FLOOD INSURANCE STUDY

TRUMBULL COUNTY
OHIO
AND INCORPORATED AREAS

Community Name	Community Number
[(1)]CORTLAND, CITY OF	390823
GIRARD, CITY OF	390536
HUBBARD, CITY OF	390537
LORDSTOWN, VILLAGE OF	390812
MCDONALD, VILLAGE OF	390538
NEWTON FALLS, CITY OF	390539
NILES, CITY OF	390540
ORANGEVILLE, VILLAGE OF	390751
TRUMBULL, COUNTY (UNINCORPORATED AREAS)	390535
WARREN, CITY OF	390541
WEST FARMINGTON, VILLAGE OF	390864
YANKEE LAKE, VILLAGE OF	390798

[(1)] No Special Flood Hazard Areas Identified

EFFECTIVE
June 18, 2010

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
39155CV000A

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 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
A1 through A30	AE
B	X (shaded)
C	X

Initial Countywide FIS Effective Date: June 18, 2010

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FLOOD INSURANCE STUDY

TRUMBULL COUNTY, OHIO AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and supersedes the FIS reports, Flood Insurance Rate Maps (FIRMs), Flood Boundary and Floodway Maps in the geographic area of Trumbull County, Ohio, including the Cities of Cortland, Girard, Hubbard, Newton Falls, Niles and Warren, the Villages of Lordstown, Mcdonald, Orangeville, West Farmington and Yankee Lake, and the Trumbull County Unincorporated Areas (hereinafter referred to collectively as Trumbull County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates. This information will also be used by Trumbull 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.

The City of Youngstown is located in Trumbull and Mahoning Counties. The entire community will be mapped with Mahoning County.

The City of Cortland is a community with No Special Flood Hazard Areas Identified.

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 Maps (DFIRMs) 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 Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

Redelineation of previously effective flood hazard information for this FIS report and accompanying FIRMs as well as conversion of the incorporated areas of Trumbull County into Countywide Format was performed by Fuller, Mossbarger, Scott and May Engineers, Inc. (FMSM), for FEMA under Contract No. HSFE05-05-D-0026. This work was completed in July, 2007.

Information pertaining to the authority and acknowledgements for each of the previously effective FIS reports and new floodplain studies for communities within Trumbull County was compiled for this FIS report and is shown below.

Trumbull County	The previously effective FIS for the Trumbull County unincorporated areas is dated March 1978. The hydrologic and hydraulic analyses were performed by Burgess and Niple Limited for the Federal Insurance Administration (FIA) under contract No. H-3911. This study was completed in May 1977 covering all the significant flooding sources within the unincorporated areas in Trumbull County. Streams studied by detailed methods in this FIS includes Chocolate Run, Crab Creek, Duck Creek, Mahoning River, West Branch Mahoning River, Meander Creek, Mosquito Creek, Little Yankee Run, Mud Creek, Shenango River and Young Run (Reference 1).
City of Girard	The previously effective FIS for the City of Girard is dated January 1980. The hydrologic and hydraulic analyses were performed by United State Army Corps of Engineers (USACE) Pittsburgh District for FEMA under interagency No. IAA-H-10-77 and IAA-H-10-77 Amendment No. 3, Project Order No. 16 respectively. This study was completed in March 1979. Flooding caused by Mahoning River within the city limits was studied in detail (Reference 2).
City of Hubbard	The previously effective FIS for the City of Hubbard is dated February 1978. The hydrologic and hydraulic analyses were performed by Howard Needles Tammen and Bergendoff for FIA under contract No. H-3980. This study was completed in May 1977. Flooding caused by Mud Run and Little Yankee Run within the city limits was studied in detail (Reference 3).
City of Lordstown	The previously effective FIS for the City of Lordstown is dated September 1978. The hydrologic and hydraulic analyses were performed by Burgess and Niple Limited for FIA under contract No. H-3911. This study was completed in June 1977. Flooding caused by Duck Creek and Mud Creek was studied in detail (Reference 4).

City of Newton Falls	The previously effective FIS for the City of Newton Falls is dated February, 1978. The hydrologic and hydraulic analyses were performed by Burgess and Niple Limited for FIA under contract No. H-3911. This study was completed in May 1977. Flooding caused by Mahoning River and West Branch of Mahoning River within the city limits was studied in detail (Reference 5).
City of Niles	The previously effective FIS for the City of Niles is dated November 2002. It was a revision of the original FIS, dated December 1977 for the City of Niles. In the 1977 FIS, the hydrologic and hydraulic analyses were performed by Burgess and Niple Limited for FIA under contract No. H-3911. The study was completed in April 1977. In the 1977 FIS, flooding caused by Mahoning River and Mosquito River was studied in detail (Reference 6). In the 2002 FIS, the hydrologic and hydraulic analyses for Meander Creek were revised by U.S. geological Survey (USGS), Water Resources Division for FEMA under Inter-Agency Agreement No. LMMP-R5-98-02. The revision work was completed in September 30, 1999 (Reference 7).
City of Warren	The previously effective FIS for the City of Warren is dated August, 1977. The hydrologic and hydraulic analyses were performed by USACE Pittsburgh District for FIA under Inter-Agency Agreement Nos. H-19-74 and H-16-75. This study was completed in May 1977. Flooding caused by Mahoning River and Mosquito Creek was studied in detail (Reference 8).
Vlg. of West Farmington	The previously effective FIS for the Village of West Farmington is dated April, 1984. The hydrologic and hydraulic analyses for the study were obtained from a report "Flood Plain Information Report, Grand River, Ohio" (Reference 9) prepared by USACE Buffalo District for FEMA (Reference 10).
New Approximate Studies:	New approximate hydrologic and hydraulic analyses for fifty-seven (57) stream reaches in Trumbull County were performed for this study by Fuller, Mossbarger, Scott and May Engineers, Inc. (FMSM) for the Federal Emergency Management Agency (FEMA), under Contract No. HSFE05-05-D-0026. This study was completed in July, 2007.

The coordinate system used for the production of this DFIRM is State Plane Ohio North 3401 Feet, North American Datum 1983, Lambert Conformal Conic Projection. Differences in the datum and projection system used in the production of DFIRMs 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 DFIRM.

Redelineation of the previously effective flood hazard information for this FIS report, correction to the North American Vertical Datum of 1988, and conversion of the unincorporated and incorporated areas of Trumbull County into the Countywide Format was performed by Fuller, Mossbarger, Scott and May Engineers, Inc., for the Federal Emergency Management Agency under Contract No. HSFE05-05-D-0026.

1.3 Coordination

The purpose of an initial Consultation Coordination Officer's (CCO's) meeting is to discuss the scope of the FIS. A final CCO meeting is held to review the results of the study. The dates of the initial and final CCO meetings held for the previous FIS reports covering the geographic area of Trumbull County, Ohio are shown in Table 1. The initial and final CCO meetings were attended by the study contractor, FEMA (or Federal Insurance Administration), Ohio Department of Natural Resources (ODNR) and the affected community.

Table 1 - CCO Meeting Dates for Previous Flood Insurance Studies*

COMMUNITY NAME	INITIAL CCO DATE	FINAL CCO DATE
Cortland, City of	N/A	November 1, 1983
Girard, City of	August 19, 1977	July 19, 1979
Hubbard, City of	March 17, 1976	July 5, 1977
Lordstown, Village of	February 27, 1975	February 10, 1977
McDonald, Village of	N/A	N/A
Newton Falls, City of	February 27, 1975	July 6, 1977
Niles, City of	February 27, 1975	July 6, 1977
Orangeville, Village of	N/A	N/A
Trumbull County (Unincorporated Areas)	February 27, 1975	February 10, 1977
Warren, City of	October 17, 1974	November 8, 1972
West Farmington, Village of	N/A	N/A
Yankee Lake, Village of	N/A	N/A

*Source: References 1-10

The initial CCO meeting for this countywide FIS was held on September 6, 2006 and was attended by FEMA, ODNR, FMSM and representatives from Trumbull County. The results of the study were reviewed at the final CCO meeting held on September 27, 2007, and attended by representatives of FEMA, ODNR, FMSM and Trumbull County. Problems raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Trumbull County, Ohio.

All previously effective FIRM panels for Trumbull County have been revised, updated and republished in countywide format as a part of this FIS. Analyses described herein refer collectively to previous study efforts detailed in References 1 to 10. The FIRM panel index, provided as Exhibit 2, illustrates the revised FIRM panel layout.

Approximate methods of analysis were used to study those areas having low development potential and/or minimal flood hazards as identified at the initial CCO meetings identified in Table 1. The scope and methods of approximate study were proposed to and agreed upon by FEMA and Trumbull County and Trumbull County communities. For this study, fifty-seven (57) new stream reaches were studied by approximate methods. In other areas where approximate studies had been completed for previous FIS reports, approximate flood hazard areas were redelineated.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas, areas of projected development and proposed construction. Limits of detailed study are indicated on the Flood Profile (Exhibit 1) and on the FIRM (Exhibit 2).

In this FIS, the following streams were studied by detailed methods: Chocolate Run, Crab Creek, Duck Creek, Grand River, Little Yankee Run, Mahoning River, Meander Creek, Mosquito Creek, Mud Creek, Mud Run, Shenango River, West Branch Mahoning River and Young's Run. The limits of detailed study are summarized in Table 2.

TABLE 2 LIMITS OF DETAILED STUDY

STREAM REACH	STUDY LENGTH (MILES)	LIMIT OF DETAILED STUDY
Chocolate Run	3.1	Mouth at Mahoning River to Chessie System
Crab Creek	2.3	Trumbull County line to approximately 300 feet upstream of Interstate 80 West
Duck Creek	9.2	Mouth at Mahoning River to Trumbull County line
Grand River	1.4	Portion within Village of West Farmington
Little Yankee Run	8.1	Mouth at Shenango River to Coalburg Lake Dam
Mahoning River	35.1	Approximately 3,100 ft downstream of confluence with Four Mile Run Creek to confluence with Kale Creek

TABLE 2 LIMITS OF DETAILED STUDY (continued)

STREAM REACH	STUDY LENGTH (MILES)	LIMIT OF DETAILED STUDY
Meander Creek	3.0	Confluence with Mahoning River to Meander Creek Dam
Mosquito Creek	13.4	Mouth at Mahoning River to Mosquito Creek Dam
Mud Creek	7.9	Mouth at Mahoning River to just downstream of intersection of Ohio Turnpike ramp and Hallock Young Road
Mud Run	2.6	Mouth at Little Yankee Run to approximately 600 ft downstream of Lincoln Avenue
Shenango River	0.7	Confluence with Little Yankee Run to approximately 800 ft upstream of Conrail
West Branch Mahoning River	4.4	Mouth at Mahoning River to Trumbull County line
Young's Run	3.9	Mouth at Mahoning River to approximately 1,000 ft upstream of Raymond Avenue

This countywide FIS also incorporated the determination of letters issued by FEMA resulting in map changes (Letters of Map Change, or LOMCs). All LOMCs in Trumbull County for which information could be found are summarized in the Summary of Map Amendment (SOMA) included in the Technical Support Data Notebook (TSDN) associated with this FIS update. LOMC's that have been incorporated into the revised FIRM panels during the production period are shown in Table 3. Copies of the SOMA may be obtained from the Community Map Repository. Copies of the TSDN may be obtained from FEMA.

TABLE 3 SUMMARY OF LOMCs INCORPORATED

CID	Flooding Source	Case Number	Date Issued	New Panel
390535	Mosquito Creek	02-05-1290P	November 15, 2002	39155C0382D, 39155C0384D, 39155C0401D, 39155C0403D
390535	Meander Creek	03-05-393P	May 28, 2003	39155C0392D, 39155C0394D

2.2 Community Description

Trumbull County is located in the northeastern part of Ohio adjacent to the Pennsylvania State Line. It is bounded on the north by Ashtabula County; the south by Mahoning County; and the West by Geauga and Portage Counties. The county is served by two major highways including Interstate 76 and 80. The City of Warren is the largest city and the county seat (Reference 1). The 2005

estimated population of Trumbull County is approximately 219,296 persons according to the U.S. Census Bureau's statistics on July 1, 2005 (Reference 11).

Trumbull County is intersected by three natural drainage areas. Mahoning River flows from west to east through the county. The majority of the county drains to the Mahoning River through Duck Creek, Meander River, Mud Creek and several small streams to the south, and through Chocolate Run, Crab Creek, Eagle Creek, Squawk Creek, Mosquito Creek and several small streams to the north. The northwest portion of the county drains to the Grand River and eventually to Lake Erie. The extreme north-eastern portion of the county drains to the Shenango-Beaver River basin, and eventually drains to the Ohio River (Reference 1).

Trumbull County was formed in 1800. Industrial development began with the early discovery of raw materials to smelt iron ore. Historically, this county was one of the great industrial areas of the state. The lower Mahoning Valley was devoted to iron and steel industry while the upland area of the county was primarily engaged in agricultural production. Dairying and raising livestock have been the most important types of farming. Trumbull County has undergone a rapid urbanization during the past decades. Land use in the floodplain of Mahoning River is primarily industrial with some residential and public park areas. Along Meander Creek, the area is primarily undeveloped with some residential and industrial use. Land use along Mosquito Creek is primarily residential. Land use within Crab Creek is a combination of residential and industrial. Land use in the floodplain of other rivers within the county is residential and/or undeveloped (Reference 1).

The climate in Trumbull County is humid continental, with moderate warm and humid summers and cold winters. The average annual temperature is about 50 degree Fahrenheit. Precipitation is well distributed throughout the year. The mean annual level of precipitation is about 36.0 inches at the City of Warren. There is a great variation of snowfall within the county. The annual snowfall ranges from approximately 38 inches in the south county border to slightly more than 70 inches along the Ashtabula County line (Reference 1).

The topography of Trumbull County is gently subdued, ranging from gently rolling to hilly. Elevations in the county vary from about 810 feet (NAVD) in the lower Mahoning Valley to over 1,280 feet (NAVD) in the upland areas of the county (Reference 1).

Soils in the floodplains of the rivers within Trumbull County are primarily silt loams with sand silt loams in the upper reaches of the Mahoning River, the West Branch Mahoning River, and Duck Creek. Vegetations within the floodplains contain brushes and small trees. There are grassed residential areas along Chocolate and Youngs Run and a considerable amount of farmland in the Duck Creek floodplain (Reference 1).

The City of Girard is located in the southern part of Trumbull County encompassing 4.2 square miles. According to the statistics of the U.S. Census Bureau's on July 1, 2005, the 2005 estimated population of the city is 10,490 (Reference 11). The climate of the City of Girard is moderate but may have rapid

changes due to passage of fronts. Measurable precipitation with the city occurs about 141 days with a mean annual precipitation of 38 inches. Land use in Girard is generally broad and heavily industrialized. Six railways follow both banks of the Mahoning River, crossing in several places. Soils in the city are sandy to clay sandy and are moderately drained (Reference 2).

The City of Hubbard is located in the southeastern part of Trumbull County. According to the statistics of the U.S. Census Bureau's on July 1, 2005, the 2005 estimated population of the city is 8,006 (Reference 11). This city, encompassing 2.7 square miles, is primarily a residential community with some commercial activities. Industry and business in Sharon, Pennsylvania and Youngstown support much of Hubbard's working population. Little future development was planned by the time of the previous FIS. The main watercourses in the city are Little Yankee Run and its tributaries: Mud Run, Tributary 1 and 2. Land use within the city is largely residential and commercial, with the remaining land being mostly open field. The floodplain of Little Yankee Run within the city is primarily undeveloped. There are a few residential buildings south of Little Yankee Run near North Main Street, but they were built on high banks. Primary land use in the floodplain of Mud Run is field, orchard or cemetery. A few residential buildings east of North Main Street and north of East Liberty Street are within the Mud Run's floodplains. The floodplain of Tributary 1 is undeveloped. Floodplain development within Tributary 2 is primarily fields with a few residential buildings (Reference 3).

The Village of Lordstown is located in the southwestern part of Trumbull County. This village is drained by Duck Creek and Mud Creek, both tributaries of the Mahoning River. Since 1940, the village has incurred a steadily increase in population of approximately 28 percent every decade by the time of previous FIS (Reference 4). In the 1970 census, the population was 2,472 persons. The huge General Motors complex and the supportive highway and rail services brought additional residential growth. According to the statistics of the U.S. Census Bureau's on July 1, 2005, the 2005 estimated population of the city is 3,636 (Reference 11). The climate of the village is moderate continental with a measurable snowfall of 38 inches at the board of Mahoning County.

The City of Newton Falls is approximately 9 miles southwest of the City of Warren. Settlement in the city began in 1806. Newton Falls was incorporated as a village in 1872. At the time of the previous FIS, this community was one of the major industrial areas of the county. According to the statistics of the U.S. Census Bureau's on July 1, 2005, the 2005 estimated population of the city is 4,833 (Reference 11). The average annual precipitation in the city is 36 inches and the mean annual snow fall is 47 inches. Elevations within the city vary from 900 feet at the bank of Mahoning River to no more than 940 feet. The floodplains of the Mahoning River and the West branch of Mahoning River in the vicinity of the city are narrow and high banked. Beyond the city, the floodplains are characterized by wide and swampy areas. The city was cut into three sections by two rivers, the Mahoning River that flows from south to north through the city and the west Branch Mahoning Rive that flows southwest to northeast. Each stream, flowing through a fluvial fill, courses for approximately 1 1/2 miles through the city and meanders little. The gradient of Mahoning River both above and below Newton Falls is pretty flat with a river bed elevation drop of about 1 foot per mile.

However the river bed within the City of Newton Falls is relatively steep. The river bed elevation drops 14 feet within 2 miles through the city. Similarly, the west Branch Mahoning River has a river bed drop of 6.0 feet through the city. The soils within the Newton Falls are silt and other alluvium glacial deposits from the Wisconsin Age, characterized by a moderately slow permeability. The vegetation along the streams is likely to be remnants of forests originally found in this area. The land use within this community is primarily residential with a few commercial and industrial areas. At the upstream end of the West Branch Mahoning River within the city limits was zoned as residential by the time of the previous FIS.

The City of Niles, encompassing 15.1 square miles, is located in south-central Trumbull County. The city is approximately 5 miles southwest of the City of Warren. Settlement of the Mahoning Valley began as early as 1700s. In 1843, the Village of Niles was platted just downstream of the confluence point of Mosquito Creek and the Mahoning River. The area continued to grow rapidly. By the time of previous FIS, this community was one of the richest areas of the county. According to the statistics of the U.S. Census Bureau's on July 1, 2005, the 2005 estimated population of the city is 20,016 (Reference 11). The Mahoning River flows from west to east through the city for 3.5 miles with little meander and forms a narrow valley. Elevations along the Mahoning River and Mosquito Creek vary from about 850 feet to about 1,050 feet in the east-central portion of the city. The river gradient is relatively flat within the city, with a slope of approximately 3 feet per mile. Mosquito Creek flows to the south in a broad, glacial outwash plain to the confluence point with Mahoning River. Meander Creek meanders northward through the city and confluences with the Mahoning River. Soils in the floodplains within the city are silt loam. Vegetation along the Mahoning River is light, consisting of some trees and brushes. Vegetation along Mosquito Creek and Meander Creek is heavy bushes or trees.

The City of Warren is located in the southwestern portion of Trumbull County, comprising a total land area of 14.56 square miles. According to the statistics of the U.S. Census Bureau's on July 1, 2005, the 2005 estimated population of the city is 45,798 (Reference 11). The floodplain of Mahoning River within the City of Warren has been developed moderately, with a mixture of residential, commercial and light to heavy industrial. Approximately 61 percent of the Urban Renewal Areas that was defined by the city is affected by the 1-percent-annual-chance flood and approximately 18 percent of these areas lie within the floodway calculated in the 1977 FIS. The floodplain with Mosquito Creek is sparsely developed by the time of previous FIS but under a lot of development pressure. The Mahoning River valley through the city consists of moderate wide floodplain with relatively flat river gradient (Reference 8).

The Village of West Farmington is located in northwest Trumbull County. According to the statistics of the U.S. Census Bureau's on July 1, 2005, the 2005 estimated population of the city is 502 (Reference 11).

2.3 Principal Flood Problems

Major flooding has occurred within the watersheds of the Mahoning, Shenango and Grand Rivers during all seasons of the year. Flooding season for the major streams is usually from December to April due to a combination of heavy rains,

frozen ground and/or snowmelt. The principal flooding problem in the Village of West Farmington is a result of extended periods of rainfall in the spring. The flooding is often compounded by ice jam and runoff from snowmelt. Large floods may occur any time throughout the year, especially on smaller streams. Summer floods usually are a result of intensive thunderstorm and may be local in natural. The duration of flooding is relatively short on small streams. On the Mahoning River, it is much longer, approaching three days in some cases (Reference 1). During the flood that occurred in January 1959, the flood peak on the Mahoning River at Youngstown did not rise until 30 hours after the flood rise began. The flood rose with a maximum rate 0f 1.5 feet per hour, and remained out of bank for 77 hours (Reference 2).

Overbank flooding is the principal flooding problem in Trumbull County. Historical records show that exceptionally high floods occurred in the Mahoning Valley in 1840, 1878, 1883, 1893, and 1904. The greatest known flood on the Mahoning River occurred on March 26, 1913, resulting in a severe blow to this area. Many industries suffered from flooding damages, bridges were washed away and power and water services were interrupted during that flood. The estimated peak flow of the 1913 flood is 44,400 cubic feet per second based on the records from a USGS gage at Youngstown (No. 03098000). The largest flood on the Mahoning River in more recent years (through 1978) occurred in January, 1959 and had a recorded discharge of 16,900 cubic feet per second at the same gage in Youngstown. At the Leavittsburg gage (No. 03094000), located 12 miles downstream of Newton Falls, the 1959 flood produced a discharge of 20,300 cubic feet per second with an estimated recurrence interval of 570 years. Table 4 lists some major floods on the Mahoning River recorded at Youngstown river mile 23.04.

Table 4 - Major Floods Recorded at Youngstown (Mahoning River Mile 23.04)

DATE OF CREST	ACTUAL STAGE (FEET)[1]	NATURAL RECURRENCE INTERVAL (YEAR)[3]
March 26, 1913	26.5[2]	200
January 22, 1959	18.6	45
January 25, 1937	14.9	5
February 11, 1959	14.8	10
March 25, 1936	14.3	5
May 28, 1946	14.2	5
December 30, 1942	14	4
January 18, 1976	13.8	5
December 15, 1977	13.8	8
January 27, 1952	13.6	8

[1] Gage Zero Datum – 825.9 feet (NAVD)

[2] Based on High Water marks

[3] Based on data through 1978

Source: Reference 2

At the Newton Falls gage (No. 03092300) on the West Branch Mahoning River, located 3 miles upstream of Newton Falls, recorded a peak discharge of 8,340 cubic feet per second during the 1959 flood and a recurrence interval of over 500 years. Other significant floods on the West Branch Mahoning River occurred in March 1936, January 1937 and January 1952.

The largest flood on Meander Creek, as recorded by the gage at Mineral Ridge (No. 03097500), occurred on May 28, 1946 with a peak discharge of 5,500 cubic feet per second. This gage was discontinued after 1951.

Mosquito Creek Dam was constructed on the Mosquito Creek in 1943. Prior to the construction of the dam, the 1913 flood produced a peak discharge of 7,500 cubic feet per second. On January 19, 1929, a peak discharge of 1,890 cubic feet per second was recorded at a gage (No. 03095500) near the Mosquito Creek Dam. After the construction of the dam, the largest recorded flood occurred on December 30, 1942 with a peak flow of 3,080 cubic feet per second at a now discontinued gage (No. 03096000) at the dam site near Robbins Avenue in the City of Niles. The discharge of the 1959 flood was estimated to be about equal to the 1942 peak discharge.

The maximum recorded flood on the Crab Creek occurred on January 29, 1959 with a peak discharge of 2,140 cubic feet per second based on gage records (No. 03098700). This gage is located on Crab Creek less than 1 mile south of the county line (Reference 1).

Potential flooding problems due to backwater effects caused by structures were investigated in previous FIS's. Two dams were constructed on the Mahoning River within Trumbull County. One is near river mile 37 and the other one is within the corporate limits of Newton Falls. Both dams have little back water effects. There is one small dam on West Branch Mahoning River within Newton Falls that causes an approximately 10-11 feet increase of water surface elevation behind the dam. A small dam on Mosquito Creek near Robbins Avenue within the City of Niles increases the water surface elevation by 4-6 feet. A small dam on Mud creek near river mile 1.1 causes a backwater elevation rise of 6 feet. Two other small dams on Mud Creek near river mile 5.1 cause a water elevation rise of approximately 6 feet behind the dams. There are two dams on Young's Run, located near river mile 4.9 and 7.5, causing a water surface elevation rise of 9 feet and 5 feet respectively (Reference 1). In the City of Warren, in addition to the overbank flooding, backwater effects from Duck Creek and Hoyt Run are also the principal flood problems. Since the Mosquito Reservoir was placed, gradual encroachment on the Mosquito Creek has occurred with a corresponding increase in potential flood damage. The gradual encroachment through the time of previous FIS resulted in a reduction of the maximum no-damage flowrate from 2,000 cfs to 800 cfs.

2.4 Flood Protection Measures

Three major flood control dams were constructed, operated and maintained by USACE, Pittsburgh District within the Trumbull County to control the runoff from upstream (Reference 2). They are Berlin Dam on the Mahoning River, Kirwan

Dam on the West Branch Mahoning River and Mosquito Creek Dam on the Mosquito Creek. Berlin Dam was placed in operation in 1943 and controls a drainage area of 276 square miles, approximately 81 percent of the total drainage area at the dam. Kirwan Dam was completed in February 1967 and controls a drainage area of 80.5 square miles. Mosquito Creek Dam was constructed in April 1944 and controls a drainage area of 97.4 square miles. This dam is located just 13 miles upstream from the mouth and controls 74 percent of the total drainage area at mouth. Downstream areas from the dam are subject to flood due to the downstream uncontrolled runoff of Mosquito Creek and encroachment of the floodplain (Reference 2). There is one Power Company dam on Mahoning River located between Summit Street and Conrail. However, it does not provide flood protection and is no longer in operation (Reference 8). Milton Dam, constructed in 1917 and owned by the City of Youngstown, is situated just downstream of Berlin Dam. It is operated in conjunction with Berlin Dam to form the single operation of the Berlin-Milton reservoir system. This network of dams reduces the flood in the City of Girard by an average of three to six feet (Reference 2).

The Crab Creek local protection channel improvement, completed in 1973, provides some benefits to the city of Youngstown and northern areas of the county.

There are two retention basins on Mud Creek. The one owned by the county is very effective in controlling the runoff from the upstream watershed. Another retention basin owned by the General Motors Corporation is currently being primarily used to trap paint spills.

Various flood protection measurements have been proposed on Duck Creek, Eagle Creek, Grand River, Pymatuning Creek, Mosquito Creek and Young's Run, but none of them has been scheduled for implementation. The county has established subdivision regulations to restrict obstructions on natural watercourse and residential developments within floodplains (Reference 1).

None of the flood protection measures were identified as providing protection from the 1-percent annual chance flood.

3.0 ENGINEERING METHODS

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

year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of the original study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting Trumbull County. A summary of peak discharges for the 10-, 2-, 1-, and 0.2-percent annual chance (10-, 50-, 100-, and 500-year return period) floods of each flooding source studied in detail in Trumbull County is presented in Table 5.

Table 5 – Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	PEAK DISCHARGE (CFS) 10-PERCENT ANNUAL CHANCE	2-PERCENT ANNUAL CHANCE	1-PERCENT ANNUAL CHANCE	0.2-PERCENT ANNUAL CHANCE
Chocolate Run					
Mouth	4.82	608	780	875	1,090
Limit of Detailed Study	1.61	255	325	370	440
Crab Creek					
Trumbull County Line	12.0	2,150	3,950	4,600	6,600
Below Unnamed Tributary 1	11.5	1,800	32,000	4,200	5,000
Above Unnamed Tributary 1	9.14	1,320	2,000	2,290	3,150
Below Unnamed Tributary 2	9.13	1,320	2,000	2,290	3,150
Above Unnamed Tributary 2	7.77	1,160	1,740	2,000	2,750
Below Unnamed Tributary 3	6.86	1,050	1,580	1,800	2,460
Above Unnamed Tributary 3	3.72	650	940	1,090	1,420
Limit of Detailed Study	3.51	625	910	1,040	1,350
Duck Creek					
At mouth	33.10	1,900	2,150	2,300	2,550
Below Duck Creek	30.26	2,550	3,420	3,860	4,800
Above Duck Creek	26.06	2,300	3,025	3,420	4,230
Below Unnamed Tributary 1	25.87	2,280	3,000	3,300	4,200
Above Unnamed Tributary 1	23.71	2,100	2,800	3,190	3,900
Hewitt-Gifford Road	23.41	2,100	2,800	3,190	3,900
Newton Falls Road	18.29	1,750	2,270	2,560	3,200

Table 5 – Summary of Discharges (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	PEAK DISCHARGE (CFS) 10-PERCENT ANNUAL CHANCE	2-PERCENT ANNUAL CHANCE	1-PERCENT ANNUAL CHANCE	0.2-PERCENT ANNUAL CHANCE
Below Unnamed Tributary 2	17.79	1,700	2,220	2,500	3,125
Above Unnamed Tributary 2	13.40	1,350	1,770	2,000	2,500
Trumbull County Line	8.25	900	1,200	1,350	1,650
Grand River					
At confluence with Dead Branch Creek	57.2	2,000	N/A	6,600	N/A
Little Yankee Run					
At mouth	41.0	2,190	3,100	3,500	4,600
Below Little Deer Creek	36.2	2,060	2,790	3,100	4,100
Above Little Deer Creek	30.3	1,670	2,350	2,630	3,440
Below Mud Creek	28.4	1,575	2,220	2,475	3,240
Above Mud Creek	19.9	1,140	1,575	1,760	2,275
Mahoning River					
At Youngstown	898	11,200	17,100	20,950	33,500
Lower Study Limit (Trumbull County unincorporated)	859	11,200	17,100	20,950	33,500
Below Meander Creek	854	11,200	17,100	20,950	33,500
Above Mosquito Creek	630	9,600	14,200	16,800	25,700
At upstream corporate limits (City of Niless)	629	9,600	14,200	16,800	25,700
Below Duck Creek	575	9,600	14,200	16,800	25,700
Above Duck Creek	542	8,250	11,800	14,100	24,500
Below Eagle Creek	536	8,000	11,300	13,600	23,600
Above Eagle Creek	426	4,100	5,700	6,800	16,800
Below West Branch	415	3,800	5,200	6,200	16,800
Limit of Detailed Study (Trumbull County unincorporated)	301	2,500	3,500	5,100	14,500
Meander Creek					
At Mouth	85.8	N/A	N/A	5,000	N/A
Corporate Limits of Niless	85.2	2,950	4,300	5,000	6,700

Table 5 – Summary of Discharges (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	PEAK DISCHARGE (CFS) 10-PERCENT ANNUAL CHANCE	2-PERCENT ANNUAL CHANCE	1-PERCENT ANNUAL CHANCE	0.2-PERCENT ANNUAL CHANCE
Limit of Detailed Study	83.9	2,950	4,300	5,000	6,700
Mosquito Creek					
Corporate Limits of Niles	131	2,100	3,350	4,050	5,400
State Route 82	127	1,700	3,000	3,750	5,200
Below Spring Run	125	1,700	3,000	3,750	5,200
Above Spring Run	119	1,500	2,250	2,700	3,500
Below Big Run	117	1,500	2,250	2,700	3,500
Above Big Run	109	1,000	1,000	1,000	1,000
Limit of Detailed Study	98	1,000	1,000	1,000	1,000
Mud Creek					
At mouth	14.6	1,220	1,800	2,080	2,760
Paramount Lake Dam	14.6	1,220	1,800	2,080	2,760
Upstream End of Paramount Lake	14.4	1,150	1,730	2,000	2,700
Below Unnamed Tributary	13.6	1,120	1,665	1,925	2,640
Above Unnamed Tributary	9.26	710	1,060	1,150	1,740
Dam at River Mile 1.12	9.25	710	1,060	1,150	1,740
B. & O. Railroad	9.00	1,000	1,000	1,625	2,125
County Storm Water Retention Basin Outlet	3.35	375	375	575	880
County Storm Water Retention Basin Inlet	2.57	525	800	950	1,275
Limit of Detailed Study (Village of Lordstown)	2.26	500	750	875	1,180
Mud Run					
Confluence with Little Yankee Run	9.43	741	1,045	1,175	1,469
Cross Section B	5.99	508	707	791	976
Cross Section L	5.29	421	591	556	813
Cross Section O	1.74	156	202	219	263
Cross Section P	1.66	150	194	210	252
Shenango River					
At confluence with Little Yankee Run	700	6,100	7,400	9,000	11,500

Table 5 – Summary of Discharges (continued)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ. MILES)	PEAK DISCHARGE (CFS) 10-PERCENT ANNUAL CHANCE	2-PERCENT ANNUAL CHANCE	1-PERCENT ANNUAL CHANCE	0.2-PERCENT ANNUAL CHANCE
At confluence with Yankee Run	656	5,500	6,200	8,000	10,400
At State Street, Sharon, Pennsylvania	608	5,000	5,000	7,000	9,300
West Branch Mahoning River					
Mouth	109	2,350	3,400	4,000	5,300
Downstream Corporate Limits of Newton Falls	102	2,000	2,900	3,400	4,500
Upstream Corporate Limits of Newton Falls	101	1,950	2,850	3,300	4,400
Trumbull County Line	100	1,850	2,740	3,250	4,200
Youngs Run					
At mouth	10.5	1,130	1,450	1640	2,040
Below Unnamed Tributary	9.41	1,020	1,330	1500	1,830
Above Unnamed Tributary	1.77	280	350	390	480
Limit of Detailed Study	0.64	130	160	175	210

(References 1 to 9)

For each stream studied in detail, a hydrologic investigation was performed to generate flow quantities. A description of the derivation of flood discharges for each stream follows.

The flood control reservoirs described in section 2.3 significantly affect the hydrology on three detailed study streams. Mahoning River is controlled by the Berlin/Milton Reservoir system, West Mahoning River is controlled by the Michael Kirwan Dam, and Mosquito Creek by the Mosquito Creek Dam. The methodology for the three reservoirs and their effects were handled in a similar fashion. Initially, the USACE was contacted to obtain detailed project reports and operational procedures for each reservoir. Then peak discharge of selected recurrence intervals was determined using a standard Log-Pearson Type III analysis based on gage records (Reference 13). For Mahoning River two gages on the Mahoning River were used: the gage at Pricetown (No. 03091500) with 33 years of controlled records and the gage near Berlin Center (No. 03090500) with 13 years of controlled records. The results were then reviewed with USACE. Then, an analysis of the uncontrolled drainage area below each of the dams was performed to develop a frequency-discharge relationship for uncontrolled areas on each stream. Finally the discharge from uncontrolled areas at a specific

location was compared with the release rate from the reservoir, and the higher value was selected as the peak discharge for that location. Information of the gages used in the hydrologic analyses was listed in Table 6.

