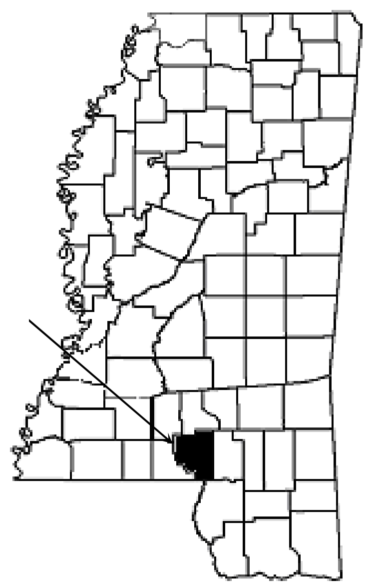
FLOOD INSURANCE STUDY

MARION COUNTY, MISSISSIPPI
AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER
COLUMBIA, CITY OF	280111
MARION COUNTY (UNINCORPORATED AREAS)	280230

EFFECTIVE:

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
28091CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program (NFIP) 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.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

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

Old Zones	New Zone
A1-A30	AE
V1-V30	VE
B	X
C	X

Initial Countywide FIS Effective Date:

Revised Countywide FIS Dates:

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FLOOD INSURANCE STUDY
MARION COUNTY, MISSISSIPPI AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and supersedes the FIS reports and/or Flood Insurance Rate Maps (FIRMs) in the geographic area of Marion County, Mississippi, including the City of Columbia and unincorporated areas of Marion County (hereinafter referred to collectively as Marion County).

This FIS 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. This information will also be used by Marion 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 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.

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.

March 1979, FIS Marion County (Unincorporated Areas)

The hydrologic and hydraulic analyses for this study were performed by Smith and Sanders, Inc., for the Federal Insurance Administration under Contract No. H-4057. This work, which was completed in April 1978, covered all significant flooding sources in Marion County.

March 1979, City of Columbia, FIS

The hydrologic and hydraulic analyses for this study were performed by Smith and Sanders, Inc., for the Federal Insurance Administration under Contract No. H-4057. This work, which was completed in January 1978, covered all significant flooding sources in the City of Columbia.

This Countywide FIS

The hydrologic and hydraulic analyses for this countywide FIS were performed by the State of Mississippi for the Federal Emergency Management Agency (FEMA), under Contract No. EMA-2007-CA-5774. This study was completed in September 2009.

The digital base map information files were provided by the U.S. Army Corps of Engineers—Vicksburg District, 4155 East Clay Street, Vicksburg, MS 39183. The digital orthophotography was acquired in March 2006, with the imagery processed to a 2-foot pixel resolution.

The digital FIRM was produced using the Mississippi State Plane Coordinate System, West Zone, FIPSZONE 2302. The horizontal datum was the North American Datum of 1983, GRS 80 spheroid. Distance units were measured in U.S. feet.

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.

March 1979, Marion County (Unincorporated Areas) FIS

The community base map was prepared from U.S. Geological Survey (USGS) quadrangle maps. The identification of streams requiring study was made in a meeting attended by representatives of the Federal Insurance Administration, Smith and Sanders, Inc., and Marion County in July 1976. Coordination activities in connection with this study include meetings or discussions with representatives of the U.S. Army Corps of Engineers (USACE), USGS, U.S. Soil Conservation Service, South Mississippi Economic and Development District, and the Mississippi Research and Development Center. Notice of intent to perform the Flood Insurance Study was published on three separate occasions in a local newspaper in February and March 1977.

March 1979, City of Columbia, FIS

The community base map was developed from maps furnished by the Mississippi Research and Development Center and USGS quadrangle maps, and the identification of streams requiring detailed study was made in a meeting attended by representatives of the FIA, the City of Columbia, and Smith and Sanders, Inc., in July 1976.

Other coordination activities include meetings or contacts with the Mississippi Research Development Center, the South Mississippi Economic Development District, the USACE, the U.S. Soil Conservation Service, and the USGS. Notice of intent to perform the Flood Insurance Study was published on three separate occasions in a local newspaper in February and March, 1977.

This Countywide FIS

For this countywide FIS, the Project Scoping Meeting was held on March 19, 2008 in Columbia, MS. Attendees for these meetings included representatives from the Mississippi Department of Environmental Quality, Mississippi Emergency Management Agency, FEMA National Service Provider, Marion County, the City of Columbia, the State, and the Study Contractor. Coordination with county officials and Federal, State, and regional agencies produced a variety of information pertaining to floodplain regulations, available community maps, flood history, and other hydrologic data. All problems raised in the meetings have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Marion County, Mississippi, and its incorporated communities listed in Section 1.1 Several flooding sources within the county were studied by approximate methods. Approximate analyses are used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon, by FEMA and the State of Mississippi.

March 1979, Marion County (Unincorporated Areas) FIS

Floods caused by the overflow of reaches of the Pearl River, Upper Little Creek, Silver Creek, and Balls Mill Creek were studied in detail. The reach of the Pearl River studied in detail extends from a point approximately fifteen miles downstream of the southern corporate limit of Columbia to a point approximately eight miles upstream of the northern corporate limit of the city. Upper Little Creek was studied in detail from its confluence with the Pearl River approximately five miles upstream. Silver Creek was studied in detail from its confluence with the Pearl River approximately five miles upstream to a county road crossing. Balls Mill Creek was studied in detail from its confluence with Pearl River approximately 4.5 miles upstream to a point just east of Columbia. The reaches of the Pearl River within Marion County not studied in detail were studied by approximate methods. Additionally, other tributaries of the Pearl River were studied by approximate methods.

March 1979, City of Columbia, FIS

The March 1979, Flood Insurance Study covered the entire incorporated area of the City of Columbia. Floods caused by the overflow of the Pearl River, Balls Mill Creek Tributary, Dry Creek, Webb Creek, and Jones Creek were studied in detail. Flooding on the upper reaches (drainage area less than one square mile) of Balls Mill Creek Tributary and Webb Creek was studied by approximate methods.

This Countywide FIS

For this countywide FIS, Pearl River and Balls Mill Creek Tributary were studied by detailed methods. This study type entails collecting basic field measurements of hydraulic structures and channel geometry. Vertical control is determined by the survey crew using USGS benchmarks. Roughness values are estimated from aerial photography and photographs collected during survey. Channel and overbank reach lengths are computed using GIS methods. Model results are calibrated to known stage values, as they are available and deemed reliable. Table 1 lists the flooding sources, which were revised or newly studied by detailed methods.

TABLE 1 – STREAMS STUDIED BY DETAILED METHODS

Pearl River	From a point approximately 0.32 miles upstream of the confluence of Dillon Creek to a point approximately 1.88 miles downstream of the confluence of Cypress Creek.
Balls Mill Creek Tributary	From approximately 5,100 feet above the confluence with Balls Mill Creek to approximately 190 feet downstream of Pearl Street.

Floodplain boundaries of streams that have been previously studied by detailed methods were redelineated based on up-to-date topographic information.

2.2 Community Description

Marion County, on the southern Mississippi-Louisiana line, was organized on December 9, 1811, from lands acquired from the Choctaw Nation by the Treaty of Mount Dexter, signed in 1805. Only seven other Mississippi counties were in existence at this time. David Holmes was territorial governor and James Madison was President of the United States.

Portions of a road built by Andrew Jackson between 1816 and 1820 can still be found in Marion County. The county was named for General Francis Marion, Revolutionary War general.

The population in 2008 was estimated by the U.S. Census Bureau was 25,830 (Census Bureau, 2009). The primary industries in Marion County are retail trade, manufacturing, and health care and social services (Census Bureau, 2009).

The topography of Marion County varies from gently rolling to steep, with elevations ranging from about 120 feet, to 510 feet above sea level. Soils in the area are composed primarily of fine sandy soils and silty loams. The climate of Marion County is characterized by hot, humid summers and mild winters. The mean low monthly temperature is 48^{o}F in January and a mean high monthly temperature of 82^{o}F in July. The yearly average precipitation is 64 inches (Mississippi State University, 2009).

2.3 Principal Flood Problems

In general, the flooding problems in Marion County have been associated with overbank flooding of the Pearl River. Lowland floods occur along many of the tributaries when intense local storm events coincide with higher than normal stages on the river.

2.4 Flood Protection Measures

Flood protection measures have consisted of channel improvements by excavation or paving and replacement of inadequate culverts and bridges.

3.0 <u>ENGINEERING METHODS</u>

For the flooding sources studied by detailed methods in the communities, 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, <u>average</u> 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 the community.

March 1979, Marion County (Unincorporated Areas) FIS Analyses

The gaging station on the Pearl River at U.S. Highway 98 at Columbia was the principal source of data for defining discharge-frequency relationships for the river. The gage has been operated by the USGS since 1905. Values for the 10-, 2- 1-, and 0.2-percent annual chance peak discharges were obtained from a log-Pearson Type III distribution of annual peak-flow data for the period 1905-1976. Those computations were performed according to “Guidelines for Determining Flood Flow Frequency” by the U.S. Water Resources Council (United States Water Resources Council, 1976).

Peak discharge-frequency data for the other streams studied in detail were computed using regional relationships relating basin characteristics to stream flow characteristics developed by the USGS. This methodology is defined in “Flood Frequency of Mississippi Streams” (Department of the Interior, 1976).

During high flows on Silver Creek, some of the flow on the reach of the stream immediately upstream of U.S. Highway 98 is diverted from the natural flood plain and flows overland in an easterly direction through the Town of Foxworth. This flow ultimately discharges into the Pearl River. It was assumed that the high natural ground along the east (right) overbank of Silver Creek forming the divide between stream flow and overland flow created a very broad crested weir. The weir equation was used to compute the amount of flow diverted from the Silver Creek flood plain into overland flow through Foxworth. Consequently, peak flows on Silver Creek decrease in the vicinity of U.S. Highway 98.

March 1979, City of Columbia FIS Analyses

The gaging station on the Pearl River at U.S. Highway 98 at Columbia was the principal source of data for defining discharge-frequency relationships for the river. The gage has been operated by the USGS since 1905. Values for the 10-, 2- 1-, and 0.2-percent annual chance peak discharges were obtained from a log-Pearson Type III distribution of annual peak-flow data for the period 1905-1976. Those computations were performed according to “Guidelines for Determining Flood Flow Frequency” by the U.S. Water Resources Council (United States Water Resources Council, 1976).

Peak discharge-frequency data for the other smaller streams studied in detail were computed using regional relationships relating basin characteristics developed by the USGS. This methodology is defined in “Flood Frequency of Mississippi Streams” (Department of the Interior, 1976). Adjustments for urbanization effects were made according to the methodology presented by the USGS in “An Approach to Estimating Flood Frequency for Urban Areas in Oklahoma” (Department of the Interior, 1974). The 0.2-percent annual chance discharges for Balls Mill Creek Tributary, Dry Creek, Web Creek, and Jones Creek were obtained by straight line extrapolation onto log-probability paper.

This Countywide FIS Analysis

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by limited detail methods affecting the communities. Peak discharges were calculated based on USGS regional regression equations (U.S. Department of the Interior, 1991). For the discharges calculated based on regional regression equations, the rural regression values were modified to reflect stream gage weighting and/or urbanization as necessary.

