

Preliminary Detention Report for Rain Link Addition

Wichita, Sedgwick County, Kansas

Location

The site is located on the east side of South West Street just south of I-235, and is in the southwest quarter of Section 12, Township 28 South, Range 1 West. The site is bordered on the south by a self-storage facility and on the north by other businesses. The total site area is approximately 1.67 acres. The site is shown on the Quadrangle Map located in Appendix A.

Soils

According to the NRCS (SCS) Sedgwick County Soil Survey in Appendix B, the soils on-site are classified as Waldeck Sandy loam. These soils are assigned an HSG classification of C.

Pre-Project Conditions

Development

There is no significant off-site drainage contribution to the site. The site is approximately 1.67 acres and consists of one residence and a large garage used as a shop with a large paved area adjacent to the garage. Currently 31.1% of the site is comprised of buildings, parking areas, and other impervious surfaces. An aerial photo is included in Appendix C.

Landform and Slope

Slopes across the site range from 0-3%. A majority of the site drains off-site to the east. A portion of the site drains to the west into a swale along South West Street. Elevations range from 102.2' at the north residence to 99.4' at the southeast corner of the site.

Drainage Conditions

The site is located in a floodplain designated Zone C according to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM). A copy of the appropriate portion of the map panel is included in Appendix D.

Runoff Characteristics

For preliminary analysis the property was divided into three watersheds. The watersheds are shown in Appendix E.

Basin E1 contains 0.24 acres and the runoff drains west to a swale along the east side of South West St. The second watershed, Basin E2, contains 0.33 acres and also drains into the swale along South West St. The last basin, Basin E3, contains 1.09 acres and drains off-site to the east.

The Rational Method was utilized to determine the runoff values for the watersheds. Weighted drainage coefficients of 0.59, 0.45, and 0.47 were used for the Basins E1, E2, and E3 respectively. These were calculated using the APWA drainage coefficients of 0.30 for pervious areas and 0.90 for impervious areas. The time of concentration was calculated using the FAA method. The time of concentration calculations are shown in Appendix F.

The Hydraflow Hydrograph Output for both existing and proposed conditions is shown in Appendix G.

Developed Conditions

Development

For the proposed development the lot will be split into two separate lots. The northern lot will be approximately 0.67 acres and will contain the residence on the northern part of the existing lot. This area will be unchanged. The southern lot will be approximately 1.0 acres. The developers' plans for the site include demolishing the existing garage and paved area on the southern lot and constructing an approximately 400 sq ft building with a parking area and an equipment yard.

Drainage Conditions

Basin 1 will not change because the area it encompasses will remain as it currently is. The weighted drainage coefficient for Basin 2 will increase to 0.50 because of the increased amount of impervious area. The weighted drainage coefficient for Basin 3 will increase to 0.56 because of the increased amount of impervious area. Construction will not change the total watershed area. Consequently, the only change in hydrologic parameters as a result of the new construction will be the slight increase in impervious area and the effect it has on the time of concentration. Peak flow rates are shown in Table 1.

Table 1: Pre- and Post-Project Peak Runoff Summary.

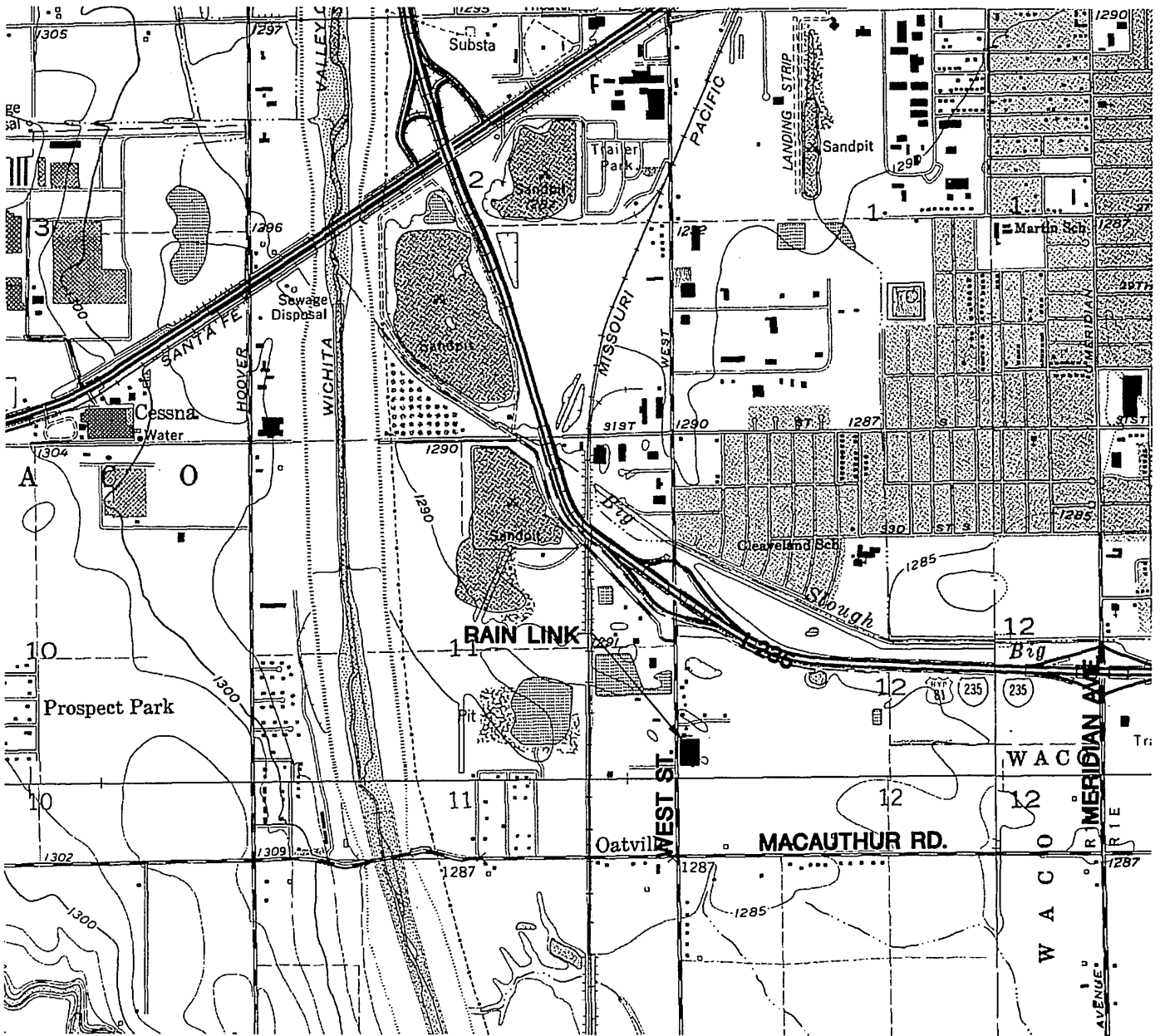
Basin	Design Storm Flows (cfs)			
	2-Yr	5-Yr	10-Yr	100-Yr
E1	0.54	0.64	0.74	1.04
P1	0.54	0.64	0.74	1.04
Basin 1 increase	0.00	0.00	0.00	0.00
E2	0.45	0.54	0.63	0.89
P2	0.53	0.63	0.73	1.03
Basin 2 increase	0.08	0.09	0.10	0.14
E3	1.76	2.10	2.41	3.42
P3	2.28	2.70	3.10	4.38
Basin3 increase	0.52	0.60	0.69	0.96

Summary

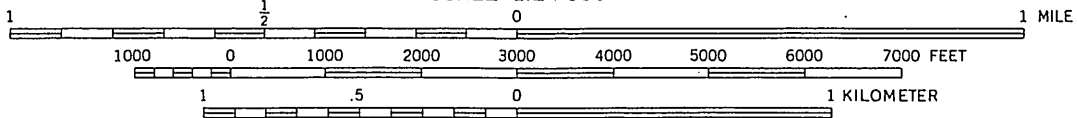
The proposed site is located on South West Street, south of I-235, and will develop as a commercial site. An existing building and parking area will be demolished. A new building, parking area, and equipment yard will be constructed. The project site will add a small amount of impervious area to the total watershed. The net effect on the peak flow rates for each basin increases by a maximum of 0.96 cfs in the 100-year design event in Basin 3. Increased runoff due to this development is less than 1 cfs in the 100-year design event without detention.

Appendix A

Quadrangle Map



SCALE 1:24 000



CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



J:\CIVIL\06712\DWG\DRAINAGE\06713QM.DWG



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

RAIN LINK

PROJECT NAME

**USGS GEOLOGICAL SURVEY
WICHITA WEST, KANSAS QUADRANGLE**

SHEET TITLE

AS
DESIGN BY:

CMJ
DRAWN BY:

KLA
CHECKED BY:

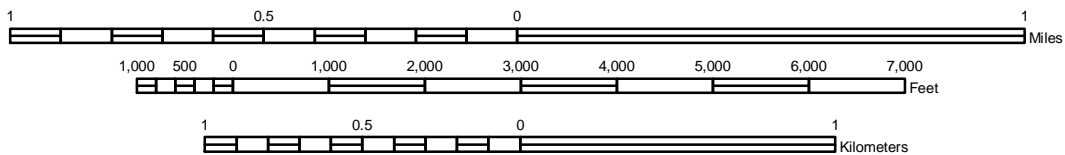
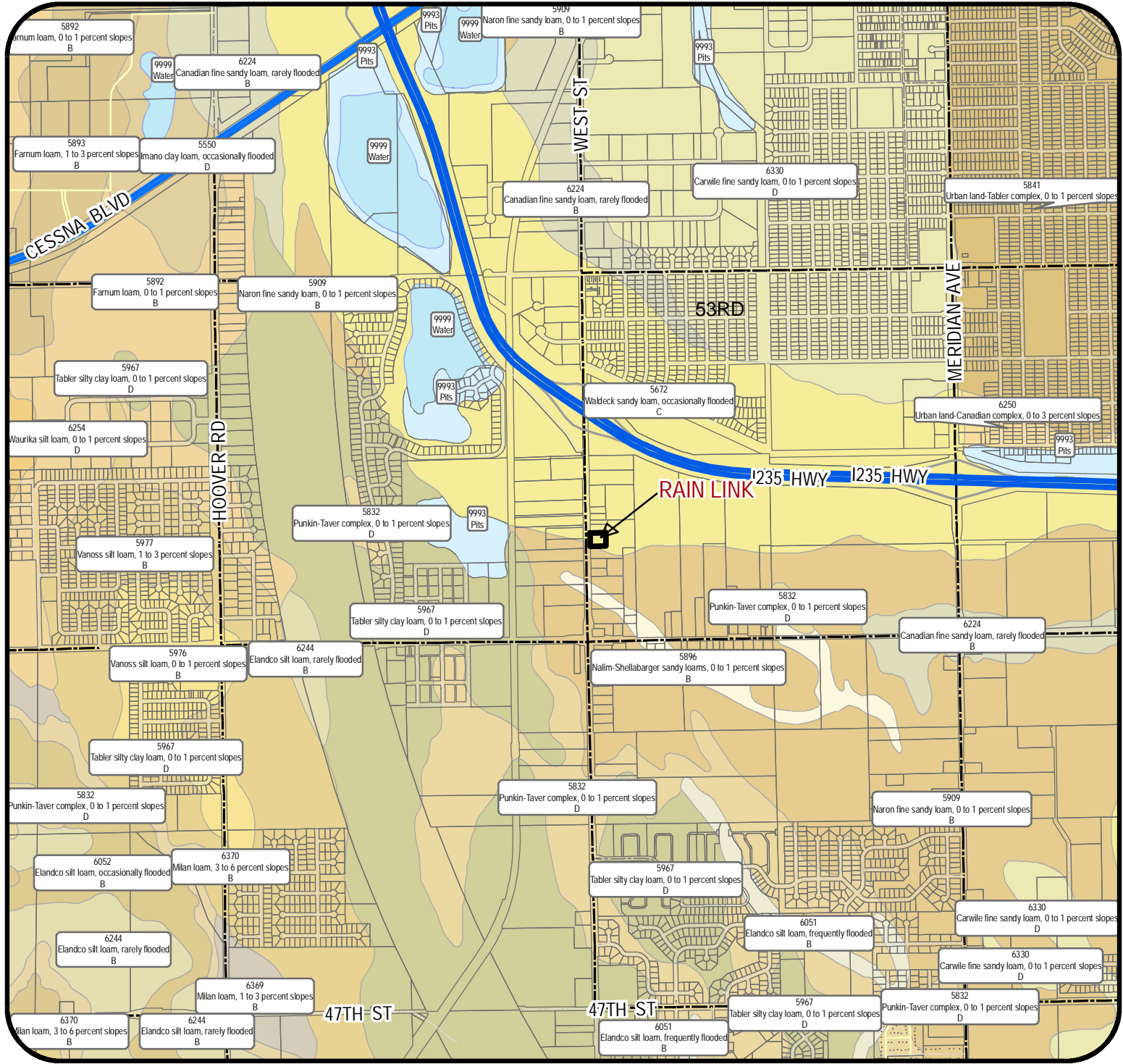
DECEMBER 2006
DATE

06713
JOB NO.

1 / 1
SHEET/OF

Appendix B

NRCS (SCS) Sedgewick County Soil Survey



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RAIN LINK

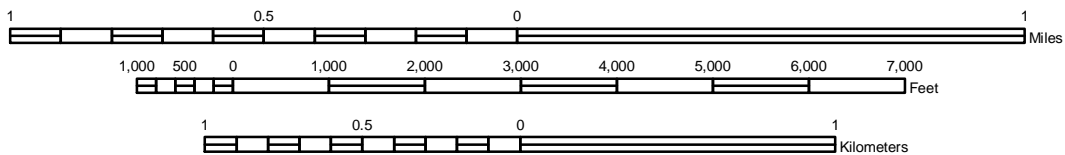
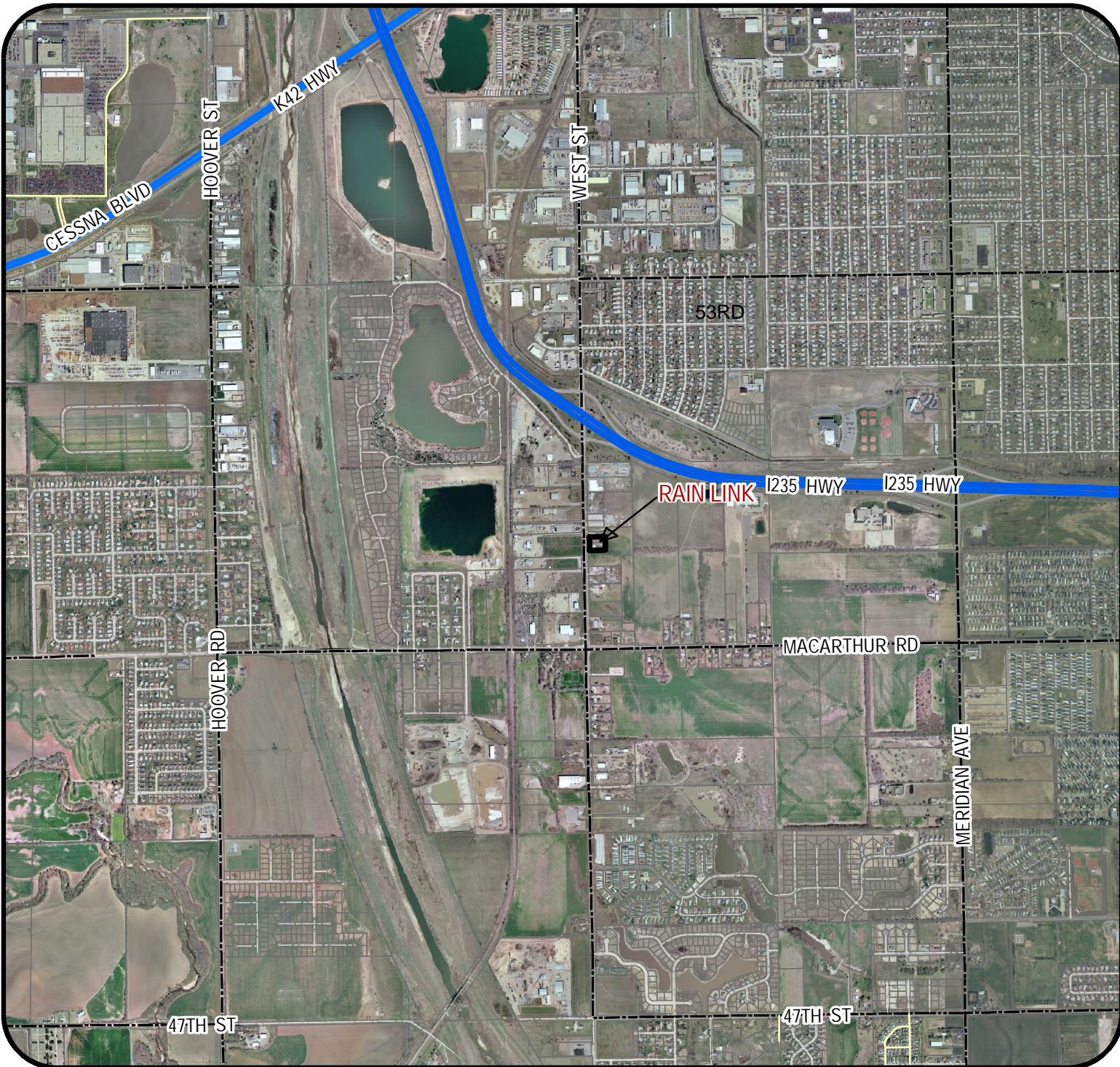
Project Name:
 USGS - Sedgwick County, KS
 Sheet Title:



