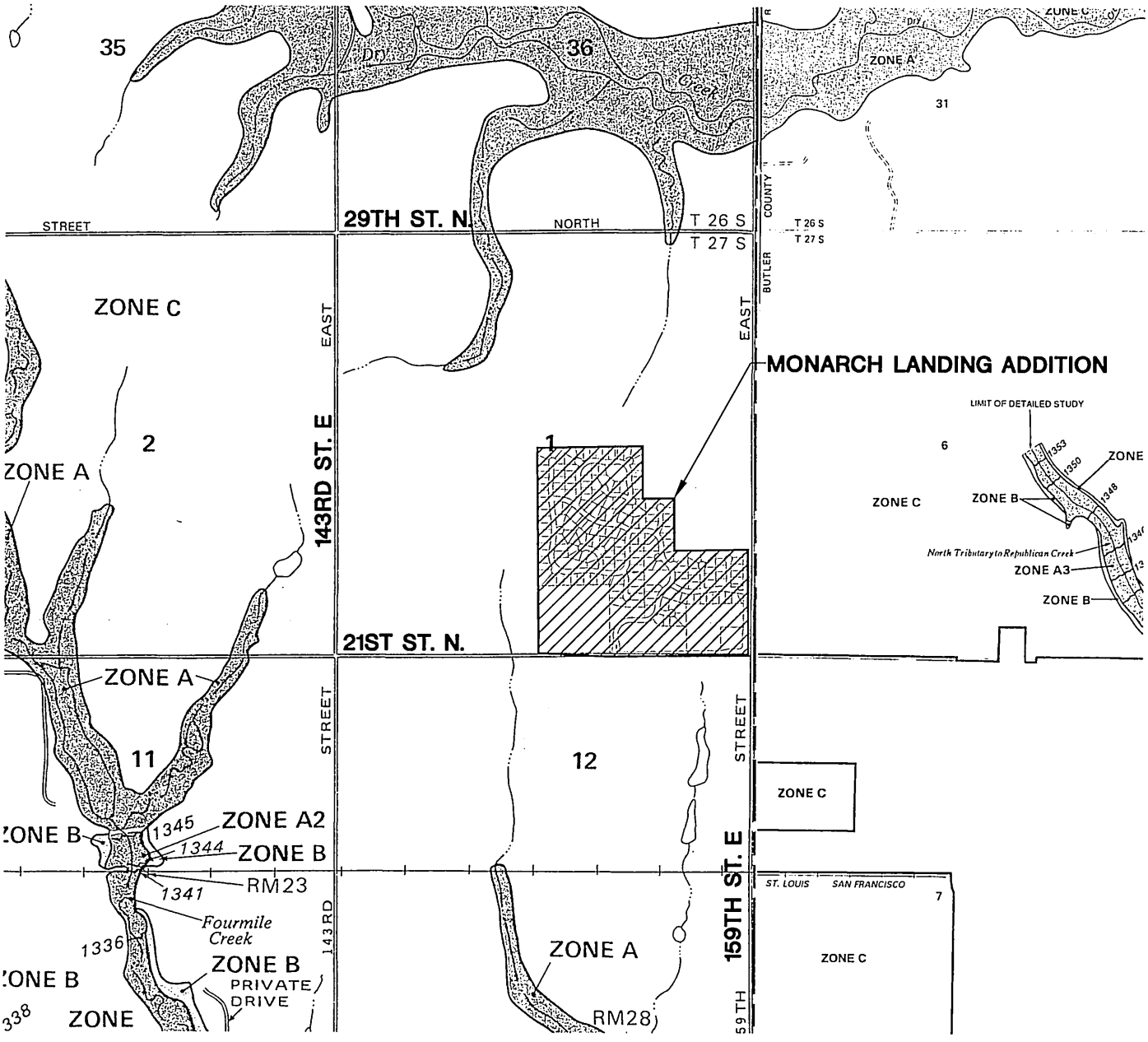
Soil Survey - Sedgwick & Bulter County, KS

Sheet Title:

MKEC ENGINEERING CONSULTANTS, INC.

KWS	SEPT. 2006
Drawn By:	Date:
TM	06201
Design / Review:	Job No.:

Appendix C
Flood Insurance Rate Map (FIRM)
&
Flood Boundary Hazard Map (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

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

BUTLER COUNTY, KANSAS
(UNINCORPORATED AREAS)

(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200037 0165 C

MAP REVISED:
JUNE 20, 2001

Federal Emergency Management Agency

N

APPROXIMATE SCALE
2000 0 2000 FEET

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

MONARCH LANDING ADDITION
PROJECT NAME

FIRM MAP
SEDGWICK & BUTLER COUNTY, KANSAS
SHEET TITLE

AJK	KWS	TM
DESIGN BY:	DRAWN BY:	CHECKED BY:

SEPTEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

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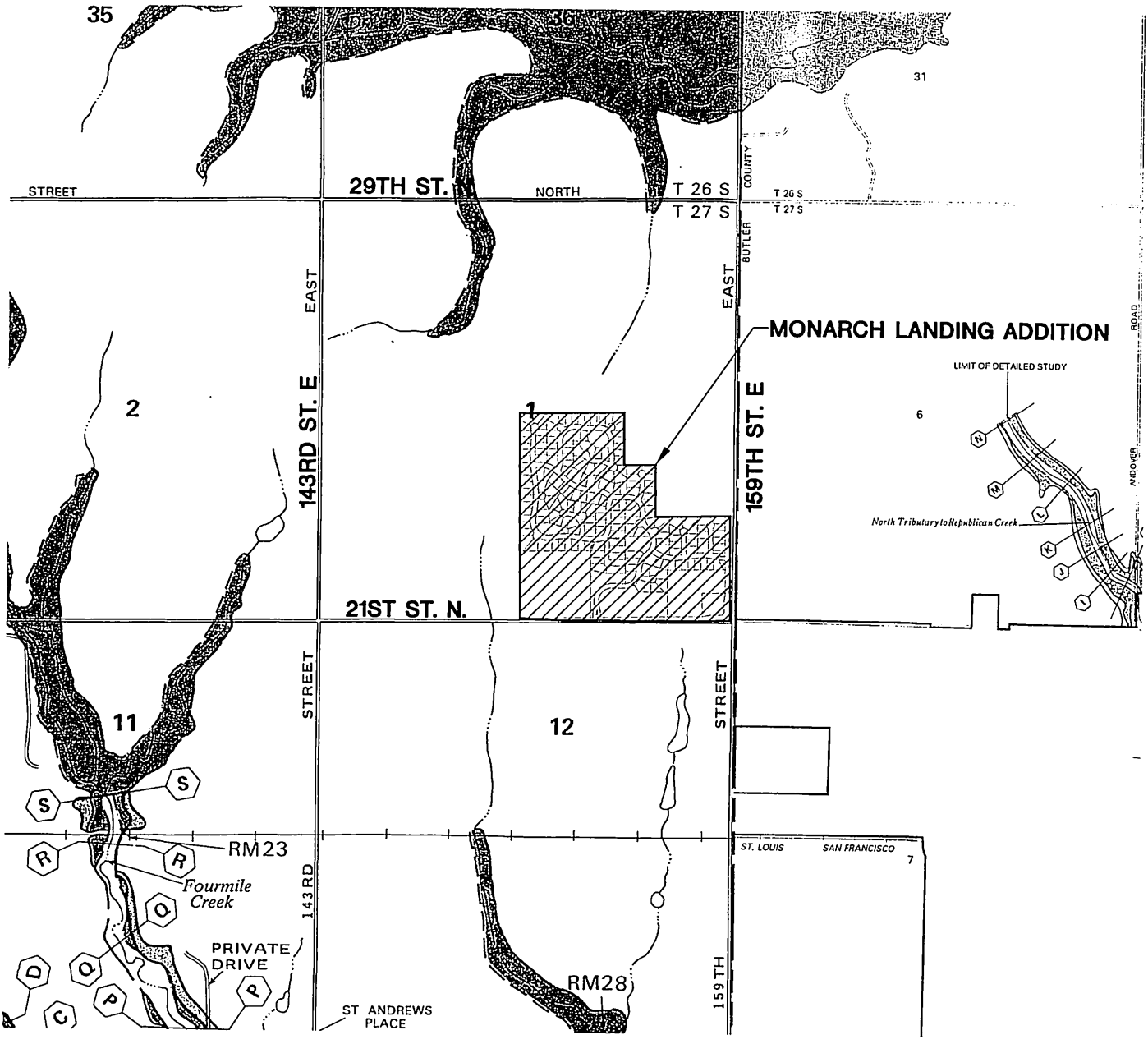

NATIONAL FLOOD INSURANCE PROGRAM

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

NATIONAL FLOOD INSURANCE PROGRAM

FLOODWAY
FLOOD BOUNDARY AND FLOODWAY MAP

BUTLER COUNTY, KANSAS
(UNINCORPORATED AREAS)

PANEL 165 OF 375
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY-PANEL NUMBER
200037 0165

MAP REVISED:
JUNE 20, 2001

Federal Emergency Management Agency

APPROXIMATE SCALE
2000 0 2000 FEET

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

MONARCH LANDING ADDITION
PROJECT NAME

FBFM
SEDGWICK & BUTLER COUNTY, KANSAS
SHEET TITLE

AJK	KWS	TM
DESIGN BY:	DRAWN BY:	CHECKED BY:

SEPTEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

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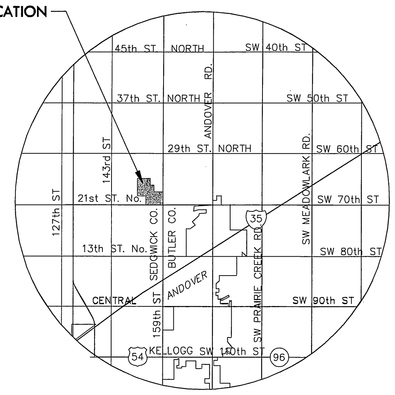
Appendix D
Existing Drainage Boundaries Drawing

Center Sec. 1, T27S, R2E, 6th P.M.
Fnd. ½" pipe

NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. stone

PLAT LOCATION



VICINITY MAP

LEGEND

- CONIFEROUS TREE & DIAMETER
- DECIDUOUS TREE & DIAMETER
- SIGN
- POWER POLE AND GUY ANCHOR
- 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 ELECTRIC LINE
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE I
- DRAINAGE BASIN
- FLOW ARROW

C
AREA=36.9 ac

B
AREA=24.3 ac

A
AREA=38.1 ac

D
AREA=13.1 ac

E
AREA=9.8 ac

GRAYSTONE
BOXTHORN CT.
KEYSTONE CT.
CHELMSFORD
KEY STONE
BOX THORN
CHELMSFORD CIR.
MONTBELLA TER.
RESERVE "A"
RESERVE "B"
RESERVE "D"
RESERVE "E"
RESERVE "F"
21st ST. N.
159th ST. E.
GRAVEL RD.
Hedge Row
CULTIVATED FIELD
RESIDENCE
BARN
POND
Pond
Ditch
Trees
Dense Trees
no buildings
GRASSLAND
8" PRESSURIZED PIPELINE
8" PRESSURIZED PIPELINE
8" PRESSURIZED PIPELINE
PROP. 8" SAN.
PROP. 8" SWS
WTR
S90°13'16"E 1328.59'(M) 1328.72'(Cal)
S88°55'31"W 2652.48'(M)
S88°55'31"W 2652.48'(M)
1625.94'(CM)
Basis of Bearing: Kansas Coordinate System 1983 South Zone S88°55'31"W 2658.28'(M)
N00°09'45"W 2654.67'(M)
80' STREET DEDICATION
10' Right Of Way Agreement (N.10° S. 40') in favor of Sedgwick County, KS Misc. Book 308, Pg. 347 Dated: July 10th 1953
Easement for Right Of Way (width varries) in favor of Sedgwick County, KS Film Book, 1670, Pg. 1900 Dated: Jan. 14th 1997
SW. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M. Fnd. thimble
S.A.C. 90.00'
ONE MAJOR OPENING 70.00'
COMPLETE ACCESS CONTROL 430.00'
ONE MAJOR OPENING 70.00'
COMPLETE ACCESS CONTROL 270.34'
ONE SECTION OPENING 102.00'
NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M. Fnd. stone
SE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M. Fnd. ¾" pipe w/ Moehring cap over thimble

NORTH
SCALE: 1" = 100'
100 0 100 200

J:\CIVIL\06201\DWG\DRNG\EX. BASIN BOUNDARY

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

MONARCH LANDING ADDITION
PROJECT NAME

APPENDIX D
EXIST. BASIN DOUNDARIES
SHEET TITLE

TM	KWS	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
SEPTEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix E
Time of Concentration Calculations

Time of Concentration Calculations by the FAA method

Monarch Landing First Addition

Project Number 0601010201-0300

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

Area Name	Land Use	Soil Group	Maximum Elevation	Minimum Elevation	Flow Length (L)	Rational Runoff Coefficient, C				Time of Concentration (min), T_c				Time of Concentration (hr), T_c				CN
						2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	2-Year	5-Year	10-Year	100-Year	
PRE DEVELOPMENT																		
005 - A	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1376.3*	*1364.0*	*1799*	0.32	0.37	0.47	0.67	67.6	63.3	54.6	37.3	1.1266	1.0544	0.9099	0.6211	80.0
010 - B	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1376.3*	*1364.5*	*1505*	0.32	0.37	0.47	0.67	59.1	55.3	47.7	32.6	0.9845	0.9214	0.7951	0.5427	80.0
035 - C	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1372.0*	*1364.0*	*1320*	0.32	0.37	0.47	0.67	60.3	56.4	48.7	33.2	1.0046	0.9402	0.8114	0.5538	80.0
045 - D	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1375.5*	*1364.0*	*1177*	0.32	0.37	0.47	0.67	48.5	45.4	39.2	26.8	0.8090	0.7572	0.6534	0.4460	80.0
050 - E	*Agricultural - Pasture - Slopes 1-4%*	*D*	*1372.0*	*1363.0*	*985*	0.32	0.37	0.47	0.67	45.4	42.5	36.7	25.0	0.7568	0.7083	0.6113	0.4172	80.0
POST DEVELOPMENT																		
055 A1	*Residential - 1/3 Acre*	*D*	*1373.0*	*1369.0*	*1518*	0.46	0.50	0.59	0.73	70.0	65.6	55.8	40.5	1.1668	1.0939	0.9298	0.6745	86.0
060 A2	*Business - Neighborhood*	*D*	*1370.0*	*1368.0*	*893*	0.68	0.69	0.73	0.80	37.2	36.3	32.8	26.6	0.6200	0.6052	0.5462	0.4428	95.0
063 A3	*Business - Neighborhood*	*D*	*1370.0*	*1368.0*	*895*	0.68	0.69	0.73	0.80	37.3	36.4	32.8	26.6	0.6211	0.6064	0.5472	0.4437	95.0
065 B1	*Residential - 1/4 Acre*	*D*	*1370.5*	*1369.5*	*868*	0.50	0.54	0.62	0.76	65.4	61.0	52.3	37.1	1.0898	1.0171	0.8718	0.6175	87.0
070 B2	*Schools*	*D*	*1372.5*	*1363.0*	*947*	0.49	0.51	0.56	0.66	33.8	32.6	29.9	24.3	0.5626	0.5441	0.4980	0.4058	92.8
075 C1	*Residential - 1/4 Acre*	*D*	*1372.0*	*1364.0*	*1342*	0.50	0.54	0.62	0.76	47.0	43.9	37.6	26.6	0.7835	0.7312	0.6268	0.4440	87.0
085 C2	*Residential - 1/4 Acre*	*D*	*1372.0*	*1364.0*	*1650*	0.50	0.54	0.62	0.76	55.8	52.1	44.7	31.6	0.9307	0.8686	0.7445	0.5274	87.0
090 D	*Residential - 1/4 Acre*	*D*	*1371.0*	*1364.0*	*1238*	0.50	0.54	0.62	0.76	46.0	42.9	36.8	26.0	0.7659	0.7148	0.6127	0.4340	87.0
110 E	*Schools*	*D*	*1372.0*	*1363.0*	*1024*	0.49	0.51	0.56	0.66	36.7	35.5	32.5	26.5	0.6113	0.5913	0.5412	0.4410	95.0

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 005

Total Area = 38.1 Acres
Total Area = 0.0595 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80 38.1
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 010

Total Area = 24.6 Acres
Total Area = 0.0384 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80 24.6
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 035

Total Area = 36.9 Acres
Total Area = 0.0577 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 045

Total Area = 13.1 Acres
Total Area = 0.0204 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 050

Total Area = 9.8 Acres
Total Area = 0.0153 sq. mi.
Composite Curve Number = 80.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	9.8 80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 050

Total Area = 21.7 Acres
Total Area = 0.0339 sq. mi.
Composite Curve Number = 86.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	21.7 86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 060

Total Area = 6.9 Acres
Total Area = 0.0108 sq. mi.
Composite Curve Number = 95.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	6.9 95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 063

Total Area = 13.1 Acres
Total Area = 0.0205 sq. mi.
Composite Curve Number = 95.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	13.1 95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 065

Total Area = 15.7 Acres
Total Area = 0.0245 sq. mi.
Composite Curve Number = 87.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	15.7 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 070

Total Area = 13.0 Acres
Total Area = 0.0204 sq. mi.
Composite Curve Number = 92.83

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	9.5 95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	3.5 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 075

Total Area = 28.9 Acres
Total Area = 0.0451 sq. mi.
Composite Curve Number = 87.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	28.9 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 085

Total Area = 5.4 Acres
Total Area = 0.0085 sq. mi.
Composite Curve Number = 87.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	5.4 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 090

Total Area = 12.4 Acres
Total Area = 0.0194 sq. mi.
Composite Curve Number = 87.00

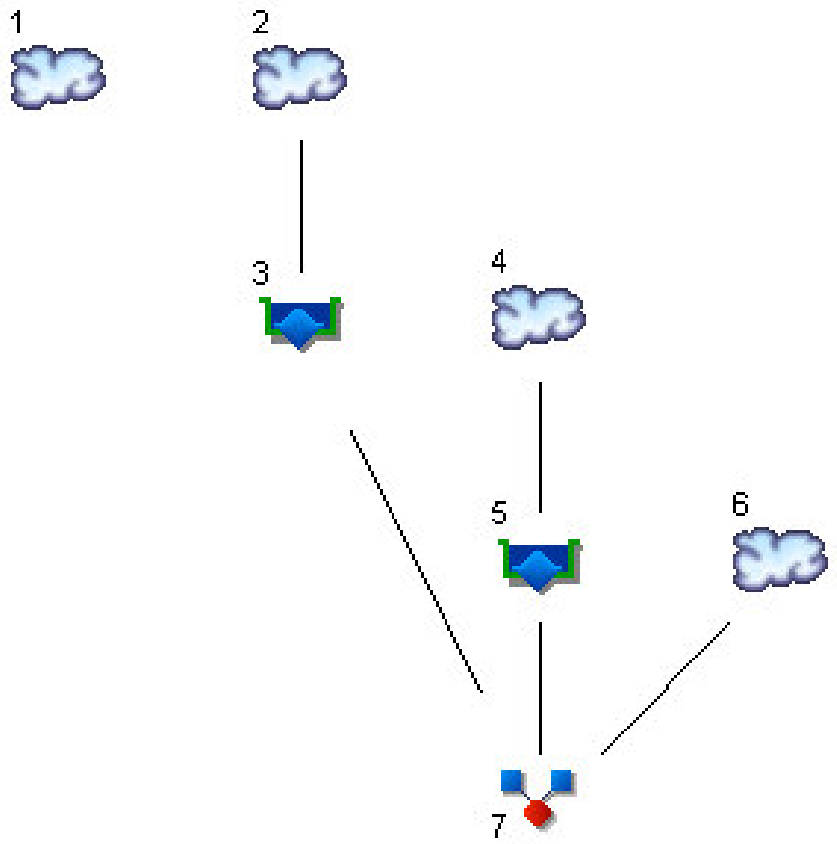
Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	12.4 87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Project Name: Monarch Landing
Project Number: 0601010201-0300
Basin: 110

Total Area = 5.5 Acres
Total Area = 0.0085 sq. mi.
Composite Curve Number = 95.00

Land Use	Percent Impervious	Area/CN Hydrological Soil Group			
		A	B	C	D
Cultivated land without conservation treatment	0	72	81	88	91
Cultivated land with conservation treatement	0	62	71	78	81
Pasture or range land - poor condition	0	68	79	86	89
Pasture or range land - good condition	0	39	61	74	80
Meadow - good condition	0	30	58	71	78
Wood or Forest land - thin stand, poor cover, no mulch	0	45	66	77	83
Wood or Forest land - good cover	0	25	55	70	77
Open spaces - good condition - grass cover on 75% or more of area	0	39	61	74	80
Open spaces - fair condition - grass cover on 50-75% of area	0	49	69	79	84
Commercial and business	85	89	92	94	5.5 95
Industrial	72	81	88	91	93
Residential - 1/8 acre or less	65	77	85	90	92
Residential - 1/4 acre	38	61	75	83	87
Residentail - 1/3 acre	30	57	72	81	86
Residential - 1/2 acre	25	54	70	80	85
Residentail - 1 acre	20	51	68	79	84
Paved Parking lots, roofs, driveways, etc.	-	98	98	98	98
Streets and roads - paved with curbs and storm sewers	-	98	98	98	98
Streets and roads - gravel	-	76	85	89	91
Streets and roads - dirt	-	72	82	87	89
Lake/Pond	100	100	100	100	100

Appendix F
Hydraflow Hydrographs Output



Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed A B4 10
2	SCS Runoff	Watershed A1 FTR 10
3	Reservoir	Watershed A1
4	SCS Runoff	Watershed A2 FTR 10
5	Reservoir	Detention Routing A2
6	SCS Runoff	Watershed A3 FTR 10
7	Combine	Combine All

