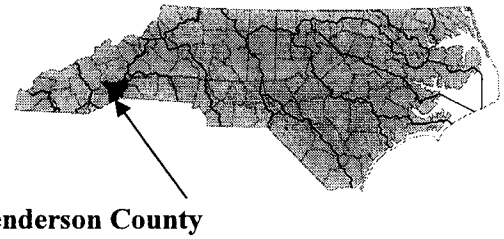
FLOOD INSURANCE STUDY

A Report of Flood Hazards in

HENDERSON COUNTY, NORTH CAROLINA

AND INCORPORATED AREAS



Henderson County

Community Name	Community Number	River Basin
Flat Rock, Village of	370565	French Broad
Fletcher, Town of	370568	French Broad
Henderson County (Unincorporated Areas)	370125	French Broad, Broad
Hendersonville, City of	370128	French Broad
Laurel Park, Town of	370384	French Broad
Mills River, Town of	370025	French Broad

NORTH CAROLINA
Cooperating Technical State
FEMA'S COOPERATING TECHNICAL PARTNER

October 2, 2008

Federal Emergency Management Agency
State of North Carolina

Flood Insurance Study Number
37089CV000A

www.fema.gov and www.ncfloodmaps.com

FOREWORD

This countywide Flood Insurance Study (FIS) Report was produced through a unique cooperative partnership between the State of North Carolina and the Federal Emergency Management Agency (FEMA). The State of North Carolina has implemented a long-term approach to floodplain management to decrease the costs associated with flooding. This is demonstrated by the State's commitment to map floodplain areas at the state level. As a part of this effort, the State of North Carolina has joined with FEMA in a Cooperating Technical State (CTS) agreement to produce and maintain this FIS Report and the accompanying digital Flood Insurance Rate Map (FIRM) for North Carolina.

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 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.

The following is a list of the publication dates of this Countywide FIS Report starting with the initial Report accompanying the North Carolina Statewide FIRM:

October 2, 2008

This FIS has been produced as part of the North Carolina Floodplain Mapping Program. Henderson County, North Carolina, falls under the administrative jurisdiction of Region IV of the Federal Emergency Management Agency (FEMA). Questions concerning this FIS may be directed to the North Carolina Floodplain Mapping Program at www.ncfloodmaps.com, the FEMA Map Assistance Center by calling the toll-free information line at 1-877-FEMA MAP (1-877-336-2627), or by contacting the FEMA Regional Office at the following address:

FEMA, Federal Insurance and Mitigation Administration
Koger Center - Rutgers Building
3003 Chamblee Tucker Road
Atlanta, Georgia 30341
(770) 220-5400

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Section 1.0 - Introduction

1.1 The National Flood Insurance Program

In 1968, Congress created the National Flood Insurance Program (NFIP) in response to the rising cost of taxpayer-funded disaster relief for flood victims and the increasing amount of damage caused by floods. The NFIP makes federally backed flood insurance available in communities that agree to adopt and enforce floodplain management ordinances to reduce future flood damage. Federally backed flood insurance is available in more than 19,000 communities across the United States and its territories.

The NFIP is managed by the Federal Insurance and Mitigation Administration of the Federal Emergency Management Agency (FEMA). The Federal Insurance and Mitigation Administration manages the insurance component of the NFIP and oversees the flood hazard mapping and the floodplain management aspects of the program.

The NFIP, through involvement with communities, the insurance industry, and the lending industry, helps reduce flood damage by nearly $800 million a year. Further, buildings constructed in compliance with NFIP building standards suffer approximately 80% less damage annually than those not built in compliance. In addition, every $3 paid in flood insurance claims saves $1 in disaster assistance payments. The NFIP is self-supporting for the average historical loss year, which means that operating expenses and flood insurance claims are not paid by the taxpayer, but through premiums collected for flood insurance policies.

Additional information of interest to homeowners, community officials, insurance companies, lenders, and study contractors is available in Section 9.0 of this FIS Report and on the NFIP Internet homepage at http://www.fema.gov/business/nfip/

1.2 Purpose of this Flood Insurance Study

Flood Insurance Studies (FISs) are one of the primary means by which the NFIP administers the National Flood Insurance Act of 1968, the Flood Disaster Protection Act of 1973, and the National Flood Insurance Reform Act of 1994. FISs develop flood risk data that are used to establish actuarial flood insurance rates. The information in this FIS Report will also be used by Henderson County and the jurisdictions therein (hereinafter referred to collectively as Henderson County) to facilitate the adoption and maintenance of floodplain management ordinances, which form the basis of communities' continued participation in the NFIP. Minimum requirements for participation in the NFIP are set forth in Title 44, Part 60, Section 3 of the Code of Federal Regulations (44 CFR 60.3). In some States and/or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. In such cases, the more restrictive criteria will take precedence, and the State and/or community (or other jurisdictional agency) will be able to explain them.

This FIS investigates the existence and severity of flood hazards in, or revises and updates previous FISs for, the geographic area of Henderson County, North Carolina, including the jurisdictions listed in Table 1.

Table 1—Jurisdictions in Henderson County

Community	Included in this FIS	Not Included in this FIS	If Not Included, Location of Flood Hazard/Flood Insurance Rate Data
Flat Rock, Town of	X		
Fletcher, Town of	X		
Henderson County (Unincorporated Areas)	X		
Hendersonville, City of	X		
Laurel Park, Town of	X		
Mills River, Town of	X		
Saluda, City of		X	Polk County

1.3 FIS Components

A Flood Insurance Study (FIS) is an analysis of flood hazards, typically presented as a set of Flood Insurance Rate Map (FIRM) panels and the FIS Report, which includes a set of Flood Profiles.

Flood Insurance Rate Map

The FIRM shows 1% annual chance (100-year) and 0.2% annual chance (500-year) floodplains, using tints, screens, and symbols. Floodways, the locations of selected cross sections used in the hydraulic analyses and floodway computations, and Velocity Zones are shown where applicable. The FIRM for North Carolina has been produced digitally, and there are separate data layers that are available in the public domain via the Internet.

Flood Insurance Study Report

The FIS Report provides a context for the information shown on the FIRM, as well as a summary of the data upon which the analyses are based. It also includes an index of sources of additional information on the NFIP.

Flood Profiles

A Flood Profile is provided for every stream studied in detail, showing the continuum of calculated flood elevations of various recurrence periods along the studied reaches. Flood Profiles are the documents that serve as a basis for determining flood insurance rate zones.

Flood events of a magnitude expected to occur with a 10%, 2%, 1%, or 0.2% annual chance have been selected as having special significance for developing sound floodplain management programs. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10%, 2%, 1%, and 0.2% chance, respectively, of being equaled in any given year. Therefore, FIS Reports typically determine water-surface elevations for floods with these probabilities. The FIRM delineates 1% and 0.2% annual chance floodplains and 1% annual chance floodway boundaries, and depicts 1% annual chance flood elevations, rounded to the nearest foot, to assist in developing floodplain management measures.

2.1 Floodplains

To provide a national standard without regional discrimination, the 1% annual chance flood has been adopted by FEMA as the base flood for floodplain management purposes. A 1% annual chance flood, or base flood, is defined as that having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance floodplains shown on the FIRM identify areas that are expected to be inundated by the 1% annual chance flood. This 1% annual chance floodplain is also called a Special Flood Hazard Area (SFHA), where the NFIP's floodplain management regulations must be enforced by the community as a condition of participation in the NFIP. The 0.2% annual chance floodplain is employed to indicate additional areas of flood risk associated with exceptionally severe floods.

2.2 Floodways

Encroachment on floodplains such as that caused by placement of structures and fill reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, floodways are provided as a tool to assist local communities in this aspect of floodplain management. Under this concept, the 1% annual chance riverine 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% annual chance flood can be carried without substantial increases in flood heights. Figure 1, "Floodway Schematic," illustrates this principle. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this FIS are presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional encroachment studies.

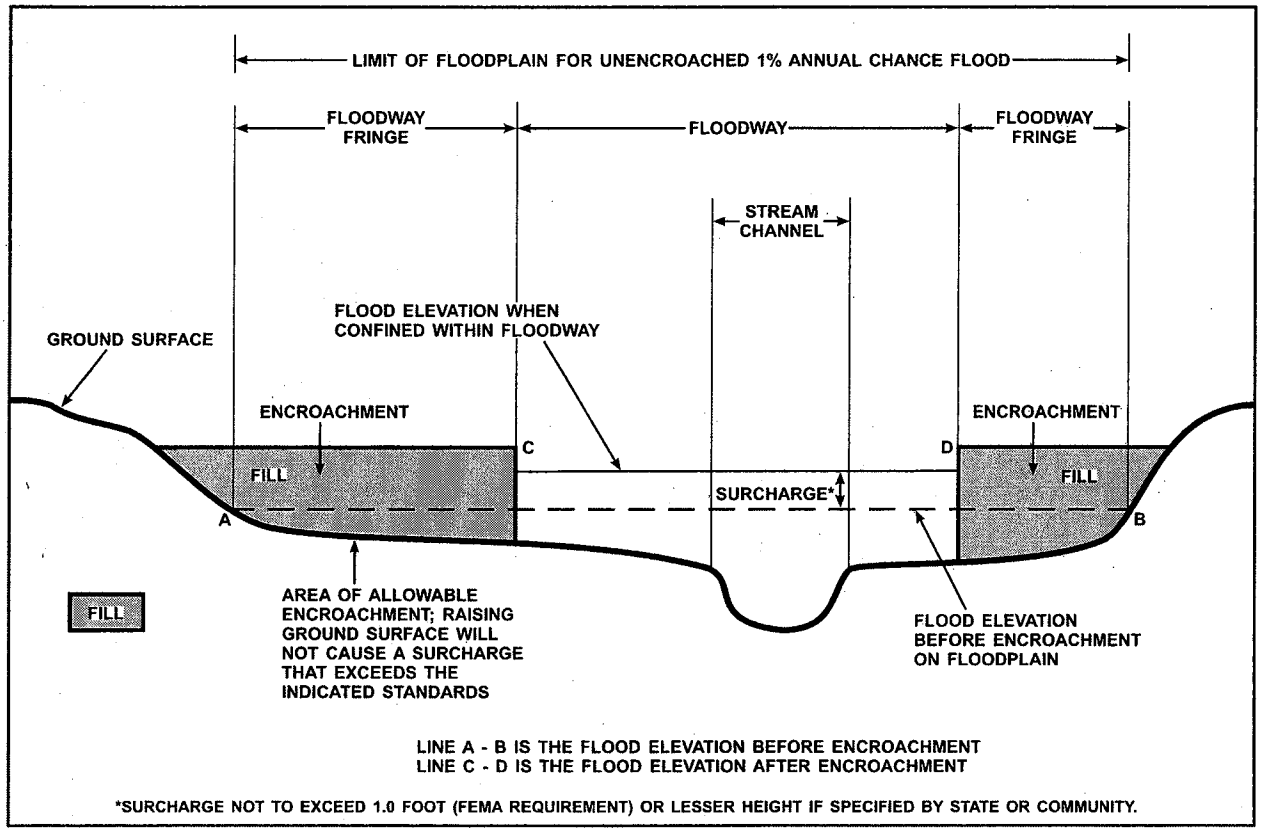

Figure 1—Floodway Schematic

2.3 Base Flood Elevations

Base Flood Elevations (BFEs) are shown on the FIRM and represent rounded, whole-foot elevations at selected locations along flooding sources that have been studied in detail. Flood Profiles in this FIS Report provide a comprehensive and definitive tool to determine specific flood elevations along a stream studied by detailed methods. In order to reduce the risk of damage from floods up to the base (1% annual chance) flood, communities are advised to consider these elevations when issuing building permits for structures.

Coastal flood elevations are provided in the Summary of Coastal Stillwater Elevations table in this report. If the elevation on the FIRM is higher than the elevation shown in this table, a wave height, 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.

2.4 Watershed Characteristics

Because a FIS is a probability analysis that may not account for some of the factors listed below, communities are strongly encouraged to consider adopting more restrictive or higher floodplain management criteria or ordinances than the minimum Federal requirements. Communities may also increase the validity of their flood hazard data by investing in continuous maintenance of river gages (see the **Data Validity and Reliability** paragraph below). If the U.S. Geological Survey (USGS) or other agencies do not maintain gages on the flooding sources of interest,

partnerships with the USGS may be pursued, or local gages may be installed. For more information, see Section 9.0 of this report.

This flood hazard study represents an analysis of certain watershed characteristics, some of which are summarized as follows:

Drainage Area

In general, streams that drain larger areas have greater flood hazards. FISs, in North Carolina, do not typically analyze flood hazards in places with rural drainage areas of less than one square mile and within urban drainage areas of less than ½ square mile.

Soil Permeability and Infiltration

Differences in the types of soil and the amount of vegetation in a watershed have a significant effect on the amount of water that the soil can absorb; soils with a high sand content absorb much more water than soils with a high clay content. The presence of vegetation increases infiltration; the presence of pavement decreases infiltration and also speeds runoff to receiving waters. As soil permeability and infiltration decrease, the volume and rate of overland flow increases.

Soil Moisture Conditions

In addition to soil permeability and infiltration, the level of the water table helps determine the saturation point, beyond which no water is absorbed. As rainfall duration increases, the height of the water table increases.

Channel and Floodplain Geometry

The geometric contour of a streambed, termed channel geometry, and the geometric contour of a floodplain determine the volume of water that a channel can hold and partially determine the rate at which water flows through it.

Channel and Floodplain Roughness

The roughness of a surface affects the characteristics of runoff whether the water is on the surface of the watershed or in the channel.

FIS Reports include analyses of how these factors will combine to produce overland flow patterns during floods that have a certain probability of occurring in any given year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at shorter intervals or even within the same year. The risk of experiencing a rare flood increases when longer periods are considered. For example, the risk of having a flood which equals or exceeds the 1% annual chance flood (1% chance of annual exceedence) in any 50-year period is approximately 40% (4 in 10), but for any 90-year period, the risk increases to approximately 60% (6 in 10).

It is important to note that the 1% annual chance flood is used as the national standard to allow a consistent approach to floodplain management, flood hazard assessment, and flood hazard mapping. In any given community, a number of factors may result in flooding characteristics that do not conform to predicted conditions. Therefore, the determination that an area is not shown on the FIRM as being within a Special Flood Hazard Area is no guarantee that it will not flood during a 1% annual chance flood. Examples of these factors include Data Validity and Reliability; Developmental and Topographic Changes Over Time; Erosion, Deposition, and Debris Flow; and Meandering and Lateral Migration.

Data Validity and Reliability

Certain types of analysis methods yield more justifiable characterizations of flood hazards. For example, a gage analysis, to determine peak discharges, is based on actual measurements of watershed conditions over time and, therefore, is typically considered the most accurate method of hydrologic analysis. However, it is not feasible to install enough gages to gather data on every stream. In addition, for many of the gage sites that do exist, there are interruptions in the period of record. The usefulness of gage data for the purpose of predicting flooding behavior decreases with interruptions in the period of record; predicted flooding conditions over a 100-year period based on 20 years of measurements spread over a 35-year period are less valid than those based on 30 years of continuous measurements. A regression analysis is typically considered the best method in the absence of gage data, as it uses gage data from watersheds with similar characteristics to estimate flood frequency and magnitude in an ungaged watershed. Regression equations reflect average conditions for a region; therefore, the results will not exactly match the results of a gage analysis at a particular location. The standard errors of the North Carolina rural regression equations range from 44 to 51 percent for estimates of the 1% annual chance flood. That means the difference between the results of the regression equation and the gage analysis for approximately two-thirds of the locations that gage data exists are within 44 to 51 percent of the gage analysis results. A rainfall-runoff hydrologic analysis may be used for gaged or ungaged watersheds, and can estimate the effects of storage areas and flood control structures and measures. This method is most valid when calibrated against historical data.

Developmental and Topographic Changes Over Time

A FIRM is based on the best topographic and planimetric information available to FEMA and the State of North Carolina at the time the study is produced. In time, however, development and/or natural phenomena can alter the physical characteristics of a watershed and its drainage channels, resulting in changes in the flood hazards in those areas. For example, constructing a housing subdivision reduces the amount of soil that is available to absorb water; this in turn causes an increase in the volume of surface water that flows into the channel.

Erosion, Deposition, and Debris Flow

The flood hazards shown on a FIRM are based on the assumption of unobstructed flow. The FIRM does not reflect an analysis of areas that are subject to erosion caused by the increased water-surface elevations and velocities that occur during flooding. In addition to the risks of landslides or a weakening of the ground underneath roads or structures, any sediment that is removed from one location will be deposited in another; accumulated deposits may have a pronounced effect on flood hazards in those areas. Similarly, debris such as fallen trees or branches, litter, or other items may obstruct stream channels or hydraulic structures, increasing water-surface elevations, velocities, and floodplain width.

Meandering and Lateral Migration

FISs are based on the assumption that channel geometry will remain stable during normal drainage and during flood events. This assumption is valid for most streams, which flow over bedrock or between bedrock outcroppings that form non-alluvial channels. However, alluvial streams change the channel geometry with time, significantly so during flood events. Alluvial streams are subject to erosion and deposition, which may result in braided or meandering channels. Streams of this type may be characterized by lateral migration, or channel shifting, in which the stream may change course entirely during a flood. Whenever clear evidence is available, a FIRM will identify the alluvial nature of a studied flooding source and designate wider floodways to allow for potential migration. However, these floodways are based on qualitative assessments and not on quantitative geomorphic and engineering analyses.

Section 3.0 – Insurance Applications

For flood insurance applications, the FIRM designates flood insurance rate zones and, in 1% annual chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies. Table 2, "Flood Zone Designations," includes a description of each type of flood hazard zone.

Table 2—Flood Zone Designations

Zone	Description
A	Zone A is the flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined in the FIS Report by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no Base Flood Elevations or depths are shown within this zone.
AE	Zone AE is the flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined in the FIS Report 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.
AH	Zone AH is the flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.
AO	Zone AO is the flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the detailed hydraulic analyses are shown within this zone.
AR	Zone AR is the flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
A99	Zone A99 is the flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No Base Flood Elevations or depths are shown within this zone.
V	Zone V is the flood insurance rate zone that corresponds to the 1% 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.
VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot Base Flood Elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Table 2—Flood Zone Designations

Zone	Description
X	Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2% annual chance floodplain, areas within the 0.2% annual chance floodplain, and to areas of 1% annual chance flooding where average depths are less than 1 foot, areas of 1% annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1% annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone.
X (Future)	Zone X (Future Base Flood) is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined based on future-conditions hydrology. No BFEs or base flood depths are shown within this zone.
D	Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

4.1 Basin Characteristics

Broad River Basin

The Broad River Basin, alongside the Catawba River Basin, establishes the headwaters of the Santee-Copper River system which flows through South Carolina before entering the Atlantic Ocean. It is bordered by the Catawba River Basin to the north and east, the French Broad River Basin to the west, and the state of South Carolina to the south. The entire Broad River Basin covers approximately 5,419 square miles, however the North Carolina portion of the basin is approximately 1,513 square miles. This area is located in the southwestern portion of North Carolina in the Blue Ridge Mountains and Piedmont regions.

The Broad River is the main river drainage system for the Broad River Basin. The four tributaries that supply the Broad River are the Green River, First Broad River, North Pacolet River, and Second Broad River. Within the Broad River Basin, the four man-made lakes are Lake Adger, Lake Lure, Lake Summit, and Moss Lake (Kings Mountain Reservoir).

There are four major reservoirs in the Broad River Basin. Along the Green River, there are two impoundments: Lake Summit, which is managed by Northbrook Carolina Hydro LLC, and Lake Adger, which is managed by Duke Power. Both hydrologic features produce electrical energy and have no minimum flow requirements. Along the Broad River, Lake Lure is managed by the Town of Lake Lure. Downstream of the dam, a flow of 6.6 cfs is required at the Town's wastewater treatment plant; however there is no minimum flow requirement. The Kings Mountain Reservoir (Moss Lake) has a minimum flow requirement of 12.0 cfs and it is the water source for the City of Kings Mountain. These flows have been shown to have negative effects on the downstream water quality.

The topography of the Broad River Basin consists of upstream portions in the Blue Ridge Mountains and downstream portions in the piedmont and coastal areas. The approximate land use in the basin is as follows: 74% forestland, 22% agriculture, and 2% urban and developed land. Developed areas in the Broad River Basin have increased in size by approximately 60,000 acres (6.2%) in the past fifteen years. Consequently this basin has experienced a large decrease of cultivated croplands, approximately 62,000 acres (6.4%).

The Broad River Basin encompasses all or part of 8 counties and 28 incorporated municipalities. According to the 2000 Census data, the population is approximately 342,282 which is based on a percentage of county land area estimated to be within the basin. The most rapidly growing communities in the basin are the Town of Boiling Springs and the City of Shelby, both in Cleveland County. Henderson, Lincoln, and Polk Counties are expected to experience the most growth in the river basin, however only a small portion of Lincoln County lies within the Broad River Basin.

French Broad River Basin

The French Broad River Basin is bordered to the south and west by the Little Tennessee and Savannah River Basins, and it is bordered to the north and east by the Broad, Catawba, and Watauga River Basins. The French Broad River Basin covers approximately 2,830 square miles. It is located in the Blue Ridge/Appalachian Mountains region of North Carolina.

The French Broad River Basin includes three separate river drainage systems. These include the French Broad River watershed, the Pigeon River watershed, and the Nolichucky watershed. All three rivers individually flow northwest into the state of Tennessee. There are seven man-made

lakes in the basin, which include Lake Kenilworth, Burnett Reservoir, Beetree Reservoir, Lake Julian, Lake Junaluska, Allen Creek Reservoir, and Waterville (Walters) Lake. Major tributaries in the basin include: the East, North, and West Fork French Broad Rivers, Mills River, the Mud Creek watershed, Swannanoa River, East and West Fork Pigeon Rivers, and the North and South Toe Rivers. The French Broad River basin drains to the Gulf of Mexico via the Ohio, Tennessee, and Mississippi Rivers.

The total distance of freshwater flooding sources sums to equal approximately 3,985.9 miles in the French Broad River Basin. The French Broad River Basin is comprised of portions or all of Avery, Buncombe, Haywood, Henderson, Madison, Mitchell, Transylvania, and Yancey counties. It is also composed of 24 municipalities including Asheville, Bakersville, Biltmore Forest, Black Mountain, Brevard, Burnsville, Canton, Clyde, Fletcher, Hazelwood, Hendersonville, Hot Springs, Laurel Park, Maggie Valley, Mars Hill, Marshall, Montreat, Newland, Rosman, Spruce Pine, Sugar Mountain, Waynesville, Weaverville, and Woodfin. According to the 2000 Census data, the population is approximately 393,795. Populations of counties that are wholly or partially contained within the basin increased by over 70,000 people between 1990 and 2000. Buncombe, Haywood, Madison, and Henderson counties contain the fastest growing municipalities in the basin. County populations are expected to grow by more than 122,000 (25 percent) by 2020 for a total population of almost 575,000 people. A loss of natural areas and an increase in impervious surface is often caused by a growth in population. Currently, the most populated areas are in the vicinity of Asheville, Hendersonville, Waynesville, and Black Mountain. Buncombe, Haywood, Madison, and Henderson counties contain the fastest growing municipalities in the basin.

Over half of the land in the basin is forested with much of it located within the 1.2 million-acre Pisgah National Forest. Steep slopes limit the land area suitable for development and crop production. The economy of the French Broad River Basin is largely supported by the following major industries: silviculture, agriculture (dairy, livestock, apples, Christmas trees), mining (feldspar, quartz, mica, gem stones and others), and tourism.

4.2 Principal Flood Problems

The principal sources of flooding in Henderson County are French Broad River, Mud Creek, Cane Creek, Clear Creek, Devils Fork, Boylston Creek, Britton Creek, Hoopers Creek, McDowell Creek, Mill Pond Creek, Bat Fork Creek, Shepherd Creek, and Wash Creek.

The French Broad River flooded in 1916. At the gage above Blantyre, mile 183.73, the flood reached an elevation of 2,087.4 feet NGVD 29 with an estimated discharge of 50,700 cfs and a recurrence interval of about 150 years. No damage information is available.

The flood of October 4, 1964 reached an elevation of 2,085.8 feet NGVD 29 with a discharge of 30,000 cfs and a recurrence interval of approximately 40 years at mile 183.73. There was a widespread overflow of the agricultural lands along French Broad River. Water stayed on the bottom lands for several days. The truck crop operations were mostly finished for the year, but there were a number of places where crops were still in the fields (Tennessee Valley Authority, 1965).

A flood occurred on August 14, 1940, reaching an elevation of 2082.2 feet NGVD 29 with a discharge of 20,800 cfs and a recurrence interval of about 20 years at mile 183.73. Bottom lands along the French Broad River were under water for four days. The corn crop was a total loss.

Damage was particularly heavy to truck crops with 400 acres destroyed (Tennessee Valley Authority, 1940).

A large flood occurred on Mud Creek on July 16, 1916. It reached elevation of 2,094 feet NGVD 29 at mile 9.85 with an estimated recurrence interval of about 200 years. The flood washed away bridges, lumber, and numerous houses were flooded. The damage to Southern Railway was heavy, bridges were destroyed, and fills washed out (Tennessee Valley Authority, 1958).

On August 13, 1940, another flood occurred on Mud Creek that reached an elevation of 2,091.5 feet NGVD 29 at mile 9.85 with recurrence interval of about 30 years. The valleys of Mud Creek and its tributaries were overflowed for several days to depths of 5 or more feet. This resulted in loss of crops on bottom lands, including large areas of high-value truck crops. Highways from Hendersonville in four directions were under water. Small steel bridges on country roads were washed out (Tennessee Valley Authority, 1958).

Another flood on Mud Creek occurred on April 5, 1957. The flood reached elevation 2,091.2 feet NGVD 29 at mile 9.85 with a recurrence interval of approximately 25 years. The high water over flowed the valley of Mud Creek, Bat Fork Creek, and Devils Fork and come into some commercial establishment in Hendersonville. The flood came soon after the start of the planting season so that there was appreciable crop damage. Scouring and washing of newly cultivated land was significant in some areas (Tennessee Valley Authority, 1958).

The October 1964 flood reached elevation 2,093.8 feet NGVD 29 at mile 9.85 with a recurrence interval of approximately 170 years on Mud Creek. Roads and bridges were overtopped throughout the basin. U.S. Highways 25 and 176 were flooded to a depth sufficient to halt traffic. Some 46 businesses or commercial firms were flooded to a depth as much as five feet (Tennessee Valley Authority, 1965).

A large flood occurred on Devils Fork on July 16, 1916. It reached elevation 2,086.5 feet NGVD 29 at mile 2.24 with an estimated recurrence interval of about 70 years. The November 6, 1977 flood crested at elevation 2,084.7 feet NGVD 29, the August 13, 1940 flood at 2,083.0 feet NGVD 29, and the April 5, 1957 flood reached elevation 2,082.4 NGVD 29 at mile 2.24. The recurrence intervals were about 30-, 13-, and 10- years respectively.

On August 13, 1940, a flood on Devils Fork reached an elevation 2,085.0 feet NGVD at mile 1.0 with an estimated recurrence interval of about 17 years. The April 5, 1957 flood crested at 2,083.6 mile 1.0 with a recurrence interval of about 10 years. The November 6, 1977 flood had an elevation of 1,084.2 at mile 0.50 and with a recurrence interval of about 18 years.

The November 6, 1977 flood caused high flows on Mud Creek and its major tributaries, Bat Fork Creek and Devils Fork. It reached elevation 2,093.1 feet NGVD 29 at mile 9.85 with a recurrence interval of about 110 years on Mud Creek. The shopping centers on Mud Creek near the intersection of Highways 25 and 176 were flooded. The Public Catalog Showroom was flooded to a depth of 3 feet with damages estimated at $250,000 by the manager. Flood damages to the airport were estimated to be in excess of $100,000 (Tennessee Valley Authority, 1977).

A large flood on Clear Creek occurred on July 16, 1916. It reached elevation 2,088.0 feet NGVD 29 with a recurrence interval of significantly over 500 years at mile 1.18. No discharge or damage information was found.

A large flood occurred on Clear Creek on October 4, 1964. At the gage near the City of Hendersonville, mile 1.18, the flood reached an elevation of 2,084.2 feet NGVD with a discharge of 7,600 cfs and a recurrence of about 110 years.

A flood on Cane Creek in May 1973 reached an elevation of 2,083.7 feet NGVD 29 and had a discharge of 26,000 cfs and a damage recurrence interval of about 500 years a the gage at mile 3.8. No damage information was found.

4.3 Historic Flood Elevations

September 5, 2004 (Hurricane Frances)
On September 5, 2004, Hurricane Frances came ashore on the central east coast of Florida as a category 2 storm with 105 mph maximum sustained winds. According to the National Weather Service, Frances spawned more reported tornadoes – at least 101 – than any other tropical storm or hurricane to hit the Eastern Seaboard. Eleven of those tornadoes occurred in North Carolina. The remnants of Hurricane Frances washed out water lines or sanitation systems in several mountain towns leaving tens of thousands of people without drinking water for some time. In Western North Carolina many streams and rivers reached well above flood stage causing many roads to be closed. The total estimated damage from Frances is estimated to be about $9 billion (US 2004 dollars).

September 16, 2004 (Hurricane Ivan)
This category 3 hurricane with sustained winds of 120 mph and possible gusts of up to 160 mph, hit Alabama and the extreme northwest Florida panhandle in the early morning hours of September 16, 2004. The storm surge was 10 – 15 feet above Mean Tide. An outbreak of 117 tornadoes, including 4 in North Carolina, developed over a 3 day period within the United States. Rainfall from the remnants of Hurricane Ivan caused flooding and triggered numerous landslides in western North Carolina. Ivan caused an estimated $13 billion worth of damage in the United States, making it the fifth costliest hurricane to ever strike the United States. Ivan is blamed for 8 deaths in North Carolina.

Additional Storm Events
An extremely strong cold front, preceeded by heavy rain all day on January 18, 1996, moved through the mountains, foothills and piedmont during the night. Heavy rain and flooding accompanied the storm system. Several inches of rain fell across the mountains during the day. At Rosman, the French Broad River flooded causing some evacuations in the downtown area.

Prolonged rain became heavier following the ice storm in the evening hours of January 26, 1996. The rain increased into the night when thunderstorms moved in from the west. Rainfall became excessive, more then 3 and 4 inches in some cases, causing flooding to begin by mid evening. At Asheville the flooding caused a wall to collapse onto several parked cars causing extensive damage. Numerous roads were closed around the mountains and foothills. Several major rivers flooded including the French Broad and the Oconoluftee Rivers. Evacuations were required in several counties because of flooding. In this event the flooding was not severe in the northern mountains. The estimated damage was $30 thousand.

On January 7 through January 8, several roads and bridges were washed out along the French Broad River, which rose significantly out of its banks on the 8th, causing damage to homes and businesses. A powerful winter storm pumped abundant moisture on very strong southerly winds into western North Carolina. The result was nearly 15 million dollars in damage across the

mountains and foothills as up to 15 inches of rain fell on the higher terrain, causing significant to major flooding and flash flooding. The Asheville Airport set a new record for 24 hour rainfall in the month of January with 4.42 inches. The excessive rain caused creeks and streams to rise well out of their banks. This combined with the enormous amounts of run-off to cause numerous roads and bridges to be covered in water or washed out. A few counties experienced widespread flooding for several hours before convective rain pushed north across the mountains, overwhelming already saturated ground and raging water basins. In addition, high gradient winds of at least 55 mph blew numerous trees and power lines down.

Severe urban flooding developed on August 5, 2003, with numerous roads flooded in the City of Hendersonville. Water entered some buildings, including the basements of homes, causing considerable damage, estimated at $100 thousand. Mud Creek flooded in the southern part of Hendersonville and damaged a parking lot.

The remnants of Hurricane Frances on September 7, 2004 brought very heavy rainfall to western North Carolina on the 7th and 8th, resulting in widespread severe flooding across the mountains and foothills. Initially, flooding developed along Shaws Creek in Henderson County. As moderate to heavy rainfall continued into the evening hours, flooding gradually worsened and expanded across the area. By the early morning hours of the 8th, flooding was widespread and severe across much of the area, with most creeks and streams flooded. Major flooding developed along the French Broad River, which reached a near-record stage of 25 feet at Blantyre, and 21 feet in Canton. Hundreds of homes and businesses were damaged or destroyed across the area, necessitating a number of evacuations and rescues. Numerous roads and bridges were washed out as well. Estimated losses were $22 million.

Flooding began shortly after midnight on September 17, 2004, across portions of the southern mountains and foothills. Henderson County experienced the most severe flooding, as numerous homes were damaged by flood waters, with damaged homes from the combination of the Ivan and Frances floods numbering in the hundreds. Numerous roads were blocked by high water, including highways 64, 280, and 25. Estimated damages were at $8.8 million.

Heavy rain associated with the remnants of Hurricane Jeanne from September 27 through September 28, 2004, resulted in the third flood event in three weeks across the county. However, this event was minor in comparison with the previous floods. A couple of roads were flooded near Etowah, Fletcher, and Bat Cave. Damages estimated at $1 thousand.

On June 27, 2005, flooding began around Hendersonville, where portions of highway 25 were under water. Numerous other roads flooded across the county, some due to poor drainage, others due to flooding streams, which included Mud Creek and Clear Creek. At least 16 roads were closed across the county during the event. By around sunrise, flooding was quite severe, as 6 motorists required rescue from submerged vehicles. Estimated damages were at $60 thousand.

Flash flooding developed along various streams when 6 to 9 inches of rain fell in about an 8 hour period on June 26, 2006. The river gauge at Bat Cave reached 11 feet at around 11 A.M. About 100 people were evacuated from the area, mostly from flooded campgrounds. Several structures were damaged by flood water. Highway 64 and 74 and Riverside Drive were covered with water and closed. A bridge was washed out on Edney Inn Road just south of Bat Cave due to flooding on Reedypatch Creek. Flooding along this creek damaged the porch of a log home. Approximately 20 homes were isolated due to washed out bridges and driveways. Mudslides also

developed, covering portions of the major highways in the area with debris, and damaging at least one business. Estimated damages from the storm were $200 thousand.

On September 5, 2006, flooding of several roads on the south side of Hendersonville and in the Flat Rock area, when up to 4 inches of rain fell over the area in about a 3 hour period. Affected roads included Old Spartanburg Road at Maple Village Drive, where a water rescue was required. A mobile home was evacuated in this area as well. Shepard Street near the airport, New Hope Road, Staton Road were also flooded. Several locations were also flooded along highway 176, where water entered at least 2 businesses. Although most of the high water was due to poor drainage, the emergency manager reported several small streams flooded, including Devils Fork and Bat Fork. Estimated damage is at $20 thousand.

Table 3, "Historic Flood Elevations," lists selected flooding sources in Henderson County with records of past stages. The table shows the historic peak, a location description, approximate stream station, the date of the historic peak, and approximate recurrence interval of the flood elevation. The approximate recurrence interval for a flood is often estimated based on an analysis of rainfall amounts from a storm and /or stream gage data.

Table 3—Historic Flood Elevations

Flooding Source	Location Description	Approximate Stream Station	Historic Peak (Feet NAVD 88)	Date	Approximate Recurrence Interval
Hurricane Frances	Mills River USGS Gage 3446000	259	2,100.63	September 7-9, 2004	25-50 year
Hurricane Ivan	Mills River USGS Gage 3446000	259	2,100.16	September 17-18, 2004	10-25 year

4.4 Flood Protection Measures

Flood protection measures may be structural (such as levees, dams, and reservoirs) or non-structural (such as land-use management ordinances, policies, or practices).

To provide safe flood protection and be mapped as such, FEMA specifies that all levees must: have a minimum of three feet of freeboard against the 1% annual chance flood event; be equipped with closure devices at every opening; be constructed with embankments and foundations that are certified not to fail due to erosion, seepage, or instability; and be certified against future loss of freeboard due to settling. For additional requirements, please refer to 44 CFR 65.10.

Flood protection measures are not known to exist in Henderson County.

4.5 Scope of Study

In order to determine the areas studied by detailed and limited detailed methods in this FIS, initial research and community coordination was necessary. Initial scoping meetings were held in Henderson County to present the results of initial research to the county and communities within

the county and to discuss their flood mapping needs. The county and communities were asked to provide input on proposed study priorities and analysis methods. Those meetings resulted in the identification of flooding sources having a flood mapping need. Draft basin plans were developed based on the results of the initial scoping meetings. Final scoping meetings were held by the State and FEMA to provide counties and communities an overview of the draft basin plans, including the proposed scope and schedule for the project, and to provide an opportunity for additional county and community input. After the final scoping meeting was held, the Final Basin Plans were produced.

This FIS covers the geographic area of Henderson County, North Carolina, and all jurisdictions therein. 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. Limits of detailed study are indicated on the Flood Profiles and/or the FIRM. Please see Table 4, "Flooding Sources Studied by Detailed Methods: Revised or Newly Studied," for a list of flooding sources that were revised or newly studied by detailed methods for this FIS.

Table 4—Flooding Sources Studied by Detailed Methods: Revised or Newly Studied

Source	Riverine Sources		Affected Communities
	From	To	
Bat Fork Creek	The confluence with Mud Creek	Approximately 1,500 feet upstream of New Hope Road (SR 1757)	City of Hendersonville, Henderson County (Unincorporated Areas)
Boylston Creek	Approximately 500 feet downstream of Banner Farm Road	Approximately 100 feet upstream of Gonce Drive	Town of Mills River
Boylston Creek Tributary 7	The confluence with Boylston Creek	Approximately 1,100 feet upstream of Cross Creek Court	Town of Mills River, Henderson County (Unincorporated Areas)
Cane Creek	The confluence with French Broad River	The Henderson/ Buncombe County boundary	Town of Fletcher, Henderson County (Unincorporated Areas)
Clear Creek	The confluence with Mud Creek	Approximately 600 feet upstream of Howard Gap Road (SR 1006)	Henderson County (Unincorporated Areas)
Devils Fork	The confluence with Bat Fork Creek	Approximately 500 feet upstream of Old Dana Road (SR 1738)	City of Hendersonville, Henderson County (Unincorporated Areas)
Green River	Approximately 0.7 mile downstream of NC Route 225	Approximately 400 feet upstream of Bear Paw Ridge Road	Henderson County (Unincorporated Areas)

Table 4—Flooding Sources Studied by Detailed Methods: Revised or Newly Studied

Source	Riverine Sources		Affected Communities
	From	To	
Higgins Branch	The confluence with Kimsey Creek	Approximately 50 feet downstream of the Henderson/Buncombe County boundary	Town of Fletcher
Hoopers Creek	The confluence with Cane Creek	Approximately 120 feet upstream of Lindsey Loop Road (SR 1571)	Town of Fletcher, Henderson County (Unincorporated Areas)
Kimsey Creek	The confluence with Cane Creek	Approximately 50 feet downstream of the Henderson/Buncombe County boundary	Town of Fletcher, Henderson County (Unincorporated Areas)
Mill Pond Creek	At Hysong Lane	Approximately 40 feet downstream of North Hills Drive	Henderson County (Unincorporated Areas)
Mills River	The confluence with French Broad River	The confluence with South Fork Mills River and North Fork Mills River	Town of Mills River, Henderson County (Unincorporated Areas)
Mud Creek	The confluence with French Broad River	Approximately 500 feet upstream of Walnut Cove Road (SR 1125)	City of Hendersonville, Village of Flat Rock, Henderson County (Unincorporated Areas)
South Wash Creek	The confluence with Wash Creek	Approximately 50 feet downstream of Lake Drive	Town of Laurel Park
Wash Creek	The confluence with Mud Creek	Approximately 1,400 feet upstream of Glasgow Lane (SR 1185)	City of Hendersonville, Town of Laurel Park Henderson County (Unincorporated Areas)

Table 5, "Flooding Sources Studied by Detailed Methods: Redelineated," contains a list of flooding sources that were studied by detailed methods for previous FISs, but were only partially revised in the current study. Their effective analyses remain valid; however, their floodplain delineations have been revised on the current FIRM.

Table 5—Flooding Sources Studied by Detailed Methods: Redelineated

Source	Riverine Sources		Affected Communities
	From	To	
Boylston Creek	The confluence with French Broad River	Approximately 500 feet downstream of Banner Farm Road	Town of Mills River, Henderson County (Unincorporated Areas)
Britton Creek	The confluence with Mud Creek	New Village Drive	City of Hendersonville, Henderson County (Unincorporated Areas)
Clear Creek	Approximately 600 feet upstream of Howard Gap Road (SR 1006)	Approximately 150 feet downstream of the confluence of Kyles Creek	Henderson County (Unincorporated Areas)
French Broad River	The Henderson/ Buncombe County boundary	The Henderson/ Transylvania County boundary	Town of Mills River, Town of Fletcher, Henderson County (Unincorporated Areas)
McDowell Creek	The confluence with French Broad River	Pennsylvania Road (SR 1348)	Town of Mills River, Henderson County (Unincorporated Areas)
Mill Pond Creek	The confluence with French Broad River	At Hysong Lane	Henderson County (Unincorporated Areas)
Shepherd Creek	The confluence with Mud Creek	Approximately 50 feet downstream of S. Lakeside Drive (SR 1148)	City of Hendersonville, Henderson County (Unincorporated Areas)

Table 6, "Flooding Sources Studied by Detailed Methods: Limited Detailed" contains a list of flooding sources that were studied by approximate methods in previous FISs but were revised using limited detailed methods for this FIS.

Table 6—Flooding Sources Studied by Detailed Methods: Limited Detailed

Source	Riverine Sources		Affected Communities
	From	To	
Allen Branch	The confluence with Clear Creek	Approximately 200 feet upstream of the Luther Capell Lane	City of Hendersonville, Henderson County (Unincorporated Areas)
Bat Fork Creek	Approximately 1,500 feet upstream of New Hope Road (SR 1757)	Approximately 200 feet upstream of US Route 176	Henderson County (Unincorporated Areas)
Battle Creek	The confluence with Shaw Creek	Approximately 0.5 mile upstream US Route 64	Henderson County (Unincorporated Areas)
Big Willow Creek	The confluence with French Broad River	The confluence of South Fork Big Willow Creek and North Fork Big Willow Creek	Henderson County (Unincorporated Areas)
Big Willow Creek Tributary 1	The confluence with Big Willow Creek	Approximately 50 feet upstream of Lakeshore Drive	Henderson County (Unincorporated Areas)
Boylston Creek	Approximately 100 feet upstream of Gonce Drive	The Henderson/ Transylvania County boundary	Town of Mills River
Britton Creek	New Village Drive	Approximately 90 feet upstream of Mistletoe Trail	City of Hendersonville, Henderson County (Unincorporated Areas)
Britton Creek Tributary 2	The confluence with Britton Creek	Approximately 150 feet upstream of Stonebrook Drive	City of Hendersonville, Henderson County (Unincorporated Areas)
Broad River	The Henderson/ Rutherford County boundary	The Henderson/ Buncombe County boundary	Henderson County (Unincorporated Areas)
Clear Creek	Approximately 150 feet downstream of the confluence of Kyles Creek	Approximately 1.0 mile upstream of Apple Valley Road (SR 1572)	Henderson County (Unincorporated Areas)
Dunn Creek	The confluence with Bat Fork Creek	Approximately 700 feet upstream of Howard Gap Road (SR 1006)	City of Hendersonville, Henderson County (Unincorporated Areas)
Featherstone Creek	The confluence with Mud Creek	Approximately 250 feet upstream of Locust Grove Road (SR 1528)	Henderson County (Unincorporated Areas)
Finley Creek	The confluence with Shepherd Creek and Perry Creek	Approximatley 0.4 mile upstream of Old Kanuga Road (SR 1138)	Henderson County (Unincorporated Areas)

Table 6—Flooding Sources Studied by Detailed Methods: Limited Detailed

Source	Riverine Sources		Affected Communities
	From	To	
Gash Creek	The confluence with French Broad River	Approximately 1,300 feet upstream of US Route 64	Henderson County (Unincorporated Areas)
Green River	The Henderson/Polk County boundary	Approximately 0.7 mile downstream of NC Route 225	Henderson County (Unincorporated Areas)
Henderson Creek	The confluence with Clear Creek	Approximately 1,300 feet upstream of Pace Rd (SR 1726)	Henderson County (Unincorporated Areas)
Hickory Creek (near Gerton)	The confluence with Broad River	Approximately 0.6 mile upstream of Bearwallow Mountain Road (SR 1693)	Henderson County (Unincorporated Areas)
King Creek	The confluence with Bat Fork Creek	Approximately 2,400 feet upstream of W. Blue Ridge Road	Village of Flat Rock, Henderson County (Unincorporated Areas)
King Creek Tributary 3	The confluence with King Creek	Approximately 200 feet upstream of Rutledge Drive (SR 1166)	Village of Flat Rock, Henderson County (Unincorporated Areas)
Kyles Creek	The confluence with Clear Creek	Approximately 150 feet downstream of Terrys Gap Road (SR 1565)	Henderson County (Unincorporated Areas)
Lanning Mill Creek	The confluence with Kyles Creek	Approximately 800 feet upstream of the confluence with Kyles Creek	Henderson County (Unincorporated Areas)
Lewis Creek	The confluence with Clear Creek	Approximately 140 feet downstream of Pilot Mountain Road (SR 1783)	Henderson County (Unincorporated Areas)
Little Willow Creek	The confluence with French Broad River	Approximately 1.0 mile upstream of Pleasant Grove Church Road (SR 1191)	Henderson County (Unincorporated Areas)
Mill Pond Creek	Approximately 40 feet downstream of North Hills Drive	Approximately 400 feet upstream of Stoney Mountain Road (SR 1383)	Henderson County (Unincorporated Areas)
North Fork Big Willow Creek	The confluence with Big Willow Creek	Approximately 0.6 mile upstream of the confluence with Big Willow Creek	Henderson County (Unincorporated Areas)

Table 6—Flooding Sources Studied by Detailed Methods: Limited Detailed

Source	Riverine Sources		Affected Communities
	From	To	
North Fork Mills River	The confluence with Mills River	Approximately 1.3 miles upstream of Rush Branch Road	Town of Mills River, Henderson County (Unincorporated Areas)
Perry Creek	The confluence with Finley Creek and Shepherd Creek	Approximately 1,500 feet upstream of Price Road (SR 1137)	Henderson County (Unincorporated Areas)
Piney Branch	The confluence with South Fork Big Willow Creek	Approximately 0.8 mile upstream of Big Willow Road (SR 1191)	Henderson County (Unincorporated Areas)
Reedypatch Creek	The confluence with Broad River	Approximately 600 feet upstream of Bald Rock Road (SR 1710)	Henderson County (Unincorporated Areas)
Rock Creek (into Green River)	The confluence with Green River	Approximately 0.4 mile upstream of Green River Road (SR 1106)	Henderson County (Unincorporated Areas)
Shaw Creek	The confluence with French Broad River	Approximately 1,400 feet upstream of Turley Falls Road (SR 1215)	Henderson County (Unincorporated Areas)
Shepherd Creek	Approximately 50 feet downstream of S. Lakeside Drive (SR 1148)	The confluence of Finley Creek and Perry Creek	Henderson County (Unincorporated Areas)
South Fork Big Willow Creek	The confluence with Big Willow Creek	Approximately 0.4 mile upstream of Patterson Road (SR 1194)	Henderson County (Unincorporated Areas)
South Fork Mills River	The confluence with Mills River	Approximately 3.2 miles upstream of Dalton Road (SR 1340)	Town of Mills River, Henderson County (Unincorporated Areas)
Tonys Creek	The confluence with Shepherd Creek	Approximately 0.5 mile upstream of Willow Road (SR 1171)	Town of Laurel Park, Henderson County (Unincorporated Areas)
Wolfpen Creek	The confluence with Clear Creek	Approximately 100 feet upstream of Chestnut Gap Road (SR 1742)	City of Hendersonville, Henderson County (Unincorporated Areas)

Table 7, "Stream Name Changes" contains a list of flooding sources that have been renamed since the previous FIS was published.

Table 7—Stream Name Changes

Community	Old Name	New Name
Henderson County (Unincorporated Areas)	Hickory Creek	Hickory Creek (near Gerton)
Henderson County (Unincorporated Areas)	Rock Creek	Rock Creek (into Green River)

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic methods were used to determine the flood hazard data required for this FIS.

5.1 Hydrologic Analyses

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

Pre-Countywide Analyses

Each jurisdiction within Henderson County, with the exceptions of the Towns of Flat Rock, Fletcher, Mills River, and Laurel Park, had previously printed FIS Reports describing each community's hydrologic analyses. Those analyses have been compiled from the FIS Reports and are summarized below. These analyses remain valid for those flooding sources listed in Table 6, "Flooding Sources Studied by Detailed Methods: Redelineated."

Formal flood records were available at gaging stations on French Broad River at Bent Creek and Blantyre. The gage at Bent Creek, number 03448000, mile 157.7, is located 6.2 miles downstream from the lower study limit. The gage was operated from 1935 to date. The gage at Blantyre, number 0344300, located with in the study limit at mile 183.7, was operated from 1925 to date. Values of the 10%, 2%, 1%, and 0.2% annual chance flow peak discharge were computed using procedures outlined in Bulletin 17A (Water Resources Council, 1977) including the skew maps, plate I, and adjustment for historic flood information where available. Consideration was given to the frequencies of the other gage records along the French Broad River when developing the frequency curves for Bent Creek and Blantyre. At other locations on the French Broad River within the study limits, discharge frequencies were determined by interpolation between the gaged points.

There are 28 dams within the county which were initially identified as having the potential to affect flood flows and elevations if they fail. Fifteen of these dams were identified by the U.S. Army Corps of Engineers (USACE), (USACE, 1975) as low hazard. From a review of the dam heights, volume of stored water, and location with respect to this study area, it was judged that only three posed a potential threat for exceeding the 1% annual chance flood levels at downstream study reaches should they fail in a non flood situation.

Each of these dams was evaluated to determine if it would fail in the 1% and 0.2% annual chance floods and was judged able to safely pass either flood. The increase in flood levels was conservatively estimated assuming the dams would fail in the floods. From the standpoint of evaluation potential flood hazards passed by the dams, it is of interest to consider what would happen should they fail under non flood conditions. Based upon these studies it is judged that they flood level in this case would not exceed the 1% annual chance flood level determined without dam failure.

Kanuga Lake and Wolf Lake Dams are located on Little Mud Creek at about miles 1.7 and 0.5 respectively. Kanuga Lake Dam is a 15-foot earth structure which impounds 180 acre-feet. The dam was evaluated in both the 1% and 0.2% annual chance floods. There was no overtopping from either of these floods; the dam was judged not to fail.

Wolf Lake Dam, located 1.2 miles downstream from Kanuga Lake Dam, is a 24-foot-high concrete dam with a maximum capacity of 173 acre-feet. The dam was evaluated in both the 1%

and 0.2% annual chance floods and would be overtopped in both floods (1.86 and 2.57 feet respectively) but was judged not to fail.

Feeney Dam is located on Hoopers Creek. The dam is 44 feet high earth structure and has a storage capacity of 225 acre-feet. The dam was evaluated in both the 1% and 0.2% annual chance floods and would be overtopped by 0.69 and 1.05 feet respectively. The dam was judged not to fail. Downstream flow frequencies and profiles are estimated assuming the dam would not fail. If the dam should fail the 1% and 0.2% annual chance flood elevation would be about 14 feet higher at the dam than without failure. The increase would diminish to 0.4 foot at mile 0.22 on Hoopers Creek.

Lake Osceola, on Shepherd Creek at the upper limit of the study reach is created by a 30-foot-high earthfill dam with a storage volume of 500 acre-feet. The U.S. Army Corps of Engineers (USACE) (USACE, 1975) and the state of North Carolina have classified the dam as high hazard. The hydrologic design of the dam was evaluated for this study and it was estimated that the 1% annual chance flood could be safely passed without overtopping but that the 0.2% annual chance flood would overtop the dam by 1.5 feet. The overtopping was estimated to be of sufficiently short duration that the dam would not fail. Thus, flow frequency estimates down stream were based on assumption that the dam would not f ail. If the dam should fail, the 0.2% annual chance flood elevation would be 19 feet higher just below the dam. The increase would diminish to 3 feet at the mouth of Shepherd Creek. On Mud Creek the maximum increase of 3 feet at the confluence with Shepherd Creek would diminish to become insignificant at Mud Creek mile 5.