CMJ	Dec. 2006
Drawn By:	Date:
AS/ KLA	06713
Design / Review:	Job No.:

Appendix C

Aerial Photo



J:\CIVIL\06713\dwg\Drng\Drng-USGS

RAIN LINK

Project Name: _____
 USGS - Sedgwick County, KS
 Sheet Title: _____



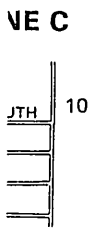
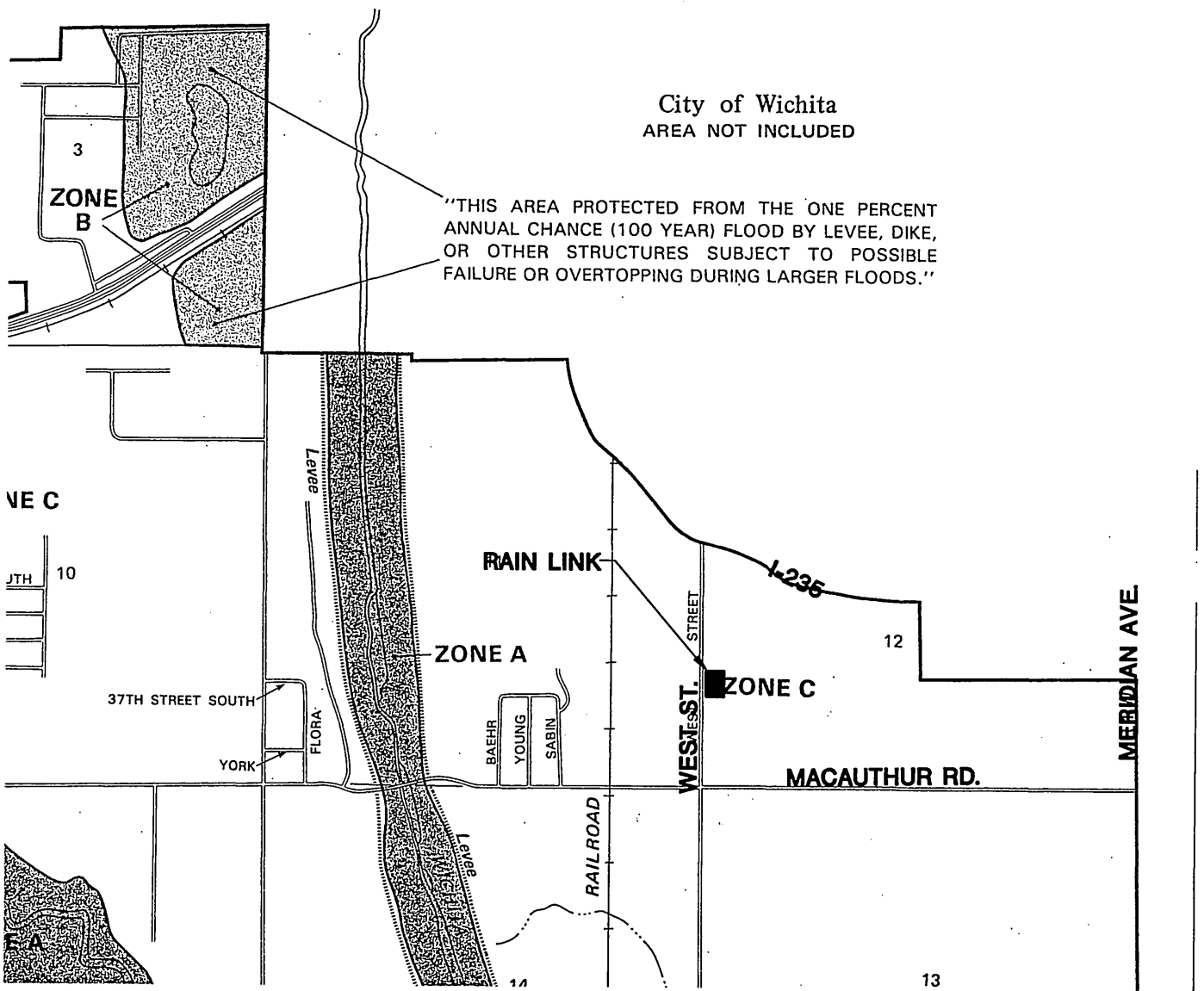
CMJ	Dec. 2006
Drawn By:	Date:
AS/ KLA	06713
Design / Review:	Job No.:

Appendix D

FEMA FIRM Map

City of Wichita
AREA NOT INCLUDED

"THIS AREA PROTECTED FROM THE ONE PERCENT ANNUAL CHANCE (100 YEAR) FLOOD BY LEVEE, DIKE, OR OTHER STRUCTURES SUBJECT TO POSSIBLE FAILURE OR OVERTOPPING DURING LARGER FLOODS."



NATIONAL FLOOD INSURANCE PROGRAM


FIRM
FLOOD INSURANCE RATE MAP

SEDGWICK COUNTY, KANSAS
(UNINCORPORATED AREAS)

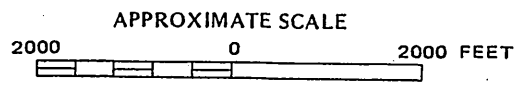
PANEL 200 OF 300

COMMUNITY-PANEL NUMBER
200321 0200 A


EFFECTIVE DATE:
JUNE 3, 1986



Federal Emergency Management Agency



J:\CIVIL\06713\DWG\RAINAGE\FIRM.DWG



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411 N. WEBB ROAD
WICHITA, KS. 67206
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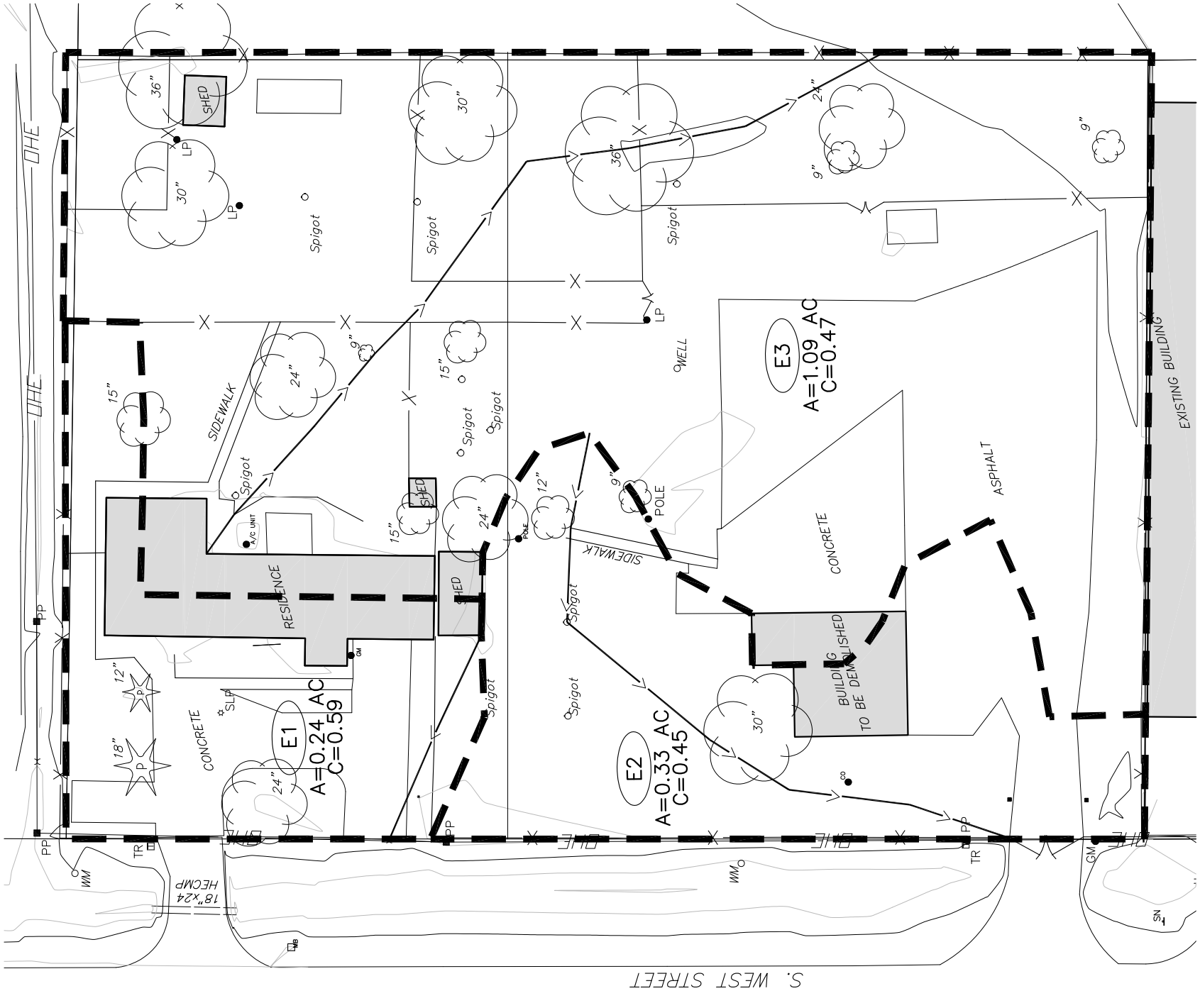
RAIN LINK
PROJECT NAME

FIRM MAP
WICHITA WEST, KANSAS
SHEET TITLE

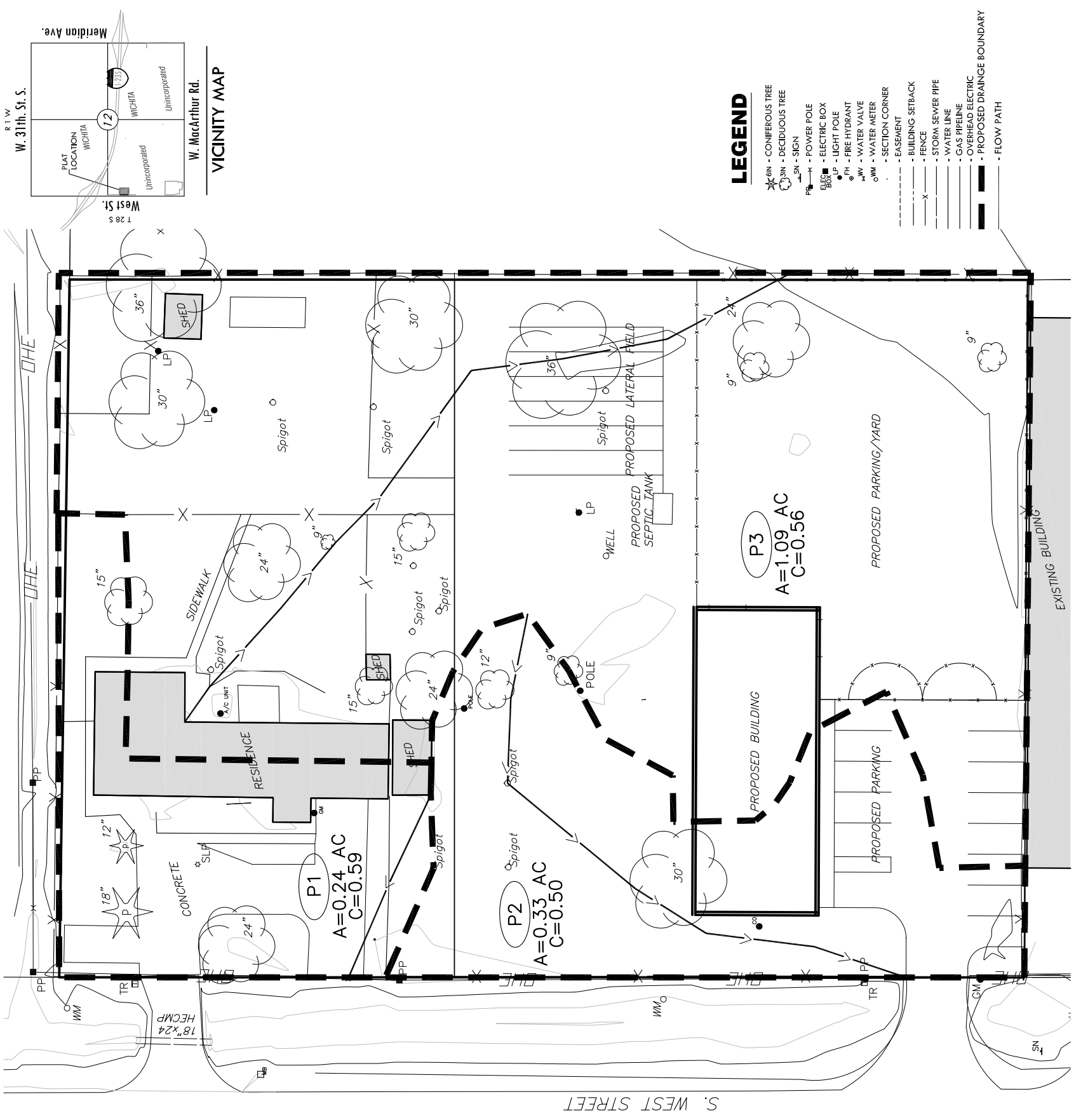
AS DESIGN BY:	CMJ DRAWN BY:	KLA CHECKED BY:
DECEMBER 2006 DATE	06713 JOB NO.	1 / 1 SHEET/OF

Appendix E

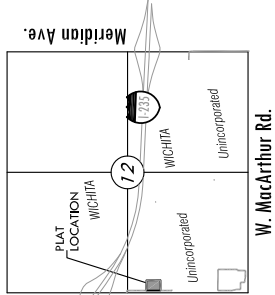
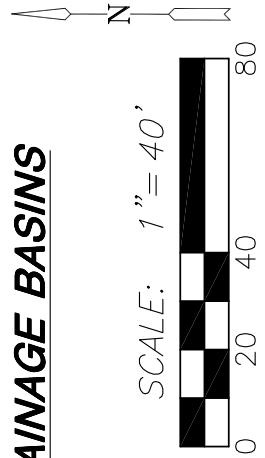
Preliminary Drainage Plan



EXISTING DRAINAGE BASINS



PROPOSED DRAINAGE BASINS



VICINITY MAP

LEGEND

- ✱ CN - CONIFEROUS TREE
- ✱ DN - DECIDUOUS TREE
- SN - SIGN
- ⊙ - POWER POLE
- ⊙ - ELECTRIC BOX
- ⊙ - LIGHT POLE
- ⊙ - FIRE HYDRANT
- ⊙ - WATER VALVE
- ⊙ - WATER METER
- ⊙ - SECTION CORNER
- ⊙ - EASEMENT
- ⊙ - BUILDING SETBACK
- ⊙ - FENCE
- ⊙ - STORM SEWER PIPE
- ⊙ - WATER LINE
- ⊙ - GAS PIPELINE
- ⊙ - OVERHEAD ELECTRIC
- ⊙ - PROPOSED DRAINAGE BOUNDARY
- ⊙ - FLOW PATH

MKEC
ENGINEERING
CONSULTANTS, INC.

