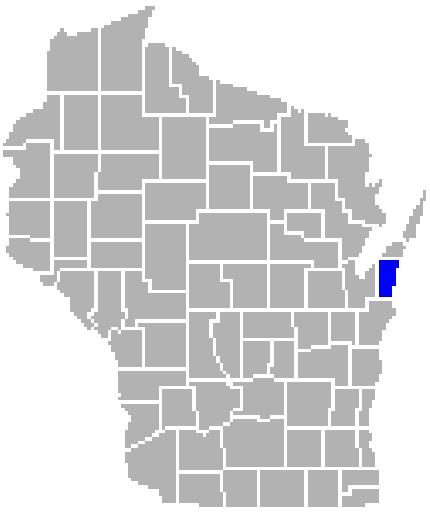
FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



KEWAUNEE COUNTY, WISCONSIN

AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER
ALGOMA, CITY OF	550213
CASCO, VILLAGE OF	550214
KEWAUNEE, CITY OF	550215
KEWAUNEE COUNTY, UNINCORPORATED AREAS	550212
LUXEMBURG, VILLAGE OF	550216

FEMA

EFFECTIVE

TBD

PRELIMINARY

January 13, 2022

FLOOD INSURANCE STUDY NUMBER
55061CV001A
Version Number 2.6.2.0

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FLOOD INSURANCE STUDY REPORT
KEWAUNEE COUNTY, WISCONSIN

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, seawalls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses, nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60, *Criteria for Land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would

be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these flood prone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as "Post-FIRM" buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) Report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community's regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of Kewaunee County, Wisconsin.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the United States Geological Survey (USGS) 8-digit Hydrologic Unit Code (HUC-8) sub-basins affecting each, are shown in Table 1. The FIRM panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Algoma, City of	550213	04030102, 04060200	55061C0177C, 55061C0179C, 55061C0181C	
Casco, Village of	550214	04030102	55061C0135C[1], 55061C0142C, 55061C0155C, 55061C0161C	
Kewaunee, City of	550215	04030101, 04030102, 04060200	55061C0256C, 55061C0257C, 55061C0258C, 55061C0259C, 55061C0276C, 55061C0278C	
Kewaunee County, Unincorporated Areas	550212	04030101, 04030102, 04060200	55061C0017C, 55061C0019C, 55061C0036C, 55061C0037C[1], 55061C0038C[1], 55061C0039C[1], 55061C0045C[1], 55061C0065C, 55061C0069C, 55061C0070C, 55061C0086C, 55061C0087C[1], 55061C0088C, 55061C0089C, 55061C0091C[1], 55061C0092C, 55061C0093C, 55061C0094C, 55061C0100C[1] 55061C0110C[1], 55061C0117C, 55061C0120C[1], 55061C0129C,	

[1]Panel Not Printed

Table 1: Listing of NFIP Jurisdictions *(Continued)*

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Kewaunee County, Unincorporated Areas (*Continued*)	550212	04030101, 04030102, 04060200	55061C0130C, 55061C0135C[1], 55061C0136C, 55061C0137C, 55061C0140C, 55061C0141C, 55061C0142C, 55061C0143C, 55061C0144C, 55061C0155C, 55061C0157C, 55061C0159C[1], 55061C0160C, 55061C0161C, 55061C0162C[1], 55061C0163C, 55061C0164C, 55061C0170C[1], 55061C0176C, 55061C0177C, 55061C0178C[1], 55061C0179C, 55061C0181C, 55061C0186C, 55061C0187C, 55061C0188C, 55061C0189C[1], 55061C0225C[1], 55061C0230C, 55061C0235C, 55061C0240C, 55061C0245C, 55061C0252C, 55061C0255C, 55061C0256C, 55061C0257C, 55061C0258C,	

[1]Panel Not Printed

Table 1: Listing of NFIP Jurisdictions *(Continued)*

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s)	If Not Included, Location of Flood Hazard Data
Kewaunee County, Unincorporated Areas (*Continued*)	550212	04030101, 04030102, 04060200	55061C0259C, 55061C0265C, 55061C0267C, 55061C0269C, 55061C0270C[1], 55061C0276C, 55061C0278C, 55061C0280C[1], 55061C0300C[1], 55061C0309C, 55061C0310C[1], 55061C0330C, 55061C0335C, 55061C0353C, 55061C0355C, 55061C0356C, 55061C0357C, 55061C0358C, 55061C0359C[1], 55061C0400C[1]	
Luxemburg, Village of	550216	04030102	55061C0136C, 55061C0137C, 55061C0140C, 55061C0141C	

[1]Panel Not Printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance flood elevations (the 1-percent-annual-chance flood elevation is also referred to as the Base Flood Elevation (BFE)); delineations of the 1-percent-annual-chance and 0.2-percent-annual-chance floodplains; and 1-percent-annual-chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 30, "Map Repositories," within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

  The initial Countywide FIS Report for Kewaunee County became effective on **TBD**. Refer to Table 27 for information about subsequent revisions to the FIRMs.

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

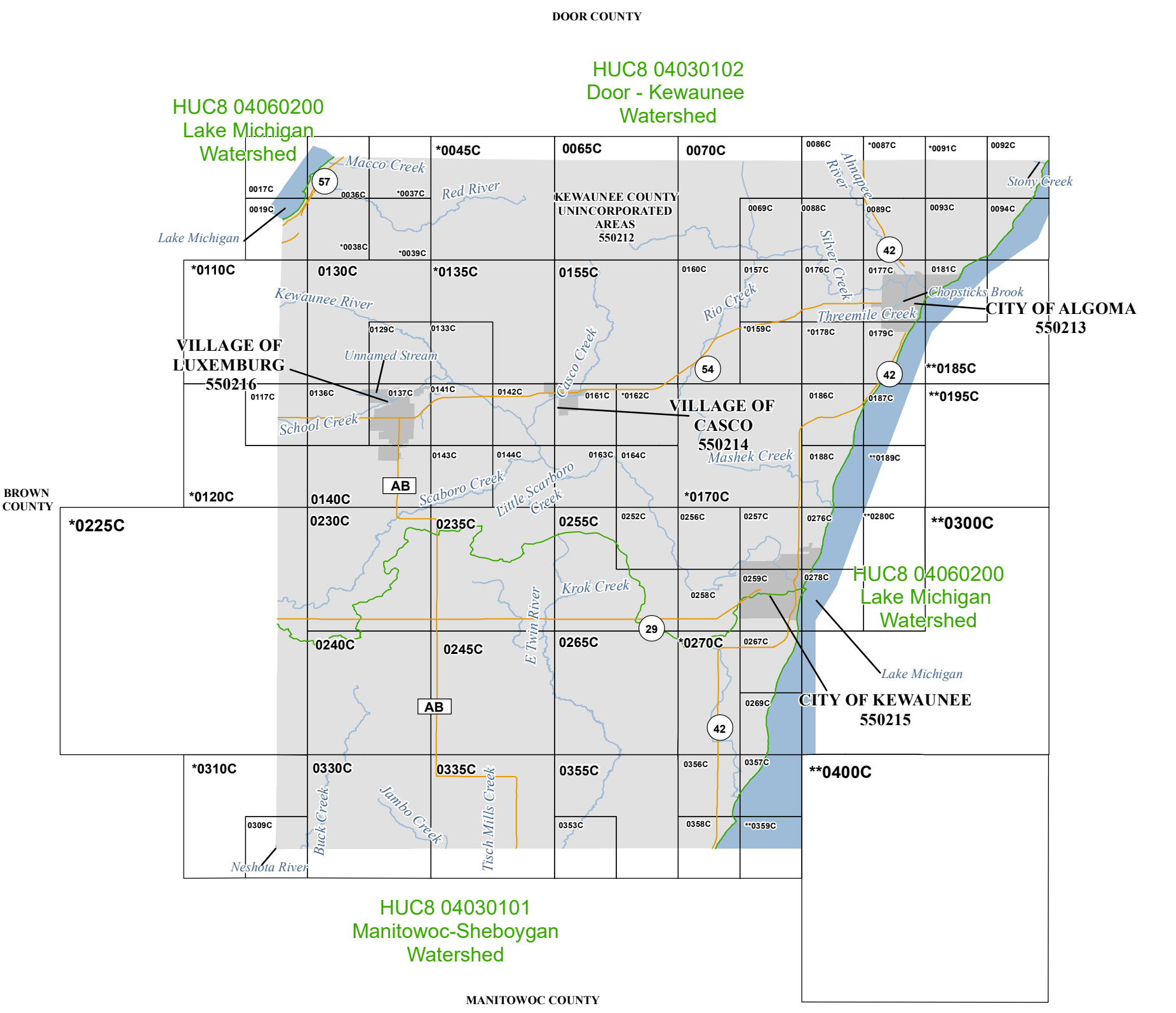
Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (shaded)
C	X (unshaded)

  The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at www.fema.gov/national-flood-insurance-program-community-rating-system or contact your appropriate FEMA Regional Office for more information about this program.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at www.fema.gov/online-tutorials.

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Kewaunee County, and also displays the panel number and effective date for each FIRM panel in the county. Other information shown on the FIRM Index includes community boundaries, flooding sources, watershed boundaries, and USGS HUC-8 codes.

Figure 1: FIRM Index



1 inch = 22,500 feet 1:270,000

0 6,250 12,500 25,000 37,500 50,000 feet

Map Projection:
Universal Transverse Mercator Zone 16 North;
North American Datum 1983

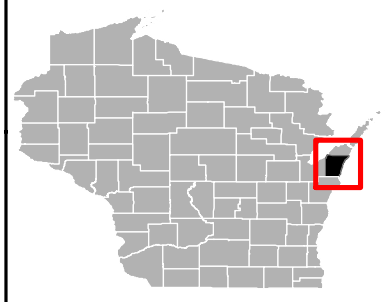
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

* PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS
** PANEL NOT PRINTED - OPEN WATER AREA

COUNTY LOCATOR



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

KEWAUNEE COUNTY, WISCONSIN and Incorporated Areas

PANELS PRINTED:

0017, 0019, 0036, 0065, 0069, 0070, 0086, 0088, 0089, 0092, 0093, 0094, 0117, 0129, 0130, 0133, 0136, 0137, 0140, 0141, 0142, 0143, 0144, 0155, 0157, 0160, 0161, 0163, 0164, 0176, 0177, 0179, 0181, 0186, 0187, 0188, 0230, 0235, 0240, 0245, 0252, 0255, 0256, 0257, 0258, 0259, 0265, 0267, 0269, 0276, 0278, 0309, 0330, 0335, 0353, 0355, 0356, 0357, 0358

FEMA

PRELIMINARY
1/13/2022

MAP NUMBER
55061CIND0B

EFFECTIVE DATE

Each FIRM panel may contain specific notes to the user that provide additional information regarding the flood hazard data shown on that map. However, the FIRM panel does not contain enough space to show all the notes that may be relevant in helping to better understand the information on the panel. Figure 2 contains the full list of these notes.

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Mapping and Insurance eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov/. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Flood Map Service Center website or by calling the FEMA Mapping and Insurance eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 27 in this FIS Report.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

PRELIMINARY FIS REPORT: FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Non-Coastal Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

Coastal Base Flood Elevations shown on the map apply only landward of the zero elevation referenced to Low Water Datum of Lake Michigan, administratively established by the National Oceanic and Atmospheric Administration at 176.0 meters (577.5 feet) above zero point International Great Lakes Datum of 1985. This lake-wide elevation is approximately equal to an elevation of 577.6 feet North American Vertical Datum of 1988 (NAVD88). Coastal flood elevations are also provided in the Coastal Transect Parameters table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Coastal Transect Parameters table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on the FIRM.

FLOODWAY INFORMATION: Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the FIS Report for this jurisdiction.

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was UTM Zone 16N. The horizontal datum was North American Datum 1983, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at www.ngs.noaa.gov.

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 30 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM panel was provided in digital format by the USDA National Resources Conservation Service. This information was photogrammetrically compiled at a scale of 1:12,000 from aerial photography dated 2013. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within Kewaunee, Wisconsin, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 27 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for Kewaunee County, Wisconsin, effective TBD.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Each FIRM panel contains an abbreviated legend for the features shown on the maps. However, the FIRM panel does not contain enough space to show the legend for all map features. Figure 3 shows the full legend of all map features. Note that not all of these features may appear on the FIRM panels in Kewaunee County.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights. See note for specific types. If the floodway is too narrow to be shown, a note is shown.

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone, either at cross section locations or as static whole-foot elevations that apply throughout the zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
Zone A99	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.

Figure 3: Map Legend for FIRM *(Continued)*

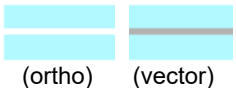
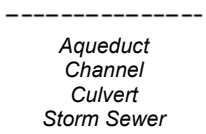
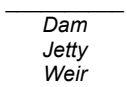
	Regulatory Floodway determined in Zone AE.
OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
	Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood.
	Area with Flood Risk due to Levee: Areas where a non-accredited levee, dike, or other flood control structure is shown as providing protection to less than the 1% annual chance flood.
OTHER AREAS	
	Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible
	Unshaded Zone X: Areas determined to be outside the 0.2% annual chance flood hazard
FLOOD HAZARD AND OTHER BOUNDARY LINES	
	Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)
	Limit of Study
	Jurisdiction Boundary
	Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet
GENERAL STRUCTURES	
	Channel, Culvert, Aqueduct, or Storm Sewer
	Dam, Jetty, Weir

Figure 3: Map Legend for FIRM *(Continued)*

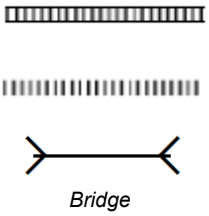
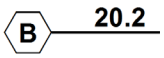
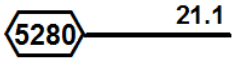
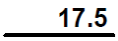
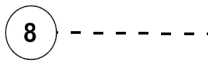
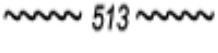
	Levee, Dike, or Floodwall accredited or provisionally accredited to reduce the flood risk from the 1% annual chance flood. Levee, Dike or Floodwall not accredited to reduce the flood risk from the 1% annual chance flood. Bridge
REFERENCE MARKERS	
	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
	Base Flood Elevation Line (shown for flooding sources for which no cross sections or profile are available)
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity
BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
	Interstate Highway
	U.S. Highway

Figure 3: Map Legend for FIRM *(Continued)*

234	State Highway
234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
$^{42}76^{000m}$E	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16’ 52.5”	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and Kewaunee County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1-percent-annual-chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent-annual-chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 22), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1-percent and 0.2-percent-annual-chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1-percent-annual-chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1-percent and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. Figure 3, “Map Legend for FIRM”, describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within Kewaunee County, respectively.

Table 2, “Flooding Sources Included in this FIS Report,” lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 2. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1-percent-annual-chance floodplain corresponds to the SFHAs. The 0.2-percent-annual-chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Ahnapee River	Algoma, City of; Kewaunee County, Unincorporated Areas	Lake Michigan	Approximately 2.3 miles upstream from confluence with Lake Michigan	04030102	2.3		Y	AE, AO	1978
Ahnapee River	Kewaunee County, Unincorporated Areas	Approximately 2.3 miles upstream from confluence with Lake Michigan	Approximately 3.4 miles upstream from confluence with Lake Michigan	04030102	3.9		N	A	2015
Bremmer Creek	Kewaunee County, Unincorporated Areas	Confluence with Silver Creek	At Kewaunee County boundary	04030102	3.2		N	A	2015
Buck Creek	Kewaunee County, Unincorporated Areas	Approximately 125 feet downstream of County Road BB crossing	Approximately 1,280 feet upstream Schweiner Road	04030101	6.9		N	A	2015
Casco Creek	Casco, Village of; Kewaunee County, Unincorporated Areas	Above confluence with Kewaunee River	Approximately 9.3 miles upstream from confluence with Kewaunee River	04030102	9.2		Y	AE	1979
Chopsticks Brook	Algoma, City of	Confluence with Silver Creek	0.1 miles southwest of intersection of Feld Street and Sunset Avenue	04030102	1.5		Y	AE	2021
East Twin River	Kewaunee County, Unincorporated Areas	County Highway BB	Approximately 200 feet upstream of Nuclear Road	04030101	16.4		Y	AE	1980
East Twin River	Kewaunee County, Unincorporated Areas	Approximately 200 feet upstream of Nuclear Road	Approximately 550 feet upstream of County Road F	04030101	1.2		N	A	2015

Table 2: Flooding Sources Included in this FIS Report (*Continued*)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
East Twin River Tributary 1	Kewaunee County, Unincorporated Areas	Confluence with East Twin River	Approximately 10,219 feet upstream from confluence with East Twin River	04030101	1.9		N	A	2015
Jambo Creek	Kewaunee County, Unincorporated Areas	County Road BB crossing	Approximately 8,068 feet upstream from County Road BB crossing	04030101	1.5		N	A	2015
Kewaunee River	Kewaunee, City of; Kewaunee County, Unincorporated Areas	2,230 feet downstream of State Highway 42	Approximately 110 feet upstream of County Road A	04060200, 04030102	23.0		Y	AE	2021
Kewaunee River	Kewaunee County, Unincorporated Areas	Approximately 110 feet upstream of County Road A	At Thiry Daems Road	04030102	2.2		N	A	2015
Krok Creek	Kewaunee County, Unincorporated Areas	Confluence with East Twin River	Approximately 26,352 feet upstream from confluence with East Twin River	04030101, 04030102	5.0		N	A	2015
Lake Michigan	Algoma, City of; Kewaunee, City of; Kewaunee County, Unincorporated Areas	Entire Shoreline of Kewaunee County, WI	Entire Shoreline of Kewaunee County, WI	04030101, 04030102, 04060200	35.9		N	VE, AE, AO	2017

Table 2: Flooding Sources Included in this FIS Report (*Continued*)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Luxemburg Creek	Kewaunee County, Unincorporated Areas	Above confluence with Kewaunee River	Approximately 13,259 feet upstream from confluence with Kewaunee River	04030102	2.4		Y	A, AE	2015
Luxemburg Creek Tributary 1	Luxemburg, Village of; Kewaunee County, Unincorporated Areas	Confluence with Luxemburg Creek	Approximately 3,016 feet upstream from confluence with Luxemburg Creek	04030102	0.55		N	A	2015
Macco Creek	Kewaunee County, Unincorporated Areas	Confluence with Green Bay (Lake Michigan)	Approximately 6,072 feet upstream from confluence with Green Bay (Lake Michigan)	04030101, 04060200	0.43		N	A, AE	2015
Neshota River	Kewaunee County, Unincorporated Areas, County, Unincorporated Areas	Approximately 125 feet downstream of County Road BB crossing	Approximately 821 feet downstream of County Road BB crossing	04030101	0.16		Y	AE	2006
Rio Creek	Kewaunee County, Unincorporated Areas	Confluence with Silver Creek	Approximately 24,161 feet upstream from confluence with Silver Creek	04030102	4.6		N	A	2015
Scarboro Creek	Kewaunee County, Unincorporated Areas	Confluence with Kewaunee River	Approximately 7,226 feet downstream of Valley Road crossing	04030102	3.1		Y	AE	1980
Scarboro Creek	Kewaunee County, Unincorporated Areas	Approximately 7,226 feet downstream of Valley Road crossing	Approximately 1,730 feet upstream of Hill Road	04030102	5.3		N	A	2015
School Creek	Luxemburg, Village of; Kewaunee County, Unincorporated Areas	Above confluence with Kewaunee River	Western boundary of Kewaunee County Unincorporated Areas	04030102	5.5		Y	AE	2021

Table 2: Flooding Sources Included in this FIS Report (*Continued*)

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Silver Creek	Algoma, City of; Kewaunee County, Unincorporated Areas	Confluence with Ahnapee River	Approximately 1,300 feet downstream town boundary	04030102	6.7		Y	AE	2021
Silver Creek	Kewaunee County, Unincorporated Areas	Approximately 1,300 feet downstream town boundary	Approximately 3,140 feet upstream of Partridge Road	04030102	6.1		N	A	2015
Silver Creek Tributary 1	Kewaunee County, Unincorporated Areas	Above confluence with Silver Creek	Approximately 13,529 feet upstream from Confluence with Silver Creek	04030102	2.6		N	A, AE	2015, 2021
Stoney Creek	Kewaunee County, Unincorporated Areas	Lake Michigan	At Door County boundary	04030102	0.4		N	A, VE	2015
Unnamed Stream	Luxemburg, Village of; Kewaunee County, Unincorporated Areas	At confluence with School Creek	0.3 miles south of Rogue Lane	04030102	1.2		Y	AE	2021

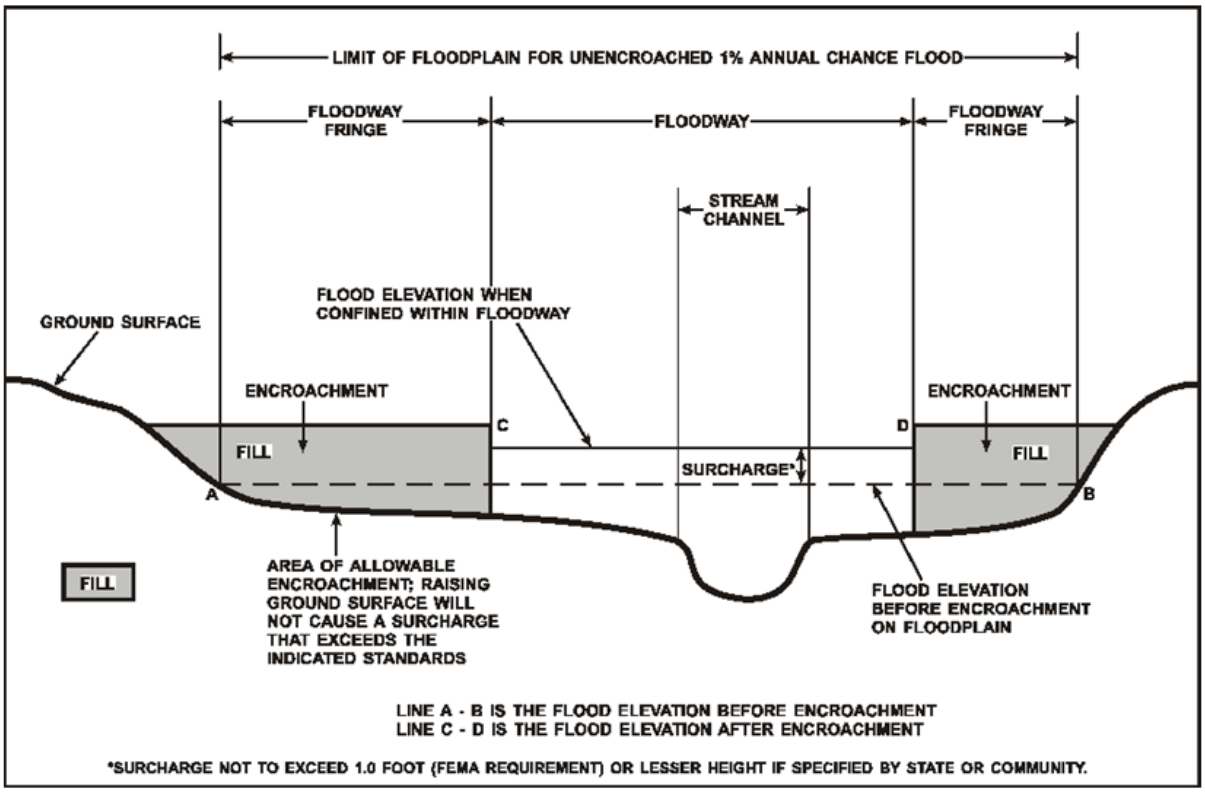
2.2 Floodways

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 balancing floodplain development against increasing flood hazard. With this approach, the area of the 1-percent-annual-chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1-percent-annual-chance flood. The floodway fringe is the area between the floodway and the 1-percent-annual-chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1-percent-annual-chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. Regulations for Wisconsin require communities in Kewaunee County to limit increases caused by encroachment to 0.0 feet and several communities have adopted additional restrictions. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 23, “Floodway Data.”

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. 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 on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1-percent-annual-chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

BFEs are primarily intended for flood insurance rating purposes. Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. 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. For example, the user may use the FIRM to determine the stream station of a location of interest and then use the profile to determine the 1-percent-annual-chance elevation at that location. Because only selected cross sections may be shown on the FIRM for riverine areas, the profile should be used to obtain the flood elevation between mapped cross sections. Additionally, for riverine areas, whole-foot elevations shown on the FIRM may not exactly reflect the elevations derived from the hydraulic analyses; therefore, elevations obtained from the profile may more accurately reflect the results of the hydraulic analysis.

2.4 Non-Encroachment Zones

This section is not applicable to this Flood Risk Project.

2.5 Coastal Flood Hazard Areas

For most areas along rivers, streams, and small lakes, BFEs and floodplain boundaries are based on the amount of water expected to enter the area during a 1-percent-annual-chance flood and the geometry of the floodplain. Floods in these areas are typically caused by runoff from storm events. However, for areas on, or near, the Great Lakes, ocean coasts, large rivers, or other large bodies of water, the BFE and floodplain boundaries may be based on additional components that include storm surge and wave dynamics.

Coastal flooding sources that are included in this Flood Risk Project are shown in Table 2.

2.5.1 Water Elevations and the Effects of Waves

Specific terminology is used in coastal analyses to indicate which components have been included in evaluating flood hazards.

The stillwater elevation (SWEL or still water level) is the surface of the water resulting from astronomical tides, storm surge, and freshwater inputs, but excluding wave setup contribution or the effects of waves.

- *Astronomical tides* are periodic rises and falls in large bodies of water caused by the rotation of the earth and by the gravitational forces exerted by the earth, moon and sun. Tidal-induced fluctuations in the Great Lakes are small and their presence is masked by the normal fluctuations due to atmospheric forcing. The Great Lakes can be treated as if no tidal signal exists, and this contribution to water levels is neglected.
- *Storm surge, inclusive of wind setup and seiche-induced fluctuation,* is the additional water depth that occurs during large storm events. These events can bring air pressure changes and strong winds that force water up against the shore. The most common cause of a large seiche in the Great Lakes is the oscillating water level after a storm that moves over the lake, with the downwind portion of the lake subject to wind setup as water piles up against the coast and the upwind portion subject to a decrease in water levels.
- *Freshwater inputs* include rainfall that falls directly on the body of water, runoff from surfaces and overland flow, and inputs from rivers.

The 1-percent-annual-chance stillwater elevation is the stillwater elevation that has been calculated for a storm surge from a 1-percent-annual-chance storm. The 1-percent-annual-chance storm surge can be determined from analyses of water level station records, statistical study of regional historical storms, or other modeling approaches. Stillwater elevations for storms of other frequencies can be developed using similar approaches.

The total stillwater elevation (also referred to as the mean water level) is the stillwater elevation plus wave setup contribution but excluding the other effects of waves, such as wave runup and overland wave propagation.

- *Wave setup* is the increase in stillwater elevation at the shoreline caused by the breaking of waves in shallow water. It occurs as breaking wave momentum is transferred to the water column.

Like the stillwater elevation, the total stillwater elevation is based on a storm of a particular frequency, such as the 1-percent-annual-chance storm. Wave setup is typically estimated using standard engineering practices or calculated using models, since water level stations are often located in areas sheltered from wave action and do not capture wave height or wave setup information.

Coastal analyses may examine the effects of overland waves by analyzing storm-induced erosion, overland wave propagation, wave runup, and/or wave overtopping.

- *Storm-induced erosion* is the modification of existing topography by erosion caused by a specific storm event, as opposed to long-term erosion that occurs over time.
- *Overland wave propagation* describes the combined effects of variation in ground elevation, vegetation, and physical features on wave characteristics as waves move onshore.
- *Wave runup* is the uprush of water from wave action on a shore barrier. It is a function of the roughness and geometry of the shoreline at the point where the stillwater elevation intersects the land, as shown in Figure 5a.
- *Wave overtopping* refers to the flooding that occurs when wave runup passes over the crest of a barrier, as shown in Figure 5b.