Table 6 – Gage Information Used in Detailed Hydrologic Analysis

STREAM	GAGE ID	LOCATION	YEARS OF RECORDS	CONTROLLED RECORDS
Mahoning River	03091500	Pricetown	33	Yes
Mahoning River	03090500	Berlin Center	13	Yes
Mahoning River	03094000	Leavittsburg	-	No
Mahoning River	03098000	Youngstown	33	No
Meander Creek	03097500	Mineral Ridge	21	Yes
Kale Creek	03062000	Pricetown	35	Yes
West Branch Mahoning River	03092500	Newton Falls	40	Yes
Ordinance Creek	03092600	Newton Falls	12	Yes

Hydrologic analyses for uncontrolled drainage areas of the Mahoning River were carried out using four USGS gages within Trumbull County: Ordinance Creek Gage No. 03092600, Kale Creek Gage No. 03092000, West Branch Mahoning River Gage No. 03092500, and Mahoning River Gage No. 03090500. These gage data were supplied by USGS. Peak flow for the 10-, 2-, and 1- percent-annual-chance floods were developed from these data using a standard Log-Pearson Type III distribution. Then the flowrate was adjusted for regional skew factors and outliers. Peak flow for the 0.2-percent-annual-chance flood was extrapolated from the calculated peak flows for other events. This analysis was performed from the upstream study limits of Mahoning River at the Trumbull County boundary to downstream of the confluence point of Mahoning River and West Branch of Mahoning River. Flow downstream from the confluence point was calculated based on a discharge-drainage-area relationship developed by USACE at the Leavittsburg Gage (No. 03094000) in the FIS report for the City of Warren (Reference 8). In that FIS report, a Discharge-Drainage area curve was developed at the City of Warren. Then the plot was extended to Youngstown gage station (No. 03098000) to determine the frequency discharge relationship. The estimated peak discharge relationship was used for the rest of Trumbull County. The Youngstown gage, located approximately 2.2 miles downstream of the Girard City limit, has been in operation since October 1921. The analysis covers a continuous time period from 1936 through 1968. This gage was originally a chain gage and has been a recording gage since 1926. The gage datum is 826.53 feet (NGVD), and the drainage area us 898 square miles. The calculated peak flow at Youngstown gage was adjusted to account effects of Berlin-Milton, M.J. Kirwan, and Mosquito Creek Dams. This was done by applying an average reduction curve to the calculated peak flow to obtain the natural peak flow for Mahoning River. The procedure of developing the discharge – drainage relationship was outlined in a FIS developed by USACE for the City of Youngstown (Reference 23).

On the West Branch Mahoning River, the same gages cited for the Mahoning River were used to define the uncontrolled drainage area. The developed discharge-drainage area relationship was used in the hydrology analyses for the rest of the West Branch Mahoning River study reach within Trumbull County limits.

Peak flows for Mosquito Creek were determined in a similar fashion as Mahoning River. The stage-frequency and stage-discharge relationship at the dam near Robbins Avenue and at Old Route 82 (East Marker Street within the City of Warren) Highway Bridge were taken from a previous report prepared by USACE (Reference 14). The reservoir release rate and operation procedure were obtained from UASCE. Continuous records at the dam near Robbins Avenue during the time Mosquito Creek reservoir has been in operation are too short to provide an accurate projection of extreme flood events. Therefore, the flood record was extended by means of correlation of six nearby stations in the Mahoning River basin with somewhat similar basin characteristics. The flow at Old Route 82 was determined by the relationship of historic flood heights at Robbins Avenue and the flow distribution from the unit hydrograph analysis. The discharge-drainage area curve for the Mosquito River at a select location was also shown in Figure 1.

The gage on Meander Creek at Mineral Ridge (Gage No. 03097500) was the source used to develop the frequency-discharge relationship for Meander Creek. The reservoir on Meander Creek came into operation in 1920. The gage was in operation from 1930 to 1951, and therefore reflects the effects of the reservoir on flooding flow. A provisional frequency-discharge relationship developed by USGS (Reference 15) was used. This relationship was developed using a standard Log-Pearson Type III distribution with adjustments for regional skew factors and outliers. The effect of the reservoir on the uncontrolled peak discharges was also computed using flood routing information for the reservoir. The calculated values were compared with the gage records and agree with the gage data.

For the detailed study streams within Trumbull County that are ungaged, provisional discharge-frequency curves developed by USGS (Reference 16) for thirty small streams were obtained. Then a regression analysis was performed to develop a regression equation for the ungaged areas. The regression analysis used parameters including drainage area, soil type and stream slope. Reaches that were studied using the regression approach include Chocolate Run, Duck Creek, Youngs Run, and Mud Creek (Reference 1). Results from the regression analysis were also used on Crab Creek to extend the floods study on Crab by USACE in Youngstown through Trumbull County. For Little Yankee Run and Mud Run, which are two ungaged streams, the frequency-discharge relationship was taken from a previous study prepared by Burgess and Niple, Limited, Consulting Engineers. In that study, regression analysis was performed for ungaged streams in northern Ohio using the provisional data from the same USGS report described above. Peak flows calculated from the regression analysis for Mud Run was adjusted to account the urbanization of the watershed. These adjustments were based on the urbanization factors obtained from previous flood studies in Ohio (Reference 3 and 18).

Because of the existence of several hydraulic structures on some ungaged streams, peak flow obtained from the regression analysis needs to be reduced to account for the storage and routing effects caused by the structures. The reduction was determined from the inflow-storage-outflow relationship developed by A.R. Pagan (Reference 17). A reduction in flow was taken for Little Yankee Run because of the storage in Coalburg Lake. Three reductions were taken for Mud Creek because of three structures on the stream: Paramount Lake, a dam at river mile 1.23 and a county stormwater retention basin near the Village of Lordstown corporate limit. Two other detention basins, owned by General Motors Corporation in Lordstown, were placed on the Mud Creek. Neither was included in the hydrologic analysis because one retention basin is used to store local runoff and the other one is used primarily as a paint spill trap facility. A reduction was also applied for Duck Creek to account the storage caused by the Chessie System railroad culvert located near river mile 0.1.

The efficiency of the flood control reservoirs on the Mahoning River, Meander Creek and Mosquito Creek are significant. The 1913 flood on Mahoning River exceeds the 1-percent-annual-chance flow calculated at the same location by 21,000 cfs. The 1946 flood on Meander Creek exceeds the calculated 1-percent-annual-chance flood at the same location by 500 cfs. The flow of the 1913 flood on Mosquito Creek exceeds the 1-percent-annual-chance flood calculated at the same location by 3,000cfs. The county retention basin on Mud Creek also has a profound effect on flood discharges. The 1-percent-annual-chance flood flow is reduced by approximately one half by this structure.

The discharge for the 1-percent-annual-chance flood for Grand River was obtained from a regional frequency analysis using gage data on the Grand River. The analysis was performed using a standard Log-Pearson Type III approach. The discharge for the 10-percent-annual-chance flood for Grand River was obtained from similar watersheds in this region.

For the new approximate studies performed for this FIS, hydrologic calculations were performed using regression equations presented in the USGS Water-Resources Investigations Report 03-4164 *Techniques for Estimating Flood Peak Discharges of Rural, Unregulated Streams in Ohio* by G.F. Koltun, 2003. These equations use drainage area, main channel slope, percentage of drainage area consisting of storage/wetlands and regional regression constants. The first three of these parameters were obtained using ArcGIS software. The present study in Trumbull County, Ohio encompasses only one region (Region A) delineated in WRIR 03-4164. For each of the study streams, watershed boundaries were delineated using USGS 10 foot topographic mapping with a scale of 1:24,000. The resulting watershed boundaries were verified using NRCS HUC-8 data.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristic of flooding from the sources studied were carried out to provide estimates of the flood elevations 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 report in conjunction with the data shown on the FIRM.

Flood profiles were prepared for all streams studied by detailed methods and show computed water-surface elevations to an accuracy of 0.5 foot for floods of selected recurrence intervals. In cases where the 1-percent-annual-chance and 0.2-percent annual chance flood elevations are close together, only the 1-percent-annual-chance profile has been shown due to limitations of the map scale. For this countywide FIS, flood profiles and approved LOMRs have been consolidated in continuous stream reaches and adjusted to reflect the new vertical datum as described in section 3.3.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1) and on the DFIRM (Exhibit 2).

Cross sections for detailed study streams were obtained by field survey, topographic maps and previous floodplain studies. Structural geometry and elevations for hydraulic structures (Bridges, Culverts, Dams, Control weirs, etc) were obtained from field survey or previous studies. Cross sections, hydraulic structures and tributaries for Mahoning River were taken from previous reports prepared by USACE (reference 14, 20 and 21). The bridge on Mahoning River at Main Street in the City of Newton Falls was modeled using the proposed design drawings obtained from the Ohio Department of Transportation. A portion of Mahoning River within the City of Girard, the cross sections were derived from the topo maps dated December 24, 1964 prepared by USACE for the Lake Erie Canal, Pittsburgh-Ashtabula Route Plan (reference 28). Further field checks were performed if any information was questionable or if a reach required specific roughness inspections and evaluations. For Mosquito Creek the field survey was augmented with data from detailed topographic maps provided by the USACE (Reference 19).

Channel roughness factors (Manning's "n") were obtained from on-site inspections or evaluation of aerial photographs obtained for this study (References1-11). For the Mahoning River and Mosquito River, USACE determined the Manning's "n" values by field inspections. The historical flood profiles of March 1913, November 1970 and January 1959 on Mahoning River were reproduced successfully. In general within Trumbull County, Manning's "n" values for overbank vary from 0.12 for high density housing and heavily wooded overbank as on Mosquito Creek to as low as 0.03 for cleared overbank as on Youngs Run and Duck Creek. Channel "n" values generally range from 0.035 to 0.060 depending on the characteristics of the channel bottom. These values for this study are tabulated in Table 7.

Table 7 – Channel and Overbank Roughness (Manning's "n") Factors

STREAM NAME	ROUGHNESS COEFFICIENT	
	CHANNEL	OVERBANK
Chocolate Run	0.035-0.06	N/A
Crab Creek	0.035-0.06	N/A
Duck Creek(within the Trumbull County unincorporate Areas)	0.03/0.035-0.06	N/A
Duck Creek(within the Village of Lordstown)	0.045-0.07	0.04
Grand River		
Little Yankee Run	0.035-0.06	0.03-0.08
Mahoning River	0032-0.04	0.063-0.07
Mahoning River (within the City of Girard)	0.031-0.034	0.054-0.077
Mahoning River (within the City of Newton Falls)	0.045	0.05
Mahoning River (within the City of Warren)	0.032-0.041	0.059-0.085
Meander Creek (within the Trumbull County unincorporate Areas)	0.035-0.06	N/A
Meander Creek (within the City of Niles)	0.05-0.07	0.04-0.09
Mosquito Creek(within the Trumbull County unincorporate Areas)	0.035-0.06	0.12
Mosquito Creek(within the City of Niles)	0.05	0.08-0.12
Mud Creek	0.042	0.05-0.11
Mud Run	0.035-0.065	0.03-0.08
Shenango River	N/A	N/A
West Branch Mahoning River	0.035-0.06	N/A
Young's Run	0.03/ 0.035-0.06	N/A

(Reference 1 and 2)

Water surface elevations of selected recurrence intervals were calculated using the HEC-2 step-backwater program developed by USACE (Reference 22) except a portion of Mahoning River and Shenango River. Water surface profiles for the portion of the Mahoning River from River Station 28.660 to 36.910 were obtained from the Trumbull County FPI report prepared by USACE (Reference 21). In this FPI report, the 1-percent-annual-chance flood profile was first developed as the intermediate Regional Flood. Then the 10-, 2-, 0.2- percent-annual-chance flood profiles were determined from the frequency-profiles developed by USACE at downstream of Youngstown (Reference 23), the frequency-profiles at upstream of Warren, and from interpolation between the observed historic flood profiles. The hydraulic analysis for the Shenango River was performed in a previous FIS by Michael Baker, Jr., Inc. for Farrell, Pennsylvania (reference 24). The hydraulic analysis results were used in this FIS.

The hydraulic analyses for Grand River were taken from the previous Floodplain Information Report (Reference 9).

Starting water surface elevation for the section of Mahoning River within the City of Girard was determined based on water surface profiles developed in a Youngstown floodplain study (Reference 21). The studied portion of Mahoning River in Youngstown is located immediately downstream of the study reach of Mahoning River in Girard. The discharge coefficient for the dam in Girard was 3.70 for all flood events. Starting water surface elevations for Mahoning River within Warren and Trumbull unincorporated areas were determined from previous studies performed by USACE (Reference 21). Backwater effects on Duck Creek caused by Mahoning River were derived from the same report. Then the calculated water surface elevations were used as the starting water surface elevations for other adjacent detailed studies. Therefore, the starting water surface elevations of Mahoning River within the City of Niles and within the City of Newton Falls were determined from the 1977 Trumbull County FIS.

Water surface profiles for the portion of Mosquito Creek within the City of Warren were determined by stage-discharge and stage-frequency curve rated at upstream and downstream control sections and by interpolation between observed flood profiles. The portion of Mosquito Creek in the northern part of the City of Warren was estimated from the USACE 1966 report (Reference 14) and engineering judgment. Water surface elevations for the downstream portion of Mosquito Creek within the City of Niles were modeled using HEC-2 step-backwater program. The starting water surface used in the program was determined using slope-area method.

The starting water surface elevation for Crab Creek was determined from the previous Youngstown FIS (Reference 21).

The starting water surface elevation for Mud Run was initially determined from open channel flow equations. Then the starting water surface elevation was adjusted based on the results of the first few runs in the HEC-2 program.

As mentioned in section 2.3, the 1913 flood was the greatest known flood and the 1959 flood was the recorded largest flood in Trumbull County. Water surface profiles for the 1959 flood were estimated through literature research on the Mahoning River, the West Branch Mahoning River, Duck Creek and Mosquito Creek. The collected information was used to calibrate the hydraulic models for these streams.

On Duck Creek, water surface elevation of the computed 1-percent-annual-chance flood and the 1959 flood are about at the same stage from mouth to approximately 2 miles upstream from the mouth, where the historical profiles end.

The modeled water surface profile of the 1-percent-annual-chance flood on Mahoning River lies between the 1913 and 1959 floods. The 1913 flood has a water surface elevation approximately 7 feet higher than the modeled 1-percent-annual-chance flood. Downstream from the confluence point of West Branch Mahoning River, the 1959 flood has a water surface elevation generally 0.5 to 1 feet lower than the calculated 1-percent-annual-chance flood water surface elevation. However, upstream from the confluence point, the water surface elevation of the 1959 flood is generally 1.0 to 3.0 feet lower than the calculated

value. On the West Branch Mahoning River, the modeled 1-percent-annual-chance water surface elevation is about 3.5 feet lower than the 1959 flood. These variations are results of the construction of the Michael Kirwan Dam on the West Branch Mahoning River. The water surface drop shows the significant reduction in flood heights due to the flood control reservoirs.

The 1-percent-annual-chance flood profile of Mosquito Creek from 1978 FIS is approximately 7 feet below and 1913 flood. Because the 1913 flood was uncontrolled, the construction of the reservoir significantly reduced the flood heights. The calculated 1-percent-annual-chance flood profile is approximately 2 to 4 feet above the 1959 flood elevation. The calculated flood height is higher because the probable annual maximum release rate from Mosquito Creek Reservoir used in the calculation is higher than the release rate during the 1959 flood. Additional encroachment onto the floodplain since 1959 also contributes to the increased flood heights.

For Eagle Creek, the flood hazard boundaries were determined from previous Floodplain Information Report (Reference 25). For the approximate study portion of Little Yankee Run, the flood hazard boundaries were derived from a regional analysis of drainage area versus depth on 30 streams in northeast of Ohio (Reference 16 and 26). This regional analysis was also used on an approximate study for Tributary 2 within the City of Hubbard and Unnamed Tributary within the City of Niles. For the approximate study reaches of Big Yankee Run, Mahoning River, Pymatuning Creek, Chocolate Run, Squaw Creek and Young Run, the floodplain boundaries were derived from flood prone area maps published by USGS. In addition, this FIS also incorporated other approximate flood hazard boundaries that were identified by the Trumbull County Engineer office and by the Niles City Engineer in the Trumbull County Stormwater Report (Reference 27). These areas are considered to have shallow 1-percent-annual-chance flooding, representative of moderate flood hazards because of their relatively small drainage areas. In some areas, a survey of village residents identified areas of past flooding. These areas were added to the flood hazards in the previous FIS and were mapped as approximate studied areas without further study.

New approximate hydraulic analyses were performed for this FIS using the U.S. Army Corps of Engineers' Hydraulic Engineering Center River Analysis System (HEC-RAS) computer program (Version 3.1.3). A simplified HEC-RAS hydraulic model was created containing each of the 57 study reaches. This model contains unsurveyed cross sections with an average spacing of 1500 to 2000 feet. No structures (i.e. bridges and culverts) were included in the modeling.

Cross-section geometric data was created using 2002 two-foot contour data supplied by the Trumbull County GIS Department, and has been established as appropriate data for conducting approximate analyses.

Aerial imagery was used in order to determine a Manning's roughness coefficient for the hydraulic models. No field reconnaissance was performed. A representative overbank and channel Manning's roughness coefficient was selected for each study reach. Roughness values ranged from 0.035 to 0.10 for the overbanks, and 0.035 to 0.058 within the channel.

The one-percent annual chance flood discharges determined using the previously described hydrologic methods were used in the HEC-RAS models. Flow changes were entered at the top of the reach in each model, and at each sub-watershed location throughout the channel. Reach boundary conditions were selected in accordance with *Guidelines and Specifications for Flood Hazard Mapping Partners* and were either normal depth or known water surface elevations at the downstream end of each stream. When the coincident peak criteria was met, a junction was created in the HEC-RAS model at the confluence of the streams in question. The model then uses the calculated water surface elevation from the receiving stream as the boundary condition for the contributing stream(s).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail and if the channel and overbank conditions remain essentially the same as ascertained during the study.

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 in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are now being prepared using NAVD88 as the referenced vertical datum. It is important to note that the adjacent counties may be referenced to NGVD29. This may result in differences of Base Flood Elevations (BFEs) across the county boundary.

Flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must be referenced to NAVD88. Effective information for this FIS was converted from NGVD 29 to NAVD88 based on data presented in Figure 1 and Table 8. An average conversion of -0.577 feet (NGVD29 – 0.577 = NAVD 88) was applied uniformly across the county to convert all effective BFEs and other profile elevations.

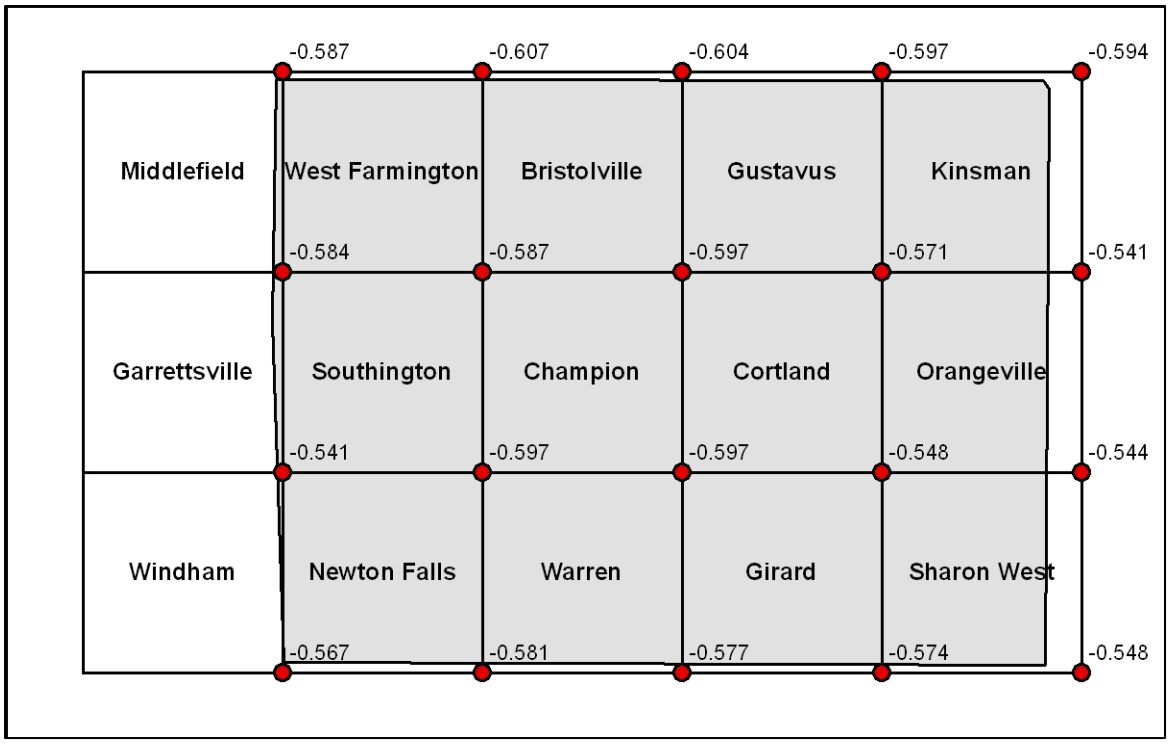

Figure 1. Vertical Datum Conversion

Table 8 – Vertical Datum Adjustment

Quadrangle Name	Corner	Latitude	Longitude	Change (feet)
Middlefield	NE	41.500	-81.000	-0.587
West Farmington	NE	41.500	-80.875	-0.607
Bristolville	NE	41.500	-80.750	-0.604
Gustavus	NE	41.500	-80.625	-0.597
Kinsman	SE	41.375	-80.500	-0.541
Gustavus	SE	41.375	-80.625	-0.571
Kinsman	NE	41.500	-80.500	-0.594
Bristolville	SE	41.375	-80.750	-0.597
West Farmington	SE	41.375	-80.875	-0.587
Middlefield	SE	41.375	-81.000	-0.584
Garretsville	SE	41.250	-81.000	-0.541
Southington	SE	41.250	-80.875	-0.597
Champion	SE	41.250	-80.750	-0.597
Cortland	SE	41.250	-80.625	-0.548

Table 8 – Vertical Datum Adjustment (continued)

Quadrangle Name	Corner	Latitude	Longitude	Change (feet)
Orangeville	SE	41.250	-80.500	-0.544
Sharon West	SE	41.125	-80.500	-0.548
Girad	SE	41.125	-80.625	-0.574
Warren	SE	41.125	-80.750	-0.577
Newton Falls	SE	41.125	-80.875	-0.581
Windham	SE	41.125	-81.000	-0.567

Range of Conversion Factors	-0.607 through -0.541
Average Conversion Factor	**-0.577**
Maximum Variance from the Average Conversion	0.036
Maximum Variance from a No Conversion Value	0.607

For more information on NAVD88, see the FEMA publication entitled *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988* (FEMA, June 1992), or contact the Spatial Reference Division of the National Geodetic Survey, National Oceanic and Atmospheric Administration, Silver Springs Metro Center 3, 1315 East-West Highway, Silver Springs, Maryland 20910-3282 (301) 713-3242 (Website: www.ngs.noaa.gov).

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 (TSDN) associated with the FIS report and FIRMs for this community. Interested individuals may contact FEMA to access these data.

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 flood elevations and delineations of the 1- and 0.2-percent-annual-chance 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 Tables. 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 redelineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic data. Topographic data used for floodplain delineation has a 2-foot contour interval and was provided by the Trumbull County GIS/Task Map Office (Reference 29).

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

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

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies. In the State oh Ohio, at the request of Ohio Department of Natural Resources and with the approval of FIS, encroachment in the floodway is limited to that which will not cause a flood height increase more than 0.5 foot in the stage of the 1-percent-annual-chance flood. Therefore, all the floodway computations in this FIS were based on the 0.5 foot increase. As mentioned in Section 3.2, the hydraulic study of Shenago River was taken from the FIS for Farrell Pennsylvania. Hence the floodway for Shenango River was calculated based on the Pennsylvania criteria of a 1.0 foot increase.

The floodway presented in this FIS report and on the FIRM was 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 9). 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.

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 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.

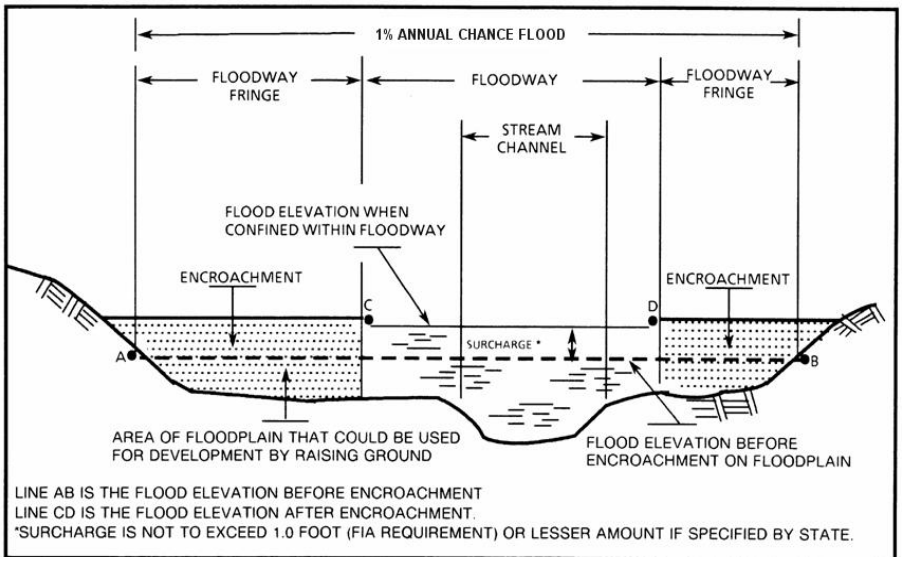

Figure 2. Floodway Schematic

As part of the redelineation efforts of this project, the floodway was not recalculated. As a result, there were areas where the previous floodway did not fit within the boundaries of the 1-percent-annual-chance floodplain or did not encompass the entire flooding source. In these areas, the floodway was reduced or expanded as necessary. Table 9 Floodway Data lists the water surface elevations with and without a floodway, the mean velocity in the floodway, and the location and area at each surveyed cross-section as determined by hydraulic methods. The width of the floodway depicted by the FIRM panels and the amount of reduction or expansion necessary is also listed, if applicable. Expansion at a cross-section is shown as a negative value in the "Width Reduced from Prior Study" column.

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Chocolate Run									
A	898	151	513	1.7	71	891.8	886.8[3]	887.3	0.5
B	2,709	48	410	1.9	56	891.8	889.0[3]	889.5	0.5
C	5,507	48	193	3.7		895.6	895.6	895.8	0.2
D	5,935	400	844	0.8		896.4	896.4	896.9	0.5
E	7,075	1,042	3,531	0.2		899.8	899.8	900.3	0.5
F	8,200	455	498	1.3		899.9	899.9	900.4	0.5
G	10,043	370	325	1.8		903.2	903.2	903.7	0.5
H	13,432	312	576	0.8		910.3	910.3	910.8	0.5
I	16,268	89	218	1.7		914.9	914.9	915.3	0.4
Crab Creek									
A	14,520	119[4]	833	5.5		888.5	888.5	888.9	0.4
B	15,798	102[4]	844	5.0		892.8	892.8	893.2	0.4
C	17,054	77	684	3.4	145	897.7	897.7	898.2	0.5
D	18,116	60	388	5.2		903.6	903.6	904.1	0.5
E	19,251	36	620	3.2	98	910.1	910.1	910.3	0.2
F	20,756	108	717	2.6		922.3	922.3	922.8	0.5
G	23,126	92	226	4.9		933.3	933.3	933.6	0.3
H	25,175	166	196	5.6		955.3	955.3	955.7	0.4
I	26,580	270	505	2.2		970.2	970.2	970.7	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM MAHONING RIVER

[4] WIDTH EXTENDS BEYOND CORPORATE LIMITS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

CHOCOLATE RUN - CRAB CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Duck Creek									
A	5,549	446	3,236	1.2		890.9	890.5[3]	891.0	0.5
B	7,413	787	4,063	1.0		891.2	891.2	891.7	0.5
C	9,805	1,387	6,792	0.6		891.7	891.7	892.2	0.5
D	11,584	1,365	5,121	0.7		892.0	892.0	892.5	0.5
E	13,242	268	1,566	2.2		893.6	893.6	894.1	0.5
F	14,985	484	1,964	1.6		894.2	894.2	894.7	0.5
G	16,722	1,147	3,081	1.0		895.1	895.1	895.6	0.5
H	17,904	870	1,987	1.4		895.6	895.6	896.1	0.5
I	18,042	533	2,009	1.4	342	895.7	895.7	896.2	0.5
J	19,763	798	1,706	1.7		896.9	896.9	897.4	0.5
K	20,550	551	1,589	1.8	156	897.7	897.7	898.2	0.5
L	22,028	490	975	2.9		898.9	898.9	899.4	0.5
M	23,132	244	748	3.8		900.6	900.6	901.1	0.5
N	24,240	802	1,834	1.6		903.1	903.1	903.6	0.5
O	25,471	860	2,794	0.9		904.1	904.1	904.6	0.5
P	26,854	1,082	5,051	0.5		906.9	906.9	907.4	0.5
Q	28,211	1,104	5,301	0.5		907.0	907.0	907.5	0.5
R	29,420	789	2,003	1.3		908.3	908.3	908.8	0.5
S	30,471	323	955	2.1		909.0	909.0	909.5	0.5
T	33,037	69	339	5.3		914.3	914.3	914.8	0.5
U	34,568	70	514	3.5		917.4	917.4	917.9	0.5
V	35,202	93	720	2.5		918.1	918.1	918.6	0.5
W	37,636	174	893	2.0	84	921.0	921.0	921.5	0.5
X	38,998	84	362	4.5		924.1	924.1	924.6	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM MAHONING RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

DUCK CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Duck Creek									
Y	41,385	287	1,084	1.5		928.6	928.6	929.0	0.4
Z	43,122	166	465	3.1		931.0	931.0	931.5	0.5
AA	44,479	147	561	2.6		933.6	933.6	934.1	0.5
AB	45,482	69	258	5.7		935.3	935.3	935.8	0.5
AC	47,182	62	367	4.0		943.2	943.2	943.7	0.5
AD	48,624	61	266	5.0		946.7	946.7	947.2	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Little Yankee Run									
A	174	66	585	6.0		845.4	844.5[3]	845.0	0.5
B	1,785	311	1,286	2.7		847.6	847.6	848.1	0.5
C	3,912	133	604	5.8		848.9	848.9	849.3	0.4
D	5,734	247	999	3.5		853.7	853.7	854.2	0.5
E	7,693	116	783	4.5		858.9	858.9	859.2	0.3
F	8,569	117	573	6.1		861.3	861.3	861.8	0.5
G	10,787	62	451	7.8		871.4	871.4	871.8	0.4
H	12,762	407	645	5.4		880.6	880.6	880.9	0.3
I	14,958	210	1,109	3.2		887.6	887.6	888.1	0.5
J	16,368	410	1,648	2.1		889.8	889.8	890.3	0.5
K	18,353	67	878	4.0	124	895.8	895.8	896.2	0.4
L	20,175	102	666	5.3		899.5	899.5	900.0	0.5
M	21,748	240	922	2.8		902.6	902.6	903.1	0.5
N	23,031	129	498	5.2		906.5	906.5	907.0	0.5
O	24,642	85	562	4.6		912.7	912.7	913.2	0.5
P	25,872	129	782	3.2		915.7	915.7	916.0	0.3
Q	26,020	119	2,971	0.8	98	925.3	925.3	925.8	0.5
R	27,176	118	614	4.1	130	925.3	925.3	925.8	0.5
S	27,731	72	623	4.0		926.1	926.1	926.6	0.5
T	27,873	73	651	3.9		926.5	926.5	927.0	0.5
U	28,269	103	658	3.8		927.1	927.1	927.5	0.4
V	28,924	64	554	3.2		927.8	927.8	928.2	0.4
W	29,204	91	673	2.6		927.9	927.9	928.4	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM SHENANGO RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE YANKEE RUN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Little Yankee Run									
X	31,041	87	698	2.5		930.1	930.1	930.6	0.5
Y	32,219	267	1,272	1.2		930.6	930.6	931.1	0.5
Z	34,721	321	1,027	1.5		935.2	935.2	935.7	0.5
AA	37,599	175	545	2.6		939.8	939.8	940.3	0.5
AB	39,637	80	297	4.8		947.9	947.9	948.2	0.3
AC	40,170	660	3,331	0.4		952.9	952.9	953.4	0.5
AD	41,416	184	1,062	1.3	178	954.0	954.0	954.5	0.5
AE	42,699	114	354	3.6		960.8	960.8	961.0	0.2

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE YANKEE RUN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Mahoning River									
A	134,534	245	4,607	4.6		852.0	852.0	852.5	0.5
B	136,435	340	4,915	4.3		852.5	852.5	853.0	0.5
C	137,544	245	4,604	4.6	75	852.7	852.7	853.2	0.5
D	138,706	370	4,801	4.4		853.0	853.0	853.4	0.4
E	139,709	345	4,893	4.3		853.3	853.3	853.7	0.4
F	141,082	290	4,498	4.7		853.7	853.7	854.0	0.3
G	143,774	420	4,473	4.7		854.7	854.7	855.1	0.4
H	145,042	370	4,835	4.3		855.1	855.1	855.5	0.4
I	146,256	257	4,424	4.7	43	855.4	855.4	855.8	0.4
J	147,840	255	4,300	4.9	95	855.8	855.8	856.2	0.4
K	149,371	256	4,465	4.7	99	856.3	856.3	856.6	0.3
L	152,539	250	3,976	5.3		857.2	857.2	857.5	0.3
M	154,018	312	4,497	4.7		857.6	857.6	857.9	0.3
N	155,707	405	6,002	3.5		858.2	858.2	858.5	0.3
O	157,054	285	4,389	4.8		858.3	858.3	858.6	0.3
P	157,106	298	4,500	4.7		858.4	858.4	858.9	0.5
Q	158,242	247	3,888	5.4		858.6	858.6	859.1	0.5
R	159,562	585	6,475	3.2		859.1	859.1	859.6	0.5
S	161,462	310	5,416	3.9		859.5	859.5	860.0	0.5
T	161,911	208	3,686	5.7		859.5	859.5	860.0	0.5
U	161,964	208	3,705	5.7		859.7	859.7	860.2	0.5
V	163,627	286	4,897	3.4		860.4	860.4	860.9	0.5
W	166,373	157	2,633	6.4		860.6	860.6	861.1	0.5
X	168,274	332	4,890	3.4		861.7	861.7	862.1	0.4

