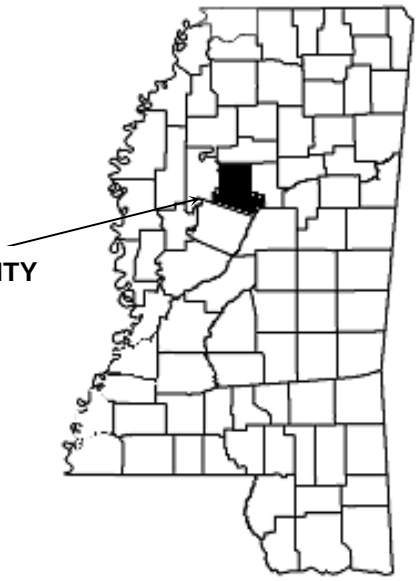
FLOOD INSURANCE STUDY

CARROLL COUNTY, MISSISSIPPI
AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER
CARROLL COUNTY (UNINCORPORATED AREAS)	280191
CARROLLTON, TOWN OF	280367
NORTH CARROLLTON, TOWN OF	280028
VAIDEN, TOWN OF	280029

EFFECTIVE:

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
28015CV000A

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) report 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 report may be revised and republished at any time. In addition, part of this FIS report 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 report components.

Old Zone(s)	New Zone
A1through A30	AE
B	X
C	X

Initial Countywide FIS Report Effective Date:

Revised Countywide FIS Report Dates:

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FLOOD INSURANCE STUDY
CARROLL 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 Carroll County, Mississippi, including the Towns of Carrollton, North Carrollton and Vaiden, and unincorporated areas of Carroll County (hereinafter referred to collectively as Carroll 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 Carroll 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.

January 1978, FIS Carroll County (Unincorporated Areas)

The hydrologic and hydraulic analyses for this study were performed by Michael Baker, Jr., Inc., for the Federal Insurance Administration, under Contract No. H-3800. This work, which was completed in January 1977, covered all significant flooding sources affecting the unincorporated areas of Carroll County.

June 1977, FIS Town of North Carrollton

The hydrologic and hydraulic analyses for this study were performed by Michael Baker, Jr., Inc., for the Federal Insurance Administration under Contract No. H-3800. This work, which was completed in January 1977, covered all significant flooding sources affecting the Town of North Carrollton.

June 1977, FIS Town of Vaiden

The hydrologic and hydraulic analyses for this study were performed by Michael Baker, Jr., Inc., for the Federal Insurance Administration under an addendum to Contract H-

3800. This work, which was completed in January 1977, covered all significant flooding sources in the Town of Vaiden.

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-2008-CA-5883. This study was completed in May 2010.

The digital base map information files were provided by the State of Mississippi. 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, FIPS ZONE 2302. The horizontal datum was the North American Datum of 1983, GRS 1980 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.

January 1978, FIS Carroll County (Unincorporated Areas)

A meeting was held at the Carroll County Courthouse in Carrollton, Mississippi, on March 3, 1975, with representatives of Carroll County, the Federal Insurance Administration, and the engineering firm of Michael Baker, Jr., Inc., in attendance. The purpose of the meeting was to review flood problems and to determine areas to be studied within the county.

On September 24, 1975, a meeting, open to the general public, was held to announce commencement of the study, to discuss the nature and purpose of the study, and to explain study methods and procedures. Public participation was encouraged, and residents were invited to provide information pertaining to flooding, high-water marks, photographs, or other pertinent data.

Representatives of the Federal Insurance Administration, county officials, the State Coordinator, Michael Baker, Jr., and concerned citizens were present at the final meeting which was held on April 8, 1977 to review report findings in detail, and to explain procedures for appealing the Federal Insurance Administration’s flood elevations. The study was accepted.

June 1977, FIS Town of North Carrollton

Discussions were held on January 20, 1976, with the Mayor of North Carrollton, a representative of Michael Baker, Jr., Inc., and the Federal Insurance Administration Consultation Coordination Officer to review flood problems and to determine areas to be studied within the community. The State Coordinator’s office was also involved in the coordination activities. The mayor was designated community contact for the study.

Throughout the study, contact was maintained with the town to seek information and review study findings.

City officials, Federal Insurance Agency representatives, and local citizens were present at the final meeting which was held on April 7, 1977, to review report findings in detail and explain procedures for appealing the Federal Insurance Administration's flood elevations. Subsequently, an unnamed tributary to Beasley Creek was added to the study area at the request of town officials.

June 1977, FIS Town of Vaiden

Discussions were held January 20, 1976, with the Honorable Claude Hatcher, Mayor of Vaiden, a representative of Michael Baker, Jr., Inc., and a representative of the Federal Insurance Administration to review flood problems and to determine areas to be studied within the community. The Honorable Claude Hatcher was designated community contact for the study. Throughout the studies, contact was maintained with the Town of Vaiden, the U.S. Army Corps of Engineers, Vicksburg District, U.S. Geological Survey (USGS), the Mississippi State Highway Department, and the State Coordinating Agency to seek information and review study findings.

On April 8, 1977, the results of the work performed by Michael Baker, Jr., Inc., were reviewed at a final coordination meeting attended by personnel from the FIA, officials of the Town of Vaiden, and representatives of Michael Baker, Jr., Inc.

This Countywide FIS

For this countywide FIS, the Project Scoping Meeting was held on March 6, 2008 in Natchez, MS. Attendees for these meetings included representatives from the Mississippi Department of Environmental Quality, Mississippi Emergency Management Agency, FEMA National Service Provider, Carroll County, the City of Natchez, 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 Carroll County, Mississippi, and its incorporated communities listed in Section 1.1

January 1978, FIS Carroll County (Unincorporated Areas)

Four stream systems, which drain approximately 40 percent of the county, were studied in detail. The streams studied were as follows: Yalobusha River, from its confluence with the Yazoo River upstream approximately 13 miles to the northern county boundary; Teoc Creek, from its confluence with the Yalobusha River upstream approximately 3.25 miles to its emergence from Valley Hill; Potacocowa Creek, from its confluence with the Yalobusha River upstream approximately 4.75 miles to its emergence from Valley Hill;

Big Sand Creek, from a point approximately 7000 feet downstream of North Carrollton, Mississippi to the western corporate limits, from the eastern corporate limits of North Carrollton to a point approximately 9500 feet upstream, and from a point approximately 5600 feet downstream of McCarley, Mississippi upstream through McCarley for a distance of approximately 12,300 feet; Beasley Creek, a tributary of Big Sand Creek, from the northern corporate limits of North Carrollton upstream approximately 12,300 feet to a U.S. Soil Conservation Service floodwater-retarding structure.

In general, areas that are developed or have a high potential for development were studied in detail; the remaining flood-prone areas were studied by approximate methods. These areas selected for study were concurred on by the community and the Federal Insurance Administration. Areas were chosen for study with consideration given to development projected through 1981.

June 1977, FIS Town of North Carrollton

Two streams were studied in detail. Big Sand Creek was studied for a length of nearly 2000 feet along the southern corporate limits. Beasley Creek was studied from its confluence with Big Sand Creek to a point approximately 1900 feet upstream at the northern corporate limits. Because flooding on the unnamed Beasley Creek tributary in north-central North Carrollton is due to inadequate drainage, this area was studied by approximate methods. Areas were chosen for study with consideration given to development projected through 1981.

June 1977, FIS Town of Vaiden

Two streams, designated as Stream 1 and Stream 2 for purposes of this study, were studied in detail. These streams drain the northeastern portion of the community and flow to the east into Hays Creek. Although Hays Creek, which was studied by approximate methods by the USGS (U.S. Dept. of the Interior, 1974), is outside the incorporated area, its flood limits extend into Vaiden. Also studied by approximate methods was Armstead Ditch which drains the southeastern portion of the community, flowing to the south into the Big Black River outside the southern corporate limits.

Studies made and results contained in this report give consideration to development projected through 1981.

This Countywide FIS

For this countywide FIS, several flooding sources within the county were studied by approximate methods. Approximate analyses are used to study those areas having a low developmental potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon, by FEMA and the State of Mississippi.

Floodplain boundaries of streams that have been previously studied by detailed methods were redelineated based on best available topographic information.

2.2 Community Description

Carroll County, located in west-central Mississippi, is primarily a rural agricultural area. The principal communities of Carroll County are Carrollton, North Carrollton, and

Vaiden. The county population in 2009 was estimated to be 10,278 (U.S. Census Bureau, 2010).

Surface transportation in Carroll County includes the Canadian National Railroad, Interstate 55, U.S. Highway 82, and State Highways 7, 17, 404, 407, and 430. The county occupies a land area of approximately 630 square miles at altitudes ranging from 110 to 520 feet. The easternmost 80 percent of the county is an area of wind-deposited hills, with narrow ridge tops and narrow valleys supporting vegetation consisting of pines, hardwoods, and grasses. The remaining 20 percent of the county to the west is an alluvial delta in the flood plains of the Yazoo and Yalobusha Rivers and their tributaries. Hardwoods and grasses are the dominant natural vegetation in the delta.

The climate of Carroll County is influenced by its subtropical latitude, the extensive land mass to the north, and the Gulf of Mexico to the south. The mean annual precipitation is 58.6 inches. Temperatures range from a January average of 43.9 ^{o}F to a July average of 82.4 ^{o}F (National Oceanic and Atmospheric Administration, 2010).

2.3 Principal Flood Problems

Seasonal rains that may last for several days and rains from tropical storms and hurricanes have caused serious flooding on many of the large creeks and rivers in and around Carroll County. Heavy rains from thunderstorms during the spring and summer caused flooding on smaller streams in the area.

2.4 Flood Protection Measures

Flood protection measures that have been undertaken consist of the installation of floodwater-retarding structures by the U.S. Soil Conservation Service, the installation of flood control levees by the USACE, Vicksburg District, and the installation of other levees by private individuals and drainage districts.

Floodwater-retarding structures constructed by the U.S. Soil Conservation Service include 5 structures above the study area of Teoc Creek, 18 structures above the study area on Potacocowa Creek, 7 structures within the study basin of Big Sand Creek, and 1 structure on Beasley Creek (U.S. Soil Conservation Service, 1963.)

Flood protection levees have been constructed on Teoc Creek, Potacocowa Creek, and Big Sand Creek through their delta segments. These three levees are currently not accredited by FEMA to protect against the 1-percent annual-chance flood.