Figure 5a: Wave Runup Transect Schematic

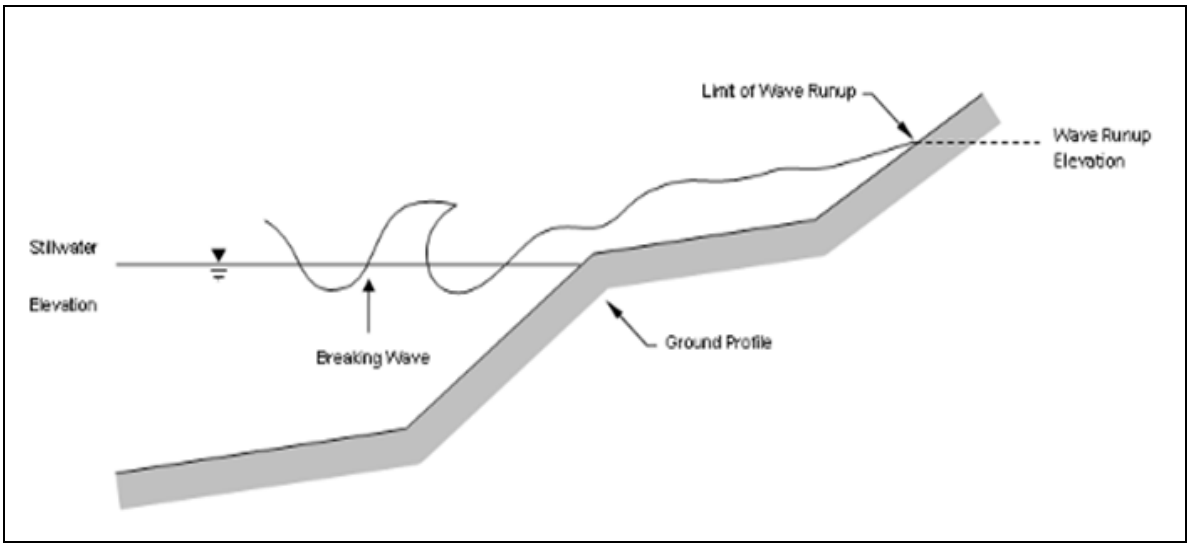
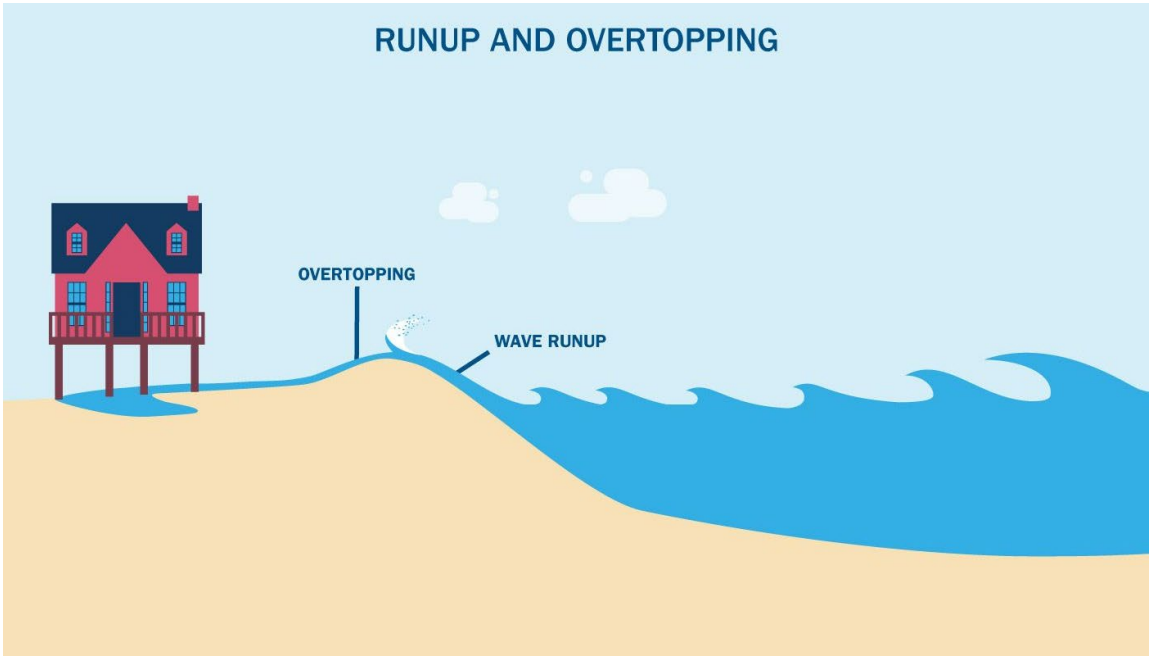


Figure 5b: Wave Overtopping Schematic



2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

For coastal communities along the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and the Caribbean Sea, flood hazards must take into account how storm surges, waves, and in some cases extreme tides or lake level variations interact with factors such as topography, structures, and vegetation. Storm surge and waves must also be considered in assessing flood risk for certain communities on rivers or large inland bodies of water.

Beyond areas that are affected by storm surge and waves, coastal communities can also have riverine floodplains with designated floodways, as described in previous sections.

Floodplain Boundaries
In many coastal areas, storm surge is the principle component of flooding. The extent of the 1-percent-annual-chance floodplain in these areas is derived from the stillwater elevation for the 1-percent-annual-chance storm. The methods used for calculation of stillwater elevations for coastal areas are described in Section 5.3 of this FIS Report.

In areas dominated by overland wave propagation, the coastal BFEs represent the wave dissipation and generation as the wave propagates landward from the shoreline. The landward extent of the 1-percent-annual-chance floodplain is determined by the stillwater elevation with the addition of wave setup, where applicable. The methods used for calculation of wave setup and overland wave propagation are described in Section 5.3 of this FIS Report.

In some areas, the 1-percent-annual-chance floodplain is determined based on the limit of wave runup or wave overtopping for the 1-percent-annual-chance storm surge. The Special Flood Hazard Area (SFHA) extent is determined based on the elevation of the land in relation to the wave runup elevation or the amount of wave overtopping. For areas dominated by wave runup, the coastal BFE can vary from reach to reach. Where wave runup exceeds the crest of a coastal feature, the SFHA extent is determined by the limit of the overtopping zone. The methods that were used for calculation of wave runup and overtopping hazards are described in Section 5.3 of this FIS Report.

Table 25 presents the types of coastal analyses that were used in mapping the 1-percent-annual-chance floodplain in coastal areas.

Coastal BFEs
Coastal BFEs are calculated as the stillwater elevation for the 1-percent-annual-chance storm plus the additional flood hazard from wave effects (storm-induced erosion, wave setup, overland wave propagation, wave runup, and wave overtopping).

Where they apply, coastal BFEs are calculated along transects extending from offshore to the limit of coastal flooding onshore. Results of these analyses are accurate until local topography, vegetation, or development type and density within the community undergoes major changes.

Parameters that were included in calculating coastal BFEs for each transect included in this FIS Report are presented in Table 16, “Coastal Transect Parameters.” The locations of transects are shown in Figure 8, “Transect Location Map.” More detailed information about the methods used in coastal analyses and the results of intermediate steps in the coastal analyses are presented in Section 5.3 of this FIS Report. Additional information on specific mapping methods is provided in Section 6.4 of this FIS Report.

2.5.3 Coastal High Hazard Areas

Certain areas along the open coast and other areas may have higher risk of experiencing structural damage caused by wave action and/or high-velocity water during the 1-percent-

annual-chance flood. These areas will be identified on the FIRM as Coastal High Hazard Areas.

- *Coastal High Hazard Area (CHHA)* is a SFHA extending from offshore to the inland limit of the primary frontal dune (PFD) or any other area subject to damages caused by wave action and/or high-velocity water during the 1-percent-annual-chance flood.
- *Primary Frontal Dune (PFD)* is a continuous or nearly continuous mound or ridge of sand with relatively steep slopes immediately landward and adjacent to the beach. The PFD is subject to erosion and overtopping from high tides and waves during major coastal storms.

The landward limit of the PFD occurs at a point where there is a distinct change from a relatively steep slope to a relatively mild slope; this point represents the landward extension of Zone VE.

No PFDs were identified within this county.

CHHAs are designated as “VE” zones (for “velocity wave zones”) and are subject to more stringent regulatory requirements and a different flood insurance rate structure. BFEs are assigned to Zones VE on the FIRM. More detailed information about the identification and designation of Zone VE is presented in Section 6.4 of this FIS Report.

Areas that are not within the CHHA but are SFHAs may still be impacted by coastal flooding and damaging waves; these areas are shown as “AE” zones on the FIRM.

Figure 6a, “Coastal Transect Schematic (Wave Runup and Overtopping),” illustrates the relationship between the base flood elevation, the 1-percent-annual-chance stillwater elevation, and the ground profile as well as the location of the Zone VE and Zone AE/AO in areas subject to wave runup and overtopping.

Figure 6a: Coastal Transect Schematic (Wave Runup and Overtopping)

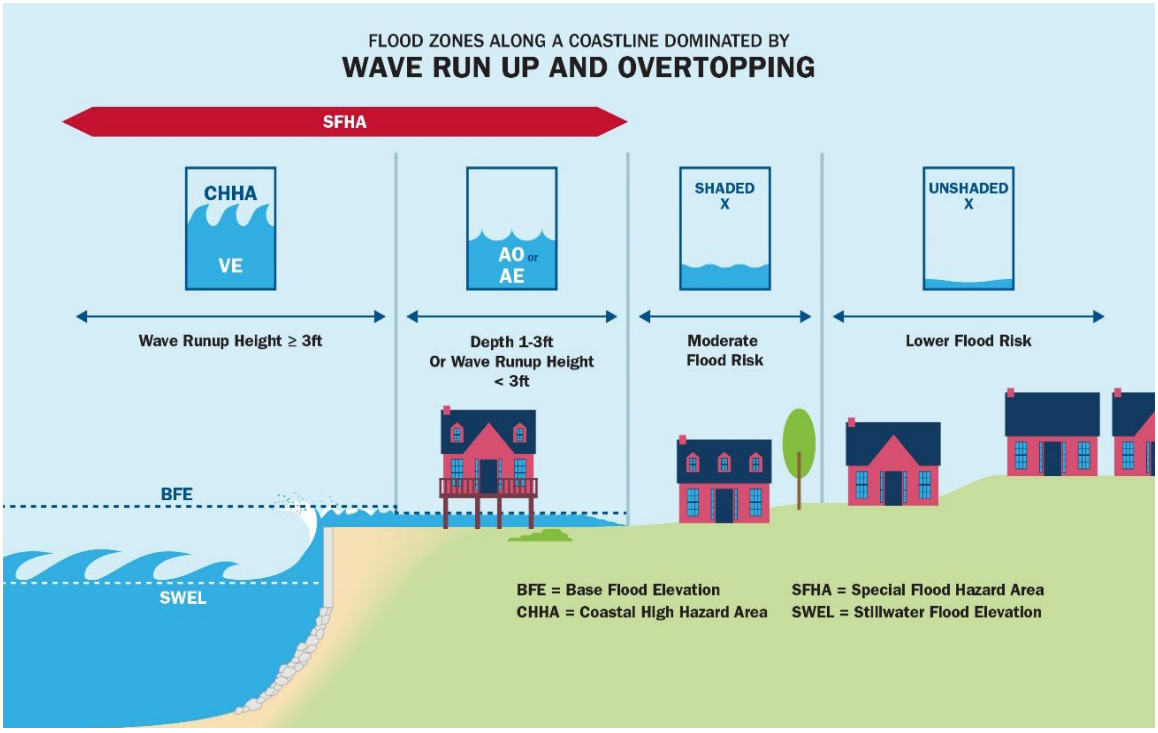
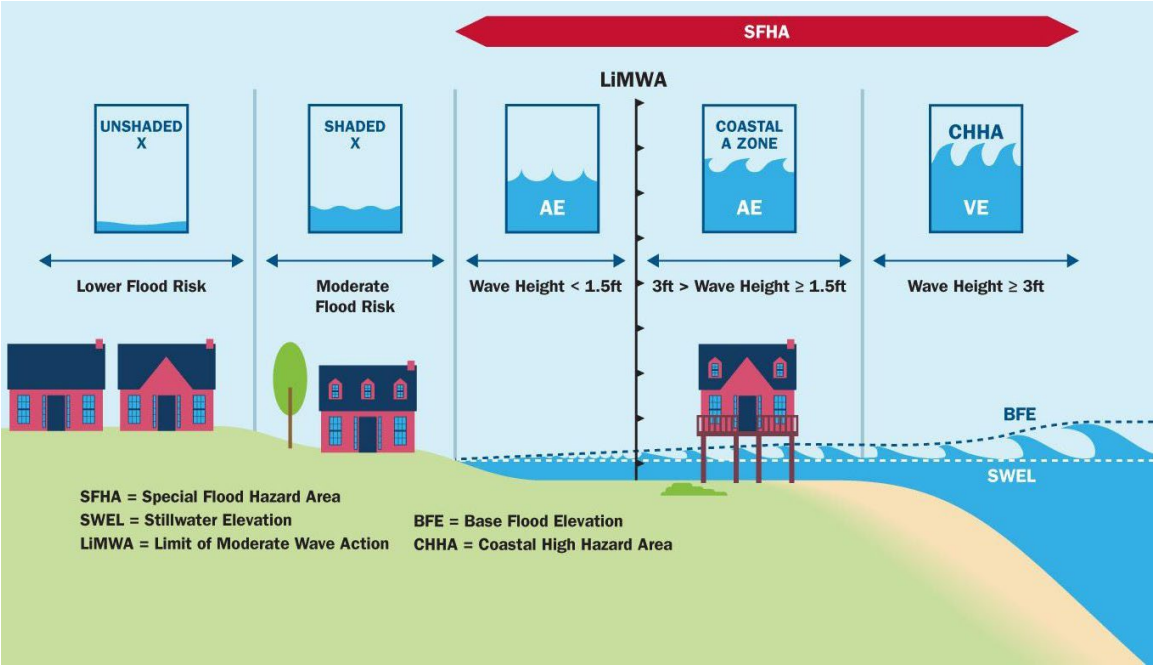


Figure 6b, “Coastal Transect Schematic (Overland Wave Propagation),” illustrates the relationship between the base flood elevation, the 1-percent-annual-chance stillwater elevation, and the ground profile as well as the location of the Zone VE and Zone AE in areas subject to overland wave propagation. This figure also illustrates energy dissipation and regeneration of a wave as it moves inland.

Figure 6b: Coastal Transect Schematic (Overland Wave Propagation)



Methods used in coastal analyses in this Flood Risk Project are presented in Section 5.3 and mapping methods are provided in Section 6.4 of this FIS Report.

Coastal floodplains are shown on the FIRM using the symbology described in Figure 3, "Map Legend for FIRM." The BFE mapped on the FIRM at the shoreline is determined by the 1-percent-annual-chance total water elevation, which includes the stillwater elevation plus wave effects. The 1-percent-annual-chance total water elevations are included in Table 16, along with the statistical stillwater elevations. If the BFE on the FIRM is higher than the stillwater elevations shown in Table 16 due to the presence of wave effects, the higher elevation should be used for construction and/or floodplain management purposes.

2.5.4 Limit of Moderate Wave Action

Laboratory tests and field investigations have shown that wave heights as little as 1.5 feet can cause damage to and failure of typical Zone AE building construction. Wood-frame, light gage steel, and masonry walls on shallow footings or slabs are subject to damage when exposed to waves less than 3 feet in height. Other flood hazards associated with coastal waves (floating debris, high velocity flow, erosion, and scour) can also damage Zone AE construction.

Therefore, a LiMWA boundary may be shown on the FIRM as an informational layer to assist coastal communities in safe rebuilding practices. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The location of the LiMWA relative to Zone VE and Zone AE is shown in Figure 6b.

The effects of wave hazards in Zone AE between Zone VE (or the shoreline where Zone VE is not identified) and the LiMWA boundary are similar to, but less severe than, those in Zone VE where 3-foot or greater breaking waves are projected to occur during the 1-

percent-annual-chance flooding event. Communities are therefore encouraged to adopt and enforce more stringent floodplain management requirements than the minimum NFIP requirements in areas lakeward of the LiMWA. The NFIP Community Rating System provides credits for these actions.

In areas where wave runup elevations dominate over wave crest elevations (Figure 6a), the LiMWA should not be shown on the FIRM. Examples of runup dominated areas include shorelines with steeply sloped beaches, bluffs, or flood protection structures that lie parallel to the shore. Similarly, in areas where the Zone VE designation is based on the presence of a PFD or wave overtopping, the LiMWA is not shown on the FIRM.

The LiMWA was not applicable for any transects within this county.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, "Map Legend for FIRM." Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in Kewaunee County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Algoma, City of	AE, AO, VE, X
Casco, Village of	AE, X
Kewaunee, City of	AE, AO, VE, X
Kewaunee County, Unincorporated Areas	A, AE, AO, VE, X
Luxemburg, Village of	A, AE, X

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 4 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a

brief description of the basin, and its drainage area.

Table 4: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Door-Kewaunee	04030102	Kewaunee River	Watershed covering the northern portion of Kewaunee County	766
Lake Michigan	04060200	Lake Michigan	Watershed covering the shoreline of Kewaunee County	22,473
Manitowoc-Sheboygan	04030101	Manitowoc River	Watershed covering the southern portion of Kewaunee County	1,630

4.2 Principal Flood Problems

Table 5 contains a description of the principal flood problems that have been noted for Kewaunee County by flooding source.

Table 5: Principal Flood Problems

Flooding Source	Description of Flood Problems
Ahnapee River	Serious flooding has historically generally resulted from the combination of both the wind acting on the high-water levels in Lake Michigan and flooding of the river.

Table 6 contains information about historic flood elevations in the communities within Kewaunee County.

Table 6: Historic Flooding Elevations

[Not Applicable to this FIS Project]

4.3 Dams and Other Flood Hazard Reduction Measures

Table 7 contains information about non-levee flood protection measures within Kewaunee County such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 7: Dams and Other Flood Hazard Reduction Measures

[Not Applicable to this FIS Project]

4.4 Levee Systems

This section is not applicable to this FIS Project

Table 8: Levee Systems

[Not Applicable to this FIS Project]

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources 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 are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 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-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 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.

In addition to these flood events, the “1-percent-plus”, or “1%+”, annual chance flood elevation has been modeled and included on the flood profile for certain flooding sources in this FIS Report. These flooding sources include Chopsticks Brook, Kewaunee River, School Creek, Silver Creek, and Unnamed Stream. While not used for regulatory or insurance purposes, this flood event has been calculated to help illustrate the variability range that exists between the regulatory 1-percent-annual-chance flood elevation and a 1-percent-annual-chance elevation that has taken into account an additional amount of uncertainty in the flood discharges (thus, the 1% “plus”). For flooding sources whose discharges were estimated using regression equations, the 1%+ flood elevations are derived by taking the 1-percent-annual-chance flood discharges and increasing the modeled discharges by a percentage equal to the average predictive error for the regression equation. For flooding sources with gage- or rainfall-runoff-based discharge estimates, the upper 84-percent confidence limit of the discharges is used to compute the 1%+ flood elevations.

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 12. Greater detail (including assumptions, analysis,and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 9.

Table 9: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Ahnapee River	Algoma corporate limit	49.8	870	*	1,810	2,200	*	3,600
Ahnapee River	Ahnapee River at sewage treatment plant in Algoma	117	3,700	*	6,600	8,200	*	12,600
Ahnapee River	Above confluence with Silver Creek	50	870	*	1,810	2,200	*	3,600
Casco Creek	Mouth (1.5 miles southwest of Casco)	15	1,020	*	1,750	2,100	*	3,050
Casco Creek	At private road in NE1/4, Sec. 8, T24N, R24E	7.9	570	*	940	1,100	*	1,600
Casco Creek	At County Highway S in NE¼, Sec. 31, T25N R24E	3.6	275	*	440	510	*	725
Casco Creek	Western Corporate Limit	10.3	720	*	1,200	1,450	*	2,100
Chopsticks Brook	Near the intersection of Navarino St. and Buchanan St.	0.8	68	89	104	119	145	156
East Twin River	At southern county boundary	55.4	1,290	*	2,575	3,360	*	5,300
Kewaunee River	At mouth	137.2	5,260	*	7,900	8,950	*	11,860
Kewaunee River	At County Highway in S 1/4, Sec. 29, T24N, R24E	111.6	4,740	*	7,120	8,080	*	10,700

*Not calculated for this Flood Risk Project

Table 9: Summary of Discharges (*Continued*)

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Kewaunee River	At Rocky Ledge Road	66.2	3,650	*	5,490	6,220	*	8,240
Kewaunee River	At State Highway 54	65.6	3,640	*	5,460	6,190	*	8,200
Kewaunee River	At County Highway K	20.9	2,050	*	3,080	3,500	*	4,630
Kewaunee River	Approximately 0.4 miles upstream of the mouth next to Rt. 42 (Main St.)	142.8	5,419	7,229	8,660	10,152	13,139	13,858
Kewaunee River	Approximately 0.5 miles upstream of intersection of County Rd. C and County Rd. FF	132.4	5,080	6,777	8,118	9,517	12,316	12,990
Kewaunee River	Approximately 1.2 miles upstream of intersection of County Rd. C and County Rd. FF	130.3	5,012	6,686	8,009	9,388	12,150	12,815
Kewaunee River	Approximately 1.5 miles upstream of intersection of County Rd. C and County Rd. FF	127.3	4,913	6,554	7,851	9,203	11,911	12,563
Kewaunee River	Approximately 2.4 miles upstream of intersection of County Rd. C and County Rd. FF	126.3	4,880	6,510	7,799	9,142	11,832	12,479
Kewaunee River	Near the intersection of Clyde Hill Rd and County Rd. E	124.8	4,831	6,445	7,720	9,050	11,712	12,353

*Not calculated for this Flood Risk Project

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Kewaunee River	Approximately 0.9 miles upstream of the intersection of Clyde Hill Rd and County Rd. E	122.6	4,755	6,344	7,599	8,908	11,528	12,159
Kewaunee River	Approximately 1.5 miles upstream of the intersection of Clyde Hill Rd and County Rd. E	121.7	4,726	6,305	7,553	8,853	11,458	12,085
Kewaunee River	Near the intersection of County Rd. A and County Rd. C	121	4,705	6,276	7,518	8,813	11,405	12,029
Kewaunee River	Next to the Ahnapee State Trail, approximately 0.3 miles upstream of County Rd. A	120.2	4,678	6,240	7,474	8,762	11,339	11,960
Kewaunee River	0.4 miles the confluence of Kewaunee River with Lake Michigan	114.3	4,479	5,975	7,157	8,389	10,858	11,452
Kewaunee River	Approximately 0.3 miles upstream of the intersection of County Rd. A and County Rd. C	142.5	5,411	7,218	8,648	10,137	13,119	13,837
Kewaunee River	Approximately 1.4 miles upstream of Hillside Rd. bridge	113.6	4,456	5,944	7,120	8,346	10,802	11,393
Kewaunee River	Approximately 1.7 miles upstream of Ryans Corner from County C Rd. bridge	32.8	1,537	2,050	2,453	2,875	3,721	3,924
Kewaunee River	Approximately 2.3 miles upstream of Ryans Corner from County C Rd. bridge	90.5	3,669	4,894	5,860	6,870	8,891	9,377

*Not calculated for this Flood Risk Project

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Kewaunee River	Approximately 0.7 miles downstream of Hillside Rd. bridge	89.2	3,623	4,833	5,788	6,785	8,781	9,261
Kewaunee River	Approximately 0.2 miles downstream of Hillside Rd. bridge	69.4	2,924	3,901	4,670	5,474	7,085	7,472
Kewaunee River	Approximately 0.7 miles upstream of Hillside Rd. bridge	69.2	2,916	3,890	4,657	5,459	7,065	7,452
Kewaunee River	Approximately 0.4 miles downstream the	63.8	2,719	3,627	4,342	5,090	6,587	6,948
Kewaunee River	Approximately 1.7 miles upstream of the confluence of Kewaunee River with Lake Michigan	32.2	1,513	2,018	2,414	2,830	3,662	3,863
Kewaunee River	At River Rd. bridge	141.1	5,365	7,157	8,574	10,051	13,008	13,720
Kewaunee River	Approximately 0.5 miles upstream of River Rd. bridge	31.9	1,504	2,006	2,400	2,814	3,641	3,841
Kewaunee River	Near the intersection of Count Rd. K and County Rd. AB	31.4	1,484	1,979	2,368	2,776	3,592	3,789
Kewaunee River	Approximately 3 miles upstream of the confluence of Kewaunee River with Lake Michigan	21.8	1,086	1,449	1,733	2,031	2,629	2,773
Kewaunee River	Near County Rd. E, approximately 3.3 miles upstream of the confluence of Kewaunee River with Lake Michigan	139.3	5,305	7,077	8,478	9,938	12,862	13,566

*Not calculated for this Flood Risk Project

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Kewaunee River	At County Rd. F bridge, near the intersection of County Rd. F and Ransom Moore Ln.	139.2	5,302	7,072	8,473	9,932	12,854	13,557
Kewaunee River	At County Rd. F bridge, near the intersection of County Rd. F and Ransom Moore Ln.	0.8	68	89	104	119	145	156
Kewaunee River	Approximately 3.9 miles upstream of the confluence of Kewaunee River with Lake Michigan	133.7	5,122	6,833	8,185	9,595	12,418	13,098
Kewaunee River	Approximately 4.3 miles upstream of the confluence of Kewaunee River with Lake Michigan	138.9	5,292	7,059	8,457	9,913	12,830	13,532
Kewaunee River	Approximately 0.6 miles downstream of the County Rd. F bridge	137.6	5,251	7,005	8,392	9,837	12,732	13,428
Kewaunee River	Approximately 0.3 miles downstream of the County Rd. F bridge	135.5	5,183	6,914	8,282	9,709	12,565	13,253
Neshota River	At Brown-Manitowoc County Boundary	44.0	2,250	*	3,700	4,400	*	6,300
Scarboro Creek	At Mouth	21.8	1,450	*	2,500	3,000	*	4,400
Scarboro Creek	At County Highway A	20.4	1,390	*	2,400	2,880	*	4,200
Scarboro Creek	At Town Road in SW1/4, Sec.35 T24N, R23E	16.6	1,200	*	2,100	2,500	*	3,700

*Not calculated for this Flood Risk Project

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
School Creek	At Town Road near mouth in the NW1/2, Scec. 11, T24N, R23E	24.6	1,375	*	2,300	2,750	*	3,500
School Creek	At County Highway A north of Luxemburg	23.7	1,300	*	2,150	2,550	*	3,250
School Creek	Downstream State Highway 54 bridge in 3 bridge group (2.0 miles west of Luxemburg)	14.9	550	*	900	1,075	*	1,400
School Creek	Approximately 0.2 miles downstream of Valley Rd. bridge	27.5	1,270	1,620	1,860	2,100	2,562	2,620
School Creek	Approximately 0.4 miles upstream of Valley Rd. bridge	27.2	1,220	1,550	1,780	2,000	2,440	2,490
School Creek	Approximately 0.2 miles downstream of County Rd. A bridge, near Paul Ln.	26.6	1,180	1,490	1,710	1,930	2,355	2,390
School Creek	Approximately 0.5 miles upstream of County Rd. A bridge, near School Creek Trail	23.5	1,070	1,350	1,550	1,750	2,135	2,170
School Creek	Approximately 0.2 miles upstream of County Rd. A bridge, near intersection of County Rd. A and N Main St.	26.4	1,180	1,500	1,720	1,940	2,367	2,410
School Creek	Approximately 0.8 miles upstream of County Rd. A bridge, near School Creek Trail	23.3	1,070	1,350	1,550	1,750	2,135	2,180
School Creek	Approximately 0.4 miles downstream of Rendezvous Rd. bridge	23.1	1,060	1,350	1,550	1,750	2,135	2,170

*Not calculated for this Flood Risk Project

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
School Creek	Approximately 0.3 miles upstream of WI-54 near the intersection of Hillview Rd. and WI-54	17.1	789	1,000	1,150	1,300	1,586	1,610
School Creek	Near the intersection of County Rd. H and WI-54	16.8	795	1,010	1,160	1,310	1,598	1,630
School Creek	Approximately 0.9 miles the intersection of County Rd. H and WI-54	14.9	1,270	1,620	1,860	2,100	2,562	2,620
Silver Creek	West Algoma city limit	66.8	2,500	*	5,000	6,200	*	10,000
Silver Creek	County Highway S	60.3	2,360	*	4,720	5,860	*	9,450
Silver Creek	County Highway D	58.2	2,310	*	4,630	5,740	*	9,250
Silver Creek	At the confluence of Silver Creek and Ahnapee River	57.7	1,230	1,570	1,820	2,060	2,513	2,600
Silver Creek	Approximately 0.5 miles upstream of the confluence of Silver Creek and Ahnapee River	56.8	1,160	1,470	1,700	1,920	2,342	2,410
Silver Creek	Approximately 0.4 miles upstream of the confluence of Silver Creek and Ahnapee River	57.6	1,200	1,530	1,760	2,000	2,440	2,510
Silver Creek	Approximately 0.6 miles upstream of the confluence of Silver Creek and Ahnapee River	56.7	1,150	1,470	1,690	1,910	2,330	2,400

*Not calculated for this Flood Risk Project

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (CFS)					
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	1% Plus Annual Chance	0.2% Annual Chance
Silver Creek	Approximately 1.1 miles upstream of the confluence of Silver Creek and Ahnapee River near Sunset Ave.	56.3	1,130	1,440	1,660	1,880	2,294	2,350
Silver Creek	Approximately 1.5 miles upstream of the confluence of Silver Creek and Ahnapee River	56	1,110	1,410	1,630	1,830	2,233	2,290
Silver Creek	Approximately 0.5 miles upstream of Willow Dr. bridge	53.9	1,050	1,330	1,530	1,730	2,111	2,150
Silver Creek	Between Ahnapee State Trail and County Rd. S	52.2	991	1,250	1,440	1,620	1,976	2,020
Silver Creek	Approximately 0.1 miles upstream of County Rd. S bridge (between County Rd. D and Poplar Dr.)	51.9	992	1,260	1,440	1,630	1,989	2,020
Silver Creek	Approximately 0.5 miles upstream of County Rd. S bridge (between County Rd. D and Poplar Dr.)	51.4	991	1,260	1,440	1,630	1,989	2,030
Silver Creek	Near the intersection of County Rd. D and W Wilson Rd.	49.8	943	1,190	1,370	1,540	1,879	1,920
Silver Creek	Approximately 0.4 miles upstream of County Rd. D bridge	49.4	948	1,200	1,380	1,550	1,891	1,930
Unnamed Tributary	Approximately 0.2 miles upstream of County Rd. A bridge, near Paul Ln.	0.5	74	96	112	128	156	164

*Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves

[Not Applicable to this FIS Project]

Table 10: Summary of Non-Coastal Stillwater Elevations

[Not Applicable to this FIS Project]

Table 11: Stream Gage Information used to Determine Discharges

[Not Applicable to this FIS Project]

5.2 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. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on theFIRM 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. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 6.3), selected cross sections are also listed in Table 23, “Floodway Data.”

