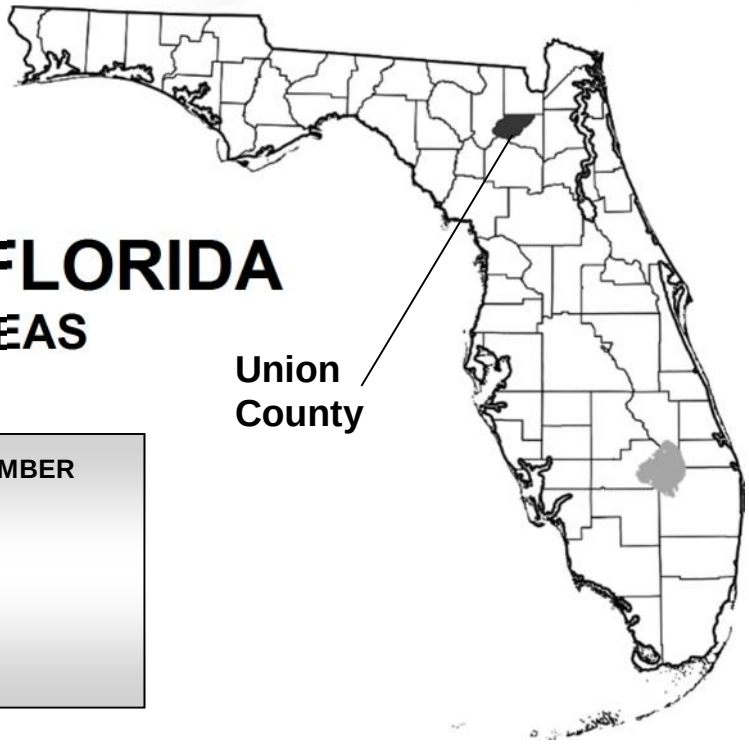

UNION COUNTY, FLORIDA
AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
LAKE BUTLER, CITY OF	120595
RAIFORD, TOWN OF	120593
UNION COUNTY (UNINCORPORATED AREAS)	120422
WORTHINGTON SPRINGS, TOWN OF	120594

Preliminary May 20, 2016

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

12125CV000B

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: February 4, 2009

Preliminary Date: May 20, 2016

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FLOOD INSURANCE STUDY
UNION COUNTY, FLORIDA AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in, or revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs) for the geographic area of Union County, Florida, including the Towns of Raiford and Worthington Springs, the City of Lake Butler, and the unincorporated areas of Union County (hereinafter referred to collectively as Union 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 Union 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 Acknowledgements

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 Union County and the incorporated communities within Union County into a countywide format. Information on the authority and acknowledgments for this countywide FIS, as compiled from their previously printed FIS reports, is shown below. No previously printed FIS reports are available for the City of Lake Butler and the Town of Raiford.

Union County (Unincorporated Areas):	The hydrologic and hydraulic analyses for the FIS report dated August 4, 1988, were performed by the U.S. Army Corps of Engineers (USACE), Jacksonville District (the Study Contractor) for the Federal

	Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-85-E-1822, Project Order No. 1, Amendment No. 15a. This study was completed in December 1986.
Worthington Springs, Town of:	The hydrologic and hydraulic analyses for the FIS report dated August 4, 1988, were performed by the USACE, Jacksonville District, for FEMA. This study was completed in December 1986.

February 4, 2009 Initial Countywide FIS

For the initial countywide FIS, revised hydrologic and hydraulic analyses were prepared for FEMA by URS Corporation under contract with the Suwannee River Water Management District (SRWMD), a FEMA Cooperating Technical Partner (CTP).

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

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.

This Physical Map Revision, Preliminary May 20, 2016

For this physical map revision (PMR), work was performed by Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) and North Florida Professional Services (NFPS), under contract with Suwannee River Water Management District (SRWMD), as part of the FEMA Risk MAP Projects for the Santa Fe Watershed (HUC 03110206). The hydrologic and hydraulic analyses for multiple flooding sources were prepared by Amec Foster Wheeler, as described in the Scope of Study section of this document.

Base map information shown on revised FIRMs was derived from Florida Department of Transportation aerials dated 2011.

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.

Pre-countywide Analyses

For the unincorporated areas of Union County and the Town of Worthington Springs, an initial CCO meeting was held in Jacksonville, Florida, on January 29, 1985. Representatives of FEMA, the USACE, and the SRWMD were in attendance. A meeting with the SRWMD to discuss the preliminary findings of this study was held in Jacksonville, Florida, on June 11, 1986. On September 16, 1987, the results of the FIS were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the communities.

February 4, 2009 Initial Countywide FIS

For the initial countywide FIS, an initial CCO meeting was held on November 29, 2006. A final CCO meeting was held on November 7, 2007. These meetings were attended by representatives of the study contractors, SRWMD, FEMA and the communities.

This Physical Map Revision, Preliminary May 20, 2016

For this PMR, a Risk MAP Discovery meeting was held on July 26, 2012 and was attended by representatives from Union County, FEMA, SRWMD, and their study contractors. At this meeting, study requests and priorities were received from the communities and documented by SRWMD and their study contractors. Subsequent to those meetings, a Flood Risk Review Meeting was held on September 11, 2015, and a Resilience Meeting was held on February 9, 2016 for the Santa Fe Watershed. At those meetings, communities within the watershed were provided with non-regulatory Risk MAP products and datasets, and were advised on their use in understanding and reducing flood risk. A CCO meeting was held on XXXX, and was attended by XXX, XXXX, XXXX, and XXXX.

2.0 AREA STUDIED

2.1 Scope of Study

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

February 4, 2009 Initial Countywide FIS

Flooding caused by overflow of the Santa Fe River was studied in detail. Additionally, one unnamed tributary to the Santa Fe River with reported flooding problems was studied in detail as part of the initial countywide FIS. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction. The scope and methods of study were proposed to and agreed upon by FEMA, SRWMD and Union County.

This Physical Map Revision, Preliminary May 20, 2016

For this PMR, Lake Butler, Deckles Millpond, and Fivemile Creek were studied using detailed methods. In addition, Unnamed Tributary to Santa Fe River was redelineated as a part of this revision by utilizing the profiles and floodway data tables from the February 4, 2009 revision. An updated digital elevation model (DEM) derived from LiDAR flown in 2011 was used to map this flooding source.

2.2 Community Description

Union County is situated in northeastern Florida. It is approximately 35 miles southwest of Jacksonville, Florida, and approximately 25 miles north of the City of Gainesville, Florida. The county is bordered by the unincorporated areas of Baker County, Florida on the north; Bradford County, Florida on the east; Alachua County, Florida on the south; and Columbia County, Florida on the west. Union County is served by State Roads 121, 100, 238, and 121. The Norfolk Southern Railway and the CSX railway traverse the county. Union County includes the Town of Lake Butler, Town of Worthington Springs, and the Town of Raiford. The 2010 population estimate for Union County is 15,535, an increase of 51 percent over the 1990 population of 10,252 (U.S. Census Bureau, 2015).

