

PRELIMINARY DRAINAGE REPORT

FOR

**Campus Crest Addition
Wichita, Kansas**

May 2007

Tab 0. Checklist



Public Works, Engineering Division Final Drainage Plan Submittal Checklist

Reviewer: _____	Date: _____
Subdivision Name: _____	Location: _____
Total Land Area Of Ownership: _____ Acres	
Type: _____ Residential _____ Commercial _____ Industrial _____ Recreation _____ Municipal _____ Other	
Applicant: _____	Contact: _____ Phone #: _____
Engineer: _____	Contact: _____ Phone #: _____

Please check the appropriate box:

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

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

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



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

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



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

Tab 4. Floodplain Submittal	Applicant			Engr	
	I	NA	Explanation / Location in Plan	I	NA
A. Provide source of flood profile					
B. Nearest base flood elevations					
C. Delineation of pre-developed regulatory floodplain/floodway limits					
D. Delineation of post-developed regulatory floodplain and floodway limits					
E. Floodplain boundary determination per elevation (project limits shown)					
F. Provide source of floodway data table and discharges					
G. Provide all hydrologic and hydraulic study information for site-specific floodplain studies, unnumbered Zone A area elevation determinations and flood plain map revisions or required permits					
H. Provide regulatory floodway and four natural profile models (10,50,100, and 500-yr) for existing and future watershed conditions					
I. Location of floodplain/floodway limits and relationship of site to upstream/downstream properties (floodplain limits to be per elevation and scaled location)					
J. Flood plains and floodways located within a Reserve, where necessary					

Tab 5. Federal, State and Local Permits (to be provided prior to construction unless otherwise specified)	Applicant			Engr	
	I/R	NA	Explanation / Location in Plan	I/R	NA
A. US Army Corps of Engineers - Regulatory program permits (404 water quality certification)					
B. Kansas Department of Agriculture - Division of Water Resources Permits (Stream Obstruction, Channel Change, Flood Plain Fill, Levee, Water Appropriations, Dam safety permit, etc.)					
C. Federal Emergency Management Agency (FEMA) Letter of Map Changes (LOMA, LOMR, LOMR-f, CLOMR, etc.) Shall be included and approved when project modifies the limits of the floodway.					
D. Kansas Department of Transportation					
E. Sedgwick County Right-of-way Permit					

Tab 1. Project Narrative

A. Location

The subject property is in the City of Wichita, Sedgwick County, Kansas and has an approximate area of 18.7 acres. The development is located in the NE ¼ of the NE ¼ of Section 2, Township 27 South, Range 1 East. The site is shown on the USGS Map, Figure 1.1.

B. Discussion of Development

The proposed site is currently platted for ¼ acre single family residential lots in the west and the land is undeveloped in the east portion of the site. The proposed plan is to add 10 multi-family residential units along with a central clubhouse area, parking and open spaces for the site. The area west and south of the site has been developed into single family residential lots approximately ¼ acres in size, the area north is undeveloped land and east of the site across Oliver there is a existing church.

C. Discussion of Offsite

Runoff flows into the proposed site from the south and will exit the site from either the north or the drainage swale along the west property line of the site. The existing road infrastructure along Oliver prevents runoff from entering the site from the east.

D. Summary of Runoff

The project was modeled using the SCS method in Hydraflow Hydrographs and the results have been summarized in Table 1 comparing the total runoff leaving the site in the existing conditions and the proposed conditions.

Table 1. Existing/Proposed Conditions Comparison

Site Conditions	Design Storm Flows (cfs)				
	2-yr	5-yr	10-yr	25-yr	100-yr
Existing Basin 1-to West	17.6	26.9	33.2	42.7	56.4
Proposed Basin 1-to West	18.9	30.2	38.0	50.1	67.6
Existing Basin 2-to East	3.1	5.8	7.7	10.8	15.5
Proposed Basin 2-to East	5.2	7.7	9.3	11.8	15.2

E. Best Management Practices

The site will be seeded or sodded after construction of grading and utilities are complete. The outlet structures of the storm water sewer system will be protected against erosion.

F. Plat

The plat is included, Figure 1.2.

G. Preliminary Grading Plan

Preliminary grades have been set for each property corner, see Figure 1.3.

H. Professional Engineer Seal

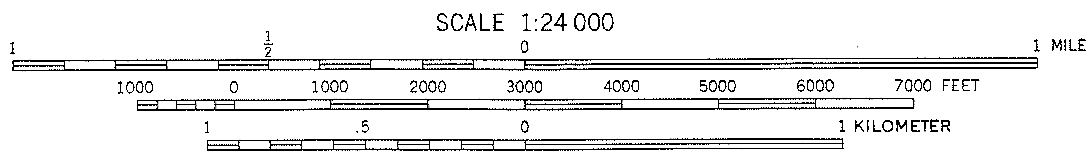
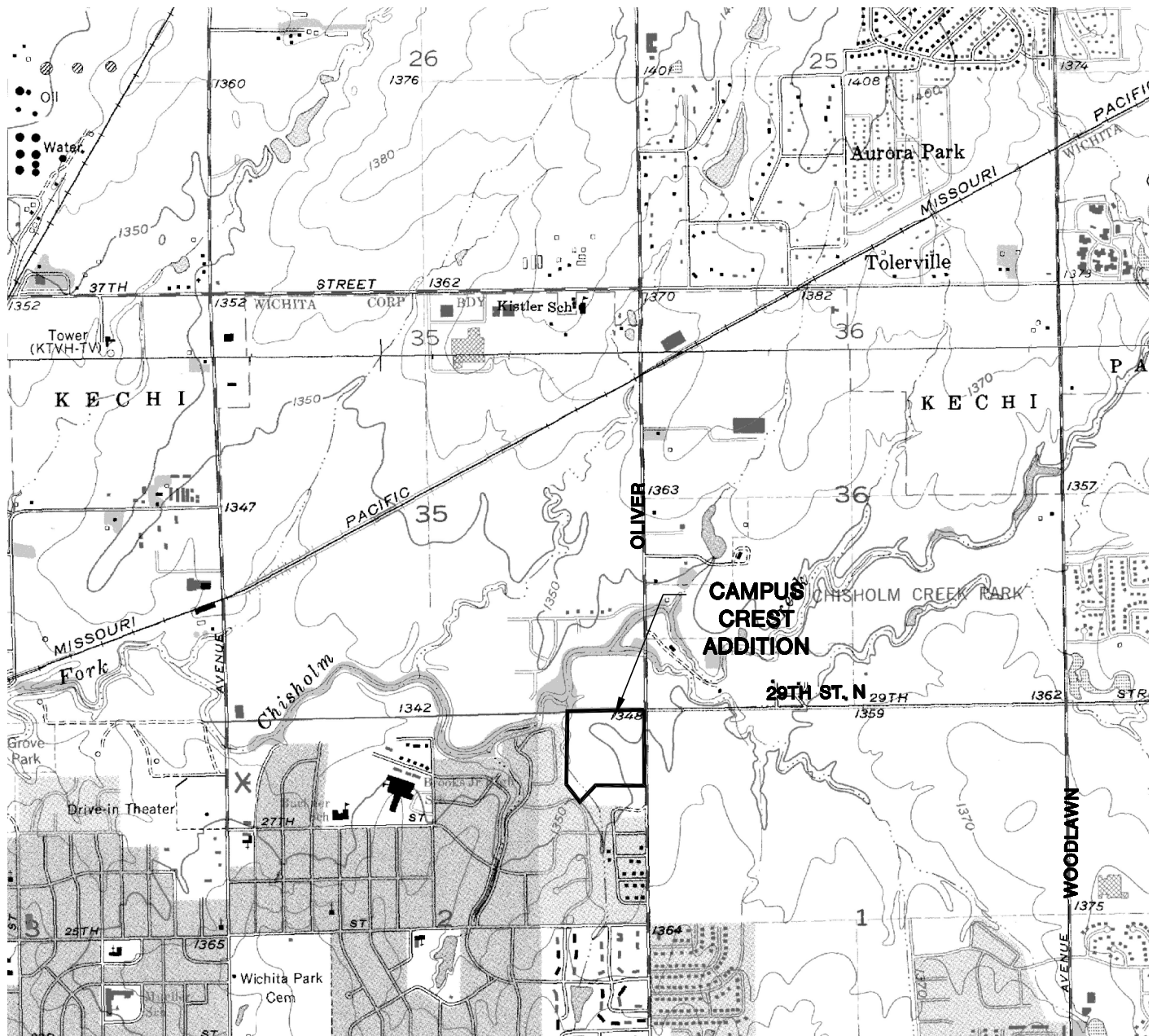
The cover of the report will be signed and dated.

I. CD

A CD of the drainage report in PDF format is attached to the inside front cover of the bound report.

Figure 1.1

USGS Quadrangle Map



CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MKEC ENGINEERING CONSULTANTS, INC. 411 N. WEBB ROAD WICHITA, KS. 67206 316 - 684 - 9600	CAMPUS CREST ADDITION PROJECT NAME		
	WICHITA KS QUADRANGLE SHEET TITLE		
TMH DESIGN BY:	CMJ DRAWN BY:	TMH CHECKED BY:	
MAY 2007 DATE	07254 JOB NO.	1 / 1 SHEET/OF	

Figure 1.2

Plat

FINAL PLAT CAMPUS CREST ADDITION AN ADDITION TO WICHITA, SEDGWICK COUNTY, KANSAS

CERTIFICATE OF SURVEY

I, Gregory J. Allison, a registered land surveyor in Kansas, do hereby certify that I have been in responsible charge of surveying and platting of "CAMPUS CREST ADDITION" an addition to Wichita, Sedgwick County, Kansas, into a Street, a Reserve, a Lot and a Block, the same being accurately set forth in the accompanying plat and described herein:

A tract of land lying within a portion of the Northeast Quarter, Section 2, Township 27 South, Range 1 East, of the 6th Principal Meridian, City of Wichita, Sedgwick County, Kansas; said tract being a replat of a portion of vacated Lots 18 and 19, and all of Lots 20 through 31, both inclusive, in Block 8, and Vacated Lots 1 through 20, both inclusive, in Block 10, in Greenbriar Manor Addition to Wichita, Sedgwick County, Kansas. Said tract being more particularly described as follows:

COMMENCING at the Northeast corner of said Northeast Quarter, Section 2, Township 27 South, Range 1 East of the 6th Principal Meridian, City of Wichita, Sedgwick County, Kansas; thence along the north line of said Northeast Quarter S88°59'14"W, a distance of 50.00 feet to the northeast corner of vacated Lot 20, Block 10 of Greenbriar Manor Addition, said point being the POINT OF BEGINNING; thence along the east line of said Block 10, S00°37'42"E, 812.71 feet; thence S89°22'18"W, 650.56 feet; thence S00°37'42"E, 336.16 feet to a point where the South line of Lot 18, block 8 intersects the East line of Lot 52, Block 8 of said Addition; thence N39°57'40"W, 489.91 feet; thence N00°37'59"W, 651.57 feet to the Northwest corner of vacated Lot 31, Block 8 of said Addition; thence along the north line of said vacated lot N62°57'31"W, 83.74 feet to the left; thence along a curve 119.88 feet, sagid curve having a central angle of 26°53'29", a radius of 255.42 feet, a long chord of 118.78 feet, bearing N49°32'23"E to a point on the North line of said Addition; thence along the North line of said Addition N88°59'14"E, 795.15 feet to the POINT OF BEGINNING.

All utility easements, building setbacks, access controls; together with any and all other public dedications, rights-of-way, and/or easements within the above described property are hereby vacated and replatted by virtue of K.S.A. 12-512(b).

I hereby certify that the details of this plat are correct to the best of my knowledge and belief this ___ day of ___, 2007.

Gregory J. Allison, PE, LS #1257
MKEC Engineering Consultants, Inc.
411 North Webb Road
Wichita, Kansas 67206

Know all men by these presents that we the undersigned property owners of the land above set forth in the Registered Land Surveyor's Certificate, have caused the same to be surveyed and platted into a Street, a Reserve, a Lot and a Block, the same to be known as "CAMPUS CREST ADDITION", an addition to Wichita, Sedgwick County, Kansas.

Easements for the construction and maintenance of public utilities and drainage, as indicated on the accompanying plat are hereby granted to the public.

A drainage plan has been developed for this plat and all drainage easements, rights-of-way, or reserves shall remain at established grades or as modified with the approval of the applicable City or County Engineer, and unobstructed to allow for the conveyance of storm water.

All abutters rights of access to or from Oliver Avenue, over and across the east line of Block 1, of "CAMPUS CREST ADDITION", are hereby granted to the appropriate governing body, as indicated herein.

Reserve "A" is platted for open spaces, private recreation, landscaping, irrigation utilities certified by easements, parking, and drainage.

Reserve "A" is also platted for flood control and shall be the responsibility of the undersigned or homeowner's association until such time as the appropriate governing body exercising jurisdiction elects to assume the responsibility for the maintenance and improvements of the drainage, provided further, that no structure shall be constructed on or within said flood control area as indicated, nor shall any fill, change of grade, creation of a channel or any other work be carried out without the permission of the City Engineer.

OWNER'S CERTIFICATE

CAMPUS CREST DEVELOPMENT, LLC, a Kansas limited liability company

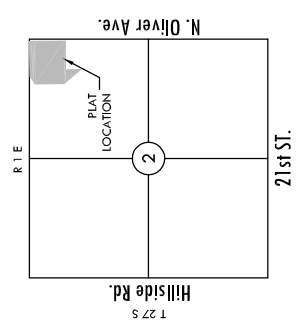
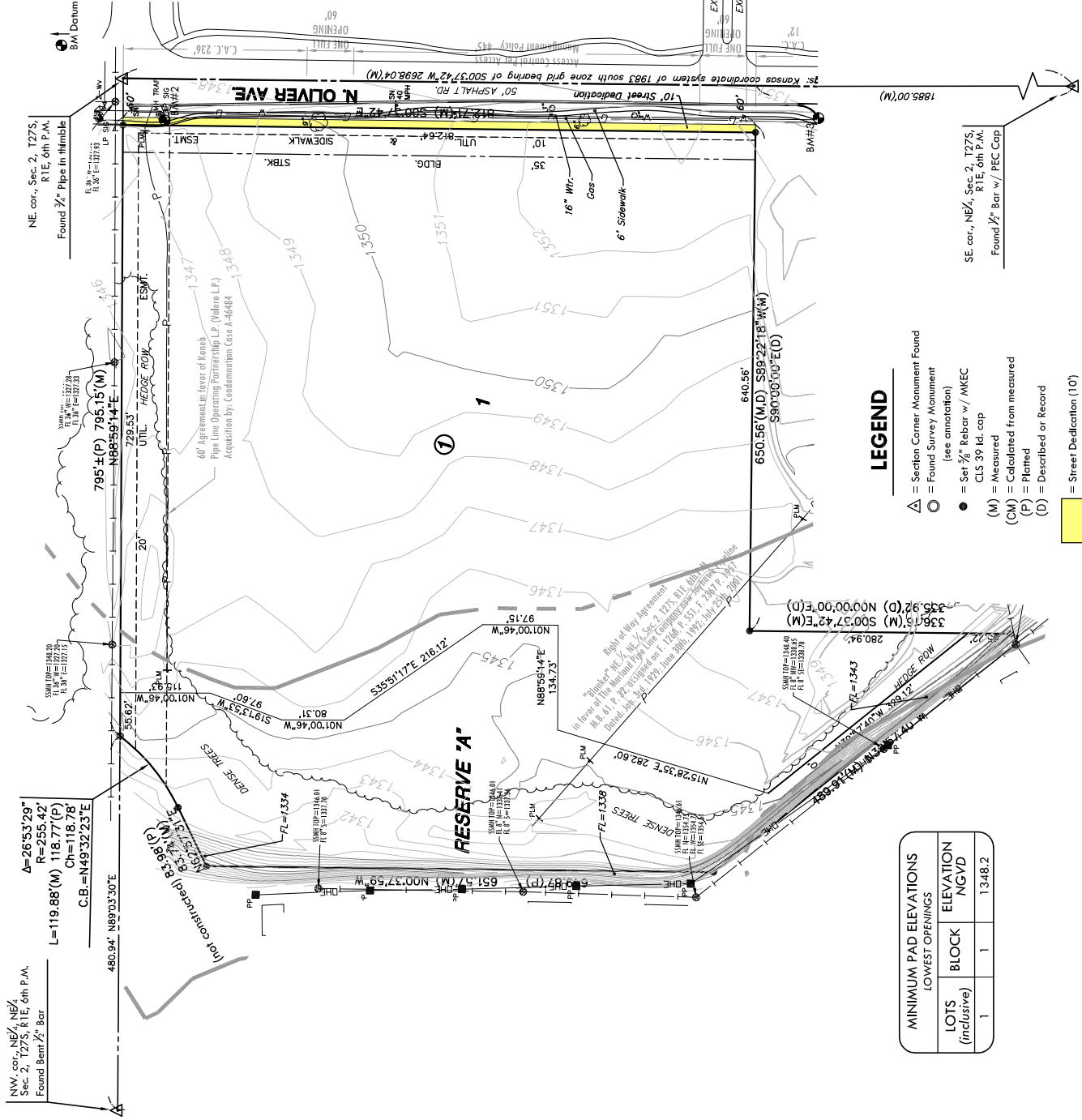
Thomas Odai, Manager

STATE OF NEW MEXICO, SANTA FE COUNTY} ss:

This instrument was acknowledged before me on ___ day of ___, 2007, by Thomas Odai, Manager, Campus Crest Development, LLC, IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal, the day and year last above written.

