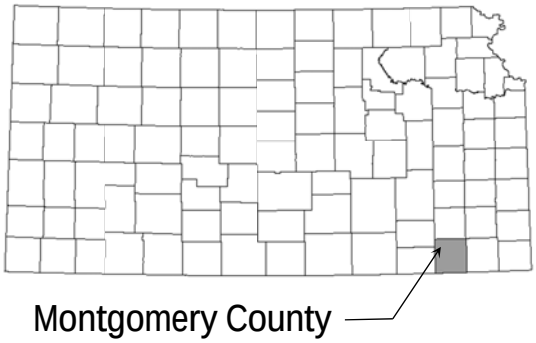
FLOOD INSURANCE STUDY

MONTGOMERY COUNTY, KANSAS
AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
CANEY, CITY OF	200230
CHERRYVALE, CITY OF	200231
COFFEYVILLE, CITY OF	200232
DEARING, CITY OF	200403
ELK CITY, CITY OF	200408
HAVANA, CITY OF	200647
INDEPENDENCE, CITY OF	200233
LIBERTY, CITY OF	200876
MONTGOMERY COUNTY (UNINCORPORATED AREAS)	200595
TYRO, CITY OF	200370



Effective:

PRELIMINARY
OCTOBER 17, 2014

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
20125CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Selected Flood Insurance Rate Map panels for the community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, cross sections). In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
B	X
C	X

Initial Countywide FIS Effective Date:

ATTENTION: On FIRM panels 0315, 0320 and 0425, the Caney Levee has not been demonstrated by the community or levee owner to meet the requirements of Section 65.10 of the NFIP regulations in 44 CFR as it relates to the levee's ability to provide 1-percent annual chance flood protection. The subject areas are identified on FIRM panels (with notes and bounding lines) and in the FIS report as potential areas of flood hazard data changes based on further review.

FEMA has updated levee analysis and mapping procedures for non-accredited levees. Until such time as FEMA is able to initiate a new flood risk project to apply the new procedures, the flood hazard information on the aforementioned FIRM panels that are affected by the Caney Levee are being added as a snapshot of the prior effective information presented on the FIRMs and FIS reports dated July 3, 1986 and June 1, 1988. As indicated above, it is expected that affected flood hazard data within the subject area could be significantly revised. This may result in floodplain boundary changes, 1% annual chance flood elevation changes, and/or changes to flood hazard zone designations.

The effective FIRM panels (and the FIS report) will again be revised to update the flood hazard information associated with the Caney Levee when FEMA is able to initiate and complete a new flood risk project to apply the new procedures.

TABLE OF CONTENTS

		Page
1.0	**INTRODUCTION**	**1**
1.1	Purpose of Study	1
1.2	Authority and Acknowledgments	1
1.3	Coordination	2
2.0	**AREA STUDIED**	**3**
2.1	Scope of Study	3
2.2	Community Description	4
2.3	Principal Flood Problems	4
2.4	Flood Protection Measures	6
3.0	**ENGINEERING METHODS**	**7**
3.1	Hydrologic Analyses	7
3.2	Hydraulic Analyses	9
3.3	Vertical Datum	13
4.0	**FLOODPLAIN MANAGEMENT APPLICATIONS**	**14**
4.1	Floodplain Boundaries	14
4.2	Floodways	15
5.0	**INSURANCE APPLICATIONS**	**19**
6.0	**FLOOD INSURANCE RATE MAP**	**19**
7.0	**OTHER STUDIES**	**21**
8.0	**LOCATION OF DATA**	**21**
9.0	**BIBLIOGRAPHY AND REFERENCES**	**22**

TABLE OF CONTENTS – continued

Page

FIGURES

Figure 1: Floodway Schematic 16

TABLES

Table 1: Initial and Final CCO Meeting Dates 3
Table 2: Flooding Sources Studied by Detailed Methods 3
Table 3: Major Floods in Verdigris River at Independence, Montgomery County 5
Table 4: Major Floods in Elk River 5
Table 5: Summary of Discharges for Detailed Study Streams 9
Table 6: Manning's "n" Values 11
Table 7: Floodway Data Tables 17
Table 8: Community Map History 20

EXHIBITS

Exhibit 1 – Flood Profiles

Elk River	01P
Rock Creek	02P
Sycamore Creek	03P
Verdigris River	04P-09P
Whiskey Creek	10P-11P

Exhibit 2 – Flood Insurance Rate Map Index
Flood Insurance Rate Map

FLOOD INSURANCE STUDY
MONTGOMERY COUNTY, KANSAS AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Montgomery County, including the Cities of Caney, Cherryvale, Coffeyville, Dearing, Elk City, Havana, Independence, Liberty, and Tyro; and the unincorporated areas of Montgomery County (referred to collectively herein as Montgomery County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some States or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence, and the State (or other jurisdictional agency) will be able to explain them.

Please also note that FEMA has identified one or more levees in this jurisdiction that have not been demonstrated by the community or levee owner(s) to meet the requirements of 44 CFR Section 65.10 of the NFIP regulations (44 CFR 65.10) as it relates to the levee's capacity to provide 1-percent annual chance flood protection. As such, there are temporary actions being taken until such time as FEMA is able to initiate a new flood risk project to apply the new levee analysis and mapping procedures. Please refer to the Notice to Flood Insurance Study Users page at the front of this FIS report for more information.

1.2 Authority and Acknowledgments

The sources of authority for this FIS report are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

This FIS was prepared to include all jurisdictions within Montgomery County into a countywide format FIS. Information on the authority and acknowledgements for each of the previously published and effective FISs and Flood Insurance Rate Maps (FIRMs) for communities within the county was compiled and is summarized below:

City of Coffeyville: the hydrologic and hydraulic analyses for January 1975 FIS were performed by U.S. Army Corps of Engineers (USACE) Tulsa District for the Federal Insurance Administration (FIA - currently known as FEMA), under Inter-Agency Agreement (IAA)-H-2-73, Project Order No. 2. This work was completed in April 1973. This study was later updated by Dames and Moore in January 1975 (Reference 1).

City of Independence: the hydrologic and hydraulic analyses for the December 1978, FIS were performed by Black and Veatch for FIA,

under Contract No. H-4006. This work was completed in August 1977 (Reference 2).

The hydrologic and hydraulic analyses for the revision published in December 19, 1995 were performed by Black & Veatch for FEMA under Contract No EMW-90-C-3131. This study was completed in March 1993 (Reference 3).

There are no previous FIS Reports published for the Cities of Caney, Coffeyville, Dearing, Elk City and the Unincorporated Areas of Montgomery County; therefore, the previous authority and acknowledgements for these communities are not included in this FIS.

There are no previous FIS reports or FIRMs for the Cities of Cherryvale, Havana, Liberty, and Tyro; therefore, the previous authority and acknowledgements for these communities are not included in this FIS.

For this countywide FIS, the hydrologic and hydraulic analyses for the streams studied by approximate method were performed by URS Group, Inc. for FEMA under Contract No. HSFEHQ-06-D-0162 Task Order HMTAP TO 08-J-0001. These studies were completed in March 6, 2008.

The Floodplain Mapping and FIRM production tasks for this countywide FIS were performed by URS Corporation on behalf of the State of Kansas Department of Agriculture (KDA), Division of Water Resources (DWR) in accordance with the Cooperating Technical Partners (CTP) Partnership Agreement between KDA and FEMA dated September 1, 1999, Mapping Activity Statement (MAS) No. 18 dated September 29, 2009. URS performed these tasks under KDA Contract 1604 dated January 24, 2008.

For this initial countywide study, no updated detailed hydrologic and hydraulic analyses were prepared. URS Corporation redelineated floodplain boundaries based on more up-to-date topography submitted by Montgomery County, Kansas. This study was completed in 2010.

Base map information shown on this FIRM was derived from State of Kansas Digital Orthophoto Quadrangles (DOQs) produced with 6 inch pixel resolution from photography dated 2011 or later (Reference 4).

The projection used in the preparation of this FIRM was Kansas State Plane South Zone (FIPS Zone 1502). The horizontal datum was NAD 83. Difference in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions many result in slight positional difference in map features across jurisdictional boundaries. These differences do not affect the accuracy of the FIRM.

1.3 Coordination

An initial Consultation Coordination Officer's (CCO) meeting is held with representatives from FEMA, the community, and the study contractor to explain the nature and purpose of a FIS, and to identify the streams to be studied by detailed methods. A final CCO meeting is held with representatives from FEMA, the community, and the study contractor to review the results of the study.

The dates of the pre-countywide initial and final CCO meetings held for the communities within Montgomery County are shown in Table 1, Initial and Final CCO Meeting Dates.

Table 1: Initial and Final CCO Meeting Dates

Community Name	FIS Date	Initial CCO Meeting Date	Final CCO Meeting Date
Coffeyville, City of	January 1975	-	-
Independence, City of	December 1978	April 1976	June 19, 1978
	December 19, 1995	July 15, 1992	-

- Date not available

The initial CCO meeting for this countywide study was held on March 30, 2010, at the Montgomery County Judicial Center in Independence, KS; the meeting was attended by representatives of FEMA, KDA, Montgomery County and URS Corporation.

The results of this countywide study were reviewed at the final CCO meeting held on _____, and attended by representatives of _____. All problems raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS report covers the geographic area of Montgomery County, Kansas, including the incorporated communities listed in Section 1.1.

All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

Table 2: Flooding Sources Studied by Detailed Methods

Stream	Limits of Study
Elk River	From Confluence with Verdigris River to approximately 5900 ft. upstream of US Highway 75
Rock Creek	From approximately 1500 ft. downstream of Cement Street to approximately 800 ft. upstream of Seventeenth Street
Sycamore Creek	From Railroad to Woodland Avenue
Verdigris River (downstream reach)	From County Road 1400 to approximately 14250 feet upstream of Railroad
Verdigris River (upstream reach)	From approximately 400 ft. downstream of the confluence of Rock Creek to approximately 4700 ft. upstream of the confluence of Elk River
Whiskey Creek	From confluence with Rock Creek to Oak Street

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction.

For this initial countywide study, floodplain boundaries for the streams that had been previously studied by detailed methods were redelineated based on more up-to-date topographic data.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. Approximate studies were conducted on all the streams that have been previously mapped Zone A or have a drainage area of at least one square mile

whichever is greater. The scope and methods of study were proposed to, and agreed upon, by FEMA and KDA.

2.2 Community Description

Montgomery County is located in the southeastern part of Kansas. It has an area of 651 square miles. It is bordered on the east by Labette County, north by Wilson County, west by Elk and Chautauqua Counties and to the south is Nowata and Washington Counties, Oklahoma. The county seat is Independence. The major highways in Montgomery County include U.S. Highways 75, 160, 166 and 169.