Union County is the smallest county in Florida. Over 80 percent of the 240 square miles of land is devoted to commercial forests, although agriculture is active in truck farming and raising hogs and cattle.

The county is in the Gulf Coastal Lowlands physiographic area with topography ranging from 50 feet to about 140 feet above the National Geodetic Vertical Datum of 1929 (NGVD). The major fresh-water swamp association of soils adjacent to the Santa Fe River consists of nearly level, very poorly drained soils subject to prolonged flooding (Florida Bureau of Comprehensive Planning, July 1975).

The climate of Union County is semi-tropical. Characterized by long, hot summers and mild winters. The average annual rainfall is 49.40 inches, while the average temperatures vary from 55.9 degrees Fahrenheit (ºF) in January to 81.4 ºF in August

2.3 Principal Flood Problems

The most severe floods in the Santa Fe basin are associated with storms or sequences of storms that produce widespread distribution of rainfall for several days duration. Flooding occurs in all seasons, but maximum annual stages occur most frequently from February through April as a result of a series of frontal-type rainfall events over the basin. The area is also subject to summer and fall tropical disturbances, occasionally of hurricane intensity. Thunderstorms caused by summer air mass activity produce intense rainfall, but the duration is usually short and aerial distribution is relatively small.

The September 1964 flood was the largest flood on the Santa Fe River. The discharge for the 1964 flood at the gage near the Town of Ft. White was 17,000 cubic feet per second (cfs); at the Town of Worthington Springs the discharge was 20,000 cfs.

In late June 2012, Tropical Storm Debby made landfall through northern Florida. The National Hurricane Center reported torrential rainfalls along the northern counties of Florida. Rainfall totals were generally greater than 10 inches in Union County, with official reports exceeding 20 inches farther west near Lake City in Columbia County. Flooding during the storm produced some of the highest stages on local streams, with the Santa Fe River at Worthington Springs reaching only moderate flood stage.

The National Weather Service also reported minor and moderate flood stage events on the New River in October 2004, March 2004, September 2004, August 2008, July 2012, August 2012, May 2013, and March 2014, and the Santa Fe River in March, 2003, June 2003, August 2003, March 2005, July 2005, December 2005, February 2006, August 2008, May 2009, January 2010, February 2010, July 2012, August 2012, May 2013, July 2013, and September 2014.

Table 1 lists historical floods at two gage locations on the Santa Fe River. The Ft. White gage is downstream from Union County.

TABLE 1 – HISTORICAL FLOODS

LOCATION	PEAK DISCHARGE (cfs)					
Santa Fe River	1964	1998	1948	2012	1934	1993
Near Fort White	17,000	13,500	12,300	11,800	11,400	10,800
At Town of Worthington Springs	20,000	12,900	14,900	15,200	17,500	15,400

2.4 Flood Protection Measures

Flood protection measures are not known to exist within the study area.

3.0 ENGINEERING METHODS

For the flooding sources studies in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this FIS. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. The events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 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 FIS. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 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.

Pre-countywide Analyses

The USGS has been monitoring flows in the Suwannee River basin since the flood of 1928. Each year, the USGS publishes the water resources data collected and periodically reports on the magnitude and frequency of floods. The hydrologic data analyses for this study utilized these publications and the results were coordinated with the USGS.

Analyses of discharge records of all gaged locations on the Santa Fe River were used to establish peak discharge frequency relationships throughout the river reaches. Flood recurrence frequencies were determined by log-Pearson Type III statistical analysis in accordance with procedures recommended by the USGS (U.S. Department of the Interior; September 1981, revised March 1982). On the Santa Fe River, a rainfall runoff model was developed using the standard Soil Conservation Service procedure and the HEC-1 runoff model (USDA, May 1965 and USACE, January 1973). The model was calibrated to the Hurricane Dora flood of 1964 and verified by statistical analysis of discharge records from four long-term gages on the Santa Fe River.

February 4, 2009 Initial Countywide FIS

For the initial FIS, one area was analyzed in detail.

The Unnamed Tributary Reach Study area is located in southern Union County, Florida. The Unnamed Tributary Reach Study area begins at its confluence with the Santa Fe River just upstream of SR-121 and terminates about 2 miles upstream.

The Unnamed Tributary Reach Study area drains an area of approximately 2.46 square miles near Worthington Springs between SR-121 and SR-18A. The reach has a significant slope of approximately 35 feet per mile and the percent of lake area is minimal (.37 percent). Land use in this area is predominately forested with some areas of low density residential.

Streamflows were estimated at the downstream end of the study reach using USGS Regional Regression Equations for a series of flood frequencies. The methodologies and equations used in that analysis are presented in detail in United States Geologic Survey (USGS), Water Resources Investigations 82-4012, Technique for Estimating Magnitude and Frequency of Floods on

Natural-Flow Streams in Florida, 1982. The National Flood Frequency Program (NFF), Version 3, was used to compute streamflow estimates for this analysis.

Drainage basin maps for the study area were prepared using GIS. Input data required for the regression equation estimates, including Drainage Area, Channel Slope and Lake Area, were all determined using GIS based data.

A flood frequency analysis was conducted to estimate streamflows at six USGS gages within and adjacent to Union County on streams with characteristics similar to those of the study reaches. The methodologies used in this analysis are documented in Bulletin #17B, Guidelines For Determining Flood Flow Frequency, March 1982. The USGS computer program PEAKFQ - Annual Flood Frequency Analysis Using Bulletin 17B Guidelines, Version 4.1, February 25, 2002 was used to estimate streamflows and associated flood frequencies.

This Physical Map Revision, Preliminary May 20, 2016

For Lake Butler, Deckles Millpond, and Fivemile Creek, Streamline Technologies Interconnected Channel and Pond Routing (ICPR) v.3.1 unsteady flow model was used to estimate discharges and elevations for flood frequencies including the 10-, 4-, 2-, 1-, and 0.2-percent annual chance events.

A synthetic (SCS Type II Florida Modified) rainfall time distribution was used to develop the ICPR models. The 24-hour 10-, 4-, 2- and 1-percent annual chance rainfall depths were obtained from the FDOT IDF curves. Closed basin boundaries were delineated using the LiDAR DEM and the 2010 FDOT aerial imagery for Union County. The SCS Curve Number Method was used to compute the direct runoff resulting from each of the analyzed frequencies. Basin time of concentration was determined using the procedures outlined in the NRCS TR-55 publication the FDOT Drainage Hydrology Handbook. The SCS Unit Hydrograph method was used to generate the hydrographs resulting from the analyzed storms. A unit hydrograph peak factor of 484 was selected.

