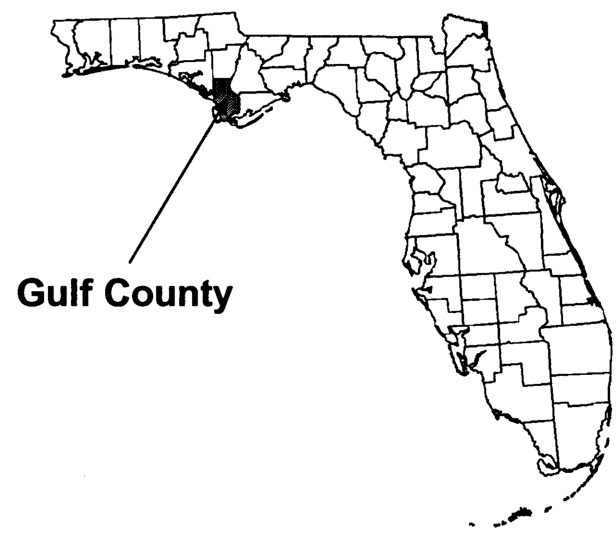
FLOOD INSURANCE STUDY

GULF COUNTY, FLORIDA
AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER
GULF COUNTY (UNINCORPORATED AREAS)	120098
PORT ST. JOE, CITY OF	120099
WEWAHITCHKA, CITY OF	120100

REVISED:
SEPTEMBER 28, 2007

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
12045CV000B

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 repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date:	November 7, 2002
Revised Countywide FIS Date(s):	September 28, 2007

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FLOOD INSURANCE STUDY
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1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) revision investigates the existence and severity of flood hazards in, or revises and updates the previous FIS and Flood Insurance Rate Map (FIRM) for the geographic area of Gulf County, Florida and incorporated areas, including: the Cities of Port St. Joe and Wewahitchka, and the unincorporated areas of Gulf County (hereinafter referred to collectively as Gulf County).

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

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

1.2 Authority and Acknowledgments

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

This FIS was prepared to include the unincorporated areas of, and incorporated communities within, Gulf County in a countywide format. 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.

Gulf County
(Unincorporated Areas): the hydrologic and hydraulic analyses for the FIS report dated December 15, 1982, were performed by Gee & Jenson Engineers-Architects-Planners, Inc., Study Contractor for the Federal Emergency Management Agency (FEMA), under Contract No. H-4625. That study was completed in December 1980.

Port St. Joe, City of:	the hydrologic and hydraulic analyses for the FIS report dated December 15, 1982, were performed by Gee & Jenson Engineers-Architects-Planners, Inc., Study Contractor for FEMA, under Contract No. H-4625. That study was completed in November 1980.
Wewahitchka, City of:	the hydrologic and hydraulic analyses for the FIS report dated November 17, 1981, were performed by Gee & Jenson Engineers-Architects-Planners, Inc., Study Contractor for FEMA, under Contract No. H-4625. That study was completed in March 1980.

For the November 7, 2002, countywide FIS, Woodward-Clyde Consultants was contracted by FEMA to perform the coastal flood studies of the Florida Panhandle under Contact No. EMW-95-C-4678/T0043. The coastal 1-percent-annual-chance Stillwater elevations and analyses were revised by Dewberry & Davis LLC, under subcontract to Woodward-Clyde Consultants. All work was completed in October 2000.

For this countywide revision, revised hydrologic and hydraulic analyses were prepared for FEMA by Dewberry & Davis LLC, as a sub-consultant to URS Corporation under contract with the Northwest Florida Water Management District (NFWMD), a FEMA Cooperating Technical Partner (CTP). All work was completed in September 2006.

The digital base map files were derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 2004 or later.

The coordinate system used for the production of the digital FIRM is State Plane in the Florida North projection zone, referenced to the North American Datum of 1983.

1.3 Coordination

Consultation Coordination Officer's (CCO) meetings may be held for each jurisdiction in this countywide FIS. An initial CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS, and to identify the streams to be studied by detailed methods. A final CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to review the results of the study.

For the pre-countywide studies of the unincorporated areas of Gulf County and the City of Port St. Joe, the initial CCO meeting was held on March 20, 1978, and the final CCO meeting was held on July 22, 1982. For the pre-countywide study of the City of Wewahitchka, the initial CCO meeting was held on March 20, 1978, and the final CCO meeting was held on May 11, 1981.

For the November 7, 2002, countywide FIS, Gulf County was notified by FEMA in a letter dated July 8, 1997, that the FIS would be revised based upon the analyses and investigations performed by FEMA's study contractor, Woodward-Clyde Consultants, and their sub-contractor Dewberry & Davis LLC. An intermediate coastal data submission meeting notification and transmittal with draft coastal hazard assessment work maps were sent to Gulf County and the City of Port St. Joe by FEMA on July 15, 1998. The intermediate meeting was held in Port St. Joe on August 27, 1998. The meeting was attended by representatives of the communities, FEMA, Dewberry & Davis LLC, and Woodward-Clyde Consultants. The purpose of the meeting was to update the communities on the progress of the study and to review the draft work maps depicting the revised coastal flood hazard assessments.

A final CCO meeting was held on February 10, 1999, and was attended by representatives of the City of Wewahitchka, City of Port St. Joe, the county, and FEMA. Final CCO meetings were also held on April 6, 2000, and January 18, 2001, and were attended by representatives of the county and FEMA.

For this revision to the countywide FIS, the initial CCO meeting was held on September 28, 2005, and was attended by officals from Gulf County, City of Port St. Joe, City of Wewahitchka, the NWFWMD, Dewberry & Davis LLC, and URS Corporation. The final CCO meeting was held on November 28, 2006, and was attended by officals from Gulf County, City of Port St. Joe, City of Wewahitchka, the NWFWMD, FEMA, FEMA's National Service Provider, Dewberry & Davis LLC, and URS Corporation.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Gulf County, Florida.

All or portions of the flooding sources listed below were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

Apalachicola River	Five Acre Farm Creek West	St. Joseph Bay
Chipola River	Gulf of Mexico	Stone Mill Creek
Dead Lake	Patton Bayou	Taylor Branch
Five Acre Farm Creek East		

For the November 7, 2002, countywide FIS, new detailed coastal flooding analyses were performed on the complete coastline of Gulf County, where the flooding sources are the Gulf of Mexico, Indian Lagoon, and St. Joseph Bay. Limits of the revised coastal analyses are outlined in Section 3.3, "Coastal Hydrologic Analyses."

For this revision to the countywide FIS, new detailed flooding analyses were performed for Five Acre Farm Creek East, Five Acre Farm Creek West and Stone

Mill Creek. Five Acre Farm Creek East was studied from its mouth at Lockey Lake to State Route 71. Five Acre Farm Creek West was studied from approximately 3,350 feet upstream of an unnamed road to State Route 71. Stone Mill Creek was studied from approximately 7,600 feet upstream of Dead Lake to approximately 1,600 feet downstream of South Diana Street.

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 flooding sources in the county were studied by approximate methods. Approximate 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 Gulf County.

2.2 Community Description

Gulf County is located in the Florida Panhandle approximately 60 miles southwest of Tallahassee and 15 miles east of Panama City. It is bounded on the east by Liberty County and Franklin County, on the north by Calhoun County, and on the west by Bay County. Major communities are the City of Wewahitchka, which is located in the northern portion near the Apalachicola River, and the City of Port St. Joe on St. Joseph Bay. Gulf County was formed in 1925 by the concession of 369,920 acres (578 square miles) from Calhoun County.

According to the U.S. Census Bureau, the population in 2000 was 13,332, which represents a 15.9% increase from 1990 to 2000.

The primary east-west artery serving the county is State Route 30 (U.S. Route 98) which provides interconnection to most of the coastal counties in the area. State Route 71 is the principal north-south road, utilized heavily for the industrial complex at the City of Port St. Joe. State Routes 386 and 22 are the other major roads. The Apalachicola Northern Railroad also serves the county. Port facilities at the City of Port St. Joe accommodate ocean going ships and barges, and the Gulf County Canal connects St. Joseph Bay with the Intracoastal Waterway near White City approximately six miles inland. The Intracoastal Waterway extends southeastward through Lake Wimico and the Brothers River to the Apalachicola River. The Apalachicola River is part of the extensive Flint-Chattahoochee River System with navigable channels as far north as Columbus, Georgia.

Residential and commercial development is centered around the Cities of Wewahitchka and Port St. Joe, with the coastal areas between Beacon Hill and Indian Pass also being populated. The major industry of the county is centered around the port facilities at the City of Port St. Joe with paper pulp and paper products being the chief commodities. Most other manufacturing operations are related to this activity. Other economic resources of the county include forestry, agriculture, fishing, seafood processing, and tourism.

The climate in Gulf County is relatively mild with mean annual temperatures in the upper 60s and average winter time temperatures about 48 to 50 degrees Fahrenheit. Temperatures in the summer months average in the low 80s, being moderated by sea breezes and frequent thunderstorms. Rainfall averages about 55 inches per year with the majority of the accumulation in July through September. Winds are generally southerly in summer months and northerly in winter months (References 1 and 2).

The terrain of the county is generally very low in elevation, sloping gently from the large, poorly-drained, swampy areas of elevations below ten feet North American Vertical Datum of 1988 (NAVD) (which extend eastward from the Apalachicola River) to higher areas in the northwest quadrant of the county that reach elevations of 60 feet NAVD. Higher elevations, ranging up to elevation of 20 feet NAVD or more, also exist along the coastal areas in the typically dune-type topography.

Coastal areas are subject to flooding and wave action resulting from hurricanes and tropical storms. The Apalachicola River, Chipola River, and Dead Lake are also a source of flooding in periods of heavy rainfall. The Apalachicola River is part of an extensive river system whose drainage area extends northward about 500 miles to a point near the northern Georgia border and encompasses an area of over 19,000 square miles. Other low-lying, poorly drained areas in the county are subjected to rainfall ponding.

2.3 Principal Flood Problems

General flooding in Gulf County results from periods of intense rainfall causing ponding and sheet-runoff in the low, poorly drained areas. The Intracoastal Waterway-Gulf County canal system passes through central Gulf County but does little to alleviate the county's drainage problem. The floodplains of the Apalachicola and Chipola Rivers and Dead Lake are also subject to flooding during high river stages. Coastal areas are subjected to flooding and wave action associated with hurricanes and tropical storms.

The eastern portion of the county lies within the floodplain of the Apalachicola River, and has been subject to several historical floods. The most remembered of these floods occurred in March of 1929, when the banks of the Apalachicola River overtopped and sent flood waters as far west as White City. More recent flooding in this portion of the county occurred in 1960 and 1966 from storms of a magnitude that would occur on the average once in ten years, and 20 years respectively (10 and 20 year recurrence intervals).

Flooding due to coastal storm surge occurred in October 1995 when Hurricane Opal made landfall northwest of Gulf County. High water marks compiled by FEMA and the U.S. Army Corps of Engineers, Mobile District, recorded a storm tide of 6.9 feet above National Geodetic Vertical Datum (NGVD) (approximate 75-year recurrence). Low lying coastal areas throughout the county experienced severe flooding effects from the storm surge.

Communities along the coastline in Gulf County are subject to widespread flooding resulting from storm surges that accompany hurricanes and other severe storms from the Gulf of Mexico, St. Joseph Bay, or both. Present conclusions about recurrent coastal elevations rely heavily on historical evidence from the continuous tidal records identified in Table 1. Areas near the beach may be subject to wave action and high velocity surges that can cause erosion and property damage.

For the November 7, 2002, FIS, in order to evaluate existing FIS coastal flood frequencies and revised 1-percent-annual-chance stillwater elevations, historical tide gauge water level records for the Florida Panhandle region were used. These water level records are shown in Table 1, "Historical Tide Gauge Water Level Records for Florida Panhandle Region."

TABLE 1 - HISTORICAL TIDE GAUGE WATER LEVEL RECORDS FOR FLORIDA PANHANDLE REGION

AGENCY and GAUGE I.D.	SITE NAME	LATITUDE	LONGITUDE	MEAN TIDE RANGE (FT)	PERIOD of RECORD
NOS 8728690	Apalachicola	29E 43.6' N	84E 58.9' W	1.11	1967-95
USACE 02359665	Panama City	30E09'22" N	85E 38'12" W	1.33	1935-95
NOS 8729108	Panama City	30E 09.1' N	85E 40.0' W	1.24	1975-95
NOS 8729210	Panama City Beach	~ 30.2E N	~ 85.8E W	1.25	1989-94
USACE 02366990	Destin/East Pass	30E23'20" N	86E 30'04" W	0.58	1957-94
NOS 8729681	Navarre Beach	30E 22.6' N	86E 51.9' W	0.74	1978-89
NOS 8729840	Pensacola	30E 24.2' N	87E 12.8' W	1.19	1923-95
USACE 02376083	Gulf Beach	30E18'50" N	87E 25'40" W	0.83	1940-95

Brief notes on the history and damages caused by hurricanes are abstracted from reports by the U.S. Army Corps of Engineers (USACE), Garriott, Sumner, and Patterson, Bailey, and Paulhus (References 3 and 4). Additional information on hurricane history and damages, particularly for recent storms, comes from papers published in the Monthly Weather Review, and other supplemental information and reports (References 5, 6, 7, and 8). The following gives the significant storms affecting the panhandle in this century. Damage figures are those determined for values at the time of the storm, and no attempt has been made to adjust these figures to present day values.

1975 Hurricane Eloise (September 13 to 24)

Making landfall approximately 40 miles west of Panama City, this storm produced highwater marks, ranging from 10 to 18 feet mean sea level (msl), between Destin and Port St. Joe. Damage to shorefront residential structure was extensive. High water marks compiled by the U.S. Army Corps of Engineers, Mobile District, indicated a storm tide of six feet above NGVD. Over 1.08 billion dollars of damage to residential and commercial property were claimed as a result of this storm.

1979 Hurricane Frederic (August 29 to September 14)

Making landfall west of Mobile Bay, in Alabama, this storm resulted in damage to shorelines, residential and commercial structures, along Mississippi, Alabama, as well as Escambia County, Florida shorelines. Dauphin Island, Alabama, sustained extensive damage, resulting from wind and the tidal surge from the Gulf of Mexico. Over 3.5 billion dollars in damage to residential and commercial property were claimed as a result of this storm.

1985 Hurricane Elena (August 29 to September 21)

Crossing the shoreline, near Gulfport, Mississippi, this storm resulted in damages to residential and commercial property in portions of Louisiana, Mississippi, Alabama and portions of the western panhandle of Florida. Since the storm's path ran parallel to the Florida shoreline, shorefront structures between Apalachicola and Pensacola Beach sustained significant damage. Nearly 1.4 billion dollars in damage to residential and commercial property were claimed as a result of this storm.

1985 Hurricane Kate (November 15 to 23)

The second hurricane of 1985 to affect the Florida panhandle was a Category 2 hurricane that made landfall near the City of Port St. Joe. With sustained winds approaching 100 miles an hour, this storm resulted in damaged to shoreline residential and commercial structures. Storm related damage was reported along eastern portions of the Florida panhandle, as well as in the City of Tallahassee and northward. Over 300 million dollars in damage to residential and commercial property were claimed as a result of this storm.

1994 Tropical Storm Alberto (June 30 to July 7)

While this storm made landfall near Pensacola Beach with only minor beach and structural damage reported, it stalled over portions of Alabama and Georgia, resulting in extensive flooding due to excessive rainfall. This flooding affected portions of the Florida panhandle, as well as portions of Alabama and Georgia. Storm related damage exceeded 500 million dollars.

1995 Hurricane Erin (August 3)

This storm made its second Florida landfall, as a weak Category 2 storm, near Fort Walton Beach, on August 3rd. Moderate beach erosion was sustained between

Navarre Beach and Pensacola Beach. Storm surges varied from 3 feet, in Pensacola Beach to 7 feet, in Navarre Beach. Damage to residential and commercial structures, resulting from hurricane force winds, affected over 2,000 structures within portions of the Cities of Pensacola and Mary Esther, as well as Pensacola Beach and Navarre Beach. Storm related damages to residential and commercial property, within the State of Florida, approached 30 million dollars.

