FLOOD INSURANCE STUDY

WAUSHARA COUNTY, WISCONSIN
AND INCORPORATED AREAS

Community Name	Community Number
BERLIN, CITY OF	550166
COLOMA, VILLAGE OF*	550552
HANCOCK, VILLAGE OF	550553
LOHRVILLE, VILLAGE OF	550566
PLAINFIELD, VILLAGE OF*	550559
REDGRANITE, VILLAGE OF	550508
WAUSHARA COUNTY (UNINCORPORATED AREAS)	550540
WAUTOMA, CITY OF	550506
WILD ROSE, VILLAGE OF	550507

*No Special Flood Hazard Areas Identified

Effective: June 18, 2013

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
55137CV000A

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 (LOMR) process, which does not involve republication or redistribution of the FIS report. Therefore, users should consult 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
Al through A30	AE
B	X
C	X

Initial Countywide FIS Effective Date: June 18, 2013

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FLOOD INSURANCE STUDY
WAUSHARA COUNTY, WISCONSIN AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in the geographic area of Waushara County, Wisconsin, including the Cities of Berlin and Wautoma, the Villages of Coloma, Hancock, Lohrville, Plainfield, Redgranite and Wild Rose; and the unincorporated areas of Waushara County (referred to collectively herein as Waushara County). Note that the City of Wautoma and the Villages of Coloma, Hancock, Lohrville, Plainfield, Redgranite and Wild Rose did not have previous FIS text.

Please note that the City of Berlin is geographically located in Green Lake and Waushara Counties. Only the portions located in Waushara County are shown in this FIS. See the separately published FIS reports and Flood Insurance Rate Maps (FIRMs) for flood-hazard information.

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

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

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

1.2 Authority and Acknowledgments

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

This FIS was prepared to include the unincorporated areas of, and incorporated communities within, Waushara County in a countywide format. Information on the authority and acknowledgements for each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports, is shown below:

Berlin, City of:	The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers, Chicago District, under Inter-Agency Agreement Nos. H-16-75 and H-7-76, Project Order Nos. 20 and 1, respectively. This work, which was completed in April 1976, covered all flooding sources affecting the City of Berlin.
Waushara County (Unincorporated Areas):	The hydrologic and hydraulic analyses for the Fox River and a portion of the Pine River were performed by Foth & Van Dyke and Associates, Inc., (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-86-C-2243. This study was completed in February 1988. The hydrologic and hydraulic analyses for the remaining streams were performed by the Soil Conservation Service (SCS) (References 5 and 6).

The authority and acknowledgments for the Villages of Coloma, Hancock, Lohrville, Plainfield, Redgranite and Wild Rose are not included because there were no previously printed FIS reports for that community.

For this countywide FIS all approximate areas were re-delineated by the WDNR to better fit the available contours shown on the U.S. Geological Survey (USGS) 7.5-minute Quadrangle Maps. This study was performed by the Wisconsin Department of Natural Resources (WDNR), for FEMA, under Mapping Activity Statement Contract No. WI-09-01. This work was completed in August 2011.

Base map information shown on the FIRM was derived from aerial photography dated 2010 and produced to meet 1:400 or 1:7,200 scale horizontal National Map Accuracy Standards. The projection used in the preparation of this map is Universal Transverse Mercator (UTM) Zone 16 North, and the horizontal datum used is North

American Datum 1983 (NAD 83). Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of information shown on the FIRM.

1.3 Coordination

An initial Consultation Coordination Officer (CCO) meeting is held typically with representatives of FEMA, the community and the study contractor to explain the nature and purpose of a FIS and to identify the streams to be studied or restudied. A final CCO meeting is typically held with representatives from FEMA, the community, and the study contractor to review the results of the study.

The dates of the initial and final CCO meetings held for previous FIS reports for Waushara County and its communities are listed in the following table:

Table 1 - Initial and Final CCO Meetings

Community	FIS Date	Initial Meeting	Final Meeting
Berlin, City of:	September, 1977	January, 1975	May 12, 1976
Waushara County (Unincorporated Areas):	November 6, 1991	February 11, 1986	November 13, 1990

The Villages of Coloma, Hancock, Lohrville, Plainfield, Redgranite and Wild Rose are not shown in the above tabulation because no FIS reports were ever published for those communities.

For this countywide FIS, the WDNR performed a cursory review of the previous effective FIS modeling and mapping. This information was provided at the initial countywide scoping meeting September 28, 2010. The meeting was attended by the WDNR, Waushara County, City of Wautoma, Village of Redgranite and Village of Wild Rose representatives. The results of the study were reviewed at the final CCO meeting held on December 8, 2012, and attended by representatives of City of Berlin, Village of Redgranite, City of Wautoma, and Waushara County. All problems raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS report covers the geographic area of Waushara County, Wisconsin, including the incorporated communities listed in Section 1.1.

The following streams and lakes were previously studied by detailed methods and their floodplains redelineated for this countywide FIS report:

Table 2 – Streams and Lakes Studied by Detailed Methods

Stream	Reach
Carpenter Creek	From mouth at Pine River to County Highway NN.
Fox River	Entire reach within Waushara County.
Lake Poygan	Entire Shoreline.
Little Silver Creek	From mouth to approximately 2,600 feet upstream of County Highway E.
Pine River	From mouth at Lake Poygan to approximately 2.9 miles upstream of County Highway A.
Popple Creek	From mouth at Pine River to 26th Road.
Willow Creek	From approximately 2,500 feet downstream of the Auroraville Dam to approximately 1,250 feet upstream of County Highway S.

The limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

Approximate techniques were used to map those areas having low development potential or minimal flood hazards.

For this countywide FIS, the FIS report and FIRM were converted to countywide format, and the flooding information for the entire county, including both incorporated and unincorporated areas, is shown. Also, the vertical datum was converted from the National Geodetic Vertical Datum of 1929 (NGVD) to the North American Vertical Datum of 1988 (NAVD). The projection used in the preparation of this map is UTM Zone 16 North, and the horizontal datum used is NAD 83, GRS80 Spheroid.

2.2 Community Description

Waushara County is in central Wisconsin, directly north of Madison, Wisconsin, and west of Lake Winnebago. The county is bordered on the north by Portage and Waupaca Counties, Wisconsin; on the east by Winnebago County, Wisconsin; on the south by Marquette and Green Lake Counties, Wisconsin; and on the west by Adams County, Wisconsin. The county is served by Interstate 39/U.S. Highway 51; and State Highways 21, 22, 49, 73 and 152, and Chicago and North Western railroad. The 2000 population was reported to be 23,154 (Reference 3).

The County seat of Waushara County is the City of Wautoma. The largest city in Waushara County is the City of Berlin. The 2000 census lists the population of the city as 5,305 (Reference 3).

The City of Berlin is primarily situated in the northeastern corner of Green Lake County, although a portion of the city extends into southeastern Waushara County. It is located along the Upper Fox River, approximately 30 miles upstream from the river's junction with Lake Winnebago at Oshkosh.

The climate in central Wisconsin is characterized by wide variations in temperatures. Average daily summer and winter temperatures can range from 90 degrees Fahrenheit to below zero, respectively. Annual average precipitation of this region is between 29 and 30 inches, with an average recorded snowfall of approximately 42 inches. Precipitation is normally higher in the spring and summer months (Reference 7).

The surface of Waushara County is undulating, consisting of valley bottom lands and sloping uplands. The western border of the county is a level alluvial plain. West and north of the City of Wautoma, Wisconsin, the land rises in a series of bluffs forming the divide between the waters of the Wisconsin River and those of the Wolf River. To the south and east of the City of Wautoma, the land descends to the Fox River and Lake Poygan. The altitudes range from 750 feet National Geodetic Vertical Datum of 1929 (NGVD) along the Fox River and Lake Poygan to about 1,200 feet NGVD in the western part on the divide between the Wolf and Wisconsin Rivers (Reference 7).

The principal geological formation outcropping at the surface or lying immediately beneath the surface deposits of drift and alluvium is Upper Cambrian (Potsdam) sandstone. The only other formation in the county is the granite occurring as isolated mounds and knobs in the vicinity of the Villages of Redgranite and Pine River, Wisconsin (Reference 7).

The majority of Waushara County is drained by the Fox River and its tributaries. The only exception is the far northwest section of the county, which contributes to the Wisconsin River Basin. All rivers studied in detail in this report contribute to the Fox River Basin (Reference 8).

The Fox River, which has a total drainage area of 6430 square miles, rises in Columbia County in south-central Wisconsin, just east of Portage. The river then flows northeasterly through Lakes Buffalo, Apuckawa, Butte des Morts, Winnebago, and Little Lake Butte des Morts, eventually emptying into Green Bay. That portion of the river upstream of Lake Winnebago is referred to as the Upper Fox River, while that portion below Lake Winnebago is known as the Lower Fox River.

2.3 Principal Flood Problems

Although the majority of severe flooding in Waushara County has occurred in the spring, floods have been recorded in all seasons of the year. These floods can occur

entirely from rainfall, from rainfall accompanied with snowmelt, or from snowmelt alone.

Historic floods are very dependent on basin size and characteristics. Floodings of smaller basins, such as the Pine River are characterized by high peak flows with relatively small volumes. Usually, these floods are a result of locally heavy thunderstorms. Floodings of larger basins, such as the Fox River, require higher volumes and are often related to spring rains in conjunction with snow- and ice-melt runoff.

The U.S. Geological Survey maintains a recording water- stage gage at Berlin, 1 mile upstream from the Huron Street bridge. Data collected from this gage and news-paper accounts provide the primary sources of formation on flooding within Berlin. Records from this gage, which cover a period from 1898, indicate that the maximum recorded discharge for the Fox River at Berlin is 6,900 cubic feet per second (cfs), and occurred on March 17 and 18, 1946 (Reference 9). The river stage for this flood was 15.5 feet. A stage of 15.59 feet was recorded on March 15, 1973 (Reference 9). Although the discharge for this flood was only 6,010 cfs, the stage-discharge relationship was altered by ice formations. Early U.S. Army Corps of Engineers data, a U.S. Geological Survey publication (Reference 10), indicate that a stage of 16.2 feet was reached November 1881.

General –

August 29, 1995

The Mount Morris Dam failed due to unusually heavy rainfall. Failure of the dam resulted in the flooding of Little Rattlesnake and Willow Creeks. Portions of State Highway 152 were undermined, a bridge was washed out, and a 40 ton crane and air compressor fell into the flood waters. In addition, part of the foundation of a nearby home was damaged. The ensuing flood waters forced the temporary closure of several county roads. The flood waters receded by the morning of the 31st. Total property damage was estimated at $45,000 (Reference 4).

July 16, 1997

Thunderstorms over Waushara County produced flooding rains, a brief tornado, strong winds and hail. Over five inches of rain fell in only three hours near Hancock, producing some basement and street flooding. Total property damage was estimated at $50,000 (Reference 4).

June 22, 2002

An east to west stationary front across central Wisconsin was the focus for the development of thunderstorms. Heavy rain occurred across that part of the state during the night of June 21-22 as thunderstorms trained over the area for several hours. Over 5 inches of rain fell during a 3 hour period across the affected areas. Waushara County suffered extensive damage to corn, potato, bean, carrot and pea crops. Within Waushara County, total property damage was estimated at $975,000 and total crop damage was estimated at $35 million (Reference 4).

June 12, 2004

Three to four inches of rain fell over Waushara County and the southern half of Winnebago County during the morning hours of the 11th. Many rivers in that part of the state were already swollen after weeks of much above normal rainfall. Flooding of streets and numerous homes and businesses caused the closure of downtown Wautoma. The eastern part of Waushara County experienced significant crop damage. Flooded basements were commonplace. Many residences sustained damage, including foundation damage and collapsed basements, due to water and sewage flooding basements. Two homes were destroyed, 207 had major damage and 445 had minor damage. Within Waushara County, total property damage was estimated at $876,000 and total crop damage was estimated at $20 million (Reference 4).

July 26, 2007

Thunderstorms developed northwest of an upper low over Michigan, as cold air aloft created an unstable atmosphere. A cold front later moved into Wisconsin from the west and produced additional storms. The storms produced large hail, wind damage, at least one funnel cloud and heavy rain that caused some flash flooding. As much as 4.50 inches of rain fell in about two hours around Wautoma between 7:30 and 9:30 PM. The heavy rain caused waters to rapidly rise on roads in Wautoma, temporarily closing them. Two basements also experienced flooding (Reference 4).

2.4 Flood Protection Measures

Several dams are located along the Pine River. These dams provide little or no flood protection within the community. There are no structural flood protection measures in the City of Berlin. There is an abandoned navigational lock and dam in the southwest portion of the city, but it does not provide any flood control for the city.

3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the community, standard hydrologic and hydraulic study methods were used to determine the flood-hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the

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

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

The following hydrologic analyses have not changed from the previous countywide FIS.

For the Fox River within the City of Berlin (for segments within Waushara County), flood flow frequency data were based on statistical analysis of stage-discharge records covering a 76-year period at the Berlin gaging station operated by the U.S. Geological Survey (Reference 9). This analysis followed the standard log-Pearson Type III method as outlined by the Water Resources Council (Reference 11). The 0.2-percent-annual-chance flood discharge was determined by straight-line extrapolation of a log-probability curve of flood discharges computed for frequencies up to 100 years.

The hydrologic analysis for the Fox River was completed utilizing the historic information recorded at a United States Geological Survey (USGS) streamflow gage located just downstream of the City of Berlin, Wisconsin. This gage has been in operation since January 1898. The recorded peak discharges were analyzed using the log-Pearson Type III technique with both the weighted regional skew and the station skew. The resulting discharges compared favorably with each other and with the Winnebago County Flood Insurance Study (Reference 17) after adjusting for changes in contributing drainage areas. These discharges were somewhat lower than the discharges used in the Flood Insurance Study for the City of Berlin, Wisconsin (Reference 1), a fact which can be attributed to using updated skew factors.

For Barnes Creek, Winchell Springs Creek, and its unnamed tributary, flood flow frequency data were based on a regional discharge-frequency curve developed by the U.S. Army Corps of Engineers as part of a previous Flood Plain Information Report for Clintonville, Wisconsin (Reference 19).