The total population of the county in 2010 was 35,471 (Reference 5). The population of Independence, the county seat, was 9,483 in 2010. Coffeyville is the most populated city in Montgomery County with a 2010 population of 10,295 (Reference 6). The 2010 population of Caney was 2,203; of Cherryvale was 2,367; of Dearing was 431; of, of Elk City was 325; of Tyro was 225; and of Liberty was 123 (Reference 6). Havana is the least populated community with a 2010 population of 104 (Reference 6). The U.S. Census Bureau estimates that population in the county between 2010 and 2012 declined by about 2.9% (Reference 5).

The climate is typical of the Midwest High Plains Region of the United States with a wide fluctuation in temperature, precipitation and humidity. Frequent weather changes occur both from day to day and from season to season. Summer precipitation generally results from local thunderstorm activity of high intensity and short duration. However, general rainfalls of moderate to heavy intensities with varied durations are not uncommon to the area and may develop at any time of the year (Reference 7). The average annual precipitation totals approximately 39.12 inches and is fairly uniformly distributed throughout the year. The average annual maximum temperature is 69.2 degrees Fahrenheit (^{o} F) and average annual minimum temperature is 46.4^{o} F. Normally August is the hottest month with an average maximum temperature of 92.2^{o} F and January is the coldest month with an average minimum temperature of 23.1^{o} F (Reference 8).

The county is primarily agricultural and undeveloped except in the incorporated areas. A majority of the floodplains fall within the aforementioned agricultural and undeveloped areas. Conversely, the floodplains of Verdigris River, Elk River, Rock Creek, Sycamore Creek and Whiskey Creek are near areas of residential and commercial development in the incorporated areas of Montgomery County.

2.3 Principal Flood Problems

The Verdigris River is the most prominent drainage feature within the county with close to 3,000 square miles of drainage area. It flows south along the east central part of Montgomery County. Big Hill Creek, Onion Creek and Drum Creek along with Elk River are the major tributaries to Verdigris River within the county. Flooding along the Verdigris River impacts the Cities of Coffeyville and Independence, as well as the unincorporated areas of the County.

Another major flooding source within the county is the Elk River, which flows east through northwestern Montgomery County before joining the Verdigris River at Independence. Duck Creek, Sycamore Creek and Card Creek are the major tributaries to Elk River within the county boundary.

The largest flood on record on the Verdigris River occurred in July 2007 and was above the 0.2 percent-annual-chance flood per the estimate published in this FIS. The major recorded flood on the Verdigris River before the construction of Fall River Reservoir was in April 1945. This event was also above the 0.2 percent-annual-chance flood per this estimate.

During the 2007 event, Verdigris River at Independence rose to a record 52.4 feet, shattering the old record of 47.6 feet and more than 20 feet above flood stage. The flood gates at the Elk City and Fall River Toronto Lake reservoirs had to be opened to release the water for the safety of the structure and the dam (Reference 9). Besides flooding the majority of eastern Independence and Coffeyville, the flood waters penetrated the Coffeyville Resources Refinery and carried crude oil down the river (Reference 10). This flood affected 459 homes and 71 businesses, resulting in an estimated loss of $15.8 million in structure values in Coffeyville alone (References 11 and 12).

Other major flooding events greater than the 0.2-percent-annual-chance flood in the Verdigris River have occurred in 1986, 1961, 1951, 1945 and 1943. The Verdigris River flooded twice in 1927. The event of April 1927 was greater than the 1-percent annual chance flood and the flood of October 1927 was close to the 0.2-percent-annual-chance flood (Reference 13).

Table 3 lists the major flood events with frequency greater than 1-percent-annual-chance and their estimated frequency along the Verdigris River. The stream flows are obtained from the gage data recorded on the Verdigris River at Independence (Reference 13). The frequency estimate is based on the frequency discharge published in this FIS for the Verdigris River at US Highway 160. The peak flows listed prior to the 1945 flood are unregulated flows and flows afterwards are regulated.

Table 3: Major Floods in Verdigris River at Independence, Montgomery County

Peak Date	Discharge (cfs)	Estimated Flood Frequency
July 1, 2007	153,000	>0.2 percent annual chance
April 17, 1945	117,000	>0.2 percent annual chance
May 19, 1943	114,000	>0.2 percent annual chance
May 6, 1961	110,000	>0.2 percent annual chance
October 4, 1986	109,000	>0.2 percent annual chance
July 1, 1951	104,000	>0.2 percent annual chance
October 3, 1927	91,000	0.2 percent annual chance
April 20, 1927	76,900	> 1 percent annual chance

The most recent major flood on the Elk River also occurred in July of 2007. The USGS gage on Elk River at Elk City has stream gage data from 1929 until 1969. However, a gage at Elk Falls approximately 20 stream miles upstream has current gage records starting from 1968. Based on these gage data the biggest flooding in Elk River happened in July of 1976. Table 4 lists five of the major flood events and their frequency estimates in Elk River. The discharges are obtained from gage records at these two locations (Reference 13). The frequency estimate is based on the frequency discharge published in this FIS for the Elk River at the Elk Reservoir.

Table 4: Major Floods in Elk River

Peak Date	Discharge (cfs)	Estimated Flood Frequency	USGS Gage Number - Location
July 3, 1976	200,000	>0.2 percent annual chance	USGS 7169800-at Elk Falls
May 6, 1961	100,000	>0.2 percent annual chance	USGS 7170000-at Elk City
June 30, 1951	81,500	>0.2 percent annual chance	USGS 7170000-at Elk City
October 2, 1927	71,000	>0.2 percent annual chance	USGS 7170000-at Elk City
June 30, 2007	63,800	>0.2 percent annual chance	USGS 7169800-at Elk Falls

Besides Verdigris and Elk Rivers, Rock Creek and Whiskey Creek also cause flooding in southern and west central Independence. Flooding of these creeks is caused by high intensity

thunderstorms unlike Verdigris River which floods due to relatively low intensity long duration rainfalls (Reference 2).

Similarly, Sycamore Creek is known to cause periodic flooding in western Coffeyville (Reference 1).

Within the City of Dearing, flooding comes primarily from Onion Creek. Biscuit Creek and five other unnamed streams that flow into Onion Creek from the north, also cause flooding within Dearing.

The City of Caney is impacted by flooding from the Little Caney River, Mud Creek and two other unnamed streams.

Several unnamed tributaries to Drum Creek and Cherry Creek can cause flooding of the City of Cherryvale. Cherry Creek has a USGS gage station near Cherryvale. The gage has recorded stream flow data from 1957 until 1977. Therefore, more recent flood data for this creek is not available. However, based on available data the biggest flood event in Cherry Creek occurred in July of 1976 and this event is estimated to be of lower frequency than the 0.2-percent-annual-chance event as per the frequency discharge published in Water Resources Investigation Report (WRIR 00-4079) (Reference 14) for Cherry Creek at the gage near Cherryvale, Kansas.

Elk City is in the floodplain at the confluence of Elk River and Duck Creek.

The City of Havana is in the eastern floodplain of Bee Creek which can cause flooding of the city.

Liberty is located west of Big Hill Creek and some of the eastern portions of this community are located in the Big Hill Creek floodplain. Most of the city is outside of the floodplain.

The City of Tyro sits between two watersheds, and is mostly outside of the floodplain. Low lying areas on the outskirts of the community are in the floodplains for the unnamed tributary of Hafer Run in the west, and the unnamed tributary of Fawn Creek in the east.

In addition to the streams listed above; there are dozens of other streams throughout the county that can cause flooding.

2.4 Flood Protection Measures

A number of dams and reservoirs within the Verdigris River basin upstream of and in Montgomery County serve as flood protection devices. USACE has constructed three flood control reservoirs on the Verdigris River and its tributaries. The Toronto Reservoir located on the Verdigris River near Coyville and Toronto has been operational since March 1960. The Fall River Reservoir on Fall River has been operational since April 1949. And the Elk City Lake reservoir on the Elk River near Elk City has been operational since 1966 (Reference 2). These dams provide a high degree of flood protection for about 94,000 acres of downstream Verdigris River basin, protecting the cities of Independence, Coffeyville, and Liberty, and large areas of the unincorporated areas of Montgomery County (Reference 1).

In Montgomery County, there is an earthen levee along Elk City Lake near the confluence with Squaw Creek. The levee is not certified and therefore mapped as not providing protection from Elk City Lake.

FEMA specifies that all levees must have a minimum of 3 foot freeboard against 1-percent annual chance flooding to be considered a safe flood protection structure.

Within this jurisdiction, there are one or more levees that have not been demonstrated by the communities or levee owner(s) to meet the requirements of 44 CFR 65.10 of the NFIP

regulations as it relates to the levee's capacity to provide 1%-percent- annual -chance flood protection. Please refer to the Notice to Flood Insurance Study Users page at the front of this FIS report for more information.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood-hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent annual chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent-annual-chance flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

Note: Within this jurisdiction there are one or more levees that have not been demonstrated by the community or levee owner to meet the requirements of 44 CFR 65.10 of the NFIP regulations as it relates to the levee's capacity to provide 1%-percent-annual-chance flood protection. Please refer to the Notice to Flood Insurance Study Users page at the front of this FIS report for more information.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting each community.

Information on the methods used to determine peak discharge-frequency relationships for the streams studied by detailed methods is shown below.

Pre-Countywide Analysis

Certain reaches of the Elk River, Rock Creek, Sycamore Creek, Verdigris River and Whiskey Creek were studied by detailed methods. The methodologies used for hydrologic analysis of these streams are summarized below:

City of Coffeyville: Flood frequencies for the Verdigris River reach near the Coffeyville area were determined from the stream gage data (Reference 1). The discharge for the selected frequencies of 10-, 2-, 1- and 0.2- percent-annual chance floods for both the stream was determined using standard statistical methods described in the USACE Civil Works Engineer Bulletin 52-8 (Reference 15).

Flood frequency analyses for Sycamore Creek near Coffeyville were determined from precipitation records, infiltration indices, unit hydrographs and flood routing techniques. There is no gaging station along Sycamore Creek (Reference 1).

City of Independence: The discharge frequency relationship of selected recurrence intervals for floods from the Verdigris River near Independence were obtained from curves developed by USACE, Tulsa District for the Verdigris River gage at Independence. USACE developed a hypothetical operation of the reservoir system for each flood during the years 1922 through 1964. The computed peak flows were then plotted on a logarithmic probability grid to describe a frequency curve reflecting the modification by the reservoirs (Reference 16).

The discharge frequency relationship for the Elk River was also developed in the same manner, except the Elk River gage at the Elk City Lake reservoir was used (Reference 3).

Discharge frequency data for Whiskey and Rock Creeks were obtained from the flood hydrographs developed by USACE, Tulsa District (Reference 2). The USACE developed unit hydrographs for the subareas within the basin of Whiskey and Rock Creeks. Rainfall estimates for the various frequencies were obtained from the Weather Bureau Technical Paper No. 40 (Reference 17). Flood hydrographs were developed for each subarea, routed downstream and combined at points of interest. Please note in Table 5: Summary of Discharges, the peak discharges for Rock Creek decrease as the drainage area increases in the lower reaches. This decrease is due to the additional overbank storage available as Rock Creek enters the Verdigris River floodplain.