FEMA specifies that all levees must have a minimum of 3-foot freeboard against 1-percent annual chance flooding to be considered a safe flood protection structure. The criteria used to evaluate protection against the 1-percent annual chance flood are 1) adequate design, including freeboard, 2) structural stability, and 3) proper operation and maintenance. Levees that do not protect against the 1-percent annual chance flood are not considered in the hydraulic analysis of the 1-percent annual chance flood.

Provisionally Accredited Levee Notes to Users: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To maintain

accreditation, the levee owner or community is required to submit the data and documentation necessary to comply with Section 65.10 of the NFIP. If the community or owner does not provide the necessary data and documentation or if the data and documentation provided indicate the levee system does not comply with Section 65.10 requirements, FEMA will revise the flood hazard and risk information for this area to reflect de-accreditation of the levee system. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.

3.0 ENGINEERING METHODS

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, 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 the community.

January 1978, FIS Carroll County (Unincorporated Areas)

For Big Sand Creek near North Carrollton, peak discharges were obtained from statistical analysis of 18 years of gage records at North Carrollton (U.S. Dept. of the Interior, 1952-1970), using the log-Pearson Type III distribution (U.S. Water Resources Council, 1963). The discharge compared favorably with those published by the USGS in a technical paper (Dept. of the Interior, 1976).

Peak discharges for Big Sand Creek near McCarley and for Beasley Creek were determined using a regional flood frequency report prepared by the USGS (U.S. Dept. of the Interior, 1976), applicable to unurbanized basins in the State of Mississippi. This technique for estimating future flood magnitudes was developed using records of annual peaks for 89 basins and observed annual peak-flow data for 221 stream-gaging stations. The length of record for 82 of the 221 stations with actual records is 25 years or more. The natural drainage areas for which flood frequency is defined range from 0.04 to 6630 miles. Multiple-regression analyses were used to average the chance variability of the

data and relate flood frequency to basin characteristics, the most significant being drainage area, slope, and length.

The effects of U.S. Soil Conservation Service floodwater-retarding structures on both streams were considered in reservoir routing analyses by the modified puls method.

Teoc Creek and Potacocowa Creek were modeled using the HEC-1 flood hydrograph computer program (USACE, 1973). Input hydrographs were calculated using the USGS regional flood frequency report (U.S. Dept. of the Interior, 1976) and routing through numerous U.S. Soil Conservation Service retention structures, which was accomplished by modified puls routing. Channel routing for both streams was done with the HEC-1 program by the Muskingum method.

No flood discharges were determined for the Yalobusha River; however, frequency elevations were determined from stage-frequency analysis by the USACE (USACE, 1976).

Peak discharges for approximate study areas were calculated using the USGS regional flood frequency report (Dept. of the Interior, 1976).

June 1977, FIS Town of North Carrollton

For Big Sand Creek near North Carrollton, peak discharges were obtained from statistical analysis of 18 years of gage records at North Carrollton (U.S. Dept. of the Interior, 1952-1970), using the log-Pearson Type III distribution (U.S. Water Resources Council, 1963). The discharge compared favorably with those published by the USGS in a technical paper (U.S. Dept. of the Interior, 1976).

Peak discharges for Beasley Creek were determined using a regional flood frequency report prepared by the USGS (Dept. of the Interior, 1976), applicable to unurbanized basins in the State of Mississippi. Techniques for estimating future flood magnitudes were developed in the report, based on analyses of both recorded and synthetic streamflow data. The effects of a Soil Conservation Service floodwater retarding structure on the main stem of Beasley Creek were considered in a reservoir routing analysis by the modified puls method.

June 1977, FIS Town of Vaiden

Methods outlined in “Flood Frequency of Mississippi Streams” prepared by the USGS (Dept. of the Interior, 1976) were used to determine peak discharges for Stream 1, Stream 2, and Hays Creek. This report is based on statistical analysis of statewide stream gage records and contains procedures for determining peak discharges for the 10-, 2.0-, and 1.0-percent annual chance floods. Peak discharges for the 0.2-percent annual chance flood were obtained by graphical extrapolation.

This Countywide FIS Analysis

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 1, "Summary of Discharges."

TABLE 1. SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. mi.)	PEAK DISCHARGES (cfs) 10-percent	2-percent	1-percent	0.2-percent
BEASLEY CREEK					
Near North Carrollton	12.42	1,281	1,991	2,370	3,586
At Cross Section F	8.50	922	1,389	1,616	2,418
BIG SAND CREEK					
Near North Carrollton	74.10	19,100	29,000	34,000	46,000
Near McCarley	24.07	6,626	10,715	12,673	20,281
POTACOCOWA CREEK					
At Mississippi Highway 7	67.60	1,805	3,060	3,923	6,395
STREAM 1					
At Town of Vaiden Corporate Limits	0.65	400	585	680	920
At Railroad	0.53	370	520	595	805
Downstream Limit of Study	0.28	265	350	400	520
STREAM 2					
At Town of Vaiden Corporate Limits	0.27	250	330	375	495
TEOC CREEK					
At Mississippi Highway 7	34.20	1,288	2,184	2,800	4,560

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.

January 1978, Carroll County (Unincorporated Areas) FIS Analyses

Cross sections of stream channels and bottom lands were field surveyed along with bridge and culvert waterway openings following field reconnaissance by engineers. Several road profiles were obtained from the Mississippi State Highway Department and correlated with field information for use in the study.

With stream characteristics determined by field observation, flood profiles were computed using the HEC-2 step-backwater computer model (USACE, 1973).

Roughness coefficients (Manning's "n") were estimated by field inspection. Roughness values ranged from 0.04 to 0.12.

Detailed flood profiles for the Yalobusha River were provided by the USACE, Vicksburg District (USACE, 1976). Profiles were determined and plotted for the 10-, 2.0-, 1.0-, and 0.2-percent annual chance floods to an accuracy of 0.5 foot for each stream studied in detail.

Approximate flood elevations for the Big Black River, Hays Creek, and several small, unnamed streams around Vaiden were obtained from data compiled by the USGS (Dept. of the Interior, 1974). Approximate elevations for the area in the southwest portion of the county were obtained from the USACE (USACE, 1976).

June 1977, Town of North Carrollton FIS Analyses

Cross sections of stream channels and bottom lands were field surveyed along with bridge and culvert waterway openings. Several road profiles were obtained from the Mississippi State Highway Department and correlated with field information for use in the study.

With stream characteristics determined by field observation, flood profiles were computed using the standard HEC-2 step-backwater computer program (USACE, 1973), developed by the USACE.

Roughness coefficients (Manning's "n") used in the flood profile calculations range from 0.04 to 0.08 for the channel and form 0.10 to 0.12 for the overbanks. Flood elevations were determined for the 10-, 2.0-, 1.0-, and 0.2-percent annual chance floods after water-surface elevations had been determined by the slope-area method.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. A flood profile was developed for Beasley Creek, but was not included in the report because the entire stream segment studied was influenced by backwater from Big Sand Creek.

Flooding along the unnamed tributary was approximated based on historical flood information provided by the North Carrollton community development plan (MS Research and Development Center, 1974), field observations, and interviews with the mayor and area residents.

June 1977, Town of Vaiden FIS Analyses

Cross sections of stream channels and bottom lands for Stream 1 and Stream 2 were field surveyed along with bridge and culvert waterway openings. Several road profiles were obtained from the Mississippi State Highway Department and correlated with field information for use in the study.
Roughness coefficients (Manning's "n") were estimated by field observation; roughness coefficients used in the computations ranged from 0.04 to 0.10 in the channel and 0.05 to

0.125 for the overbanks. Flood profiles were computed using the HEC-2 computer step-backwater model (USACE, 1973), developed by the USACE.

Profiles were determined and plotted for the 10-, 2.0-, 1.0-, and 0.2-percent annual chance floods for Stream 1 and Stream 2. Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals.

Rating curves for Hays Creek at the confluence of Streams 1 and 2 were calculated by normal depth method. The slope of the energy gradient was determined from a USGS 100-year profile used to develop the flood-prone area maps (U.S Dept. of the Interior, 1974). Cross sections were developed from a USGS quadrangle map (U.S. Dept. of the Interior, 1968) and from field reconnaissance.

This Countywide FIS Analysis

Cross section geometries were obtained from a combination of terrain data and field surveys. Bridges and culverts located within the limited 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 4.0 computer program (USACE, 2008). The model was run for the 1-percent-annual-chance storm for the limited detail and approximate studies.

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.

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 0.1 feet to the NAVD88 elevation. The 0.1 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. Dept. of the Interior, 1966). 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. Between cross sections, the boundaries were interpolated using topographic data developed from the State of Mississippi digital orthophotography dated March 2006 with a contour interval of 5 feet (State of Misssissippi, 2010).

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 5-foot contours generated from the March 2006 2-foot resolution digital orthophotography from the State of Mississippi (State of Mississippi, 2010).

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 2). 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.

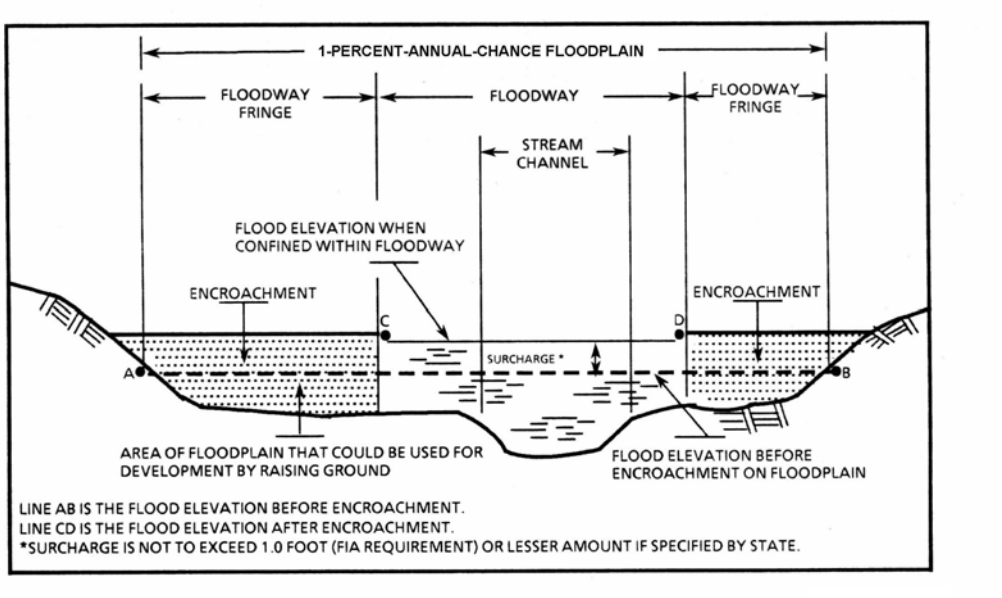
Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 2, "Floodway Data," for certain downstream cross sections are lower than the regulatory flood elevations 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 2. 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.