Revised Analyses for Countywide FIS

The hydrologic analyses for the French Broad River basin, except for flooding sources with stream gages, were performed using the urban and rural regression equations developed by the USGS. The urban equations were published in "Estimation of Flood-Frequency Characteristics of Small Urban Streams in North Carolina," Water Resources Investigations Report 96-4084 (U.S. Department of the Interior, 1996). The rural equations were published in "Estimating the Magnitude and Frequency of Floods in Rural Basins in North Carolina, - Revised," Water Resources Investigations Report 01-4207 (U.S. Department of the Interior, 2001). Regression equations are mathematical formulas that relate the flow in the stream to physical factors such as the area of the basin and the percentage of the surface that is impervious (paved). Regression equations are developed by fitting a line through the center of the points on a graph that compares flood flows to basin area. The results reflect the "statistical average" of the data. If a gage station is located on the stream being studied, data from that station can be used to adjust the regression results to more accurately estimate the flood flow. There are three separate regional regression equations that cover North Carolina. Henderson County is located in the hydrologic region known as the Blue Ridge/Piedmont region. The regression equation was used to estimate the 1% annual chance flow for the streams in Henderson County. Analyses of historical high-water marks obtained from interviews of county residents were used to confirm the accuracy of the regression equation estimates.

Delineation of drainage basins and drainage areas was based on digital elevation models (DEM) produced from light detection and ranging (LIDAR) data supplied by the NCFMP.

The hydrologic analysis also includes a review and update of flood-flow frequency estimates for active stream gages within the basin to include the most current stream flow records available. The flood-flow frequency data was updated using methods described in USGS "Bulletin 17B

Delineation of drainage basins and drainage areas was based on digital elevation models (DEM) produced from light detection and ranging (LIDAR) data supplied by the NCFMP.

The hydrologic analysis also includes a review and update of flood-flow frequency estimates for active stream gages within the basin to include the most current stream flow records available. The flood-flow frequency data was updated using methods described in USGS "Bulletin 17B guidelines for Determining Flood Flow Frequency." The updated information was utilized for adjustment of regression equation discharges.

A summary of the drainage area-peak discharge relationships for the flooding sources studied by detailed methods is shown in Table 8, "Summary of Discharges."

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Allen Branch	At the confluence with Clear Creek	1.3	*	*	870	*
	At Lakewood Road (SR 1518)	1.0	*	*	730	*
	At Howard Gap Road	0.5	*	*	470	*
Bat Fork Creek	At Martin Luther King Jr. Boulevard	15.7	2,440	4,080	4,890	7,210
	Approximately 1,000 feet upstream of Martin Luther King Jr. Boulevard	14.9	2,360	3,960	4,750	7,010
	Approximately 1,200 feet upstream of Martin Luther King Jr. Boulevard	14.7	2,330	3,910	4,690	6,930
	Approximately 500 feet downstream of confluence of King Creek	14.0	2,260	3,790	4,550	6,720
	Approximately 0.5 mile downstream of US 176	1.0	*	*	930	*
Battle Creek	At the confluence with Shaw Creek	1.9	*	*	1,110	*
Big Willow Creek	At the confluence with French Broad River	9.6	*	*	3,070	*
	Approximately 100 feet upstream of confluence with Big Willow Creek Tributary 1	8.9	*	*	2,920	*
Big Willow Creek Tributary 1	At the confluence with Big Willow Creek	0.6	*	*	520	*

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Boylston Creek	At the confluence with French Broad River	15.5	2,000	3,300	4,000	5,400
	Approximately 1,100 feet downstream of Banner Farm Road	14.8	1,900	3,200	3,850	5,200
	Approximately 300 feet upstream of Banner Farm Road	14.6	1,090	1,870	2,270	3,400
	Approximately 1,400 feet downstream of Warlick Road	13.8	1,080	1,850	2,250	3,380
	Approximately 900 feet downstream of confluence of Boylston Creek Tributary 7	12.3	1,060	1,830	2,220	3,330
	Approximately 1,500 feet downstream of Ray Hill Road	12.0	1,060	1,820	2,210	3,320
	Approximately 100 feet upstream of Ray Hill Road	10.6	1,050	1,800	2,190	3,290
	Approximately 1.0 mile downstream of Gash Road	9.6	1,040	1,780	2,170	3,260
	Approximately 300 feet downstream of Gash Road	8.6	1,030	1,770	2,150	3,230
	Approximately 400 feet downstream of Quellette Road	7.8	1,020	1,750	2,130	3,200
	Approximately 0.6 mile of Brickyard Road	7.0	*	*	2,120	*
	Approximately 1,400 feet downstream of the Henderson / Transylvania County boundary	6.0	*	*	2,100	*
Boylston Creek Tributary 7	At Ray Hill Road	0.6	230	430	530	840
Britton Creek	At the confluence with Mud Creek	3.5	720	1,250	1,530	2,000
	Below tributary, Mile 0.29	3.2	685	1,180	1,475	1,900
	Above tributary, mile 0.29	2.3	540	960	1,185	1,520
	Below tributary, mile 0.96	2.1	500	900	1,100	1,420

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Britton Creek	Above tributary, mile 0.96	1.6	430	760	945	1,200
	Approximately 100 feet downstream of Essex Path	0.5	*	*	470	*
Britton Creek Tributary 2	At the confluence with Britton Creek	0.9	*	*	700	*
	Approximately 300 feet upstream of Browning Avenue	0.5	*	*	500	*
Broad River	At the Henderson / Rutherford County boundary	64.9	*	*	16,180	*
	Approximately 300 feet downstream of US Route 64	51.5	*	*	9,710	*
	Approximately 0.5 mile upstream of US Route 74A	40.8	*	*	7,570	*
	Approximately 1.8 miles upstream of US Route 74A	36.5	*	*	7,060	*
Cane Creek	At the confluence with French Broad River	87.1	7,360	10,760	11,940	15,150
	Approximately 50 feet upstream of confluence of Kimsey Creek	84.0	7,110	10,450	11,600	14,760
	Approximately 0.4 mile upstream of Interstate 26	82.5	7,030	10,330	11,480	14,610
	Approximately 200 feet upstream of US Route 25	81.5	6,970	10,260	11,400	14,510
	Approximately 900 feet downstream of Howard Gap Road (SR 1006)	80.6	6,960	10,230	11,360	14,460
	Approximately 300 feet downstream of Howard Gap Road (SR 1006)	79.8	6,950	10,210	11,340	14,410
	Approximately 50 feet upstream of confluence of Hoopers Creek	63.6	6,680	9,690	10,690	13,410
	Approximately 100 feet upstream of Mills Gap Road (SR 1551)	63.1	6,670	9,670	10,670	13,380

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Cane Creek	Approximately 1,200 feet upstream of Mills Gap Road (SR 1551)	60.6	4,000	6,750	8,160	12,150
	At the Henderson / Buncombe County boundary	60.3	3,990	6,740	8,150	12,130
Clear Creek	At the confluence with Mud Creek	44.4	3,550	5,970	7,200	10,620
	Approximately 50 feet upstream of Allen Branch	43.0	3,430	5,790	7,000	10,340
	Approximately 200 feet upstream of Nix Road (SR 1513)	42.6	3,400	5,740	6,940	10,260
	Approximately 900 feet downstream of Howard Gap Road (SR 1006)	42.3	3,380	5,710	6,900	10,220
	Approximately 100 feet downstream of Howard Gap Road (SR 1006)	39.2	3,290	5,540	6,690	9,880
	Approximately 0.6 mile upstream of the confluence with Wolfpen Creek	37.1	3,100	5,300	6,500	9,700
	Approximately 0.4 mile upstream of Lancaster Road (SR 1582)	34.1	2,950	5,000	6,200	9,200
	Approximately 1,500 feet upstream of Fruitland Road (SR 1574)	28.0	2,600	4,500	5,500	8,100
	Approximately 50 feet upstream of confluence of Kyles Creek	23.7	*	*	5,320	*
	At the confluence of Puncheon Camp Creek	10.7	*	*	3,270	*
Devils Fork	At the confluence with Bat Fork Creek	8.5	1,380	2,350	2,840	4,240
	Approximately 100 feet upstream of Tracy Grove Road (SR 1793)	8.2	1,350	2,300	2,780	4,150

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Devils Fork	Approximately 1,500 feet upstream of Tracy Grove Road (SR 1793)	7.8	1,300	2,220	2,690	4,020
	Approximately 0.5 mile upstream of Tracy Grove Road (SR 1793)	7.4	1,260	2,150	2,610	3,900
	Approximately 0.4 mile downstream of Interstate 26	6.8	1,190	2,040	2,480	3,710
	Approximately 200 feet upstream of Interstate 26	6.3	1,130	1930	2,350	3,520
	Approximately 0.4 mile upstream of Interstate 26	5.8	1,080	1,850	2,250	3,390
	Approximately 0.7 mile upstream of Interstate 26	4.9	960	1,660	2,020	3,050
	Approximately 300 feet upstream of Howard Gap Road (SR 1006)	4.5	910	1,570	1,920	2,900
	Approximately 0.5 mile upstream of Howard Gap Road (SR 1006)	4.0	840	1,450	1,770	2,680
	Approximately 0.5 mile downstream of Dana Road (SR 1525)	2.4	600	1,060	1,300	1,990
	Approximately 1,500 feet downstream of Dana Road (SR 1525)	1.9	500	890	1,100	1,690
Dunn Creek	At the confluence with Bat Fork Creek	3.1	*	*	1,500	*
	Approximately 600 feet downstream of Howard Gap Road (SR 1006)	1.0	*	*	750	*
Featherstone Creek	At the confluence with Mud Creek	4.1	*	*	1,810	*
	Approximately 1,100 feet downstream of Locust Grove Road (SR 1528)	1.4	*	*	910	*
Finley Creek	At the confluence with Shepherd Creek	2.2	*	*	1,230	*

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area (*square miles*)	Discharges (*cfs*)			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
French Broad River	Mile 157.75	676	23,000	41,000	50,000	76,000
	Mile 166.9 below Cane Creek	633	22,000	39,000	48,500	73,000
	Mile 166.9 above Cane Creek	546	20,600	36,600	46,000	69,000
	Mile 168.5 above Mud Creek	432	18,500	33,000	41,500	63,000
	Mile 169.2 above Mill River	357	17,000	30,600	38,000	58,500
Gash Creek	At the confluence with French Broad River	2.9	*	*	1,440	*
	Approximately 1,000 feet upstream of US Route 64	1.1	*	*	770	*
Green River	At the Henderson / Polk County boundary	74.9	*	*	12,830	*
	At Interstate 26	50.1	*	*	9,980	*
	Approximately 0.8 mile downstream of US Route 176	43.4	*	*	9,120	*
	Approximately 0.8 mile upstream of Railroad	39.7	*	*	8,630	*
	Approximately 0.6 mile upstream of S. Lake Summit Road (SR 1852)	33.7	4,050	6,510	7,780	11,100
	Approximately 400 feet downstream of NC Route 225	33.5	4,020	6,500	7,760	11,060
	Approximately 900 feet upstream of NC Route 225	31.3	3,860	6,230	7,440	10,620
	Approximately 0.9 mile upstream of Riverwood Drive (SR 1290)	30.6	3,800	6,140	7,330	10,490
	At US Route 25	25.9	3,400	5,520	6,610	9,470
	Approximately 1,900 feet upstream of Terrys Creek Road (SR 1103)	25.6	3,370	5,480	6,570	9,410
	Approximately 0.5 mile upstream of Terrys Creek Road (SR 1103)	20.9	2,950	4,810	5,780	8,310
	Approximately 1.4 miles upstream of Terrys Creek Road (SR 1103)	19.9	2,860	4,660	5,600	8,080

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Green River	Approximately 800 feet downstream of confluence of Rock Creek (into Green River)	19.4	2,810	4,580	5,510	7,950
	Approximately 50 feet upstream of Rock Creek (into Green River)	12.1	2,050	3,400	4,090	5,960
	Approximately 0.4 mile upstream of confluence of Rock Creek (into Green River)	11.9	2,030	3,380	4,070	5,930
	Approximately 400 feet downstream of Bobs Creek Road (SR 1104)	10.9	1,920	3,190	3,850	5,620
	Approximately 0.8 mile upstream of Bobs Creek Road (SR 1104)	10.0	1,810	3,000	3,640	5,320
	Approximately 1.0 mile upstream of Bobs Creek Road (SR 1104)	9.1	1,700	2,840	3,430	5,030
	Approximately 0.8 mile downstream of Bear Paw Ridge Road	8.1	1,580	2,630	3,200	4,700
	Approximately 0.4 mile downstream of Bear Paw Ridge Road	7.3	1,480	2,470	2,990	4,410
	Approximately 1,300 feet downstream of Bear Paw Ridge Road	6.4	1,350	2,270	2,760	4,070
Henderson Creek	At the confluence with Clear Creek	4.2	*	*	1,820	*
	Approximately 800 feet downstream of Pace Road (SR 1726)	3.1	*	*	1,510	*
Hickory Creek (near Gerton)	At the confluence with Broad River	10.3	*	*	3,720	*
	Approximately 0.4 mile downstream of Grant Mountain Road (SR 1602)	4.9	*	*	2,340	*
	Approximately 100 feet downstream of Little Bearwallow Road (SR 1597)	1.2	*	*	950	*

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Higgins Branch	At the confluence with Kimsey Creek	0.7	480	820	930	1,220
	Approximately 50 feet downstream of Hickory Drive	0.4	340	600	680	900
Hoopers Creek	At the confluence with Cane Creek	15.9	2,090	3,490	4,200	6,190
	Approximately 1,800 feet upstream of confluence with Cane Creek	15.5	2,050	3,420	4,120	6,080
	Approximately 1,600 feet downstream of Jackson Road (SR 1539)	14.5	1,960	3,290	3,960	5,850
	Approximately 1,000 feet upstream of Jackson Road (SR 1539)	13.7	1,890	3,170	3,820	5,640
	Approximately 1,600 feet downstream of Southern Road (SR 1552)	11.6	1,690	2,850	3,440	5,100
	Approximately 0.5 mile upstream of Southern Road (SR 1552)	10.7	1,600	2,700	3,270	4,850
	Approximately 0.4 mile downstream of Hoopers Creek Road (SR 1569)	8.0	1,320	2,250	2,720	4,070
	Approximately 1,500 feet downstream of Hoopers Creek Road (SR 1569)	7.9	1,320	2,240	2,720	4,060
	Approximately 0.4 mile upstream of Hoopers Creek Road (SR 1569)	7.2	1,230	2,110	2,560	3,830
	Approximately 1,200 feet downstream of Lindsey Loop Road (SR 1571)	6.3	1,130	1,940	2,350	3,530
Kimsey Creek	At the confluence with Cane Creek	2.8	1,000	1,650	1,860	2,440
	Approximately 1,000 feet upstream of Interstate 26	1.7	750	1,260	1,420	1,880

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Kimsey Creek	Approximately 900 feet downstream of Fanning Bridge Road (SR 1358)	1.4	690	1,160	1,300	1,710
	Approximately 0.4 mile upstream of Fanning Bridge Road (SR 1358)	0.7	460	780	880	1,170
King Creek	At the confluence with Bat Fork Creek	7.6	*	*	2,640	*
	Approximately 500 feet downstream of Highland Lake Road (SR 1783)	5.2	*	*	2,080	*
	Approximately 50 feet upstream of confluence of King Creek Tributary 3	5.9	*	*	2,250	*
King Creek Tributary 3	At the confluence with King Creek	0.8	*	*	720	*
	Approximately 0.4 mile upstream of confluence with King Creek	0.4	*	*	420	*
Kyles Creek	At the confluence with Clear Creek	4.4	*	*	1,880	*
	At the confluence of Lanning Mill Creek	2.1	*	*	1,170	*
Lanning Mill Creek	At the confluence with Kyles Creek	1.1	*	*	800	*
Lewis Creek	At the confluence with Clear Creek	6.6	*	*	2,410	*
	Approximately 1,900 feet downstream of N Ridge Road (SR 1861)	4.1	*	*	1,790	*
Little Willow Creek	At the confluence with French Broad River	4.4	*	*	1,880	*
	Approximately 0.8 mile upstream of Pleasant Grove Road (SR 1191)	3.6	*	*	1,640	*
McDowell Creek	At the confluence with French Broad River	4.9	900	1,580	1,900	2,500
	Mile 3.5	1.0	500	870	1,000	1,400
Mill Pond Creek	At the confluence with French Broad River	3.6	750	1,300	1,600	2,060
	Mile 0.65	2.5	590	1,020	1,270	1,630
	Mile 1.4	2.0	500	880	1,100	1,400
	At Triple Creek Drive	1.0	*	*	750	*

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Mills River	At the confluence with French Broad River	72.9	5,470	8,850	10,540	15,160
	Approximately 500 feet downstream of Hooper Lane (SR 1353)	72.2	5,430	8,780	10,460	15,060
	Approximately 0.9 miles downstream of Boylston Highway (NC 191)	71.3	5,380	8,700	10,370	14,940
	Approximately 1,100 feet upstream of Boylston Highway (NC 191)	70.3	5,320	8,620	10,270	14,800
	Approximately 1.3 miles upstream of Boylston Highway (NC 191)	69.4	5,270	8,530	10,170	14,670
	Approximately 1.6 miles upstream of Boylston Highway (NC 191)	67.2	5,140	8,340	9,950	14,360
	Approximately 2.4 miles upstream of Boylston Highway (NC 191)	66.5	5,100	8,280	9,880	14,260
	Approximately 2,100 feet downstream of confluence of South Fork Mills River	65.9	5,070	8,240	9,830	14,190
Mud Creek	At the confluence with French Broad River	112.6	7,620	12,080	14,260	20,210
	Approximately 0.5 mile upstream of Rugby Road (SR 1365)	111.3	7,560	12,000	14,170	20,080
	Approximately 100 feet downstream of Asheville Highway (US 25)	110.4	7,520	11,940	14,100	19,980
	Approximately 0.4 mile upstream of Asheville Highway (US 25)	109.7	7,490	11,890	14,040	19,900
	Approximately 0.6 mile upstream of Asheville Highway (US 25)	106.2	7,330	11,650	13,760	19,510

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Mud Creek	Approximately 0.8 mile upstream of Asheville Highway (US 25)	105.3	7,290	11,580	13,680	19,410
	Approximately 1.3 miles upstream of Asheville Highway (US 25)	105.2	7,280	11,570	13,670	19,390
	Approximately 100 feet upstream of Brookside Camp Road (SR 1528)	104.3	7,240	11,510	13,600	19,300
	Approximately 200 feet upstream of confluence of Featherstone Creek	100.0	7,040	11,210	13,250	18,820
	Approximately 0.5 mile upstream of confluence of Featherstone Creek	99.4	7,020	11,170	13,200	18,750
	Approximately 0.8 mile downstream of Balfour Road (SR 1508)	98.8	6,990	11,120	13,150	18,680
	Approximately 1,000 feet downstream of confluence of Clear Creek	98.0	6,950	11,070	13,080	18,590
	Approximately 50 feet upstream of confluence of Clear Creek	53.4	4,650	7,530	8,960	12,880
	Approximately 0.4 mile downstream of Berkeley Road (SR 1508)	52.9	4,620	7,480	8,900	12,800
	Approximately 200 feet upstream of Berkeley Road (SR 1508)	52.5	4,600	7,450	8,860	12,740
	Approximately 1,500 feet downstream of N Main Street (SR 1503)	49.0	4,390	7,130	8,490	12,220
	Approximately 600 feet upstream of N Main Street (SR 1503)	48.9	4,370	7,090	8,440	12,160

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Mud Creek	Approximately 0.6 mile upstream of N Main Street (SR 1503)	48.1	4,330	7,030	8,370	12,060
	Approximately 200 feet downstream of 7th Avenue	39.4	3,800	6,210	7,400	10,710
	Approximately 500 feet upstream of Martin Luther King Jr. Boulevard (US 64)	23.7	2,720	4,500	5,390	7,880
	Approximately 600 feet upstream of Old Spartanburg Highway	23.4	2,690	4,460	5,350	7,810
	Approximately 50 feet upstream of confluence of Wash Creek	21.3	2,530	4,190	5,030	7,370
	Approximately 1,600 feet upstream of White Street	21.1	2,520	4,180	5,020	7,350
	Approximately 1,000 feet downstream of confluence of Shepherd Creek	20.5	2,460	4,090	4,920	7,210
	Approximately 50 feet upstream of confluence of Shepherd Creek	15.4	2,040	3,410	4,110	6,060
	Approximately 0.8 mile downstream of Crail Farm Road (SR 1137)	14.4	1,950	3,270	3,940	5,820
	Approximately 0.5 mile downstream of Crail Farm Road (SR 1137)	13.1	1,830	3,080	3,710	5,490
	At Crail Farm Road (SR 1137)	12.5	1,780	2,990	3,610	5,340
	Approximately 1,500 feet upstream of Crail Farm Road (SR 1137)	11.6	1,690	2,850	3,440	5,100
	Approximately 800 feet downstream of Little River Road	11.1	1,650	2,780	3,360	4,980
	Approximately 200 feet upstream of Little River Road	8.2	1,350	2,300	2,780	4,160

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Mud Creek	Approximately 1,700 feet upstream of Little River Road	5.4	1,020	1,750	2,130	3,200
	Approximately 0.6 mile downstream of Berea Church Road (SR 1126)	5.2	1,000	1,720	2,090	3,150
	At Berea Church Road (SR 1126)	4.3	880	1,520	1,850	2,800
	Approximately 0.4 mile upstream of Berea Church Road (SR 1126)	3.4	760	1,320	1,610	2,440
	Approximately 900 feet downstream of Walnut Cove Road (SR 1125)	2.9	670	1,180	1,440	2,200
North Fork Big Willow Creek	At the confluence with Big Willow Creek	2.6	*	*	1,340	*
	Approximately 0.4 mile upstream of confluence with Big Willow Creek	2.4	*	*	1,280	*
North Fork Mills River	At the confluence with Mills River	24.2	*	*	5,450	*
	Approximately 1.0 mile upstream of Whitaker Lane (SR 1341)	19.6	*	*	4,780	*
	Approximately 1.9 miles upstream of Whitaker Lane (SR 1341)	18.6	*	*	4,620	*
Perry Creek	At the confluence with Shepherd Creek	1.6	*	*	990	*
Piney Branch	At the confluence with South Fork Big Willow Creek	0.6	*	*	540	*
Reedypatch Creek	At the confluence with Broad River	12.4	*	*	4,160	*
	Approximately 1.1 miles upstream of Edney Inn Road (SR 1702)	6.0	*	*	2,640	*
	Approximately 0.8 mile downstream of Bald Rock Road (SR 1710)	0.8	*	*	780	*

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Rock Creek (into Green River)	At the confluence with Green River	7.2	*	*	2,970	*
Shaw Creek	At the confluence with French Broad River	7.4	*	*	2,600	*
	Approximately 600 feet upstream of Hunters Glen Lane (SR 2115)	5.2	*	*	2,080	*
	Approximately 200 feet downstream of Turley Falls Road (SR 1215)	2.3	*	*	1,240	*
Shepherd Creek	At the confluence with Mud Creek	5.0	920	1,590	1,940	2,530
	Mile 0.6	4.7	885	1,520	1,875	2,420
	At the confluence of Tonys Creek	4.0	*	*	1,780	*
South Fork Big Willow Creek	At the confluence with Big Willow Creek	6.2	*	*	2,330	*
	Approximately 1,600 feet upstream of Patterson Road (SR 1194)	4.7	*	*	1,960	*
South Fork Mills River	At the confluence with Mills River	41.4	*	*	7,630	*
	Approximately 0.5 mile downstream of Dalton Road (SR 1340)	39.8	*	*	7,450	*
	Approximately 1.3 miles upstream of Dalton Road (SR 1340)	35.7	*	*	6,960	*
South Wash Creek	At the confluence with Wash Creek	0.4	180	330	410	650
Tonys Creek	At the confluence with Shepherd Creek	0.5	*	*	510	*
Wash Creek	At the confluence with Mud Creek	2.1	950	1,550	1,740	2,240
	Approximately 100 feet downstream of S Whitted Street	1.5	440	780	960	1,480
	Approximately 100 feet upstream of confluence of South Wash Creek	0.6	350	630	720	990
Wolfpen Creek	At the confluence with Clear Creek	2.4	*	*	1,300	*

Table 8—Summary of Discharges

Flooding Source	Location	Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Wolfpen Creek	Approximately 0.5 mile upstream of Wood Duck Way	1.4	*	*	900	*

*Data Not Available

Table 9, "Gage Information," lists the stream gages located in Henderson County, including the drainage area of the flooding source at the gage and the period of record available at the time of the publication of this FIS Report.

Table 9—Gage Information

Gage Number or Identifier	Flooding Source	Site Name	Drainage Area *(square miles)*	Period of Record	
				From	To
03444000	Boylston Creek	near Horseshoe, NC	14.80	1942	1973
03446000	Mills River	near Mills River NC	66.70	1876	2006
03446410	Laurel Branch	near Edneyville, NC	0.57	1955	1970
03446500	Clear Creek	near Hendersonville, NC	42.20	1910	1964
03447000	Mud Creek	at Naples, NC	109.00	1876	1973
3447500	Cane Creek	at Fletcher, NC	63.10	1876	1973

5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the flood elevations for the selected recurrence intervals. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which BFEs were computed, selected cross-section locations are also shown on the FIRM. Flood profiles were developed showing computed water-surface elevations for 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 the FIS in conjunction with the data shown on the FIRM.

The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the Flood Profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Pre-Countywide Analyses

Each jurisdiction within Henderson County, with the exceptions of the Towns of Flat Rock, Fletcher, Mills River, and Laurel Park, had previously printed FIS Reports describing each community's hydraulic analyses. Those analyses have been compiled and are summarized below. These analyses remain valid for those flooding sources listed in Table 6, "Flooding Sources Studied by Detailed Methods: Redelineated."

Water-surface elevations of the floods of the selected recurrence interval were computed using the USACE HEC-2 computer program (USACE, 1977). Cross sections were field surveyed at bridges and other strategic locations and were supplemented by valley cross sections taken by photogrammetric methods. Cross sections were taken at close intervals to accurately compute water-surface elevations. All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Channel roughness Manning's "n" for these computations were determined on the basis of field inspection of channel and flood plain areas and computed coefficients based on known flood profiles.

Starting water-surface elevations for the French Broad River were obtained from the flood insurance study for Buncombe County. Clear Creek profile was computed as continuation of the Hendersonville study. Starting water-surface elevation for the remainder of the streams in the study were obtained by slope-area calculations using the slope of a recent high water profile.

Flood profiles were drawn showing computed water-surface elevation to an accuracy of 0.5 foot for floods of the selected recurrence intervals.

In the City of Hendersonville, starting water-surface elevations for Britton and Shepherd Creeks were determined from slope-area calculations using the slope of a recent high water profile.

Revised Analyses for Countywide FIS

For the streams studied by detailed methods, water-surface elevations of floods of the selected recurrence intervals were computed through use of the Army Corps of Engineers' HEC-RAS step-backwater computer program version 3.1.3 (U.S. Army Corps of Engineers, 2005). The hydraulic analyses 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. The computer models were calibrated using historic high water data collected during field investigations.

The cross section geometries were obtained from a combination of digital elevation data obtained by Light Detection and Ranging (LIDAR) and field surveys. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry. Natural floodplain cross sections were surveyed approximately every 4000' along the detail study reaches to obtain the channel

geometry between bridges and culverts. Overbank cross section data for the backwater analyses were obtained from recently flown LIDAR data.

Channel roughness factors (Manning's "n") used in the hydraulic computations were made in the field by an engineer where stream access was possible, with orthophotos used to supplement areas that could not be accessed. The channel and overbank "n" values for all of the streams studied by detailed methods are shown in Table 10, "Roughness Coefficients."

Table 10—Roughness Coefficients

Stream	Channel "n"	Overbank "n"
Allen Branch	0.045 - 0.050	0.030 - 0.090
Bat Fork Creek	0.040 - 0.060	0.022 - 0.150
Battle Creek	0.035 - 0.040	0.040 - 0.090
Big Willow Creek	0.040	0.050 - 0.090
Big Willow Creek Tributary 1	0.025 - 0.050	0.050 - 0.090
Boylston Creek	0.035 - 0.090	0.040 - 0.120
Boylston Creek Tributary 7	0.040 - 0.090	0.050 - 0.090
Britton Creek	0.035 - 0.060	0.030 - 0.160
Britton Creek Tributary 2	0.040 - 0.050	0.030 - 0.090
Broad River	0.055 - 0.010	0.055 - 0.010
Cane Creek	0.040 - 0.050	0.025 - 0.250
Clear Creek	0.035 - 0.060	0.030 - 0.140
Devils Fork	0.040 - 0.070	0.010 - 0.150
Dunn Creek	0.035 - 0.050	0.030 - 0.090
Featherstone Creek	0.045 - 0.090	0.030 - 0.090
Finley Creek	0.040 - 0.050	0.040 - 0.090
French Broad River	0.035 - 0.060	0.050 - 0.130
Gash Creek	0.037 - 0.057	0.030 - 0.125
Green River	0.032 - 0.090	0.025 - 0.100
Henderson Creek	0.045 - 0.050	0.050 - 0.090
Hickory Creek (near Gerton)	0.060 - 0.100	0.060 - 0.100
Higgins Branch	0.050 - 0.065	0.025 - 0.100
Hoopers Creek	0.045 - 0.070	0.025 - 0.150
Kimsey Creek	0.040 - 0.045	0.025 - 0.100

Table 10—Roughness Coefficients

Stream	Channel "n"	Overbank "n"
King Creek	0.045 – 0.050	0.030 – 0.090
King Creek Tributary 3	0.045 - 0.050	0.030 – 0.090
Kyles Creek	0.045 - 0.050	0.006 - 0.090
Lanning Mill Creek	0.050	0.050 – 0.090
Lewis Creek	0.045 – 0.050	0.030 – 0.090
Little Willow Creek	0.040 – 0.050	0.050 – 0.090
McDowell Creek	0.055 – 0.065	0.070 – 0.150
Mill Pond Creek	0.040 – 0.065	0.050 – 0.150
Mills River	0.035 – 0.055	0.045 – 0.086
Mud Creek	0.035 – 0.070	0.030 – 0.120
North Fork Big Willow Creek	0.040 – 0.050	0.050 – 0.090
North Fork Mills River	0.040 – 0.057	0.050 – 0.095
Perry Creek	0.050	0.040 – 0.090
Piney Branch	0.050	0.030 – 0.150
Reedypatch Creek	0.060 – 0.070	0.060 – 0.100
Rock Creek (into Green River)	0.050	0.050 - 0.090
Shaw Creek	0.040 - 0.080	0.030 – 0.090
Shepherd Creek	0.030 – 0.060	0.020 – 0.120
South Fork Big Willow Creek	0.040 – 0.050	0.025 – 0.090
South Fork Mills River	0.035 – 0.050	0.045 – 0.090
South Wash Creek	0.050	0.032 – 0.100
Tonys Creek	0.030 – 0.050	0.030 – 0.090
Wash Creek	0.055 – 0.055	0.035 – 0.110
Wolfpen Creek	0.040 – 0.050	0.020 – 0.090

For flooding sources studied by limited detailed methods in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this report and the FIRM panels. This method entails developing a HEC-RAS hydraulic model, resulting in the calculation of BFEs and the delineation of the 1% annual chance floodplain (designated as Zone AE). Cross sections for the flooding sources studied by limited detailed methods were obtained using digital elevation data obtained with LIDAR technology developed as part of the North Carolina Statewide Floodplain Mapping Program. The hydraulic model is prepared using this

digital elevation data, without surveying bathymetric or structural data. Where bridge or culvert data are readily available, such as from the North Carolina Department of Transportation, these data have been reflected in the hydraulic model. If these structural data are not readily available, field measurements of these structures were made to approximate their geometry in the hydraulic models. In addition, this method does not include field surveys that determine specifics on channel and floodplain characteristics. A limited detailed study is a "buildable" product that can be upgraded to a fully detailed study at a later date by verifying stream channel characteristics, bridge and culvert opening geometry, and by analyzing multiple recurrence intervals.

The results of the HEC-RAS computations are tabulated for all cross sections (Table 11, "Limited Detailed Flood Hazard Data"). Flood Profiles have not been developed for streams studied by limited detailed methods. In addition, floodways for streams studied by limited detailed methods are not delineated on the FIRM. However, the 1% annual chance water-surface elevations, flood discharges, and non-encroachment widths from the limited detailed studies for every modeled cross section are given in Table 11. The non-encroachment widths given at modeled cross sections can be used by communities to enforce floodplain management ordinances that meet the requirement defined in 44 CFR 60.3(c)(10).

Between cross sections for streams studied by limited detailed methods, 1% annual chance water-surface elevations should be calculated by mathematical interpolation using the distance along the stream centerline. Non-encroachment widths and, therefore, the location of a non-encroachment area boundary between cross sections should be determined based on either 1) mathematical interpolation, or 2) the non-encroachment width at the upstream or downstream cross section, whichever is larger. If the width determined by this second method is wider than the Special Flood Hazard Area (SFHA) or the 1% annual chance floodplain delineated on the FIRM for this location along the stream, the non-encroachment area shall be considered to be coincident with the SFHA. A full detailed study incorporating field survey data in the HEC-RAS hydraulic model may be submitted for a Letter of Map Revision (LOMR) request to map a regulatory floodway along a section of a stream in lieu of applying the non-encroachment widths listed in Table 11. FEMA's current (as of August 2001) map revision structure exempts submittal fees for map revision requests based solely on the submission of more detailed data.

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
ALLEN BRANCH				
005	452	870	2,082.4[4]	13 / 99
011	1,143	870	2,082.4[4]	20 / 213
019	1,895	870	2,082.4[4]	21 / 20
024	2,367	870	2,083.2	35 / 23
030	2,994	870	2,086.9	23 / 17
032	3,206	730	2,088.5	17 / 17
033	3,280	730	2,090.5	17 / 27
035	3,457	730	2,091.1	23 / 23
038	3,824	730	2,094.6	21 / 18
042	4,217	730	2,099.2	21 / 21

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
ALLEN BRANCH				
048	4,774	730	2,103.9	23 / 23
053	5,266	730	2,109.1	10 / 12
058	5,768	730	2,113.1	13 / 21
063	6,284	730	2,117.7	11 / 14
067	6,702	730	2,130.0	20 / 20
068	6,750	730	2,130.1	66 / 70
069	6,916	730	2,130.1	67 / 70
072	7,166	730	2,130.1	53 / 37
077	7,664	730	2,131.7	16 / 16
081	8,139	730	2,136.0	15 / 59
084	8,419	470	2,137.6	35 / 52
086	8,578	470	2,141.2	35 / 17
089	8,897	470	2,143.3	46 / 11
095	9,493	470	2,150.2	12 / 13
097	9,737	470	2,153.8	46 / 12
099	9,886	470	2,162.5	46 / 12
102	10,165	470	2,162.7	15 / 16
106	10,565	470	2,165.9	16 / 11
110	11,043	470	2,174.5	16 / 18
114	11,438	470	2,181.7	12 / 25
116	11,572	470	2,182.6	18 / 17
BAT FORK CREEK				
133	13,253	4,550	2,084.0[4]	703 / 33
136	13,584	4,550	2,084.0[4]	721 / 24
140	14,009	4,550	2,084.0[4]	515 / 15
142	14,210	4,550	2,085.0	913 / 23
143	14,326	4,550	2,086.7	923 / 300
144	14,426	4,550	2,086.8	1,080 / 12
155	15,471	2,320	2,087.0	297 / 73
159	15,947	2,320	2,087.6	22 / 175
164	16,441	2,320	2,088.6	20 / 249
169	16,931	2,320	2,089.1	75 / 278
174	17,357	2,320	2,089.4	28 / 380
177	17,714	2,220	2,089.8	105 / 221
179	17,885	2,220	2,090.0	208 / 125
184	18,448	2,220	2,090.4	240 / 162
190	18,970	2,220	2,091.0	156 / 45
195	19,450	2,220	2,091.6	255 / 29
199	19,897	2,220	2,092.6	206 / 82
200	20,008	2,220	2,099.1	206 / 82
201	20,115	2,220	2,099.1	190 / 27
206	20,637	2,220	2,099.1	355 / 148
212	21,231	2,100	2,099.1	529 / 76

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
BAT FORK CREEK				
220	22,004	2,100	2,099.1	249 / 151
226	22,585	1,350	2,099.2	150 / 16
230	22,981	1,350	2,099.7	75 / 15
232	23,201	1,350	2,100.2	20 / 20
234	23,373	1,350	2,100.8	20 / 20
235	23,497	1,350	2,102.1	53 / 47
236	23,553	1,350	2,102.1	19 / 50
240	23,979	1,350	2,102.9	17 / 101
245	24,510	1,350	2,104.3	16 / 102
250	25,000	1,350	2,106.1	42 / 36
256	25,582	1,220	2,107.9	111 / 10
261	26,075	1,220	2,109.4	152 / 32
264	26,363	1,220	2,110.5	15 / 103
268	26,794	1,220	2,112.5	16 / 68
273	27,264	1,220	2,115.6	42 / 6
277	27,686	1,220	2,118.2	11 / 97
282	28,197	1,220	2,122.1	14 / 25
284	28,443	1,220	2,124.7	9 / 52
286	28,589	1,220	2,126.0	31 / 29
287	28,696	1,220	2,132.6	49 / 61
287	28,749	1,220	2,132.7	89 / 71
292	29,187	1,220	2,133.8	62 / 17
295	29,504	1,220	2,135.4	177 / 16
299	29,930	930	2,136.8	31 / 104
304	30,381	930	2,138.8	109 / 14
308	30,806	930	2,142.4	43 / 93
311	31,074	930	2,143.9	82 / 17
311	31,144	930	2,144.2	48 / 94
313	31,348	930	2,150.8	10 / 14
314	31,428	930	2,155.8	46 / 58
315	31,458	930	2,155.8	39 / 35
319	31,888	930	2,156.0	43 / 13
321	32,120	930	2,156.4	89 / 19
323	32,288	930	2,156.9	70 / 40
325	32,483	930	2,158.7	78 / 38
326	32,625	930	2,158.8	49 / 110
BATTLE CREEK				
014	1,372	1,110	2,068.6[4]	23 / 23
014	1,423	1,110	2,068.6[4]	82 / 29
015	1,451	1,110	2,068.6[4]	100 / 29
015	1,537	1,110	2,068.6[4]	90 / 54
016	1,596	1,110	2,069.3	52 / 53
017	1,715	1,110	2,069.4	117 / 12

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
BATTLE CREEK				
019	1,867	1,110	2,069.5	133 / 11
023	2,284	1,110	2,069.9	10 / 65
028	2,807	1,110	2,073.7	11 / 52
031	3,142	1,110	2,076.0	25 / 12
034	3,414	1,110	2,078.1	20 / 25
034	3,440	1,110	2,080.5	21 / 19
035	3,450	1,110	2,080.6	45 / 50
035	3,479	1,110	2,081.9	45 / 45
037	3,701	1,110	2,082.1	17 / 20
BIG WILLOW CREEK				
001	97	3,070	2,080.6[4]	35 / 407
007	691	3,070	2,080.6[4]	123 / 283
012	1,231	2,920	2,080.6[4]	102 / 186
013	1,328	2,920	2,080.6[4]	110 / 188
015	1,492	2,920	2,080.6[4]	267 / 297
018	1,834	2,920	2,080.6[4]	165 / 250
023	2,326	2,920	2,080.6[4]	23 / 241
030	3,015	2,920	2,080.6[4]	26 / 251
034	3,369	2,920	2,080.6[4]	22 / 149
038	3,838	2,920	2,080.6[4]	113 / 81
BIG WILLOW CREEK TRIBUTARY 1				
001	100	520	2,080.6[4]	15 / 14
002	159	520	2,080.6[4]	39 / 39
003	264	520	2,080.6[4]	49 / 41
005	513	520	2,080.6[4]	15 / 121
009	871	520	2,080.6[4]	20 / 10
011	1,070	520	2,080.9	12 / 12
012	1,185	520	2,104.1	154 / 149
014	1,359	520	2,104.1	142 / 143
018	1,788	520	2,104.1	175 / 173
023	2,295	520	2,104.1	115 / 116
024	2,391	520	2,108.5	23 / 50
BOYLSTON CREEK				
368	36,764	2,130	2,144.9	92 / 73
371	37,095	2,130	2,145.3	252 / 26
375	37,513	2,130	2,147.2	130 / 50
376	37,587	2,130	2,149.4	130 / 50
381	38,135	2,130	2,149.7	103 / 127
389	38,869	2,120	2,150.6	60 / 100
390	38,964	2,120	2,152.8	60 / 100
394	39,404	2,120	2,153.6	27 / 100
403	40,259	2,120	2,156.6	102 / 25
409	40,916	2,120	2,158.3	100 / 30

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
BOYLSTON CREEK				
415	41,476	2,120	2,160.1	98 / 47
420	42,018	2,120	2,161.2	20 / 20
421	42,107	2,120	2,163.1	20 / 20
426	42,587	2,120	2,164.8	49 / 81
432	43,207	2,120	2,165.9	23 / 119
441	44,138	2,120	2,170.1	132 / 22
446	44,591	2,120	2,171.0	71 / 109
449	44,900	2,100	2,172.1	100 / 130
450	45,011	2,100	2,173.7	110 / 190
455	45,530	2,100	2,174.8	29 / 174
460	46,047	2,100	2,180.5	32 / 118
461	46,142	2,100	2,185.8	32 / 48
463	46,313	2,100	2,186.4	21 / 17
465	46,520	2,100	2,194.6	36 / 15
BRITTON CREEK				
119	11,869	1,130	2,156.7	35 / 64
119	11,938	1,130	2,156.7	24 / 164
125	12,478	1,130	2,159.2	14 / 27
128	12,793	1,130	2,162.8	17 / 16
131	13,127	470	2,167.2	20 / 18
132	13,235	470	2,172.0	19 / 18
133	13,333	470	2,172.1	14 / 13
138	13,769	470	2,177.2	12 / 11
139	13,912	470	2,179.0	17 / 18
140	14,047	470	2,180.1	17 / 15
141	14,133	470	2,186.4	65 / 22
142	14,197	470	2,186.4	14 / 21
144	14,431	470	2,188.9	10 / 6
146	14,605	470	2,192.6	21 / 28
147	14,736	470	2,198.9	21 / 28
148	14,795	470	2,198.9	21 / 52
149	14,890	470	2,199.0	18 / 19
150	14,986	470	2,199.6	18 / 18
151	15,093	470	2,204.7	18 / 18
152	15,154	470	2,204.7	18 / 19
153	15,269	470	2,204.8	14 / 15
155	15,466	470	2,208.0	10 / 11
156	15,614	470	2,215.6	41 / 20
158	15,804	470	2,217.5	16 / 10
163	16,273	470	2,231.8	8 / 13
165	16,529	470	2,239.3	8 / 8
168	16,834	470	2,250.6	20 / 11
169	16,947	470	2,259.4	31 / 11

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
BRITTON CREEK				
171	17,068	470	2,260.6	14 / 12
172	17,150	470	2,265.5	10 / 9
172	17,205	470	2,269.7	11 / 15
173	17,302	470	2,281.2	11 / 21
173	17,335	470	2,284.0	14 / 14
BRITTON CREEK TRIBUTARY 2				
002	216	700	2,081.6[4]	11 / 44
004	428	700	2,081.6[4]	17 / 18
006	580	700	2,081.6[4]	17 / 17
008	788	700	2,083.7	18 / 29
012	1,214	700	2,085.4	52 / 60
013	1,297	700	2,085.4	52 / 60
014	1,387	700	2,085.7	117 / 21
016	1,648	700	2,086.4	63 / 13
019	1,945	700	2,088.3	50 / 18
021	2,061	700	2,093.6	49 / 18
021	2,142	700	2,093.7	23 / 18
028	2,827	700	2,098.4	55 / 5
033	3,275	700	2,102.6	24 / 16
035	3,519	700	2,104.2	116 / 12
036	3,607	700	2,104.6	136 / 33
038	3,789	700	2,105.8	22 / 26
042	4,236	700	2,110.8	10 / 11
046	4,615	700	2,113.8	15 / 24
050	5,027	700	2,117.6	17 / 14
051	5,143	700	2,119.5	21 / 13
052	5,230	700	2,122.9	21 / 13
054	5,385	700	2,123.4	15 / 15
055	5,480	700	2,124.5	17 / 17
056	5,552	700	2,127.7	17 / 17
056	5,599	700	2,127.7	53 / 19
057	5,708	700	2,127.8	57 / 19
058	5,779	700	2,127.8	57 / 20
061	6,090	500	2,129.4	12 / 13
064	6,440	500	2,132.5	17 / 19
066	6,575	500	2,133.7	13 / 11
067	6,659	500	2,139.7	26 / 26
067	6,720	500	2,139.7	15 / 59
071	7,099	500	2,140.6	18 / 19
074	7,437	500	2,144.6	15 / 17
076	7,629	500	2,149.4	14 / 10
077	7,730	500	2,154.0	44 / 20
078	7,833	500	2,154.0	24 / 23

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
BROAD RIVER				
3361	336,121[6]	15,920	1,417.3	56 / 54
3365	336,521[6]	15,920	1,424.6	60 / 50
3369	336,921[6]	15,920	1,431.7	46 / 36
3373	337,313[6]	15,920	1,440.7	52 / 47
3377	337,692[6]	15,920	1,448.6	45 / 55
3381	338,060[6]	15,920	1,454.5	46 / 54
3385	338,471[6]	15,920	1,458.7	41 / 74
3389	338,916[6]	9,710	1,464.7	52 / 60
3390	339,017[6]	9,710	1,466.3	61 / 44
3393	339,321[6]	9,710	1,469.1	113 / 52
3397	339,664[6]	9,710	1,474.3	115 / 35
3401	340,121[6]	9,710	1,481.1	80 / 75
3406	340,563[6]	7,600	1,487.0	62 / 59
3407	340,731[6]	7,600	1,490.7	64 / 66
3409	340,921[6]	7,600	1,491.8	42 / 66
3413	341,321[6]	7,600	1,495.8	46 / 32
3416	341,633[6]	7,600	1,499.4	47 / 56
3417	341,694[6]	7,600	1,503.2	48 / 55
3419	341,881[6]	7,600	1,504.8	43 / 39
3421	342,121[6]	7,600	1,512.0	31 / 32
3425	342,521[6]	7,600	1,520.1	31 / 39
3429	342,921[6]	7,600	1,532.2	33 / 31
3434	343,358[6]	7,600	1,548.6	40 / 54
3437	343,721[6]	7,570	1,556.9	39 / 39
3441	344,090[6]	7,570	1,565.1	34 / 37
3446	344,572[6]	7,260	1,578.1	41 / 39
3449	344,921[6]	7,260	1,584.2	37 / 36
3453	345,321[6]	7,260	1,593.7	33 / 33
3457	345,721[6]	7,260	1,601.6	30 / 32
3461	346,121[6]	7,260	1,611.2	41 / 43
3465	346,521[6]	7,260	1,620.1	35 / 33
3469	346,937[6]	7,260	1,629.5	30 / 55
3473	347,321[6]	7,260	1,635.8	35 / 31
3478	347,783[6]	7,260	1,645.4	40 / 40
3481	348,121[6]	7,260	1,651.2	41 / 49
3486	348,570[6]	7,260	1,657.0	34 / 36
3489	348,921[6]	7,260	1,664.3	29 / 28
3493	349,321[6]	7,260	1,671.6	38 / 37
3497	349,721[6]	7,180	1,678.0	37 / 41
3501	350,109[6]	7,060	1,687.1	32 / 62
3505	350,521[6]	7,060	1,695.6	36 / 114
3509	350,921[6]	7,060	1,701.0	71 / 64
3513	351,321[6]	7,060	1,706.1	37 / 36

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
BROAD RIVER				
3517	351,721[6]	7,060	1,713.2	38 / 53
CLEAR CREEK				
299	29,910	6,690	2,117.7	36 / 234
309	30,896	5,320	2,118.2	887 / 80
318	31,841	5,320	2,118.6	830 / 97
326	32,568	5,320	2,119.5	433 / 140
330	32,976	5,320	2,121.0	344 / 180
331	33,094	5,320	2,125.7	175 / 180
333	33,329	5,320	2,125.7	264 / 337
339	33,930	5,120	2,125.9	150 / 301
348	34,764	5,120	2,126.1	660 / 54
353	35,320	5,120	2,126.3	1,015 / 29
363	36,262	5,120	2,127.1	834 / 25
370	37,007	5,120	2,129.5	460 / 29
379	37,943	4,060	2,133.6	322 / 28
383	38,307	4,060	2,135.0	283 / 76
384	38,415	4,060	2,136.7	283 / 75
386	38,597	4,060	2,136.9	248 / 154
392	39,208	4,060	2,139.0	26 / 81
397	39,696	4,060	2,141.4	28 / 207
401	40,112	4,060	2,142.2	32 / 230
406	40,631	4,060	2,143.4	32 / 177
411	41,077	4,060	2,144.8	35 / 129
417	41,653	4,060	2,147.0	106 / 31
422	42,162	3,880	2,149.1	135 / 26
428	42,753	3,880	2,151.5	98 / 75
430	43,003	3,880	2,152.5	67 / 61
431	43,086	3,880	2,156.2	79 / 77
433	43,315	3,880	2,156.5	29 / 273
439	43,859	3,880	2,156.7	134 / 134
444	44,398	3,880	2,157.5	78 / 48
453	45,269	3,710	2,159.5	356 / 35
459	45,852	3,710	2,161.1	221 / 105
464	46,439	3,580	2,163.5	25 / 238
470	47,035	3,580	2,165.6	22 / 148
475	47,533	3,270	2,167.2	26 / 356
480	47,959	3,270	2,168.4	25 / 201
485	48,459	3270	2170.7	28 / 358
DUNN CREEK				
001	122	1,500	2,099.1[4]	33 / 40
007	657	1,500	2,099.1[4]	28 / 27
008	839	1,500	2,099.1[4]	27 / 27
010	957	1,500	2,100.2	46 / 51

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
DUNN CREEK				
010	1,025	1,500	2,100.3	78 / 31
016	1,577	1,500	2,100.5	67 / 71
020	1,981	1,390	2,100.7	25 / 79
022	2,179	1,390	2,101.0	69 / 69
026	2,622	1,390	2,104.4	63 / 21
029	2,894	1,390	2,104.5	36 / 29
029	2,945	1,390	2,104.6	22 / 21
032	3,197	1,390	2,107.6	43 / 20
033	3,274	1,390	2,107.8	93 / 10
034	3,370	1,390	2,107.8	57 / 44
035	3,497	1,390	2,108.9	40 / 50
036	3,578	1,390	2,108.9	23 / 93
040	4,019	1,290	2,109.0	31 / 116
043	4,325	1,290	2,109.1	43 / 132
048	4,791	1,290	2,109.4	26 / 126
053	5,281	1,150	2,110.5	21 / 83
057	5,665	1,150	2,111.7	20 / 118
058	5,817	1,150	2,111.9	36 / 112
059	5,896	1,150	2,113.4	46 / 65
060	5,968	1,150	2,113.4	38 / 143
064	6,444	1,150	2,114.2	111 / 71
071	7,062	1,150	2,115.9	32 / 23
076	7,593	960	2,117.2	41 / 41
079	7,876	960	2,118.2	24 / 19
081	8,082	960	2,119.7	71 / 34
081	8,122	960	2,121.5	59 / 81
082	8,191	960	2,121.5	54 / 23
084	8,401	960	2,121.9	23 / 24
085	8,547	960	2,122.6	18 / 15
088	8,754	960	2,126.3	68 / 68
088	8,829	960	2,126.5	27 / 140
091	9,123	960	2,126.5	67 / 98
098	9,760	960	2,127.3	46 / 30
103	10,290	960	2,129.7	57 / 20
106	10,616	960	2,131.5	35 / 35
110	11,049	960	2,133.3	52 / 19
112	11,249	960	2,134.8	26 / 137
113	11,327	960	2,135.8	35 / 137
114	11,435	960	2,135.8	31 / 129
119	11,929	750	2,136.7	19 / 22
120	12,045	750	2,137.4	32 / 31
121	12,140	750	2,138.2	32 / 23
122	12,214	750	2,138.3	22 / 16

