

FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 3



GREENE COUNTY, NEW YORK

(ALL JURISDICTIONS)

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
TOWN OF ASHLAND	360284	TOWN OF JEWETT	361114
TOWN OF ATHENS	361117	TOWN OF LEXINGTON	360294
TOWN OF CAIRO	360286	TOWN OF NEW BALTIMORE	360295
TOWN OF CATSKILL	361116	TOWN OF PRATTSVILLE	360296
TOWN OF COXSACKIE	361115	TOWN OF WINDHAM	361401
TOWN OF DURHAM	360289	VILLAGE OF ATHENS	360285
TOWN OF GREENVILLE	360290	VILLAGE OF CATSKILL	360287
TOWN OF HALCOTT	360291	VILLAGE OF COXSACKIE	360288
TOWN OF HUNTER	360292	VILLAGE OF HUNTER	360293
		VILLAGE OF TANNSERVILLE	360297

REVISED: JUNE 2, 2015

FLOOD INSURANCE STUDY NUMBER
36039CV001B

Version Number 2.1.2.2



FEMA

NOTICE TO
FLOOD INSURANCE STUDY USERS

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

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

Initial Countywide FIS Effective Date: May 16, 2008

Revised Countywide FIS Date: June 2, 2015

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FLOOD INSURANCE STUDY
GREENE COUNTY, NEW YORK (ALL JURISDICTIONS)

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in, or revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs) for the geographic area of Greene County, New York, including the Towns of Ashland, Athens, Cairo, Catskill, Coxsackie, Durham, Greenville, Halcott, Hunter, Jewett, Lexington, New Baltimore, Prattsville, and Windham, and the Villages of Athens, Catskill, Coxsackie, Hunter, and Tannersville (hereinafter referred to collectively as Greene County).

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

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

1.2 Authority and Acknowledgments

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

This FIS was prepared to include all jurisdictions within Greene County in a countywide format. Information on the authority and acknowledgments for each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports, is shown below.

Ashland, Town of:	the hydrologic and hydraulic analyses for the FIS report dated September 30, 1988, were prepared by the Soil Conservation Service (SCS) during the preparation of a SCS study on Batavia Kill, for the Federal Emergency Management Agency (FEMA). That work was completed on February 24, 1987.
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Athens, Town of: the hydrologic and hydraulic analyses for the FIS report dated September 6, 1989, were prepared by McCoy-Jackson Associates for FEMA, under Contract No. EMW-84-C-1603. That work was completed in October 1987.

Athens, Village of: the hydrologic and hydraulic analyses for the FIS report dated September 6, 1989, were prepared by McCoy-Jackson Associates for FEMA, under Contract No. EMW-84-C-1603. That work was completed in October 1987.

Cairo, Town of: the hydrologic and hydraulic analyses for the FIS report dated September 6, 1989, were prepared by McCoy-Jackson Associates for FEMA under Contract No. EMW-84-C-1603. That work was completed in October 1987.

Catskill, Town of: the hydrologic and hydraulic analyses for the FIS report dated February 16, 1990, were performed by McCoy-Jackson Associates for FEMA, under Contract No. EMW-84-C-1603. That work was completed in October 1987.

Catskill, Village of: the hydrologic and hydraulic analyses for the FIS report dated September 6, 1989, were performed by McCoy-Jackson Associates for FEMA, under Contract No. EMW-84-C-1603. That work was completed in October 1987.

Coxsackie, Town of: the hydrologic and hydraulic analyses for the FIS report dated September 6, 1989, were performed by McCoy-Jackson Associates for FEMA, under Contract No. EMW-84-C-1603. That work was completed in October 1987.

Coxsackie, Village of: the hydrologic and hydraulic analyses for the FIS report dated September 6, 1989, were performed by McCoy-Jackson Associates for FEMA, during the preparation of the FIS for the Town of Coxsackie. That work was completed in October 1987

Hunter, Town of: the hydrologic and hydraulic analyses for the FIS report dated August 2, 1982, were performed by the SCS, under Inter-Agency Agreement No. IAA-H-11-79, Project Order No. 2. That work was completed in April 1981.

- Hunter, Village of: the hydrologic and hydraulic analyses for the FIS report dated June 1, 1982, were performed by the SCS, under Inter-Agency Agreement No. IAA-H-11-79, Project Order No. 2. That work was completed in April 1981.
- Jewett, Town of: the hydrologic and hydraulic analyses for the FIS report dated October 4, 1982, were performed by the SCS for FEMA, under Inter-Agency Agreement No. IAA-H-11-79, Project Order No. 2. That work was completed in April 1981.
- Lexington, Town of: the hydrologic and hydraulic analyses for the FIS report dated February 1, 1983, were performed by the SCS for FEMA, under Inter-Agency Agreement No. IAA-H-11-79, Project Order No. 2. That work was completed in April 1981.
- Prattsville, Town of: the hydrologic and hydraulic analyses for the FIS report dated November 16, 1982, were performed by the SCS for FEMA, under Inter-Agency Agreement No. IAA-H-11-79, Project Order No. 9, Amendment No. 1. That work was completed in April 1981.
- Tannersville, Village of: the hydrologic and hydraulic analyses for the FIS report dated October 18, 1982, were performed by the SCS for FEMA, under Inter-Agency Agreement No. IAA-H-11-79, Project Order No. 2. That work was completed in April 1981.
- Windham, Town of: the hydrologic and hydraulic analyses for the original March 3, 1997, FIS, were performed by Leonard Jackson Associates for FEMA, under Contract No. EMW-92-C-3821. That work was completed in February 1993.

The authority and acknowledgments for the Towns of Durham, Greenville, Halcott, and New Baltimore, are not available because no FIS reports were published for these communities.

For the May 16, 2008, FIS, the New York State Department of Environmental Conservation (NYSDEC) and FEMA entered into a Cooperative Technical Partners (CTP) Agreement to collaboratively produce this countywide FIS. The revised hydrologic analyses were prepared by PAR Government Systems Corporation (PGSC). The revised hydraulic analyses were performed by both PGSC and the NYSDEC. PGSC performed this work under contract with the NYSDEC. This work was completed in June 2004.

Minor adjustments were made to the flood elevation boundaries along community boundaries in order to produce a seamless FIRM for the entire county.

For the May 18, 2008, FIS, base map information was derived from digital orthophotography provided by the New York State Office of Cyber Security and Critical Infrastructure Coordination. This information was produced as 30-centimeter resolution natural color orthoimagery from photography dated April 2004 and 30-centimeter resolution color infrared orthoimagery from photography dated April 2001.

For the June 2, 2015, FIS revision, the hydrologic and hydraulic analyses for Broadstreet Hollow, Bushnellsville Creek, Gooseberry Creek, Hollow Tree Brook, Red Kill, Sawmill Creek, Schoharie Creek, and Stony Clove Creek were prepared by Risk Assessment Mapping and Planning Partners (RAMPP) for FEMA under contract No.HSFEHQ-09-D-0369. This work was completed in March 2013.

For the June 2, 2015, FIS revision, base map imagery was provided by the New York State Digital Ortho-Imagery Program from the New York State Office of Cyber Security. The digital ortho imagery is 4-band ortho-imagery produced from 4 band digital capture with a 1 foot ground pixel resolution, dated 2009.

The projection used in the preparation of this FIRM was Universal Transverse Mercator (UTM) Zone 18. The horizontal datum was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

1.3 Coordination

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

The dates of the initial and final CCO meetings held prior to the May 16, 2008, FIS, for the incorporated communities within Greene County are shown in Table 1, "Initial and Final Precountywide CCO Meetings."

TABLE 1 - INITIAL AND FINAL PRECOUNTYWIDE CCO MEETINGS

<u>Community</u>	<u>Initial CCO Date</u>	<u>Final CCO Date</u>
Ashland, Town of	May 5, 1987	December 8, 1987
Athens, Town of	March 1984	September 26, 1988
Athens, Village of	March 1984	September 26, 1988
Cairo, Town of	March 1984	September 21, 1988
Catskill, Town of	March 1984	March 22, 1989
Catskill, Village of	March 1984	September 26, 1988
Coxsackie, Town of	February 22, 1984	September 22, 1988
Coxsackie, Village of	March 1988	September 22, 1988
Hunter, Town of	November 1978	January 12, 1982
Hunter, Village of	November 1978	January 12, 1982
Jewett, Town of	November 1978	January 13, 1982
Lexington, Town of	November 1978	January 13, 1982
Prattsville, Town of	November 1978	June 14, 1982
Tannersville, Village of	November 1978	January 12, 1982
Windham, Town of	*	June 7, 1994

*Data not available

Initial CCO meetings for the May 16, 2008, FIS were held on November 25, 2002, with representatives of NYSDEC and local officials. A final CCO meeting was held November 13, 2006, with representatives from Greene County, NYSDEC, New York State Department of Environmental Protection, and communities within Greene County.

For the June 2, 2015, FIS revision, an initial CCO meeting was held on November 15, 2011 and attended by representatives of NYSDEC, RAMPP, FEMA, and local officials. The Flood Risk Review (FRR) meeting was held on March 20, 2013. The final CCO meeting was held on May 30, 2013, and attended by representatives of FEMA, NYDEC, RAMPP, and representatives from the communities. All issues and concerns raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Greene County, New York.

All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

TABLE 2 - FLOODING SOURCES STUDIED BY DETAILED METHODS

Acra Tributary	Mitchell Hollow Creek
Batavia Kill	Potic Creek
Broadstreet Hollow	Potic Reservoir
Bushnellsville Creek	Red Kill
Catskill Creek	Reservoir Tributary
Climax Tributary	Sawmill Creek
Cob Creek	Schoharie Creek
Coxsackie Creek	Shingle Kill
East Branch Murderers Creek	Sleepy Hollow Lake
East Kill	Stony Clove Creek
Gooseberry Creek	Trout Brook
Hollow Tree Brook	West Branch Murderers Creek
Hudson River	West Kill
Kaaterskill Creek	

For the May 16, 2008, FIS, updated or new analyses were included for the flooding sources shown in Table 3, "May 16, 2008, Scope of Revision."

TABLE 3 - MAY 16, 2008, SCOPE OF REVISION

<u>Stream</u>	<u>Limits of Revised or New Detailed Study</u>
Batavia Kill	From its confluence with Schoharie Creek to approximately 0.44 mile upstream of Big Hollow Road
East Kill	From its confluence with Schoharie Creek to Village of Tannersville corporate limits
Mitchell Hollow Road	From its confluence with Batavia Kill to approximately 0.52 mile upstream of State Route 23
Sawmill Creek	From its confluence with Gooseberry Creek to the upstream Village of Tannersville corporate limits

<u>Stream</u>	<u>Limits of Revised or New Detailed Study</u>
Schoharie Creek	From the confluence with Schoharie Reservoir to approximately Elka Park Road
West Kill	From its confluence with Schoharie Creek to approximately 100 feet upstream of Ad Van Road

For the June 2, 2015, FIS revision, updated or new analyses were included for the flooding sources shown in Table 4, “June 2, 2015, Scope of Revision.”

TABLE 4 - JUNE 2, 2015, SCOPE OF REVISION

<u>Stream</u>	<u>Limits of Revised or New Detailed Study</u>
Broadstreet Hollow	From the County Boundary to approximately 3,710 feet upstream of Broadstreet Hollow Road
Bushnellsville Creek	From the County Boundary to approximately 6,240 feet upstream of the county boundary
Gooseberry Creek	From the confluence with Schoharie Creek to approximately 2,460 feet upstream of Clum Hill Road
Hollow Tree Brook	From the confluence with Stony Clove Creek to approximately 1,630 feet upstream of Diamond Notch Road
Red Kill	From the confluence with Schoharie Creek to approximately 480 feet upstream of Scribner Hollow Road
Schoharie Creek	From Elka Park Road to approximately 6,280 feet upstream of Dale Lane
Stony Clove Creek	From the downstream county boundary to approximately 500 feet upstream of State Route 214

Additionally, for the June 2, 2015, FIS revision, Sawmill Creek and Schoharie Creek, from approximately XS Y upstream to Elka Park Road, were redelineated based on more up-to-date topographic data.

Riverine flooding sources throughout the county have been studied by detailed methods at different times and, prior to the May 16, 2008, FIS, often on a community-by-community basis. Table 5, “Model Dates for Riverine Flooding,”

represents the hydraulic modeling dates for the detailed study flooding sources in the county.

TABLE 5 - MODEL DATES FOR RIVERINE FLOODING

<u>STREAM NAME</u>	<u>COMMUNITY</u>	<u>MOST RECENT MODEL DATE</u>
Acra Tributary	Town of Cairo	October 1987
Allen Brooke	Town of Hunter	April 1981
Batavia Kill	Town of Ashland	June 2004
	Town of Prattsville	June 2004
	Town of Windham	June 2004
Broadstreet Hollow	Town of Lexington	March 2013
Bushnellsville Creek	Town of Lexington	March 2013
Catskill Creek	Town of Cairo	October 1987
Climax Tributary	Town of Coxsackie	October 1987
Cob Creek	Town of Coxsackie	October 1987
Coxsackie Creek	Town of Coxsackie	October 1987
	Village of Coxsackie	October 1987
East Branch Murderers Creek	Town of Coxsackie	October 1987
East Kill	Town of Jewett	June 2004
Gooseberry Creek	Town of Hunter	March 2013
	Village of Tannersville	March 2013
Hollow Tree Brook	Town of Hunter	March 2013
Hudson River*	Town of Catskill	July 1982
	Village of Catskill	July 1982
	Town of Athens	July 1982
	Village of Athens	July 1982
	Town of Coxsackie	July 1982
	Village of Coxsackie	July 1982
Kaaterskill Creek	Town of Catskill	October 1987
Mitchell Hollow Creek	Town of Windham	June 2004
Potic Creek	Town of Coxsackie	October 1987
Potic Reservoir	Village/Town of Coxsackie	October 1987

*For the Hudson River, tidal elevations were taken from the Flood Insurance Studies for the Towns of Saugerties (FEMA 1985) and Stockport (FEMA, 1983).

TABLE 5 - MODEL DATES FOR RIVERINE FLOODING - continued

<u>STREAM NAME</u>	<u>COMMUNITY</u>	<u>MOST RECENT MODEL DATE</u>
Red Kill	Town of Hunter	March 2013
Reservoir Tributary	Town of Coxsackie	October 1987
Sawmill Creek	Village of Tannersville	June 2004
Schoharie Creek	Town of Jewett	June 2004
	Town of Lexington	June 2004
	Town of Hunter	June 2004
	Village of Hunter	March 2013
	Town of Prattsville	June 2004
Shingle Kill	Town of Cairo	October 1987
	Town of Catskill	October 1987
	Village of Catskill	October 1987
Sleepy Hollow Lake	Town of Athens	October 1987
	Village of Athens	October 1987
Stony Clove Creek	Town of Hunter	March 2013
Trout Brook	Town of Cairo	October 1987
West Branch Murderers Creek	Village/Town of Coxsackie	October 1987
West Kill	Town of Lexington	May 2008

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. In addition, one area was studied by limited detailed methods. Section 3.2 provides a comprehensive definition of limited detailed flood hazard designations.

All or portions of numerous flooding sources in the county were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA, the local communities, and Greene County.

2.2 Community Description

Greene County is located in the Capitol District of New York State, on the northeastern edge of the region known as The Catskills. It is bordered on the north by Albany County, on the east by Columbia County and the Hudson River, on the south by Ulster County, on the west by Delaware County, and on the northwest by Schoharie County.

Greene County was formed by an act of the New York State legislature on March 25, 1800. Its county seat is the Town of Catskill. According to the United

States (U.S.) Census Bureau, the county encompasses approximately 647 square miles and the population in 2010 was 49,221, an increase of 2.1 percent from 2000.

The climate of the region consists of cold winters and moderately warm summers. The average maximum temperature in January is 34 degrees Fahrenheit (°F) and the average maximum temperature in July is 85°F. The mean annual precipitation accumulation is approximately 42 inches. The maximum average precipitation typically occurs in October (The Weather Channel, 2014).

The Hudson River flows in a southern direction to its confluence with Upper New York Harbor at the Battery in New York City. The river is an estuary in the vicinity of Albany and is used for navigation to connect New York Harbor with the Erie Canal to the City of Buffalo and the Great Lakes.

The Schoharie Creek watershed encompasses an area of 237 square miles within Greene County, and contains major streams in the county including Schoharie Creek, Batavia Kill, West Kill, and East Kill, along with their tributaries. Schoharie Creek is a northward flowing tributary of the Mohawk River, with its headwaters in the Town of Hunter, in the Catskill Mountains.

Stony Clove Creek is in the Esopus Creek watershed, which is part of the Hudson River Basin. The Stony Clove Creek basin encompasses approximately 16 square miles within Greene County.

Catskill Creek flows in a southeastern direction to its confluence with the Hudson River. It has an average slope of 20 feet per mile and a drainage area of 370 square miles at its mouth.

East Kill flows east to west and joins Schoharie Creek near the center of the Town of Jewett. Almost all of its 36.3 square mile drainage area is within this town.

Gooseberry Creek flows west through the Village of Tannersville, through Rip Van Winkle Lake and out of Tannersville into Schoharie Creek. The drainage area at the confluence of Sawmill Creek is 2.9 square miles.

2.3 Principal Flood Problems

Flooding can occur in any month of the year in Greene County. However, the majority of the larger floods have occurred in late winter and early spring and when snowmelt adds to heavy spring rains to produce increased runoff. Summer and fall floods also occur due to hurricane activity.

A USGS gage on Catskill Creek is operated in Oak Hill (Gage No. 01361500) and has over 65 years of systematic record. A log-Pearson Type III analysis of this gage data was prepared by NYSDEC to compute peak discharges at the gage site for various return periods (U.S. Department of the Interior).

There are eight communities within the Greene County Schoharie Creek watershed and Esopus Creek watershed. The effective FISs for the towns and villages along Schoharie Creek all indicated major flooding events within the Schoharie Creek watershed in 1938, 1955, 1960, and 1980. Major floods also occurred within the Schoharie Creek watershed in April 1987, January 1996 and September 1999 (USGS, 1989; USGS, 1998; U.S. Department of Agriculture, 2002). In addition, ice jams were noted as a cause of flooding in 1979 within the unincorporated Village of Prattsville (FEMA, 1982).

Two significant flood events took place in the Schoharie Creek watershed in April 1987 and January 1996 and were both the direct results of snowmelt or combined precipitation-snowmelt events. Both of these floods occurred when unseasonably warm weather produced significant melting of the existing snowpack, and was followed by intense rainfall.

In April 1987, an intense rainstorm occurred when the soils were already saturated, stream discharges were high, and some reservoirs were at or near capacity from snowmelt and previous rainfall. In early March, due to unseasonably warm weather, the 30-inch snowpack had been reduced by nearly half, creating saturated soil conditions and filling reservoirs. Over the 3-day period from April 3 to April 6, 1987, more than 9 inches of rain had fallen in the higher elevations. At the time, with a peak discharge exceeding 47,600 cubic feet per second (cfs) at the Prattsville gage (Gage No. 01350000) and was the flood of record for most of the Schoharie Creek watershed (USGS, 1989).

On January 18 and 19, 1996, extensive flooding was caused in the Schoharie Creek watershed when precipitation from a large storm combined with rapidly melting snow brought on by unseasonably warm temperatures. Earlier in January 1996, a classic “Nor’easter” had brought heavy snows, and was followed by two additional storms, bringing the accumulated snowpack in the Catskills region to exceed 45 inches. The two-day storm of January 18-19 provided 2.0 to 4.5 inches of rain, with the greater rainfalls recorded at higher elevations. The January 1996 storm was the most widespread and devastating flood since the October 1955 event. With a peak discharge exceeding 52,800 cfs at the Prattsville gage (Gage No. 01350000), the January 1996 storm was a record event at the time in the Schoharie Creek watershed (USGS, 1998). That discharge record has since been superseded by Hurricane Irene, on August 28, 2011, which resulted in a peak discharge of 120,000 cfs at the Prattsville gage (Gage No. 01350000).

Of the eleven largest events of record, all but three were influenced by snowmelt events similar in nature to the April 1987 and January 1996 floods. The other floods were due to Hurricane Agnes in June 1972, and two November rainstorms.

Hurricane Irene on August 28, 2011, was a tropical storm which caused major damages within Greene County. During Hurricane Irene, Batavia Kill flooded its banks flooding Main Street in the Town of Windham causing widespread damage. Schoharie Creek also overcame its banks, sending raging water through the streets in the Towns of Prattsville and Windham causing extensive damage. The Town of Tannersville also had its downtown flooded. Numerous bridges were

washed away and parts of Interstate 87 were closed due to flooding caused by Hurricane Irene. Hurricane Irene also left many communities cut off from supplies and without electricity or running water. On August 31, 2011, President Obama declared a disaster (DR-4020) for the State of New York, including Greene County, making federal funding available to affected individuals and state and eligible local governments.

2.4 Flood Protection Measures

Three flood control structures are located within the Greene County Schoharie Creek watershed. These flood control structures were built in the Batavia Kill basin in the Town of Windham to mitigate flooding previously experienced on Batavia Kill. The largest of the three structures, CD Lane Park Dam (Batavia Kill Watershed Site 1 Dam), was constructed in 1974 and is located on Batavia Kill approximately 3.5 miles upstream of Hensonville. The Site 3 Dam was constructed in 1970 and is located on Lake Heloise Tributary approximately 1 mile north of its confluence with Batavia Kill. The Site 4A Dam was constructed in 1967 and is located on Mitchell Hollow Creek approximately 1.7 miles north of its confluence Batavia Kill. The Batavia Kill Watershed District owns and maintains these three flood control structures (Van Schaak, 2004).

Sleepy Hollow Lake is regulated by a fixed spillway and has only a small capability to attenuate major peak flood flows.

Small dams exist on both Potic and Cob Creeks, but are not flood protection structures.

Non-structural measures of flood protection are being utilized to aid in the prevention of future flood damage. These measures are in the form of land use regulations which control building within areas that have a high risk of flooding.

3.0 ENGINEERING METHODS

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

county at the time of completion of this FIS. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Prior to the May 16, 2008, FIS, and the June 2, 2015, FIS revision, each incorporated community within Greene County, with the exception of the Towns of Durham, Greenville, Halcott, and New Baltimore, has a previously printed FIS report. The hydrologic analyses described in those reports and unrevised by these studies have been compiled and are summarized below.

A U.S. Army Corps of Engineers (USACE) Regional Frequency Analysis was used to compute peak discharges of flood events of the desired magnitudes for Catskill Creek, Cob Creek, Coxsackie Creek, Climax Tributary, Kaaterskill Creek, Potic Creek, Shingle Creek, and West Branch Murderers Creek (USACE, 1974). This regional analysis method used gage data throughout the upper Delaware and Hudson River Basins to formulate regression equations for computing peak discharges for ungaged streams. The parameters of drainage area, mean annual flood peak, standard deviation, and skew are used in the regression equations. For Catskill Creek and Shingle Creek, calculated peak flows were compared to statistical analyses of USGS gage data (gage no. 01361500) to insure the suitability of the computational method to the Catskill basin.

Acra Tributary, East Branch Murderers Creek, Reservoir Tributary, and Trout Brook have relatively small drainage basins. The use of regional analysis methods is not recommended for these small basins because of the lack of gage data to incorporate into the regression equations. An SCS study was therefore used for these streams because the method was based on data from similar small basins (U.S. Department of Agriculture, 1975). This empirical method uses the parameters of drainage area, basin slope, a permeability coefficient, and land form cover types to compute peak discharges on small ungaged streams.

The Hudson River is an estuary in this county. High tides produce higher flood elevations than fluvial flows; therefore, peak discharges were not computed on the Hudson River.

May 16, 2008, FIS

The majority of streamflow within the study area is unregulated, including Schoharie Creek, East Kill, West Kill, and their respective tributaries, Batavia Kill, Mitchell Hollow Creek and Saw Mill Creek. For each study, hydrologic analyses were performed to determine discharge–frequency relationships for floods of selected recurrence intervals.

To calculate stream discharges, the revised hydrologic analyses followed the standardized regional regression equation procedure detailed by the USGS publication 90-4197, Regionalization of Flood Discharges for Rural, Unregulated Streams in New York, Excluding Long Island (USGS, 1991). This procedure relates runoff discharge to the mean annual precipitation, and several other

parameters based on watershed basin characteristics, within a number of geographically distinct regions in New York State. The Greene County watersheds fall within USGS Region 4 for New York State. The parameters required for the Region 4 regression equations included mean annual precipitation, watershed area, and basin storage. Basin storage is defined by USGS as the percentage of the area within a watershed covered by lakes, ponds, or swamps.

The delineation of watersheds and the determination of values for the regression-equation parameters representative of those watersheds were carried out using spatial analysis techniques and GIS software. To model watershed topography, the spatial analysis utilized the New York State Digital Elevation Model (NYSDEM), which has a 10-meter resolution.

Additionally, as part of the spatial analysis, remotely-sensed National Land Cover Data (NLCD), obtained under the Multi-Resolution Land Characteristics (MRLC) program, were used to identify the percentage of the area within each watershed belonging to land classification categories that contribute to basin storage. The NLCD, a product with nationwide standardized coverage, identifies and organizes land cover into standard categories and maps their occurrence using a 30-meter grid spacing (U.S. Environmental Protection Agency [USEPA], 2003).

Using basin area, the mean annual precipitation (from USGS 90-4197, Plate 1, averaged over the basin area), and the percentage of the watershed area contributing to basin storage, discharge values were determined throughout the study area using the USGS regional regression equations (USGS 90-4197; USGS, 1991) for recurrence intervals of 10, 50, 100, and 500 years, which represented flood events having probabilities of 10, 2, 1, and 0.2 percent, respectively, of being equaled or exceeded in any one year. These discharge values were determined at approximately 90 locations within the study area where discharge values were required to complete flood hydraulics analysis.

Schoharie Creek

For Schoharie Creek, the hydrologic analysis method was modified to take advantage of the availability of long-record gage data. Records for USGS Gage No. 01350000 at Prattsville cover 98 years including 93 systematic records and one historic record. Nominations at the gage site were determined using the log-Pearson Type III (LP3) gage analysis performed using the method described in Guidelines for Determining Flood Flow Frequency, U.S. Water Resources Council Bulletin No. 17B (USGS, 1982). At the Prattsville gage site, the gage analysis was compared to the regression equation calculation for each recurrence interval. The comparison ratio was determined between the gage analysis and the regression equation values at each recurrence interval. These gage site comparison ratios were used as adjustment factors applied to the regression equations to determine peak flow nominated at ungaged locations along Schoharie Creek.

East Kill

The peak flow nominations along East Kill in the Town of Jewett were determined from the analysis of gage data. The two-station analysis was used, as described in Appendix 7 of WRC Bulletin No. 17B (USGS 1982). Using this technique, the confidence in a short-period gage record is improved through a statistical correlation with a nearby long-record gage. The East Kill gage near Jewett Center (USGS Gage No. 01349700) was the short-record site, with 18 records. The long-record site was the Prattsville gage (USGS Gage No. 01350000) with 94 records. The confidence in the East Kill gage analysis was improved to an equivalent period of 45 years using the Bulletin No. 17B Appendix 7 method (USGS, 1982).

The gage analysis was transferred upstream and downstream along East Kill to ungaged nomination locations using a weighting technique based on the relative drainage basin area between the gaged and ungaged sites. The weighting technique is recommended in the USGS Water-Resources Investigation Report 02-4168 (USGS, 2002).

Batavia Kill

For this revised study, nominated discharges were developed for the Batavia Kill partially regulated flow system downstream of Site 1 Dam, using the following procedure. First, a discharge-frequency curve was developed utilizing the USACE Flood Frequency Analysis (FFA) for the Hensonville gage (No. 01349850), which was located approximately 3.5 miles downstream of the Site 1 Dam. To analyze the influence of the dam, only the gage data from 1975 and later were used (the dam was constructed in 1974), which resulted in 20 years of discharge data. Using the flood-frequency curve, discharges were determined for the four flood recurrence intervals (10-, 2-, 1-, and 0.2-percent annual chance occurrence).

Second, the discharges were transferred upstream from the Hensonville gage (Gage No. 1349850) to the Site 1 Dam based on USGS National Flood Frequency (NFF) procedures (USGS, 2002) that used drainage area weighting, with a drainage area exponent applied. Finally, the discharges nominated at the dam were added to the regression equation discharges downstream of the gage to account for the regulated and unregulated contributions to downstream flow. In addition, the nominated discharge at the dam was considered to equal the inflow to the dam (i.e., steady state). Using the Site 1 Dam stage-discharge curve (USDA, 1970), stage was calculated and used to map the flood extents at the dam.

Discharges for the two smaller flood control structures in the Batavia Kill watershed (Site 3 Dam and the Site 4A Dam) were calculated using the following approach. To estimate the storage provided by these dams, the regression equation storage parameters were increased relative to the areal extent of storage behind each dam. Nominated discharges downstream of the dams were calculated using the regression equations with the increased storage. Using the stage-

discharge curves (USDA, 1966 and 1967) for each of the dams, stage was calculated at each dam for the peak discharges.

June 2, 2015, FIS Revision

Detailed Hydrologic Analyses for the June 2, 2015, FIS revision, were carried out to establish peak discharge-frequency relationships for five frequencies for Schoharie Creek, Gooseberry Creek, Red Kill within Schoharie Watershed and for Broadstreet Hollow, Bushnellsville Creek, Hollow Tree Brook, and Stony Clove Creek in Ashokan Watershed. Approximate Hydrologic Analyses were carried out to establish peak discharge-frequency relationships for Allen Brook and Tributary to Allen Brook affecting the county, within Schoharie Watershed for 1-percent annual chance flood frequency. Both detailed and approximate analyses were based on HEC-HMS watershed model.

Flood flow frequencies for all the study streams were developed using a calibrated rainfall-runoff model of Schoharie and Ashokan Watersheds. The model was developed following the criteria outlined in Appendix C. The Rainfall-Runoff model was developed using HEC-HMS 3.5 computer model (USACE, 2010). Hydrologic losses were based on the Natural Resources Conservation Service (NRCS) Curve Number method, rainfall-runoff transformations were based on NRCS (unit hydrograph) procedures, and reach routing was based on Muskingum-Cunge method. The model calibration and verification were performed by simulating historic flood events. Calibration was performed for Hurricane Irene, which occurred in August 2011 and verifications were performed for Tropical Storm Lee, which occurred in September 2011 and another storm that occurred in October 2005.

Hypothetical rainfall data (frequency storm) are used to develop peak flow hydrographs for the five return intervals scoped for the project. The frequencies considered for this study are 10-Year (10-percent), 25-year (4-percent), 50-Year (2-percent), 100-Year (1-percent) and 500-Year (0.2-percent) for detailed streams and only 100-Year (1-percent) for approximate streams. The hypothetical rainfall used in this study was based on National Oceanic and Atmospheric Administration (NOAA) Atlas 14 data and was obtained from the Northeast Regional Climate Center – Cornell University. The duration chosen for the frequency storm is 24-hour and the type of distribution chosen is Frequency Storm. Depth-Area analyses were utilized to transfer point rainfall to aerial distribution.

A summary of the drainage area-peak discharge relationships for all the streams studied by detailed methods is shown in Table 6, “Summary of Discharges.”