Floodways were calculated for Big Sand Creek, Beasley Creek, Stream 1 and Stream 2.

For Teoc and Potacocowa Creeks, no floodway was computed because the levee system confines the 1-percent annual-chance floodplain. The area within the levee should be considered the floodway.



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
BEASLEY CREEK								
A	506	119	680	3.5	215.8	210.1[2]	211.0	0.9
B	810	94	501	4.7	215.8	210.6[2]	211.3	0.7
C	1,667	75	473	5.0	215.8	211.9[2]	212.3	0.4
D	2,944	38	322	7.4	215.8	215.8	216.6	0.8
E	4,716	43	389	6.1	219.7	219.7	220.6	0.9
F	6,488	44	400	5.9	222.8	222.8	223.7	0.9
G	8,260	48	422	5.6	226.2	226.2	226.8	0.6
H	10,032	48	420	5.6	229.2	229.2	229.8	0.6
I	11,804	122	615	2.6	232.2	232.2	232.6	0.4
J	13,774	122	600	2.7	233.6	233.6	233.8	0.2

[1] FEET ABOVE MOUTH

[2] ELEVATIONS COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM BIG SAND CREEK

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

BEASLEY 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
BIG SAND CREEK								
A	60,300	487	4,980	6.8	205.8	205.8	206.8	1.0
B	62,598	333	3,059	11.1	207.9	207.9	208.2	0.3
C	67,800	230	2,961	11.5	215.9	215.9	216.6	0.7
D	69,179	562	6,320	5.4	221.0	221.0	221.0	0.0
E	69,965	1134	7,997	4.3	222.2	222.2	222.4	0.2
F	71,745	230	3,212	10.6	223.7	223.7	224.5	0.8
G	75,245	709	2,175	4.1	230.6	230.6	231.6	1.0
H	78,945	258	1,247	8.5	233.2	233.2	234.2	1.0
I	100,100	120	1,776	7.1	257.7	257.7	258.7	1.0
J	103,670	265	3,245	3.9	262.5	262.5	263.1	0.6
K	104,900	209	2,847	4.5	263.0	263.0	263.8	0.8
L	105,810	115	1,502	8.4	264.4	264.4	264.7	0.3
M	106,684	460	3,054	4.1	266.1	266.1	266.7	0.6
N	110,034	457	3,626	3.5	269.9	269.9	270.9	1.0
O	112,434	218	2,578	4.9	273.1	273.1	274.1	1.0

[1] FEET ABOVE MOUTH

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

BIG SAND 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
STREAM 1								
A	50	196	376	1.8	302.3	298.0[2]	299.0	1.0
B	2,550	143	176	3.9	308.2	308.2	308.6	0.4
C	2,693	68	183	3.3	310.1	310.1	310.7	0.6
D	2,781	154	273	2.2	312.0	312.0	312.0	0.0
E	2,968	340	1289	0.5	315.7	315.7	316.7	1.0
F	3,593	208	644	0.6	315.9	315.9	316.9	1.0
STREAM 2								
A	180	212	266	1.4	300.7	295.3[2]	296.2	0.9
B	1,430	20	69	5.4	304.7	304.7	305.6	0.9

[1] FEET ABOVE CORPORATE LIMITS

[2] ELEVATIONS COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM HAYS CREEK

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS AND INCORPORATED AREAS

FLOODWAY DATA

STREAM 1 – STREAM 2

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 Carroll 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 3, “Community Map History.”

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Carroll County (Unincorporated Areas)	July 3, 1978	--	July 3, 1978	--
Town of Carrollton	--	--	--	--
Town of North Carrollton	June 7, 1974	--	April 3, 1978	--
Town of Vaiden	June 7, 1974	--	March 15, 1978	--

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Carroll 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 Carroll County 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 Federal Insurance and Mitigation Division, FEMA Region IV, Koger-Center — Rutgers Building, 3003 Chamblee Tucker Road, Atlanta, GA 30341.

9.0 BIBLIOGRAPHY AND REFERENCES

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1% ANNUAL CHANCE BACKWATER EFFECTS FROM BIG SAND CREEK

ELEVATION IN FEET (NAVD)