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MAHONING RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Mahoning River									
Y	169,488	505	5,949	2.8		862.0	862.0	862.4	0.4
Z	171,019	392	4,410	3.8		862.2	862.2	862.7	0.5
AA	174,134	1,334	12,141	1.4		863.4	863.4	863.9	0.5
AB	176,246	786	6,949	2.4	-299	863.6	863.6	864.1	0.5
AC	178,094	1,134	13,538	1.2		864.1	864.1	864.6	0.5
AD	179,045	1,218	12,476	1.4		864.9	864.9	865.4	0.5
AE	181,262	1,858	15,306	1.1		865.0	865.0	865.5	0.5
AF	185,011	958	10,888	1.5	203	865.3	865.3	865.8	0.5
AG	189,235	1,260	12,825	1.3		865.9	865.9	866.4	0.5
AH	194,515	208	3,879	4.3		866.5	866.5	867.0	0.5
AI	196,046	430	3,170	5.3		867.9	867.9	868.4	0.5
AJ	197,910	1,060	9,380	1.8		869.6	869.6	870.1	0.5
AK	199,705	840	8,850	1.9		870.0	870.0	870.5	0.5
AL	201,131	1,370	12,350	1.4		870.2	870.2	870.7	0.5
AM	203,137	940	8,540	2.0		870.5	870.5	871.0	0.5
AN	204,721	245	3,380	5.0		871.1	871.1	871.6	0.5
AO	206,200	210	2,920	5.8		871.9	871.9	872.4	0.5
AP	206,886	410	4,860	3.5		872.9	872.9	873.3	0.4
AQ	207,836	920	8,750	1.9		873.3	873.3	873.8	0.5
AR	209,632	845	5,910	2.8		873.7	873.7	874.2	0.5
AS	211,427	221	3,630	4.6	79	874.4	874.4	874.9	0.5
AT	211,638	219	2,710	6.2	91	875.6	875.6	876.1	0.5
AU	211,691	235	3,000	5.6	75	875.8	875.8	876.3	0.5
AV	213,803	770	3,890	4.3		878.9	878.9	879.4	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MAHONING RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Mahoning River									
AW	215,123	1,015	8,190	2.1		880.1	880.1	880.4	0.3
AX	217,552	250	2,850	5.9		881.2	881.2	881.7	0.5
AY	219,226	430	4,250	4.0		882.4	882.4	882.8	0.4
AZ	221,971	1,000	8,850	1.9		883.6	883.6	884.0	0.4
BA	225,192	540	4,490	3.7		884.6	884.6	884.9	0.3
BB	230,683	740	6,490	2.6		887.4	887.4	887.5	0.1
BC	232,584	370	5,420	3.1		887.7	887.7	887.9	0.2
BD	238,920	1,045	7,140	2.4		889.2	889.2	889.3	0.1
BE	244,147	760	7,780	2.2		890.9	890.9	891.4	0.5
BF	247,104	600	4,860	3.5		891.5	891.5	891.9	0.4
BG	249,797	424	5,196	3.2		892.3	892.3	892.8	0.5
BH	253,878	400	3,783	1.8		893.2	893.2	893.7	0.5
BI	256,207	950	7,740	0.9		893.5	893.5	894.0	0.5
BJ	259,396	2,077	7,108	1.0		893.7	893.7	894.2	0.5
BK	261,761	1,472	10,914	0.6		893.9	893.9	894.4	0.5
BL	264,074	720	5,399	1.3		894.0	894.0	894.5	0.5
BM	265,658	857	6,457	1.1		894.3	894.3	894.8	0.5
BN	268,752	1,378	8,465	0.8		894.4	894.4	894.9	0.5
BO	271,012	868	6,062	1.1		894.6	894.6	895.1	0.5
BP	277,448	649	5,609	1.2		895.2	895.2	895.7	0.5
BQ	282,163	1,039	5,334	1.2		895.7	895.7	896.2	0.5
BR	283,663	1,148	6,899	0.9		895.8	895.8	896.4	0.6
BS	285,648	541	3,557	1.8		896.0	896.0	896.5	0.5
BT	286,984	267	2,904	2.2		896.2	896.2	896.7	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MAHONING RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Mahoning River									
BU	288,161	1,005	6,229	1.0		896.4	896.4	896.9	0.5
BV	291,060	585	2,903	2.2		896.6	896.6	897.1	0.5
BW	293,367	130	2,156	3.0		897.1	897.1	897.6	0.5
BX	294,576	179	2,145	3.0		897.3	897.3	897.8	0.5
BY	296,208	739	6,942	0.9	140	897.6	897.6	898.1	0.5
BZ	297,892	145	1,937	2.6		897.7	897.7	898.2	0.5
CA	299,735	120	1,671	3.1		898.1	898.1	898.6	0.5
CB	300,960	134	1,945	2.6		898.5	898.5	899.0	0.5
CC	302,174	238	3,329	1.5	60	898.8	898.8	899.3	0.5
CD	302,333	184	3,694	1.4	129	900.7	900.7	901.2	0.5
CE	302,650	233	2,656	1.9		900.7	900.7	901.2	0.5
CF	302,861	168	2,744	1.9	62	900.8	900.8	901.3	0.5
CG	302,966	157	2,295	2.2	42	900.8	900.8	901.3	0.5
CH	303,178	171	2,290	2.2	26	900.8	900.8	901.3	0.5
CI	304,498	168	1,753	2.9	33	901.1	901.1	901.6	0.5
CJ	304,762	167	1,718	3.0	33	901.2	901.2	901.7	0.5
CK	305,554	130	1,264	4.0	34	901.7	901.7	902.2	0.5
CL	305,712	137	1,262	4.0	27	902.0	902.0	902.5	0.5
CM	306,187	147	1,303	3.9		902.6	902.6	903.0	0.4
CN	306,293	147	1,293	3.9		902.7	902.7	903.2	0.5
CO	307,560	158	1,524	3.4		903.7	903.7	904.1	0.4
CP	309,107	130	1,134	4.5		904.8	904.8	905.2	0.4
CQ	310,739	156	1,823	2.8		905.8	905.8	906.2	0.4
CR	313,178	118	1,326	3.9		906.4	906.4	906.8	0.4

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MAHONING RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Mahoning River									
CS	314,836	131	1,355	3.8		907.3	907.3	907.6	0.3
CT	316,124	420	3,190	1.6		907.7	907.7	908.1	0.4
CU	317,518	479	2,646	1.9		908.0	908.0	908.4	0.4

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MAHONING RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Meander Creek									
A	1,415	613	1,980	2.5		860.4	852.9[3]	853.4	0.5
B	2,709	709	4,166	1.2		860.4	853.9[3]	854.4	0.5
C	4,071	498	2,323	2.2		860.4	854.6[3]	855.1	0.5
D	5,549	70	794	6.3		860.4	857.2[3]	857.7	0.5
E	5,713	82	1,353	3.7	68	860.4	858.7[3]	859.1	0.4
F	5,978	150	1,404	3.6		860.4	859.0[3]	859.3	0.3
G	6,452	150	1,570	3.2		860.4	859.3[3]	859.6	0.3
H	6,796	150	1,758	2.8		860.4	859.3[3]	859.8	0.5
I	7,102	220	1,688	3.0		860.4	859.4[3]	860.0	0.6
J	7,459	250	2,320	2.2		860.4	859.7[3]	860.4	0.7
K	7,819	250	2,214	2.3		860.4	859.8[3]	860.5	0.7
L	8,025	120	1,404	3.6		860.4	859.9[3]	860.6	0.7
M	8,387	83	847	5.9		860.4	859.9[3]	860.8	0.9
N	8,737	93	920	5.4		861.0	861.0	861.7	0.7
O	10,708	126	971	5.1		866.7	866.7	867.1	0.4
P	13,548	129	1,322	3.8		870.8	870.8	871.3	0.5
Q	15,697	341	4,967	1.0		872.1	872.1	872.5	0.4

[1] FEET ABOVE CONFLUENCE WITH MAHONING RIVER

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM MAHONING RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MEANDER CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Mosquito Creek									
A	792	87	572	8.0		860.6	853.3[3]	853.8	0.5
B	1,183	107	662	7.0		860.6	855.3[3]	855.4	0.1
C	1,368	83	595	7.7		860.6	856.2[3]	856.7	0.5
D	1,822	127	865	5.3		860.6	858.0[3]	858.2	0.2
E	1,985	55	483	9.5		860.6	859.7[3]	860.2	0.5
F	2,323	127	1,010	4.6		861.6	861.6	862.0	0.4
G	2,492	80	818	5.6		861.6	861.6	862.1	0.5
H	2,656	79	846	5.4		862.0	862.0	862.5	0.5
I	2,809	50	461	10.0		862.3	862.3	862.8	0.5
J	3,205	200	1,914	2.4		864.4	864.4	864.9	0.5
K	3,369	144	1,288	3.6		864.7	864.7	865.2	0.5
L	3,728	140	1,181	3.9		864.9	864.9	865.4	0.5
M	4,235	95	952	4.8		865.1	865.1	865.6	0.5
N	4,430	129	1,179	3.9		866.2	866.2	866.7	0.5
O	5,555	230	1,961	2.3		866.9	866.9	867.4	0.5
P	6,278	381	2,940	1.6		867.0	867.0	867.5	0.5
Q	7,070	664	3,764	1.2		867.2	867.2	867.7	0.5
R	8,205	970	6,493	0.7		867.3	867.3	867.8	0.5
S	9,789	947	8,869	0.5		867.4	867.4	867.9	0.5
T	12,007	867	5,007	0.9		867.5	867.5	868.0	0.5
U	13,649	1,400	7,334	0.6		867.6	867.6	868.1	0.5
V	15,148	1,210	6,494	0.7		867.7	867.7	868.2	0.5
W	16,099	1,246	6,734	0.6		867.7	867.7	868.2	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM MAHONING RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MOSQUITO CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Mosquito Creek									
X	16,320	1,283	7,022	0.6		867.9	867.9	868.4	0.5
Y	17,572	544	3,697	1.2		868.0	868.0	868.5	0.5
Z	21,447	1,248	7,653	0.5		868.6	868.6	869.1	0.5
AA	27,773	1,978	12,334	0.3		868.8	868.8	869.3	0.5
AB	30,006	133	3,513	1.1	288	868.9	868.9	869.4	0.5
AC	31,659	2,086	8,663	0.4		869.3	869.3	869.8	0.5
AD	36,189	2,204	13,629	0.3		869.5	869.5	870.0	0.5
AE	41,823	1,731	7,493	0.5		869.7	869.7	870.2	0.5
AF	47,404	1,834	3,299	1.1		870.3	870.3	870.8	0.5
AG	51,422	212	3,299	1.1	914	871.8	871.8	872.3	0.5
AH	53,919	1,693	5,912	0.6		872.5	872.5	873.0	0.5
AI	58,011	1,641	5,271	0.7		872.9	872.9	873.4	0.5
AJ	60,356	666	3,028	0.9		873.7	873.7	874.2	0.5
AK	62,457	256	1,087	2.5		875.4	875.4	875.9	0.5
AL	64,632	370	1,939	0.5		876.0	876.0	876.5	0.5
AM	66,058	129	837	1.2		876.1	876.1	876.6	0.5
AN	67,024	368	2,048	0.5		876.2	876.2	876.7	0.5
AO	68,418	107	2,227	0.5	156	876.8	876.8	877.3	0.5
AP	69,332	174	1,304	0.8		876.9	876.9	877.4	0.5
AQ	69,744	276	1,751	0.6		876.9	876.9	877.4	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MOSQUITO CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Mud Creek									
A	1,072	545	5,703	0.4		863.9	860.8[3]	861.3	0.5
B	4,198	141	1,033	1.9		865.1	865.1	865.6	0.5
C	5,729	400	293	3.9	-358	865.9	865.9	866.4	0.5
D	6,795	644	5,013	0.2		872.4	872.4	872.9	0.5
E	8,063	403	2,238	0.7		873.6	873.6	874.1	0.5
F	8,802	500	2,703	0.6		874.5	874.5	875.0	0.5
G	10,080	281	1,255	1.2		874.6	874.6	875.1	0.5
H	10,718	179	644	2.3		874.8	874.8	875.3	0.5
I	12,931	187	2,672	0.5	408	880.6	880.6	881.0	0.4
J	15,233	98	446	2.9		886.9	886.9	887.4	0.5
K	16,944	133	445	2.9		894.0	894.0	894.5	0.5
L	18,633	139	454	2.6		899.8	899.8	900.2	0.4
M	19,895	164	246	4.8		902.2	902.2	902.2	0.0
N	21,257	149	687	1.5		908.3	908.3	908.7	0.4
O	22,630	146	328	3.2	26	909.5	909.5	909.9	0.4
P	24,473	84	359	2.6		918.7	918.7	919.1	0.4
Q	25,444	49	264	3.6		923.3	923.3	923.7	0.4
R	25,840	46	253	3.8		926.6	926.6	927.0	0.4
S	26,933	44	525	1.8	63	928.1	928.1	928.6	0.5
T	27,583	277	1,440	0.6		934.5	934.5	935.0	0.5
U	29,526	63	138	5.6		935.7	935.7	935.9	0.2
V	31,110	103	168	4.6		945.5	945.5	945.6	0.1
W	32,736	138	495	1.4		950.8	950.8	951.3	0.5
X	35,313	135	334	1.7		955.2	955.2	955.7	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM MAHONING RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MUD CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Mud Run									
A	296	86	307	3.8		927.8	926.8[3]	927.1	0.3
B	1,151	245	542	1.5		928.9	928.9	929.1	0.2
C	1,626	130	237	3.3		929.3	929.3	929.6	0.3
D	1,690	95	268	2.9		929.6	929.6	929.9	0.3
E	1,806	42	485	1.6	88	929.8	929.8	930.2	0.4
F	1,859	33	413	1.9	117	929.8	929.8	930.2	0.4
G	2,228	119	288	2.7		930.9	930.9	931.0	0.1
H	2,645	38	170	4.6		933.6	933.6	933.7	0.1
I	3,142	56	140	5.6		935.1	935.1	935.3	0.2
J	3,722	44	138	5.7		937.8	937.8	937.8	0.0
K	4,351	46	163	4.8		940.0	940.0	940.0	0.0
L	4,847	47	180	4.4		944.2	944.2	944.2	0.0
M	6,162	35	110	7.2		952.3	952.3	952.3	0.0
N	7,086	26	113	5.8		963.5	963.5	963.8	0.3
O	8,084	40	150	4.4		968.6	968.6	968.8	0.2
P	9,435	55	155	4.2		979.8	979.8	980.0	0.2
Q	10,935	24	79	2.8		996.5	996.5	996.6	0.1
R	12,371	25	59	3.7		1016.2	1016.2	1016.2	0.0
S	13,638	29	69	3.0		1024.7	1024.7	1025.0	0.3

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM LITTLE YANKEE RUN

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

MUD RUN

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Shenango River									
A	7,455	169	2,133	3.8		845.8	845.8	846.6	0.8
B	9,182	203	2,302	3.0		846.2	846.2	847.2	1.0

[1] FEET ABOVE OHIO STREET
[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS
[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM MAHONING RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

SHENANGO RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
West Branch Mahoning River									
A	539	79	678	5.9		897.6	890.6[3]	891.1	0.5
B	2,186	98	830	4.8		897.6	894.2[3]	894.7	0.5
C	4,224	378	1,549	2.6	-210	897.6	896.1[3]	896.5	0.4
D	6,162	334	2,486	1.5		897.6	897.4[3]	897.8	0.4
E	8,348	322	2,023	1.9		898.9	898.9	899.2	0.3
F	9,356	131	924	4.2		899.7	899.7	900.1	0.4
G	10,560	87	979	3.5		901.0	901.0	901.3	0.3
H	10,718	85	898	3.8		901.0	901.0	901.5	0.5
I	11,669	92	1,083	3.1		901.6	901.6	902.1	0.5
J	12,672	76	993	3.4		902.2	902.2	902.6	0.4
K	13,570	112	1,007	3.4		902.8	902.8	903.3	0.5
L	13,781	112	996	3.4		902.9	902.9	903.4	0.5
M	14,784	165	1,925	1.8		903.4	903.4	903.9	0.5
N	15,048	184	1,977	1.7		914.2	914.2	914.7	0.5
O	15,682	80	864	3.9		914.6	914.6	914.7	0.1
P	16,526	128	1,433	2.4		915.5	915.5	915.7	0.2
Q	17,582	168	1,690	2.0		915.7	915.7	915.9	0.2
R	18,691	134	1,248	2.6		916.0	916.0	916.3	0.3
S	19,378	234	1,616	2.0		916.3	916.3	916.6	0.3
T	21,653	690	4,799	0.7		916.9	916.9	917.2	0.3

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM MAHONING RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

WEST BRANCH MAHONING RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE FLOOD WATER SURFACE ELEVATION (FEET)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY[2] (FEET)	REGULATORY (NAVD)	WITHOUT FLOODWAY (NAVD)	WITH FLOODWAY (NAVD)	INCREASE (FEET)
Young's Run									
A	1,204	175	936	1.7		882.4	877.5[3]	878.0	0.5
B	3,115	145	840	1.9		884.9	884.9	885.4	0.5
C	3,443	142	1,454	1.1	101	885.7	885.7	886.2	0.5
D	6,056	188	602	2.6		893.2	893.2	893.6	0.4
E	7,471	143	643	2.5		896.4	896.4	896.9	0.5
F	8,622	746	1,917	0.8		896.8	896.8	897.2	0.4
G	10,233	144	213	7.4	-46	898.2	898.2	898.5	0.3
H	11,896	458	2,703	0.6		906.2	906.2	906.7	0.5
I	14,256	91	289	1.2		908.9	908.9	909.4	0.5
J	15,323	89	272	1.2		910.5	910.5	911.0	0.5
K	16,389	24	102	3.1		912.5	912.5	913.0	0.5
L	18,279	56	123	1.9		916.2	916.2	916.6	0.4
M	19,594	333	835	0.3		917.9	917.9	918.4	0.5
N	20,518	200	372	0.5		918.0	918.0	918.5	0.5

[1] FEET ABOVE MOUTH

[2] SEE EXPLANATION IN SECTION 4.2 FLOODWAYS

[3] WATER SURFACE ELEVATION WITHOUT CONSIDERING BACKWATER EFFECTS FROM MAHONING RIVER

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOODWAY DATA

YOUNG'S 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 X (Shaded)

Zone X (shaded) 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 that 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.

Zone X (Unshaded)

Zone X (unshaded) is the areas determined to be outside of the 0.2% annual chance flood plain.

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 Trumbull County. Previously, separate FIRMs were prepared for each identified flood prone incorporated community and for the unincorporated areas of the county. Historical data relating to the maps prepared for each community are presented in Table 10.

7.0 OTHER STUDIES

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

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Flood Insurance and Mitigation Division, Federal Emergency Management Agency Region V, 536 South Clark Street, 6th Floor, Chicago, IL 60605-1509.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Cortland, City of[1]	N/A	None	N/A	None
Girard, City of	January 23, 1974	May 21, 1976	July 2, 1980	None
Hubbard, City of	April 12, 1974	None	August 15, 1978	None
Lordstown, Village of	January 13, 1978	None	March 1, 1979	None
McDonald, Village of	May 17, 1974	April 9, 1976	August 8, 1979	August 8, 1980
Newtown Falls, City of	August 8, 1975	None	August 1, 1978	None
Niles, City of	March 1, 1974	None	June 1, 1978	November 21, 2002
Orangeville, Village of	April 18, 1975	June 8, 1979	September 4, 1987	None
Trumbull County (Unincorporated Areas)	September 29, 1978	None	September 29, 1978	None
Warren, City of	October 26, 1973	None	August 1, 1977	None
West Farmington, Village of	September 29, 1978	None	October 16, 1984	None
Yankee Lake, Village of	July 29, 1977	None	June 18, 2010	None

[1] No Special Flood Hazard Areas Identified

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OHIO

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

9.0 BIBLIOGRAPHY AND REFERENCES

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2) Federal Emergency Management Agency, Flood Insurance Study, City of Girard, Ohio, January 30, 1980.

3) Federal Insurance Administration, Flood Insurance Study, City of Hubbard, Ohio, February, 1978.

4) Federal Insurance Administration, Flood Insurance Study, Village of Lordstown, September, 1978.

5) Federal Insurance Administration, Flood Insurance Study, City of Newton Falls, February, 1978.

6) Federal Insurance Administration, Flood Insurance Study, City of Niles, April, 1977.

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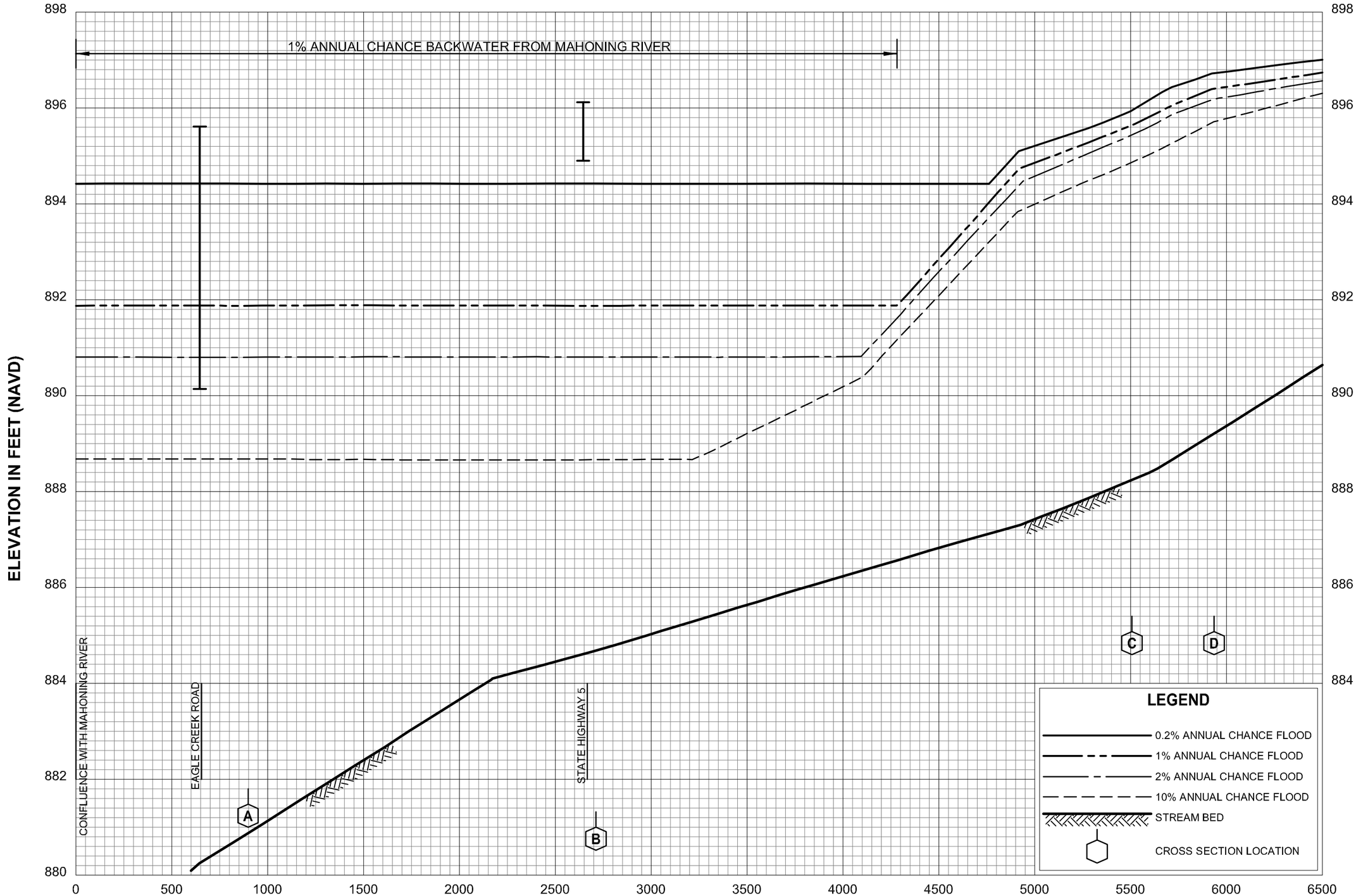


FLOOD PROFILES

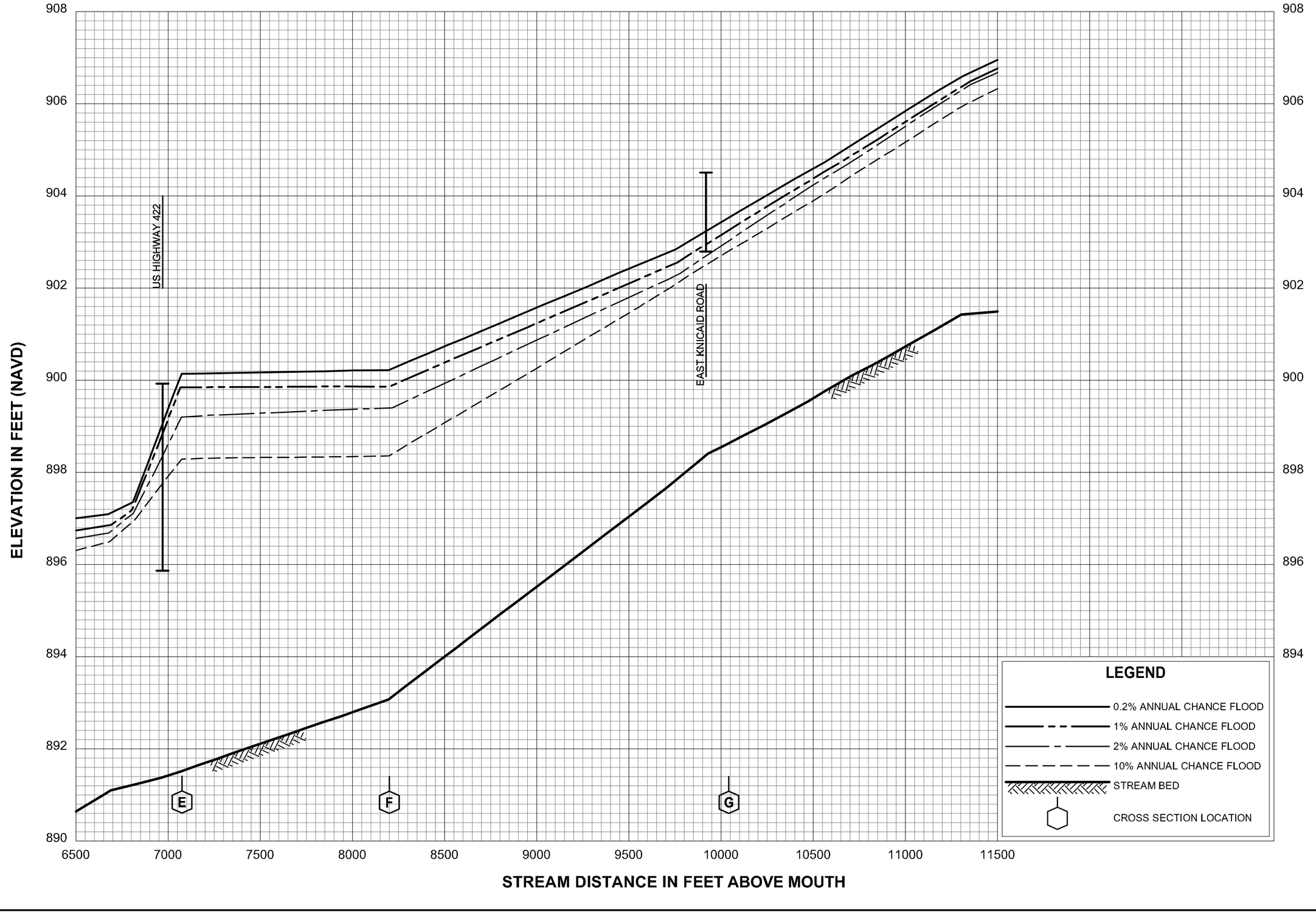
CHOCOLATE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

01P



FLOOD PROFILES

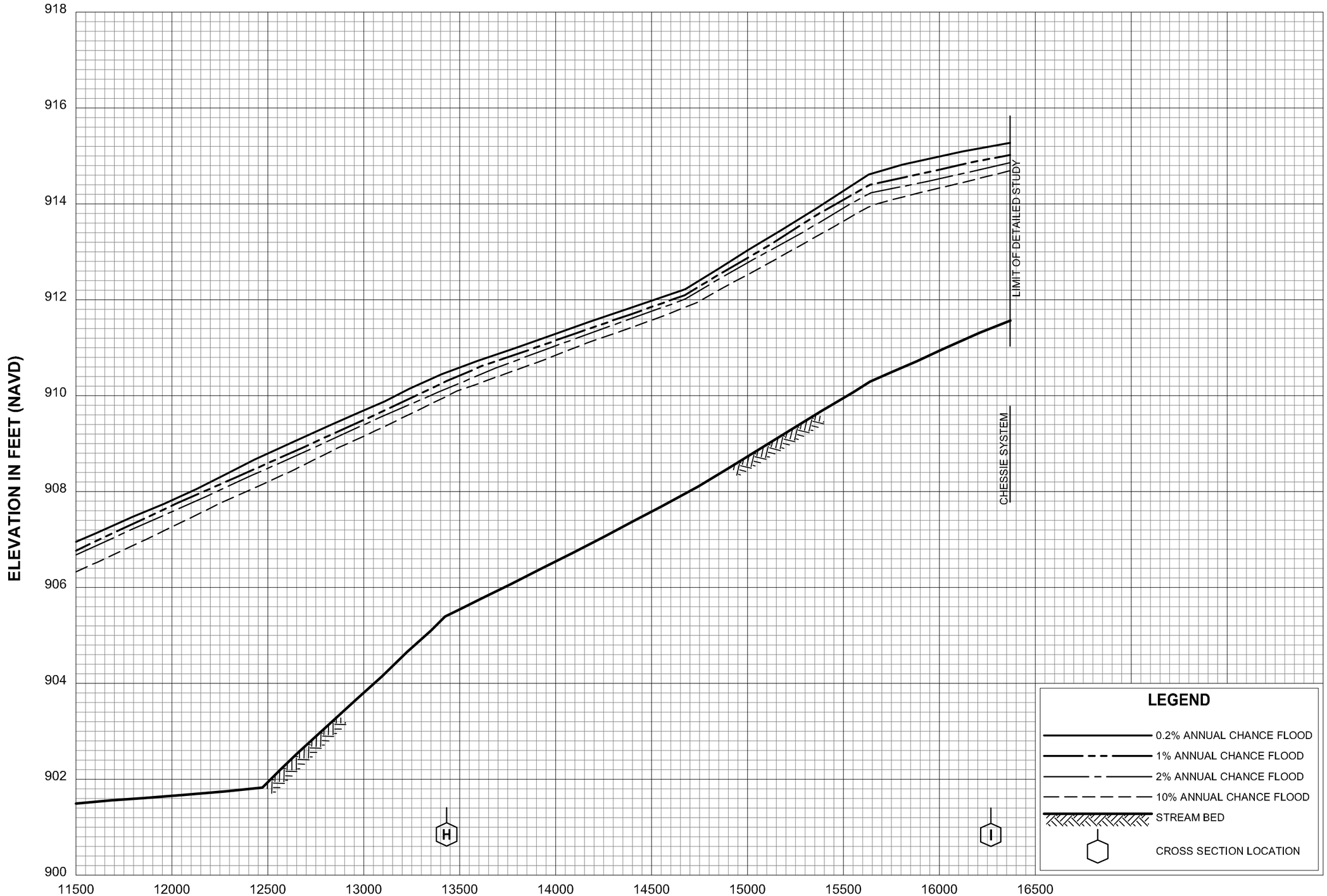
CHOCOLATE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

02P



FLOOD PROFILES

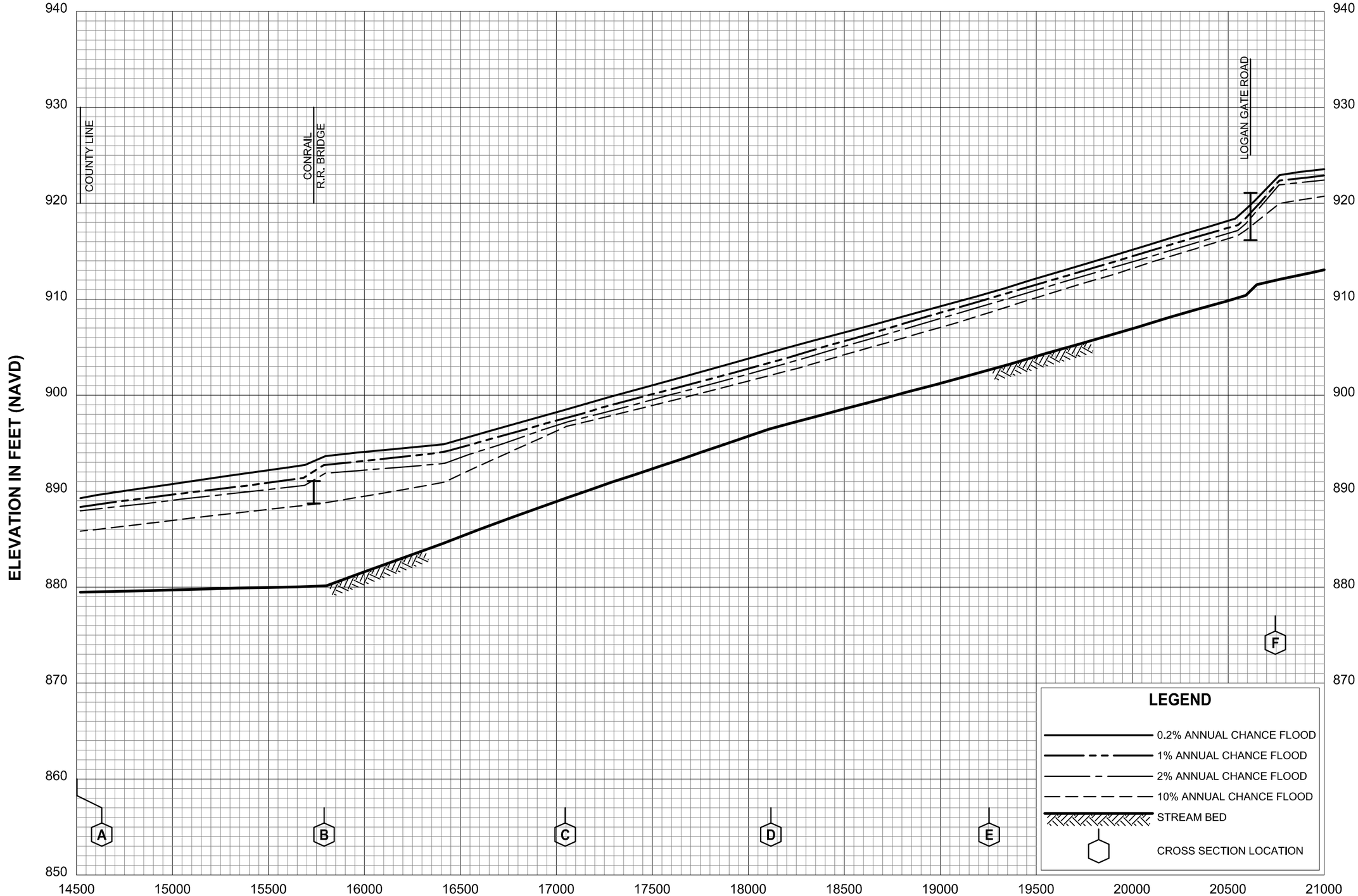
CHOCOLATE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

03P



FLOOD PROFILES

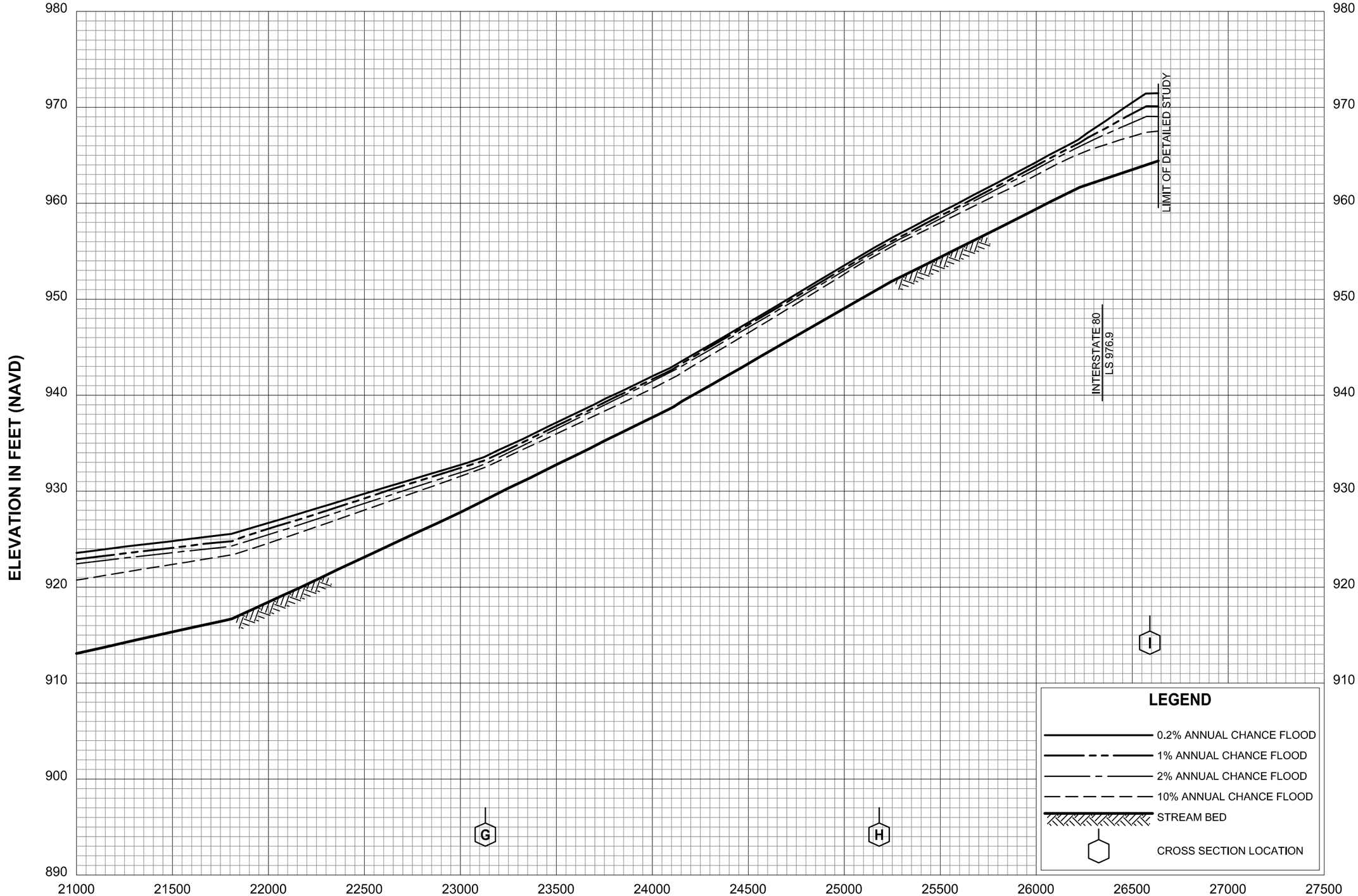
CRAB CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

