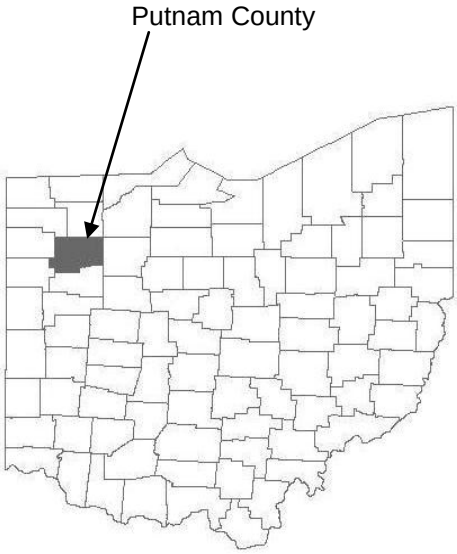
FLOOD INSURANCE STUDY

PUTNAM COUNTY, OHIO

AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER
CLOVERDALE, VILLAGE OF	391001
*COLUMBUS GROVE, VILLAGE OF	390466
*DUPONT, VILLAGE OF	390467
FORT JENNINGS, VILLAGE OF	390468
GILBOA, VILLAGE OF	390469
GLANDORF, VILLAGE OF	390470
KALIDA, VILLAGE OF	390471
OTTAWA, VILLAGE OF	390472
OTTOVILLE, VILLAGE OF	390473
PANDORA, VILLAGE OF	390474
PUTNAM COUNTY (UNINCORPORATED AREAS)	390465

*No Special Flood Hazard Areas Identified

PRELIMINARY:
MAY 23, 2014

REVISED PRELIMINARY:
JULY 31, 2015

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
39137CV000A

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 may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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

Selected Flood Insurance Rate Map panels for this community contain information that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels (e.g., floodways, 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 Rate Map

FLOOD INSURANCE STUDY
PUTNAM COUNTY, OHIO
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 Putnam County, Ohio, including the Villages of Cloverdale, Columbus Grove, Dupont, Fort Jennings, Gilboa, Glandorf, Kalida, Ottawa, Ottoville, and Pandora; and unincorporated areas of Putnam County (hereinafter referred to collectively as Putnam County). 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 Putnam County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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

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

The Digital Flood Insurance Rate Map (DFIRM) and FIS report for this countywide study have been produced in digital format. Flood hazard information was converted to meet the Federal Emergency Management Agency (FEMA) DFIRM database specifications and Geographic Information System (GIS) format requirements. The flood hazard information was created and is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community.

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

Gilboa Village of	For the May 16, 1995 study, the hydrologic and hydraulic analyses were prepared by the Soil Conservation Service (SCS) in a report Entitled Flood Plain Management Study: The Blanchard River and Riley Creek – Allen, Putnam, Hancock and Hardin Counties, which was revised in July 1990 (Reference 1).
Ottawa Village of	For the January 3, 1986 study, the hydrologic and hydraulic analyses were prepared by the U.S. Army Corps of Engineers (USACE), Buffalo District for the FEMA, under Inter-Agency Agreement No. EMW-E0941, Project Order No. 11. That work was completed in February 1984 (Reference 2).
Pandora Village of	For the May 1978 study, the hydrologic and hydraulic analyses were prepared by Howard, Needles, Tammen & Bergendoff, for the Federal Insurance Administration (FIA), under Contract No. H-3980. That work was completed in April 1977 (Reference 3).
Putnam County (Unincorporated Areas)	For the December 5, 1990 study, the hydrologic and hydraulic analyses for the Ottawa River in the vicinity of the unincorporated community of Rimer were prepared by the USACE, Buffalo District, for FEMA, under Inter-Agency Agreement No. EMW-86-E-2226, Project Order No. 15. That work was completed in March 1987 (Reference 4). The hydrologic and hydraulic analyses for the Blanchard River and Riley Creek were prepared by the U.S. Department of Agriculture, Soil Conservation Service (SCS) Ohio District (Reference 4).

No previous reports were prepared for the Villages of Cloverdale, Columbus Grove, Dupont, Fort Jennings, Glandorf, Kalida, and Ottoville.

The orthophotography base mapping was provided by the State of Ohio Office of Information Technology, Ohio Geographically Referenced Information Program. The DFIRM was produced in Ohio State Plane North Zone coordinate system with a Lambert Conformal Conic projection, units in feet, 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 DFIRM database and mapping were prepared for FEMA by STARR, a joint venture between Atkins, Stantec, and Camp Dresser and McKee (CDM) under Joint Venture Contract No. EMP-2003-CO-2606, Task Order No. 103. The new countywide FIS includes detailed hydraulic analyses, redelineation, digitizing of effective flood hazard information, and new approximate analyses. This work was completed in December 2011.

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.

The initial and final meeting dates for the previous FIS reports for Putnam 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
Ottawa, Village of	August 16, 1982	December 11, 1984
Pandora, Village of	March 19, 1976	November 22, 1977
Putnam County (Unincorporated Areas)	October 31, 1985	September 15, 1989

The results of the study were reviewed at the final CCO meeting held on _____, and attended by representatives of _____. 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 of Putnam County, Ohio, including the incorporated communities listed in Section 1.1. The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction. Table 2, "Areas Studied by Detailed Methods," lists the streams that were studied by detailed methods.

Table 2 – Areas Studied by Detailed Methods

Stream	Limits of Detailed Study
Blanchard River	From the confluence with Auglaize River to the Putnam/Hancock County Line
Ottawa River	From the confluence with Auglaize River to the Putnam/Allen County Line
Riley Creek	From the confluence with Blanchard River to the Putnam/Allen County Line

Table 2 – Areas Studied by Detailed Methods (Continued)

Stream	Limits of Detailed Study
Sugar Creek	From the confluence with Ottawa River to the Putnam/Allen County Line
Tawa Run	From the confluence with Blanchard River to approximately 1 mile upstream of Agner Street

In this countywide study, only the Ottawa River and Sugar Creek were studied in detail. Blanchard River, Riley Creek, and Tawa Run were redelineated using updated topographic information.

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 Putnam County, Ohio. Table 3, "Areas Studied by Approximate Methods" lists all the streams studied by approximate methods:

Table-3 Areas Studied by Approximate Methods

Auglaize River	Flat Fork	Tributaries to Blanchard River
Bear Creek Tributary 1	Jennings Creek	Unnamed Tributaries to Cranberry Creek
Big Run	Lammer Ditch	Unnamed Tributaries to Dry Fork
Blanchard River	Little Auglaize River	Unnamed Tributaries to Jennings Creek
Brush Creek	Little Yellow Creek	Unnamed Tributaries to Little Auglaize River
Brush Creek Tributary	Mark Ditch	Unnamed Tributaries to Ottawa River
Cartwright Run	North Powell Creek	Unnamed Tributaries to Plum Creek
Cranberry Creek	Plum Creek	Unnamed Tributaries to Sugar Creek
Cranberry Run	Rattlesnake Creek	Unnamed Tributaries to Tawa Run
Deer Creek	South Powell Creek	
Deer Creek Tributaries	South Turkeyfoot Creek	
Dog Creek	South Turkeyfoot Creek Tributary	
Dry Fork	Tawa Run	
Duck Run	West Creek	
Dukes Run	Yellow Creek Unnamed	
Dutch Run		

There were no Letter of Map Changes (LOMCs) incorporated into this countywide study for Putnam County.

2.2 Community Description

Putnam County is located in northwestern Ohio and has a total land area of 480 square miles. It is bordered by Paulding and Van Wert Counties on the west, Allen County on the south, Hancock County on the east, Wood County on the northeast, and Henry and Defiance Counties on the north. The 2010 population of Putnam County was reported to be 34,529 (Reference 5).

The climate in Putnam County has the characteristics of being continental in nature. This is characterized by moderate extremes of temperature and precipitation. Summer temperatures average 73 degrees Fahrenheit (°F) in July and winter temperatures average 24°F in January respectively. The highest recorded temperature was 103°F in 1988 and the lowest recorded temperature was -23°F in 1963. Annual average precipitation of the region is 35.2 inches (Reference 6).

The soils are the typical heterogeneous material found in the till plain that covers central Ohio. Glacial drift varies in thickness, but generally is not very deep. Because this area was so heavily forested and the drainage so inadequate, the early explorers referred to most of this area of northwestern Ohio as the "Black Swamps". Today, much of the best agricultural land in Ohio is found here. The present tree growth consists mainly of second growth maple and oak.

The Village of Ottawa was developed by settlers in the early 1800s and named for the Indian tribe that had previously lived along the Blanchard River. It was settled in 1824 and incorporated in 1834. It has been the county seat of Putnam County since 1886 (Reference 7).

The main watercourses are the Blanchard River and Tawa Run. The Village of Ottawa is located approximately 22 miles upstream of the Blanchard River confluence with the Auglaize River. The Auglaize River eventually flows into the Maumee River, which empties into Lake Erie at the City of Toledo. The Blanchard River basin upstream of Ottawa drains approximately 638 square miles and is roughly rectangular in shape. The character of the basin varies from flat plains along its main course to rolling hills in the headwaters. Ground elevations at Ottawa vary from a riverbank elevation of 704 feet to a height of 739 feet North American Vertical Datum of 1988 (NAVD88) in the northeastern part of the village. About 50 percent of the densely populated area lies between the elevations of 724 and 729 feet NAVD88. The stream slope of the Blanchard River varies from approximately 1.8 feet per mile upstream of Ottawa to approximately 0.5 feet per mile downstream of Ottawa (Reference 7).

Riley Creek, which is 100 feet wide, flows northerly along the western edge of the community. The stream roughly parallels Jefferson Street and is bounded by Pandora Park and Hilly Cemetery in the northern part of the Village of Pandora. Pandora Park lies on the east floodplain of Riley Creek. It contains several shelter houses, baseball fields, and a football and track field for the high school. Most of the houses along the creek nearer the middle of Pandora are built above the flood plain, which is primarily pastureland in the southern part of Pandora and cultivated fields in the north.

2.3 Principal Flood Problems

Most floods in Putnam County are caused by rainfall of unusually high intensity and duration which leads to local flash flooding. General flooding occurs most frequently during January to March and occasionally during August or October (Reference 8). The most severe flood of record occurred in March 1913 and was estimated to be a 0.01-percent-annual chance flood (Reference 7) . The majority of the damage occurred in and around the Village of Ottawa and inundated the entire commercial district and almost all of the residential areas for several days. People were forced from their homes because of direct inundation or loss of public services. Inventory and finished products from local

business establishments were ruined. USACE estimated the damage done during the 1913 flood as $2,542,000 based on 1963 price levels. Flood marks at the Village of Ottawa were about 3 feet higher than the 1959 flood. Residents of the Village of Pandora claim the floodwaters came near the western edge of Jefferson Street during this flood and estimate they experienced a 0.2-percent-annual-chance flood (Reference 7).

Two serious floods, the worst since 1913, occurred in 1959 within a period of 20 days. An extremely low temperature was experienced in the January flood, and this resulted in the ponded floodwaters freezing at their peak stage. Many roads in the Village of Ottawa were impassable for several days after the flood subsided due to the accumulation of ice. Water froze in the basements and on the first floors of many homes preventing reoccupation of the dwellings for extended periods. Some of these dwellings were still vacant when the second flood occurred in February. The amount of damage caused by the February 1959 flood was approximately $705,000 (Reference 7). The January and February floods of 1959 were approximately an 11- and 2.9-percent-annual-chance flood respectively. The 1959 flood within the Village of Pandora was an estimated 5.8-percent-annual-chance flood and no damage to structures is known to have occurred during this flood.

These same floods caused overbank flooding along the Ottawa River, near the unincorporated community of Rimer. The gage station located at Allentown, upstream of Rimer, measured a peak discharge of 7,740 cubic feet per second (cfs). This was approximately a 2-percent-annual-chance flood in Rimer.

Another serious flood occurred in June 1981 causing major damage in the Village of Ottawa and adjacent rural areas. More than half of the village was inundated. The flood crested at 728.5 feet NAVD88 near the Natural Resources Conservation Service (NCRS) building on South Oak Street. At the U.S. Geological Survey (USGS) gaging station near the City of Findlay in Hancock County, the June 1981 flood exceeded the February 1959 flood by two-thirds of a foot for an all-time high at the gage. The corresponding peak discharge was estimated to be a 2-percent-annual-chance flood. Thus, this was the worst flood since the flood of record in 1913.

Three highways and two railroad bridges over the Blanchard River at the Village of Ottawa tend to obstruct flood flows. The bridge pier and abutments of the abandoned Perry Street bridge form obstacles for flood flows, as does an abandoned railroad embankment just north of and parallel to Main Street. Further to the east are the Oak Street bridge and the Detroit, Toledo, and Ironton Railroad bridge. The Chessie System railroad bridge, about 200 feet downstream of the Oak Street bridge, has an inadequate waterway opening and is subject to ice and debris jams. These factors increased flood heights by about 1.2 feet east of the bridge in the February 1959 flood. The other two bridges on State Route 65 and U.S. Route 224 evidently had some effect on the 1959 floods and would probably increase the heights of a larger flood such as that of 1913, although no significant ice jams have been observed on the Blanchard River at Ottawa in the past (Reference 7).

On the night of August 20, 2007, Putnam County received nine inches of rain in less than eighteen hours, which ultimately resulted in severe flooding throughout the county. Many homes in the community had their entire first floor totally inundated with flood water. The flooding was the result of rain generated from the remnants of Tropical Storm Erin, combined with an east-west-oriented stationary front that stalled over northern Ohio.

Waves of slow-moving thunderstorms continued across the area for 5 days, causing rivers to flood several communities in the area. The cities of Findlay and Ottawa were severely damaged by floodwaters from the Blanchard River. The peak streamflow was estimated to have occured on August 21, 2007; the recorded gage height and the streamflow estimate at this site were the highest for the 33 years of record. The Blanchard River at Ottawa streamgage recorded a gage height of 31.1 feet NAVD88 on August 23, 2007 (Reference 9).

Because of the magnitude of and damages from this flood, a Presidential Disaster Declaration, FEMA–1720–DR, was declared for eight counties. A Presidential Disaster Declaration puts into motion long-term Federal recovery programs to assist individuals, businesses, and public entities (Reference 9).

On February 28, 2011, yet another major flood in a series along the Blanchard River, following storms throughout Ohio that flooded roads and homes, cut power to thousands and prompted some evacuations. Blanchard River crested late on a Monday night at 5.5 feet above flood level, within a range of floods seen in the past, though not the catastrophic August 2007 flood. At midday, minor flooding along the river had yet to reach the city's main street. The National Weather Service said flooding was a threat Monday throughout most of Ohio in the aftermath of violent storms that began Sunday night. Wind gusts of 60 mph or more were recorded in several locations, followed by scattered reports of roof damage on homes, uprooted trees and downed power lines. Utilities reported that more than 25,000 Ohio customers had no power late Monday morning (Reference 10).

2.4 Flood Protection Measures

In the Village of Ottawa, non-structural measures of flood protection are used to aid in the prevention of future flood damage. These are in the form of land use regulations, adopted from the Code of Federal Regulations, which control building within areas that have a high risk flooding.

There are no other known flood protection measures in Putnam County.

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 source studied in detail affecting the communities in Putnam County.

Pre-countywide Analysis

The flood discharges for the Blanchard River and Riley Creek were established using the TR-20 computer program (Reference 11). This version of TR-20 uses the modified Attenuation-Kinematic procedure of stream and valley flood routing. The discharges for Blanchard River at the Village of Ottawa were developed using two stream gage stations and performing a log-Pearson Type III analysis on the two gages. The gages used were USGS gage (No. 04189500) which was located 1.5 miles northwest of the Village of Ottawa, and the USGS gage (No. 04189000) which is located 16 miles upstream of Village of Ottawa.

To develop discharge-frequency relationships for the Blanchard River data from the discontinued USGS gage (No. 04189500) near the Village of Ottawa were correlated with information from the USGS gage (No. 04189000) near the City of Findlay, Ohio. Gage (No. 04189500) was located at the Township Road 229 bridge over the Blanchard River, approximately 1.5 miles northwest of Ottawa, and was in operation during the years 1922 to 1928 and 1947 to 1951. Gage (No. 04189000) is located 2 miles west of Findlay or approximately 16 miles upstream of Ottawa. It has been in continuous operation since 1924 except for the years 1937 to 1940.