1995 Hurricane Opal (October 5)

After briefly reaching Category 4 intensity in the Gulf of Mexico, Hurricane Opal made landfall as a Category 3 hurricane, near Pensacola Beach, on October 4th. Hurricane force winds were reported between Pensacola Beach and Cape San Blas, with sustained winds exceeding 100 miles per hour reported between the Cities of Destin and Panama City Beach. Beaches and dune systems, already weakened by Hurricane Erin, sustained extensive erosion and washover as a result of the storm. Storm surges varied between 5 and 14 feet, depending on location. Breaking waves in some areas added approximately 10 feet to the reported storm surge. High water marks above mean sea level varied from 10 feet in Pensacola Beach, to 18 feet in Panama City Beach, to over 21 feet in Walton County. Beach and dune erosion, as well as damage to commercial and residential structures, was reported to be extensive for shoreline areas of the Gulf of Mexico, as well as portions of shoreline areas of Pensacola Bay, Santa Rosa Sound, and Choctawhatchee Bay. Storm related damages to residential and commercial property exceeded 3 billion dollars.

2.4 Flood Protection Measures

Gulf County does not have any flood protection measures designed and constructed specifically for that purpose. The USACE designed and built the Jim Woodruff Lock and Dam which is located north of Gulf County on the Apalachicola River at the Florida/Georgia state line (Reference 9). This is approximately 108 miles north of the mouth of the Apalachicola River and approximately 45 miles north of the City of Wewahitchka in Gulf County. Construction of this dam was initiated in September 1947, and the impounding of water was begun in May 1954. Although the Jim Woodruff Dam was primarily designed for navigation purposes, it does offer a limited amount of flood regulation of the Apalachicola River. Because of the dam's geographical location, it provides minimal flood protection for Gulf County.

There is a private dike south of Wewahitchka which extends for several miles along the west bank of the Apalachicola River. This dike was constructed for agricultural purposes and was not engineered. It is anticipated that the dike will not have the integrity to offer protection during a 1-percent annual chance (100-year) flood stage.

A portion of the waterfront adjacent to the St. Joe Paper Mill is protected by a bulkhead. The City of Port St. Joe is additionally protected by its storm drainage system. The system is not designed to handle flooding from the 1-percent annual chance event but upon implementing the Storm Drainage Master Plan would suffice for most annual rainfall major flooding events.

St. Joseph Spit and Indian Peninsula offer some natural wave protection for the coastal areas along St. Joseph Bay and Indian Lagoon.

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 which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) 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 community 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.

Initial Countywide Analyses

The flows of the required frequencies for the Apalachicola and Chipola Rivers were based on statistical analyses of discharge records covering the 20-year period taken from the Blountstown, Florida gage (No. 0258700) on the Apalachicola River and the 42-year period for the Altha, Florida gage (No. 02359000) on the Chipola River. This statistical analysis is the standard log-Pearson Type III method as recommended by the Water Resources Council (Reference 10). The same was done for the Chipola River using the USGS gages at Altha, Florida (#02359000, 1922-1977) and Dead Lake (#02359100, 1965-1977).

The flood levels of the required frequencies for Taylor Branch were determined using a modification of the U.S. Department of Agriculture, Soil Conservation Service (SCS) procedure designated in Technical Release (TR) No. 55 (Reference 11). The modification includes the use of the Santa Barbara Urban Hydrograph, utilizing rainfall data calculated from the U.S. Weather Bureau Technical Papers 40 and 49 (References 12 and 13). The resultant peak discharges were then reduced to account for the amount of flow that is lost west of Catalpa Avenue and the ponding in the channel behind several restrictive culverts.

The approximate methods of analysis used the 100-year, 5-day storm to generate the flood levels. Synthetic Unit Hydrographs used in conjunction with an unpublished USACE frequency study were used in the Wetappo Creek and Odena areas. This hydrograph method combines rainfall data, calculated from the U.S. Weather Bureau's Technical Papers 40 and 49 (References 12 and 13), with basin characteristics such as drainage area, stream slope, soil cover, vegetation, and land use.

The detailed shallow flooding study south of the City of Port St. Joe was accomplished using a modified SCS method documented in its TR No. 55 (Reference 11). This method also uses rainfall data (as above), soil cover, drainage area, vegetation and land use characteristics in its volumetric stage-storage computations.

Revised Analyses

Five Acre Farm Creek East, Five Acre Farm Creek West and Stone Mill Creek were studied in detail using the HEC-HMS hydrologic model (Reference 14) with the NRCS Curve Number and TR-55 methodologies. No reservoir routing was performed in the watersheds.

A summary of the drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 2, "Summary of Discharges."

TABLE 2 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs*)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
APALACHICOLA RIVER					
At the confluence of Brothers River	18,163	157,680	198,675	215,675	254,845
At the confluence of Chipola River	17,963	156,650	197,365	214,245	253,150
At the confluence of the Chipola Cutoff	17,800	148,205	188,635	205,400	244,035
CHIPOLA RIVER					
Chipola Cutoff	1,206	119,420	129,220	134,320	148,780
Dead Lake	1,206	14,440	24,240	29,340	43,800
FIVE ACRE FARM CREEK EAST					
At the confluence of Lockey Lake	1.57	855	1152	1390	1724
FIVE ACRE FARM CREEK WEST					
Approximately 2,200 feet upstream of Unnamed Road	1.13	782	1030	1228	1504

TABLE 2 - SUMMARY OF DISCHARGES – continued

STONE MILL CREEK					
Approximately 1,600 feet downstream of Diana Street	57.9	9,216	12,669	15,926	21,433
TAYLOR BRANCH					
At Chipola River	1.35	333	631	824	1,184
State Road 71	0.42	78	188	259	390
Catalpa Avenue	0.25	30	133	185	292

*cubic feet per second

3.2 Riverine Hydraulic Analyses

Initial Countywide Analyses

Analyses of the hydraulic characteristics of flooding from the riverine sources studied were carried out to provide estimates of the elevations of the 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 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.

Cross sections for the water elevation analyses of the Apalachicola River and Chipola River were obtained by Aerial Survey Methods from photography flown in 1979 for upland areas and by field measurement below the water surface. Bridges were field checked to confirm elevation data and structural geometry.

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).

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the USACE HEC-2 step-backwater computer program (Reference 15). Flood profiles were drawn showing water-surface elevations for floods of the selected recurrence intervals. The starting water-surface elevations at the mouth of the Apalachicola and Chipola Rivers used in these calculations were determined from the slope/area method.

The backwater calculations indicated that stages on the Chipola River would be lower than stages on the Apalachicola River.

The results of the shallow flooding analysis indicated that the coastal surge events, as discussed in the following paragraphs, dominate south of the City of Port St. Joe, while the Apalachicola River has been shown to dominate near Odena.

The stages on Wetappo Creek were computed by normal depth calculations.

Channel roughness factors (Manning's "n") used in hydraulic computations were chosen based on aerial photography and field observations of the streams and floodplain areas. This measure of roughness for the main channel of the Apalachicola River ranges from 0.040 to 0.065 with floodplain roughness values ranging from 0.090 to 0.130 for all floods. Roughness values for the main channels of the Chipola River and Taylor Branch range from 0.050 to 0.060 and from 0.012 to 0.080, respectively, with floodplain roughness values ranging from 0.100 to 0.120 and 0.012 to 0.100, respectively.

The acceptability of the above hydraulic factors, cross sections, and hydraulic structure data was checked using these computations and comparing the results to known historic storms and the resulting flood elevations.

Revised Analyses

New riverine hydraulic analysis was performed along Five Acre Farm Creek East, Five Acre Farm Creek West and Stone Mill Creek. HEC-RAS version 3.1.3 (Reference 16) was used to model the hydraulic characteristics of these streams. Cross sections and hydraulic structures were ground surveyed and used to build the HEC-RAS models. Channel roughness values for Five Acre Farm Creek East, Five Acre Farm Creek West and Stone Mill Creek were 0.060, 0.040, and 0.050 respectively. Floodplain roughness values ranged from 0.100 to 0.120 for Five Acre Farm Creek East and Five Acre Farm Creek West, and a constant floodplain roughness value of 0.120 was used for Stone Mill Creek. The starting water-surface elevations were determined using the normal depth method.

The hydraulic analyses for the riverine portion of 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.

3.3 Coastal Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for each flooding source studied in detail affecting the county. Establishing appropriate relationships has been an iterative process, and the following material describes successive stages of analyses reaching present conclusions.

Precountywide Analyses

Inundations from the Gulf of Mexico and St. Joseph Bay caused by passage of storms (storm surge) previously had been determined by the joint probability method (Reference 17). The storm populations were described by probability distributions of 5 parameters that influence surge heights. These were central pressure depression (which measures the intensity of the storm), radius to maximum winds, forward speed of the storm, shoreline crossing point, and crossing angle. These characteristics were described statistically based on an analysis of observed storms in the vicinity of Gulf County. Primary sources of data for this were obtained from two U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) reports (References 18 and 19). A summary of the parameters used for the area is presented in Table 3, "Parameter Values for Surge Elevations."

CENTRAL PRESSURE DEPRESSION (MILLIBARS)	29.47	29.20	28.94	28.67	28.41	28.14	27.88	27.61
ASSIGNED PROBABILITIES[1]	0.30	0.30	0.055	0.115	0.090	0.035	0.070	0.070
STORM RADIUS TO MAXIMUM WINDS (NAUTICAL MILES)	11.0			20.5			30.0	
PROBABILITY[1]	0.26			0.52			0.22	
FORWARD SPEED (KNOTS)	6.0			11.5			17.0	
PROBABILITIES: ENTERING	0.24			0.64			0.12	
ALONGSHORE								
EXITING	0.39			0.35			0.26	
DIRECTION OF STORM PATH (DEGREES FROM TRUE NORTH)	10		50		290		330	
PROBABILITY[1]	0.25		0.18		0.25		0.32	
FREQUENCY OF STORM OCCURRENCE (STORM/NAUTICAL MILE/YEAR)								

[1]AVERAGE OF ENTERING, ALONGSHORE, AND EXITING PROBABILITIES

FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL AND INCORPORATED AREAS

PARAMETER VALUES FOR SURGE ELEVATIONS

TABLE 3

For areas subject to flooding directly from the Gulf of Mexico and St. Joseph Bay, the FEMA standard surge model was used to simulate the coastal surge generated by any chosen storm (that is, any combination of the 5 storm parameters defined in Table 3). By performing such simulations for a large number of storms, each of known total probability, the frequency distribution of surge height can be established as a function of coastal location. These distributions incorporate large-scale surge behavior, but do not include an analysis of the added effects associated with much finer scale wave phenomena, such as wave height or runup. As the final step in the calculations, the astronomic tides for the region were statistically combined with the computed storm surge to yield recurrence intervals of total water level.

The model utilized a grid pattern approximating the geographical features of the study area and the adjoining areas. Surges were computed utilizing grids of 5 statute miles and 1 statute mile, depending on the resolution required. Underwater depths and land heights for the model grid system were obtained from topographic mapping at a scale of 1:24,000 with contour intervals of 5 and 10 feet (Reference 20).

Shoreline areas of Gulf County are primarily subject to coastal storm surge flooding from the Gulf of Mexico and St. Joseph Bay. Detailed analyses of the shoreline characteristics were carried out to provide the estimates of the elevations of floods of the selected recurrence intervals. The U.S. Department of Housing and Urban Development's standard coastal storm surge model (References 21 and 22) was utilized to determine these flood levels. This model is a numerical hydrodynamic computer model, which calculates the coastal storm surge generated by the simulated storms.

Before applying the numerical model to the study area, several recent hurricanes which have affected the northwest Florida coast were simulated for verification purposes. Surge elevations computed by the numerical model were compared to recorded tide gage heights and high water marks at several locations in northwest Florida. The results for Gulf County are shown in Table 4, "High Water Marks."

TABLE 4 - HIGH WATER MARKS

STORM	LOCATION	COMPUTED BY NUMERICAL MODEL PLUS PREDICTED TIDE	OBSERVED
Eloise 1975	Beacon Hill	6.4	10.7(a), 9.6(a), 8.1(a)
	City of Port St. Joe	6.4	6.6(a), 5.8(a), 5.2(a) 6.7(c), 6.7(c), 6.5(c), 6.9(c), 6.4(c)
	Cape San Blas	7.2	7.5(a), 6.1(a)
	Money Bayou	3.9	5.7(a)
Frederic 1979	City of Port St. Joe	3.8	3.8(b), 3.5(b)

Source:
(a) High water marks, U.S. Army Corps of Engineers, Mobile District.
(b) Data from tide gage, Gee & Jenson Engineers-Architects-Planners, Inc., West Palm Beach, Florida.
(c) High water marks - supplied by local residents of the City of Port St. Joe and surveyed by Florida Engineering Associates, Inc.

Initial Countywide Analyses

The original surge model study was recognized to provide unrealistic flood elevations in view of severe impacts within Gulf County from the 1979 Hurricane Frederic (Reference 23). Flooding assessments were then revised to reflect upward adjustments to coastal stillwater elevations, inclusion of wave setup, and an erosion treatment for barrier island beaches and dunes. However, experience with the 1995 Hurricane Opal and further review of the available historical record demonstrated the need to reexamine conclusions about coastal flood elevations in Gulf County. The flooding effects from Hurricane Opal were primarily felt in the Okaloosa, Walton, and Bay County area, although significant coastal inundations, beach erosion and wave damages were experienced along the entire Florida Panhandle region. In order to provide an update to the storm hydrology for the study area without completing an entire storm surge model restudy, this revision relied heavily upon the use of historical flood tide data collected along the Florida Panhandle region by NOAA, the USACE, the Hurricane Opal flood inundation investigation, and high water mark data collection performed by FEMA and the USACE.

Most recent investigations for this revision reviewed available reports and extensive historical data, including storm surge and wave effects along the Florida Panhandle coast from Hurricane Opal on October 4, 1995. Existing data and studies include the report on Opal's basic meteorology by the National Hurricane Center (NHC), a hindcast for Gulf of Mexico wave action by the Coastal Engineering Research Center (CERC), and a NOAA simulation of coastal storm surge using the numerical

Sea, Lake, and Overland Surges for Hurricanes (SLOSH) model. Other primary data comprised of long-term and Opal-related measurements of wave characteristics at offshore sites (over 25 total years of wave records) by the National Data Buoy Center (NDBC); historical tide gauge data for water levels at coastal sites (over 275 total years of tide records) by the National Ocean Service (NOS) and the USACE (Table 1); post-Opal coastal dune erosion assessments recorded by the Florida Department of Environmental Protection (FDEP); and post-Opal high water mark surveys and coastal inundation mapping performed by FEMA and the USACE, Mobile District.

From those investigations, wave setup was determined to significantly contribute to the total stillwater flood levels along the Gulf of Mexico coastline. The amount of wave setup was calculated using the methodology outlined in the USACE publication Shore Protection Manual (Reference 24).

The storm surge elevations for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods have been determined for the Gulf of Mexico and St. Joseph Bay and are shown in Table 5, "Summary of Coastal Stillwater Elevations." Stillwater elevations were revised for the entire shoreline of St. Joseph Bay and for the shoreline of the Gulf of Mexico from the Bay/Gulf County boundary to a point approximately 2.8 miles south of the county boundary measured along the shoreline. Stillwater elevations for the Gulf of Mexico shoreline along St. Joseph Peninsula and extending to the Gulf/Franklin County boundary remain unchanged from those determined by the storm surge modeling of the precountywide coastal flood studies.

TABLE 5 - SUMMARY OF COASTAL STILLWATER ELEVATIONS

FLOODING SOURCE AND LOCATION	ELEVATION (feet NAVD)			
	10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
GULF OF MEXICO				
Open coast shoreline from SR 386 to the south side of Saint Joe Beach	3.5	6.3	10.0[1]	10.3
Open coast shoreline of St. Joseph Peninsula starting at St. Joseph Point and extending south for approximately 4.7 miles	3.0	5.1	8.2[1]	7.1
Open coast shoreline of St. Joseph Peninsula starting approximately 4.7 miles south of St. Joseph Point and ending approximately 8.3 miles south of St. Joseph Point	2.8	4.8	7.9[1]	6.6

[1]Includes wave setup of 2.5 feet

TABLE 5 - SUMMARY OF COASTAL STILLWATER ELEVATIONS - continued

FLOODING SOURCE AND LOCATION	ELEVATION (feet NAVD)			
	10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
GULF OF MEXICO/ ST. JOSEPH BAY				
Open coast shoreline of St. Joseph Peninsula starting approximately 8.3 miles south of St. Joseph Point and ending at Cape San Blas	2.9	4.8	7.6[1]	6.3
Open coast shoreline starting at Cape San Blas and extending east approximately 2.2 miles	3.2	5.0	7.5[1]	6.9
Entire shoreline of St. Joseph Bay within Gulf County and incorporated areas	3.5	6.3	7.5	10.3
INDIAN LAGOON				
Open coast shoreline starting approximately 2.2 miles east of Cape San Blas and extending east to Indian Pass Road	3.4	5.5	8.6[1]	7.2

[1]Includes wave setup of 2.5 feet

3.4 Coastal Hydraulic Analyses

Hydraulic analyses, considering storm characteristics and the shoreline and bathymetric characteristics of the flooding sources studied, were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of the shorelines. Users of the FIRM should also be aware that coastal flood elevations are provided in the Summary of Stillwater Elevations table in this report. If the elevation on the FIRM is higher than the elevation shown in this table, a wave height, wave runup and/or wave setup component likely exists, in which case, the higher elevation should be used for construction and/or floodplain management purposes.