The hydrologic analysis for the Pine River, from its mouth at Lake Poygan to the eastern edge of Section 11, Township 19 North, Range 12 East, just downstream of Poy Sippi, was completed using regional regression equations (Reference 23). The results from this analysis were compared with peak discharges from local gaged basins, as well as with discharges computed by the SCS for portions of the Pine River upstream of the study area. All comparisons were favorable, with the resulting discharges deemed acceptable.

The hydrologic analyses for the remainder of the Pine River, Willow Creek, Carpenter Creek, Little Silver Creek, and Popple Creek were all completed using regional regression equations (Reference 23). This approach is based on the historical gage records of streams grouped in areas of similar topography.

Peak discharge-drainage area relationships for each flooding source studied in detail are shown in Table 3.

Table 3 – Summary of Discharges

		Peak Discharges (cubic feet per second)			
Flooding Source and Location	Drainage Area (square miles)	10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
CARPENTER CREEK					
At mouth	13	249	378	427	565
FOX RIVER					
At east county boundary	1,430	5,550	7,200	7,800	9,250
LITTLE SILVER CREEK					
At mouth	14	154	218	246	315
PINE RIVER					
At mouth	105	1,050	1,500	1,675	2,200
About 700 feet downstream of State Highway 49	N/A	920	1,300	1,450	1,900
Just downstream of Poy Sippi Dam	99	400	580	644	709
About 1.1 miles upstream of Poy Sippi Dam	N/A	895	1,265	1,412	1,850
About 1.1 miles upstream of 28th Court	N/A	750	1,061	1,190	1,540
Just downstream of Pine River Dam	65	538	761	854	1,105
About 1.1 miles upstream of Private Bridge No. 1	N/A	589	834	935	1,210

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
About 600 feet upstream of County Highway A	N/A	535	754	845	1,100
About 3.2 miles upstream of County Highway A	53	450	675	760	1,000
POPPLE CREEK					
At mouth	4	52	79	91	115
WILLOW CREEK					
Just downstream of State Highway 49	74	870	1,360	1,550	1,930
Just downstream of 28th Road	N/A	930	1,300	1,550	2,000

Table 3 – Summary of Discharges (Continued)

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
WILLOW CREEK (CONTINUED)					
Just upstream of Happersett Lane	N/A	700	970	1,150	1,500
About 1,200 feet upstream of County Highway S	46	600	920	1,100	1,420

Elevations for floods of the selected recurrence intervals of Lake Poygan are shown in Table 4.

Table 4 – Summary of Elevations

Flooding Source and Location	Peak Elevation (Feet NAVD) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
LAKE POYGAN				
Along shoreline	749	749.8	750.3	751

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Cross sections were obtained by field surveys. All bridge elevation and structural geometry data, as well as the channel soundings utilized in the backwater analyses of the flooding sources studied, were also obtained by field measurement. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles and on the Flood Insurance Rate Map.

Water-surface elevations for Barnes Creek and Winchell Springs Creek, of floods of the selected recurrence intervals were computed through use of the U.S. Army Corps of Engineers HEC-2 step-backwater computer program (Reference 22). Cross sections for the backwater analyses were field surveyed and were located at close intervals above and below bridges and culverts in order to compute the significant backwater effects of these structures in the highly urbanized areas.

Within the City of Berlin, inside of Waushara County, starting elevations for the Fox River were selected by trial and error, such that the computed water-surface elevations at the Berlin gage were equivalent to the values obtained from a U.S. Geological Survey rating curve at this same location (Reference 24). For the other streams, starting elevations were developed by the slope-area method.

The starting water-surface elevations for the portions of the Fox River in the unincorporated areas of Waushara County were taken from the Winnebago County Flood Insurance Study (Reference 17). The starting water-surface elevations for the lower portion of the Pine River were established using the slope-area method for elevations below the Lake Poygan flood stages. Starting water-surface elevations for Carpenter Creek, Little Silver Creek, Popple Creek and Willow Creek were computed by the SCS (References 5 and 6).

Water-surface elevations for floods of the selected recurrence intervals on the Fox River, Willow Creek, and the lower portion of the Pine River were computed using the HEC-2 step-backwater computer program (Reference 22).

Water-surface elevations for Carpenter Creek, Little Silver Creek, Popple Creek and the upper portion of the Pine River were computed using the WSP-2 step-backwater computer program (Reference 25).

Three dams along the Pine River (Saxville, Pine River and Poy Sippi) were breached utilizing the National Weather Service dam break model (Reference 26). The worst case scenario, no one able to operate the spillways (stoplogs could not be removed) causing the dams to overtop and fail, was used in the model. The failure flood was routed until the floodwaters receded to the 1-percent-annual-chance flood level and then terminated. The Auroraville dam on Willow Creek was replaced as part of upgrading State Highway 49. The new structure was breached as part of the hydraulics analysis performed by Wisconsin Department of Transportation (DOT). The results of the breach analysis are included as part of this study. The hydraulic analysis was performed utilizing the COE HEC-1 hydrology program (Reference 21).

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 2- and 1-percent-annual-chance flood elevations are close together, due to limitations of the profile scale, only the 1-percent-annual-chance profile has been shown.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

The flood elevations for the upper section of the Pine River are based on the assumption that the outlet structures for the Pine River and Poy Sippi Dams are operational and the Saxville Dam has only the top panels removed.

Roughness coefficients (Manning's "n") were estimated by field inspection at each cross section.

Table 5 – Manning's "n" Values for Detailed Study Streams

Stream	Channel "n"	Overbank "n"
Barnes Creek	0.033-0.035	0.075
Fox River (segments within the City of Berlin, inside of Waushara County)	0.033-0.035	0.075
Fox River	0.03	0.07-0.1
Pine River	0.35	0.08-0.12
Winchell Springs Creek	0.033-0.035	0.075

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

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD88. This may result in differences in Base Flood Elevations (BFEs) across the corporate limits between the communities. Some of the data used in this study were taken from the prior effective FIS reports and adjusted to NAVD88. The average conversion factor that was used to convert the data in this FIS report to NAVD88 was calculated using the WISCON program (Reference 18). The data points used to determine the conversion are listed in Table 6.

Vertical Datum Conversion: NGVD - 0.1 = NAVD

Table 6 - Vertical Datum Conversion

Quad Name	Corner	Latitude	Longitude	Conversion from NGVD to NAVD (feet)
Auroraville	NE	44.125	88.875	-0.08
Berlin	NE	44	88.875	-0.08
Coloma	NE	44.125	89.5	-0.04
Coloma NW	NE	44.25	89.625	-0.05
Coloma SW	NE	44.125	89.625	-0.06
Fairburn	NE	44	89	-0.08
Germania	NE	44	89.25	-0.09
Grand Marsh	NE	44	89.625	-0.04
Hancock	NE	44.25	89.5	-0.05
Neshkoro	NE	44	89.125	-0.09

Table 6 - Vertical Datum Conversion (Continued)

Quad Name	Corner	Latitude	Longitude	Conversion from NGVD to NAVD (feet)
Plainfield	NE	44.25	89.375	-0.03
Poy Sippi	NE	44.25	88.875	-0.07
Redgranite	NE	44.125	89	-0.07
Richford	NE	44.125	89.375	-0.05
Saxeville	NE	44.25	89	-0.06
Spring Lake	NE	44.125	89.125	-0.06
Wautoma	NE	44.125	89.25	-0.07
Wautoma NE	NE	44.25	89.25	-0.05
Westfield East	NE	44	89.375	-0.09
Westfield West	NE	44	89.5	-0.07
Wild Rose	NE	44.25	89.125	-0.05
			Average	-0.1

For additional information regarding conversion between NGVD and NAVD, visit the NGS website at www.ngs.noaa.gov, or contact the NGS at the following address:

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this community.

Interested individuals may contact FEMA to access these data.

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance 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.

Detailed studies were delineated on 5-, 10- and 20- foot interval contours shown on the USGS 7.5-minute quadrangle maps (Reference 14).

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

For areas mapped by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2). Floodplain boundaries have been delineated using USGS 7.5-minute quadrangle maps with 5-, 10- and 20- foot intervals (Reference 18).

4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies. However, the WDNR has established a policy that requires a 0.0 foot surcharge except for the waterways which were redelineated, where the surcharge from the effective study remains valid (Reference 20).

The floodways presented in this FIS report and on the FIRM were computed at representative cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections (Table 7). 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.

In the redelineation efforts, the floodways were not recalculated. As a result, there were areas where the previous floodway did not fit within the boundaries of the redelineated 1-percent-annual chance floodplain. In these areas, the floodway was reduced to coincide with the 1-percent-annual chance floodplain. 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 the hydraulic methods can be seen in Table 7. The width of the floodway depicted by the FIRM panels and the amount of reduction to fit the floodway inside the 1-percent annual chance floodplain, if necessary, is also listed.

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
CARPENTER CREEK									
A	1,278	249	689	0.6	0	796.1	796.1	796.1	0.0
B	3,473	219	410	1.0	0	802.8	802.8	802.8	0.0
FOX RIVER									
A	432,603	833[2]	6,399	1.2	0	755.9	755.9	755.9	0.0
B	434,916	655	5,837	1.3	0	755.9	755.9	755.9	0.0
C	438,118	618	5,769	1.3	0	756.1	756.1	756.1	0.0
D	439,939	679	6,162	1.3	0	756.2	756.2	756.2	0.0
E	442,263	1,677	10,068	0.8	0	756.3	756.3	756.3	0.0
F	444,918	1,583	7,960	1.0	0	756.5	756.5	756.5	0.0
G	447,578	1,750	1,750	0.7	0	756.7	756.7	756.7	0.0
H	449,143	973	5,120	1.5	0	756.8	756.8	756.8	0.0

[1]Feet above mouth
[2]This width extends beyond county boundary

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI
AND INCORPORATED AREAS

FLOODWAY DATA

CARPENTER CREEK – FOX RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
LITTLE SILVER CREEK									
A	287	283	1,093	0.2	0	789.3	789.3	789.3	0.0
B	2,986	256	872	0.3	0	793.2	793.2	793.2	0.0
C	4,429	252	602	0.4	0	795.1	795.1	795.1	0.0
D	6,748	257	671	0.4	59	798.5	798.5	798.5	0.0
E	8,715	179	387	0.6	0	802.1	802.1	802.1	0.0
F	9,254	230	458	0.5	0	803.0	803.0	803.0	0.0
PINE RIVER									
A	8,500	1,618	4,526	0.4	0	750.3	750.3	750.3	0.0
B	9,796	1,655	2,498	0.7	0	750.9	750.9	750.9	0.0
C	12,263	1,668	2,552	0.7	0	752.4	752.4	752.4	0.0
D	14,539	996	1,302	1.3	0	753.9	753.9	753.9	0.0
E	16,147	917	783	2.1	0	754.7	754.7	754.7	0.0
F	18,424	767	1,538	1.1	31	757.4	757.4	757.4	0.0
G	20,391	1,024	2,053	0.8	0	758.1	758.1	758.1	0.0
H	22,555	911	628	2.7	57	759.2	759.2	759.2	0.0
I	25,914	1,075	665	1.9	0	763.5	761.9[2]	761.9	0.0
J	30,110	630	901	1.6	371	767	764.4[2]	764.4	0.0

[1]Feet above mouth

[2]Elevations without considering effect from dam break

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI
AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE SILVER CREEK – PINE RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
PINE RIVER (CONTINUED)									
K	32,604	505	1,244	1.7	0	768.0	765.3[2]	765.3	0.0
L	33,795	581	1,520	1.7	0	768.3	765.7[2]	765.7	0.0
M	35,609	700	700	2.1	138	770.1	767.3[2]	767.3	0.0
N	36,645	163	716	3.0	0	771.0	768.2[2]	768.2	0.0
O	37,518	114	672	1.2	0	775.0	769.7[2]	769.7	0.0
P	38,531	191	979	1.4	0	778.1	775.4[2]	775.4	0.0
Q	40,312	379	1,397	1.0	0	778.1	775.5[2]	775.5	0.0
R	42,303	216	755	1.9	0	778.2	775.8[2]	775.8	0.0
S	43,600	369	877	1.6	0	778.2	776.2[2]	776.2	0.0
T	45,483	857	1,548	0.9	0	778.4	777.0[2]	777.0	0.0
U	48,993	984	2,292	0.6	0	780.2	779. 7[2]	779.7	0.0
V	51,235	607	1,951	0.7	0	781.2	781.0[2]	781.0	0.0
W	54,693	814	1,784	0.8	0	783.1	783.0[2]	783.0	0.0
X	58,213	1,040	2,031	0.7	0	785.6	785.5[2]	785.5	0.0
Y	60,228	223	982	1.4	0	787.0	787.0	787.0	0.0
Z	62,447	250	893	1.6	113	788.9	788.9	788.9	0.0
AA	63,810	713	1,713	0.7	0	789.8	789.8	789.8	0.0
AB	66,476	578	2,154	0.6	0	790.6	790.6	790.6	0.0
AC	69,377	169	806	1.5	0	792.4	792.3[2]	792.3	0.0

[1]Feet above mouth
[2]Elevations without considering effect from dam break

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI AND INCORPORATED AREAS

FLOODWAY DATA

PINE RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
PINE RIVER (CONTINUED)									
AD	70,989	426	1,203	0.8	0	793.0	792.9[2]	792.9	0.0
AE	73,935	112	403	2.3	0	798.5	797.3[2]	797.3	0.0
AF	74,787	37	155	5.5	0	805.2	800.0[2]	800.0	0.0
AG	75,996	81	307	3.1	0	809.1	807.9[2]	807.9	0.0
AH	77,301	256	436	2.2	0	810.5	809.9[2]	809.9	0.0
AI	80,543	387	766	1.2	0	814.6	814.5[2]	814.5	0.0
AJ	84,398	285	953	1.0	69	817.6	817.6	817.6	0.0
AK	86,975	524	1,406	0.7	0	818.2	818.2	818.2	0.0
AL	90,201	410	554	1.7	0	820.3	820.3	820.3	0.0
AM	93,365	463	856	1.1	0	822.6	822.2[2]	822.2	0.0
AN	95,795	133	434	2.2	0	825.1	824.1[2]	824.1	0.0
AO	98,385	78	374	2.3	0	826.4	825.0[2]	825.0	0.0
AP	100,039	679	1,143	0.7	0	835.2	835.2	835.2	0.0
AQ	101,456	277	600	1.4	0	835.4	835.4	835.4	0.0
AR	103,025	100	423	2.0	0	839.2	839.2	839.2	0.0
AS	104,190	159	242	3.5	80	848.0	848.0	848.0	0.0
AT	104,979	237	498	1.7	0	852.3	852.3	852.3	0.0
AU	105,927	333	677	1.3	0	854.5	854.5	854.5	0.0
AV	106,532	373	648	1.3	0	855.4	855.4	855.4	0.0