A log-Pearson Type III analysis was performed on the two-station data using procedures of Appendix 7, Bulletin No.17B (Reference 11). The procedure involves adjusting the log-Pearson Type III statistics at the short-term station (Glandorf) using the statistics at a long-term station (Findlay) and regression and correlation coefficients derived from concurrent flow record of the two stations.

Tawa Run is an ungaged stream with a 41 square mile drainage area. The USGS gage (No. 04189100) on Tiderishi Creek near the City of Jeneria, Hancock County, has a 4.35 square mile drainage area. The Tiderishi gage data were used in determining the discharge frequency relationship for Tawa Run using Bulletin 17B (Reference 12).

Countywide Analyses

New hydrologic analyses for this countywide FIS were performed for all new approximate and detailed studies in Putnam County. The methods used to estimate flow frequency in this report provide better accuracy of flow frequency than studies previously undertaken for the region due to the additional flow data available and improved statistical procedures. The application of the USGS WRIR 03-4164 regression equations for estimating peak flows also standardizes the approach and methodology county-wide.

Peak flows for approximate and detailed studies were computed for the 10-, 2-, 1-, and 0.2-percent-annual-chance-flood events using USGS rural regression equations whose

parameters were determined based on each watershed's characteristics. The equations were used to calculate the 10-, 2-, 1-, and 0.2-percent-annual-chance-flood events and are shown below:

$$Q_{10} = 83.3(DA)^{0.759}(SL)^{0.217}(W+1)^{-0.241}$$
$$Q_{50} = 114.2(DA)^{0.751}(SL)^{0.240}(W+1)^{-0.272}$$
$$Q_{100} = 126.1(DA)^{0.750}(SL)^{0.248}(W+1)^{-0.281}$$
$$Q_{500} = 151.5(DA)^{0.747}(SL)^{0.263}(W+1)^{-0.298}$$

Where:

- Q_t is the calculated peak flow for recurrence interval t, in cubic feet per second.
- DA is drainage area in square miles.
- SL is main channel slope in feet per mile.
- W is the percentage of drainage area that is open water or wetlands

As shown above, the regression equations include three different parameters. The computation of these parameters was based on USGS WRIR 03-4164. Drainage area was obtained from the shapefile created in watershed delineation. Slope of the main channel in feet per mile was completed by using the Digital Elevation Model (DEM) and ArcHydro. For watershed drainage areas less than 5 square miles, 10-85 slopes as defined in USGS WRIR 03-4164 were used. For watershed drainage areas larger than 5 square miles, the slopes based on longest flow path were used.

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**
Blanchard River					
About 1.25 miles above the confluence of Auglaize River	746.0	15,700	20,700	23,200	27,800
About 0.8 mile upstream of County Route 19	723.7	15,900	20,800	23,300	27,900
About 0.7 mile downstream of County Route 15	704.4	15,600	20,500	23,000	27,600
Just downstream of County Route 15	701.5	15,400	20,300	22,800	27,400
About 3.76 miles upstream of County Route 15	648.7	13,400	17,800	19,900	24,000

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
Blanchard River (cont.)					
About 5.14 miles upstream of County Route 15	641.3	13,300	17,700	19,800	24,000
About 1.22 miles downstream of confluence of Tawa Run	630.5	13,100	18,200	20,700	26,500
About 0.8 mile downstream of State Route 696	534.1	9,600	13,200	14,300	16,900
About 0.5 mile upstream of County Route 5	509.1	9,500	13,200	14,200	16,800
Ottawa River					
At the confluence of Sugar Creek	366.1	8,300	10,950	12,070	14,360
About 1,200 feet downstream of Road 19	351.5	8,010	10,560	11,650	13,860
About 6,800 feet downstream of State Route 224	349.8	8,000	10,560	11,640	13,850
About 1 mile downstream of State Route 224	309.8	7,200	9,480	10,450	12,430
About 100 feet downstream of State Route 224	309.4	7,210	9,500	10,470	12,450
About 5,980 feet upstream of State Route 224	305.8	7,150	9,430	10,400	12,370
At the confluence of Sugar Creek	239.8	5,840	7,700	8,480	10,080
About 200 feet downstream of Township Road P	239.2	5,850	7,710	8,490	10,100
About 3,370 feet upstream of Township Road P	237.6	5,840	7,690	8,480	10,070
About 4,200 feet upstream of Township Road P	235.9	5,830	7,680	8,460	10,050
About 7,200 feet downstream of Road R17	232.7	5,830	7,680	8,460	10,050

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
Blanchard River (cont.)					
About 3,500 feet downstream of Road R17	231.4	5,840	7,690	8,470	10,060
About 3,800 feet downstream of State Route 189	217.2	5,730	7,520	8,270	9,810
About 5,000 feet upstream of State Route 189	216.4	5,700	7,480	8,220	9,740
About 30 feet downstream of Allentown Road	160.0	5,310	6,970	7,620	8,990
Riley Creek					
About 2,200 feet above confluence of Blanchard River	84.0	5,400	7,100	8,200	10,400
About 2,800 feet downstream of State Route 696	70.4	5,300	7,000	8,200	10,500
Sugar Creek					
At the confluence with Ottawa River	65.0	2,640	3,600	4,010	4,850
About 1,700 feet upstream of County Road 160	61.6	2,530	3,450	3,840	4,640
About 2,600 feet upstream of Township Road P	59.0	2,460	3,350	3,720	4,510
About 4,300 feet upstream of Township Road P	53.5	2,250	3,070	3,410	4,130
About 300 feet downstream of Road R	51.8	2,210	3,010	3,350	4,050
About 860 feet downstream of Township Road S	49.3	2,120	2,900	3,220	3,900
About 1 mile downstream of State Route 189	45.6	2,000	2,730	3,040	3,680
About 150 feet downstream of State Route 189	45.1	1,990	2,720	3,020	3,660
About 560 feet downstream of Road U13	42.0	1,890	2,580	2,870	3,480

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
Sugar Creek (cont.)					
About 500 feet upstream of Road U13	35.3	1,670	2,280	2,540	3,080
Tawa Run					
At confluence of Blanchard River	4.1	375	490	535	620
About 0.9 mile above confluence of Blanchards River	3.7	345	440	475	550
About 1.9 miles above confluence of Blanchard River	1.5	180	250	280	350

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 NAVD88.

Pre-countywide Analyses

Cross-section data for the streams studied by detailed methods were obtained by field survey, topographic maps, and aerial photography and photogrammetry (Reference 12). Bridges were surveyed to obtain elevation data and structural geometry.

For the Blanchard River, Riley Creek, and Tawa Run, water-surface profiles were developed using the HEC-2 step backwater computer program (Reference 13).

Starting water-surface elevations for the Blanchard River near the Village of Ottawa, and Tawa Run were calculated using Manning's equation and the continuity equation.

Starting water-surface elevations for the remaining areas of the Blanchard River and for Riley Creek were developed using the WSP-2 step-backwater computer program (Reference 14).

Blanchard River is in a heavily wooded area. The river carries debris, and in several areas small debris dams approximately 3 feet high extended across the channel. Profiles in this report reflect the channel conditions described since there is evidence that the shoals and debris jams existed before the June 1981 flood. The flood profiles along the Blanchard River affect the profiles for a considerable reach along Tawa Run. In some areas, shallow flooding occurs. These areas (Zone AO) were determined using historical data and field observations.

Starting elevations for Riley Creek in the Village of Pandora, were calculated using Manning's equation, the continuity equation, and an approximation of the downstream cross section and were adjusted based on the results of the first runs of the HEC-2 computer program.

Roughness coefficients (Manning's “n”) and contraction and expansion loss coefficients used in the hydraulic computations were chosen using the Guide for Selecting Roughness Coefficient “n” values for Channels (Reference 15), engineering judgment, and based on field observations of the streams and floodplain areas. Table 5, “Manning’s “n” Values”, shows the channel and overbank “n” values for the streams studied by detailed methods.

Table 5 – Manning’s “n” Values

Stream	Channel	Overbank
Blanchard River	0.026-0.063	0.041-0.187
Ottawa River	0.046	0.032-0.075
Riley Creek	0.042-0.057	0.070-0.168
Sugar Creek	0.046	0.032-0.090
Tawa Run	0.012-0.035	0.013-0.060

Countywide Analyses

As part of this countywide FIS, new detailed hydraulic analyses were performed on the Ottawa River and Sugar Creek. The cross section data for Ottawa River and Sugar Creek were comprised of field collected survey data and the Light Detection and Ranging (LiDAR) data that was collected by Photo Science Geospatial Solutions, and USGS National Elevation Dataset (NED). Surveyed channel sections were obtained at the bridge and culvert faces. Additional survey was also provided on an “as-needed” basis at bridge approach sections and at long stretches of stream between structures. Surveyed channel

sections were propagated upstream and downstream to non-surveyed cross sections and were blended with the LiDAR data to create a consistent channel profile.

Water surface elevations for the selected recurrence intervals for Ottawa River and Sugar Creek were calculated using HEC-RAS V. 4.0 USACE computer program.

The starting water surface elevations for all profiles of Ottawa River and Sugar Creek were calculated using the normal depth method.

All qualifying benchmarks within a given jurisdiction that are catalogued by the 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 http://www.ngs.noaa.gov.

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 (NGVD29). With the completion of the NAVD88, many FIS reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD88. 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 NAVD88. The datum conversion factor from NGVD29 to NAVD88 in Putnam County is -0.566 feet. The data

points used to determine the conversion are listed in Table 6, "Vertical Datum Conversion Values."

Table 6 – Vertical Datum Conversion Values

Quad Name	Corner	Longitude	Latitude	Conversion from NGVD29 to NAVD88
Junction	SE	41.125	-84.375	-0.581
Ayersville	SE	41.125	-84.250	-0.577
New Bavaria	SE	41.125	-84.125	-0.650
Hamler	SE	41.125	-84.000	-0.597
Deshler	SE	41.125	-83.875	-0.591
Oakwood	SE	41.000	-84.375	-0.554
Continental	SE	41.000	-84.250	-0.571
Miller City	SE	41.000	-84.125	-0.577
Ottawa	SE	41.000	-84.000	-0.551
Leipsic	SE	41.000	-83.875	-0.522
Wetsel	SE	40.875	-84.375	-0.511
Ottoville	SE	40.875	-84.250	-0.561
Kalida	SE	40.875	-84.125	-0.554
Columbus Grove	SE	40.875	-84.000	-0.525
			AVERAGE	**-0.566 feet**

The Base Flood Elevations (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 NGVD29 should apply the conversion factor (-0.566 feet) 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.

NAVD88 = NGVD29 + conversion factor

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 the flood elevations determined at each cross section.

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

For each stream studied in detail, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross-sections, the boundaries for the Blanchard River, Ottawa River, and Tawa Run were interpolated using topographic maps at a scale of 1:24000 with a contour interval of 5 feet (Reference 12). The boundaries in the remaining areas of the Blanchard River and Riley Creek were delineated on topographic maps and transposed to aerial photomosaics using the width of the floodplain and floodway at each surveyed cross section and interpolating along contours between cross sections (Reference 12). The photomosaics were made from aerial photos supplied by United States Department of Agriculture, Agricultural Stabilization and Conservation Service.

The RASPLOT databases used for redelineation for this countywide study were compiled from the effective Floodway Data Tables (FDT) and flood profiles included in the FIS reports and were converted from NGVD29 to NAVD88 prior to redelineating floodplain boundaries. The datum shift from NGVD29 to NAVD88 was calculated and verified at -0.56 feet. River stationing and flood elevations were determined. The water surface

elevations were transferred to the FIS cross sections and to additional mapping cross sections digitized across the stream and perpendicular to the stream flow at the inflection points. A water-surface TIN is generated representing a 3D surface for the 1-percent annual chance flooding event from RASPLOT. The water-surface TIN is intersected with a terrain TIN to develop the associated floodplain boundaries. The same procedures are repeated for the 0.2-percent-annual-chance flooding event where flood elevations are available.

The redelineated floodplain boundaries for the Blanchard River, Riley Creek, and Tawa Run were reviewed against topographic contours derived from the LiDAR TINs and ortho-imagery. After the detailed 1- and 0.2-percent-annual-chance floodplain boundaries were redelineated, the effective floodway boundaries were digitized from geo-referenced FIRMs and Flood Boundary Floodway Maps (FBFM). While digitizing floodway boundaries, the stream centerline layer and ortho-photography were used to ensure that floodways contain the stream channel. In addition, topology tools were used to verify that the stream centerlines were within the floodway and the floodway boundaries were within or coincident with the 1-percent-annual-chance floodplain. The digitized floodway widths were checked within a maximum tolerance of five percent of the map scale or five percent of the floodway width, whichever is greater (refer to FEMA Guideline and Specifications (G&S) Appendix K, Section K.4.2.1).

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2). The boundary of the 1-percent-annual-chance floodplain was delineated using digital terrain models developed from LiDAR.

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 6, 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 mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, “Without Floodway” elevations presented in Table 7 for certain downstream cross sections of Ottawa River and Tawa Run 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 water surface elevation 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.

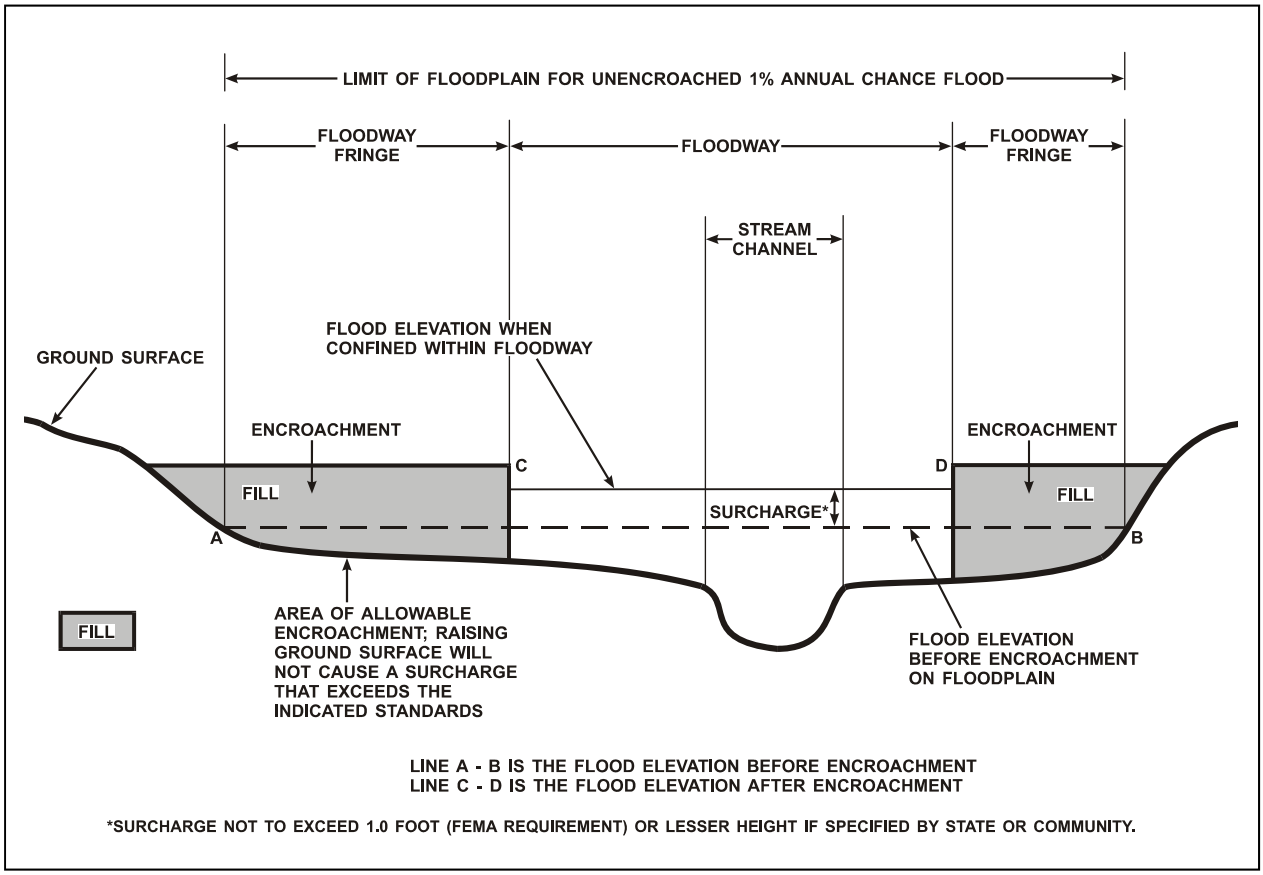

Figure 1 - Floodway Schematic

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 NAVD88)	WITHOUT FLOODWAY (FEET NAVD88)	WITH FLOODWAY (FEET NAVD88)	INCREASE (FEET)
BLANCHARD RIVER								
A	6,600	864	10,548	2.2	713.4	713.4	714.4	1.0
B	8,554	577	7,983	2.9	713.6	713.6	714.6	1.0
C	11,933	919	11,009	2.1	714.0	714.0	715.0	1.0
D	12,936	757	8,918	2.6	714.1	714.1	715.1	1.0
E	13,147	314	5,257	4.4	714.2	714.2	715.2	1.0
F	14,256	815	11,108	2.1	714.4	714.4	715.4	1.0
G	16,104	1,281	16,617	1.4	714.6	714.6	715.6	1.0
H	20,117	1,012	12,864	1.8	715.0	715.0	716.0	1.0
I	21,912	560	7,400	3.1	715.4	715.4	716.4	1.0
J	24,974	927	12,093	1.9	715.9	715.9	716.9	1.0
K	26,928	1,099	14,941	1.6	716.0	716.0	717.0	1.0
L	28,090	904	11,645	2.0	716.2	716.2	717.2	1.0
M	29,410	515	8,037	2.9	716.3	716.3	717.3	1.0
N	32,208	778	10,177	2.3	716.7	716.7	717.7	1.0
O	34,003	428	7,098	3.3	717.0	717.0	718.0	1.0
P	34,162	381	6,386	3.6	717.3	717.3	718.3	1.0
Q	35,640	680	11,062	2.1	717.6	717.6	718.6	1.0
R	38,069	872	11,282	2.1	717.8	717.8	718.8	1.0

