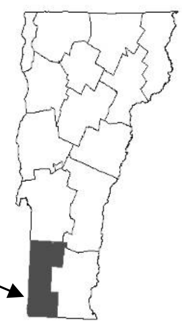
FLOOD INSURANCE STUDY

BENNINGTON COUNTY, VERMONT

AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER	COMMUNITY NAME	COMMUNITY NUMBER
ARLINGTON, TOWN OF	500012	READSBORO, TOWN OF	500017
BENNINGTON, TOWN OF	500013	RUPERT, TOWN OF	500018
BENNINGTON, VILLAGE OF	500176	SANDGATE, TOWN OF	500183
DORSET, TOWN OF	500014	SEARSBURG, TOWN OF	500184
GLASTONBURY, TOWN OF	500177	SHAFTSBURY, TOWN OF	500019
LANDGROVE, TOWN OF	500178	STAMFORD, TOWN OF	500020
MANCHESTER, TOWN OF	500015	SUNDERLAND, TOWN OF	500021
MANCHESTER, VILLAGE OF	500179	WINHALL, TOWN OF	500022
NORTH BENNINGTON, VILLAGE OF	500180	WOODFORD, TOWN OF	500023
PERU, TOWN OF	500181		
POWNAL, TOWN OF	500016		

REVISED PRELIMINARY
SEP 24 2011

PRELIMINARY
DEC 16 2010

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
50003CV000A

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) report may not contain all data available within the Community Map Repository. Please contact the Community Map Repository for any additional data.

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

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

Old Zone(s)	New Zone
Al through A30	AE
B	X
C	X

Initial Countywide FIS Effective Date: ___________________

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FLOOD INSURANCE STUDY
BENNINGTON COUNTY, VERMONT
AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) report investigates the existence and severity of flood hazards in the geographic area of Bennington County, Vermont; including the Towns of Arlington, Bennington, Dorset, Glastonbury, Landgrove, Manchester, Peru, Pownal, Readsboro, Rupert, Sandgate, Searsburg, Shaftsbury, Stamford, Sunderland, Winhall, Woodford; and the Villages of Old Bennington, Manchester, North Bennington; and unincorporated areas of Bennington County (hereinafter referred to collectively as Bennington County). The Village of Readsboro was incorporated into the Town of Readsboro. This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates. This information will also be used by Bennington County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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 Bennington County into a countrywide format. Information on the authority and acknowledgements for each of the previously printed FISs and Flood Insurance Rate Maps (FIRMs) for communities within Bennington County was compiled, and is shown below.

Arlington, Town of	In the July 17, 1986 study, the hydrologic and hydraulic analyses were performed by the Soil Conservation Service (SCS) during the preparation of the Flood Plain Management Study report for the Town of Arlington (Reference 1). That SCS report was completed in December 1982.

Bennington, Town of	In the July 17, 1986 study, the hydrologic and hydraulic analyses were prepared by Dufresne-Henry, Inc., for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-C-0683 (Reference 2). That work was completed in April 1983.
Manchester, Town of	In the January 3, 1985 study, the hydrologic and hydraulic analyses represent a revision of the original analyses by Anderson-Nichols and Co., Inc. The original work was completed in 1976. The updated version was prepared by Dufresne Henry, Inc. for FEMA, under Contract No. EMW-C-0683 (Reference 3). That updated work was completed in March 1983.
Manchester, Village of	In the August 19, 1986 study, the hydrologic and hydraulic analyses were performed by Dewberry & Davis for FEMA using the FIS prepared for the Town of Manchester, Vermont (Reference 4).
Pownal, Town of	In the October 1979 study, the hydrologic and hydraulic analyses were performed by Dufresne-Henry Engineering Corporation for the Federal Insurance Administration (FIA), under Contract No. H-4020 (Reference 5). That work, which was completed in January 1978, covered all significant flooding sources affecting the Town of Pownal.
Stamford, Town of	In the January 1978 study, the hydrologic and hydraulic analyses were performed by Dufresne-Henry Engineering Corporation for the FIA, under Contract No. H 4020 (Reference 6). That work, which was completed in June 1977, covered all significant flooding sources affecting the Town of Stamford.
Winhall, Town of	In the June 19, 1989 study, the hydrologic and hydraulic analyses were prepared by the U. S. Geological Survey (USGS) for the FEMA, under Inter-Agency Agreement No. EMW-85-E1823, Project Order No. 20 (Reference 7). That work was completed in July 1987.

No previous reports were prepared for the Towns of Dorset, Glastonbury, Landgrove, Peru, Readsboro, Rupert, Sandgate, Searsburg, Shaftbury, Sunderland, Woodford, and the Villages of Bennington, North Bennington, and Readsboro.

Bennington County terrain data is composed of two separate datasets. LiDAR data collected in 2007, provided by the Vermont Agency of Natural Resources, and 2010 LiDAR data provided by the Strategic Alliance for Risk Reduction (STARR). 2 feet topographic data was also used for the entire county

The digital countywide FIRM was produced in Vermont State Plane coordinate system with a Lambert Conformal Conic projection, units in meter, and referenced to the North American Datum of 1983, GRS80 spheroid. Differences in datum and spheroid used in the production of the FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of information shown on this FIRM.

For this countywide FIS, the digital Flood Insurance Rate Map (DFIRM) database and mapping were prepared for FEMA by STARR, (a joint venture between Post Buckley Schuh and Jernigan, Greenhorne & O'Mara, Inc., Stantec, and Camp, Dresser, and McKee (CDM) under Joint Venture Contract No. EMP-2003-CO-2606, Task Order No. 6. The new countywide FIS includes detailed hydraulic analyses, redelineation, digitizing of effective flood hazard information, and new approximate analyses. This work was completed in September 2009.

1.3 Coordination

An initial Consultation Coordination Officer's (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 streams to be studied by detailed methods.

The initial and final meeting dates for the previous FIS reports for Bennington County and its communities are listed in Table 1, "Initial and Final CCO Meetings."

Table 1 – Initial and Final CCO Meetings

Community Name	Initial Meeting	Final Meeting
Arlington, Town of	*	August 26, 1985
Bennington, Town of	June 1991	September 24, 1984
Manchester, Town of	June 1981	August 21, 1984
Manchester, Village of	*	August 26, 1985
Pownal, Town of	April 14, 1976	July 26, 1976
Stamford, Town of	February 3, 1977	August 11, 1977
Winhall, Town of	February 26, 1985	July 26, 1988

* Data Not Available

The results of the study were reviewed at the final CCO meeting held on February 9, 2011, and attended by representatives of FEMA, the study contractors, and community officials. All problems raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS report covers the geographic area Bennington County, Vermont, including the unincorporated communities listed in Section 1.1. Batten Kill, Furnace Brook, Hoosic

River, South Stream, Warm Brook, West Branch Batten Kill, and Winhall River were studied in detail for this countywide FIS. Table 2, "Areas Studied by Detailed Methods," lists the streams that were newly and previously studied by detailed methods.

Table 2 – Areas Studied by Detailed Methods

Stream	Limits of Detailed Study
Batten Kill	From Vermont-New York State border to approximately 0.2 mile downstream of Richville Road
Bourn Brook	From the confluence with Batten Kill to approximately 1000 feet upstream of Glen Road
Bromley Brook	From the confluence with Bourn Brook to approximately 900 feet upstream of Butternut Lane
Fayville Branch	From confluence with Warm Brook to approximately 750 upstream of Ice Pond Road
Furnace Brook	From confluence with Walloomsac River to approximately 330 feet downstream of North Branch Street
Green River	From the confluence with Batten Kill to approximately 0.6 mile downstream of southeast Corner Road
Hoosic River	From the Vermont-Massachusetts State border to the Vermont-New York State border
Ladd Brook	From the confluence of Hoosic River to Church Street
Lye Brook	From the confluence with Batten Kill to approximately 1,100 feet upstream of Lye Brook Road

Table 2 – Areas Studied by Detailed Methods (Continued)

Stream	Limits of Detailed Study
North Branch Hoosic River	From the confluence of Hoosic River to approximately 156 feet upstream of State Route 8
Potter Hollow Brook	From the confluence of Hoosic River to approximately 0.3 mile upstream of State Route 346 Bridge
Roaring Brook North	From the confluence with Batten Kill to approximately 0.7 mile upstream of Route 7A
Roaring Brook South	From the confluence with N. Branch Hoosic River to approximately 0.6 mile downstream of Tatro Road
South Stream	From the confluence of Walloomsac River to approximately 0.5 mile upstream of the confluence of Jewett Brook
Walloomsac River	From the Town of Bennington corporate limits Boundary to the confluence of Roaring Branch and South Stream
Warm Brook	From the confluence with Roaring Brook to approximately 3.4 miles upstream of Maple Hill Road
West Branch Batten Kill	From the confluence with Batten Kill to approximately 3.4 miles downstream of Pig Pen Road
Winhall River	From county boundary to approximately 1.2 miles upstream of State Route 30

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon, by FEMA and Bennington County, Vermont. The following streams were studied by approximate methods in partial or full for this countywide analyses; Barney Brook, Batten Kill, Beaver Meadow Brook, Beaver Meadow Brook Tributary 1, Bolles Brook, Bromley Brook, Brown Brook, Cole Brook, Deerfield River, Dry Brook, Equinox Pond, Equinox Pond Tributary, Fayville Branch, Flood Brook Tributary 1, Furnace Brook, Gilbert Brook, Goodman Brook, Green River, Jewett Brook, Mattawee River, Munson Brook, Munson Brook Tributary 1, North Branch Hoosic River, Paran Creek, Pruddy Brook, Roaring Branch, Shaftsbury Lake, South Stream, South Stream Tributary 1, Summer Brook, West Branch Batten Kill and West Branch Batten Kill Tributaries 1-3, West Branch Deerfield River and West Branch Deerfield River Tributary 1.

The following stream were redelineated in partial or full for this countywide analyses; Batten Kill, Bourn Brook, Bromley Bromley, Brown Brook, Fayville Branch, Green River, Ladd Brook, Lye Brook, North Branch Hoosic River, Potter Hollow Brook, Roaring Brook North and South, Summer Brook, Walloomsac River, Warm Brook. For this countywide study, Roaring Brook was split into an upper and lower reach labeled as North and South.

Table 3, "LOMCs", Letter of Map Changes lists those revisions that have been incorporated into the countywide update for Bennington County.

Table 3 – LOMCs

LOMC	Case Number	Date Issued	Project Identifier
LOMR	01-01-025P	09/07/2001	Roaring Branch- Oak Street
LOMR	04-01-005P	02/11/2004	Beech Street
LOMR	06-01-B249A	03/16/2006	Bourn Brook-Mountain View Estates

2.2 Community Description

Bennington County is located in southwestern Vermont. The county is bordered on the north by Rutland County, Vermont; on the northeast by Windsor County, Vermont; on the east by Windham County, Vermont; on the south by Berkshire County, Massachusetts; on the southeast by Franklin County, Massachusetts; on the northwest by Washington County, New York; and on the southwest by Rensselaer County, New York.

The 2000 population of Bennington County was reported to be 36,436 (Reference 7).

The climate in Bennington County has the characteristics of being humid continental. Summer and winter temperatures average 79°F, in July and 29°F, in January respectively (Reference 8). Annual average precipitation of the region is 35.74 inches, while snowfall totals 64.1 inches (Reference 9).

The topography in Bennington County is hilly and mountainous to the Northeast and Southwest. Elevations range from 550 feet on the Walloomsac River near the western county boundary to 2,340 feet on the summit of Mount Anthony. The valley floors are silty, sandy, gravelly soils formed on terraces and old lake beds. Soils on the slopes are loamy and silty, having formed in glacial till on the slate and limestone uplands (Reference 3).

Evidence for Pleistocene glaciations is widespread throughout the Town of Pownal. The upland areas are either scraped bare, occasionally showing striated rock outcrops, or are covered by a thin veneer of till. Much of the till is quite coarse, showing many large erratic boulders. While the glacial picture is clearly recorded in the rocks of the upland, it can best be reconstructed within the valleys. The drainage of the Hoosic Valley is predominantly towards the northwest; this had a profound effect upon the area as the glacial ice withdrew. Retreating slowly, the ice dammed the northwest drainage system, resulting in the formation of a large glacial lake. The streams which drained the mountainsides emptied into this glacial lake and were heavily laden with sediments brought down by the glacier. Upon entering the lake, the streams deposited their loads. The sediments can be seen today in the many sand pits that have been opened in the valley, as well as in the ancient delta of Potter Hollow Brook in North Pownal. As the ice continued to retreat, outlets at successively lower elevations became available. The lake gradually drained, leaving behind the Hoosic Valley much as it is today.

The flood plains of Batten Kill and the Green River consist of agricultural and idle land. Batten Kill rises on the southwestern side of Styles Peak in the Town of Peru. It flows southwest at a very steep slope. The stream continues southwest through the Town of Manchester where it has developed a flood plain of significant width. Southwest of the Town of Manchester in the Town of Arlington, Batten Kill turns due west, eventually emptying into the Hudson River near Schuylerville, New York.

Bourn Brook drains Bourn Pond in the Town of Sunderland and flows north for several miles across moderately sloping terrain into the Town of Winhall. In Winhall, the stream turns sharply to the northwest and drops over 1,000 feet in approximately 1.0 mile. The slope of Bourn Brook gradually flattens as it flows west through the Village of Manchester and follows the northern edge of a south-sloping flood plain before emptying into Batten Kill approximately 0.5 mile downstream of Manchester Shopping Center.

The valleys and flood plains of Fayville Branch and Warm Brook are characterized by residential, recreational, and idle land use. There are commercial establishments located in these valleys, but none in the flood plains.

Furnace Brook originates in the Town of Bennington and has a drainage area of approximately 15 square miles. It flows southwest to its confluence with the Walloomsac River. Significant commercial and residential development has recently occurred along the banks of Furnace Brook.

North Branch Hoosic River flows in a northeast to southwest direction through the eastern portion of Stamford. Its flood plain is composed of deep, water-deposited sands and gravels. Toward the southern limit of the town, the flood plain changes to deep stream deposits of silt or very fine sandy loam, which are subject to flooding and excess wetness.

The drainage area of Roaring Branch is approximately 41 square miles. It originates in the Town of Woodford and has a very deep, boulder-strewn channel. In the study area, the stream flows west to the confluence of South Stream along the face of a glacial delta.

South Stream, with a drainage area of 34 square miles, flows through the center of the urban area of the Town of Bennington adjacent to residential, commercial, and industrial development.

The Walloomsac River, which has a total drainage area of 156 square miles, originates in the Town of Bennington and flows northwest 16.4 miles to the Hoosic River near Hoasie Falls, New York. The river passes through a developed area at the Paper Mill Village in the Village of North Bennington .

West Branch Batten Kill rises on the eastern slopes of Spruce Peak in the Town of Dorset as a number of small brooks which empty into a large swampy area. It exits the swampy area and flows southeast through Manchester Shopping Center, emptying into Batten Kill a short distance downstream.

The Winhall River is the Town of Winhall's principal water body. Continued economic development in this area is expected and the need for increased floodplain management will accompany such development.

2.3 Principal Flood Problems

In the past, flood damage to Bennington County has been limited primarily to roads, bridges, and agricultural lands. Some damage was experienced to residences during major storm events. The 1927 and 1936 storms both exceeded what is considered the largest storms of record in the Batten Kill watershed. More frequent storms have also caused major damage at several locations. In particular, Paper Mill Village in the Village of North Bennington is subject to floods which often cause erosion damage and exceed the spillway capacity of the dam, causing overland flow down State Route 67A.

On August 10, 1976, significant flooding occurred at several locations in the Town of Manchester as a result of heavy thunderstorms. Four bridges, several roads and railroad tracks washed out at an estimated cost of $30,000 to $35,000.

The flood of September 18-23, 1938, was the greatest flood of record to occur in the Town of Pownal. This flood was generated by a general West Indies hurricane-type storm. The storm was preceded by a period of steady rainfall which filled surface ponds, saturated the ground, and resulted in favorable conditions for large surface runoff and greatly increased stream flow.

Flooding problems in the Town of Stamford include spring ice jams, which cause a bottleneck effect at the bridges, particularly the bridge at the crossing of Route 8 and Roaring Brook, where the low steel of the bridge at its highest point is four feet from the ground. Every major flood plugs the bridge and the overflow goes through the houses on the right bank upstream and downstream of the bridge.

Floods in the Town of Winhall have occurred in every season of the year. Spring floods are common and are caused by rainfall in combination with snowmelt.

On Batten Kill in the Village of Manchester, flood stage reached the low steel of the bridge at Union Street and flowed over the road to the point where Union Street crosses the railroad tracks. At Richville Road near Depot Street, water flowed over the road at its lowest point to a depth of 0.4 foot. The sewage treatment plant on Lincoln Avenue was flooded to a depth of approximately 4.5 feet. In August 1966, heavy rains caused flooding on Batten Kill and Bourn Brook and resulted in damage to the water pollution control plant at Manchester Depot. Several highways in the town were washed out, and meadows along Batten Kill were under water.

On Bromley Brook, the bridge and road were washed out at Routeville Road in the Town of Manchester, and considerable erosion occurred downstream.

On Bourn Brook, flood stage came up to the roadway on the left bank, severely damaged the bridge, and deposited a considerable amount of debris in the flood plain at Glen Road and Richville Road in the Town of Manchester.

During the flood of June 1973, heavy rains caused much damage in the Town of Manchester. Approximately 4 to 7 inches of precipitation in a 24-hour period caused flash flooding on Bourn Brook and Lye Brook, resulting in damage to homes, buildings, and farmlands. Increased flow frame the mountains carrying debris clogged culverts and drains, causing water to rise over roads. Damage in the Lye Brook Road area was caused not only by flood-waters but also by boulders carried with the flood.

On the North Hoosic River, large magnitude floods occurred in November 1927 and September 1938. Return frequency intervals for these floods have been estimated at 100-years and 90-years respectively. Obstructive openings, such as low, narrow bridges and undersize culverts which serve to constrict flow, causing overbank flow and damage to properties, mainly by erosion, occur down the length of North Branch Hoosic River.

Boulders from Roaring Branch choked the railroad bridge just upstream of the Walloomsac River and forced flow into Furnace Brook.

2.4 Flood Protection Measures

In Vermont, municipalities have the authority to regulate development in flood hazard areas under 24 Vermont Statues Annotated (VSA), Chapter 91. 10 VSA, Chapter 32, authorizes the Secretary of the Agency of Environmental Conservation to designate flood hazard areas and to assist the towns with flood hazard regulations. 2S VSA, subsection 4409, requires towns to submit a report to the Vermont Department of Water Resources before issuing a permit for development in a designated flood hazard area. Several other laws and regulations administered by the state contain special requirements for development in flood hazard areas.

Since several major floods, significant changes have occurred, including the construction of flood protection works along Roaring Branch, the relocation of U. S. Route 7, the building of a diversion structure at the Kocher Drive shopping center, and significant development along all of the study streams. These changes make it likely that future major storms in Bennington County may exhibit flood patterns significantly different from those observed in the past. The Town of Arlington has wisely allocated a sizeable portion of the flood plains in the northern portion of the town to a recreational park. This reduces the risk of potential flood damage. In addition, the Town of Arlington has a flood plain zoning ordinance in effect.

Dufresne Dam has been used, and could be used again, for limited control of the flood level on the upper portion of Batten Kill.

Levees along the banks of Lye Brook and the lower portion of Bourn Brook would also contain the flows of lesser magnitude floods. During floods of large magnitude, little or no control is afforded on these streams, and the specific lodging patterns created by the failure of levees are substantially unpredictable. The levees on Bourn Brook do not meet the FEMA freeboard requirement and thus are not mapped as providing protection from the 1-perecent-annual-chance-flood.

Earthen levees have been erected along Roaring Branch by the Town of Bennington. A 1,300-foot floodwall was constructed on the west bank of Roaring Branch at Brooklyn Bridge to protect residents in the area of Branch and County Streets. A flood control project consisting of two levees was completed by the U.S. Army Corps of Engineers (USACE) in 1972 (Reference 6). The project consists of a 675-foot levee extending upstream and a 3,200-foot levee extending downstream from the floodwall on the west bank of Roaring Branch at Brooklyn Bridge.

The two dams on the Walloomsac River within Bennington County have negligible flood storage capacity and, thus, no attenuation of downstream flooding.
Numerous culverts and relief channels indicate that attempts have been made to alleviate flood problems and provide outlets for ponded floodwaters at several locations on West Branch Batten Kill near its confluence with Batten Kill and on Bourn Brook.

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding sources studied in detail affecting the communities in Bennington County. For new studied streams, the latest USGS publication for Vermont is USGS Water Resources Investigations Report 02-4238, released in 2002 (Reference 9). USGS regression analyses used for this project is based on the equations in this document. For redelineated streams, peak flows were obtained from previous effective studies.

Pre-countywide Analyses

This section is a compilation of hydrologic information from previously published FIS reports where streams were studied in detail. Updated hydraulic data for this FIS report is reported in the Countywide Analysis section.

Discharges for the streams studied in detailed methods were obtained from the Flood Plain Management Study for Arlington (Reference 10). In that study, flood flows for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods recurrence intervals were developed using records from the USGS gaging station located on Batten Kill in the Town of Arlington. The discharges were transferred using a drainage area-discharge ratio formula published in the National Engineering Handbook (Reference 11).

The hydrologic analyses for the flooding source studied by detailed methods for Bourn Brook, Bromley Brook, and Lye Brook were obtained from the FIS for Town of Manchester (Reference 3)

Discharges for the streams of Fayville Branch, Green River, and Warm Brook were obtained from the Soil Conservation Service (SCS) Flood Plain Management Study for Arlington, as recorded in the Town of Arlington FIS report of 1986 (Reference 10).

Discharges for Furnace Brook and Roaring Branch were obtained from previous USACE studies. The discharges for Furnace Brook were reduced downstream of Kocher Drive to account for the diversion of flow by the flood control weir around the shopping center and into Roaring Branch (Reference 12, 13 and 14).

Peak discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods on the North Branch Hoosic River and on Roaring Brook were computed by a regional flood-frequency method developed for the Hudson River Basin by the USACE (Reference 15), using the standard deviation and skew coefficients determined by the USGS for gaging station (No. 201332000) located on North Branch Hoosic River in North Adams, Massachusetts. This gaging station has been in continuous operation since 1932. These calculated discharges were then projected upstream using a drainage area proportionality to the 0.75 power.

Discharges for Potter Hollow Brook and Ladd Brook were computed by using a regional flood-frequency method developed for the New England area by the USGS (Reference 16). This method relates flood peaks to topographic and climatic factors through statistical multiple regression techniques. The 0.2-percent-annual-chance peak discharge was determined by a straight-line extrapolation on a log-probability plot of peak flows computed for frequencies up to 100 years.

Countywide Analyses

The hydrologic analyses for the flooding source studied by detailed methods of Batten Kill from 0.2 mile downstream of Richville Road to the Bennington County line; Furnace Brook from the confluence with Walloomsac River to 190 feet downstream of North Branch Street; the entire reach of Hoosic River within Bennington County; South Stream from the confluence with Walloomsac River to 0.8 mile upstream of Main Street; Walloomsac River from Northside Drive to the corporate limits of the Town of Bennington; Warm Brook from 1.3 mile upstream of Ubu Lane to 2.6 miles upstream of Ubu Lane; West Branch Batten Kill from confluence of Batten Kill to 1,800 ft downstream of Pig Pen Road; Winhall River from Bennington County line to 0.34 mile upstream of Arthur Court, and all approximate flooding sources are based on USGS Water Resources Investigations Report 02-4238 (Reference 9). Peak flows for each stream were computed based on the USGS regression equations, whose parameters were determined based on watershed characteristics. The equations were used to calculate the 10-, 2-, 1-, and 0.2-percent-annual-chance-flood events and are shown below:

$Q10 = 79.7A^{0.897}L^{-0.302}E^{0.0890}Y^{-0.298}$
$Q50 = 129A^{0.874}L^{-0.327}E^{0.115}Y^{-0.385}$
$Q100 = 153A^{0.865}L^{-0.336}E^{0.125}Y^{-0.420}$
$Q500 = 217A^{0.846}L^{-0.355}E^{0.148}Y^{-0.497}$

Where:

- Q is the calculated peak flow for recurrence interval n, in cubic feet per second
- A is the drainage area of the basin, in square miles,
- L is the area of lakes and ponds in a basin as a percentage of drainage area, plus 1 percent.
- E is the percent of the basin at or greater than 1,200 ft in altitude, plus 1 percent.
- Y is the northing of the centroid of the drainage basin determined with Geographical Information System (GIS), in the Vermont State Plane coordinate system, divided by 100,000, then increased by one.

For Batten Kill upstream of West Branch Batten Kill and Walloomsac River from the Village of North Bennington corporate limits to the Bennington County line, the methodology and peak flows were obtained from the FIS reports for the Town of Manchester and the Town of Bennington, respectively (Reference 17 and 18). Statistical analyses of the recorded annual peaks from stream gages (No. 01329000) Batten Kill at Arlington, Vermont and (No. 01334000) Walloomsac River near North Bennington, Vermont were used to determine the flood-flow frequency relationships as detailed in Interagency Committee on Water Data Bulletin 17B (Reference 17). The discharge values at the gage were transposed to the drainage areas using the following drainage area-discharge ration formula:

$$Q_1/Q_2 = (A_1/A_2)^n$$

Where $Q_1$and Q_2 are the discharges at specific locations, A_1 and A_2 are the drainage areas at these locations, and “n” is the correlating exponent.

Peak discharge computations for the Hoosic River were based on the long-term records of the USGS Gaging Station No. 01332500, near Williamstown Massachusetts, and historic flood information dating to 1927. The Williamstown gage has continuously recorded flows since 1941. In addition to these 35 years of record, estimated peak discharges for the 1927 and 1938 floods were available (Reference 19). Peak discharge-frequency curves were developed using a log Pearson Type III distribution of the systematic gage records at Williamstown, as outlined by the Water Resources Council (Reference 20). From North Adams, Massachusetts, to Schaghticoke, New York, it was determined that flood discharges were in the same ratio as the 0.72 power of drainage area.

Discharges for South Stream were obtained from weighted averages of flows from the gage analysis and data used by the USACE in previous studies. The discharges were reduced from Cooper Street to just downstream of Depot Street to account for the effect of the naturally occurring diversion of flow down Main Street (References 12 and 13).

Discharges for Warm Brook were obtained from the SCS Flood Plain Management Study for Arlington, as recorded in the Town of Arlington FIS report of 1986 (Reference 10).

Discharges for the Walloomsac River were transposed from the frequency analysis of the 49 years of flood peak data for the North Bennington USGS gage (No. 01334000) using the methodology in Water Resources Council Bulletin 17B (Reference 17).

The 1-percent-annual-chance flood discharge for the Winhall River was based on equations developed from a report on flood magnitude and frequency of Vermont streams (Reference 21). This regional method relates drainage area, area of lakes and ponds, and 24-hour rainfall intensity values to the peak discharge by regression equations.

Peak discharge-drainage area relationships for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods for each stream studied by detailed methods are presented in Table 4, "Summary of Discharges."

Table 4 – Summary of Discharges

		PEAK DISCHARGES (cfs)			
FLOODING SOURCE AND LOCATION	**DRAINAGE AREA (sq. miles)**	**10%-ANNUAL-CHANCE**	**2%-ANNUAL-CHANCE**	**1%-ANNUAL-CHANCE**	**0.2%-ANNUAL-CHANCE**
BATTEN KILL					
At the downstream Vermont-New York State border	202.2	6,521	9,507	10,955	14,815
0.72 miles downstream of River Road	198.6	10,572	16,028	18,510	24,971
1,400 feet upstream of River Road	197.3	10,508	15,935	18,405	24,835
0.97 miles upstream of River Road	195.5	10,421	15,807	18,259	24,643
1,900 feet downstream of Covered Bridge Road	194.2	10,355	15,709	18,147	24,497
80 feet upstream of the confluence with Green River	162.8	8,777	13,355	15,446	20,900
0.65 miles downstream of Benedict Crossing Road	161.9	8,729	13,283	15,363	20,791

Table 4 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
BATTEN KILL (cont.)					
430 feet downstream of Benedict Crossing Road	160.3	8,649	13,163	15,225	20,607
2,200 feet upstream of Benedict Crossing Road	156.7	8,454	12,871	14,888	20,155
0.73 miles downstream of River Road	155.6	8,401	12,792	14,798	20,036
1,100 feet upstream of River Road	149.7	8,102	12,348	14,291	19,364
200 feet above the confluence with Warm Brook	95.0	5,297	8,124	9,425	12,835
240 feet downstream of Fishing Access Road	93.9	5,237	8,034	9,322	12,698
2,000 feet upstream of Route 7A	90.9	5,076	7,792	9,043	12,323
0.72 miles downstream of Hill Farm Road	90.1	5,036	7,733	8,976	12,236
1,200 feet downstream of Hill Farm Road	87.6	4,896	7,522	8,733	11,910
220 feet upstream of the confluence with Mill Brook	81.9	4,584	7,047	8,183	11,165
590 feet upstream of the confluence with Mill Brook	81.0	4,534	6,972	8,097	11,050
140 feet upstream of the confluence with Tanner Brook	77.7	4,351	6,696	7,778	10,622
140 feet downstream of Sunderland Hill Road	76.4	4,283	6,592	7,658	10,459
1,900 feet upstream of Sunderland Hill Road	75.9	4,257	6,553	7,613	10,400
0.72 miles upstream of Sunderland Hill Road	75.4	4,224	6,502	7,554	10,319
0.74 miles downstream of the confluence with Batten Kill Tributary2	74.9	4,202	6,468	7,515	10,268
1,200 feet downstream of the confluence with Batten Kill Tributary2	74.4	4,173	6,425	7,466	10,201

Table 4 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
BATTEN KILL (cont.)					
1,800 feet downstream of Richville Road	73.3	4,112	6,333	7,359	10,057
500 feet downstream of Richville Road	72.3	4,064	6,262	7,279	9,952
0.76 miles upstream of Richville Road	71.7	4,035	6,219	7,229	9,887
80 feet upstream of the confluence with Equinox Pond	68.9	3,904	6,026	7,008	9,596
120 feet upstream of the confluence with Lye Brook	59.6	3,463	5,360	6,240	8,562
At Union Street	58.5	3,406	5,275	6,144	8435
90 feet upstream of the confluence with Bourn Brook	39.6	2,420	3,772	4,404	6,075
At the confluence of Bourn Brook	38.4	2,275	4,525	5,575	9,225
Upstream of the confluence of West Branch Batten Kill	19.8	1,450	2,900	3,675	5,900
Upstream of Dufresne Dam	17.4	1,375	2,750	3,375	5,600
BROMLEY BROOK					
At the confluence with Bourn Brook	9.5	750	1,475	1,825	3,000
BOURN BROOK					
At the confluence with Batten Kill	14.9	1,200	2,375	2,925	4,850
FAYVILLE BROOK					
At the confluence with Warm Brook	14.3	1,336	1,947	2,244	3,035
FURNACE BROOK					
1,100 feet downstream of Morse Road	14.8	1,144	1,871	2,226	3,198
870 feet downstream of North Bennington Road	14.3	1,109	1,816	2,162	3,110

Table 4 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
FURNACE BROOK (cont.)					
1,500 feet downstream of Orchard Road	12.9	1,022	1,682	2,005	2,897
GREEN RIVER					
At the confluence with Batten Kill	30.3	2,193	3,197	3,684	4,983
HOOSIC RIVER					
870 feet downstream of the confluence with Ladd Brook	213.4	11,663	18,118	21,136	29,163
40 feet upstream of the confluence with Ladd Brook	211.6	11,570	17,980	20,977	28,950
55 feet upstream of the confluence with Tributary B to Hoosic River	208.1	11,387	17,705	20,662	28,530
0.54 miles upstream of the confluence with Tributary B to Hoosic River	207.0	11,331	17,620	20,564	28,399
1,000 feet upstream of Highway 346	233.7	12,680	19,635	22,876	31,474
0.85 miles upstream of Highway 346	232.7	12,631	19,562	22,792	31,363
At the Vermont-New York State border	227.0	12,000	22,500	29,400	55,800
100 feet upstream of the confluence with Potter Hollow Brook	226.7	12,321	19,099	22,260	30,655
150 feet upstream of Furlong Road	225.0	12,255	19,003	22,152	30,516
80 feet upstream of the confluence with Halifax Hollow	219.2	11,961	18,564	21,647	29,844
1,600 feet upstream of the confluence with Halifax Hollow	217.9	11,896	18,467	21,538	29,699
0.50 miles downstream of the confluence with Lincoln Hollow	217.3	11,869	18,428	21,493	29,642

Table 4 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
HOOSIC RIVER (cont.)					
50 feet upstream of the confluence with Lincoln Hollow	216.4	11,820	18,356	21,410	29,530
0.42 miles downstream of Main Street	215.8	11,790	18,311	21,358	29,463
1,200 feet upstream of Main Street	214.7	11,732	18,224	21,258	29,329
At the confluence of Ladd Brook	209.7	11,300	21,300	27,800	52,700
At the Vermont-Massachusetts State border	205.5	11,000	21,000	27,400	51,900
LADD BROOK					
At the mouth	1.66	175	400	500	780
LYE BROOK					
At the confluence with Batten Kill	9.5	735	1,475	1,825	3,000
NORTH BRANCH HOOSIC RIVER					
At the Massachusetts-Vermont State Line	24.5	3,160	5,615	6,420	10,710
At the confluence with Roaring Brook	14.2	2,100	3,730	4,260	7,115
At the confluence with Brown Brook	12.7	1,930	3,430	3,920	6,540
At the confluence with Summer Brook	10.2	1,640	2,910	3,325	5,550
At the confluence with Summer Brook	8.8	1,470	2,610	2,980	4,970
At the confluence with Basin Brook	7.2	1,265	2,245	2,565	4,280
Downstream of Crazy John Stream confluence	5.2	990	1,755	2,010	3,350
Upstream of Crazy John Stream confluence	2.9	640	1,130	1,300	2,160
Downstream of Route 8 Bridge at limit of detailed study	1.4	370	660	760	1,270

Table 4 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
POTTER HOLLOW BROOK					
At the confluence of Hoosic river	5.76	1,570	3,750	4,810	6,480
ROARING BROOK					
At the confluence of Warm Brook	54.6	3,450	4,594	5,294	7,158
At the confluence with North Branch Hoosic River	8.2	1,385	2,460	2,810	4,690
SOUTH STREAM					
140 feet downstream of Hunt Street	34.3	2,251	3,588	4,227	5,947
360 feet downstream of Holden Street	32.8	2,163	3,455	4,073	5,739
380 feet downstream of Depot Street	30.7	2,039	3,262	3,849	5,432
330 feet upstream of Main Street	27.6	1,842	2,954	3,488	4,931
120 feet upstream of the confluence with Jewett Brook	18.3	1,259	2,048	2,432	3,481
WALLOOMSAC RIVER					
At the downstream corporate limits of the Town of Bennington	121	6,600	9,850	11,400	15,300
At the USGS gage in the Town of North Bennington	111	6,200	9,200	10,700	14,400
At Murphy Road	94.2	5,750	9,024	10,565	14,680
Above the confluence of Paran Creek	94	5,460	8,150	9,400	12,700
1,400 feet upstream of Silk Road	93.0	5,683	8,924	10,451	14,530
230 feet upstream of the confluence with Furnace Brook	77.5	4,794	7,565	8,876	12,392
Above the confluence of Furnace Brook	77	4,700	7,000	8,100	10,900

Table 4 – Summary of Discharges (Continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10%-ANNUAL-CHANCE	2%-ANNUAL-CHANCE	1%-ANNUAL-CHANCE	0.2%-ANNUAL-CHANCE
WARM BROOK					
At the confluence with Batten Kill	27.0	2,037	2,970	3,423	4,629
120 feet upstream of the confluence with Shaftsbury Lake	2.0	170	280	335	485
WEST BRANCH BATTEN KILL					
950 feet downstream of Depot Street	19.7	1,306	2,067	2,428	3,392
0.83 miles upstream of Bonnet Street	18.8	1,253	1,988	2,337	3,271
At the confluence with Batten Kill	18.6	1,250	2,475	3,050	5,050
0.45 miles downstream of Pig Pen Road	17.2	1,154	1,836	2,160	3,030
WINHALL RIVER					
0.62 miles downstream of Route 30	28.8	1,762	2,801	3,296	4,631
100 feet downstream of Route 30	26.1	1,620	2,582	3,041	4,282
860 feet upstream of Route 30	25.2	1,565	2,496	2,940	4,141
800 feet downstream of Lower Taylor Hill Road	21.6	1,336	2,135	2,518	3,554
0.91 upstream of Lower Taylor Hill Road	20.8	1,283	2,052	2,420	3,416
0.57 miles downstream of Arthur Court	19.3	1,191	1,906	2,249	3,178
520 feet downstream of Arthur Court	17.3	1,068	1,712	2,021	2,860
1.0 mile upstream of the confluence with Tributary to Winhall River	3.7	220	360	429	619

3.2 Hydraulic Analyses

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

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. 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 is computed (Section 4.2), selected cross-section locations are also shown on the FIRM (Exhibit 2). Unless specified otherwise, the hydraulic analyses for these studies were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations shown on the Flood Profiles and FIRM (Exhibits 1 and 2) are referenced to the North American Vertical Datum of 1988 (NAVD).

STARR documented locations where the effective flood profiles show a bridge/culvert crossing but the new ortho photos clearly show that the crossing no longer exists. Again, the profiles were not adjusted to remove the crossing, since the structure was included in the effective model and removing it would give the false impression that the model does not include the structure and reflects the current conditions.

<u>Pre-countywide Analyses</u>

This section is a compilation of hydraulic information from previously published FIS reports where streams were studied in detail. Updated hydraulic data for this FIS report is reported in the Countywide Analyses section.

Overbank and bridge cross sections for the backwater analyses of Batten Kill, Bourn Brook, and West Branch Batten Kill were obtained from aerial photographs flown in November 1981 (Reference 22). Bridge geometry and below-water sections were obtained from the original FIS for the Town of Manchester, bridge plans, and field surveys (Reference 23).

Cross-sections for the backwater analyses of Bromley Brook and Lye Brook were field surveyed. Cross-sections were located above and below bridges and culverts in order to compute the significant backwater effects of these structures.

Cross-sections for Furnace Brook were taken from a USACE report on the stream and supplemented with the topographic maps and field surveys (References 10 and 24).

Cross-sections for the backwater analyses of the Roaring Branch, South Stream, and Walloomsac River, were obtained from the Town of Bennington FIS report, topographic maps compiled from aerial photographs, and field surveys (References 24 and 25).