Notary Public: _____, Notary Public

My Term Expires: _____



BENCH MARK

- Datum: City of Wichita disc SE corner hubguard on RCB 100'± S. of Norwood Elev.= 1349.34 (NAVD 88)
- BM#2: SW corner traffic signal light pole at the SW corner, Oliver & 29th St. N. Elev.= 1348.33 (NAVD 88)
- BM#3: NW corner of vacated 28th St. Greenbriar Manor Addition. 28th St. & Oliver Elev.= 1352.18 (NAVD 88)

Basis of Bearings: Kansas coordinate system of 1983 south zone grid bearing of S00°37'42"W along the E. line of NE 1/4, Sec. 2 T27S, R1E, 6th P.M.

PLANNING COMMISSION CERTIFICATE

This plat of "CAMPUS CREST ADDITION" has been submitted to and approved by the Wichita-Sedgwick County Metropolitan Area Planning Commission, Wichita, Kansas.

Dated this ___ day of ___, 2007

WICHITA-SEDGWICK COUNTY METROPOLITAN AREA PLANNING COMMISSION

Darrell A. Downing, Chair

John L. Schlegel, Secretary

GOVERNING BODY CERTIFICATE

The dedications shown on this plat are hereby accepted and this plat is hereby approved by the governing body of the City of Wichita, Kansas.

Dated this ___ day of ___, 2007

At the direction of the City Council.

Carl Brewer, Mayor

Karen Sublett, City Clerk

TRANSFER RECORD

STATE OF KANSAS, SEDGWICK COUNTY} ss:
Entered on transfer record this ___ day of ___, 2007.

Don Brace, County Clerk

REGISTER OF DEEDS CERTIFICATE

STATE OF KANSAS, SEDGWICK COUNTY} ss:
This is to certify that this instrument was filed for record in the Register of Deeds office this ___ day of ___, 2007, at o'clock ___, and is duly recorded for a Fee of \$20.00

Bill Meek, Register of Deeds

Tonya E. Buckingham, Deputy

COUNTY SURVEYOR

Reviewed in accordance with K.S.A. 58-2006 on this ___ day of ___, 2007.

Tricia L. Robello, LS #1246
Deputy County Surveyor
Sedgwick County, Kansas

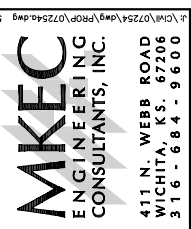


Figure 1.3

Preliminary Grading Plan

Tab 2. Existing Conditions Runoff Calculations

A. Orthophotograph

The aerial photograph of the Campus Crest Addition is shown in Figure 2.1.

B. Runoff Method

The site was modeled using the SCS method, see Table 2 runoff values. The runoff coefficients were calculated as a weighted number from the land uses.

C. Existing Topography

The existing topography is shown on the Existing Conditions Drawing, Figure 2.2.

D. Site Areas

The total site area of Campus Crest Addition is 18.7 acres. The site includes 7.6 acres platted for ¼ acre single family and the remaining area of the site (11.1 acres) is platted for light commercial.

E. Benchmarks

Benchmarks used for site control are included on the Existing Basin Drawing, Figure 2.2.

F. Streams, Creeks, and Waterways

The site includes a branch of East Fork Chisholm Creek. The existing FEMA boundaries are shown on the FIRM map, Figure 2.3. The majority of the site is located within flood Zone X, areas outside the 500-yr floodplain, there is a section on the west side of the proposed site that lies within FIRM Zone "AO", area within the 500-yr floodplain and FIRM Zone "AE", area within the 100-yr floodplain, FIRM panel 20173CO 356E & 357E, effective date February 2, 2007, Sedgwick County, Kansas. The 100-year and 500-year floodplain elevations have been calculated using the FIS Report and interpolating the results, these boundaries can be seen on Figure 2.2. The floodplain that is located on the proposed site lies between cross sections "V" and "W" of East Fork Chisholm Creek, the floodplain profile and table was used to determine the elevations for the 100-year and 500-year floods. These elevations were added to the surveyed contours to give a more exact boundary of the floodplains. Data from the FIS Report is included behind Figure 2.3.

G. Soils

The soil present on site is primarily Farnum Loam, 1 to 3 percent slopes, HSG "B". An overall HSG of "B" was used for calculations. The site is shown on the Soil Survey, Figure 2.4.

H. Natural Features

Currently there are single family residential lots on the west and south sides of the proposed site. The lot north of the site is currently undeveloped and the east border runs along Oliver Avenue. Along the west property line a drainage swale exists that is located in a FEMA floodplain.

I. Location of Existing Impervious Areas

The site is undeveloped and has no impervious areas on site currently.

J. Location of Existing Utilities

The site has two (2) buried gas mains running across the site, the first is in the southeast corner running northwest and the second runs parallel to the north property line. There are two (2) sanitary mains running just offsite, the first is parallel to the west property line and the second is

parallel to the north property line. Along the east property line a water main runs parallel just offsite of the proposed site.

K. Location of Existing Conveyance Systems

There is no existing storm sewer on the site. Currently the majority of runoff flows offsite to the northwest through an existing drainage swale running along the west property line.

L. Flow Paths

The site was divided into 2 drainage basins. E1 encompasses the majority of the site, 13.4 acres, that flows into an existing drainage swale along the west property line that flows offsite to the north. E2 includes the remaining 5.2 acres of the site that flows offsite to the north towards East Fork Chisholm Creek. Flow paths are shown on the Existing Conditions Drawing, Figure 2.2.

M. Location and Sizes of Existing Structures

There are no existing structures onsite; runoff currently leaves the site via a naturally occurring drainage swale. The drainage swale has an average slope of 1% with 4:1 side slopes.

N. Existing Conditions Hydrologic Analysis

The hydraulic analysis was completed for the existing basins and the results have summarized below. The hydrographs are located in the Figure 2.6 tab.

Table 2. Existing Runoff.

Basin	Area (ac)	T _c (min)	Design Storm Flows (cfs)				
			2-yr	5-yr	10-yr	25-yr	100-yr
Basin 1-West	13.4	40	17.6	26.9	33.2	42.7	56.4
Basin 2-East	5.2	42	3.1	5.8	7.7	10.8	15.5

O. Pre-Developed Runoff Curve Numbers

The curve number used for pre-developed conditions was 69 to represent the undeveloped conditions and 75 to represent the ¼ acre single family residential with an HGS of “B”. Basin E1 includes areas from both land uses; therefore the curve number used was weighted and was calculated to be 72. Basin E2 lies entirely in the undeveloped portion of the site and has a curve number of 69.

P. Existing Time of Concentration

The time of concentration was calculated using the FAA method. The calculations can be found in Figure 2.5.

Q. Downstream Drainage Capacity

The entire site eventually drains into East Fork Chisholm Creek where the immediate downstream area is the confluence with the Wichita Drainage Canal. This is a studied area with FEMA and the peak discharge in the 100-year event was found to be 6,540 cfs, FIS Report Volume 1, page 41, which is included in Figure 2.3.

R. Existing Structural Elevations

There are no existing structures onsite.

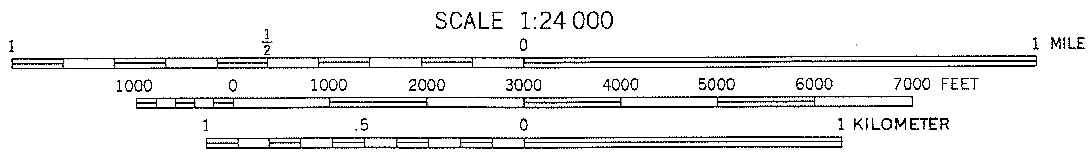
S. Open Channels

A typical section of the drainage swale along the west property line is shown on the existing drainage basins drawing, Figure 2.2.

T. Groundwater Elevations

Not applicable to this project.

Figure 2.1
Orthophotograph



CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MKEC
ENGINEERING
CONSULTANTS, INC.

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

CAMPUS CREST ADDITION
PROJECT NAME

AERIAL MAP
SHEET TITLE

TMH
DESIGN BY:

CMJ
DRAWN BY:

TMH
CHECKED BY:

MAY 2007
DATE

07254
JOB NO.

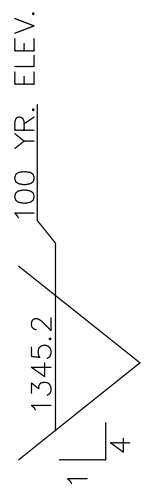
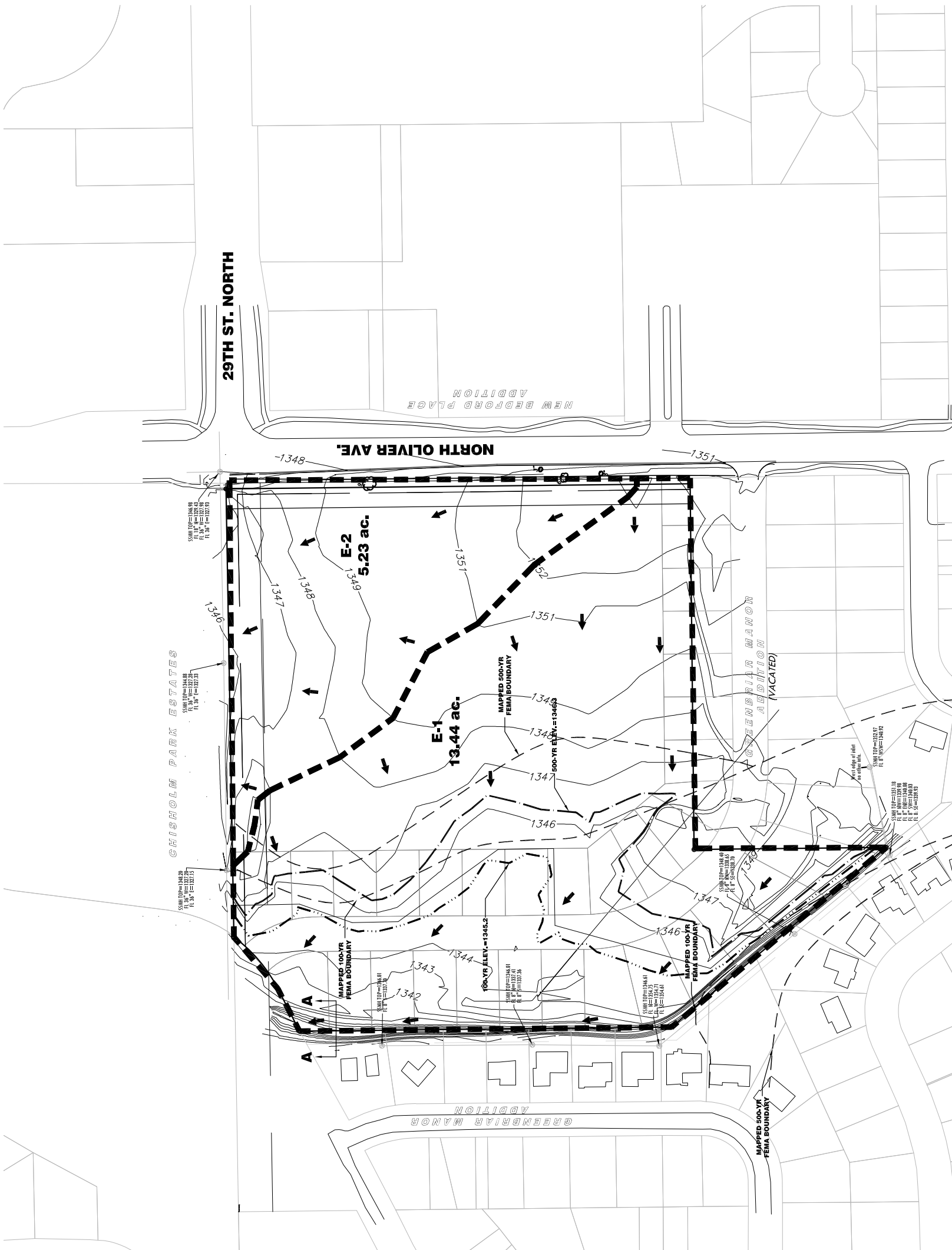
1 / 1
SHEET/OF

Figure 2.2

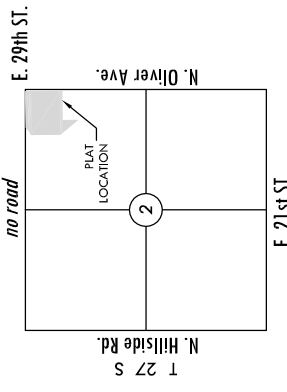
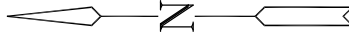
Existing Conditions Drawing

LEGEND

- ✕ - CONIFEROUS TREE
- - DECIDUOUS TREE
- SN - SIGN
- PH - POWER POLE
- ELC - ELECTRIC BOX
- LP - LIGHT POLE
- FH - FIRE HYDRANT
- WV - WATER VALVE
- WM - WATER METER
- SC - SECTION CORNER
- BM - BENCHMARK
- EA - EASEMENT
- BS - BUILDING SETBACK
- FC - FENCE
- SSP - STORM SEWER PIPE
- WL - WATER LINE
- SSL - SANITARY SEWER LINE
- GL - GAS LINE
- GP - GAS PIPELINE
- TL - TELEPHONE LINE
- UG - UNDERGROUND ELEC.
- OE - OVERHEAD ELECTRIC
- FOC - FIBER OPTIC CABLE
- DB - DRAINAGE BASIN
- FA - FLOW ARROW
- E-1 - DRAINAGE BASINS
- - 100-YEAR ELEVATION
- - 500-YR ELEVATION
- - MAPPED FEMA BOUNDARIES



EXISTING SWALE SECTION A-A
N.T.S.



VICINITY MAP

BENCH MARK

- Datum BM: City of Wichita disc SE corner Hubguard on RCB 100± S. of Norwood Elev.= 1349.34 (NAVD 88)
- BM#2: SW corner traffic signal light pole at the SW corner Oliver & 29th St. N. Elev.=1348.33 (NAVD 88)
- BM#3: top of curb at east edge of sidewalk NW corner of vacated 28th St. Greenbriar Manor Addition. 28th St. & Oliver Elev.=1352.18 (NAVD 88)

MKEC
ENGINEERING
CONSULTANTS, INC.