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
DUNN CREEK				
127	12,680	750	2,143.6	52 / 74
FEATHERSTONE CREEK				
003	257	1,810	2,068.8[4]	53 / 121
004	448	1,810	2,068.8[4]	225 / 18
006	559	1,810	2,068.8[4]	67 / 50
008	799	1,810	2,070.8	34 / 35
011	1,056	1,810	2,071.1	80 / 27
014	1,445	1,810	2,071.2	100 / 50
017	1,696	1,810	2,071.2	120 / 110
019	1,856	1,810	2,072.2	61 / 110
021	2,110	1,810	2,072.3	140 / 49
024	2,435	1,810	2,072.5	99 / 27
028	2,799	1,810	2,073.2	99 / 19
033	3,258	1,810	2,075.1	55 / 21
036	3,646	1,810	2,076.9	26 / 36
041	4,117	1,810	2,079.5	73 / 25
046	4,633	1,810	2,082.0	21 / 36
049	4,935	1,810	2,083.8	46 / 28
053	5,327	1,810	2,086.5	55 / 65
054	5,435	1,810	2,091.4	58 / 63
056	5,579	1,810	2,091.6	36 / 50
058	5,794	1,810	2,097.1	22 / 70
060	5,980	1,810	2,102.4	21 / 35
062	6,219	1,810	2,110.6	17 / 15
064	6,390	1,810	2,114.3	34 / 34
065	6,505	1,810	2,120.6	24 / 30
066	6,619	1,810	2,120.9	35 / 37
069	6,939	1,810	2,125.4	20 / 28
073	7,259	1,450	2,133.8	13 / 10
073	7,328	1,450	2,140.4	55 / 54
075	7,465	1,450	2,142.5	23 / 25
076	7,621	1,450	2,150.2	15 / 85
077	7,679	1,450	2,151.5	15 / 85
077	7,741	1,450	2,151.6	19 / 91
079	7,943	1,450	2,152.0	16 / 67
081	8,140	1,450	2,153.0	18 / 42
084	8,375	1,450	2,154.8	21 / 58
086	8,578	1,450	2,157.0	16 / 127
086	8,641	1,450	2,157.4	16 / 127
089	8,898	1,450	2,159.4	84 / 52
094	9,396	1,120	2,162.1	34 / 37
097	9,722	1,120	2,164.0	44 / 26
098	9,818	1,120	2,166.6	26 / 107

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
FEATHERSTONE CREEK				
100	9,995	1,120	2,168.3	50 / 73
106	10,555	1,120	2,171.9	54 / 23
110	10,990	1,120	2,175.7	87 / 11
111	11,115	1,120	2,176.7	41 / 23
112	11,174	1,120	2,181.2	50 / 74
113	11,331	1,120	2,181.7	13 / 74
116	11,552	1,120	2,182.3	104 / 35
119	11,878	1,120	2,185.1	28 / 49
123	12,263	1,120	2,191.3	22 / 22
126	12,631	1,120	2,198.3	41 / 14
129	12,888	910	2,204.3	18 / 14
131	13,088	910	2,225.9	14 / 14
133	13,294	910	2,231.5	34 / 29
137	13,656	910	2,239.1	22 / 30
138	13,826	910	2,244.3	20 / 19
139	13,944	910	2,248.0	19 / 44
141	14,130	910	2,252.7	11 / 45
FINLEY CREEK				
003	252	1,230	2,130.7	33 / 78
004	400	1,230	2,130.9	108 / 14
005	504	1,230	2,131.5	60 / 45
006	581	1,230	2,132.7	61 / 44
006	620	1,230	2,132.8	57 / 27
007	656	1,230	2,132.8	80 / 24
007	727	1,230	2,133.5	100 / 24
008	791	1,230	2,133.9	150 / 13
011	1,096	1,230	2,134.2	131 / 14
014	1,360	1,230	2,135.6	83 / 13
018	1,761	1,230	2,139.0	27 / 30
022	2,177	1,230	2,143.1	16 / 16
025	2,520	1,230	2,145.9	22 / 72
GASH CREEK				
019	1,877	1,440	2,081.2[4]	35 / 205
030	3,012	1,440	2,081.2[4]	25 / 203
048	4,792	1,440	2,081.2[4]	130 / 34
055	5,526	1,440	2,081.2[4]	49 / 42
056	5,644	1,440	2,081.2[4]	71 / 42
061	6,115	1,440	2,081.2[4]	76 / 77
069	6,866	1,440	2,082.7	94 / 48
081	8,068	1,170	2,086.6	142 / 20
088	8,799	1,170	2,088.4	101 / 69
089	8,882	1,170	2,089.2	98 / 67
092	9,222	1,170	2,089.4	81 / 89

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
GASH CREEK				
095	9,540	1,170	2,090.0	57 / 100
096	9,649	1,170	2,090.8	80 / 100
101	10,068	1,170	2,092.0	113 / 181
105	10,488	1,170	2,093.8	27 / 150
106	10,551	1,170	2,096.9	40 / 60
106	10,584	1,170	2,096.9	53 / 197
107	10,708	1,170	2,096.9	70 / 150
108	10,773	1,170	2,096.9	50 / 150
109	10,858	1,170	2,096.9	37 / 303
110	11,023	1,170	2,096.9	100 / 100
111	11,118	1,170	2,097.9	100 / 100
115	11,487	1,170	2,097.9	34 / 204
119	11,853	1,170	2,097.9	31 / 29
120	11,982	1,170	2,100.4	31 / 29
124	12,445	1,170	2,101.0	47 / 53
132	13,173	770	2,101.3	41 / 44
GREEN RIVER				
2077	207,671	13,140	1,409.8	44 / 39
2082	208,246	12,830	1,453.0	59 / 59
2088	208,813	12,830	1,475.8	53 / 50
2093	209,283	12,830	1,498.4	130 / 44
2097	209,653	12,830	1,516.8	39 / 40
2100	210,035	12,830	1,525.3	43 / 49
2104	210,400	12,830	1,533.2	44 / 50
2108	210,814	12,830	1,538.6	50 / 49
2113	211,298	12,830	1,539.9	39 / 39
2120	211,979	12,830	1,553.2	38 / 67
2127	212,682	12,750	1,564.3	57 / 43
2132	213,194	10,320	1,570.2	95 / 44
2137	213,651	10,320	1,571.0	55 / 51
2141	214,086	10,320	1,571.8	40 / 41
2146	214,583	10,320	1,576.8	37 / 36
2150	214,989	10,320	1,578.9	48 / 46
2155	215,514	10,320	1,579.6	42 / 42
2160	215,962	10,320	1,584.8	43 / 46
2165	216,500	10,320	1,588.3	41 / 77
2171	217,083	10,320	1,590.6	44 / 39
2177	217,740	10,220	1,599.3	39 / 40
2183	218,319	10,030	1,604.8	39 / 37
2188	218,763	10,030	1,612.2	37 / 36
2193	219,260	10,030	1,619.0	41 / 124
2197	219,656	10,030	1,620.1	53 / 88
2200	219,972	9,980	1,620.8	60 / 40

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
GREEN RIVER				
2203	220,304	9,980	1,625.0	63 / 70
2206	220,608	9,980	1,626.2	43 / 43
2212	221,151	9,980	1,629.7	52 / 134
2220	222,039	9,980	1,634.4	42 / 43
2226	222,564	9,980	1,637.9	41 / 45
2231	223,060	9,980	1,640.1	43 / 46
2236	223,617	9,870	1,644.2	42 / 45
2242	224,192	9,870	1,648.0	42 / 46
2248	224,771	9,840	1,651.0	37 / 42
2252	225,247	9,640	1,654.8	40 / 38
2258	225,803	9,640	1,659.2	38 / 38
2262	226,229	9,640	1,661.4	39 / 39
2267	226,681	9,640	1,663.5	44 / 45
2271	227,131	9,640	1,664.7	39 / 35
2276	227,637	9,640	1,669.4	35 / 35
2281	228,113	9,640	1,675.1	43 / 45
2288	228,757	9,640	1,691.6	51 / 35
2292	229,239	9,640	1,698.1	42 / 42
2297	229,677	9,580	1,700.3	64 / 38
2302	230,235	9,580	1,702.8	47 / 46
2309	230,903	9,250	1,705.2	43 / 44
2315	231,526	9,250	1,708.5	36 / 37
2321	232,120	9,250	1,712.1	44 / 43
2327	232,684	9,250	1,716.6	35 / 40
2330	233,048	9,250	1,720.3	52 / 54
2336	233,584	9,250	1,722.3	67 / 85
2336	233,641	9,250	1,722.7	68 / 79
2340	233,999	9,250	1,723.9	53 / 53
2345	234,502	9,250	1,730.8	41 / 41
2351	235,081	9,250	1,752.2	37 / 37
2354	235,449	9,120	1,758.7	47 / 43
2358	235,814	9,120	1,766.0	32 / 39
2363	236,274	9,120	1,774.4	70 / 31
2367	236,711	9,120	1,779.5	38 / 31
2371	237,119	9,120	1,790.1	33 / 37
2375	237,459	9,120	1,797.0	88 / 31
2377	237,727	9,120	1,800.3	40 / 47
2380	237,996	9,120	1,805.1	29 / 28
2384	238,387	9,120	1,821.5	28 / 32
2388	238,818	9,120	1,844.1	36 / 41
2393	239,310	9,120	1,858.1	63 / 45
2394	239,441	9,120	1,865.2	49 / 51
2397	239,722	9,120	1,876.5	43 / 34

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
GREEN RIVER				
2402	240,195	9,120	1,886.5	43 / 32
2405	240,520	9,120	1,893.8	27 / 50
2408	240,762	8,990	1,898.7	31 / 35
2411	241,148	8,990	2,017.8	211 / 198
2413	241,335	8,990	2,017.8	215 / 214
2417	241,743	8,990	2,017.8	215 / 217
2418	241,821	8,990	2,017.8	208 / 225
2428	242,775	8,990	2,017.8	271 / 272
2439	243,860	8,990	2,017.8	280 / 281
2449	244,921	8,990	2,017.8	175 / 175
2461	246,114	8,630	2,017.8	785 / 785
2473	247,270	8,630	2,017.8	564 / 564
2485	248,491	8,550	2,017.8	443 / 444
2500	249,987	8,360	2,017.8	528 / 528
2512	251,152	8,360	2,017.8	139 / 138
2516	251,588	8,360	2,017.8	124 / 133
2517	251,655	8,360	2,017.8	107 / 118
2517	251,679	8,360	2,017.8	101 / 119
2517	251,742	8,360	2,017.8	107 / 106
2519	251,935	8,360	2,017.8	94 / 105
2521	252,135	8,360	2,017.8	90 / 98
2528	252,805	8,260	2,017.8	127 / 102
2540	254,000	8,020	2,017.8	82 / 125
HENDERSON CREEK				
007	667	1,820	2,118.2[5]	20 / 203
015	1,506	1,820	2,118.6[4]	19 / 497
023	2,345	1,820	2,118.6[4]	16 / 170
029	2,947	1,820	2,120.6	20 / 224
033	3,339	1,820	2,121.8	18 / 219
037	3,670	1,820	2,122.8	17 / 153
040	4,049	1,820	2,124.6	42 / 42
041	4,097	1,820	2,126.7	33 / 35
041	4,132	1,820	2,127.1	38 / 38
042	4,206	1,820	2,129.9	54 / 52
045	4,548	1,820	2,130.0	74 / 66
050	4,959	1,820	2,130.1	67 / 99
055	5,538	1,820	2,130.2	100 / 81
060	5,980	1,820	2,130.9	100 / 19
067	6,688	1,820	2,132.5	157 / 22
073	7,320	1,820	2,134.6	21 / 96
079	7,862	1,820	2,137.0	157 / 17
085	8,506	1,510	2,138.8	18 / 135
088	8,772	1,510	2,139.9	20 / 40

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
HENDERSON CREEK				
089	8,862	1,510	2,144.2	50 / 50
089	8,932	1,510	2,144.3	138 / 165
096	9,587	1,510	2,144.4	16 / 288
101	10,051	1,510	2,145.5	23 / 161
HICKORY CREEK (NEAR GERTON)				
001	112	3,720	1,483.1[4]	33 / 25
006	633	3,720	1,499.9	108 / 21
012	1,175	3,720	1,515.5	27 / 115
017	1,710	3,720	1,540.8	25 / 16
020	2,030	3,720	1,555.7	83 / 25
022	2,178	3,720	1,560.8	22 / 22
022	2,218	3,720	1,564.3	22 / 22
023	2,348	3,720	1,566.8	20 / 15
026	2,561	3,720	1,577.2	35 / 23
027	2,744	3,720	1,582.2	70 / 38
029	2,915	3,720	1,587.5	30 / 31
030	2,958	3,720	1,590.5	31 / 33
032	3,171	3,720	1,594.9	19 / 29
034	3,367	3,720	1,602.3	34 / 26
036	3,593	3,720	1,607.3	31 / 19
038	3,848	3,720	1,615.8	46 / 18
042	4,170	3,720	1,627.0	18 / 29
045	4,516	3,720	1,637.6	29 / 17
049	4,922	3,720	1,657.3	38 / 19
054	5,358	3,720	1,678.9	28 / 35
056	5,648	3,530	1,690.1	14 / 14
060	6,000	3,530	1,705.2	70 / 16
062	6,219	3,530	1,713.7	15 / 16
063	6,257	3,530	1,723.7	23 / 23
064	6,398	3,530	1,723.9	32 / 52
067	6,702	3,530	1,730.2	18 / 18
070	7,037	3,530	1,741.2	13 / 12
074	7,444	2,580	1,764.5	11 / 12
080	7,988	2,580	1,784.1	14 / 12
085	8,523	2,580	1,811.3	14 / 18
090	8,981	2,580	1,848.4	28 / 23
094	9,387	2,580	1,874.1	11 / 65
098	9,820	2,580	1,912.1	15 / 21
103	10,295	2,580	1,946.1	27 / 14
107	10,739	2,580	1,978.4	13 / 13
112	11,179	2,580	2,004.0	15 / 26
118	11,770	2,580	2,035.7	20 / 37
123	12,257	2,580	2,066.3	20 / 24

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
HICKORY CREEK (NEAR GERTON)				
128	12,800	2,340	2,109.7	13 / 18
132	13,217	2,340	2,137.6	68 / 16
136	13,632	2,340	2,162.8	68 / 17
140	14,008	2,340	2,178.6	26 / 87
144	14,406	2,340	2,194.1	15 / 20
147	14,660	2,340	2,204.7	28 / 38
147	14,706	2,340	2,206.4	30 / 39
150	15,025	2,340	2,221.0	18 / 22
155	15,496	2,340	2,241.1	12 / 19
159	15,906	2,340	2,265.9	65 / 17
164	16,373	2,340	2,290.1	25 / 24
169	16,920	2,050	2,320.0	27 / 18
173	17,335	2,050	2,345.4	24 / 30
178	17,818	2,050	2,382.3	11 / 23
181	18,113	2,050	2,397.1	13 / 12
186	18,583	2,050	2,432.7	15 / 12
191	19,112	2,050	2,495.8	16 / 11
195	19,488	2,050	2,527.4	16 / 16
198	19,826	2,050	2,545.3	17 / 41
200	20,038	2,050	2,556.7	12 / 75
202	20,230	1,720	2,566.2	11 / 14
203	20,275	1,720	2,572.8	20 / 20
203	20,349	1,720	2,573.3	26 / 37
206	20,637	1,720	2,575.0	21 / 19
207	20,744	1,720	2,579.1	14 / 20
211	21,071	1,720	2,594.3	27 / 14
214	21,427	1,720	2,598.8	36 / 15
218	21,829	1,720	2,606.0	70 / 12
221	22,066	1,720	2,611.5	80 / 18
221	22,128	1,720	2,614.7	80 / 18
222	22,232	1,720	2,615.3	60 / 10
224	22,362	1,720	2,619.5	60 / 30
224	22,430	1,720	2,621.6	60 / 30
226	22,630	1,720	2,624.0	42 / 10
229	22,854	1,720	2,631.8	60 / 18
229	22,905	1,720	2,635.6	60 / 18
231	23,145	1,720	2,638.4	29 / 51
234	23,441	1,360	2,646.4	13 / 72
238	23,793	1,360	2,659.7	39 / 96
240	24,034	1,360	2,668.5	7 / 140
241	24,107	1,360	2,672.2	22 / 125
244	24,355	1,360	2,682.3	54 / 61
245	24,509	1,360	2,688.7	16 / 87

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
HICKORY CREEK (NEAR GERTON)				
247	24,743	1,360	2,703.0	14 / 20
248	24,817	1,360	2,708.5	15 / 20
250	25,028	1,360	2,714.0	24 / 14
253	25,340	1,360	2,728.5	13 / 10
256	25,624	1,360	2,743.2	7 / 5
259	25,875	950	2,755.4	17 / 17
260	25,953	950	2,758.2	11 / 16
262	26,225	950	2,771.4	25 / 18
266	26,572	950	2,789.4	23 / 23
270	27,014	950	2,813.2	19 / 14
274	27,439	950	2,844.6	16 / 14
279	27,879	950	2,872.2	10 / 12
282	28,152	950	2,895.2	14 / 13
283	28,344	950	2,916.0	20 / 20
284	28,413	950	2,919.7	20 / 20
286	28,627	950	2,940.0	15 / 10
289	28,878	950	2,962.9	17 / 33
289	28,942	950	2,967.2	10 / 58
290	29,016	950	2,977.5	10 / 62
291	29,120	950	2,986.2	23 / 53
293	29,276	950	2,993.8	11 / 11
297	29,702	950	3,039.3	8 / 10
301	30,119	950	3,077.2	7 / 11
305	30,518	950	3,125.6	9 / 10
308	30,784	950	3,169.6	11 / 15
313	31,264	950	3,238.9	19 / 11
316	31,566	950	3,273.8	8 / 9
321	32,089	950	3,360.1	8 / 13
326	32,565	950	3,444.3	19 / 12
330	33,013	950	3,542.3	5 / 4
334	33,380	950	3,652.4	3 / 3
KING CREEK				
026	2,639	4,550	2,087.0[4]	24 / 362
029	2,941	4,550	2,087.1	38 / 307
035	3,460	4,550	2,088.9	27 / 309
041	4,068	4,420	2,090.2	28 / 354
045	4,539	4,420	2,090.9	230 / 101
049	4,910	4,420	2,091.9	29 / 216
052	5,188	4,420	2,093.1	30 / 306
053	5,282	4,420	2,095.2	106 / 284
055	5,542	4,420	2,095.4	249 / 24
059	5,873	4,420	2,095.8	185 / 34
062	6,181	2,450	2,096.3	22 / 23

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
KING CREEK				
064	6,390	2,450	2,097.6	31 / 43
068	6,792	2,450	2,098.1	88 / 31
073	7,286	2,450	2,099.0	59 / 33
076	7,614	2,450	2,099.4	116 / 25
078	7,764	2,450	2,101.4	233 / 51
079	7,863	2,450	2,101.4	283 / 51
082	8,210	2,450	2,101.4	437 / 124
086	8,645	2,450	2,101.5	479 / 195
092	9,178	2,250	2,101.5	91 / 553
096	9,576	2,250	2,101.7	34 / 236
101	10,063	2,250	2,102.2	36 / 43
104	10,437	2,250	2,103.5	31 / 34
109	10,940	2,080	2,106.1	76 / 33
113	11,275	1,710	2,106.8	46 / 49
114	11,378	1,710	2,110.7	46 / 49
114	11,447	1,710	2,110.8	39 / 38
116	11,579	1,710	2,111.0	43 / 50
117	11,673	1,710	2,131.2	72 / 90
120	11,968	1,710	2,131.2	88 / 90
123	12,303	1,710	2,131.2	183 / 181
129	12,893	1,710	2,131.2	88 / 88
137	13,672	1,710	2,131.3	289 / 288
142	14,179	1,710	2,132.0	73 / 73
146	14,602	1,710	2,135.3	24 / 24
151	15,118	1,710	2,139.3	38 / 61
156	15,649	1,710	2,140.3	63 / 132
158	15,784	1,710	2,140.4	38 / 158
158	15,824	1,710	2,140.6	37 / 159
159	15,910	1,710	2,140.8	30 / 156
161	16,144	1,710	2,141.2	36 / 114
164	16,425	1,710	2,142.7	21 / 51
166	16,573	1,710	2,143.8	16 / 24
167	16,672	1,710	2,147.0	13 / 17
167	16,749	1,710	2,147.3	16 / 18
168	16,835	1,530	2,147.9	13 / 16
169	16,883	1,530	2,151.1	13 / 20
170	16,977	1,530	2,152.7	33 / 37
173	17,261	1,530	2,152.9	54 / 44
177	17,704	1,530	2,153.1	65 / 31
179	17,912	1,530	2,153.2	72 / 38
180	18,028	1,530	2,154.0	28 / 38
182	18,168	1,530	2,163.9	143 / 73
184	18,448	1,530	2,163.9	81 / 81

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
KING CREEK				
187	18,673	1,530	2,163.9	97 / 105
192	19,157	1,530	2,165.7	40 / 49
194	19,353	1,530	2,167.6	18 / 119
196	19,616	1,460	2,168.2	18 / 280
202	20,214	1,460	2,169.2	28 / 29
207	20,652	1,460	2,177.5	17 / 29
KING CREEK TRIBUTARY 3				
014	1,394	720	2,103.1[4]	23 / 31
017	1,701	720	2,103.2	51 / 58
020	2,008	720	2,105.5	45 / 17
023	2,270	420	2,107.6	33 / 20
023	2,343	420	2,107.9	29 / 30
024	2,407	420	2,109.2	30 / 29
025	2,518	420	2,109.4	21 / 43
028	2,785	420	2,111.7	26 / 20
030	3,037	420	2,114.0	20 / 21
032	3,213	420	2,114.8	21 / 25
033	3,286	420	2,118.1	24 / 26
033	3,306	420	2,118.1	30 / 16
034	3,445	420	2,119.5	30 / 15
036	3,603	420	2,119.8	15 / 15
038	3,813	420	2,121.3	6 / 6
039	3,874	420	2,123.1	15 / 16
039	3,932	420	2,124.3	15 / 35
040	4,042	420	2,124.6	16 / 22
042	4,213	420	2,125.4	8 / 8
043	4,267	420	2,130.3	30 / 27
044	4,437	420	2,130.4	16 / 19
045	4,517	420	2,135.0	31 / 20
046	4,607	420	2,135.1	22 / 21
047	4,733	420	2,135.7	26 / 11
048	4,806	420	2,137.2	26 / 11
051	5,081	420	2,139.7	18 / 18
054	5,403	420	2,146.0	11 / 16
057	5,658	420	2,158.8	14 / 21
058	5,759	420	2,162.1	30 / 21
058	5,816	420	2,164.0	30 / 21
059	5,860	420	2,165.1	30 / 21
060	5,988	420	2,170.8	64 / 36
KYLES CREEK				
006	603	1,880	2,118.3[4]	21 / 13
008	750	1,880	2,118.8	20 / 13
008	830	1,880	2,120.6	20 / 14

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
KYLES CREEK				
009	918	1,880	2,121.5	142 / 47
014	1,440	1,880	2,122.8	81 / 46
019	1,889	1,880	2,125.0	62 / 57
024	2,410	1,880	2,128.0	84 / 62
027	2,691	1,880	2,129.6	61 / 59
029	2,870	1,880	2,130.9	80 / 40
029	2,926	1,880	2,131.5	80 / 40
030	2,973	1,880	2,131.6	62 / 28
033	3,319	1,750	2,133.3	42 / 28
035	3,534	1,750	2,134.6	25 / 52
036	3,617	1,750	2,137.3	30 / 61
037	3,685	1,750	2,137.8	21 / 200
043	4,346	1,750	2,139.3	22 / 85
050	4,995	1,750	2,142.8	22 / 28
053	5,299	1,750	2,145.6	48 / 70
054	5,409	1,750	2,147.2	48 / 70
055	5,486	1,750	2,147.2	26 / 73
058	5,813	1,750	2,148.4	39 / 20
061	6,107	1,750	2,151.3	64 / 21
062	6,240	1,750	2,154.2	64 / 21
063	6,307	1,750	2,154.3	120 / 40
067	6,726	1,750	2,156.4	17 / 39
070	7,037	1,750	2,158.5	21 / 47
073	7,259	1,750	2,159.7	18 / 60
076	7,618	1,750	2,163.1	63 / 20
077	7,708	1,750	2,164.8	63 / 21
078	7,799	1,750	2,165.3	125 / 15
079	7,935	1,750	2,166.8	76 / 22
082	8,190	1,750	2,169.4	79 / 19
083	8,270	1,750	2,171.1	80 / 19
084	8,357	1,750	2,171.5	76 / 24
088	8,829	1,750	2,175.6	23 / 23
093	9,298	1,170	2,181.0	7 / 95
097	9,667	1,170	2,186.8	17 / 16
LANNING MILL CREEK				
001	50	800	2,176.2[5]	57/10
001	140	800	2,177.2[5]	74/8
002	186	800	2,177.5[5]	84/12
002	230	800	2,179.5[4]	60/15
003	276	800	2,180.5	60/15
003	324	800	2,180.5	50/10
004	389	800	2,180.6	52/8
005	517	800	2,181.7	19/8

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
LANNING MILL CREEK				
008	808	800	2,186.8	25/11
LEWIS CREEK				
003	330	2,410	2,126.7[5]	139 / 72
010	1,040	2,410	2,127.1[5]	43 / 166
018	1,833	2,410	2,128.7[5]	23 / 401
027	2,661	2,410	2,130.1[5]	14 / 361
036	3,595	2,410	2,132.0[4]	25 / 164
044	4,363	2,410	2,134.8	15 / 74
048	4,786	2,410	2,136.3	18 / 174
051	5,083	2,410	2,136.9	63 / 112
052	5,241	2,410	2,137.4	72 / 94
053	5,314	2,410	2,137.9	71 / 95
055	5,535	2,410	2,138.1	197 / 93
062	6,236	2,280	2,138.5	19 / 322
071	7,087	2,280	2,139.5	15 / 293
080	7,992	2,050	2,141.8	154 / 185
085	8,543	2,050	2,143.3	141 / 65
090	9,038	2,050	2,144.7	35 / 106
093	9,253	2,050	2,147.6	107 / 33
096	9,599	2,050	2,147.9	17 / 291
104	10,399	2,050	2,148.6	104 / 83
110	11,006	1,790	2,150.0	54 / 209
118	11,765	1,790	2,151.9	12 / 336
125	12,515	1,790	2,154.7	37 / 147
129	12,903	1,790	2,156.2	157 / 112
133	13,254	1,790	2,157.7	20 / 152
134	13,353	1,790	2,160.2	98 / 152
135	13,533	1,790	2,160.3	27 / 217
145	14,498	1,790	2,161.3	25 / 221
153	15,283	1,790	2,164.6	45 / 93
159	15,852	1,790	2,167.2	132 / 83
163	16,283	1,790	2,169.0	19 / 158
LITTLE WILLOW CREEK				
024	2,384	1,880	2,083.3[4]	212 / 17
030	2,996	1,880	2,083.3[4]	130 / 43
031	3,107	1,880	2,083.3[4]	131 / 44
036	3,624	1,880	2,083.3[4]	71 / 99
043	4,311	1,880	2,084.1	131 / 15
049	4,907	1,880	2,087.1	61 / 25
054	5,370	1,880	2,088.2	19 / 35
060	5,971	1,880	2,091.6	60 / 60
060	6,016	1,880	2,093.6	60 / 60
062	6,247	1,880	2,093.8	21 / 36

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
LITTLE WILLOW CREEK				
067	6,696	1,880	2,095.8	19 / 36
071	7,115	1,880	2,098.4	19 / 70
072	7,209	1,880	2,101.9	31 / 90
079	7,922	1,640	2,106.6	40 / 63
083	8,348	1,640	2,112.5	53 / 62
MILL POND CREEK				
076	7,639	1,330	2,087.1	50 / 30
080	7,964	1,160	2,087.9	124 / 126
082	8,183	1,160	2,088.4	19 / 20
083	8,269	1,160	2,091.6	25 / 25
085	8,483	1,160	2,091.6	26 / 44
089	8,865	1,160	2,092.4	50 / 70
090	8,958	1,160	2,094.2	50 / 50
093	9,307	1,160	2,094.3	57 / 23
099	9,850	1,160	2,098.0	20 / 20
099	9,907	1,160	2,100.8	40 / 40
101	10,063	1,160	2,100.9	43 / 47
102	10,155	1,160	2,100.9	33 / 87
102	10,231	1,160	2,101.5	33 / 92
104	10,422	1,160	2,101.5	37 / 53
105	10,513	1,160	2,101.6	41 / 39
106	10,552	1,160	2,103.2	40 / 80
109	10,856	1,160	2,103.8	23 / 23
112	11,161	1,160	2,106.3	20 / 26
112	11,243	1,160	2,111.3	38 / 61
116	11,617	1,160	2,111.3	22 / 23
121	12,128	1,160	2,115.0	17 / 29
126	12,610	1,160	2,118.5	21 / 29
127	12,676	1,160	2,120.2	25 / 25
131	13,101	750	2,124.1	16 / 19
138	13,763	750	2,132.5	24 / 21
144	14,357	750	2,139.4	13 / 55
148	14,788	750	2,147.0	14 / 15
149	14,948	750	2,154.0	30 / 30
151	15,056	750	2,154.1	50 / 30
151	15,133	750	2,155.3	50 / 30
155	15,486	750	2,155.5	23 / 30
158	15,819	750	2,161.2	15 / 15
159	15,875	750	2,164.1	25 / 25
160	16,018	750	2,164.4	26 / 17
161	16,122	750	2,164.8	10 / 15
161	16,149	750	2,167.5	20 / 20
162	16,193	750	2,168.1	27 / 26

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
MILL POND CREEK				
163	16,273	750	2,169.8	11 / 80
163	16,316	750	2,171.2	11 / 110
164	16,430	750	2,173.9	17 / 61
166	16,555	750	2,178.1	50 / 20
166	16,600	750	2,181.0	50 / 20
167	16,656	750	2,181.0	111 / 17
167	16,720	750	2,182.3	59 / 21
168	16,758	750	2,184.7	70 / 20
169	16,859	750	2,186.5	53 / 17
170	17,024	750	2,190.5	13 / 51
171	17,091	750	2,193.3	20 / 50
175	17,456	750	2,201.9	29 / 53
NORTH FORK BIG WILLOW CREEK				
001	64	1,340	2,080.6[4]	22 / 113
004	428	1,340	2,080.6[4]	35 / 100
008	808	1,340	2,082.9	19 / 152
012	1,187	1,340	2,086.2	154 / 13
016	1,643	1,340	2,090.1	124 / 14
024	2,386	1,284	2,095.5	25 / 73
027	2,730	1,284	2,098.9	22 / 21
NORTH FORK MILLS RIVER				
002	168	5,450	2,118.9[4]	76 / 136
005	532	5,450	2,119.1	142 / 31
008	763	5,450	2,121.5	175 / 36
010	1,027	5,450	2,121.5	69 / 71
015	1,483	5,450	2,125.2	42 / 60
019	1,903	5,450	2,126.9	34 / 34
022	2,166	5,450	2,128.6	30 / 28
022	2,198	5,450	2,131.5	30 / 30
025	2,518	5,450	2,134.5	37 / 270
029	2,857	5,450	2,134.5	199 / 101
033	3,290	5,450	2,134.5	198 / 52
038	3,760	5,450	2,135.0	224 / 33
042	4,212	5,450	2,137.2	205 / 40
047	4,701	5,450	2,141.1	211 / 37
050	5,048	5,450	2,144.2	160 / 85
052	5,183	5,450	2,148.1	210 / 85
057	5,695	5,310	2,148.4	99 / 51
061	6,132	5,310	2,151.8	120 / 30
070	6,984	5,310	2,156.8	51 / 141
078	7,751	5,310	2,161.1	106 / 94
087	8,718	5,310	2,167.8	37 / 122
092	9,162	5,200	2,170.4	49 / 300

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
NORTH FORK MILLS RIVER				
092	9,247	5,200	2,172.1	100 / 200
097	9,739	5,200	2,174.4	36 / 85
104	10,443	5,200	2,179.2	40 / 33
109	10,891	4,780	2,184.6	73 / 41
109	10,946	4,780	2,189.0	100 / 100
113	11,311	4,780	2,189.3	29 / 30
117	11,699	4,780	2,196.8	27 / 28
120	12,017	4,780	2,202.2	29 / 29
124	12,368	4,780	2,205.5	43 / 182
127	12,691	4,780	2,205.9	31 / 396
131	13,052	4,780	2,206.2	28 / 313
134	13,395	4,780	2,208.7	28 / 117
136	13,564	4,780	2,212.1	53 / 58
137	13,735	4,780	2,216.9	118 / 59
139	13,948	4,780	2,219.9	80 / 80
140	14,004	4,780	2,220.1	80 / 80
143	14,295	4,780	2,220.3	38 / 39
147	14,730	4,780	2,224.8	45 / 50
148	14,787	4,780	2,228.5	40 / 45
150	15,048	4,780	2,229.0	30 / 31
154	15,434	4,780	2,231.3	28 / 27
159	15,902	4,620	2,237.1	54 / 43
159	15,944	4,620	2,238.9	161 / 45
161	16,138	4,620	2,239.1	31 / 31
166	16,565	4,620	2,244.7	30 / 38
169	16,867	4,620	2,250.8	39 / 60
172	17,160	4,620	2,255.0	26 / 75
176	17,570	4,620	2,259.2	27 / 83
PERRY CREEK				
001	96	990	2,130.7[4]	84 / 11
004	407	990	2,130.7[4]	110 / 10
007	736	990	2,131.3	14 / 20
011	1,113	990	2,134.3	12 / 61
013	1,294	990	2,135.1	11 / 93
014	1,435	990	2,135.9	29 / 66
015	1,496	990	2,137.5	101 / 170
016	1,604	990	2,137.6	35 / 42
019	1,915	990	2,138.4	22 / 11
022	2,230	990	2,140.6	18 / 20
027	2,653	990	2,143.0	11 / 13
030	2,997	990	2,147.0	12 / 49
PINEY BRANCH				
001	87	540	2,083.0	10 / 8

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
PINEY BRANCH				
006	590	540	2,090.5	12 / 23
007	666	540	2,094.9	26 / 26
009	925	540	2,098.1	32 / 36
014	1,387	540	2,106.2	23 / 25
019	1,872	540	2,117.1	37 / 32
023	2,281	540	2,130.5	6 / 100
023	2,301	540	2,133.4	33 / 100
025	2,481	540	2,133.5	15 / 29
028	2,832	540	2,147.8	47 / 17
030	3,012	540	2,150.6	16 / 15
034	3,436	540	2,162.6	18 / 29
039	3,860	540	2,176.0	10 / 23
042	4,234	540	2,192.8	12 / 13
047	4,676	540	2,217.8	19 / 12
REEDYPATCH CREEK				
004	369	4,160	1,463.2[4]	24 / 44
007	690	4,160	1,467.1	41 / 43
008	767	4,160	1,470.2	44 / 42
012	1,200	4,160	1,481.1	24 / 26
016	1,600	4,160	1,492.6	22 / 28
020	2,000	4,160	1,501.1	24 / 26
024	2,427	4,160	1,511.7	22 / 33
028	2,777	4,160	1,520.8	18 / 33
032	3,167	4,160	1,530.6	19 / 21
036	3,617	4,160	1,539.0	29 / 22
041	4,052	4,160	1,543.4	25 / 25
044	4,424	4,160	1,546.6	24 / 30
045	4,477	4,160	1,549.3	29 / 31
048	4,800	4,160	1,550.9	22 / 78
052	5,177	4,160	1,553.2	42 / 28
055	5,531	4,160	1,556.2	80 / 20
060	5,991	4,060	1,559.6	32 / 38
061	6,072	4,060	1,564.0	49 / 131
065	6,524	4,060	1,565.0	60 / 50
068	6,801	4,060	1,566.4	129 / 27
071	7,105	4,060	1,569.7	58 / 39
072	7,176	4,060	1,571.0	66 / 54
076	7,634	4,060	1,574.8	22 / 18
080	8,019	2,980	1,582.9	31 / 39
085	8,486	2,980	1,599.5	17 / 19
089	8,879	2,820	1,624.2	20 / 15
092	9,204	2,820	1,664.9	22 / 18
096	9,600	2,820	1,719.7	17 / 15

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
REEDYPATCH CREEK				
100	10,000	2,820	1,733.6	12 / 12
104	10,407	2,820	1,745.4	32 / 20
108	10,813	2,820	1,751.4	16 / 47
112	11,212	2,820	1,759.6	32 / 46
116	11,597	2,820	1,771.7	48 / 21
121	12,055	2,820	1,778.6	21 / 39
125	12,483	2,820	1,783.2	29 / 16
129	12,896	2,820	1,789.2	21 / 19
132	13,222	2,820	1,793.6	23 / 17
135	13,479	2,820	1,796.5	18 / 17
139	13,874	2,820	1,802.0	19 / 31
141	14,148	2,820	1,804.3	18 / 40
142	14,188	2,820	1,806.8	18 / 40
145	14,478	2,820	1,817.4	15 / 15
149	14,872	2,640	1,829.9	28 / 27
152	15,166	2,640	1,853.3	18 / 18
155	15,519	2,640	1,875.1	18 / 15
160	16,000	2,640	1,901.8	25 / 14
163	16,319	2,640	1,911.0	32 / 19
167	16,693	2,640	1,918.4	16 / 19
172	17,179	2,640	1,924.6	16 / 15
177	17,720	2,640	1,931.1	13 / 15
181	18,093	2,640	1,935.5	17 / 17
182	18,164	2,640	1,937.1	18 / 19
185	18,474	2,640	1,943.4	18 / 13
189	18,858	2,640	1,954.6	13 / 14
193	19,292	2,370	1,975.5	16 / 18
196	19,593	2,370	1,978.9	150 / 20
197	19,654	2,370	1,979.3	145 / 20
200	20,000	2,370	1,980.1	50 / 15
203	20,344	2,370	1,981.8	50 / 60
204	20,414	2,370	1,983.1	50 / 60
208	20,800	2,370	1,984.4	70 / 70
212	21,161	2,370	1,985.8	58 / 72
215	21,494	2,370	1,987.5	70 / 70
219	21,930	2,370	1,989.8	59 / 91
222	22,158	2,370	1,990.6	60 / 90
222	22,220	2,370	1,992.8	60 / 80
226	22,587	2,370	1,994.1	72 / 38
230	23,042	2,080	1,996.6	74 / 21
235	23,496	2,080	2,000.1	37 / 33
238	23,750	1,250	2,002.2	31 / 71
238	23,783	1,250	2,002.6	23 / 71

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
REEDYPATCH CREEK				
241	24,052	1,250	2,004.9	39 / 41
244	24,367	1,250	2,008.1	29 / 31
248	24,751	1,250	2,012.6	20 / 20
248	24,846	1,250	2,016.7	19 / 21
252	25,223	1,250	2,022.4	15 / 30
256	25,625	1,250	2,032.1	10 / 7
261	26,084	780	2,039.5	22 / 11
262	26,223	780	2,041.5	15 / 30
263	26,270	780	2,043.7	15 / 30
264	26,383	780	2,044.6	20 / 20
265	26,537	780	2,056.0	19 / 21
268	26,849	780	2,056.2	26 / 19
269	26,920	780	2,056.2	24 / 21
272	27,200	780	2,061.2	9 / 9
277	27,655	780	2,090.5	12 / 8
281	28,077	780	2,099.4	9 / 31
285	28,452	780	2,104.3	8 / 12
288	28,797	780	2,113.2	11 / 9
293	29,265	780	2,125.3	10 / 10
297	29,672	780	2,140.3	6 / 11
300	30,001	780	2,155.9	18 / 22
301	30,079	780	2,166.7	20 / 20
303	30,339	780	2,168.1	8 / 8
306	30,576	780	2,175.7	6 / 6
ROCK CREEK (INTO GREEN RIVER)				
003	274	2,970	2,068.7[4]	42 / 31
005	492	2,970	2,070.9	36 / 58
006	612	2,970	2,072.3	50 / 42
008	791	2,970	2,073.4	36 / 20
012	1,169	2,970	2,079.2	20 / 20
016	1,597	2,970	2,085.0	13 / 13
020	2,038	2,970	2,093.8	19 / 19
023	2,282	2,970	2,097.9	18 / 19
025	2,505	2,970	2,102.7	10 / 11
SHAW CREEK				
004	444	2,600	2,068.6[4]	193 / 187
009	888	2,600	2,068.6[4]	27 / 230
016	1,556	2,600	2,068.6[4]	314 / 111
021	2,081	2,600	2,068.6[4]	485 / 58
025	2,503	2,600	2,068.6[4]	498 / 33
026	2,624	2,600	2,068.6[4]	570 / 37
031	3,120	2,140	2,068.6[4]	355 / 19
037	3,732	2,140	2,068.6[4]	194 / 27

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
SHAW CREEK				
041	4,058	2,140	2,068.6[4]	36 / 47
041	4,146	2,140	2,068.8	30 / 35
045	4,467	2,140	2,069.9	36 / 36
052	5,177	2,080	2,072.9	164 / 46
059	5,907	2,080	2,074.6	235 / 25
066	6,648	2,080	2,077.3	99 / 121
070	7,011	2,080	2,078.9	50 / 50
071	7,082	2,080	2,079.3	70 / 102
074	7,443	2,080	2,080.3	55 / 155
081	8,086	2,080	2,083.1	111 / 21
086	8,649	2,080	2,086.3	34 / 34
091	9,057	2,080	2,088.2	134 / 22
092	9,167	2,080	2,089.6	136 / 39
096	9,572	2,080	2,090.6	23 / 146
104	10,416	1,820	2,093.3	36 / 40
113	11,310	1,820	2,097.4	46 / 79
117	11,695	1,820	2,099.0	101 / 99
118	11,828	1,820	2,101.5	58 / 199
124	12,398	1,820	2,101.9	33 / 217
130	13,008	1,560	2,105.9	19 / 142
139	13,850	1,560	2,110.6	21 / 59
144	14,393	1,240	2,113.2	27 / 32
144	14,436	1,240	2,114.6	31 / 25
149	14,941	1,240	2,117.2	25 / 25
158	15,822	1,240	2,121.5	36 / 30
SHEPHERD CREEK				
035	3,456	1,940	2,126.2	207 / 209
038	3,770	1,940	2,126.2	244 / 243
043	4,267	1,940	2,126.2	274 / 275
046	4,555	1,780	2,126.2	291 / 292
049	4,939	1,780	2,126.2	314 / 314
053	5,336	1,780	2,126.2	250 / 296
056	5,606	1,780	2,126.2	506 / 28
059	5,897	1,780	2,126.2	309 / 25
062	6,232	1,780	2,126.4	32 / 148
066	6,588	1,780	2,127.4	21 / 113
068	6,833	1,780	2,128.7	71 / 14
070	6,986	1,780	2,129.8	76 / 16
070	7,047	1,780	2,130.5	90 / 16
071	7,085	1,780	2,130.5	130 / 40
073	7,341	1,230	2,130.7	33 / 78
SOUTH FORK BIG WILLOW CREEK				
000	0	2,230	2,080.6[4]	113 / 81

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
SOUTH FORK BIG WILLOW CREEK				
006	597	2,230	2,080.6[4]	21 / 146
012	1,242	2,190	2,084.3	20 / 109
020	1,982	2,190	2,087.5	21 / 111
027	2,737	2,190	2,092.1	19 / 79
032	3,196	2,190	2,096.6	79 / 40
033	3,272	2,190	2,101.1	86 / 59
037	3,677	2,190	2,101.4	60 / 72
040	4,005	2,190	2,101.6	90 / 117
045	4,535	2,190	2,101.8	23 / 189
050	5,028	1,960	2,102.8	19 / 113
SOUTH FORK MILLS RIVER				
000	0	7,631	2,118.9	74 / 176
005	521	7,631	2,119.2	143 / 130
011	1,101	7,631	2,120.0	45 / 76
019	1,946	7,631	2,123.6	44 / 71
025	2,471	7,631	2,127.8	122 / 41
027	2,676	7,631	2,128.2	53 / 52
028	2,789	7,631	2,129.1	53 / 52
032	3,191	7,631	2,130.3	302 / 48
039	3,891	7,631	2,130.7	399 / 45
044	4,429	7,631	2,131.3	403 / 67
054	5,443	7,581	2,132.9	50 / 393
067	6,732	7,581	2,135.9	384 / 112
075	7,543	7,581	2,138.3	301 / 31
088	8,789	7,581	2,143.4	45 / 458
098	9,788	7,581	2,144.7	251 / 399
103	10,334	7,581	2,145.2	46 / 467
106	10,646	7,581	2,146.1	52 / 346
107	10,697	7,581	2,148.0	52 / 346
111	11,138	7,581	2,149.5	418 / 78
125	12,459	7,453	2,153.0	597 / 42
129	12,944	7,453	2,155.0	552 / 53
141	14,111	7,453	2,157.8	354 / 196
147	14,740	7,453	2,160.3	304 / 116
149	14,854	7,453	2,161.2	365 / 125
160	15,953	7,453	2,166.1	215 / 46
167	16,710	7,453	2,170.9	136 / 39
178	17,803	7,351	2,179.5	63 / 287
188	18,847	7,351	2,186.0	160 / 164
198	19,841	7,236	2,191.6	100 / 100
207	20,672	6,999	2,197.7	146 / 35
216	21,646	6,999	2,202.3	49 / 399
221	22,062	6,956	2,203.6	51 / 549

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
SOUTH FORK MILLS RIVER				
221	22,131	6,956	2,206.4	164 / 201
225	22,500	6,956	2,207.7	116 / 154
231	23,063	6,956	2,212.3	122 / 36
240	23,973	6,956	2,217.0	33 / 198
245	24,510	6,956	2,220.6	97 / 103
253	25,342	6,956	2,223.3	101 / 42
260	26,020	6,956	2,226.9	54 / 46
267	26,688	6,956	2,229.7	40 / 40
274	27,391	6,956	2,234.2	50 / 80
282	28,229	6,956	2,240.2	32 / 161
288	28,797	6,956	2,243.8	38 / 298
294	29,393	6,956	2,245.6	33 / 97
306	30,643	6,956	2,252.3	40 / 80
314	31,427	6,956	2,258.1	61 / 69
TONYS CREEK				
005	507	510	2,126.2[4]	137 / 138
008	794	510	2,126.2[4]	14 / 10
009	859	510	2,126.2[4]	22 / 22
009	893	510	2,126.2[4]	15 / 35
013	1,296	510	2,126.2[4]	14 / 22
019	1,855	510	2,131.4	19 / 65
019	1,948	510	2,132.1	20 / 21
020	2,015	510	2,135.1	20 / 21
022	2,200	510	2,135.4	28 / 14
024	2,447	510	2,136.6	12 / 11
025	2,508	510	2,138.5	14 / 17
027	2,735	510	2,139.4	15 / 11
030	2,961	510	2,141.8	22 / 13
034	3,388	510	2,157.7	27 / 27
038	3,834	510	2,164.2	13 / 7
044	4,400	510	2,187.5	9 / 20
045	4,538	510	2,200.9	188 / 172
048	4,810	510	2,200.9	95 / 95
WOLFPEN CREEK				
002	246	1,300	2,091.4[4]	12 / 84
007	737	1,300	2,091.4[4]	14 / 229
010	1,039	1,300	2,091.4[4]	29 / 66
014	1,418	1,300	2,093.0	26 / 23
016	1,630	1,300	2,096.4	41 / 48
019	1,879	1,300	2,096.7	109 / 13
027	2,728	1,300	2,099.9	184 / 12
033	3,337	1,300	2,103.1	18 / 18
035	3,487	1,300	2,104.3	10 / 14

Table 11—Limited Detailed Flood Hazard Data

Cross Section[1]	Stream Station[2]	Flood Discharge *(cfs)*	1% Annual Chance Water-Surface Elevation *(feet NAVD 88)*	Non-Encroachment Width[3] *(feet)*
WOLFPEN CREEK				
071	7,062	900	2,129.6	41 / 41
071	7,118	900	2,129.7	9 / 28

[1]This table reflects all modeled cross sections. Some cross sections shown in this table may not appear on the map
[2]Feet above mouth
[3]Left/Right Distance from the Mapped Center of Stream to Encroachment Boundary based on a 1.0-foot or less surcharge (Looking Downstream)
[4]Elevation includes backwater effects
[5]Elevation includes flooding controlled by effects
[6]Feet above confluence of Goforth Creek in South Carolina

6.1 Vertical and Horizontal Control

Vertical Datum

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

All flood elevations shown on the FIRM for Henderson County are referenced to NAVD 88. Structure and ground elevations in the county must, therefore, be referenced to NAVD 88. It is important to note that FISs for adjacent communities may be referenced to NGVD 29. This may result in BFE differences across political boundaries between the communities.

Prior versions of this FIS were referenced to NGVD 29. When a datum conversion is effected for an FIS, the Flood Profiles, BFEs, and bench marks reflect the new datum values. To compare structural and ground elevations to 1% annual chance flood elevations shown in this FIS, the subject structural and ground elevations must be referenced to the new datum values.

As noted above, the elevations shown in this FIS 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 for Henderson County is -0.15 feet. The locations used to establish the conversion factor were USGS quadrangle corners that fell within the county, as well as those that were within 2.5 miles outside the county. The benchmarks are referenced to NAVD 88. Table 12, "Datum Conversion Locations and Values," is shown below.

Table 12—Datum Conversion Locations and Values

Latitude	Longitude	Conversion from NGVD 29 to NAVD 88 (feet)
35.500	82.375	-0.25
35.500	82.250	-0.24
35.375	82.750	0.12
35.375	82.625	-0.10
35.375	82.500	-0.20
35.375	82.375	-0.21
35.375	82.250	-0.32
35.250	82.625	-0.10
35.250	82.500	-0.06
35.250	82.375	-0.14
35.125	82.500	-0.16
Average conversion in Henderson County from NGVD 29 to NAVD 88 = -0.15 feet		

The BFEs shown on the FIRM represent whole-foot rounded values. For example, a 1% annual chance water-surface elevation of 102.4 feet will appear as 102 on the FIRM and 102.6 feet will appear as 103. Therefore, users who 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 more information on NAVD 88, see *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988*, or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (http://www.ngs.noaa.gov).

Vertical Control Monuments

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

The National Geodetic Survey establishes precisely located monuments on the North Carolina Grid System and Bench Marks referenced to a vertical datum (NGVD 1929 and NAVD 1988).

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

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)
- Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutment)
- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below frost line)
- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

In addition, when local jurisdictions have established their own vertical monument network, these monuments may also be shown on the FIRM with the appropriate designations. Local monuments will be placed on the FIRM if the community has requested that they be included and if the monuments meet the aforementioned criteria.

North Carolina Geodetic Survey (NCGS) and contractor surveyed vertical control monuments will be shown on the FIRM panels. Those cataloged by NCGS meet similar requirements to the NGS monuments as described above. Most monuments that have been cataloged by NCGS have been established to NGS standards, but have not been submitted to NGS for inclusion into the NSRS. The qualifying criteria for depicting bench marks established by the State's contractors on the new digital FIRM panels include:

- GPS surveying of permanent 3-D survey monuments to 5-centimeter or better local network accuracy guidelines, in accordance with NOAA Technical Memorandum NOS NGS-58

"Guidelines for Establishing GPS-Derived Ellipsoid Heights (Standards: 2 cm and 5 cm)," and conversion to NAVD 88 orthometric heights using NGS' latest geoid mode;

- Requiring a stability classification of "C" or better; and
- Submitting GPS files and station descriptions to NCGS.