TABLE 6 - SUMMARY OF DISCHARGES

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10-PERCENT</u>	<u>2-PERCENT</u>	<u>1-PERCENT</u>	<u>0.2-PERCENT</u>
ACRA TRIBUTARY					
At mouth	3.4	1,070	1,890	2,200	2,960
Upstream of confluence of unnamed tributary	1.9	700	1,230	1,430	1,930
Upstream of confluence of unnamed tributary Approximately 200 feet downstream of State Route 23 bridge	1.2	470	730	1,040	1,390
	0.9	380	590	840	1,130
BATAVIA KILL					
Confluence with Schoharie Creek	72.82	9,100	15,760	19,160	28,530
Prattsville upstream corporate limit	68.25	8,600	14,910	18,130	27,040
Approximately 0.51 mile upstream of confluence with Lewis Creek	63.76	8,060	13,980	17,010	25,410
Upstream of confluence of West Hollow Brook	54.06	6,970	12,120	14,770	23,130
Windham downstream corporate limits	41.55	5,490	9,570	11,690	17,630
Upstream of Mitchell Hollow Tributary	29.11	4,020	7,060	8,650	13,190
Upstream of Lake Heloise Tributary	24.30	3,530	6,260	7,710	11,880
Hensonville Gage (#01349850)	13.38	1,680	2,880	3,570	5,680
CD Lane Park Dam	9.45	1,250	2,160	2,680	4,280
Approximately 1,000 feet upstream of Route 56	3.27	680	1,290	1,620	2,530
Upstream of Big Hollow Road	1.12	280	540	690	1,100
BROADSTREET HOLLOW					
Above Esopus Creek	7.3	1,772	3,628	4,810	8,598
Above Jay Hand Hollow	4.9	1,406	2,869	3,796	6,741

TABLE 6 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
BUSHNELLSVILLE CREEK					
Approximately 2,000 feet upstream of Gossoo Road	8.6	1,823	3,787	4,944	8,930
Above Angle Creek	4.4	1,083	2,129	2,767	4,944
CATSKILL CREEK					
At confluence with the Hudson River	370	25,300	42,700	52,000	79,000
Upstream of confluence of Kaaterskill Creek	291	20,100	33,300	40,200	59,700
Upstream of confluence of Potic Creek	283	19,100	30,600	38,400	52,600
Upstream of confluence of Mohigan Tributary	265	18,100	29,100	34,700	50,200
Upstream of confluence of Shingle Kill	246	17,100	27,500	32,800	47,600
CLIMAX TRIBUTARY					
At confluence with Coxsackie Creek	7.1	750	1,640	2,210	4,210
COB CREEK					
Upstream of confluence with Potic Reservoir	19.7	2,070	4,060	5,240	9,030
Upstream of confluence of unnamed tributary	16.0	1,750	3,470	4,500	7,820
At Gayhead Earlton Road bridge	15.3	1,690	3,360	4,350	7,580
At Tranquility Road bridge	13.9	1,570	3,120	4,050	7,090
COXSACKIE CREEK					
At downstream Town of New Baltimore corporate limit	21.9	1,860	3,810	5,020	9,110
Upstream of confluence of unnamed tributary	18.3	1,610	3,330	4,400	8,050
Upstream of confluence of unnamed tributary	16.0	1,440	3,010	3,990	7,340
Upstream of confluence of Climax Tributary	7.4	770	1,680	2,260	4,300

TABLE 6 - SUMMARY OF DISCHARGES - continued

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10-PERCENT</u>	<u>2-PERCENT</u>	<u>1-PERCENT</u>	<u>0.2-PERCENT</u>
COXSACKIE CREEK					
(continued)					
Upstream of confluence of unnamed tributary	6.6	710	1,550	2,090	4,000
Upstream of confluence of Reservoir Tributary	2.44	480	870	1,010	1,350
Upstream of confluence of unnamed tributary	2.20	440	800	930	1,250
Upstream of confluence of unnamed tributary	1.87	390	710	830	1,110
Upstream of confluence of unnamed tributary	1.40	320	570	670	890
Upstream of confluence of unnamed tributary	0.73	180	230	260	340
Upstream of confluence of unnamed tributary	0.25	23	29	32	43
EAST BRANCH MURDERERS CREEK					
At downstream Town of Coxsackie corporate limit	3.0	460	850	1,000	1,330
Upstream of confluence of unnamed tributary	2.87	440	820	960	1,280
Upstream of confluence of unnamed tributary	2.65	420	780	900	1,200
Approximately 300 feet downstream of Sleepy Hollow Road bridge	2.52	400	740	870	1,160
Upstream of confluence of unnamed tributary	2.36	380	700	830	1,100
EAST KILL					
At confluence with Schoharie Creek	36.29	9,070	15,210	18,130	25,630
At Mill Hollow Road 01349700	35.60	8,920	14,960	17,840	25,220
At State Route 296	25.18	6,590	11,160	13,340	18,940
At Scribner Hollow Road	14.87	4,170	7,150	8,580	12,250
At confluence of Halsey Brook	7.80	2,370	4,140	4,990	7,190

TABLE 6 - SUMMARY OF DISCHARGES - continued

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10-PERCENT</u>	<u>2-PERCENT</u>	<u>1-PERCENT</u>	<u>0.2-PERCENT</u>
GOOSEBERRY CREEK					
At confluence with Schoharie Creek	9.5	2,985	5,753	7,341	12,233
Upstream of confluence with Allen Brook	6.1	1,927	3,810	4,857	8,086
Upstream of confluence with Sawmill Creek	2.6	902	1,821	2,337	3,937
Approximately 2,000 feet upstream of Clum Hill Road	0.4	191	348	436	704
HOLLOW TREE BROOK					
Hollow Tree Brook above Stony Clove Creek	4.6	1,517	3,360	4,553	8,362
At Hollow Tree Brook Gage (No. 01362342)	2.0	658	1,443	1,950	3,576
KAATERSKILL CREEK					
At confluence with Catskill Creek	70.2	7,100	13,900	18,000	31,200
Upstream of confluence with Vedder Brook	65.7	6,700	13,300	17,200	29,800
Approximately 0.7 mile above lower State Route 23A crossing	59.1	6,200	12,200	15,900	27,700
Approximately 0.5 mile downstream of lower High Falls Road crossing	44.1	5,450	10,800	14,000	24,300
MITCHELL HOLLOW CREEK					
Confluence with Batavia Kill	8.71	1,100	1,900	2,290	3,370
At Site 4A Dam	6.65	1,100	2,000	2,460	3,740
POTIC CREEK					
At downstream corporate limit	41.2	3,800	7,100	9,000	15,100
Upstream of confluence of Cob Creek	19.9	2,090	4,090	5,280	9,100
Approximately 1,500 feet downstream of State Route 81 bridge	18.0	1,930	3,790	4,900	8,480

TABLE 6 - SUMMARY OF DISCHARGES - continued

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10-PERCENT</u>	<u>2-PERCENT</u>	<u>1-PERCENT</u>	<u>0.2-PERCENT</u>
POTIC CREEK					
(continued)					
Upstream of confluence of unnamed tributary	13.6	1,540	3,070	3,990	6,980
Upstream of confluence of unnamed tributary	12.5	1,440	2,880	3,750	6,580
RED KILL					
At confluence with Schoharie Creek	2.1	723	1,405	1,797	3,013
Upstream confluence of tributary on east bank	0.9	395	743	939	1,542
RESERVOIR TRIBUTARY					
At confluence with Coxsackie Creek	4.0	1,200	2,240	2,640	3,520
SAWMILL CREEK					
At confluence with Gooseberry Creek	3.17	990	2,030	2,620	4,360
At Tannersville upstream corporate limit	2.36	750	1,540	1,990	3,310
Upstream of confluence of Sawmill Creek Tributary	1.57	530	1,120	1,450	2,440
SCHOHARIE CREEK					
At Prattsville downstream corporate limit	237.79	34,030	56,710	67,900	97,700
At Prattsville gage (No. 03150000)	236.42	34,000	56,700	67,900	97,700
Upstream of confluence of Batavia Kill	153.57	25,190	43,050	52,000	76,170
At Prattsville upstream corporate limit	147.86	24,470	41,900	50,630	74,260
At State Route 42 bridge	99.63	17,190	31,130	37,810	56,060
At Lexington upstream corporate limit	95.61	17,390	30,280	36,810	54,660
At confluence of East Kill	54.63	12,460	22,660	27,980	42,860
At Jewett upstream corporate limits	43.20	10,650	19,660	24,400	37,780
At Bridge Street	40.12	10,130	18,770	23,330	36,240
At Hunter Village upstream corporate limits	36.28	9,370	17,440	21,710	33,830

TABLE 6 - SUMMARY OF DISCHARGES - continued

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10-PERCENT	2-PERCENT	1-PERCENT	0.2-PERCENT
SCHOHARIE CREEK					
(continued)					
At State Route 214	28.89	7,770	14,580	18,190	28,490
At confluence of Gooseberry Creek	17.23	5,430	10,510	13,250	21,180
Upstream confluence with Cook Brook Tributary	15.8	4,233	8,532	11,082	19,284
Upstream confluence with Roaring Kill on south bank	6.7	2,029	4,180	5,496	9,615
Approximately 3,130 feet upstream of Elka Park Road	4.5	1,406	2,998	3,938	6,899
SHINGLE KILL					
At mouth	14.4	2,410	4,940	6,480	11,500
Approximately 300 feet downstream of State Route 145 culvert	13.6	2,270	4,660	6,110	10,900
Upstream of confluence of unnamed tributary	12.1	2,100	4,330	5,700	10,200
Upstream of confluence of unnamed tributary	8.4	1,570	3,290	4,350	7,900
STONY CLOVE CREEK					
At Greene-Ulster County boundary	16.3	4,634	10,216	13,863	25,736
At confluence of Hollow Tree Brook	9.3	2,647	5,913	8,031	14,853
At Lanesville Bridge	4.4	1,350	3,068	4,185	7,770
At State Route 214	3.3	1,097	2,412	3,263	5,977
TROUT BROOK					
At mouth	4.4	920	1,720	2,050	2,770
Upstream of confluence of unnamed tributary	2.9	670	1,260	1,500	2,030
Approximately 100 feet downstream of County Route 31 culvert	2.6	620	1,160	1,380	1,870
WEST BRANCH MURDERERS CREEK					
At downstream Town of Coxsackie corporate limit	8.1	750	1,610	2,170	4,100
Upstream of confluence of unnamed tributary	6.7	640	1,390	1,880	3,590

TABLE 6 - SUMMARY OF DISCHARGES - continued

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10-PERCENT</u>	<u>2-PERCENT</u>	<u>1-PERCENT</u>	<u>0.2-PERCENT</u>
WEST BRANCH					
MURDERERS CREEK					
(continued)					
Upstream of confluence of unnamed tributary	6.3	610	1,330	1,790	3,430
At Sleepy Hollow Road bridge	5.9	580	1,260	1,710	3,280
At telephone cable crossing	5.4	530	1,180	1,600	3,080
At Flats Road bridge	5.1	520	1,140	1,550	2,990
WEST KILL					
Confluence with					
Schoharie Creek	31.41	5,520	10,230	12,700	19,630
At State Route 42	22.35	4,290	8,080	10,080	15,770
Upstream of Lex-6 Tributary	11.16	2,520	4,900	6,180	9,870

The stillwater elevations have been determined for the 10-, 2-, 1-, and 0.2-percent chance floods for the flooding sources studied by detailed methods and are summarized in Table 7, "Summary of Stillwater Elevations." For the Hudson River, tidal elevations were taken from the Flood Insurance Studies for the Towns of Saugerties (FEMA 1985) and Stockport (FEMA, 1983).

TABLE 7 - SUMMARY OF STILLWATER ELEVATIONS

<u>FLOODING SOURCE AND LOCATION</u>	<u>ELEVATION (feet NAVD*)</u>			
	<u>10-PERCENT</u>	<u>2-PERCENT</u>	<u>1-PERCENT</u>	<u>0.2-PERCENT</u>
HUDSON RIVER				
At downstream Town of Catskill corporate limits	6.3	8.0	8.6	10.9
At downstream Village of Catskill corporate limits	6.9	8.0	9.9	12.4
At downstream Town of Athens-Town of Catskill corporate limits	7.2	9.5	10.5	13.2
At downstream Village of Athens-Town of Athens corporate limits	7.4	9.8	10.9	13.6
At upstream Town of Athens-Town of Coxsackie corporate limits	7.8	10.6	11.8	14.8
At downstream Village of Coxsackie corporate limits	8.5	11.5	12.9	16.1
At upstream Village of Coxsackie corporate limits	8.8	12.0	13.5	16.8
At upstream Town of Coxsackie corporate limits	8.9	12.1	13.7	17.0

TABLE 7 - SUMMARY OF STILLWATER ELEVATIONS - continued

<u>FLOODING SOURCE AND LOCATION</u>	<u>ELEVATION (feet NAVD*)</u>			
	<u>10-PERCENT</u>	<u>2-PERCENT</u>	<u>1-PERCENT</u>	<u>0.2-PERCENT</u>
POTIC RESERVOIR				
At Potic Reservoir Dam	427.5	428.3	429.1	431.4
SLEEPY HOLLOW LAKE				
Entire shoreline within community	71.1	72.2	72.8	74.6

3.2 Hydraulic Analyses

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

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

The hydraulic analyses for this countywide FIS were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if the hydraulic structures remain unobstructed, operate properly, and do not fail.

Prior to the May 16, 2008, FIS, and the June 2, 2015, FIS revision, each incorporated community within Greene County, with the exception of the Towns of Durham, Greenville, Halcott, and New Baltimore, has a previously printed FIS report. The hydraulic analyses described in those reports and unrevised by these studies have been compiled and are summarized below.

Water-surface elevations of floods of the selected recurrence intervals for Aca Tributary, Catskill Creek, Cob Creek, Climax Tributary, Cocksackie Creek, East Branch Murderers Creek, Kaaterskill Creek, Potic Creek, Reservoir Tributary, Shingle Kill, Trout Brook, and West Branch Murderers Creek were computed using the USACE HEC-2 step-backwater computer program (USACE, 1984). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals.

Starting water-surface elevations for Cocksackie Creek, and the two downstream sections of Kaaterskill Creek in the Town of Catskill were calculated using the slope/area method.

Starting water-surface elevations for Cob Creek were obtained from a USACE analysis report on the Potic Reservoir Dam (USACE, 1981).

Acra Tributary, Climax Tributary, Reservoir Tributary, Shingle Kill, Trout Brook, and the upstream section of Kaaterskill Creek are steep streams and were started at critical depth.

Starting water-surface elevations for East and West Branch Murderers Creeks were obtained from the Flood Insurance Study for the Town of Athens (FEMA, 1989).

Starting water-surface elevations for Potic Creek were determined using known depth criteria.

The starting water-surface elevations for Catskill Creek were taken from the Hudson River tidal elevations and the Town of Athens (FEMA, 1989) and Town of Catskill FISs (FEMA, 1990).

For the Hudson River, the water-surface elevations of floods for selected recurrence intervals were obtained from the FISs for the Towns of Stockport (FEMA, 1982) and Saugerties (FEMA, 1985). Potic Reservoir and Sleepy Hollow Lake elevations were calculated using a spillway rating curve taken from USACE Phase I Inspection Reports (USACE, 1978, 1981).

All below-water sections were obtained by field measurements. All bridges, dams, and culverts were field surveyed to obtain elevation data and structural geometry.

May 16, 2008, FIS

For all the revised studies, the HEC-RAS steady flow module was used to compute water surface elevations. The basic computational procedure is based on the solution of the one-dimensional energy equation. Energy losses are evaluated by friction (Manning's equation) and contraction/expansion (coefficient multiplied by the change in velocity head). The momentum equation is utilized in situations where the water-surface profile is rapidly varied. These situations include mixed flow regime calculations (i.e., hydraulic jumps), hydraulics of bridges, and evaluating profiles at river confluences (stream junctions) (USACE, 2004).

Cross-section elevations were extracted from a Digital Elevation Model (DEM). The DEM was generated by combining overbank elevation data from an aerial Light Detection and Ranging (LiDAR) survey with data from traditional field survey of the stream channel and its immediate overbank areas. For both detailed and approximate studies, all bridges, culverts, dams, and other hydraulic obstructions were field surveyed to provide data on elevation, orientation, and structural geometry. Detailed structural geometry for bridges and culverts was also obtained from New York State Department of Transportation (NYSDOT) as-built drawings where they were available. All field survey data for structures and stream channels were provided by NYSDEC.

Roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the streams and

floodplain areas. Roughness factors for all streams studied by detailed methods are shown in Table 7, "Manning's "n" Values."

June 2, 2015, FIS revision

Hydraulic computations and analyses for the June 2, 2015, FIS revision, consists of determining the the 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood elevations for Broadstreet Hollow, Bushnellsville Creek, Gooseberry Creek, Hollow Tree Brook, Red Kill, Schoharie Creek, and Stony Clove Creek.

The water surface elevations for the 1-percent-annual-chance flood events for streams studied by approximate methods, and 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood elevations for stream studied by detailed methods were computed using the USACE HEC-RAS 4.1.0 step backwater program (USACE, 2010). The hydraulic analyses for this study used a steady-state riverine analysis and also included cross sections and field data collected during detailed field surveyed. For the hydraulic simulations, all structures were assumed to remain fully functional and have unobstructed flows.

The detailed study reaches in this update were field surveyed in July 2012. All structures along the upper reach of Schoharie Creek, along Broadstreet Hollow, Bushnellsville Creek, Gooseberry Creek, Hollow Tree Brook, and Red Kill were field surveyed. Natural cross-sections were also surveyed along these stream reaches. Cross sections were placed at representative locations; usually no greater than 500 feet apart along the stream centerline. Field surveyed channel geometry was combined in overbank areas with LiDAR data collected in 2009 to complete the modeled cross-sectional geometry. Additional surveys were not conducted on the Greene County portion of Stony Clove Creek, therefore the geometry used is based on the existing model.

In addition to the field survey cross-sections, non-surveyed or interpolated cross sections were also used to complete the hydraulic modeling along detailed study streams. Field surveyed cross sections were used to interpolate the channel geometry for non-surveyed cross section. All cross section overbank ground information were obtained from the LiDAR data collected in 2009.

The downstream boundary conditions for profiles along Broadstreet Hollow, Bushnellsville Creek, Gooseberry Creek, Hollow Tree Brook, and Red Kill in the HEC-RAS models were calculated using the normal depth method. Using a normal depth method, the flow is assumed to be uniform so the energy slope was estimated by measuring the channel bed slope at the downstream end. The downstream boundary conditions for profiles along the upper reach of Schoharie Creek and upper Stony Clove Creek were known water surface elevations (WSELs). In order to maintain continuity between the upper and lower reaches of aforementioned streams, the WSELs for the most upstream cross section in the lower reach were used as the downstream boundary conditions in the model of the upper reach.

Manning's n-values for detailed study reaches were estimated based on aerial imagery and field survey photographs. The areas these streams travel through are sparsely developed, relatively steep and rocky, and generally heavily forested. The channel n-values were all between 0.025 and 0.083. It is typical for stream

channels to have lower n-values than the overbanks. The highest n-values on the overbanks, between 0.016-0.120, were generally reserved for forested areas, while more scattered trees, brush, or developed areas with significant obstructions due to buildings were generally assigned somewhat lower values. Some areas of bare earth or short grass exist and were typically assigned values between 0.050 and 0.070. The differences in these assigned n-values from stream to stream are a result of slight differences in the terrain and engineering judgment. The n-values used in the HEC-RAS models are summarized in Table 8 below.

TABLE 8 - MANNING'S "n" VALUES

<u>Stream</u>	<u>Channel "n"</u>	<u>Overbank "n"</u>
Acra Tributary	0.028 – 0.035	0.030 -0.0120
Batavia Kill	0.025 – 0.050	0.040 – 0.200
Broadstreet Hollow	0.044 – 0.070	0.016 – 0.100
Bushnellsville Creek	0.050 – 0.070	0.016 – 0.120
Catskill Creek	0.020 – 0.035	0.050 – 0.120
Climax Tributary	0.015 – 0.035	0.070 – 0.110
Cob Creek	0.013 – 0.035	0.050 – 0.120
Coxsackie Creek	0.020 – 0.035	0.050 – 0.120
East Branch Murderers Creek	0.024 – 0.040	0.045 – 0.120
East Kill	0.026 – 0.075	0.060 – 0.200
Gooseberry Creek	0.050	-0.050 – 0.100
Hollow Tree Brook	0.025 – 0.083	0.016 – 0.120
Kaaterskill Creek	0.030 – 0.035	0.050 – 0.120
Mitchell Hollow Creek	0.026 – 0.054	0.033 – 0.200
Potic Creek	0.015 – 0.090	0.032 – 0.124
Red Kill	0.060	0.080 – 0.120
Reservoir Tributary	0.015 – 0.040	0.100
Sawmill Creek	0.025 – 0.075	0.042 – 0.200
Schoharie Creek	0.026 – 0.050	0.030 – 0.200
Schoharie Creek_s3	0.033 – 0.055	0.055 – 0.100
Shingle Kill	0.030 – 0.035	0.070 – 0.120
Stony Clove Creek	0.025 – 0.083	0.016 – 0.120
Trout Brook	0.030 – 0.035	0.080 – 0.100
West Branch Murderers Creek	0.024 – 0.035	0.060 – 0.120
West Kill		

Certain flooding sources were studied using limited detailed methods. These methods are discussed below.

Limited Detail (LD) "Enhanced A Zones": This category is assigned to areas where "unnumbered" A Zones are shown on the effective maps, and communities have requested new/upgraded studies, but the level of projected development does not warrant a detailed study, or where budget limitations do not allow for a detailed study. It is also applied to lakes that do not have level gage data, and will be included in a hydraulic model. The level of effort includes collection of an orthophoto, LIDAR and limited survey of structures, nomination of flow rates, and the development of HEC-RAS hydraulic models.

The term “limited survey” refers to the survey of man-made hydraulic obstructions, such as dams, bridges, and culverts, and to the survey of the outlet channels of lakes with natural outlet controls. The purpose of collecting “limited survey” is to enhance the accuracy of the hydraulic model thus allowing the development and publication of “Advisory Base Flood Elevations (BFEs) at selected cross sections.” Engineering drawing plans and Department of Transportation (DOT) hydraulic studies may be substituted for limited survey, where appropriate and available.

Methodology, Limited Detail (LD) “Enhanced A Zones”: The water-surface elevations of the selected recurrence interval floods were computed using the USACE HEC-RAS river modeling computer program, for each flooding source. The HEC-RAS model for each flooding source is developed from cross-section geometry generated using manual and semi-automated methods derived from Geographic Information Systems (GIS) techniques and data.

Cross-section elevations for LD studies were extracted from a DEM. The DEM was generated by combining overbank elevation data from an aerial LIDAR survey with data from traditional field survey of the structures (hydraulic obstructions) on the stream and its immediate overbank areas to produce a GIS grid. All bridges, culverts, dams, and other hydraulic obstructions were field surveyed to provide data on elevation, orientation, and structural geometry. Detailed structural geometry for bridges and culverts was also derived from NYSDOT as-built drawings where they were available. This method does not include field surveys that determine specifics on channel and floodplain characteristics. The water-surface elevations calculated using HEC-RAS were mapped to the DEM using GIS software to generate the flood extents.

Floodway and flood profiles were not developed for streams studied using limited detailed methods; however, the 1-percent annual chance advisory base flood elevations for selected modeled cross section are given in this FIS report. Because the base flood elevations are advisory, the published values need not be used to enforce floodplain management ordinances as outlined in 44 CFR 60.3(c)(10), but should be used as base flood elevation data according to 44 CFR 60.3(b)(4). Development in Special Flood Hazard Areas that are designated as Zone A but which have advisory flood elevations should comply with the elevation standards, but may not have to develop an analysis of increases in water-surface elevations, unless required by the local community.

The Table 9, “Limited Detailed Flood Hazard Data Table” is included in the FIS report for each stream studied by limited detailed methods to present the Advisory BFEs for selected numbered cross sections. The table format will be similar to the Flood Hazard Data Tables proposed for FIRM panels with the columns identifying the selected cross-section number, identifying the stream stationing, depicting the flood discharge, and the final column depicting the 1-percent annual chance advisory base flood elevations rounded to nearest tenth of the foot. While these specifications require additional effort, and therefore result in increased costs; the added benefit to FIS report users makes the effort worthwhile.

TABLE 9 - LIMITED DETAILED FLOOD HAZARD DATA

<u>Cross Section</u>	<u>Flood Discharge (cfs)</u>	<u>1-Percent Annual Chance Advisory Base Flood Elevation (Feet NAVD 88*)</u>	<u>FIRM Panel Number</u>
MITCHELL HOLLOW CREEK			
1	2,290	1,566.59	0185/0205
2	2,290	1,574.50	0185/0205
3	2,290	1,592.10	0205
4	2,290	1,606.80	0185/0205
5	2,290	1,632.00	0205
6	2,290	1,648.90	0205
7	2,290	1,666.90	0205
8	2,290	1,677.20	0205
9	2,290	1,686.80	0205
10	2,290	1,694.30	0205
11	2,290	1,700.60	0205

*North American Vertical Datum of 1988

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

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

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

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

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

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

3.3 Vertical Datum

All FISs and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum in use for newly created or revised FISs and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD 29). With the finalization of the North American Vertical Datum of 1988 (NAVD 88), many FIS reports and FIRMs are being prepared using NAVD 88 as the referenced vertical datum.

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

Versions of the FIS report and FIRM prior to the May 16, 2008, initial countywide FIS report were referenced to NGVD 29. When a datum conversion is affected for an FIS report and FIRM, the Flood Profiles and base flood elevations (BFEs) reflect the new datum values. To compare structure and ground elevations to 1-percent annual chance flood elevations shown on the May 16, 2008, initial countywide FIS, and on the FIRM, and subsequent revisions, the subject structure and ground elevations must be referenced to the new datum values.

As noted above, the elevations shown in the FIS report and on the FIRM for Greene County are referenced to NAVD 88. Ground, structure, and flood elevations may be compared and/or referenced to NGVD 29 by applying a standard conversion factor. The conversion factor to NGVD 29 is +0.7, whereby:

$$\text{NGVD29} = \text{NAVD88} + 0.7 \text{ foot.}$$

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

For more information on NAVD 88, see Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20190
(301) 713-3242
<http://www.ngs.noaa.gov/>

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance flood is employed to indicate additional areas of flood risk in the county. For the streams 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.

For the May 16, 2008, FIS, for each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries were delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using the GIS software and the DEM.

For June 2, 2015, FIS revision, for streams studied by detail methods, the 1- and 0.2-percent-annual-chance floodplains were delineated using the flood elevations determined at each cross section. Between the cross sections, the boundaries were interpolated using the topographic data obtained from NYCDEP.

The 1- and 0.2-percent annual chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, and AH), and the 0.2-percent annual chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent annual chance floodplain boundaries are close together, only the 1-percent annual chance floodplain boundary has been shown. Small areas within the floodplain

boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

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

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year 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 100-year 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 floodway in this study is presented to local agencies as a minimum standard that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this FIS were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain.

Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 10). The computed floodways are shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent annual chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

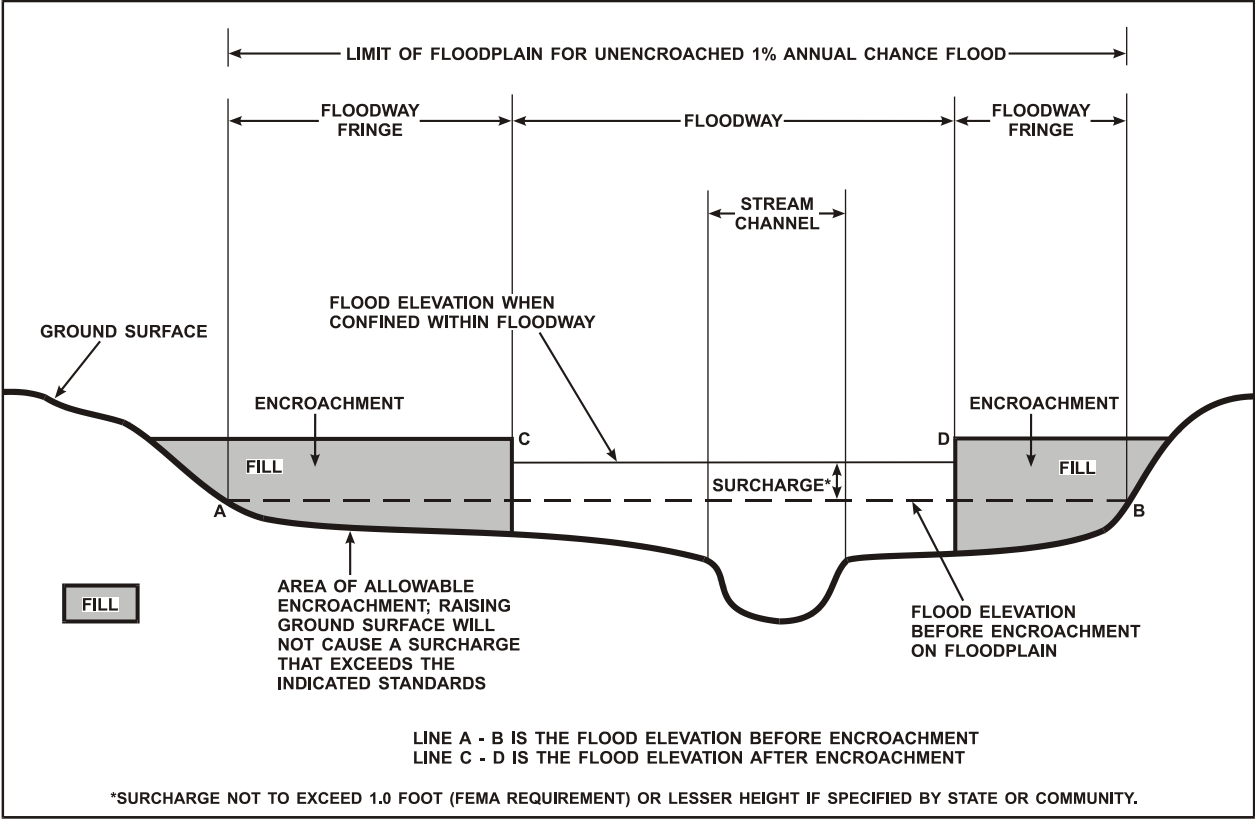
Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 10 for certain downstream cross sections of Gooseberry Creek, Hollow Tree Brook, Climax Tributary, Kaaterskill Creek, Mitchell Hollow Creek, Reservoir Tributary, and West Kill 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.

Since the Hudson River is an estuary and tidal elevations determine the 1-percent annual chance flood elevation, no floodway was computed for the Hudson River.