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

BLANCHARD 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)
BLANCHARD RIVER (CONTINUED)								
S	40,709	559	8,577	2.7	718.2	718.2	719.2	1.0
T	43,243	1,160	16,902	1.4	718.4	718.4	719.4	1.0
U	45,461	664	10,503	2.2	718.6	718.6	719.6	1.0
V	45,619	521	9,187	2.5	719.2	719.2	720.2	1.0
W	47,203	723	10,980	2.1	719.3	719.3	720.3	1.0
X	48,998	980	12,869	1.8	719.5	719.5	720.5	1.0
Y	51,427	802	11,175	2.1	719.7	719.7	720.7	1.0
Z	53,434	969	13,504	1.7	719.8	719.8	720.8	1.0
AA	55,176	975	12,966	1.0	719.9	719.9	720.9	1.0
AB	58,133	1,541	18,841	1.2	720.1	720.1	721.1	1.0
AC	61,195	747	9,369	2.5	720.3	720.3	721.3	1.0
AD	63,360	882	11,261	2.0	720.6	720.6	721.6	1.0
AE	65,842	1,355	17,644	1.3	720.8	720.8	721.8	1.0
AF	67,109	916	11,258	2.0	720.8	720.8	721.8	1.0
AG	67,320	824	10,226	2.2	721.1	721.1	722.1	1.0
AH	68,746	601	8,491	2.7	721.3	721.3	722.3	1.0
AI	71,122	1,520	19,329	1.2	721.6	721.6	722.6	1.0

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

BLANCHARD 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)
BLANCHARD RIVER (CONTINUED)								
AJ	75,979	709	9,404	2.4	721.8	721.8	722.8	1.0
AK	77,722	488	7,931	2.9	722.0	722.0	723.0	1.0
AL	79,622	703	9,572	2.4	722.3	722.3	723.3	1.0
AM	83,318	1,423	18,129	1.3	722.5	722.5	723.5	1.0
AN	85,958	720	9,931	2.3	722.7	722.7	723.7	1.0
AO	87,067	1,083	14,108	1.4	722.8	722.8	723.8	1.0
AP	89,760	413	6,551	3.0	723.0	723.0	724.0	1.0
AQ	91,238	1,131	12,189	1.6	723.3	723.3	724.3	1.0
AR	94,354	706	9,508	2.1	723.5	723.5	724.5	1.0
AS	96,360	334	5,621	3.5	723.7	723.7	724.7	1.0
AT	110,986	1,065	12,903	1.6	724.9	724.9	726.3	0.8
AU	113,098	1,793	17,226	1.2	725.1	725.1	726.5	0.8
AV	118,008	1,128	16,245	1.3	725.4	725.4	726.2	0.8
AW	118,642	1,345	12,874	1.6	725.5	725.5	726.3	0.8
AX	127,829	1,050	12,797	1.6	728.8	728.8	729.6	0.8
AY	132,000	1,223	15,149	1.4	729.4	729.4	730.2	0.8
AZ	133,214	590	9,139	2.3	729.5	729.5	730.3	0.8
BA	134,059	669	11,029	1.9	730.1	730.1	730.9	0.8

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

BLANCHARD 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)
BLANCHARD RIVER (CONTINUED)								
BB	136,224	1,006	12,064	1.7	730.6	730.6	731.4	0.8
BC	143,246	631	9,007	2.3	731.4	731.4	732.3	0.9
BD	143,722	710	10,343	2.0	731.6	731.6	732.5	0.9
BE	145,358	580	7,633	2.5	731.6	731.6	732.6	1.0
BF	145,570	827	8,928	2.2	732.1	732.1	733.1	1.0
BG	146,784	748	10,436	1.9	732.3	732.3	733.3	1.0
BH	149,266	2,271	32,803	0.6	732.4	732.4	733.4	1.0
BI	151,483	860	11,981	1.6	732.7	732.7	733.7	1.0
BJ	154,915	965	10,180	1.4	733.1	733.1	734.1	1.0
BK	157,027	1,212	8,072	1.7	733.5	733.5	734.5	1.0
BL	158,875	366	5,063	2.8	734.0	734.0	735.0	1.0
BM	159,086	308	4,042	3.5	734.3	734.3	735.3	1.0
BN	160,934	1,107	8,026	1.7	734.7	734.7	735.7	1.0
BO	162,624	950	6,880	2.0	735.2	735.2	736.2	1.0
BP	164,894	345	4,067	3.5	736.7	736.7	737.7	1.0
BQ	165,106	490	6,130	2.3	737.6	737.6	738.6	1.0
BR	167,798	552	4,326	3.2	738.1	738.1	739.1	1.0
BS	169,699	512	5,362	2.6	739.0	739.0	740.0	1.0

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

BLANCHARD 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)
BLANCHARD RIVER (CONTINUED)								
BT	171,811	557	5,683	2.5	739.6	739.6	740.6	1.0
BU	174,926	441	3,012	4.7	741.1	741.1	742.1	1.0
BV	175,666	238	2,632	5.3	741.4	741.4	742.4	1.0
BW	176,722	478	4,924	2.8	741.8	741.8	742.8	1.0
BX	176,880	483	5,355	2.6	742.6	742.6	743.6	1.0
BY	178,094	356	2,978	4.7	743.0	743.0	744.0	1.0
BZ	180,312	372	4,665	3.0	743.7	743.7	744.7	1.0
CA	182,213	810	4,894	2.9	744.3	744.3	745.3	1.0
CB	185,486	887	5,405	2.6	745.6	745.6	746.6	1.0
CC	188,021	787	4,766	2.9	746.1	746.1	747.1	1.0
CD	189,974	626	4,696	3.0	747.3	747.3	748.3	1.0
CE	192,034	1,441	10,176	1.4	747.8	747.8	748.8	1.0
OTTAWA RIVER								
A	3,280	406	2,562	6.1	721.5	717.9[2]	718.1	0.2
B	5,116	276	2,781	5.0	721.5	719.8[2]	720.0	0.2
C	6,881	440	4,158	3.9	721.5	721.0[2]	721.1	0.1

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

[2]Elevation considered without backwater effects from the Auglaize River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

BLANCHARD RIVER – OTTAWA 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)
OTTAWA RIVER (CONTINUED)								
D	11,242	1,859	10,062	2.1	721.8	721.8	721.9	0.1
E	13,874	412	3,985	3.6	722.4	722.4	722.4	0.0
F	14,502	647	5,293	2.6	722.6	722.6	722.6	0.0
G	18,185	602	4,766	3.1	723.2	723.2	723.7	0.5
H	19,493	219	2,961	3.9	723.9	723.9	724.3	0.4
I	20,748	484	4,727	2.8	724.6	724.6	725.1	0.5
J	23,995	1,069	6,176	2.6	725.1	725.1	725.6	0.5
K	26,506	779	4,397	3.6	725.6	725.6	726.1	0.5
L	28,703	293	2,353	5.3	726.9	726.9	727.4	0.5
M	32,112	437	3,444	3.6	728.5	728.5	728.8	0.3
N	34,020	1,011	6,838	2.2	729.1	729.1	729.6	0.5
O	35,240	543	3,130	3.8	729.3	729.3	729.8	0.5
P	37,989	575	3,785	3.3	730.4	730.4	731.0	0.6
Q	42,322	217	2,169	4.5	732.8	732.8	733.0	0.2
R	44,435	797	4,733	2.4	733.5	733.5	734.0	0.5
S	49,380	421	2,600	4.6	734.4	734.4	735.1	0.7
T	53,698	1,166	5,214	3.0	736.0	736.0	736.5	0.5
U	56,976	1,491	5,913	2.9	737.7	737.7	738.2	0.5
V	61,041	424	2,998	3.8	740.1	740.1	740.5	0.4

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

OTTAWA 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)
OTTAWA RIVER (CONTINUED)								
W	63,314	816	4,681	3.0	741.0	741.0	741.4	0.4
X	65,559	606	3,399	3.8	741.3	741.3	741.8	0.5
Y	67,045	201	2,284	4.2	741.8	741.8	742.5	0.7
Z	68,122	753	4,927	2.3	742.4	742.4	743.1	0.7
AA	70,352	907	4,252	2.8	742.8	742.8	743.6	0.8
AB	74,405	387	2,908	3.6	745.6	745.6	746.2	0.6
AC	76,536	1,187	5,488	2.4	746.3	746.3	747.0	0.7
AD	77,725	782	3,082	3.8	746.6	746.6	747.4	0.8
AE	79,642	417	1,541	6.2	748.6	748.6	748.7	0.1
AF	80,996	181	1,395	6.0	752.5	752.5	752.8	0.3
AG	83,611	1,058	4,460	2.7	756.8	756.8	757.7	0.9
AH	86,281	825	3,264	3.8	759.0	759.0	759.3	0.3
AI	90,450	990	3,707	3.3	762.2	762.2	762.7	0.5
AJ	93,603	764	2,928	3.9	764.2	764.2	765.1	0.9
AK	95,252	213	1,845	4.6	766.2	766.2	766.7	0.5
AL	95,691	420	1,792	5.5	767.0	767.0	767.3	0.3

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

OTTAWA 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)
RILEY CREEK								
A	2,165	1,328	16,492	0.5	732.7	732.7	733.7	1.0
B	5,122	1,085	11,482	0.7	732.8	732.8	733.8	1.0
C	6,230	224	2,586	3.2	733.2	733.2	734.2	1.0
D	6,442	1,059	9,915	0.8	733.7	733.7	734.7	1.0
E	8,395	884	4,386	1.9	734.4	734.4	735.4	1.0
F	9,451	446	2,558	3.2	735.5	735.5	736.5	1.0
G	9,662	441[2]	1,130	7.3	736.6	736.6	737.6	1.0
H	11,563	1,078	3,357	2.4	738.4	738.4	739.4	1.0
I	13,411	846	5,916	1.4	739.0	739.0	740.0	1.0
J	14,995	278	2,307	3.6	739.4	739.4	740.4	1.0
K	17,424	304	2,458	3.3	740.4	740.4	741.4	1.0
L	19,536	514	4,075	2.0	742.9	742.9	743.9	1.0
M	20,592	572	4,371	1.9	744.0	744.0	745.0	1.0
N	22,229	259	2,211	3.7	745.4	745.4	746.4	1.0
O	22,387	430	3,296	2.5	747.5	747.5	748.5	1.0
P	24,710	611	2,964	2.8	749.1	749.1	750.1	1.0
Q	26,030	419	2,498	3.3	750.9	750.9	751.9	1.0
R	27,509	288	1,913	4.3	753.3	753.3	754.3	1.0

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

[2]Floodway coincident with channel banks

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

RILEY CREEK

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)
RILEY CREEK (CONTINUED)								
S	28,618	455	3,046	2.7	754.7	754.7	755.7	1.0
T	30,624	254	1,899	4.3	757.6	757.6	758.6	1.0
U	32,155	586	3,270	2.5	759.3	759.3	760.3	1.0
V	33,739	172	1,551	5.3	761.8	761.8	762.8	1.0
W	33,950	232	1,734	4.7	762.2	762.2	763.2	1.0
X	34,954	369	2,620	3.1	763.4	763.4	764.4	1.0
Y	35,376	183	1,657	5.0	763.9	763.9	764.9	1.0
Z	35,587	216	1,791	4.6	764.9	764.9	765.9	1.0
AA	36,802	249	1,826	4.5	767.0	767.0	768.0	1.0
AB	38,280	301	2,268	3.6	768.5	768.5	769.5	1.0
AC	38,491	401	2,494	3.3	769.0	769.0	770.0	1.0
AD	39,970	239	1,465	5.6	772.2	772.2	773.2	1.0
AE	40,762	509	2,692	3.1	773.1	773.1	774.1	1.0
AF	43,718	640	2,752	3.0	778.1	778.1	779.1	1.0
AG	45,514	705	2,560	3.2	781.4	781.4	782.4	1.0
AH	46,464	683	3,356	2.4	782.3	782.3	783.3	1.0

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

RILEY CREEK

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)
SUGAR CREEK								
A	3,369	189	1,201	5.4	729.3	729.3	730.0	0.7
B	3,641	655	4,234	1.4	729.7	729.7	730.6	0.9
C	5,225	597	3,010	2.0	730.1	730.1	730.9	0.8
D	6,192	829	3,941	1.7	730.3	730.3	731.1	0.8
E	10,828	112	762	5.8	733.1	733.1	733.7	0.6
F	13,470	721	3,081	3.2	734.3	734.3	734.9	0.6
G	17,531	340	1,246	4.0	736.2	736.2	737.1	0.9
H	19,499	848	4,062	1.0	737.3	737.3	738.0	0.7
I	20,908	592	1,782	4.2	737.6	737.6	738.3	0.7
J	24,021	681	2,180	2.4	739.4	739.4	740.3	0.9
K	27,564	625	3,447	1.4	743.2	743.2	744.1	0.9
L	28,558	467	1,731	2.9	743.6	743.6	744.5	0.9
M	30,410	351	1,259	3.9	745.0	745.0	745.9	0.9
N	32,593	356	1,443	3.4	746.7	746.7	747.7	1.0
O	33,016	277	880	5.2	747.1	747.1	748.1	1.0
P	33,661	262	1,342	2.6	748.8	748.8	749.6	0.8
Q	35,420	409	1,407	3.3	749.9	749.9	750.8	0.9
R	37,719	427	1,264	4.2	751.6	751.6	752.5	0.9

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

SUGAR CREEK

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)
SUGAR CREEK (CONTINUED)								
S	40,390	356	1,314	3.8	754.9	754.9	755.8	0.9
T	42,400	617	2,187	2.7	756.9	756.9	757.9	1.0
U	45,168	135	887	4.1	759.2	759.2	760.1	0.9
V	46,594	138	788	4.2	760.5	760.5	761.2	0.7
W	47,058	336	1,378	3.2	761.3	761.3	761.9	0.6
X	48,547	115	879	3.7	763.0	763.0	763.4	0.4
Y	49,503	257	1,164	3.9	764.0	764.0	764.5	0.5
Z	50,922	357	1,360	4.1	765.3	765.3	766.1	0.8
AA	52,872	263	1,465	2.9	766.8	766.8	767.8	1.0
AB	54,591	455	1,977	2.4	767.7	767.7	768.7	1.0
AC	56,395	192	876	5.6	770.1	770.1	770.9	0.8
AD	57,082	80	680	4.6	771.1	771.1	772.1	1.0
AE	60,495	618	1,720	2.5	775.8	775.8	776.8	1.0

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

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

SUGAR CREEK

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)
TAWA RUN								
A	828	37	99	5.4	725.3	707.9[2]	707.9	0.0
B	1,098	20	139	3.8	725.3	713.1[2]	713.1	0.0
C	1,658	49	261	2.0	725.3	716.5[2]	716.5	0.0
D	2,930	50	322	1.7	725.3	719.9[2]	720.9	1.0
E	4,250	70	496	1.1	725.3	723.9[2]	724.6	0.7
F	6,040	16	125	3.8	725.3	725.3[2]	726.2	0.9
G	6,743	100	409	1.2	728.3	728.3	729.2	0.9
H	9,789	30	95	2.5	730.3	730.3	731.3	1.0
I	10,861	32	114	2.1	732.4	732.4	732.8	0.4

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

[2]Elevation without considering backwater effects from Blanchard River

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH
AND INCORPORATED AREAS

FLOODWAY DATA

TAWA RUN

5.0 INSURANCE APPLICATIONS

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

Zone A

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

Zone AE

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

Zone AO

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

Zone X

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

6.0 FLOOD INSURANCE RATE MAP

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

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

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

The current FIRM presents flooding information for the entire geographic area of Putnam County. Previously, separate FIRMs were prepared for each identified floodprone incorporated community and for the unincorporated areas of the county. 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
Cloverdale, Village of	N/A	N/A	N/A	
*Columbus Grove, Village of	N/A	N/A	N/A	
*Dupont, Village of	N/A	N/A	N/A	
Fort Jennings, Village of	May 31, 1974	September 03, 1976	March 09, 1984	
Gilboa, Village of	August 09, 1974	May 21, 1976	May 16, 1995	
Glandorf, Village of	May 17, 1974	April 16, 1976	March 09, 1984	
Kalida, Village of	March 01, 1974	June 04, 1976 December 24, 1978	October 05, 1984	
Ottawa, Village of	June 07, 1974	August 06, 1976	February 15, 1979	January 03, 1986
Ottoville, Village of	May 03, 1974	N/A	August 01, 1987	
Pandora, Village of	February 08, 1974	N/A	November 01, 1978	
Putnam County (Unincorporated Areas)	August 12, 1977	N/A	December 05, 1990	

*No Special Flood Hazard Areas Identified

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OHIO
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.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA Region V, Federal Insurance and Mitigation Division, 536 South Clark Street, Sixth Floor, Chicago, Illinois 60605.

