

# FLOOD INSURANCE STUDY



## BARTHOLOMEW COUNTY, INDIANA AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
Bartholomew County (Unincorporated Areas)	180006
*Clifford, Town of	180604
Columbus, City of	180007
Edinburgh, Town of	180113
*Elizabethtown, Town of	180605
Hartsville, Town of	180606
Hope, Town of	180607
*Jonesville, Town of	180354

\*No Special Flood Hazard Areas identified

BARTHOLOMEW  
COUNTY



PRELIMINARY

July 30, 2014



Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER  
18005CV000B

## **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) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS report 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.

Initial Countywide FIS Effective Date: December 09, 2014

Revised Countywide FIS Effective Date: To be Determined

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Clifty Creek	06P-07P
Denios Creek	08P-09P
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East Fork White Creek	11P-12P
East Fork White Creek Tributary No. 1	13P
East Fork White Creek Tributary No. 2	14P
East Fork White River- Driftwood River	15P-17P
East Side Swale	18P
Ensley Ditch	19P-20P
Flatrock River	21P-23P
Haw Creek	24P-30P
Little Haw Creek	31P
Lutheran Lake Tributary	32P
North Ogilville Tributary	33P
Opossum Creek	34P-35P
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### **Flood Insurance Rate Map**

**FLOOD INSURANCE STUDY**  
**BARTHOLOMEW COUNTY, INDIANA AND INCORPORATED AREAS**

**1.0 INTRODUCTION**

**1.1 Purpose of Study**

This Flood Insurance Study (FIS) revises and supercedes the FIS reports and Flood Insurance Rate Maps (FIRMs) in the geographic area of Bartholomew County, Indiana, including the City of Columbus, the Towns of Clifford, Edinburgh, Elizabethtown, Hartsville, Hope, and Jonesville, and the unincorporated areas of Bartholomew County (hereinafter referred to collectively as Bartholomew 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. This information will also be used by Bartholomew County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. 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.

Furthermore, the Towns of Clifford, Elizabethtown, and Jonesville do not have special flood hazard areas within their incorporated limits. However, for the purposes of complete countywide mapping of Bartholomew County, these towns are still included in this FIS and FIRMs.

The Digital Flood Insurance Rate Map (DFIRM) and FIS report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into local GIS and be accessed more easily by the community.

## 1.2 Authority and Acknowledgments

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

Information of the authority and acknowledgements for each of the new studies and previously printed FIS reports and Flood Insurance Rate Maps (FIRMs) for communities within Bartholomew County was compiled and is shown below:

### Bartholomew County (Unincorporated Areas)

#### Pre-Countywide Analyses:

The previously effective FIS for the Unincorporated Areas of Bartholomew County is dated September 15, 1981. The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers, Louisville District, for the Federal Emergency Management Agency under Inter Agency Agreement No. H-10-77. This study was completed in August 1979.

#### Initial Countywide Analyses:

For the first time countywide FIS, dated December 09, 2014, updated hydrologic and hydraulic analyses were prepared. The hydrologic and hydraulic analyses for approximate stream reaches of Bartholomew County were performed by AMEC Earth and Environmental, Inc., on behalf of the Indiana Department of Natural Resources, under Indiana Public Works Project Number E400203. The Indiana Department of Natural Resources managed the production of this study as part of their Cooperating Technical Partner agreement with the Federal Emergency Management Agency dated April 29, 2004, which was defined by the Indiana DNR Mapping Activity Statement 06-01 dated June 22, 2006 and funded under agreement number EMC-2005-GR-7022.

#### City of Columbus:

The previously effective FIS for the City of Columbus is dated January 5, 1996. In the original January 19, 1982, FIS, the hydrologic and hydraulic analyses were performed by the U.S. Army Corps of Engineers, Louisville District, for the Federal Emergency Management Agency, under Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 24, and Inter-Agency Agreement No. IAA-H-10-77,

Project Order No. 2. That work was completed in June 1978. The January 5, 1996 revision was requested by the City of Columbus for the purpose of showing annexations and extraterritorial jurisdiction boundaries. Special Flood Hazard Areas previously shown on the Unincorporated Areas of Bartholomew County, Indiana, FIRM dated March 15, 1982, were added to the City of Columbus FIRM due to annexations.

Town of Edinburgh: The previously effective FIS for the Town of Edinburgh is dated January 2, 1987. The hydrologic and hydraulic analyses for this study were performed by Cole Associates Inc., for the Federal Emergency Management Agency under Inter Agency Agreement No. H-4023. This study was completed in March 1978.

Revised Countywide Analyses: The hydrologic and hydraulic analyses for this restudy were performed by AMEC Earth and Environmental, Inc., on behalf of the Indiana Department of Natural Resources. This work, which was completed in October 2013, covered Haw Creek. The Indiana Department of Natural Resources managed the production of this study as part of their Cooperating Technical Partner agreement with the Federal Emergency Management Agency dated April 29, 2004, which was defined by the Indiana DNR Mapping Activity Statement dated September 22, 2009 and funded under agreement number EMC-2009-CA-7008.

Redelineation of the previously effective flood hazard information for this FIS report, correction to the North American Vertical Datum of 1988, and conversion of the unincorporated and incorporated areas of Bartholomew County into the Countywide format was performed by AMEC Earth and Environmental, Inc., on behalf of the Indiana Department of Natural Resources, under Indiana Public Works Project Number E400203. The Indiana Department of Natural Resources managed the production of this study as part of their Cooperating Technical Partner agreement with the Federal Emergency Management Agency dated April 29, 2004, which was defined by the Indiana DNR Mapping Activity Statement 06-01 dated June 22, 2006 and funded under agreement number EMC-2005-GR-7022.

### **1.3 Coordination**

The purpose of an initial Consultation Coordinated Officer's (CCO's) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study. The dates of the initial and final CCO meetings held for the previously effective FIS reports covering the geographic area of Bartholomew County, Indiana are shown in

Table 1. The initial and final CCO meetings were attended by the study contractor, FEMA (or the Federal Insurance Administration), the Indiana Department of Natural Resources (IDNR), and the affected communities.

Table 1: CCO Meeting Dates for Pre-Countywide FIS

<u>Community Name</u>	<u>Initial CCO Date</u>	<u>Final CCO Date</u>
Bartholomew County (Unincorporated Areas)	September 1976	March 31, 1981
City of Columbus	February 1976	March 31, 1981
Town of Edinburgh	March 1976	May 15, 1979

For this countywide FIS, an initial CCO meeting was held on July 21, 2005, and was attended by IDNR, Bartholomew County Highway Department, Planning Department, Building and Zoning Department and Emergency Management Agency, E.R. Gray and Associates, and representatives from the City of Columbus, the Towns of Edinburgh and Hartsville, and Bartholomew County.

The results of the countywide study were reviewed at the final CCO meeting held on January 5, 2012 and attended by representatives of FEMA, IDNR, Bartholomew County, City of Columbus, and Town of Clifford. All problems raised at that meeting have been addressed.

## **2.0 AREA STUDIED**

### **2.1 Scope of Study**

This FIS covers the geographic area of Bartholomew County, Indiana, including the incorporated communities listed in Section 1.1

All FIRM panels for Bartholomew County have been revised, updated, and republished in countywide format as a part of this FIS. The FIRM panel index, provided as Exhibit 2, illustrates the revised FIRM panel layout.

Approximate methods of analyses were used to study those areas having a low development potential or minimal flood hazards as identified during the initial CCO meeting. For this study, ten (10) new stream reaches were studied using approximate methods. The scope and methods of new approximate studies were proposed and agreed upon by FEMA, the IDNR, and Bartholomew County.

The areas studied by detailed methods were selected with priority given to all known flood hazards areas and areas of projected development of proposed construction. This study incorporates new detailed studies of the East Side Swale and Unnamed Tributary to Driftwood River, performed for and approved by IDNR. For detailed stream reaches that were studied in previous FIS reports, flood hazard areas were redelineated using updated and revised topographic mapping.

This FIS update also incorporates the determination of letters issued by FEMA resulting in map changes (Letters of Map Change, or LOMC's). All Letters of Map Revision (LOMR's) are summarized in Table 2. Letters of Map Amendment (LOMA's) incorporated for this study are summarized in the Summary of Map Actions (SOMA) included in the Technical Support Data Notebook (TSDN) associated with this FIS update. Copies of the TSDN may be obtained from the Community Map Repository.

Table 2: Incorporated Letters of Map Change

<u>LOMC</u>	<u>Case Number</u>	<u>Date Issued</u>	<u>Project Identifier</u>
LOMR	06-05-BD86P	4/27/2006	Columbus Regional Hospital
LOMR	06-05-BP25X	6/26/2006	Columbus Regional Hospital
LOMR	199103867FIA	12/29/1989	Lowell Road Vicinity

Table 3: Streams Previously Studied by Detailed Methods

Airport Tributary	East Side Swale
Big Slough	Ensley Ditch
Big Slough Tributary	Flatrock River
Catherine Creek	Haw Creek
Clifty Creek	Little Haw Creek
Denios Creek	Lutheran Lake Tributary
Denios Creek Tributary No. 6	North Ogilville Tributary
Driftwood River	Opossum Creek
East Fork White Creek	South Fork White Creek
East Fork White Creek Tributary No. 1	Unnamed Tributary to Driftwood River
East Fork White Creek Tributary No. 2	Wolf Creek
East Fork White River	

Table 4: Streams Previously Studied by Redelineation Methods

Big Slough	East Fork White River
Big Slough Tributary	Flatrock River
Catherine Creek	Haw Creek
Clifty Creek	Little Haw Creek
Denios Creek	Opossum Creek
Driftwood River	Wolf Creek
East Fork White Creek	

Table 5: Streams Previously Studied by Approximate Methods

Bear Creek	Haw Creek
Brush Creek	Horse Creek
Buck Creek	Little Sand Creek
Chambers Ditch	Middle Fork
Clifty Creek	Otter Creek
Cooks Creek	Rock Creek
Denios Creek	Sand Branch
Denios Creek Tributary No. 3	Sand Creek
Denios Creek Tributary No. 7	Slash-Loesch Ditch
Duck Creek	Sloan Branch
East Fork White Creek	Tough Creek
East Fork White Creek Tributary No. 1	White Creek
Fall Fork	Wolf Creek
Fischers' Fork	

Table 6: Scope of Study

<u>Stream</u>	<u>Limits of Detailed Study</u>
Haw Creek	Mouth at East Fork White River to County Line Road

## 2.2 Community Description

Bartholomew County is located in south-central Indiana, approximately 60 miles north of Louisville, Kentucky; 30 miles south of Indianapolis, Indiana; 70 miles west of Cincinnati, Ohio; and 260 miles east of St. Louis Missouri. Bartholomew County is bordered by Shelby County to the north, Decatur County to the east, Jennings County to the southeast, Jackson County to south, Brown County to the west, and Johnson County to the northwest. According to STATS Indiana, the estimated population of Bartholomew County in 2005 was 73,540.

Bartholomew County was occupied by the Delaware Indians until 1819 when it was first surveyed and opened to the sale of public lands. Jasper Cox was the first settler and settled along Haw Creek in 1819. The majority of early settlers were from Ohio, Kentucky, Virginia and North Carolina. The county was organized on February 14, 1821, and was named after the famous Indian fighter General Joseph Bartholomew.

The Bartholomew County area has experience several periods of rapid growth during its history. The first period was the coming of the railroad in the 1850's, which resulted in the area becoming a major supply center for the Union Army during the Civil War. The second period of growth was the early 1920's when two major industries, Cummins Engine and Arvin Industries, moved to Columbus, the county seat. These industries still

provide employment to a large portion of the local population. The final era is the continuing period of economic growth caused by the completion of the Interstate Highway system through the area. Interstate Highway 65, running north/south through the county just west of Columbus, allows Bartholomew County to share the rapid growth now being experienced by the Indianapolis-Marion County complex.

The climate in the area consists of rather warm humid summers with temperatures in the 90's not uncommon and cold winters with the temperatures ranging to below 0 degrees Fahrenheit. According to the National Oceanic and Atmospheric Administration (NOAA), average daily temperatures for Bartholomew County range from 74 degrees Fahrenheit (F) in summer to 31 degrees F in winter. For the period of record between 1971 and 2000, annual average precipitation is approximately 41.9 inches. Spring and early summer rains generally exceed fall precipitation. Snowfall varies greatly from winter to winter. The average total seasonal fall is 11 inches, but in a single month as much as 12 inches has fallen, and as much as eight inches has fallen in a single day.

Bartholomew County is near the southern boundary of the Wisconsin glacial deposit which has deposited a mantle of drift ranging from 10 to 50 feet in thickness overlying a bed of limestone. Representative soil types for the county include silt loams of the Rossmayne, Avonburg and Dubois categories. Flood plain vegetation for the area is typically tree-lined stream channels with substantial overgrowth. Development within the flood plain is primarily agricultural in nature with some residential development. About two-thirds of the acreage of the county is used for crops. The areas around cities and towns have been annexed and the land use is being changed. Some areas lend themselves to urban development with few limitations; but other areas have so many limitations that nonfarm uses are questionable. Such nonfarm uses as recreation development and hunting are not confined to suburban areas. Farming is one of the major businesses in Bartholomew County. In the eastern part of the county, most land is used to grow grain and to feed livestock. In the western part of the county, most farms are of the general type. There is more grass in this area. Some tree farms are in the steeper areas of the western part of the county. The major crops are corn, soybeans, and wheat. Most planting is on the terrace and sandier bottomlands. Melons are grown on some sandy soils. Pasture plants and hay are the main crops on the more sloping areas or areas that are too steep to be cultivated.

The relief of Bartholomew County ranges from nearly flat to very steep. In the eastern part of the county, the upland topography is nearly level to gently sloping, except for the areas near draws. The relief in the area is formed by the dendritic stream pattern that is entrenched into the till plain. The deeper entrenchments are near the streams. The terrace areas are nearly level except for the steep breaks between the terrace and bottomlands. In the western part of the county, in areas overlying Illinoian drift, the relief is nearly level to moderately sloping, except near the entrenched drainageways. The relief in this area is the result of the entrenchments of natural drainage systems into the till. In the far western part of the county, the relief ranges from steep on the hillsides to gently sloping on top of ridges. These unglaciated hills are the most prominent features on the landscape. The east-facing prominent hills are part of the Knobstone escarpment.

The City of Columbus is located in central Bartholomew County and is surrounded by unincorporated areas of Bartholomew County. According to STATS Indiana, the estimated population of Columbus in 2005 was 39,380. The Flatrock River and the East Fork White River border the City of Columbus on the west. The Driftwood River, from the northwest, and the Flatrock River, from the north-northeast, converge and form the East Fork White River near the southwest corner of the city. Haw Creek flows through the City of Columbus and joins the East Fork White River approximately two miles south of the confluence of the Driftwood and Flatrock Rivers. Clifty Creek flows in a southwesterly direction along the extreme eastern part of the city and discharges into the East Fork White River approximately four miles downstream from its junction with Haw Creek. Most of the residential properties and the larger part of the business section of the city are located on high ground, but there are important commercial and some industrial establishments on the floodplains of the Driftwood and Flatrock Rivers. Development along the floodplains of Clifty Creek and the Flatrock River is partially residential with open spaces. The floodplains of the Driftwood River and the East Fork White River are primarily agricultural, except for an industrial site along Interstate Highway 65. The Haw Creek floodplain is primarily clear, with a little development consisting of a mixture of industrial, residential, and commercial development.

The Town of Edinburgh is located in the southwest corner of Johnson County and the northern section of Bartholomew County. According to STATS Indiana, the estimated population of Edinburgh in 2005 was 4,517. Edinburgh is served by Interstate Highway 65, U.S. Highway 31, and State Road 252. The economy is a mixture of both agricultural and industrial concerns. Most of the large scale industry is concentrated in producing molded plastic parts. Lumber and face veneers constitute the other major portion of heavy manufacturing. Sugar Creek originates in southeast Hancock County and continues south until it joins the Big Blue River at point west of the Edinburgh downtown area. The Big Blue River flows into the planning area from the northeast. The confluence of these two streams constitutes the headwaters of the Driftwood River. The last area studied, the East Side Swale, is located on the east side of Edinburgh and was considered important to analyze because of recent flooding problems encountered in that vicinity.

### **2.3 Principal Flood Problems**

Floods may occur in Bartholomew County during any season on the year. However, past flood records indicate that the majority of severe flooding events have occurred during the period between January and May and result from general heavy rainfall throughout the basin. Flash floods resulting from short intense periods of thunderstorms, common to the area, occur on many of the small streams. The flood of record for the area was the 1913 flood on the White river, which reached a stage of 620.62 feet (NAVD) at Columbus. This flood has a recurrence interval in excess of once in 100 years. Other major floods occurred on the East Fork White River in 1963, 1952, and 2005.

The greatest flood known to occurred within the City of Columbus occurred in March 1913. From a floodmark, the stage on the East Fork White River at the Columbus gage has been estimated as 17.0 feet, or 7.9 feet above bankfull stage. Other large floods occurred in the City of Columbus in 1963 and 2005.

Minor flooding in the Town of Edinburgh has taken place recently in the Pruitt addition on the east side of the city. This flooding began when Interstate Highway 65 was completed in the late 1960's, which resulted in the alteration of the drainage patterns in the upstream areas of the East Side Swale. The swale runs through this subdivision and continues south and west until it joins the Driftwood River south of the city. Lack of an adequate sized culvert under Main Cross Street causes the backups in the subdivision. If, however, the culvert were enlarged, flooding would probably occur in the next subdivision, downstream to the southwest of East Pruitt.

## **2.4 Flood Protection Measures**

There are four levee structures within the City of Columbus. One, located in the northwest corner of the interchange of Interstate Route 65 and State Route 46, provides no protection to the west side of the interchange from Driftwood River flooding. Three levee structures are located on Haw Creek. One is located on the east side of Haw Creek between Third Street and Seventh Street, and another on the west side of Haw Creek between State Street and Eight Street approximately 1,500 feet downstream of Conrail. The third structure is located on the east side of Haw Creek from Conrail to the confluence with the East Fork White River. There is no other flood protection works directly affecting flooding within the City of Columbus.

The Town of Edinburgh has been given a grant from the U.S. Department of Housing and Urban Development to help alleviate the problem of flooding by constructing an interceptor sewer to divert some of the upstream storm flows of the East Side Swale to the Big Blue River. This situation, however, does not provide full protection from the 1%-annual chance flood.

## **3.0 ENGINEERING METHODS**

For the flooding sources studied by detailed methods in Bartholomew County, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are 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 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.

### 3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting Bartholomew County. Table 7 contains a summary of peak discharges for the 10-, 2-, 1-, and 0.2-percent annual chance floods, where applicable, for each flooding source studied in detail in Bartholomew County. Peak discharges in the table were compiled from previously effective FIS reports for Bartholomew County and incorporated areas. Source citations refer to the source of the detailed study.