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

CAMPUS CREST ADDITION
PROJECT NAME

EXISTING DRAINAGE BASINS
SHEET TITLE

CLC
DESIGN BY: CMJ
DRAWN BY: KLA
CHECKED BY: KLA

MAY 2007
DATE

07254
JOB NO.

1 / 1
SHEET/OF

J:\C:\M\07254\dwg\DRNG\07254existing boundary.DWG

Figure 2.3

FIRM

100 0 100 200

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0357E

FIRM
FLOOD INSURANCE RATE MAP
SEDGWICK COUNTY,
KANSAS
AND INCORPORATED AREAS
PANEL 357 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)


CONTAINS:
 NUMBER: 200229
 PANEL: 0357
 SUFFIX: E

WICHITA, CITY OF

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

MAP NUMBER
 20173C0357E

EFFECTIVE DATE
 FEBRUARY 2, 2007



NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0356E

FIRM
FLOOD INSURANCE RATE MAP
SEDGWICK COUNTY,
KANSAS
AND INCORPORATED AREAS
PANEL 356 OF 700

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
 NUMBER: 200228
 PANEL: 0356
 SUFFIX: E


WICHITA, CITY OF

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

MAP NUMBER
 20173C0356E

EFFECTIVE DATE
 FEBRUARY 2, 2007

Federal Emergency Management Agency



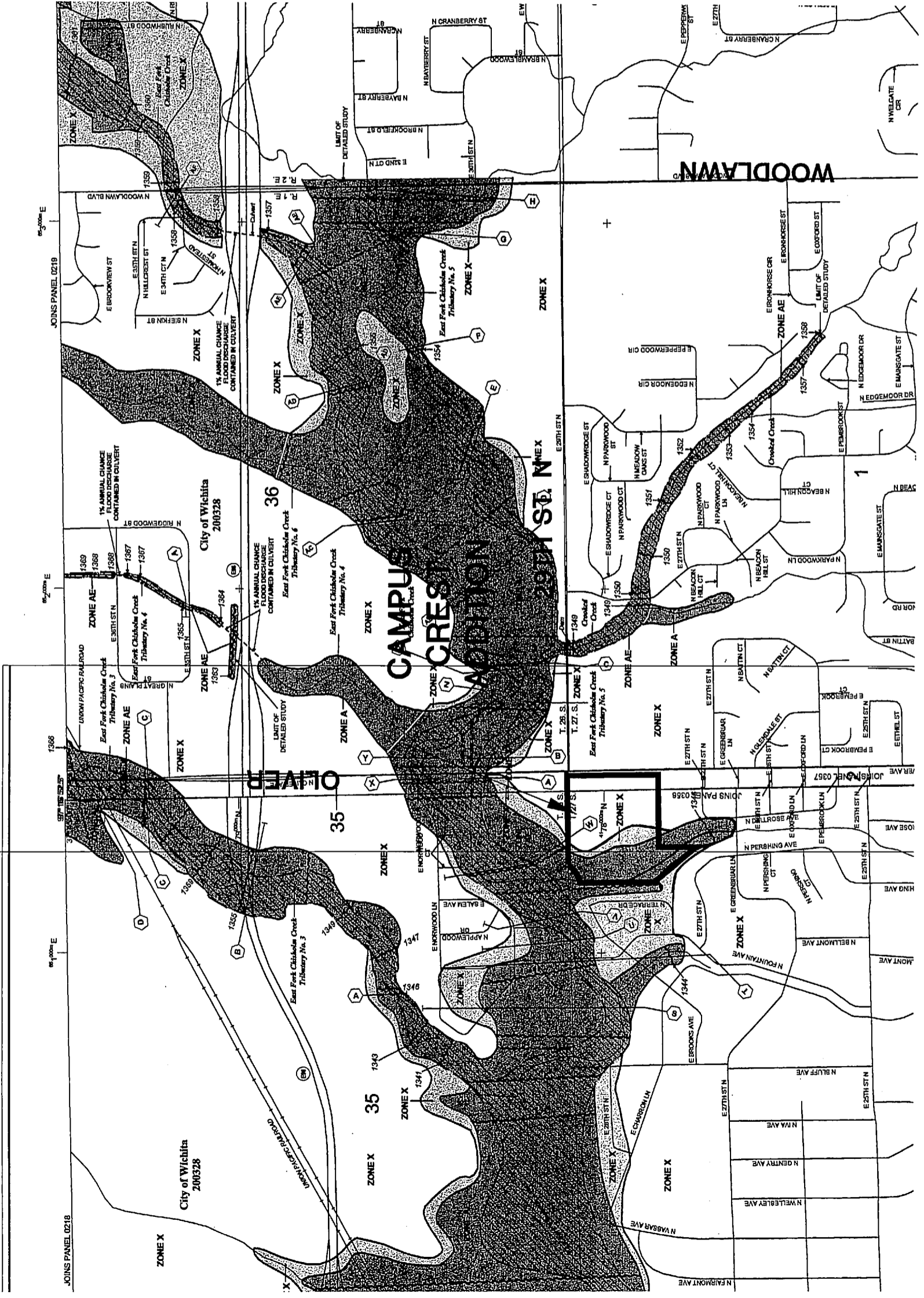
MKEC
 ENGINEERING
 CONSULTANTS, INC.

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

CAMPUS CREST ADDITION
 PROJECT NAME

FIRM PANEL 356 OF 700
FIRM PANEL 357 OF 700
 SHEET TITLE

DATE: MAY 2007
 JOB NO.: 07254
 DRAWN BY: CMJ
 CHECKED BY: TMH
 SHEET OF: 1 / 1



MAP SCALE 1" = 500'

0 500 1000 FEET

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Table 5 - Summary of Discharges (*Continued*)

<u>Flooding Source and Location</u>	<u>Drainage Area (square miles)</u>	<u>Peak Discharges (cubic feet per second)</u>			
		<u>10-Percent- Annual-Chance</u>	<u>2-Percent- Annual-Chance</u>	<u>1-Percent- Annual-Chance</u>	<u>0.2-Percent- Annual-Chance</u>
DRY CREEK SOUTH OF COWSKIN CREEK (CONT'D)					
At confluence with Cowskin Creek	26.24	4,240	7,860	9,610	12,500
At South 87 th Street West	22.92	4,000	7,380	9,010	13,300
DRY CREEK OF SPRING CREEK					
At confluence with Spring Creek	4.80	2,130	3,850	4,690	7,100
Just upstream of confluence With Spring Creek	4.80	2,160	3,001	3,424	4,365
At East Madison Avenue	4.60	1,957	2,420	3,103	3,981
At East Meadowlark Road South	3.20	1,400	2,000	2,200	2,754
At Farm Road	2.20	1,150	1,600	1,900	2,399
At East 63 rd Street South	1.80	1,020	1,460	1,600	2,020
DRY CREEK OF SPRING CREEK TRIBUTARY					
Just upstream of Spring Creek	0.60	610	875	1,000	1,303
Approximately 445 feet upstream of North Brook Forest Road	0.40	450	638	750	1,096
EAST BRANCH DRY CREEK OF GYPSUM CREEK					
At Orme Street	1.53	1,700 ¹	2,250 ¹	2,550 ¹	3,650 ¹
EAST BRANCH GYPSUM CREEK					
At confluence with Gypsum Creek	2.76	1,550	2,270	2,590	1,495
EAST FORK CHISHOLM CREEK					
At confluence with Wichita Drainage Canal	13.80	3,250	5,580	6,540	9,420
Just upstream of confluence of East Fork Chisholm Creek Tributary No. 5	6.30	2,240	3,310	3,740	5,850
At 45 th Street North	1.60	860	1,270	1,545	2,240

¹ USACE Floodplain Information Report (Reference 22)

Table 5 - Summary of Discharges (*Continued*)

<u>Flooding Source and Location</u>	<u>Drainage Area (square miles)</u>	<u>Peak Discharges (cubic feet per second)</u>			
		<u>10-Percent- Annual-Chance</u>	<u>2-Percent- Annual-Chance</u>	<u>1-Percent- Annual-Chance</u>	<u>0.2-Percent- Annual-Chance</u>
EAST FORK CHISHOLM CREEK TRIBUTARY NO. 3					
At confluence with East Fork Chisholm Creek	1.00	890	1,610	1,970	3,000
At Union Pacific Railroad	*	*	*	800	*
EAST FORK CHISHOLM CREEK TRIBUTARY NO. 4					
Just upstream of 35 th Street North Circle	0.13	*	*	355	*
EAST FORK CHISHOLM CREEK TRIBUTARY NO. 5					
At confluence of Crooked Creek	2.90	*	*	2,280	3,340
Just downstream of North Woodlawn Boulevard	1.70	800	1,200	1,475	2,200
EAST FORK CHISHOLM CREEK TRIBUTARY NO. 7					
At confluence with East Fork Chisholm Creek	0.60	720	1,300	1,580	2,400
At Union Pacific Railroad	*	*	*	800	*
FABRIQUE BRANCH GYPSUM CREEK					
At confluence with Gypsum Creek	1.20	1,500	2,350	2,700	1,292
FOURMILE CREEK					
At county boundary	27.20	11,680	17,390	20,100	26,800
Just upstream of confluence of Brookhaven Creek	8.40	3,220	4,760	5,500	7,100
Upstream of confluence of West Fork Fourmile Creek	2.20	1,410	2,070	2,400	3,130
Upstream of confluence of Unnamed Tributary to Fourmile Creek	0.80	467	*	747	925
FRISCO DITCH					
At confluence with Wichita Drainage Canal	1.05	920	1,480	1,700	2,360

* Data not Available

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)	
EAST FORK CHISHOLM CREEK									
A	105	99	970	6.7	1,305.5	1,304.7 ²	1,304.7	0.0	
B	1,900	130	888	7.4	1,305.8	1,305.8	1,305.8	0.0	
C	3,907	107	602	10.9	1,307.6	1,307.6	1,307.6	0.0	
D	4,699	124	908	7.0	1,310.5	1,310.5	1,310.9	0.4	
E	5,068	113	7,664	8.6	1,312.0	1,312.0	1,312.2	0.2	
F	6,019	130	1,123	5.8	1,315.9	1,315.9	1,316.3	0.4	
G	7,339	135	1,223	5.4	1,318.4	1,318.4	1,318.5	0.1	
H	7,656	195	1,674	3.9	1,318.9	1,318.9	1,319.1	0.2	
I	8,236	73	738	8.9	1,319.7	1,319.7	1,319.7	0.0	
J	8,976	69	775	8.4	1,322.4	1,322.4	1,322.4	0.0	
K	9,292	77	822	8.0	1,323.5	1,323.5	1,323.5	0.0	
L	9,556	52	583	11.2	1,324.1	1,324.1	1,324.1	0.0	
M	9,820	50	481	13.6	1,325.7	1,325.7	1,325.7	0.0	
N	10,401	265	1,099	6.0	1,332.3	1,332.3	1,332.4	0.1	
O	11,193	210	1,196	5.5	1,334.2	1,334.2	1,334.5	0.3	
P	11,827	165	1,422	4.6	1,335.3	1,335.3	1,335.7	0.4	
Q	12,302	200	985	6.6	1,335.9	1,335.9	1,336.3	0.4	
R	13,252	564	2,412	2.4	1,337.7	1,337.7	1,338.6	0.9	

¹Feet above confluence with Wichita Drainage Canal

²Elevation computed without consideration of backwater effects from Wichita Drainage Canal

FEDERAL EMERGENCY MANAGEMENT AGENCY

**SEDGWICK COUNTY, KS
AND INCORPORATED AREAS**

FLOODWAY DATA

EAST FORK CHISHOLM CREEK

TABLE 9

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANGE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
EAST FORK CHISHOLM CREEK (CONTINUED)								
S	17,740	215	1,626	3.6	1,343.6	1,343.6	1,343.6	0.0
T	18,057	160	1,369	4.3	1,343.9	1,343.9	1,343.9	0.0
U	18,268	195	1,648	3.6	1,344.1	1,344.1	1,344.1	0.0
V	18,638	375	1,114	5.2	1,344.5	1,344.5	1,344.5	0.0
W	19,641	580	3,607	1.6	1,345.9	1,345.9	1,346.3	0.4
X	20,750	112	885	4.6	1,346.1	1,346.1	1,346.4	0.3
Y	20,908	127	991	4.1	1,347.1	1,347.1	1,347.4	0.3
Z	21,700	99	760	5.3	1,348.1	1,348.1	1,348.5	0.4
AA	22,176	131	934	4.3	1,348.8	1,348.8	1,349.4	0.6
AB	23,918	133	1,016	4.0	1,350.3	1,350.3	1,351.1	0.8
AC	25,132	235	1,388	2.9	1,351.7	1,351.7	1,352.4	0.7
AD	26,928	230	1,293	3.1	1,354.0	1,354.0	1,354.4	0.4
AE	28,934	109	646	6.2	1,355.7	1,355.7	1,356.1	0.4
AF	31,152	124	862	4.7	1,359.4	1,359.4	1,359.5	0.1
AG	32,736	350	1,570	2.1	1,361.7	1,361.7	1,361.9	0.2
AH	33,052	210	1,550	2.1	1,362.6	1,362.6	1,363.2	0.6
AI	34,267	250	1,686	1.9	1,362.7	1,362.7	1,363.3	0.6

¹Feet above confluence with Wichita Drainage Canal

FEDERAL EMERGENCY MANAGEMENT AGENCY

**SEDGWICK COUNTY, KS
AND INCORPORATED AREAS**

FLOODWAY DATA

EAST FORK CHISHOLM CREEK

TABLE 9

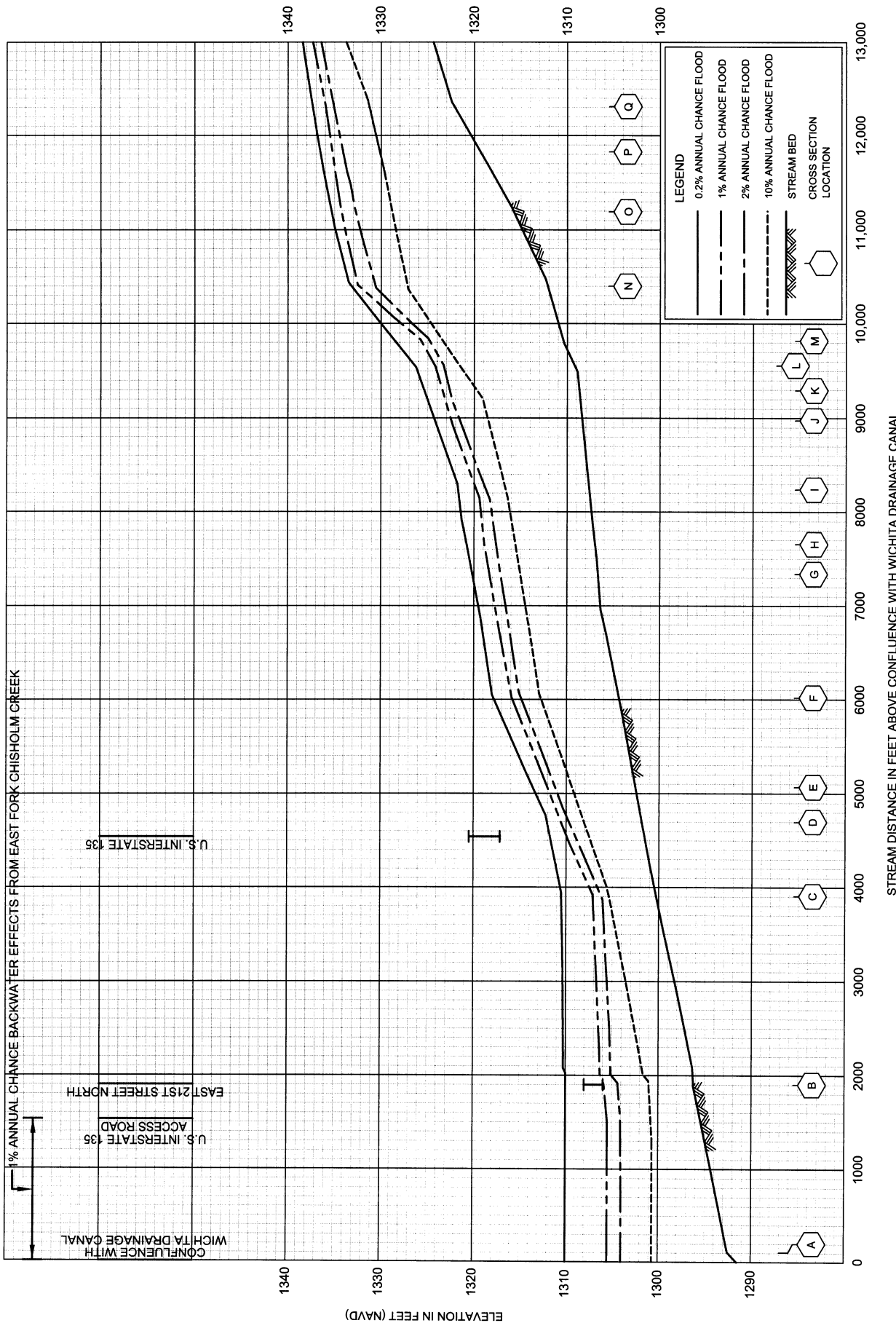


Figure 2.4
Soil Survey

Figure 2.5

T_c Calculations

Time of Concentration Calculations by the FAA method
 Campus Crest Addition

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

Area Name	Soil Group	Maximum Elevation	Minimum Elevation	Flow Length (L)	Rational Runoff Coefficient, C	Time of Concentration (min), T _c
Existing Basin 1-West	B	1353.0	1334.0	1360	0.42	40.4
Existing Basin 2-East	B	1353.0	1346.0	790	0.30	42.1
Proposed Basin 1-West	B	1352.0	1334.0	1410	0.50	37.4
Proposed Basin 2-East	B	1352.0	1346.0	610	0.68	18.8