Precountywide Analyses

The numerical model for this region included a five nautical mile square grid for the adjacent Gulf of Mexico, which was reduced to a two nautical mile square grid for St. Joseph Bay. St. Joseph Spit and Cape San Blas were incorporated into the model with representative elevations and friction factors.

Inland routing of the coastal storm surge along the eastern shore of St. Joseph Bay and Indian Lagoon was accomplished using information taken from aerial topographic maps (1979) with a contour interval of two feet (Reference 25), topographic maps (1976) supplied by St. Joseph Bay Estates with a contour interval of one foot (Reference 26), and other assorted aerial photography such as the USGS orthophoto quadrangle sheets (Reference 27). Inland routing for St. Joseph Spit and Cape San Blas was accomplished using both USGS 7.5-minute series quadrangles with contour intervals of 5 and 10 feet (Reference 20), and USGS orthophoto quadrangles.

The variation of the stillwater elevations along the coast is mainly attributed to the offshore bathymetry. The shallow bathymetry in the eastern region tends to increase surge elevations due to increased effects of bottom and wind friction. The relatively deep bathymetry in the western region tends to decrease the effect of bottom and wind friction, resulting in low surge elevations. Other features such as constrictive bays, passes and barrier islands have localized effects on the surge elevations.

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 (Reference 28). This method is based on the following major concepts. First, depth-limited waves in shallow water reach a 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 due to the presence 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 prescribed in Reference 30 by the National Academy of Sciences. The third major concept is that wave height can be regenerated in open fetch areas due to the transfer of wind energy to the water. This added energy is related to fetch length and depth.

Wave heights were computed along transects (cross section lines) that were located along coastal and inland bay areas of Gulf County, as illustrated in Figure 1, "Transect Location Map". 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. Transects were spaced close together in areas of complex topography and dense development. In areas having more uniform characteristics, they were spaced at larger intervals. It was necessary to locate transects in area where unique flooding existed and in areas where computed wave heights varied significantly between adjacent transects.

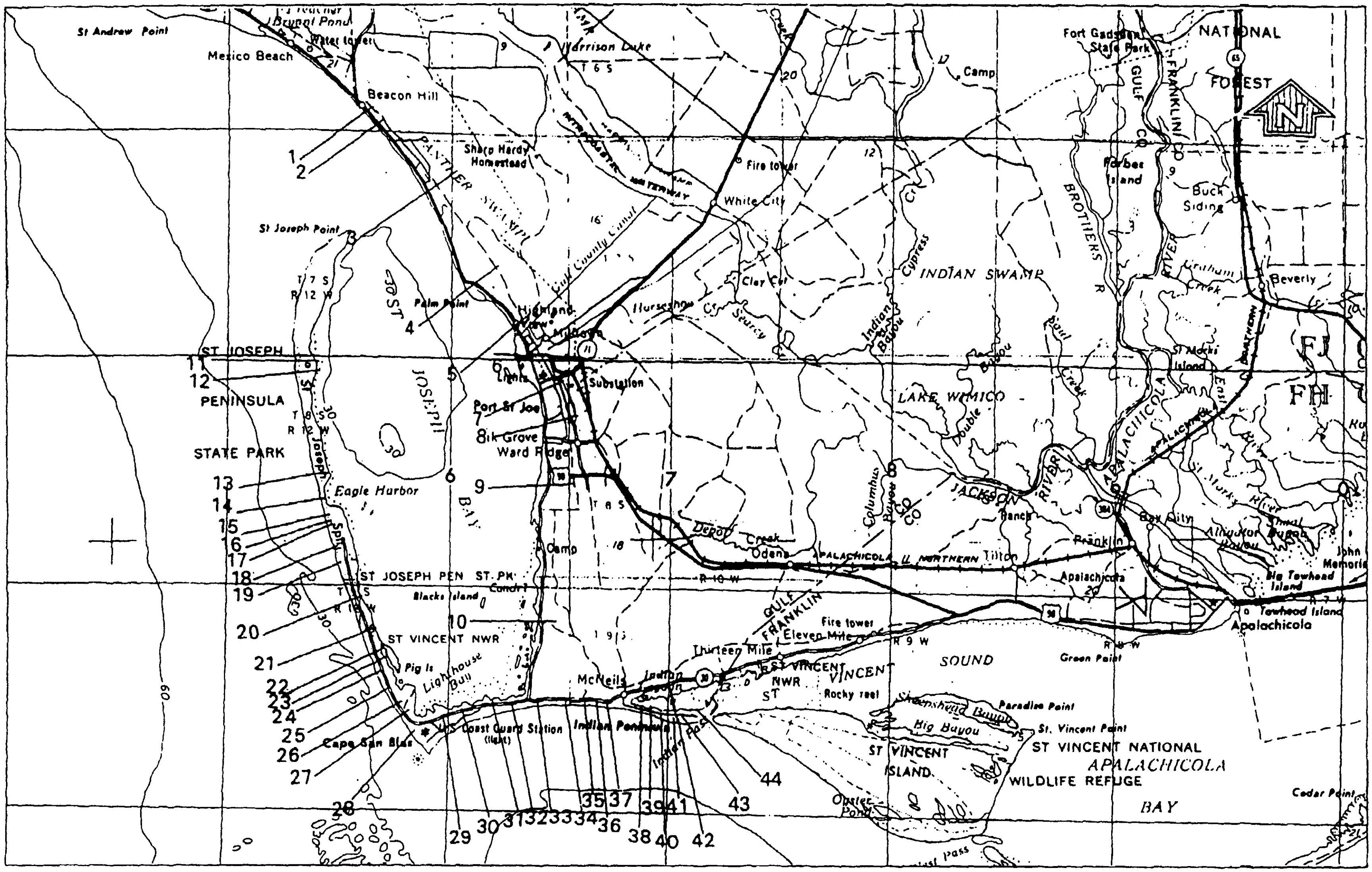


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL AND INCORPORATED AREAS

TRANSECT LOCATION MAP

Initial Countywide Analyses

This countywide FIS includes a technical wave height analysis using the revised and previously determined 1-percent-annual-chance flood elevations as described in Section 3.3 above. The analysis was performed as specified in FEMA's Guidelines and Specifications for Wave Elevation Determination and V-Zone Mapping (Reference 29). This countywide FIS updates the existing FIS on the basis of the post-Hurricane Opal investigations and FEMA's updated definition of "coastal hazard areas" and "primary frontal dunes," field investigations, and development of topography and aerial photography.

As of 1989, FEMA defines a "coastal high hazard area" as an area of special flood hazards extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action (i.e., wave heights greater than or equal to 3 feet) from storms or seismic sources. The "primary frontal dune" is defined as a continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves during major coastal storms, such as hurricanes. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.

Some dunes in Gulf County were found to be sufficient enough in size to sustain wave attack, while others were subjected to failure due to wave attacks, erosion and overtopping. Therefore, using standard erosion analysis procedures as outlined in the Guidelines and Specifications for Wave Elevation Determination and V-Zone Mapping (Reference 29), dune erosion and retreat were used in developing the eroded profiles. Data used to develop the transects were compiled from various sources, including topographic maps and FDEP aerial photography and surveys.

The wave height transects for this countywide FIS were located along the coastline of the Gulf of Mexico, from the northwestern-most county limits with Bay County to the St. Joseph Bay shoreline south of Port St. Joe, along the entire barrier island coastline of the St. Joseph Peninsula, and along the barrier island coastline of the Gulf of Mexico from St. Joseph Peninsula to the eastern-most county limits with Franklin County. For the coastal beaches and barrier islands, the FEMA erosion treatment (540 square foot method) was performed to adjust the wave transect profiles to an eroded condition before conducting the wave height or wave runup analyses using the FEMA wave height analysis models (WHAFIS 3.0 and RUNUP 2.0). For each coastal transect without overtopping by the 1-percent-annual-chance stillwater elevation, wave runup analyses were conducted using the FEMA wave runup model (RUNUP 2.0).

Each transect was taken perpendicular to the shoreline and extended inland to a point where wave action ceased. Along each transect, wave heights, runup depths, and elevations were computed considering the combined effects of changes in ground elevation, vegetation, beach slope, and physical features. The stillwater elevations for the 1-percent-annual-chance flood were used as the starting elevations for these computations. Wave heights and runup depths 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 V zone (area with velocity wave action) was also computed at each transect.

The transect data is presented in Table 6, "Transect Descriptions," which describes the location of each transect. In addition, Table 6 provides the Gulf of Mexico 1-percent-annual-chance stillwater and maximum 1-percent-annual-chance wave crest elevations for each transect along with the corresponding inland bay or soundside 1-percent-annual-chance stillwater and maximum wave crest elevation.

TABLE 6 - TRANSECT DESCRIPTIONS

		ELEVATION (feet NAVD)	
TRANSECT	LOCATION	1-PERCENT STILLWATER	MAXIMUM 1-PERCENT WAVE CREST[2]
1	At shoreline of Gulf of Mexico, in the Unincorporated Areas of Gulf County, approximately 750 feet south of the Gulf/Bay County line, measured along the shoreline	10.0[1]	15.6
2	At shoreline of Gulf of Mexico, in the Unincorporated Areas of Gulf County, approximately 2,850 feet south of the Gulf/Bay County line, measured along the shoreline	10.0[1]	15.6
3	At shoreline of Gulf of Mexico, in the Unincorporated Areas of Gulf County, approximately 2.8 miles south of the Gulf/Bay County line, measured along the shoreline	10.0[1]	15.6
4	At shoreline of St. Joseph Bay, approximately 2.3 miles north of U.S. Route 98 bridge over Gulf County Canal, measured along the shoreline	7.5	11.5

[1]Includes wave setup of 2.5 feet
[2]Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM

TABLE 6 - TRANSECT DESCRIPTIONS - continued

TRANSECT	LOCATION	ELEVATION (feet NAVD) 1-PERCENT STILLWATER	ELEVATION (feet NAVD) MAXIMUM 1-PERCENT WAVE CREST[2]
5	At shoreline of St. Joseph Bay, just south of Scamp Street	7.5	11.5
6	At shoreline of St. Joseph Bay, approximately 2,200 feet south of U.S. Route 98 bridge over Gulf County Canal	7.5	11.5
7	At shoreline of St. Joseph Bay, approximately 1.5 miles south-southeast of U.S. Route 98 over Gulf County Canal	7.5	11.5
8	At shoreline of St. Joseph Bay, approximately 0.78 mile north of intersection of U.S. Route 98 and Madison Street	7.5	11.5
9	At shoreline of St. Joseph Bay, approximately 2,250 feet southwest of intersection of U.S. Route 98 and State Highway 30	7.5	11.4
10	At shoreline of St. Joseph Bay, approximately 1.1 miles south-southwest of intersection of Country Club Road and State Highway 30	7.5	11.4
11	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 4.67 miles south of St. Joseph Point, measured along the shoreline	8.2[1]	12.9
12	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 5.25 miles south of St. Joseph Point, measured along the shoreline	7.9[1]	12.4

[1]Includes wave setup of 2.5 feet
[2]Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM

TABLE 6 - TRANSECT DESCRIPTIONS - continued

TRANSECT	LOCATION	ELEVATION (feet NAVD) 1-PERCENT STILLWATER	MAXIMUM 1-PERCENT WAVE CREST[2]
13	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 1.7 miles north, along CR C30-E Road, from entrance gate	7.6[1]	12.0
14	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.9 mile north, along CR C30-E Road, from entrance gate	7.6[1]	12.0
15	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.2 mile northwest of intersection of Bent Tree Road and Cross Creek Lane	7.6[1]	12.0
16	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.25 mile northwest of intersection of Secluded Dunes Drive and Seacliff Drive	7.6[1]	12.0
17	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 350 feet west of intersection of Sabal Circle and Myrtle Street	7.6[1]	12.0
18	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.24 mile southwest of intersection of CR C30-E Road and Seacliff Drive	7.6[1]	12.0

[1]Includes wave setup of 2.5 feet
[2]Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM

TABLE 6 - TRANSECT DESCRIPTIONS - continued

TRANSECT	LOCATION	ELEVATION (feet NAVD) 1-PERCENT STILLWATER	MAXIMUM 1-PERCENT WAVE CREST[2]
19	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 700 feet southwest of intersection of Shoreline Drive and Sago Avenue	7.6[1]	12.0
20	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.46 mile south-southeast of intersection of Port Street and Windward Street	7.6[1]	12.0
21	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.31 mile northwest of intersection of CR C30-E Road and Haven Road	7.6[1]	12.0
22	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.21 mile southwest of intersection of CR C30-E Road and Haven Road	7.6[1]	12.0
23	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.27 mile southwest of intersection of CR C30-E Road and Cancun Drive	7.6[1]	12.0
24	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 700 feet northwest of intersection of CR C30-E Road and Schooner Way	7.6[1]	12.0

[1]Includes wave setup of 2.5 feet
[2]Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM

TABLE 6 - TRANSECT DESCRIPTIONS - continued

TRANSECT	LOCATION	ELEVATION (feet NAVD) 1-PERCENT STILLWATER	ELEVATION (feet NAVD) MAXIMUM 1-PERCENT WAVE CREST[2]
25	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 800 feet southeast of intersection of Barnacle Drive and CR C30-E Road	7.6[1]	12.0
26	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.43 mile northwest of Stump Hole	7.6[1]	12.0
27	On St. Joseph Peninsula at shoreline of Gulf of Mexico at Stump Hole	7.6[1]	12.0
28	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.42 mile southeast of Stump Hole	7.6[1]	12.0
29	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.84 mile southwest of intersection of Sandpiper Road and West Sand Dollar Way	7.5[1]	11.8
30	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 900 feet south of intersection of Sandpiper Road and West Sand Dollar Way	8.0[1]	12.0
31	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.26 mile southeast of intersection of CR C30-E Road and Boardwalk Avenue	8.4[1]	13.2

[1]Includes wave setup of 2.5 feet
[2]Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM

TABLE 6 - TRANSECT DESCRIPTIONS - continued

TRANSECT	LOCATION	ELEVATION (feet NAVD) 1-PERCENT STILLWATER	MAXIMUM 1-PERCENT WAVE CREST[2]
32	On St. Joseph Peninsula at shoreline of Gulf of Mexico, approximately 0.43 mile southeast of intersection of CR C30-E Road and Florida Avenue	8.6[1]	13.5
33	At shoreline of Gulf of Mexico, approximately 650 feet south-southeast of intersection of Ski Breeze Circle and CR C30 Road	8.6[1]	13.5
34	At shoreline of Gulf of Mexico, approximately 0.63 mile west of confluence of Money Bayou	8.6[1]	13.5
35	At shoreline of Gulf of Mexico, approximately 600 feet west of confluence of Money Bayou	8.6[1]	13.5
36	At shoreline of Gulf of Mexico, approximately 550 feet southwest of intersection of Griffin Avenue and Hall Street	8.6[1]	13.5
37	At shoreline of Gulf of Mexico, approximately 0.20 mile southwest of intersection of Treasure Drive and Canoe Lane	8.6[1]	13.5
38	At shoreline of Gulf of Mexico, approximately 900 feet southeast of intersection of Treasure Drive and Canoe Lane	8.6[1]	13.5
39	At shoreline of Gulf of Mexico, approximately 0.34 mile southeast of intersection of CR C30-B Road and Painted Pony Road	8.6[1]	13.5

[1]Includes wave setup of 2.5 feet
[2]Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM

TABLE 6 - TRANSECT DESCRIPTIONS - continued

TRANSECT	LOCATION	ELEVATION (feet NAVD) 1-PERCENT STILLWATER	MAXIMUM 1-PERCENT WAVE CREST[2]
40	At shoreline of Gulf of Mexico, approximately 0.7 mile west-southwest of intersection of CR C30-B Road and Redbird Lane	8.6[1]	13.5
41	At shoreline of Gulf of Mexico, approximately 0.3 mile south of intersection of CR C30-B Road and South Palm Street	8.6[1]	13.5
42	At shoreline of Gulf of Mexico, approximately 0.23 mile southeast of intersection of CR C30-B Road and South Osceola Street	8.6[1]	13.5
43	At shoreline of Gulf of Mexico, approximately 0.40 mile east of intersection of CR C30-B Road and South Osceola Street	8.6[1]	13.5
44	At shoreline of Gulf of Mexico/ Indian Pass, approximately 300 feet southwest of terminus of CR C30-B Road	8.6[1]	13.5

In addition to the wave height analysis, wave runup was examined along the Gulf of Mexico shoreline of Gulf County. Wave runup was computed using the methodology presented in the Shore Protection Manual (Reference 24). In areas where a wave runup depth of 3 feet existed further inland than the inland penetration of the 3-foot breaking wave depth, the base flood elevation was established from the wave runup analysis.

