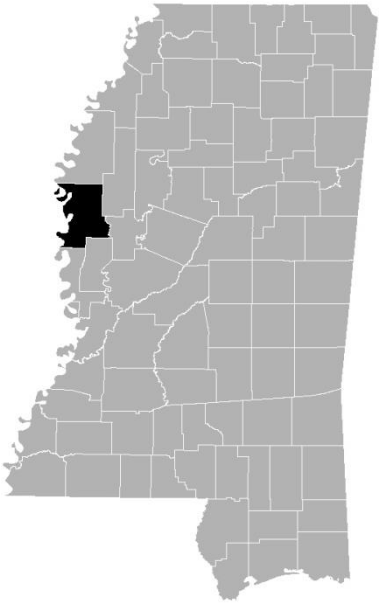
FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



WASHINGTON COUNTY, MISSISSIPPI

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
ARCOLA, TOWN OF	280178
GREENVILLE, CITY OF	280179
HOLLANDALE, CITY OF	280180
LELAND, CITY OF	280181
METCALFE, TOWN OF	280355
WASHINGTON COUNTY, UNINCORPORATED AREAS	280177

FEMA

PRELIMINARY
12/30/2020

REVISED:

TBD

FLOOD INSURANCE STUDY NUMBER
28151CV000C

Version Number 2.6.3.0

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FLOOD INSURANCE STUDY REPORT
WASHINGTON COUNTY, MISSISSIPPI

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60.3, *Criteria for Land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal

Government. Congress also recognized that most of these floodprone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as "Post-FIRM" buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community's regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of Washington County, Mississippi.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the 8-digit Hydrologic Unit Codes (HUC-8) sub-basins affecting each, are shown in Table 1. The Flood Insurance Rate Map (FIRM) panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Arcola, Town of	280178	08030207 08030209	28151C0270C	
Greenville, City of	280179	08030100 08030209	28151C0133D 28151C0134C 28151C0139D 28151C0140D 28151C0141D 28151C0142C 28151C0143C 28151C0144C 28151C0165C 28151C0207C 28151C0226D 28151C0227D 28151C0228C 28151C0229C	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Greenville, City of (Continued)	280179	08030100 08030209	28151C0231C 28151C0232C 28151C0233C 28151C0234C	
Hollandale, City of	280180	08030207 08030209	28151C0405C 28151C0415C	
Leland, City of	280181	08030207 08030209	28151C0166C 28151C0167C 28151C0168C 28151C0169C 28151C0200D	
Metcalfe, Town of	280355	08030207 08030209	28151C0134C 28151C0153C	
Washington County, Unincorporated Areas	280177	08030100 08030207 08030209	28151C0025C 28151C0050C 28151C0075C 28151C0100D 28151C0125C 28151C0130D 28151C0133D 28151C0134C 28151C0135C 28151C0139D 28151C0140D 28151C0141D 28151C0142C 28151C0144C 28151C0153C 28151C0155C 28151C0160C 28151C0165C 28151C0166C 28151C0167C 28151C0168C 28151C0169C 28151C0200D 28151C0207C 28151C0210C 28151C0225C 28151C0226D 28151C0227D 28151C0228C 28151C0229C 28151C0232C 28151C0233C 28151C0234C 28151C0250C 28151C0270C 28151C0275C	

Table 1: Listing of NFIP Jurisdictions (continued)

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Washington County, Unincorporated Areas (continued)	280177	08030100 08030207 08030209	28151C0300D 28151C0325D 28151C0350C 28151C0375C 28151C0400C 28151C0405C 28151C0415C 28151C0425C 28151C0450D 28151C0475C 28151C0500C 28151C0525C 28151C0550D 28151C0575D	

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1% annual chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% annual chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- 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 a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 30, “Map Repositories,” within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not

jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

The initial Countywide FIS Report for Washington County became effective on May 2, 2012. Refer to Table 27 for information about subsequent revisions to the FIRMs.

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

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (shaded)
C	X (unshaded)

The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at www.fema.gov/national-flood-insurance-program-community-rating-system or contact your appropriate FEMA Regional Office for more information about this program.

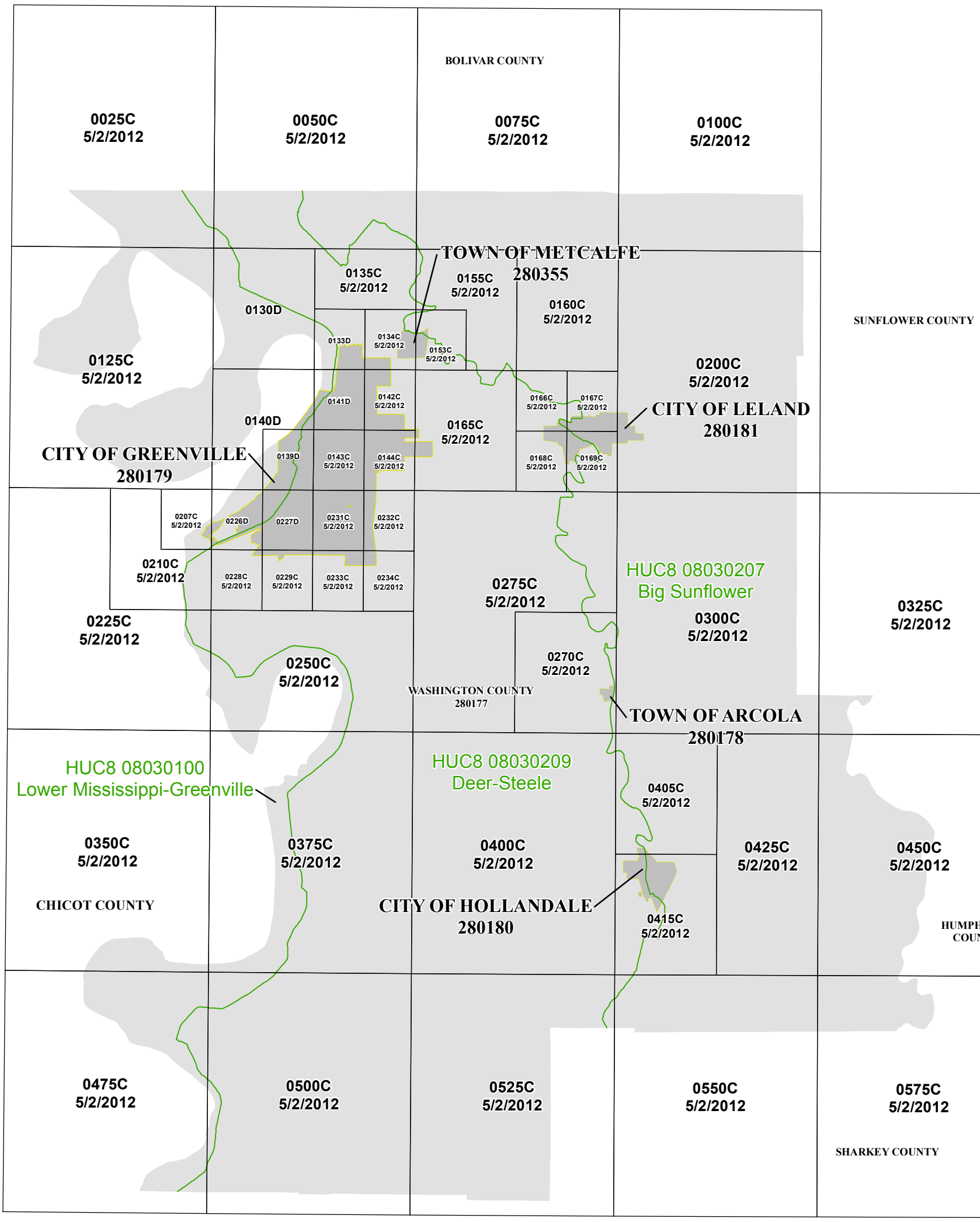
- Previous FIS Reports and FIRMs may have included levees that were accredited as reducing the risk associated with the 1% annual chance flood based on the information available and the mapping standards of the NFIP at that time. For FEMA to continue to accredit the identified levees, the levees must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled "Mapping of Areas Protected by Levee Systems."

  Since the status of levees is subject to change at any time, the user should contact the appropriate agency for the latest information regarding levees presented Table 8 of this FIS Report. For levees owned or operated by the U.S. Army Corps of Engineers (USACE), information may be obtained from the USACE national levee database (nld.usace.army.mil). For all other levees, the user is encouraged to contact the appropriate local community.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Washington County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, flooding sources, watershed boundaries, and United States Geological Survey (USGS) HUC-8 codes.

Figure 1: FIRM Panel Index



ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before MONTH DAY YEAR.

N

1 inch = 21,120 feet 1:253,444

0 6,000 12,000 24,000 36,000 48,000 feet

Map Projection:
State Plane Transverse Mercator, Mississippi West Zone 2302; North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

WASHINGTON COUNTY, MS and Incorporated Areas

PANELS PRINTED:

0025, 0050, 0075, 0100, 0125, 0130, 0133, 0134, 0135, 0139, 0140, 0141, 0142, 0143, 0144, 0153, 0155, 0160, 0165, 0166, 0167, 0168, 0169, 0200, 0207, 0210, 0225, 0226, 0227, 0228, 0229, 0231, 0232, 0233, 0234, 0250, 0270, 0275, 0300, 0325, 0350, 0375, 0400, 0405, 0415, 0425, 0450, 0475, 0500, 0525, 0550, 0575

FEMA

PRELIMINARY

MAP NUMBER
28151CIND0C

MAP REVISED

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Mapping Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Mapping Insurance eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 27 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

PRELIMINARY FIS REPORT: FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

Figure 2: FIRM Notes to Users

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was State Plane Transverse Mercator, Mississippi West Zone 2302. The horizontal datum was the North American Datum of 1983 NAVD83, Western Hemisphere. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 30 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on this FIRM was provided in digital format by United States Geological Survey, Mississippi Automated Resource Information System, and the US Census Bureau. Ortho imagery was produced by the Surdex Corporation in 2017 and has a 1 - foot ground sample distance. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Washington County, Mississippi, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 27 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM Panels issued before **TBD**.

Figure 2: FIRM Notes to Users

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for Washington County, Mississippi, effective **TBD**.

ACCREDITED LEVEE: 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 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 www.fema.gov/national-flood-insurance-program.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Washington County.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: *The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.*

Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)

Zone A — The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.

Zone AE — The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone.

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

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

Zone AR — The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

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

Zone V — The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.

Zone VE — Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.

Regulatory Floodway determined in Zone AE.

Non-encroachment zone (see Section 2.4 of this FIS Report for more information)

Figure 3: Map Legend for FIRM

OTHER AREAS OF FLOOD HAZARD

Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.

Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.

Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood. See Notes to Users for important information.

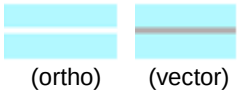
Area with Flood Risk due to Levee: Areas where a non-accredited levee, dike, or other flood control structure is shown as providing protection to less than the 1% annual chance flood.

OTHER AREAS

Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

Unshaded Zone X: Areas of minimal flood hazard.

FLOOD HAZARD AND OTHER BOUNDARY LINES



Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)

Limit of Study

Jurisdiction Boundary

Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet

GENERAL STRUCTURES

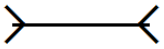
Aqueduct
Channel
Culvert
Storm Sewer

Channel, Culvert, Aqueduct, or Storm Sewer

Dam
Jetty
Weir

Dam, Jetty, Weir

Levee, Dike, or Floodwall



Bridge

Bridge

Figure 3: Map Legend for FIRM

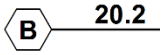
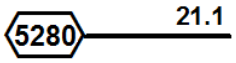
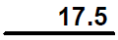
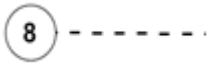
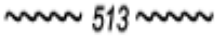
REFERENCE MARKERS	
	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
	Base Flood Elevation Line
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity

Figure 3: Map Legend for FIRM

BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
234	Interstate Highway
234	U.S. Highway
234	State Highway
234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
$^{42}76^{000m}E$	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16’ 52.5”	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1% annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2% annual chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and Washington County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1% annual chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 22), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1% and 0.2% annual chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1% annual chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary is shown on the FIRM. Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within Washington County, respectively.

Table 2, “Flooding Sources Included in this FIS Report,” lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 12. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1% annual chance floodplain corresponds to the SFHAs. The 0.2% annual chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

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. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
All Zone A streams in HUC 08030207 and 08030209	Washington County, Unincorporated Areas	Various	Various	08030207 08030209	N/A	N	A	09/01/1977
Big Sunflower River	Washington County, Unincorporated Areas	Sunflower County boundary	Sharkey County boundary	08030207	18.0	N	AE	04/06/2016
Black Bayou	Washington County, Unincorporated Areas	Confluence with Steele Bayou	Confluence with Main Canal	08030209	35.0	N	AE	09/01/1977
Bogue Phalia Creek	Washington County, Unincorporated Areas	Confluence with Big Sunflower River	Bolivar County boundary	08030207	34.5	N	A	09/01/1977
Bowman Boulevard Ditch	Greenville, City of; Washington County, Unincorporated Areas	Confluence with Main Canal	Approximately 290 feet upstream of Goodrich Street	08030209	3.6	N	AE	09/01/1977
Cypress Slough	Washington County, Unincorporated Areas	Confluence with East Cypress Slough / Unnamed Stream 4	Sunflower County boundary	08030207	1.3	N	A	04/06/2016
Deer Creek	Leland, City of; Washington County, Unincorporated Areas	Approximately 2,100 feet downstream of U.S. Highway 82	Approximately 800 feet upstream of Witte Street	08030207 08030209	3.0	N	AE	05/01/1977
Ditch No.6	Greenville, City of; Washington County, Unincorporated Areas	Confluence with Main Canal	At U.S. Highway 82	08030209	5.9	N	AE	09/01/1977
East Cypress Slough	Washington County, Unincorporated Areas	Confluence with Cypress Slough / Unnamed Stream 4	Sunflower County boundary	08030207	0.9	N	A	04/06/2016
East Sixmile Bayou	Washington County, Unincorporated Areas	Approximately 1.4 miles downstream of Sunflower County boundary	Sunflower County boundary	08030207	1.4	N	A	04/06/2016
Horseshoe Ditch	Greenville, City of; Washington County, Unincorporated Areas	Confluence with Main Canal	Approximately 1,056 feet upstream of Sampson Road	08030209	1.5	N	AE	05/01/1977

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Horseshoe Ditch	Greenville, City of	Approximately 1,056 feet upstream of Sampson Road	Approximately 380 feet upstream of Twist Street	08030209	0.2	N	A	05/01/1977
Lake Ferguson	Washington County, Unincorporated Areas	Confluence with Mississippi River	Approximately 10.6 miles upstream of the confluence with Mississippi River	08030100	10.6	N	AE	05/01/1977
Main Canal	Greenville, City of; Washington County, Unincorporated Areas	Confluence with Swan Lake	Confluence of Bowman Boulevard Ditch	08030209	29.5	N	AE	09/01/1977
Mississippi River	Washington County, Unincorporated Areas	Bolivar County boundary	Issaquena County boundary	08030100	44	N	AE	09/01/1977
Murphy Bayou	Washington County, Unincorporated Areas	Confluence with Big Sunflower River	At Watson Road	08030207	6.0	N	A	09/01/1977
Park Ditch	Greenville, City of	Confluence with Main Canal	Approximately 460 feet upstream of Illinois Central Railroad	08030209	1.2	N	AE	05/01/1977
Park Ditch	Greenville, City of	Approximately 460 feet upstream of Illinois Central Railroad	Approximately 790 feet upstream of Chatham Drive	08030209	0.4	N	A	05/01/1977
Robert Shaw Boulevard Ditch	Greenville, City of	Confluence with Main Canal	Approximately 440 feet upstream of Fairview Avenue	08030209	1.2	N	AE	05/01/1977
Sixmile Bayou	Washington County, Unincorporated Areas	At McKay Road	Sunflower County boundary	08030207	2.2	N	A	04/06/2016
Steele Bayou	Washington County, Unincorporated Areas	Issaquena County boundary	Approximately 11.0 miles upstream of Issaquena County boundary	08030209	11.0	N	AE	07/01/2010
Unnamed Stream 2	Washington County, Unincorporated Areas	Confluence with Red Branch	Sunflower County boundary	08030207	1.3	N	A	04/06/2016

Table 2: Flooding Sources Included in this FIS Report (continued)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Unnamed Stream 4	Washington County, Unincorporated Areas	Confluence with Cypress Slough / East Cypress Slough	Sunflower County boundary	08030207	0.6	N	A	04/06/2016
Wrong Prong	Washington County, Unincorporated Areas	Sunflower County boundary	Just upstream of D O Baker Road	08030207	0.3	N	A	04/06/2016

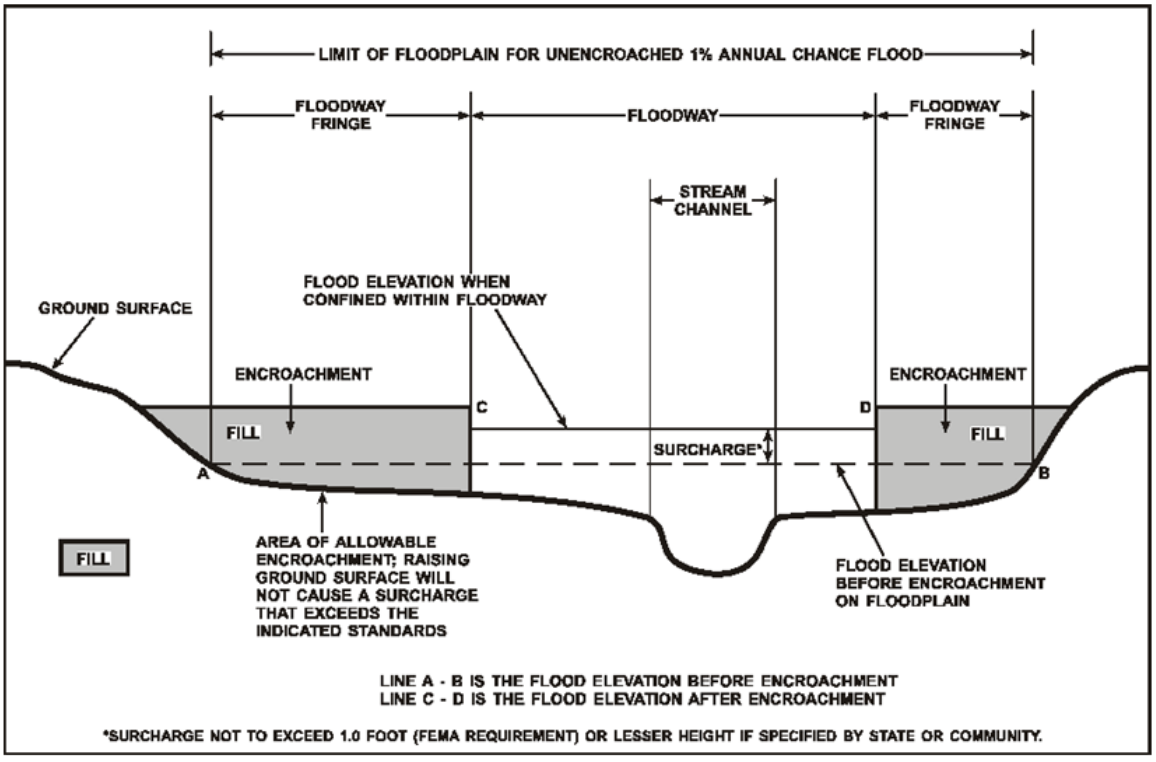
2.2 Floodways

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 balancing floodplain development against increasing flood hazard. With this approach, the area of the 1% annual chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1% annual chance flood. The floodway fringe is the area between the floodway and the 1% annual chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1% annual chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs 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.