04P



FLOOD PROFILES

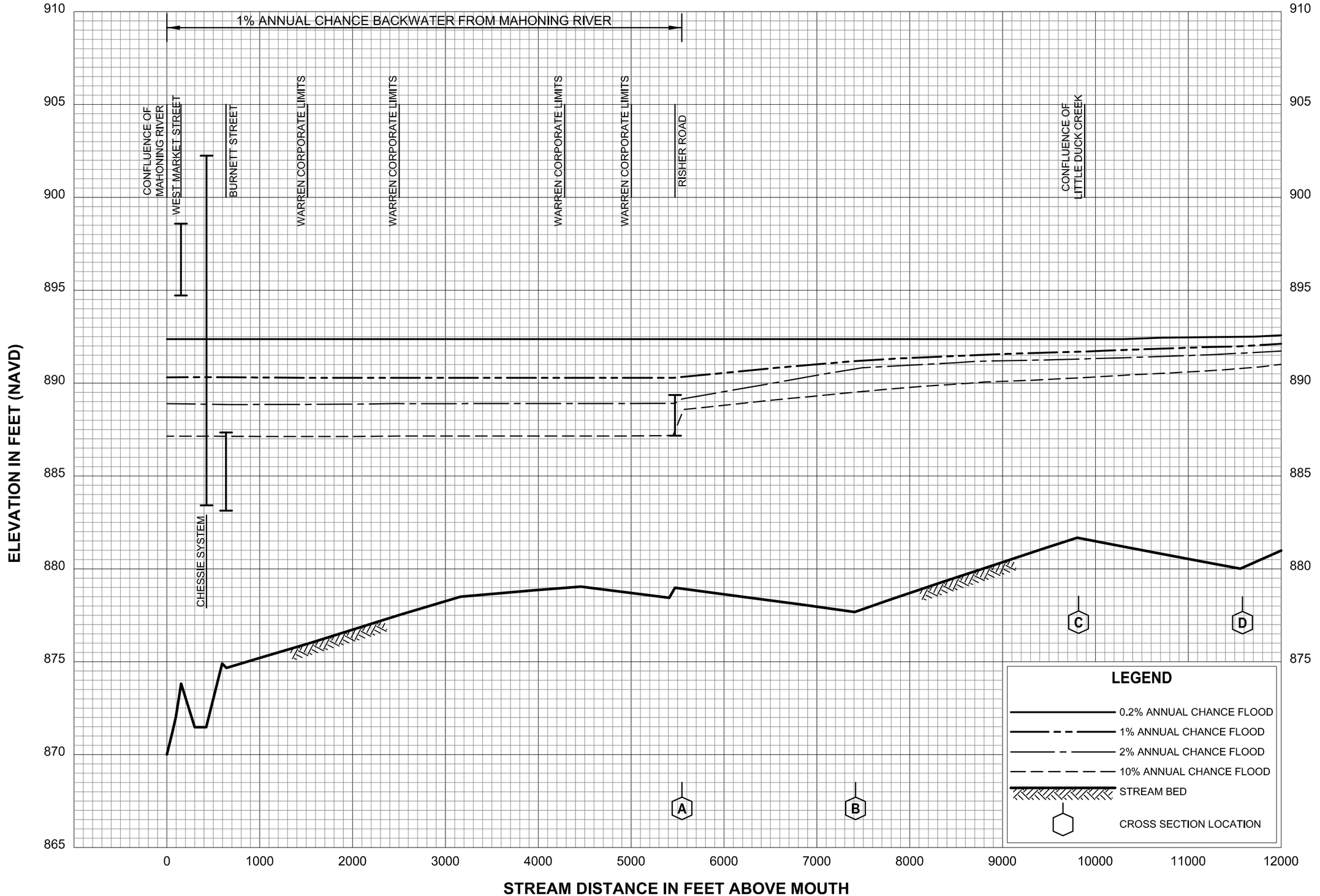
CRAB CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

05P



FLOOD PROFILES

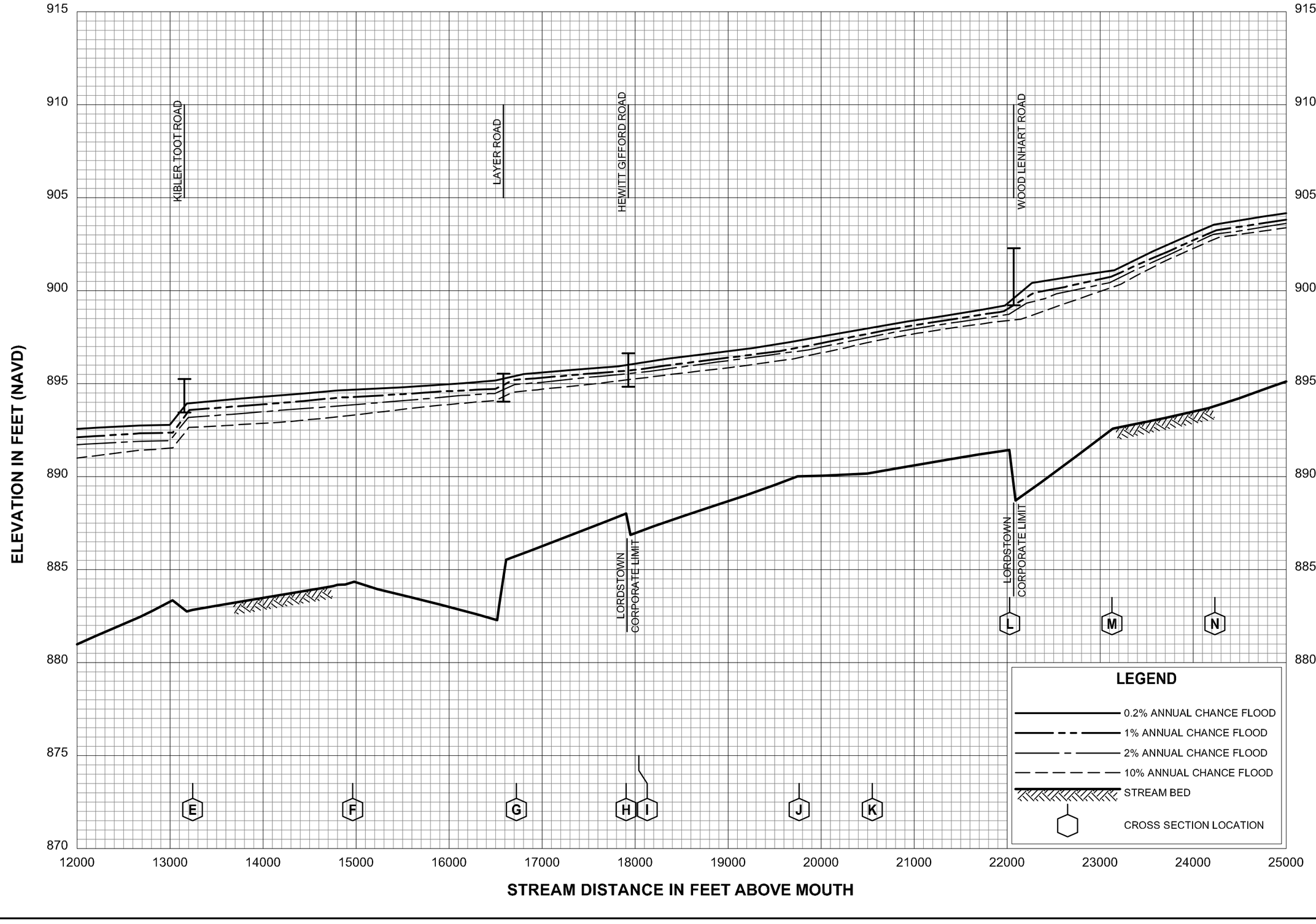
DUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

06P



FLOOD PROFILES

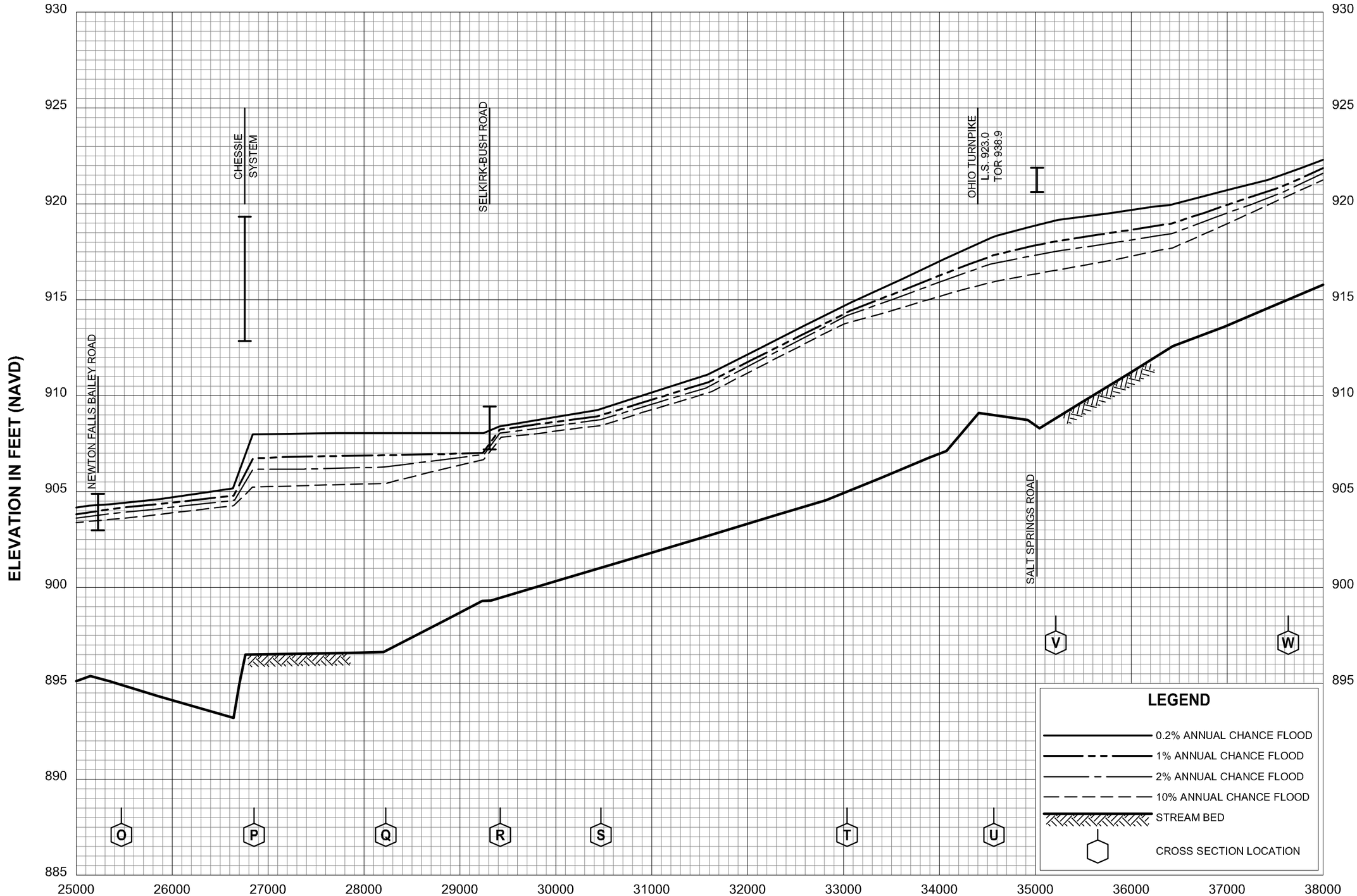
DUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

07P



FLOOD PROFILES

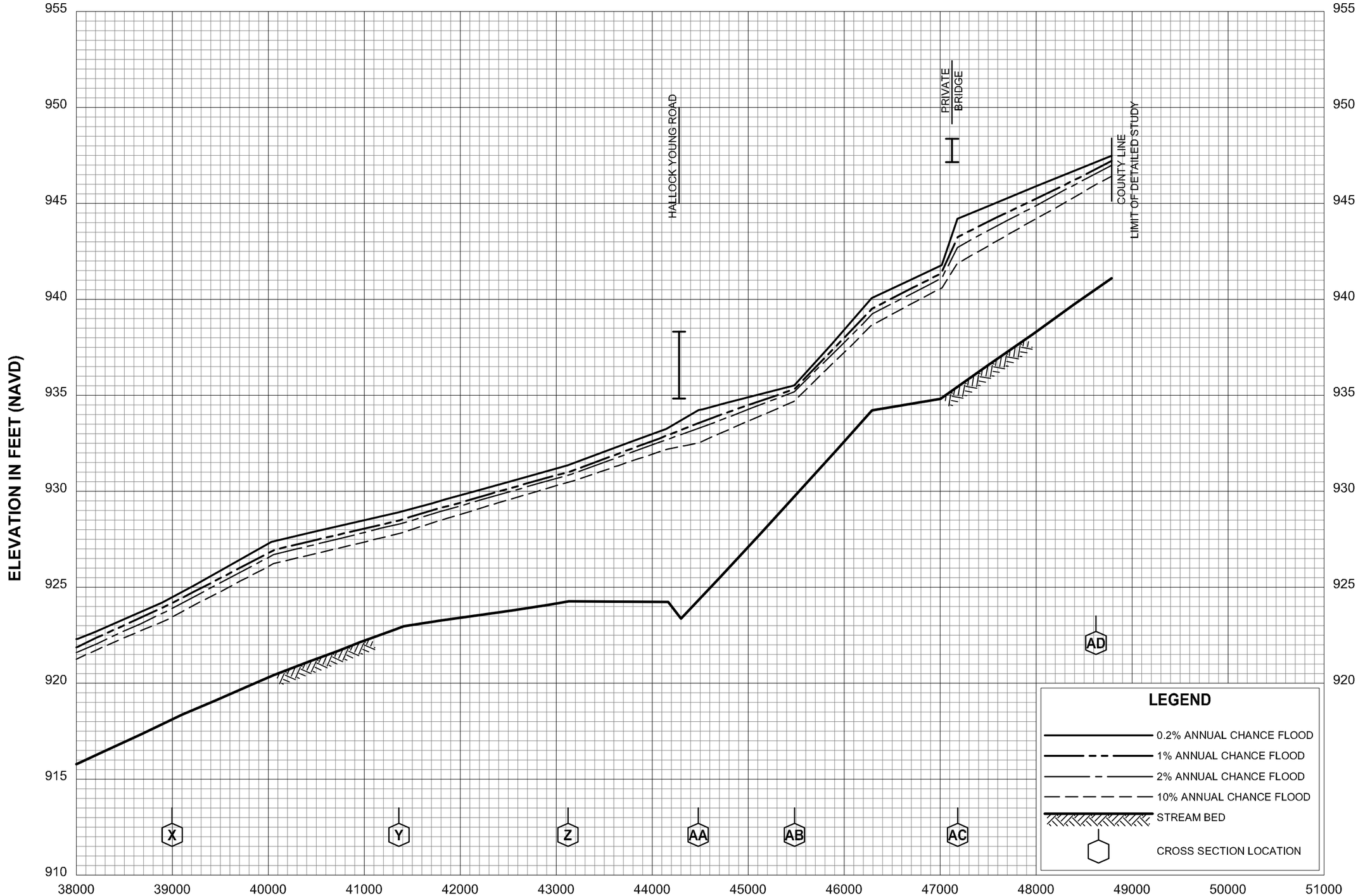
DUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

08P



FLOOD PROFILES

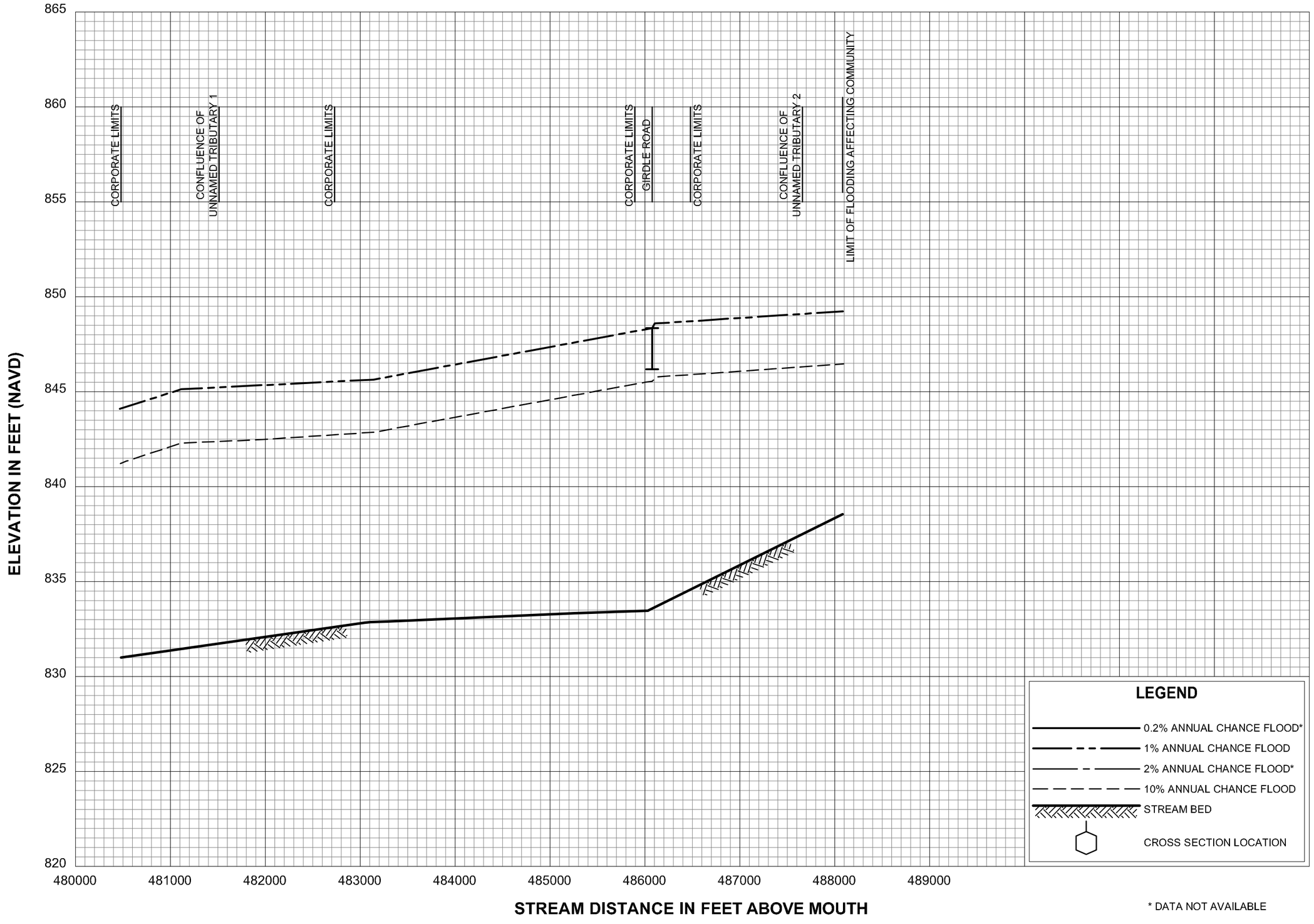
DUCK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

09P



FLOOD PROFILES

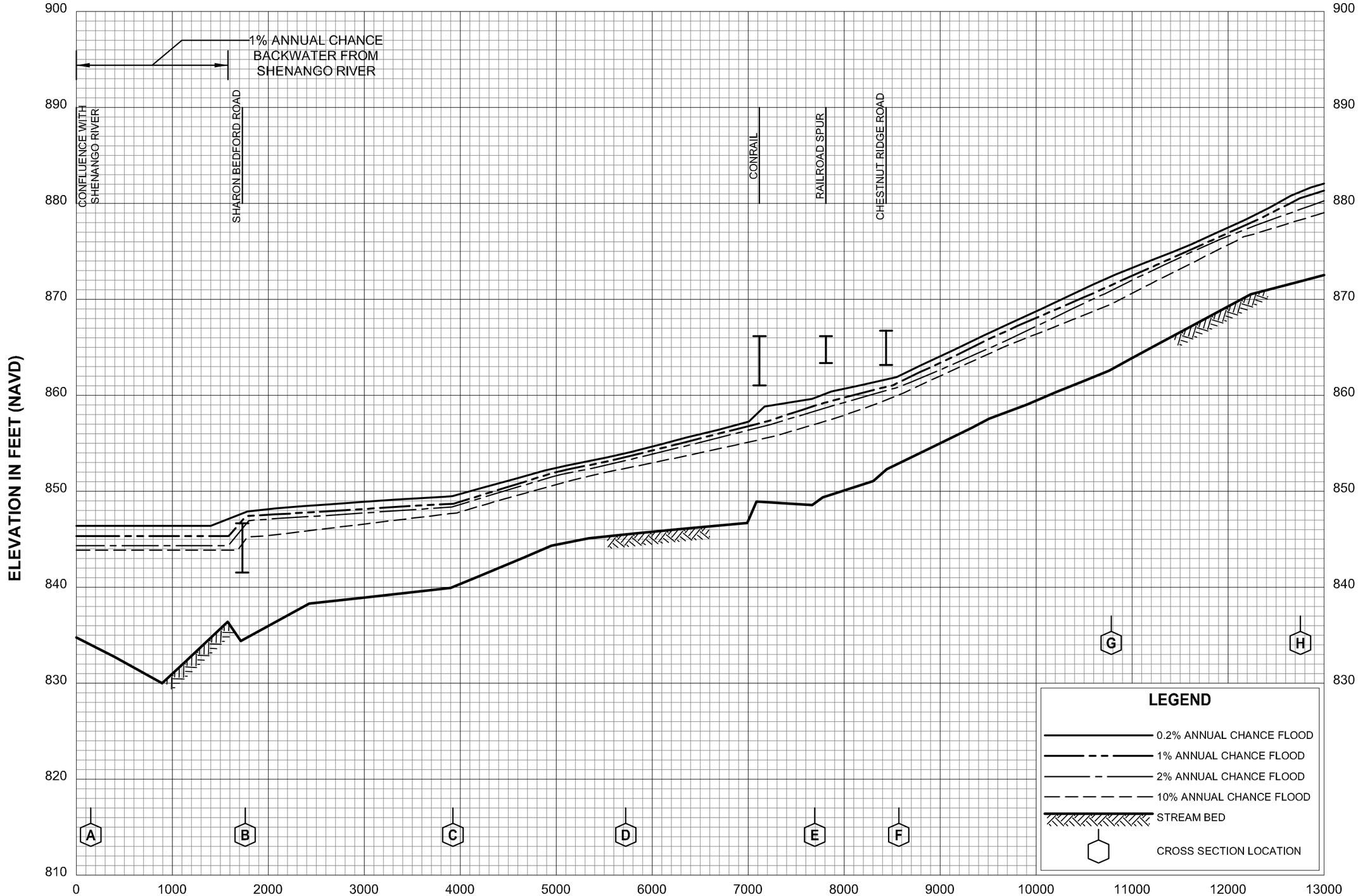
GRAND RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

10P



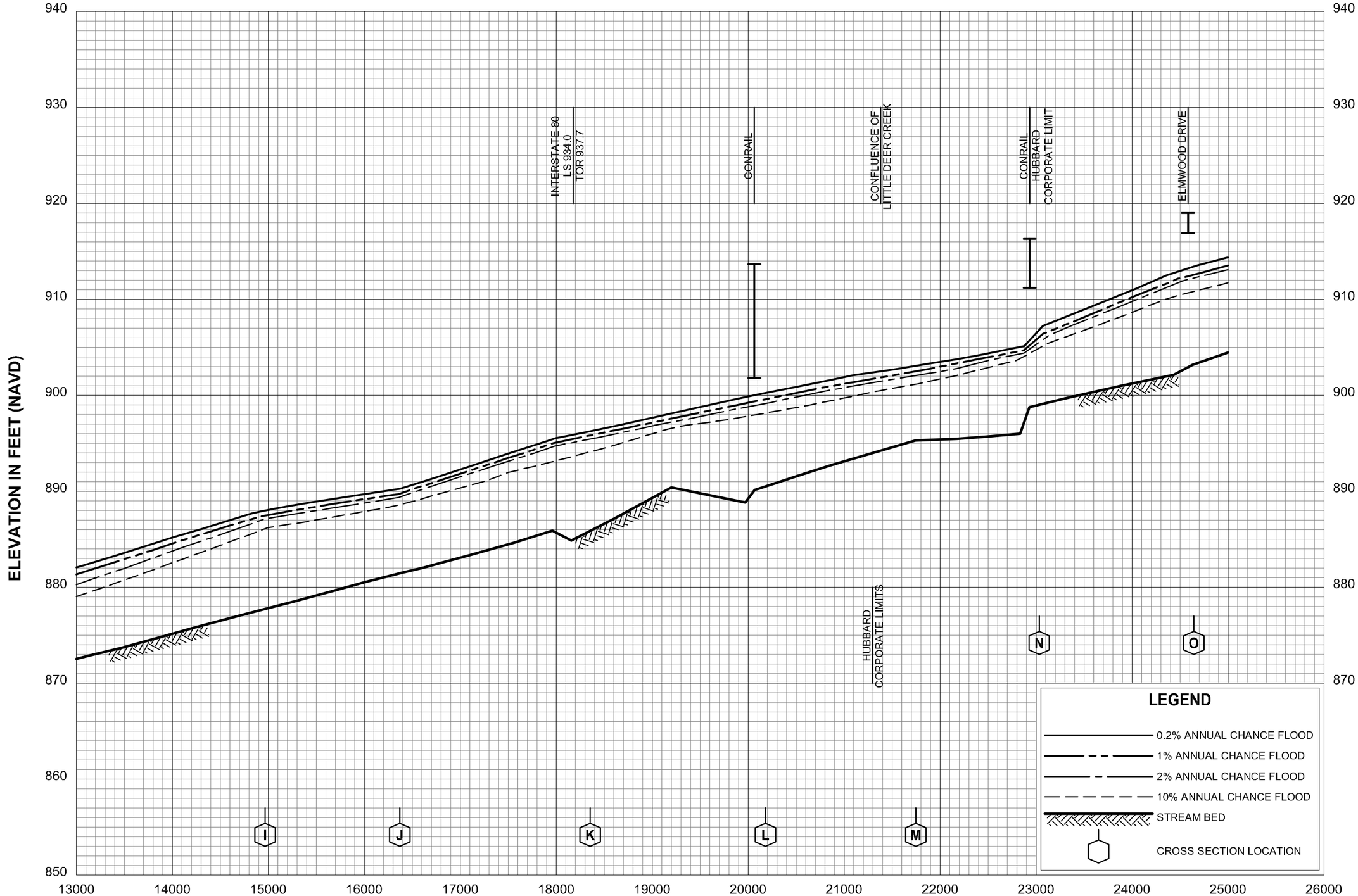
FLOOD PROFILES

LITTLE YANKEE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

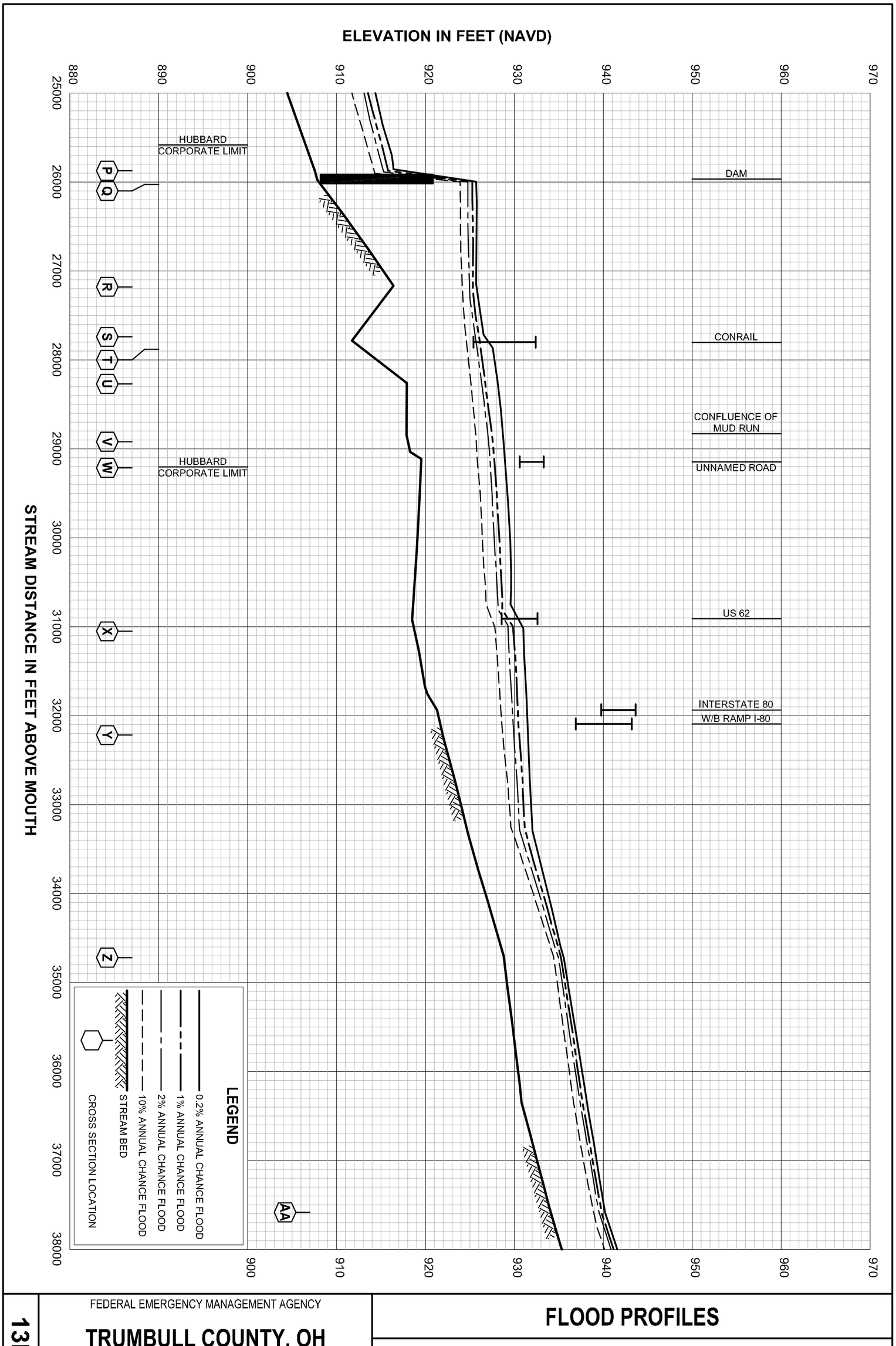
LITTLE YANKEE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

12P



FEDERAL EMERGENCY MANAGEMENT AGENCY

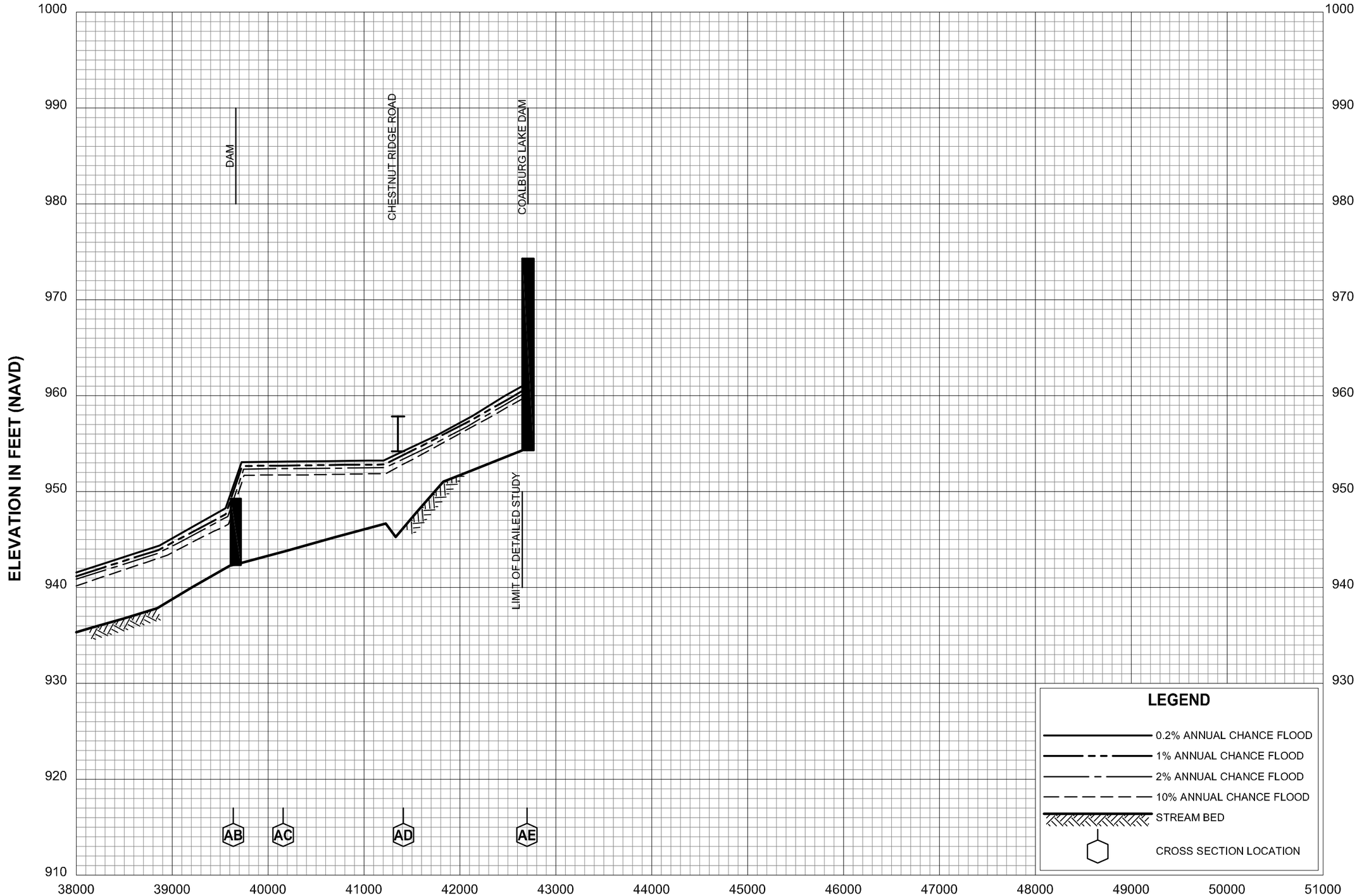
TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