A summary of the methods used in hydraulic analyses performed for this project is provided in Table 12. Roughness coefficients are provided in Table 13. Roughness coefficients are values representing the frictional resistance water experiences when passing overland or through a channel. They are used in the calculations to determine water surface elevations. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

Table 12: Summary of Hydrologic and Hydraulic Analyses

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Ahnapee River	Lake Michigan	Approximately 2.3 miles upstream from confluence with Lake Michigan	Regression Equations	E 431 step-backwater computer program	1978	AE w/ Floodway, AO	The special flood hazards at the mouth have been slightly modified to tie into coastal flood hazards. Regression Equations developed by Conger (1971) were used. Field survey for channel and structure geometry was used. Redelineated in 2021.
Ahnapee River	Approximately 2.3 miles upstream from confluence with Lake Michigan	Approximately 3.4 miles upstream from confluence with Lake Michigan	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Bremmer Creek	Confluence with Silver Creek	At Kewaunee County boundary	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Buck Creek	Approximately 125 feet downstream of County Road BB crossing	Approximately 1,280 feet upstream Schweiner Road	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Casco Creek	Above confluence with Kewaunee River	Approximately 9.3 miles upstream from confluence with Kewaunee River	Regression Equations	E 431 step-backwater computer program	1979	AE w/ Floodway	Regression Equations developed by Conger (1971) were used. Field surveys for channel and structure geometry. Redelineated in 2021.

Table 12: Summary of Hydrologic and Hydraulic Analyses *(Continued)*

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Chopsticks Brook	Confluence with Silver Creek	0.1 miles southwest of intersection of Feld Street and Sunset Avenue	Regression Equations	HEC-RAS 3.1.1 and up	2021	AE w/ Floodway	
East Twin River	County Highway BB	Approximately 200 feet upstream of Nuclear Road	Regression Equations	E 431 step-backwater computer program	1980	AE w/ Floodway	Regression Equations developed by Conger (1971) were used. Field surveys for channel and structure geometry. Redelineated in 2021.
East Twin River	Approximately 200 feet upstream of Nuclear Road	Approximately 550 feet upstream of County Road F	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
East Twin River Tributary 1	Confluence with East Twin River	Approximately 10,219 feet upstream from confluence with East Twin River	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Jambo Creek	County Road BB crossing	Approximately 8,068 feet upstream from County Road BB crossing	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Kewaunee River	2,230 feet downstream of State Highway 42	Approximately 110 feet upstream of County Road A	PEAKFQ 2.4 (April 1998) and up	HEC-RAS 3.1.1 and up	2021	AE w/ Floodway	Approximately 7,450 feet of flood hazards upstream of Lake Michigan were modified to tie into the new coastal flood hazards in 2021.

Table 12: Summary of Hydrologic and Hydraulic Analyses *(Continued)*

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Kewaunee River	Approximately 110 feet upstream of County Road A	At Thiry Daems Road	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Krok Creek	Confluence with East Twin River	Approximately 26,352 feet upstream from confluence with East Twin River	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Luxemburg Creek	Above confluence with Kewaunee River	Approximately 13,259 feet upstream from confluence with Kewaunee River	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Luxemburg Creek Tributary 1	Confluence with Luxemburg Creek	Approximately 3,016 feet upstream from confluence with Luxemburg Creek	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Macco Creek	Confluence with Green Bay (Lake Michigan)	Approximately 6,072 feet upstream from confluence with Green Bay (Lake Michigan)	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	The special flood hazards at the mouth have been slightly modified to tie into coastal flood hazards

Table 12: Summary of Hydrologic and Hydraulic Analyses *(Continued)*

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Neshota River	Approximately 125 feet downstream of County Road BB crossing	Approximately 821 feet downstream of County Road BB crossing	National Engineering Handbook – Section 4	HEC-2	2006	AE w/ Floodway	Field surveys for channel and structure geometry; floodway data for Neshota River shown in Brown County.
Rio Creek	Confluence with Silver Creek	Approximately 24,161 feet upstream from confluence with Silver Creek	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	The overflow from Rio Creek leaves the system and flows into Silver Creek Tributary 1. This is reflected in the HECRAS model for Rio Creek where Silver Creek Tributary 1 is included. The mapping is based on this HECRAS model.
Scarboro Creek	Confluence with Kewaunee River	Approximately 7,226 feet downstream of Valley Road crossing	Regression Equations	E 431 step-backwater computer program	1980	AE w/ Floodway	Regression Equations developed by Conger (1971) were used. Field surveys for channel and structure geometry. Redelineated in 2021.
Scarboro Creek	Approximately 7,226 feet downstream of Valley Road crossing	Approximately 1,730 feet upstream of Hill Road	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
School Creek	Above confluence with Kewaunee River	Western boundary of Kewaunee County Unincorporated Areas	Regression Equations	HEC-RAS 3.1.1 and up	2021	AE w/ Floodway	

Table 12: Summary of Hydrologic and Hydraulic Analyses *(Continued)*

Flooding Source	Study Limits Downstream Limit	Study Limits Upstream Limit	Hydrologic Model or Method Used	Hydraulic Model or Method Used	Date Analyses Completed	Flood Zone on FIRM	Special Considerations
Silver Creek	Confluence with Ahnapee River	Approximately 1,300 feet downstream town boundary	Regression Equations	HEC-RAS 3.1.1 and up	2021	AE w/ Floodway	
Silver Creek	Approximately 1,300 feet downstream town boundary	Approximately 3,140 feet upstream of Partridge Road	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Silver Creek Tributary 1	Above confluence with Silver Creek	Approximately 13,529 feet upstream from confluence with Silver Creek	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	
Stoney Creek	Lake Michigan	At Door County boundary	Regression Equations	HEC-RAS 3.1.1 and up	2015	A	The special flood hazards at the mouth have been slightly modified to tie into coastal flood hazards
Unnamed Stream	At confluence with School Creek	0.3 miles south of Rogue Lane	Regression Equations	HEC-RAS 3.1.1 and up	2021	AE w/ Floodway	

Table 13: Roughness Coefficients

Flooding Source	Channel "n"	Overbank "n"
Ahnapee River	0.040	0.080-0.120
Ahnapee River (City of Algoma)	0.030-0.038	0.025-0.150
Ahnapee River (Unincorporated Areas)	0.025-0.032	0.040-0.160
Bremmer Creek	0.055	0.150
Buck Creek	0.055	0.050-0.150
Casco Creek (Village of Casco)	0.033-0.040	0.055-0.120
Casco Creek (Unincorporated Areas)	0.040-0.060	0.060-0.120
Chopsticks Brook	0.045-0.050	0.045-0.150
East Twin River	0.045-0.055	0.060-0.150
East Twin River (Unincorporated Areas)	0.040-0.045	0.080-0.120
East Twin River Tributary 1	0.055	0.060-0.150
Jambo Creek	0.055	0.060-0.150
Kewaunee River	0.040	0.080-0.120
Kewaunee River (City of Kewaunee)	0.055-0.090	0.025-0.028
Kewaunee River (Unincorporated Areas)	0.028-0.045	0.055-0.120
Krok Creek	0.055	0.120-0.150
Luxemburg Creek	0.040-0.055	0.050-0.150
Luxemburg Creek Tributary 1	0.040-0.055	0.050-0.150
Macco Creek	0.060	0.030-0.100
Neshota River	*	*
Rio Creek	0.055	0.060-0.150
Scarboro Creek	0.044	0.070-0.130
Scarboro Creek (Unincorporated Areas)	0.035-0.045	0.055-0.110
School Creek	0.045-0.050	0.090-0.150
School Creek (Unincorporated Areas)	0.034-0.040	0.060-0.150
School Creek Tributary 1	0.035-0.050	0.040-0.100
Silver Creek	0.050-0.055	0.060-0.150

*Data not available

Table 13: Roughness Coefficients (*continued)*

Flooding Source	Channel "n"	Overbank "n"
Silver Creek (City of Algoma)	0.032-0.038	0.035-0.150
Silver Creek (Unincorporated Areas)	0.030-0.040	0.055-0.120
Stony Creek	0.045-0.055	0.060-0.150
Unnamed Stream	0.045-0.070	0.050-0.160

*Data not available

5.3 Coastal Analyses

For the areas of Kewaunee County that are impacted by coastal flooding processes, coastal flood hazard analyses were performed to provide estimates of coastal BFEs. Coastal BFEs reflect the increase in water levels during a flood event due to storm surge as well as overland wave effects.

The following subsections provide summaries of how each coastal process was considered for this FIS Report. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation (STARR, 2017). Table 14 summarizes the methods and/or models used for the coastal analyses. Refer to Section 2.5.1 for descriptions of the terms used in this section.

Table 14: Summary of Coastal Analyses

Flooding Source	Study Limits From	Study Limits To	Hazard Evaluated	Model or Method Used	Date Analysis was Completed
Lake Michigan	Modeling starts at the northern boundary of Kewaunee County, WI where it meets Door County, WI	Modeling ends at the southern boundary of Kewaunee County where it meets Brown/Manitowoc Counties	Lake-wide Storm Surge	Advanced Circulation Model (ADCIRC)	10/31/2016
Lake Michigan	Modeling starts at the northern boundary of Kewaunee County, WI where it meets Door County, WI	Modeling ends at the southern boundary of Kewaunee County where it meets Brown/Manitowoc Counties	Lake-wide Wave Generation	Simulating Waves Nearshore Model (SWAN)	10/31/2016

Table 14: Summary of Coastal Analyses *(Continued)*

Flooding Source	Study Limits From	Study Limits To	Hazard Evaluated	Model or Method Used	Date Analysis was Completed
Lake Michigan	Modeling starts at the northern boundary of Kewaunee County, WI where it meets Door County, WI	Modeling ends at the southern boundary of Kewaunee County where it meets Brown/Manitowoc Counties	Event-Based Erosion	Cross-Shore Numerical Model (CSHORE)	12/31/2017
Lake Michigan	Modeling starts at the northern boundary of Kewaunee County, WI where it meets Door County, WI	Modeling ends at the southern boundary of Kewaunee County where it meets Brown/Manitowoc Counties	Overland Wave Propagation	Joint Probability Method (JPM); WHAFIS	12/31/2017
Lake Michigan	Modeling starts at the northern boundary of Kewaunee County, WI where it meets Door County, WI	Modeling ends at the southern boundary of Kewaunee County where it meets Brown/Manitowoc Counties	Statistical Analyses	GPD with Q-Q Optimization	12/31/2017
Lake Michigan	Modeling starts at the northern boundary of Kewaunee County, WI where it meets Door County, WI	Modeling ends at the southern boundary of Kewaunee County where it meets Brown/Manitowoc Counties	Wave Setup	Direct Integration Method (DIM)	12/31/2017
Lake Michigan	Modeling starts at the northern boundary of Kewaunee County, WI where it meets Door County, WI	Modeling ends at the southern boundary of Kewaunee County where it meets Brown/Manitowoc Counties	Wave Runup	Stockdon, Van Gent, and Shore Protection Manual (SPM)[1]	12/31/2017
Lake Michigan	Modeling starts at the northern boundary of Kewaunee County, WI where it meets Door County, WI	Modeling ends at the southern boundary of Kewaunee County where it meets Brown/Manitowoc Counties	Wave Overtopping	EurOtop Manual; Plateau Method	12/31/2017

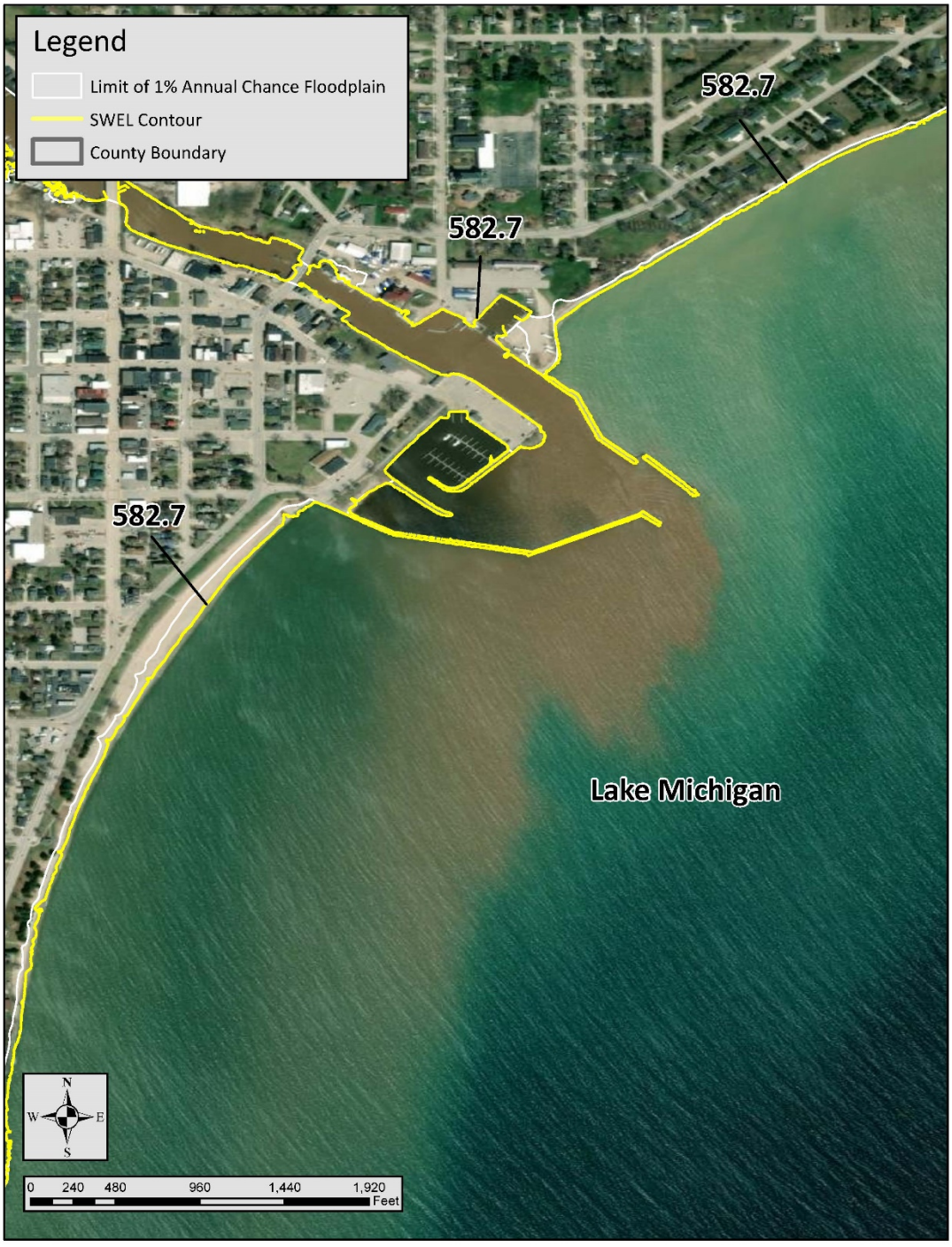
[1] U.S. Army Corps of Engineers (USACE) Shore Protection Manual (SPM). (USACE, 1984)

5.3.1 Total Stillwater Elevations

The stillwater elevations for the 1-percent-annual-chance flood were determined for areas subject to coastal flooding. The models and methods that were used to determine storm surge and wave setup are listed in Table 14. The stillwater elevation that was used for each transect in the coastal analyses is shown in Table 16, “Coastal Transect Parameters.” Figure 8 shows an example of the stillwater elevations for the 1-percent-annual-chance flood that was determined for this coastal analysis; wave setup is computed at each transect location and added to the stillwater elevation to determine a total stillwater elevation.

Stillwater elevations and starting wave conditions for Kewaunee County were determined from the lake-wide wave and storm surge study conducted for Lake Michigan by FEMA and Strategic Alliance for Risk Reduction (STARR, 2016). The study was performed using the coupled SWAN + ADCIRC hydrodynamic and wave model on a mesh of 1,045,141 nodes and validated using water levels and waves for six historical storms. The model was then used to simulate 150 selected historic storms based on historic peak water levels and peak wave heights. When available, ice coverage was accounted for in validation and production events. The modeled data were used to create a history of water elevation and wave height records from which the 10-, 2-, 1-, and 0.2-percent-annual-chance of exceedance elevations were calculated.

Figure 8: 1% Annual Chance Total Stillwater Elevations for Coastal Areas



Storm Surge Statistics

Storm surge is modeled based on characteristics of actual storms responsible for significant coastal flooding. The characteristics of these storms are typically determined by statistical study of the regional historical record of storms or by statistical study of water level stations.

When historic records are used to calculate storm surge, characteristics such as the strength, size, track, etc., of storms are identified by site. Storm data was used in conjunction with numerical hydrodynamic models to determine the corresponding storm surge levels. An extreme value analysis was performed on the storm surge modeling results to determine a stillwater elevation for the 1-percent-annual-chance event.

In an oceanic environment, water level stations can be used instead of historic records of storms when the available station record for the area represents both the astronomical tide component and the storm surge component. Great Lakes studies rely on water level stations to identify the highest water level storm events from the historic record. The selected storms are then used to simulate storm surge and wave heights across the study area. Table 15 provides the water level station name, managing agency, station type, station identifier, start date, end date, and statistical methodology applied to each station to determine the stillwater elevations.

Table 15: Tide Gage Analysis Specifics

Station Name	Managing Agency of Station	Station Type	Start Date	End Date[1]	Statistical Methodology
Calumet Harbor, IL (9087044)	National Oceanic and Atmospheric Administration (NOAA)	Water Level	1960	2009	N/A
Green Bay, WI (9087079)	NOAA	Water Level	1960	2009	N/A
Holland, MI (9087031)	NOAA	Water Level	1960	2009	N/A
Kewaunee, WI (9087068)	NOAA	Water Level	1973	2009	N/A
Ludington, MI (9087023)	NOAA	Water Level	1960	2009	N/A
Mackinaw City, MI (9075080)	NOAA	Water Level	1960	2009	N/A

[1]Available data within study period of record (1960-2009); prior to 1970, only monthly measured data is available.

Table 15: Tide Gage Analysis Specifics *(Continued)*

Station Name	Managing Agency of Station	Station Type	Start Date	End Date[1]	Statistical Methodology
Milwaukee, WI (9087057)	NOAA	Water Level	1960	2009	N/A
Port Inland, MI (9087096)	NOAA	Water Level	1964	2009	N/A
Sturgeon Bay, WI (9087072)	NOAA	Water Level	1960	2009	N/A

[1]Available data within study period of record (1960-2009); prior to 1970, only monthly measured data is available.

The storm surge modeling was performed with elevation data referenced to the long term low water datum. At the time of this study, the low water datum for Lake Michigan was 577.6 feet NAVD88 or 577.5 feet IGLD85.

5.3.2 Waves

Starting wave heights and wave periods for Kewaunee County were determined from the lake-wide wave and storm surge study conducted for Lake Michigan by FEMA and STARR as described in Section 5.3.1. The modeled data were used to create a history of wave height and wave period records which was used to determine starting wave conditions for the transect analysis.

Wave Setup Analysis

Wave setup was computed based on the wave and water level modeling results through the methods and models listed in Table 14. To adequately capture the complex hydrodynamics of wave-breaking across the surf zone, wave setup was calculated at each transect using the Direct Integration Method (DIM).

5.3.3 Coastal Erosion

A single storm episode can cause extensive erosion in coastal areas. Storm-induced erosion was evaluated using the methods listed in Table 14 to determine the modification to existing topography that is expected to be associated with coastal flooding events. The post-event eroded profile was used for the subsequent transect-based onshore wave hazard analyses.

5.3.4 Wave Hazard Analyses

Overland wave hazards were evaluated to determine the combined effects of ground elevation, vegetation, and physical features on overland wave propagation and wave runup. These analyses were performed at representative transects where waves are expected to be present during the floods of the selected recurrence intervals. The results of these analyses were used to determine elevations for the 1-percent-annual-chance

flood. The transect analysis was performed with elevations in the vertical datum of IGLD85 and ultimately converted to NAVD88 for mapping.

Transect locations were chosen with consideration given to the physical land characteristics as well as development type and density so that they would closely represent conditions in their locality. Additional consideration was given to changes in the total stillwater elevation. Transects were spaced close together in areas of complex topography and dense development or where total stillwater elevations varied. In areas having more uniform characteristics, transects were spaced at larger intervals. Transects shown in Figure 9, “Transect Location Map,” are also depicted on the FIRM. Table 16 provides the location, stillwater elevations, and total water elevations for all coastal analysis transects. Starting wave conditions are also provided for each transect evaluated for overland wave hazards. In this table, “starting” indicates the parameter value at the beginning of the transect.

Wave Height Analysis

Wave height analyses were performed to determine wave heights and corresponding wave crest elevations for the areas inundated by coastal flooding and subject to overland wave propagation hazards. Refer to Figure 6b for a schematic of a coastal transect evaluated for overland wave propagation hazards.

The methodology for analyzing the effects of wave heights associated with coastal storm surge flooding is described in a report prepared by the National Academy of Sciences (NAS). This method is based on three major concepts. First, depth-limited waves in shallow water reach maximum breaking height that is equal to 0.78 times the stillwater depth. The wave crest is 70 percent of the total wave height above the stillwater level. The second major concept is that wave height may be diminished by dissipation of energy due to the presence of obstructions, such as sand dunes, dikes and seawalls, buildings and vegetation. The amount of energy dissipation is a function of the physical characteristics of the obstruction and is determined by procedures prescribed in the NAS Report. The third major concept is that wave height can be regenerated in open fetch areas due to the transfer of wind energy to the water. This added energy is related to fetch length and depth.

Along each transect, wave heights and wave crest elevations were computed considering the combined effects of changes in ground elevation, vegetation, and physical features. The joint probability method (JPM) is used to compute five theoretical combinations of wave and water level conditions that have a joint 1-percent-annual-chance probability of occurrence. These theoretical combinations were simulated to determine the water levels, which include wave setup, and wave conditions at the shoreline. Wave heights and wave crest elevations were modeled using the methods and models listed in Table 14

Wave Runup and Overtopping Analysis

Wave runup is the uprush of water caused by wave action on a shore barrier exceeding the total stillwater level. As part of the coastal study, an evaluation of wave runup is conducted to determine the total water elevation due to storm surge, wave setup, and wave runup, and whether that total water elevation is the dominant coastal flood hazard for an area. Wave runup is evaluated for areas having dune barrier systems, coastal

bluffs, as well as sloped and vertical structures.

Wave runup elevations were calculated for each coastal transect using the methods and models listed in Table 14, which follow the FEMA Guidelines and Specifications. For gently sloping shorelines (slopes less than 1:10), the Stockdon equations were applied (Stockdon et al., 2006). For steeper (but non-vertical) sloping shorelines, the van Gent method was performed (van Gent, 2001). For vertical structures, runup elevations were determined using the guidance in Figure D-14 of the FEMA Guidelines and Specifications obtained from the SPM (USACE, 1984). The SPM results in a mean wave runup value, which was multiplied by 2.2 to obtain the 2-percent runup height.

Wave overtopping occurs when the potential wave runup elevation is greater than the topographic feature crest elevation. The overtopping rate will depend on the incident water level and wave conditions, the barrier geometry and roughness characteristics, and the upland slope. Overtopping rates were calculated using the methods and models listed in Table 14, which follow the FEMA Guidelines and Specifications.

Wave overtopping behavior is determined based on the slope landward of the barrier crest. Where the shoreline geometry is characterized by a low-crested bluff or structure backed by a positively-sloping, nearly level upland, the Plateau Method was applied to calculate an adjusted runup elevation and the inland extent of runup. Where the shoreline geometry is characterized by a negative slope landward of the barrier crest, the overtopping water will result in sheet flow on the negative slope and may propagate until it reaches another flooding source or ponding area.

Table 16: Coastal Transect Parameters

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance[1,2]		Starting Stillwater Elevations (feet NAVD88)					1% Annual Chance Total Water Elevation[4] (ft NAVD88)
		Significant Wave Height H_s (feet)	Peak Wave Period T_p (second)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance[3]	0.2% Annual Chance	
Lake Michigan	1	N/A	N/A	582.0	582.4	582.6	582.7	583.0	589.2
Lake Michigan	2	N/A	N/A	581.9	582.2	582.4	582.5	582.8	590.2
Lake Michigan	3	N/A	N/A	581.9	582.2	582.4	582.6	582.8	590.5
Lake Michigan	4	N/A	N/A	582.0	582.3	582.5	582.7	582.9	588.1
Lake Michigan	5	4.8	5.9	581.9	582.3	582.5	582.6	582.9	585.6
Lake Michigan	6	N/A	N/A	581.9	582.3	582.5	582.6	582.9	590.9
Lake Michigan	7	N/A	N/A	581.9	582.2	582.4	582.6	582.8	588.4

[1]Wave data are provided for WHAFIS-based transects only. The 1% starting wave parameters are not applicable for runup transects since a response-based approach is utilized.
[2]Wave data correspond to the 1-percent-annual-chance floodplain but may not be directly associated with the 1-percent-annual-chance SWEL.
[3]Statistical 1-percent-annual-chance starting Stillwater elevation may be different than that used in WHAFIS wave analysis as a result of the Joint Probability approach
[4]Includes wave action representative of 1% Total Water Level (for wave runup and overtopping) or 1% Wave Crest Elevation (for overland wave propagation).
[*]Runup dominant at shoreface and WHAFIS dominant offshore.