2.4 Non-Encroachment Zones

Some States and communities use non-encroachment zones to manage floodplain development. For flooding sources with medium flood risk, field surveys are often not collected and surveyed bridge and culvert geometry is not developed. Standard hydrologic and hydraulic analyses are still performed to determine BFEs in these areas. However, floodways are not typically determined, since specific channel profiles are not developed. To assist communities with managing floodplain development in these areas, a “non-encroachment zone” may be provided. While not a FEMA designated floodway, the non-encroachment zone represents that area around the stream that should be reserved to convey the 1% annual chance flood event. As with a floodway, all surcharges must fall within the acceptable range in the non-encroachment zone.

General setbacks can be used in areas of lower risk (e.g. unnumbered Zone A), but these are not considered sufficient where unnumbered Zone A is replaced by Zone AE. The NFIP requires communities to ensure that any development in a non-encroachment area causes no increase in BFEs. Communities must generally prohibit development within the area defined by the non-encroachment width to meet the NFIP requirement. Regulations for Mississippi require communities in Washington County to limit increases caused by encroachment to 1.0 foot and several communities have adopted additional restrictions for non-encroachment areas.

Non-encroachment determinations may be delineated where it is not possible to delineate floodways because specific channel profiles with bridge and culvert geometry were not developed. Any non-encroachment determinations for this Flood Risk Project have been tabulated for selected cross sections and are shown in Table 24, “Flood Hazard and Non-Encroachment Data for Selected Streams.” Areas for which non-encroachment zones are provided show BFEs and the 1% annual chance floodplain boundaries mapped as zone AE on the FIRM but no floodways.

2.5 Coastal Flood Hazard Areas

This section is not applicable to this Flood Risk Project.

2.5.1 Water Elevations and the Effects of Waves

This section is not applicable to this Flood Risk Project.

Figure 5: Wave Runup Transect Schematic

[Not Applicable to this Flood Risk Project]

2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

This section is not applicable to this Flood Risk Project.

2.5.3 Coastal High Hazard Areas

This section is not applicable to this Flood Risk Project.

Figure 6: Coastal Transect Schematic

[Not Applicable to this Flood Risk Project]

2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Project.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, “Map Legend for FIRM.” Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in Washington County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Arcola, Town of	A, X
Greenville, City of	AE, A, X
Hollandale, City of	A, X
Leland, City of	AE, A, X
Metcalfe, Town of	AE, A, X
Washington County, Unincorporated Areas	AE, A, X

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 4 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

Table 4: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Big Sunflower	08030207	Big Sunflower River	Encompasses the entire eastern boarder of the county. .	3,154
Deer-Steele	08030209	Deer Creek	Encompasses the middle of the county, much of the concentrated detailed areas.	823
Lower Mississippi-Greenville	08030100	Mississippi River	Encompasses the entire western border of the county, which is delineated by the Mississippi River. It is the smallest of the three HUC's contained in the county.	601

4.2 Principal Flood Problems

Table 5 contains a description of the principal flood problems that have been noted for Washington County by flooding source.

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
All Flooding Sources	Principal flood problems in Washington County result from the nature of the terrain. A very large portion of the county lies in the flat, extremely broad delta region which is confined between the Mississippi River levees on the western side and Deer Creek Ridge on the eastern side. The area east of Deer Creek Ridge is also flat. Flows in this region occur over alluvial fans and over broad areas. Watercourses, including Main Canal and Black Bayou, have minimal capacity. Flows commonly cross the individual drainage divides, and the direction of overflow is generally variable, unpredictable, or difficult to determine (FIS 2012).
All Flooding Sources	In September 2008, over 11 inches of precipitation fell on Washington County from Hurricane Gustav (NOAA 2008). Widespread flooding occurred within the county, especially in the City of Greenville. The Washington County Emergency Management agency concluded that approximately 1,450 homes were damaged during the event (MLB 2009).

Table 6 contains information about historic flood elevations in the communities within Washington County.

Table 6: Historic Flooding Elevations

[Not Applicable to this Flood Risk Project]

4.3 Non-Levee Flood Protection Measures

Table 7 contains information about non-levee flood protection measures within Washington County such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 7: Non-Levee Flood Protection Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Various	N/A	Channel Improvements	Various	The Flood Control Act of December 22, 1944, authorized approximately 100 miles of channel improvements in the Steele Bayou basin, including work in Steele Bayou, Main Canal, and Black Bayou, to be accomplished by the USACE. These improvements have been completed. Additional improvements were authorized in 1970 and include additional channel enlargement of Steele Bayou and Main Canal, improvement of Black Bayou, and a closure fill on Main Canal at mile 27.2 to divert waters from approximately 21,000 acres of land north of Greenville down Black Bayou (FIS 2012).

4.4 Levees

For purposes of the NFIP, FEMA only recognizes levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with comprehensive floodplain management criteria. The Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10) describes the information needed for FEMA to determine if a levee system reduces the risk from the 1% annual chance flood. This information must be supplied to FEMA by the community or other party when a flood risk study or restudy is conducted, when FIRMs are revised, or upon FEMA request. FEMA reviews the information for the purpose of establishing the appropriate FIRM flood zone.

Levee systems that are determined to reduce the risk from the 1% annual chance flood are accredited by FEMA. FEMA can also grant provisional accreditation to a levee system that was previously accredited on an effective FIRM and for which FEMA is awaiting data and/or documentation to demonstrate compliance with Section 65.10. These levee systems are referred to as Provisionally Accredited Levees, or PALs. Provisional accreditation provides communities and levee owners with a specified timeframe to obtain the necessary data to confirm the levee's certification status. Accredited levee systems and PALs are shown on the FIRM using the symbology shown

in Figure 3 and in Table 8. If the required information for a PAL is not submitted within the required timeframe, or if information indicates that a levee system not longer meets Section 65.10, FEMA will de-accredit the levee system and issue an effective FIRM showing the levee-impacted area as a SFHA.

FEMA coordinates its programs with USACE, who may inspect, maintain, and repair levee systems. The USACE has authority under Public Law 84-99 to supplement local efforts to repair flood control projects that are damaged by floods. Like FEMA, the USACE provides a program to allow public sponsors or operators to address levee system maintenance deficiencies. Failure to do so within the required timeframe results in the levee system being placed in an inactive status in the USACE Rehabilitation and Inspection Program. Levee systems in an inactive status are ineligible for rehabilitation assistance under Public Law 84-99.

FEMA coordinated with the USACE, the local communities, and other organizations to compile a list of levees that exist within Washington County. Table 8, “Levees,” lists all accredited levees, PALs, and de-accredited levees shown on the FIRM for this FIS Report. Other categories of levees may also be included in the table. The Levee ID shown in this table may not match numbers based on other identification systems that were listed in previous FIS Reports. Levees identified as PALs in the table are labeled on the FIRM to indicate their provisional status.

Please note that the information presented in Table 8 is subject to change at any time. For that reason, the latest information regarding any USACE structure presented in the table should be obtained by contacting USACE and accessing the USACE national levee database. For levees owned and/or operated by someone other than the USACE, contact the local community shown in Table 30.

Table 8: Levees

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)
Greenville, City of; Washington County, Unincorporated Areas	Mississippi River	Left Bank	N/A	Yes	5904000034	Yes	28151C0025C 28151C0050C 28151C0130D 28151C0133D 28151C0139D 28151C0140D 28151C0141D 28151C0207C 28151C0210C 28151C0225C 28151C0226D 28151C0227D 28151C0250C 28151C0375C 28151C0475C 28151C0500C
Washington County, Unincorporated Areas	Mississippi River	Greenville Harbor	N/A	Yes	5904000049	Yes	28151C0130D 28151C0140D 28151C0226D

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 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-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2-% annual chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 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.

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 12. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 9. Frequency Discharge-Drainage Curves used to develop the hydrologic models may also be shown in Figure 7 for selected flooding sources. A summary of stillwater elevations developed for non-coastal flooding sources is provided in Table 10. Stream gage information is provided in Table 11.

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Big Sunflower	Sharkey County boundary	2,666	14,475	16,298	18,708	20,487	24,594
Bowman Boulevard Ditch	At mouth	4.19	960	*	1,160	1,350	1,550
Deer Creek	At U.S. Highway 82	81.40	756	*	1,064	1,205	1,537
Ditch No.6	At mouth	5.15	630	*	810	900	1,120
Horseshoe Ditch	Above mouth	1.58	490	*	640	710	900
Main Canal	Above mouth	109.59	5,120	*	6,500	7,280	9,310
Main Canal	Above Ditch No. 10	77.28	4,570	*	5,810	6,500	8,300
Main Canal	Above Ditch No. 88	39.00	2,600	*	3,300	3,690	4,700
Main Canal	Just below Bowman Boulevard	28.91	2,210	*	2,810	3,140	3,980
Main Canal	Above U.S. Highway 82	21.27	1,790	*	2,280	2,540	3,220
Main Canal	Above Horseshoe Ditch	15.67	1,340	*	1,710	1,900	2,420
Main Canal	Above proposed dam site	13.00	1,220	*	1,550	1,730	2,180
Park Ditch	At mouth	1.69	530	*	680	760	960
Robert Shaw Boulevard Ditch	At mouth	1.38	410	*	540	600	750

* Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves

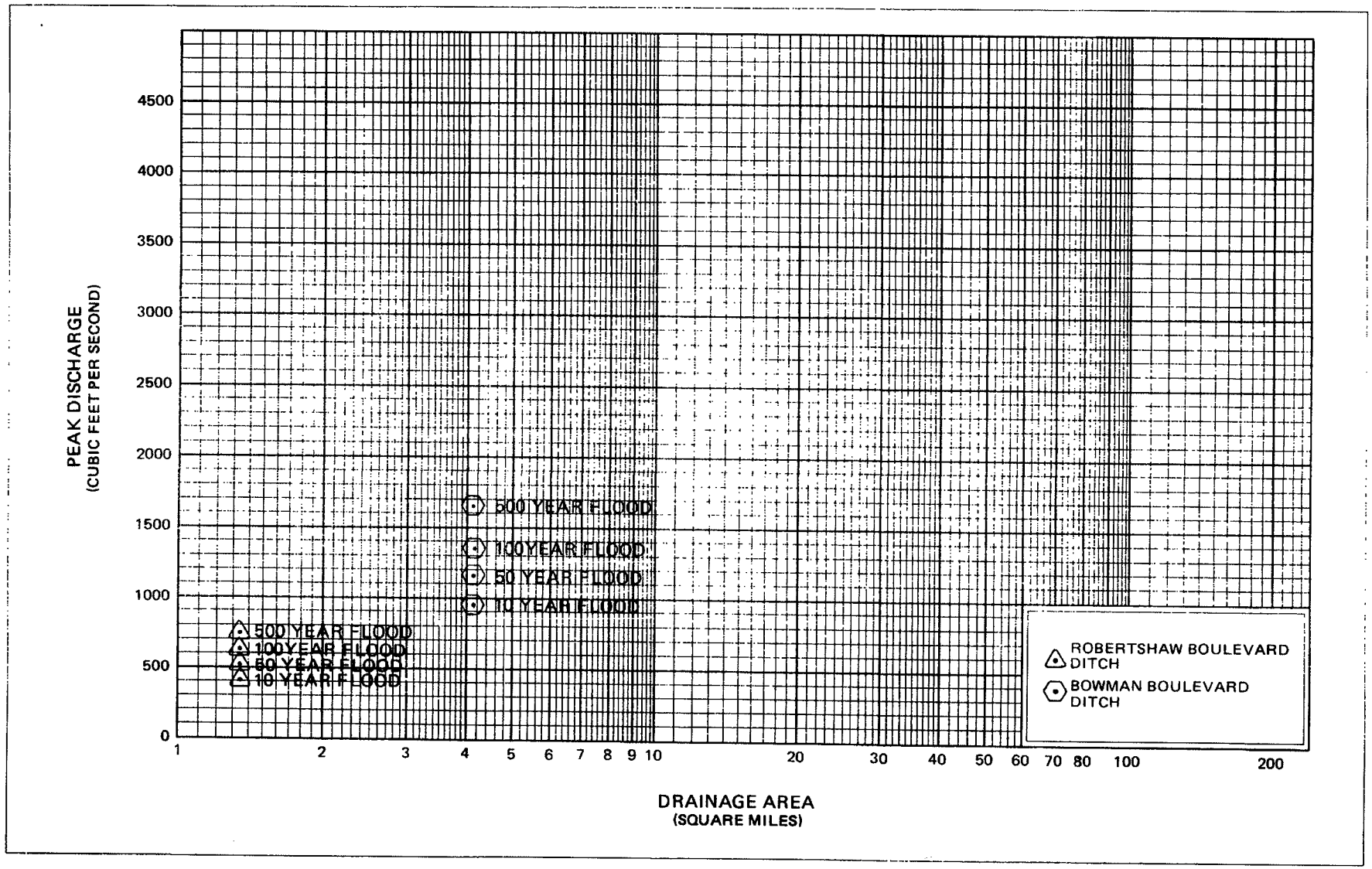


FIGURE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS AND INCORPORATED AREAS

FREQUENCY DISCHARGE, DRAINAGE AREA CURVES

ROBERTSHAW BOULEVARD DITCH –BOWMAN BOULEVARD DITCH

Table 10: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Steele Bayou	At Control Structure	*	*	*	100.1	*

*Not calculated for this Flood Risk Project

Table 11: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Big Sunflower River	07288500	USGS	Big Sunflower River at Sunflower, MS	767	02/16/1936	06/12/2014
Bogue Phalia	07288650	USGS	Bogue Phalia near Leland, MS	484	01/12/1946	01/10/2017
Deer Creek	07288770	USGS	Deer Creek near Hollandale, MS	98	02/17/1946	01/03/1983
Mississippi River	07289000	USGS	Mississippi River at Vicksburg, MS	1,140,000	06/24/1858	04/18/2014

5.2 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. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. 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. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 12. Roughness coefficients are provided in Table 13. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
All Zone A streams in HUC 08030207 and 08030209	Various	Various	Other	Other	09/01/1977	A	Streams studied by approximate methods in FIS 1980 did not mention a Hydrologic and/or Hydraulic Model/Method used.
Big Sunflower River	Sunflower County boundary	Sharkey County boundary	Gage Analysis	HEC-RAS 4.1.0 (USACE 2010)	04/06/2016	AE	
Black Bayou	Confluence with Steele Bayou	Confluence with Main Canal	Other	Other	09/01/1977	AE	Discharge frequencies relationships could not be determined accurately for the Mississippi River, Main Canal, and Black Bayou (FIS 1980). After numerous attempts to develop flood profiles through HEC-2, it was concluded that the mathematical models for backwater calculations give erroneous results for shallow flooding areas because of poorly defined flood plains and unpredictable flow patterns. The 10- and 1.0% annual chance flood profiles for Main Canal and Black Bayou developed for the 1971 Flood Plain Information Report (USACE 1971), were reviewed and found to be satisfactory for use in the study. Therefore, the 2% and 0.2% annual chance flood profiles were not shown. These profiles were based on backwater calculations and adjusted according to analysis of the September 1958 flood profile (FIS 1979 & FIS 1980).