Proposed and completed changes to the Leonard Street and School Street bridges over South Stream have been incorporated into the computations.

Water-surface elevations of floods of the selected recurrence intervals were computed using the SCS WSP-2, USACE HEC-2, and USGS step-backwater computer programs (Reference 9).

Starting water surface elevations for Bourn Brook, Bromley Brook, Lye Brook, Roaring Branch, and Walloomsac River were determined by the slope/area method. Starting water-surface elevations for the Fayville Branch, Green River, and Roaring Brook were determined assuming coincident peak flows at their respective points of confluence.

Streambed elevations for the Winhall River were determined both by field surveys at structures such as dams, culverts, and bridges, and from contours crossing the stream channel on the topographic map at a scale of 1:62,500 feet with a contour interval of 20 feet (Reference 26).

Channel and overbank roughness coefficients (Manning's "n") used in the detailed study hydraulic computations were estimated by engineering judgment and based on field observation at each cross-section and adjusted with known high-water marks and stream gage rating curves where possible. Table 5, "Manning's "n" Value Table", shows the channel and overbank "n" values for all streams studied by detailed methods.

Table 5 – Manning's "n" Value Table

Stream	Channel	Overbank
Batten Kill	0.029-0.053	0.030-0.100
Fayville Branch	0.038-0.070	0.030-0.100
Furnace Brook	0.055-0.060	0.020-0.100
Green River	0.038-0.059	0.035-0.100
Hoosic River	0.002-0.005	0.002-0.001
Ladd Brook	0.045	0.012-0.008
Potter Hollow Brook	0.003-0.045	0.035-0.012
Roaring Brook	0.043-0.068	0.030-0.100
South Stream	0.065	0.040-0.110
Walloomsac River	0.037-0.040	0.037-0.110
Warm Brook	0.020-0.109	0.030-0.100
West Branch Batten Kill	0.058	0.032-0.085
Winhall River	0.065	0.032-0.090

Countywide Analyses

No new detailed hydraulic analyses conducted as part of this countywide FIS

Starting water surface elevations for Batten Kill, Furnace Brook, South Stream and West Branch Batten Kill were determined by the slope/area method. Starting water-surface elevations for Warm Brook were determined assuming coincident peak flows at their respective points of confluence.

Starting water-surface elevations for Hoosic River and South Stream were determined using a known elevation.

The starting elevation for the Winhall River was obtained from the existing study of Jamaica, Vermont, at their common corporate limits (Reference 27).

Streambed elevations for all flooding sources in the countywide study were determined both by field surveys at structures such as dams, culverts, and bridges, and LiDAR data.

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-RAS computer programs (Reference 9).

Delineation of the approximate 1-percent-annual-chance flood boundaries were based on 1-percent-annual-chance flood depths. Approximate hydraulic analyses were performed using the HEC-RAS computer program. Manning's "n" values used were based on National Land Cover Data layers. Stream channel "n" values used were 0.050. The use of a 10 meter digital elevation model was the basis of the existing grade elevations.

All qualifying benchmarks within a given jurisdiction that are catalogued 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.

Benchmarks catalogued by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

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

In addition to NSRS benchmarks, 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 NSRS inclusion criteria.

To obtain current elevation, description, and/or location information for benchmarks 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 the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

3.3 Vertical Datum

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

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Some of the data used in this revision were taken from the prior effective FIS reports and FIRMs and adjusted to NAVD. The datum conversion factor from NGVD to NAVD in Bennington County is -0.41 feet. The data points used to determine the conversion are listed in Table 6, "Vertical Datum Conversion."

Table 6 – Vertical Datum Conversion

Quad Name	Corner	Latitude	Longitude	Conversion from NGVD to NAVD
Arlington	SE	43.000	-73.125	-0.28
Bennington	SE	42.875	-73.125	-0.36
Berlin	SE	42.625	-73.250	-0.46
Cambridge	SE	43.000	-73.375	-0.46
Cossayuna	SE	43.125	-73.375	-0.50
Danby	SE	43.250	-72.875	-0.39
Dorset	SE	43.250	-73.000	-0.36
Eagle Bridge	SE	42.875	-73.375	-0.51
Fort Ann	SE	43.375	-73.375	-0.44
Grafton	SE	42.750	-73.375	-0.52
Granville	SE	43.375	-73.250	-0.43
Hartford	SE	43.250	-73.375	-0.48
Heath	SE	42.625	-72.750	-0.53
Hoosick Falls	SE	42.875	-73.250	-0.43
Jacksonville	SE	42.750	-72.750	-0.45
Jamaica	SE	43.000	-72.750	-0.41
Londonderry	SE	43.125	-72.750	-0.42
Manchester	SE	43.125	-73.000	-0.27
Middletown Springs	SE	43.375	-73.000	-0.40
Mount Holly	SE	43.375	-72.750	-0.28

Table 6 – Vertical Datum Conversion (Continued)

Quad Name	Corner	Latitude	Longitude	Conversion from NGVD to NAVD
Mount Snow	SE	42.875	-72.875	-0.41
North Adams	SE	42.625	-73.000	-0.47
North Pownal	SE	42.750	-73.250	-0.50
Pawlet	SE	43.250	-73.125	-0.34
Peru	SE	43.125	-72.875	-0.37
Pownal	SE	42.750	-73.125	-0.45
Readsboro	SE	42.750	-72.875	-0.40
Rowe	SE	42.625	-72.875	-0.53
Salem	SE	43.125	-73.250	-0.41
Shushan	SE	43.000	-73.250	-0.32
Stamford	SE	42.750	-73.000	-0.38
Stratton Mountain	SE	43.000	-72.875	-0.34
Sunderland	SE	43.000	-73.000	-0.36
Taborton	SE	42.625	-73.375	-0.46
Wallingford	SE	43.375	-72.875	-0.32
Wells	SE	43.375	-73.125	-0.32
West Dover	SE	42.875	-72.750	-0.42
West Pawlet	SE	43.250	-73.250	-0.41
West Rupert	SE	43.125	-73.125	-0.37
Weston	SE	43.250	-72.750	-0.36
Williamstown	SE	42.625	-73.125	-0.50
Woodford	SE	42.875	-73.000	-0.36
			AVERAGE	**-0.41 feet**

The Base Flood Elevation (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 elevation in this FIS to NGVD 29 should apply the conversion faction (0.41 foot) to elevation shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1-foot.

For additional information regarding conversion between the NGVD29 and NAVD88, visit the National Geodetic Survey website at http://www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

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

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 the FIS report and FIRM for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at http://www.ngs.noaa.gov.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance (100-year) flood elevations and delineations of the 1- and 0.2-percent-annual-chance (500-year) floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles and Floodway Data Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using Triangulated Irregular Network (TINs) developed from 2007 and 2010 LiDAR data provided by the Vermont Agency of Natural Resources and STARR. TINs provide the terrain and topography that HEC-GeoRAS reads and attaches to cross-section cut lines. HEC-GeoRAS was used to link the GIS data to a HEC-RAS model and to delineate the floodplain once water surface elevations are calculated in the HEC-RAS model. Floodplains were then cleaned and made to appropriately tie-in to adjacent studies, both detailed and approximate, including those in adjacent counties. A Floodplain Boundary Standard (FBS) check was run to insure compliance.

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. The boundary of the 1-percent-annual-chance floodplain was delineated using the same method as above using USGS 1/3 arc second National Elevation Dataset (NED). This data is referenced to NAVD88.

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

The informational boundary for Roaring Branch represents a Fluvial Erosion Hazard (FEH) provided by the State of Vermont. This area is the current extent used by the community to regulate development. For further information on the Vermont FEH program please visit http://www.anr.state.vt.us/dec/waterq/rivers.htm.

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 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this FIS report and on the FIRM were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections (Table 7, Floodway Data). The computed floodways are shown on the FIRM. In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

Near the mounts 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 7 for certain downstream cross-sections of Furnace Brook, South Stream and West Branch Batten Creek are lower than the regulatory flood elevations in that area, which must take into account the 1-percent-annual-chance flooding due to backwater from other sources.

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

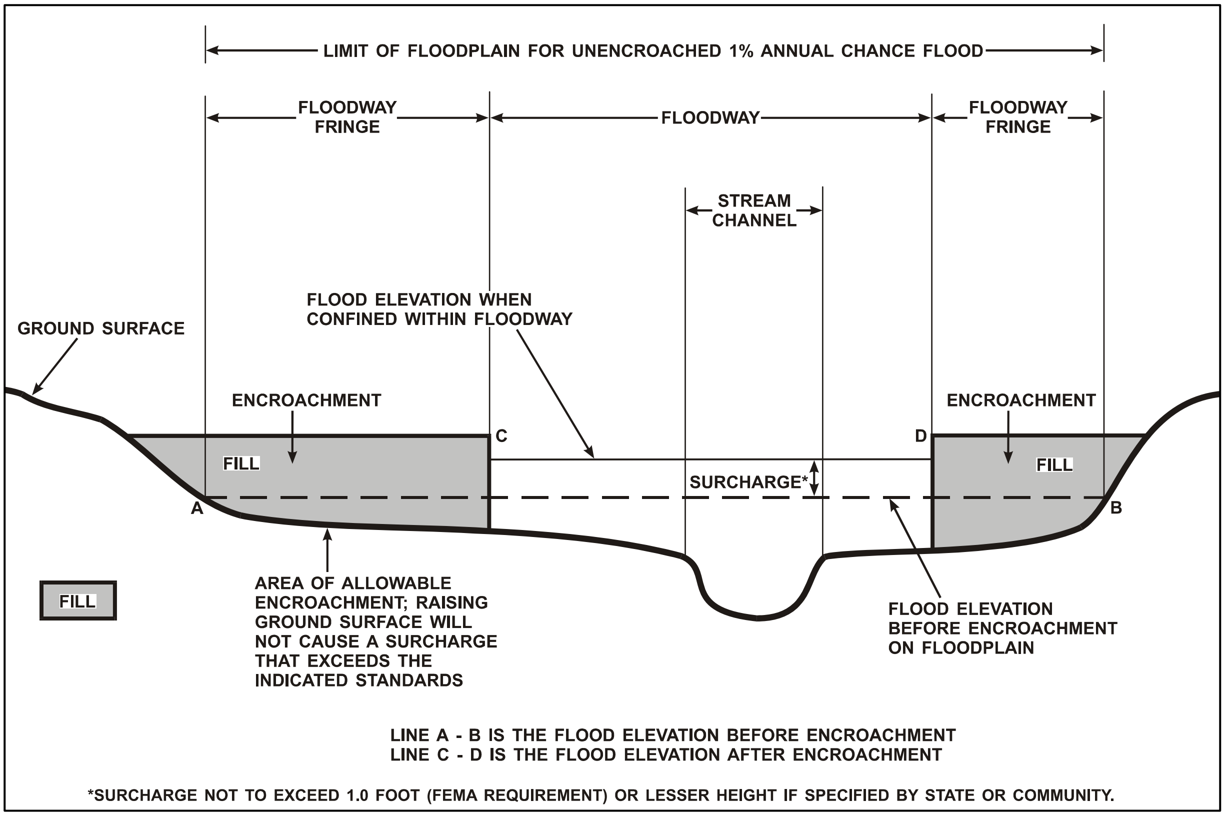

Figure 1 - Floodway Schematic

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BATTEN KILL								
A	71	317	2,713	6.0	524.0	524.0	524.9	0.9
B	1,890	250	2,270	7.2	528.5	528.5	529.4	0.9
C	3,463	255	2,811	5.8	536.4	536.4	537.0	0.6
D	5,217	500	4,935	3.3	537.7	537.7	538.5	0.8
E	7,316	328	2,518	6.4	540.6	540.6	541.4	0.8
F	9,472	670	4,076	3.9	544.2	544.2	545.2	1.0
G	12,005	352	2,680	5.9	550.4	550.4	550.5	0.1
H	14,221	280	2,489	6.3	558.9	558.9	559.5	0.6
I	16,086	350	2,639	5.9	561.7	561.7	562.5	0.8
J	18,027	300	2,486	4.5	565.1	565.1	565.8	0.7
K	20,027	350	2,031	5.5	568.1	568.1	565.8	0.7
L	21,710	320	2,073	5.4	572.1	572.1	572.8	0.7
M	22,608	430	2,013	5.4	574.8	574.8	575.3	0.5
N	24,244	150	1,112	9.8	578.9	578.9	578.9	0.0
O	25,962	379	3,524	3.0	583.4	583.4	583.6	0.2
P	27,693	289	1,973	5.3	585.1	585.1	585.7	0.6
Q	29,506	277	2,147	4.8	588.4	588.4	589.2	0.8
R	31,398	215	2,010	5.2	592.7	592.7	593.2	0.5

[1]Feet above Vermont-New York State border

TABLE 7	FEDERAL EMERGENCY MANAGEMENT AGENCY **BENNINGTON COUNTY, VT** **AND INCORPORATED AREAS**	**FLOODWAY DATA** **BATTEN KILL**

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BATTEN KILL (Continued)								
S	32,570	229	1,931	5.4	595.0	595.0	595.6	0.6
T	33,237	300	2,532	4.1	597.4	597.4	598.0	0.6
U	35,181	653	2,550	3.8	599.2	599.2	600.0	0.8
V	36,901	635	2,901	3.3	609.4	609.4	610.2	0.8
W	38,525	512	1,711	5.6	611.8	611.8	612.6	0.8
X	39,920	550	2,008	4.8	619.2	619.2	620.1	0.9
Y	42,464	321	2,139	4.0	632.7	632.7	633.4	0.7
Z	44,250	502	4,091	2.1	634.2	634.2	635.1	0.9
AA	46,742	359	2,764	3.1	635.7	635.7	636.6	0.9
AB	46,983	470	4,089	2.1	636.4	636.4	637.3	0.9
AC	48,540	819	6,650	1.3	636.9	636.9	637.8	0.9
AD	52,013	922	8,064	1.1	637.2	637.2	638.1	0.9
AE	54,444	621	5,036	1.7	637.6	637.6	638.5	0.9
AF	57,055	519	5,036	2.3	638.0	638.0	638.9	0.9
AG	58,548	264	1,838	4.5	639.1	639.1	640.0	0.9
AH	59,716	747	6,701	1.2	640.0	640.0	640.7	0.7
AI	61,693	547	4,724	1.7	640.1	640.1	640.8	0.7
AJ	64,593	447	3,242	2.4	640.4	640.4	641.3	0.9
AK	66,749	292	2,283	3.4	642.5	642.5	643.4	0.9

[1] Feet above Vermont-New York State border

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

BATTEN KILL

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
BATTEN KILL (Continued)								
AL	67,279	355	2,004	3.8	643.1	643.1	644.1	1.0
AM	68,461	295	3,347	2.3	643.9	643.9	644.8	0.9
AN	70,504	496	4,847	1.6	644.9	644.9	645.8	0.9
AO	72,288	1,087	11,260	0.7	645.1	645.1	646.0	0.9
AP	72,817	660	6,494	1.2	645.1	645.1	646.1	1.0
AQ	74,229	629	6,097	1.2	645.2	645.2	646.2	1.0
AR	77,826	519	3,839	1.9	645.4	645.4	646.4	1.0
AS	80,085	98	1,174	6.2	648.5	648.5	649.0	0.5
AT	81,272	604	5,707	1.3	649.5	649.5	650.4	0.9
AU	83,367	633	5,512	1.3	649.7	649.7	650.6	0.9
AV	85,722	605	4,039	1.8	650.0	650.0	650.9	0.9
AW	87,331	260	1,796	3.9	651.3	651.3	651.8	0.5
AX	89,162	520	2,723	2.3	652.5	652.5	653.5	1.0
AY	89,709	323	1,594	3.9	653.0	653.0	653.9	0.9
AZ	91,739	283	1,431	4.4	658.5	658.5	659.5	1.0
BA	94,268	213	891	7.0	667.7	667.7	668.5	0.8
BB	95,874	137	928	6.7	677.4	677.4	677.9	0.5
BC	96,331	169	1,076	5.7	682.8	682.8	683.5	0.7
BD	99,487	283	1549	2.8	689.5	689.5	690.4	0.9
BE	100,462	311	1604	2.7	690.3	690.3	691.1	0.8

[1] Feet above Vermont-New York State border

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

BATTEN KILL

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
BATTEN KILL (Continued)								
BF	101,034	580	2,360	1.6	691.1	691.1	692.0	0.9
BG	101,314	450	1,706	2.2	691.2	691.2	692.1	0.9
BH	101,494	390	1,445	2.5	691.4	691.4	692.4	1.0
BI	101,634	280	1,642	2.2	693.1	693.1	693.6	0.5
BJ	101,924	256	2,079	1.8	693.2	693.2	693.8	0.6
BK	102,059	222	1,926	1.9	694.2	694.2	694.6	0.4
BL	103,134	190	1,340	2.7	694.6	694.6	695.1	0.5
BM	103,934	198	1,598	2.3	694.8	694.8	695.5	0.7
BN	105,774	205	1,377	2.7	695.6	695.6	696.4	0.8
BO	106,044	200	1,941	1.9	699.6	699.6	699.8	0.2
BP	106,279	142	1,281	2.9	699.6	699.6	699.9	0.3
BQ	107,804	150	959	3.8	700.3	700.3	701.2	0.9
BR	108,829	140	952	3.9	702.2	702.2	702.7	0.5
BS	109,044	140	1,061	3.5	703.6	703.6	704.6	1.0
BT	109,179	301[2]	942	3.6	711.8	711.8	711.8	0.0
BU	109,559	60	594	5.7	712.1	712.1	712.1	0.0
BV	113,979	75	434	7.8	714.8	714.8	714.8	0.0

[1] Feet above Vermont-New York State border

[2] Floodway coincident with channel banks

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

BATTEN KILL

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
BOURN BROOK								
A	280	114	372	5.2	686.8	686.8	687.8	1.0
B	487	75	404	4.8	690.7	690.7	691.1	0.4
C	1,297	138	248	7.8	698.3	698.3	698.3	0.0
D	1,347	145	271	10.8	700.8	700.8	700.8	0.0
E	1,447	150	760	3.8	701.0	701.0	702.0	1.0
F	1,687	130	451	6.5	701.7	701.7	702.5	0.8
G	2,437	75	269	10.9	713.2	713.2	713.2	0.0
H	3,837	55	275	10.6	734.7	734.7	735.2	0.5
I	3,998	61	386	7.6	739.0	739.0	739.0	0.0
J	4,206	51	238	12.3	741.7	741.7	741.7	0.0
K	4,375	58	371	7.9	746.3	746.3	746.3	0.0
L	4,662	60	329	8.9	760.1	760.1	760.9	0.8
M	4,806	45	510	5.7	764.8	764.8	764.8	0.0

[1] Feet Above confluence with Batten Kill

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

BOURN BROOK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
BROMLEY BROOK								
A	1,901[1]	180	291	6.3	810.0	810.0	810.9	0.9
B	1,948[1]	150	464	3.9	814.4	814.4	814.4	0.0
C	3,390[1]	65	206	8.9	830.9	830.9	830.9	0.0
D	3,469[1]	65	242	7.5	832.0	832.0	832.0	0.0
E	7,207[1]	90	164	11.2	882.5	882.5	882.6	0.1
F	7,263[1]	110	222	8.2	883.1	883.1	883.1	0.0
G	8,169[1]	155	206	8.9	896.6	896.6	896.9	0.3
H	8,262[1]	150	305	6.0	898.3	898.3	898.3	0.0
I	9,039[1]	78	211	8.6	913.0	913.0	913.0	0.0
FAYVILLE BRANCH								
A	1,055[2]	103	470	4.8	725.3	725.3	726.3	1.0
B	1,800[2]	61	270	8.3	737.4	737.4	738.4	1.0
C	2,460[2]	62	290	7.7	760.2	760.2	761.2	1.0

[1]Feet Above confluence with Bourn Brook

[2]Feet Above confluence with Warm Brook

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

BROMLEY BROOK – FAYVILLE BRANCH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
FURNACE BROOK								
A	431	202	432	5.2	573.8	572.1[2]	572.5	0.4
B	1,303	139	885	2.6	579.3	579.3	580.2	0.9
C	1,698	362	885	2.5	580.0	580.0	580.7	0.7
D	2,211	356	711	3.1	582.9	582.9	582.9	1.0
E	3,425	205	765	2.8	587.4	587.4	588.4	1.0
F	3,689	280	1,067	2.0	591.6	591.6	592.0	0.4
G	4,384	80	624	3.5	592.6	592.6	593.0	0.4
H	5,012	123	717	3.0	593.6	593.6	594.0	0.4
I	6,505	76	313	6.4	602.5	602.5	604.1	0.5
J	7,470	107	489	4.1	612.8	612.8	613.1	0.3
K	8,499	247	614	3.3	620.5	620.5	620.6	0.1
L	8,827	72	558	3.6	628.2	628.2	628.2	0.0
M	9,218	241	616	3.3	628.8	628.8	628.8	0.0
N	9,416	244	914	2.2	632.0	632.0	632.4	0.4
O	9,706	59	473	4.2	638.0	638.0	638.6	0.6
P	10,628	94	259	7.5	642.0	642.0	642.2	0.2
Q	10,965	190	761	2.6	648.0	648.0	649.0	1.0
R	12,264	57	275	7.1	661.3	661.3	661.8	0.5

[1]Feet above confluence with Walloomsac River

[2]Elevations computed without consideration of backwater effects from Walloomsac River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

FURNACE BROOK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
GREEN RIVER								
A	1,225[1]	68	432	8.5	572.0	572.0	572.9	0.9
B	3,325[1]	64	413	8.8	589.2	589.2	590.0	0.8
C	4,375[1]	94	455	8.0	596.6	596.6	597.5	0.9
D	4,485[1]	41	270	13.4	598.4	598.4	599.3	0.9
E	5,915[1]	55	256	10.1	611.2	611.2	612.1	0.9
F	8,575[1]	259	556	6.3	635.1	635.1	635.8	0.7
HOOSIC RIVER								
A	133[2]	478	5,646	4.1	498.6	498.6	499.2	0.6
B	1,777[2]	405	4,647	4.9	500.1	500.1	500.9	0.8
C	4,932[2]	781	6,716	3.4	502.7	502.7	503.2	0.5
D	6,540[2]	490	4,357	5.2	504.1	504.1	505.1	1.0
E	7,460[2]	355	4,363	5.1	506.2	506.2	507.1	0.9
F	9,030[2]	285	3,837	5.8	508.3	508.3	508.9	0.6
G	10,408[2]	240	3,066	7.3	511.7	511.7	512.5	0.8
H	11,181[2]	149	2,864	7.7	528.7	528.7	528.9	0.2
I	12,429[2]	175	3,601	6.2	530.8	530.8	531.0	0.2
J	15,009[2]	895	13,188	1.6	531.9	531.9	532.7	0.8

[1]Feet above confluence with Batten Kill

[2]Feet above Vermont-Massachusetts State boundary

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

GREEN RIVER – HOOSIC RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
HOOSIC RIVER (Continued)								
K	17,719[1]	1,047	13,727	1.6	532.2	532.2	533.0	0.8
L	19,910[1]	945	7,104	3.0	532.4	532.4	533.3	0.9
M	22,233[1]	1,303	11,213	1.9	533.4	533.4	534.1	0.7
N	24,526[1]	555	3,947	5.4	534.4	534.4	535.4	1.0
O	25,984[1]	194	2,826	7.6	540.7	540.7	540.7	0.0
P	27,222[1]	325	3,704	5.7	542.7	542.7	543.0	0.3
Q	29,474[1]	390	3,610	5.8	545.2	545.2	545.8	0.6
R	30,951[1]	321	4,311	4.9	548.1	548.1	548.6	0.5
S	33,384[1]	307	3,392	6.1	552.7	552.7	553.2	0.5
T	36,227[1]	190	2,680	7.7	556.5	556.5	557.2	0.7
U	37,412[1]	249	2,831	7.3	559.7	559.7	560.0	0.3
V	38,895[1]	270	2,759	7.5	562.5	562.5	563.5	1.0
W	40,383[1]	285	2,715	7.6	567.3	567.3	567.6	0.3
LADD BROOK								
A	690[2]	40	433	1.1	554.1	554.1	555.1	1.0
B	1,180[2]	40	65	7.6	558.4	558.4	559.0	0.6
C	1,410[2]	40	74	6.7	563.4	563.4	564.3	0.9

[1]Feet above Vermont-Massachusetts State boundary

[2]Feet above confluence with Hoosic River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

HOOSIC RIVER – LADD BROOK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
LYE BROOK								
A	253	45	350	5.2	649.9	649.9	650.9	1.0
B	280	40	2,251	0.8	650.2	650.2	651.2	1.0
C	565	180	1,058	1.7	650.5	650.5	651.5	1.0
D	591	45	156	11.6	650.6	650.6	651.5	0.9
E	612	80	574	3.2	653.2	653.2	653.2	0.0
F	1,864	120	477	3.8	653.6	653.6	654.5	0.9
G	1,938	40	549	3.3	659.6	659.6	659.6	0.0
H	2,740	140	347	5.2	661.5	661.5	662.0	0.5
I	2,777	150	815	2.2	661.5	661.5	662.0	0.5
J	3,374	385	1,359	1.3	661.6	661.6	662.5	0.9
K	4,002	310	758	2.4	667.6	667.6	668.6	1.0
L	4,778	175	467	3.9	676.6	676.6	677.2	0.6
M	6,278	215	398	4.6	716.3	716.3	716.9	0.6
N	6,320	170	241	7.5	717.9	717.9	717.9	0.0
O	7,445	63	211	8.6	772.6	772.6	772.7	0.1

[1]Feet above confluence with Batten Kill

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

LYE BROOK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
NORTH BRANCH HOOSIC RIVER								
A	29,600	375	1,449	4.4	1,073.4	1,073.4	1,074.4	1.0
B	30,590	315	1,561	4.1	1,078.1	1,078.1	1,079.1	1.0
C	32,325	318	1,018	6.3	1,085.1	1,085.1	1,086.1	1.0
D	32,515	71	587	10.9	1,089.5	1,089.5	1,089.5	0.0
E	32,581	121	993	6.5	1,094.0	1,094.0	1,094.8	0.8
F	32,631	103	1059	6.1	1,094.2	1,094.2	1,096.0	0.8
G	33,721	340	850	7.6	1,099.0	1,099.0	1,099.7	0.7
H	34,296	290	1,371	4.7	1,103.9	1,103.9	1,104.9	1.0
I	35,126	169	910	7.1	1,108.7	1,108.7	1,109.4	0.7
J	35,976	170	820	5.2	1,113.9	1,113.9	1,114.3	0.4
K	37,486	370	751	5.2	1,121.3	1,121.3	1,122.2	0.9
L	38,996	199	723	5.4	1,135.2	1,135.2	1,135.8	0.6
M	40,386	55	334	11.8	1,146.1	1,146.1	1,146.8	0.7
N	40,475	230	998	3.9	1,151.2	1,151.2	1,151.2	0.0
O	41,455	250	611	6.4	1,160.8	1,160.8	1,160.8	0.0
P	43,265	215	590	5.6	1,179.0	1,179.0	1,180.0	1.0
Q	44,040	102	356	9.3	1,188.0	1,188.0	1,188.2	0.2
R	45,455	181	416	7.2	1,211.1	1,211.1	1,211.1	0.0
S	45,540	57	397	7.5	1,214.0	1,214.0	1,214.0	0.0
T	45,665	88	297	10.0	1,215.1	1,215.1	1,215.1	0.0

[1]Feet above confluence with Hoosic River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

NORTH BRANCH HOOSIC RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
NORTH BRANCH HOOSIC RIVER (Continued)								
U	46,915	64	273	10.9	1,242.9	1,242.9	1,243.0	0.1
V	48,380	59	228	11.3	1,265.9	1,265.9	1,265.9	0.0
W	48,950	95	266	9.7	1,277.7	1,277.7	1,277.7	0.0
X	49,060	149	802	3.2	1,283.2	1,283.2	1,283.2	0.0
Y	49,258	47	272	9.4	1,284.5	1,284.5	1,285.2	0.7
Z	49,423	109	610	4.2	1,286.1	1,286.1	1,287.1	1.0
AA	50,468	79	367	7.0	1,304.2	1,304.2	1,305.0	0.8
AB	50,848	59	229	11.2	1,312.3	1,312.3	1,312.3	0.0
AC	50,933	59	314	8.2	1,317.1	1,317.1	1,317.1	0.0
AD	51,533	41	202	12.7	1,334.8	1,334.8	1,334.8	0.0
AE	52,803	46	210	12.2	1,356.7	1,356.7	1,356.9	0.2
AF	52,913	85	746	3.4	1,361.3	1,361.3	1,361.9	0.6
AG	53,283	38	167	12.0	1,364.6	1,364.6	1,364.6	0.0
AH	54,346	65	278	4.7	1,387.6	1,387.6	1,387.6	0.0
AI	55,036	129	263	4.9	1,400.0	1,400.0	1,400.0	0.0
AJ	55,761	30	116	11.2	1,425.6	1,425.6	1,425.6	0.0
AK	56,751	52	139	9.4	1,495.3	1,495.3	1,495.3	0.0
AL	57,831	64	287	4.5	1,503.3	1,503.3	1,503.9	0.6
AM	57,861	58	361	3.6	1,505.3	1,505.3	1,506.2	0.9

[1]Feet above confluence with Hoosic River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

NORTH BRANCH HOOSIC RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
NORTH BRANCH HOOSIC RIVER (Continued)								
AN	58,481	28	80	9.6	1,507.3	1,507.3	1,507.3	0.0
AO	58,721	175	432	1.8	1,515.7	1,515.7	1,515.9	0.2
AP	59,514	136	679	1.1	1,536.1	1,536.1	1,536.2	0.1
AQ	59,634	83	351	2.2	1,536.1	1,536.1	1,536.2	0.1
POTTER HOLLOW BROOK								
A	1,160	200	588	8.2	506.9	506.9	507.9[2]	1.0
B	1,885	130	571	8.4	518.4	518.4	519.2	0.8
C	2,232	130	710	6.8	523.4	523.4	524.3	0.9
D	2,652	130	559	8.6	529.5	529.5	530.5	1.0
E	3,072	70	373	12.9	536.5	536.5	536.6	0.1

[1]Feet above confluence with Hoosic River

[2]Elevations computed without consideration of backwater effects from Hoosic River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

NORTH BRANCH HOOSIC RIVER – POTTER HOLLOW BROOK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
ROARING BROOK NORTH								
A	1,125[1]	172	784	6.8	641.4	641.4	642.4	1.0
B	1,810[1]	108	573	9.2	645.9	645.9	646.9	1.0
C	4,110[1]	69	594	8.8	671.3	671.3	672.3	1.0
ROARING BROOK SOUTH								
A	920[2]	117	365	7.7	1,128.9	1,128.9	1,129.9	1.0
B	1,010[2]	179	632	4.4	1,135.2	1,135.2	1,135.2	0.0
C	1,600[2]	53	235	11.9	1,144.7	1,144.7	1,144.7	0.0
D	2,020[2]	47	226	12.4	1,158.0	1,158.0	1,158.0	0.0
E	2,250[2]	52	235	11.9	1,165.4	1,165.4	1,165.4	0.0
F	3,250[2]	66	245	11.5	1,197.6	1,197.6	1,197.6	0.0
G	3,570[2]	141	403	7.0	1,215.2	1,215.2	1,215.2	0.0
H	3,970[2]	52	233	12.1	1,225.5	1,225.5	1,225.5	0.0
I	4,220[2]	67	272	10.3	1,231.8	1,231.8	1,231.8	0.0

[1]Feet above confluence with Batten Kill

[2]Feet above confluence with North Branch Hoosic River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

ROARING BROOK NORTH – ROARING BROOK SOUTH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
SOUTH STREAM								
A	197	60	442	9.6	622.7	622.7	622.7	0.0
B	1,454	82	588	7.2	631.9	631.9	632.5	0.6
C	2,310	60	637	6.6	642.1	642.1	642.8	0.7
D	3,395	107	492	8.6	646.7	646.7	647.5	0.8
E	4,020	74	498	8.2	654.2	654.2	654.7	0.5
F	4,445	182	1,045	3.9	656.3	656.3	657.1	0.8
G	4,869	165	904	4.5	659.5	659.5	660.4	0.9
H	5,513	108	563	7.2	663.7	663.7	664.0	0.3
I	5,918	154	840	4.6	673.0	673.0	673.6	0.6
J	6,388	204	981	3.9	680.7	680.7	681.3	0.6
K	7,059	199	790	4.9	689.6	689.6	690.2	0.6
L	7,519	120	665	5.8	698.8	698.8	699.5	0.7
M	8,163	246	389	9.9	708.4	708.4	709.2	0.8
N	8,545	192	511	7.5	716.8	716.8	717.6	0.8
O	9,041	104	768	5.0	728.2	728.2	729.0	0.8
P	9,477	115	1,002	3.8	736.3	736.3	737.1	0.8
Q	10,353	158	1,484	1.6	737.2	737.2	737.9	0.7
R	11,386	157	994	2.4	737.7	737.7	738.5	0.8

[1]Feet above confluence with Walloomsac River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH STREAM

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
SOUTH STREAM (Continued)								
S	12,493[1]	192	875	2.8	740.3	740.3	741.3	1.0
T	13,360[1]	126	441	5.5	743.2	743.2	743.9	0.7
U	14,481[1]	403	1,315	1.8	745.6	745.6	746.2	0.6
V	16,215[1]	230	645	3.8	753.3	753.3	754.0	0.7
WALLOOMSAC RIVER								
A	0[2]	175	1,372	8.3	516.3	516.3	517.0	0.7
B	810[2]	415	3,453	3.3	519.4	519.4	520.2	0.8
C	2,060[2]	405	3,298	3.5	520.3	520.3	521.2	0.9
D	3,275[2]	320	2,308	4.9	521.4	521.4	522.2	0.8
E	4,105[2]	320	2,772	4.1	523.0	523.0	523.6	0.6
F	5,060[2]	392	2,870	4.0	524.4	524.4	525.1	0.7
G	6,200[2]	405	1,882	6.1	525.5	525.5	526.5	1.0
H	7,490[2]	295	1,652	6.9	530.2	530.2	530.4	0.2
I	9,080[2]	295	2,089	5.5	533.9	533.9	534.6	0.7
J	10,330[2]	295	2,142	5.3	536.2	536.2	536.8	0.6
K	11,045[2]	126	1,448	7.9	537.3	537.3	538.2	0.9
L	11,710[2]	160	1,620	6.6	538.7	538.7	539.7	1.0
M	12,170[2]	150	1,667	6.4	539.7	539.7	540.5	0.8

[1]Feet above confluence with Walloomsac River

[2]Feet above the Town of Bennington corporate limits

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH STREAM – WALLOOMSAC RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WALLOOMSAC RIVER (Continued)								
N	12,298	130	1,865	5.7	541.2	541.2	541.7	0.5
O	12,355	131	1,898	5.6	541.5	541.5	542.3	0.8
P	13,250	127	1,511	7.1	542.2	542.2	543.1	0.8
Q	14,380	150	1,634	6.5	544.0	544.0	544.7	0.7
R	15,435	228	1,826	5.1	546.6	546.6	547.6	1.0
S	16,493	170	1,869	5.0	548.9	548.9	549.6	0.0
T	17,677	235	2,000	4.7	550.9	550.9	551.7	0.8
U	18,277	710	2,973	3.3	560.9	560.9	561.6	0.3
V	19,511	260	1,853	5.0	563.0	563.0	563.7	0.7
W	21,358	287	2,600	3.6	567.6	567.6	568.6	1.0
X	23,343	563	4,180	2.2	568.3	568.3	569.3	1.0
Y	24,511	430	2,843	3.2	570.9	570.9	571.5	0.6
Z	25,397	625	3,770	2.4	572.8	572.8	572.8	0.0
AA	26,664	510	3,167	2.6	575.0	575.0	575.4	0.4
AB	28,235	500	2,236	3.7	577.7	577.7	578.7	1.0
AC	29,671	200	1,172	7.1	586.1	586.1	586.9	0.8
AD	31,595	175	1,006	8.2	596.5	596.5	597.2	0.7
AE	32,373	145	772	10.7	601.6	601.6	602.2	0.6
AF	33,084	92	862	9.6	609.9	609.9	610.3	0.4
AG	34,321	143	933	5.7	618.8	618.8	619.1	0.3

[1]Feet above the Town of Bennington corporate limits

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

WALLOOMSAC RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WARM BROOK								
A	875	180	657	5.2	695.9	695.9	696.9	1.0
B	4,100	57	445	7.6	710.5	710.5	711.5	1.0
C	4,450	83	636	5.3	713.3	713.3	714.3	1.0
D	5,410	242	1,368	1.5	721.1	721.1	722.1	1.0
E	7,060	70	300	6.7	730.7	730.7	731.7	1.0
F	7,390	99	343	5.9	741.7	741.7	742.7	1.0
G	9,265	90	418	4.5	746.6	746.6	747.6	1.0
H	9,850	456	3,530	0.5	755.4	755.4	756.4	1.0
I	11,750	451	2,845	0.6	755.4	755.4	756.4	1.0
J	12,300	283	1,691	1.1	756.1	756.1	757.1	1.0
K	13,600	230	1,085	1.7	756.8	756.8	757.8	1.0
L	16,000	156	619	2.9	759.1	759.1	760.1	1.0
M	16,625	455	4,642	0.4	768.2	768.2	769.2	1.0
N	17,625	543	4,552	0.4	768.3	768.3	769.3	1.0
O	20,325	204	1,409	1.1	769.3	769.3	770.3	1.0
P	22,840	176	1,108	0.9	772.1	772.1	773.1	1.0
Q	23,852	250	1,061	0.9	772.4	772.4	773.2	0.8
R	24,453	174	728	1.4	772.6	772.6	773.3	0.7
S	25,767	175	501	2.0	773.0	773.0	773.9	0.9
T	26,905	140	228	4.4	774.8	774.8	775.2	0.4

[1]Feet above confluence with Roaring Brook

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

WARM BROOK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WARM BROOK (Continued)								
U	27,733[1]	79	166	2.0	776.0	776.0	776.8	0.8
V	28,702[1]	77	156	2.1	778.8	778.8	779.3	0.5
W	29,767[1]	75	124	2.7	781.3	781.3	782.2	0.9
WEST BRANCH BATTEN KILL								
A	181[2]	127	510	4.8	690.9	689.2[3]	689.2	0.0
B	1,245[2]	100	356	6.8	699.4	699.4	700.0	0.6
C	2,229[2]	45	210	11.6	706.0	706.0	706.4	0.4
D	2,633[2]	51	213	11.4	717.9	717.9	718.0	0.1
E	2,948[2]	42	480	5.1	741.7	741.7	741.8	0.1
F	3,558[2]	120	770	3.2	743.6	743.6	744.4	0.8
G	4,448[2]	200	904	2.7	745.7	745.7	746.1	0.4
H	5,260[2]	277	789	3.0	751.4	751.4	752.2	0.8
I	6,179[2]	265	1,004	2.4	752.5	752.5	753.3	0.8
J	6,565[2]	135	567	4.5	755.4	755.4	756.0	0.6
K	7,161[2]	156	965	2.5	757.3	757.3	757.9	0.6
L	7,944[2]	204	872	2.7	757.9	757.9	758.9	1.0
M	8,766[2]	206	768	3.1	760.1	760.1	761.0	0.9

[1]Feet above confluence with Roaring Brook

[2]Feet above confluence with Batten Kill

[3]Elevations computed without consideration of backwater effects from Batten Kill

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

WARM BROOK – WEST BRANCH BATTEN KILL

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WEST BRANCH BATTEN KILL (Continued)								
N	9,951[1]	200	608	3.7	762.7	762.7	763.3	0.6
O	11,166[1]	230	390	5.7	767.4	767.4	767.4	0.0
P	12,908[1]	156	910	2.4	775.4	775.4	776.2	0.8
WINHALL RIVER								
A	344[2]	125	516	6.4	1,249.6	1,249.6	1,249.8	0.2
B	1,336[2]	61	415	8.0	1,262.7	1,262.7	1,262.7	0.0
C	2,882[2]	58	371	8.2	1,279.3	1,279.3	1,279.9	0.6
D	3,169[2]	89	586	5.2	1,283.3	1,283.3	1,284.4	0.1
E	4,003[2]	80	500	5.9	1,296.5	1,296.5	1,297.2	0.7
F	5,357[2]	60	365	8.1	1,309.5	1,309.5	1,309.7	0.2
G	6,554[2]	75	440	6.7	1,326.5	1,326.5	1,326.5	0.0
H	7,574[2]	131	622	4.7	1,336.3	1,336.3	1,336.7	0.4
I	8,545[2]	85	344	7.3	1,344.8	1,344.8	1,345.4	0.6
J	9,144[2]	87	536	4.7	1,352.6	1,352.6	1,352.8	0.2
K	9,472[2]	100	490	5.1	1,354.4	1,354.4	1,354.6	0.2
L	10,699[2]	73	337	7.5	1,366.9	1,366.9	1,366.9	0.0
M	11,495[2]	70	338	7.5	1,374.5	1,374.5	1,375.3	0.8

[1]Feet above confluence with Batten Kill

[2]Feet above county boundary

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

WEST BRANCH BATTEN KILL – WINHALL RIVER

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WINHALL RIVER (Continued)								
N	12,487	69	278	9.1	1,386.0	1,386.0	1,386.0	0.0
O	13,290	69	303	8.3	1,398.1	1,398.1	1,398.2	0.1
P	14,175	124	483	5.0	1,407.2	1,407.2	1,408.1	0.9
Q	15,146	101	452	5.4	1,414.0	1,414.0	1,414.2	0.2
R	16,060	72	387	6.3	1,422.7	1,422.7	1,423.3	0.6
S	17,073	132	341	7.1	1,430.9	1,430.9	1,431.8	0.9
T	18,483	168	500	4.5	1,445.4	1,445.4	1,446.0	0.6
U	20,494	45	278	7.3	1,473.8	1,473.8	1,474.8	1.0
V	20,963	42	259	7.8	1,481.1	1,481.1	1,481.8	0.7
W	21,896	64	269	7.5	1,495.3	1,495.3	1,495.3	0.0
X	22,727	68	254	8.0	1,510.5	1,510.5	1,510.7	0.2

[1] Feet above county boundary

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

FLOODWAY DATA

WINHALL RIVER

5.0 INSURANCE APPLICATIONS

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

Zone A
Zone A is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report 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 report by detailed methods. 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, 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 (sq. mi.), and areas protected from the base 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 risk zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

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

The current FIRM presents flooding information for the entire geographic area of Bennington County. Previously, FIRMs were prepared for each incorporated community of the County identified as flood-prone. This countywide FIRM also includes flood hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 8, “Community Map History.”