270
260
250
240
230
220
210
200
190
180

0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
11000
12000
13000

STREAM DISTANCE IN FEET ABOVE MOUTH

A
B
C
D
E
F
G
H
I

LEGEND

- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

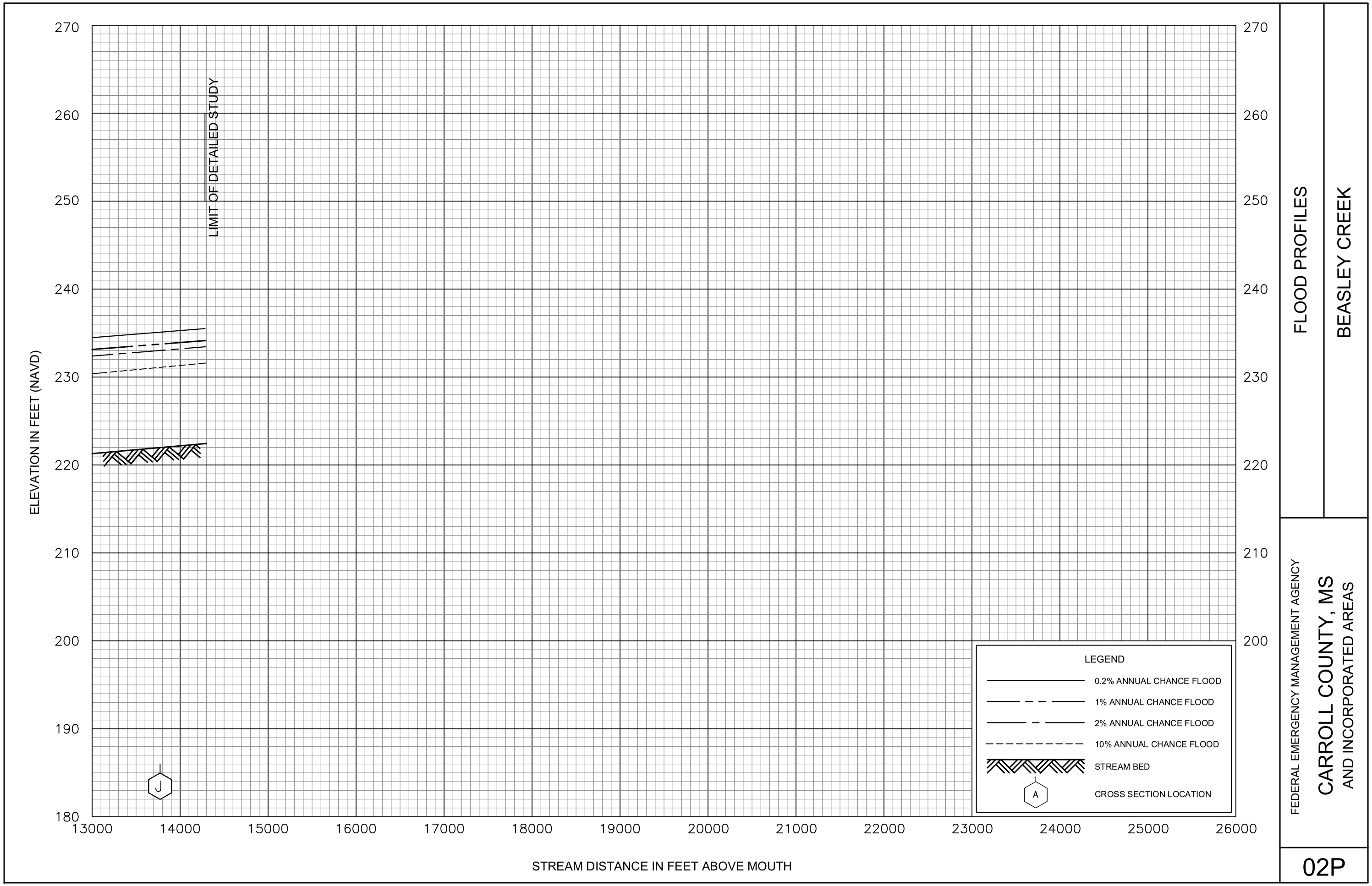
FLOOD PROFILES

BEASLEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

01P



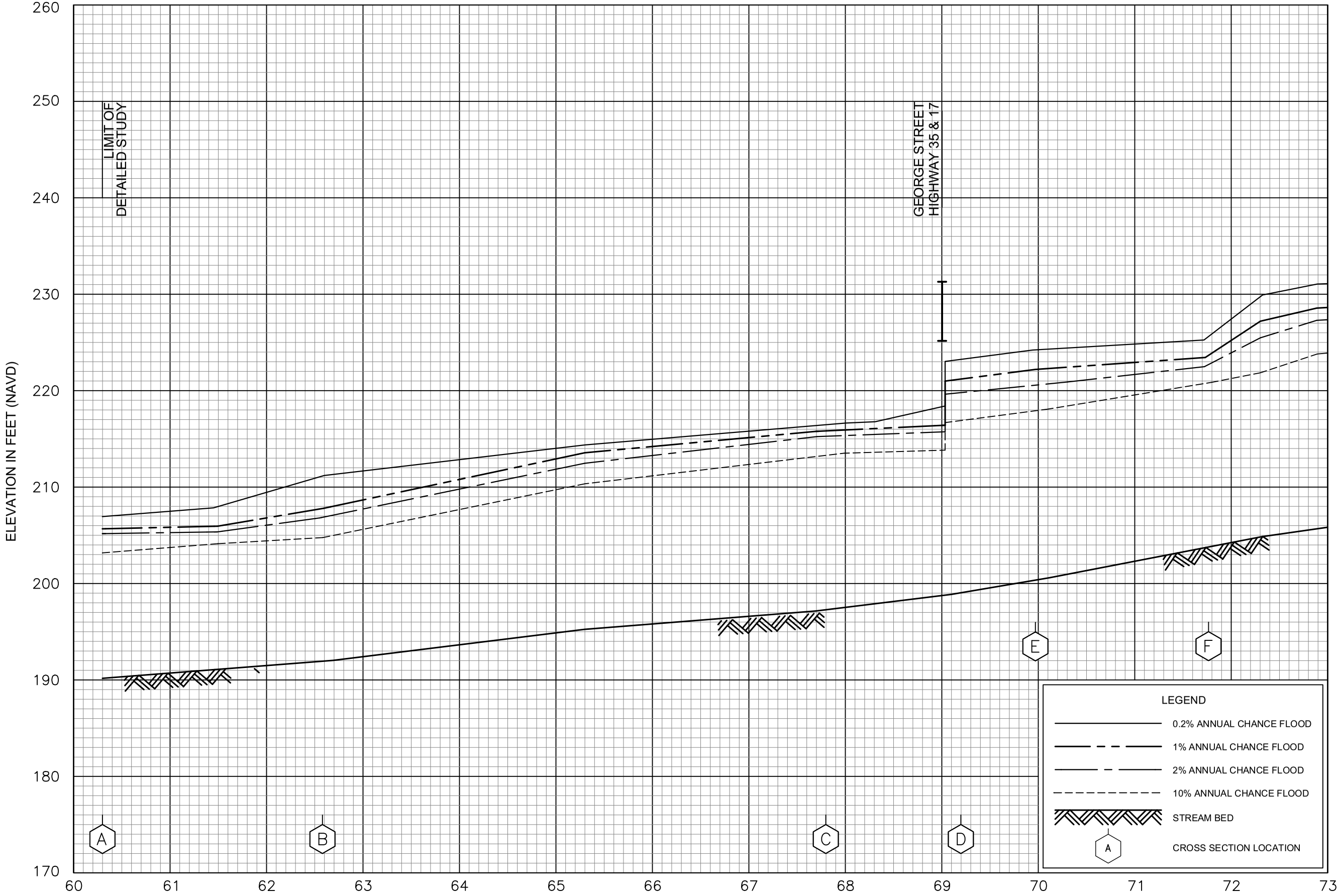
FLOOD PROFILES

BEASLEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

02P



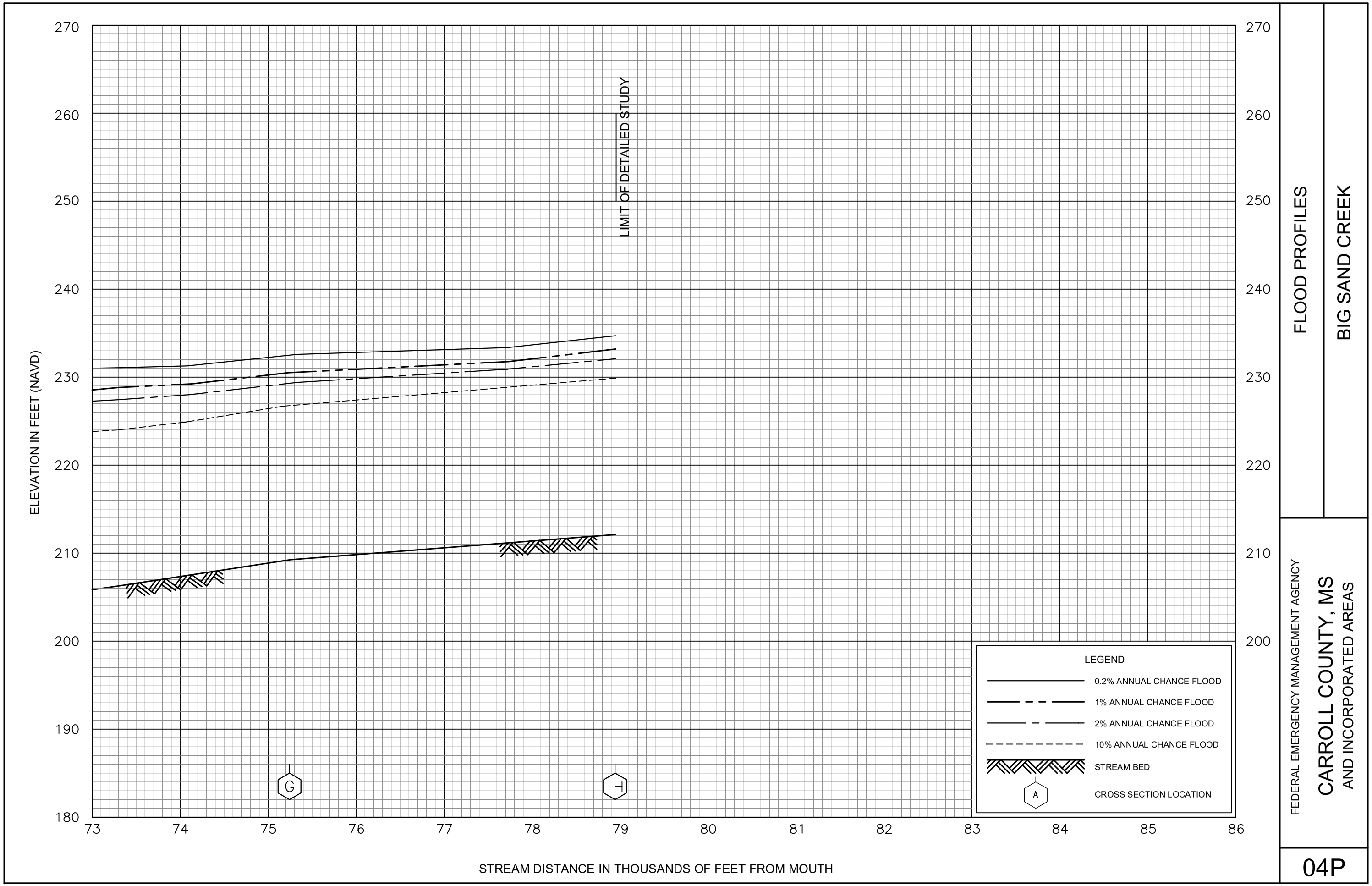