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	34.02	-------	53.21	66.24	-------	-------	115.28	Watershed A B4 10
2	SCS Runoff	-------	-------	25.23	-------	36.88	44.67	-------	-------	73.15	Watershed A1 FTR 10
3	Reservoir	2	-------	12.42	-------	17.98	23.43	-------	-------	50.08	Watershed A1
4	SCS Runoff	-------	-------	14.53	-------	19.50	22.73	-------	-------	34.40	Watershed A2 FTR 10
5	Reservoir	4	-------	3.99	-------	8.47	11.22	-------	-------	19.93	Detention Routing A2
6	SCS Runoff	-------	-------	27.58	-------	37.01	43.15	-------	-------	65.31	Watershed A3 FTR 10
7	Combine	3, 5, 6	-------	31.71	-------	47.46	59.09	-------	-------	100.96	Combine All

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	34.02	6	750	5.144	----	------	------	Watershed A B4 10
2	SCS Runoff	25.23	6	750	3.763	----	------	------	Watershed A1 FTR 10
3	Reservoir	12.42	6	786	3.757	2	1367.48	1.478	Watershed A1
4	SCS Runoff	14.53	6	732	1.731	----	------	------	Watershed A2 FTR 10
5	Reservoir	3.99	6	768	1.728	4	1368.63	0.915	Detention Routing A2
6	SCS Runoff	27.58	6	732	3.287	----	------	------	Watershed A3 FTR 10
7	Combine	31.71	6	738	8.772	3, 5, 6	------	------	Combine All

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	53.21	6	750	7.949	----	------	------	Watershed A B4 10
2	SCS Runoff	36.88	6	744	5.514	----	------	------	Watershed A1 FTR 10
3	Reservoir	17.98	6	786	5.509	2	1368.04	2.109	Watershed A1
4	SCS Runoff	19.50	6	732	2.357	----	------	------	Watershed A2 FTR 10
5	Reservoir	8.47	6	762	2.354	4	1369.16	1.109	Detention Routing A2
6	SCS Runoff	37.01	6	732	4.474	----	------	------	Watershed A3 FTR 10
7	Combine	47.46	6	744	12.337	3, 5, 6	------	------	Combine All

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	66.24	6	750	9.878	----	------	------	Watershed A B4 10
2	SCS Runoff	44.67	6	744	6.693	----	------	------	Watershed A1 FTR 10
3	Reservoir	23.43	6	786	6.687	2	1368.36	2.487	Watershed A1
4	SCS Runoff	22.73	6	732	2.768	----	------	------	Watershed A2 FTR 10
5	Reservoir	11.22	6	762	2.764	4	1369.45	1.223	Detention Routing A2
6	SCS Runoff	43.15	6	732	5.254	----	------	------	Watershed A3 FTR 10
7	Combine	59.09	6	744	14.706	3, 5, 6	------	------	Combine All

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	115.28	6	744	17.260	----	------	------	Watershed A B4 10
2	SCS Runoff	73.15	6	744	11.099	----	------	------	Watershed A1 FTR 10
3	Reservoir	50.08	6	774	11.094	2	1369.13	3.454	Watershed A1
4	SCS Runoff	34.40	6	732	4.271	----	------	------	Watershed A2 FTR 10
5	Reservoir	19.93	6	756	4.268	4	1370.43	1.636	Detention Routing A2
6	SCS Runoff	65.31	6	732	8.108	----	------	------	Watershed A3 FTR 10
7	Combine	100.96	6	750	23.469	3, 5, 6	------	------	Combine All

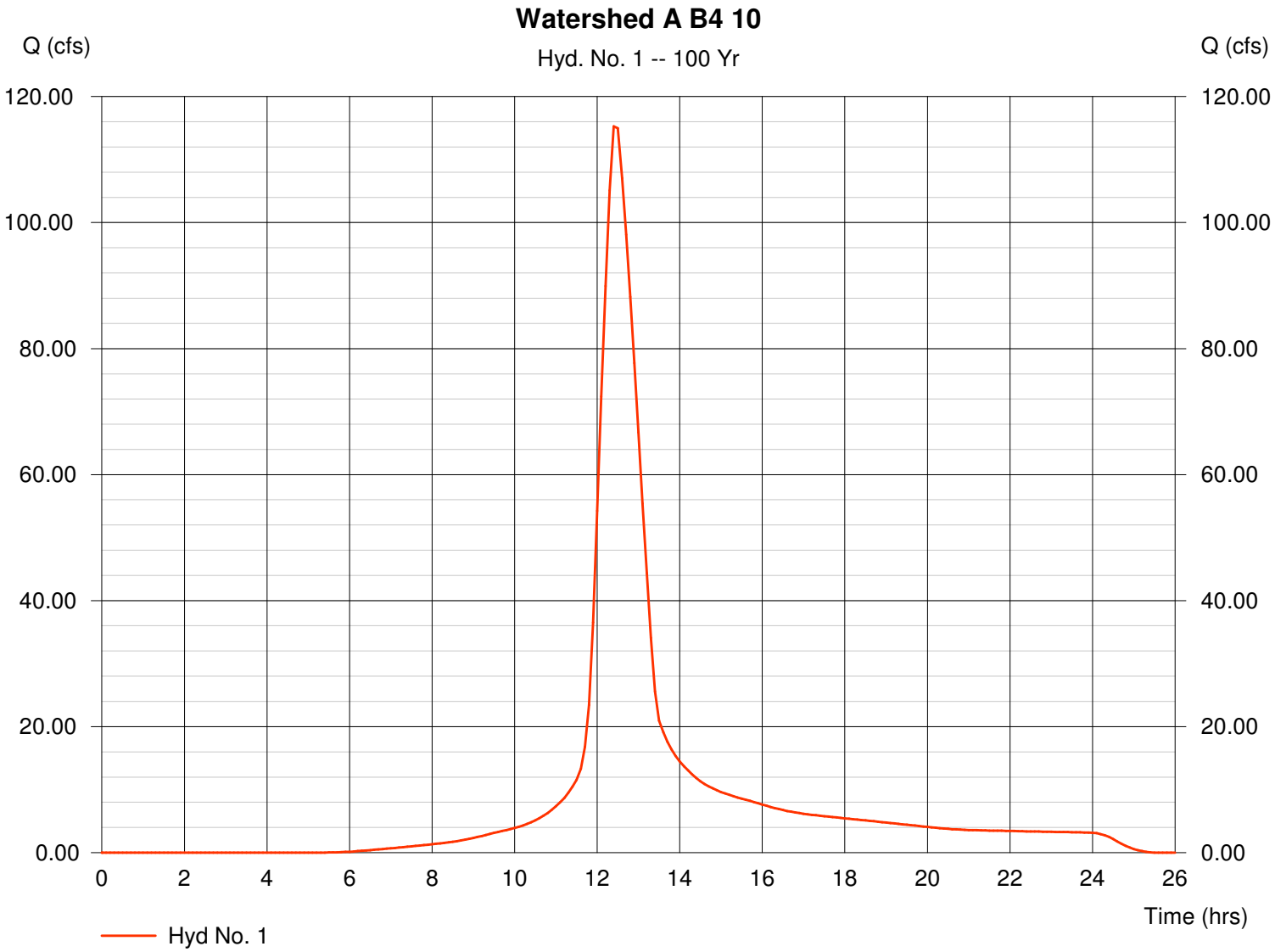
Hydrograph Plot

Hyd. No. 1

Watershed A B4 10

Hydrograph type	= SCS Runoff	Peak discharge	= 115.28 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 38.090 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 54.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 17.260 acft



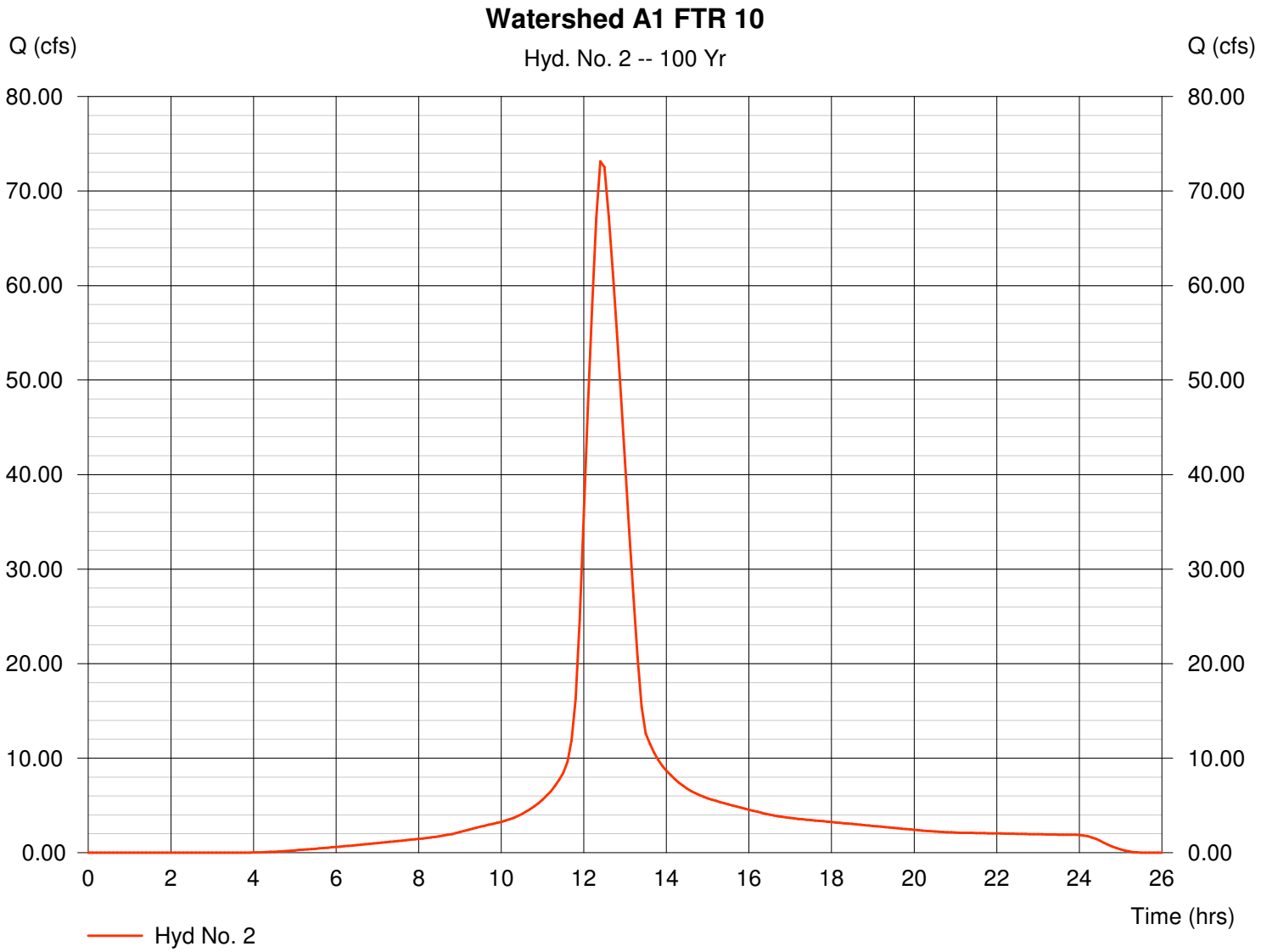
Hydrograph Plot

Hyd. No. 2

Watershed A1 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 73.15 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 21.700 ac	Curve number	= 86
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 55.80 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 11.099 acft



Hydrograph Plot

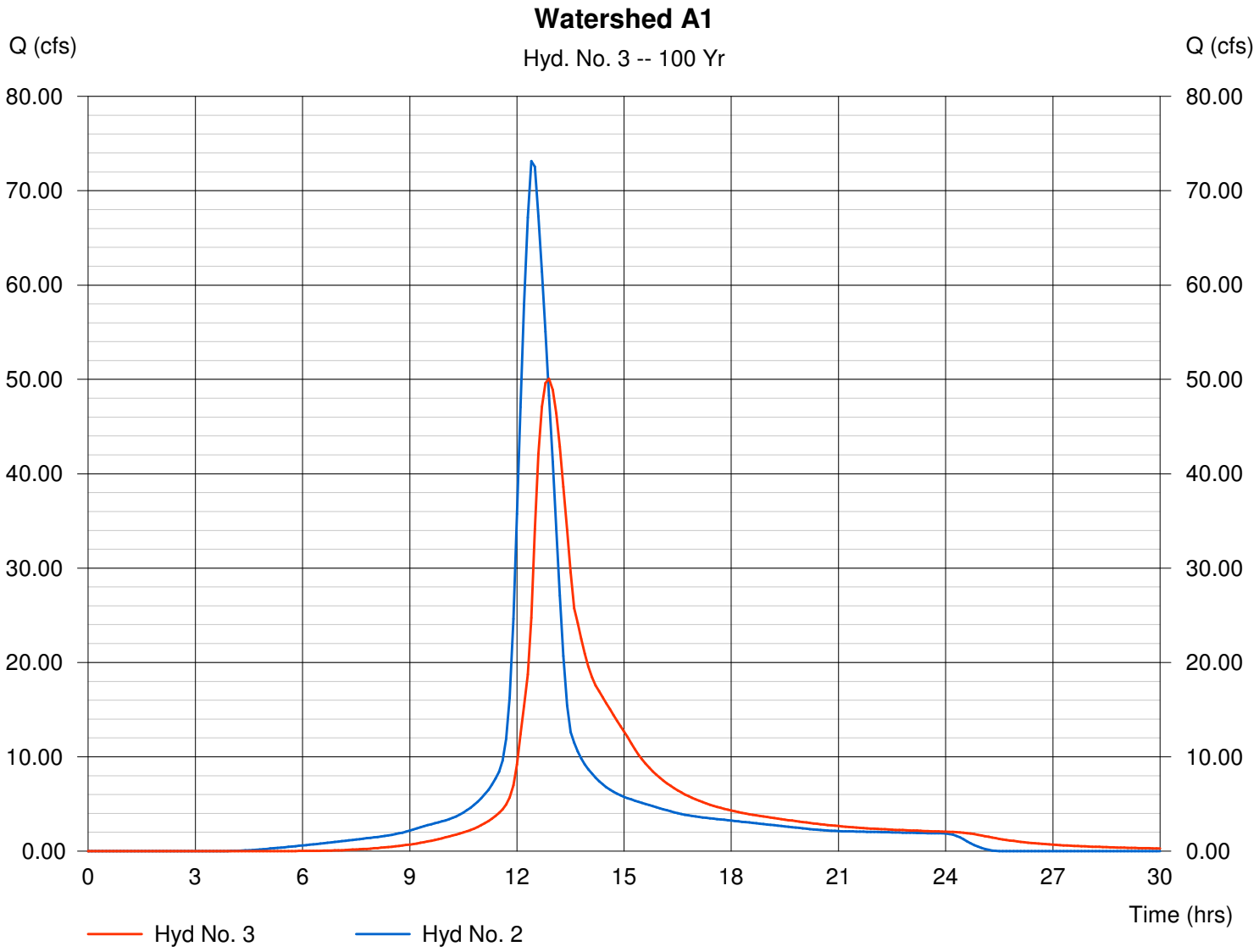
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:40 PM

Hyd. No. 3

Watershed A1

Hydrograph type	=	Reservoir	Peak discharge	=	50.08 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	2	Max. Elevation	=	1369.13 ft
Reservoir name	=	Conceptual Watershed A1	Max. Storage	=	3.454 acft

Storage Indication method used. | Hydrograph Volume = 11.094 acft



Pond Report

Pond No. 1 - Conceptual Watershed A1

Pond Data

Bottom LxW = 200.0 x 200.0 ft Side slope = 6.0:1 Bottom elev. = 1366.00 ft Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1366.00	40,000	0.000	0.000
0.25	1366.25	41,209	0.233	0.233
0.50	1366.50	42,436	0.240	0.473
0.75	1366.75	43,681	0.247	0.720
1.00	1367.00	44,944	0.254	0.974
1.25	1367.25	46,225	0.262	1.236
1.50	1367.50	47,524	0.269	1.505
1.75	1367.75	48,841	0.277	1.782
2.00	1368.00	50,176	0.284	2.066
2.25	1368.25	51,529	0.292	2.358
2.50	1368.50	52,900	0.300	2.657
2.75	1368.75	54,289	0.308	2.965
3.00	1369.00	55,696	0.316	3.280
3.25	1369.25	57,121	0.324	3.604
3.50	1369.50	58,564	0.332	3.936
3.75	1369.75	60,025	0.340	4.276
4.00	1370.00	61,504	0.349	4.625
4.25	1370.25	63,001	0.357	4.982
4.50	1370.50	64,516	0.366	5.348
4.75	1370.75	66,049	0.375	5.723
5.00	1371.00	67,600	0.384	6.107

Culvert / Orifice Structures

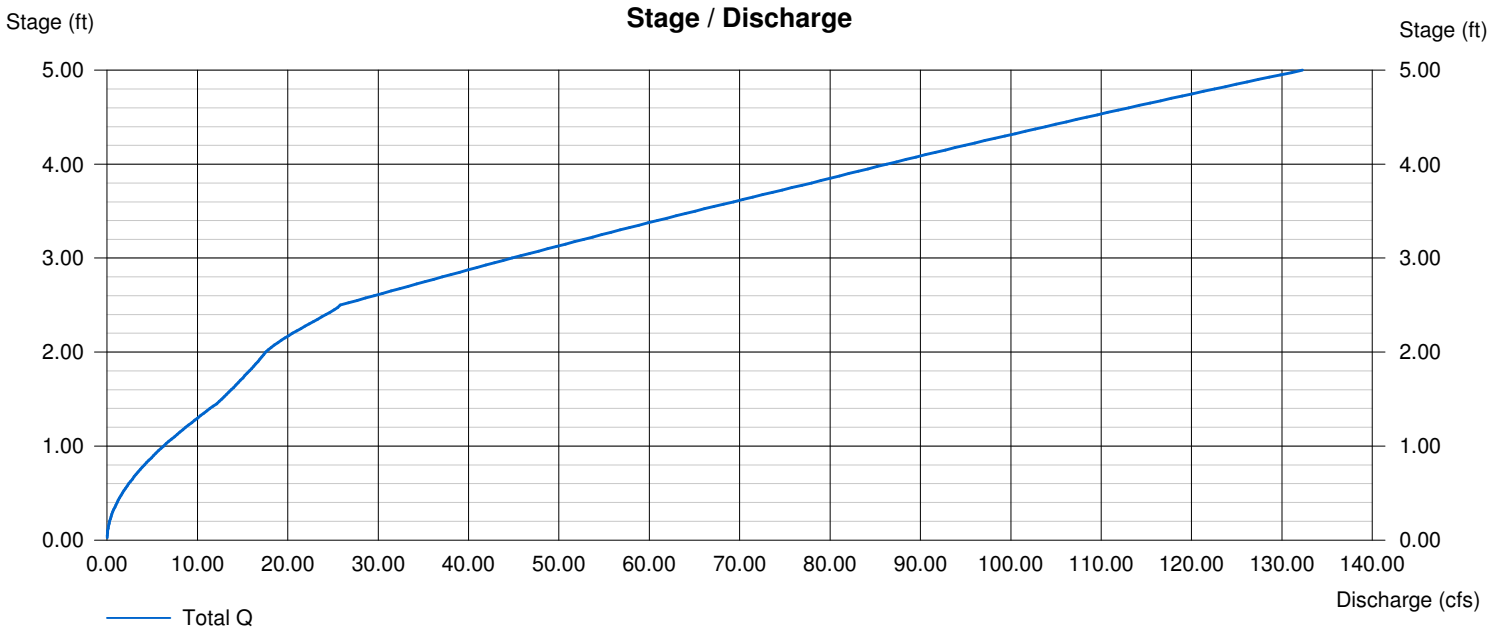
	[A]	[B]	[C]	[D]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1366.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 5.00	0.00	0.00	0.00
Crest El. (ft)	= 1368.00	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 (Wet area) Tailwater Elev. = 0.00 ft

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



Hydrograph Plot

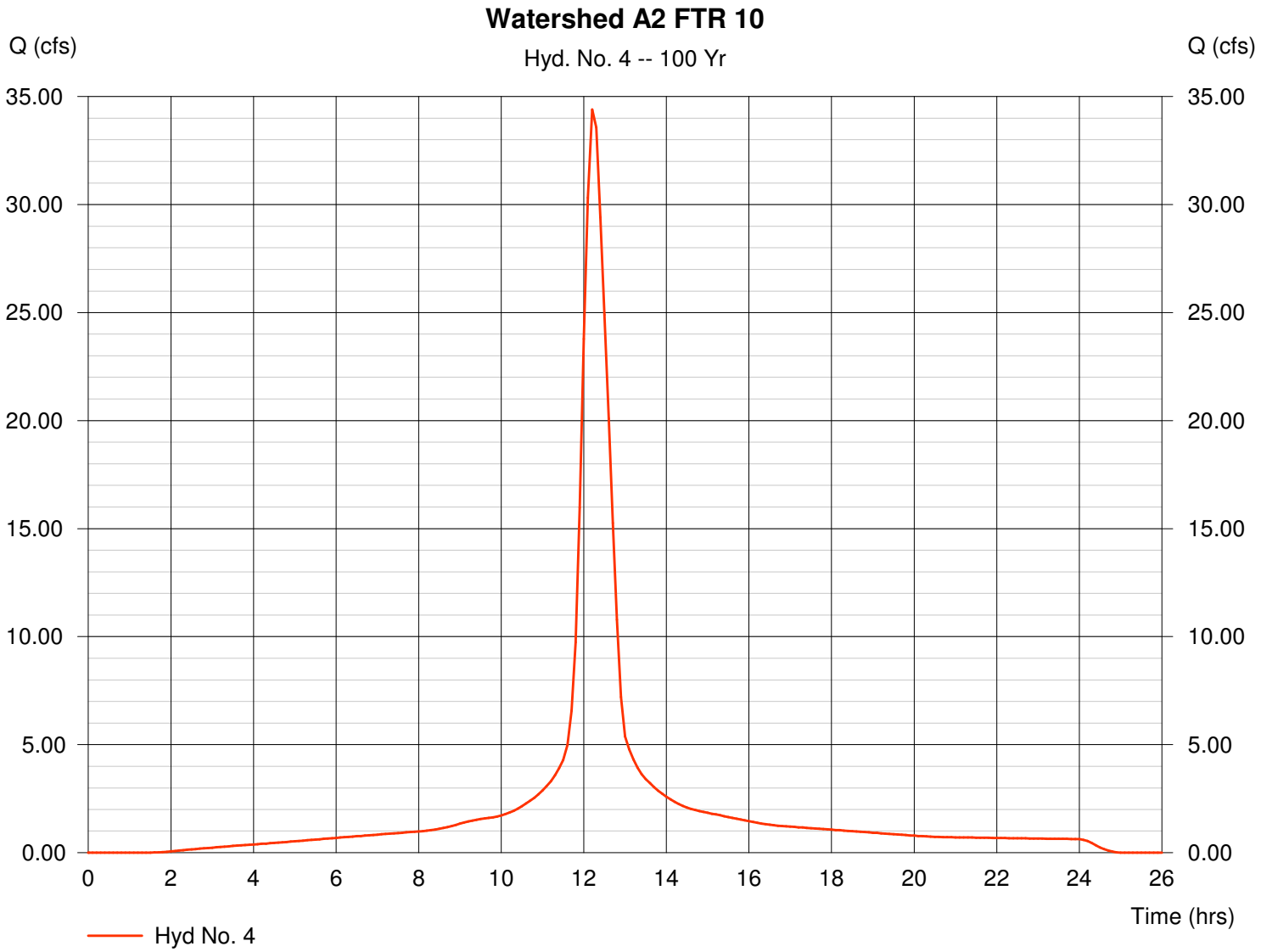
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:40 PM

