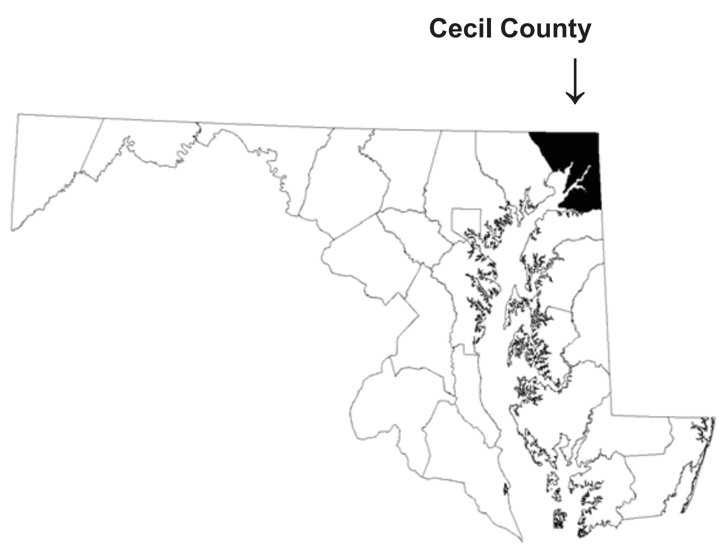
FLOOD INSURANCE STUDY

CECIL COUNTY, MARYLAND

AND INCORPORATED AREAS



Community Name	Community Number
CECIL COUNTY (UNINCORPORATED AREAS)	240019
*CECILTON, TOWN OF	240020
CHARLESTOWN, TOWN OF	240021
CHESAPEAKE CITY, TOWN OF	240099
ELKTON, TOWN OF	240022
NORTH EAST, TOWN OF	240023
PERRYVILLE, TOWN OF	240024
PORT DEPOSIT, TOWN OF	240025
RISING SUN, TOWN OF	240158

*No Special Flood Hazard Areas Identified

EFFECTIVE: JULY 8, 2013

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER:

24015CV000A

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) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

The Federal Emergency Management Agency (FEMA) may revise and republish part or all of this FIS report at any time. In addition, FEMA may revise part of this FIS report by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult with community officials and check the Community Map Repository to obtain the most current FIS report components.

Flood Insurance Rate Map panels for this community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways and cross sections). In addition, Flood Insurance Rate Map panels for this community contain new flood zone designations. The flood hazard zones have been changed as follows:

Old Zone(s)	New Zone
A1 – A30	AE
V1 – V30	VE
B	X
C	X

Initial Countywide FIS Effective Date: July 8, 2013

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FLOOD INSURANCE STUDY
CECIL COUNTY, MARYLAND AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and supersedes the FIS reports and/or Flood Insurance Rate Maps (FIRMs) in the geographic area of Cecil County, Maryland including the Towns of Cecilton, Charlestown, Chesapeake City, Elkton, North East, Perryville, Port Deposit, and Rising Sun, and the unincorporated areas of Cecil County (hereinafter referred to collectively as Cecil County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood nsurance rates. This information will also be used by Cecil County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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

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

1.2 Authority and Acknowledgements

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

This FIS was prepared to include the unincorporated areas of, and incorporated communities within, Cecil County in a countywide format FIS. The information on the authority and acknowledgments for previous FIS issued for each jurisdiction in Cecil County is as follows: The Flood Insurance Studies for the unincorporated areas of Cecil County, the Town of Charlestown, the Town of Chesapeake City, the Town of North East, and the Town of Rising Sun were prepared by the Flood Management Division of the Maryland Water Resources Administration of the State of Maryland, for the Federal Emergency Management Agency (FEMA) under Contract No. H-4621, and were completed in June 1980. The Flood Insurance Study for the Town of Elkton was prepared by the U.S. Army Corps of Engineers (USACE) for the Federal Emergency Management Agency under Inter-

Agency Agreement No. IAA-H-7-76, Project Order No. 20 and was completed in July 1978. The Flood Insurance Studies for the Towns of Perryville and Port Deposit were conducted by the Susquehanna River Basin Commission (SRBC) at the request of the Federal Insurance Administration, U. S. Department of Housing and Urban Development under Contract No. H-3496 and was completed in August 1976.

There is no previous FIS for the Town of Cecilton; therefore the previous authority and acknowledgement information for this community is not included in this FIS.

For this countywide FIS, revised hydrologic and hydraulic analyses were prepared for all streams except the Susquehanna River. The hydraulic analyses for the Susquehanna River was brought forward from the previous FIS. The revised analysis was completed by the USACE for the Maryland Department of Environment (MDE) as part of the FEMA Map Modernization Program (MMP) under Contract No. ICA-05-CRL-01. This study was completed in March 2009.

The hydrologic and hydraulic analysis for the Susquehanna River was completed by the State of Maryland, Water Resources Administration, Flood Management Division, for FEMA under contract H-4621. That work was completed in June 1980.

No new coastal hydraulic analysis was completed as part of this revision. Coastal hydraulics were brought forward from the previous studies. Coastal floodplain boundaries were delineated based on updated topography.

The base mapping for this revision was obtained from the National Aerial Imagery Program (NAIP). This data was flown at scale of 1:40000. The projection is Universal Transverse Mercator (UTM) Zone 18, and the horizontal datum is NAD 83. Differences in datum, spheroid, projection, or UTM zones used in the production of the FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdictional boundaries. These differences do not affect the accuracy of this FIRM.

1.3 Coordination

The purpose of the initial Consultation Coordination Officer (CCO) meeting is to discuss the scope of the study. A final CCO meeting is held to review the results of the study.

The initial CCO meetings were held for the previous studies. The unincorporated areas of Cecil County, the Town of Charlestown, the Town of Chesapeake City, and the Town of North East held their CCO meeting on March 6, 1978 and was attended by representatives of the State of Maryland, Water Resources Administration; and FEMA. Flood discharge information was coordinated with the U.S. Geological Survey (USGS), the National Oceanic and Atmospheric Administration; the U.S. Department of Agriculture, Soil Conservation Service (SCS): and USACE.

The initial CCO meeting for the previous study for the Town of Elkton was held on December, 16, 1975 and was attended by officials of the Town of Elkton, representatives of the USACE, the State of Maryland and FEMA.

The initial CCO meeting for this study was held on April 12, 2005 at the Maryland Department of Environment offices and attended by representatives of the Maryland Department of the Environment (MDE), FEMA, and the USACE (study contractor for this study).

Coordination with City officials and Federal, State, and regional agencies produced information pertaining to floodplain regulations, community maps, flood history, and other hydrologic data.

For this countywide study, a final CCO meeting was held on June 11, 2010. The meeting was attended by representatives of Cecil County, the Towns of Charleston, Chesapeake City, Elkton, North East, Perryville, and Port Deposit, the State NFIP Coordinator, USACE, and FEMA. The Town of Cecilton and the Town of Rising Sun did not attend the meeting.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Cecil County, Maryland, including all unincorporated areas of the county and the Towns of Cecilton, Charlestown, Chesapeake City, Elkton, North East, Perryville, Port Deposit, and the Town of Rising Sun.

The USACE was contracted to perform detailed studies on the same streams studied with detailed methods in the previous FIS, with the exception of the Susquehanna River. The selection of streams for detailed study in the previous FIS was made with priority given to all known flood hazard areas and areas of projected development and proposed construction through September 1984. All or portions of the flooding sources listed in Table 1 were studied by detailed methods. Limits of detailed study are indicated on the flood profiles (Exhibit 1) and the FIRMs (Exhibit 2).

Table 1: Flooding Sources Studied by Detailed Methods

Big Elk Creek	Northeast Creek
Christina River	Stone Run Tributary 1
Dogwood Run	Stone Run Tributary 2
Gravelly Run	Susquehanna River
Laurel Run	Unnamed Tributary to Laurel Run
Little Elk Creek	West Branch Christina River
Little Northeast Creek	West Branch Laurel Run
Mill Creek	

The USACE was contracted to perform approximate studies on the same streams studied using approximate methods in the previous FIS. For the previous FIS, areas to study using approximate analysis were chosen based on low development potential and/or flood risk. The flooding sources listed in Table 2 were studied by approximate methods.

Table 2: Flooding Sources Studied by Approximate Methods

Basin Run	Stone Run
Conowingo Creek	Stone Run Tributary 1
East Branch Laurel Run	Stone Run Tributary 2
Gramies Run	Stony Run
Gravelly Run	Susquehanna River
Laruel Run	Tributary 1 to Northeast River
Little Northeast Creek	Tributary 2 to Northeast River
Mill Creek	Tributary to Stony Run
Northeast Creek	Tributary to Susquehanna River
Octoraro Creek	West Branch Laurel Run
Perch Creek	West Branch Little Northeast Creek
Principio Run	

No Letters of Map Revision (LOMRs) were recorded for this countywide study.

2.2 Community Description

Cecil County is located in the northeastern corner of Maryland. It is bordered by the Susquehanna River and the Chesapeake Bay to the west, the Sassafras River to the south, the State of Pennsylvania to the north, and the State of Delaware to the east. Much of Cecil County is affected by tidal waters of Chesapeake Bay. The county is drained by the Susquehanna, the Northeast, the Elk, and the Sassafras Rivers. Land use is predominantly rural with some development on the floodplains of major rivers. Development of waterfront properties is extensive and is susceptible to storm damage from high winds and rising tides (Reference 1).

The population of Cecil County in 2010 was 101,108. The largest city in Cecil County, the Town of Elkton, had a 2010 population of 15,443 (Reference 2).

The topography of Cecil County is characterized by the rolling hills of the piedmont and the low, flat coastal plain. Piedmont elevations average approximately 300 feet and sometimes exceed 400 feet. Conversely, the coastal plain rarely exceeds 200 feet, averaging approximately 50 feet elevation (Reference 3).

The climate of Cecil County is characterized by well defined seasons with a large annual temperature range. The average January temperature for the Town of Elkton is 31°F, and the average July temperature is 72°F. Average precipitation for the Town of Elkton is 62 inches (References 1 and 4).

2.3 Principal Flood Problems

Floods in Cecil County unincorporated areas are usually caused by severe thunderstorms, rapidly rising tides from runoff, and occasional hurricanes. The Town of Elkton is also subject to fluvial flooding on Big Elk Creek (References 1 and 4).

In late June 1884, a series of thunderstorms ended a period of long drought and caused an estimated $70,000 in bridge damage throughout the county. A water-surface elevation of 14.3 feet was recorded on Elk Creek (Reference 5).

A hurricane brought 7.1 inches of rain on the Town of Elkton in a 48-hour period in August 1933. Little Elk Creek washed away a wall at the Elk Paper Manufacturing Company in Childs. The equipment at the company was under 3 feet of water. Two major highways were covered by 6 feet of water, and basements along Main Street had several inches of water. Piers weakened under the highway bridge over the Northwest River from heavy and rapid flow, casing the State Road Commissioner to close the road (Reference 6).

A severe thunderstorm on July 8, 1935, completely isolated the Town of Elkton. A bridge at mechanics Valley and Childs was washed out. The State road from Elkton to Glasgow was under 3 to 6 feet of water at the Big Elk Creek crossing (Reference 7).

In August 1937, heavy thunderstorms caused automobile traffic to come to a halt as a record 4.24 inches of rain fell in a 24-hour period at Elkton. Approximately 10,000 cars were held up in Elkton because small bridges had washed out, and all roads in a 25-mile radius southwest of Wilmington, Delaware, were inundated (Reference 8).

On September 20, 1945, a storm brought the highest water level to Elkton since the flood of August 1933. The rising Elk River washed out the bridge at the Elk Paper Manufacturing Company and came within a foot o the high-water mark of 1933 (Reference 9).

In October 1954, Tropical Storm Hazel struck the Eastern Shore and brought winds up to 100 miles per hour. As in 1933 and most major storms, the low lying Water and Conestoga Streets of the Town of Charlestown were inundated. Tidal surges reached within 1 foot of the Well Wood Yacht Club front porch along Water Street. The storm overtopped a USGS bench mark at the C.W. Thorn Jr. Boatyard which has an elevation of 7.41 feet (Reference 4 and 10).

On August 18, 1955, Hurricane Connie caused as estimated $100,000 damage to roads in Cecil County, $50,000 of which was done to bridges. Most road damage was to State Routes 272 and 280, north of U.S. Route 40. Newark Road, State Route 7, East Main Street at Farr Creek, and Walnut Lane in the Town of Elkton were flooded and closed for 7 hours. Approximately 1,000 customers of the Conowingo Power Company were without service for approximately 24 hours, and telephones were out in Elkton, North East, and Port Deposit. The Chesapeake and Delaware Canal rose 5 feet above normal high tide at Schaeffer's Wharf and covered the floor of a restaurant with 8 inches of water. A warehouse along the canal, usually 4 feet above the water surface, was flooded with 6 inches of water. Waterfront properties were extensively damaged, especially Hanford Owen's wharf at Perryville. Rising floodwaters from the Susquehanna River swept away piers, docks, gasoline tanks, and small vessels. Nearby, 3 feet of water rose inside many Charlestown Beach houses (Reference 11).

In August 1969, severe thunderstorms caused washouts on the Susquehanna River and flooding in the Havre de Grace, port Deposit, and Perryville. Unofficial records show storm totals of 6 inches in Port Deposit and 4 inches in a 2-hour period at Havre de Grace. A reported $100,000 in damage occurred in Port Deposit, as well as $50,000 in Havre de Grace (Reference 12).

In June 1972, Maryland experienced one of the most devastating floods in its history. Hurricane Agnes reportedly caused the deaths of 19 people, injured 57 others, and caused $80 million damage statewide. In Elkton, business property losses were nearly $300,000. North East reported $14,000 in damage. Conowingo Dam had a record flood stage height of 111.5 feet, 3 feet above its designated capacity. Big Elk Creek, one of the hardest hit areas, overflowed its banks and closed Delaware Avenue, Howard Street, Appleton Road and Rickets Mill road. Little Elk Creek flooded Newark Avenue. A huge washout on Northeast Creek severely damaged the Maudlin Avenue bridge. Basements along Main Street in Elkton were also flooded (Reference 12).

In July 1975, Hurricane Eloise caused a reported $24 million damage to the State of Maryland. Cecil County was among the 10 counties in the State listed as disaster areas which were eligible for Federal relief. Tidal creeks, such as the Elk River, overflowed their banks and caused business and residential districts to be evacuated in Elkton and Rising Sun (Reference 12).

Tropical Storm David, September 1979, caused water to inundate the C. W. Thorn Jr. boatyard to within 1 foot of the 1954 level. Water covered the floor of the boat house and pier damage was experienced due to overtopping (Reference 1).

Cecil County experienced major flooding on September 16th, 1999 due to heavy rain associated with Hurricane Floyd. Floyd started as a tropical depression on

September 2, 1999 east of the Lesser Antilles but was upgraded to a tropical storm on the 8th and a hurricane by the 10th of September. At its maximum intensity, Floyd was a Category 4 (Major) Hurricane on the Saffir-Simpson Scale. By the time Floyd made landfall in Cape Fear, North Carolina it had weakened to a Category 2 with maximum wind speeds of 104 mph. Flash flooding closed 62 roads, damaged 92 homes, 78 businesses and caused 300 people to be evacuated. Storm totals included 9 inches of rain in the town of North East and 6.57 inches at the Conowingo Dam. Damage in Cecil County reached $3 million (Reference 13).

On July 2, 2004 flash flooding occurred that was caused by a series of thunderstorms that passed through Cecil County. Five bridges were destroyed or closed and a total of $2 million in property damage was reported. Storm totals included 7.21 inches in Elkton and 3.74 inches in Conowingo (Reference 13).

Remnants of Hurricane Ivan caused an estimated $1 million dollars in property damage on September 18, 2004. Storm totals include 4.25 inches of rainfall in Elkton (Reference 13).

2.4 Flood Protection Measures

At the present time, no major flood control structures exist in Cecil County. However, minor flood protection is afforded by stormwater management ponds and channelization projects (Reference 1). A small channelization project was completed on a tributary that drains the northernmost portion of the Town of Charlestown. Several channelization projects exist within the Town of Elkton which aid in the control of floodwaters during storms. For the Towns of Perryville and Port Deposit, a number of upstream dams contribute to the reduction of flood hazards from the Susquehanna River.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community (Table 1), standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 1-percent annual chance flood in any 50-year period is approximately 40 percent (4 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

The previous FIS for Cecil County, Maryland included hydrologic analyses for the areas studied in detail. For all streams studied by detailed methods, except the Susquehanna River and Unnamed Tributary to Laurel Run, updated hydrologic data was produced as part of this revision. The new hydrologic analysis calculated revised 10-, 2-, 1-and 0.2-percent annual chance flows, along with 1-percent annual chance future flows based on ultimate development conditions. For this FIS update flows were also established for streams studied using approximate methods.

The Maryland Department of Environment contracted Dr. Glenn Moglen of the Department of Civil and Environmental Engineering at the University of Maryland to perform the updated hydrologic calculations for this FIS (Reference 14).

The current regional regression equations being used by the Maryland State Highway Administration were developed by Jonathan Dillow, a hydrologist for the USGS. Dillow defined regression equations for five hydrologic fixed regions: Appalachian Plateaus and Allegheny Ridges, Blue Ridge and Great Valley, Piedmont, Western Coastal Plain and Eastern Coastal Plain (Reference 15).

Dr. Moglen developed a new set of regression equations, called the fixed region regression equations, for the State of Maryland. The fixed region method used in his study is based on the predefined regions of Dillow since these regions are based on physiographic regions. Cecil County is located within the Eastern Coastal Plain, Western Coastal Plain, and Piedmont Regions.

The region regression equations for the Eastern Coastal Plain Region (Table 3) are based on 15 stations in Maryland and 9 stations in Delaware with drainage area (DA) ranging from 2.27 to 112.20 square miles, basin relief (BR) ranging from 5.1 to 43.5 feet, and percent A soils (S_A) ranging from 0.0 to 49.4 percent.

Basin relief is not statistically significant for discharges less than the 20 percent annual chance event but is included in the equations for consistency. The standard errors range from 33.7 percent (0.142 log units) for $Q_{1.50}$ to 50.8 percent (0.208 log units) for Q_{500}.

Table 3. Eastern Coastal Plain Fixed Region Regression Equations

Eastern Coastal Plain Fixed Region Regression Equation	Standard error (percent)	Equivalent years of record
$Q_{1.25} = 19.85\ DA^{0.796}\ BR^{0.066}\ (S_A+1)^{-0.106}$	34.2	4.5
$Q_{1.50} = 20.48\ DA^{0.795}\ BR^{0.156}\ (S_A+1)^{-0.140}$	33.7	4.1
$Q_{1.75} = 20.81\ DA^{0.799}\ BR^{0.197}\ (S_A+1)^{-0.146}$	34.2	4.1
$Q_{2} = 20.95\ DA^{0.803}\ BR^{0.222}\ (S_A+1)^{-0.144}$	34.9	4.1
$Q_{5} = 25.82\ DA^{0.793}\ BR^{0.368}\ (S_A+1)^{-0.190}$	36.9	6.8
$Q_{10} = 31.17\ DA^{0.777}\ BR^{0.439}\ (S_A+1)^{-0.215}$	38.2	9.5
$Q_{25} = 40.26\ DA^{0.751}\ BR^{0.511}\ (S_A+1)^{-0.242}$	40.0	13
$Q_{50} = 50.00\ DA^{0.732}\ BR^{0.549}\ (S_A+1)^{-0.261}$	41.7	16
$Q_{100} = 63.44\ DA^{0.711}\ BR^{0.576}\ (S_A+1)^{-0.279}$	44.0	18
$Q_{200} = 79.81\ DA^{0.689}\ BR^{0.601}\ (S_A+1)^{-0.296}$	46.5	19
$Q_{500} = 108.7\ DA^{0.660}\ BR^{0.628}\ (S_A+1)^{-0.316}$	50.8	21

The region regression equations for the Western Coastal Plain Region (Table 4) are based on the following parameters. The drainage (DA) ranges from 0.10 to 349.50 square miles, the 1985 impervious area (IA) ranges from 0.0 to 36.8 percent, and percent D soils (S_D) range from 2.5 to 26.4 percent. The standard errors range from 35.4 percent (0.149 log units) for Q_2 to 65.7 percent (0.260 log units) for Q_{100}.

Table 4. Western Coastal Plain Fixed Region Regression Equations

Western Coastal Plain Fixed Region Regression Equation	Standard error (percent)	Equivalent years of record
$Q_{1.25} = 18.62\ DA^{0.611}\ (IA+1)^{0.419}\ (S_D+1)^{0.165}$	38.9	3.2
$Q_{1.50} = 21.97\ DA^{0.612}\ (IA+1)^{0.399}\ (S_D+1)^{0.226}$	36.3	3.2
$Q_{1.75} = 24.42\ DA^{0.612}\ (IA+1)^{0.391}\ (S_D+1)^{0.246}$	35.6	3.4
$Q_{2} = 26.32\ DA^{0.612}\ (IA+1)^{0.386}\ (S_D+1)^{0.256}$	35.4	3.7
$Q_{5} = 42.64\ DA^{0.607}\ (IA+1)^{0.347}\ (S_D+1)^{0.340}$	36.3	6.8
$Q_{10} = 58.04\ DA^{0.603}\ (IA+1)^{0.323}\ (S_D+1)^{0.382}$	40.6	8.4
$Q_{25} = 86.25\ DA^{0.582}\ (IA+1)^{0.295}\ (S_D+1)^{0.421}$	48.9	9.3
$Q_{50} = 111.50\ DA^{0.584}\ (IA+1)^{0.270}\ (S_D+1)^{0.457}$	54.7	9.9
$Q_{100} = 143.56\ DA^{0.586}\ (IA+1)^{0.260}\ (S_D+1)^{0.469}$	65.7	9.0
$Q_{200} = 185.15\ DA^{0.580}\ (IA+1)^{0.243}\ (S_D+1)^{0.488}$	75.5	8.7
$Q_{500} = 256.02\ DA^{0.573}\ (IA+1)^{0.222}\ (S_D+1)^{0.510}$	89.8	8.3

The fixed region equations for the Piedmont Region are based on 34 rural stations and 16 urban stations in. Two sets of regression equations were developed for the rural and urban stations with urban stations having a 10 percent or greater impervious area and rural stations less than 10 percent. Across the two data sets, 9 stations were deleted as outliers: 01582510, 01583000, 01583495, 01583600, 01589000, 01589240, 01592000, 01650050, and 01650085. Therefore, 50 of the 59 stations in the Piedmont Region were used in developing the following two sets of equations. For rural equations, the drainage area (*DA*) ranges from 0.28 to 258.07 square miles and forest cover (*FOR*) ranges from 4.4 to 75.3 percent. For the urban equations, drainage area (*DA*) ranges from 0.39 to 102.05 square miles and impervious area (*IA*) ranges from 10.9 to 42.8 percent. Basin relief and channel slope are highly correlated with drainage area. Therefore, neither basin relief nor channel slope were used as significant parameters in this region.

Rural Equations

Standard errors range from 24.3 percent (0.104 log units for Q_{10} to 39.7 percent (0.166 log units) for Q_{500}. Table 5 lists the Piedmont (Rural) regression equations.