FLOOD PROFILES

LITTLE YANKEE RUN

13P



FLOOD PROFILES

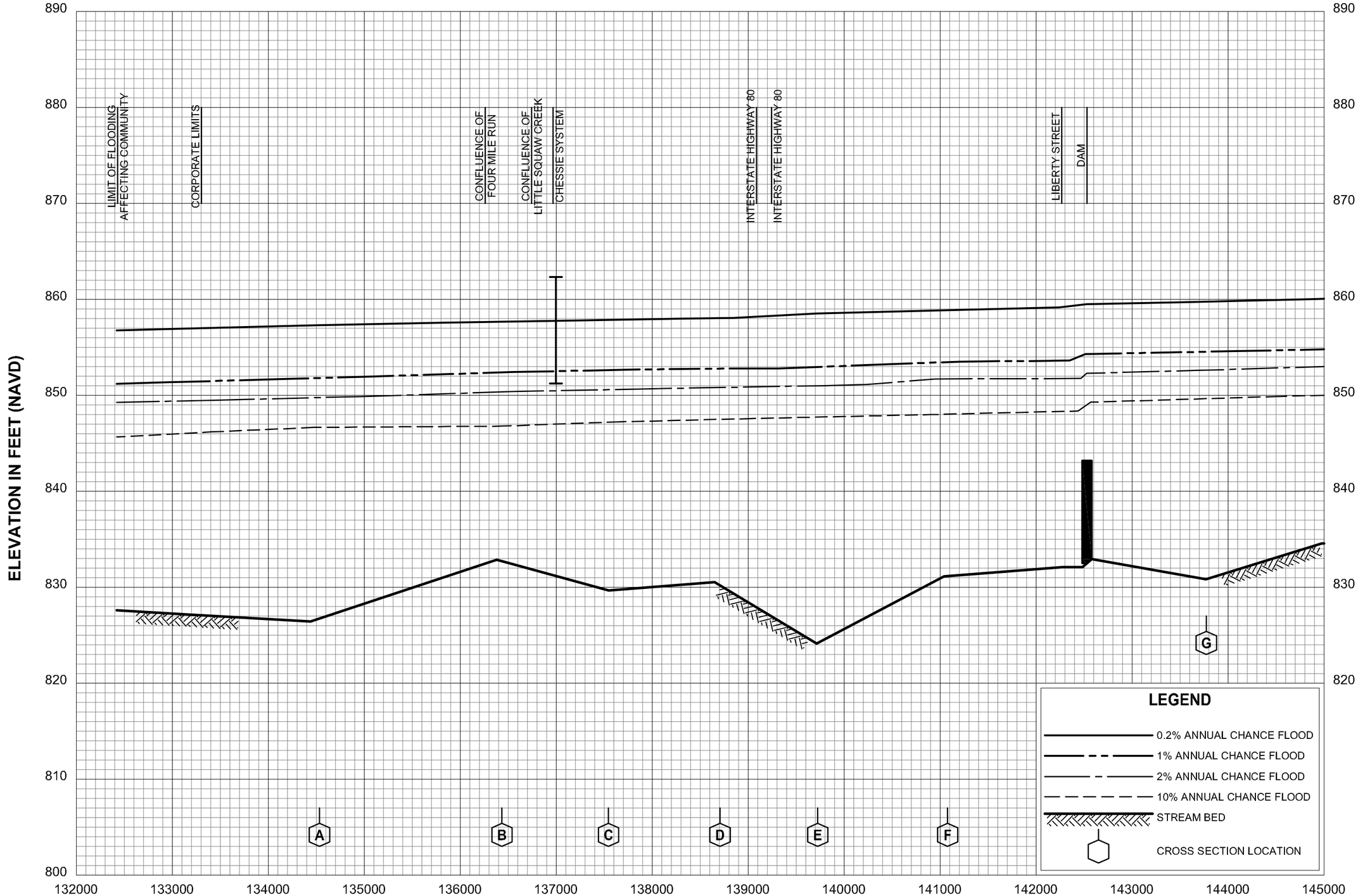
LITTLE YANKEE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

14P



FLOOD PROFILES

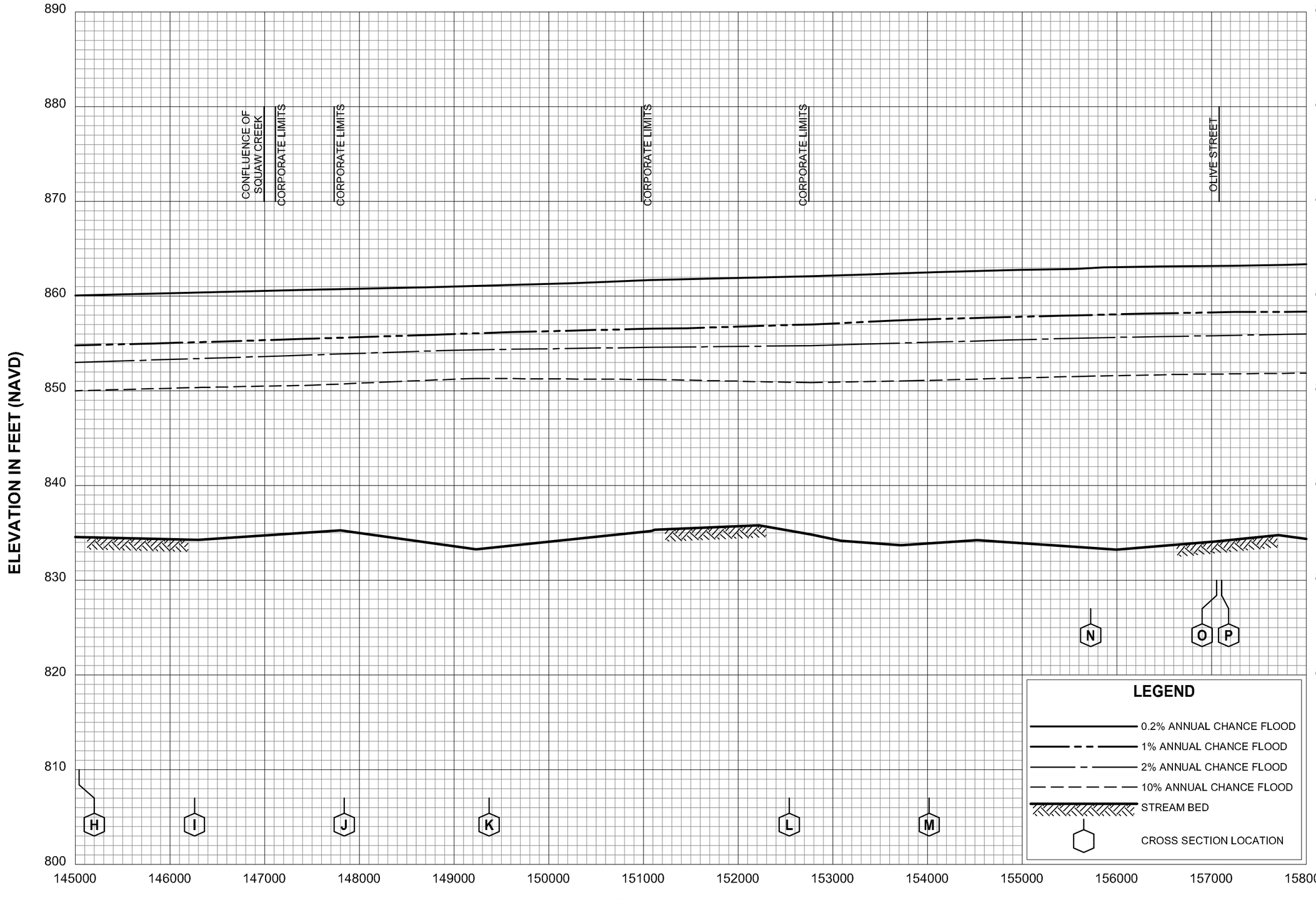
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

15P



FLOOD PROFILES

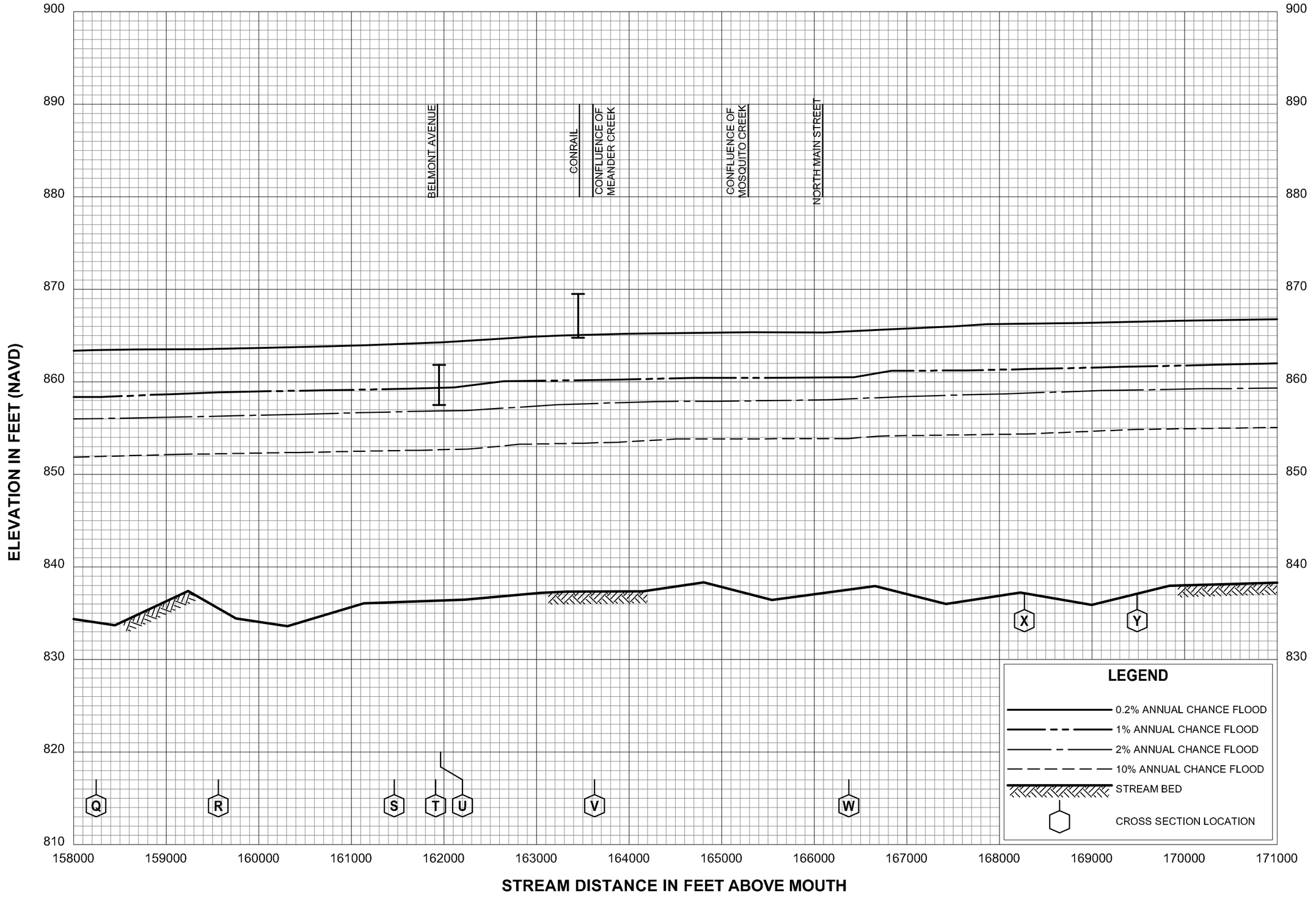
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

16P



FLOOD PROFILES

MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

17P

ELEVATION IN FEET (NAVD)

900
890
880
870
860
850
840
830
820
810

CORPORATE LIMITS

CONRAIL

W PARK AVE

CONFLUENCE OF MUD CREEK

Z
AA
AB
AC
AD
AE

LEGEND

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

171000 172000 173000 174000 175000 176000 177000 178000 179000 180000 181000 182000 183000 184000

STREAM DISTANCE IN FEET ABOVE MOUTH

FLOOD PROFILES

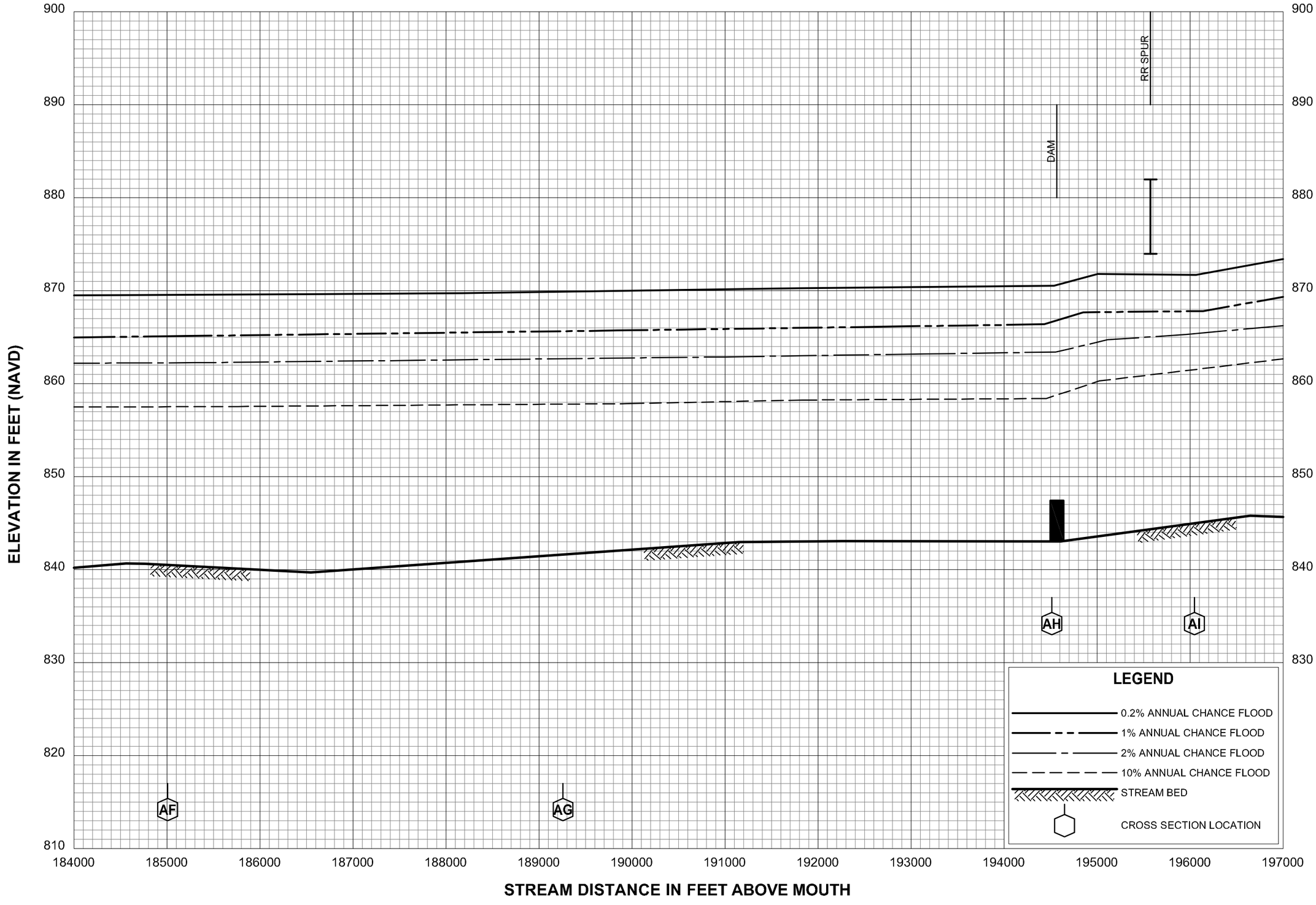
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

18P



FLOOD PROFILES

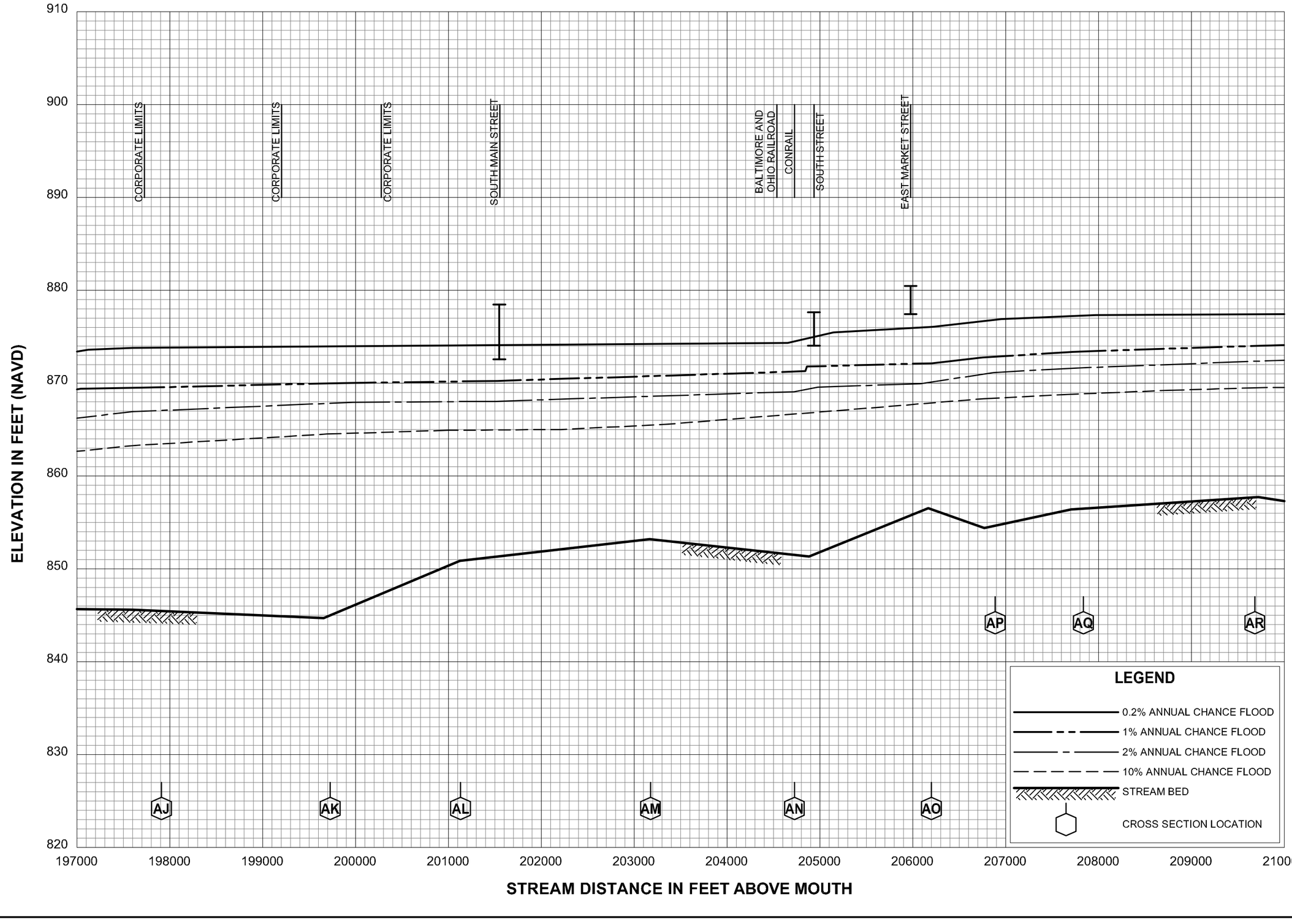
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

19P



FLOOD PROFILES

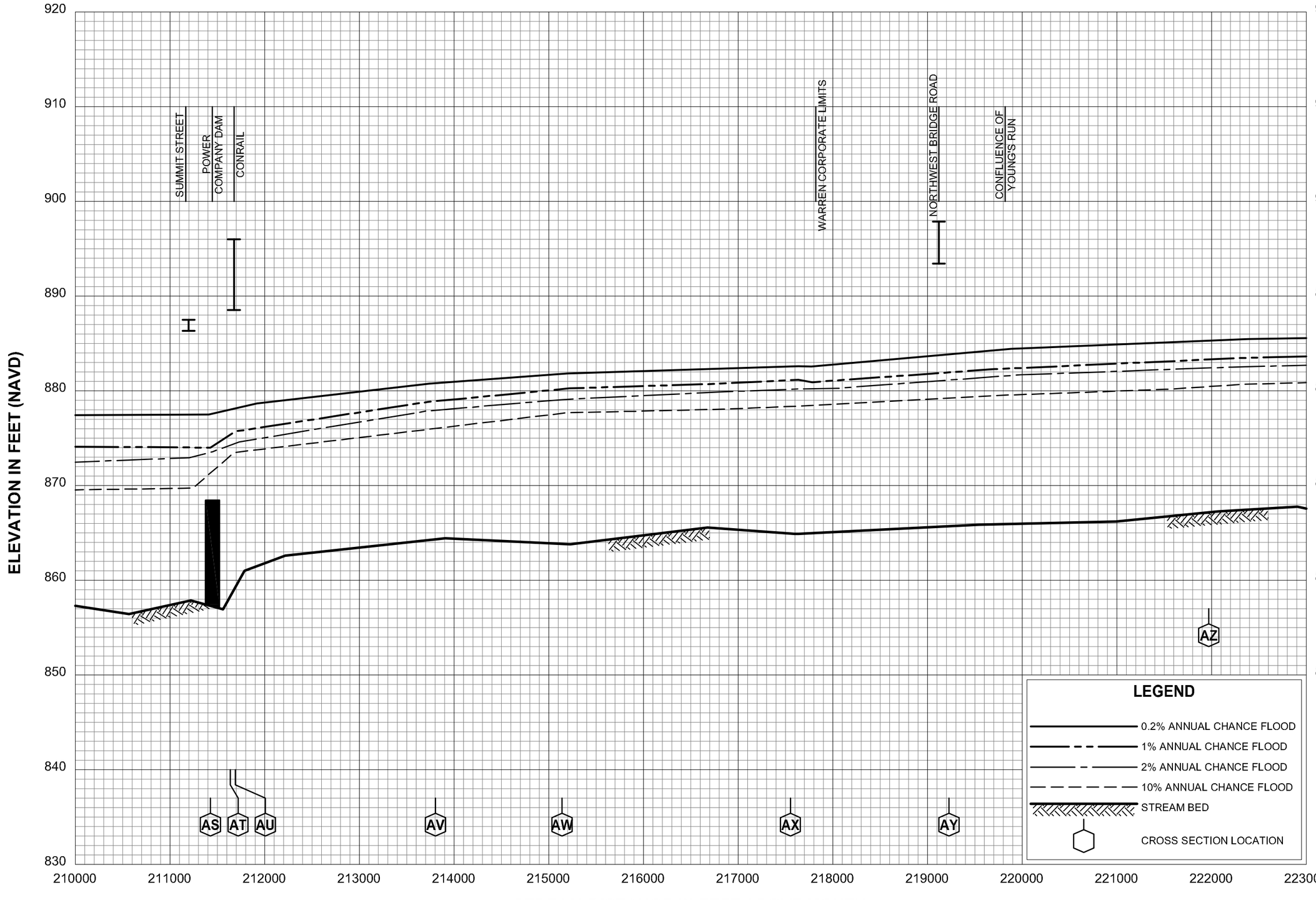
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

20P



FLOOD PROFILES

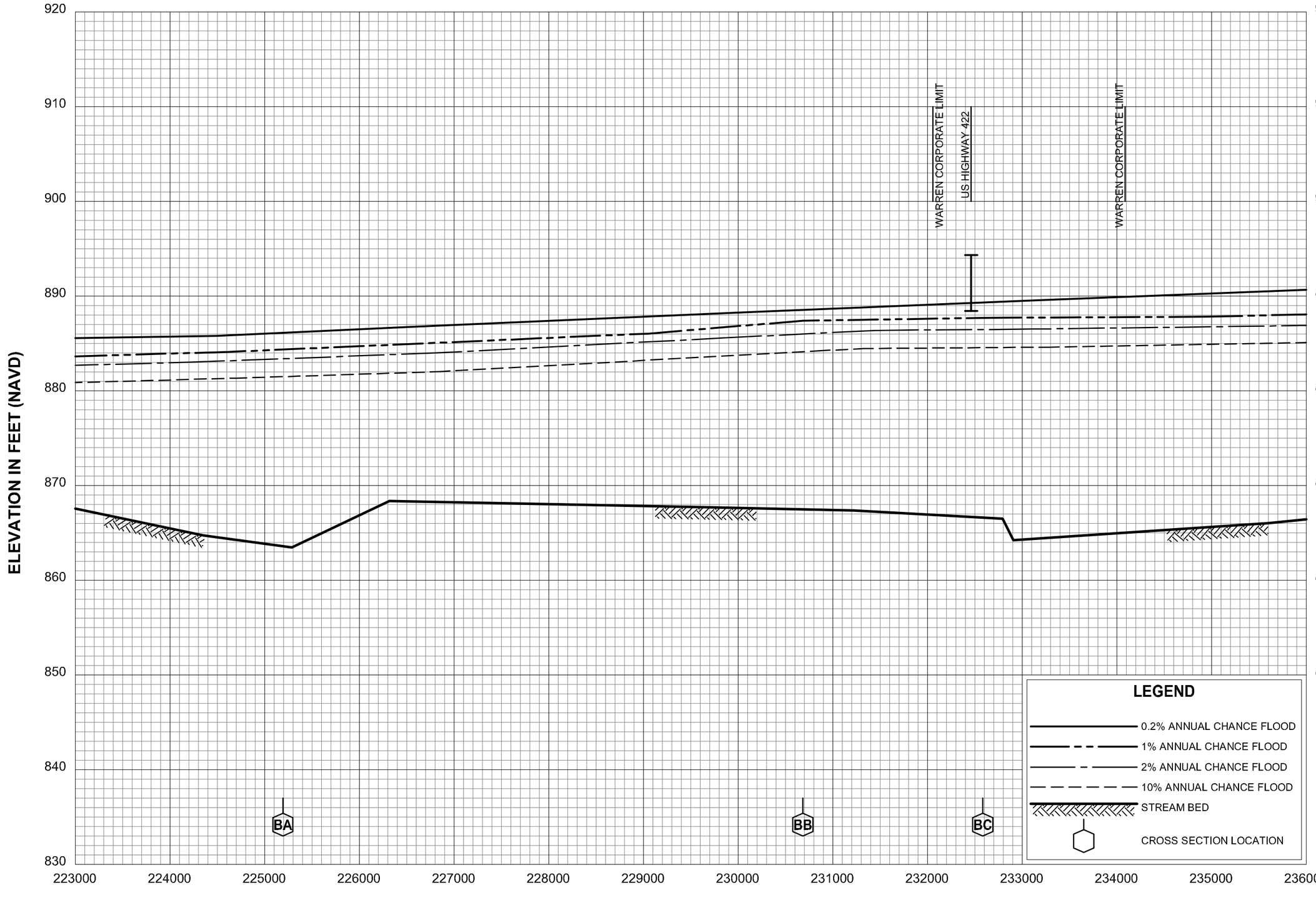
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

21P



FLOOD PROFILES

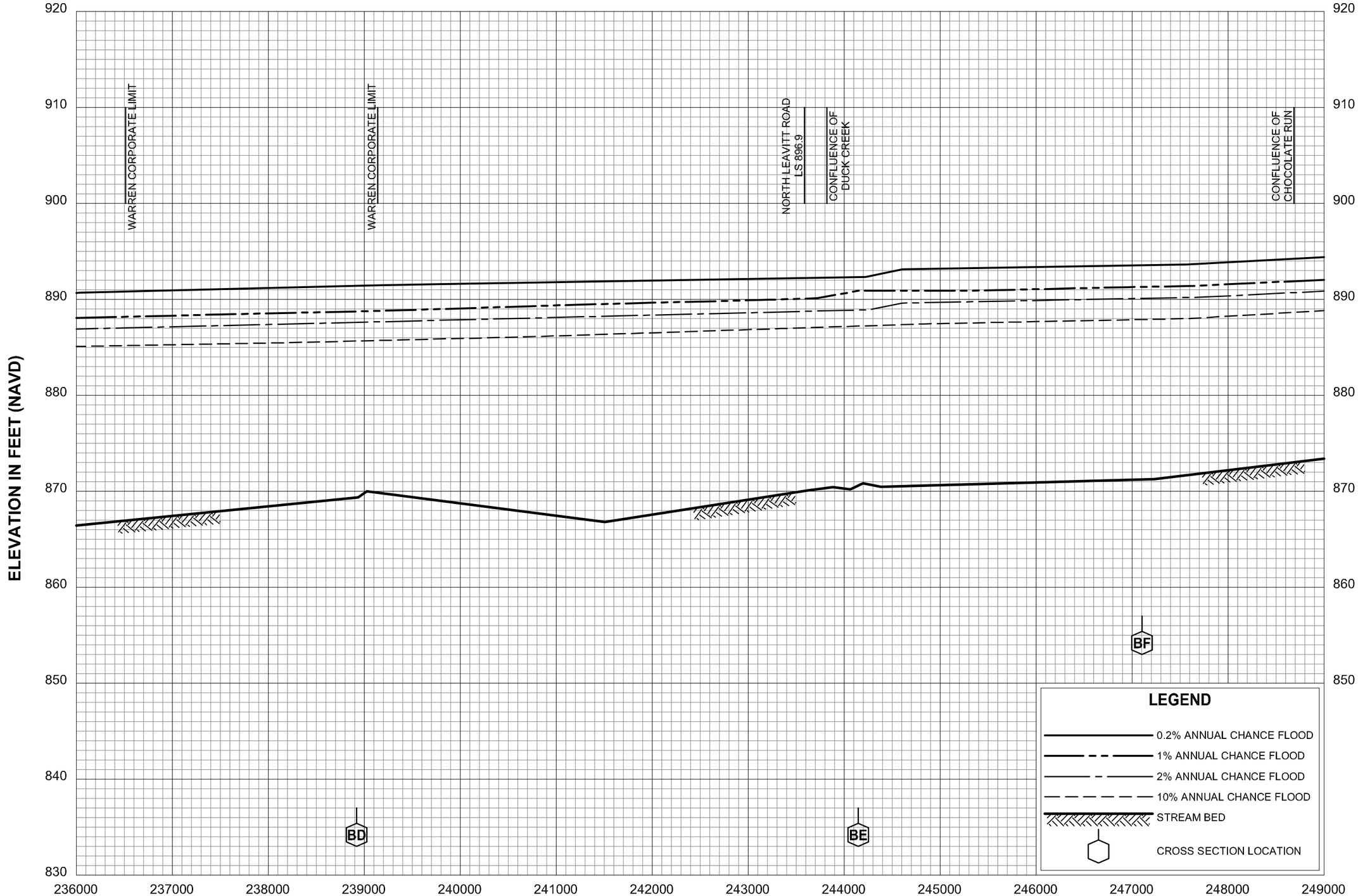
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