A summary of the drainage area-peak discharge relationships for all the streams is shown in Table 2, “Summary of Discharges.”

TABLE 2. SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	PEAK DISCHARGES (cfs)			
		10-percent	2-percent	1-percent	0.2-percent
BALLS MILLS CREEK					
At Cross Section B	5.59	2,340	3,560	4,010	5,170
At Cross Section D	4.77	2,310	3,460	3,860	4,940
At Cross Section E	3.54	2,280	3,300	3,640	4,600
At Cross Section I	3.15	2,260	3,250	3,570	4,490
At U.S. Highway 98	1.14	870	1,220	1,340	1,680
At Park Avenue	1.00	680	950	1,090	1,360
BALLS MILL CREEK TRIBUTARY					
At Lumberton Road	1.70	*	*	1,538	*
At RA Johnson Road	0.87	*	*	1,137	*

* Data Not Available

TABLE 2. SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	PEAK DISCHARGES (cfs)			
		10-percent	2-percent	1-percent	0.2-percent
DRY CREEK					
At Mouth	5.06	2,120	3,170	3,540	4,510
At Dewey Street	3.94	1,620	2,430	2,710	3,470
At West Avenue	3.71	1,470	2,260	2,520	3,260
At Cross Section L	3.52	1,390	2,140	2,390	3,090
JONES CREEK					
At Mouth	5.52	1,800	2,730	3,090	3,950
At Evergreen Street	4.93	1,580	2,420	2,770	3,570
At State Highway 13	4.73	1,540	2,400	2,740	3,550
PEARL RIVER					
At U.S. Highway 98	5,690	53,200	64,190	102,200	114,700
SILVER CREEK					
At U.S. Highway 98	37.4	8,200	10,700	11,400	13,300
At Cross Section F	37.0	9,000	13,000	14,500	18,000
At State Highway 587	36.8	9,510	15,400	17,300	22,600
At Cross Section K	35.6	9,200	14,900	16,700	21,900
At Water Valley Road	33.2	9,030	14,600	16,400	21,500
UPPER LITTLE CREEK					
At Cross Section B	125	14,000	22,800	25,900	33,800
At Cross Section E	122	13,700	22,300	25,300	33,100
WEBB CREEK					
At Mouth	1.08	690	970	1,100	1,380
At Owens Street	0.92	560	800	920	1,150

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 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.

March 1979, Marion County (Unincorporated Areas) FIS Analyses

Cross section data fro the streams in the study area were obtained by field measurements. All bridges and culverts were field surveyed to obtain elevation data and structural geometry. Cross sections were located at close intervals upstream and downstream of bridges and culverts to compute significant backwater effects of these structures.

Roughness coefficients (Manning's "n") were estimated by field inspection at each cross section. Roughness values for the main channels of Silver Creek, Balls Mill Creek, and Upper Little Creek varied from 0.050 to 0.080; roughness values for their flood plains ranged from 0.070 to 0.200.

Water-surface profiles were developed on all streams studied by detailed methods using a HEC-2 computer step-backwater model (USACE, 1976). The model for the Pearl River was calibrated with a log-Pearson Type III distribution of annual peak stage data at the gage at U.S. Highway 98 for the period 1905-1976. High water records of Pearl River floods of 1962 and 1972 obtained from the USGS also were used to refine the model. Profiles were determined for the 10-, 2-, 1-, and 0.2-percent annual chance floods.

Water-surface elevations in the portion of Marion County east of State Highway 35 and north of the Pearl River near northwest Columbia were determined from the computed elevations on the Pearl River west of the highway and form high water marks of the April 1974 flood. The high water marks, obtained from the USGS, were taken along both the upstream (west) and downstream (east) sides of the highway embankment. These marks indicated an elevation differential of approximately 1.5 feet between the upstream and downstream sides of the embankment. Based on the computed elevations along the Pearl River and this elevation differential, water-surface elevations were determined in this area which is flooded by the Pearl River.

Flood boundaries along certain reaches of the Pearl River and some of its tributaries not studied by detailed methods were determined from USGS publications, "Map of Flood Prone Areas, Columbia North, Columbia South, and Morgantown, Mississippi (USGS, 1973). These maps depict approximate 1-percent annual chance flood boundaries delineated through the use of readily available information on past floods and regional studies rather than from detailed field surveys and engineering computations. No water-surface elevations were published. Other approximate flood boundaries in this study were determined from past flood data and field and map reconnaissance.

March 1979, City of Columbia FIS Analyses

Cross section data for the streams in the study area were obtained by field inspection. All bridges and culverts were field surveyed to obtain elevation data and structural geometry. Cross sections were located at close intervals upstream and downstream of bridges and culverts to compute significant backwater effects of these structures.

Roughness coefficients (Manning's "n") were estimated by field inspection at each cross section. Roughness values for the main channels of Dry Creek, Webb Creek, and Jones Creek varied from 0.040 to 0.080; roughness values for their flood plains ranged from 0.060 to 0.200.

Water-surface profiles were developed on all streams studied by detailed methods using a HEC-2 computer step-backwater model (USGS, 1976). The model for the Pearl River was calibrated with a log-Pearson Type III distribution of annual peak stage data at the gage at U.S. Highway 98 for the period of 1905-1976. Profiles were determined for the 10-, 2-, 1-, and 0.2-percent annual chance floods.

Water surface elevations in northwest Columbia east of State Highway 35 were determined from the computed elevations on the Pearl River west of the highway and high water marks from the April 1974 flood. The high water marks, obtained from the USGS, were taken along both the upstream (west) and downstream (east) sides of the highway embankment. These marks indicated an elevation differential of approximately 1.5 feet between the upstream and downstream sides of the embankment. Based on the computed elevation differential, water-surface elevations were determined for the area of northwest Columbia, east of State Highway 35, which is flooded by the Pearl River.

Starting water-surface elevations for the streams studied in detail were determined by the slope-area method.

Flood boundaries along the upper reaches of Balls Mill Creek Tributary and Webb Creek within the study area were determined by approximate methods. These boundaries were determined by USGS Topographic Maps and inspection of the areas. Flood elevations in the City of Columbia may be raised by debris blockage of the streams in the study area. The hydraulic analyses for this study, however, are based only on the effect of unobstructed flow.

This Countywide FIS Analysis

Cross section geometries were obtained from a combination of terrain data and field surveys. Bridges and culverts located within the detailed study limits were field surveyed to obtain elevation data and structural geometry.

Downstream boundary conditions for the hydraulic models were set to normal depth using a starting slope calculated from values taken from topographic data, or where applicable, derived from the water-surface elevations. Water-surface profiles were computed through the use of the USACE HEC-RAS version 3.1.3 computer program (USACE, 2003). The model was run for the 1-and 0.2-percent annual chance storms for the detailed and the 1-percent annual chance storm for approximate studies.

Channel roughness factors (Manning's "n" values) used in the hydraulic computations for both channels and overbank areas were based on recent digital orthophotography and field investigations.

Table 3, "Summary of Roughness Coefficients", shows the range of the channel and overbank roughness factors used in the computations for all of the streams studied by detailed methods.

TABLE 3 – SUMMARY OF ROUGHNESS COEFFICIENTS

FLOODING SOURCE	CHANNEL "N"	OVERBANK "N"
BALLS MILL CREEK TRIBUTARY 1	0.04	0.1-0.11
PEARL RIVER	0.055	0.15

The hydraulic analyses for this countywide FIS 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.
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.

Benchmarks 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 monuments below 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 benchmarks, the FIRM may also show vertical control monument 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 current elevation, description, and/or location information for benchmarks shown on the FIRM for this jurisdiction, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov.

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 the 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 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. The elevations shown in the FIS report and on the FIRM for Marion County are referenced to NAVD88.

Ground, structure, and flood elevations may be compared and/or referenced to NGVD29 by applying a conversion factor. To convert elevations from NAVD88 to NGVD29, add 0.10 feet to the NAVD88 elevation. The 0.10 feet value is an average for the entire county. The adjustment value was determined using the USACE Corpscon 6.0.1 computer program (USACE, 2004) and topographic maps (U.S. Department of the Interior, 1972). The BFE's shown on the FIRM represent whole-foot rounded values. For example, a BFE of 12.4 feet will appear as 12 feet on the FIRM, and 12.6 feet as 13 feet. Users who wish to convert the elevations in this FIS report to NGVD29 should apply the stated conversion factor to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1-foot.

For more information regarding conversion between the NGVD and the NAVD, see the FEMA publication entitled *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988* 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).

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, Floodway Data Table and Summary of Stillwater Elevations 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-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 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 limited detailed and approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2). Floodplain boundaries for these streams, as well as those streams that have been previously studied by detailed methods, were generated using USGS 10-meter Digital Elevation Models (USGS), then refined using detailed hydrographic data (Dept. of Interior, 1972).

4.2 Floodways

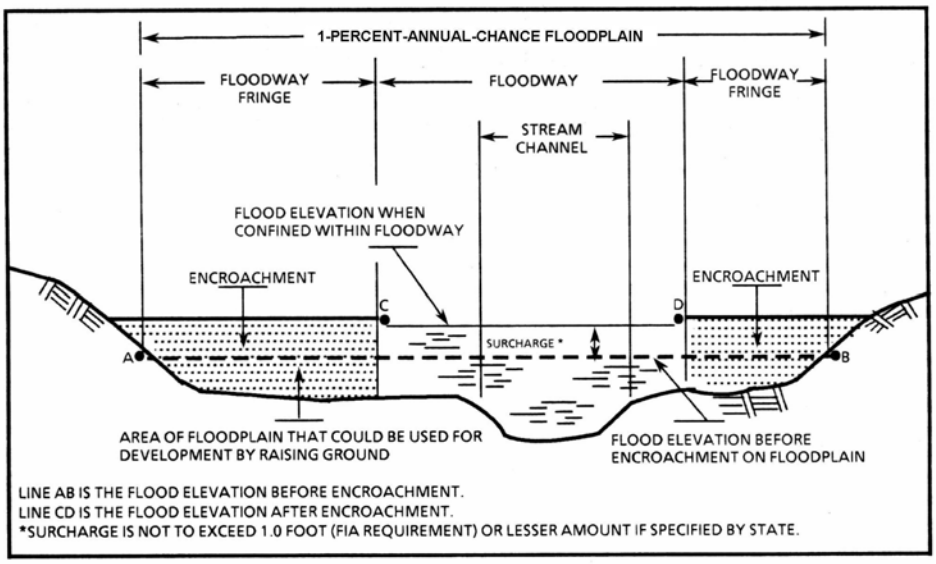
Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development 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 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 of detailed study streams (Table 4). For detailed study streams, 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 4, “Floodway Data,” for certain downstream cross sections 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. For detailed study streams, a listing of stream velocities at selected cross sections is provided in Table 4. In order to reduce the risk of property damage in areas where the stream velocities are high, the county 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 of the 1-percent-annual-chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.