The 0.2-percent annual chance discharges for all streams were determined by straight-line extrapolation of the frequency discharge curves developed from values up to the 1-percent annual chance discharge.

Initial Countywide Analysis

USGS gage station 07170600 on Cherry Creek near Cherryvale, KS, was used to calculate the 1-percent-annual-chance peak discharge at different locations along Cherry Creek. The gage data was used to calculate the 1-percent-annual-chance peak discharge using the PeakFQ Version 5.0 computer program (Reference 18). The 1-percent-annual-chance peak discharge at the gage was then used to calculate the weighted discharge along the creek at ungaged locations using the rural flood frequency estimation technique outlined in the National Flood Frequency program (Reference 19).

All other streams in the county were studied by approximate methods. For these streams the USGS regression equations were used to estimate the 1-percent-annual-chance peak discharges (Reference 14). For drainage areas greater than or equal to 30 square miles the 2-variable regression equation was used. For drainage areas less than 30 square miles the small basin regression equation was used. Input parameters for the regression equations are the mean annual precipitation and the contributing drainage areas.

The mean annual precipitation value for each watershed was calculated from a grid of mean annual precipitation values derived from Figure 3 of USGS Water Resources Investigation Report 00-4079 (Reference 14). The contributing drainage areas for each study reach were delineated electronically using ArcGIS 9.2 (Reference 20) with the ArcHydro Extension (Reference 21). The USGS 10 meter Digital Elevation Model (DEM) was used as the topographic data for this purpose (Reference 22).

Peak flow calculations determined above were modified in some instances to account for stream flow regulation of upstream peak flow values from existing studies.

The discharge values for the rivers with flow regulations upstream were obtained from USGS Scientific Investigations Report 2004-5033 (Reference 23). The regulated streams are Big Hill Creek, Elk River, and Verdigris River. For Elk River, the regulating reservoir is inside the county. So, for the reach upstream of the reservoir, the discharge values were calculated using the USGS regression equations (Reference 14).

For Rock Creek and Whiskey Creek, discharges for areas upstream of the detailed reaches were determined using USGS regression equations (Reference 14).

Peak discharge-drainage area relationships for the 10-, 2-, 1-, and 0.2-percent annual chance floods for the flooding sources studied in detail in the community are shown in Table 5: Summary of Discharges for Detailed Study Streams.

Table 5: Summary of Discharges for Detailed Study Streams

Flooding Source And Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Elk River					
At Elk River Reservoir (Gage)	702	9,380	15,500	20,500	28,600
Rock Creek					
At Railroad	24.67	3,950	4,200	4,300	4,500
At Cement Plant Road	24.25	3,475	3,500	3,500	3,500
At County Road	22.90	5,900	8,725	9,975	13,000
At County Road	20.32	4,400	6,600	7,525	10,000
At 10th Street	19.90	4,250	6,325	7,200	9,500
At 17th Street	19.44	4,000	6,000	6,825	9,200
Sycamore Creek					
	-	-	-	-	-
Verdigris River					
At U.S. Highway 160 (Gage)	2,892	35,500	64,000	72,000	94,000
Coffeyville	-	-	-	-	-
Whiskey Creek					
At Cherry Street	3.22	2,950	4,405	5,020	6,800
At Maple Street	2.23	2,000	3,020	3,440	4,600
At Laurel Street	1.51	1,700	2,540	2,905	3,900
At Railroad	0.64	850	1,360	1,570	2,200
At Circle Drive	0.52	600	905	1,035	1,400
At Oak Street	0.49	475	720	820	1,100

-Data not available

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded

whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Pre-Countywide Analysis

Portions of Elk River, Rock Creek, Verdigris River, Sycamore Creek and Whiskey Creek were studied by detailed methods during the pre-countywide studies carried out prior to this countywide study.

Detail-studied streams that were not re-studied as part of this map update may include a "profile baseline" on the maps. This "profile baseline" provides a link to the flood profiles included in the FIS report. The detail-studied stream centerline may have been digitized or redelineated as part of this revision. The "profile baselines" for these streams were based on the best available data at the time of their study and are depicted as they were on the previous FIRMs. In some cases where improved topographical data was used to redelineate floodplain boundaries, the "profile baseline" may deviate significantly from the channel centerline or may be outside the Special Flood Hazard Area (SFHA).

The methodologies used for hydraulic analysis of these streams are summarized below:

City of Coffeyville: The detailed study segments of Sycamore Creek and Verdigris River near the Coffeyville area were each studied as a single reach. A stream segment through which the distance between the computed 10-percent-annual-chance and 1-percent-annual-chance flood elevation does not vary by more than a specified amount is considered as a reach. On this basis, both the streams each form a single reach. In order to estimate the flood elevations at the selected frequency events on these reaches, an index station was determined on the Verdigris River and on Sycamore Creek. An index station is considered as a station being hydraulically representative of the entire reach. The flood elevation for these reaches was estimated using the flood elevation-frequency relationship developed for an index station (Reference 1).

City of Independence: For the detailed studies of Rock Creek, Whiskey Creek and the Verdigris River near Independence, the cross-sections for the backwater analyses were obtained from the field surveys and from the USACE (References 16 and 25). Cross-sections were located at close intervals above and below bridges in order to compute the significant backwater effects of these structures. Supplemental cross-section information was obtained from topographic maps (Reference 26).

Starting water surface elevations for the Verdigris River were selected by trial. These elevations were then adjusted to meet the upstream stage-discharge curve at the selected recurrent intervals by the slope of the profile between the gage and the downstream limit of study (Reference 2).

Starting water surface elevations for Rock Creek were determined by the slope area method except for the 1-percent-annual-chance event. For this event, the starting elevation was obtained from the USACE (Reference 25).

Initial water surface elevations for Whiskey Creek were read from the Rock Creek Profile at the confluence of the two creeks, after the free flow depths were determined. A stage-discharge curve was developed for the gaging station at the old US Highway 160 Bridge over the Verdigris River. Water surface elevations of floods of the selected recurrence intervals were computed by the USACE HEC-2 step backwater computer program (Reference 27).

The computed water surface profile for the 1-percent-annual-chance flood on Whiskey Creek was modified by hand computation of losses through bridges and adjusted to be consistent with the high water marks of historic floods. The 1-percent-annual-chance flood profile and computer model for Whiskey Creek and Rock Creek were obtained from the USACE, Tulsa District (Reference 2).

Starting water surface elevations for the Elk River were determined by the slope-area method. The USACE HEC-2 (Reference 27) model was used to estimate the flood elevations for this stream. The model verified that the Elk River is controlled by the Verdigris River backwater at a point just upstream of the City of Independence corporate limits. The Verdigris River backwater governs the 1-percent and 0.2-percent annual chance flood events well beyond the corporate limits of the City of Independence (Reference 3).

Initial Countywide Analysis

Cross section information for the streams studied by approximate method was obtained from USGS 10 meter DEM (Reference 22). The cross sections were placed with the goal of approximately 1,500 foot spacing. For an approximate study, hydraulic structures such as bridges, culverts, weirs, dams, or levees are typically not included in the analyses thus, no structures were included for any stream studied using this method.

The USACE computer model HEC-RAS Version 3.1.3 (Reference 28) was used to calculate the water surface elevations of all the streams studied by approximate method. The expansion and contraction loss coefficient of 0.3 and 0.1 were assigned for all the cross sections.

Table 6: Manning's "n" Values

Stream	Channel	Overbank
Elk River	0.035-0.040	0.050
Rock Creek	0.040-0.250	0.040-0.250
Sycamore Creek	-	-
Verdigris River	0.040	0.050
Whiskey Creek	0.020-0.150	0.030-0.220
All Streams studied by approximate methods	0.050	0.10

- Data not available

Channel and overbank roughness factors (Manning's "n" values) used in the hydraulic computations of approximate studies were chosen based on field reconnaissance and orthophotographic interpretation. The "n" values used for the study are listed in Table 6. The

higher “n” values were chosen for all the streams studied by approximate method in order to account for hydraulic structures not included in the model, which may have an impact to the water surface elevations.

Starting water-surface elevations for nearly all of the approximate studied streams were determined using normal depth. The starting slope for normal depth calculation is assigned the slope between the mouth of the stream and the first cross section. However, in the case of Verdigris River, Rock Creek and Whiskey Creek, the effective Base Flood Elevation (BFE) at the downstream limit of an approximate study reach was used as the known water surface elevation downstream boundary condition.

Channel roughness coefficients (Manning’s “n”) for all streams were assigned by engineering judgment on the basis of field inspection of the channels and the floodplains. Table 6 lists the n values assigned for the channel and overbanks of these streams (Reference 24).

For FIRM panels dated July 16, 2004, or later, qualifying bench marks within a given jurisdiction that are cataloged by the National Geodetic Survey (NGS) and entered into the National Spatial Reference System (NSRS) as First or Second Order Vertical and have a vertical stability classification of A, B, or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

Bench marks cataloged by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)
- Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutment)
- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below the frost line)
- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

In addition to NSRS bench marks, the FIRM may also show vertical control monuments established by a local jurisdiction; these monuments will be shown on the FIRM with the appropriate designations. Local monuments will only be placed on the FIRM if the community has requested that they be included, and if the monuments meet the aforementioned NSRS inclusion criteria.

To obtain elevation, description, and /or location information for bench marks shown on the FIRM for this jurisdiction, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their Web site at www.ngs.noaa.gov.

It is important to note that temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with this FIS report and FIRM. Interested individuals may contact FEMA to access this data.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

To accurately convert flood elevations for Montgomery County from the current NGVD29 datum to the newer NAVD88 datum, the following procedure was implemented. The steps outlined in FEMA's *Guidelines and Specifications for Flood Hazard Mapping Partners Appendix B: Guidance for converting to the North American Vertical Datum of 1988* was used to determine an average conversion factor from NGVD29 to NAVD88. The corners of each USGS 7.5-minute series topographic quadrangle maps were buffered by a distance of 2.5 miles to determine which corner lies within 2.5 miles of the jurisdictional boundary of Montgomery County. The Corpscon Version 6.0 (Reference 29) developed by the USACE was used to determine the conversion factor for each quadrangle corner that fell inside the jurisdictional boundary of Montgomery County. The average of all points for the entire jurisdiction was calculated to be +0.47 foot.

$$\text{NGVD29} + 0.47 = \text{NAVD88}$$

Flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the NGVD29 and NAVD88, visit the National Geodetic Survey website at www.ngs.noaa.gov , or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242
(301) 713-4172 (fax)

It is important to note that adjacent counties may be referenced to NGVD29. This may result in differences in BFEs across the political boundaries between the counties.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS report provides 1-percent-annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent-annual-chance flood elevations; delineations of the 1- and 0.2-percent-annual-chance floodplains; and a 1-percent-annual-chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles and Floodway Data tables. Users should reference the data presented in the FIS report as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for the floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section.