[1]Feet above mouth
[2]Elevations without considering effect from dam break

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI AND INCORPORATED AREAS

FLOODWAY DATA

PINE RIVER

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
PINE RIVER (CONTINUED)									
AW	107,877	568	1,135	0.7	198	856.9	856.9	856.9	0.0
AX	114,220	790	1,425	0.6	0	860.7	860.7	860.7	0.0
AY	120,274	868	1,674	0.5	0	864.9	864.9	864.9	0.0
AZ	121,288	1,000	1,905	0.4	0	866.1	866.1	866.1	0.0
POPPLE CREEK									
A	361	137	442	0.2	0	827.6	827.6	827.6	0.0
B	961	72	115	0.8	0	828.2	828.2	828.2	0.0
C	1,466	134	173	0.5	27	834.4	834.4	834.4	0.0
D	2,239	30	43	2.1	0	840.2	840.2	840.2	0.0
WILLOW CREEK									
A	42,200[2]	549	1,096	3.1	0	759.6	757.7[3]	757.7	0.0
B	43,491[2]	560	1,588	1.9	0	760.7	758.5[3]	758.5	0.0
C	44,822[2]	340	628	2.5	0	764.6	764.6	764.6	0.0
D	49,000[2]	2,006	5,557	0.4	0	764.9	764.9	764.9	0.0
E	55,341[2]	482	2,494	1.6	0	769.7	769.7	769.7	0.0

[1]Feet above mouth
[2]Feet above County Highway D
[3]Elevations without considering effect from dam break

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI AND INCORPORATED AREAS

FLOODWAY DATA

PINE RIVER – POPPLE CREEK – WILLOW CREEK

FLOODING SOURCE		FLOODWAY				1-PERCENT-ANNUAL-CHANCE-FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY (FEET NAVD)	WITHOUT FLOODWAY (FEET NAVD)	WITH FLOODWAY (FEET NAVD)	INCREASE (FEET)
WILLOW CREEK (CONTINUED)									
F	58,728	507	2,108	2.0	0	770.1	770.1	770.1	0.0
G	62,018	704	1,355	3.2	0	770.9	770.9	770.9	0.0
H	67,295	720	3,454	1.4	0	773.4	773.4	773.4	0.0
I	70,615	2,450	6,343	0.7	0	773.6	773.6	773.6	0.0
J	74,534	2,425	3,358	1.4	0	773.8	773.8	773.8	0.0
K	75,434	2,750	1,944	2.7	33	774.2	774.2	774.2	0.0
L	78,313	2,033	2,192	2.2	0	776.6	776.6	776.6	0.0
M	81,095	893	1,100	4.1	0	778.9	778.9	778.9	0.0
N	84,401	379	719	1.6	0	782.4	782.4	782.4	0.0
O	84,708	499	1,288	0.9	0	784.3	784.3	784.3	0.0
P	91,814	549	1,490	2.4	0	785.8	785.8	785.8	0.0
Q	95,189	370	1,948	1.7	44	792.1	792.1	792.1	0.0
R	96,852	504	2,822	1.2	91	792.2	792.2	792.2	0.0
S	99,050	412	1,880	1.7	185	792.3	792.3	792.3	0.0
T	100,927	199	766	3.4	0	792.6	792.6	792.6	0.0
U	103,548	307	848	3.2	0	794.3	794.3	794.3	0.0
V	105,230	495	2,339	1.5	57	799.7	799.7	799.7	0.0
W	106,286	243	1,271	1.9	29	799.8	799.8	799.8	0.0

[1]Feet above County Highway D

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI
AND INCORPORATED AREAS

FLOODWAY DATA

WILLOW CREEK

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 (WSEL) of the 1-percent-annual-chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

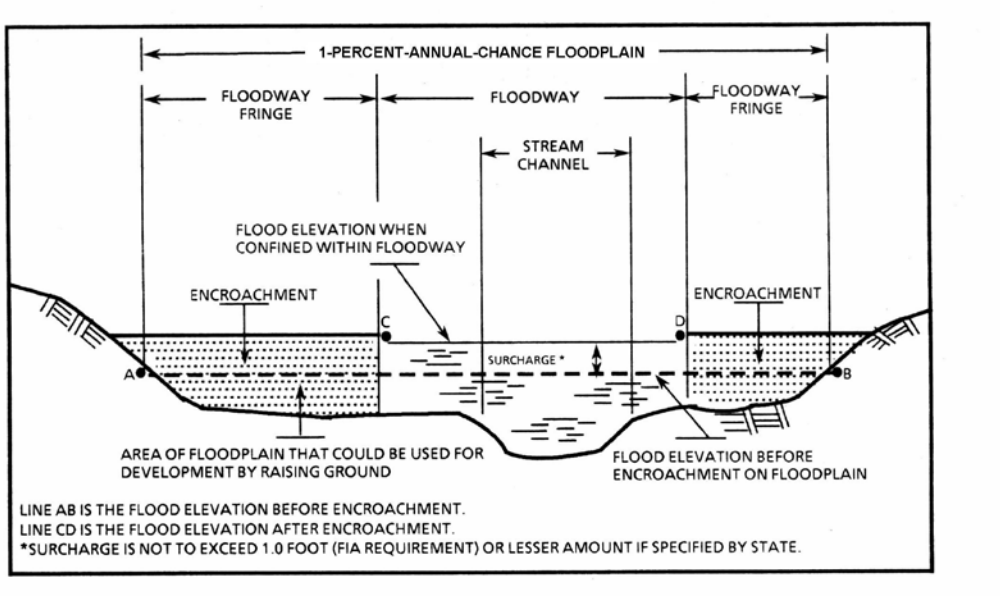

Figure 1 - Floodway Schematic

5.0 INSURANCE APPLICATION

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

Zone A

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

Zone AE

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

Zone X

Zone X is the flood insurance risk zone that corresponds to areas outside the

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

6.0 FLOOD INSURANCE RATE MAP

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

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot 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 countywide FIRM presents flooding information for the entire geographic area of Waushara County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps, where applicable. Historical data relating to the maps prepared for each community are presented in Table 8.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE	FIRM EFFECTIVE DATE	FIRM REVISION DATE
Berlin, City of	January 16, 1974	July 9, 1976	September 30, 1977	None
*Coloma, Village of	N/A	None	N/A	None
Hancock, Village of	June 18, 2013	None	June 18, 2013	None
Lohrville, Village of	June 18, 2013	None	June 18, 2013	None
*Plainfield, Village of	N/A	None	N/A	None
Redgranite, Village of	May 17, 1974	May 28, 1976	June 18, 2013	None
Waushara County (Unincorporated Areas)	June 17, 1977	None	November 6, 1991	None
Wautoma, City of	May 17, 1974	March 14, 1975	June 18, 2013	None
Wild Rose, Village of	May 31, 1974	June 4, 1976	September 30, 1988	None

*No Special Flood Hazard Areas Identified

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Flood Insurance Studies (FISs) have been prepared for Adams County and Incorporated Areas (Reference 12), Green Lake County and Incorporated Areas (Reference 13), Portage County and Incorporated Areas (Reference 15), Waupaca County and Incorporated Areas (Reference 16) and Winnebago County and Incorporated Areas (Reference 17). The FIS for Marquette County and Incorporated Areas (Reference 14) is in the process of being revised.

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

8.0 LOCATION OF DATA

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

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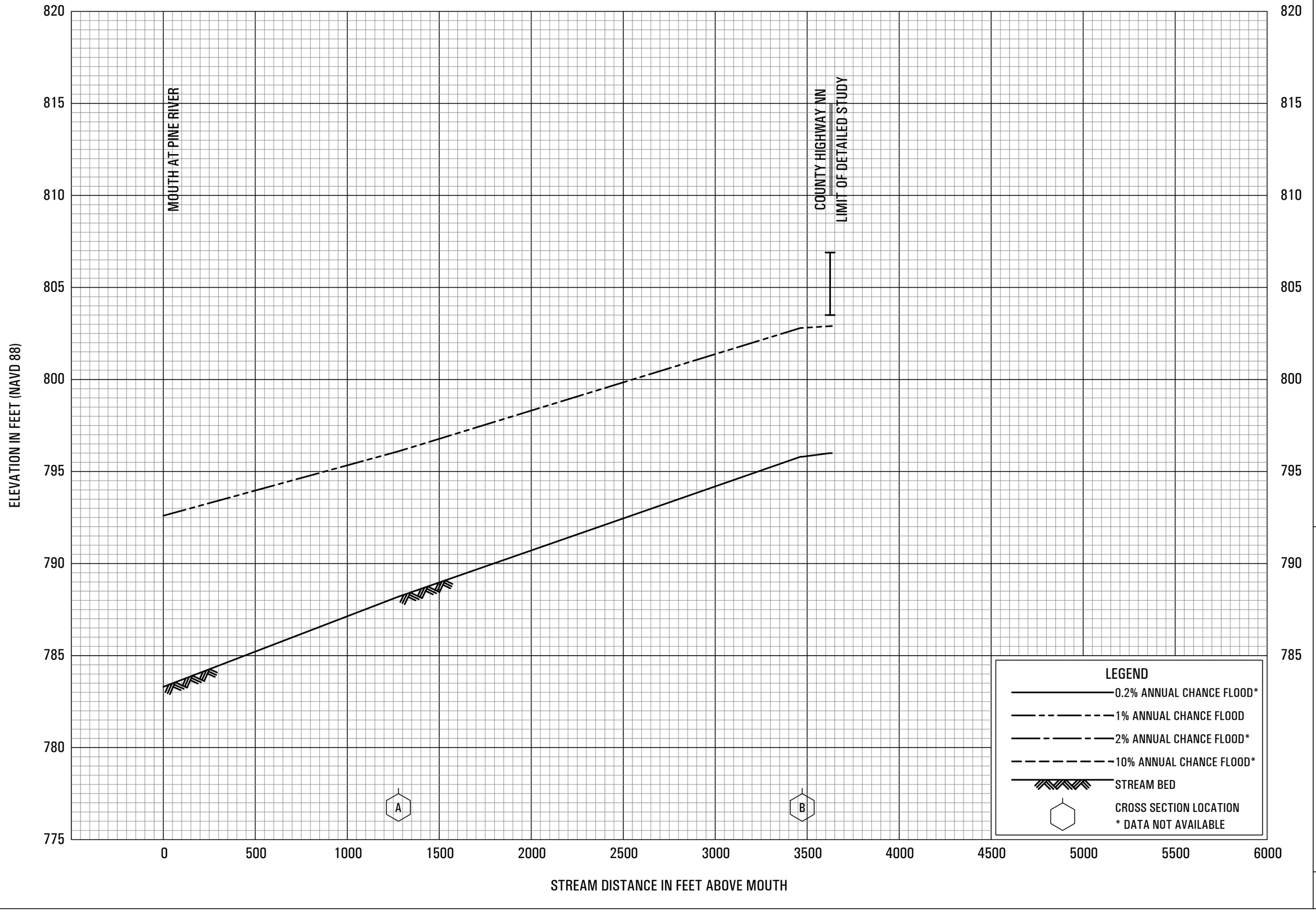


FLOOD PROFILES

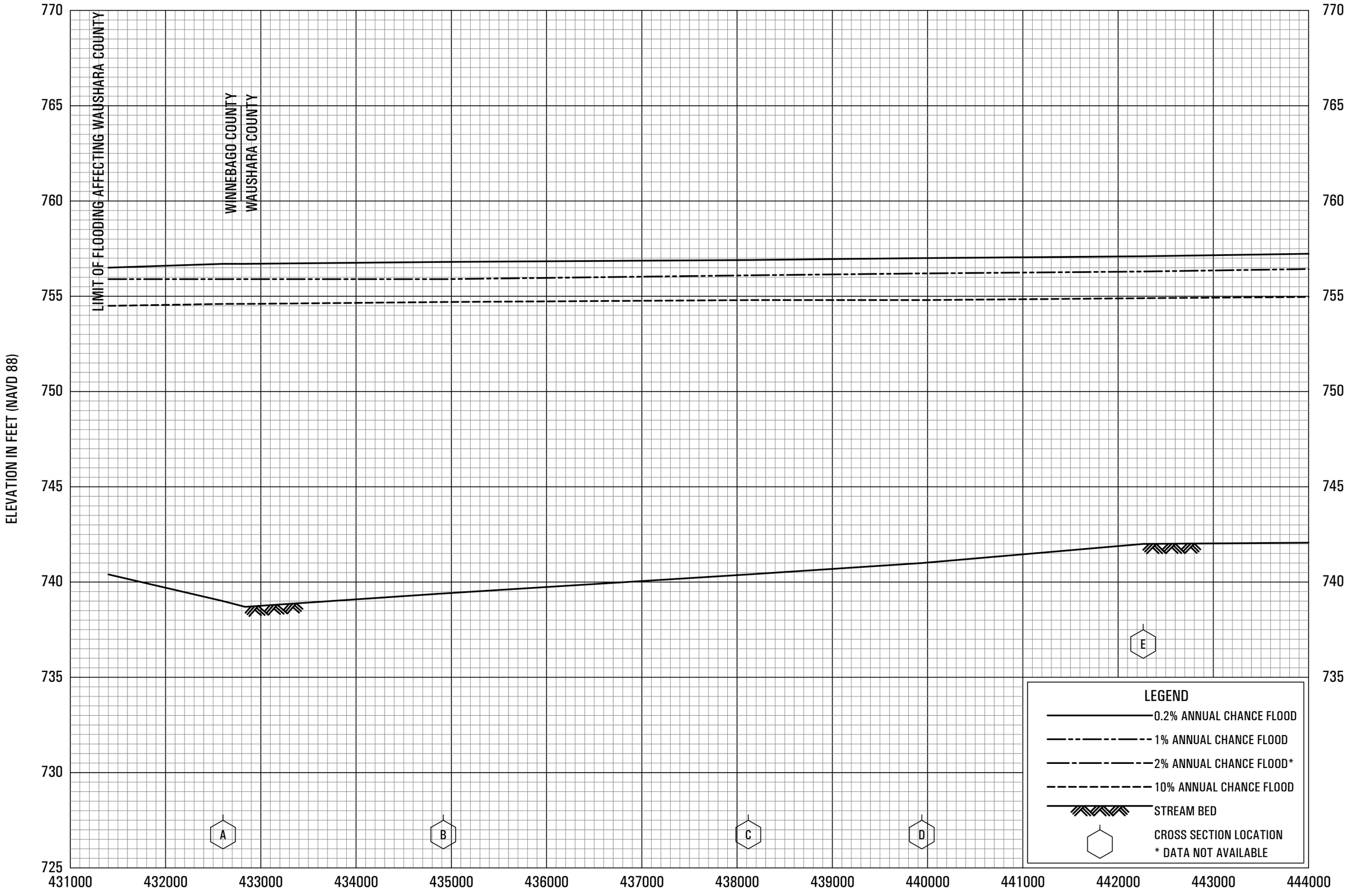
CARPENTER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