Table 5. Piedmont (Rural) Fixed Region Regression Equations

Piedmont (Rural) Fixed Region Regression Equations	Standard Error (Percent)	Equivalent Years of Record
$Q_{1.25} = 202.9\, DA^{0.682}\, (FOR+1)^{-0.222}$	39.0	3.3
$Q_{1.50} = 262.0\, DA^{0.683}\, (FOR+1)^{-0.217}$	33.8	3.8
$Q_{1.75} = 308.9\, DA^{0.679}\, (FOR+1)^{-0.219}$	32.1	4.3
$Q_2 = 349.0\, DA^{0.674}\, (FOR+1)^{-0.224}$	31.3	4.8
$Q_5 = 673.8\, DA^{0.659}\, (FOR+1)^{-0.228}$	25.6	14
$Q_{10} = 992.6\, DA^{0.649}\, (FOR+1)^{-0.230}$	24.3	23
$Q_{25} = 1556\, DA^{0.635}\, (FOR+1)^{-0.231}$	25.3	33
$Q_{50} = 2146\, DA^{0.624}\, (FOR+1)^{-0.235}$	27.5	37
$Q_{100} = 2897\, DA^{0.613}\, (FOR+1)^{-0.238}$	30.6	37
$Q_{200} = 3847\, DA^{0.603}\, (FOR+1)^{-0.239}$	34.2	35
$Q_{500} = 5519\, DA^{0.589}\, (FOR+1)^{-0.242}$	39.7	35

Urban Equations

For the urban equations (10 percent or greater impervious area), the standard errors range from 26.0 percent (0.111 log units) for Q_{25} to 41.7 percent (0.174 log units) for $Q_{1.25}$. Table 6 lists the Piedmont (Urban) regression equations.

Table 6. Piedmont (Urban) Fixed Region Regression Equations

Piedmont (Urban) Fixed Region Regression Equations	Standard Error (Percent)	Equivalent Years of Record
$Q_{1.25} = 17.85\, DA^{0.652}\, (IA+1)^{0.635}$	41.7	3.3
$Q_{1.50} = 24.66\, DA^{0.648}\, (IA+1)^{0.631}$	36.9	3.8
$Q_{1.75} = 30.82\, DA^{0.643}\, (IA+1)^{0.611}$	35.6	4.1
$Q_2 = 37.01\, DA^{0.635}\, (IA+1)^{0.588}$	35.1	4.5
$Q_5 = 94.76\, DA^{0.624}\, (IA+1)^{0.499}$	28.5	13
$Q_{10} = 169.2\, DA^{0.622}\, (IA+1)^{0.435}$	26.2	24
$Q_{25} = 341.0\, DA^{0.619}\, (IA+1)^{0.349}$	26.0	38
$Q_{50} = 562.4\, DA^{0.619}\, (IA+1)^{0.284}$	27.7	44
$Q_{100} = 898.3\, DA^{0.619}\, (IA+1)^{0.222}$	30.7	45
$Q_{200} = 1413\, DA^{0.621}\, (IA+1)^{0.160}$	34.8	44
$Q_{500} = 2529\, DA^{0.623}\, (IA+1)^{0.079}$	41.2	40

All calculations using the fixed region regression equations were preformed with GISHydro2000. GISHydro is a computer program used to assemble and evaluate hydrologic models for watershed analysis. Originally developed in the mid1980s, the program combines a database of terrain, land use, and soils data with specialized GIS tools for assembling data and extracting model parameters. The primary purpose of the GISHydro program is to assist engineers in performing watershed analyses in the State of Maryland. In the fall of 1997, a new collaborative project between the Department of Civil and Environmental Engineering at the University of Maryland and the Maryland State Highway Administration began to update and enhance GISHydro into GISHydro2000.

It should also be emphasized that these regression equations, although not developed by the USGS, provide better standard error performance than the current USGS regression equations for Maryland and also apply not just to rural but to both rural and urban watershed conditions. These equations were endorsed for use in Maryland by the Maryland Hydrology Panel as documented in their report which can be obtained from the Maryland State Highway Administration or from the following URL (Reference 14):

http://www.gishydro.umd.edu/HydroPanel/panel_report_101306.pdf

Peak flows for the Susquehanna River were brought forward from the previous FIS. These calculations were provided by the Susquehanna River Basin Commission. The flow values were extrapolated from discharge-frequency curves for stream gages in Harrisburg and Sunbury, Pennsylvania.

Peak flow data for the Unnamed Tributary to Laurel Run was taken from Letter of Map Revision (LOMR) Case 06-03-B926P.

Peak discharge-drainage area relationships for the selected recurrence intervals are shown in Table 7.

Table 7. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cubic feet per second)				
		10-percent annual chance	2-percent annual chance	1-percent annual chance	1-percent annual chance future	0.2-percent annual chance
BIG ELK CREEK						
At Conrail Railroad Tracks	57.05	6,923	13,478	17,332	19,615	29,589
Approximately 1900 feet downstream of Brewster Bridge Road	52.72	6,720	13,000	16,700	18,600	28,500
Approximately 400 feet upstream of Maryland/Pennsylvania border	43.49	6,420	12,500	16,100	16,300	27,600
CHRISTINA RIVER						
Approximately 2200 feet upstream of Maryland/Delaware border	3.8	1,100	1,900	2,500	*	3,800
At Maryland/Pennsylvania border	1.6	660	1,050	1,280	*	1,850
DOGWOOD RUN						
At mouth	1.63	405	1,022	1,442	1,527	3,010
Approximately 780 feet upstream of Dogwood Rd	1.06	298	703	972	1,114	1,978
Approximately 120 feet upstream of Singerly Road	0.53	254	575	782	862	1,530
GRAVELLY RUN						
At confluence with Little Elk Creek	1.15	330	797	1,111	1,316	2,281
LAUREL RUN						
At confluence with Little Elk Creek	4.46	753	1,773	2,412	2,697	4,676
LITTLE ELK CREEK						
At mouth	42.09	5,022	10,446	13,605	16,415	23,854
At Leeds Rd	24.96	4,020	7,890	10,200	10,600	17,800
Approximately 800 feet downstream of Blake Rd	13.88	3,040	6,080	7,930	7,970	14,000
LITTLE NORTHEAST CREEK						
At Mechanics Valley Road	18.23	2,861	5,892	7,713	9,289	13,709

* Data not available

Table 7. Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cubic feet per second)				
		10-percent annual chance	2-percent annual chance	1-percent annual chance	1-percent annual chance future	0.2-percent annual chance
MILL CREEK						
Approximately 900 feet upstream of Broad Street	5.29	1,314	3,203	4,442	4,798	8,969
Approximately 1200 feet downstream of Jackson Station Road	2.56	907	2,064	2,825	3,182	5,550
Approximately 300 feet upstream of Diamond Jim Road	1.14	645	1,390	1,850	2,010	3,440
NORTHEAST CREEK						
Approximately 1000 feet downstream of State Highway 7	44.9	3,971	7,887	10,242	10,528	17,835
At Chessie System Railroad Bridge	25	466	987	1,320	1,910	2,470
STONE RUN TRIBUTARY 1						
At East Main Street	1.41	689	1,460	1,950	2,370	3,640
STONE RUN TRIBUTARY 2						
At Main Street	1.52	625	1,440	1,990	2,280	3,970
SUSQUEHANNA RIVER						
At the confluence with Chesapeake Bay	27,500	460,000	680,000	780,000	*	1,200,000
UNNAMED TRIBUTARY TO LAUREL RUN						
At confluence with Laurel Run	*	74	140	176	*	284
WEST BRANCH CHRISTINA RIVER						
At Maryland/Delaware border	2.35	875	1,970	2,690	3,390	5,270
Brewster Bridge Rd	1.25	515	1,090	1,450	2,080	2,710
At Jackson Hall School Rd	0.42	251	544	735	1,050	1,410
WEST BRANCH LAUREL RUN						
At confluence with Laurel Run	2.05	316	772	1,071	1,072	2,151

* Data not available

No new coastal flood analysis was conducted for this revision. The effective coastal stillwater analysis and wave heights from the previous Flood Insurance Studies were brought forward from the previous FIS. The effective coastal flood elevations were converted from the National Geodetic Vertical Datum of 1929 (NGVD29) to the North American Vertical Datum of 1988 (NAVD88) as part of this revision.

Water-surface elevations were developed by VIMS using a unique storm surge model for the Chesapeake Bay (Reference 24). Specific input parameters developed by VIMS include bathymetric data recorded and coded for computer use, historical storm events analyzed for their probability of occurrence where known and unknown elevations were identifiable, astronomical tides (periodic rise and fall of the water surface resulting from gravitational interactions between the sun, moon, and earth) were mathematically described, and orthogonal segments were designed to describe coastal configurations. The model was verified and calibrated by known water-surface elevations and measured storm surges from field data and gage records.

The stillwater surge elevation is the elevation of the water due solely to the effects of the astronomical tides, storm surge, and wave setup on the water surface but does not include wave heights. The inclusion of wave heights, which is the distance from the trough to the crest of the wave, increases the water-surface elevations. The height of a wave is dependent upon wind speed and its duration, depth of water, and length of fetch. The wave crest elevation is the sum of the stillwater elevation and the portion of the wave height above the stillwater elevation. Wave heights and corresponding waved crest elevations were determined using the National Academy of Science (NAS) methodology (Reference 15).

It was determined that the highest possible surge would occur when a hurricane travels north along the Western Shore of the Chesapeake Bay. This will produce high southwesterly winds changing to westerly as the storm passes north of the region. Shorelines exposed to the southwesterly winds are the most likely to experience wave velocity effects in conjunction with high stillwater surge. For this reason, the wave height analysis was limited to southwesterly facing shorelines.

A summary of peak elevation-frequency relationships is shown in Table 8, "Summary of Stillwater Elevations."

Table 8: Summary of Stillwater Elevations

	Elevation (feet) NAVD88			
Flooding Source and Location	**10-percent annual chance**	**2 -percent annual chance**	**1 -percent annual chance**	**0.2- percent annual chance**
CHESAPEAKE BAY				
At Sassafras River	4.3	7.9	9.7	12.6
At Town of Perryville	4.5	8.8	10.7	13.8
NORTHEAST RIVER				
At Town of Charlestown	5.1	9.4	11.4	14.4
ELK RIVER				
At Turkey Point	4.7	8.7	10.6	13.6
At Town of Elkton	5.2	9.2	11.1	14.1
BOHEMIA RIVER				
At Elk River	4.9	8.9	10.8	13.8
BACK CREEK				
At Chesapeake and Delaware Canal Mooring Basin	5.2	9.2	11.1	14.1

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods for 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 table in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS report in conjunction with the data shown on the FIRM.

Updated hydraulic analysis was prepared for all streams other than the Susquehanna River. For the updated analysis, a Digital Elevation Model (DEM), which is a 3-D model of the ground surface, was created from LIDAR provided by the Maryland Department of Natural Resources. Cross sections for the hydraulic analyses were obtained from this DEM. For detailed study streams, below-water portions of the cross sections were either obtained from the previous FEMA hydraulic models, which in most cases were originally obtained by field survey, or estimated from the thalweg on the profile sheet in the effective FIS. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

The previous FEMA hydraulic models contained surveyed structural geometry and measurements for bridges and culverts. In an effort to identify any bridges/culverts that had been modified or added since the previous studies had been conducted, MDE provided the USACE with a database of bridge/culvert measurements and photographs. Information from the database/field investigation was from compared to the data from the previous hydraulic models. If no difference existed, the surveyed elevations and measurements from the previous model were used. If a difference existed or the bridge/culvert was not included in the previous model, the measurement information from the database/field investigation was used, and structural elevations were based off the DEM.

Additional channel, bridge/culvert, and other hydraulic model input data was obtained from effective LOMRs.

Water-surface elevations for floods of the selected recurrence intervals were computed through use of the USACE's HEC-RAS (Version 4.0) step-backwater computer program (Reference 18).

Starting water-surface elevations were calculated using the slope-area method for detailed study streams. Where the detailed study began at an existing structure with known backwater effects, the headwater elevation for each frequency flood was acquired from the effective FIS and used as the starting water surface elevation in the hydraulic analysis.

Channel and overbank roughness factors (Manning's "n" values) used in the original hydraulic computations were chosen by engineering judgment and were based on field inspection, aerial photography, or stream photographs. The range of values used for Manning's "n" values in this study is shown in Table 9, "Manning's "n" Values."

TABLE 9 – MANNING'S "n" VALUES

STREAM	CHANNEL "n"	OVERBANK "n"
Big Elk Creek	0.035-0.1	0.035-0.12
Christina River	0.03-0.045	0.07-0.12
Dogwood Run	0.04-0.1	0.06-0.1
Gravelly Run	0.04-0.045	0.1
Laurel Run	0.04	0.1
Little Elk Creek	0.035-0.11	0.04-0.12
Little Northeast Creek	0.04-0.045	0.1

TABLE 9 – MANNING'S "n" VALUES (Continued)

STREAM	CHANNEL "n"	OVERBANK "n"
Mill Creek	0.045-0.05	0.06-0.12
Northeast Creek	0.035-0.045	0.1-0.12
Stone Run Tributary 1	0.035	0.1
Stone Run Tributary 2	0.035	0.1
Susquehanna River	0.03	0.075
Unnamed Tributary to Laurel Run	0.04	0.1
West Branch Christina River	0.035	0.1-0.15
West Branch Laurel Run	0.04-0.045	0.07-0.1

The hydraulic analysis for the Susquehanna River was brought forward from the previous FIS. Water surface elevations of floods of selected recurrence intervals were computed using the USACE HEC-2 step backwater program. Cross sections for the flooding sources were obtained by field surveys. All hydraulic structures were surveyed to obtain elevation data and structural geometry. For this study, the computed water surface elevations were converted to the North American Vertical Datum of 1988 (NAVD 88).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail. The Susquehanna River was studied using effective hydraulics from the 1980 State of Maryland study (Reference 14).

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

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

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation (e.g., mounted in bedrock)

- Stability B: Monuments which generally hold their position/elevation (e.g., concrete bridge abutment)

- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below frost line)

- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

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

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

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

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was NGVD 29. With the completion of NAVD 88, many FIS reports and FIRMs are now prepared using NAVD 88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities. The vertical datum conversion factor from NGVD29 to NAVD88 for Cecil County is –0.83 feet.

NGVD 29 – 0.83 = NAVD 88

For more information on NAVD 88, see FEMA publication entitled, Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, or contact the National Geodetic Survey online (http:www.ngs.noaa.gov) or at the following address:

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 1-and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections the boundaries were interpolated using the triangulated irregular network discussed in Section 3.2.

The 1- and 0.2-percent annual chance floodplain boundaries are shown on the FIRMs (Exhibit 2). On this map, the 1_percent_annual_chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, and AE), and the 0.2_percent_annual_chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent annual chance floodplain boundaries are close together, only the 1-percent annual chance boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to the limitations of the map scale. For the streams studied by approximate methods only the 1-percent annual chance floodplain boundary is shown.

Floodplain boundaries for the Susquehanna River downstream of the Conowingo Dam were delineated based on the effective hydraulic model produced by the study referenced in Section 1.2. The effective flood elevations from this model were converted to NAVD 88 and used to identify floodplain boundaries based on the DEM referenced in Section 3.2. Floodplain boundaries for the Susquehanna River upstream of the Conowingo Dam were digitized and brought forward from the effective study.

For all other streams included in this report, the floodplain boundaries have been delineated based on a comparison of the flood elevations calculated at each cross section to the DEM. Between cross sections the boundaries were interpolated.

4.2 Floodways

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

The floodways presented in this study 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 10, "Floodway Data"). The computed floodways are shown on the Flood Boundary and Floodway Map or the revised FIRM (Exhibit 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway"elevations presented in Table 10 for certain downstream cross sections of Big Elk Creek, Dogwood Run, Gravelly Run, Little Elk Creek, Little Northeast Creek, and Susquehanna River are lower than the regulatory flood elevations in that area, which must take into account the 1-percent annual chance flooding due to backwater from other sources.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage, and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 10. In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplains will not cause more than a 1.0-foot increase in the BFEs at any point within the community

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

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Big Elk Creek								
A	3744 [1]	1,079	7,398	2.4	11.1	9.4 [2]	10.3	0.9
B	4739 [1]	330	3,282	5.4	12.1	12.1	12.9	0.8
C	5455 [1]	651	4,047	4.4	13.2	13.2	13.8	0.6
D	6133 [1]	1,051	7,227	2.5	13.8	13.8	14.8	1.0
E	6818 [1]	1,044	11,028	1.6	14.3	14.3	15.3	1.0
F	9158 [1]	2,042	19,087	0.9	14.6	14.6	15.6	1.0
G	11264 [1]	1,070	9,627	1.8	14.7	14.7	15.7	1.0
H	12131 [1]	814	6,373	2.8	15.1	15.1	16.1	1.0
I	13563 [1]	1,457	9,915	1.8	15.9	15.9	16.8	0.9
J	14638 [1]	635	6,865	2.6	19.5	19.5	20.5	1.0
K	15642 [1]	758	4,863	3.6	20.4	20.4	21.3	0.9
L	17426 [1]	776	5,494	3.2	24.0	24.0	24.9	0.9
M	19008 [1]	266	3,045	5.7	30.4	30.4	30.6	0.2
N	19470 [1]	862	7,872	2.2	31.6	31.6	31.8	0.2
O	20116 [1]	1,230	10,279	1.7	31.7	31.7	32.1	0.4
P	20555 [1]	1,221	10,407	1.7	31.7	31.7	32.2	0.5
Q	20845 [1]	1,065	8,502	2.0	31.8	31.8	32.3	0.5
R	21194 [1]	473	2,875	6.0	32.1	32.1	32.1	0.0
S	21427 [1]	160	1,879	9.2	34.0	34.0	34.1	0.1

[1]Stream distance in feet above confluence with Little Elk Creek

[2]Elevation computed without consideration of backwater effects

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

BIG ELK CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Big Elk Creek (Continued)								
T	23465 [1]	320	3,082	5.6	37.9	37.9	38.9	1.0
U	25233 [1]	667	4,242	4.0	40.6	40.7	41.6	0.9
V	25303 [1]	490	4,086	4.1	41.3	41.3	42.1	0.8
W	29196 [1]	406	3,236	5.2	48.4	48.4	49.3	0.9
X	30744 [1]	528	2,580	6.5	51.8	51.8	52.7	0.9
Y	32664 [1]	263	3,108	5.4	61.3	61.3	61.3	0.0
Z	34539 [1]	637	2,246	7.5	62.7	62.7	63.7	1.0
AA	34893 [1]	239	2,346	7.2	66.2	66.2	66.3	0.1
Christina River								
A	275 [2]	77	314	8.0	160.6	160.6	161.5	0.9
B	2939 [2]	68	355	6.4	180.0	180.0	180.4	0.4
C	4383 [2]	58	205	10.4	192.9	192.9	193.6	0.7
D	6728 [2]	115	429	4.7	209.7	209.7	210.6	0.9
E	9120 [2]	61	201	8.7	223.0	223.0	223.0	0.0
F	11192 [2]	53	260	6.2	236.7	236.7	237.7	1.0
G	12988 [2]	78	302	5.0	246.8	246.8	247.5	0.7
H	14428 [2]	140	323	4.4	258.1	258.1	258.3	0.2

[1]Stream distance in feet above confluence with Little Elk Creek

[2]Stream Distance in feet above Maryland/Delaware border

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

BIG ELK CREEK - CHRISTINA RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Dogwood Run								
A	186 [1]	32	170	8.5	21.7	14.4 [2]	14.8	0.4
B	1384 [1]	26	135	8.0	26.9	26.9	27.9	1.0
Gravelly Run								
A	767 [1]	100	210	4.8	49.4	48.9 [2]	49.9	1.0
B	1960 [1]	50	172	5.9	57.6	57.6	58.3	0.7
Laurel Run								
A	1306 [1]	130	320	7.5	40.7	40.7	41.3	0.6
B	2584 [1]	96	367	5.8	47.0	47.0	47.6	0.6
C	3788 [1]	180	732	2.9	52.3	52.3	52.8	0.5
D	4464 [1]	48	306	6.9	55.2	55.2	56.0	0.8
E	5448 [1]	116	608	3.5	59.2	59.2	60.0	0.8

[1]Stream distance in feet above confluence with Little Elk Creek

[2]Elevation computed without consideration of backwater effects

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

DOGWOOD RUN - GRAVELLY RUN - LAUREL RUN

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Elk Creek								
A	1274 [1]	1,269	6,570	2.1	11.1	4.7 [2]	5.6	0.9
B	2319 [1]	964	5,859	2.3	11.1	6.8 [2]	7.3	0.5
C	2854 [1]	781	4,659	2.9	11.1	7.1 [2]	7.5	0.4
D	5962 [1]	1,300	8,420	1.6	11.1	8.3 [2]	9.1	0.8
E	7472 [1]	1,382	8,507	1.5	11.1	8.6 [2]	9.6	1.0
F	8245 [1]	1,495	8,531	1.5	11.1	8.9 [2]	9.9	1.0
G	9514 [1]	317	3,150	4.0	14.0	14.0	14.0	0.0
H	10159 [1]	451	4,553	2.7	15.0	15.0	15.0	0.0
I	11657 [1]	418	3,992	3.1	16.2	16.2	16.6	0.4
J	12966 [1]	532	3,849	3.3	19.0	19.0	20.0	1.0
K	14047 [1]	610	4,097	3.0	20.6	20.6	21.4	0.8
L	24875 [1]	505	2,422	4.8	38.7	38.7	39.7	1.0
M	27348 [1]	360	1,872	5.2	46.2	46.2	46.6	0.4
N	28976 [1]	600	3,369	3.3	49.3	49.3	50.1	0.8
O	30000 [1]	610	3,339	3.1	52.7	52.7	53.5	0.8
P	31069 [1]	435	2,029	5.2	58.0	58.0	59.0	1.0

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

[2]Elevation computed without consideration of backwater effects

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE ELK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Little Northeast Creek								
A	527[1]	97	877	8.9	37.4	35.8[3]	36.6	0.8
B	753[1]	100	1,042	7.5	37.9	37.9	38.3	0.4
C	2,260[1]	130	1,092	7.1	41.1	41.1	41.9	0.8
D	3,939[1]	277	1,193	6.5	49.7	49.7	49.8	0.1
E	4,034[1]	300	1,889	4.1	53.1	53.1	53.4	0.3
F	5,760[1]	342	1,074	6.8	57.3	57.3	57.7	0.4
G	7,013[1]	600	2,046	3.6	65.7	65.7	65.8	0.1
H	8,563[1]	109	701	10.0	73.7	73.7	74.4	0.7
I	9,253[1]	121	708	10.0	79.1	79.1	79.1	0.0
Mill Creek								
A	2,349[2]	220	680	6.9	21.3	21.3	21.7	0.4
B	2,584[2]	292	1,136	4.1	23.8	23.8	24.8	1.0
C	2,660[2]	310	1,475	3.2	25.8	25.8	26.7	0.9
D	3,132[2]	113	411	11.4	29.1	29.1	29.3	0.2
E	3,710[2]	450	1,593	2.9	35.5	35.5	36.5	1.0
F	4,078[2]	56	1,949	5.3	44.9	44.9	44.9	0.0
G	4,920[2]	200	922	4.8	45.9	45.9	46.1	0.2
H	5,144[2]	245	1,252	3.6	46.7	46.7	47.5	0.8
I	6,301[2]	270	789	3.2	51.3	51.3	52.0	0.7

[1] Stream distance in feet above confluence with Northeast Creek
[2] Stream distance in feet above confluence with Chesapeake Bay
[3] Elevation computed without consideration of backwater effects

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD
AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE NORTHEAST CREEK - MILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mill Creek (Continued)								
J	7,468	275	741	4.6	60.5	60.5	61.4	0.9
K	8,349	480	1,870	1.8	69.2	69.2	70.2	1.0
L	9,288	200	540	6.3	75.5	75.5	75.9	0.4
M	10,126	450	1,277	2.7	82.8	82.8	83.4	0.6
N	11,567	56	273	12.5	97.3	97.3	97.3	0.0
O	11,767	68	780	4.8	105.5	105.5	105.5	0.0
P	12,126	310	2,295	1.5	107.1	107.1	107.1	0.0
Q	13,540	290	600	5.7	117.0	117.0	117.0	0.0
R	14,704	100	394	8.2	131.5	131.5	131.9	0.4
S	15,687	85	386	8.3	144.3	144.3	144.9	0.6
T	16,746	85	424	6.7	156.8	156.8	157.8	1.0