Figure 2, "Transect Schematic," represents a sample transect that illustrates the relationship between the stillwater elevation, the wave crest elevation, the ground elevation profile, and the location of the A/V zone boundary.

In Table 7, "Transect Data," the flood hazard zone and base flood elevations for each transect flooding source is provided, along with the 1-percent-annual-chance stillwater elevation for the respective flooding source.

TABLE 7 - TRANSECT DATA

FLOODING SOURCE	STILLWATER ELEVATION (feet NAVD) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT	ZONE	BASE FLOOD ELEVATION (feet NAVD)[2]
GULF OF MEXICO						
1-2	3.5	6.3	10.0[1]	10.3	VE	13-16
					AE	11-12
3	3.5	6.3	10.0[1]	10.3	VE	13-16
					AE	11-12
			7.5		AE	8
ST. JOSEPH BAY						
4-10	3.5	6.3	7.5	10.0	VE	10-12
	3.5	6.3	7.5	10.0	AE	8-10
GULF OF MEXICO						
11	3.5	6.3	8.2[1]	10.3	VE	11-16
					AE	9-11
			5.7		AE	6-8
12	3.5	6.3	7.9[1]	10.3	VE	11-13
					AE	8-10
			5.4		AE	6-7
13-28	3.5	6.3	7.6[1]	10.3	VE	10-12
					AE	8-10
			5.1		AE	6-7
29	3.5	6.3	7.5[1]	10.3	VE	10-12
					AE	8-10
			5.0		AE	6-7
30	3.5	6.3	8.0[1]	10.3	VE	11-14
					AE	9-10
			5.0		AE	6-7
31	3.5	6.3	8.4[1]	10.3	VE	11-14
					AE	9-10
			5.0		AE	6-7

[1]Includes wave setup of 2.5 feet
[2]Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted

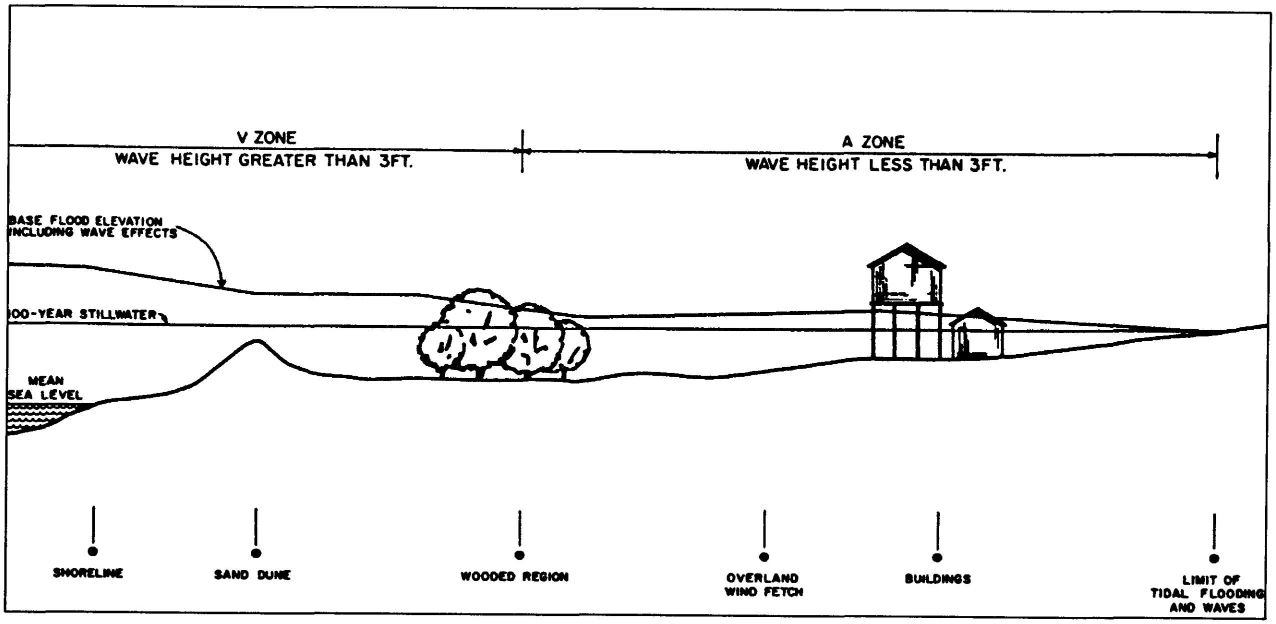
TABLE 7 - TRANSECT DATA - continued

FLOODING SOURCE	STILLWATER ELEVATION (feet NAVD) 10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT	ZONE	BASE FLOOD ELEVATION (feet NAVD)[2]
GULF OF MEXICO						
32-44	3.5	6.3	8.6[1]	10.3	VE	11-14
					AE	7-11
			6.1		AE	7
INDIAN LAGOON						
39-44	4.8	7.7	8.4	9.6	VE	11
					AE	9-11

[1]Includes wave setup of 2.5 feet
[2]Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted

After analyzing wave heights and wave runup along each transect, wave elevations were interpolated between transects. Various source data were used in the interpolation, including topographic maps, FDEP aerial photography and surveys, and engineering judgment (References 20 and 30). Controlling features affecting the elevations were identified and considered in relation to their positions at a particular transect and their variations between transects. In addition to the wave height analysis, wave runup was examined along the Gulf of Mexico coastline of Gulf County. The areas of Gulf County affected by wave runup are included in Tables 6 and 7.

All elevations are referenced to NAVD.



TRANSECT SCHEMATIC Figure 2

3.5 Vertical Datum

All FISs 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 FISs and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD 29). With the finalization of the North American Vertical Datum of 1988 (NAVD 88), many FIS reports and FIRMs are being prepared using NAVD 88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD 88. Structure and ground elevations in the community must, therefore, be referenced to NAVD 88. It is important to note that adjacent communities may be referenced to NGVD 29. This may results in differences in base flood elevations across corporate limits between the communities.

Prior versions of the FIS report and FIRM were referenced to NGVD 29. When a datum conversion is effected for an FIS report and FIRM, the Flood Profiles, Base Flood Elevations (BFEs) and Elevation Reference Marks (ERMs) reflect new datum values. To compare structure and ground elevations to 1% annual chance flood elevations shown in the FIS and on the FIRM, the subject structure and ground elevation must be referenced to the new datum values.

As noted above, the elevations shown in the FIS report and on the FIRM for Gulf County, Florida and incorporated areas are referenced to NAVD 88. Ground, structure, and flood elevations may be compared and/or referenced to NGVD 29 by applying a standard conversion factor. The conversion factor to NGVD 29 is

+0.52. The BFEs shown on the FIRM represent whole-foot rounded values. For example, a BFE of 102.4 will appear as 102 on the FIRM and 102.6 will appear as 103. Therefore, users that wish to convert the elevations in the FIS to NGVD 29 should apply the stated conversion factor to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1 foot. Figure 3 illustrates the differences in BFEs due to the datum conversion.

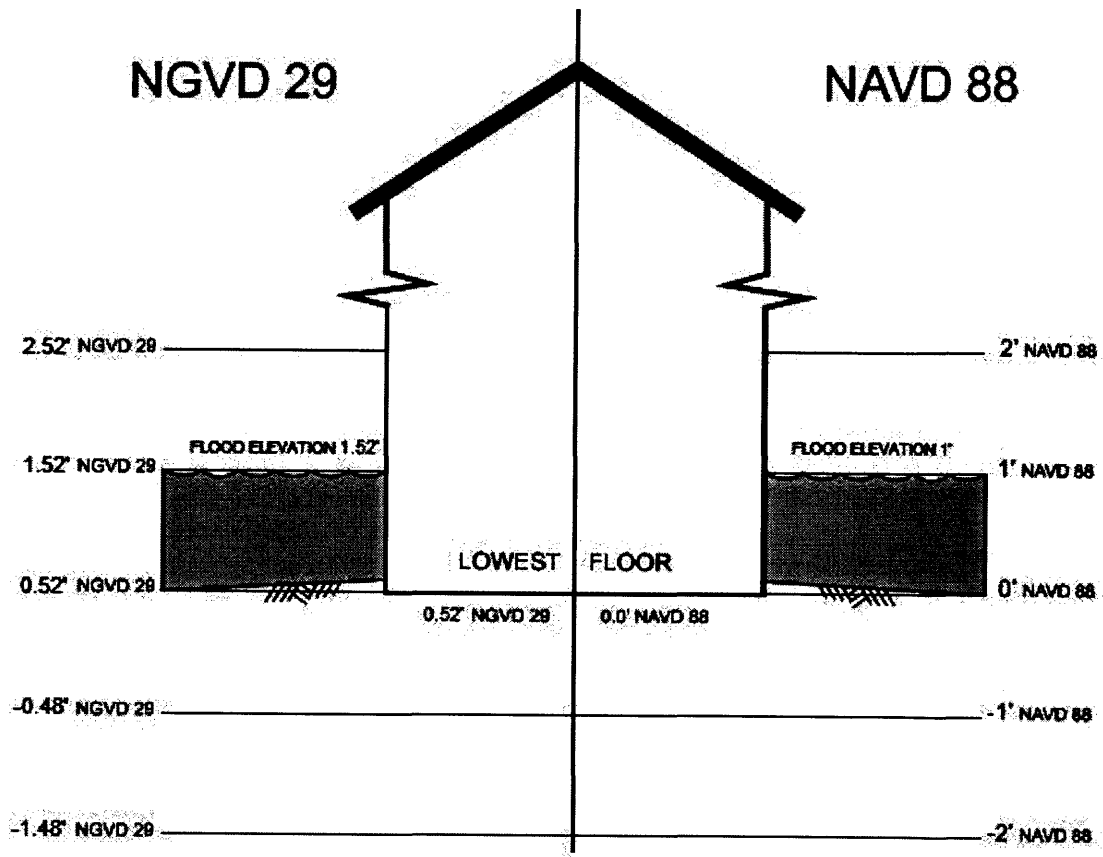


Figure 3 – Datum Conversion Schematic

For more information on NAVD 88, see *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988*, FEMA Publication FIA-20/June 1992, or contact the Vertical Network Branch, National Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, MD (http://www.ngs.noaa.gov).

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-percent 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 (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance (500-year) flood is employed to indicate additional areas of flood risk in the county. For each stream studied in detail, the 1-percent and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic manuscripts at a scale of 1"=800' with contour intervals of 2 feet (U.S. Department of Housing and Urban Development, April 1979), the USGS 7.5-Minute Topographic Maps with contour intervals of 10 feet (USGS, 7.5-Minute Series Orthophoto Quadrangles); and topographic maps at a scale of 1"=500' with a contour interval of 1 foot (Abrams Aerial Survey Corporation of Florida, 1979).

For each coastal flooding source studied in detail, the 1- and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each transect. Between transects, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour intervals of 5 and 10 feet (Reference 20), 2 feet (Reference 25), and 1 foot (Reference 26).

For the flooding sources studied by approximate methods, the 1-percent annual chance floodplain boundaries were delineated using a combination of the following: field inspection, engineering judgment, normal depth calculations, topographic maps, previously printed FISs, historic data, examination of available topographic mapping, and water-surface elevations determined by the slope conveyance method.

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

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

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the 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 National Flood Insurance Program, 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 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 are tabulated for selected cross sections (Table 8). The computed floodways are shown on the FIRM (Exhibit 2). A floodway was calculated for Five Acre Farm Creek West, Five Acre Farm Creek East and Stone Mill Creek only.

Encroachment into areas subject to inundation by floodwater 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.

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 4.

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 for certain downstream cross sections of Five Acre Farm Creek East and Stone Mill Creek 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.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Five Acre Farm Creek West								
A	3353[1]	1400	4326.8	0.3	24.8	24.8	25.7	0.9
	4817[1]	1113	4720.5	0.3	24.9	24.9	25.8	0.9
C	5994[1]	1420	4591.3	0.3	25.0	25.0	25.9	0.9
D	11518[1]	1131	4550.9	0.3	25.5	25.5	26.3	0.8
Five Acre Farm Creek East								
A	3962[2]	140	309.3	4.5	23.0	15.1[3]	15.1	0.0
	4775[2]	190	492.8	2.8	23.8	23.8	23.9	0.1
C	4908[2]	740	1749.4	0.8	25.8	25.8	26.8	1.0
D	6708[2]	1073	4402.6	0.3	26.2	26.2	27.1	0.9
E	8332[2]	821	2538.6	0.6	26.4	26.4	27.3	0.9
F	9939[2]	1189	7101.1	0.2	26.4	26.4	27.4	1.0

[1]Feet above an unnamed road
[2]Feet above the confluence with Lockey Lake
[3]Elevation computed without consideration of backwater effects from Apalachicola River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL AND INCORPORATED AREAS

FLOODWAY DATA

FIVE ACRE FARM CREEK WEST – FIVE ACRE FARM CREEK EAST

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Stone Mill Creek								
A	7586	888	13995	1.1	30.0	25.5[2]	25.9	0.4
B	9400	614	11221	1.9	30.0	25.6[2]	26.0	0.4
C	9586	614	10391	2.4	30.0	25.8[2]	26.2	0.4
D	12810	451	7220	2.2	30.0	26.4[2]	26.8	0.4
E	13956	474	7339	2.2	30.0	26.9[2]	27.4	0.5
F	15012	526	7883	2.0	30.0	27.4[2]	27.9	0.5
G	16937	401	6124	2.6	30.0	28.4[2]	29.0	0.6
H	18783	871	11852	1.3	30.0	29.4[2]	30.1	0.7
I	19792	577	7736	2.1	30.0	29.7[2]	30.4	0.7
J	21263	1732	17299	0.9	30.1	30.1	30.9	0.8
K	23092	1671	14453	1.1	30.4	30.4	31.2	0.8
L	24114	1344	12665	1.3	30.8	30.8	31.6	0.8

[1]Feet above the confluence with Dead Lake
[2]Elevation computed without consideration of backwater effects from Apalachicola River