Table 7. Summary of Discharges

Flooding Source And Location	Drainage Area (Square Miles)	Peak Discharge (cfs)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Airport Tributary At mouth	2.9	1,050	1,450	1,900	2,600
Big Slough At mouth	16.6	2,500	3,950	4,550	6,250
Big Slough Tributary At mouth	3.9	1,200	1,900	2,200	3,000
Catherine Creek At mouth	11.3	2,075	3,275	3,700	5,080
Clifty Creek At mouth	206	11,900	18,000	20,500	27,500
Upstream of confluence Of Sloan Branch	186	11,350	17,200	19,700	26,500
Denios Creek At mouth	18.5	2,750	4,200	4,800	6,600
Denios Creek Tributary No. 6 At mouth	2.0	850	1,340	1,530	2,100

Table 7. Summary of Discharges (cont'd)

Flooding Source And Location	Drainage Area (Square Miles)	Peak Discharge (cfs)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Driftwood River					
At 750' downstream of Confluence of Wolf Creek	1,165	34,500	51,000	58,000	80,000
At mouth	1,165	34,000	50,000	58,000	76,000
Above Nineveh Creek	1,061	33,300	49,000	56,000	73,900
At gage	1,060	32,500	47,000	52,000	72,000
East Fork White Creek					
At downstream limit of detailed study	12.4	2,130	3,400	3,900	5,390
East Fork White Creek Tributary No. 1					
Approximately 0.8 mile Upstream of 400 West Road	1.2	660	1,050	1,200	1,640
East Fork White Creek Tributary No. 2					
At mouth	2.8	1,020	1,600	1,850	2,500
East Fork White River					
At Jackson County line	2,320	59,000	85,000	98,000	131,000
At mile 232.75	1,997	53,000	77,000	89,000	116,000
Upstream of confluence of Clifty Creek	1,772	48,000	71,000	81,000	108,000
At Columbus Gage No. 03364000	1,707	47,000	69,000	79,000	105,000
East Side Swale					
At Conrail South of Johnson County Line Road	6.5	*	*	1100	*
	4.5	280	430	500	640
Ensley Ditch					
At mouth	5.3	1,390	2,180	2,500	3,420
Flatrock River					
At Columbus Gage No. 03363900	534	19,500	29,000	32,500	43,000

Table 7. Summary of Discharges (cont'd)

Flooding Source And Location	Drainage Area (Square Miles)	Peak Discharge (cfs)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Flatrock River Just downstream of 550 North Road	510	18,300	27,500	31,500	42,500
Haw Creek					
At mouth	56.6	4,900	8,400	10,100	13,600
At 25 <sup>th</sup> Street	53.8	4,700	8,050	9,600	13,000
At Marr Road	51.0	4,500	7,650	9,200	12,400
Above Slash-Loesch Ditch	42.9	3,900	6,600	7,900	10,700
At County Road 400 East	25.5	2,500	4,200	5,000	6,900
Above Horse Creek	19.7	2,000	3,350	4,000	5,400
Above Little Haw Creek	11.6	1,250	2,100	2,550	3,400
Little Haw Creek	6.2	1,525	2,400	2,750	3,850
Lutheran Lake Tributary At mouth	2.8	1,020	1,620	1,850	2,560
North Ogilville Tributary At mouth	0.4	390	600	700	960
Opossum Creek At mouth	3.4	760	1,130	1,270	1,710
South Fork White Creek At mouth	16.9	2,520	4,000	4,550	6,300
Unnamed Tributary to Driftwood River					
At US 31 South of Johnson County Line Road	7.5	*	*	1500	*
	4.5	*	*	500	*
Wolf Creek At mouth	13.4	2,300	3,600	4,100	5,600

### **Initial Countywide Analyses**

Flow data for East Side Swale and Unnamed Tributary to Driftwood River were developed by the DNR using a HEC-1 model and calibrating to the discharge value at the end of the reach. Data from Technical Paper No. 40 and Rainfall Frequency Atlas of the Midwest (Huff) was used to analyze the discharges from 6-, 12-, and 24-hr frequency storm events. The 24-hr storm from TP 40 was found to have the highest discharge and was selected for application in the hydraulic model.

Standard and accepted hydrologic methods were used to develop discharge data on the study streams in Bartholomew County. These data were coordinated with the Indiana Department of Natural Resources, the Natural Resources Conservation Service (formally the Soil Conservation Service), the U. S. Geological Survey and the Louisville District of the U. S. Army Corps of Engineers, through a Memorandum of Understanding dated May 6, 1976. Discharge curves for the 10-, 50-, 100-, and 500-year floods were developed for each study stream using several different procedures and compared for consistency.

### **Revised Countywide Analyses**

For Haw Creek, discharges are based on a detailed hydrology study performed by Christopher B. Burke Engineering, Ltd. The watershed was broken up into 8 different subbasins. SCS Type II Distributions were chosen for the 24-hour storm with 10%-, 4%, 2%, 1% and 0.2%-Annual Chance Events. These storms were analyzed using HEC-HMS to generate discharges for each frequency. Model calibration used storm events on the Haw Creek watershed from flooding events in 1990 and 2008.

## **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 Flood Insurance Rate Map (FIRM) represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data table 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 report in conjunction with the data shown on the FIRM.

### **Initial Countywide Analyses**

Cross sections for the backwater analyses were obtained from a variety of sources including: physical survey data, IDNR contour mapping, USGS topographic mapping and local contour mapping developed and produced by the City of Columbus.

Water-surface elevations for floods of the selected recurrence intervals were computed through use of the USACE HEC-2 step-backwater computer program for streams

originally studied in the Unincorporated Areas of Bartholomew County Flood Insurance Study and the City of Columbus Flood Insurance Study. For the new approximate study reaches, the USACE HEC-RAS program was used. HEC-RAS is an updated version of the HEC-2 program used to perform step-backwater analyses.

Flood profiles were prepared for all streams studied by detailed methods and show computed water-surface elevations to an accuracy of 0.5 feet for floods of the selected recurrence intervals. For this countywide FIS, flood profiles and approved LOMRs have been consolidated into continuous stream reaches and adjusted to reflect the current vertical datum as described in Section 3.3. New profiles have been prepared for the new detailed studies and for the purposes of incorporating the LOMRs described in Section 2.1 above.

Starting water-surface elevations for the Driftwood River and Flatrock River correspond to the 10%, 2%, 1% and 0.2% annual chance water surface elevations on the East Fork White River. Starting elevations for all other streams studied in detail were determined using normal depth.

Channel and overbank roughness factors (Manning’s “n” values) used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the stream and floodplain areas. Channel and overbank roughness factors used in the detailed studies are summarized by stream in Table 8.

Table 8. Channel and Overbank Roughness Factors

<u>Stream</u>	<u>Roughness Coefficients</u>	
	<u>Main Channel</u>	<u>Overbanks</u>
Airport Tributary	0.040-0.070	0.040-0.045
Big Slough	0.045-0.050	0.040
Big Slough Tributary	0.045	0.050
Catherine Creek	0.050	0.045-0.050
Clifty Creek	0.060-0.070	0.070-0.090
Denios Creek	0.045-0.070	0.045-0.070
Denios Creek Tributary No. 6	0.040-0.065	0.040-0.065
Driftwood River	0.045-0.080	0.045-0.080
East Fork White Creek	0.070-0.085	0.060-0.090
East Fork White Creek Tributary No. 1	0.100	0.080-0.090
East Fork White Creek Tributary No. 2	0.050-0.075	0.050-0.075
East Fork White River	0.045-0.070	0.055-0.070
East Side Swale	0.035	0.035
Ensley Ditch	0.045-0.060	0.050
Flatrock River	0.050-0.075	0.050-0.080
Haw Creek	0.055-0.070	0.045-0.060

Table 8. Channel and Overbank Roughness Factors (Continued)

<u>Stream</u>	<u>Roughness Coefficients</u>	
	<u>Main Channel</u>	<u>Overbanks</u>
Little Haw Creek	0.050-0.055	0.045-0.080
Lutheran Lake Tributary	0.045	0.060
North Ogilville Tributary	0.045-0.055	0.050-0.055
Opossum Creek	0.035-0.085	0.035-0.085
South Fork White Creek	0.050	0.045
Unnamed Tributary to Driftwood River	0.035	0.035
Wolf Creek	0.045	0.055-0.065

For new approximate study areas, analyses were based on field inspection and modeling of the stream reaches using simplified HEC-RAS models. Structural measurements or field surveying was not performed. Cross section geometry was derived from 2005 IDHS DEM data. Starting elevations were assumed to be normal depth.

For the new detailed study of East Side Swale and Unnamed Tributary to Driftwood River, water surface elevations were computed using HEC-RAS version 3.1.3. The normal depth method was utilized to develop a boundary condition for the model. Cross section data was derived from a digital terrain model developed in 2007 with a vertical accuracy of 1.2 feet at 95% confidence level.

### **Revised Countywide Analyses**

For the new detailed study of Haw Creek, water surface elevations were computed using HEC-RAS version 4.1.0. The normal depth method was utilized to develop a boundary condition for the model. Cross section, bridge and culvert geometry data was obtained from a field survey conducted in 2010.

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.

### **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 in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities.

For the initial countywide FIS, a vertical datum conversion of -0.40 feet was calculated at the centroid of the county and used to convert all elevations in Bartholomew county from NGVD29 to NAVD88 using the National Geodetic Survey's VERTCON online utility (VERTCON, 2005).

For more information on NAVD88, see the FEMA publication entitled *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988* (FEMA, June 1992), or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address <http://www.ngs.noaa.gov>).

Temporary vertical monuments are often established during the preparation of a flood hazard Analyses 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 the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

## **4.0 FLOODPLAIN MANAGEMENT APPLICATIONS**

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance flood elevations and delineations of the 1- and 0.2-percent-annual-chance floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, and the Floodway Data table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local 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 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.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, V, and VE); 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 chance floodplain boundary is shown on the FIRM (Exhibit 2).

## **4.2 Floodways**

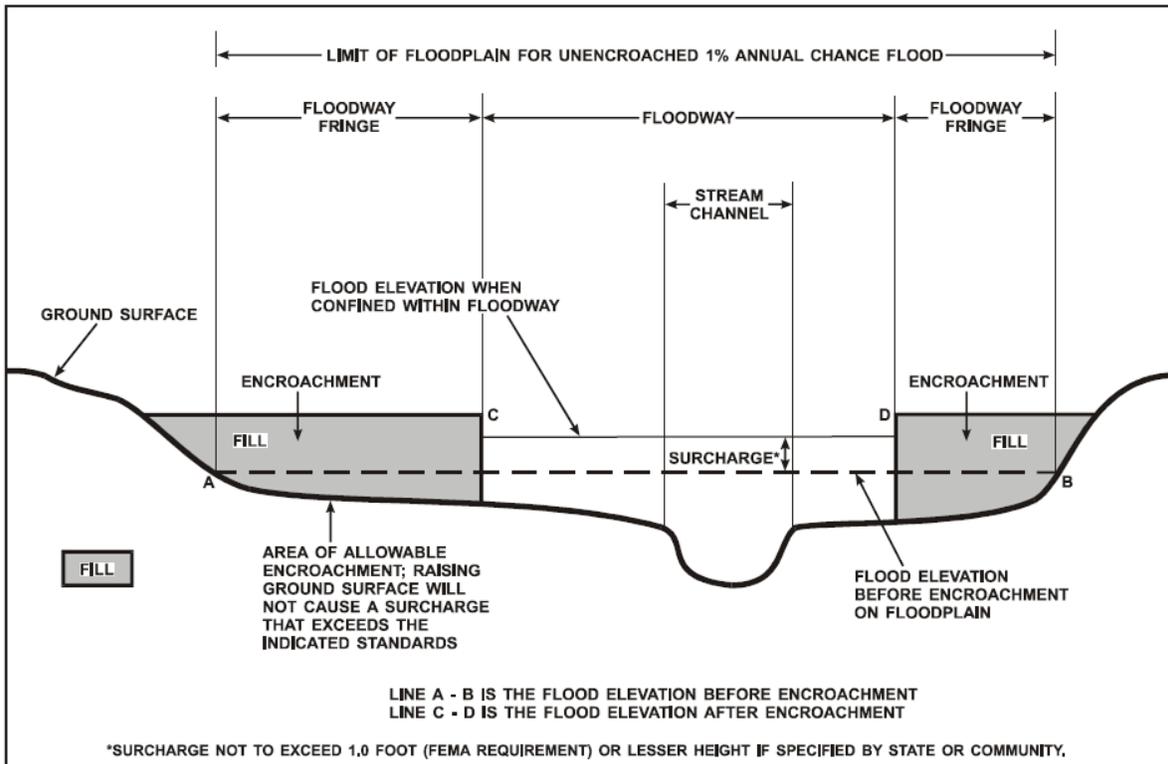
Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development 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 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 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 State of Indiana, however, per Indiana Code IC 14-28-1 and Indiana Administrative Code 312 IAC 10, has designated that encroachment in the floodplain is limited to that which will cause no significant increase in flood height. As a result, floodways for this study are delineated based on a flood surcharge of less than 0.15 feet. The floodways in this study were approved by the IDNR, and 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 floodway presented in this FIS report and on the FIRM was 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 have been tabulated for selected cross sections (Table 9). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

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 of the 1-percent-annual-chance flood more than 0.14 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			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>AIRPORT TRIBUTARY</b>								
A	0.37	134	791	2.5	605.1	605.1	605.2	0.1
B	0.40	200	1,246	1.4	606.4	606.4	606.4	0.1
C	0.47	396	2,147	0.8	606.4	606.4	606.5	0.1
D	0.63	70	414	3.9	606.5	606.5	606.7	0.1
E	0.64	69	417	3.9	606.6	606.6	606.7	0.1
F	0.70	70	388	4.2	607.1	607.1	607.2	0.1
G	0.78	88	419	3.9	607.8	607.8	607.8	0.1
H	0.87	82	432	3.3	608.5	608.5	608.5	0.1
I	0.98	148	595	2.4	609.1	609.1	609.1	0.0
J	1.10	383	1,528	0.7	610.5	610.5	610.7	0.1
K	1.18	417	708	1.5	610.6	610.6	610.8	0.1
L	1.27	435	989	1.1	611.1	611.1	611.2	0.1
M	1.37	454	1,098	1	611.3	611.3	611.4	0.1
N	1.46	250	501	2.1	611.6	611.6	611.8	0.1
O	1.65	515	1,590	0.6	614.5	614.5	614.6	0.1
P	1.73	434	1,046	0.9	614.6	614.6	614.7	0.1
Q	1.81	169	340	2.8	614.8	614.8	614.9	0.1
R	1.87	330	1,267	0.7	616.9	616.9	617.1	0.1
S	1.93	295	1,230	0.8	617.0	617.0	617.1	0.1
T	2.02	340	887	1.1	618.3	618.3	618.4	0.1
U	2.06	338	799	1.2	618.4	618.4	618.5	0.1
V	2.11	94	332	2.8	618.4	618.4	618.5	0.1
W	2.15	75	242	3.9	618.8	618.8	618.9	0.1
X	2.20	78	288	3.3	619.5	619.5	619.6	0.1
Y	2.29	67	284	3.3	620.3	620.3	620.4	0.1

<sup>1</sup> MILES ABOVE MOUTH

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**COUNTY OF BARTHOLOMEW, IN  
(AND INCORPORATED AREAS)**

**FLOODWAY DATA**

**AIRPORT TRIBUTARY**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>AIRPORT TRIBUTARY</b>								
Z	2.31	89	339	2.8	620.5	620.5	620.6	0.1
AA	2.39	87	430	2.2	620.9	620.9	621.0	0.1
AB	2.45	99	546	1.7	621.1	621.1	621.2	0.1
AC	2.54	394	1,555	0.4	621.2	621.2	621.4	0.1
AD	2.64	342	1,091	0.6	621.3	621.3	621.4	0.1
AE	2.72	275	489	1.4	621.4	621.4	621.5	0.1
AF	2.81	252	577	0.2	621.6	621.6	621.7	0.1
AG	2.90	102	227	0.5	621.6	621.6	621.7	0.1
AH	3.00	30	38	3.1	623.4	623.4	623.4	0.1
<b>BIG SLOUGH</b>								
A	1.03	641	1,834	2.5	636.9	636.9	637.0	0.1
B	1.440	788	1,623	2.8	642.1	642.1	642.2	0.1
C	1.980	1,334	7,203	0.6	647.0	647.0	647.0	0.0
D	2.550	92	929	4.5	647.0	647.0	647.0	0.0
E	3.420	659	1,508	2.6	651.6	651.6	651.7	0.1
F	3.620	731	1,958	1.5	652.9	652.9	652.9	0.0
G	4.130	322	1,129	2.7	654.4	654.4	654.5	0.1
<b>BIG SLOUGH</b>								
A	0.370	348	949	2.3	654.3	654.3	654.4	0.1
B	0.400	419	1,256	1.8	655.0	655.0	655.0	0.0
C	0.950	261	922	2.4	657.3	657.3	657.4	0.1
D	0.980	388	1,169	1.9	657.7	657.7	657.7	0.0
E	1.120	550	1,069	1.9	658.4	658.4	658.4	0.0
F	1.700	236	1,148	1.7	660.2	660.2	660.3	0.1

<sup>1</sup> MILES ABOVE MOUTH

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**COUNTY OF BARTHOLOMEW, IN  
(AND INCORPORATED AREAS)**

**FLOODWAY DATA**  
**AIRPORT TRIBUTARY - BIG SLOUGH -  
BIG SLOUGH TRIBUTARY**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>DENIOS CREEK</b>								
A	0.06	7,876 <sup>2</sup>	37,284	2.4	603.4	602.9 <sup>3</sup>	603.0	0.1
B	0.85	7,907 <sup>2</sup>	47,778	1.9	604.8	603.1 <sup>3</sup>	603.2	0.1
C	1.30	8,336 <sup>2</sup>	53,935	1.7	605.7	605.6 <sup>3</sup>	605.7	0.1
D	2.17	315	1,326	3.2	609.5	609.5	609.6	0.1
E	2.18	100	592	7.1	610.2	610.2	610.3	0.1
F	2.96	1,307	3,507	1.2	614.2	614.2	614.3	0.1
G	3.12	907	2,218	1.9	614.6	614.6	614.7	0.1
H	3.28	163	750	5.6	615.8	615.8	615.9	0.1
I	3.32	407	1,457	2.9	617.3	617.3	617.4	0.1
J	4.33	90	600	6.4	623.0	623.0	623.1	0.1
K	4.41	164	1,162	3.3	624.4	624.4	624.5	0.1
L	5.08	781	3,106	1.2	625.6	625.6	625.7	0.1
M	5.96	1,292	1,374	2.4	628.3	628.3	628.4	0.1
N	5.99	1,436	2,293	1.4	628.8	628.8	628.9	0.1
O	6.63	1,617/800 <sup>4</sup>	2,437	1.2	632.0	632.0	632.1	0.1
<b>DENIOS CREEK TRIBUTARY NO. 6</b>								
A	0.39	471/90 <sup>4</sup>	490	3.1	635.1	635.1	635.2	0.1
B	0.42	672/262 <sup>4</sup>	1,236	1.2	636.0	636.0	636.1	0.1
C	0.57	572/350 <sup>4</sup>	739	2.1	636.9	636.9	637.0	0.1
D	0.72	550/290 <sup>4</sup>	677	2.3	639.2	639.2	639.3	0.1
E	1.02	105	234	4.3	644.1	644.1	644.2	0.1

<sup>1</sup> MILES ABOVE MOUTH

<sup>2</sup> COMBINED FLOODWAY WIDTH OF EAST FORK WHITE RIVER AND DENIOS CREEK

<sup>3</sup> ELEVATIONS WITHOUT CONSIDERING OVERFLOW EFFECT FROM EAST FORK WHITE RIVER

<sup>4</sup> TOTAL WIDTH / WIDTH WITHIN UNINCORPORATED AREAS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**COUNTY OF BARTHOLOMEW, IN  
(AND INCORPORATED AREAS)**

**FLOODWAY DATA**

**DENIOS CREEK - DENIOS CREEK TRIBUTARY**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>DRIFTWOOD RIVER</b>								
Y	240.15	3,367/2,600 <sup>2</sup>	25,393	1.9	623.2	623.2	623.3	0.1
Z	240.78	2,920/ 150 <sup>2</sup>	25,477	2.3	623.9	623.9	624.0	0.1
AA	241.73	2,501/700 <sup>2</sup>	24,392	2.4	626.1	626.1	626.2	0.1
AB	242.43	2,924	20,080	2.8	627.8	627.8	627.9	0.1
AC	242.92	3,441	21,157	2.7	628.8	628.8	628.9	0.1
AD	243.86	2,681	12,506	4.6	631.3	631.3	631.4	0.1
AE	244.30	2,327	11,609	4.9	633.6	633.6	633.7	0.1
AF	245.20	2,804	19,104	3.0	637.1	637.1	637.2	0.1
AG	246.90	3,726	23,777	2.4	639.9	639.9	640.0	0.1
AH	247.81	3,904	19,998	2.8	642.0	642.0	642.1	0.1
AI	249.01	2,006	14,517	3.9	646.7	646.7	646.8	0.1
AJ	249.05	2,092	16,111	3.5	647.3	647.3	647.4	0.1
AK	249.92	2,756	26,419	2.1	649.4	649.4	649.5	0.1
AL	250.80	3,300	30,392	1.8	650.6	650.6	650.7	0.1
AM	252.63	2,500/1,800 <sup>2</sup>	26,253	2.1	652.8	652.8	652.9	0.1
AN	253.44	3,300/2,400 <sup>2</sup>	27,762	1.9	654.9	654.9	655.0	0.1
<b>EAST FORK WHITE CREEK</b>								
A	11.83	1,466 <sup>3</sup>	3,579	1.1	605.4	605.4	605.5	0.1
B	12.00	1,000 <sup>3</sup>	1,483	1.8	606.5	606.5	606.6	0.1
C	12.82	763	1,966	1.0	610.7	610.7	610.8	0.1
D	13.21	941 <sup>4</sup>	1,072	2.3	613.2	613.2	613.3	0.1
E	13.96	570	1,445	1.7	621.2	621.2	621.3	0.1
F	13.99	534	1,342	1.8	621.9	621.9	621.9	0.0
G	14.85	609	1,440	1.7	629.7	629.7	629.7	0.0
H	15.54	604	1,110	1.9	636.5	636.5	636.6	0.1