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Arlington, Town of	August 2, 1974	December 10, 1976 November 29, 1977	July 17, 1986	None
Bennington, Town of	September 13, 1974	February 18, 1977 November 1, 1977	June 17, 1986	None
Dorset, Town of	July 26, 1974	September 24, 1976	August 1, 1986	None
Glastenbury, Town of	N/A	None	N/A	None
Landgrove, Town of	January 3, 1975	None	September 18, 1985	None
Manchester, Town of	August 2, 1974	None	April 3, 1978	July 3, 1985
Manchester, Village of	October 13, 1974	October 1, 1976	August 19, 1986	None
North Bennington, Village of	February 21, 1975	February 21, 1975	N/A	None
Old Bennington, Village of	N/A	None	N/A	None
Peru, Town of	January 10, 1975	October 25, 1977	N/A	None
Pownal, Town of	August 16, 1974	February 4, 1977 November 29, 1977	April 1, 1980	None
Readsboro, Town of	May 31, 1974	February 18, 1977	September 27, 1985	None
Rupert, Town of	August 9, 1974	July 26, 1977	September 18, 1985	None
Sandgate, Town of	January 31, 1975	November 29, 1977 December 31, 1976	N/A	None

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT
(AND INCORPORATED AREAS)

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Searsburg, Town of	November 15, 1974	November 15, 1974	N/A	None
Shaftsbury, Town of	June 28, 1974	November 29, 1977	September 18, 1985	None
Stamford, Town of	May 31, 1974 December 3, 1976	None	July 3, 1978	None
Sunderland, Town of	February 1, 1974	November 26, 1976 December 13, 1977	November 1, 1985	None
Winhall, Town of	September 20, 1974	June 18, 1976 December 13, 1977	June 19, 1989	None
Woodford, Town of	November 15, 1974	None	September 18, 1985	None

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

This FIS report either supersedes or is compatible with all previous studies published on streams studied in this report and should be considered authoritative for the purposes of the NFIP. The countywide FIS report for Windham County, Vermont (2007) has already gone effective (Reference 10). The countywide FIS report for Rutland County, Vermont (2008) has already gone effective (Reference 11). The countywide FIS report for Windsor County, Vermont (2007) has already gone effective (Reference 12). The countywide FIS report for Franklin County and Berkshire County, Massachusetts currently underway. The countywide FIS report for Rensselaer County and Washington County, New York is currently underway

8.0 LOCATION OF DATA

Information concerning the pertinent data used in preparation of this study can be obtained by contacting FEMA Region 1, 99 High Street, 6th floor, Boston, Massachusetts 02110

9.0 BIBLIOGRAPHY AND REFERENCES

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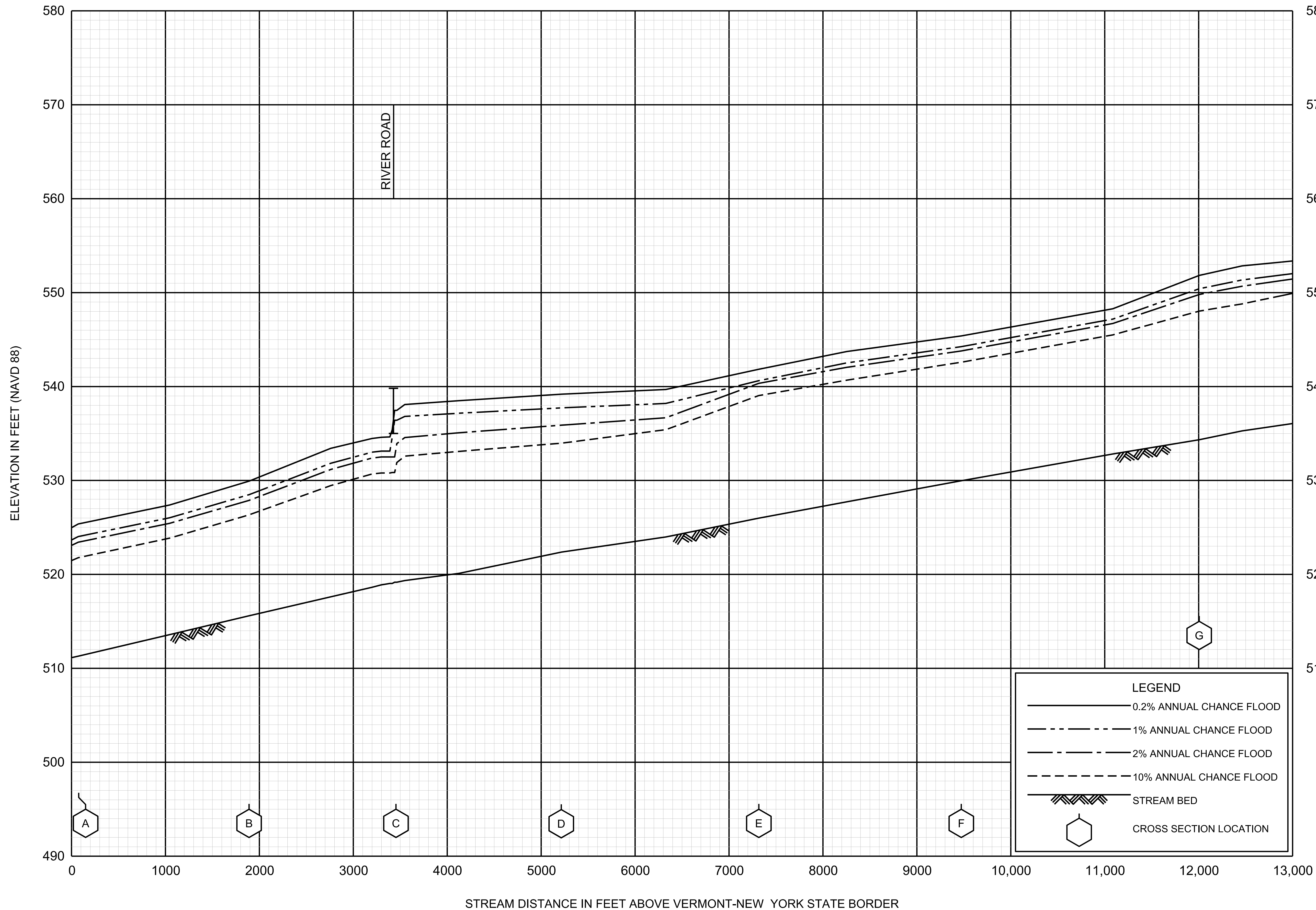

FLOOD PROFILES

BATTEN KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

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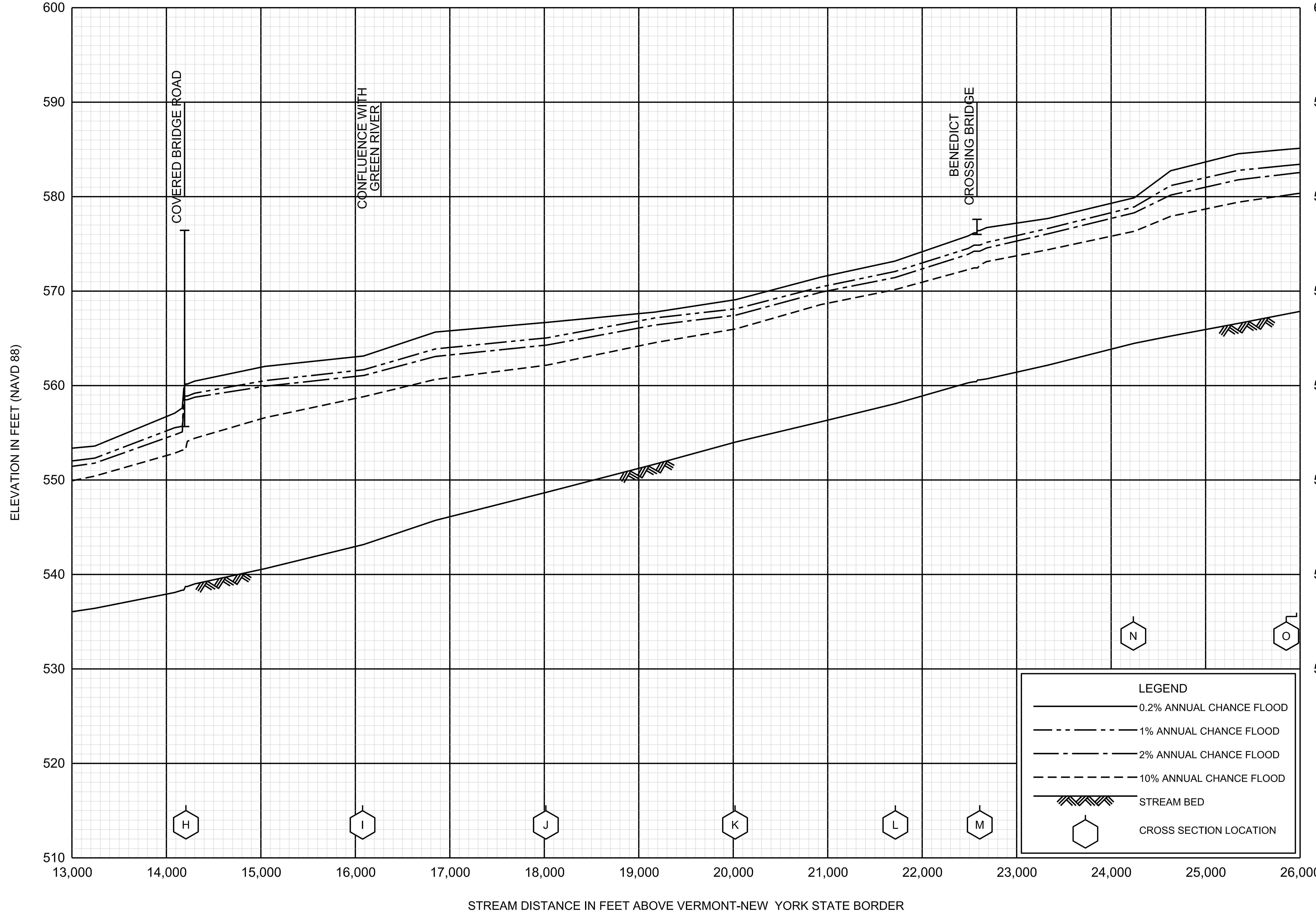

FLOOD PROFILES

BATTEN KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

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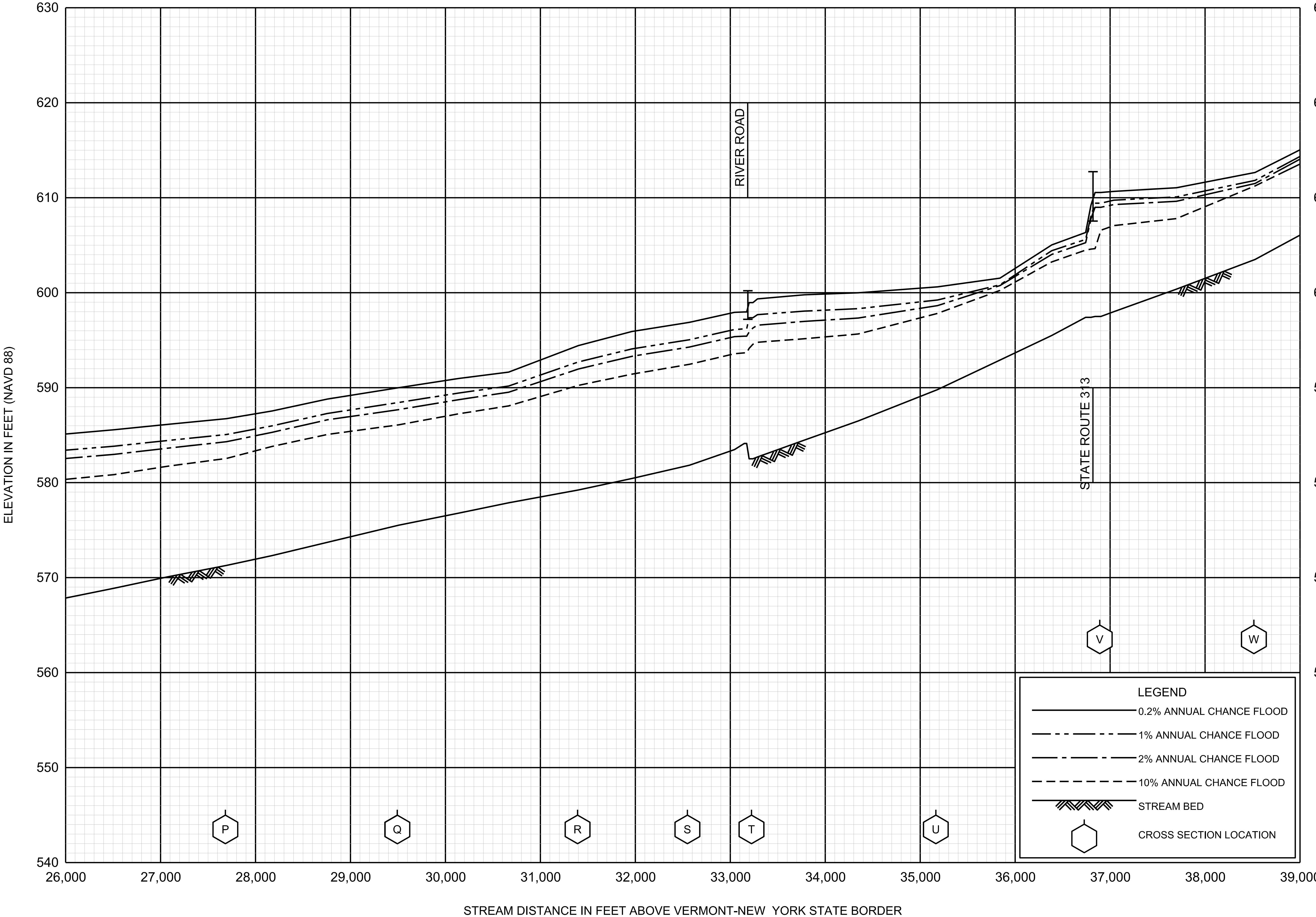

FLOOD PROFILES

BATTEN KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

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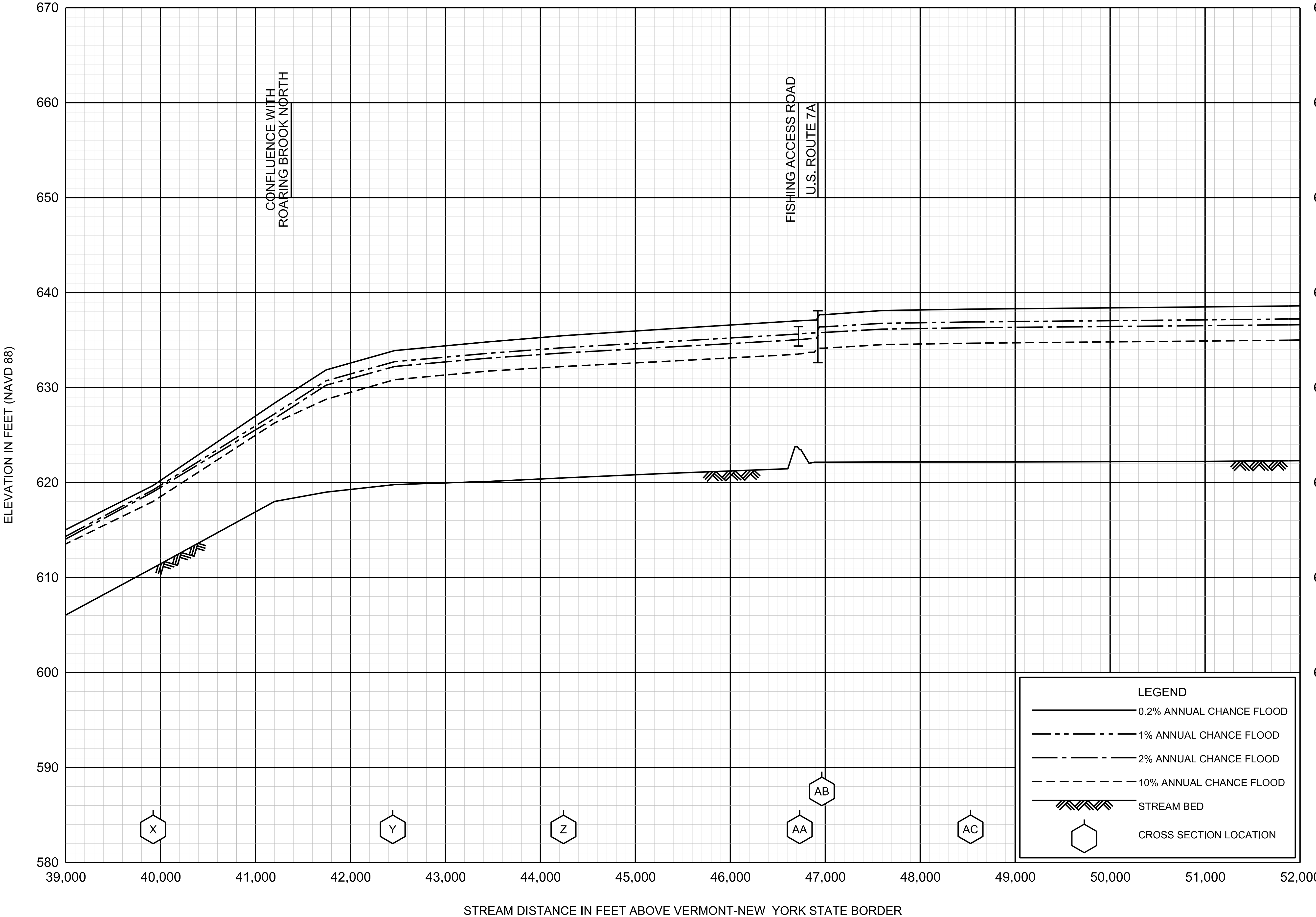

FLOOD PROFILES

BATTEN KILL

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BENNINGTON COUNTY, VT

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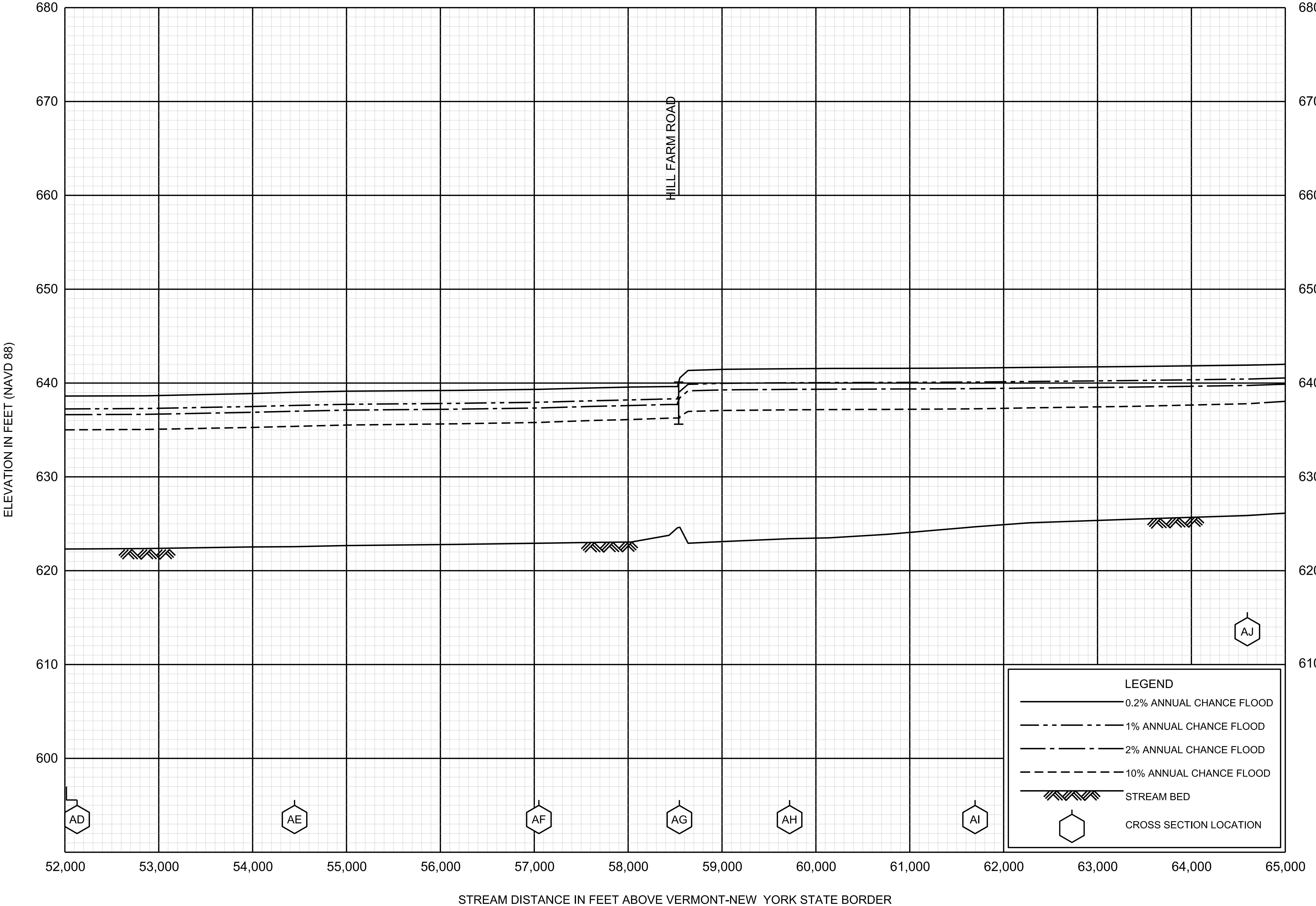

FLOOD PROFILES

BATTEN KILL

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BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

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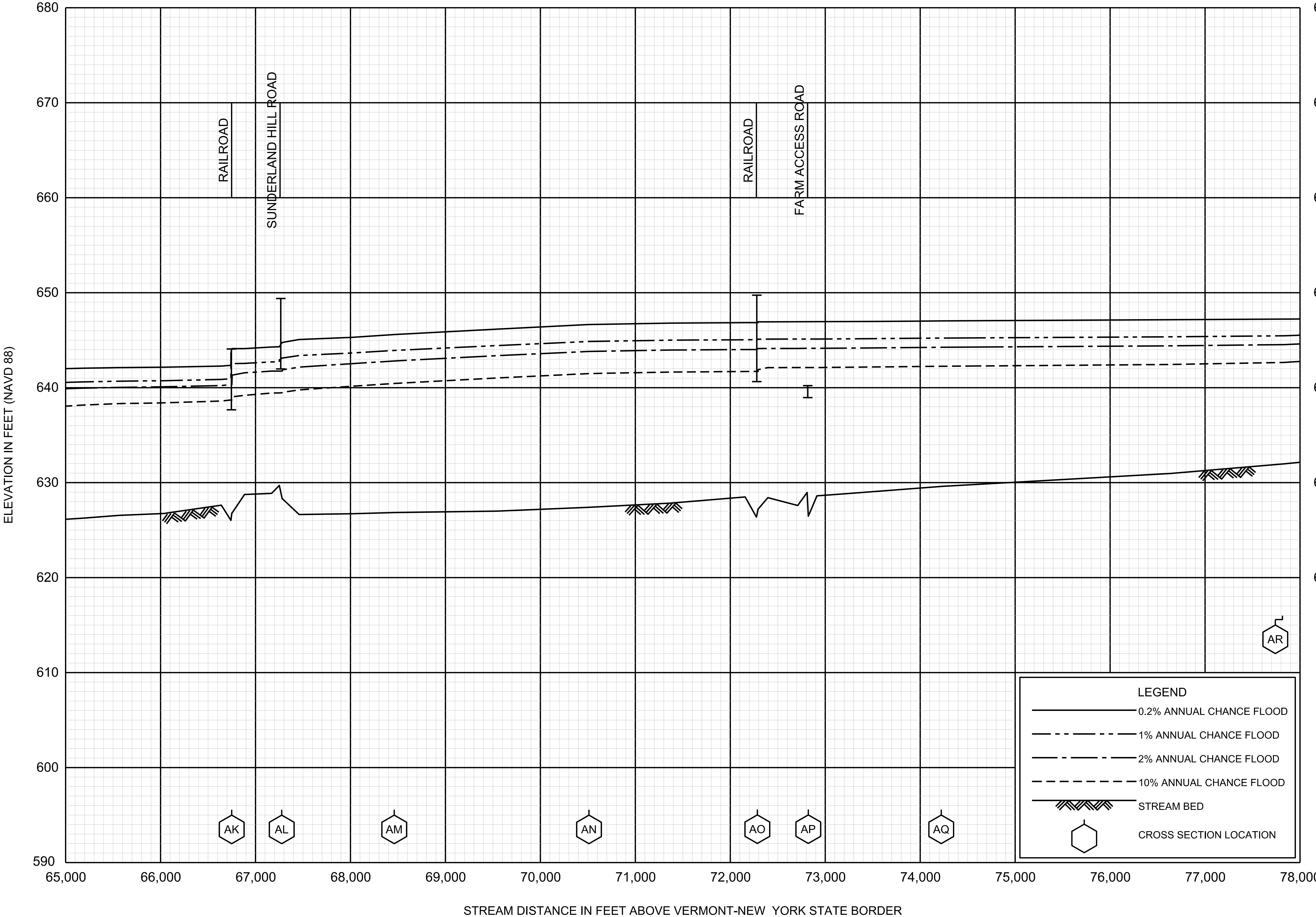

FLOOD PROFILES

BATTEN KILL

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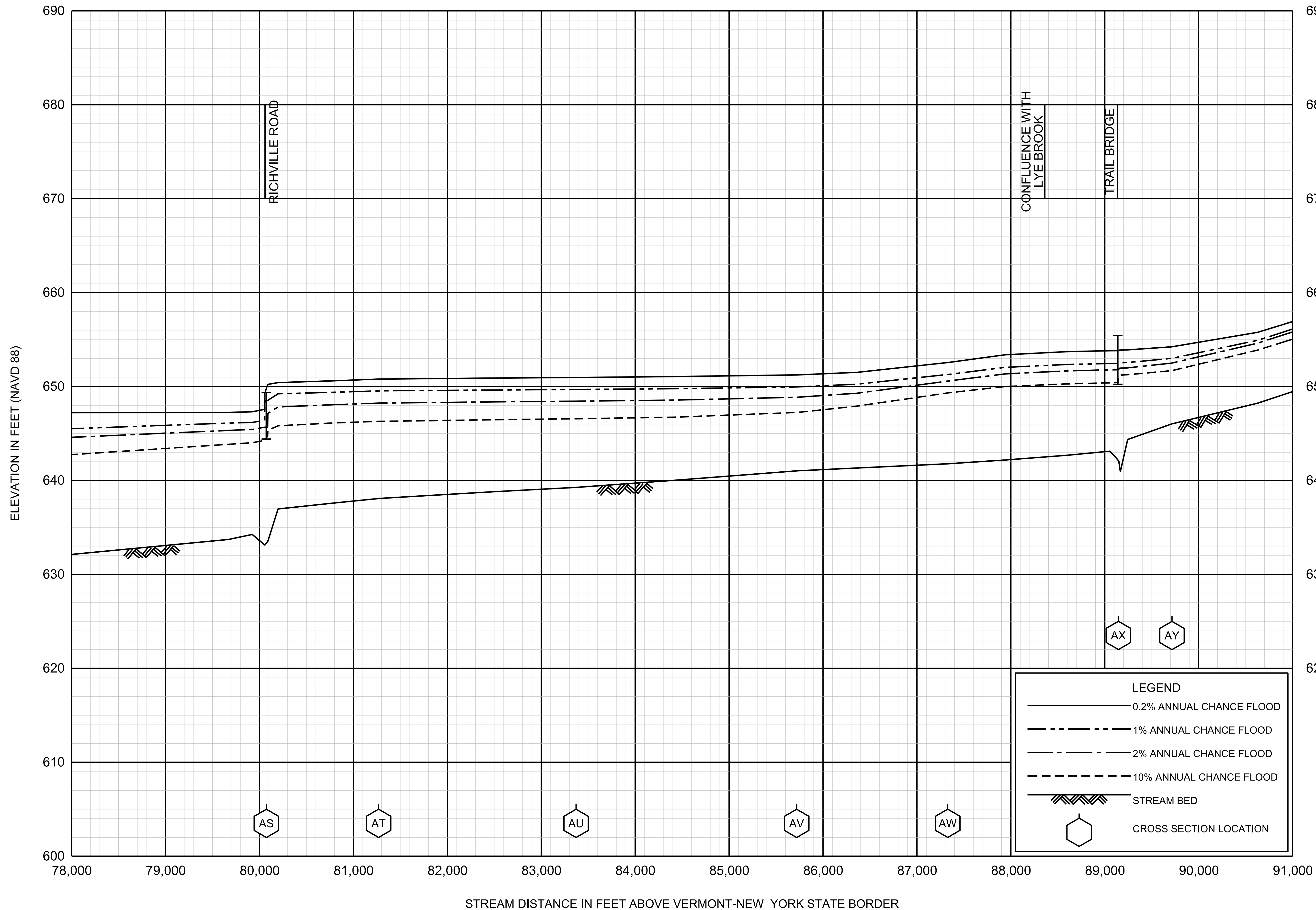

FLOOD PROFILES

BATTEN KILL

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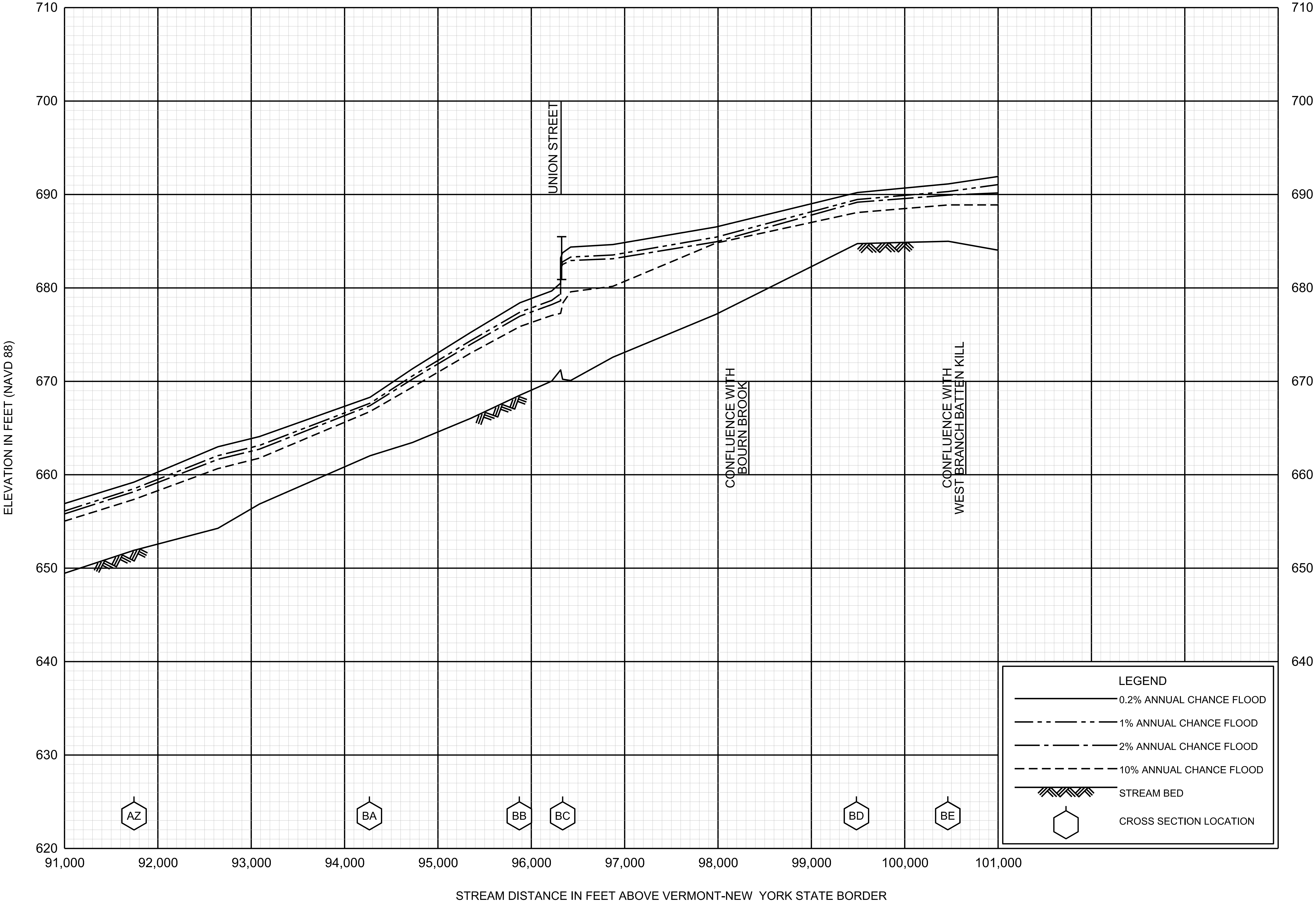