PROJECT NAME: **RAIN LINK ADDITION**
SHEET TITLE: **PRELIMINARY DRAINAGE PLAN**

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

ALS
DESIGN BY: JLB
DRAWN BY: JLB
DATE: 12/12/2006
JOB NO.: 06713
SHEET NO.: 1 / 1
SHEET OF: 1

Appendix F

Time of Concentration Calculations

Time of Concentration Calculations by the FAA method
Rain Link

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

Area Name	Soil Group	Maximum Elevation	Minimum Elevation	Length (L)	Rational Runoff Coefficient, C			Time of Concentration (min), T _c			
					2-Year	5-Year	10-Year	2-Year	5-Year	10-Year	100-Year
<i>Existing 1</i>	C	101.1	100.4	65	0.59	0.59	0.59	15.0	15.0	15.0	15.0
<i>Proposed 1</i>	C	101.1	100.4	65	0.59	0.59	0.59	15.0	15.0	15.0	15.0
<i>Existing 2</i>	C	100.7	100.1	201	0.45	0.45	0.45	24.0	24.0	24.0	24.0
<i>Proposed 2</i>	C	100.7	100.1	201	0.50	0.50	0.50	22.2	22.2	22.2	22.2
<i>Existing 3</i>	C	102.2	99.9	257	0.47	0.47	0.47	18.9	18.9	18.9	18.9
<i>Proposed 3</i>	C	102.2	99.9	257	0.56	0.56	0.56	16.2	16.2	16.2	16.2

Appendix G

Hydraflow Hydrographs Output

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	Rational	-----	-----	0.54	-----	0.64	0.74	-----	-----	1.04	E1
2	Rational	-----	-----	0.45	-----	0.54	0.63	-----	-----	0.89	E2
3	Rational	-----	-----	1.76	-----	2.10	2.41	-----	-----	3.42	E3
5	Rational	-----	-----	0.54	-----	0.64	0.74	-----	-----	1.04	P1
6	Rational	-----	-----	0.53	-----	0.63	0.73	-----	-----	1.03	P2
7	Rational	-----	-----	2.28	-----	2.70	3.10	-----	-----	4.38	P3

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:25 PM

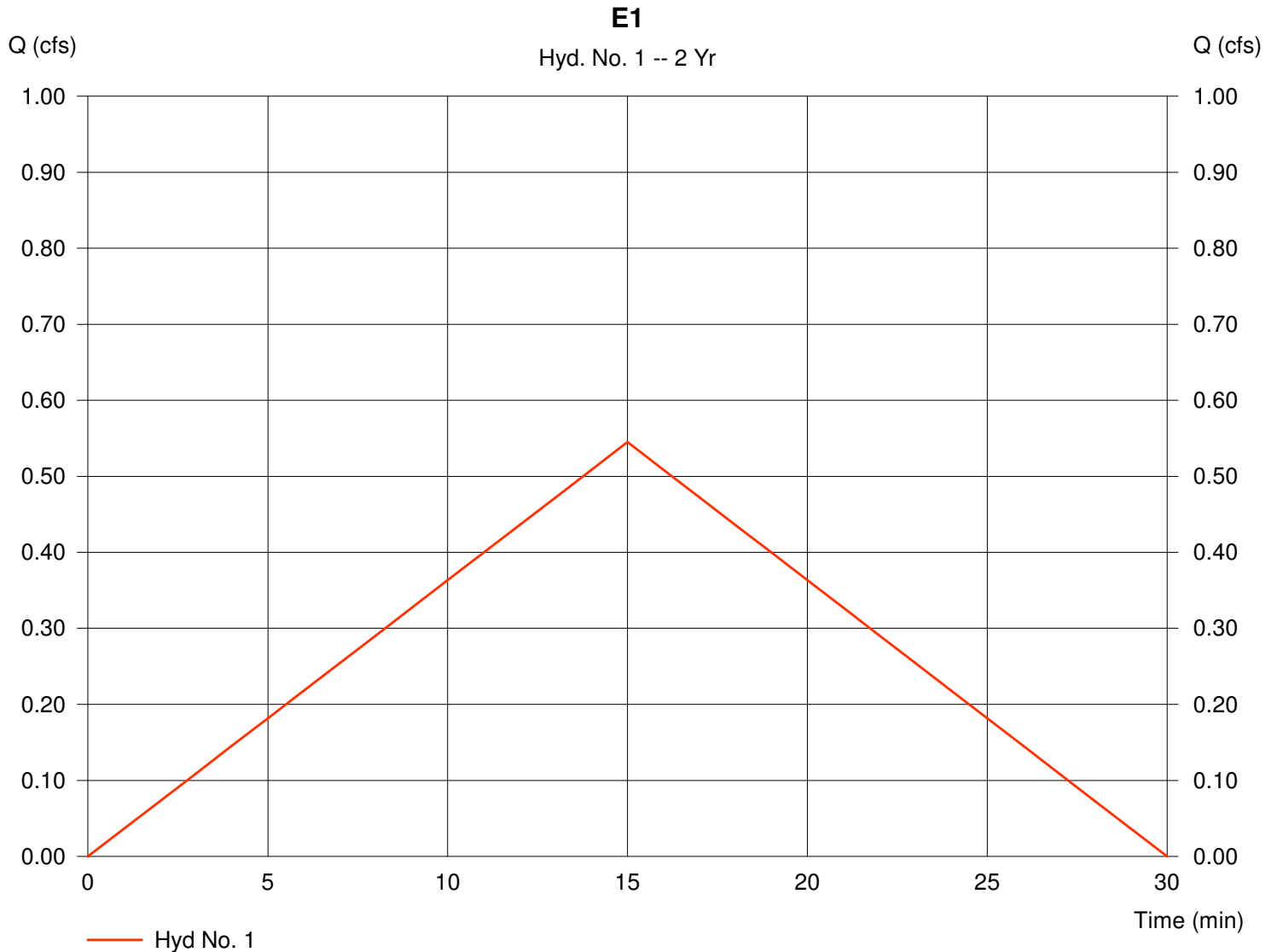
Hyd. No. 1

E1

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 0.240 ac
Intensity = 3.849 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.54 cfs
Time interval = 1 min
Runoff coeff. = 0.59
Tc by User = 15.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 490 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 4:23 PM

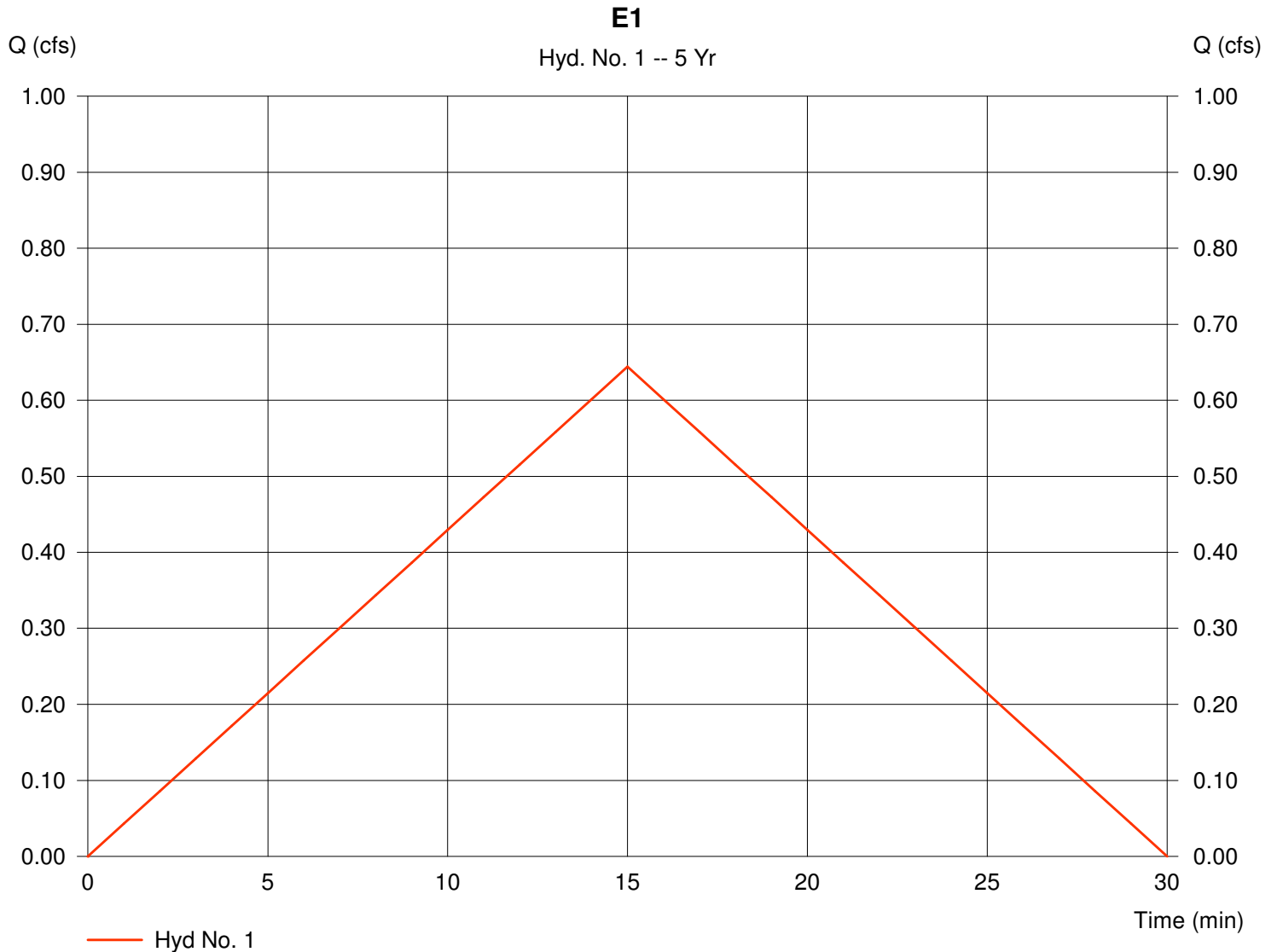
Hyd. No. 1

E1

Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 0.240 ac
Intensity = 4.549 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.64 cfs
Time interval = 1 min
Runoff coeff. = 0.59
Tc by User = 15.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 580 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:31 PM