To obtain current information for cataloging local bench marks in the NSRS, please visit the Data Sheet page of the NGS website at http://www.ngs.noaa.gov/datasheet.html, or contact the NGS Information Services Branch at:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

Information regarding the NCGS or State contractor bench marks can be obtained through the NCGS website at www.ncgs.state.nc.us, or by phone at (919) 733-3836.

It is important to note that temporary vertical monuments, sometimes called Elevation Reference Marks, are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, interested individuals may contact FEMA to access this information.

Horizontal Datum and Control

The digital files that comprise the FIRM are georeferenced to an established coordinate system. The coordinate system used for the production of this FIRM is North Carolina State Plane (FIPSZONE 3200) referenced to the North American Datum of 1983 (NAD83), GRS80 ellipsoid.

6.2 Base Map

Aerial photography, flown by the State of North Carolina in 2001, is used as the base maps for digital FIRM production for Henderson County. The base maps are supplemented with stream centerlines, shoreline, and political boundaries, and road name data from other sources; this includes locally available GIS data.

The projection used in the preparation of this map was the North Carolina State Plane Coordinate System. The horizontal datum was NAD83, GRS80 spheroid. Differences in datum, spheroid, or projection used in the production of FIRMs for adjacent states may result in slight positional differences in map features across the state boundary. These differences do not affect the accuracy of this FIRM.

As part of the North Carolina CTS Initiative, North Carolina digital FIRM panel numbers are consistent with the North Carolina Land Records Management Program (LRMP).

The 11-digit digital FIRM panel numbering system for North Carolina is: SS MM LLLL PP X, where SS = State Federal Information Processing Code (37); MM = Easting-Northing (EN) 1,000,000-foot coordinates; LLLL = LRMP map numbers to include the EN 100,000-foot

coordinates, and the EN 10,000-foot coordinates; PP = place holders for additional EN 1,000-foot coordinates; and X = suffix ("J" for the initial edition). North Carolina's State Plane Coordinate System origin is outside the State boundary to the southwest (in Georgia), the eastings range from approximately 0,404,000 (Tennessee border) to 3,040,000 (Atlantic Ocean); and the northings range from approximately 0,045,000 (South Carolina border) to 1,043,000 (Virginia border). Digital FIRM panels were compiled at either 1"=1,000', covering an area of 20,000 feet x 20,000 feet (20" x 20" panels); or at 1"=500', covering an area of 10,000 feet x 10,000 feet (20" x 20" panels). An additional 2 digits (both zeros) are held in reserve as a "place holder" in the event that future FIRMs are printed at a larger scale; e.g., 1"=250', covering an area of 5,000 feet x 5,000 feet for which the 1,000-foot coordinates would either be 0 or 5.

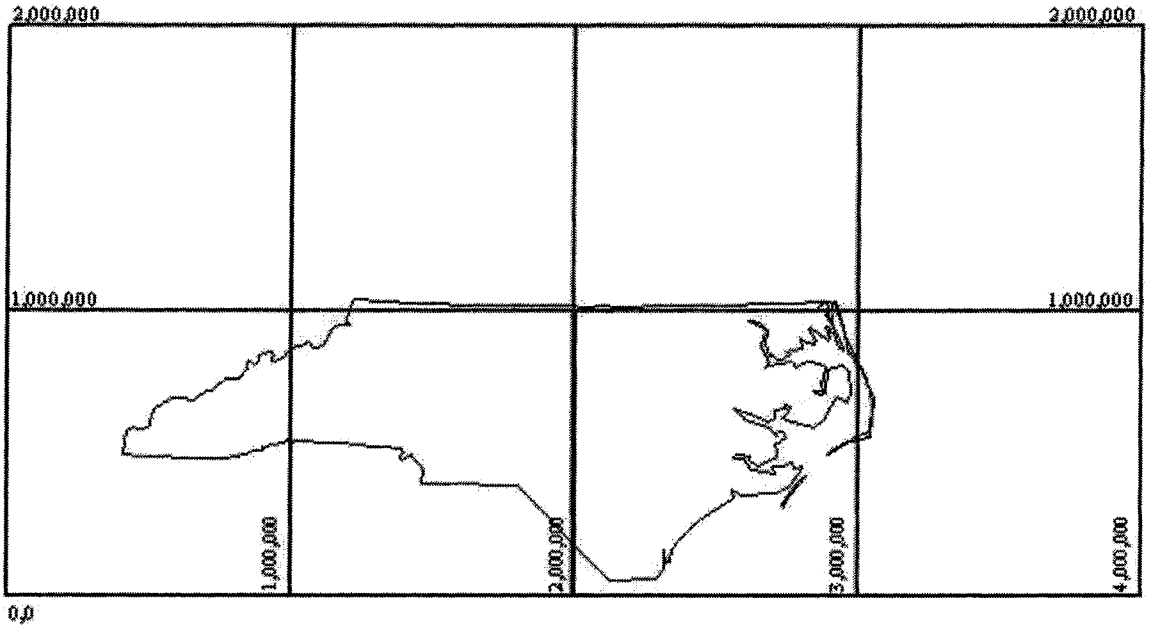

Figure 2—North Carolina's State Plane Coordinate System

6.3 Floodplain and Floodway Delineation

Floodplain Delineation

For streams restudied by detailed and limited detailed methods, the 1% and 0.2% annual chance floodplains were delineated using flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic data acquired using airborne Light Detection and Ranging (LIDAR). This LIDAR data was acquired during the winter 2000-2001 flying season.

The topographic data satisfies a vertical root-mean-square error (RMSE) accuracy standard of 20 cm (1.3 feet accuracy at the 95% confidence limit) for the Outer Banks and 25 cm (1.6 feet accuracy at the 95% confidence limit) for those portions of the basin lying west of the Outer Banks. These data could be contoured at roughly a 2-foot vertical contour interval. All elevations were referenced to the NAVD 88 and reflect orthometric heights. Variably spaced, bare-earth digital topographic data in ASCII point file format were combined with imagery (either flown concurrently with the LIDAR data or using existing digital orthophotos) to establish a Triangulated Irregular Network (TIN) of digital elevation points, which include selected breaklines to be used for hydraulic modeling. Furthermore, a uniformly spaced sampling of the TIN resulted in uniformly spaced Digital Elevation Models (DEMs), with 20 ft x 20 ft post spacing, which was generated in multiple file formats.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones VE, AO, AH, A99, AR, A, and AE), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundaries have been shown.

Floodway Delineation

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 13, "Floodway Data"). The computed floodway is shown on the FIRM. In cases where the floodway and 1% annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown. In areas where the top of the bridge or road is higher than the 1.0-percent annual chance (100-year) flood, the FIRM will show the flood discharge as contained within the structure for emergency management purposes. It is important to note that FEMA and community floodway regulations still apply in and around those areas.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Bat Fork Creek								
069	6,918	640	3,013	1.6	2,084.0	2,078.7[2]	2,079.7	1.0
087	8,685	695	2,798	1.7	2,084.0	2,079.0[2]	2,080.0	1.0
107	10,717	506	2,191	2.1	2,084.0	2,080.2[2]	2,081.2	1.0
117	11,680	396	1,221	3.8	2,084.0	2,081.1[2]	2,081.9	0.8
133	13,253	735	2,313	2.0	2,084.0	2,082.8[2]	2,083.7	0.9
Boylston Creek								
021	2,112	800	2,974	1.3	2,065.1	2,058.3[3]	2,059.3	1.0
037	3,748	350	1,511	2.6	2,065.1	2,060.1[3]	2,060.7	0.6
043	4,329	350	1,311	3.1	2,065.1	2,061.3[3]	2,061.7	0.4
067	6,705	300	930	4.3	2,067.0	2,067.0	2,068.0	1.0
084	8,373	316	1,124	2.0	2,071.6	2,071.6	2,072.5	0.9
089	8,879	280	884	2.6	2,072.5	2,072.5	2,073.1	0.6
090	8,978	300	1,220	1.9	2,072.8	2,072.8	2,073.5	0.7
097	9,710	400	1,083	2.1	2,073.3	2,073.3	2,074.0	0.7
102	10,221	304	893	2.5	2,074.1	2,074.1	2,074.7	0.6
106	10,635	276	626	3.6	2,075.3	2,075.3	2,075.6	0.3
107	10,658	276	728	3.1	2,075.8	2,075.8	2,076.3	0.5
112	11,237	297	531	4.3	2,077.0	2,077.0	2,077.5	0.5
113	11,252	337	741	3.1	2,077.5	2,077.5	2,078.3	0.8
118	11,827	236	860	2.6	2,078.3	2,078.3	2,079.1	0.8
124	12,386	144	594	3.8	2,079.6	2,079.6	2,080.2	0.6
128	12,833	168	722	3.1	2,080.8	2,080.8	2,081.6	0.8

[1]Feet above mouth

[2] Elevation computed without consideration of backwater effects from Mud Creek

[3] Elevation computed without consideration of backwater effects from French Broad River

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

BAT FORK CREEK – BOYLSTON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Boylston Creek								
138	13,770	208	708	3.2	2,083.9	2,083.9	2,084.9	1.0
151	15,123	370	1,137	2.0	2,086.4	2,086.4	2,087.2	0.8
163	16,285	470	1,190	1.9	2,088.1	2,088.1	2,088.8	0.7
164	16,359	430	841	2.7	2,088.3	2,088.3	2,089.0	0.7
192	19,157	400	943	2.4	2,093.5	2,093.5	2,094.3	0.8
199	19,934	360	817	2.7	2,095.4	2,095.4	2,096.4	1.0
221	22,112	150	493	4.5	2,101.8	2,101.8	2,102.2	0.4
222	22,187	124	722	3.1	2,102.6	2,102.6	2,102.8	0.2
234	23,426	160	448	4.9	2,104.8	2,104.8	2,105.4	0.6
235	23,512	55	464	4.7	2,106.8	2,106.8	2,106.9	0.1
240	24,035	156	794	2.8	2,108.4	2,108.4	2,108.8	0.4
251	25,135	190	715	3.1	2,109.9	2,109.9	2,110.6	0.7
267	26,686	170	539	4.1	2,114.2	2,114.2	2,114.9	0.7
282	28,208	170	737	3.0	2,118.6	2,118.6	2,119.6	1.0
290	29,026	248	844	2.6	2,120.2	2,120.2	2,121.1	0.9
294	29,444	135	509	4.3	2,121.4	2,121.4	2,122.1	0.7
306	30,615	222	622	3.5	2,124.0	2,124.0	2,124.9	0.9
322	32,210	190	500	4.3	2,128.8	2,128.8	2,129.6	0.8
328	32,831	240	1,076	2.0	2,132.4	2,132.4	2,133.1	0.7
333	33,266	145	1,029	2.1	2,136.6	2,136.6	2,137.2	0.6
344	34,395	225	1,038	2.1	2,137.0	2,137.0	2,137.8	0.8

[1]Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

BOYLSTON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Boylston Creek								
358	35,785	169	520	4.1	2,140.2	2,140.2	2,140.8	0.6
361	36,100	178	431	4.9	2,141.8	2,141.8	2,142.3	0.5
362	36,194	230	863	2.5	2,142.6	2,142.6	2,143.6	1.0
365	36,495	157	532	4.0	2,143.5	2,143.5	2,144.3	0.8
367	36,732	230	829	2.6	2,144.9	2,144.9	2,145.8	0.9
368	36,764	165	693	3.1	2,144.9	2,144.9	2,145.8	0.9
Boylston Creek Tributary 7								
006	553	46	164	3.2	2,103.5	2,103.5	2,104.3	0.8
009	945	29	140	3.8	2,105.1	2,105.1	2,105.5	0.4
013	1,250	29	129	4.1	2,106.5	2,106.5	2,106.8	0.3
016	1,573	28	84	6.3	2,108.4	2,108.4	2,108.6	0.2
019	1,867	30	111	4.8	2,110.2	2,110.2	2,110.4	0.2
020	1,958	40	239	2.2	2,113.0	2,113.0	2,113.9	0.9
023	2,348	37	69	7.6	2,117.7	2,117.7	2,117.7	0.0
028	2,793	31	161	3.3	2,126.0	2,126.0	2,127.0	1.0
030	3,033	38	93	5.7	2,127.7	2,127.7	2,128.1	0.4

[1]Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

BOYLSTON CREEK – BOYLSTON CREEK TRIBUTARY 7

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Britton Creek								
015	1.478	250	1.719	0.7	2.081.6	2.080.7[2]	2.081.5	0.8
025	2.482	270	814	1.4	2.081.6	2.080.9[2]	2.081.7	0.8
035	3.538	65	217	5.3	2.086.2	2.086.2	2.086.2	0.0
041	4.066	60	207	5.5	2.090.3	2.090.3	2.090.8	0.5
043	4.330	35	225	5.1	2.092.9	2.092.9	2.093.3	0.4
051	5.122	50	225	4.2	2.096.2	2.096.2	2.097.0	0.8
055	5.544	60	220	4.2	2.098.0	2.098.0	2.098.4	0.4
066	6.600	65	203	4.3	2.105.2	2.105.2	2.105.5	0.3
073	7.286	100	408	2.1	2.112.0	2.112.0	2.112.7	0.7
076	7.550	70	247	3.4	2.114.0	2.114.0	2.114.6	0.6
087	8.659	50	179	4.4	2.123.1	2.123.1	2.123.2	0.1
095	9.504	80	181	4.1	2.128.8	2.128.8	2.129.0	0.2
103	10.349	70	233	3.1	2.138.9	2.138.9	2.139.5	0.6
114	11.352	80	200	3.6	2.149.7	2.149.7	2.150.5	0.8
Cane Creek								
038	3.799	1.672	6.667	1.8	2.061.0	2.053.6[3]	2.054.1	0.5
046	4.557	1.750	7.209	1.7	2.061.0	2.054.0[3]	2.054.5	0.5
066	6.642	840	6.549	1.8	2.062.0	2.062.0	2.062.0	0.0
075	7.459	900	5.610	2.1	2.062.1	2.062.1	2.062.3	0.2

[1]Feet above mouth

[2] Elevation computed without consideration of backwater effects from Mud Creek

[3] Elevation computed without consideration of backwater effects from French Broad River

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

BRITTON CREEK – CANE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Cane Creek								
083	8,270	850	5,241	2.2	2,062.4	2,062.4	2,062.8	0.4
093	9,313	1,075	5,899	2.0	2,062.6	2,062.6	2,063.1	0.5
102	10,197	1,130	5,184	2.2	2,062.8	2,062.8	2,063.5	0.7
111	11,079	1,278	4,901	2.3	2,063.2	2,063.2	2,064.1	0.9
121	12,053	1,155	3,353	3.4	2,064.1	2,064.1	2,065.0	0.9
130	12,981	1,470	5,435	2.1	2,069.1	2,069.1	2,069.1	0.0
145	14,471	1,200	5,570	2.0	2,070.9	2,070.9	2,071.8	0.9
156	15,589	1,450	5,307	2.1	2,071.9	2,071.9	2,072.8	0.9
167	16,741	1,045	4,146	2.7	2,072.6	2,072.6	2,073.5	0.9
177	17,715	1,310	4,417	2.6	2,074.1	2,074.1	2,075.0	0.9
188	18,769	730	3,114	3.4	2,076.8	2,076.8	2,077.8	1.0
192	19,156	1,185	4,432	2.4	2,077.6	2,077.6	2,078.5	0.9
196	19,610	1,060	3,514	3.0	2,078.2	2,078.2	2,078.9	0.7
207	20,739	183	1,721	6.2	2,085.8	2,085.8	2,085.8	0.0
213	21,274	645	5,106	2.1	2,086.8	2,086.8	2,087.5	0.7
223	22,326	1,150	4,999	1.6	2,087.1	2,087.1	2,087.9	0.8
229	22,919	895	3,723	2.2	2,087.7	2,087.7	2,088.5	0.8
238	23,791	450	2,491	3.3	2,089.6	2,089.6	2,090.1	0.5
248	24,794	295	1,619	5.0	2,091.6	2,091.6	2,092.0	0.4
252	25,165	420	2,312	3.5	2,092.6	2,092.6	2,093.2	0.6
259	25,857	560	2,594	3.1	2,093.5	2,093.5	2,094.4	0.9

[1]Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

CANE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Clear Creek								
002	210	375	1,890	3.8	2,077.6	2,073.3[2]	2,074.3	1.0
011	1,057	546	2,687	2.7	2,077.7	2,074.6[3]	2,075.6	1.0
020	1,976	138	1,396	5.2	2,077.7	2,075.8[3]	2,076.6	0.8
021	2,120	125	1,035	7.0	2,077.7	2,076.1[3]	2,076.9	0.8
028	2,848	242	1,692	4.3	2,078.2	2,078.2	2,078.7	0.5
032	3,187	139	1,249	5.8	2,078.6	2,078.6	2,079.2	0.6
036	3,642	80	1,135	6.4	2,081.1	2,081.1	2,081.5	0.4
040	4,049	242	2,323	3.1	2,081.8	2,081.8	2,082.6	0.8
049	4,851	499	3,683	1.9	2,082.2	2,082.2	2,083.0	0.8
057	5,679	294	2,228	3.1	2,082.6	2,082.6	2,083.4	0.8
066	6,632	323	2,127	3.3	2,083.3	2,083.3	2,084.1	0.8
067	6,732	314	1,909	3.6	2,083.4	2,083.4	2,084.3	0.9
073	7,340	178	1,293	5.4	2,084.7	2,084.7	2,085.5	0.8
081	8,055	571	4,032	1.7	2,085.8	2,085.8	2,086.8	1.0
088	8,795	813	4,633	1.5	2,086.0	2,086.0	2,087.0	1.0
089	8,897	560	3,111	2.2	2,086.1	2,086.1	2,087.1	1.0
095	9,490	278	1,622	4.1	2,087.4	2,087.4	2,088.3	0.9
129	12,883	590	3,220	2.1	2,093.6	2,093.6	2,094.4	0.8
162	16,157	460	2,064	3.1	2,097.8	2,097.8	2,098.8	1.0
172	17,160	440	1,827	3.5	2,100.8	2,100.8	2,101.0	0.2

[1] Feet above mouth

[2] Flooding effects controlled by Mud Creek

[3] Elevation computed without consideration of backwater effects from Mud Creek

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

CLEAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Clear Creek								
185	18,533	230	1,662	3.9	2,103.0	2,103.0	2,103.3	0.3
204	20,434	350	1,736	3.6	2,105.2	2,105.2	2,105.8	0.6
215	21,542	430	1,738	3.5	2,106.7	2,106.7	2,107.6	0.9
249	24,922	640	2,866	2.0	2,110.2	2,110.2	2,111.1	0.9
262	26,189	300	1,725	3.3	2,113.9	2,113.9	2,114.0	0.1
281	28,142	260	1,393	3.9	2,117.7	2,117.7	2,118.3	0.6
Devils Fork								
020	2,041	88	588	4.7	2,084.0	2,083.0[2]	2,083.4	0.4
021	2,124	90	549	5.1	2,084.0	2,083.7[2]	2,084.7	1.0
025	2,463	35	327	8.5	2,084.9	2,084.9	2,085.6	0.7
027	2,676	51	576	4.8	2,086.4	2,086.4	2,087.0	0.6
028	2,806	109	996	2.8	2,086.8	2,086.8	2,087.4	0.6
038	3,803	487	4475	0.6	2,087.1	2,087.1	2,087.7	0.6
057	5,677	837	5706	0.5	2,087.1	2,087.1	2,087.7	0.6
074	7,379	292	1224	2.0	2,087.5	2,087.5	2,088.2	0.7
088	8,753	36	367	6.1	2,089.5	2,089.5	2,090.4	0.9
090	8,981	38	421	5.3	2,091.0	2,091.0	2,091.8	0.8
113	11,277	225	795	2.8	2,093.1	2,093.1	2,094.0	0.9
117	11,723	304	971	2.1	2,094.8	2,094.8	2,095.1	0.3
124	12,403	159	521	3.9	2,095.4	2,095.4	2,095.9	0.5
144	14,368	144	432	4.7	2,101.1	2,101.1	2,101.8	0.7

[1] Feet above mouth

[2] Elevation computed without consideration of backwater effects from Bat Fork Creek

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

CLEAR CREEK – DEVILS FORK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Devils Fork								
156	15,586	277	682	2.8	2,104.5	2,104.5	2,105.4	0.9
163	16,322	34	276	7.0	2,106.4	2,106.4	2,107.3	0.9
164	16,423	35	283	6.8	2,107.4	2,107.4	2,107.9	0.5
171	17,084	49	384	5.0	2,109.4	2,109.4	2,110.3	0.9
175	17,546	180	738	2.4	2,110.7	2,110.7	2,111.6	0.9
180	17,984	171	624	2.8	2,111.3	2,111.3	2,112.0	0.7
186	18,570	131	441	4.0	2,112.5	2,112.5	2,113.4	0.9
202	20,181	91	308	4.2	2,117.1	2,117.1	2,118.0	0.9
206	20,622	159	435	3.0	2,118.5	2,118.5	2,119.4	0.9
207	20,698	188	506	2.6	2,118.7	2,118.7	2,119.7	1.0
219	21,932	111	232	4.8	2,124.8	2,124.8	2,125.1	0.3
223	22,262	100	243	4.5	2,126.7	2,126.7	2,126.8	0.1
224	22,372	46	253	4.3	2,128.4	2,128.4	2,128.4	0.0
228	22,777	38	216	5.1	2,130.4	2,130.4	2,130.4	0.0
233	23,348	72	310	3.6	2,132.2	2,132.2	2,133.0	0.8
240	23,992	36	173	6.4	2,135.0	2,135.0	2,135.4	0.4

[1] Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

DEVILS FORK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
French Broad River								
8686	868,560	555	8,916	5.5	2,055.6	2,055.6	2,056.6	1.0
8709	870,936	610	10,786	4.5	2,057.9	2,057.9	2,058.8	0.9
8731	873,100	1,050	18,144	2.7	2,060.0	2,060.0	2,060.8	0.8
8754	875,371	1,700	29,802	1.6	2,060.3	2,060.3	2,061.2	0.9
8766	876,586	1,800	28,624	1.7	2,060.4	2,060.4	2,061.3	0.9
8823	882,288	1,300	20,963	2.2	2,061.1	2,061.1	2,062.0	0.9
8842	884,189	1,910	28,141	1.6	2,061.5	2,061.5	2,062.5	1.0
8907	890,736	3,320	43,874	0.9	2,062.3	2,062.3	2,063.3	1.0
9014	901,402	2,600	29,984	1.3	2,065.0	2,065.0	2,065.8	0.8
9068	906,840	1,500	17,405	2.2	2,066.5	2,066.5	2,067.3	0.8
9134	913,440	1,560	17,685	2.1	2,068.2	2,068.2	2,069.0	0.8
9149	914,918	630	8,048	4.6	2,071.0	2,071.0	2,071.6	0.6
9198	919,776	960	15,132	2.5	2,072.9	2,072.9	2,073.8	0.9
9250	925,056	1,790	25,021	1.5	2,073.7	2,073.7	2,074.7	1.0
9348	934,771	730	12,752	2.9	2,075.3	2,075.3	2,076.3	1.0
9353	935,352	1,120	15,853	2.3	2,077.3	2,077.3	2,078.0	0.7
9390	939,048	620	8,215	4.4	2,078.6	2,078.6	2,079.2	0.6
9433	943,272	1,060	16,650	2.2	2,080.2	2,080.2	2,081.1	0.9
9517	951,720	1,900	24,370	1.5	2,081.0	2,081.0	2,082.0	1.0
9547	954,730	1,160	13,252	2.7	2,082.6	2,082.6	2,083.1	0.5
9617	961,752	1,650	22,679	1.6	2,084.8	2,084.8	2,085.6	0.8
9673	967,296	1,700	21,445	1.7	2,086.2	2,086.2	2,087.0	0.8
9701	970,094	1,580	20,393	1.7	2,087.3	2,087.3	2,088.1	0.8
9742	974,160	890	12,340	2.9	2,088.0	2,088.0	2,088.7	0.7

[1] Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

FRENCH BROAD RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Green River								
2548	254,817	211	2,504	3.2	2,017.9	2,017.9	2,017.9	0.0
2550	255,047	440	2,597	3.0	2,017.9	2,017.9	2,017.9	0.0
2556	255,595	465	3,419	2.3	2,018.5	2,018.5	2,018.5	0.0
2567	256,703	520	3,427	2.3	2,018.7	2,018.7	2,019.2	0.5
2584	258,414	510	3,093	2.5	2,019.3	2,019.3	2,020.2	0.9
2586	258,630	82	1,194	6.5	2,020.1	2,020.1	2,021.1	1.0
2592	259,179	180	1,204	6.4	2,021.3	2,021.3	2,022.0	0.7
2597	259,731	213	1,777	4.2	2,022.6	2,022.6	2,023.5	0.9
2606	260,590	200	1,803	4.1	2,023.5	2,023.5	2,024.4	0.9
2608	260,761	115	1,755	4.2	2,024.2	2,024.2	2,025.1	0.9
2612	261,196	140	1,247	6.0	2,024.8	2,024.8	2,025.6	0.8
2617	261,709	106	1,174	6.3	2,026.6	2,026.6	2,027.3	0.7
2624	262,398	129	1,289	5.8	2,028.4	2,028.4	2,029.2	0.8
2628	262,785	117	1,563	4.8	2,029.3	2,029.3	2,030.0	0.7
2632	263,204	110	1,397	5.3	2,029.4	2,029.4	2,030.2	0.8
2640	264,041	87	1,322	5.6	2,030.8	2,030.8	2,031.5	0.7
2645	264,490	90	1,408	5.3	2,031.7	2,031.7	2,032.4	0.7
2649	264,902	89	1,451	5.1	2,032.2	2,032.2	2,033.1	0.9
2652	265,163	89	1,406	5.3	2,032.6	2,032.6	2,033.5	0.9
2657	265,739	89	1,305	5.7	2,033.8	2,033.8	2,034.7	0.9
2663	266,311	89	805	9.1	2,035.8	2,035.8	2,036.8	1.0

[1] Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

GREEN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Green River								
2669	266,895	116	1,934	3.4	2,042.4	2,042.4	2,042.7	0.3
2673	267,308	105	1,888	3.5	2,043.9	2,043.9	2,044.2	0.3
2680	268,035	105	1,490	4.4	2,044.3	2,044.3	2,044.8	0.5
2681	268,144	132	1,690	3.9	2,044.9	2,044.9	2,045.2	0.3
2690	268,999	340	3,239	2.0	2,045.1	2,045.1	2,046.0	0.9
2701	270,119	201	2,074	3.2	2,045.6	2,045.6	2,046.5	0.9
2705	270,481	268	2,678	2.5	2,045.9	2,045.9	2,046.8	0.9
2711	271,101	288	2,544	2.3	2,046.2	2,046.2	2,047.1	0.9
2719	271,887	320	2,424	2.4	2,046.7	2,046.7	2,047.6	0.9
2725	272,549	320	2,008	2.9	2,047.1	2,047.1	2,048.1	1.0
2741	274,078	323	1,552	3.7	2,049.6	2,049.6	2,050.4	0.8
2756	275,574	441	2,293	2.4	2,052.6	2,052.6	2,053.6	1.0
2761	276,109	400	1,695	3.3	2,053.2	2,053.2	2,054.1	0.9
2762	276,193	430	1,853	3.0	2,053.3	2,053.3	2,054.3	1.0
2771	277,116	513	2,170	2.6	2,055.2	2,055.2	2,056.2	1.0
2785	278,462	280	1,431	3.9	2,059.6	2,059.6	2,060.5	0.9
2786	278,562	250	1,590	3.5	2,060.4	2,060.4	2,061.3	0.9
2790	278,952	197	799	7.0	2,061.7	2,061.7	2,062.3	0.6
2795	279,466	190	1,460	3.8	2,064.7	2,064.7	2,065.3	0.6
2798	279,833	88	600	9.2	2,066.2	2,066.2	2,066.5	0.3
2809	280,924	130	1,054	3.9	2,071.2	2,071.2	2,071.6	0.4

[1] Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

GREEN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Green River								
2813	281,252	125	925	4.4	2,071.6	2,071.6	2,072.1	0.5
2817	281,710	148	900	4.5	2,072.8	2,072.8	2,073.4	0.6
2828	282,795	209	644	6.3	2,074.8	2,074.8	2,075.6	0.8
2833	283,287	200	1,239	3.3	2,076.4	2,076.4	2,077.4	1.0
2837	283,679	198	941	4.3	2,076.9	2,076.9	2,077.7	0.8
2844	284,400	212	1,034	3.9	2,078.4	2,078.4	2,079.1	0.7
2850	284,988	214	767	5.3	2,079.3	2,079.3	2,080.3	1.0
2855	285,542	180	812	4.7	2,083.0	2,083.0	2,083.5	0.5
2858	285,825	195	978	3.9	2,083.4	2,083.4	2,084.2	0.8
2867	286,737	217	864	4.5	2,085.5	2,085.5	2,086.2	0.7
2875	287,460	235	782	4.9	2,087.4	2,087.4	2,088.3	0.9
2886	288,626	219	807	4.8	2,092.6	2,092.6	2,093.4	0.8
2892	289,225	195	859	4.5	2,094.9	2,094.9	2,095.8	0.9
2912	291,181	240	919	3.7	2,102.3	2,102.3	2,103.3	1.0
2923	292,337	234	776	4.4	2,106.4	2,106.4	2,107.4	1.0
2933	293,334	181	741	4.6	2,111.4	2,111.4	2,112.2	0.8
2938	293,773	150	470	7.3	2,114.2	2,114.2	2,114.5	0.3
2955	295,491	54	291	11.0	2,125.1	2,125.1	2,125.4	0.3
2957	295,718	96	576	5.6	2,128.4	2,128.4	2,129.1	0.7
2958	295,811	81	624	5.1	2,130.8	2,130.8	2,131.1	0.3

[1] Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

GREEN RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Green River								
2968	296.757	86	409	7.3	2.135.8	2.135.8	2.136.0	0.2
2979	297.856	140	351	7.9	2.148.7	2.148.7	2.148.9	0.2
2989	298.946	156	665	4.2	2.163.7	2.163.7	2.164.1	0.4
2993	299.269	59	264	10.5	2.166.3	2.166.3	2.166.9	0.6
Higgins Branch								
003	261	28	97	9.6	2.065.6	2.065.6	2.065.7	0.1
006	554	28	177	5.3	2.068.6	2.068.6	2.068.7	0.1
009	911	60	264	3.5	2.069.6	2.069.6	2.069.8	0.2
016	1.611	32	131	7.1	2.078.0	2.078.0	2.078.1	0.1
023	2.262	35	225	4.1	2.085.4	2.085.4	2.086.3	0.9
024	2.437	58	293	3.2	2.087.9	2.087.9	2.088.5	0.6
026	2.628	102	274	3.4	2.089.0	2.089.0	2.089.9	0.9
028	2.820	57	218	4.3	2.090.4	2.090.4	2.091.1	0.7
034	3.393	108	122	7.6	2.095.8	2.095.8	2.096.3	0.5
040	4.012	27	109	8.6	2.105.6	2.105.6	2.106.0	0.4
045	4.460	28	110	6.2	2.110.2	2.110.2	2.111.0	0.8
046	4.574	21	139	4.9	2.113.8	2.113.8	2.114.4	0.6
050	5.044	20	81	8.4	2.118.5	2.118.5	2.118.8	0.3
059	5.913	25	108	6.3	2.132.8	2.132.8	2.133.4	0.6

[1] Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

GREEN RIVER – HIGGINS BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Higgins Branch								
064	6,384	20	199	3.4	2,140.9	2,140.9	2,141.4	0.5
066	6,619	60	197	3.5	2,142.9	2,142.9	2,143.2	0.3
071	7,071	21	74	9.2	2,151.2	2,151.2	2,151.3	0.1
074	7,435	20	73	9.3	2,159.6	2,159.6	2,160.2	0.6
082	8,171	25	79	8.7	2,177.9	2,177.9	2,178.7	0.8
Hoopers Creek								
008	809	430	1,177	3.6	2,076.1	2,075.8[2]	2,076.4	0.6
018	1,832	440	1,247	3.3	2,078.3	2,078.3	2,079.3	1.0
033	3,294	480	1,492	2.8	2,082.5	2,082.5	2,082.9	0.4
056	5,586	410	1,143	3.6	2,087.1	2,087.1	2,088.0	0.9
074	7,419	350	1,496	2.7	2,093.0	2,093.0	2,093.9	0.9
088	8,801	180	1,169	3.4	2,098.4	2,098.4	2,098.4	0.0
096	9,607	260	1,216	3.3	2,099.4	2,099.4	2,099.6	0.2
104	10,409	212	668	5.7	2,100.4	2,100.4	2,100.6	0.2
114	11,426	230	928	3.7	2,102.9	2,102.9	2,103.6	0.7
123	12,322	80	587	5.9	2,106.5	2,106.5	2,106.9	0.4
128	12,793	190	815	4.2	2,107.5	2,107.5	2,108.3	0.8
142	14,229	190	728	4.7	2,111.1	2,111.1	2,112.0	0.9
150	15,026	170	639	5.1	2,113.6	2,113.6	2,114.5	0.9
154	15,389	155	597	5.5	2,115.1	2,115.1	2,115.9	0.8

[1] Feet above mouth

[2] Elevation computed without consideration of backwater effects from Cane Creek

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

HIGGINS BRANCH – HOOPERS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Hoopers Creek								
163	16,305	240	1,007	3.3	2,118.1	2,118.1	2,118.7	0.6
170	17,000	255	950	3.4	2,119.2	2,119.2	2,120.0	0.8
177	17,676	180	720	3.8	2,121.4	2,121.4	2,122.1	0.7
183	18,320	180	694	3.9	2,123.6	2,123.6	2,124.4	0.8
190	18,993	180	674	4.0	2,125.5	2,125.5	2,126.3	0.8
194	19,428	270	846	3.2	2,127.1	2,127.1	2,127.9	0.8
200	20,016	110	737	3.7	2,129.8	2,129.8	2,130.1	0.3
204	20,367	160	661	4.1	2,130.9	2,130.9	2,131.4	0.5
214	21,396	180	671	4.1	2,133.3	2,133.3	2,134.2	0.9
219	21,853	120	626	4.3	2,134.8	2,134.8	2,135.4	0.6
221	22,079	130	464	5.9	2,135.8	2,135.8	2,136.2	0.4
229	22,920	100	464	5.5	2,139.9	2,139.9	2,140.7	0.8
235	23,472	130	498	5.2	2,141.9	2,141.9	2,142.7	0.8
240	24,032	113	519	4.9	2,144.6	2,144.6	2,145.5	0.9
249	24,908	195	595	4.3	2,149.2	2,149.2	2,149.8	0.6
257	25,728	140	469	5.5	2,152.4	2,152.4	2,153.2	0.8
265	26,532	50	240	9.8	2,162.0	2,162.0	2,162.6	0.6
270	27,046	32	187	12.6	2,181.3	2,181.3	2,181.3	0.0

[1] Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

HOOPERS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Kimsey Creek								
011	1,078	162	1,411	1.3	2,061.5	2,061.0[2]	2,061.0	0.0
022	2,185	85	280	5.1	2,061.9	2,061.8	2,062.1	0.3
027	2,705	174	288	4.9	2,064.5	2,064.5	2,065.1	0.6
032	3,156	247	649	2.2	2,065.3	2,065.3	2,065.9	0.6
034	3,379	30	130	10.9	2,070.3	2,070.3	2,070.3	0.0
039	3,899	50	370	3.8	2,073.1	2,073.1	2,073.3	0.2
040	3,977	87	276	5.1	2,073.1	2,073.1	2,073.7	0.6
045	4,475	34	146	9.7	2,076.3	2,076.3	2,076.7	0.4
049	4,918	205	318	4.5	2,080.9	2,080.9	2,081.1	0.2
065	6,482	181	616	2.3	2,097.6	2,097.6	2,098.2	0.6
072	7,150	50	277	4.7	2,098.4	2,098.4	2,098.8	0.4
076	7,558	39	168	7.7	2,100.2	2,100.2	2,100.4	0.2
077	7,699	53	511	2.6	2,108.2	2,108.2	2,109.0	0.8
082	8,176	30	158	8.2	2,109.8	2,109.8	2,110.3	0.5
086	8,648	76	179	7.3	2,115.3	2,115.3	2,115.4	0.1
092	9,193	37	140	9.3	2,120.7	2,120.7	2,120.8	0.1
097	9,730	122	411	2.1	2,128.6	2,128.6	2,129.5	0.9
098	9,812	62	160	5.5	2,128.8	2,128.8	2,129.5	0.7
100	9,983	203	256	3.4	2,131.4	2,131.4	2,131.4	0.0
101	10,067	235	302	2.9	2,132.5	2,132.5	2,132.5	0.0
105	10,462	22	84	10.5	2,136.2	2,136.2	2,136.2	0.0
110	10,968	21	95	9.3	2,143.7	2,143.7	2,143.8	0.1
116	11,585	28	90	9.8	2,154.5	2,154.5	2,154.5	0.0

[1] Feet above mouth
[2] Elevation computed without consideration of backwater effects from French Broad River

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

KIMSEY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
McDowell Creek								
017	1,742	180	1,349	1.4	2,060.3	2,055.3[2]	2,056.2	0.9
038	3,854	200	548	3.2	2,062.9	2,062.9	2,063.4	0.5
073	7,339	200	637	2.8	2,079.6	2,079.6	2,080.4	0.8
077	7,656	200	340	4.7	2,080.4	2,080.4	2,081.2	0.8
092	9,187	200	739	2.0	2,091.1	2,091.1	2,091.5	0.4
109	10,930	110	172	8.2	2,101.8	2,101.8	2,101.8	0.0
124	12,408	140	869	1.5	2,115.0	2,115.0	2,115.7	0.7
144	14,362	120	387	3.2	2,129.9	2,129.9	2,130.8	0.9
154	15,418	100	192	6.1	2,139.1	2,139.1	2,139.2	0.1
163	16,262	130	326	3.5	2,148.6	2,148.6	2,149.3	0.7
173	17,266	90	440	2.5	2,161.0	2,161.0	2,161.0	0.0
185	18,480	60	214	4.7	2,171.8	2,171.8	2,172.5	0.7
Mill Pond Creek								
025	2,482	145	242	6.3	2,065.5	2,061.3[2]	2,062.1	0.8
037	3,749	65	218	5.8	2,066.0	2,066.0	2,066.0	0.0
056	5,596	140	516	2.6	2,075.2	2,075.2	2,075.8	0.6
063	6,253	139	358	3.7	2,077.2	2,077.2	2,078.1	0.9
071	7,081	76	420	3.2	2,080.7	2,080.7	2,081.4	0.7
076	7,569	80	284	4.7	2,082.9	2,082.9	2,083.5	0.6

[1] Feet above mouth

[2] Elevation computed without consideration of backwater effects from French Broad River

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

McDOWELL CREEK – MILL POND CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mills River								
036	3,638	890	2,358	4.5	2,063.3	2,054.5[2]	2,055.3	0.8
048	4,770	1,195	3,255	0.2	2,063.3	2,057.2[2]	2,058.2	1.0
061	6,123	1,120	3,250	3.2	2,063.3	2,060.1[2]	2,061.1	1.0
086	8,606	1,110	2,979	3.5	2,065.4	2,065.4	2,066.4	1.0
103	10,300	1,150	3,444	3.0	2,068.4	2,068.4	2,069.3	0.9
123	12,266	930	2,363	4.4	2,072.6	2,072.6	2,073.2	0.6
137	13,744	291	1,791	5.8	2,078.3	2,078.3	2,078.4	0.1
150	14,975	600	3,038	3.4	2,080.8	2,080.8	2,081.3	0.5
177	17,682	1,000	3,180	3.2	2,084.1	2,084.1	2,085.0	0.9
193	19,305	775	2,492	4.1	2,086.7	2,086.7	2,087.7	1.0
204	20,407	750	2,833	3.6	2,088.8	2,088.8	2,089.7	0.9
214	21,356	620	1,760	5.8	2,090.9	2,090.9	2,091.3	0.4
221	22,111	560	1,788	5.6	2,092.8	2,092.8	2,093.6	0.8
234	23,432	230	1,086	9.2	2,095.5	2,095.5	2,096.2	0.7
244	24,386	210	1,185	8.4	2,098.9	2,098.9	2,099.7	0.8
259	25,863	160	1,068	9.3	2,102.2	2,102.2	2,102.5	0.3
268	26,799	122	1,353	7.3	2,106.4	2,106.4	2,106.8	0.4
278	27,753	350	2,291	4.3	2,108.4	2,108.4	2,109.3	0.9
286	28,629	140	1,052	9.4	2,108.9	2,108.9	2,109.6	0.7
297	29,696	180	2,010	4.9	2,114.3	2,114.3	2,114.3	0.0
303	30,311	200	1,658	6.0	2,114.6	2,114.6	2,114.6	0.0
310	30,961	250	1,772	5.5	2,115.0	2,115.0	2,115.7	0.7
319	31,919	280	1,972	5.0	2,116.9	2,116.9	2,117.8	0.9
328	32,766	250	2,025	4.9	2,118.9	2,118.9	2,119.8	0.9

[1] Feet above mouth

[2] Elevation computed without consideration of backwater effects from French Broad River

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

MILLS RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mud Creek								
018	1,782	517	3,711	3.8	2,062.2	2,053.7[2]	2,054.7	1.0
029	2,947	200	2,058	6.9	2,062.2	2,057.4[2]	2,057.7	0.3
035	3,454	1,137	12,239	1.2	2,062.2	2,058.6[2]	2,059.2	0.6
052	5,226	870	7,513	1.9	2,062.2	2,058.8[2]	2,059.5	0.7
065	6,517	863	7,609	1.9	2,062.2	2,059.3[2]	2,060.0	0.7
079	7,893	681	5,317	2.7	2,062.2	2,059.9[2]	2,060.6	0.7
089	8,882	198	2,260	6.2	2,062.2	2,060.4[2]	2,061.2	0.8
091	9,067	239	2,795	5.0	2,062.2	2,061.5[2]	2,062.3	0.8
099	9,906	682	6,077	2.3	2,062.2	2,062.2[2]	2,063.1	0.9
106	10,627	1,157	10,262	1.4	2,062.4	2,062.4	2,063.4	1.0
131	13,098	1,588	10,440	1.3	2,062.7	2,062.7	2,063.6	0.9
132	13,201	1,828	14,706	0.9	2,065.4	2,065.4	2,065.7	0.3
150	15,033	925	6,961	2.0	2,065.5	2,065.5	2,065.8	0.3
170	16,990	474	3,971	3.4	2,066.1	2,066.1	2,066.6	0.5
183	18,309	1,029	7,322	1.9	2,066.9	2,066.9	2,067.5	0.6
194	19,366	562	4,774	2.9	2,067.2	2,067.2	2,067.9	0.7
196	19,554	509	4,683	2.9	2,068.1	2,068.1	2,069.0	0.9
213	21,314	800	6,262	2.1	2,068.9	2,068.9	2,069.9	1.0
224	22,426	682	5,616	2.4	2,069.7	2,069.7	2,070.7	1.0
238	23,760	1,000	7,782	1.7	2,070.6	2,070.6	2,071.6	1.0
250	25,029	521	4,127	3.2	2,071.3	2,071.3	2,072.2	0.9
257	25,726	630	5,084	2.6	2,071.8	2,071.8	2,072.8	1.0
270	26,962	414	3,828	3.4	2,072.5	2,072.5	2,073.5	1.0

[1] Feet above mouth

[2] Elevation computed without consideration of backwater effects from French Broad River

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

MUD CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mud Creek								
275	27,519	306	2,833	4.6	2,073.1	2,073.1	2,074.0	0.9
284	28,351	603	4,700	2.8	2,074.5	2,074.5	2,075.5	1.0
291	29,097	352	3,132	4.2	2,075.3	2,075.3	2,076.2	0.9
299	29,874	401	4,060	3.2	2,076.4	2,076.4	2,077.4	1.0
300	29,965	483	4,711	2.8	2,077.0	2,077.0	2,078.0	1.0
308	30,814	539	5,374	2.4	2,077.4	2,077.4	2,078.4	1.0
316	31,631	385	4,035	2.2	2,077.7	2,077.7	2,078.7	1.0
323	32,266	254	2,909	3.1	2,078.1	2,078.1	2,079.1	1.0
335	33,462	496	5,288	1.7	2,078.8	2,078.8	2,079.8	1.0
345	34,487	513	4,962	1.8	2,079.0	2,079.0	2,080.0	1.0
346	34,608	386	3,408	2.6	2,080.6	2,080.6	2,081.6	1.0
350	34,983	357	3,386	2.6	2,080.8	2,080.8	2,081.7	0.9
356	35,622	298	3,438	2.6	2,081.2	2,081.2	2,082.1	0.9
367	36,726	463	4,734	1.8	2,081.8	2,081.8	2,082.6	0.8
373	37,336	426	4,465	1.9	2,081.8	2,081.8	2,082.8	1.0
375	37,468	180	2,095	4.1	2,081.8	2,081.8	2,082.8	1.0
381	38,091	329[2]	3,427	2.5	2,082.4	2,082.4	2,083.4	1.0
388	38,790	574[2]	6,309	1.3	2,082.7	2,082.7	2,083.7	1.0
397	39,678	1,039[2]	10,350	0.8	2,082.9	2,082.9	2,083.9	1.0
405	40,549	777[2]	7,159	1.2	2,083.0	2,083.0	2,084.0	1.0
415	41,540	1,109[2]	7,864	1.1	2,083.2	2,083.2	2,084.1	0.9
426	42,559	946[3]	4,710	1.8	2,083.4	2,083.4	2,084.4	1.0
433	43,326	1,809[3]	15,143	1.8	2,083.9	2,083.9	2,084.8	0.9

[1] Feet above mouth

[2] Combined Bat Fork Creek/Mud Creek floodway

[3] Combined Bat Fork Creek/Mud Creek/Devils Fork floodway

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

MUD CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mud Creek								
438	43,844	1,697	14,147	0.5	2,084.0	2,084.0	2,085.0	1.0
444	44,390	938	6,871	0.8	2,084.1	2,084.1	2,085.0	0.9
449	44,855	903	6,394	0.8	2,084.2	2,084.2	2,085.1	0.9
452	45,209	1,271	8,905	0.6	2,084.2	2,084.2	2,085.1	0.9
459	45,913	975	4,659	1.2	2,084.3	2,084.3	2,085.2	0.9
473	47,331	910	5,108	1.1	2,086.0	2,086.0	2,086.3	0.3
480	48,016	740	974	5.5	2,086.3	2,086.3	2,086.4	0.1
488	48,769	638	3,790	1.4	2,087.5	2,087.5	2,087.7	0.2
494	49,427	1,118	1,097	4.9	2,087.6	2,087.6	2,088.2	0.6
504	50,357	959	4,663	1.1	2,091.8	2,091.8	2,092.2	0.4
514	51,442	601	4,458	1.1	2,091.9	2,091.9	2,092.3	0.4
522	52,202	533	3,374	1.5	2,092.1	2,092.1	2,092.5	0.4
526	52,552	577	3,443	1.5	2,092.1	2,092.1	2,092.6	0.5
531	53,055	719	3,702	1.3	2,092.2	2,092.2	2,092.7	0.5
537	53,677	666	3,041	1.6	2,092.4	2,092.4	2,092.9	0.5
544	54,363	502	2,467	1.7	2,093.2	2,093.2	2,093.9	0.7
553	55,255	301	934	4.4	2,093.5	2,093.5	2,094.1	0.6
563	56,344	595	2,298	1.8	2,095.3	2,095.3	2,096.2	0.9
572	57,188	374	1,122	3.7	2,096.0	2,096.0	2,096.8	0.8
599	59,883	452	1,195	3.3	2,101.4	2,101.4	2,102.3	0.9
619	61,873	210	979	3.8	2,105.2	2,105.2	2,106.1	0.9
639	63,863	283	1,046	3.5	2,108.8	2,108.8	2,109.6	0.8

[1] Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

MUD CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mud Creek								
645	64,539	360	1,123	3.2	2,109.5	2,109.5	2,110.5	1.0
658	65,824	284	1,216	2.8	2,112.7	2,112.7	2,113.7	1.0
675	67,456	246	933	3.7	2,115.1	2,115.1	2,115.9	0.8
686	68,559	207	739	4.5	2,117.8	2,117.8	2,118.6	0.8
692	69,239	119	735	4.6	2,120.8	2,120.8	2,121.5	0.7
702	70,206	267	959	2.9	2,123.3	2,123.3	2,123.9	0.6
719	71,880	195	769	2.8	2,126.9	2,126.9	2,127.2	0.3
741	74,069	187	500	4.2	2,132.1	2,132.1	2,133.0	0.9
760	75,999	195	909	2.0	2,139.3	2,139.3	2,140.3	1.0
779	77,899	155	568	3.3	2,144.9	2,144.9	2,145.9	1.0
801	80,051	26	158	9.1	2,152.3	2,152.3	2,152.3	0.0
810	80,975	32	252	5.7	2,159.9	2,159.9	2,160.2	0.3
812	81,222	62	341	4.2	2,161.0	2,161.0	2,161.3	0.3
Shepherd Creek								
008	845	70	296	6.6	2,094.0	2,094.0	2,094.3	0.3
021	2,059	80	330	5.8	2,098.7	2,098.7	2,099.4	0.7
033	3,326	80	288	6.5	2,103.0	2,103.0	2,103.4	0.4

[1] Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

MUD CREEK – SHEPHERD CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
South Wash Creek								
003	287	17	74	5.6	2,156.2	2,156.2	2,157.0	0.8
008	846	12	82	5.0	2,167.7	2,167.7	2,168.6	0.9
014	1,410	26	102	4.0	2,175.7	2,175.7	2,176.0	0.3
020	2,033	22	50	8.2	2,193.2	2,193.2	2,193.4	0.2
026	2,556	19	48	8.5	2,213.5	2,213.5	2,213.8	0.3
030	3,026	20	63	6.6	2,217.1	2,217.1	2,217.9	0.8
Wash Creek								
001	129	46	246	7.1	2,090.0	2,086.9[2]	2,087.8	0.9
006	644	134	777	2.2	2,092.1	2,092.1	2,093.0	0.9
014	1,393	97	682	2.6	2,095.7	2,095.7	2,096.1	0.4
022	2,208	66	505	3.4	2,099.5	2,099.5	2,100.5	1.0
028	2,847	71	486	3.6	2,101.7	2,101.7	2,102.6	0.9
033	3,293	101	400	4.4	2,102.5	2,102.5	2,103.3	0.8
036	3,616	39	293	5.9	2,106.1	2,106.1	2,106.7	0.6
038	3,834	44	354	4.9	2,107.0	2,107.0	2,107.7	0.7
042	4,245	33	348	5.0	2,110.8	2,110.8	2,111.7	0.9
046	4,635	29	293	3.3	2,113.2	2,113.2	2,114.2	1.0
052	5,193	39	262	3.7	2,114.5	2,114.5	2,115.5	1.0
058	5,848	39	165	5.8	2,121.6	2,121.6	2,121.6	0.0
064	6,386	45	289	3.3	2,128.5	2,128.5	2,129.0	0.5

[1] Feet above mouth

[2] Elevation computed without consideration of backwater effects from Mud Creek

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH WASH CREEK – WASH CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Wash Creek								
071	7,099	49	346	2.8	2,133.9	2,133.9	2,134.7	0.8
077	7,696	44	232	4.1	2,138.3	2,138.3	2138.3	0.0
078	7,766	19	133	7.2	2,139.9	2,139.9	2,140.6	0.7
085	8,462	31	136	7.1	2,149.8	2,149.8	2,150.3	0.5
091	9,073	73	345	2.1	2,156.2	2,156.2	2,157.2	1.0
092	9,248	75	345	2.1	2,159.2	2,159.2	2,160.0	0.8
098	9,763	23	86	8.4	2,162.7	2,162.7	2,163.2	0.5
103	10,308	21	110	6.6	2,167.8	2,167.8	2,168.7	0.9
109	10,909	51	342	2.1	2,177.4	2,177.4	2,178.4	1.0
114	11,380	19	85	8.4	2,181.9	2,181.9	2,182.5	0.6
118	11,778	19	88	8.2	2,186.5	2,186.5	2,186.9	0.4
123	12,280	45	357	2.0	2,201.9	2,201.9	2,202.8	0.9
125	12,505	73	333	2.2	2,202.1	2,202.1	2,203.0	0.9

[1]Feet above mouth

TABLE 13

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC AND INCORPORATED AREAS

FLOODWAY DATA

WASH CREEK

This FIS is based on the most up-to-date data available to FEMA or the State at the time of production; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time; certain types of revisions will require the submission of supporting data. FEMA or the State may also initiate a revision. FIS revisions may take several forms; these include Letters of Map Amendment (LOMAs), Letters of Map Revision - based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs), Physical Map Revisions (PMRs), and FEMA or the State-contracted restudies.