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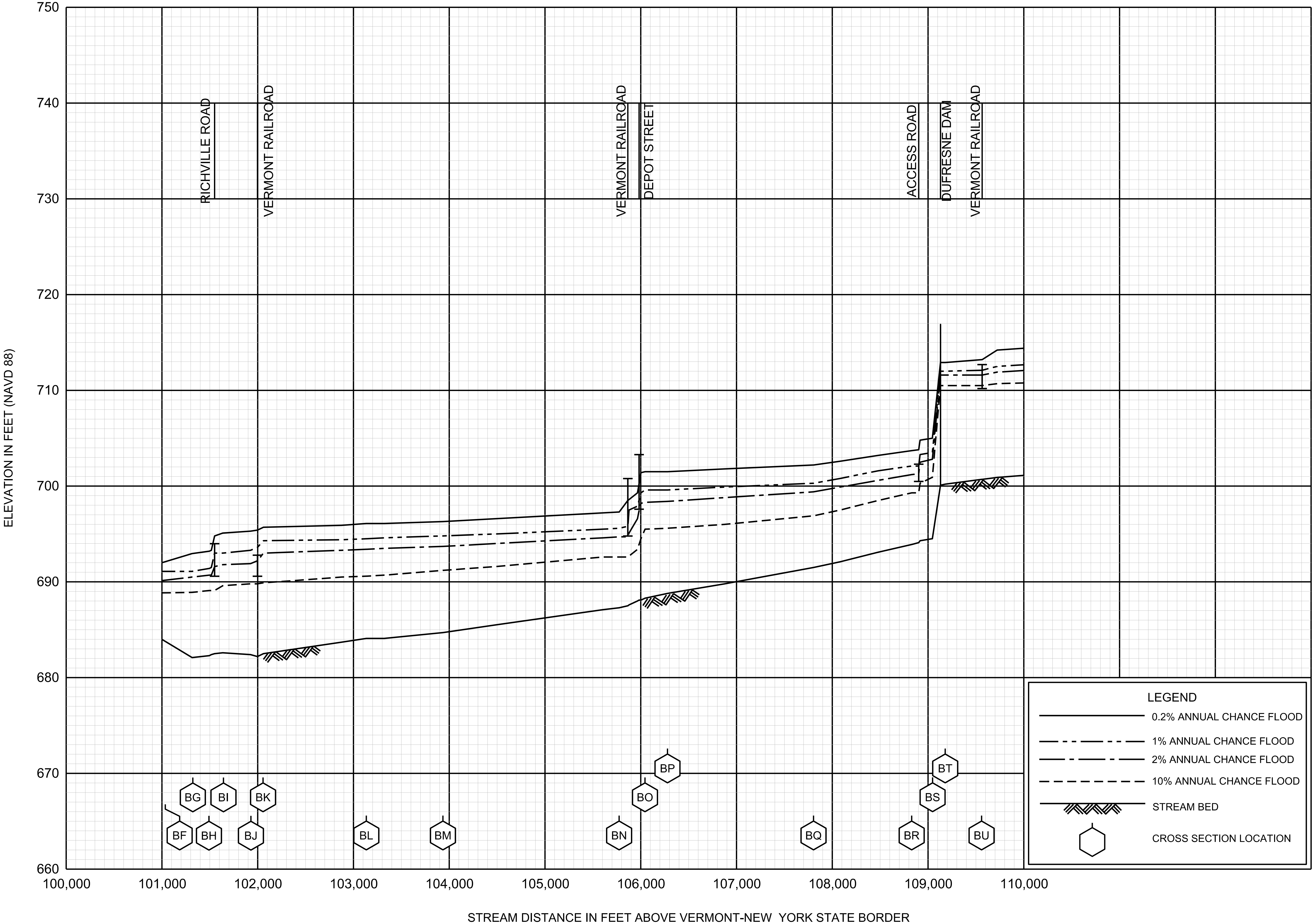

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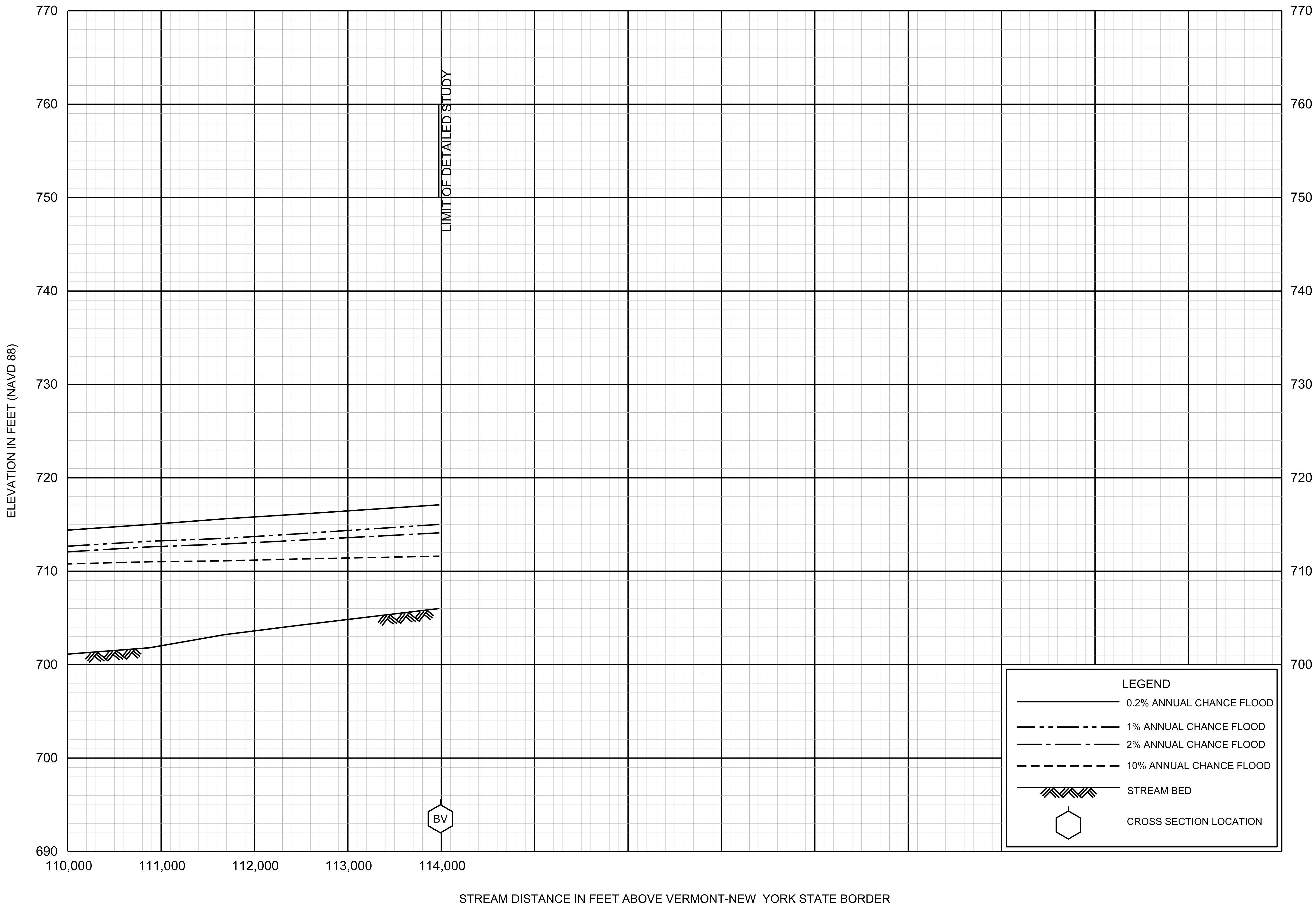

FLOOD PROFILES

BATTEN KILL

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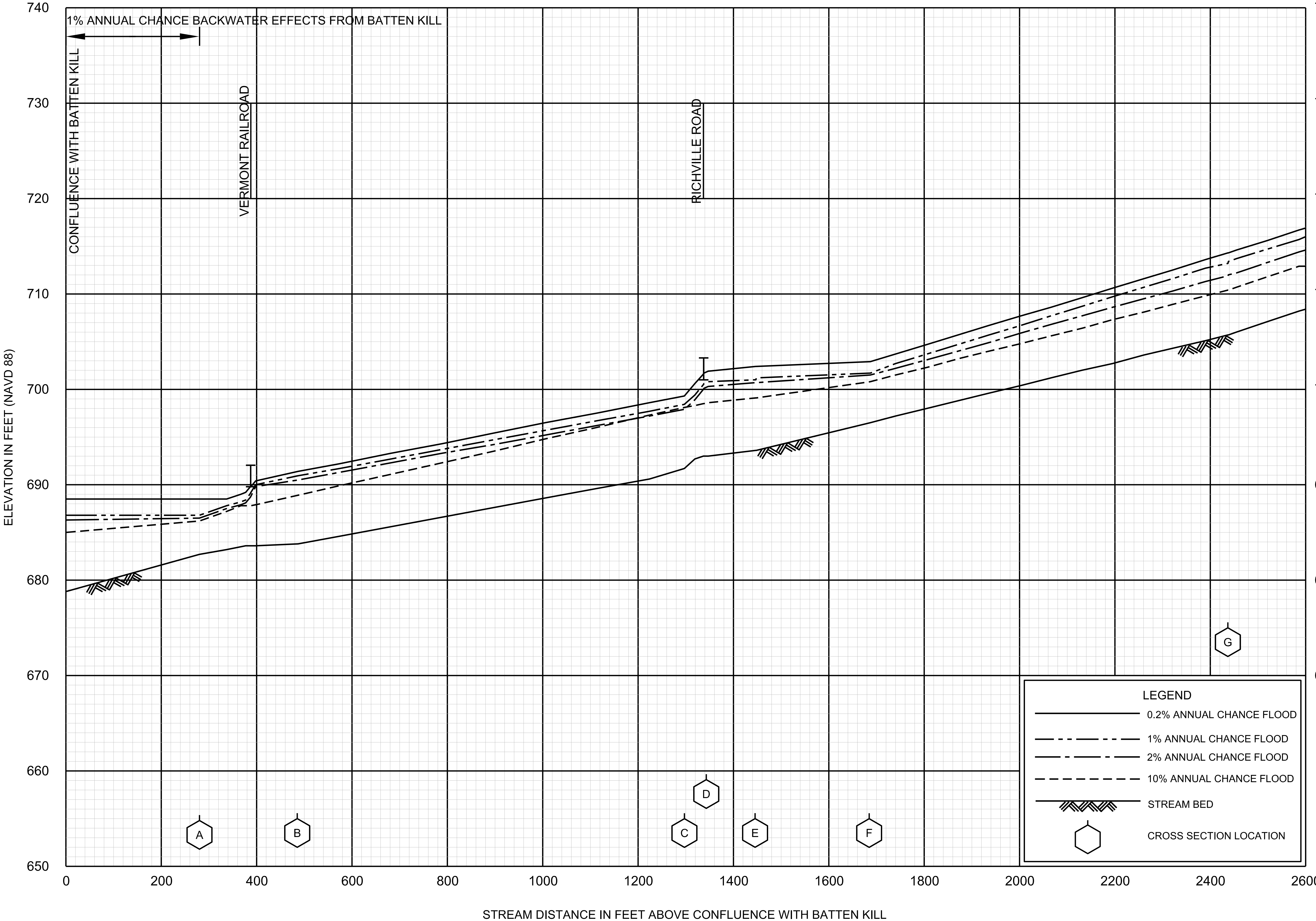

FLOOD PROFILES

BOURN BROOK

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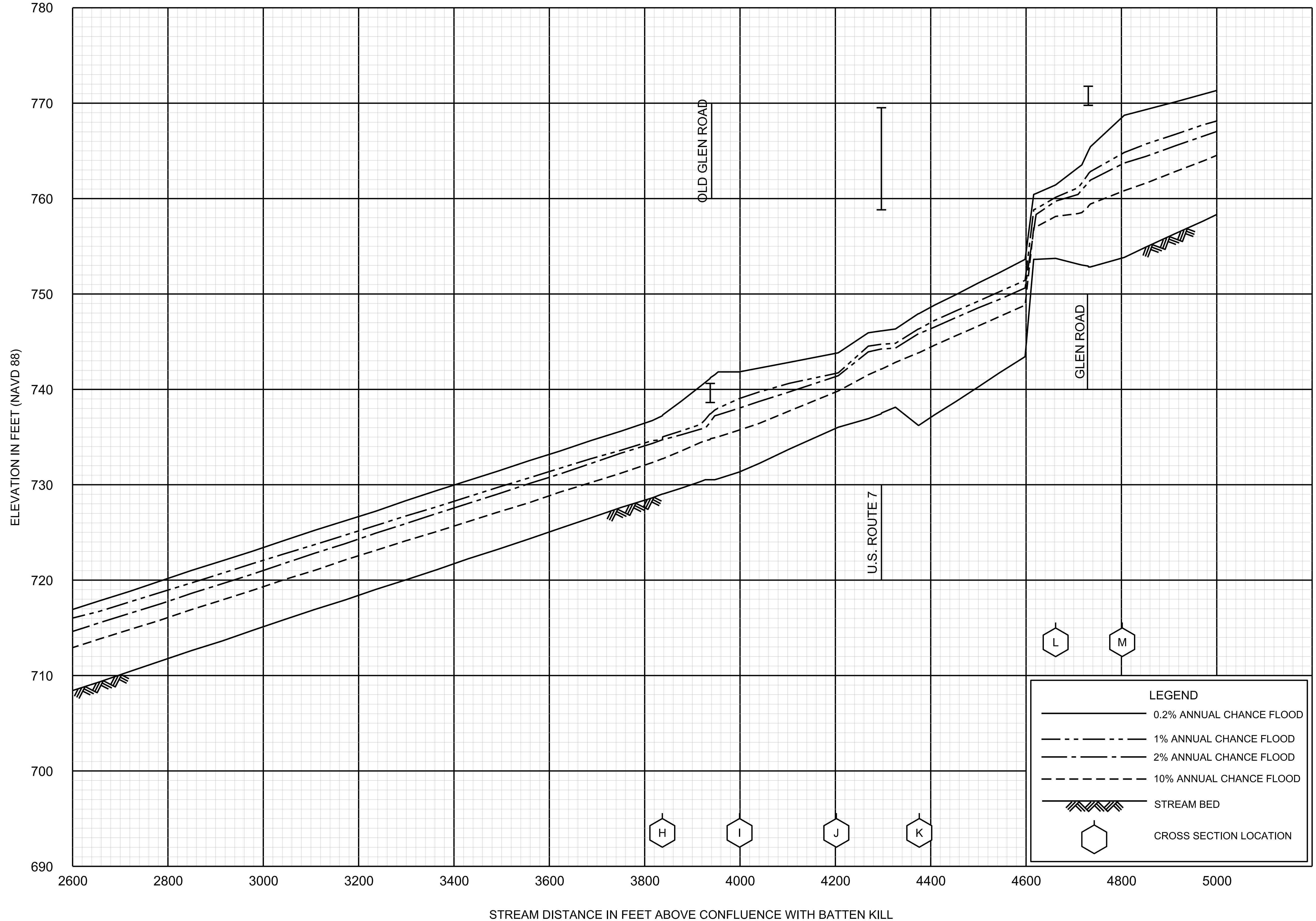

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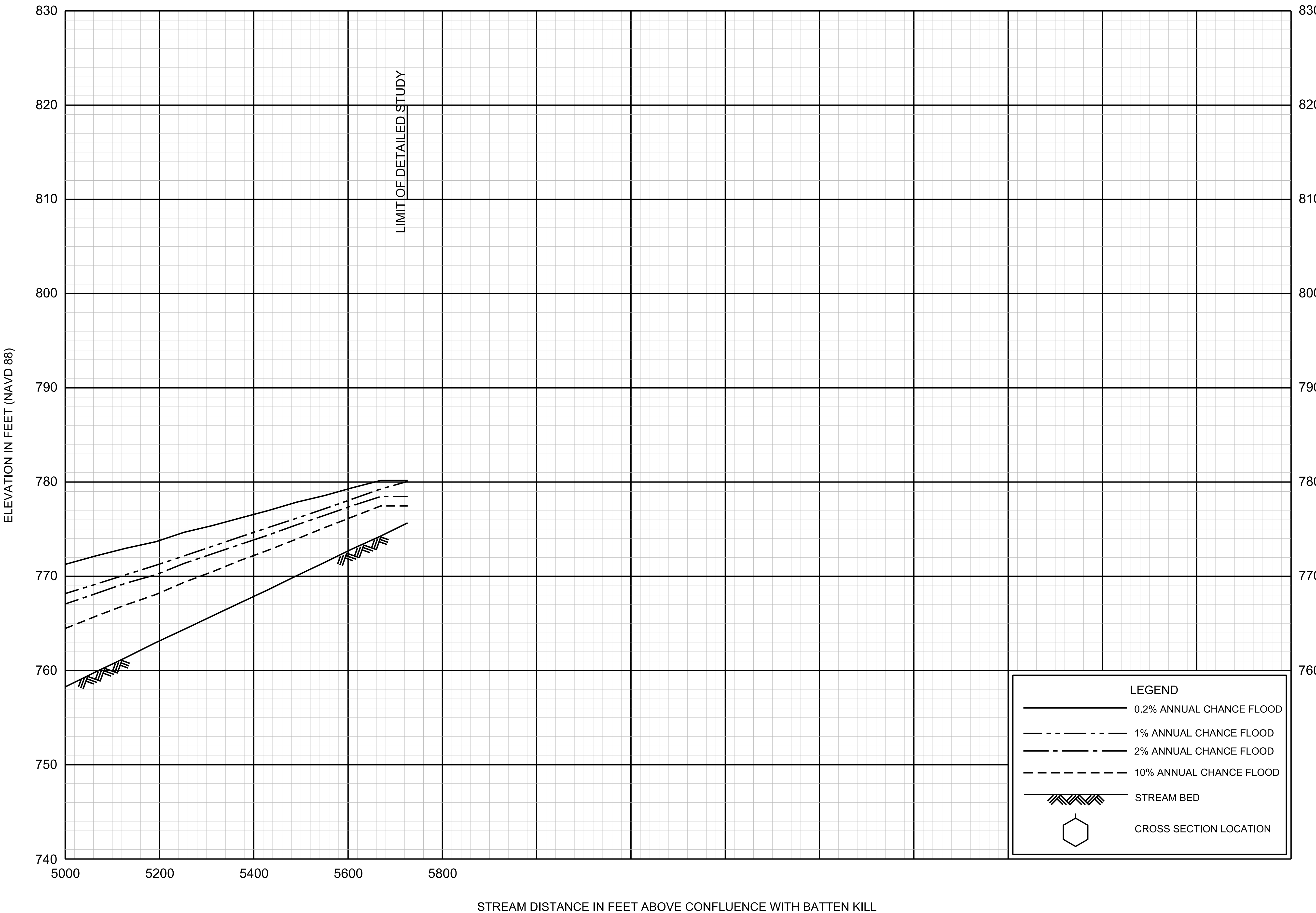

FLOOD PROFILES

BOURN BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

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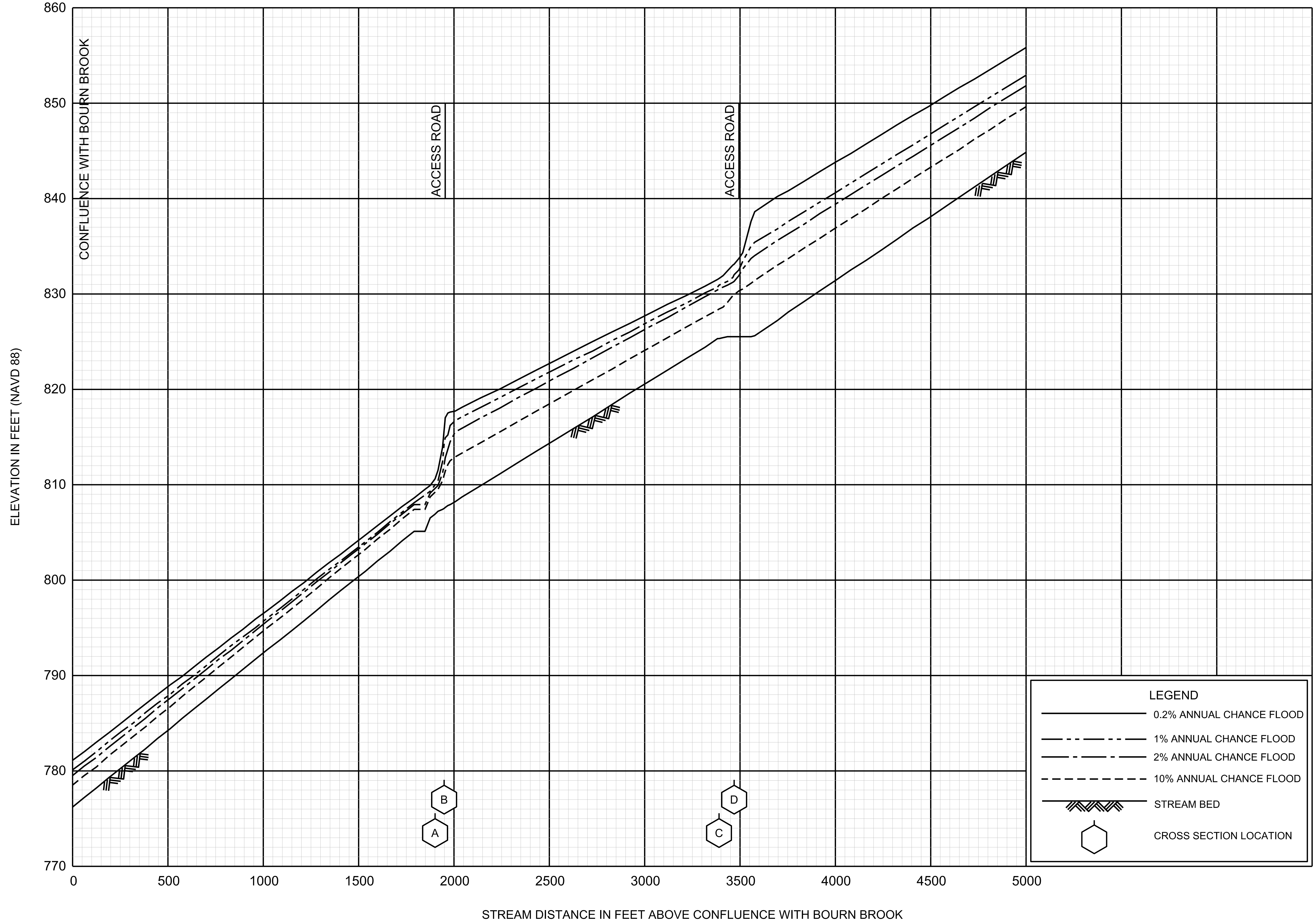

FLOOD PROFILES

BROMLEY BROOK

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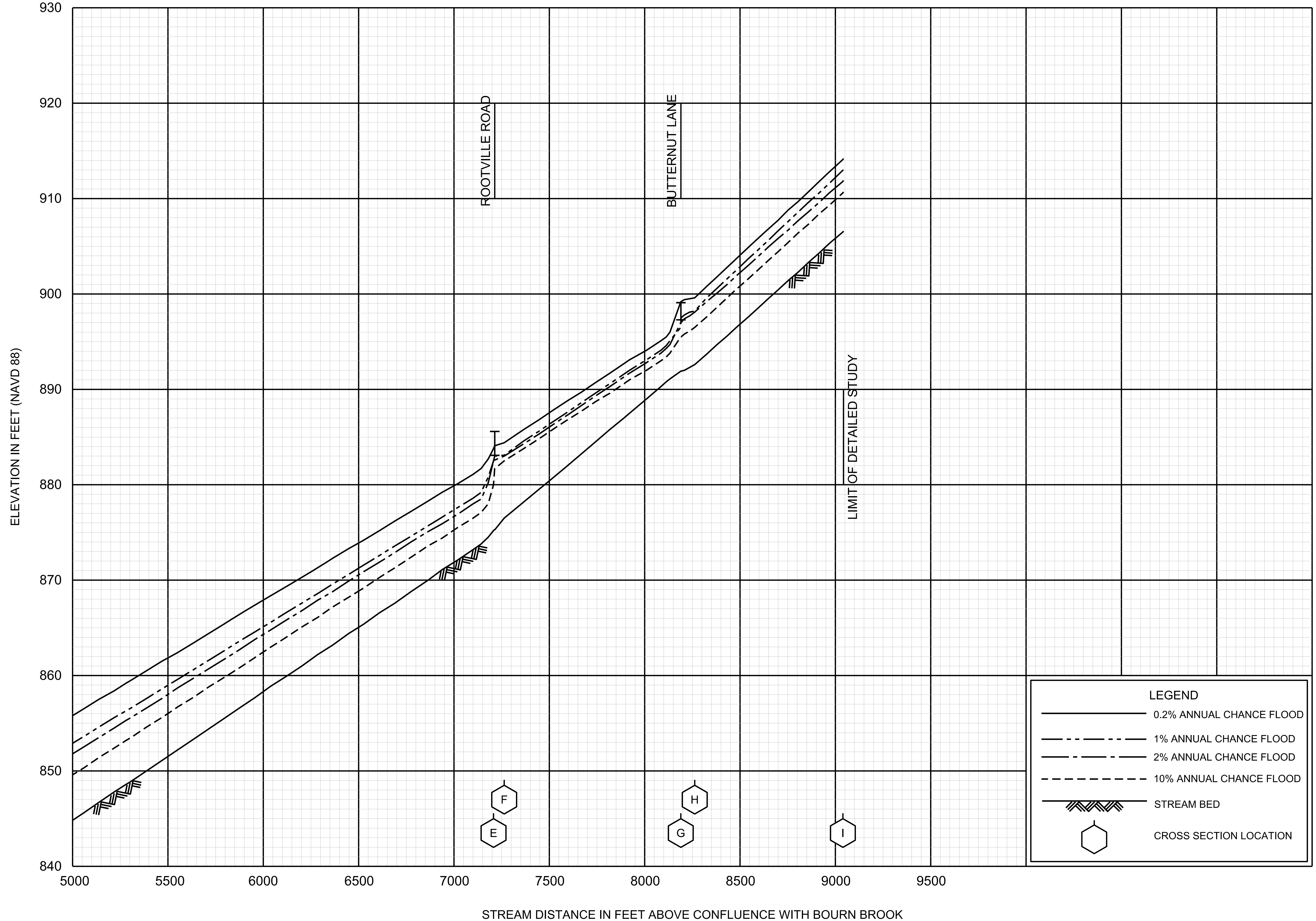

FLOOD PROFILES

BROMLEY BROOK

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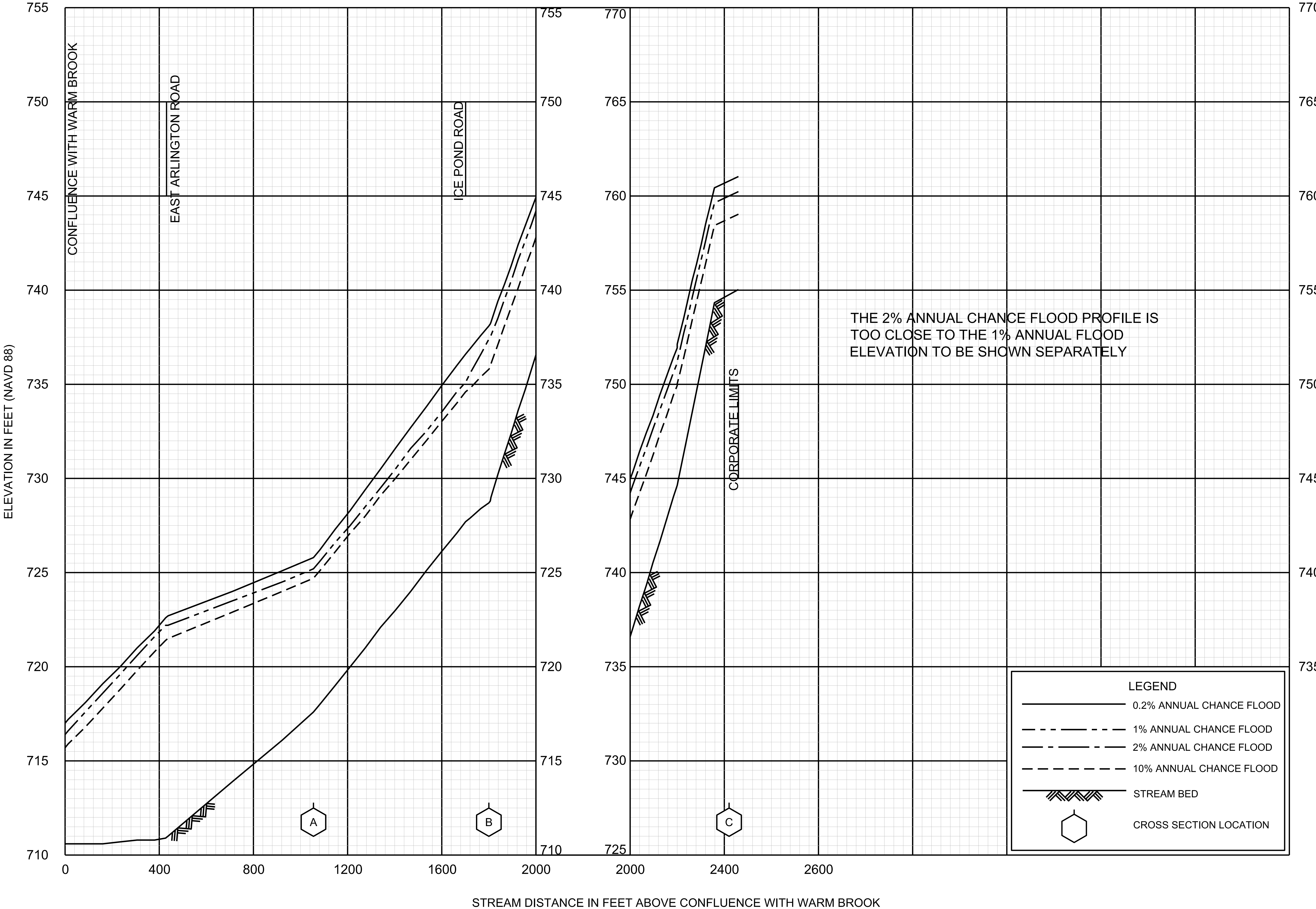

FLOOD PROFILES

FAYVILLE BRANCH

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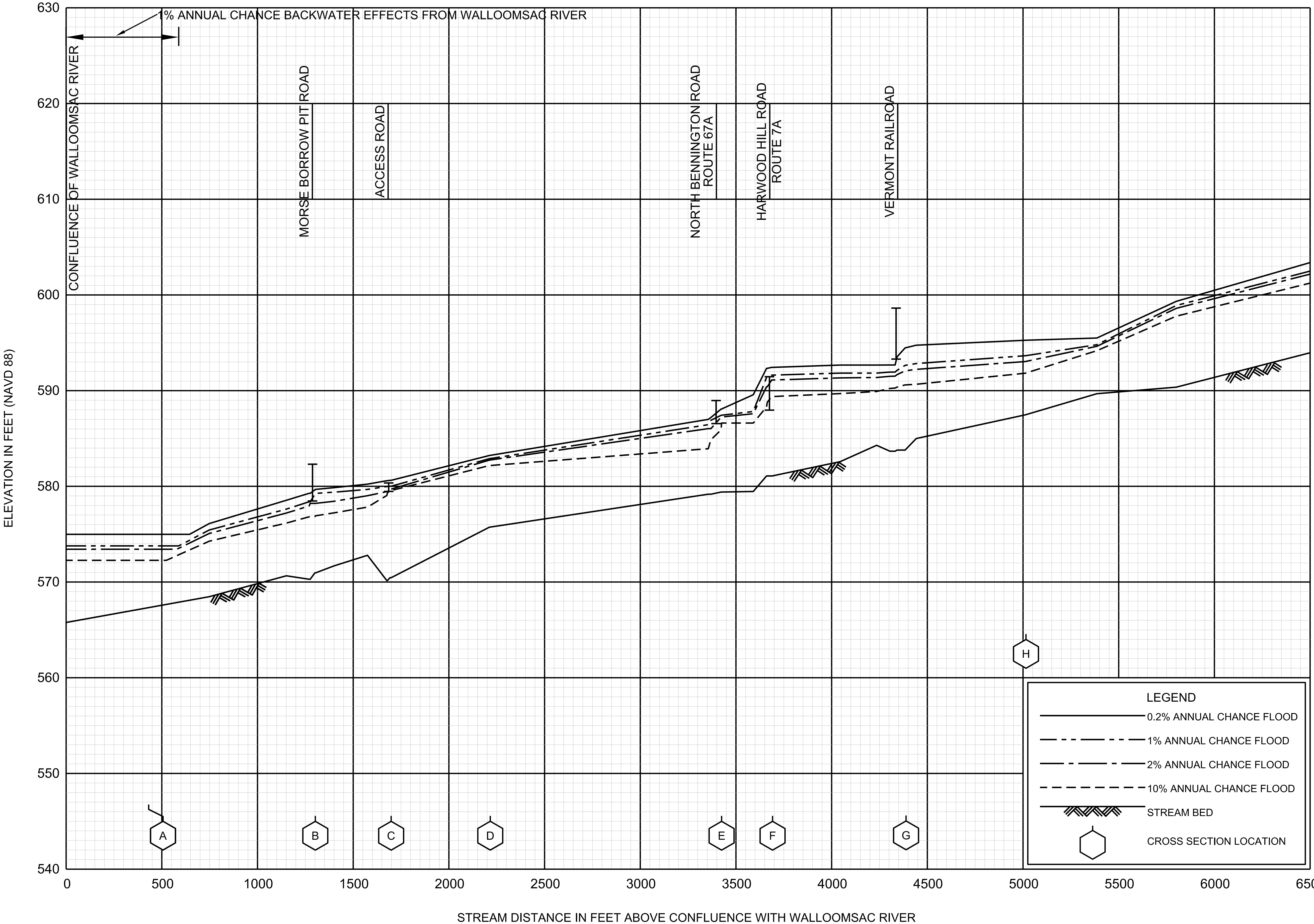

FLOOD PROFILES

FURNACE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

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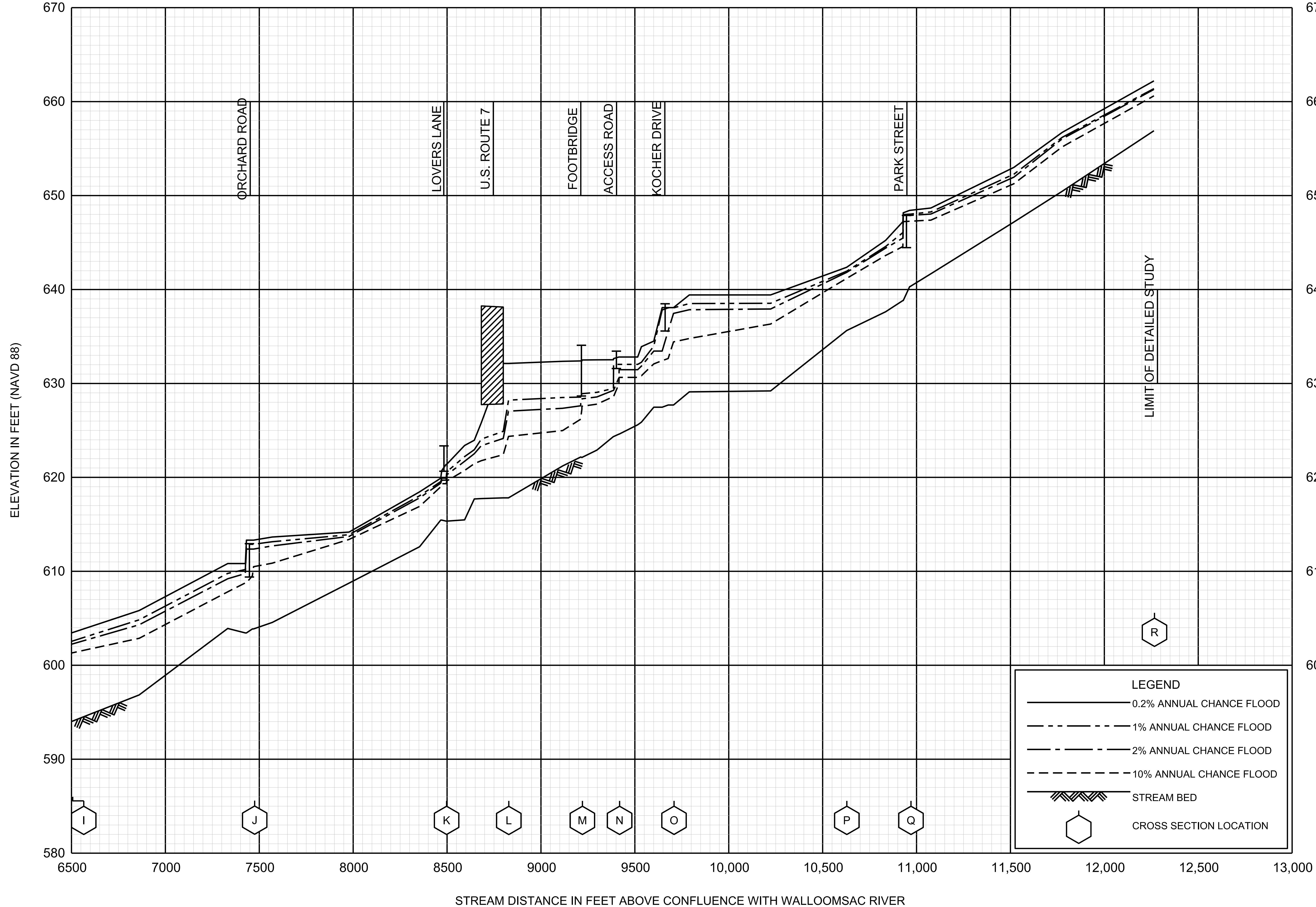

FLOOD PROFILES

FURNACE BROOK

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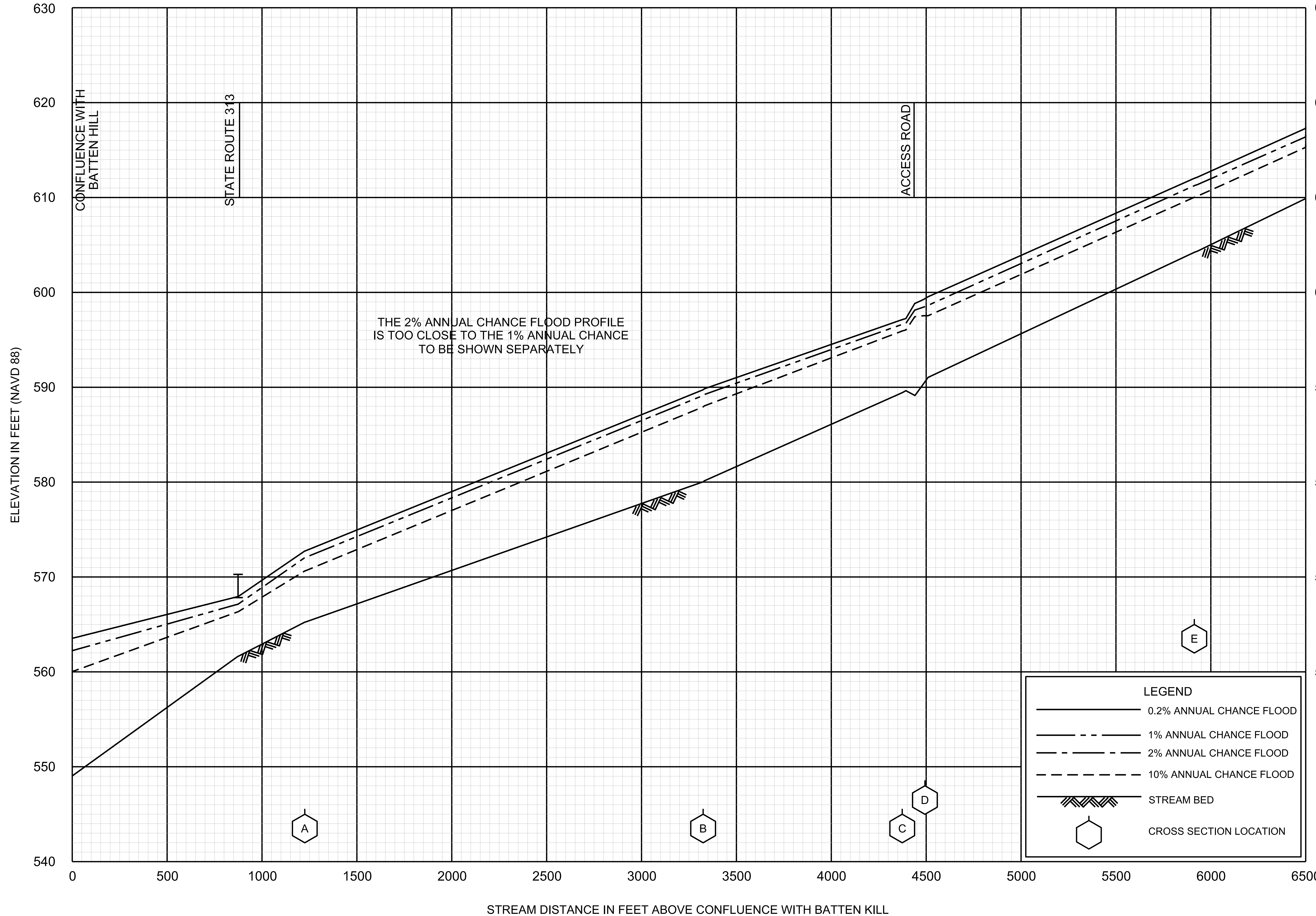