Table 16: Coastal Transect Parameters *(Continued)*

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance[1,2]		Starting Stillwater Elevations (feet NAVD88)					1% Annual Chance Total Water Elevation[4] (ft NAVD88)
		Significant Wave Height H_s (feet)	Peak Wave Period T_p (second)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance[3]	0.2% Annual Chance	
Lake Michigan	8	N/A	N/A	581.9	582.2	582.4	582.6	582.8	591.1
Lake Michigan	9	N/A	N/A	581.9	582.2	582.4	582.6	582.8	590.5
Lake Michigan	10	N/A	N/A	581.9	582.2	582.4	582.6	582.8	590.2
Lake Michigan	11	7.9	8.9	581.9	582.2	582.4	582.6	582.8	589.8
Lake Michigan	12	N/A	N/A	581.9	582.3	582.5	582.6	582.9	585.8
Lake Michigan	13	N/A	N/A	581.9	582.2	582.4	582.6	582.9	591.2
Lake Michigan	14	7.6	10.3	581.9	582.3	582.5	582.6	582.9	584.8*

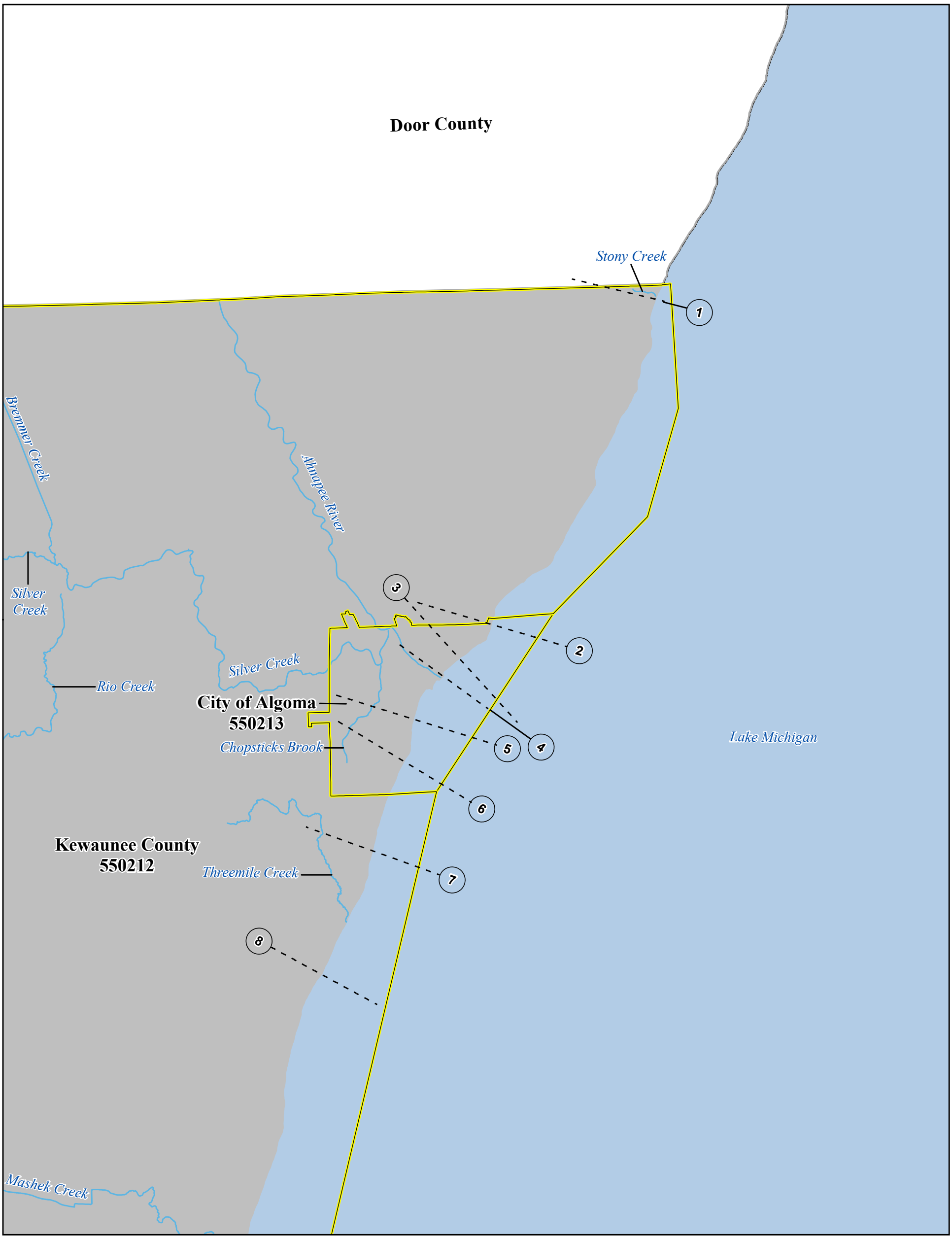
[1]Wave data are provided for WHAFIS-based transects only. The 1% starting wave parameters are not applicable for runup transects since a response-based approach is utilized.
[2]Wave data correspond to the 1-percent-annual-chance floodplain but may not be directly associated with the 1-percent-annual-chance SWEL.
[3]Statistical 1-percent-annual-chance starting Stillwater elevation may be different than that used in WHAFIS wave analysis as a result of the Joint Probability approach
[4]Includes wave action representative of 1% Total Water Level (for wave runup and overtopping) or 1% Wave Crest Elevation (for overland wave propagation).
*Runup dominant at shoreface and WHAFIS dominant offshore.

Table 16: Coastal Transect Parameters *(Continued)*

Flood Source	Coastal Transect	Starting Wave Conditions for the 1% Annual Chance[1,2]		Starting Stillwater Elevations (feet NAVD88)					1% Annual Chance Total Water Elevation[4] (ft NAVD88)
		Significant Wave Height H_s (feet)	Peak Wave Period T_p (second)	10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance[3]	0.2% Annual Chance	
Lake Michigan	15	3.5	3.9	583.1	583.6	583.8	584.0	584.3	585.1*
Lake Michigan	16	3.8	3.3	583.0	583.5	583.8	584.1	584.5	586.3*

[1]Wave data are provided for WHAFIS-based transects only. The 1% starting wave parameters are not applicable for runup transects since a response-based approach is utilized.
[2]Wave data correspond to the 1-percent-annual-chance floodplain but may not be directly associated with the 1-percent-annual-chance SWEL.
[3]Statistical 1-percent-annual-chance starting Stillwater elevation may be different than that used in WHAFIS wave analysis as a result of the Joint Probability approach
[4]Includes wave action representative of 1% Total Water Level (for wave runup and overtopping) or 1% Wave Crest Elevation (for overland wave propagation).
*Runup dominant at shoreface and WHAFIS dominant offshore.

Figure 9 - Transect Location Map

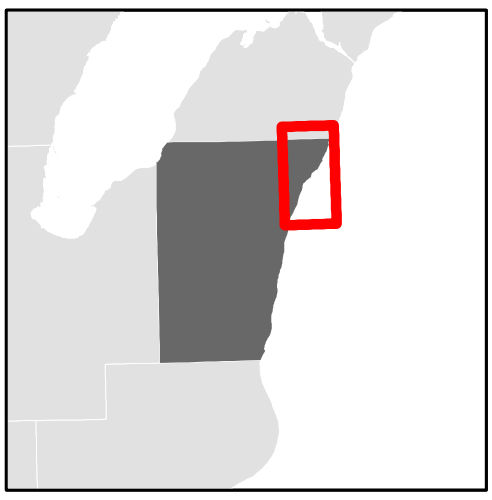


1 inch = 6,000 feet

Feet

0 3,000 6,000 12,000

Map Projection:
Wisconsin State Plane Zone South 4803; North American Datum 1983; North American Vertical Datum of 1988



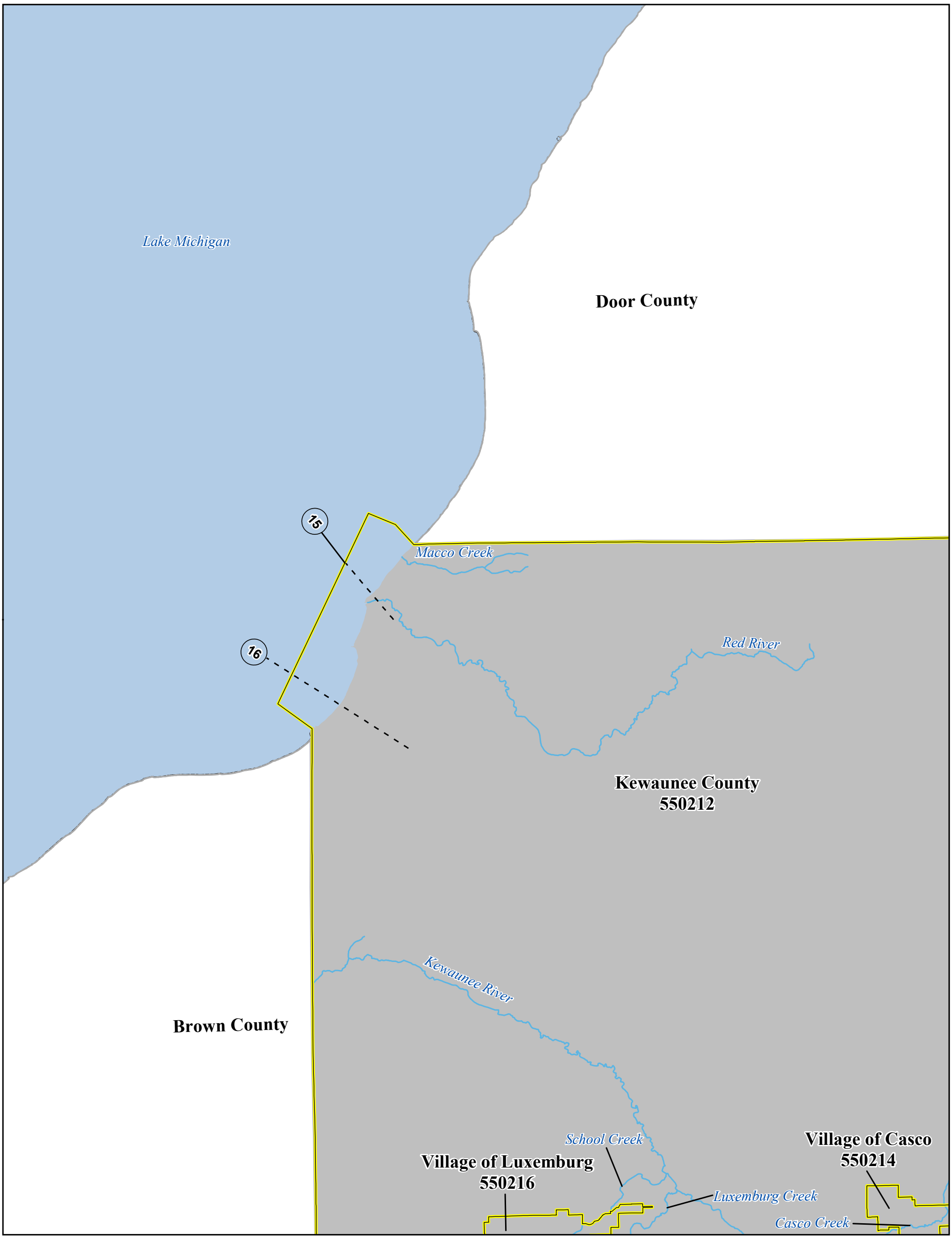
NATIONAL FLOOD INSURANCE PROGRAM

Transect Locator Map

PANELS WITH TRANSECTS:
0017, 0019, 0036, 0038, 0092, 0177, 0178, 0179, 0181, 0185, 0186, 0187, 0257, 0259, 0267, 0276, 0278, 0300, 0357, 0358, 0359, 0377

FEMA

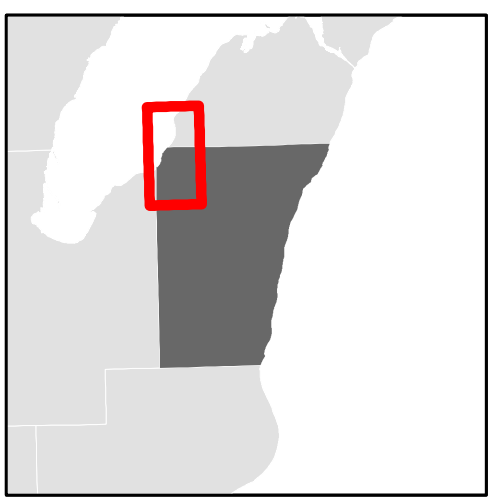
Figure 9 - Transect Location Map *(Continued)*



1 inch = 6,000 feet

Feet
0 3,000 6,000 12,000

Map Projection:
Wisconsin State Plane Zone South 4803; North American Datum 1983; North American Vertical Datum of 1988



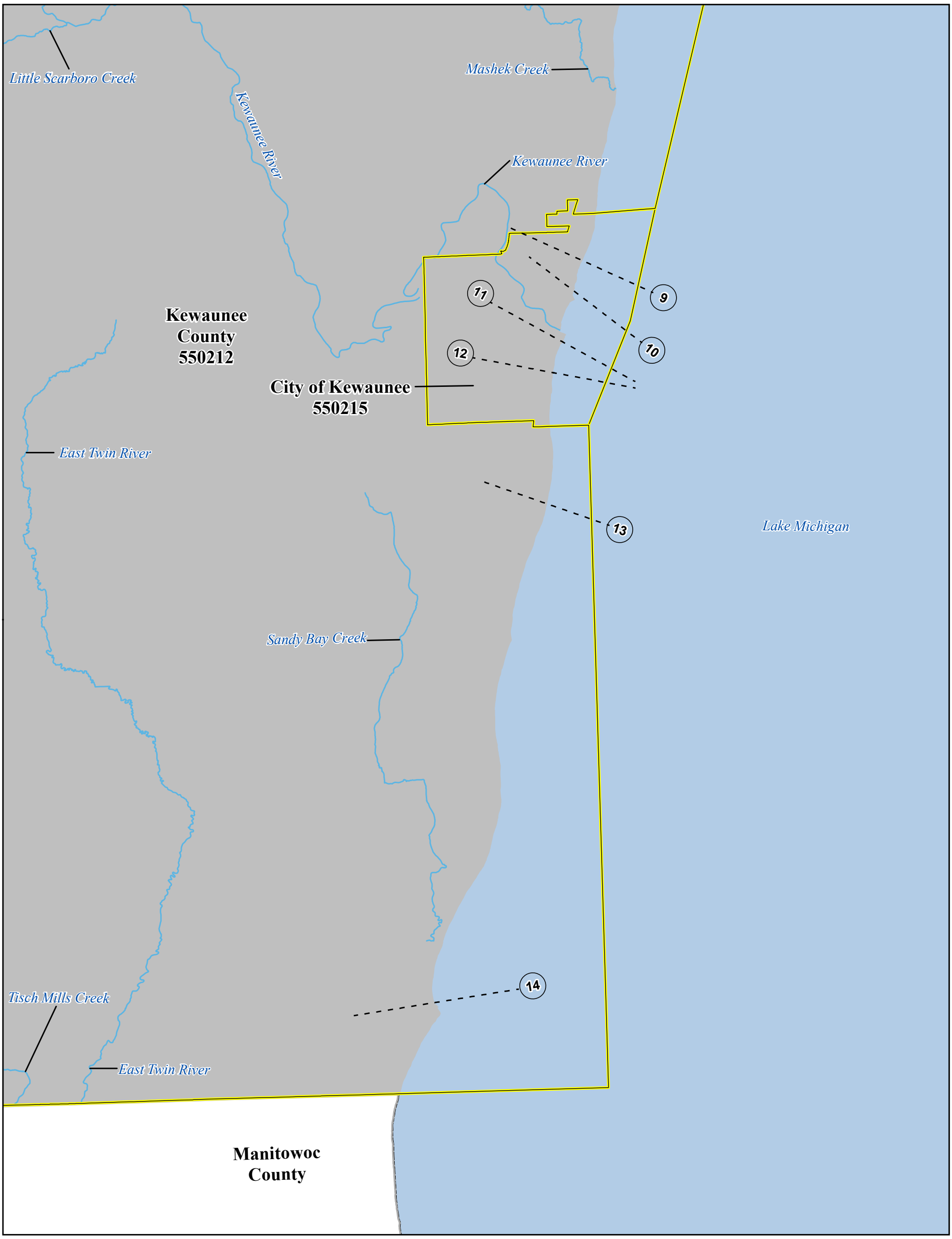
NATIONAL FLOOD INSURANCE PROGRAM

Transect Locator Map

PANELS WITH TRANSECTS:
0017, 0019, 0036, 0038, 0092, 0177, 0178, 0179, 0181, 0185, 0186, 0187, 0257, 0259, 0267, 0276, 0278, 0300, 0357, 0358, 0359, 0377

FEMA

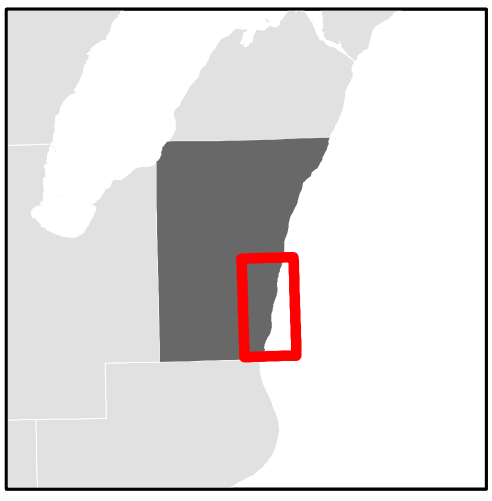
Figure 9 - Transect Location Map *(Continued)*



1 inch = 6,000 feet

Feet
0 3,000 6,000 12,000

Map Projection:
Wisconsin State Plane Zone South 4803; North American Datum 1983; North American Vertical Datum of 1988



NATIONAL FLOOD INSURANCE PROGRAM

Transect Locator Map

PANELS WITH TRANSECTS:
0017, 0019, 0036, 0038, 0092, 0177, 0178, 0179, 0181, 0185, 0186, 0187, 0257, 0259, 0267, 0276, 0278, 0300, 0357, 0358, 0359, 0377

FEMA

5.4 Alluvial Fan Analyses

This section is not applicable to this Flood Risk Project.

Table 17: Summary of Alluvial Fan Analyses
[Not Applicable to this FIS Project]

Table 18: Results of Alluvial Fan Analyses
[Not Applicable to this FIS Project]

SECTION 6.0 – MAPPING METHODS

6.1 Vertical and Horizontal Control

All FIS Reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS Reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS Reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at 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 archived project documentation associated with the FIS Report and the FIRMs for this community. Interested individuals may contact FEMA to access these data.

To obtain current elevation, description, and/or location information for benchmarks in the area, please visit the NGS website at www.ngs.noaa.gov.

The datum conversion locations and values that were calculated for Kewaunee County are provided in Table 19.

Table 19: Countywide Vertical Datum Conversion

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from National Geodetic Vertical Datum of 1929 to North American Vertical Datum of 1988 (NAVD 88) (feet)
Algoma	NE	44.625	-87.375	-0.118
Algoma	SW	44.500	-87.500	-0.095
Algoma	NW	44.625	-87.500	-0.118
Brussels	SW	44.625	-87.625	-0.075
Casco	SW	44.500	-87.625	-0.072

Table 19: Countywide Vertical Datum Conversion (continued)

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from National Geodetic Vertical Datum of 1929 to North American Vertical Datum of 1988 (NAVD 88) (feet)
Denmark	NE	44.375	-87.750	0.020
Dyckesville	SE	44.625	-87.750	-0.075
Kewaunee	SE	44.375	-87.500	-0.072
Kewaunee	SW	44.375	-87.625	-0.020
Luxemburg	SW	44.500	-87.750	-0.033
Average Conversion from National Geodetic Vertical Datum of 1929 (NGVD 29) to North American Vertical Datum of 1988 (NAVD 88) = -0.066 feet				

Table 20: Stream-Based Vertical Datum Conversion

[Not Applicable to this FIS Project]

6.2 Base Map

The FIRMs and FIS Report for this project have been produced in a digital format. The flood hazard information was converted to a Geographic Information System (GIS) formatthat meets FEMA's FIRM Database specifications and geographic information standards.This information is provided in a digital format so that it can be incorporated into a local GIS and be accessed more easily by the community. The FIRM Database includes most of the tabular information contained in the FIS Report in such a way that the data can be associated with pertinent spatial features. For example, the information contained in the Floodway Data table and Flood Profiles can be linked to the cross sections that are shown on the FIRMs. Additional information about the FIRM Database anditsits contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, www.fema.gov/flood-maps/guidance-partners/guidelines-standards.

Base map information shown on the FIRM was derived from the sources described in Table 21.

Table 21: Base Map Sources

Data Type	Data Provider	Data Date	Data Scale	Data Description
Basemap Imagery	USDA National Resources Conservation Service	2013	1:12,000	Digital Ortho Imagery for Kewaunee County (USDA 2013)
Kewaunee County Transportation and Water	US Census Bureau, Geography Division	2012	1:6,000	Shapefile containing roadways and railroads S_Trnsport_Ln and Hydrographic features for S_Wtr_Ln and S_Wtr_Ar (USCB 2012)
National Hydrography Dataset	United States Geological Survey	2016	1:100,000	Spatial and attribute information for subbasins. (USGS 2016)
USACE Structures	US Army Corps of Engineers, Chicago District	2012	1:6,000	General Structures, S_Gen_Struct (USACE 2012)
USGS topographic 7.5-by 7.5-minute quadrangles	United States Geological Survey	2010	1:24,000	S_FIRM_Pan, S_Datum_Conv_Pt (USGS 2010)
Wisconsin PLSS Sections	Wisconsin Department of Natural Resources	1996	1:24,000	PLSS data for Mason County S_PLSS_Ar (DNR 1996)
WisDOT Wisconsin 2004 Municipalities	Wisconsin Department of Transportation	2005	1:6,000	Political corporate boundary lines for Kewaunee County S_Pol_Ar (WisDOT 2005)

6.3 Floodplain and Floodway Delineation

The FIRM shows tints, screens, and symbols to indicate floodplains and floodways as well as the locations of selected cross sections used in the hydraulic analyses and floodway computations.

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22. For each coastal flooding source studied as part of this FIS Report, the mapped floodplain boundaries on the FIRM have been delineated using the flood and wave elevations determined at each transect; between transects, boundaries were delineated using land use and land cover data, the topographic elevation data described in Table 22, and knowledge of coastal flood processes. In ponding areas, flood elevations were determined at each junction of the model; between junctions, boundaries were interpolated using the topographic elevation data described in Table 22.

In cases where the 1-percent and 0.2-percent annual chance floodplain boundaries are close together, only the 1-percent annual chance floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 23, “Floodway Data.”

Table 22: Summary of Topographic Elevation Data used in Mapping

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Algoma, City of; Kewaunee, City of; Kewaunee County, Unincorporated Areas	Lake Michigan	Joint Airborne Lidar Bathymetry Technical Center of eXpertise (JALBTCX) Seamless Bathymetry and Terrain for Lake Michigan	15cm RMSE V.	10 Meter	JALBTCX 2013

Community	Flooding Source	Source for Topographic Elevation Data			
		Description	Vertical Accuracy	Horizontal Accuracy	Citation
Algoma, City of; Casco, Village of; Kewaunee, City of; Kewaunee County, Unincorporated Areas; Luxemburg, Village of	Ahnapee River, Bremmer Creek, Buck Creek, Casco Creek, Chopsticks Brook, East Twin River, East Twin River Tributary 1, Jambo Creek, Kewaunee River, Krok Creek, Luxemburg Creek, Luxemburg Creek Tributary 1, Macco Creek, Neshota River, Rio Creek, Scarboro Creek, School Creek, Silver Creek, Silver Creek Tributary 1, Stoney Creek, Unnamed Stream	LiDAR	72.6cm	*	GroundPoint 2012

* Data not provided

BFEs shown at cross sections on the FIRM represent the 1-percent-annual-chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations.

Table 23: Floodway Data

LOCATION		FLOODWAY				1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AHNAPEE RIVER									
A	1,200	160	1,510	0.1	0	583.5	583.5	583.5	0.0
B	1,590	190	1,490	5.5	0	584.5	584.5	584.5	0.0
C	1,850	210	1,700	4.8	0	584.9	584.9	584.9	0.0
D	2,150	310	2,950	2.8	0	585.6	585.6	585.6	0.0
E	2,660	280	2,630	3.1	0	585.7	585.7	585.7	0.0
F	2,990	280	2,980	2.8	0	585.9	585.9	585.9	0.0
G	3,510	300	2,830	2.9	0	586.0	586.0	586.0	0.0
H	3,980	310	2,040	4.0	0	586.1	586.1	586.1	0.0
I	4,320	270	1,720	4.8	0	586.2	586.2	586.2	0.0
J	4,610	430	2,500	3.3	0	586.5	586.5	586.5	0.0
K	5,180	490	3,580	0.6	0	586.7	586.7	586.7	0.0
L	5,690	410	3,280	0.7	0	586.7	586.7	586.7	0.0
M	7,075	1,425	8,040	0.3	75	586.7	586.7	586.7	0.0
N	8,870	930	5,590	0.4	0	586.7	586.7	586.7	0.0
O	10,613	1,040	5,640	0.4	0	586.7	586.7	586.7	0.0
P	12,091	930	5,720	0.4	0	586.7	586.7	586.7	0.0

[1] Feet above mouth

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

FLOODWAY DATA

AHNAPEE RIVER

LOCATION		FLOODWAY				1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CASCO CREEK									
A	739	520	1,240	1.7	0	665.4	665.4	665.4	0.0
B	1,373	190	316	6.6	0	669.3	669.3	669.3	0.0
C	1,954	410	1,140	1.8	0	674.4	674.4	674.4	0.0
D	2,006	383	3,370	0.6	197	679.5	679.5	679.5	0.0
E	2,429	260	1,050	2.0	0	679.6	679.6	679.6	0.0
F	2,587	268	2,370	0.9	62	684.6	684.6	684.6	0.0
G	3,326	120	340	6.2	0	685.0	685.0	685.0	0.0
H	4,224	180	380	5.5	0	694.3	694.3	694.3	0.0
I	5,438	355	690	3.0	35	701.1	701.1	701.1	0.0
J	6,494	435	2,020	1.0	195	703.7	703.7	703.7	0.0
K	7,392	300	1,300	1.6	71	704.5	704.5	704.5	0.0
L	8,131	295	1,060	2.0	45	705.3	705.3	705.3	0.0
M	8,759	192	880	1.6	12	706.3	706.3	706.3	0.0
N	9,117	233	650	2.2	0	706.8	706.8	706.8	0.0
O	9,569	148	850	1.4	120	708.7	708.7	708.7	0.0
P	9,766	175	450	2.6	59	708.7	708.7	708.7	0.0
Q	9,906	266	540	2.7	4	709.7	709.7	709.7	0.0
R	9,996	242	500	2.9	0	712.8	712.8	712.8	0.0
S	10,225	374	1,560	0.9	20	713.1	713.1	713.1	0.0

[1] Feet above confluence with Kewaunee River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

FLOODWAY DATA

CASCO CREEK

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY				1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CASCO CREEK (CONTINUED)									
T	10,778	402	2,030	0.7	37	713.2	713.2	713.2	0.0
U	11,319	479	2,170	0.7	7	713.3	713.3	713.3	0.0
V	12,062	207	630	2.3	0	713.6	713.6	713.6	0.0
W	12,334	203	1,250	1.2	3	713.9	713.9	713.9	0.0
X	12,566	130	1,200	1.2	52	713.9	713.9	713.9	0.0
Y	12,693	187	2,590	0.6	202	719.1	719.1	719.1	0.0
Z	13,398	497	3,710	0.4	63	719.1	719.1	719.1	0.0
AA	13,959	638	3,870	0.4	132	719.1	719.1	719.1	0.0
AB	15,046	1037	5,340	0.3	153	719.1	719.1	719.1	0.0
AC	16,251	625	3,560	0.4	5	719.1	719.1	719.1	0.0
AD	17,613	385	1,510	1.0	25	719.3	719.3	719.3	0.0
AE	18,288	400	1,610	0.9	20	719.6	719.6	719.6	0.0
AF	19,238	232	1,190	0.9	78	720.0	720.0	720.0	0.0
AG	19,653	310	2,120	0.5	40	720.1	720.1	720.1	0.0
AH	19,901	556	2,390	0.5	164	720.1	720.1	720.1	0.0
AI	20,528	490	2,240	0.5	70	720.1	720.1	720.1	0.0
AJ	21,420	330	590	1.8	90	720.3	720.3	720.3	0.0
AK	22,932	282	610	1.8	18	726.7	726.7	726.7	0.0
AL	23,816	255	730	1.4	35	728.5	728.5	728.5	0.0

[1] Feet above confluence with Kewaunee River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

FLOODWAY DATA

CASCO CREEK

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY				1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CASCO CREEK (CONTINUED)									
AM	24,624	400	800	1.4	40	729.4	729.4	729.4	0.0
AN	24,811	320	1,510	0.7	150	733.5	733.5	733.5	0.0
AO	25,396	215	670	1.6	15	733.7	733.7	733.7	0.0
AP	26,093	133	710	1.6	57	734.2	734.2	734.2	0.0
AQ	27,043	757	2,770	0.4	123	734.6	734.6	734.6	0.0
AR	27,976	989	3,030	0.4	111	734.6	734.6	734.6	0.0
AS	28,261	1,103	2,770	0.4	87	734.7	734.7	734.7	0.0
AT	30,040	413	1,120	1.0	157	735.4	735.4	735.4	0.0
AU	32,173	2,126	3,680	0.3	124	736.4	736.4	736.4	0.0
AV	33,370	1,504	2,060	0.5	166	736.9	736.9	736.9	0.0
AW	34,297	1,359	1,800	0.6	81	737.5	737.5	737.5	0.0
AX	35,464	416	530	1.5	24	739.7	739.7	739.7	0.0
AY	35,709	218	380	2.1	0	740.6	740.6	740.6	0.0
AZ	35,940	784	2,380	0.3	6	742.4	742.4	742.4	0.0
BA	36,757	555	760	1.0	0	742.4	742.4	742.4	0.0
BB	37,647	350	790	1.0	0	742.8	742.8	742.8	0.0
BC	37,856	275	360	2.2	0	743.0	743.0	743.0	0.0
BD	37,982	340	2,070	0.4	10	744.9	744.9	744.9	0.0
BE	40,229	440	750	1.1	20	745.3	745.3	745.3	0.0

[1] Feet above confluence with Kewaunee River

TABLE 23	FEDERAL EMERGENCY MANAGEMENT AGENCY **KEWAUNEE COUNTY, WI** AND INCORPORATED AREAS	**FLOODWAY DATA** **CASCO CREEK**

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY				1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CASCO CREEK (CONTINUED)									
BF	42,870	330	630	0.8	20	747.5	747.5	747.5	0.0
BG	44,320	270	450	1.1	0	748.5	748.5	748.5	0.0
BH	44,847	177	740	3.2	53	751.6	751.6	751.6	0.0
BI	45,379	100	685	0.7	220	752.2	752.2	752.2	0.0
BJ	45,990	257	170	3.0	0	753.5	753.5	753.5	0.0
BK	47,104	320	670	0.8	0	755.3	755.3	755.3	0.0
BL	48,550	240	460	1.1	90	756.0	756.0	756.0	0.0

