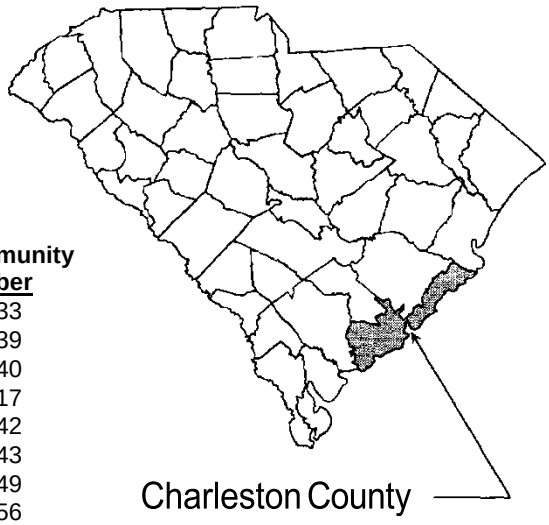
FLOOD INSURANCE STUDY

CHARLESTON COUNTY, SOUTH CAROLINA

AND INCORPORATED AREAS



Community Name	Community Number	Community Name	Community Number
Awendaw, Town of	450262	Lincolnville, Town of*	450233
Charleston, City of	455412	McClellanville, Town of	450039
Charleston County		Meggett, Town of	450040
(Unincorporated Areas)	455413	Mount Pleasant, Town of	455417
Folly Beach, City of	455415	North Charleston, City of	450042
Hollywood, Town of	450037	Ravenel, Town of	450043
Isle of Palms, City of	455416	Rockville, Town of	450249
James Island, Town of	450263	Seabrook Island, Town of	450256
Kiawah Island, Town of	450257	Sullivan's Island, Town of	455418

*No Special Flood Hazard Areas Identified

REVISED: **PRELIMINARY SEPTEMBER 9, 2016**

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

45019CV000B

NOTICE TO
FLOOD INSURANCE STUDY USERS

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

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

Initial Countywide FIS Effective Date: November 17, 2004

Revised Countywide FIS Dates: [TBD] - To add Base Flood Elevations and Special Flood Hazard Areas; to change Base Flood Elevations and Special Flood Hazard Areas; to incorporate previously issued Letters of Map Revision; to reflect the effects of coastal erosion, revised shoreline, and updated topographic information; and to update corporate limits, the effects of wave action, and road and road names.

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FLOOD INSURANCE STUDY
CHARLESTON COUNTY, SOUTH CAROLINA AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs) for, the geographic area of Charleston County, South Carolina, including: the Cities of Charleston, Folly Beach, Isle of Palms, and North Charleston; the Towns of Awendaw, Hollywood, James Island, Kiawah Island, Lincolnville, McClellanville, Meggett, Mount Pleasant, Ravenel, Rockville, Seabrook Island, and Sullivan's Island; and the unincorporated areas of Charleston County (hereinafter referred to collectively as Charleston County).

The City of Charleston is geographically located in Berkeley and Charleston Counties. This countywide study contains flood hazard data for the portion of the City of Charleston located within Charleston County. The flood hazard data for the portion of the City of Charleston within Berkeley County is included in the Berkeley County, South Carolina and Incorporated Areas FIS.

The City of North Charleston is geographically located in Berkeley, Charleston and Dorchester Counties. The City of North Charleston will be included in its entirety in this countywide study.

The Town of Summerville is geographically located in Berkeley, Charleston and Dorchester Counties. The Town of Summerville will be included in its entirety in the Dorchester County, South Carolina and Incorporated Areas FIS.

Please note that on the effective date of this study, the Town of Lincolnville has no mapped Special Flood Hazard Areas (SFHAs). This does not preclude future determinations of SFHAs that could be necessitated by changed conditions affecting the community (i.e. annexation of new lands) or the availability of new scientific or technical data about flood hazards.

This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data that will be used to establish actuarial flood insurance rates. This information will also be used by Charleston County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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

1.2 Authority and Acknowledgements

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

The November 17, 2004, FIS was prepared to include the unincorporated areas and incorporated communities within Charleston County into a countywide FIS. Information on the authority and acknowledgments for each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports, is shown below.

Charleston, City of:	the hydrologic and hydraulic analyses for the FIS report dated November 5, 1986, were obtained from the draft Type 19 FIS data for the Unincorporated Areas of Charleston County, South Carolina, published in April 1987 (Federal Emergency Management Agency [FEMA], 1987), and from the previously printed Type 15 FIS for the City of Charleston, Charleston County, South Carolina, dated March 15, 1984 (FEMA, 1984[c]).
Charleston County (Unincorporated Areas)	the Wave Height Analysis for Flood Insurance Studies (WHAFIS) analyses for the FIS report dated March 18, 1991, were performed by FEMA. That work was completed in January 1990. For the FIS report dated July 15, 1988, topographic data, used to revise the base flood elevations and flood delineations along the coast in the vicinity of the City of Charleston, were obtained from the City of Charleston, South Carolina. For the FIS report dated April 17, 1987, the hydrologic and hydraulic analyses were prepared by Post, Buckley, Schuh & Jernigan, Inc., for FEMA, under Contract No. EMW-C-0947. That work was completed in May 1984.
Folly Beach, City of:	the hydrologic and hydraulic analyses for the FIS report dated November 17, 1993, were performed by FEMA in September 1989.

Hollywood, Town of:	the hydrologic and hydraulic analyses for Mellichamp Branch in the FIS report dated December 20, 1999, were prepared by Wilbur Smith Associates, Inc., for FEMA, under Contract No. EMW-94-C-4482. That work was completed in February 1997. For the June 17, 1986, FIS report, the hydrologic and hydraulic analyses were obtained from the draft Type 19 FIS data for the Unincorporated Areas of Charleston County, South Carolina, published in April 1987 (FEMA, 1987). Flood hazard analyses not affected by the Type 19 reanalysis in Charleston County were taken from the Type 15 FIS for the Unincorporated Areas of Charleston County, South Carolina (FEMA, 1984[b]).
Isles of Palms, City of:	the hydrologic and hydraulic analyses for the FIS report dated March 18, 1991, were performed by FEMA in September 1989.
McClellanville, Town of:	the hydrologic and hydraulic analyses for the FIS report dated April 17, 1987, were obtained from the draft Type 19 FIS data for the Unincorporated Areas of Charleston County, South Carolina, published in April 1987 (FEMA, 1987).
Meggett, Town of:	the hydrologic and hydraulic analyses for the FIS report dated October 17, 1986, were obtained from the draft Type 19 FIS data for the Unincorporated Areas of Charleston County, South Carolina, published in April 1987 (FEMA, 1987).
Mount Pleasant, Town of:	the hydrologic and hydraulic analyses for the FIS report dated October 17, 1986, were obtained from the draft Type 19 FIS data for the Unincorporated Areas of Charleston County, South Carolina, published in April 1987 (FEMA, 1987).
North Charleston, City of:	the hydrologic and hydraulic analyses for the FIS report dated November 5, 1986, were obtained from the draft Type 19 FIS data for the Unincorporated Areas of Charleston County, South Carolina, published in April 1987 (FEMA, 1987), and from the

North Charleston, City of: (continued)	previously printed Type 15 FIS for the City of North Charleston, Charleston County, South Carolina (FEMA, 1984[a]).
Ravenel, Town of:	the hydrologic and hydraulic analyses for the FIS report dated December 20, 1999, were prepared by Wilbur Smith Associates, Inc., for FEMA, under Contract No. EMW-94-C-4482. That work was completed in February 1997. For the October 1, 1980, FIS report, the hydrologic and hydraulic analyses were prepared by Law Engineering Testing Company for FEMA, formerly the Federal Insurance Administration, under Contract No. H-4753. That study was completed in October 1979.
Sullivan's Island, Town of:	the hydrologic and hydraulic analyses for the FIS report dated March 18, 1991, were performed by FEMA in January 1990.

The authorities and acknowledgments for the Towns of Awendaw, James Island, Kiawah Island, Lincolnville, Rockville, and Seabrook Island are not included because there were no previously printed FIS reports for those communities.

For the November 17, 2004, countywide FIS, the WHAFIS analysis for Charleston Harbor and the Ashley, Cooper, and Wando Rivers was performed by Dewberry. This work was completed in March 2003.

For the [TBD], countywide FIS, the coastal hydrology and hydraulics were completed as part of the South Carolina storm surge project initiated under the Cooperating Technical Partners (CTP) agreement between the South Carolina Department of Natural Resources (SCDNR) and FEMA Region IV under Mapping Activity Statements (MAS) 7, 8, and 10. The project team consists of FEMA, SCDNR, URS, AECOM/Watershed Concepts and their subcontractors, Taylor Engineering, Risk Engineering, and Ocean Weather, Inc. The study replaces outdated coastal analyses as well as previously published storm surge stillwater elevations for all FIS Reports in the study area, including Charleston County, South Carolina and serves as the basis for updated FIRMs. Study efforts were initiated in 2007 and concluded in 2013.

Additionally, for the [TBD], countywide FIS, riverine hydrology and hydraulics and the development of the DFIRM database were completed by AECOM (formerly URS Corporation) in accordance with the CTP agreement between SCDNR and FEMA, MAS No. FY06.07. New detailed study streams that border Charleston and Dorchester Counties were included in this FIS: Coosaw Creek and Sawpit Creek. The Edisto River was also added as a detailed study stream from the Colleton County, South Carolina and Incorporated Areas FIS. In addition,

limited detailed study streams that border Charleston and Dorchester Counties were included in this FIS: Ashely River Tributaries 8, 8-4, and 30; Coosaw Creek; Fishburne Creek; McChune Branch; McChune Branch Tributary 2; North Santee River and Watson Hill Tributary. New and revised approximate stream analysis was also completed. That work was completed in May 2016.

The base map information shown on the FIRM was provided in digital format by Charleston County, South Carolina.

The projection used in preparation of the FIRM was State Plane, South Carolina, FIPS Zone 3900 (feet). The horizontal datum was North American Datum 1983 (NAD83), Geodetic Reference System 1980 (GRS 80) spheroid. Difference 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 jurisdictional boundaries. These differences do not affect the accuracy of the FIRM.

1.3 Coordination

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

The dates of the initial and final CCO meetings held for Charleston County and the incorporated communities within its boundaries are shown in Table 1, "CCO Meeting Dates for Precountywide FISs."

Table 1 – CCO Meeting Dates for Precountywide FISs

Community Name	Initial CCO Date	Final CCO Date
Charleston, City of	*	December 11, 1985
Charleston County (Unincorporated Areas)	June 21, 1982	May 29, 1986
Folly Beach, Town of	*	May 1, 1990
Hollywood, Town of	September 16, 1993	**
Isle of Palms, City of	*	May 1, 1990
McClellanville, Town of	*	May 27, 1986
Meggett, Town of	*	December 4, 1985
Mount Pleasant, Town of	*	December 11, 1985
North Charleston, City of	*	December 5, 1985
Ravenel, Town of	September 16, 1993	**
Sullivan's Island, Town of	*	May 1, 1990

*Initial CCO meeting not held
**Final CCO meeting not held

For the November 17, 2000, countywide FIS, an initial CCO meeting was held on December 4, 1995, and was attended by representatives of Charleston County; Wilbur Smith Associates, Inc.; and FEMA. A final CCO meeting was held on September 18, 2003, and was attended by representatives of the Town of Awendaw, City of Charleston, Charleston County, Town of Hollywood, Town of James Island, Town of Kiawah Island, Town of McClellanville, Town of Meggett, Town of Mount Pleasant, City of North Charleston, Town of Ravenel, Town of Rockville, Town of Seabrook Island, Town of Sullivan's Island, and FEMA.

For the [TBD], countywide FIS, an initial meeting was held on June 27, 2007, and was attended by representatives of Charleston County; the Cities of Charleston, Isle of Palms, and North Charleston; and the Towns of Mount Pleasant, Ravenel, Sullivan's Island, and Summerville; South Carolina Department Health and Environmental Control ; SCDNR; FEMA; and study contractor, AECOM (formerly URS Corporation). Additionally, Charleston County represented the Towns of Awendaw, Kiawah Island, McClellanville, Meggett, Rockville, and Seabrook Island.

For the [TBD], countywide FIS, a final CCO meeting was held on [TBD], and was attended by representatives of [insert attendee list after meeting]. All concerns and/or issues raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Charleston County, South Carolina.

All or portions of the following flooding sources were studied by detailed methods: Atlantic Ocean, Charleston Harbor, reaches of Santee River, Wando River, Cooper River, Ashely River, Stono River, Kiawah River, North Edisto River and South Fork Edisto River that affected by coastal flooding effect, Bridge Cardin Creek, Caw Caw Swamp, Church Creek, Coosaw Creek, Edisto River, McChune Branch, Mellichamp Branch, Middle Branch, Sawmill Branch, Sawpit Creek, Sub-Tributary to Tributary 1 to McChune Branch, Tributaries 1 and 2 to McChune Branch, Tributaries Nos. 0, 1, and 2 to Church Creek, Tributary No. 2, Unnamed Tributary 1 to Mellichamp Branch and Unnamed Tributary 4 to Bridge Cardin Creek. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

All or portions of the following flooding sources were studied by limited detailed methods: Ashely River Tributaries 8, 8-4, and 30; Coosaw Creek; Fishburne Creek 4-1; McChune Branch; McChune Branch Tributary 2; North Santee River and Watson Hill Tributary. Limits of limited detailed study are indicated on the FIRM (Exhibit 2).

The areas studied by detailed methods were selected with priority given to all

known flood hazard areas and areas of projected development and proposed construction.

Numerous streams were studied by approximate methods. Approximately analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon, by FEMA and Charleston County.

The [TBD], countywide FIS also incorporates the determinations of the Letters of Map Revision (LOMRs) as shown in Table 2, "Letters of Map Revision." Please note, LOMR 14-04-3481P, Spring Grove – Caw Caw Swamp, is superseded due to the vertical datum conversion incorrectly applied and backwater not accounted for in the LOMR. However, the hydrology and hydraulics in that LOMR remain valid and the floodway data for Caw Caw Swamp has been corrected and has been utilized as a detailed study for this countywide FIS.

Table 2 – Letters of Map Revision

Community	Case No.	Project Identifier/Flooding Source(s)	Effective Date
Ravenel, Town of; Charleston County (Unincorporated Areas)	14-04-2514P	Spring Grove - Bridge Cardin Creek, Unnamed Tributary 4 to Bridge Cardin Creek and Middle Branch/Bridge Cardin Creek & Middle Branch	02/02/2015
Hollywood, Town of; Charleston County (Unincorporated Areas)	14-04-2513P	Spring Grove - Mellichamp Branch & Unnamed Tributary 1 to Mellichamp Branch/Mellichamp Branch & Unnamed Tributary 1 to Mellichamp Branch	02/02/2015
Charleston, City of; Charleston County (Unincorporated Areas)	11-04-0520P*	Church Creek Drainage Basin/Church Creek, etc.	05/09/2012

*The coastal portion of this LOMR has been superseded by the new coastal analyses developed for this FIS.

Table 2 – Letters of Map Revision – continued

Community	Case No.	Project Identifier/Flooding Source(s)	Effective Date
North Charleston, City of	10-04-1595P*	Tributary No. 2 to Ashley River	09/10/2010
North Charleston, City of	08-04-2279P	Blueswamp/McChune Branch, Tributary 1 to McChune Branch, Tributary 2 to McChune Branch, Sub-tributary to Tributary 1 to McChune Branch	09/03/2009

*The Charleston County portion of LOMR 10-04-1595P has been incorporated in this FIS, please refer to the Dorchester County, South Carolina and Incorporated Areas FIS for the Dorchester County portion of the LOMR.

2.2 Community Description

Charleston County, approximately 916.1 square miles in area, is located in the southeastern portion of South Carolina and borders on the Atlantic Ocean. The county is bordered by Colleton County on the southwest across the South Edisto River, Dorchester County on the west and northwest, Berkeley County on the north, Georgetown County on the northeast across the South Santee River, and the Atlantic Ocean on the south. The Atlantic Ocean coastline accounts for approximately 100 miles of the county's border.

According to the United States (U.S.) Bureau of the Census, the population of Charleston County was 350,209 at the 2010 U.S. Census (U.S. Census Bureau, 2010[a]), making Charleston County the third most populous county in South Carolina. The City of Charleston, the county seat and the largest city in the county, had a population of 120,083 at the 2010 U.S. Census (U.S. Census Bureau, 2010[b]). The county is served by several primary highways and railroads and by one major airport.

The mean temperatures in Charleston County range from a low of 39.2 degrees Fahrenheit (°F) in January to a high of 89.8°F in July. Average annual rainfall is 50.2 inches, with summer months receiving the most precipitation. Natural vegetation consists mostly of marsh grasses, pines, cedars, and gums (South Carolina State Climatology Office, 2014).

Charleston County is situated on a low coastal plain, with much of the area consisting of tidal marshes and swamps. Almost all of the southeastern portion

of the county is covered by the Romain National Wildlife Refuge and the Francis Marion National Forest. Elevations range from sea level at the coast to approximately 74 feet North American Vertical Datum of 1988 (NAVD88) in the northern portions of the county.

The South Edisto River, which forms the western boundary, and the South Santee River, which forms the northeastern boundary, have drainage areas extending far beyond the limits of Charleston County. Other streams within the county are chiefly tidal estuaries and include the North Edisto River, Wadmalaw River, Stono River, Ashley River, Cooper River, Wando River, Romain River, and numerous tributaries to these. Main openings to the Atlantic Ocean are Charleston Harbor and Bulls Bay.

Much of the land situated in the floodplain is undeveloped marshland with some residential, commercial, and industrial development. Principal residential and commercial developments are located along the county coastline on Edisto Island, Folly Island, Sullivan's Island, Isle of Palms, and the City of Charleston. The economy of the county depends on both local industry as well as its historical attraction to many tourists.

2.3 Principal Flood Problems

On October 6, 2015, a Major Disaster Declaration (FEMA-4241-DR) was declared for the State of South Carolina after an unprecedented rain event set rainfall records across the state and flooded entire communities. For some locations, the rainfall was historic and qualified as a 1,000-year rain event, resulting in deadly and disastrous flooding with damages that could top $1 billion (Beam and Kinnard, 2015). Rainfall was severe enough to close a 75-mile stretch of Interstate 95 between Interstates 20 and 26. In the City of Charleston, 6.40 inches of rain was received over a 12-hour period (Carolinas Integrated Sciences & Assessments [CISA], 2015) and shut down the city's historic district due to flooding. The hydrologic response was much longer than the four-day rainfall event. While flooding in coastal areas occurred as a result of intense and large amounts of precipitation from October 1 to 5, riverine floodwaters flowed downstream draining the state with some stream gages not recording peak flow until October 11, 2015 (CISA, 2015). The most significant flooding occurred in areas along and near smaller creeks and streams, especially those that were tributaries to larger rivers such as the Edisto, Ashley, Cooper, and Santee (National Weather Service, 2015).

Charleston County is subject to flooding caused by hurricanes and tropical storms. Records of hurricanes that have affected the Charleston County area can be found as early as the 17th century. Major storms and hurricanes caused flooding in 1686, 1713, 1728, 1752, 1783, 1787, 1804, 1813, 1822, 1854, 1885, 1893, 1911, l940, and 1959 (NOAA, 1975). Prior to Hurricane Agnes in 1972, the highest surges occurred during the hurricanes of August 1893 and August 1940, reaching

heights up to 8.9 and 8.0 feet mean sea level (msl), respectively, in the City of Charleston (NOAA, 1975). Hurricane Hugo in 1989 produced even higher storm surges.

The primary factors contributing to flooding in Charleston County are its openness to Atlantic Ocean surges and the unfavorable bathymetry extending offshore. Many of the large streams near the coast have wide mouths and are bordered by extensive areas of low marsh. In addition, the terrain at the coast is generally too low to provide an effective barrier. The offshore ocean depths are shallow for great distances, thereby generating a high Atlantic Ocean surge.

A storm history, as compiled from previous FIS reports, of Charleston County and its vicinity during the past two centuries is summarized below. Damage figures are determined in dollar values at the time of the storm. No attempt has been made to adjust these figures to current dollar values.

September 7, 1804

This severe hurricane moved inland on September 7 between the City of Savannah, Georgia, and Charleston, causing significant damage on the coasts of Georgia and South Carolina. This storm is said to have caused more than 500 drowning deaths in South Carolina. The hurricane also caused major damage to the South Carolina economy. Historical notes contain no data on the height of the storm tides or strength of the winds.

August 27, 1813

This storm passed near Charleston causing a large loss of lives and property. This hurricane rates a position close to the top of Charleston's meteorological list for its combination of severe winds, heights of flood tide, and general destruction.

September 27, 1822

This small destructive hurricane passed inland between the City of Georgetown and Charleston on September 27. This hurricane caused unprecedented tides at Georgetown and several hundred deaths in Charleston, the Town of Sullivan's Island, Georgetown, and North Island.

August 7, 1854

This major hurricane approached the United States from the south-southeast after moving through the northern Bahamas. The southeasterly winds along the South Carolina coast drove the waters of the Atlantic Ocean into the bays and inlets, over some of the low-lying islands, and into the tidal lowlands that fringe all the rivers and streams (American Meteorological Society, 1963). Edisto Island, near Charleston, suffered severely as did the Town of Port Royal and Beaufort County

to the south. The storm commenced on Thursday, August 7, and did not end until Saturday night.

August 25, 1855

This hurricane, which originated in the Bahamas, moved inland north of Savannah on a northeasterly course and passed to the west of Wilmington, North Carolina. This hurricane is said to have damaged 90 percent of the houses in Charleston and swept some away completely. This extreme hurricane severely damaged all of the South Carolina coast. Damage in Charleston alone was $1.7 million. As a result of this destructive storm, it was proposed that a weather reporting network be set up in the West Indies and Mexico. Twenty-one lives were lost in Charleston as a result of this storm (The South Carolina Disaster Preparedness Agency, 1973).

August 27, 1893

This severe hurricane penetrated the Georgia and lower South Carolina coasts on August 27. An estimate of more than 1,000 people lost their lives on the coastal islands and in the lowlands between the City of Tybee Island, Georgia, and Charleston (The South Carolina Disaster Preparedness Agency, 1973). The highest tide in this storm was estimated to have ranged from 17.0 to 19.5 feet msl at Savannah Beach, Georgia (U.S. Army Corps of Engineers [USACE], 1968). At Charleston, the tide was 8.9 feet msl. Extensive property damage was caused along Georgia and South Carolina coasts.

August 23-30, 1911

The center of this hurricane crossed the coast between the City of Savannah and Charleston on August 28. This storm is considered in the same category as the storm of 1940, described below. At Charleston, the barometer fell to 992 millibars (mb) (29.30 inches). The wind at the weather bureau office reached 81 mph from the southeast (U.S. Department of Commerce, 1949). Seventeen lives were lost, and damage totaled about $1 million. The storm passed into the piedmont section of South Carolina and then recurved to the northeast (NOAA, 1971). At Charleston, the tide reached 7.5 feet msl, the third highest of Charleston County records.

August 11, 1940

This hurricane entered the coast from the southeast, between Savannah County, Georgia, and Beaufort County, South Carolina, at about 4 p.m. on August 11. Near Beaufort County, the tide is estimated to have reached 14.2 feet msl. Near the southern tip of Edisto Island, a high-water mark indicated a tide of 13.6 feet msl on the open coast. About 175 cottages were destroyed on Edisto Island. On Folly Island, the maximum tide determined from a National Ocean Survey benchmark was 8.3 feet msl. The entire beachfront eroded an average of 75 feet.

At Charleston, most of the damage was to buildings, wharves, and boats along the waterfront. Large areas of the low waterfront perimeter in the city were inundated and many automobiles were damaged by the storm tide, which reached an elevation of 8.0 feet msl. Estimated damage to the city was $1 million.

Sullivan's Island, the City of Isle of Palms, and Pawleys Island suffered minor damage. Overall, this hurricane was responsible for 34 deaths and caused damage estimated at $6.6 million (USACE, 1957).

October 15, 1954 (Hurricane Hazel)

Hurricane Hazel crossed the coast just north of the City of Myrtle Beach, South Carolina, on October 15. This hurricane was one of the most destructive to strike the Carolinas in terms of property damage. Hurricane winds hit the Atlantic coast between Georgetown, South Carolina, and Cape Lookout, North Carolina. Storm tides devastated the immediate oceanfront along this stretch of coast. High tides of 16.6 feet msl were observed at Holden Beach Bridge and the Town of Calabash, North Carolina. The lowest recorded barometric pressure of 938 mb (27.71 inches) was reported at Little River Inlet on the South Carolina-North Carolina border. Folly Island, Sullivan's Island, and Isle of Palms suffered light property damage and slight beach erosion. The City of Charleston experienced no serious damage. Total property damage was estimated at $34 million in North Carolina and at $27 million in South Carolina.

September 29, 1959 (Hurricane Gracie)

Hurricane Gracie moved inland on September 29. The center passed over the South Carolina coast at St. Helen about 10 miles east of the City of Beaufort. Damage of disaster proportions occurred in the coastal region from Beaufort to Charleston, and considerable additional damage occurred in the area of Walterboro. An enormous number of trees were felled, causing considerable random damage. There was a great deal of crop damage, especially to unpicked cotton (The South Carolina Disaster Preparedness Agency, 1973). A barometric pressure of 950 mb (28.06 inches) was reported at Beaufort. The total damage inflicted by the storm was estimated at $14 million. High-water marks, which were reported near the Town of Edisto Beach, South Carolina, ranged from 7.3 to 11.9 feet msl.

August 25 - September 7, 1979 (Hurricane David)

Hurricane David was the most intense storm of the century to affect the islands of the eastern Caribbean. However, the storm was not a major hurricane when it struck the United States. David struck just north of the Town of Palm Beach, Florida, on September 3 and made a second landfall about 24 hours later near Savannah Beach, Georgia. In the United States, David was responsible for five deaths and about $300 million in damages. The death toll and damage were much

greater in Dominica, Cuba, and the Dominican Republic (NOAA, 1979).

September 12-25, 1989 (Hurricane Hugo)

Hurricane Hugo struck the Charleston, South Carolina, area at about midnight on September 22, near high tide. As of 1990, Hugo was the most destructive hurricane (in dollar losses) to ever strike the continental U.S. coastline. High-water elevations (including wave setup and wave crest contributions) were 11 to 12 feet (NAVD88) at the open coast from the City of Folly Beach, South Carolina, northward to the City of Myrtle Beach, South Carolina, with elevations up to 18 feet (NAVD88) in bay areas in the vicinity of the maximum winds. Downtown Charleston experienced high-water elevations of approximately 9 feet (NAVD88).

2.4 Flood Protection Measures

Appreciable Federal or state-funded flood protection measures have not been employed in Charleston County. However, scattered flood and erosion protection measures have been constructed on private properties. These protection measures offer minimal protection.

Levees exist in the study area that provide the community with some degree of protection against flooding. However, it has been ascertained that these levees may not protect the community from rare events such as the 1-percent annual chance flood. The criteria used to evaluate protection against the 1-percent annual chance flood are 1) adequate design, including freeboard, 2) structural stability, and 3) proper operation and maintenance. Levees that do not protect against the 1-percent annual chance flood are not considered in the hydraulic analysis of the 1-percent annual chance floodplain.

Two earthen ring levees are located on Hog Island. The top elevations of the levees are greater than the 1-percent annual chance Stillwater; however, the levees do not meet the above criteria therefore they are not considered to provide protection against the 1-percent annual chance flood event in this countywide study.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2- percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals

or even within the same year. The risk of experiencing a rare flood increases when periods greater than one 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) in any 50-year period is approximately 40 percent (4 in 10) and, 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 county at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Riverine Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the county.

Precountywide FISs

The unincorporated areas of Charleston County, as well as the Towns of Hollywood and Ravenel, had a previously printed FIS report describing each community's hydrologic analyses. Those analyses have been compiled from the FIS reports and are summarized below.

For Mellichamp Branch, the flood discharge-frequency data were computed using the U.S. Geological Survey (USGS) Water Resources Division regionalized regression equations methodologies (USGS, 1992 and USGS, 1982).

For Middle Branch, flood discharge-frequency data was calculated using a USGS administrative report and TR-55 model results (USDA, 1975 and USGS, 1975). The lower portions of Middle Branch are influenced by the Atlantic Ocean tides. Therefore, storm induced tidal surges were also considered in the detailed study of Middle Branch. Hydrologic analyses were also carried out to establish the peak tidal frequency-elevation relationships for floods of the selected recurrence intervals for Middle Branch. The peak tidal elevations were determined using the National Oceanic and Atmospheric Administration Technical Report NWS-16, Storm Tide Frequencies on the South Carolina Coast (NOAA, 1975).

For Sawmill Branch, the flood discharge-frequency data were computed using the USGS administrative report Estimating Magnitude of Peak Discharges for Selected Flood Frequencies on Small Streams in South Carolina (USGS, 1975). This report is a regional approach based on a multiple regression analysis. This analysis related peak discharge to drainage area, slope, length, precipitation intensity, and soils index. Drainage area explained 85 to 90 percent of the variation of the dependent variable, while the other independent variables were not significant.

The Sauer Method was used to adjust the natural flows for the effects of

urbanization (USGS, 1977). This method relates the urbanized peak discharge for any return interval to the percentage of area served by storm sewers, percentage of impervious area, the rainfall intensity ratios, and the natural peak discharge.

Land use for each watershed was determined from aerial photographs (Chicago Aerial Survey, 1979), topographic maps (USGS, 1958, et cetera; USGS, 1956, et cetera; and USGS, 1943, et cetera), and field inspection. The percent impervious area for any given land use was obtained from U.S. Soil Conservation Service Technical Release No. 55 (USDA, 1975). For this study, the percent impervious area was assumed to equal the percent of the area served by storm sewer.

Hydrology for Church Creek, Tributary No. 1 to Church Creek, and Tributary No. 2 to Church Creek was calculated using the advanced Interconnected Channel and Pond Routing (adICPR) computer program.

November 17, 2004, Countywide FIS

No new hydrologic analyses were conducted.

[TBD], Countywide FIS

For Caw Caw Swamp the hydrology came from superseded LOMR 14-04-3481P, Spring Grove – Caw Caw Swamp. Please note the LOMR is superseded due to the vertical datum conversion incorrectly applied and backwater not accounted for in the LOMR. The hydrology in that LOMR remains valid and has been utilized as a detailed study for this countywide FIS.

For the Edisto River hydrologic analyses were taken from the Colleton County, South Carolina and Incorporated Areas FIS (FEMA, 2001). Discharges for the Edisto River were determined from a log-Pearson Type III frequency analysis using data from a 50-year older record of two USGS continuous-record stations at Branchville and Givens (nos. 02174000 and 02175000, respectively). The Branchville gage was transposed downstream to more accurately reflect discharges in the upstream reach of the detailed study. The gage at Givens was transposed to the downstream limit of the study.

For Coosaw Creek and Sawpit Creek the hydrologic analyses were taken from the Dorchester County, South Carolina and Incorporated Areas FIS (FEMA, 2014). Discharges for the 10-, 2-, 1-, and 0.2- percent annual chance recurrence intervals were determined using USGS regression equations. The calculations used the most recent editions of equations for both rural and urban streams (USGS, 2004 and 2002).

Discharges for the 1-percent annual chance recurrence interval for the limited detailed methods were determined using USGS regression equations. The calculations used the most recent edition of equations for both rural and urban streams (USGS, 2004 and 2002).

Peak discharges for the 10-, 2-, 1-, and 0.2-percent annual chance floods of each riverine flooding source studied in detail, are shown in Table 3, "Summary of Discharges." Stillwater elevations for ponding sources are shown in Table 4, "Summary of Stillwater Elevations."