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Bogue Phalia Creek	Confluence with Big Sunflower River	Bolivar County boundary	Other	Other	09/01/1977	A	Streams studied by approximate methods in FIS 1980 did not mention a Hydrologic and/or Hydraulic Model/Method used.
Bowman Boulevard Ditch	Confluence with Main Canal	Approximately 290 feet upstream of Goodrich Street	Other	HEC-2 (USACE 1973)	09/01/1977	AE	A synthetic unit hydrograph method sometimes referred to as Snyder's Method, was used to develop flood-flow frequency relationships (USACE 1959). This method relates U.S. Weather Service rainfall records to the physiographic and climatological characteristics of a drainage basin through applying proper quantitative emphasis on various factors. These factors are drainage area and shape of the basin; transmission and retention capacities of the soils in the basin; type, amount, and density of soil cover; and evapotranspiration rates of the vegetation within the basin. Frequency discharge, drainage area relationships for Bowman Boulevard Ditch and Robert Shaw Boulevard Ditch are shown in Figure 7 (FIS 1979 & FIS 1980). Cross sectional data were obtained by field survey. All bridges and culverts were surveyed in order to obtain elevation data and structural geometry. Water-surface profiles were developed using the HEC-2 computer program (USACE 1973). Starting water-surface elevations for all detailed-study streams were developed by using the slope-area method (FIS 1980).

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Cypress Slough	Confluence with East Cypress Slough / Unnamed Stream 4	Sunflower County boundary	Regression Equations (USGS 1991)	HEC-RAS 4.1.0 (USACE 2010)	04/06/2016	A	
Deer Creek	Approximately 2,100 feet downstream of U.S. Highway 82	Approximately 800 feet upstream of Witte Street	Other	HEC-2 (USACE 1973)	05/01/1977	AE	Detailed information for Deer Creek is provided in the narrative below.
Ditch No.6	Confluence with Main Canal	At U.S. Highway 82	Other	HEC-2 (USACE 1973)	09/01/1977	AE	A synthetic unit hydrograph method sometimes referred to as Snyder's Method, was used to develop flood-flow frequency relationships (USACE 1959). This method relates U.S. Weather Service rainfall records to the physiographic and climatological characteristics of a drainage basin through applying proper quantitative emphasis on various factors. These factors are drainage area and shape of the basin; transmission and retention capacities of the soils in the basin; type, amount, and density of soil cover; and evapotranspiration rates of the vegetation within the basin (FIS 1980). Cross sectional data were obtained by field survey. All bridges and culverts were surveyed in order to obtain elevation data and structural geometry. Water-surface profiles were developed using the HEC-2 computer program (USACE 1973). Starting water-surface elevations for all detailed-study streams were developed by using the slope-area method (FIS 1980).

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
East Cypress Slough	Confluence with Cypress Slough / Unnamed Stream 4	Sunflower County boundary	Regression Equations (USGS 1991)	HEC-RAS 4.1.0 (USACE 2010)	04/06/2016	A	
East Sixmile Bayou	Approximately 1.4 miles downstream of Sunflower County boundary	Sunflower County boundary	Regression Equations (USGS 1991)	HEC-RAS 4.1.0 (USACE 2010)	04/06/2016	A	
Horseshoe Ditch	Confluence with Main Canal	Approximately 1,056 feet upstream of Sampson Road	Other	HEC-2 (USACE 1973)	05/01/1977	AE	A synthetic unit hydrograph method, sometimes referred to as Snyder's Method, was used to develop flood-flow frequency relationships (USACE 1959). This method involves relating National Weather Service rainfall records to the physiographic and climatological characteristics of a drainage basin. This is done by applying proper quantitative emphasis on various factors, such as the drainage area and the shape of the basin; transmission and retention capacities of the soils in the basin; type, amount, and density of soil cover in the basin; and, evapotranspiration rates of the vegetation within the basin. Frequency discharge, drainage area relationships for Bowman Boulevard Ditch and Robert Shaw Boulevard Ditch are shown in Figure 7 (FIS 1979). Headwater flooding along Horseshoe Ditch and Park Ditch is mostly confined to the channels. Therefore, shallow backwater flooding from Main Canal governs the flooding along these two streams, as well as a downstream portion of Robert Shaw Boulevard Ditch (FIS 1979).

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Horseshoe Ditch	Approximately 1,056 feet upstream of Sampson Road	Approximately 380 feet upstream of Twist Street	Other	Other	05/01/1977	A	The area flooded due to inadequate drainage facilities and the areas on Park Ditch and Horseshoe Ditch above the limit of detailed study were studied by approximate methods and delineated through field inspections, photographs, and local accounts of past flooding (FIS 1979).
Lake Ferguson	Confluence with Mississippi River	Approximately 10.6 miles upstream of the confluence with Mississippi River	Other	Other	05/01/1977	AE	Discharge-frequency relationships cannot be determined accurately for the Mississippi River, the Lake Ferguson flooding source, and the Main Canal. High-water discharges were taken from a gaging station on the Main Canal. The gaging station record covers 21 years (FIS 1979). Water-surface elevations for Lake Ferguson were derived from River Mile station 538 on the Mississippi River. This point denotes the confluence of Lake Ferguson with the Mississippi River. Lake Ferguson is an isolated meander separated from the Mississippi River by a levee system and is inundated by the backwater of the Mississippi River (FIS 1979).

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Main Canal	Confluence with Swan Lake	Confluence of Bowman Boulevard Ditch	Other	HEC-2 (USACE 1973)	09/01/1977	AE	Discharge frequencies relationships could not be determined accurately for the Mississippi River, Main Canal, and Black Bayou (FIS 1980). High-water discharges were taken from a gaging station on the Main Canal. The gaging station record covers 21 years (FIS 1979). After numerous attempts to develop flood profiles through HEC-2, it was concluded that the mathematical models for backwater calculations give erroneous results for shallow flooding areas because of poorly defined flood plains and unpredictable flow patterns. The 10% and 1% annual chance flood profiles for Main Canal and Black Bayou developed for the 1971 Flood Plain Information Report (USACE 1971), were reviewed and found to be satisfactory for use in the study. Therefore, the 2 and 0.2% annual chance flood profiles were not shown. These profiles were based on backwater calculations and adjusted according to analysis of the September 1958 flood profile (FIS 1979, FIS 1980).
Mississippi River	Bolivar County boundary	Issaquena County boundary	Other	HEC-2 (USACE 1973)	09/01/1977	AE	Detailed information for Mississippi River is provided in the narrative below.
Murphy Bayou	Confluence with Big Sunflower River	At Watson Road	Other	Other	09/01/1977	A	Streams studied by approximate methods in FIS 1980 did not mention a Hydrologic and/or Hydraulic Model/Method used.

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Park Ditch	Confluence with Main Canal	Approximately 460 feet upstream of Illinois Central Railroad	Other	HEC-2 (USACE 1973)	05/01/1977	AE	A synthetic unit hydrograph method, sometimes referred to as Snyder's Method, was used to develop flood-flow frequency relationships (USACE 1959). This method involves relating National Weather Service rainfall records to the physiographic and climatological characteristics of a drainage basin. This is done by applying proper quantitative emphasis on various factors, such as the drainage area and the shape of the basin; transmission and retention capacities of the soils in the basin; type, amount, and density of soil cover in the basin; and, evapotranspiration rates of the vegetation within the basin. Frequency discharge, drainage area relationships for Bowman Boulevard Ditch and Robert Shaw Boulevard Ditch are shown in Figure 7 (FIS 1979). Headwater flooding along Horseshoe Ditch and Park Ditch is mostly confined to the channels. Therefore, shallow backwater flooding from Main Canal governs the flooding along these two streams, as well as a downstream portion of Robert Shaw Boulevard Ditch (FIS 1979).
Park Ditch	Approximately 460 feet upstream of Illinois Central Railroad	Approximately 790 feet upstream of Chatham Drive	Other	Other	05/01/1977	A	The area flooded due to inadequate drainage facilities and the areas on Park Ditch and Horseshoe Ditch above the limit of detailed study were studied by approximate methods and delineated through field inspections, photographs, and local accounts of past flooding (FIS 1979).

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Robert Shaw Boulevard Ditch	Confluence with Main Canal	Approximately 440 feet upstream of Fairview Avenue	Other	HEC-2 (USACE 1973)	05/01/1977	AE	A synthetic unit hydrograph method, sometimes referred to as Snyder's Method, was used to develop flood-flow frequency relationships (USACE 1959). This method involves relating National Weather Service rainfall records to the physiographic and climatological characteristics of a drainage basin. This is done by applying proper quantitative emphasis on various factors, such as the drainage area and the shape of the basin; transmission and retention capacities of the soils in the basin; type, amount, and density of soil cover in the basin; and, evapotranspiration rates of the vegetation within the basin. Frequency discharge, drainage area relationships for Bowman Boulevard Ditch and Robert Shaw Boulevard Ditch are shown in Figure 7 (FIS 1979).
Sixmile Bayou	At McKay Road	Sunflower County boundary	Regression Equations (USGS 1991)	HEC-RAS 4.1.0 (USACE 2010)	04/06/2016	A	
Steele Bayou	Issaquena County boundary	Approximately 11.0 miles upstream of Issaquena County boundary	Other	Other	07/01/2010	AE	The 1% annual chance flood elevation for the Steele Bayou Control Structure was determined by analysis of historical gage records. Much of the county north of the Control Structure is below the computed flood elevation (FIS 2012).
Unnamed Stream 2	Confluence with Red Branch	Sunflower County boundary	Regression Equations (USGS 1991)	HEC-RAS 4.1.0 (USACE 2010)	04/06/2016	A	

Table 12: Summary of Hydrologic and Hydraulic Analyses (continued)

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Unnamed Stream 4	Confluence with Cypress Slough / East Cypress Slough	Sunflower County boundary	Regression Equations (USGS 1991)	HEC-RAS 4.1.0 (USACE 2010)	04/06/2016	A	
Wrong Prong	Sunflower County boundary	Just upstream of D O Baker Road	Regression Equations (USGS 1991)	HEC-RAS 4.1.0 (USACE 2010)	04/06/2016	A	

Special Considerations

Deer Creek

A gaging station on Deer Creek, located near Hollandale, approximately 28 miles downstream from Leland, was the principal source of data for defining discharge-frequency relationships for the creek. The gage has been operated since 1945 by the USACE. Values of the 10, 2, 1, and 0.2% annual chance peak discharges at the gage site were obtained from a log-Pearson Type III distribution of annual peak flow data (WRC 1967). Flows thus derived at the gage, where the drainage area is 98 square miles, were used without reduction for the 81 square miles of drainage area at the U.S. Highway 82 bridge in Leland because of the characteristics of the basin. With no appreciable increase in the drainage area, and with the available storage in this 28-mile segment of Deer Creek, flows are expected to remain fairly constant between Leland and the gage site.

Because of shallow flooding or inadequate drainage-type conditions, peak flood-flows were not appreciable for other streams in the study area. However, approximate volume-frequency relationships for the 1% percent annual chance flood in shallow flooding areas was established by assuming that all the water from rainfall over these areas, barring some losses, will be retained in the area until the capacity of the area to hold water is exhausted (FIS 1978).

Starting water-surface elevations were developed by the slope-area method. The elevation for the 1% annual chance flood, within the shallow flooding area, was determined by correlating the volume-frequency relationships of the 1% annual chance flood with the stage-volume relationships for these areas. The elevation for the approximate 1% annual chance flood in the area of inadequate drainage was determined by calculating the approximate water-surface elevation on the downstream side of the drainage structure and adding to it the head loss through the drainage structure (FIS 1979).

Mississippi River

For the Mississippi River, flood frequencies were developed on the basis of statistical analysis (USGS 1976), historical flood routings, and model studies. The 0.2% annual chance frequency flood discharges and corresponding flood elevations on the Mississippi River within the study area were not determined due to the difficulty in analyzing a specified flood frequency of this magnitude in such a large, unique drainage basin. The sequence and severity of meteorological and hydrologic events, which could reasonably be expected to occur and cause a major flood such as a 0.2% annual chance frequency flood, would involve the consideration of storm transpositions, storm adjustments, seasonal variations, storm mechanics, and the determination of the feasibility of the occurrence of the events, as well as the determination of flows under natural conditions and as regulated by reservoirs at key stations on the tributaries and on the main Mississippi River. Mississippi River Project Flood was used in the report as an alternative to the 0.2% annual chance flood. Although no specific return period is assigned to a project flood, it is typically greater than the 1.0-percent annual chance flood (FIS 1980). Hydraulic analyses on the Mississippi River for floods of selected recurrence intervals were made in conjunction with studies to update the Mississippi River Project flowline. Channel and overbank cross sections were surveyed in 1973. Channel roughness coefficients (Manning's "n") were determined by computer modeling of the 1973 flood high-water profile. Flowlines were computed using the HEC-2 computer program (USACE 1973) for backwater computations and adjusted according to physical model test. Model tests were run on the Mississippi River basin model located in Clinton, Mississippi (FIS 1980).

Discharge frequencies relationships could not be determined accurately for the Mississippi River, Main Canal, and Black Bayou (FIS 1980).

Discharge-frequency relationships cannot be determined accurately for the Mississippi River, the Lake Ferguson flooding source, and the Main Canal. High-water discharges were taken from a gaging station on the Main Canal. The gaging station record covers 21 years (FIS 1979).

Water-surface profiles were developed using the HEC-2 computer program (USACE 1973). Profiles were determined for the 10-, 2.0-, 1.0-, and 0.2% annual chance floods for the Mississippi River, Ditch No. 6, and Bowman Boulevard Ditch. Starting water-surface elevations for all detailed-study streams were developed by using the slope-area method.

Table 13: Roughness Coefficients

Flooding Source	Channel “n”	Overbank “n”
All Zone A streams in HUC 08030207 and 08030209	*	*
Big Sunflower River	0.040-0.055	0.070-0.130
Black Bayou	*	*
Bogue Phalia Creek	*	*
Bowman Boulevard Ditch	0.045-0.075	0.100-0.150
Cypress Slough	0.045	0.050-0.070
Deer Creek	0.045	0.100
Ditch No.6	0.045-0.075	0.100-0.150
East Cypress Slough	0.045	0.070
East Sixmile Bayou	0.045-0.050	0.070-0.150
Horseshoe Ditch	0.045-0.075	0.150
Horseshoe Ditch	*	*
Lake Ferguson	*	*
Main Canal	*	*
Mississippi River	0.030	0.140
Murphy Bayou	*	*
Park Ditch	0.045-0.050	0.070-0.150
Park Ditch	*	*
Robert Shaw Boulevard Ditch	0.040-0.055	0.070-0.130
Sixmile Bayou	0.045	0.070
Steele Bayou	*	*
Unnamed Stream 2	0.050	0.150
Unnamed Stream 4	0.045	0.070
Wrong Prong	0.045-0.050	0.070-0.150

*Data not available

5.3 Coastal Analyses

This section is not applicable to this Flood Risk Project.

Table 14: Summary of Coastal Analyses

[Not Applicable to this Flood Risk Project]

5.3.1 Total Stillwater Elevations

This section is not applicable to this Flood Risk Project.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas

[Not Aplicable to this Flood Risk Project]

Table 15: Tide Gage Analysis Specifics

[Not Applicable to this Flood Risk Project]

5.3.2 Waves

This section is not applicable to this Flood Risk Project.

5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Project.

5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

Table 16: Coastal Transect Parameters

[Not Applicable to this Flood Risk Project]

Figure 9: Transect Location Map

[Not Applicable to this Flood Risk Project]

5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Project.

Table 17: Summary of Alluvial Fan Analyses

[Not Applicable to this Flood Risk Project]

Table 18: Results of Alluvial Fan Analyses

[Not Applicable to this Flood Risk Project]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

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

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at 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 archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please visit the NGS website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for Washington County are provided in Table 19.

Table 19: Countywide Vertical Datum Conversion

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
Average Conversion from NGVD29 to NAVD88 = -0.230 feet				

Table 20: Stream-Based Vertical Datum Conversion

[Not Applicable to this Flood Risk Project]

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) format that meets FEMA's FIRM database specifications and geographic information standards. This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross

sections that are shown on the FIRMs. Additional information about the FIRM Database and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, www.fema.gov/guidelines-and-standards-flood-risk-analysis-and-mapping.

Base map information shown on the FIRM was derived from the sources described in Table 21.