[1]Stream distance in feet above confluence with Chesapeake Bay

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD
AND INCORPORATED AREAS

FLOODWAY DATA

MILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mill Creek (continued)								
U	16,856[1]	145	743	3.8	162.9	162.9	163.8	0.9
V	17,117[1]	68	268	10.6	164.0	164.0	164.2	0.2
W	17,386[1]	205	1,937	1.5	175.2	175.2	176.0	0.8
X	17,579[1]	70	365	7.7	175.3	175.3	175.6	0.3
Y	18,962[1]	98	468	6.0	189.3	189.3	190.3	1.0
Z	20,578[1]	94	256	9.3	216.1	216.1	216.6	0.5
AA	20,648[1]	120	489	4.9	220.2	220.2	221.1	0.9
AB	21,204[1]	33	176	13.6	232.5	232.5	232.5	0.0
AC	21,255[1]	49	344	7.0	235.6	235.6	236.2	0.6
AD	21,347[1]	41	190	12.6	237.6	237.6	237.6	0.0
AE	21,755[1]	45	544	5.5	267.2	267.2	267.2	0.0
AF	22,325[1]	95	289	8.3	278.0	278.0	278.6	0.6
AG	22,785[1]	180	387	6.2	284.5	284.5	285.0	0.5
Northeast Creek								
A	1,531[2]	285	1,844	7.7	13.1	13.1	14.1	1.0
B	1,684[2]	290	2,475	5.7	15.4	15.4	16.1	0.7
C	1,855[2]	315	3,578	3.9	17.6	17.6	18.6	1.0
D	3,698[2]	130	1,415	9.9	19.0	19.0	19.8	0.8
E	3,753[2]	125	1,431	9.8	10.8	10.8	21.2	0.4

[1] Stream distance in feet above confluence with Chesapeake Bay

[2] Stream distance in feet above State Route 7

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD
AND INCORPORATED AREAS

FLOODWAY DATA

MILL CREEK – NORTHEAST CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Northeast Creek (Continued)								
F	4315 [1]	230	2,289	6.1	22.8	22.8	23.1	0.3
G	4569 [1]	157	1,431	9.8	23.3	23.3	23.5	0.2
H	4741 [1]	207	1,987	7.1	35.2	35.2	35.2	0.0
I	6127 [1]	805	5,933	2.4	37.4	37.4	37.4	0.0
J	6919 [1]	162	1,925	8.7	37.2	37.2	37.4	0.2
K	7162 [1]	151	2,839	7.1	40.3	40.3	40.3	0.0
L	8566 [1]	110	901	11.4	48.9	48.9	49.0	0.1
M	9726 [1]	87	674	15.2	63.2	63.2	63.3	0.1
N	10099 [1]	54	558	18.4	72.4	72.4	72.4	0.0
Stone Run Tributary 1								
A	897 [2]	140	488	6.7	276.2	276.2	276.6	0.4
B	1912 [2]	50	319	10.0	282.6	282.6	283.4	0.8
C	3874 [2]	114	417	7.7	293.4	293.4	293.6	0.2
D	3998 [2]	155	1,874	1.7	303.0	303.0	303.0	0.0
E	4419 [2]	175	1,122	2.9	303.0	303.0	303.1	0.1
F	4515 [2]	175	996	3.2	302.9	302.9	303.4	0.5
G	4783 [2]	125	703	4.6	303.0	303.0	303.5	0.5
H	4912 [2]	90	361	8.9	306.7	306.7	307.5	0.8

[1]Stream distance in feet above State Route 7

[2]Stream distance in feet above confluence with Stone Run

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

NORTHEAST CREEK- STONE RUN TRIBUTARY 1

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Stone Run Tributary 1 (Continued)								
I	6310 [1]	190	806	2.8	315.1	315.1	315.8	0.7
J	9641 [1]	125	496	3.9	339.4	339.4	340.4	1.0
K	10805 [1]	22	73	10.3	359.0	359.0	359.1	0.1
Stone Run Tributary 2								
A	632.4494 [1]	100	297	6.7	277.6	277.6	278.1	0.5
B	943.5313 [1]	87	530	3.75	282.8	282.8	283.7	0.9
C	2002.508 [1]	80	258	7.72	295.0	295.0	295.2	0.2
D	3031.687 [1]	75	277	7.19	305.4	305.4	305.5	0.1
Susquehanna River								
A	10286 [2]	5,010	114,491	6.8	10.7	7.6 [3]	8.2	0.6
B	14236 [2]	4,200	109,192	7.1	10.7	8.8 [3]	9.3	0.5
C	17498 [2]	4,555	126,224	6.2	10.7	9.8 [3]	10.2	0.4
D	21411 [2]	4,563	116,906	6.7	10.7	10.5 [3]	10.9	0.4
E	25463 [2]	3,979	73,360	10.2	11.6	11.6	11.9	0.3
F	27483 [2]	4,255	84,157	9.2	13.4	13.4	13.6	0.2

[1]Stream distance in feet above confluence with Stone Run

[2]Stream distance in feet above confluence with Chesapeake Bay

[3]Elevation computed without consideration of backwater effects

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

STONE RUN TRIBUTARY 1 - STONE RUN TRIBUTARY 2 SUSQUEHANNA RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Susquehanna River (Continued)								
G	28315 [1]	4,355	106,594	7.3	14.3	14.3	14.5	0.2
H	30550 [1]	4,011	82,982	9.4	14.9	14.9	15.1	0.2
I	32950 [1]	3,291	65,008	12.0	16.4	16.4	16.5	0.1
J	34210 [1]	3,132	51,834	15.0	17.3	17.3	17.4	0.1
K	36180 [1]	3,146	67,286	11.6	21.4	21.4	21.7	0.3
L	37900 [1]	3,011	69,511	11.2	23.1	23.1	23.3	0.2
M	40910 [1]	3,066	75,340	10.3	25.5	25.5	25.7	0.2
N	43170 [1]	2,613	65,522	11.9	26.7	26.7	26.9	0.2
O	47480 [1]	2,528	65,980	11.8	29.4	29.4	29.5	0.1
P	49125 [1]	2,597	61,994	12.6	33.6	33.6	33.7	0.1
Q	49845 [1]	3,226	88,884	8.8	36.8	36.8	37.1	0.3
Unnamed Tributary to Laurel Run								
A	480 [2]	18	40	4.35	41.8	41.8	41.9	0.1
B	1019 [2]	17	30	5.83	47.2	47.2	47.3	0.1
C	1407 [2]	21	34	5.1	52.1	52.1	52.2	0.1

[1]Stream distance in feet above confluence with Chesapeake Bay

[2]Stream Distance in feet above confluence with Laurel Run

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

SUSQUEHANNA RIVER- UNNAMED TRIBUTARY TO LAUREL RUN

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
West Branch Christina River								
A	388 [1]	135	520	5.0	106.7	106.7	106.9	0.2
B	1667 [1]	85	400	6.5	110.7	110.7	111.7	1.0
C	3399 [1]	81	323	5.3	117.0	117.0	118.0	1.0
D	4317 [1]	195	634	2.7	121.7	121.7	122.6	0.9
E	5791 [1]	110	484	3.5	128.3	128.3	128.5	0.2
F	5884 [1]	210	510	3.3	127.8	127.8	128.7	0.9
G	6604 [1]	120	418	4.1	130.0	130.0	130.9	0.9
H	7609 [1]	85	275	6.2	134.0	134.0	134.9	0.9
I	8705 [1]	60	206	7.03	138.4	138.4	139.4	1.0
J	9942 [1]	63	292	4.97	144.9	144.9	145.9	1.0
K	10341 [1]	270	1,071	1.35	149.3	149.3	149.4	0.1
L	10684 [1]	320	633	2.29	149.5	149.5	149.6	0.1
M	11185 [1]	255	1,019	1.42	152.8	152.8	152.8	0.0
N	12261 [1]	35	183	7.92	155.1	155.1	155.5	0.4
O	13077 [1]	76	458	2.88	158.1	158.1	159.1	1.0
P	13561 [1]	36	180	6.63	158.4	158.4	159.2	0.8
Q	13933 [1]	35	160	7.43	160.0	160.0	160.8	0.8
R	14714 [1]	43	199	5.99	162.5	162.5	163.5	1.0
S	16094 [1]	54	218	5.45	166.7	166.7	167.2	0.5

[1]Stream distance in feet above Maryland/Delaware border

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

WEST BRANCH CHRISTINA RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
West Branch Christina River (Continued)								
T	16521 [1]	33	170	7.0	169.1	169.1	170.0	0.9
U	17067 [1]	43	178	5.2	171.4	171.4	172.2	0.8
V	18155 [1]	65	193	3.8	179.2	179.2	179.9	0.7
W	19531 [1]	123	186	3.9	189.2	189.2	189.6	0.4
X	19815 [1]	35	114	6.5	192.9	192.9	193.6	0.7
West Branch Laurel Run								
A	513 [2]	40	163	5.4	63.9	63.9	64.9	1.0
B	1821 [2]	35	154	5.7	69.0	69.0	69.7	0.7
C	2764 [2]	40	199	4.4	74.3	74.3	75.2	0.9

[1]Stream distance in feet above Maryland/Delaware border

[2]Stream distance in feet above confluence with Laurel Run

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD AND INCORPORATED AREAS

FLOODWAY DATA

WEST BRANCH CHRISTINA RIVER
WEST BRANCH LAUREL RUN

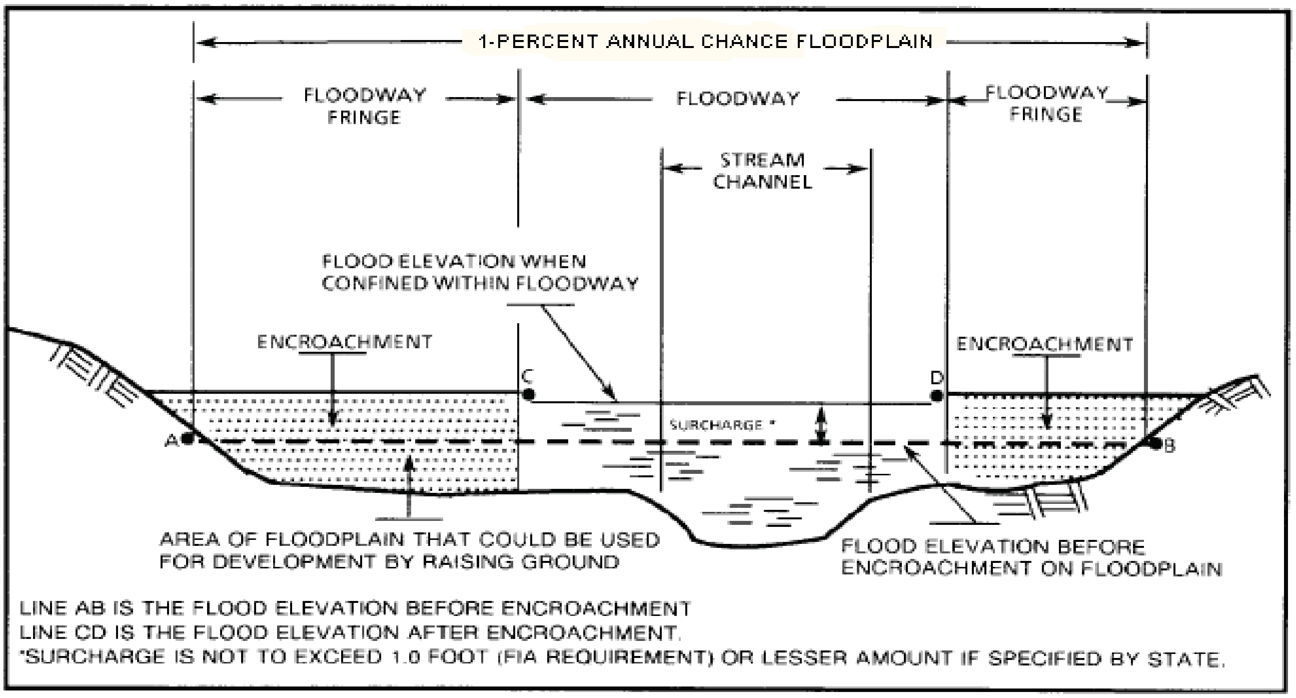

Figure 1 – Floodway Schematic

5.0 INSURANCE APPLICATIONS

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

Zone A:

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

Zone AE:

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

Zone VE:

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

Zone X:

Zone X is the flood insurance risk zone that corresponds to areas outside the 0.2-percent annual chance floodplain, areas within the 0.2-percent annual chance floodplain, areas of 1-percent annual chance flooding where average depths are less than 1 foot, areas of 1-percent annual chance flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 1-percent annual chance flood by levees. No BFEs or base flood depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

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

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

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent annual chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The current FIRM presents flooding information for the entire geographic area of Cecil County. Previously, separate Flood Hazard Boundary Maps and/or FIRMs were prepared for each incorporated community with identified flood hazard areas and the unincorporated areas of the county. Historical map dates relating to pre-countywide maps prepared for each community are presented in Table 10, "Community Map History."

7.0 OTHER STUDIES

This FIS report either supersedes or is compatible with all previous studies on streams studied in this report and should be considered authoritative for purposes of the NFIP.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Flood Insurance and Mitigation Division, Federal Emergency Management Agency, One Independence Mall, Sixth floor, 615 Chestnut Street, Philadelphia, PA 19106-4404.

COMMUNITY NAME	INITIAL NFIP MAP DATE	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	INITIAL FIRM DATE	FIRM REVISIONS DATE
Cecil County (Unincorporated Areas)	July 18, 1975	None	April 4, 1983	September 5, 1984 December 4, 1986 January 3, 1997
Charlestown, Town of	September 20, 1974	December 19, 1975	November 17, 1982	None
Chesapeake City, Town of	September 13, 1974	February 20, 1976	October 15, 1981	None
Elkton, Town of	February 15, 1974	December 19, 1975	March 18, 1980	June 16, 1992
North East, Town of	February 7, 1975	None	October 15, 1981	None
Perryville, Town of	March 18, 1974	None	March 1, 1977	March 5, 1990 September 30, 1992
Port Deposit, Town of	August 9, 1974	None	August 16, 1976	February 16, 1977
Rising Sun, Town of	January 14, 1977	None	May 15, 1986	None

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD
AND INCORPORATED AREAS

TABLE 11: COMMUNITY MAP HISTORY

9.0 BIBLIOGRAPHY AND REFERENCES

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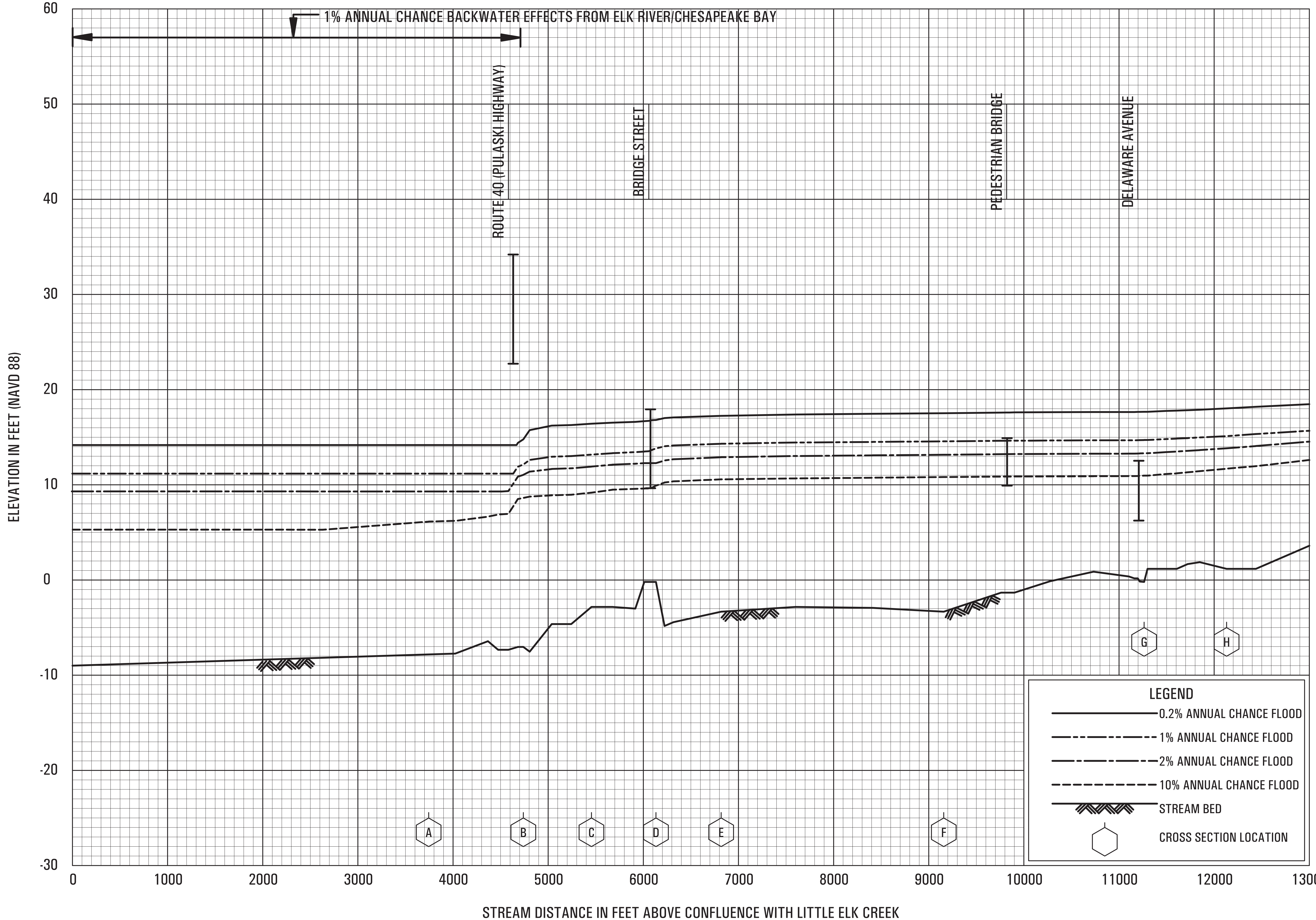


FLOOD PROFILES

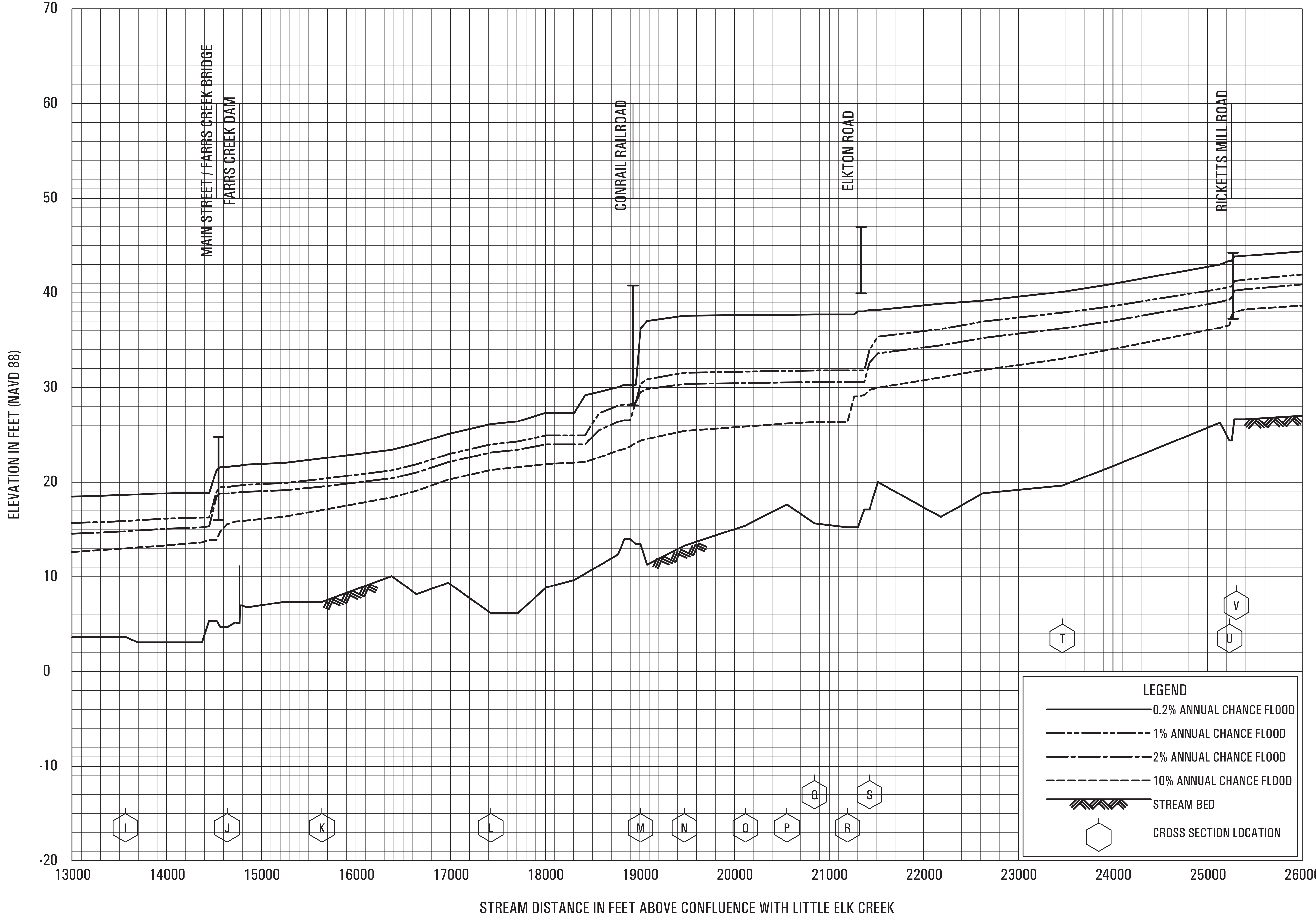
BIG ELK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

01P



FLOOD PROFILES

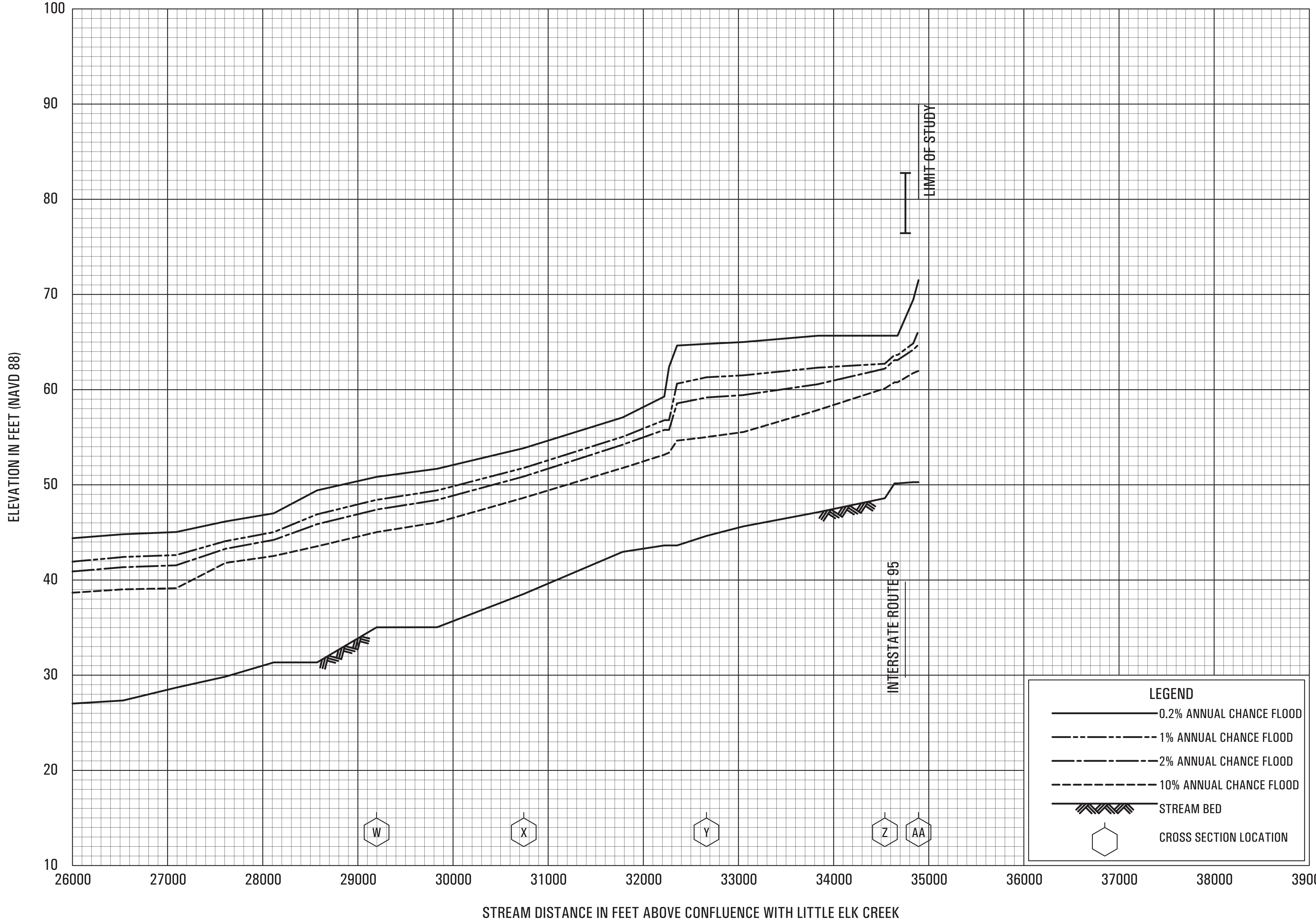
BIG ELK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