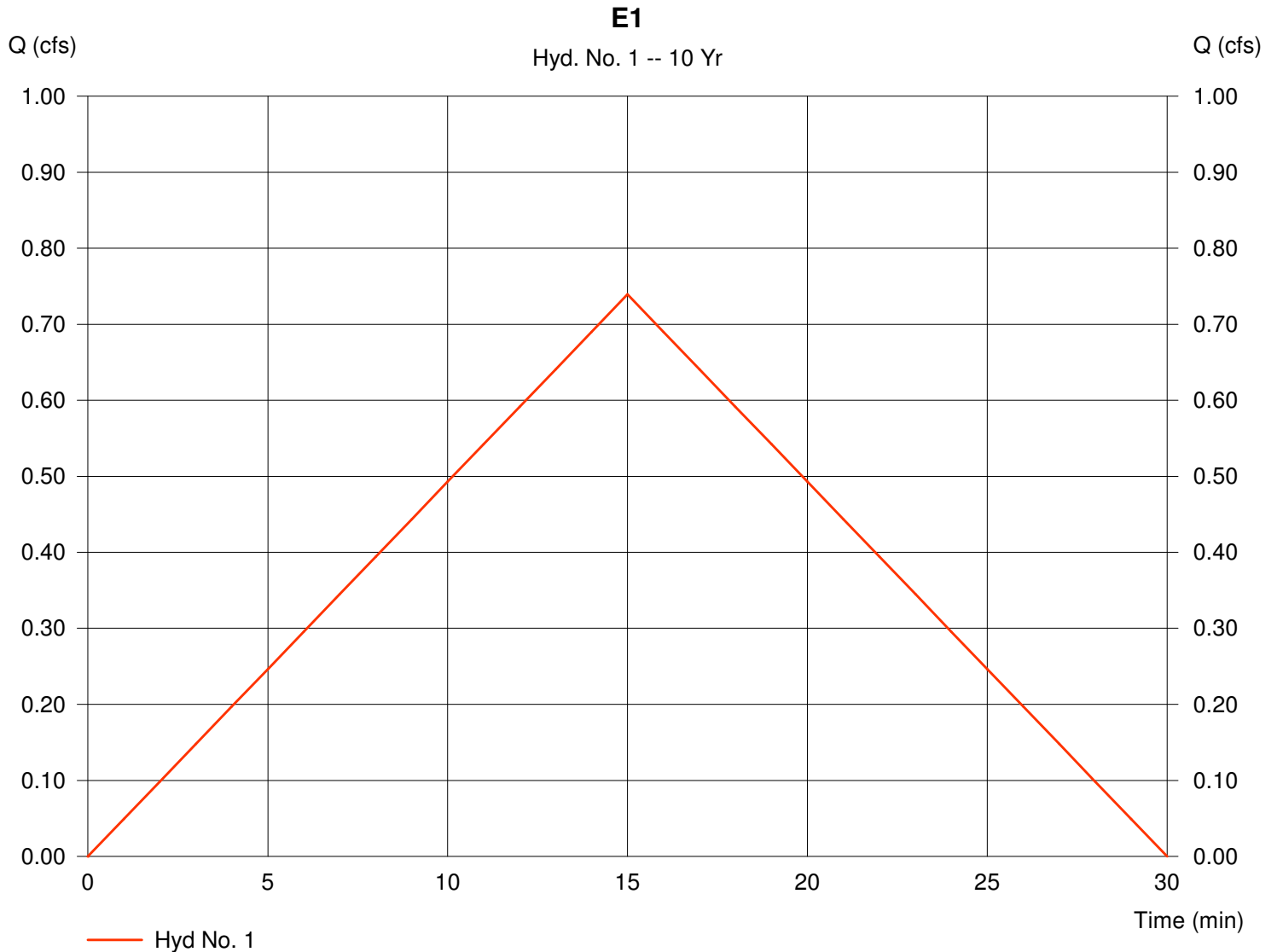
Hyd. No. 1

E1

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 0.240 ac
Intensity = 5.221 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.74 cfs
Time interval = 1 min
Runoff coeff. = 0.59
Tc by User = 15.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 665 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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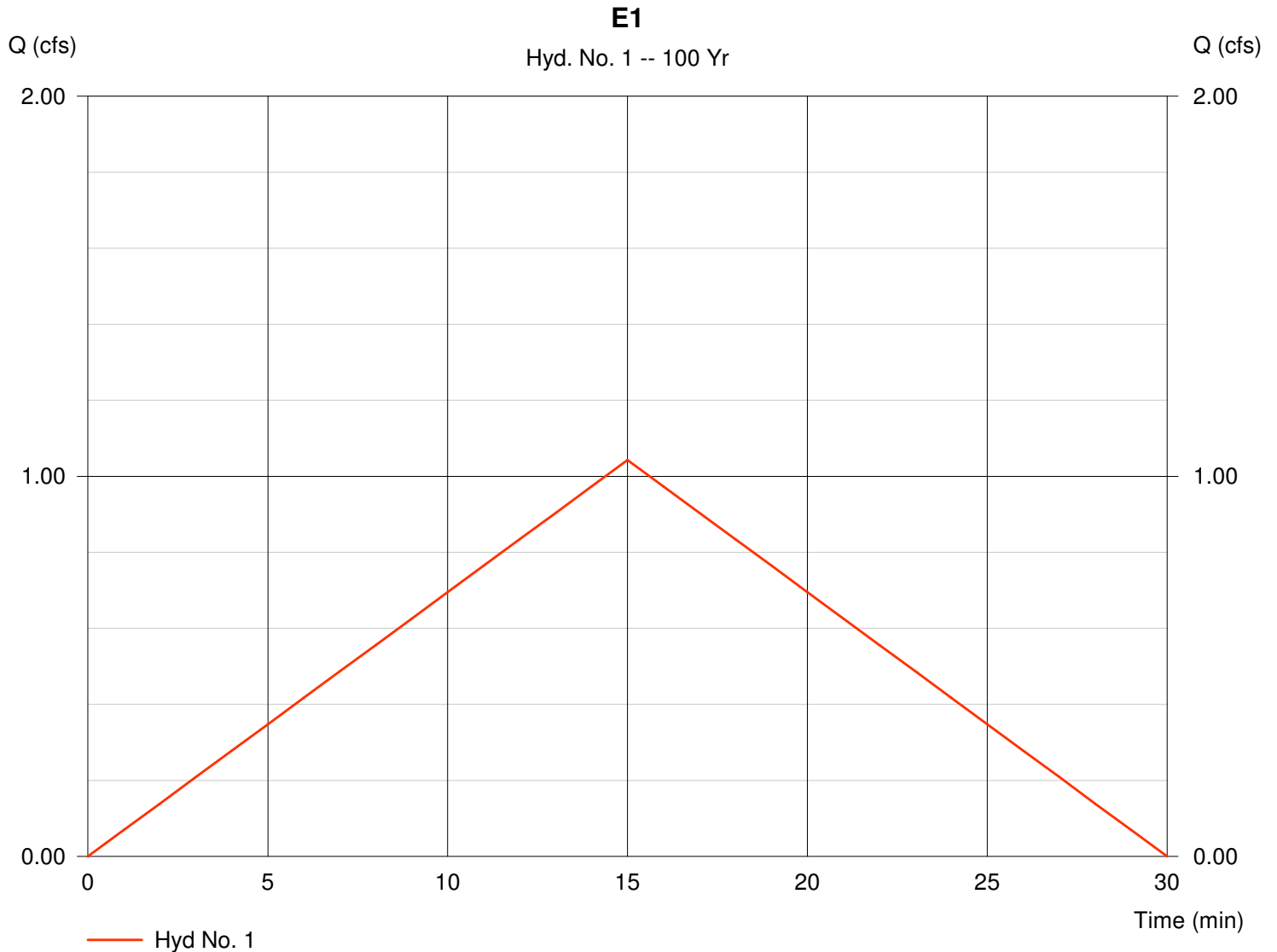
Hyd. No. 1

E1

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 0.240 ac
Intensity = 7.365 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 1.04 cfs
Time interval = 1 min
Runoff coeff. = 0.59
Tc by User = 15.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 939 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:34 PM

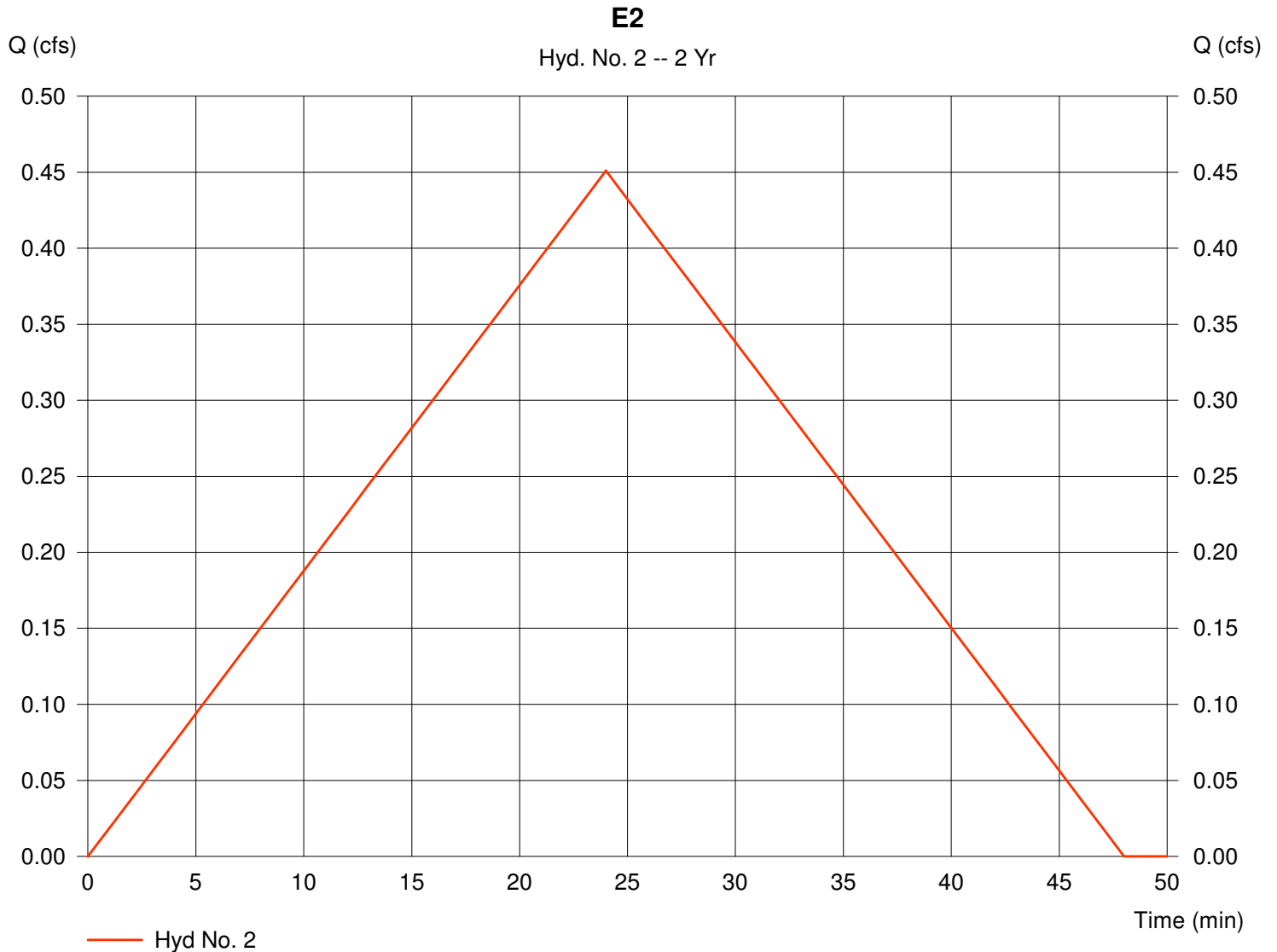
Hyd. No. 2

E2

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 0.330 ac
Intensity = 3.037 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.45 cfs
Time interval = 1 min
Runoff coeff. = 0.45
Tc by User = 24.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 649 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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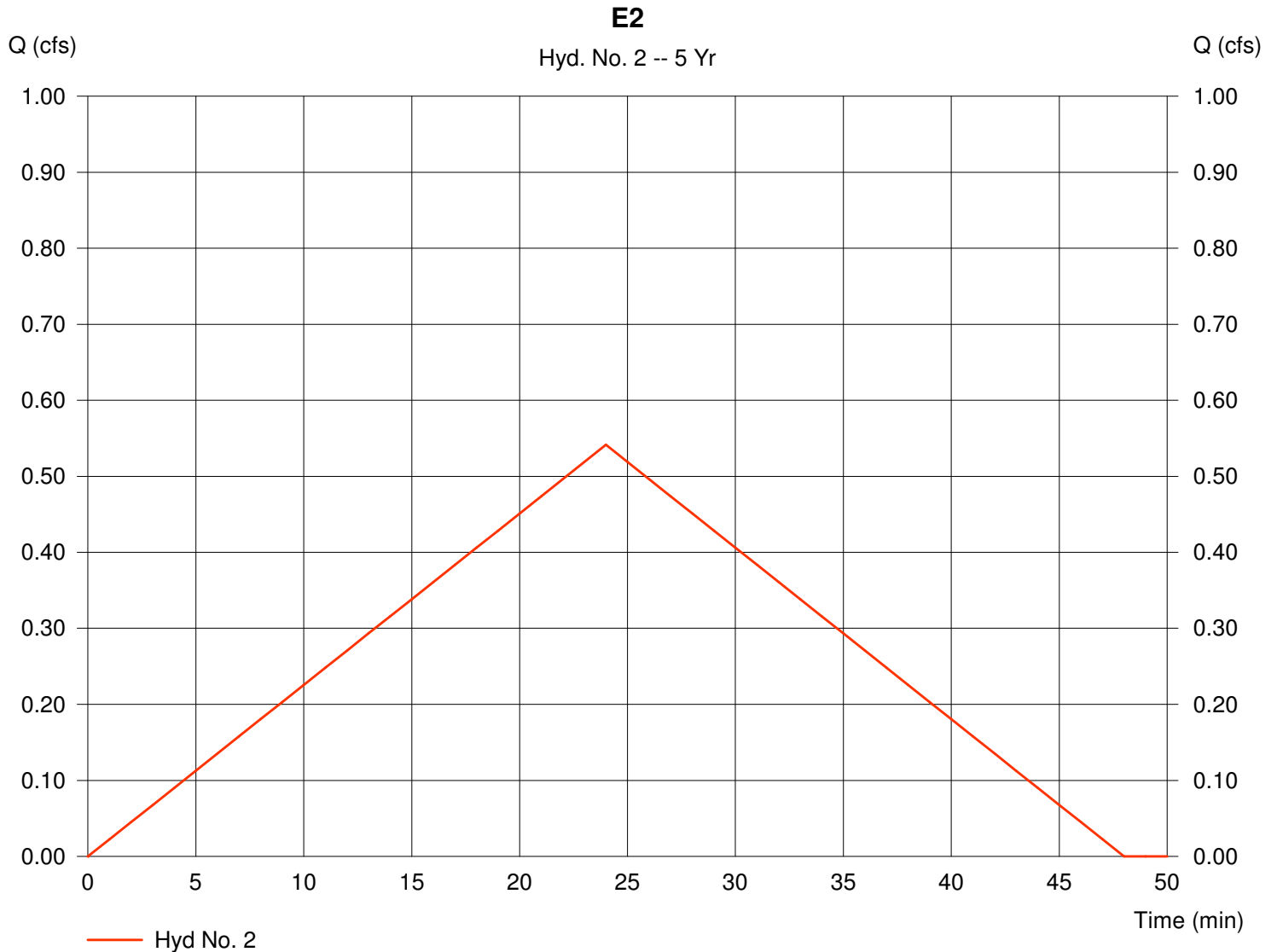
Hyd. No. 2

E2

Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 0.330 ac
Intensity = 3.646 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.54 cfs
Time interval = 1 min
Runoff coeff. = 0.45
Tc by User = 24.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 780 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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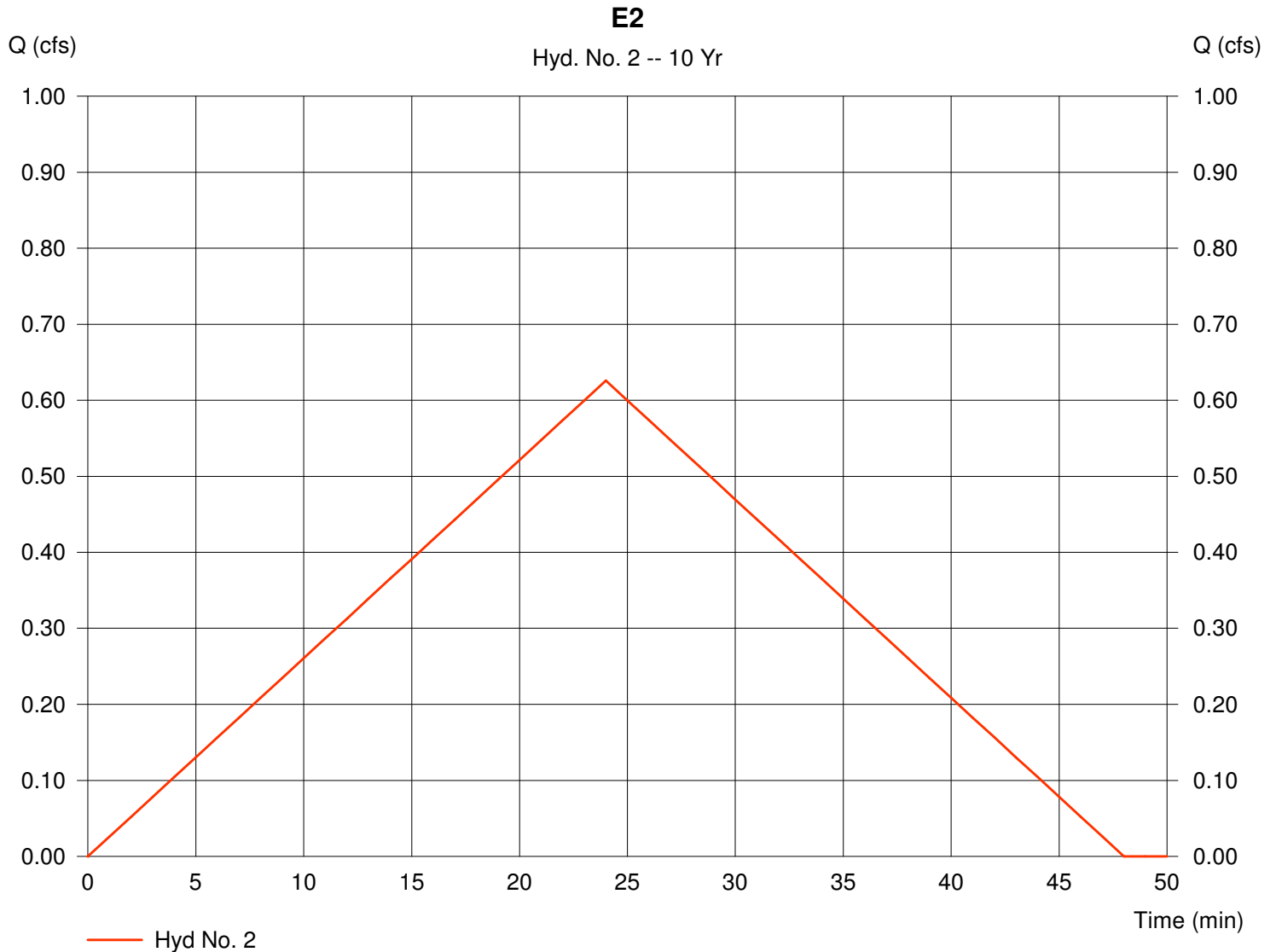
Hyd. No. 2