FLOOD PROFILES

BIG SAND CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

03P



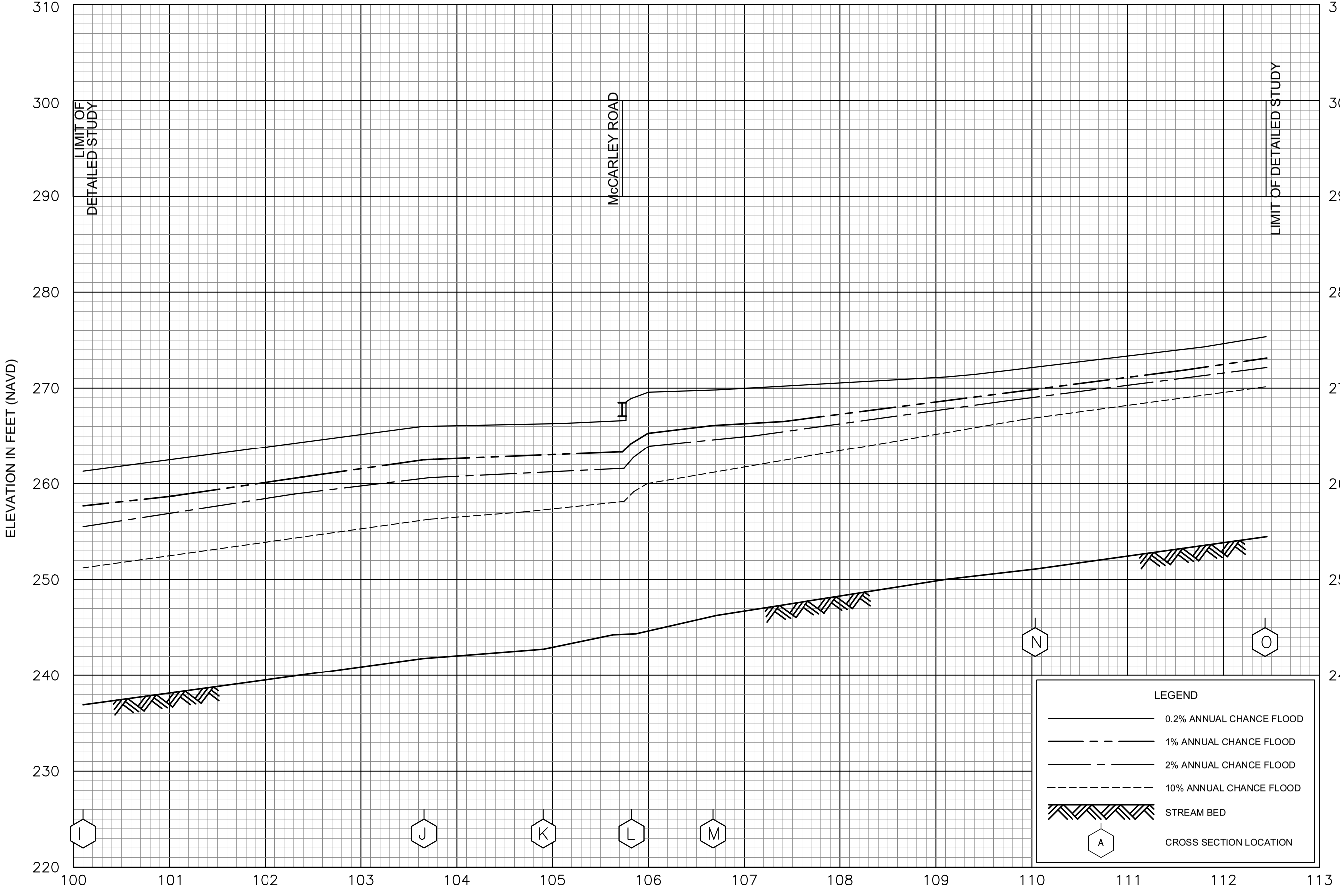
FLOOD PROFILES

BIG SAND CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

04P



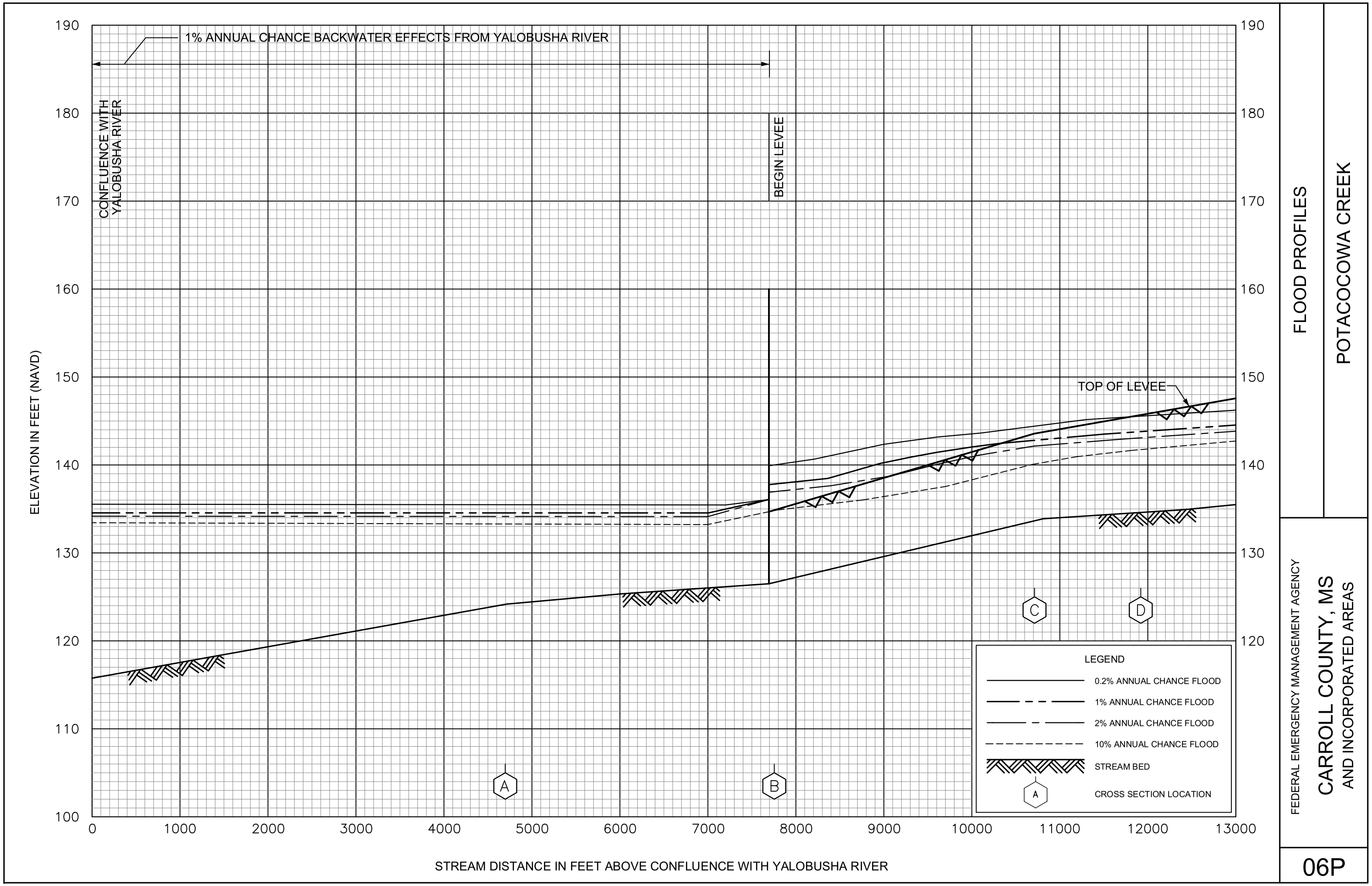
FLOOD PROFILES

BIG SAND CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

05P



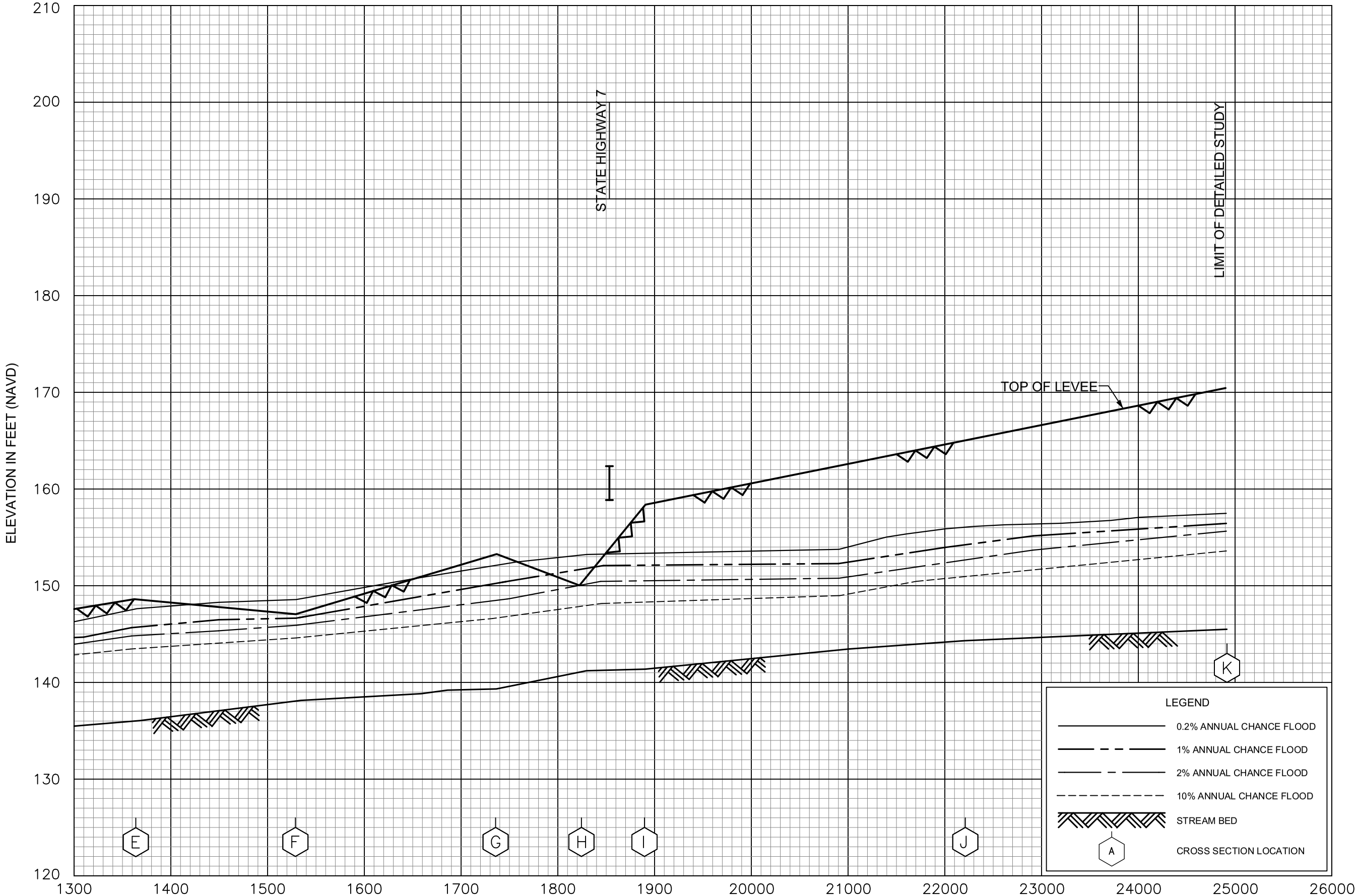
FLOOD PROFILES

POTACOCOWA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

06P



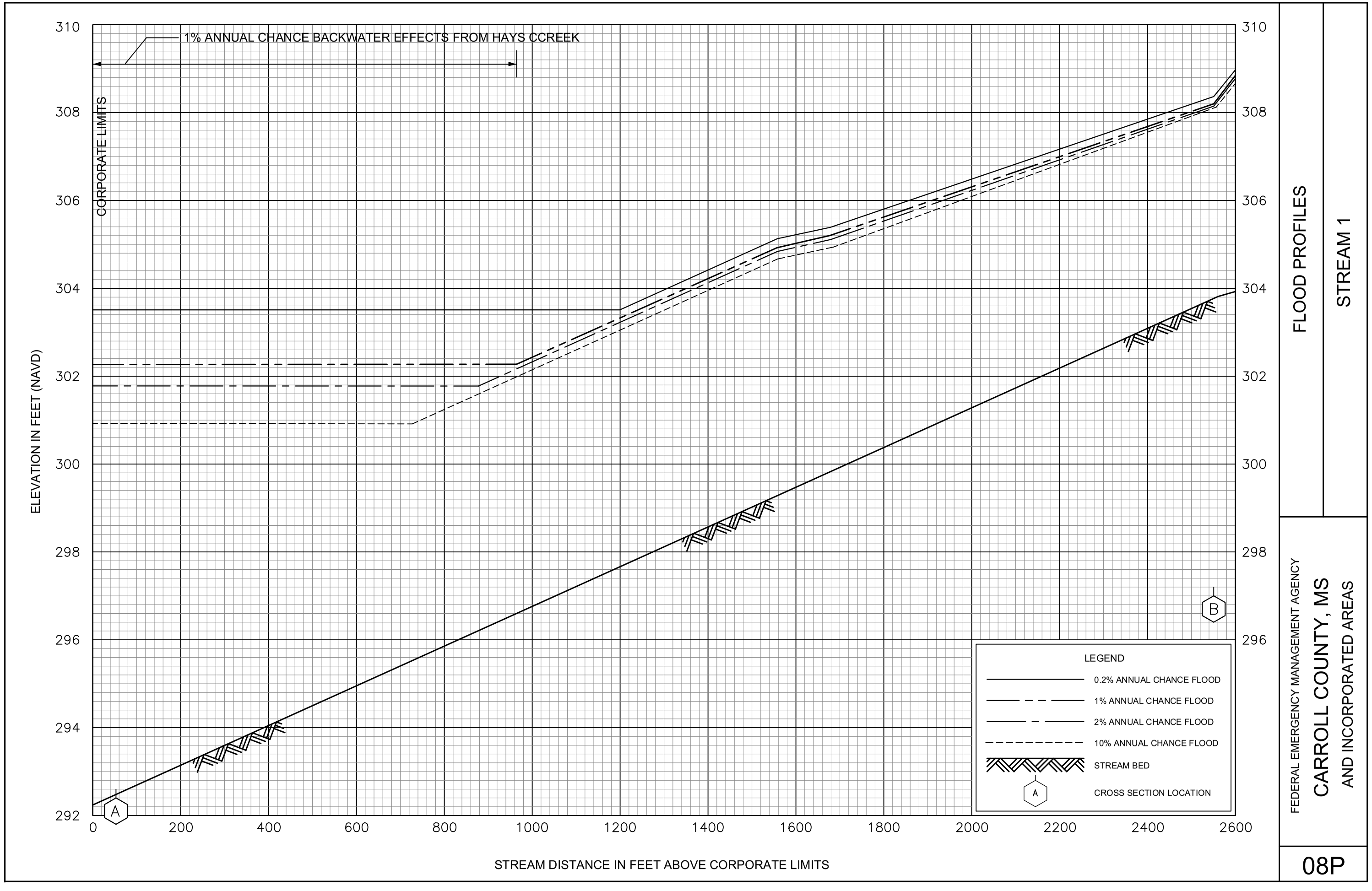