02P



FLOOD PROFILES

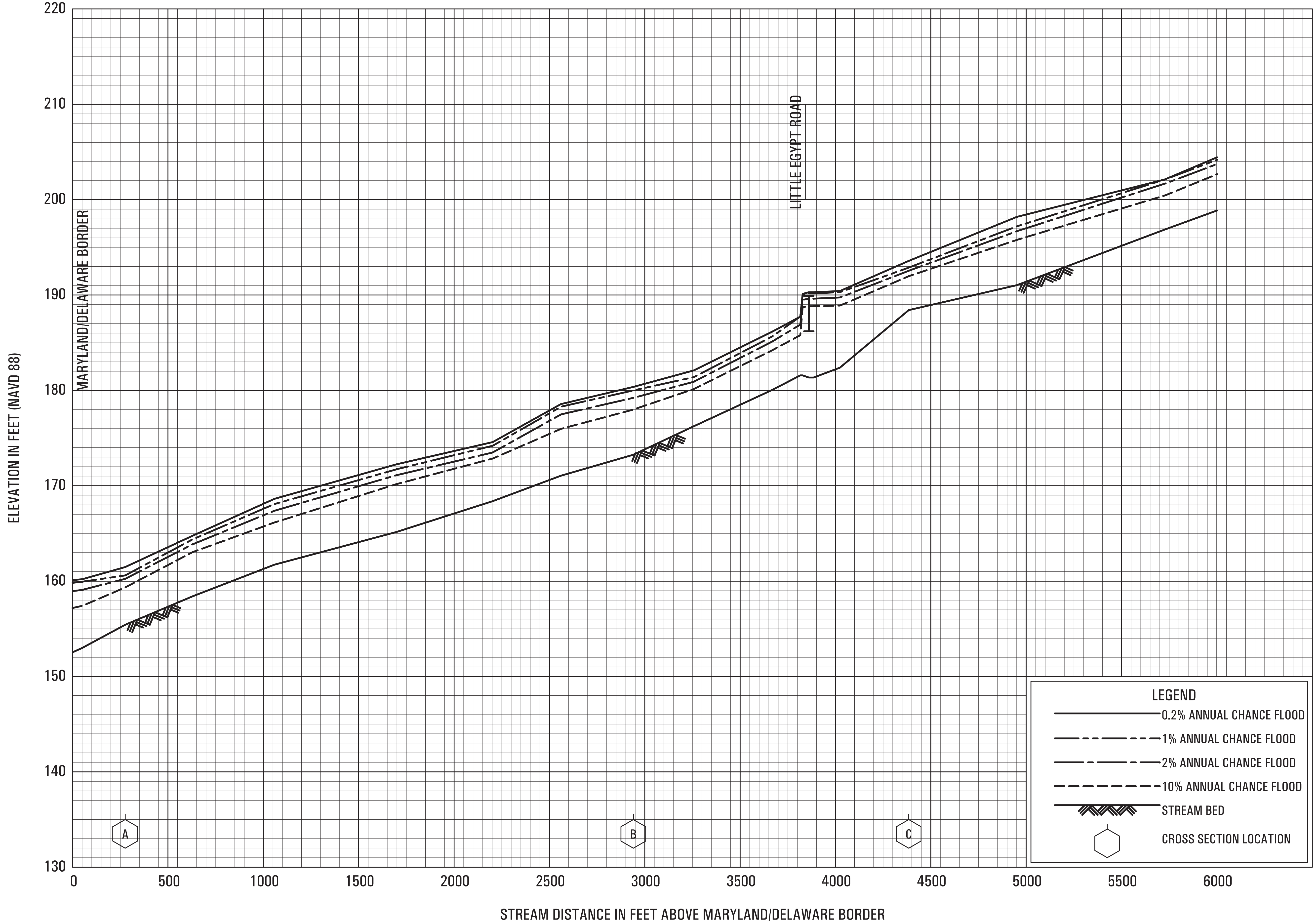
BIG ELK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

03P



FLOOD PROFILES

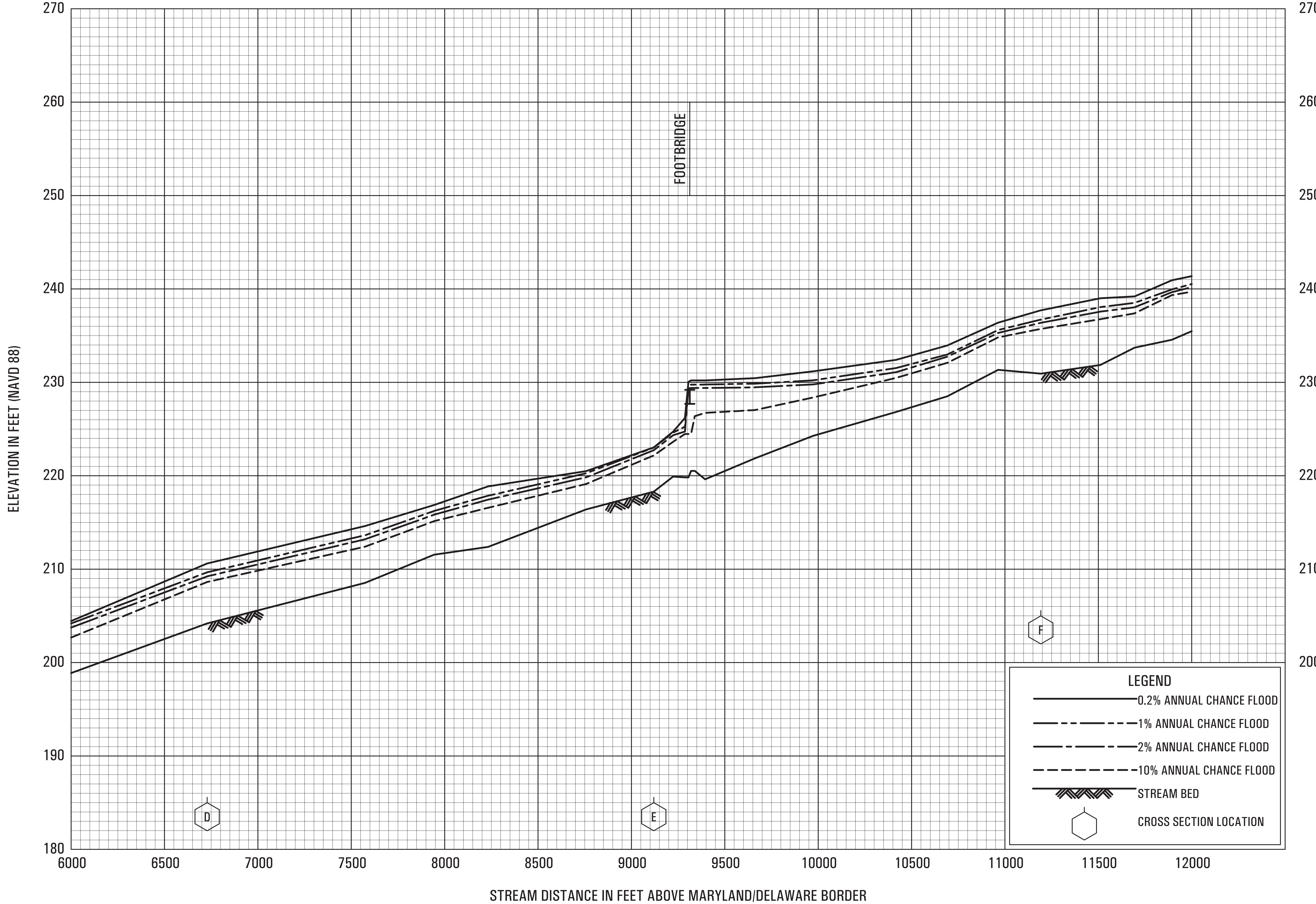
CHRISTINA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

04P



FLOOD PROFILES

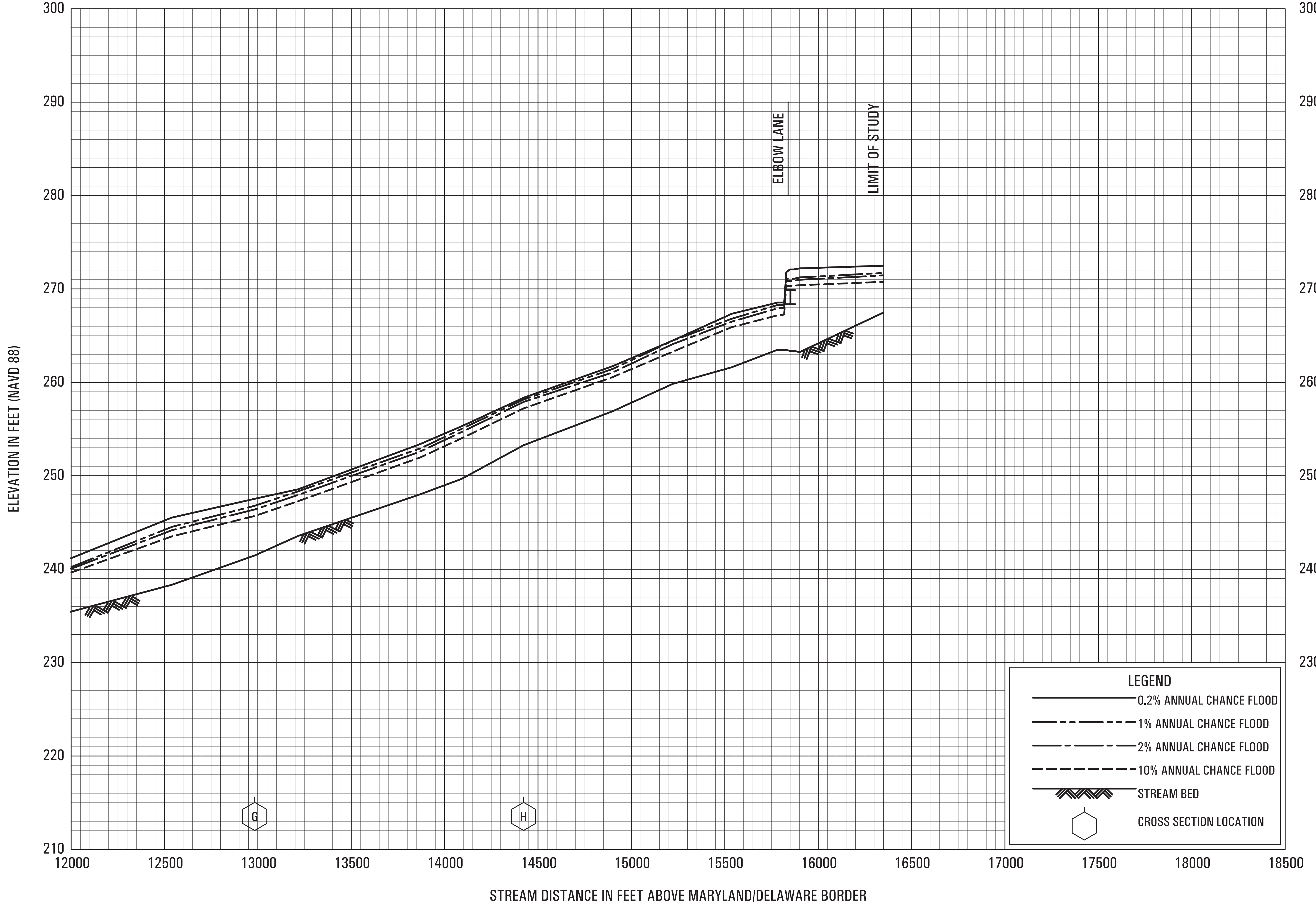
CHRISTINA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

05P



FLOOD PROFILES

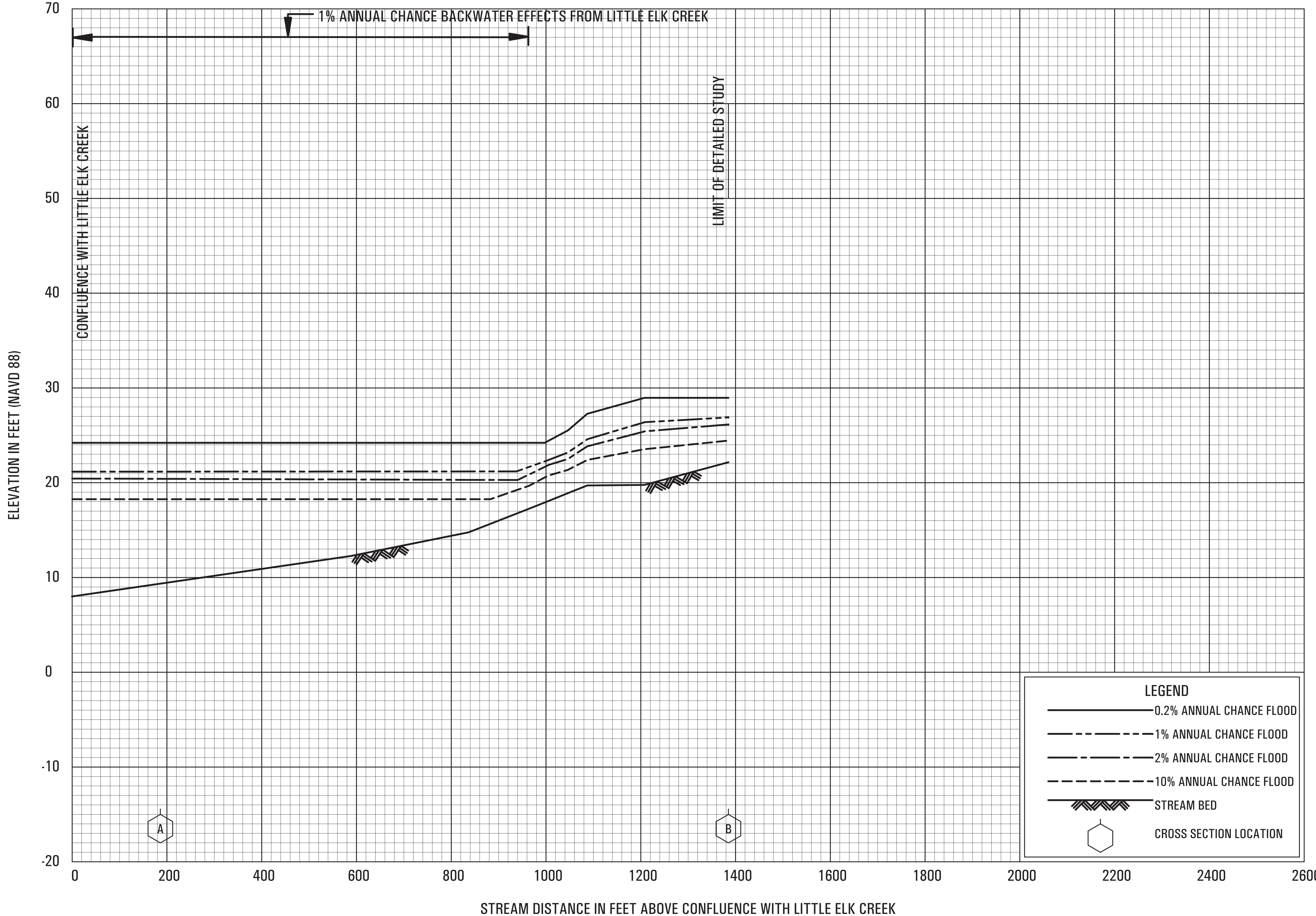
CHRISTINA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

06P



FLOOD PROFILES

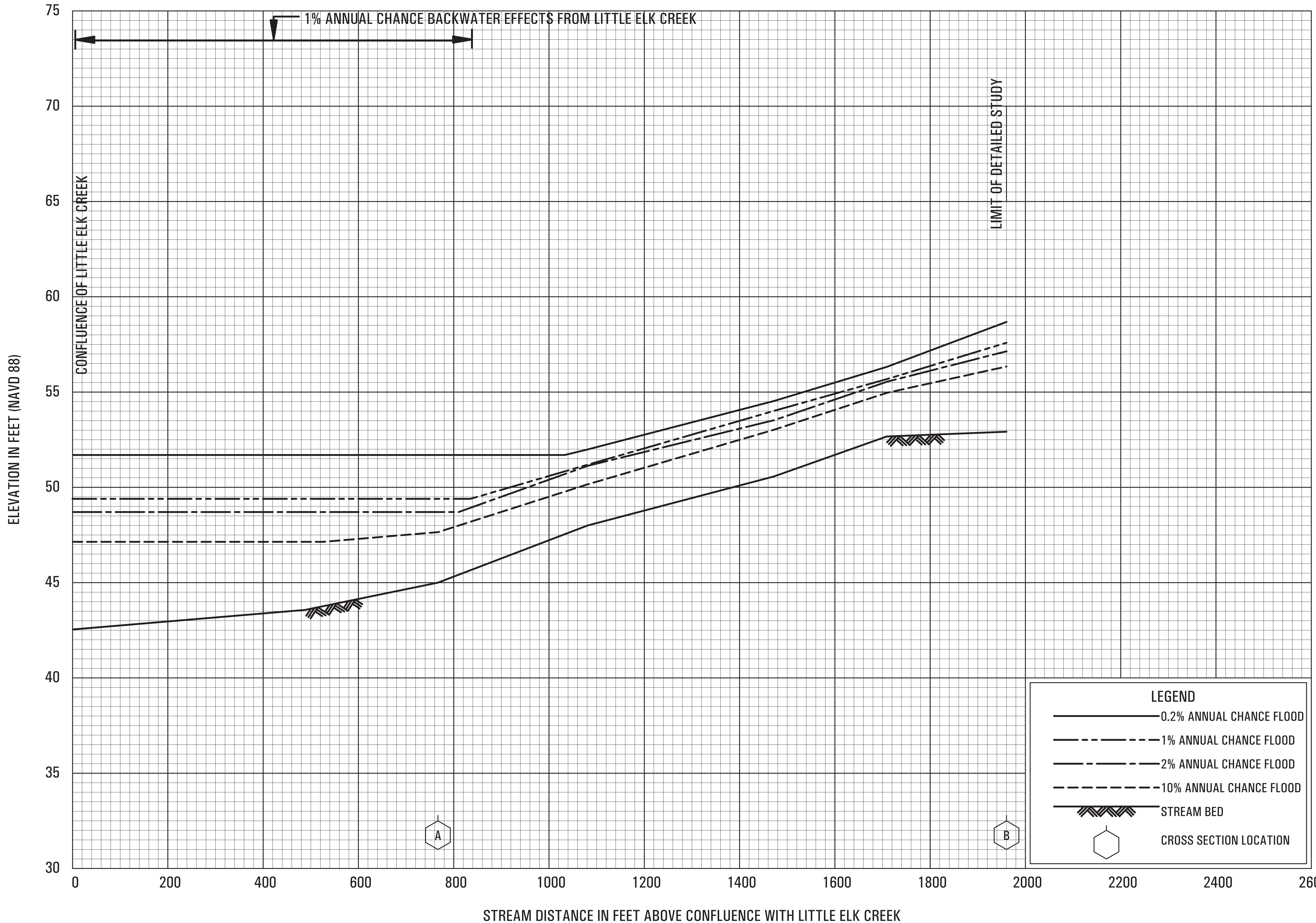
DOGWOOD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATD AREAS