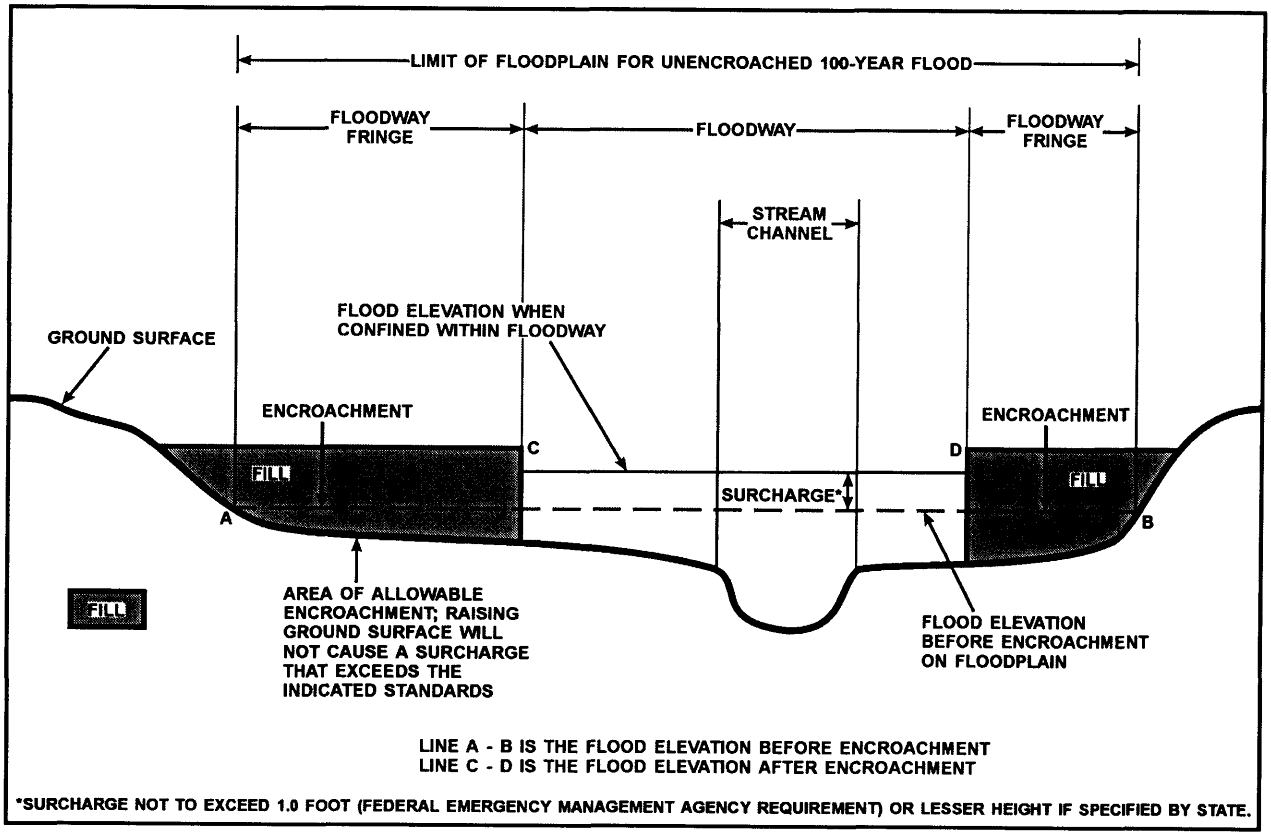
FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL
AND INCORPORATED AREAS

FLOODWAY DATA

STONE MILL CREEK

TABLE 8



FLOODWAY SCHEMATIC Figure 4

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 base flood elevations 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 base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

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

Zone V

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

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1-percent-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 base flood elevations 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 base flood elevations 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 1- and 0.2-percent-annual-chance floodplains. On selected FIRM panels, 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 area of Gulf County. Historical data relating to the maps prepared for each community, up to and including the November 7, 2002, countywide FIS, are presented in Table 9, "Community Map History."

7.0 OTHER STUDIES

FISs have been prepared for the unincorporated areas of Liberty County, as well as Franklin County and incorporated areas, Calhoun County and incorporated areas, and Bay County and incorporated areas (References 34, 35, 36 and 37).

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Gulf County, Florida, has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS reports, Wave Height Analysis Supplements to FIS Reports, FHBMs, FIRMs, and/or FBFMs for all of the incorporated and unincorporated jurisdictions within Gulf County.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA, Federal Insurance and 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
Gulf County (Unincorporated Areas)	December 23, 1977	None	June 15, 1983	October 1, 1983 June 2, 1992 November 7, 2002
Port St. Joe, City of	June 28, 1974	May 14, 1976	June 15, 1983	August 4, 1988 June 2, 1992 November 7, 2002
Wewahitchka, City of	August 9, 1974	January 9, 1976	May 17, 1982	November 7, 2002

FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

TABLE 9

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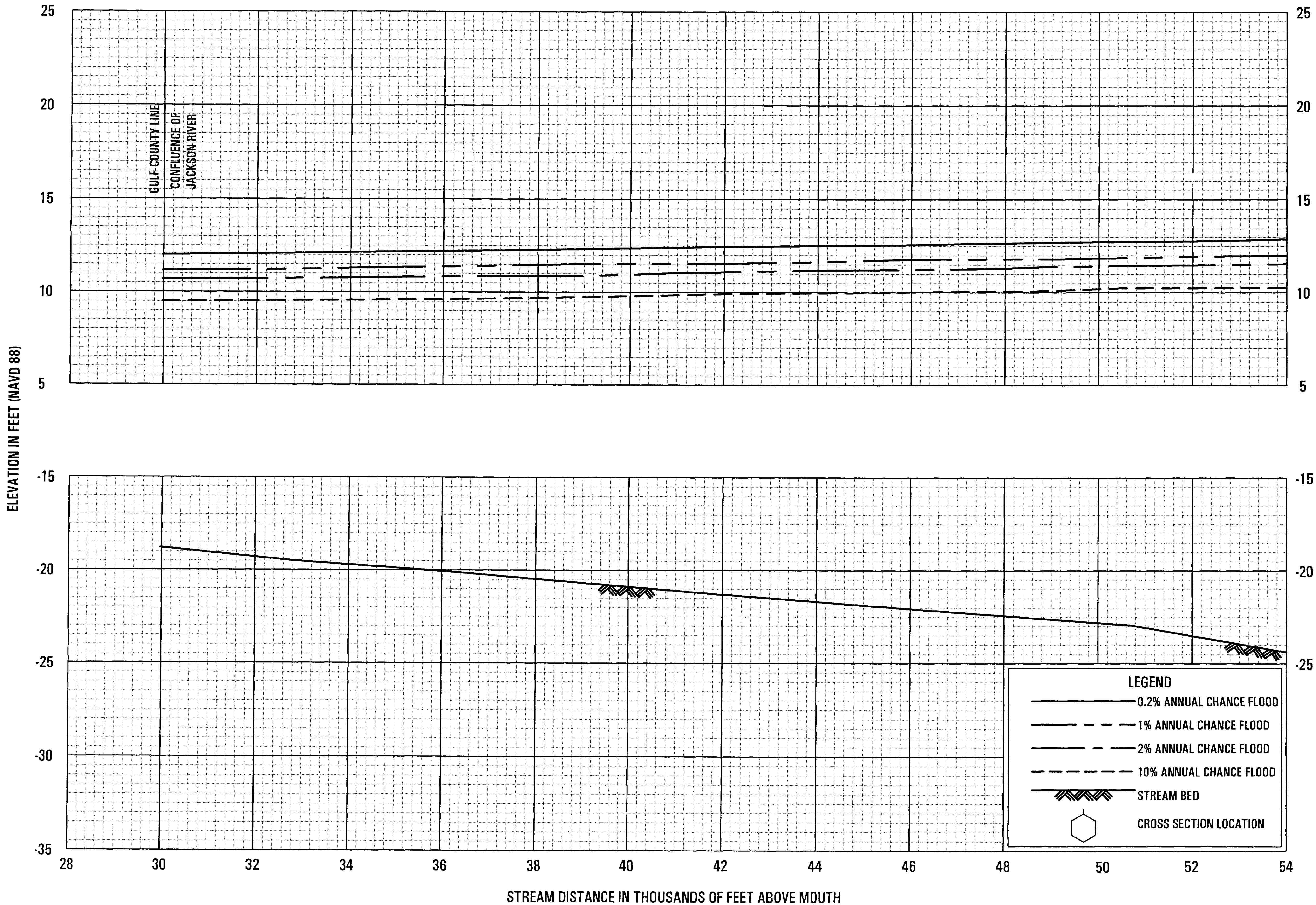

FLOOD PROFILES

APALACHICOLA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL

AND INCORPORATED AREAS

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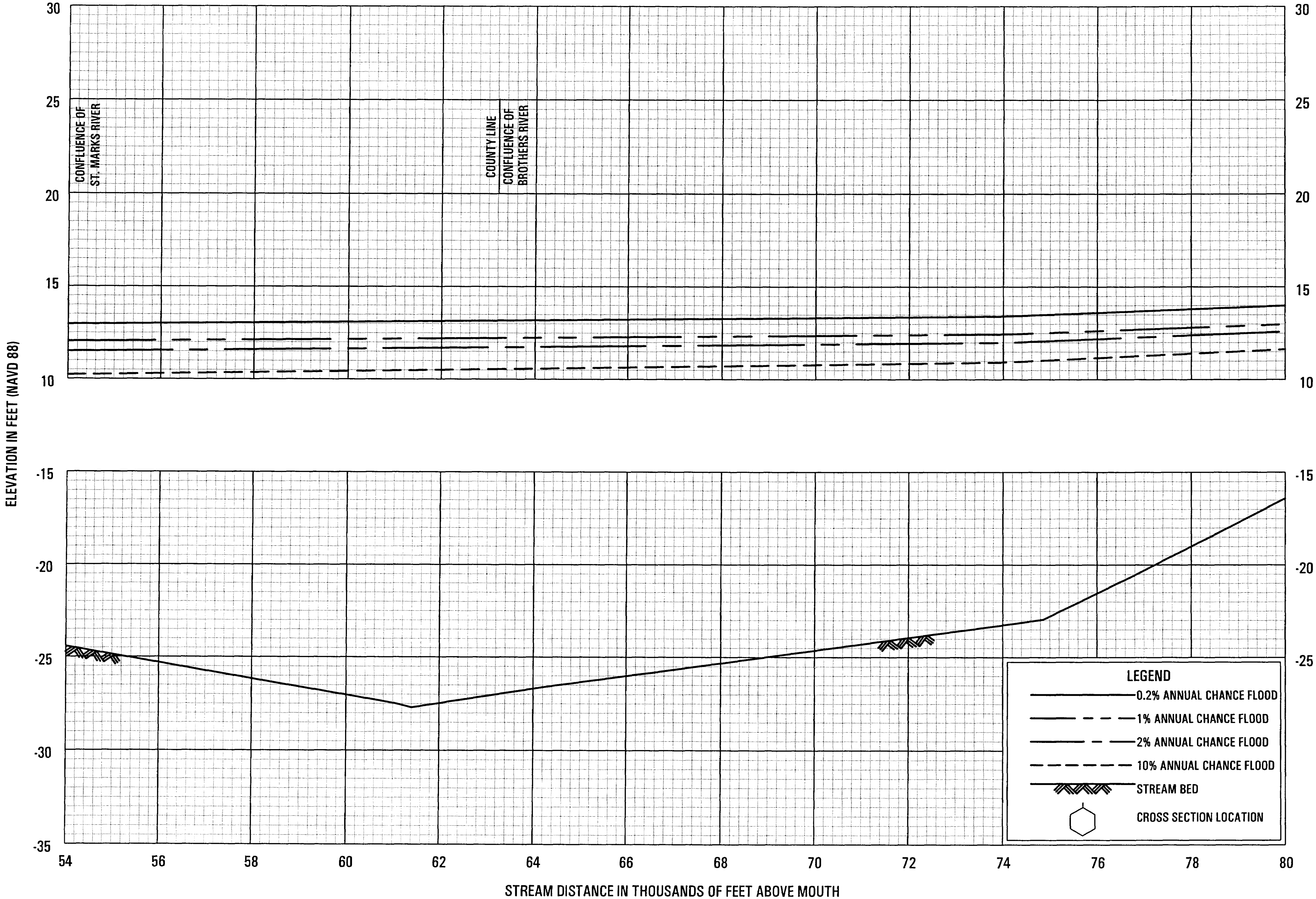

FLOOD PROFILES

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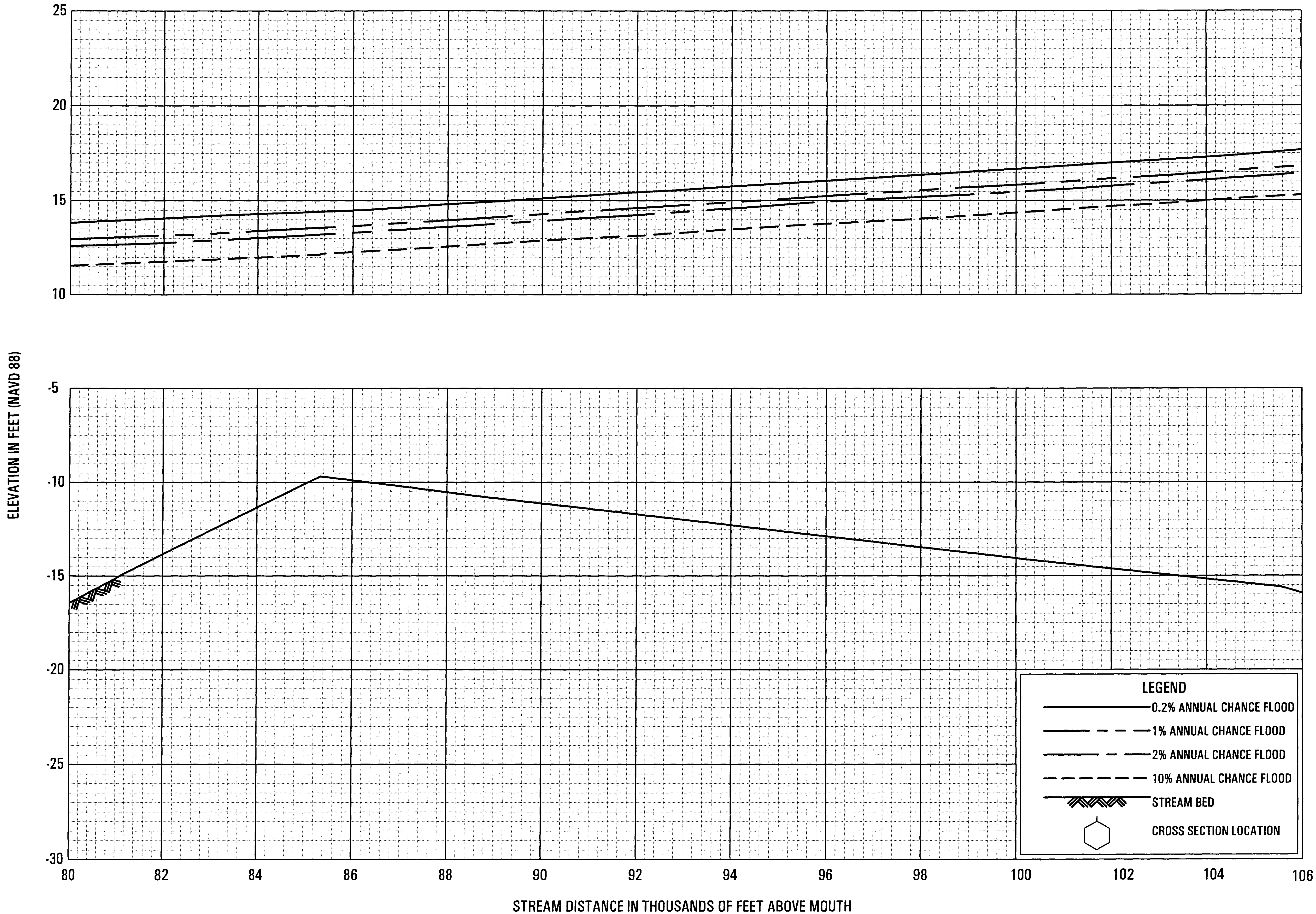