Between cross sections, the boundaries were interpolated using the Light Detection and Ranging (LiDAR) data generated 2 meter DEM (Reference 30).

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM. On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations, but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 1-percent-annual-change floodplain boundary is shown on the FIRM. The 1-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using the LiDAR data generated 2 meter DEM (Reference 30).

<u>Redelineation of Non-Revised Areas</u>

Effective detailed SFHAs were redelineated using 2 meter LiDAR DEM topographic data. Approximately 27 stream miles of SFHA were redelineated. The stream reaches redelineated in this study include 2.38 miles of Elk River, 4.56 miles of Rock Creek, 1.95 miles of Sycamore Creek, 15.85 miles of Verdigris River and 2.2 miles of Whiskey Creek. The methodology used in redelineation process is as follows.

The City of Coffeyville and the City of Independence effective FIRMs were georeferenced to the DASC 2002 DOQQ (Reference 4). The cross sections were digitized and additional lines were added to better represent the flood profile. The lines were attributed with the 1- and 0.2- percent-annual-chance flood elevation. The lines were then extended to fully cover the valley to ensure the correct backwater elevation is applied to the tributaries. The lines were used to create a water surface Triangular Irregular Network (TIN). The water surface TIN was then converted into a 2 meter grid representing water surface DEM and subtracted from the topographic DEM. The result was a depth of water grid that was then contoured. The contour representing a zero depth represented the flood boundary. This process was repeated for the 0.2-percent-annual-chance flood elevation. The flood boundary lines were

revised to match the adjacent Zone AE areas, and ‘islands’ and ‘ponds’ that are less than 0.5 inches in length in map scale were removed.

Creation of Zone A Mapping

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. The water surface DEM grid is created from the result of the HEC-RAS hydraulic analysis. The 2 meter LiDAR DEM (Reference 30) was used for the flood boundary delineation of Zone A boundaries as well. The depth grid method outlined in the section for *Redelineation of Non-Revised Areas* was used to create the draft flood hazard boundary for these streams. The zero depth contour represented draft Zone A flood boundary delineations from the hydraulic analyses. Then the draft Zone A boundary delineations were revised for edge matching to detailed study areas.

The 2 meter DEM topographic data meets the mapping suitability for Risk Class ‘C’ according to *Table 7-6 of the Multi-Year Flood Hazard Identification Plan (MHIP) Chapter 7*, and delineated the flood boundaries to be within + 0.5 contour/90% delineation/reliability range according to *Table 7-1 of the MHIP Chapter 7* (Reference 31).

Within this jurisdiction there are one or more levees that have not been demonstrated by the community or levee owner(s) to meet the requirements of 44 CFR 65.10 of the NFIP regulations as it relates to the levee’s capacity to provide 1% annual chance flood protection. As such, the floodplain boundaries in this area were taken directly from the previously effective FIRM and are subject to change. Please refer to the Notice to Flood Insurance Study Users page at the front of this FIS report for more information on how this may affect the floodplain boundaries shown on the FIRM.

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the base flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways for streams studied in detail in pre-countywide studies were digitized directly from the georeferenced FIRMs and Flood Boundary and Floodway Maps (FBFMs). The floodways presented in this study were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations tabulated for selected cross sections are shown in Table 7. In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 7 for certain downstream cross sections of Rock Creek are

lower than the regulatory flood elevations in that area, which must take into account the 1-percent annual chance flooding due to backwater from other sources.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 7. In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water surface elevation (WSEL) of the base flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

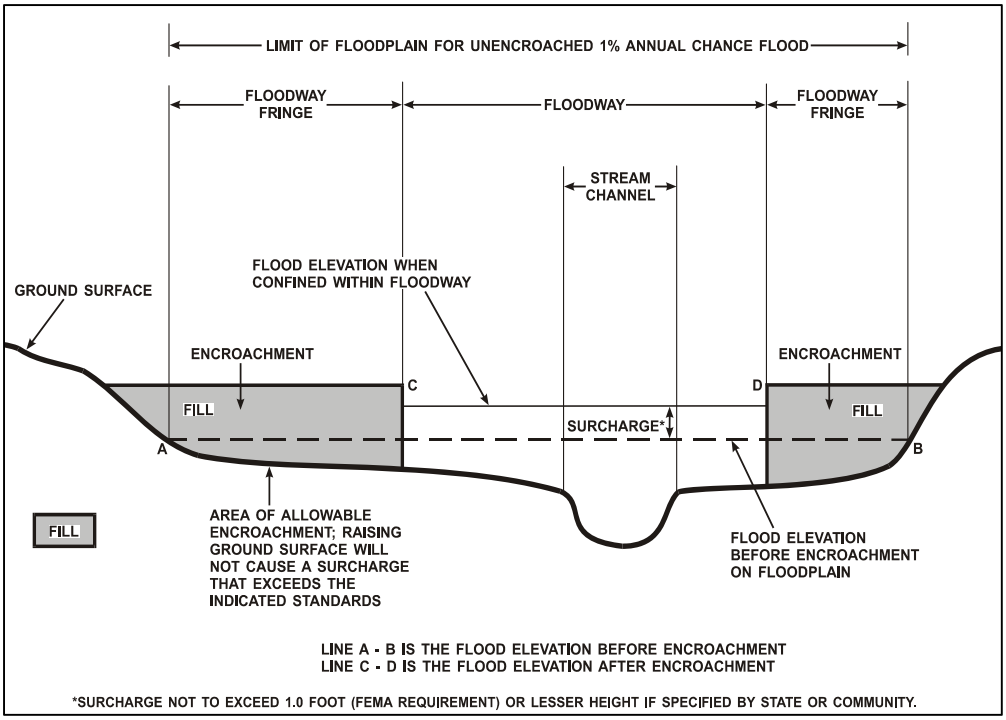


Figure 1: Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Rock Creek								
A	23,338[1]	1,242	6,215	1.16	761.5	760.7[3]	761.5	0.8
Sycamore Creek								
A	2,534[2]	340	*	*	725.5	724.5	725.5	1.0
B	2,957[2]	350	*	*	726.7	726.7	726.7	0.0
C	3,274[2]	340	*	*	726.9	726.9	726.9	0.0
D	3,749[2]	360	*	*	729.3	728.3	729.3	1.0
E	4,014[2]	340	*	*	730.3	729.2	730.3	1.1
F	4,330[2]	320	*	*	731.1	730.2	731.1	0.9
G	4,910[2]	330	*	*	732.6	731.5	732.6	1.1
H	5,650[2]	360	*	*	734.2	733.4	734.2	0.8
I	6,494[2]	370	*	*	736.6	735.7	736.6	0.9
J	6,706[2]	370	*	*	736.9	736.1	736.9	0.8
K	7,075[2]	350	*	*	737.7	736.7	737.7	1.0
L	7,445[2]	390	*	*	738.6	737.5	738.6	1.1
M	7,709[2]	350	*	*	739.2	738.0	739.2	0.8
N	8,237[2]	350	*	*	740.0	739.0	740.0	1.0
O	8,660[2]	370	*	*	740.5	739.8	740.5	0.7
P	9,134[2]	400	*	*	741.5	740.8	741.5	0.7
Q	9,768[2]	330	*	*	742.3	742.2	742.3	0.1
R	10,824[2]	350	*	*	745.3	744.7	745.3	0.6

[1] Feet above confluence with Verdigris River
[2] Feet above confluence with Onion Creek
[3] Elevation computed without considering backwater effects from Verdigris River
* Data is unavailable

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS
AND INCORPORATED AREAS

FLOODWAY DATA

ROCK CREEK – SYCAMORE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Verdigris River								
A	23,602[1]	2,400	*	*	721.0	720.3	721.0	0.7
B	24,235[1]	2,500	*	*	721.4	720.9	721.4	0.5
C	28,934[1]	3,500	*	*	722.7	721.9	722.7	0.8
D	29,198[1]	3,500	*	*	723.6	722.8	723.6	0.8
E	52,958[1]	4,500	*	*	726.7	725.5	726.7	0.7
F	53,064[1]	4,500	*	*	726.7	725.5	726.7	0.7
G	53,170[1]	4,500	*	*	726.8	725.6	726.8	1.2
H	172,498[1]	3,219	29,878	2.41	764.2	763.2	764.2	1.0
I	177,883[1]	3,856	32,719	2.20	765.3	764.3	765.3	1.0
Whiskey Creek								
A	0[2]	189	1,524	4.48	762.4	761.4	762.4	1.0
B	2,059[2]	400	1,847	2.72	765.8	765.5	765.8	0.3
C	2,270[2]	238	1,285	3.91	766.9	765.9	766.9	1.0
D	2,534[2]	484	2,892	1.66	768.4	767.4	768.4	1.0
E	3,274[2]	425	1,311	2.70	769.7	769.3	769.7	0.4
F	5,333[2]	386	1,944	1.77	776.3	775.3	776.3	1.0
G	8,078[2]	400	1,124	1.40	785.1	785.1	785.1	0.0
H	8,712[2]	300	468	3.35	790.0	789.6	790.0	0.4
I	9,926[2]	320	1,385	0.75	794.6	794.3	794.6	0.3
J	10,877[2]	100	239	3.43	797.2	796.8	797.2	0.4

[1] Feet above County Road
[2] Feet above confluence with Rock Creek

* Data is unavailable

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS
AND INCORPORATED AREAS

FLOODWAY DATA

VERDIGRIS RIVER – WHISKEY CREEK

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base (1-percent-annual-chance) flood elevations (BFEs) or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by detailed methods. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile (sq. mi.), and areas protected from the base flood by levees. No BFEs or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The countywide FIRM presents flooding information for the entire geographic area of Montgomery County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the county identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on FBFMs where applicable. Historical data relating to the maps prepared for each community are presented in Table 8, “Community Map History.”

Within this jurisdiction there are one or more levees that have not been demonstrated by the community or levee owner(s) to meet the requirements of 44 CFR 65.10 of the NFIP regulations as it relates to the levee’s capacity to provide 1% annual chance flood protection. Please refer to the Notice to Flood Insurance Study Users page at the front of this FIS report for more information on how this may affect the FIRM.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Caney, City of	February 15, 1974	October 24, 1975	July 3, 1986	
Cherryvale, City of		NONE		
Coffeyville, City of	May 3, 1974	NONE	March 12, 1976	
Dearing, City of	July 25, 1975	NONE	June 1, 1988	
Elk City, City of	October 29, 1976	NONE	April 1, 1989	
Havana, City of		NONE		
Independence, City of	December 14, 1973	September 26, 1975	June 15, 1979	December 19, 1995
Liberty, City of		NONE		
Montgomery County (Unincorporated Areas)	October 18, 1977	NONE	June 1, 1988	
Tyro, City of		NONE		

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Montgomery County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS reports, and FIRMs for all of the incorporated and unincorporated jurisdictions within Montgomery County.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting: Federal Insurance and Mitigation Division, FEMA Region VII, 9221 Ward Parkway, Suite 300, Kansas City, Missouri 64114-3372.