07P



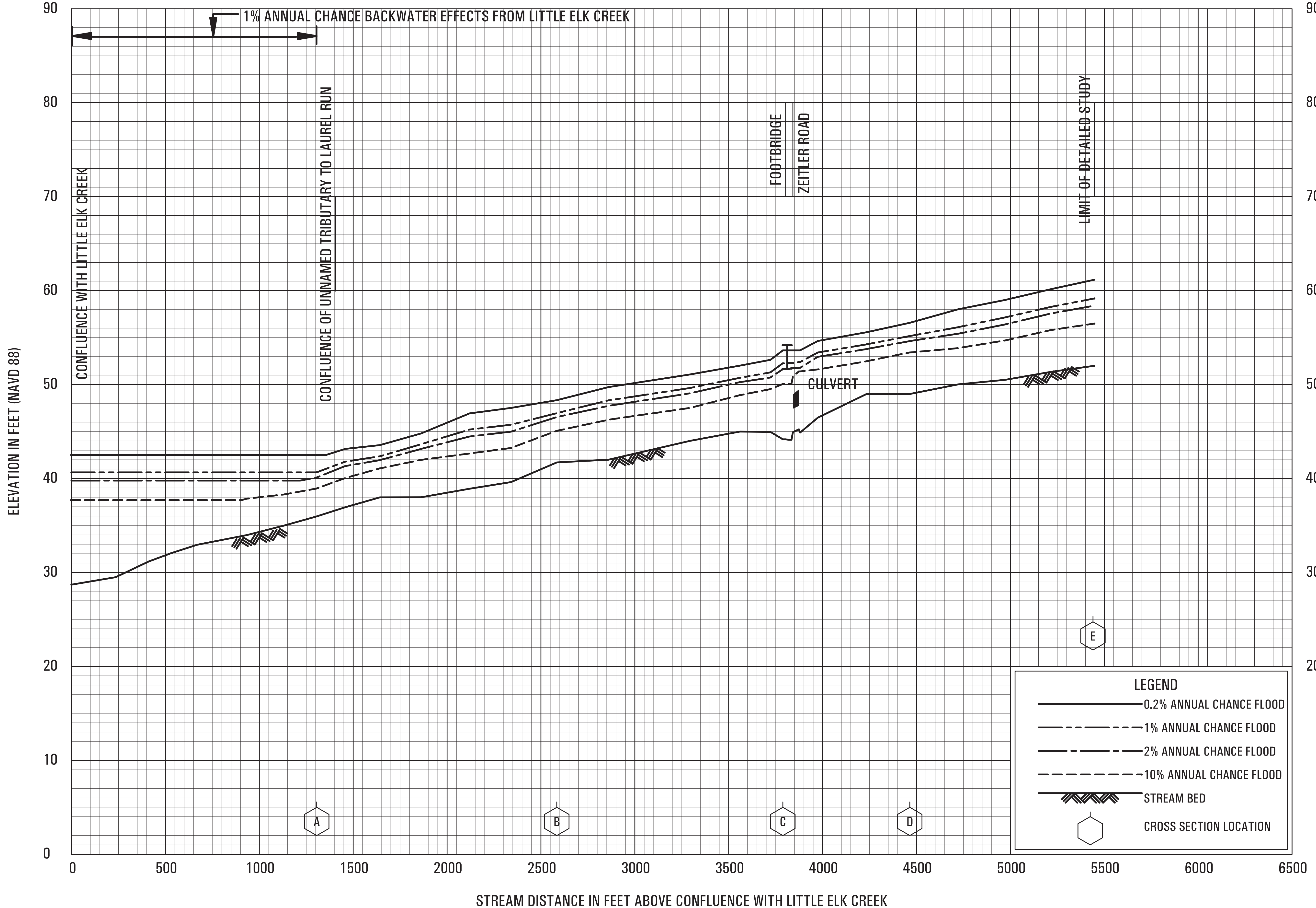
FLOOD PROFILES

GRAVELLY RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



FLOOD PROFILES

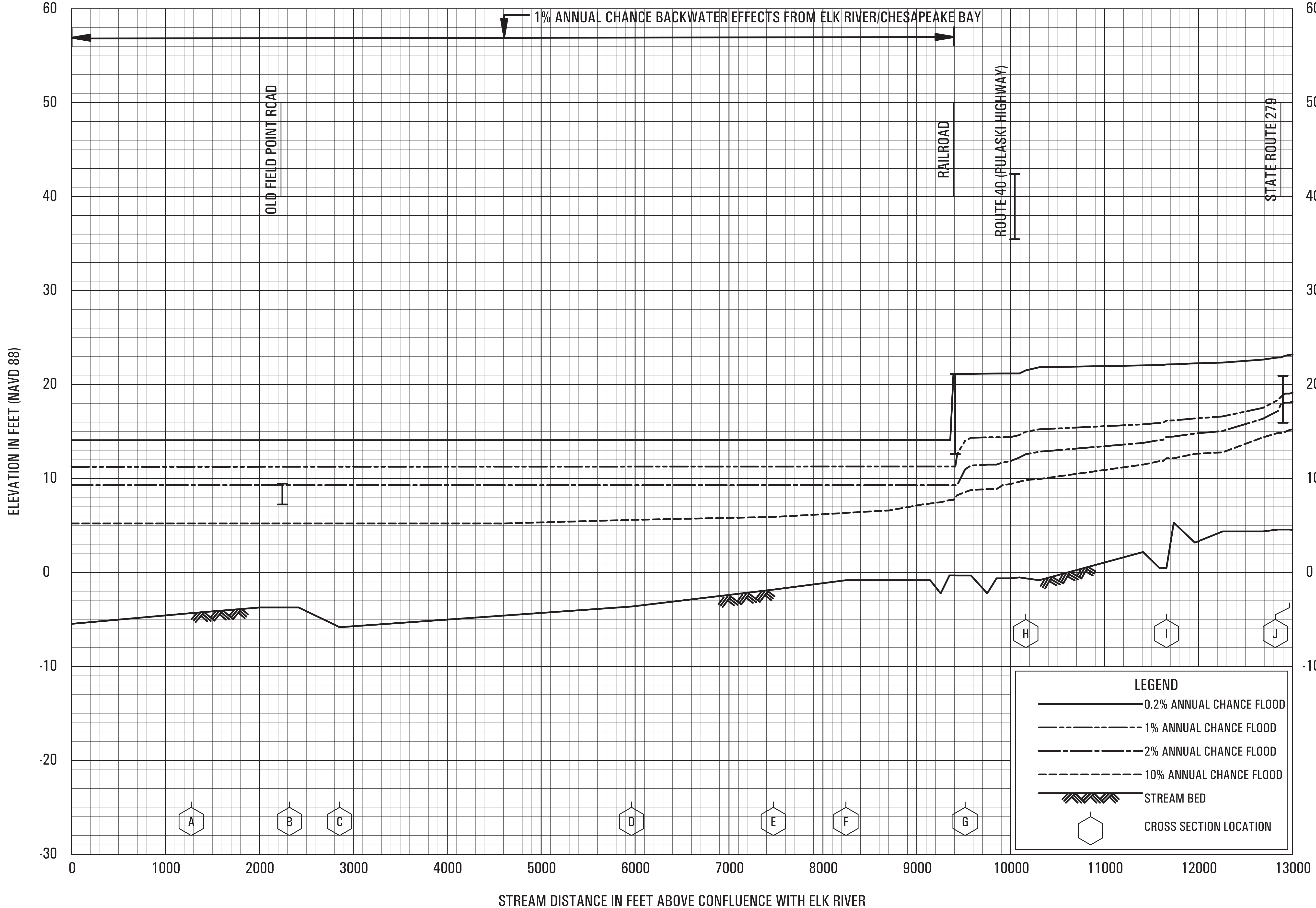
LAUREL RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

09P

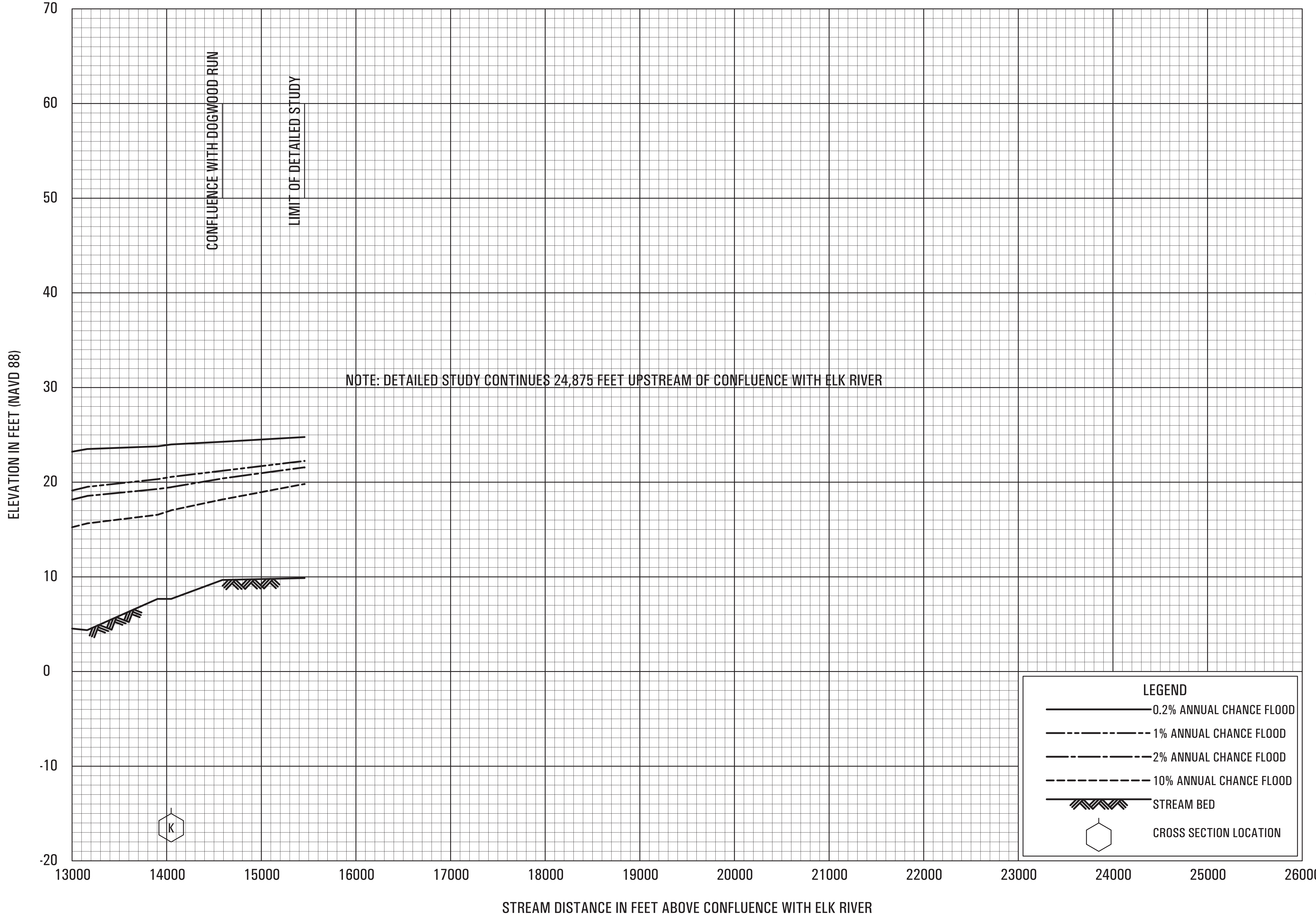


FLOOD PROFILES

LITTLE ELK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD
AND INCORPORATED AREAS



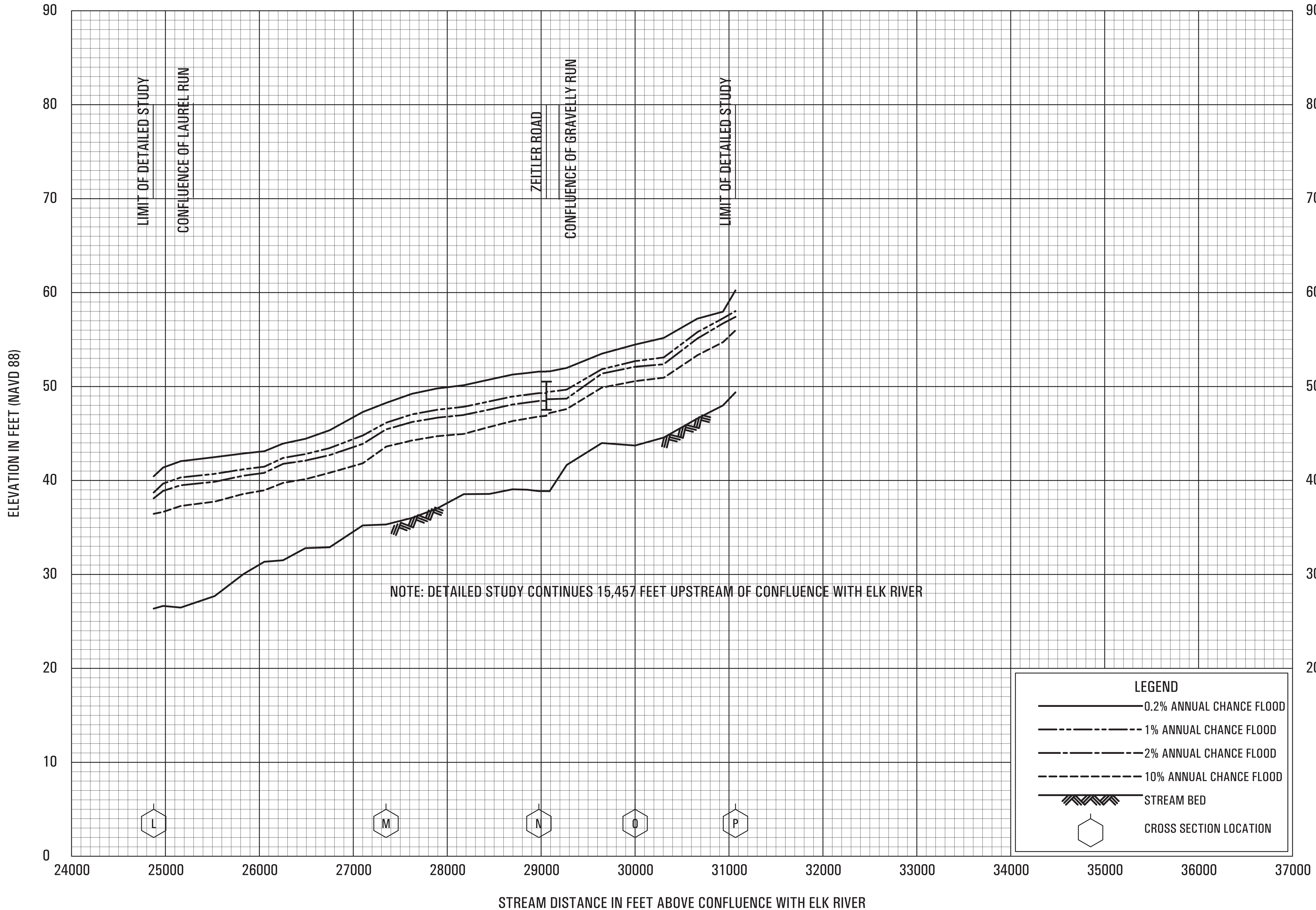
FLOOD PROFILES

LITTLE ELK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



FLOOD PROFILES

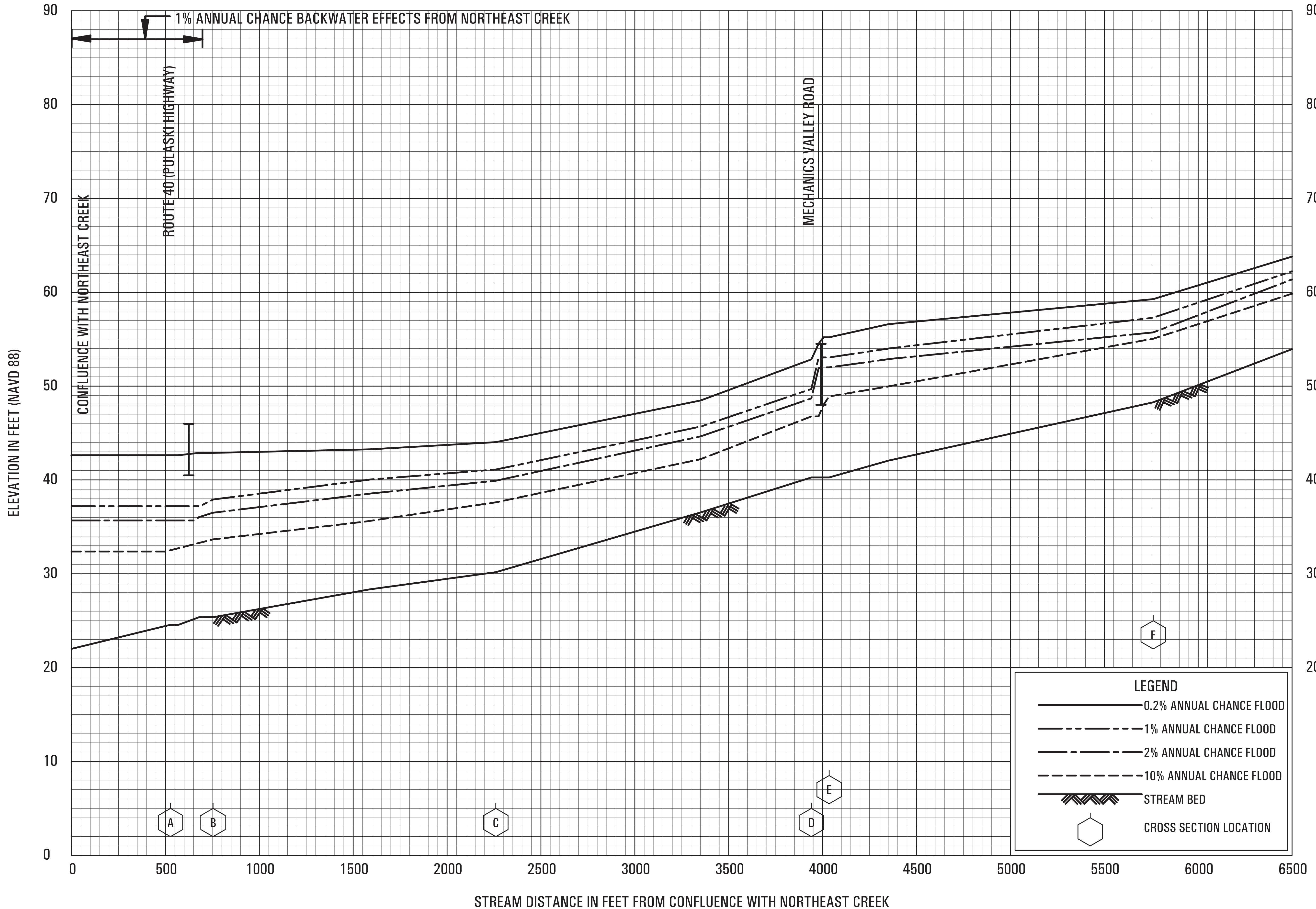
LITTLE ELK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

12P



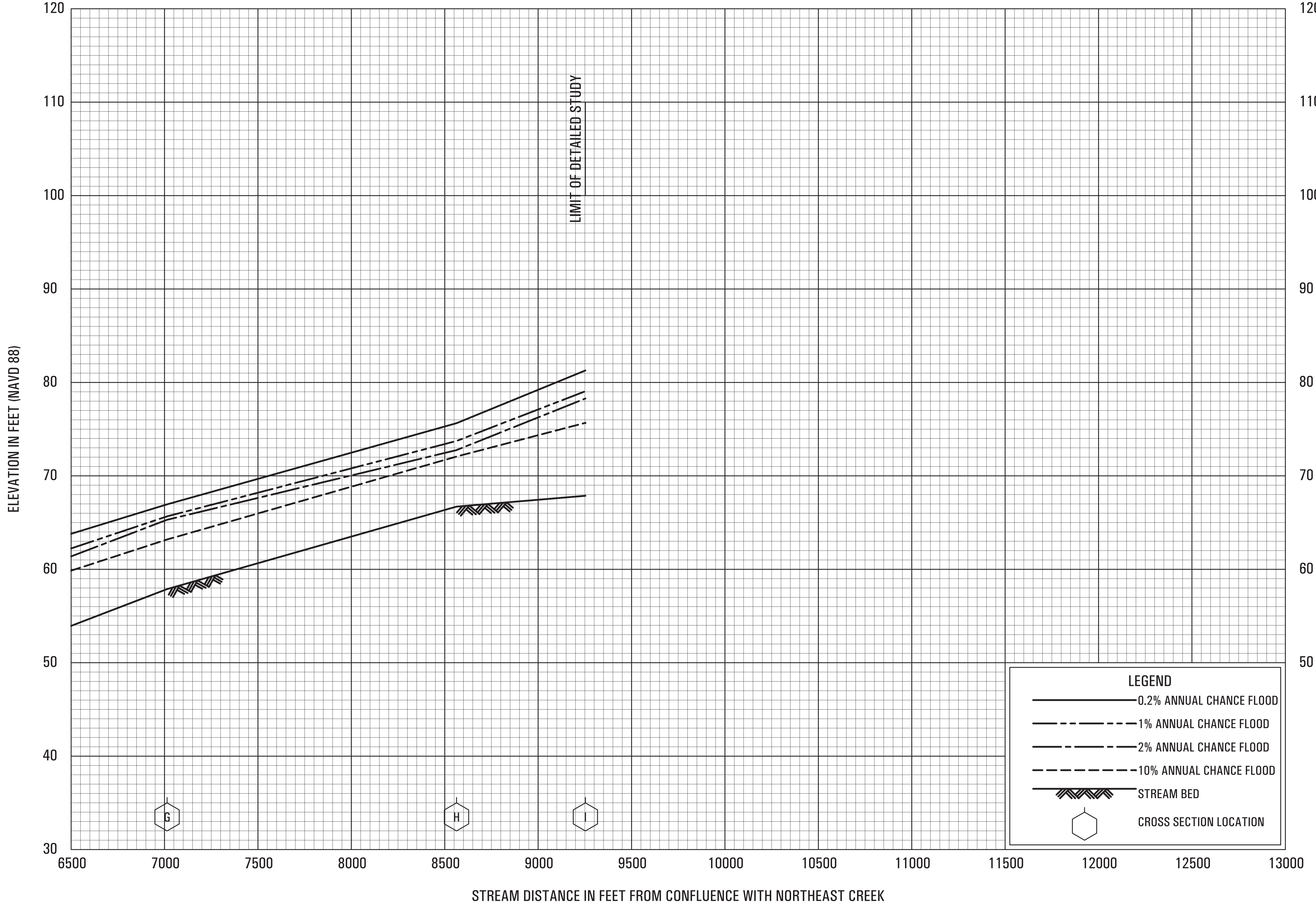
FLOOD PROFILES

LITTLE NORTHEAST CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



FLOOD PROFILES

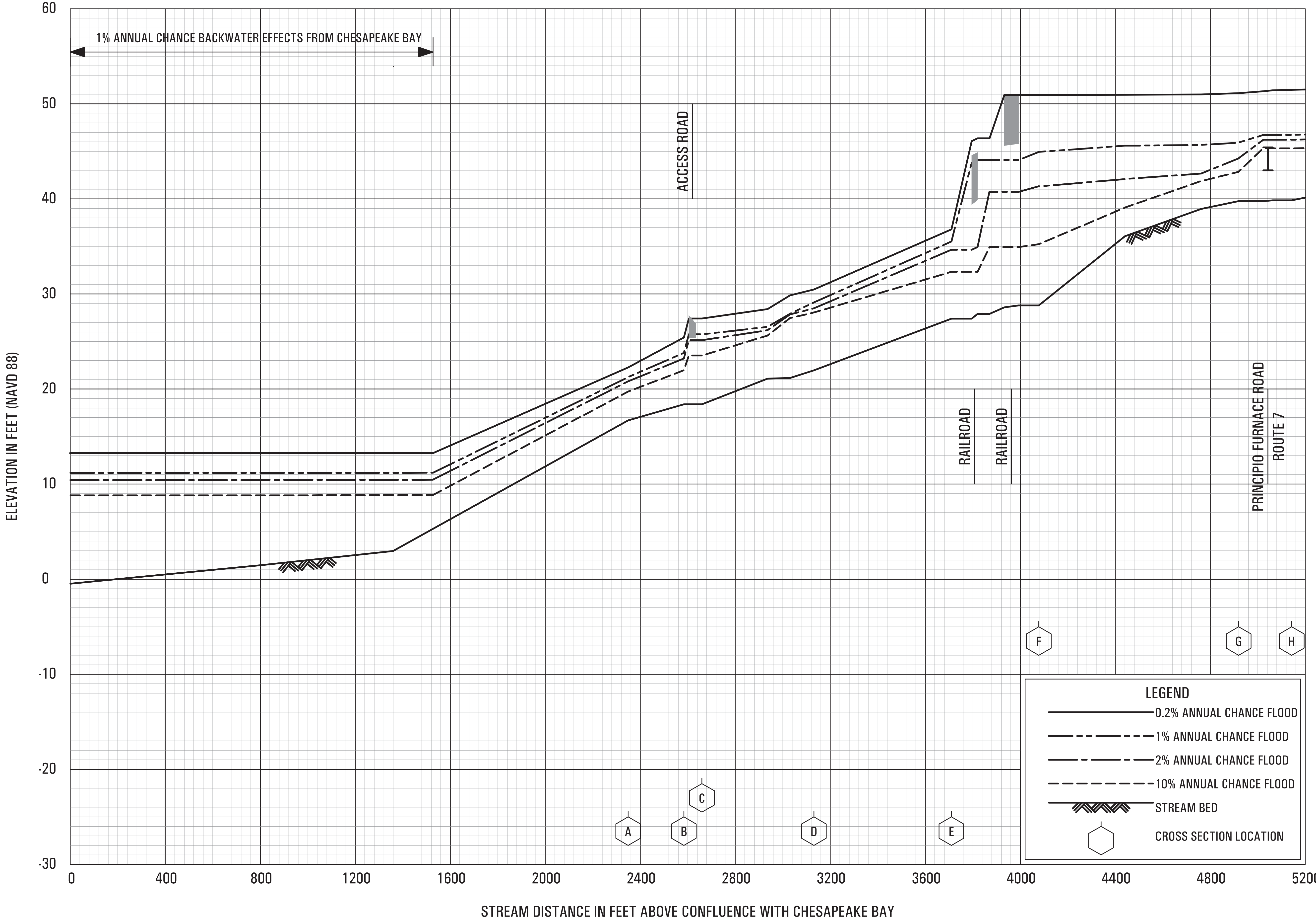
LITTLE NORTHEAST CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