<sup>1</sup> MILES ABOVE MOUTH

<sup>2</sup> TOTAL WIDTH / WIDTH WITHIN UNINCORPORATED AREAS

<sup>3</sup> COMBINED FLOODWAY WIDTH OF EAST FORK WHITE CREEK AND EAST FORK WHITE CREEK TRIBUTARY NO. 1

<sup>5</sup> COMBINED FLOODWAY WIDTH OF EAST FORK WHITE CREEK AND EAST FORK WHITE CREEK TRIBUTARY NO. 2

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**COUNTY OF BARTHOLOMEW, IN  
(AND INCORPORATED AREAS)**

**FLOODWAY DATA**

**DRIFTWOOD RIVER - EAST FORK WHITE CREEK**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>EAST FORK WHITE CREEK TRIBUTARY NO. 1</b>								
A	0.52	1,466 <sup>2</sup>	3,579	1.1	605.4	604.8 <sup>4</sup>	604.9	0.1
B	0.67	1,000 <sup>2</sup>	1,190	1.0	606.5	606.2 <sup>4</sup>	606.3	0.1
C	1.22	391	758	1.6	611.5	611.5	611.5	0.0
D	2.00	385	762	1.6	621.7	621.7	621.8	0.1
<b>EAST FORK WHITE CREEK TRIBUTARY NO. 2</b>								
A	0.08	941 <sup>3</sup>	1,101	1.7	613.4	612.4 <sup>4</sup>	612.5	0.1
B	0.12	1,050 <sup>3</sup>	1,464	1.3	613.6	613.6	613.7	0.1
C	1.31	307	856	1.9	626.3	626.3	626.4	0.1
D	1.36	181	537	3.0	627.3	627.3	627.3	0.0
E	1.84	295	644	2.0	631.7	631.7	631.8	0.1
F	1.89	373	1,105	1.2	633.3	633.3	633.3	0.0
G	2.60	132	190	5.7	646.1	646.1	646.1	0.0
<b>EAST FORK WHITE RIVER</b>								
A	222.72	6,766/3,000 <sup>5</sup>	54,011	1.8	584.3	584.3	584.4	0.1
B	224.74	6,446	42,386	2.1	587.3	587.3	587.4	0.1
C	225.90	8,202	40,834	2.2	588.7	588.7	588.8	0.1
D	226.67	8,376	50,414	1.8	590.1	590.1	590.2	0.1
E	227.03	6,554	38,225	2.5	590.9	590.9	591.0	0.1
F	227.10	6,135	38,704	2.3	591.2	591.2	591.3	0.1
G	227.60	7,611	44,197	2.0	592.4	592.4	592.5	0.1
H	228.60	8,450	46,708	1.9	594.2	594.2	594.3	0.1
I	229.26	7,730	53,461	1.7	595.2	595.2	595.3	0.1
J	230.39	6,850	43,593	2.0	597.0	597.0	597.1	0.1

<sup>1</sup> MILES ABOVE MOUTH

<sup>2</sup> COMBINED FLOODWAY WIDTH OF EAST FORK WHITE CREEK AND EAST FORK WHITE CREEK TRIBUTARY NO. 1

<sup>3</sup> COMBINED FLOODWAY WIDTH OF EAST FORK WHITE CREEK AND EAST FORK WHITE CREEK TRIBUTARY NO. 2

<sup>4</sup> ELEVATIONS WITHOUT CONSIDERING OVERFLOW EFFECT FROM EAST FORK WHITE CREEK

<sup>5</sup> TOTAL WIDTH / WIDTH WITHIN UNINCORPORATED AREAS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**COUNTY OF BARTHOLOMEW, IN  
(AND INCORPORATED AREAS)**

**FLOODWAY DATA**

**EAST FORK WHITE CREEK TRIBUTARY NO. 1 - EAST FORK  
WHITE CREEK TRIBUTARY NO. 2 - EAST FORK WHITE RIVER**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>EAST FORK WHITE RIVER</b>								
K	230.88	5,520	34,706	2.5	597.9	597.9	598.0	0.1
L	231.37	4,624	28,238	3.1	599.7	599.7	599.8	0.1
M	232.37	8,186	35,085	2.5	602.1	602.1	602.1	0.0
N	232.88	7,876 <sup>2</sup>	37,284	2.4	603.4	603.4	603.4	0.0
O	233.52	7,907 <sup>2</sup>	47,778	1.9	604.8	604.8	604.9	0.1
P	234.00	8,336 <sup>2</sup>	53,935	1.7	605.7	605.7	605.8	0.1
Q	235.90	7,170 <sup>3</sup>	42,278	1.9	610.9	610.9	611.0	0.1
R	236.50	6,288 <sup>4</sup>	38,847	2.1	612.4	612.4	612.5	0.1
S	237.50	4,800 <sup>5</sup>	22,921	3.5	615.4	615.4	615.5	0.1
T	237.88	5,100 <sup>5</sup>	19,141	4.1	616.5	616.5	616.6	0.1
U	238.13	5,150	7,952	9.9	617.5	617.5	617.6	0.1
V	238.41	3,900	11,166	7.1	618.5	618.5	618.6	0.1
W	239.00	4,850	33,201	2.4	621.9	621.9	622.0	0.1
X	239.30	5,700	47,908	1.6	622.3	622.3	622.4	0.1
<b>ENSLEY DITCH</b>								
A	0.25	848	1,102	2.3	663.5	661.5 <sup>6</sup>	661.6	0.1
B	0.53	785	1,408	1.8	664.7	664.7	664.8	0.1
C	1.01	607	1,013	2.3	674.0	674.0	674.1	0.1
D	1.52	594	686	3.2	683.8	683.8	683.9	0.1

<sup>1</sup> MILES ABOVE MOUTH

<sup>2</sup> COMBINED FLOODWAY WIDTH OF EAST FORK WHITE RIVER AND DENIOS CREEK

<sup>3</sup> COMBINED FLOODWAY WIDTH OF EAST FORK WHITE RIVER AND OPOSSUM CREEK

<sup>4</sup> THIS WIDTH IS WITHIN EXTRATERRITORIAL LIMITS OF THE CITY OF COLUMBUS

<sup>5</sup> COMBINED FLOODWAY WIDTH OF EAST FORK WHITE RIVER AND HAW CREEK

<sup>6</sup> ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM FLATROCK RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**COUNTY OF BARTHOLOMEW, IN  
 (AND INCORPORATED AREAS)**

**FLOODWAY DATA**

**EAST FORK WHITE RIVER - ENSLEY DITCH**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>FLATROCK RIVER</b>								
A	0.37	2,510/1,400 <sup>2</sup>	16,547	1.9	622.7	622.7	622.8	0.1
B	1.16	3,339/1,900 <sup>2</sup>	24,837	1.3	625.5	625.5	625.6	0.1
C	1.50	2,532/1,900 <sup>2</sup>	20,323	1.6	626.0	626.0	626.1	0.1
D	1.80	2,732/2,000 <sup>2</sup>	21,430	1.5	626.5	626.5	626.6	0.1
E	2.56	3,590 <sup>3</sup>	16,113	2.0	627.7	627.7	627.8	0.1
F	2.89	2,551/ 900 <sup>2</sup>	16,543	1.9	630.0	630.0	630.1	0.1
G	3.91	3,257/2,000 <sup>2</sup>	16,976	1.9	632.2	632.2	632.3	0.1
H	4.85	3,089/2,900 <sup>2</sup>	13,019	2.4	636.2	636.2	636.3	0.1
I	4.89	3,221	14,922	2.1	636.7	636.7	636.8	0.1
J	5.70	2,759	14,202	2.2	639.8	639.8	639.9	0.1
K	6.50	2,939	14,487	2.2	643.8	643.8	643.9	0.1
L	7.20	1,200	5,994	5.3	647.8	647.8	647.9	0.1
M	7.23	1,000	6,302	5.0	648.3	648.3	648.4	0.1
N	8.22	2,383	16,102	2.0	651.5	651.5	651.6	0.1
O	9.51	4,292	12,939	2.4	655.1	655.1	655.2	0.1
P	10.35	1,300	5,897	5.3	660.1	660.1	660.2	0.1
Q	11.26	1,797	12,353	2.6	663.4	663.4	663.5	0.1
R	12.50	2,769	12,101	2.6	666.3	666.3	666.4	0.1
S	13.80	1,680	7,338	4.2	671.2	671.2	671.3	0.1
T	14.73	2,780	12,065	2.5	675.1	675.1	675.2	0.1
U	15.42	3,053	14,987	2.0	676.6	676.6	676.7	0.1

<sup>1</sup> MILES ABOVE CONFLUENCE WITH EAST FORK WHITE RIVER

<sup>2</sup> TOTAL WIDTH / WIDTH WITHIN UNINCORPORATED AREAS

<sup>3</sup> THIS WIDTH IS WITHIN CITY OF COLUMBUS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**COUNTY OF BARTHOLOMEW, IN  
(AND INCORPORATED AREAS)**

**FLOODWAY DATA**

**FLATROCK RIVER**

FLOODING SOURCE		FLOODWAY			1- PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>HAW CREEK</b>								
A	0.18	2250	4369	3.4	616.8	610.6 <sup>2</sup>	610.7	0.1
B	0.28	2638	4155	4.7	616.8	611.2 <sup>2</sup>	611.3	0.1
C	0.76	2351	5805	2.1	616.8	613.3 <sup>2</sup>	613.4	0.1
D	1.02	1020	2398	6.0	617.2	617.2	617.2	0.0
E	1.28	194	1346	7.5	618.4	618.4	618.4	0.0
F	1.47	161	1474	6.9	620.5	620.5	620.5	0.0
G	1.67	134	1266	8.0	622.1	622.1	622.1	0.0
H	1.83	162	2106	7.2	624.0	624.0	624.1	0.1
I	1.98	182	1961	7.5	625.3	625.3	625.4	0.1
J	2.12	434	3836	3.3	626.7	626.7	626.8	0.1
K	2.19	885	7837	2.0	626.9	626.9	627.0	0.1
L	2.29	823	6408	2.7	627.0	627.0	627.1	0.1
M	2.40	860	5786	3.0	627.1	627.1	627.2	0.1
N	2.51	597	4035	4.0	627.2	627.2	627.3	0.1
O	2.59	293	2166	5.3	627.4	627.4	627.5	0.1
P	2.62	221	2150	4.7	627.8	627.8	627.9	0.1
Q	2.64	171	1656	6.4	627.7	627.7	627.8	0.1
R	2.73	212	2264	5.0	628.6	628.6	628.7	0.1
S	2.82	235	1993	6.4	628.9	628.9	629.0	0.1
T	2.97	395	2213	6.4	630.1	630.1	630.2	0.1
U	3.07	300	2111	7.8	631.1	631.1	631.2	0.1
V	3.14	141	1710	5.9	632.0	632.0	632.1	0.1
W	3.25	147	1543	6.3	632.7	632.7	632.8	0.1
X	3.37	310	4072	3.8	633.8	633.8	633.8	0.0
Y	3.48	400	5677	3.1	634.1	634.1	634.2	0.1
Z	3.62	378	2593	5.2	634.3	634.3	634.4	0.1
AA	3.78	300	2698	4.7	635.1	635.1	635.2	0.1
AB	3.95	495	4740	4.3	635.7	635.7	635.8	0.1
AC	4.10	530	6138	3.2	636.1	636.1	636.2	0.1

<sup>1</sup> Miles Above Mouth

<sup>2</sup> Elevations Without Considering Overflow Effect From East Fork White River

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**BARTHOLOMEW COUNTY, IN  
AND INCORPORATED AREAS**

**FLOODWAY DATA**

**HAW CREEK**

FLOODING SOURCE		FLOODWAY			1- PERCENT ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>HAW CREEK</b> (continued)								
AD	4.34	816	2375	6.2	639.5	639.5	639.5	0.0
AE	4.41	720	5130	3.4	640.2	640.2	640.3	0.1
AF	4.50	893	5511	2.9	640.3	640.3	640.4	0.1
AG	4.77	748	2879	5.7	641.3	641.3	641.4	0.1
AH	4.94	663	3133	5.6	642.3	642.3	642.4	0.1
AI	5.11	704	3661	4.1	643.3	643.3	643.4	0.1
AJ	5.21	679	3956	4.4	643.7	643.7	643.8	0.1
AK	5.36	918	5267	3.4	644.4	644.4	644.5	0.1
AL	5.52	955	3776	4.8	644.8	644.8	644.9	0.1
AM	5.94	1063	3760	4.5	647.2	647.2	647.3	0.1
AN	6.37	1248	2946	6.2	649.0	649.0	649.1	0.1
AO	6.69	1164	3003	5.7	651.1	651.1	651.2	0.1
AP	7.00	1055	2530	6.9	652.9	652.9	653.0	0.1
AQ	7.49	1638	4224	3.9	655.5	655.5	655.6	0.1
AR	7.97	1108	2352	6.4	657.4	657.4	657.5	0.1
AS	8.60	84	823	9.6	662.6	662.6	662.7	0.1
AT	9.01	93	1056	7.7	666.9	666.9	666.9	0.0
AU	9.48	84	904	5.6	669.8	669.8	669.8	0.0
AV	9.70	76	936	5.4	671.0	671.0	671.1	0.1
AW	10.30	82	906	5.6	675.6	675.6	675.7	0.1
AX	10.90	76	712	7.6	679.1	679.1	679.2	0.1
AY	11.78	815	4670	1.5	684.4	684.4	684.5	0.1
AZ	12.10	848	2221	3.3	684.8	684.8	684.9	0.1
BA	12.48	496	1270	5.4	686.7	686.7	686.8	0.1
BB	12.95	794	1933	3.9	689.5	689.5	689.6	0.1
BC	13.31	173	1011	5.97	693.2	693.2	693.2	0.0
BD	13.66	227	873	3.6	694.8	694.8	694.9	0.1

<sup>1</sup> Miles Above Mouth

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**BARTHOLOMEW COUNTY, IN  
AND INCORPORATED AREAS**

**FLOODWAY DATA**

**HAW CREEK**

FLOODING SOURCE		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER-SURFACE ELEVATION (FEET, NAVD)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH <sup>2</sup> (FEET)	SECTION AREA (SQARE FEET)	MEAN VELOCITY (FEET / SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE (FEET)
<b>HAW CREEK</b>								
(continued)								
BE	14.04	472	1,155	5.4	698.5	698.5	698.6	0.1
BF	14.32	423	957	4.0	702.1	702.1	702.2	0.1
BG	14.63	357	797	5.6	704.4	704.4	704.5	0.1
BH	14.92	340	736	6.1	706.8	706.8	706.9	0.1
BI	15.22	231	236	9.1	712.4	712.4	712.5	0.1
BJ	15.63	269	267	8.4	715.9	715.9	716.0	0.1
BK	15.97	581	547	4.7	722.6	722.6	722.7	0.1
BL	16.26	405	796	5.9	726.8	726.8	726.9	0.1
BM	16.48	94	353	7.1	728.3	728.3	728.4	0.1
BN	16.64	538	1,498	1.9	730.2	730.2	730.3	0.1
BO	16.85	396	743	3.8	731.5	731.5	731.6	0.1
BP	17.06	427	1,195	3.4	735.3	735.3	735.4	0.1
BQ	17.42	317	601	4.9	738.3	738.3	738.4	0.1
BR	17.68	335	776	4.9	742.3	742.3	742.4	0.1
<b>LITTLE HAW CREEK</b>								
A	0.21	225	900	3.1	698.0	698.0	698.1	0.1
B	0.25	241	1,041	2.6	698.5	698.5	698.6	0.1
C	0.33	80	403	6.8	698.9	698.9	698.9	0.0
D	0.37	83	416	6.6	701.3	701.3	701.3	0.0
E	0.65	135	661	4.2	706.9	706.9	707.0	0.1
F	0.91	165	634	4.3	711.0	711.0	711.1	0.1
G	1.21	216	542	4.4	718.8	718.8	718.9	0.1
H	1.25	324	1,081	2.2	720.2	720.2	720.3	0.1
I	1.50	99	290	8.3	724.4	724.4	724.5	0.1
J	1.97	178	774	3.1	733.8	733.8	733.9	0.1

<sup>1</sup> MILES ABOVE MOUTH  
<sup>2</sup> FLOODWAY WIDTH MAY DIFFER FROM DFIRM. SEE DFIRM FOR REGULATORY WIDTH

<b>TABLE 9</b>	FEDERAL EMERGENCY MANAGEMENT AGENCY	<b>FLOODWAY DATA</b>
	<b>BARTHOLOMEW COUNTY, IN AND INCORPORATED AREAS</b>	<b>HAW CREEK - LITTLE HAW CREEK</b>

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>LUTHERAN LAKE TRIBUTARY</b>								
A	0.30	404	574	3.2	604.5	604.5	604.6	0.1
B	0.34	538	1,190	1.6	605.5	605.5	605.5	0.0
C	0.48	521	957	1.9	606.5	606.5	606.6	0.1
D	0.66	373	740	2.4	608.0	608.0	608.1	0.1
<b>NORTH OGILVILLE TRIBUTARY</b>								
A	0.09	100	241	2.9	628.6	628.6	628.7	0.1
B	0.15	61	140	5.0	629.8	629.8	629.9	0.1
C	0.25	124	409	1.7	634.9	634.9	634.9	0.0
D	0.47	89	121	5.8	640.9	640.9	641.0	0.1
<b>OPOSSUM CREEK</b>								
A	0.530	7,170 <sup>2</sup>	42,278	1.9	610.9	605.2 <sup>3</sup>	605.3	0.1
B	1.150	101	374	2.9	611.9	611.4 <sup>3</sup>	611.5	0.1
C	1.265	72	317	3.4	614.0	614.0	614.1	0.1
D	1.290	124	543	2.0	614.4	614.4	614.5	0.1
E	1.530	871	3,008	0.4	614.5	614.5	614.6	0.1
F	1.670	924	3,106	0.3	614.5	614.5	614.6	0.1
G	2.060	271	738	1.1	615.8	614.6 <sup>4</sup>	614.7	0.1
H	2.090	284	792	1.0	617.3	614.9 <sup>4</sup>	615.0	0.1
I	2.520	135	336	2.5	617.3	616.4 <sup>4</sup>	616.5	0.1
J	2.550	340	582	1.4	617.6	617.6	617.7	0.1
K	3.300	190	302	1.8	623.8	623.8	623.9	0.1
L	3.600	104	234	4.4	628.8	628.8	628.8	0.0
M	4.120	207	348	2.2	637.0	637.0	637.1	0.1
N	4.230	172	377	2.0	638.9	638.9	639.0	0.1

<sup>1</sup> MILES ABOVE MOUTH

<sup>2</sup> COMBINED FLOODWAY WIDTH OF EAST FORK WHITE RIVER AND OPOSSUM CREEK

<sup>3</sup> ELEVATIONS WITHOUT CONSIDERING OVERFLOW EFFECT FROM EAST FORK WHITE RIVER

<sup>4</sup> ELEVATIONS WITHOUT CONSIDERING OVERFLOW EFFECT FROM DENIOS CREEK

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**COUNTY OF BARTHOLOMEW, IN  
(AND INCORPORATED AREAS)**

**FLOODWAY DATA**

**LUTHERAN LAKE TRIBUTARY -  
NORTH OGILVILLE TRIBUTARY - OPOSSUM CREEK**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FT/SEC)	REGULATORY (FEET, NAVD)	WITHOUT FLOODWAY (FEET, NAVD)	WITH FLOODWAY (FEET, NAVD)	INCREASE (FEET)
<b>SOUTH FORK WHITE CREEK</b>								
A	0.05	828	2,622	1.7	595.1	595.1	595.2	0.1
B	1.28	720	2,215	2.0	598.7	598.7	598.8	0.1
C	2.26	1,230	4,073	0.9	602.4	602.4	602.5	0.1
D	2.30	1,058	4,100	0.9	602.5	602.5	602.6	0.1
E	2.73	786	3,047	1.3	602.9	602.9	603.0	0.1
<b>WOLF CREEK</b>								
A	0.72	264/180 <sup>2</sup>	621	6.1	626.4	621.7 <sup>3</sup>	621.8	0.1
B	0.76	277/100 <sup>2</sup>	869	4.4	626.4	623.1 <sup>3</sup>	623.2	0.1
C	2.36	534/334 <sup>2</sup>	1,473	2.3	633.4	633.4	633.5	0.1
D	3.06	759	1,342	2.5	638.6	638.6	638.7	0.1
E	3.10	814	2,171	1.5	639.0	639.0	639.1	0.1
F	4.26	844	1,335	2.5	644.7	644.7	644.8	0.1

<sup>1</sup> MILES ABOVE CONFLUENCE WITH EAST FORK WHITE RIVER

<sup>2</sup> TOTAL WIDTH / WIDTH WITHIN UNINCORPORATED AREAS

<sup>3</sup> ELEVATIONS WITHOUT CONSIDERING BACKWATER EFFECT FROM DRIFTWOOD RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**COUNTY OF BARTHOLOMEW, IN  
(AND INCORPORATED AREAS)**

**FLOODWAY DATA**

**SOUTH FORK WHITE CREEK - WOLF 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 risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no BFEs or base flood depths are shown within this zone.