[1] Feet above confluence with Kewaunee River

TABLE 23	FEDERAL EMERGENCY MANAGEMENT AGENCY KEWAUNEE COUNTY, WI AND INCORPORATED AREAS	FLOODWAY DATA CASCO CREEK

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CHOPSTICKS BROOK								
A	21	60	85	1.4	586.6	581.6[2]	581.6	0.0
B	369	64	195	0.6	588.8	588.8	588.8	0.0
C	716	16	30	4.0	590.3	590.3	590.3	0.0
D	1,014	63	168	0.7	593.6	593.6	593.6	0.0
E	1,311	24	65	1.8	593.7	593.7	593.7	0.0
F	1,750	127	427	0.3	597.9	597.9	597.9	0.0
G	2,182	58	94	1.3	597.9	597.9	597.9	0.0
H	2,391	66	168	0.7	600.6	600.6	600.6	0.0
I	3,550	115	226	0.5	607.8	607.8	607.8	0.0
J	4,296	24	41	2.9	608.8	608.8	608.8	0.0
K	5,104	317	951	0.1	613.5	613.5	613.5	0.0
L	6,066	258	337	0.4	613.7	613.7	613.7	0.0
M	7,461	179	78	1.5	615.3	615.3	615.3	0.0

[1] Feet above confluence with Silver Creek
[2] Elevation computed without consideration of backwater effects from Silver Creek

TABLE 23	FEDERAL EMERGENCY MANAGEMENT AGENCY **KEWAUNEE COUNTY, WI** AND INCORPORATED AREAS	**FLOODWAY DATA** **CHOPSTICKS BROOK**

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY				1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
EAST TWIN RIVER									
A	107,765	110	780	4.3	0	639.2	639.2	639.2	0.0
B	108,557	150	1,030	3.3	0	640.2	640.2	640.2	0.0
C	109,613	520	3,080	1.1	0	641.0	641.0	641.0	0.0
D	110,510	560	3,520	1.0	0	641.3	641.3	641.3	0.0
E	112,781	600	2,450	1.4	90	642.1	642.1	642.1	0.0
F	114,629	442	2,310	1.4	18	642.9	642.9	642.9	0.0

[1] Feet above mouth

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
KEWAUNEE RIVER								
A	124	255	3,114	3.3	*	580.7[2]	580.7	0.0
B	1,975	714	5,235	1.9	*	581.6[2]	581.6	0.0
C	3,374	1,454	6,164	1.6	*	582.0[2]	582.0	0.0
D	5,616	2,620	6,917	1.5	*	582.3[2]	582.3	0.0
E	8,189	1,915	7,544	1.3	583.5	583.5	583.5	0.0
F	10,544	2,083	7,886	1.3	583.8	583.8	583.8	0.0
G	14,155	1,101	4,899	2.1	584.3	584.3	584.3	0.0
H	17,043	1,326	8,388	1.2	585.2	585.2	585.2	0.0
I	17,407	1,214	7,174	1.4	585.4	585.4	585.4	0.0
J	19,199	1,308	6,217	1.6	585.7	585.7	585.7	0.0
K	21,976	1,965	9,294	1.1	586.0	586.0	586.0	0.0
L	26,767	806	4,702	2.1	586.4	586.4	586.4	0.0
M	27,967	1,043	5,921	1.7	586.7	586.7	586.7	0.0
N	28,750	235	1,619	6.1	586.8	586.8	586.8	0.0
O	29,076	1,394	13,085	0.8	591.5	591.5	591.5	0.0
P	32,110	1,767	13,292	0.7	591.5	591.5	591.5	0.0
Q	32,628	2,079	9,817	1.0	591.5	591.5	591.5	0.0
R	33,430	1,886	6,805	1.4	591.6	591.6	591.6	0.0
S	35,444	1,090	3,462	2.8	593.1	593.1	593.1	0.0
T	36,044	398	1,376	7.1	593.8	593.8	593.8	0.0
U	36,250	204	1,103	8.8	595.3	595.3	595.3	0.0
V	36,576	304	2,240	4.3	599.3	599.3	599.3	0.0
W	37,174	286	1,764	5.4	599.7	599.7	599.7	0.0

[1] Feet above Lake Michigan
[2] Elevation computed without consideration of backwater effects from Lake Michigan
* Controlled by coastal flooding – see Flood Insurance Rate Map for regulatory base flood elevation

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
KEWAUNEE RIVER (CONTINUED)								
X	37,780	490	2,608	3.7	601.0	601.0	601.0	0.0
Y	38,205	328	1,855	5.1	601.1	601.1	601.1	0.0
Z	38,522	244	1,379	6.9	603.7	603.7	603.7	0.0
AA	38,851	555	2,266	4.2	605.0	605.0	605.0	0.0
AB	39,875	849	3,674	2.6	606.2	606.2	606.2	0.0
AC	41,161	798	4,648	2.0	606.8	606.8	606.8	0.0
AD	42,315	994	4,372	2.2	607.2	607.2	607.2	0.0
AE	43,449	736	4,108	2.3	607.8	607.8	607.8	0.0
AF	44,054	488	2,764	3.4	608.1	608.1	608.1	0.0
AG	44,576	335	1,786	5.3	608.5	608.5	608.5	0.0
AH	45,410	682	5,194	1.8	613.1	613.1	613.1	0.0
AI	46,162	822	6,389	1.5	613.2	613.2	613.2	0.0
AJ	46,761	867	6,495	1.5	613.3	613.3	613.3	0.0
AK	47,965	821	4,259	2.2	613.5	613.5	613.5	0.0
AL	49,758	622	3,434	2.7	614.2	614.2	614.2	0.0
AM	50,981	513	2,846	3.3	615.1	615.1	615.1	0.0
AN	52,762	512	2,831	3.3	616.2	616.2	616.2	0.0

[1] Feet above mouth

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

FLOODWAY DATA

KEWAUNEE RIVER

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
KEWAUNEE RIVER (CONTINUED)								
AO	53,361	754	4,224	2.2	616.8	616.8	616.8	0.0
AP	53,958	868	4,687	2.0	617.0	617.0	617.0	0.0
AQ	54,563	823	4,351	2.1	617.3	617.3	617.3	0.0
AR	55,784	574	3,063	3.0	618.0	618.0	618.0	0.0
AS	58,154	859	3,280	2.8	619.7	619.7	619.7	0.0
AT	59,944	544	2,626	3.4	621.1	621.1	621.1	0.0
AU	61,446	636	3,535	2.5	623.2	623.2	623.2	0.0
AV	62,045	583	2,582	3.4	623.5	623.5	623.5	0.0
AW	62,272	470	1,817	4.9	623.8	623.8	623.8	0.0
AX	62,602	490	2,611	3.4	626.9	626.9	626.9	0.0
AY	63,951	537	1,775	5.0	628.9	628.9	628.9	0.0
AZ	65,644	847	1,888	4.7	634.2	634.2	634.2	0.0
BA	66,566	420	1,460	6.1	638.2	638.2	638.2	0.0
BB	67,145	550	1,956	4.5	640.4	640.4	640.4	0.0
BC	67,577	470	1,748	5.1	641.5	641.5	641.5	0.0
BD	69,543	691	2,877	3.1	645.0	645.0	645.0	0.0
BE	71,927	602	3,528	2.5	646.5	646.5	646.5	0.0
BF	72,620	431	3,292	2.7	646.8	646.8	646.8	0.0
BG	73,161	413	3,418	2.6	650.3	650.3	650.3	0.0
BH	74,339	561	3,706	2.4	650.6	650.6	650.6	0.0
BI	75,296	886	4,296	2.0	651.0	651.0	651.0	0.0
BJ	75,619	385	3,020	2.8	651.2	651.2	651.2	0.0
BK	76,266	757	5,322	1.6	654.1	654.1	654.1	0.0

[1] Feet above mouth

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
KEWAUNEE RIVER (CONTINUED)								
BL	79,047	972	3,931	2.1	654.6	654.6	654.6	0.0
BM	81,824	773	2,896	2.9	657.6	657.6	657.6	0.0
BN	84,520	1,116	5,689	1.2	658.2	658.2	658.2	0.0
BO	85,373	764	3,848	1.8	658.5	658.5	658.5	0.0
BP	86,950	1,059	3,852	1.8	659.0	659.0	659.0	0.0
BQ	88,346	222[2]	1,409	4.8	659.7	659.7	659.7	0.0
BR	88,606	521	2,768	2.5	660.8	660.8	660.8	0.0
BS	89,821	895	3,981	1.7	661.3	661.3	661.3	0.0
BT	90,582	337	1,992	3.4	661.4	661.4	661.4	0.0
BU	91,537	929	4,707	1.4	662.5	662.5	662.5	0.0
BV	93,721	767	3,534	1.5	663.1	663.1	663.1	0.0
BW	96,095	616	2,920	1.9	663.6	663.6	663.6	0.0
BX	97,283	187	1,154	4.7	664.0	664.0	664.0	0.0
BY	97,867	526	2,955	1.8	665.7	665.7	665.7	0.0
BZ	98,715	569	3,715	1.5	667.0	667.0	667.0	0.0
CA	99,471	402	2,759	2.0	667.1	667.1	667.1	0.0
CB	99,701	315	2,148	2.5	667.9	667.9	667.9	0.0
CC	100,717	530	3,113	1.8	668.3	668.3	668.3	0.0
CD	101,544	568	3,092	1.6	668.4	668.4	668.4	0.0
CE	101,822	566	2,801	1.8	668.5	668.5	668.5	0.0
CF	103,292	504	1,685	3.0	669.1	669.1	669.1	0.0
CG	104,792	666	1,521	3.3	672.3	672.3	672.3	0.0
CH	105,833	815	3,864	0.7	672.8	672.8	672.8	0.0

[1] Feet above mouth
[2] Mapped floodway width includes Casco Creek floodway

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

FLOODWAY DATA

KEWAUNEE RIVER

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
KEWAUNEE RIVER (CONTINUED)								
CI	106,606	904	3,561	0.8	672.9	672.9	672.9	0.0
CJ	107,544	1,036	3,665	0.8	673.0	673.0	673.0	0.0
CK	109,189	307	1,325	2.1	673.0	673.0	673.0	0.0
CL	109,567	470	2,420	1.2	673.8	673.8	673.8	0.0
CM	111,514	724	2,255	1.2	674.0	674.0	674.0	0.0
CN	113,531	631	1,694	1.6	674.4	674.4	674.4	0.0
CO	116,125	1,378	3,698	0.8	675.0	675.0	675.0	0.0
CP	120,329	640	1,616	1.3	676.1	676.1	676.1	0.0
CQ	121,422	301	1,037	2.0	678.2	678.2	678.2	0.0

[1] Feet above mouth

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
NESHOTA RIVER								
A	6,019	115	1,036	4.0	687.7	687.7	687.7	0.0
B	6,072	190	1,687	2.8	687.9	687.9	687.9	0.0

[1] Feet above mouth
[2] Floodway is mapped within Brown County

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

FLOODWAY DATA

NESHOTA RIVER

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY				1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION(FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	WIDTH REDUCED FROM PRIOR STUDY (FEET)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SCARBORO CREEK									
A	2,376	661	1,070	2.8	9	659.0	659.0	659.0	0.0
B	3,432	975	2,000	1.5	25	665.5	665.5	665.5	0.0
C	4,963	796	1,250	2.4	34	670.5	670.5	670.5	0.0
D	5,861	440	1,140	2.6	10	674.1	674.1	674.1	0.0
E	6,072	347	2,820	1.1	3	678.4	678.4	678.4	0.0
F	7,181	701	1,310	2.3	0	679.3	679.3	679.3	0.0
G	7,603	437	910	3.3	3	684.7	684.7	684.7	0.0
H	8,026	220	390	7.5	0	687.6	687.6	687.6	0.0
I	8,290	350	1,300	2.2	0	693.5	693.5	693.5	0.0
J	8,554	161	440	6.6	9	694.9	694.9	694.9	0.0
K	8,976	240	760	3.8	0	697.5	697.5	697.5	0.0
L	9,557	401	1,110	2.6	19	698.8	698.8	698.8	0.0
M	10,190	731	2,030	1.4	0	699.9	699.9	699.9	0.0
N	10,982	200	720	4.0	0	701.1	701.1	701.1	0.0
O	12,408	876	1,680	1.7	44	704.6	704.6	704.6	0.0
P	13,939	520	1,710	1.7	0	706.3	706.3	706.3	0.0
Q	16,104	548	1,170	2.5	22	708.9	708.9	708.9	0.0
R	16,790	530	1,370	2.1	0	710.0	710.0	710.0	0.0

[1] Feet above confluence with Kewaunee River

TABLE 23	FEDERAL EMERGENCY MANAGEMENT AGENCY **KEWAUNEE COUNTY, WI** AND INCORPORATED AREAS	**FLOODWAY DATA** **SCARBORO CREEK**

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SCHOOL CREEK								
A	557	664	1,465	1.4	675.7	675.7	675.7	0.0
B	990	283	420	5.0	678.0	678.0	678.0	0.0
C	1,986	284	386	5.5	688.0	688.0	688.0	0.0
D	2,375	230	353	5.9	692.3	692.3	692.3	0.0
E	2,993	165	379	5.5	698.4	698.4	698.4	0.0
F	3,441	84	267	7.9	701.9	701.9	701.9	0.0
G	3,967	131	290	6.9	706.5	706.5	706.5	0.0
H	5,002	82	321	6.2	714.4	714.4	714.4	0.0
I	5,774	112	305	6.5	716.6	716.6	716.6	0.0
J	7,377	99	309	6.5	725.3	725.3	725.3	0.0
K	8,212	282	500	3.9	731.5	731.5	731.5	0.0
L	8,765	56	185	10.5	737.2	737.2	737.2	0.0
M	9,332	140	705	2.8	743.9	743.9	743.9	0.0
N	9,738	195	785	2.5	744.6	744.6	744.6	0.0
O	10,697	166	552	3.5	747.2	747.2	747.2	0.0
P	11,222	262	702	2.8	750.0	750.0	750.0	0.0
Q	12,018	95	337	5.2	752.8	752.8	752.8	0.0
R	13,281	318	776	2.3	756.4	756.4	756.4	0.0
S	14,811	310	773	2.3	757.8	757.8	757.8	0.0
T	15,535	336	987	1.8	758.8	758.8	758.8	0.0

[1] Feet confluence with Kewaunee River

TABLE 23	FEDERAL EMERGENCY MANAGEMENT AGENCY **KEWAUNEE COUNTY, WI** AND INCORPORATED AREAS	**FLOODWAY DATA** SCHOOL CREEK

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SCHOOL CREEK (CONTINUED)								
U	16,772[1]	334	950	1.8	760.2	760.2	760.2	0.0
V	17,746[1]	419	996	1.8	761.5	761.5	761.5	0.0
W	18,814[1]	315	746	2.3	762.8	762.8	762.8	0.0
X	19,830[1]	219	685	1.9	763.9	763.9	763.9	0.0
Y	20,433[1]	238	592	2.2	764.5	764.5	764.5	0.0
Z	21,364[1]	68	204	6.4	766.2	766.2	766.2	0.0
AA	22,317[1]	175	816	1.6	768.9	768.9	768.9	0.0
AB	22,951[1]	290	1,730	0.8	774.1	774.1	774.1	0.0
AC	25,955[1]	341	1,105	1.2	774.8	774.8	774.8	0.0
AD	27,506[1]	384	1,155	1.1	775.6	775.6	775.6	0.0
AE	29,768[1]	208	642	1.9	776.3	776.3	776.3	0.0
SILVER CREEK								
A	1,974[2]	129	539	3.8	586.6	584.0[3]	584.0	0.0
B	2,851[2]	480	1482	1.3	586.6	584.6[3]	584.6	0.0
C	3,336[2]	507	1422	1.3	586.6	584.7[3]	584.7	0.0
D	4,041[2]	263	829	2.3	586.6	585.2[3]	585.2	0.0
E	4,796[2]	123	564	3.4	586.6	585.9[3]	585.9	0.0
F	5,333[2]	356	1,154	1.7	586.6	586.3[3]	586.3	0.0

[1] Feet above confluence with Kewaunee River
[2] Feet above confluence with Ahnapee River
[3] Elevation computed without the consideration of backwater effects from Ahnapee River

TABLE 23	FEDERAL EMERGENCY MANAGEMENT AGENCY **KEWAUNEE COUNTY, WI** AND INCORPORATED AREAS	**FLOODWAY DATA** **SCHOOL CREEK, SILVER CREEK**

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SILVER CREEK (CONTINUED)								
G	6,050	292	1,357	1.4	586.7	586.7	586.7	0.0
H	6,569	286	1,028	1.8	586.9	586.9	586.9	0.0
I	7,374	464	1,517	1.2	587.7	587.7	587.7	0.0
J	8,018	315	871	2.2	588.3	588.3	588.3	0.0
K	8,900	320	603	3.0	591.1	591.1	591.1	0.0
L	9,779	324	956	1.9	593.6	593.6	593.6	0.0
M	10,372	361	670	2.7	595.3	595.3	595.3	0.0
N	10,926	218	427	4.3	598.9	598.9	598.9	0.0
O	11,369	202	445	4.1	601.9	601.9	601.9	0.0
P	11,661	101	320	5.7	604.4	604.4	604.4	0.0
Q	11,806	81	341	5.4	606.4	606.4	606.4	0.0
R	12,097	76	313	5.8	608.0	608.0	608.0	0.0
S	12,330	255	1,360	1.3	616.1	616.1	616.1	0.0
T	13,229	387	1,111	1.6	616.4	616.4	616.4	0.0
U	14,311	211	741	2.5	617.2	617.2	617.2	0.0
V	14,866	318	696	2.5	618.4	618.4	618.4	0.0
W	15,366	246	521	3.3	620.4	620.4	620.4	0.0
X	15,693	258	632	2.7	621.8	621.8	621.8	0.0
Y	16,642	196	451	3.8	624.9	624.9	624.9	0.0
Z	17,417	282	694	2.5	627.9	627.9	627.9	0.0

[1] Feet above confluence with Ahnapee River

[2] Elevation computed without the consideration of backwater effects from Ahnapee River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

FLOODWAY DATA

SILVER CREEK

Table 23: Floodway Data (Continued)

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SILVER CREEK (CONTINUED)								
AA	18,427	280	638	2.7	631.2	631.2	631.2	0.0
AB	19,123	138	539	3.2	634.7	634.7	634.7	0.0
AC	19,272	210	827	2.1	635.1	635.1	635.1	0.0
AD	19,837	302	606	2.7	636.2	636.2	636.2	0.0
AE	20,618	327	547	3.0	638.2	638.2	638.2	0.0
AF	21,422	196	524	3.1	640.3	640.3	640.3	0.0
AG	22,790	221	770	2.1	643.0	643.0	643.0	0.0
AH	23,898	378	1,061	1.5	644.5	644.5	644.5	0.0
AI	24,378	340	1,023	1.6	645.0	645.0	645.0	0.0
AJ	25,081	415	1,095	1.5	645.8	645.8	645.8	0.0
AK	26,375	702	744	2.2	647.7	647.7	647.7	0.0
AL	27,248	553	956	1.7	648.8	648.8	648.8	0.0
AM	28,202	193	529	3.1	650.3	650.3	650.3	0.0
AN	29,245	561	1,200	1.4	652.3	652.3	652.3	0.0
AO	30,187	328	642	2.4	653.7	653.7	653.7	0.0
AP	31,123	295	654	2.4	655.7	655.7	655.7	0.0
AQ	32,249	254	589	2.6	657.1	657.1	657.1	0.0
AR	33,671	352	772	2.0	659.2	659.2	659.2	0.0
AS	35,260	631	1,359	1.1	661.1	661.1	661.1	0.0

[1] Feet above confluence with Ahnapee River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

FLOODWAY DATA

SILVER CREEK

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
UNNAMED STREAM								
A	148	38	26	4.8	745.0	744.6[2]	744.6	0.0
B	390	76	37	3.5	752.5	752.5	752.5	0.0
C	516	30	25	5.2	756.1	756.1	756.1	0.0
D	634	28	25	5.2	762.6	762.6	762.6	0.0
E	827	134	345	0.4	764.0	764.0	764.0	0.0
F	1,211	26	23	5.5	764.9	764.9	764.9	0.0
G	1,493	56	42	3.0	770.4	770.4	770.4	0.0
H	1,839	58	42	3.0	774.7	774.7	774.7	0.0
I	2,043	55	72	1.8	777.8	777.8	777.8	0.0
J	2,273	69	127	1.0	781.6	781.6	781.6	0.0
K	2,409	39	27	4.8	782.5	782.5	782.5	0.0
L	2,729	87	121	1.1	787.6	787.6	787.6	0.0
M	3,315	378	426	0.3	789.9	789.9	789.9	0.0
N	4,239	802	1,502	0.1	789.9	789.9	789.9	0.0
O	5,119	198	221	0.6	789.9	789.9	789.9	0.0
P	5,659	196	1,088	0.1	796.1	796.1	796.1	0.0
Q	6,234	595	2,760	0.0	796.1	796.1	796.1	0.0

[1] Feet above confluence with School Creek

[2] Elevation computed without the considering backwater effects from School Creek

TABLE 23	FEDERAL EMERGENCY MANAGEMENT AGENCY KEWAUNEE COUNTY, WI AND INCORPORATED AREAS	FLOODWAY DATA UNNAMED STREAM

Table 24: Flood Hazard and Non-Encroachment Data for Selected Streams

[Not Applicable to this FIS Project]

6.4 Coastal Flood Hazard Mapping

Flood insurance zones and BFEs including the wave effects were identified on each transect based on the results from the onshore wave hazard analyses. Between transects, elevations were interpolated using topographic maps, land-use and land-cover data, and knowledge of coastal flood processes to determine the extent of flooding. Sources for topographic data are shown in Table 22**.**

Zone VE is subdivided into elevation zones and BFEs are provided on the FIRM.

The limit of Zone VE shown on the FIRM is defined as the farthest inland extent of any of the following criteria (determined for the 1-percent-annual-chance flood condition):

- The *primary frontal dune* is defined in 44 CFR Section 59.1 of the NFIP regulations. “The primary frontal dune represents a continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes that occur immediately landward and adjacent to the beach. The primary frontal dune zone is subject to erosion and overtopping from high tides and waves during major coastal storms. The inland limit of the primary frontal dune zone occurs at the point where there is a distinct change from a relatively steep slope to a relatively mild slope.”

- The *wave runup Zone VE* occurs where the (eroded) ground profile is 3.0 feet or more below the 2-percent wave runup elevation.

- The *wave overtopping splash Zone VE* is the area landward of the crest of an overtopped barrier, in cases where the potential 2-percent wave runup exceeds the barrier crest elevation.

- The *breaking wave height Zone VE* occurs where 3-foot or greater wave heights could occur.

- The *high-velocity flow Zone VE* is landward of the overtopping splash zone (or area on a sloping beach or other shore type), where the product of depth of flow times the flow velocity squared (hv^2) is greater than or equal to 200 ft^3/sec^2.

The SFHA boundary indicates the landward extent of the coastal SFHAs shown on the FIRM as Zones VE, AE, AO, AH, or A.

Table 25 indicates the coastal analyses used for floodplain mapping and the criteria used to determine the inland limit of the open-coast Zone VE and the SFHA boundary at each transect.

Table 25: Summary of Coastal Transect Mapping Considerations

Coastal Transect	Primary Frontal Dune (PFD) Identified	Wave Runup Analysis	Wave Height Analysis	Zone VE Limit	SFHA Boundary
		Zone Designation and BFE (feet NAVD88)	Zone Designation and BFE (feet NAVD88)		
1	N/A	VE 589	N/A	Runup	Runup
2	N/A	VE 590	N/A	Runup	Runup
3	N/A	VE 591	N/A	Runup	Runup
4	N/A	VE 588 AO 1	AE 583	Runup	SWEL
5	N/A	VE 586 AE 586	N/A	Runup	Runup
6	N/A	VE 591	N/A	Runup	Runup
7	N/A	VE 588	N/A	Runup	Runup
8	N/A	VE 591	N/A	Runup	Runup
9	N/A	VE 591	N/A	Runup	Runup
10	N/A	VE 590 AO 1	N/A	Runup	Overtopping
11	N/A	VE 589	N/A	Wave Overtopping Splash	Wave Overtopping Splash
12	N/A	VE 586 AE 586	N/A	Runup	Runup
13	N/A	VE 591	N/A	Runup	Runup
14	N/A	VE 585 AE 585	VE 587	Runup	Runup
15	N/A	AE 585	VE 587 AE 586	Overland Wave Propagation	Runup
16	N/A	VE 586	VE 587	Runup	Runup

6.5 FIRM Revisions

This FIS Report and the FIRM are based on the most up-to-date information available to FEMA at the time of its publication; however, flood hazard conditions change over time. Communities or private parties may request flood map revisions at any time. Certain types of requests require submission of supporting data. FEMA may also initiate a revision. Revisions may take several forms, including Letters of Map Amendment (LOMAs), Letters of Map Revision Based on Fill (LOMR-Fs), Letters of Map Revision (LOMRs) (referred to collectively as Letters of Map Change (LOMCs)), Physical Map Revisions (PMRs), and FEMA-contracted restudies. These types of revisions are further described below. Some of these types of revisions do not result in the republishing of the FIS Report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood-hazard data (shown in Table 30, “Map Repositories”).

6.5.1 Letters of Map Amendment

A LOMA is an official revision by letter to an effective NFIP map. A LOMA results from an administrative process that involves the review of scientific or technical data submitted by the owner or lessee of property who believes the property has incorrectly been included in a designated SFHA. A LOMA amends the currently effective FEMA map and establishes that a specific property is not located in a SFHA.

To obtain an application for a LOMA, www.fema.gov/flood-maps/change-your-flood- zone and download the form "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill". Visit the "Flood Map-Related Fees" section to determine the cost, if any, of applying for a LOMA.

FEMA offers a tutorial on how to apply for a LOMA. The LOMA Tutorial Series can be accessed at www.fema.gov/online-tutorials.

For more information about how to apply for a LOMA, call the FEMA Mapping and Insurance eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627).

6.5.2 Letters of Map Revision Based on Fill

A LOMR-F is an official revision by letter to an effective NFIP map. A LOMR-F states FEMA's determination concerning whether a structure or parcel has been elevated on fill above the base flood elevation and is, therefore, excluded from the SFHA.

Information about obtaining an application for a LOMR-F can be obtained in the same manner as that for a LOMA, by visiting www.fema.gov/flood-maps/change-your-flood-zone for the "MT-1 Application Forms and Instructions for Conditional and Final Letters of Map Amendment and Letters of Map Revision Based on Fill" or by calling the FEMA Mapping and Insurance eXchange, toll free, at 1-877-FEMA MAP (1-877-336-2627). Fees for applying for a LOMR-F, if any, are listed in the "Flood Map-Related Fees" section.

A tutorial for LOMR-F is available at www.fema.gov/online-tutorials.

6.5.3 Letters of Map Revision

A LOMR is an official revision to the currently effective FEMA map. It is used to change flood zones, floodplain and floodway delineations, flood elevations and planimetric features. All requests for LOMRs should be made to FEMA through the chief executive officer of the community, since it is the community that must adopt any changes and revisions to the map. If the request for a LOMR is not submitted through the chief executive officer of the community, evidence must be submitted that the community has been notified of the request.

To obtain an application for a LOMR, visit www.fema.gov/flood-maps/change-your-flood-zone and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Mapping and Insurance eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Kewaunee County FIRM are listed in Table 26.

Table 26: Incorporated Letters of Map Change

[Not Applicable to this FIS Project]

6.5.4 Physical Map Revisions

A Physical Map Revision (PMR) is an official republication of a community's NFIP map to effect changes to base flood elevations, floodplain boundary delineations, regulatory floodways and planimetric features. These changes typically occur as a result of structural works or improvements, annexations resulting in additional flood hazard areas or correction to base flood elevations or SFHAs.

The community's chief executive officer must submit scientific and technical data to FEMA to support the request for a PMR. The data will be analyzed and the map will be revised if warranted. The community is provided with copies of the revised information and is afforded a review period. When the base flood elevations are changed, a 90-day appeal period is provided. A 6-month adoption period for formal approval of the revised map(s) is also provided.

For more information about the PMR process, please visit www.fema.gov and visit the "Flood Map Revision Processes" section.

6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

6.5.6 Community Map History

The current FIRM presents flooding information for the entire geographic area of Kewaunee County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBMs) and/or Flood Boundary and Floodway Maps (FBFMs) may have been prepared for the incorporated communities and the unincorporated areas in the county that had identified SFHAs. Current and historical data relating to the maps prepared for the project area are presented in Table 27, "Community Map History." A description of each of the column headings and the source of the date is also listed below.

- *Community Name* includes communities falling within the geographic area shown on the FIRM, including those that fall on the boundary line, nonparticipating communities, and communities with maps that have been rescinded. Communities with No Special Flood Hazards are indicated by a footnote. If all maps (FHBM, FBFM, and FIRM) were rescinded for a community, it is not listed in this table unless SFHAs have been identified in this community.

- *Initial Identification Date (First NFIP Map Published)* is the date of the first NFIP map that identified flood hazards in the community. If the FHBM has been converted to a FIRM, the initial FHBM date is shown. If the community has never been mapped, the upcoming effective date or "pending" (for Preliminary FIS Reports) is shown. If the community is listed in Table 27 but not identified on the map, the community is treated as if it were unmapped.