FLOOD PROFILES

GREEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

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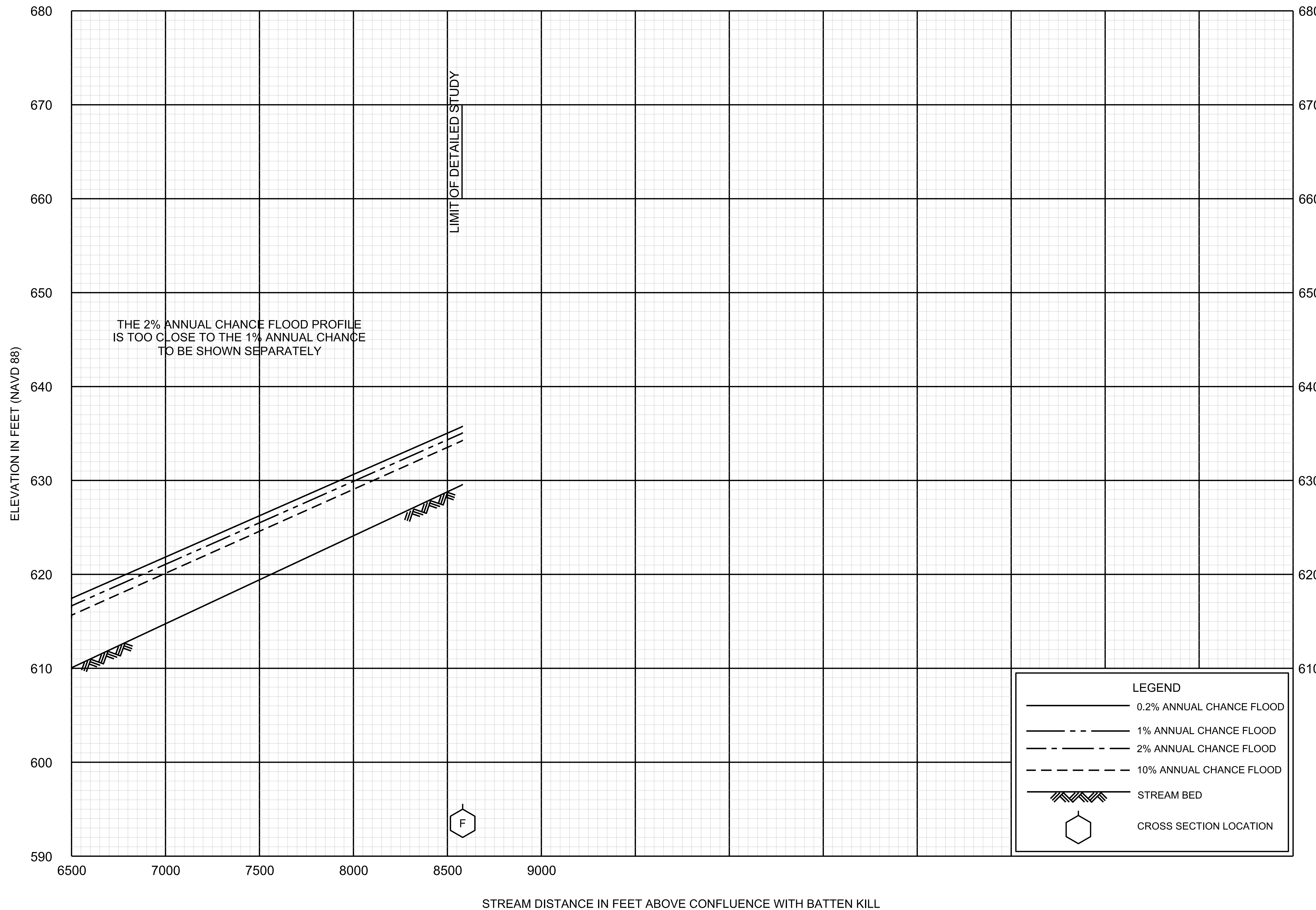

FLOOD PROFILES

GREEN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

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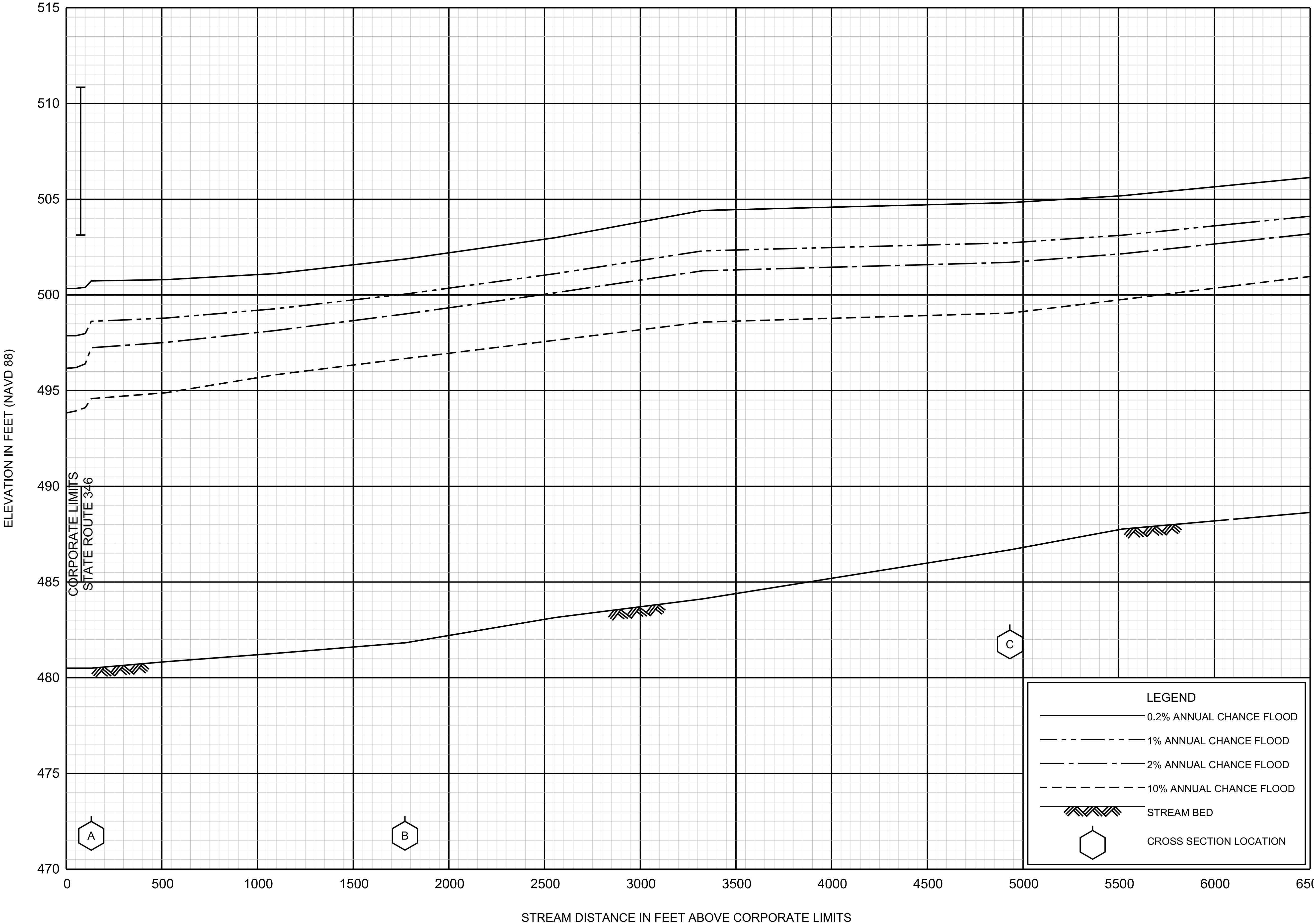


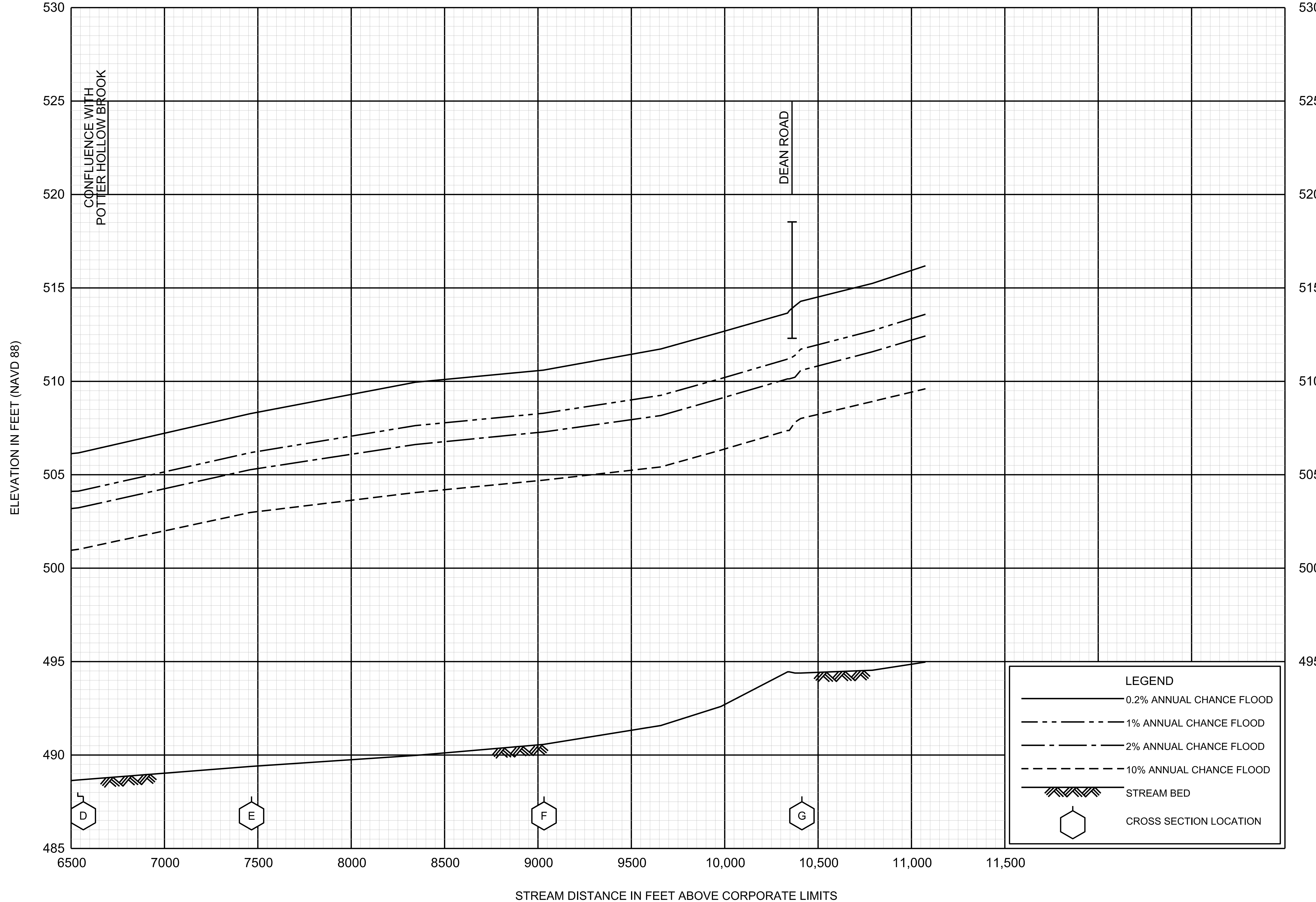
FLOOD PROFILES

HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



FLOOD PROFILES

HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

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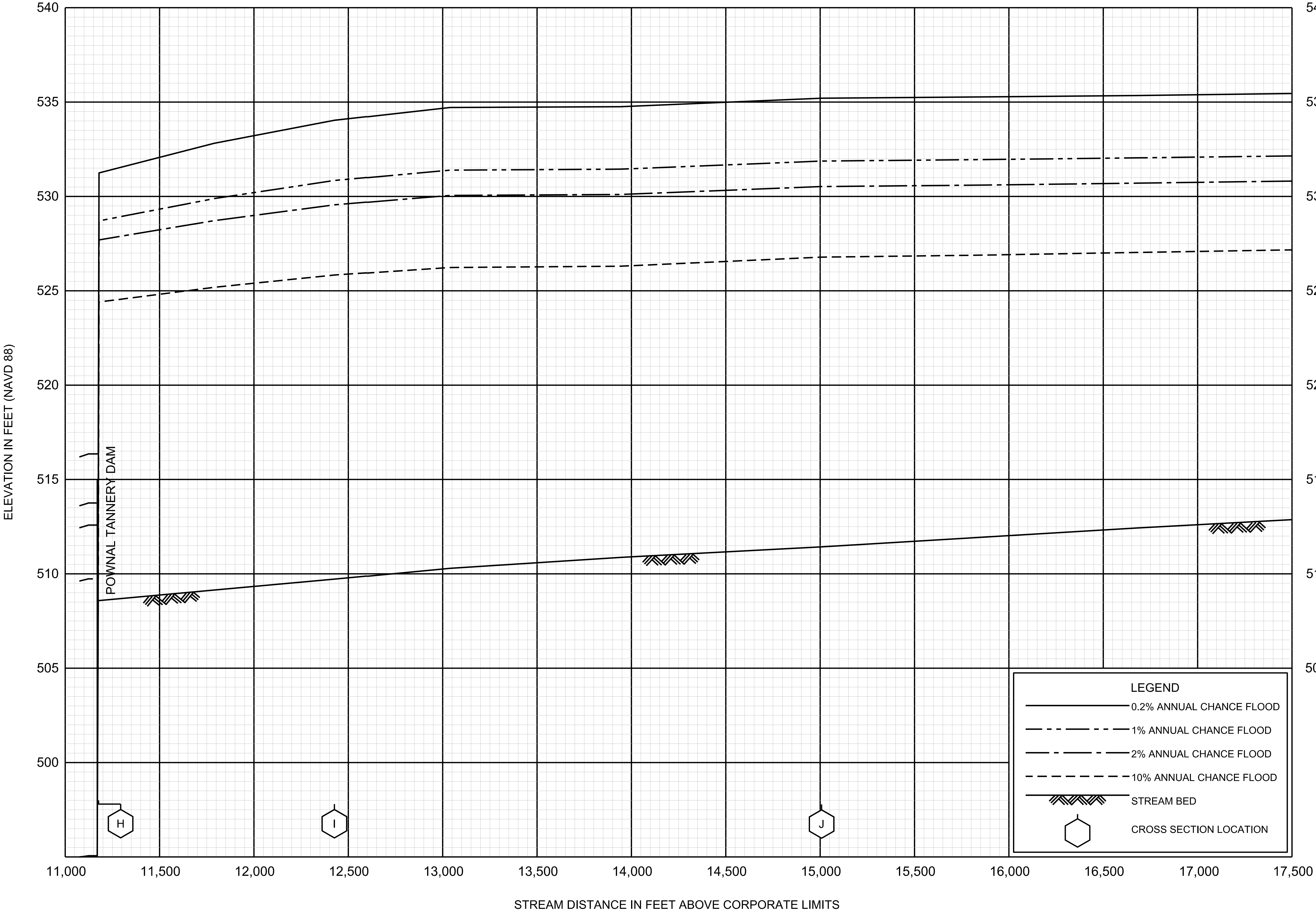


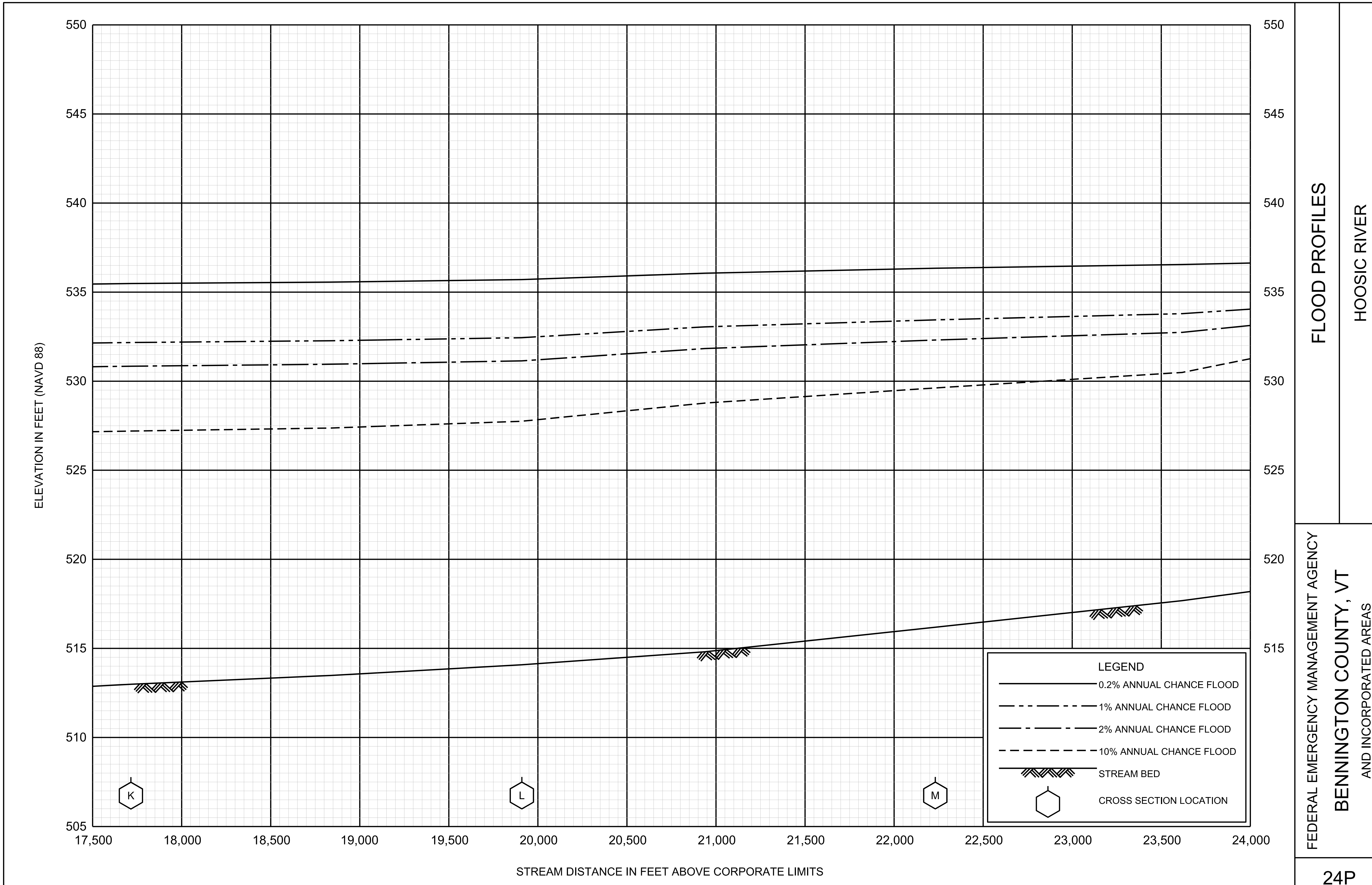
FLOOD PROFILES

HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS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ELEVATION IN FEET (NAVD 88)
STREAM DISTANCE IN FEET ABOVE CORPORATE LIMITS
K
L
M
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION
FLOOD PROFILES
HOOSIC RIVER
FEDERAL EMERGENCY MANAGEMENT AGENCY
BENNINGTON COUNTY, VT
AND INCORPORATED AREAS
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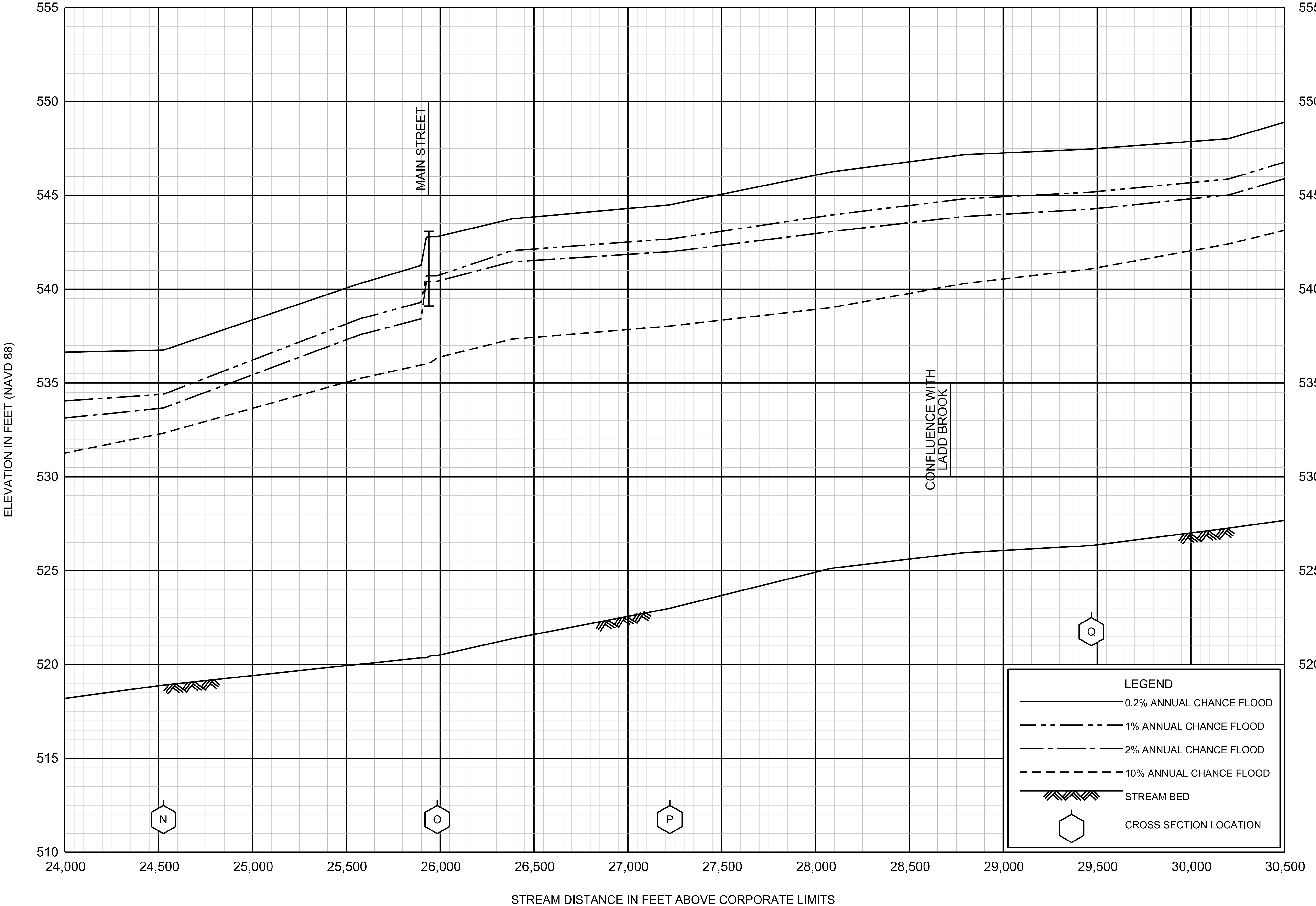