FLOOD PROFILES

POTACOCOWA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

07P



FLOOD PROFILES

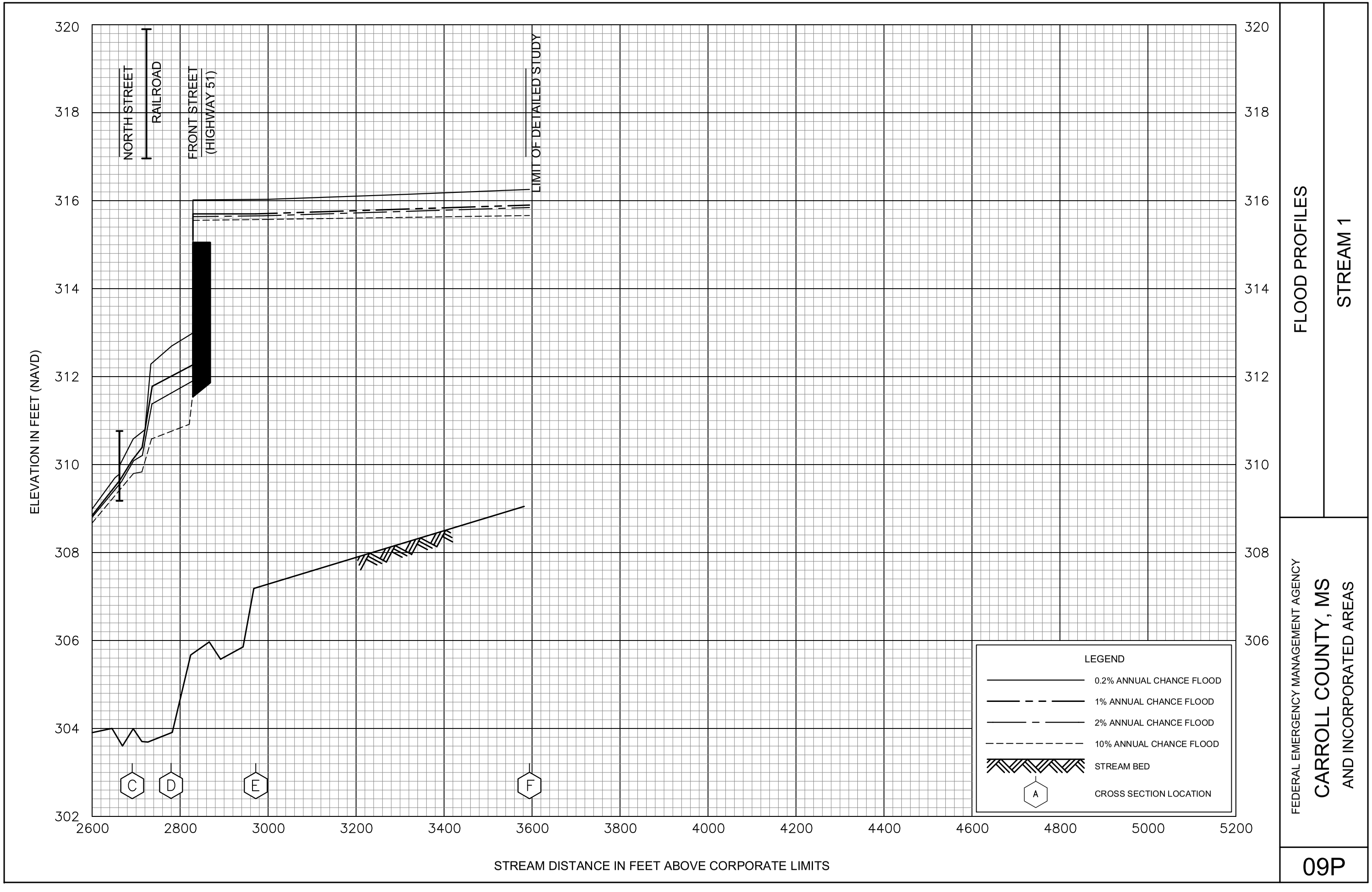
STREAM 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS

AND INCORPORATED AREAS

08P



FLOOD PROFILES

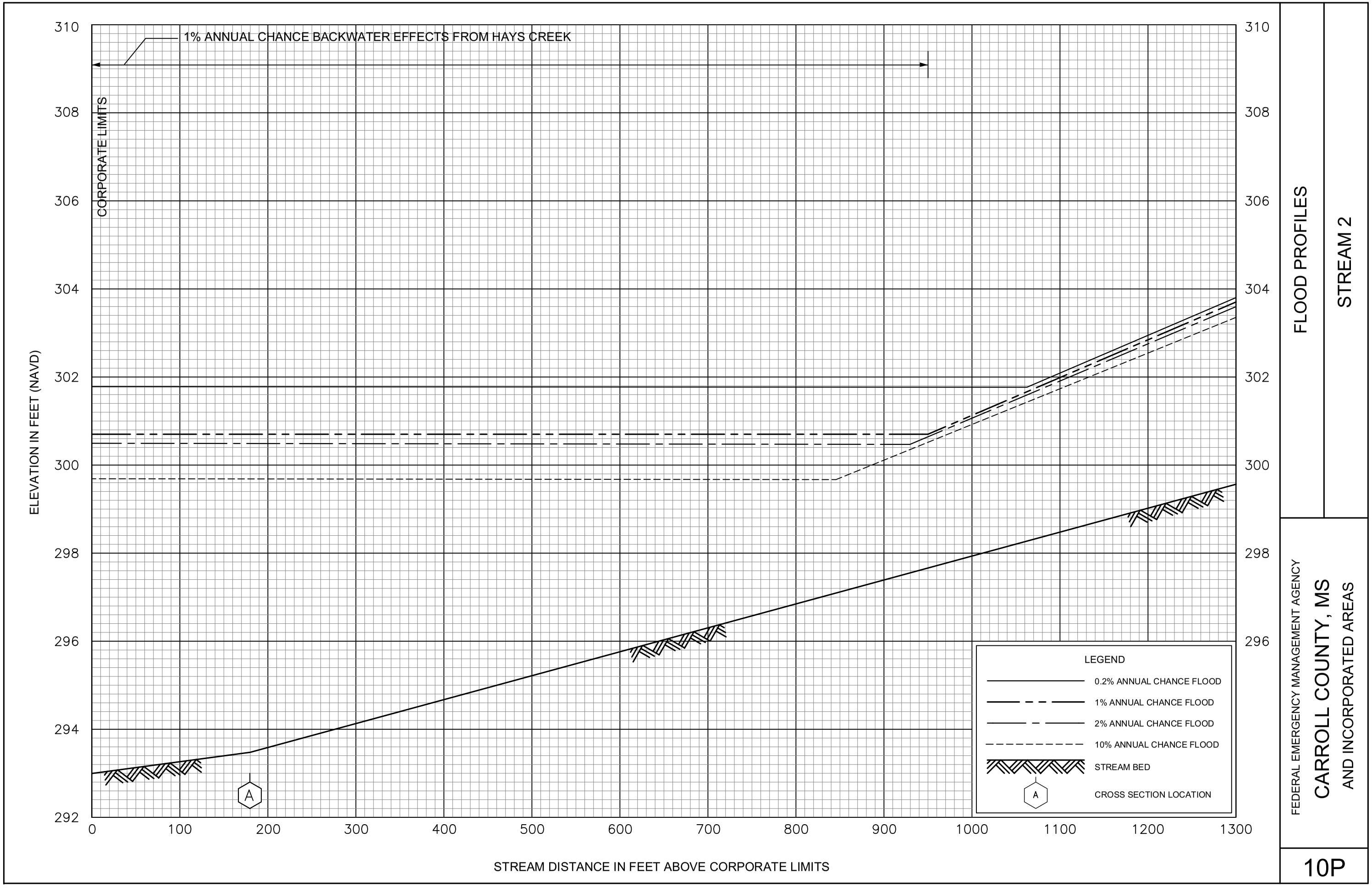
STREAM 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS

AND INCORPORATED AREAS

09P



FLOOD PROFILES

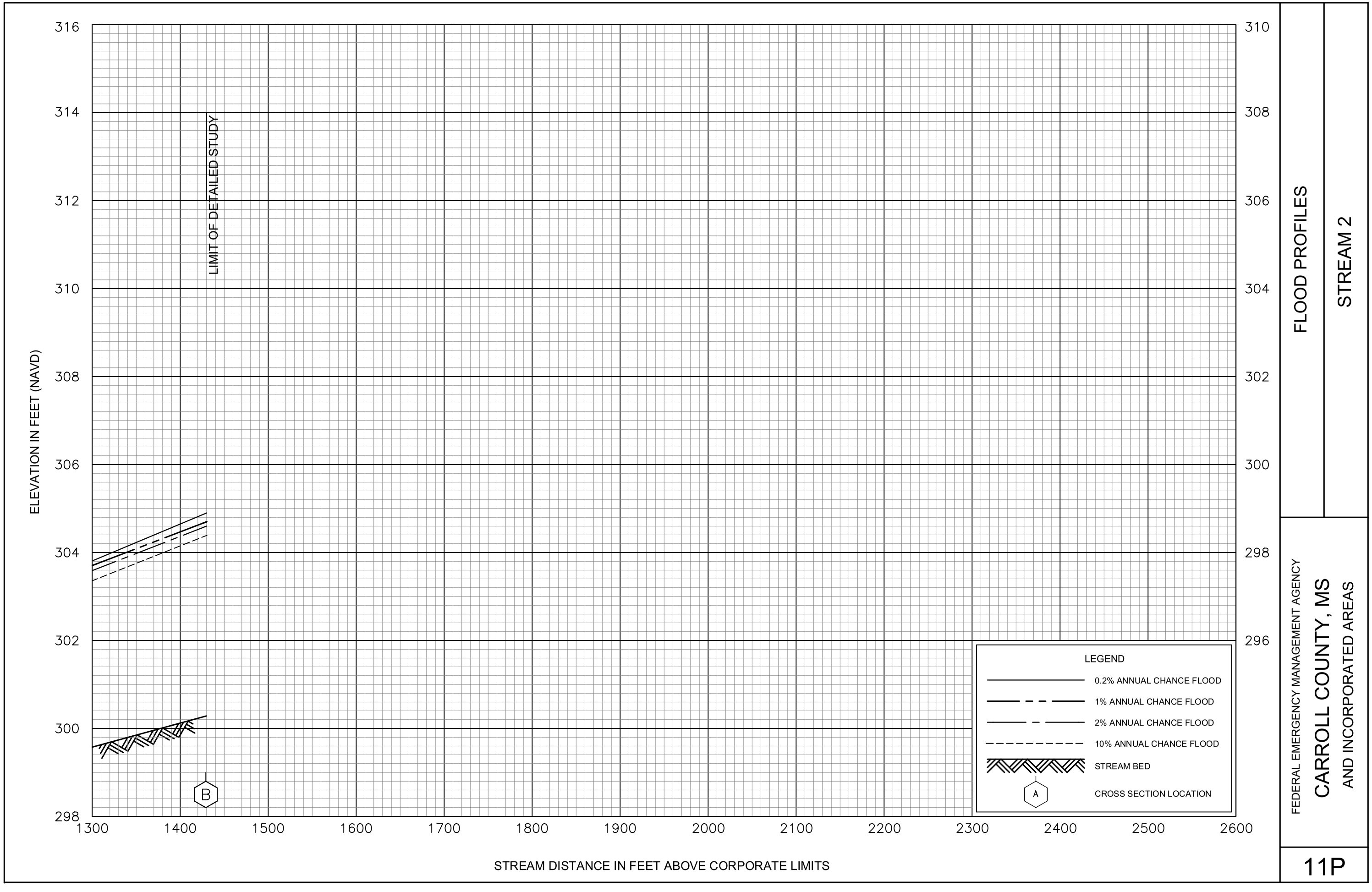
STREAM 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS

AND INCORPORATED AREAS

10P



FLOOD PROFILES

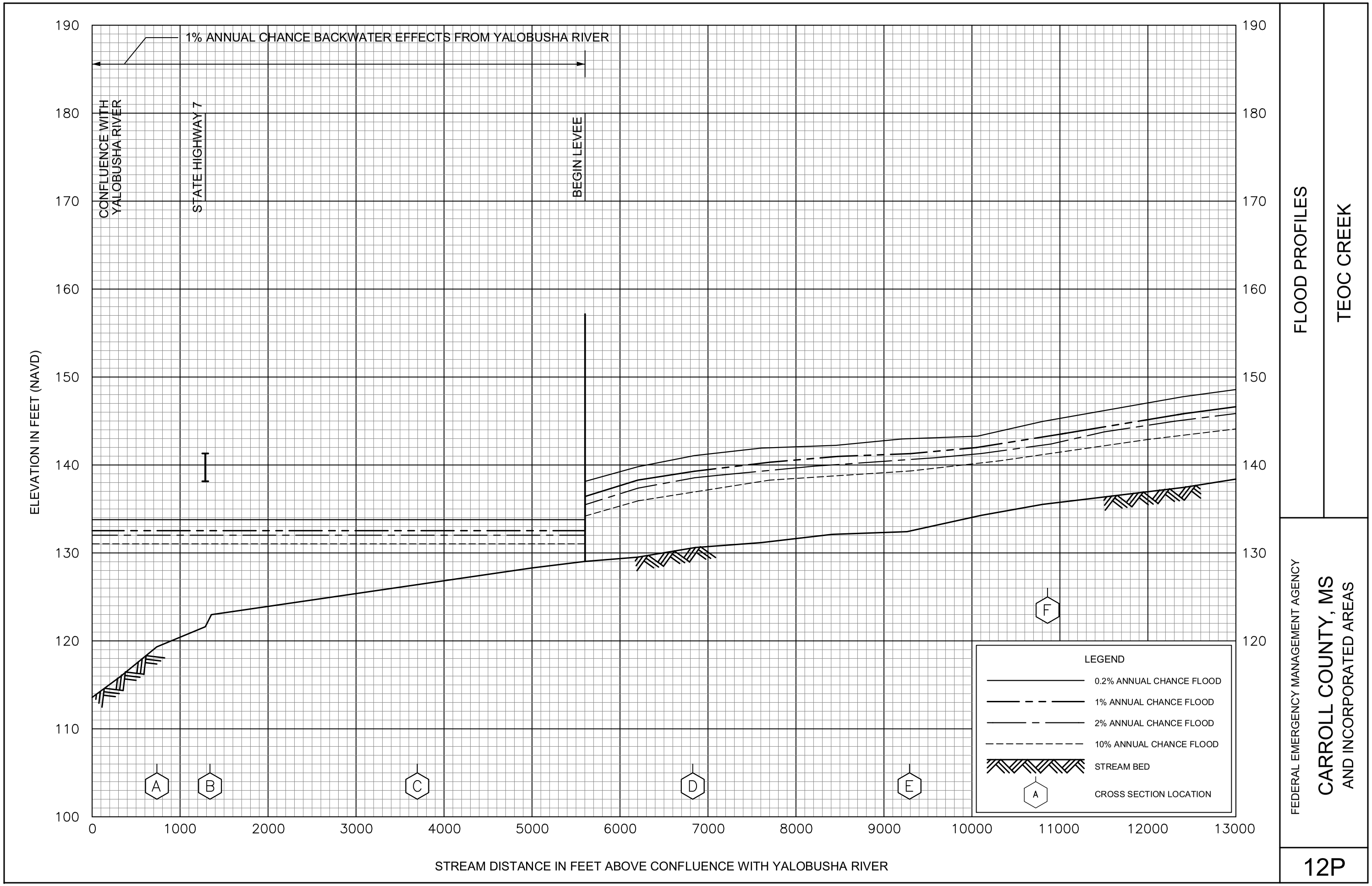
STREAM 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS

AND INCORPORATED AREAS

11P



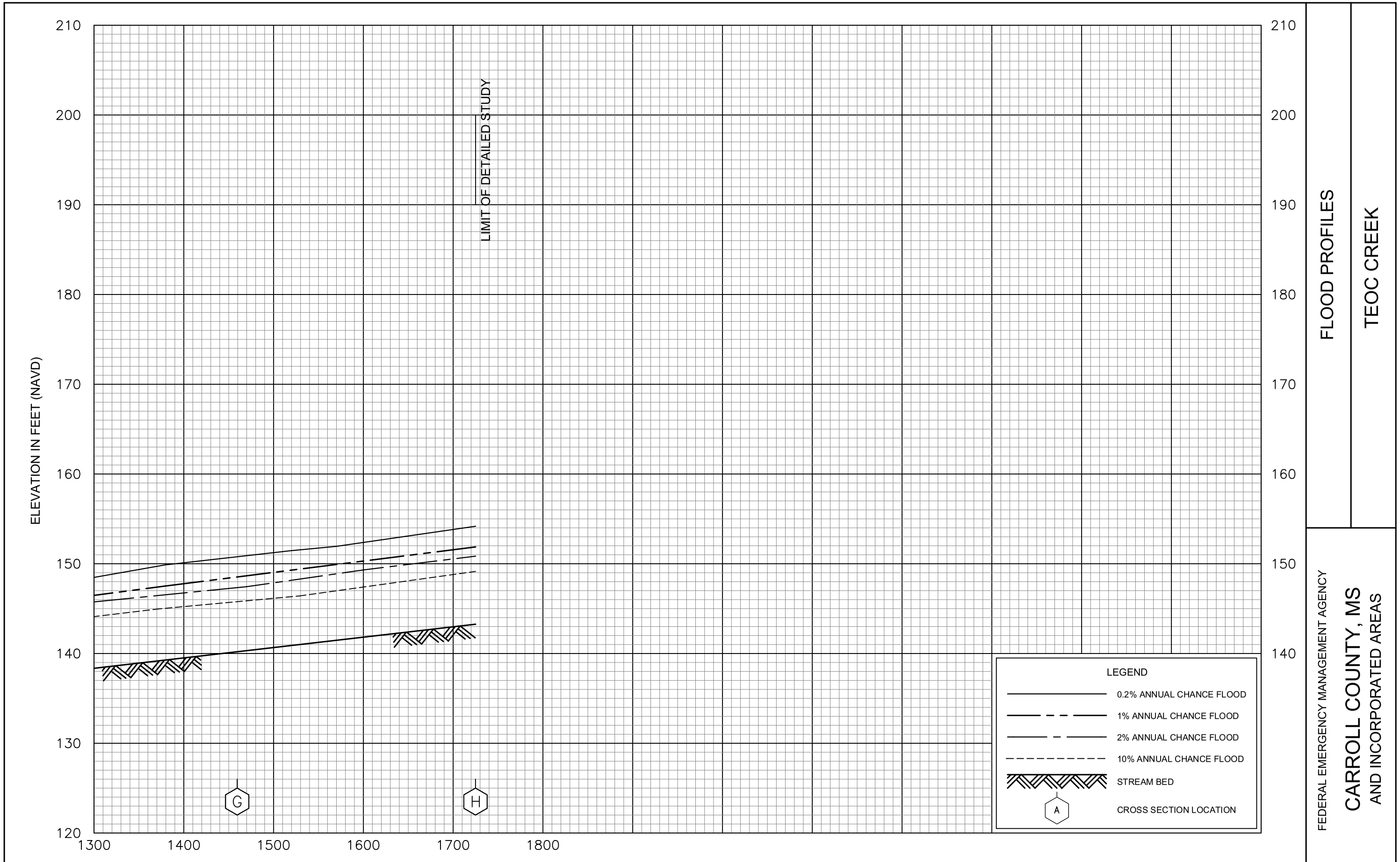
FLOOD PROFILES

TEOC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

12P



FLOOD PROFILES

TEOC CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

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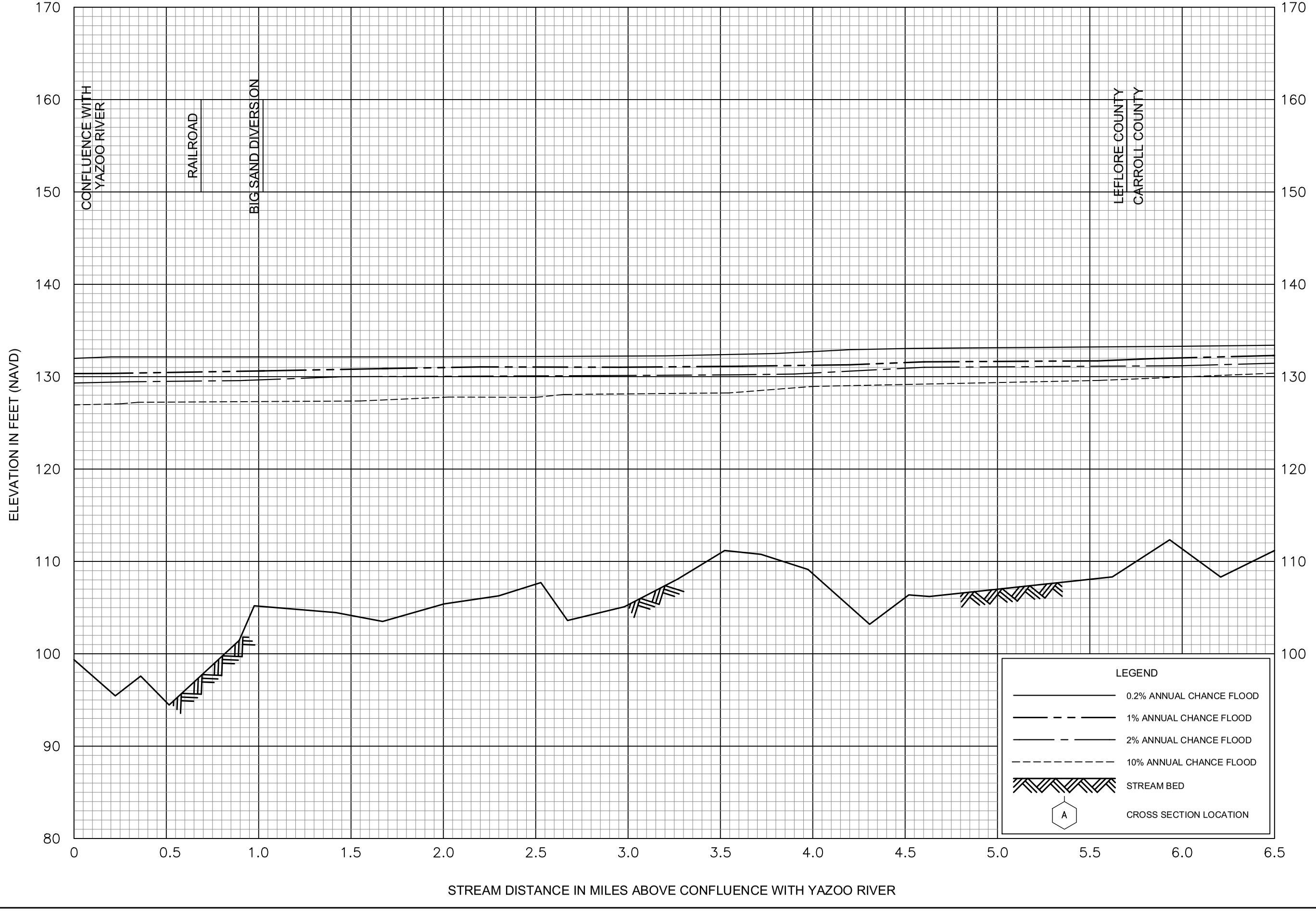


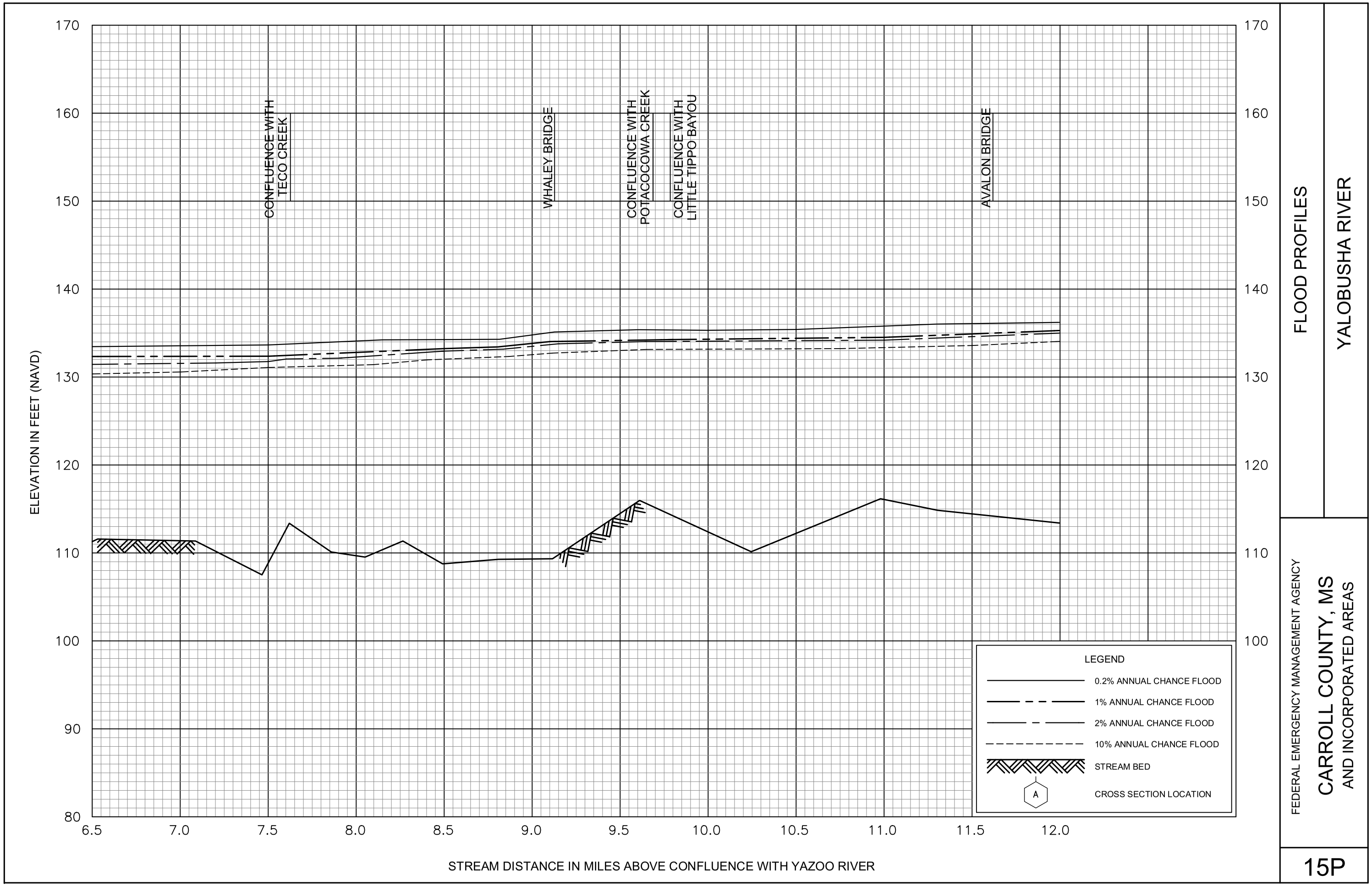
FLOOD PROFILES

YALOBUSHA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

14P



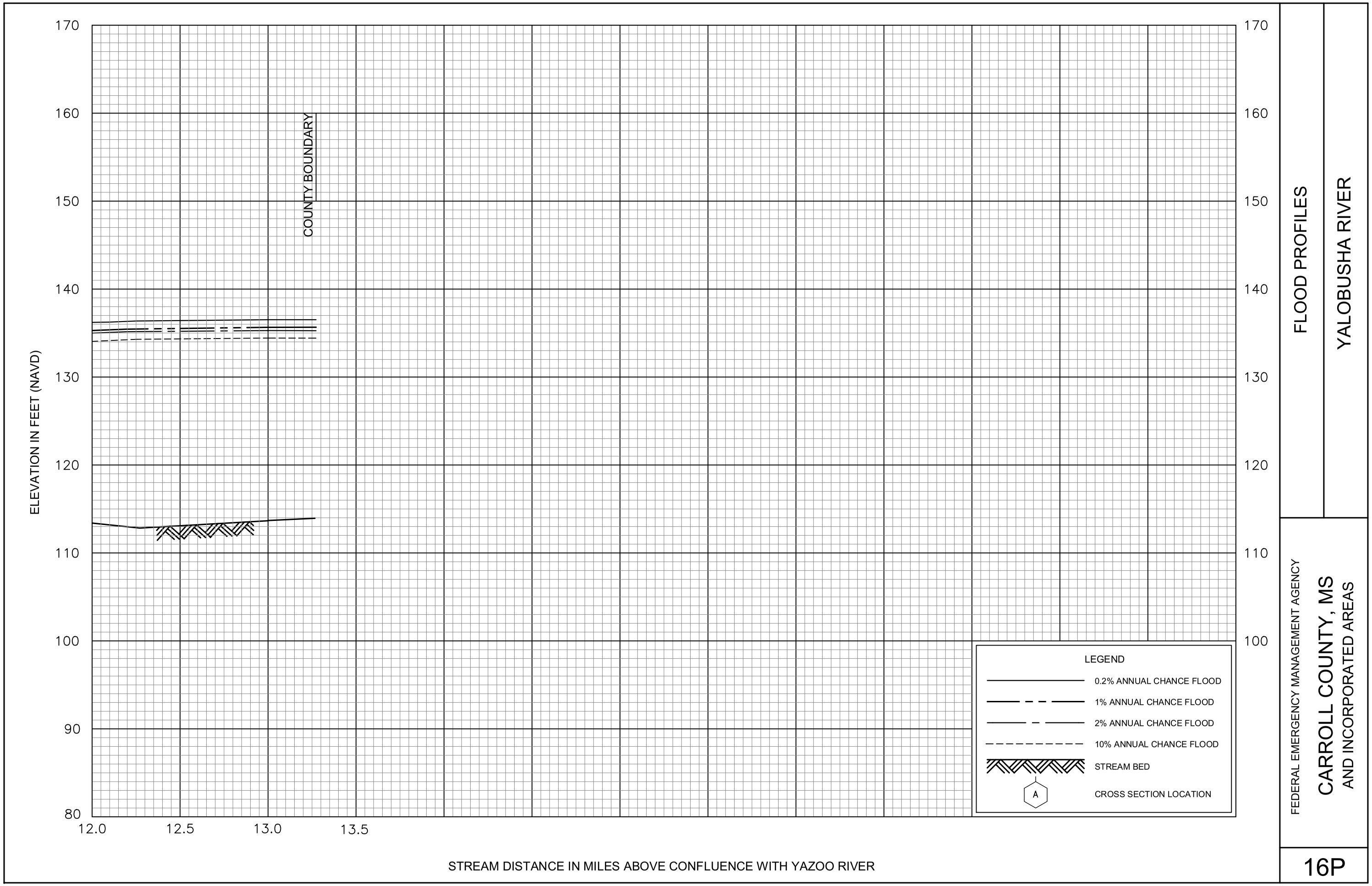
FLOOD PROFILES

YALOBUSHA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

15P



FLOOD PROFILES

YALOBUSHA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CARROLL COUNTY, MS
AND INCORPORATED AREAS

16P