### Zone AE

Zone AE is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS by detailed methods. In most instances, 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 risk 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, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs or base flood 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 risk 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 the 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 current FIRM presents flooding information for the entire geographic area of Bartholomew County. Previously, separate FIRMs were prepared for each identified flood prone incorporated community and for the unincorporated areas of the county. Historical data relating to the maps prepared for each community are presented in Table 10.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Bartholomew County (Unincorporated Areas)	September 20, 1974	July 30, 1976	March 15, 1982	
<sup>1,2</sup> Clifford, Town of	N/A	N/A	N/A	
Columbus, City of	December 7, 1973	July 23, 1976	July 19, 1982	January 5, 1996 February 19, 1997
Edinburgh, Town of	February 1, 1974	N/A	September 16, 1981	
<sup>1,2</sup> Elizabethtown, Town of	N/A	N/A	N/A	
<sup>2</sup> Hartsville, Town of	N/A	N/A	N/A	
<sup>2</sup> Hope, Town of	March 15, 1982	N/A	N/A	
<sup>1,2</sup> Jonesville, Town of	N/A	N/A	N/A	

<sup>1</sup>No Special Flood Hazard Areas identified

<sup>2</sup>This community does not have map history prior to the first countywide mapping

**TABLE 10**

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

**BARTHOLOMEW COUNTY, IN  
AND INCORPORATED AREAS**

**COMMUNITY MAP HISTORY**

## **7.0 OTHER STUDIES**

This FIS report either supersedes or is compatible with all previous studies on streams studied in this report and should be considered authoritative for purposes of the NFIP.

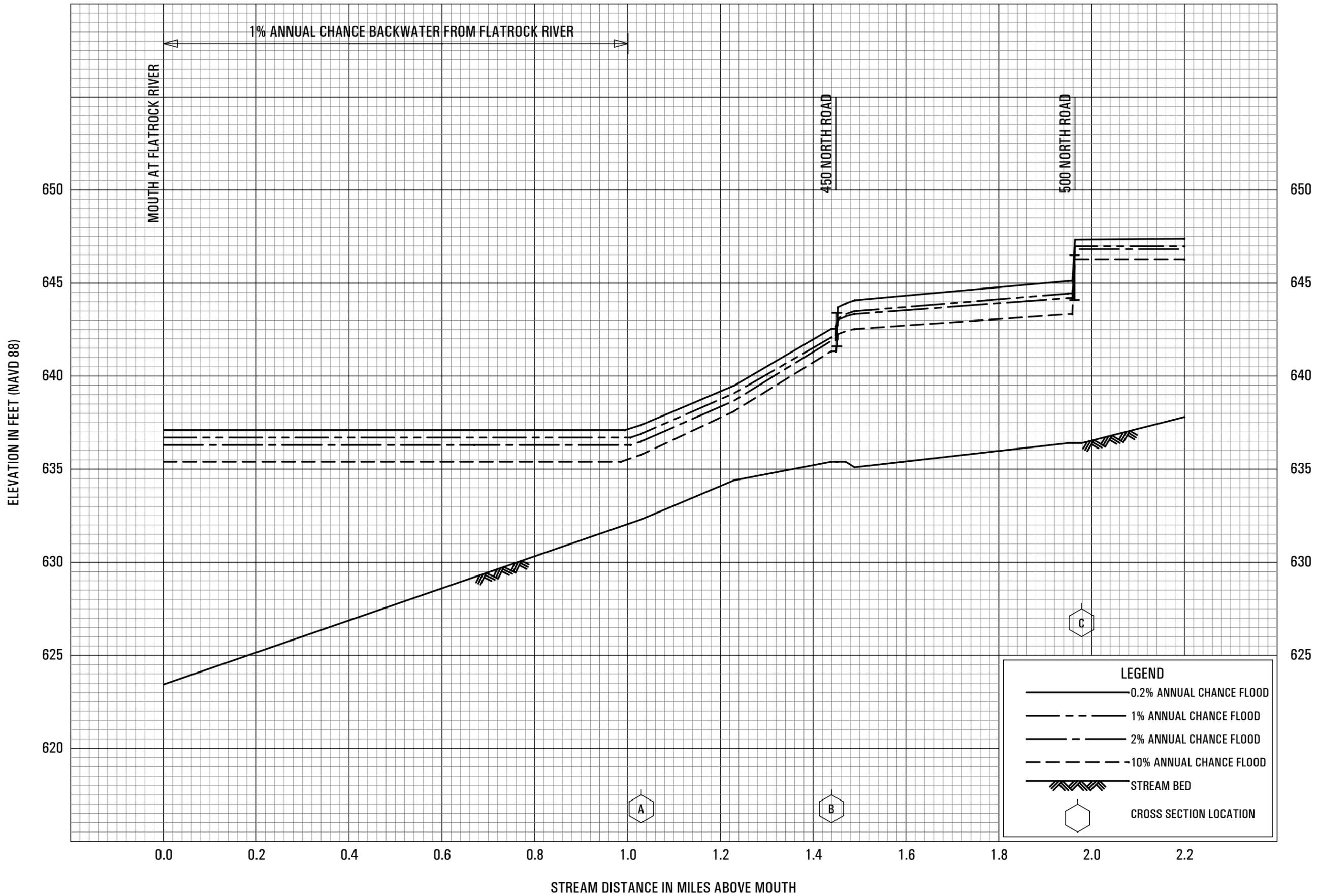
## **8.0 LOCATION OF DATA**

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Flood Insurance and Mitigation Division, Federal Emergency Management Agency, Region V, 536 S. Clark Street, 6<sup>th</sup> Floor, Chicago, IL 60605

## **9.0 BIBLIORAPHY AND REFERENCES**

1. Federal Emergency Management Agency, Flood Insurance Study, Bartholomew County, Unincorporated Areas, IN, Washington D.C., September 15, 1981.
2. Federal Emergency Management Agency, Flood Insurance Study, City of Columbus, Bartholomew County, IN, Washington D.C., January 5, 1996.
3. Federal Emergency Management Agency, Flood Insurance Study, Town of Edinburgh, Bartholomew County, IN, Washington D.C., January 2, 1987.
4. "Population Counts, Estimates and Projections", STATS Indiana, Indiana Business Research Center, Indiana University Kelley School of Business, accessed at [www.stats.indiana.edu/pop\\_totals\\_topic\\_page.html](http://www.stats.indiana.edu/pop_totals_topic_page.html).
5. National Oceanic and Atmospheric Administration, National Climatic Data Center, Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Days, 1971-2000, Climatology of the United States No. 81, 2002
6. "Peak Streamflow for Indiana", United States Geological Survey, National Water Information System, accessed at <http://nwis.waterdata.usgs.gov/in>.

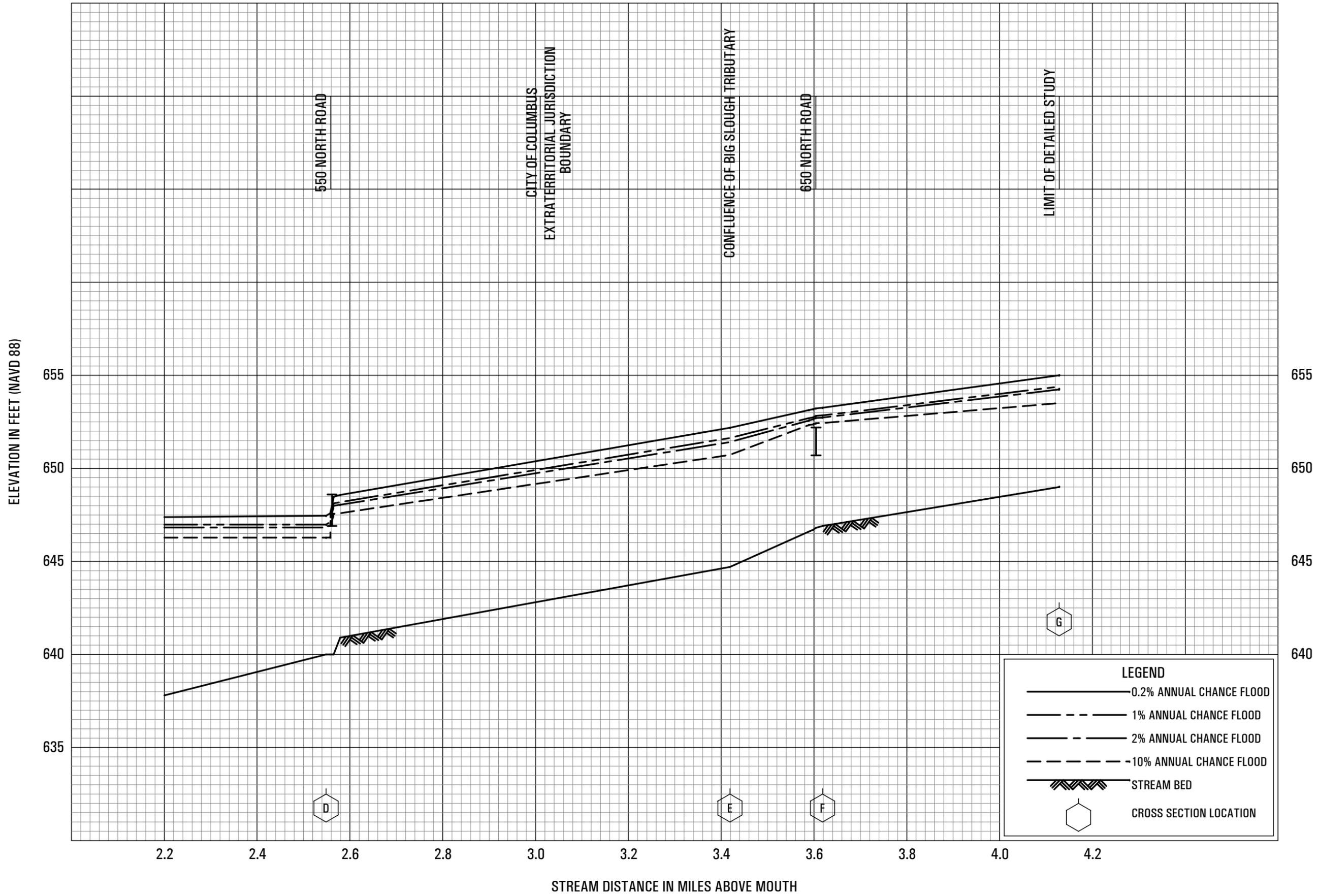




**FLOOD PROFILES**

**BIG SLOUGH**

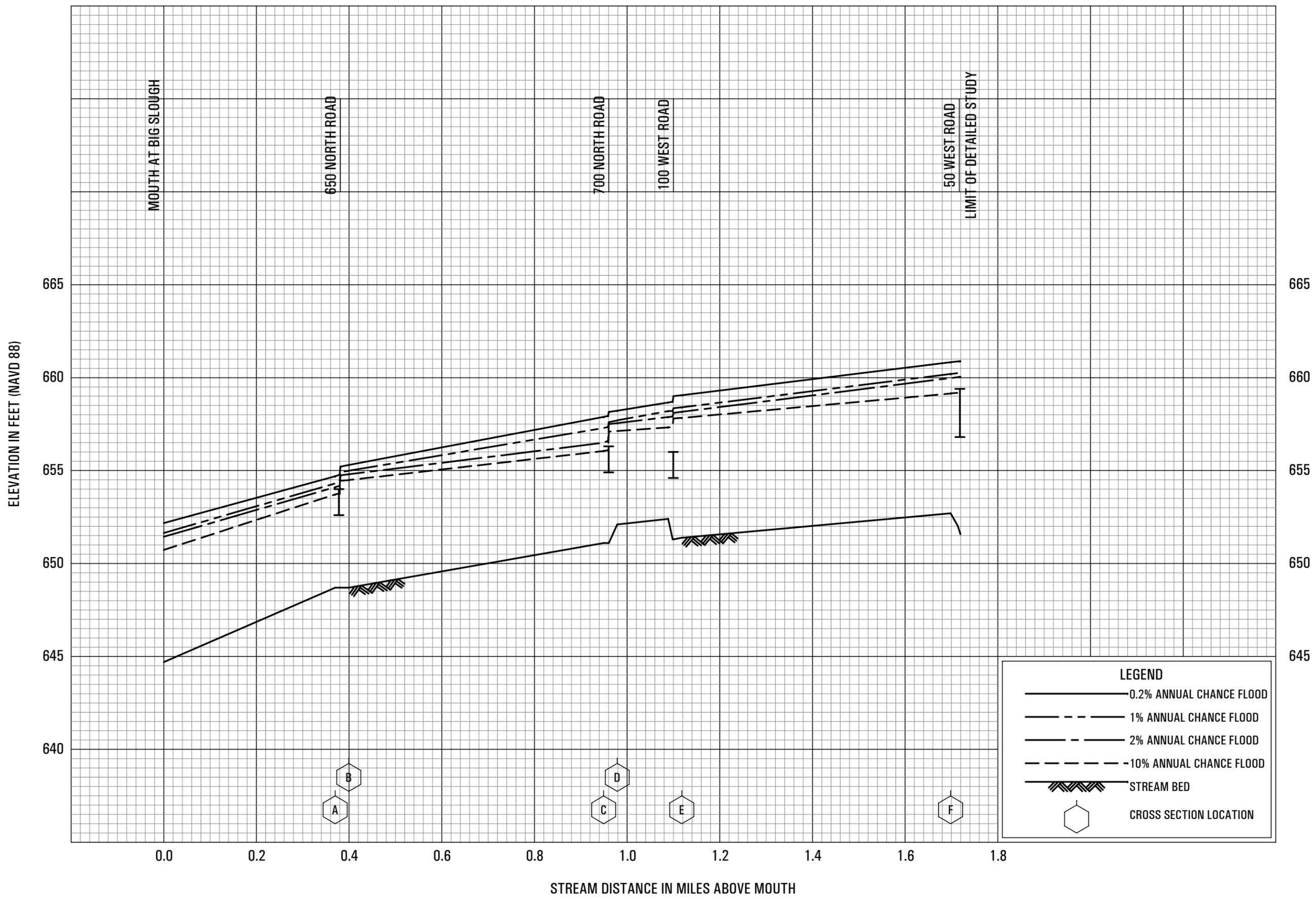
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BARTHOLOMEW COUNTY, IN  
AND INCORPORATED AREAS**



**FLOOD PROFILES**

BIG SLOUGH

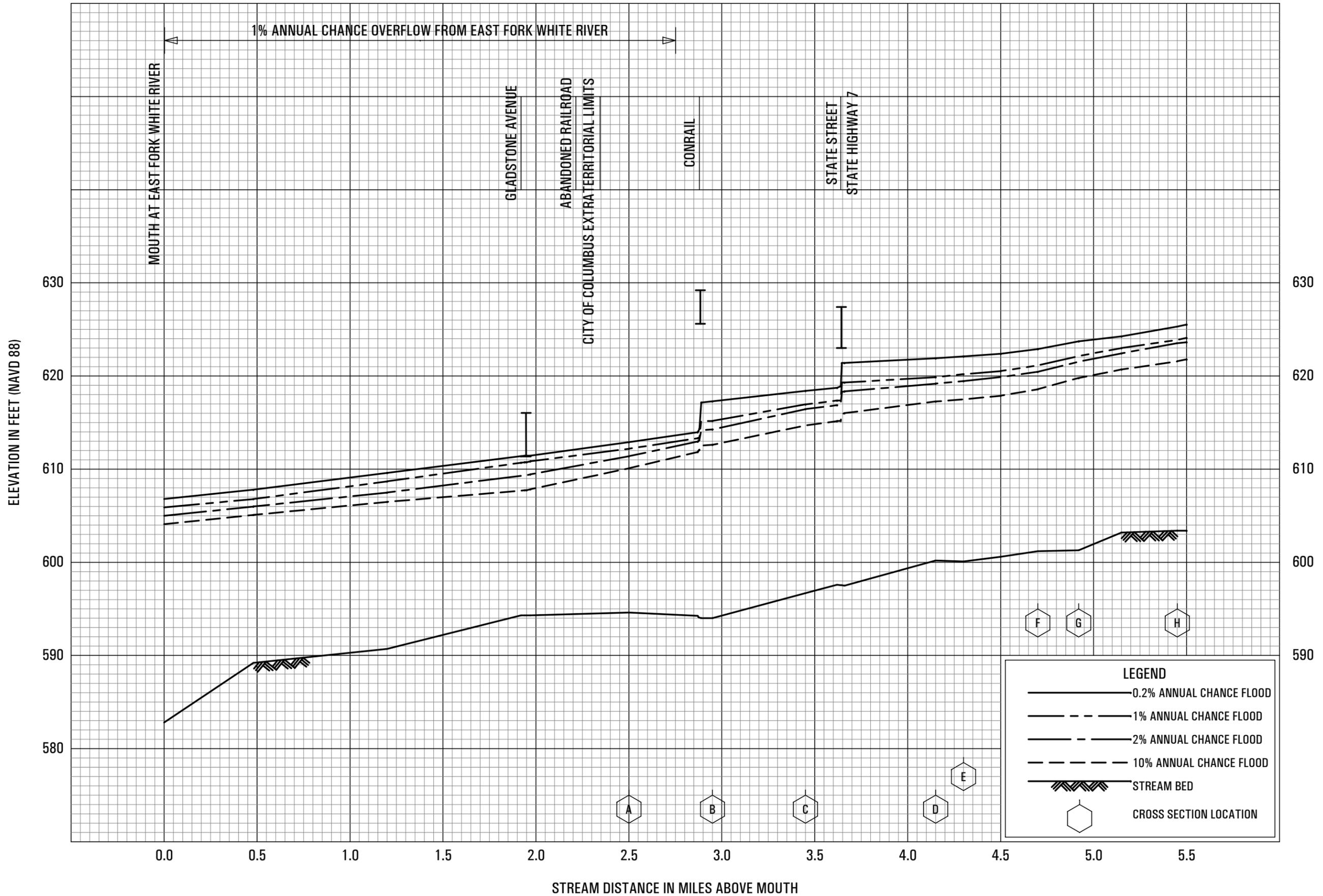
FEDERAL EMERGENCY MANAGEMENT AGENCY  
**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS



FEDERAL EMERGENCY MANAGEMENT AGENCY  
**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS

**FLOOD PROFILES**  
 BIG SLOUGH TRIBUTARY

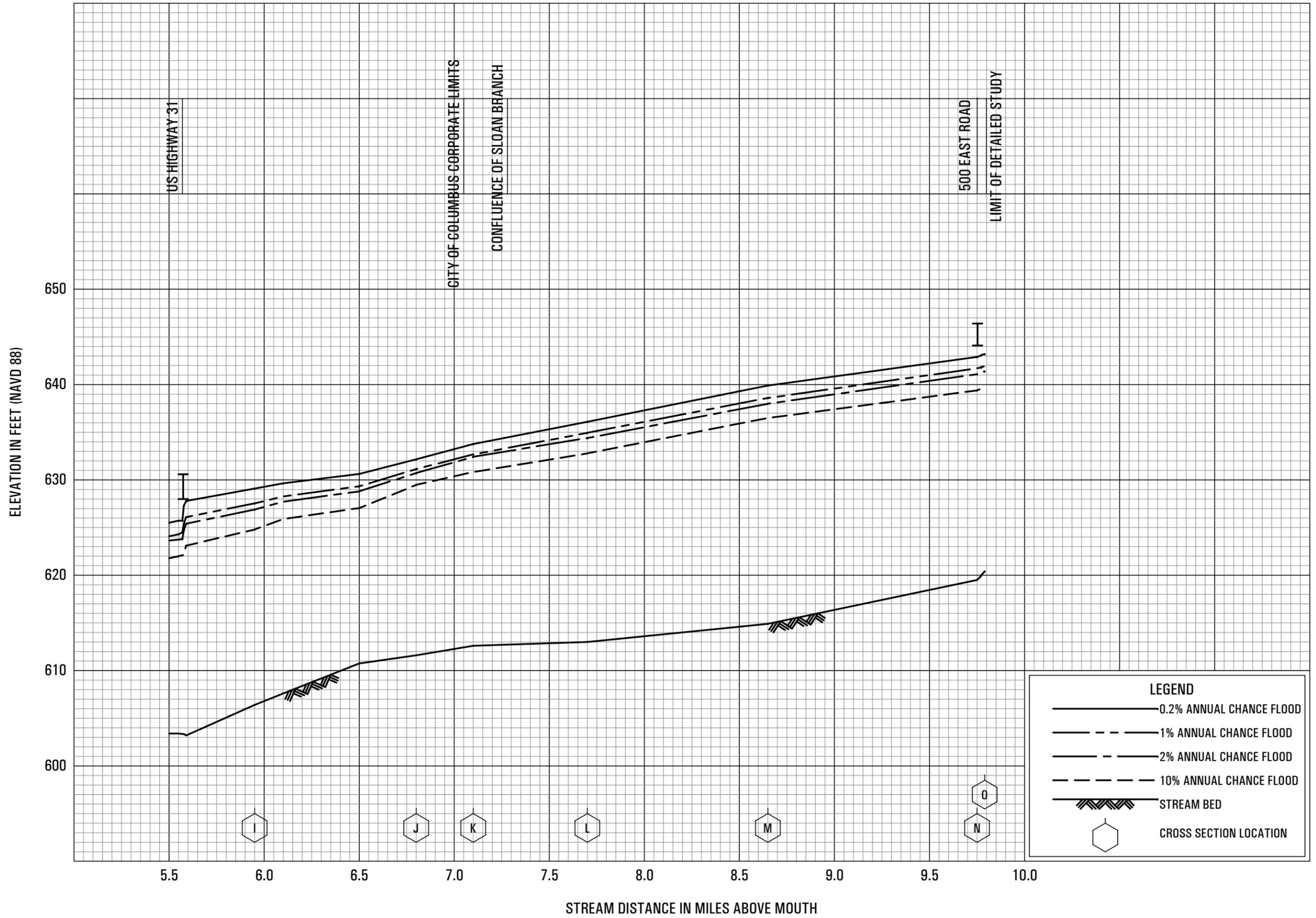




**FLOOD PROFILES**

CLIFTY CREEK

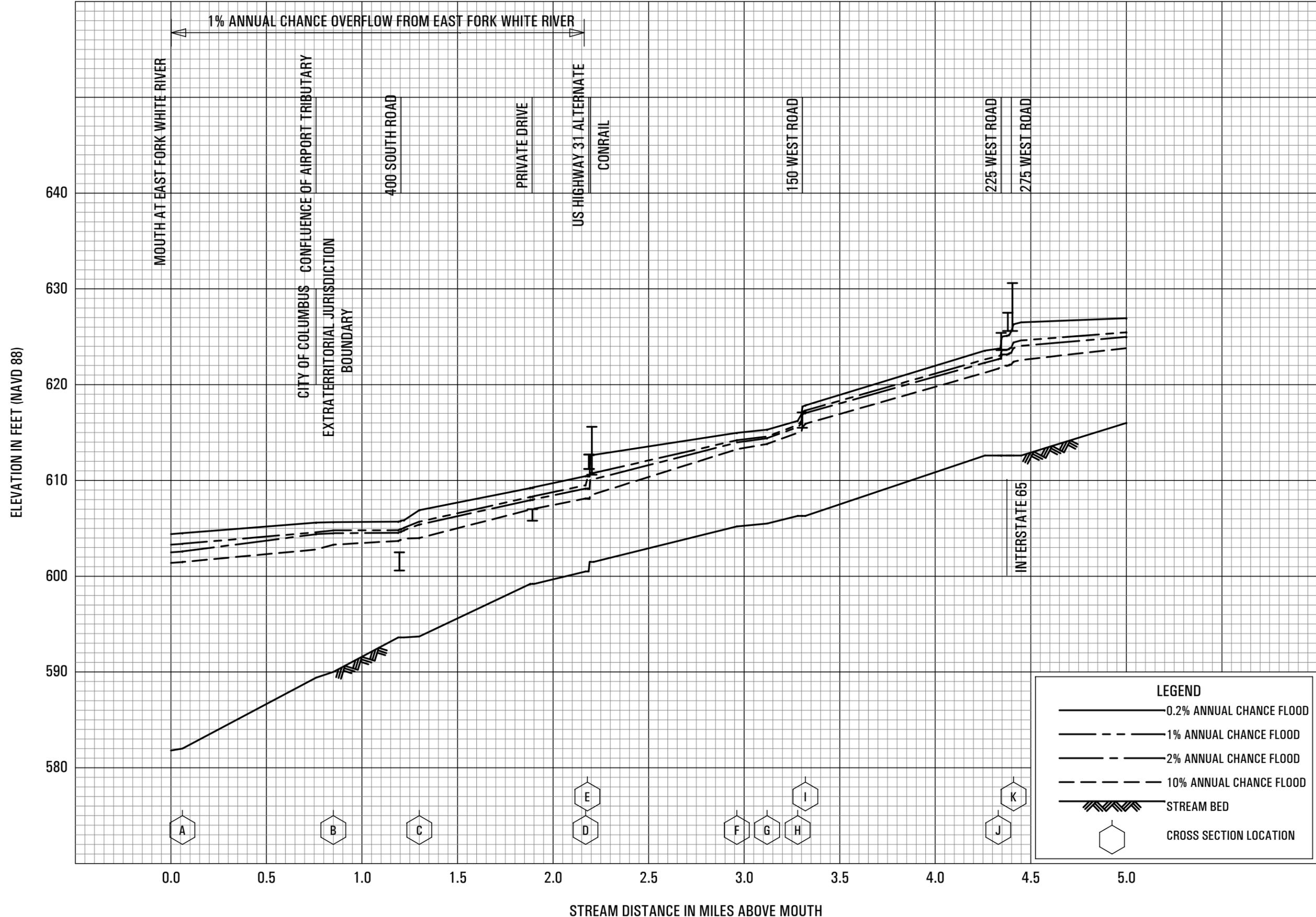
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**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS



FLOOD PROFILES

CLIFTY CREEK

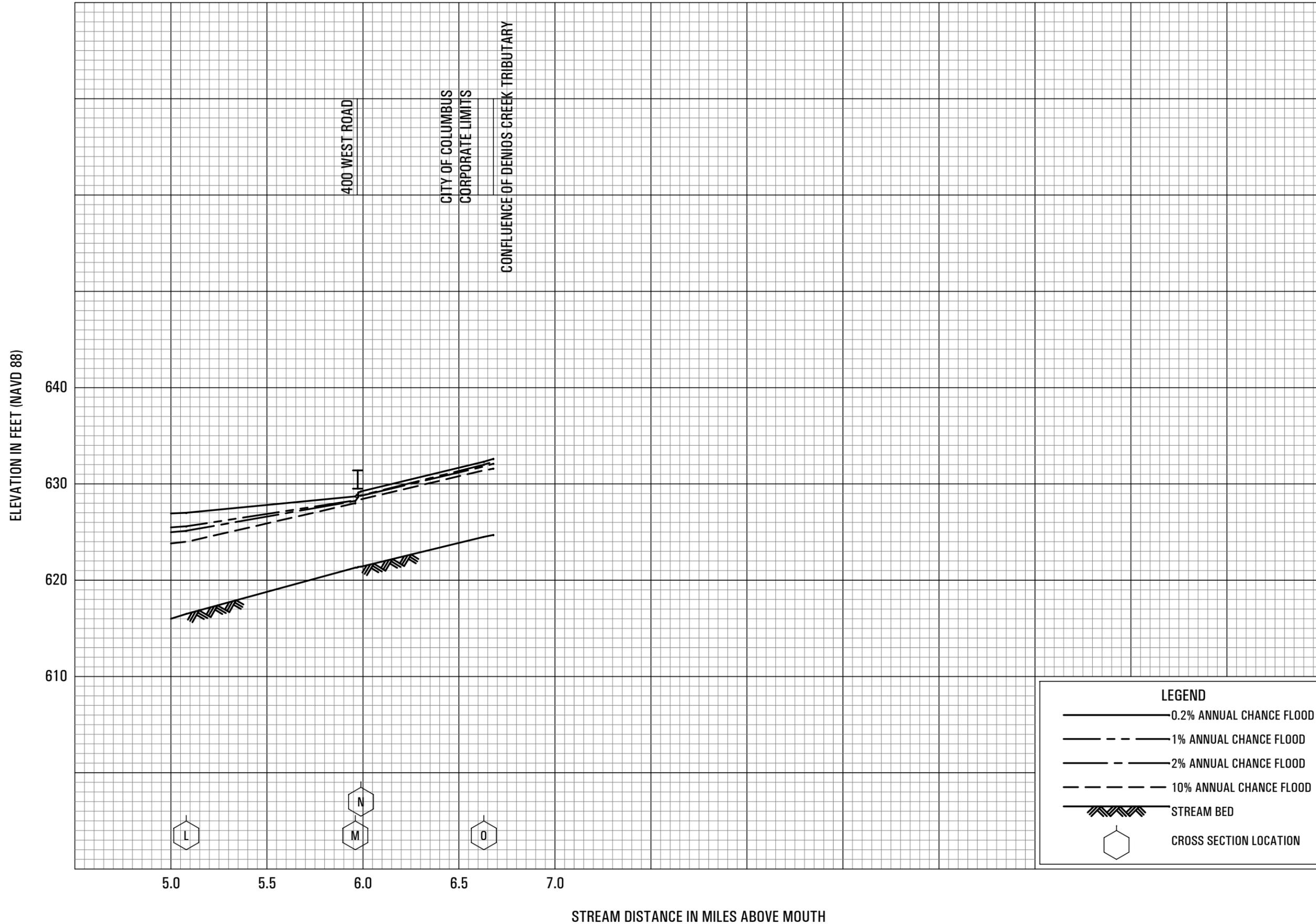
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 BARTHOLOMEW COUNTY, IN  
 AND INCORPORATED AREAS



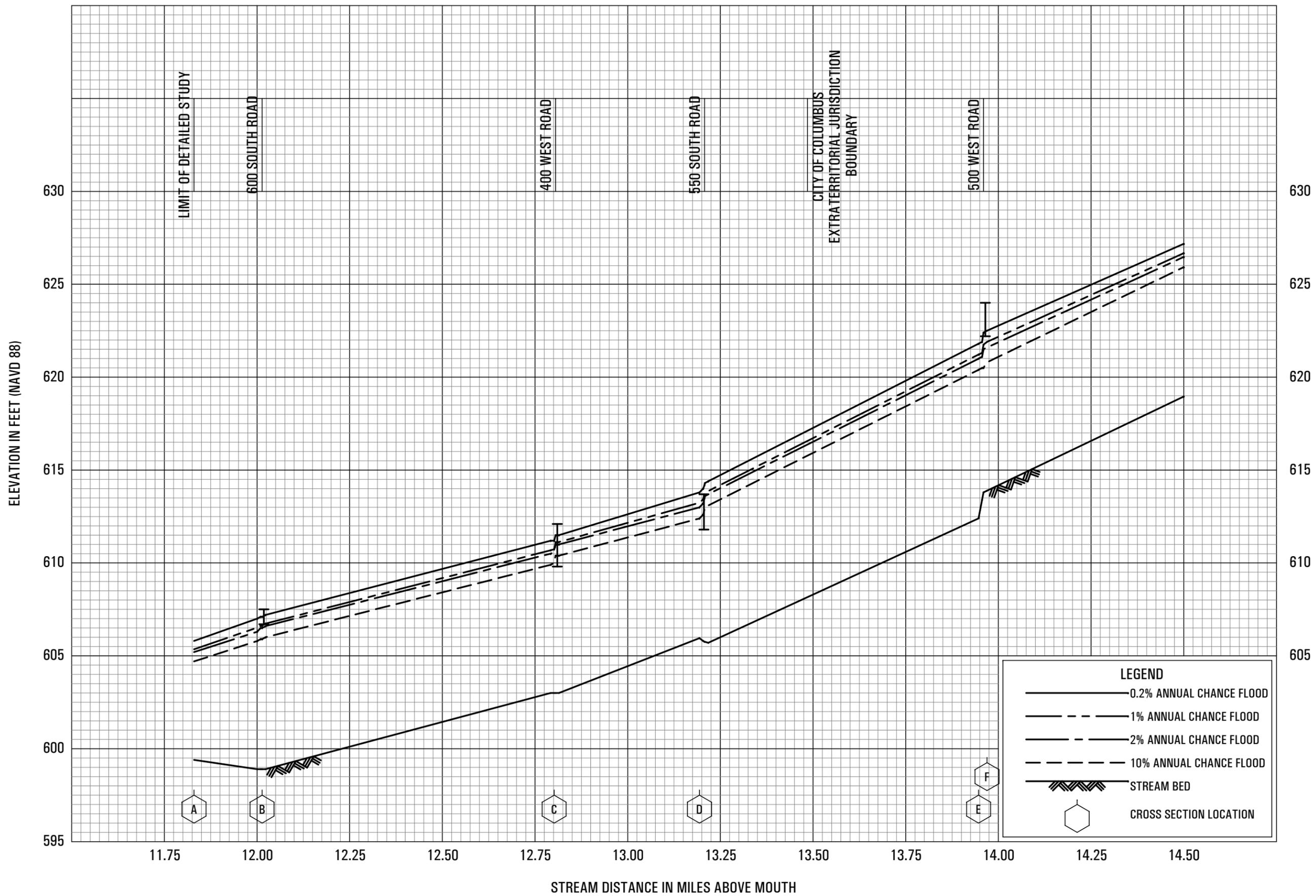
**FLOOD PROFILES**

DENIOS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS





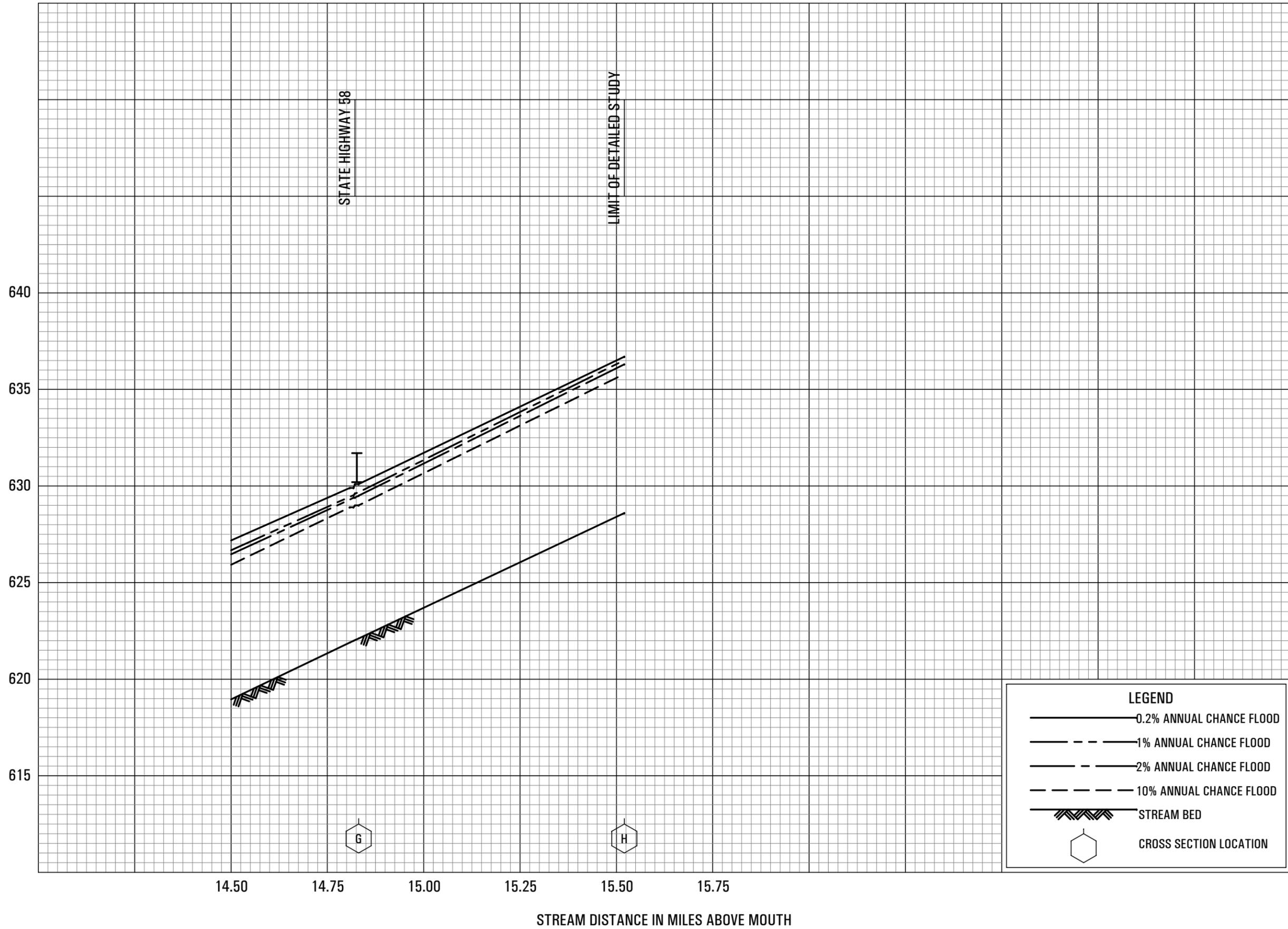


**FLOOD PROFILES**

**EAST FORK WHITE CREEK**

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS

ELEVATION IN FEET (NAVD 88)



**LEGEND**

- 0.2% ANNUAL CHANCE FLOOD
- - - 1% ANNUAL CHANCE FLOOD
- · - 2% ANNUAL CHANCE FLOOD
- - - 10% ANNUAL CHANCE FLOOD
- ▨ STREAM BED
- ⬡ CROSS SECTION LOCATION