Table 3 – Summary of Discharges

Flooding Source and Location	Drainage Area (sq. miles)	Peak Discharges (cfs) 10-percent annual chance	2-percent annual chance	1-percent annual chance	0.2-percent annual chance
BRIDGE CARDIN CREEK					
Approximately 1.05 miles upstream of State Route 165	48.20	2,377	4,113	4,960	7,291
Approximately 1.82 miles downstream of State Route 165	22.90	1,065	1,889	2,295	3,419
At the divergence of Unnamed Tributary 4 to Bridge Cardin Creek	6.80	746	1,326	1,607	2,393
Approximately 630 feet downstream of Hyde Park Road	13.80	607	1,067	1,293	1,916
Approximately 0.95 miles downstream of Hyde Park Road	9.20	413	725	877	1,298
CAW CAW SWAMP					
At the confluence with Bridge Cardin Creek	7.1	367	663	809	1,217
CHURCH CREEK					
At confluence with the Ashley River	8.47	880	1,216	1,428	1,708
Just downstream of Railroad	7.68	526	761	880	1,044
COOSAW CREEK					
At mouth	4.3	470	840	1,120	1,850
EDISTO RIVER					
At County Boundary	2,807.2	18,930	26,181	29,134	35,690
At Givhans Gage	2,730.2	18,498	25,730	28,696	35,265
At Old Dam Road	2,030.0	14,895	21,795	24,785	31,281
At State Road 29	1,902.8	13,891	20,636	23,603	30,011
McCHUNE BRANCH					
At U.S. Highway 78	11.71	656	863	1,248	1,808
MELLICHAMP BRANCH					
At confluence of Log Bridge Creek	10.40	624	1,068	1,301	1,920

Table 3 – Summary of Discharges – continued

Flooding Source and Location	Drainage Area (sq. miles)	Peak Discharges (cfs) 10-percent annual chance	2-percent annual chance	1-percent annual chance	0.2-percent annual chance
MELLICHAMP BRANCH (continued)					
Approximately 1,350 feet downstream of the confluence of Unnamed Tributary 1 to Mellichamp Branch	5.90	143	271	336	519
Approximately 5,725 feet upstream of the confluence of Unnamed Tributary 1 to Mellichamp Branch	1.50	39	73	85	129
MIDDLE BRANCH					
At downstream corporate limits of Town of Ravenel	7.20	641	1,138	1,498	2,447
At Miley Hill Road	4.20	466	832	1,108	1,826
At State Highway 165	2.80	367	658	883	1,466
At New Road	1.70	274	492	668	1,118
Approximately 1.02 miles downstream of Buckhorn Road	1.30	53	97	118	178
SAWMILL BRANCH					
At U.S. Route 78	6.80	650	1,440	1,490	2,410
SAWPIT CREEK					
At Dorchester Road	0.5	182	312	382	489
SUB-TRIBUTARY TO TRIBUTARY 1 TO McCHUNE BRANCH					
At the confluence with Tributary 1 to McChune Branch	1.70	266	418	542	853
TRIBUTARY 1 TO McCHUNE BRANCH					
At the confluence with McChune Branch	2.93	319	451	550	806
TRIBUTARY 2 TO McCHUNE BRANCH					
At Norfolk and Southern Railroad	1.27	58	64	160	182
At confluence with Church Creek	0.22	184	254	302	337

Table 3 – Summary of Discharges – continued

Flooding Source and Location	Drainage Area (sq. miles)	Peak Discharges (cfs) 10-percent annual chance	2-percent annual chance	1-percent annual chance	0.2-percent annual chance
TRIBUTARY NO. 0 TO CHURCH CREEK					
At confluence with Church Creek	0.22	184	254	302	337
TRIBUTARY NO.1 TO CHURCH CREEK					
At confluence with Church Creek	1.93	175	234	275	318
TRIBUTARY NO.1 TO TRIBUTARY NO. 2 TO CHURCH CREEK					
At confluence with Tributary No. 2 to Church Creek	0.24	133	213	297	333
TRIBUTARY NO.2					
At mouth	1.1	324	539	656	838
At Dorchester Road	0.6	215	362	444	564
TRIBUTARY NO. 2 TO CHURCH CREEK					
At confluence with Church Creek	0.85	205	243	246	325
UNNAMED TRIBUTARY 4 TO BRIDGE CARDIN CREEK					
At the convergence with Bridge Cardin Creek	1.60	320	567	689	1,026
UNNAMED TRIBUTARY 1 TO MELLICHAMP BRANCH					
Approximately 2,540 feet upstream of the confluence with Mellichamp Branch	1.60	35	68	86	135

Table 4 – Summary of Stillwater Elevations

Flooding Source and Location	Elevation (feet, NAVD88) 10-percent annual chance	2-percent annual chance	1-percent annual chance	0.2-percent annual chance
PONDING AREA NO. 2	11.3	11.9	12.2	12.5
PONDING AREA NO. 3	8.7	9.1	9.3	9.6
PONDING AREA NO. 4	8.8	9.1	9.3	9.6

3.2 Riverine Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the riverine sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM (Exhibit 2).

The hydraulic analyses for this study 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.

Precountywide FISs

The unincorporated areas of Charleston County, as well as the Towns of Hollywood and Ravenel, had a previously printed FIS report describing each community's riverine hydraulic analyses. Those analyses have been compiled from the FIS reports and are summarized below.

Cross sections for Mellichamp Branch and Middle Branch were obtained from field surveys. All bridges, dams, and culverts were surveyed to obtain elevation data and structural geometry.

Cross sections for the backwater analyses of Sawmill Branch were obtained from the USACE, Charleston District. All bridges and culverts were field checked to verify elevation data and structural geometry.

For Mellichamp Branch, Middle Branch, and Sawmill Branch, water-surface elevations for the selected recurrence intervals were developed using the U.S. Army Corps of Engineers (USACE) Hydrologic Engineering Center (HEC), HEC-2 water-surface profile model (USACE, 1990). Starting water-surface elevations were calculated using the slope/area method. Flood profiles were drawn using both the elevations obtained from the backwater computations and storm tide elevations for the selected recurrence intervals. The backwater computations were calculated for the entire flooding source by neglecting the tidal influences. The tidal elevations were then superimposed on the backwater elevations, showing only the higher of the two elevations.

The adICPR computer program was used to determine the water-surface elevations for Church Creek, Tributary No. 1to Church Creek, and Tributary No. 2 to Church Creek.

November 17, 2004, Countywide FIS

No new hydraulic analyses were computed.

[TBD], Countywide FIS

The hydraulic analysis for Caw Caw Swamp came from superseded LOMR 14-04-3481P, Spring Grove – Caw Caw Swamp. Please note the LOMR is superseded due to the vertical datum conversion incorrectly applied and backwater not accounted for in the LOMR. The hydraulics in that LOMR remain valid and has been utilized as a detailed study for this countywide FIS. The floodway data has been corrected for this countywide FIS.

The hydraulic analyses for Coosaw Creek and Sawpit Creek were taken from the Dorchester County, South Carolina and Incorporated Areas FIS (FEMA, 2014).

For Coosaw Creek and Sawpit Creek channel cross sections were obtained by field survey work conducted as part of the Dorchester County, South Carolina Unincorporated Areas FIS and included surveys of bridges, dams, and culverts. Additional topography was obtained from topographic maps (FEMA, 1994).

Starting water-surface elevations for Coosaw Creek and Sawpit Creek were determined using normal depth. Water surface elevations for floods of the selected recurrence intervals were computed using the USACE, Hydrologic Engineering Center's (HEC) computer program, HEC-2 (USACE, 1990).

The hydraulic analyses for Edisto River were taken from the Colleton County, South Carolina and Incorporated Areas FIS (FEMA, 2001). Cross sections were obtained from field surveys. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry. The channel sections were located at close intervals upstream and downstream of structures. The overbank

cross section data were obtained from 5 feet contour interval USGS topographic maps at a scale of 1:24,000 (USGS, various dates). Water-surface elevations were computed using the USACE computer program, HEC-2 (USGS, 1990). Starting water-surface elevations were calculated using the slope/area method.

For the streams studied by limited detailed methods, the hydraulic analyses were taken from the Dorchester County, South Carolina and Incorporated Areas FIS (FEMA, 2014). One exception is the limited detailed study on North Santee River, which was taken from the Georgetown County, South Carolina and Incorporated Areas FIS (FEMA, 2015). North Santee River was a limited detailed study in Georgetown County, South Carolina. North Santee River in Georgetown County and South Santee River in Charleston County share the same floodplain and hydrologic discharges. The cross-sections of North Santee River cover the entire floodplain and cross the streamline of South Santee River. Therefore, the 1-percent annual chance water-surface elevations and floodplain boundaries from North Santee River were adopted for Charleston County, South Carolina and Incorporated Areas FIS.

For the streams studied by limited detailed methods, cross section geometries were obtains from Light Detection and Ranging (LiDAR) data provided by SCDNR and all structure openings were field measured.

Starting water surface elevations for the streams studied by limited detailed methods were determined using normal depth using starting slopes calculated from the LiDAR data, or where applicable, derived from the water surface elevations of existing effective flood elevations.

Water surface elevations for the 1-percent annual chance flood were computed using the USACE, HEC River Analysis System computer program, HEC-RAS 4.0, for steady state hydraulic modeling (USACE, 2005).

Roughness factors (Manning's "n" Values) used in the hydraulic computations were estimated by using engineering judgment, field survey, and field survey photographs in conjunction with aerial photographs. Roughness factors for all streams studied by detailed methods are shown in the following tabulation.

Stream	Channel "n"	Overbank "n"
	Detailed Study Streams	
Bridge Cardin Creek	*	*
Caw Caw Swamp	*	*
Church Creek	*	*
Coosaw Creek	0.020-0.120	0.035-0.150
Edisto River	0.039-0.044	0.118-0.150

*Data Not Available

Stream	Channel "n"	Overbank "n"
	Detailed Study Streams – continued	
McChune Branch	*	*
Mellichamp Branch	0.06-0.10	0.15-0.20
Middle Branch	0.04-0.05	0.07-0.12
Sawmill Branch	0.04	0.06-0.12
Sawpit Creek	0.020-0.120	0.035-0.150
Sub-Tributary to Tributary 1 to McChune Branch	*	*
Tributary 1 to McChune Branch	*	*
Tributary 2 to McChune Branch	*	*
Tributary No. 0 to Church Creek	*	*
Tributary No. 1 to Church Creek	*	*
Tributary No. 2	0.020-0.120	0.035-0.150
Tributary No. 2 to Church Creek	*	*
Unnamed Tributary 1 to Mellichamp Branch	*	*
Unnamed Tributary 4 to Bridge Cardin Creek	*	*
	Limited Detailed Study Streams	
Ashley River Tributary 8	0.050	0.100-0.150
Ashley River Tributary 8-4	0.050	0.140
Ashley River Tributary 30	0.050	0.140-0.150
Coosaw Creek	0.020-0.120	0.035-0.150
Fishburne Creek	0.035-0.040	0.100-0.0145
McChune Branch	0.050	0.150
North Santee River	0.035-0.05	0.10-0.15
Watson Hill Tributary	0.045-0.050	0.100-0.150

*Data Not Available

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

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

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)
- Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutment)

- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below frost line)
- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

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

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

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

3.3 Coastal Analyses

The stillwater surge elevation is the water elevation due solely to the effects of the astronomical tides, storm surge, and wave setup on the water surface but which does not include wave heights. The inclusion of wave heights, which is the distance from the trough to the crest of the wave, increases the water-surface elevations. The height of a wave is dependent upon wind speed and duration, depth of water, and length of fetch. The wave crest elevation is the sum of the stillwater elevation and the portion of the wave height above the stillwater elevation.

For this countywide FIS revision, the coastal analysis considered storm characteristics and the shoreline and bathymetric characteristics of the flooding sources studied, to provide estimates of the elevations of floods of the selected recurrence intervals along the shoreline. Users of the FIRM should be aware that coastal flood elevations are provided in Table 5, “Summary of Coastal Stillwater Elevations” table in this report. If the elevation on the FIRM is higher than the elevation shown in this table, a wave height, and/or wave runup component likely exists, in which case the higher elevation should be used for construction and/or floodplain management purposes.

The South Carolina storm surge project was initiated under the CTP agreement between SCDNR and FEMA Region IV under MAS 7, 8, and 10 for coastal storm surge activities being conducted as a statewide effort. The project team consists

of FEMA, SCDNR, URS, AECOM/Watershed Concepts and their subcontractors, Taylor Engineering, Risk Engineering, and Ocean Weather, Inc. The study replaces outdated coastal analyses as well as previously published storm surge stillwater elevations for all FIS Reports in the study area, including Charleston County, South Carolina and serves as the basis for updated FIRMs. Study efforts were initiated in 2007 and concluded in 2013.

In addition to FEMA and SCDNR, project oversight and guidance are being provided by a Steering Committee for this project, which consists of an independent panel of scientists identified by SCDNR. The purpose of the Steering Committee is to provide oversight and guidance in the event of unusual circumstances that are encountered on the project.

The purpose of the South Carolina storm surge project was to develop updated storm surge analyses for the 10-percent, 2-percent, 1-percent, and 0.2-percent-annual-chance stillwater elevations or storm surge levels along the entire South Carolina coast. Storm surge includes the cumulative effects of storm winds, wave forces, and tides. The storm surge levels were determined by using the ADCIRC hydrodynamic model in concert with the Steady State Spectral Wave (STWAVE) model to complete a series of model runs with input data from artificial storms created using the Joint Probability Method (JPM) statistical analysis. After the completion of this process, the data were analyzed to determine the stillwater elevations, and then overland wave height analysis was performed with the WHAFIS model, to determine the final Base Flood Elevations (BFEs). The results of the overland wave height study were used to update the FIRMs and FISs for the counties in South Carolina affected by coastal surge.

The storm surge from Atlantic Ocean affects the shoreline of Cooper River and Wando River. The storm-surge elevations for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods along the coastline of Charleston are shown in Table 5, "Summary of Coastal Stillwater Elevations." The analyses reported herein reflect the stillwater elevations due to storm surge and wave setup effects. As storm surge is driven by wind and the inverse barometric effect of low atmospheric pressure and is also influenced by waves, tides, and uneven bathymetric and topographic surfaces, it varies along the shoreline.

Table 5 – Summary of Coastal Stillwater Elevations

	ELEVATION (feet NAVD88)			
	Percent Annual Chance			
FLOODING SOURCE AND LOCATION	10-Percent	2-Percent	1-Percent	0.2-Percent
Atlantic Ocean				
Along Big Bay Creek and Scott Creek	5.8	7.2	8.4	13.8
Near Bailey Island	N/A	7.3	9.5	14.3

Table 5 – Summary of Coastal Stillwater Elevations – continued

FLOODING SOURCE AND LOCATION	ELEVATION (feet NAVD88) Percent Annual Chance 10-Percent	2-Percent	1-Percent	0.2-Percent
Along South Edisto River from Racoon Island to the confluence of Dawho River	N/A	7.2-6.3	8.3-8.2	13.3
Along shoreline from Edingsville Beach to the mouth of north Edisto river	5.7	7.1-7.2	9.0-9.2	13.6-13.8
Along North Edisto River from Privateer Point to confluence of Toogoodoo Creek	N/A	7.1-7.2	9.1-9.4	13.7-14.1
Along Wadmalaw River from confluence of Toogoodoo Creek to confluence of Stono River	N/A	6.5-7.2	9.0-9.1	13.6-13.8
Along North Edisto River at the Town of Ravenel	N/A	6.8	9.0	14.0
Along shoreline from mouth of North Edisto River to the west end of Kiawah Island	5.7	7.1-7.8	9.0-10.0	13.5-14.8
Along shoreline from west end of Kiawah Island to east end of Kiawah Island	5.6-5.7	7.3-8.0	8.8-10.0	12.9-15.0
At the mouth of Folly River	5.6	7.4-7.7	9.2-9.6	13.3-13.8
Along the shoreline from west end of Folly Island to the east end of Folly Island	5.5-5.6	7.3-7.8	9.2-9.6	13.2-13.7
At Lighthouse Inlet	5.5	7.6-8.1	9.4-10.0	13.6-14.2
Along the shoreline from south end of Morris Island to the north end of Morris Island	5.4-5.5	7.3-8.0	9.2-10.2	13.4-14.2
Along the shoreline of Charleston Harbor	N/A	7.9-8.4	9.6-10.5	13.8-14.9
Along Ashley River from the mouth to the confluence with Wappoo Creek	N/A	8.3-8.5	10.4-10.6	14.8-15.1
Along Ashley River from Robert B Scarborough Bridge to Charles Towne Landing State Park	N/A	8.4	10.4	14.6
Along Ashley River from Charles Towne Landing State Park to the confluence with Bull Creek	N/A	8.2-8.5	10.3-10.6	14.3-14.7
From mouth of Ashley River to mouth of Wando River	N/A	8.2-8.4	10.2-10.5	14.3-14.8
Along Wando River from mouth to the confluence of Rathall Creek	N/A	7.6-8.2	9.4-10.2	13.0-14.5
Along Wando River from the confluence with Rathall Creek to the confluence of Horlbeck Creek	N/A	7.4-7.6	9.1-9.4	12.7-13.0
Along Wando River from confluence with Horlbeck Creek to confluence of Wagner Creek	N/A	6.5-7.4	7.8-9.1	10.8-12.7

Table 5 – Summary of Coastal Stillwater Elevations – continued

FLOODING SOURCE AND LOCATION	ELEVATION (feet NAVD88) Percent Annual Chance 10-Percent	2-Percent	1-Percent	0.2-Percent
At confluence of Cooper River and Wando River	N/A	8.1	10.1-10.2	14.3-14.5
Along Cooper River from the mouth to the confluence with Clouter Creek	N/A	8.1-8.2	10.1-10.2	14.4-14.5
Along Cooper River from the confluence with Clouter Creek to the confluence with Goose Creek	N/A	7.7-8.2	9.5-10.2	13.3-14.5
Along shoreline from Charleston Harbor to Breach Inlet	5.4	7.5-8.0	9.6-10.0	13.7-14.8
Along shoreline from Breach Inlet to the east end of Island of Palms	5.4	7.4-8.0	9.2-9.8	14.2-14.8
Along shoreline from Dewees Inlet to Capers Inlet	5.4	7.9-8.4	9.4-10.0	14.6-15.0
Along shoreline from Capers Inlet to the mouth of Price Creek	5.4	7.9-8.4	9.8-10.3	14.9-15.2
Along the shoreline from the west end of Bull Island to the east end of Bull Island	5.4	7.5-8.4	9.3-10.4	14.4-16.0
Along shoreline of Bulls Bay from the mouth of Bull Creek to the mouth of Venning Creek	5.4	9.1-9.6	11.2-11.9	17.1-18.0
Along shoreline of Bulls Bay from the mouth of Venning Creek to the mouth of Graham Creek	5.4	9.4-9.6	11.7-11.9	17.8-18.0
Along shoreline from the mouth of Graham Creek to the mouth of Long Creek	5.4	8.8-9.6	11.0-11.8	16.8-18.0
Along shoreline of Bulls Bay from the mouth of Long Creek to the mouth of Five Fathom Creek	5.4	7.7-8.8	9.6-11.0	14.8-16.9
Along shoreline from the mouth of Five Fathom Creek to the east end of Lighthouse Island	5.4	7.1-7.7	8.7-9.5	12.8-14.6
Along shoreline from the south end of Cape Island to the north end of Cape Island	5.4	7.8-8.5	9.4-10.4	13.6-14.7
Along shoreline of Cape Romain Harbor from the mouth of Romain River to the mouth of Casino River	N/A	8.0-8.6	9.7-10.5	14.0-15.0
Along shoreline from the west end of Murphy Island to the mouth of Santee River	5.4	7.7-8.6	9.4-10.5	13.3-14.5

The methodology for analyzing the effects of wave heights associated with coastal storm surge flooding is described in a report prepared by the National

Academy of Sciences (NAS; NAS, 1977). This method is based on three major concepts. First, depth-limited waves in shallow water reach maximum breaking height that is equal to 0.78 times the stillwater depth. The wave crest is 70 percent of the total wave height above the stillwater level. The second major concept is that wave height may be diminished by dissipation of energy because of obstructions, such as sand dunes, dikes and seawalls, buildings and vegetation. The amount of energy dissipation is a function of the physical characteristics of the obstruction and is determined by procedures described in the NAS Report. The third major concept is that wave height can be regenerated in open fetch areas because of the transfer of wind energy to the water. This added energy is related to fetch length and depth.

The coastal analysis for this revision involved transect layout, field reconnaissance, erosion analysis, and overland wave modeling, wave height analysis and wave runup analysis .

Atlantic Ocean is the primary coastal flooding sources in Charleston County. Wave heights were computed along transects that were located along open coastline and along shorelines of major rivers, as illustrated on the FIRMs. The transects were located with consideration given to existing transect locations and to the physical and cultural characteristics of the land so that they would closely represent conditions in the locality.

Each transect was taken perpendicular to the shoreline and extended inland to a point where coastal flooding ceased. Along each transect, wave heights and elevations were computed in consideration of the combined effects of changes in ground elevation, vegetation, and physical features. The stillwater elevations for a 1-percent-annual-chance event were used as the starting elevations for these computations. Wave heights were calculated to the nearest 0.1 foot, and wave elevations were determined at whole-foot increments along the transects. The location of the 3-foot breaking wave for determining the terminus of the Zone VE (area with velocity wave action) was computed at each transect.

Majority of Atlantic Ocean coastline is composed of dunes with peak elevations that vary from approximate 6.0 feet to approximate 16 feet (NAVD88) where a continuous dune feature exists. Historical data was evaluated, and no erodible bluffs were identified in Charleston County. Thus, only dune erosion was taken into account along the Atlantic Ocean coastline. A review of the geology and shoreline type in Charleston County was made to determine the applicability of standard erosion methods, and FEMA's standard erosion methodology for coastal areas having primary frontal dunes, referred to as the "540 rule," was used (FEMA, 2007[a]). This methodology first evaluates the dune's cross-sectional profile to determine whether the dune has a reservoir of material that is greater or less than 540 square feet. If the reservoir is greater than 540 square feet, the "retreat" erosion method is employed and approximately 540 square feet of the dune is eroded using a standardized eroded profile, as specified in FEMA

guidelines. If the reservoir is less than 540 square feet, the "removal" erosion method is employed where the dune is removed for subsequent analysis, again using a standard eroded profile. The storm surge study provided the return period stillwater elevations required for erosion analyses. Each cross-shore transect was analyzed for erosion, where applicable. In summary, erosion analysis was conducted for 66 transects out of 84 transects that are along the open coast and all the cases are "removal".

Wave height calculations used in this flood insurance study are based on the methodologies described in the FEMA guidance for coastal mapping (FEMA, 2007[a]). Wave setup results in an increased water level at the shoreline due to the breaking of waves and transfer of momentum to the water column during hurricanes and severe storms. For the Charleston County study, wave setup was determined directly from the coupled wave and storm surge model. The total stillwater elevation (SWEL) with wave setup was then used for simulations of overland wave propagation conducted using FEMA's WHAFIS model Version 4.0 (FEMA, 2007[b]). WHAFIS is a one-dimensional model that was applied to each transect in the study area. The model uses the specified SWEL and the starting wave conditions as input. Simulations of wave transformations were then conducted with WHAFIS taking into account the storm-induced erosion and overland features of each transect. Output from the model includes the combined SWEL and wave height along each cross-shore transect allowing for the establishment of BFEs and flood zones from the shoreline to points inland within the study area.

Wave runup is defined as the maximum vertical extent of wave uprush on a beach or structure. FEMA's 2007 Guidelines and Specifications require the 2-percent wave runup level be computed for the coastal feature being evaluated (cliff, coastal bluff, dune, or structure; FEMA, 2007[a]). The 2-percent runup level is the highest 2-percent of wave runup affecting the shoreline during the 1-percent annual chance flood event. Each transect defined within the study area was evaluated for the applicability of wave runup, and if necessary, the appropriate runup methodology was selected and applied to each transect. Runup 2.0, which is applicable for mild runup slopes, was applied at thirteen transects and TAW, which is applicable for steep runup slopes, was applied at nine transects in Charleston County. Vertical runup method was applied at a seawall in Folly Beach. The Runup elevations were then compared to WHAFIS results to determine the dominant process affecting BFEs and associated flood hazard levels. Based on wave runup, wave overtopping was computed following the FEMA 2007 Guidelines and Specifications.

The starting wave conditions at each transect are shown in Table 6, "Transect Data."

Table 6 – Transect Data

Flood Source	Transect	Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
		Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Atlantic Ocean	1	N 33.102846 W 79.296330	8.56	13.77	5.4	8.3 7.7 - 8.5	10.2 9.6 - 10.3	14.4 13.6 - 14.5
Atlantic Ocean	2	N 33.092303 W 79.323735	9.01	13.27	5.4	8.5 7.7 - 9	10.4 9.4 - 11	14.7 14.1 - 15.8
Atlantic Ocean	3	N 33.069293 W 79.336107	9.59	12.31	5.4	8.6 8.1 - 9	10.5 9.7 - 11.2	14.9 14.1 - 16.5
Atlantic Ocean	4	N 33.011078 W 79.362612	9.82	13.22	5.4	7.5 7.5 - 8.9	9.1 9.1 - 11.1	13.1 13.1 - 16.5
Atlantic Ocean	5	N 33.007365 W 79.405616	9.51	13.54	5.4	7.3 7.3 - 8.7	8.9 8.9 - 10.9	13.2 13.2 - 16.9
Atlantic Ocean	6	N 33.013938 W 79.439344	9.51	13.56	5.4	7.6 7.6 - 8.8	9.3 9.3 - 11.1	14.1 14.1 - 17.4
Atlantic Ocean	7	N 33.012185 W 79.478700	9.49	13.34	5.4	7.8 5.5 - 8.7	9.7 7.7 - 10.9	14.8 11.9 - 17.6
Bulls Bay	8	N 33.034749 W 79.517620	5.05	4.00	5.4	8.6 5.6 - 8.9	10.8 7.7 - 11.3	16.5 11.7 - 17.5
Bulls Bay	9	N 33.026487 W 79.544603	5.40	4.03	5.4	9 9 - 9.4	11.2 11.2 - 11.8	17.1 16.8 - 17.8
Bulls Bay	10	N 33.014787 W 79.567205	5.69	4.85	5.4	9.3 9.3 - 9.6	11.6 10 - 12	17.6 16.8 - 18.1
Bulls Bay	11	N 32.999119 W 79.583775	5.62	4.84	5.4	9.5 9.1 - 9.9	11.8 10.3 - 12.4	17.9 16.7 - 18.7
Bulls Bay	12	N 32.973976 W 79.606301	5.61	4.75	5.4	9.6 7.3 - 10.2	12 8.3 - 12.8	18.1 14.6 - 19.6
Bull Harbor	13	N 32.959597 W 79.610979	5.98	4.19	5.4	9.5 6.3 - 10.2	11.7 6.8 - 12.7	17.8 11.3 - 19.9
Bull Harbor	14	N 32.941074 W 79.616612	5.92	4.58	5.4	9.4 9.4 - 10.1	11.6 11.6 - 12.5	17.6 17.1 - 18.8
Atlantic Ocean	15	N 32.903310 W 79.588772	10.02	13.28	5.4	7.4 7.1 - 9.4	9.3 9.3 - 11.4	14 14 - 17.1
Atlantic Ocean	16	N 32.897956 W 79.605647	10.03	13.05	5.4	7.6 7.6 - 10.4	9.4 9.4 - 12.9	14.3 14 - 19.7
Atlantic Ocean	17	N 32.891451 W 79.622832	10.02	12.71	5.4	7.7 5.4 - 10.1	9.5 6.8 - 12.5	14.5 8.8 - 19.3
Atlantic Ocean	18	N 32.883414 W 79.637963	10.02	12.25	5.4	7.9 5.4 - 10.1	9.7 6.5 - 12.5	14.7 8.8 - 18.6
Atlantic Ocean	19	N 32.874306 W 79.657261	10.05	12.57	5.4	8 5.4 - 9.7	9.8 6.7 - 12.1	14.8 9.2 - 18
Atlantic Ocean	20	N 32.868332 W 79.669718	10.04	12.53	5.4	8.4 5.4 - 9.2	10.2 6.7 - 11.8	15 9.2 - 17.5
Atlantic Ocean	21	N 32.859525 W 79.684585	10.04	12.24	5.4	8.3 5.5 - 9	10.3 6.8 - 11.3	15.2 9.7 - 17.5
Atlantic Ocean	22	N 32.852116 W 79.695900	10.04	12.19	5.4	7.9 5.6 - 8.9	9.8 7.2 - 11.3	14.7 9.7 - 17.1
Atlantic Ocean	23	N 32.834962 W 79.704938	10.44	12.40	5.4	8 5.8 - 8.8	9.9 7.4 - 11.5	14.6 7.9 - 17.1
Atlantic Ocean	24	N 32.828369 W 79.715707	11.16	12.25	5.4	8 7.2 - 9	9.9 9.5 - 11.5	14.6 14.6 - 17.5
Dewees Inlet	25	N 32.829883 W 79.729134	5.63	7.27	5.4	8 8 - 9	9.9 9.9 - 11.6	15 15 - 17.4

*For transects with a constant Stillwater Elevation, only one number is provided to represent both the starting value and the range.

Table 6 – Transect Data – continued

Flood Source	Transect	Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
		Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Atlantic Ocean	26	N 32.812797 W 79.719344	11.44	12.35	5.4	7.9 7.6 - 8.8	9.7 9.6 - 11.3	14.3 14.3 - 17.5
Atlantic Ocean	27	N 32.806422 W 79.724348	11.42	12.57	5.4	7.7 7.6 - 8.8	9.4 9.4 - 11.3	13.9 13.9 - 17.4
Atlantic Ocean	28	N 32.802433 W 79.731925	9.77	13.17	5.4	7.4 7.4 - 8	9.2 9.2 - 9.9	13.3 13.3 - 15.1
Atlantic Ocean	29	N 32.799992 W 79.740358	8.98	13.32	5.4	7.5 7.5 - 8.2	9.2 9.2 - 10.2	13.4 13.4 - 15.4
Atlantic Ocean	30	N 32.798595 W 79.748580	8.96	13.51	5.4	7.7 7.7 - 8.3	9.5 9.4 - 10.3	13.7 13.7 - 15.5
Atlantic Ocean	31	N 32.797188 W 79.754816	8.69	13.32	5.4	7.7 7.7 - 8.4	9.5 9.5 - 10.5	14 14 - 15.6
Atlantic Ocean	32	N 32.795164 W 79.761181	8.70	13.33	5.4	7.7 7.7 - 9	9.5 9.5 - 11.5	14 14 - 17.3
Atlantic Ocean	33	N 32.792429 W 79.768933	8.58	12.96	5.4	7.8 7.8 - 9	9.6 9.6 - 11.5	14.2 14.2 - 17.5
Atlantic Ocean	34	N 32.789397 W 79.776080	8.49	13.23	5.4	7.8 7.8 - 9.1	9.6 9.3 - 11.6	14.1 14.1 - 17
Atlantic Ocean	35	N 32.785901 W 79.783834	8.50	13.31	5.4	7.8 7.8 - 9.1	9.6 9.6 - 11.8	13.8 13.8 - 17.1
Atlantic Ocean	36	N 32.782492 W 79.792082	8.50	13.20	5.4	7.9 6.5 - 9.1	9.8 7.8 - 11.6	13.8 10.5 - 17.2
Atlantic Ocean	37	N 32.778660 W 79.799198	8.62	13.14	5.4	7.9 7.9 - 8.9	9.8 8.5 - 11.6	14.3 11.3 - 18.1
Atlantic Ocean	38	N 32.775283 W 79.805167	8.81	13.15	5.4	7.9 7.9 - 9	9.8 8.9 - 11.5	14 10.6 - 17.3
Atlantic Ocean	39	N 32.773200 W 79.814338	9.04	13.12	5.4	8.1 7.9 - 9	10.1 9.6 - 11.5	14.6 12.6 - 17.1
Atlantic Ocean	40	N 32.765407 W 79.818711	8.59	12.93	5.4	8.0 8.0 – 9.0	9.9 9.1 - 11.4	14.2 14.2 - 17
Atlantic Ocean	41	N 32.761567 W 79.825474	7.46	12.79	5.4	7.8 7.8 - 8.9	9.7 9.7 - 11.4	13.9 13.9 - 16.9
Atlantic Ocean	42	N 32.759379 W 79.832359	7.65	12.57	5.4	7.8 7.6 - 8.9	9.8 9.7 - 11.1	14 14 - 16.3
Atlantic Ocean	43	N 32.755937 W 79.840548	7.53	10.33	5.4	7.8 7.5 - 8.5	9.7 9.6 - 10.7	13.9 13.5 - 15.5
Atlantic Ocean	44	N 32.753811 W 79.847560	6.85	10.30	5.4	7.7 7.7 - 8.5	9.5 8.7 - 10.6	13.7 13.7 - 15
Atlantic Ocean	45	N 32.755459 W 79.855957	6.52	4.60	5.4	7.7 7.7 – 8.0	9.8 9.5 - 9.8	13.8 13.7 - 14.6
Charleston Harbor	46	N 32.779508 W 79.871540	4.86	3.94	5.4	7.9	9.8 9.6 - 9.9	14 13.6 - 14.7
Charleston Harbor	47	N 32.786212 W 79.879590	4.28	3.80	5.4	8.1	10.1 10 - 10.1	14.4 12.8 - 14.4
Charleston Harbor	48	N 32.786724 W 79.892495	4.80	3.79	5.4	8.2	10.2 10.2 - 10.3	14.6 13 - 14.7
Cooper River	49	N 32.799169 W 79.906145	4.02	3.27	5.4	8.1 8.0 - 8.1	10.1 10 - 10.3	14.3 14.2 - 14.9
Wando River	50	N 32.815921 W 79.905715	4.04	3.48	5.4	8.0 7.7 – 8.0	9.9 9.8 - 10	13.9 13.4 - 14.1
Wando River	51	N 32.822180 W 79.898687	3.85	3.31	5.4	7.8 7.8 - 7.9	9.8	13.7 13 - 13.7

*For transects with a constant Stillwater Elevation, only one number is provided to represent both the starting value and the range.