E2

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 0.330 ac
Intensity = 4.214 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.63 cfs
Time interval = 1 min
Runoff coeff. = 0.45
Tc by User = 24.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 901 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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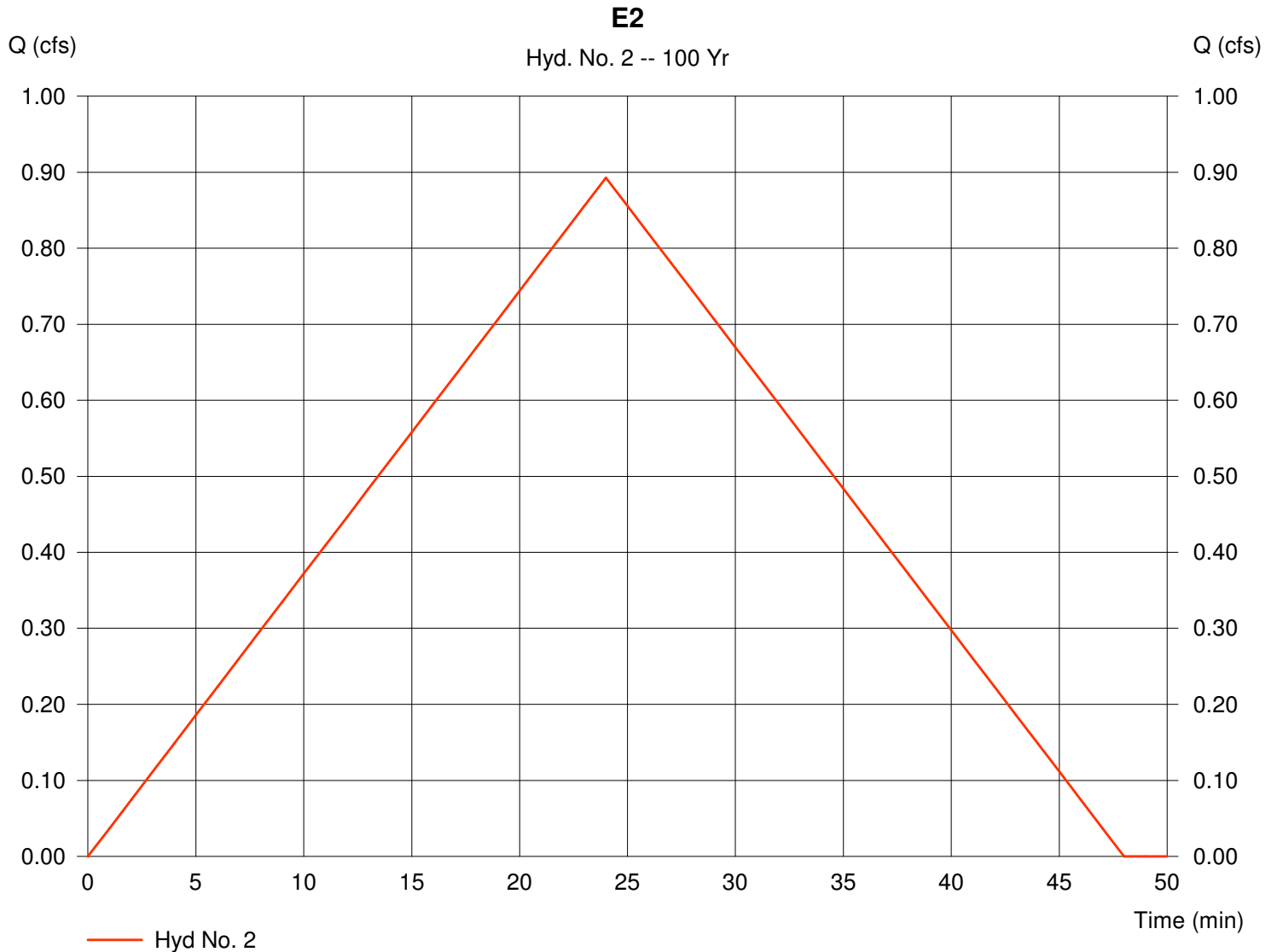
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E2

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 0.330 ac
Intensity = 6.012 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.89 cfs
Time interval = 1 min
Runoff coeff. = 0.45
Tc by User = 24.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1,286 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:37 PM

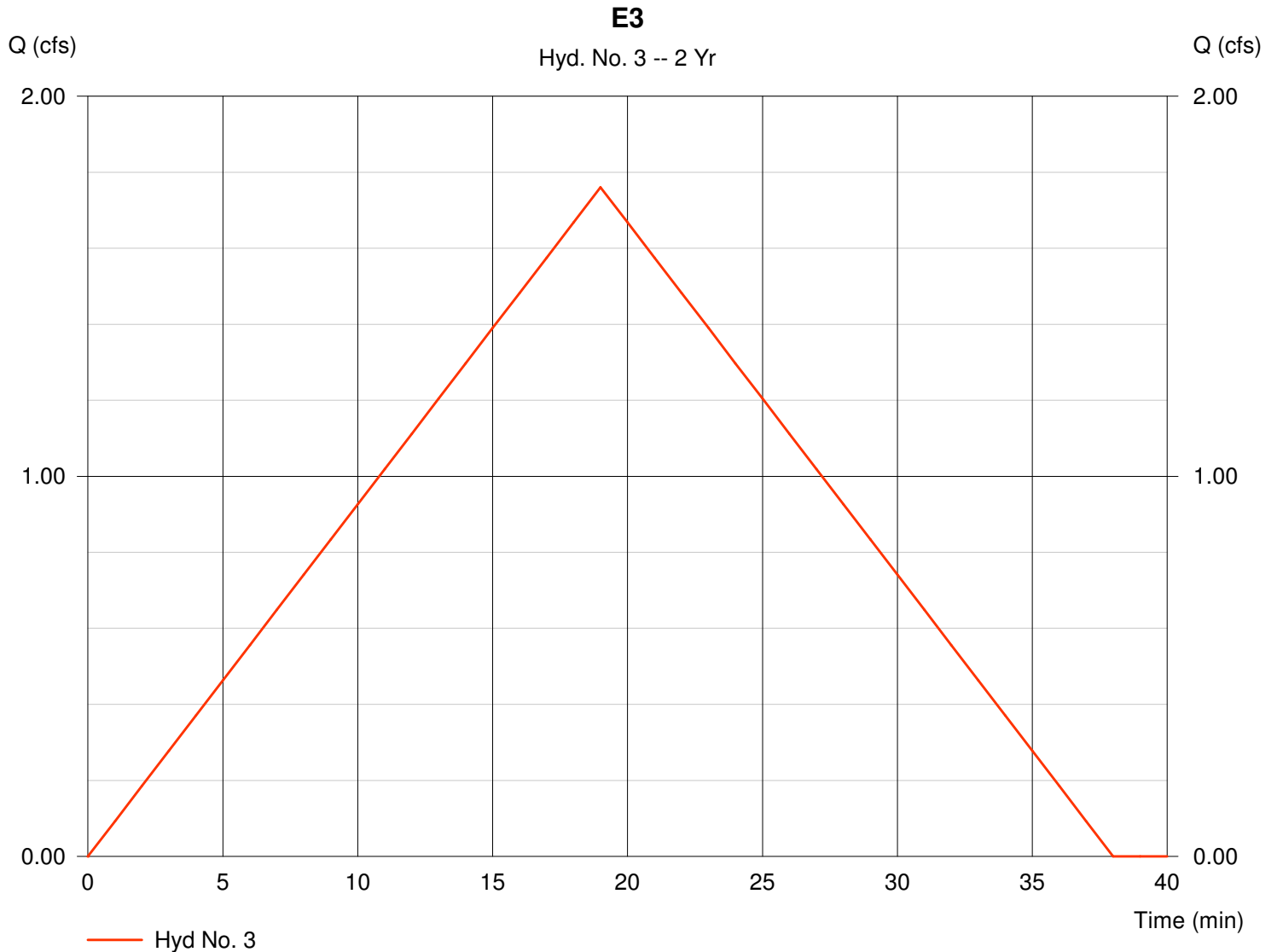
Hyd. No. 3

E3

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 1.090 ac
Intensity = 3.437 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 1.76 cfs
Time interval = 1 min
Runoff coeff. = 0.47
Tc by User = 19.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2,007 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 4:25 PM

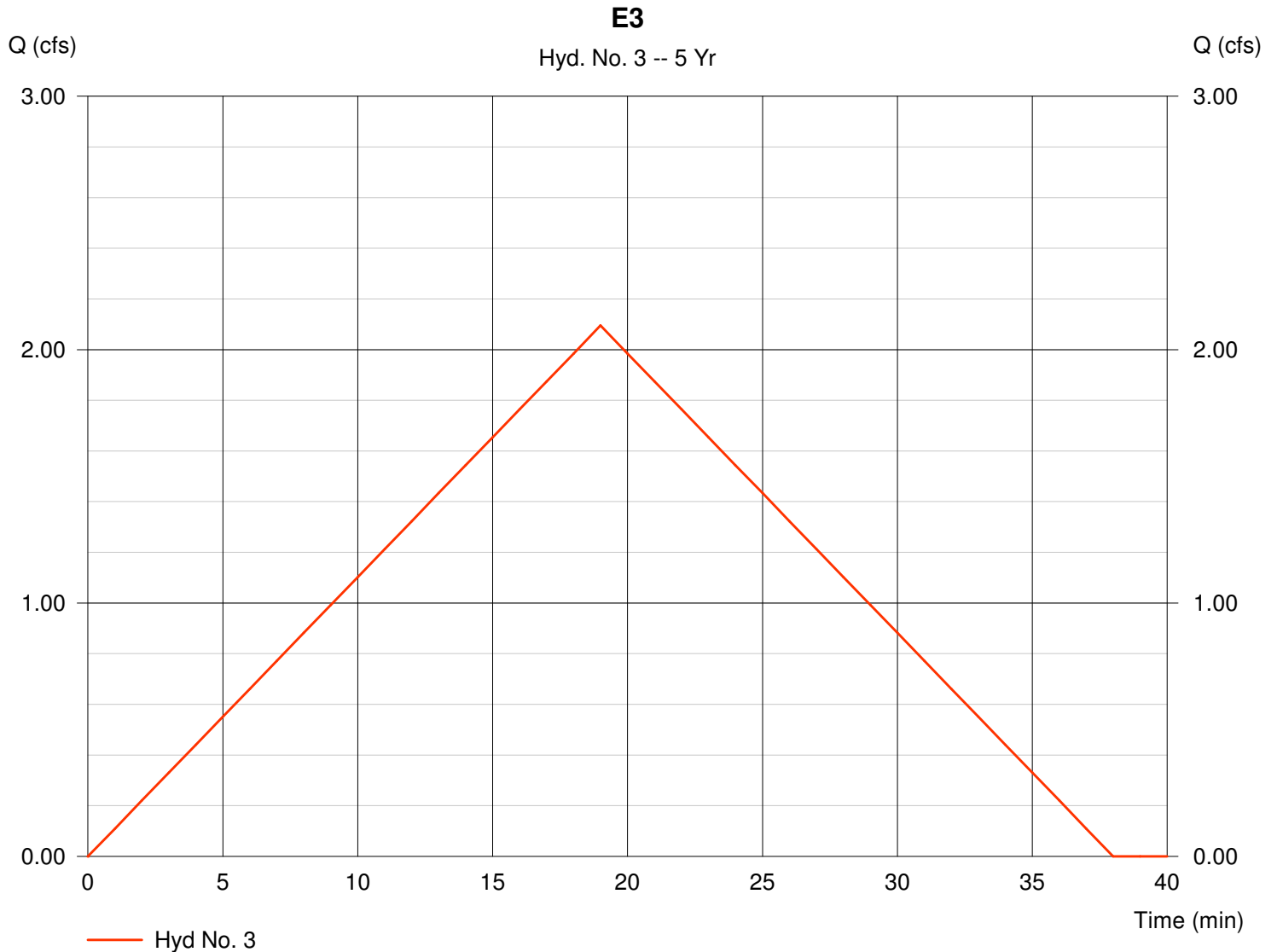
Hyd. No. 3

E3

Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 1.090 ac
Intensity = 4.089 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 2.10 cfs
Time interval = 1 min
Runoff coeff. = 0.47
Tc by User = 19.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2,388 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:38 PM

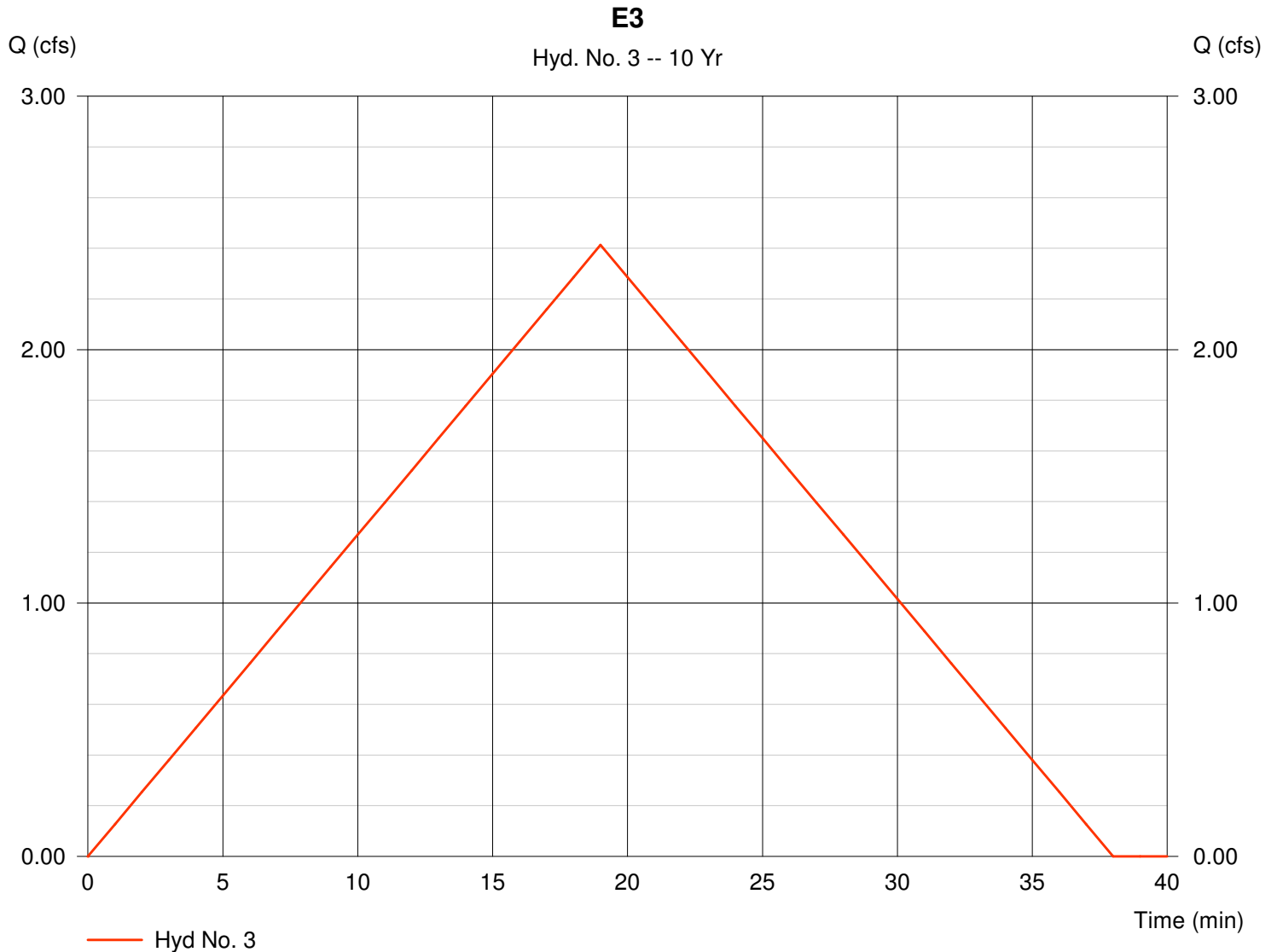
Hyd. No. 3

E3

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 1.090 ac
Intensity = 4.710 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 2.41 cfs
Time interval = 1 min
Runoff coeff. = 0.47
Tc by User = 19.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2,750 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:39 PM