Figure 2.6

Hydragraphs (Existing Conditions)

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.22

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	-----	-----	17.61	-----	26.89	33.16	42.67	-----	56.37	E1
2	SCS Runoff	-----	-----	3.065	-----	5.768	7.714	10.81	-----	15.49	E2
4	SCS Runoff	-----	-----	18.86	-----	30.20	38.02	50.06	-----	67.59	P1
5	SCS Runoff	-----	-----	5.221	-----	7.678	9.305	11.75	-----	15.24	P2

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description	
1	SCS Runoff	17.61	2	738	85,907	----	-----	-----	E1	
2	SCS Runoff	3.065	2	740	18,056	----	-----	-----	E2	
4	SCS Runoff	18.86	2	736	87,395	----	-----	-----	P1	
5	SCS Runoff	5.221	2	724	16,327	----	-----	-----	P2	
07254_Drainage_Basins.gpw					Return Period: 2 Year			Friday, May 25, 2007		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Friday, May 25, 2007

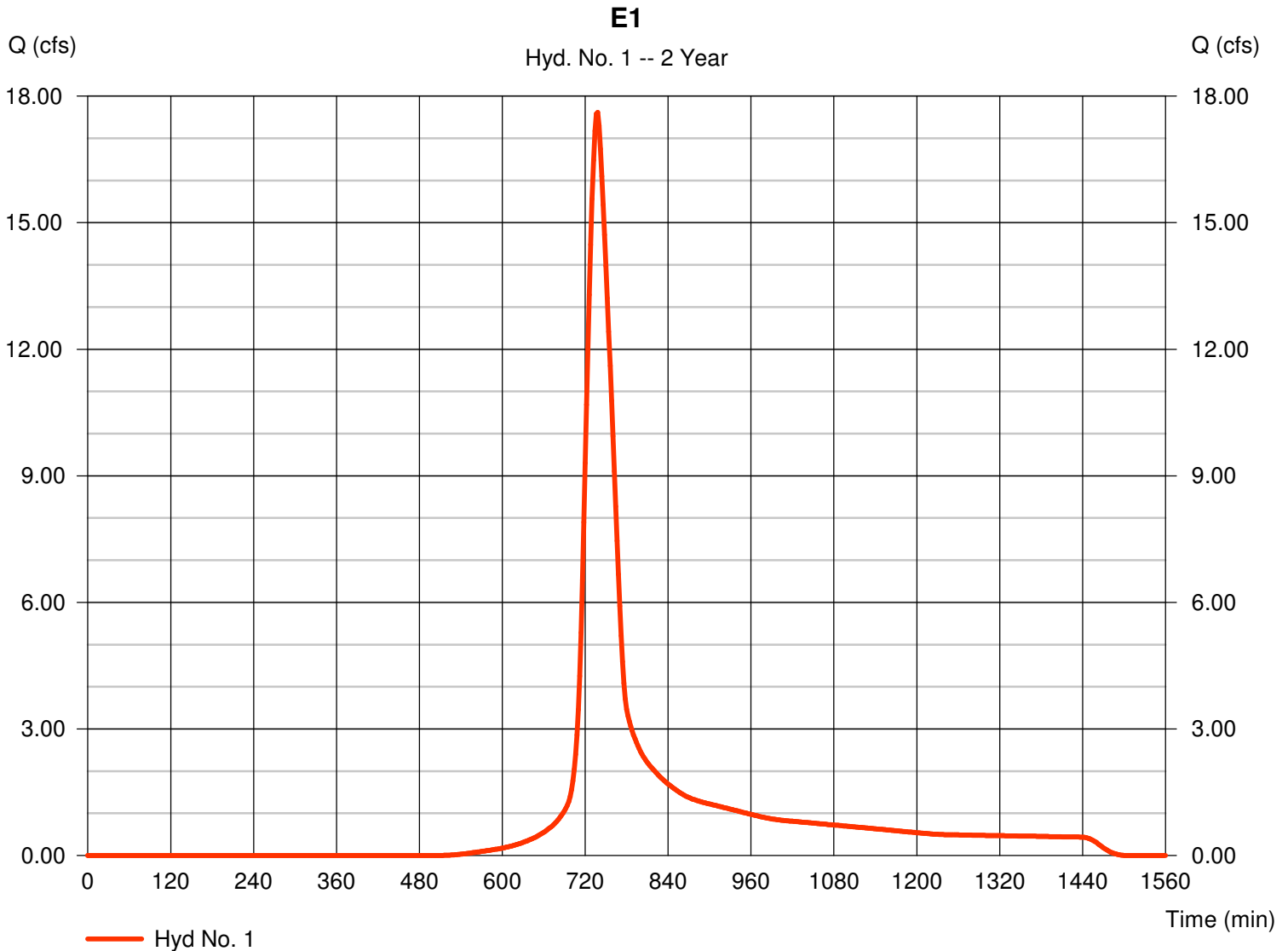
Hyd. No. 1

E1

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 13.400 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 17.61 cfs
Time to peak = 738 min
Hyd. volume = 85,907 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(7.600 \times 75) + (5.800 \times 92)] / 13.400$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

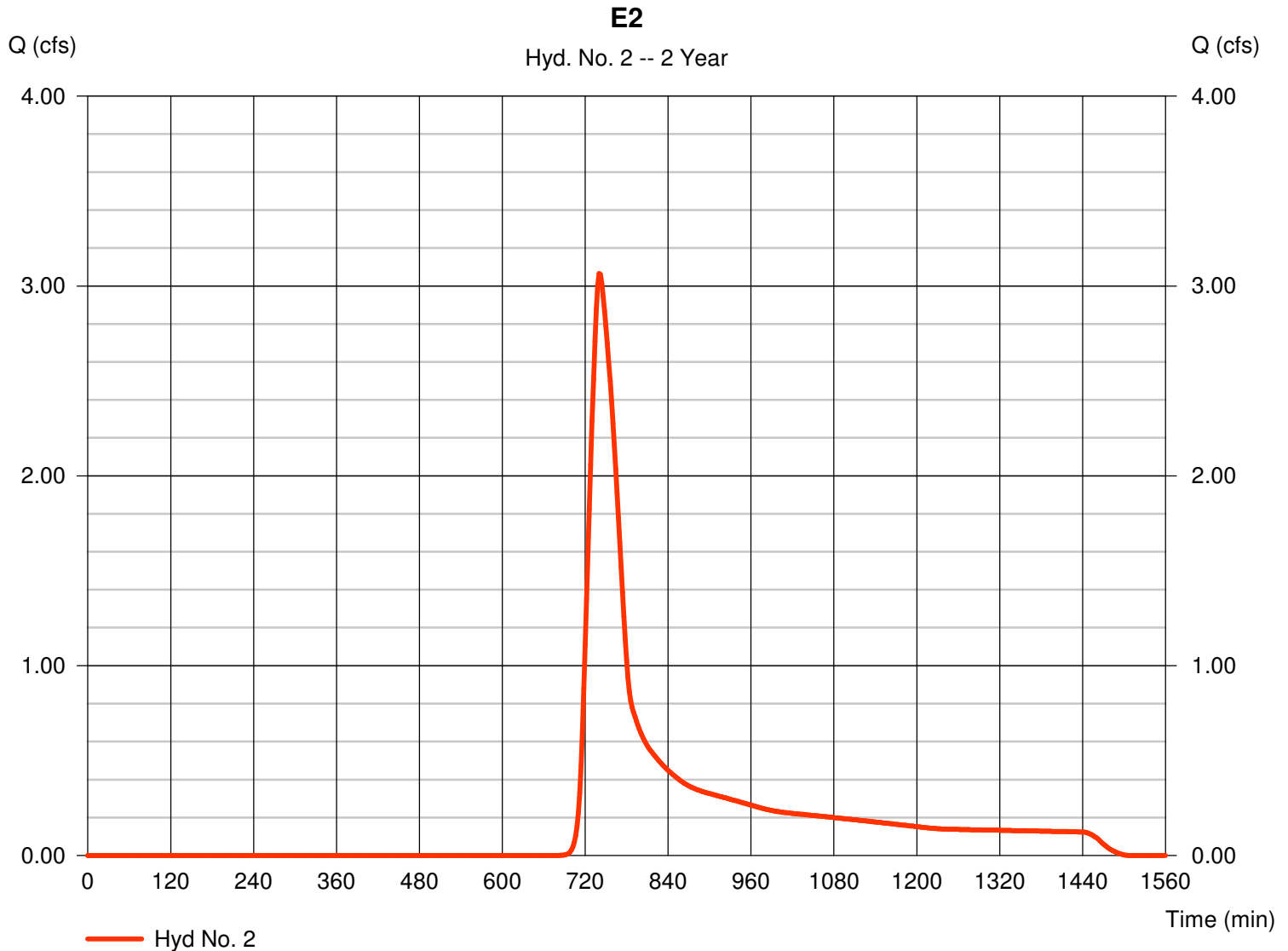
Friday, May 25, 2007

Hyd. No. 2

E2

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 5.230 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 3.065 cfs
Time to peak = 740 min
Hyd. volume = 18,056 cuft
Curve number = 69
Hydraulic length = 0 ft
Time of conc. (Tc) = 42.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description
1	SCS Runoff	26.89	2	736	130,359	----	-----	-----	E1
2	SCS Runoff	5.768	2	740	31,380	----	-----	-----	E2
4	SCS Runoff	30.20	2	736	137,631	----	-----	-----	P1
5	SCS Runoff	7.678	2	724	24,133	----	-----	-----	P2
07254_Drainage_Basins.gpw					Return Period: 5 Year			Friday, May 25, 2007	

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Friday, May 25, 2007

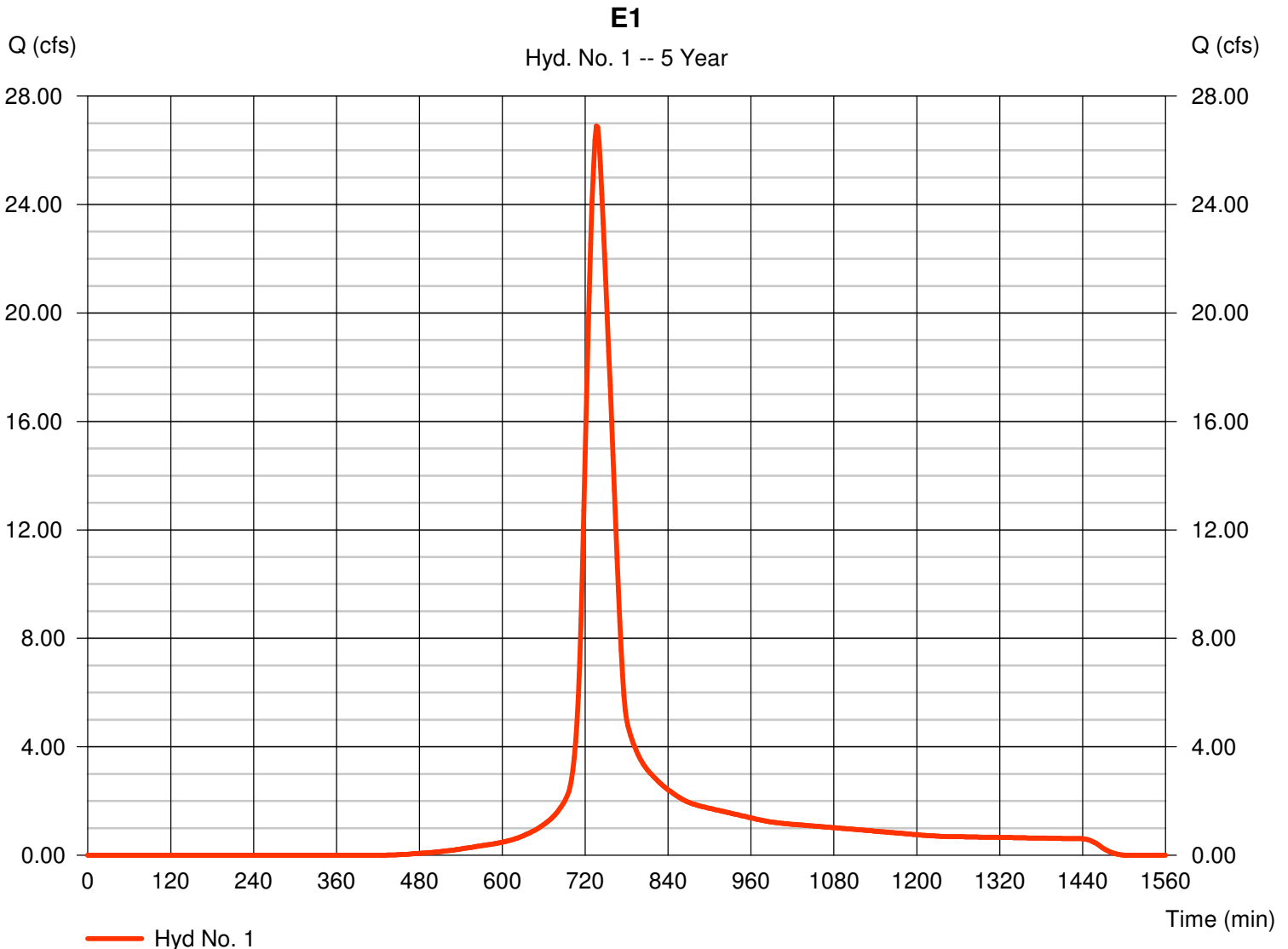
Hyd. No. 1

E1

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 2 min
Drainage area = 13.400 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 26.89 cfs
Time to peak = 736 min
Hyd. volume = 130,359 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(7.600 \times 75) + (5.800 \times 92)] / 13.400$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