Table 6 – Transect Data – continued

Flood Source	Transect	Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
		Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Wando River	52	N 32.841910 W 79.886220	3.83	3.23	5.4	7.8 7.6 - 7.8	9.7 8.8 - 9.7	13.5 11.5 - 13.5
Wando River	53	N 32.863336 W 79.882448	4.11	3.62	5.4	7.6 7.2 - 7.6	9.3 9 - 9.3	13 12 - 13
Wando River	54	N 32.868119 W 79.853808	3.05	3.02	5.4	7.4 7.1 - 7.4	9.1 8.6 - 9.1	12.7 12.1 - 12.7
Wando River	55	N 32.872171 W 79.850643	3.05	2.99	5.4	7.4 6.5 - 7.4	9.1 8.4 - 9.1	12.7 10.3 - 12.7
Wando River	56	N 32.891852 W 79.840156	2.73	2.80	5.4	7.4 6.1 - 7.4	9.1 8.3 - 9.1	12.6 8.7 - 12.9
Wando River	57	N 32.910074 W 79.836093	2.55	2.77	5.4	7.3 6.2 - 7.3	9.0 7.6 – 9.0	12.4 8.4 - 12.4
Cooper River	58	N 32.800710 W 79.924133	5.19	4.01	5.4	8.3 8.2 - 8.3	10.3	14.7 14.6 - 14.8
Cooper River	59	N 32.899917 W 79.961646	4.01	3.53	5.4	7.8	9.7 9.2 - 9.7	13.6 12.8 - 14
Cooper River	60	N 32.894255 W 79.965843	3.92	3.53	5.4	7.9 7.8 - 7.9	9.8 9.3 - 9.8	13.8 13.4 - 13.8
Cooper River	61	N 32.884632 W 79.967907	3.95	3.49	5.4	8.0 7.9 – 8.0	9.9 9.9 - 10	13.9 13.5 - 14
Cooper River	62	N 32.874407 W 79.967965	3.95	3.58	5.4	8.1 8.0 - 8.1	10 9.6 - 10.2	14.1 13.9 - 15.1
Cooper River	63	N 32.866338 W 79.964223	4.09	3.61	5.4	8.1 8.0 - 8.1	10.1 9.2 - 10.2	14.2 14.2 - 14.5
Cooper River	64	N 32.860389 W 79.960360	4.22	3.64	5.4	8.1 8.0 - 8.1	10.1 9.5 - 10.1	14.3 13.8 - 14.6
Cooper River	65	N 32.856191 W 79.956108	4.39	3.69	5.4	8.2 8.2 - 8.3	10.2 10 - 10.5	14.5 12.5 - 14.6
Cooper River	66	N 32.843703 W 79.935276	3.94	3.32	5.4	8.1 8.0 - 8.3	10.2 10 - 10.5	14.3 12.9 - 15
Cooper River	67	N 32.834547 W 79.936267	4.07	3.43	5.4	8.2 8.2 - 8.3	10.2 10.2 - 10.4	14.5 12.3 - 14.8
Cooper River	68	N 32.822897 W 79.934036	4.24	3.56	5.4	8.2 7.9 - 8.2	10.2 10 - 10.3	14.4 13.6 - 14.8
Town Creek	69	N 32.810363 W 79.934256	3.15	2.96	5.4	8.3 8 - 8.3	10.3 10.3 - 10.5	14.6 14.6 - 15.2
Town Creek	70	N 32.799679 W 79.929305	4.17	3.83	5.4	8.2 7.8 - 8.2	10.3 9.7 - 10.3	14.6 13.6 - 14.9
Cooper River	71	N 32.793922 W 79.926160	5.28	4.21	5.4	8.1 7.5 - 8.2	10.2 9.8 - 10.5	14.6 13.4 - 14.9
Cooper River	72	N 32.786690 W 79.923643	5.99	4.23	5.4	8.3 7.7 - 8.3	10 9.7 - 10.4	14.6 13.8 - 15.1
Charleston Harbor	73	N 32.780351 W 79.924485	5.94	4.22	5.4	8.3 7.8 - 8.4	9.9 9.7 - 10.5	14.9 14.4 - 15.1
Charleston Harbor	74	N 32.773154 W 79.926128	6.16	4.58	5.4	8.4 8.1 - 8.4	10.5 9.7 - 10.5	15 14 - 15.2
Charleston Harbor	75	N 32.770884 W 79.928133	6.22	4.57	5.4	8.2 7.7 - 8.2	10.3 10.1 - 10.3	15 14.8 - 15
Charleston Harbor	76	N 32.769529 W 79.933767	5.13	4.58	5.4	8.1 7.6 - 8.1	10.4 9.7 - 10.4	14.8 14.1 - 15.1
Ashley River	77	N 32.771462 W 79.940496	4.55	4.05	5.4	8.2 7.6 - 8.2	10.4 9.7 - 10.4	14.8 14.1 - 15

*For transects with a constant Stillwater Elevation, only one number is provided to represent both the starting value and the range.

Table 6 – Transect Data – continued

Flood Source	Transect	Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
		Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Ashley River	78	N 32.776841 W 79.947409	3.85	3.48	5.4	8.4 7.6 - 8.4	10.5 9.8 - 10.5	14.8 13.2 - 14.9
Ashley River	79	N 32.781296 W 79.955197	3.47	3.41	5.4	8.4 7.7 - 8.4	10.4 9.7 - 10.4	14.7 13.9 - 14.9
Ashley River	80	N 32.792415 W 79.968616	3.70	3.46	5.4	8.3 8.0 - 8.4	10.4 10.1 - 10.4	14.5 13.6 - 15.1
Ashley River	81	N 32.808600 W 79.964649	2.91	2.75	5.4	8.2 8.0 - 8.2	10.2 8.9 - 10.2	14.3 13.4 - 15.1
Ashley River	82	N 32.829912 W 79.965359	2.58	2.74	5.4	8.1	10.2 9.8 - 10.2	14.4 13.2 - 14.4
Ashley River	83	N 32.838046 W 79.979040	2.94	2.97	5.4	8.2 8.1 - 8.3	10.4 10.3 - 10.5	14.6 13.6 - 14.8
Ashley River	84	N 32.835698 W 80.002100	3.01	3.00	5.4	8.4 8.3 - 8.4	10.5 10.4 - 10.6	14.7 14.7 - 14.8
Ashley River	85	N 32.837407 W 80.032451	2.88	2.97	5.4	8.5 8.5 - 8.6	10.7 10.2 - 10.7	14.9 13.3 - 14.9
Ashley River	86	N 32.824807 W 80.012597	2.85	2.94	5.4	8.4 7.8 - 8.4	10.5 10.2 - 10.5	14.6 14.3 - 14.6
Ashley River	87	N 32.831365 W 79.982407	2.93	2.95	5.4	8.2 8.2 - 8.3	10.4 10.2 - 10.4	14.5 14.1 - 14.6
Ashley River	88	N 32.821044 W 79.967134	2.94	2.92	5.4	8.1 8.1 - 8.4	10.2 10.2 - 10.5	14.3 13.6 - 14.7
Ashley River	89	N 32.803177 W 79.974702	3.71	3.27	5.4	8.3 8.3 - 8.5	10.4 10.3 - 10.7	14.5 12.2 - 14.8
Ashley River	90	N 32.797100 W 79.976081	4.00	3.46	5.4	8.3 8.3 - 8.6	10.4 10.4 - 10.8	14.5 13.1 - 15.1
Ashley River	91	N 32.788698 W 79.972767	3.96	3.50	5.4 5.4 - 5.5	8.4 6.7 - 8.5	10.4 8.7 - 10.6	14.7 11 - 14.8
Ashley River	92	N 32.784090 W 79.966283	3.69	3.34	5.4	8.4 6.6 - 8.5	10.4 8.3 - 10.5	14.6 13 - 14.7
Ashley River	93	N 32.776561 W 79.957291	3.84	3.41	5.4	8.4 8.4 - 8.5	10.4 9.1 - 10.6	14.7 12.7 - 14.8
Ashley River	94	N 32.764565 W 79.950100	4.29	4.12	5.4 5.4 - 5.6	8.6 6.3 - 8.8	10.7 8.2 - 11.1	15.1 12.4 - 15.6
Charleston Harbor	95	N 32.758416 W 79.941343	4.45	4.61	5.4 5.4 - 5.6	8.5 6.5 - 8.7	10.5 8.5 - 10.9	14.9 12.8 - 15.2
Charleston Harbor	96	N 32.754013 W 79.930356	5.05	4.65	5.4	8.4 7.8 - 8.5	10.2 9.6 - 10.3	14.8 13.8 - 14.9
Charleston Harbor	97	N 32.752532 W 79.913788	5.99	4.27	5.4	8.3	10.3 10.3 - 10.4	14.6 14.4 - 14.7
Atlantic Ocean	98	N 32.738250 W 79.870461	7.63	4.74	5.4	7.9 7.5 - 8.4	9.8 9.5 - 10.5	14.3 13.6 - 15
Atlantic Ocean	99	N 32.714615 W 79.881797	7.76	11.15	5.5 5.4 - 5.5	8.2 7.7 - 8.2	9.9 9.5 - 10.3	14.3 13.8 - 15.2
Atlantic Ocean	100	N 32.682915 W 79.887434	8.15	12.55	5.5 5.4 - 5.5	7.4 7.2 - 8	9.1 8.9 - 10.4	13 12.9 - 15.5
Atlantic Ocean	101	N 32.678360 W 79.894498	8.27	13.03	5.5 5.4 - 5.5	7.5 7.2 - 8.2	9.3 9 - 10.3	13 12.6 - 16.1
Atlantic Ocean	102	N 32.673747 W 79.900946	8.26	12.98	5.5 5.4 - 5.5	7.3 7.1 - 8.4	9.1 9 - 10.7	13.2 13.1 - 16.1
Atlantic Ocean	103	N 32.669407 W 79.907397	8.12	12.96	5.5 5.4 - 5.5	7.3 7 - 8.4	9.2 8.9 - 10.7	13.3 13.1 - 15.8

*For transects with a constant Stillwater Elevation, only one number is provided to represent both the starting value and the range.

Table 6 – Transect Data – continued

Flood Source	Transect	Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
		Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Atlantic Ocean	104	N 32.665371 W 79.914404	7.95	12.71	5.5 5.4 - 5.5	7.4 7.2 - 8.7	9.1 9 - 11	13.5 13.3 - 15.9
Atlantic Ocean	105	N 32.662106 W 79.921228	6.68	13.28	5.5	7.4 7.3 - 8.6	9.2 9.1 - 10.9	13.2 12.6 - 16.2
Atlantic Ocean	106	N 32.658854 W 79.929266	8.04	12.93	5.6 5.5 - 5.6	7.5 6.5 - 8.7	9.4 8.6 - 11.2	13 12.4 - 16.2
Atlantic Ocean	107	N 32.654914 W 79.937604	8.12	13.04	5.6 5.5 - 5.6	7.6 7.2 - 8.8	9.5 9 - 10.9	13.6 12.8 - 15.3
Atlantic Ocean	108	N 32.653048 W 79.942933	8.00	13.14	5.6	7.5 6 - 7.6	9.3 8.9 - 9.8	13.4 13 - 14.8
Atlantic Ocean	109	N 32.649825 W 79.950410	8.00	13.05	5.6	7.6 6.3 - 7.7	9.5 8.9 - 9.8	13.6 12.6 - 14.4
Atlantic Ocean	110	N 32.645744 W 79.958537	7.93	13.08	5.6	7.3 6.7 - 7.7	9.5 9 - 9.9	13.5 13.2 - 14.4
Atlantic Ocean	111	N 32.642004 W 79.965485	7.45	13.25	5.6	7.6 7.1 - 7.7	9.3 9 - 9.7	13.3 13.1 - 14.2
Stono River	112	N 32.637616 W 80.003796	5.08	3.85	5.6	7.8 7.5 - 7.8	9.8 9.6 - 9.8	14.1 14 - 14.2
Stono River	113	N 32.705723 W 79.986505	2.54	2.84	5.6	7.0 6.6 – 7.0	9 8.9 - 9	13.5 13.2 - 15.1
Stono River	114	N 32.723308 W 79.995410	2.54	2.71	5.6 5.4 - 5.6	6.8 6 - 8.8	8.7 8.6 - 10.7	13 12.8 - 15.1
Stono River	115	N 32.759551 W 80.003457	2.27	2.54	5.6	6.6 6.4 - 6.6	8.6 8.5 - 8.7	12.7 12.1 - 14
Stono River	116	N 32.772851 W 80.011465	2.39	2.74	5.6	6.6 6.6 - 6.9	8.7 8.7 - 8.9	12.9 11.9 - 13.3
Stono River	117	N 32.779447 W 80.045097	2.56	2.87	5.6	6.7 6.5 - 6.7	8.7 7.6 - 8.9	12.8 11.9 - 13.2
Stono River	118	N 32.768027 W 80.031378	2.20	2.69	5.6	6.7 6.5 - 6.8	8.6 7.5 - 8.6	12.7 12.3 - 12.7
Stono River	119	N 32.729907 W 80.011574	2.73	2.97	5.6	6.8 6.5 - 6.8	8.6 8.6 - 8.7	12.8 12.6 - 12.9
Stono River	120	N 32.688063 W 80.003184	3.60	3.27	5.6	7.4 7.4 - 7.5	9.6 9.2 - 9.8	14.7 14.7 - 15.1
Stono River	121	N 32.663051 W 80.007579	3.86	3.18	5.6	7.6 7.6 - 7.8	9.7 9.4 - 10.1	14.4 14.4 - 15.6
Stono River	122	N 32.645889 W 80.020632	4.89	3.68	5.6	7.9 7.5 - 8.2	10.0 9.6 - 10.5	14.6 14.6 - 16.2
Atlantic Ocean	123	N 32.610710 W 79.991862	7.58	13.15	5.6	7.3 7.3 - 8.4	9.1 9.1 - 10.5	13.2 13.2 - 14.7
Atlantic Ocean	124	N 32.609792 W 80.029479	6.68	13.28	5.6	7.1 7.1 - 8.4	9.0 9 - 10.8	13.2 13.2 - 15.8
Atlantic Ocean	125	N 32.607590 W 80.048311	7.33	13.19	5.6	7.2 7.1 - 8.4	9.1 9.1 - 10.9	13.5 13.5 - 16.2
Atlantic Ocean	126	N 32.605455 W 80.059755	7.77	13.18	5.6 5.6 - 5.7	7.2 5.6 - 8	9.2 7.6 - 10.5	13.6 12.2 - 15.9
Atlantic Ocean	127	N 32.602742 W 80.075497	7.98	13.49	5.6 5.6 - 5.7	7.3 6.0 - 8.3	9.3 7.6 - 10.6	13.7 12.2 - 15.7
Atlantic Ocean	128	N 32.600261 W 80.088991	8.07	13.42	5.6 5.6 - 5.7	7.5 5.7 - 8.3	9.6 8 - 10.6	14.1 12.2 - 15.7
Atlantic Ocean	129	N 32.597655 W 80.099500	8.59	13.37	5.6 5.6 - 5.7	7.5 6.0 - 8.5	9.6 7.6 - 10.7	14.3 12.2 - 16.3

*For transects with a constant Stillwater Elevation, only one number is provided to represent both the starting value and the range.

Table 6 – Transect Data – continued

Flood Source	Transect	Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
		Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Atlantic Ocean	130	N 32.594654 W 80.109107	8.88	13.24	5.6 5.6 - 5.7	7.5 6.1 - 8.6	9.7 7.7 - 10.6	14.4 11 - 16
Atlantic Ocean	131	N 32.590619 W 80.119355	8.92	12.84	5.6 5.6 - 5.7	7.4 5.7 - 8.7	9.8 7.7 - 10.7	14.5 10.3 - 15.9
Atlantic Ocean	132	N 32.585937 W 80.128966	8.46	12.96	5.6 5.6 - 5.7	7.7 5.6 - 8.5	9.8 7.6 - 10.6	14.5 10.3 - 15.6
Atlantic Ocean	133	N 32.580088 W 80.138219	8.39	12.93	5.7 5.6 - 5.7	7.6 5.7 - 8.8	9.8 6.9 - 10.8	14.6 12.4 - 15.5
Atlantic Ocean	134	N 32.575669 W 80.149784	8.66	12.41	5.7	7.8 5.7 - 8.1	10.1 7 - 10.4	14.9 12.4 - 15.4
Atlantic Ocean	135	N 32.566280 W 80.156935	7.42	10.74	5.7	7.5 5.8 - 8.1	9.8 7.9 - 10.5	14.5 12.2 - 15.2
Atlantic Ocean	136	N 32.559457 W 80.171316	7.66	10.39	5.7	7.3 6.3 - 7.4	9.4 8.3 - 10.2	13.8 12.9 - 14.7
North Edisto River	137	N 32.586128 W 80.210484	3.57	3.57	5.7	7.1 6.6 - 7.1	9.1 8.7 - 9.1	13.7 13.5 - 13.8
North Edisto River	138	N 32.611746 W 80.239234	4.04	3.58	5.7	7.2 6.7 - 7.3	9.2 8.8 - 9.4	13.9 13.5 - 14
Wadmalaw River	139	N 32.648291 W 80.239626	2.61	3.24	5.7	7.1 7.0 - 7.1	9.1	13.4 11.3 - 13.4
Wadmalaw River	140	N 32.692530 W 80.205619	2.58	2.88	5.7	6.8	8.9 8.9 – 9.0	13.6 13.4 - 13.6
Wadmalaw River	141	N 32.695934 W 80.224147	2.43	2.84	5.7	6.8 6.4 - 7	9 9 - 9.7	13.8 13.8 - 15.3
Wadmalaw River	142	N 32.682251 W 80.250359	2.84	3.06	5.7	7.0	9.2	14.0
North Edisto River	143	N 32.629336 W 80.278045	3.78	3.52	5.7	7.3 7.1 - 7.3	9.5 9 - 9.8	14.2 14.2 - 15.1
North Edisto River	144	N 32.607087 W 80.256799	3.85	3.67	5.7	7.2 7.1 - 7.3	9.2 9.2 - 9.3	13.8 13.7 - 13.8
North Edisto River	145	N 32.585652 W 80.228477	4.04	3.62	5.7	7.1 6.0 - 7.1	9.1 9 - 9.4	13.7 13.7 - 16.3
Atlantic Ocean	146	N 32.561018 W 80.193132	7.44	11.62	5.7	7.2 6.4 - 7.4	9.3 9.1 - 9.7	14.1 13.9 - 15.1
Atlantic Ocean	147	N 32.547849 W 80.223843	7.23	12.86	5.7	7.6 6.3 - 7.7	10.1 8.9 - 10.3	15.2 13.1 - 15.8
Atlantic Ocean	148	N 32.538069 W 80.240508	7.51	12.59	5.7 5.7 - 5.8	7.7 7.1 - 7.9	10.1 8.2 - 10.6	15.2 12.8 - 16.4
Atlantic Ocean	149	N 32.527051 W 80.259542	8.31	12.67	5.7 5.7 - 5.8	7.4 6.8 - 7.7	10.1 7.9 - 10.7	15.3 10.9 - 16.3
Atlantic Ocean	150	N 32.515839 W 80.278616	8.32	12.54	5.7 5.7 - 5.8	7.4 6.2 - 7.4	10.2 7.9 - 10.3	15.4 11.1 - 16.1
Atlantic Ocean	151	N 32.505438 W 80.292834	8.10	11.92	5.8	7.4 6.7 - 7.4	9.7 7.9 - 9.2	14.9 12.9 - 15.3
South Edisto River	152	N 32.506365 W 80.346554	3.08	2.99	5.8	7.3 6.2 - 7.3	9.4 7.9 - 9.4	14.2 12.6 - 14.4

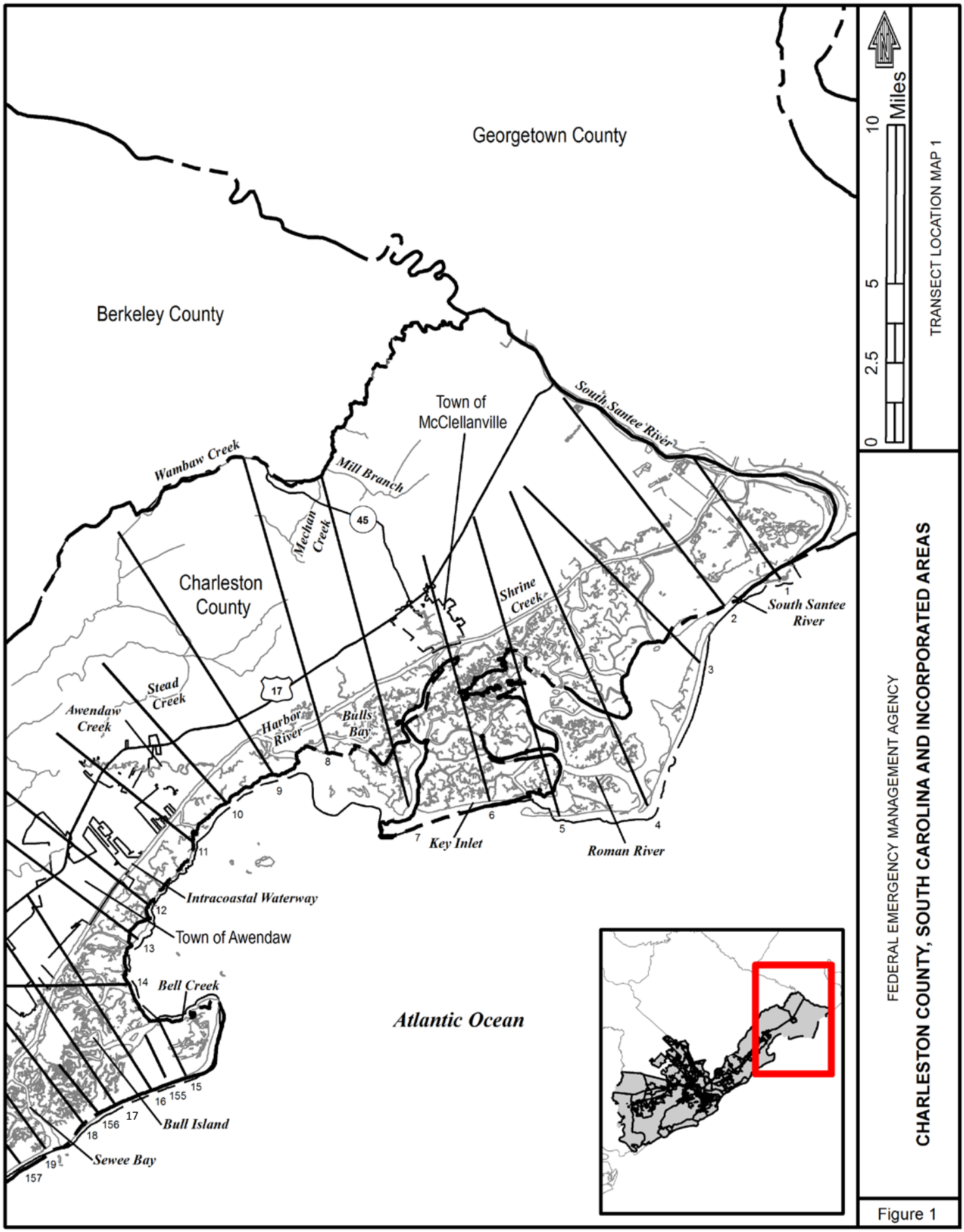
*For transects with a constant Stillwater Elevation, only one number is provided to represent both the starting value and the range.

Table 6 – Transect Data – continued

Flood Source	Transect	Starting Wave Conditions for the 1% Annual Chance			Starting Stillwater Elevations (ft NAVD88) Range of Stillwater Elevations*(ft NAVD88)			
		Coordinates	Significant Wave Height H_s (ft)	Peak Wave Period T_p (sec)	10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
South Edisto River	153	N 32.537397 W 80.383286	2.73	2.93	5.8	7.2 6.9 - 7.2	9.3 8.4 - 9.3	14.0 12.9 - 14
South Edisto River	154	N 32.578325 W 80.385766	2.30	2.93	5.8	6.9 6.8 - 6.9	8.7 8.6 - 8.9	12.9 12.6 - 12.9
Bull Creek	155	N 32.920460 W 79.608272	3.19	3.52	5.4	9.0 7.6 - 9.1	11.1 10.6 - 11.4	17 16.1 - 17
Sewee Bay	156	N 32.908691 W 79.650287	3.87	3.37	5.4	9.4 7.8 - 9.4	11.6 9.6 - 11.6	17.2 14.6 - 17.2
Capers Creek	157	N 32.877963 W 79.700014	2.95	3.07	5.4	8.5 8.0 - 8.5	10.7 10.2 - 10.7	16 15.2 - 16
Bullyard Sound	158	N 32.848145 W 79.725304	3.82	3.27	5.4	8.1 7.2 - 8.1	10.2 9.4 - 10.2	15.3 14.7 - 15.3
Intracoastal Waterway	159	N 32.819341 W 79.746431	3.22	3.35	5.4	8.2 7.4 - 8.2	10.3 9.1 - 10.3	15.5 14.3 - 15.5
Intracoastal Waterway	160	N 32.799557 W 79.776513	2.17	3.37	5.4	8.5 8.0 - 8.5	10.6 9.2 - 10.6	15.8 15.3 - 15.8
Hamlin Creek	161	N 32.782092 W 79.803550	2.43	3.07	5.4	8.1 8.0 - 8.1	10.0 9.8 – 10.0	14.8 14.6 - 14.9
Intracoastal Waterway	162	N 32.771164 W 79.844337	3.00	2.85	5.4	8.2 7.6 - 8.2	10.2 9.4 - 10.2	14.8 14.3 - 14.8
Folly River	163	N 32.670384 W 79.912302	2.84	3.27	5.5	7.2 7.2 - 7.4	9.1 8.8 - 9.1	13.2 12.9 - 13.3
Folly River	164	N 32.661620 W 79.936600	2.62	2.75	5.5	7.3 7.3 - 7.5	9.0 9.0 - 9.4	13.4 12.8 - 13.4
Folly River	165	N 32.649938 W 79.958676	3.24	2.87	5.6	7.2 7.2 - 7.5	9.1 9.0 - 9.1	13.2 13.2 - 13.3
Kiawah River	166	N 32.630555 W 80.061281	2.76	2.79	5.6	8.0 7.0 – 8.0	10.0 9.1 - 10.1	14.7 13.9 - 15
Kiawah River	167	N 32.617436 W 80.089830	2.74	2.87	5.6	8.2 7.6 - 8.2	10.2 8.6 - 10.3	14.7 14.1 - 14.7
Kiawah River	168	N 32.604819 W 80.112952	2.42	2.63	5.6	8.4 7.7 - 8.4	10.4 9.1 - 10.4	14.7 14.3 - 14.7
Schooner Creek	169	N 32.724818 W 79.916200	4.29	3.00	5.4	7.9 7.9 - 8.1	10.1 10 - 10.3	14.7 14.4 - 15.3
Ashley River	170	N 32.847963 W 80.045123	2.63	2.89	5.4	8.6 8.0 - 8.6	10.8 9.8 - 10.8	15.0 14.2 – 15.0

*For transects with a constant Stillwater Elevation, only one number is provided to represent both the starting value and the range.

Figure 1, “Transect Location Map,” illustrates the location of each transect. Along each transect, wave envelopes were computed considering the combined effects of changes in ground elevation, vegetation and physical features. Between transects, elevations were interpolated using topographic maps, land-use and land-cover data, and engineering judgment to determine the aerial extent of flooding. The results of the calculations are accurate until local topography, vegetation, or cultural development within the community undergoes major changes. In Table 6, base flood elevations for each transect flooding source are provided, along with the 10-, 2-, 1-, and 0.2-percent-annual-chance stillwater elevations for the respective flooding sources.



FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SOUTH CAROLINA AND INCORPORATED AREAS

Figure 1

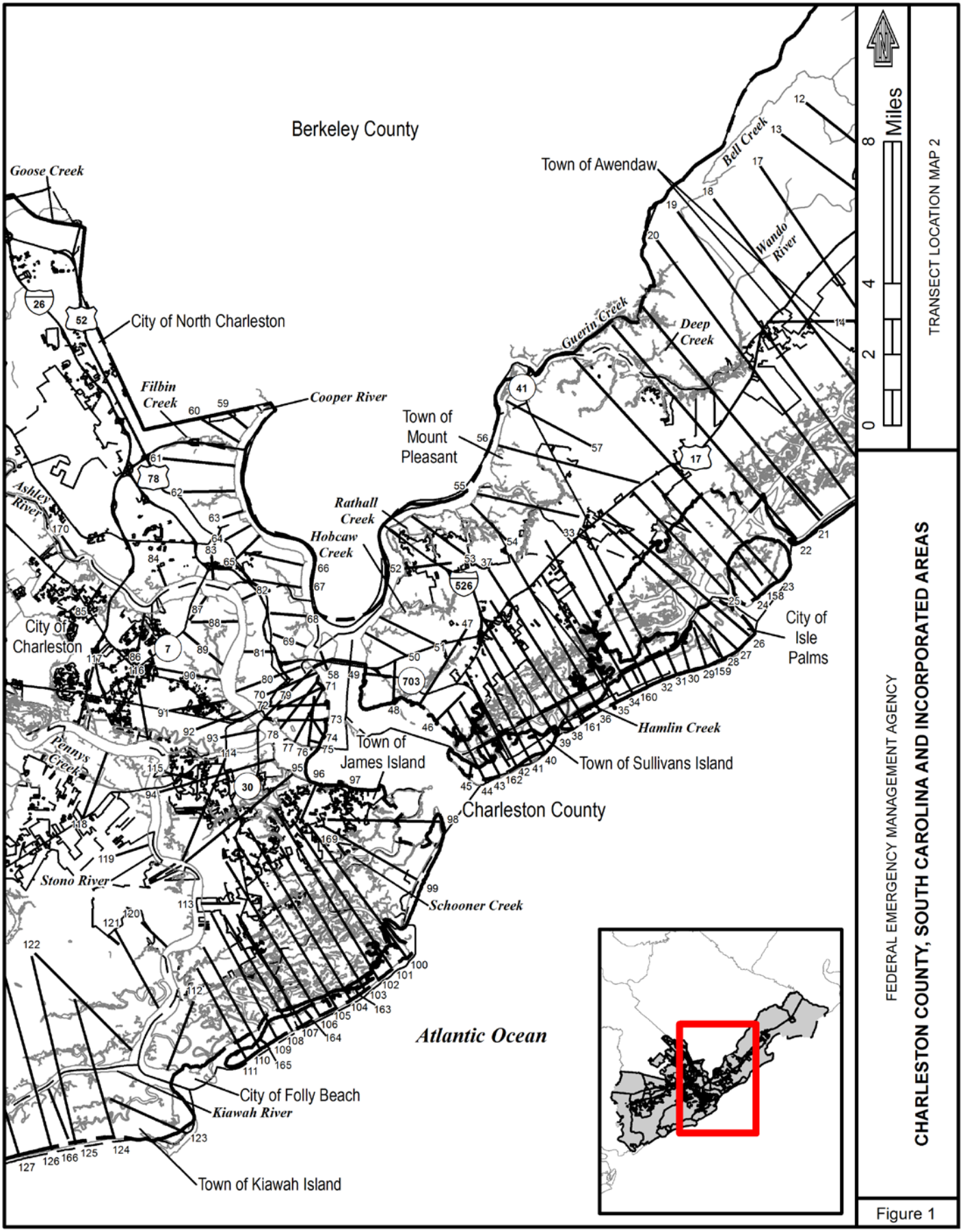
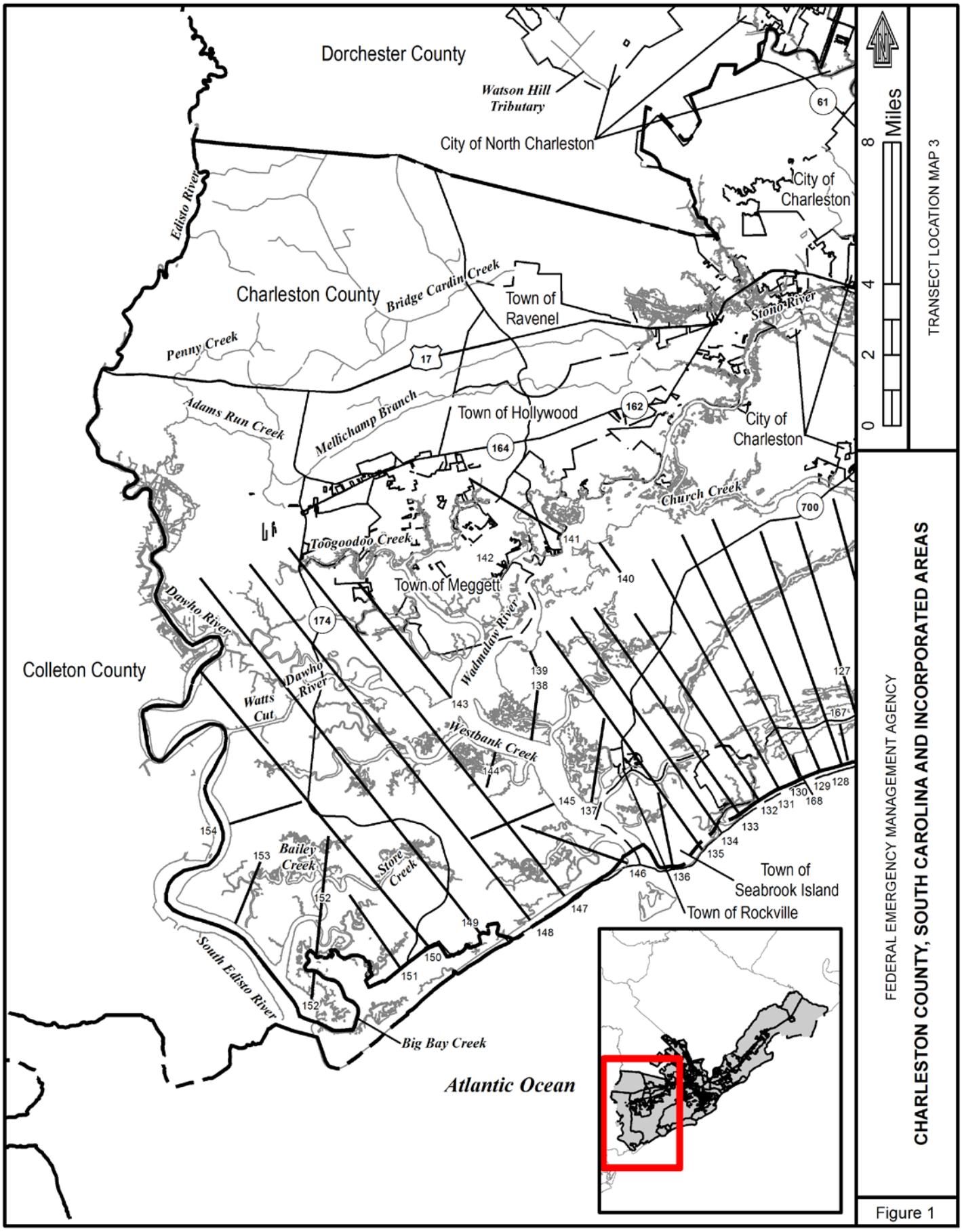

Berkeley County
Goose Creek
City of North Charleston
Filbin Creek
Cooper River
Town of Mount Pleasant
Town of Awendaw
Bell Creek
Wando River
Guerin Creek
Deep Creek
Ashley River
Rathall Creek
Hobcaw Creek
City of Charleston
City of Isle Palms
Hamlin Creek
Town of Sullivans Island
Town of James Island
Pennys Creek
Charleston County
Stono River
Schooner Creek
Atlantic Ocean
City of Folly Beach
Kiawah River
Town of Kiawah Island
0 2 4 8 Miles
TRANSECT LOCATION MAP 2
FEDERAL EMERGENCY MANAGEMENT AGENCY
CHARLESTON COUNTY, SOUTH CAROLINA AND INCORPORATED AREAS

Figure 1


Dorchester County
Watson Hill Tributary
City of North Charleston
City of Charleston
Edisto River
Charleston County
Bridge Cardin Creek
Town of Ravenel
Stono River
Penny Creek
Adams Run Creek
Mellichamp Branch
Town of Hollywood
City of Charleston
Church Creek
Toogoodoo Creek
Town of Meggett
Dawho River
Colleton County
Watts Cut
Wadmalaw River
Westbank Creek
Bailey Creek
Store Creek
Town of Seabrook Island
Town of Rockville
South Edisto River
Big Bay Creek
Atlantic Ocean
0 2 4 8 Miles
TRANSECT LOCATION MAP 3
FEDERAL EMERGENCY MANAGEMENT AGENCY
CHARLESTON COUNTY, SOUTH CAROLINA AND INCORPORATED AREAS
Figure 1

Areas of coastline subject to significant wave attack are referred to as coastal high hazard zones. The coastal high hazard zone is depicted on the FIRMs as Zone VE. The USACE has established the 3-foot breaking wave as the criterion for identifying the limit of coastal high hazard zones. The one exception to the 3-foot wave criteria is where a primary frontal dune exists. The limit of the coastal high hazard area then becomes the landward toe of the primary frontal dune or where a 3-foot or greater breaking wave exists, whichever is most landward. The delineation of the landward toe of the primary frontal dune are based on the methodologies described in the FEMA guidance (FEMA, 2007[a]). It extends along the coastline of Charleston County except for at the inlet openings and at Bulls Bay. The basis of the VE zone is presented in the Technical Support Data Notebook in association with the FIS report and FIRM for this community. Zone AE is depicted on the FIRMs where the delineated flood hazard includes wave heights less than three feet. A depiction of how the Zones VE and AE are mapped is shown in Figure 2.