7.1 Letters of Map Amendment and Letters of Map Revision - Based on Fill

LOMAs and LOMR-Fs are documents issued by FEMA that officially remove a property and/or a structure from a Special Flood Hazard Area (SFHA), if data supporting the removal are submitted. LOMAs and LOMR-Fs are generally determinations regarding areas that are too small to be shown on a FIRM panel; consequently, the changes they describe become official without revising the FIRM or the FIS Report.

NFIP regulations require that the lowest adjacent grade (the lowest ground touching the structure) be at or above the 1% annual chance flood elevation for a LOMA to be issued. Currently, there is no fee for FEMA's review of a LOMA request, but the requester of a LOMA is responsible for providing all the information needed for the review, which may include structure and/or property elevations certified by a licensed land surveyor or professional engineer. Therefore, LOMA requesters may need to retain the services of a land surveyor or engineer.

A LOMA cannot be used for property on which fill has been placed. For those situations, a LOMR-F must be used. As a participant in the NFIP, a local government must adopt ordinances that meet the minimum Federal floodplain management standards, which are outlined in Section 60.3 of the NFIP regulations. For a number of reasons, these ordinances generally vary from community to community. Nonetheless, because the placement of fill within the floodplain can affect flood hazards in the surrounding area, additional information is needed before FEMA can process a LOMR-F request. Among the data required for a LOMR-F is the community acknowledgment form. This form is FEMA's assurance that all appropriate Federal, State, and local floodplain management requirements have been met. Furthermore, NFIP regulations require that the lowest adjacent grade (the lowest ground touching the structure) be at or above the 1% annual chance flood elevation for a LOMR-F to be issued removing the structure from the floodplain. Because LOMR-F requests are the result of changed physical conditions rather than limitations of scale or topographic definition, FEMA charges a fee for the review of a LOMR-F request. As with the LOMA, the requester of a LOMR-F is responsible for providing all supporting information, including structure and/or property elevation data.

In cases where property owners plan to add fill in the SFHA, NFIP regulations require plans and technical information to be submitted for review by FEMA before construction takes place. FEMA will issue a conditional LOMR-F stating how flood hazards would change and what portions of the property, if any, would remain in the SFHA if the project were built according to the submitted plans.

The issuance of a LOMA or LOMR-F ends the property owner's obligation to purchase flood insurance as a condition of Federal or federally backed financing. However, the property owner's mortgage company maintains the prerogative to require flood insurance as a condition of providing financing. Before attempting to obtain a LOMA or LOMR-F, property owners are advised to consult their mortgage companies regarding this policy. Even if the mortgage

company indicates that it will require flood insurance if a LOMA or LOMR-F is issued, it may be advantageous for property owners to request a LOMA or LOMR-F because flood insurance premiums are lower for properties removed from the SFHA than for properties that remain within the SFHA.

For additional information regarding LOMAs, LOMR-Fs, conditional LOMR-Fs, or current application fees, please call the FEMA Map Assistance Center toll-free information line at 1-877-FEMA MAP (1-877-336-2627).

7.2 Letters of Map Revision

A Letter of Map Revision (LOMR) is a document issued by FEMA that revises an FIS Report and/or FIRM. A LOMR is used to change flood risk zones, floodplain and/or floodway delineations, flood elevations, or planimetric features such as road systems or corporate limits. A LOMR provides FEMA with a cost-effective means of revising the FIS information without physically changing and reprinting the map or report itself. A portion of the FIRM panel or FIS Report showing the revised information is issued with the LOMR. The LOMR is sent to all affected communities and is archived in the communities' NFIP map repository for public reference.

In cases where a proposed project (such as construction in the 1% annual chance floodplain) would result in a significant rise in 1% annual chance water-surface elevations, NFIP regulations require the community to submit plans and technical information for review by FEMA before construction takes place. This assures communities participating in the NFIP that proposed projects meet minimum NFIP requirements. The result of FEMA's review is documented in a conditional LOMR.

For additional information regarding LOMRs, conditional LOMRs, or current application fees, please call the FEMA Map Assistance Center toll-free information line at 1-877-FEMA MAP (1-877-336-2627).

7.3 Physical Map Revisions

Physical Map Revisions (PMRs) are processed to incorporate information concerning conditions present in the community that are not reflected in the FIS, and involve distributing republished FISs that supersede the most current NFIP data in the community repository. PMRs may be initiated by a request from a community resident or agency, or FEMA may initiate a PMR to incorporate one or more LOMRs, to reflect significant changes in corporate limits, to correct errors, or to update flood hazards to match new information from an adjacent community's FIS. Due to the costs associated with updating and distributing FISs, map revisions will be processed as LOMRs rather than PMRs whenever possible. For more information regarding PMRs, please contact the FEMA Map Assistance Center toll-free information line at 1-877-FEMA MAP (1-877-336-2627) or the FEMA Regional Office at the address listed on the Notice to Flood Insurance Study Users page at the front of this report.

7.4 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards in a given community. FEMA accomplishes this through a national mapping needs assessment process that assigns priorities and allocates funds to sponsor or subsidize new flood hazard analyses used to update

FIS Reports. For more information regarding FEMA-contracted restudies, please contact the FEMA Map Assistance Center toll-free information line at 1-877-FEMA MAP (1-877-336-2627) or the FEMA Regional Office at the address listed on the Notice to Flood Insurance Study Users page at the front of this report.

7.5 Map Revision History

The current FIRM is a subset of the Statewide FIRM, showing flood hazard information for the entire geographic area of Henderson County. Previously, separate Flood Hazard Boundary Maps (FHBMs), Flood Boundary and Floodway Maps (FBFMs), and/or FIRMs were prepared for each identified flood prone jurisdiction within the county. Historical data relating to the NFIP maps prepared for each community prior to and including the North Carolina Statewide FIRM, which includes Henderson County, are presented in Table 14, "Community Map History."

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

Table 14—Community Map History

Community Name	Initial Identification Date	FHBM Revision Date	FIRM Effective Date	FIRM Revision Date
Flat Rock, Town of	January 10, 1975[1]	July 29, 1977[1]	March 1, 1982[1]	October 2, 2008
Fletcher, Town of	January 10, 1975[1]	July 29, 1977[1]	March 1, 1982[1]	October 2, 2008
Henderson County (Unincorporated Areas)	January 10, 1975	July 29, 1977	March 1, 1982	October 2, 2008
Hendersonville, City of	July 29, 1977	None	January 20, 1982	October 2, 2008
Laurel Park, Town of	June 11, 1976	None	October 2, 2008	
Mills River, Town of	January 10, 1975[1]	July 29, 1977[1]	March 1, 1982[1]	October 2, 2008

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

Section 8.0 – Study Contracting and Community Coordination

8.1 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 revises and updates previous FISs for the geographic area of Henderson County. Table 15, "Authority and Acknowledgments," includes information for the single-jurisdiction FISs published for each community included in this countywide FIS, with the exceptions of the Towns of Flat Rock, Fletcher, Laurel Park, and Mills River, as compiled from their previously printed FIS Reports. The table also includes information for this revision.

Table 15—Authority and Acknowledgments

Community	FIS Dated	Study Contracted by	Data Source *(Study Contractor or Source of Data)*	Contract or Inter-Agency Agreement (IAA) Number	Work Completed in *(month and/or year)*
Henderson County and Incorporated Areas	October 2, 2008	FEMA	North Carolina Floodplain Mapping Program	N/A	March 2007
Henderson County (Unincorporated Areas)	September 1, 1981	FEMA and North Carolina Floodplain Mapping Program	Tennessee Valley Authority (TVA)	No. H-12-79	August 1980
Hendersonville, City of	July 20, 1981	FEMA and North Carolina Floodplain Mapping Program	TVA	No. H-12-79	August 1980

N/A – Not Applicable

This FIS Report was produced through a unique cooperative partnership between the State of North Carolina and FEMA. The State of North Carolina, through FEMA's Cooperating Technical Partner (CTP) Initiative, has become the first Cooperating Technical State (CTS) and will assume primary ownership of the NFIP FIRM panels for all North Carolina communities. This role has traditionally been fulfilled by FEMA. The North Carolina Floodplain Mapping Program is conducting flood hazard analyses and producing updated, digital FIRM panels. The hydrologic and hydraulic analyses and the FIRM panels were produced by Greenhorne & O'Mara, Inc., under contract with the State of North Carolina.

In August 2000, the North Carolina General Assembly allocated $23 million to Phase I of the Program. FEMA has contributed an additional $10.0 million towards the Program, as well as in-kind contributions of engineering, mapping, and program management services.

8.2 Consultation Coordination Officer's Meetings/Scoping Meetings

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

For each FIS produced by the State of North Carolina and FEMA's unique partnership, an Initial Scoping Meeting is held with representatives from FEMA, the county, the incorporated communities, and the State of North Carolina. A Final Scoping meeting is held to review the Draft Basin Plan and finalize the streams to be studied by detailed methods. This information is then used to create the Final Basin Plan.

The dates of the initial and final CCO meetings held for Henderson County were compiled from their previous FIS Reports and are shown in Table 23, "Consultation Coordination Officer's Meetings." Dates are not shown for the town of Laurel Park because this community never had a previously printed FIS. The Towns of Flat Rock, Fletcher, and Mills River were previously unincorporated and were included in the Henderson County (Unincorporated Areas) FIS.

Table 16—Consultation Coordination Officer's Meetings

Community Name	For FIS Dated	Initial CCO Date	Attended by	Final CCO Date	Attended by
Henderson County (Unincorporated Areas)	September 1, 1981	November 28, 1978	Representatives of Henderson County, TVA, FEMA	April 1, 1981	Representatives of Henderson County, TVA, FEMA
Hendersonville, City of	July 20, 1981	November 28, 1978	Representatives of the city of Hendersonville, TVA, and FEMA	February 27, 1981	Representatives of the City of Hendersonville, TVA, and FEMA

A Preliminary Meeting was held in Hendersonville, North Carolina on May 23, 2007 to disseminate and review the FIS Report and FIRM panels for Henderson County. This meeting was attended by community officials from Henderson County and the Incorporated Communities, along with representatives from the State of North Carolina, Dewberry, and Greenhorne & O'Mara, Inc. A Public Participation Meeting was held on June 27, 2007 to review and discuss the FIS Report and FIRM panels for the Henderson County in a public setting.

The dates of the Initial and Final Scoping Meetings held for Henderson County are shown in Table 17, "Scoping Meetings."

Table 17—Scoping Meetings

Community Name	Basin	Initial Scoping Date	Attended by	Final Scoping Date	Attended by
Fletcher, Town of	French Broad	September 21, 2005	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM	January 25, 2006	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM
Henderson County (Unincorporated Areas)	French Broad	September 20, 2005	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM	January 25, 2006	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM
Henderson County (Unincorporated Areas)	Broad	August 30, 2005	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM	*	*
Hendersonville, Town of	French Broad	September 21, 2005	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM	*	*
Laurel Park, Town of	French Broad	September 21, 2005	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM	January 25, 2006	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM

Table 17—Scoping Meetings

Community Name	Basin	Initial Scoping Date	Attended by	Final Scoping Date	Attended by
Mills River, Town of	French Broad	September 19, 2005	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM	January 25, 2006	Representatives of local communities, Henderson County Dewberry, NCFMP, and NCDEM

*Data Not Available

Section 9.0 – Guide to Additional Information

FISs have been prepared for Polk County and Incorporated Areas (FEMA, 2008) and Rutherford County and Incorporated Areas (FEMA, 2008). Countywide FISs to accompany the Statewide FIRM are being prepared for Buncombe County and Incorporated Areas (FEMA, 1996) and Transylvania County and Incorporated Areas (FEMA, 1998). All FIRM panels created for the State of North Carolina are produced in a seamless statewide format; however, FIS Reports are produced for individual counties.

Copies of FIRM panels are available for a nominal fee. To obtain a copy of the current flood map for a specific community, contact the FEMA Map Service Center at 1-800-358-9616. To facilitate the processing of your request, please review the current flood map on file at your local community repository and obtain the panel number in which you are interested. If necessary, users may also order a FIRM Index from the Map Service Center to determine the appropriate panel numbers. The Map Service Center also accepts orders for the Community Status Book and the Flood Insurance Manual. The FIS Report, FIRM panels, and digital data used to produce the FIRM panels are available online at www.ncfloodmaps.com.

Information concerning the data used in the preparation of this FIS, contained in an Engineering Study Data Package, may be obtained by contacting the FEMA Regional Office at the address listed on the Notice to Flood Insurance Study Users page at the front of this report.

Table 18, "Additional Information," contains useful contact information regarding this FIS, the FIRM, and data.

Table 18—Additional Information

FEMA and the NFIP	
FEMA website	www.fema.gov
NFIP Internet website	http://www.fema.gov/business/nfip/
Other Federal Agencies	
USGS website	www.usgs.gov/
Hydraulic Engineering Center website	www.hec.usace.army.mil/
State Agencies and Organizations	
CGIA website	www.cgia.state.nc.us/
NCGS website	www.ncgs.state.nc.us/
NCFMP website	www.ncfloodmaps.com

Section 10.0 – Bibliography and References

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Federal Emergency Management Agency. (May 6, 1996). Flood Insurance Study, Buncombe County, North Carolina and Incorporated Areas. Washington, D.C. Currently being revised.

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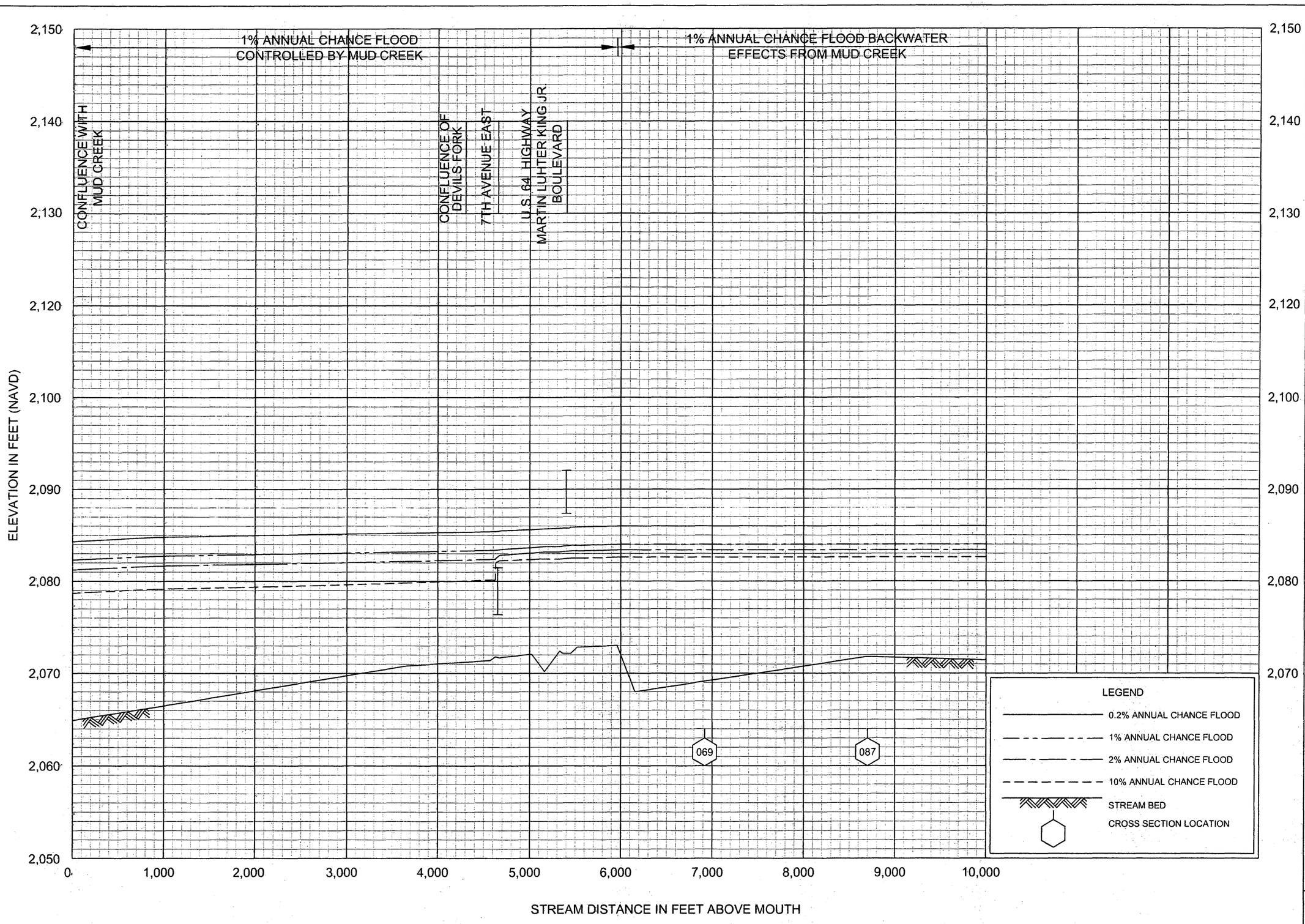