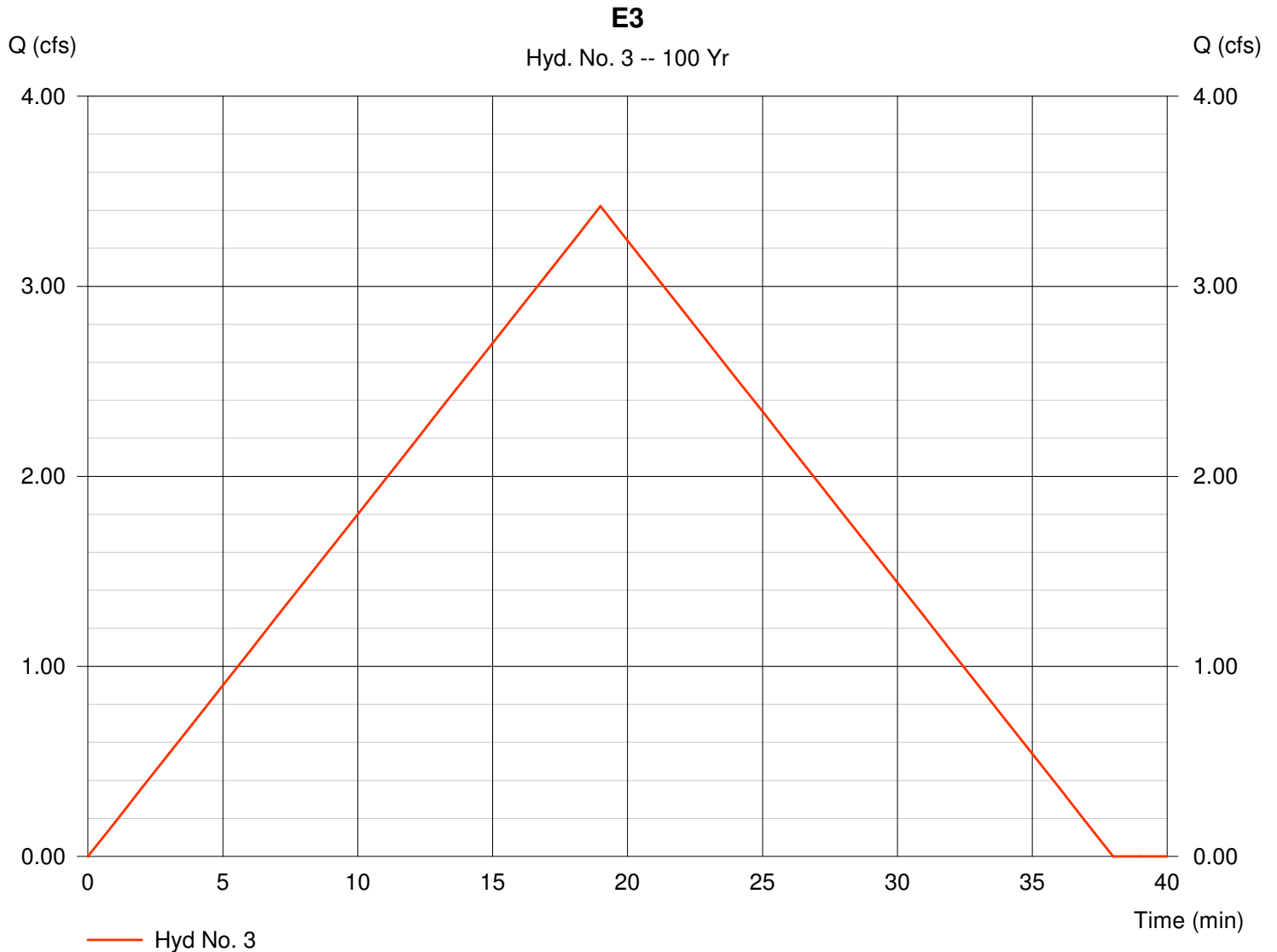
Hyd. No. 3

E3

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 1.090 ac
Intensity = 6.678 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 3.42 cfs
Time interval = 1 min
Runoff coeff. = 0.47
Tc by User = 19.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 3,900 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:49 PM

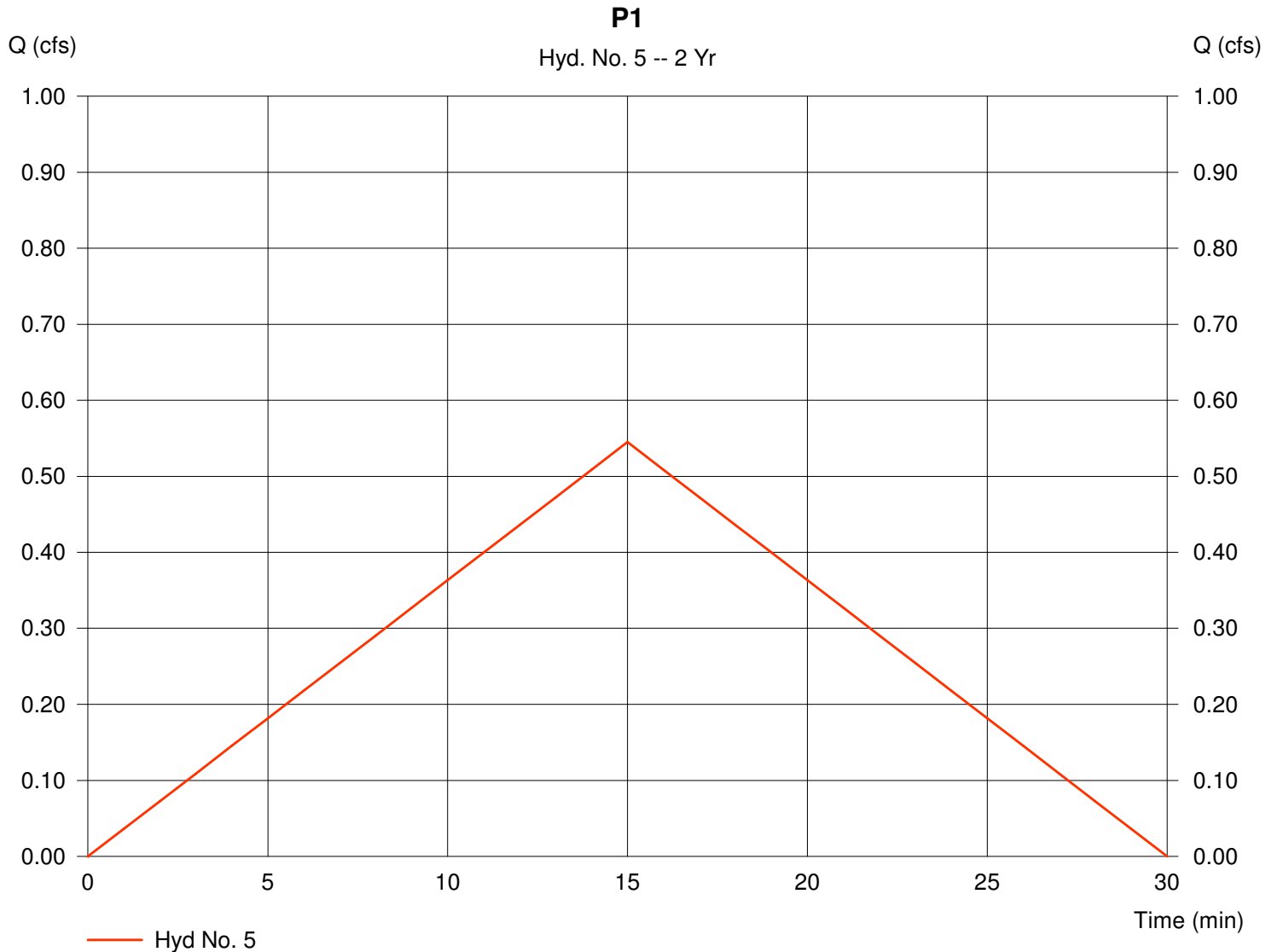
Hyd. No. 5

P1

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 0.240 ac
Intensity = 3.849 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.54 cfs
Time interval = 1 min
Runoff coeff. = 0.59
Tc by User = 15.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 490 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 4:26 PM

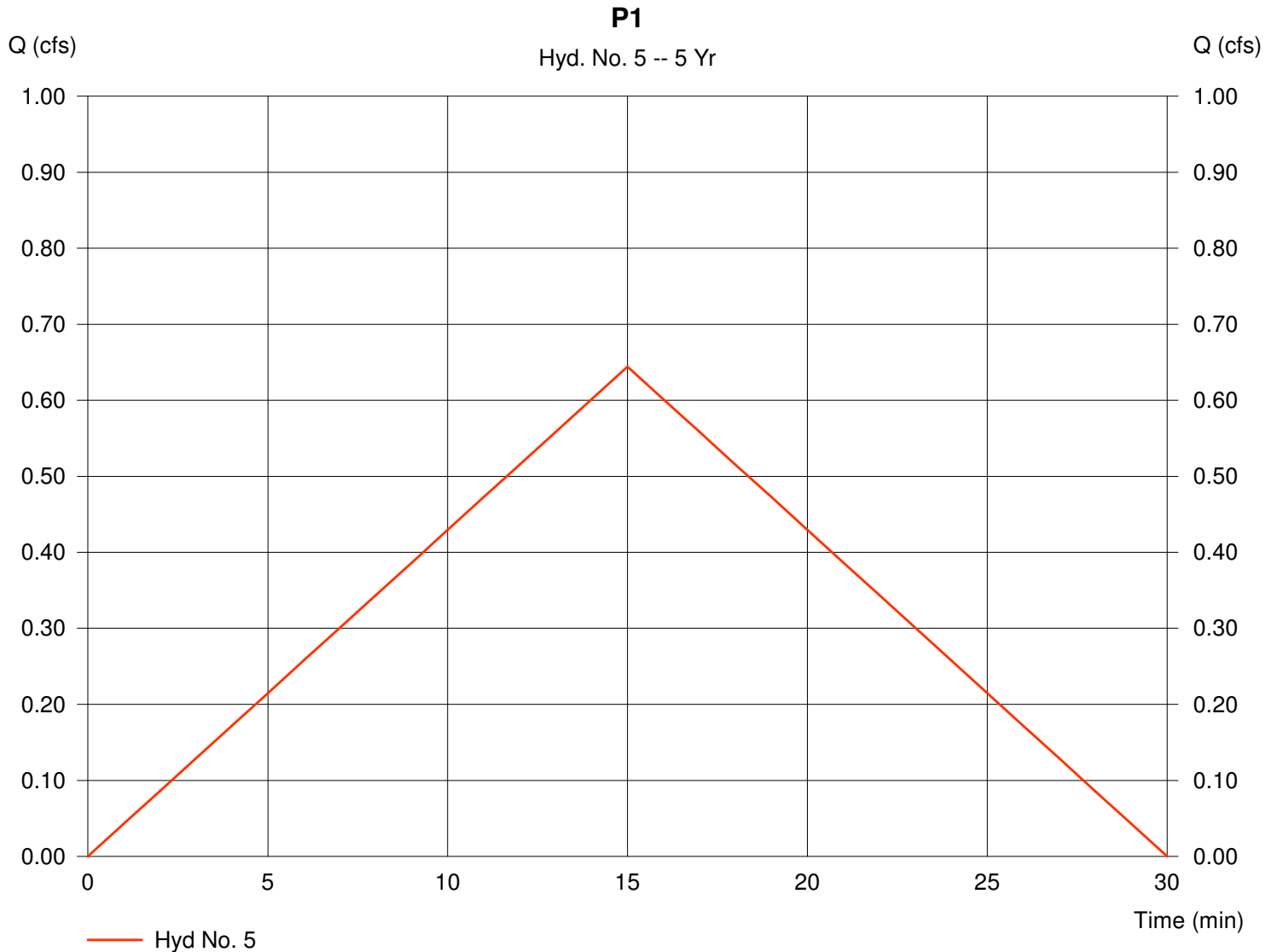
Hyd. No. 5

P1

Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 0.240 ac
Intensity = 4.549 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.64 cfs
Time interval = 1 min
Runoff coeff. = 0.59
Tc by User = 15.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 580 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:49 PM

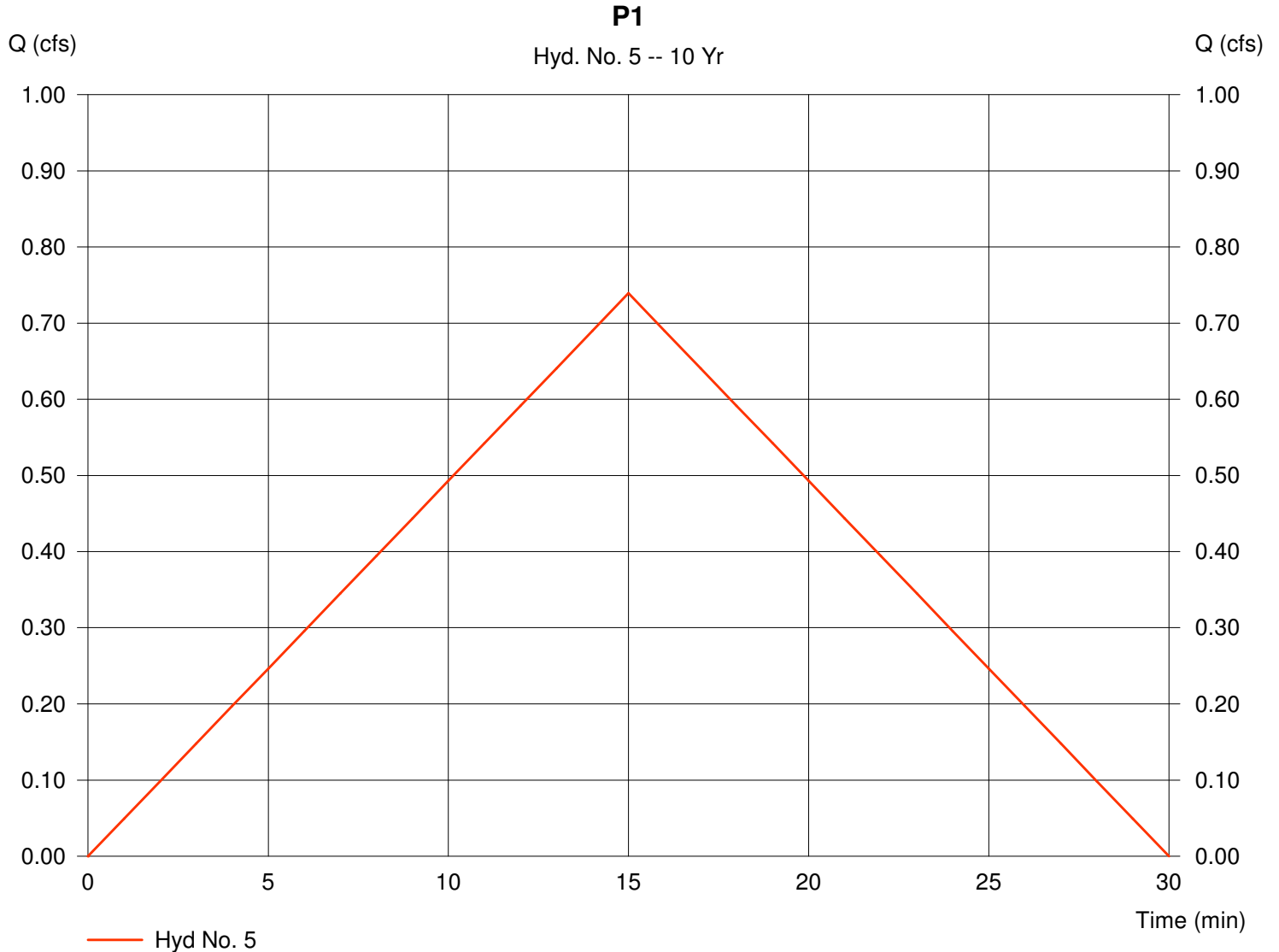
Hyd. No. 5

P1

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 0.240 ac
Intensity = 5.221 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.74 cfs
Time interval = 1 min
Runoff coeff. = 0.59
Tc by User = 15.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 665 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