Post-storm field visits and laboratory tests have confirmed that wave heights as small as 1.5 feet can cause significant damage to structures constructed without consideration to the coastal hazards. Additional flood hazards associated with coastal waves include floating debris, high velocity flow, erosion, and scour which can cause damage to Zone AE-type construction in these coastal areas. To help community officials and property owners recognize this increased potential for damage due to wave action in the AE zone, FEMA issued guidance in December 2008 on identifying and mapping the 1.5-foot wave height line, referred to as the Limit of Moderate Wave Action (LiMWA). While FEMA does not impose floodplain management requirements based on the LiMWA, the LiMWA is provided to help communicate the higher risk that exists in that area. Consequently, it is important to be aware of the area between this inland limit and the Zone VE boundary, as it still poses a high risk, though not as high a risk as Zone VE (see Figure 2, “Transect Schematic.”)

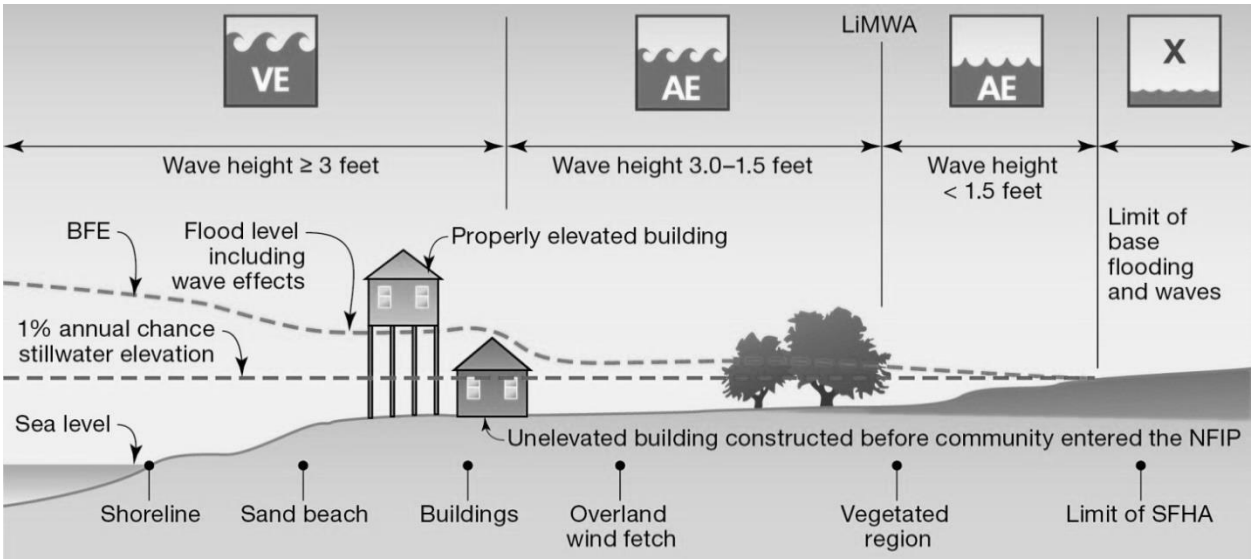


Figure 2 – Transect Schematic

3.4 Vertical Datum

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

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in BFEs across the corporate limits between the communities. Some of the data used in this study were taken from the prior effective FIS report and adjusted to NAVD88. The average vertical datum conversion factor that was used to convert the data in this FIS report from NGVD29 to NAVD88 for Charleston County is -0.975 feet. The full datum conversion calculation is shown in Table 7, "Datum Conversion Factor for Charleston County, SC."

The BFEs show on the FIRM represent whole-foot rounded values. For example, a BFE of 12.4 will appear as 12 on the FIRM and 12.6 will appear as 13. Therefore, users that wish to convert the elevations in this FIS to NGVD29 should apply the stated conversion factor to elevations shown in this FIS report, which are shown at a minimum to the nearest 0.1 foot.

Table 7 – Datum Conversion Factor for Charleston County, SC

Quad Name	Latitude of Northeast Corner	Longitude of Northeast Corner	Conversion from NGVD29 to NAVD88 (ft)
Adams Run	32.75	80.25	-0.965
Awendaw	33.12	79.50	-0.968
Bennetts Point	32.62	80.37	-0.955
BullIsland	33.00	79.50	-0.988
Cainhoy	33.00	79.75	-0.974
Cape Romain	33.12	79.25	-1.001
Capers Inlet	32.87	79.62	-0.981
Charlestown	32.87	79.87	-0.984
Edisto Beach	32.50	80.25	-0.961
Edisto Island	32.62	80.25	-0.968
Fenwick	32.75	80.37	-0.965
Fort Moultrie	32.87	79.75	-0.971
Jacksonboro	32.87	80.37	-0.958
JamesIsland	32.75	79.87	-0.988
JohnsIsland	32.87	80.00	-0.981
KiawahIsland	32.62	80.00	-0.978
Legareville	32.75	80.00	-0.981
McClellanville	33.12	79.37	-0.994
McClellanville OE S	33.00	79.37	-1.001
OceanBay	33.12	79.62	-0.984
Osborn	32.87	80.25	-0.968
Ravenel	32.87	80.12	-0.968
Rockville	32.62	80.12	-0.978
Saint Helena Sound	32.50	80.37	-0.945
SeweeBay	33.00	79.62	-0.978
Stallsville	33.00	80.12	-0.965
Wadmalaw Island	32.75	80.12	-0.974
		Average Conversion Factor (ft)	**-0.975**

For more information about conversion between NGVD29 and NAVD88, see the FEMA publication entitled, Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, or contact the National Geodetic Survey at www.ngs.noaa.gov, or at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 731-3242

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1 Floodplain Boundaries

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

For each coastal flooding source, streams studied in detail, and streams studied by approximate methods, the 1- and 0.2-percent annual chance floodplain have been delineated using two sources of topographic data. LiDAR and a National Oceanic and Atmospheric Administration (NOAA) improved USGS 10-meter National Elevation Dataset (NED). The LiDAR was used as the priority data set and covered the central portion of the county (Photo Science, 2007). The NOAA improved USGS 10-meter NED was used in the eastern and western areas of the county (NOAA, 2009).

For three areas studied by approximate methods within the City of North Charleston, the 1-percent annual chance floodplains were taken from the previously publish FIS for the City of North Charleston (FEMA, 1986). Those areas are: a section of McChune Branch and McChune Branch Tributary 2; unnamed flooding source to the east of Peppercorn Lane; and an unnamed flooding source between Midland Park Road and Raymond Avenue.

The 1- and 0.2-percent annual chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AO and VE), and the 0.2-percent chance annual floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent annual chance floodplain boundaries are close together, only the 1-percent annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For streams studied by approximate methods, only the 1-percent annual chance floodplain boundary is shown on the FIRM (Exhibit 2).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent annual chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent annual chance flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this FIS report and shown 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. The results of the floodway computations tabulated for selected cross sections are provided in Table 8, “Floodway Data.” The computed floodways are shown on the FIRM (Exhibit 2). In cases where the floodway

and 1-percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Portions of the floodway for Sawmill Branch extend beyond the county boundary. Floodways were not calculated for Church Creek, Tributary No. 1 to Church Creek, and Tributary No. 2 to Church Creek.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 8, " Floodway Data." In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 8, "Floodway Data," for certain downstream cross sections of Mellichamp Branch, Middle Branch, and Unnamed Tributary 1 to Mellichamp Branch are lower than the regulatory flood elevations in that area, which must take into account the 1-percent annual chance flooding due to backwater from other sources.

No floodways have been computed for streams studied by limited detailed methods. Information pertaining to the flood discharges and 1-percent annual chance water surface elevations for selected cross sections along streams studied by limited detailed methods is shown in Table 9, "Limited Detailed Flood Hazard Data."

The area between the floodway and 1-percent annual chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent annual chance flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 3, "Floodway Schematic".

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Bridge Cardin Creek								
A	-5,582	2,825	7,392	0.7	8.0	8.0	8.5	0.5
B	-2,724	4,140	15,508	0.3	8.5	8.5	9.0	0.5
C	1,738	5,547	24,335	0.1	10.4	10.4	10.6	0.2
D	4,360	3,526	13,424	0.2	10.4	10.4	10.6	0.2
E	6,590	2,831	10,010	0.3	10.5	10.5	10.7	0.2
F	9,585	2,296	7,215	0.3	10.7	10.7	10.9	0.2
G	11,829	2,874	8,473	0.2	10.9	10.9	11.0	0.1
H	12,187	3,348	13,851	0.2	12.3	12.3	12.3	0.0
I	15,602	1,632	5,329	0.2	12.3	12.3	12.4	0.1
J	18,763	3,162	9,249	0.1	12.4	12.4	12.6	0.2

[1] Feet upstream of State Route 165

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: BRIDGE CARDIN CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Caw Caw Swamp								
A	2,932	479	1,016	0.6	12.4	12.4	12.6	0.2
B	4,605	342	685	0.9	13.2	13.2	13.4	0.2
C	9,360	1,090	4,427	0.1	13.4	13.4	13.8	0.4
D	11,051	949	3,638	0.1	13.4	13.4	13.8	0.4
E	15,726	671	2,424	0.2	13.5	13.5	13.9	0.4
F	17,055	602	2,201	0.2	13.5	13.5	13.9	0.4
G	20,875	533	1,642	0.3	13.7	13.7	14.1	0.4

[1] Feet above confluence with Bridge Cardin Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: CAW CAW SWAMP

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Coosaw Creek								
A	*	*	*	*	*	*	*	*
B	8,860	88	510	2.2	9.4	6.5[2]	7.5	1.0
C	10,710	183	743	1.4	9.4	9.0[2]	10.0	1.0
D	12,402	303	1,824	0.6	13.8	13.8	14.4	0.6
E	15,502	296	1,771	0.6	14.0	14.0	14.7	0.7
F	18,476	306	1,648	0.5	14.2	14.2	15.0	0.8
G	21,226	314	1,756	0.5	14.4	14.4	15.2	0.8
H	22,576	342	1,823	0.5	14.5	14.5	15.4	0.9
I	24,886	276	1,110	0.4	14.6	14.6	15.6	1.0
J	26,706	186	669	0.6	14.9	14.9	15.8	0.9
K	28,390	70	357	0.1	15.9	15.9	16.9	1.0

[1] Feet above confluence with Ashley River
[2] Elevation computed without consideration of backwater effects from Atlantic Ocean
* No floodway data computed – controlled by coastal flooding – see Flood Insurance Rate Map for regulatory base flood elevation

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: COOSAW CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Edisto River								
A	178,055	1,062 / 3,100	30,727	1.0	11.3	11.3	12.1	0.8
B	182,018	1,607 / 4,880	36,293	0.8	11.6	11.6	12.5	0.9
C	185,791	2,696 / 5,300	42,160	0.7	12.0	12.0	13.0	1.0
D	189,789	1,688 / 3,650	33,413	0.9	12.5	12.5	13.5	1.0
E	193,627	1,994 / 5,450	34,422	0.9	13.2	13.2	14.2	1.0
F	197,695	776 / 4,370	31,777	1.0	14.0	14.0	15.0	1.0
G	201,739	1,542 / 4,350	32,030	1.0	14.8	14.8	15.8	1.0
H	221,763	2,081 / 2,698	25,184	1.2	17.3	17.3	18.3	1.0

[1] Feet above confluence with Atlantic Ocean
[2] Width within county / total width

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: EDISTO RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mellichamp Branch								
A	0	403	571	2.3	6.7	2.4[2]	3.4	1.0
B	1,793	825	2,045	0.6	6.7	4.2[2]	5.2	1.0
C	5,387	47	270	4.8	6.7	6.5[2]	6.8	0.3
D	8,237	558	2,915	0.4	8.9	8.9	9.0	0.1
E	12,948	513	2,813	0.5	9.2	9.2	9.3	0.1
F	16,796	845	3,926	0.3	10.0	10.0	10.1	0.1
G	20,001	240	660	2.0	10.7	10.7	10.7	0.0
H	24,694	584	3,307	0.4	11.6	11.6	12.0	0.4
I	25,189	426	2,586	0.5	12.7	12.7	13.1	0.4
J	28,464	386	2,608	0.5	14.1	14.1	14.2	0.1
K	30,176	44	154	8.4	14.1	14.1	14.25	0.1
L	34,967	154	393	3.3	20.5	20.5	21.3	0.8
M	36,880	475	660	0.5	29.8	29.8	29.8	0.0
N	38,433	209	603	0.6	31.2	31.2	31.3	0.1
O	41,458	67	149	2.3	32.6	32.6	32.6	0.0
P	45,102	35	116	0.7	35.2	35.2	35.4	0.2
Q	48,584	333	283	0.3	36.4	36.4	36.8	0.4
R	52,512	988	892	0.1	36.5	36.5	37.0	0.5
S	*	*	*	*	*	*	*	*

[1] Feet above confluence with Log Bridge Creek
[2] Elevation computed without consideration of backwater effects from Atlantic Ocean
[*] No floodway data computed – controlled by coastal flooding – see Flood Insurance Rate Map for regulatory base flood elevation

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: MELLICHAMP BRANCH

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Middle Branch								
A	0	100	441	3.4	6.7	3.0[2]	3.5	0.5
B	210	100	564	2.7	6.7	4.0[2]	4.7	0.7
C	2,050	157	686	2.2	6.7	5.0[2]	5.8	0.8
D	5,950	215	960	1.4	6.7	5.9[2]	6.8	0.9
E	8,450	168	783	1.7	7.3	7.3	8.3	1.0
F	12,750	271	1,385	1.0	11.6	11.6	12.6	1.0
G	15,700	442	1,695	0.8	12.7	12.7	13.7	1.0
H	15,990	682	3,278	0.3	13.9	13.9	14.9	1.0
I	17,690	237	1,062	1.0	14.1	14.1	15.1	1.0
J	20,090	199	759	1.3	16.1	16.1	17.1	1.0
K	21,990	161	532	1.9	19.6	19.6	20.5	1.0
L	24,290	90	445	2.2	25.9	25.9	26.9	1.0
M	24,410	283	1,940	0.5	29.4	29.4	30.4	1.0
N	25,570	186	1,136	0.8	29.6	29.6	30.6	1.0
O	28,270	596	2,180	0.4	30.2	30.2	31.2	1.0
P	30,870	351	969	0.8	33.0	33.0	34.0	1.0
Q	33,470	271	695	1.0	36.5	36.5	37.5	1.0
R-S	*	*	*	*	*	*	*	*

[1] Feet above U.S. 17
[2] Elevation computed without consideration of backwater effects from Atlantic Ocean
[*] No floodway data computed – controlled by coastal flooding – see Flood Insurance Rate Map for regulatory base flood elevation

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: MIDDLE BRANCH

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Sawmill Branch								
A	39,819[1]	111[2]	1,802	1.1	46.8	46.8	47.6	0.8
B	40,341[1]	0[2]	1,198	1.7	47.0	47.0	47.9	0.9
Sawpit Creek								
A	300[3]	97	277	1.4	22.6	22.6	23.3	0.7
B	1,628[3]	98	312	1.2	23.2	23.2	24.1	0.9
C	2,378[3]	19	52	7.3	25.9	25.9	25.9	0.0

[1] Feet above confluence with Ashley River
[2] Floodway width within Charleston County
[3] Feet above county boundary

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: SAWMILL BRANCH – SAWPIT CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Tributary No. 2								
A	5, 480[1]	212[2]	531	1.2	9.0	3.5[3]	4.5	1.0
B[4]								
C	8,135[1]	19[2]	56	8.0	12.7	12.7	12.7	0.0
Unnamed Tributary 1 to Mellichamp Branch								
A	344[5]	104	179	0.5	29.9	26.5[6]	26.6	0.1
B	2,541[5]	12	14	6.1	30.9	30.9	30.9	0.0
C-G[7]								

[1] Feet above confluence with Ashley River
[2] Floodway lies partially or totally outside Charleston County
[3] Elevation computed without consideration of backwater effects from Atlantic Ocean
[4] Not located within Charleston County
[5] Feet above confluence with Mellichamp Branch
[6] Elevation computed without consideration of backwater effects from Mellichamp Branch
[7] Floodway not computed

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: TRIBUTARY NO. 2 AND UNNAMED TRIBUTARY 1 TO MELLICHAMP BRANCH

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Unnamed Tributary 4 to Bridge Cardin Creek								
A	942	1,431[2]	3,910	0.2	10.8	10.8	10.9	0.1
B	4,660	1,553	2,803	0.3	10.9	10.9	11.0	0.1
C	8,411	2,439	6,232	0.1	11.8	11.8	11.9	0.1
D	10,977	578	2,162	0.3	11.8	11.8	11.9	0.1
E	13,476	1,931[2]	7,486	0.1	11.9	11.9	12.0	0.1

[1] Feet above convergence with Bridge Cardin Creek
[2] Floodway width does not account for flooding effects from Bridge Cardin Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: UNNAMED TRIBUTARY 4 TO BRIDGE CARDIN CREEK

TABLE 9—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
ASHLEY RIVER TRIBUTARY 8			
131	13,124	701	12.7
136	13,581	701	13.0
141	14,079	701	13.2
145	14,503	641	13.4
150	15,020	641	13.6
154	15,412	641	13.7
163	16,284	641	15.8
167	16,723	641	15.9
172	17,189	641	15.9
177	17,666	641	15.9
182	18,218	514	15.9
186	18,596	514	16.0
192	19,155	361	16.0
205	20,502	320	16.1
211	21,067	320	16.1
217	21,656	320	16.1
228	22,799	320	16.3
235	23,457	320	16.3
241	24,063	320	16.4
248	24,789	320	16.6
256	25,612	320	17.0
265	26,456	320	17.5
270	26,953	320	17.7
275	27,453	320	18.0
281	28,068	320	18.2
286	28,636	320	18.3
292	29,184	320	18.3
ASHLEY RIVER TRIBUTARY 8-4			
030	2,995	314	15.81
036	3,610	314	16.15
ASHLEY RIVER TRIBUTARY 30			
056	5,580	403	13.5
060	5,981	403	13.9
065	6,471	403	14.5
070	6,968	403	15.4
075	7,461	403	16.0
COOSAW CREEK			
295	29,503	359	16.1
300	30,012	359	16.1
306	30,556	359	16.2
310	31,012	359	16.2
316	31,556	359	16.2
319	31,901	359	16.3
324	32,405	359	16.3

[1] This table reflects all modeled cross-sections. Some cross-sections shown in this table may not appear on the map.

[2] Feet above mouth.

TABLE 9—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
COOSAW CREEK (continued)			
328	32,816	359	16.4
332	33,215	359	17.5
335	33,507	359	17.5
341	34,109	359	17.6
348	34,790	359	17.7
FISHBURNE CREEK 4-1			
282	28,235	3,546	11.7
292	29,230	3,546	12.1
302	30,230	3,546	12.4
307	30,669	3,546	12.6
316	31,550	3,546	12.8
322	32,244	3,546	12.9
327	32,745	3,546	12.9
332	33,245	3,546	13.0
337	33,744	3,546	13.0
343	34,252	3,546	13.1
348	34,753	3,546	13.2
353	35,332	1,453	13.2
MCCHUNE BRANCH			
290	29,034	316	15.0
296	29,583	316	15.0
302	30,150	316	15.0
309	30,870	316	15.1
313	31,254	316	15.1
319	31,868	316	15.2
331	33,132	316	15.4
326	32,597	316	17.4
333	33,258	316	20.4
338	33,759	316	20.6
MCCHUNE BRANCH TRIBUTARY 2			
027	2,723	641	13.0
034	3,390	641	13..2
041	4,077	641	13.5
046	4,592	641	13.5
053	5,267	641	13.9
058	5,787	432	14.3
064	6,360	432	14.6
069	6,872	432	14.9
073	7,290	432	15.0
086	8,621	432	17.9
089	8,873	432	18.0
092	9,244	432	18.0
098	9,795	432	19.1

[1] This table reflects all modeled cross-sections. Some cross-sections shown in this table may not appear on the map.

[2] Feet above mouth.

TABLE 9—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
MCCHUNE BRANCH TRIBUTARY 2 (continued)			
103	10,330	432	22.3
112	11,223	432	24.7
117	11,657	432	26.5
122	12,241	432	28.7
SOUTH SANTEE RIVER[3]			
784	78,421	155,000	9.55
795	79,466	155,000	9.67
810	80,962	155,000	9.83
827	82,712	155,000	10.05
841	84,137	155,000	10.1
855	85,490	155,000	10.66
870	87,033	155,000	11.33
886	88,628	155,000	11.94
WATSON HILL TRIBUTARY			
278	27,789	2,667	11.8
287	28,746	2,667	12.0
296	29,569	2,667	12.1
301	30,118	2,667	12.1
310	31,018	2,667	12.1
318	31,819	2,667	12.2
327	32,718	2,667	12.3
333	33,343	2,667	12.4
338	33,807	2,667	12.4
345	34,519	2,667	12.4
355	35,535	2,667	12.5
378	37,758	2,667	12.7
383	38,265	2,667	12.8
390	38,992	2,667	12.9
395	39,492	2,667	12.9
400	39,992	2,667	12.9
405	40,492	2,381	13.0
410	40,992	2,381	13.0
415	41,492	2,381	13.1
420	41,992	2,381	13.1
425	42,492	2,381	13.2
430	42,992	2,381	13.3
435	43,492	2,381	13.4
440	43,992	2,381	13.5
445	44,492	2,381	13.6
450	44,992	2,381	13.7
455	45,492	941	13.7
461	46,119	941	13.7
467	46,656	941	13.8

[1] This table reflects all modeled cross-sections. Some cross-sections shown in this table may not appear on the map.

[2] Feet above mouth.

[3] Flooding controlled by North Santee River.

TABLE 9—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge (cfs)	1% Annual Chance Water-Surface Elevation (feet NAVD 88)
WATSON HILL TRIBUTARY (continued)			
470	46,992	941	13.8
480	47,992	941	13.9
485	48,492	941	13.9
492	49,173	941	13.9

[1] This table reflects all modeled cross-sections. Some cross-sections shown in this table may not appear on the map.

[2] Feet above mouth.

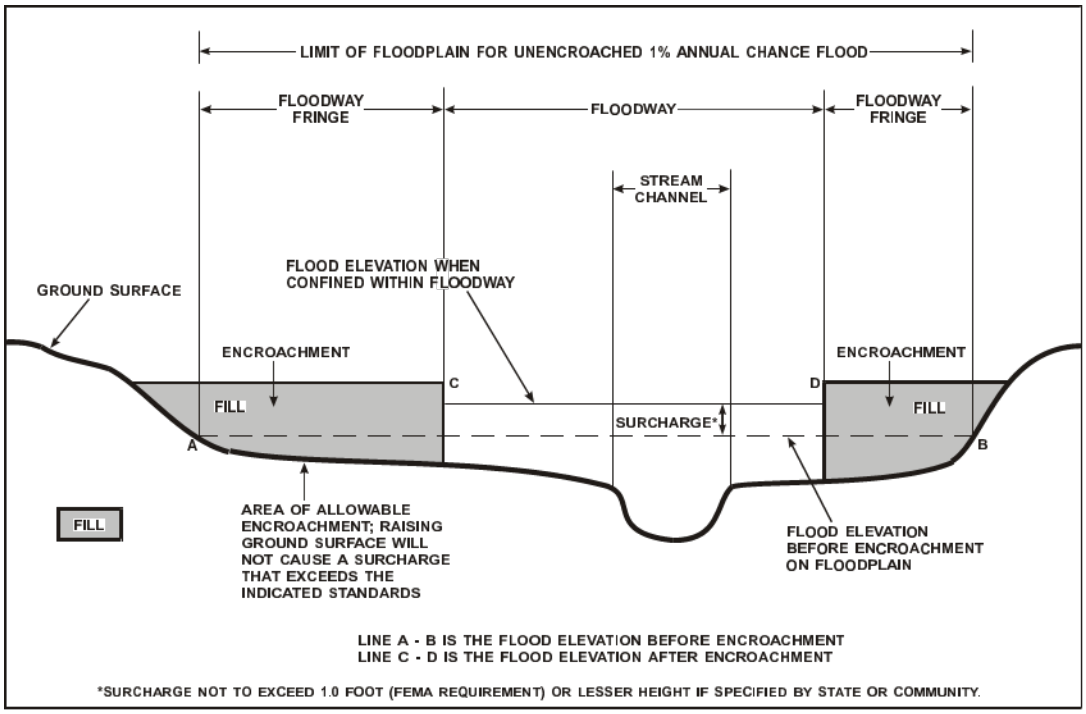


Figure 3 – Floodway Schematic

5.0 INSURANCE APPLICATIONS

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

Zone A

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

Zone AE

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

Zone AH

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

Zone AO

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

Zone AR

Area of special flood hazard formerly protected from the 1-percent annual chance flood event 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-percent annual chance or greater flood event.

Zone A99

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

Zone V

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

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1-percent annual chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent annual chance floodplain, areas within the 0.2-percent annual chance

floodplain, and to areas of 1-percent annual chance flooding where average depths are less than 1 foot, areas of 1-percent annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent annual chance flood by levees. No BFEs or depths are shown within this zone.

Zone D

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

6.0 FLOOD INSURANCE RATE MAP

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

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

For floodplain management applications, the map shows by tints, screens, and symbols, the 100-year and 500-year floodplains. On selected FIRM panels, the floodways and the locations of selected cross sections used in the hydraulic analyses and floodway computations are shown where applicable.

The current FIRM presents flooding information for the entire geographic areas of Charleston County. Historical data relating to the pre-countywide maps prepared for each community are presented in Table 10, “Community Map History.”

7.0 OTHER STUDIES

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

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this FIS can be obtained by contacting FEMA, Mitigation Division, Koger Center-Rutgers Building, 3003 Chamblee Tucker Road, Atlanta, Georgia 30341.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Awendaw, Town of[1]	April 27, 1971	None	April 27, 1971	May 25, 1973 July 1, 1974 November 12, 1976 October 1, 1983 January 5, 1984 April 17, 1987 November 4, 1992
Charleston, City of	April 9, 1971	None	April 9, 1971	May 25, 1973 July 1, 1974 September 3, 1976 March 15, 1984 November 5, 1986 November 4, 1992 October 16, 2003

[1] This community did not have its own FIRM prior to the 2004 countywide FIS. The land area for this community was previously shown on the FIRM for the unincorporated areas of Charleston County. Therefore, the dates for this community were taken from the FIRM for Charleston County.

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Charleston County (Unincorporated Areas)	April 27, 1971	None	April 27, 1971	May 25,1973 July 1,1974 November 12,1976 October 1, 1983 January 5, 1984 April 17, 1987 July 15, 1988 March 18, 1991 November 4,1992 September 2, 1993
Folly Beach, City of	April 2, 1971	None	April 2, 1971	July 1, 1974 October 3, 1975 March 15, 1984 April 17, 1987 March 18, 1991 November 4,1992 November 17, 1993
Hollywood, Town of	September 6,1974	April 23, 1976	June 17, 1986	December 20,1999

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Isle of Palms, City of	April 2, 1971	None	April 2, 1971	July 1,1974 October 3, 1975 September 15, 1983 October 17, 1986 September 18, 1987 March 18, 1991
James Island, Town of [1]	N/A	None	N/A	
Kiawah Island, Town of [2]	April 27, 1971	None	April 27, 1971	May 25,1973 July 1,1974 November 12, 1976 October 1, 1983 January 5, 1984 April 17, 1987 July 15, 1988 March 18, 1991 November 4, 1992 September 2, 1993
Lincolnville, Town of [1,3]	N/A	N/A	N/A	

[1] This community does not have a map history prior to the first countywide mapping.
[2] This community did not have its own FIRM prior to the 2004 countywide FIS. The land area for this community was previously shown on the FIRM for the unincorporated areas of Charleston County. Therefore, the dates for this community were taken from the FIRM for Charleston County.
[3] No Special Flood Hazard Areas identified

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
McClellanville, Town of	October 25, 1974	None	March 16, 1981	November 2,1983 April 17, 1987
Meggett, Town of	October 25, 1974	None	May 11,1979	February 1, 1984 October 17, 1986
Mount Pleasant, Town of	April 2, 1971	None	April 2, 1971	May 25,1973 July 1, 1974 September 3, 1976 January 9, 1981 March 15, 1984 October 17, 1986
North Charleston, City of	April 27, 1971	July 1, 1974	October 8, 1976	November 12, 1976 January 5, 1984 November 5, 1986
Ravenel, Town of	June 14, 1974	April 2, 1976	April 1, 1981	December 20, 1999

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Rockville, Town of[1]	April 27, 1971	None	April 27, 1971	May 25, 1973 July 1,1974 November 12,1976 October 1, 1983 January 5, 1984 April 17, 1987 November 4,1992 September 2, 1993
Seabrook Island, Town of[1]	April 27, 1971	None	April 27, 1971	May 25, 1973 July 1,1974 November 12,1976 October 1, 1983 January 5, 1984 April 17, 1987 November 4,1992 September 2, 1993

[1] This community did not have its own FIRM prior to the 2004 countywide FIS. The land area for this community was previously shown on the FIRM for the unincorporated areas of Charleston County. Therefore, the dates for this community were taken from the FIRM for Charleston County.