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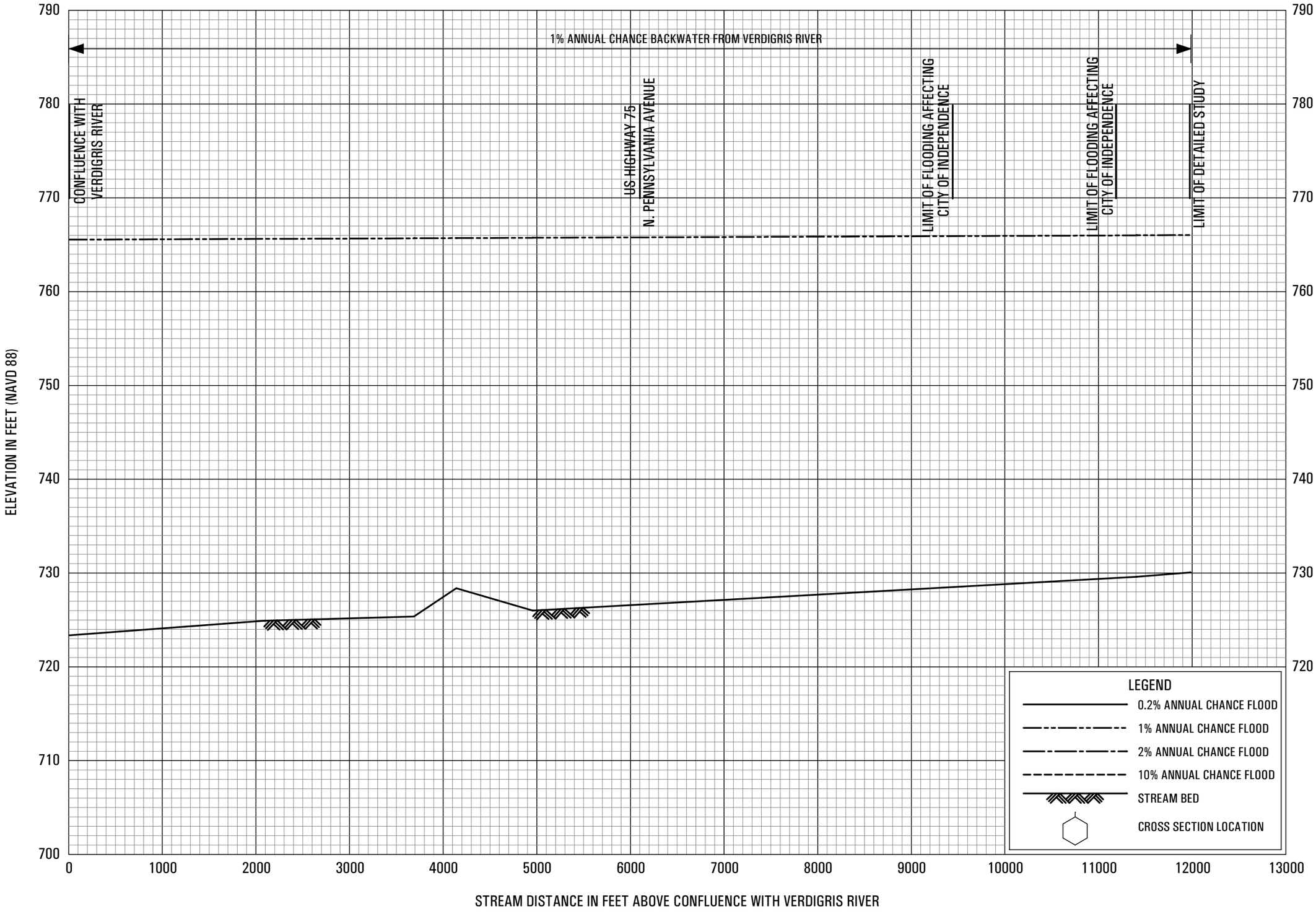


FLOOD PROFILES

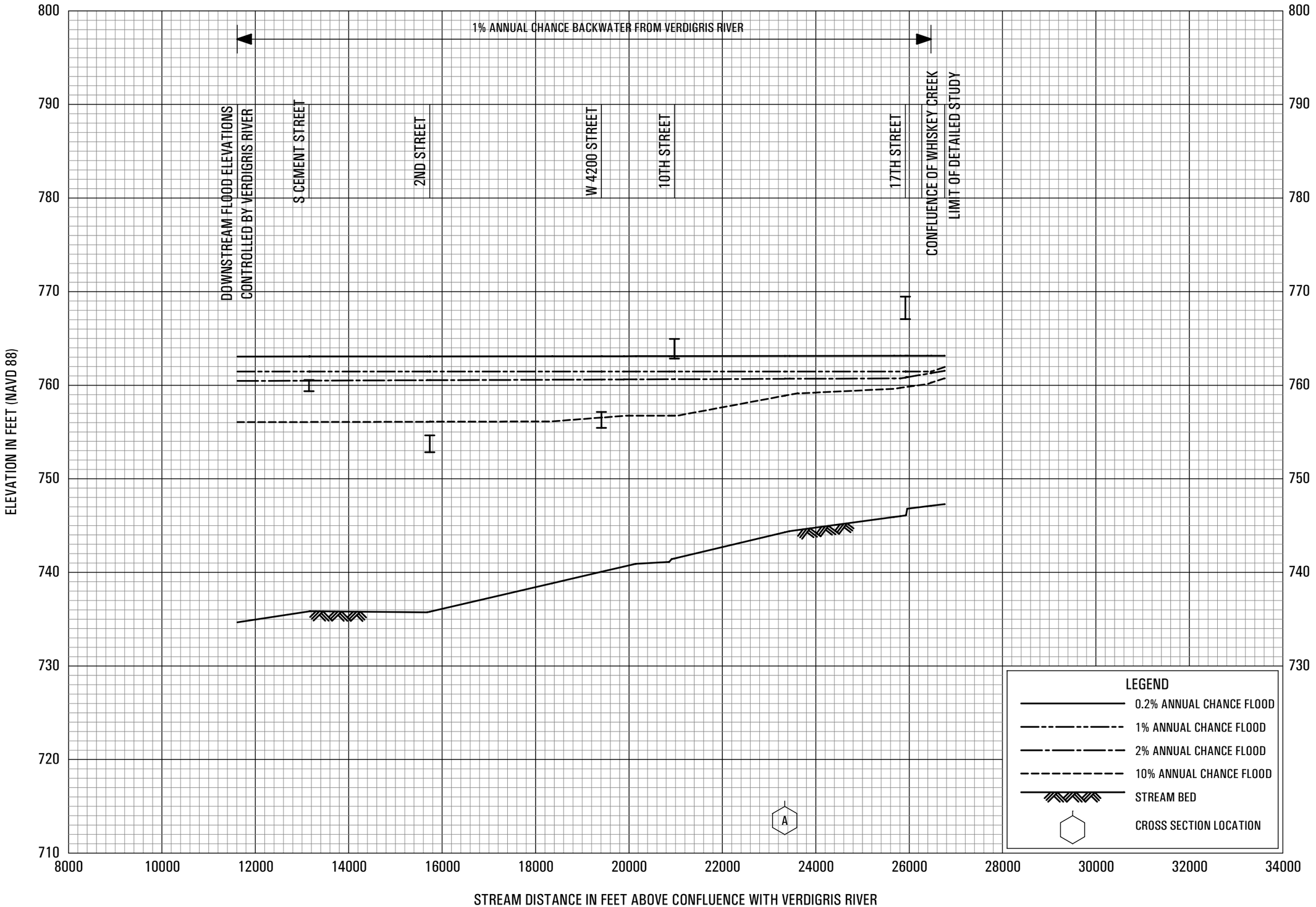
ELK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)

01P



FLOOD PROFILES

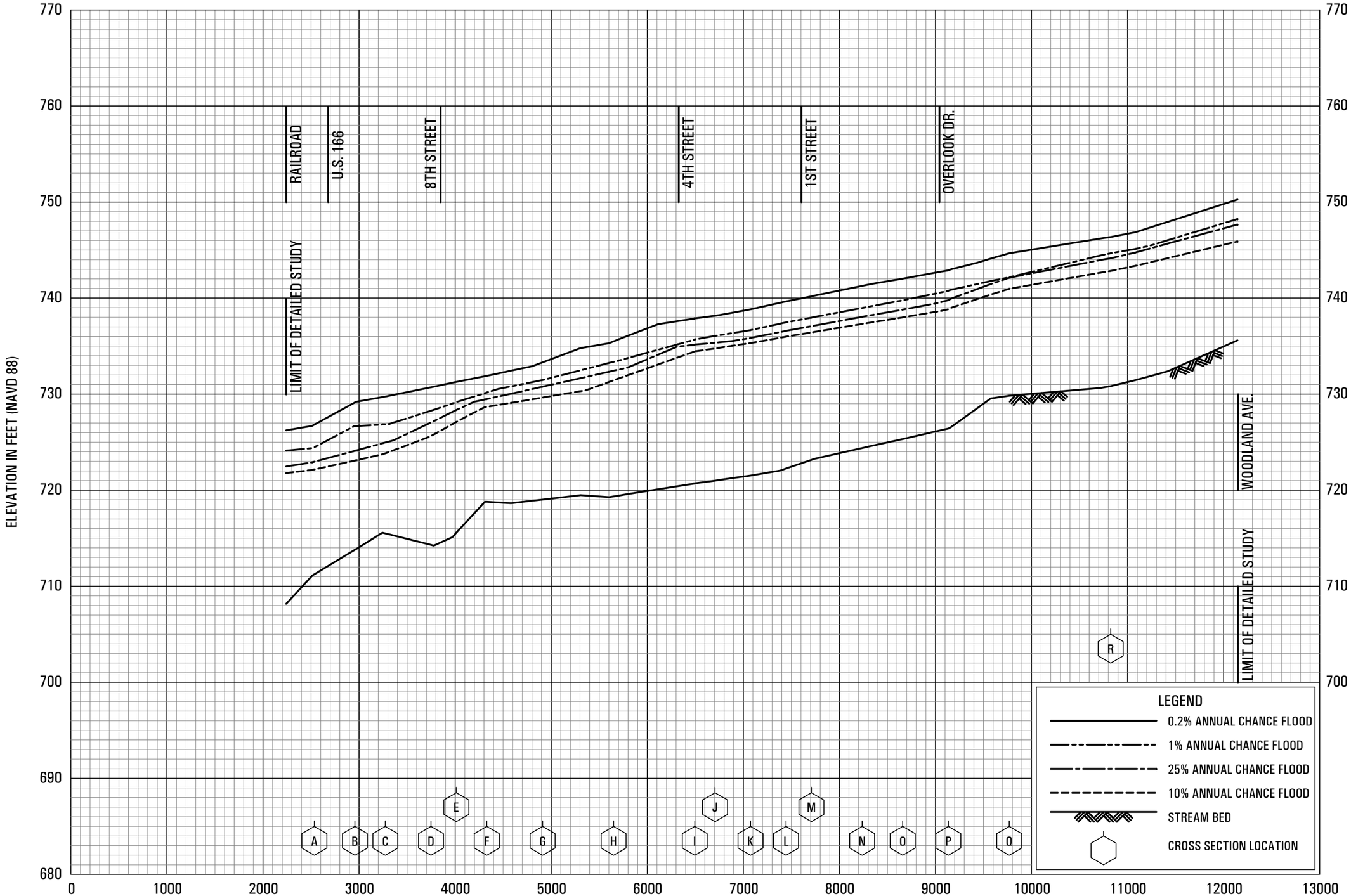
ROCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)