Hyd. No. 4

Watershed A2 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 34.40 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 6.900 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 32.80 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4.271 acft



Hydrograph Plot

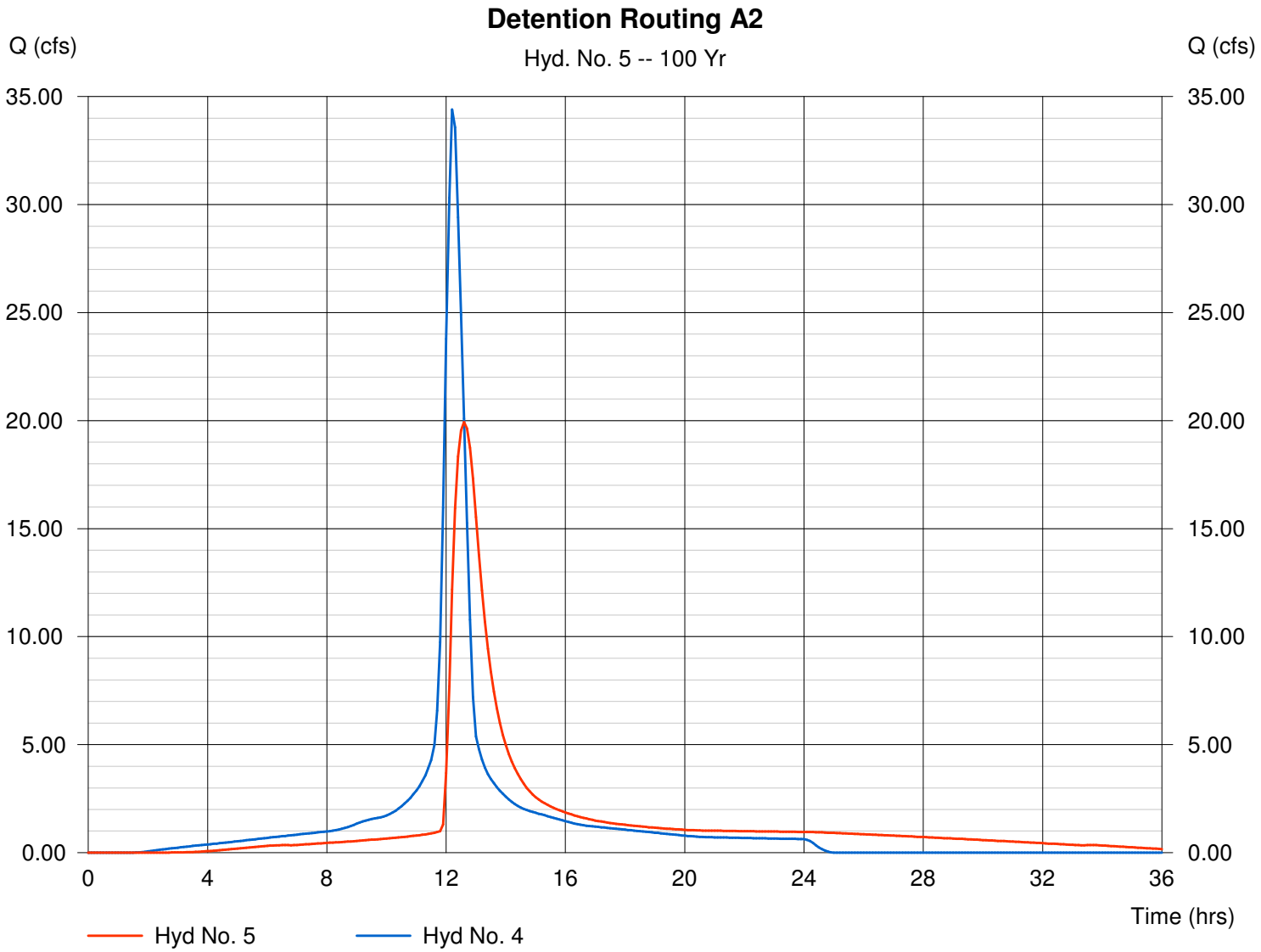
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:40 PM

Hyd. No. 5

Detention Routing A2

Hydrograph type	=	Reservoir	Peak discharge	=	19.93 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	4	Max. Elevation	=	1370.43 ft
Reservoir name	=	Watershed A2	Max. Storage	=	1.636 acft

Storage Indication method used. | Hydrograph Volume = 4.268 acft



Pond Report

Pond No. 2 - Watershed A2

Pond Data

Bottom LxW = 100.0 x 100.0 ft Side slope = 4.0:1 Bottom elev. = 1365.50 ft Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1365.50	10,000	0.000	0.000
0.25	1365.75	10,404	0.059	0.059
0.50	1366.00	10,816	0.061	0.119
0.75	1366.25	11,236	0.063	0.183
1.00	1366.50	11,664	0.066	0.248
1.25	1366.75	12,100	0.068	0.317
1.50	1367.00	12,544	0.071	0.387
1.75	1367.25	12,996	0.073	0.461
2.00	1367.50	13,456	0.076	0.537
2.25	1367.75	13,924	0.079	0.615
2.50	1368.00	14,400	0.081	0.696
2.75	1368.25	14,884	0.084	0.780
3.00	1368.50	15,376	0.087	0.867
3.25	1368.75	15,876	0.090	0.957
3.50	1369.00	16,384	0.093	1.049
3.75	1369.25	16,900	0.096	1.145
4.00	1369.50	17,424	0.098	1.243
4.25	1369.75	17,956	0.102	1.345
4.50	1370.00	18,496	0.105	1.450
4.75	1370.25	19,044	0.108	1.557
5.00	1370.50	19,600	0.111	1.668

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 6.00	36.00	0.00	0.00
Span (in)	= 6.00	36.00	0.00	0.00
No. Barrels	= 1	1	0	0
Invert El. (ft)	= 1365.50	1368.00	0.00	0.00
Length (ft)	= 50.00	50.00	0.00	0.00
Slope (%)	= 0.50	0.50	0.00	0.00
N-Value	= .013	.013	.000	.000
Orif. Coeff.	= 0.60	0.60	0.00	0.00
Multi-Stage	= n/a	No	No	No

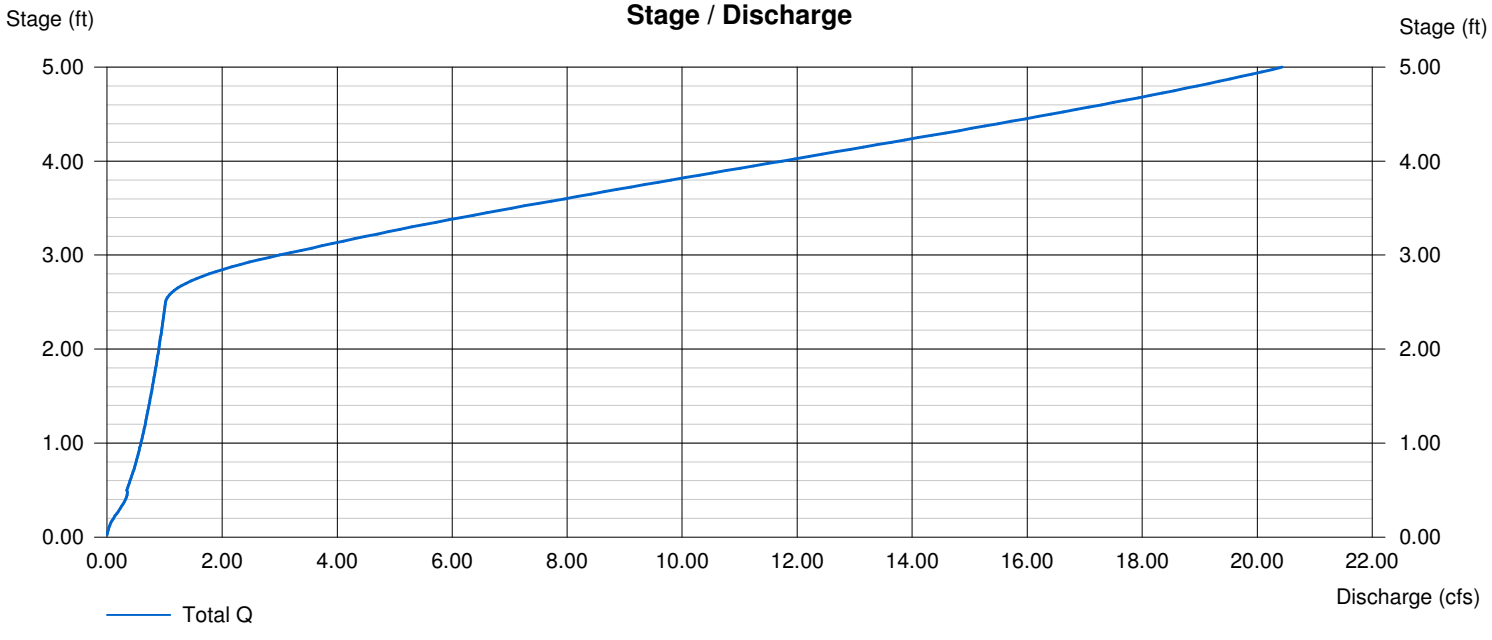
Weir Structures

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

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

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

Stage / Discharge



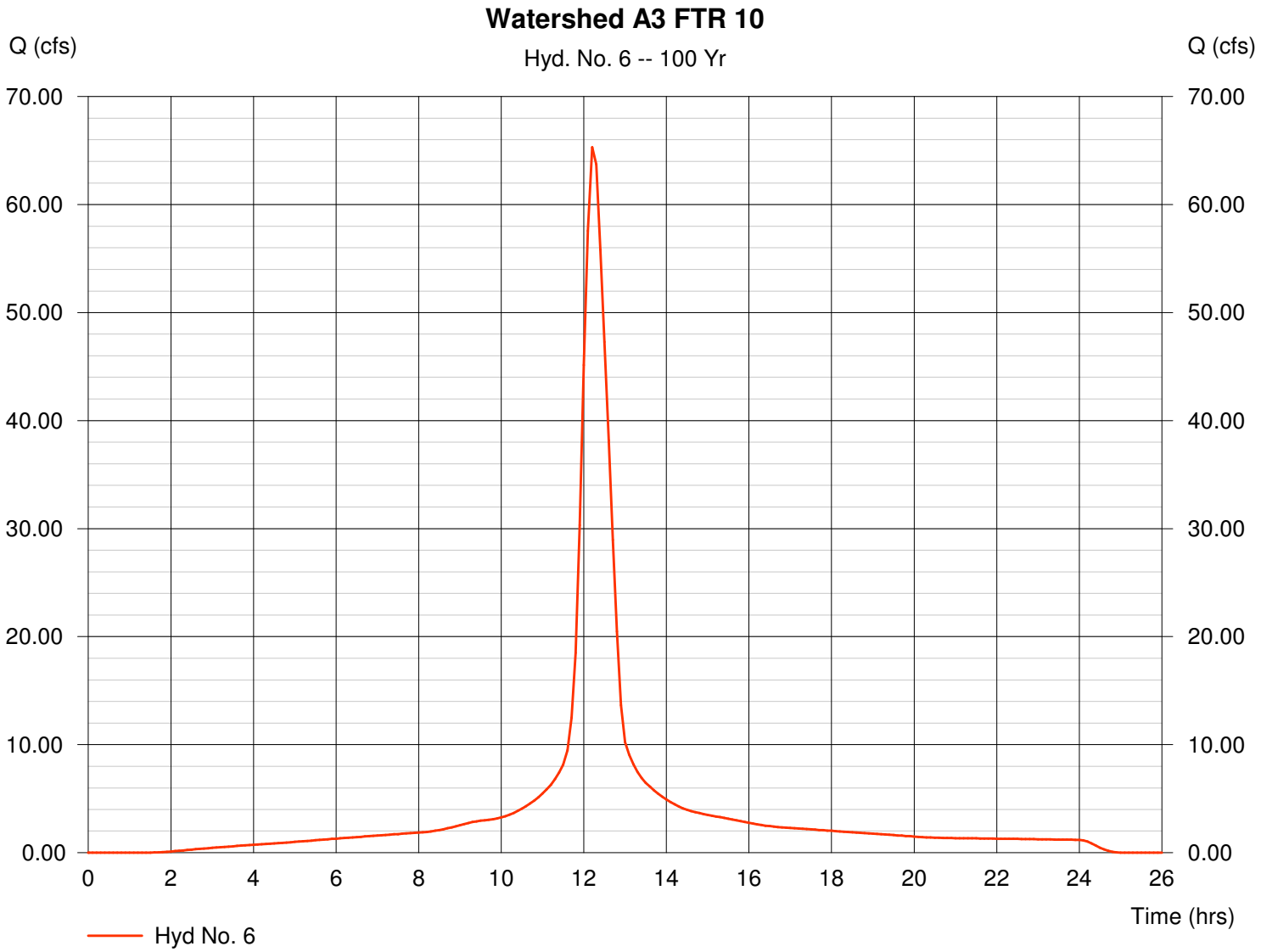
Hydrograph Plot

Hyd. No. 6

Watershed A3 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 65.31 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 13.100 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 32.80 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 8.108 acft



Hydrograph Plot

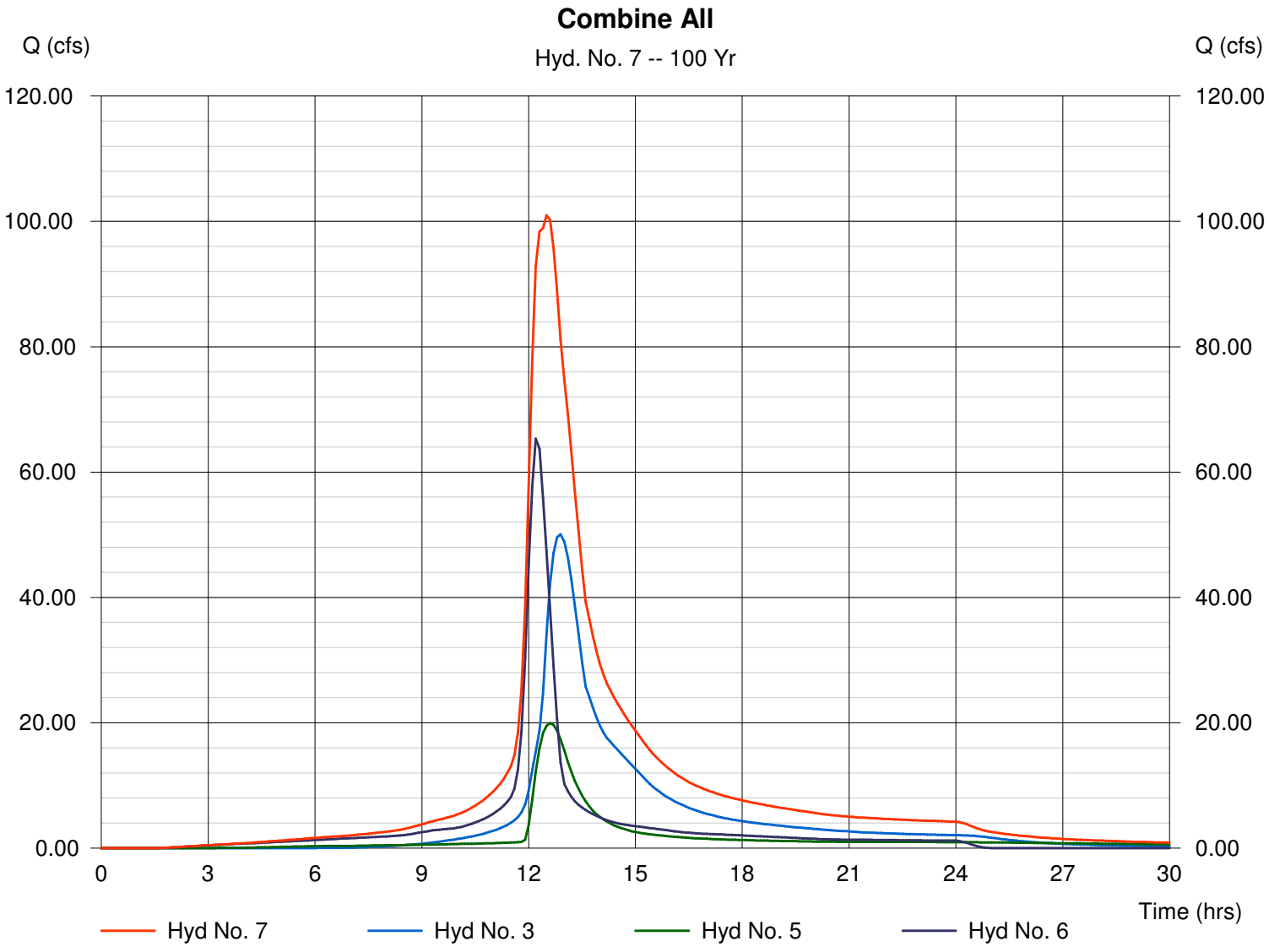
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:40 PM

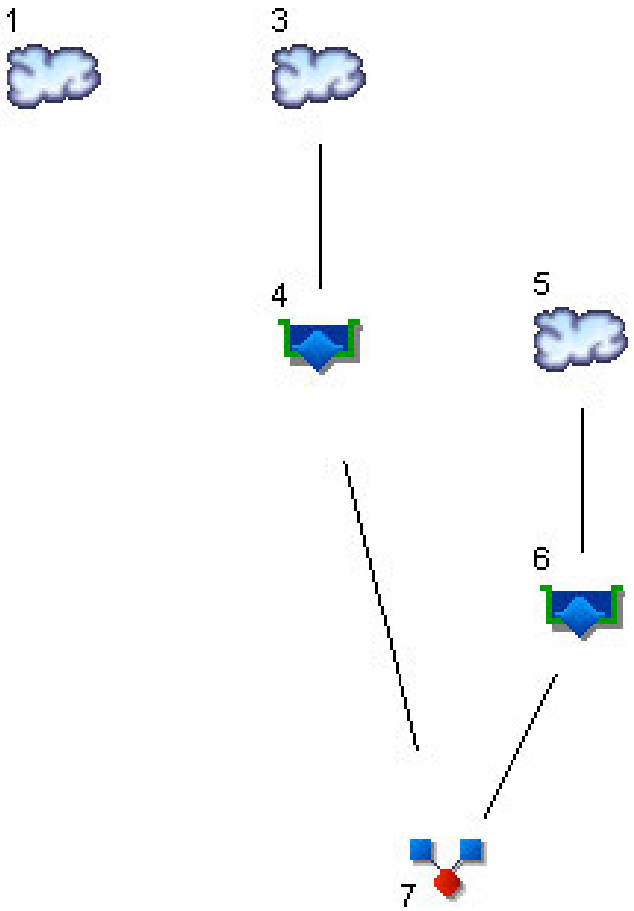
Hyd. No. 7

Combine All

Hydrograph type	= Combine	Peak discharge	= 100.96 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyds.	= 3, 5, 6		

Hydrograph Volume = 23.469 acft





Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed B West
3	SCS Runoff	Watershed B1 FTR Res
4	Reservoir	Watershed B1
5	SCS Runoff	Watershed B2 FTR WestSchool
6	Reservoir	School Detention
7	Combine	Total Discharge to West

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	24.48	-------	38.18	47.55	-------	-------	83.02	Watershed B West
3	SCS Runoff	-------	-------	18.93	-------	27.43	33.07	-------	-------	53.60	Watershed B1 FTR Res
4	Reservoir	3	-------	2.36	-------	5.92	8.36	-------	-------	15.49	Watershed B1
5	SCS Runoff	-------	-------	27.47	-------	36.87	42.98	-------	-------	65.06	Watershed B2 FTR WestSchool
6	Reservoir	5	-------	21.71	-------	35.33	42.69	-------	-------	64.53	School Detention
7	Combine	4, 6	-------	21.71	-------	35.34	43.11	-------	-------	69.94	Total Discharge to West

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	24.48	6	744	3.194	----	------	------	Watershed B West
3	SCS Runoff	18.93	6	750	2.825	----	------	------	Watershed B1 FTR Res
4	Reservoir	2.36	6	846	1.833	3	1367.76	1.789	Watershed B1
5	SCS Runoff	27.47	6	732	3.274	----	------	------	Watershed B2 FTR WestSchool
6	Reservoir	21.71	6	750	3.273	5	1367.09	0.606	School Detention
7	Combine	21.71	6	750	5.106	4, 6	------	------	Total Discharge to West