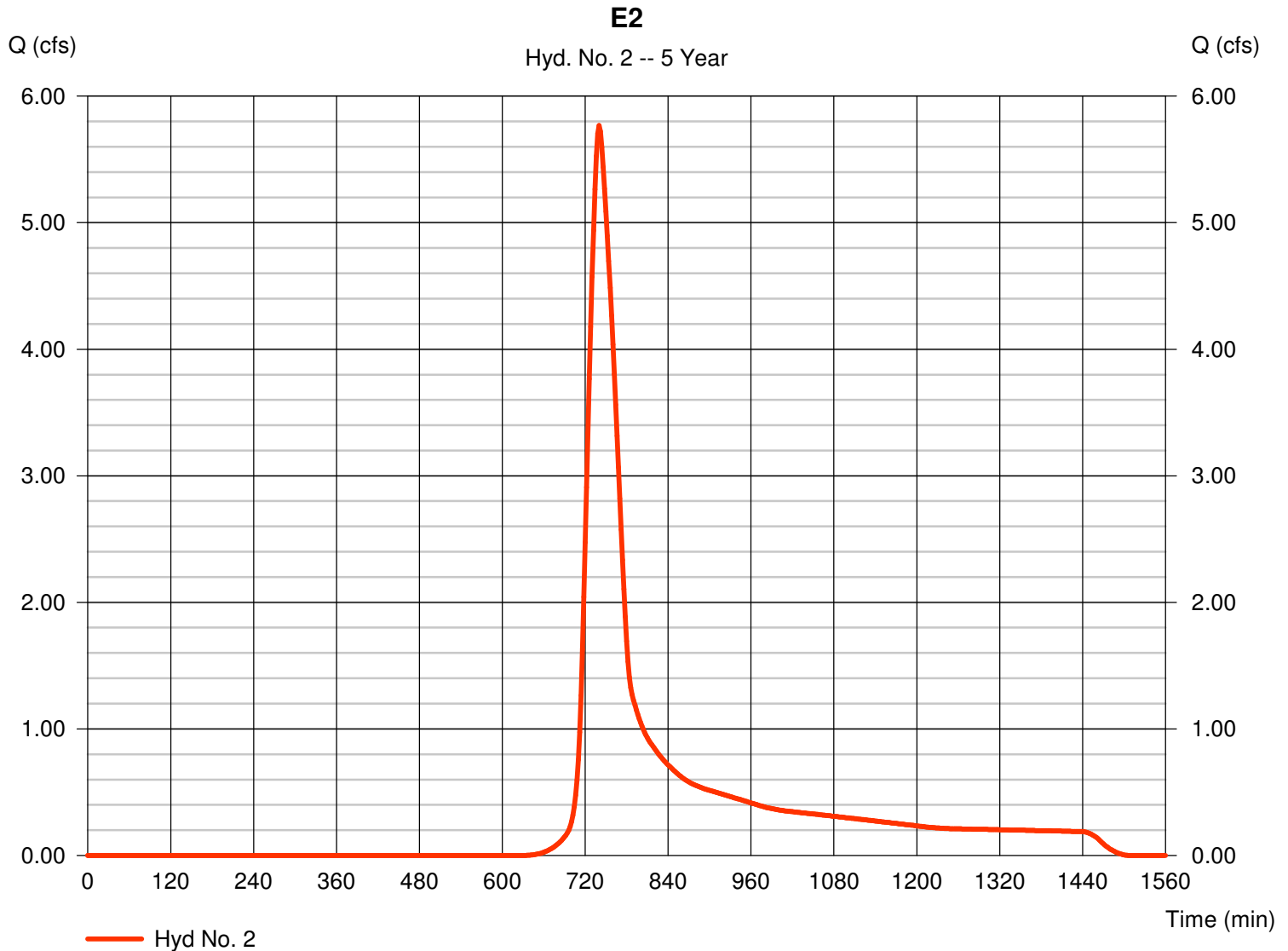
Friday, May 25, 2007

Hyd. No. 2

E2

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 2 min
Drainage area = 5.230 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 5.768 cfs
Time to peak = 740 min
Hyd. volume = 31,380 cuft
Curve number = 69
Hydraulic length = 0 ft
Time of conc. (Tc) = 42.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description	
1	SCS Runoff	33.16	2	736	160,695	----	-----	-----	E1	
2	SCS Runoff	7.714	2	740	41,037	----	-----	-----	E2	
4	SCS Runoff	38.02	2	734	172,478	----	-----	-----	P1	
5	SCS Runoff	9.305	2	724	29,402	----	-----	-----	P2	
07254_Drainage_Basins.gpw					Return Period: 10 Year			Friday, May 25, 2007		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Friday, May 25, 2007

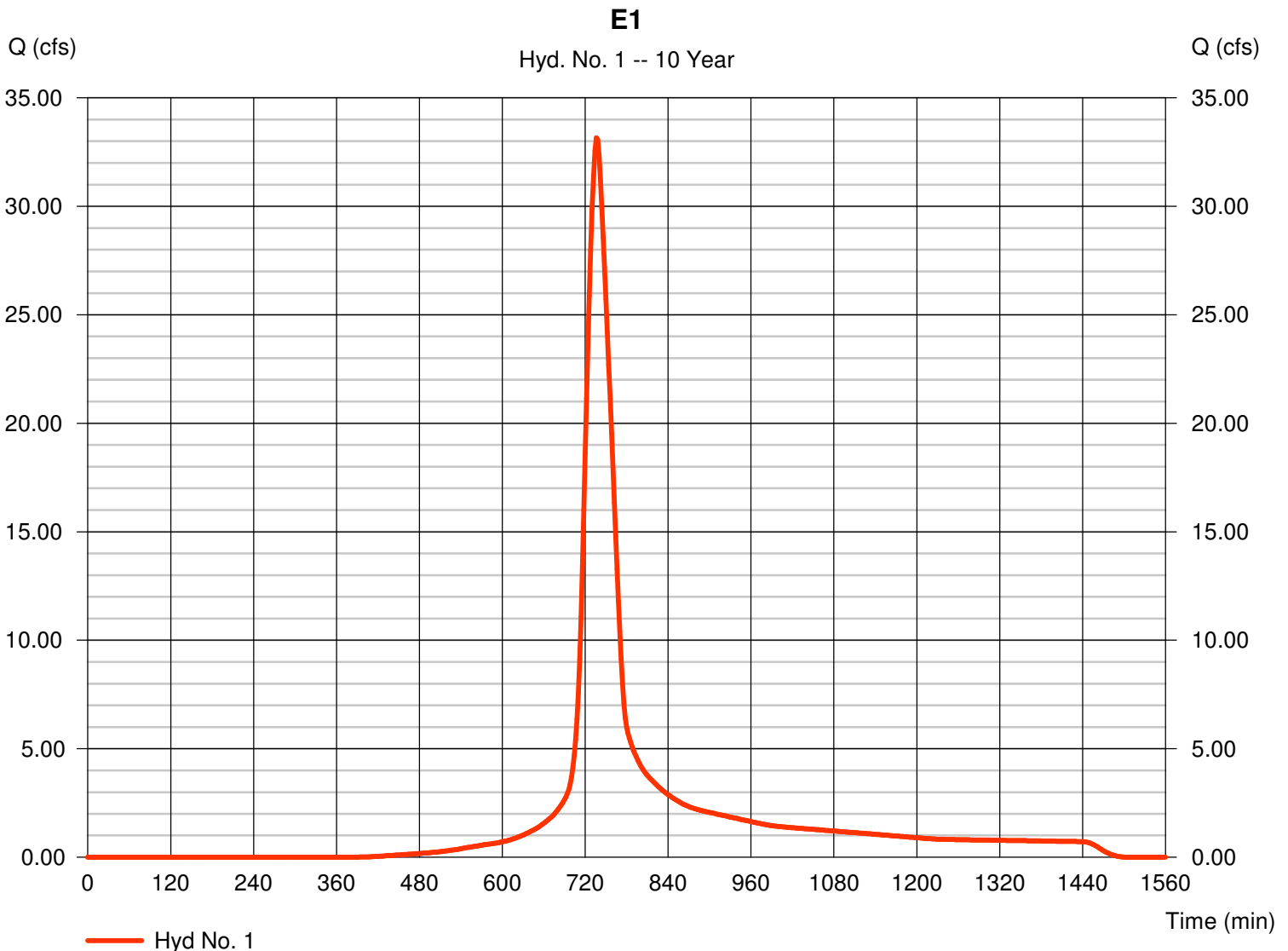
Hyd. No. 1

E1

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 13.400 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 33.16 cfs
Time to peak = 736 min
Hyd. volume = 160,695 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(7.600 \times 75) + (5.800 \times 92)] / 13.400$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

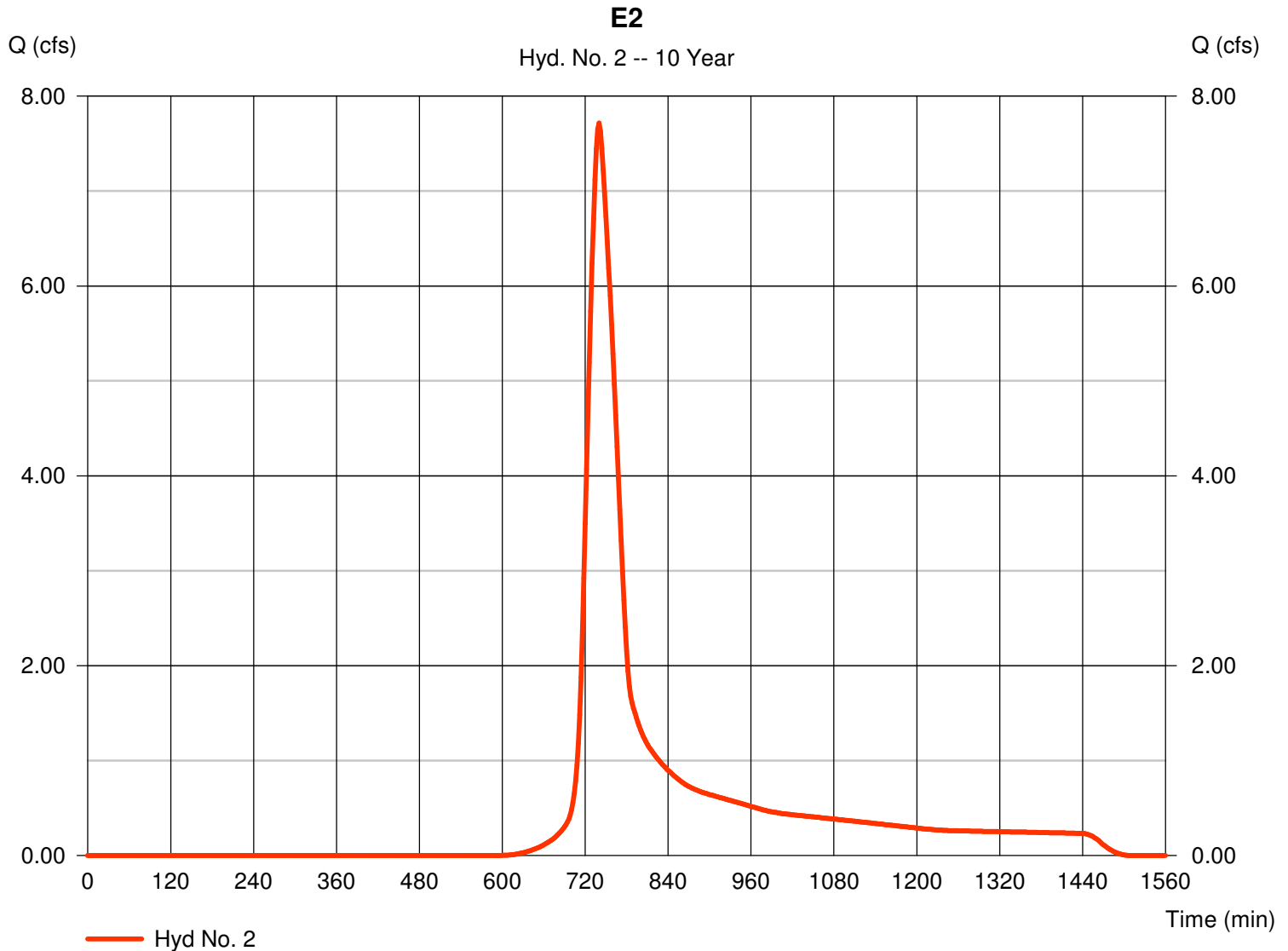
Friday, May 25, 2007

Hyd. No. 2

E2

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 5.230 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 7.714 cfs
Time to peak = 740 min
Hyd. volume = 41,037 cuft
Curve number = 69
Hydraulic length = 0 ft
Time of conc. (Tc) = 42.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description	
1	SCS Runoff	56.37	2	736	275,805	----	-----	-----	E1	
2	SCS Runoff	15.49	2	740	80,124	----	-----	-----	E2	
4	SCS Runoff	67.59	2	734	306,989	----	-----	-----	P1	
5	SCS Runoff	15.24	2	724	49,172	----	-----	-----	P2	
07254_Drainage_Basins.gpw					Return Period: 100 Year			Friday, May 25, 2007		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Friday, May 25, 2007

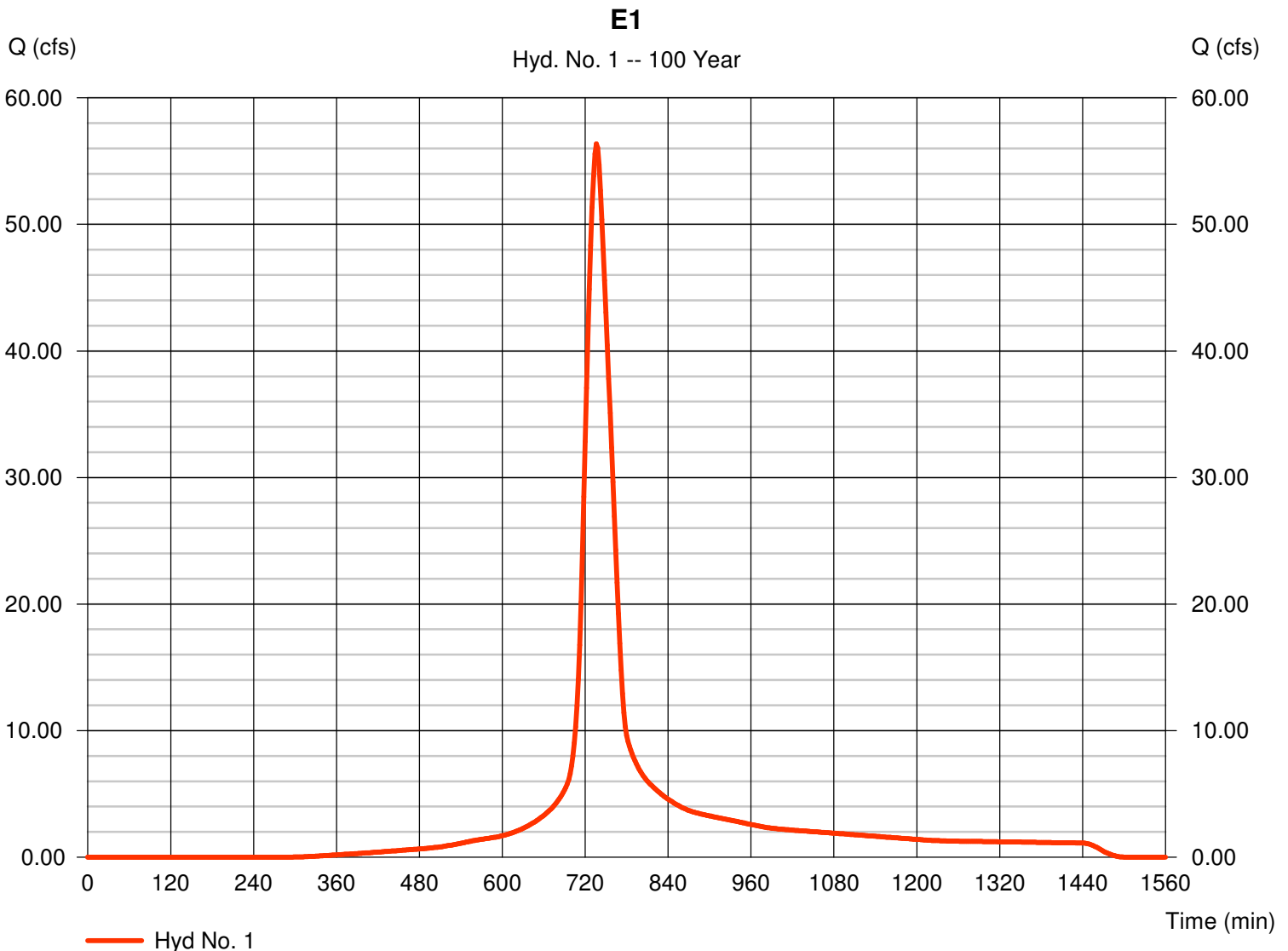
Hyd. No. 1

E1

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 13.400 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 56.37 cfs
Time to peak = 736 min
Hyd. volume = 275,805 cuft
Curve number = 82*
Hydraulic length = 0 ft
Time of conc. (Tc) = 40.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(7.600 \times 75) + (5.800 \times 92)] / 13.400$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