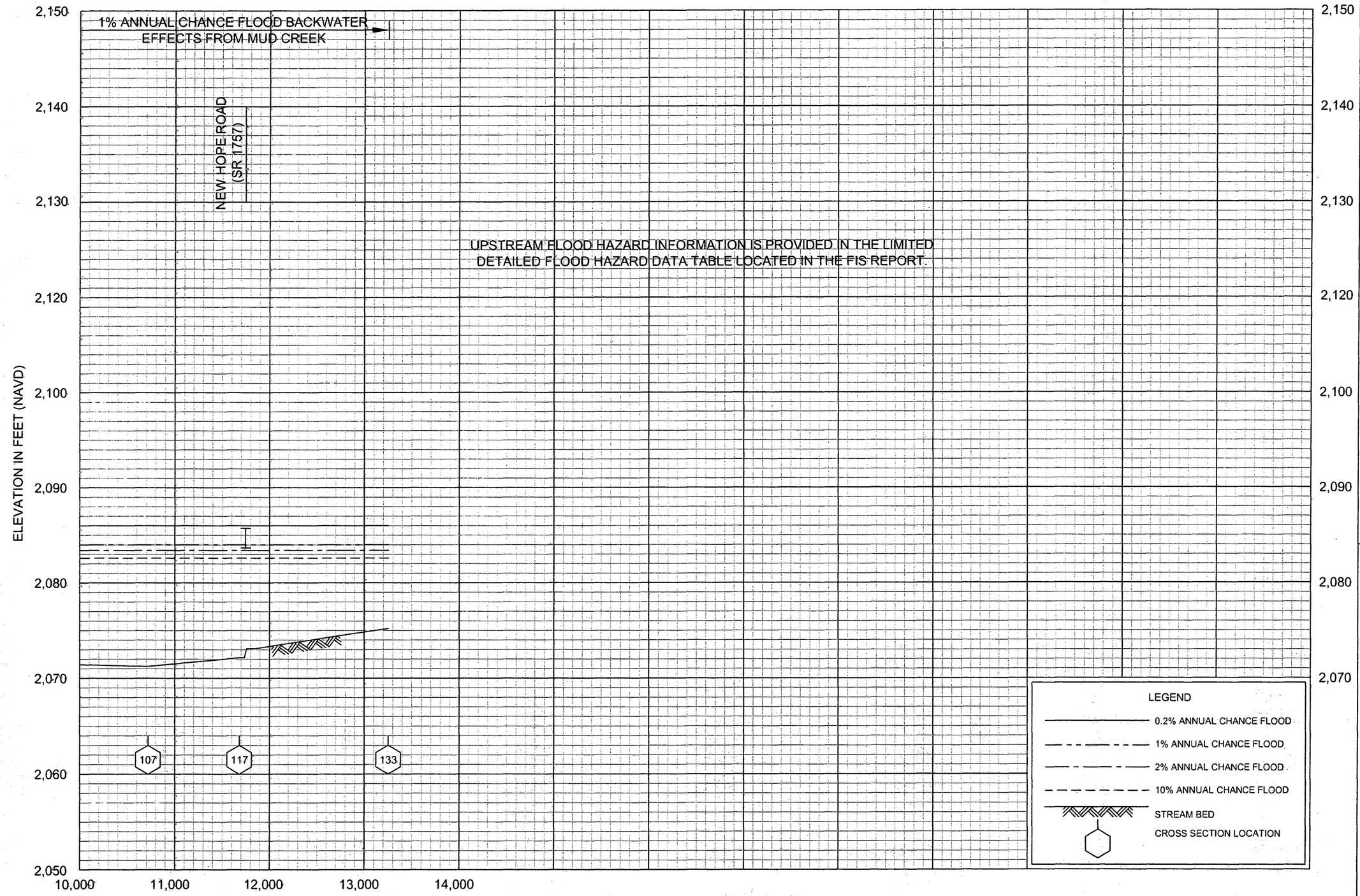
FLOOD PROFILES

BAT FORK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

01P



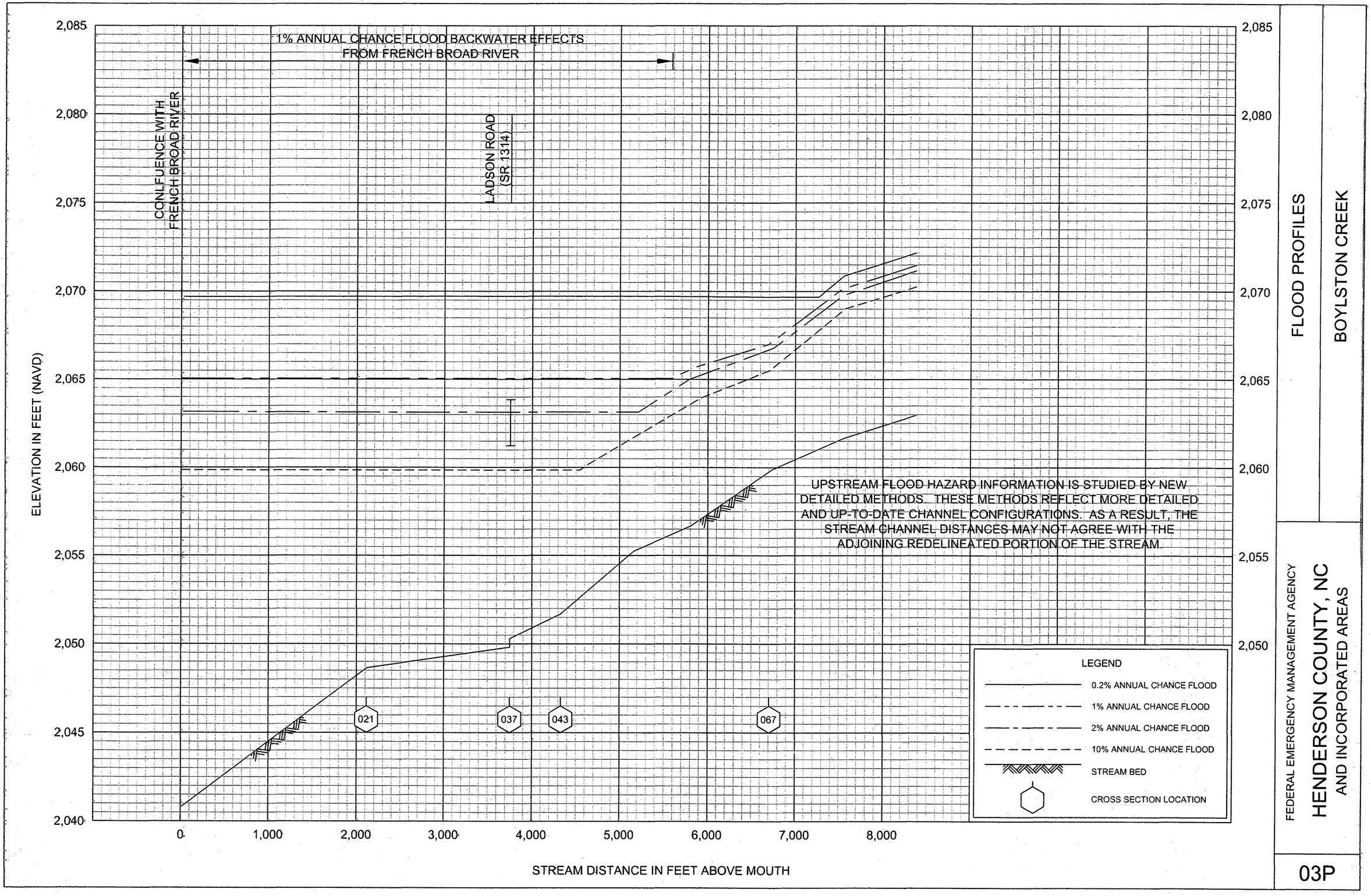
FLOOD PROFILES

BAT FORK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

02P



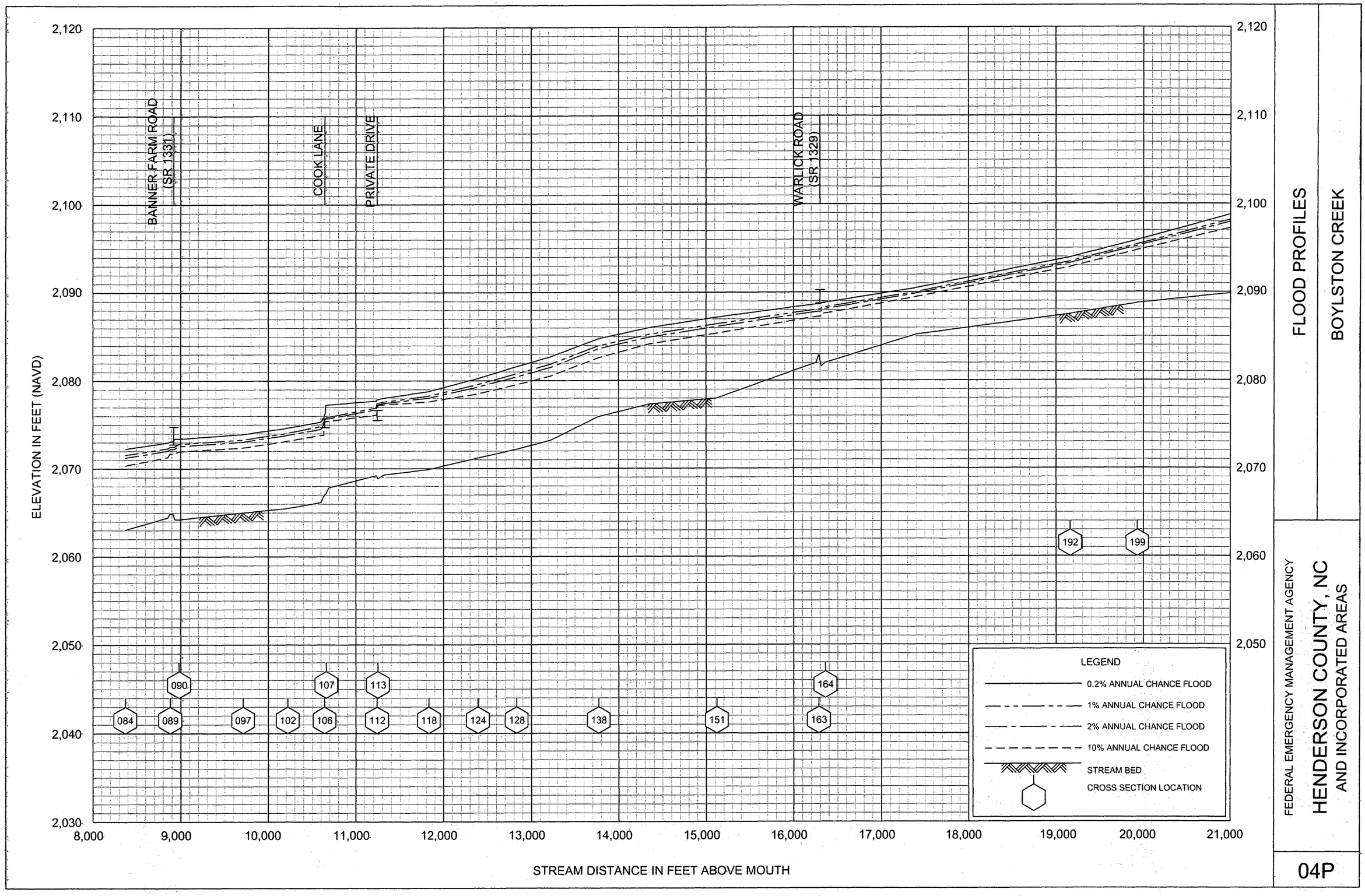
FLOOD PROFILES

BOYLSTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

03P



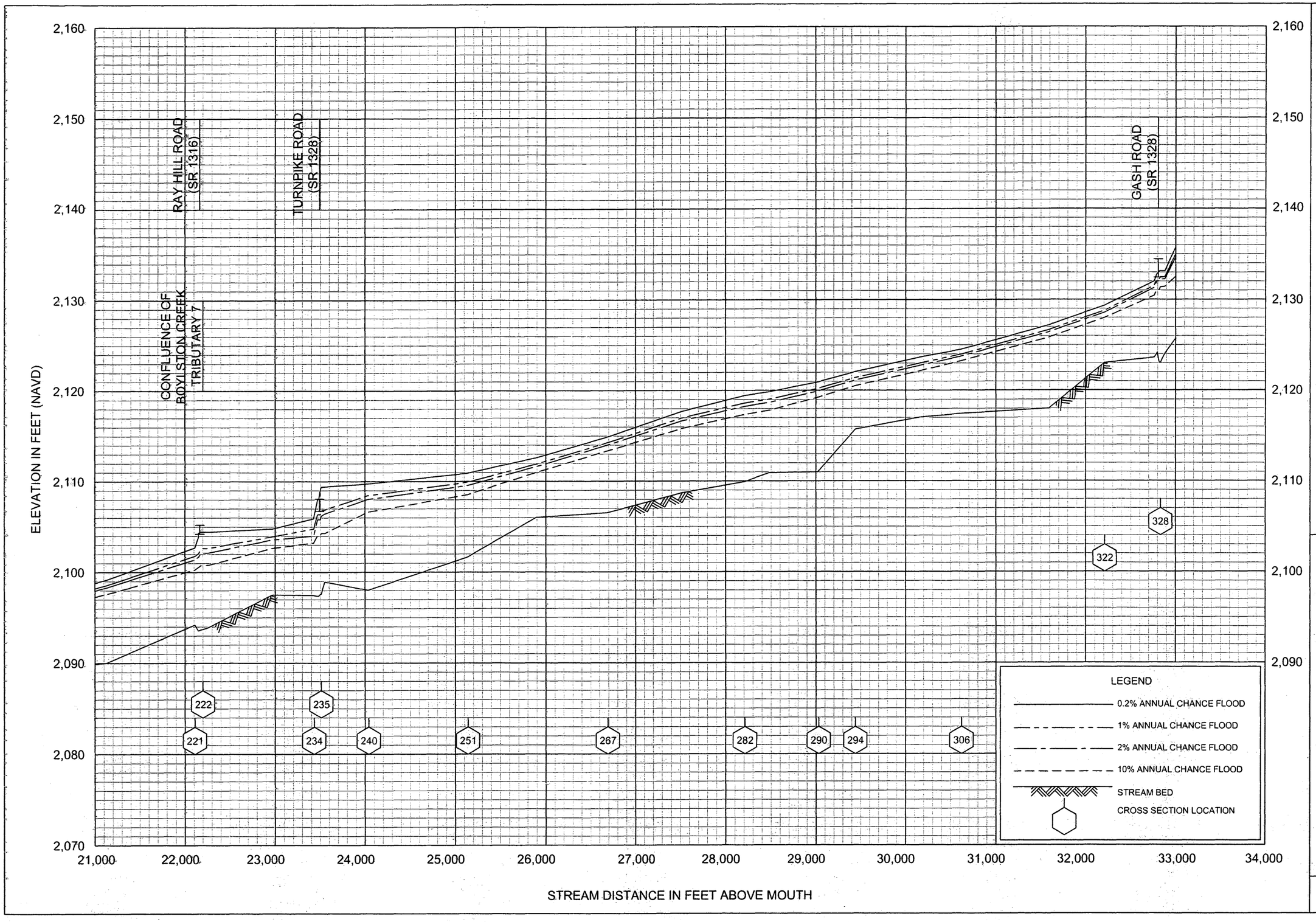
FLOOD PROFILES

BOYLSTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

04P



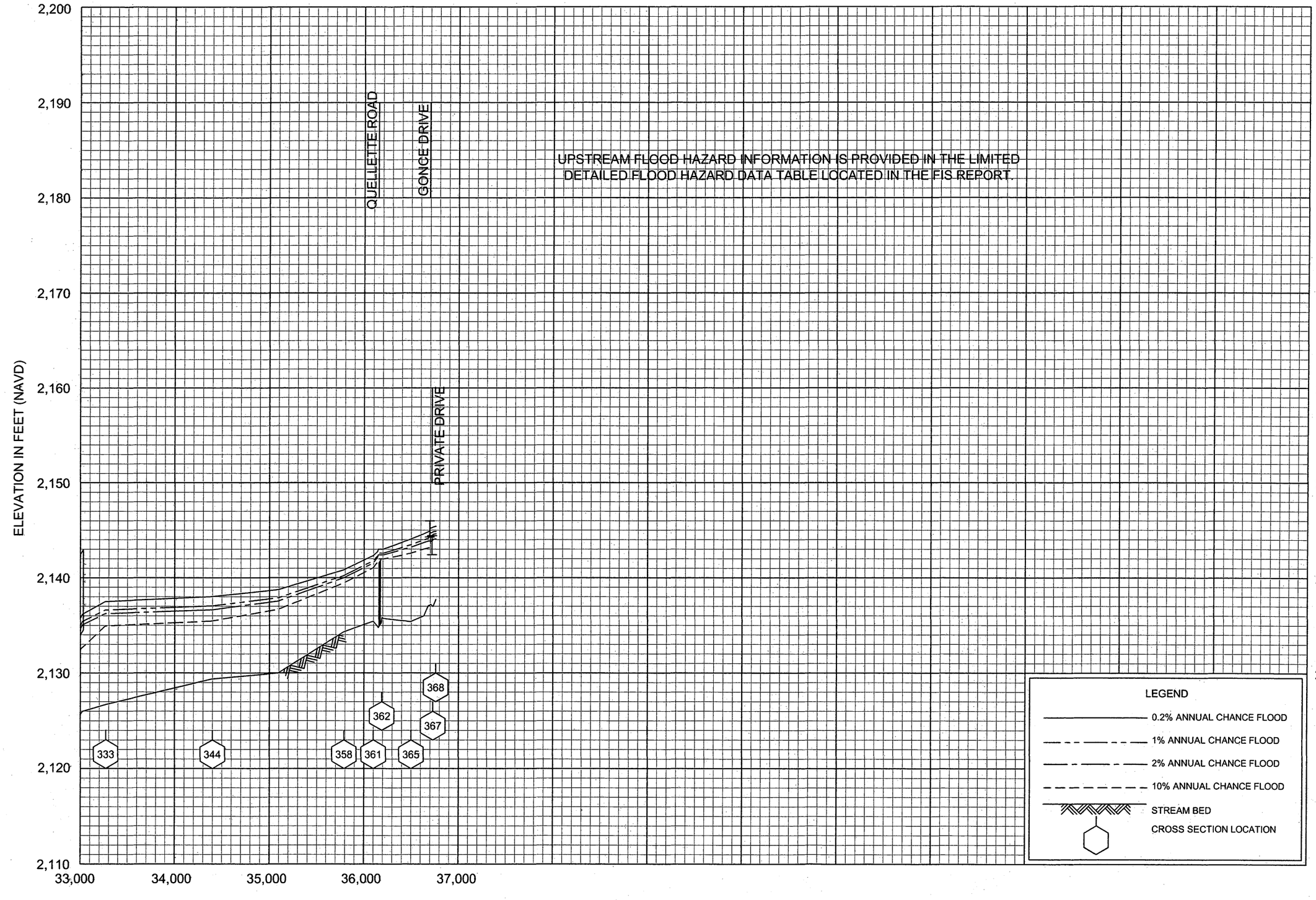
FLOOD PROFILES

BOYLSTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

05P



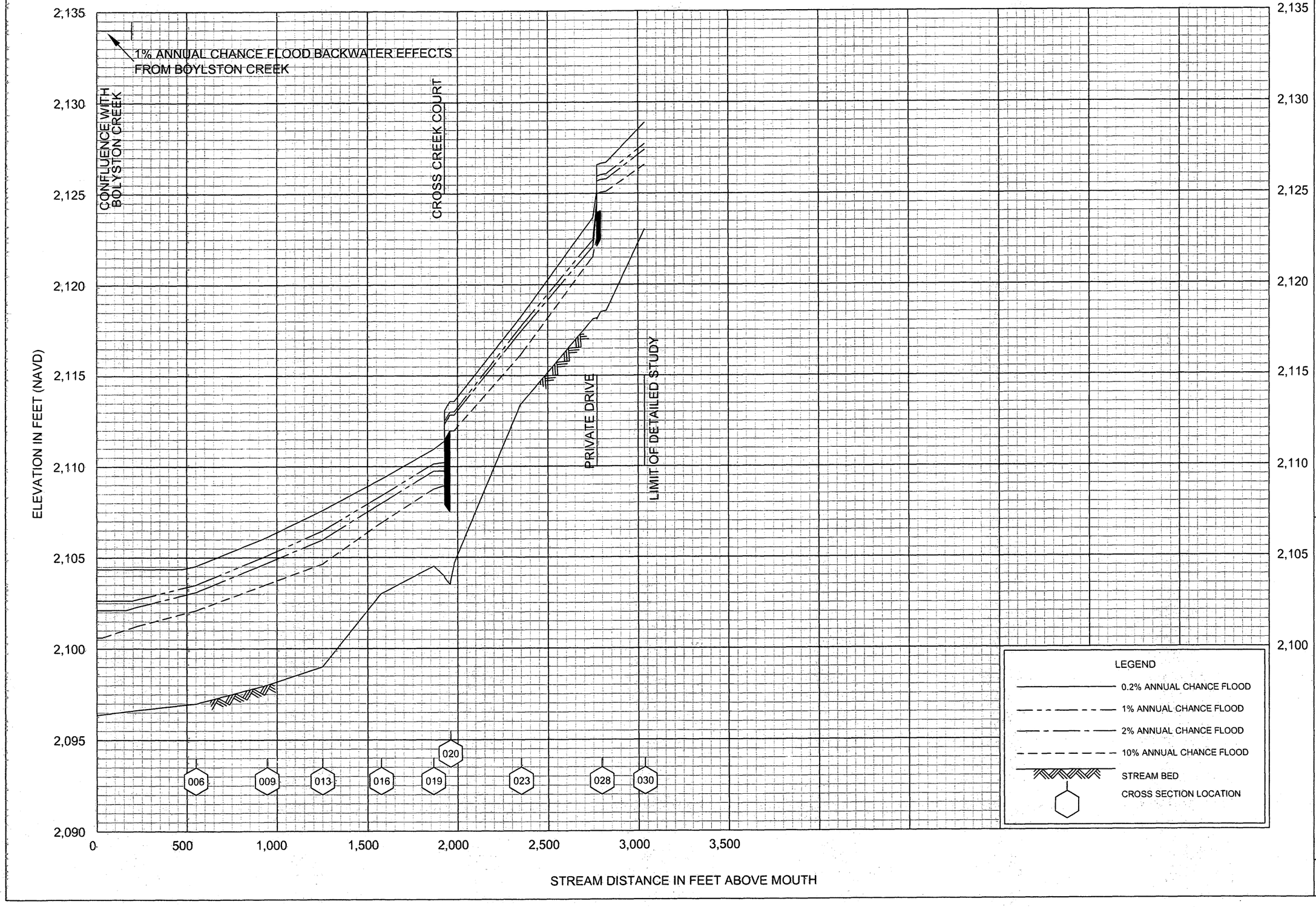
FLOOD PROFILES

BOYLSTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

06P



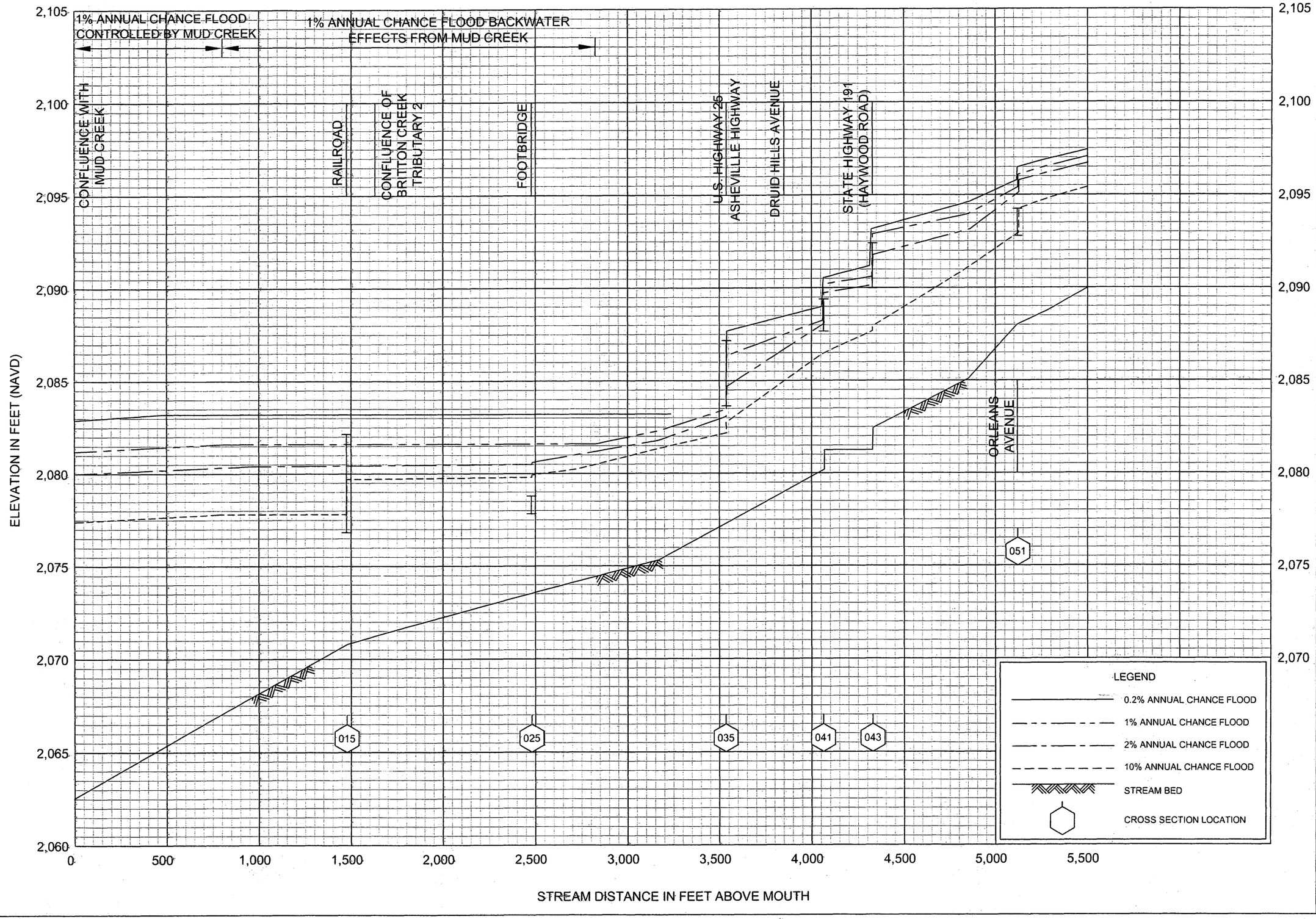
FLOOD PROFILES

BOYLSTON CREEK TRIBUTARY 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

07P



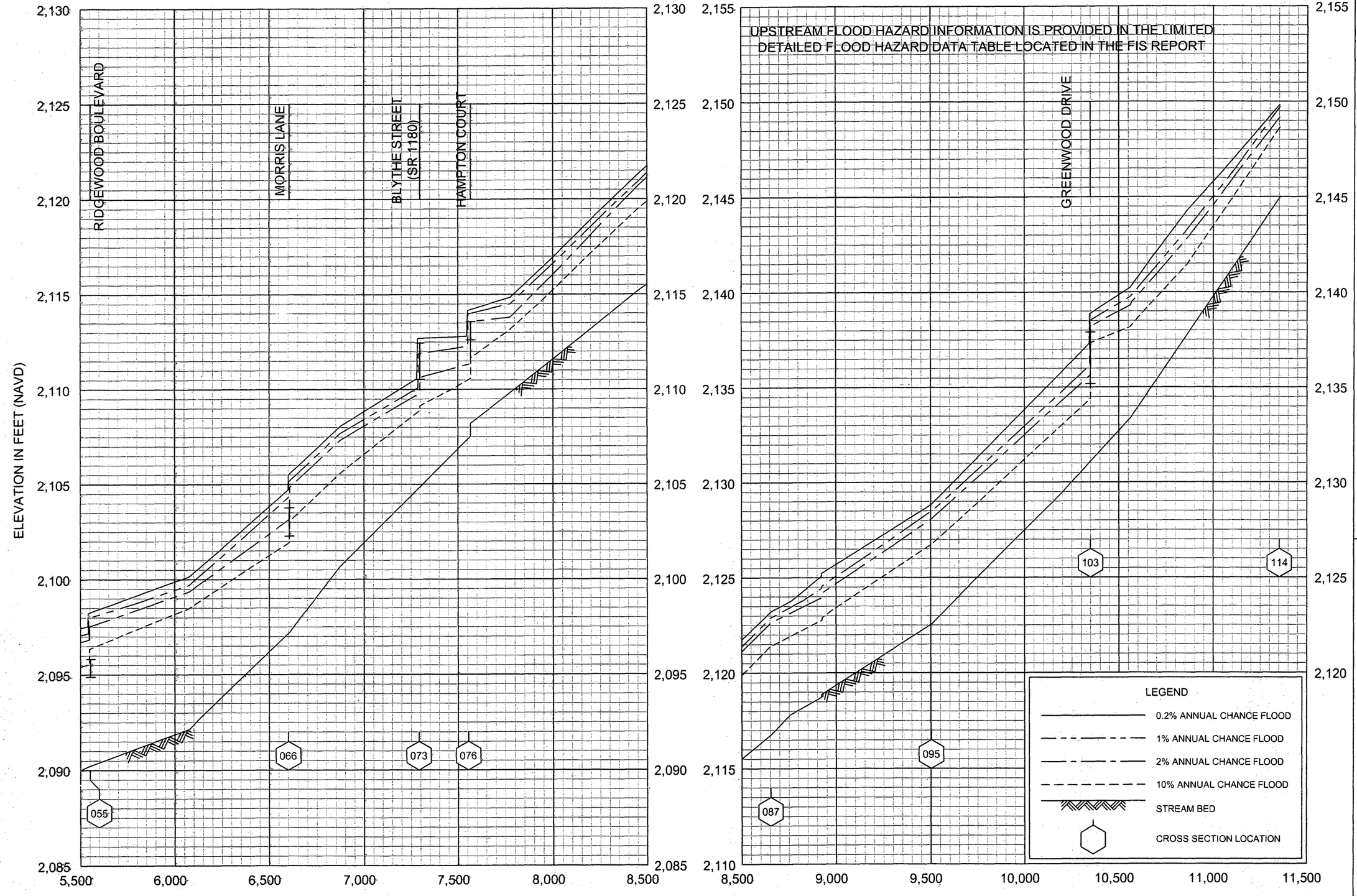
FLOOD PROFILES

BRITTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

08P



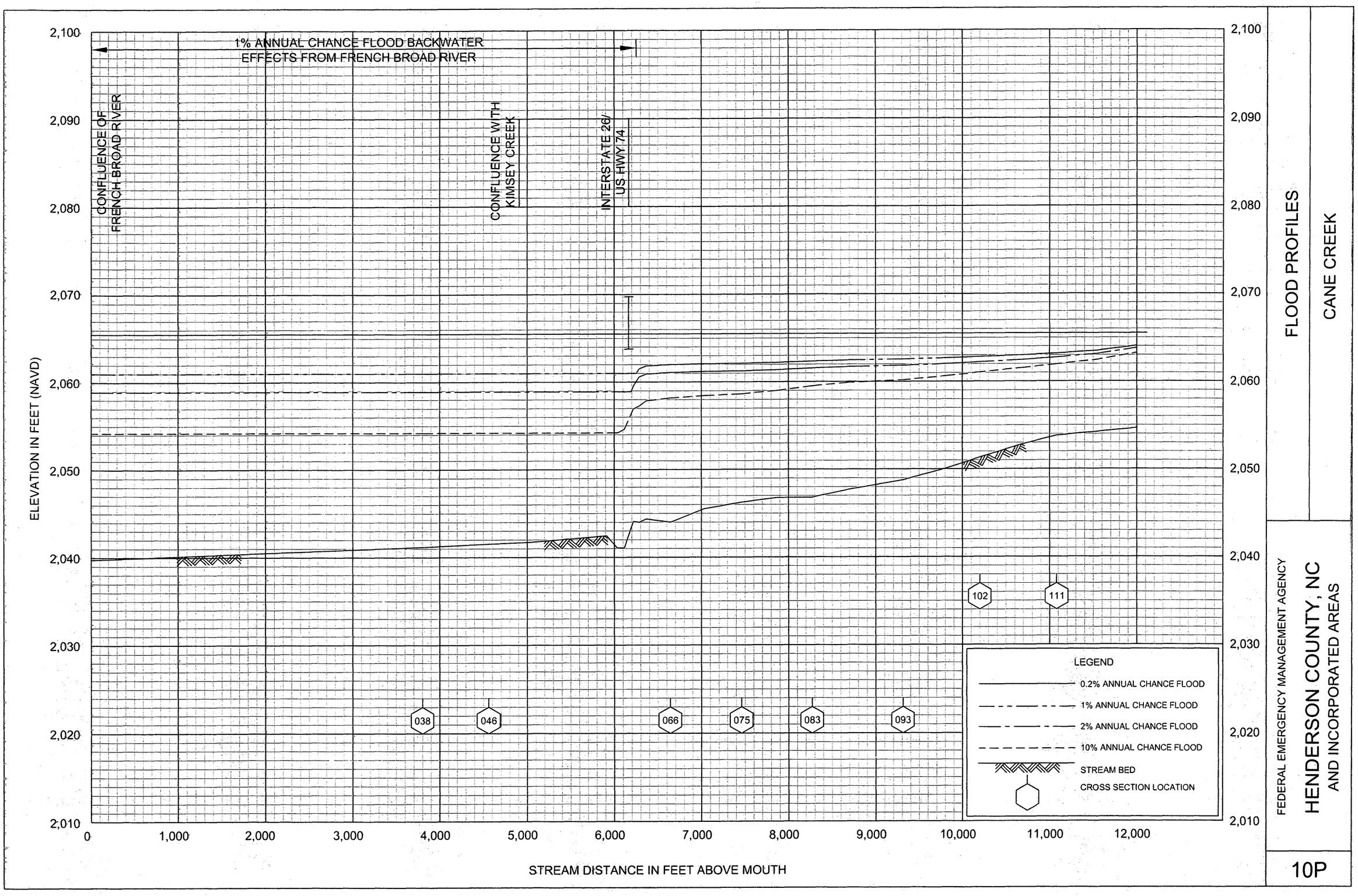
FLOOD PROFILES

BRITTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

09P



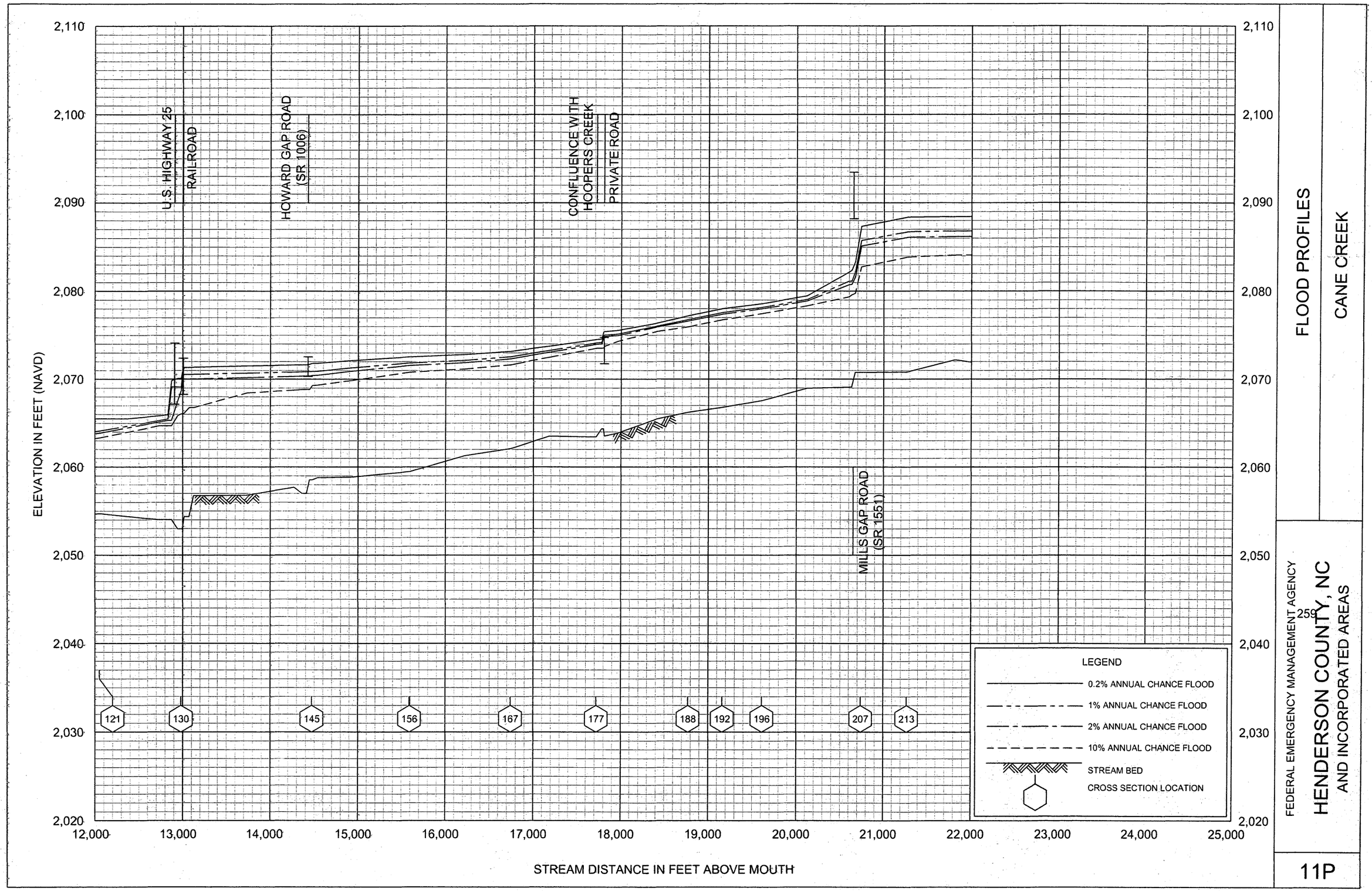
FLOOD PROFILES

CANE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

10P



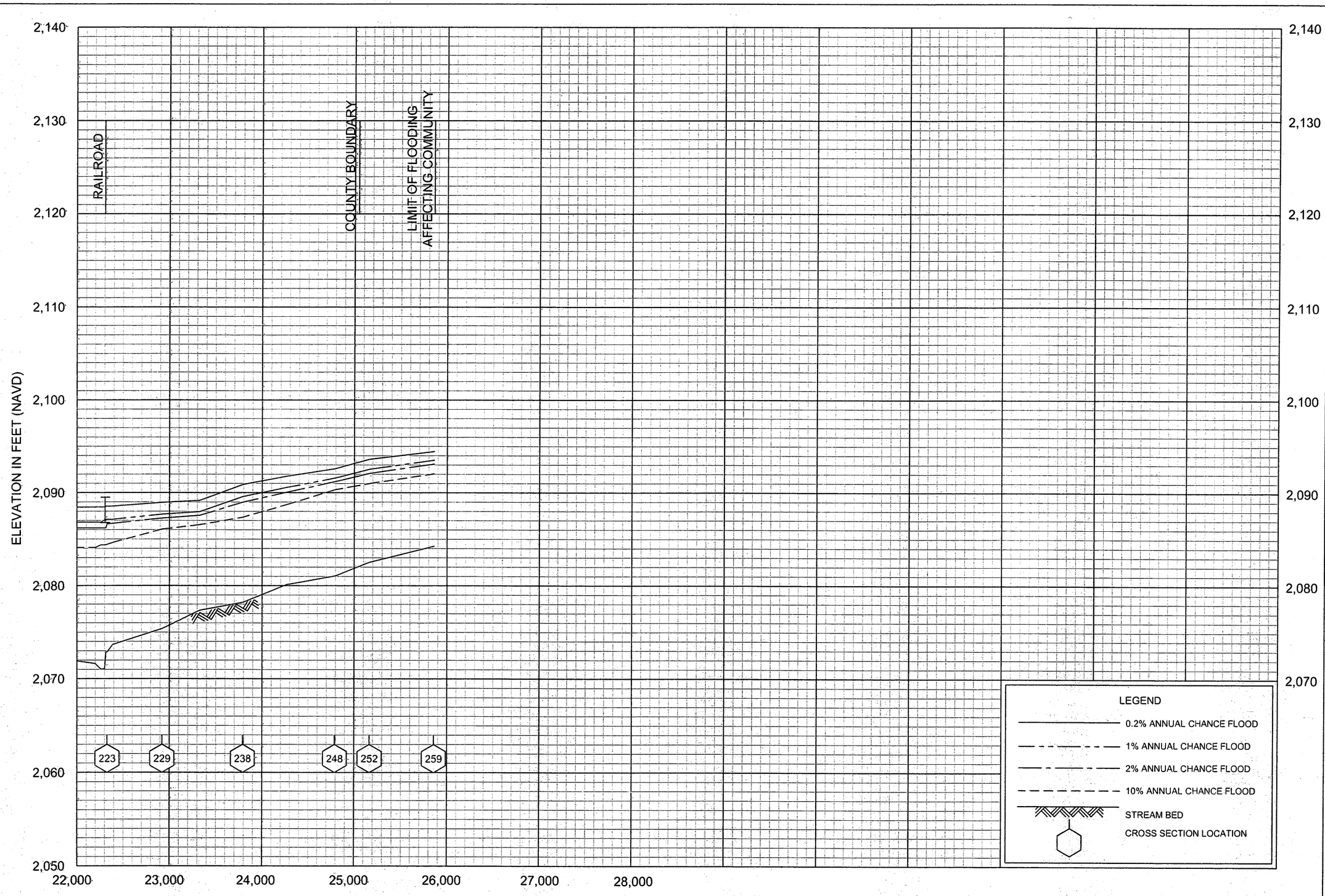
FLOOD PROFILES

CANE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

11P



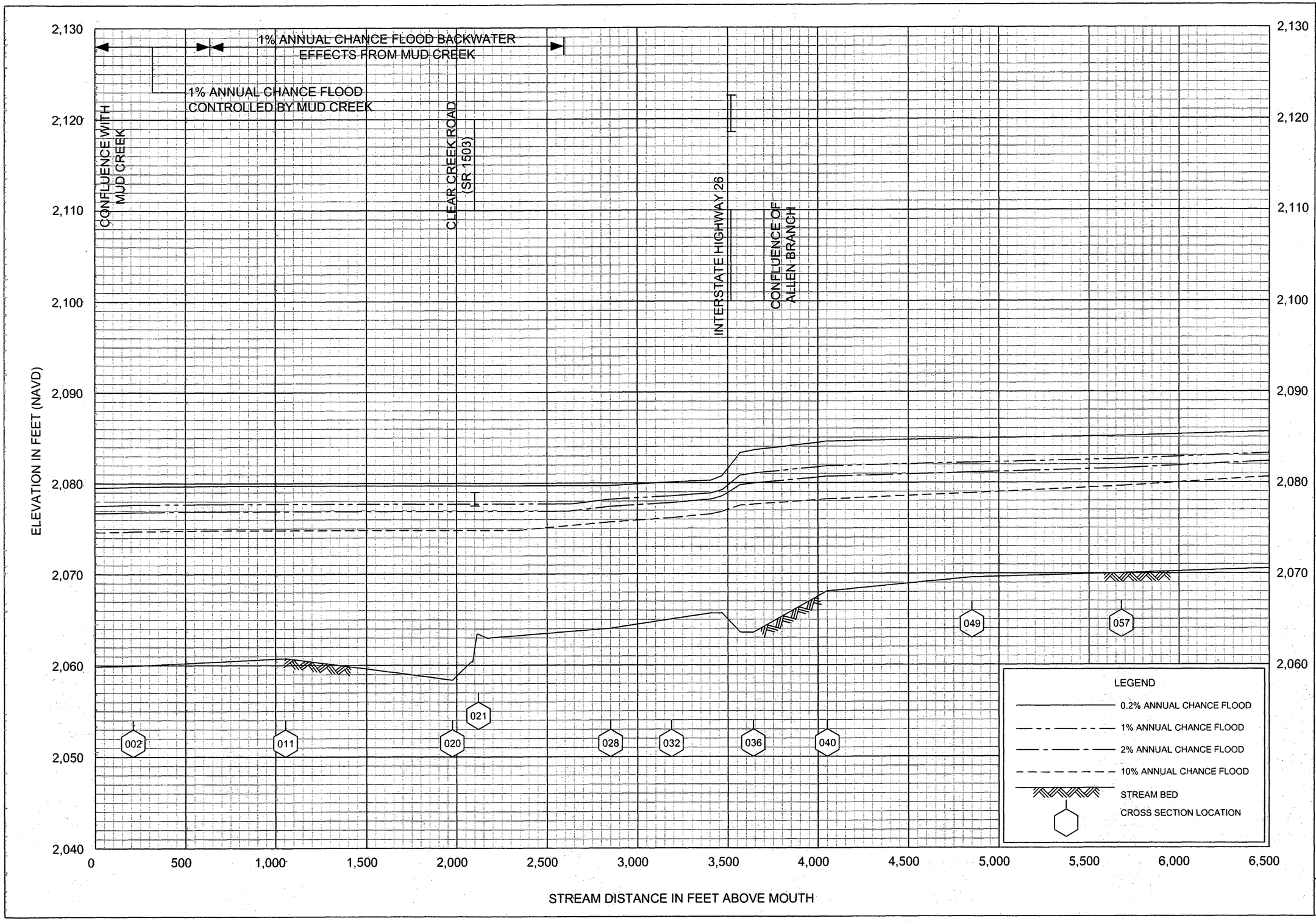
FLOOD PROFILES

CANE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

12P



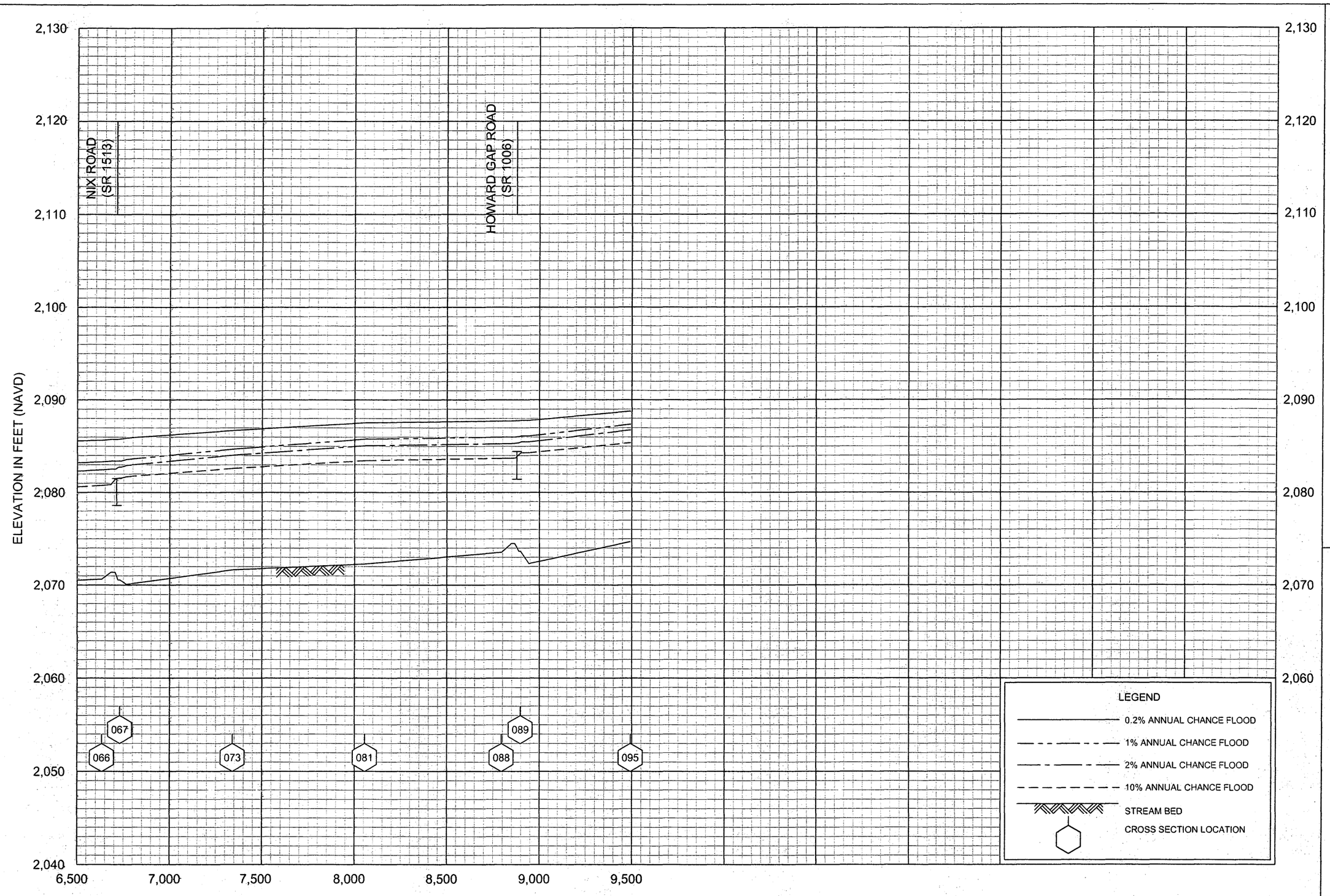
FLOOD PROFILES

CLEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

13P



FLOOD PROFILES

CLEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

14P

DOWNSTREAM FLOOD HAZARD INFORMATION IS STUDIED BY NEW DETAILED METHODS. THESE METHODS REFLECT MORE DETAILED AND UP-TO-DATE CHANNEL CONFIGURATIONS. AS A RESULT THE STREAM CHANNEL DISTANCES MAY NOT AGREE WITH THE ADJOINING REDELINEATED PORTION OF THE STREAM.

CONFLUENCE OF WOLFPEN CREEK

LANCASTER ROAD (SR 1582)

ELEVATION IN FEET (NAVD)

2,115
2,110
2,105
2,100
2,095
2,090
2,085
2,080
2,075
2,070

8,000 9,000 10,000 11,000 12,000 13,000 14,000 15,000 16,000 17,000 18,000 19,000 20,000

STREAM DISTANCE IN FEET ABOVE MOUTH

129 162 171 185

LEGEND

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

FLOOD PROFILES

CLEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

15P

UPSTREAM FLOOD HAZARD INFORMATION IS PROVIDED IN THE LIMITED DETAILED FLOOD HAZARD DATA TABLE LOCATED IN THE FIS REPORT.

FRUITLAND ROAD (SR 1574)

TOWNSEND ROAD (SR 1578)

ELEVATION IN FEET (NAVD)

2,125
2,120
2,115
2,110
2,105
2,100
2,095
2,090
2,085
2,080

20,000 21,000 22,000 23,000 24,000 25,000 26,000 27,000 28,000 29,000

STREAM DISTANCE IN FEET ABOVE MOUTH

204 215 249 262 281

LEGEND

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

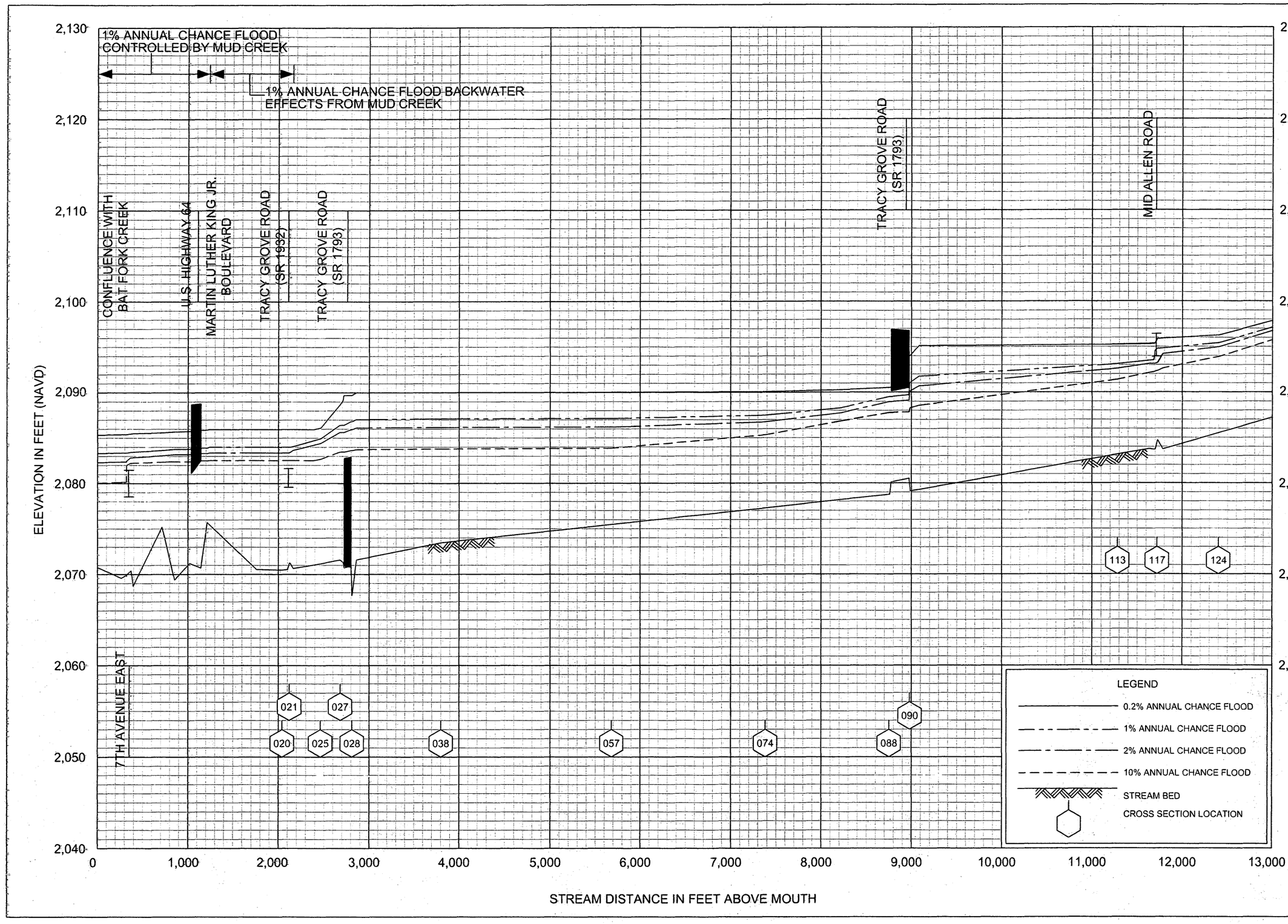
FLOOD PROFILES

CLEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

16P



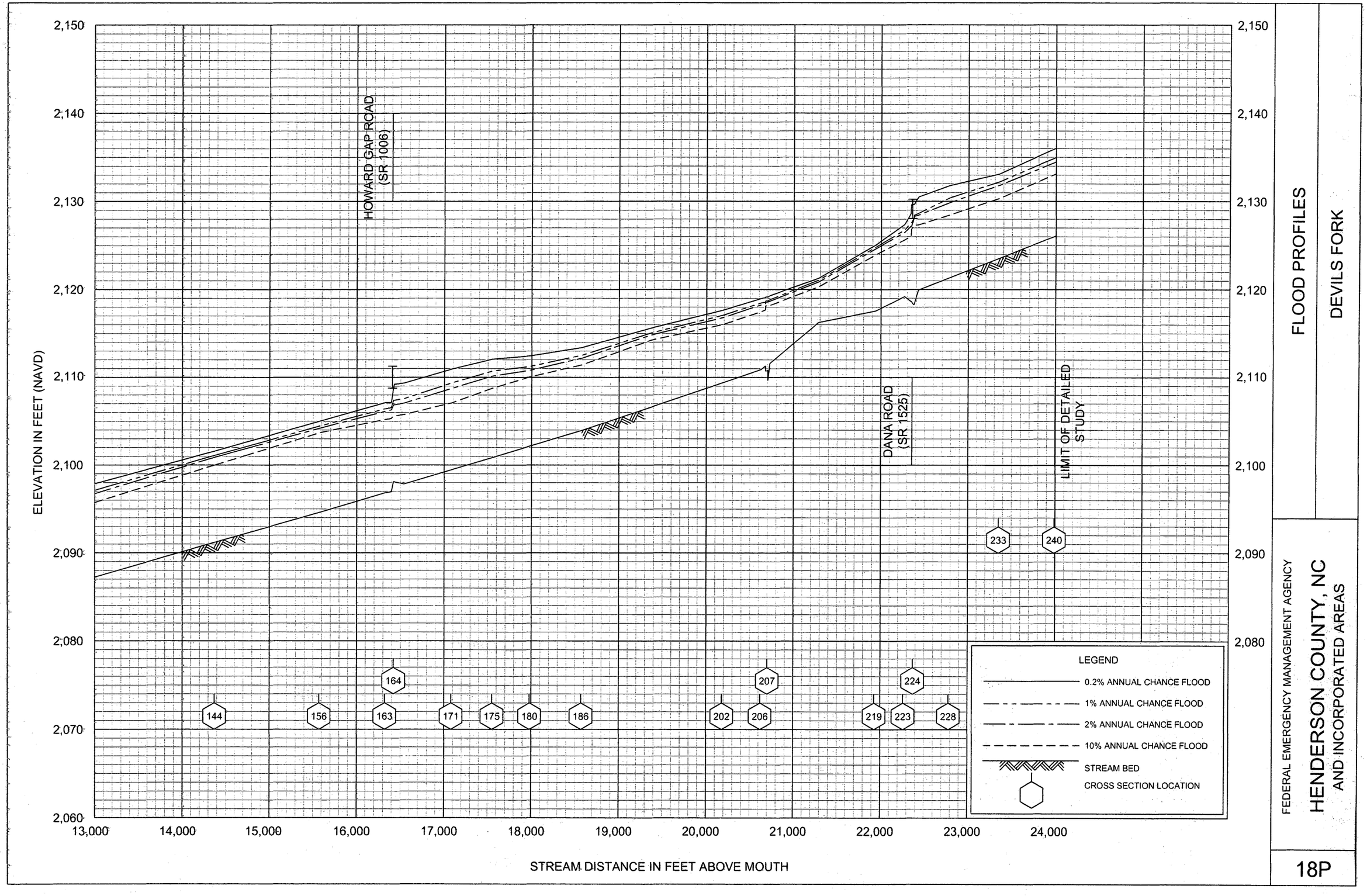
FLOOD PROFILES

DEVILS FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

17P



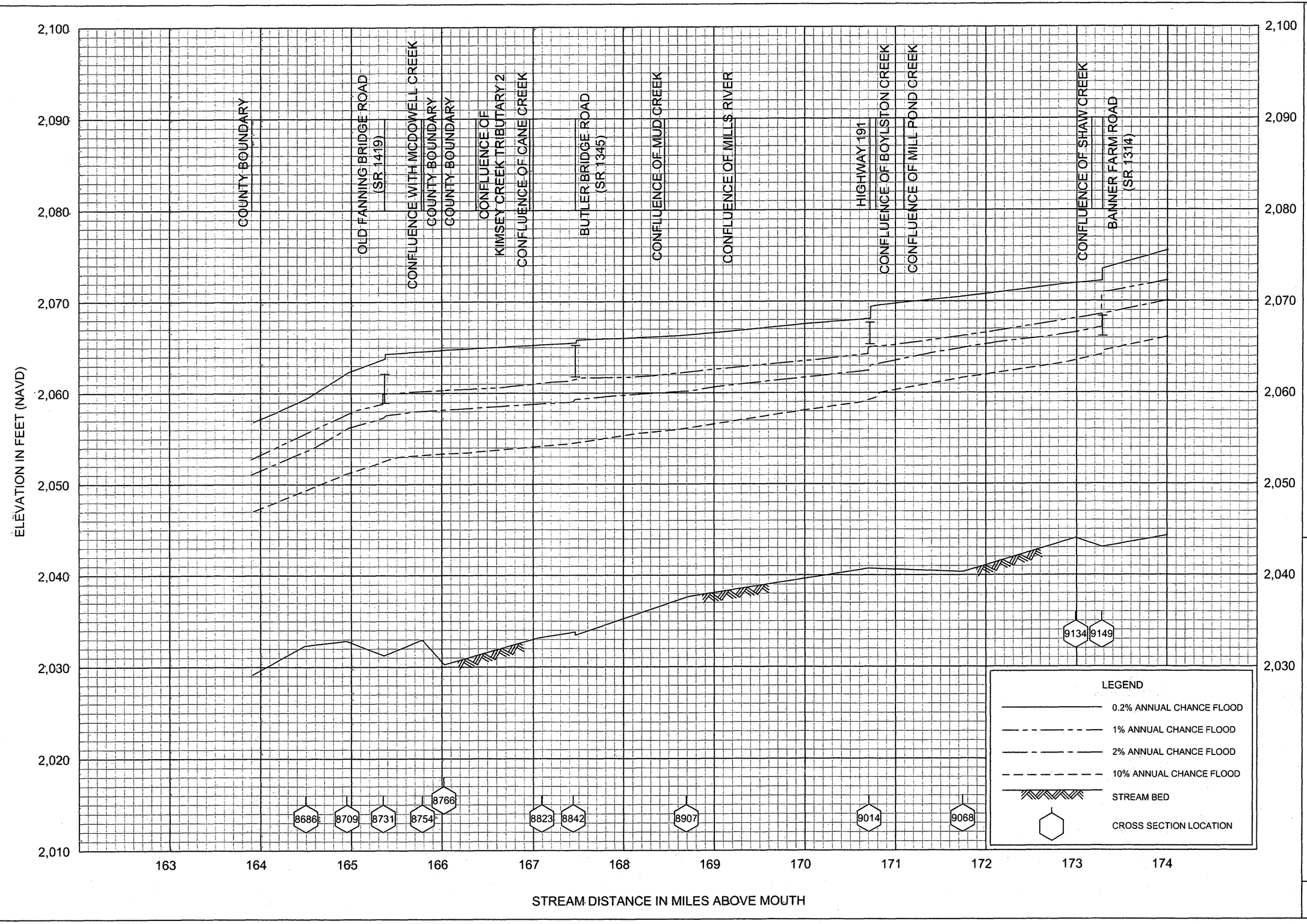
FLOOD PROFILES

DEVILS FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

18P



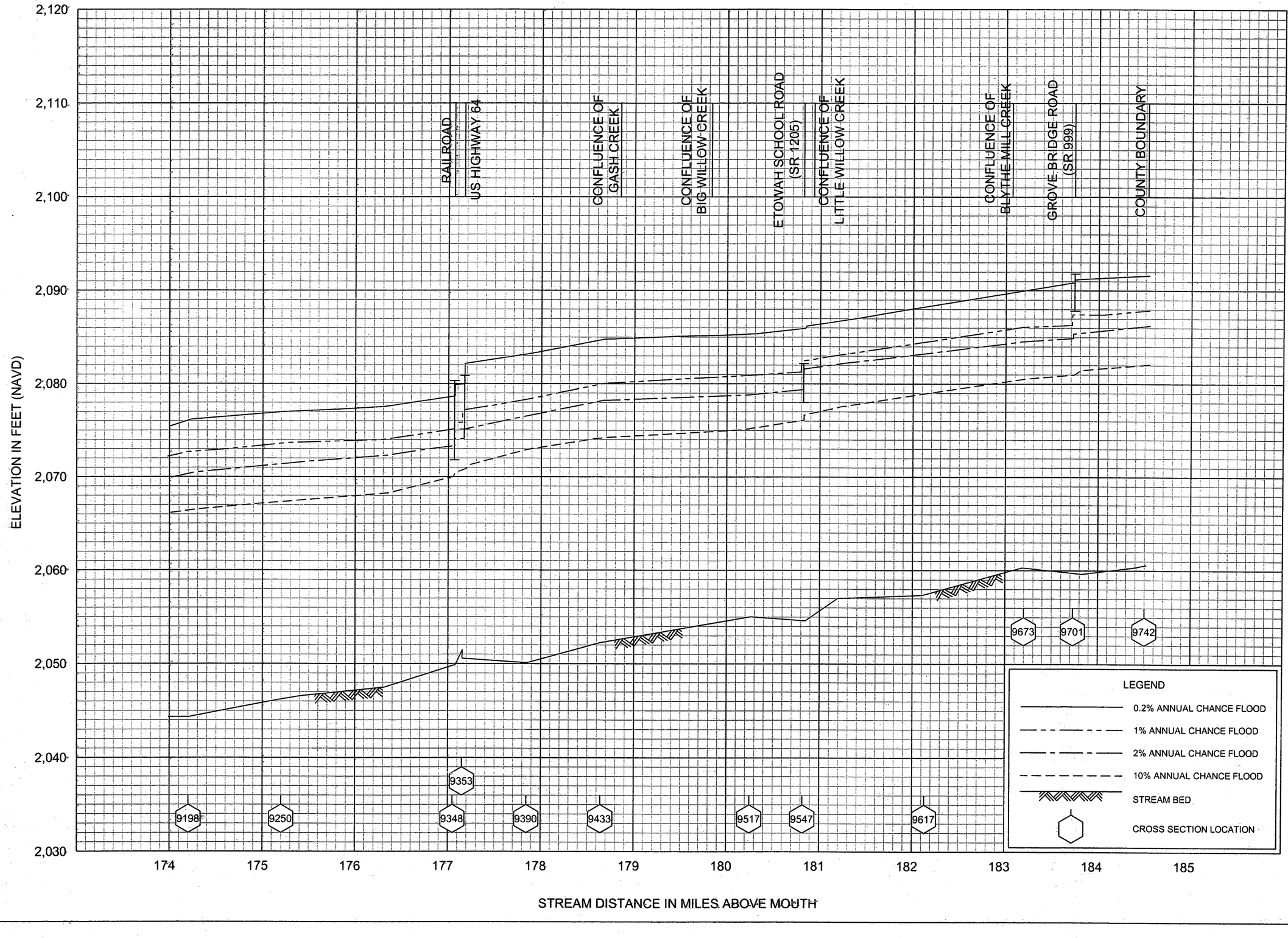
FLOOD PROFILES

FRENCH BROAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

19P

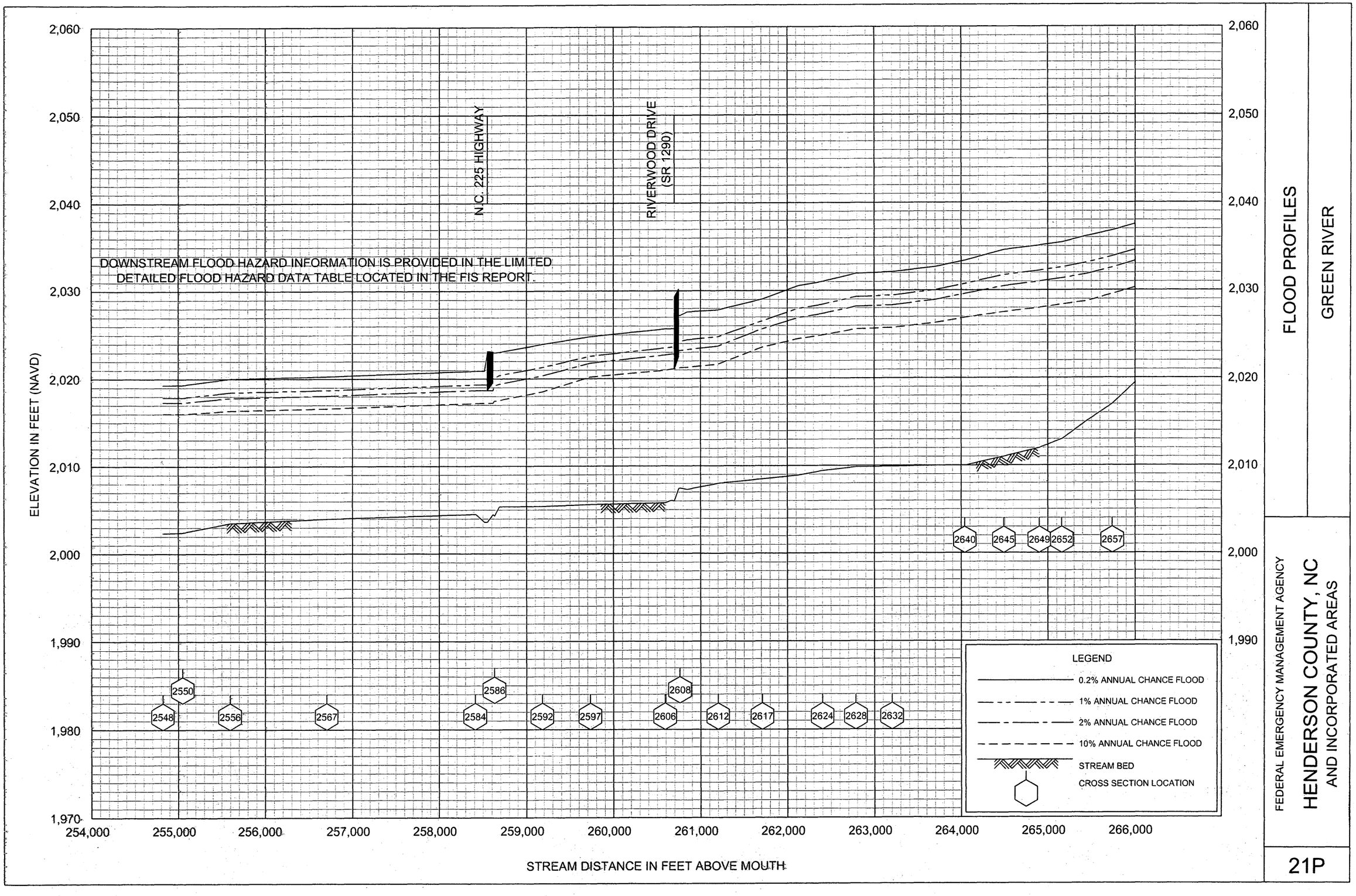


FLOOD PROFILES

FRENCH BROAD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

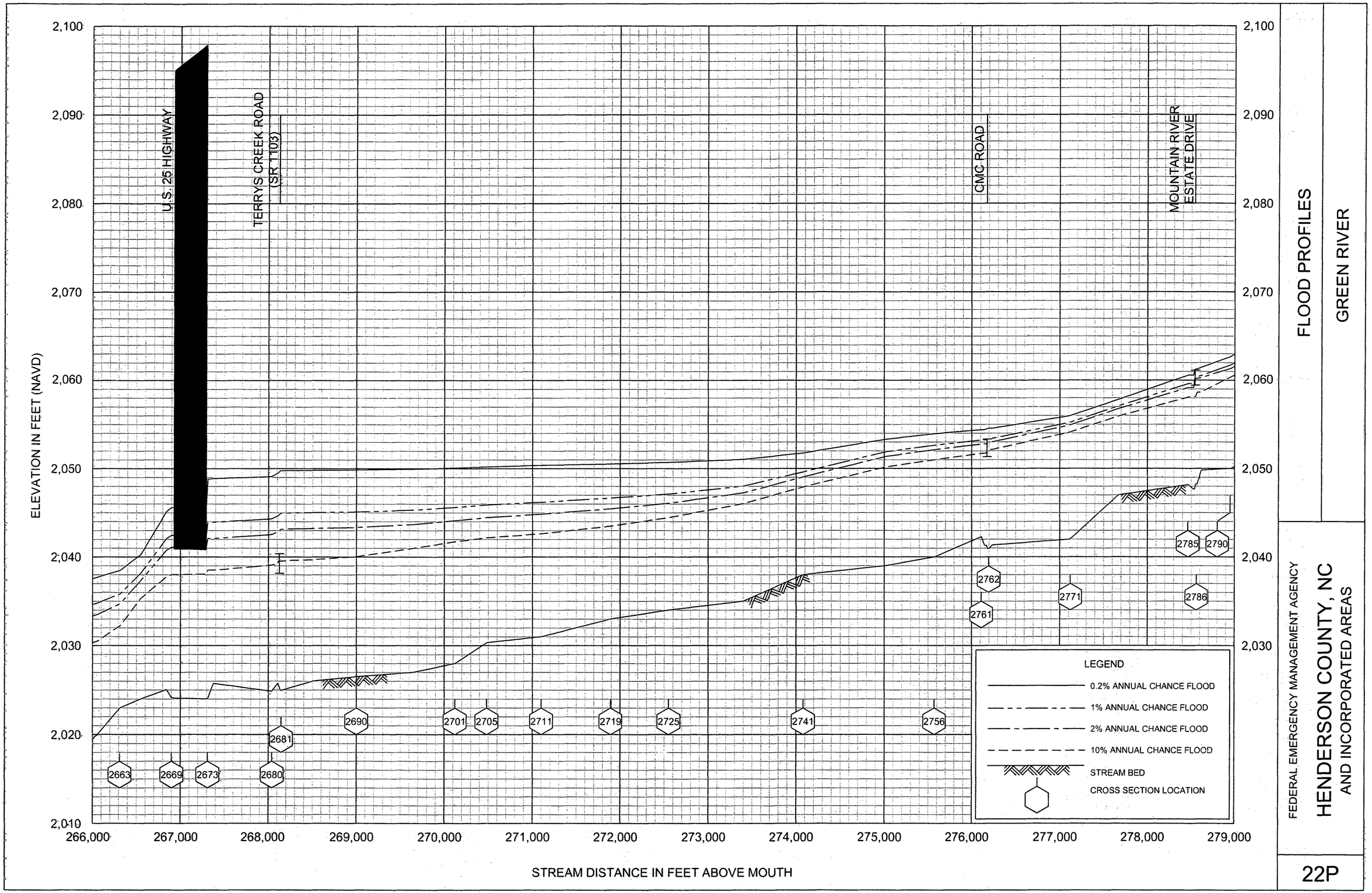


FLOOD PROFILES

GREEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS



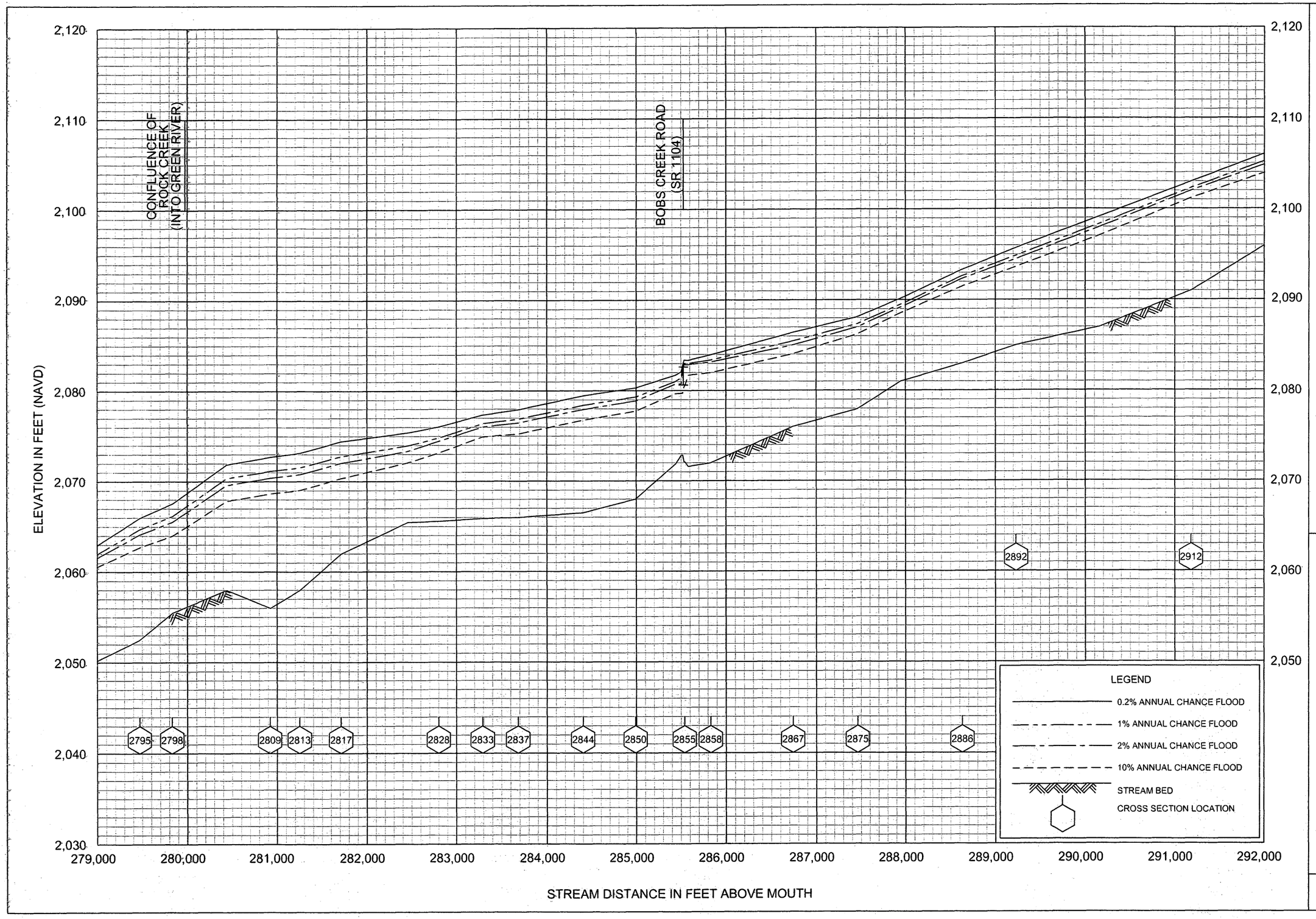
FLOOD PROFILES

GREEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

22P



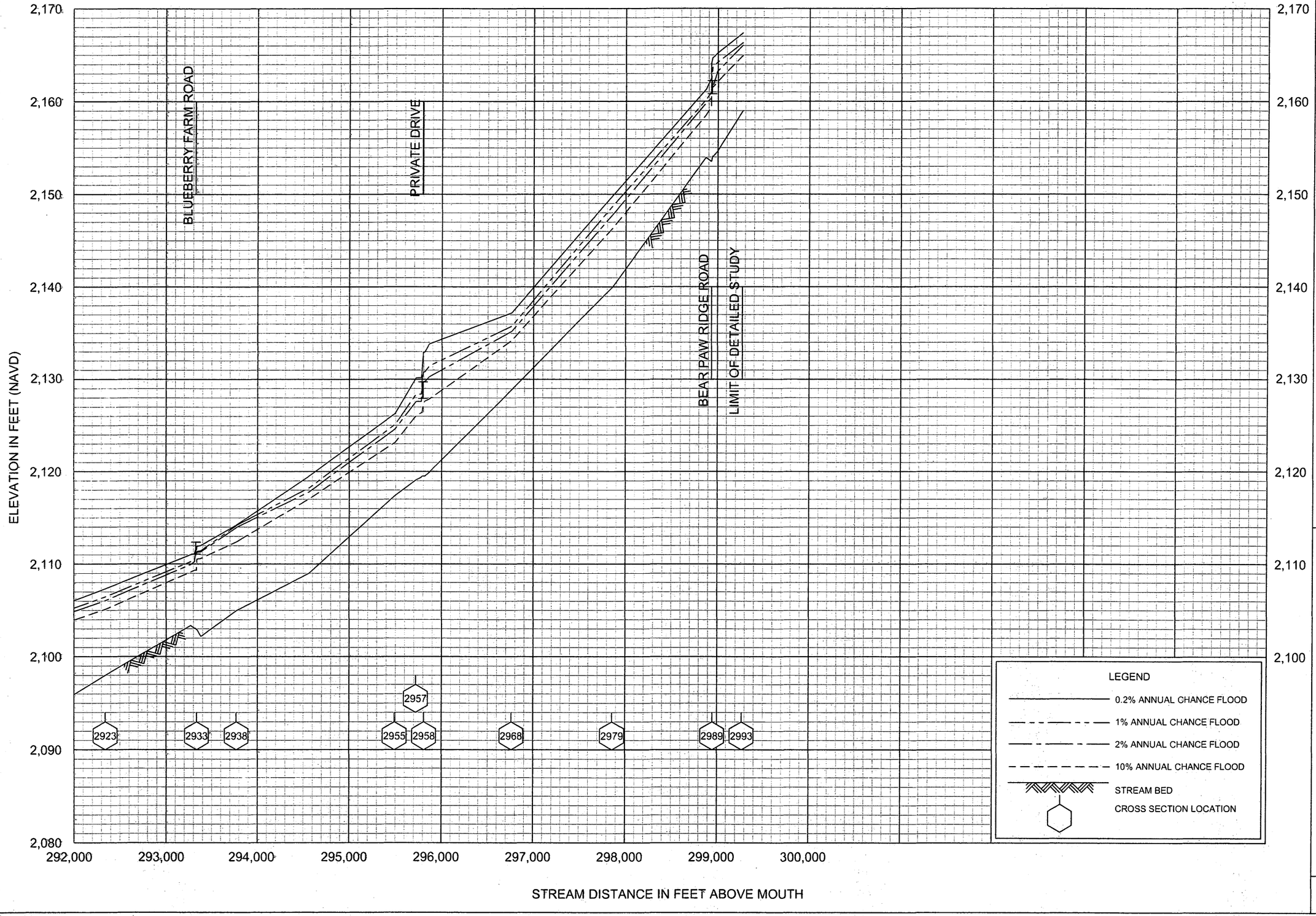
FLOOD PROFILES

GREEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

23P



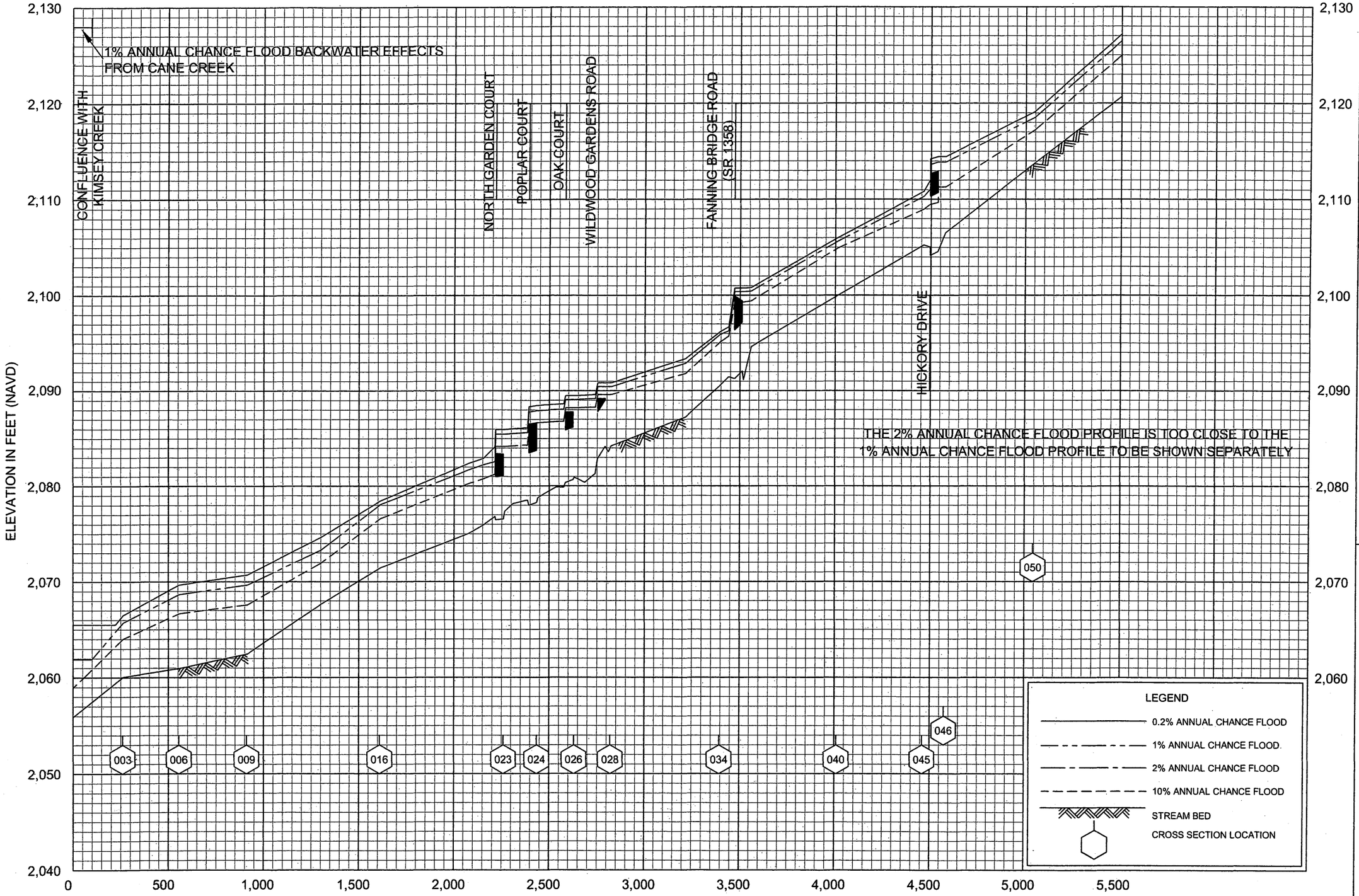
FLOOD PROFILES

GREEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

24P



FLOOD PROFILES

HIGGINS BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

25P

THE 2% ANNUAL CHANCE FLOOD PROFILE IS TOO CLOSE TO THE
1% ANNUAL CHANCE FLOOD PROFILE TO BE SHOWN SEPARATELY

BIRKSHIRE WAY

PRIVATE DRIVE

LIMIT OF DETAILED STUDY

ELEVATION IN FEET (NAVD)