9.0 BIBLIOGRAPHY AND REFERENCES

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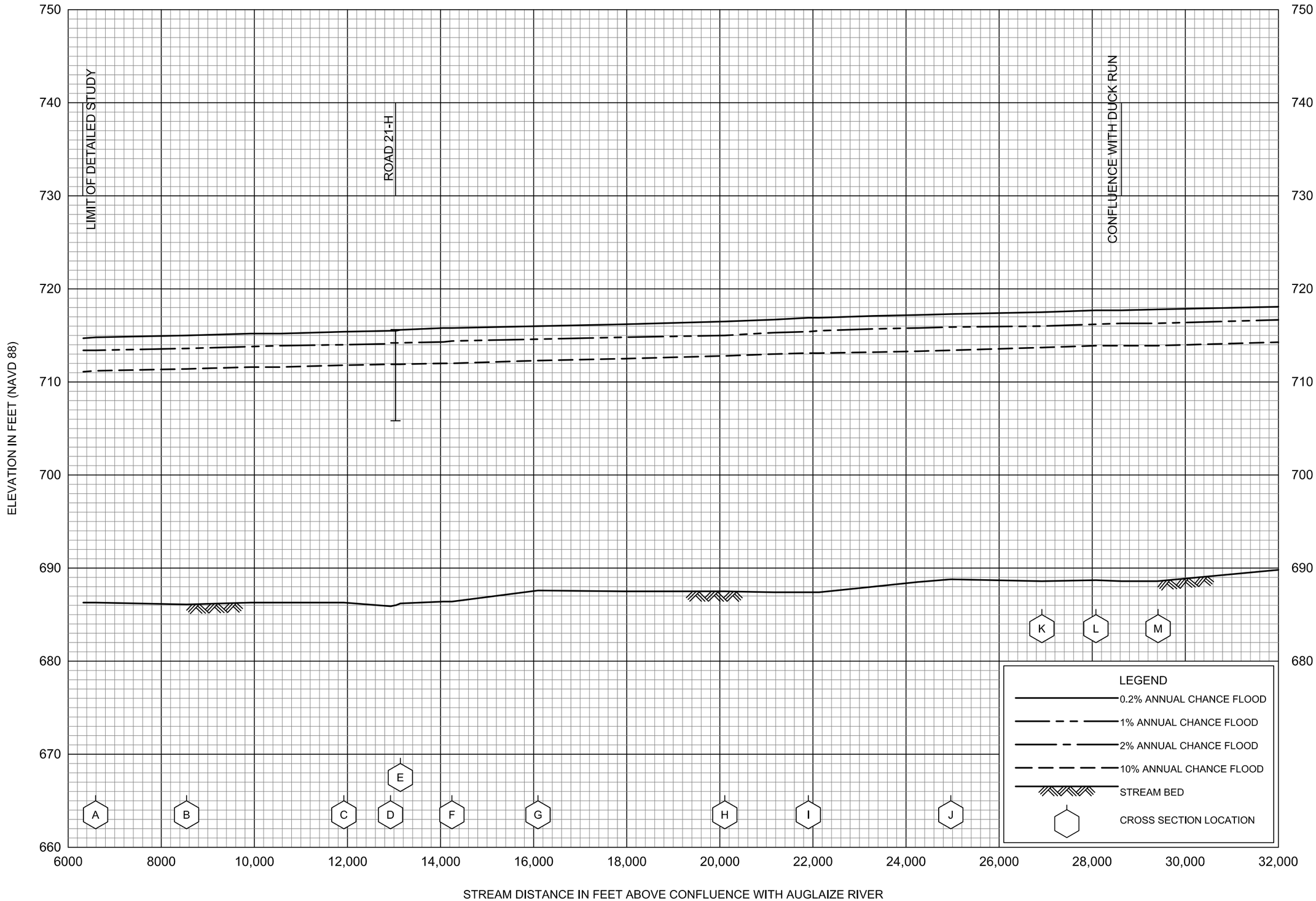

FLOOD PROFILES

BLANCHARD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS

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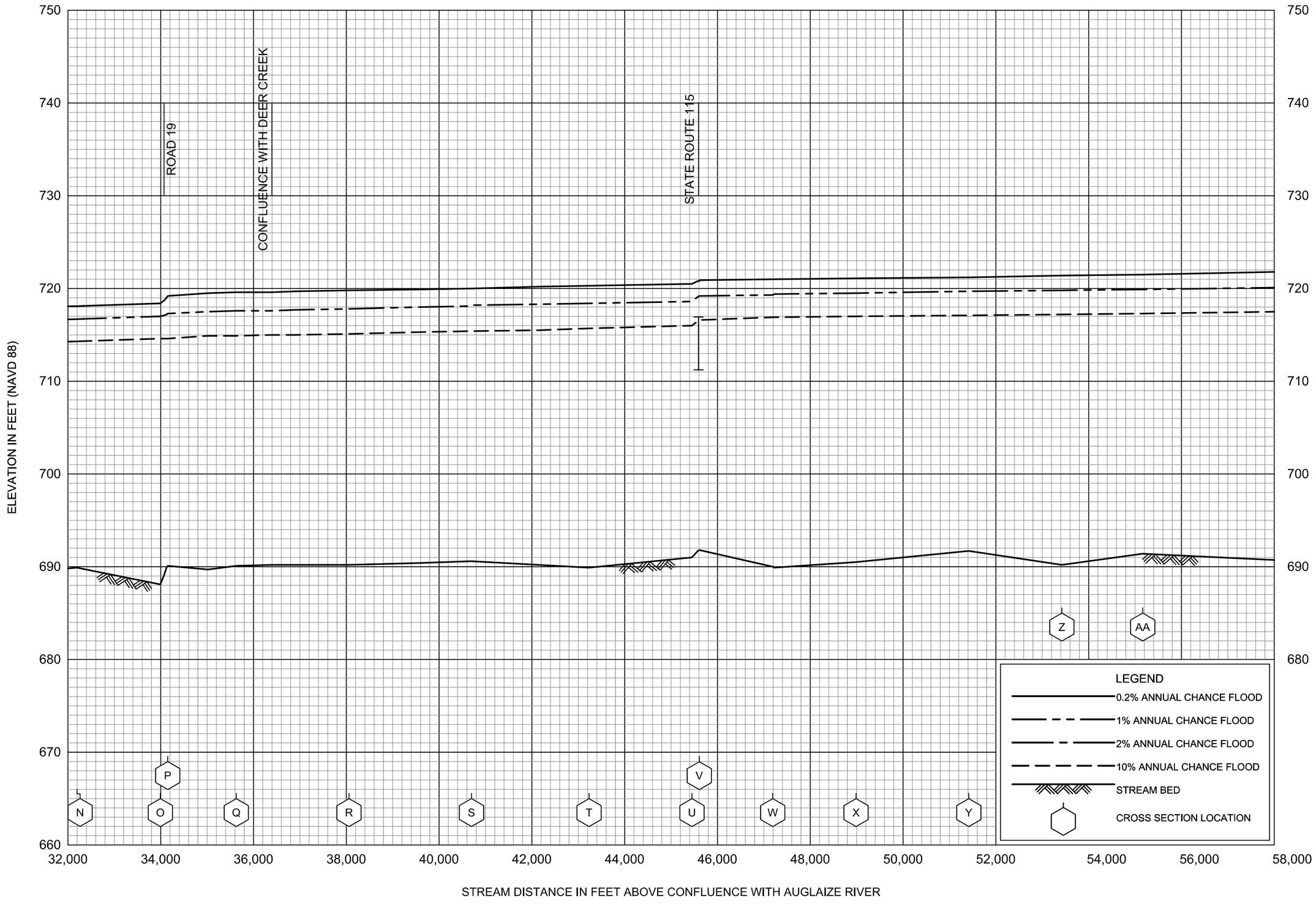