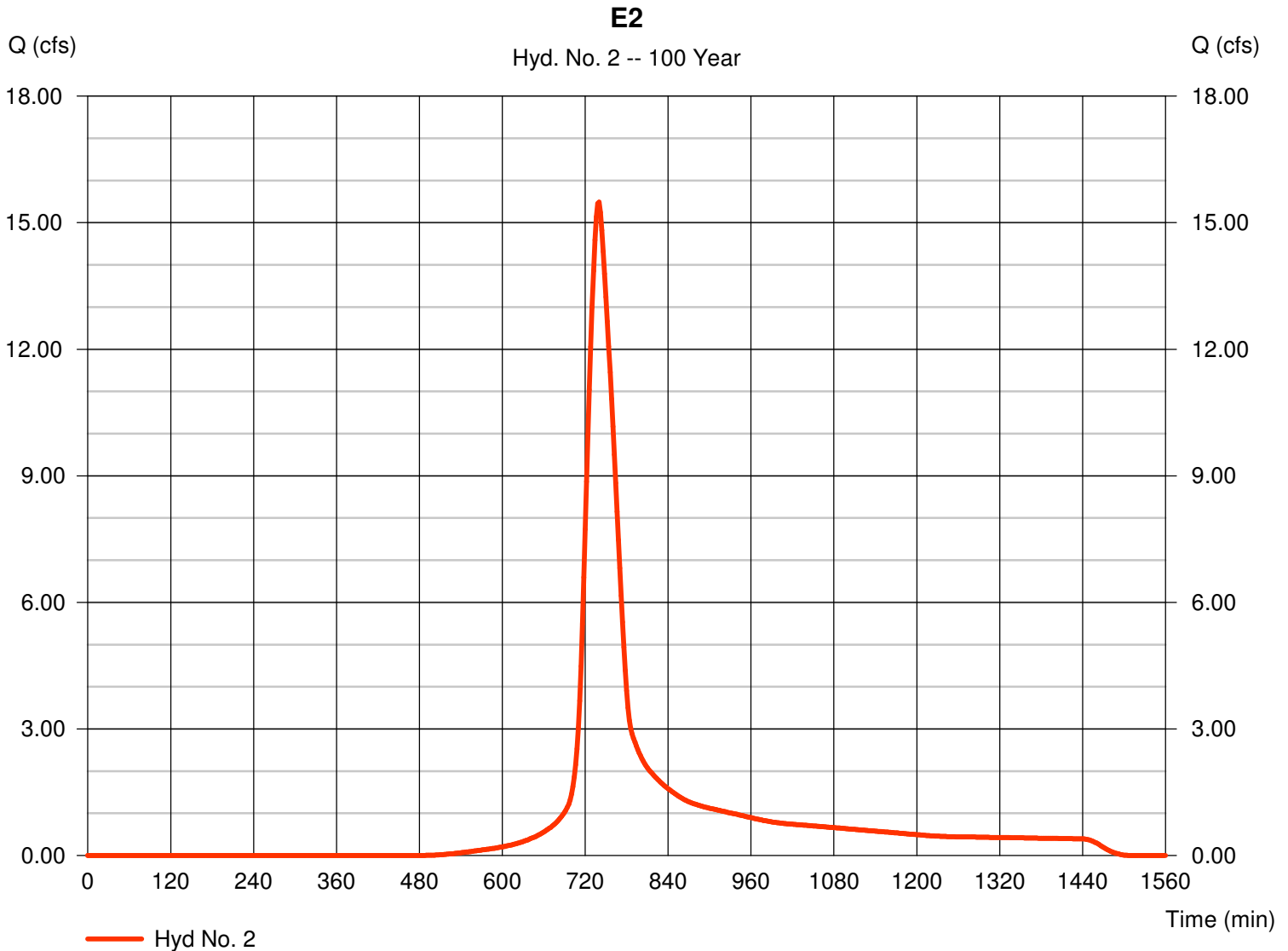
Friday, May 25, 2007

Hyd. No. 2

E2

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 5.230 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 15.49 cfs
Time to peak = 740 min
Hyd. volume = 80,124 cuft
Curve number = 69
Hydraulic length = 0 ft
Time of conc. (Tc) = 42.00 min
Distribution = Type II
Shape factor = 484



Tab 3. Post-Development Hydrologic Analysis

A. Proposed Conditions Hydrologic and Hydraulic Analysis

The hydraulic analysis was completed for the proposed basins, the results have summarized below. The hydrographs are located in the Figure 2.6 tab.

Table 3. Proposed Runoff.

Basin	Area (ac)	T _c (min)	Design Storm Flows (cfs)				
			2-yr	5-yr	10-yr	25-yr	100-yr
Basin 1-West	16.4	37	18.9	30.2	38.0	50.1	67.6
Basin 2-East	2.3	19	5.2	7.7	9.3	11.8	15.2

B. Proposed Time of Concentration

The time of concentration was calculated using the FAA method for basins P1 and P2. The calculations can be found on a spreadsheet in Figure 2.5.

C. Assumed Post-Developed Curve Numbers

The curve number used for developed conditions was 85 and 69 for the area that will remain undisturbed.

D. Proposed Contours for Detention

Not applicable to this project.

E. Preliminary SWS Sizing Calculations

The proposed SWS will be finalized during final grading.

F. Stage-Storage-Discharge

Not applicable to this project.

G. Analysis of Upstream/Downstream Impact

The proposed site will not be changing the upstream drainage patterns of the runoff entering East Fork Chisholm Creek. The developed site will add an additional 11.2 cfs towards the creek in the 100-year event; however that is an increase of less than 0.2% from the 6,540 cfs already flowing through the creek in the 100-year event.

H. Existing and Proposed Structural Elevations

The proposed SWS will be finalized during final grading.

I. Pond Design Elevations

Not applicable to this project.

J. Structure Details

Not applicable to this project.

K. Limits of Clearing and Grading

The west portion of the site will remain undisturbed; the limits of clearing and grading will be limited to approximately 11 acres in the east portion of the site.

L. Location of Impervious Areas

In the proposed conditions, impervious areas will include the multi-family units as well as the supporting parking lots and sidewalks around the structures. There will also be two access points off from Oliver Road.

M. Location of Utilities

Proposed utilities will be designed at a later date.

N. Location of Conveyance Systems

Proposed utilities will be designed at a later date.

O. Location of Channel Modifications

The drainage swale along the west property line will remain undisturbed.

P. Selection and Location of Stormwater Controls

Not applicable to this project.

Q. Emergency Overflow

Not applicable to this project.

R. Freeboard

Not applicable to this project.

S. 100-Year High Water Line

Not applicable to this project.

T. Lowest Openings

Not applicable to this project.

V. Maintenance Responsibility

The maintenance of the drainage infrastructures built on the site will be the responsibility of the land owner.

W. Offsite-Drainage Easements

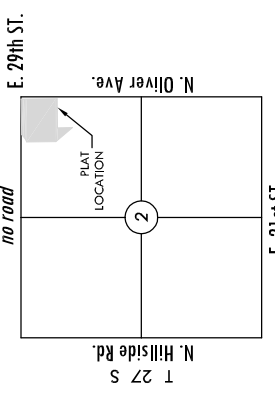
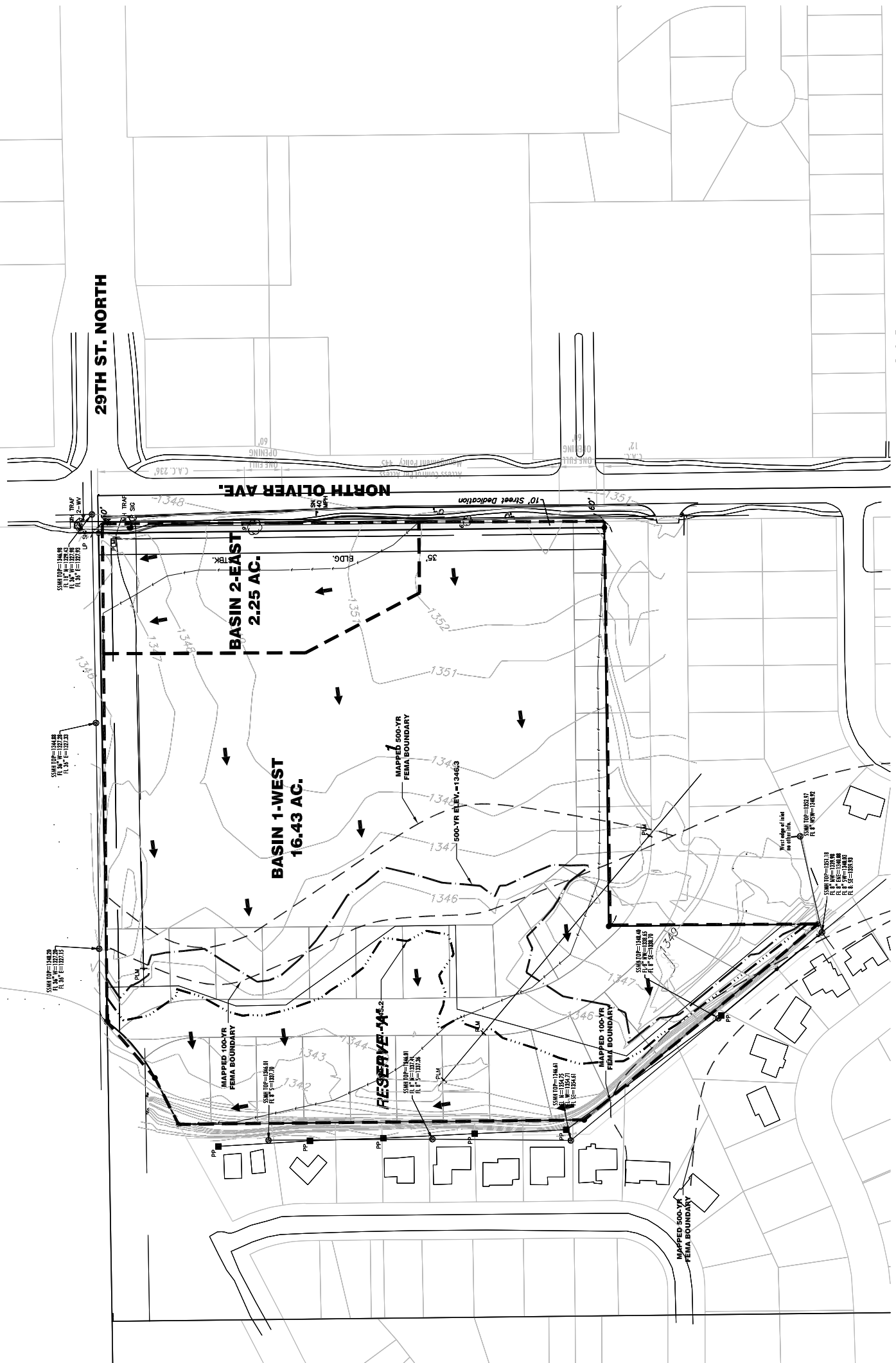
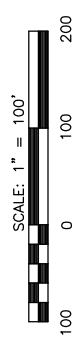
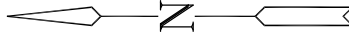
Not applicable to this project.

Figure 3.1

Drainage and Utility Plan

LEGEND

- CONIFEROUS TREE
- DECIDUOUS TREE
- POWER POLE
- ELECTRIC BOX
- LIGHT POLE
- FIRE HYDRANT
- WATER VALVE
- SECTION CORNER
- BENCHMARK
- EASEMENT
- BUILDING SETBACK
- FENCE
- STORM SEWER PIPE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- GAS PIPELINE
- TELEPHONE LINE
- UNDERGROUND ELEC.
- OVERHEAD ELECTRIC
- FIBER OPTIC CABLE 1
- DRAINAGE BASIN
- FLOW ARROW
- P1
- DRAINAGE BASINS
- 100-YR ELEVATION
- 500-YR ELEVATION
- MAPPED FEMA BOUNDARIES



- BENCH MARK**
- Datum BM: City of Wichita disc SE corner Subguard on RCB 100'± S. of Norwood Elev.= 1349.34 (NAVD 88)
 - BM#2: SW corner traffic signal light pole at the SW corner Oliver & 29th St. N. Elev.=1348.33' (NAVD 88)
 - BM#3: top of curb at east edge of sidewalk NW corner of vacated 28th St. Greenbriar Manor Addition. 28th St. & Oliver Elev.=1352.18 (NAVD 88)

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

CAMPUS CREST ADDITION
PROJECT NAME

PROPOSED DRAINAGE BOUNDARY
SHEET TITLE

CLS
DESIGN BY: CMJ
DRAWN BY: KLA
CHECKED BY: KLA

MAY 2007
DATE

07254
JOB NO.

1 / 1
SHEET/OF

Figure 3.2

Hydragraphs (Proposed Conditions)

Hydrograph Return Period Recap

Hydraflow Hydrographs by Intelisolve v9.22

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	-----	-----	17.61	-----	26.89	33.16	42.67	-----	56.37	E1
2	SCS Runoff	-----	-----	3.065	-----	5.768	7.714	10.81	-----	15.49	E2
4	SCS Runoff	-----	-----	18.86	-----	30.20	38.02	50.06	-----	67.59	P1
5	SCS Runoff	-----	-----	5.221	-----	7.678	9.305	11.75	-----	15.24	P2

Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description	
1	SCS Runoff	17.61	2	738	85,907	----	-----	-----	E1	
2	SCS Runoff	3.065	2	740	18,056	----	-----	-----	E2	
4	SCS Runoff	18.86	2	736	87,395	----	-----	-----	P1	
5	SCS Runoff	5.221	2	724	16,327	----	-----	-----	P2	
07254_Drainage_Basins.gpw					Return Period: 2 Year			Friday, May 25, 2007		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Friday, May 25, 2007

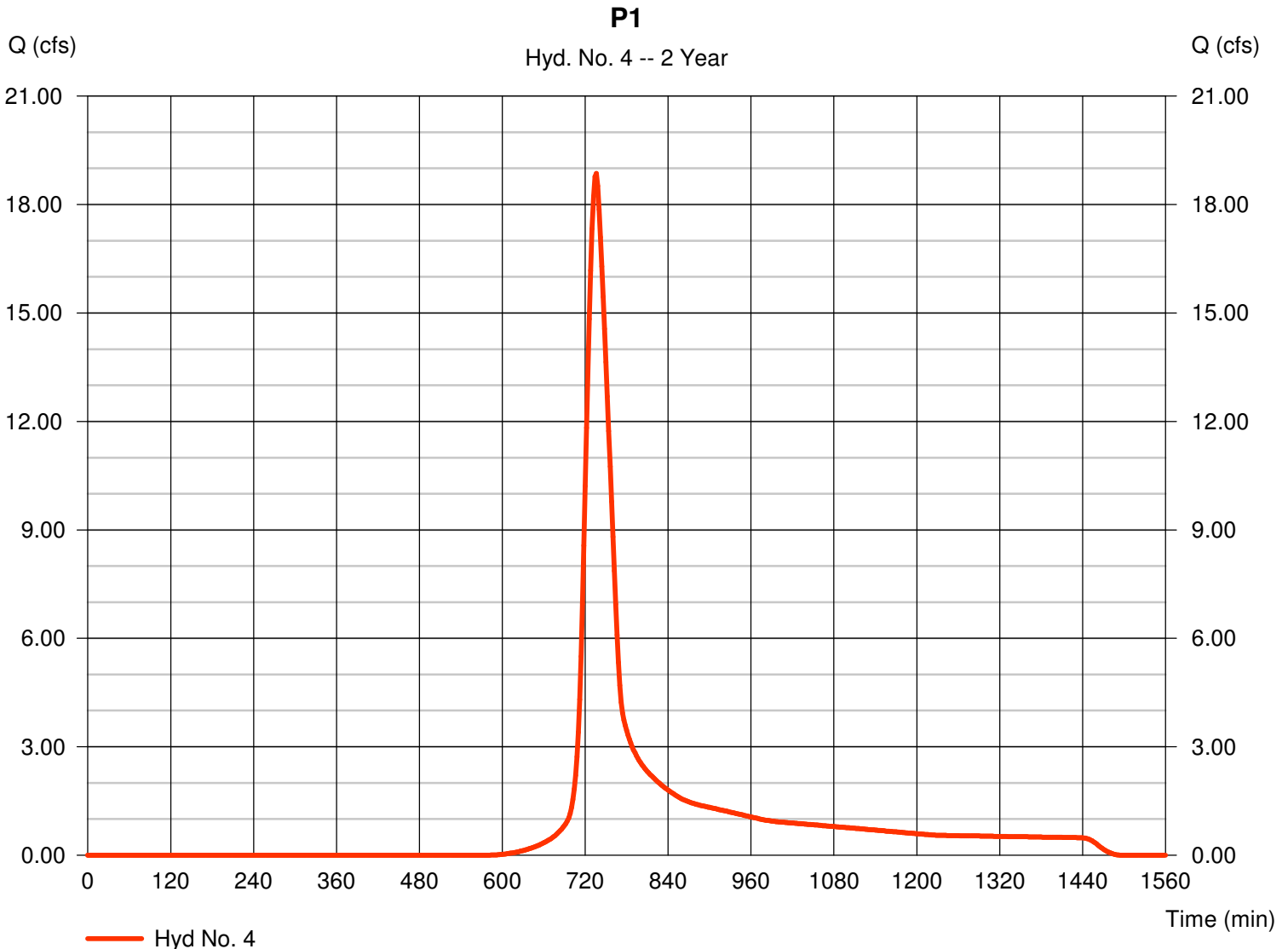
Hyd. No. 4

P1

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 16.430 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 18.86 cfs
Time to peak = 736 min
Hyd. volume = 87,395 cuft
Curve number = 78*
Hydraulic length = 0 ft
Time of conc. (Tc) = 37.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(7.610 \times 69) + (8.820 \times 85)] / 16.430$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