A summary of the drainage area-peak discharge relationships for all the streams studied by detailed methods are 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	4-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
FIVEMILE CREEK						
Just downstream of State Route 121	7.2	860	970	1,040	1,130	1,240
At approximately 1,900 feet upstream of confluence with Deckles Millpond	8.0	950	1,210	1,490	2,060	3,050
SANTA FE RIVER						
Near the Town of Ft. White	1,017	9,192	*	13,791	16,717	22,200
At the City of Worthington Springs	630	12,824	*	20,748	25,162	36,500
SANTA FE RIVER UNNAMED TRIBUTARY						
Near the City of Worthington Springs	2.46	886	*	1,455	1,705	2,221

*Data not available

The stillwater elevations have been determined for the 10-, 2-, 1-, and 0.2-percent annual chance floods for the flooding sources studied by detailed methods and are summarized in Table 3, "Summary of Stillwater Elevations."

TABLE 3: SUMMARY OF STILLWATER ELEVATIONS

FLOODING SOURCE	ELEVATION (feet NAVD) 10-Percent-Annual-Chance	4-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
DECKLES MILLPOND					
DM01 (Deckles Millpond)	97.2	97.8	98.1	98.7	99.7
DM03	105.3	106.1	106.5	106.7	107.0
LAKE BUTLER					
LB01 (Lake Butler)	132.3	132.6	132.8	133.0	133.4

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data 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.

Pre-countywide Analyses

Cross-section data were obtained from photography by aerial survey methods flown for the floodplain areas and by field measurements for the main channel and immediate overbanks (USACE, October 1985). All bridges were field surveyed to obtain elevation data and structural geometry.

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

Water-surface elevations of floods of the selected recurrence intervals were computed using the HEC-2 step-backwater computer program (USACE, November 1976). Roughness coefficients (Manning's "n") used in the hydraulic computation were determined by analyzing known flood events in the Union County and Worthington Springs reaches of the Santa Fe River. The Manning's "n" values used for the Santa Fe River calculations were 0.059 for the main channel and 0.310 for the overbank areas. The starting water-surface elevations were obtained from the Flood Insurance Study for Alachua County, Florida (FEMA, September 1984).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 2- and 1-percent annual chance flood elevations are close together, due to limitations of the profile scale, only the 1-percent annual chance profile has been shown.

The hydraulic analyses for this study are based on the effects of 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.

February 4, 2009 Initial Countywide FIS

The Santa Fe River HEC-2 step-backwater model was converted to HEC-RAS by the SRWMD.

All of the National Geodetic Vertical Datum of 1929 (NGVD 29) elevation data in the input HEC-RAS files from the SRWMD were converted to North American Vertical Datum of 1988 (NAVD 88). Therefore, the input and output of the revised HEC-RAS files now reflect elevations in NAVD 88.

For the initial countywide FIS, the Unnamed Tributary Reach Study area was studied in detail to estimate flood elevations for the selected recurrence intervals.

The reach has a significant slope of approximately 35 feet per mile and the percent of lake area is minimal (.37 percent). The tributary channel consists of a silty-sandy weathered soil matrix with generally heavy vegetated banks. The overbank areas are heavily vegetated with trees and underbrush, causing a high degree of roughness throughout the reach outside of the channel. The study area includes one road crossing with parallel box culverts providing stormwater conveyance beneath the road crossing.

A HEC-RAS model was developed to simulate flood elevations. The model included details of natural channel geometry and considered all structures which potentially impact flood levels such as bridges and culverts. Channel cross-sections were obtained primarily from field surveys with supplemented cross-sections being developed from USGS Union County topographic data. Bridge and culvert structures were surveyed to obtain elevation data and structural geometry. All field survey was established with horizontal control in Florida North Zone (903) State Plane coordinates, and vertical control in NAVD 1988 datum. Bridge and culvert structure surveys included the top of road profile and upstream regular cross section.

Channel and floodplain roughness coefficients (Manning's "n") were estimated based upon the methodology documented in USGS Water Supply Paper 2339. A combination of field observation, surveyor photographs, and aerial photography (USGS DOQQ) was used to establish the parameters used in the methodology. All of the areas studied as part of this revision have channels composed of sandy material and generally have bare bottoms. The channels have a relatively high roughness factor due to overhanging vegetation that persists year round. Similarly, the overbank areas are quite rough due to surface irregularities and heavy vegetation. Roughness values for the main channels were 0.045 and overbank values were 0.120 for the Santa Fe River Unnamed Tributary.

The starting water-surface elevations for the HEC-RAS models were determined using either normal depth or known water surface elevations for areas that were a continuation of the previous FIS. Floodways were determined for the streams in this study using method 4 in HEC-RAS initially, then method 1 to refine the floodway and fix the encroachment stations. All surcharge values are between 0.0 and 1.0, and the floodway contains the channel and is within the 1-percent annual chance floodplain at all cross sections.

<u>This Physical Map Revision, Preliminary May 20, 2016</u>

For this revision, closed basin studies for Deckles Millpond, Fivemile Creek and Lake Butler were performed by detailed methods, using Streamline Technologies ICPR v.3.1, Service Pack 8 to estimate flood levels. For these studies, the model schematic was developed using ArcGIS. Various sources were utilized in developing the schematic including GIS shapefiles of the transportation network, aerial imagery of Union County, LiDAR DEM and contours derived from the DEM.

The stage-area relationships for each closed basin were derived from the DEM and aerial imagery provided by FDOT. Starting water surface elevations for each basin were determined from the DEM. Basin connectivity in the model was represented by the use of overtopping weirs, channels and conveyance structures. The cross-section geometry for overtopping weirs and channel cross-sections was derived from the DEM. Conveyance structures were modeled using data obtained from field survey.

3.3 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 result in differences in base flood elevations across the 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 and Base Flood Elevations (BFEs) reflect the 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 elevations must be referenced to the new datum values.

As noted above, the elevations shown in the FIS report and on the FIRM for Union 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 from NGVD 29 to NAVD 88 is -0.88-foot. 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 this FIS to NGVD 29 should apply the stated conversion factor(s) to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1 foot.

For additional information regarding conversion between NGVD and NAVD, visit the NGS website at www.ngs.noaa.gov, or contact the NGS at the following address: Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance flood elevations and delineations of the 1- and 0.2-percent-annual-chance floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS, 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 in detail the 1- and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section

February 4, 2009 Initial Countywide FIS

For the initial countywide FIS, between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000 with a contour interval of 5 feet (USGS – Ellaville, Florida, 1963; Lulu, Florida, 1966; Lake Butler, Florida, 1966; Railford, Florida, 1970; Mikesville, Florida, 1962; Worthington Springs, Florida, 1966; and Brooker, Florida, 1966).

Areas studied by approximate methods were updated using a data layer known as ‘wetcomp’ provided by the Suwannee River Water Management District. ‘Wetcomp’ combines National Wetlands Inventory (NWI) data, land use and cover, as well as hydrography features.