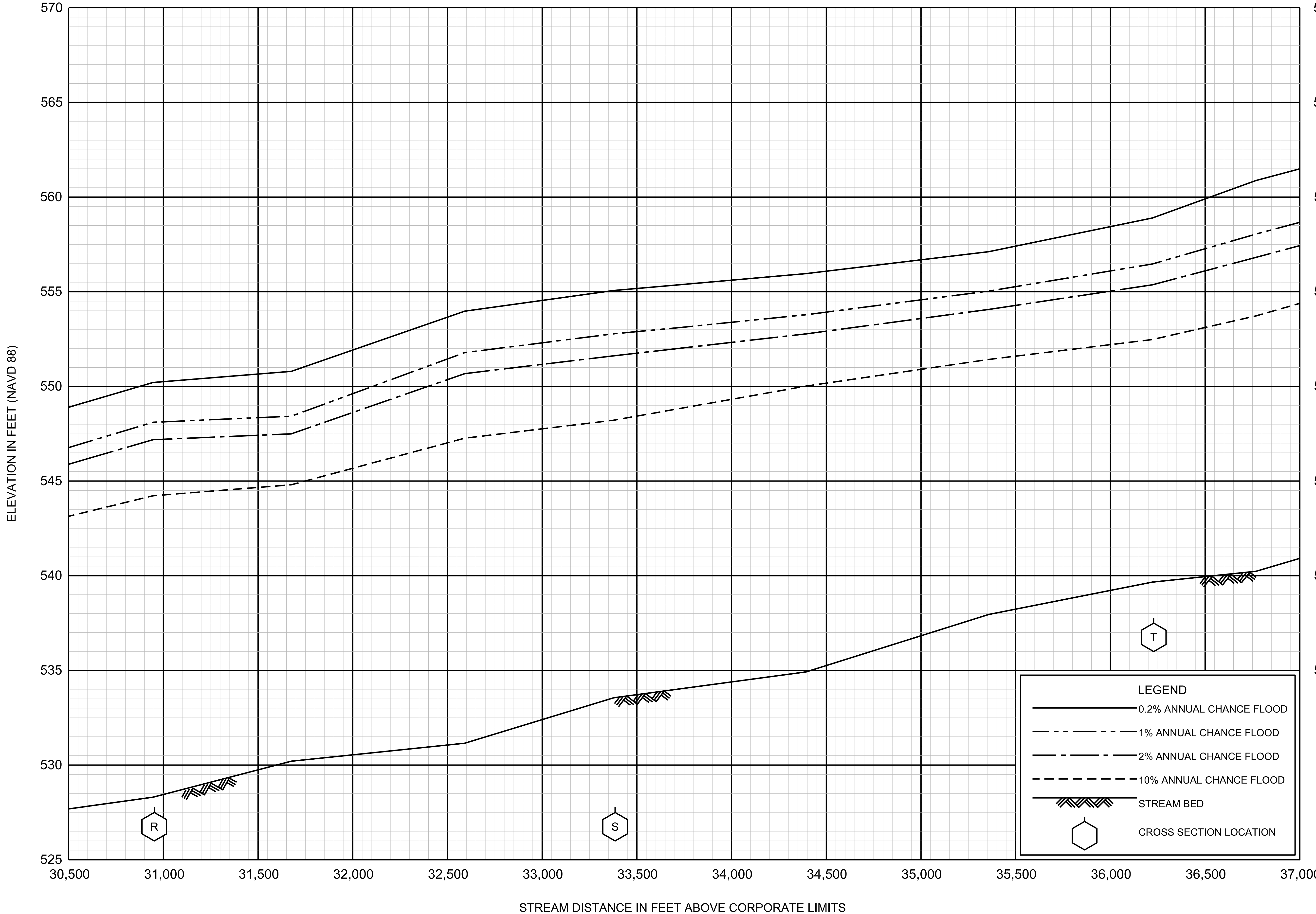
FLOOD PROFILES

HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



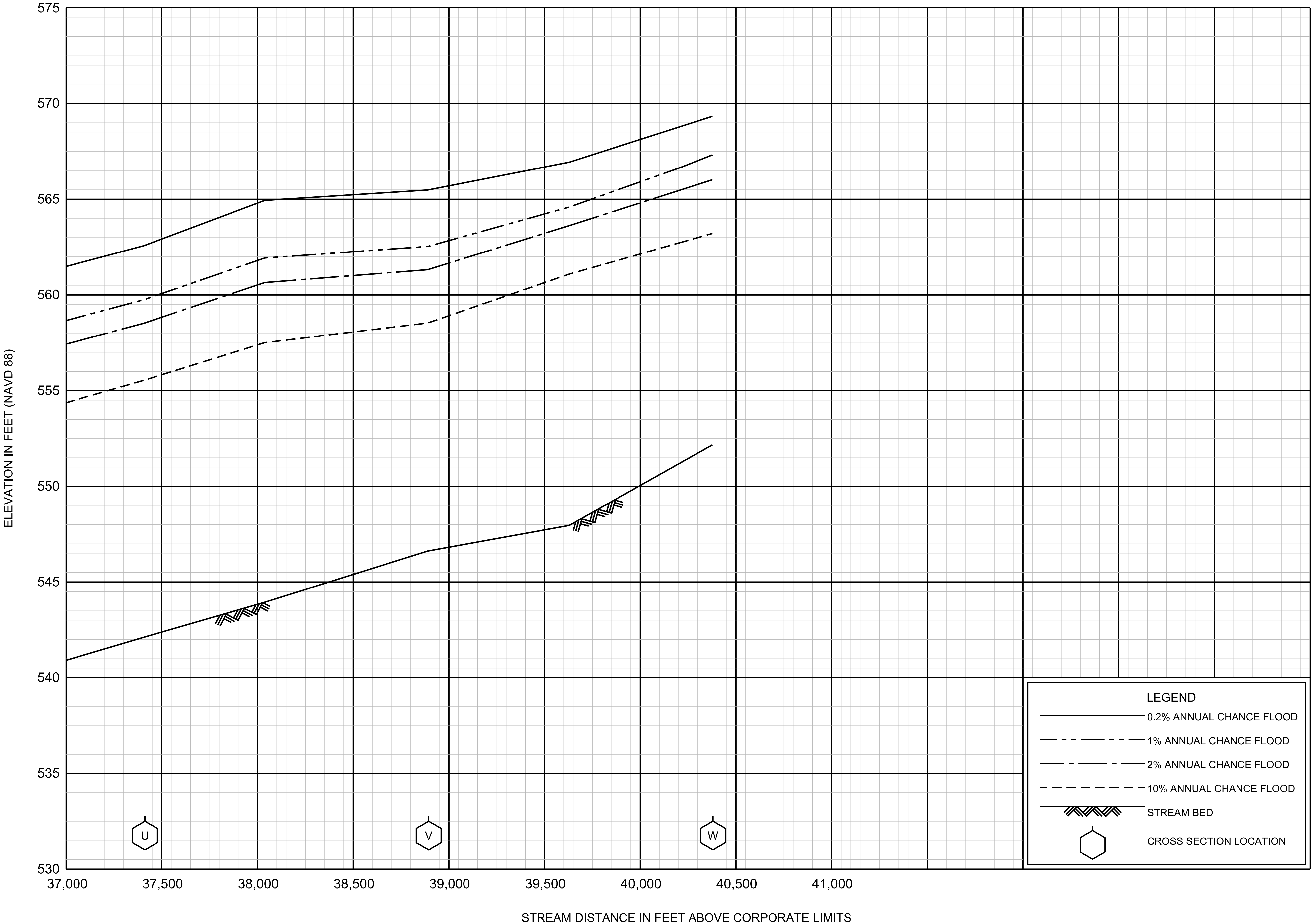
FLOOD PROFILES

HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



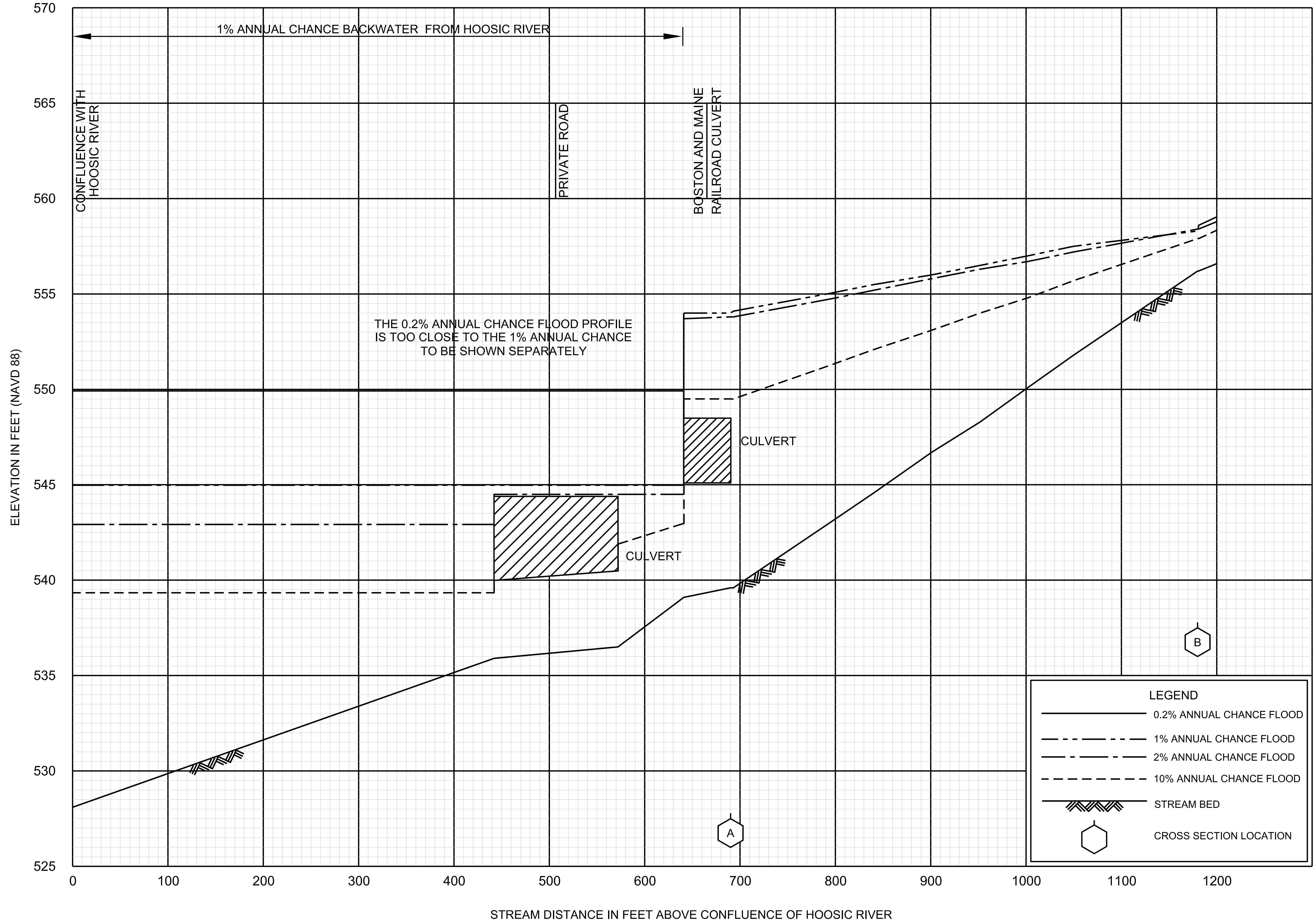
FLOOD PROFILES

HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



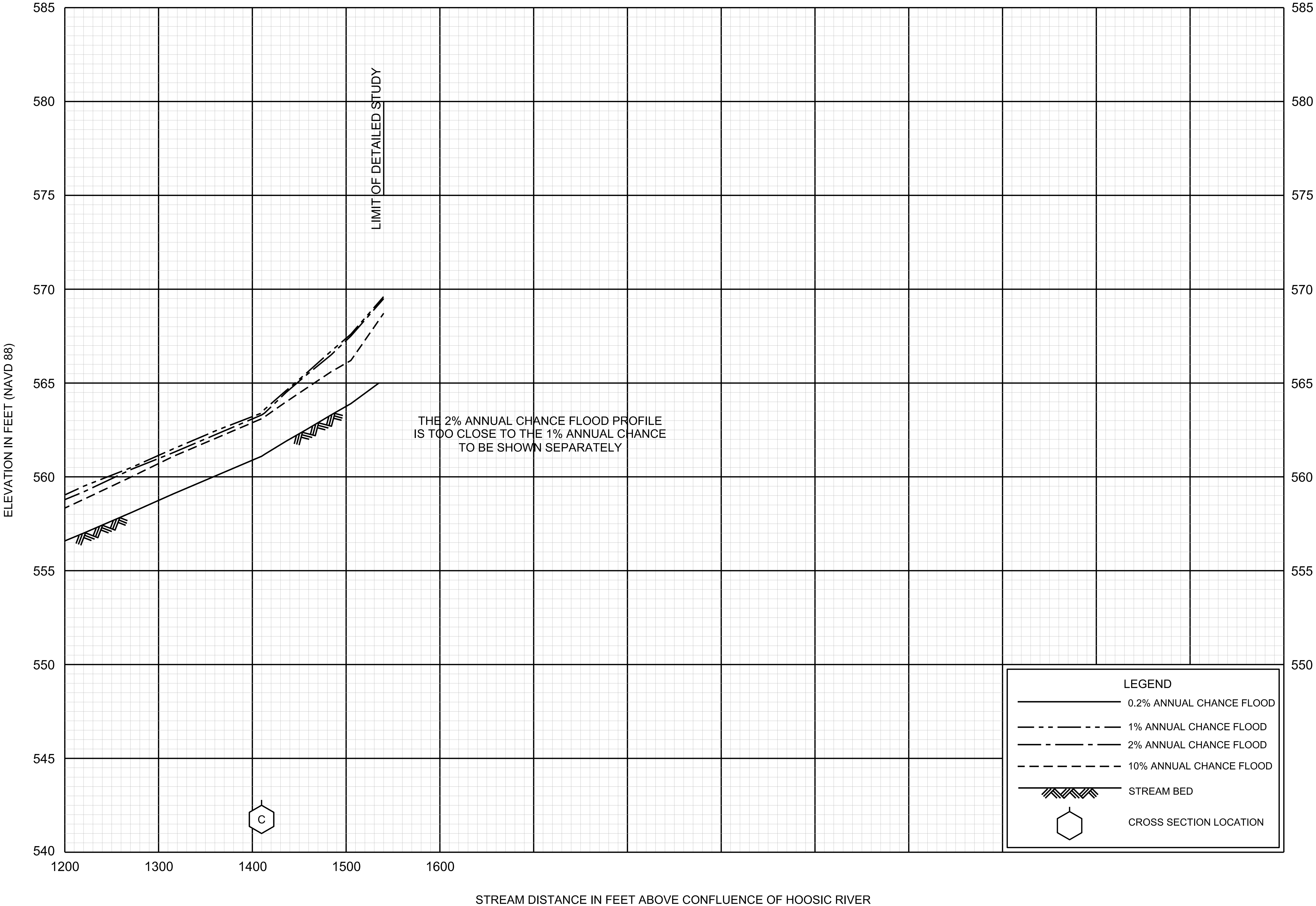
FLOOD PROFILES

LADD BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



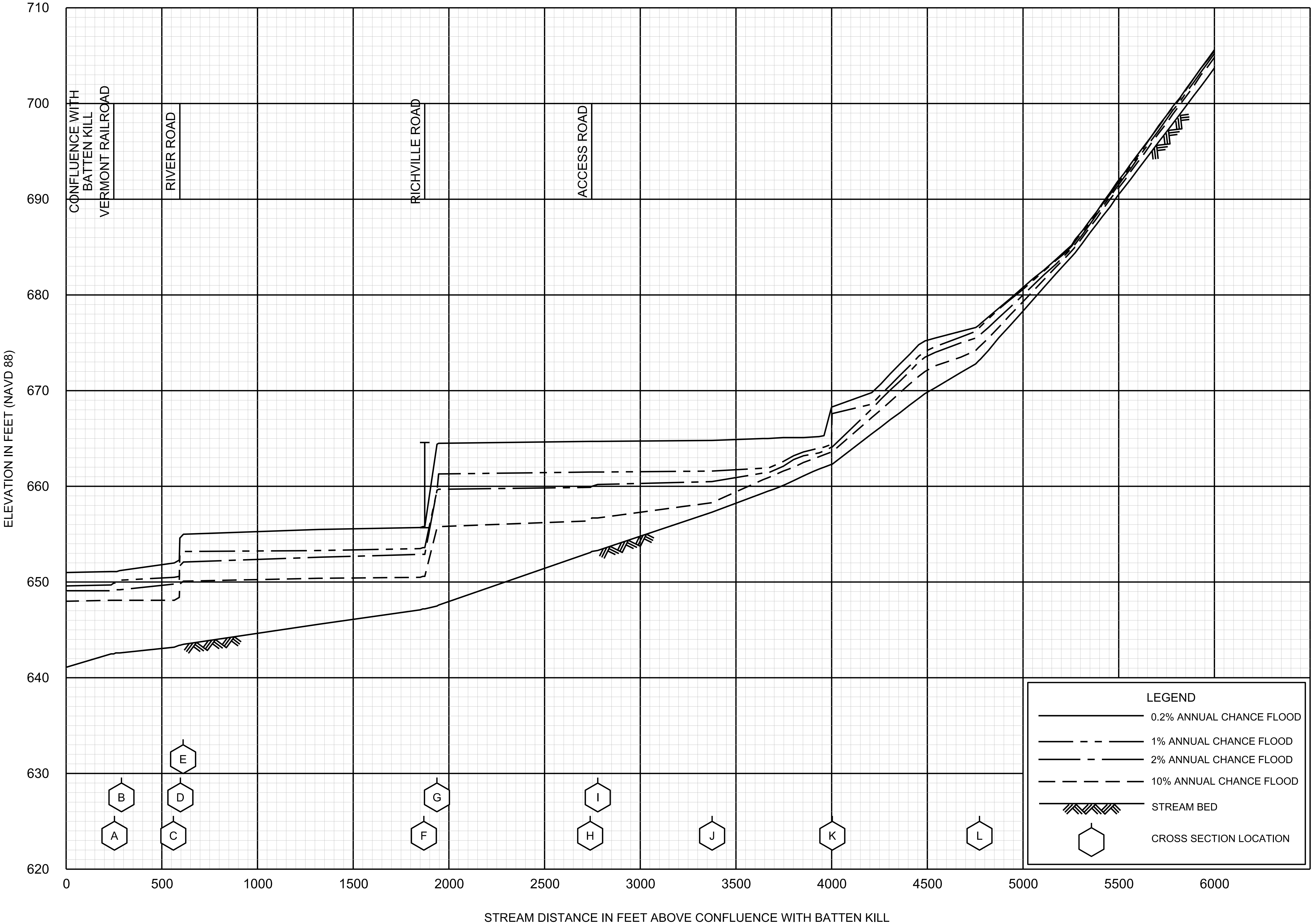
FLOOD PROFILES

LADD BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



FLOOD PROFILES

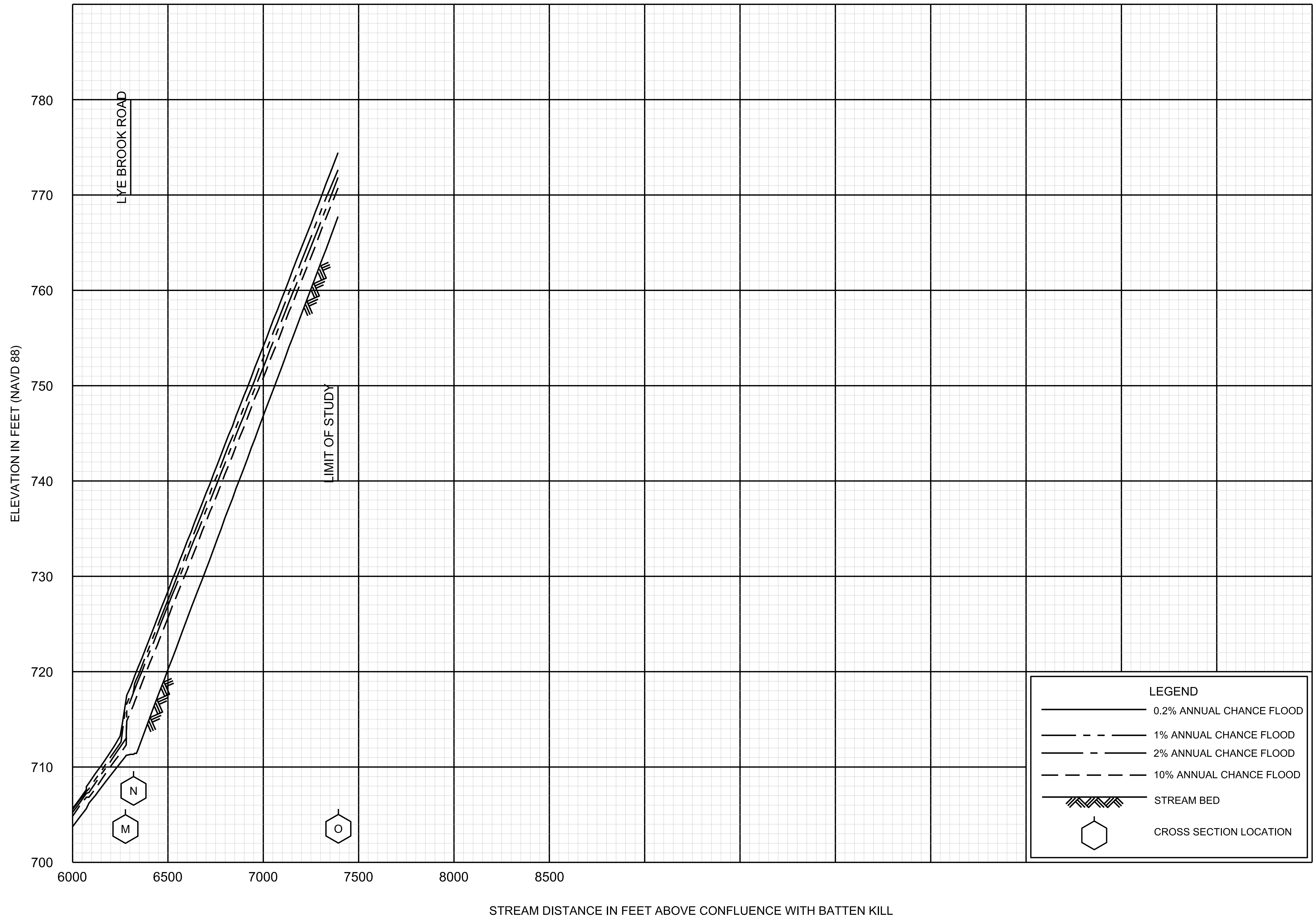
LYE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

30P



FLOOD PROFILES

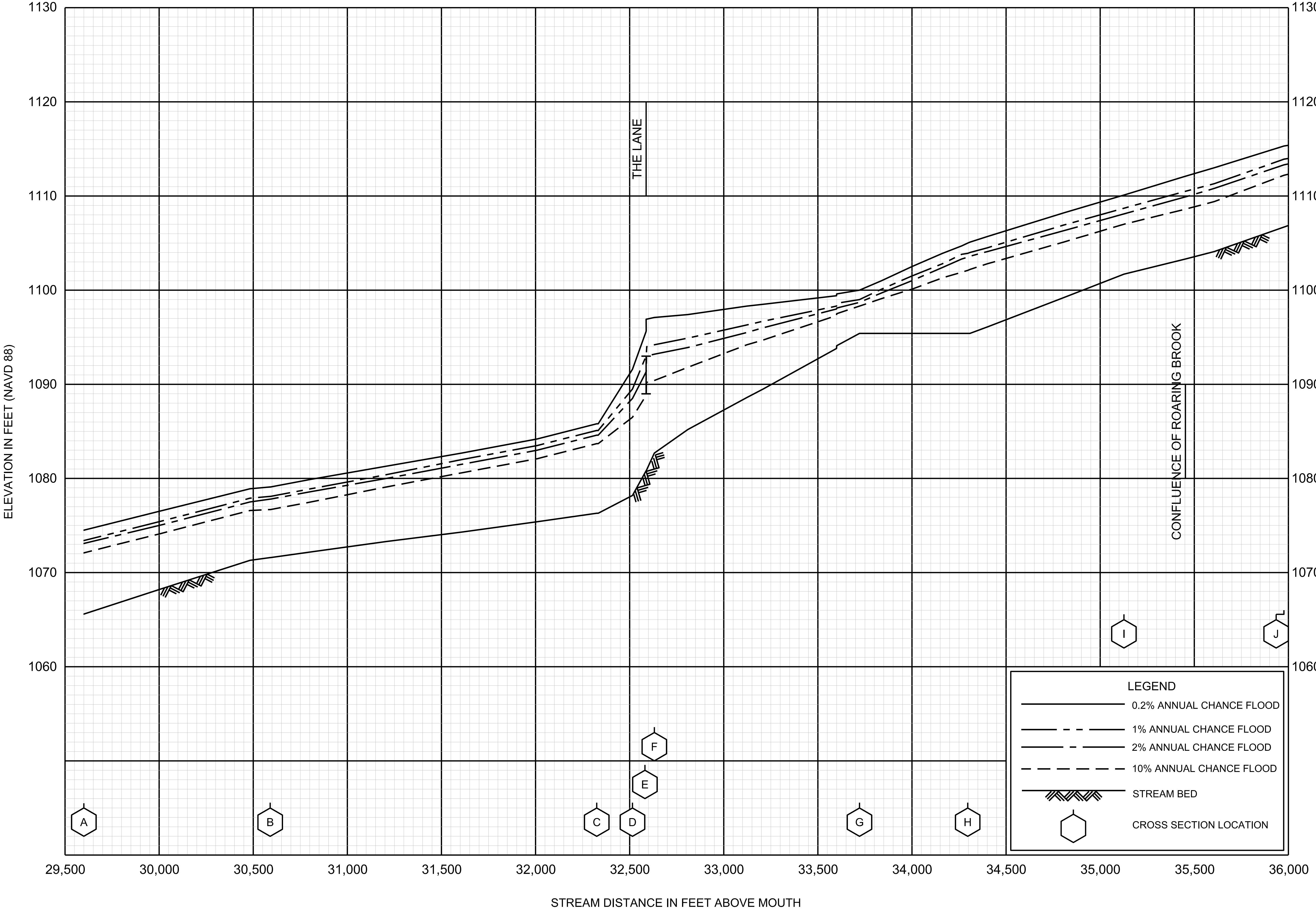
LYE BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

31P



FLOOD PROFILES

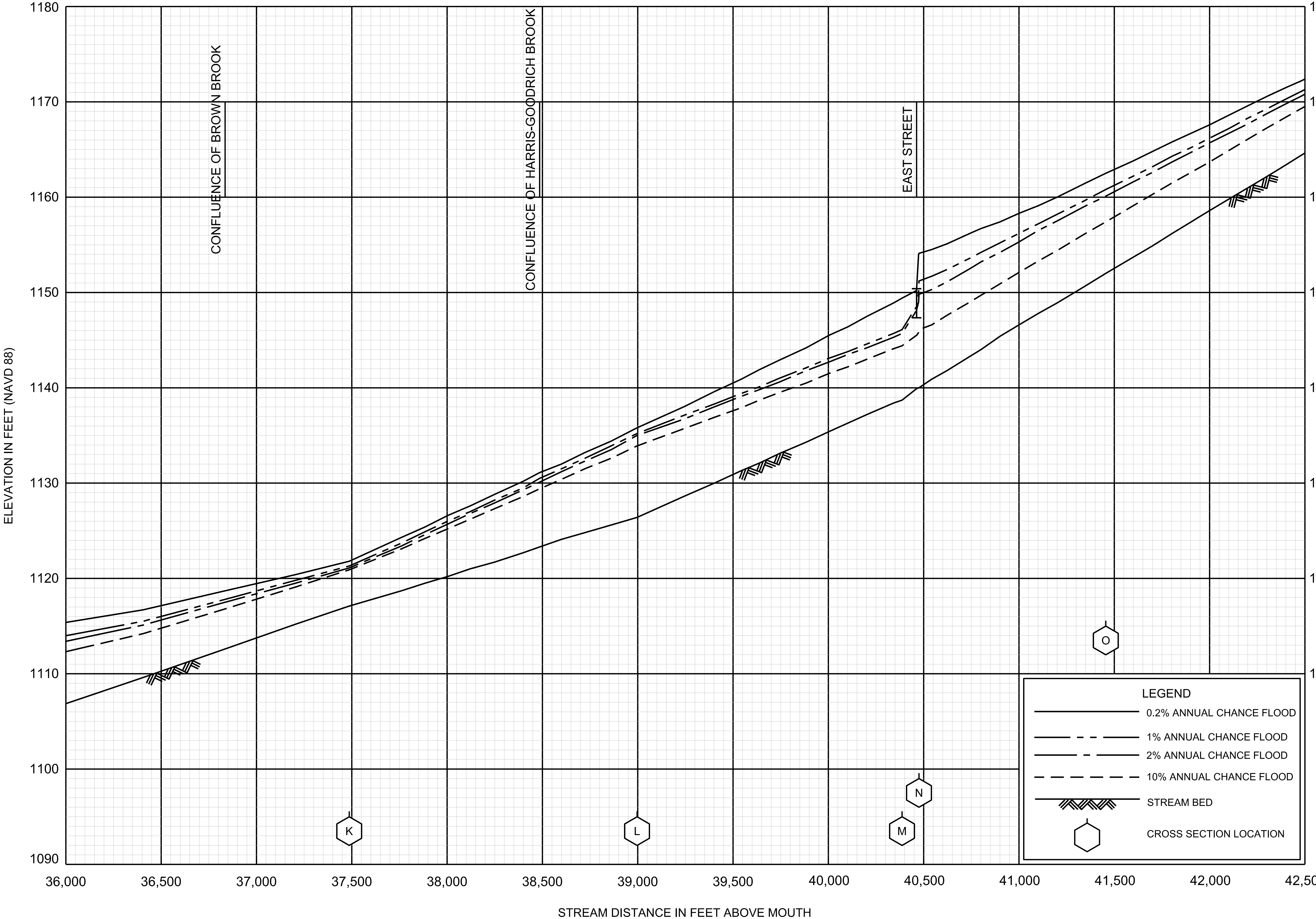
NORTH BRANCH HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

32P



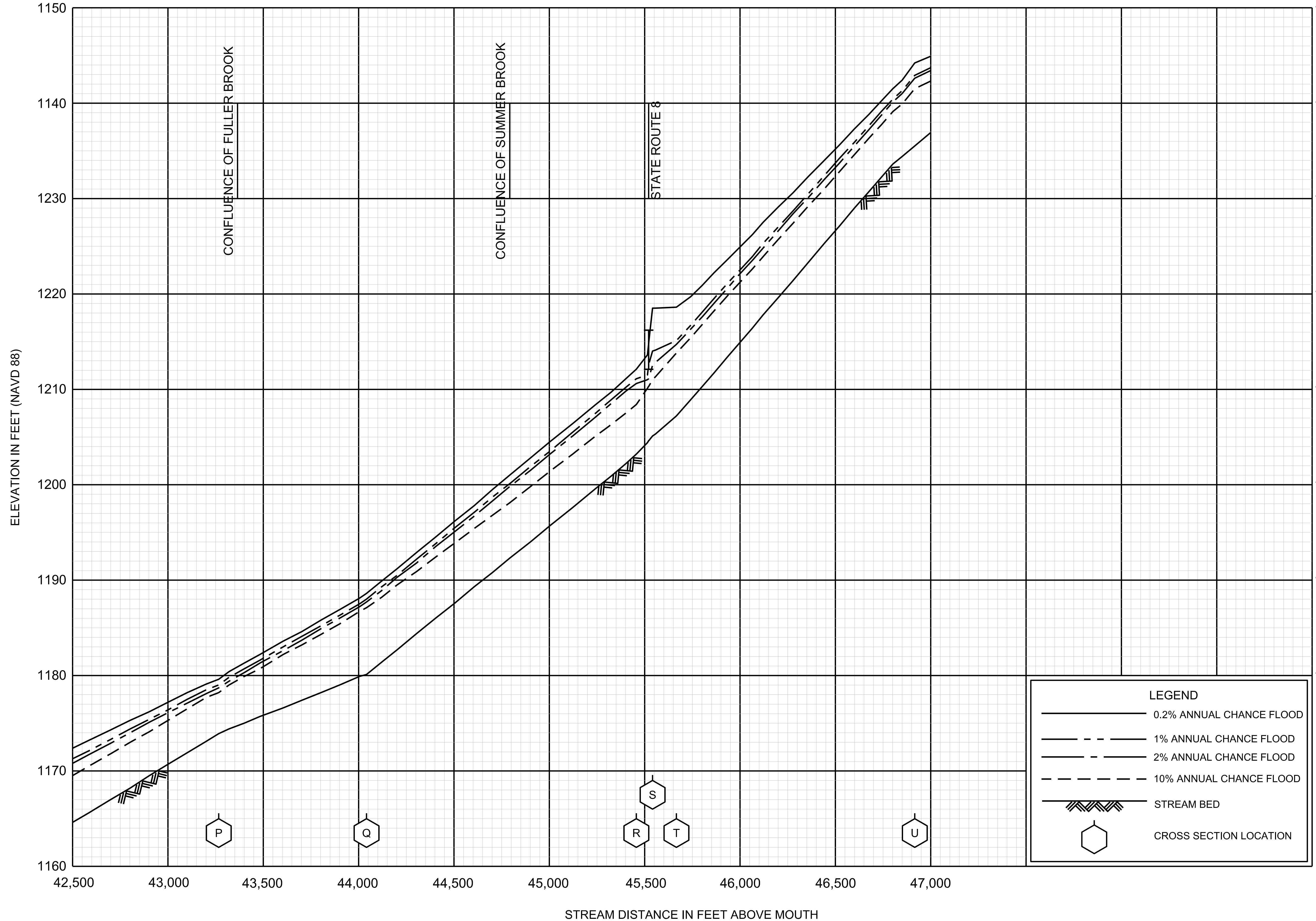
FLOOD PROFILES

NORTH BRANCH HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



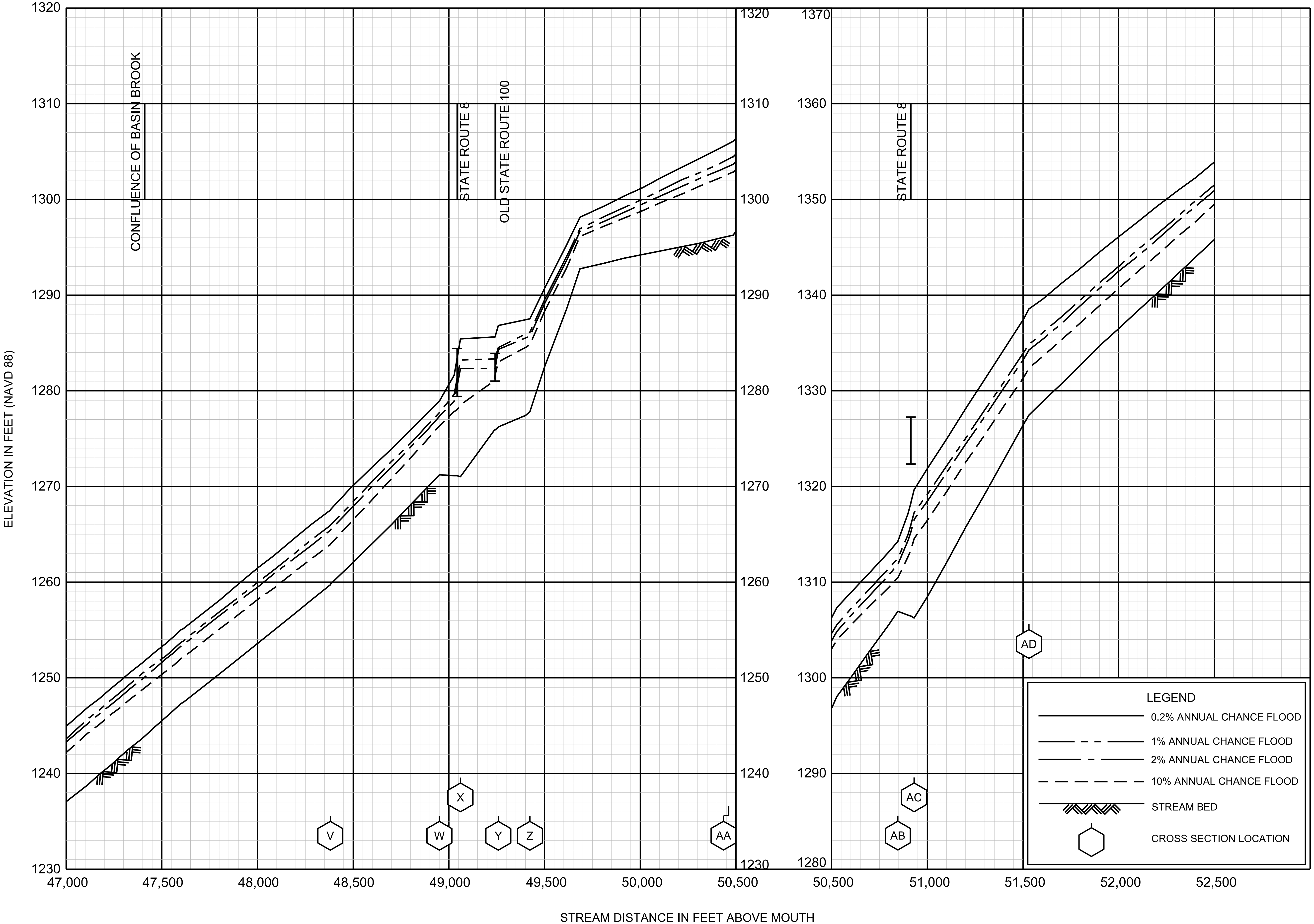
FLOOD PROFILES

NORTH BRANCH HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



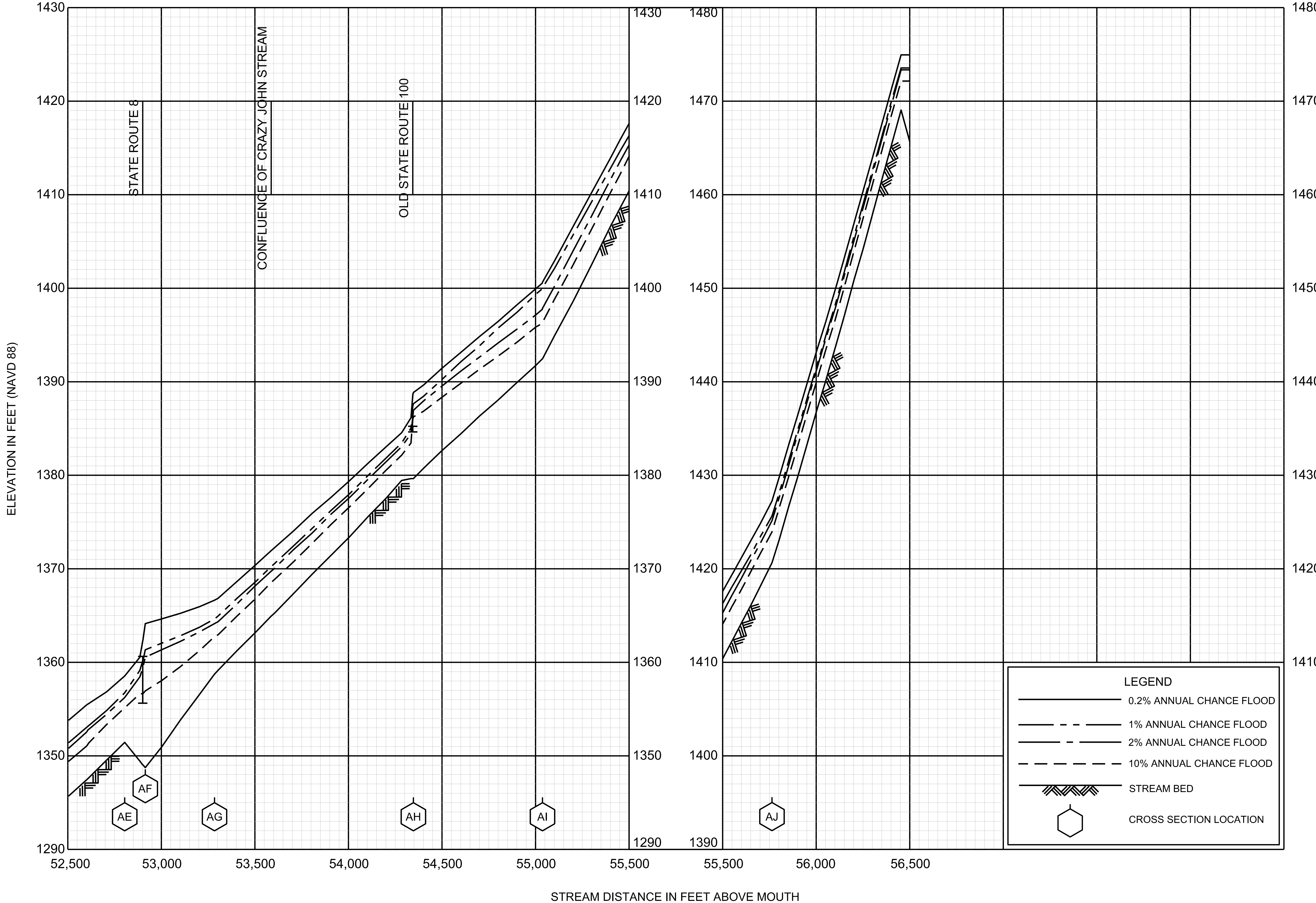
FLOOD PROFILES

NORTH BRANCH HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



FLOOD PROFILES

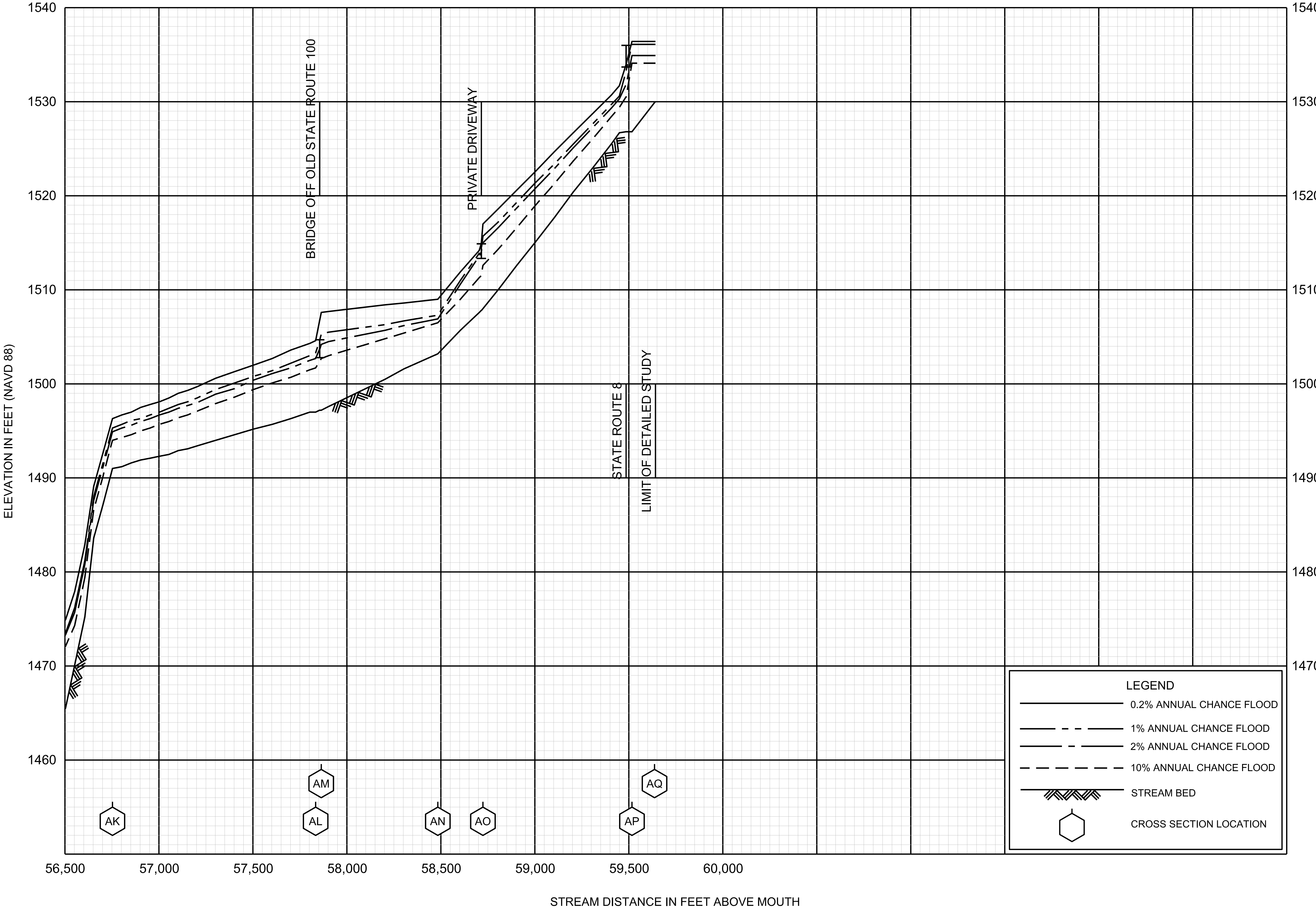
NORTH BRANCH HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