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	38.18	6	744	4.936	----	------	------	Watershed B West
3	SCS Runoff	27.43	6	744	4.105	----	------	------	Watershed B1 FTR Res
4	Reservoir	5.92	6	804	3.113	3	1368.30	2.417	Watershed B1
5	SCS Runoff	36.87	6	732	4.457	----	------	------	Watershed B2 FTR WestSchool
6	Reservoir	35.33	6	738	4.456	5	1367.34	0.674	School Detention
7	Combine	35.34	6	738	7.569	4, 6	------	------	Total Discharge to West

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	47.55	6	738	6.134	----	------	------	Watershed B West
3	SCS Runoff	33.07	6	744	4.963	----	------	------	Watershed B1 FTR Res
4	Reservoir	8.36	6	804	3.971	3	1368.65	2.839	Watershed B1
5	SCS Runoff	42.98	6	732	5.234	----	------	------	Watershed B2 FTR WestSchool
6	Reservoir	42.69	6	738	5.233	5	1367.45	0.703	School Detention
7	Combine	43.11	6	738	9.205	4, 6	------	------	Total Discharge to West

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	83.02	6	738	10.718	----	------	------	Watershed B West
3	SCS Runoff	53.60	6	744	8.163	----	------	------	Watershed B1 FTR Res
4	Reservoir	15.49	6	798	7.171	3	1369.92	4.514	Watershed B1
5	SCS Runoff	65.06	6	732	8.077	----	------	------	Watershed B2 FTR WestSchool
6	Reservoir	64.53	6	738	8.076	5	1367.71	0.778	School Detention
7	Combine	69.94	6	738	15.247	4, 6	------	------	Total Discharge to West

Hydrograph Plot

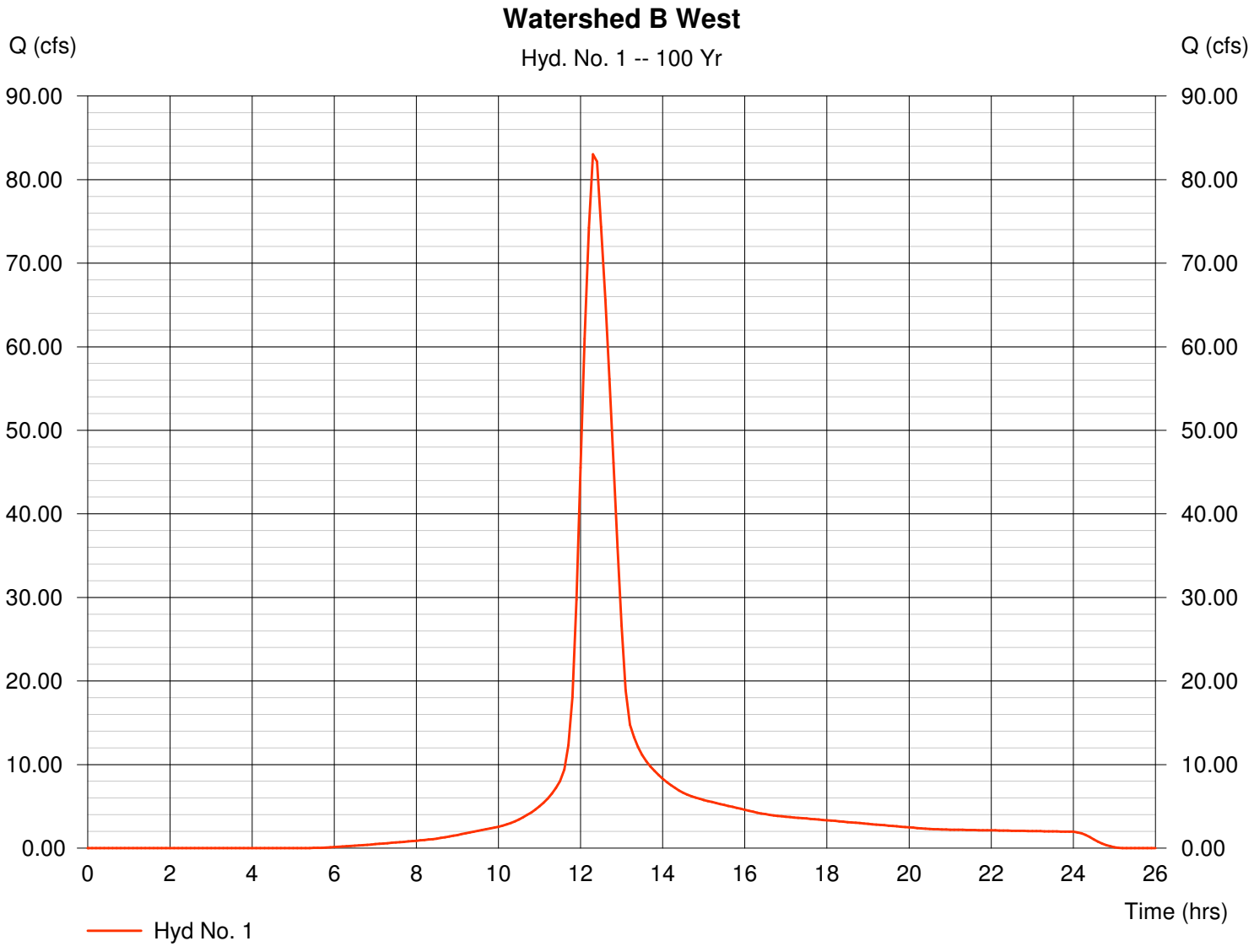
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:49 PM

Hyd. No. 1

Watershed B West

Hydrograph type	= SCS Runoff	Peak discharge	= 83.02 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 24.259 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 47.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 10.718 acft



Hydrograph Plot

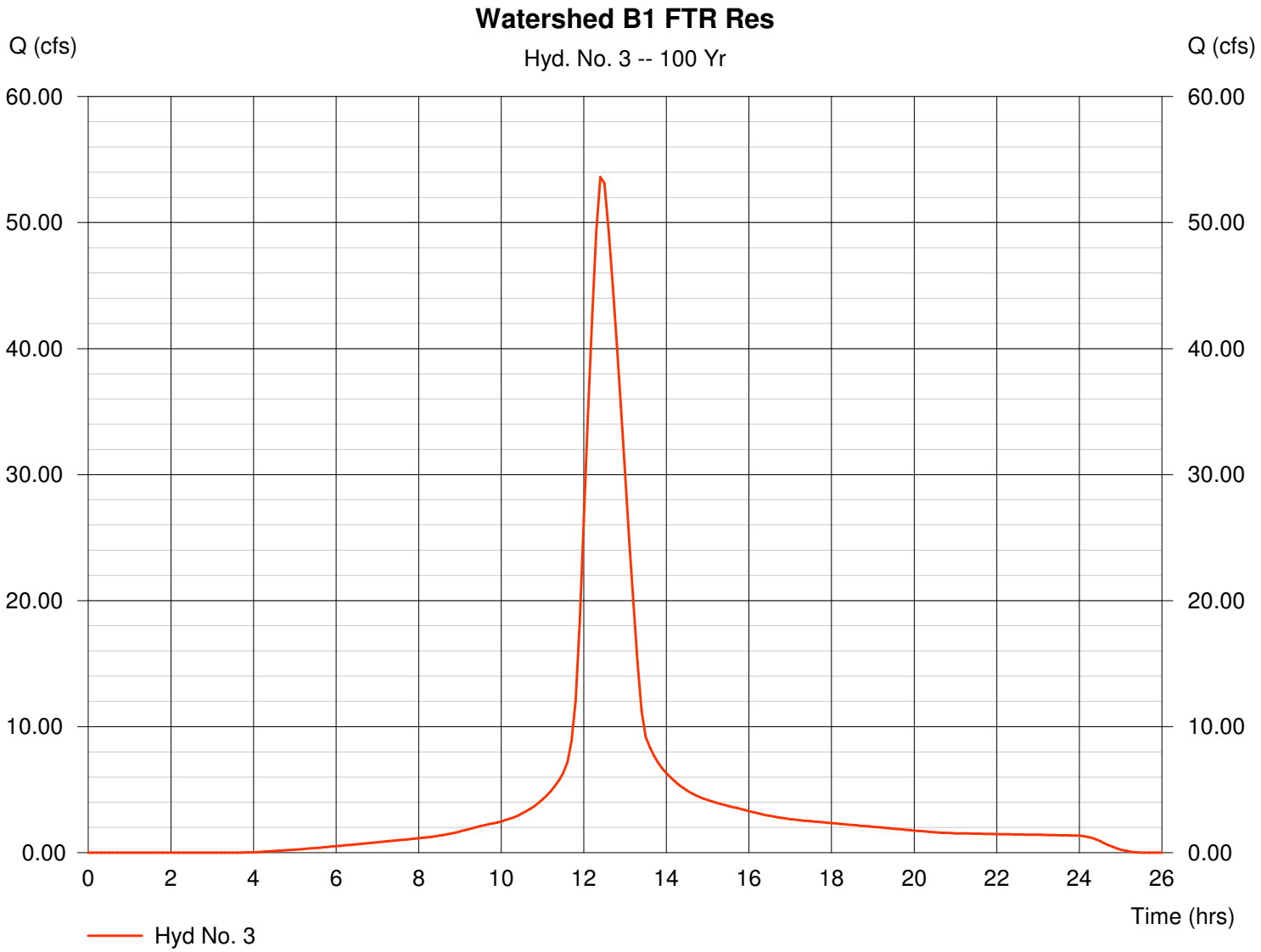
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:49 PM

Hyd. No. 3

Watershed B1 FTR Res

Hydrograph type	= SCS Runoff	Peak discharge	= 53.60 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 15.660 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 52.30 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 8.163 acft



Hydrograph Plot

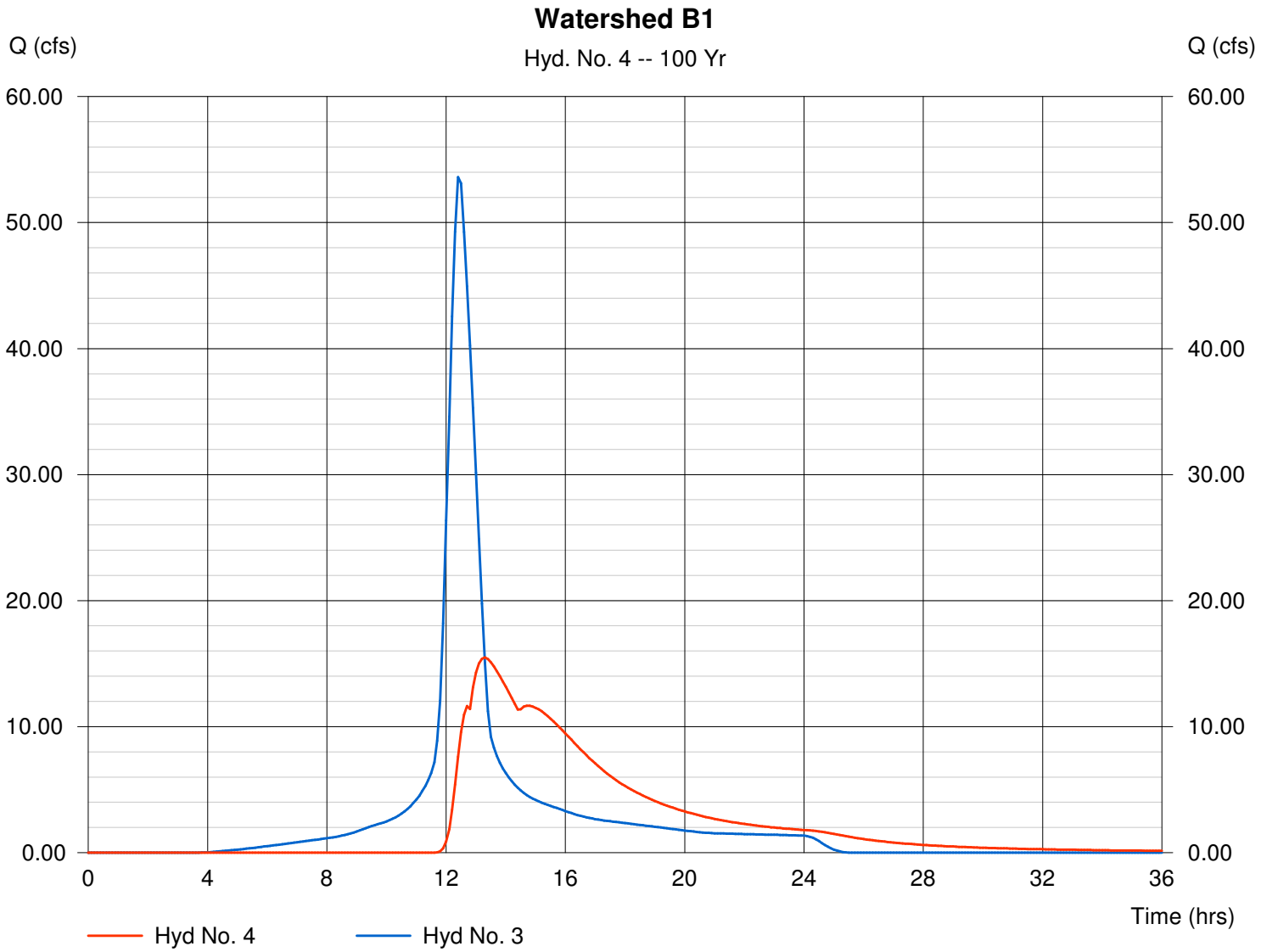
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:49 PM

Hyd. No. 4

Watershed B1

Hydrograph type	=	Reservoir	Peak discharge	=	15.49 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	3	Max. Elevation	=	1369.92 ft
Reservoir name	=	Watershed B1 NorthWest	Max. Storage	=	4.514 acft

Storage Indication method used. | Hydrograph Volume = 7.171 acft



Pond Report

Pond No. 1 - Watershed B1 NorthWest

Pond Data

Bottom LxW = 200.0 x 200.0 ft Side slope = 6.0:1 Bottom elev. = 1366.00 ft Depth = 7.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1366.00	40,000	0.000	0.000
0.35	1366.35	41,698	0.328	0.328
0.70	1366.70	43,431	0.342	0.670
1.05	1367.05	45,199	0.356	1.026
1.40	1367.40	47,002	0.370	1.397
1.75	1367.75	48,841	0.385	1.782
2.10	1368.10	50,715	0.400	2.182
2.45	1368.45	52,624	0.415	2.597
2.80	1368.80	54,569	0.431	3.027
3.15	1369.15	56,549	0.446	3.474
3.50	1369.50	58,564	0.462	3.936
3.85	1369.85	60,614	0.479	4.415
4.20	1370.20	62,700	0.495	4.910
4.55	1370.55	64,821	0.512	5.423
4.90	1370.90	66,977	0.529	5.952
5.25	1371.25	69,169	0.547	6.499
5.60	1371.60	71,396	0.565	7.064
5.95	1371.95	73,658	0.583	7.646
6.30	1372.30	75,955	0.601	8.247
6.65	1372.65	78,288	0.620	8.867
7.00	1373.00	80,656	0.639	9.506

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 30.00	0.00	0.00	0.00
Span (in)	= 30.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1365.00	0.00	0.00	0.00
Length (ft)	= 450.00	0.00	0.00	0.00
Slope (%)	= 0.10	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

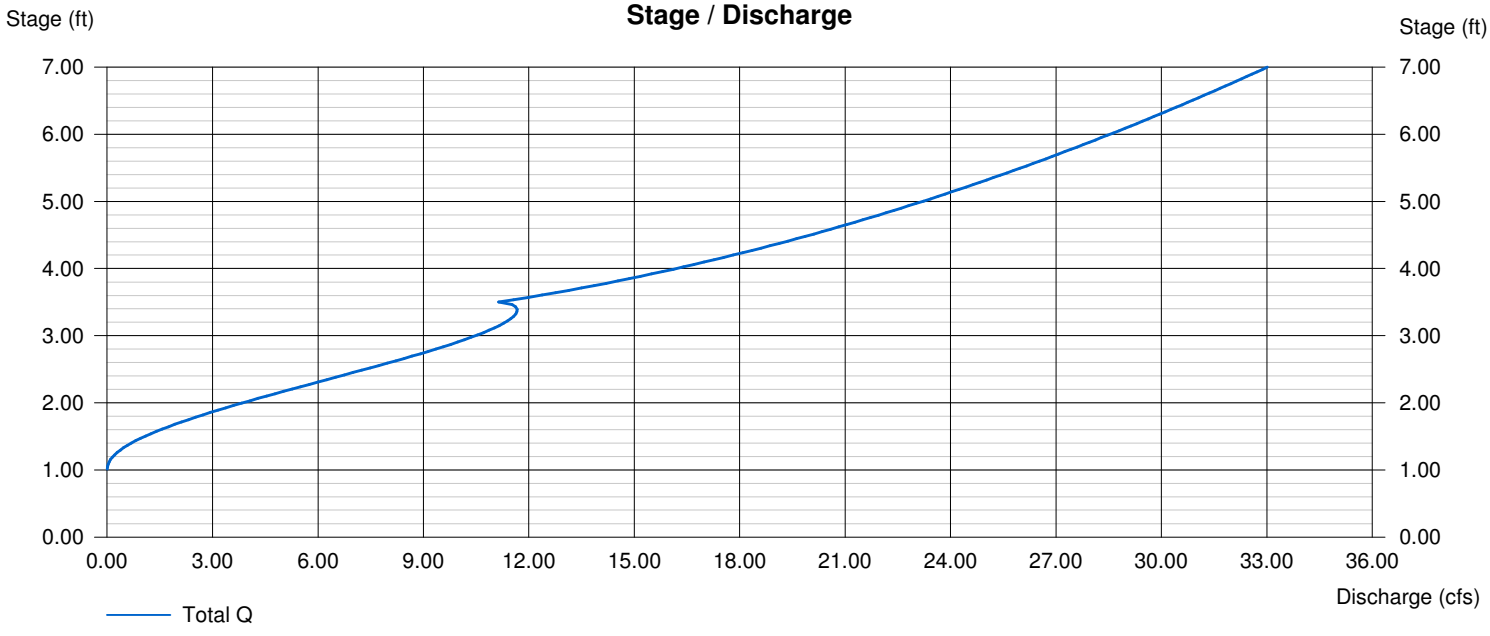
Weir Structures

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

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

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

Stage / Discharge



Hydrograph Plot

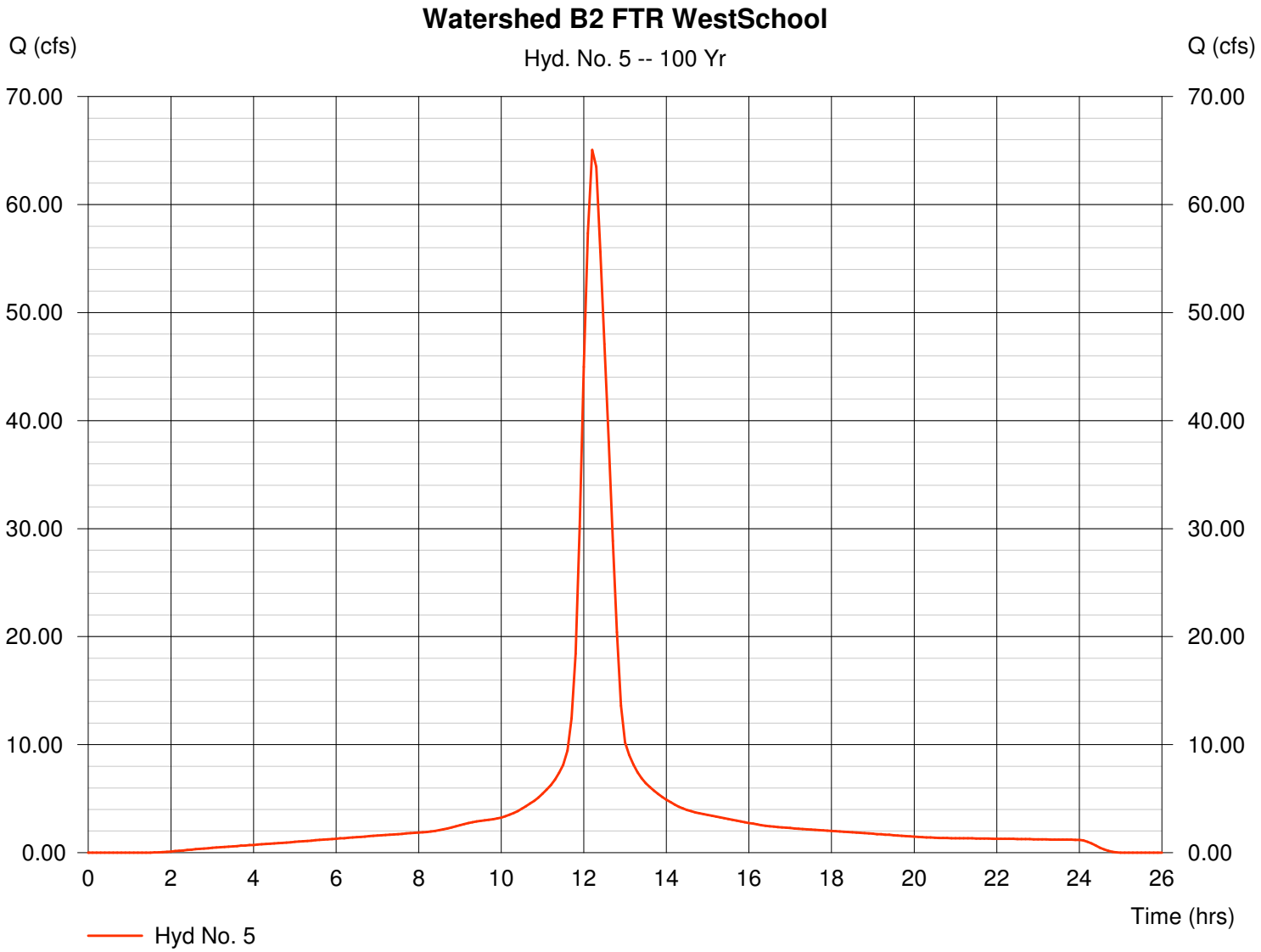
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:49 PM