This Physical Map Revision, Preliminary May 20, 2016

For this revision, between cross sections, the floodplain boundaries were interpolated using the LiDAR-derived DEM. This DEM was also utilized to plot floodplains for closed basin studies using the flood elevations in each basin.

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

4.2 Floodways

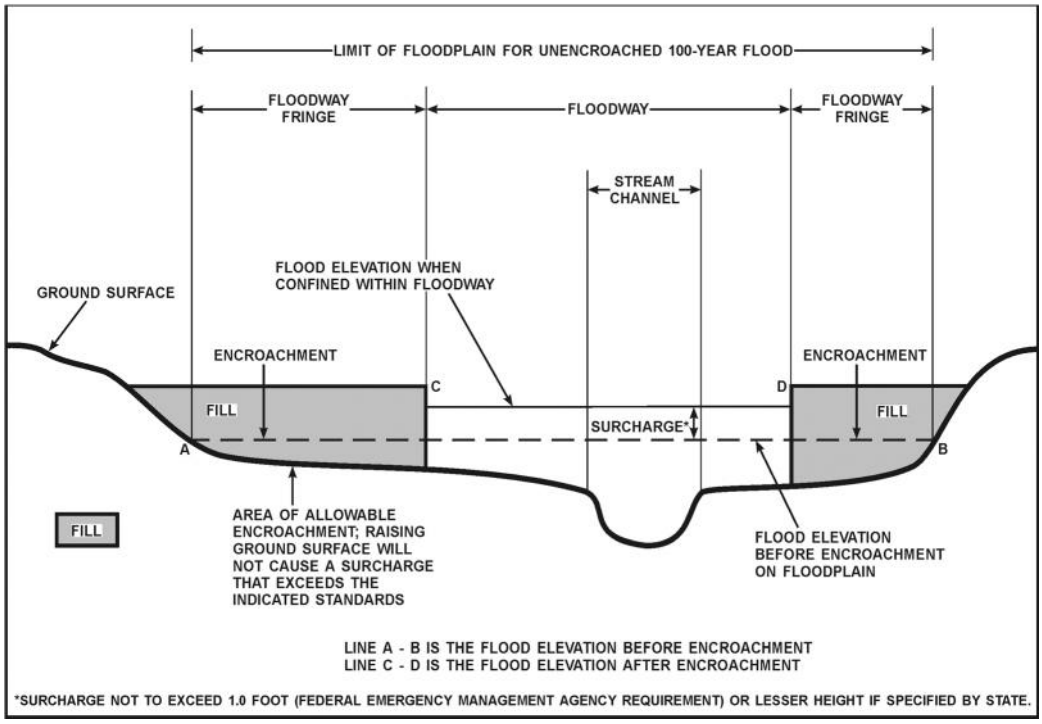
Encroachment on floodplains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development 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 chance annual 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 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 are tabulated for selected cross sections and are shown in Table 4 – Floodway Data. The computed floodways are shown on the FIRM. In cases where the floodway and the 1-percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Portions of the floodway for the Santa Fe River lie outside the county boundary. The area between the floodway and the 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 show in Figure 1.

No floodways were computed for Fivemile Creek.

FIGURE 1- FLOODWAY SCHEMATIC



FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
SANTA FE RIVER								
A	40.91	1,497/669	24,272	1.0	57.6	57.6	58.5	0.9
B	41.56	3,997/616	50,186	0.5	58.7	58.7	59.7	1.0
C	42.54	4,161/1,579	53,577	0.4	59.9	59.9	60.9	1.0
D	44.02	1,746/473	23,693	1.0	62.1	62.1	63.0	0.9
E	45.48	1,600/273	26,451	1.0	65.3	65.3	66.2	0.9
F	46.59	1,779/967	22,357	1.1	67.1	67.1	68.0	0.9
G	48.04	1,435/631	25,510	1.0	70.0	70.0	70.9	0.9
H	49.19	1,749/1,204	30,074	0.8	71.6	71.6	72.5	0.9
I	49.38	1,792/1,255	29,035	0.9	72.0	72.0	73.0	1.0
J	49.61	1,537/1,027	19,936	1.3	72.7	72.7	73.7	1.0

[1] Miles above mouth
[2] Total width/width within jurisdiction

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL
AND INCORPORATED AREAS

FLOODWAY DATA

SANTA FE RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
SANTA FE RIVER UNNAMED TRIBUTARY								
A	3,480	40	150	11	72.8	69.0[2]	69.8	0.8
B	4,344	55	600	2.7	77.2	77.2	77.5	0.3
C	6,123	113	455	3.1	82.2	82.2	83.1	0.9
D	7,227	166	830	1.0	83.2	83.2	84.1	0.9
E	8,727	131	116	3.7	91.2	91.2	91.3	0.1
F	10,517	101	55	1.8	113.4	113.4	113.6	0.2

[1] Feet above confluence with Santa Fe River
[2] Elevation computed without consideration of backwater effects from Santa Fe River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL
AND INCORPORATED AREAS

FLOODWAY DATA

SANTA FE RIVER UNNAMED TRIBUTARY

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. These 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 Flood Insurance Study 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 Flood Insurance Study by details methods. 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 1-percent annual chance floodplain, areas of the 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.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map 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, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The countywide FIRM presents flooding information for the entire geographic area of Union County. Previously, separate Flood Hazard Boundary Maps and/or FIRMs were prepared for each identified flood-prone incorporated community and the unincorporated

areas of the county. This countywide FIRM also includes flood hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community up to and including this countywide FIS, are presented in Table 5 – Community Map History.

7.0 OTHER STUDIES

Flood Insurance Studies for Bradford County (FEMA, 1989), Columbia County (FEMA, 1988), and Alachua County (FEMA, 2006) have been published. Those studies and this FIS are in agreement.

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Union County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS Reports, FHBMs, FBFMs, and FIRMs for all of the incorporated and unincorporated jurisdictions within Union 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
Union County (Unincorporated Areas)	December 2, 1977	None	August 4, 1988	February 4, 2009
Lake Butler, City of	September 22, 1978	None	July 3, 1986	February 4, 2009
Raiford, Town of[1]	February 4, 2009	None	February 4, 2009	N/A
Worthington Springs, City of	October 13, 1978	None	June 3, 1986	August 4, 1988 February 4, 2009

[1]This community does not have map history prior to the first countywide mapping.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