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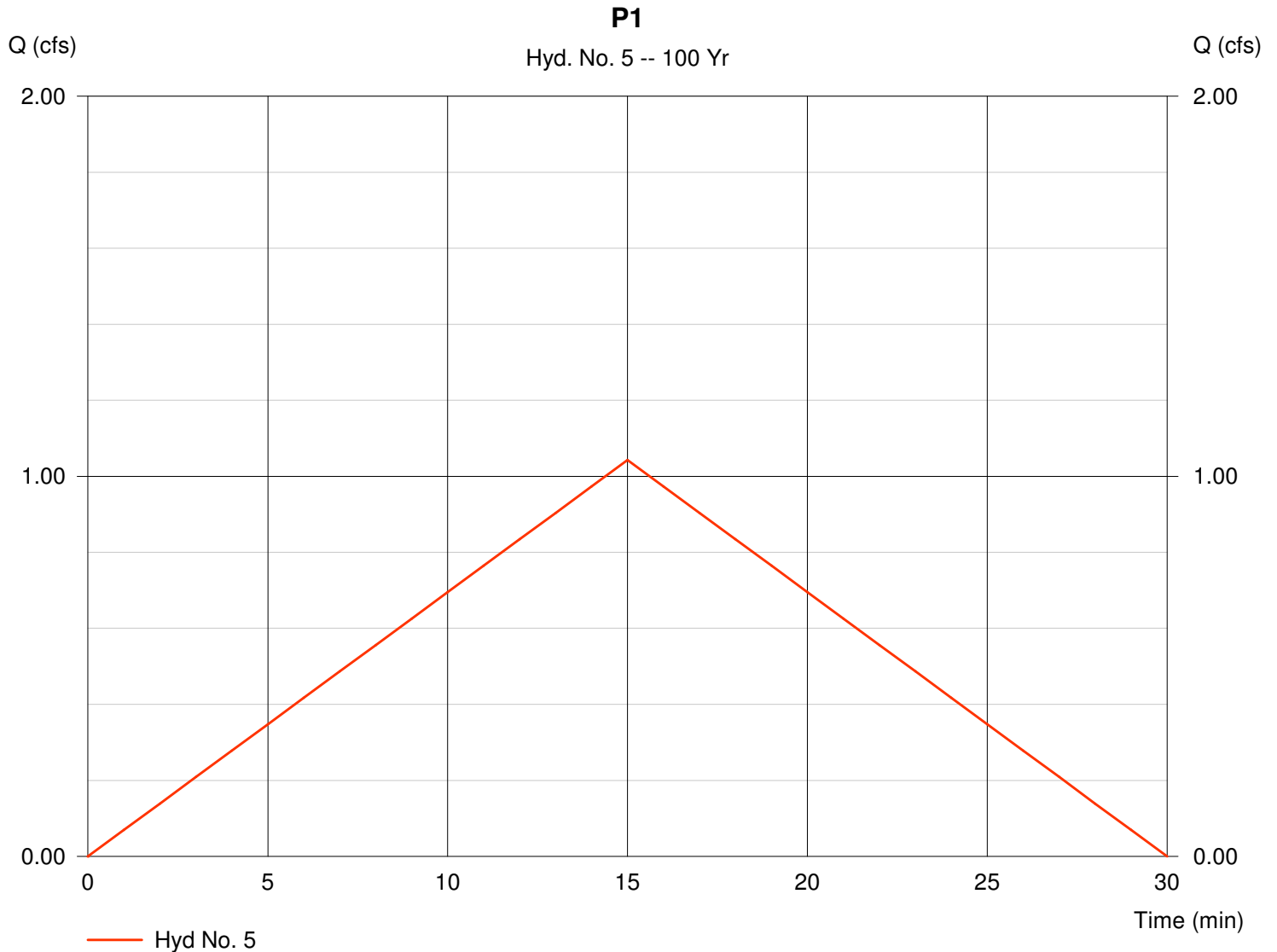
Hyd. No. 5

P1

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 0.240 ac
Intensity = 7.365 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 1.04 cfs
Time interval = 1 min
Runoff coeff. = 0.59
Tc by User = 15.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 939 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:51 PM

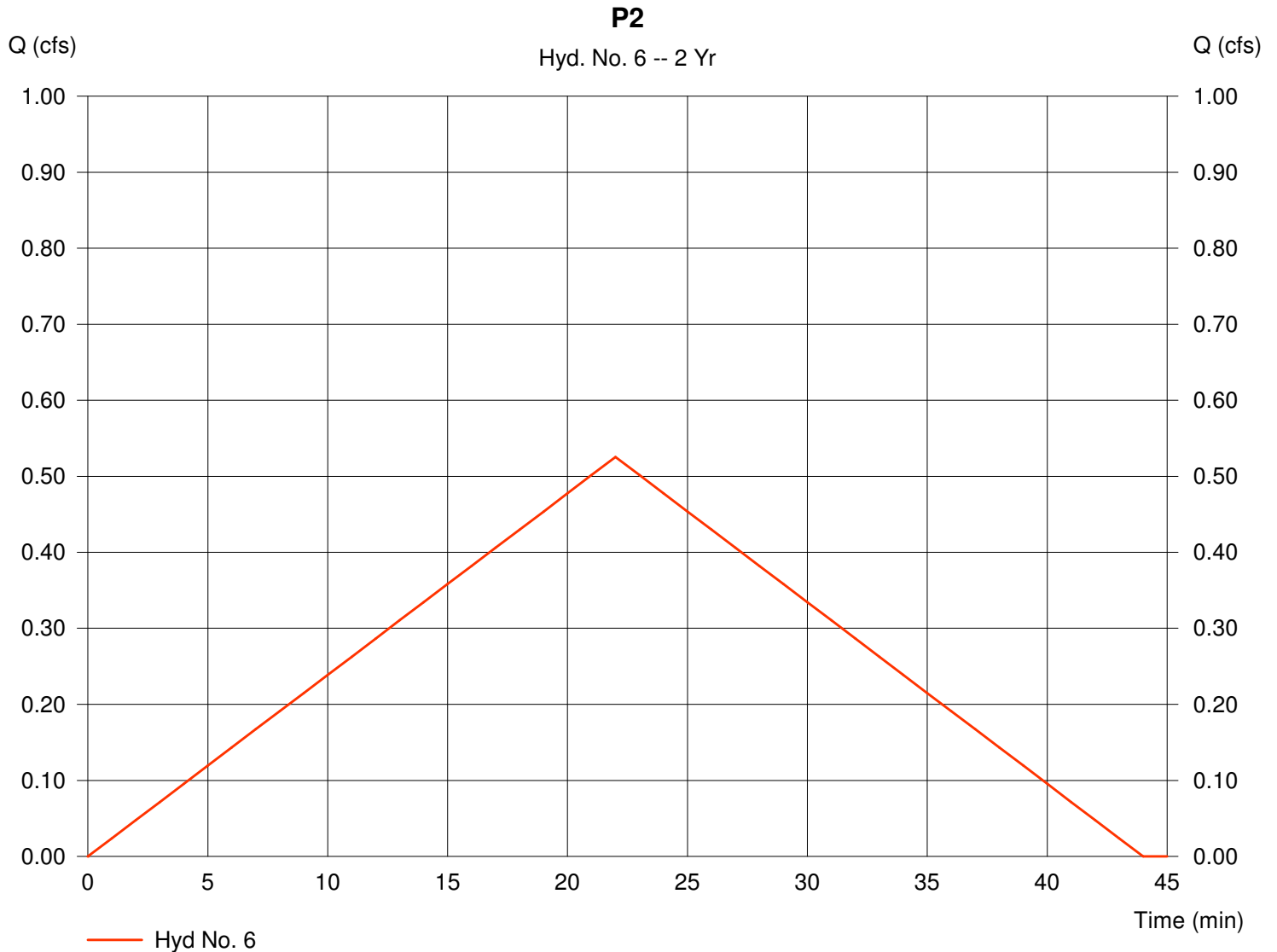
Hyd. No. 6

P2

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 0.330 ac
Intensity = 3.184 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.53 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 22.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 694 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 4:27 PM

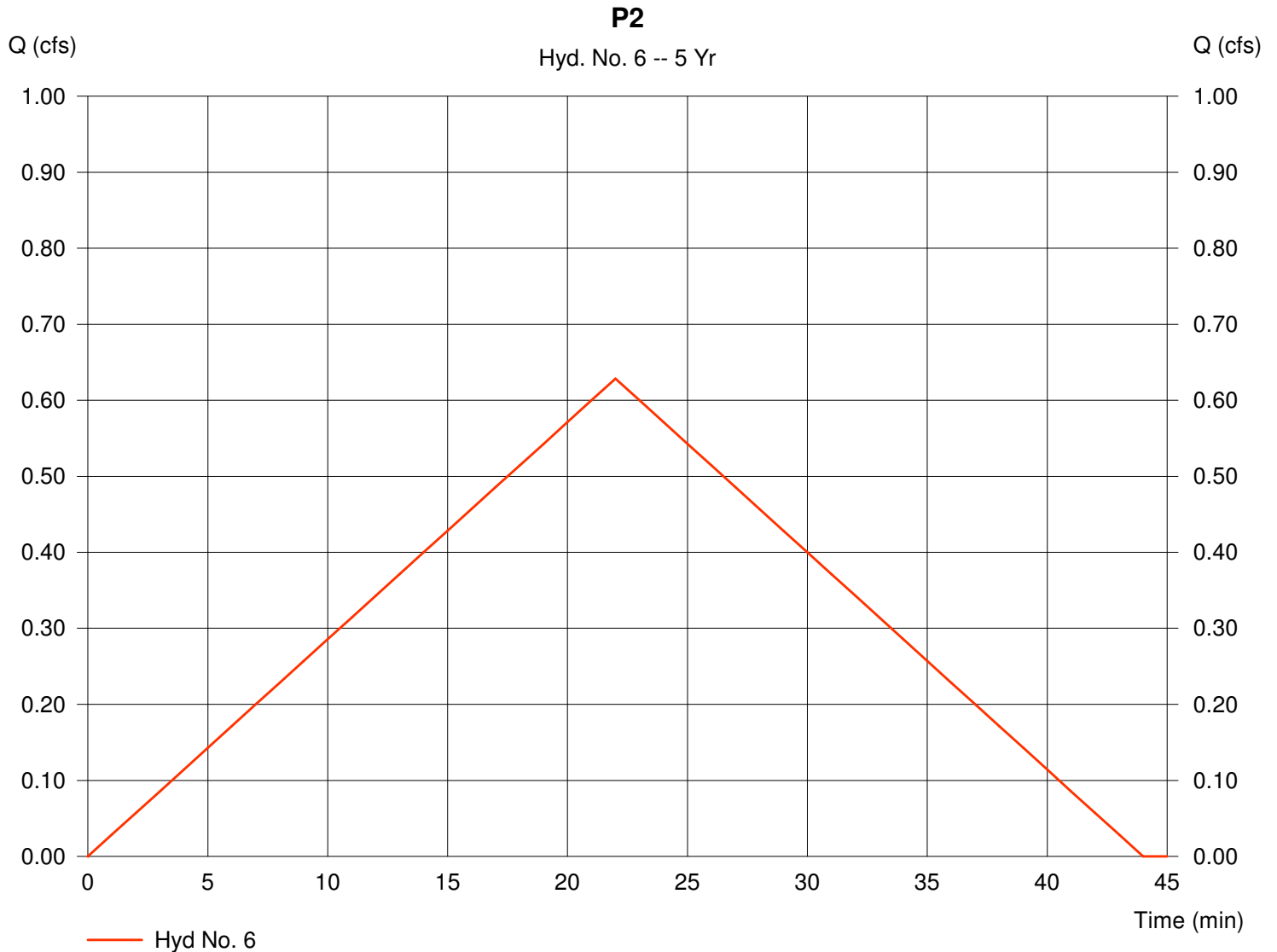
Hyd. No. 6

P2

Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 0.330 ac
Intensity = 3.809 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.63 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 22.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 830 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:52 PM

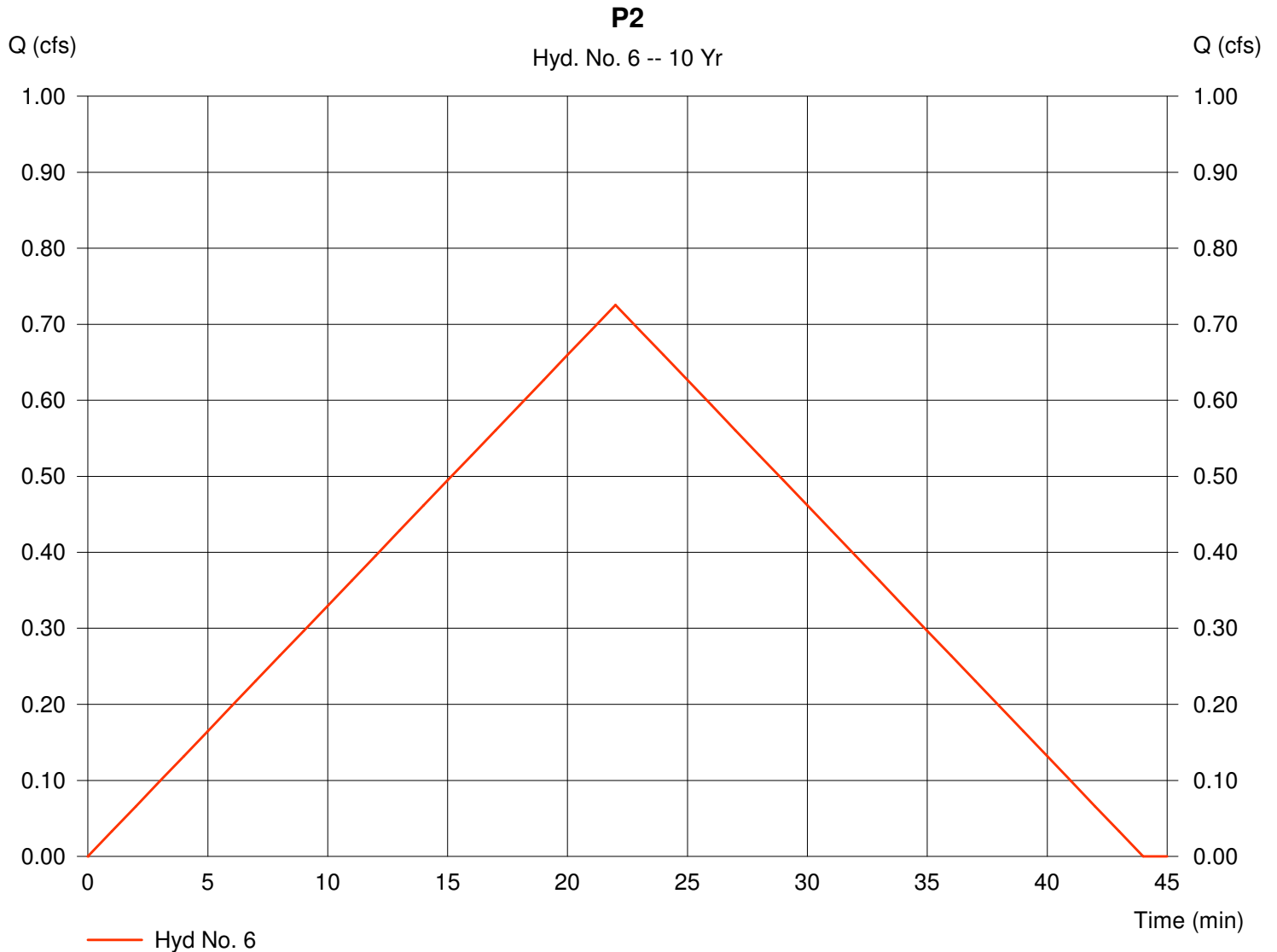
Hyd. No. 6

P2

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 0.330 ac
Intensity = 4.397 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 0.73 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 22.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 958 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:53 PM