2,200
2,190
2,180
2,170
2,160
2,150
2,140
2,130
2,120
2,110

5,500 6,000 6,500 7,000 7,500 8,000 8,500

STREAM DISTANCE IN FEET ABOVE MOUTH

059 064 066 071 074 082

LEGEND

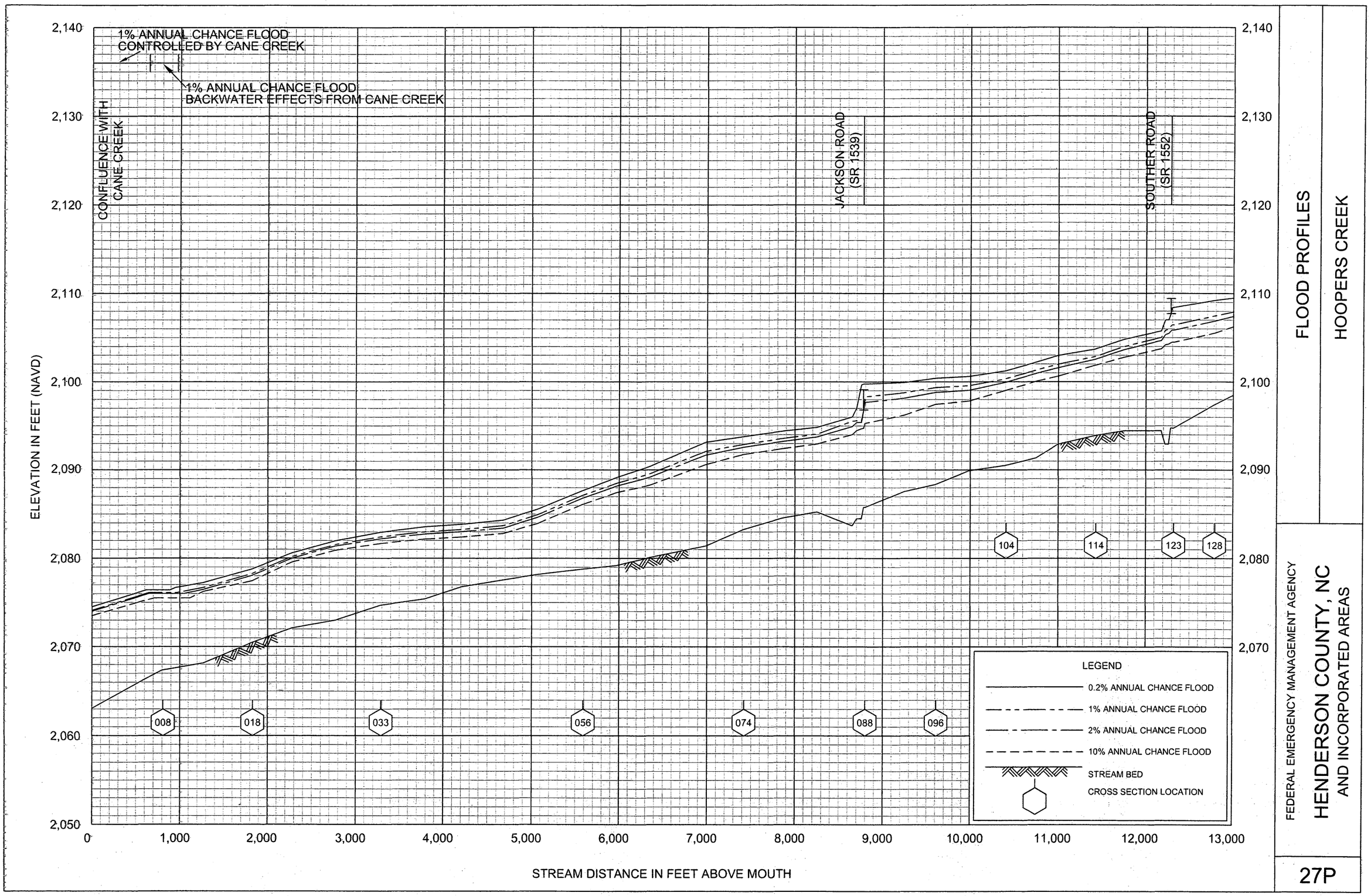
- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

HIGGINS BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS



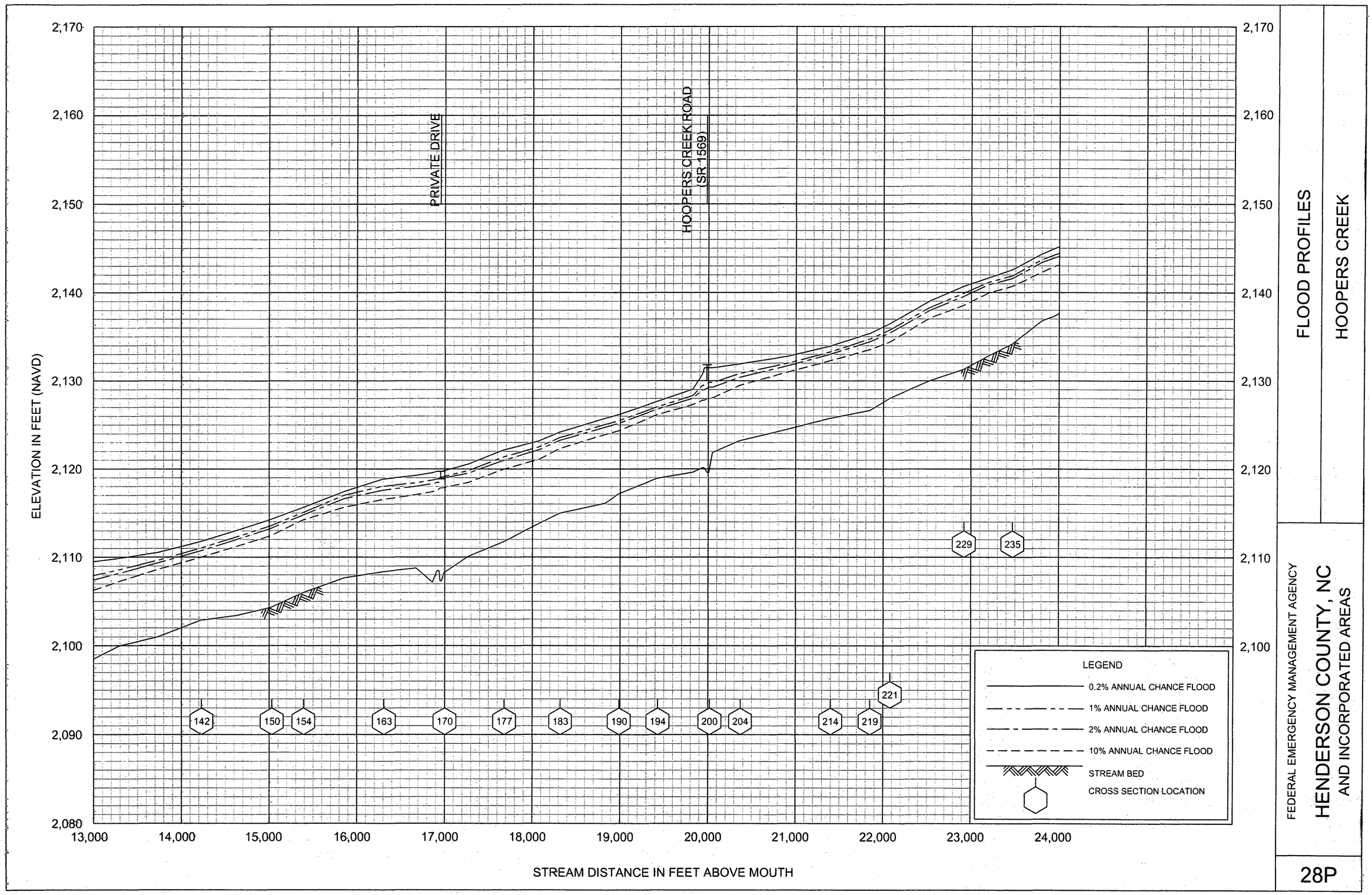
FLOOD PROFILES

HOOPERS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

27P



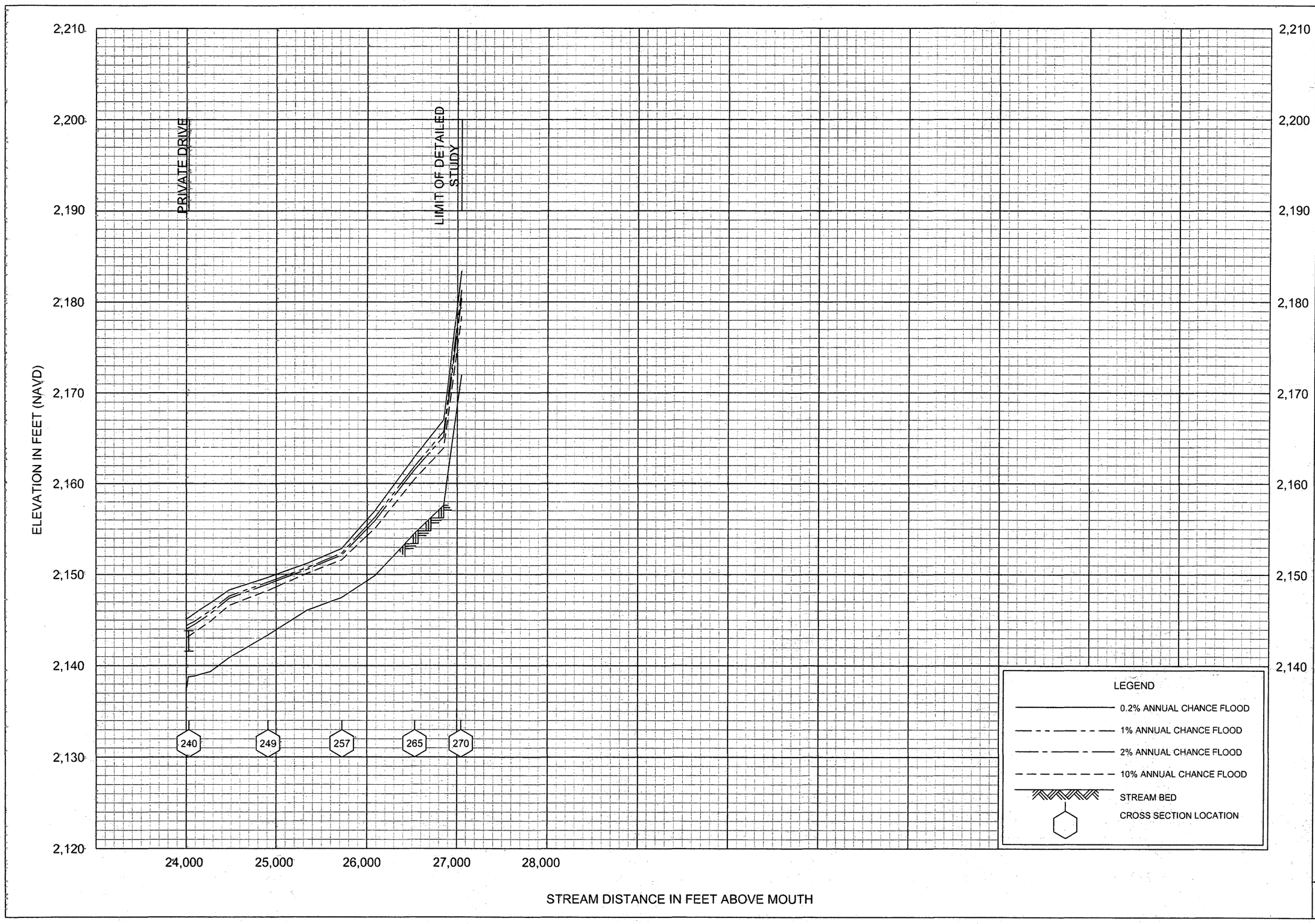
FLOOD PROFILES

HOOPERS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

28P



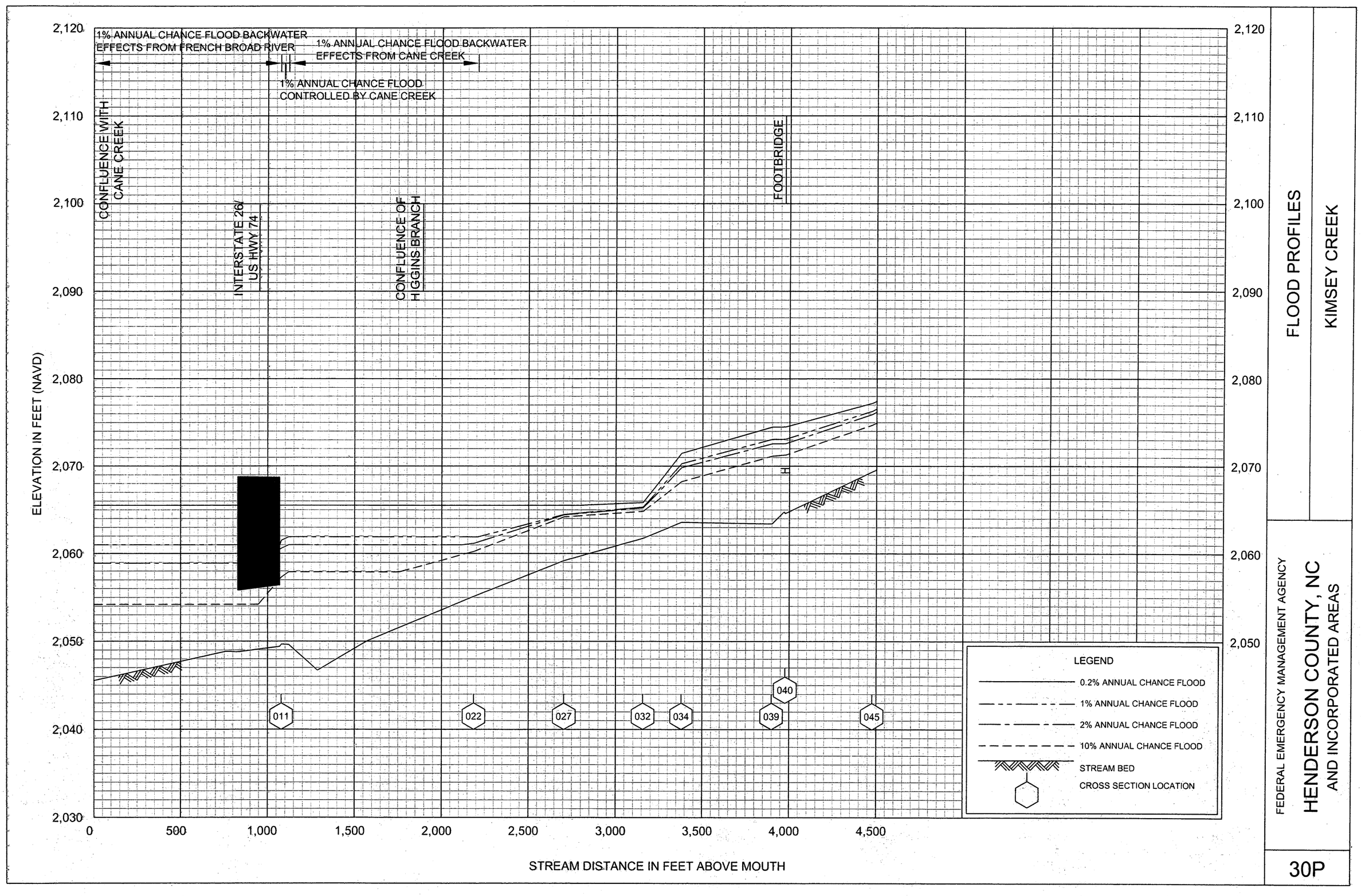
FLOOD PROFILES

HOOPERS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

29P



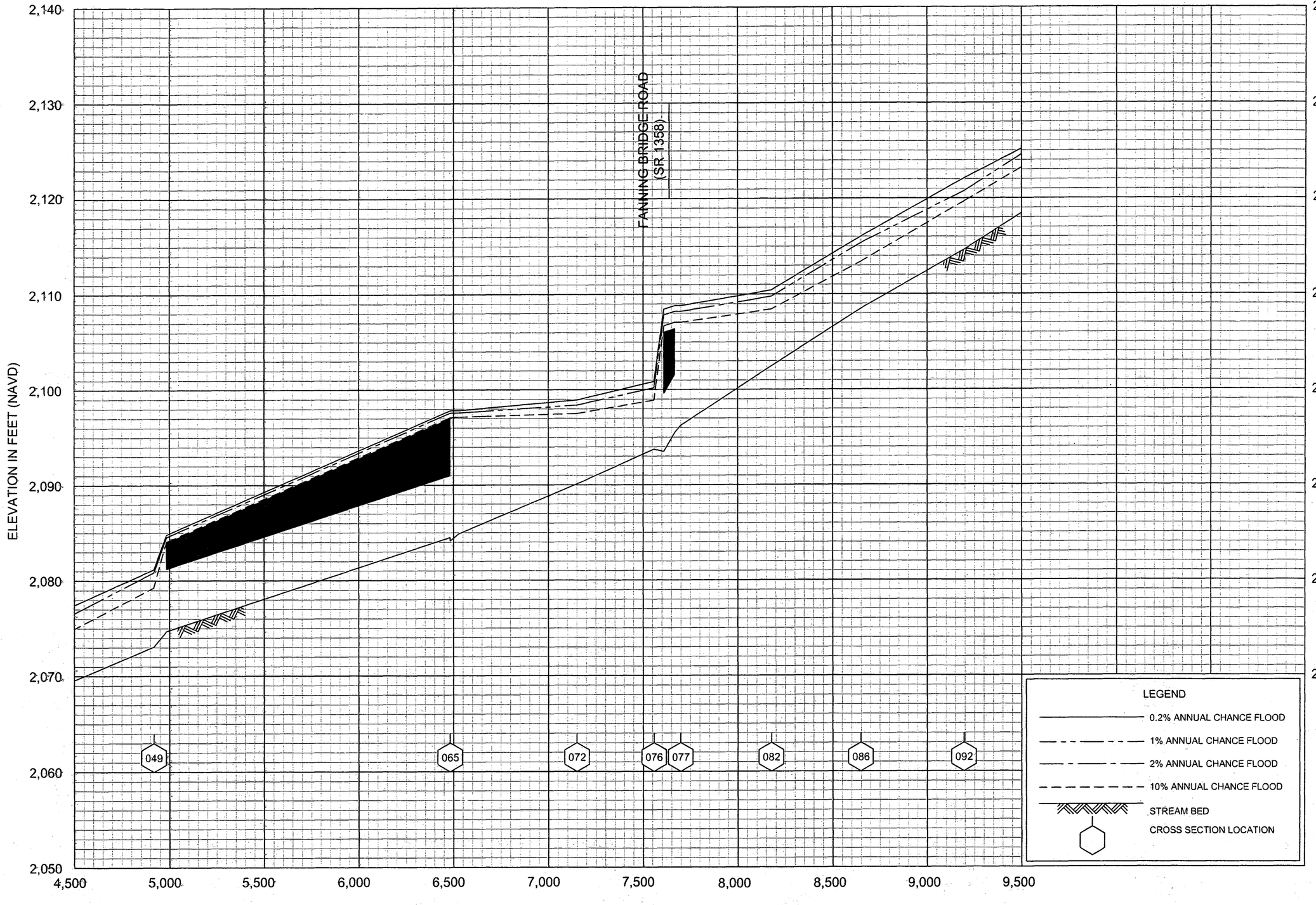
FLOOD PROFILES

KIMSEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

30P

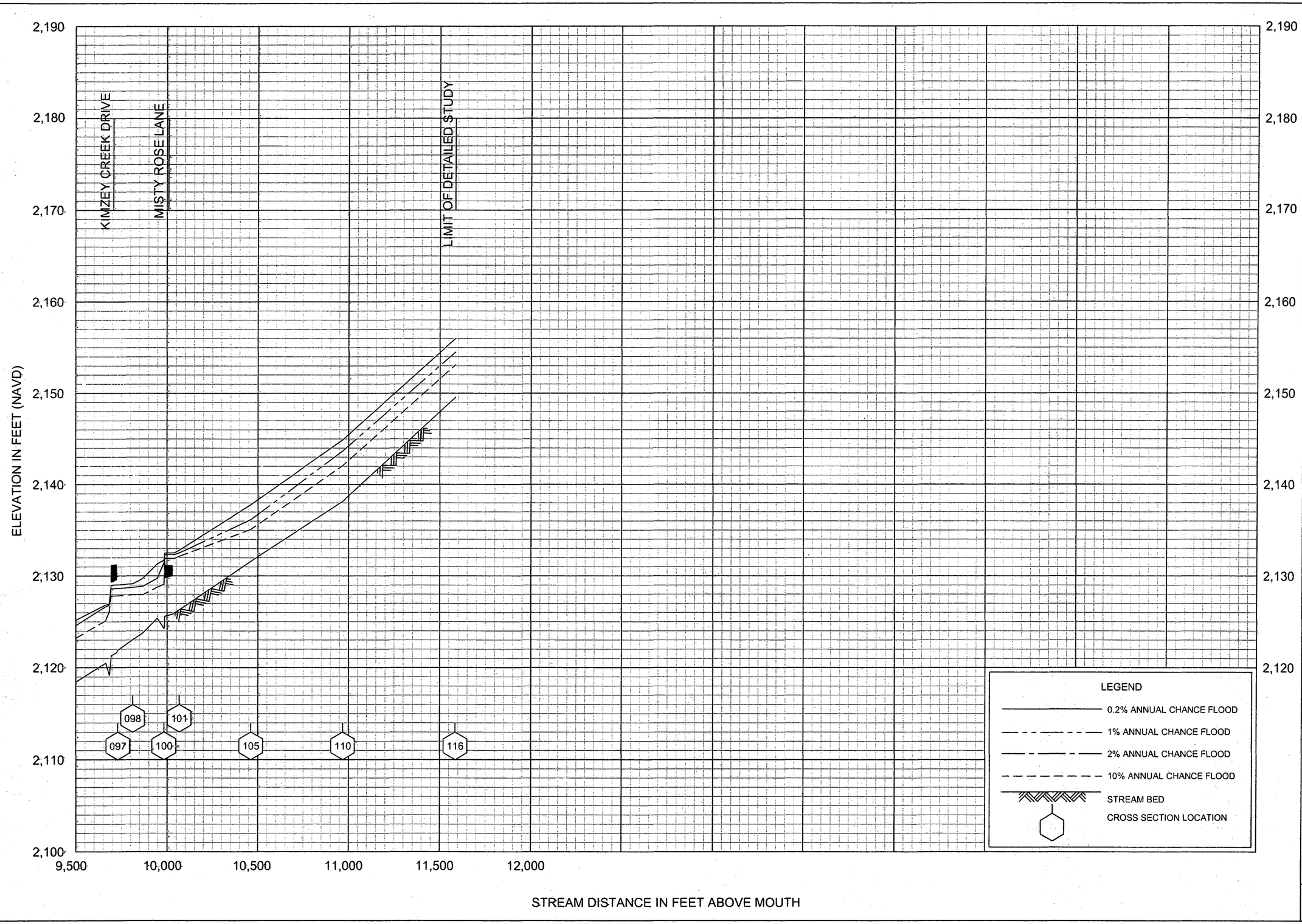


FLOOD PROFILES

KIMSEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS



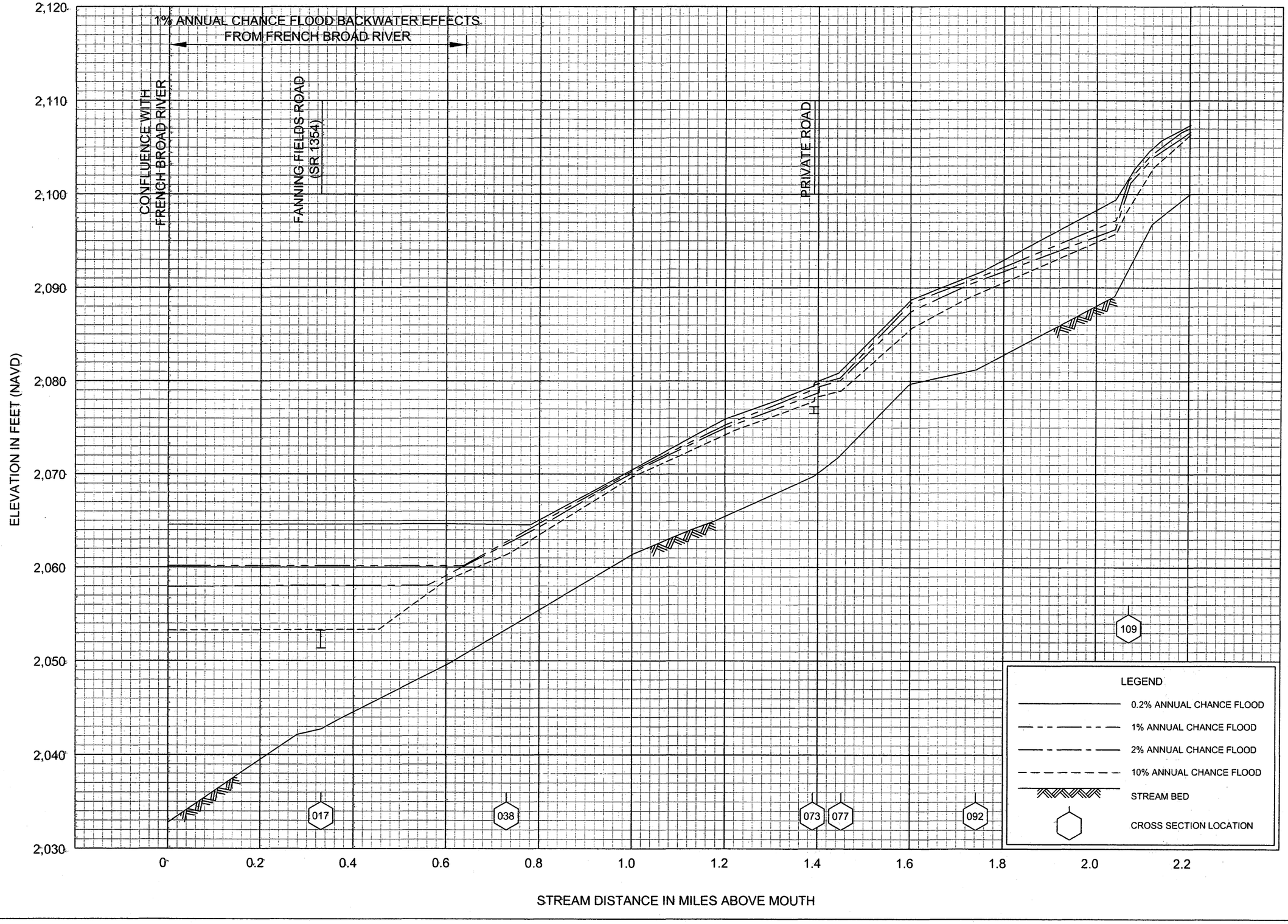
FLOOD PROFILES

KIMSEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

32P



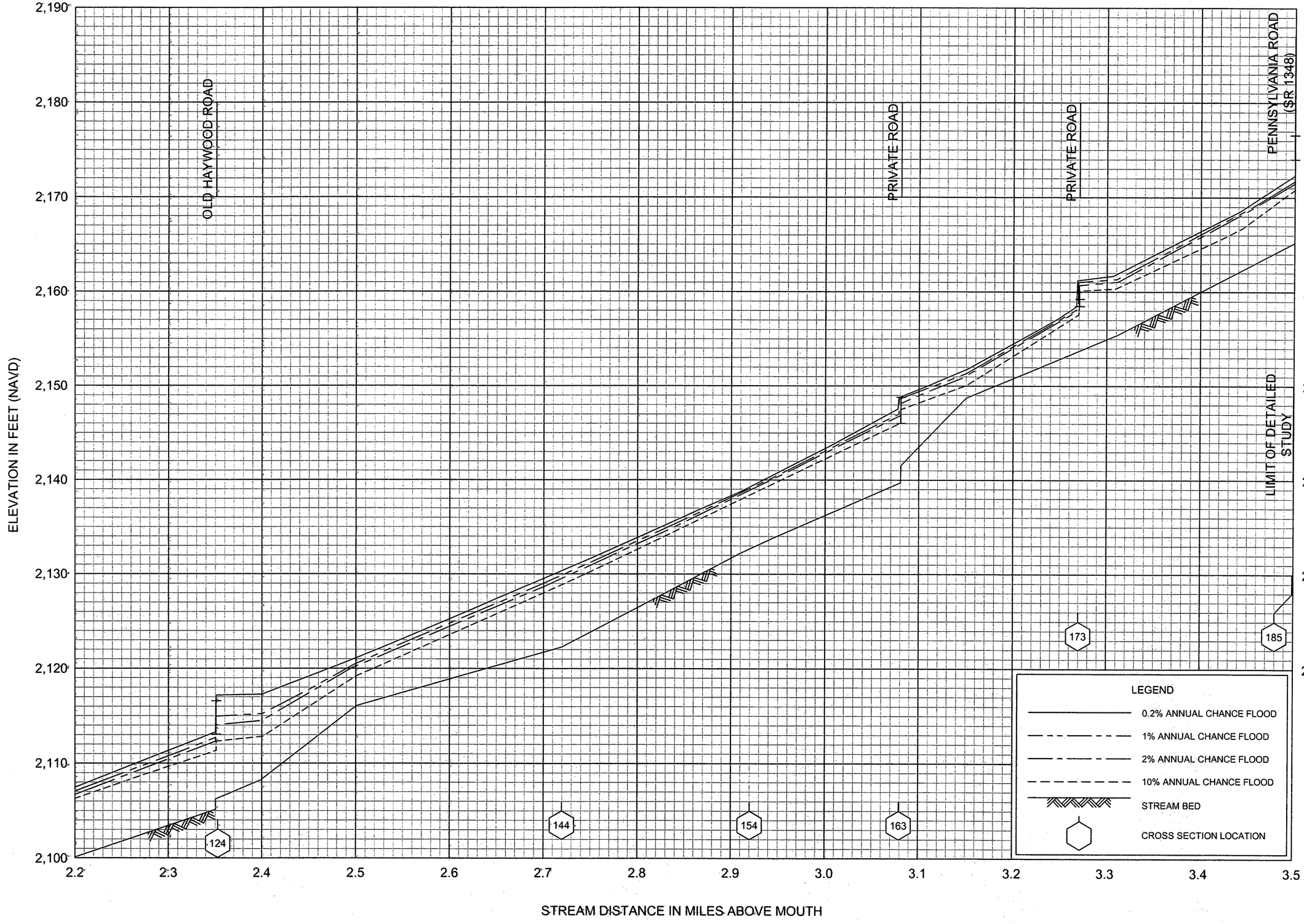
FLOOD PROFILES

MCDOWELL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

33P



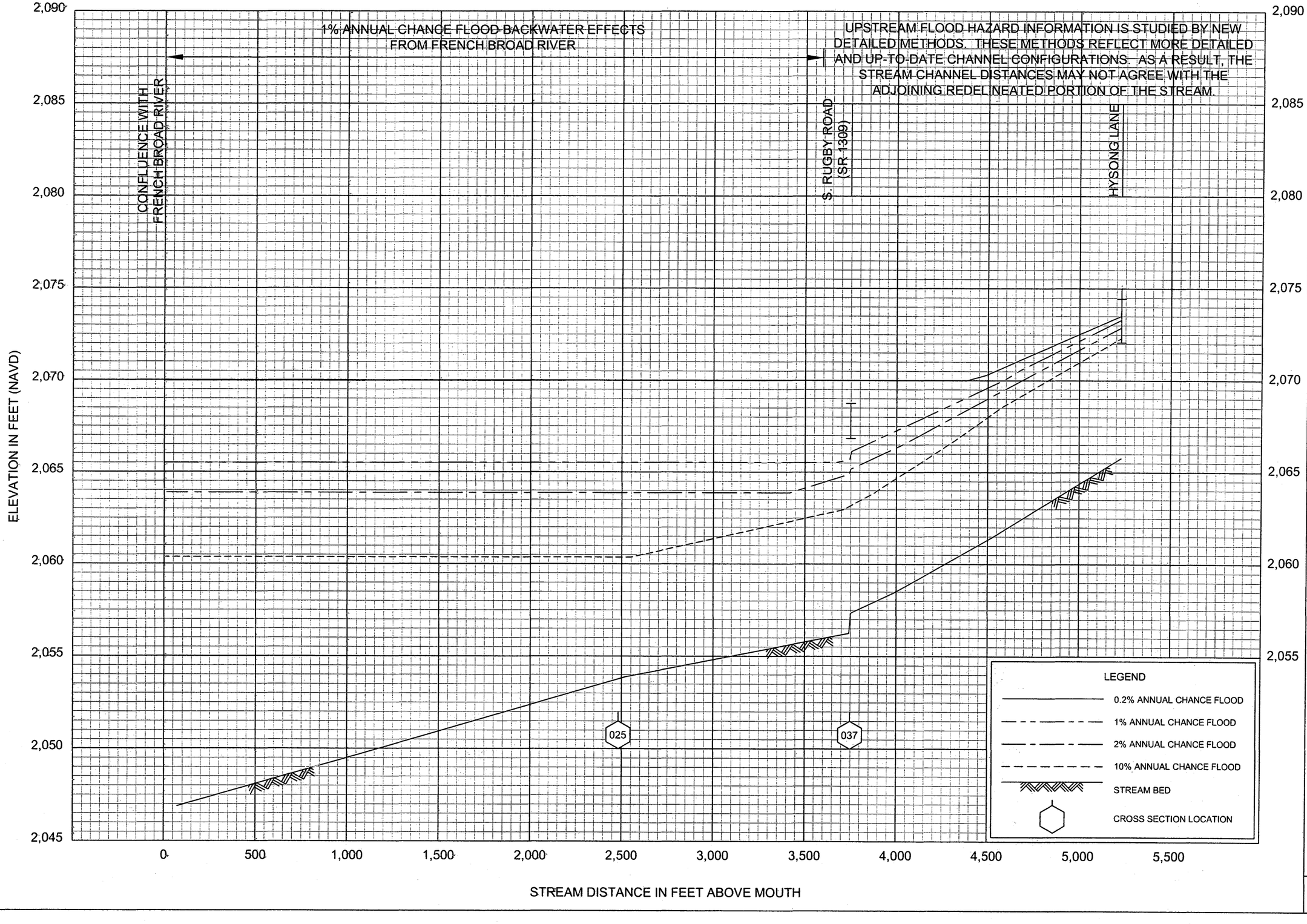
FLOOD PROFILES

MCDOWELL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

34P



FLOOD PROFILES

MILL POND CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

35P

UPSTREAM FLOOD HAZARD INFORMATION IS PROVIDED IN THE LIMITED DETAILED FLOOD HAZARD DATA TABLE LOCATED IN THE FIS REPORT.

ELEVATION IN FEET (NAVD)

2,100
2,095
2,090
2,085
2,080
2,075
2,070
2,065
2,060
2,055

5,500
6,000
6,500
7,000
7,500
8,000

STREAM DISTANCE IN FEET ABOVE MOUTH

056
063
071
076

LEGEND

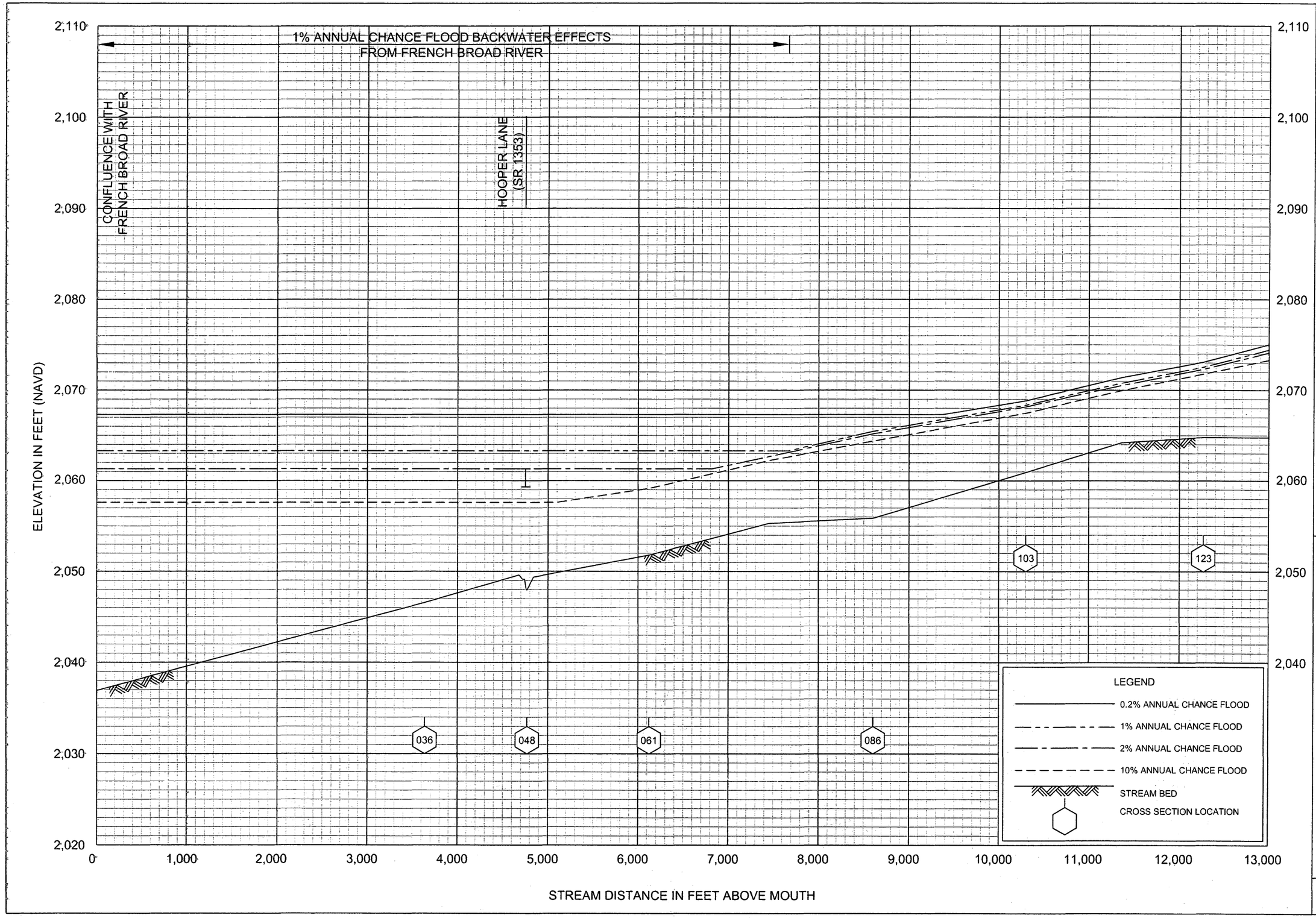
- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FLOOD PROFILES