02P



*THIS PROFILE WAS DIGITIZED FROM THE EFFECTIVE 1975 CITY OF COFFEYVILLE FIS AND REFLECTS THE "WITHOUT FLOODWAY" ELEVATION IN THE FDT

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ONION CREEK

FLOOD PROFILES

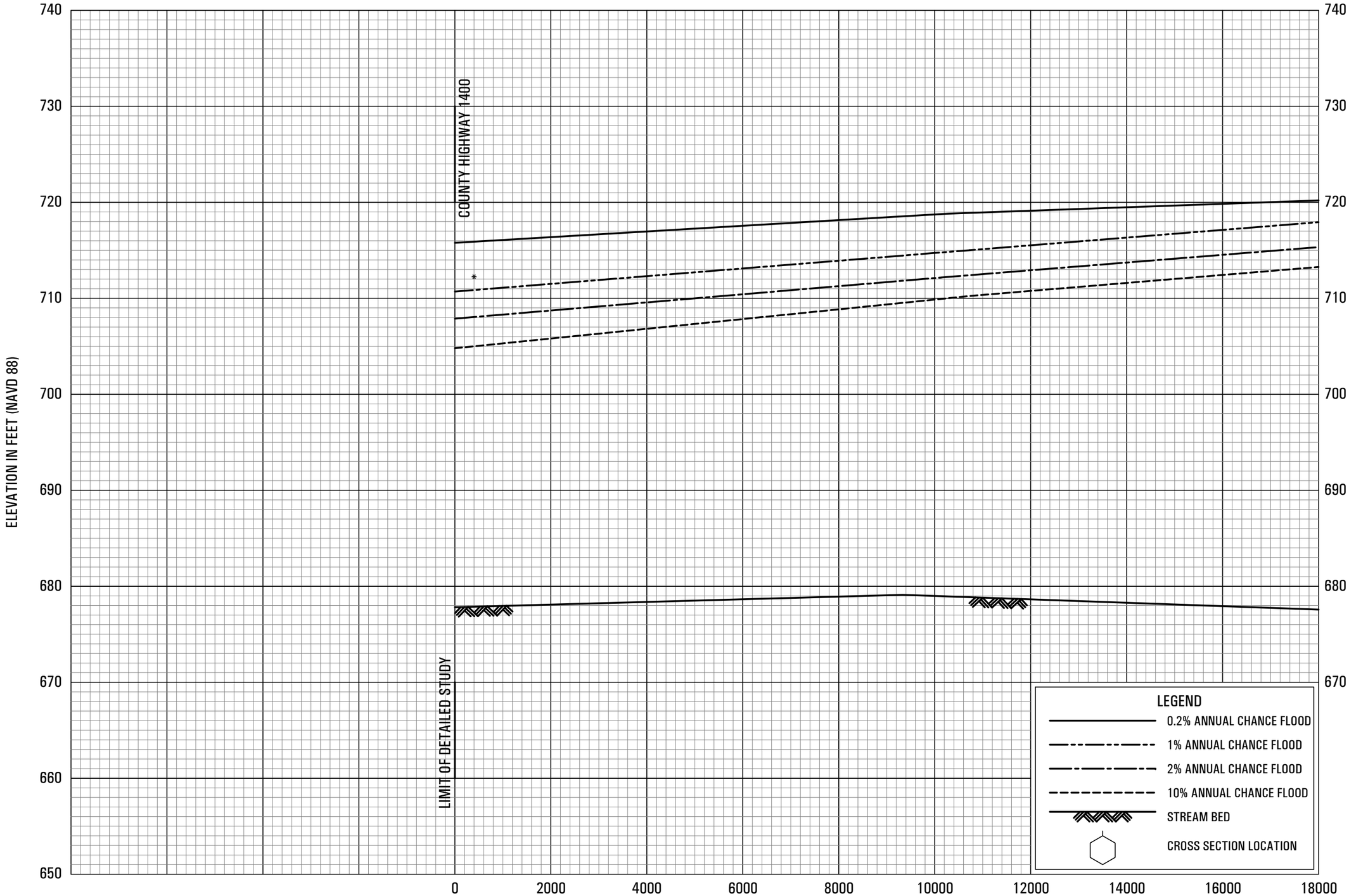
SYCAMORE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)

03P



*THIS PROFILE WAS DIGITIZED FROM THE EFFECTIVE 1975 CITY OF COFFEYVILLE FIS AND REFLECTS THE "WITHOUT FLOODWAY" ELEVATION IN THE FDT

FLOOD PROFILES

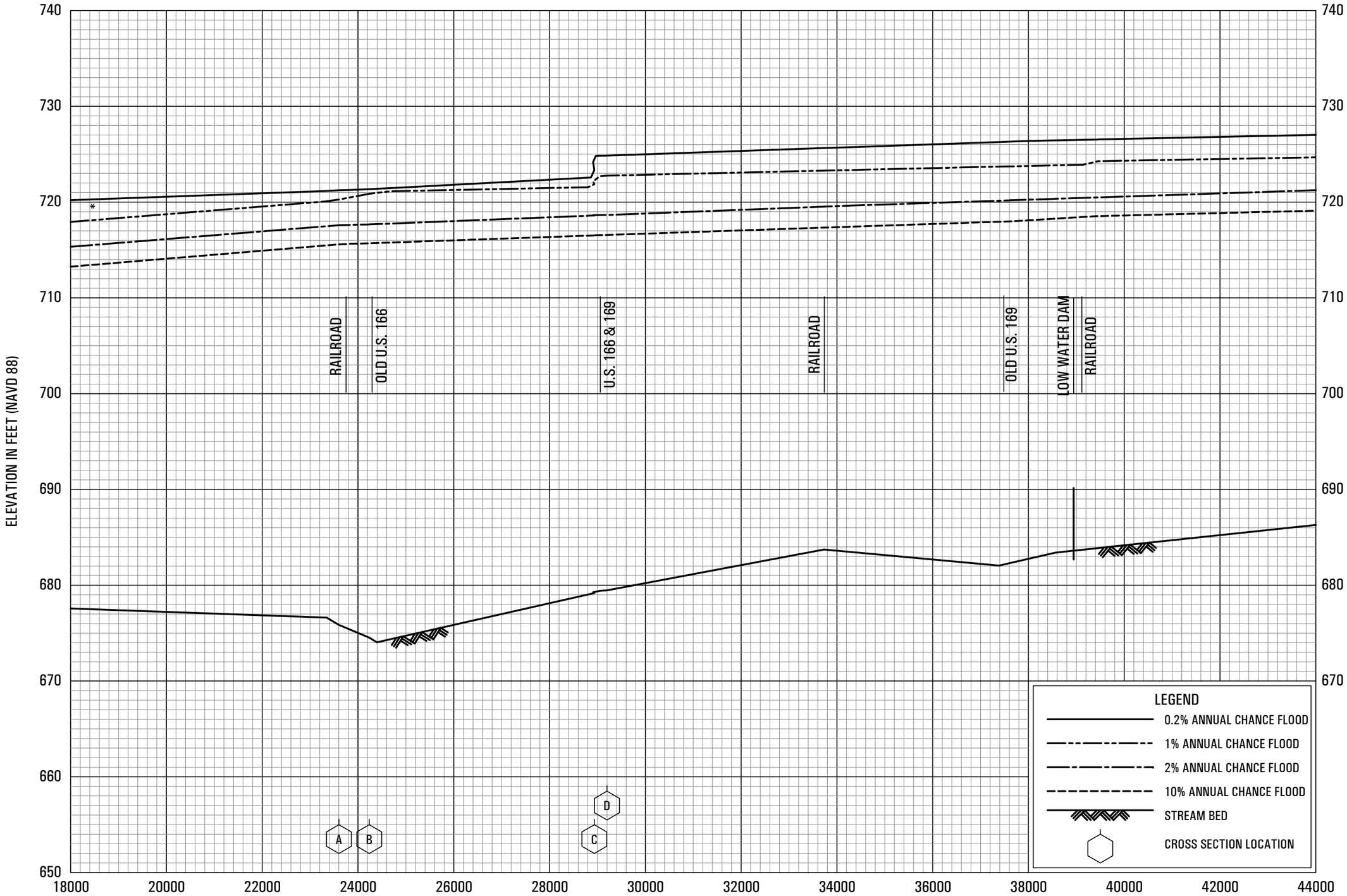
VERDIGRIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)