FLOOD PROFILES

APALACHICOLA RIVER

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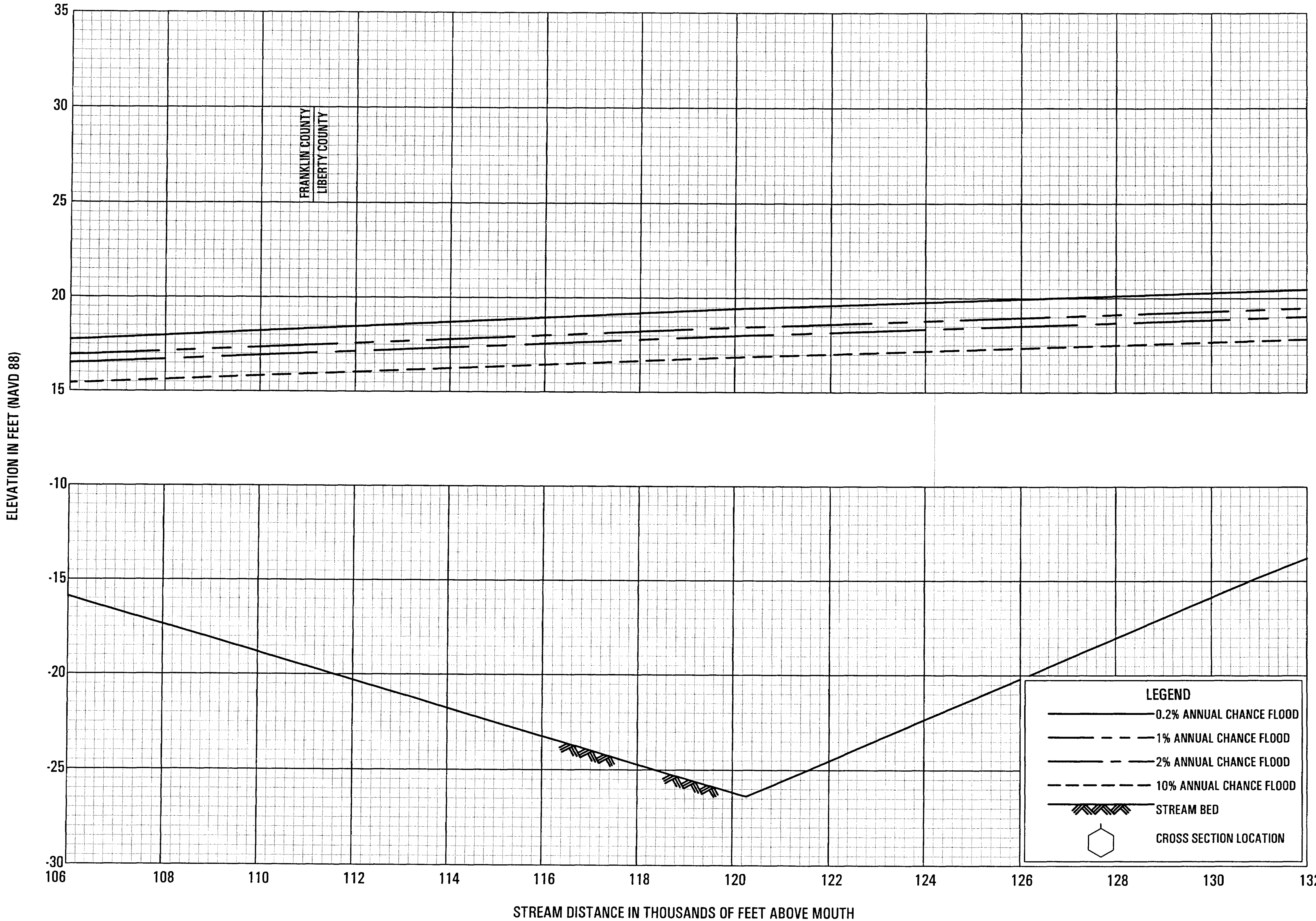

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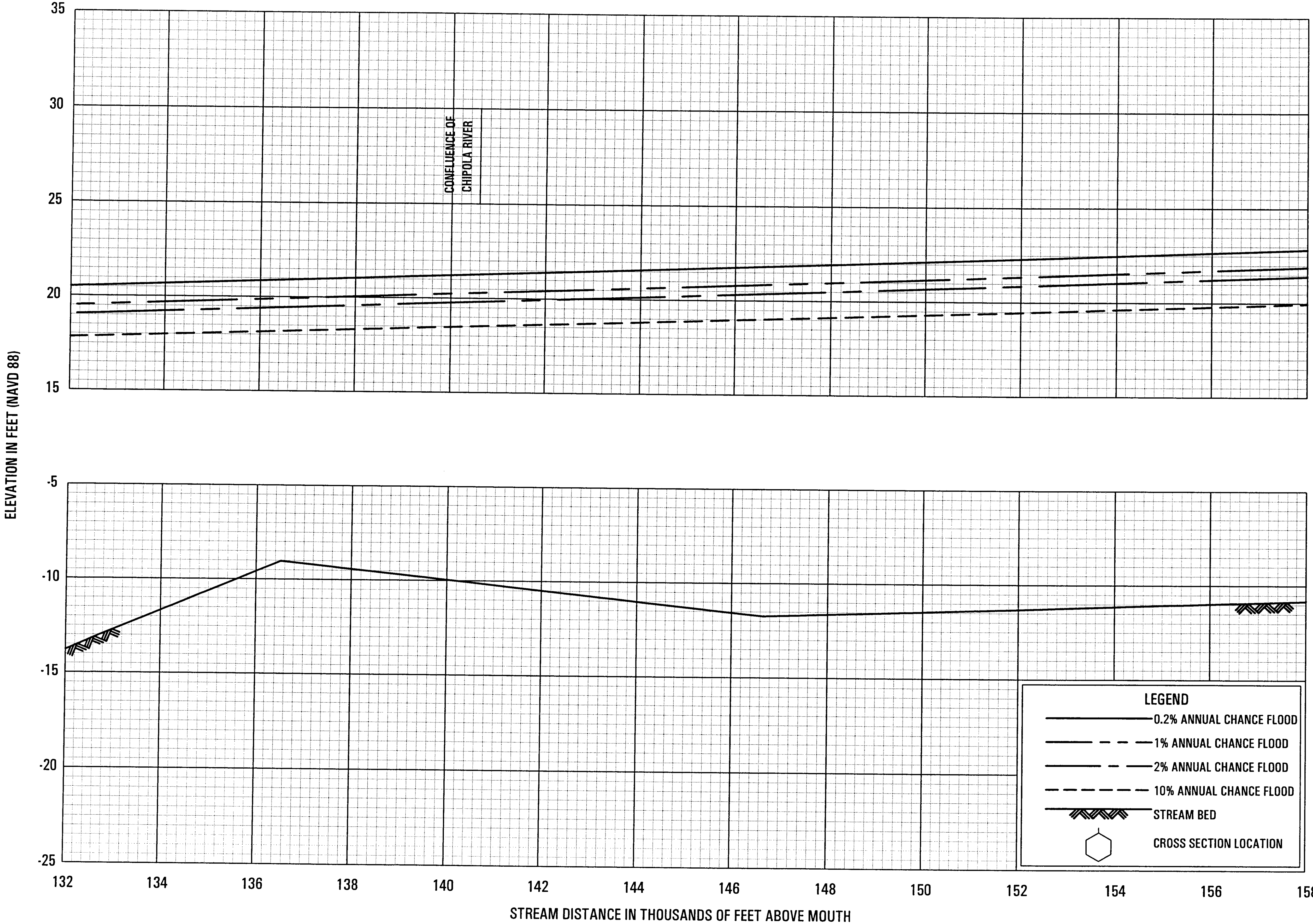

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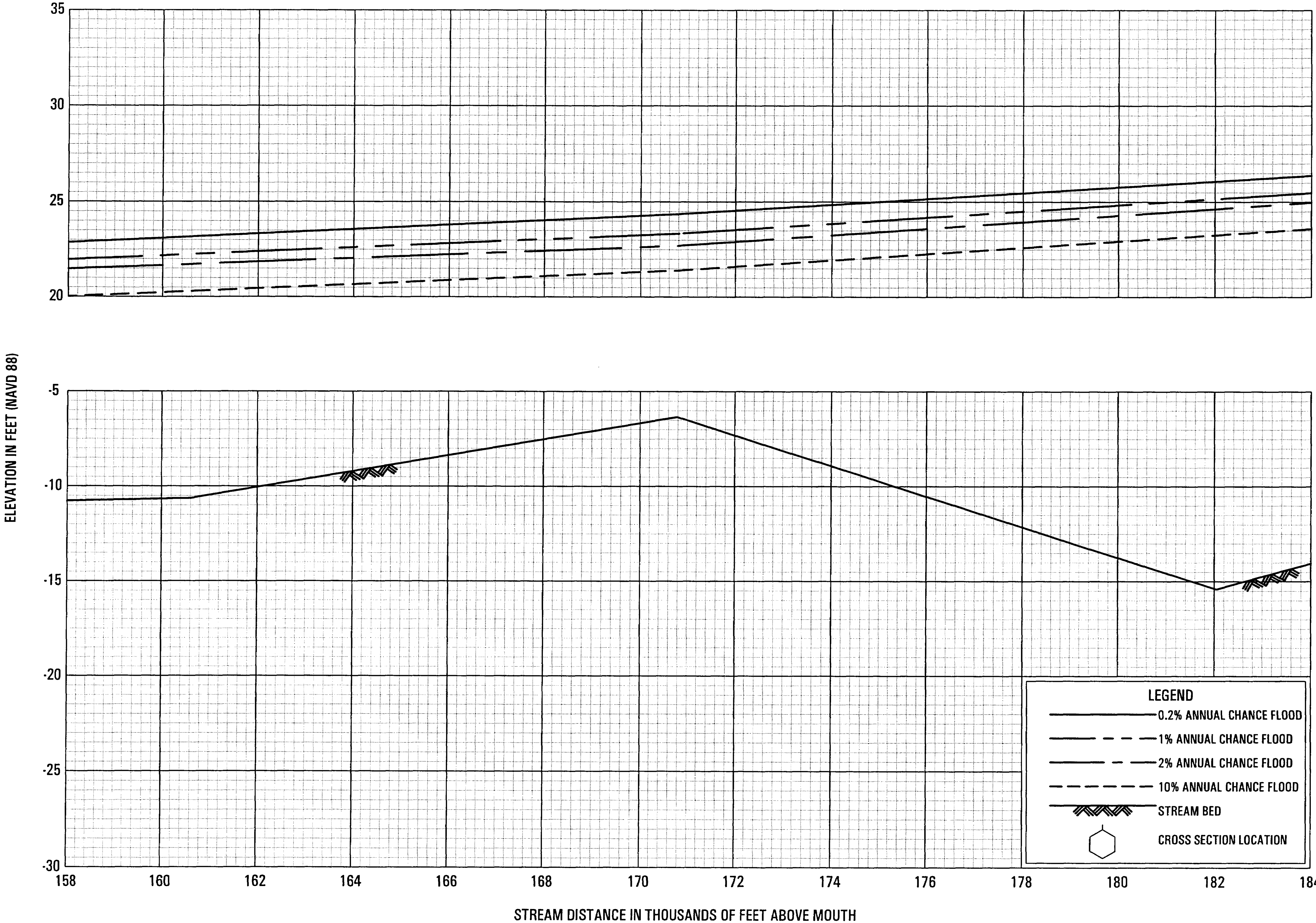

FLOOD PROFILES

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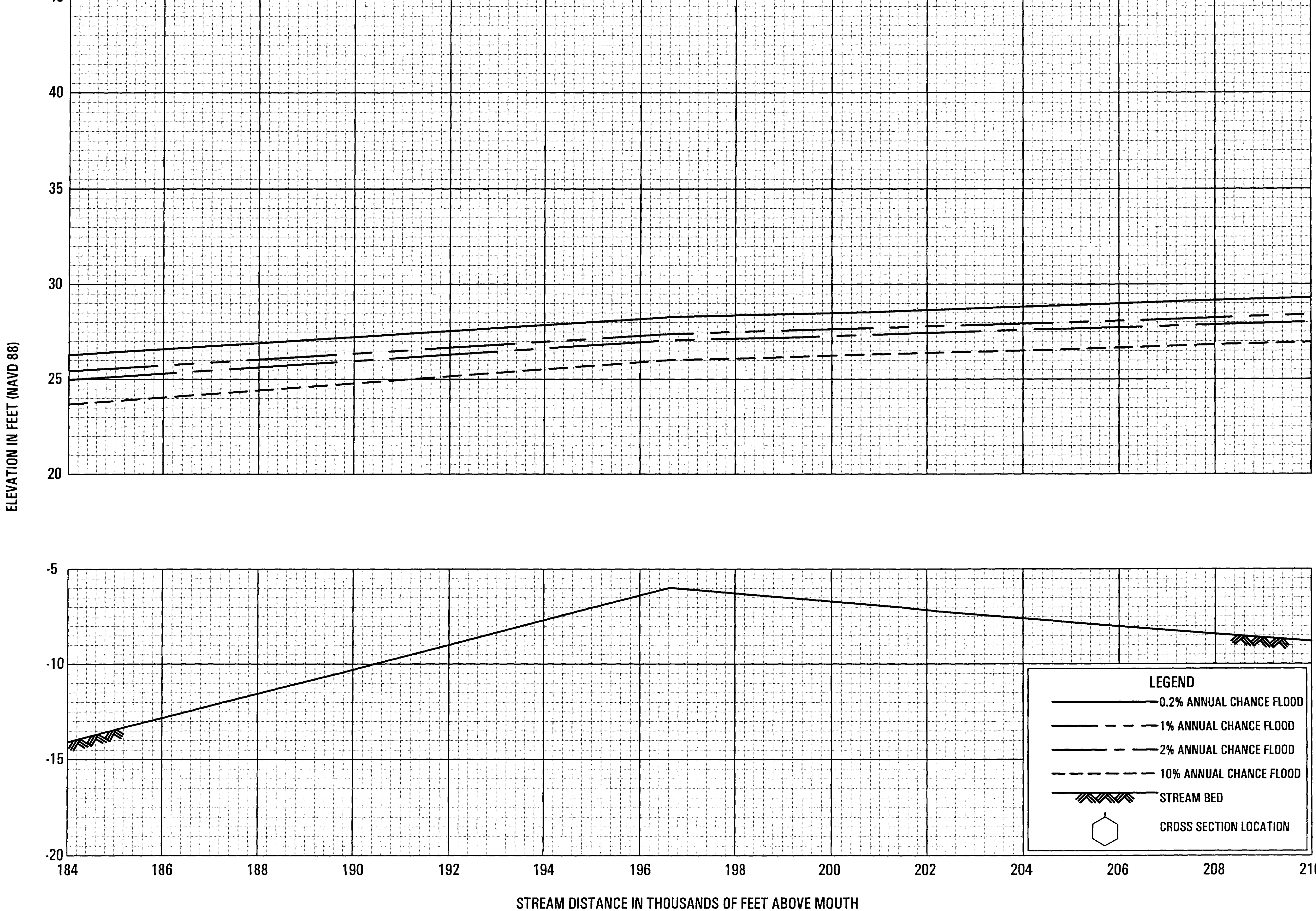

FLOOD PROFILES

APALACHICOLA RIVER

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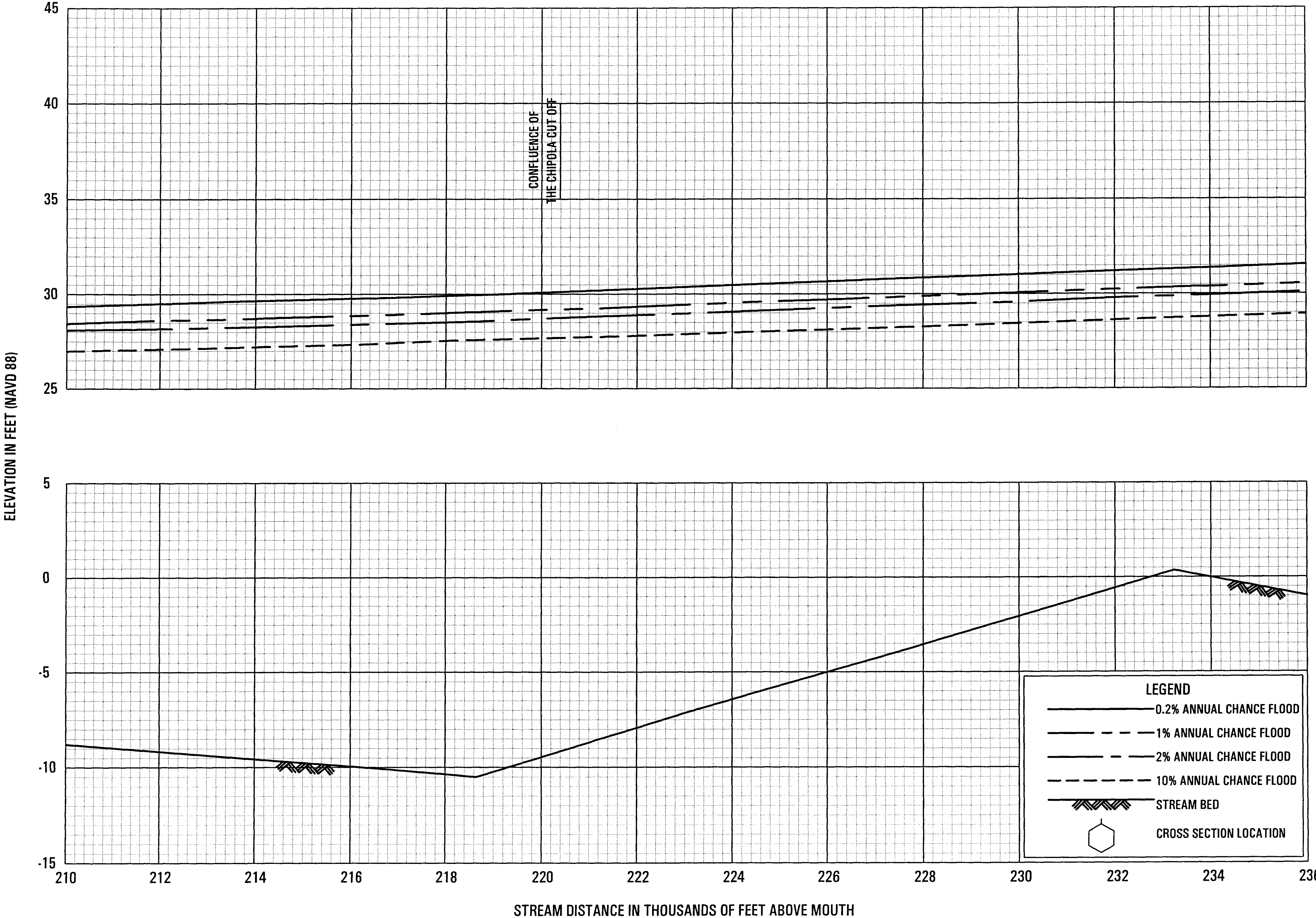