FLOODWAY SCHEMATIC Figure 1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BALLS MILL CREEK								
A	6,950	1918	4,627	0.87	142.5	142.5	143.5	1.0
B	8,950	766	5,904	0.68	145.5	145.5	146.4	0.9
C	12,000	697	2,794	1.38	146.6	146.6	147.6	1.0
D	16,050	1014	2,298	1.58	157.2	157.2	158.2	1.0
E	17,710	372	1,437	2.53	165.3	165.3	166.2	0.9
F	17,985	345	1,601	2.27	167.3	167.3	168.3	1.0
G	18,400	303	1,957	1.86	169.1	169.1	170.0	0.9
H	20,175	175	1,499	2.38	174.2	174.2	174.7	0.5
I	21,720	119	607	2.21	180.2	180.2	180.3	0.1
J	22,985	131	539	2.49	184.8	184.8	185.6	0.8
K	24,300	101	462	2.66	191.6	191.6	192.5	0.9
BALLS MILL CREEK TRIBUTARY								
A	5,100	193	919	1.48	144.0	142.9[2]	143.9	1.0
B	5,470	541	1,915	0.63	144.0	143.9[2]	144.2	0.3
C	6,422	315	1,340	0.69	144.0	143.9[2]	144.5	0.6
D	7,041	198	717	1.52	144.9	144.0[3]	144.6	0.6
E	7,726	300	2,270	0.54	146.5	146.2[3]	146.9	0.7
F	8,800	275	1,747	0.98	147.0	146.3[3]	147.0	0.7
G	10,276	250	884	1.64	152.2	152.1[3]	153.0	0.9

[1] FEET ABOVE MOUTH
[2] ELEVATIONS COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM PEARL RIVER.
[3] ELEVATIONS COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM BALLS MILL CREEK.

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

BALLS MILL CREEK - BALLS MILL CREEK TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DRY CREEK								
A	1,350	151	688	5.15	145.7	137.0[2]	137.7	0.7
B	2,150	80	557	4.86	145.7	142.0[2]	142.5	0.5
C	3,300	97	641	4.23	149.6	149.6	150.1	0.5
D	4,710	261	1,619	1.67	154.1	154.1	154.9	0.8
E	5,700	177	1,035	2.62	155.4	155.4	156.2	0.8
F	6,660	114	804	3.13	159.4	159.4	159.8	0.4
G	7,430	55	507	4.97	161.4	161.4	162.1	0.7
H	8,340	73	696	3.62	166.8	166.8	167.2	0.4
I	9,400	86	702	3.59	169.4	169.4	169.7	0.3
J	9,910	110	1,016	2.48	170.3	170.3	170.6	0.3
K	10,780	100	950	2.52	171.1	171.1	171.6	0.5

[1] FEET ABOVE MOUTH
[2] ELEVATIONS COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM PEARL RIVER

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

DRY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
JONES CREEK								
A	360	93	575	5.37	145.7	134.7[2]	135.0	0.3
B	1,330	139	532	5.81	145.7	139.9[2]	140.8	0.9
C	2,810	138	1,018	3.04	146.3	146.3	147.0	0.7
D	3,780	105	835	3.70	149.7	149.7	150.3	0.6
E	4,460	161	1064	2.90	152.0	152.0	152.9	0.9
F	5,430	63	561	4.94	155.9	155.9	156.4	0.5
G	6,400	165	1,203	2.30	158.0	158.0	158.6	0.6
H	7,350	195	917	3.02	161.3	161.3	162.0	0.7
I	8,360	160	963	2.88	165.1	165.1	166.1	1.0
J	9,310	134	876	3.13	170.9	170.9	171.7	0.8

[1] FEET ABOVE MOUTH
[2] ELEVATIONS COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM PEARL RIVER.

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

FLOODWAY DATA

JONES CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
PEARL RIVER								
A	123.90	9,400	14,482	2.12	129.8	129.8	130.7	0.9
B	126.36	11,500	53,793	1.62	131.1	131.1	132.1	1.0
C	127.66	9,800	17,846	2.35	132.0	132.0	132.9	0.9
D	129.00	6,200	65,968	3.80	133.1	133.1	134.0	0.9
E	132.90	9,750	85,155	3.07	136.4	136.4	137.4	1.0
F	135.88	7,270	28,217	1.77	144.9	144.9	145.7	0.8
G	139.40	7,030	62,061	3.37	149.6	149.6	150.3	0.7
H	142.00	7,282	56,991	3.48	152.9	152.9	153.7	0.8
I	145.24	7,878	76,335	3.45	155.1	155.1	156.0	0.9
J	147.18	9,800	98,637	2.54	156.8	156.8	157.7	0.9
K	150.46	3,300	29,747	6.58	158.9	158.9	159.7	0.8

[1] MILES ABOVE MOUTH

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

PEARL RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SILVER CREEK								
A	8,000	3,210	18,365	0.62	144.3	144.3	145.3	1.0
B	11,500	1,900	6,753	1.69	146.4	146.4	147.4	1.0
C	12,850	323	1,942	5.87	152.8	152.8	153.7	0.9
D	13,125	241	1,890	6.03	154.7	154.7	155.5	0.8
E	13,550	272	2,051	5.56	156.1	156.1	157.1	1.0
F	14,000	439	3,533	4.10	157.7	157.7	158.7	1.0
G	14,600	425	4,233	3.43	159.2	159.2	160.2	1.0
H	14,925	646	4,700	3.68	162.1	162.1	163.1	1.0
I	17,150	465	5,787	2.99	167.3	167.3	168.3	1.0
J	19,100	606	5,704	3.03	170.5	170.5	171.4	0.9
K	23,775	867	6,709	2.49	180.8	180.8	181.7	0.9
L	27,250	549	5,403	3.04	189.3	189.3	190.2	0.9

[1] FEET ABOVE MOUTH

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

SILVER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
UPPER LITTLE CREEK								
A	14,800	822	8580	3.02	139.8	139.8	140.7	0.9
B	18,800	854	6977	3.71	143.7	143.7	144.5	0.8
C	22,950	717	6830	3.79	147.6	147.6	148.4	0.6
D	25,500	145	2236	11.31	151.2	151.2	151.7	0.5
WEBB CREEK								
A	150	65	297	3.70	145.7	136.4[2]	136.9	0.5
B	850	42	200	5.49	145.7	142.3[2]	142.3	0.0
C	1,120	55	277	3.98	150.2	150.2	150.2	0.0
D	1,740	115	598	1.84	150.6	150.6	150.6	0.0
E	2,230	69	341	3.23	151.5	151.5	152.0	0.5
F	2,630	106	407	2.26	153.3	153.3	153.6	0.3
G	3,800	214	444	2.07	156.6	156.6	157.6	1.0
H	4,400	84	361	2.55	160.9	160.9	161.4	0.5

[1] FEET ABOVE MOUTH
[2] ELEVATIONS COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM PEARL RIVER.

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

UPPER LITTLE CREEK – WEBB CREEK

5.0 INSURANCE APPLICATION

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 base (1-percent annual chance) flood elevations (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 AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 1-percent annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within the zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to the areas of 1-percent annual chance shallow flooding (usually sheet flow on sloping terrain) where the average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within the zone.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 1-percent floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 1-percent coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1-percent coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations 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 base flood by levees. No BFEs or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

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 countywide FIRM presents flooding information for the entire geographic area of Marion 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 Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community, up to and including this countywide FIS are presented in Table 5, “Community Map History.”

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Columbia, City of	May 31, 1974	January 16, 1976	September 28, 1979	September 4, 1981
Marion County (Unincorporated Areas)	December 23, 1977	--	September 28, 1979	--

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Marion County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS reports, FIRMs, and/or FBFMs for all of the incorporated and unincorporated jurisdictions within Marion 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 IV, Koger-Center — Rutgers Building, 3003 Chamblee Tucker Road, Atlanta, GA 30341.

9.0 BIBLIOGRAPHY AND REFERENCES

National Weather Service (November, 2009). Website, Jackson, MS, monitoring station, http://www.srh.noaa.gov/jan/climate_connection.php

United States Water Resources Council, "Guidelines for Determining Flood Flow Frequency," Bulletin 17, 1976.

U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis California, October 1973

U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, May 1991

U.S. Army Corps of Engineers Hydrologic Engineering Center, HEC-2 Water Surface Profiles Generalized Computer Program, Davis, California, November 1976.

U.S. Army Corps of Engineers (May 2003). Hydrologic Engineering Center, HEC-RAS River Analysis System, User's Manual, version 3.1.3, Davis, California.

U.S. Army Corps of Engineers, Topographic Engineering Center, Corpscon Version 6.0.1, Alexandria, Virginia, August 2004

U.S. Census Bureau (November 2009). Website–2008 Population Estimate.

U.S. Census Bureau (November 2009). Website–2008 Economic Fact Sheet.

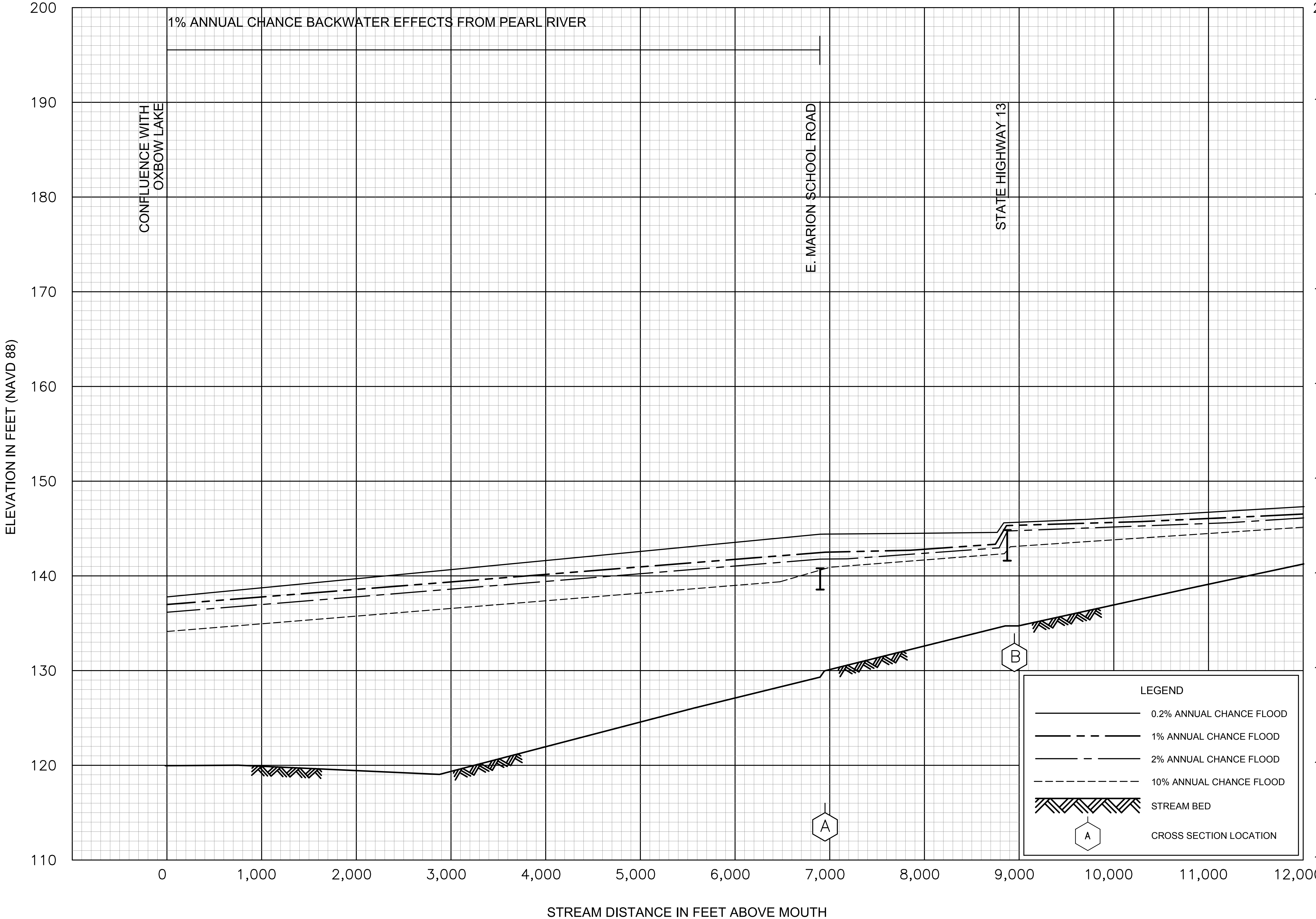
U.S Department of the Interior, Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: Brookhaven, Mississippi, 1972.