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, "Floodway Data." In order to reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent annual chance flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

Figure 1 – Floodway Schematic



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
Acra Tributary								
A	1,000	29	184	12.0	406.2	406.2	406.2	0.0
B	1,950	107	986	2.2	465.0	465.0	465.9	0.9
C	3,100	50	295	7.5	478.2	478.2	478.2	0.0
D	5,100	31	206	10.7	542.3	542.3	542.3	0.0
E	6,260	142	1,022	1.4	564.4	564.4	565.3	0.9
F	7,500	36	160	8.9	588.3	588.3	588.3	0.0
G	9,150	85	185	5.6	635.5	635.5	635.5	0.0
H	10,500	39	147	7.1	671.3	671.3	671.5	0.2
I	12,000	60	131	6.4	716.5	716.5	716.5	0.0
J	13,400	29	105	8.0	758.5	758.5	758.5	0.0
K	14,500	23	94	9.0	795.3	795.3	795.3	0.0

¹ Feet above confluence with Catskill Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

ACRA TRIBUTARY

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
Batavia Kill								
A	4,879	201	1,496	12.8	1,211.5	1,211.5	1,212.0	0.5
B	5,270	135	1,842	10.4	1,217.0	1,217.0	1,217.3	0.3
C	9,809	153	1,855	10.3	1,260.9	1,260.9	1,261.8	0.9
D	10,492	280	3,311	5.8	1,284.0	1,284.0	1,284.3	0.3
E	11,223	295	1,894	10.1	1,291.2	1,291.2	1,291.2	0.0
F	14,556	196	2,149	8.4	1,324.5	1,324.5	1,324.7	0.2
G	15,303	161	2,165	8.4	1,339.0	1,339.0	1,339.9	0.9
H	19,241	248	2,753	6.6	1,359.8	1,359.8	1,360.3	0.4
I	26,598	881	7,678	2.2	1,396.0	1,396.0	1,396.7	0.7
J	31,596	310	2,577	6.6	1,405.4	1,405.4	1,406.1	0.7
K	36,611	295	2,837	6.0	1,421.3	1,421.3	1,421.7	0.3
L	45,359	556	3,907	3.8	1,437.5	1,437.5	1,438.3	0.8
M	56,052	364	2,423	4.8	1,468.8	1,468.8	1,469.4	0.6
N	59,575	431	2,326	5.0	1,482.0	1,482.0	1,482.2	0.2
O	60,731	448	1,549	7.5	1,486.3	1,486.3	1,486.7	0.4
P	63,089	273	1,852	6.3	1,500.1	1,500.1	1,500.2	0.1
Q	64,068	663	3,676	3.2	1,503.1	1,503.1	1,503.5	0.4
R	65,799	231	1,346	8.7	1,511.8	1,511.8	1,512.0	0.2
S	72,146	182	876	9.9	1,550.8	1,550.8	1,550.9	0.1
T	73,603	146	1,228	6.3	1,563.5	1,563.5	1,563.5	0.0
U	77,692	688	2,335	3.3	1,582.4	1,582.4	1,583.0	0.6
V	81,460	663	2,218	3.5	1,604.9	1,604.9	1,605.5	0.4
W	84,926	102	741	4.8	1,638.3	1,638.3	1,638.9	0.6

¹ Feet above confluence with Schoharie Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

BATAVIA KILL

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
Batavia Kill (continued)								
X	89,447	97	601	5.9	1,691.6	1,691.6	1,691.9	0.3
Y	92,915	69	468	7.6	1,735.2	1,735.2	1,735.7	0.5
Z	95,977	60	418	8.5	1,768.0	1,768.0	1,768.4	0.4
AA	99,586	64	424	8.4	1,807.1	1,807.1	1,807.7	0.6
AB	105,383	71	179	9.1	1,881.5	1,881.5	1,881.5	0.0
AC	105,657	89	258	6.3	1,885.5	1,885.5	1,885.5	0.0
AD	106,777	97	309	5.2	1,900.1	1,900.1	1,900.1	0.0
AE	108,002	65	321	5.0	1,916.6	1,916.6	1,917.2	0.6
AF	110,089	63	226	7.2	1,948.3	1,948.3	1,948.5	0.2
AG	113,865	82	303	5.3	2,022.6	2,022.6	2,022.9	0.3
AH	116,870	32	79	8.8	2,090.6	2,090.6	2,090.6	0.0
AI	120,068	44	159	4.3	2,198.9	2,198.9	2,199.1	0.2

¹ Feet above confluence with Schoharie Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

BATAVIA KILL

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
Broadstreet Hollow								
A	8,806	90 ²	425	11.3	1,187.1	1,187.1	1,187.2	0.1
B	9,263	73	412	11.7	1,198.9	1,198.9	1,198.9	0.0
C	9,606	112	461	10.4	1,206.8	1,206.8	1,206.9	0.1
D	9,913	71	371	13.0	1,216.6	1,216.6	1,217.0	0.4
E	10,142	65	429	11.2	1,221.9	1,221.9	1,222.2	0.3
F	10,882	66	316	12.0	1,245.4	1,245.4	1,245.4	0.0
G	11,112	58	295	12.9	1,252.5	1,252.5	1,252.5	0.0
H	11,819	71	366	10.4	1,276.8	1,276.8	1,276.9	0.1
I	12,168	85	564	6.7	1,291.0	1,291.0	1,291.7	0.7
J	12,453	84	641	5.9	1,302.3	1,302.3	1,302.9	0.6
K	12,674	36	301	12.6	1,307.0	1,307.0	1,307.9	0.9
L	13,182	50	320	11.9	1,327.8	1,327.8	1,328.0	0.2
M	13,422	36	338	11.2	1,338.5	1,338.5	1,339.1	0.6
N	13,778	85	403	9.4	1,352.1	1,352.1	1,352.3	0.2
O	14,432	31	247	15.4	1,386.0	1,386.0	1,386.1	0.1
P	14,826	37	297	12.8	1,401.6	1,401.6	1,401.6	0.0
Q	15,122	66	378	10.0	1,411.9	1,411.9	1,412.3	0.4
R	15,367	57	314	12.1	1,421.5	1,421.5	1,421.5	0.0
S	15,792	121	453	8.4	1,435.7	1,435.7	1,435.7	0.0

¹ Feet above confluence with Esopus Creek

² Portion of floodway is located outside of Greene County

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

BROADSTREET HOLLOW

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
Bushnellsville Creek								
A	15,410	103	455	10.9	1,446.2	1,446.2	1,446.5	0.3
B	15,832	117	487	10.2	1,454.0	1,454.0	1,454.3	0.3
C	16,055	90	611	8.1	1,460.0	1,460.0	1,460.8	0.8
D	16,763	101	506	9.8	1,473.4	1,473.4	1,473.4	0.0
E	17,205	130	555	8.9	1,480.6	1,480.6	1,480.7	0.1
F	17,813	212	468	5.9	1,491.4	1,491.4	1,491.5	0.1
G	18,456	72	308	9.0	1,507.7	1,507.7	1,507.8	0.1
H	19,000	53	252	11.0	1,522.5	1,522.5	1,522.8	0.3
I	19,816	57	263	10.5	1,546.2	1,546.2	1,546.4	0.2
J	20,729	85	379	7.3	1,560.4	1,560.4	1,561.1	0.7
K	21,429	40	232	11.9	1,574.6	1,574.6	1,574.7	0.1

¹ Feet above confluence with Esopus Creek

TABLE 10	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	GREENE COUNTY, NY (ALL JURISDICTIONS)	BUSHNELLSVILLE 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
Catskill Creek								
A	2,000	310	6,690	7.8	10.1	10.1	10.1	0.0
B	4,000	302	6,188	8.4	11.1	11.1	11.2	0.1
C	6,500	302	6,158	8.4	15.7	15.7	16.0	0.3
D	7,400	294	6,825	7.6	17.7	17.7	18.0	0.3
E	8,100	447	8,199	6.3	19.2	19.2	19.6	0.4
F	9,200	406	7,696	6.8	20.8	20.8	20.9	0.1
G	11,000	781	11,521	4.5	21.6	21.6	22.0	0.4
H	13,200	244	5,235	9.9	21.6	21.6	22.3	0.7
I	16,600	1,156	14,075	2.9	26.3	26.3	27.1	0.8
J	17,800	518	5,099	7.9	26.4	26.4	27.1	0.7
K	19,000	663	6,325	6.4	29.6	29.6	30.5	0.9
L	20,800	282	3,529	11.4	33.0	33.0	34.0	1.0
M	22,500	415	3,690	10.9	42.4	42.4	42.7	0.3
N	24,150	161	3,177	12.7	62.0	62.0	62.2	0.2
O	26,300	153	3,014	13.3	78.1	78.1	78.6	0.5
P	28,200	220	3,951	10.2	90.1	90.1	90.5	0.4
Q	31,500	433	4,690	8.6	139.3	139.3	139.4	0.1
R	32,800	809	10,471	3.8	146.4	146.4	146.7	0.3
S	34,650	727	10,797	3.7	147.1	147.1	147.9	0.8
T	36,400	404	4,451	9.0	148.0	148.0	149.0	1.0
U	38,200	775	6,262	5.8	152.2	152.2	152.7	0.5
V	41,000	1,728	10,622	3.4	155.5	155.5	156.3	0.8
W	43,400	588	4,265	8.5	159.3	159.3	160.3	1.0

¹ Feet above confluence with Hudson River

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

CATSKILL 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
Catskill Creek (continued)								
X	45,200	173	2,647	13.8	163.3	163.3	163.8	0.5
Y	47,400	200	3,507	10.4	169.7	169.7	170.5	0.8
Z	49,200	608	5,709	6.4	173.5	173.5	174.3	0.8
AA	51,000	1,265	8,067	4.5	176.8	176.8	177.8	1.0
AB	53,400	1,264	6,286	5.8	183.0	183.0	183.1	0.1
AC	55,200	343	3,718	9.8	186.6	186.6	187.6	1.0
AD	56,050	587	5,280	6.9	192.2	192.2	193.2	1.0
AE	58,400	249	3,849	9.5	195.1	195.1	195.8	0.7
AF	61,400	207	3,886	8.9	203.1	203.1	203.6	0.5
AG	63,600	309	4,980	7.0	207.2	207.2	207.7	0.5
AH	66,000	397	3,776	9.2	210.1	210.1	210.6	0.5
AI	69,000	391	4,423	7.8	224.3	224.3	224.9	0.6
AJ	72,050	261	3,263	10.6	234.6	234.6	235.2	0.6
AK	73,800	580	4,784	7.3	244.2	244.2	244.9	0.7
AL	76,500	209	2,062	16.8	256.8	256.8	257.2	0.4
AM	78,800	217	2,238	14.7	270.6	270.6	270.6	0.0
AN	80,600	593	3,353	9.8	285.8	285.8	285.8	0.9
AO	83,025	142	2,228	14.7	308.3	308.3	309.0	0.7
AP	84,000	258	5,300	6.2	334.8	334.8	335.2	0.4
AQ	86,400	639	6,904	4.8	335.8	335.8	336.7	0.9
AR	88,200	287	3,192	10.3	339.2	339.2	340.1	0.9
AS	90,000	195	3,444	9.5	346.9	346.9	347.9	1.0
AT	93,000	490	6,499	5.0	364.5	364.5	365.2	0.7

¹ Feet above confluence with Hudson River

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

CATSKILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Catskill Creek (continued)								
AU	95,000 ¹	589	6,386	5.1	371.0	371.0	371.5	0.5
AV	97,400 ¹	235	2,954	11.1	375.8	375.8	376.7	0.9
AW	98,600 ¹	707	4,607	7.1	381.9	381.9	382.5	0.6
AX	100,400 ¹	848	5,094	6.4	385.6	385.6	386.0	0.4
Climax Tributary								
A	850 ²	211	601	3.7	113.3	110.4 ³	111.2	0.8
B	1,900 ²	288	2,159	1.0	116.1	116.1	117.1	1.0
C	3,600 ²	297	1,596	1.4	116.5	116.5	117.5	1.0
D	4,900 ²	385	1,806	1.2	117.1	117.1	118.0	0.9
E	6,250 ²	308	1,131	2.0	119.2	119.2	120.0	0.8
F	7,800 ²	151	637	3.5	124.2	124.2	125.1	0.9
G	8,350 ²	109	357	6.2	128.0	128.0	128.9	0.9

¹ Feet above confluence with Hudson River

² Feet above confluence with Coxsackie Creek

³ Elevation computed without consideration of backwater effects from Coxsackie Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

CATSKILL CREEK – CLIMAX TRIBUTARY

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
Cob Creek								
A	3,700	222	2,165	2.4	434.6	434.6	435.6	1.0
B	5,900	205	1,480	3.5	448.2	448.2	449.2	1.0
C	6,850	145	1,219	4.3	454.7	454.7	455.7	1.0
D	7,800	123	1,129	4.6	456.7	456.7	457.6	0.9
E	9,230	314	2,340	1.9	457.6	457.6	458.5	0.9
F	11,000	648	3,797	1.2	458.8	458.8	459.8	1.0
G	12,500	410	2,883	1.6	459.2	459.2	460.2	1.0
H	12,920	104	871	5.2	459.2	459.2	460.1	0.9
I	14,350	235	1,477	2.9	460.8	460.8	461.8	1.0
J	15,000	331	2,030	2.1	462.7	462.7	463.0	0.3
K	16,350	389	1,718	2.5	464.7	464.7	465.6	0.9
L	17,900	184	802	5.4	470.3	470.3	470.9	0.6
M	19,300	80	460	9.5	479.1	479.1	479.6	0.5
N	20,100	216	1,093	4.0	483.4	483.4	484.4	1.0
O	20,700	177	1,364	3.0	488.8	488.8	489.1	0.3
P	21,750	85	654	6.2	489.7	489.7	490.2	0.5

¹ Feet above Potic Reservoir Dam

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

COB 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
Coxsackie Creek								
A	11,200	143	1,529	3.3	105.9	105.9	106.7	0.8
B	12,400	198	1,787	2.8	108.1	108.1	108.7	0.6
C	13,850	260	2,177	2.3	108.8	108.8	109.6	0.8
D	15,900	295	2,581	1.7	109.4	109.4	110.3	0.9
E	17,650	373	3,236	1.4	109.7	109.7	110.6	0.9
F	19,000	384	2,475	1.6	109.9	109.9	110.8	0.9
G	20,420	202	1,829	2.2	111.5	111.5	111.8	0.3
H	21,600	279	2,384	1.7	111.9	111.9	112.6	0.7
I	23,000	318	2,742	1.5	112.6	112.6	113.6	1.0
J	24,980	411	3,496	1.1	113.3	113.3	114.3	1.0
K	26,500	278	1,991	1.1	113.4	113.4	114.4	1.0
L	28,100	279	1,789	1.3	114.0	114.0	114.9	0.9
M	29,900	209	1,739	1.2	117.9	117.9	118.8	0.9
N	31,000	219	1,806	1.2	118.5	118.5	119.5	1.0
O	32,050	234	1,657	1.3	118.8	118.8	119.8	1.0
P	33,500	239	1,873	0.5	118.9	118.9	119.9	1.0
Q	35,100	160	1,021	0.9	119.1	119.1	120.1	1.0
R	36,800	103	483	1.7	120.0	120.0	121.0	1.0
S	38,400	152	756	1.1	122.9	122.9	123.9	1.0
T	39,950	110	462	1.5	123.9	123.9	124.9	1.0
U	41,400	108	460	1.5	126.2	126.2	127.2	1.0
V	42,900	102	316	2.1	128.8	128.8	129.1	0.9
W	44,400	132	483	0.5	131.6	131.6	132.6	1.0

¹ Feet above confluence with Hudson River

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

COXSACKIE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Coxsachie Creek (continued)								
X	45,800 ¹	85	199	1.3	133.4	133.4	134.4	1.0
Y	47,300 ¹	20	45	0.7	135.5	135.5	136.5	1.0
East Branch Murderers Creek								
A	3,550 ²	60	530	1.7	72.8	72.8	72.8	0.0
B	4,800 ²	39	223	4.0	79.8	79.8	80.6	0.8
C	5,500 ²	57	284	3.1	81.8	81.8	82.6	0.8
D	6,000 ²	41	318	2.6	86.1	86.1	86.3	0.2
E	6,750 ²	65	450	1.8	86.7	86.7	87.2	0.5
F	7,130 ²	126	875	0.9	89.1	89.1	90.0	0.9

¹ Feet above confluence with Hudson River

² Feet above confluence with Sleepy Hallow Lake

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

**COXSACHIE CREEK –
EAST BRANCH MURDERERS 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
East Kill								
A	2,944	211	2,714	6.68	1,434.0	1,434.0	1,434.3	0.3
B	5,401	161	1,696	10.69	1,459.1	1,459.1	1,459.5	0.4
C	7,106	258	3,481	5.13	1,477.6	1,477.6	1,477.9	0.2
D	12,835	248	2,662	6.70	1,529.8	1,529.8	1,530.5	0.7
E	16,428	141	1,917	9.31	1,565.7	1,565.7	1,565.9	0.2
F	20,995	244	2,975	6.00	1,611.6	1,611.6	1,611.8	0.3
G	24,156	311	3,489	5.11	1,631.2	1,631.2	1,631.7	0.6
H	29,086	167	2,320	5.75	1,668.0	1,668.0	1,668.9	0.7
I	30,964	275	2,779	4.80	1,680.6	1,680.6	1,681.0	0.5
J	34,596	329	3,358	3.97	1,706.7	1,706.7	1,707.1	0.4
K	37,906	134	1,905	7.00	1,714.7	1,714.7	1,714.9	0.2
L	42,522	207	2,336	5.71	1,765.3	1,765.3	1,765.6	0.3
M	48,554	437	3,214	4.15	1,801.5	1,801.5	1,802.3	0.8
N	49,978	553	2,807	4.75	1,806.1	1,806.1	1,806.9	0.9
O	53,660	412	1,942	4.42	1,833.1	1,833.1	1,833.5	0.4
P	57,316	488	1,683	5.10	1,858.8	1,858.8	1,859.0	0.2
Q	62,561	137	926	9.26	1,905.5	1,905.5	1,905.9	0.4
R	65,271	350	2,100	4.09	1,938.0	1,938.0	1,938.3	0.3
S	68,471	280	896	55.7	1,976.4	1,976.4	1,976.5	0.1
T	72,395	156	886	5.63	2,036.2	2,036.2	2,036.5	0.5

¹ Feet above confluence with Schoharie Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

EAST KILL

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
Gooseberry Creek								
A	75	215	1,583	4.6	1,729.1	1,726.7 ²	1,727.2	0.5
B	1,045	176	869	8.5	1,736.8	1,736.8	1,737.2	0.4
C	1,829	235	1,255	5.9	1,749.5	1,749.5	1,750.3	0.8
D	2,543	68	483	15.2	1,759.0	1,759.0	1,759.0	0.0
E	2,676	92	805	9.1	1,763.2	1,763.2	1,763.2	0.0
F	3,077	104	581	12.6	1,767.9	1,767.9	1,767.9	0.0
G	4,274	94	765	9.6	1,789.4	1,789.4	1,789.5	0.1
H	4,982	70	575	12.8	1,796.7	1,796.7	1,797.3	0.6
I	5,310	118	671	10.9	1,801.2	1,801.2	1,801.3	0.1
J	5,690	73	381	12.8	1,806.1	1,806.1	1,806.1	0.0
K	6,315	59	365	13.3	1,818.3	1,818.3	1,818.3	0.0
L	6,898	85	582	8.3	1,828.4	1,828.4	1,828.9	0.5
M	7,535	76	420	11.6	1,838.0	1,838.0	1,838.2	0.2
N	7,964	150	833	5.8	1,846.1	1,846.1	1,846.5	0.4
O	8,757	284	1,121	4.3	1,853.5	1,853.5	1,853.8	0.3
P	9,407	52	420	11.6	1,859.3	1,859.3	1,859.8	0.5
Q	10,348	337	1,644	1.4	1,866.5	1,866.5	1,866.7	0.2
R	10,639	859	7,908	0.3	1,866.6	1,866.6	1,866.8	0.2
S	12,706	754	4,047	0.6	1,866.7	1,866.7	1,866.8	0.1
T	13,279	545	1,672	1.4	1,866.7	1,866.7	1,866.9	0.2
U	14,669	174	950	2.5	1,885.2	1,885.2	1,885.2	0.0
V	15,537	72	376	6.2	1,895.7	1,895.7	1,895.7	0.0
W	16,535	42	63	7.0	1,914.3	1,914.3	1,914.3	0.0

¹ Feet above confluence with Schoharie Creek

² Elevation computed without consideration of backwater effects from Schoharie Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

GOOSEBERRY 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
Gooseberry Creek (continued)								
X	16,814	41	63	7.0	1,931.0	1,931.0	1,931.0	0.0
Y	17,205	23	52	8.5	1,950.2	1,950.2	1,950.2	0.0
Z	17,358	205	1,033	0.4	1,955.9	1,955.9	1,955.9	0.0
AA	18,390	87	123	3.6	1,956.8	1,956.8	1,956.8	0.0
AB	19,276	33	61	7.2	1,978.5	1,978.5	1,979.4	0.9
AC	19,465	23	97	4.5	1,986.6	1,986.6	1,987.3	0.7
AD	20,454	39	84	5.2	2,004.6	2,004.6	2,005.2	0.6
AE	21,419	19	49	9.0	2,057.1	2,057.1	2,057.7	0.6
AF	22,064	17	54	8.0	2,081.1	2,081.1	2,081.7	0.6
AG	22,243	118	904	0.5	2,092.1	2,092.1	2,092.4	0.3
AH	23,283	84	79	5.5	2,096.1	2,096.1	2,096.1	0.0

¹ Feet above confluence with Schoharie Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

GOOSEBERRY 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
Hollow Tree Brook								
A	72	119	496	9.2	1,285.5	1,284.6 ²	1,284.8	0.2
B	520	71	648	7.0	1,299.7	1,299.7	1,299.8	0.1
C	1,147	76	379	12.0	1,311.4	1,311.4	1,311.4	0.0
D	1,602	111	613	7.4	1,324.4	1,324.4	1,325.4	1.0
E	1,980	138	927	4.9	1,334.5	1,334.5	1,335.1	0.6
F	2,403	223	682	6.7	1,344.5	1,344.5	1,344.7	0.2
G	2,983	197	684	6.7	1,362.0	1,362.0	1,362.3	0.3
H	3,261	49	450	10.1	1,371.1	1,371.1	1,371.9	0.8
I	3,742	82	500	9.1	1,382.3	1,382.3	1,382.5	0.2
J	3,999	34	279	16.3	1,392.0	1,392.0	1,392.0	0.0
K	4,565	104	442	10.3	1,411.2	1,411.2	1,411.4	0.2
L	4,754	101	471	9.7	1,416.9	1,416.9	1,417.4	0.5
M	5,468	99	460	9.9	1,442.8	1,442.8	1,442.8	0.0
N	6,309	57	220	8.9	1,478.3	1,478.3	1,478.3	0.0
O	6,596	49	193	10.1	1,491.3	1,491.3	1,491.9	0.6
P	6,914	33	157	12.4	1,507.8	1,507.8	1,507.9	0.1
Q	7,072	55	192	10.2	1,517.8	1,517.8	1,517.8	0.0
R	7,478	32	156	12.5	1,539.0	1,539.0	1,539.5	0.5
S	7,941	46	175	11.1	1,567.9	1,567.9	1,567.9	0.0
T	8,065	23	139	14.0	1,575.2	1,575.2	1,575.4	0.2

¹ Feet above confluence with Stony Clove Creek

² Elevation computed without consideration of backwater effects from Stony Clove Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

HOLLOW TREE BROOK

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
Kaaterskill Creek								
A	1,100	86	1,240	14.5	25.2	18.6 ²	19.6	1.0
B	3,500	391	4,903	3.7	26.6	26.6	27.3	0.7
C	6,000	172	2,187	8.2	50.5	50.5	50.7	0.2
D	8,500	292	3,586	5.0	53.2	53.2	54.0	0.8
E	10,150	120	1,631	11.0	57.2	57.2	58.1	0.9
F	11,500	368	4,009	4.3	61.4	61.4	62.3	0.9
G	13,500	467	4,851	3.5	63.0	63.0	63.9	0.9
H	16,000	563	5,861	2.9	64.3	64.3	65.2	0.9
I	18,800	259	3,020	5.7	65.9	65.9	66.5	0.6
J	21,200	215	3,623	4.7	71.1	71.1	71.6	0.5
K	23,000	388	5,997	2.9	72.2	72.2	72.9	0.7
L	25,500	455	6,654	2.4	72.5	72.5	73.4	0.9
M	28,300	219	3,606	4.4	74.4	74.4	75.3	0.9
N	30,000	599	7,044	2.3	75.8	75.8	76.7	0.9
O	32,600	117	1,907	8.3	94.2	94.2	94.3	0.1
P	35,000	199	2,884	5.5	97.5	97.5	98.1	0.6
Q	38,500	204	2,640	6.0	103.7	103.7	104.6	0.9
R	41,000	148	2,117	7.5	106.1	106.1	106.9	0.8
S	43,000	289	3,038	5.2	108.3	108.3	109.3	1.0
T	45,000	519	6,228	2.6	111.5	111.5	112.4	0.9
U	54,000	93	1,349	10.4	140.7	140.7	141.6	0.9
V	55,450	92	997	14.0	195.6	195.6	195.7	0.1

¹ Feet above confluence with Catskill Creek

² Elevation computed without consideration of backwater effects from Catskill Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

KAATERSKILL 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
Kaaterskill Creek (continued)								
W	57,250	82	896	15.6	231.1	231.1	232.0	0.9
X	59,000	328	2,717	5.2	242.3	242.3	242.7	0.4
Y	60,000	192	1,325	10.6	250.4	250.4	251.3	0.9
Z	62,500	219	1,781	7.9	283.9	283.9	284.7	0.8
AA	64,300	400	1,940	7.0	305.7	305.7	306.6	0.9
AB	65,520	492	1,938	7.0	319.5	319.5	320.2	0.7
AC	67,000	814	5,134	2.6	330.4	330.4	331.2	0.8
AD	70,000	950	4,811	2.8	333.1	333.1	333.7	0.6
AE	71,800	381	1,896	7.1	335.0	335.0	336.0	1.0
AF	74,300	592	3,492	2.6	341.2	341.2	342.0	0.8
AG	76,250	124	1,353	6.8	350.4	350.4	350.5	0.1
AH	77,150	107	1,282	6.6	351.8	351.8	352.4	0.6
AI	78,600	224	1,513	5.6	354.8	354.8	355.5	0.7
AJ	82,000	1,480	5,507	1.5	357.0	357.0	357.8	0.8
AK	89,650	151	647	10.1	430.2	430.2	430.2	0.0
AL	91,000	218	1,024	6.4	455.2	455.2	455.4	0.2
AM	92,500	52	450	14.5	476.7	476.7	476.7	0.0
AN	94,000	70	484	13.5	514.4	514.4	514.4	0.0
AO	95,500	84	553	11.8	539.0	539.0	539.0	0.0
AP	97,000	68	462	14.2	571.2	571.2	571.9	0.7
AQ	98,000	81	533	11.7	599.1	599.1	599.6	0.5
AR	99,500	60	502	12.5	632.0	632.0	633.0	1.0

¹ Feet above confluence with Catskill Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

KAATERSKILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mitchell Hallow Creek								
A	250 ¹	35	192	12.0	1,517.0	1,516.4 ³	1,516.6	0.2
Potic Creek								
A	900 ²	268	1,655	3.2	377.7	377.7	378.1	0.4
B	2,700 ²	294	1,552	3.4	382.8	382.8	383.2	0.4
C	4,300 ²	171	929	5.7	389.9	389.9	390.0	0.1
D	6,000 ²	187	1,366	3.6	395.5	395.5	396.4	0.9
E	7,250 ²	167	1,540	3.4	398.4	398.4	399.4	1.0
F	8,150 ²	470	3,148	1.6	399.2	399.2	400.2	1.0
G	9,700 ²	231	1,422	2.8	400.0	400.0	400.9	0.9
H	10,500 ²	143	611	6.5	405.3	405.3	405.8	0.5
I	11,630 ²	61	434	9.2	416.8	416.8	416.8	0.0
J	12,650 ²	251	1,922	2.1	422.0	422.0	422.8	0.8
K	14,200 ²	828	5,024	0.7	424.0	424.0	425.0	1.0

¹ Feet above confluence with Hudson River

² Feet above Schoharie Turnpike

³ Elevation computed without consideration of backwater effects from Batavia Kill

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

**MITCHELL HALLOW CREEK -
POTIC 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
Red Kill								
A	383	72	239	7.5	1,639.7	1,639.7	1,640.0	0.3
B	653	32	146	12.3	1,652.1	1,652.1	1,652.4	0.3
C	1,017	58	214	8.4	1,666.1	1,666.1	1,667.0	0.9
D	1,205	44	172	10.5	1,674.7	1,674.7	1,675.0	0.3
E	1,460	23	265	6.8	1,699.7	1,699.7	1,699.7	0.0
F	2,225	40	177	10.2	1,729.5	1,729.5	1,729.5	0.0
G	2,800	38	156	11.5	1,760.1	1,760.1	1,760.2	0.1
H	3,151	33	154	11.7	1,785.1	1,785.1	1,785.1	0.0
I	4,556	34	109	8.6	1,869.5	1,869.5	1,869.7	0.2
J	5,171	28	196	4.8	1,904.5	1,904.5	1,904.9	0.4
K	5,701	88	173	5.4	1,922.5	1,922.5	1,922.8	0.3
L	6,133	76	163	5.8	1,935.9	1,935.9	1,936.4	0.5
M	6,544	35	99	9.5	1,951.4	1,951.4	1,951.5	0.1
N	6,819	47	143	6.6	1,964.3	1,964.3	1,964.3	0.0
O	7,202	26	95	9.9	1,980.5	1,980.5	1,980.6	0.1
P	7,464	51	126	7.5	1,990.2	1,990.2	1,990.3	0.1
Q	7,733	73	198	4.7	2,002.2	2,002.2	2,003.1	0.9
R	8,255	42	120	7.8	2,024.2	2,024.2	2,024.3	0.1
S	8,491	44	199	4.7	2,035.5	2,035.5	2,035.8	0.3
T	8,662	70	149	6.3	2,042.3	2,042.3	2,042.4	0.1
U	8,937	36	165	5.7	2,058.5	2,058.5	2,058.7	0.2
V	9,071	52	131	7.2	2,065.3	2,065.3	2,065.3	0.0
W	9,620	46	130	7.2	2,109.0	2,109.0	2,109.4	0.4

¹ Feet above confluence with Schoharie Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

RED KILL

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Red Kill (continued)								
X	10,212 ¹	77	163	5.8	2,148.5	2,148.5	2,148.8	0.3
Y	10,494 ¹	32	96	9.8	2,161.1	2,161.1	2,161.1	0.0
Z	10,975 ¹	39	124	7.6	2,190.0	2,190.0	2,190.4	0.4
AA	11,351 ¹	30	103	9.1	2,216.3	2,216.3	2,216.6	0.3
AB	11,555 ¹	81	195	4.8	2,227.0	2,227.0	2,227.5	0.5
AC	11,988 ¹	30	94	10.0	2,259.9	2,259.9	2,259.9	0.0
AD	12,260 ¹	89	286	3.3	2,276.4	2,276.4	2,276.7	0.3
Reservoir Tributary								
A	1,400 ²	400	1,766	1.5	118.8	118.7 ³	119.6	0.9
B	2,300 ²	107	433	6.1	130.0	130.0	130.7	0.7

¹ Feet above confluence with Schoharie Creek

² Feet above confluence with Cocksackie Creek

³ Elevation computed without consideration of backwater effects from Cocksackie Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

RED KILL – RESERVOIR TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD 88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Sawmill Creek								
A	599 ¹	70	353	7.43	1,868.7	1,868.7	1,869.2	0.5
B	2,067 ¹	184	748	3.50	1,890.9	1,890.9	1,891.1	0.2
C	5,386 ¹	50	193	7.53	1,948.7	1,948.7	1,948.7	0.0
D	5,909 ¹	57	265	5.48	1,965.1	1,965.1	1,965.5	0.4
Schoharie Creek								
A	5,234 ²	1,527	17,946	3.8	1,143.4	1,143.4	1,143.5	0.1
B	6,672 ²	1,534	15,574	4.4	1,144.7	1,144.7	1,144.9	0.2
C	9,523 ²	479	5,752	11.8	1,149.7	1,149.7	1,149.9	0.2
D	12,605 ²	391	7,494	9.1	1,161.7	1,161.7	1,161.9	0.2
E	15,113 ²	756	9,767	7.0	1,168.4	1,168.4	1,168.6	0.2
F	18,409 ²	375	6,155	11.0	1,176.2	1,176.2	1,176.7	0.4
G	22,794 ²	1,296	8,645	6.0	1,188.1	1,188.1	1,188.4	0.3
H	28,287 ²	376	3,995	13.0	1,210.0	1,210.0	1,210.0	0.0
I	29,803 ²	710	8,229	6.3	1,219.8	1,219.8	1,219.8	0.0
J	33,957 ²	274	3,915	12.9	1,231.4	1,231.4	1,231.5	0.1
K	36,963 ²	263	3,882	13.0	1,251.7	1,251.7	1,251.9	0.2
L	39,563 ²	454	6,033	8.4	1,264.2	1,264.2	1,264.1	0.0
M	44,337 ²	214	3,926	12.9	1,282.5	1,282.5	1,282.5	0.0
N	47,606 ²	370	5,518	9.2	1,300.5	1,300.5	1,300.4	0.0
O	56,323 ²	423	5,946	6.4	1,334.1	1,334.1	1,334.4	0.4
P	60,412 ²	226	3,401	11.1	1,349.1	1,349.1	1,349.3	0.2
Q	65,006 ²	767	4,122	9.2	1,369.8	1,369.8	1,370.3	0.5
R	66,829 ²	305	3,843	9.6	1,377.2	1,377.2	1,377.6	0.4

¹ Feet above the confluence with Gooseberry Creek

² Feet above the confluence with Schoharie Reservoir

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

SAWMILL CREEK – SCHOHARIE 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
Schoharie Creek (continued)								
S	70,607 ²	309	3,652	10.1	1,398.9	1,398.9	1,399.2	0.4
T	73,790 ²	356	2,656	10.5	1,416.2	1,416.2	1,416.2	0.0
U	76,443 ²	266	2,676	10.5	1,429.2	1,429.2	1,429.3	0.1
V	79,890	356	3,724	7.5	1,448.5	1,448.5	1,448.9	0.4
W	85,458	528	3,559	7.9	1,475.5	1,475.5	1,475.7	0.2
X	89,809	355	2,820	9.9	1,499.9	1,499.9	1,500.6	0.7
Y	95,338	304	2,415	11.6	1,528.4	1,528.4	1,528.7	0.3
Z	98,228	163	1,886	14.8	1,542.4	1,542.4	1,543.2	0.8
AA	101,686	164	1,648	14.8	1,562.1	1,562.1	1,562.8	0.7
AB	103,133	154	1,744	14.0	1,571.8	1,571.8	1,572.0	0.2
AC	106,927	232	1,507	15.5	1,599.2	1,599.2	1,599.9	0.7
AD	109,251	470	3,906	6.0	1,613.7	1,613.7	1,614.1	0.4
AE	111,073	385	2,289	9.5	1,626.9	1,626.9	1,627.1	0.2
AF	114,335	691	4,591	4.7	1,643.5	1,643.5	1,644.0	0.5
AG	116,451	197	2,623	8.3	1,657.8	1,657.8	1,657.9	0.1
AH	118,334	537	2,464	8.8	1,670.2	1,670.2	1,671.0	0.8
AI	121,493	301	2,711	6.7	1,696.7	1,696.7	1,697.2	0.5
AJ	124,641	312	1,712	10.6	1,722.4	1,722.4	1,723.0	0.6
AK	128,554	462	1,679	7.9	1,742.9	1,742.9	1,742.9	0.0
AL	133,301	111	950	11.7	1,796.5	1,796.5	1,796.5	0.0
AM	133,452	143	1,126	9.8	1,802.9	1,802.9	1,803.1	0.2
AN	134,508	380	4,308	2.6	1,809.6	1,809.6	1,810.2	0.6
AO	137,946	765	3,576	2.3	1,817.0	1,817.0	1,817.1	0.1
AP	139,266	187	968	8.6	1,824.6	1,824.6	1,824.8	0.2