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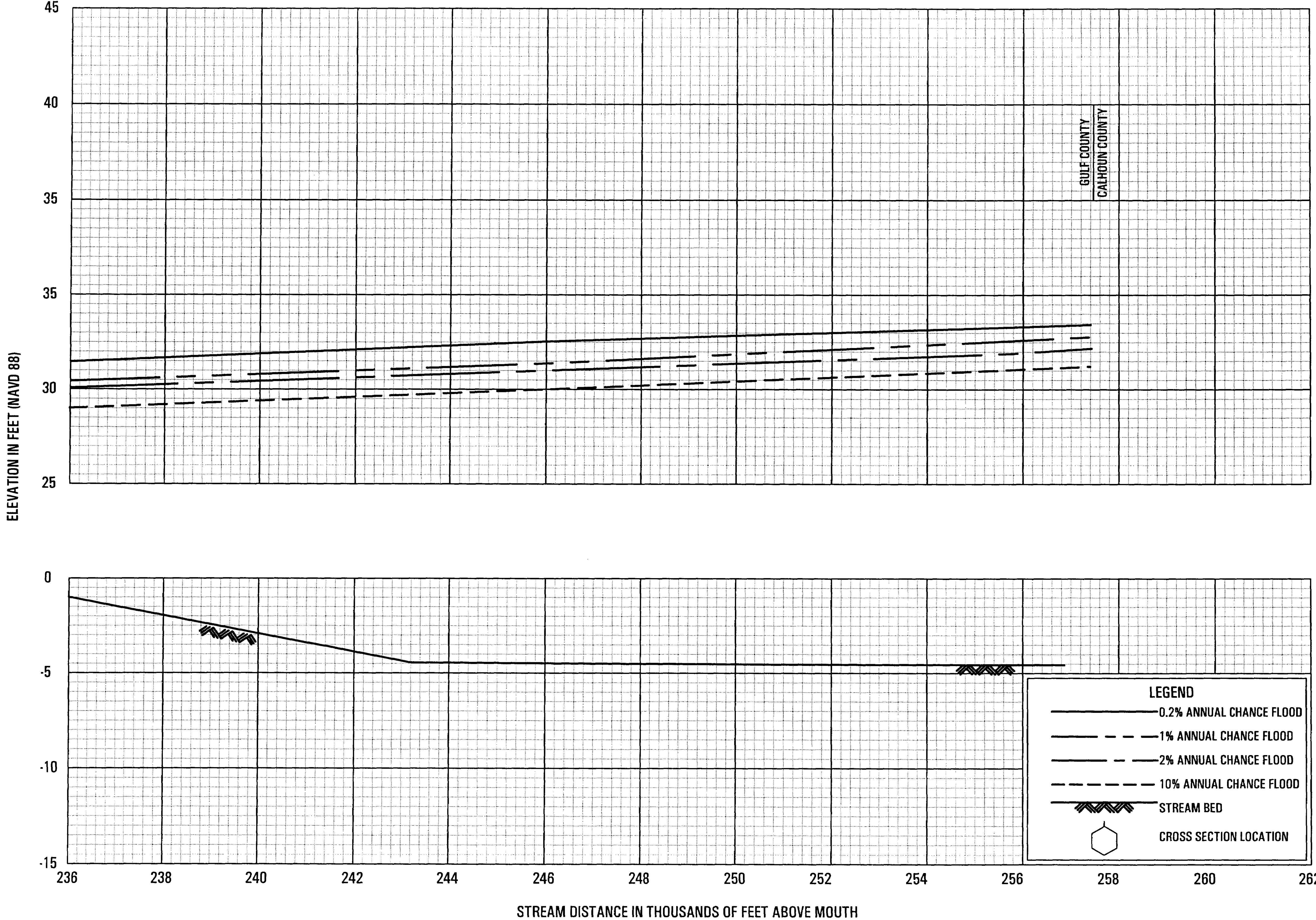

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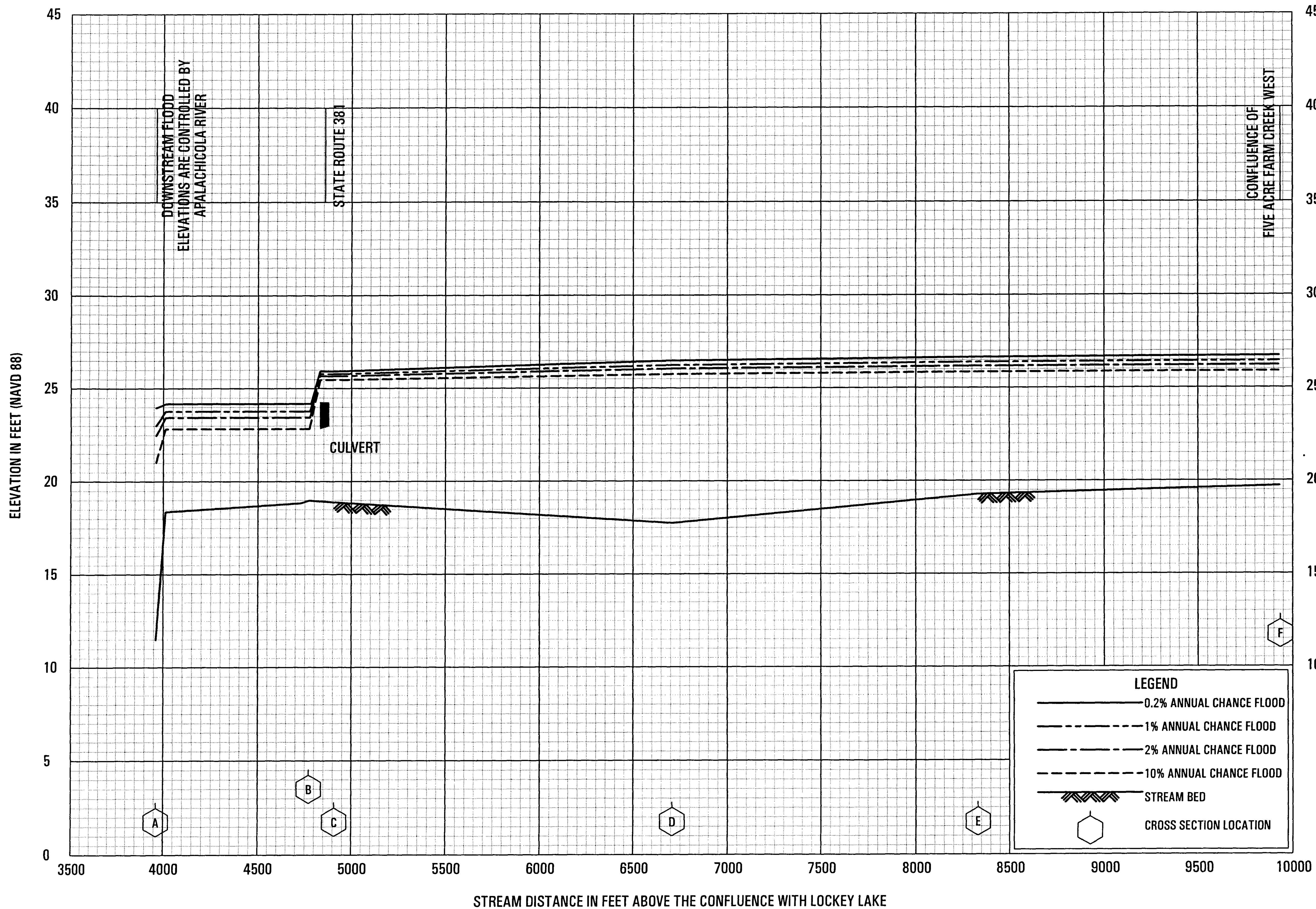

FLOOD PROFILES

FIVE ACRE FARM CREEK EAST

FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL

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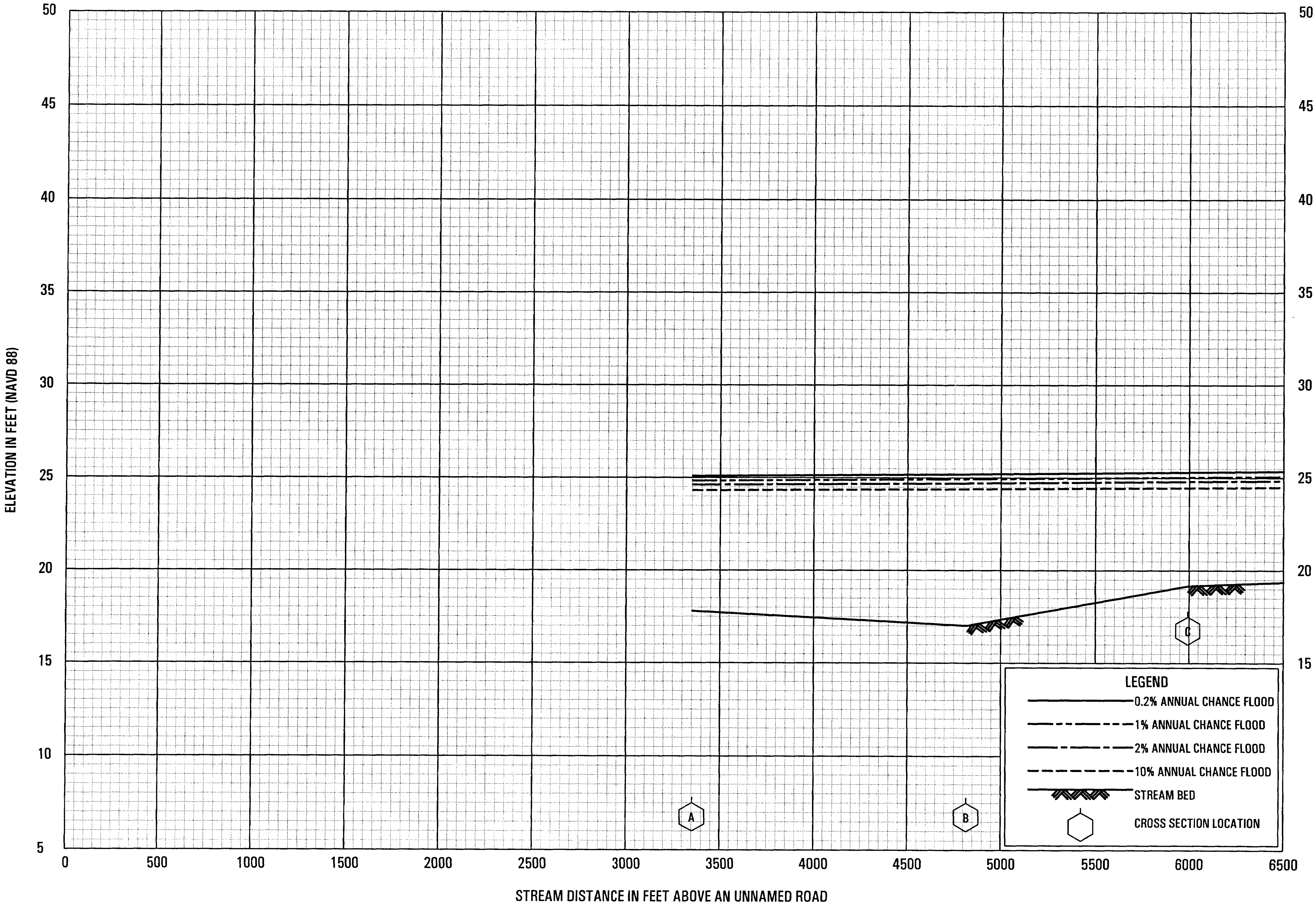

FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL

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FLOOD PROFILES

FIVE ACRE FARM CREEK WEST

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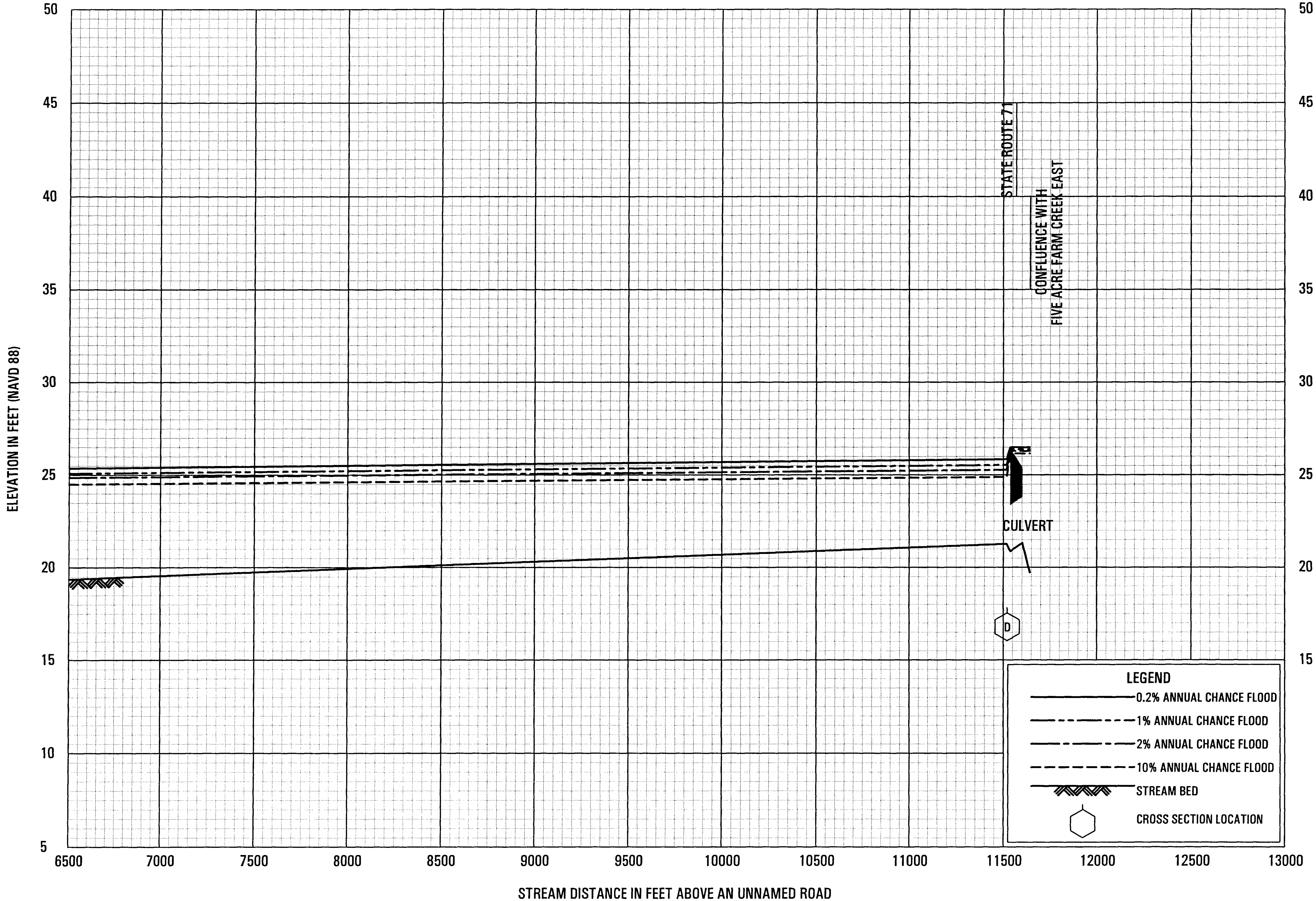