Table 21: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
Digital Orthophoto	Surdex Corporation	2014 2015 2016 2017	1:6,300	S_Base_Index Orthophotography S_Base_Index table contains information about the raster data used as a base map for the study area. (SURDEX 2014; SURDEX 2015; SURDEX 2016; SURDEX 2017a; SURDEX 2017b)
Digital Orthophoto	Sanborn Mapping Company	2013	1:6,300	S_Base_Index Orthophotography S_Base_Index table contains information about the raster data used as a base map for the study area. (SANBORN 2013)
Digital Orthophoto	EarthData International, Inc.	2007	N/A	Ortho Imagery Base Index (EDI 2007)
HUC Boundaries	United States Geological Survey (USGS)	1994	1:250,000	8-digit Watershed Boundary Dataset (USGS 1994)
Hydrology	Mississippi Automated Resource Information System	2005	1:6,300	Hydrology (MARIS 2005)
Municipal Boundaries	U.S. Census Bureau	2010	N/A	S_Pol_Ar Incorporated Community Boundaries. (US Census 2010)
Political County Boundaries	Mississippi Automated Resource Information System	2007	1:24,000	S_Pol_Ar County Boundaries (MARIS 2007)
Public Land Survey System (PLSS)	Mississippi Automated Resource Information System	2010	1:24,000	S_Plss_Ar Township and Range Boundaries (MARIS 2010a; MARIS 2010b)
Public Land Survey System (PLSS)	Mississippi Department of Environmental Quality	2004	N/A	S_Plss_Ln (MDEQ 2004)

Table 21: Base Map Sources (continued)

Data Type	Data Provider	Data Date	Data Scale	Data Description
Surface Water Features	United States Geological Survey (USGS)	2016	1:100,000	S_Wtr_Ln Waterlines for updated study. (USGS 2016)
Transportation Features	Mississippi Department of Environmental Quality	2010	N/A	S_Trnsport_Ln Roads (MDEQ 2010)
Transportation Features	Mississippi Automated Resource Information System	2019	1:5,000	S_Trnsport_Ln Roads (MARIS 2019)
Transportation Features	Mississippi Automated Resource Information System	2000	1:100,000	S_Trnsport_Ln Railroads (MARIS 2000)

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22.

In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% 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.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 23, “Floodway Data.”

Certain flooding sources may have been studied that do not have published BFEs on the FIRMs, or for which there is a need to report the 1% annual chance flood elevations at selected cross sections because a published Flood Profile does not exist in this FIS Report. These streams may have also been studied using methods to determine non-encroachment zones rather than floodways. For these flooding sources, the 1% annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22. All topographic data used for modeling or mapping has been converted as necessary to NAVD88. The 1% annual chance elevations for selected cross sections along these flooding sources,

along with their non-encroachment widths, if calculated, are shown in Table 24, “Flood Hazard and Non-Encroachment Data for Selected Streams.”

Table 22: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Washington County and Incorporated Areas	All flooding sources within county	1 meter resolution Light Detection and Ranging data (LiDAR)	0.09 Meters $RMSE_z$	0.09 meter at 95% confidence level	MRD 2010
Washington County and Incorporated Areas	All flooding sources within county	1 meter resolution Light Detection and Ranging data (LiDAR)	6.6 cm $RMSE_z$	N/A	Woolpert 2017
Washington County and Incorporated Areas	All flooding sources within county	1 meter resolution Light Detection and Ranging data (LiDAR)	6.6 cm $RMSE_z$	0.45 meter at 95% confidence level	NGC 2011

BFEs shown at cross sections on the FIRM represent the 1% annual chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report.

Table 23: Floodway Data

[Not Applicable to this Flood Risk Project]

Non-encroachment areas may be delineated where it is not possible to delineate floodways because specific channel profiles with bridge and culvert geometry were not developed. Any non-encroachment determinations for this Flood Risk Project have been tabulated for selected cross sections and are shown in Table 24. The non-encroachment width indicates the measured distance left and right (looking downstream) from the mapped center of the stream to the non-encroachment boundary based on a surcharge of 1.0 foot or less.

Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams

Flooding Source	Cross Section	Stream Station[1]	1% Annual Chance Flood Discharge (cfs)	1% Annual Chance Water Surface Elevation (feet NAVD88)	Non-Encroachment Width (feet)	
					Left	Right
Big Sunflower River		291,503	20,487	100.1[2]	160	160
Big Sunflower River		293,404	20,487	100.1[2]	214	144
Big Sunflower River		295,550	20,487	100.1[2]	155	155
Big Sunflower River	A	297,037	20,487	100.1[2]	179	187
Big Sunflower River		298,660	20,487	100.1[2]	168	168
Big Sunflower River		299,707	20,487	100.1[2]	158	186
Big Sunflower River		301,281	20,487	100.1[2]	167	167
Big Sunflower River		302,452	20,487	100.1[2]	198	168
Big Sunflower River		304,326	20,487	100.1[2]	163	217
Big Sunflower River		306,050	20,487	100.1[2]	399	178
Big Sunflower River	B	307,313	20,487	100.1[2]	238	158
Big Sunflower River		308,768	20,487	100.1[2]	173	196
Big Sunflower River		310,515	20,487	100.1[2]	165	165
Big Sunflower River		312,352	20,487	100.1[2]	397	135
Big Sunflower River		314,428	20,487	100.1[2]	269	269
Big Sunflower River	C	316,924	20,487	100.1[2]	166	221
Big Sunflower River		319,240	20,487	100.1[2]	262	162
Big Sunflower River		321,653	20,487	100.1[2]	140	263
Big Sunflower River		323,876	20,487	100.1[2]	149	234
Big Sunflower River	D	326,428	20,487	100.1[2]	149	200
Big Sunflower River		329,283	20,487	100.1[2]	215	192
Big Sunflower River		332,354	20,487	100.1[2]	152	202
Big Sunflower River		334,874	20,487	100.1[2]	178	178
Big Sunflower River		334,951	20,487	100.1[2]	214	144
Big Sunflower River		335,002	20,487	100.1[2]	214	144
Big Sunflower River		336,144	20,487	100.2	166	166
Big Sunflower River	E	337,620	20,487	100.4	167	167
Big Sunflower River		338,964	20,487	100.5	173	160
Big Sunflower River		339,046	20,487	101.0	173	162
Big Sunflower River		339,137	20,487	101.0	173	162

Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams (continued)

Flooding Source	Cross Section	Stream Station[1]	1% Annual Chance Flood Discharge (cfs)	1% Annual Chance Water Surface Elevation (feet NAVD88)	Non-Encroachment Width (feet)	
					Left	Right
Big Sunflower River		340,213	20,487	101.1	165	165
Big Sunflower River	F	342,941	20,487	101.4	198	215
Big Sunflower River		345,032	20,487	101.5	155	255
Big Sunflower River		347,446	20,487	101.7	215	196
Big Sunflower River		350,500	20,487	101.9	143	283
Big Sunflower River		354,295	20,487	102.2	264	153
Big Sunflower River	G	358,409	20,487	102.4	246	148
Big Sunflower River		361,394	20,487	102.6	209	186
Big Sunflower River		364,383	20,487	102.8	136	177
Big Sunflower River	H	367,640	20,487	103.0	196	188
Big Sunflower River		369,662	20,487	103.1	182	204
Big Sunflower River		372,759	20,487	103.3	753	182
Big Sunflower River	I	375,236	20,487	103.3	1,051	152
Big Sunflower River		378,177	20,487	103.4	173	135
Big Sunflower River		379,867	20,487	103.5	215	145
Big Sunflower River		381,862	20,487	103.7	201	1,009
Big Sunflower River		383,942	20,487	103.8	105	1,210
Big Sunflower River	J	385,676	20,487	103.9	138	114

[1] Stream distance in feet above confluence with Yazoo River

[2] Elevation controlled by Steele Bayou

6.4 Coastal Flood Hazard Mapping

This section is not applicable to this Flood Risk Project.

Table 25: Summary of Coastal Transect Mapping Considerations

[Not Applicable to this Flood Risk Project]

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 30, "Map Repositories").

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA.

To obtain an application for a LOMA, visit www.fema.gov/floodplain-management/letter-map-amendment-loma and download the form "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill". Visit the "Flood Map-Related Fees" section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at www.fema.gov/online-tutorials.

For more information about how to apply for a LOMA, call the FEMA Mapping Insurance eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting www.fema.gov/floodplain-management/letter-map-amendment-loma for the "MT-1 Application Forms and Instructions for Conditional

and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Mapping Insurance eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at www.fema.gov/online-tutorials.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/mt-2-application-forms-and-instructions and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Mapping Insurance eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Table 26: Incorporated Letters of Map Change

[Not Applicable to this Flood Risk Project]

6.5.4 Physical Map Revisions

Physical Map Revisions (PMRs) are an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy

(CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of Washington County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 27, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.

- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 27 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first Flood Hazard Boundary Map (FHBM). This date may be the same date as the Initial NFIP Map Date.

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.

- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community.

- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as Physical Map Revisions (PMR) of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Washington County FIRMs in countywide format was 05/02/2012.

Table 27: Community Map History

Community Name	Initial Identification Date	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Arcola, Town of	06/07/1974	06/07/1974	07/09/1976	08/01/1986	05/02/2012
Greenville, City of	11/16/1973	11/16/1973	05/21/1976	08/01/1979	TBD 05/02/2012
Hollandale, City of	05/03/1974	05/03/1974	07/23/1976	01/14/1983	05/02/2012
Leland, City of	05/31/1974	05/31/1974	06/18/1976	02/15/1979	03/23/2021 05/02/2012
Metcalfe, Town of[1]	10/18/1974	10/18/1974	12/16/1977	09/03/1980	05/02/2012
Washington County, Unincorporated Areas	10/18/1974	10/18/1974	12/16/1977	09/03/1980	TBD 03/23/2021 05/02/2012

[1] This community did not have its own FIRM prior to the first countywide FIS. The land areas for this community was previously shown on the FIRM for the unincorporated areas of Washington County, but was not identified as a separate NFIP community. Therefore, the dates for this community were taken from the Washington County FIRM.

SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

7.1 Contracted Studies

Table 28 provides a summary of the contracted studies, by flooding source, that are included in this FIS Report.

Table 28: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
All Zone A streams in HUC 08030207 and 08030209	03/01/1980	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	September 1977	Washington County, Unincorporated Areas
Big Sunflower River	03/23/2021	AECOM	MS FY.11	April 2016	Washington County, Unincorporated Areas
Black Bayou	03/01/1980	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	September 1977	Washington County, Unincorporated Areas
Bogue Phalia Creek	03/01/1980	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	September 1977	Washington County, Unincorporated Areas
Bowman Boulevard Ditch	03/01/1980	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	September 1977	Greenville, City of; Washington County, Unincorporated Areas
Cypress Slough	03/23/2021	AECOM	MS FY.11	April 2016	Washington County, Unincorporated Areas
Deer Creek	08/01/1978	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	May 1977	Leland, City of; Washington County, Unincorporated Areas
Ditch No.6	03/01/1980	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	September 1977	Greenville, City of; Washington County, Unincorporated Areas
East Cypress Slough	03/23/2021	AECOM	MS FY.11	April 2016	Washington County, Unincorporated Areas
East Sixmile Bayou	03/23/2021	AECOM	MS FY.11	April 2016	Washington County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report (continued)

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Horseshoe Ditch	02/01/1979	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	May 1977	Greenville, City of; Washington County, Unincorporated Areas
Horseshoe Ditch	02/01/1979	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	May 1977	Greenville, City of
Lake Ferguson	02/01/1979	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	May 1977	Washington County, Unincorporated Areas
Main Canal	03/01/1980	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	September 1977	Greenville, City of; Washington County, Unincorporated Areas
Mississippi River	03/01/1980	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	September 1977	Washington County, Unincorporated Areas
Murphy Bayou	03/01/1980	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	September 1977	Washington County, Unincorporated Areas
Park Ditch	02/01/1979	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	May 1977	Greenville, City of

Table 28: Summary of Contracted Studies Included in this FIS Report (continued)

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Park Ditch	02/01/1979	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	May 1977	Greenville, City of
Robert Shaw Boulevard Ditch	02/01/1979	USACE, Vicksburg District	Inter-Agency Agreement No. IAA-H-16-75, Project Order No. 21 and IAA-H-7-76, Project Order No. 1	May 1977	Greenville, City of
Sixmile Bayou	03/23/2021	AECOM	MS FY.11	April 2016	Washington County, Unincorporated Areas
Steele Bayou	05/02/2012	State of Mississippi	Contract No. EMA-2008-CA-5883	July 2010	Washington County, Unincorporated Areas
Unnamed Stream 2	03/23/2021	AECOM	MS FY.11	April 2016	Washington County, Unincorporated Areas
Unnamed Stream 4	03/23/2021	AECOM	MS FY.11	April 2016	Washington County, Unincorporated Areas
Wrong Prong	03/23/2021	AECOM	MS FY.11	April 2016	Washington County, Unincorporated Areas

7.2 Community Meetings

The dates of the community meetings held for this Flood Risk Project and previous Flood Risk Projects are shown in Table 29. These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

Table 29: Community Meetings

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Arcola, Town of	05/02/2012	08/18/2008	Scoping	Representatives from Mississippi Department of Environmental Quality (MDEQ), Mississippi Emergency Management Agency (MEMA), FEMA National Service Provider, Washington County, the City of Natchez, and the study contractor
		11/15/2010	Final CCO	Representatives from MDEQ, MEMA, FEMA National Service Provider, Washington County, the City of Natchez, and the study contractor
Greenville, City of	TBD	12/04/2018	LAMP Stakeholder Coordination and Data Collection Meeting	MDEQ, MEMA, Mississippi Levee Board, Federal Emergency Management Agency Region IV, Washington County, Waggoner Engineering, and AECOM
		01/31/2019	Local Levee Partnership Team Meeting 1	MDEQ, MEMA, MS Levee Board, FEMA, Washington County, Waggoner Engineering, and AECOM
		03/25/2020	Local Levee Partnership Team Meeting 2	MDEQ, MEMA, MS Levee Board, FEMA, Washington County, the City of Greenville, Waggoner Engineering, and AECOM
		TBD	Final CCO	TBD
	05/02/2012	08/18/2008	Scoping	Representatives from MDEQ, MEMA, FEMA National Service Provider, Washington County, the City of Natchez, and the study contractor
		11/15/2010	Final CCO	Representatives from MDEQ, MEMA, FEMA National Service Provider, Washington County, the City of Natchez, and the study contractor

Table 29: Community Meetings (continued)

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Hollandale, City of	05/02/2012	08/18/2008	Scoping	Representatives from MDEQ, MEMA, FEMA National Service Provider, Washington County, the City of Natchez, and the study contractor
		11/15/2010	Final CCO	Representatives from MDEQ, MEMA, FEMA National Service Provider, Washington County, the City of Natchez, and the study contractor
Leland, City of	03/23/2021	07/09/2013	Discovery	MDEQ, MEMA, Mississippi Department of Transpiration, FEMA Region IV, United States Geological Survey, Yazoo Mississippi Levee District, South Delta Planning Development District, Waggoner Engineering, and AECOM
		07/12/2018	Flood Risk Review (FRR)	MDEQ, MEMA, Mississippi Geographic Information, LLC (MGI), FEMA, AECOM, and the community.
		01/16/2019	Final CCO	MDEQ, MEMA, MGI, FEMA, AECOM, and the community.
Metcalfe, Town of	05/02/2012	08/18/2008	Scoping	Representatives from MDEQ, MEMA, FEMA National Service Provider, Washington County, the City of Natchez, and the study contractor
		11/15/2010	Final CCO	Representatives from MDEQ, MEMA, FEMA National Service Provider, Washington County, the City of Natchez, and the study contractor

Table 29: Community Meetings (continued)

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Washington County, Unincorporated Areas	TBD	12/04/2018	LAMP Stakeholder Coordination and Data Collection Meeting	MDEQ, MEMA, Mississippi Levee Board, FEMA Region IV, Washington County, Waggoner Engineering, and AECOM
		01/31/2019	Local Levee Partnership Team Meeting 1	MDEQ, MEMA, MS Levee Board, FEMA, Washington County, Waggoner Engineering, and AECOM
		03/25/2020	Local Levee Partnership Team Meeting 2	MDEQ, MEMA, MS Levee Board, FEMA, Washington County, the City of Greenville, Waggoner Engineering, and AECOM
		TBD	Final CCO	TBD
	03/23/2021	07/09/2013	Discovery	MDEQ, MEMA, Mississippi Department of Transpiration, FEMA Region IV, United States Geological Survey, Yazoo Mississippi Levee District, South Delta Planning Development District, Waggoner Engineering, and AECOM
		07/12/2018	Flood Risk Review (FRR)	MDEQ, MEMA, MGI, FEMA, AECOM, and the community.
		01/16/2019	Final CCO	MDEQ, MEMA, MGI, FEMA, AECOM, and the community.

SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see www.fema.gov.

Discrepancies have been identified along the Washington County boundary as not edge matching with the surrounding counties. This is due to effective modeling not being consistent across county boundaries

Table 30 is a list of the locations where FIRMs for Washington County can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 30: Map Repositories

Community	Address	City	State	Zip Code
Arcola, Town of	Town Hall 102 Tower Lane	Arcola	MS	38722
Greenville, City of	City Hall 340 Main Street	Greenville	MS	38701
Hollandale, City of	City Hall 200 East Avenue South	Hollandale	MS	38748
Leland, City of	City Hall 206 North Broad Street	Leland	MS	38756
Metcalfe, Town of	Town Hall 315 Martin Luther King Jr Boulevard	Metcalfe	MS	38760
Washington County, Unincorporated Areas	Washington County Planning Department 900 Washington Avenue	Greenville	MS	38701

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 31.

Table 31 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the State NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of State and local GIS data in their state.