¹ Feet above confluence with Schoharie Reservoir

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

SCHOHARIE 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
Schoharie Creek (continued)								
AQ	140,566	226	962	8.7	1,835.7	1,835.7	1,836.3	0.6
AR	141,973	86	748	11.2	1,859.3	1,859.3	1,859.6	0.3
AS	142,960	58	651	12.8	1,865.7	1,865.7	1,866.1	0.4
AT	145,850	358	2,003	4.2	1,876.6	1,876.6	1,876.7	0.1
AU	148,456	590	3,040	1.8	1,883.5	1,883.5	1,883.5	0.0
AV	150,549	251	1,187	4.6	1,886.3	1,886.3	1,886.6	0.3
AW	151,849	1092	5,061	1.1	1,890.4	1,890.4	1,890.5	0.1
AX	154,833	384	1,693	2.3	1,896.5	1,896.5	1,896.6	0.1
AY	156,201	394	1,238	3.2	1,899.7	1,899.7	1,900.0	0.3
AZ	156,901	719	2,487	1.6	1,900.9	1,900.9	1,901.1	0.2

¹ Feet above confluence with Schoharie Reservoir

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

SCHOHARIE 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
Shingle Kill								
A	1,100	67	640	10.1	276.4	276.4	276.4	0.0
B	2,700	72	530	12.2	317.7	317.7	317.9	0.2
C	3,712	110	1,610	4.0	332.9	332.9	333.8	0.9
D	4,900	142	828	7.8	334.2	334.2	335.0	0.8
E	5,900	243	1,239	4.9	342.2	342.2	342.9	0.7
F	7,100	214	775	7.9	350.2	350.2	351.0	0.8
G	8,750	217	1,005	6.1	364.4	364.4	364.8	0.4
H	9,300	282	947	6.5	369.6	369.6	370.6	1.0
I	10,500	100	627	9.1	381.1	381.1	381.2	0.1
J	11,700	63	536	10.6	393.4	393.4	394.2	0.8
K	12,871	120	1,304	4.4	467.3	467.3	468.3	1.0
L	13,800	86	514	11.1	478.8	478.8	478.8	0.0
M	15,100	230	952	6.0	488.9	488.9	489.6	0.7
N	16,900	50	419	13.6	504.6	504.6	504.8	0.2
O	19,000	51	394	11.0	537.1	537.1	537.1	0.0

¹ Feet above confluence with Catskill Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

SHINGLE KILL

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
Stony Clove Creek								
A	706	452	3,068	4.5	1,178.7	1,178.7	1,179.4	0.3
B	1,295	434	2,452	5.7	1,185.4	1,185.4	1,186.1	0.7
C	2,729	124	1,226	11.3	1,207.0	1,207.0	1,207.4	0.4
D	4,559	165	1,084	12.8	1,234.5	1,234.5	1,234.6	0.1
E	6,212	206	1,154	12.0	1,258.4	1,258.4	1,258.4	0.0
F	7,618	258	1,326	10.5	1,280.6	1,280.6	1,280.8	0.2
G	8,329	101	571	14.1	1,292.3	1,292.3	1,292.3	0.0
H	9,768	164	981	8.2	1,319.5	1,319.5	1,320.3	0.9
I	11,212	149	1,276	6.3	1,347.6	1,347.6	1,348.0	0.4
J	11,664	121	872	9.2	1,357.1	1,357.1	1,357.1	0.0
K	12,055	171	1,419	5.7	1,366.0	1,366.0	1,366.6	0.6
L	12,649	127	874	9.2	1,374.9	1,374.9	1,375.6	0.7
M	14,542	126	900	8.9	1,435.2	1,435.2	1,435.3	0.1
N	16,439	191	1,012	6.0	1,485.9	1,485.9	1,486.1	0.2
O	17,593	54	410	14.7	1,514.9	1,514.9	1,515.3	0.4
P	19,645	70	441	9.5	1,582.2	1,582.2	1,582.6	0.4
Q	21,818	127	741	5.7	1,665.7	1,665.7	1,665.8	0.1
R	22,336	81	590	7.1	1,678.9	1,678.9	1,679.4	0.5
S	23,304	59	414	10.1	1,707.5	1,707.5	1,707.7	0.2
T	24,183	27	830	13.5	1,758.1	1,758.1	1,758.1	0.0
U	24,247	124	939	3.5	1,767.3	1,767.3	1,768.1	0.8
V	24,491	24	355	14.7	1,773.3	1,773.3	1,774.1	0.8
W	24,727	92	1,321	2.5	1,793.9	1,793.9	1,794.1	0.2
X	25,093	67	555	5.9	1,793.9	1,793.9	1,794.1	0.2

¹ Feet above County boundary

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

STONY CLOVE 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
Trout Brook								
A	1,200	81	305	6.7	562.1	562.1	563.0	0.9
B	2,300	44	229	9.0	579.1	579.1	579.2	0.1
C	3,500	55	219	9.4	600.8	600.8	600.8	0.0
D	4,800	33	187	11.0	619.0	619.0	619.3	0.3
E	6,150	88	346	5.9	646.9	646.9	647.1	0.2
F	7,200	57	227	6.6	668.1	668.1	668.3	0.2
G	8,000	120	288	5.2	691.7	691.7	692.5	0.8
H	9,600	29	120	11.5	730.2	730.2	730.2	0.0
I	10,600	70	235	5.9	755.1	755.1	755.5	0.4
J	11,800	21	118	11.7	783.8	783.8	783.9	0.1
K	13,100	19	109	12.6	815.4	815.4	815.4	0.0
L	14,000	64	200	6.9	846.6	846.6	846.9	0.3
M	15,800	36	128	10.8	908.7	908.7	908.7	0.0

¹ Feet above confluence with Shingle Kill

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

TROUT BROOK

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
West Branch Murderers Creek								
A	13,000	43	257	7.0	73.3	73.3	73.3	0.0
B	14,400	112	494	3.6	76.9	76.9	77.8	0.9
C	15,200	82	282	6.3	80.4	80.4	81.4	1.0
D	17,300	28	213	8.0	111.2	111.2	112.1	0.9
E	18,300	49	478	3.6	115.2	115.2	115.8	0.6
F	19,600	119	870	2.0	115.7	115.7	116.6	0.9
G	20,400	57	421	3.8	115.9	115.9	116.9	1.0
H	21,200	100	570	2.8	116.8	116.8	117.7	0.9
I	22,000	38	316	5.2	117.7	117.7	118.5	0.8
J	23,050	96	948	1.6	120.1	120.1	121.0	0.9

¹ Feet above confluence with Sleepy Hollow Lake

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

WEST BRANCH MURDERERS 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
West Kill								
A	59	138	924	13.74	1,317.6	1,317.6 ²	1,317.7	0.1
B	2,872	273	1,320	9.62	1,342.5	1,342.5	1,342.9	0.4
C	5,915	91	873	14.55	1,369.2	1,369.2	1,369.3	0.1
D	9,601	302	3,581	3.18	1,405.1	1,405.1	1,406.0	0.9
E	12,975	400	1,355	8.41	1,425.6	1,425.6	1,426.5	0.9
F	19,799	246	981	10.28	1,509.6	1,509.6	1,510.6	1.0
G	21,585	135	774	13.03	1,540.7	1,540.7	1,540.8	0.1
H	26,353	142	833	12.10	1,606.7	1,606.7	1,606.9	0.2
I	28,139	107	747	13.50	1,640.2	1,640.2	1,640.6	0.4
J	31,206	144	960	7.75	1,683.8	1,683.8	1,684.7	0.9
K	33,949	265	1,057	7.04	1,723.0	1,723.0	1,723.3	0.3
L	35,939	88	633	11.75	1,750.6	1,750.6	1,751.0	0.4
M	37,685	150	634	9.74	1,782.7	1,782.7	1,783.1	0.4
N	41,124	115	585	10.56	1,839.9	1,839.9	1,840.3	0.4
O	43,047	120	583	8.74	1,872.8	1,872.8	1,873.2	0.4
P	45,013	108	447	11.40	1,907.4	1,907.4	1,907.5	0.1
Q	46,518	160	8,176	6.23	1,932.5	1,932.5	1,933.5	1.0

¹ Feet above confluence with Schoharie Creek

² Elevation computed without consideration of backwater effects from Schoharie Creek

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

FLOODWAY DATA

WEST KILL

5.0 INSURANCE APPLICATIONS

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

Zone A

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

Zone AE

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

Zone AH

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

Zone AO

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

Zone AR

Area of special flood hazard formerly protected from the 1-percent annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1-percent annual chance or greater flood event.

Zone A99

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

Zone V

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

Zone VE

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

Zone X

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

Zone D

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

6.0 FLOOD INSURANCE RATE MAP

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

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

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

The current FIRM presents flooding information for the entire geographic area of Greene County. Historical data relating to the FIRMs prepared for each community, prior to the May 16, 2008, initial countywide FIS, are presented in Table 11, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Ashland, Town of	November 1, 1974	October 24, 1975	April 10, 1981	September 30, 1988
Athens, Town of	August 13, 1976	June 3, 1977	September 3, 1982	September 6, 1989
Athens, Village of	October 29, 1976	None	September 6, 1989	
Cairo, Town of	December 20, 1974	July 9, 1976	September 6, 1989	
Catskill, Town of	December 27, 1974	None	February 16, 1990	
Catskill, Village of	March 1, 1974	March 26, 1976	September 6, 1989	
Coxsackie, Town of	December 6, 1974	None	September 6, 1989	
Coxsackie, Village of	March 8, 1974	May 28, 1976	December 2, 1983	September 6, 1989
Durham, Town of	December 13, 1974	July 30, 1976	June 1, 1988	
Greenville, Town of	July 26, 1974	July 23, 1976	February 1, 1988	
Halcott, Town of	February 14, 1974	None	November 4, 1983	
Hunter, Town of	July 9, 1975	None	February 2, 1983	

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Hunter, Village of	August 16, 1974	June 11, 1976	December 1, 1982	
Jewett, Town of	December 23, 1977	None	April 4, 1983	
Lexington, Town of	August 23, 1974	April 23, 1976	August 1, 1983	
New Baltimore, Town of	December 17, 1976	None	July 23, 1982	
Prattsville, Town of	September 20,	June 25, 1976	May 16, 1983	
Tannersville, Village of	1974 June 7, 1974	June 25, 1976	April 18, 1983	
Windham, Town of	November 4, 1977	October 27, 1978	June 1, 1988	March 3, 1997 July 19, 2001

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

**GREENE COUNTY, NY
(ALL JURISDICTIONS)**

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Greene County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS Reports and FIRMs for all jurisdictions within Greene County.

This is a multi-volume FIS. Each volume may be revised separately, in which case it supersedes the previously printed volume. Users should refer to the Table of Contents in Volume 1 for the current effective date of each volume; volumes bearing these dates contain the most up-to-date flood hazard data.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this FIS can be obtained by contacting FEMA, Federal Insurance and Mitigation Division, 26 Federal Plaza, Room 1351, New York, New York 10278.

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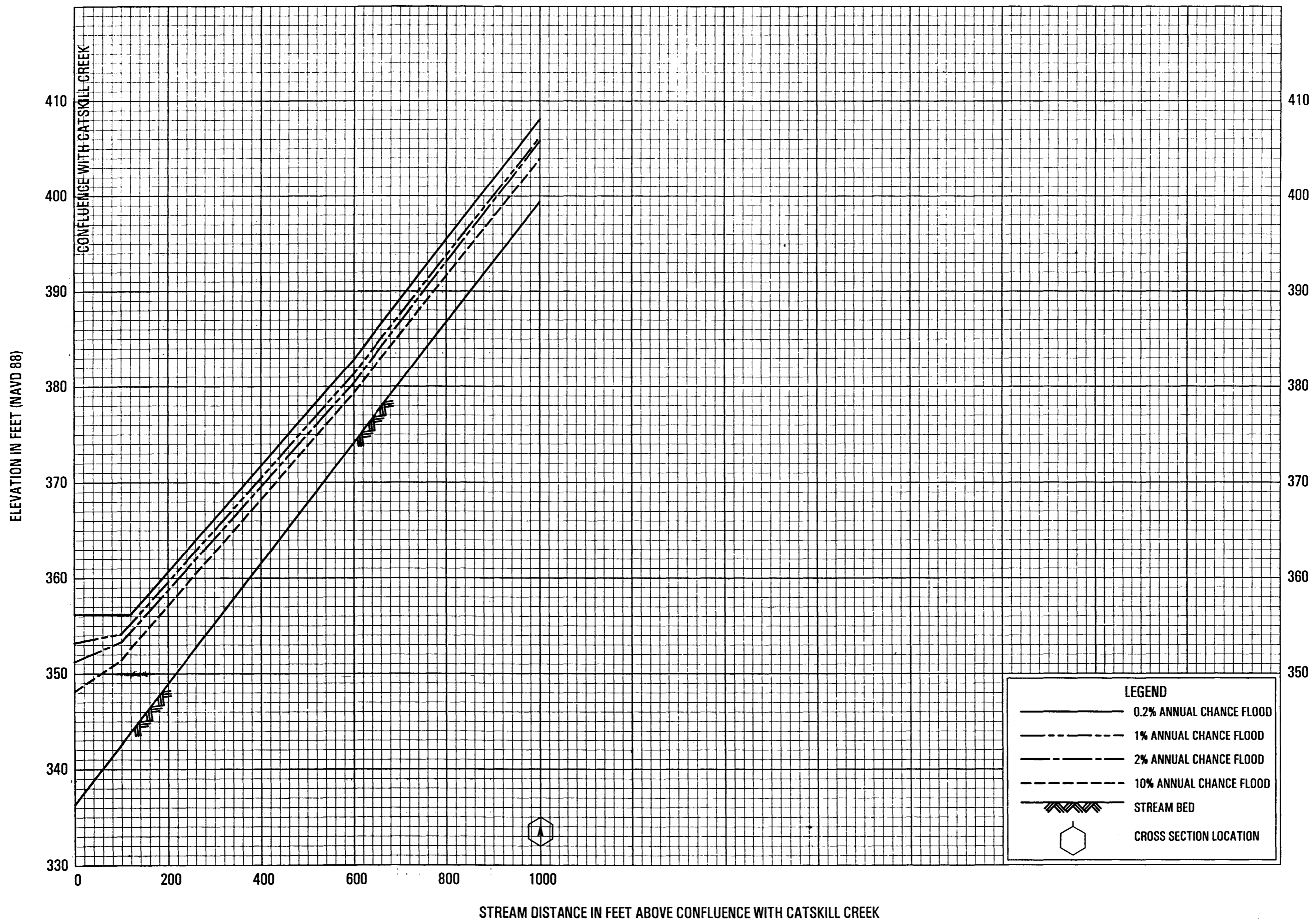
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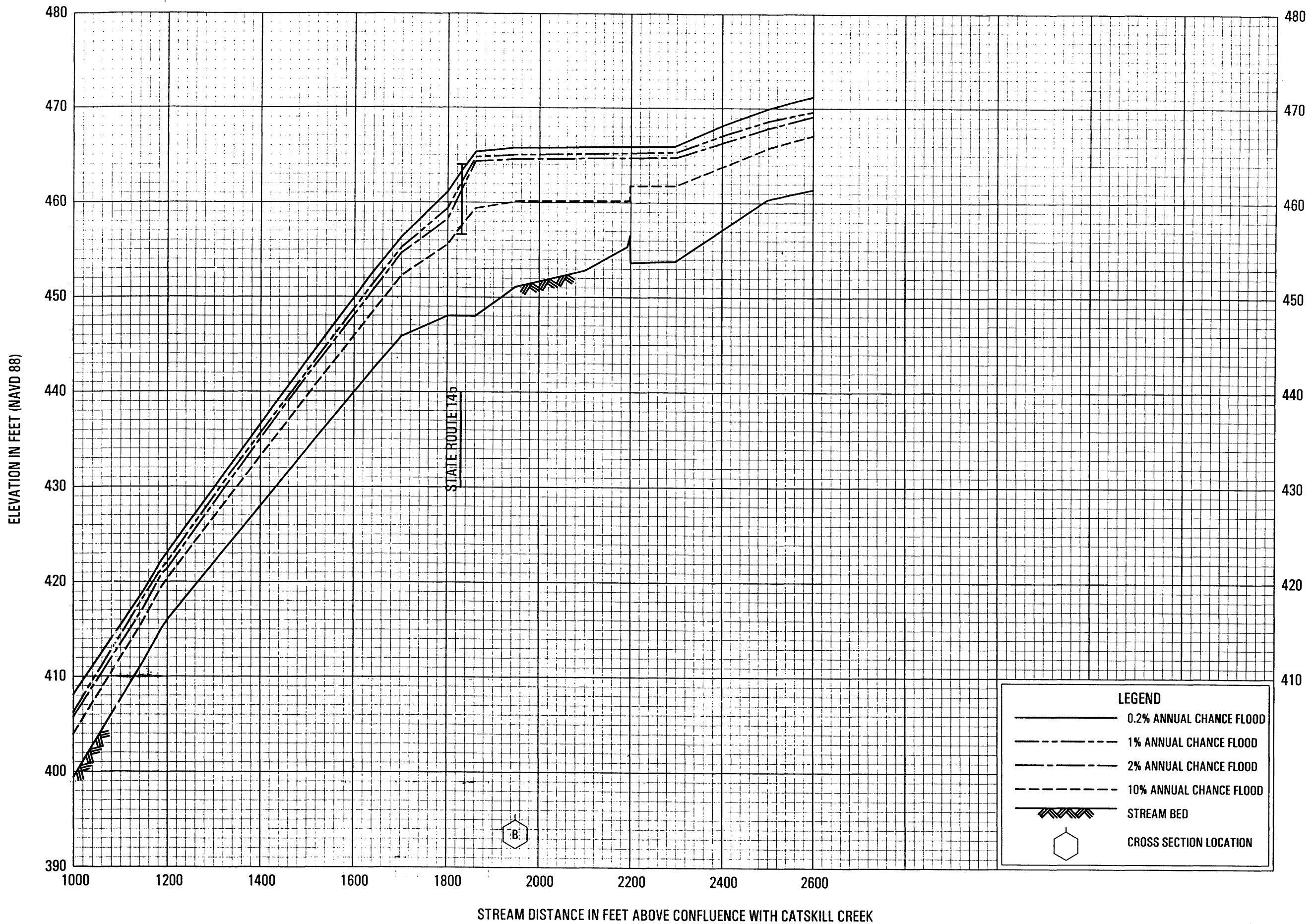
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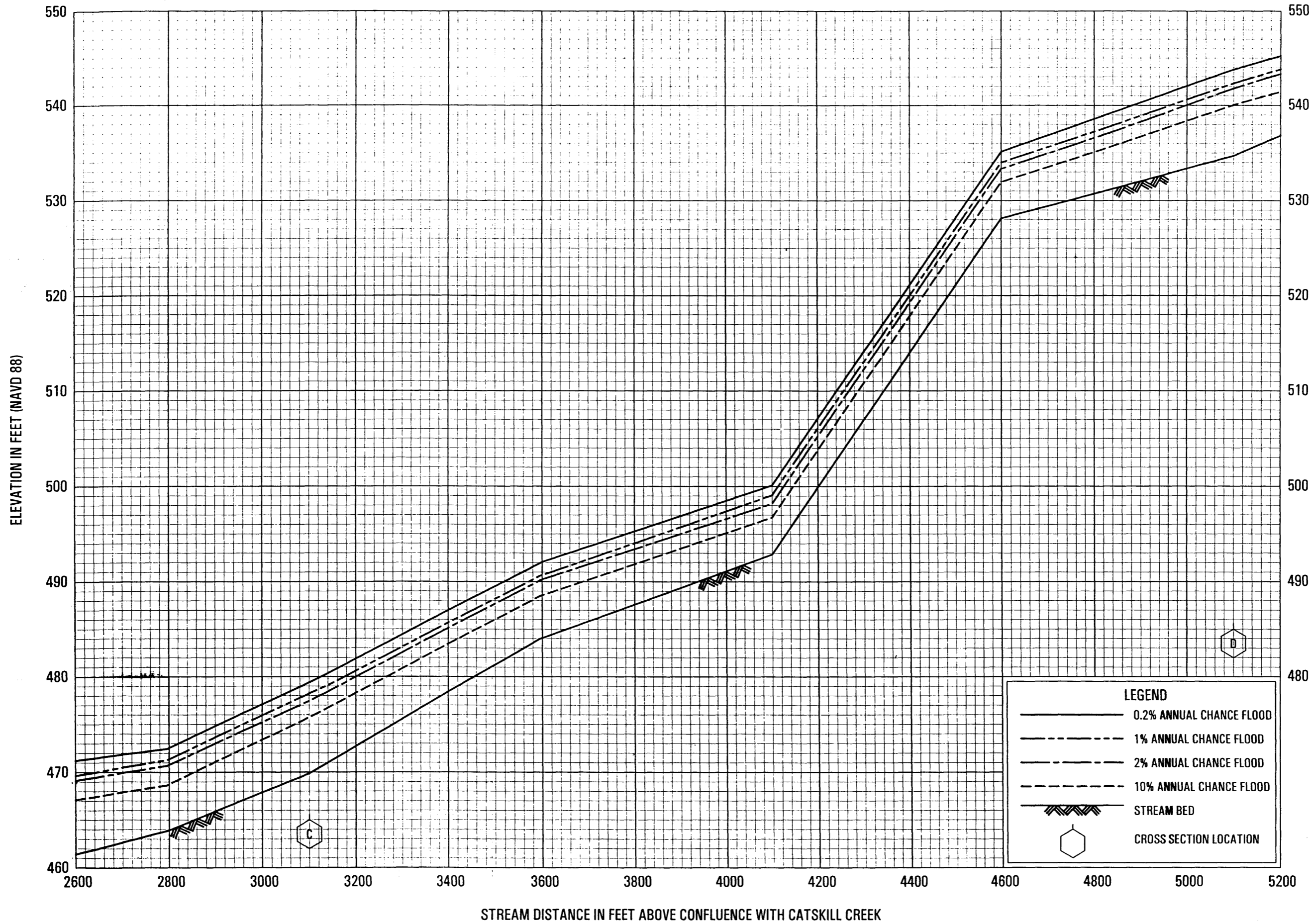


FLOOD PROFILES
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FEDERAL EMERGENCY MANAGEMENT AGENCY
GREENE COUNTY, NY
(ALL JURISDICTIONS)

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FLOOD PROFILES

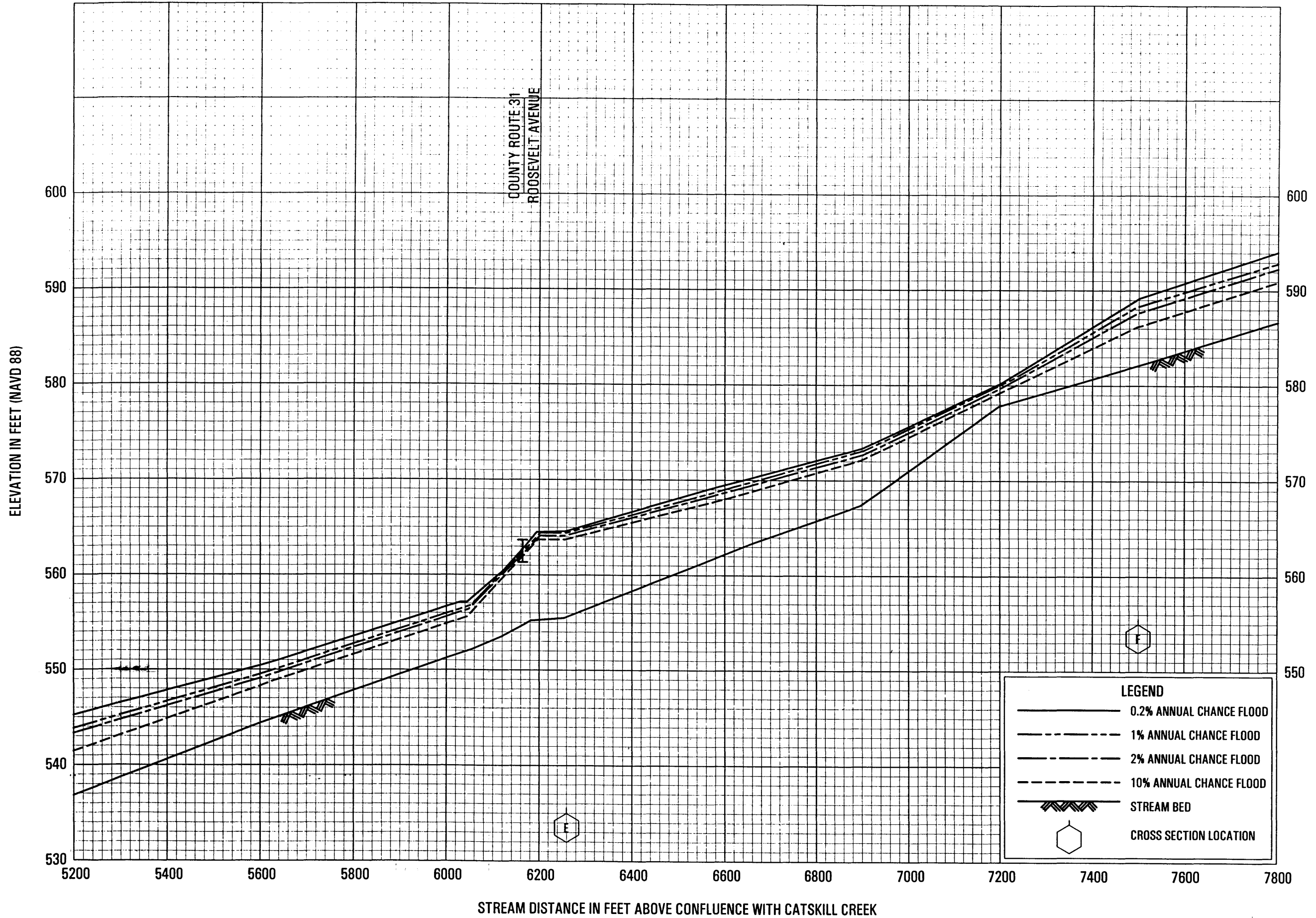
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GREENE COUNTY, NY

(ALL JURISDICTIONS)

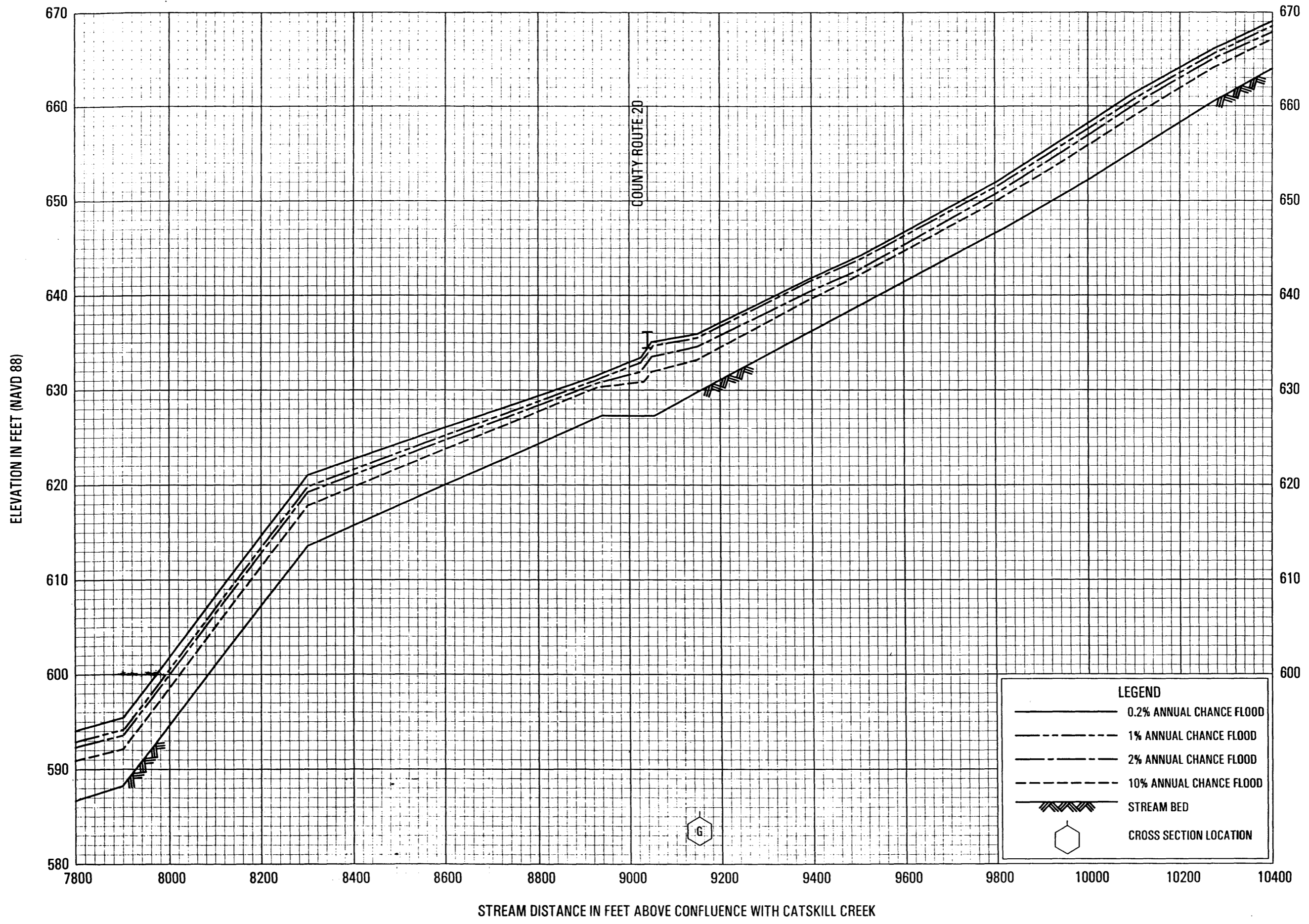
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GREENE COUNTY, NY
 (ALL JURISDICTIONS)

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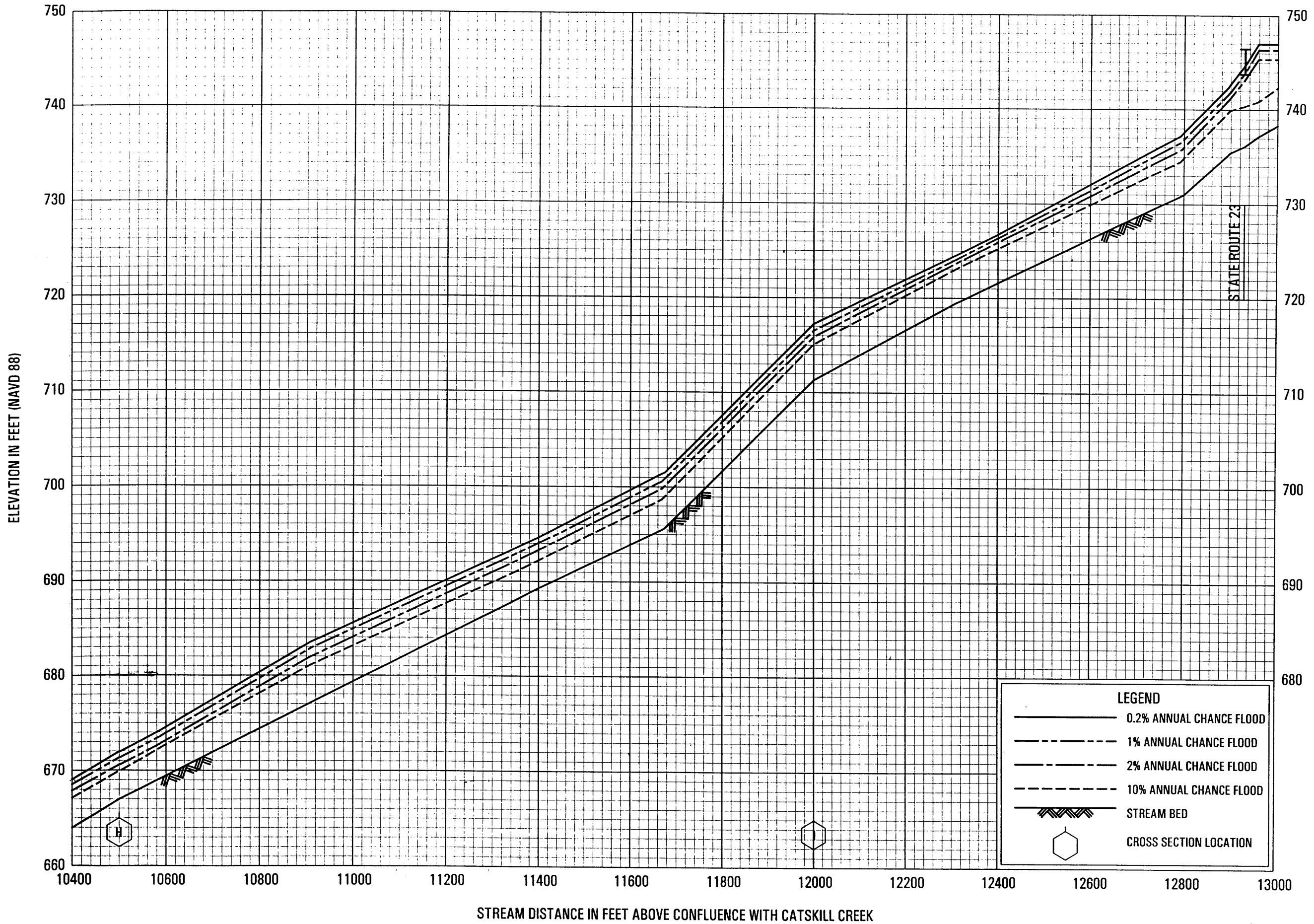
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GREENE COUNTY, NY
(ALL JURISDICTIONS)