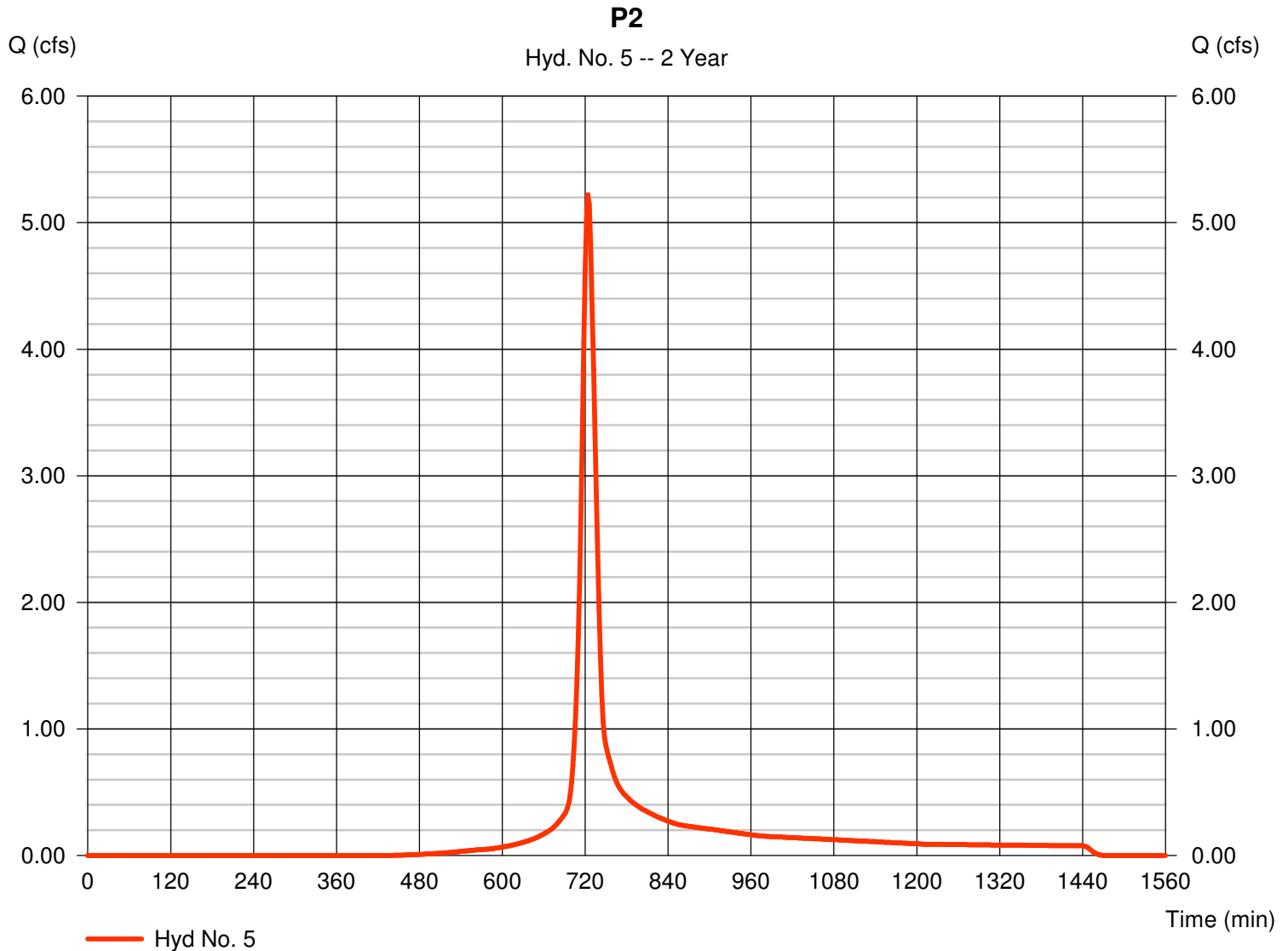
Friday, May 25, 2007

Hyd. No. 5

P2

Hydrograph type = SCS Runoff
Storm frequency = 2 yrs
Time interval = 2 min
Drainage area = 2.250 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 3.48 in
Storm duration = 24 hrs

Peak discharge = 5.221 cfs
Time to peak = 724 min
Hyd. volume = 16,327 cuft
Curve number = 85
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description	
1	SCS Runoff	26.89	2	736	130,359	----	-----	-----	E1	
2	SCS Runoff	5.768	2	740	31,380	----	-----	-----	E2	
4	SCS Runoff	30.20	2	736	137,631	----	-----	-----	P1	
5	SCS Runoff	7.678	2	724	24,133	----	-----	-----	P2	
07254_Drainage_Basins.gpw					Return Period: 5 Year			Friday, May 25, 2007		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Friday, May 25, 2007

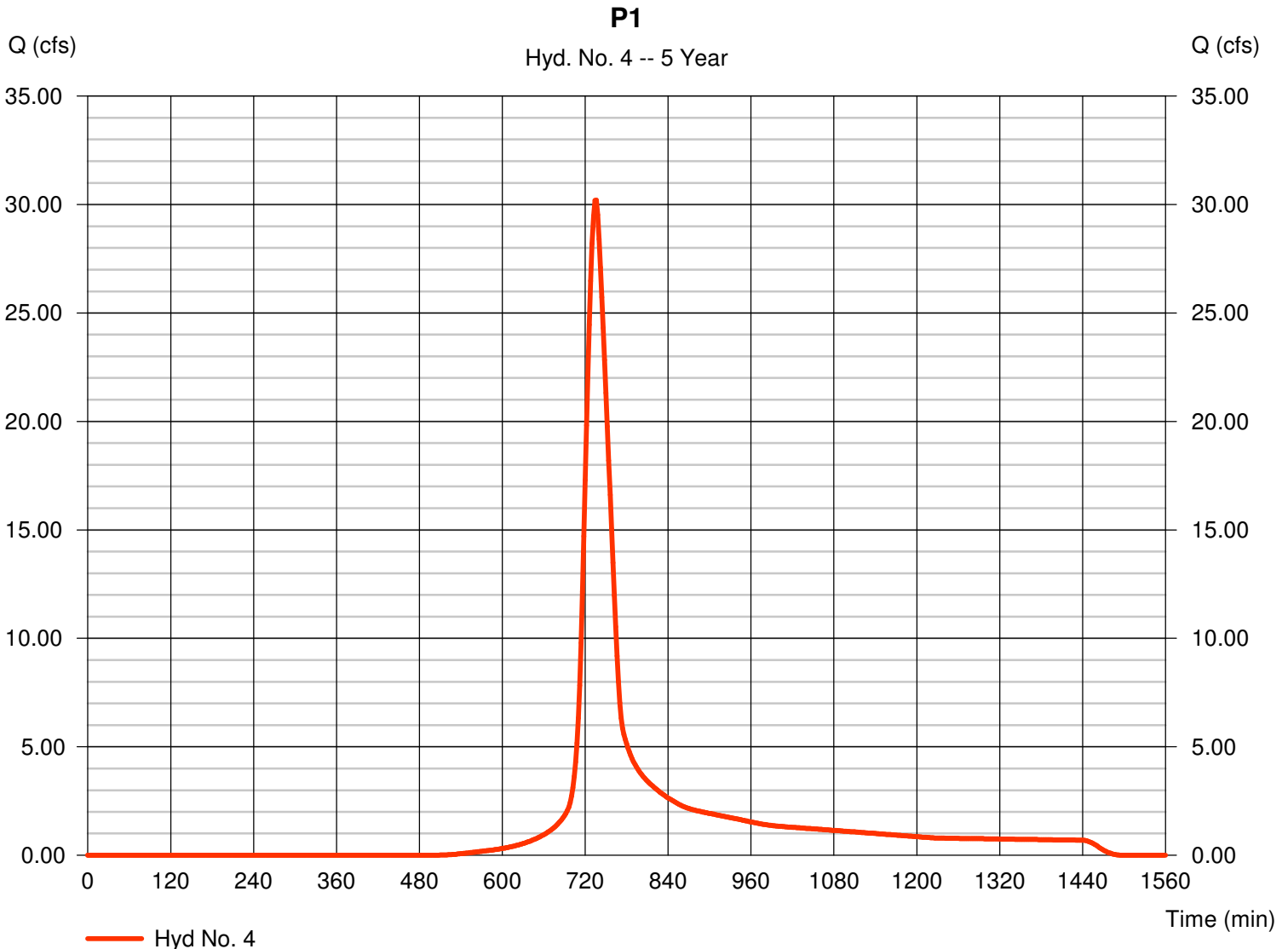
Hyd. No. 4

P1

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 2 min
Drainage area = 16.430 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 30.20 cfs
Time to peak = 736 min
Hyd. volume = 137,631 cuft
Curve number = 78*
Hydraulic length = 0 ft
Time of conc. (Tc) = 37.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(7.610 \times 69) + (8.820 \times 85)] / 16.430$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

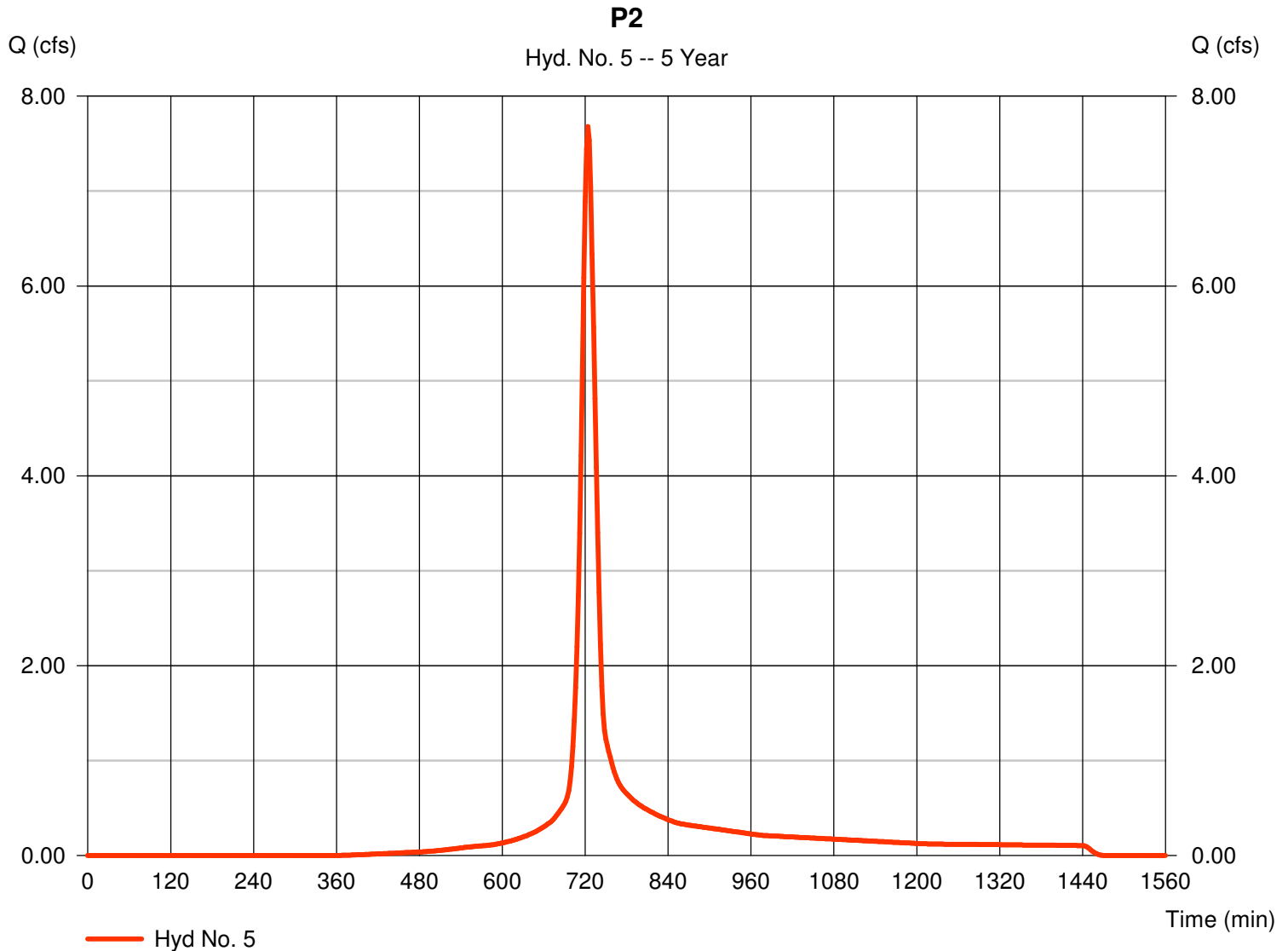
Friday, May 25, 2007

Hyd. No. 5

P2

Hydrograph type = SCS Runoff
Storm frequency = 5 yrs
Time interval = 2 min
Drainage area = 2.250 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 4.55 in
Storm duration = 24 hrs

Peak discharge = 7.678 cfs
Time to peak = 724 min
Hyd. volume = 24,133 cuft
Curve number = 85
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description	
1	SCS Runoff	33.16	2	736	160,695	----	-----	-----	E1	
2	SCS Runoff	7.714	2	740	41,037	----	-----	-----	E2	
4	SCS Runoff	38.02	2	734	172,478	----	-----	-----	P1	
5	SCS Runoff	9.305	2	724	29,402	----	-----	-----	P2	
07254_Drainage_Basins.gpw					Return Period: 10 Year			Friday, May 25, 2007		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Friday, May 25, 2007