FLOOD PROFILES

FIVE ACRE FARM CREEK WEST

FEDERAL EMERGENCY MANAGEMENT AGENCY

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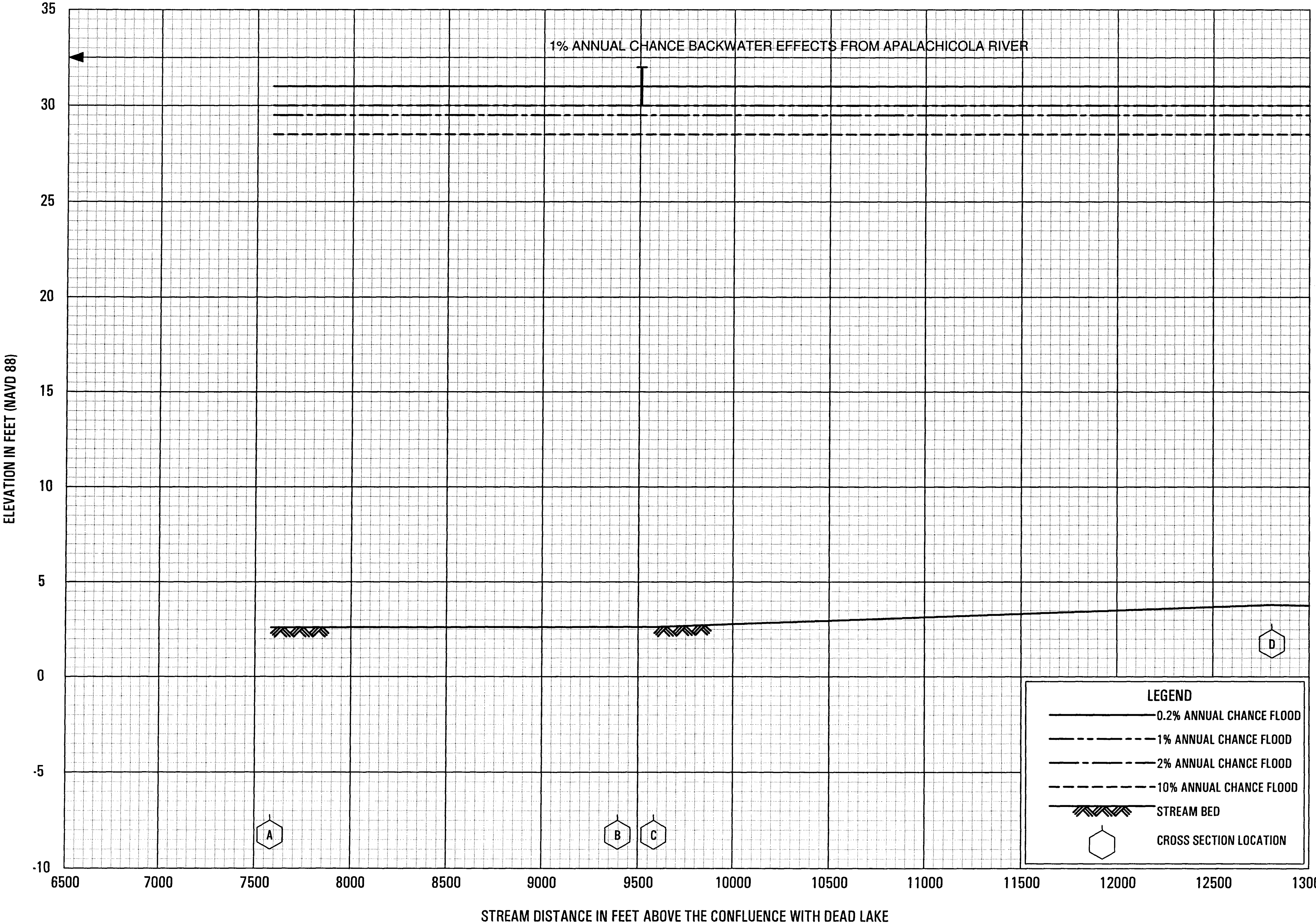

FLOOD PROFILES

STONE MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL

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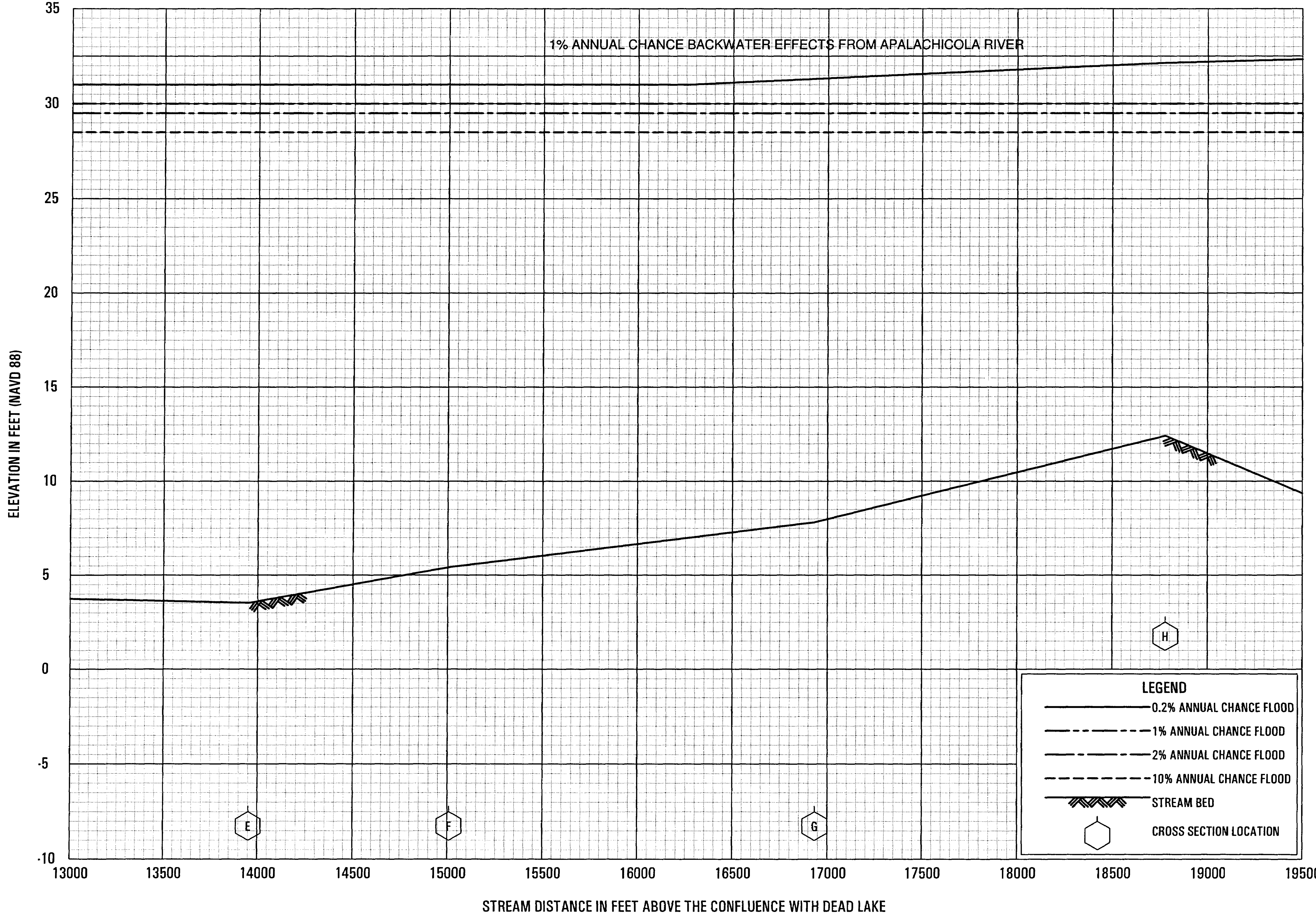

FLOOD PROFILES

STONE MILL CREEK

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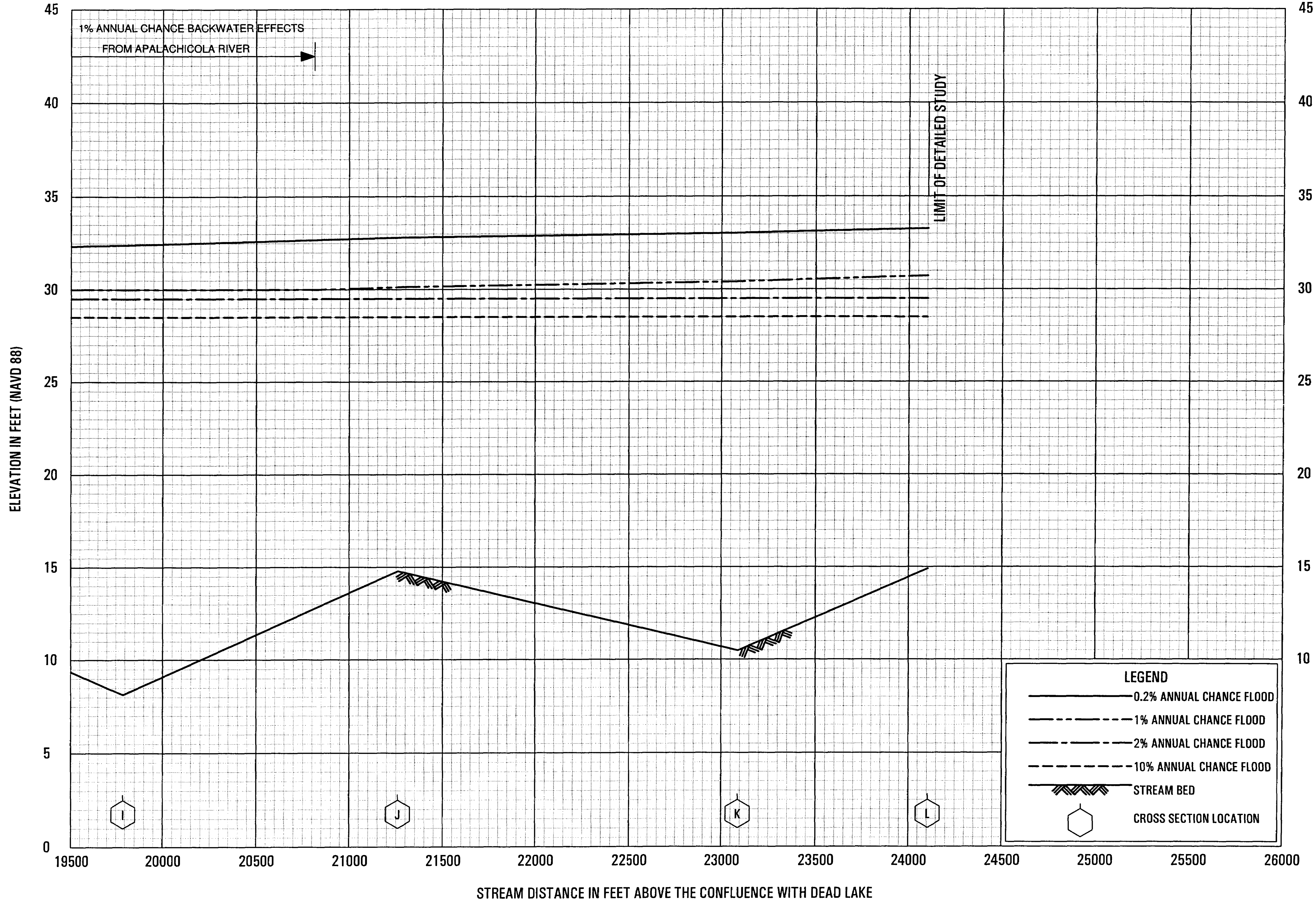

FLOOD PROFILES

STONE MILL CREEK

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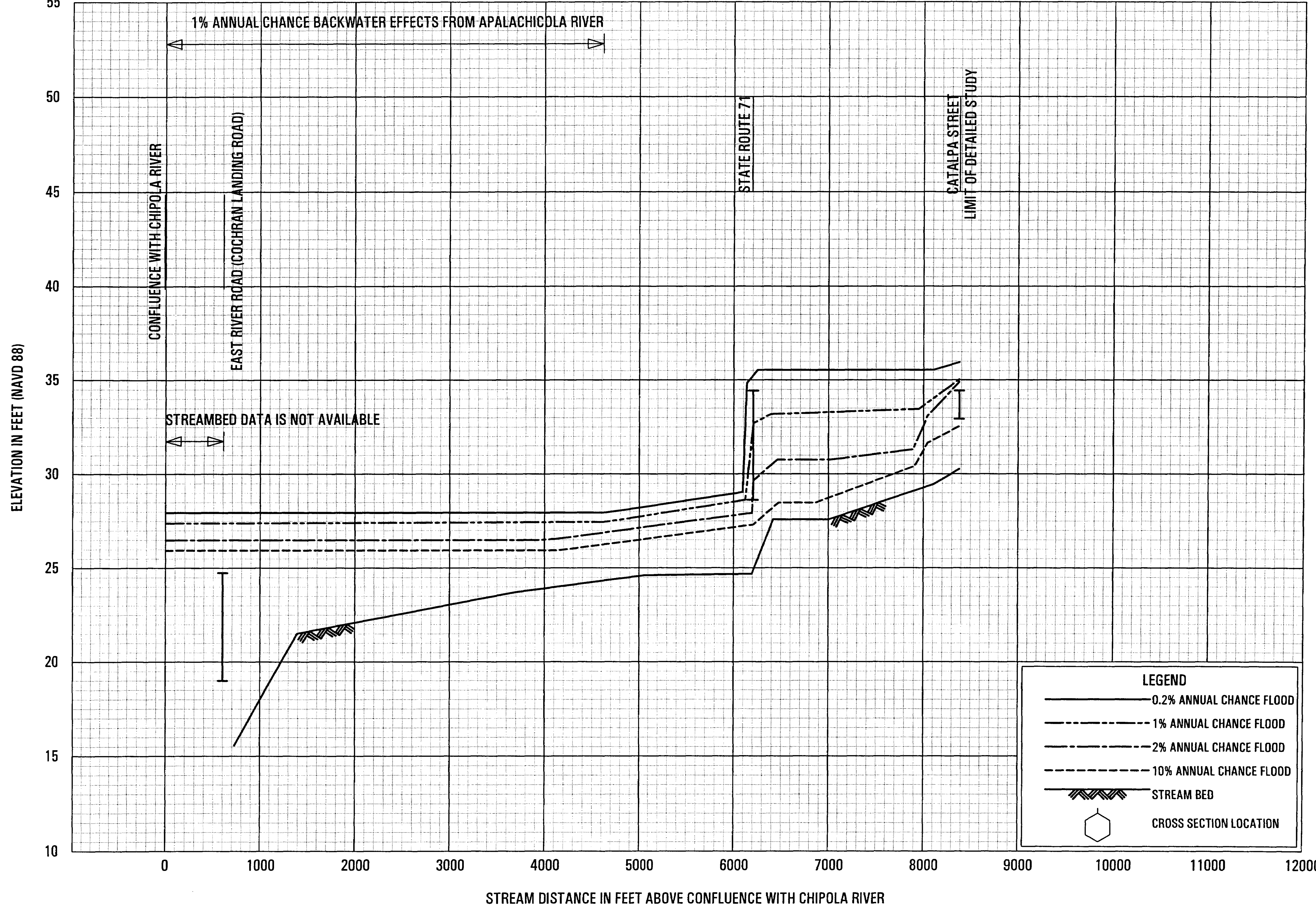
AND INCORPORATED AREAS



FLOOD PROFILES

TAYLOR BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

GULF COUNTY, FL

AND INCORPORATED AREAS

16P