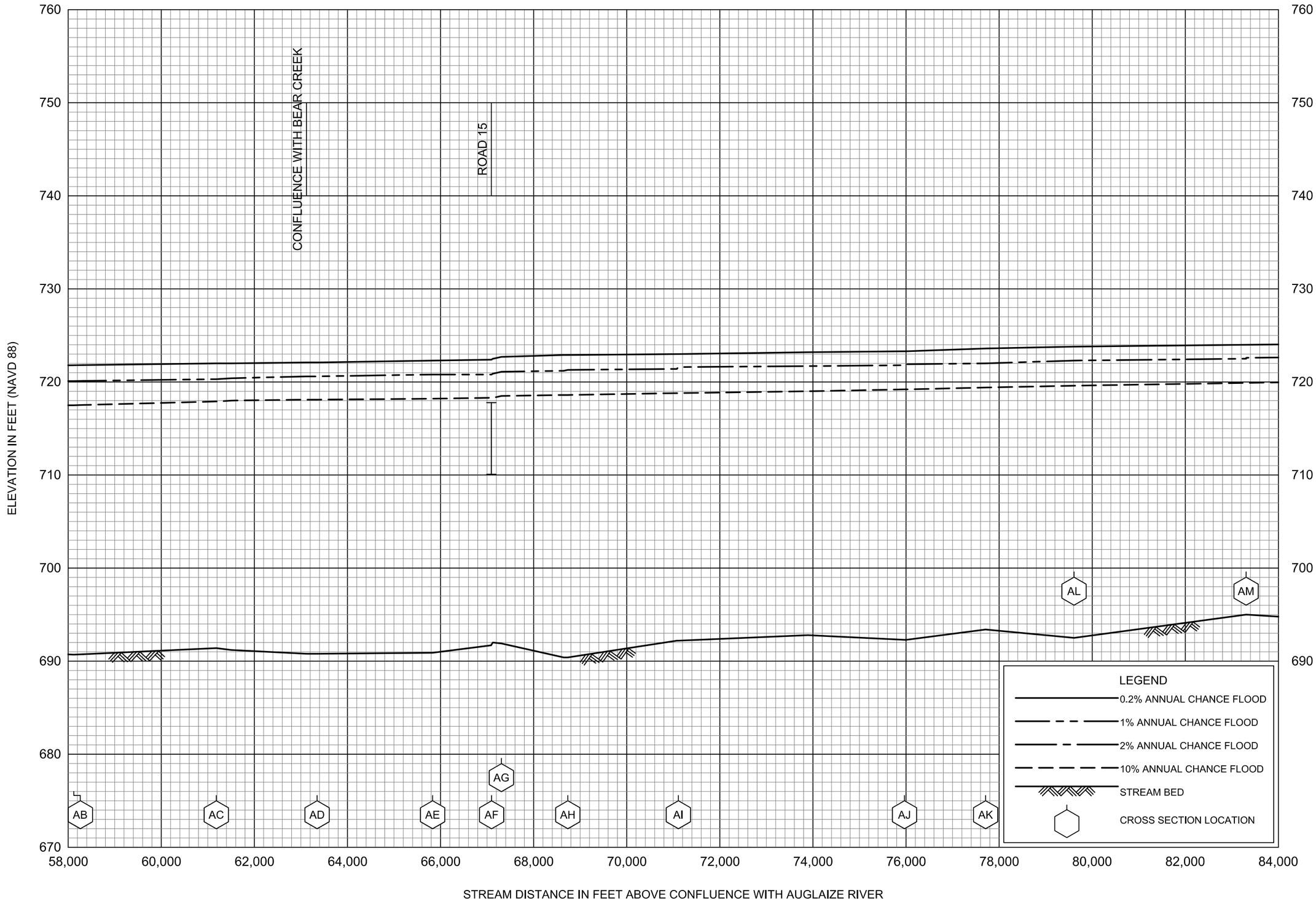
FLOOD PROFILES

BLANCHARD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



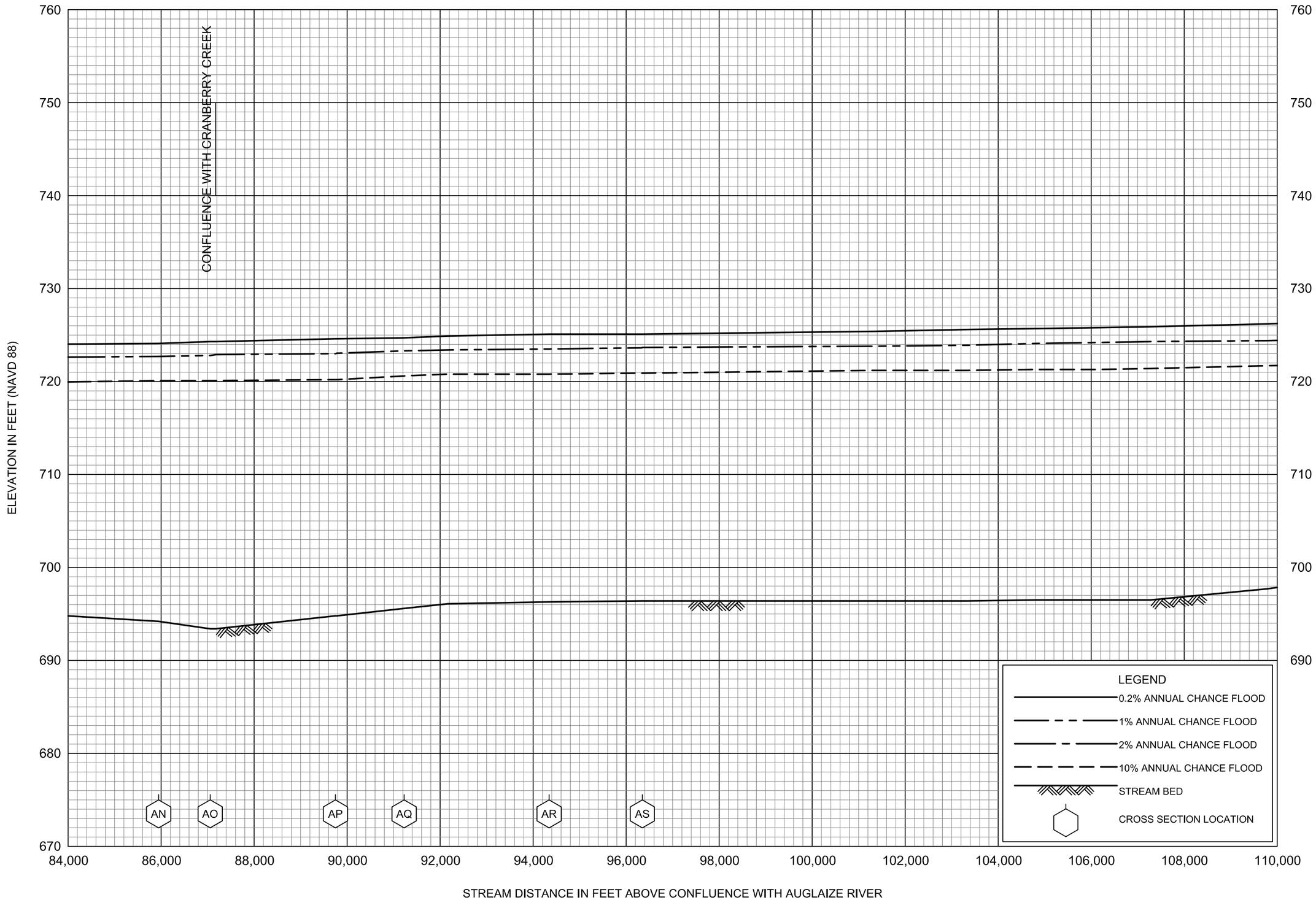
FLOOD PROFILES

BLANCHARD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



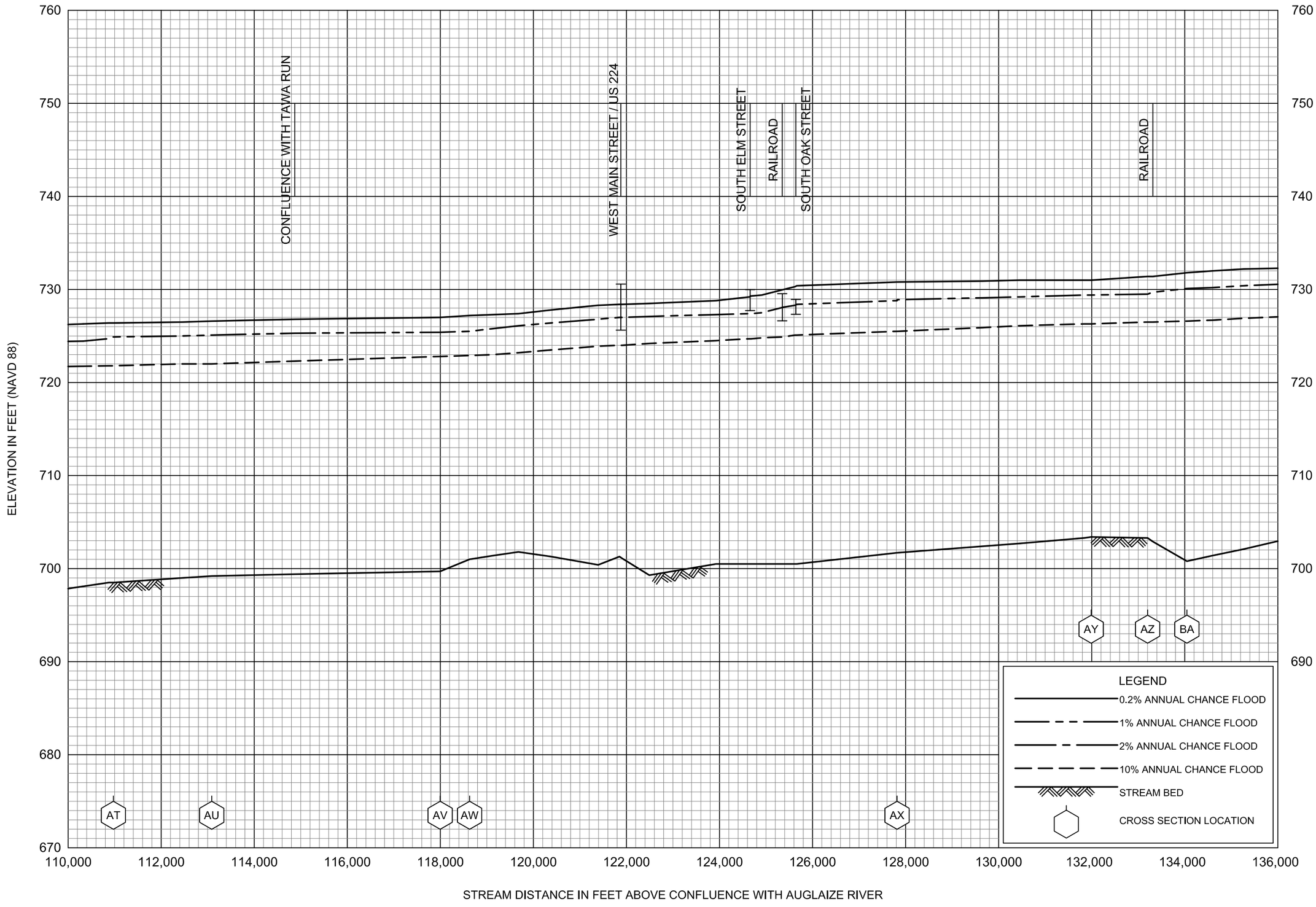
FLOOD PROFILES

BLANCHARD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



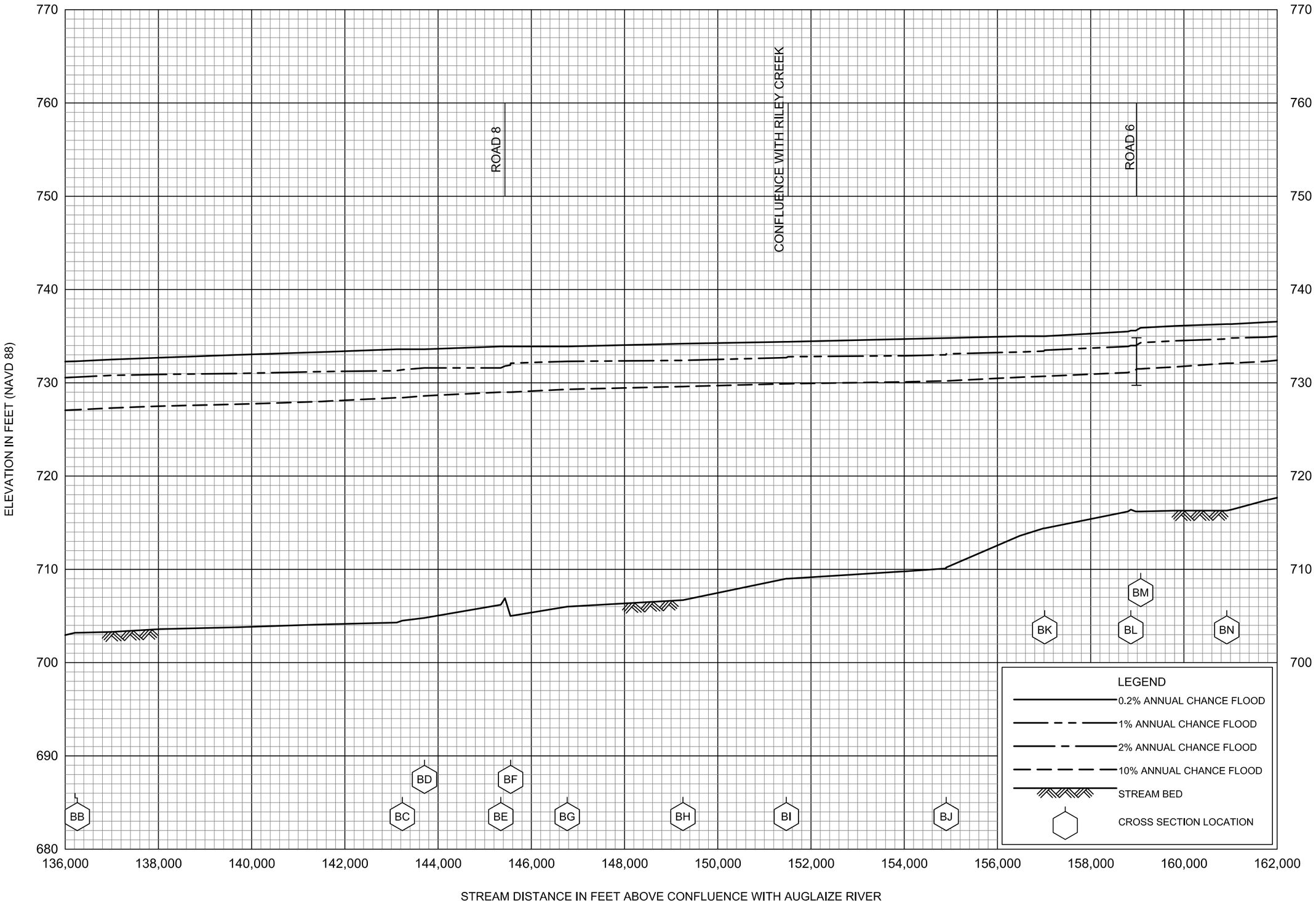
FLOOD PROFILES

BLANCHARD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

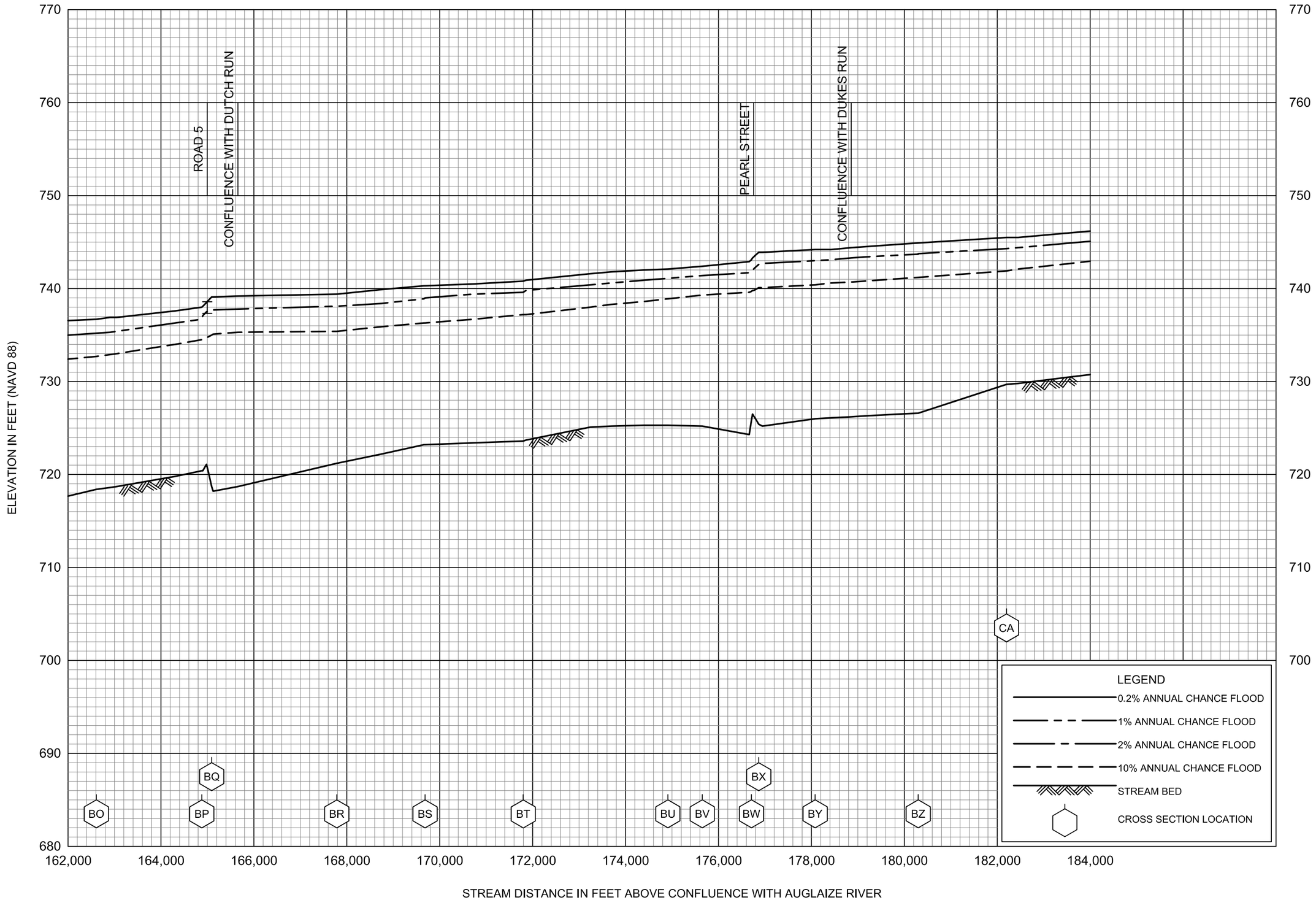
BLANCHARD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS

06P



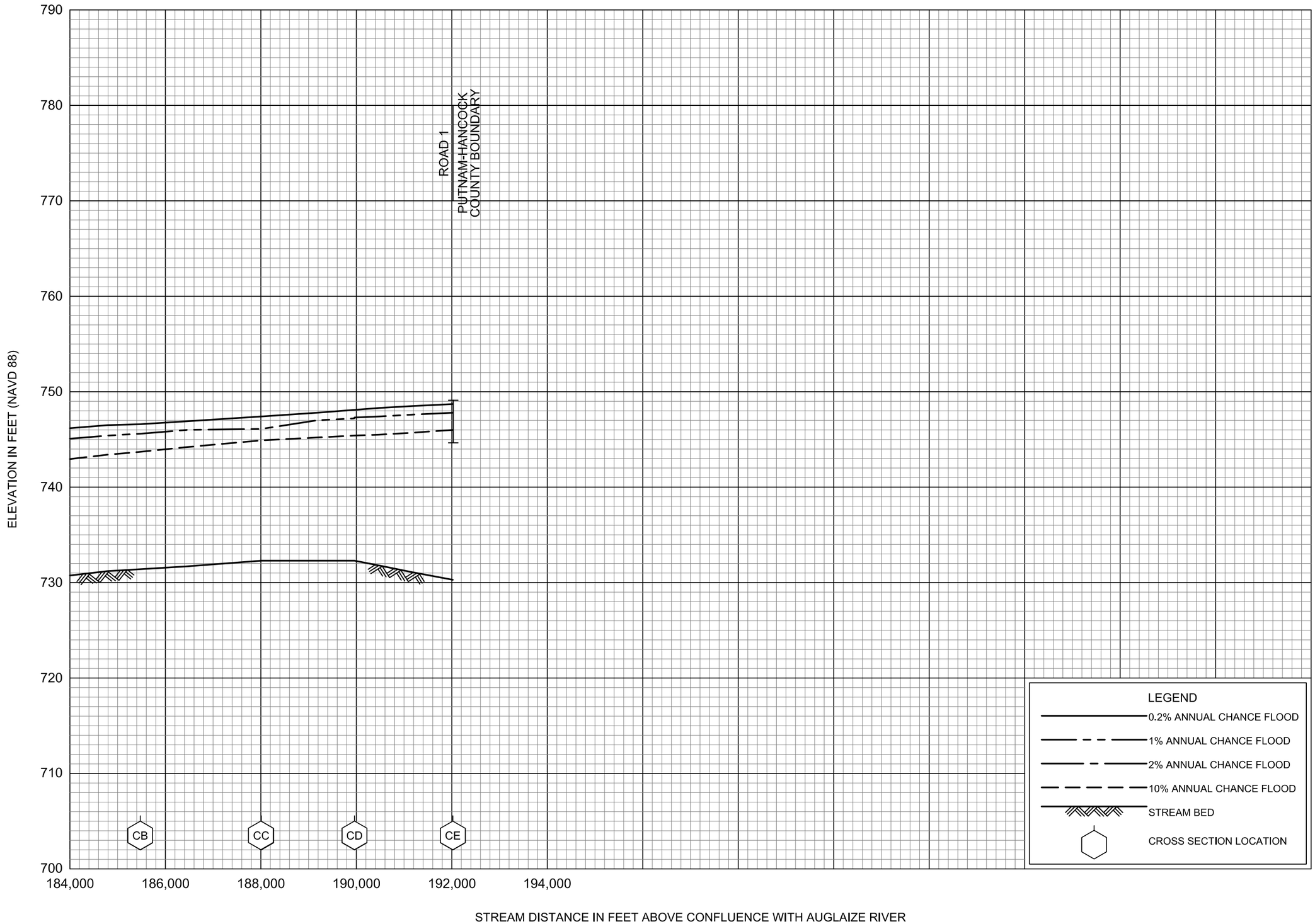
FLOOD PROFILES

BLANCHARD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



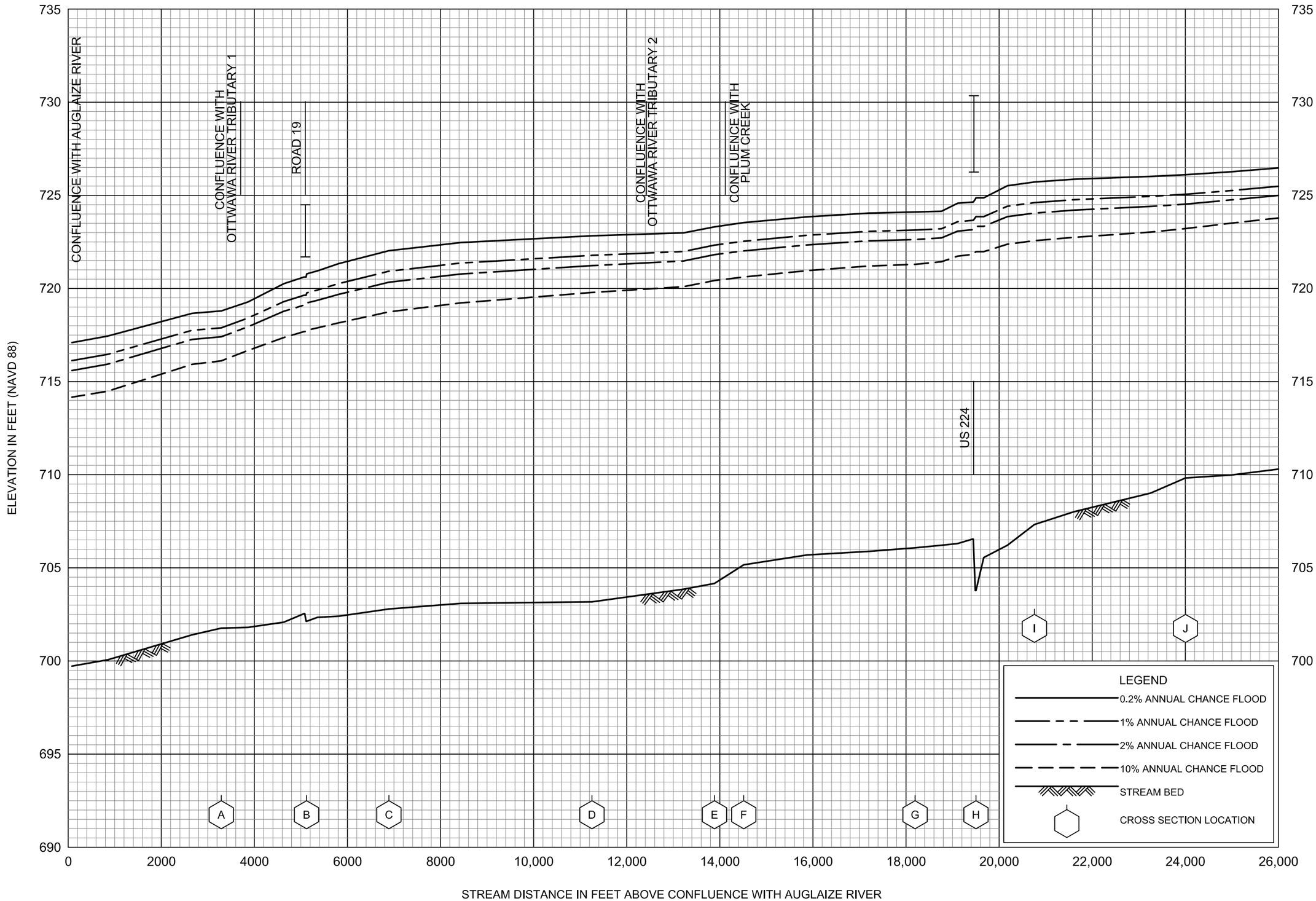
FLOOD PROFILES

BLANCHARD RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

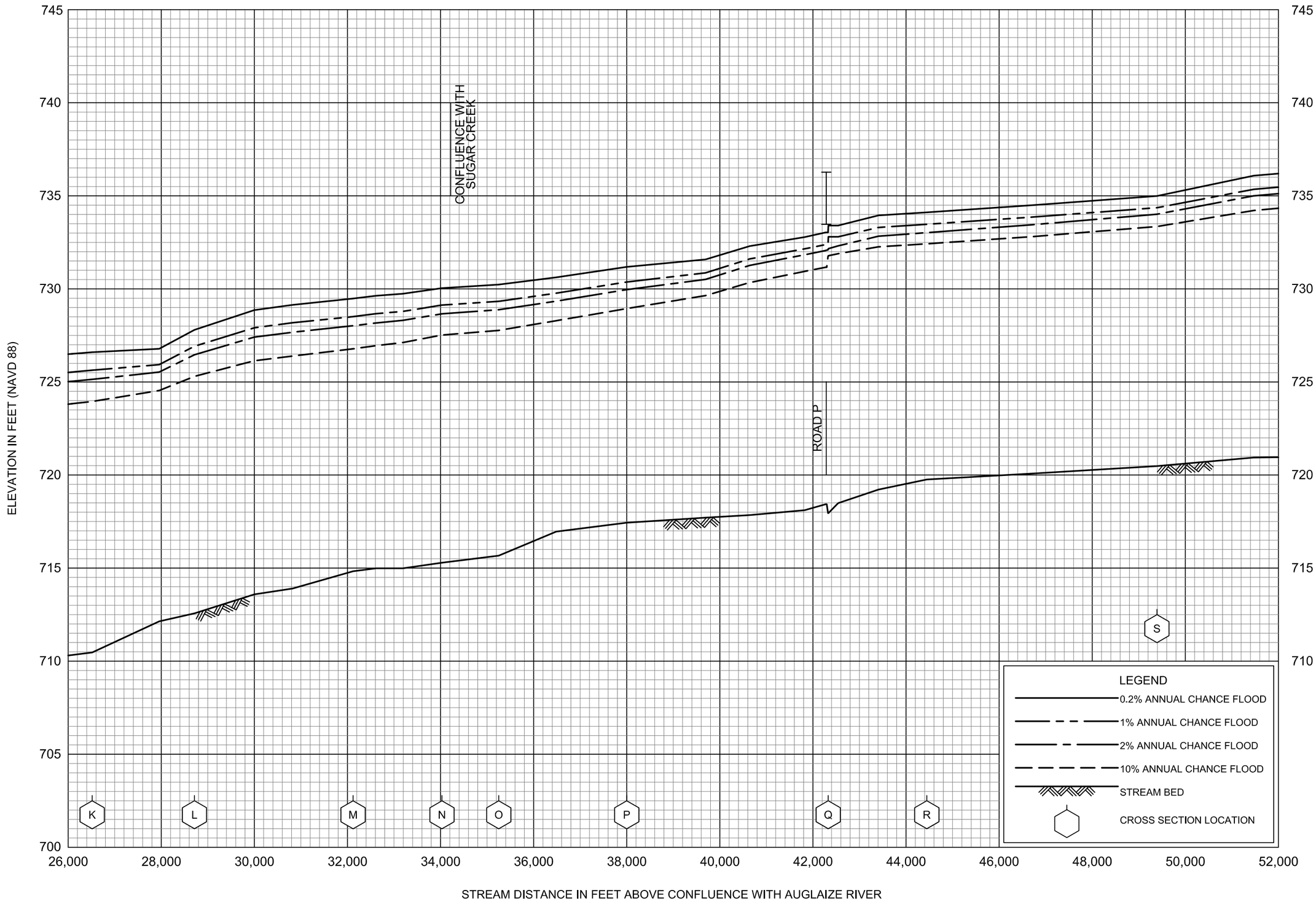
OTTAWA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS

09P



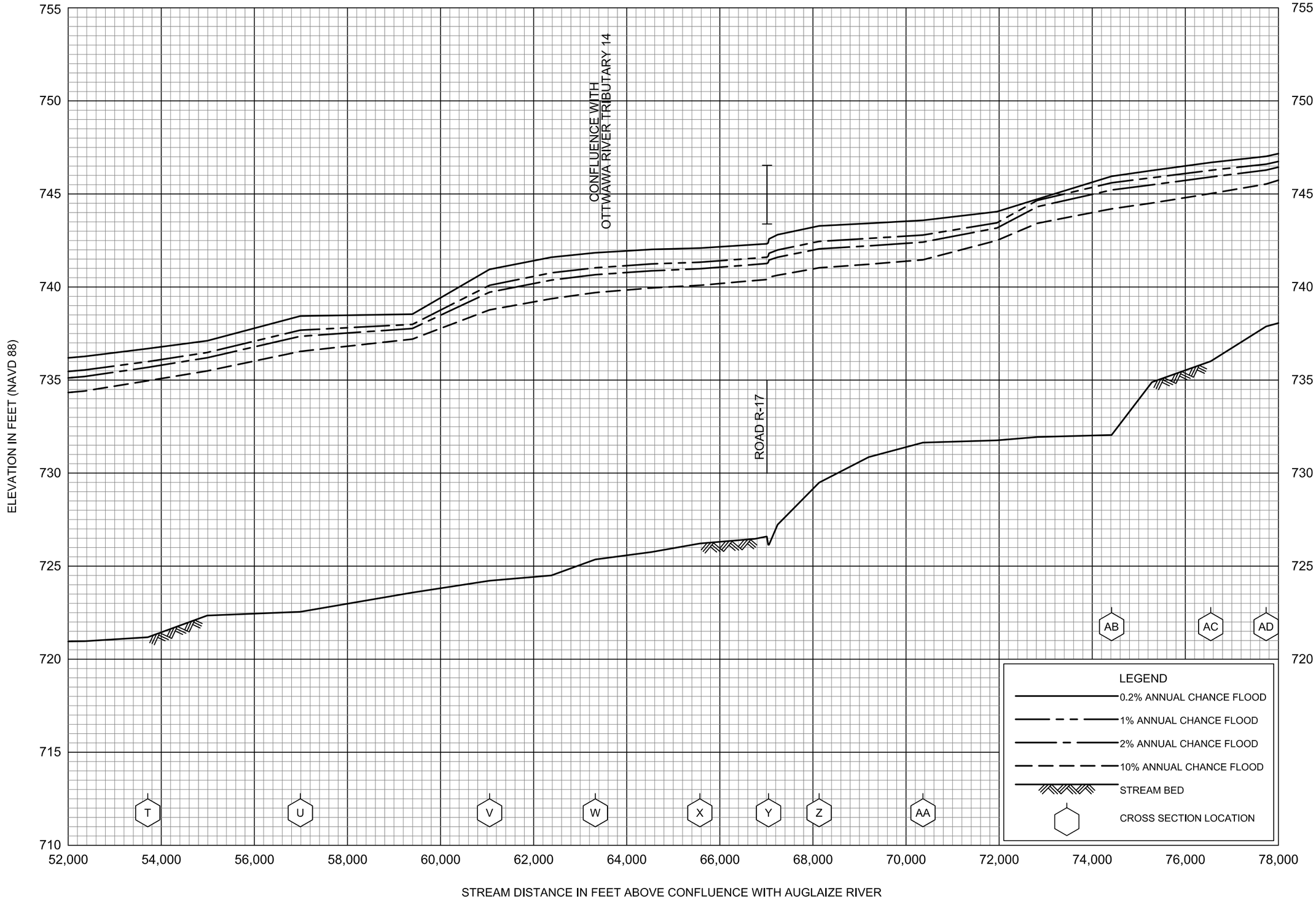
FLOOD PROFILES

OTTAWA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



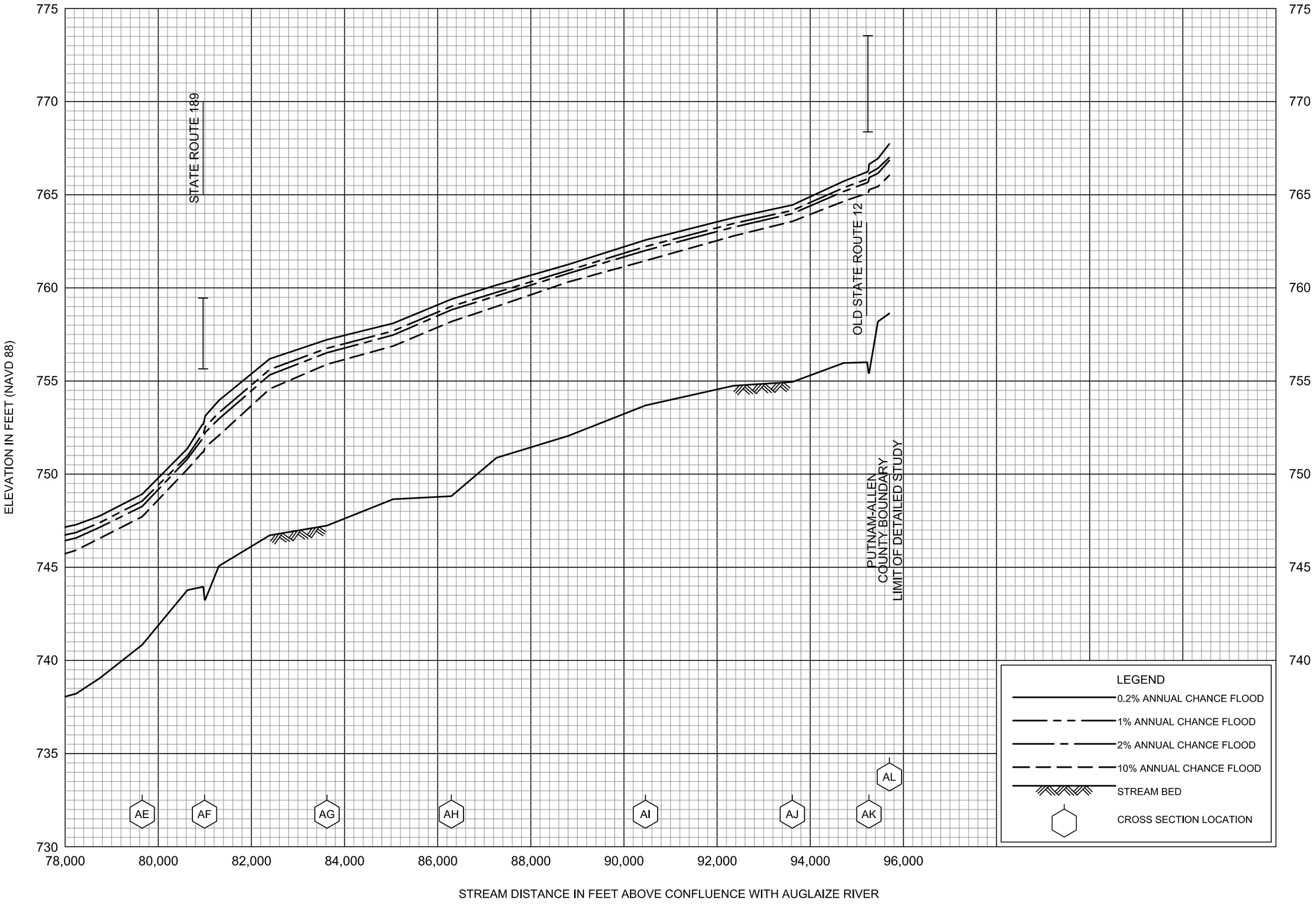
FLOOD PROFILES

OTTAWA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

OTTAWA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

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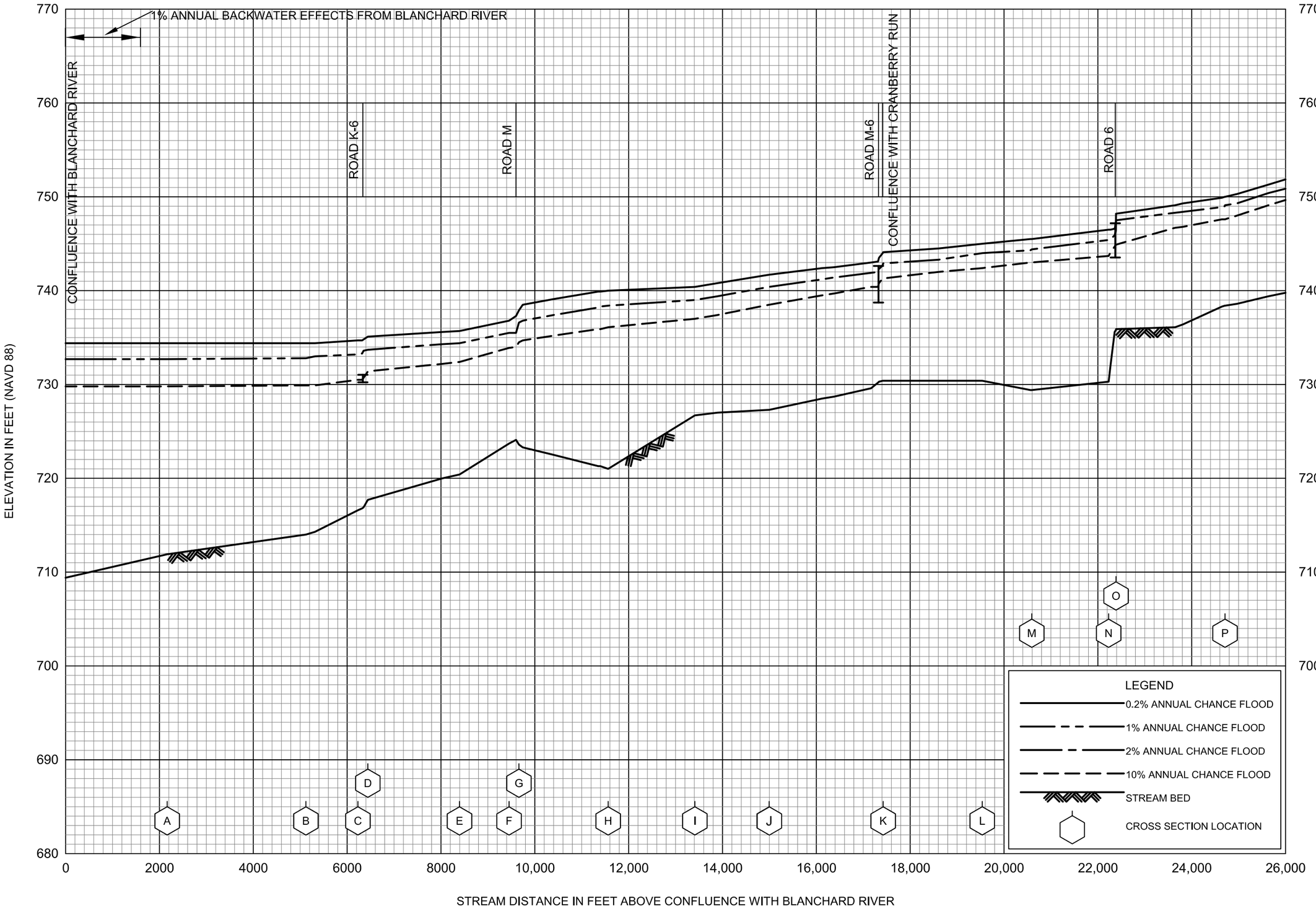