01P



FLOOD PROFILES

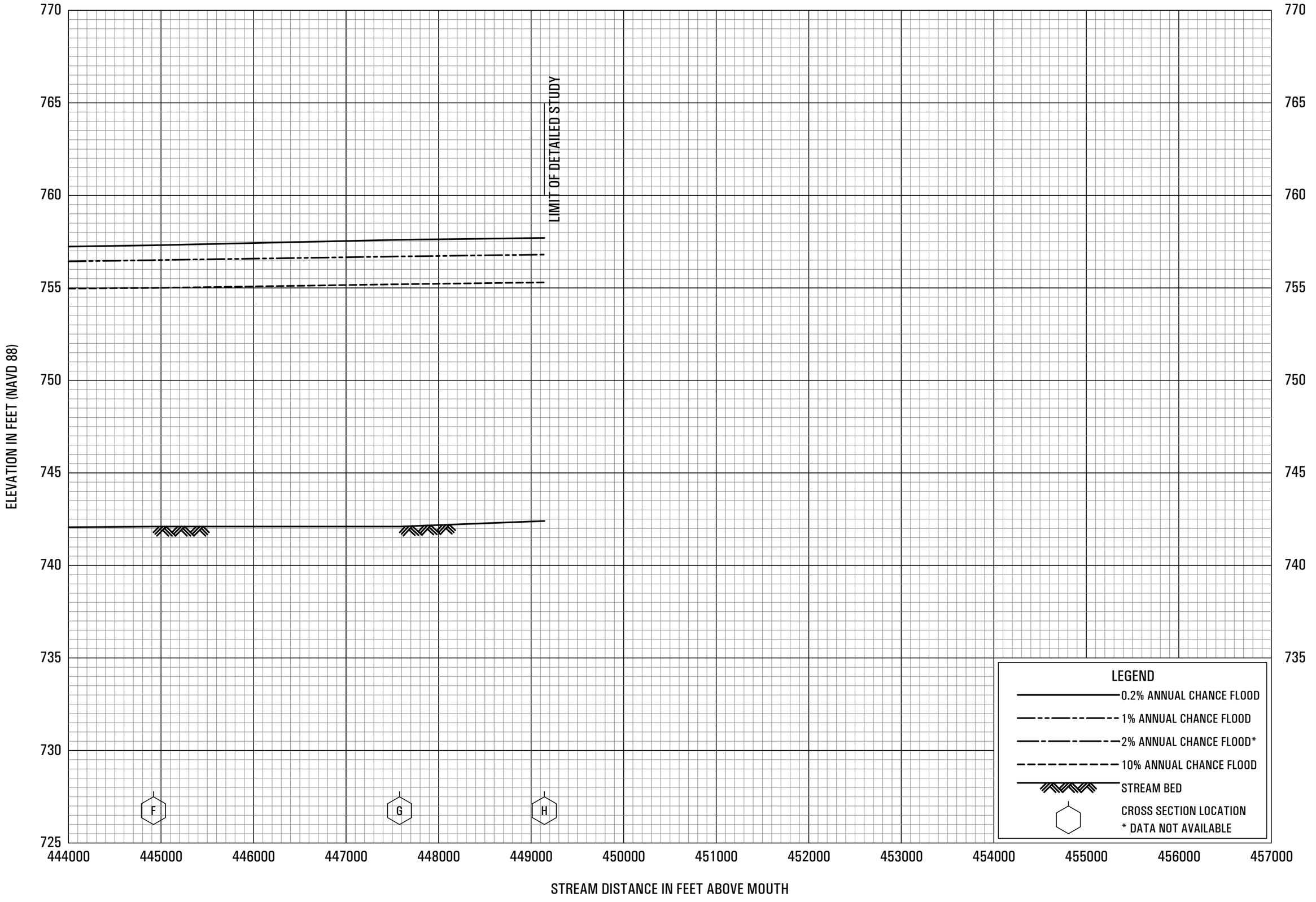
FOX RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

02P



FLOOD PROFILES

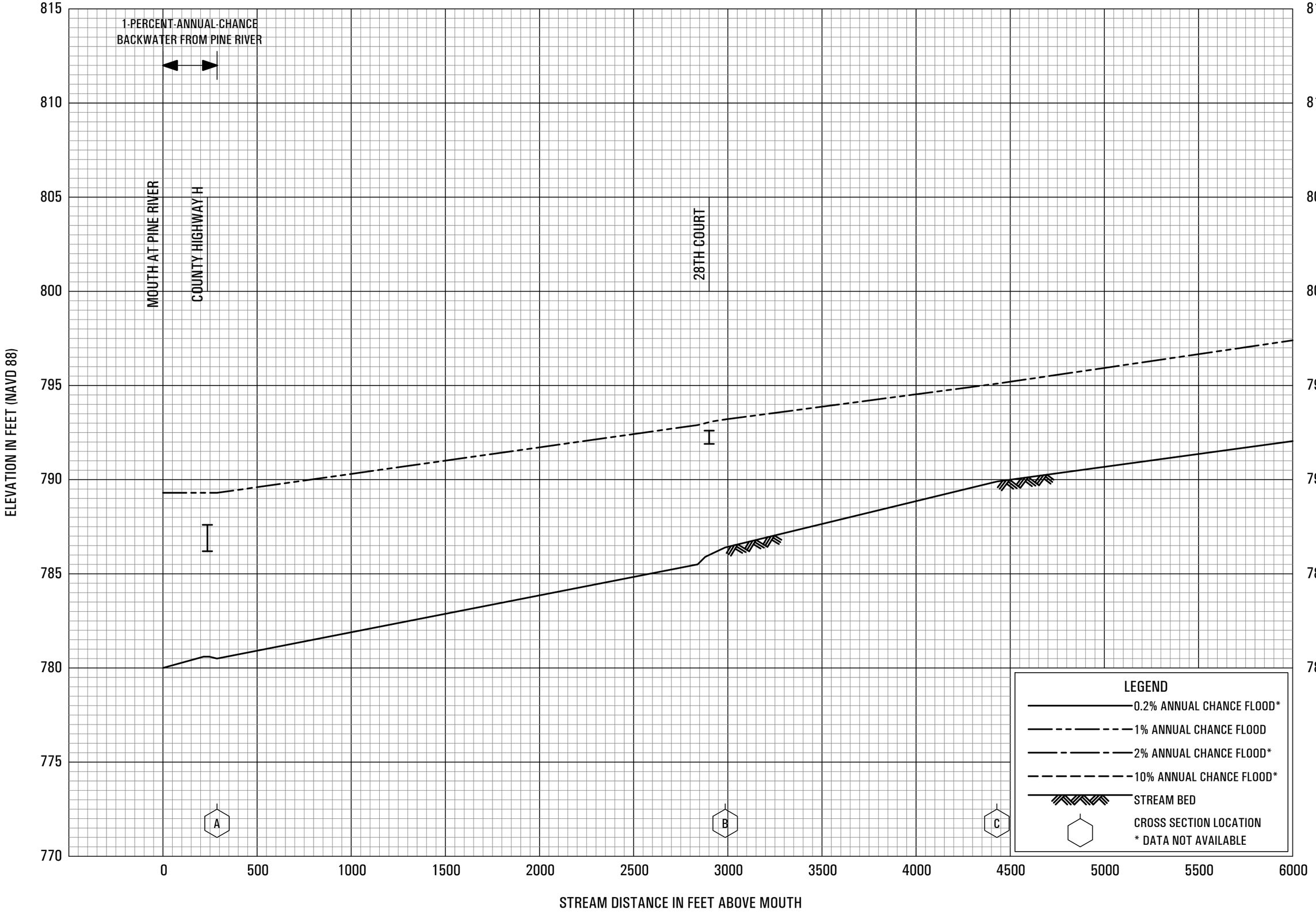
FOX RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

03P



FLOOD PROFILES

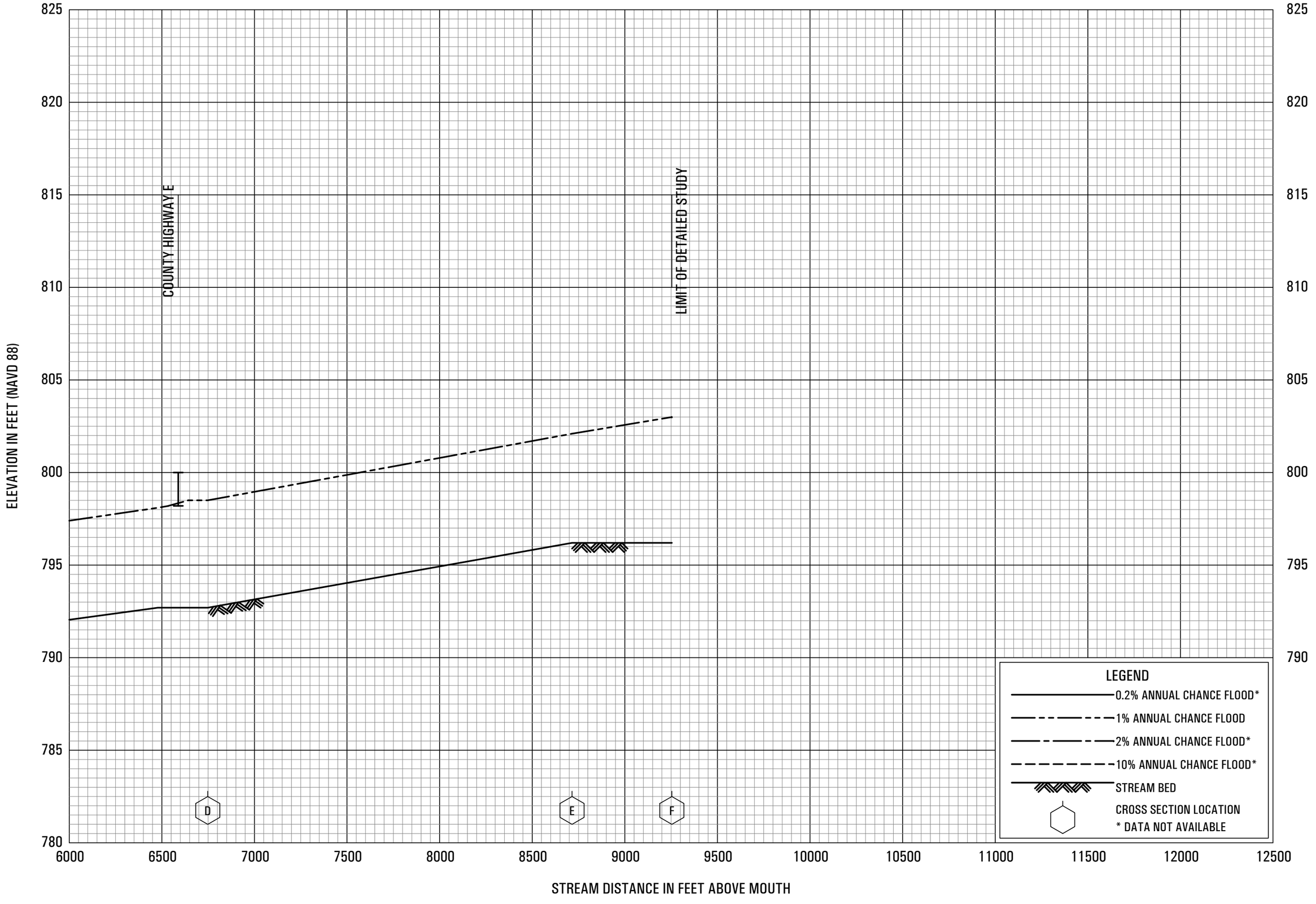
LITTLE SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