36P



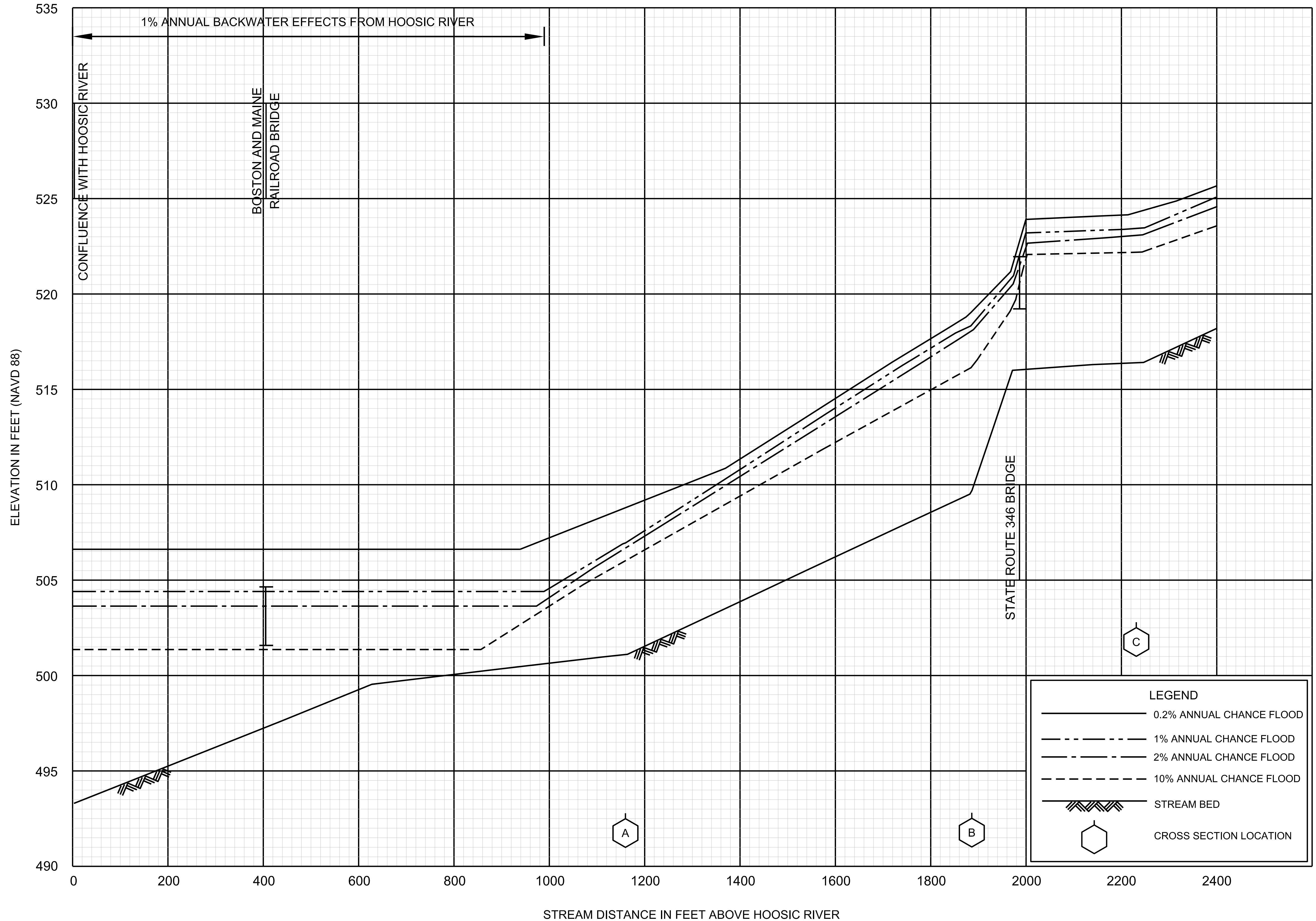
FLOOD PROFILES

NORTH BRANCH HOOSIC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



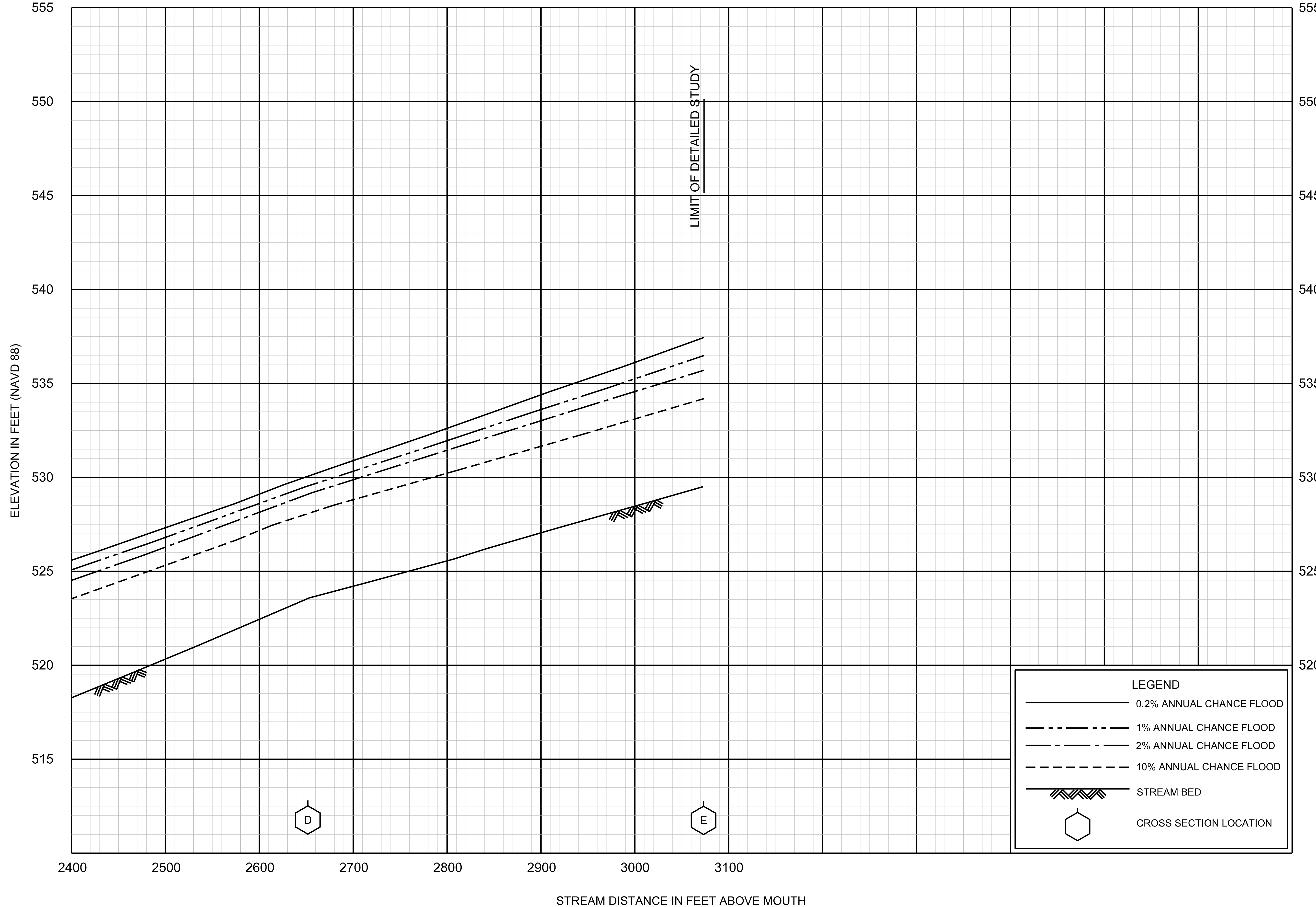
FLOOD PROFILES

POTTER HOLLOW BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



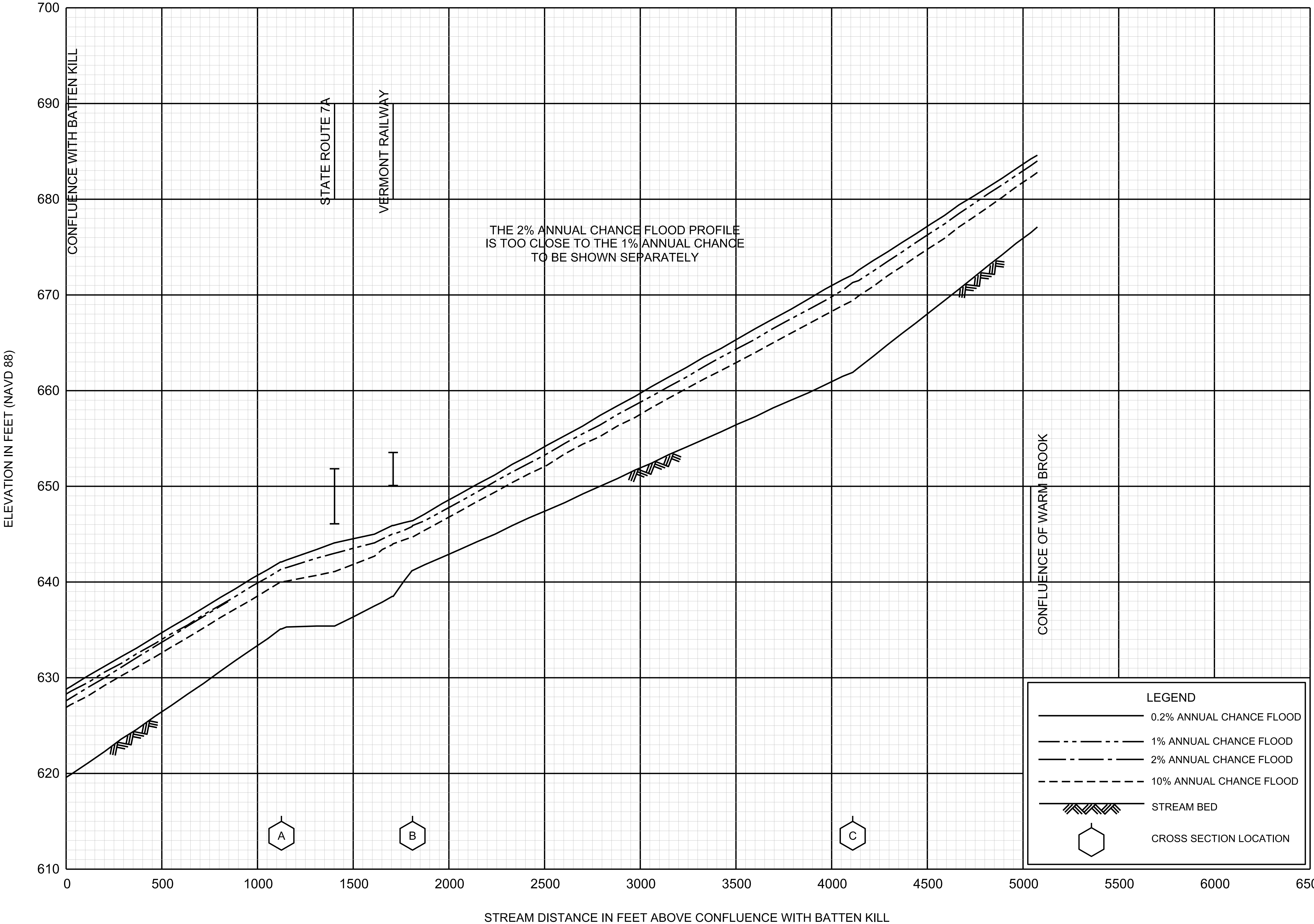
FLOOD PROFILES

POTTER HOLLOW BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



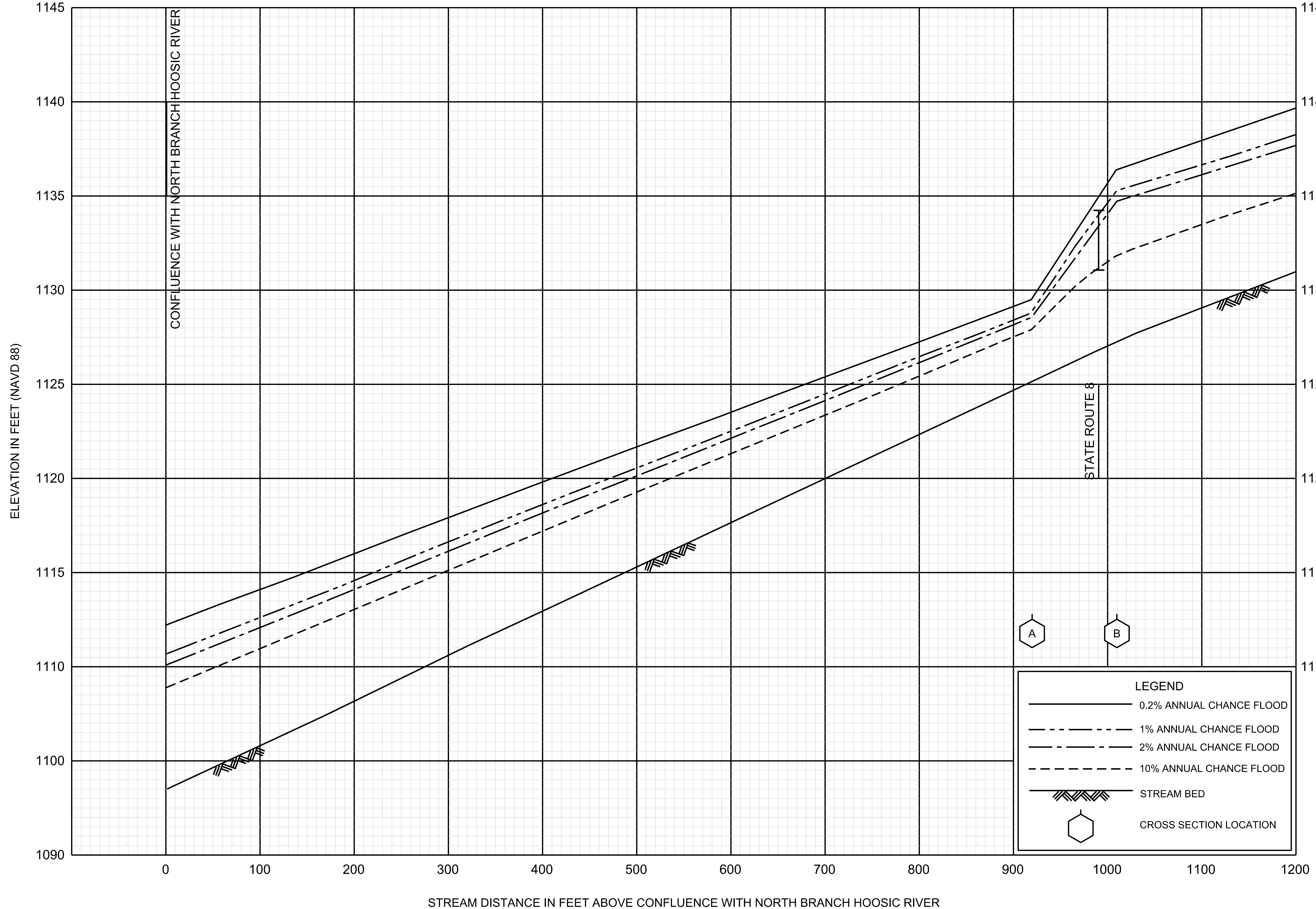
FLOOD PROFILES

ROARING BROOK NORTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



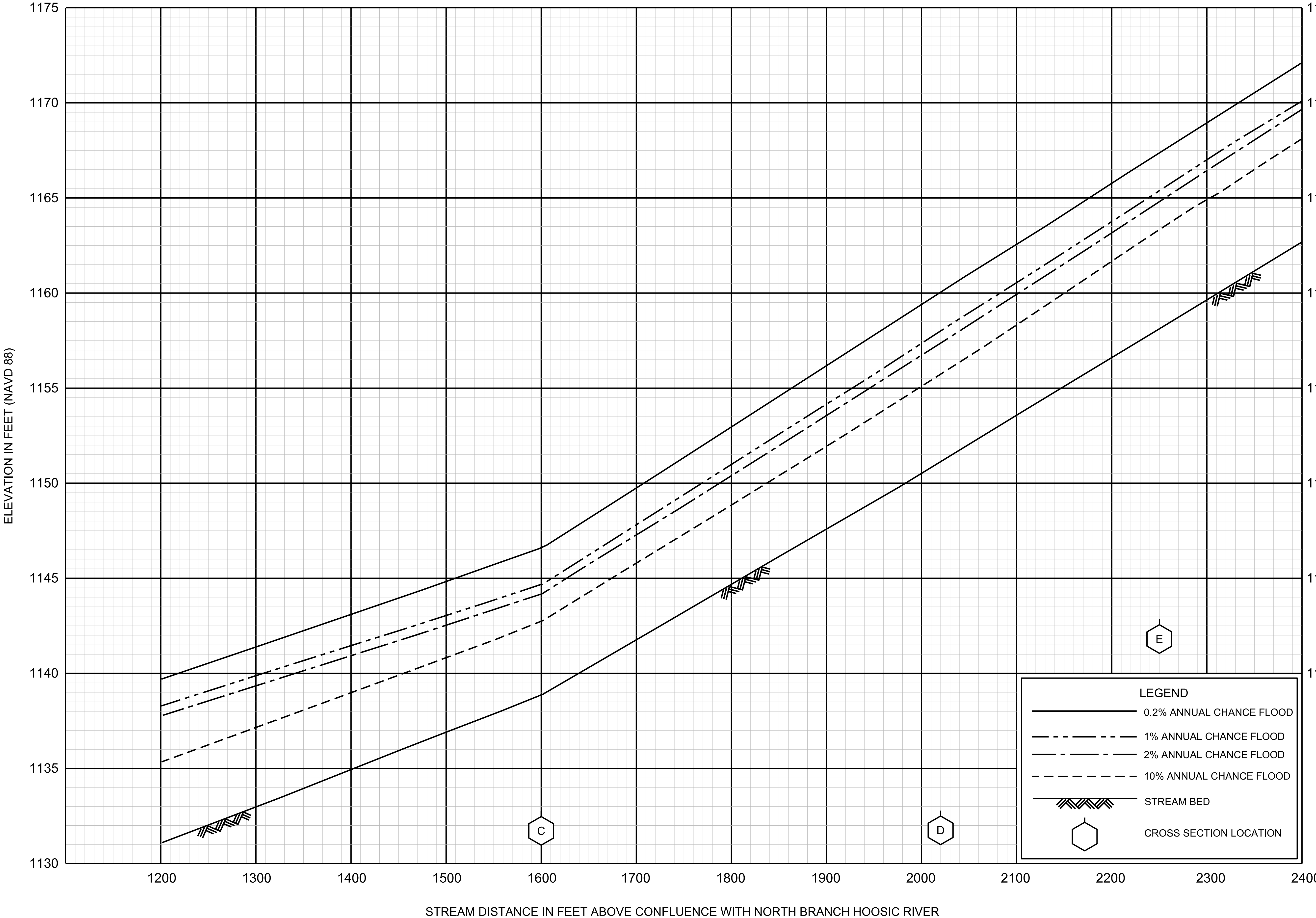
FLOOD PROFILES

ROARING BROOK SOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



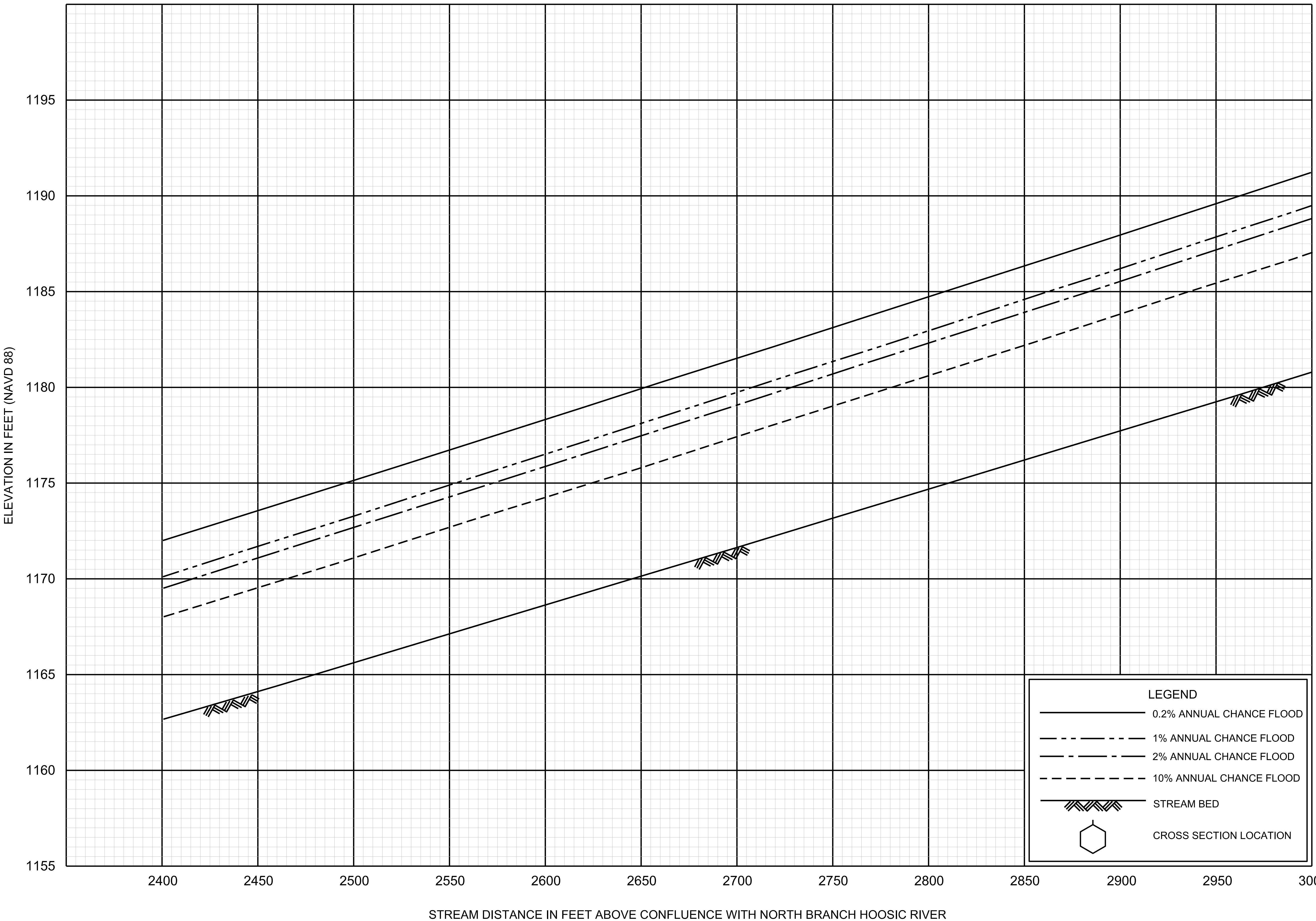
FLOOD PROFILES

ROARING BROOK SOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



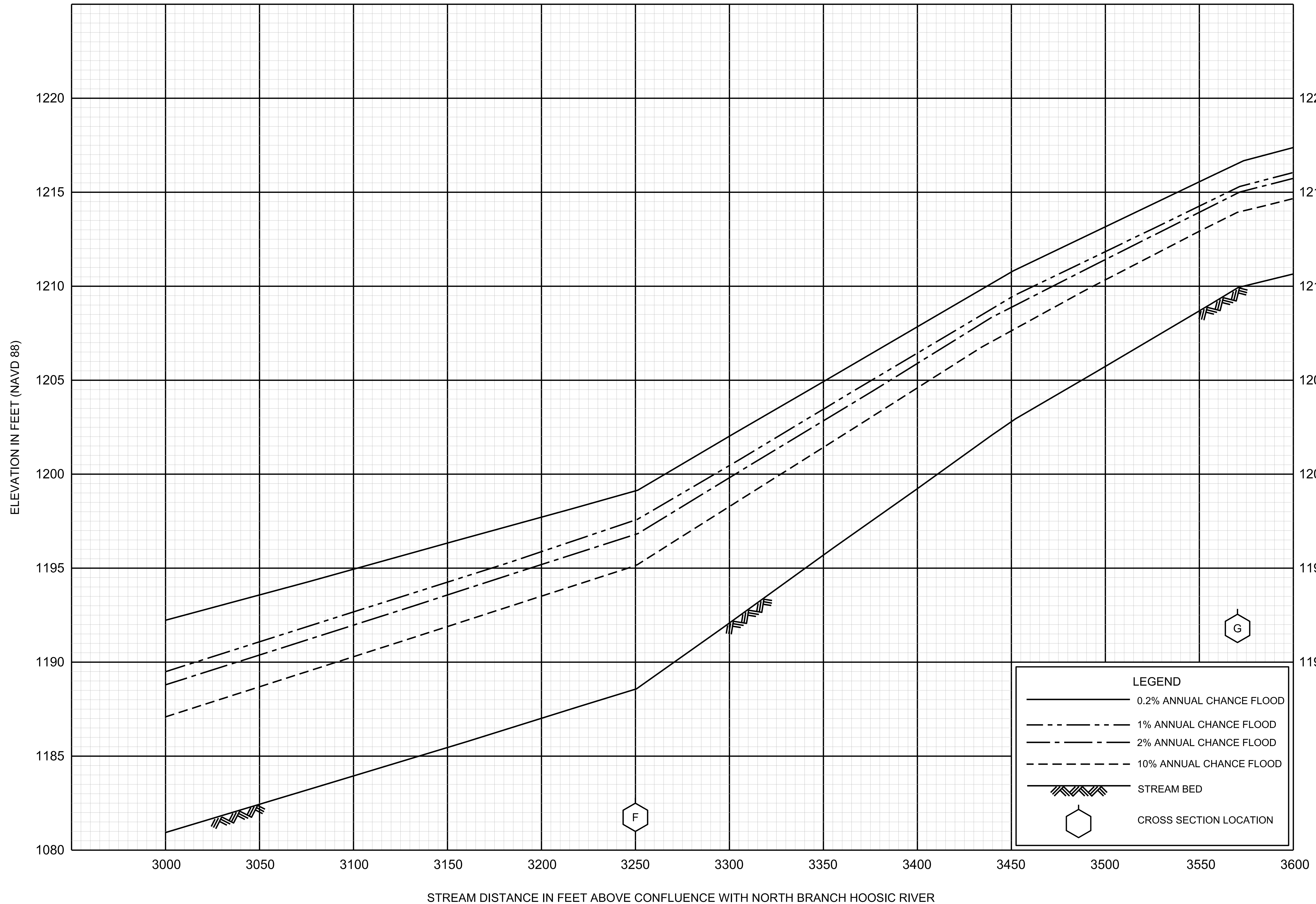
FLOOD PROFILES

ROARING BROOK SOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



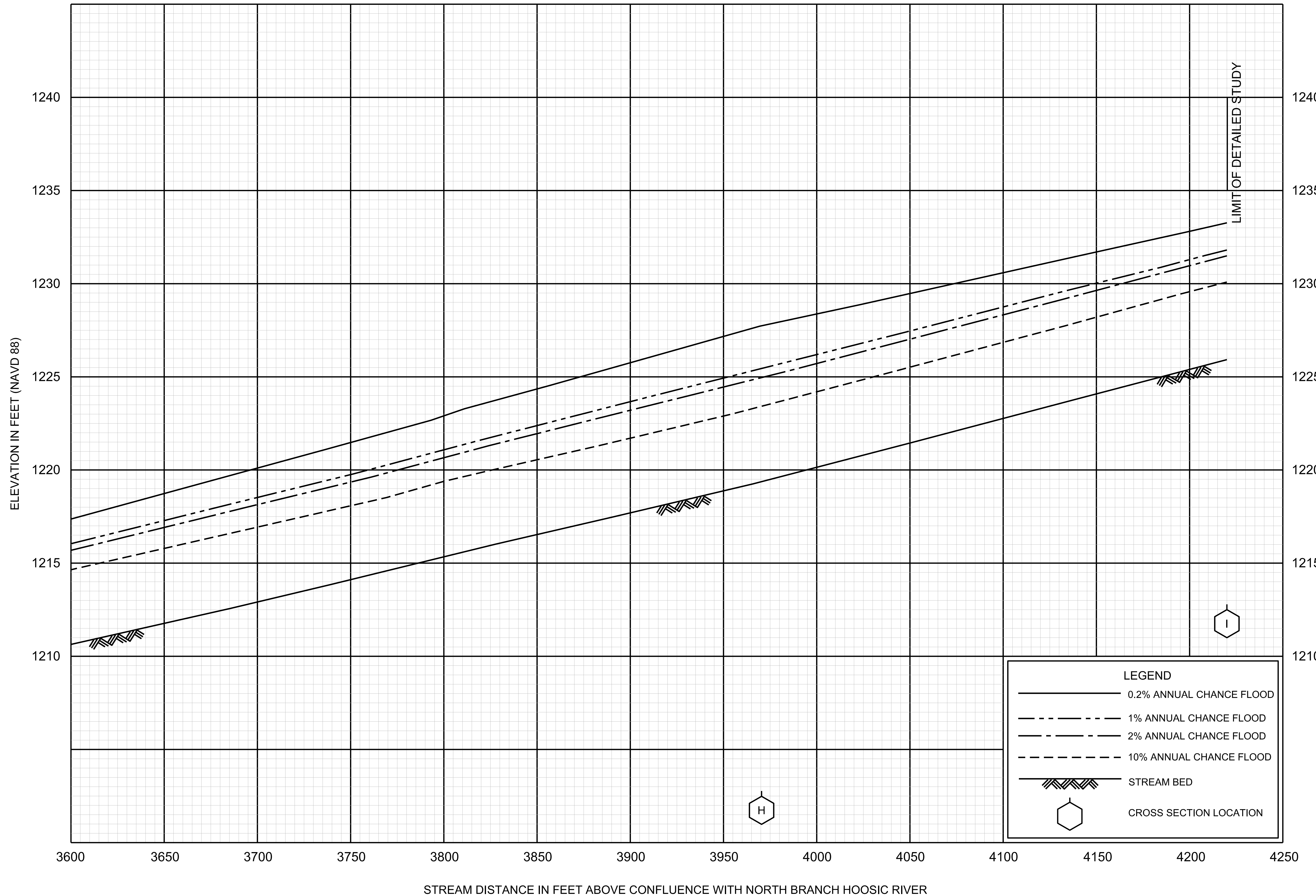
FLOOD PROFILES

ROARING BROOK SOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



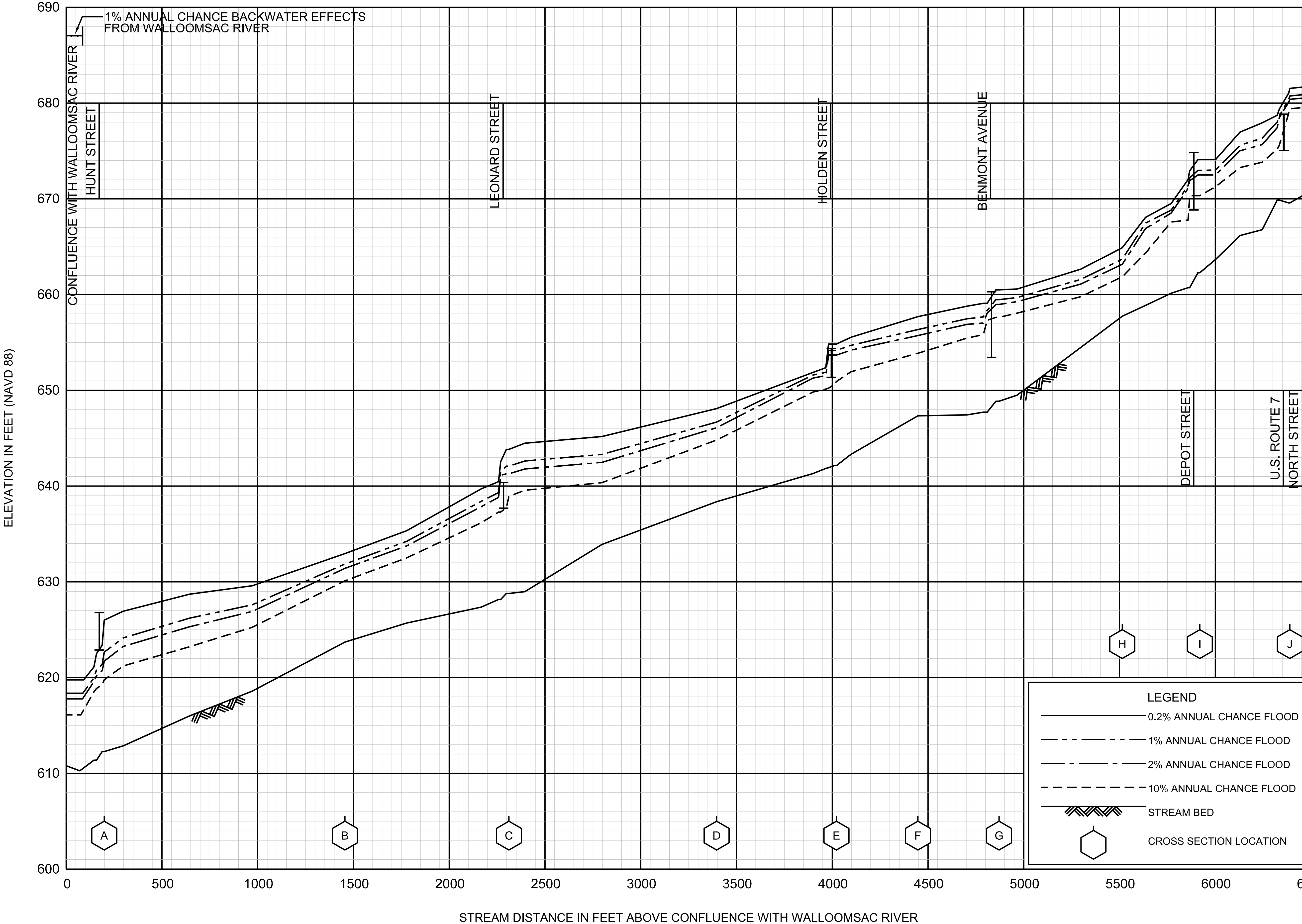
FLOOD PROFILES

ROARING BROOK SOUTH

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



FLOOD PROFILES

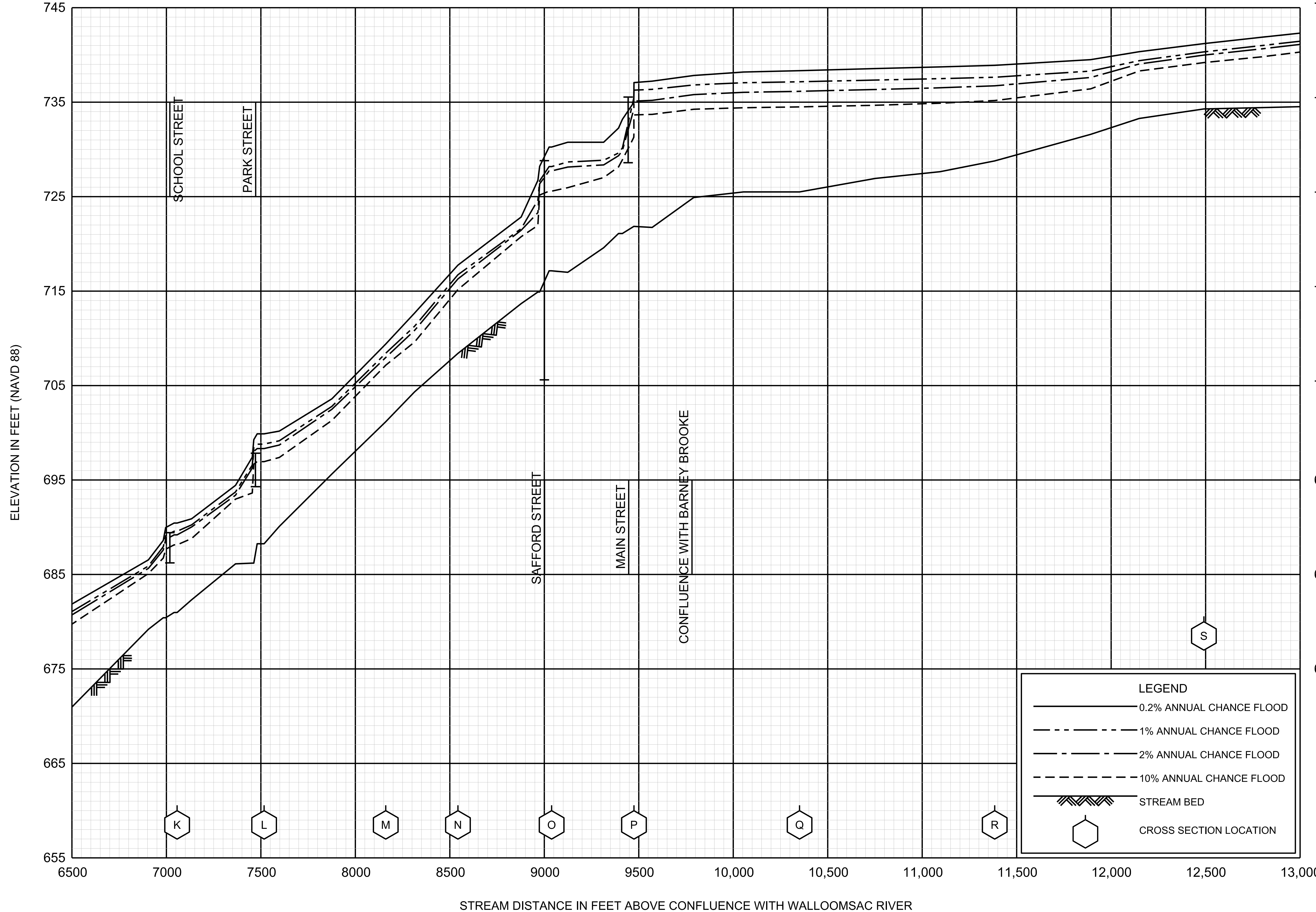
SOUTH STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS

46P



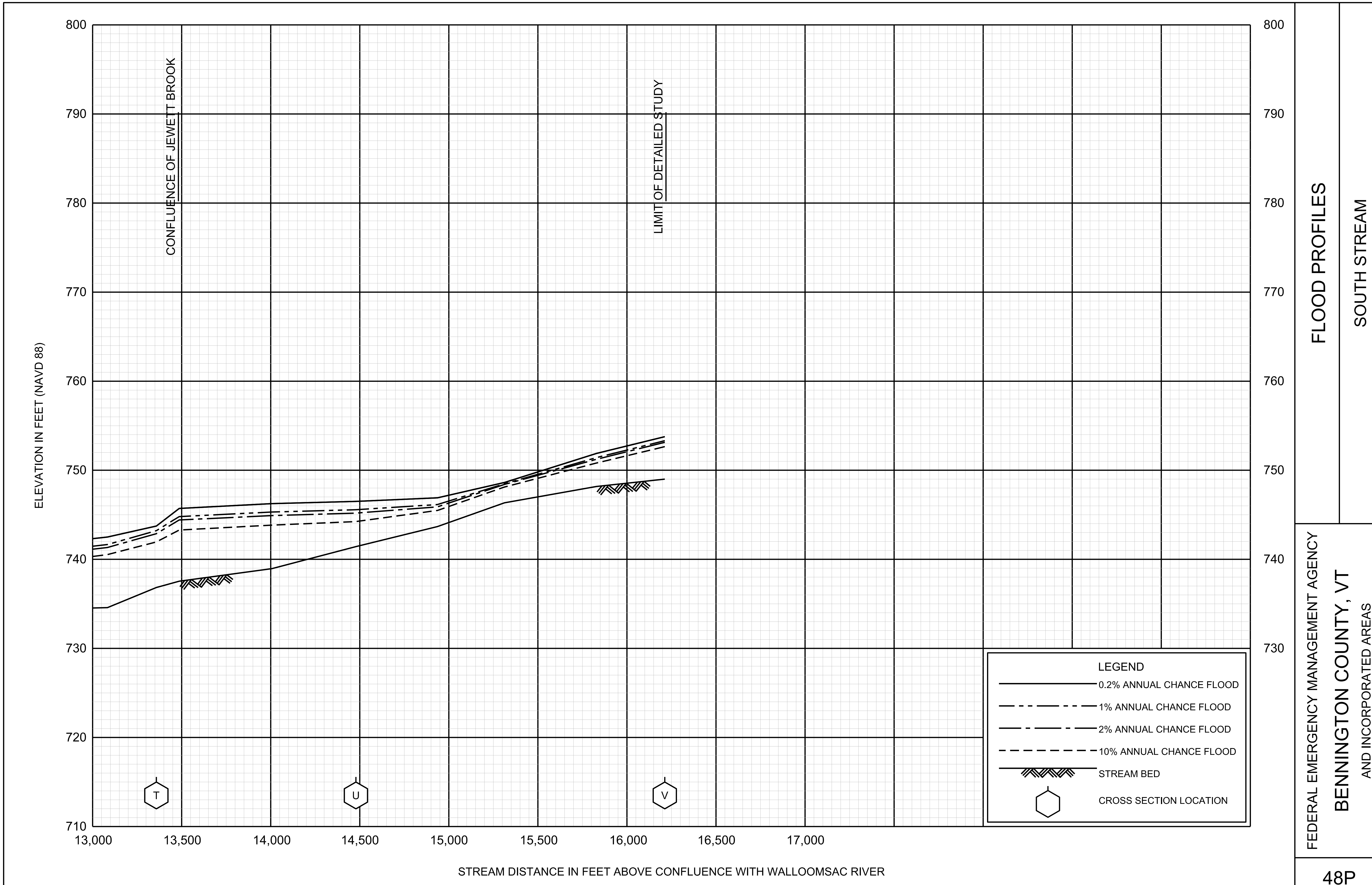
FLOOD PROFILES

SOUTH STREAM

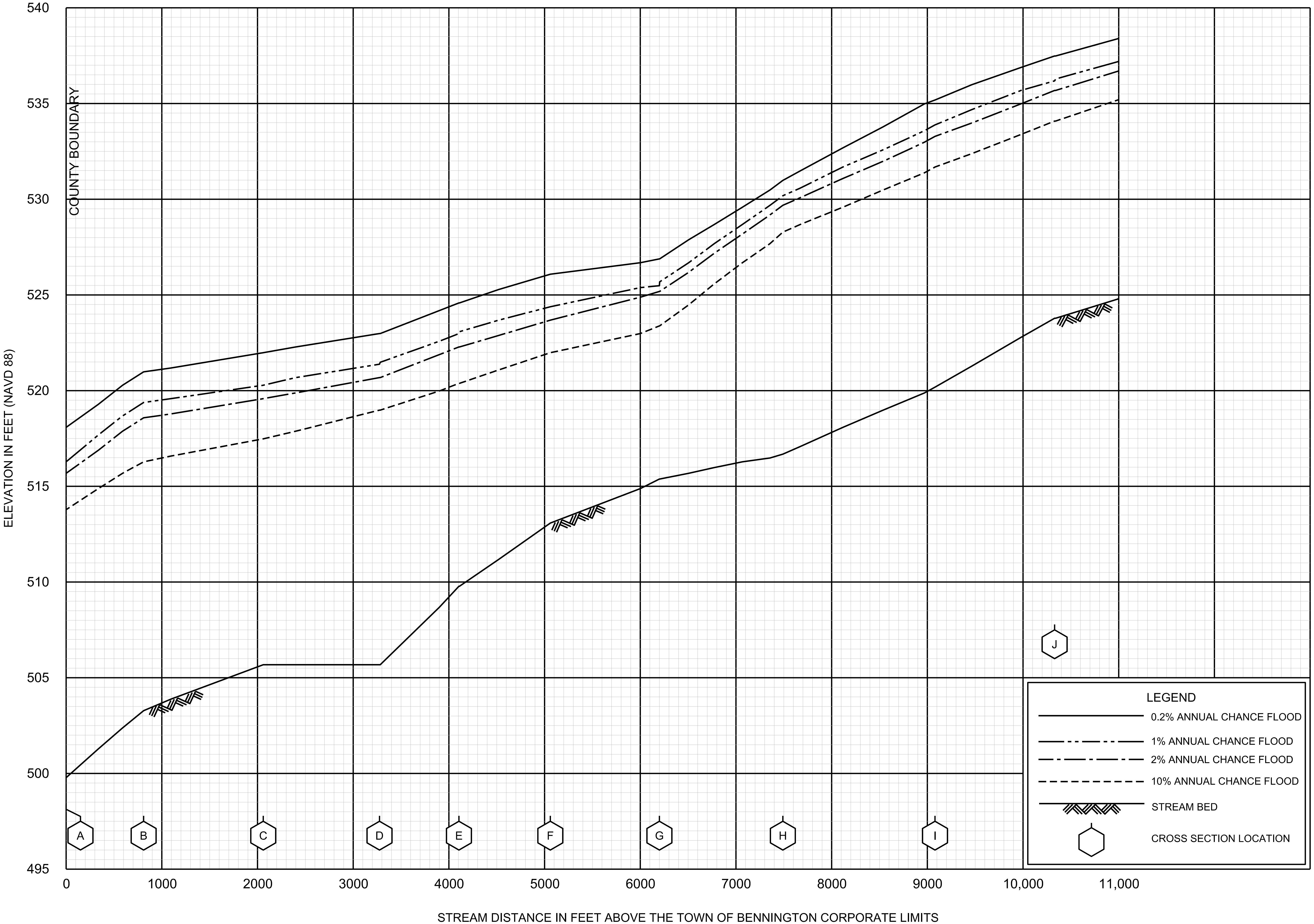
FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