U.S Department of the Interior, Geological Survey, Water Resources Division, An Approach to Estimating Flood Frequency for Urban Areas in Oklahoma, Oklahoma City, Oklahoma, July 1974.

U.S Department of the Interior, Geological Survey, Flood Frequency of Mississippi Streams, B.E. Colson and J.W. Hudson, 1976.

U.S. Department of the Interior, Geological Survey, Flood Characteristics of Mississippi Streams, Water-Resources Investigations Report 91-4037, Jackson, MS, 1991.

U.S. Department of the Interior, U.S. Geological Survey, Map of Flood Prone Areas, Columbia North, Columbia South, Morgantown, Mississippi, 1973.



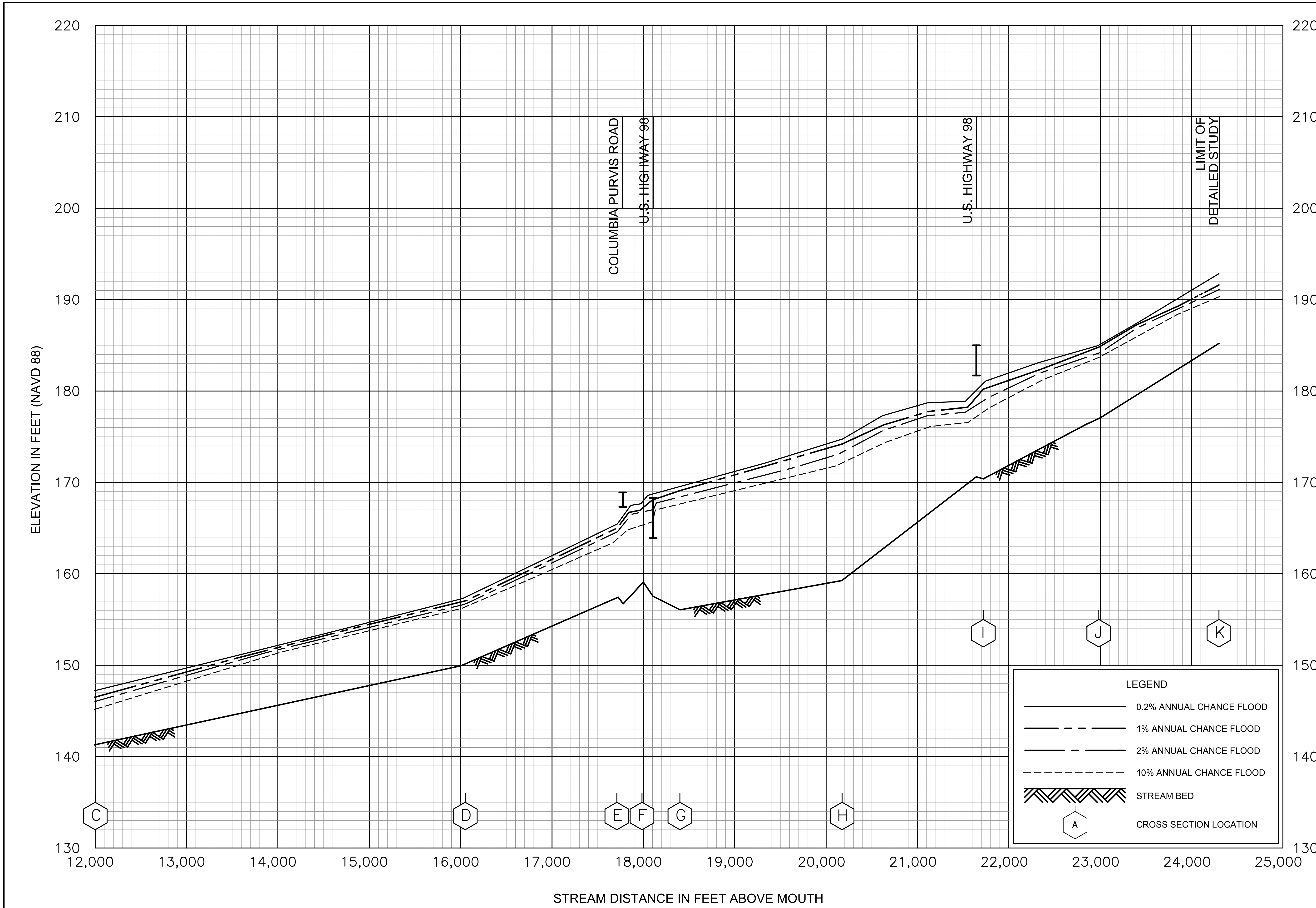
FLOOD PROFILES

BALLS MILLS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

01P



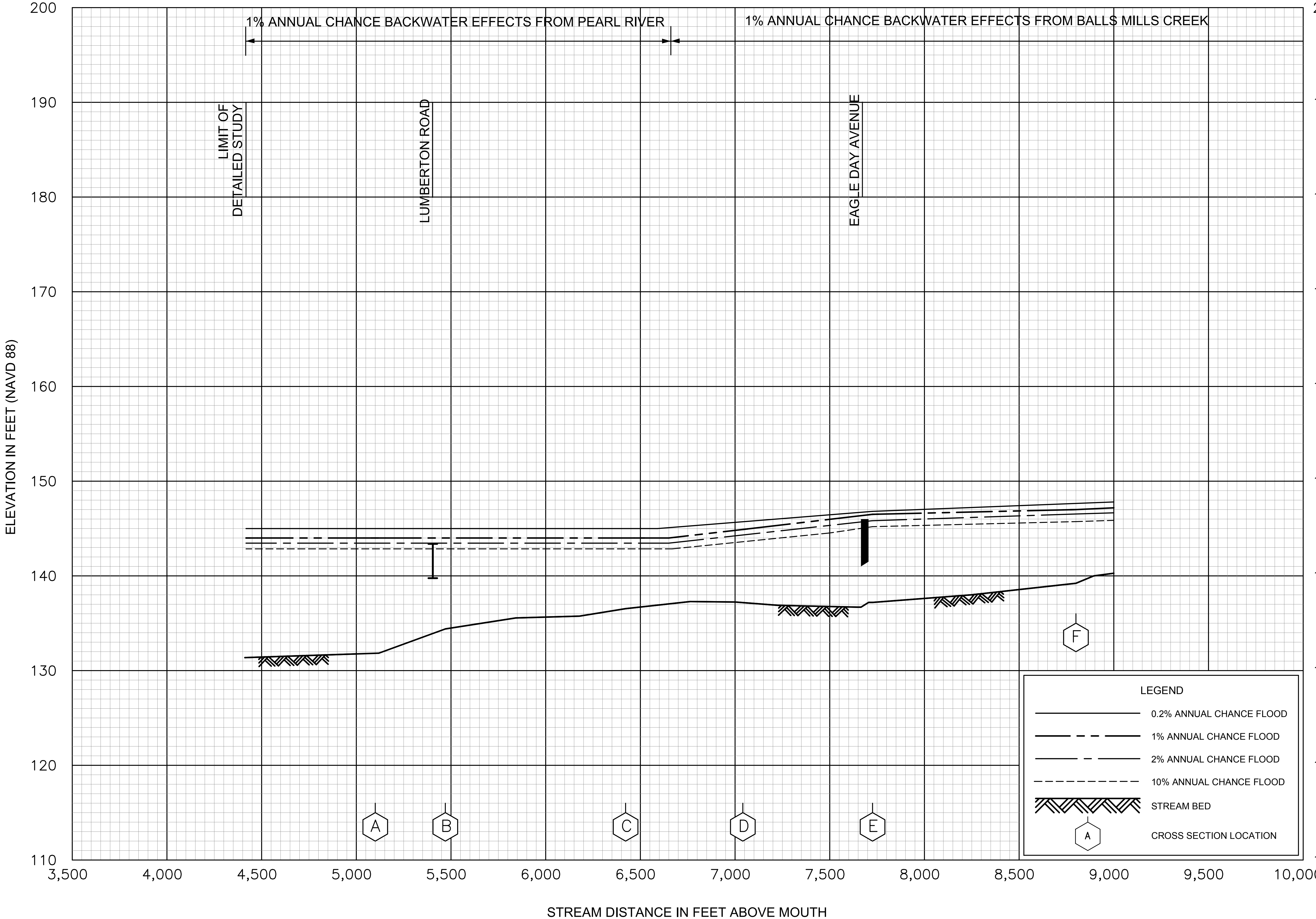
FLOOD PROFILES

BALLS MILLS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

02P



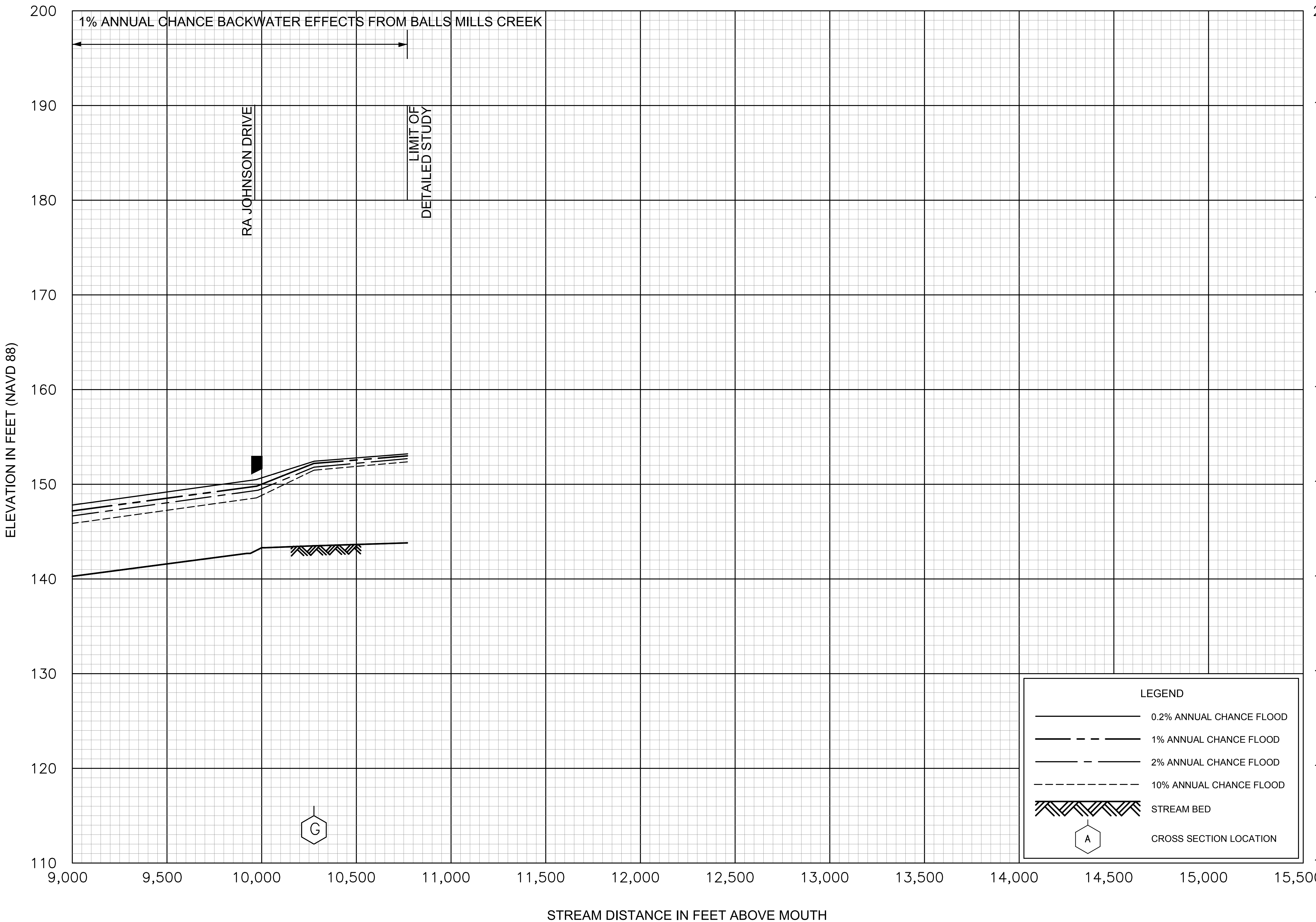
FLOOD PROFILES

BALLS MILL CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

03P



FLOOD PROFILES

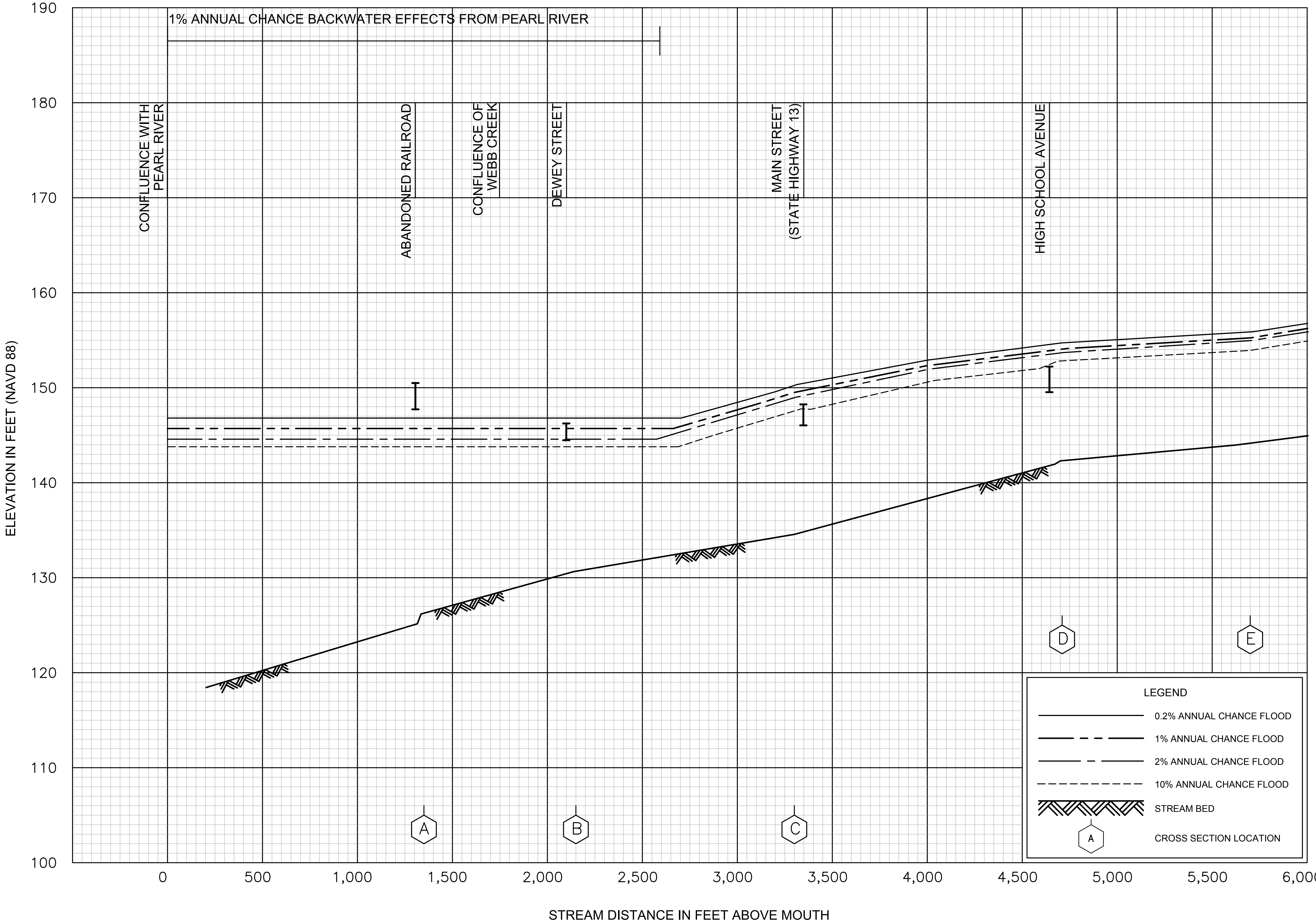
BALLS MILL CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS

AND INCORPORATED AREAS

04P



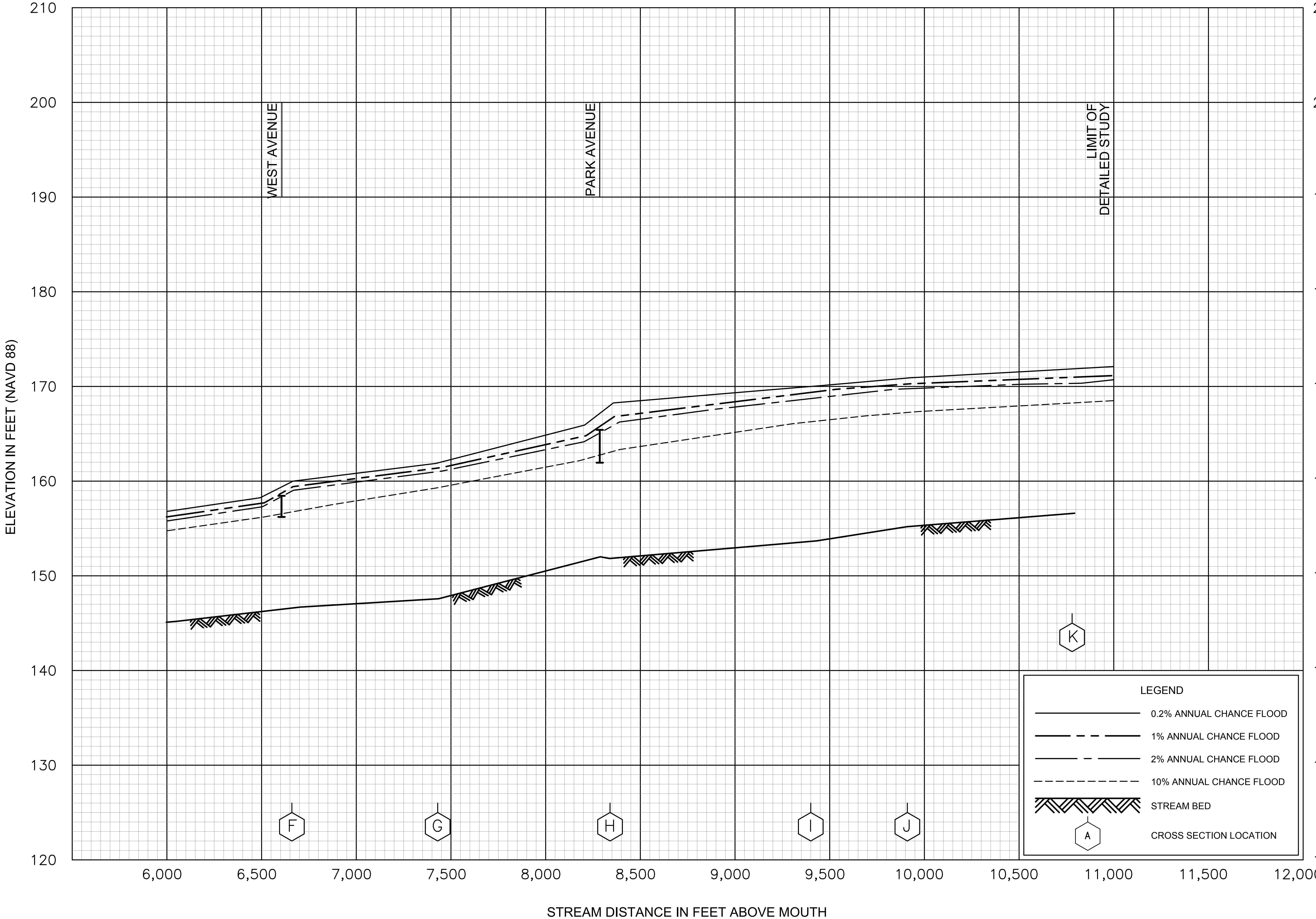
FLOOD PROFILES

DRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

05P



FLOOD PROFILES

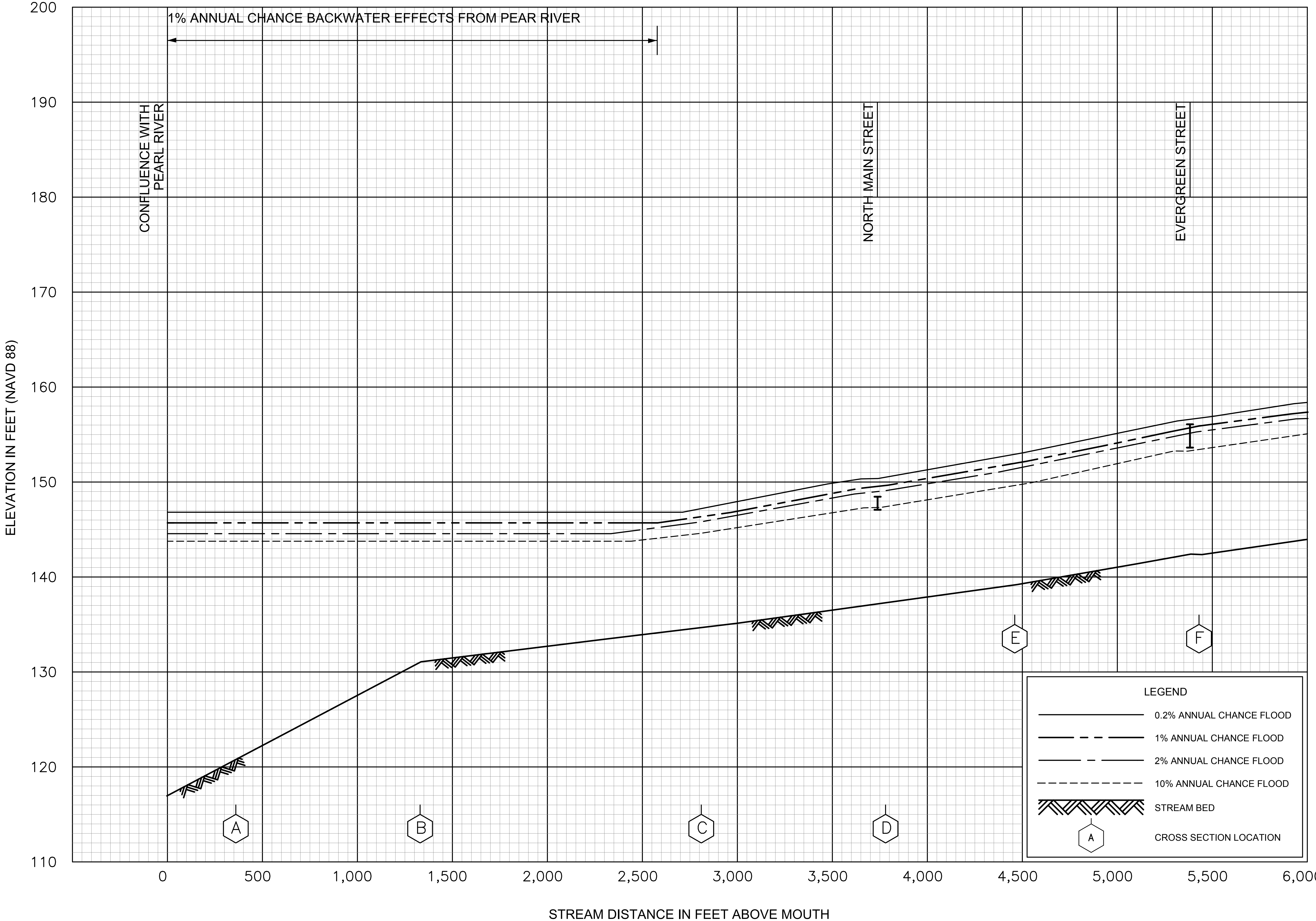
DRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS

AND INCORPORATED AREAS

06P



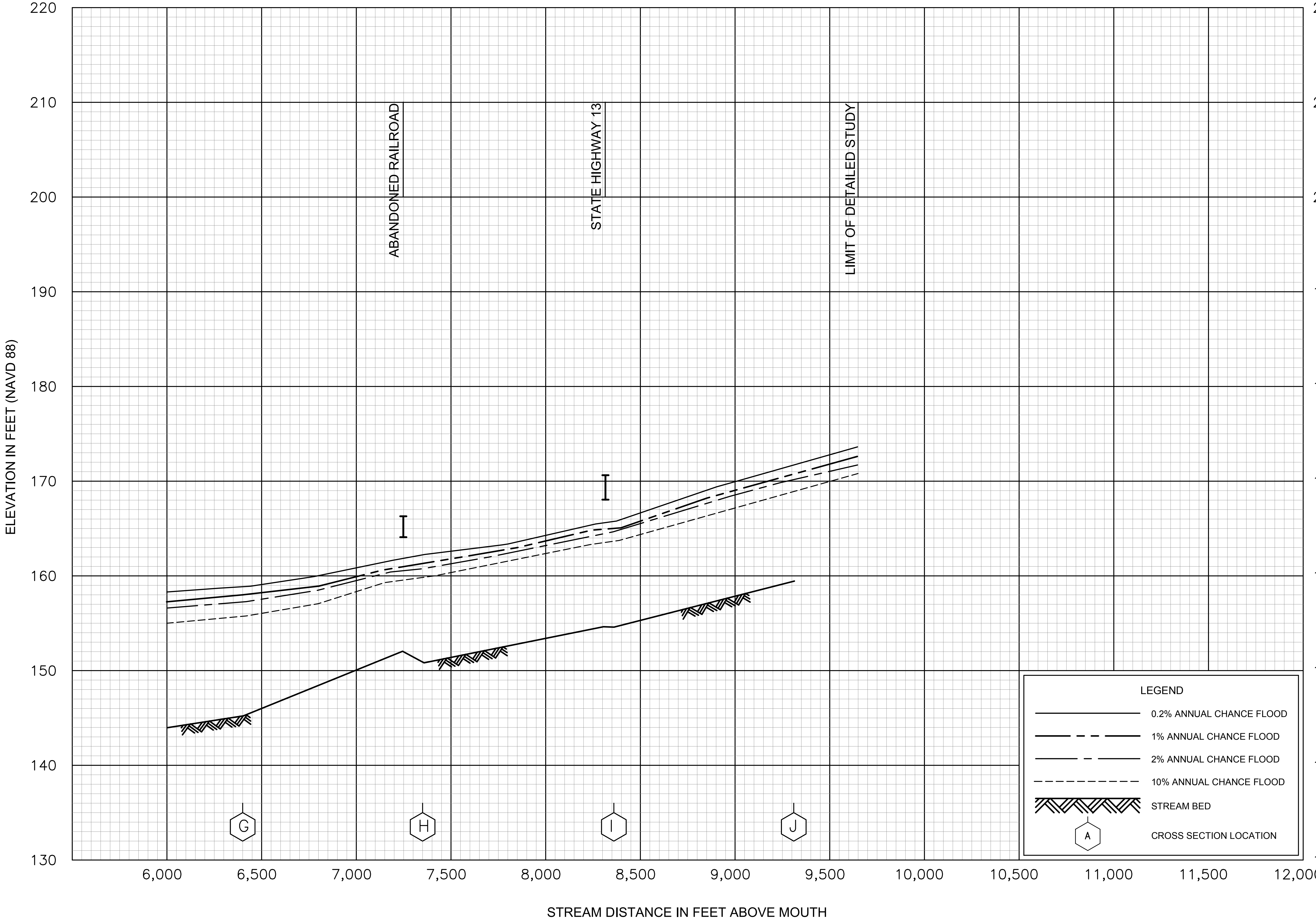
FLOOD PROFILES

JONES CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

07P



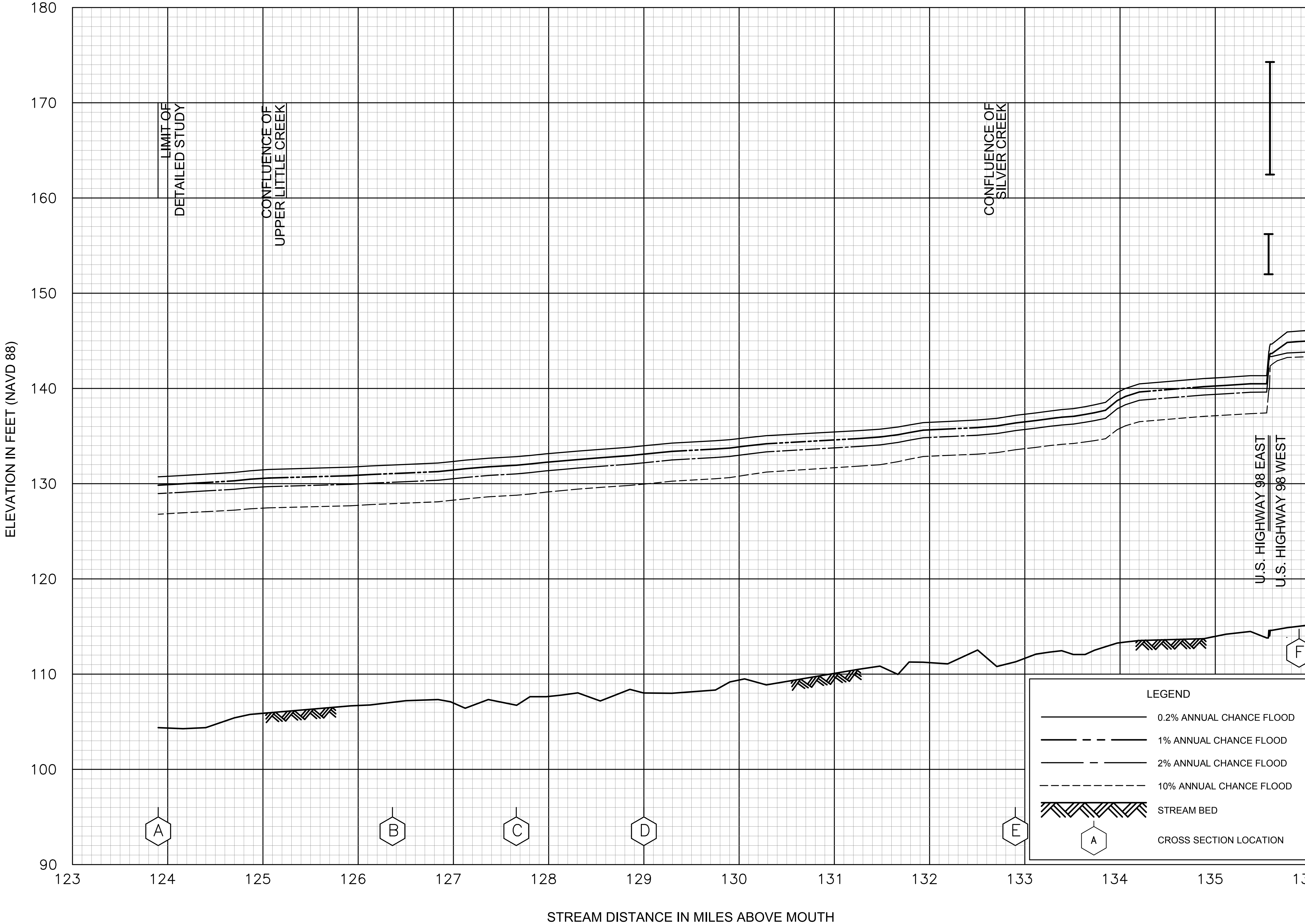
FLOOD PROFILES

JONES CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

08P



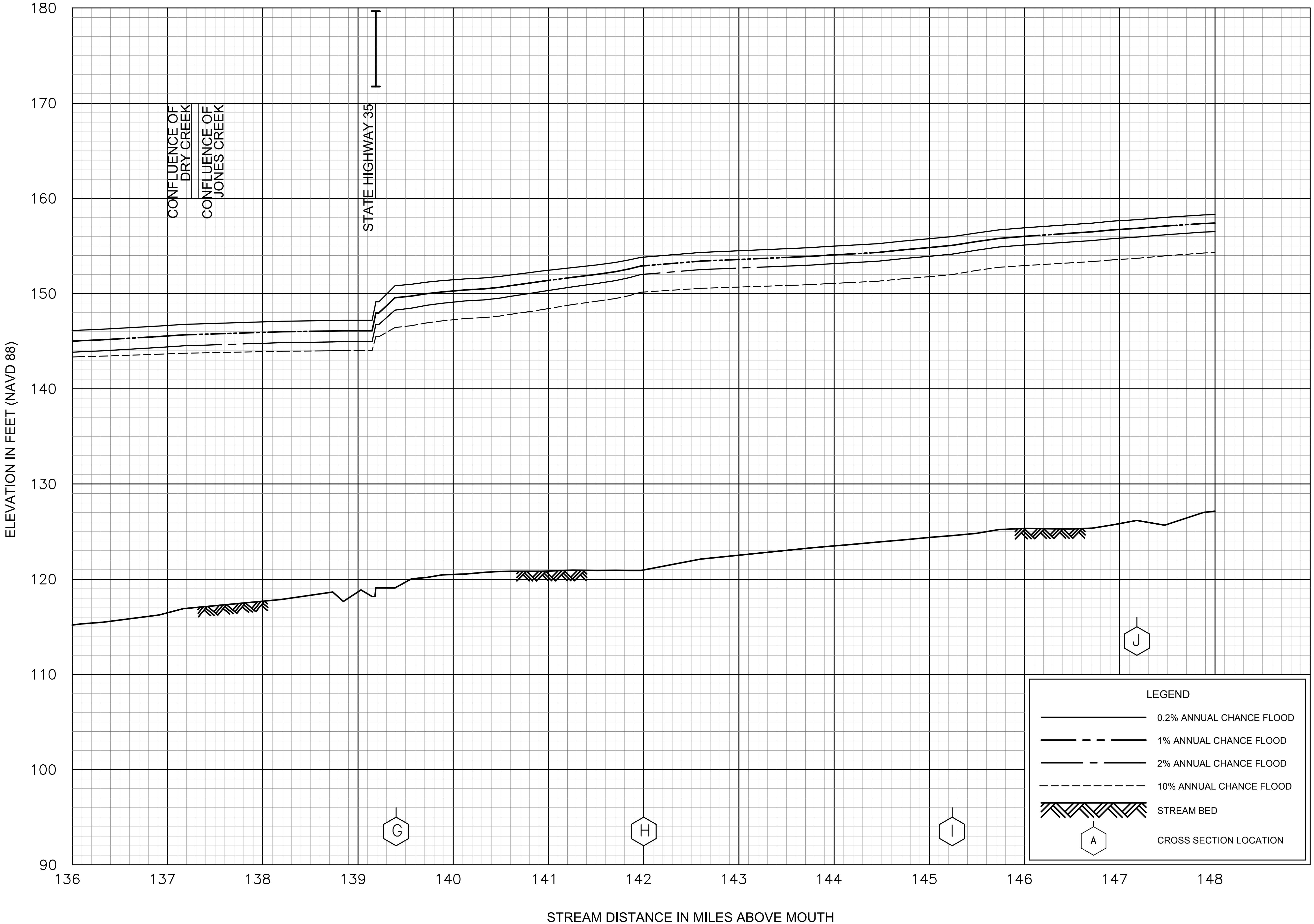
FLOOD PROFILES

PEARL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