Hyd. No. 5

Watershed B2 FTR WestSchool

Hydrograph type	= SCS Runoff	Peak discharge	= 65.06 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 13.050 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 29.90 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 8.077 acft



Hydrograph Plot

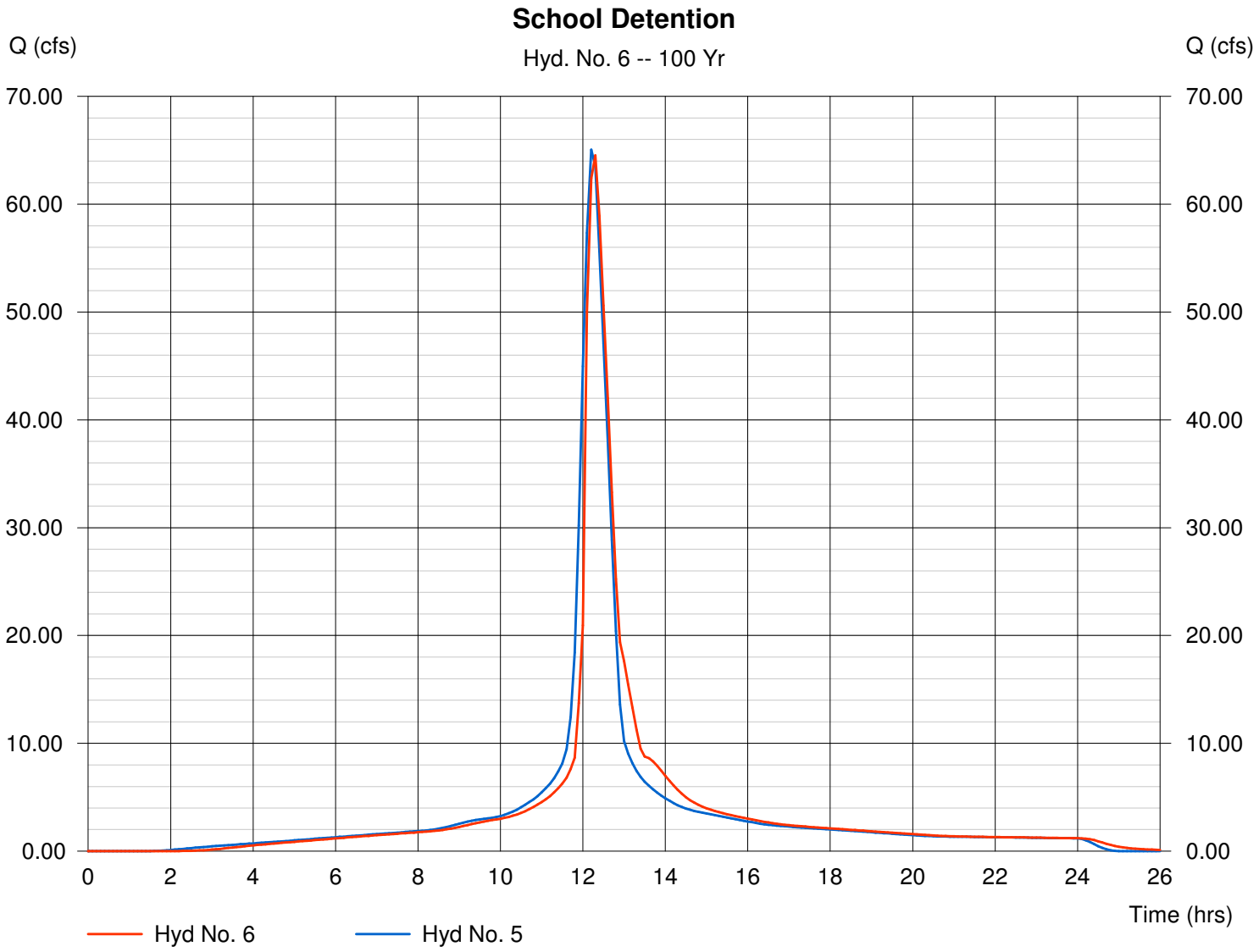
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:49 PM

Hyd. No. 6

School Detention

Hydrograph type	=	Reservoir	Peak discharge	=	64.53 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	5	Max. Elevation	=	1367.71 ft
Reservoir name	=	School Detention	Max. Storage	=	0.778 acft

Storage Indication method used. | Hydrograph Volume = 8.076 acft



Pond Report

Pond No. 2 - School Detention

Pond Data

Bottom LxW = 40.0 x 150.0 ft Side slope = 4.0:1 Bottom elev. = 1364.00 ft Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1364.00	6,000	0.000	0.000
0.25	1364.25	6,384	0.036	0.036
0.50	1364.50	6,776	0.038	0.073
0.75	1364.75	7,176	0.040	0.113
1.00	1365.00	7,584	0.042	0.156
1.25	1365.25	8,000	0.045	0.200
1.50	1365.50	8,424	0.047	0.248
1.75	1365.75	8,856	0.050	0.297
2.00	1366.00	9,296	0.052	0.349
2.25	1366.25	9,744	0.055	0.404
2.50	1366.50	10,200	0.057	0.461
2.75	1366.75	10,664	0.060	0.521
3.00	1367.00	11,136	0.063	0.583
3.25	1367.25	11,616	0.065	0.649
3.50	1367.50	12,104	0.068	0.717
3.75	1367.75	12,600	0.071	0.788
4.00	1368.00	13,104	0.074	0.861
4.25	1368.25	13,616	0.077	0.938
4.50	1368.50	14,136	0.080	1.018
4.75	1368.75	14,664	0.083	1.100
5.00	1369.00	15,200	0.086	1.186

Culvert / Orifice Structures

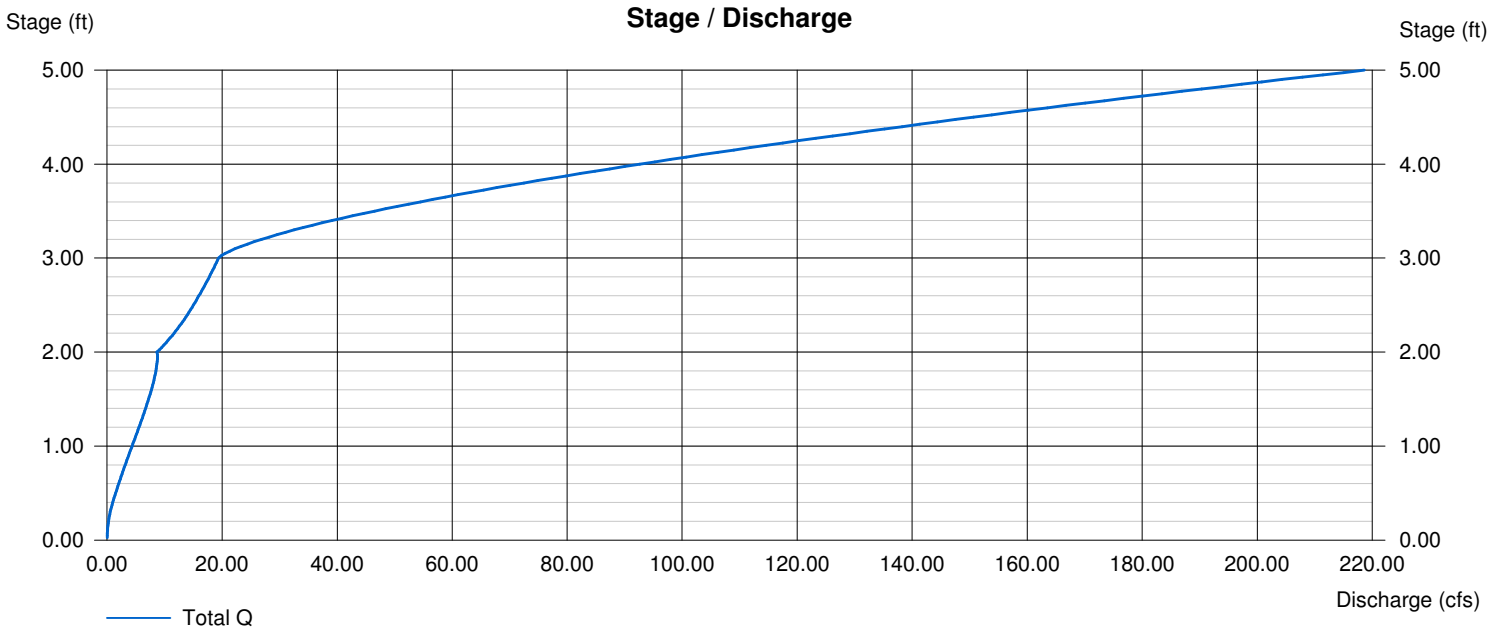
	[A]	[B]	[C]	[D]
Rise (in)	= 24.00	0.00	0.00	0.00
Span (in)	= 24.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1364.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 0.50	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 20.00	0.00	0.00	0.00
Crest El. (ft)	= 1367.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Rect	---	---	---
Multi-Stage	= No	No	No	No

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

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



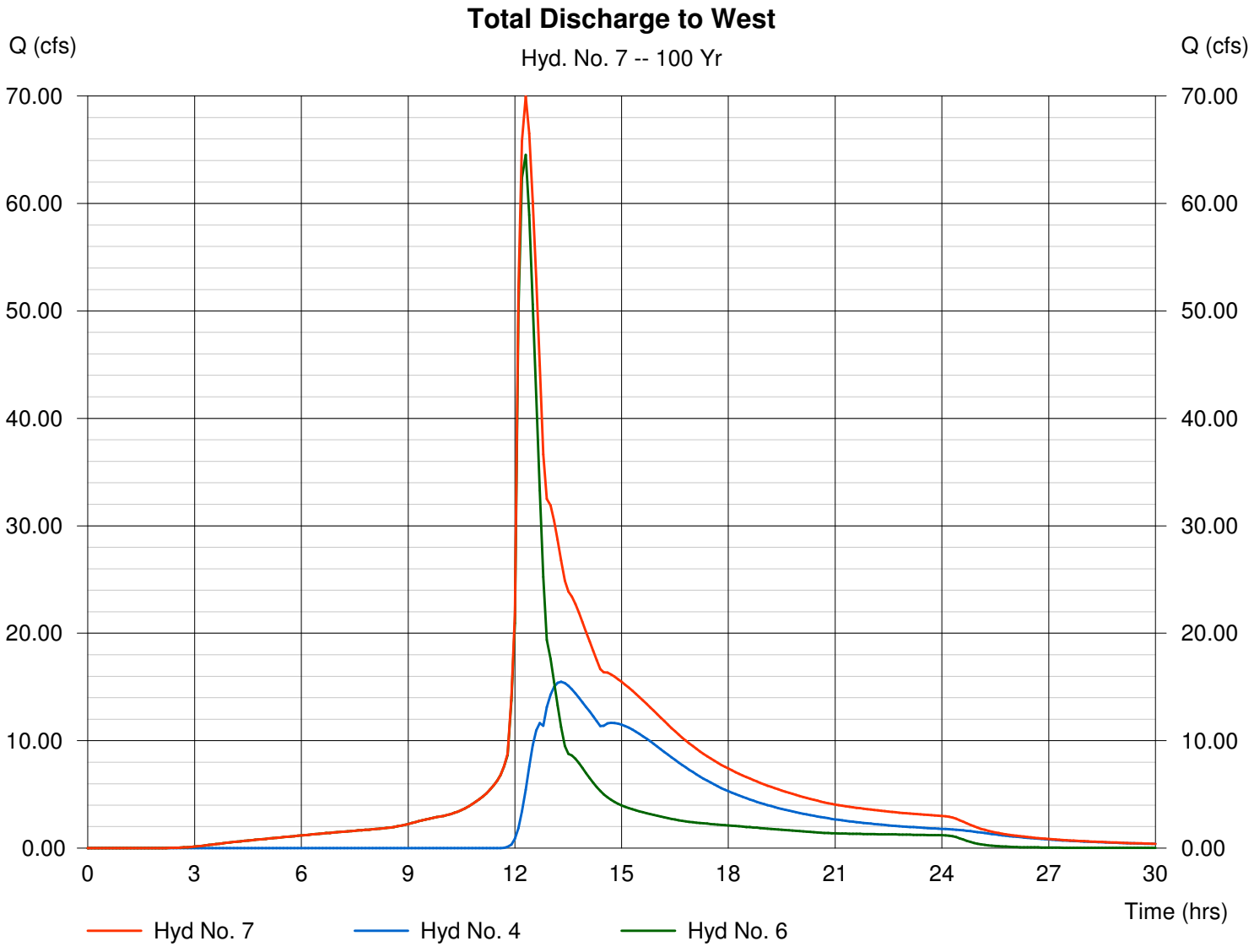
Hydrograph Plot

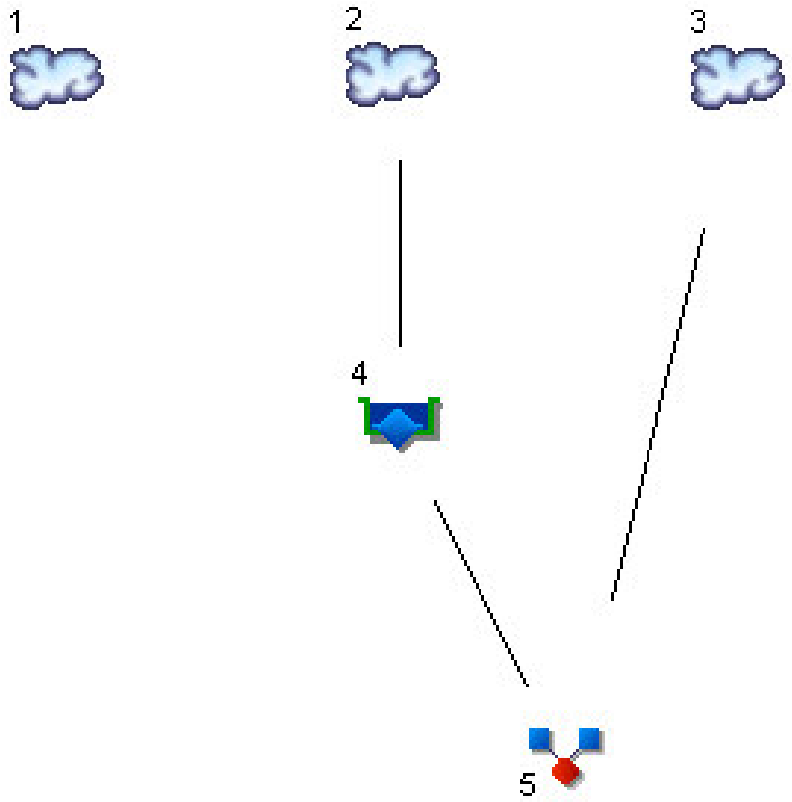
Hyd. No. 7

Total Discharge to West

Hydrograph type	= Combine	Peak discharge	= 69.94 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyds.	= 4, 6		

Hydrograph Volume = 15.247 acft





Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed C B4 10
2	SCS Runoff	Watershed C1 FTR 10
3	SCS Runoff	Watershed C2 FTR 10
4	Reservoir	<no description>
5	Combine	<no description>

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	37.24	-------	58.09	72.34	-------	-------	126.32	Watershed C B4 10
2	SCS Runoff	-------	-------	37.21	-------	53.99	65.05	-------	-------	105.33	Watershed C1 FTR 10
3	SCS Runoff	-------	-------	13.82	-------	20.04	24.15	-------	-------	39.11	Watershed C2 FTR 10
4	Reservoir	2	-------	21.51	-------	33.03	40.69	-------	-------	82.04	<no description>
5	Combine	3, 4	-------	33.13	-------	50.14	61.46	-------	-------	118.37	<no description>

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	37.24	6	744	4.860	----	------	------	Watershed C B4 10
2	SCS Runoff	37.21	6	732	4.293	----	------	------	Watershed C1 FTR 10
3	SCS Runoff	13.82	6	738	1.780	----	------	------	Watershed C2 FTR 10
4	Reservoir	21.51	6	756	4.293	2	1366.01	1.330	<no description>
5	Combine	33.13	6	750	6.072	3, 4	------	------	<no description>

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	58.09	6	744	7.510	----	------	------	Watershed C B4 10
2	SCS Runoff	53.99	6	732	6.239	----	------	------	Watershed C1 FTR 10
3	SCS Runoff	20.04	6	738	2.586	----	------	------	Watershed C2 FTR 10
4	Reservoir	33.03	6	756	6.238	2	1366.50	1.825	<no description>
5	Combine	50.14	6	750	8.825	3, 4	------	------	<no description>

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	72.34	6	738	9.333	----	------	------	Watershed C B4 10
2	SCS Runoff	65.05	6	732	7.544	----	------	------	Watershed C1 FTR 10
3	SCS Runoff	24.15	6	738	3.127	----	------	------	Watershed C2 FTR 10
4	Reservoir	40.69	6	756	7.543	2	1366.80	2.137	<no description>
5	Combine	61.46	6	750	10.670	3, 4	------	------	<no description>

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	126.32	6	738	16.307	----	------	------	Watershed C B4 10
2	SCS Runoff	105.33	6	732	12.407	----	------	------	Watershed C1 FTR 10
3	SCS Runoff	39.11	6	738	5.143	----	------	------	Watershed C2 FTR 10
4	Reservoir	82.04	6	750	12.406	2	1367.53	2.940	<no description>
5	Combine	118.37	6	744	17.549	3, 4	------	------	<no description>

Hydrograph Plot

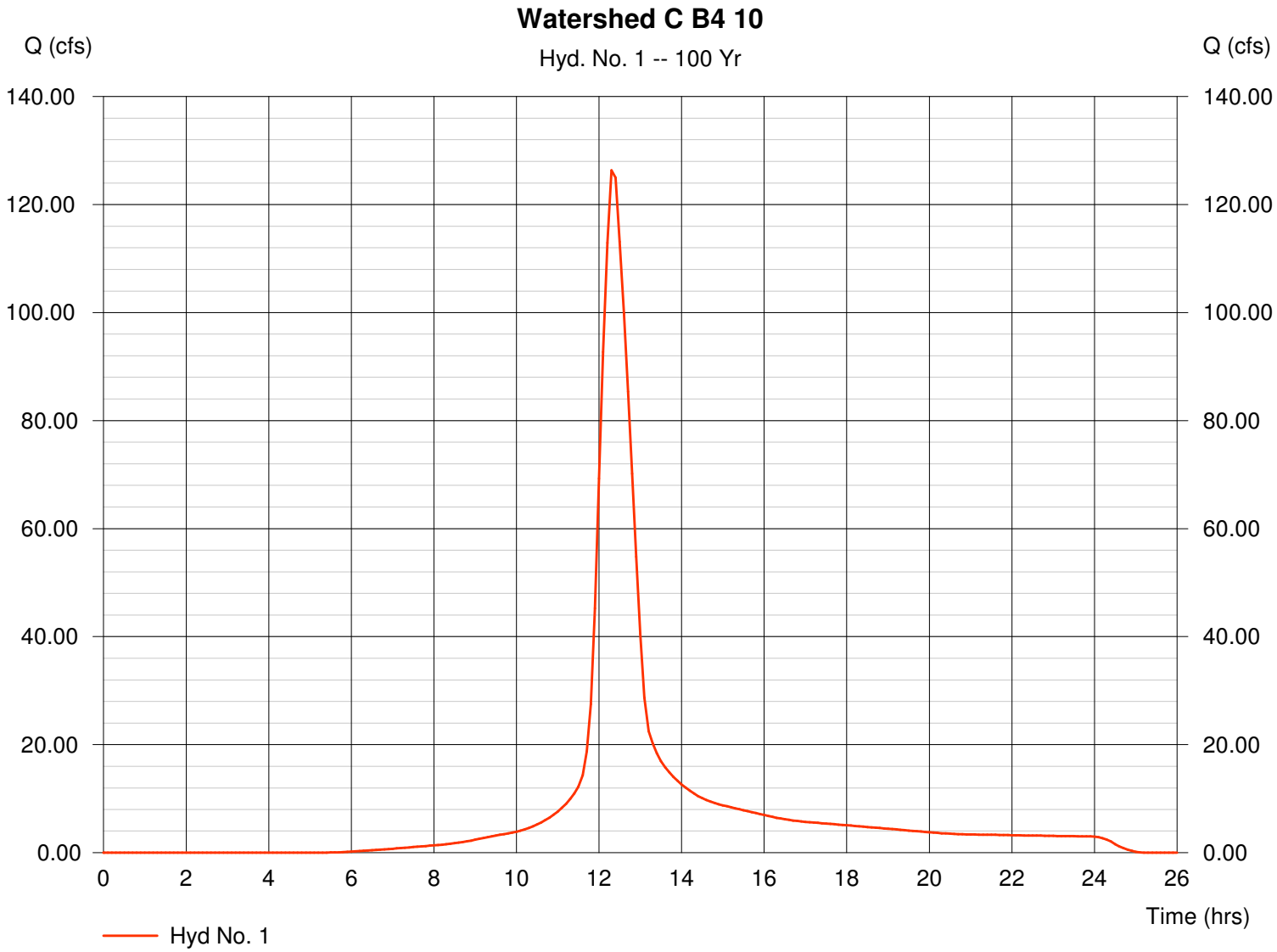
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:50 PM

Hyd. No. 1

Watershed C B4 10

Hydrograph type	= SCS Runoff	Peak discharge	= 126.32 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 36.910 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 48.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 16.307 acft