**FLOOD PROFILES**

**EAST FORK WHITE CREEK**

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

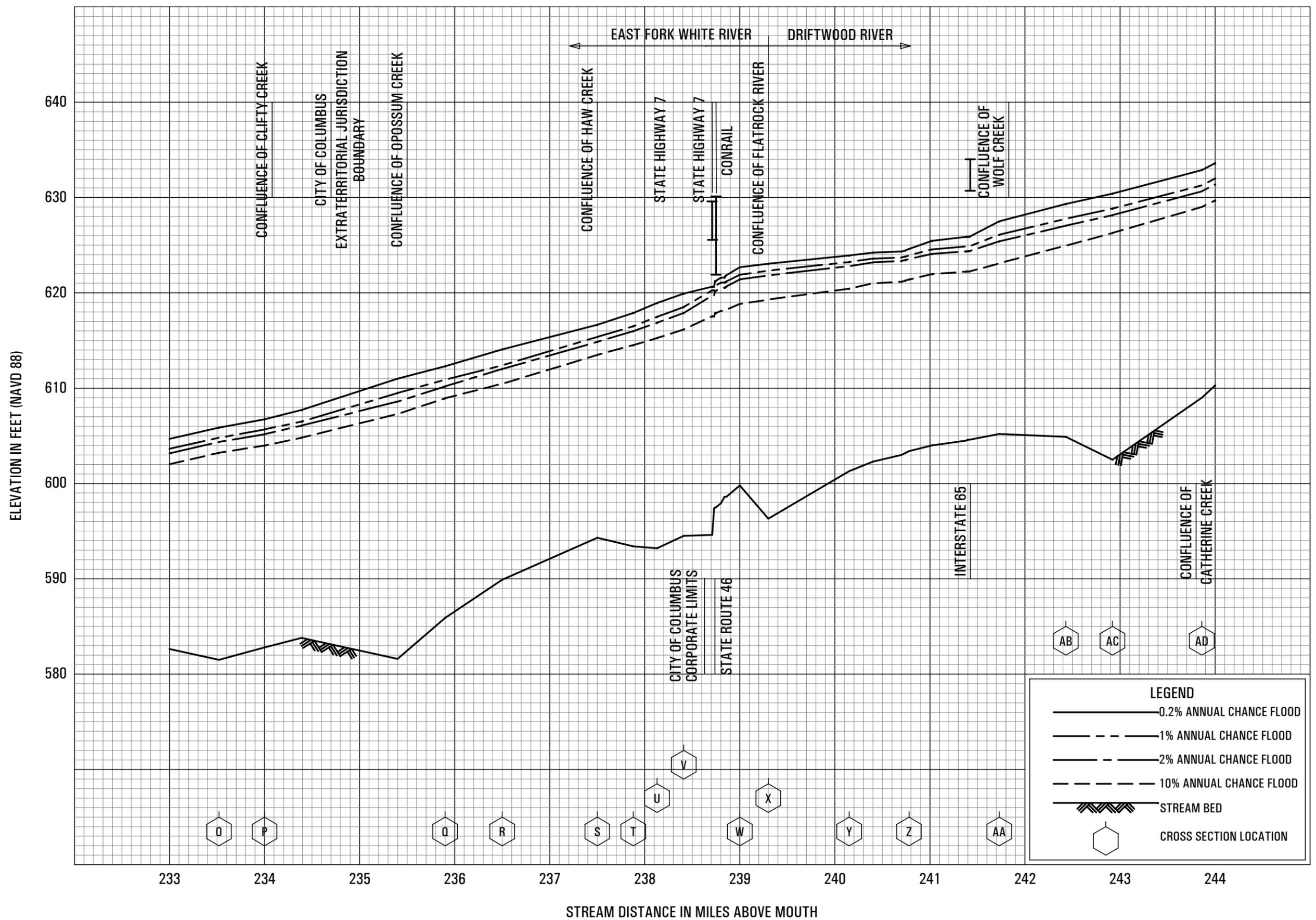
**BARTHOLOMEW COUNTY, IN**

**AND INCORPORATED AREAS**



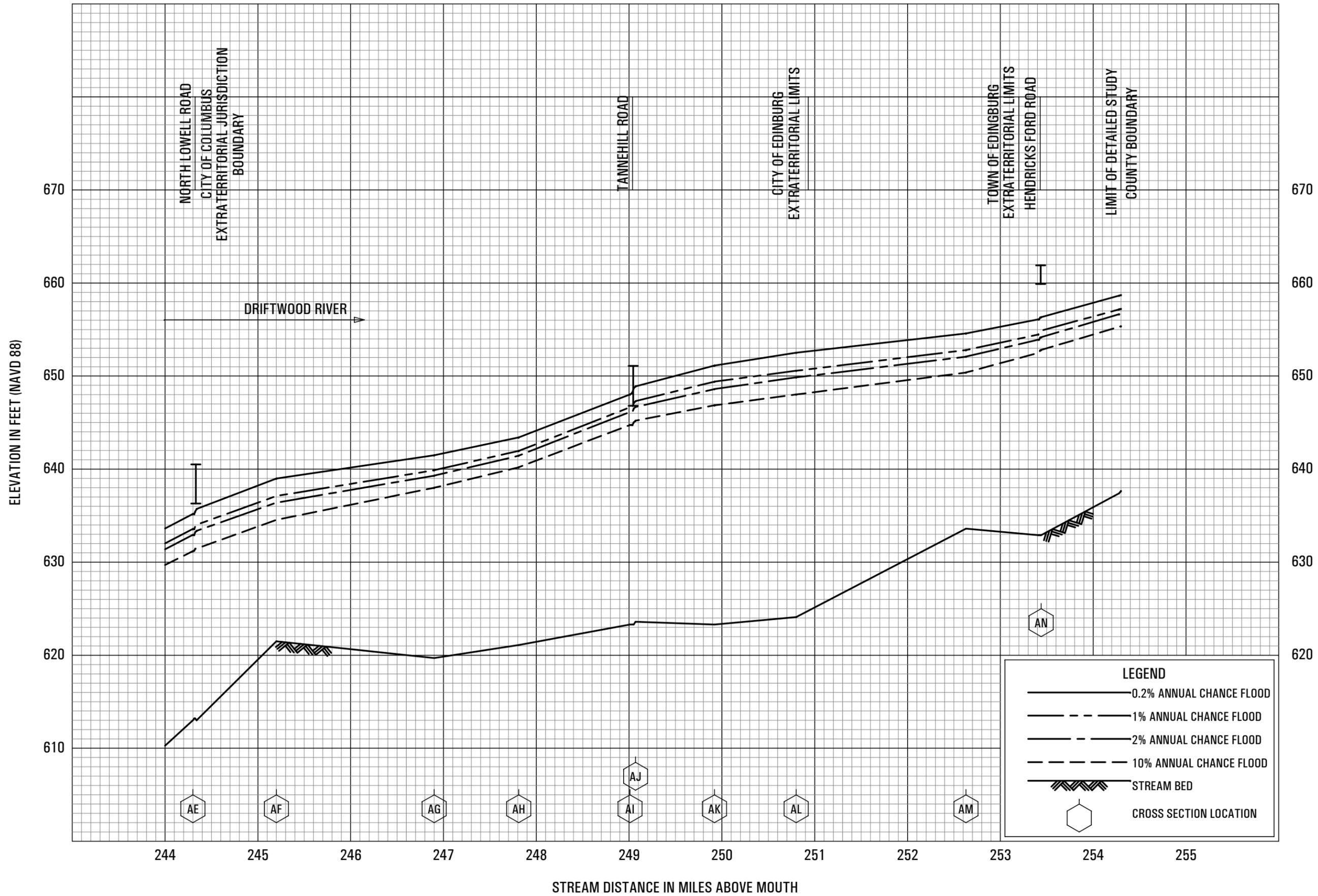






**FLOOD PROFILES**  
**EAST FORK WHITE RIVER - DRIFTWOOD RIVER**

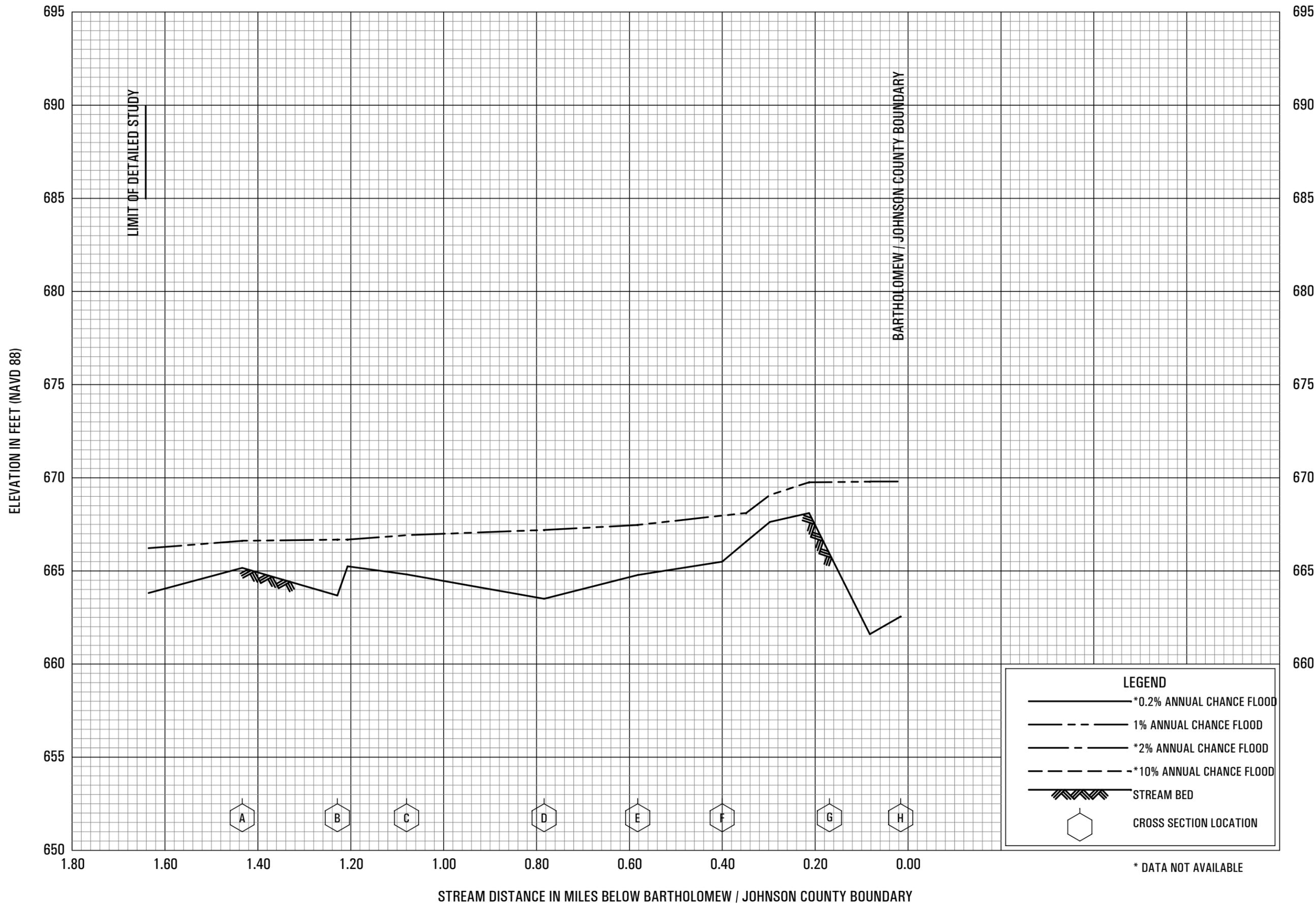
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**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS



**FLOOD PROFILES**

**EAST FORK WHITE RIVER - DRIFTWOOD RIVER**

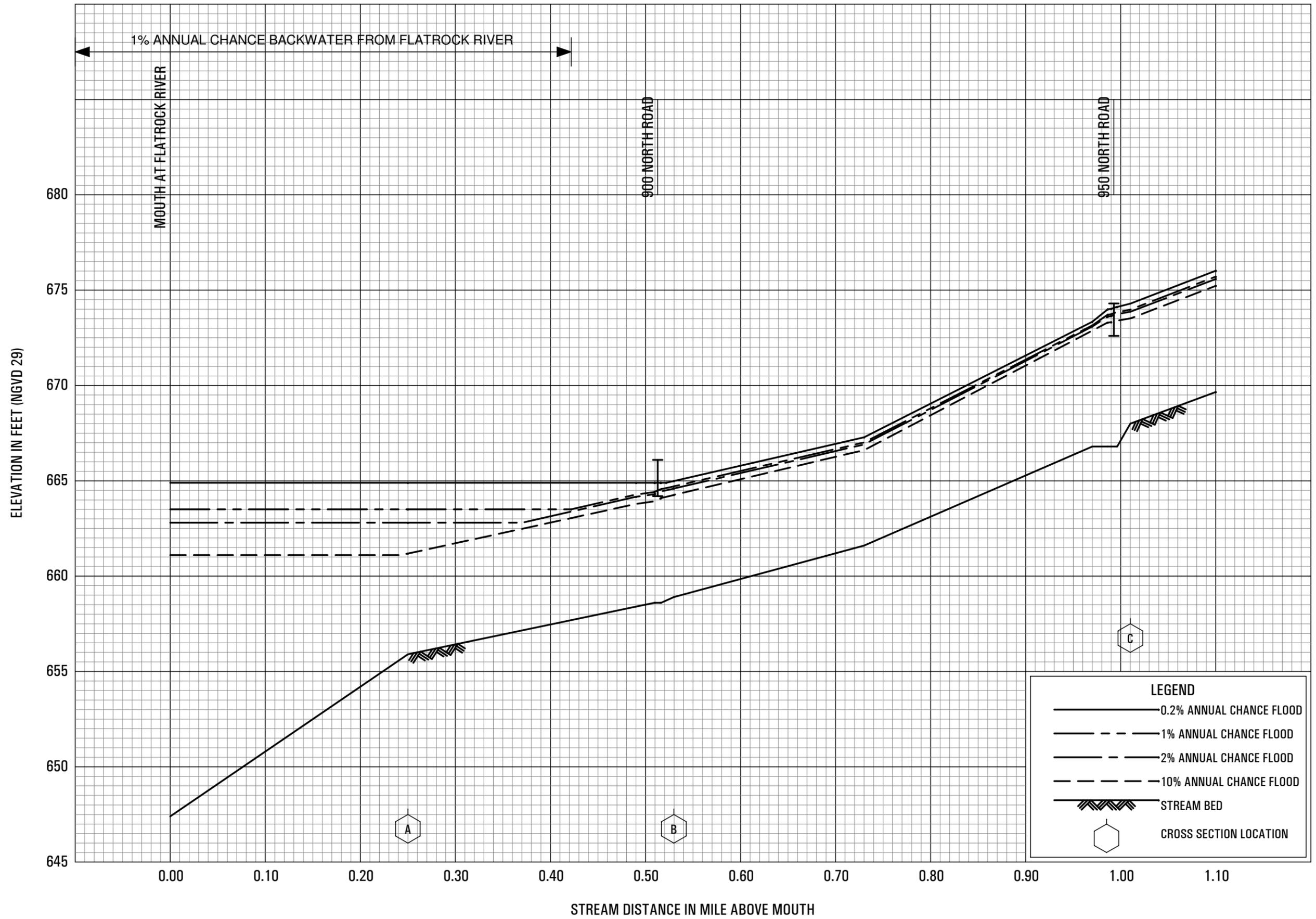
**FEDERAL EMERGENCY MANAGEMENT AGENCY  
BARTHOLOMEW COUNTY, IN  
AND INCORPORATED AREAS**