04P



FLOOD PROFILES

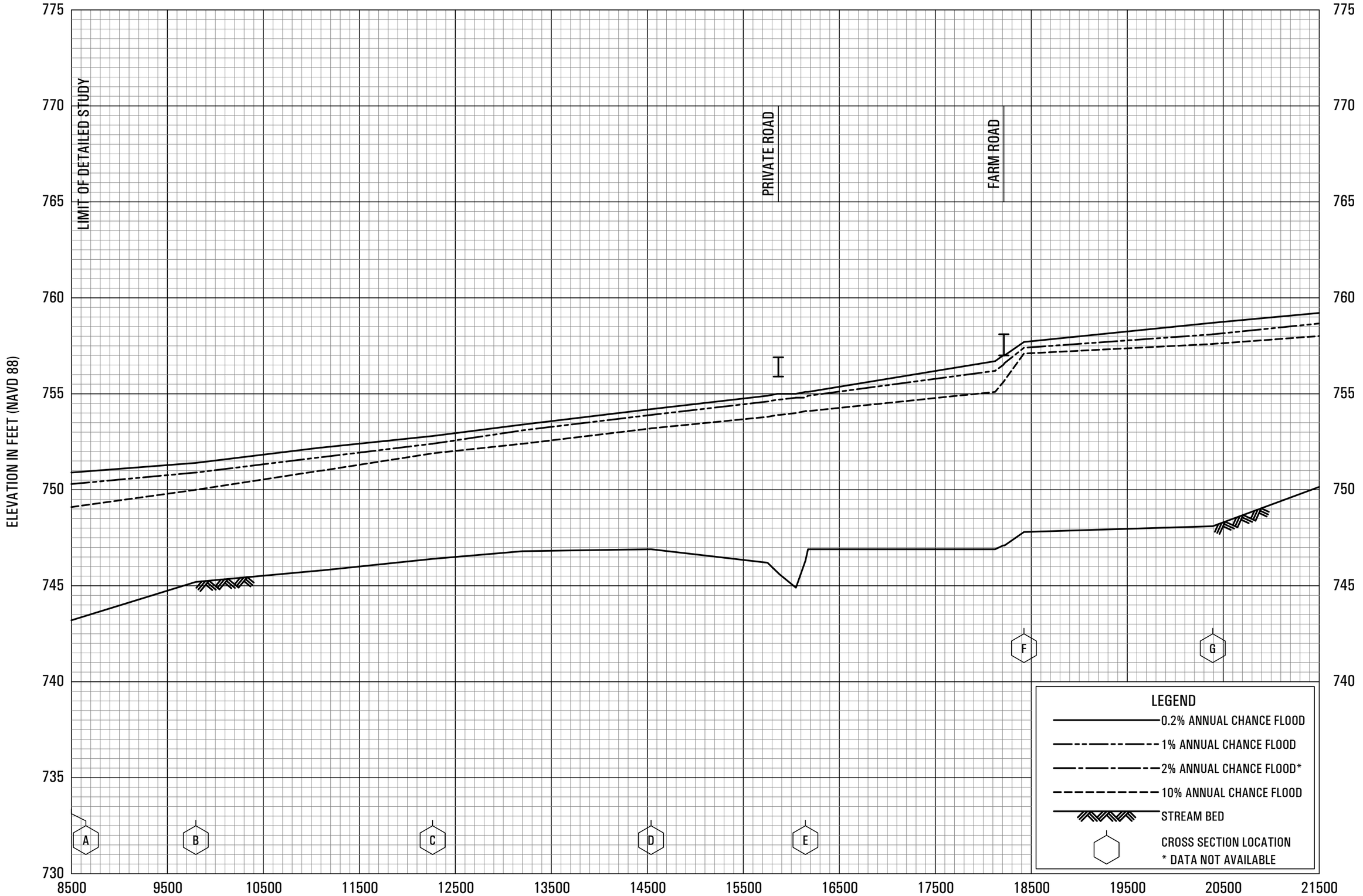
LITTLE SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

05P



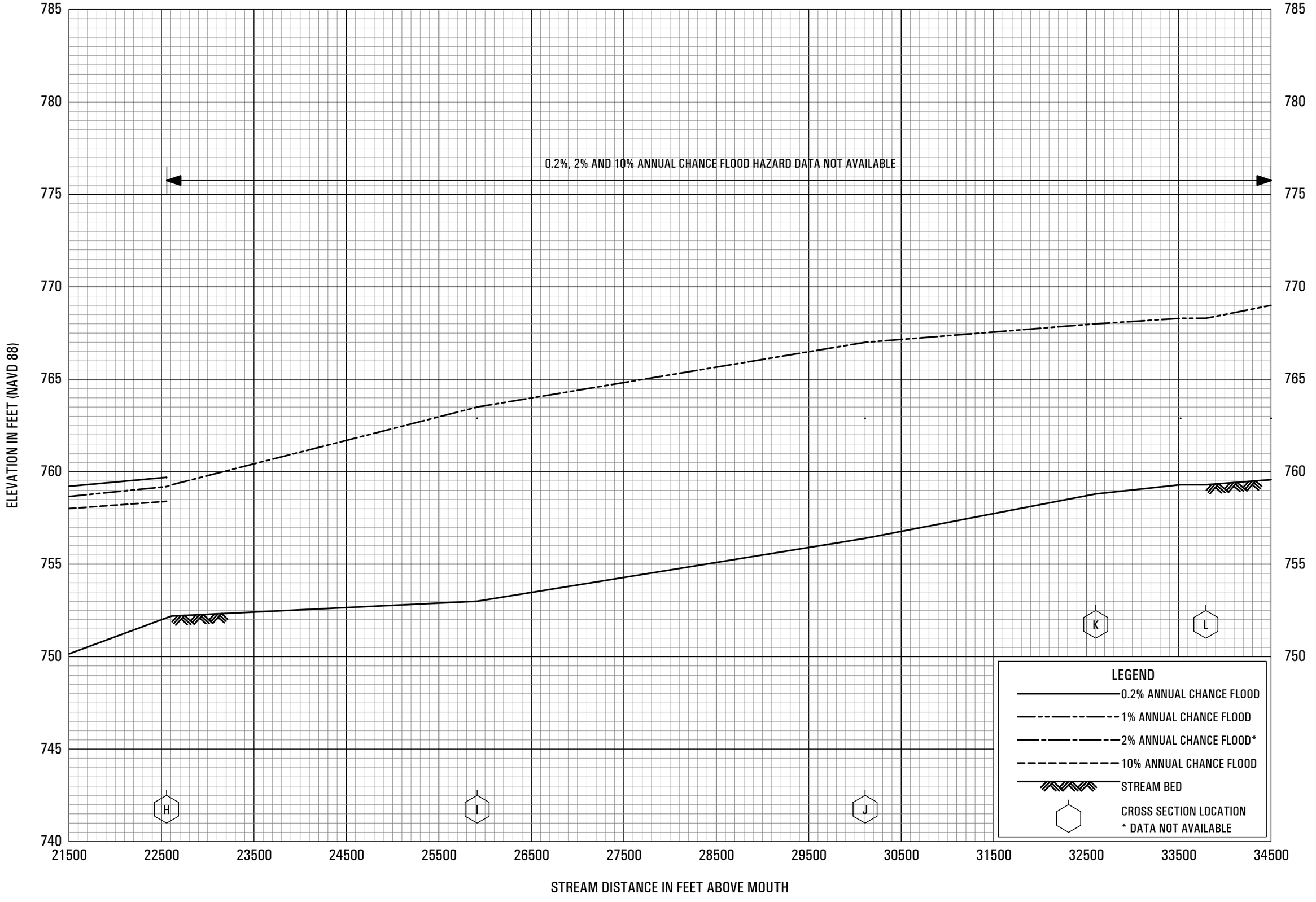
FLOOD PROFILES

PINE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

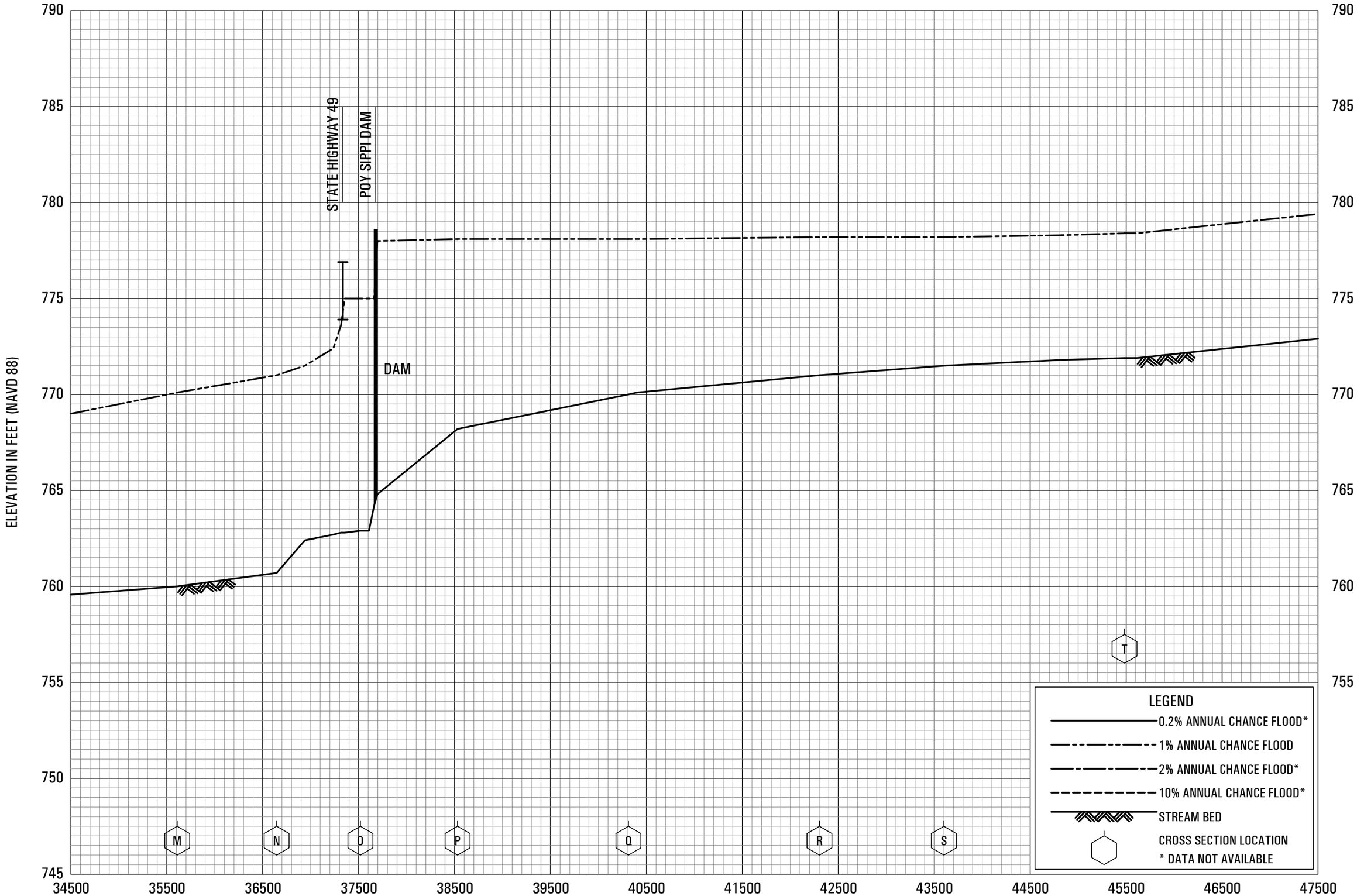


FLOOD PROFILES

PINE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI
AND INCORPORATED AREAS



FLOOD PROFILES

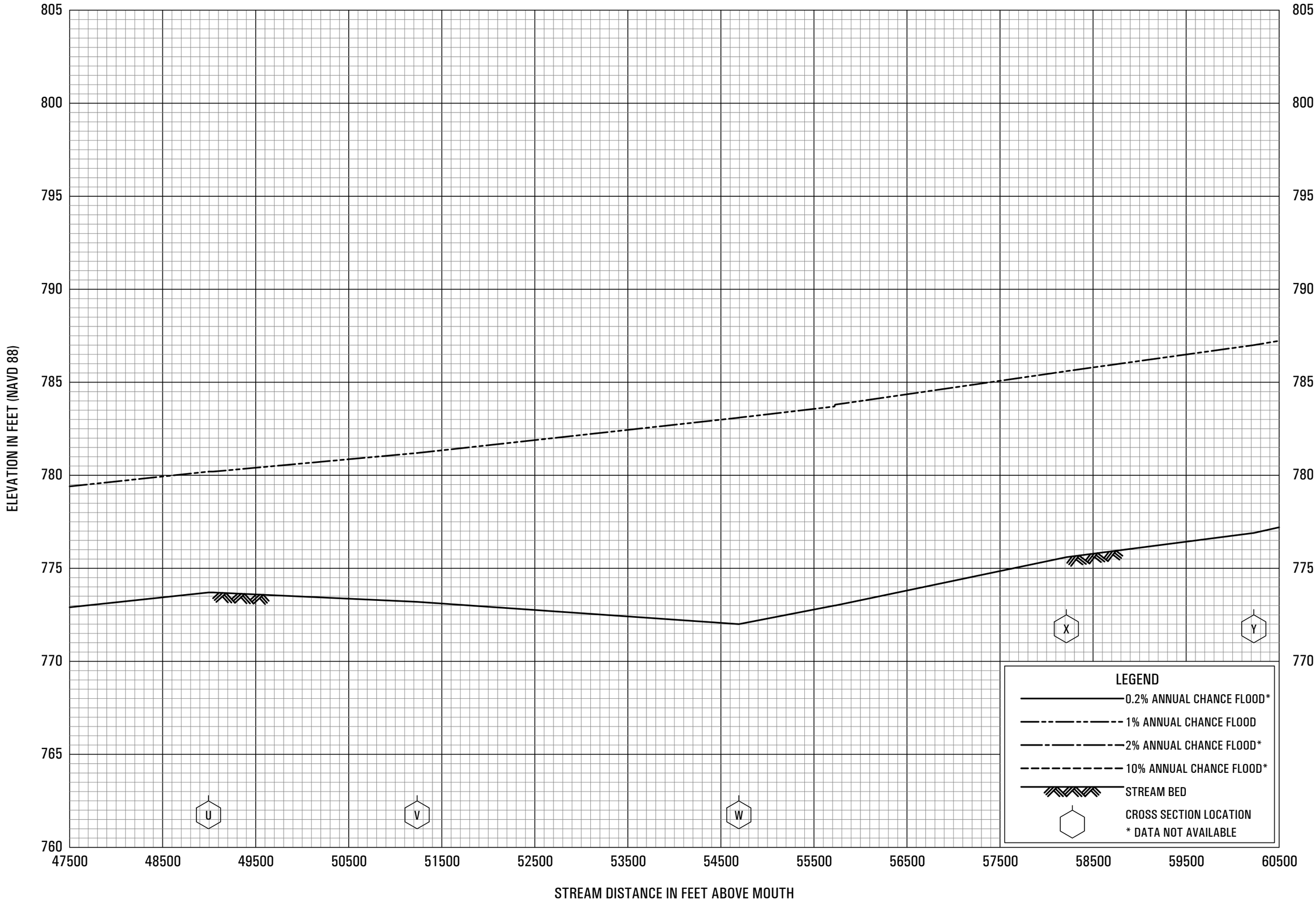
PINE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