22P



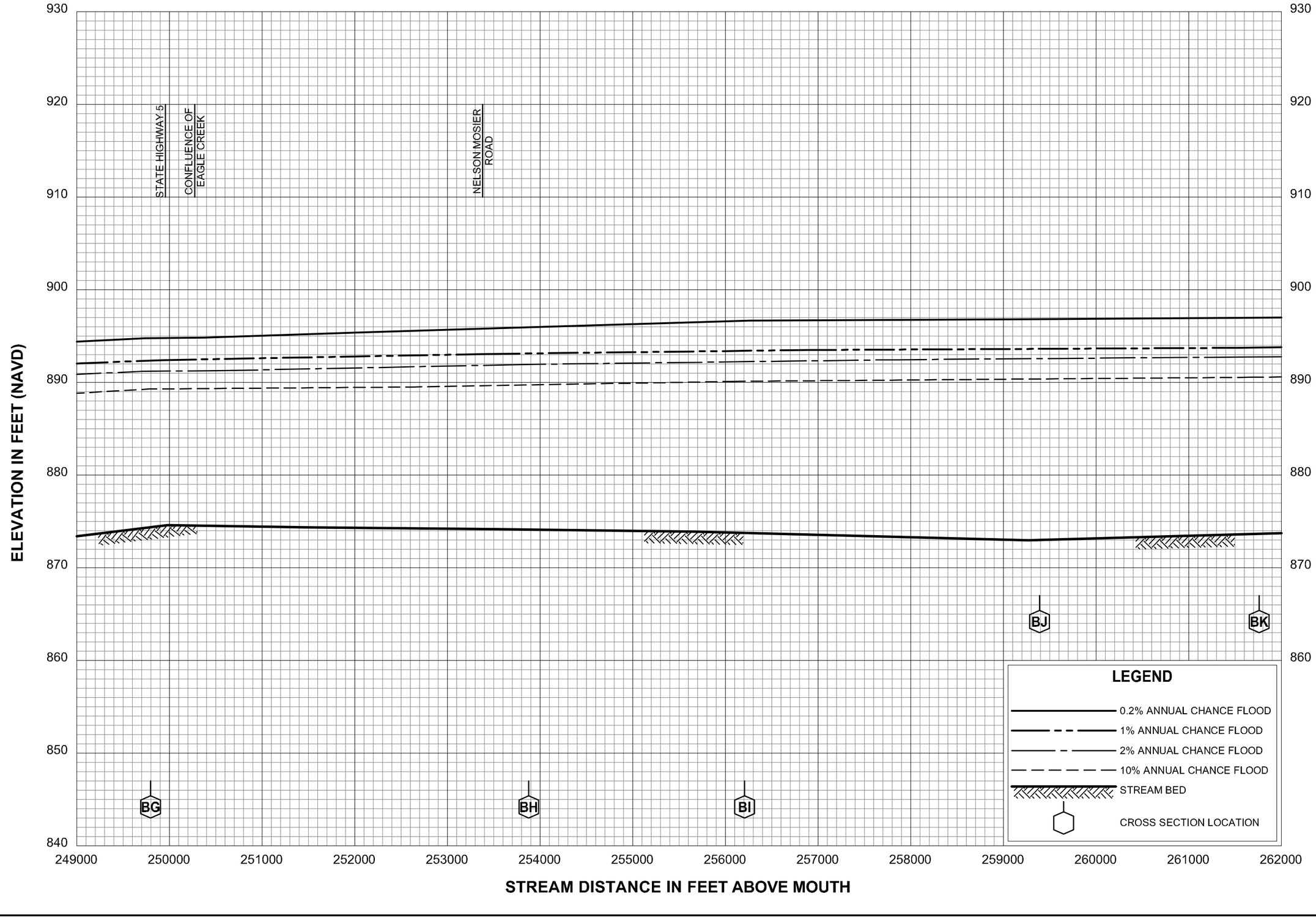
FLOOD PROFILES

MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS



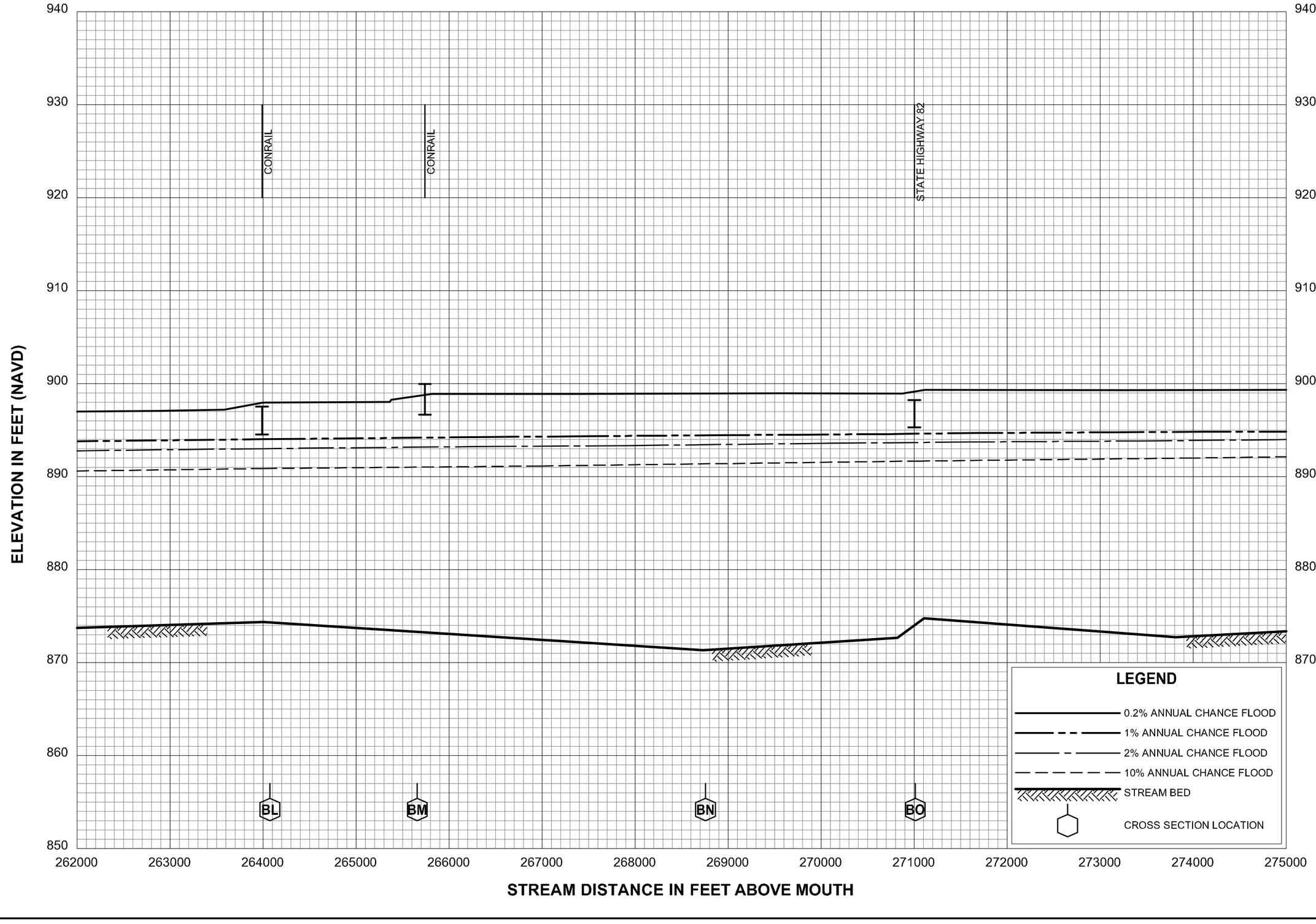
FLOOD PROFILES

MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS



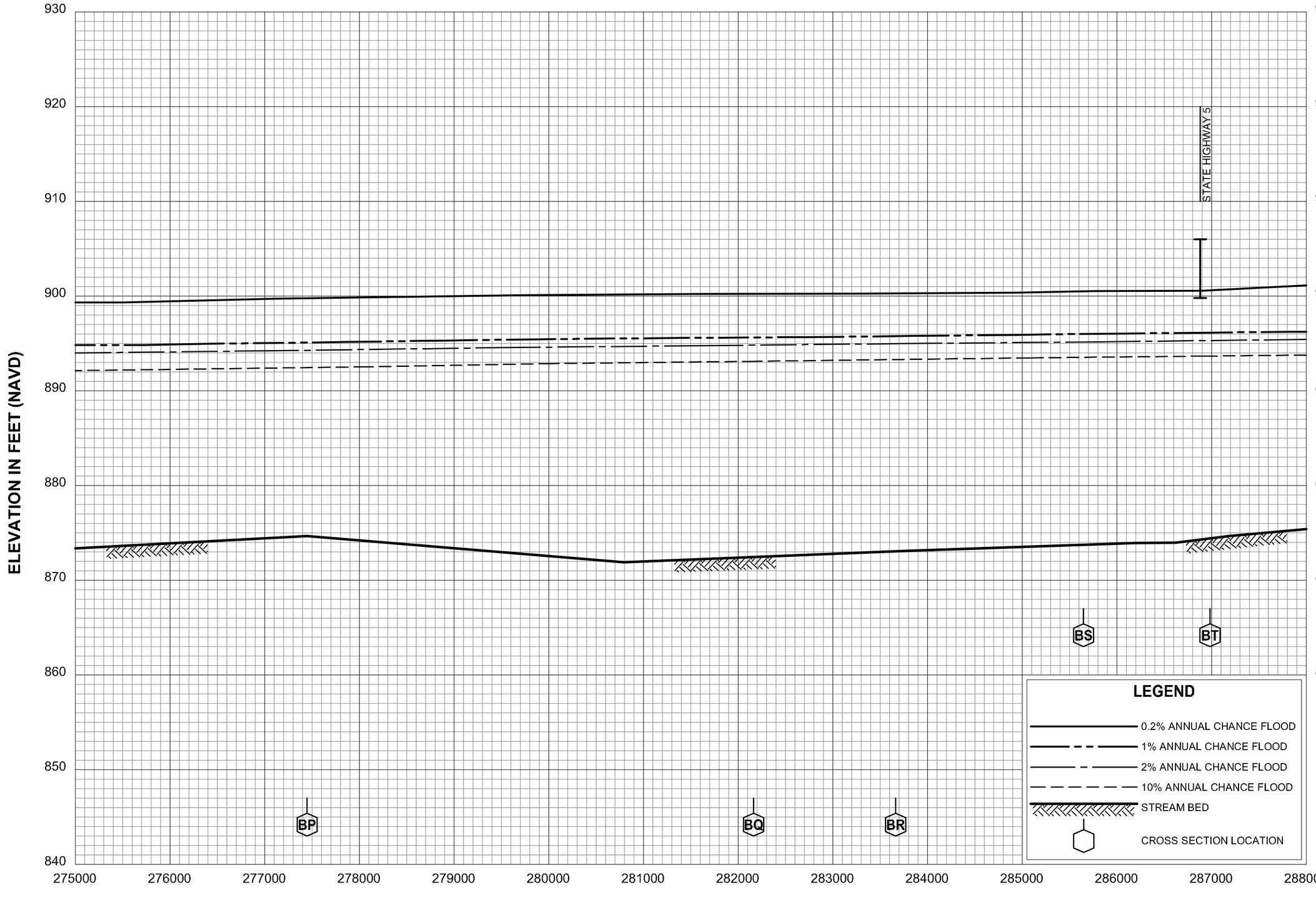
FLOOD PROFILES

MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS



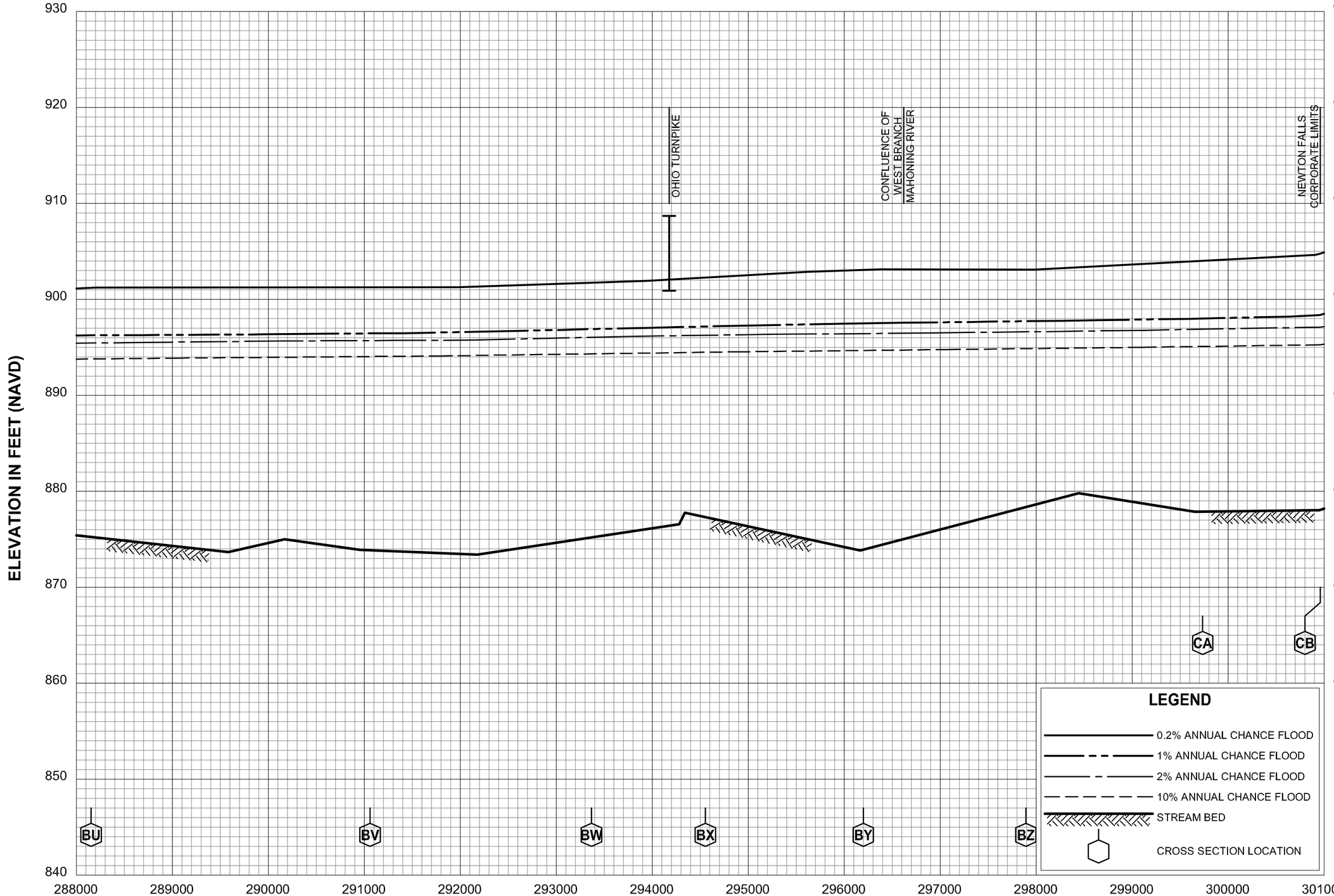
FLOOD PROFILES

MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

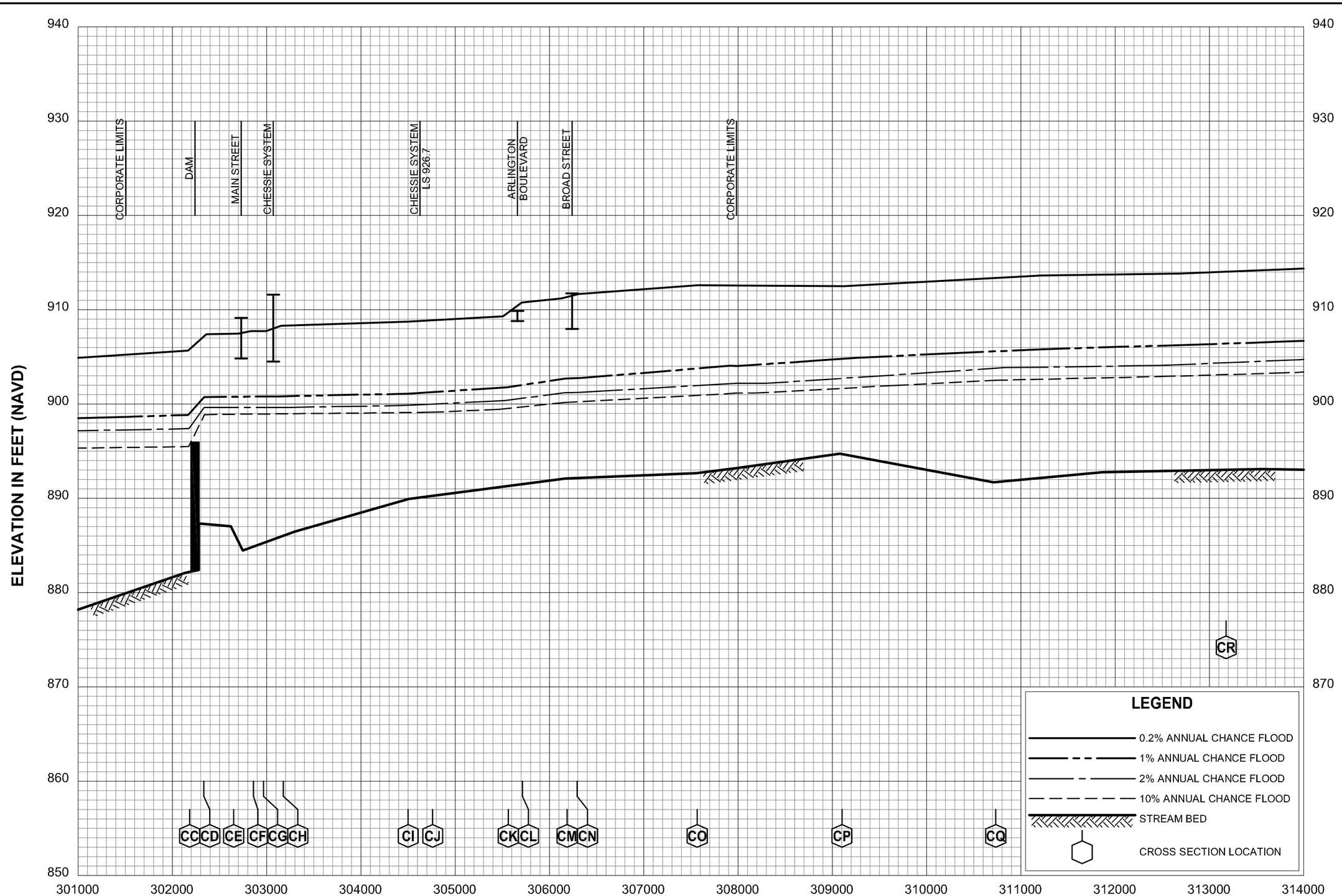
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

27P



FLOOD PROFILES

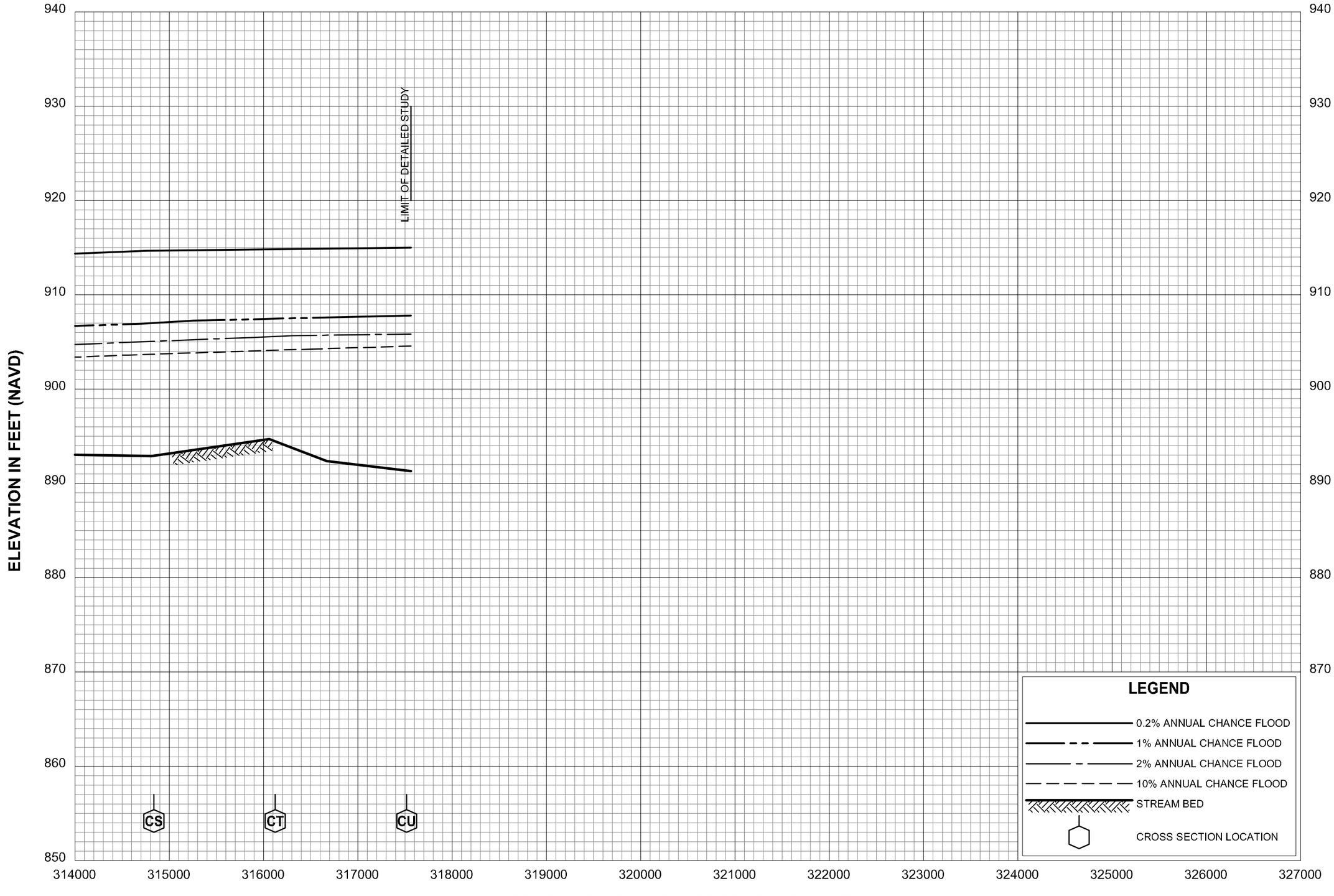
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

28P



FLOOD PROFILES

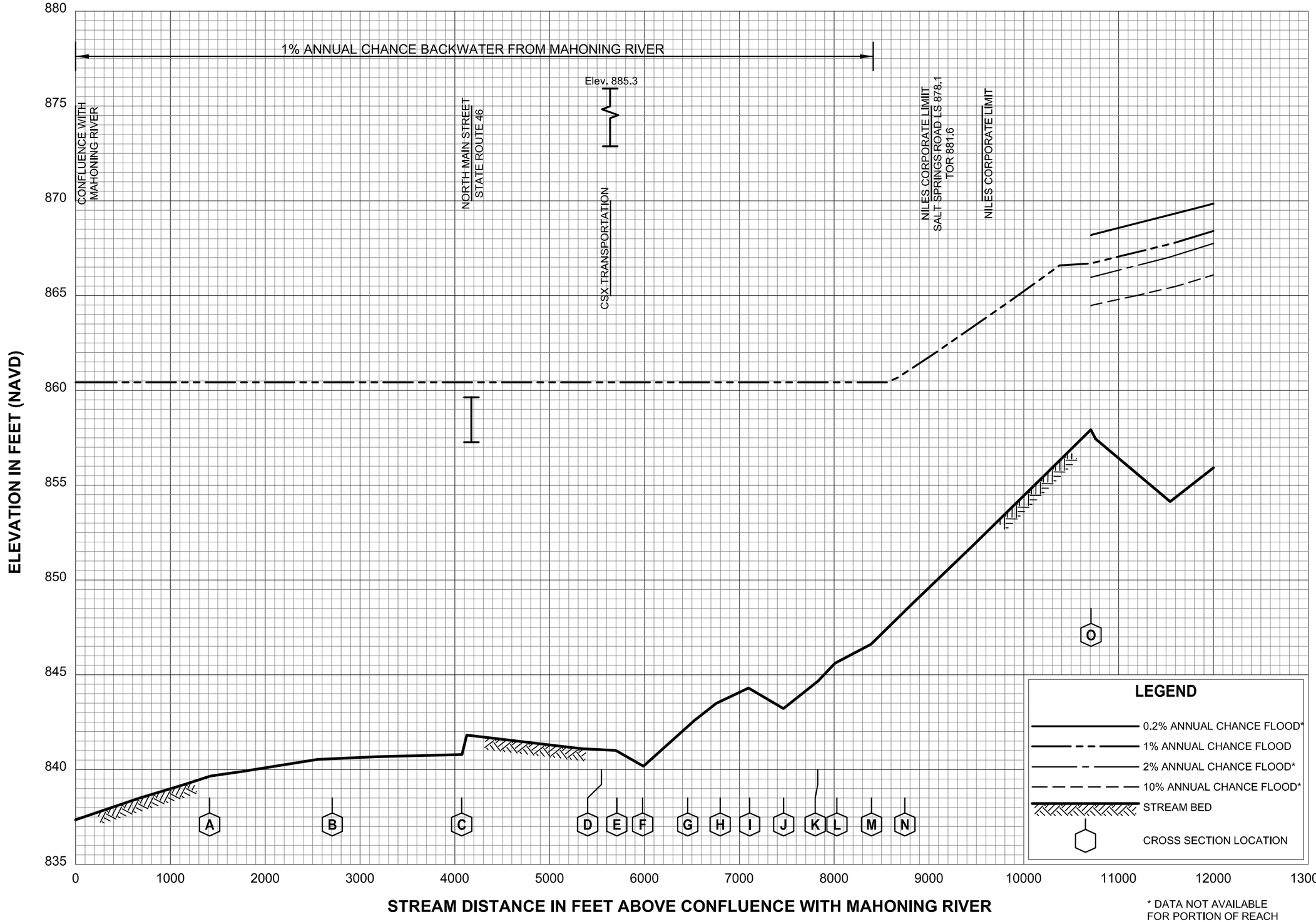
MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

29P



FLOOD PROFILES

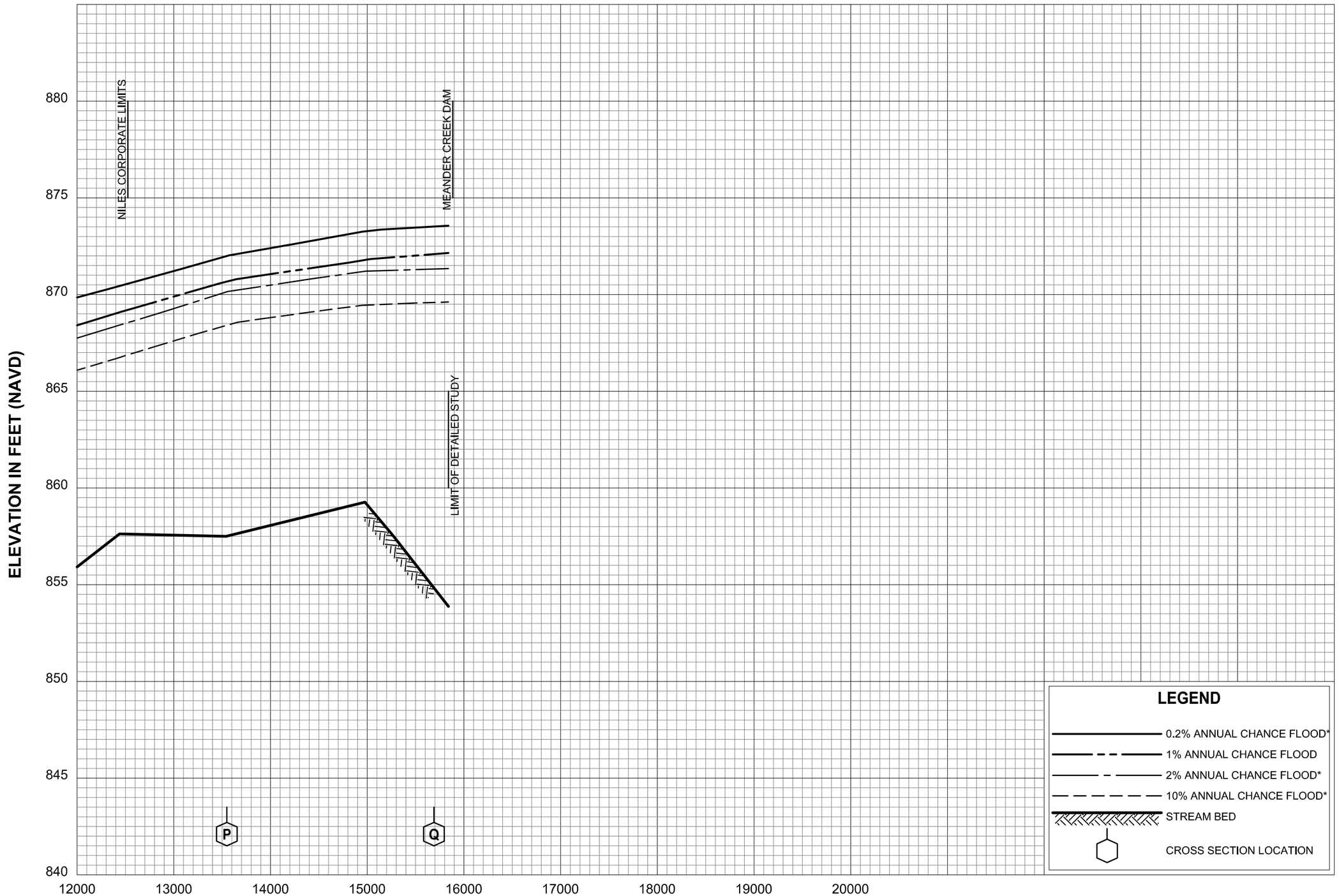
MEANDER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

30P



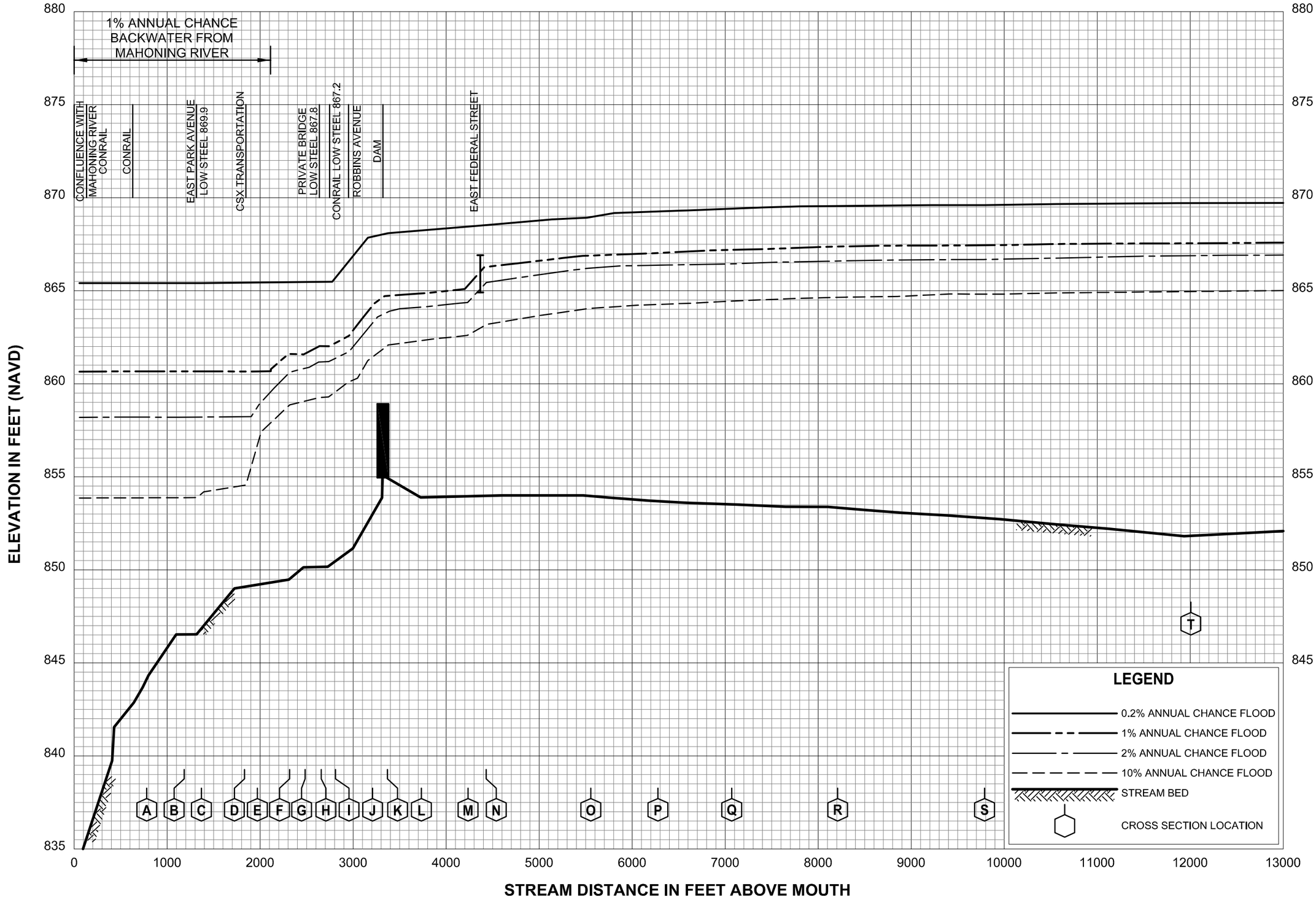
FLOOD PROFILES

MEANDER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

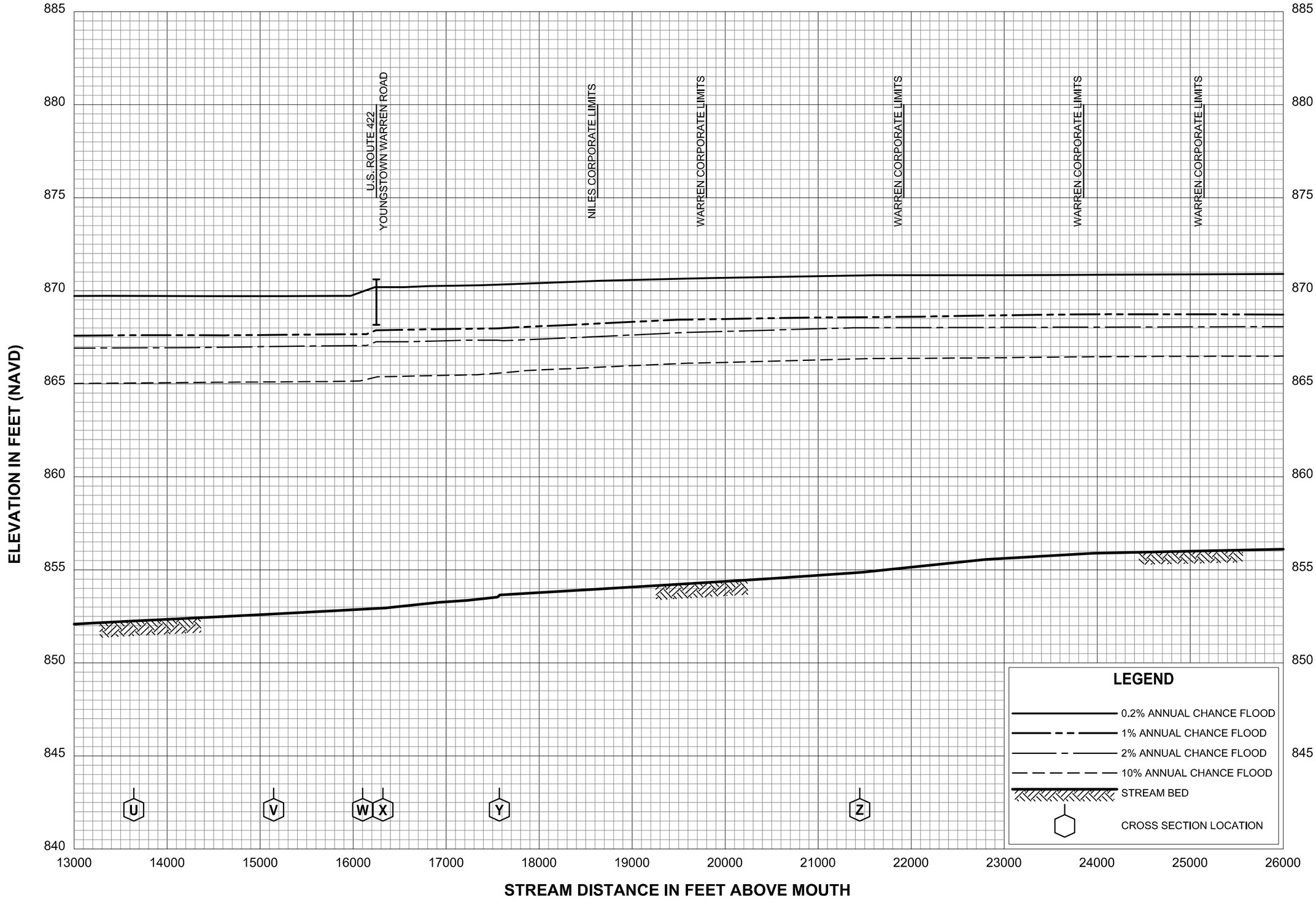
MOSQUITO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

32P



FLOOD PROFILES

MOSQUITO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

33P

FLOOD PROFILES

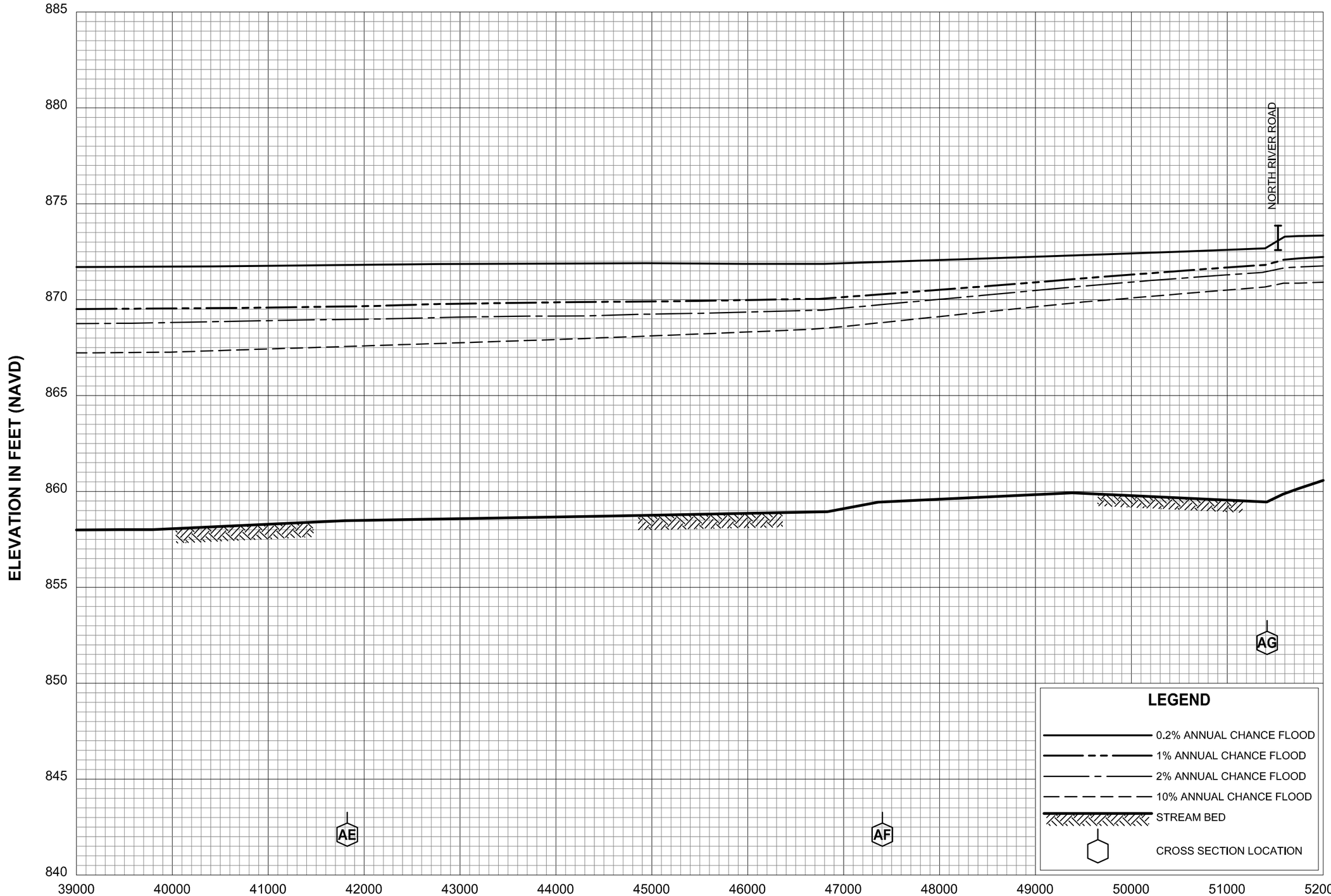
MOSQUITO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