9.0 REFERENCES AND BIBLIOGRAPHY

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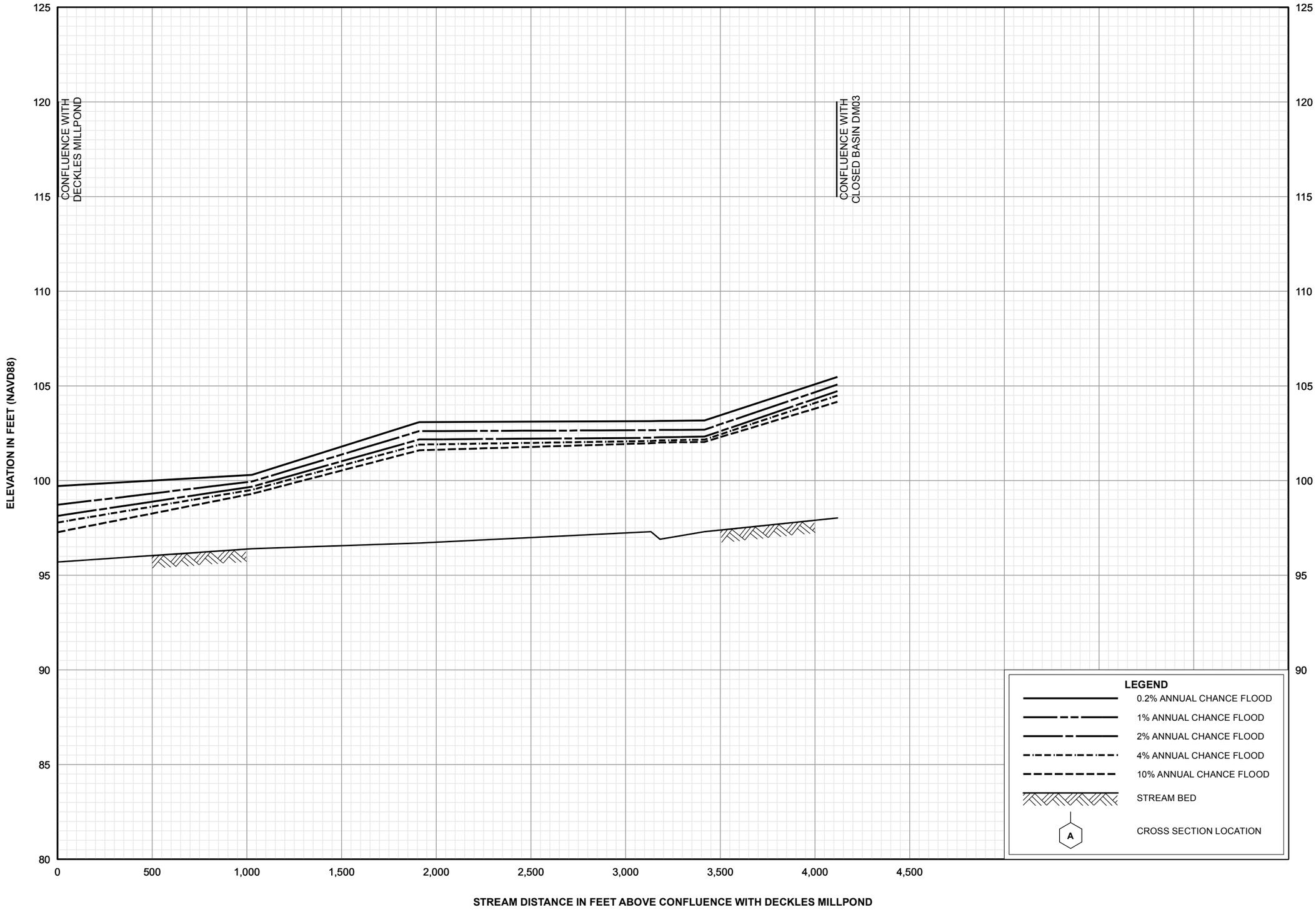
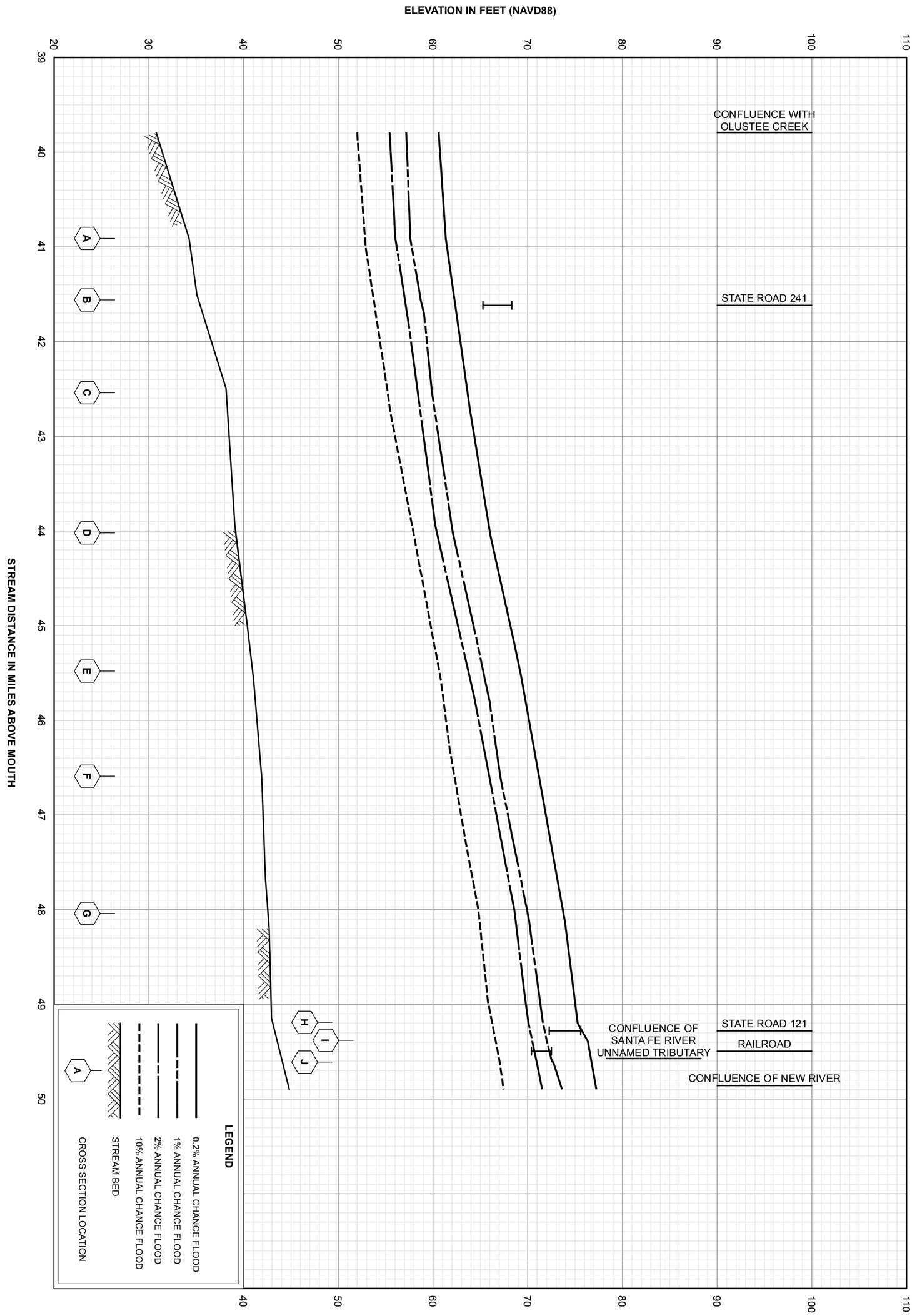