**FLOOD PROFILES**

**EAST SIDE SWALE**

**FEDERAL EMERGENCY MANAGEMENT AGENCY  
BARTHOLOMEW COUNTY, IN  
AND INCORPORATED AREAS**



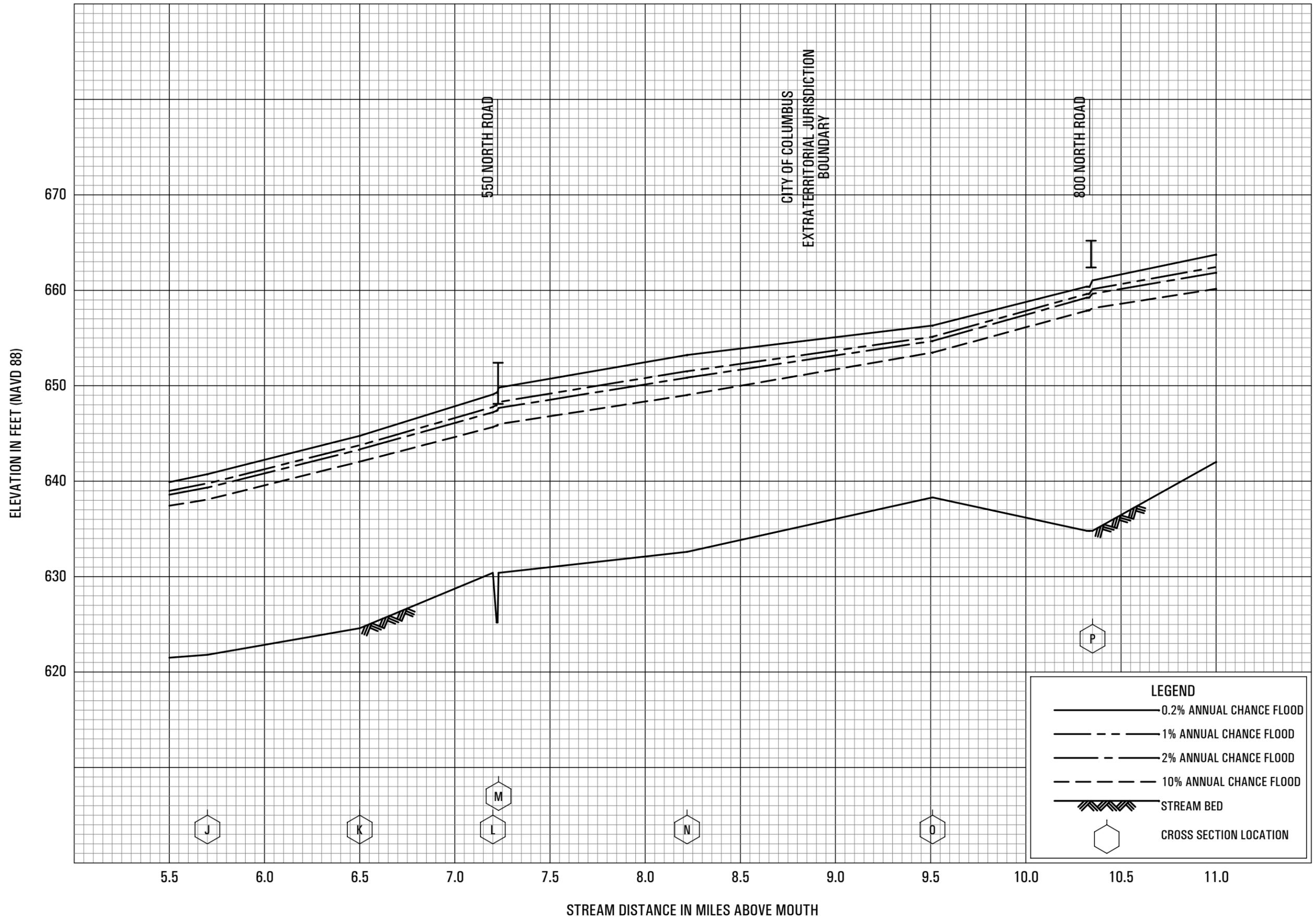
**FLOOD PROFILES**

**ENSLEY DITCH**

**FEDERAL EMERGENCY MANAGEMENT AGENCY  
BARTHOLOMEW COUNTY, IN  
AND INCORPORATED AREAS**

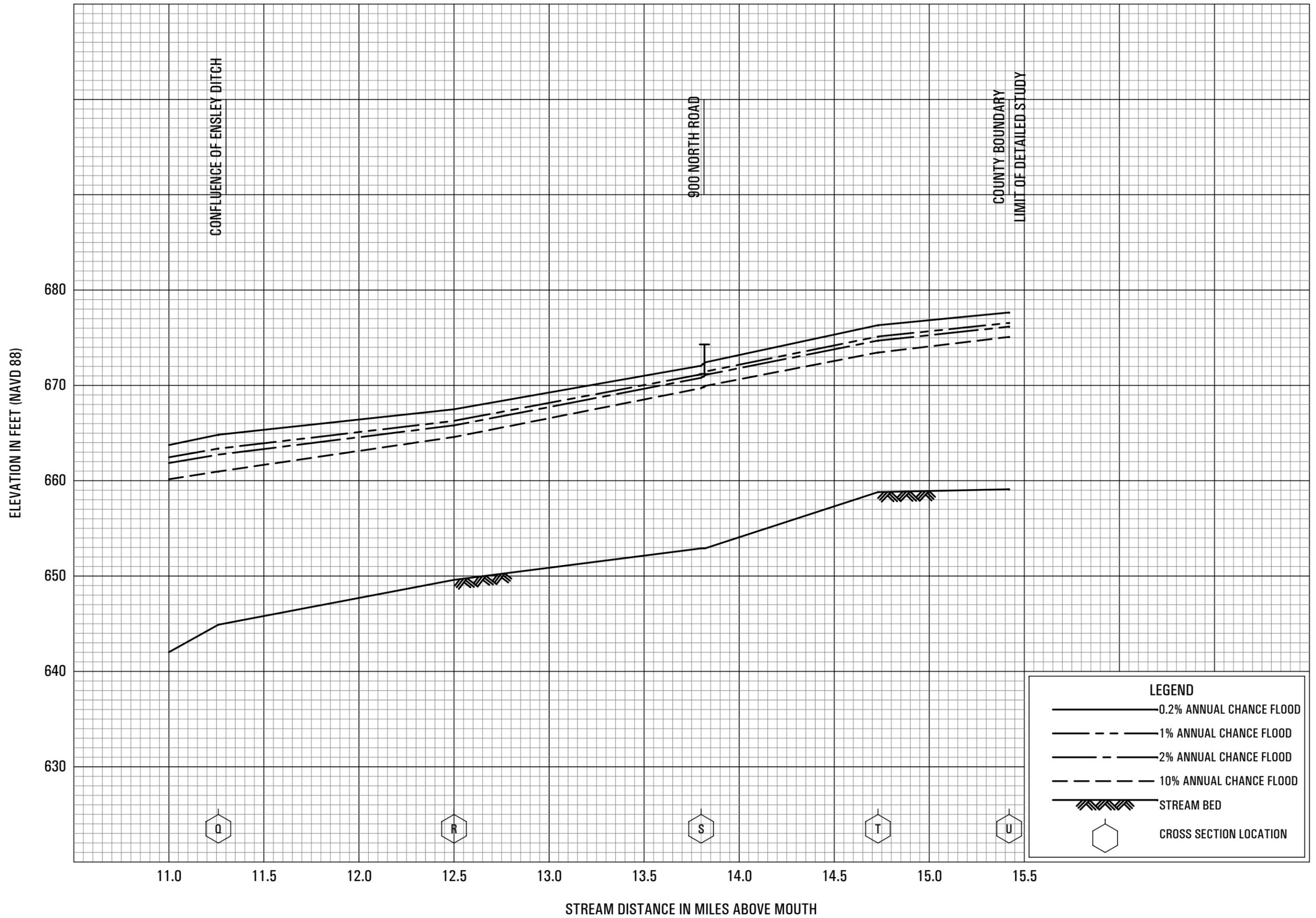






**FLOOD PROFILES**  
**FLATROCK RIVER**

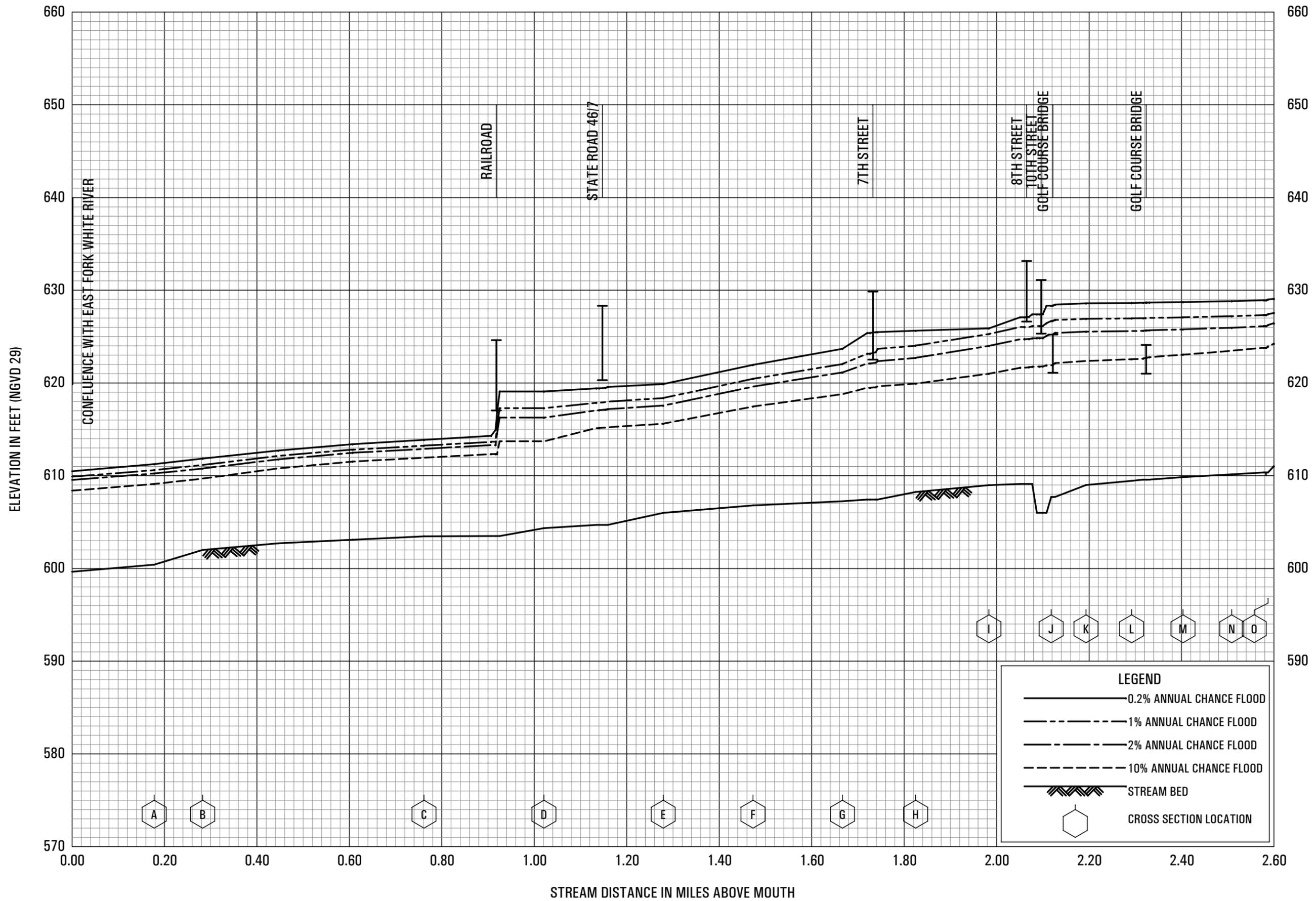
**FEDERAL EMERGENCY MANAGEMENT AGENCY**  
**BARTHOLOMEW COUNTY, IN**  
**AND INCORPORATED AREAS**



FLOOD PROFILES

FLATROCK RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY  
 BARTHOLOMEW COUNTY, IN  
 AND INCORPORATED AREAS

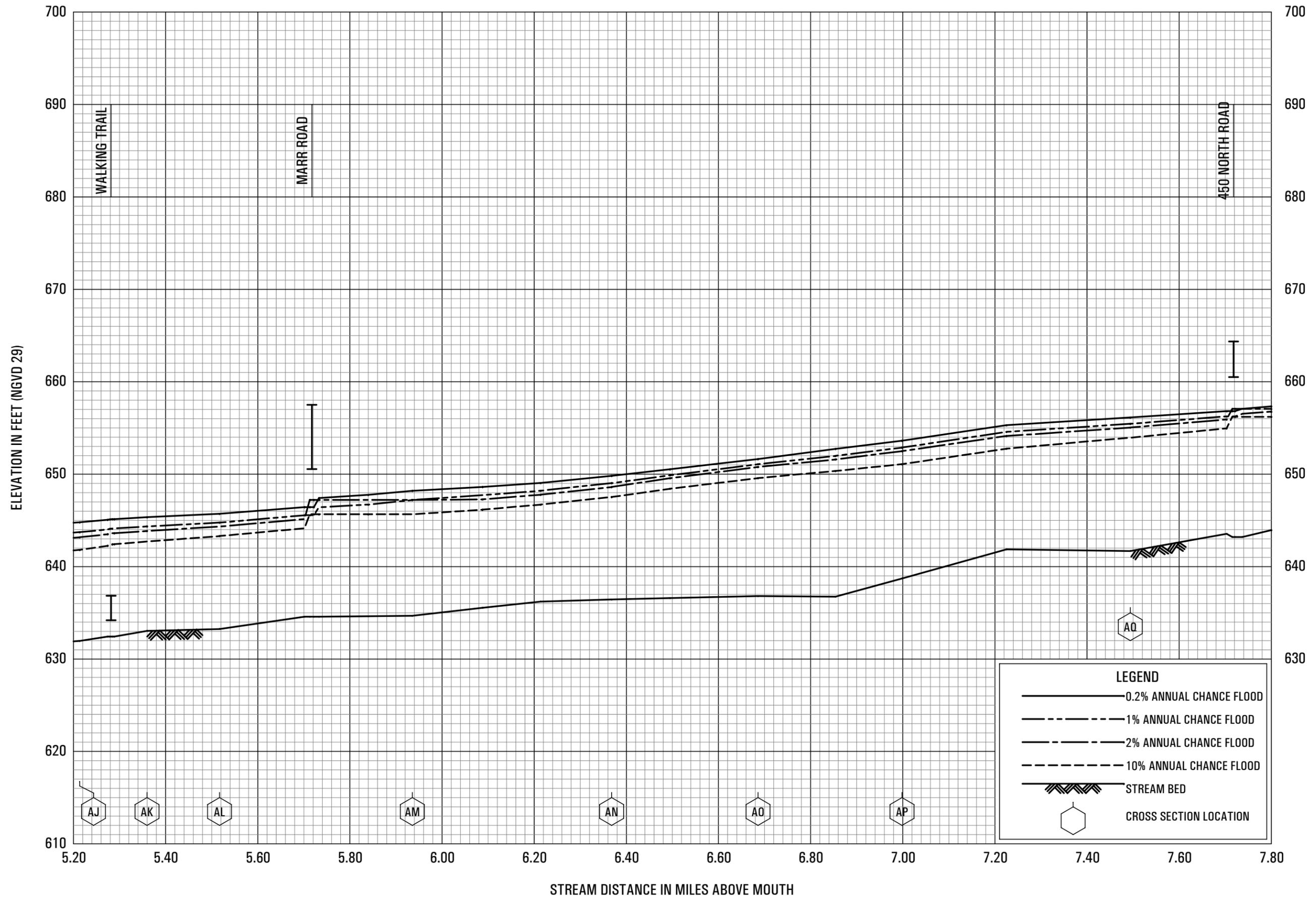


**FLOOD PROFILES**

HAW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS

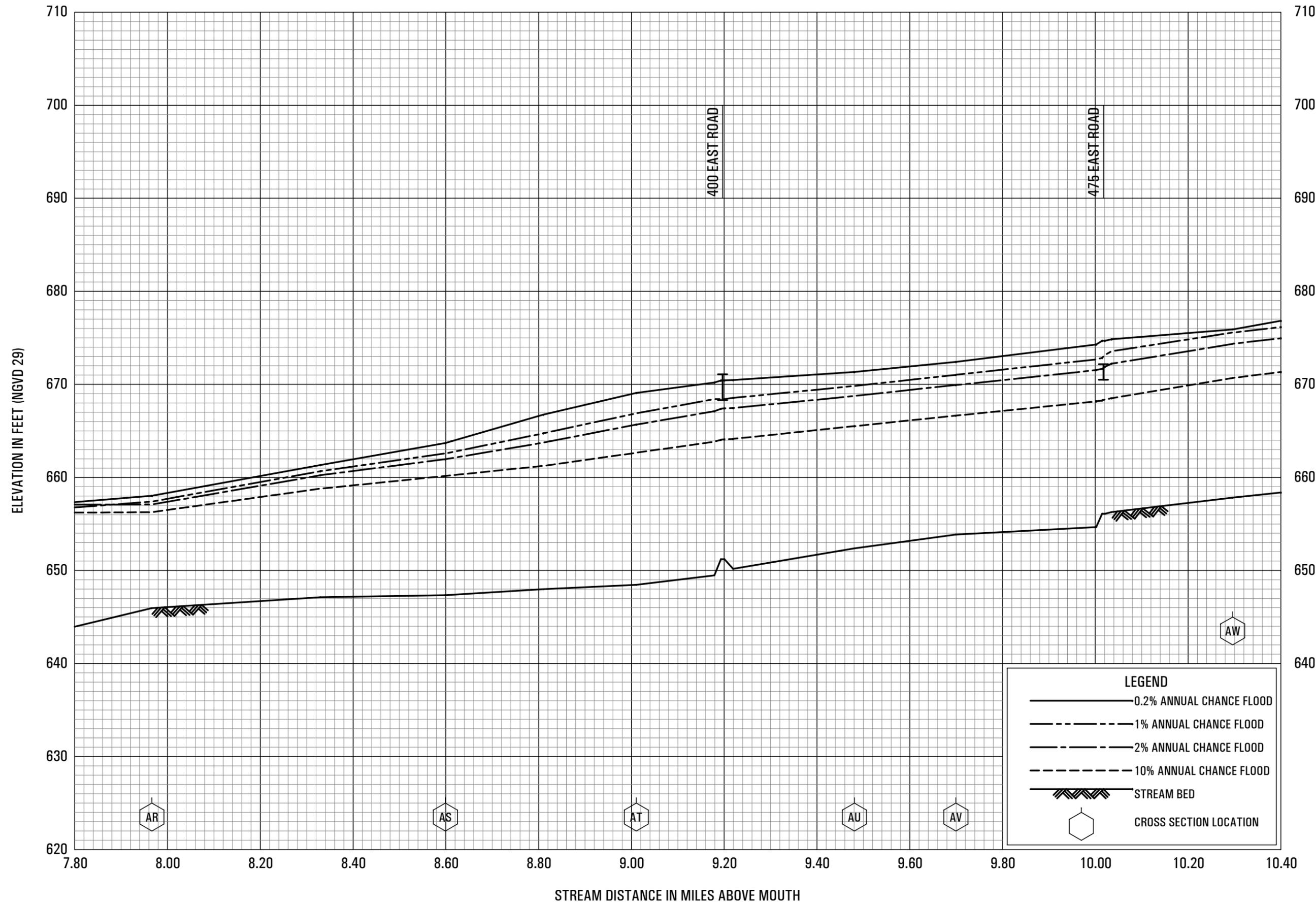




FLOOD PROFILES

HAW CREEK

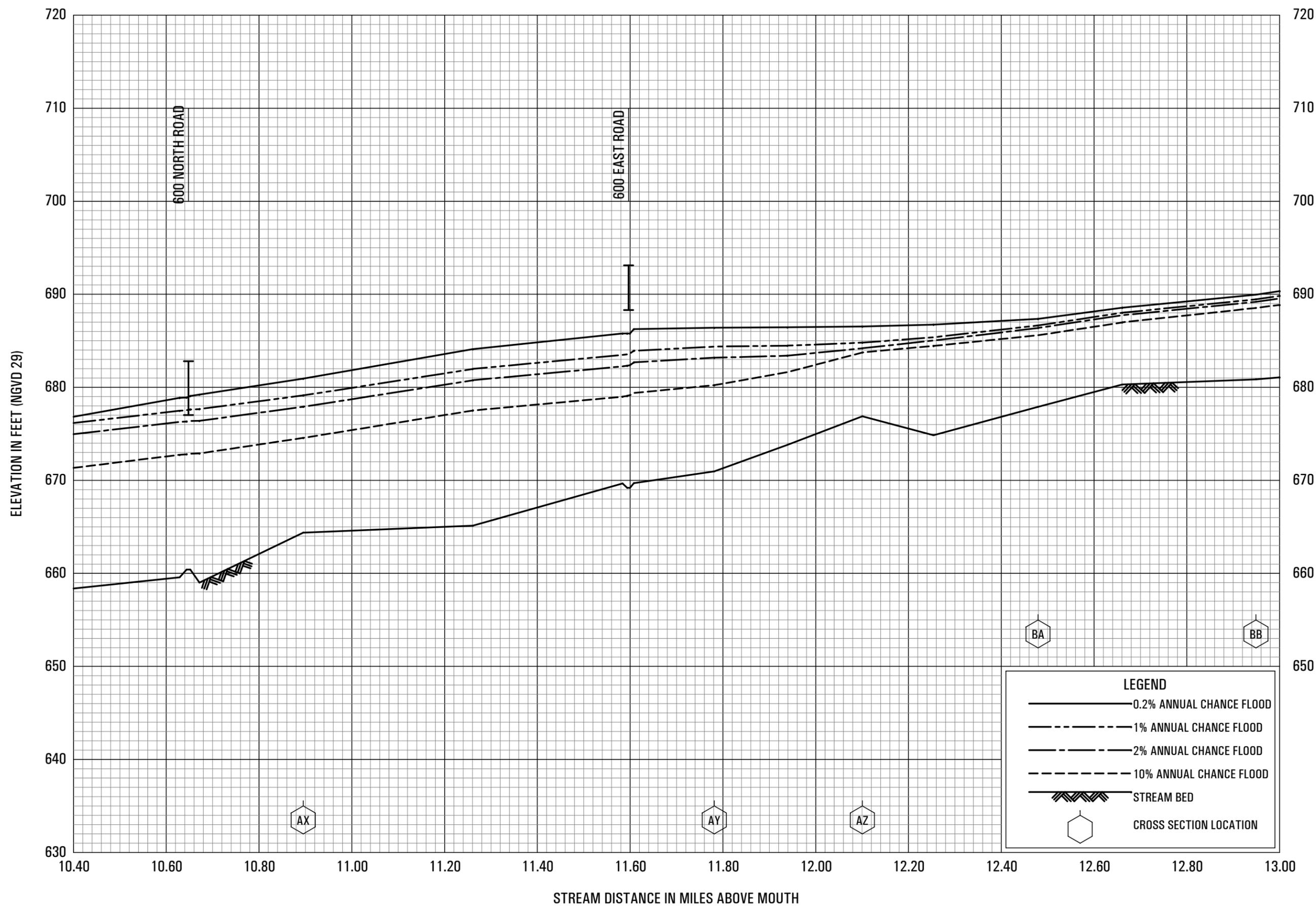
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 BARTHOLOMEW COUNTY, IN  
 AND INCORPORATED AREAS



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HAW CREEK

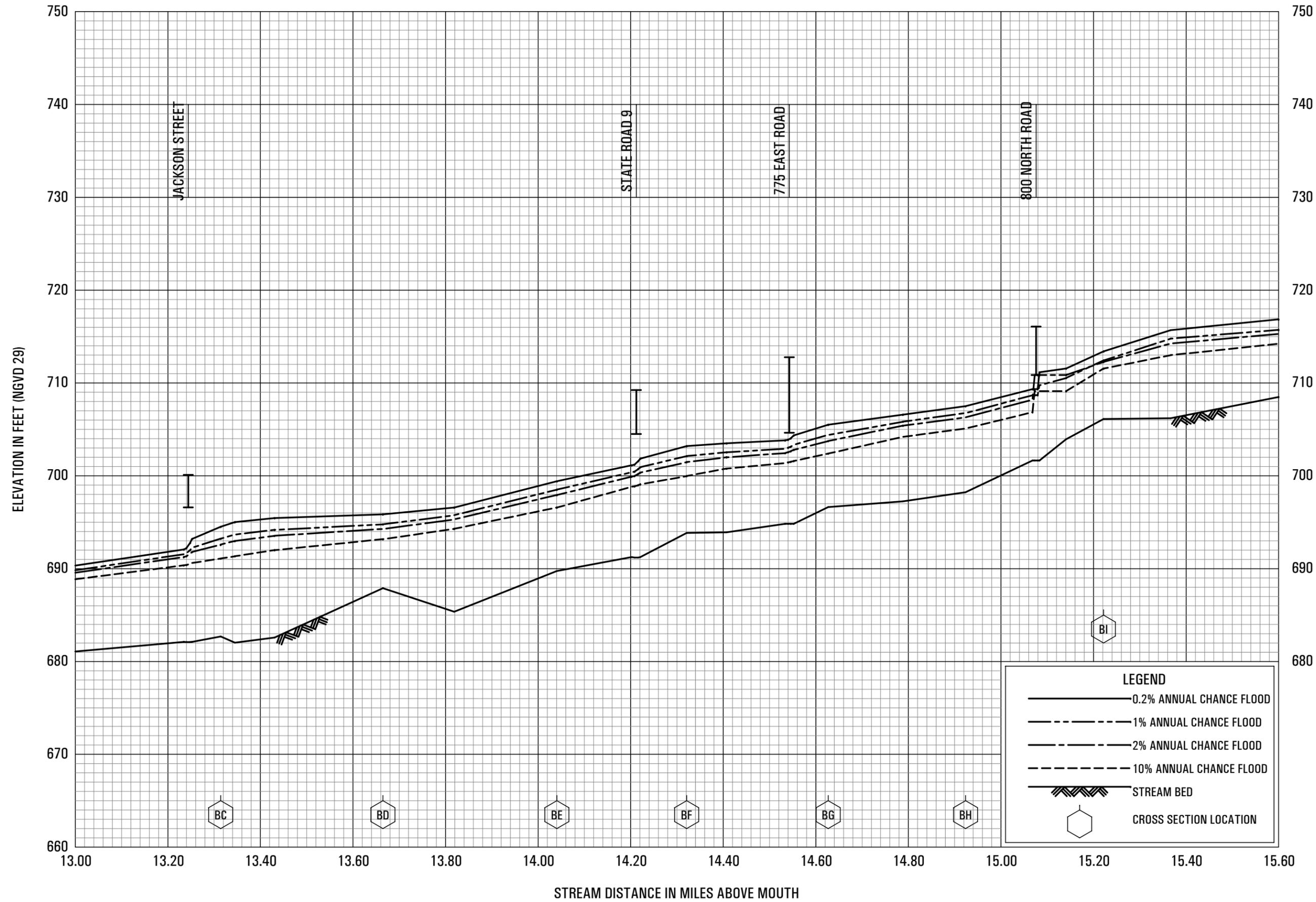
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**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS



**FLOOD PROFILES**

HAW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS



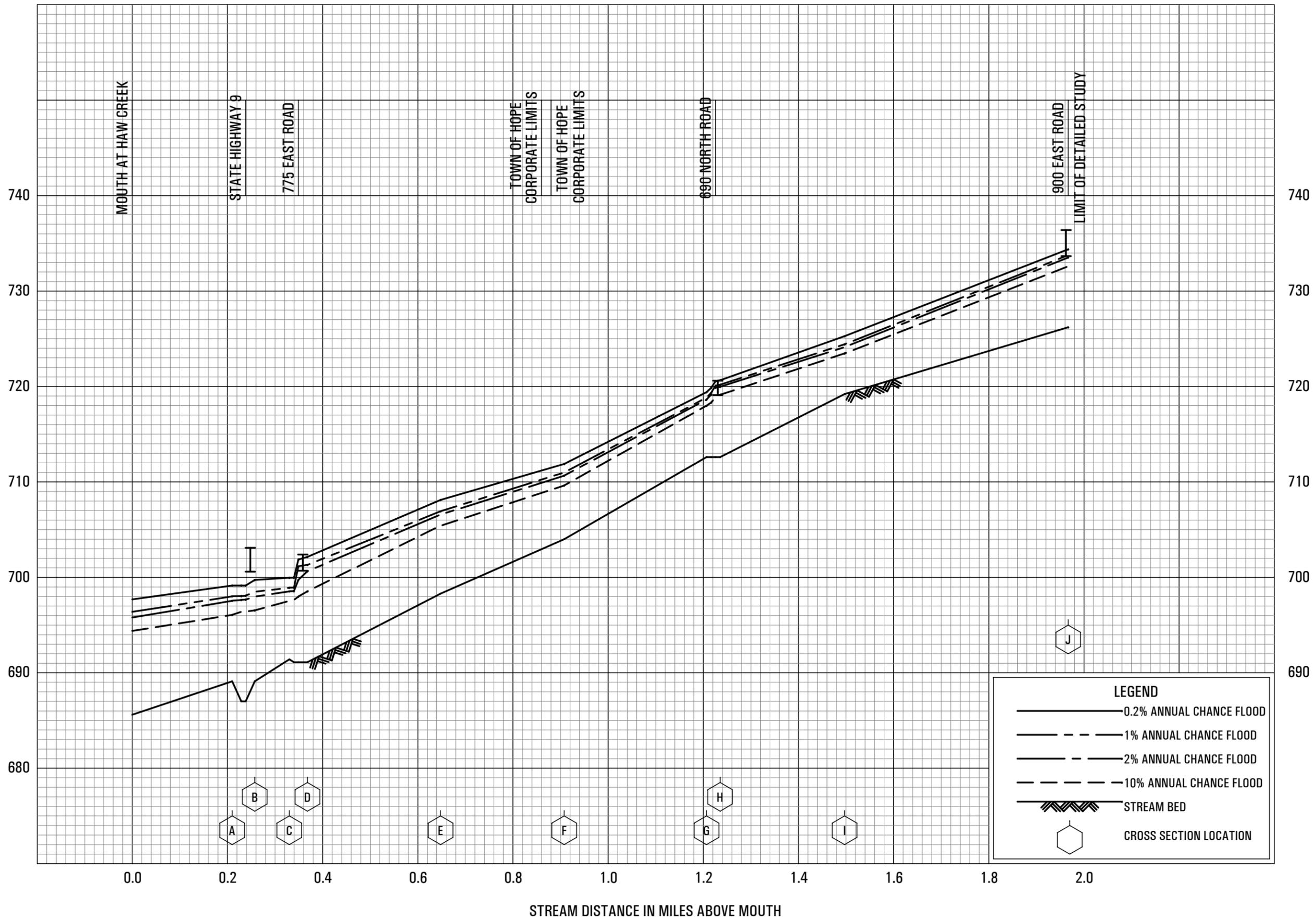
FLOOD PROFILES

HAW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY  
 BARTHOLOMEW COUNTY, IN  
 AND INCORPORATED AREAS



ELEVATION IN FEET (NAVD 88)



FLOOD PROFILES

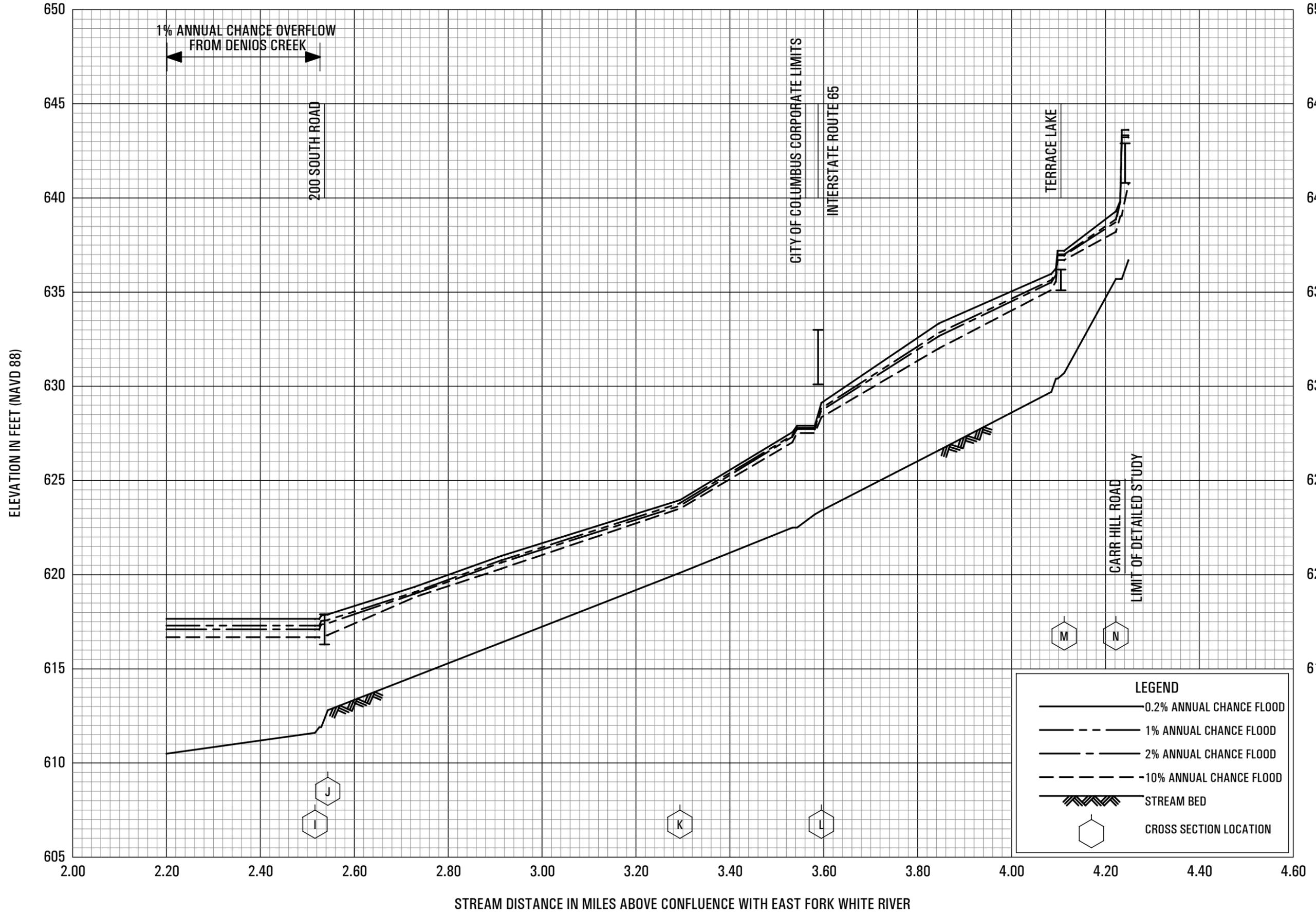
LITTLE HAW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY  
BARTHOLOMEW COUNTY, IN  
AND INCORPORATED AREAS





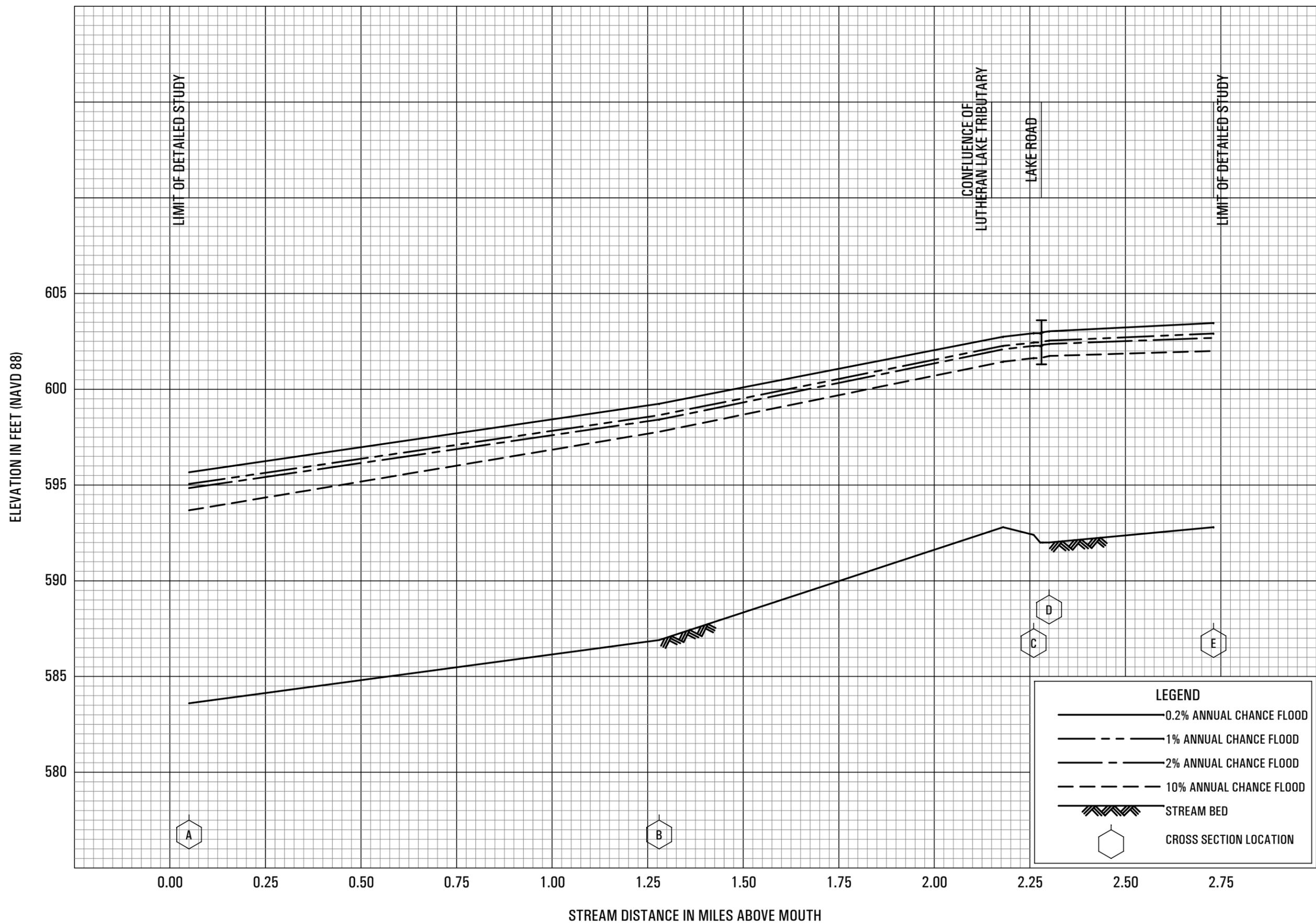


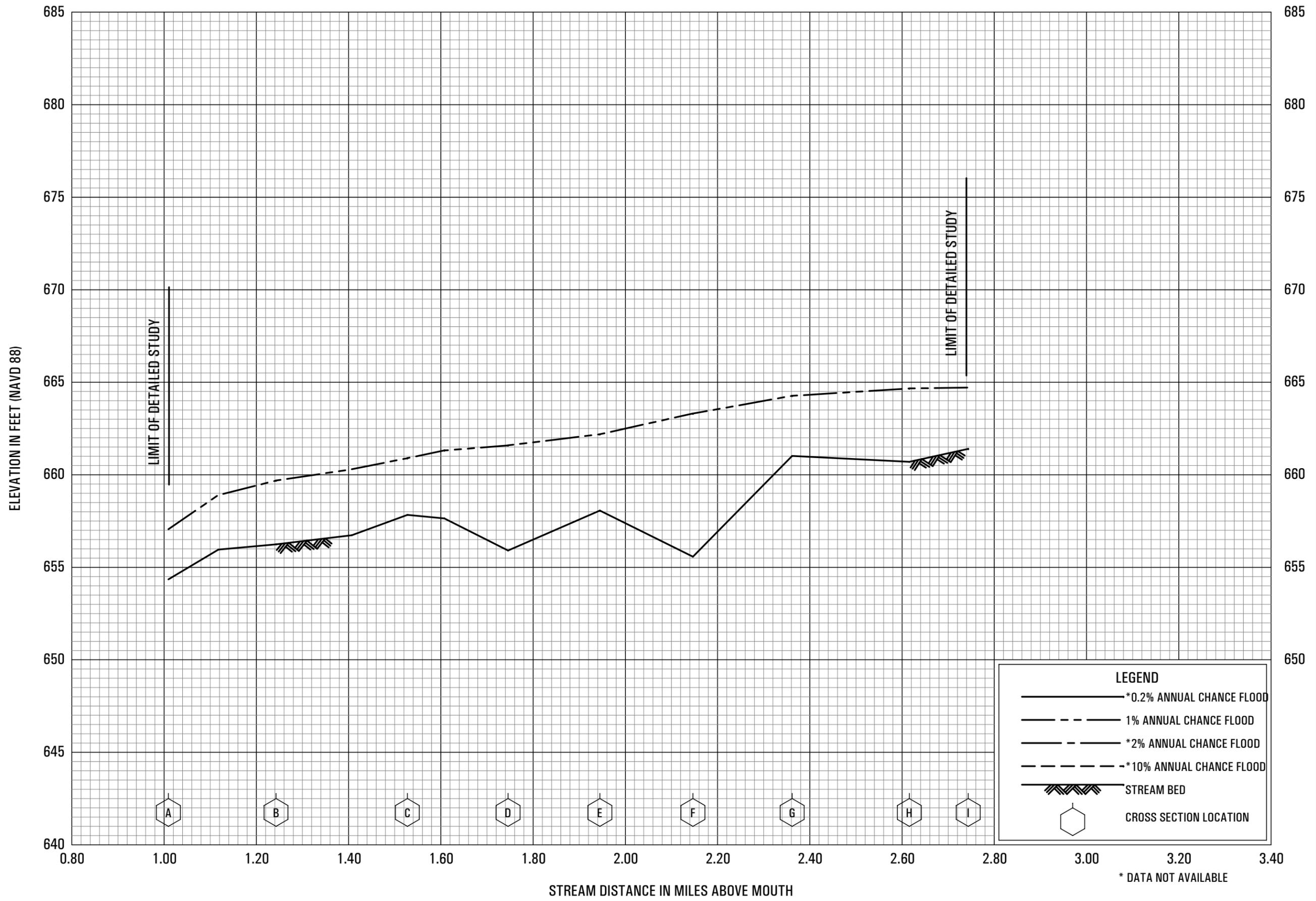


**FLOOD PROFILES**

OPOSSUM CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**BARTHOLOMEW COUNTY, IN**  
 AND INCORPORATED AREAS

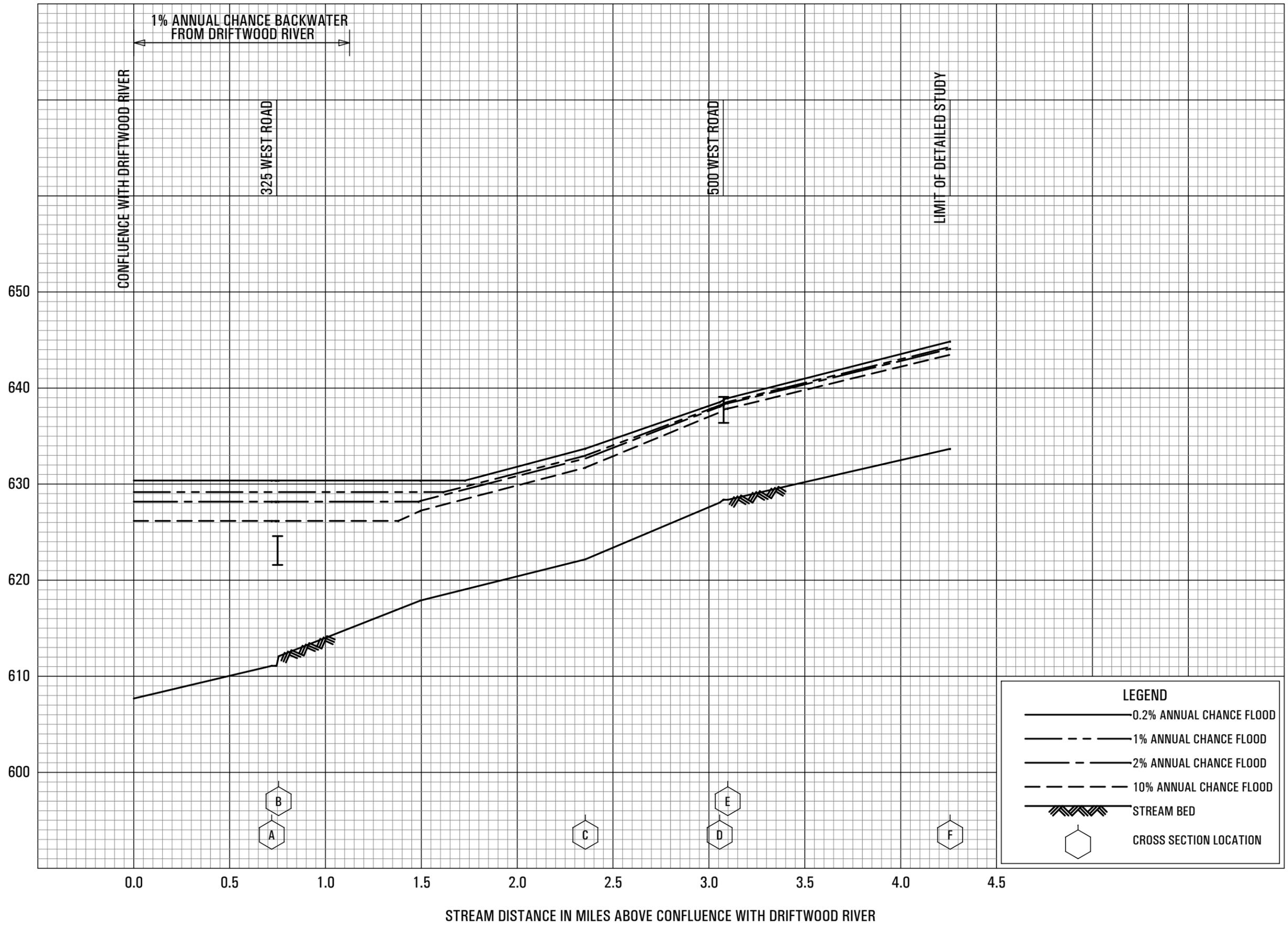




**FLOOD PROFILES**  
**UNNAMED TRIBUTARY TO DRIFTWOOD RIVER**

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**BARTHOLOMEW COUNTY, IN**  
 AND UNINCORPORATED AREAS

ELEVATION IN FEET (NAVD 88)



FLOOD PROFILES

WOLF CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY  
BARTHOLOMEW COUNTY, IN  
AND INCORPORATED AREAS