04P



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FLOOD PROFILES

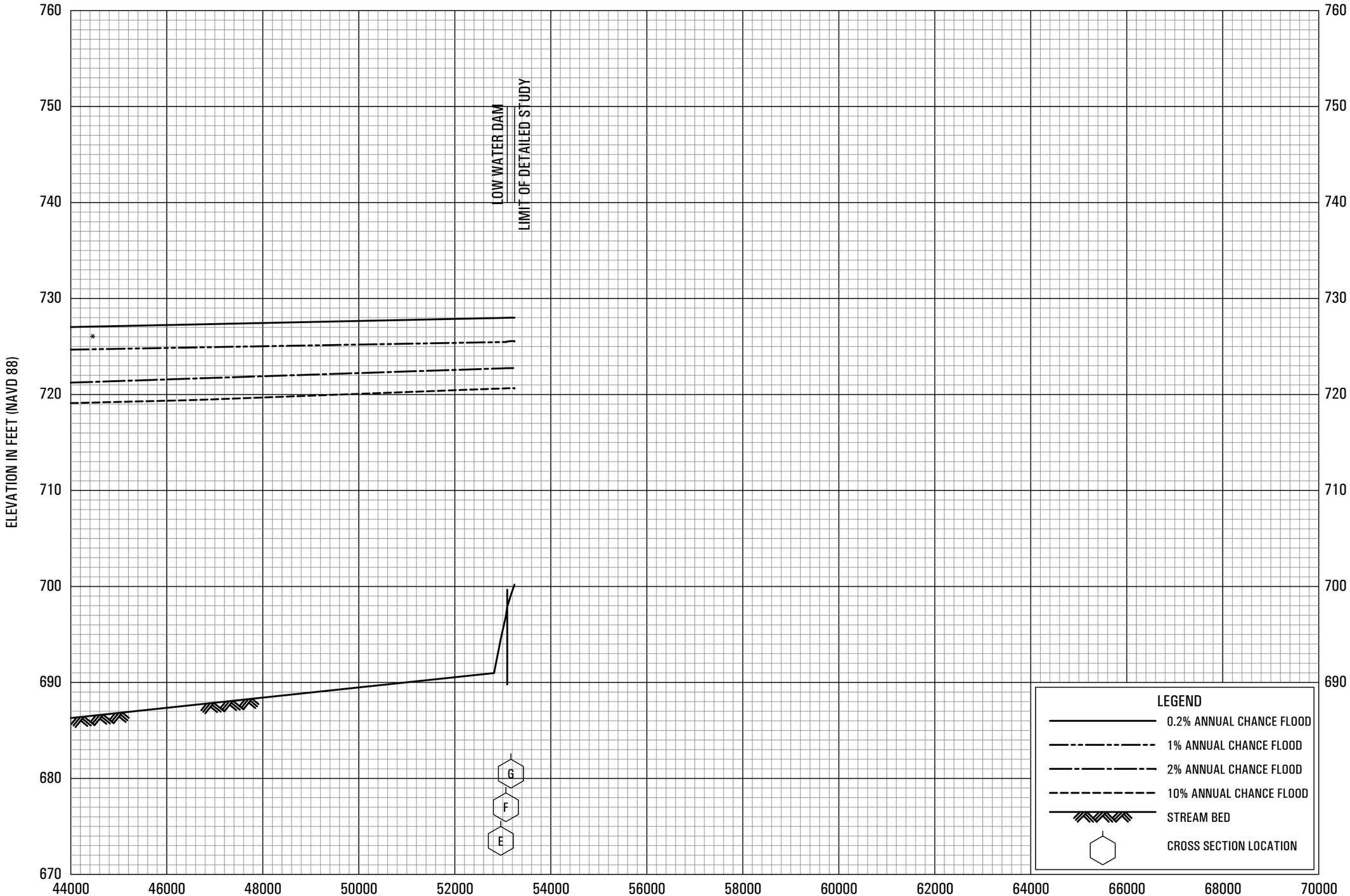
VERDIGRIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)

05P



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FLOOD PROFILES

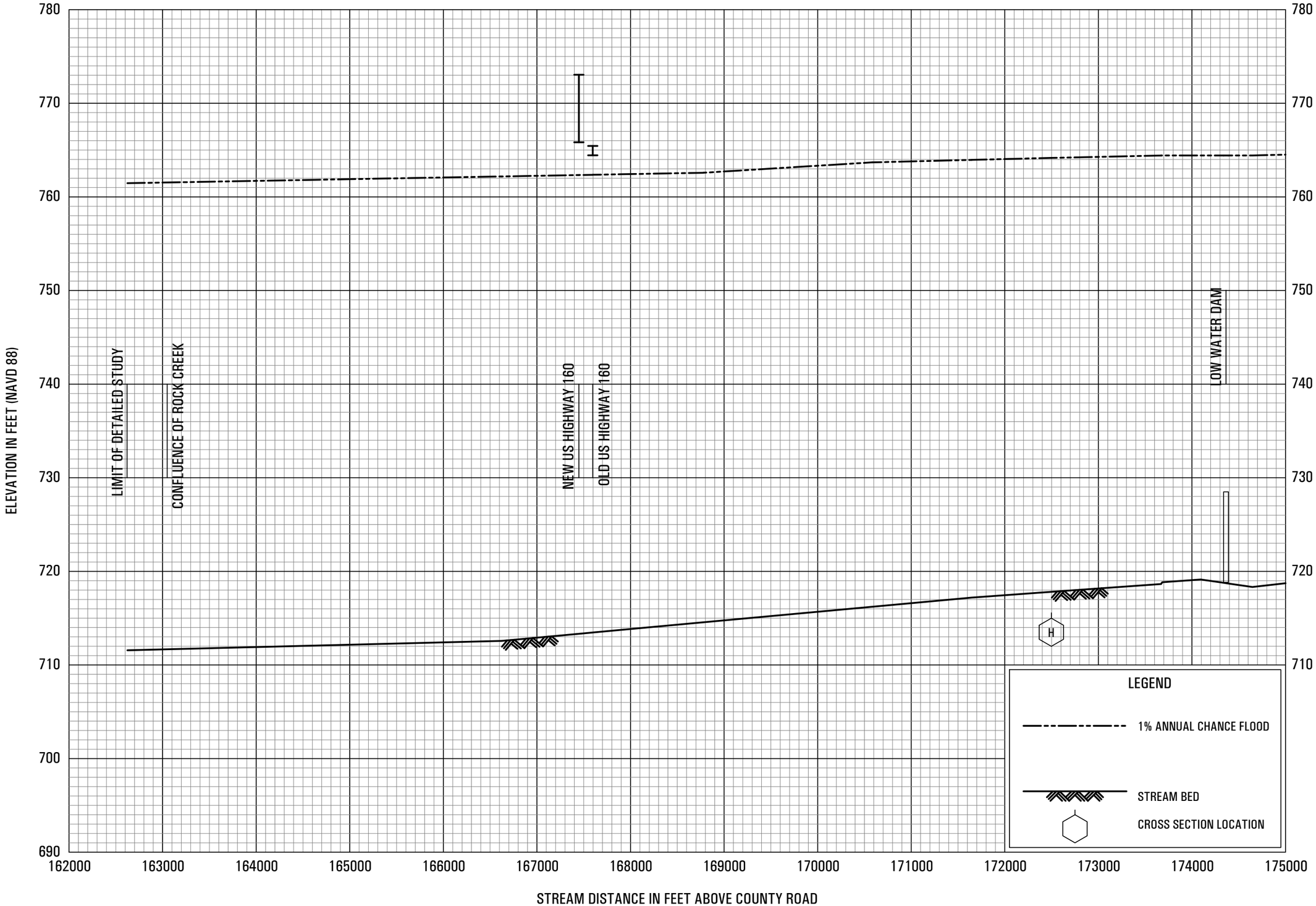
VERDIGRIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)

06P



FLOOD PROFILES

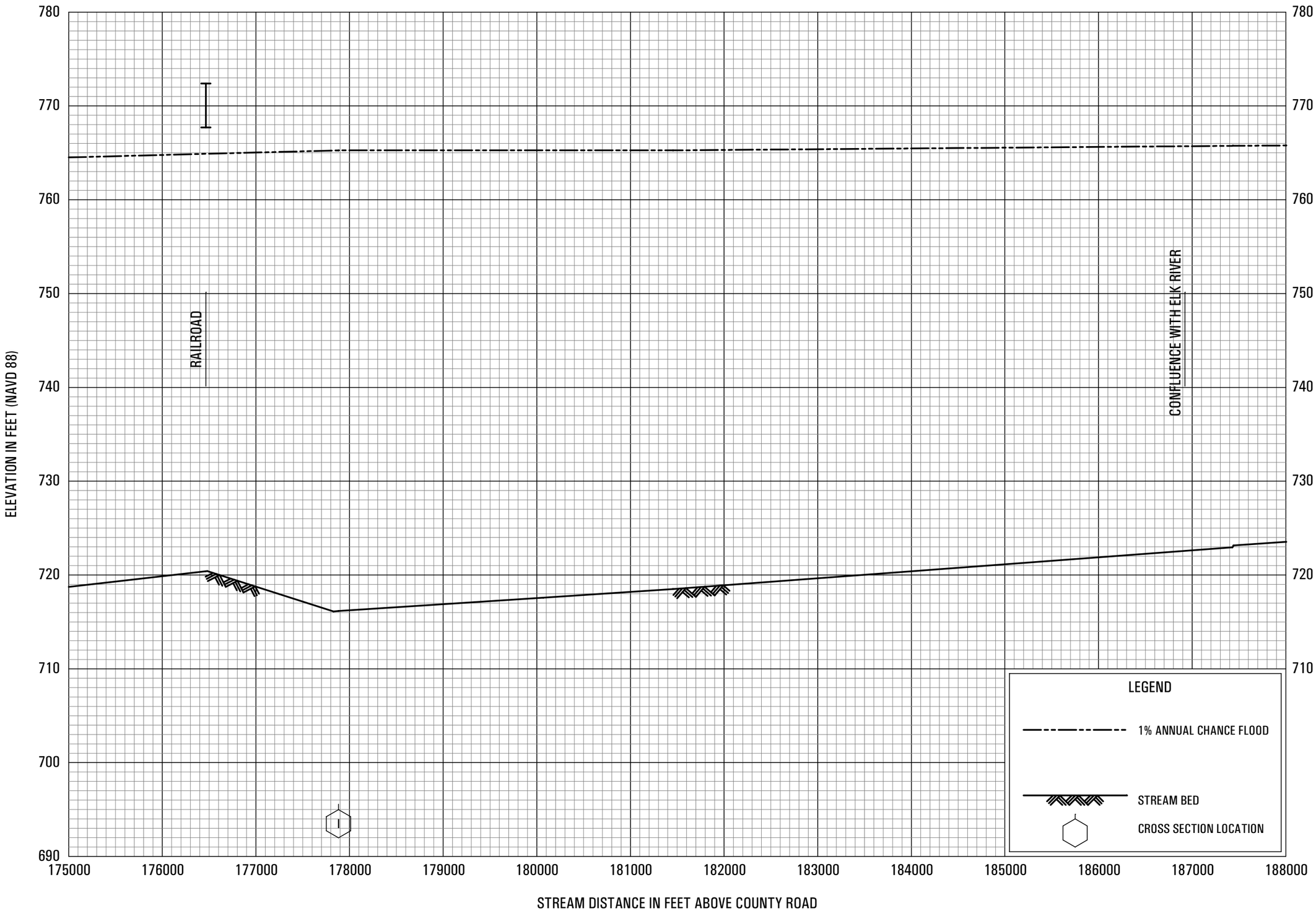
VERDIGRIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)