34P



FLOOD PROFILES

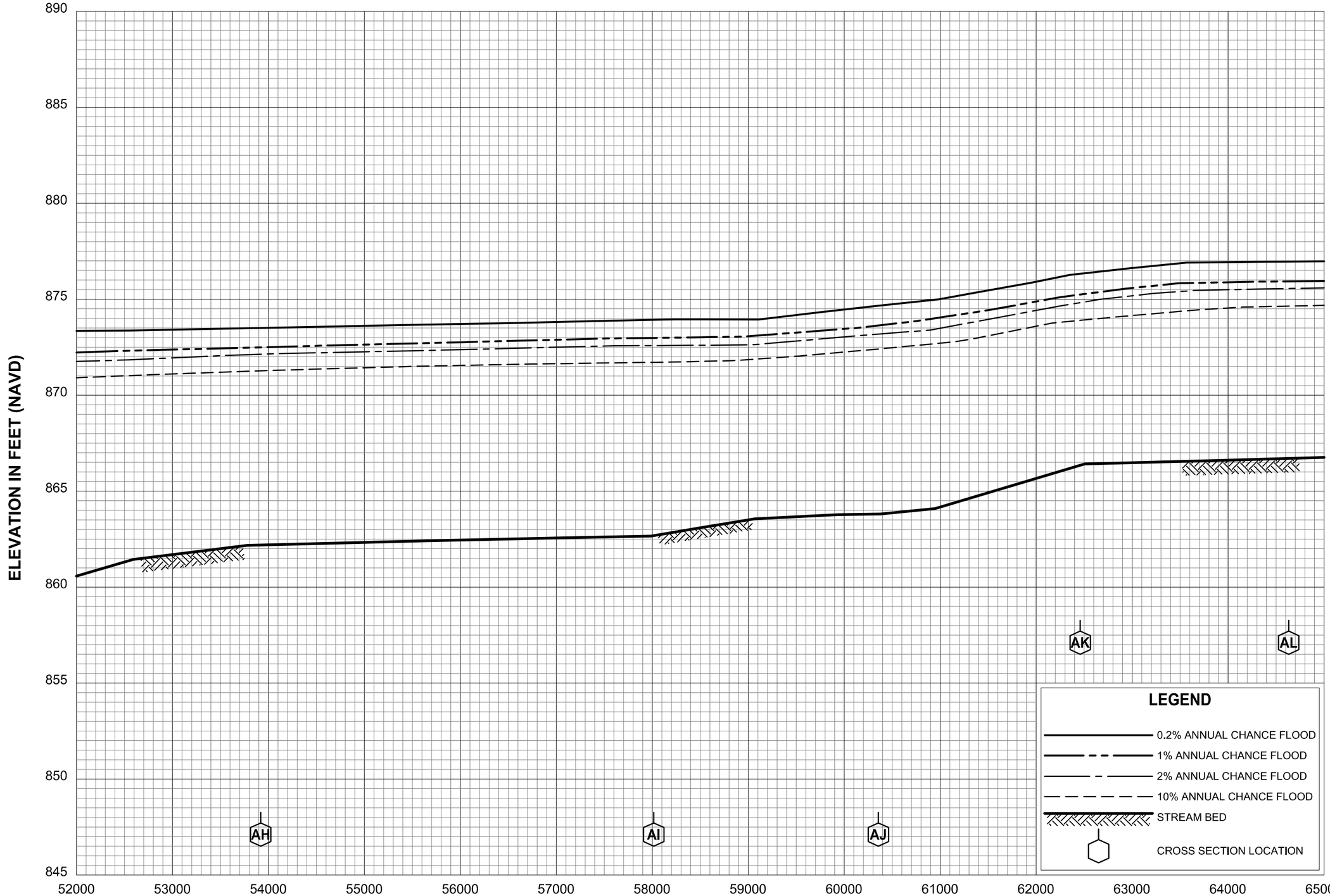
MOSQUITO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

35P



FLOOD PROFILES

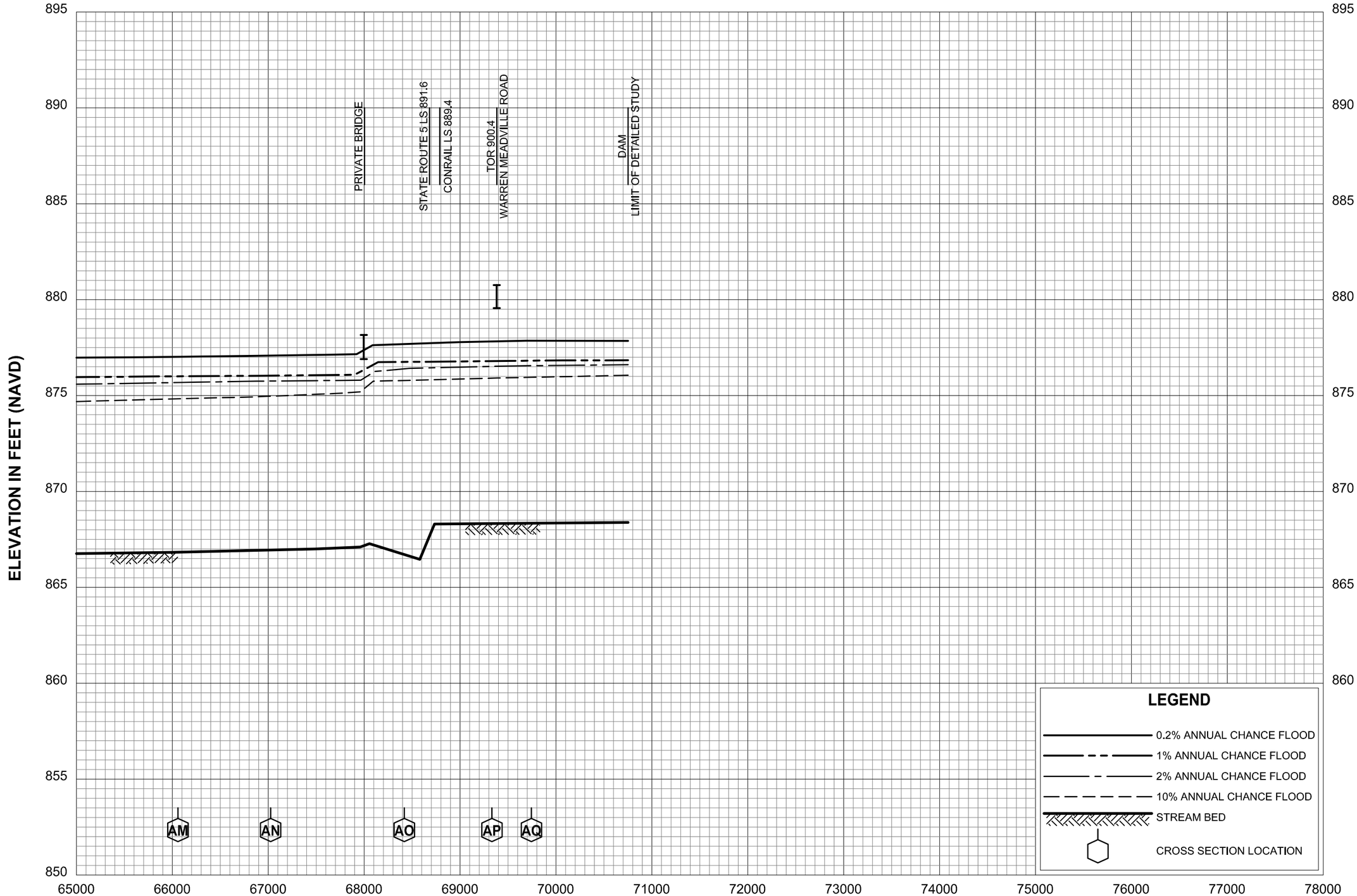
MOSQUITO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

36P



FLOOD PROFILES

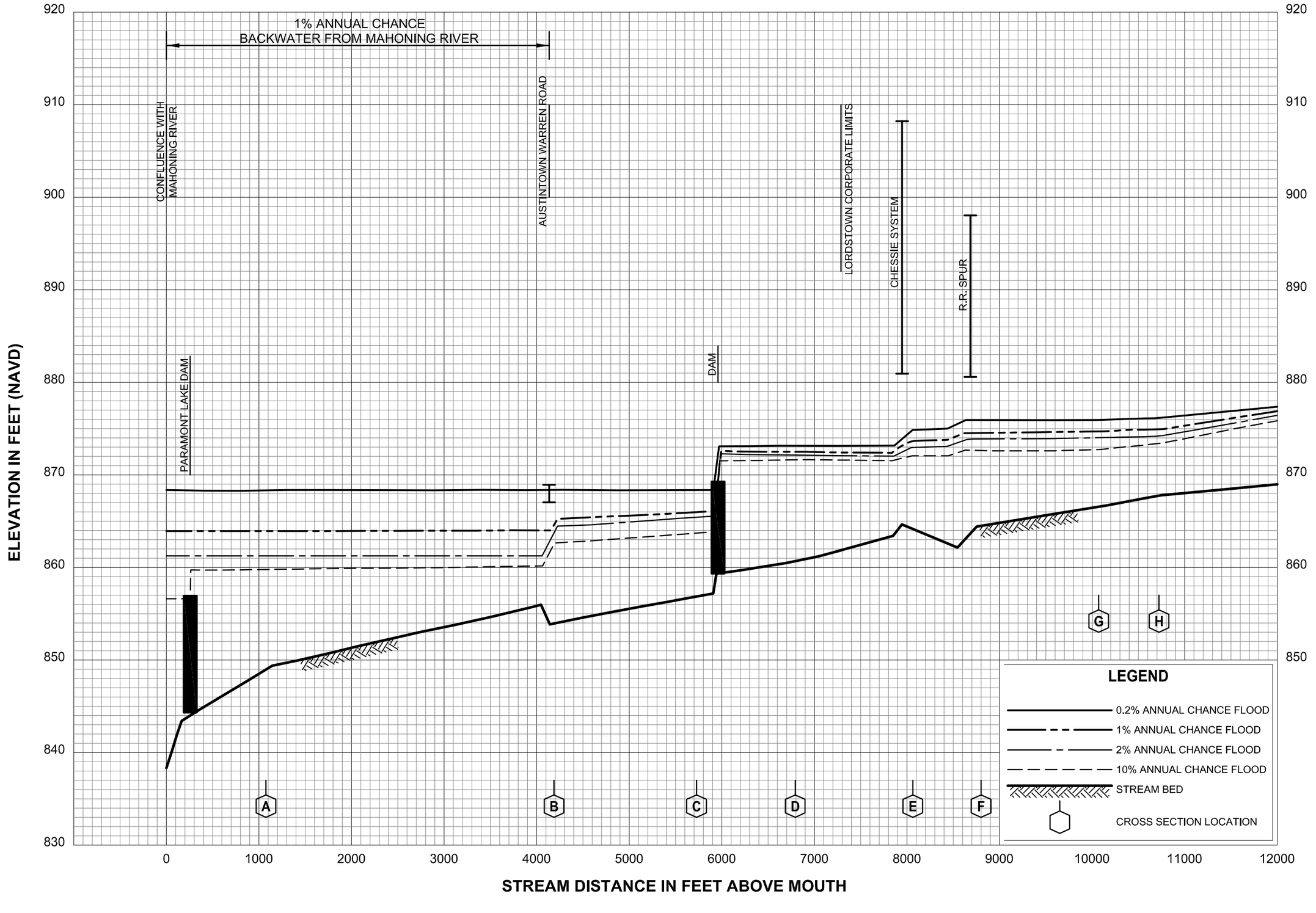
MOSQUITO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

37P



FLOOD PROFILES

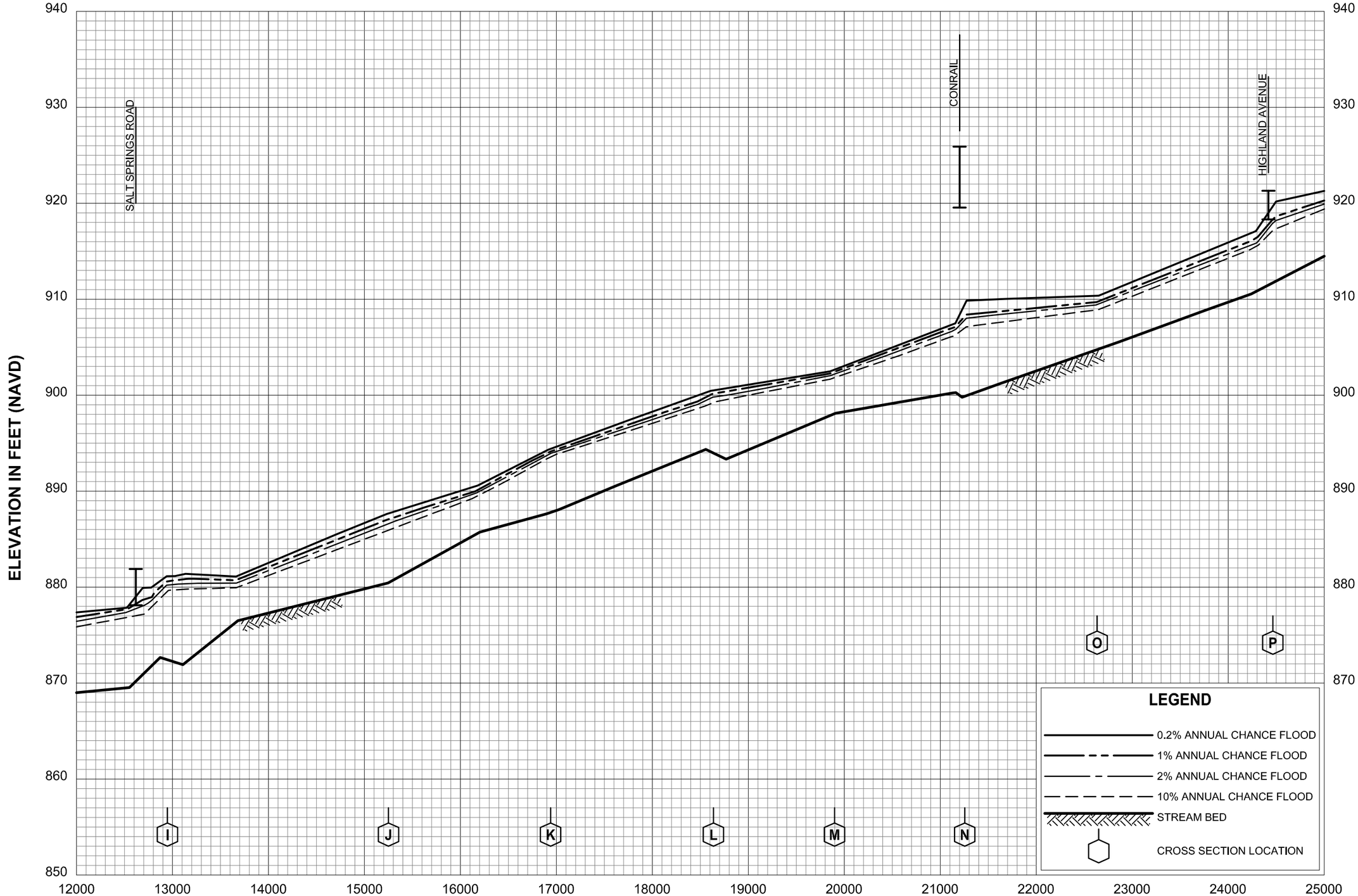
MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

38P



FLOOD PROFILES

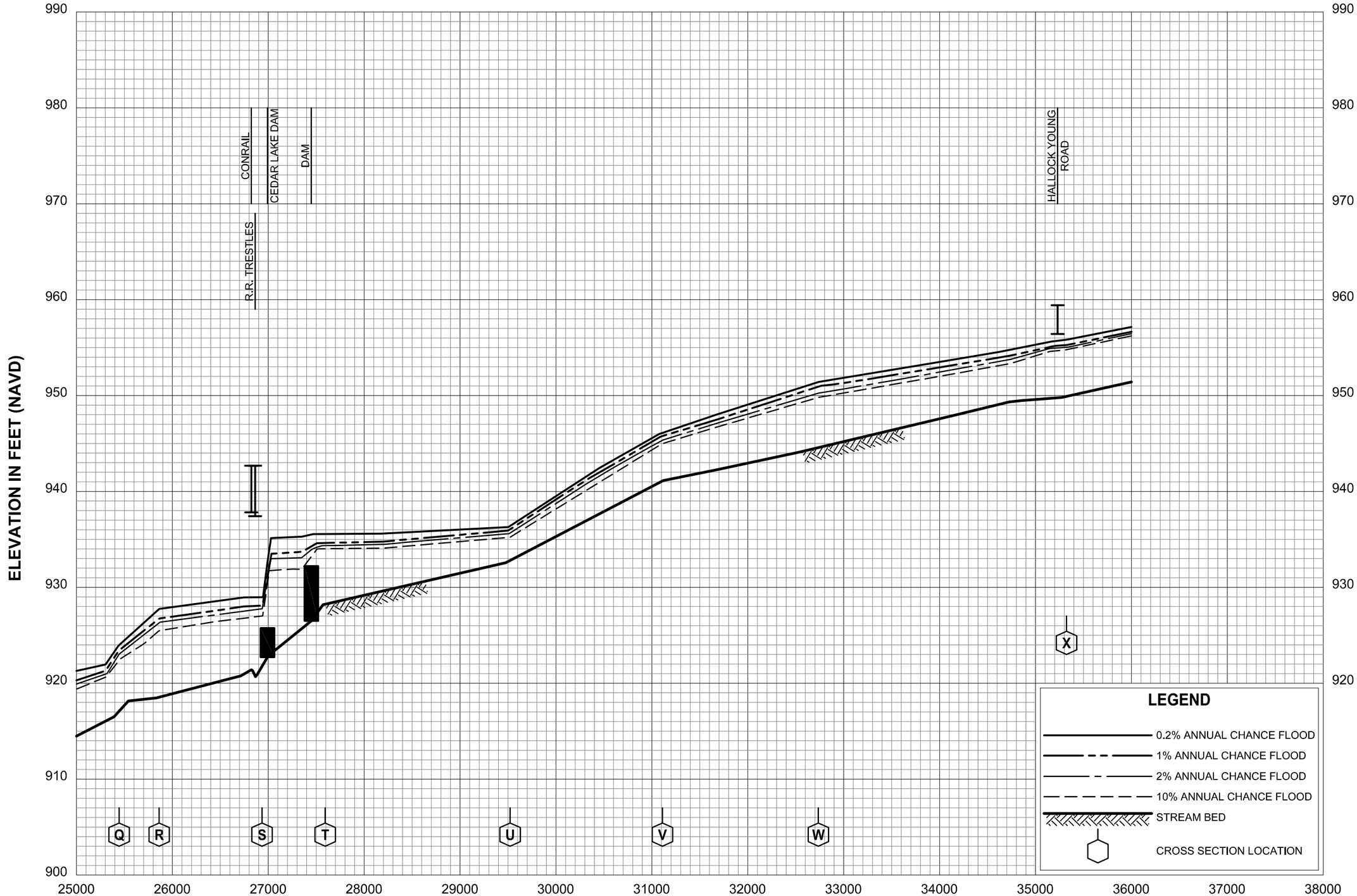
MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

39P



FLOOD PROFILES

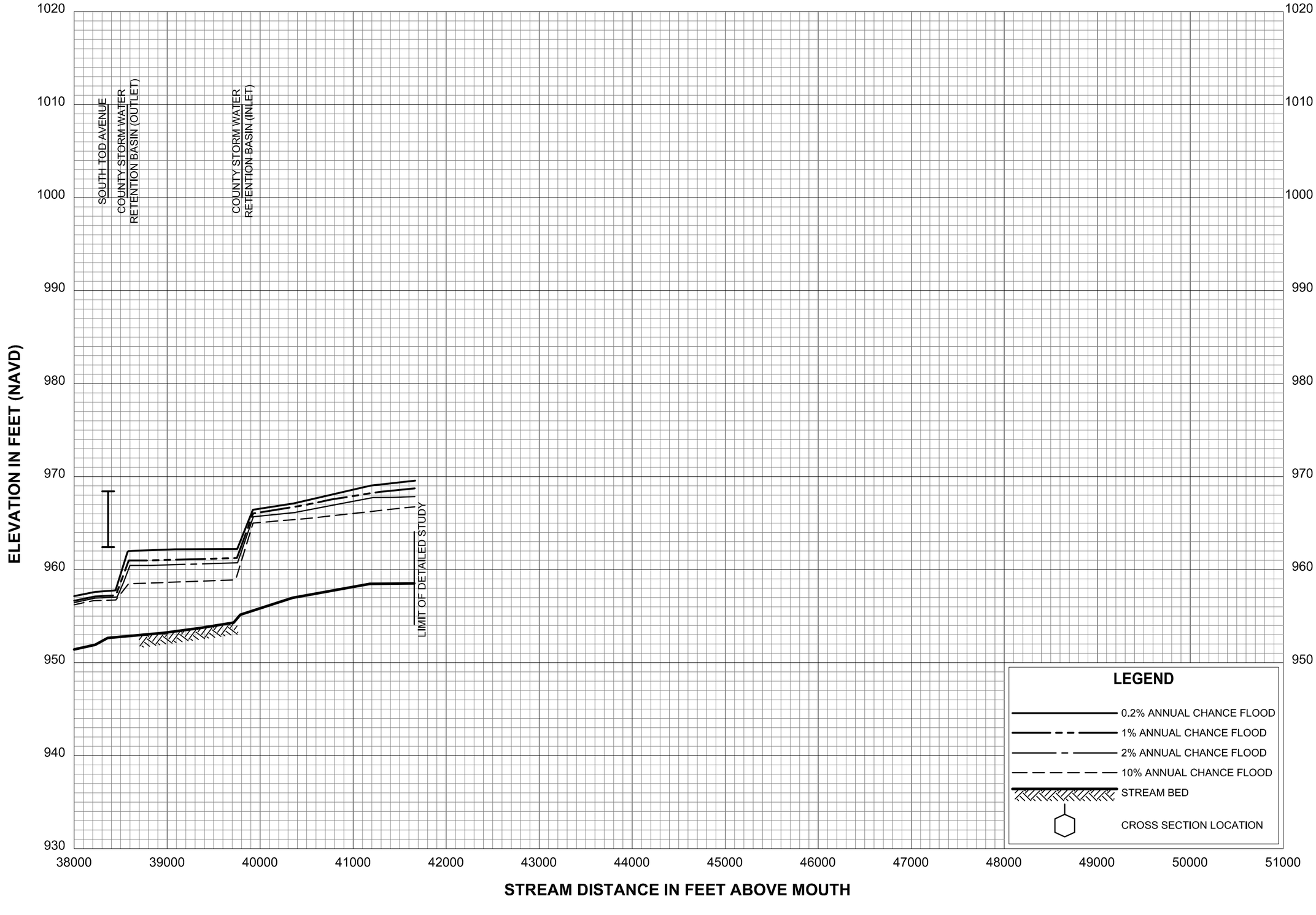
MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

40P



FLOOD PROFILES

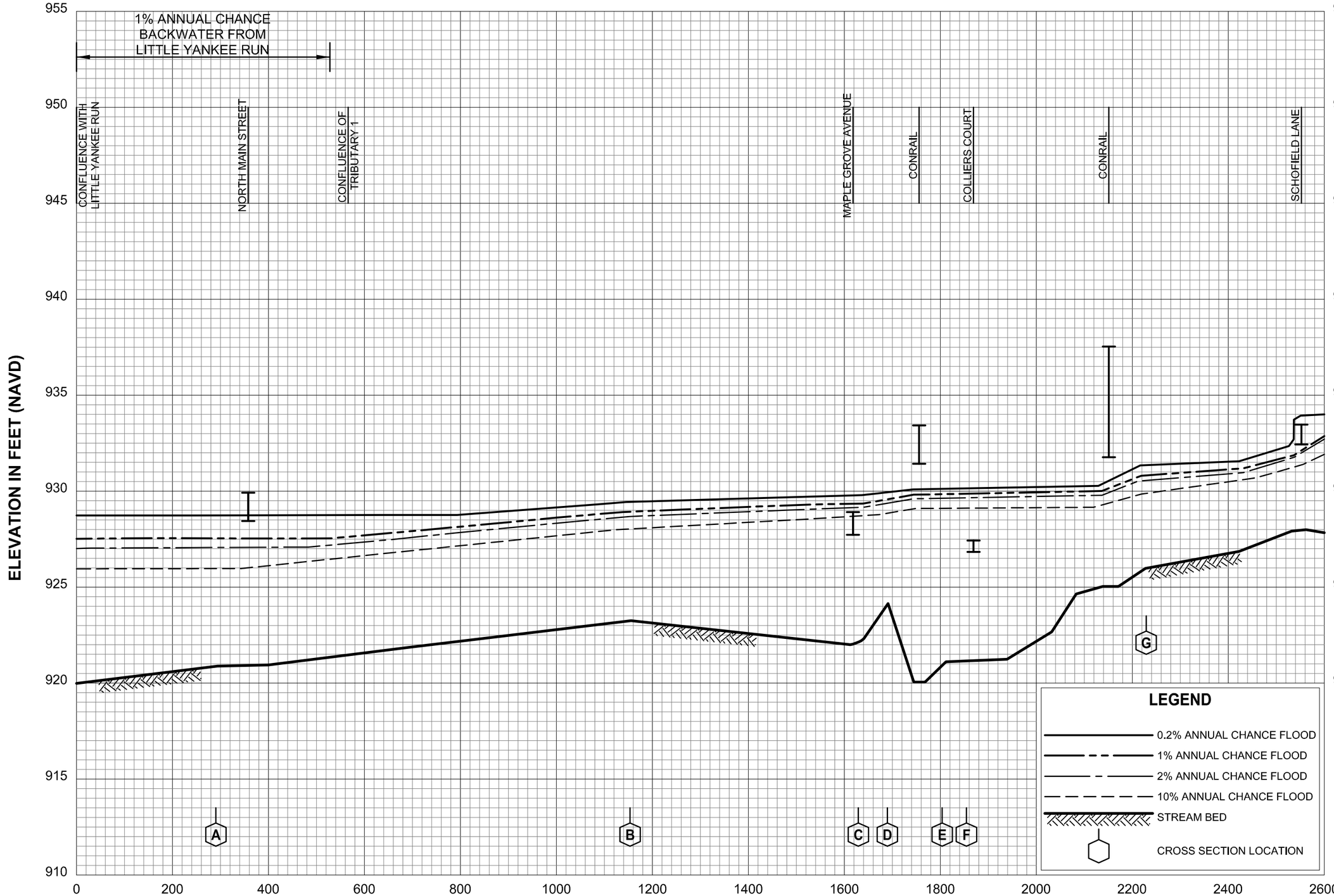
MUD CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

41P



FLOOD PROFILES

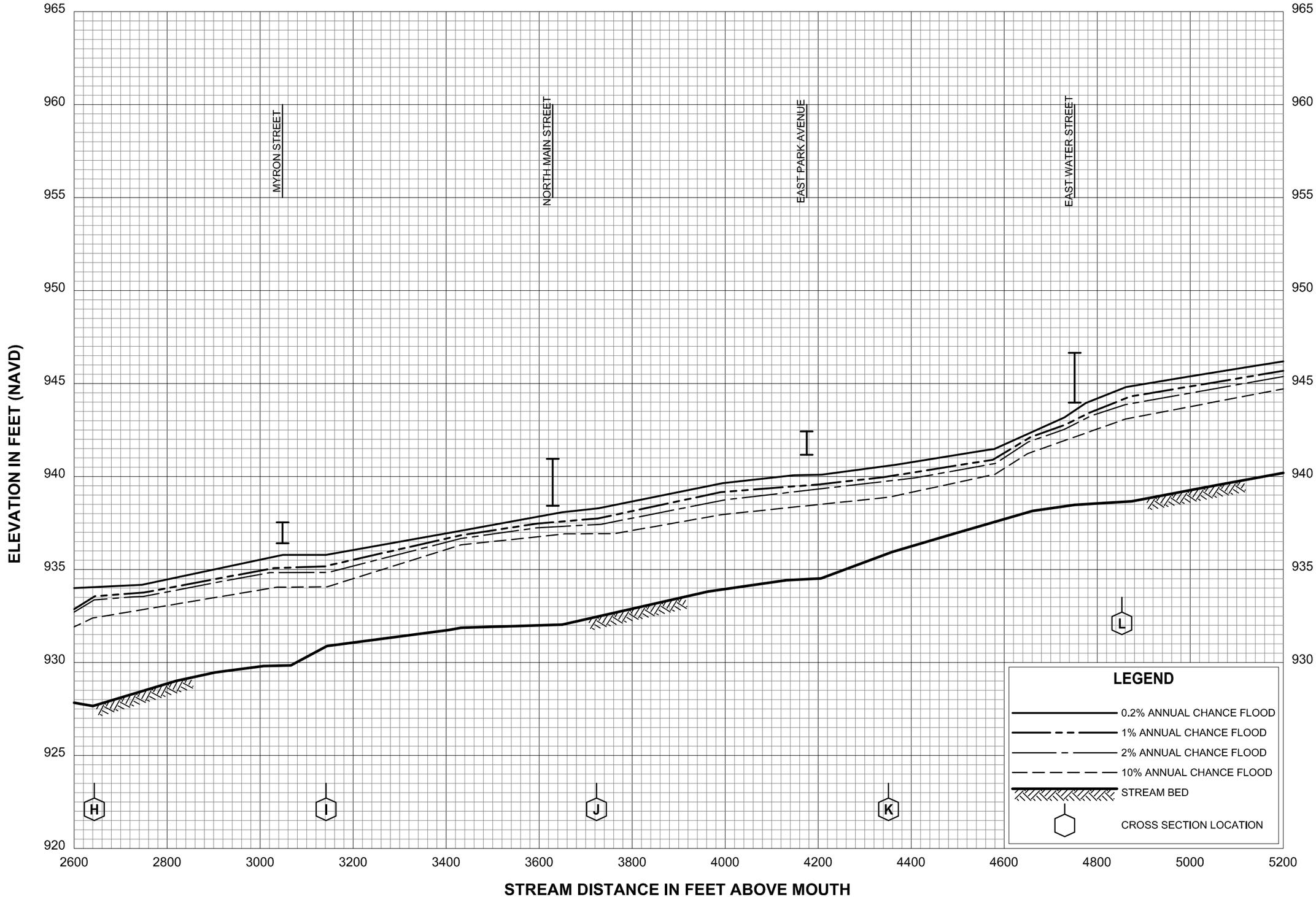
MUD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

42P



FLOOD PROFILES

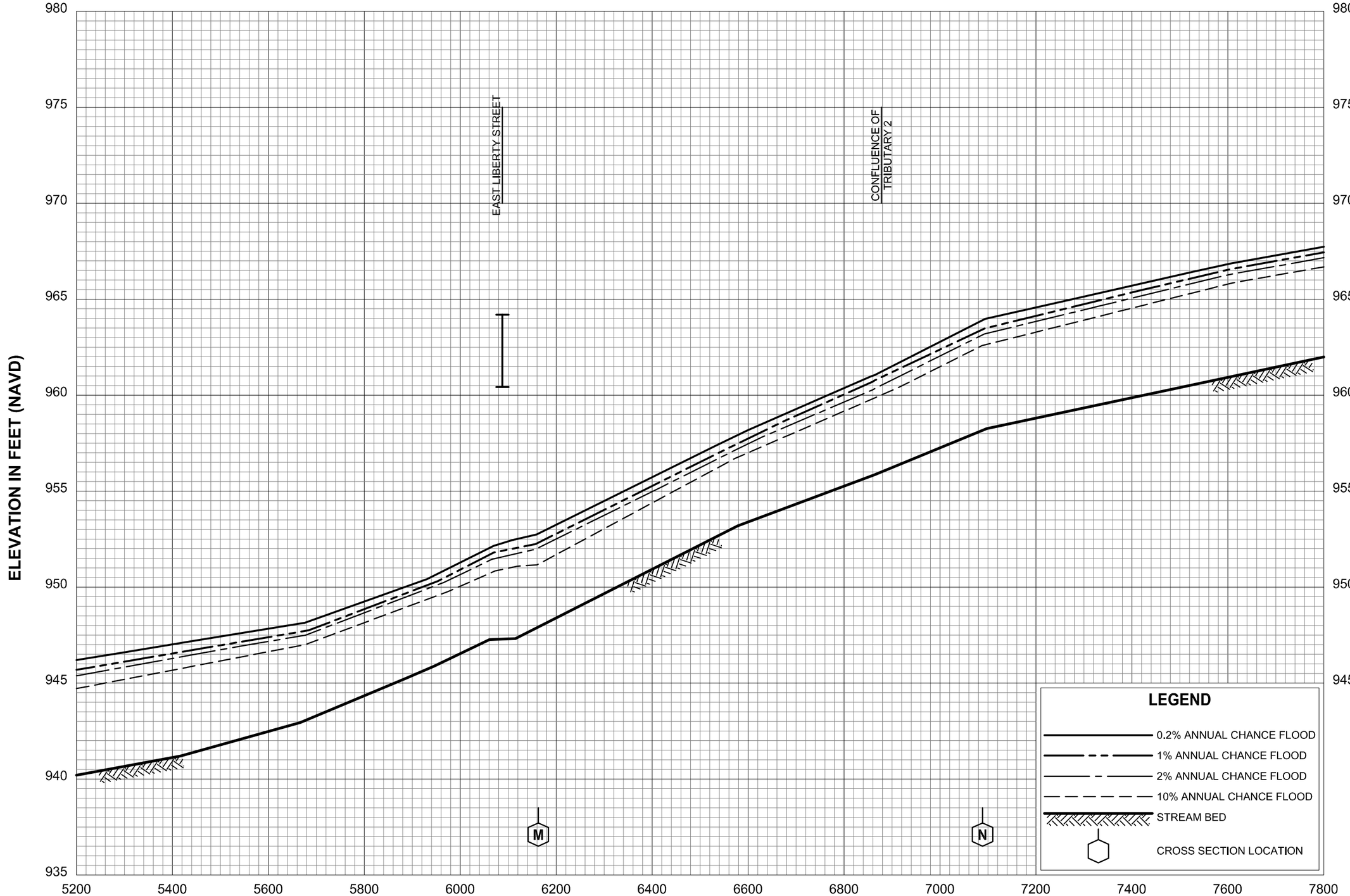
MUD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

43P



FLOOD PROFILES

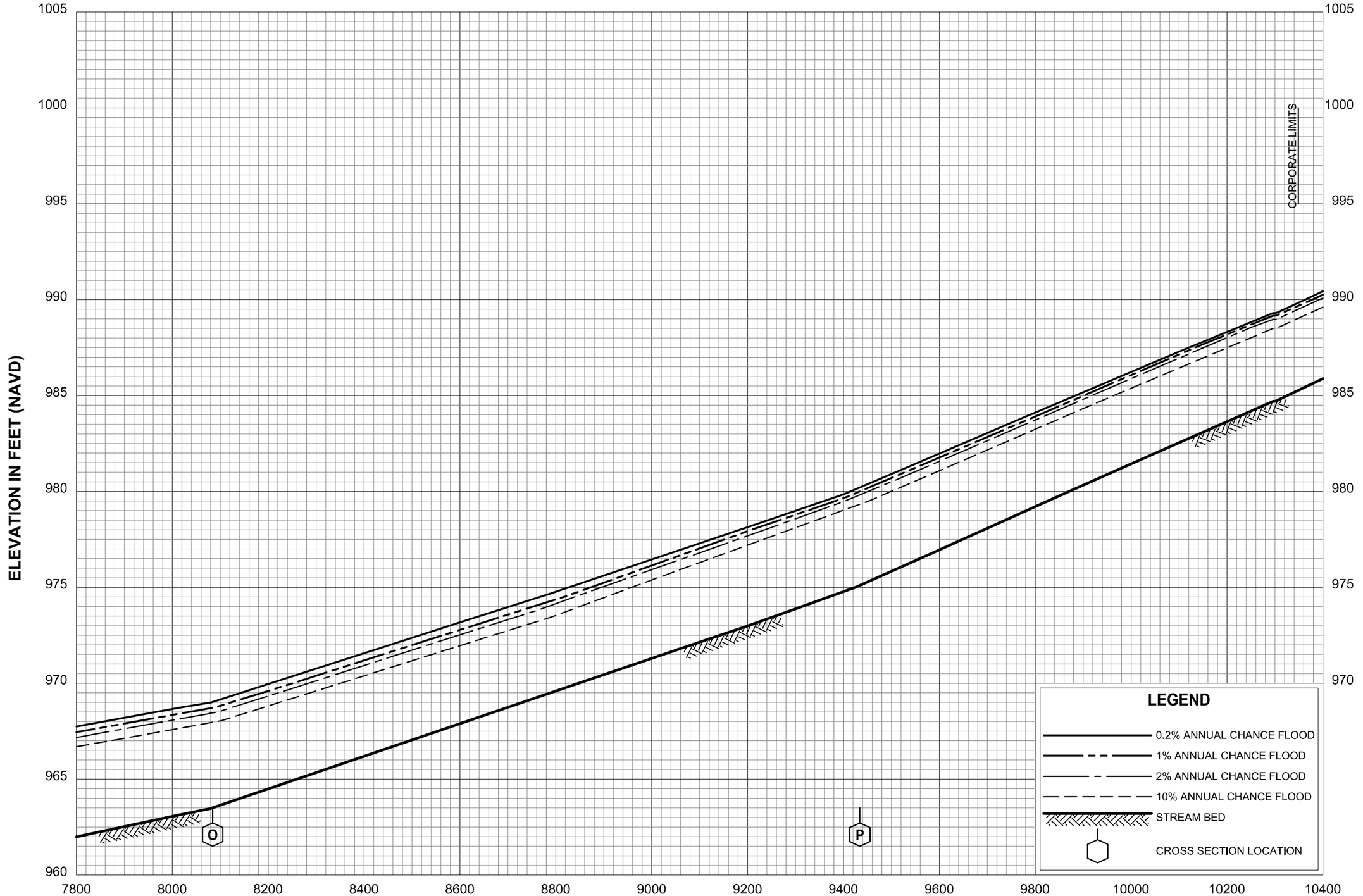
MUD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