Hydrograph Plot

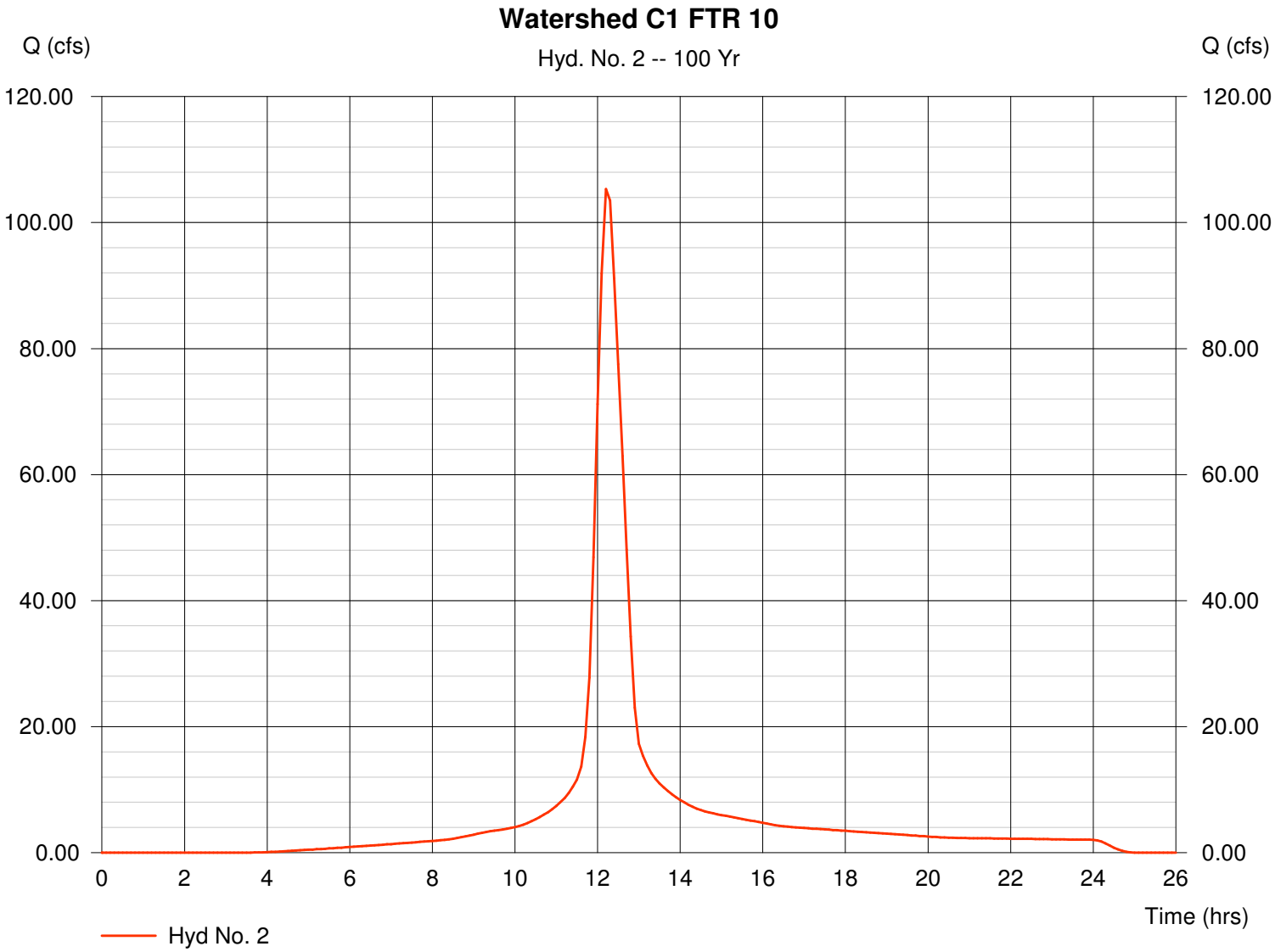
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:50 PM

Hyd. No. 2

Watershed C1 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 105.33 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 23.080 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 37.60 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 12.407 acft



Hydrograph Plot

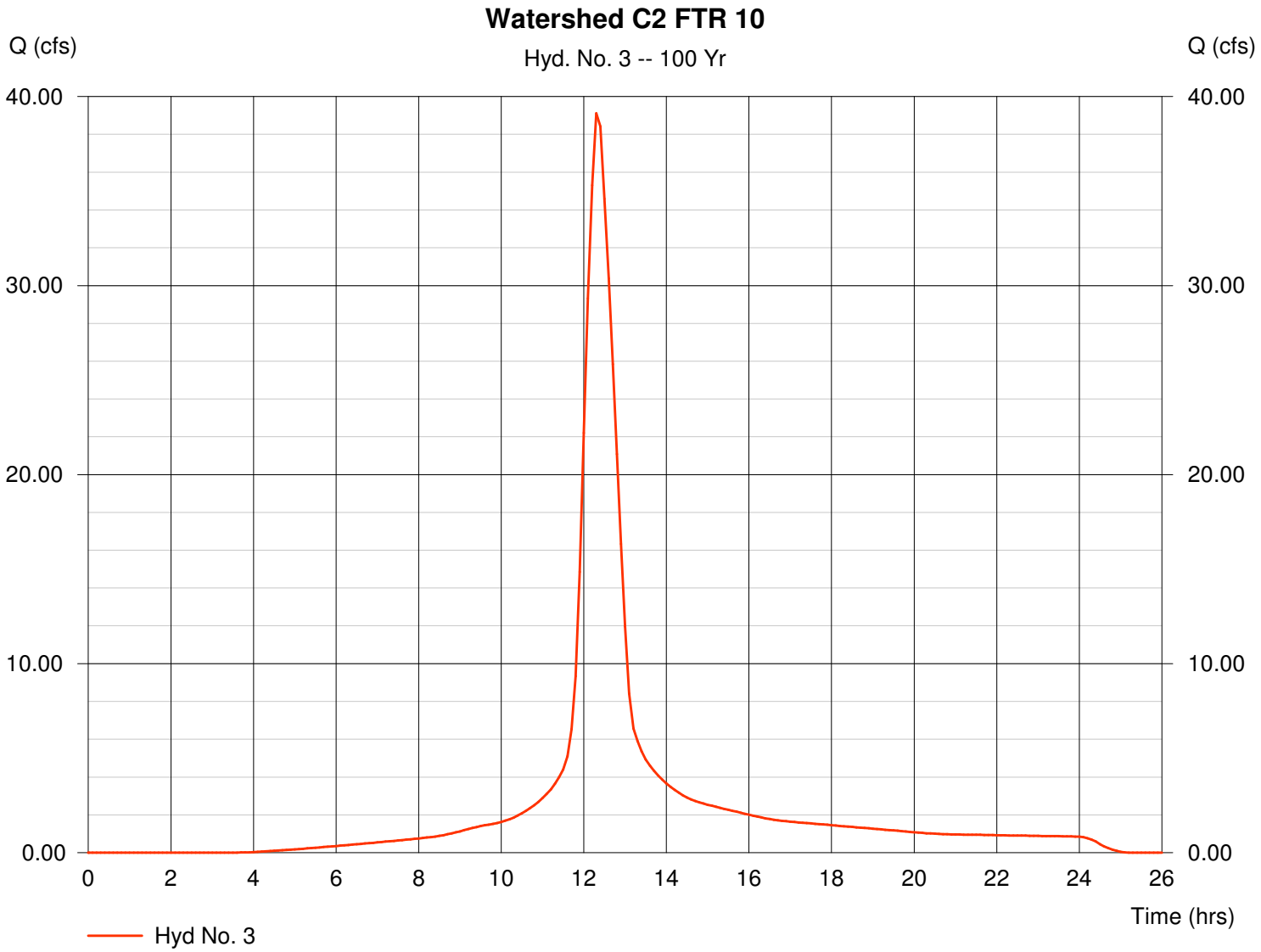
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:50 PM

Hyd. No. 3

Watershed C2 FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 39.11 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 10.120 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 44.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 5.143 acft



Hydrograph Plot

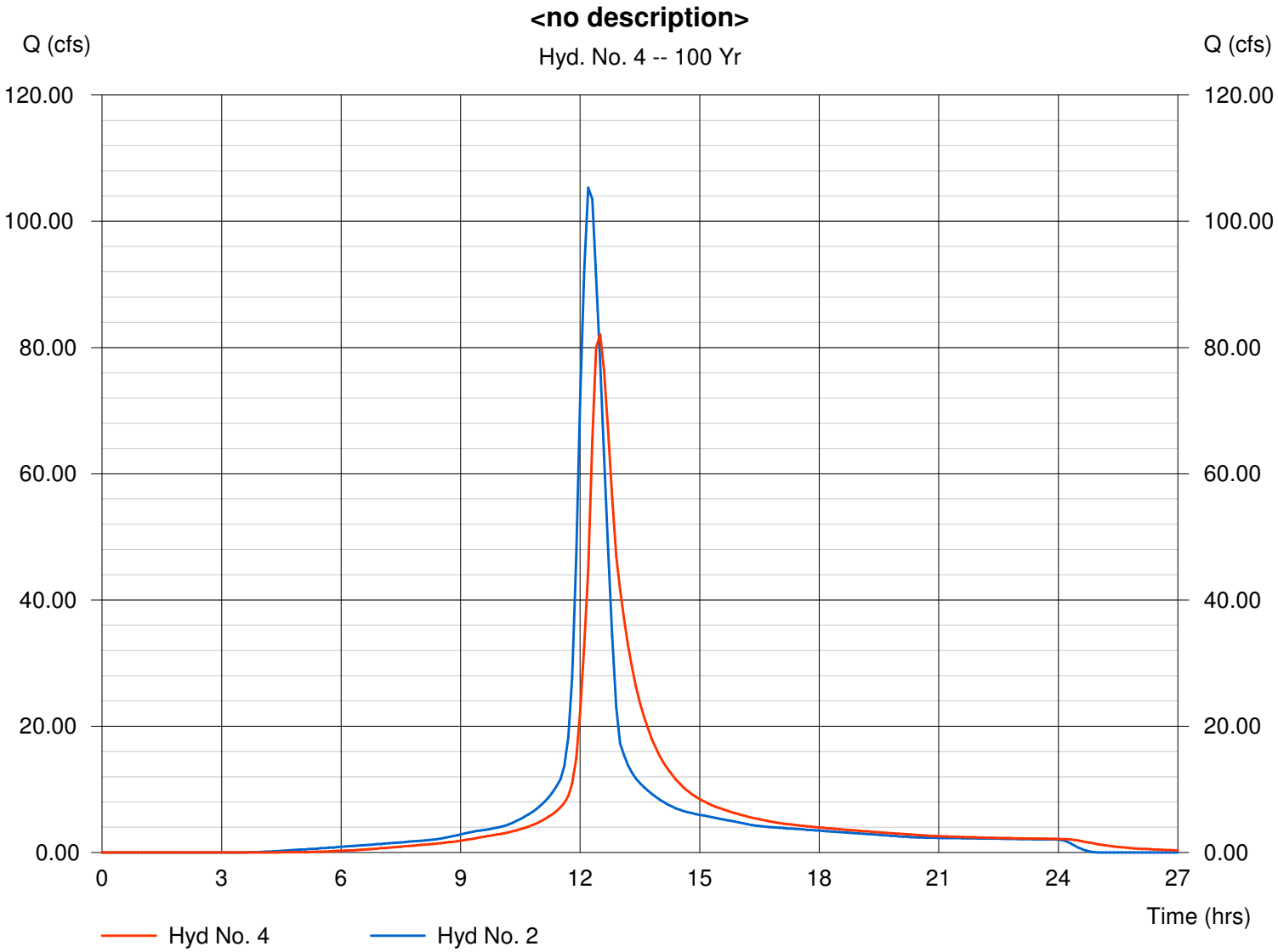
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:50 PM

Hyd. No. 4

<no description>

Hydrograph type	=	Reservoir	Peak discharge	=	82.04 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	2	Max. Elevation	=	1367.53 ft
Reservoir name	=	Conceptual at Watershed C	Max. Storage	=	2.940 acft

Storage Indication method used. | Hydrograph Volume = 12.406 acft



Pond Report

Pond No. 1 - Conceptual at Watershed C

Pond Data

Bottom LxW = 175.0 x 200.0 ft Side slope = 6.0:1 Bottom elev. = 1364.50 ft Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1364.50	35,000	0.000	0.000
0.25	1364.75	36,134	0.204	0.204
0.50	1365.00	37,286	0.211	0.415
0.75	1365.25	38,456	0.217	0.632
1.00	1365.50	39,644	0.224	0.856
1.25	1365.75	40,850	0.231	1.087
1.50	1366.00	42,074	0.238	1.325
1.75	1366.25	43,316	0.245	1.570
2.00	1366.50	44,576	0.252	1.822
2.25	1366.75	45,854	0.259	2.082
2.50	1367.00	47,150	0.267	2.349
2.75	1367.25	48,464	0.274	2.623
3.00	1367.50	49,796	0.282	2.905
3.25	1367.75	51,146	0.290	3.195
3.50	1368.00	52,514	0.297	3.492
3.75	1368.25	53,900	0.305	3.798
4.00	1368.50	55,304	0.313	4.111
4.25	1368.75	56,726	0.321	4.432
4.50	1369.00	58,166	0.330	4.762
4.75	1369.25	59,624	0.338	5.100
5.00	1369.50	61,100	0.346	5.447

Culvert / Orifice Structures

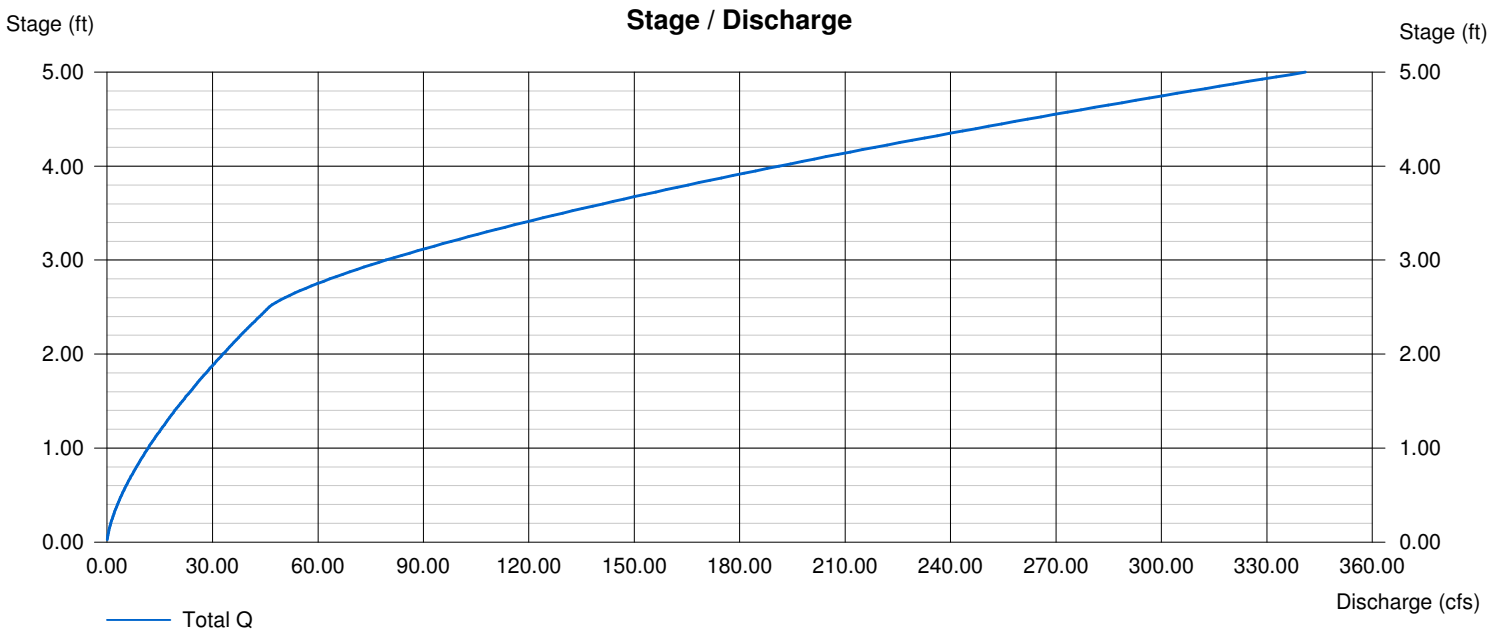
	[A]	[B]	[C]	[D]
Rise (in)	= 0.00	0.00	0.00	0.00
Span (in)	= 0.00	0.00	0.00	0.00
No. Barrels	= 0	0	0	0
Invert El. (ft)	= 0.00	0.00	0.00	0.00
Length (ft)	= 0.00	0.00	0.00	0.00
Slope (%)	= 0.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 3.50	16.00	0.00	0.00
Crest El. (ft)	= 1364.50	1367.00	0.00	0.00
Weir Coeff.	= 3.33	3.33	0.00	0.00
Weir Type	= Rect	Rect	---	---
Multi-Stage	= No	No	No	No

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

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



Hydrograph Plot

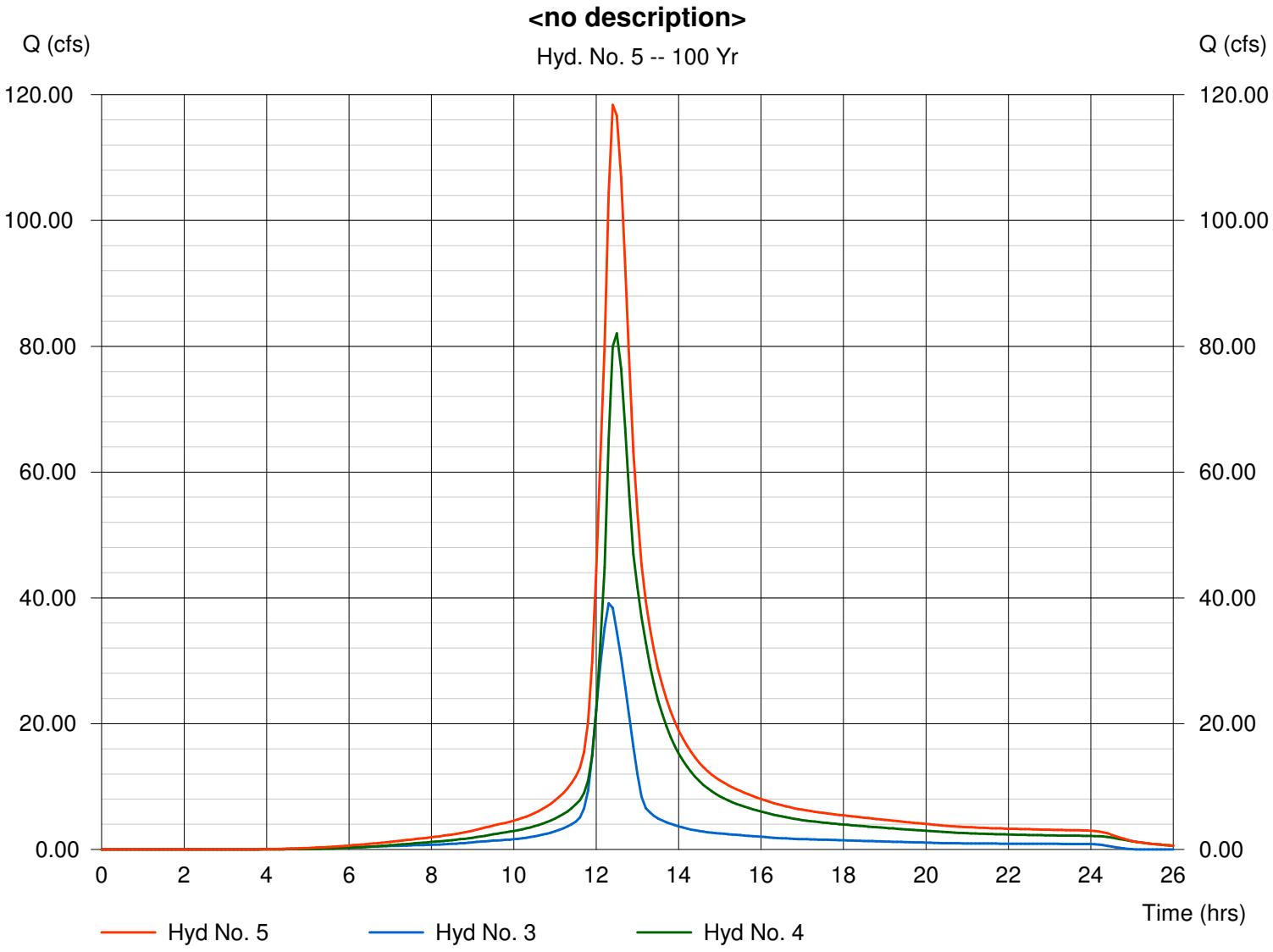
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:50 PM

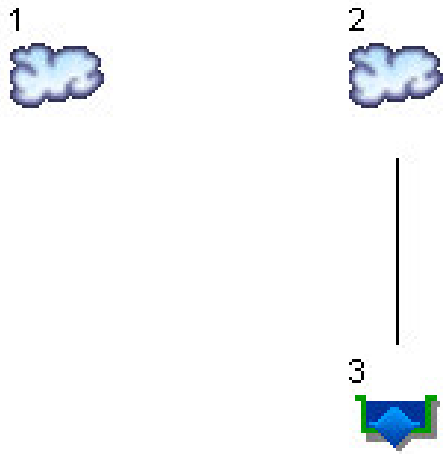
Hyd. No. 5

<no description>

Hydrograph type	= Combine	Peak discharge	= 118.37 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Inflow hyds.	= 3, 4		

Hydrograph Volume = 17.549 acft





Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed D B4 10
2	SCS Runoff	Watershed D FTR 10
3	Reservoir	Detention D

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	15.65	-------	24.38	30.30	-------	-------	52.87	Watershed D B4 10
2	SCS Runoff	-------	-------	19.99	-------	29.01	34.95	-------	-------	56.59	Watershed D FTR 10
3	Reservoir	2	-------	15.13	-------	22.84	27.96	-------	-------	47.42	Detention D

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	15.65	6	738	1.822	----	------	------	Watershed D B4 10
2	SCS Runoff	19.99	6	732	2.306	----	------	------	Watershed D FTR 10
3	Reservoir	15.13	6	750	2.306	2	1363.43	0.504	Detention D