MILL POND CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS



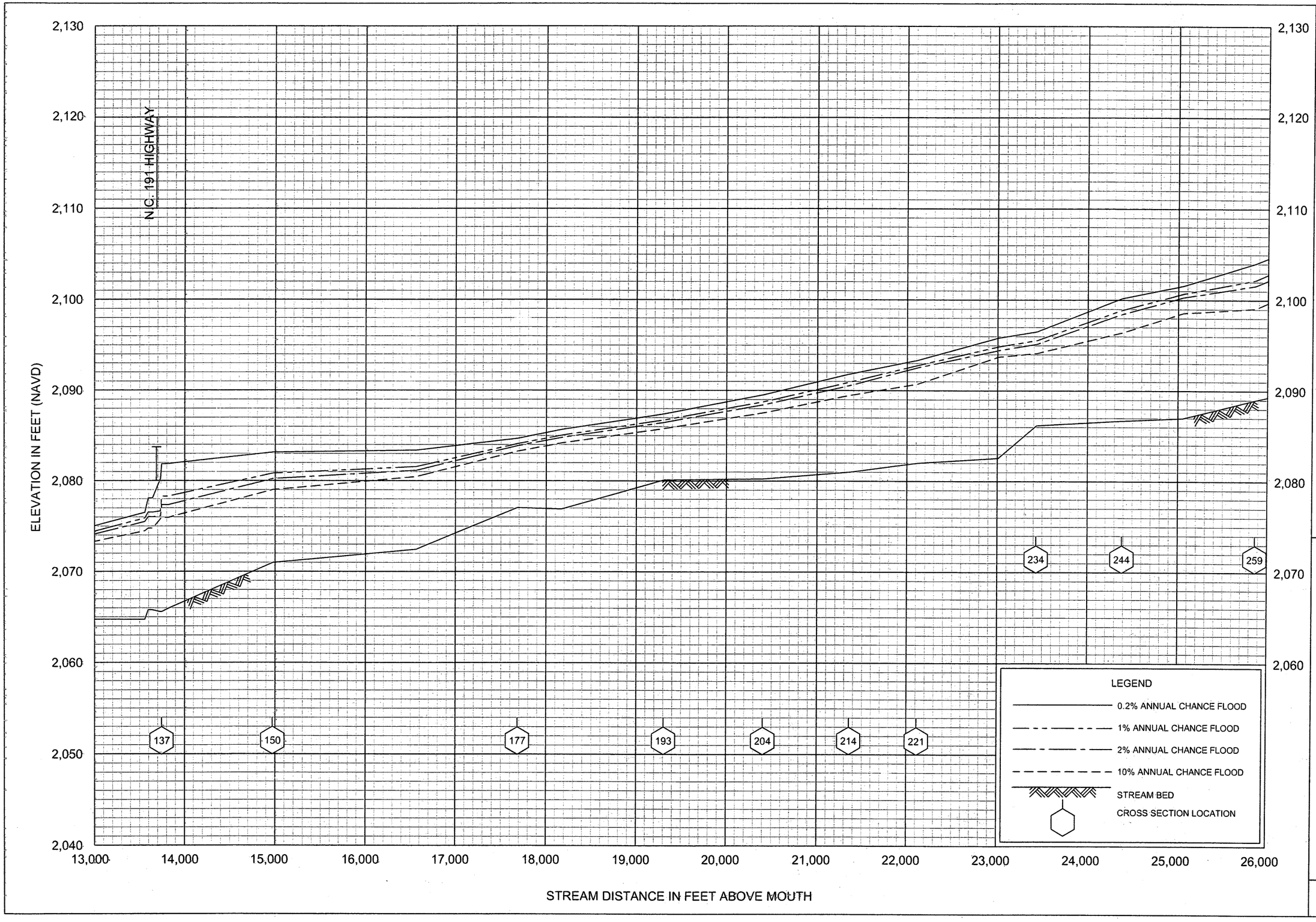
FLOOD PROFILES

MILLS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

37P



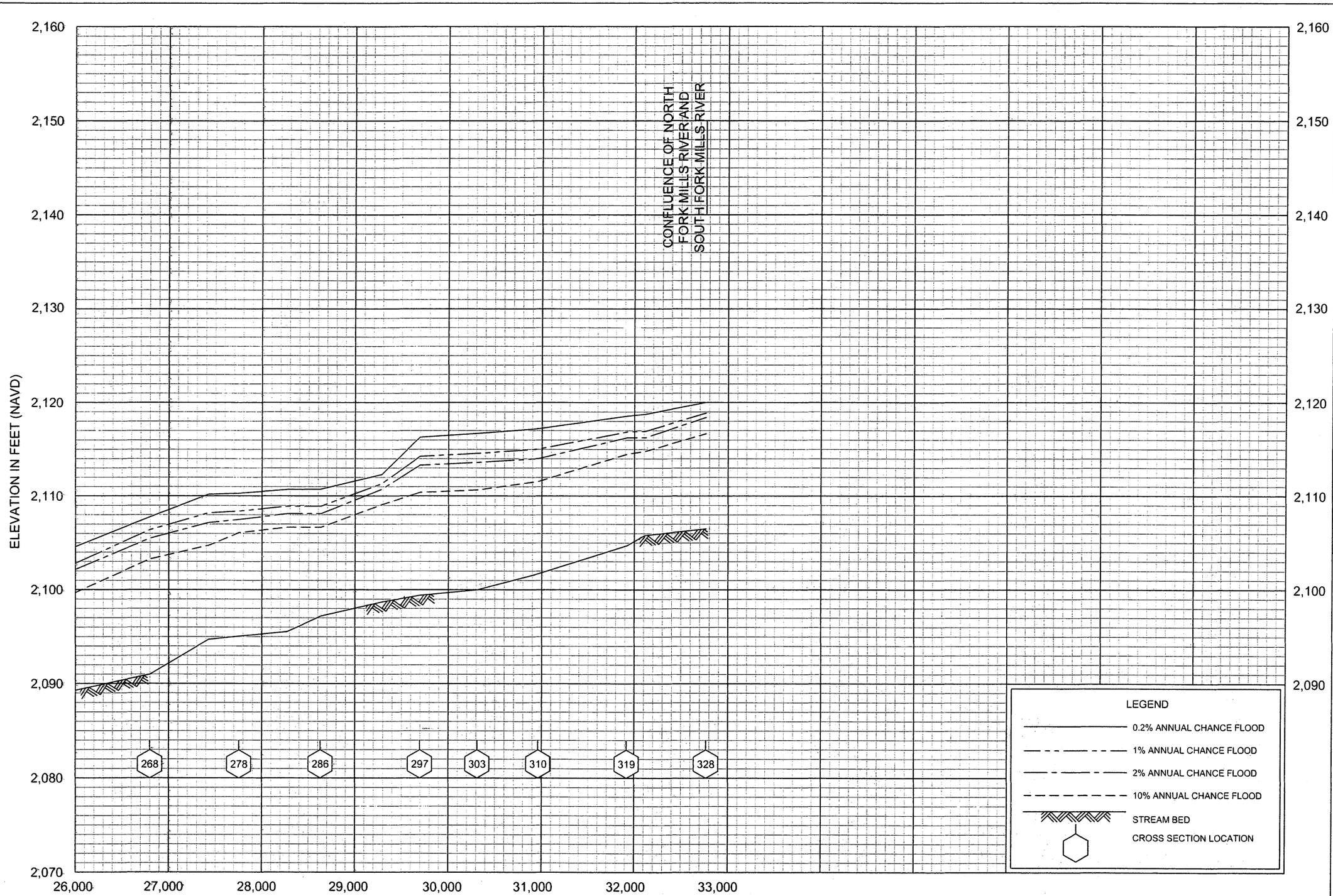
FLOOD PROFILES

MILLS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

38P



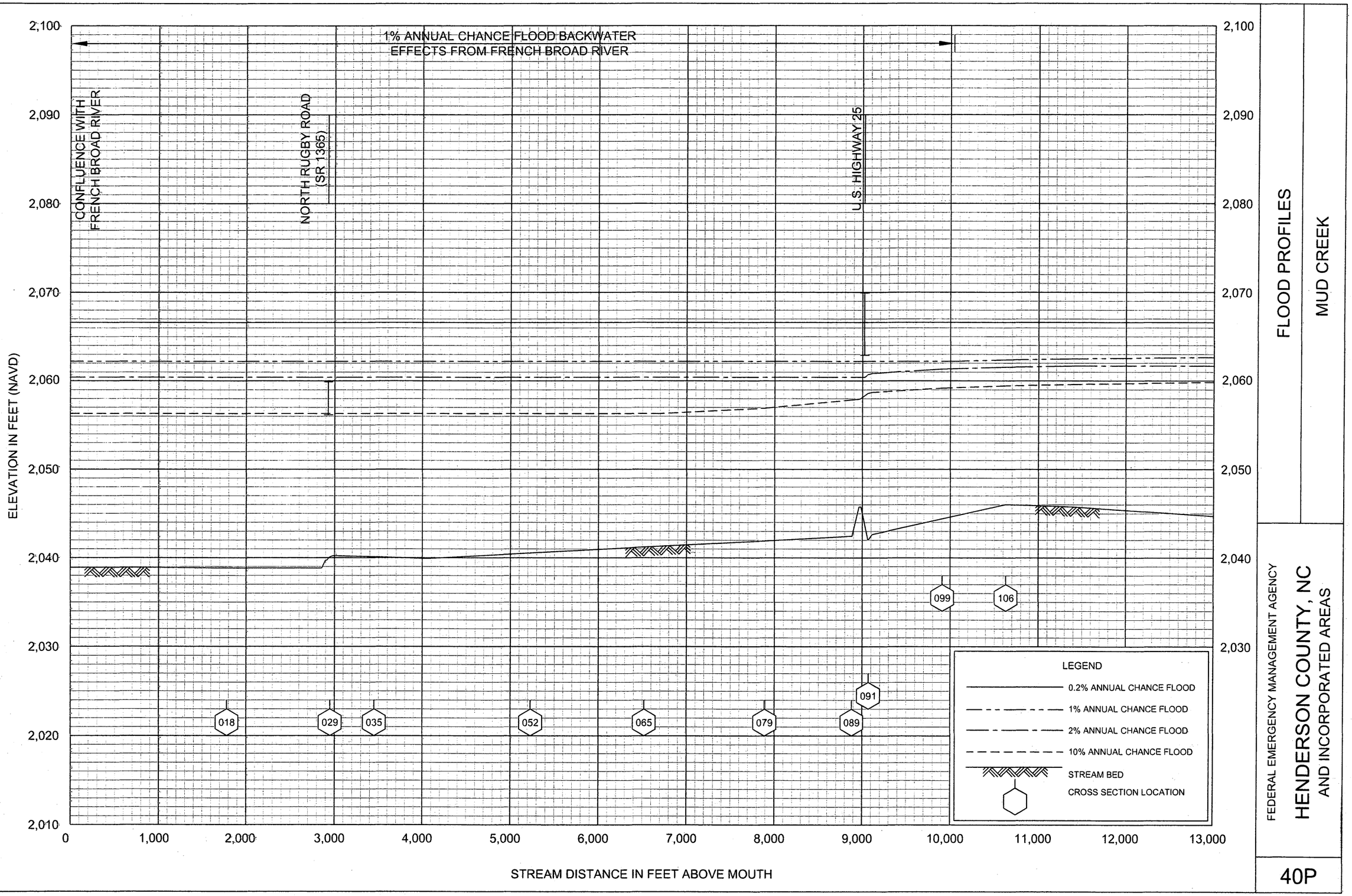
FLOOD PROFILES

MILLS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

39P

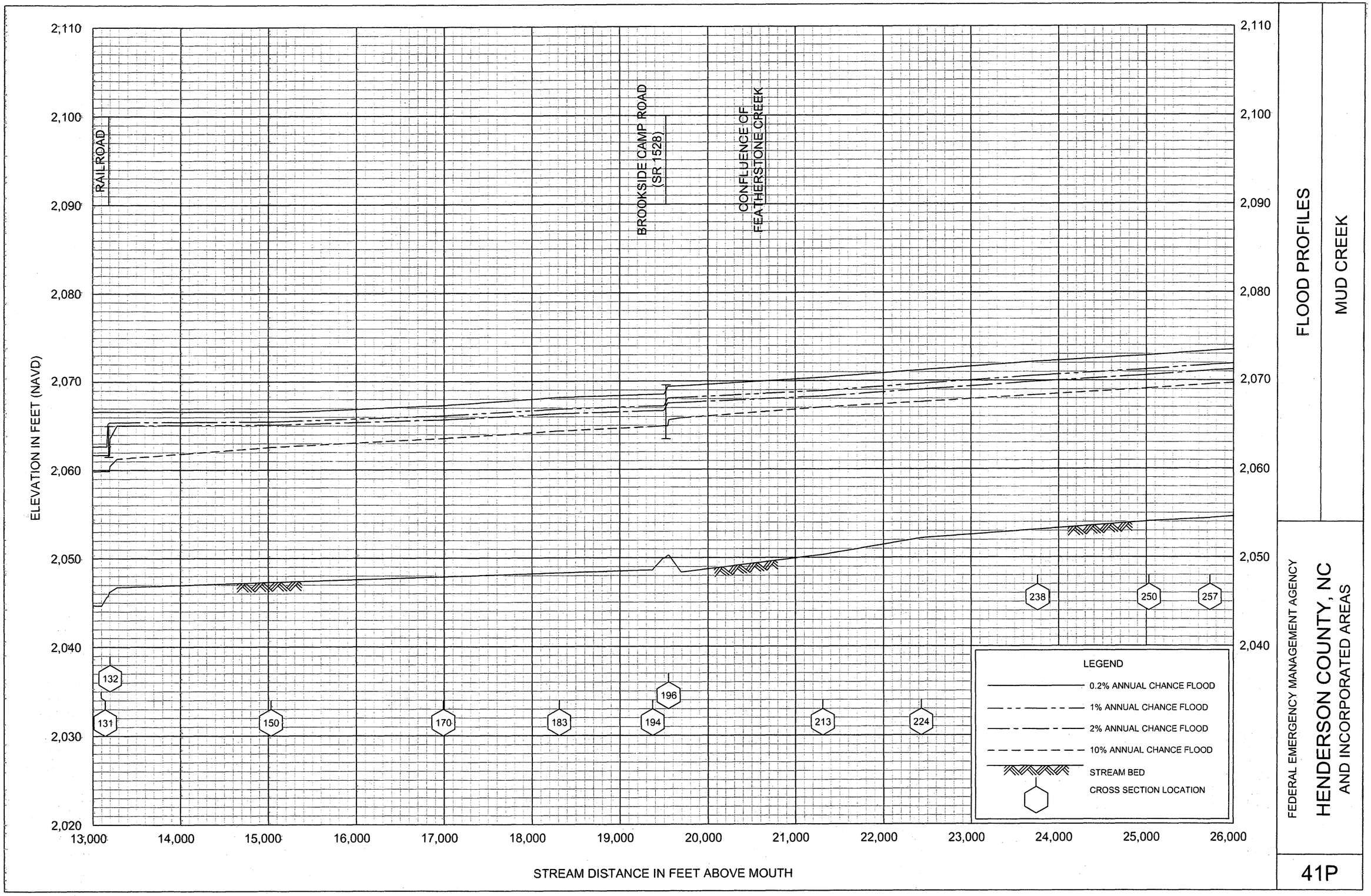


FLOOD PROFILES

MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS



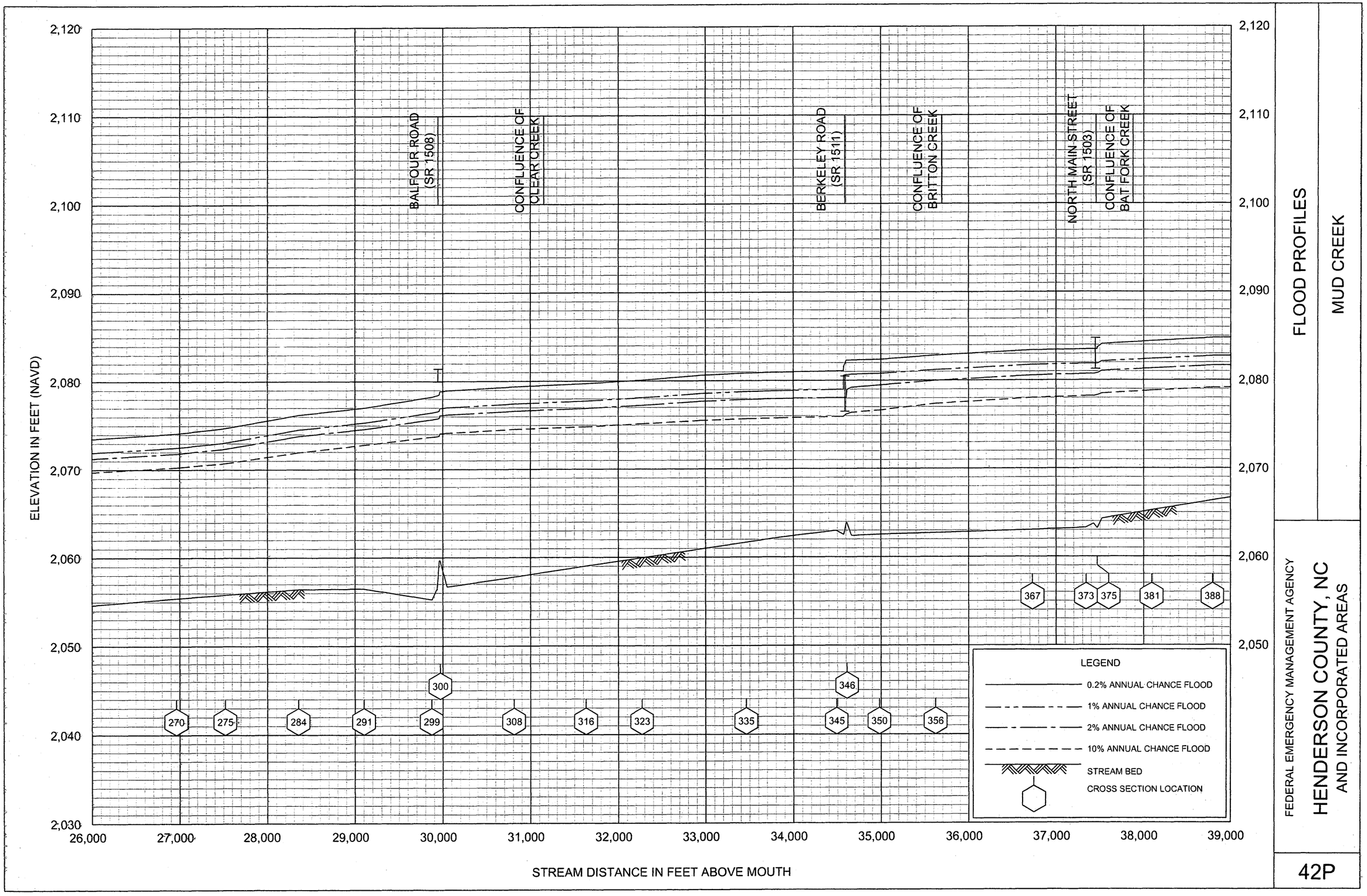
FLOOD PROFILES

MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

41P



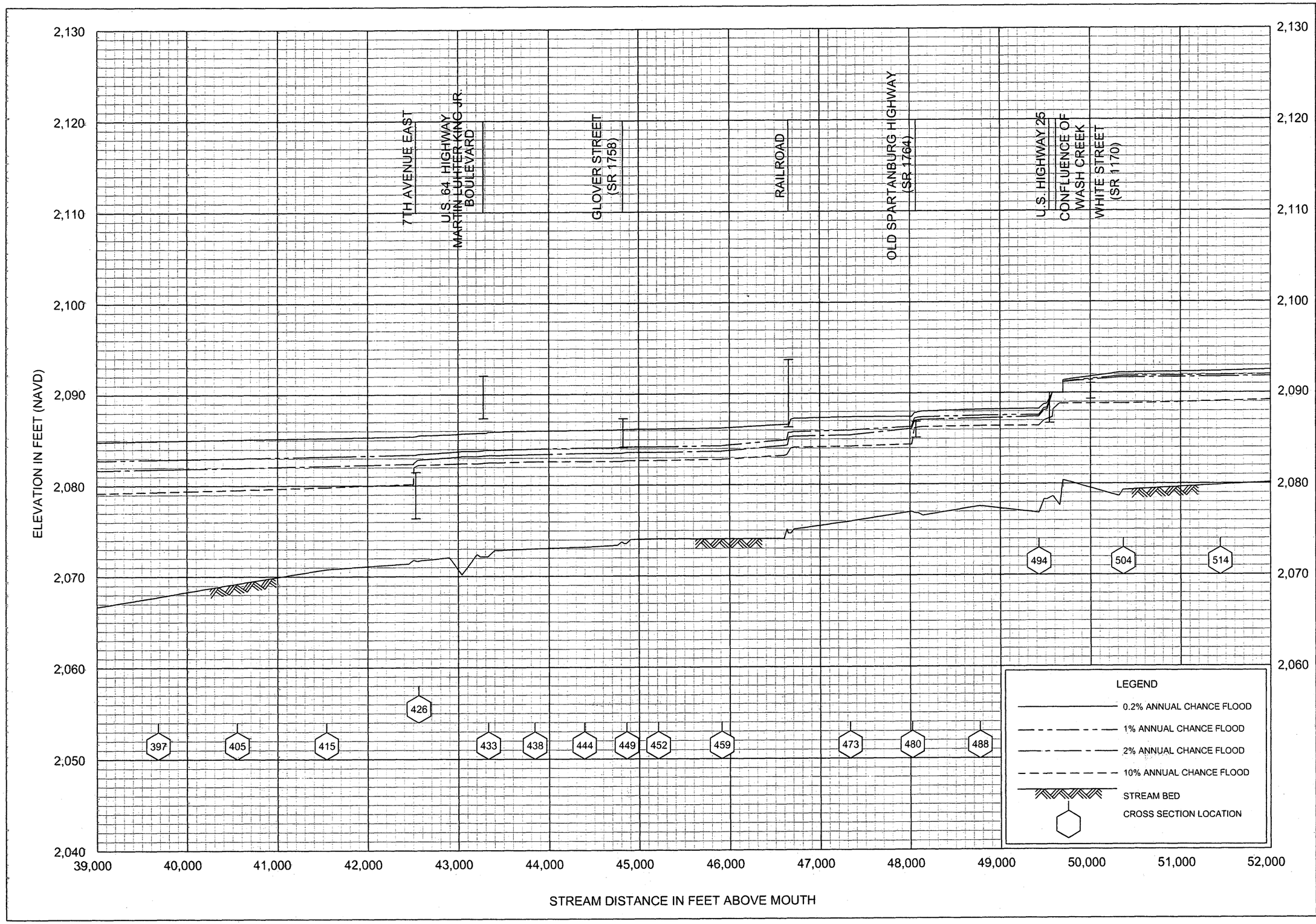
FLOOD PROFILES

MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

42P



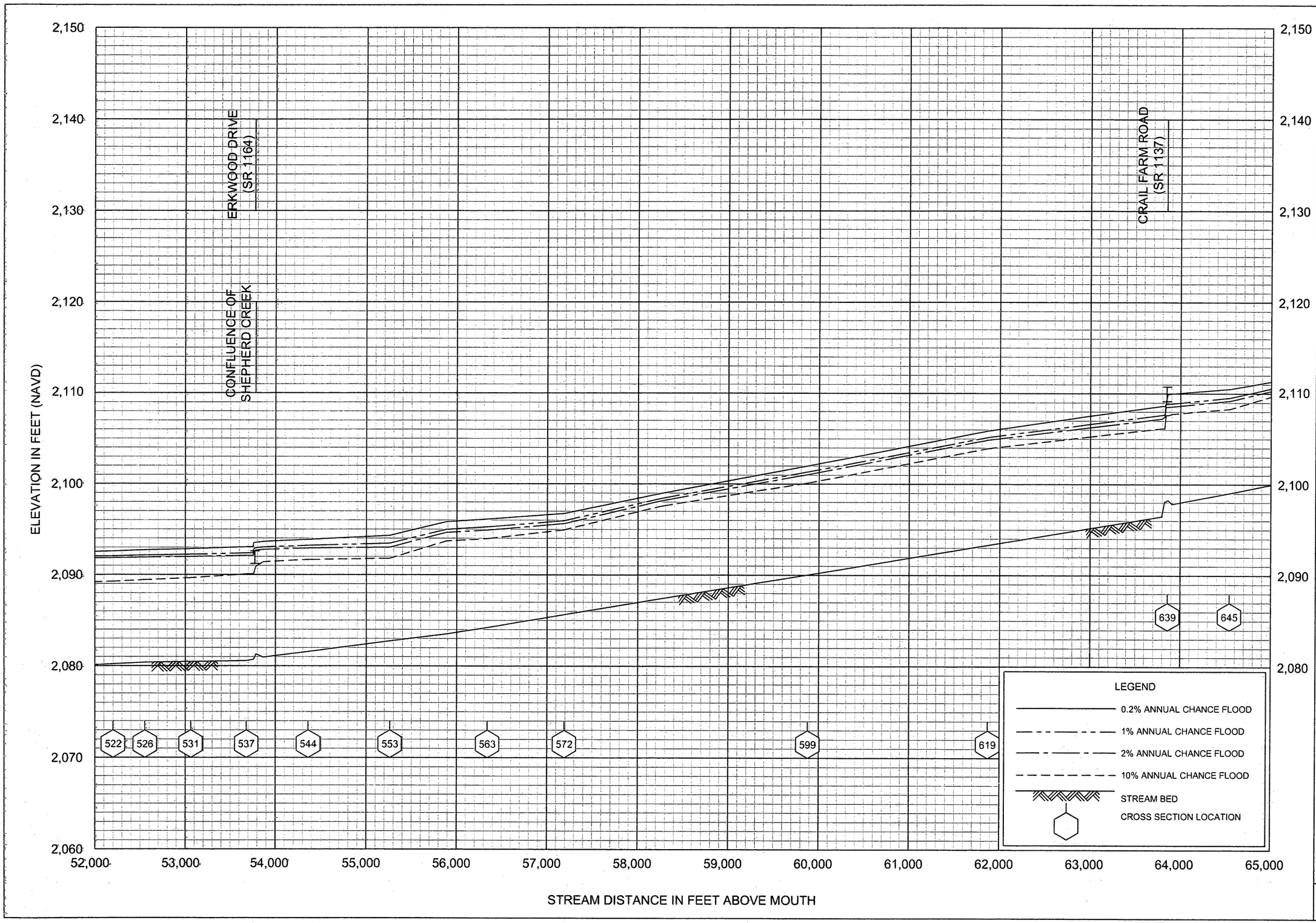
FLOOD PROFILES

MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

43P

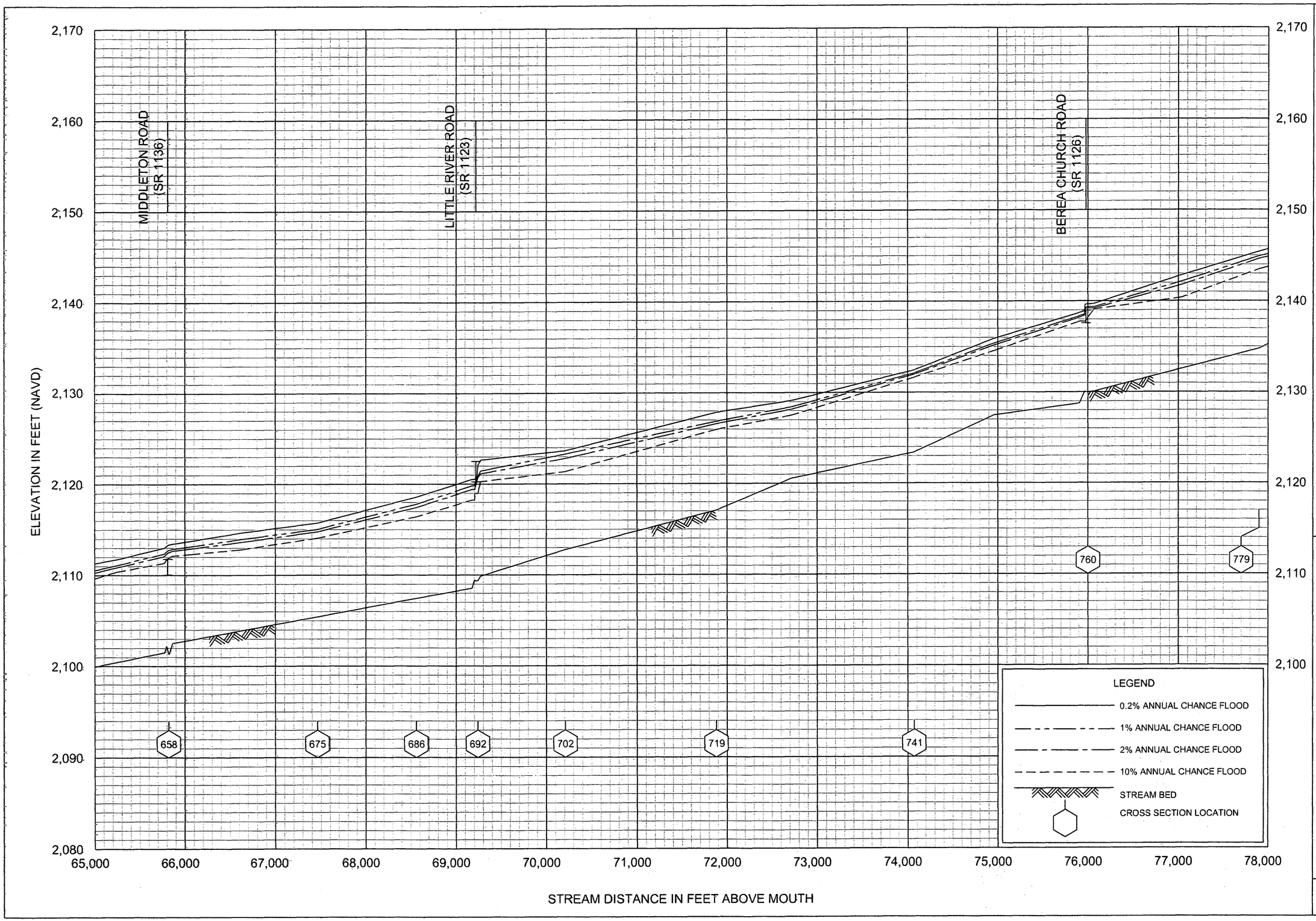


FLOOD PROFILES

MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS



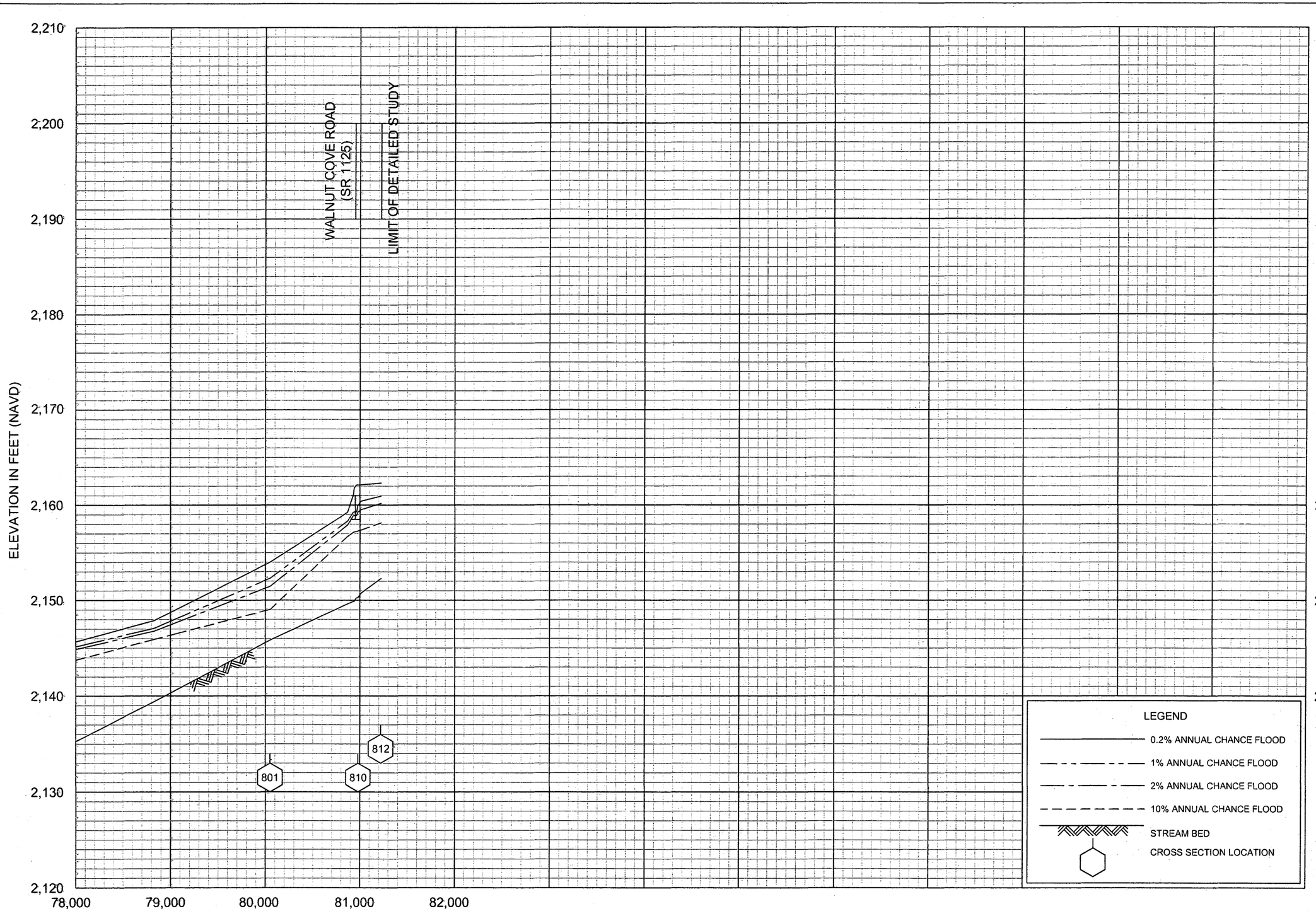
FLOOD PROFILES

MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

45P

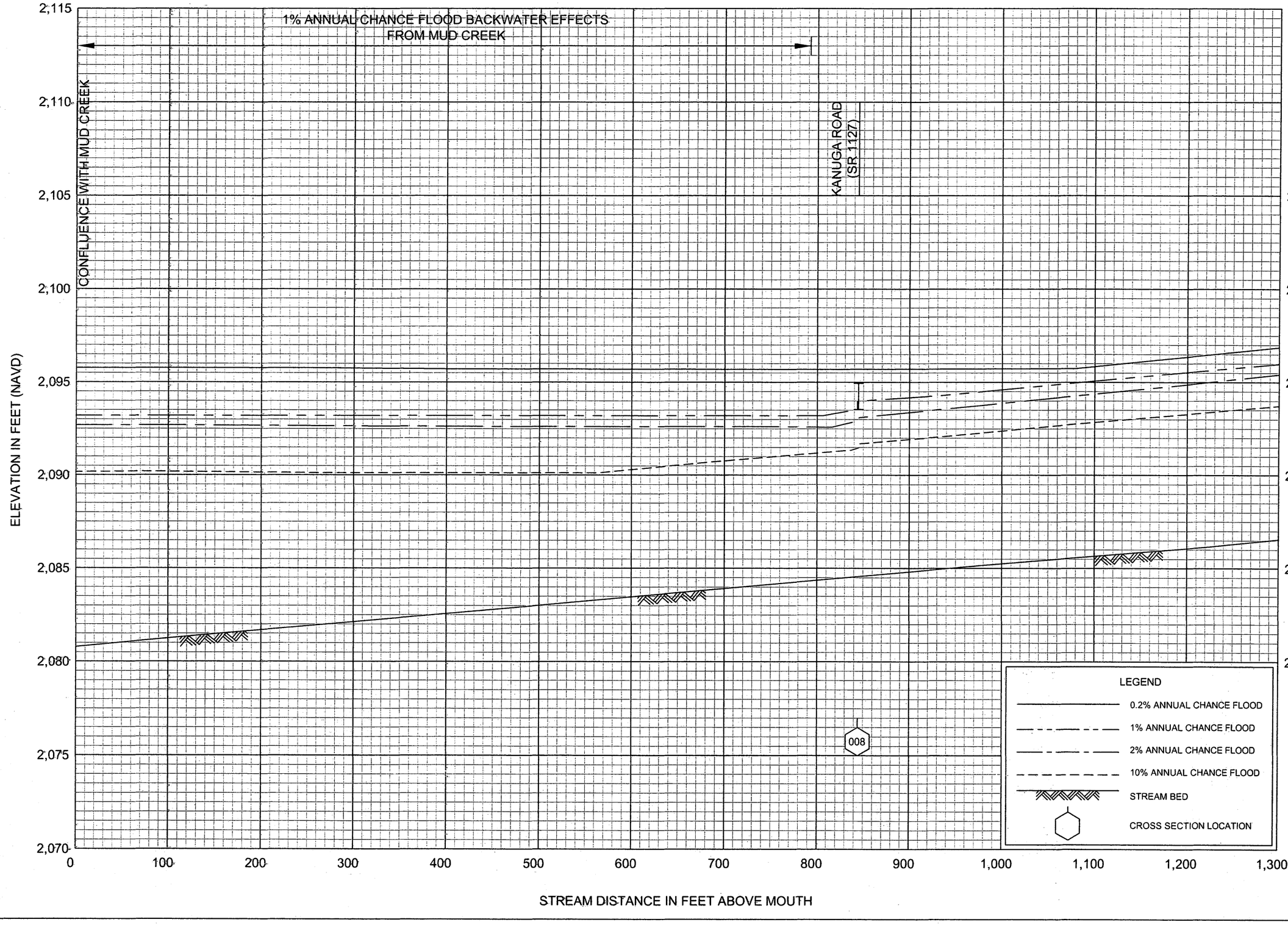


FLOOD PROFILES

MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS



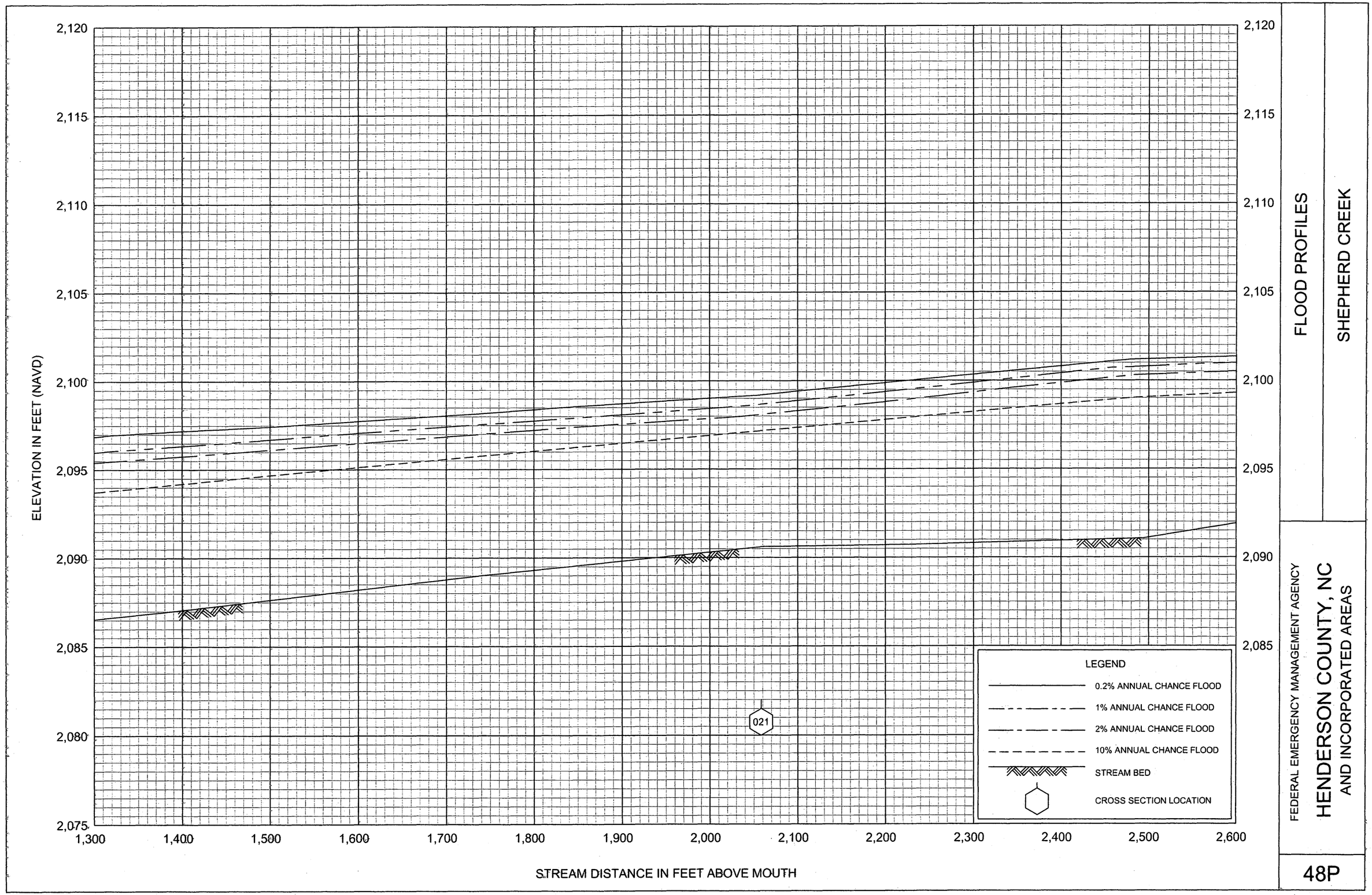
FLOOD PROFILES

SHEPHERD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

47P



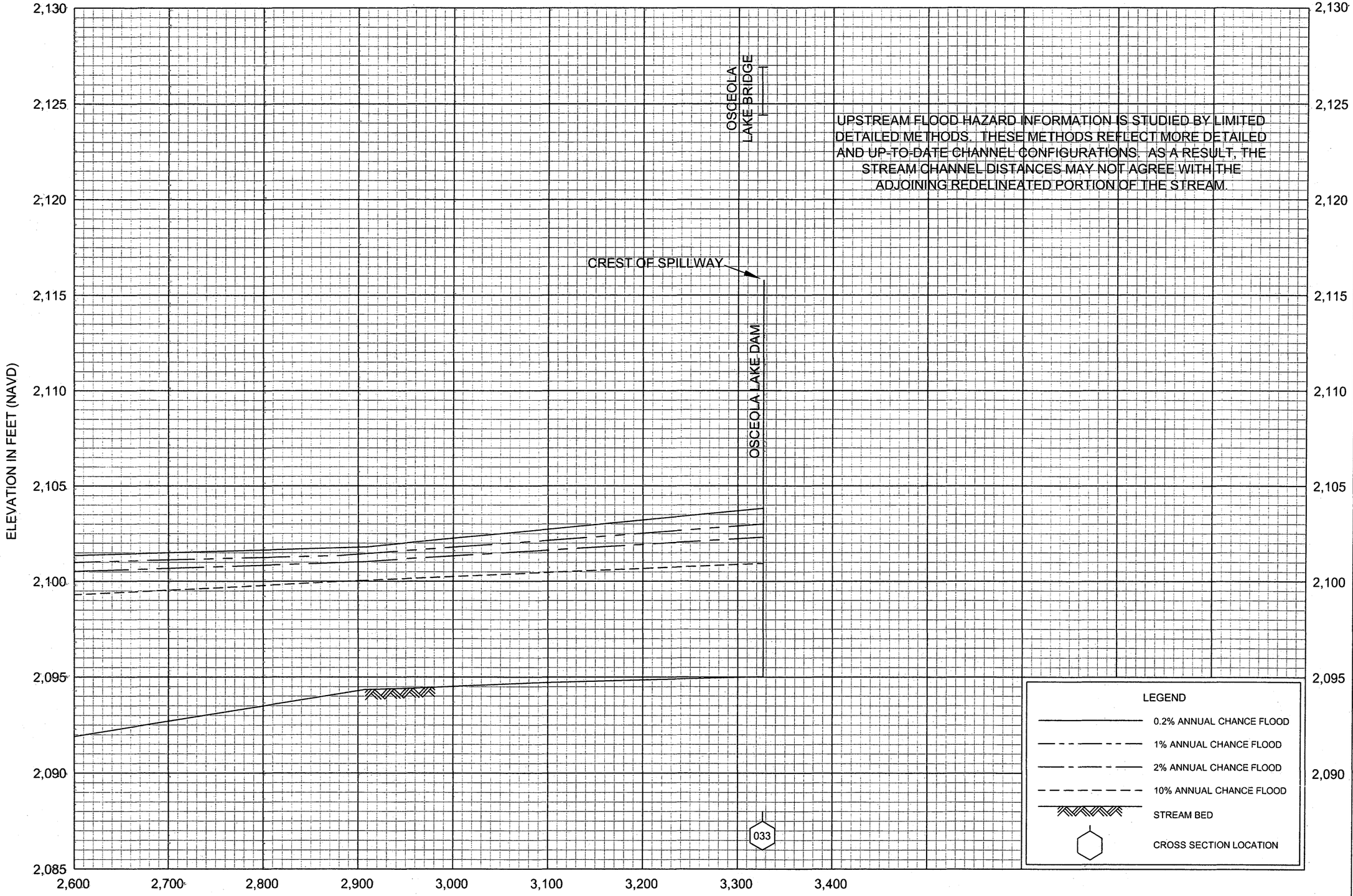
FLOOD PROFILES

SHEPHERD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

48P

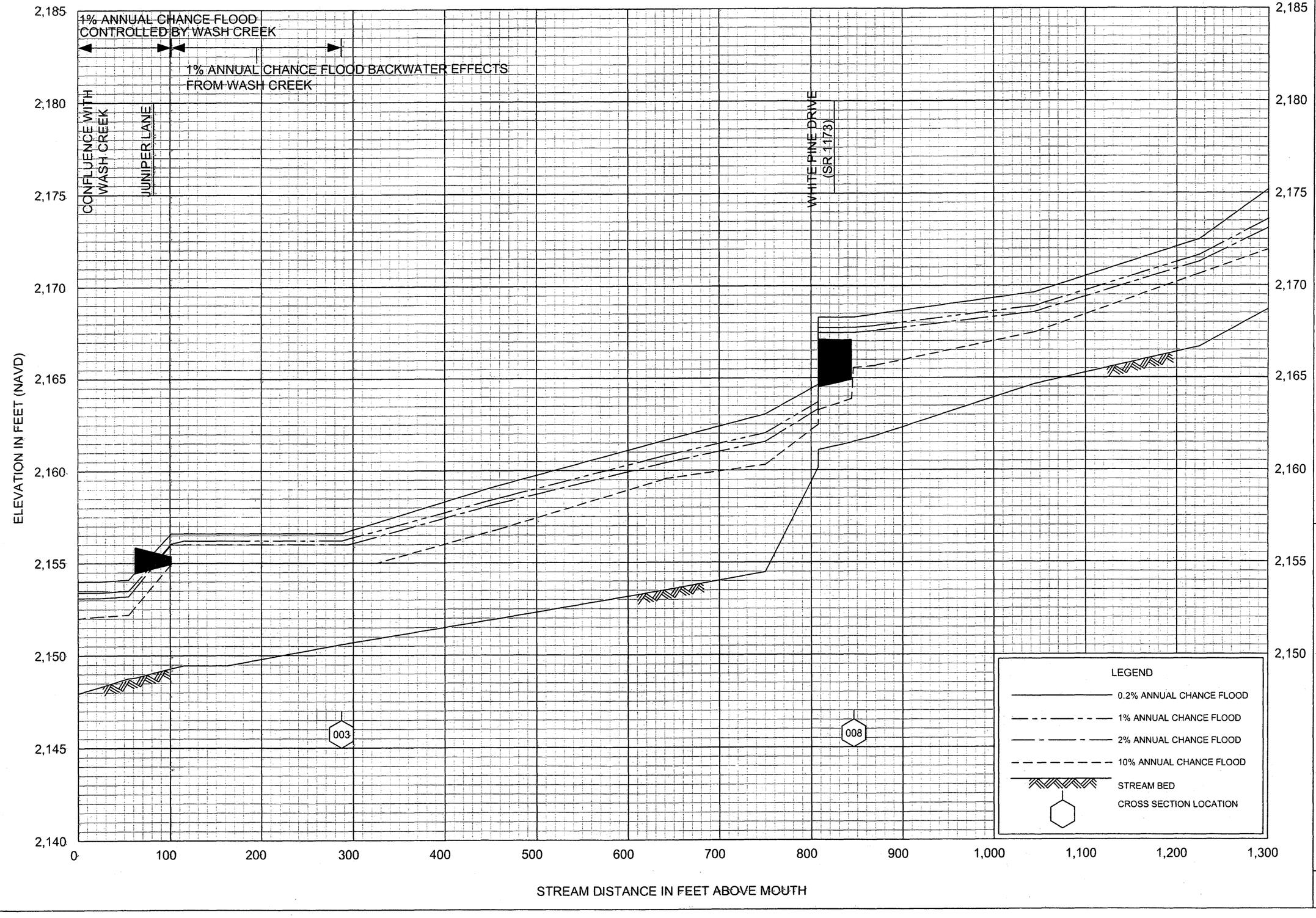


FLOOD PROFILES

SHEPHERD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS



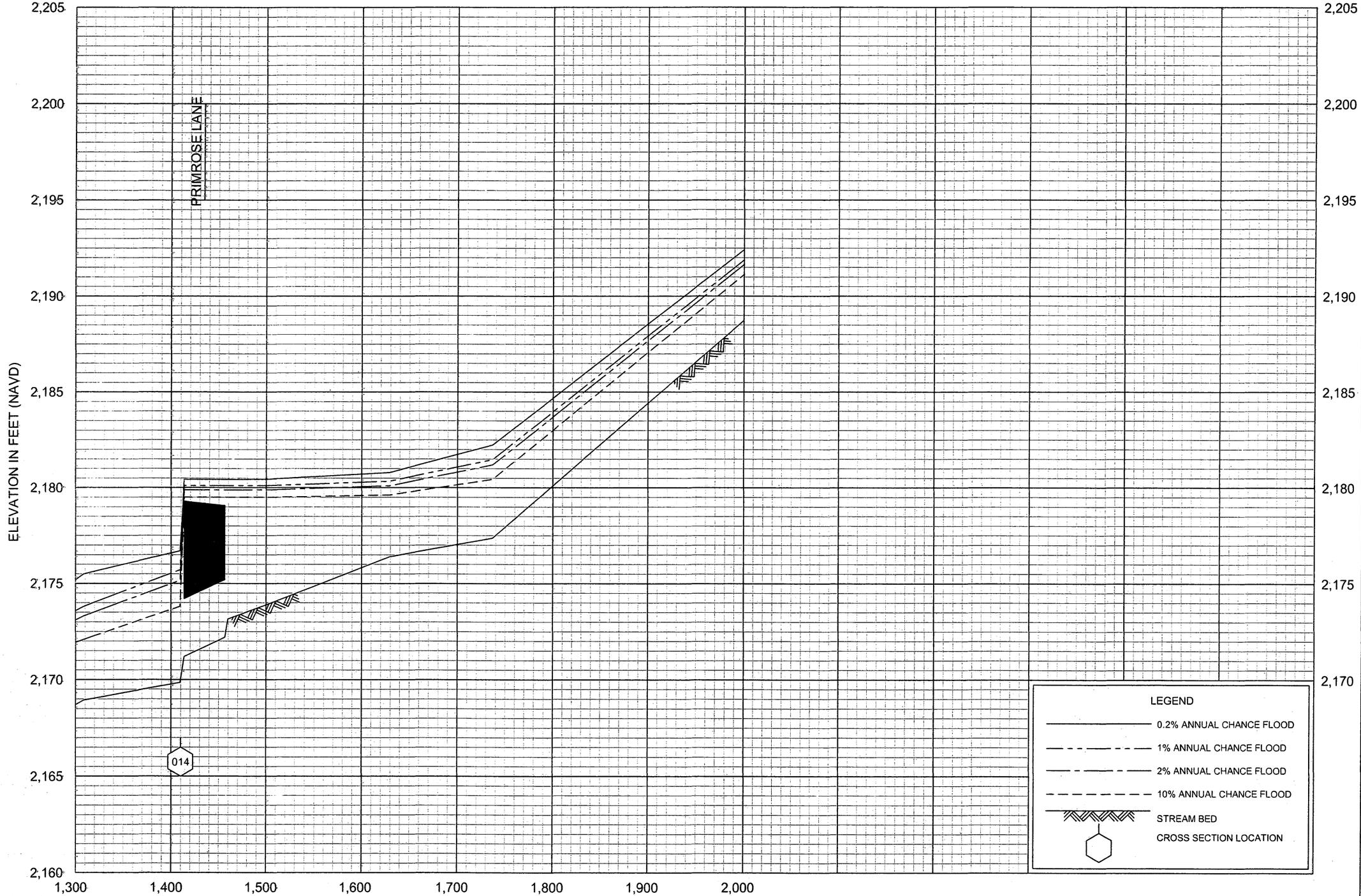
FLOOD PROFILES

SOUTH WASH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

50P



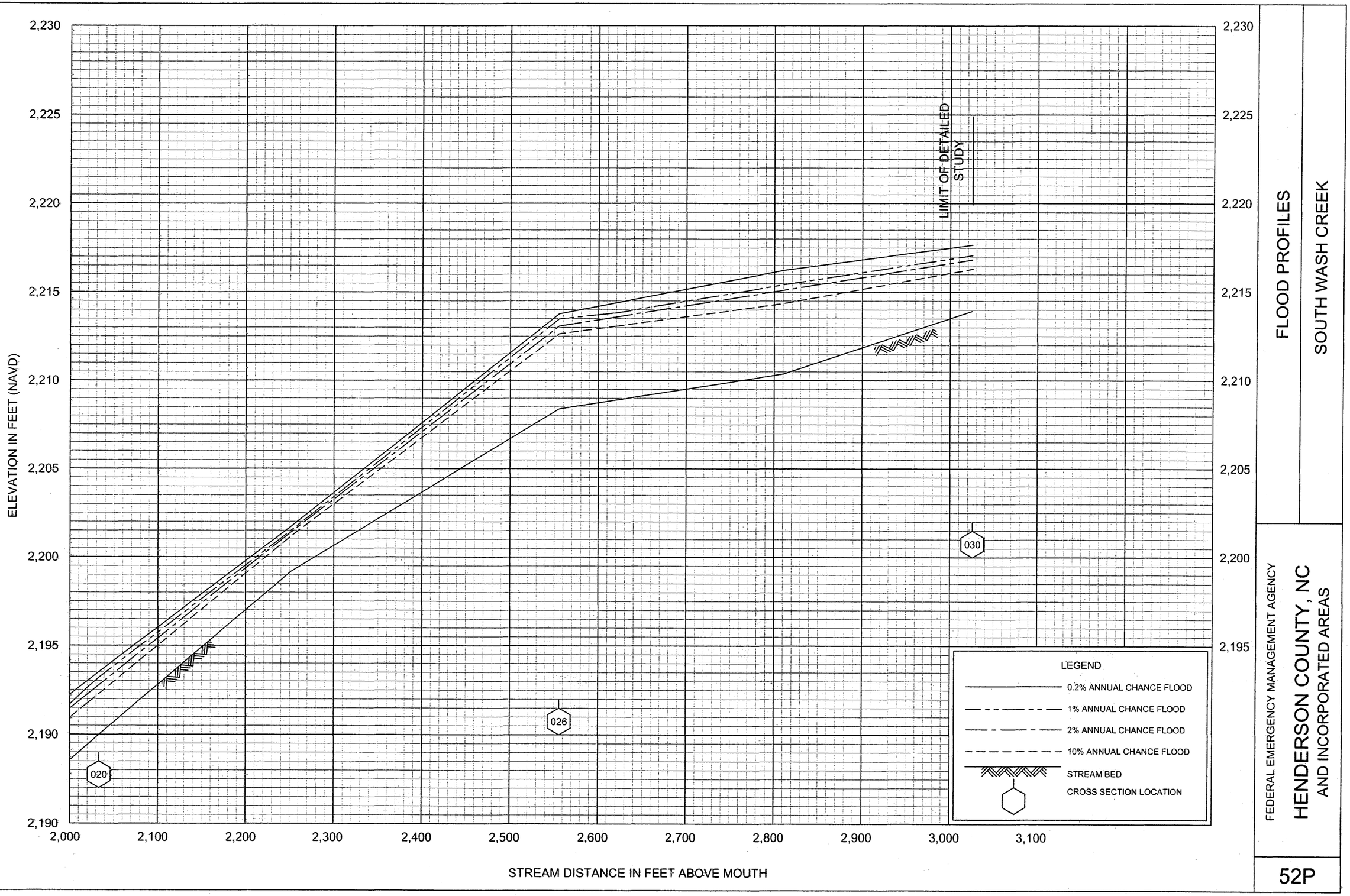
FLOOD PROFILES

SOUTH WASH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

51P



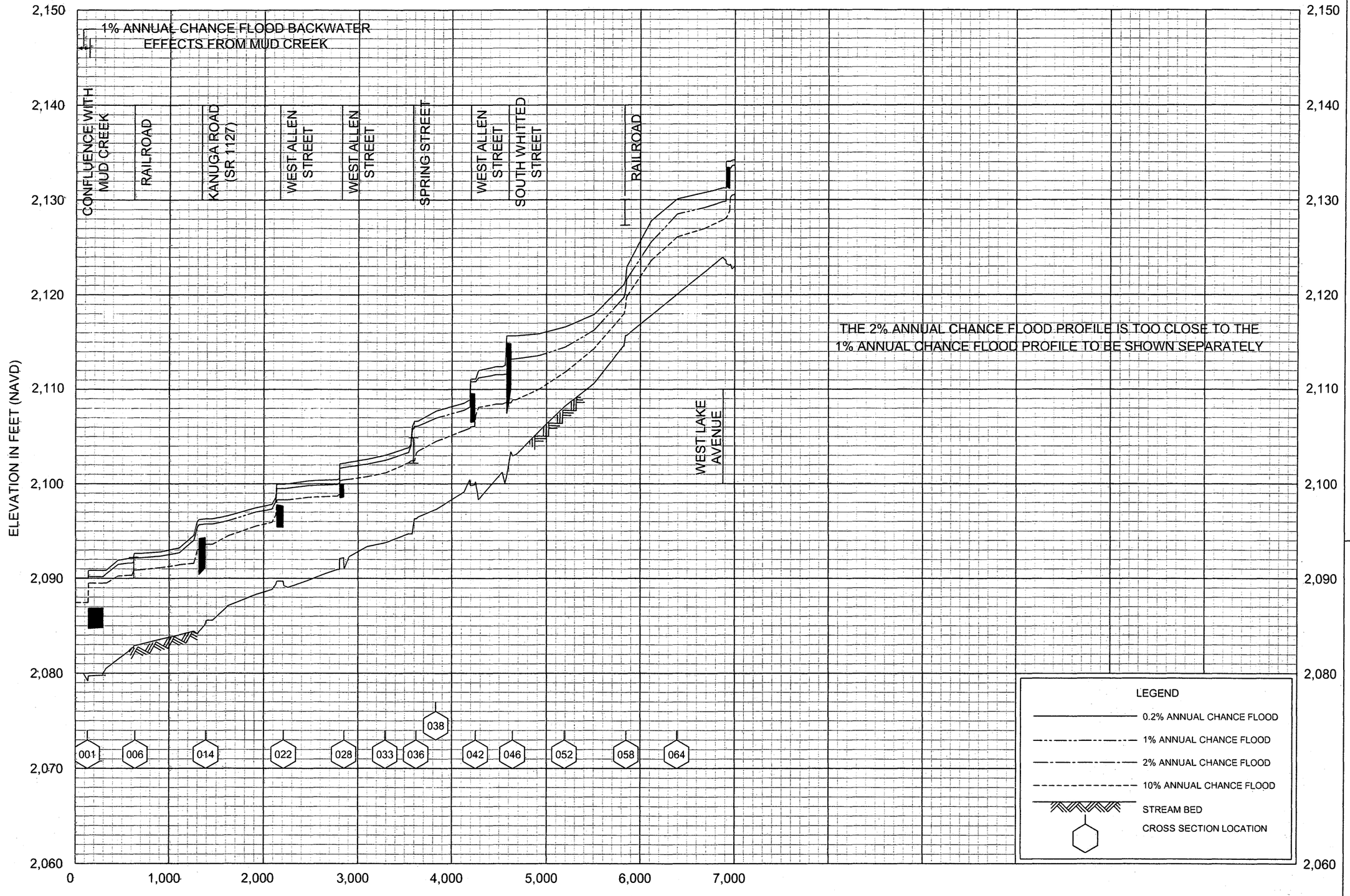
FLOOD PROFILES

SOUTH WASH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

52P



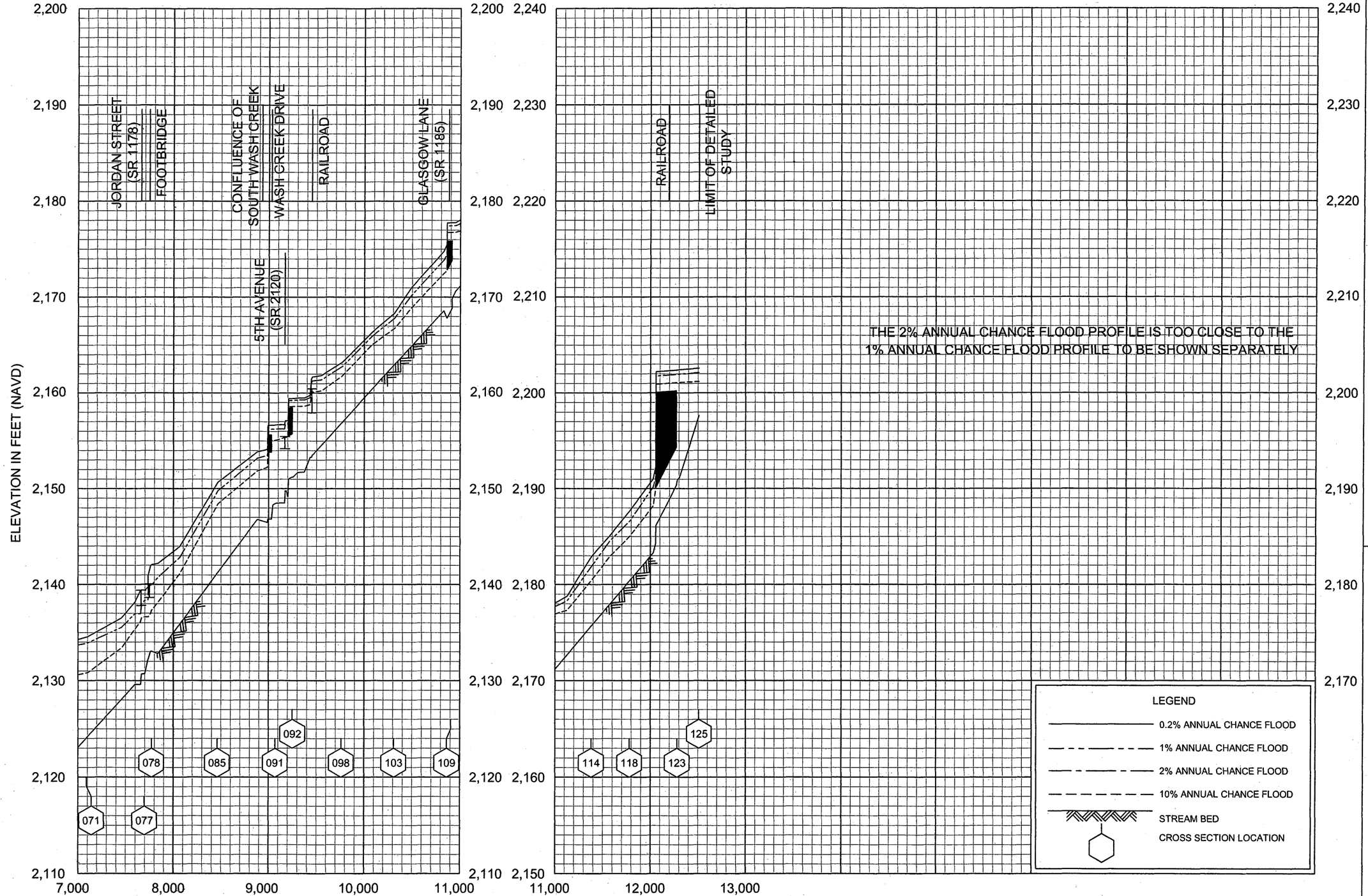
FLOOD PROFILES

WASH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

53P



FLOOD PROFILES

WASH CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

HENDERSON COUNTY, NC
AND INCORPORATED AREAS

54P