08P



FLOOD PROFILES

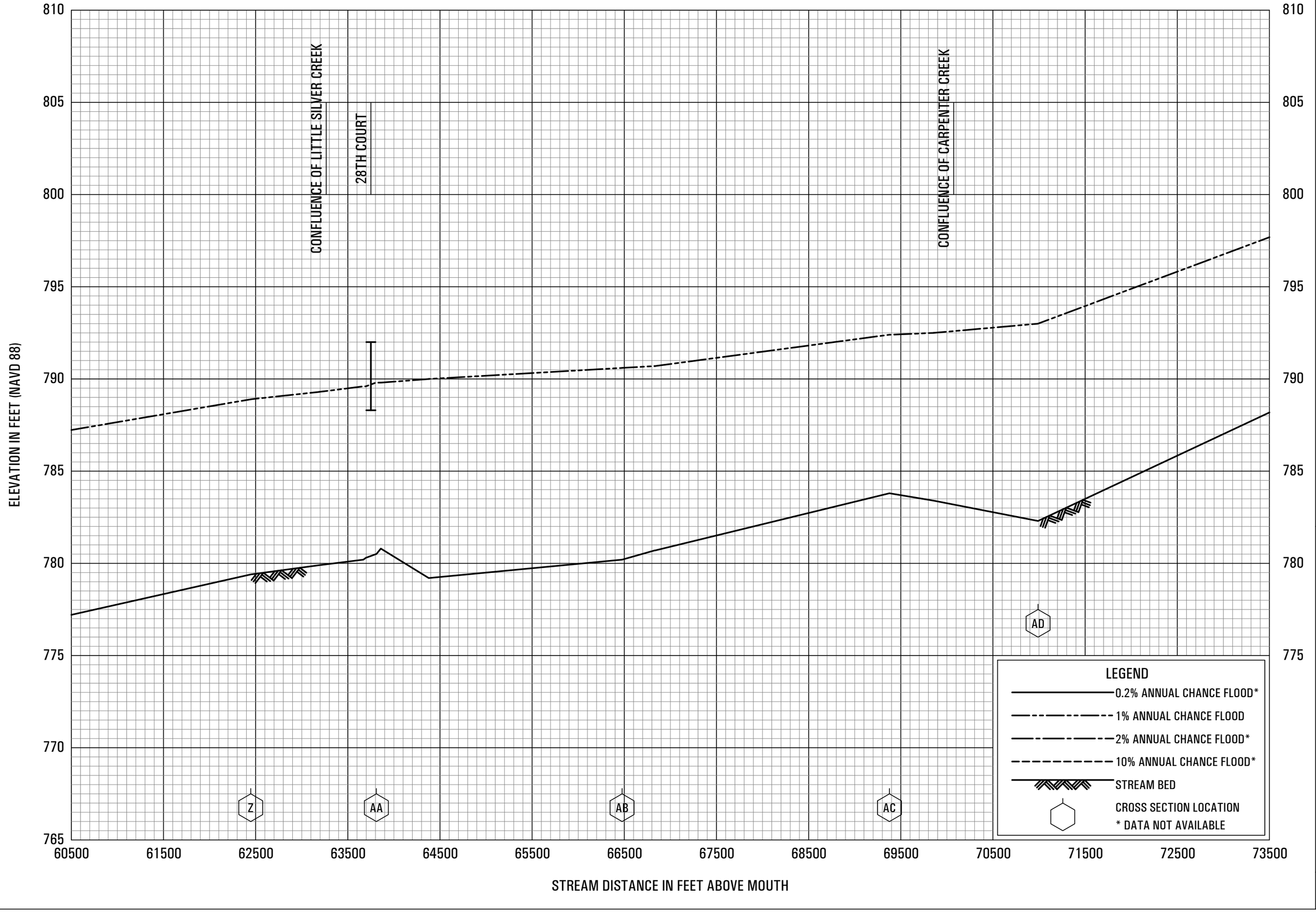
PINE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

09P



FLOOD PROFILES

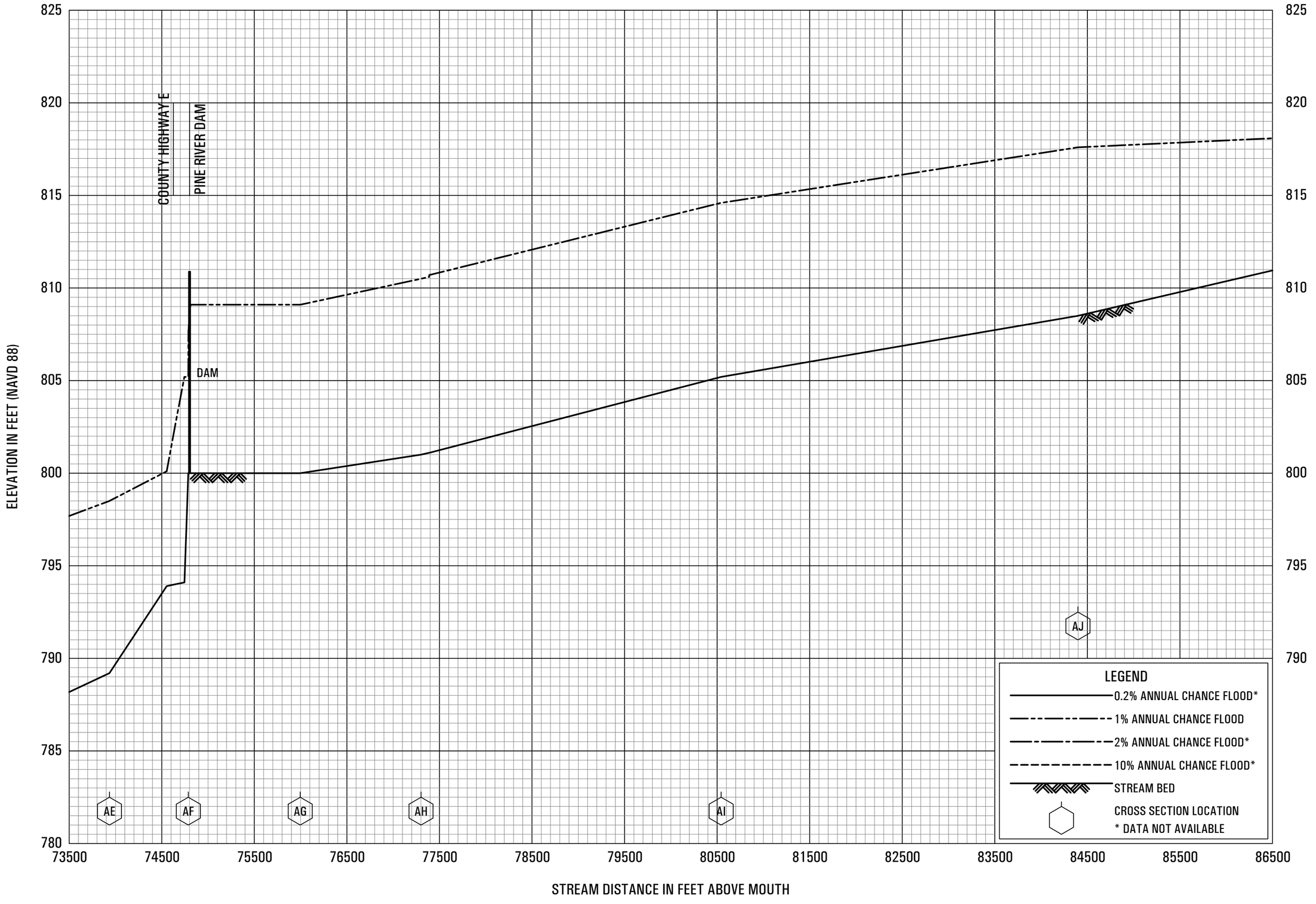
PINE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