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	24.38	6	738	2.815	----	------	------	Watershed D B4 10
2	SCS Runoff	29.01	6	732	3.352	----	------	------	Watershed D FTR 10
3	Reservoir	22.84	6	750	3.352	2	1363.57	0.666	Detention D

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	30.30	6	738	3.498	----	------	------	Watershed D B4 10
2	SCS Runoff	34.95	6	732	4.053	----	------	------	Watershed D FTR 10
3	Reservoir	27.96	6	750	4.053	2	1363.65	0.765	Detention D

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	52.87	6	732	6.112	----	------	------	Watershed D B4 10
2	SCS Runoff	56.59	6	732	6.666	----	------	------	Watershed D FTR 10
3	Reservoir	47.42	6	744	6.665	2	1363.93	1.098	Detention D

Hydrograph Plot

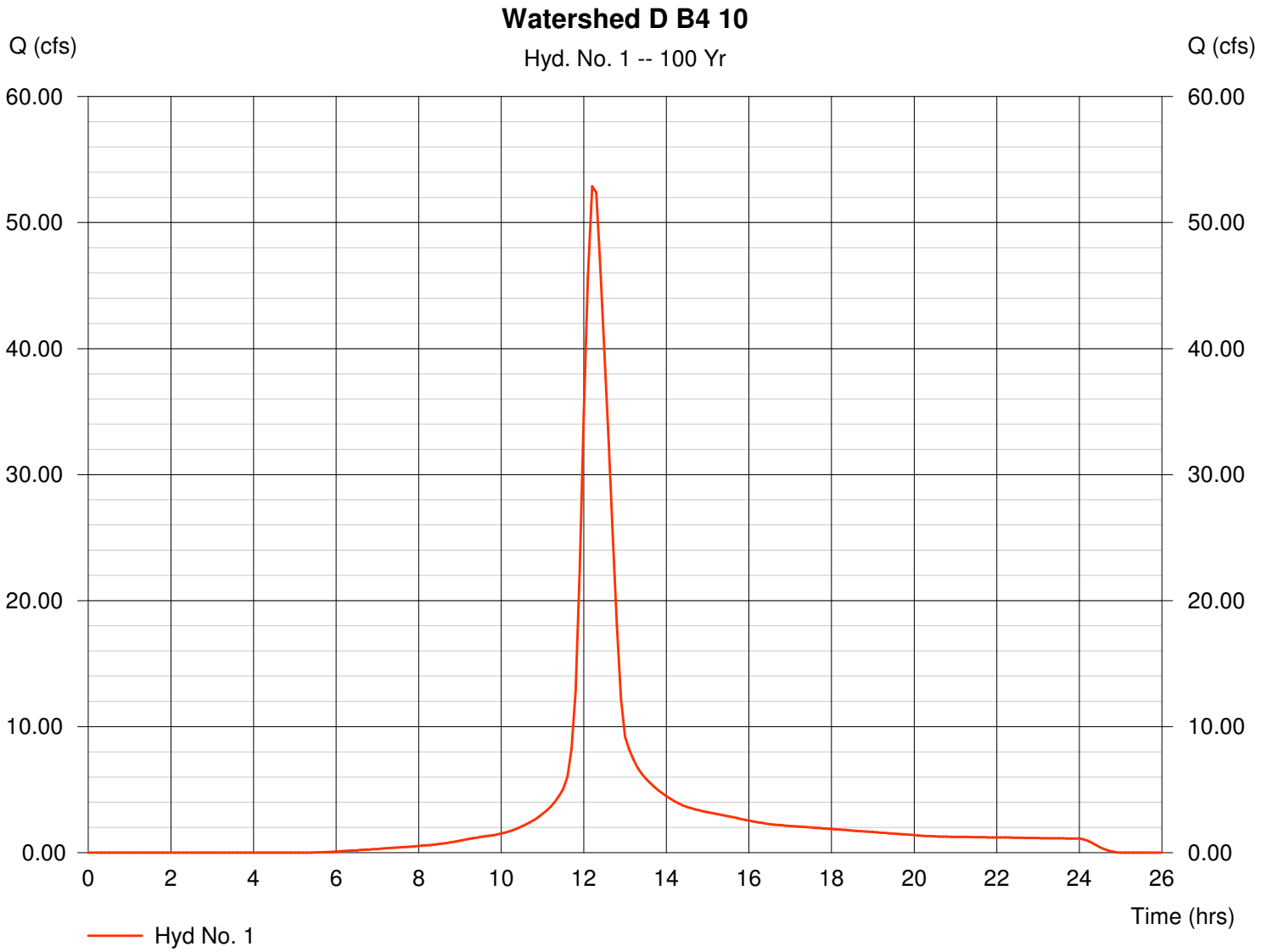
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:50 PM

Hyd. No. 1

Watershed D B4 10

Hydrograph type	= SCS Runoff	Peak discharge	= 52.87 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 13.080 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 39.20 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6.112 acft



Hydrograph Plot

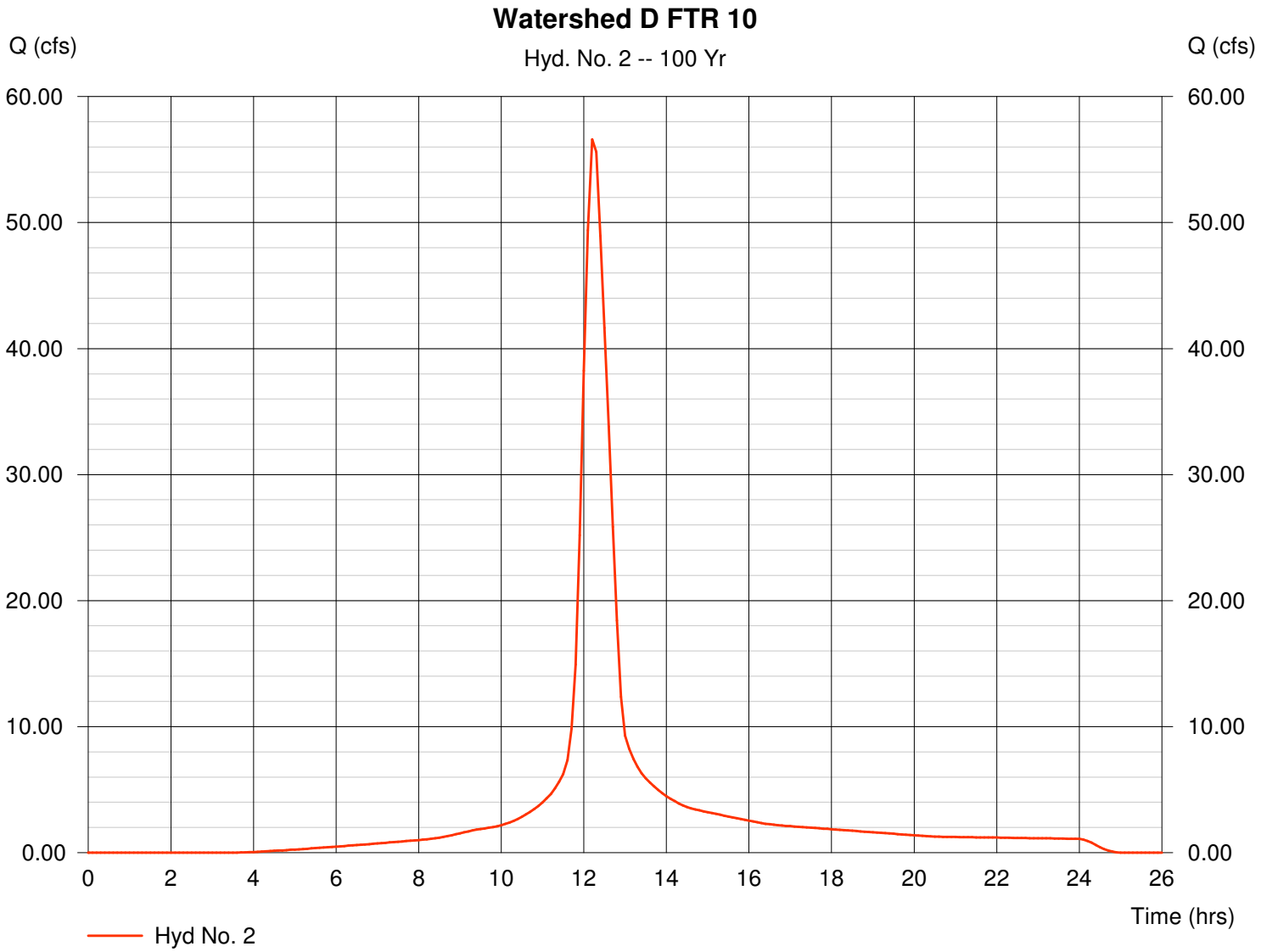
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:50 PM

Hyd. No. 2

Watershed D FTR 10

Hydrograph type	= SCS Runoff	Peak discharge	= 56.59 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 12.400 ac	Curve number	= 87
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 36.80 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 6.666 acft



Hydrograph Plot

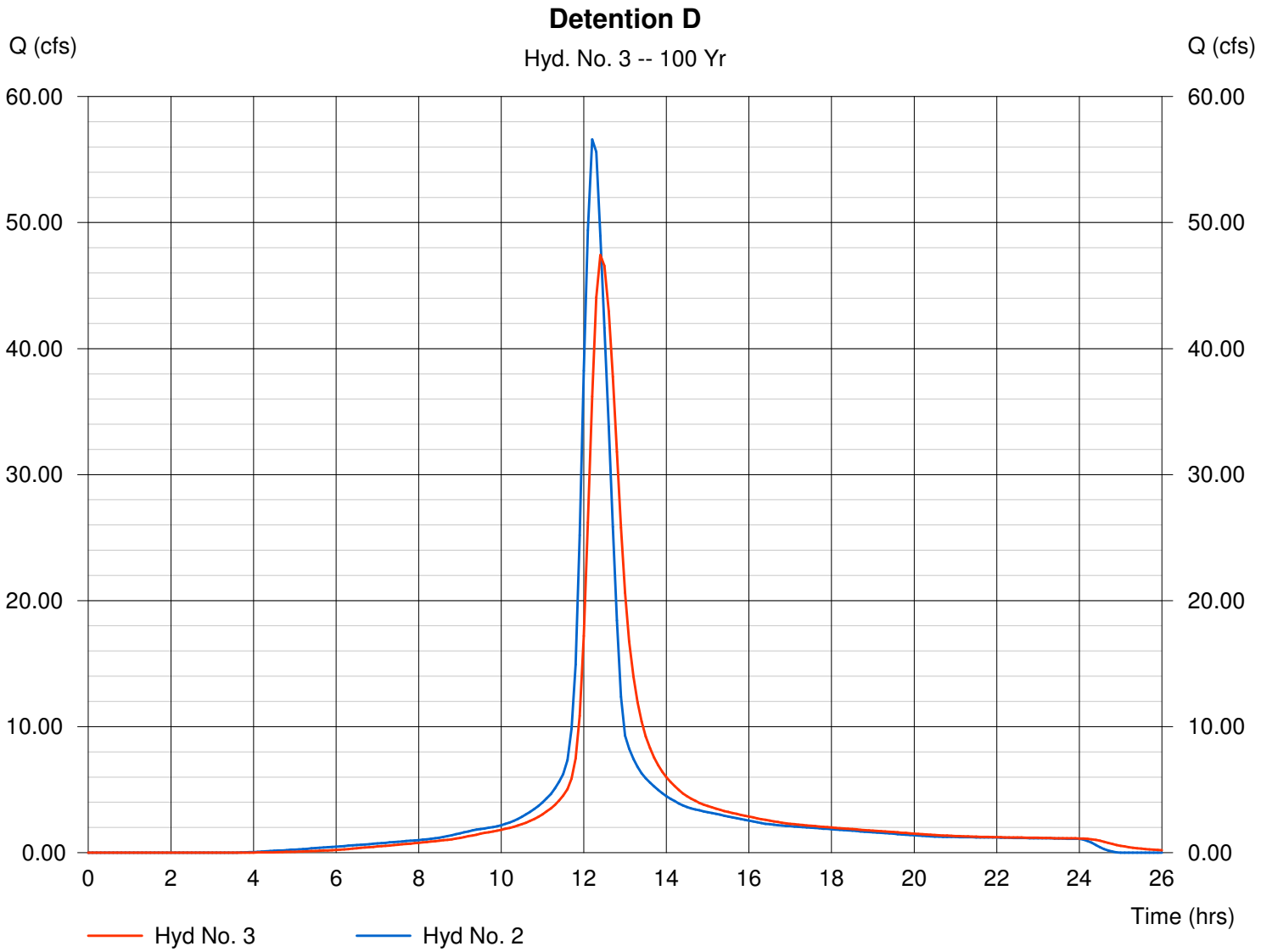
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:50 PM

Hyd. No. 3

Detention D

Hydrograph type	=	Reservoir	Peak discharge	=	47.42 cfs
Storm frequency	=	100 yrs	Time interval	=	6 min
Inflow hyd. No.	=	2	Max. Elevation	=	1363.93 ft
Reservoir name	=	Conceptual Watershed D	Max. Storage	=	1.098 acft

Storage Indication method used. | Hydrograph Volume = 6.665 acft



Pond Report

Pond No. 1 - Conceptual Watershed D

Pond Data

Bottom LxW = 250.0 x 200.0 ft Side slope = 4.0:1 Bottom elev. = 1363.00 ft Depth = 5.00 ft

Stage / Storage Table

Stage (ft)	Elevation (ft)	Contour area (sqft)	Incr. Storage (acft)	Total storage (acft)
0.00	1363.00	50,000	0.000	0.000
0.25	1363.25	50,904	0.290	0.290
0.50	1363.50	51,816	0.295	0.584
0.75	1363.75	52,736	0.300	0.884
1.00	1364.00	53,664	0.305	1.190
1.25	1364.25	54,600	0.311	1.500
1.50	1364.50	55,544	0.316	1.816
1.75	1364.75	56,496	0.322	2.138
2.00	1365.00	57,456	0.327	2.465
2.25	1365.25	58,424	0.333	2.797
2.50	1365.50	59,400	0.338	3.136
2.75	1365.75	60,384	0.344	3.479
3.00	1366.00	61,376	0.349	3.829
3.25	1366.25	62,376	0.355	4.184
3.50	1366.50	63,384	0.361	4.545
3.75	1366.75	64,400	0.367	4.911
4.00	1367.00	65,424	0.373	5.284
4.25	1367.25	66,456	0.378	5.662
4.50	1367.50	67,496	0.384	6.047
4.75	1367.75	68,544	0.390	6.437
5.00	1368.00	69,600	0.396	6.833

Culvert / Orifice Structures

	[A]	[B]	[C]	[D]
Rise (in)	= 36.00	0.00	0.00	0.00
Span (in)	= 36.00	0.00	0.00	0.00
No. Barrels	= 1	0	0	0
Invert El. (ft)	= 1359.00	0.00	0.00	0.00
Length (ft)	= 50.00	0.00	0.00	0.00
Slope (%)	= 1.00	0.00	0.00	0.00
N-Value	= .013	.000	.000	.000
Orif. Coeff.	= 0.60	0.00	0.00	0.00
Multi-Stage	= n/a	No	No	No

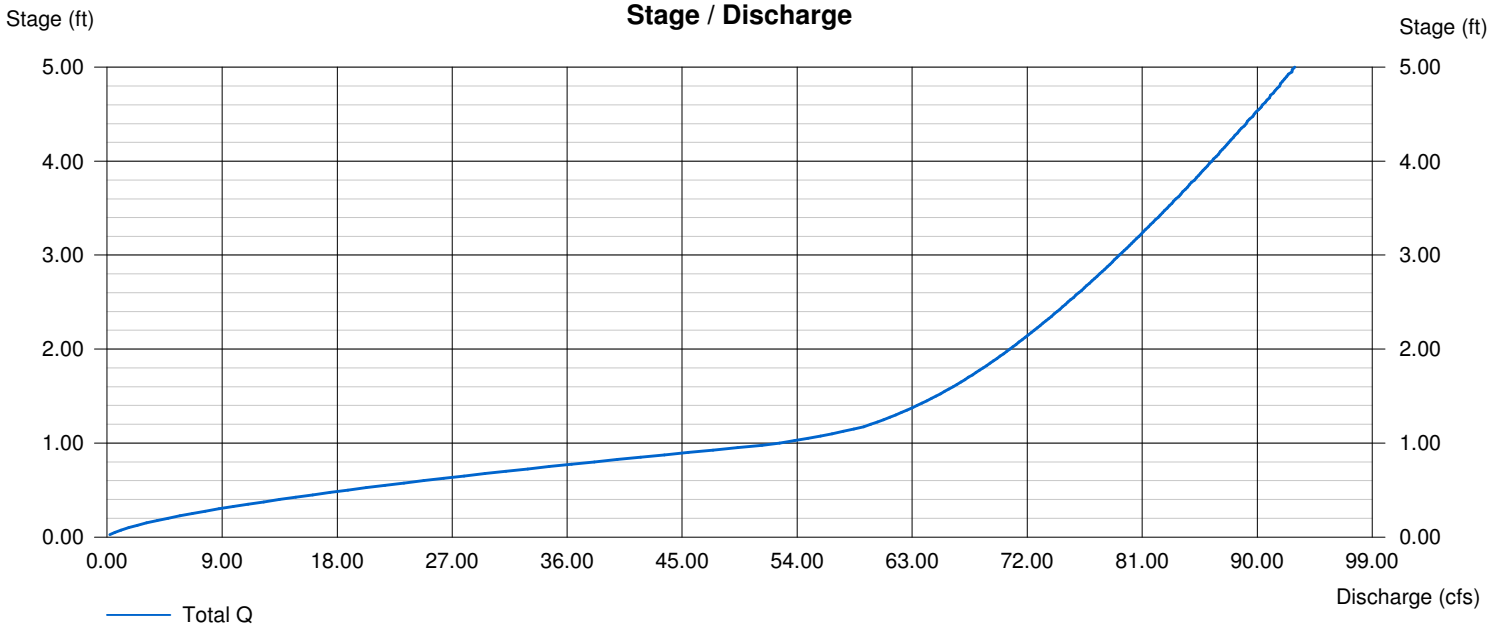
Weir Structures

	[A]	[B]	[C]	[D]
Crest Len (ft)	= 16.00	0.00	0.00	0.00
Crest El. (ft)	= 1363.00	0.00	0.00	0.00
Weir Coeff.	= 3.33	0.00	0.00	0.00
Weir Type	= Riser	---	---	---
Multi-Stage	= Yes	No	No	No

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

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

Stage / Discharge



Legend

Hyd.	Origin	Description
1	SCS Runoff	Watershed E Pre-Project
2	SCS Runoff	Watershed E Post-project

Hydrograph Return Period Recap

Hyd. No.	Hydrograph type (origin)	Inflow Hyd(s)	Peak Outflow (cfs)								Hydrograph description
			1-Yr	2-Yr	3-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr	
1	SCS Runoff	-------	-------	11.68	-------	18.20	22.62	-------	-------	39.46	Watershed E Pre-Project
2	SCS Runoff	-------	-------	10.53	-------	14.13	16.47	-------	-------	24.93	Watershed E Post-project

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	11.68	6	738	1.360	----	------	------	Watershed E Pre-Project
2	SCS Runoff	10.53	6	732	1.254	----	------	------	Watershed E Post-project

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	18.20	6	738	2.101	----	------	------	Watershed E Pre-Project
2	SCS Runoff	14.13	6	732	1.708	----	------	------	Watershed E Post-project

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	22.62	6	738	2.611	----	------	------	Watershed E Pre-Project
2	SCS Runoff	16.47	6	732	2.005	----	------	------	Watershed E Post-project

Hydrograph Summary Report

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Volume (acft)	Inflow hyd(s)	Maximum elevation (ft)	Maximum storage (acft)	Hydrograph description
1	SCS Runoff	39.46	6	732	4.563	----	------	------	Watershed E Pre-Project
2	SCS Runoff	24.93	6	732	3.095	----	------	------	Watershed E Post-project