Table 31: Additional Information

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library
NFIP website	www.fema.gov/national-flood-insurance-program
NFHL Dataset	msc.fema.gov
FEMA Region IV	Federal Regional Center 3003 Chamblee Tucker Road Atlanta, GA 30341 (770) 220-5200
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Stacey D. Ricks, CFM Mississippi Emergency Management Agency PO Box 5644 Pearl, MS 39208 Office: (601) 933-6605 Fax: (601) 933-6805 sricks@mema.ms.gov
State GIS Coordinator	John Wieber MFMMI Program Director Administrator of the MS Coordinating Council for Remote and Geographic Information Systems P.O. Box 20307 Jackson, MS 39289-1307

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

Table 32 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

Table 32: Bibliography and References

Citation in this FIS	Publisher / Issuer	Publication Title, "Article," Volume, Number, etc.	Author / Editor	Place of Publication	Publication Date / Date of Issuance	Link
EDI 2007	EarthData International, Inc.	*Ortho Imagery Base Index*	EarthData International, Inc.	Washington, D.C.	April 6, 2007	https://earthdata.nasa.gov/
FIS 1978	Federal Emergency Management Agency	Flood Insurance Study, City of Leland, Washington County Mississippi		Washington, D.C.	August 1978	https://msc.fema.gov/
FIS 1979	Federal Emergency Management Agency	Flood Insurance Study, City of Greenville, Washington County, Mississippi		Washington, D.C.	February 1979	https://msc.fema.gov/
FIS 1980	Federal Emergency Management Agency	Flood Insurance Study, Washington County, Mississippi, Unincorporated Areas		Washington, D.C.	March 1980	https://msc.fema.gov/
FIS 2012	Federal Emergency Management Agency	Flood Insurance Study, Washington County, Mississippi and Incorporated Areas		Washington, D.C.	May 2, 2012	https://msc.fema.gov/
MARIS 2000	Mississippi Automated Resource Information System	*MS Active Railroads*	U.S. Census Bureau	Jackson, MS	January 1, 2000	http://www.maris.state.ms.us/
MARIS 2005	Mississippi Automated Resource Information System	*Hydrology*	Mississippi Automated Resource Information System	Jackson, MS	January 1, 2005	http://www.maris.state.ms.us/
MARIS 2007	Mississippi Automated Resource Information System	*County Boundaries for Mississippi*	U.S. Census Bureau	Jackson, MS	April 1, 2007	http://www.maris.state.ms.us/
MARIS 2010a	Mississippi Automated Resource Information System	*Statewide Sections; Mississippi*	Mississippi Automated Resource Information System	Jackson, MS	April 1, 2010	http://www.maris.state.ms.us/

Table 32: Bibliography and References (continued)

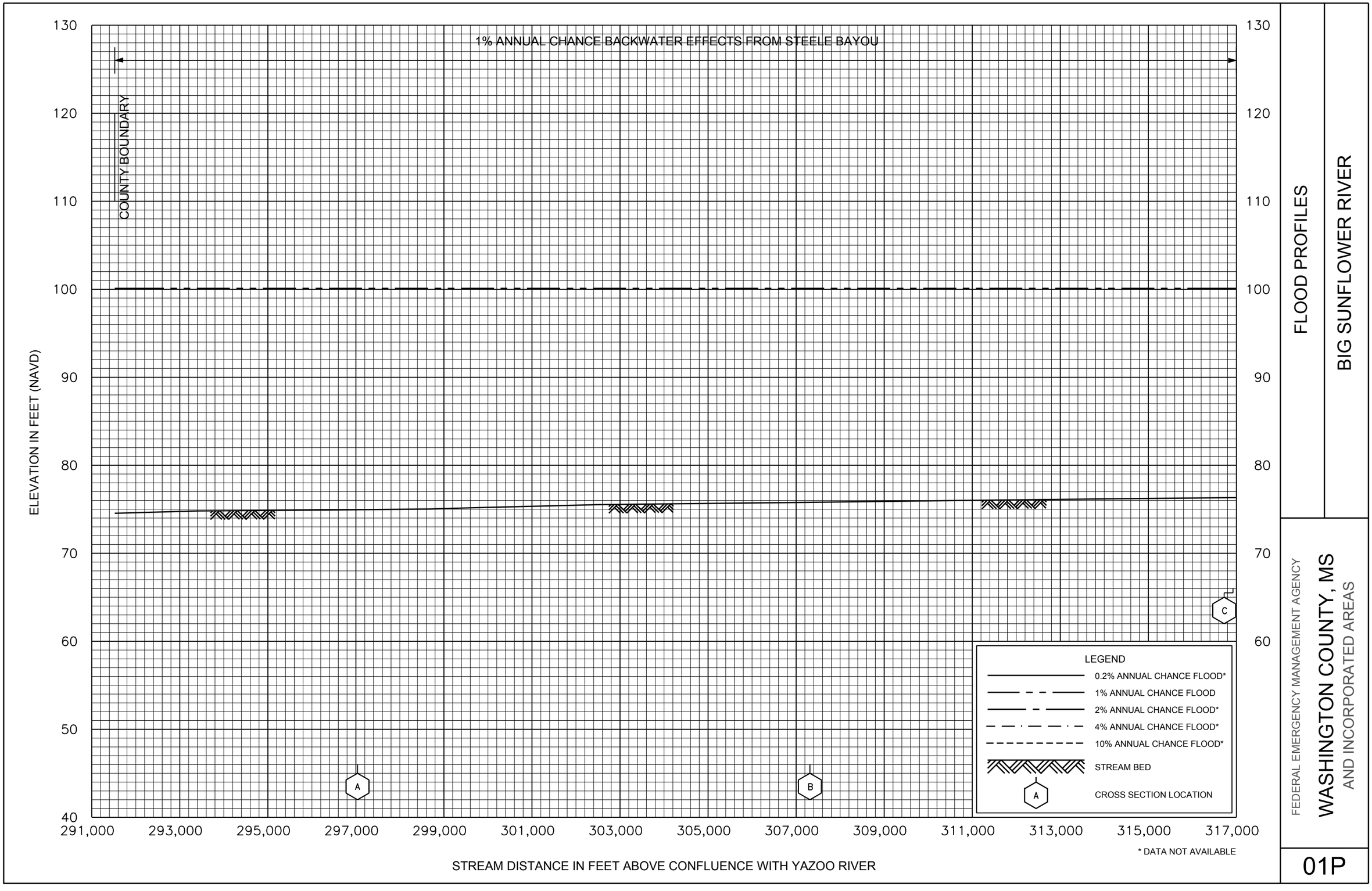
Citation in this FIS	Publisher / Issuer	Publication Title, "Article," Volume, Number, etc.	Author / Editor	Place of Publication	Publication Date / Date of Issuance	Link
MARIS 2010b	Mississippi Automated Resource Information System	*Public Land Survey System*	Mississippi Automated Resource Information System	Jackson, MS	April 1, 2010	http://www.maris.state.ms.us/
MARIS 2019	Mississippi Automated Resource Information System	*MDOT_CO_LRM*	U.S. Census Bureau	Jackson, MS	September 4, 2019	http://www.maris.state.ms.us/
MDEQ 2004	Mississippi Department of Environment Quality	*Processing of 2ft Digital Orthoimagery for Part B, Statewide, MS*	Mississippi Department of Environment Quality	Jackson, MS	April 6, 2004	https://www.mdeq.ms.gov
MDEQ 2010	Mississippi Department of Environment Quality	*Transportation*	Mississippi Department of Environment Quality, Office of Geology	Jackson, MS	September 20, 2010	https://www.mdeq.ms.gov
MLB 2009	Mississippi Levee Board	Impact Newsletter, vol. 8, no. 1			Winter 2009	
MRD 2010	Mississippi River Delta	Mississippi River Delta LiDAR			August 2, 2010	
NGC 2011	United States Geological Survey	*2011 FEMA/USGS Chicot and Desha LiDAR*	Northrop Grumman Corporation	Reston, VA	January 28, 2012	https://viewer.nationalmap.gov/basic/
NOAA 2008	National Oceanic and Atmospheric Administration, National Weather Service Forecast Office	Remnants of Hurricane Gustav Brings Heavy Rainfall to the Region			September 2008	http://www.crh.noaa.gov/lsx/?n=gustav

Table 32: Bibliography and References (continued)

Citation in this FIS	Publisher / Issuer	Publication Title, "Article," Volume, Number, etc.	Author / Editor	Place of Publication	Publication Date / Date of Issuance	Link
SANBORN 2013	Mississippi Automated Resource Information System	*Sharkey County, MS Raster Imagery*	Sanborn Mapping Company	Jackson, MS	September 18, 2013	http://www.maris.state.ms.us/
SURDEX 2014	Mississippi Automated Resource Information System	*Humphreys County, MS Raster Imagery*	Surdex Corporation	Jackson, MS	May 28, 2014	http://www.maris.state.ms.us/
SURDEX 2015	Mississippi Automated Resource Information System	*Bolivar County, MS Raster Imagery*	Surdex Corporation	Jackson, MS	May 28, 2015	http://www.maris.state.ms.us/
SURDEX 2016	Mississippi Automated Resource Information System	*Sunflower County, MS Raster Imagery*	Surdex Corporation	Jackson, MS	May 28, 2016	http://www.maris.state.ms.us/
SURDEX 2017a	Mississippi Automated Resource Information System	*Washington County, MS Raster Imagery*	Surdex Corporation	Jackson, MS	May 28, 2017	http://www.maris.state.ms.us/
SURDEX 2017b	Mississippi Automated Resource Information System	*MS - 2017*	Surdex Corporation	Jackson, MS	March 8, 2017	http://www.maris.state.ms.us/
US Census 2010	Mississippi Automated Resource Information System	*MS Census Designated Places 2010*	U.S. Census Bureau	Jackson, MS	January 1, 2010	http://www.maris.state.ms.us/
USACE 1959	US Army Corps of Engineers	Flood Hydrograph Analysis and Computations		St Louis, MO	August 1959	
USACE 1971	US Army Corps of Engineers	Flood Plain Information Report; Mississippi River (Lake Ferguson) Main Canal and Black Bayou		Greenville, MS	May 1971	
USACE 1973	U.S. Army Corps of Engineers, Hydrologic Engineering Center	HEC-2 Water Surface Profiles Generalized Computer Program		Davis, California	June 1973	
USACE 2010	U.S. Army Corps of Engineers, Hydrologic Engineering Center	HEC-RAS 4.1.0, River Analysis System, Version 4.1.0, Computer Software		Davis, California	2010	

Table 32: Bibliography and References (continued)

Citation in this FIS	Publisher / Issuer	Publication Title, "Article," Volume, Number, etc.	Author / Editor	Place of Publication	Publication Date / Date of Issuance	Link
USGS 1976	U.S. Department of Interior, Geological Survey	Flood Frequency of Mississippi Streams	B.E. Colson and J.W. Hudson	Jackson, MS	1976	
USGS 1991	US Dept. of the Interior, Geological Survey, Open File Report	Flood Characteristics of Mississippi Streams, Water-Resources Investigations Report 91-4037		Jackson, MS	1991	
USGS 1994	United States Geological Survey	*HUC8 Boundaries*	USGS	Washington, D.C.	1994	https://water.usgs.gov/
USGS 2016	United States Geological Survey	*NHD Flowline*	USGS	Jackson, MS	January 1, 2016	https://www.usgs.gov/
Woolpert 2017	United States Geological Survey	*2017 Ouachita FEMA R6 LiDAR*	Woolpert	Reston, VA	March 26, 2017	https://viewer.nationalmap.gov/basic/
WRC 1967	U.S. Water Resources Council	"A Uniform Technique for Determining Flood Flow Frequencies", Bulletin 15			December 1967	



FLOOD PROFILES

BIG SUNFLOWER RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

01P

1% ANNUAL CHANCE BACKWATER EFFECTS FROM STEELE BAYOU

WEIR

STATE HWY 12

ELEVATION IN FEET (NAVD)

130
120
110
100
90
80
70
60
50
40

317,000 319,000 321,000 323,000 325,000 327,000 329,000 331,000 333,000 335,000 337,000 339,000 341,000 343,000

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH YAZOO RIVER

D E F

LEGEND

- 0.2% ANNUAL CHANCE FLOOD*
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD*
- 4% ANNUAL CHANCE FLOOD*
- 10% ANNUAL CHANCE FLOOD*
- STREAM BED
- A — CROSS SECTION LOCATION

* DATA NOT AVAILABLE

FLOOD PROFILES

BIG SUNFLOWER RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

02P

ELEVATION IN FEET (NAVD)

130
120
110
100
90
80
70
60
50
40

343,000 345,000 347,000 349,000 351,000 353,000 355,000 357,000 359,000 361,000 363,000 365,000 367,000 369,000

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH YAZOO RIVER

H

G

LEGEND

- 0.2% ANNUAL CHANCE FLOOD*
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD*
- 4% ANNUAL CHANCE FLOOD*
- 10% ANNUAL CHANCE FLOOD*
- STREAM BED
- A — CROSS SECTION LOCATION