- *Initial FHBM Effective Date* is the effective date of the first Flood Hazard Boundary Map (FHBM). This date may be the same date as the Initial NFIP Map Date.

- *FHBM Revision Date(s)* is the date(s) that the FHBM was revised, if applicable.

- *Initial FIRM Effective Date* is the date of the first effective FIRM for the community. This is the first effective date that is shown on the FIRM panel.

- *FIRM Revision Date(s)* is the date(s) the FIRM was revised, if applicable. This is the revised date that is shown on the FIRM panel, if applicable. As countywide studies are completed or revised, each community listed should have its FIRM dates updated accordingly to reflect the date of the countywide study. Once the FIRMs exist in countywide format, as Physical Map Revisions (PMR) of FIRM panels within the county are completed, the FIRM Revision Dates in the table for each community affected by the PMR are updated with the date of the PMR, even if the PMR did not revise all the panels within that community.

The initial effective date for the Kewaunee County FIRMs in countywide format was TBD.

Table 27: Community Map History

Community Name	Initial Identification Date (First NFIP Map Published)	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Algoma, City of	1/9/1974	1/9/1974	4/16/1976	6/15/1979	TBD
Casco, Village of	11/15/1974	11/15/1974	6/2/1978	8/15/1979	TBD
Kewaunee, City of	2/8/1974	2/8/1974	4/16/1976	2/15/1980	TBD
Kewaunee County, Unincorporated Areas	4/21/1978	4/21/1978	N/A	9/3/1980	TBD
Luxemburg, Village of	5/10/1974	5/10/1974	10/3/1975	9/4/1986	TBD

SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

7.1 Contracted Studies

Table 28 provides a summary of the contracted studies, by flooding source that are included in this FIS Report.

Table 28: Summary of Contracted Studies Included in this FIS Report

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Ahnapee River	TBD	USGS	IAA-H-9-77	July 1978	Algoma, City of, Kewaunee County, Unincorporated Areas
Ahnapee River	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Bremmer Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Buck Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Casco Creek	TBD	USGS	IAA-H-9-77	July 1978	Casco, Village of, Kewaunee County, Unincorporated Areas
Chopsticks Brook	TBD	STARR II	HSFEHQ-09-D-0370	February 2021	Algoma, City of
East Twin River	TBD	USGS	IAA-H-9-77	July 1978	Kewaunee County, Unincorporated Areas
East Twin River	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
East Twin River Tributary 1	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Jambo Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Kewaunee River	TBD	STARR II	HSFEHQ-09-D-0370	February 2021	Kewaunee County, Unincorporated Areas, Kewaunee, City of

Table 28: Summary of Contracted Studies Included in this FIS Report *(Continued)*

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Kewaunee River	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Krok Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Lake Michigan	TBD	STARR II	HSFEHQ-09-D-0370	February 2021	Algoma, City of, Kewaunee County, Unincorporated Areas, Kewaunee, City of
Luxemburg Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Luxemburg Creek Tributary 1	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas, Luxemburg, Village of
Macco Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Neshota River	TBD	WIDNR	*	August 2006	Kewaunee County, Unincorporated Areas
Rio Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Scarboro Creek	TBD	USGS	IAA-H-9-77	July 1978	Kewaunee County, Unincorporated Areas
Scarboro Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
School Creek	TBD	STARR II	HSFEHQ-09-D-0370	February 2021	Kewaunee County, Unincorporated Areas, Luxemburg, Village of
Silver Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas

Table 28: Summary of Contracted Studies Included in this FIS Report *(Continued)*

Flooding Source	FIS Report Dated	Contractor	Number	Work Completed Date	Affected Communities
Silver Creek	TBD	STARR II	HSFEHQ-09-D-0370	February 2021	Algoma, City of, Kewaunee County, Unincorporated Areas
Silver Creek Tributary 1	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Stoney Creek	TBD	STARR	HSFEHQ-09-D-0370	November 2015	Kewaunee County, Unincorporated Areas
Unnamed Stream	TBD	STARR II	HSFEHQ-09-D-0370	February 2021	Kewaunee County, Unincorporated Areas, Luxemburg, Village of

*Data not available

7.2 Community Meetings

The dates of the community meetings held for this FIS project and any previous FIS projects are shown in Table 29 . These meetings may have previously been referred to by a variety of names (Community Coordination Officer (CCO), Scoping, Discovery, etc.), but all meetings represent opportunities for FEMA, community officials, study contractors, and other invited guests to discuss the planning for and results of the project.

Table 29: Community Meetings

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Algoma, City of	TBD	7/17/2017	Flood Risk	Kewaunee County, Manitowoc County, STARR, Wisconsin DNR, the City of Manitowoc, the City of Two Rivers, the Village of Cleveland
Kewaunee, City of	TBD	7/17/2017	Flood Risk	Kewaunee County, Manitowoc County, STARR, Wisconsin DNR, the City of Manitowoc, the City of Two Rivers, the Village of Cleveland
County of, Kewaunee	TBD	7/17/2017	Flood Risk	Kewaunee County, Manitowoc County, STARR, Wisconsin DNR, the City of Manitowoc, the City of Two Rivers, the Village of Cleveland

Table 29: Community Meetings (Continued)

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Casco, Village of	TBD	7/17/2017	Flood Risk	Kewaunee County, Manitowoc County, STARR, Wisconsin DNR, the City of Manitowoc, the City of Two Rivers, the Village of Cleveland
Luxemburg, Village of	TBD	7/17/2017	Flood Risk	Kewaunee County, Manitowoc County, STARR, Wisconsin DNR, the City of Manitowoc, the City of Two Rivers, the Village of Cleveland
Algoma, City of	TBD	8/8/2017	Flood Risk Review	Wisconsin DNR, STARR, Kewaunee County, Village of Cleveland, City of Manitowoc, Manitowoc County, City of Two Rivers
Kewaunee, City of	TBD	8/8/2017	Flood Risk Review	Wisconsin DNR, STARR, Kewaunee County, Village of Cleveland, City of Manitowoc, Manitowoc County, City of Two Rivers
County of, Kewaunee	TBD	8/8/2017	Flood Risk Review	Wisconsin DNR, STARR, Kewaunee County, Village of Cleveland, City of Manitowoc, Manitowoc County, City of Two Rivers
Casco, Village of	TBD	8/8/2017	Flood Risk Review	Wisconsin DNR, STARR, Kewaunee County, Village of Cleveland, City of Manitowoc, Manitowoc County, City of Two Rivers
Luxemburg, Village of	TBD	8/8/2017	Flood Risk Review	Wisconsin DNR, STARR, Kewaunee County, Village of Cleveland, City of Manitowoc, Manitowoc County, City of Two Rivers
Algoma, City of	TBD	11/6/2020	Flood Risk Review	FEMA, STARRII, Wisconsin DNR, Wisconsin Division of Emergency Management
Kewaunee, City of	TBD	11/6/2020	Flood Risk Review	FEMA, STARRII, Wisconsin DNR, Wisconsin Division of Emergency Management
County of, Kewaunee	TBD	11/6/2020	Flood Risk Review	FEMA, STARRII, Wisconsin DNR, Wisconsin Division of Emergency Management

Table 29 Community Meetings (Continued)

Casco, Village of	TBD	11/6/2020	Flood Risk Review	FEMA, STARRII, Wisconsin DNR, Wisconsin Division of Emergency Management
Luxemburg, Village of	TBD	11/6/2020	Flood Risk Review	FEMA, STARRII, Wisconsin DNR, Wisconsin Division of Emergency Management

SECTION 8.0 – ADDITIONAL INFORMATION

Information concerning the pertinent data used in the preparation of this FIS Report can be obtained by submitting an order with any required payment to the FEMA Engineering Library. For more information on this process, see https://www.fema.gov.

Table 30 is a list of the locations where FIRMs for Kewaunee County can be viewed. Please note that the maps at these locations are for reference only and are not for distribution. Also, please note that only the maps for the community listed in the table are available at that particular repository. A user may need to visit another repository to view maps from an adjacent community.

Table 30: Map Repositories

Community	Address	City	State	Zip Code
Algoma, City of	City Hall Administrator's Office 416 Freemont Street	Algoma	WI	54201
Casco, Village of	Village Office 311 Church Avenue	Casco	WI	54205
Kewaunee, City of	City Hall 401 Fifth Street	Kewaunee	WI	54216
Kewaunee County, Unincorporated Areas	Kewaunee County Emergency Management Department 625 3rd Street	Luxemburg	WI	54216
Luxemburg, Village of	Village Office 206 Maple Street	Luxemburg	WI	54217

The National Flood Hazard Layer (NFHL) dataset is a compilation of effective FIRM databases and LOMCs. Together they create a GIS data layer for a State or Territory. The NFHL is updated as studies become effective and extracts are made available to the public monthly. NFHL data can be viewed or ordered from the website shown in Table 31.

Table 31 contains useful contact information regarding the FIS Report, the FIRM, and other relevant flood hazard and GIS data. In addition, information about the state NFIP Coordinator and GIS Coordinator is shown in this table. At the request of FEMA, each Governor has designated an agency of State or territorial government to coordinate that State's or territory's NFIP activities. These agencies often assist communities in developing and adopting necessary floodplain management measures. State GIS Coordinators are knowledgeable about the availability and location of state and local GIS data in their state.

Table 31: Additional Information

FEMA and the NFIP	
FEMA and FEMA Engineering Library website	www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library
NFIP website	www.fema.gov/national-flood-insurance-program
NFHL Dataset	msc.fema.gov
FEMA Region V	536 South Clark Street, 6th Floor Chicago, IL 60605 (312) 408-5500
Other Federal Agencies	
USGS website	www.usgs.gov
Hydraulic Engineering Center website	www.hec.usace.army.mil
State Agencies and Organizations	
State NFIP Coordinator	Brian Cunningham Wisconsin Department of Natural Resources 101 S. Webster Street, Box 7921 Madison, WI 53707-7921 (608) 220-5633 brian.bunningham@wisconsin.gov
State GIS Coordinator	James Giglierano, Geographic Information Officer State of Wisconsin DOA Division of Enterprise Technology 101 East Wilson Street P.O. Box 7844 Madison, WI 53707-7844 (608)261-5042 Jim.giglierano@wisconsin.gov

SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

Table 32 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

Table 32: Bibliography and References

Citation in this FIS	Publisher/ Issuer	Publication Title, "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
DNR 1996	Wisconsin Department of Natural Resources	Wisconsin PLSS Sections	Wisconsin Department of Natural Resources	Madison, WI	1996	http://www.dnr.state.wi.us
FEMA 1978	FEMA	City of Algoma Flood Insurance Study	Federal Emergency Management Agency	Washington, D.C.	12/1/1978	https://www.fema.gov/
FEMA 1979a	FEMA	Village of Casco Flood Insurance Study	Federal Emergency Management Agency	Washington, D.C.	2/1/1979	https://www.fema.gov/
FEMA 1979b	FEMA	City of Kewaunee Flood Insurance Study	Federal Emergency Management Agency	Washington, D.C.	8/3/1979	https://www.fema.gov/
FEMA 1980	FEMA	Kewaunee County (Unincorporated Areas) Flood Insurance Study	Federal Emergency Management Agency	Washington, D.C.	3/1/1980	https://www.fema.gov/
FEMA 1981	Federal Emergency Management Agency	User's Manual for Wave Height Analysis	Federal Emergency Management Agency	Washington, D.C.	2/1/1981	
FEMA 1988	Federal Emergency Management Agency	Technical Documentation for WHAFIS Program Version 3.0	Federal Emergency Management Agency	Washington, D.C.	9/1/1988	
FEMA 2002	Federal Emergency Management Agency	Guidelines and Specifications for Flood Hazard Mapping Partners, Appendix D: Guidance for Coastal Flooding Analyses and Mapping	Federal Emergency Management Agency	Washington, D.C.	2/1/2002	

Table 32: Bibliography and References *(Continued)*

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
FEMA 2005	Federal Emergency Management Agency	FEMA Coastal Flood Hazard Analysis and Mapping Guidelines Focused Study Report	Jones et. al		2/1/2005	http://www.fema.gov/media-library-data/20130726-1541-20490-9494/frm_p1wave2.pdf
FEMA 2007	Federal Emergency Management Agency	Supplementary WHAFIS Documentations, WHAFIS 4.0, A Revision of FEMA's WHAFIS 3.0 Program	Divoky, D.		08/10/2007	
FEMA 2013	Federal Emergency Management Agency	Great Lakes Coastal Flood Study Discovery Report for Lake St. Clair: Basin-wide Report	STARR II		2/1/2013	
FEMA 2014	Federal Emergency Management Agency	FEMA Great Lakes Coastal Guidelines, Appendix D.3 Update	Federal Emergency Management Agency		2014	
FEMA 2016	Federal Emergency Management Agency	Lake Michigan Water Level and Wave Modeling: Model Creation and Validation Report	Federal Emergency Management Agency Region V	Washington, D.C.	6/1/2016	

Table 32: Bibliography and References *(Continued)*

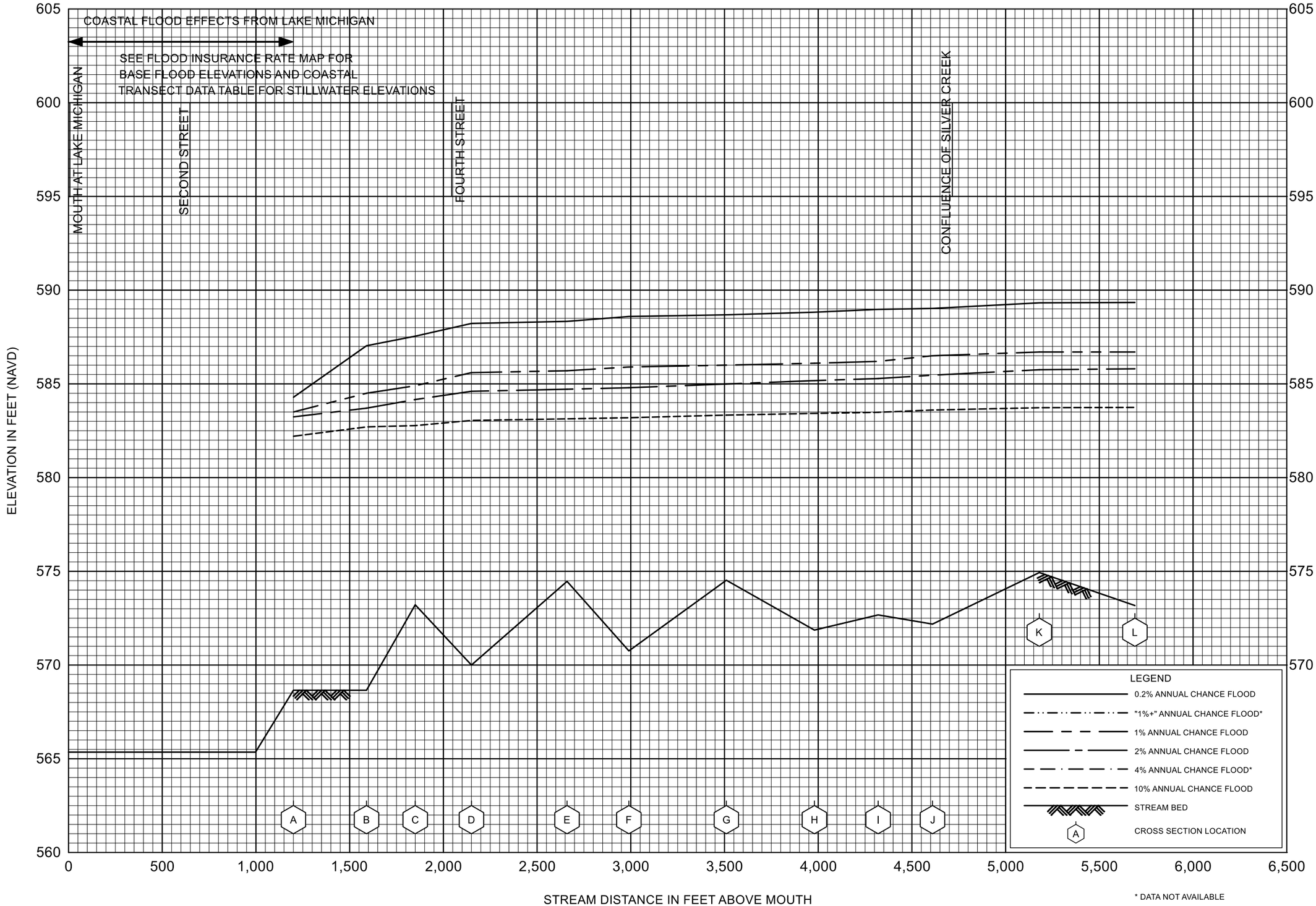
Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
GroundPoint 2012	GroundPoint Technologies	LiDAR	GroundPoint Technologies		2012	
JALBTCX 2013	Joint Airborne LiDAR Bathymetry Technical Center of eXpertise	U.S. Army Corps of Engineers (USACE), JALBTCX (Joint Airborne Lidar Bathymetry Technical Center of eXpertise) Seamless Bathymetry and Terrain for Lake Michigan	Joint Airborne LiDAR Bathymetry Technical Center of eXpertise	Washington, D.C.	10/31/2013	https://www.usace.army.mil/
OE 2001	Journal of Waterway, Port, Coastal, Ocean Engineering	Wave runup on dikes with shallow foreshores. Journal of Waterway, Port, Coastal, Ocean Engineering, Vol. 127(5), pp. 254-262.	Van Gent, M.R.A.		2001	
PTC 2007	Parametric Technology Corporation	Mathcad Version 14.0	Parametric Technology Corporation		2007	http://www.ptc.com/products/mathcad/
STARR II 2017	STARR II	Coastal Flood Study for Kewaunee County, WI	STARR	Laurel, MD	12/8/2017	

Table 32: Bibliography and References *(Continued)*

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
STARR II 2018	STARR II	Kewaunee County New Approximate Riverine Study	Federal Emergency Management Agency	Washington, D.C.	9/1/2018	https://www.fema.gov/
STARR II 2021a	STARR II	Kewaunee County Redelineation	Federal Emergency Management Agency	Washington, D.C.	2/18/2021	https://www.fema.gov/
STARR II 2021b	STARR II	Kewaunee County New Detailed Riverine Study	Federal Emergency Management Agency	Washington, D.C.	2/18/2021	https://www.fema.gov/
STARR II 2021c	STARR II	DFIRM Database for Kewaunee County, WI	Federal Emergency Management Agency	Washington, D.C.	2/18/2021	https://www.fema.gov/
Stockdon 2006	Coastal Engineering	Empirical parameterization of setup, swash, and runup	Stockdon, H.F., Holman, R.A., Howd, P.A., and Sallenger, A.H.		2006	
USACE 1984	United States Army Corps of Engineers	Shore Protection Manual	United States Army Corps of Engineers	Washington, D.C.	1984	
USACE 2012	US Army Corps of Engineers, Chicago District	USACE Structures	US Army Corps of Engineers, Chicago District	Chicago, IL	9/30/2012	http://www.lrc.usace.army.mil/
USACE 2012a	United States Army Corps of Engineers	Wave Runup Prediction for Flood Hazard Assessment	Melby, J.A.	Washington, D.C.	10/1/2012	
USACE 2012b	United States Army Corps of Engineers	Statistical Analysis and Storm Sampling Approach for Lakes Michigan and St. Clair	Nadal-Carabello, N.C., Melby, J.A., and B.A., Ebersole		9/1/2012	
USACE 2012c	United States Army Corps of Engineers	CSHORE	U.S. Army Corps of Engineers Engineer Research and Development Center		9/1/2012	http://greatlakescoast.org/pubs/reports/CHL+TR-12-22.pdf

Table 32: Bibliography and References *(Continued)*

Citation in this FIS	Publisher/ Issuer	*Publication Title,* "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
USACE 2013	United States Army Corps of Engineers	*Lake St. Clair: Storm Wave and Water Level Modeling*	Hesser, T.J., Cialone, M.A., and Anderson, M.E.		6/1/2013	
USACE 2017	United States Army Corps of Engineers	Great Lakes Region National Shoreline Management Study: Lake Michigan National Shoreline Management Study	Institute of Water Resources, United States Army Corps of Engineers	Fort Belvoir, VA	2/1/2017	
USCB 2012	US Census Bureau, Geography Division	Kewaunee County Transportation and Water	US Census Bureau, Geography Division	Washington, D.C.	6/30/2012	http:www.census.gov/cgi_-bin/geo/shapefiles2012/main
USCB 2017	U.S. Census Bureau	State & County QuickFacts, Website	U.S. Census Bureau		2/22/2017	http://www.census.gov/quickfacts/table/PST045215/26163
USDA 2013	USDA National Resources Conservation Service	Basemap Imagery	USDA National Resources Conservation Service	Washington, D.C.	10/1/2013	http://nrcs.usda.gov
USGS 2010	United States Geological Survey	USGS topographic 7.5- by 7.5-minute quadrangles	United States Geological Survey	Washington, D.C.	11/3/2010	https://www.usgs.gov/
USGS 2016	United States Geological Survey	National Hydrography Dataset	U.S. Department of Interior, Geological Survey	Reston, VA	2016	nhd.usgs.gov
WisDOT 2005	Wisconsin Department of Transportation	WisDOT Wisconsin 2004 Municipalities	Wisconsin Department of Transportation	Madison, WI	1/1/2005	http://www.dot.wisconsin.gov



FLOOD PROFILES

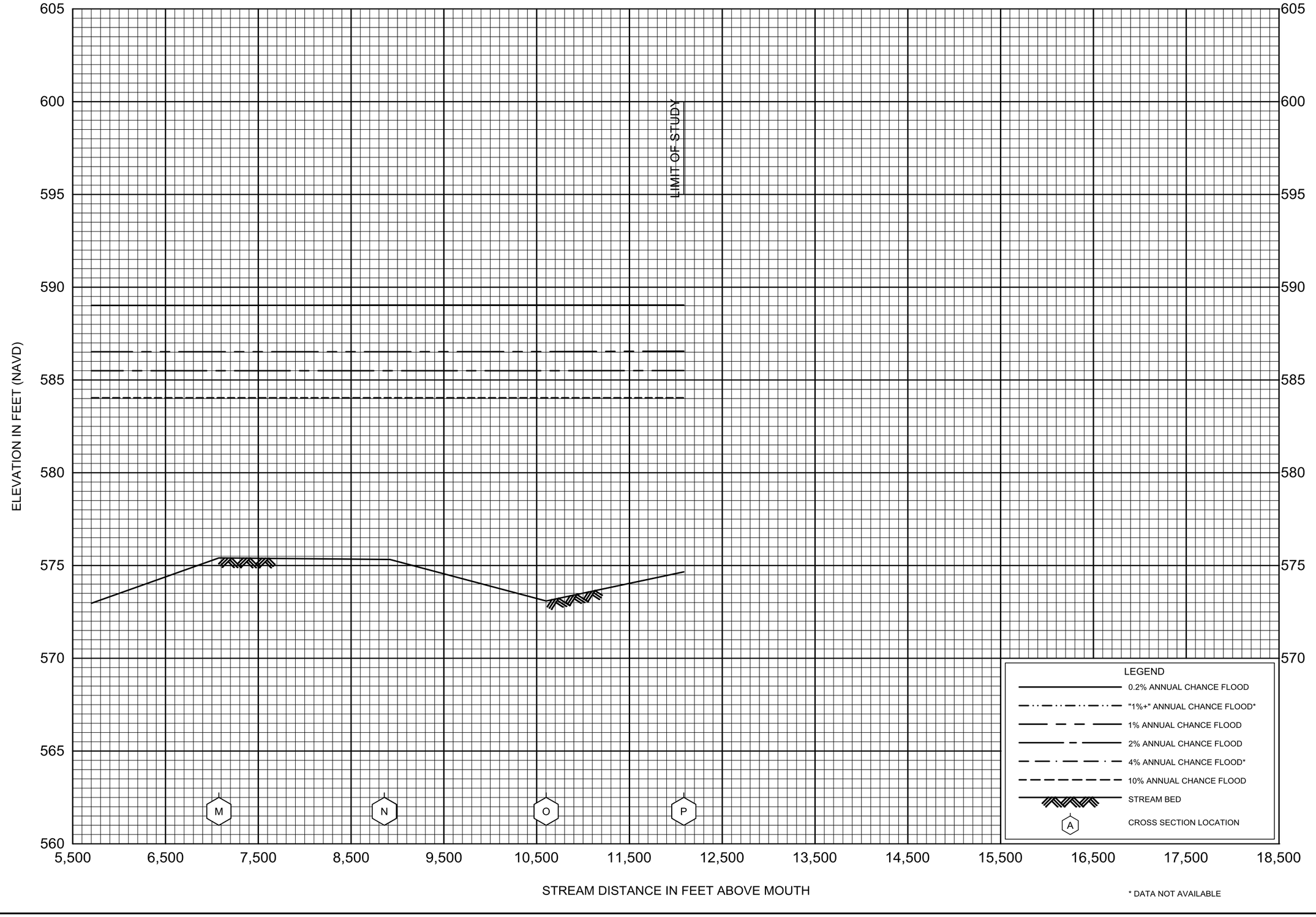
AHNAPEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUTNY, WI

AND INCORPORATED AREAS

01P



FLOOD PROFILES

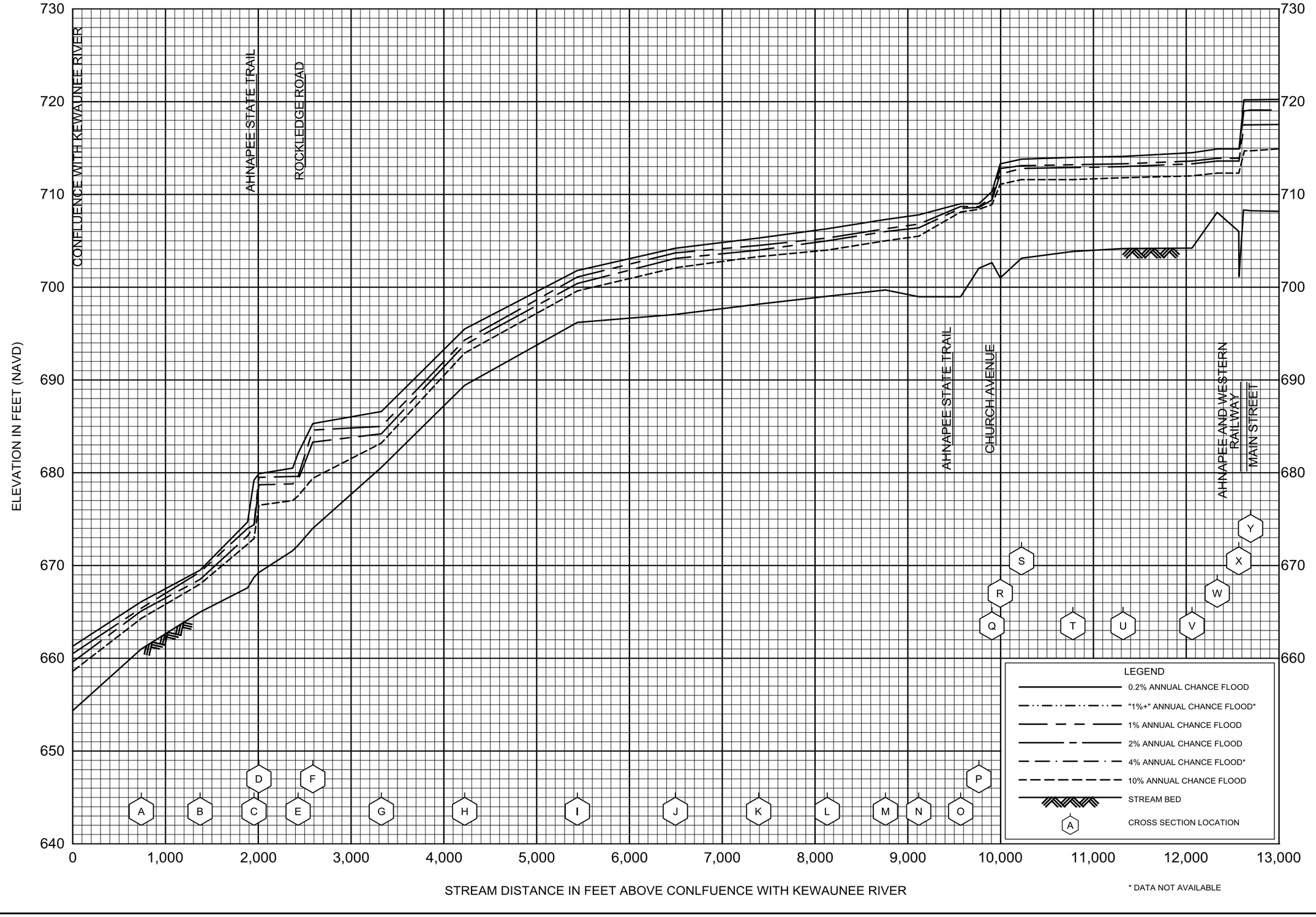
AHNAPEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