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Sullivan's Island, Town of	April 2, 1971	None	April 2, 1971	July 1, 1974 October 31, 1975 September 30,1983 October 17, 1986 March 18, 1991

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

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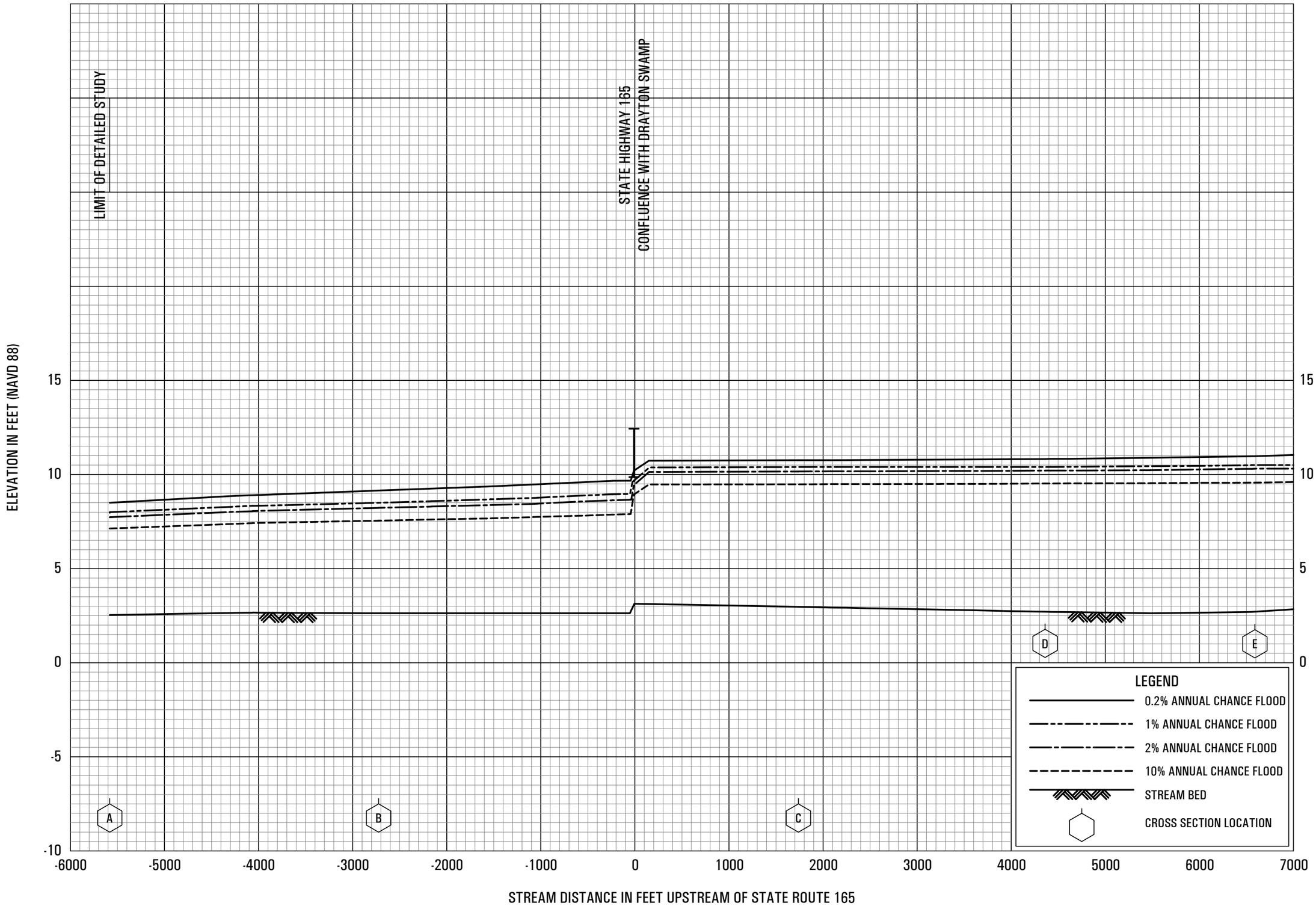


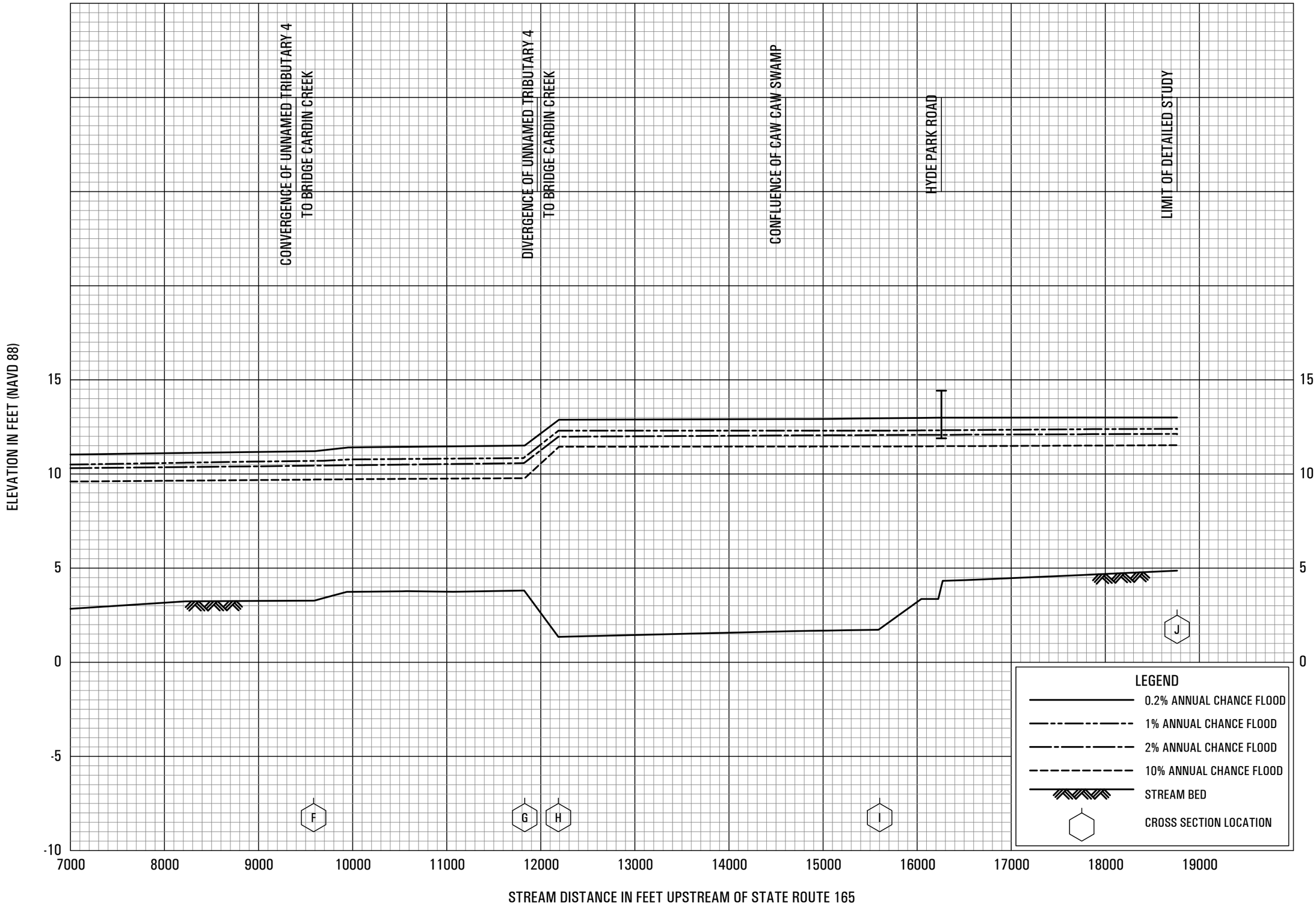
FLOOD PROFILES

BRIDGE CARDIN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



FLOOD PROFILES

BRIDGE CARDIN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

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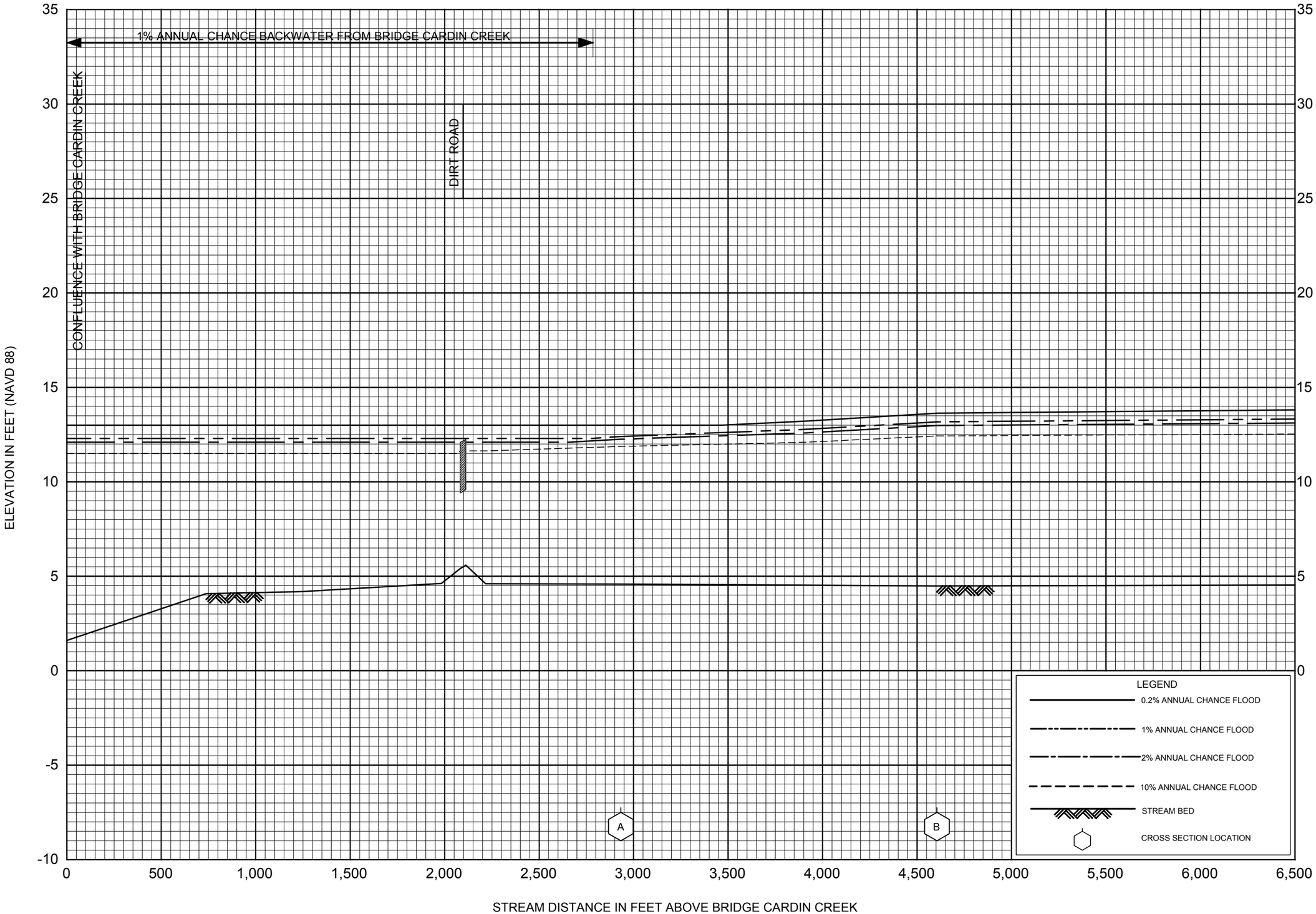


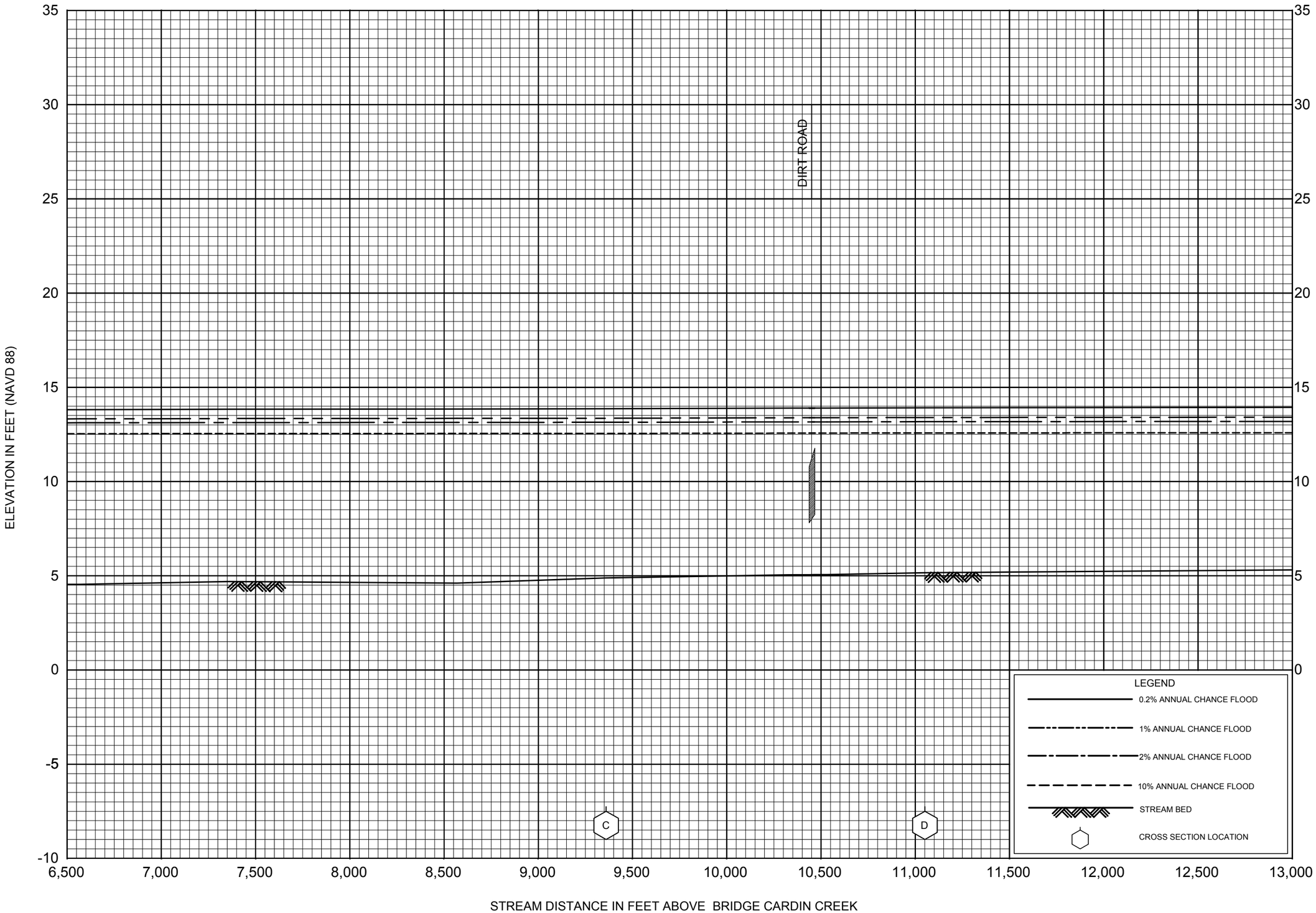
FLOOD PROFILES

CAW CAW SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



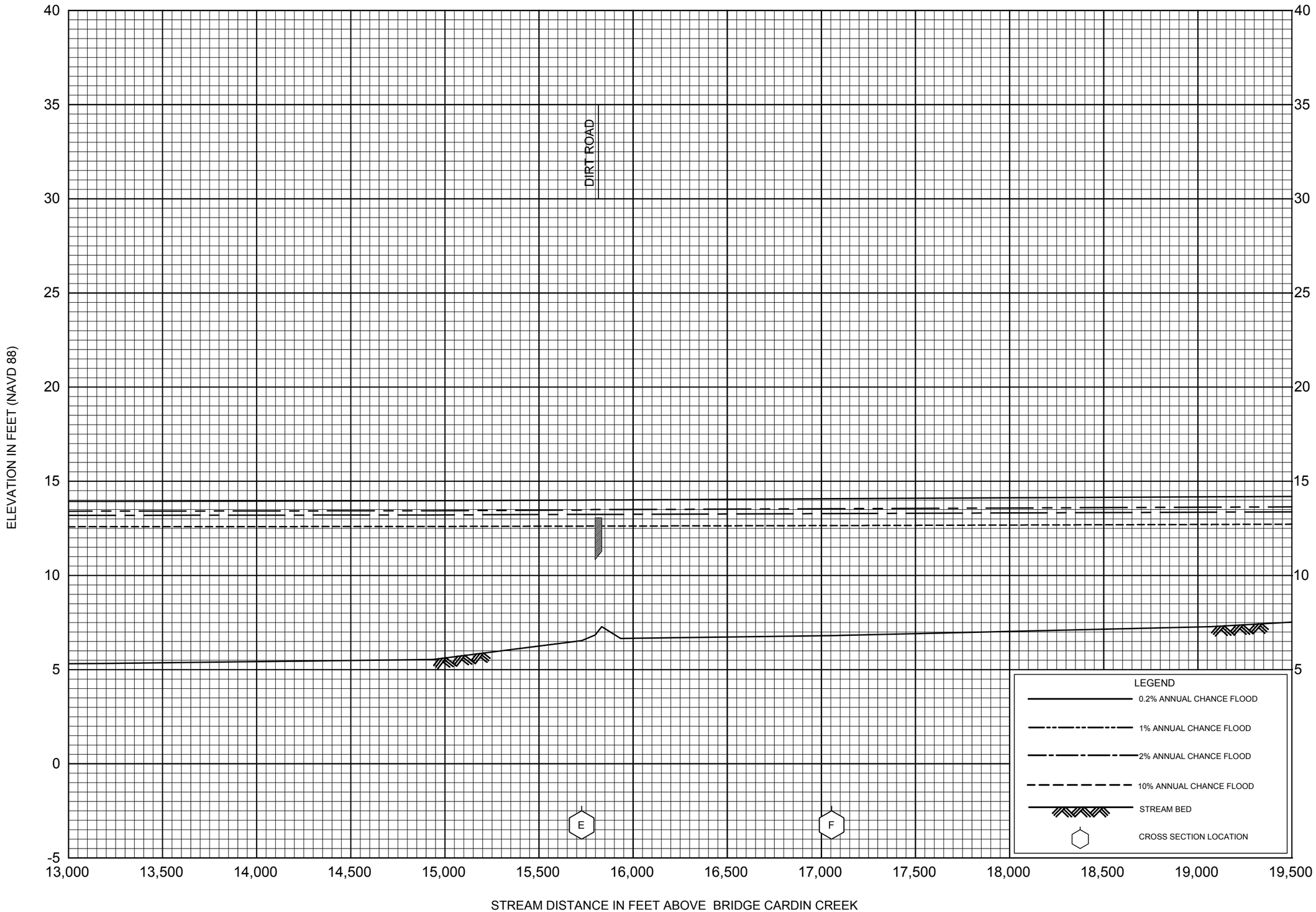
FLOOD PROFILES

CAW CAW SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



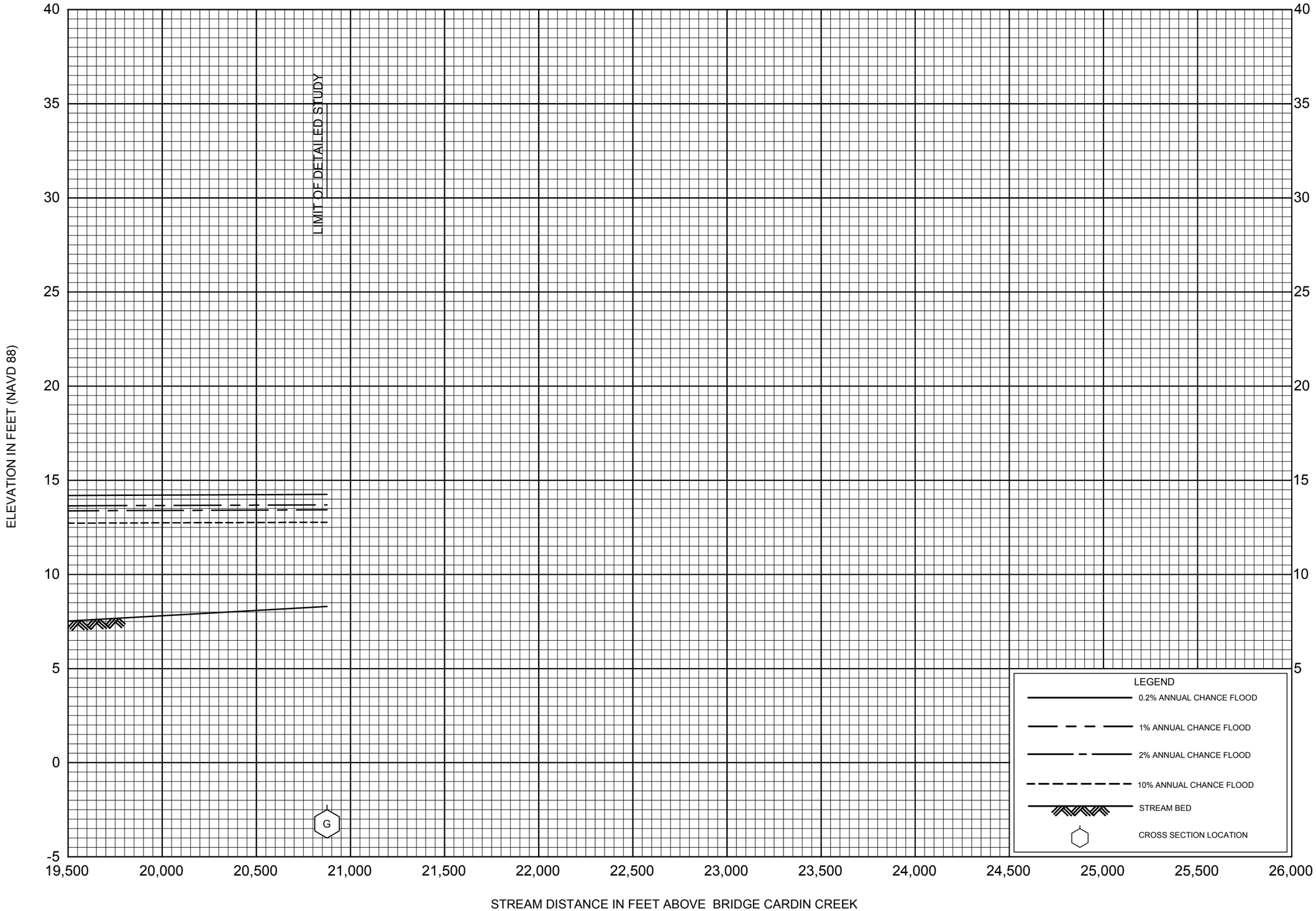
FLOOD PROFILES

CAW CAW SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



FLOOD PROFILES

CAW CAW SWAMP

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

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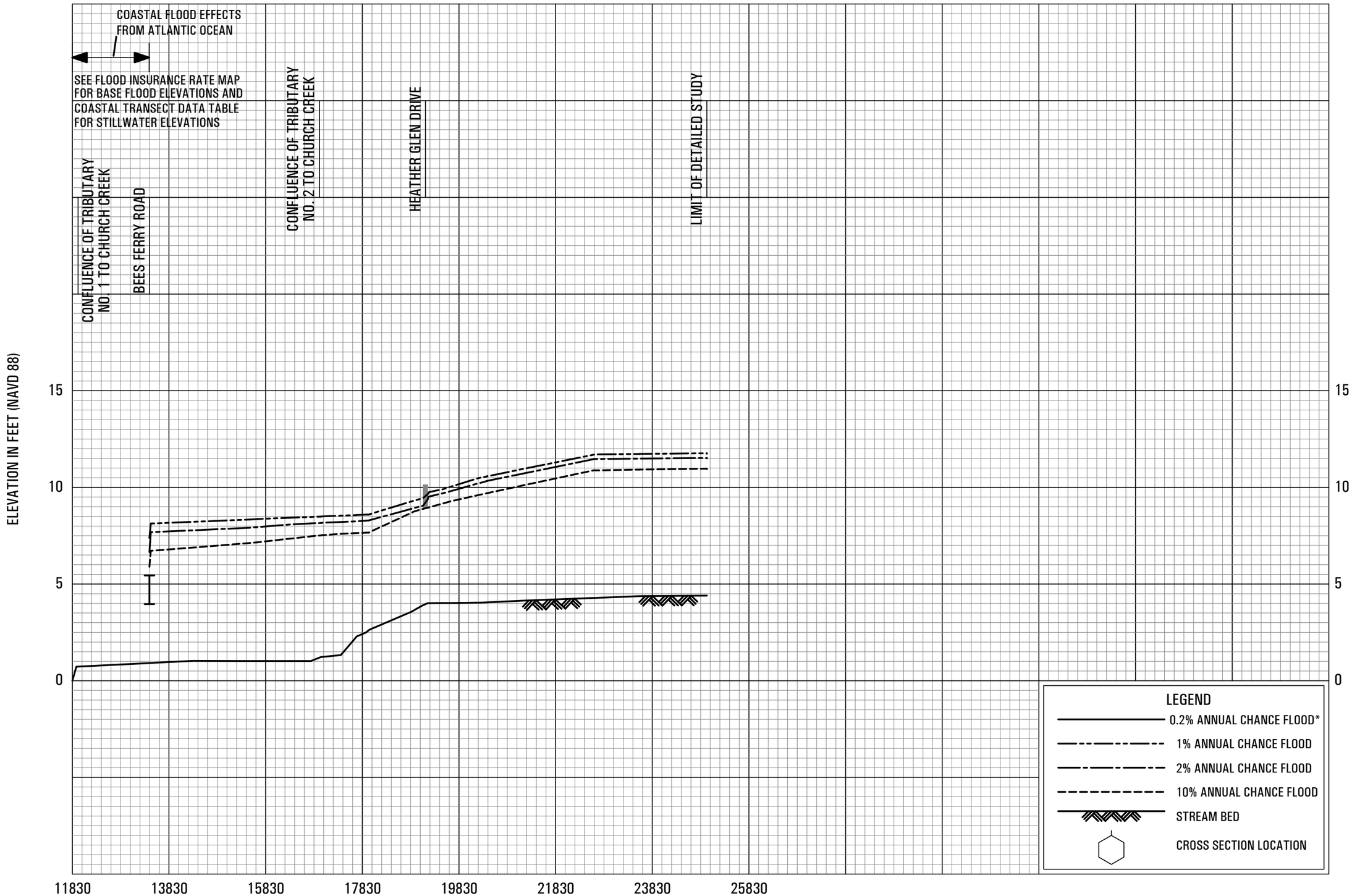


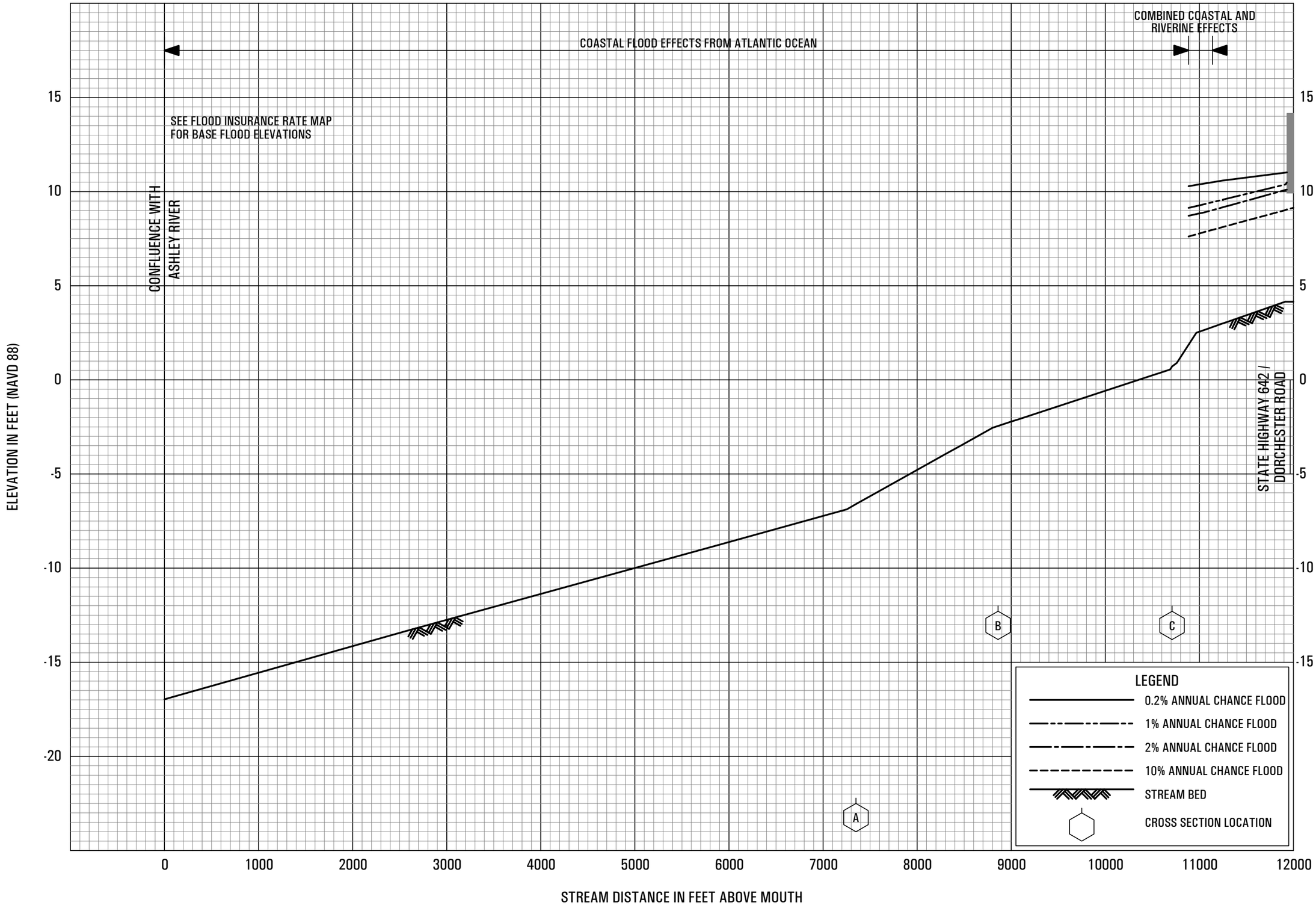
FLOOD PROFILES

CHURCH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



FLOOD PROFILES

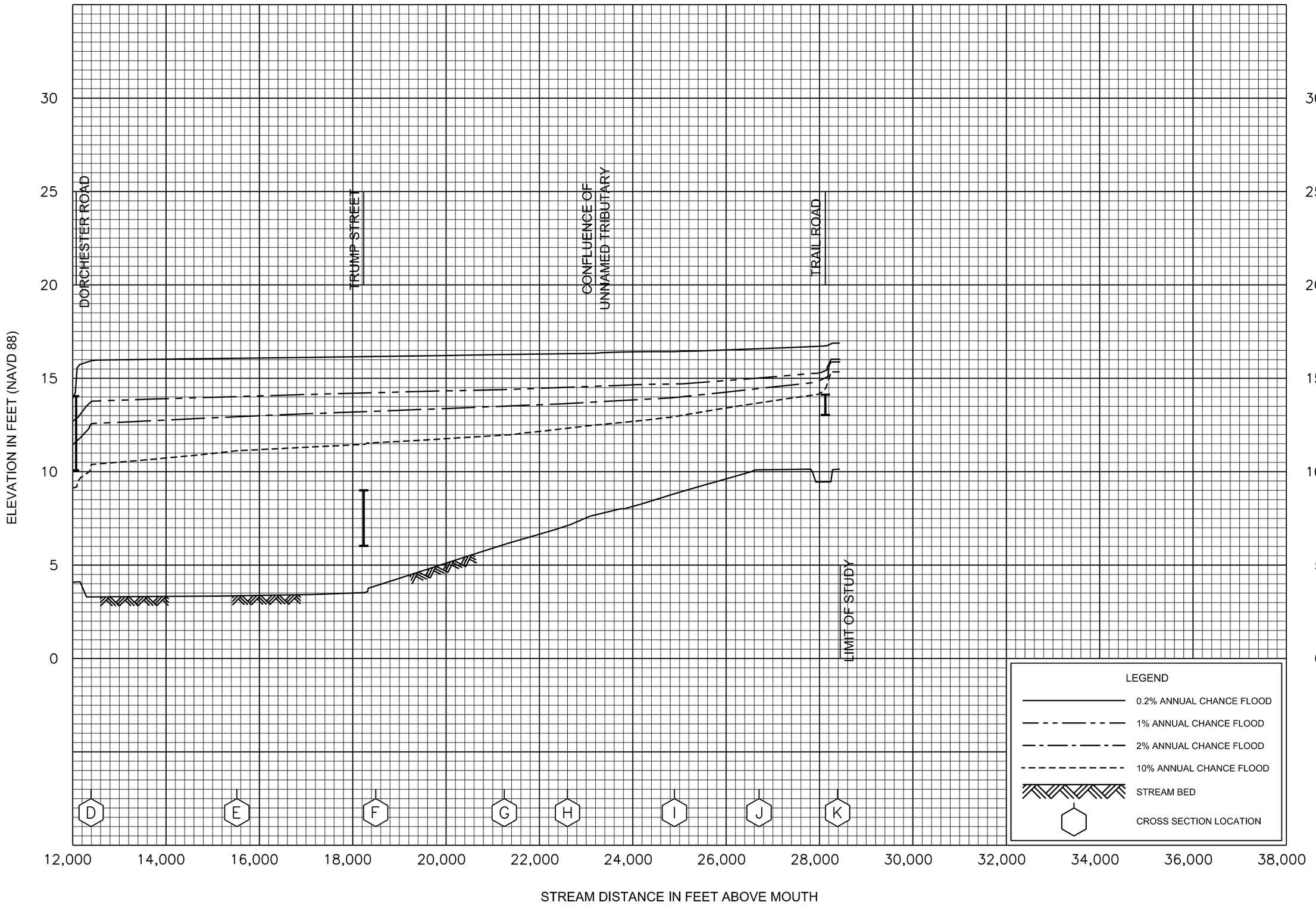
COOSAW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