* DATA NOT AVAILABLE

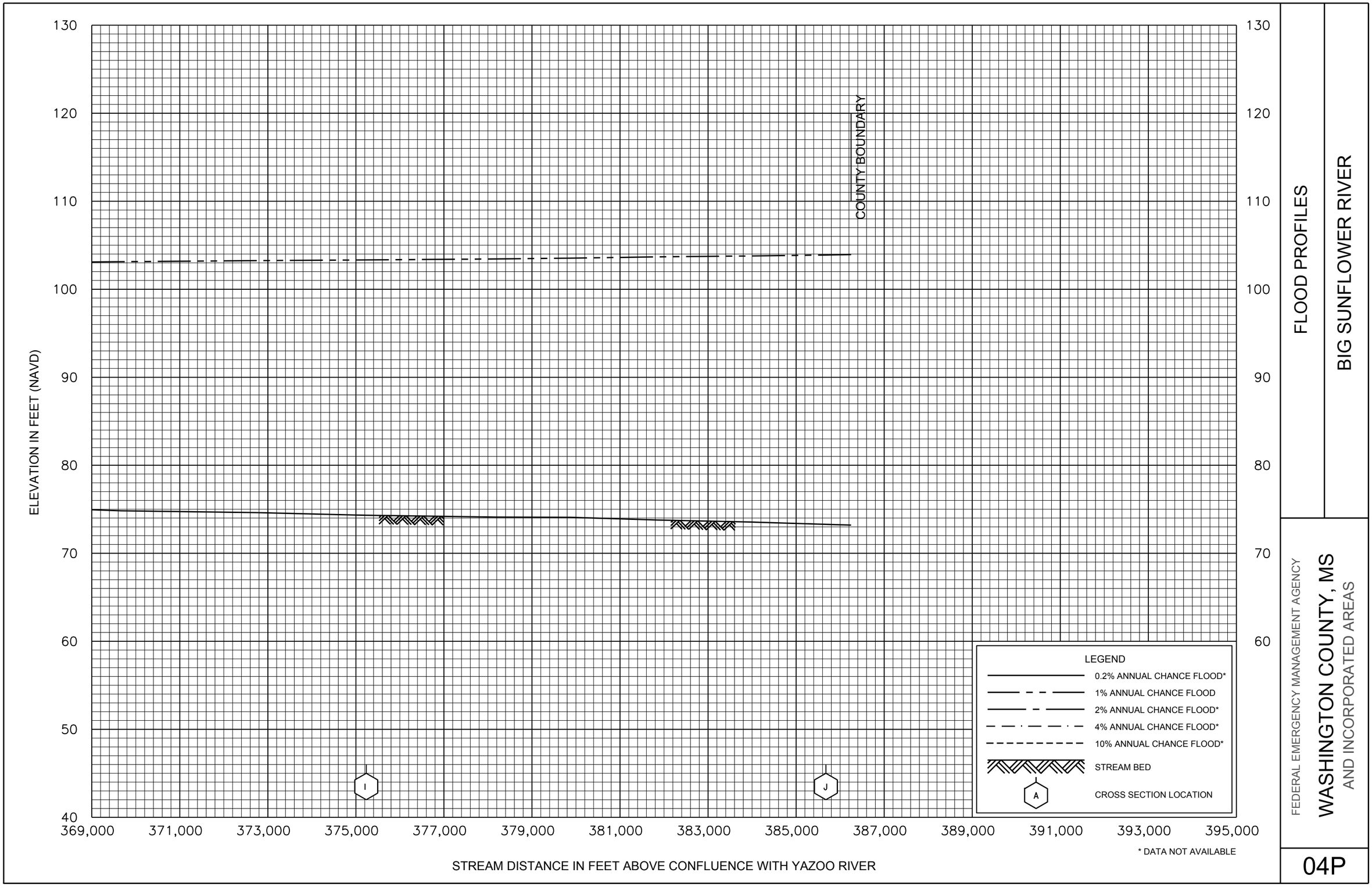
FLOOD PROFILES

BIG SUNFLOWER RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

03P



FLOOD PROFILES

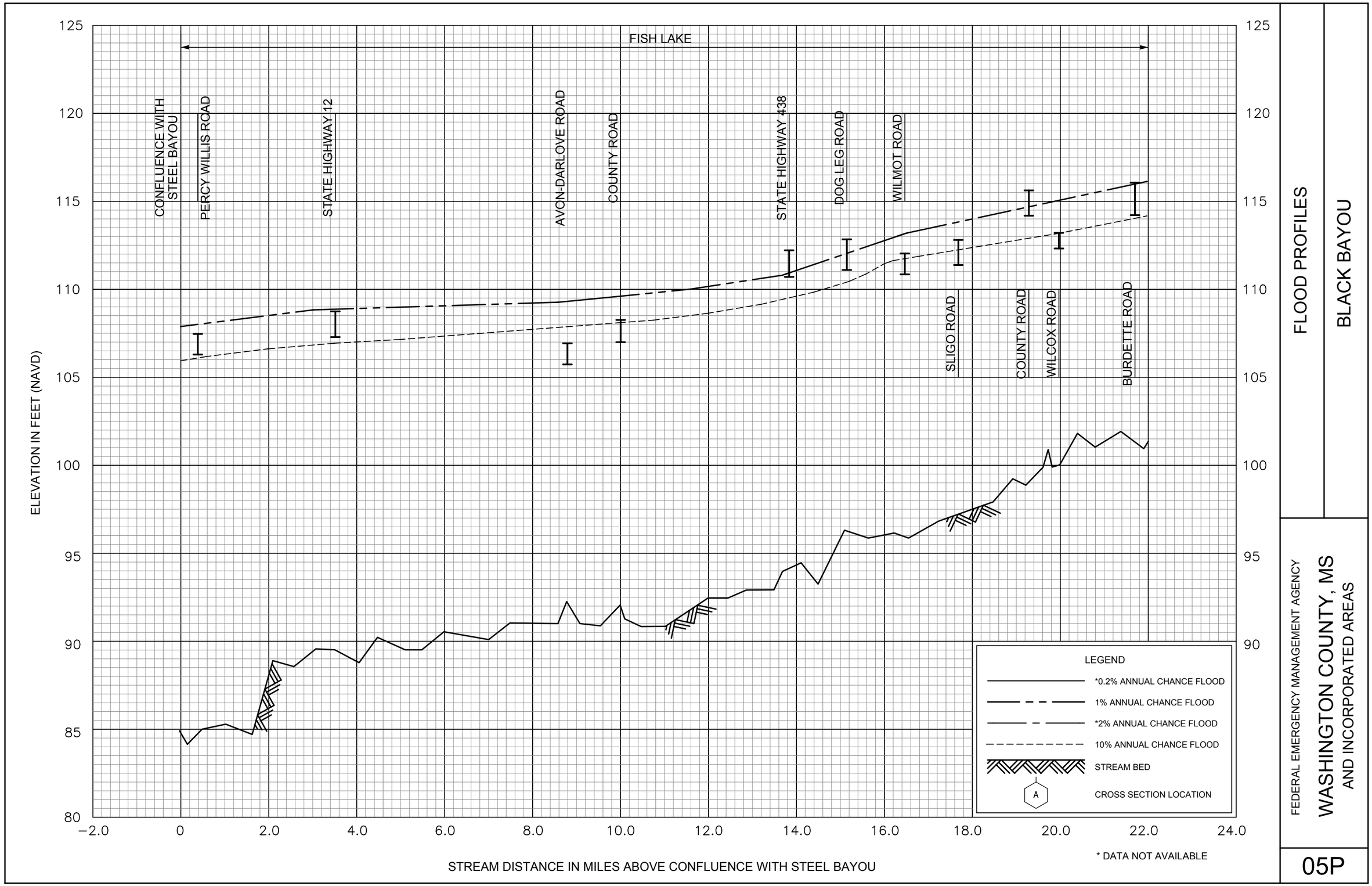
BIG SUNFLOWER RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS

AND INCORPORATED AREAS

04P



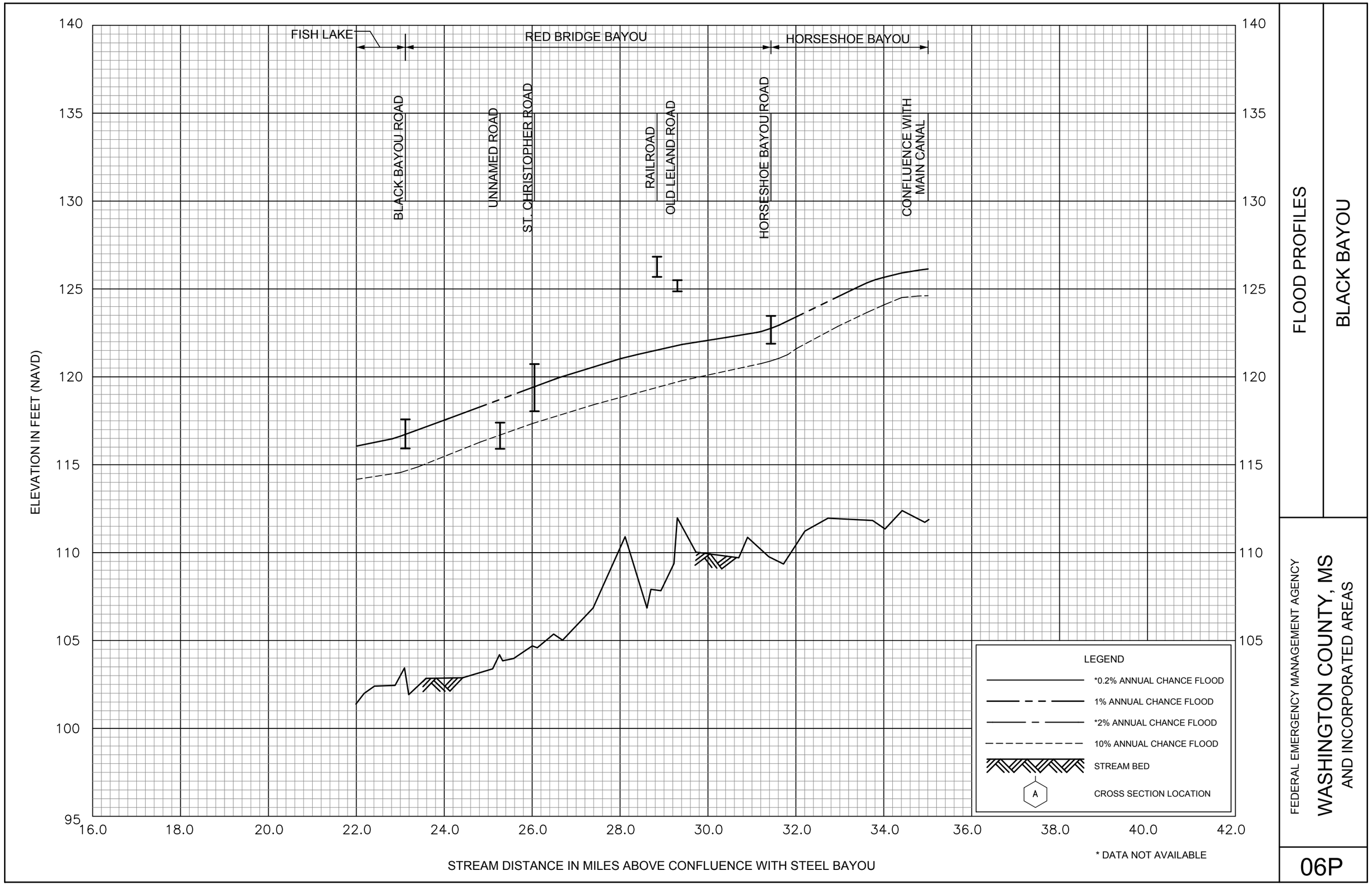
FLOOD PROFILES

BLACK BAYOU

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

05P



FLOOD PROFILES

BLACK BAYOU

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

06P

1% ANNUAL CHANCE BACKWATER EFFECTS FROM MAIN CANAL

0.2 AND 2% ANNUAL CHANCE FLOOD DATA NOT AVAILABLE

CONFLUENCE WITH MAIN CANAL

BOWMAN BOULEVARD EXIT

STATE HIGHWAY 1

DRIVE TO GREENVILLE MALL

EAST DRIVE TO SOLOMON JUNIOR HIGH

WEST DRIVE TO SOLOMON JUNIOR HIGH

ROAD TO SOLOMON LOT

CANAL AVENUE

SOUTH MAIN STREET

ELEVATION IN FEET (NAVD)