Hydrograph Plot

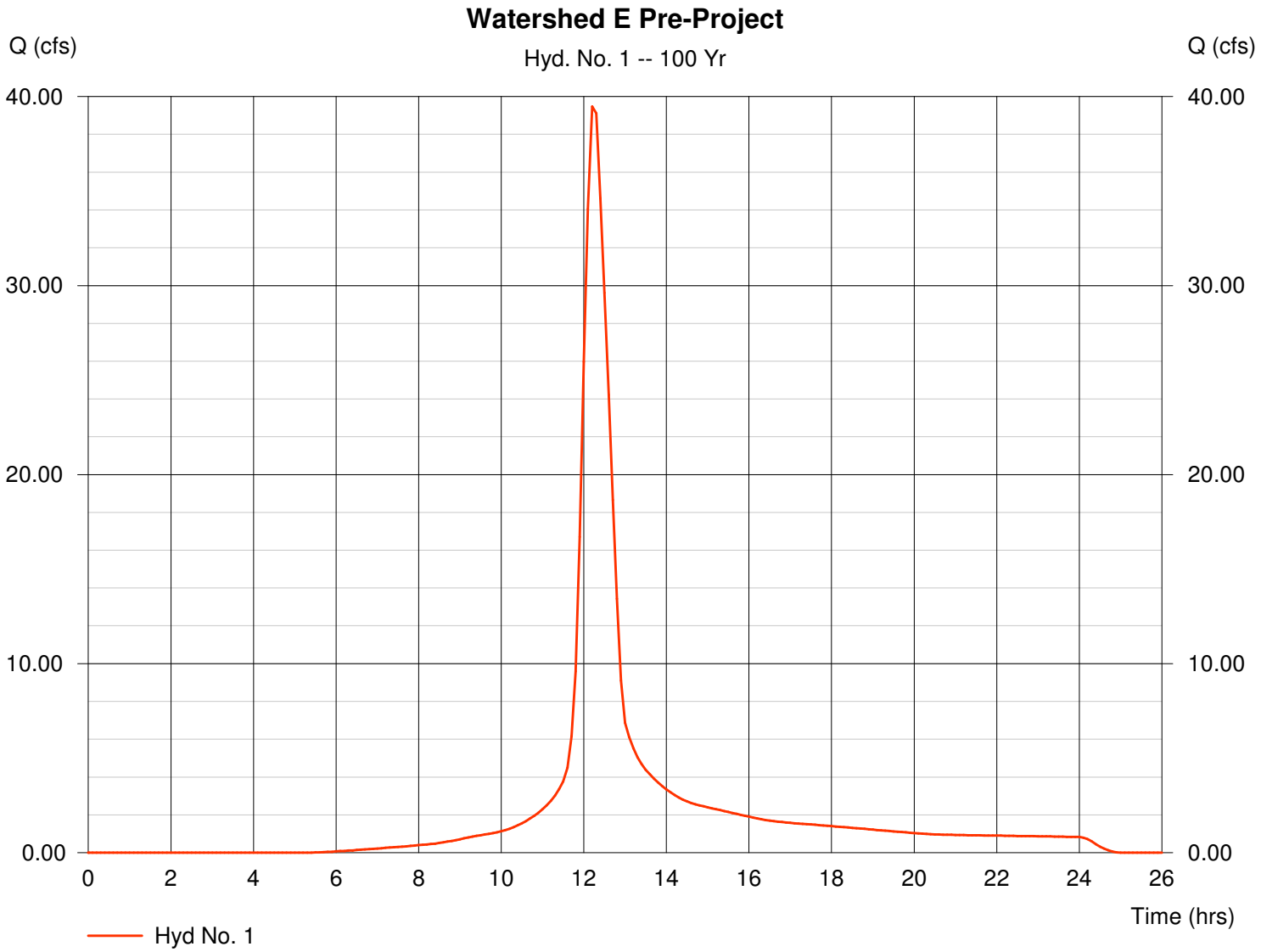
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:28 PM

Hyd. No. 1

Watershed E Pre-Project

Hydrograph type	= SCS Runoff	Peak discharge	= 39.46 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 9.764 ac	Curve number	= 80
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 36.70 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 4.563 acft



Hydrograph Plot

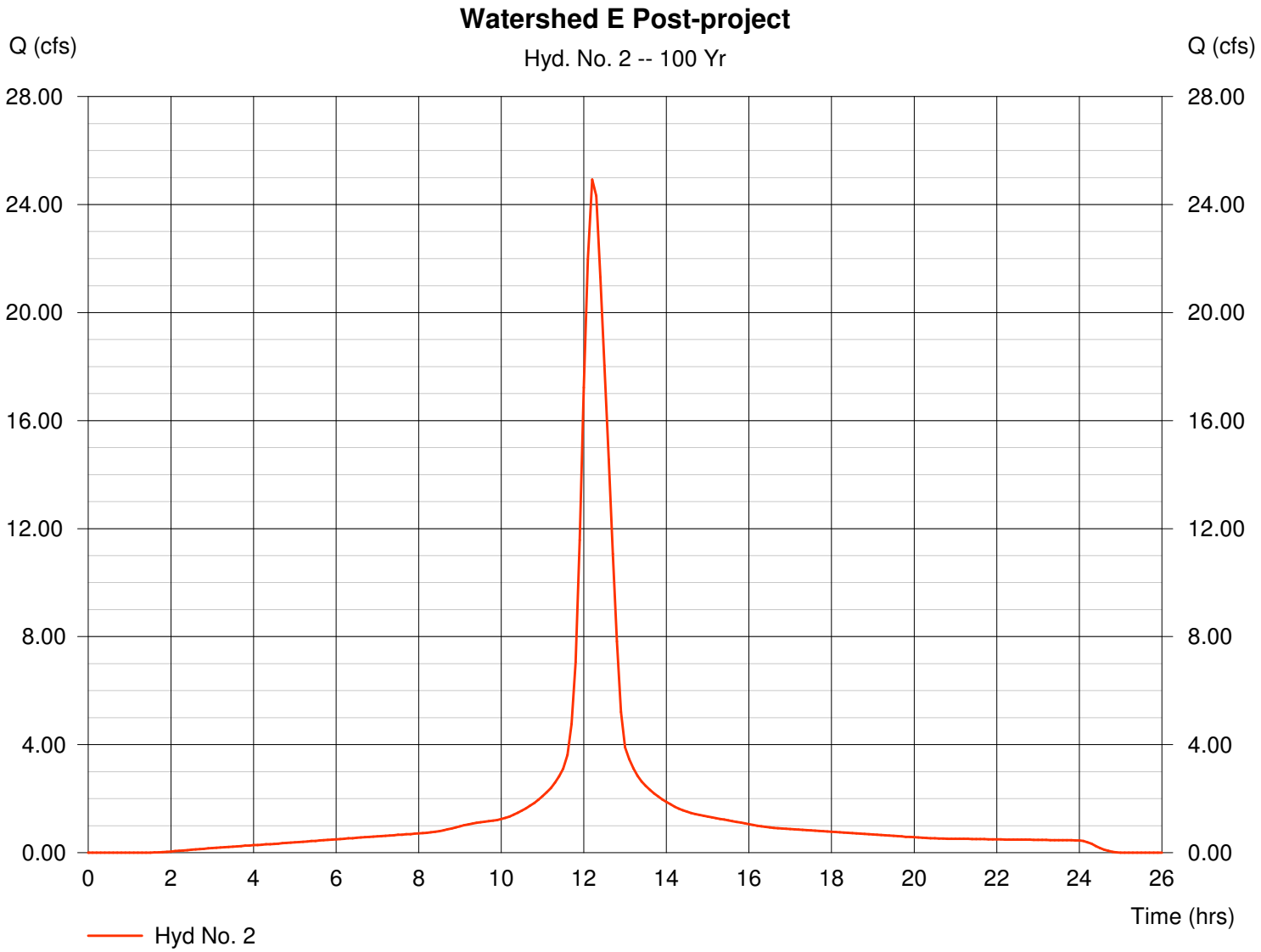
Hydraflow Hydrographs by Intelisolve | Monday, Nov 20 2006, 1:28 PM

Hyd. No. 2

Watershed E Post-project

Hydrograph type	= SCS Runoff	Peak discharge	= 24.93 cfs
Storm frequency	= 100 yrs	Time interval	= 6 min
Drainage area	= 5.000 ac	Curve number	= 95
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= USER	Time of conc. (Tc)	= 32.50 min
Total precip.	= 7.80 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 3.095 acft

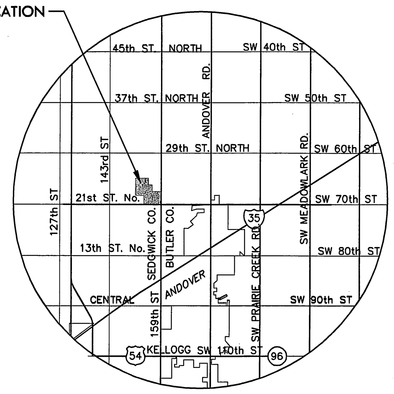


Appendix G
Preliminary Lot Grading Plan

Center Sec. 1, T27S, R2E, 6th P.M.
Fnd. ½" pipe

NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. stone

PLAT LOCATION



VICINITY MAP

LEGEND

- SIN - CONIFEROUS TREE & DIAMETER
- DIN - DECIDUOUS TREE & DIAMETER
- SN - SIGN
- PP - POWER POLE AND GUY ANCHOR
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UGE - UNDERGROUND ELECTRIC LINE
- OHE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE I

℄ MAINSGATE ST.
℄ GRAYSTONE CIR.
℄ CHELMSFORD CT.
CHELMSFORD CT.
℄ CHELMSFORD
℄ 24TH ST.
24th ST.
BOXTHORN CT.
℄ KEY STONE CT.
℄ GRAYSTONE
℄ CHELMSFORD
℄ KEYSTONE
℄ BOXTHORN
℄ KEY STONE
℄ CHELMSFORD CIR
℄ MONTBELLA TER.
℄ 159th ST. E.
℄ 21st ST. N.
RESERVE "E"
RESERVE "G"
RESERVE "F"
RESERVE "B"
RESERVE "H"
RESERVE "A"
Hedge Row
Trees
Ditch
Pond
GRAVEL RD.
Dense Trees
no buildings
8" PRESSURIZED PIPELINE
60' STREET DEDICATION
SW Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. thimble
SAC 90.00'
ONE MAJOR OPENING 70.00'
COMPLETE ACCESS CONTROL 430.00'
ONE MAJOR OPENING 70.00'
COMPLETE ACCESS CONTROL 270.34'
ONE MAJOR OPENING 102.00'
ACCESS CONTROL PER ACCESS MANAGEMENT REGULATIONS 1551.69'
ONE MAJOR OPENING 98.19'
ONE MAJOR OPENING 70.00'
ONE MAJOR OPENING 400.00'
COMPLETE ACCESS CONTROL 482.60'
ACCESS CONTROL EXCEPT ONE RIGHT IN/OUT
Basis of Bearing: Kansas Coordinate System 1983 South Zone S88°55'31"W 2658.28'(M)
1625.94'(CU)
S00°13'16"E 1328.59'(M) 1328.72'(CM)
NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. stone
SE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. ¾" pipe w/ Moehring cap over thimble
10' Right Of Way Agreement (N.10' S. 40') in favor of Sedgwick County, KS Misc. Book 308, Pg. 347 Dated: July 18th 1953
Agricultural Right Of Way Agreement (N.16' S. 48') in favor of Sedgwick County, KS Misc. Book 308, Pg. 347 Dated: July 18th 1953
Easement for Right Of Way (Width varies) in favor of Sedgwick County, KS Film Book 1870, Pg. 1900 Dated: Jan. 14th 1997

NORTH
SCALE: 1" = 100'
100 0 100 200

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

MONARCH LANDING ADDITION
PROJECT NAME

APPENDIX G GRADING PLAN
SHEET TITLE

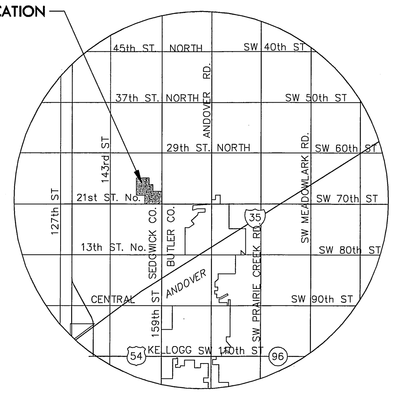
TM	KWS/CMJ	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
NOVEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix H
Preliminary Drainage and Utility Plan

Center Sec. 1, T27S, R2E, 6th P.M.
Fnd. ½" pipe

NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. stone

PLAT LOCATION



VICINITY MAP

LEGEND

- CONIFEROUS TREE & DIAMETER
- DECIDUOUS TREE & DIAMETER
- SIGN
- POWER POLE AND GUY ANCHOR
- 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 ELECTRIC LINE
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE I
- DRAINAGE SUB BASIN
- DRAINAGE BASIN
- FLOW ARROW

C
Area = 34.4

B1
Area = 15.7

A1
Area = 21.7

D
Area = 12.4

B2
Area = 13.1

A2
Area = 6.9

E
Area = 5.5

A3
Area = 13.1

CHELMSFORD CT.
CHELMSFORD
MAINS GATE ST.
GRAYSTONE CIR.
GRAYSTONE
CAMDEN CHASE
KEY STONE CT.
KEY STONE
BOXTHORN CT.
BOXTHORN
MONARCH LANDING CIR.
MONTBELLA TER
24th ST.
21st ST. N.
159th ST. E.
GRAVEL RD.

DETENTION C
RESERVE "K"

DETENTION B1
RESERVE "E"

DETENTION B2

DETENTION A1
RESERVE "F"

DETENTION A2

RESERVE "A"
RESERVE "B"

TEMPORARY DRAINAGE DITCHES

Hedge Row
Trees
Dense Trees
no buildings
Pond
Ditch
INLET BY OTHERS

8" PRESSURIZED PIPELINE
8" PRESSURIZED PIPELINE

S00°13'16"E
1328.59'(M)
1328.72'(CM)

Basis of Bearing: Kansas Coordinate System 1983 South Zone S88°55'31"W 2658.28'(M)

SW. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. thimble

SE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. ¾" pipe w/ Moehring cap over thimble

10' Right Of Way Agreement (N.10° E. 40') in favor of Sedgwick County, KS Misc. Book 308, Pg. 347 Dated: July 18th 1923

Easement for Right Of Way (width varries) in favor of Sedgwick County, KS Film Book 1670, Pg. 1900 Dated: Jan. 14th 1997

ONE MAJOR OPENING 70.00'
COMPLETE ACCESS CONTROL 430.00'
ONE MAJOR OPENING 70.00'
COMPLETE ACCESS CONTROL 270.34'
ONE MAJOR OPENING 102.00'

100 0 100 200

NORTH
SCALE: 1" = 100'
100 0 100 200

POND AREA CALCULATIONS

POND	NP (ft)	100-Year Water Surface Elevation (ft)	100-Year Volume (acre-ft)	AREA @ WSEL 100 (sq. ft)
A1	1366.0	1369.4	3.80	58,500
A2	1365.5	1370.0	1.45	18,500
B1	1366.0	1369.9	4.51	61,000
B2	1364.0	1367.7	0.78	12,600
C	1364.5	1367.5	2.94	50,000

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

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MONARCH LANDING ADDITION
PROJECT NAME

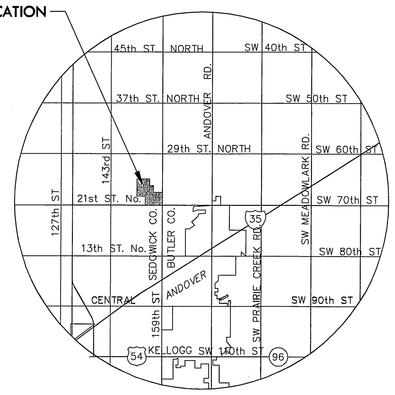
APPENDIX H
DRAINAGE PLAN
SHEET TITLE

TM	KWS	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
NOVEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

Center Sec. 1, T27S, R2E, 6th P.M.
Fnd. ½" pipe

NE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. stone

PLAT LOCATION



VICINITY MAP

LEGEND

- GIN - CONIFEROUS TREE & DIAMETER
- DIN - DECIDUOUS TREE & DIAMETER
- SN - SIGN
- PP - POWER POLE AND GUY ANCHOR
- ELEC BOX - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SECTION CORNER
- BM - BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UGE - UNDERGROUND ELECTRIC LINE
- OHE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE I

GRAYSTONE
BOXTHORN CT.
KEYSTONE CT.
CHELMSFORD
KEYSTONE
BOXTHORN
CHELMSFORD CIR.
MONTBELLA TER.
KEY STONE
RESERVE "E"
RESERVE "D"
RESERVE "B"
RESERVE "F"
RESERVE "A"
Hedge Row
Trees
Ditch
Pond
Dense Trees
no buildings
8" PRESSURIZED PIPELINE
GRAVEL RD.
159th ST. E.
21st ST. N.
80' STREET DEDICATION
ASPHALT
24" CMP
S.A.E. 90.00'
ONE MAJOR OPENING 70.00'
COMPLETE ACCESS CONTROL 430.00'
ONE MAJOR OPENING 70.00'
COMPLETE ACCESS CONTROL 270.34'
ONE MAJOR OPENING 102.00'
10' Right Of Way Agreement (N.10' S. 40') in favor of Sedgwick County, KS Misc. Book 358, Pg. 347 Dated: July 18th 1953
10' Right Of Way Agreement (N.10' S. 40') in favor of Sedgwick County, KS Misc. Book 388, Pg. 347 Dated: July 18th 1953
Easement for Right Of Way (width varries) in favor of Sedgwick County, KS Film Book 1670 Pg. 1900 Dated: Jan. 14th 1997
Basis of Bearing: Kansas Coordinate System 1983 South Zone S88°55'31"W 2658.28'(M)
S00°13'16"E 1328.59'(M) 1328.72'(CM)
N00°09'46"W 2654.07'(M)

SW. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. thimble

SE. Cor., SE. ¼, Sec. 1, T27S, R2E, 6th P.M.
Fnd. ¾" pipe w/ Moehring cap over thimble

NORTH
SCALE: 1" = 100'
100 0 100 200

J:\CIVIL\06201\DWG\DRNG\06201DUP

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

MONARCH LANDING ADDITION
PROJECT NAME

APPENDIX H
UTILITY PLAN
SHEET TITLE

KLA	CMJ	GJA
DESIGN BY:	DRAWN BY:	CHECKED BY:
NOVEMBER 2006	06201	1 / 1
DATE	JOB NO.	SHEET/OF

Appendix I
Preliminary Inlet and Pipe Sizes

PIPE SIZING USING MANNING'S EQUATION
Monarch Landing Addition
Wichita, Kansas

Manning's n = 0.013

Pipe Identifier	Design Storm	Design Q (cfs)	Design Pipe Size	Design Slope (%)	Minimum Slope (%)	Design Velocity	Capacity of Design Pipe	Curb Inlet Width (ft)
NULL								
OO	2	1.34	12	0.40	0.14	2.9	2.3	5
PP	2	2.09	12	0.40	0.34	2.9	2.3	5
OO-PP	2	3.43	15	0.40	0.28	3.3	4.1	
RR	2	2.80	15	0.40	0.19	3.3	4.1	5
OO-RR	2	6.22	24	0.21	0.08	3.3	10.4	
SS	2	1.59	12	0.40	0.20	2.9	2.3	5
TT	2	2.49	15	0.40	0.15	3.3	4.1	5
SS-TT	2	4.08	15	0.40	0.40	3.3	4.1	
UU	2	2.01	12	0.40	0.32	2.9	2.3	
SS-UU	2	6.09	24	0.21	0.07	3.3	10.4	
VV	2	1.88	12	0.40	0.28	2.9	2.3	
SS-VV	2	7.97	24	0.21	0.12	3.3	10.4	
WW	2	2.76	15	0.40	0.18	3.3	4.1	
LL-WW	2	16.95	36	0.12	0.06	3.3	23.1	
XX	2	0.80	12	0.40	0.05	2.9	2.3	
LL-XX	2	17.75	36	0.12	0.07	3.3	23.1	
NULL	None							
YY	2	1.51	12	0.40	0.18	2.9	2.3	5
ZZ	2	1.40	12	0.40	0.15	2.9	2.3	5
YY-ZZ	2	2.91	15	0.40	0.20	3.3	4.1	
AA	2	1.55	12	0.40	0.19	2.9	2.3	5
YY-AA	2	4.46	18	0.32	0.18	3.4	5.9	
BB	2	1.19	12	0.40	0.11	2.9	2.3	5
YY-BB	2	5.65	18	0.32	0.29	3.4	5.9	
CC	2	2.22	12	0.40	0.39	2.9	2.3	
YY-CC	2	7.87	24	0.21	0.12	3.3	10.4	
NULL	None							
DD	2	4.00	15	0.40	0.38	3.3	4.1	5
NULL	None							
EE	2	0.96	12	0.40	0.07	2.9	2.3	5
FF	2	1.05	12	0.40	0.09	2.9	2.3	5
EE-FF	2	2.01	12	0.40	0.32	2.9	2.3	
NULL	None							
NULL	None							
A	2	0.57	12	0.40	0.03	2.9	2.3	
B	2	0.69	12	0.40	0.04	2.9	2.3	
A-B	2	1.26	12	0.40	0.13	2.9	2.3	
C	2	2.24	12	0.40	0.40	2.9	2.3	(5)
D	2	2.62	12	0.40	0.54	2.9	2.3	(5)
C-D	2	4.86	18	0.32	0.21	3.4	5.9	
A-D	2	6.13	24	0.21	0.07	3.3	10.4	
E	2	1.24	12	0.40	0.12	2.9	2.3	
A-E	2	7.37	24	0.21	0.11	3.3	10.4	
F	2	1.63	12	0.40	0.21	2.9	2.3	5
A-F	2	9.00	24	0.21	0.16	3.3	10.4	
G	2	0.79	12	0.40	0.05	2.9	2.3	5
A-G	2	9.79	24	0.21	0.19	3.3	10.4	

PIPE SIZING USING MANNING'S EQUATION
Monarch Landing Addition
Wichita, Kansas

Manning's n = 0.013

Pipe Identifier	Design Storm	Design Q (cfs)	Design Pipe Size	Design Slope (%)	Minimum Slope (%)	Design Velocity	Capacity of Design Pipe	Curb Inlet Width (ft)
NULL	None							
H	2	1.59	12	0.40	0.20	2.9	2.3	
I	2	1.97	12	0.40	0.31	2.9	2.3	
H-I	2	3.56	15	0.40	0.30	3.3	4.1	
J	2	1.07	12	0.40	0.09	2.9	2.3	
K	2	1.26	12	0.40	0.13	2.9	2.3	
H-K	2	5.90	18	0.32	0.32	3.4	5.9	
L	2	2.01						
H-L	2	7.91	24	0.21	0.12	3.3	10.4	
M	2	6.51	24	0.21	0.08	3.3	10.4	10
N	2	0.61						
M-N	2	7.12	24	0.21	0.10	3.3	10.4	
H-N	2	15.03	30	0.16	0.13	3.3	16.4	
NULL	None							
O	2	1.92	12	0.40	0.29	2.9	2.3	5
P	2	1.19						5
O-P	2	3.10	15	0.40	0.23	3.3	4.1	
NULL	None							
Q	None							
NULL	None							
R	2	2.49	15	0.40	0.15	3.3	4.1	
NULL	None							
S	2	1.15	12	0.40	0.10	2.9	2.3	
NULL	None							
T	2	0.71	12	0.40	0.04	2.9	2.3	
U	2	1.55						
T-U	2	2.26	15	0.40	0.12	3.3	4.1	
V	2	1.55						
T-V	2	3.81	15	0.40	0.35	3.3	4.1	

Note: Parentheses indicate future construction