09P



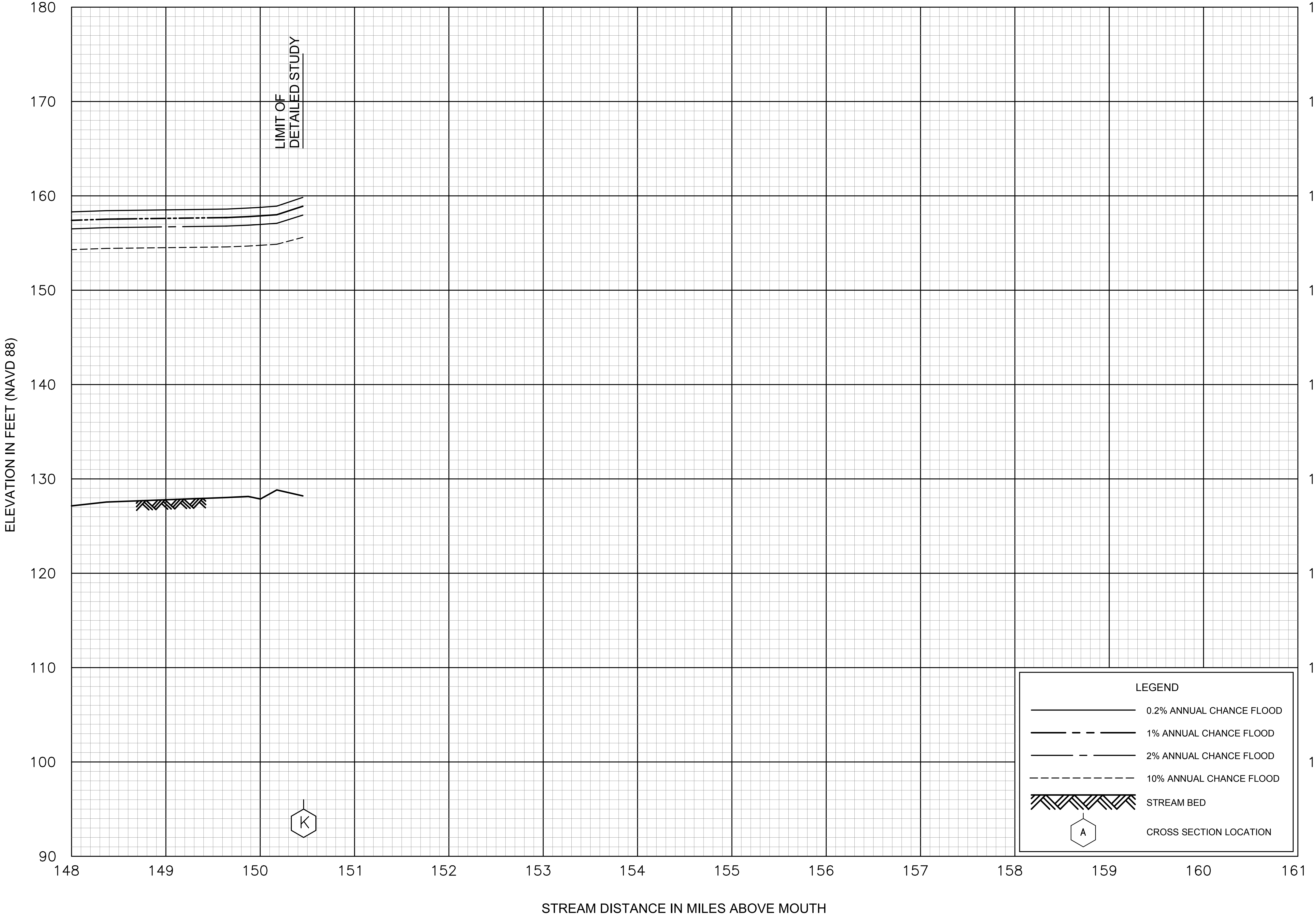
FLOOD PROFILES

PEARL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

10P



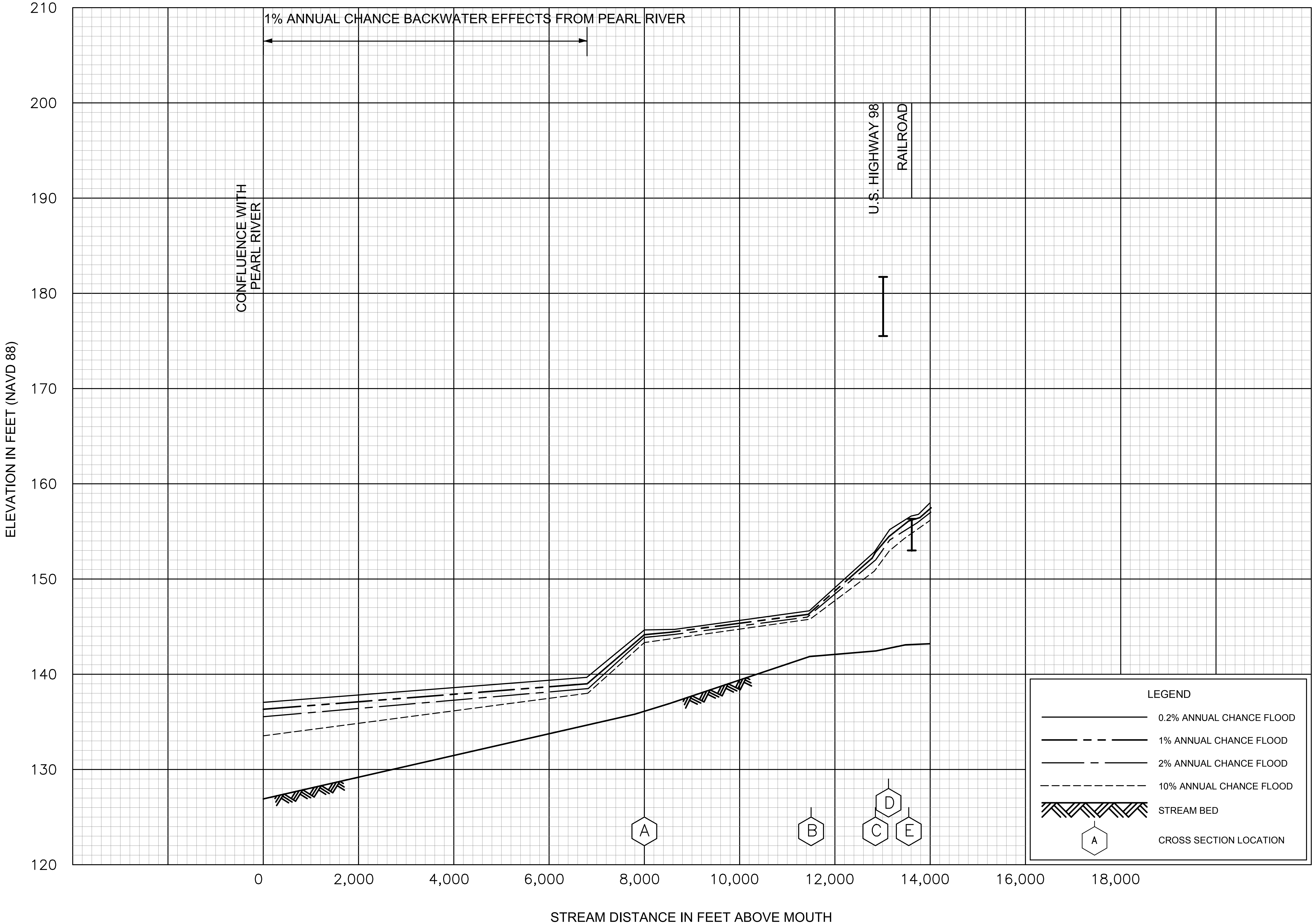
FLOOD PROFILES

PEARL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

11P



FLOOD PROFILES

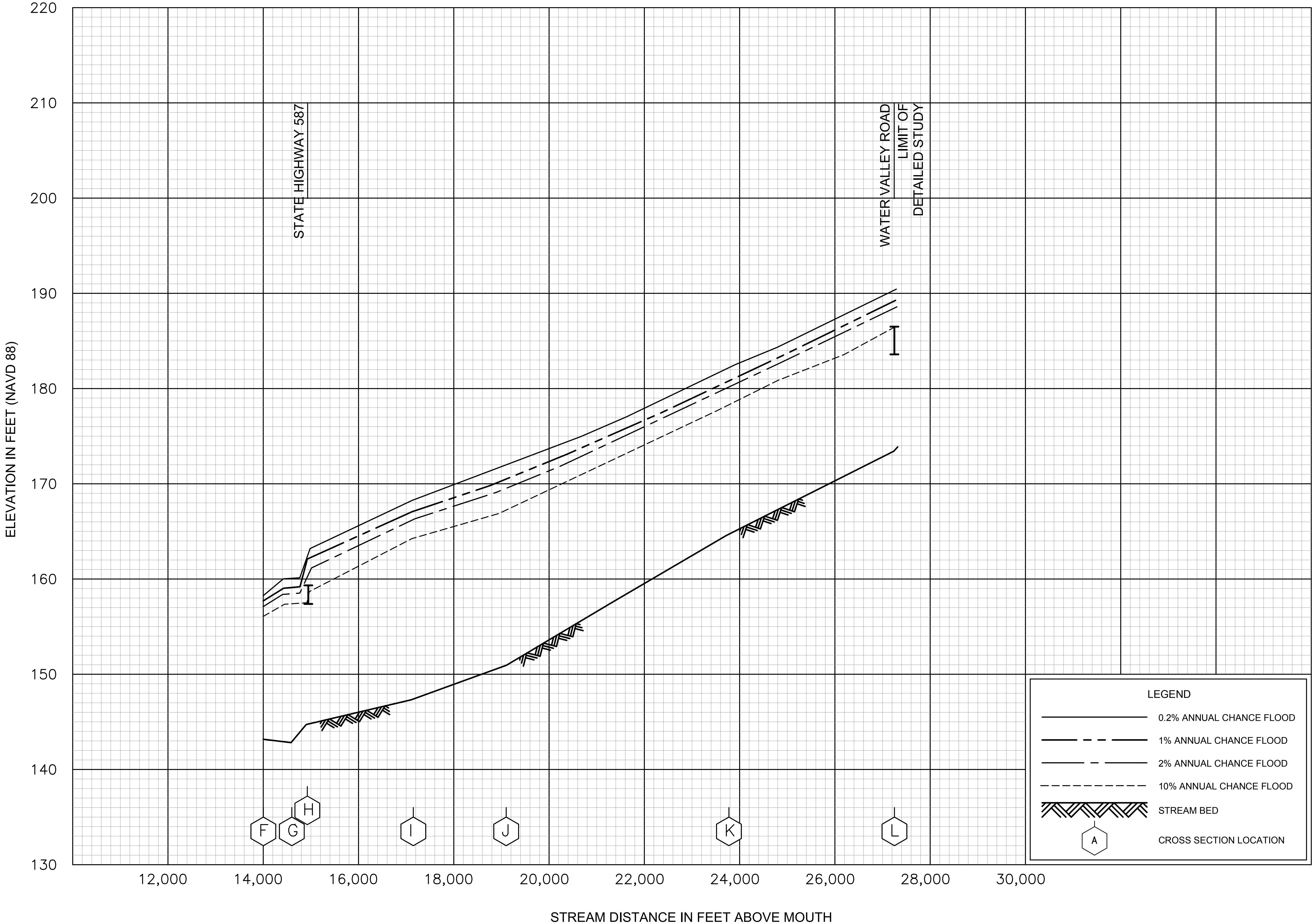
SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS

AND INCORPORATED AREAS