14P



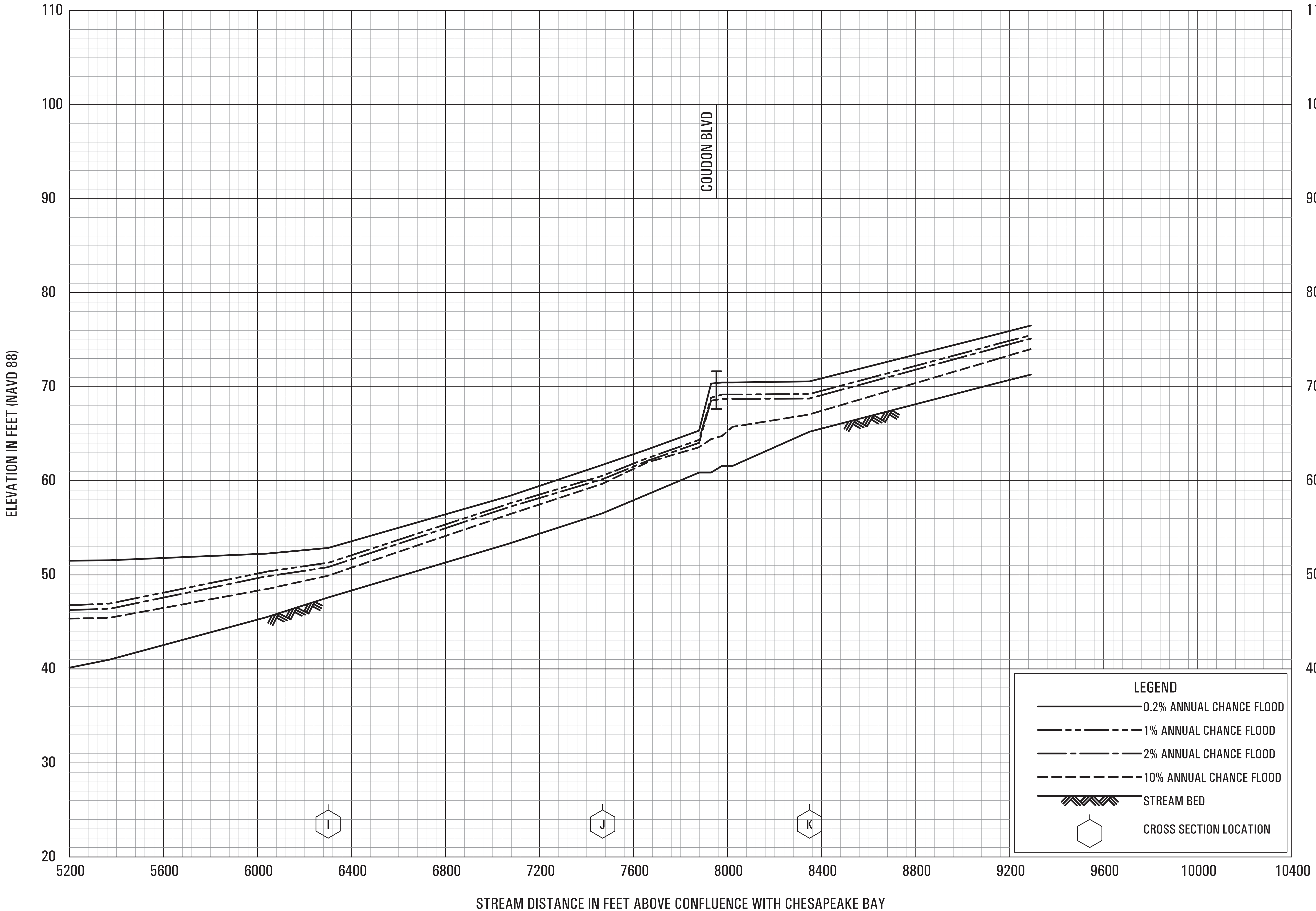
FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



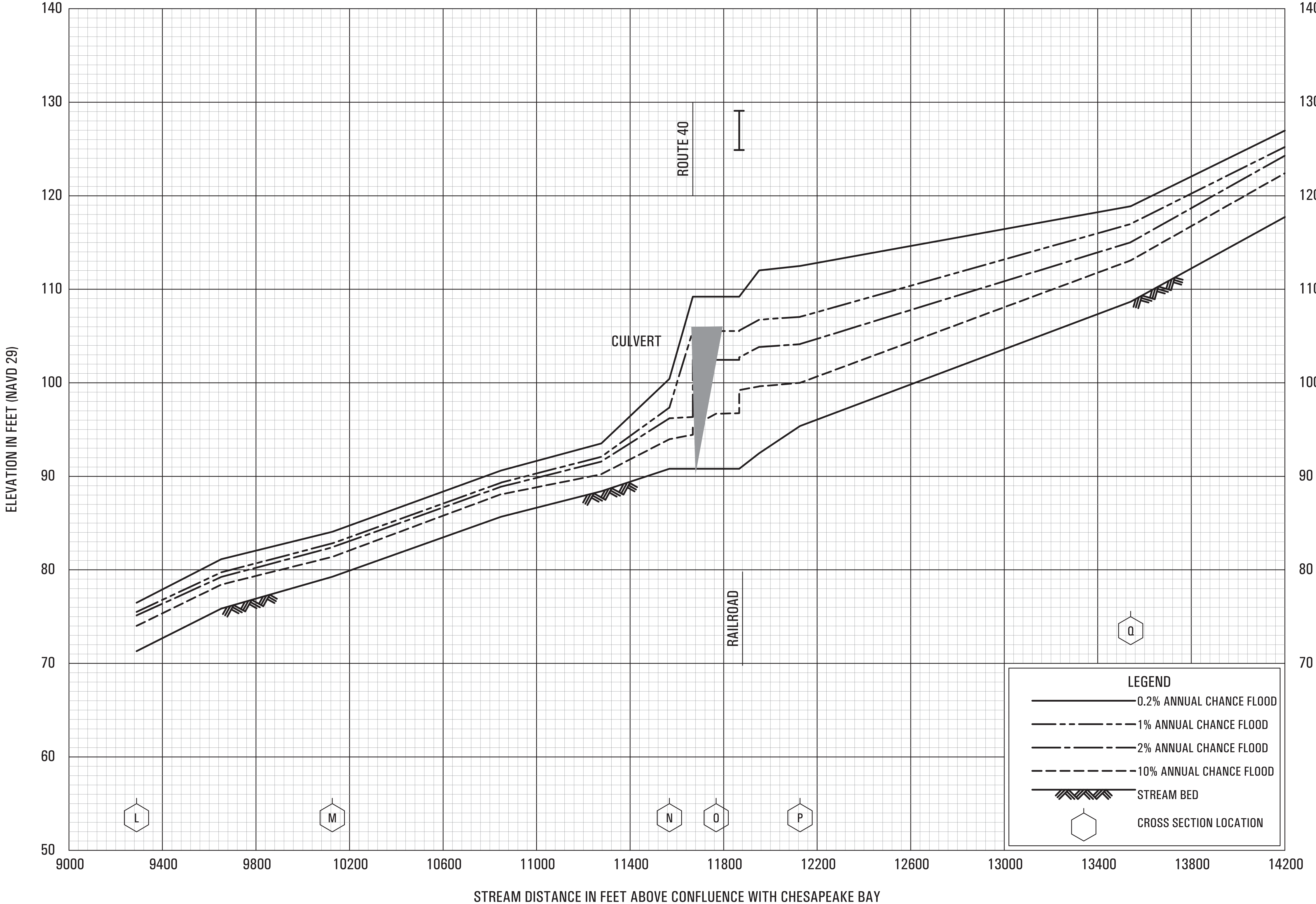
FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



FLOOD PROFILES

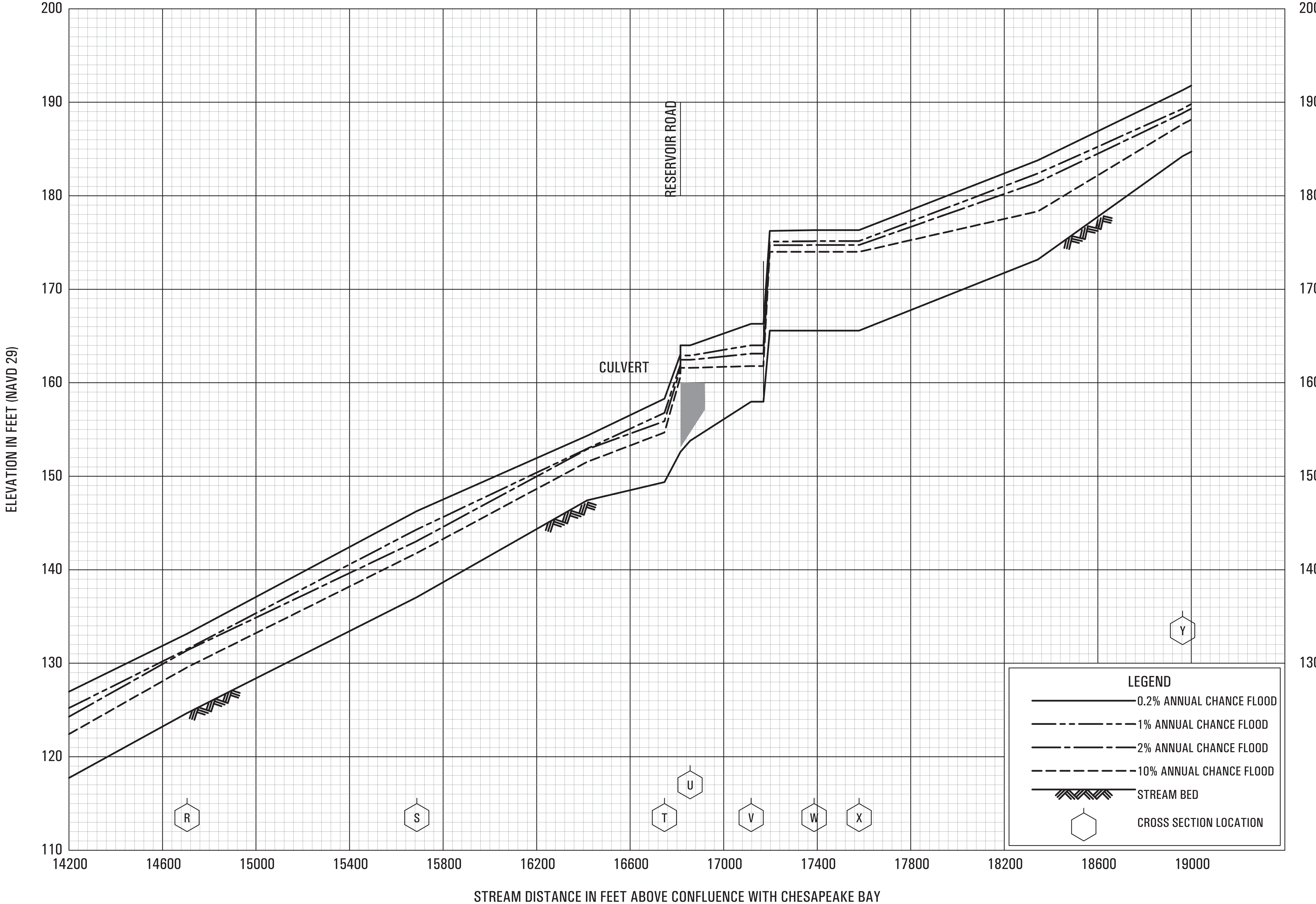
MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

17P



FLOOD PROFILES

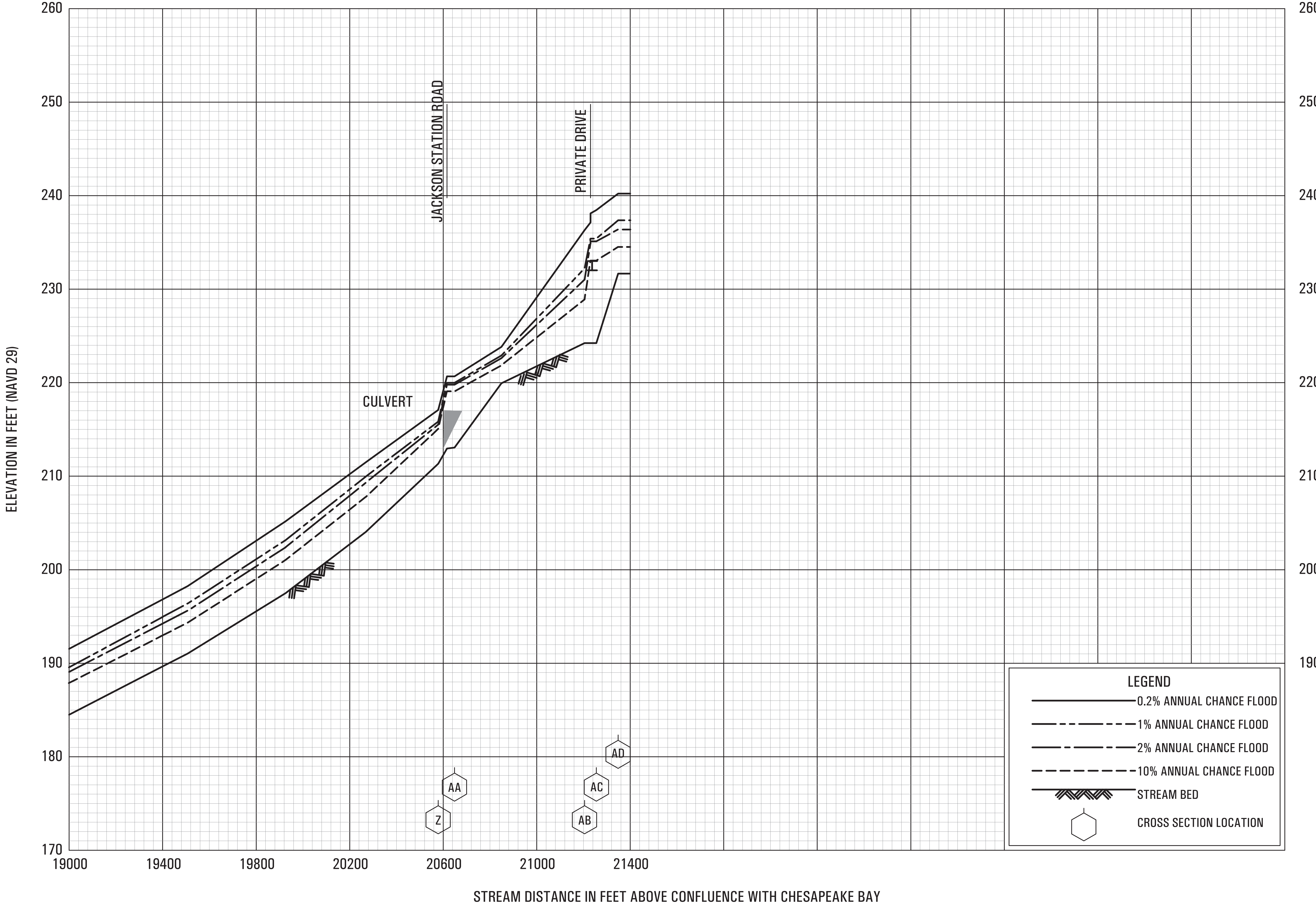
MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

18P



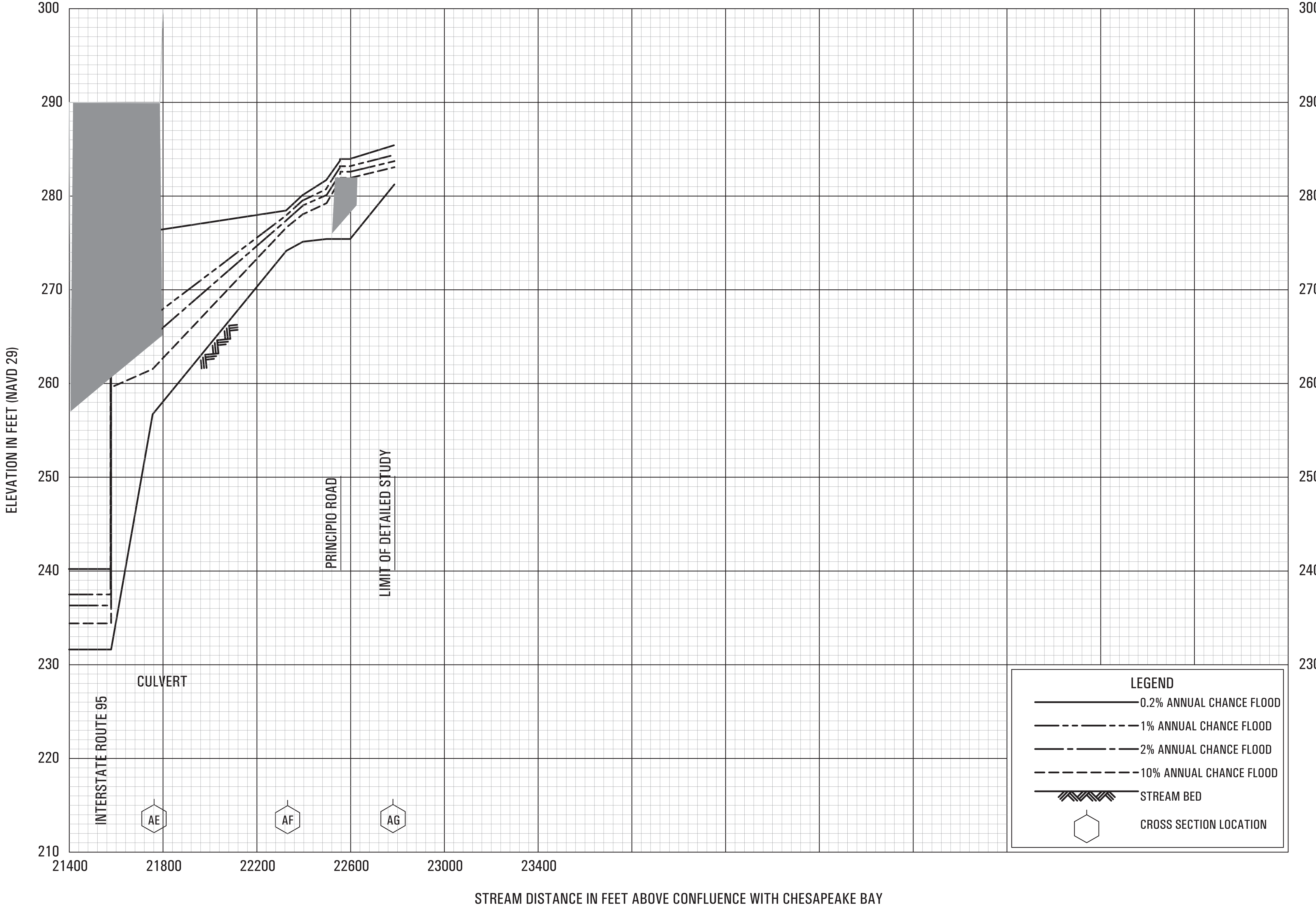
FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