08P

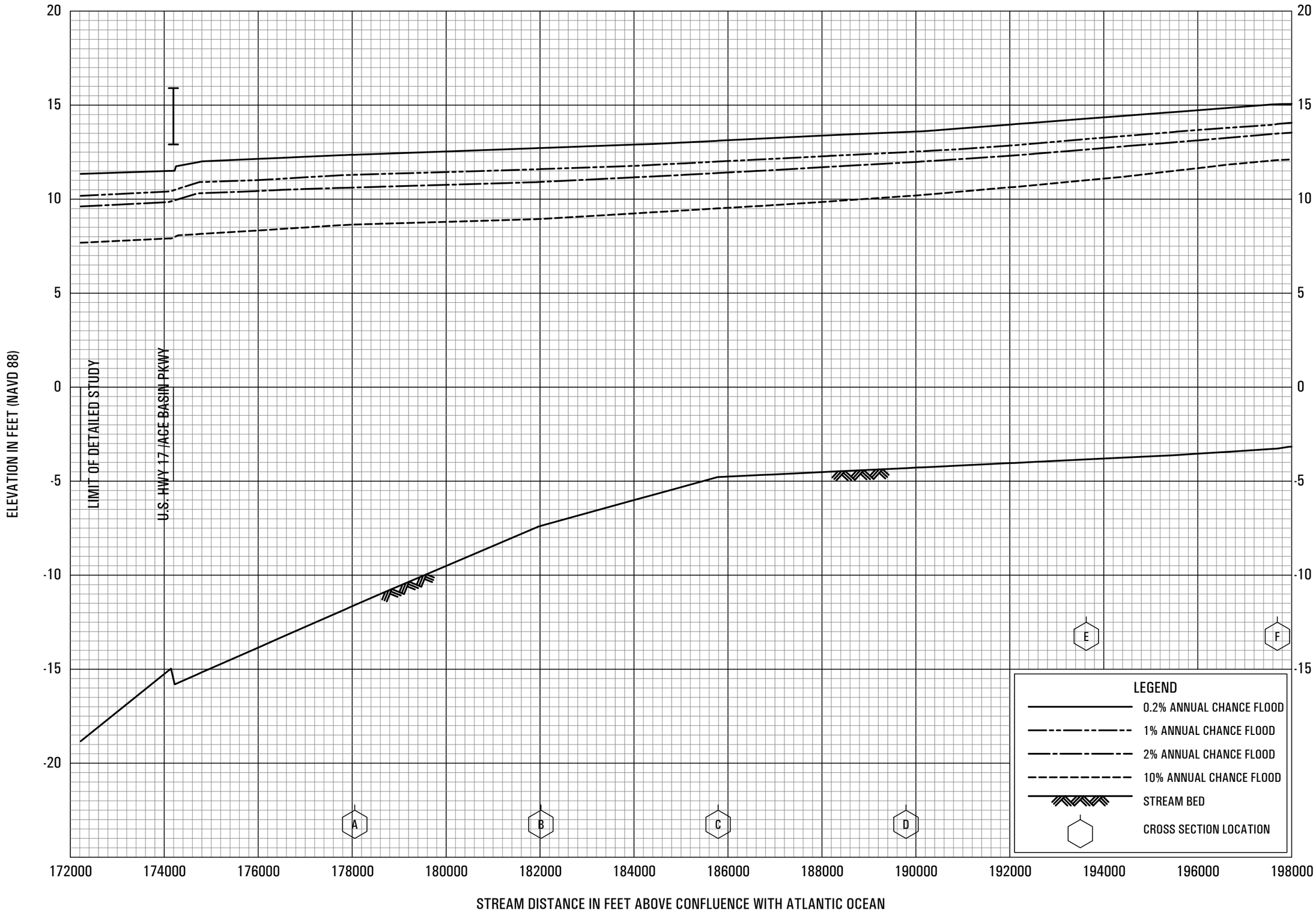


FLOOD PROFILES

COOSAW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC
AND INCORPORATED AREAS



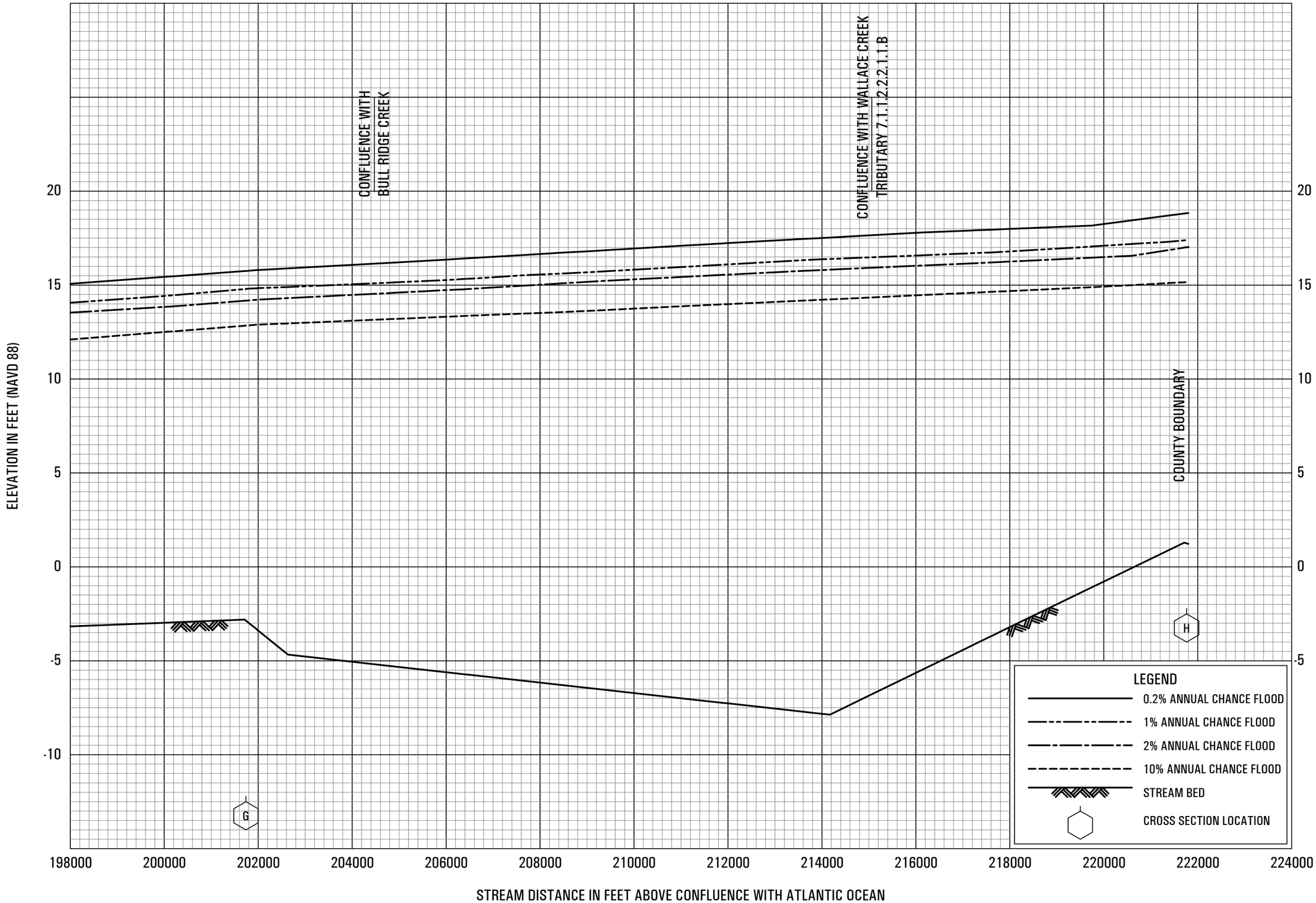
FLOOD PROFILES

EDISTO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



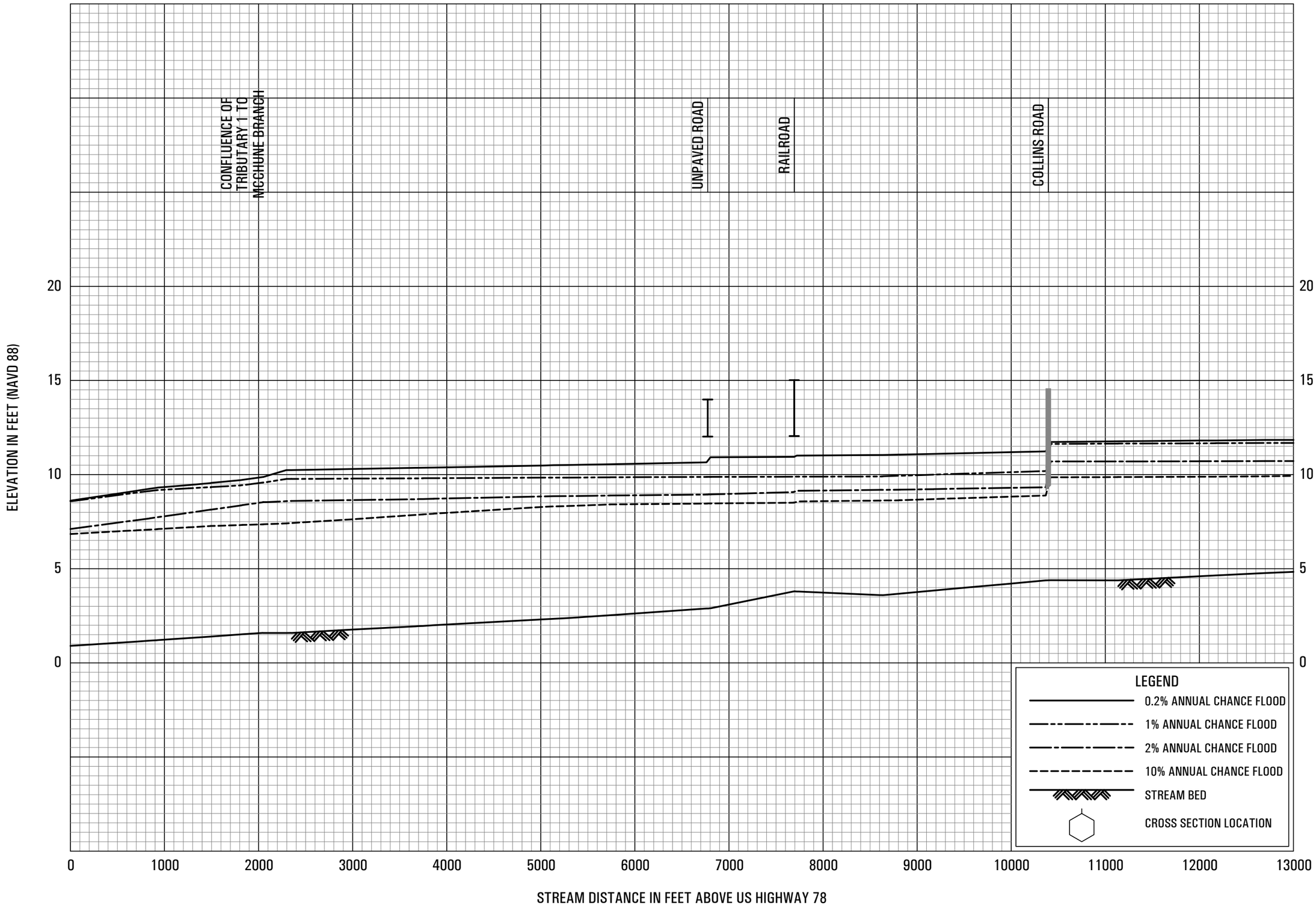
FLOOD PROFILES

EDISTO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



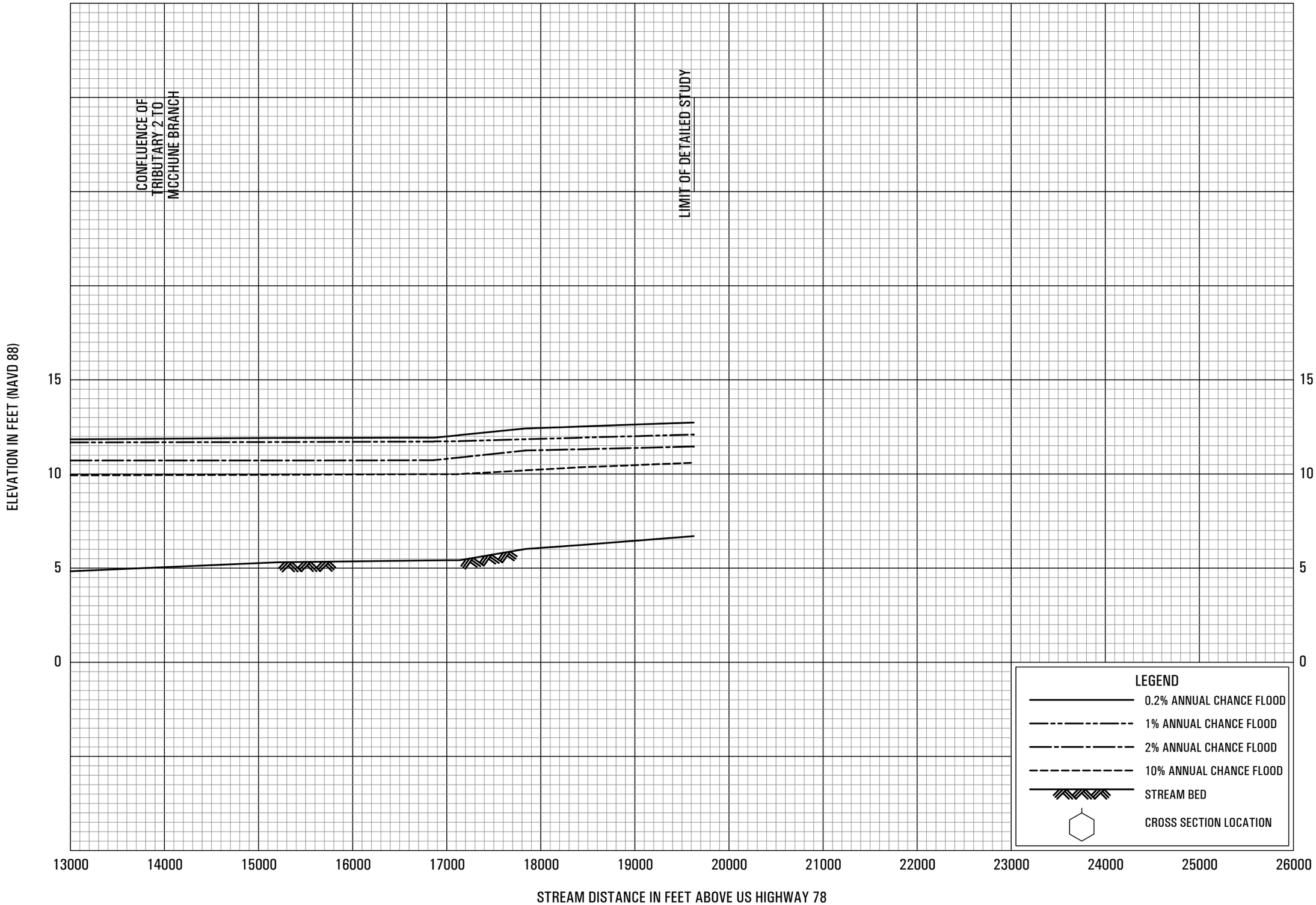
FLOOD PROFILES

MCCHUNE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



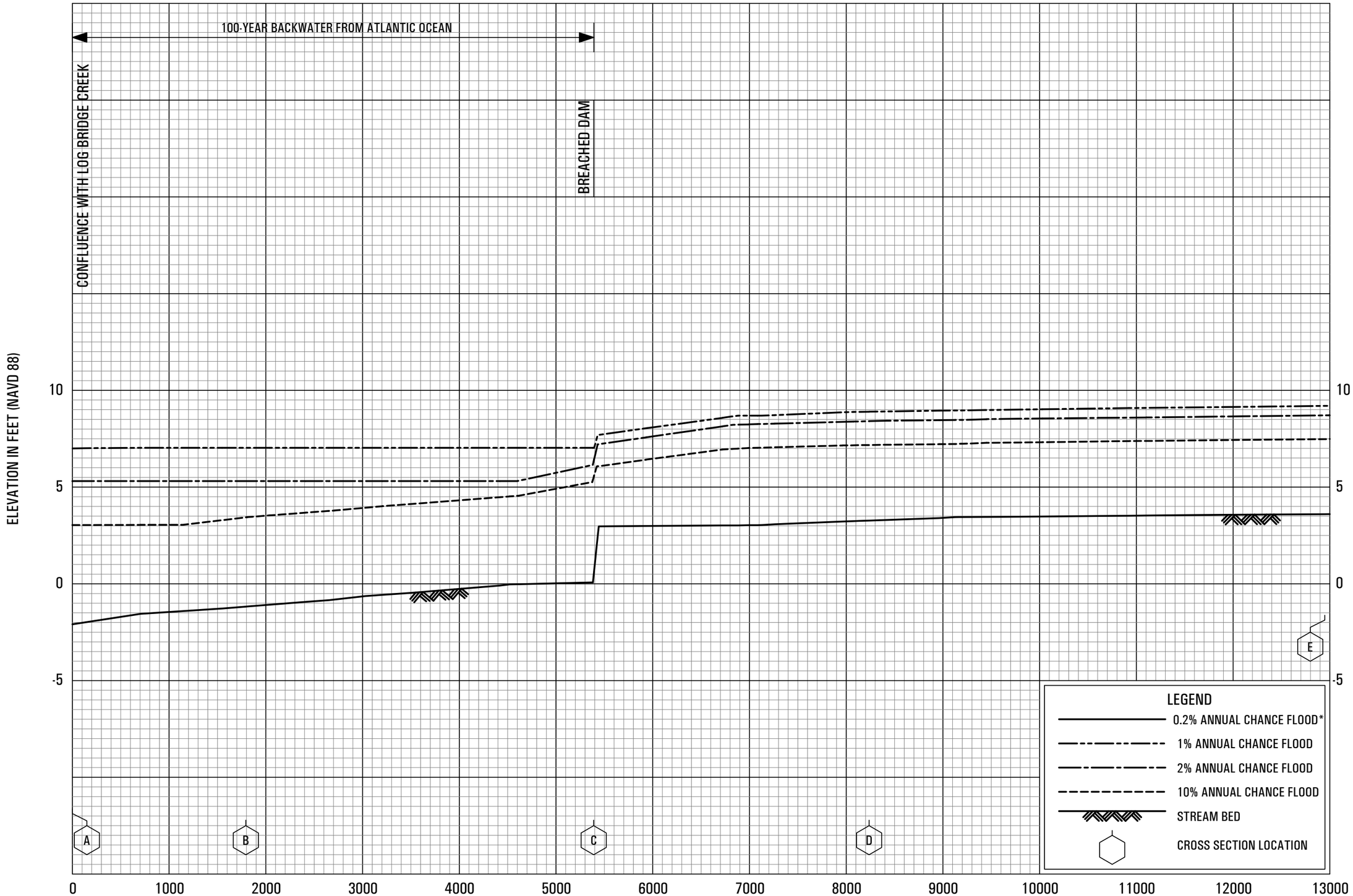
FLOOD PROFILES

MCCHUNE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



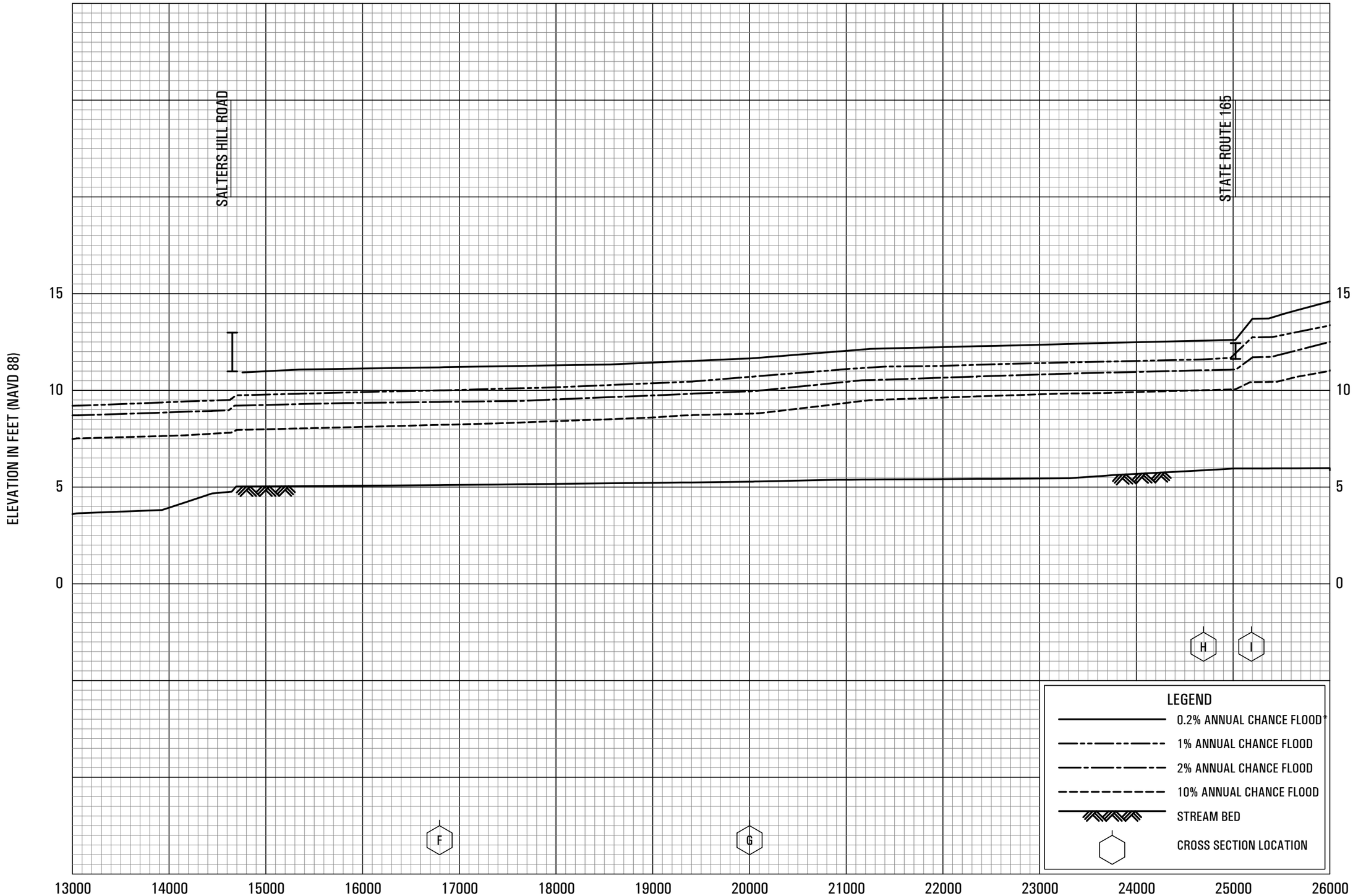
FLOOD PROFILES

MELLICHAMP BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH LOG BRIDGE CREEK