FLOOD PROFILES

FIVEMILE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL
AND INCORPORATED AREAS



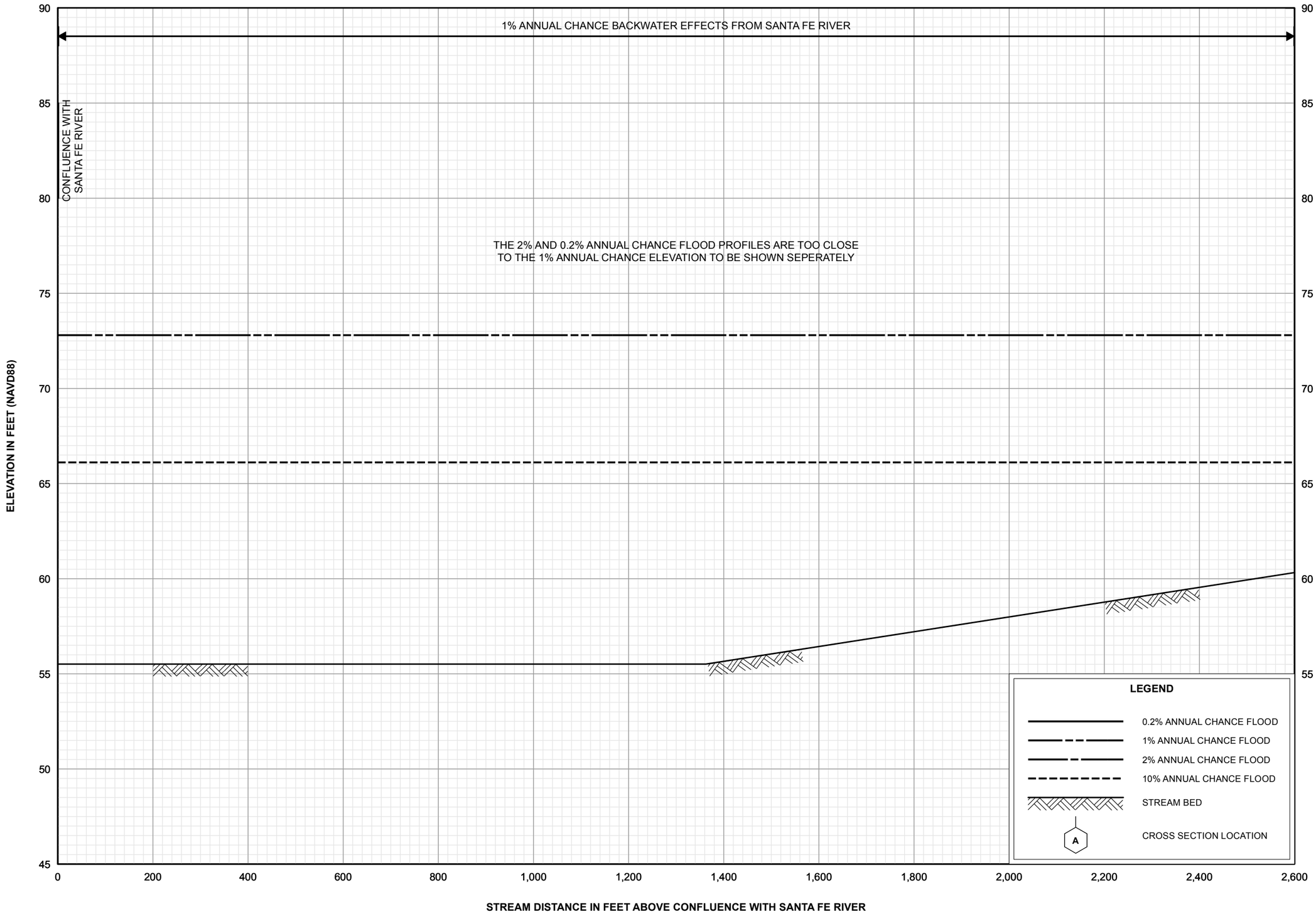
FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL
AND INCORPORATED AREAS