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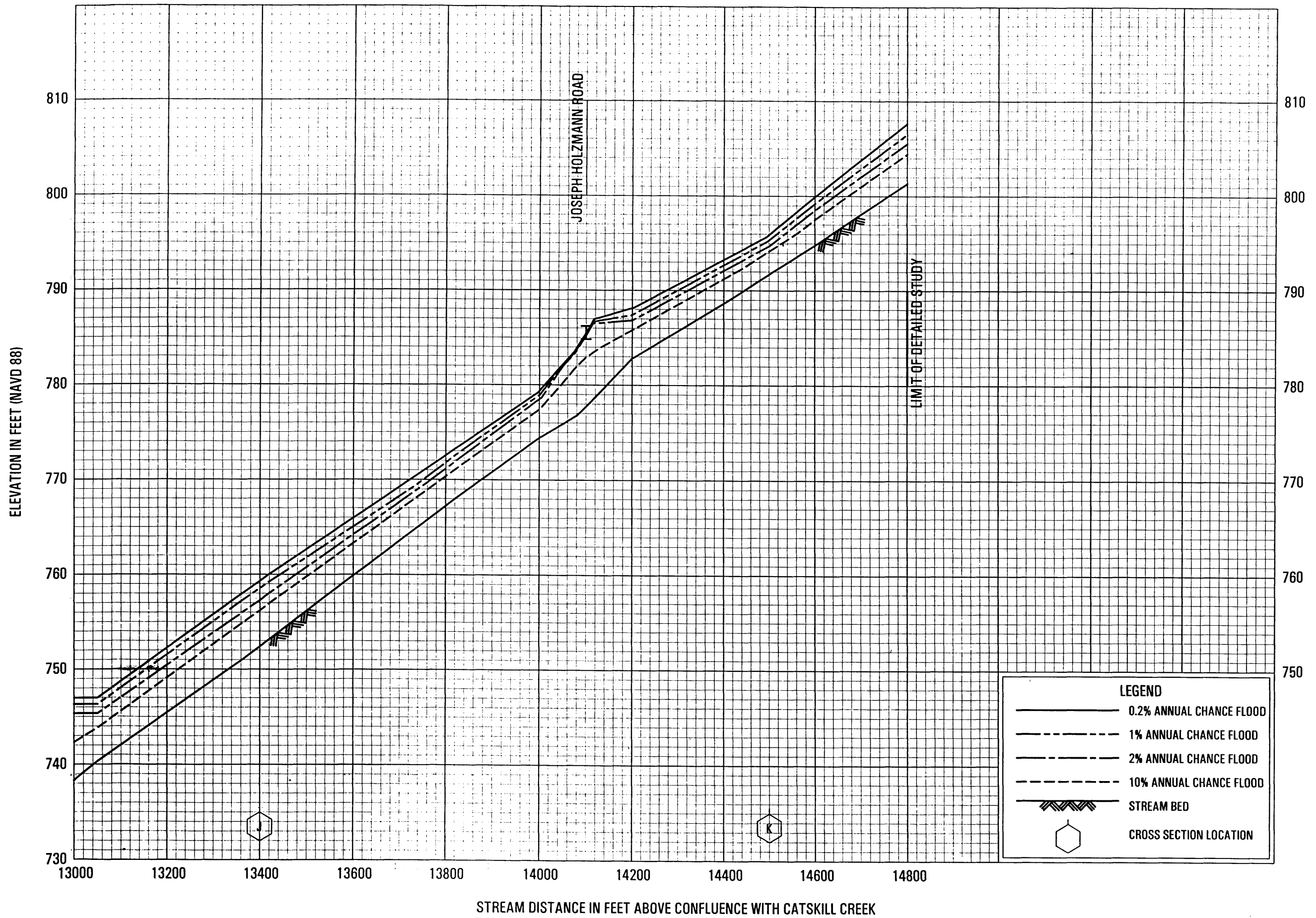


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GREENE COUNTY, NY
(ALL JURISDICTIONS)

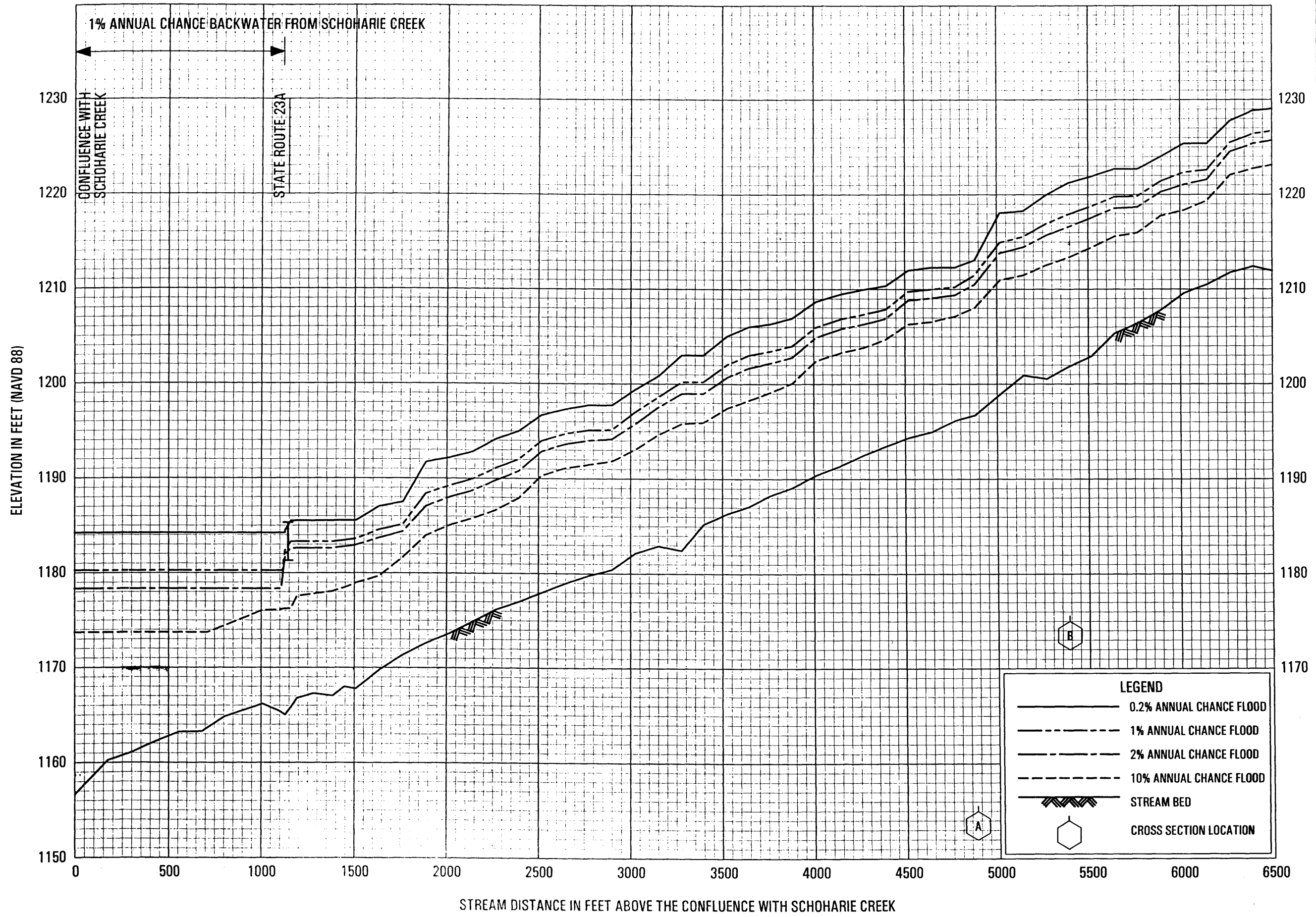
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GREENE COUNTY, NY
 (ALL JURISDICTIONS)



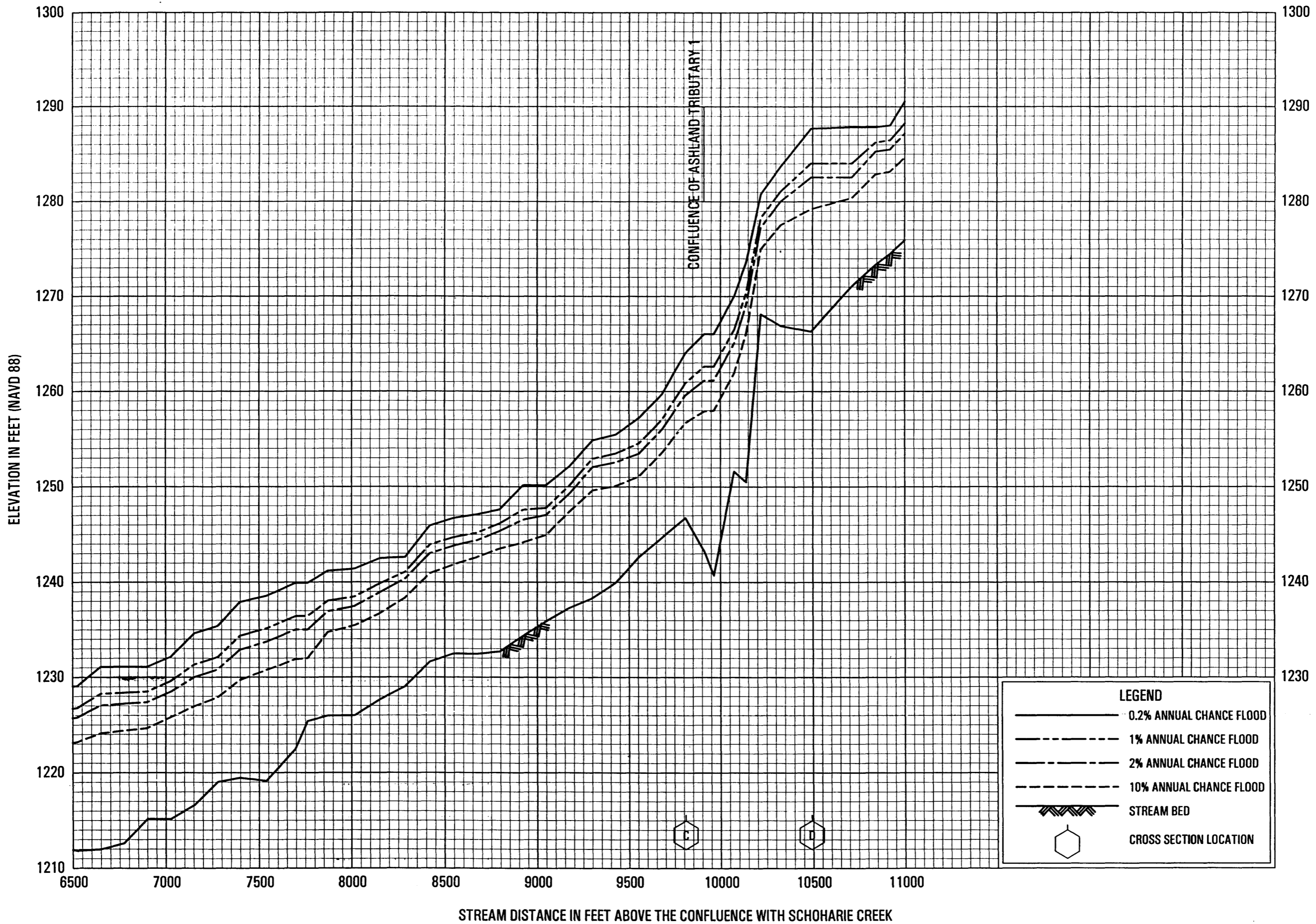
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BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY
(ALL JURISDICTIONS)

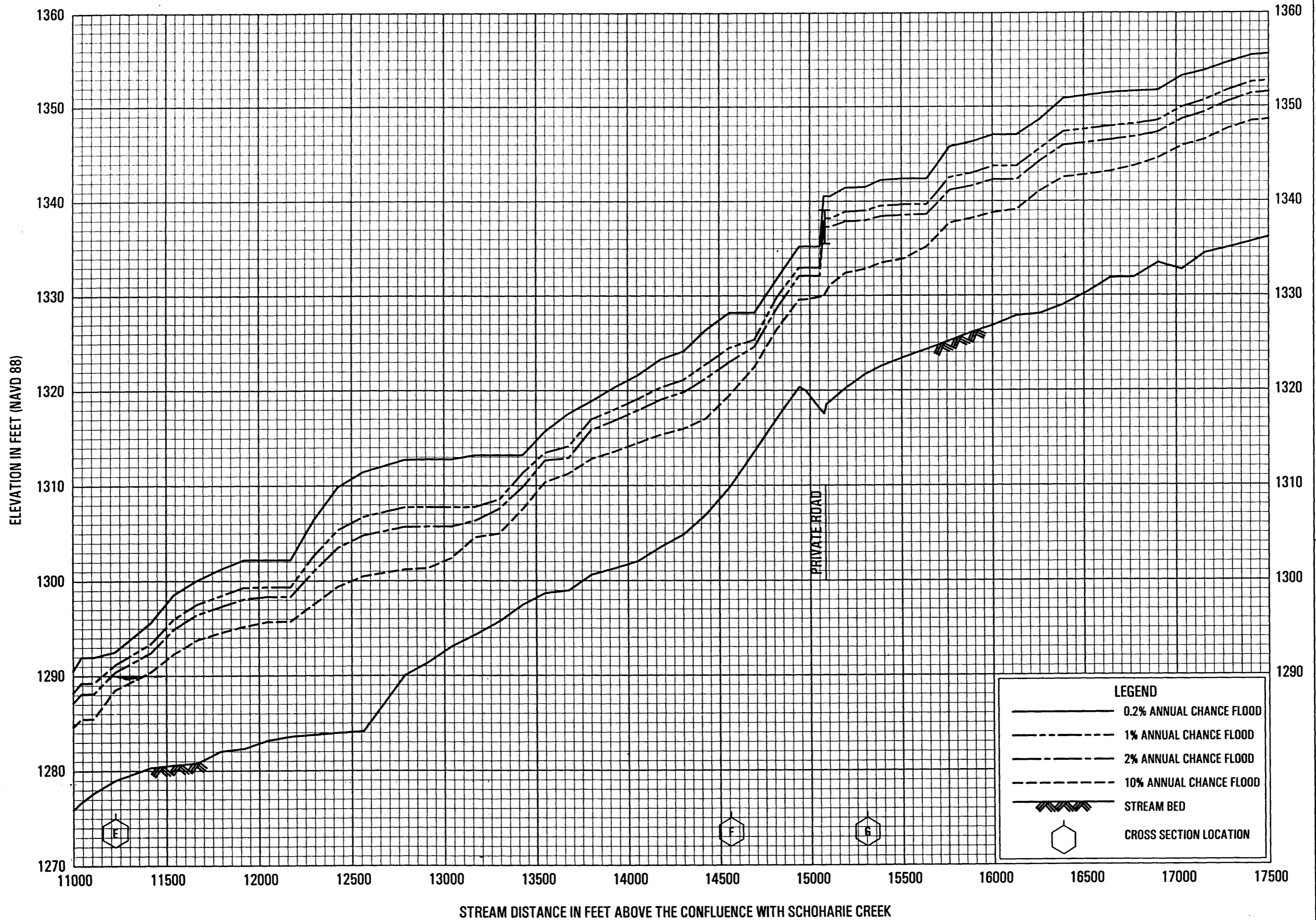
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FLOOD PROFILES

BATAVIA KILL

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GREENE COUNTY, NY
(ALL JURISDICTIONS)**



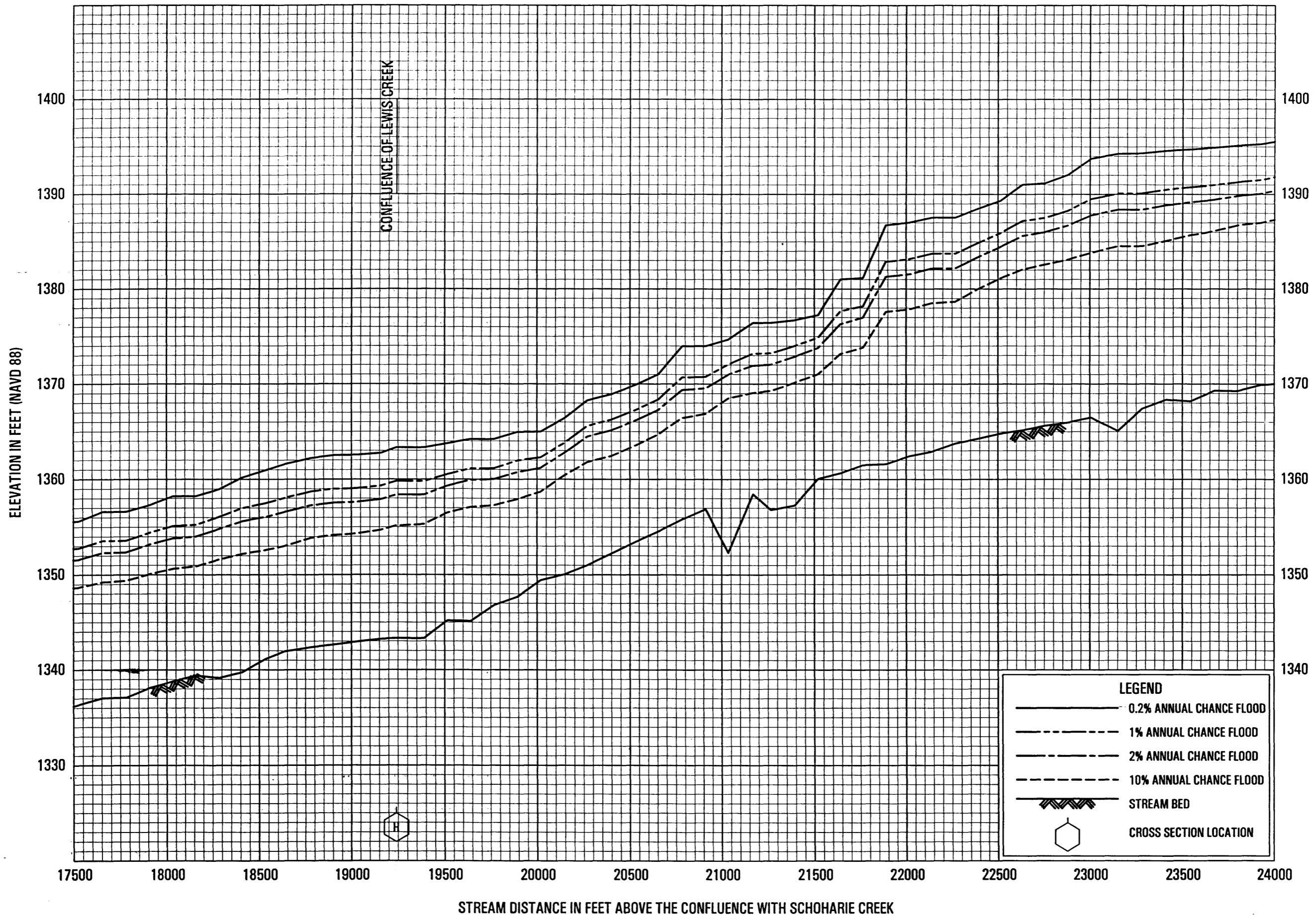
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BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

(ALL JURISDICTIONS)



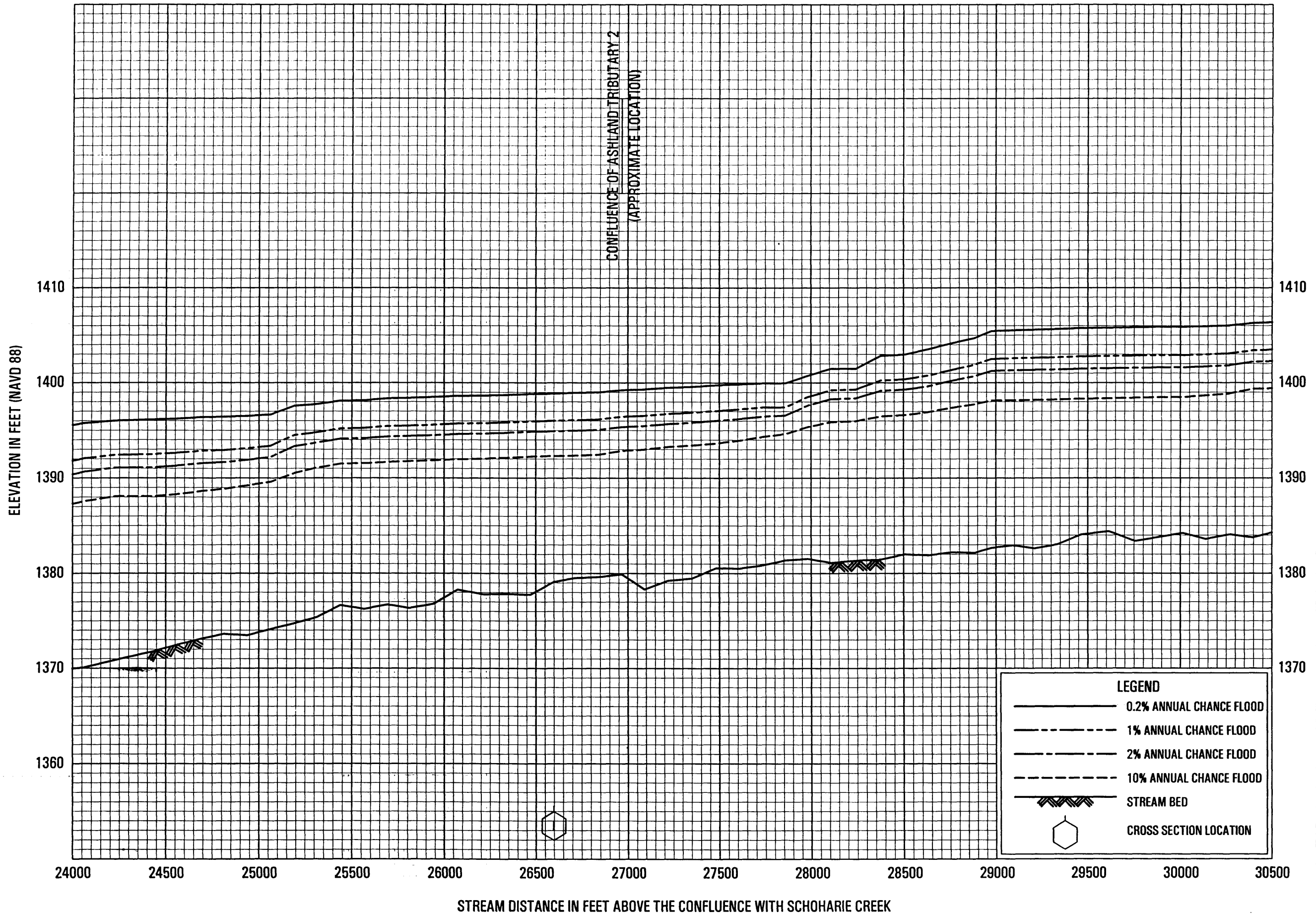
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BATAVIA KILL

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GREENE COUNTY, NY

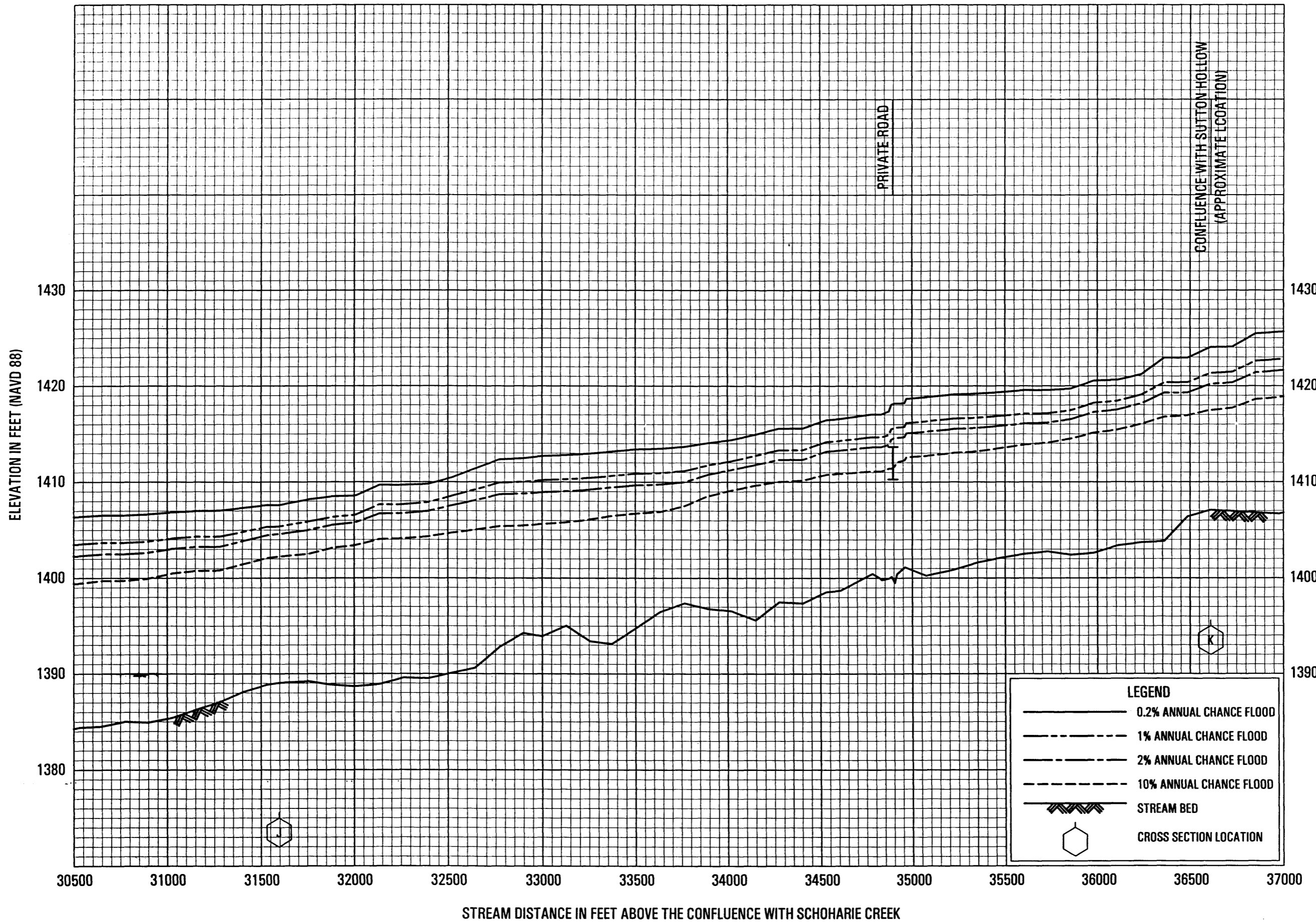
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BATAVIA KILL

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 GREENE COUNTY, NY
 (ALL JURISDICTIONS)



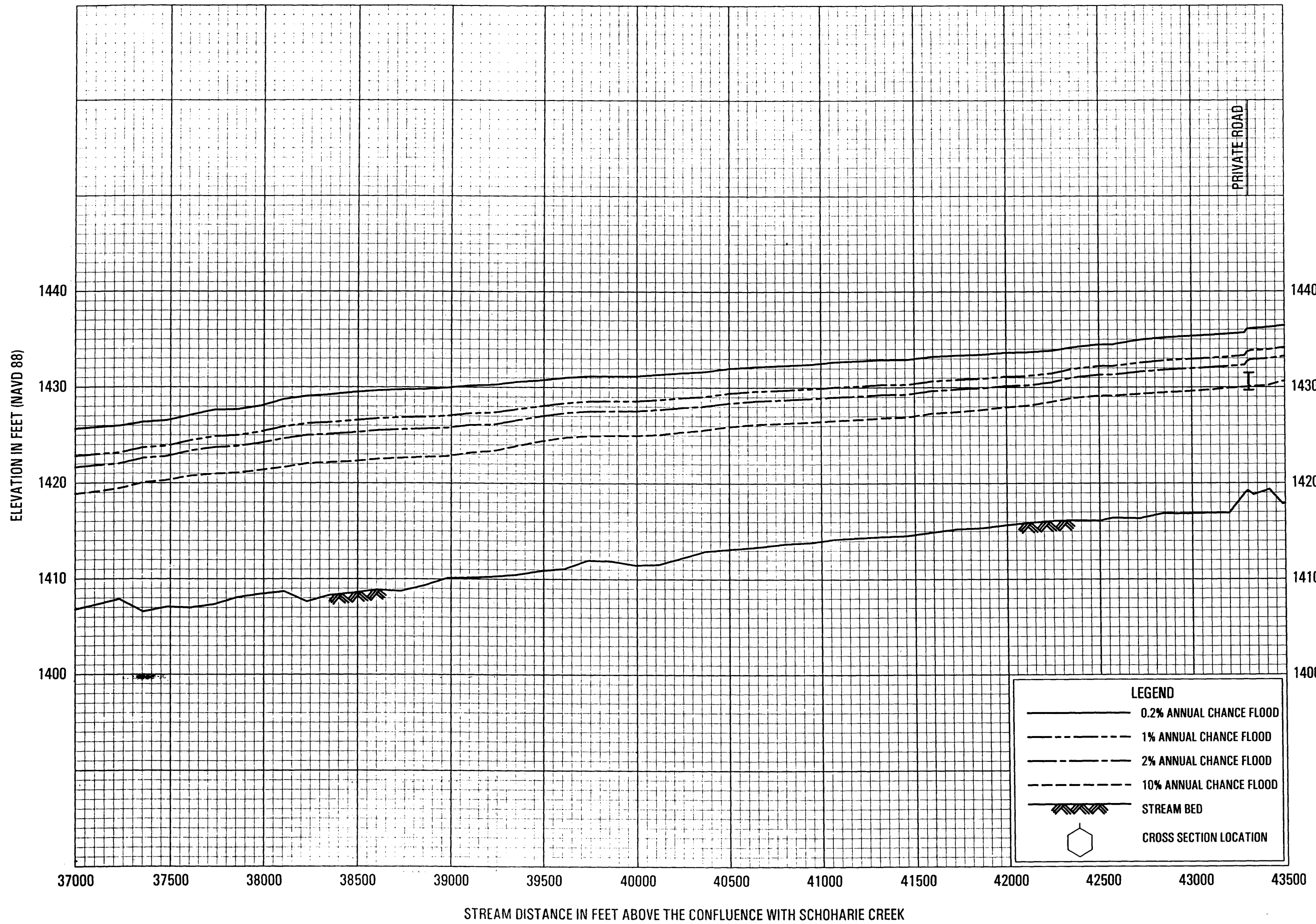
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BATAVIA KILL

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GREENE COUNTY, NY

(ALL JURISDICTIONS)