10P



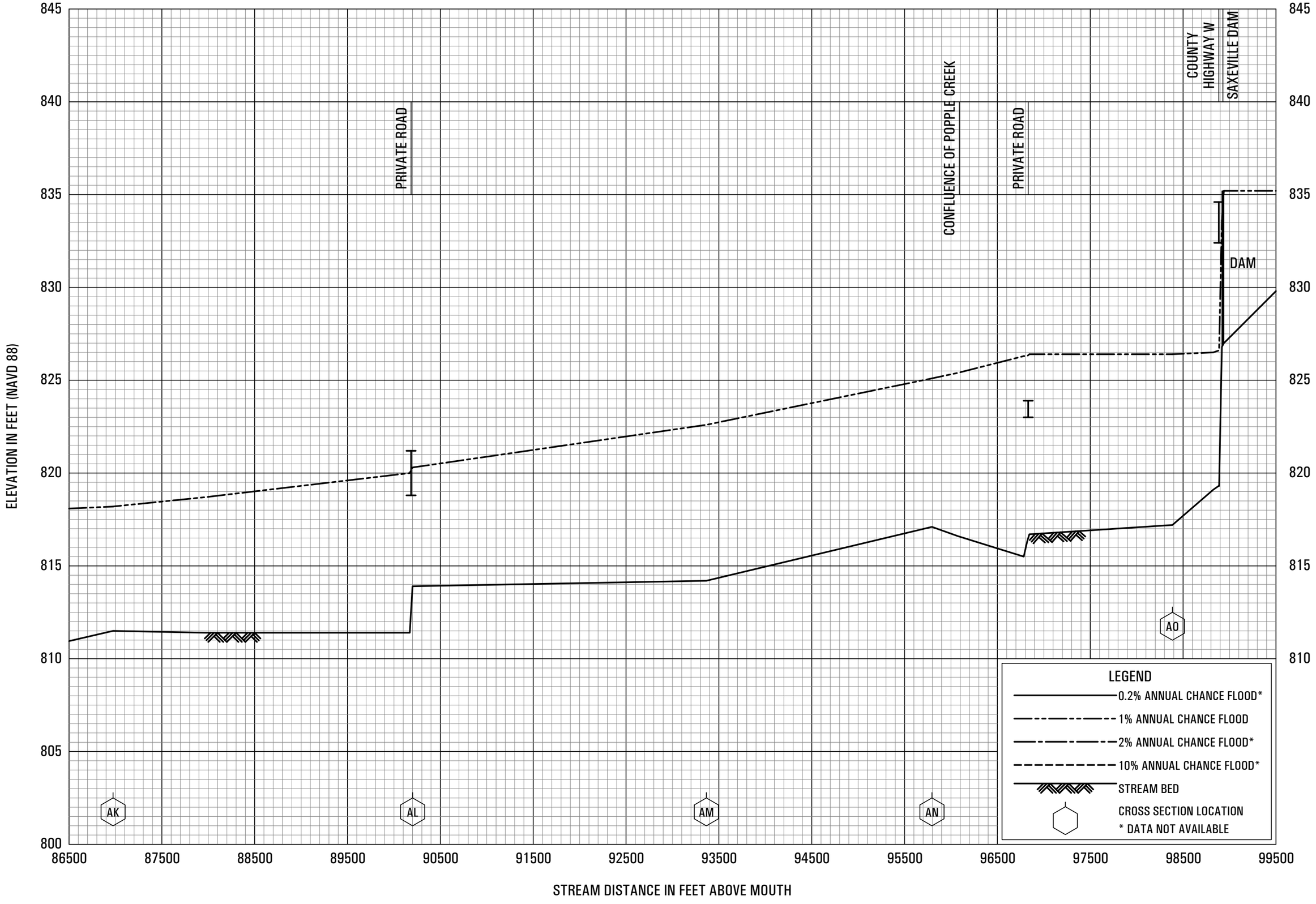
FLOOD PROFILES

PINE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS



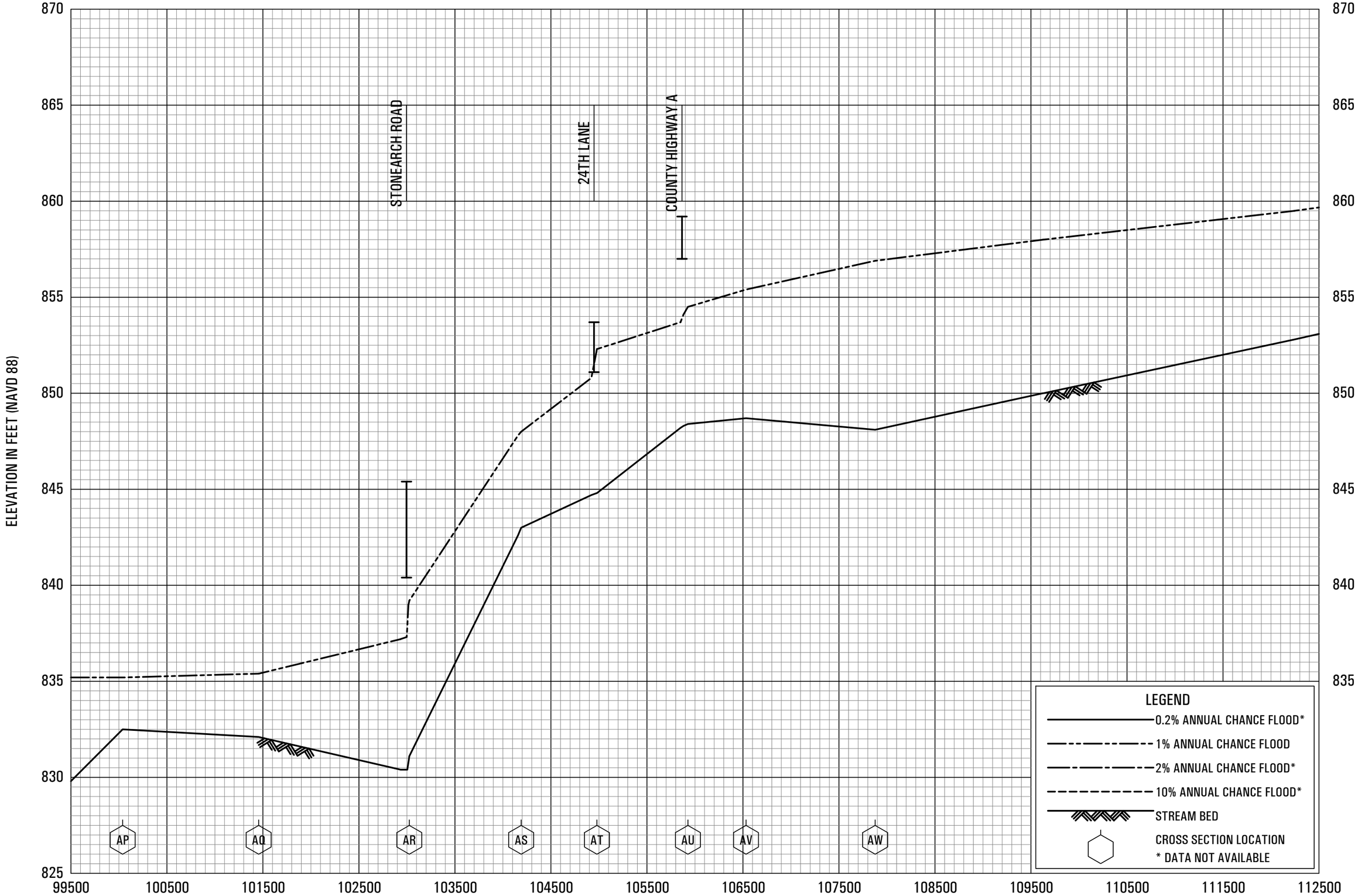
FLOOD PROFILES

PINE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS



FLOOD PROFILES

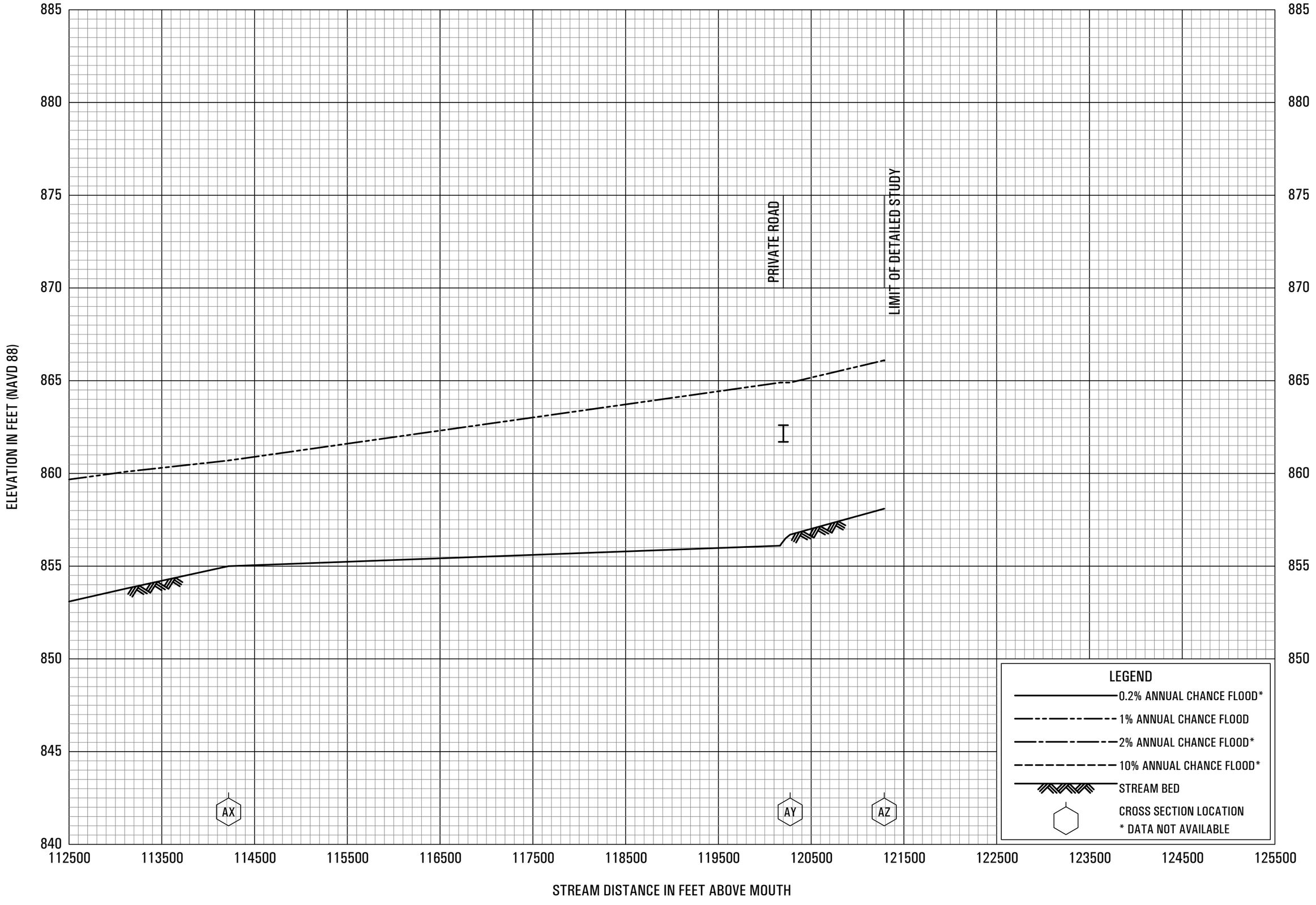
PINE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