FLOOD PROFILES

SANTA FE RIVER

02P



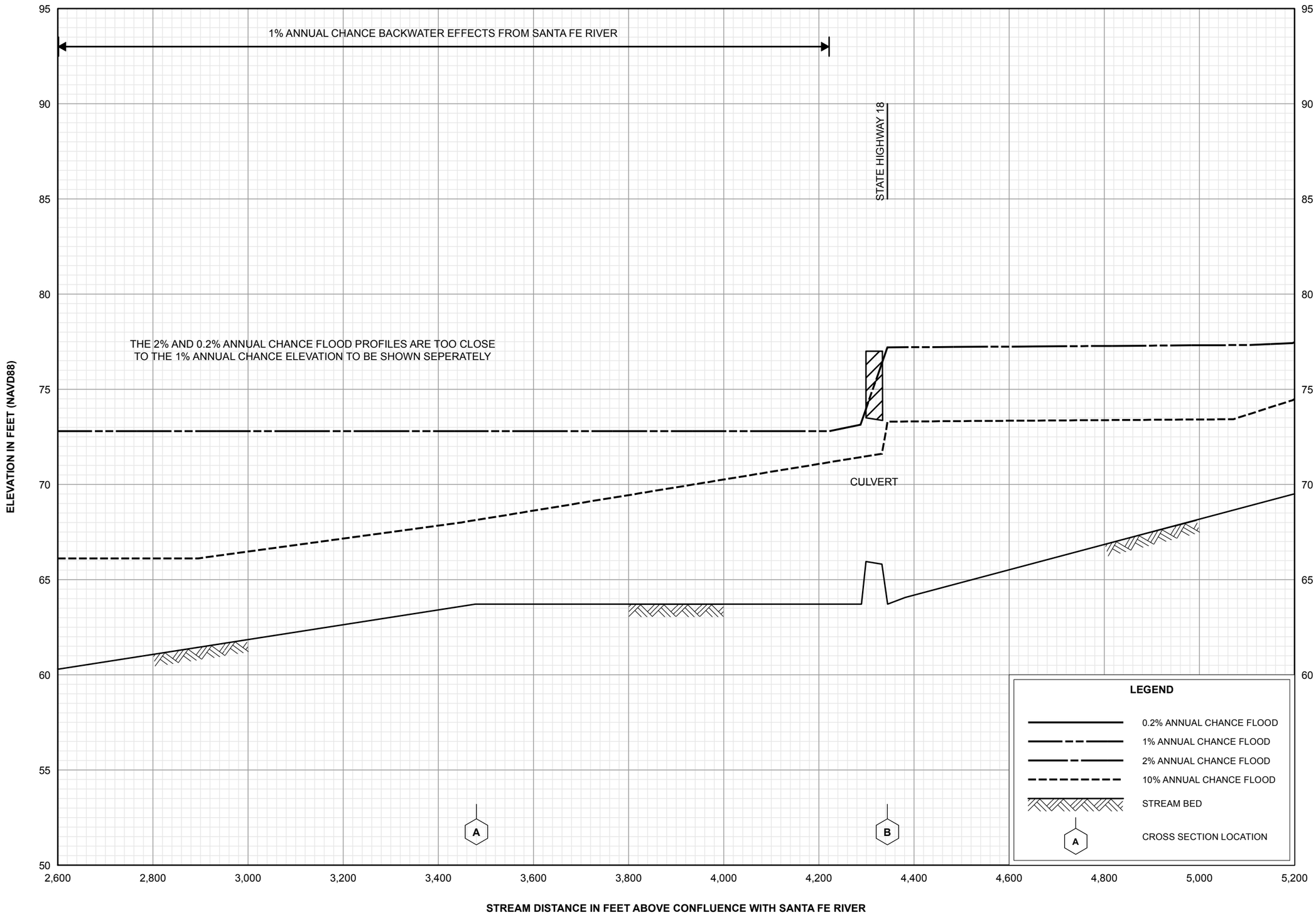
FLOOD PROFILES

SANTA FE RIVER UNNAMED TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL
AND INCORPORATED AREAS

03P



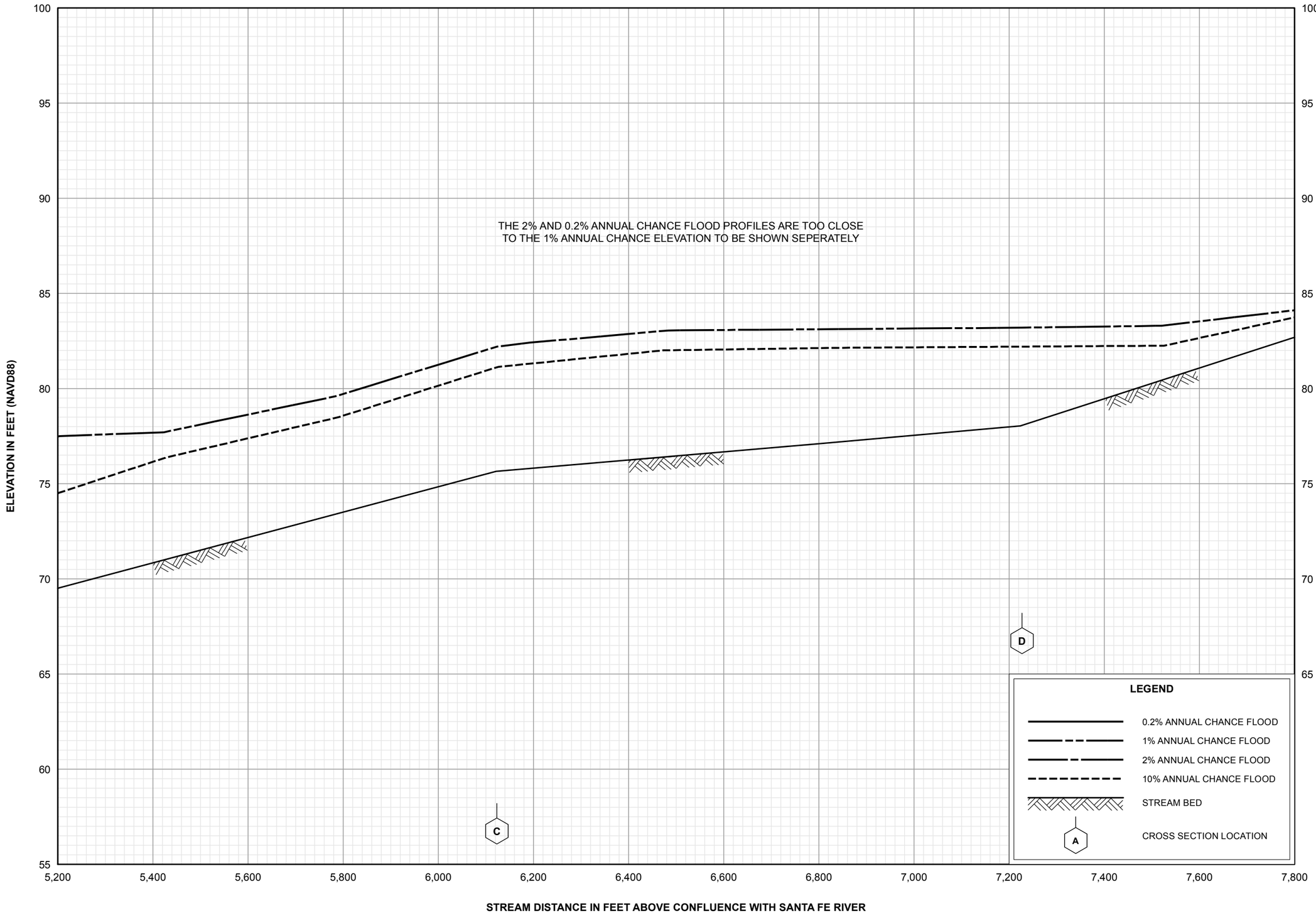
FLOOD PROFILES

SANTA FE RIVER UNNAMED TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL
AND INCORPORATED AREAS

04P



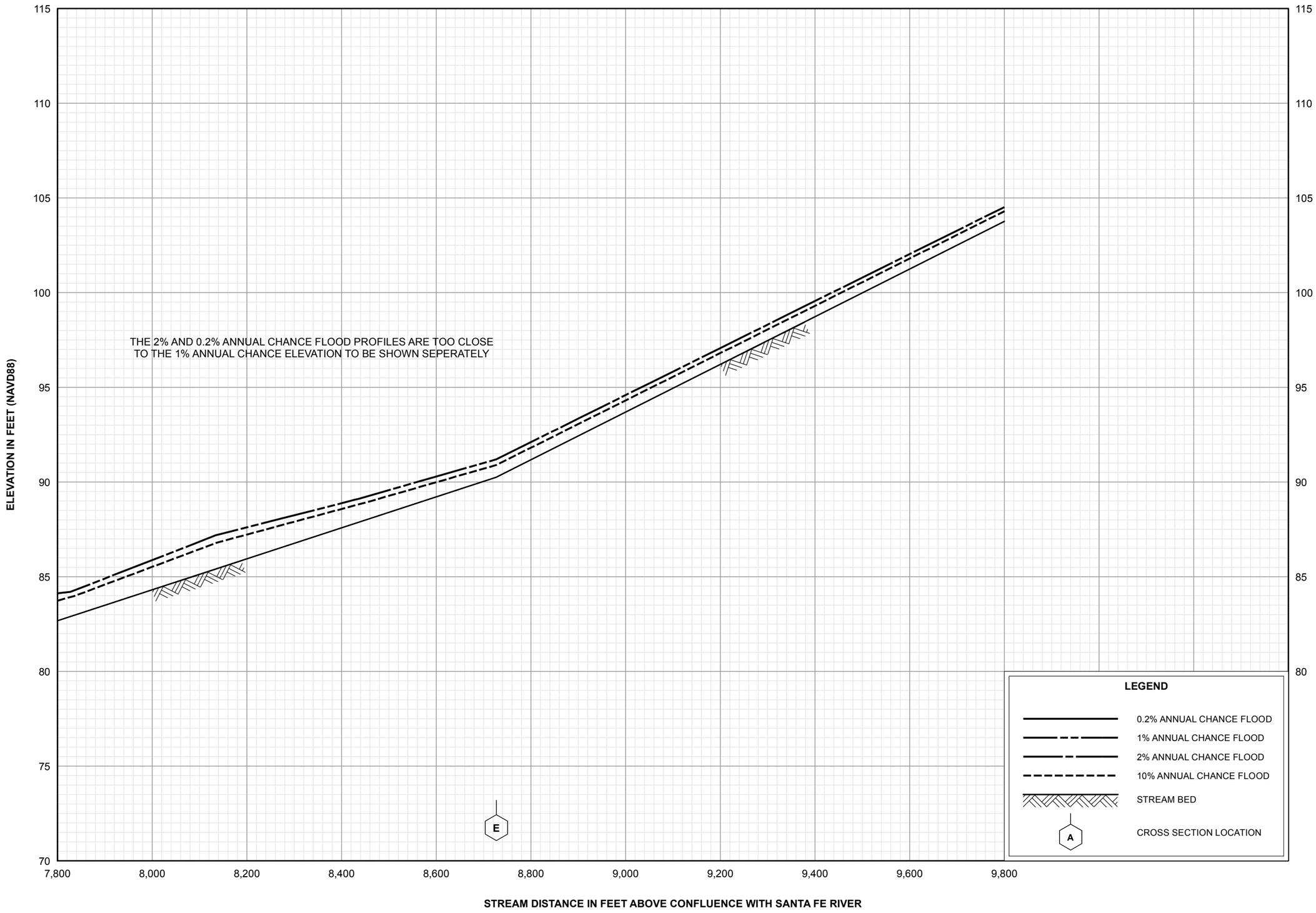