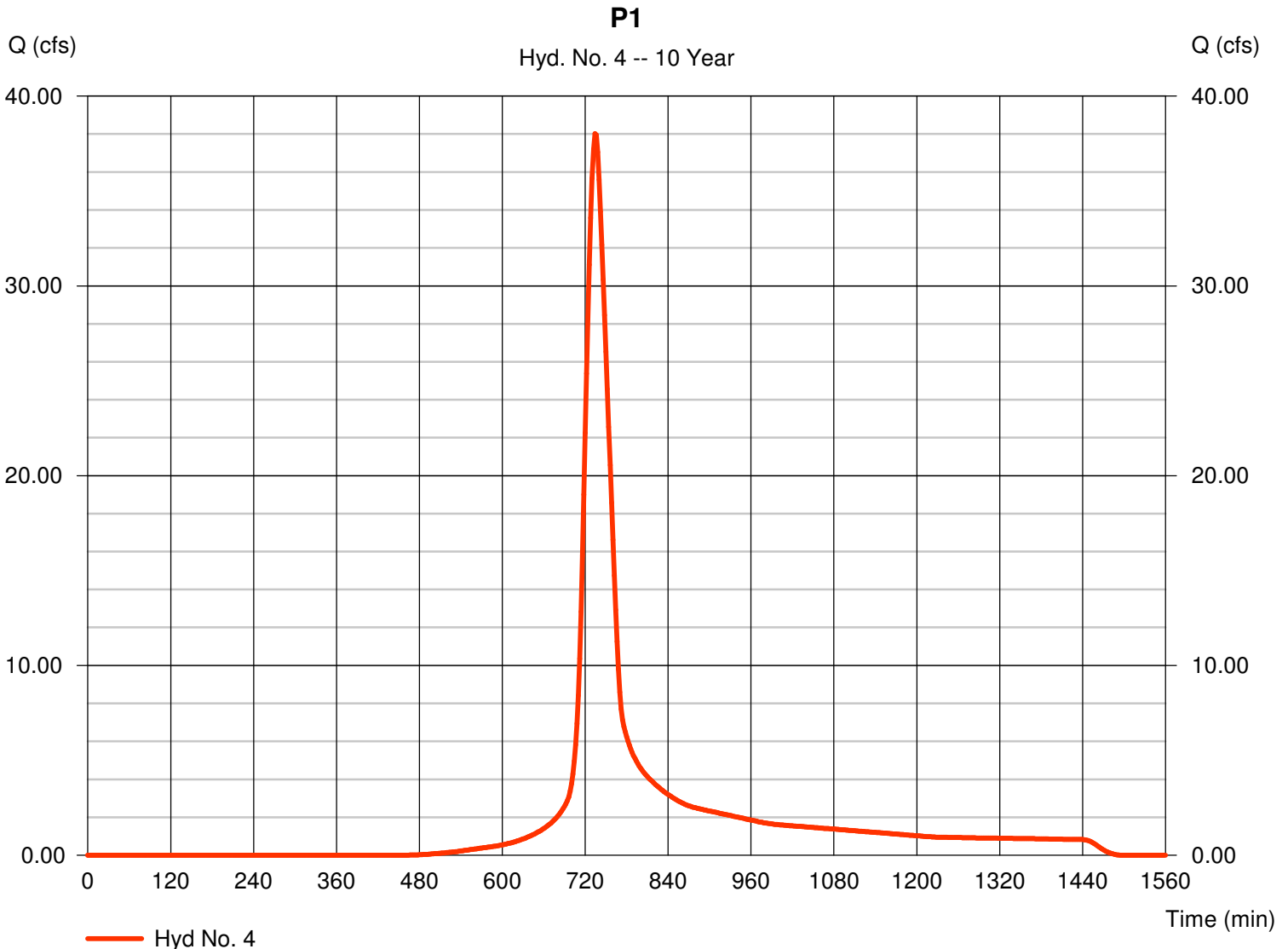
Hyd. No. 4

P1

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 16.430 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 38.02 cfs
Time to peak = 734 min
Hyd. volume = 172,478 cuft
Curve number = 78*
Hydraulic length = 0 ft
Time of conc. (Tc) = 37.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(7.610 \times 69) + (8.820 \times 85)] / 16.430$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

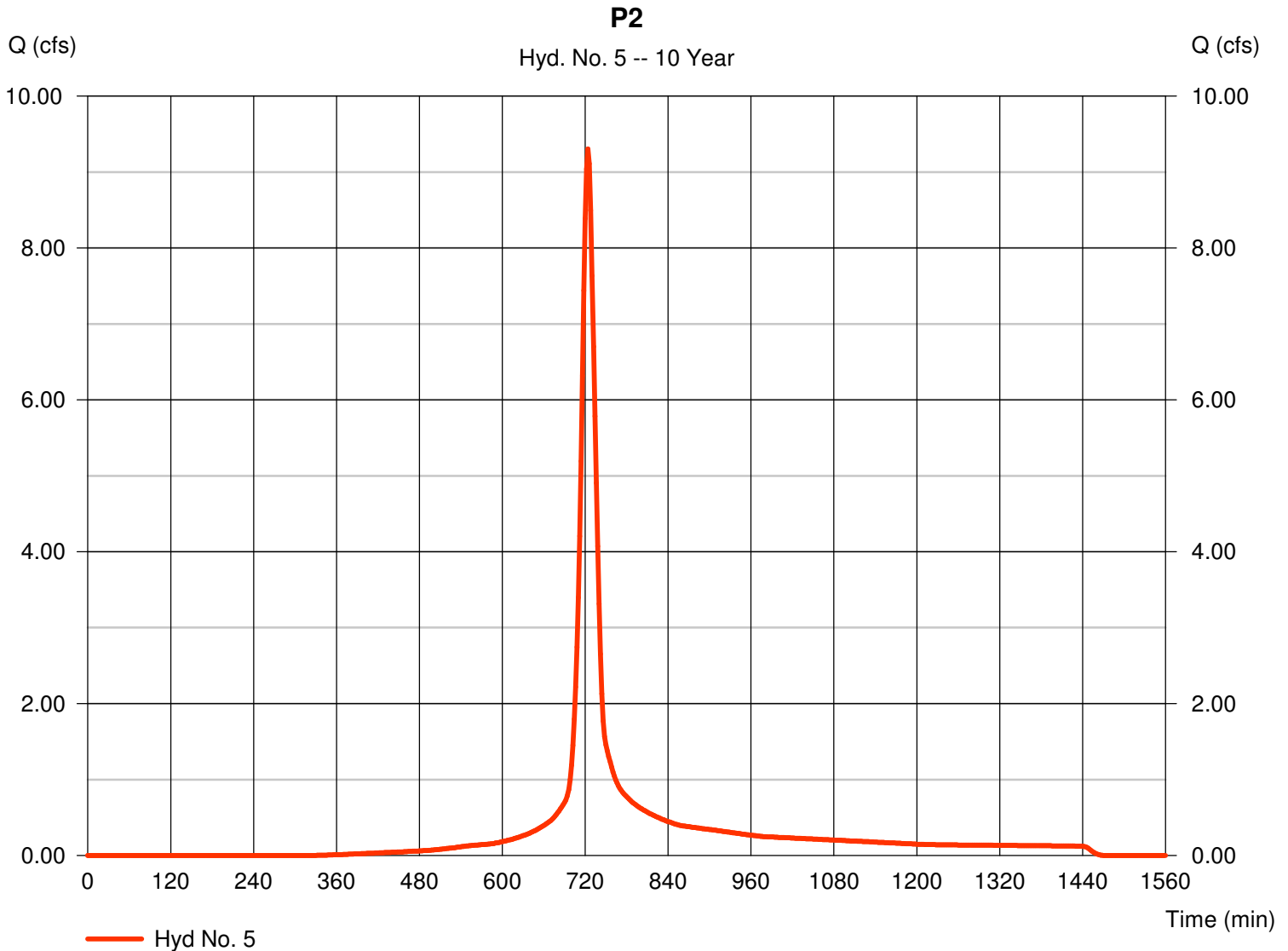
Friday, May 25, 2007

Hyd. No. 5

P2

Hydrograph type = SCS Runoff
Storm frequency = 10 yrs
Time interval = 2 min
Drainage area = 2.250 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 5.25 in
Storm duration = 24 hrs

Peak discharge = 9.305 cfs
Time to peak = 724 min
Hyd. volume = 29,402 cuft
Curve number = 85
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Type II
Shape factor = 484



Hydrograph Summary Report

Hydraflow Hydrographs by Intelisolve v9.22

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph description	
1	SCS Runoff	56.37	2	736	275,805	----	-----	-----	E1	
2	SCS Runoff	15.49	2	740	80,124	----	-----	-----	E2	
4	SCS Runoff	67.59	2	734	306,989	----	-----	-----	P1	
5	SCS Runoff	15.24	2	724	49,172	----	-----	-----	P2	
07254_Drainage_Basins.gpw					Return Period: 100 Year			Friday, May 25, 2007		

Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

Friday, May 25, 2007

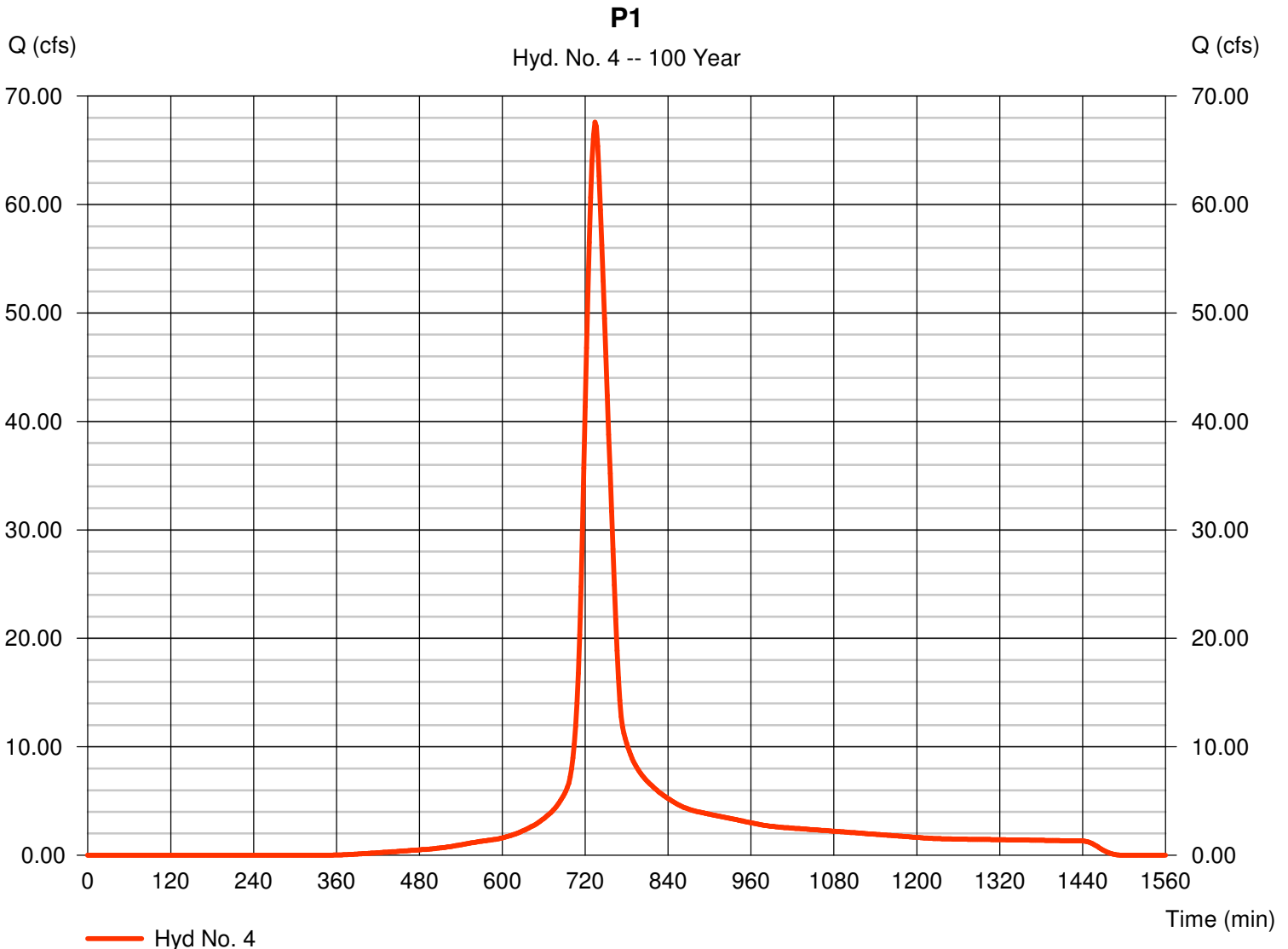
Hyd. No. 4

P1

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 16.430 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 67.59 cfs
Time to peak = 734 min
Hyd. volume = 306,989 cuft
Curve number = 78*
Hydraulic length = 0 ft
Time of conc. (Tc) = 37.00 min
Distribution = Type II
Shape factor = 484

* Composite (Area/CN) = $[(7.610 \times 69) + (8.820 \times 85)] / 16.430$



Hydrograph Report

Hydraflow Hydrographs by Intelisolve v9.22

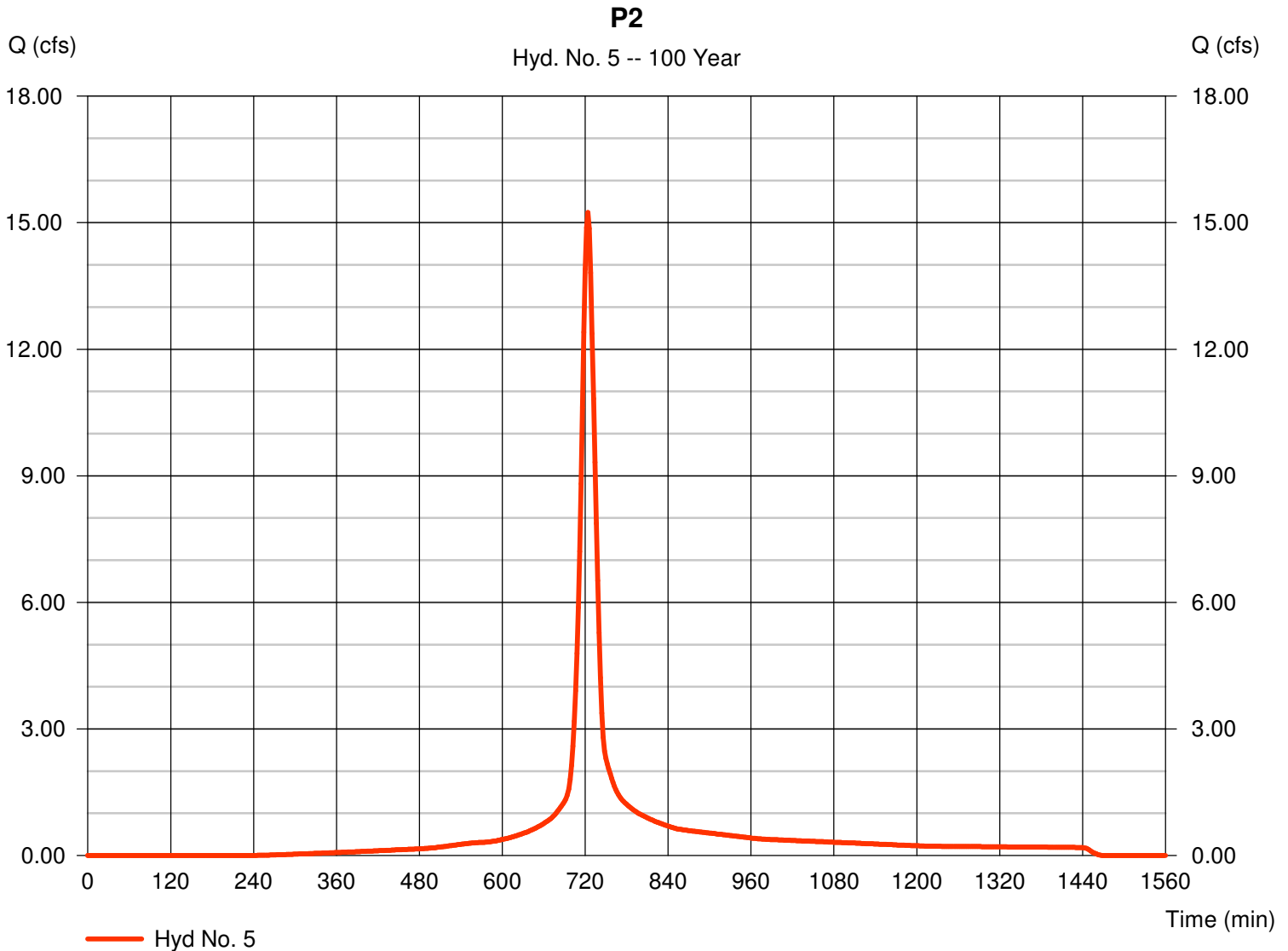
Friday, May 25, 2007

Hyd. No. 5

P2

Hydrograph type = SCS Runoff
Storm frequency = 100 yrs
Time interval = 2 min
Drainage area = 2.250 ac
Basin Slope = 0.0 %
Tc method = USER
Total precip. = 7.80 in
Storm duration = 24 hrs

Peak discharge = 15.24 cfs
Time to peak = 724 min
Hyd. volume = 49,172 cuft
Curve number = 85
Hydraulic length = 0 ft
Time of conc. (Tc) = 19.00 min
Distribution = Type II
Shape factor = 484



Tab 4. Floodplain Submittal

Not applicable to this project.

Tab 5. Permits

A. *US Army Corps of Engineers*

Not applicable to this project.

B. *Kansas Department of Agriculture*

Watershed is less than 240 acres; therefore, permits are not applicable to this project.

C. *Federal Emergency Agency (FEMA)*

Not applicable to this project.

D. *Kansas Department of Transportation*

Not applicable to this project.

E. *Sedgwick County Right-of-way Permit*

Not applicable to this project.