13P



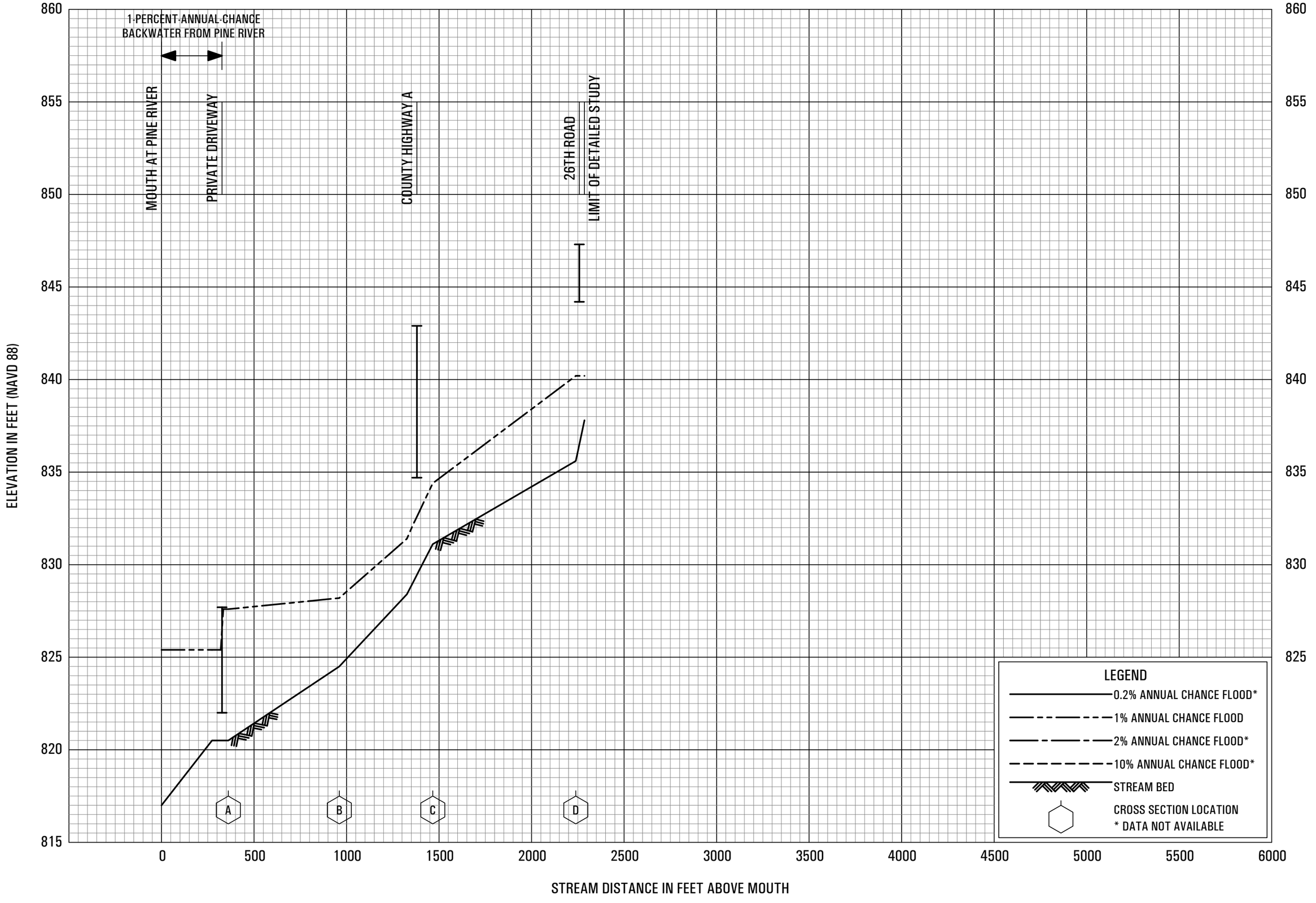
FLOOD PROFILES

PINE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS



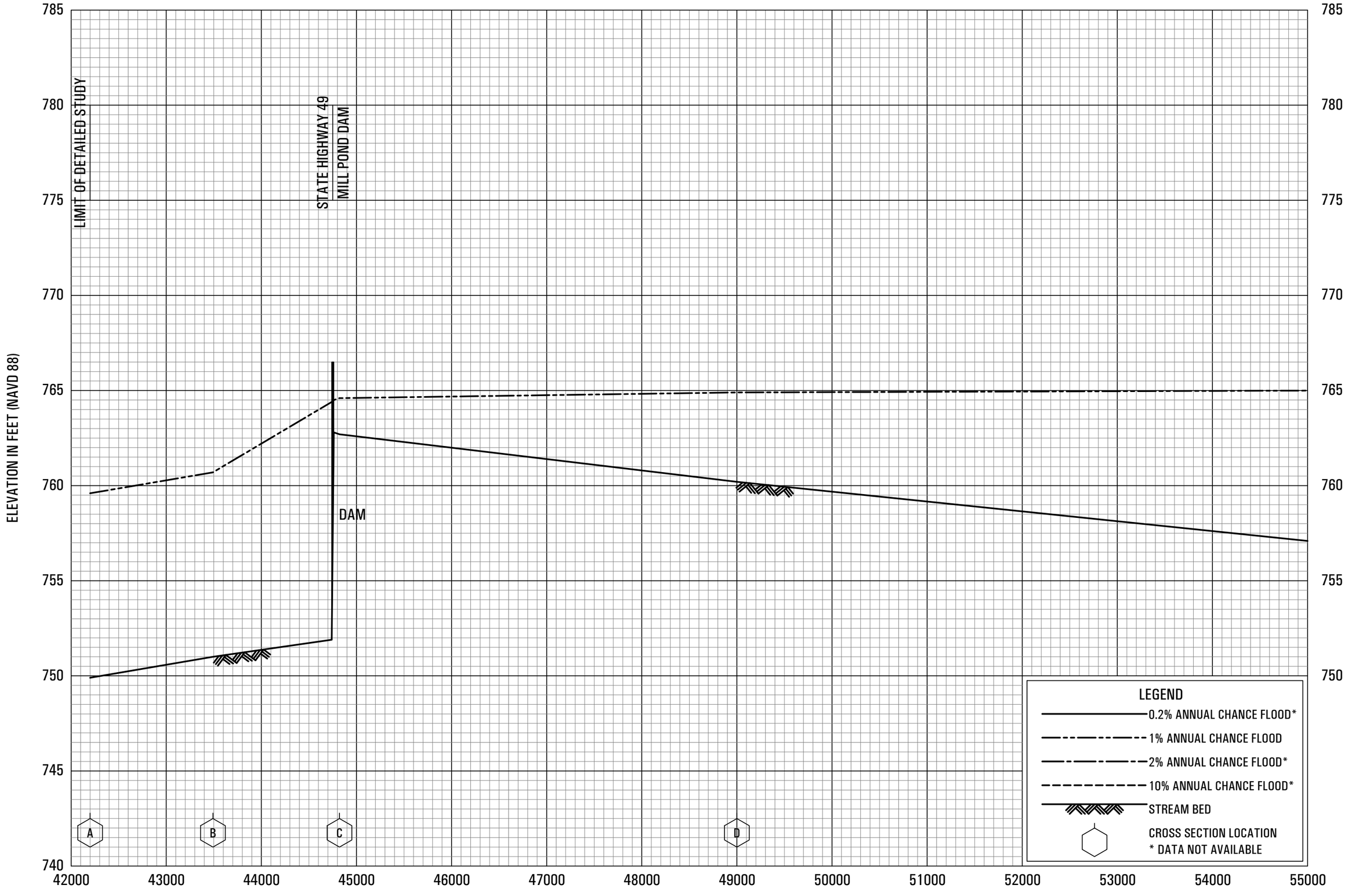
FLOOD PROFILES

POPPLE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS



FLOOD PROFILES

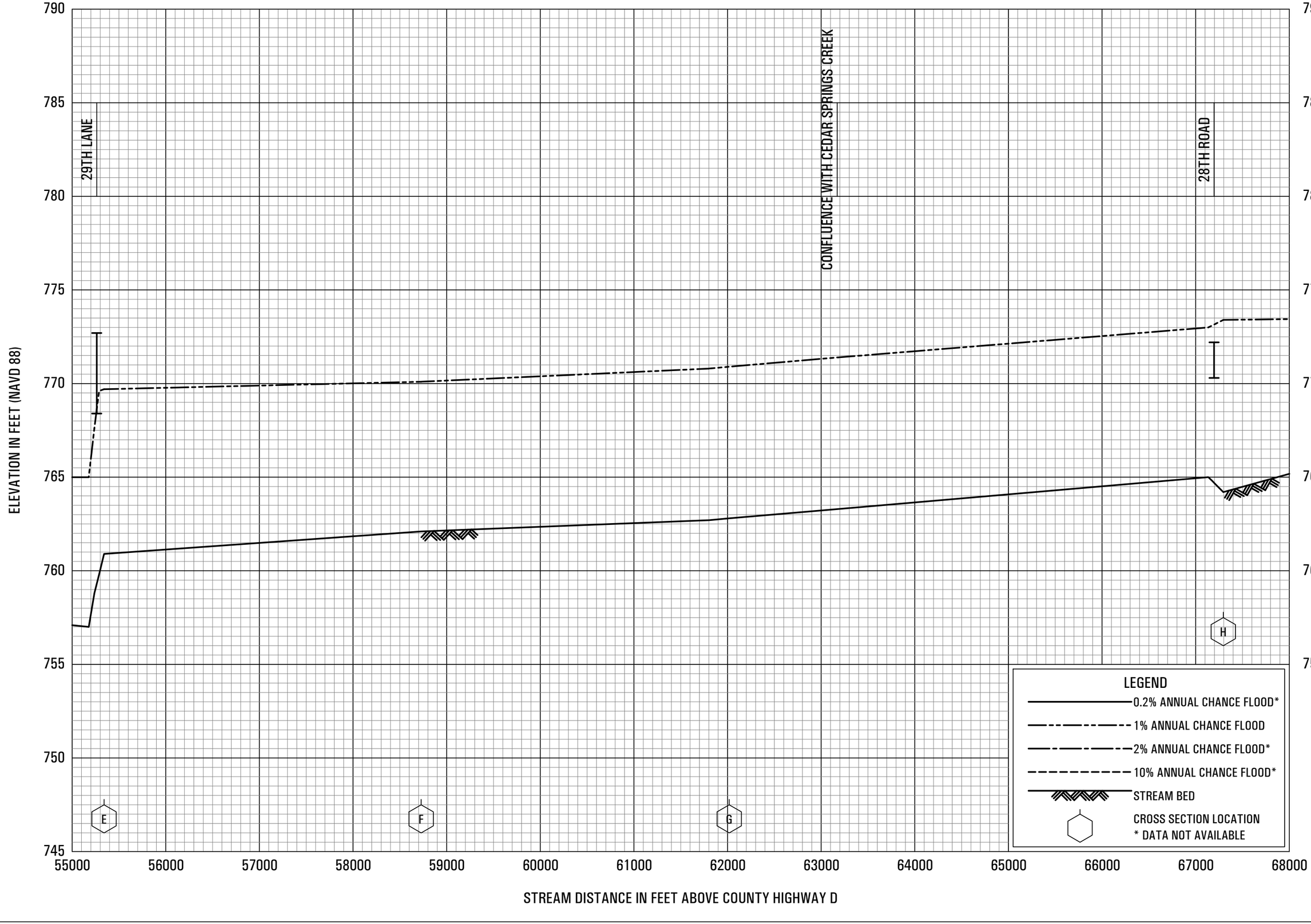
WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS

16P



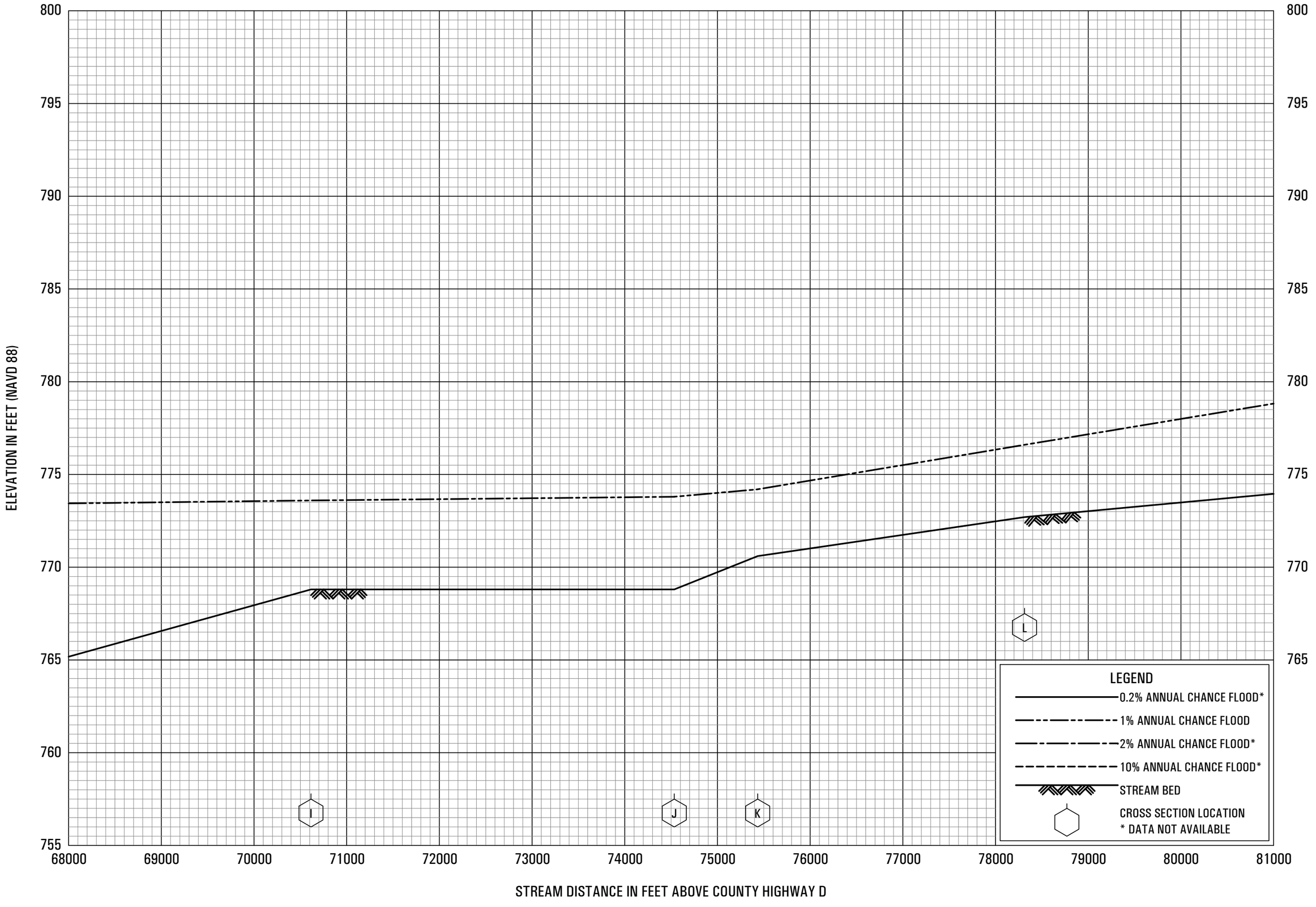
FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS



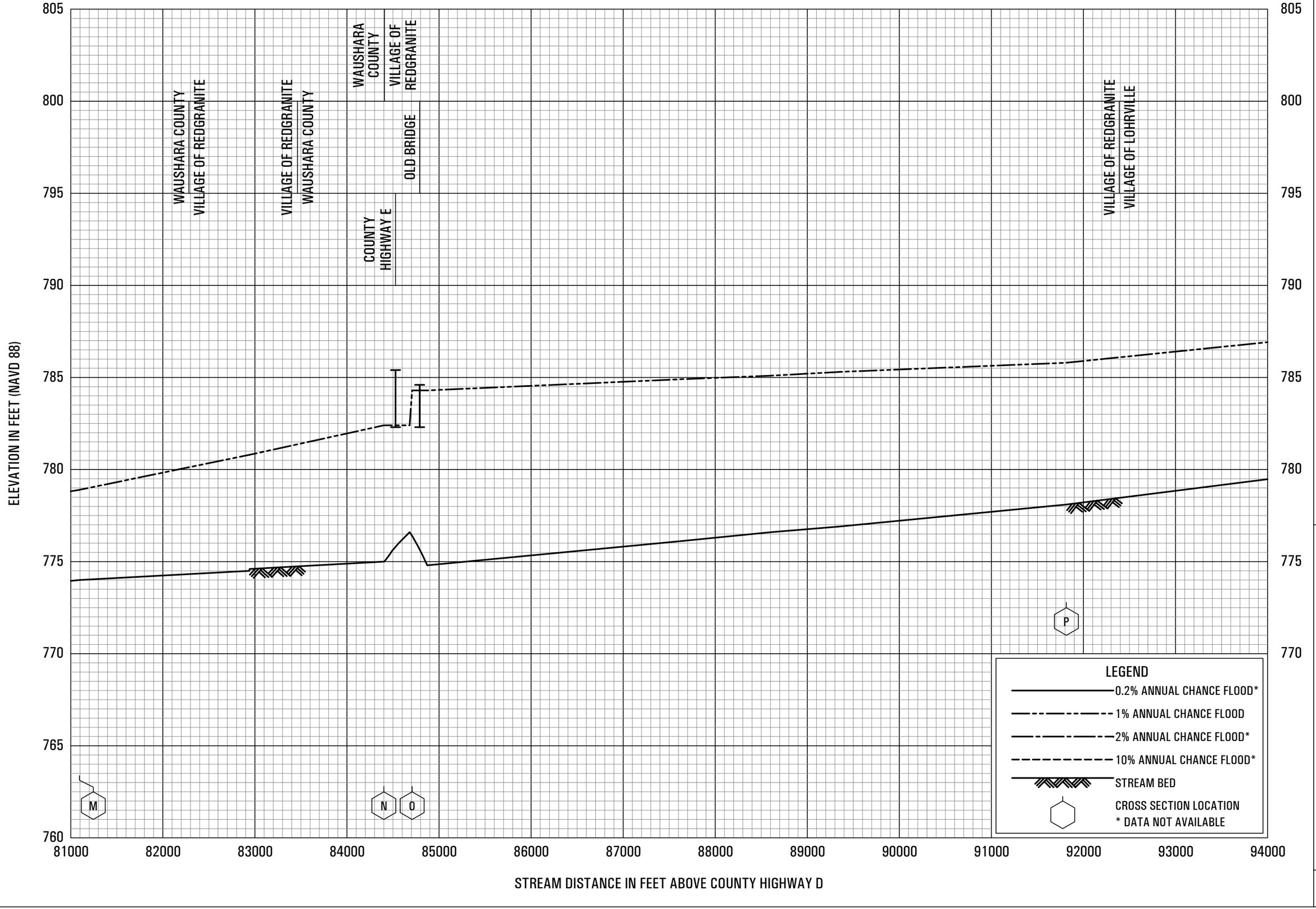
FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS



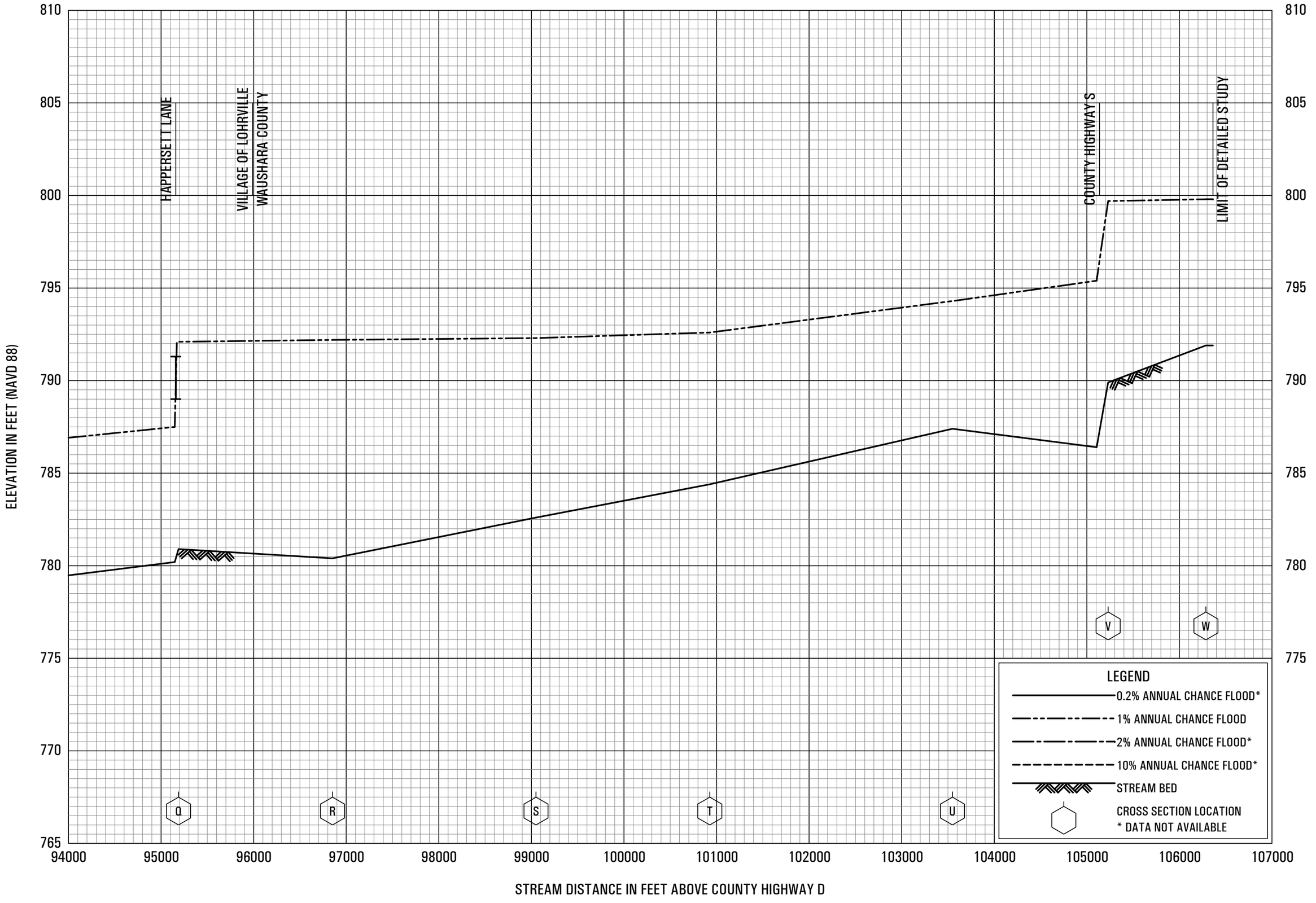
FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS



FLOOD PROFILES

WILLOW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAUSHARA COUNTY, WI

AND INCORPORATED AREAS