02P



FLOOD PROFILES

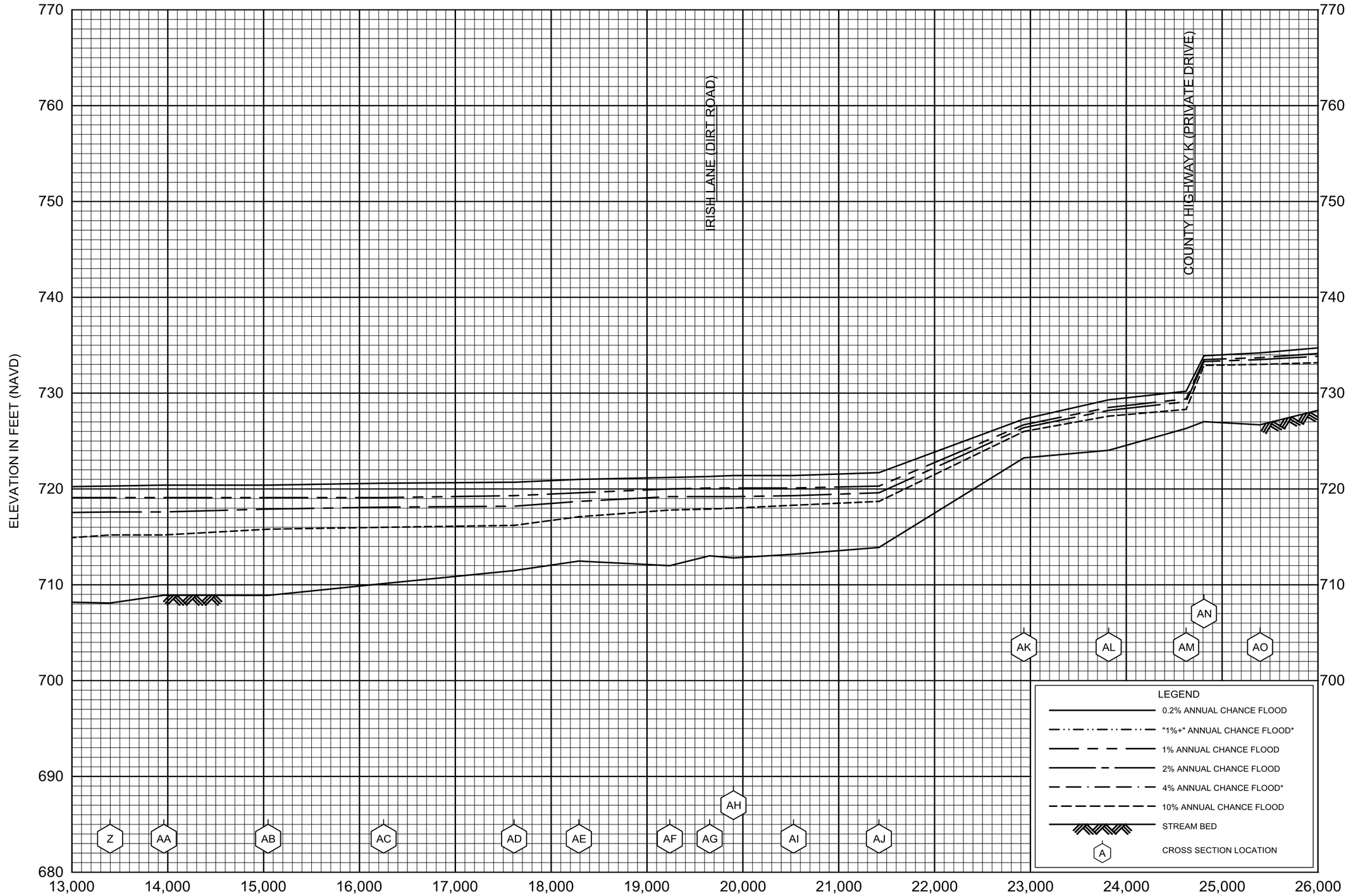
CASCO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

03P



FLOOD PROFILES

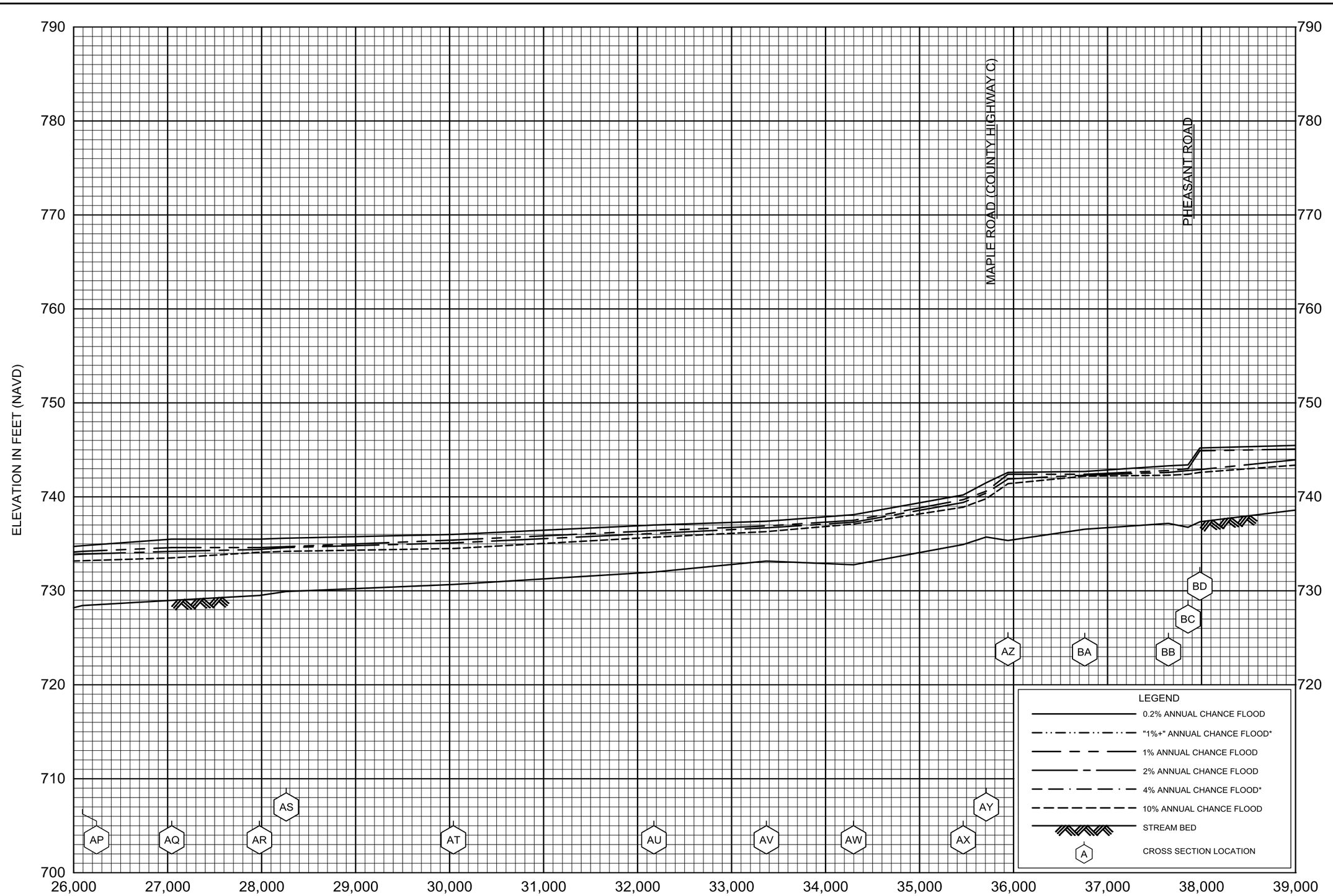
CASCO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

04P



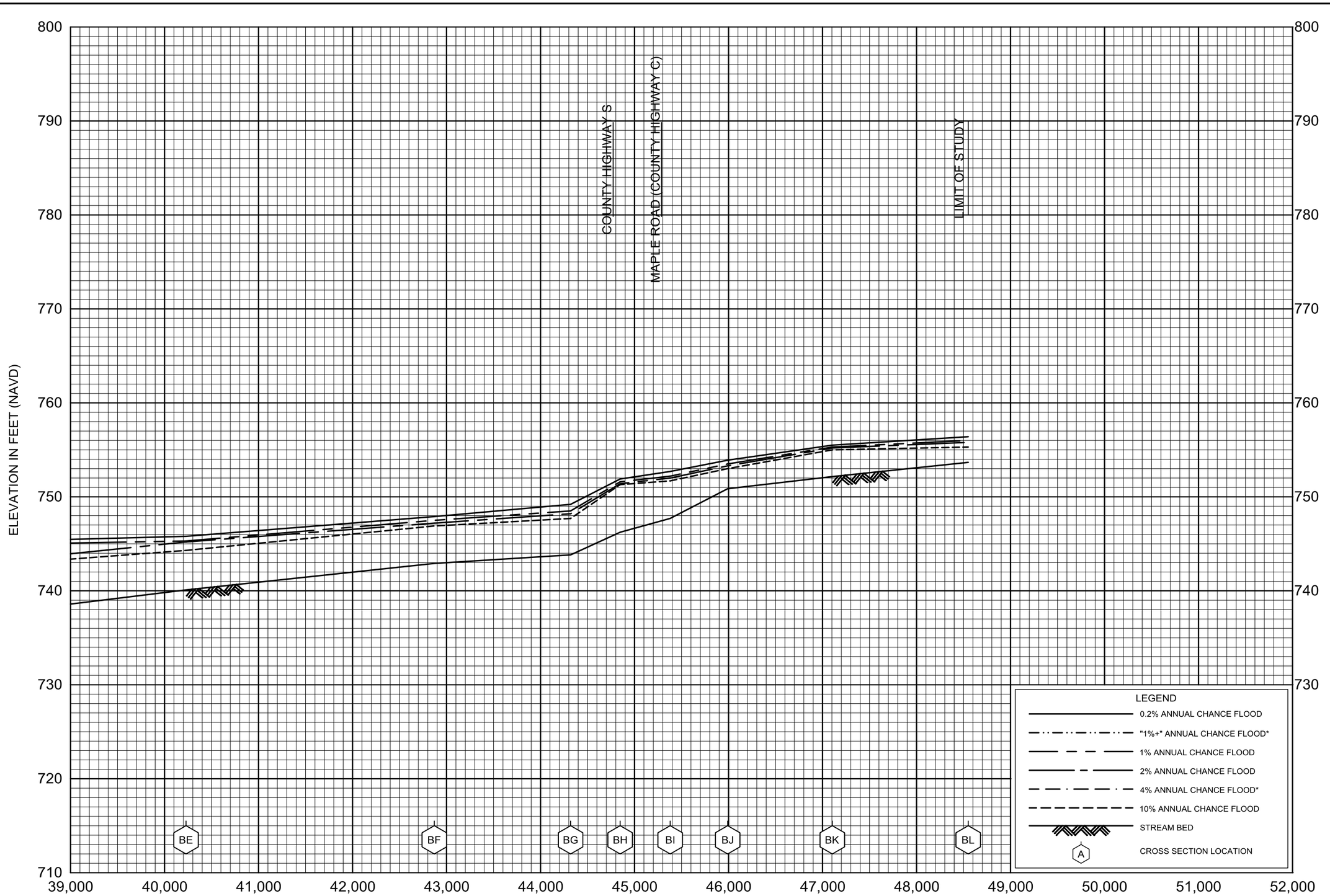
FLOOD PROFILES

CASCO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS



* DATA NOT AVAILABLE

FLOOD PROFILES

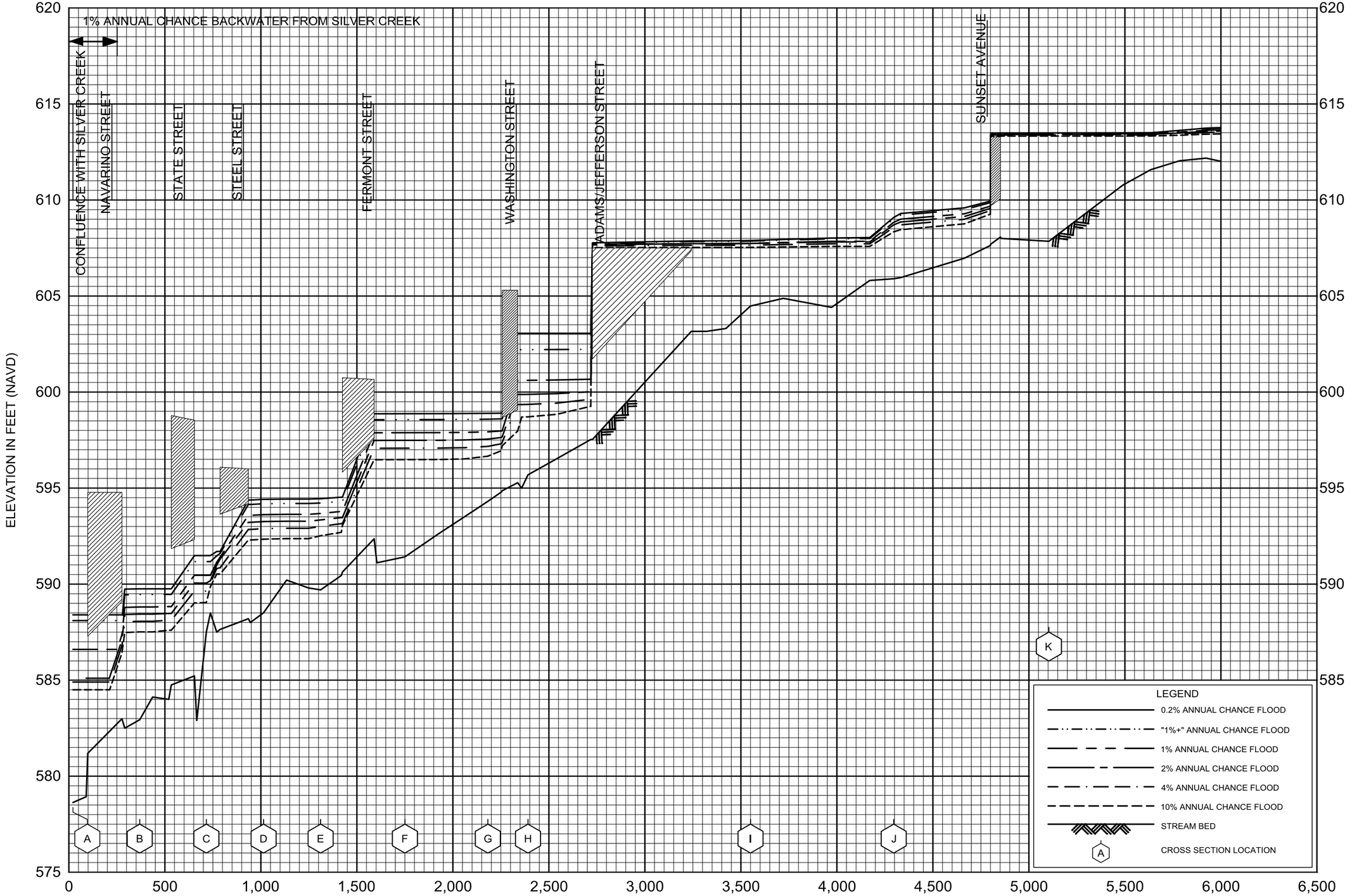
CASCO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

06P



FLOOD PROFILES

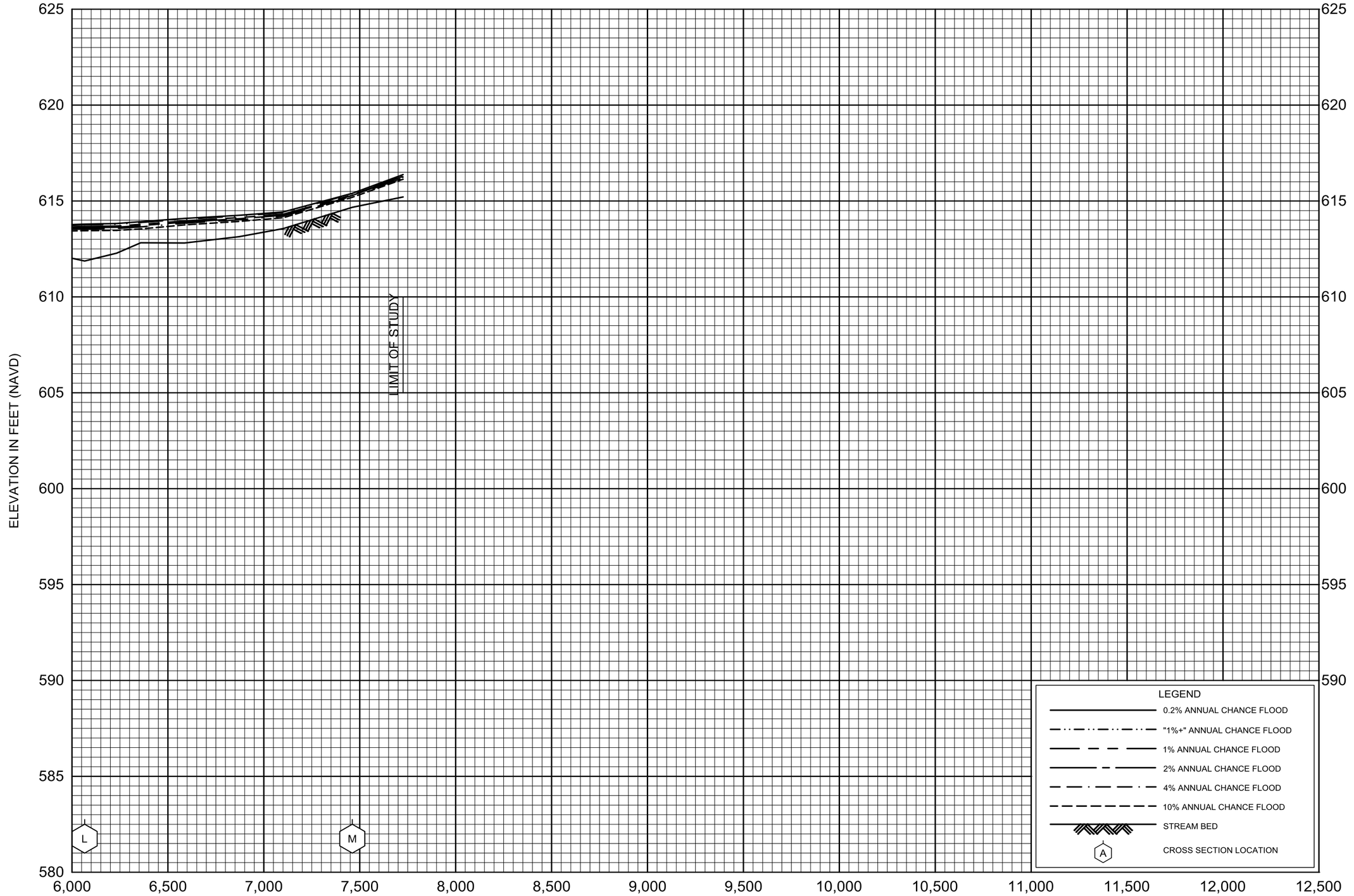
CHOPSTICKS BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

07P



FLOOD PROFILES

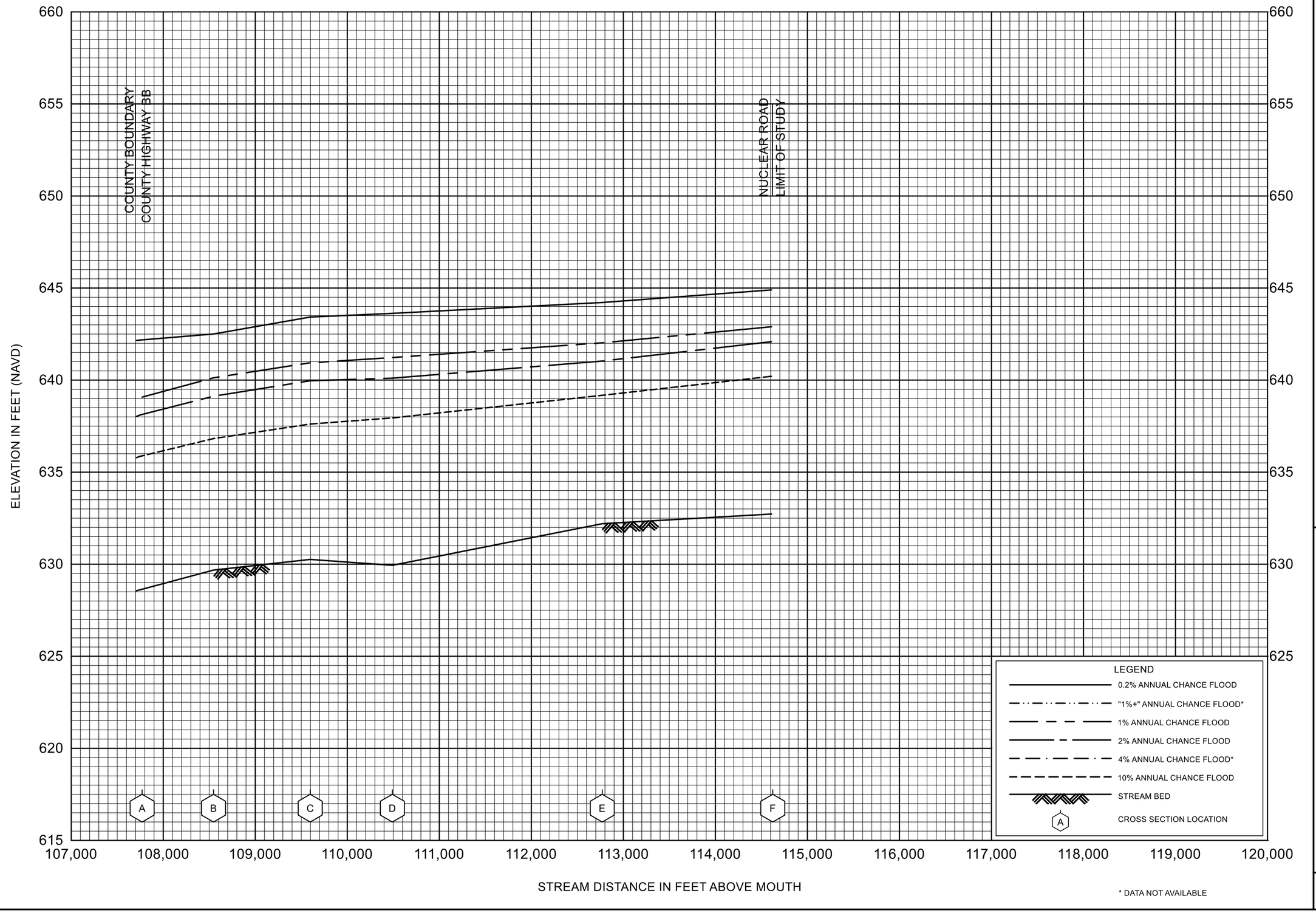
CHOPSTICKS BROOK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

08P



FLOOD PROFILES

EAST TWIN RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

09P

COASTAL FLOOD EFFECTS FROM LAKE MICHIGAN

SEE FLOOD INSURANCE RATE MAP FOR BASE FLOOD ELEVATIONS AND COASTAL TRANSECT DATA TABLE FOR STILLWATER ELEVATIONS.

MOUTH AT LAKE MICHIGAN

MAIN STREET - STATE HIGHWAY 42

ELEVATION IN FEET (NAVD)

600
595
590
585
580
575
570
565
560
555

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500 5,000 5,500 6,000 6,500

STREAM DISTANCE IN FEET ABOVE LAKE MICHIGAN

A B C D

LEGEND

- 0.2% ANNUAL CHANCE FLOOD
- "1%+" ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 4% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- A CROSS SECTION LOCATION

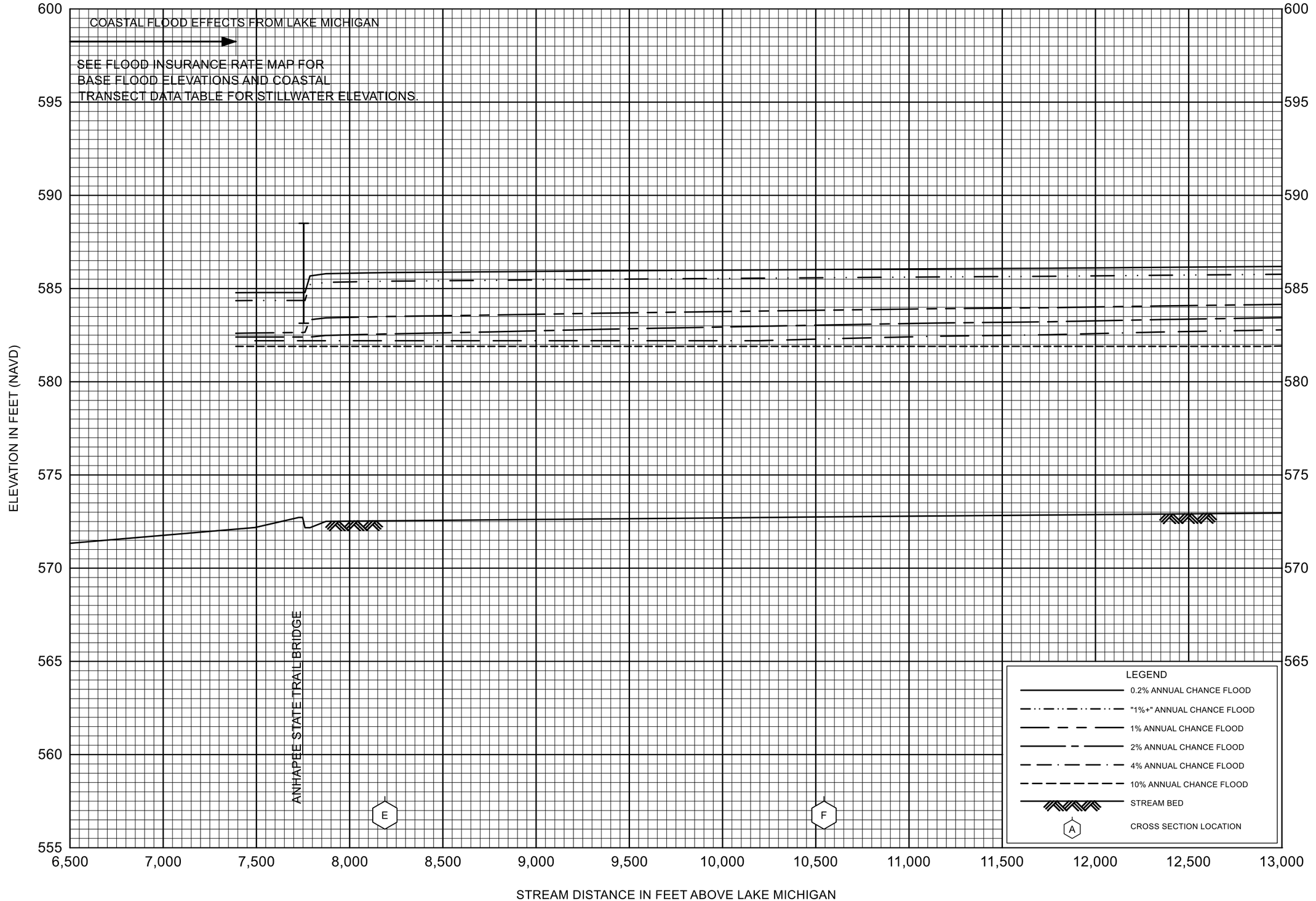
FLOOD PROFILES

KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI
AND INCORPORATED AREAS

10P



FLOOD PROFILES

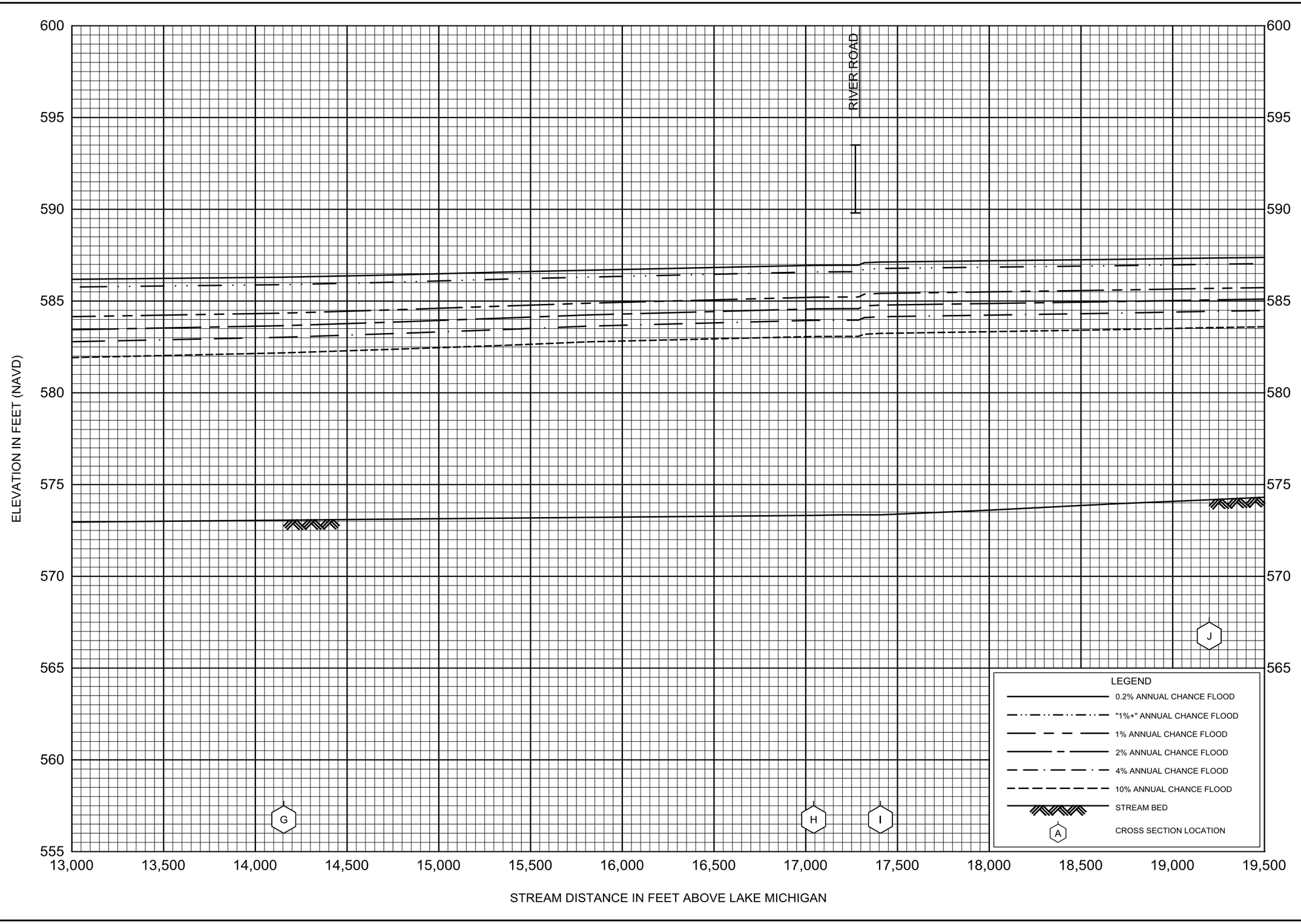
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