145
140
135
130
125
120
115
110
105
100

−0.2 0 0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4

STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH MAIN CANAL

LEGEND

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

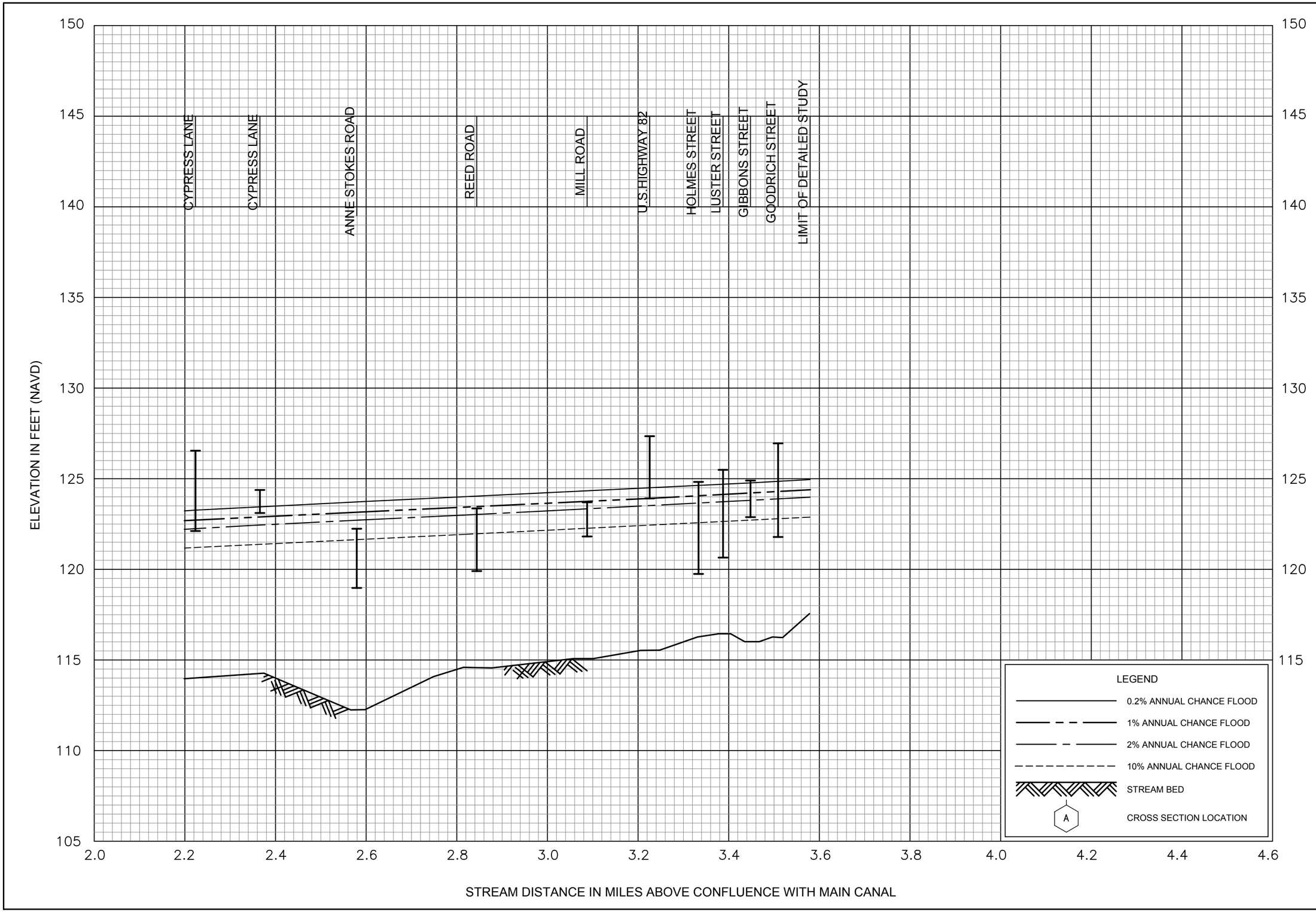
FLOOD PROFILES

BOWMAN BOULEVARD DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

07P



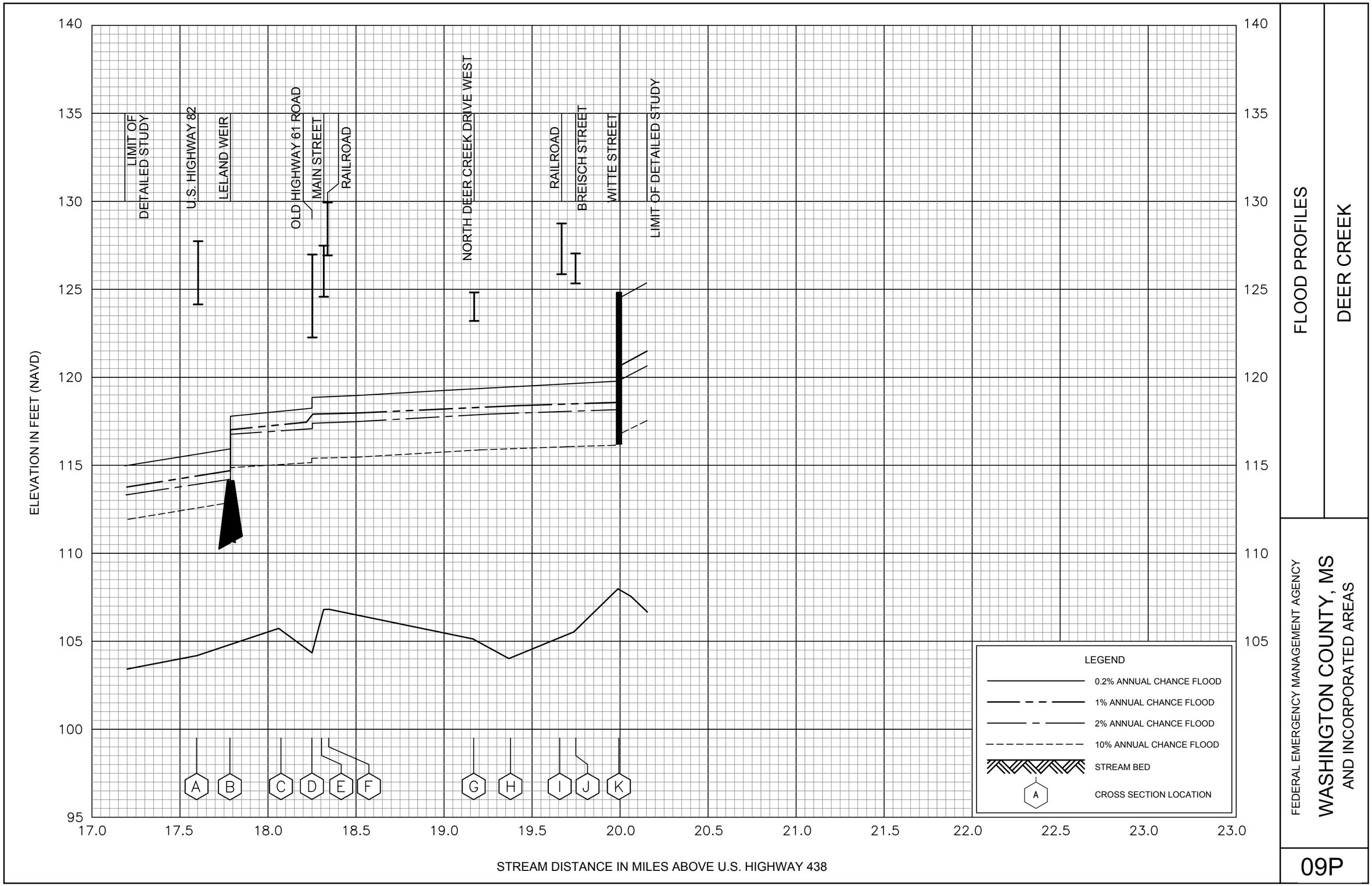
FLOOD PROFILES

BOWMAN BOULEVARD DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

08P



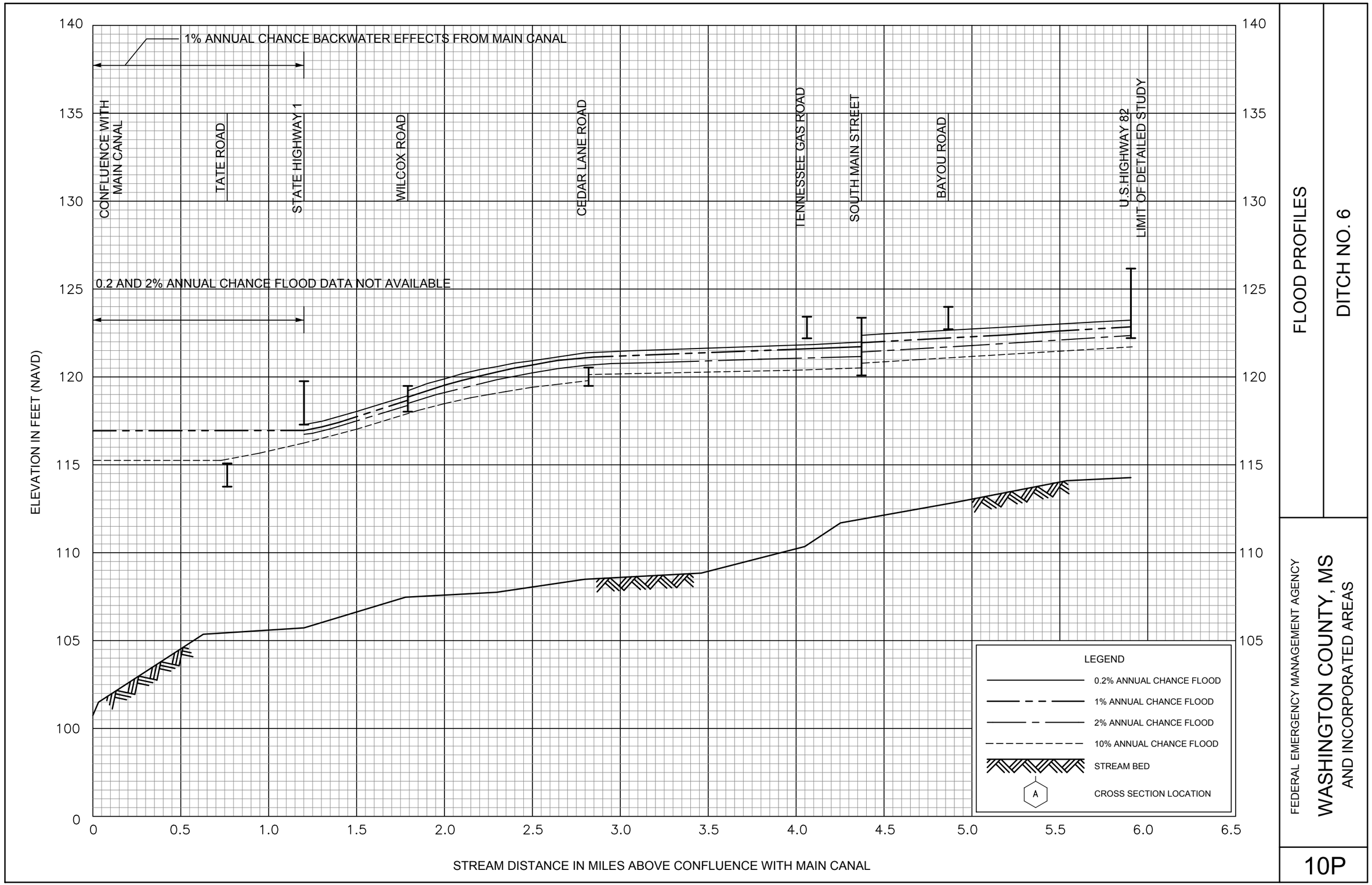
FLOOD PROFILES

DEER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

09P



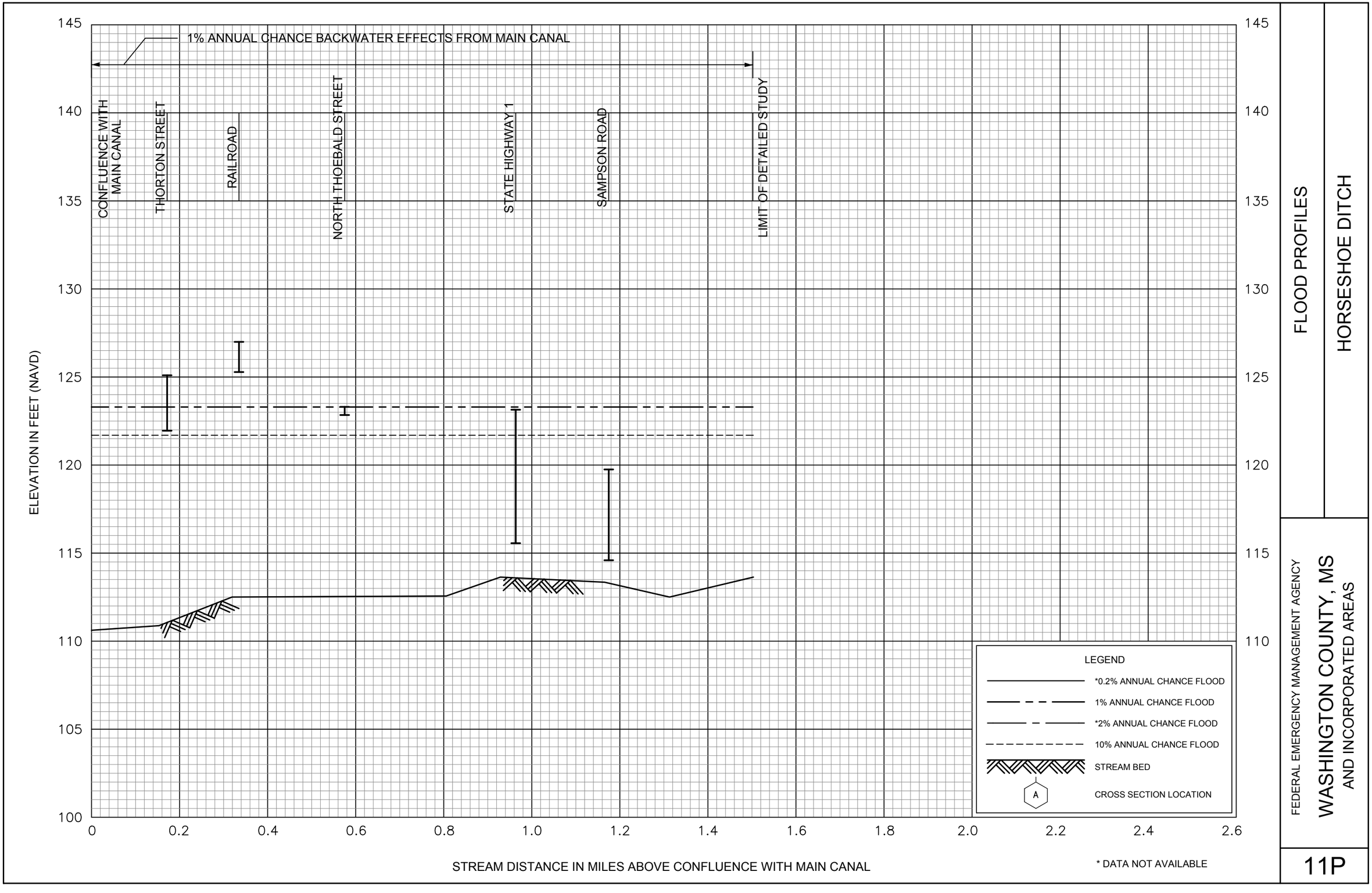
FLOOD PROFILES

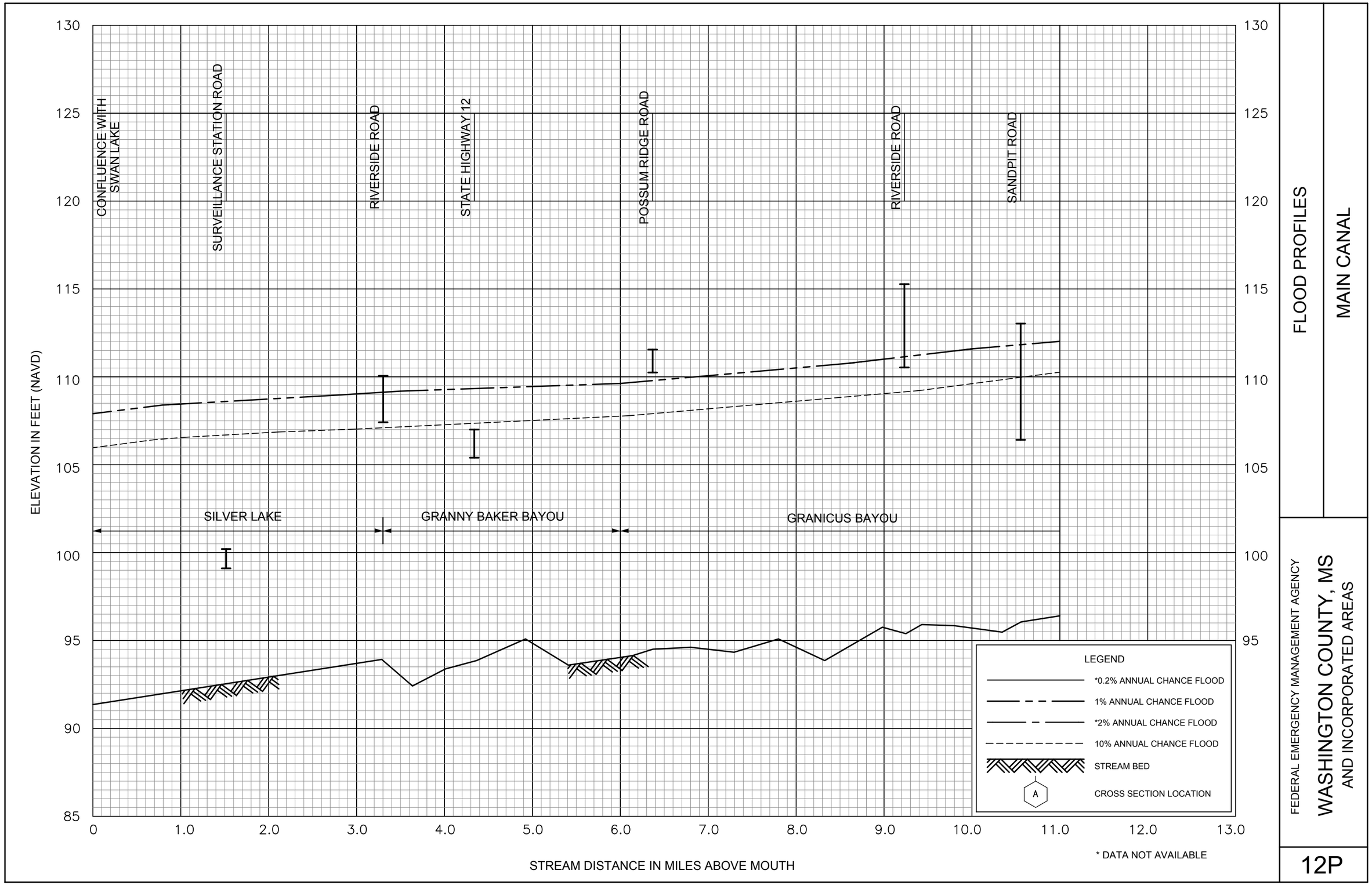
DITCH NO. 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

10P


1% ANNUAL CHANCE BACKWATER EFFECTS FROM MAIN CANAL
CONFLUENCE WITH MAIN CANAL
THORTON STREET
RAILROAD
NORTH THOEBALD STREET
STATE HIGHWAY 1
SAMPSON ROAD
LIMIT OF DETAILED STUDY
ELEVATION IN FEET (NAVD)
145
140
135
130
125
120
115
110
105
100
0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
2.6
STREAM DISTANCE IN MILES ABOVE CONFLUENCE WITH MAIN CANAL
LEGEND
*0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
*2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
A
CROSS SECTION LOCATION
* DATA NOT AVAILABLE
FLOOD PROFILES
HORSESHOE DITCH
FEDERAL EMERGENCY MANAGEMENT AGENCY
WASHINGTON COUNTY, MS
AND INCORPORATED AREAS
11P