*SOME DATA NOT AVAILABLE - COASTAL SUPERSEDES RIVERINE

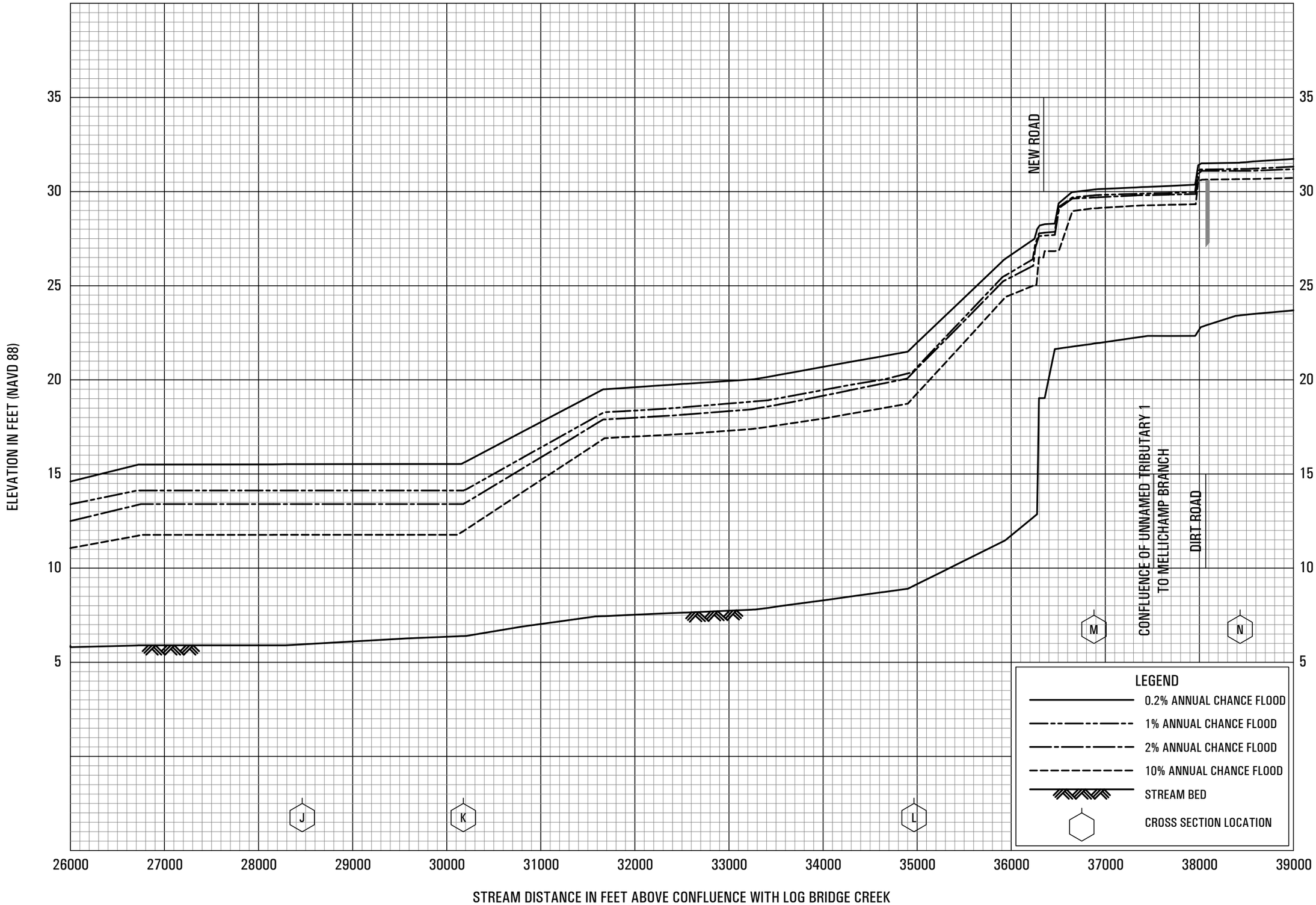
FLOOD PROFILES

MELLICHAMP BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



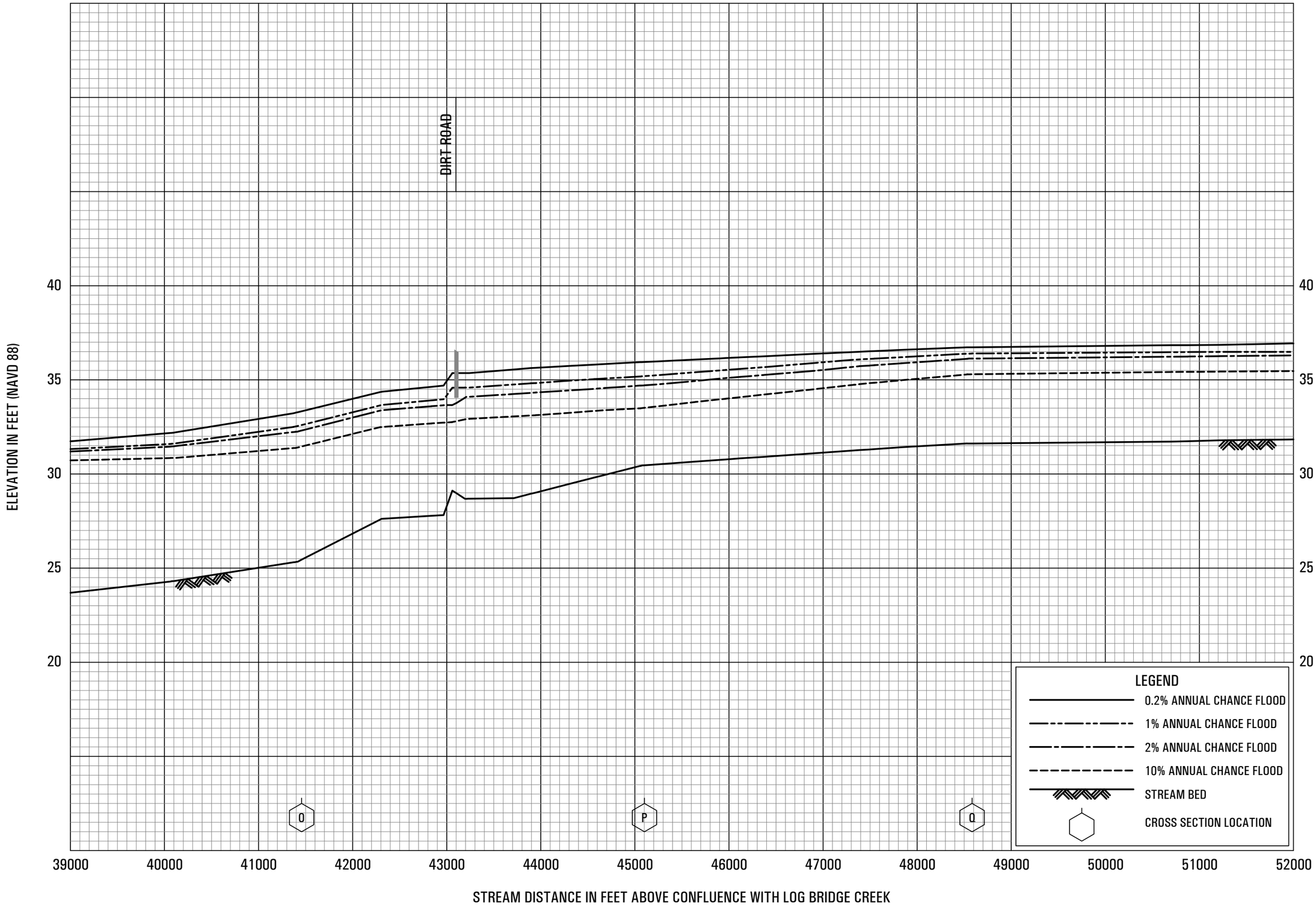
FLOOD PROFILES

MELLICHAMP BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



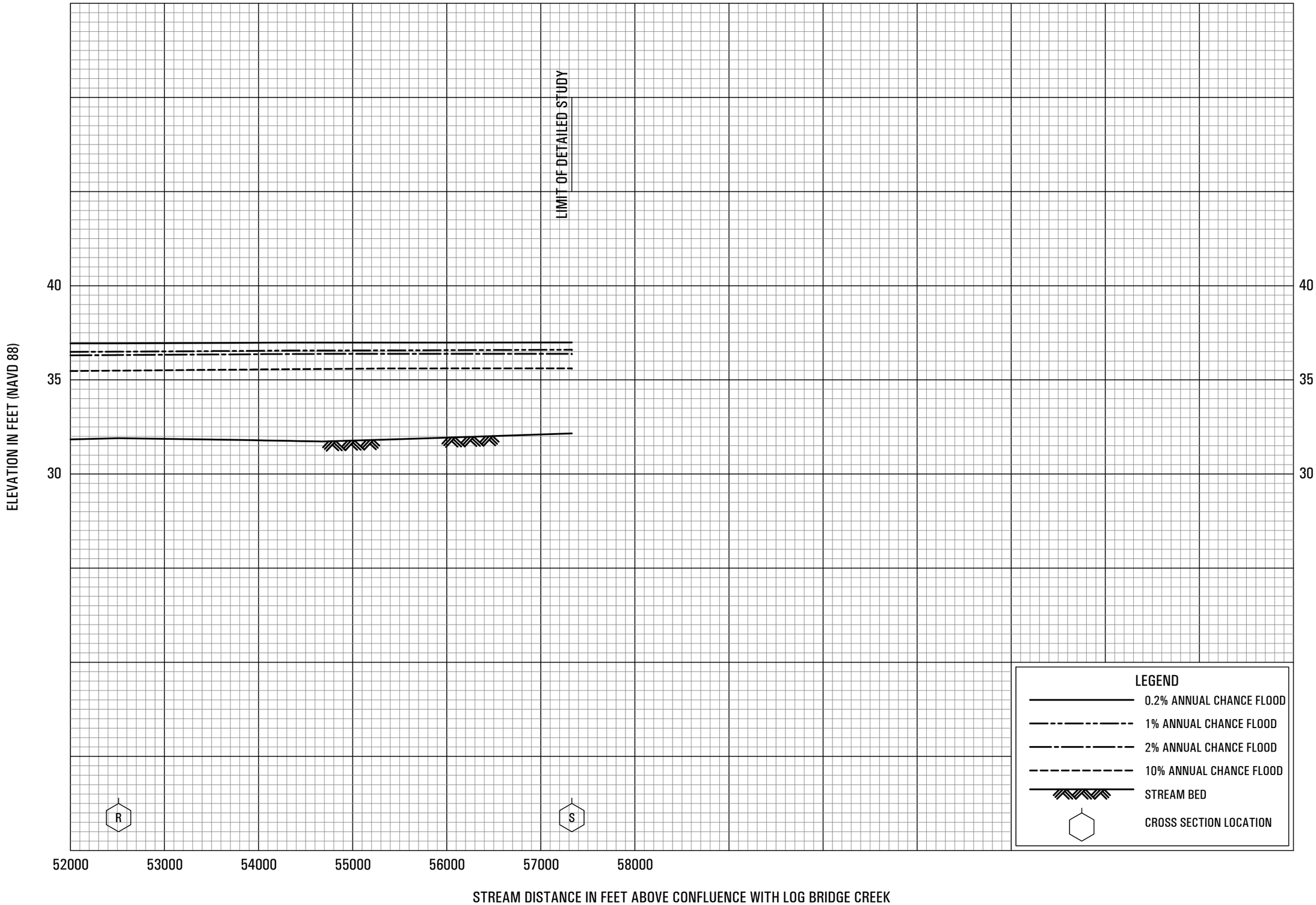
FLOOD PROFILES

MELLICHAMP BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



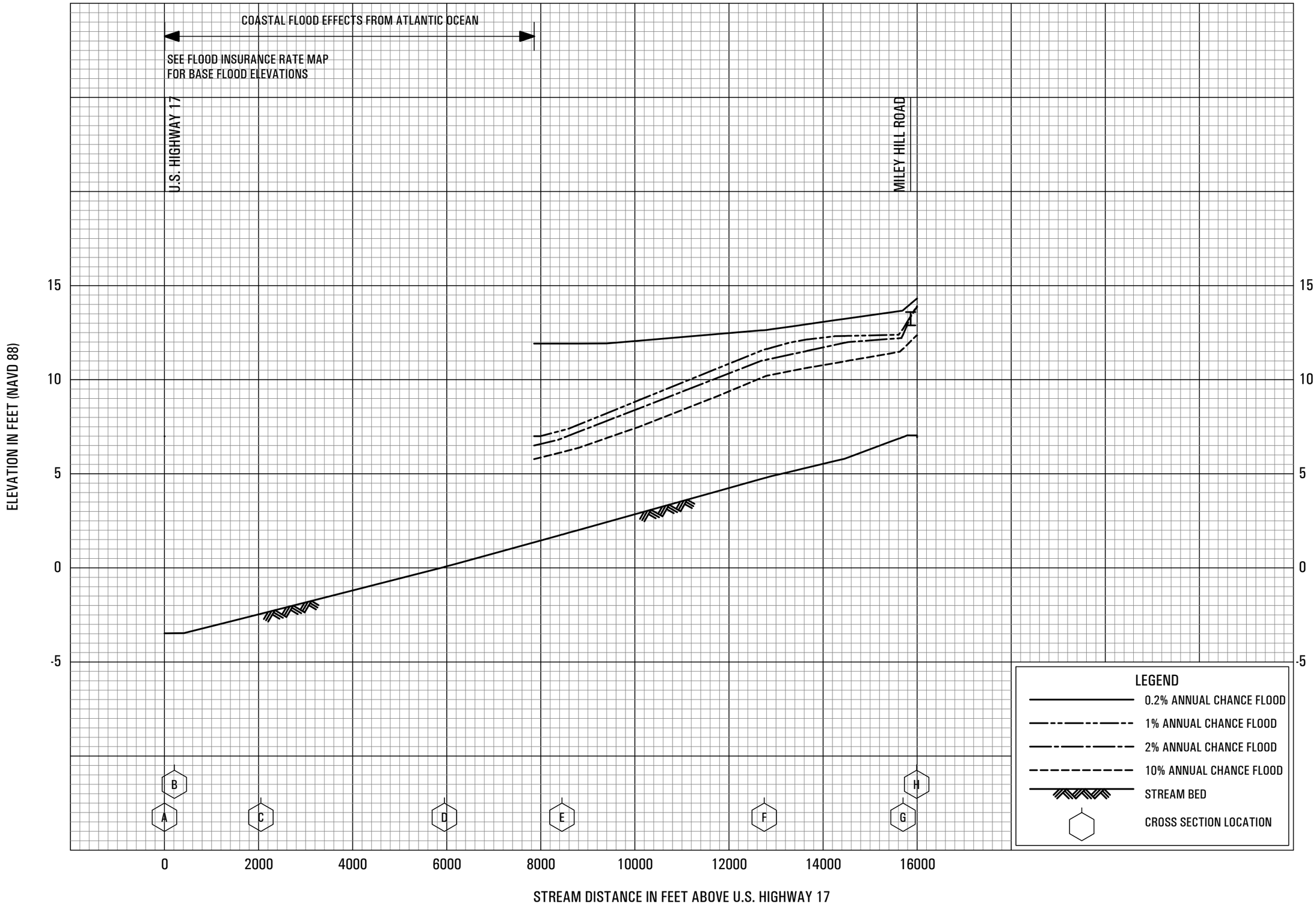
FLOOD PROFILES

MELLICHAMP BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



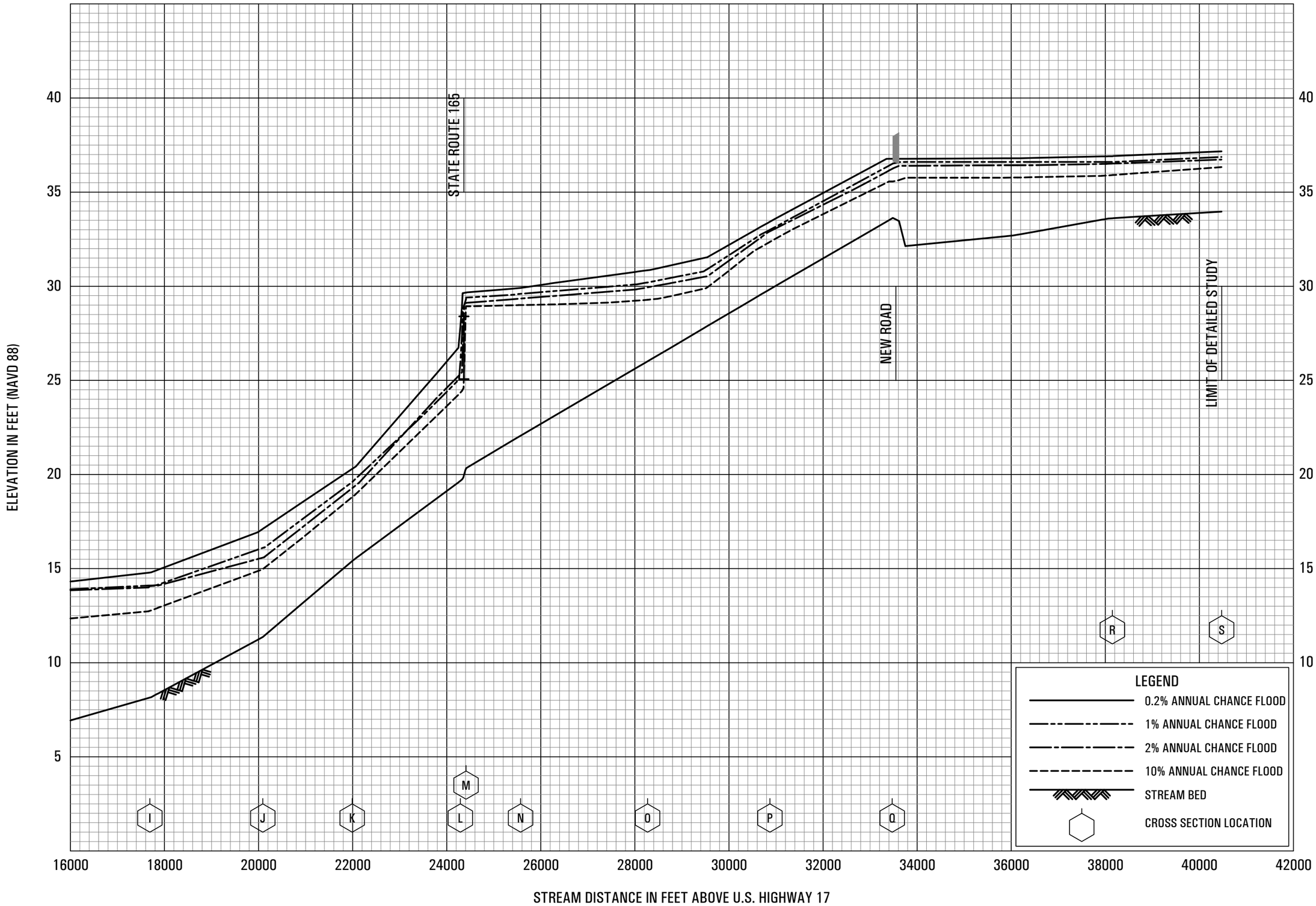
FLOOD PROFILES

MIDDLE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



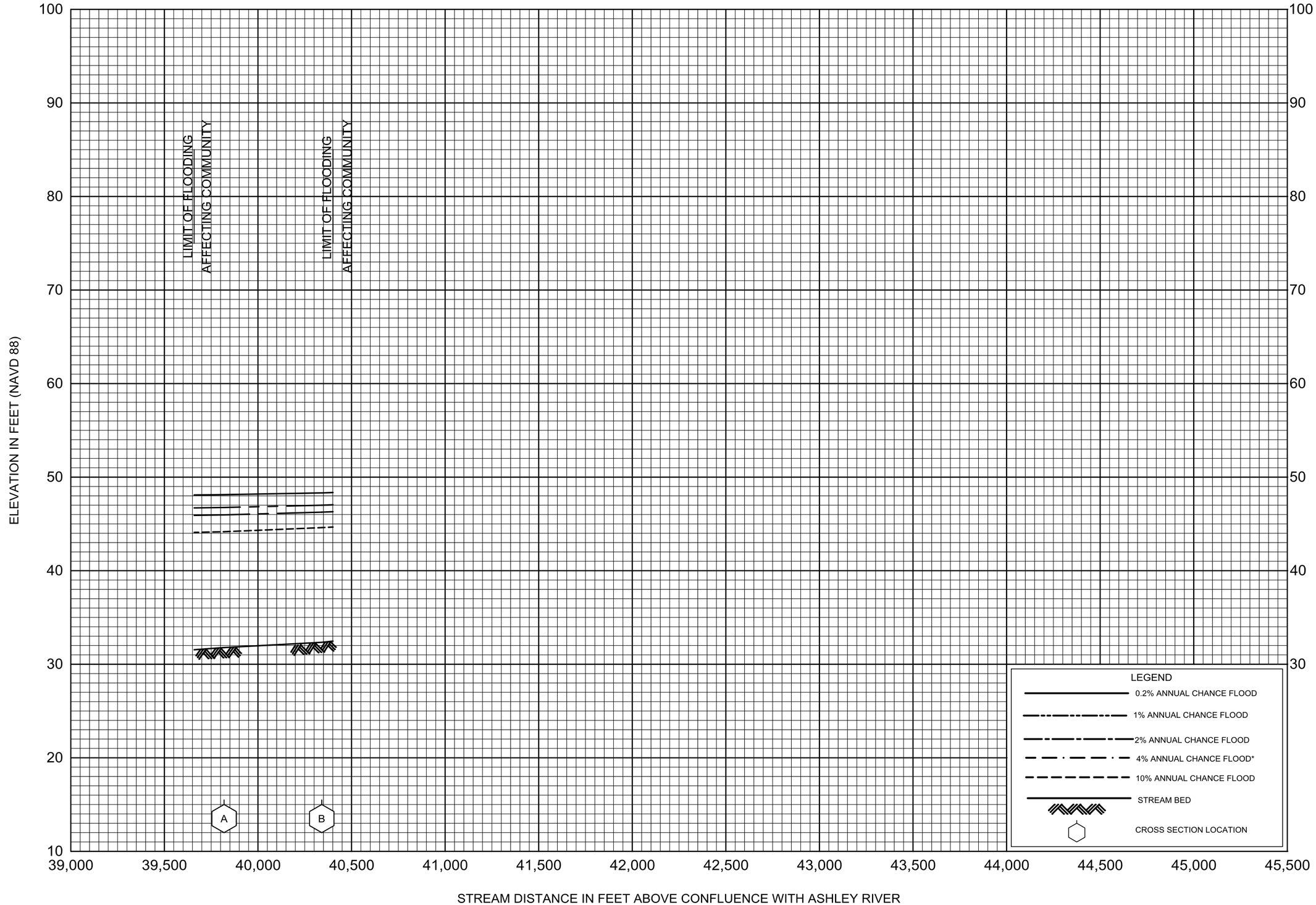
FLOOD PROFILES

MIDDLE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



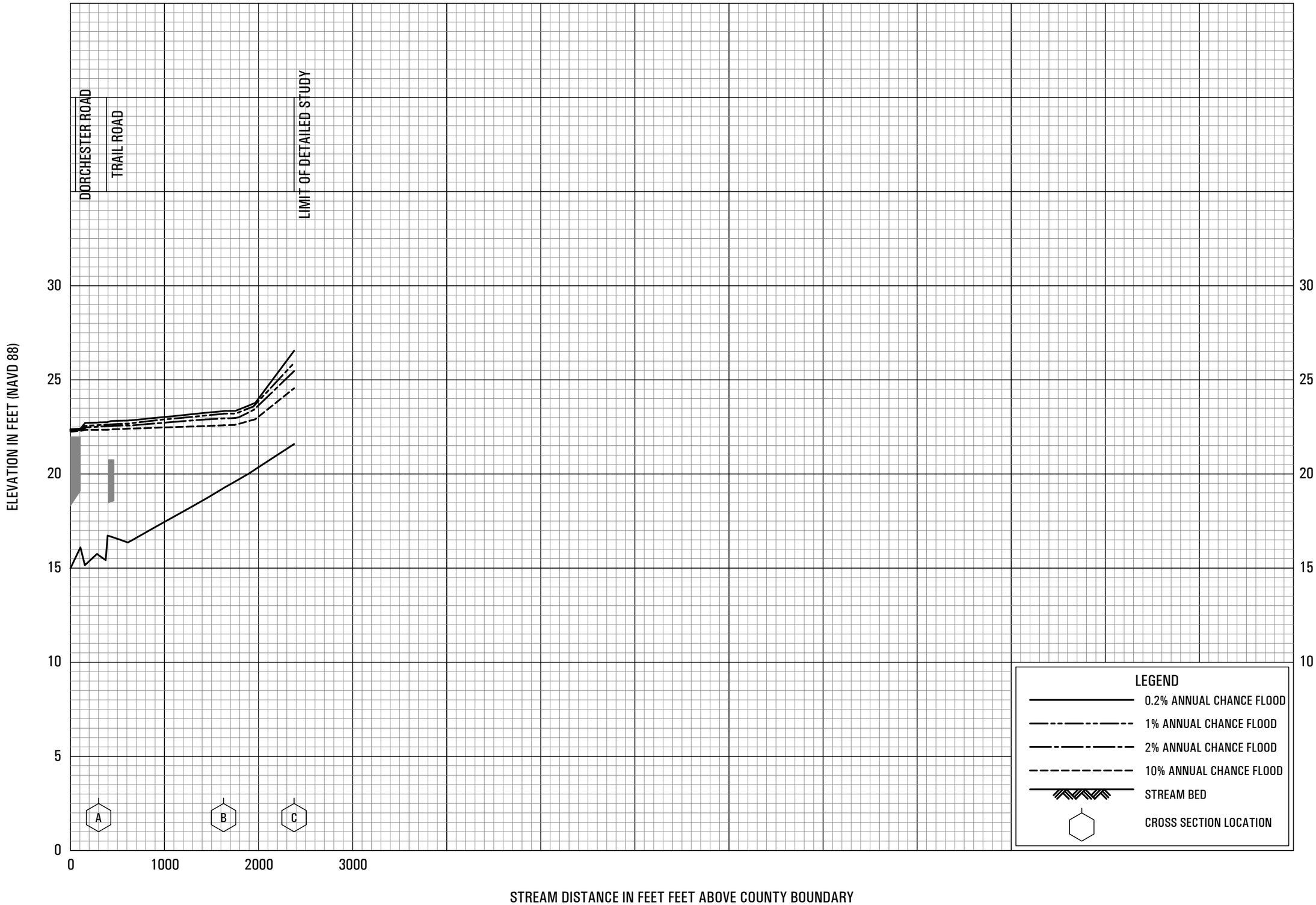
FLOOD PROFILES

SAWMILL BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



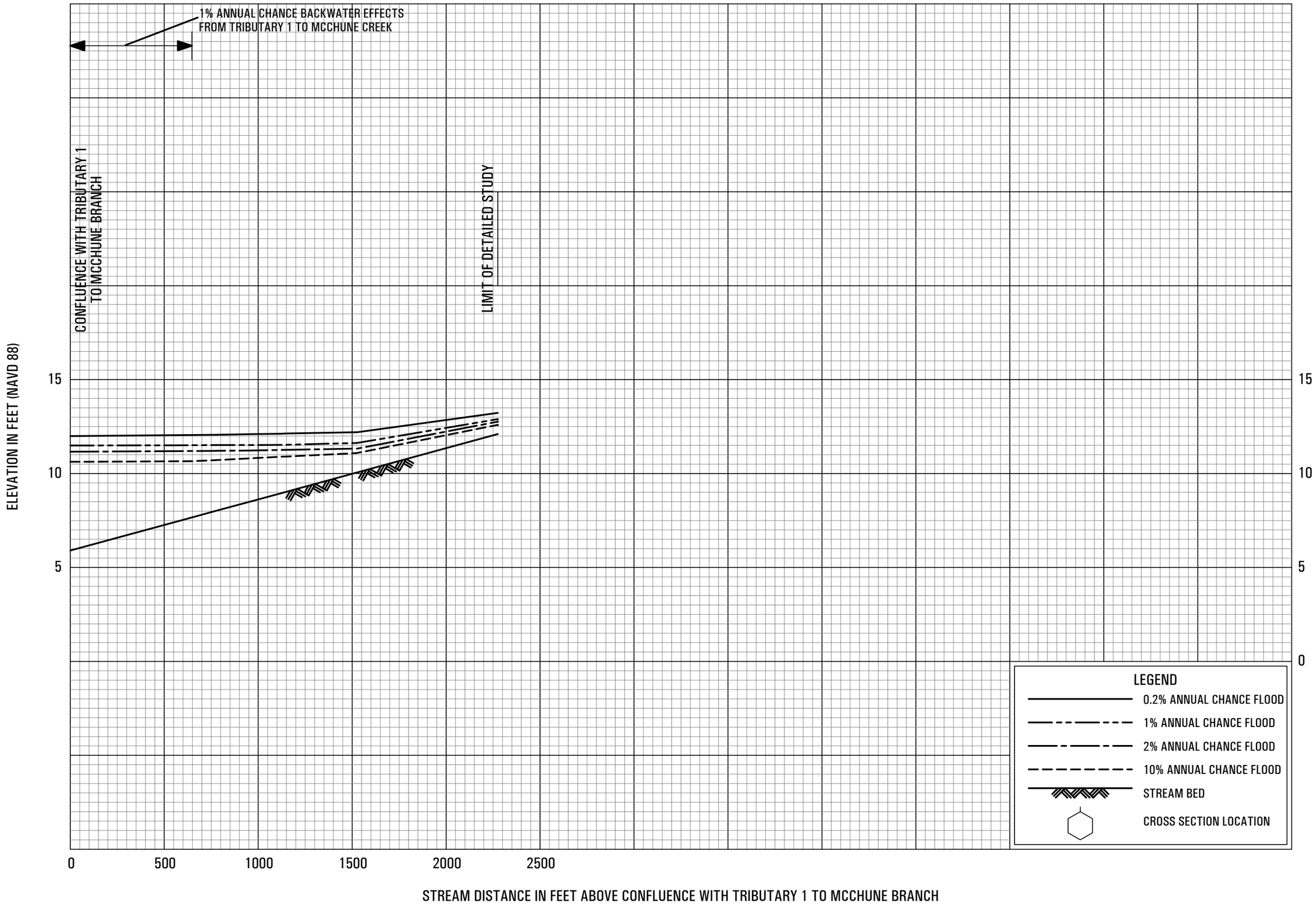
FLOOD PROFILES

SAWPIT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



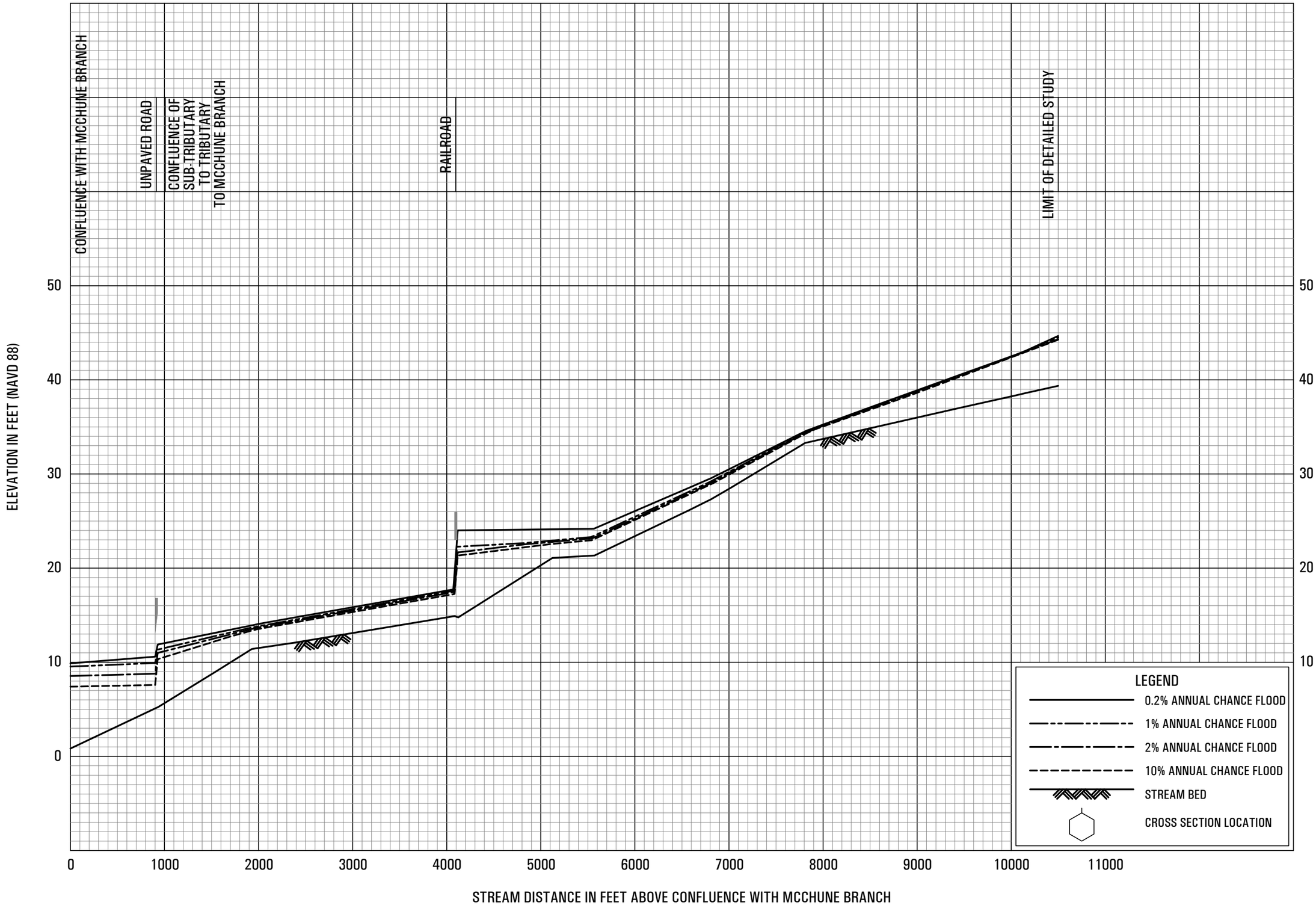
FLOOD PROFILES

SUB-TRIBUTARY TO TRIBUTARY 1 TO MCCHUNE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