12P



FLOOD PROFILES

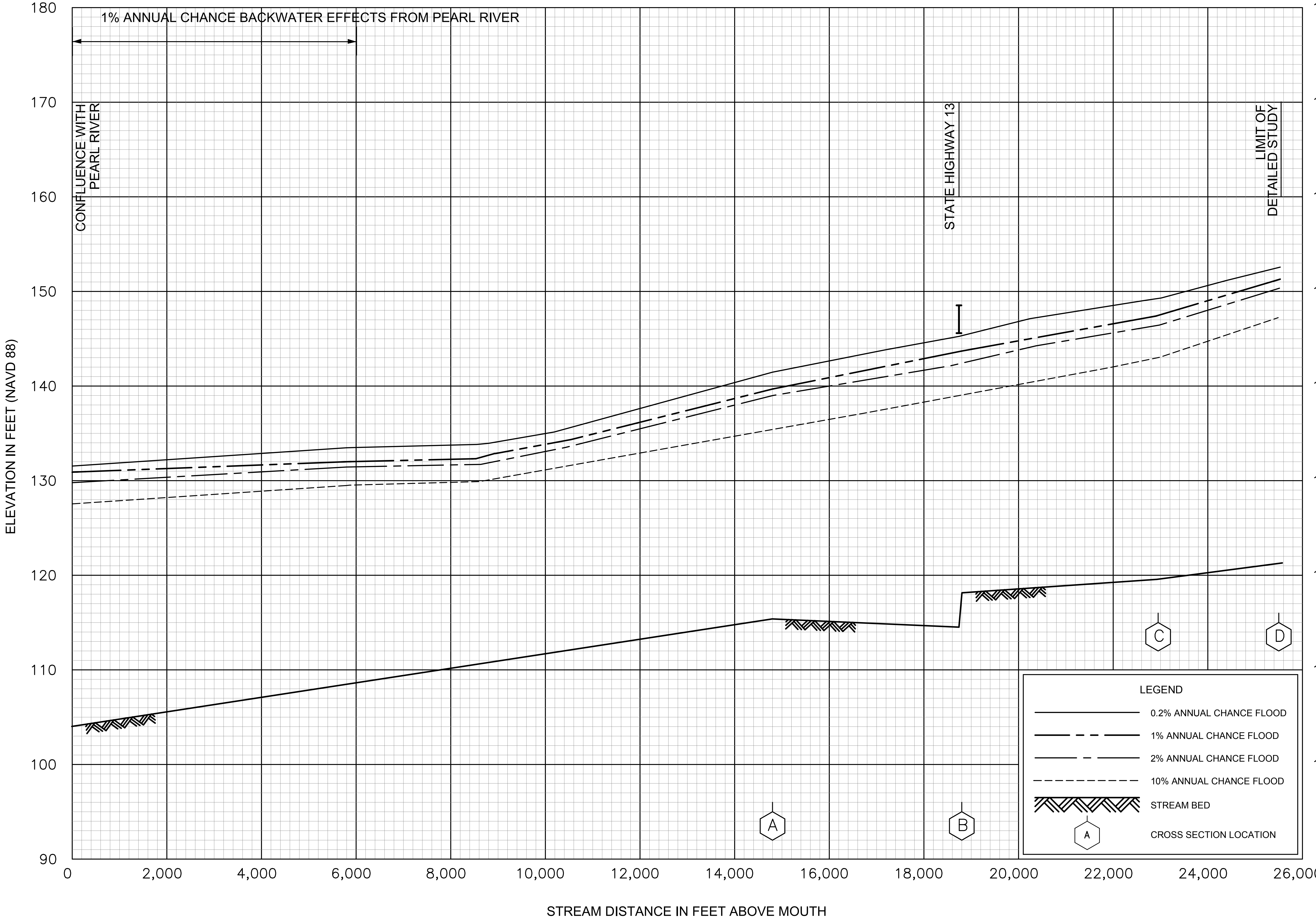
SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS

AND INCORPORATED AREAS

13P



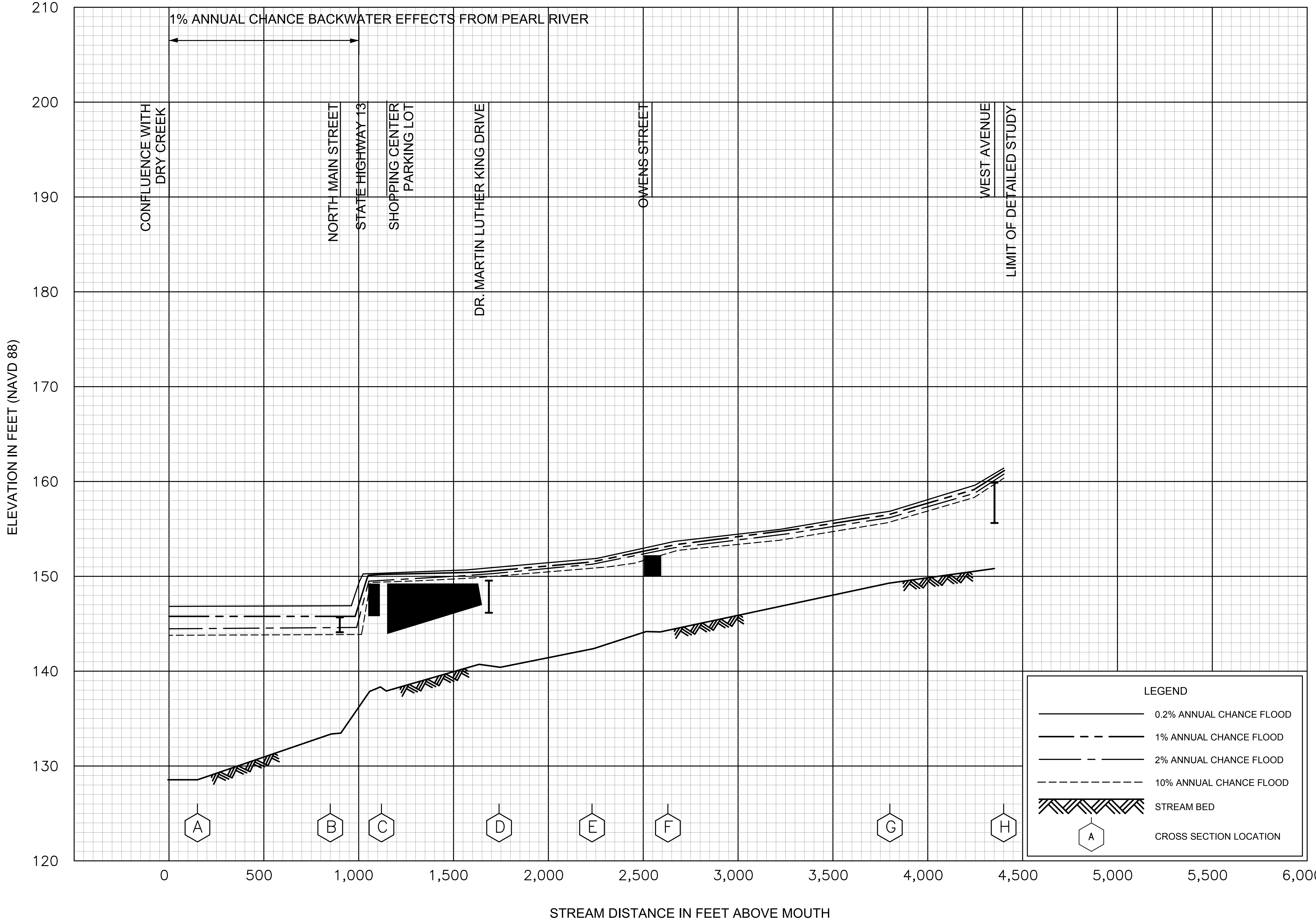
FLOOD PROFILES

UPPER LITTLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

14P



FLOOD PROFILES

WEBB CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARION COUNTY, MS
AND INCORPORATED AREAS

15P