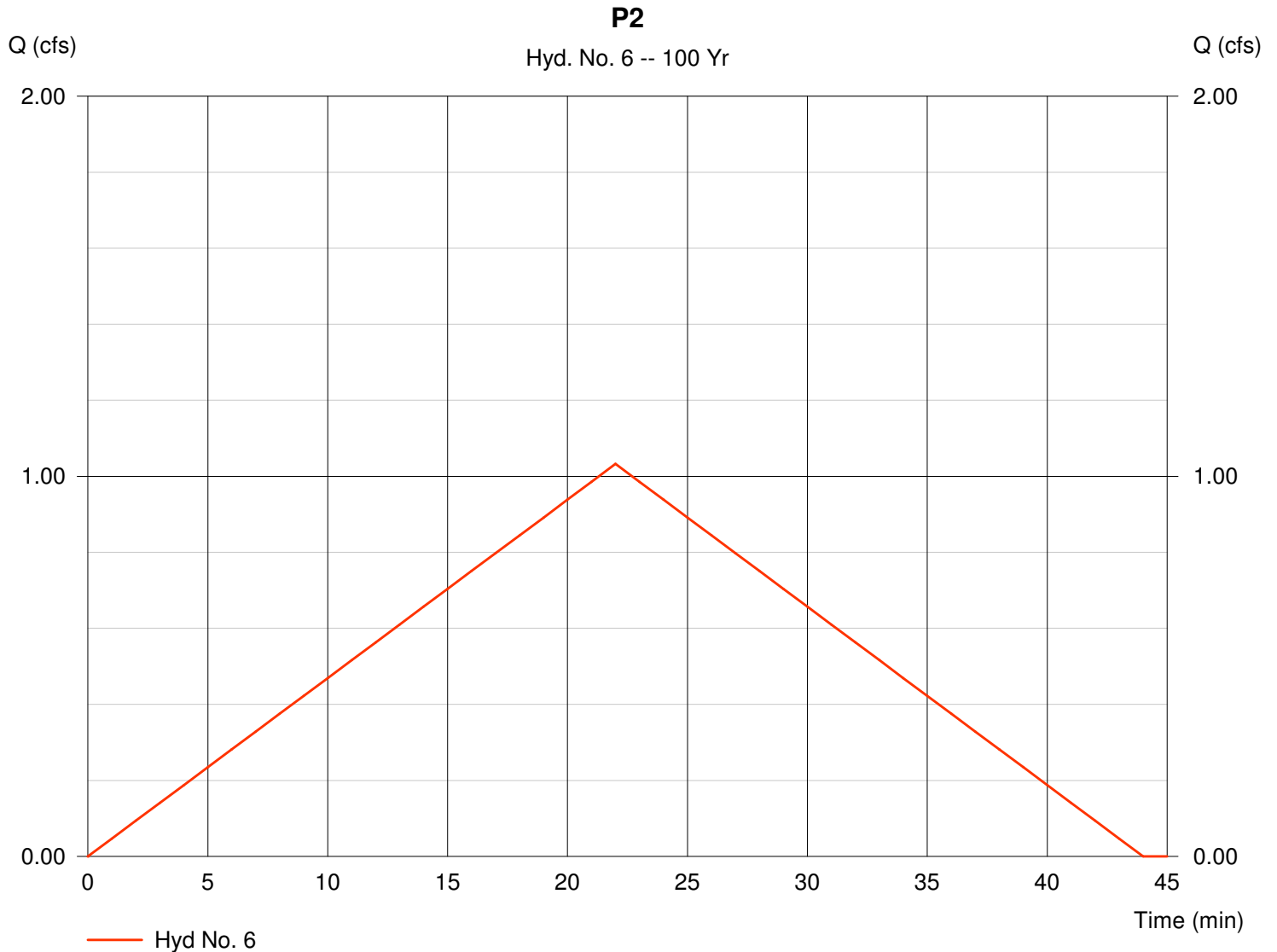
Hyd. No. 6

P2

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 0.330 ac
Intensity = 6.258 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 1.03 cfs
Time interval = 1 min
Runoff coeff. = 0.5
Tc by User = 22.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 1,363 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:54 PM

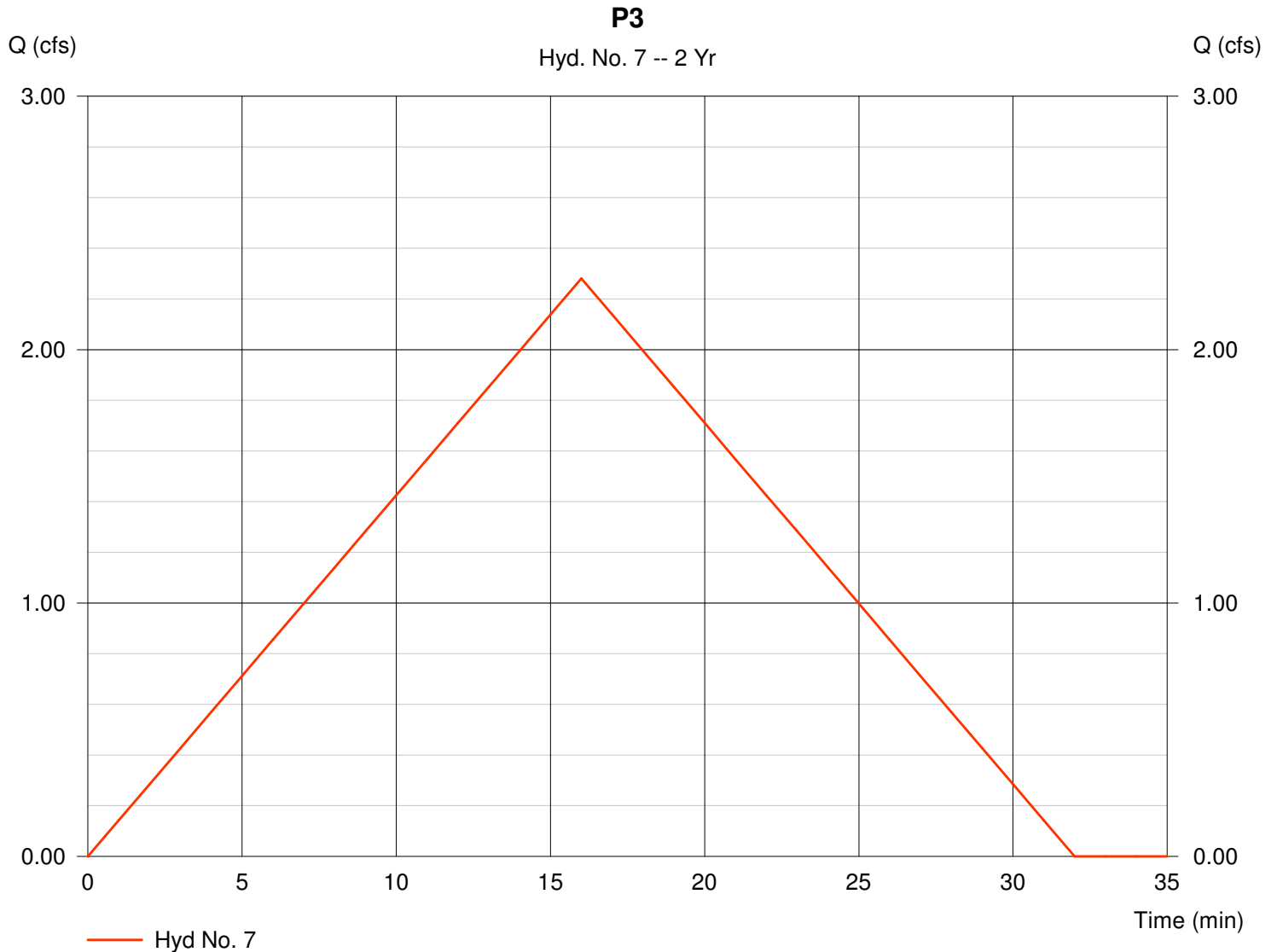
Hyd. No. 7

P3

Hydrograph type = Rational
Storm frequency = 2 yrs
Drainage area = 1.090 ac
Intensity = 3.736 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 2.28 cfs
Time interval = 1 min
Runoff coeff. = 0.56
Tc by User = 16.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2,189 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 4:27 PM

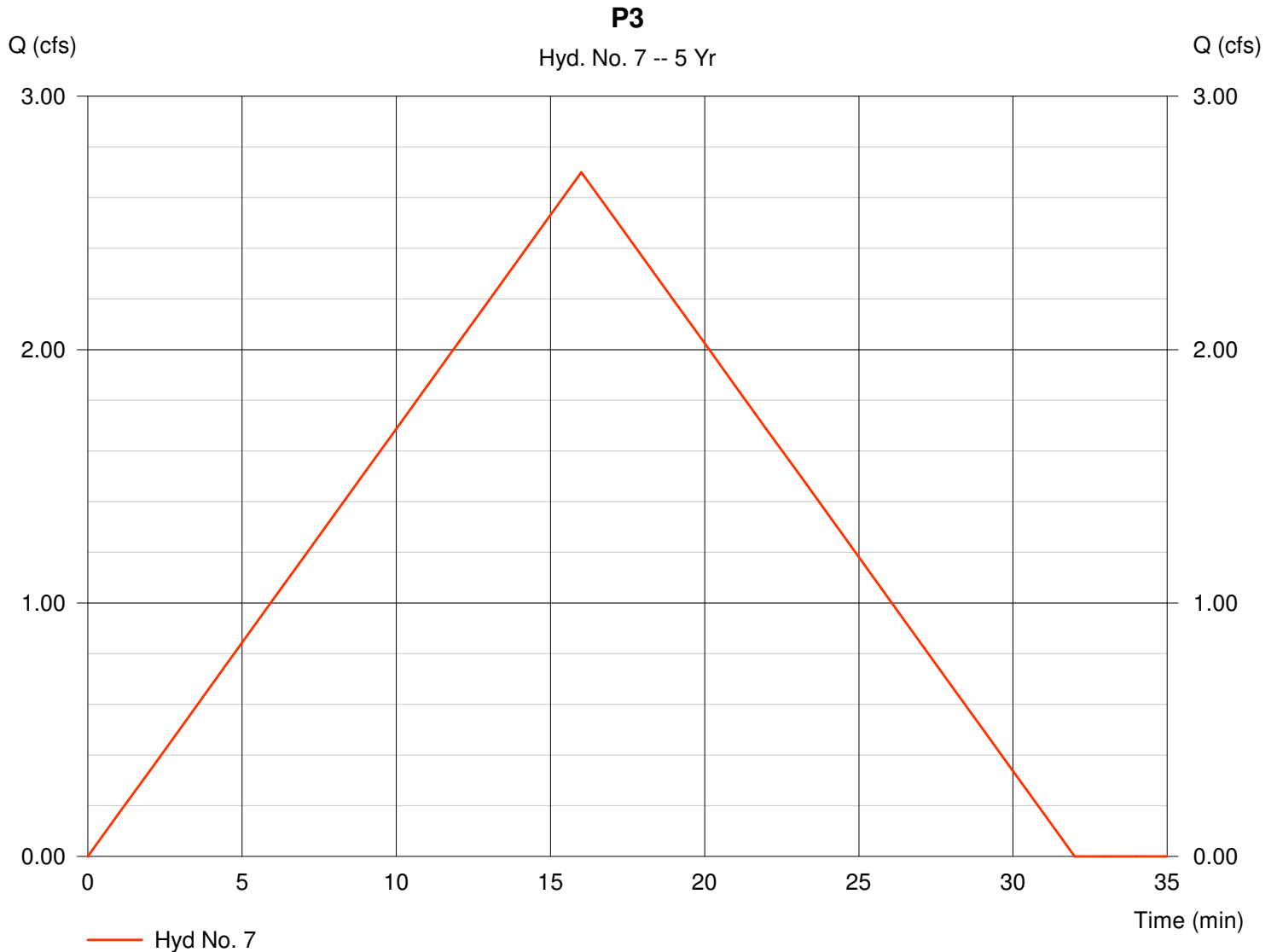
Hyd. No. 7

P3

Hydrograph type = Rational
Storm frequency = 5 yrs
Drainage area = 1.090 ac
Intensity = 4.423 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 2.70 cfs
Time interval = 1 min
Runoff coeff. = 0.56
Tc by User = 16.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2,592 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:55 PM

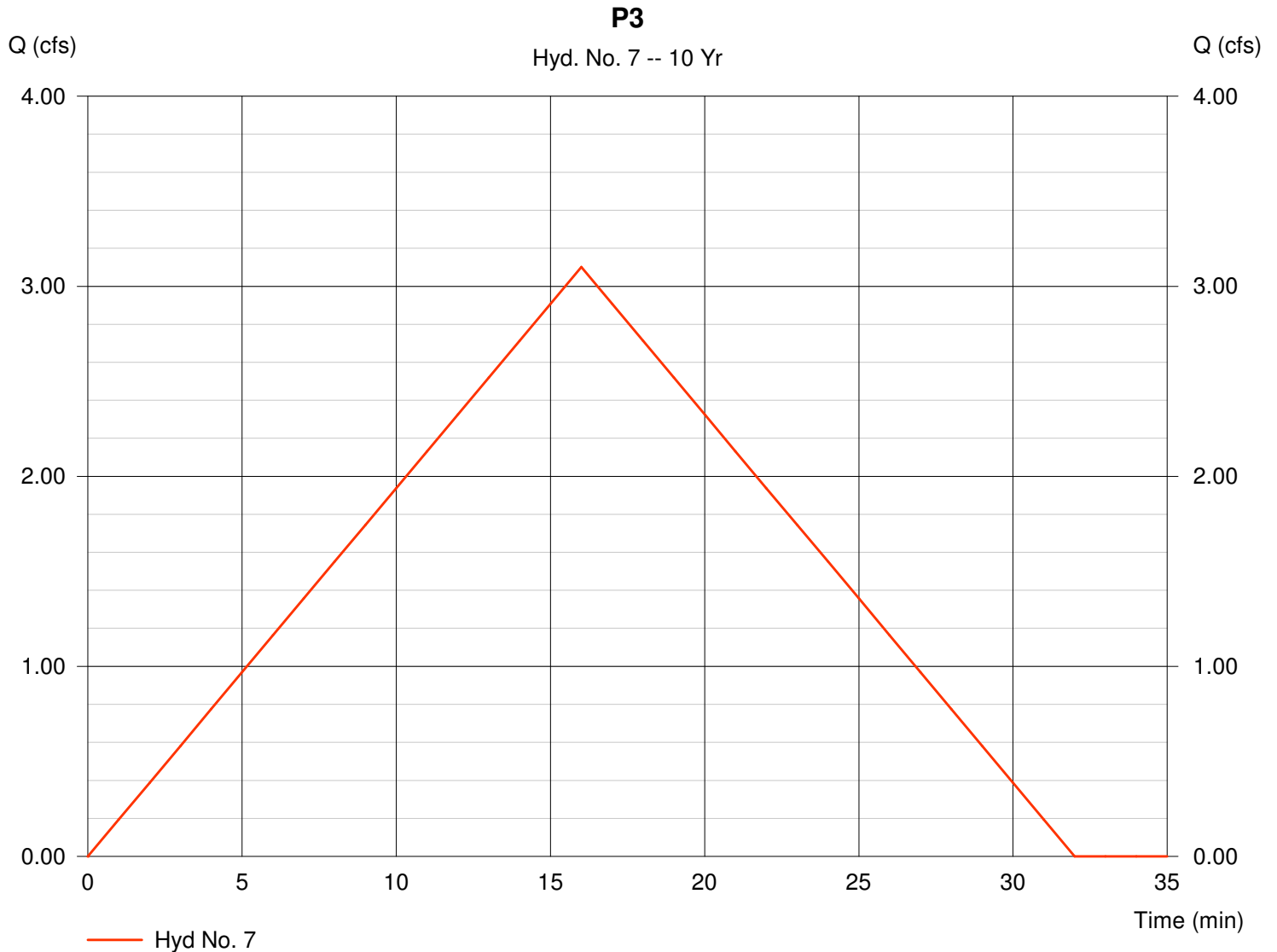
Hyd. No. 7

P3

Hydrograph type = Rational
Storm frequency = 10 yrs
Drainage area = 1.090 ac
Intensity = 5.081 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 3.10 cfs
Time interval = 1 min
Runoff coeff. = 0.56
Tc by User = 16.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 2,977 cuft



Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

Monday, Dec 11 2006, 3:56 PM

Hyd. No. 7

P3

Hydrograph type = Rational
Storm frequency = 100 yrs
Drainage area = 1.090 ac
Intensity = 7.177 in/hr
IDF Curve = SedgwickCoKS.IDF

Peak discharge = 4.38 cfs
Time interval = 1 min
Runoff coeff. = 0.56
Tc by User = 16.00 min
Asc/Rec limb fact = 1/1

Hydrograph Volume = 4,206 cuft