44P



FLOOD PROFILES

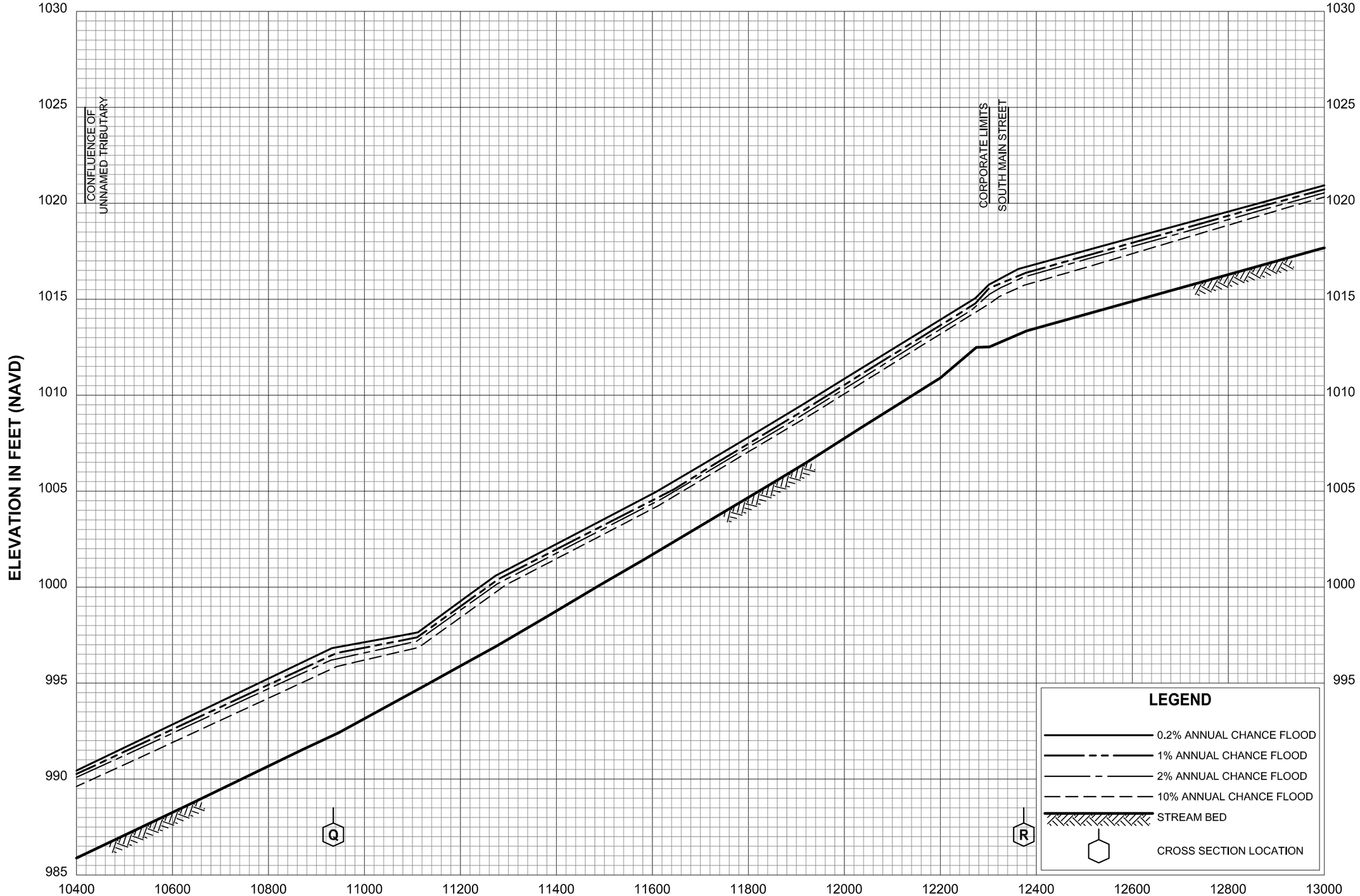
MUD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

45P



FLOOD PROFILES

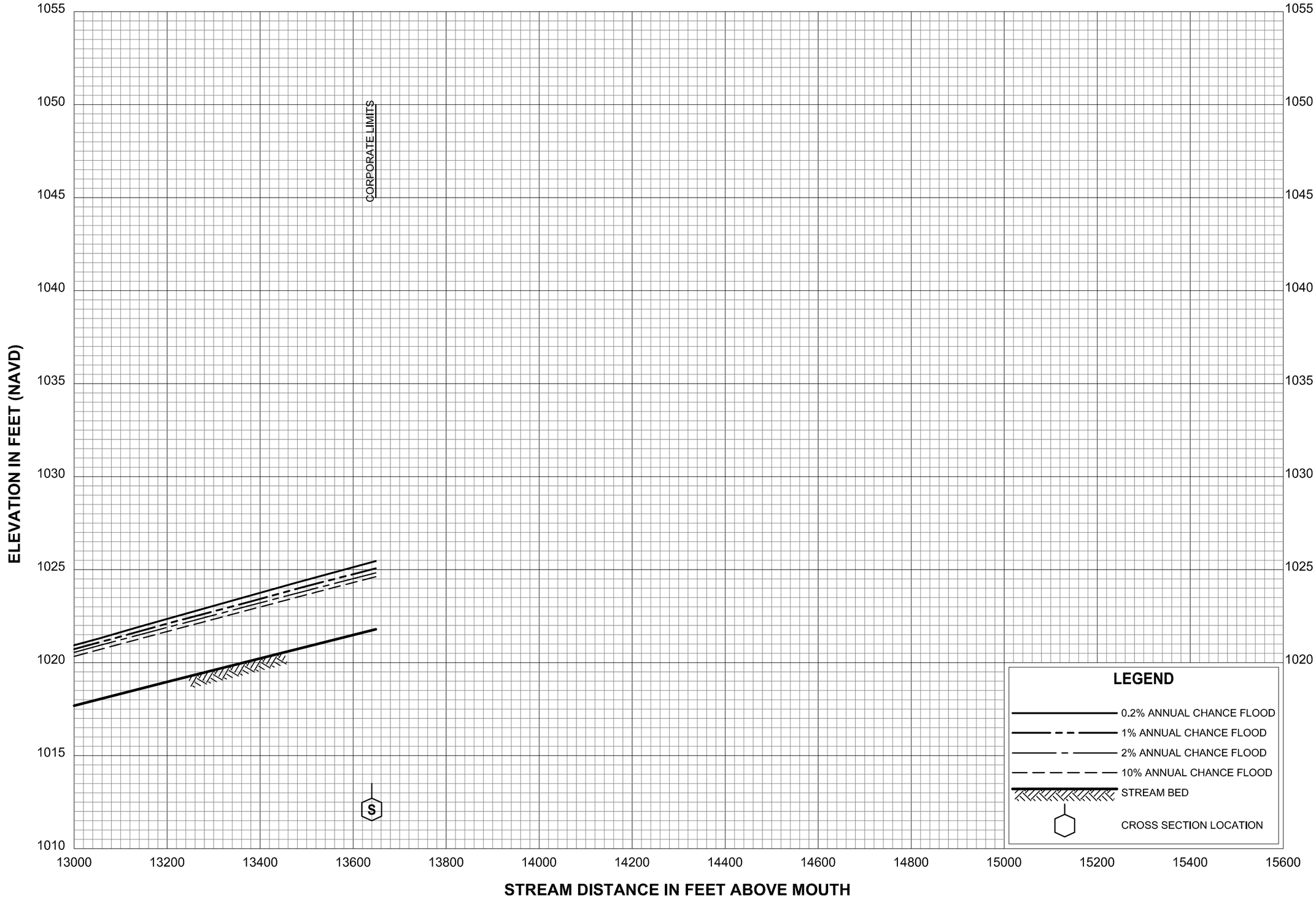
MUD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

46P



FLOOD PROFILES

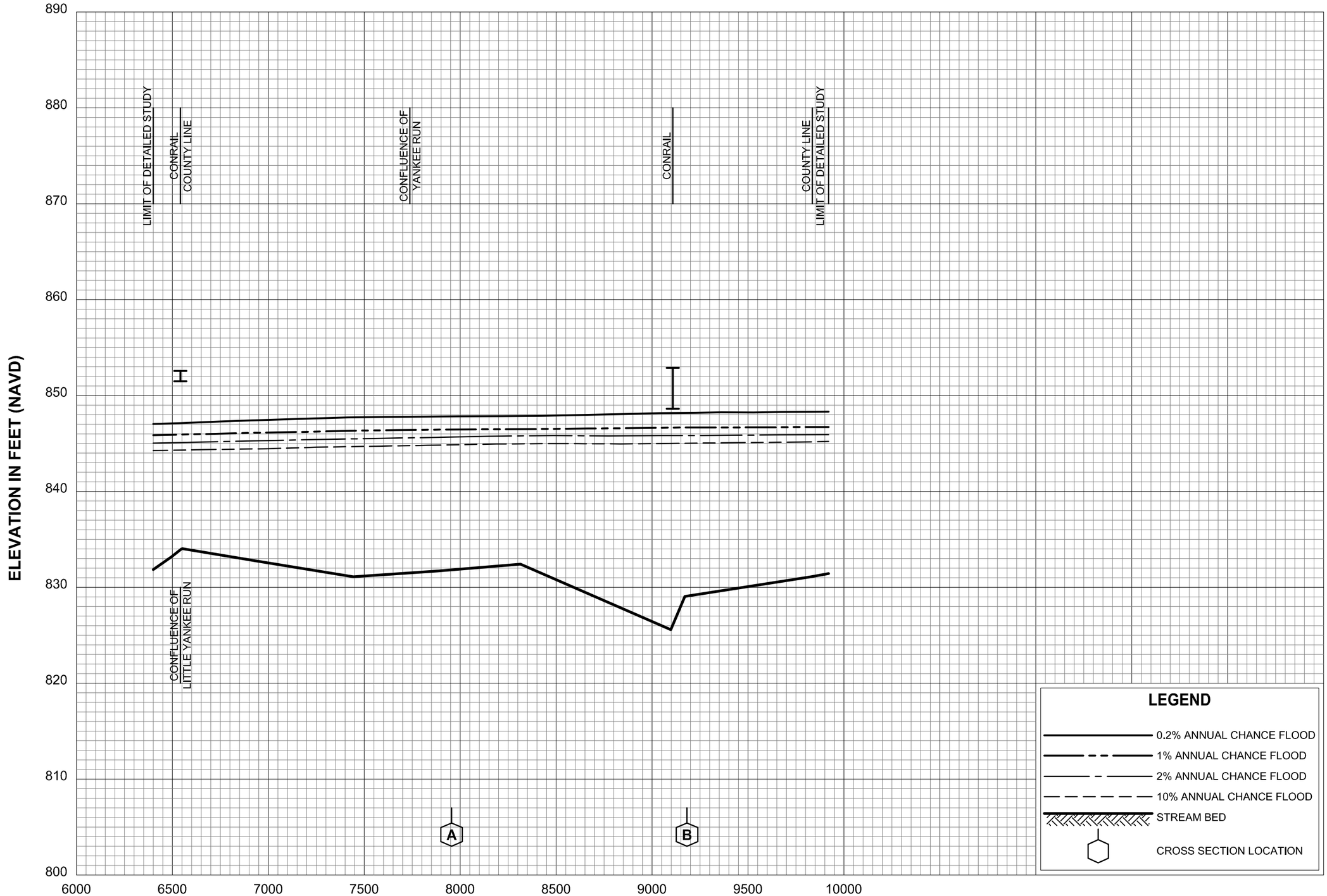
MUD RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

47P



FLOOD PROFILES

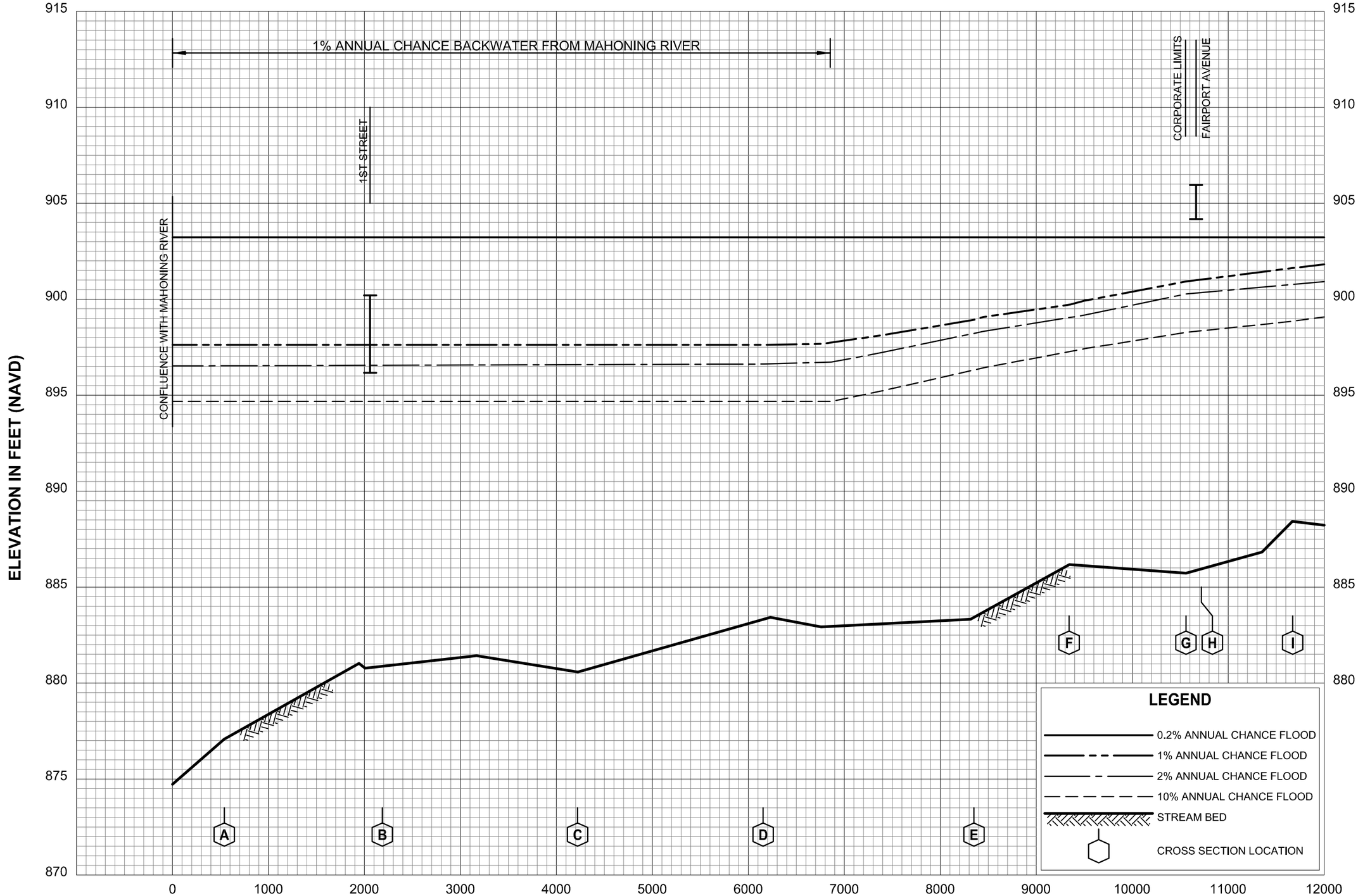
SHENANGO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

(UNINCORPORATED AREAS)

48P



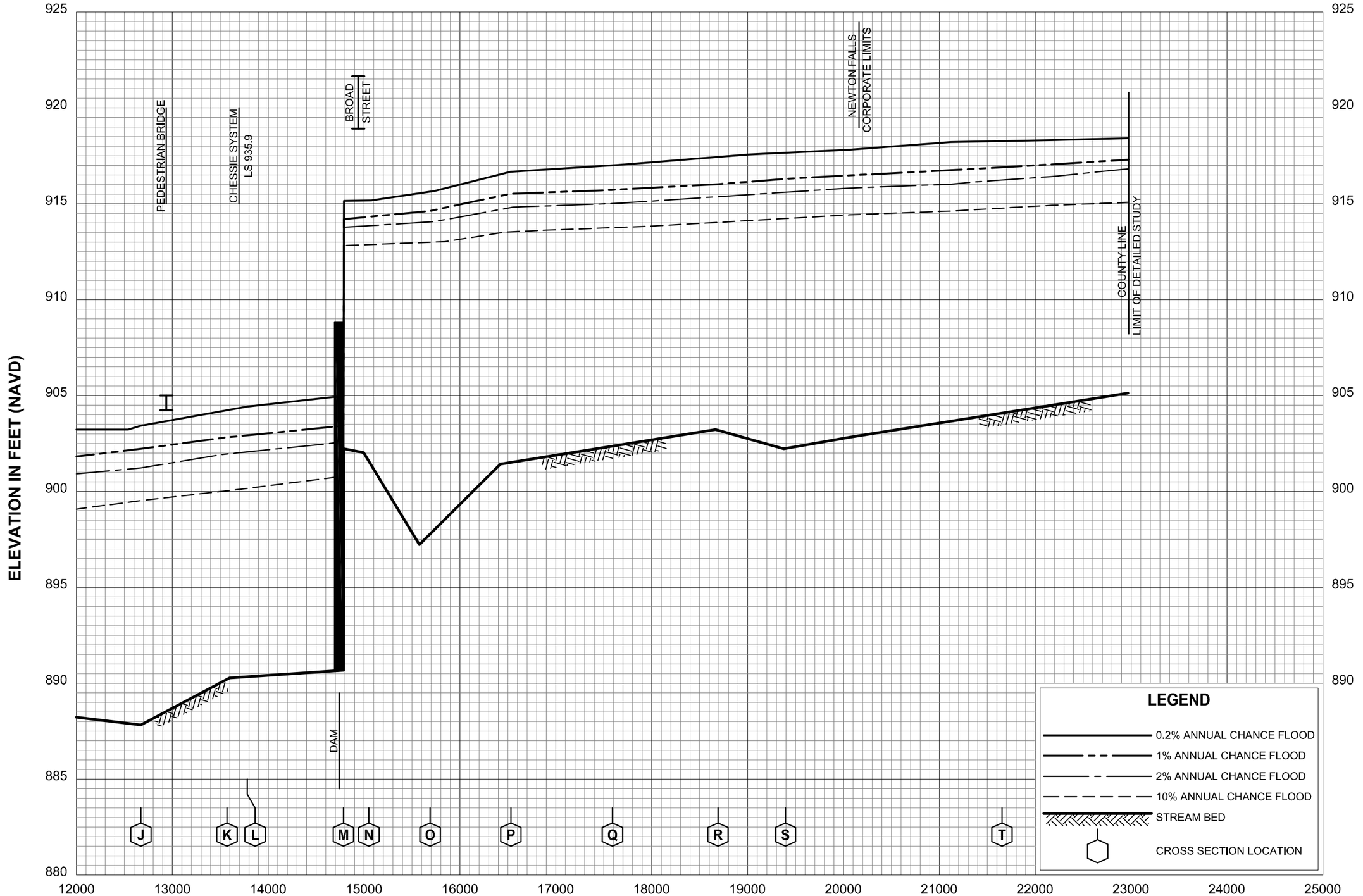
FLOOD PROFILES

WEST BRANCH MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS



FLOOD PROFILES

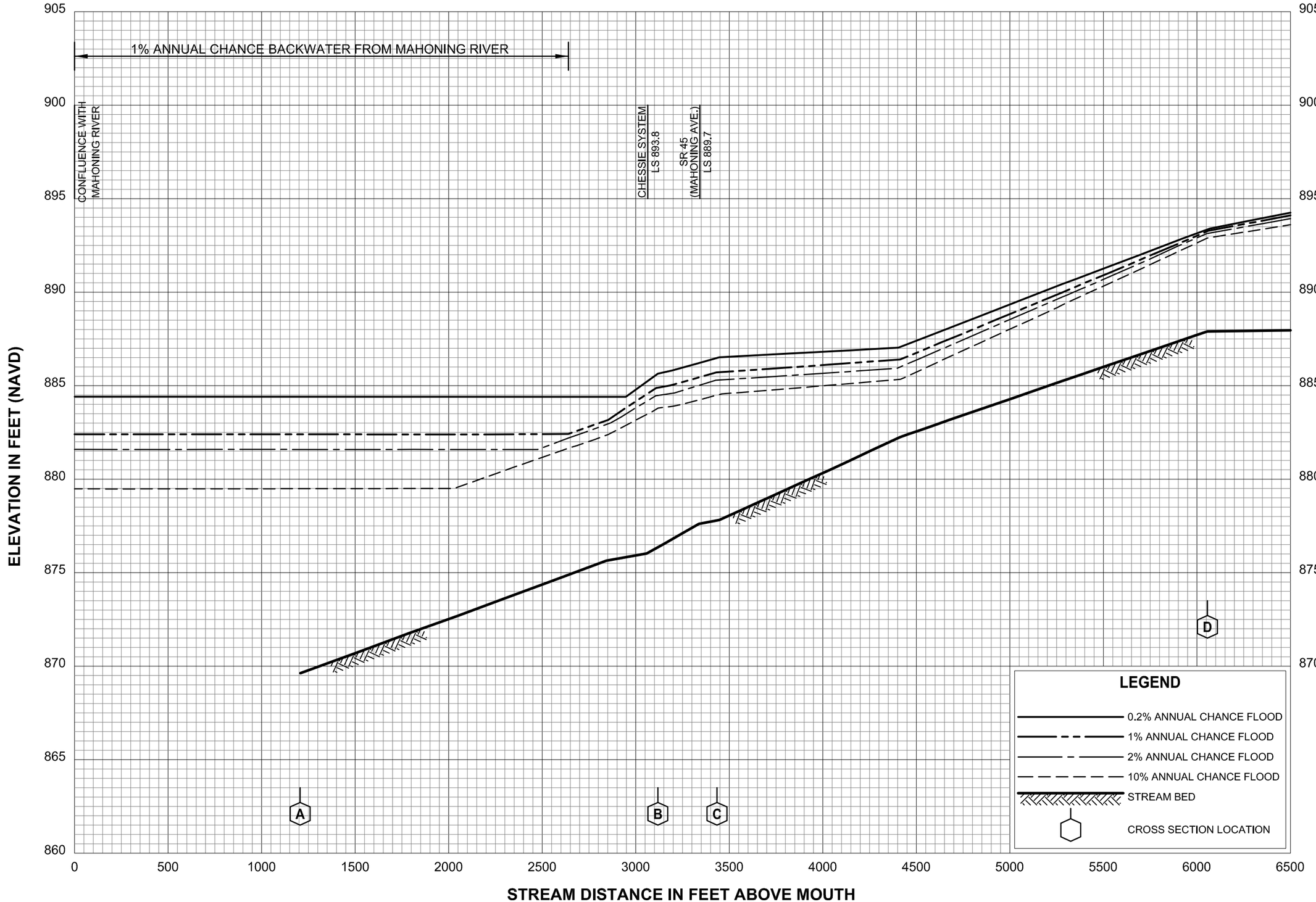
WEST BRANCH MAHONING RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

50P



FLOOD PROFILES

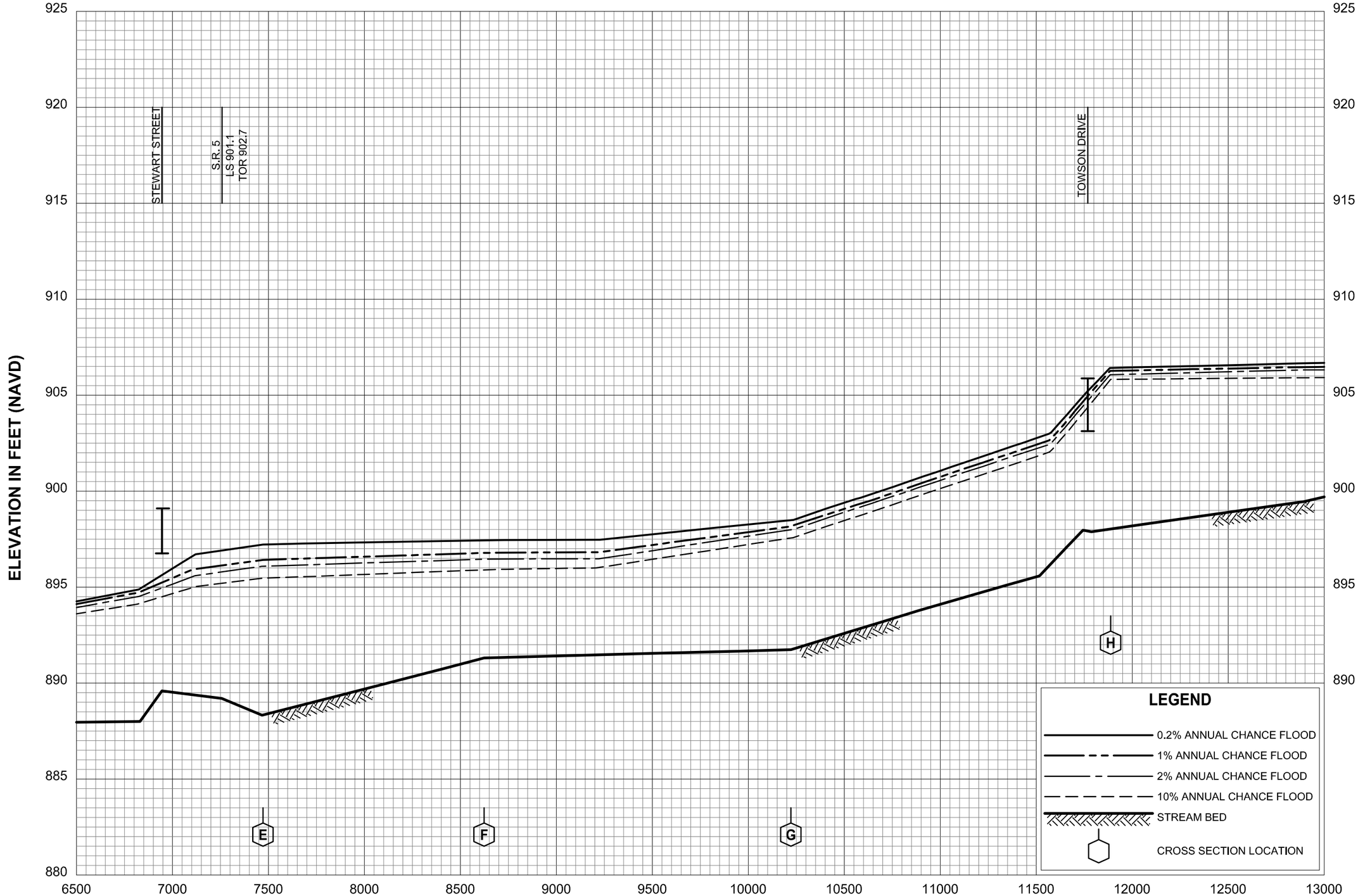
YOUNG'S RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

51P



FLOOD PROFILES

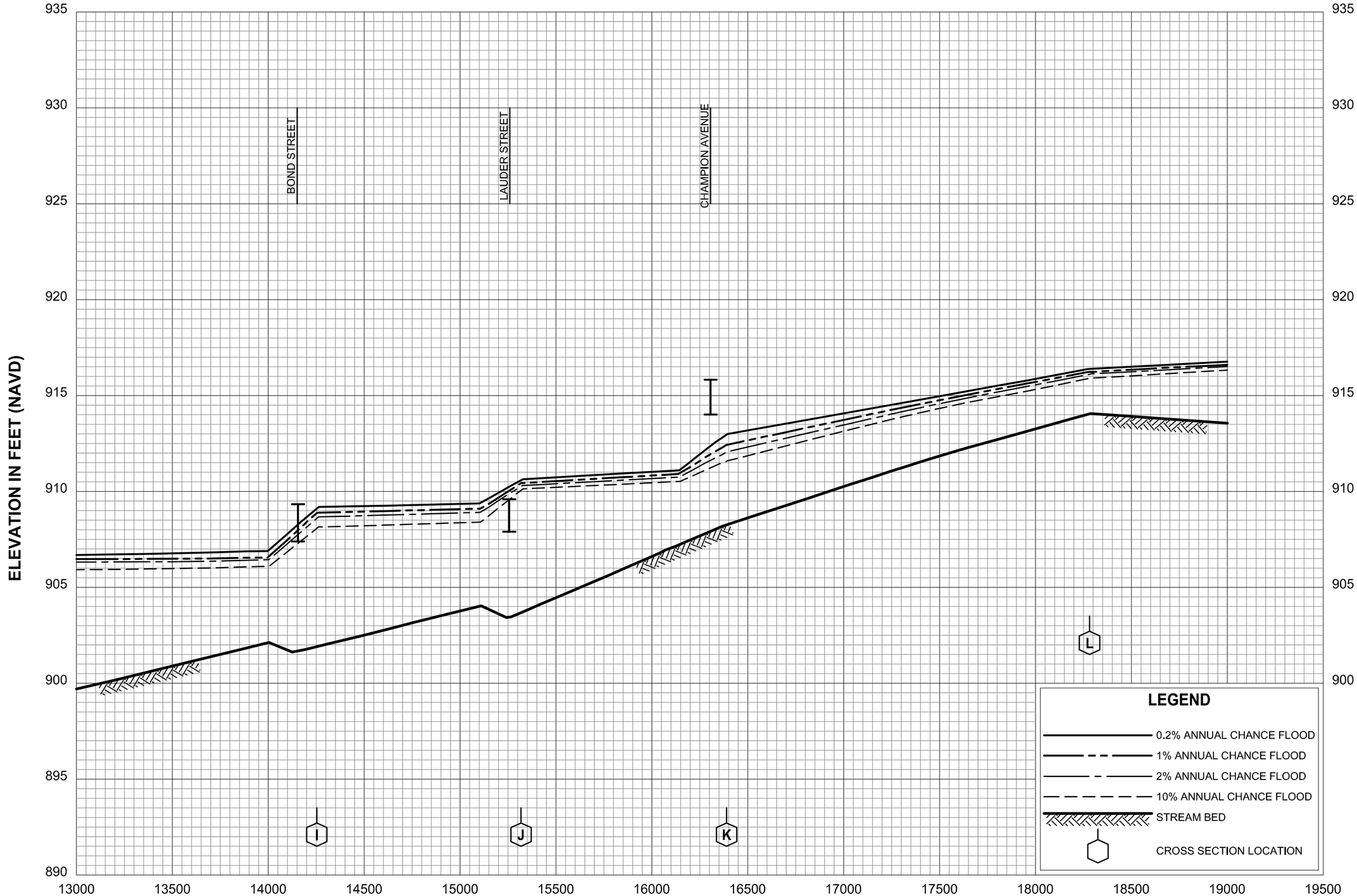
YOUNG'S RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

52P



FLOOD PROFILES

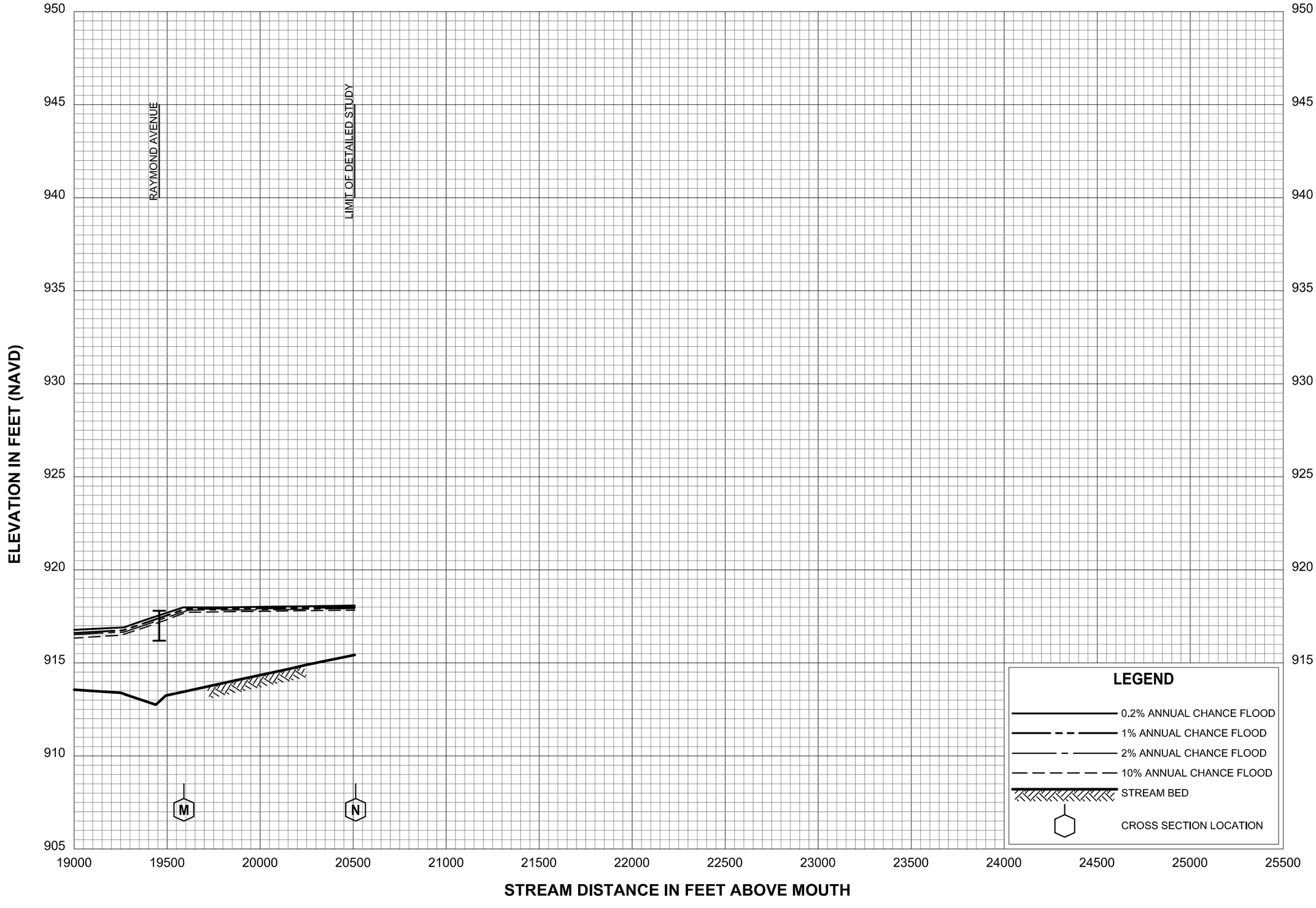
YOUNG'S RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

53P



FLOOD PROFILES

YOUNG'S RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY

TRUMBULL COUNTY, OH

AND INCORPORATED AREAS

54P