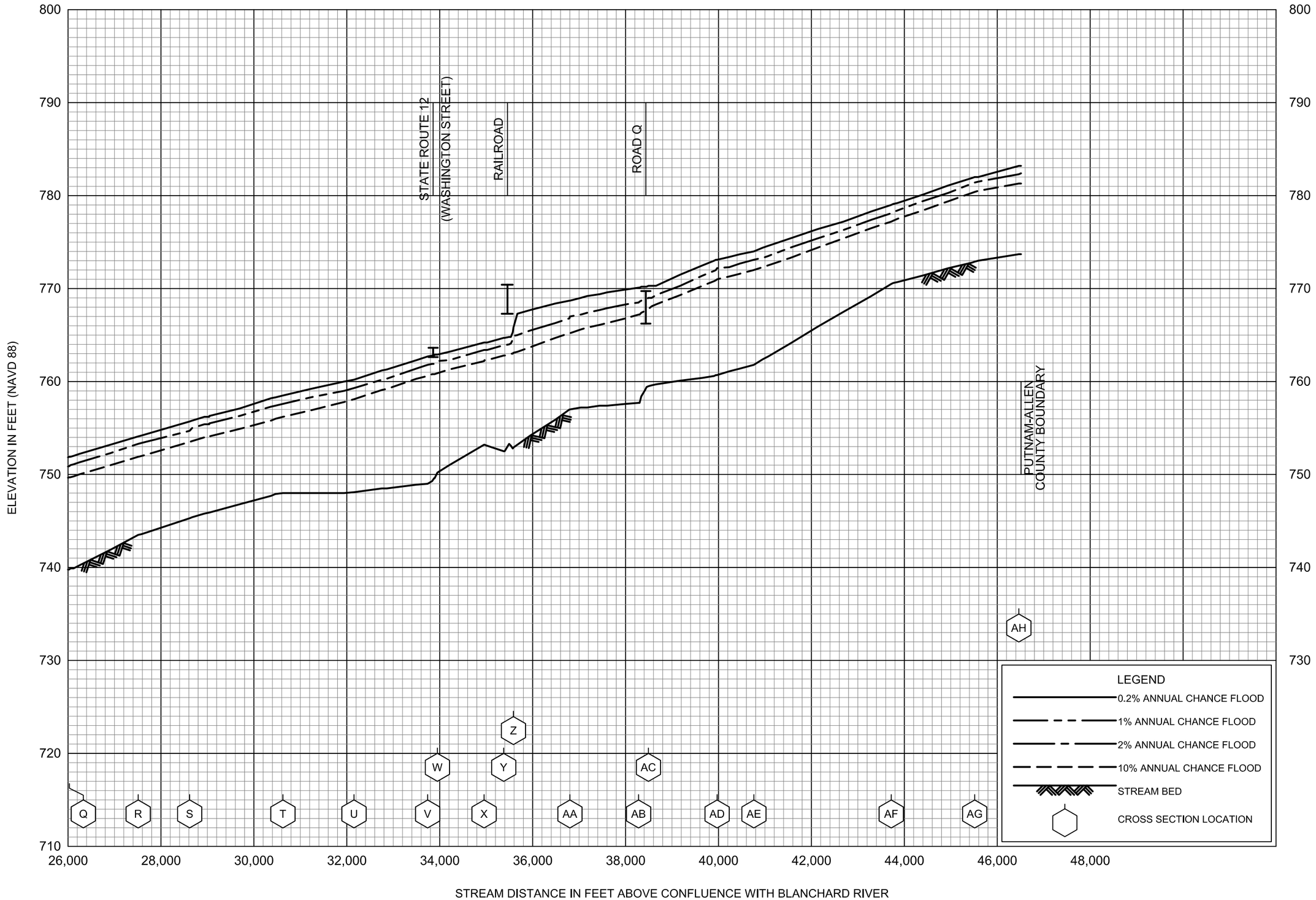
FLOOD PROFILES

RILEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



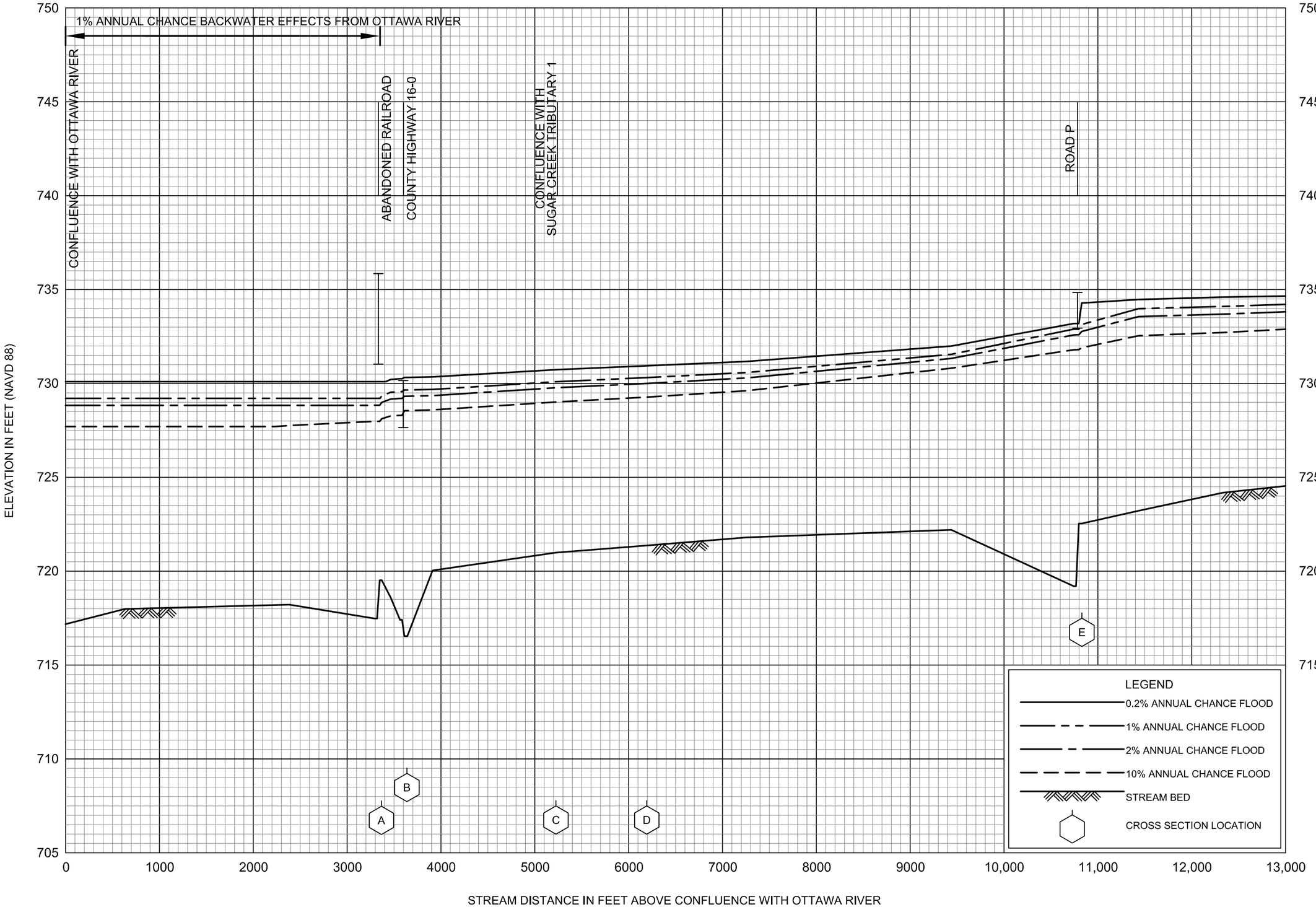
FLOOD PROFILES

RILEY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



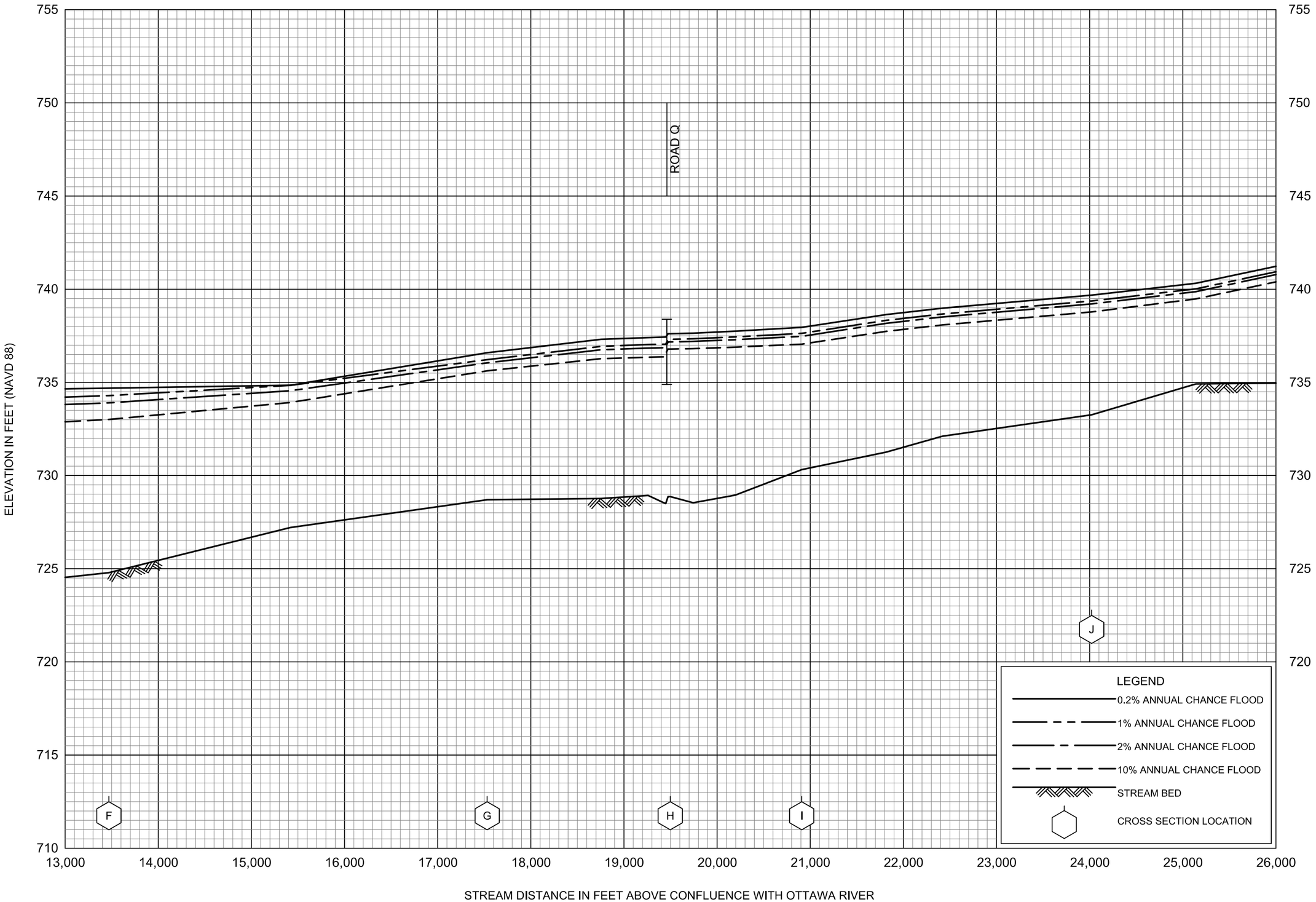
FLOOD PROFILES

SUGAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

SUGAR CREEK

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PUTNAM COUNTY, OH

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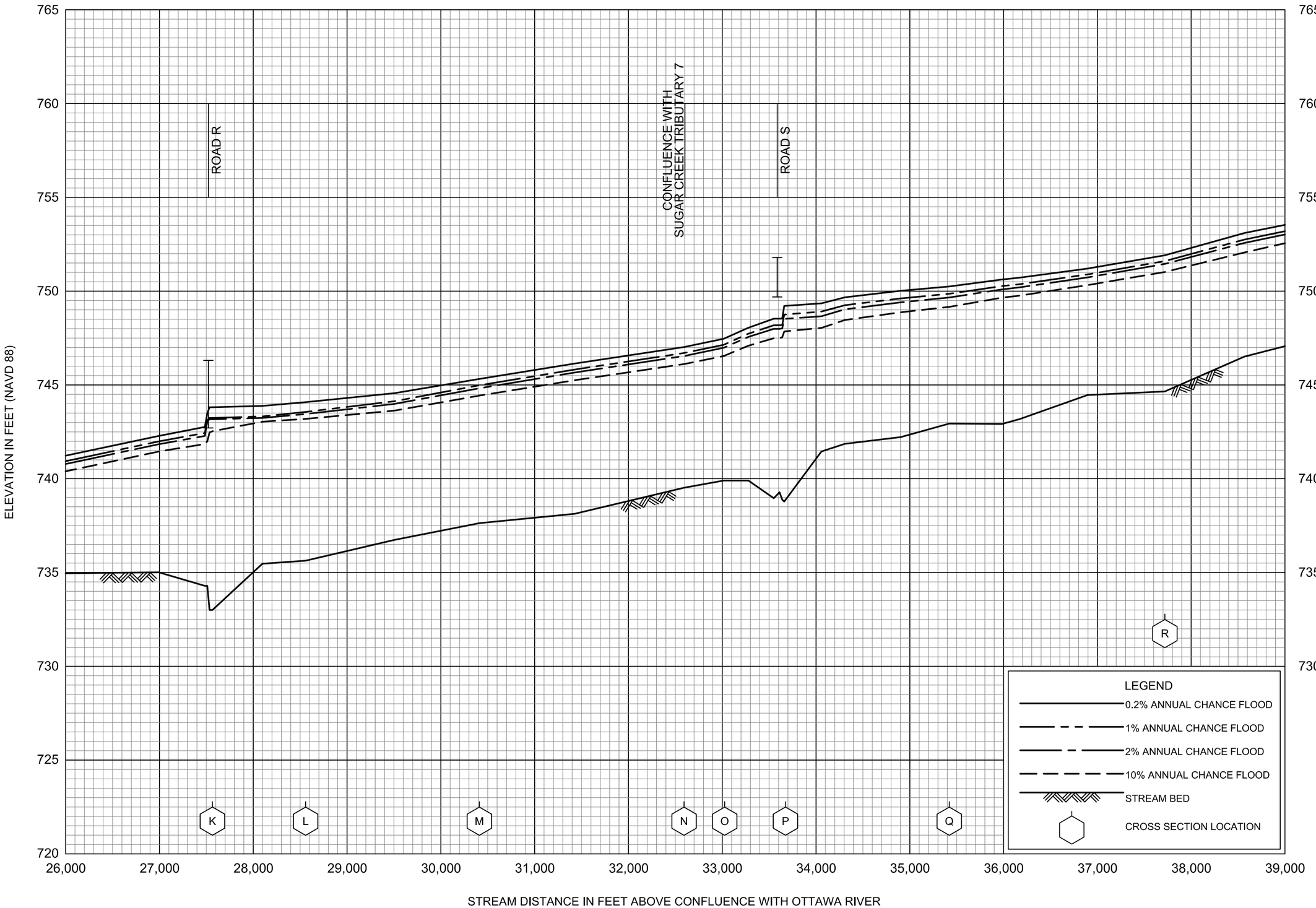