FLOOD PROFILES
SOUTH STREAM
FEDERAL EMERGENCY MANAGEMENT AGENCY
BENNINGTON COUNTY, VT
AND INCORPORATED AREAS
ELEVATION IN FEET (NAVD 88)
STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH WALLOOMSAC RIVER
CONFLUENCE OF JEWETT BROOK
LIMIT OF DETAILED STUDY
800
790
780
770
760
750
740
730
720
710
13,000
13,500
14,000
14,500
15,000
15,500
16,000
16,500
17,000
T
U
V
LEGEND
0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION



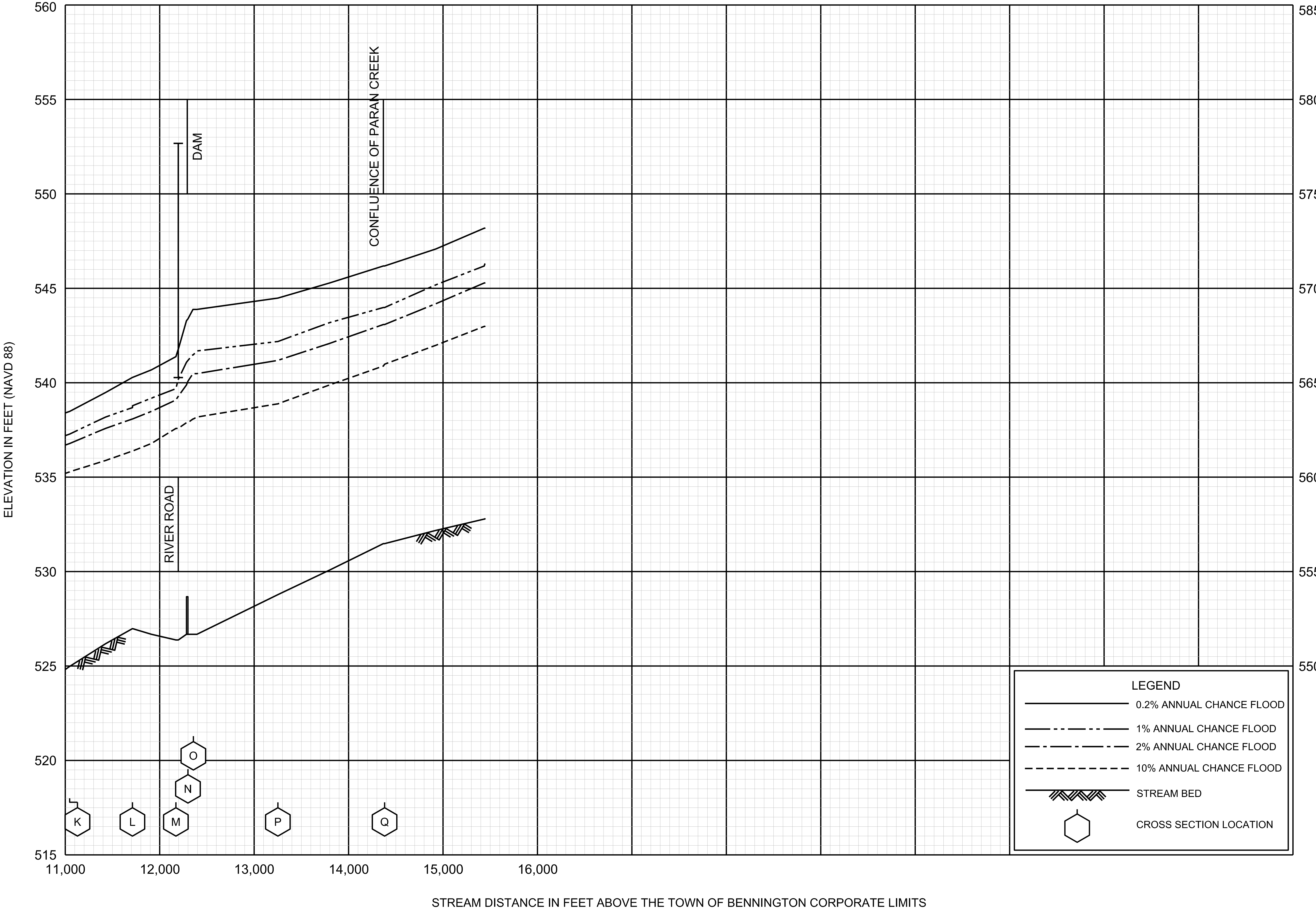
FLOOD PROFILES

WALLOOMSAC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



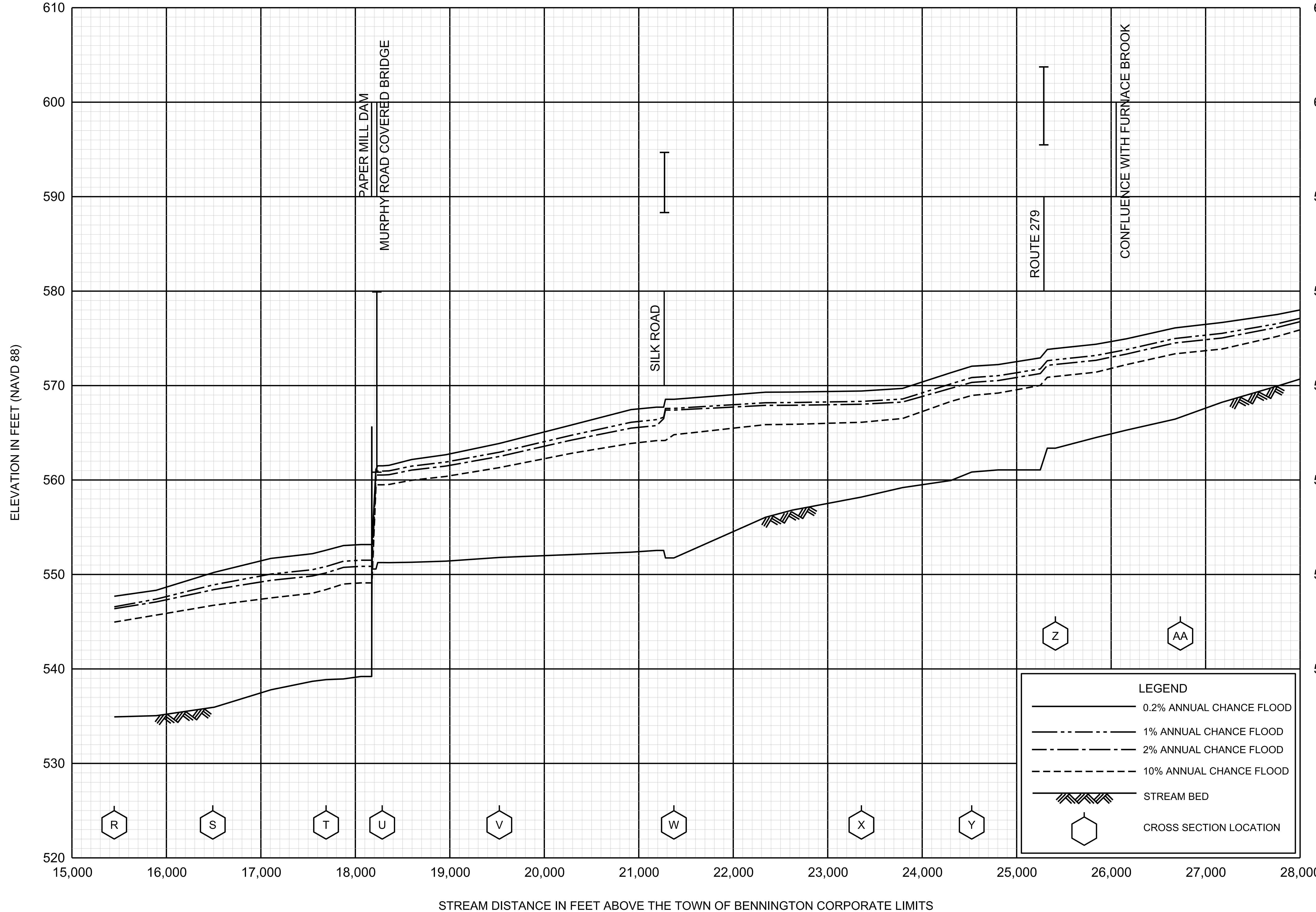
FLOOD PROFILES

WALLOOMSAC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



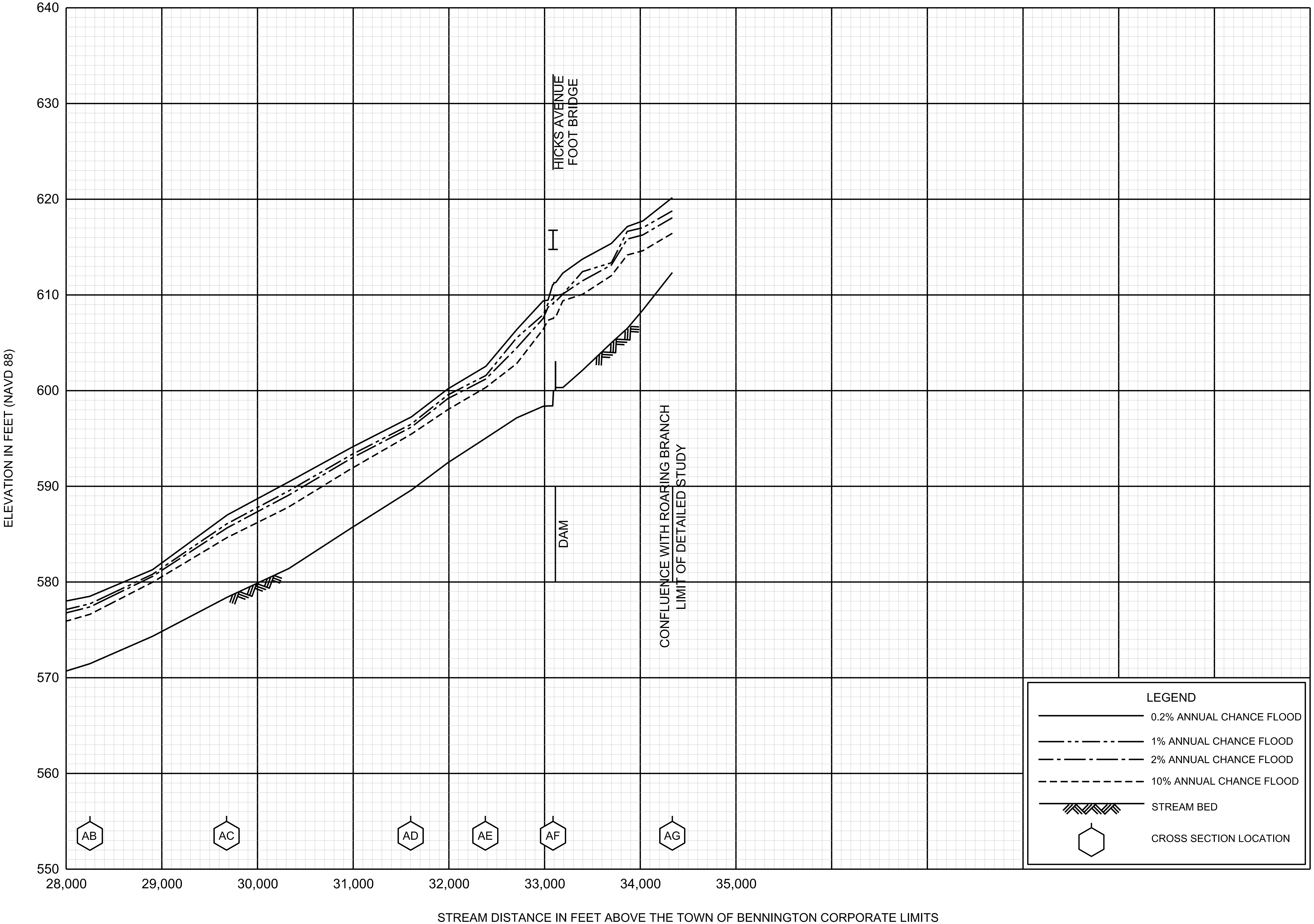
FLOOD PROFILES

WALLOOMSAC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



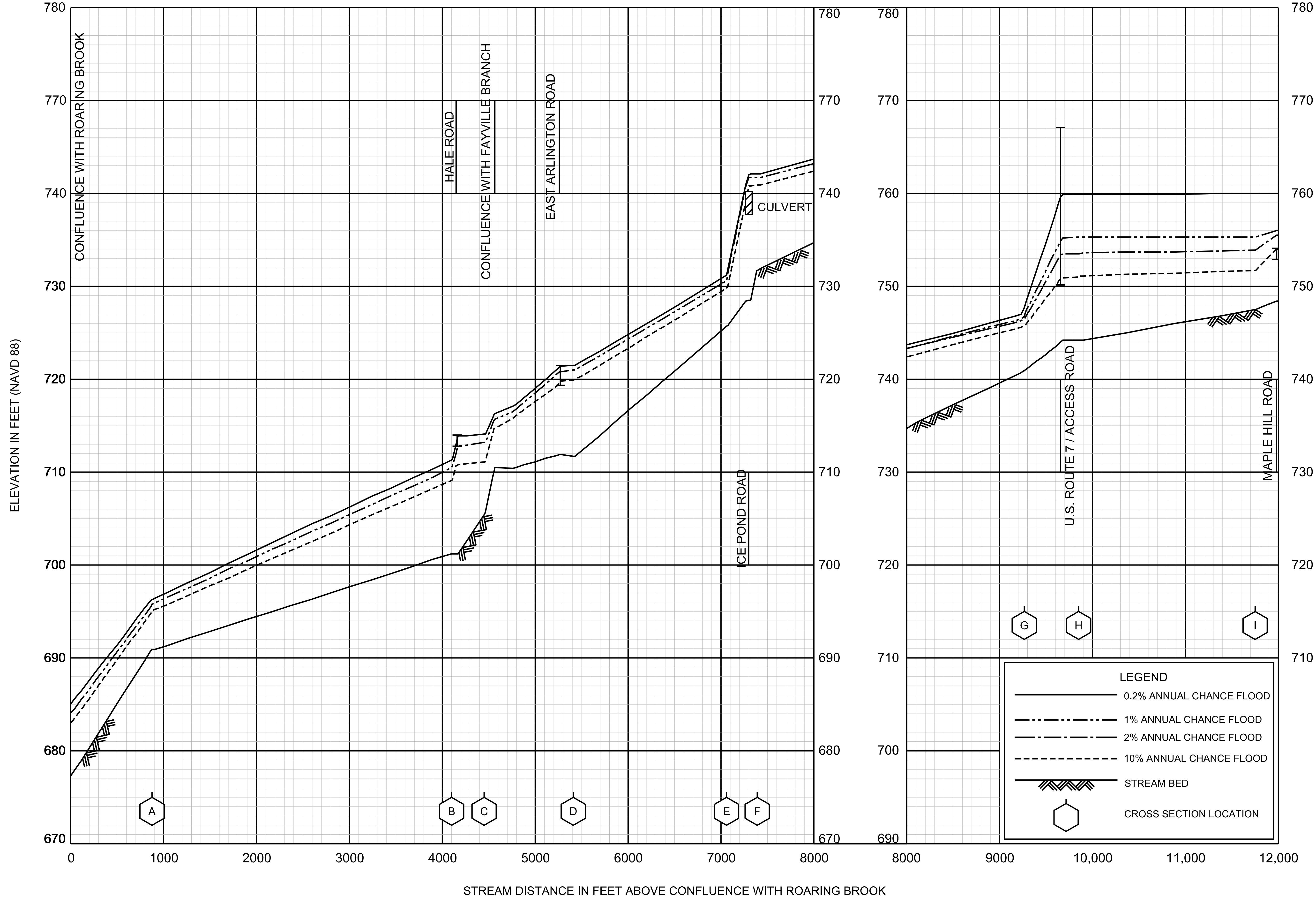
FLOOD PROFILES

WALLOOMSAC RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



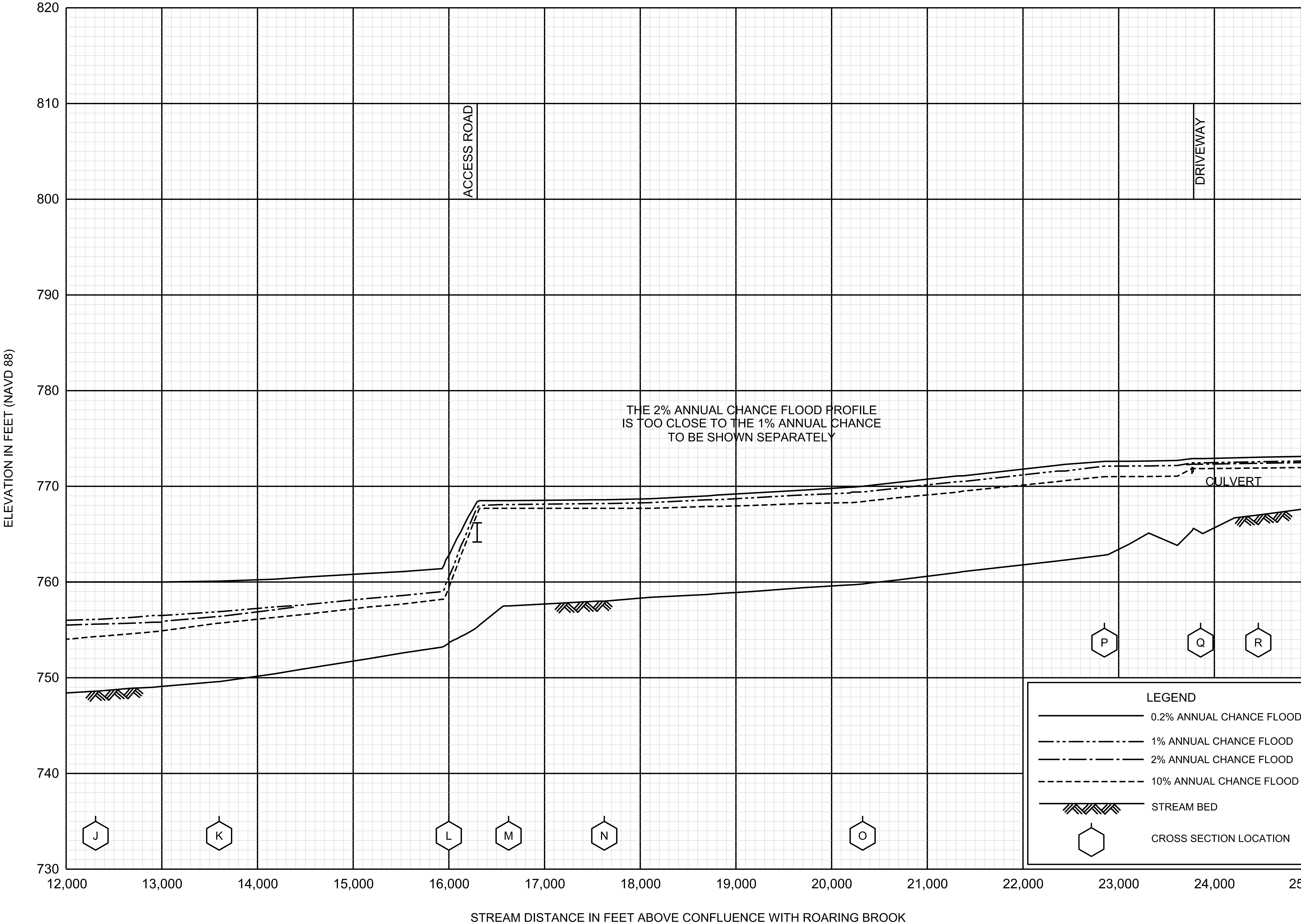
FLOOD PROFILES

WARM BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



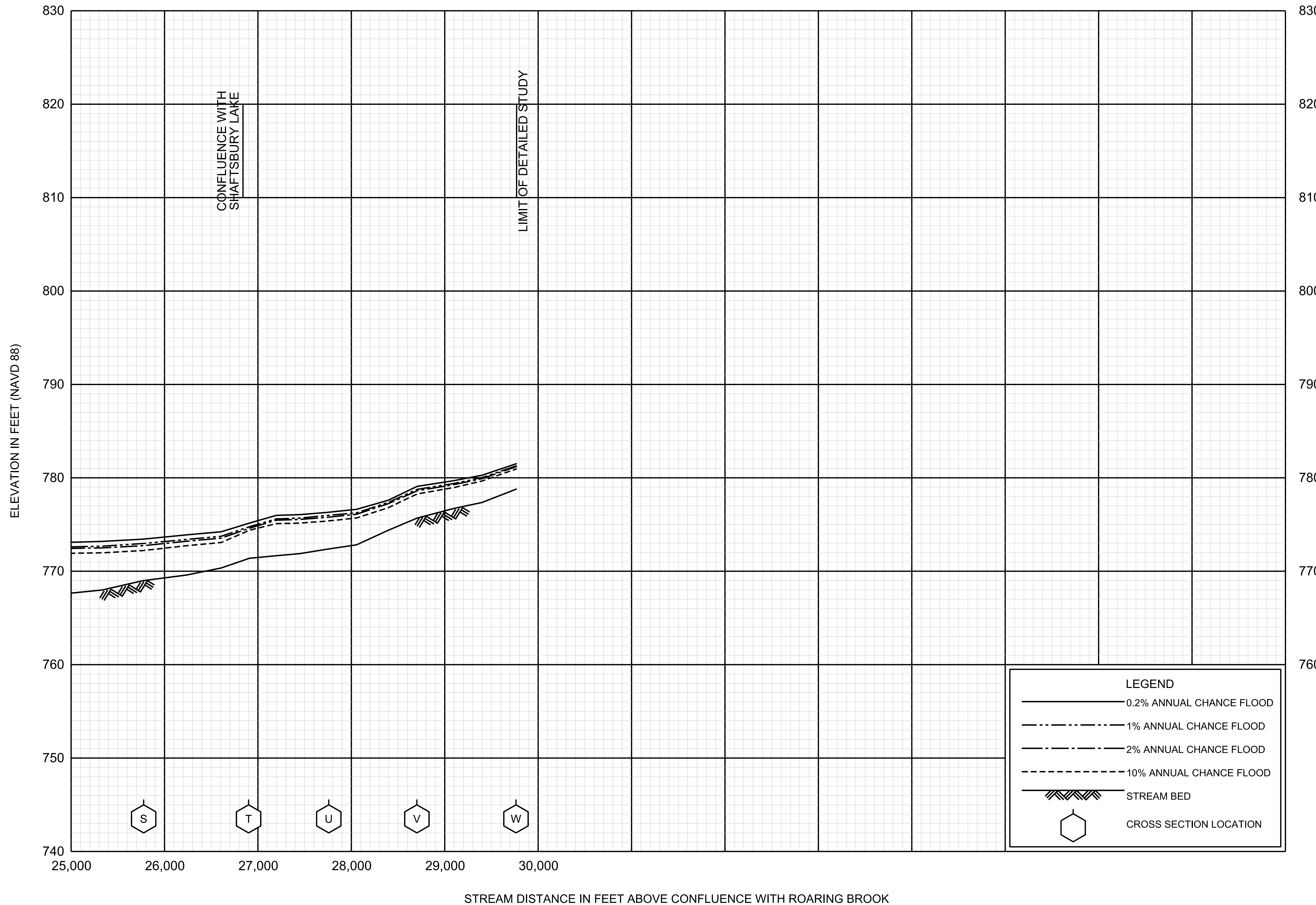
FLOOD PROFILES

WARM BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



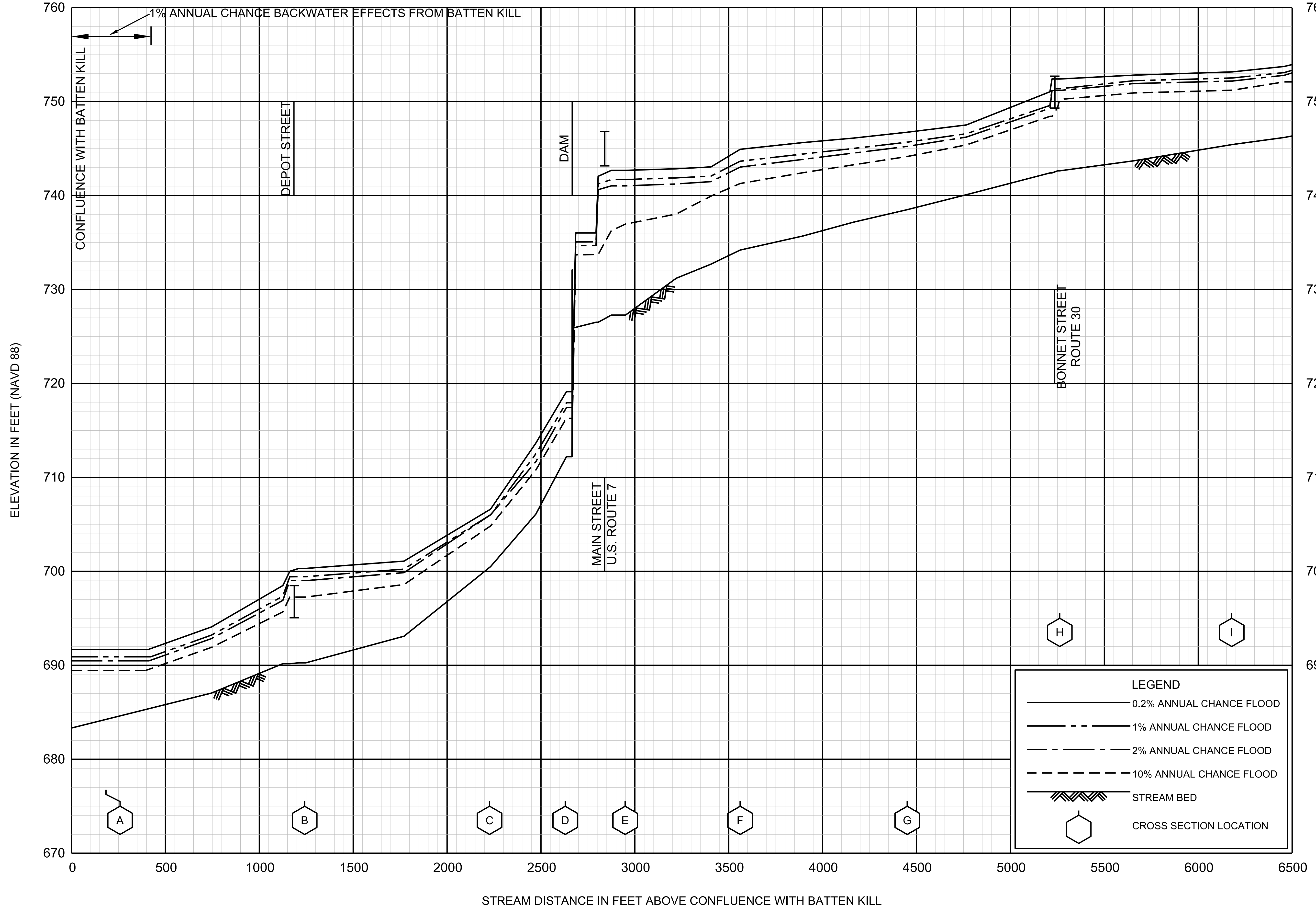
FLOOD PROFILES

WARM BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

(ALL JURISDICTIONS)



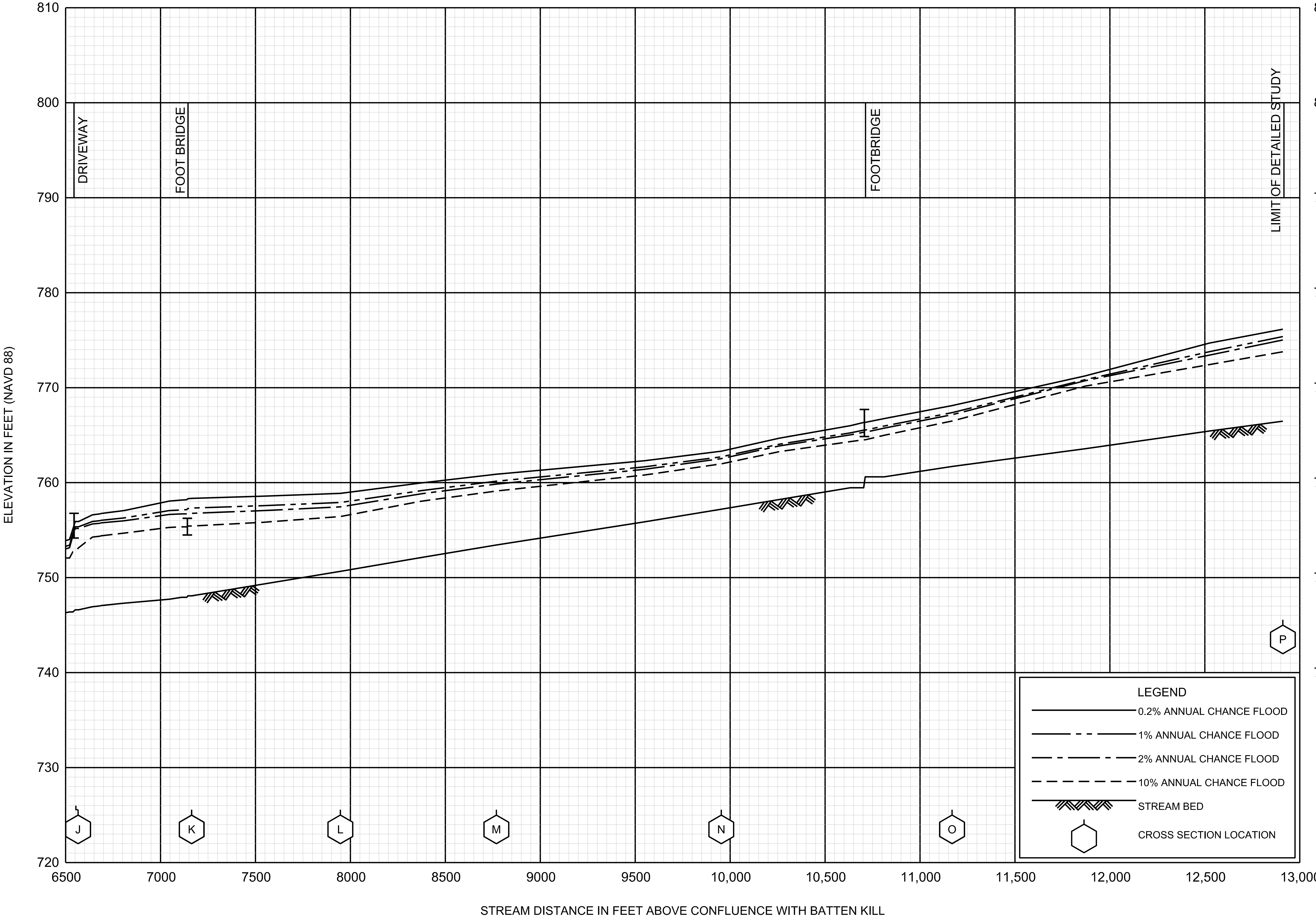
FLOOD PROFILES

WEST BRANCH BATTEN KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



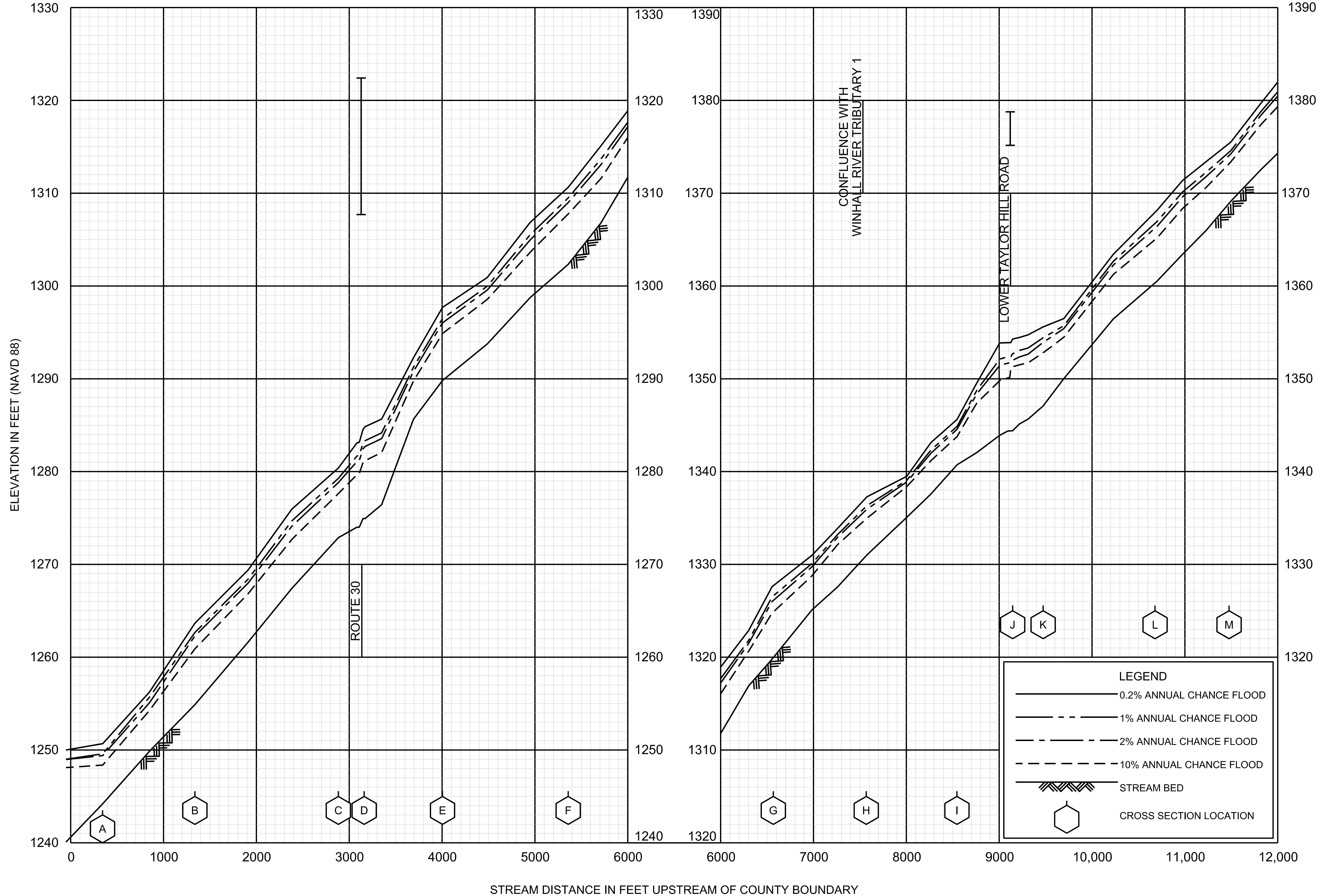
FLOOD PROFILES

WEST BRANCH BATTEN KILL

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



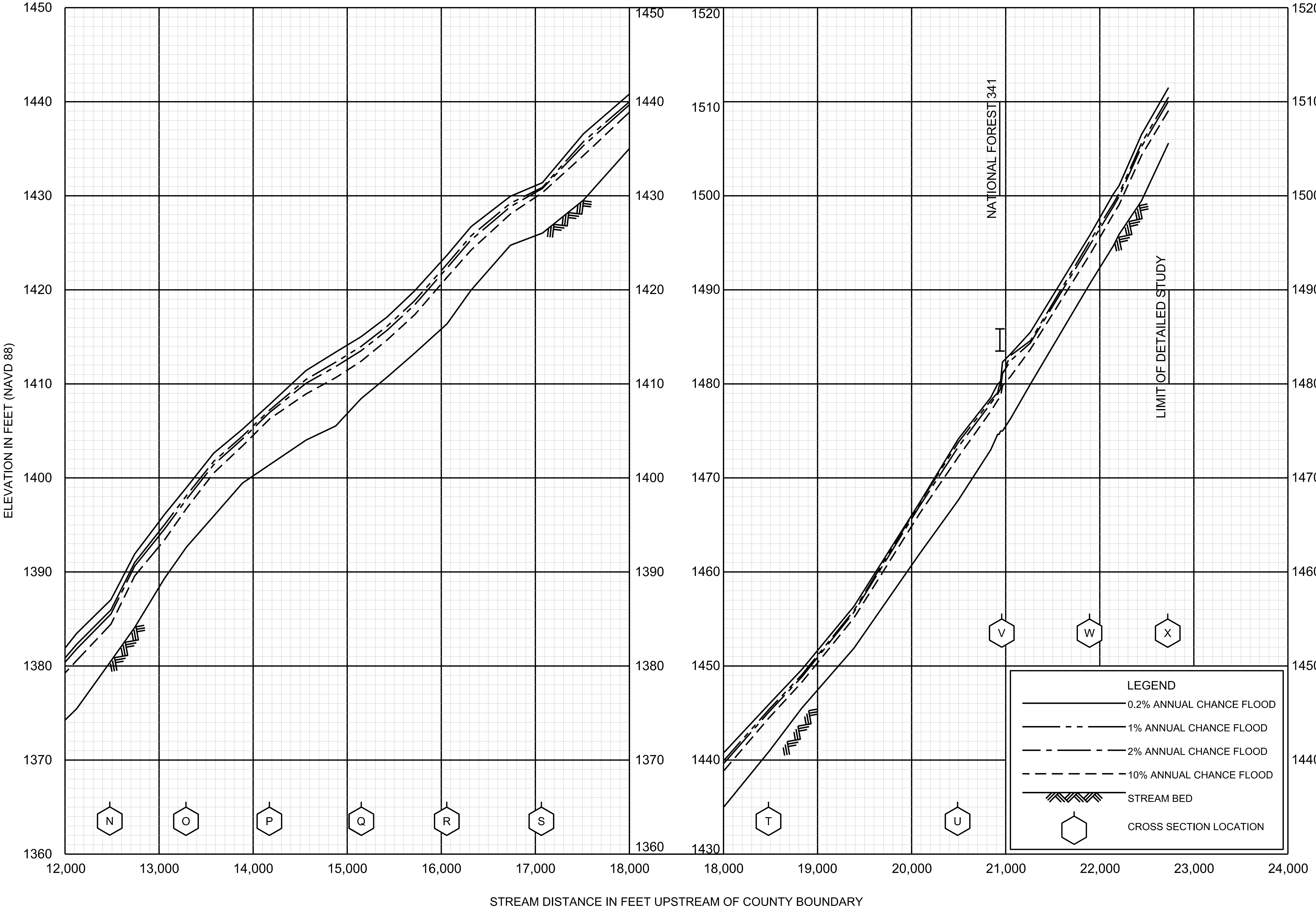
FLOOD PROFILES

WINHALL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS



FLOOD PROFILES

WINHALL RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

BENNINGTON COUNTY, VT

AND INCORPORATED AREAS