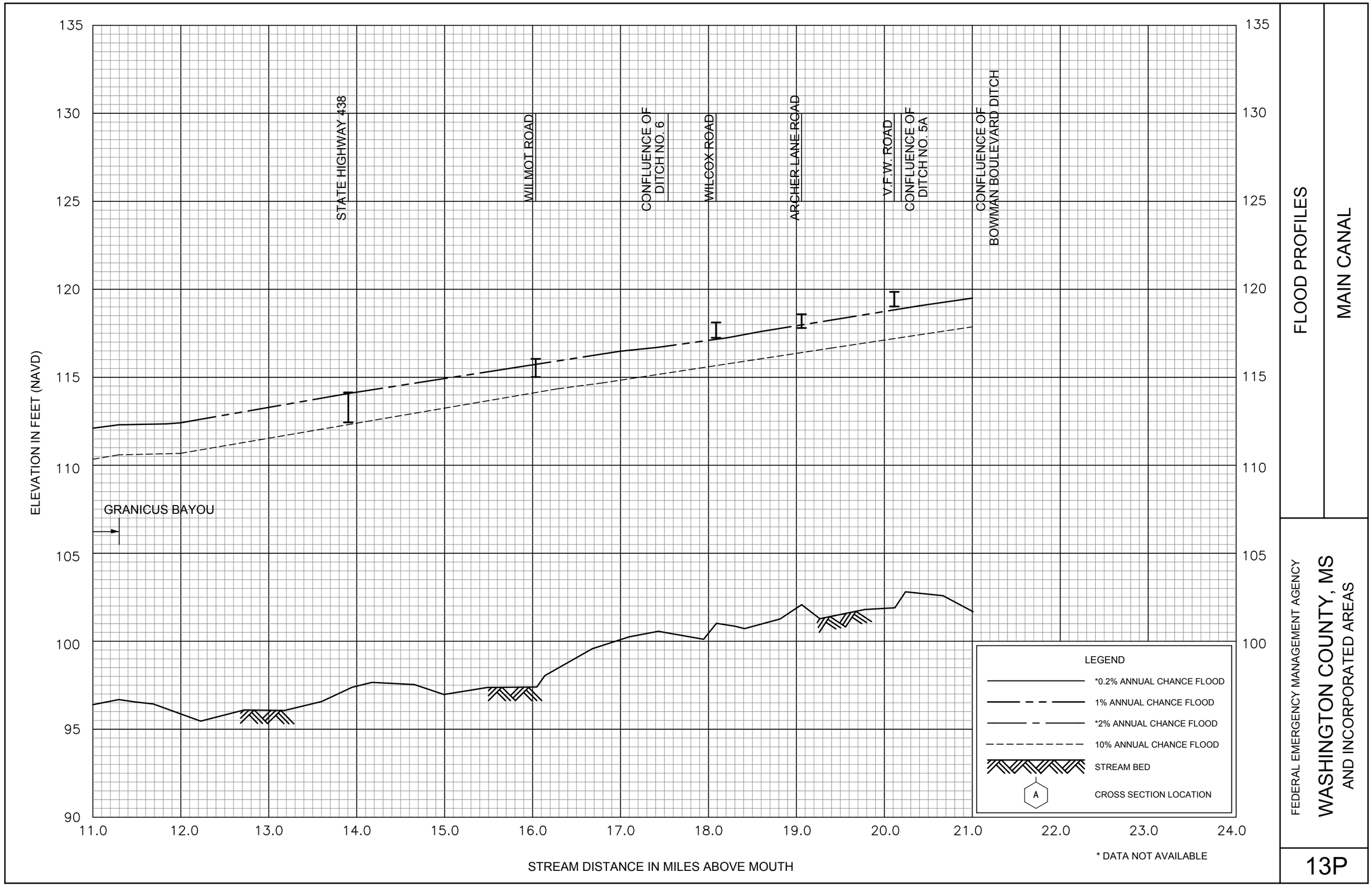
FLOOD PROFILES

MAIN CANAL

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

12P



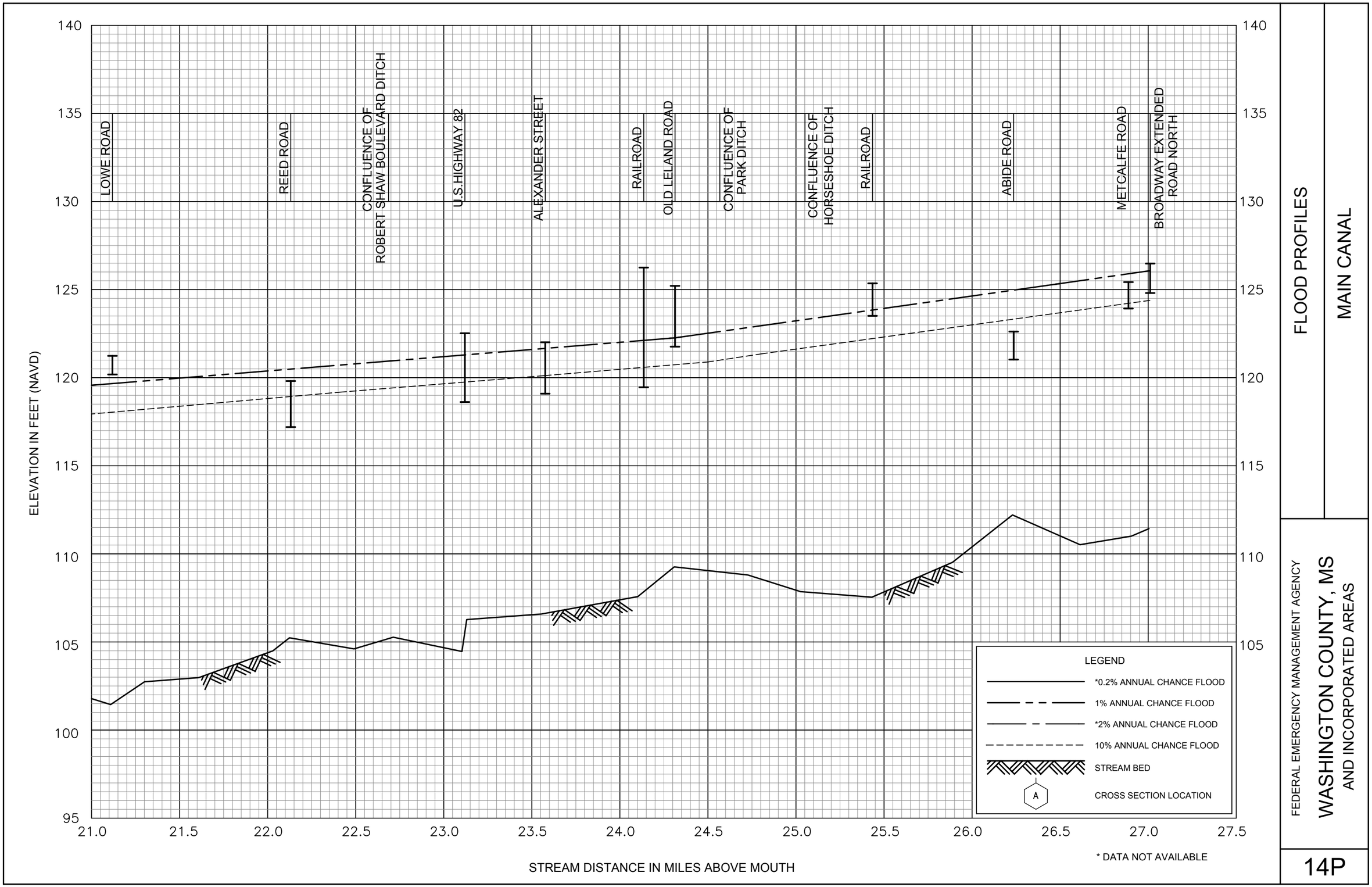
FLOOD PROFILES

MAIN CANAL

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

13P



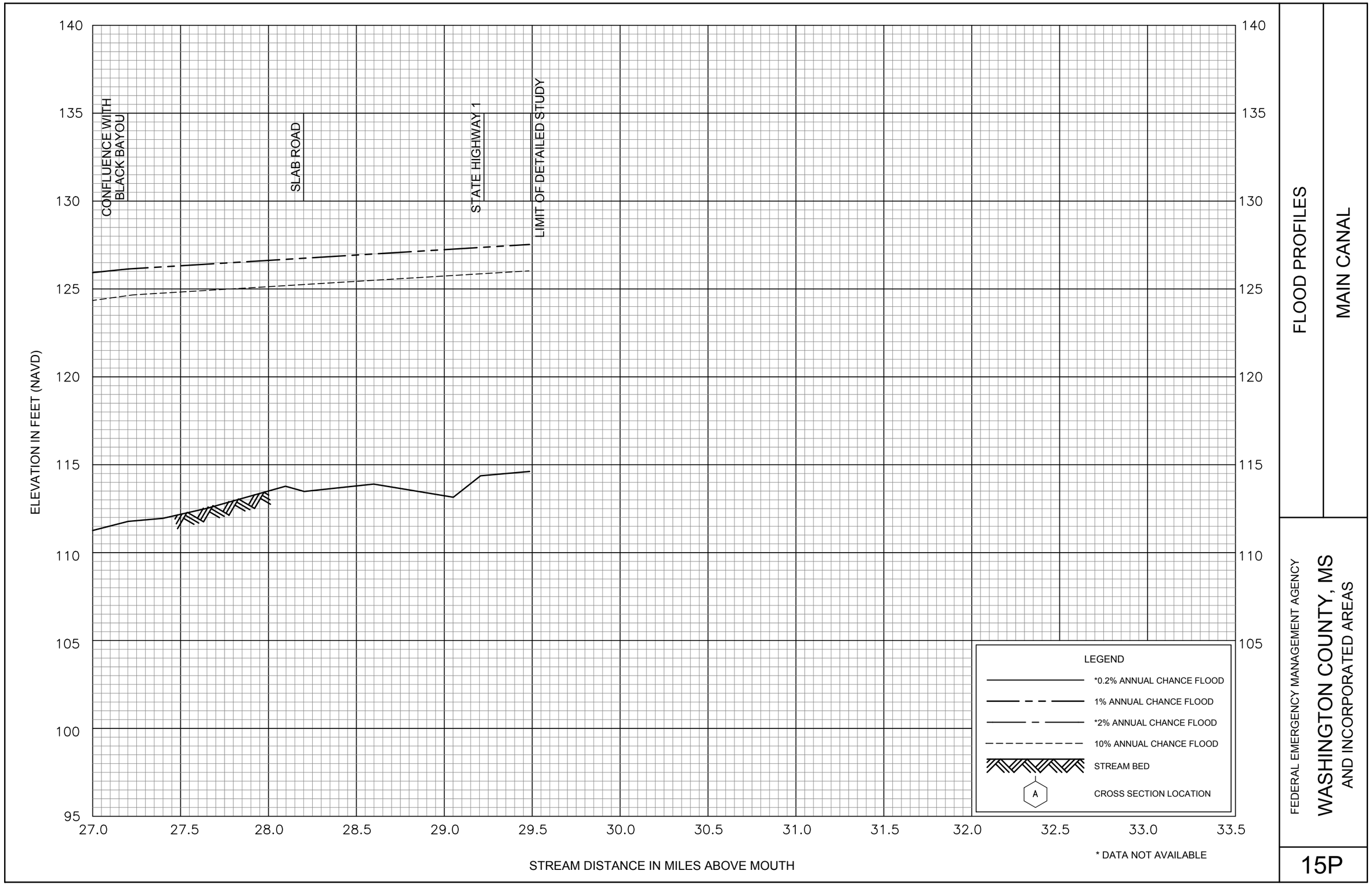
FLOOD PROFILES

MAIN CANAL

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

14P



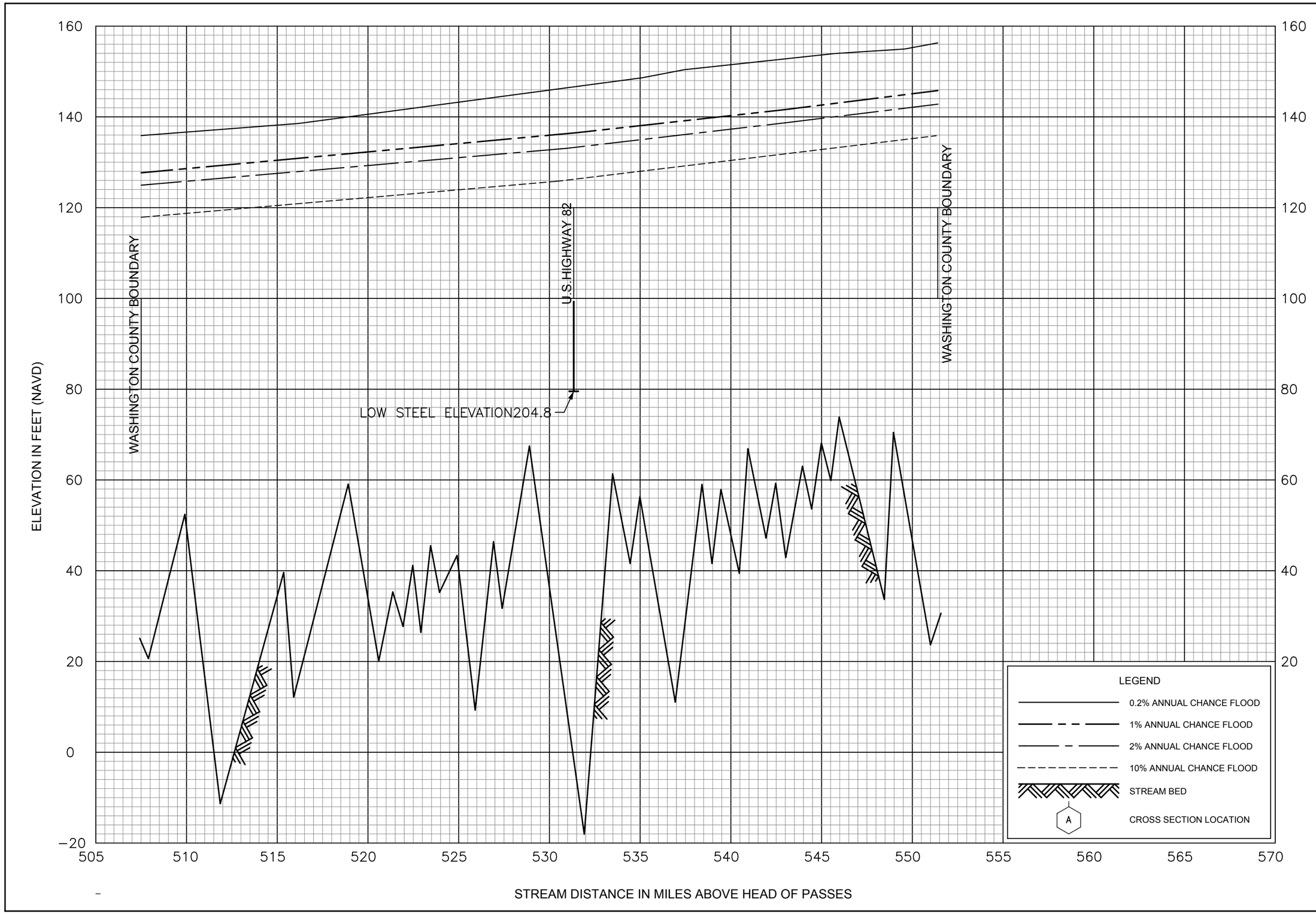
FLOOD PROFILES

MAIN CANAL

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

15P



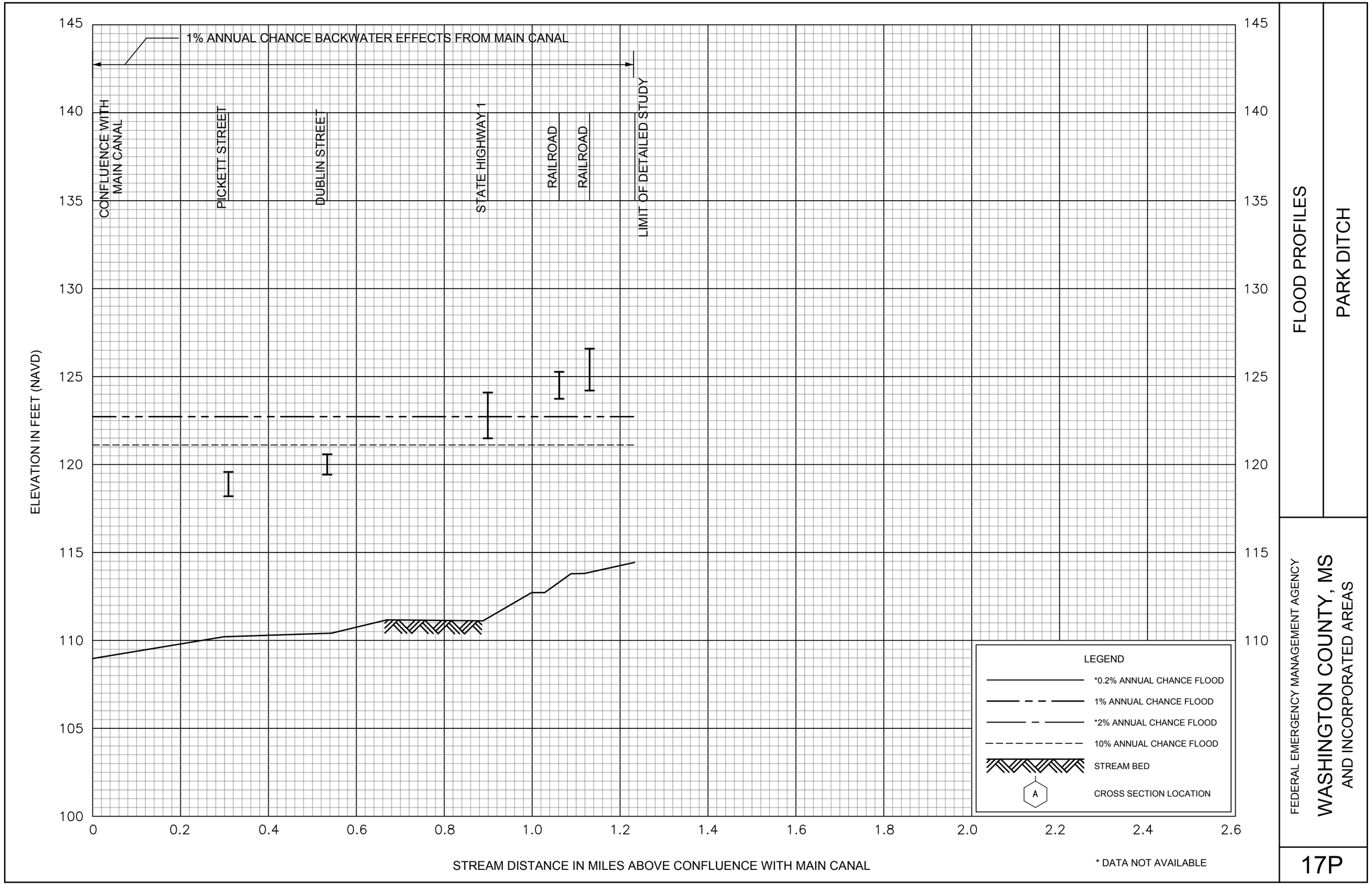
FLOOD PROFILES

MISSISSIPPI RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

16P



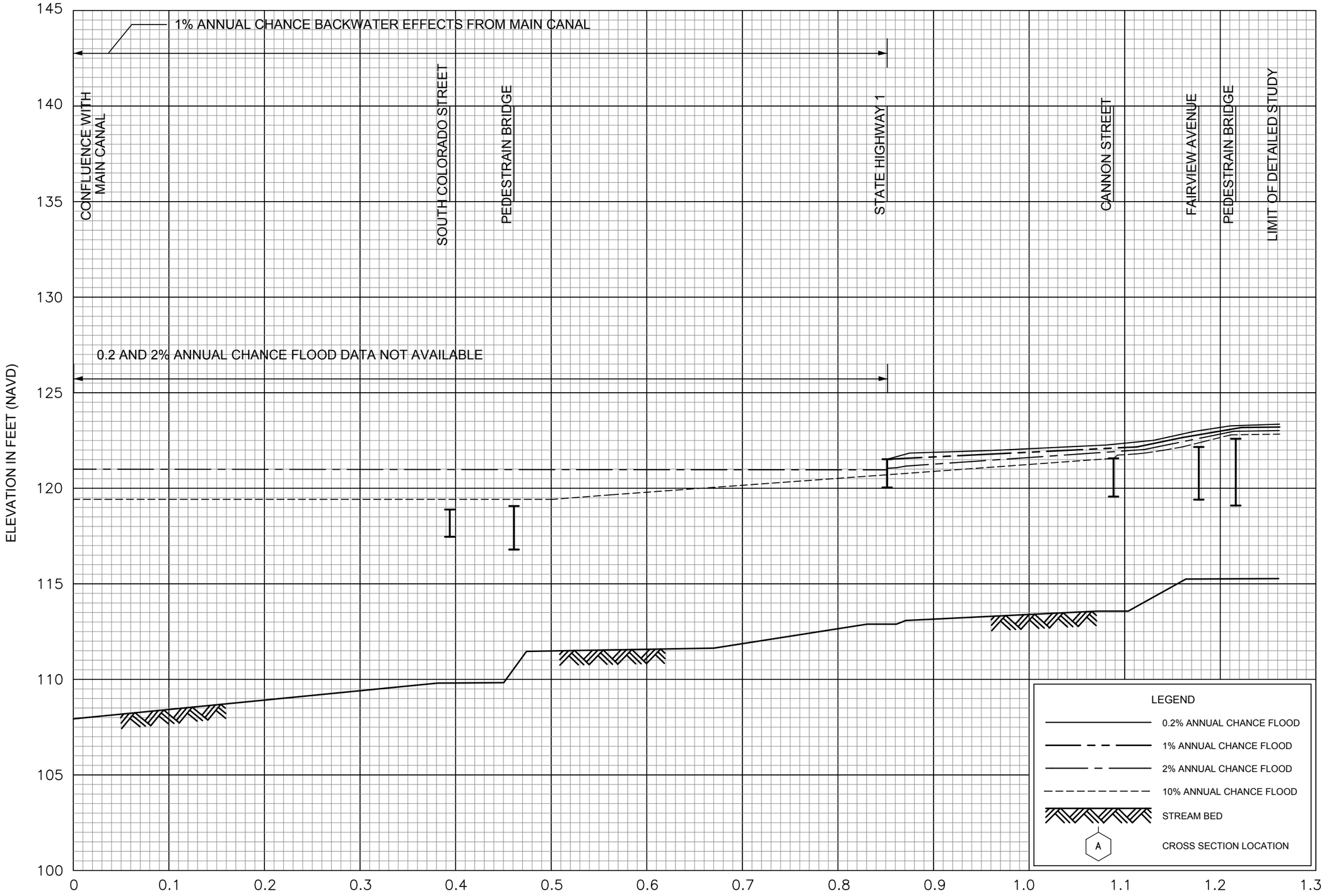
FLOOD PROFILES

PARK DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

17P



FLOOD PROFILES

ROBERT SHAW BOULEVARD DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WASHINGTON COUNTY, MS
AND INCORPORATED AREAS

18P