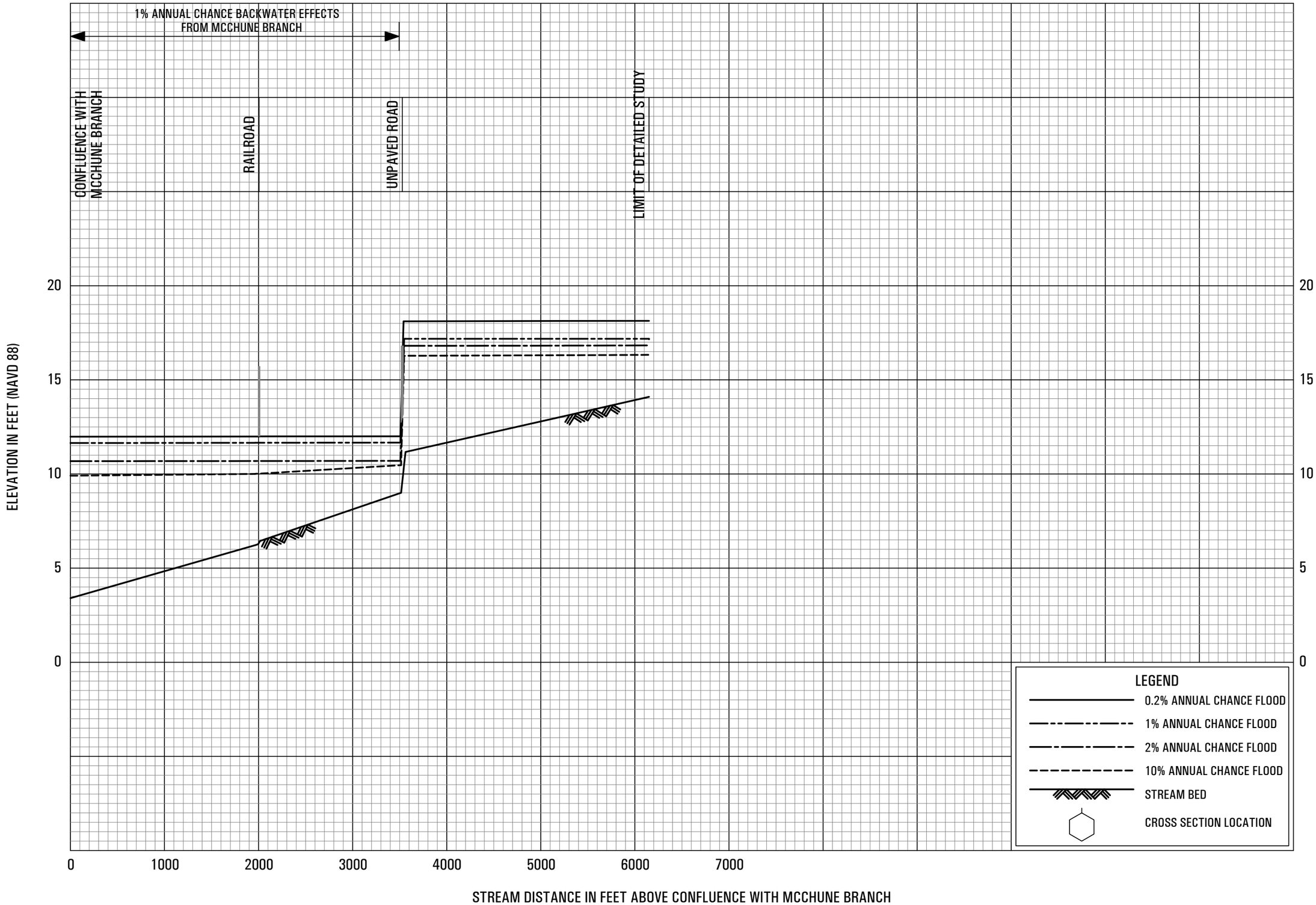
FLOOD PROFILES

TRIBUTARY 1 TO MCCHUNE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



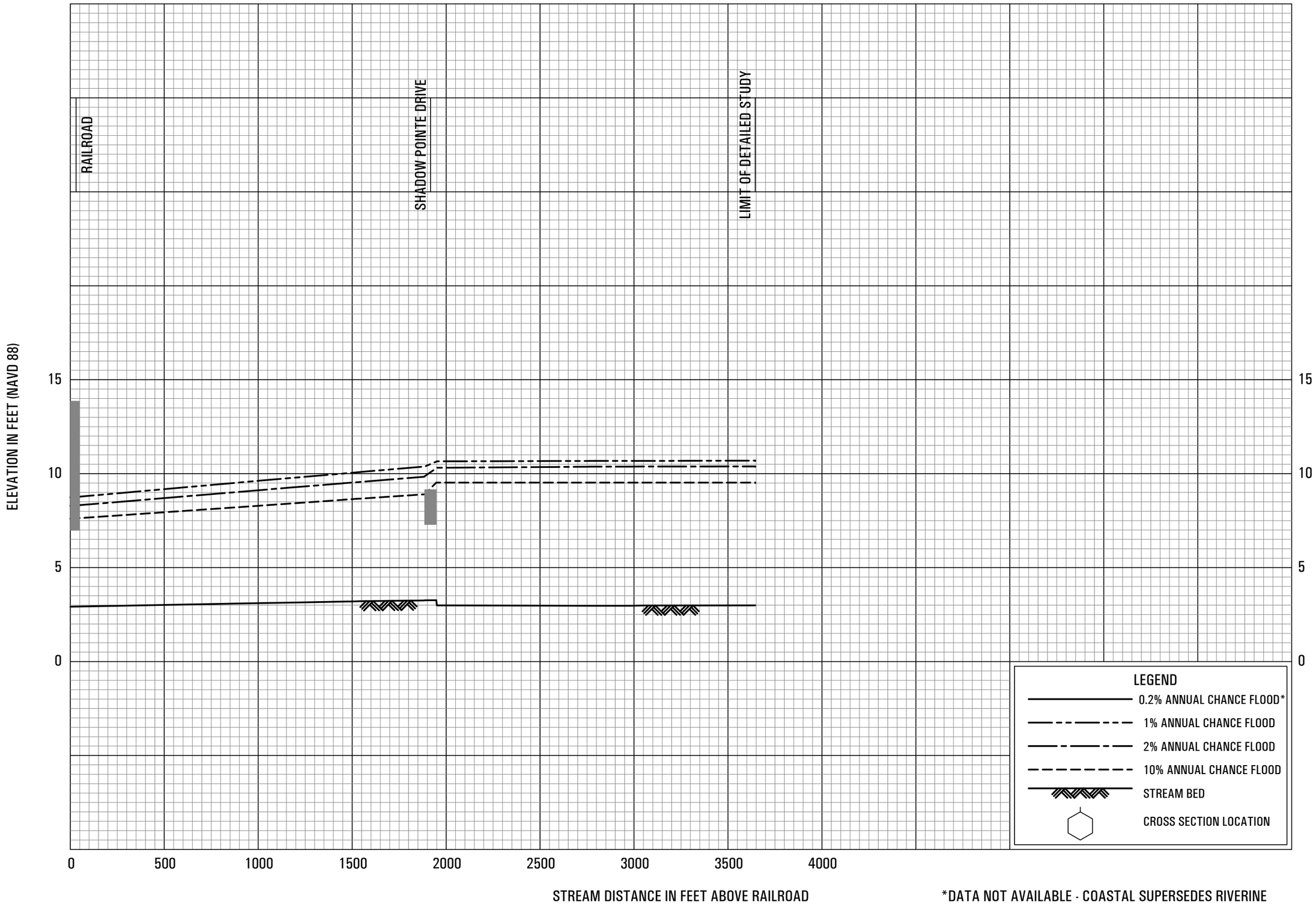
FLOOD PROFILES

TRIBUTARY 2 TO MCCHUNE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



*DATA NOT AVAILABLE - COASTAL SUPERSEDES RIVERINE

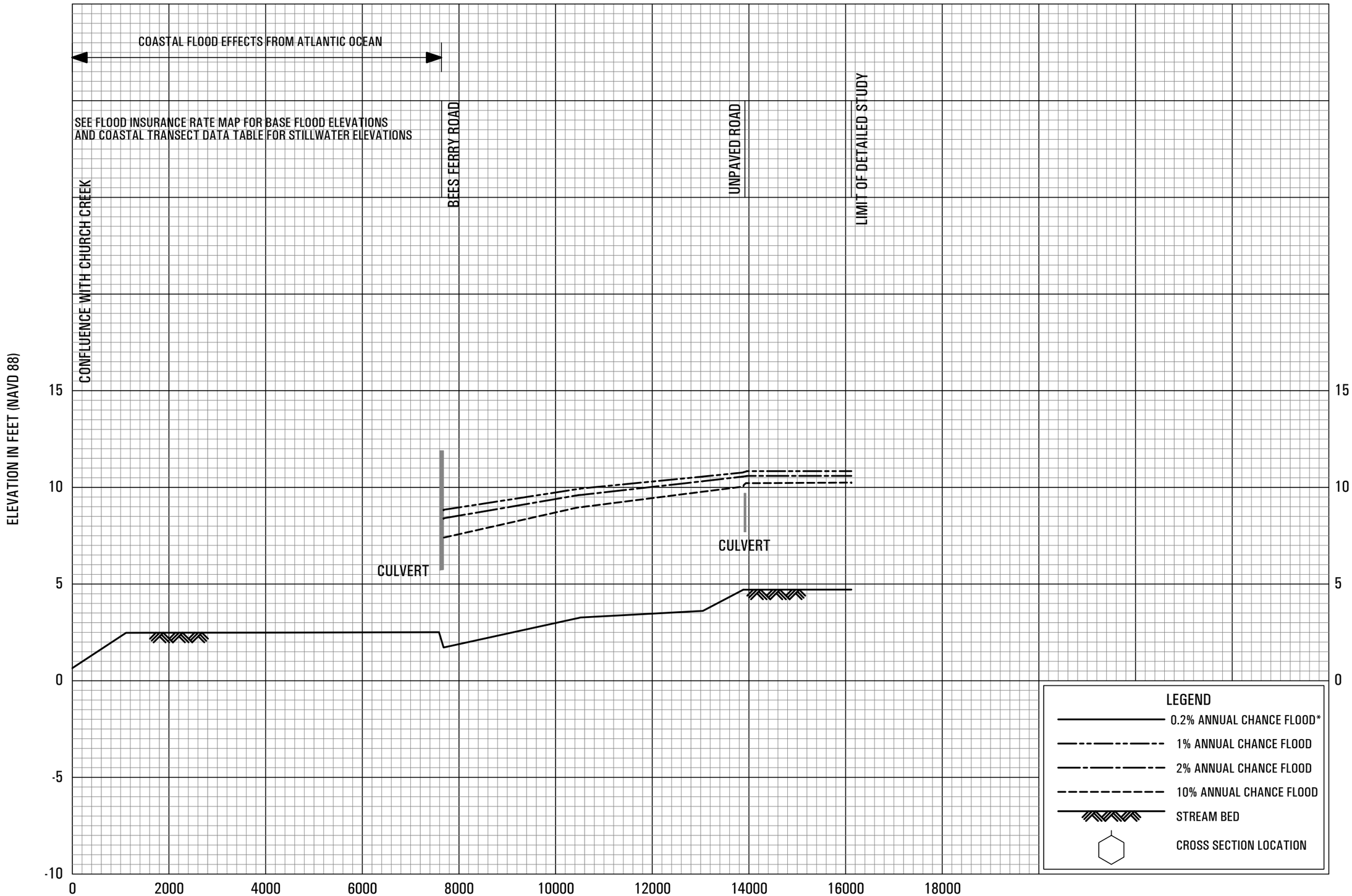
FLOOD PROFILES

TRIBUTARY NO. 0 TO CHURCH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



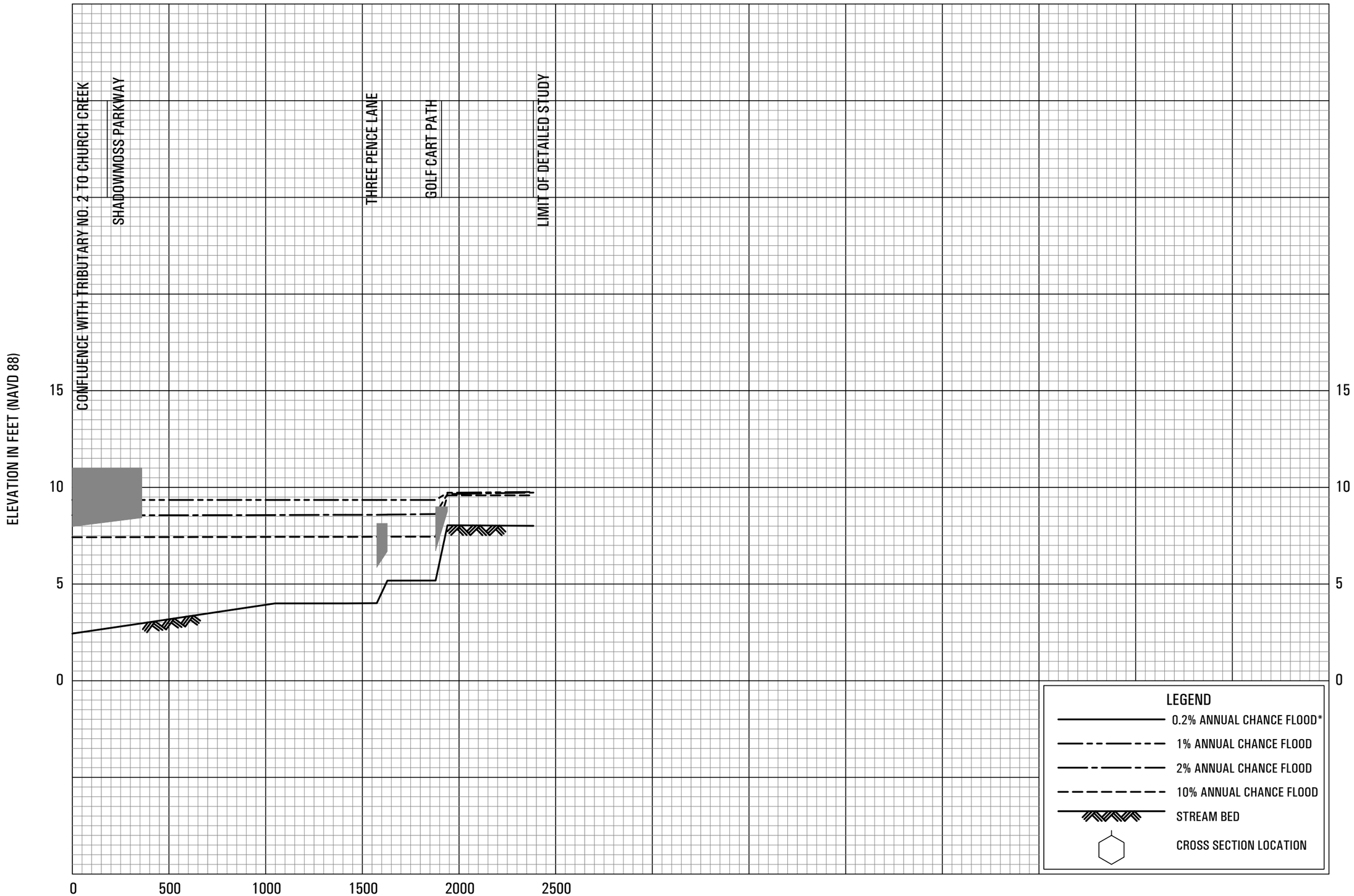
FLOOD PROFILES

TRIBUTARY NO. 1 TO CHURCH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



*DATA NOT AVAILABLE - COASTAL SUPERSEDES RIVERINE

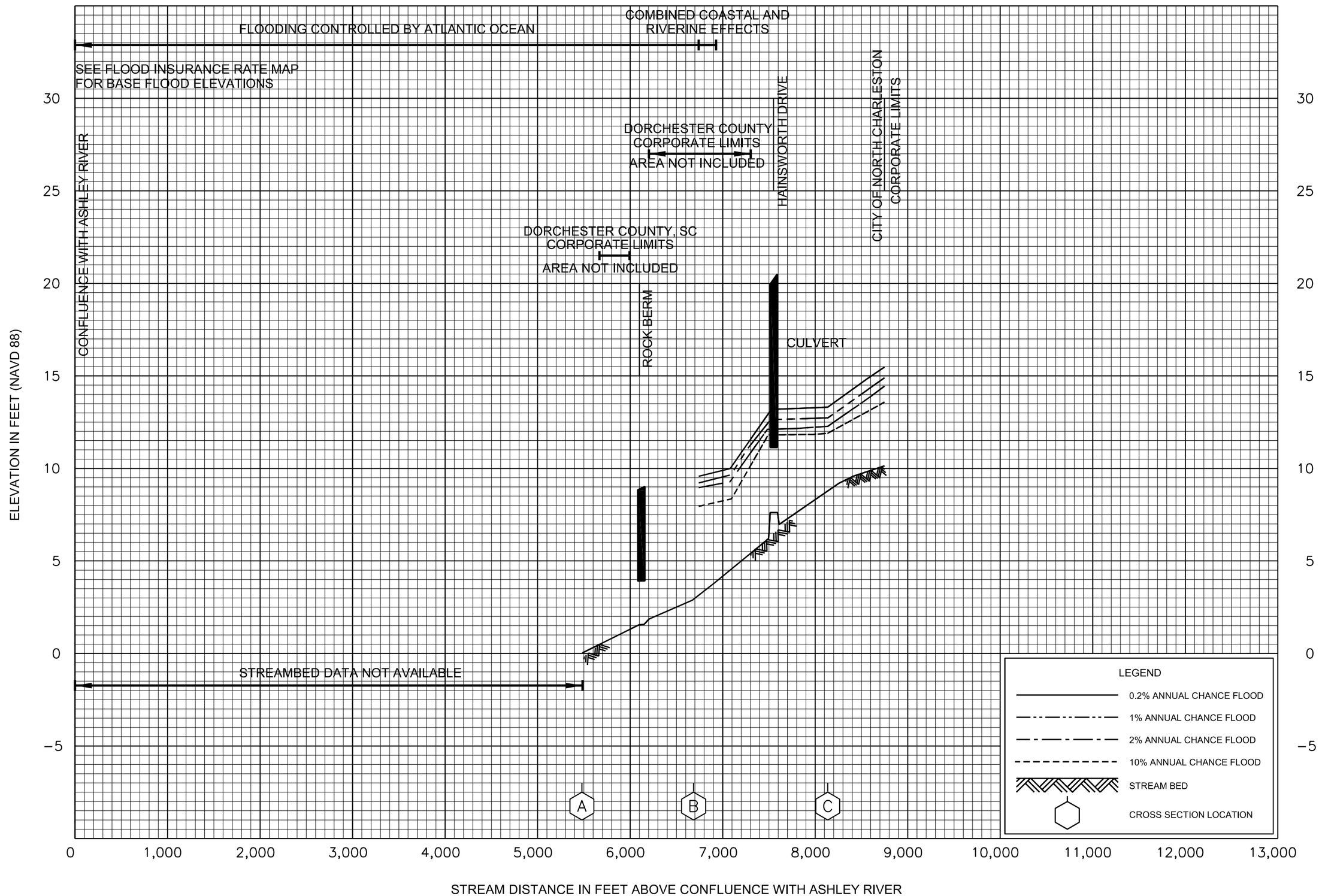
FLOOD PROFILES

TRIBUTARY NO. 1 TO TRIBUTARY NO. 2 TO CHURCH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS

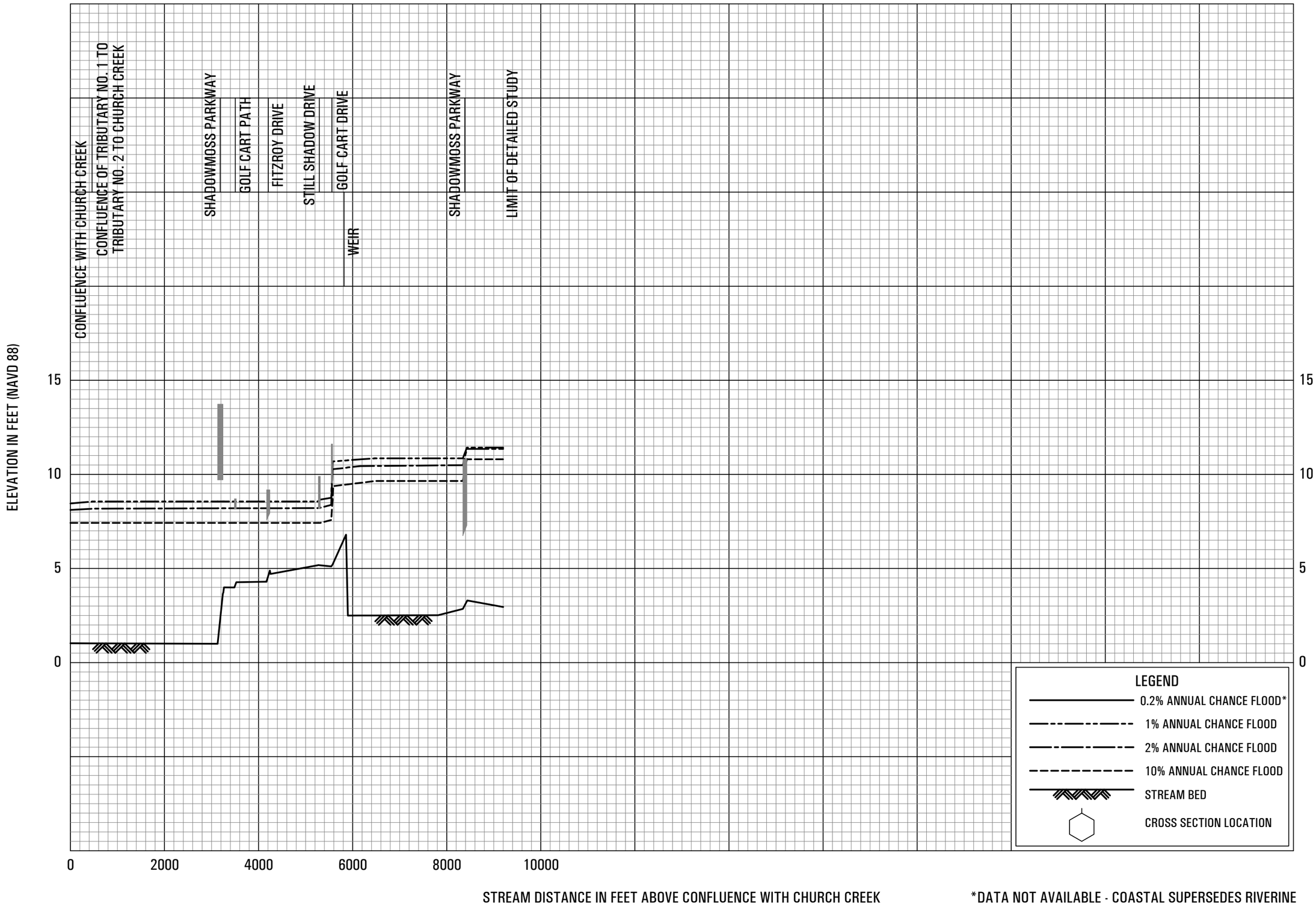


FLOOD PROFILES

TRIBUTARY NO. 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC
AND INCORPORATED AREAS



*DATA NOT AVAILABLE - COASTAL SUPERSEDES RIVERINE

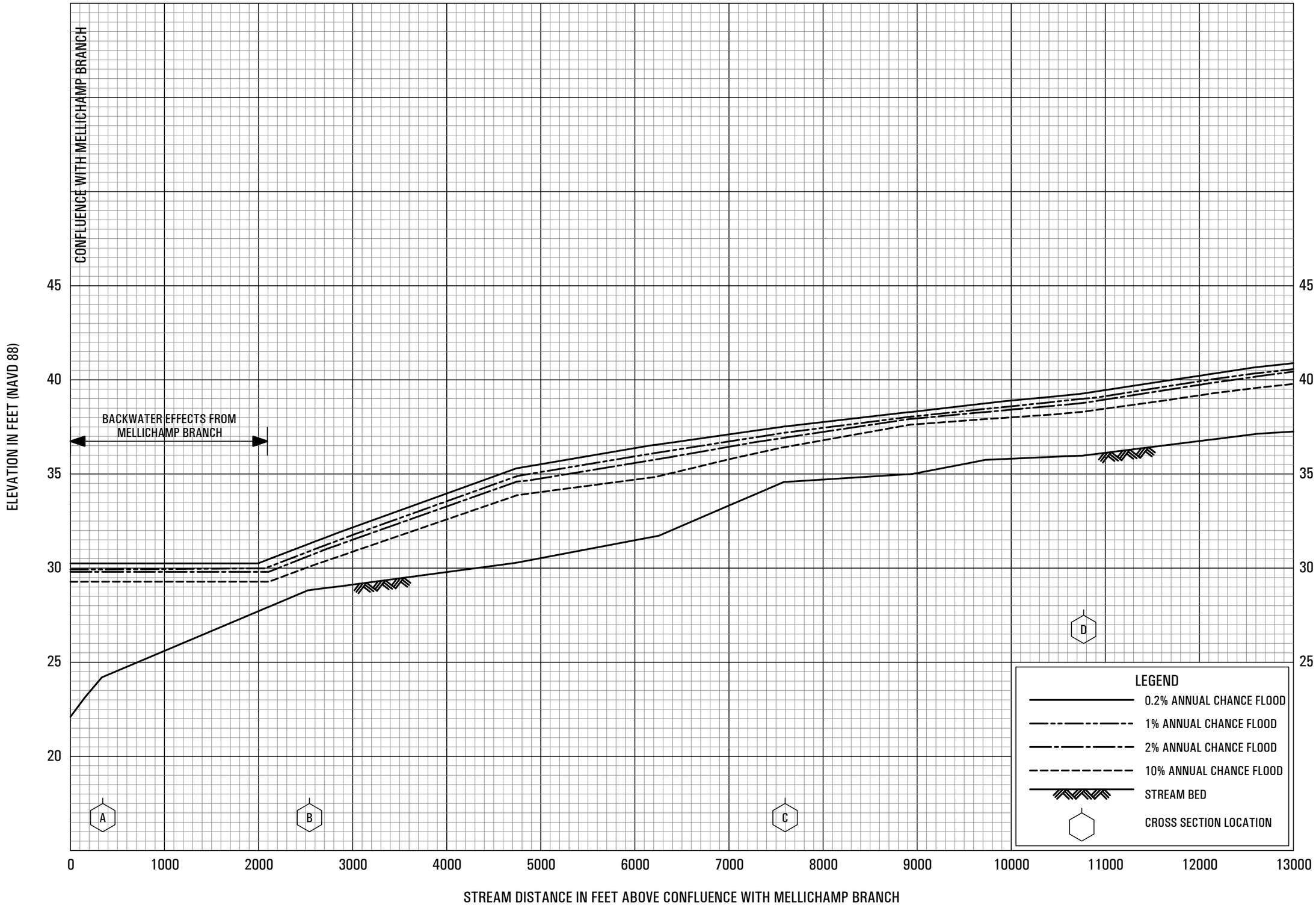
FLOOD PROFILES

TRIBUTARY NO. 2 TO CHURCH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



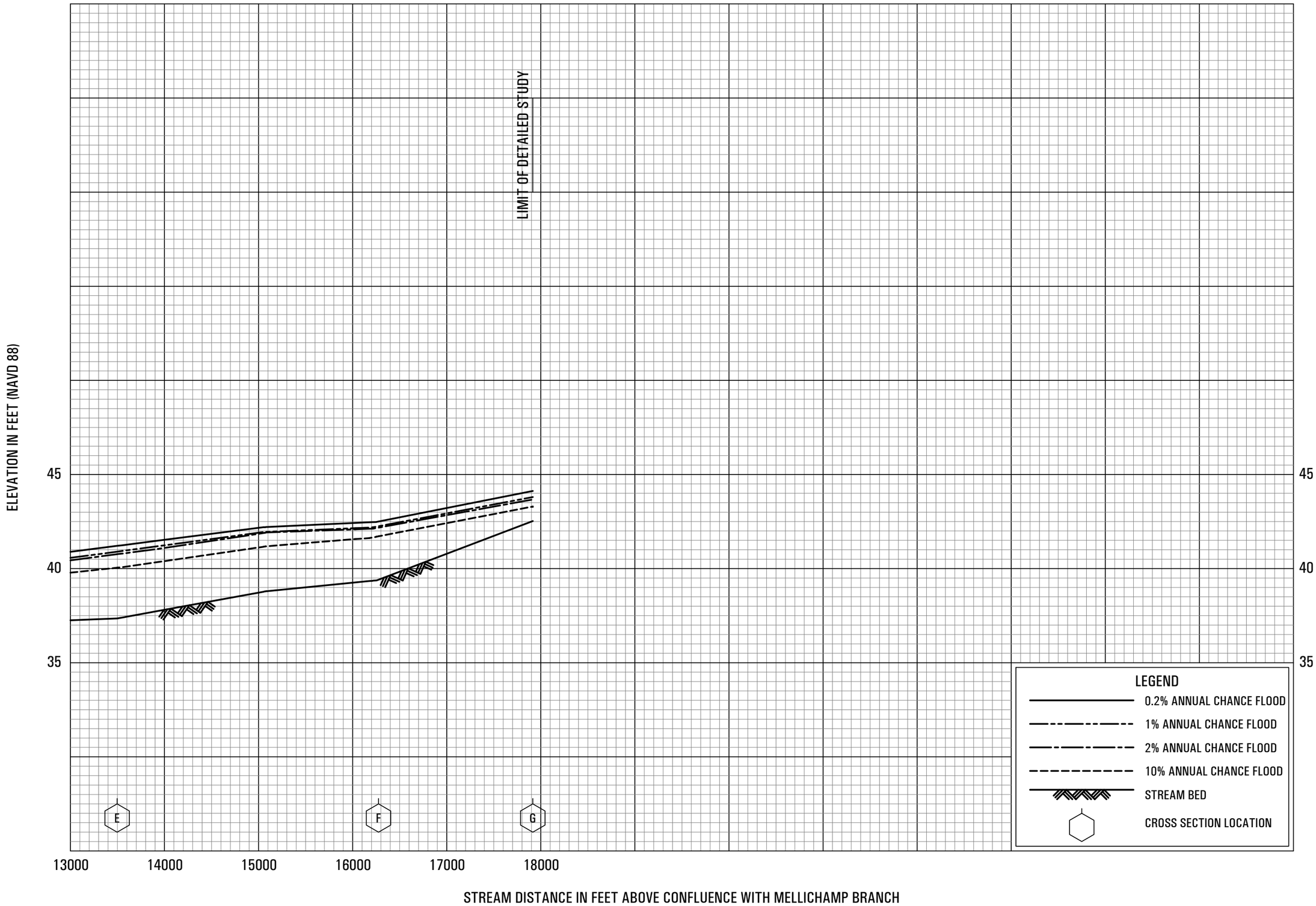
FLOOD PROFILES

UNNAMED TRIBUTARY 1 TO MELLICHAMP BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



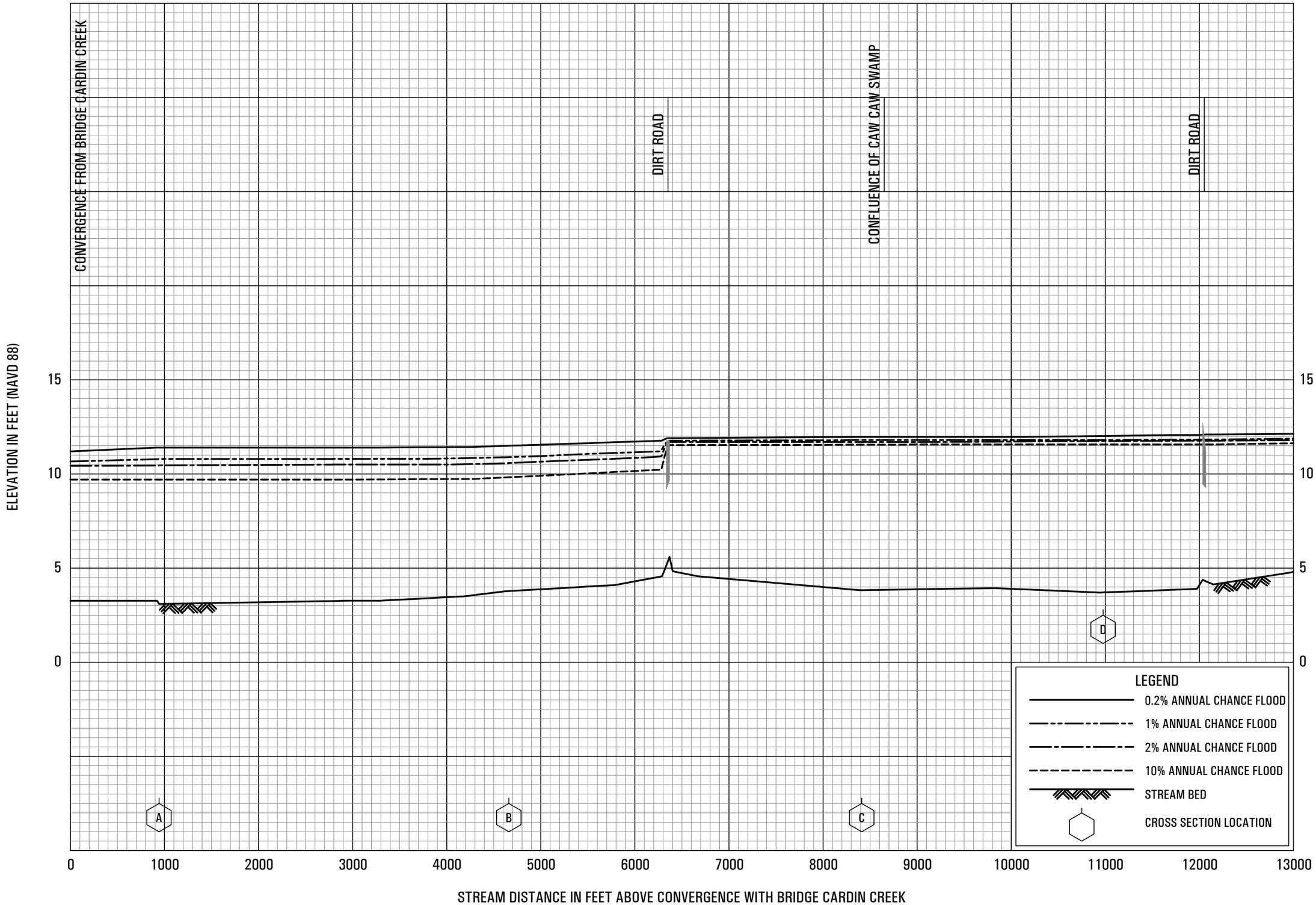
FLOOD PROFILES

UNNAMED TRIBUTARY 1 TO MELLICHAMP BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



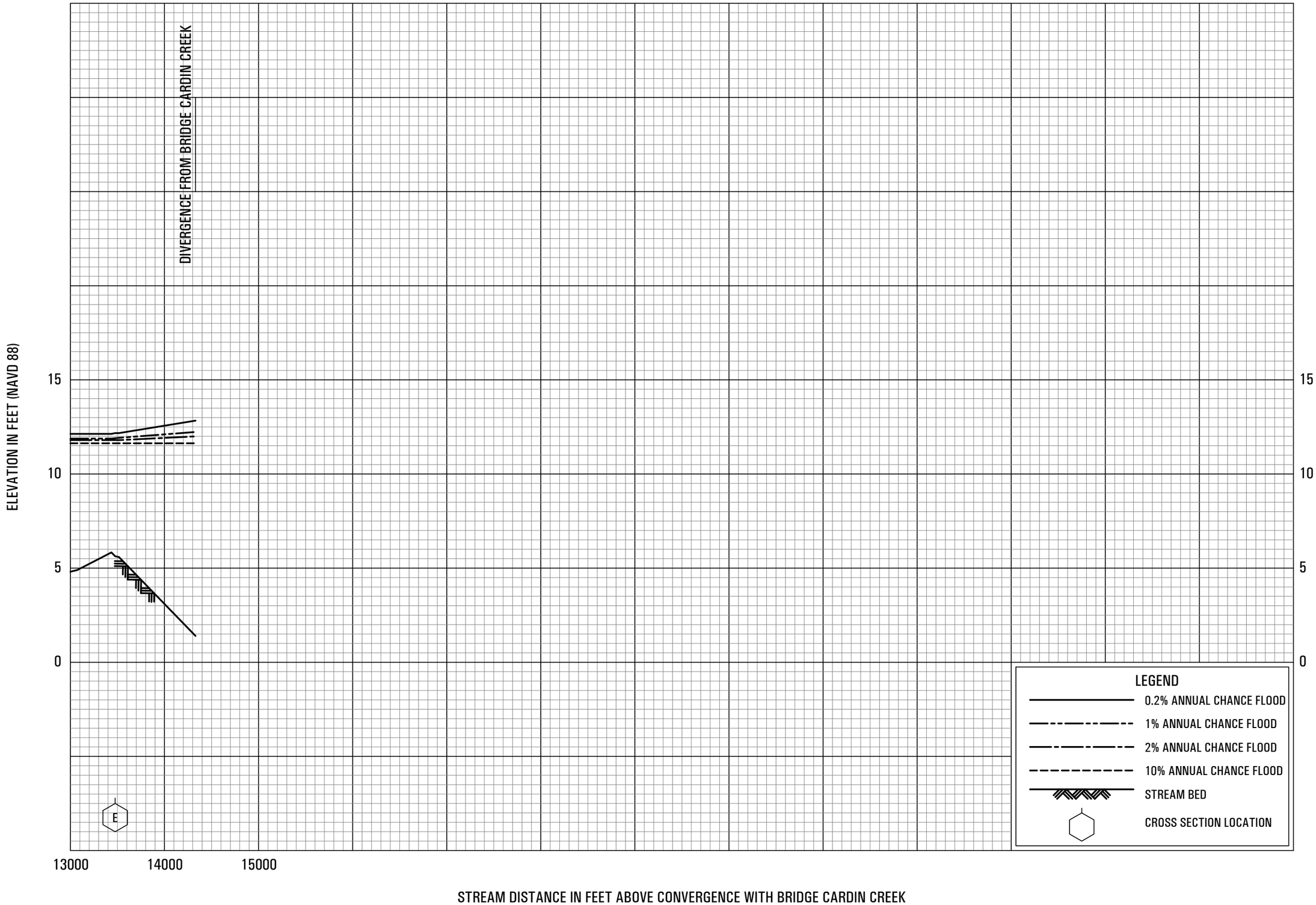
FLOOD PROFILES

UNNAMED TRIBUTARY 4 TO BRIDGE CARDIN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS



FLOOD PROFILES

UNNAMED TRIBUTARY 4 TO BRIDGE CARDIN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CHARLESTON COUNTY, SC

AND INCORPORATED AREAS