FLOOD PROFILES

SANTA FE RIVER UNNAMED TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL
AND INCORPORATED AREAS

05P



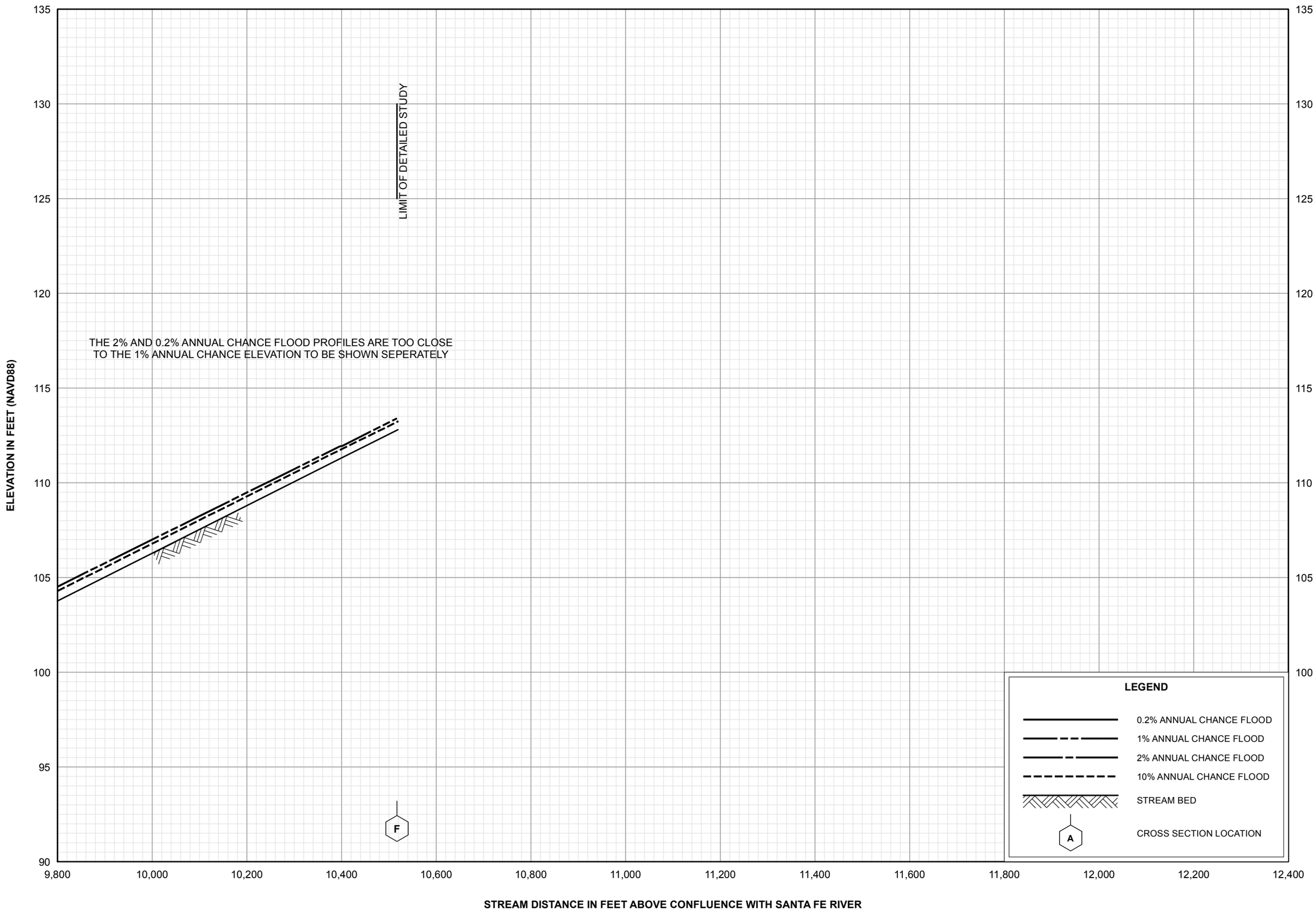
FLOOD PROFILES

SANTA FE RIVER UNNAMED TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL
AND INCORPORATED AREAS

06P



FLOOD PROFILES

SANTA FE RIVER UNNAMED TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

UNION COUNTY, FL
AND INCORPORATED AREAS