FLOOD PROFILES

SUGAR CREEK

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PUTNAM COUNTY, OH

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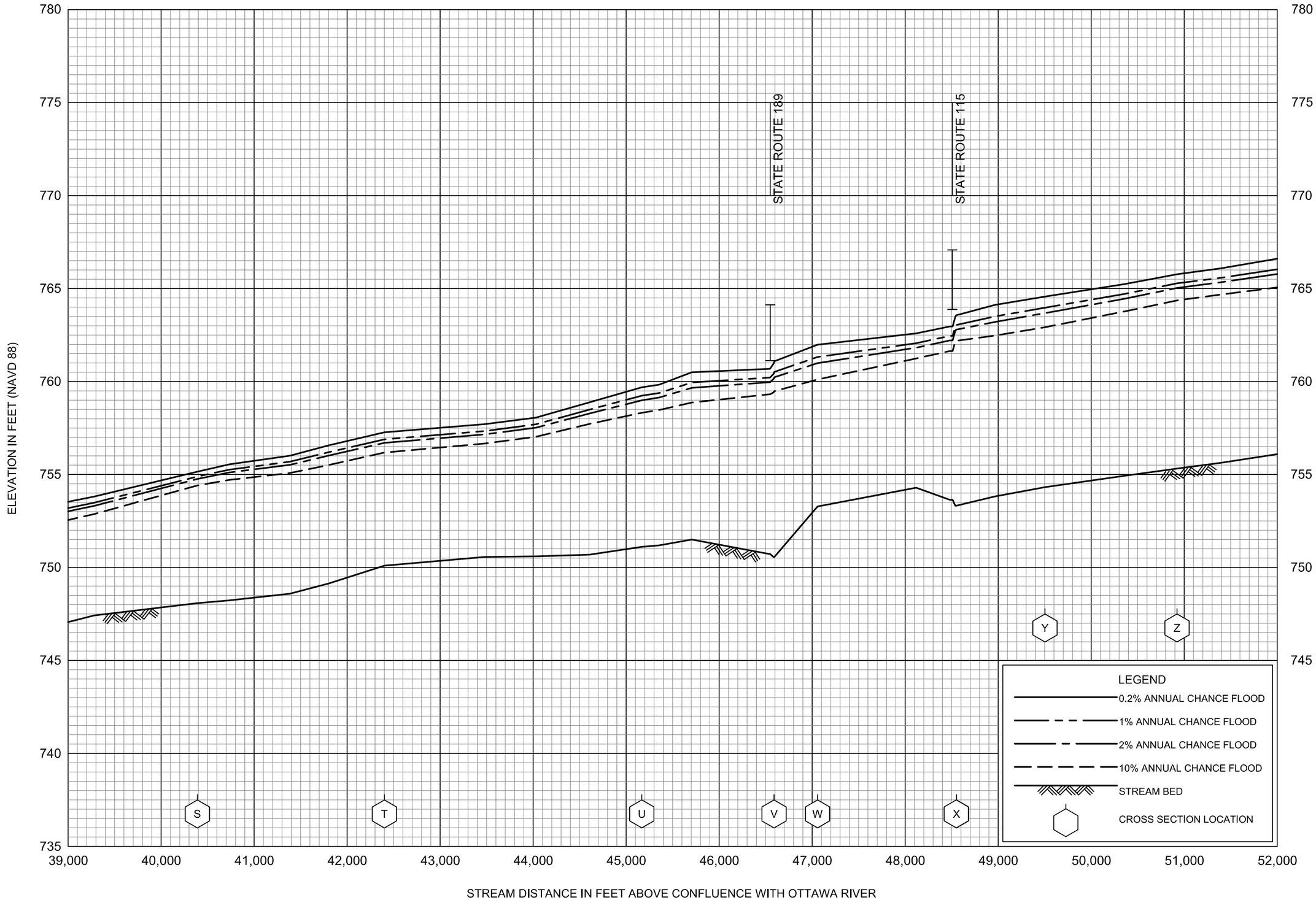

FLOOD PROFILES

SUGAR CREEK

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PUTNAM COUNTY, OH

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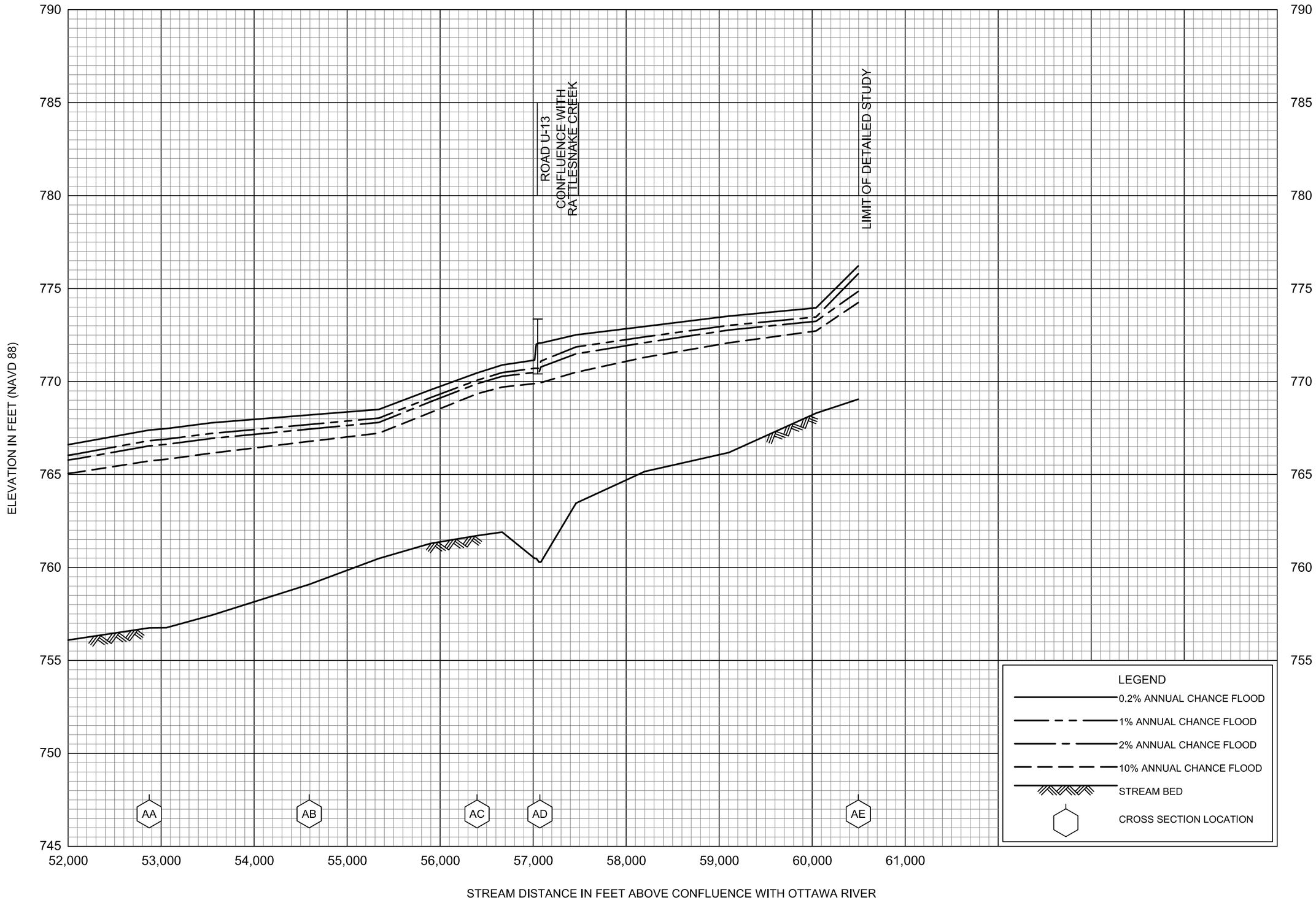

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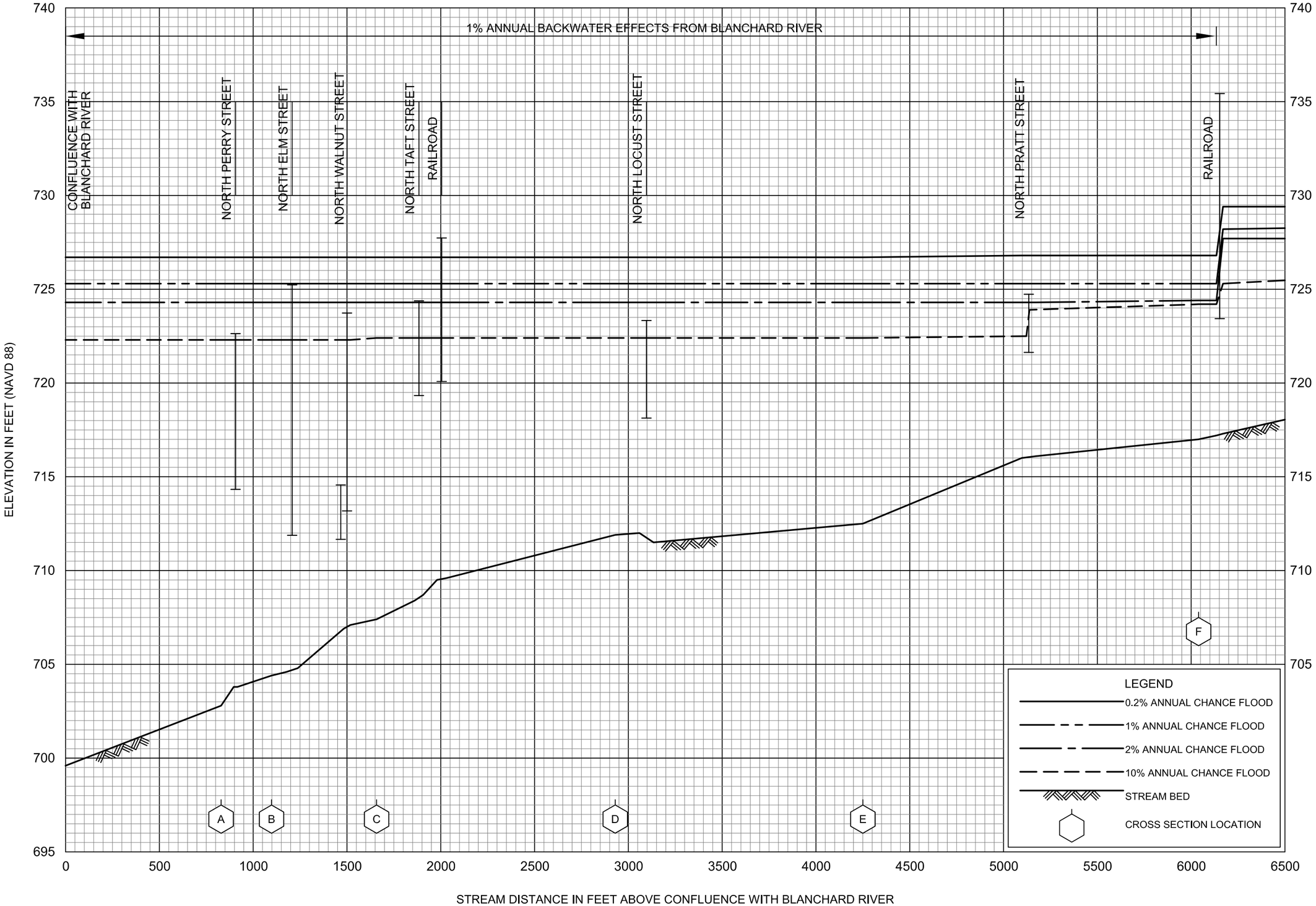


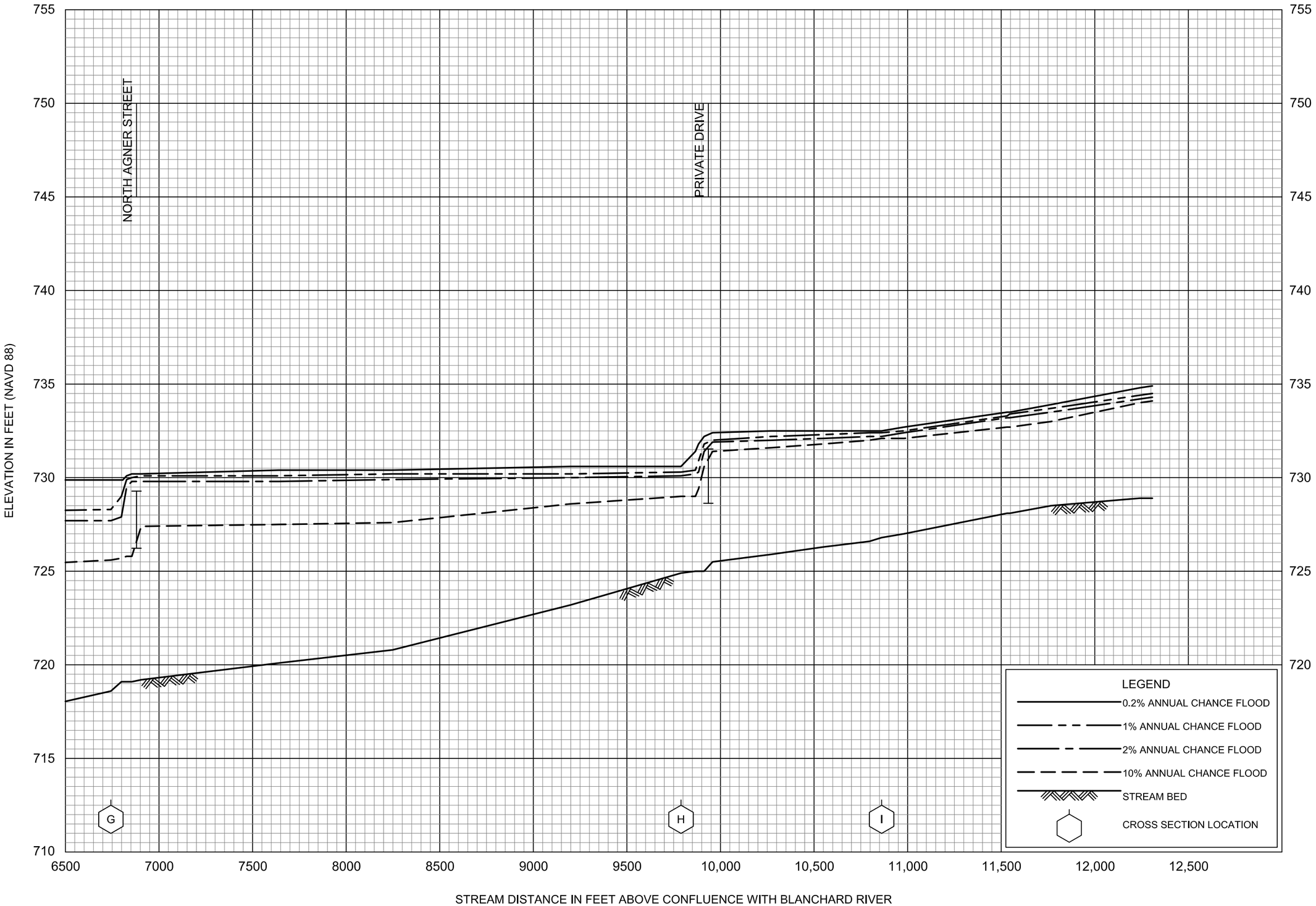
FLOOD PROFILES

TAWA RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

TAWA RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

PUTNAM COUNTY, OH

AND INCORPORATED AREAS