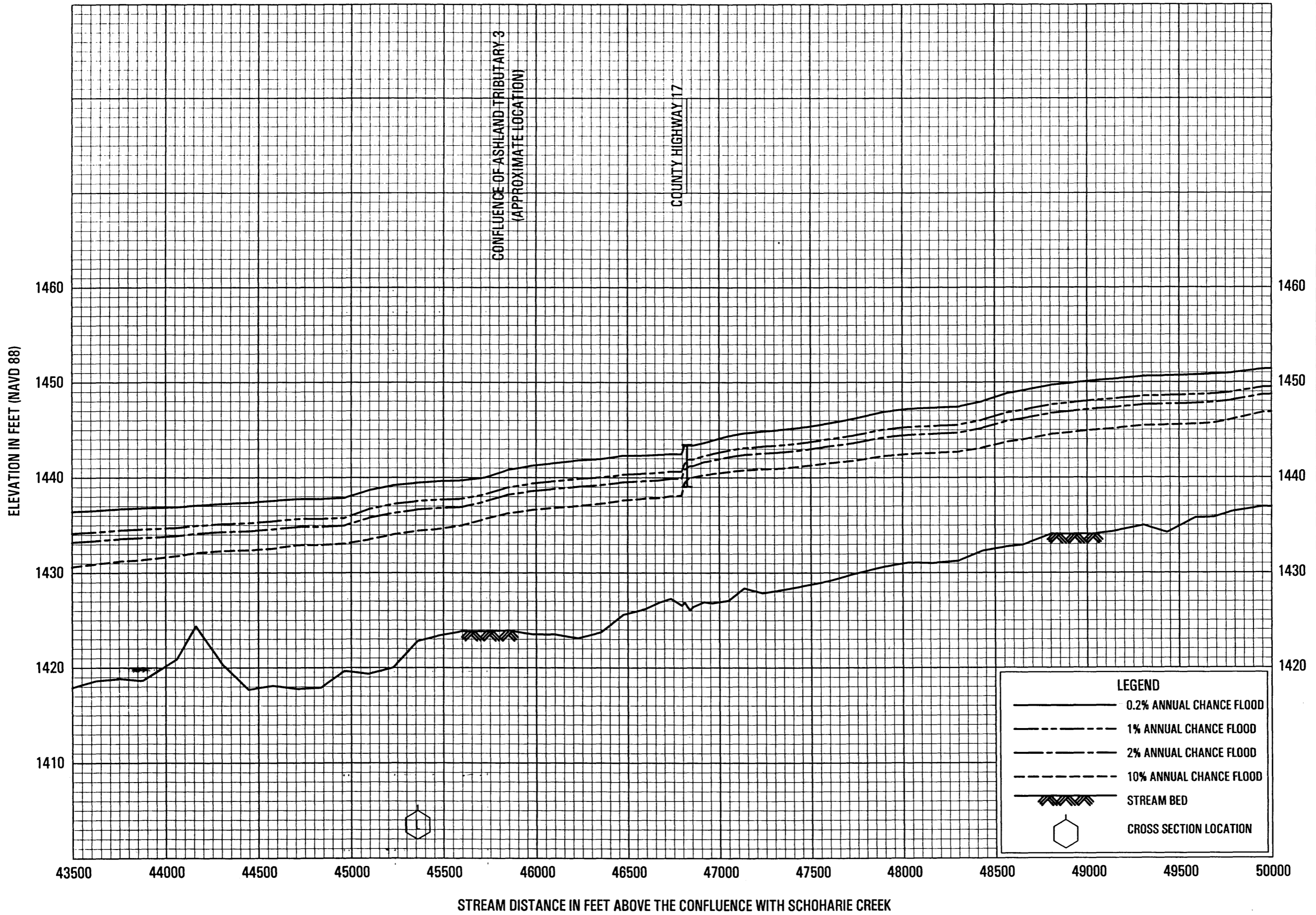
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BATAVIA KILL

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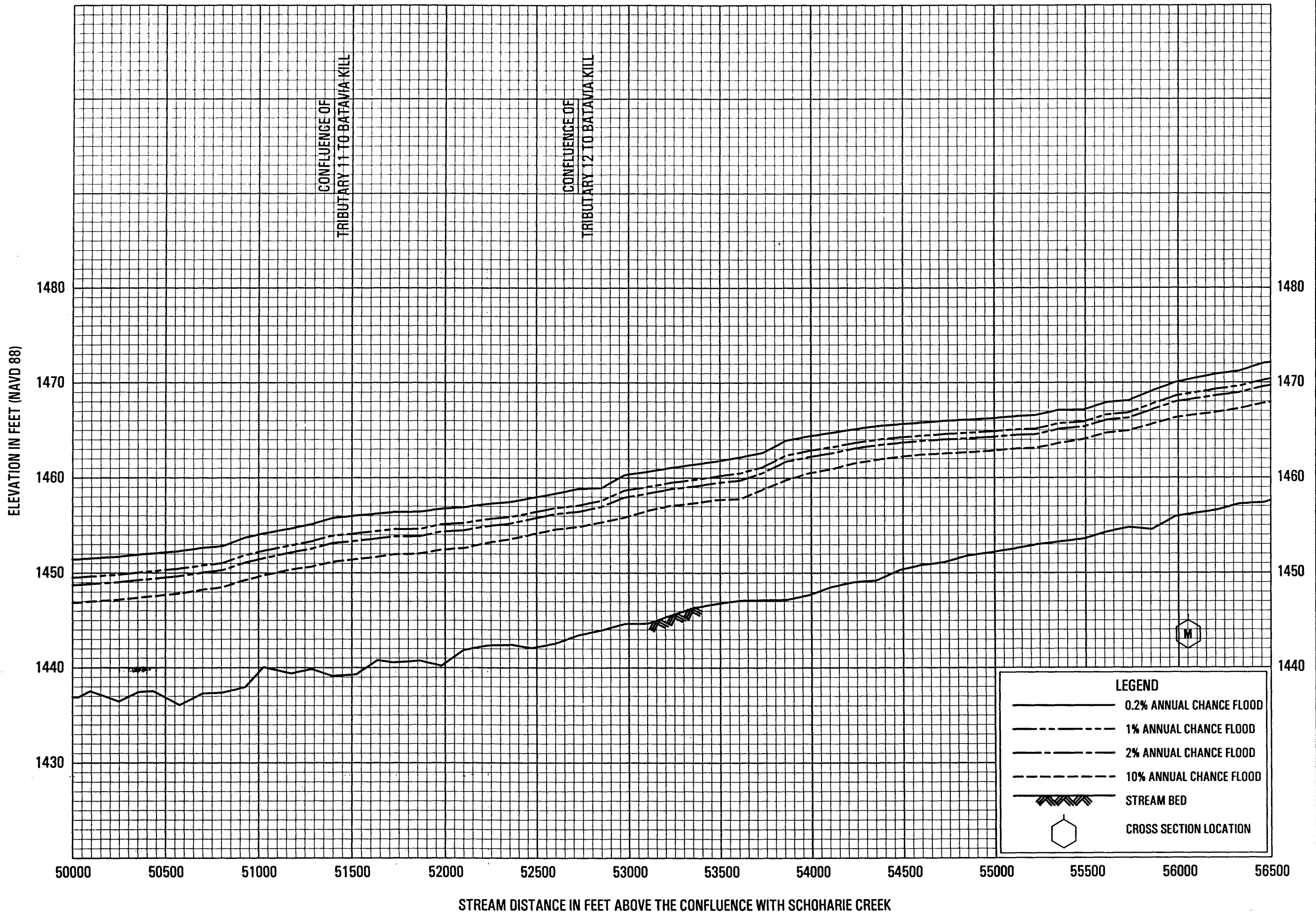
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BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

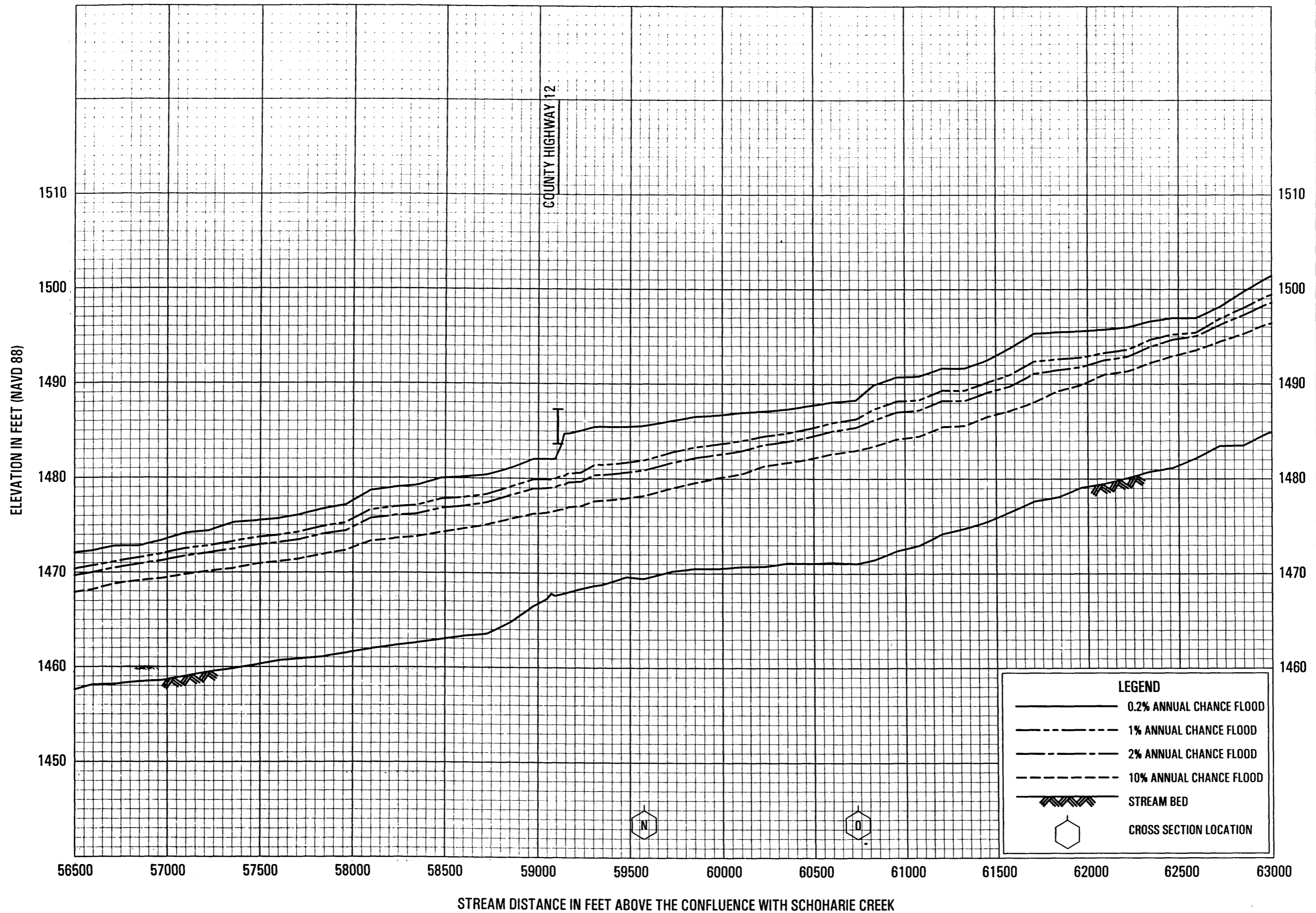
(ALL JURISDICTIONS)

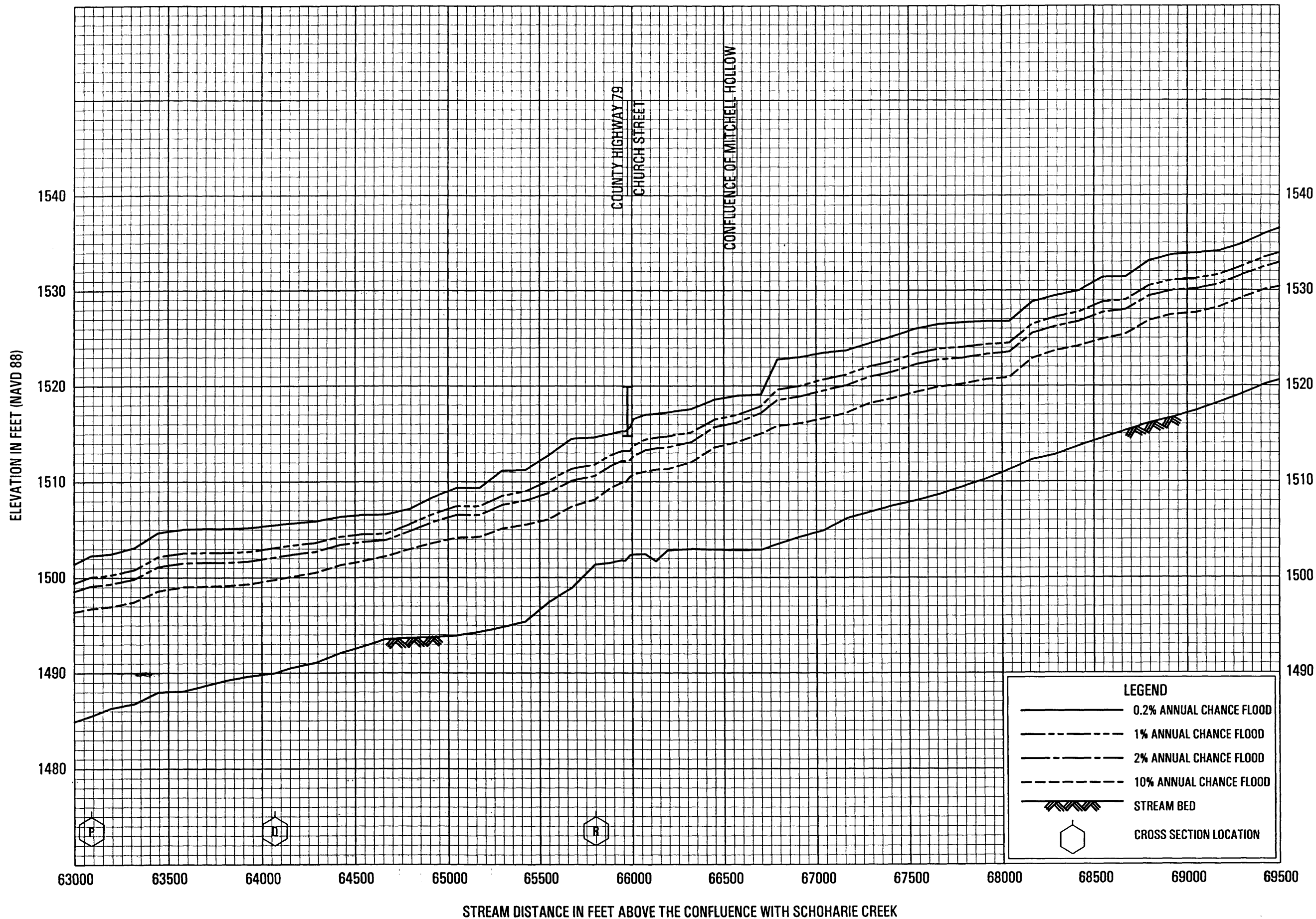


FLOOD PROFILES

BATAVIA KILL

**FEDERAL EMERGENCY MANAGEMENT AGENCY
GREENE COUNTY, NY
(ALL JURISDICTIONS)**





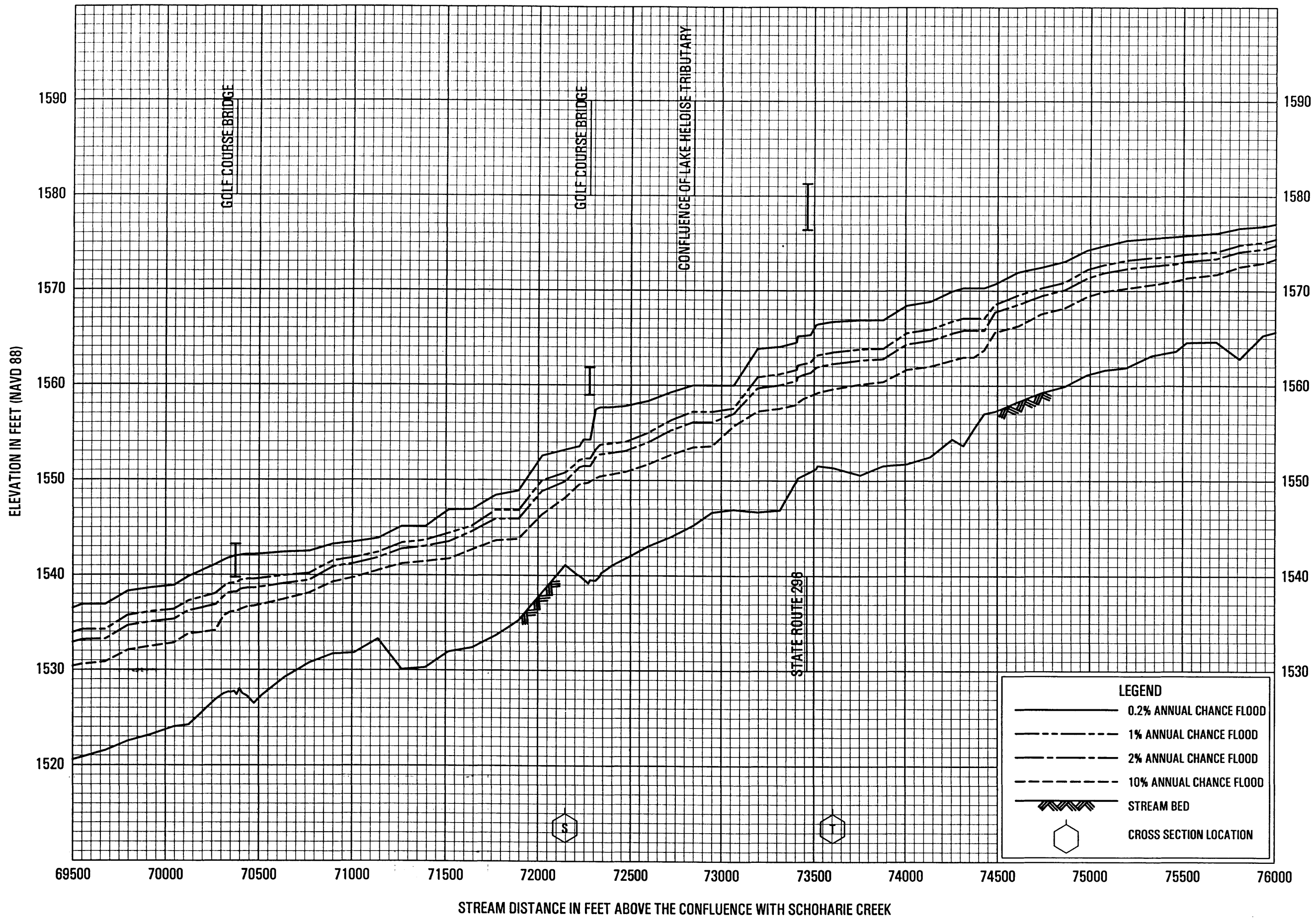
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BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

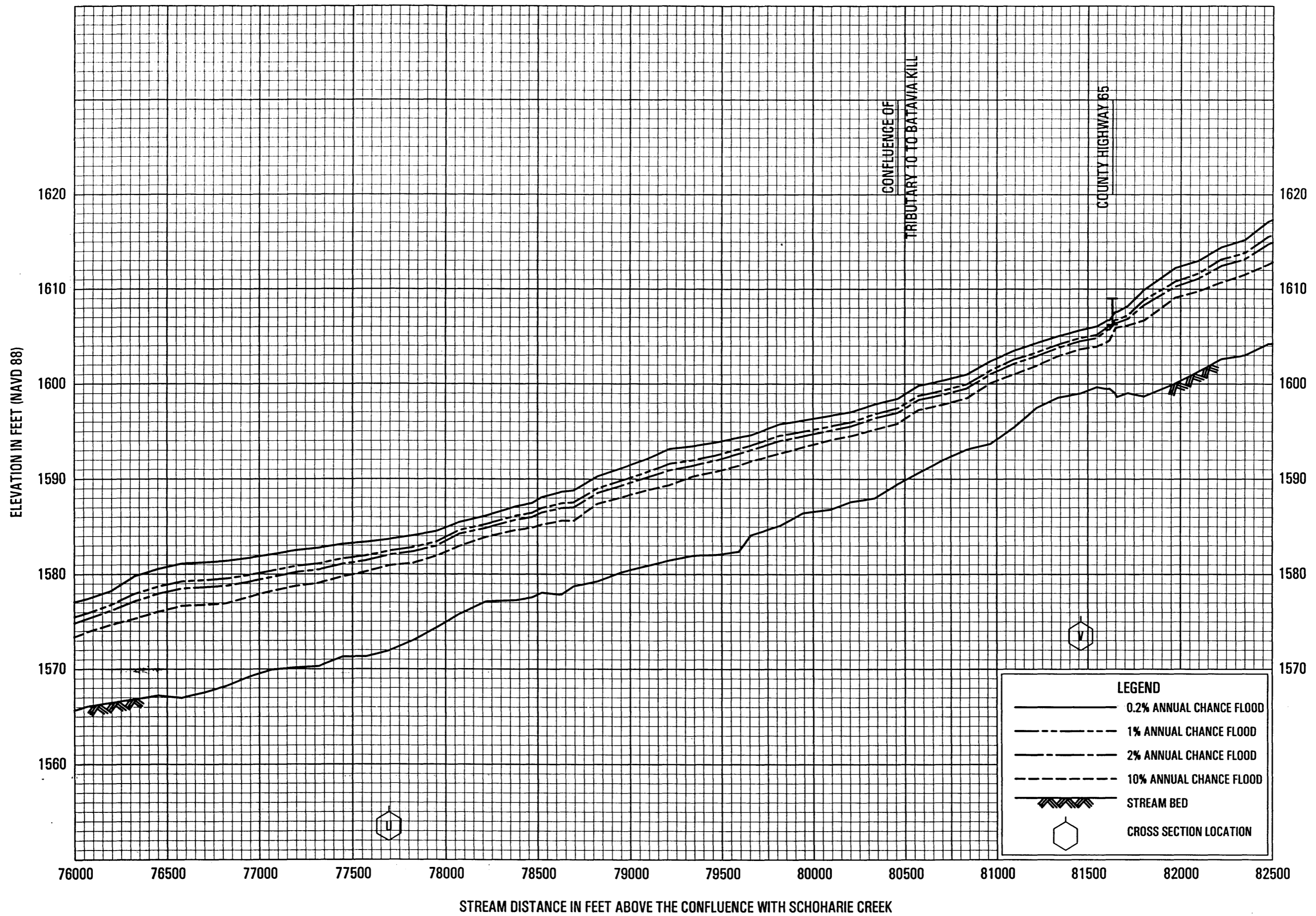
(ALL JURISDICTIONS)



FLOOD PROFILES

BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY
 GREENE COUNTY, NY
 (ALL JURISDICTIONS)



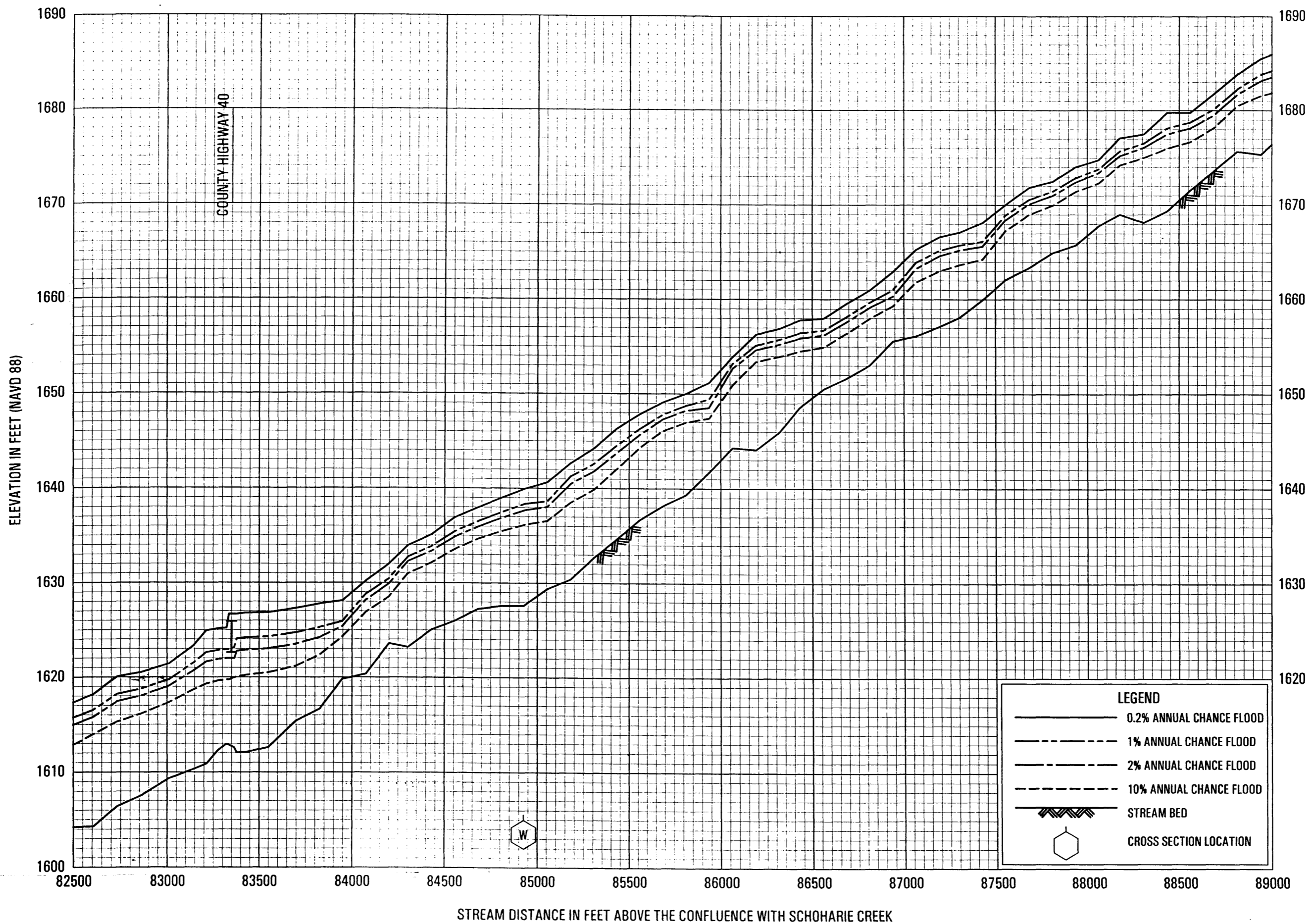
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BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

(ALL JURISDICTIONS)



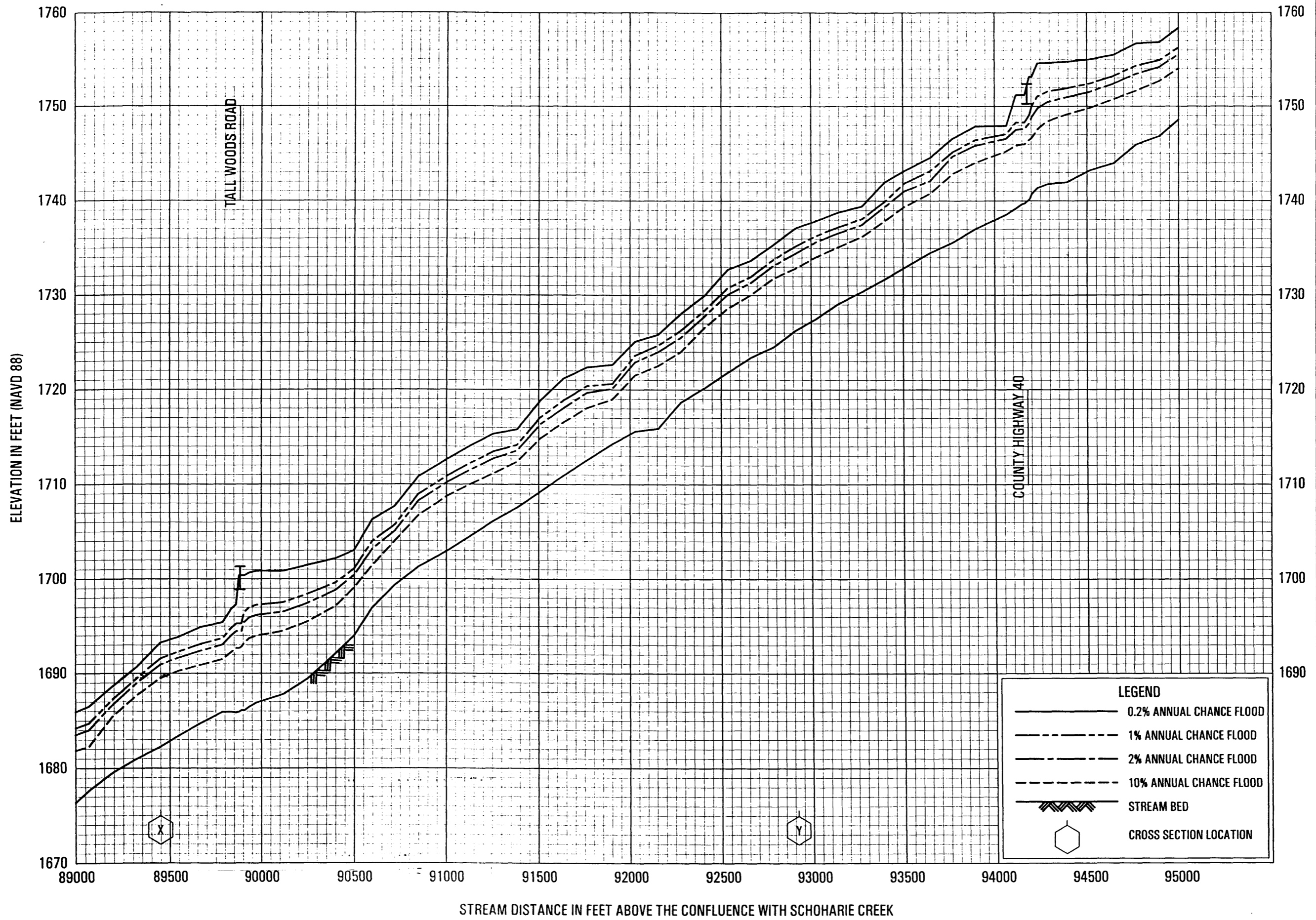
FLOOD PROFILES

BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

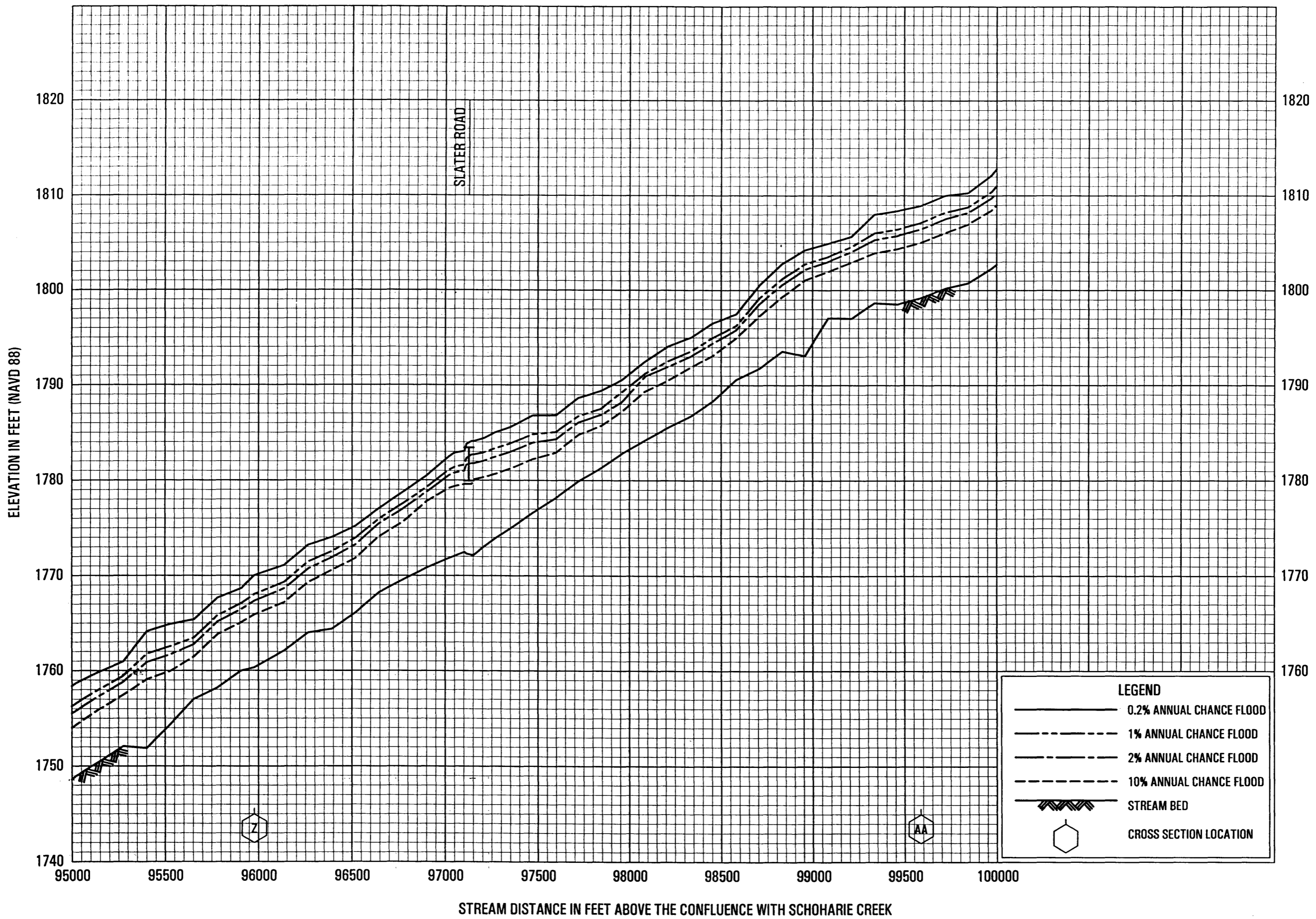
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FLOOD PROFILES

BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY
 GREENE COUNTY, NY
 (ALL JURISDICTIONS)



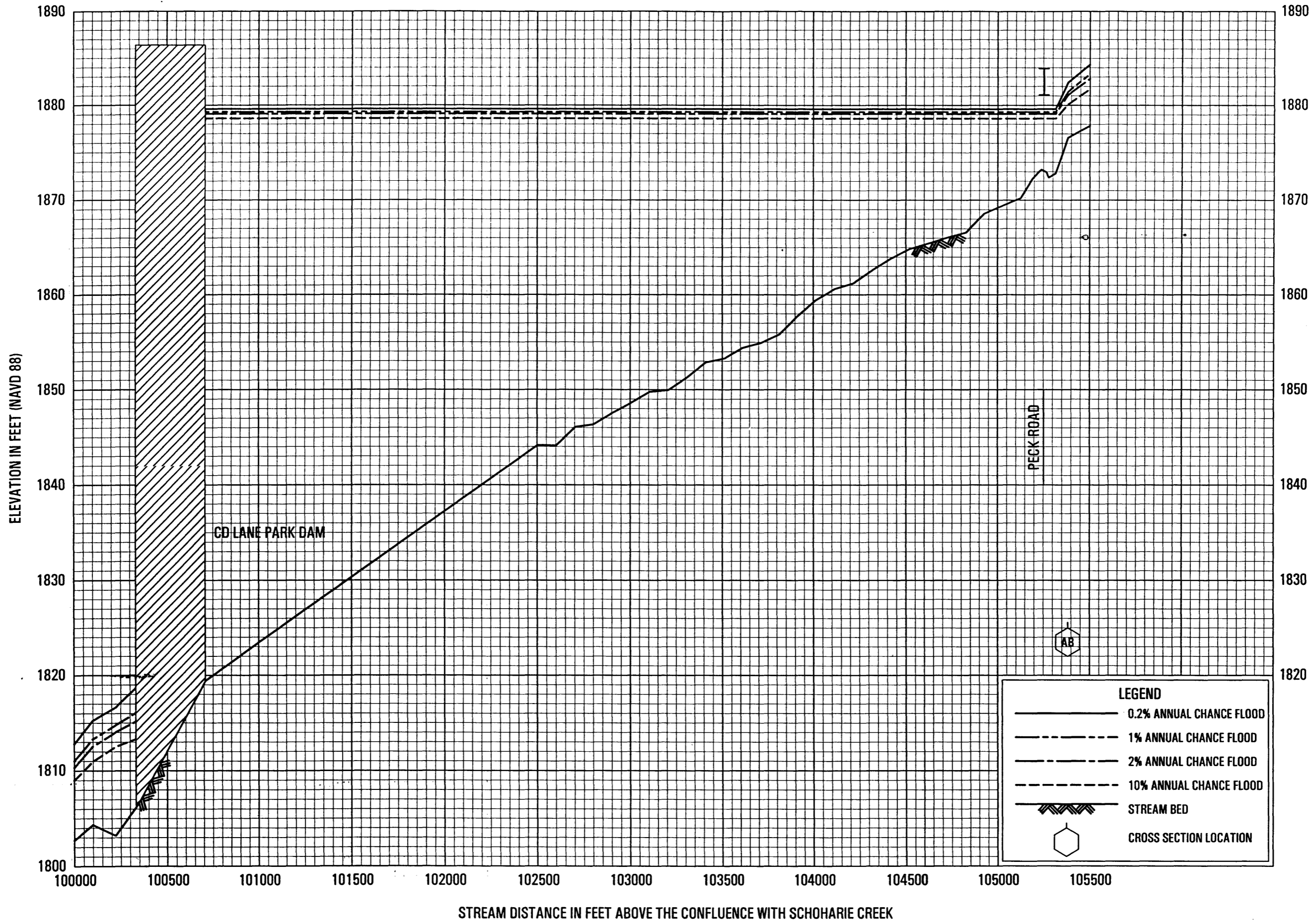
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BATAVIA KILL

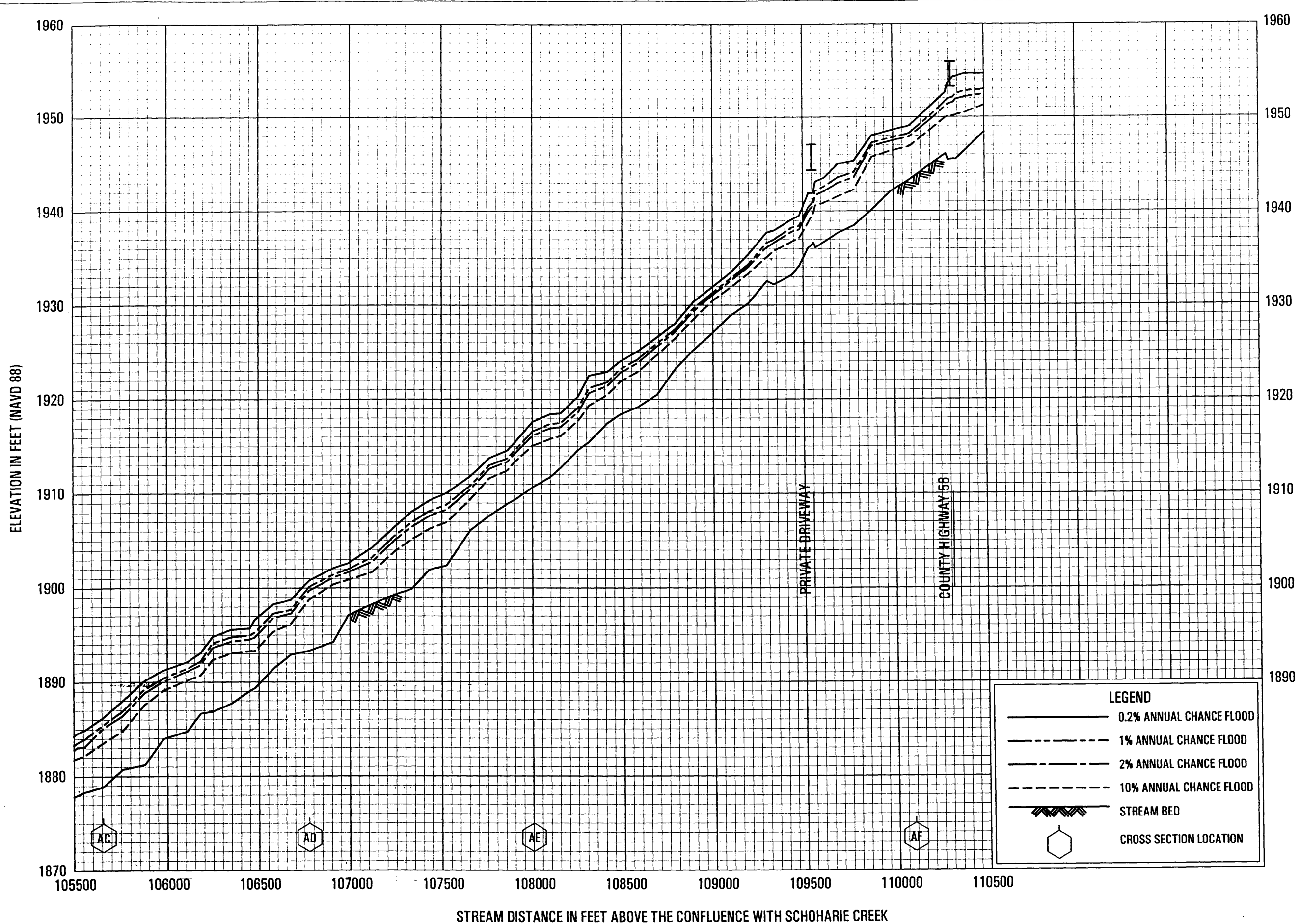
FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

(ALL JURISDICTIONS)



FEDERAL EMERGENCY MANAGEMENT AGENCY
GREENE COUNTY, NY
(ALL JURISDICTIONS)



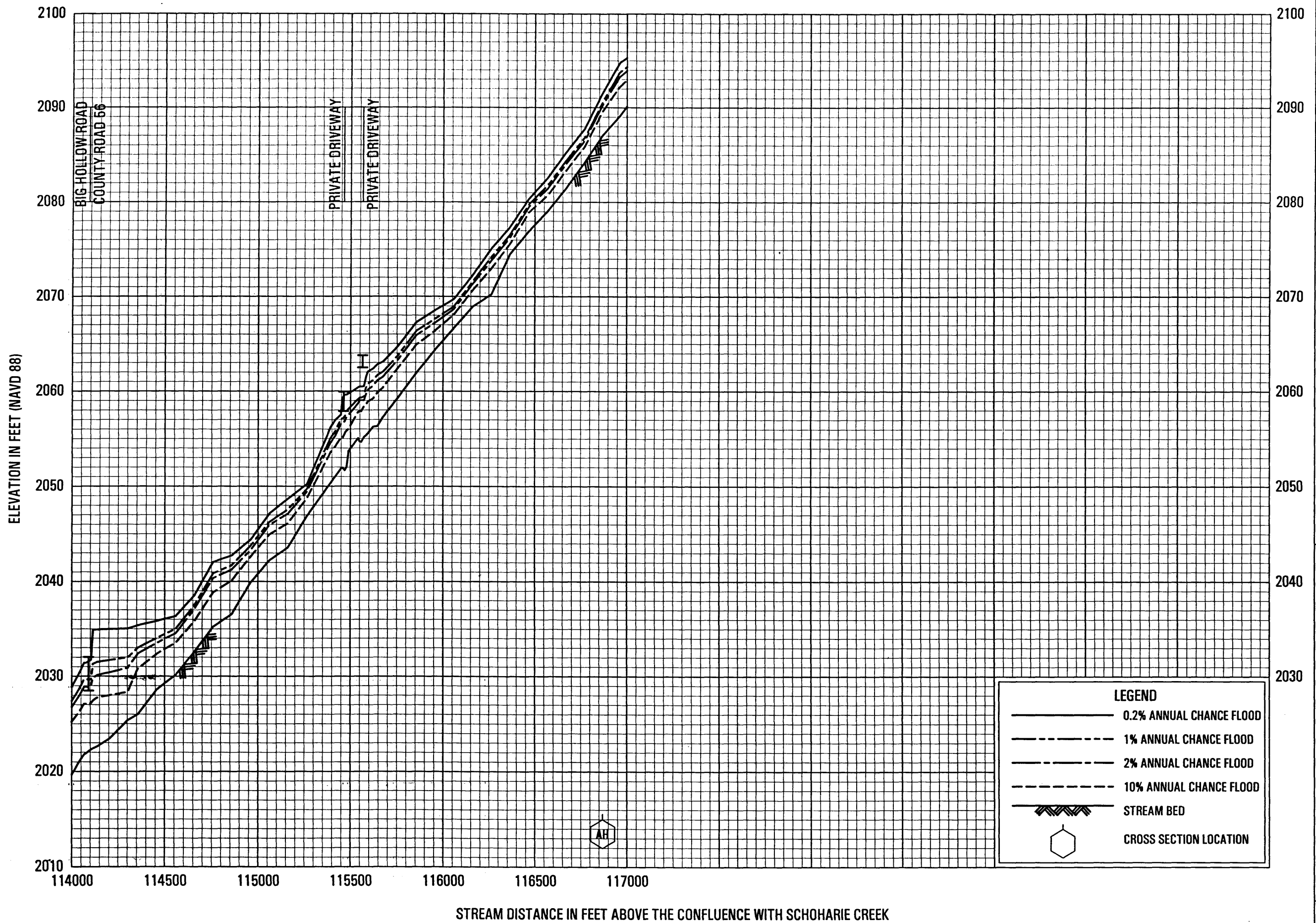
FLOOD PROFILES

BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

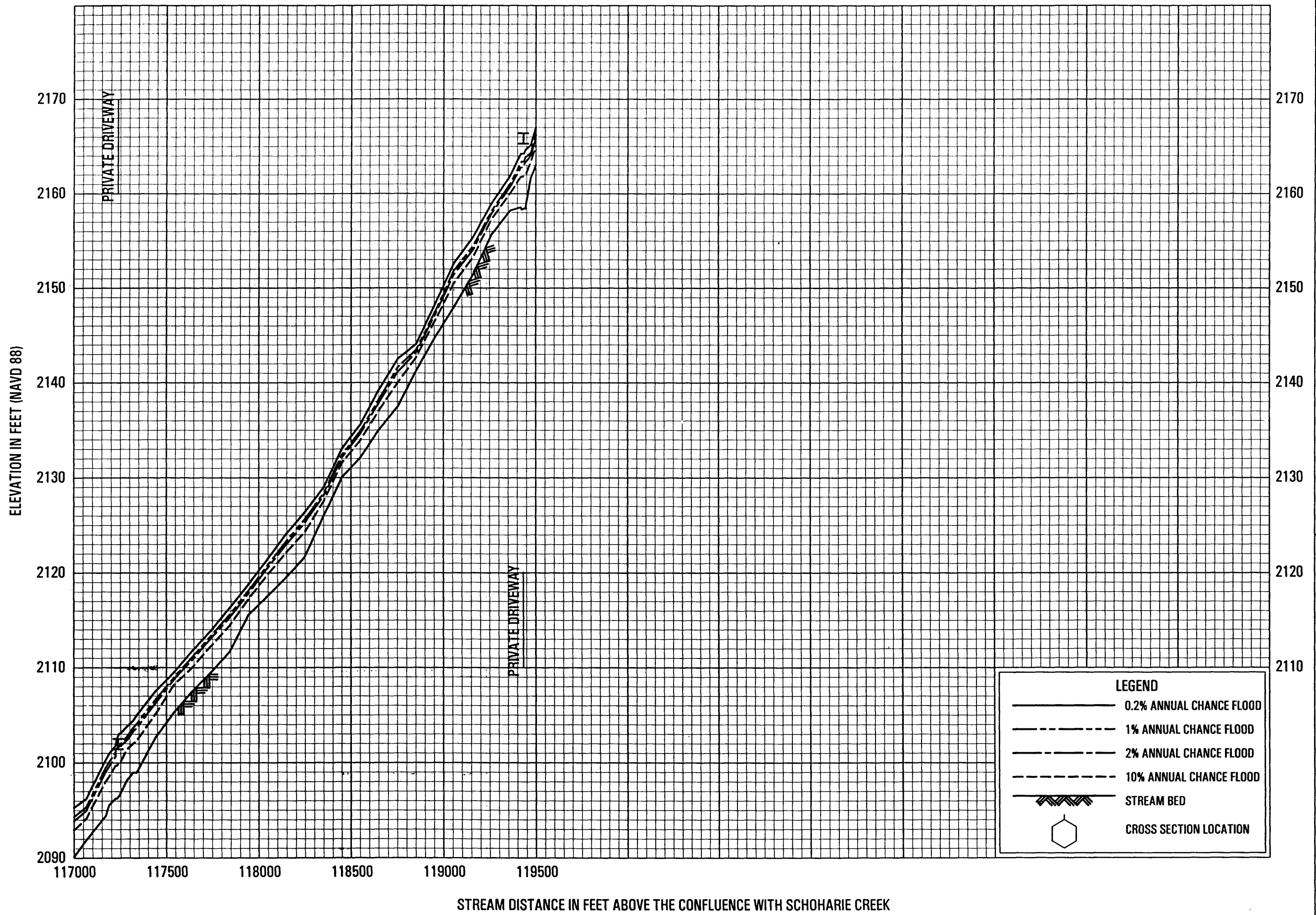
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FLOOD PROFILES

BATAVIA KILL

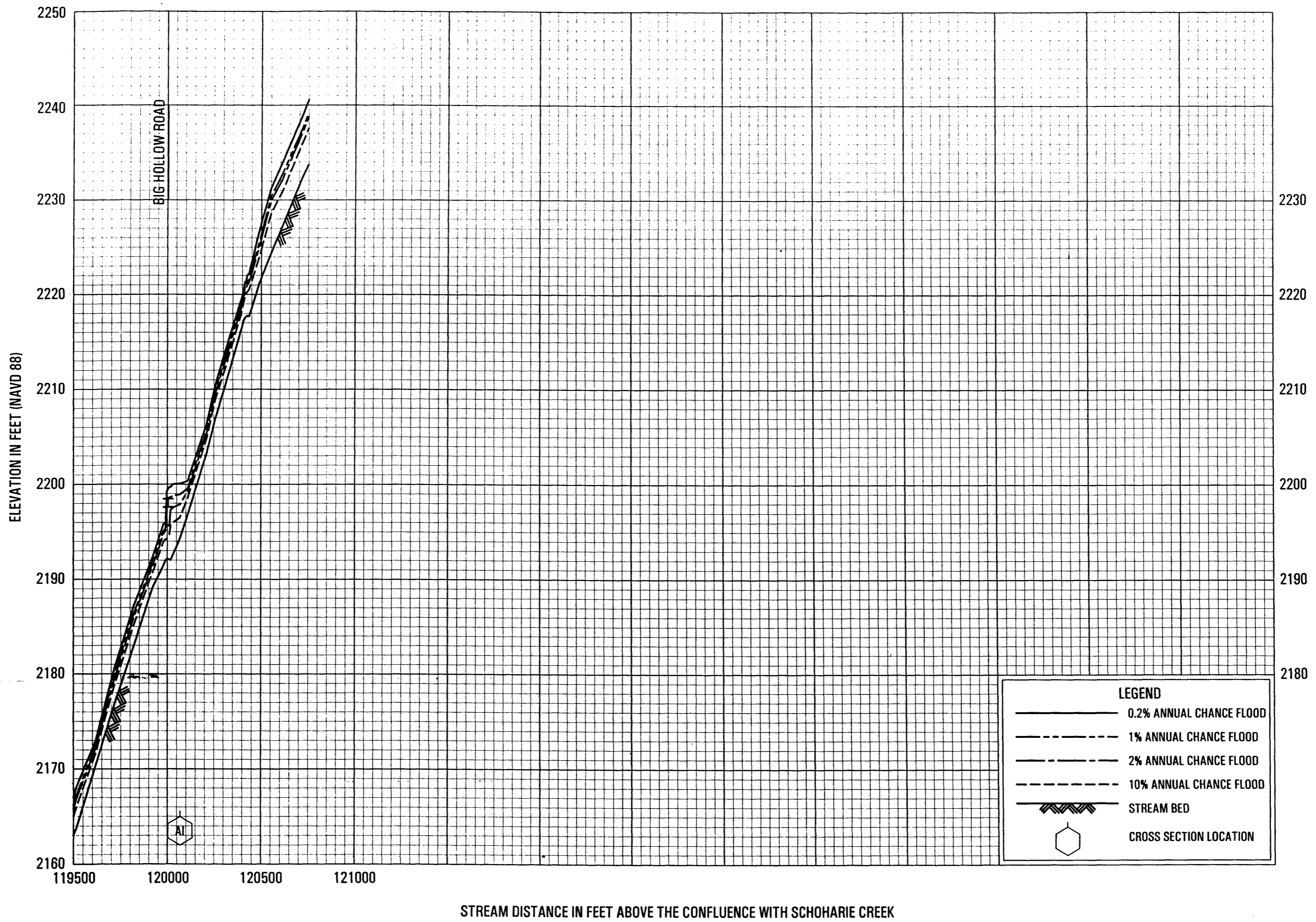
FEDERAL EMERGENCY MANAGEMENT AGENCY
 GREENE COUNTY, NY
 (ALL JURISDICTIONS)



FLOOD PROFILES

BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY
GREENE COUNTY, NY
 (ALL JURISDICTIONS)

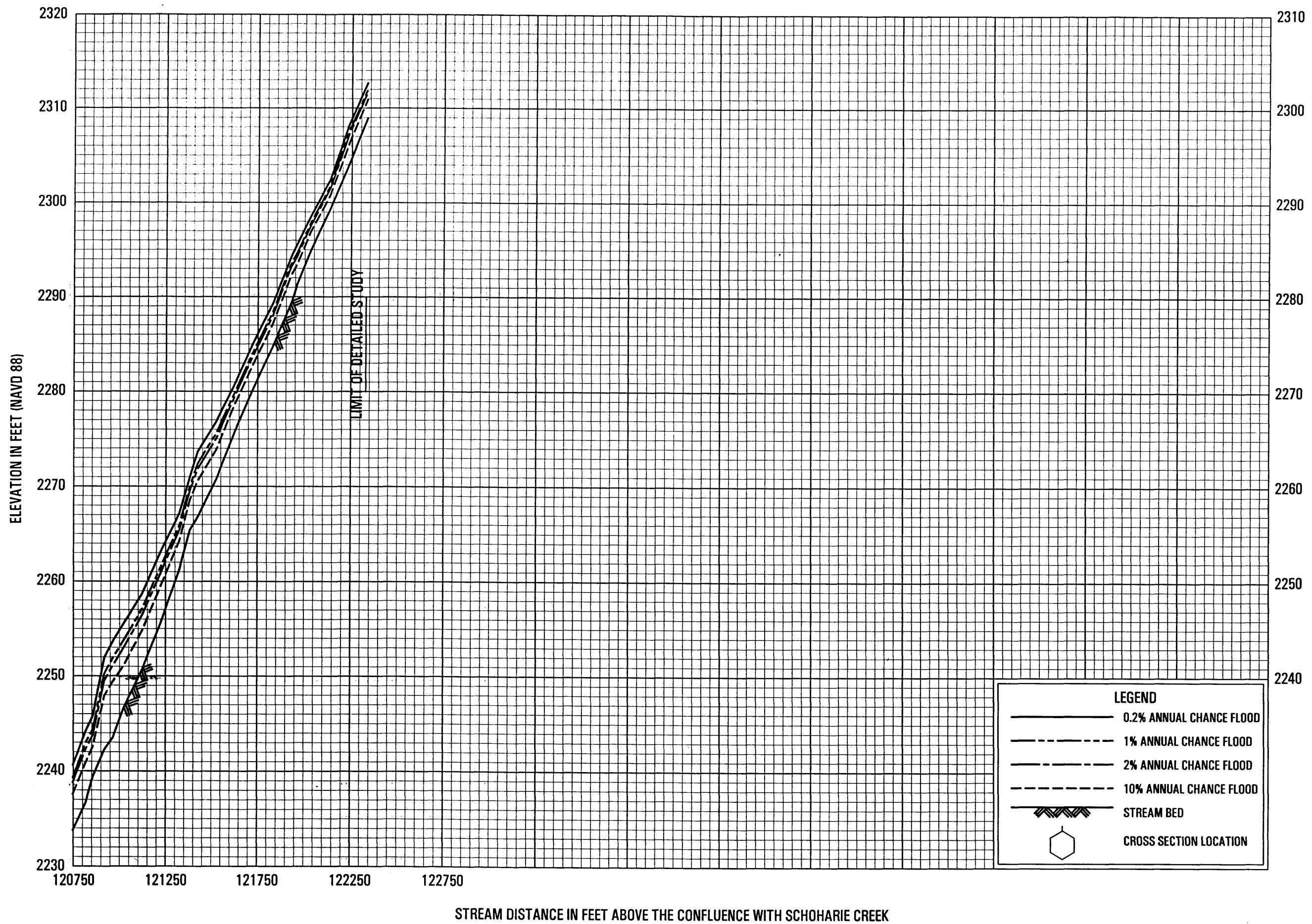


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BATAVIA KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

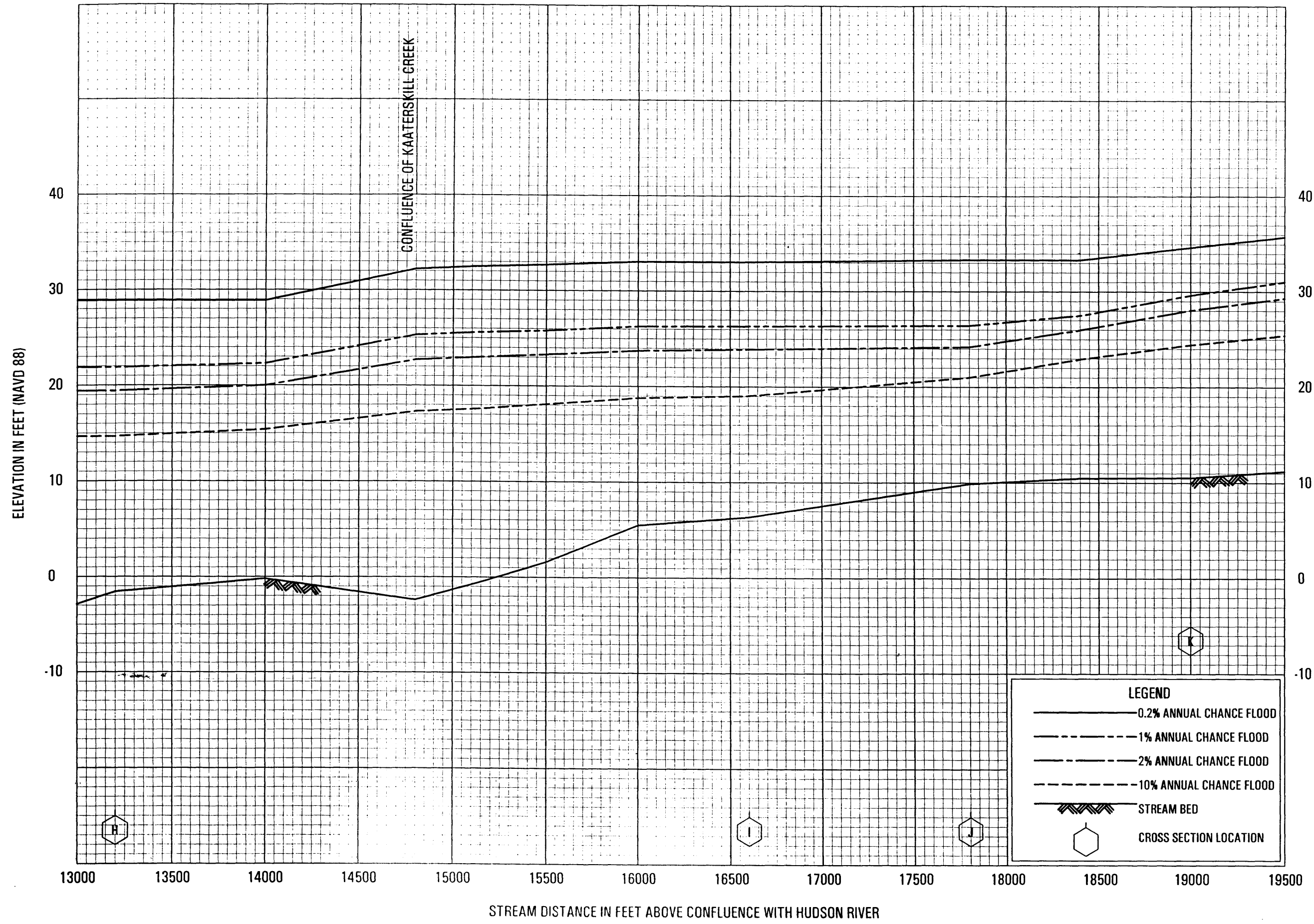
GREENE COUNTY, NY
(ALL JURISDICTIONS)



FLOOD PROFILES

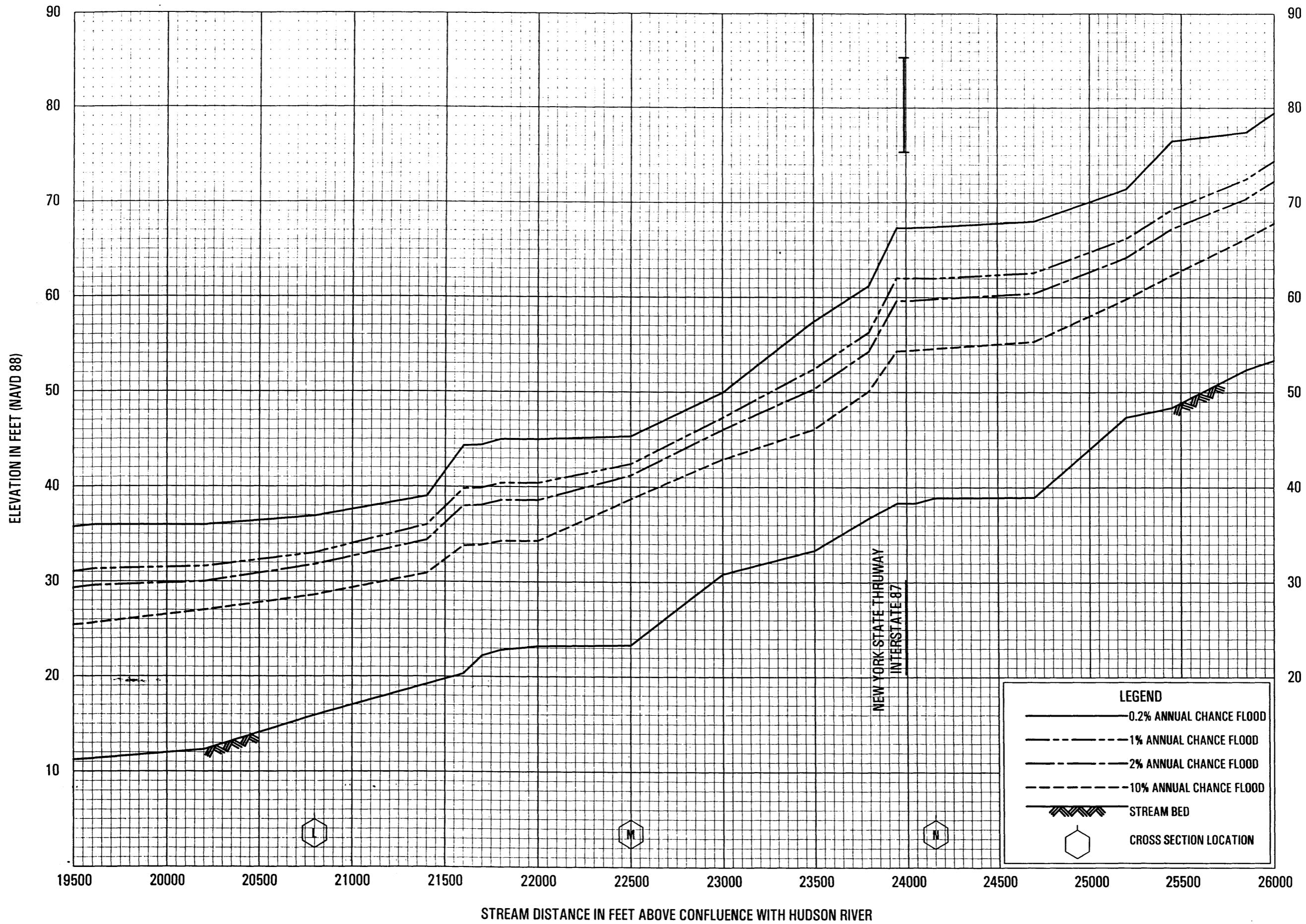
BATAVIA KILL

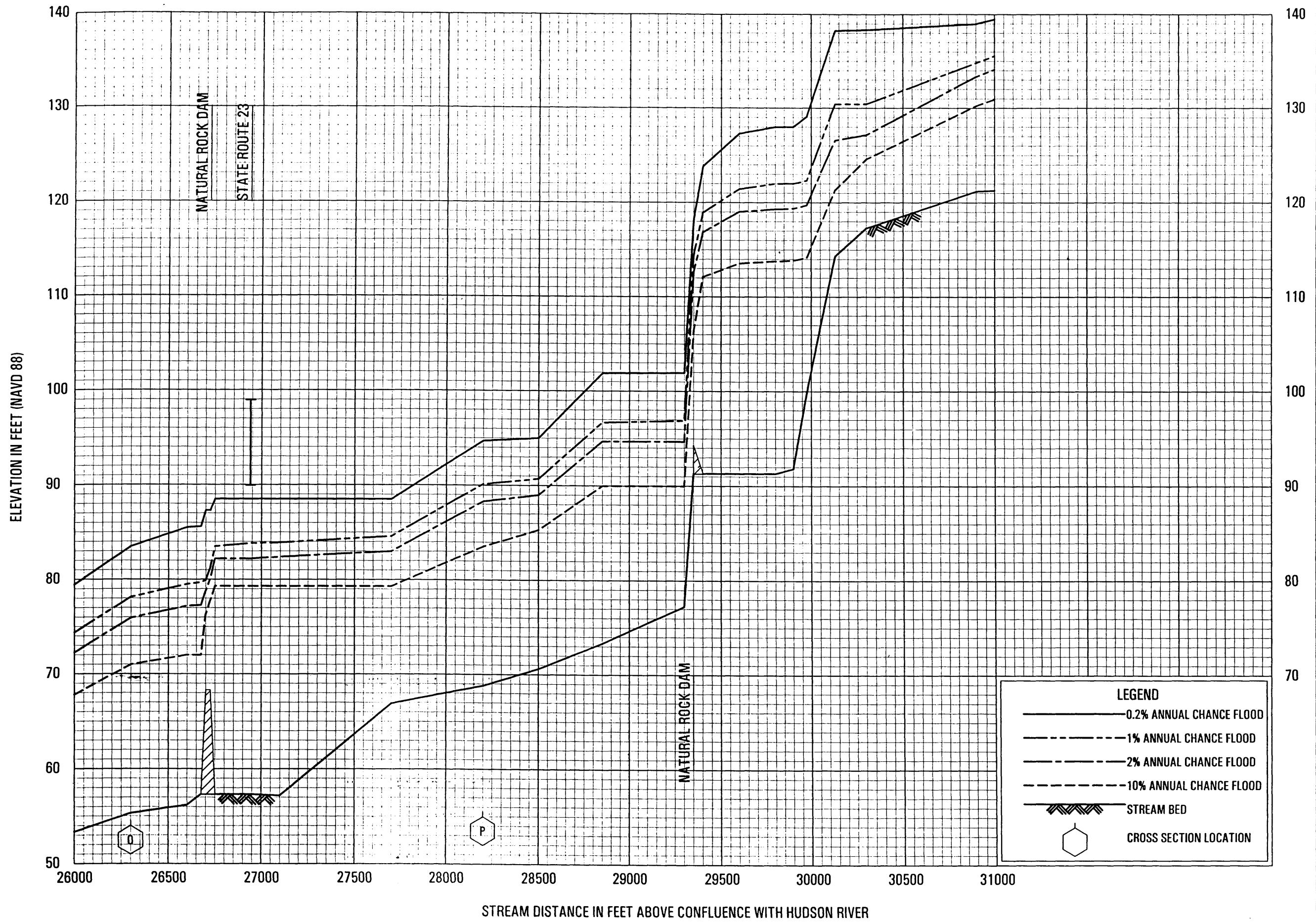
FEDERAL EMERGENCY MANAGEMENT AGENCY
 GREENE COUNTY, NY
 (ALL JURISDICTIONS)