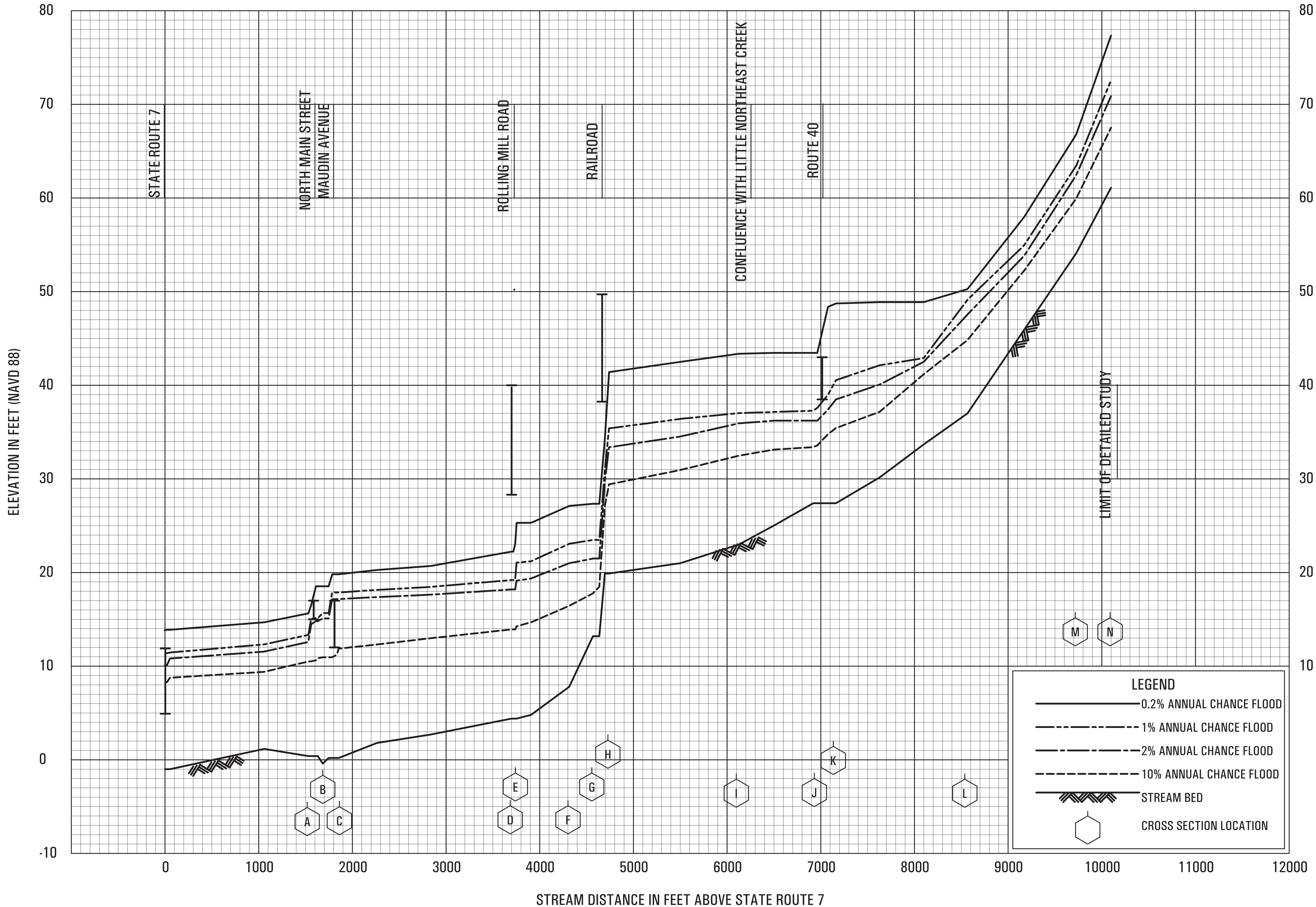


FLOOD PROFILES

MILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD
AND INCORPORATED AREAS



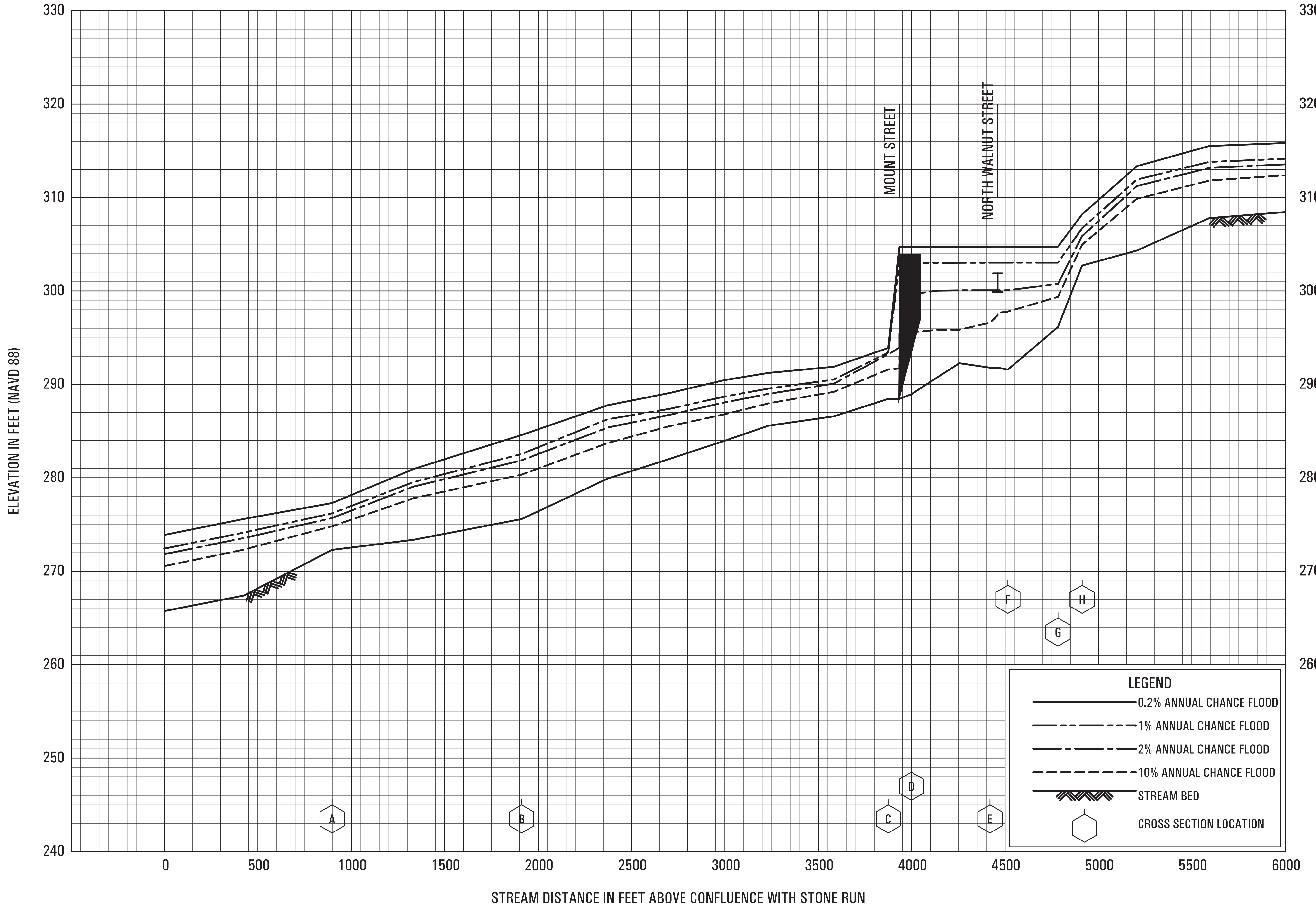
FLOOD PROFILES

NORTHEAST CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



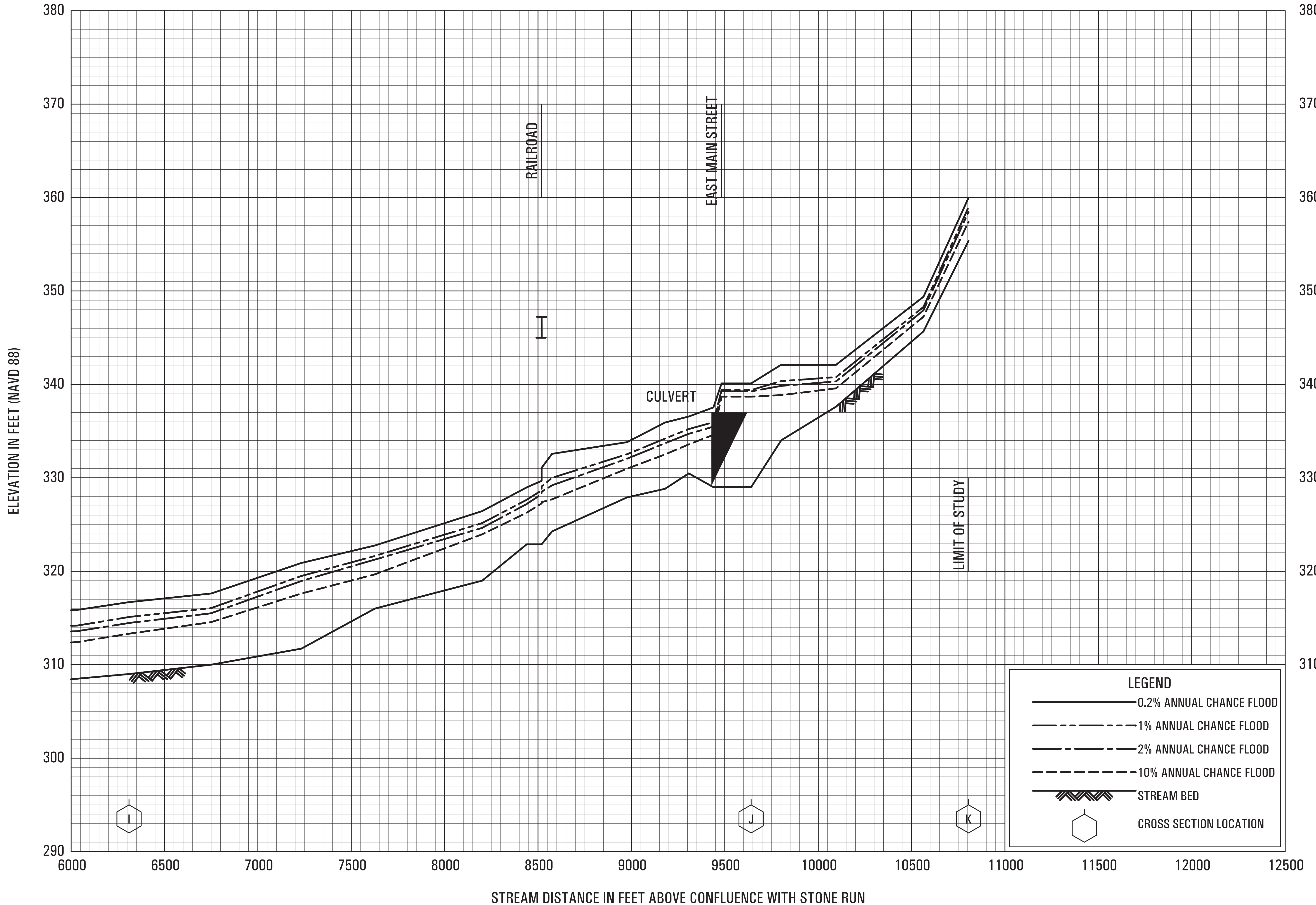
FLOOD PROFILES

STONE RUN TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



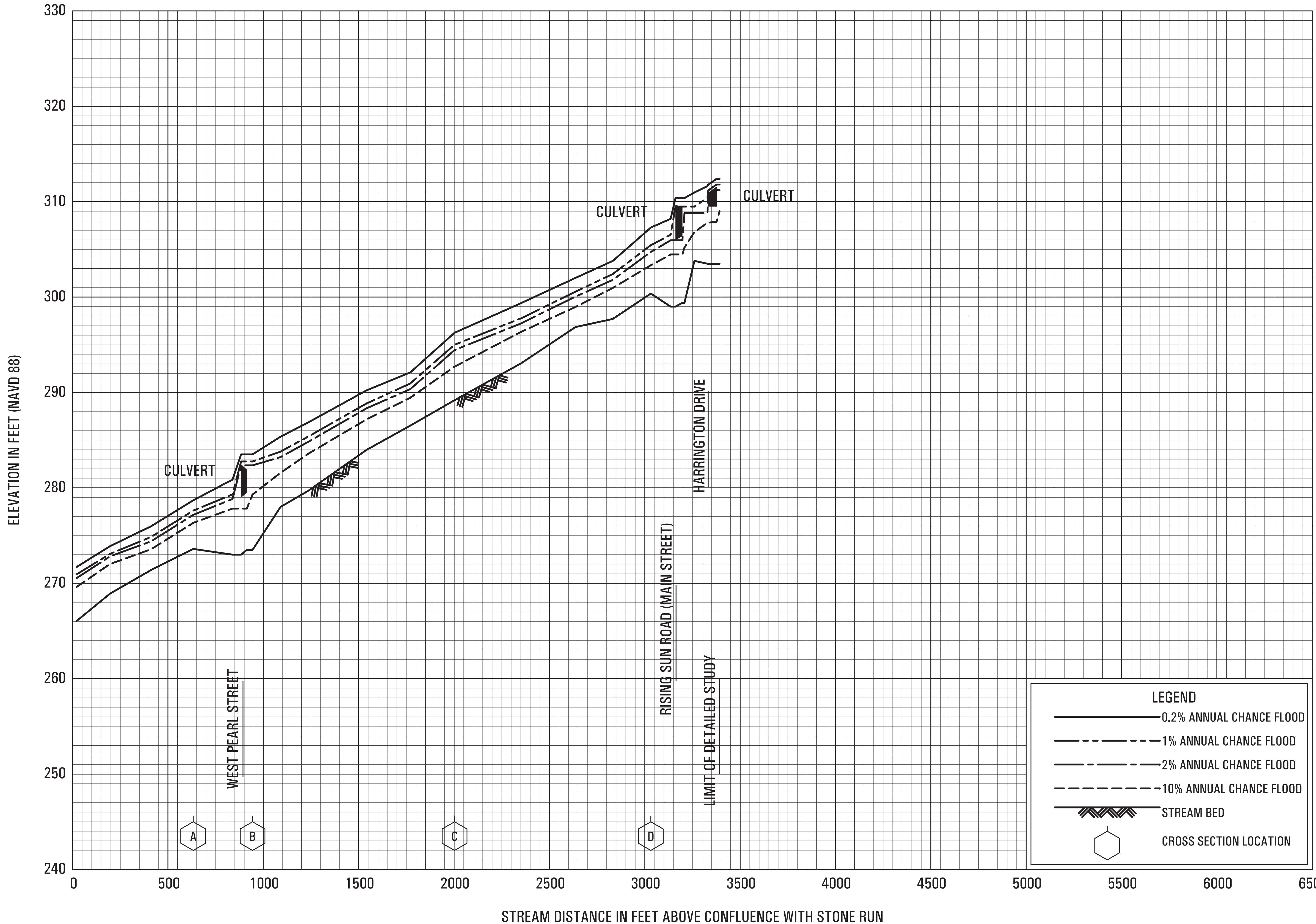
FLOOD PROFILES

STONE RUN TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



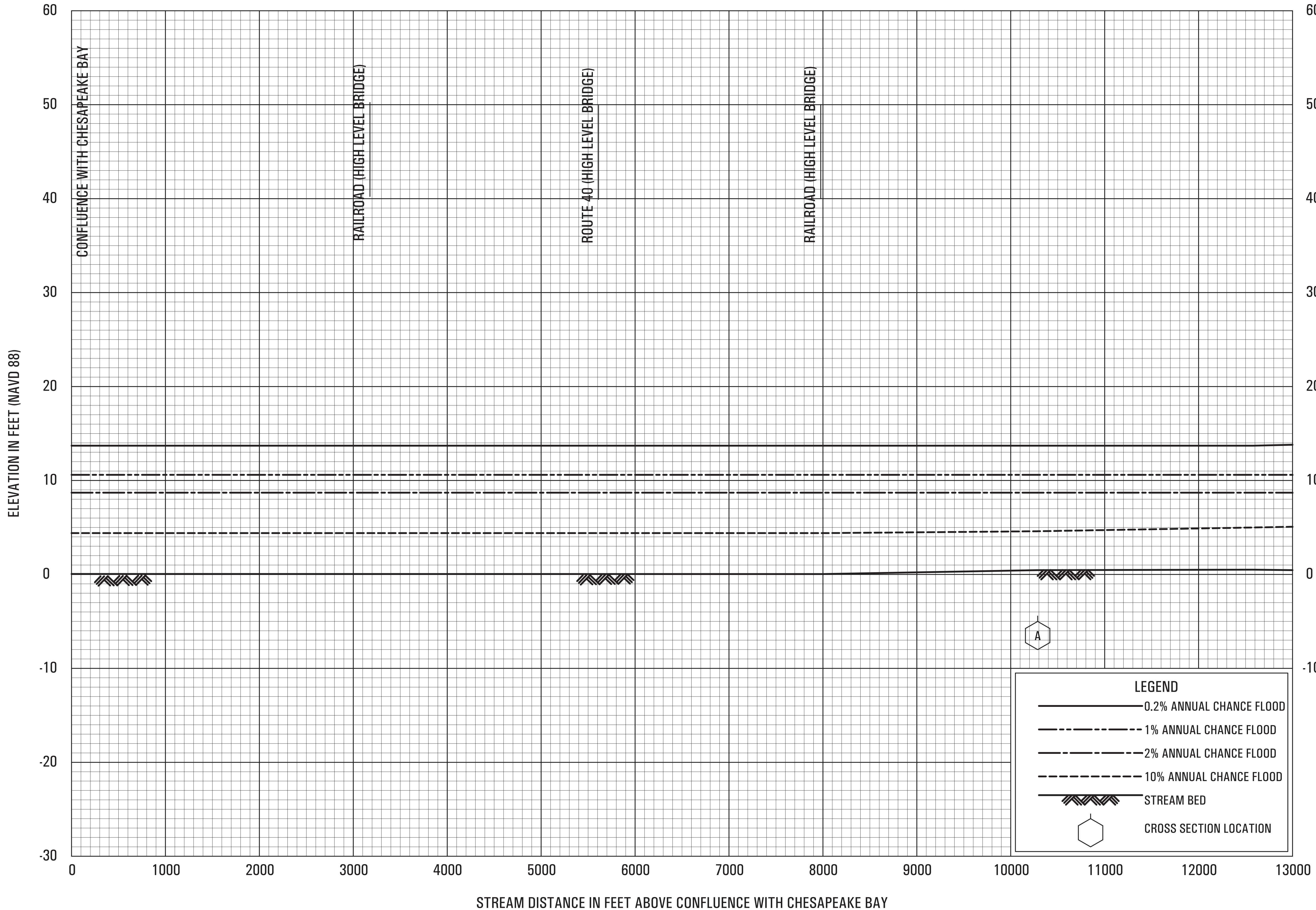
FLOOD PROFILES

STONE RUN TRIBUTARY 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



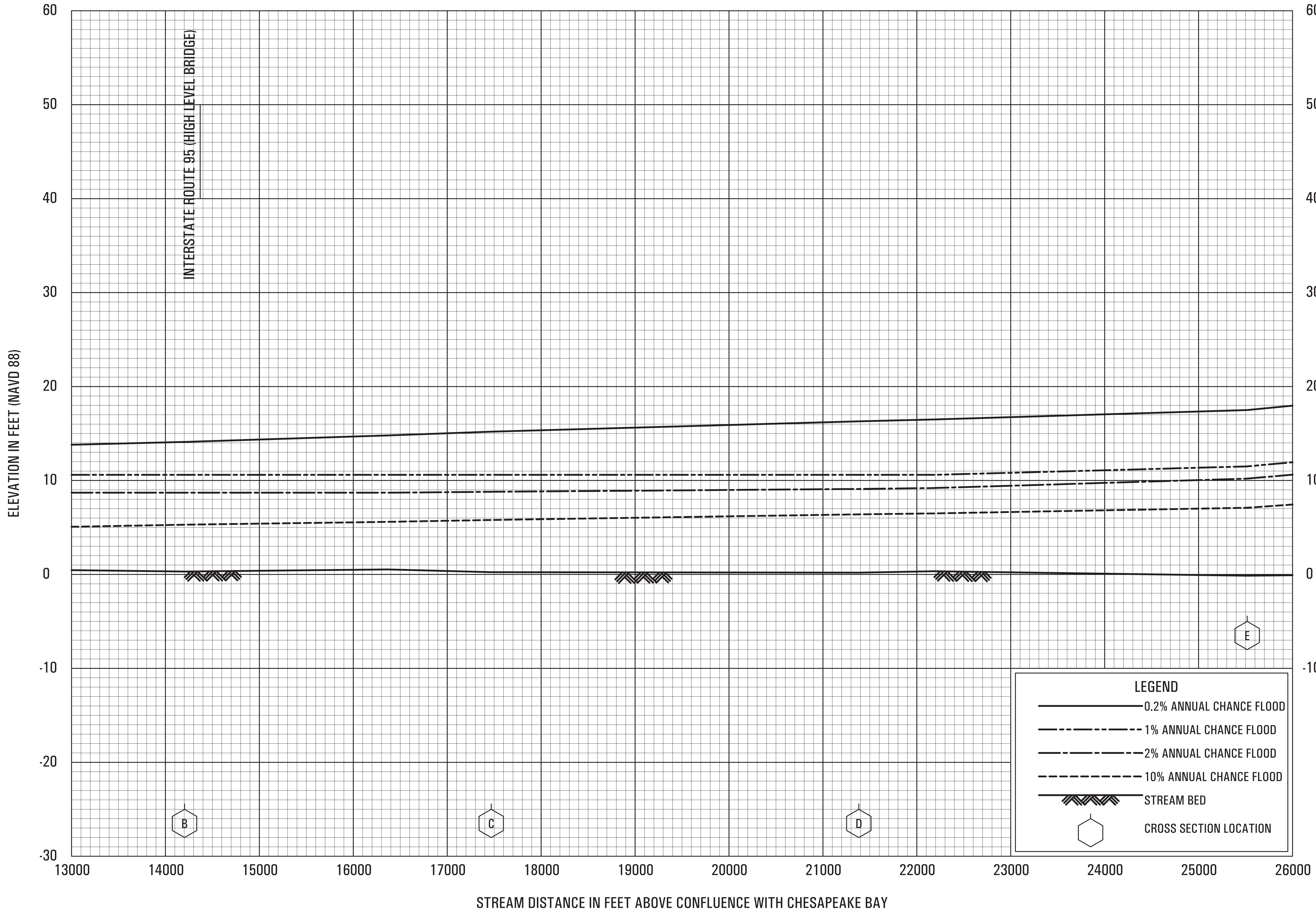
FLOOD PROFILES

SUSQUEHANNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



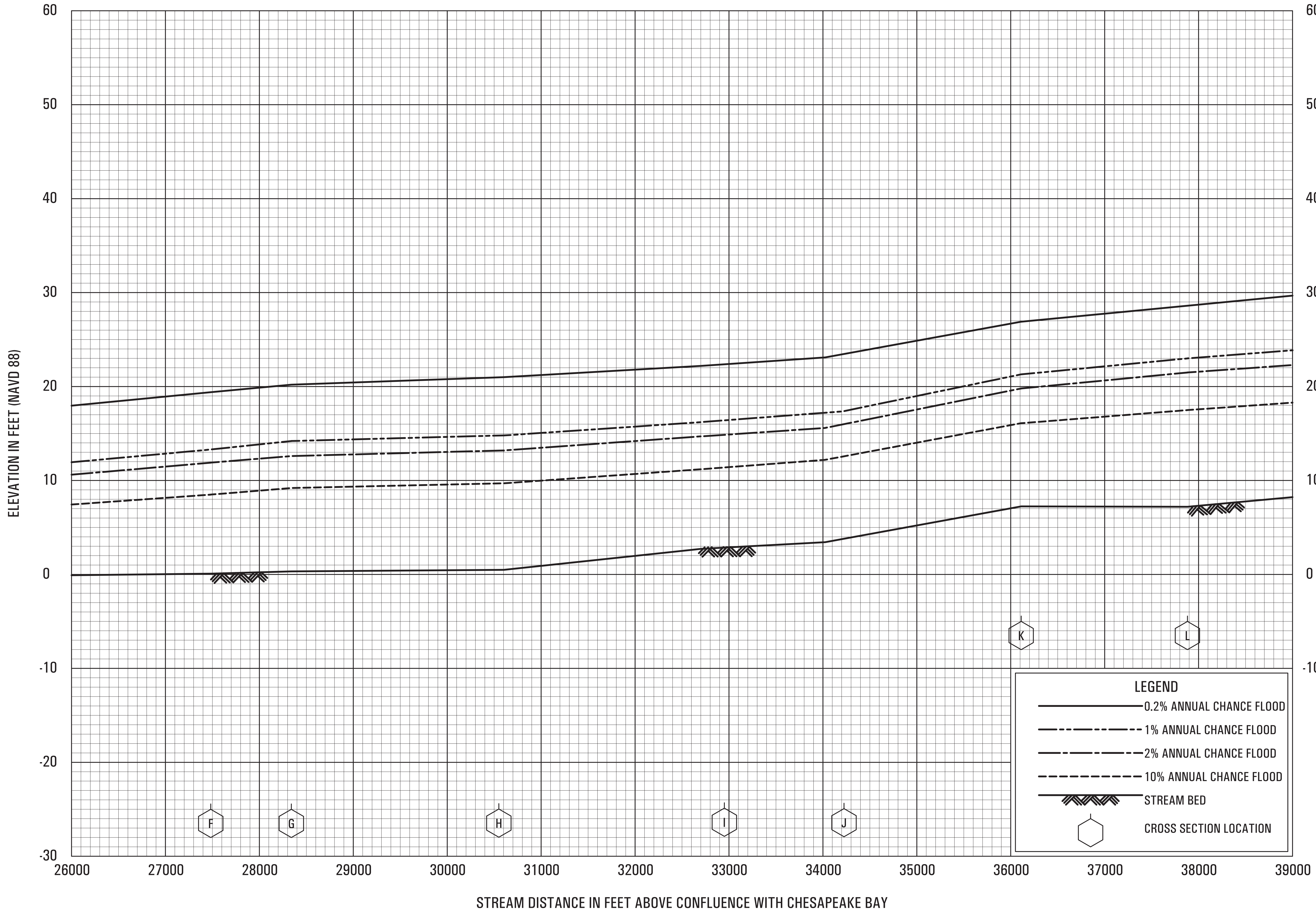
FLOOD PROFILES

SUSQUEHANNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



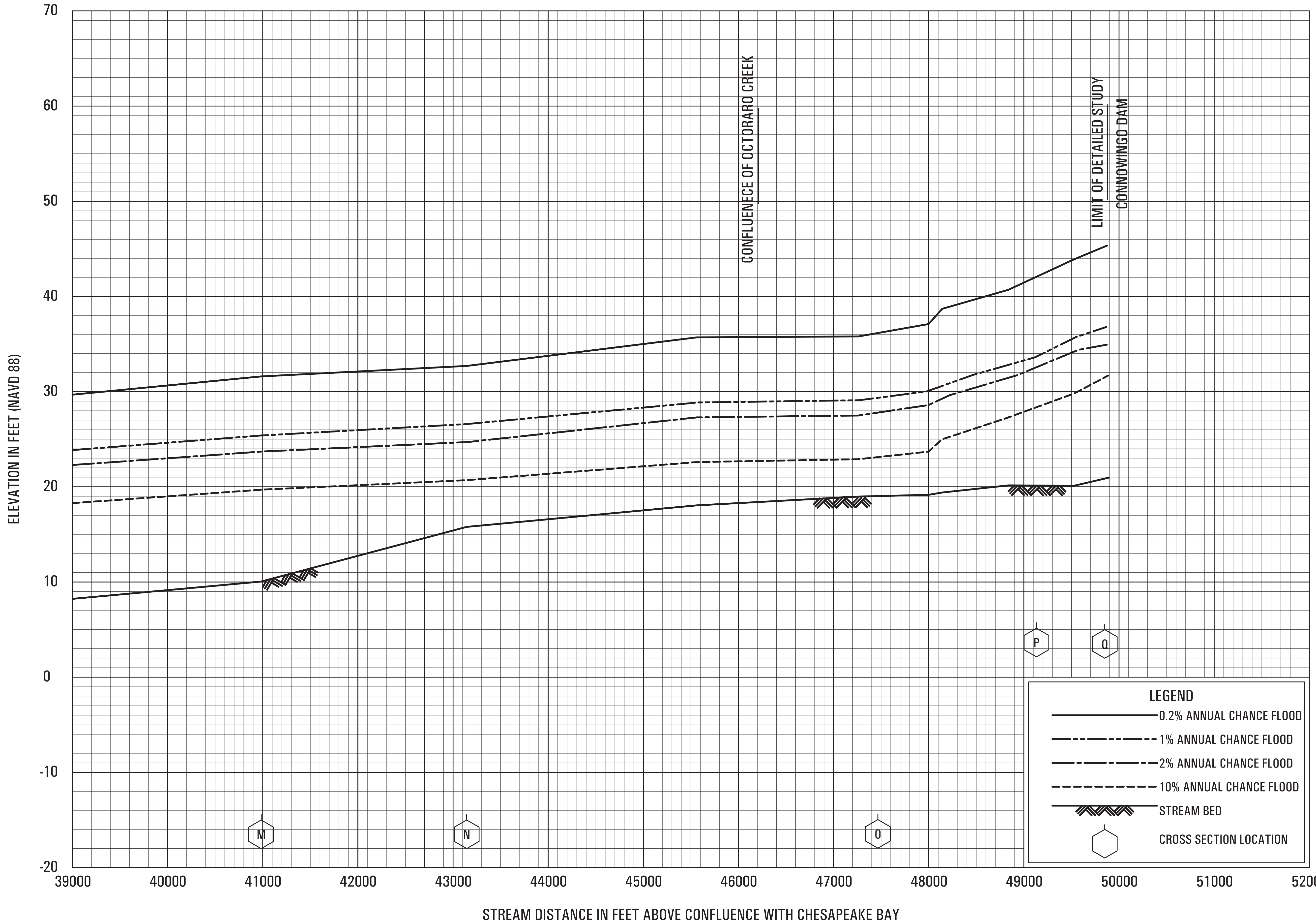
FLOOD PROFILES

SUSQUEHANNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



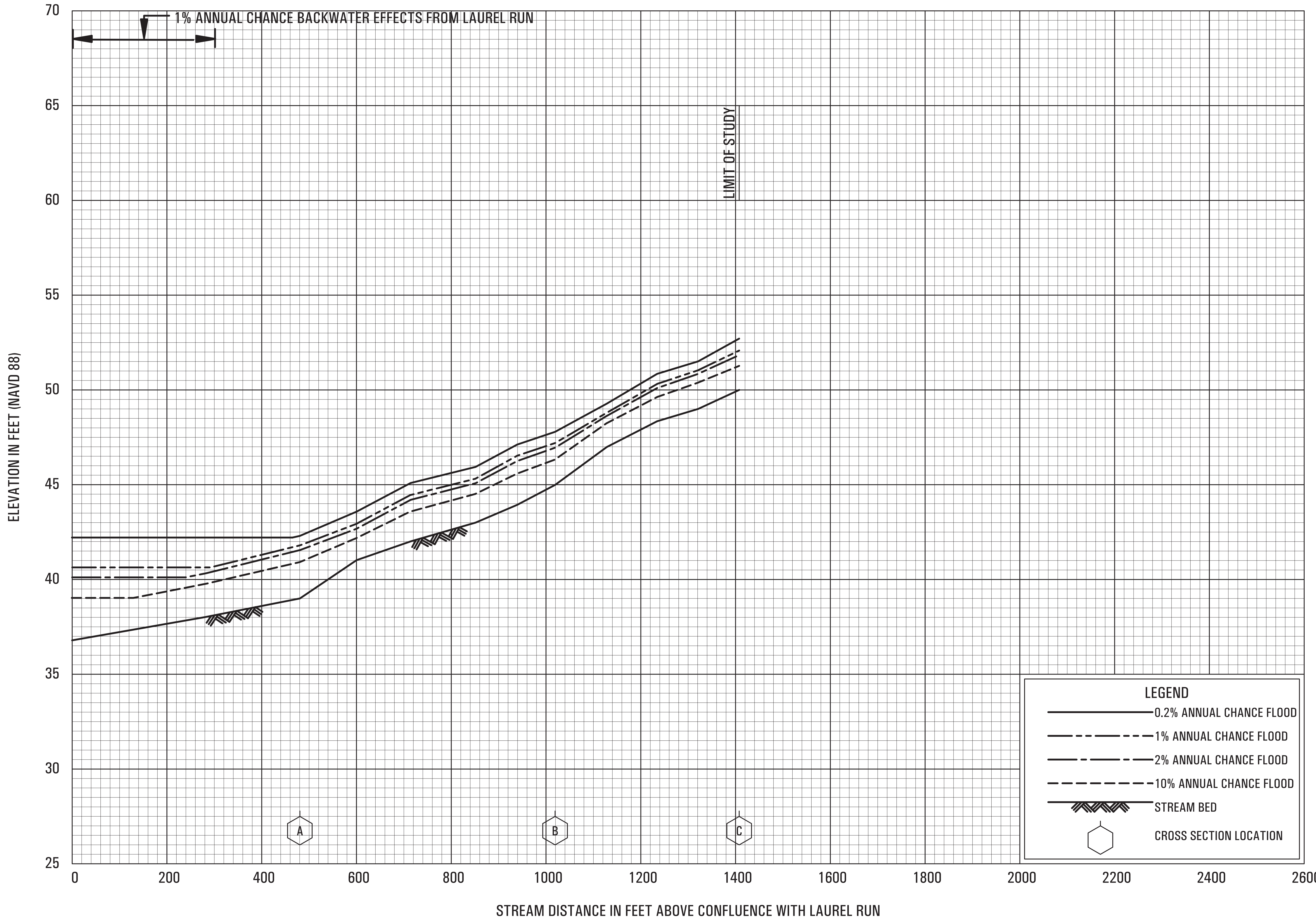
FLOOD PROFILES

SUSQUEHANNA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



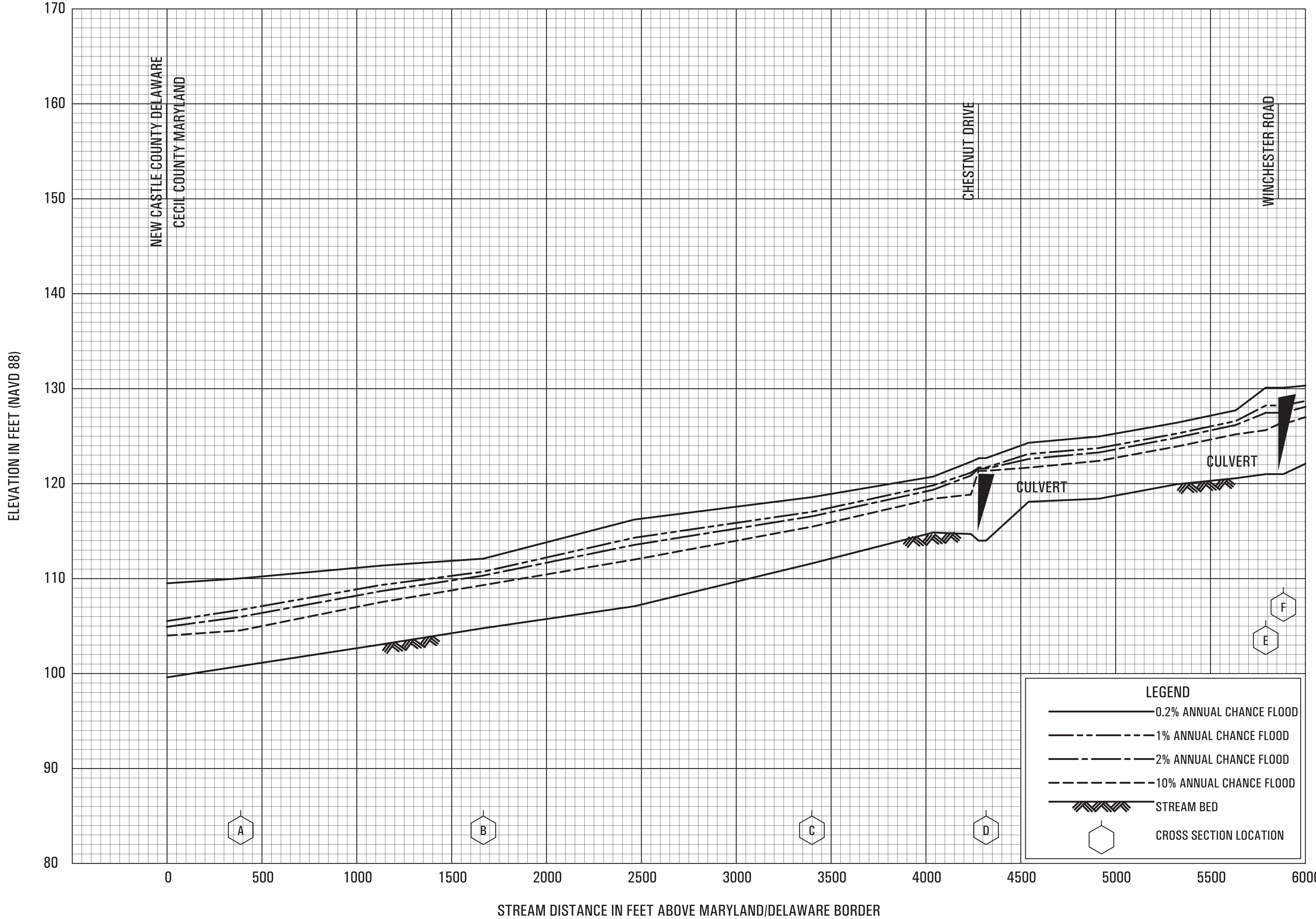
FLOOD PROFILES

UNNAMED TRIBUTARY TO LAUREL RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



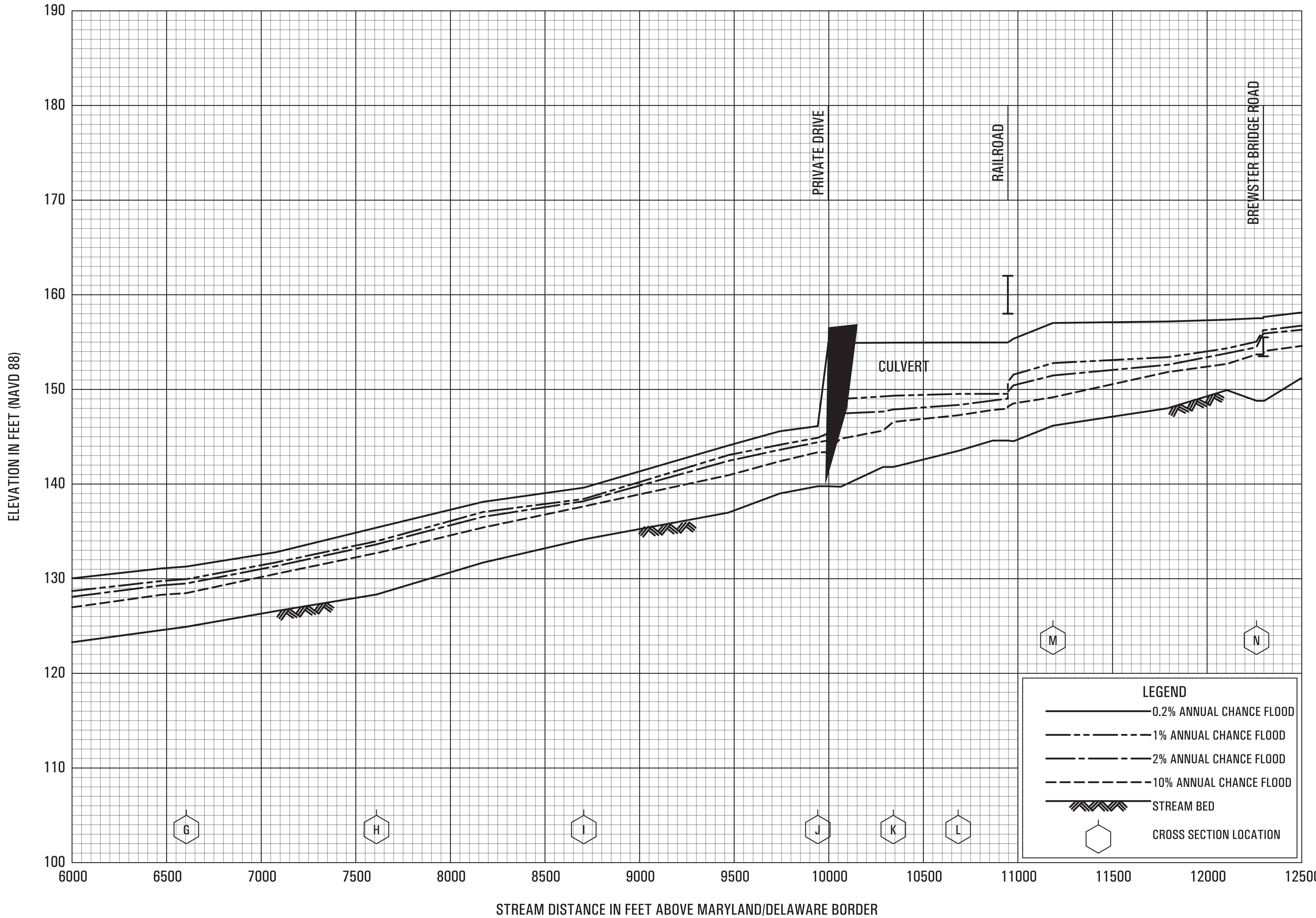
FLOOD PROFILES

WEST BRANCH CHRISTINA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



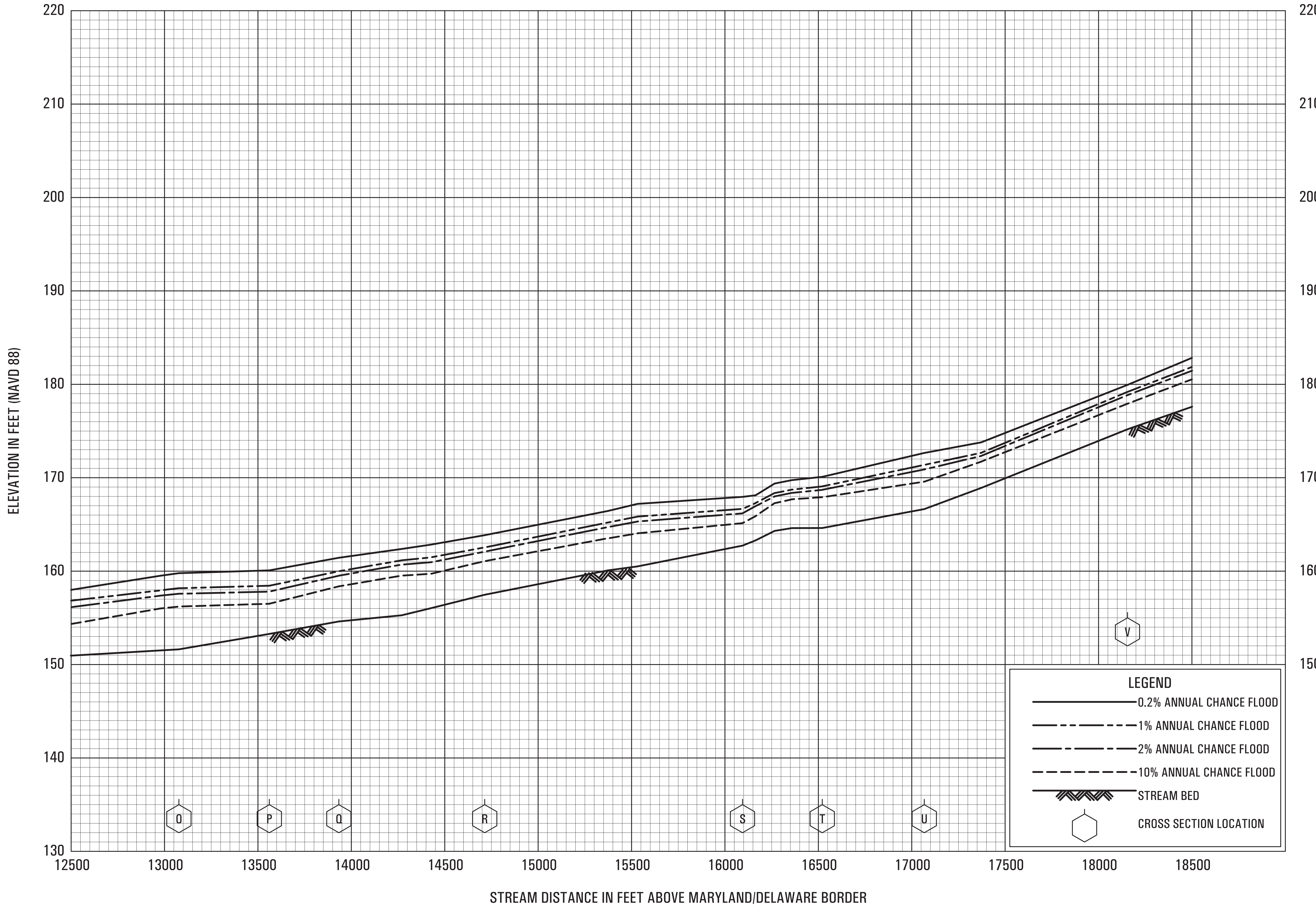
FLOOD PROFILES

WEST BRANCH CHRISTINA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



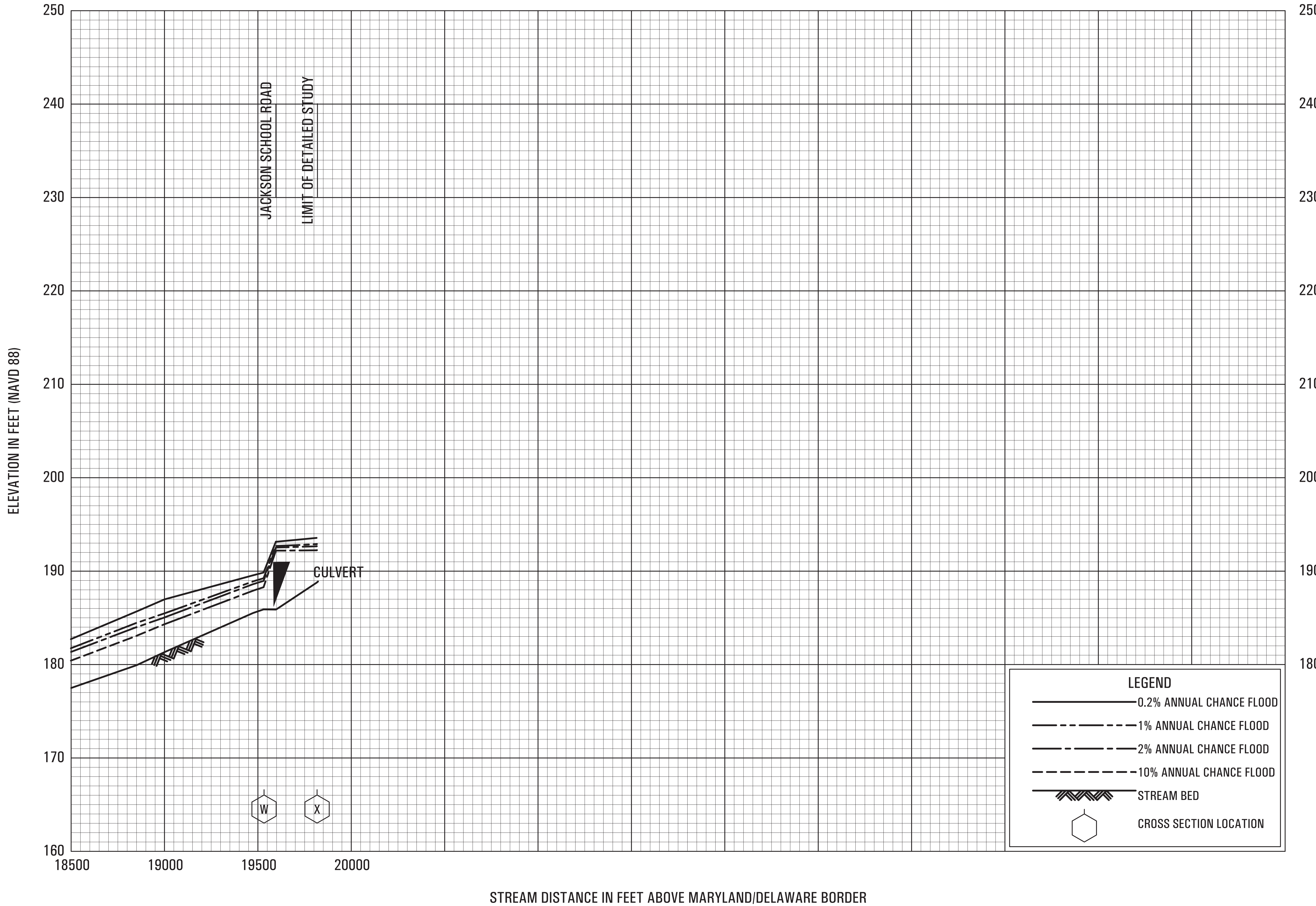
FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS

FLOOD PROFILES

WEST BRANCH CHRISTINA RIVER



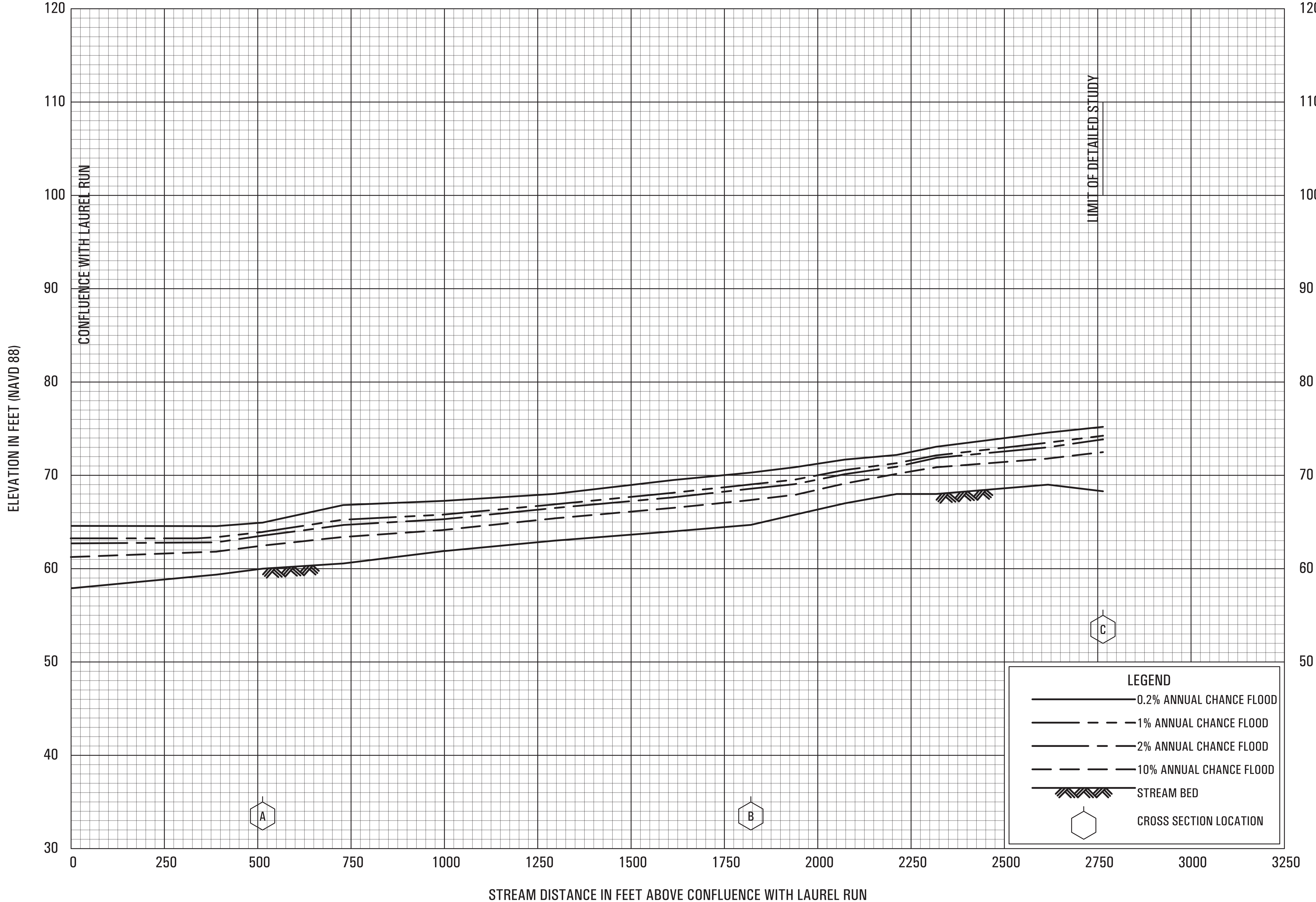
FLOOD PROFILES

WEST BRANCH CHRISTINA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS



FLOOD PROFILES

WEST BRANCH LAUREL RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

CECIL COUNTY, MD

AND INCORPORATED AREAS