07P



FLOOD PROFILES

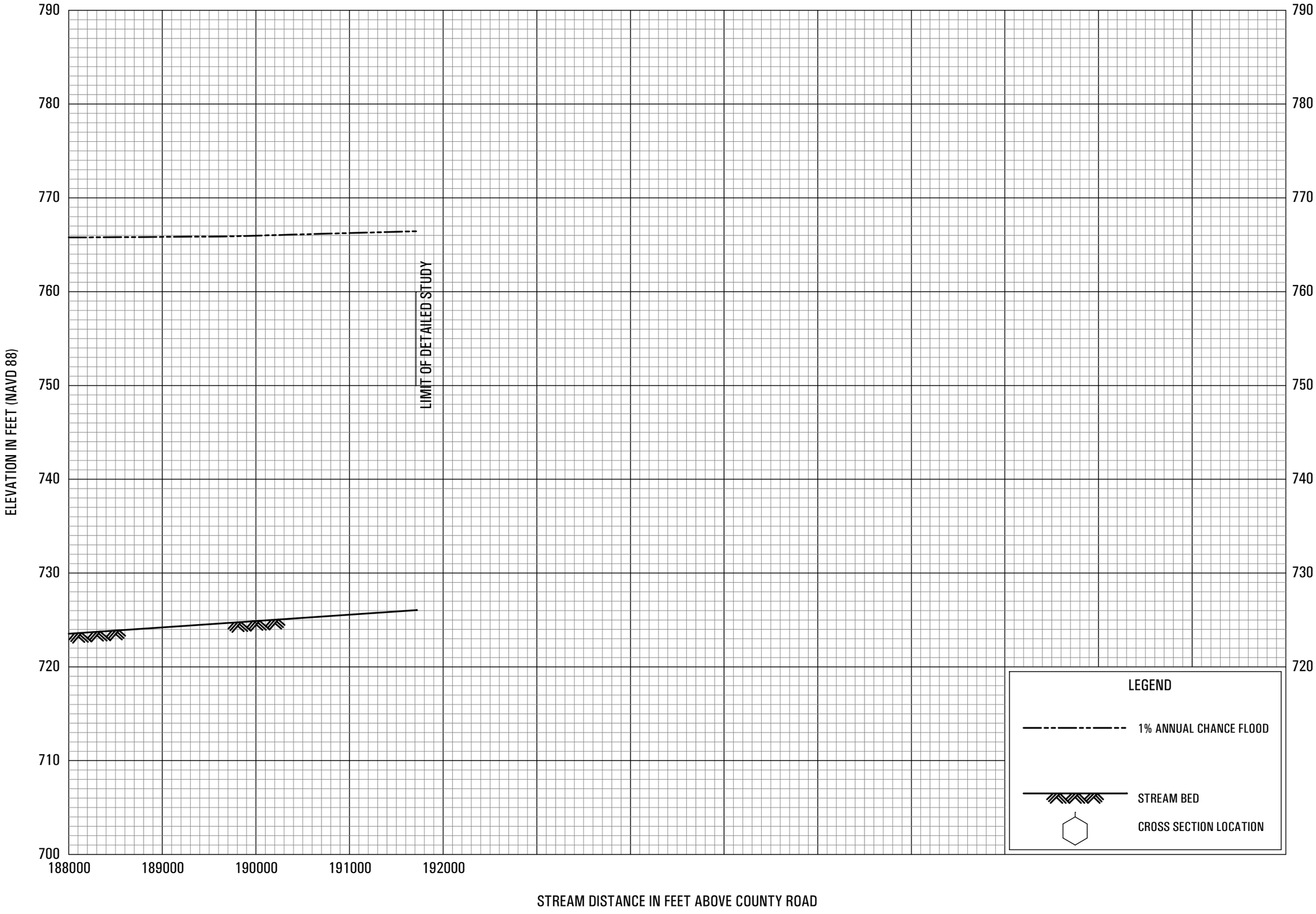
VERDIGRIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)

08P



FLOOD PROFILES

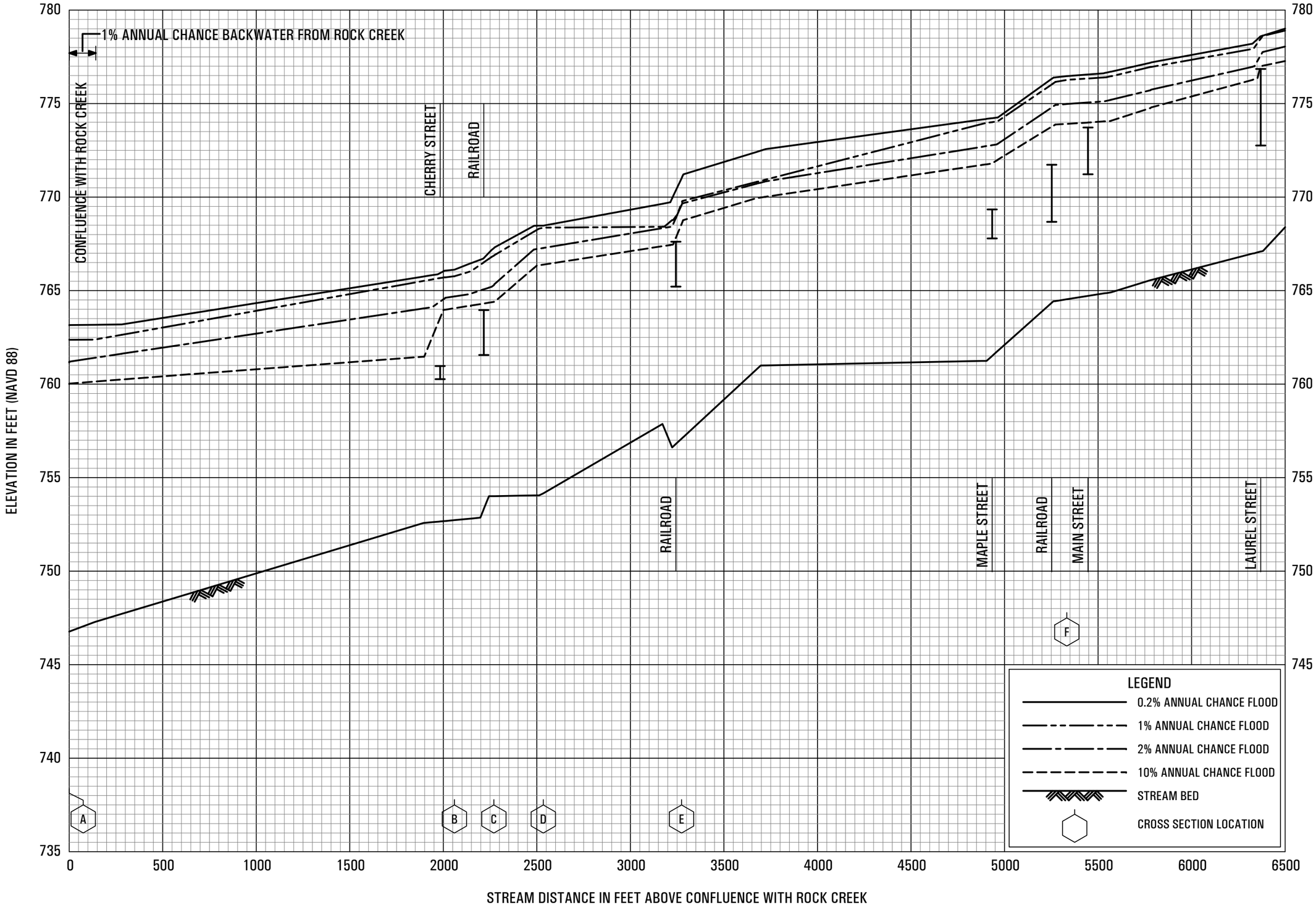
VERDIGRIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)

09P



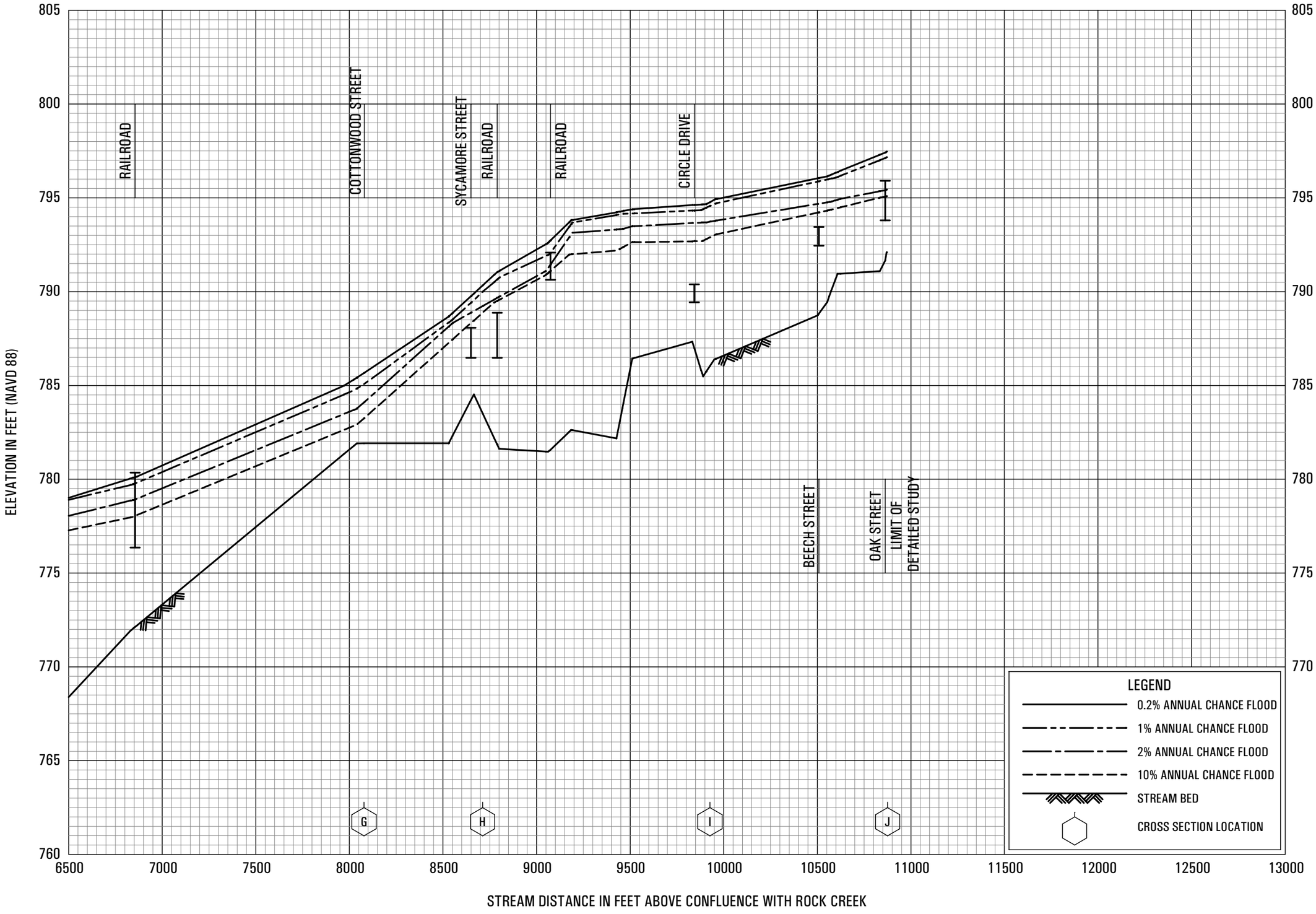
FLOOD PROFILES

WHISKEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)



FLOOD PROFILES

WHISKEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MONTGOMERY COUNTY, KS

(AND INCORPORATED AREAS)