FLOOD PROFILES
CATSKILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
GREENE COUNTY, NY
(ALL JURISDICTIONS)





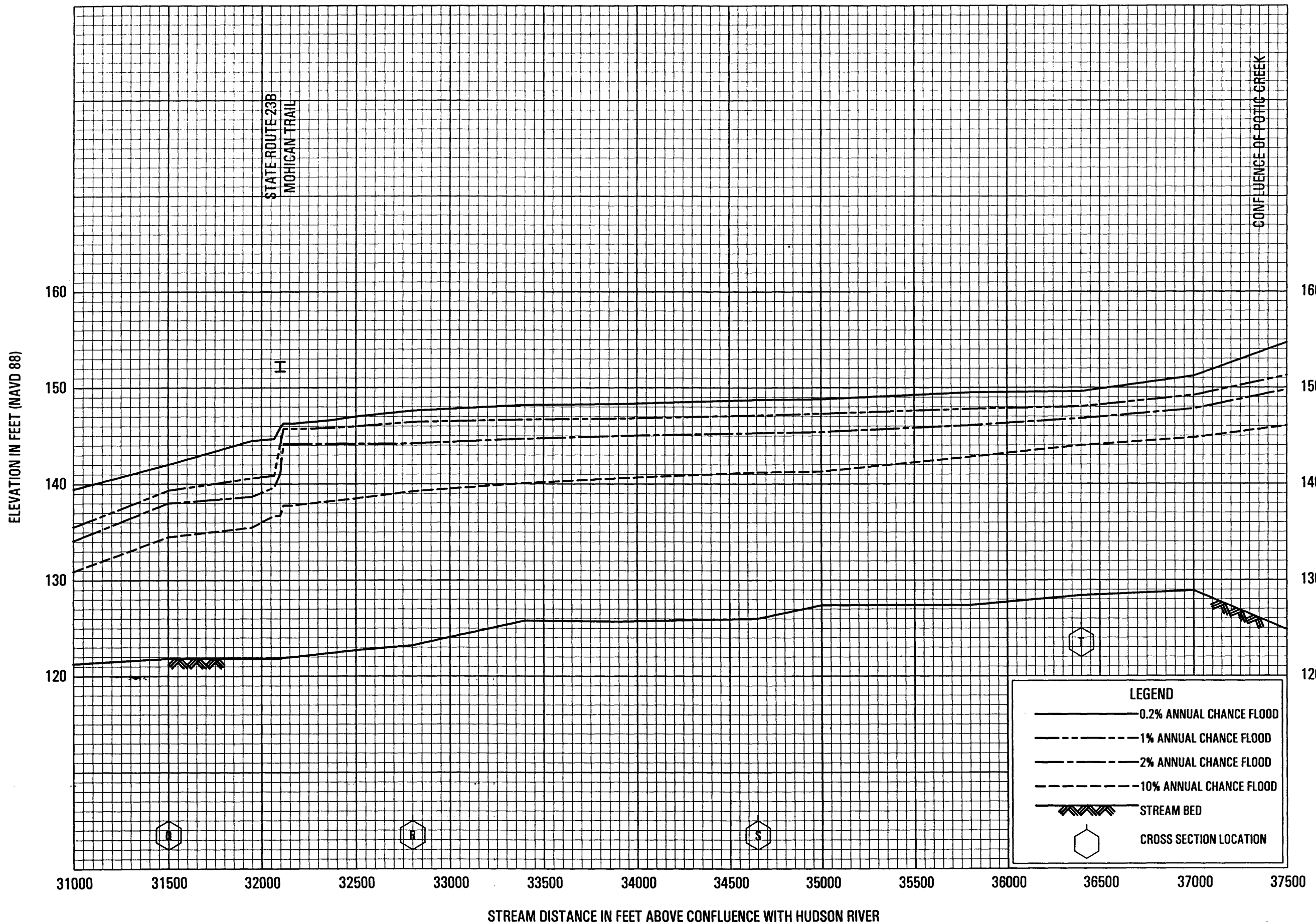
FLOOD PROFILES

CATSKILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

(ALL JURISDICTIONS)

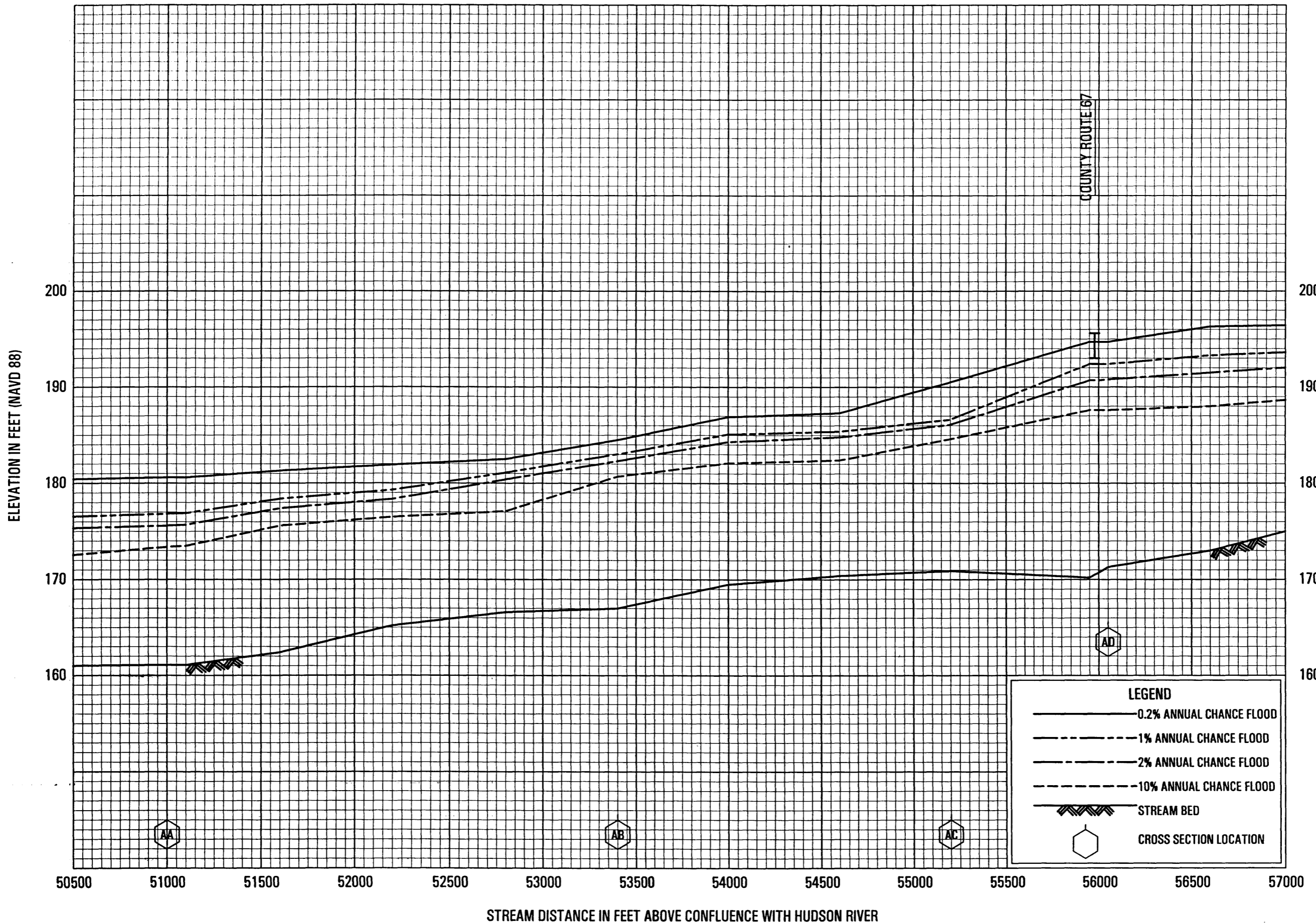


FLOOD PROFILES

CATSKILL CREEK

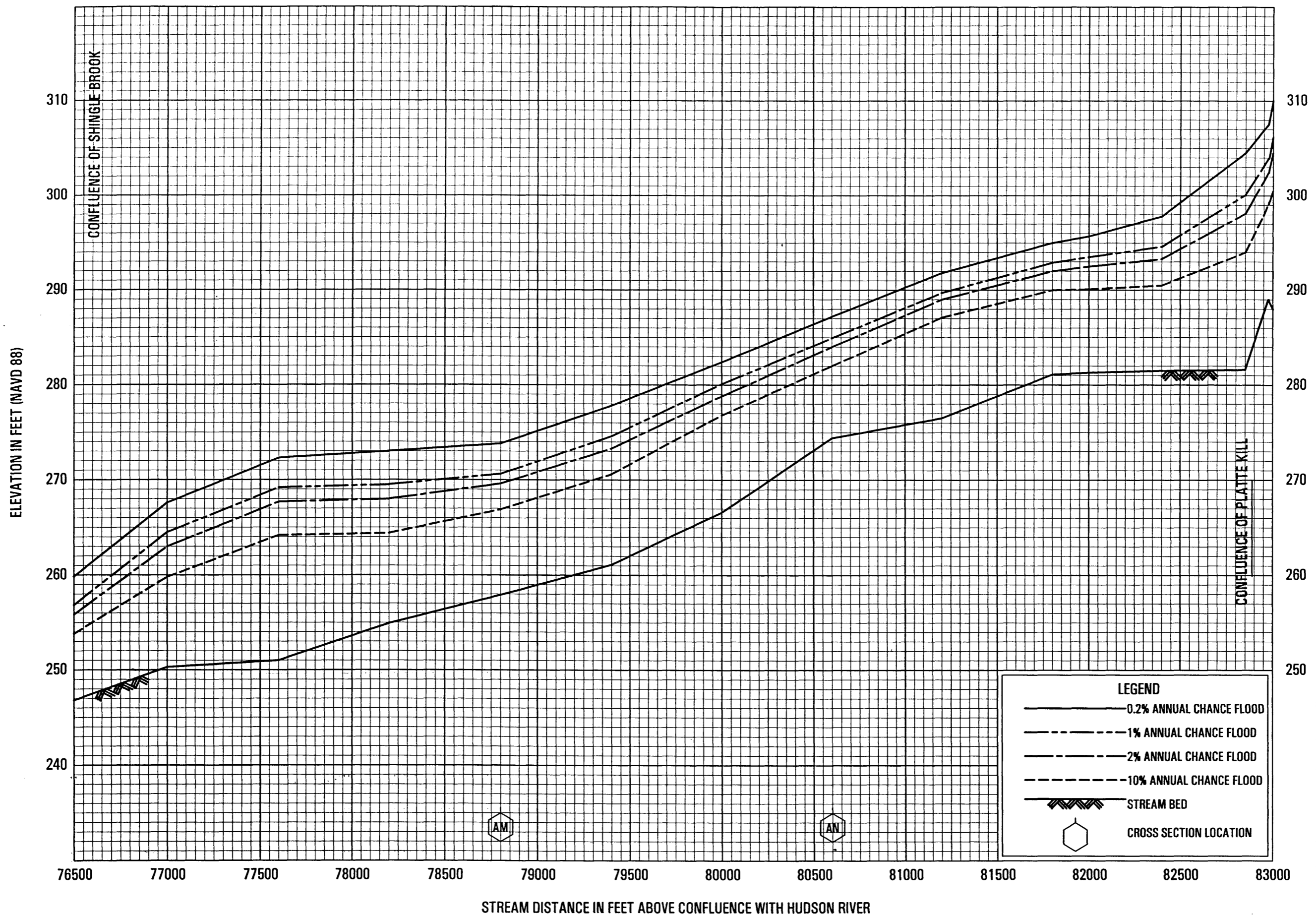
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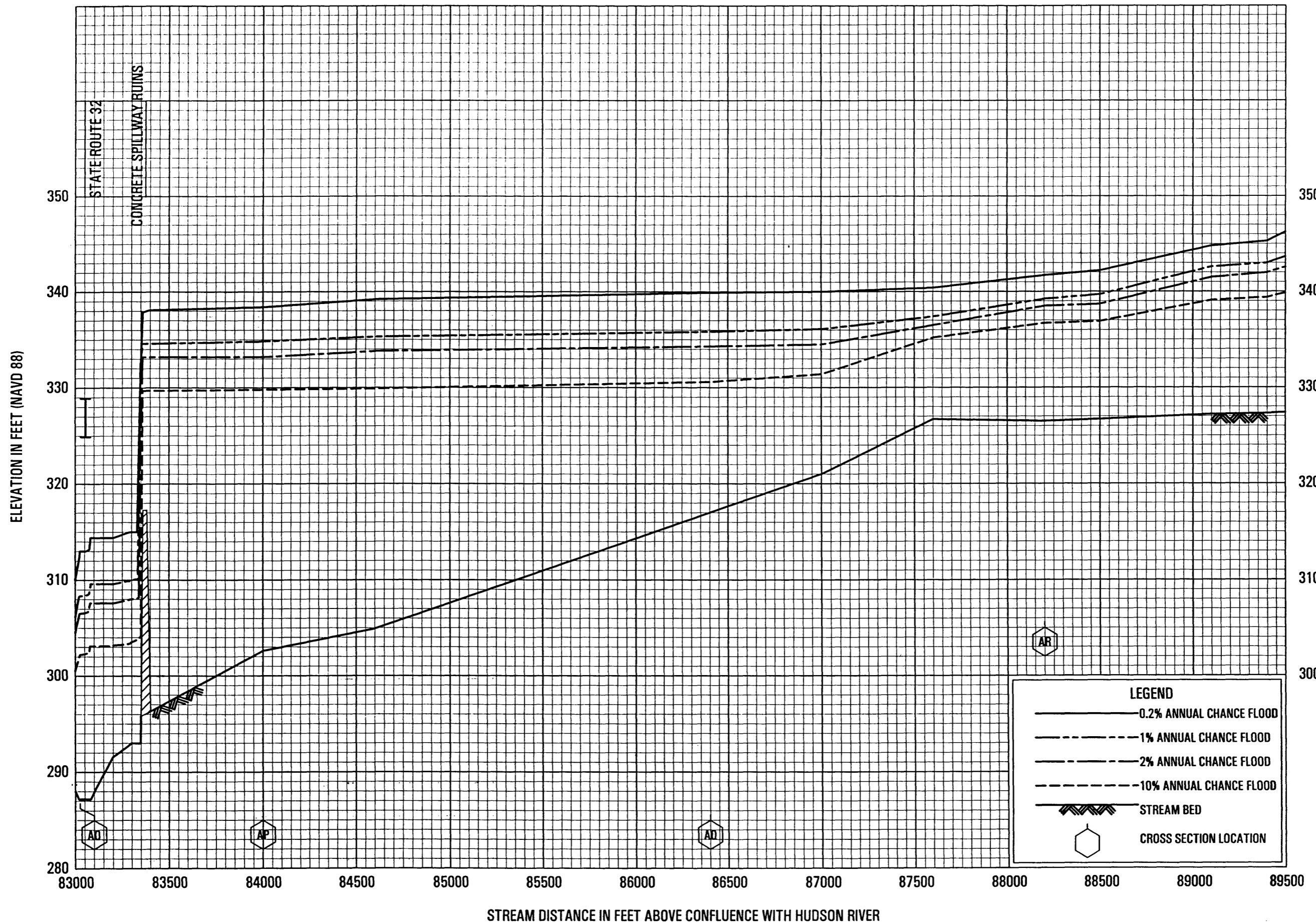
GREENE COUNTY, NY
(ALL JURISDICTIONS)



FLOOD PROFILES
CATSKILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
GREENE COUNTY, NY
(ALL JURISDICTIONS)





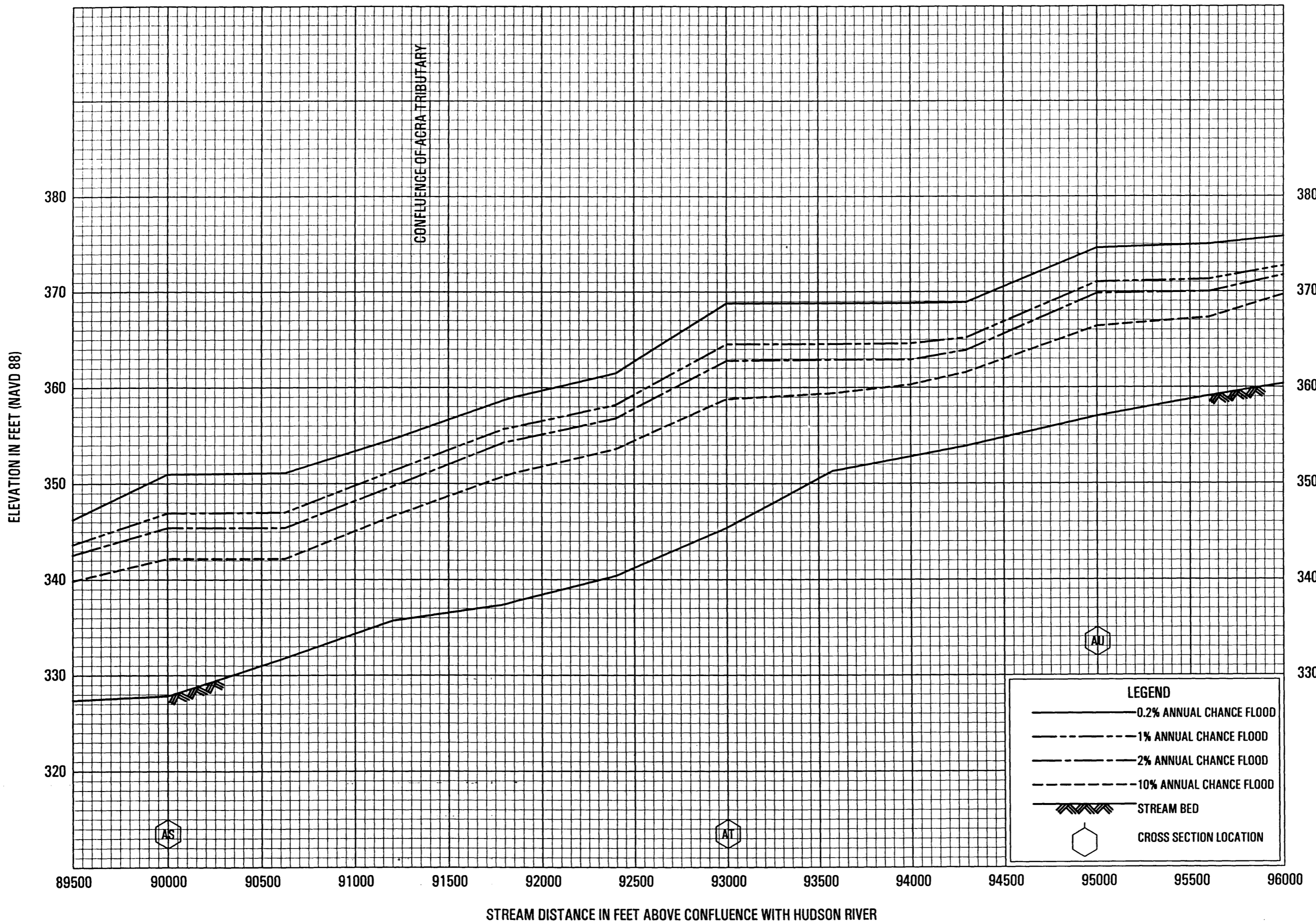
FLOOD PROFILES

CATSKILL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

(ALL JURISDICTIONS)



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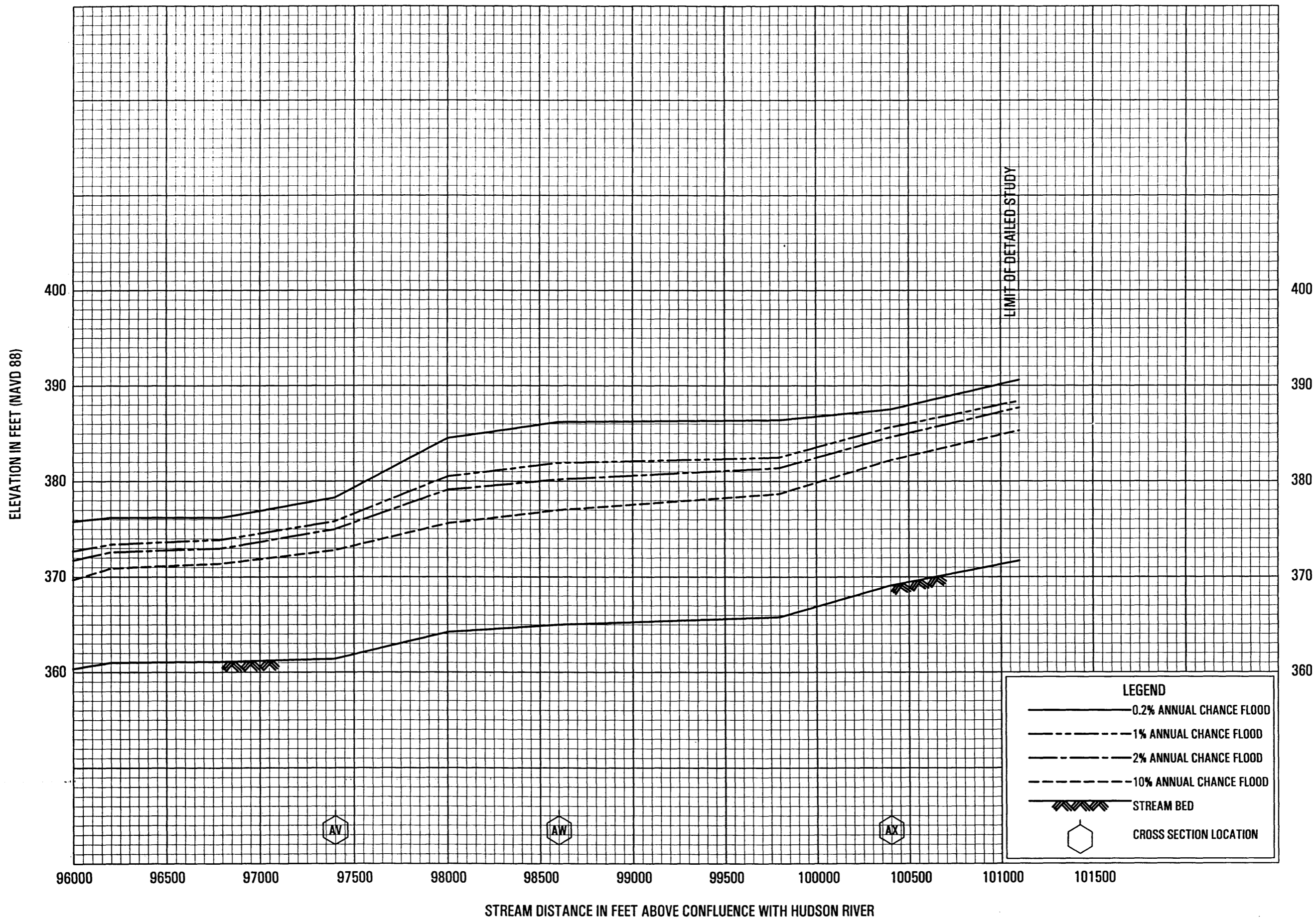
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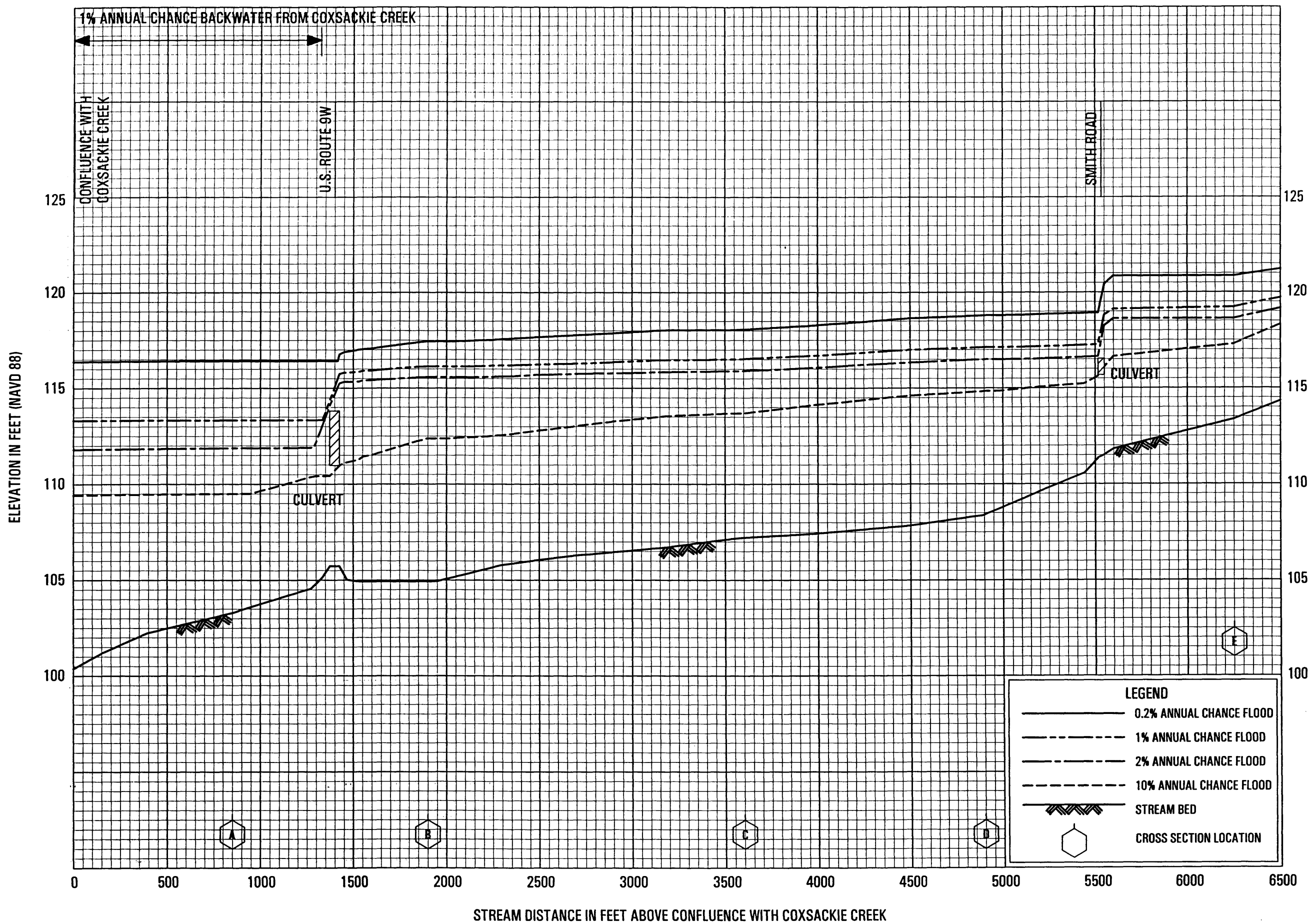
FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

(ALL JURISDICTIONS)

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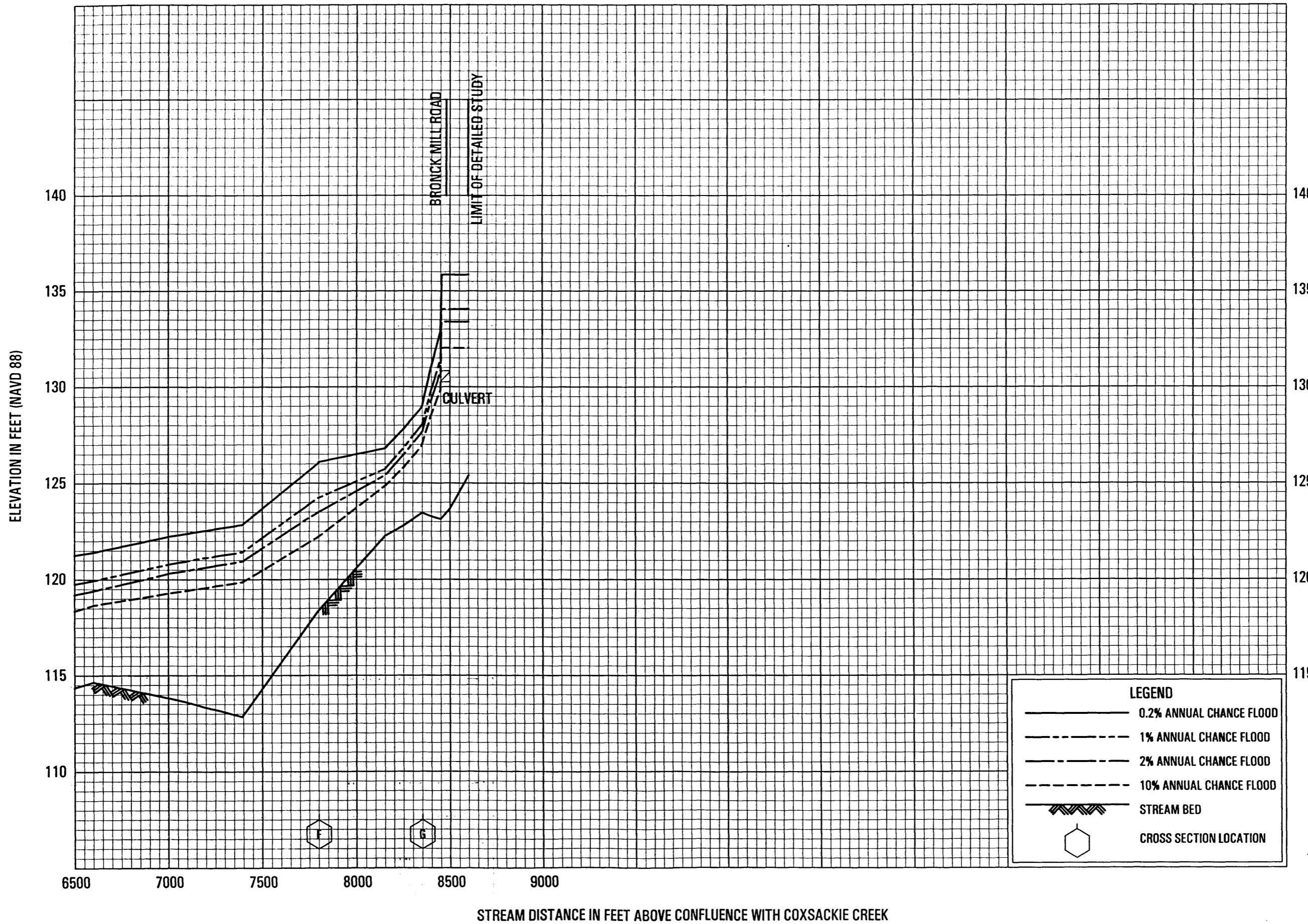
FLOOD PROFILES

CLIMAX TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

(ALL JURISDICTIONS)



FLOOD PROFILES

CLIMAX TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

GREENE COUNTY, NY

(ALL JURISDICTIONS)