11P



FLOOD PROFILES

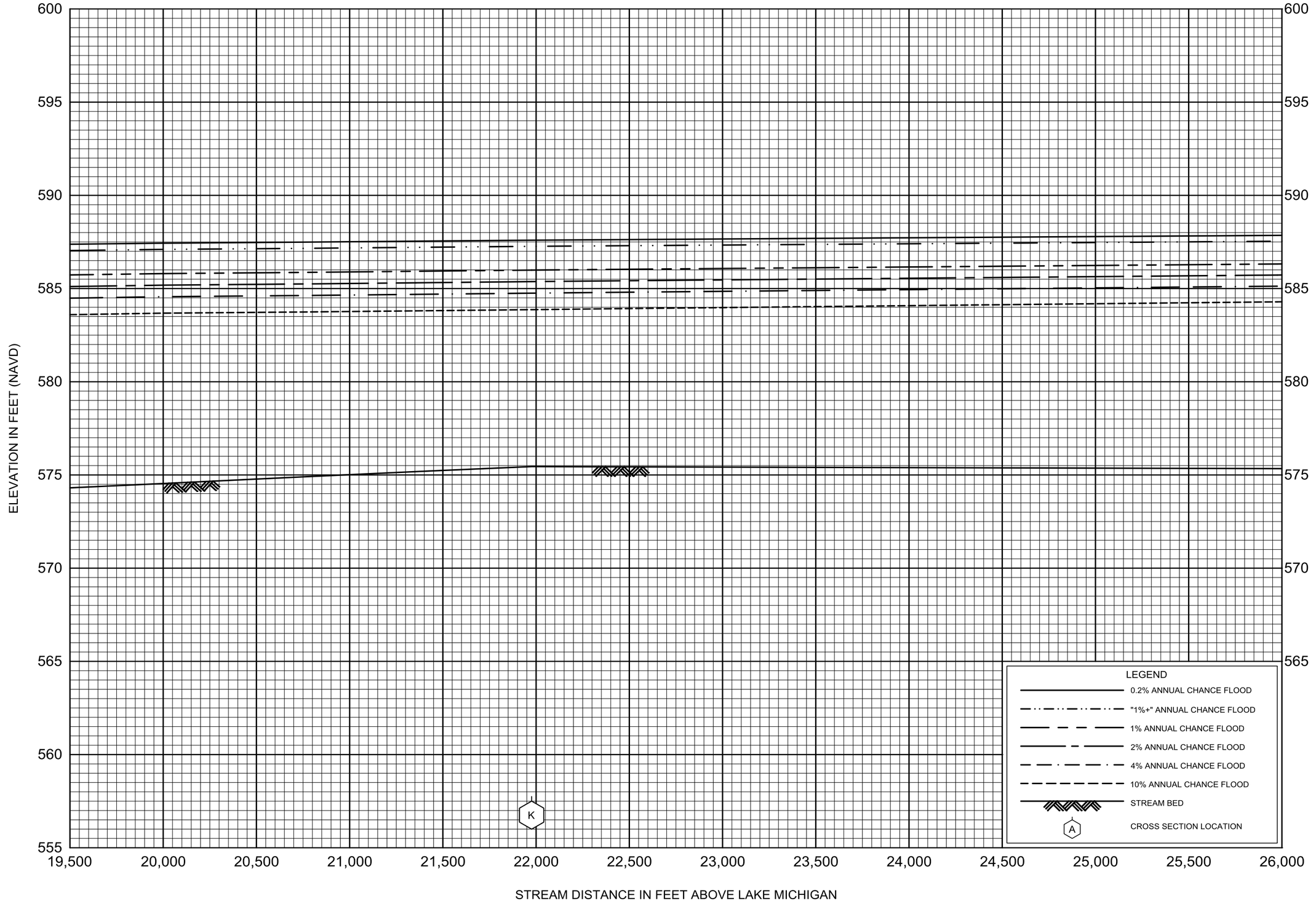
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

12P



FLOOD PROFILES

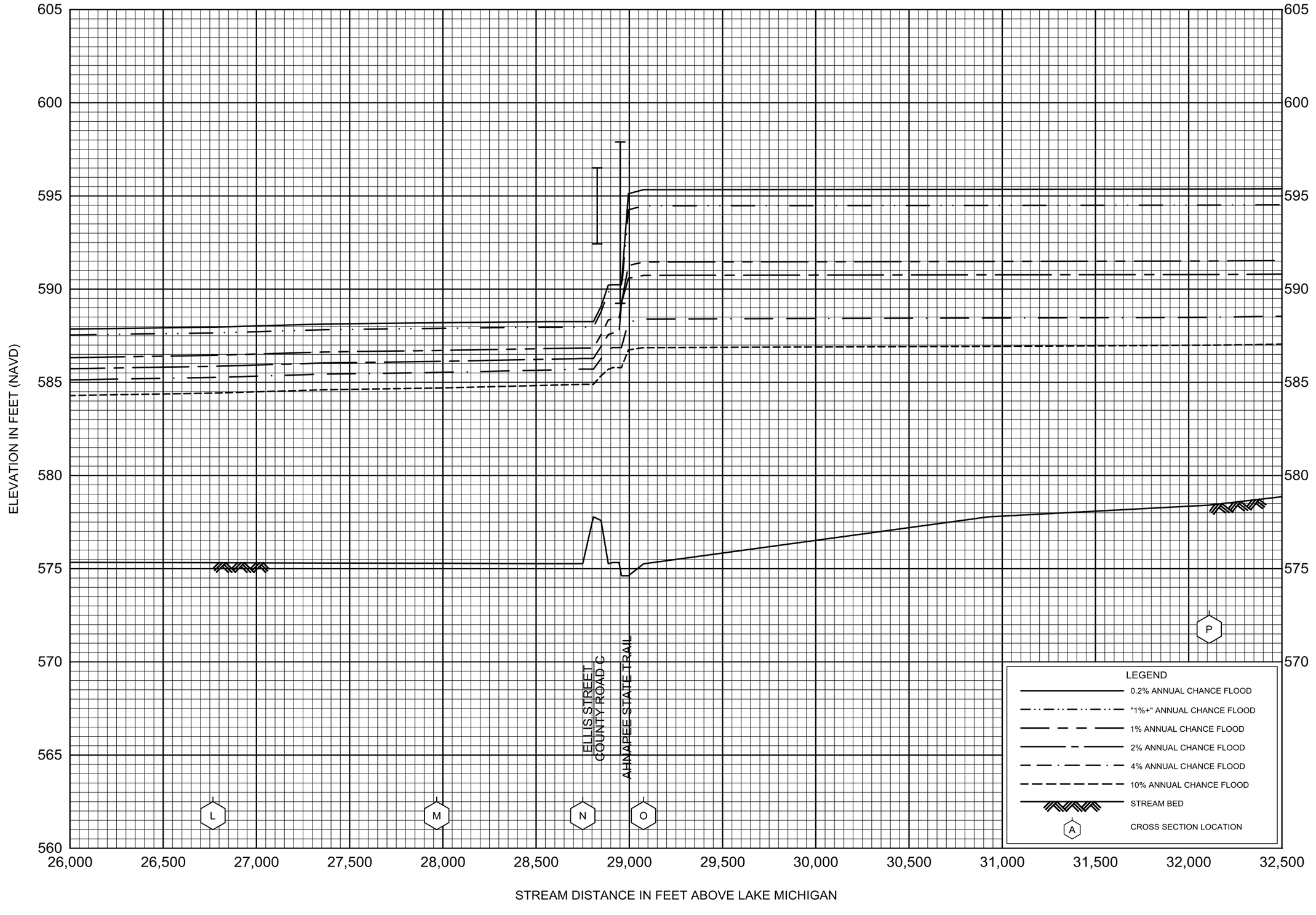
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

13P



FLOOD PROFILES

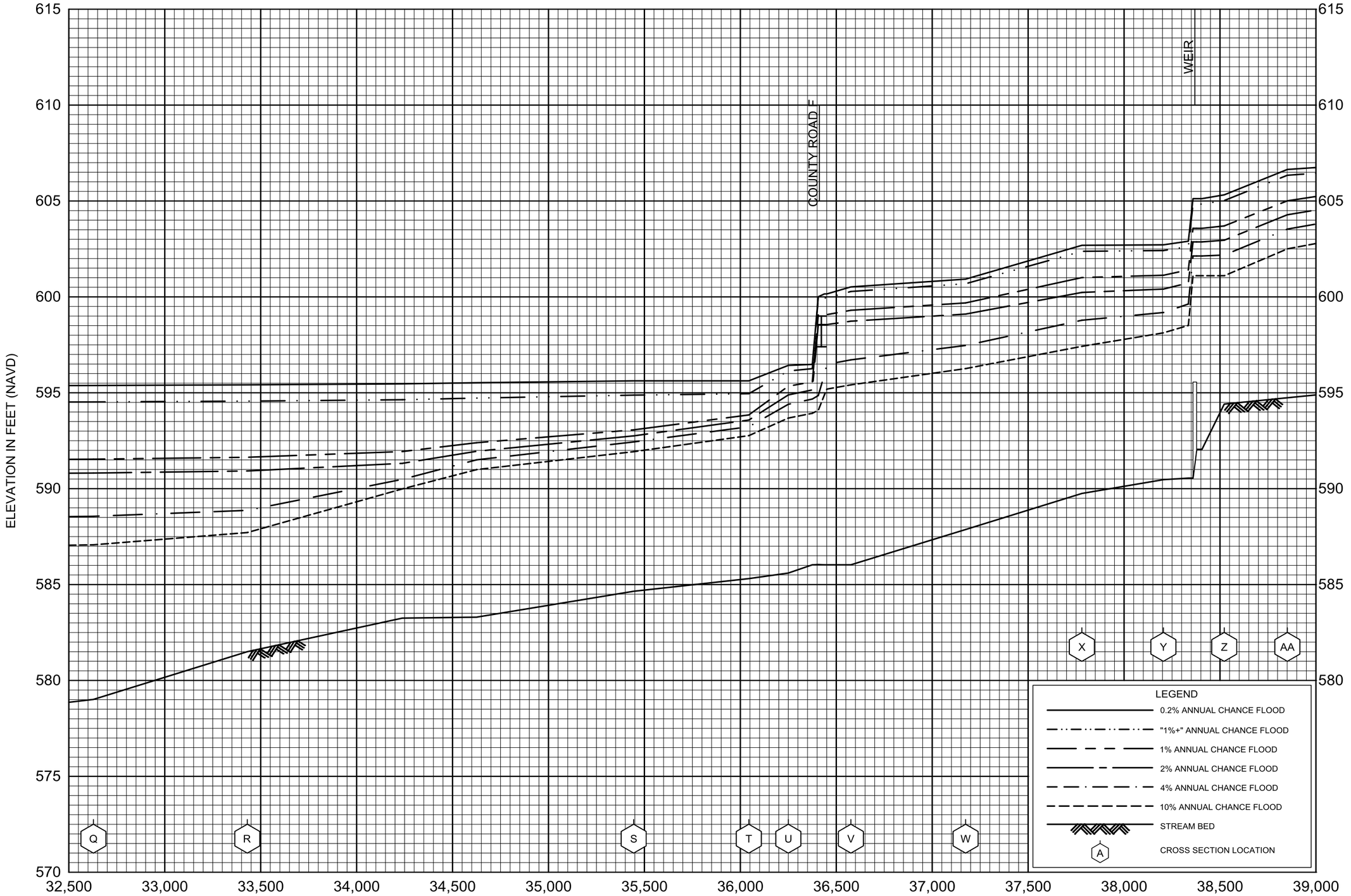
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

14P



FLOOD PROFILES

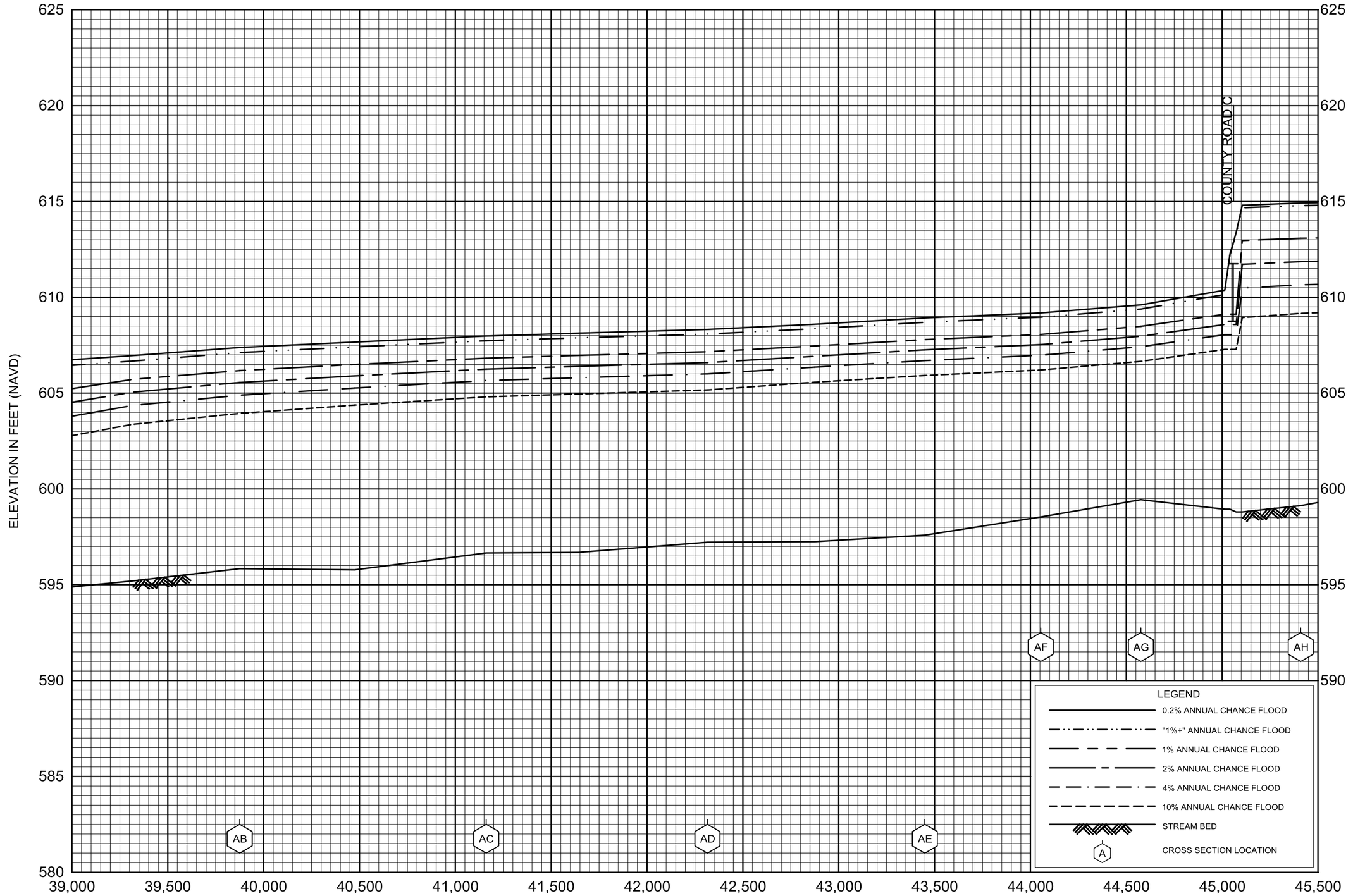
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

15P



FLOOD PROFILES

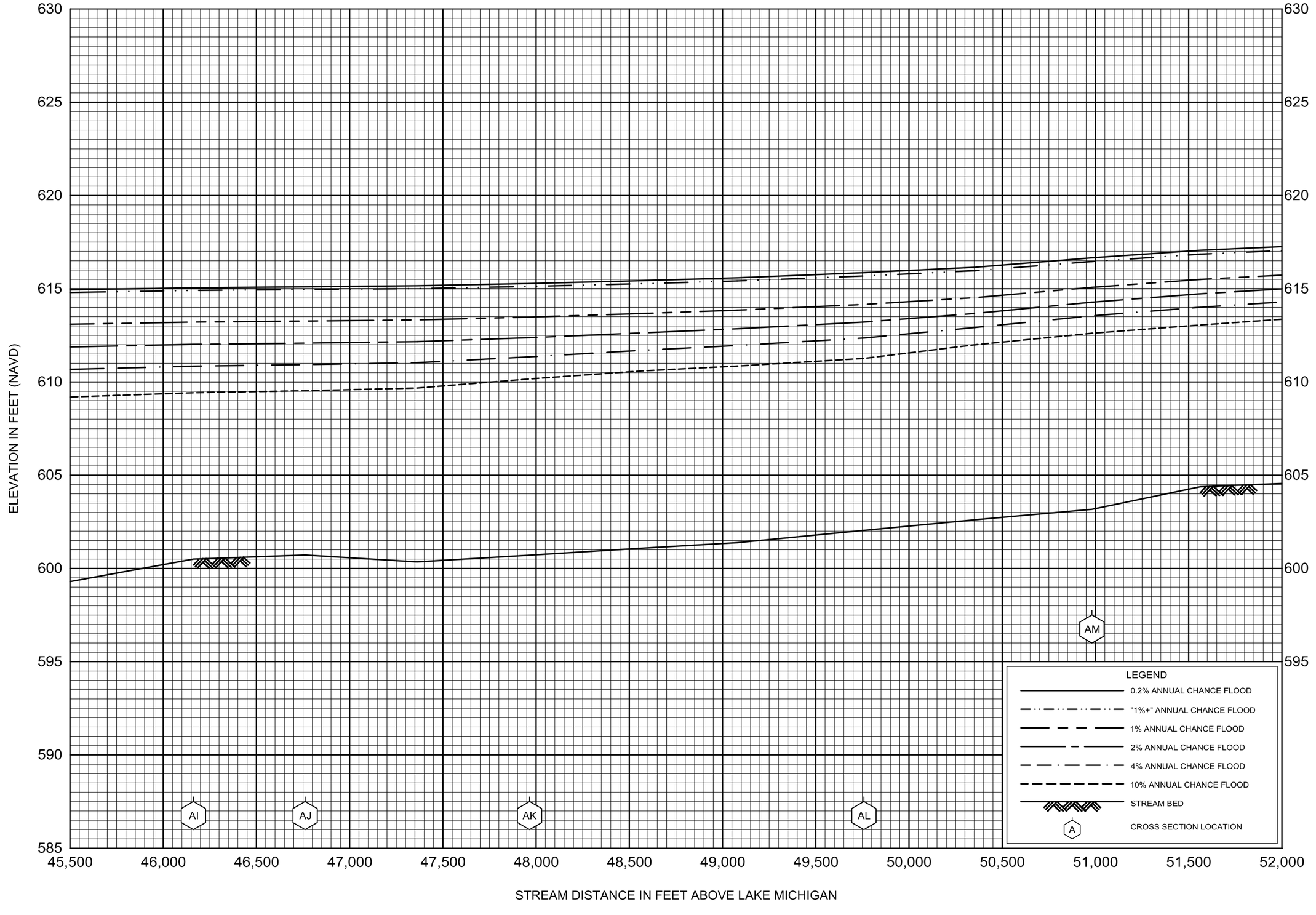
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

16P



FLOOD PROFILES

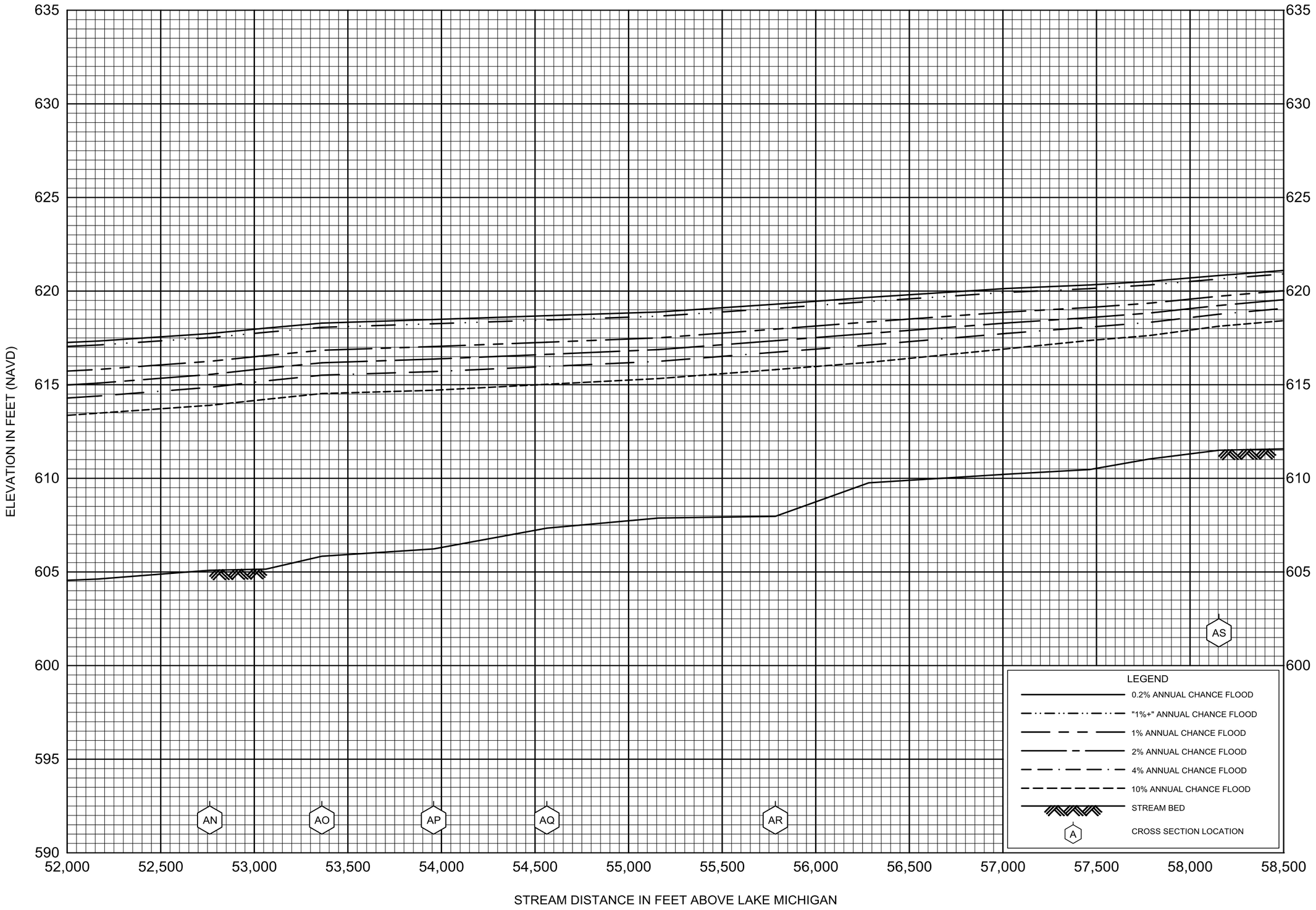
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

17P



FLOOD PROFILES

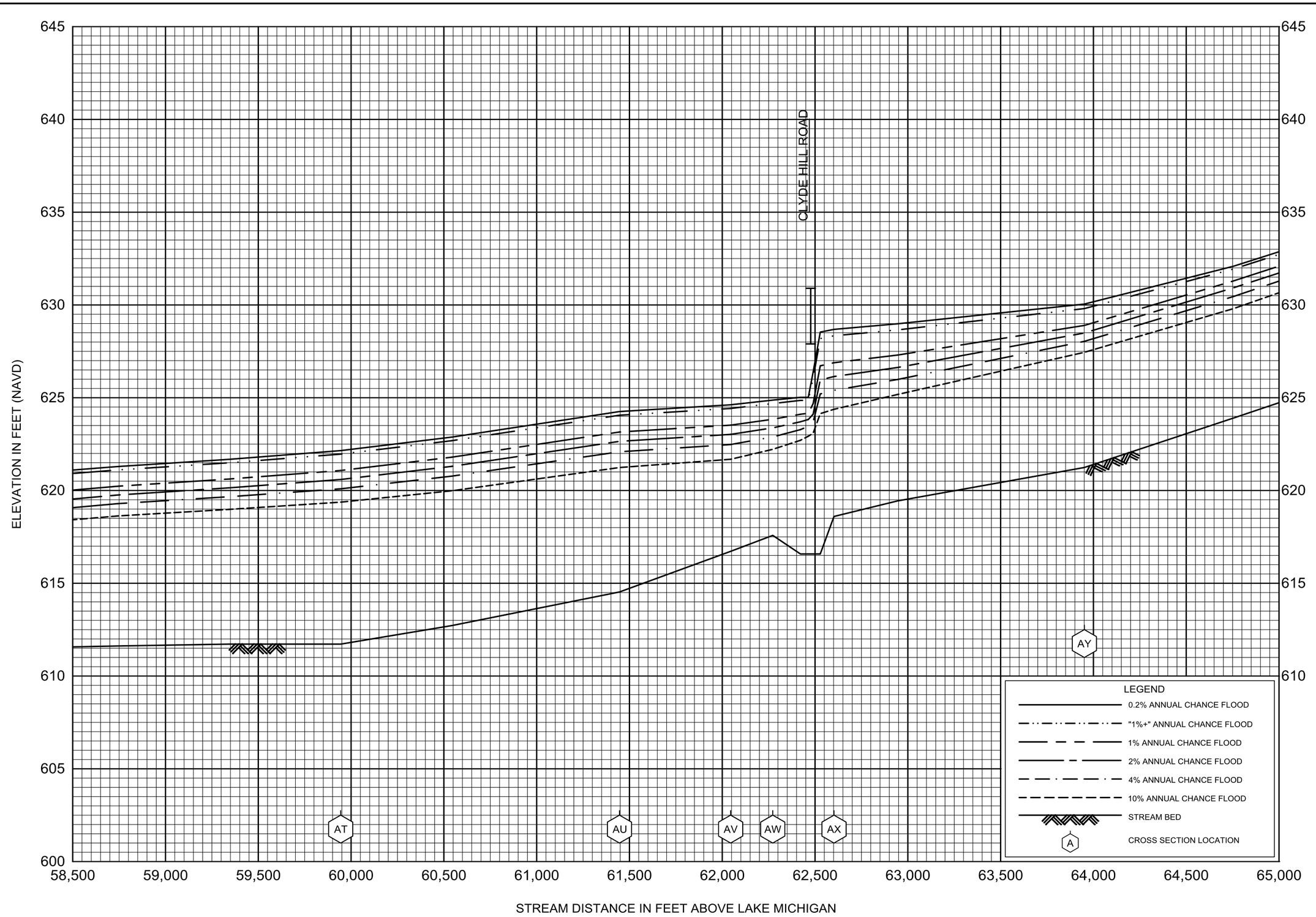
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

18P



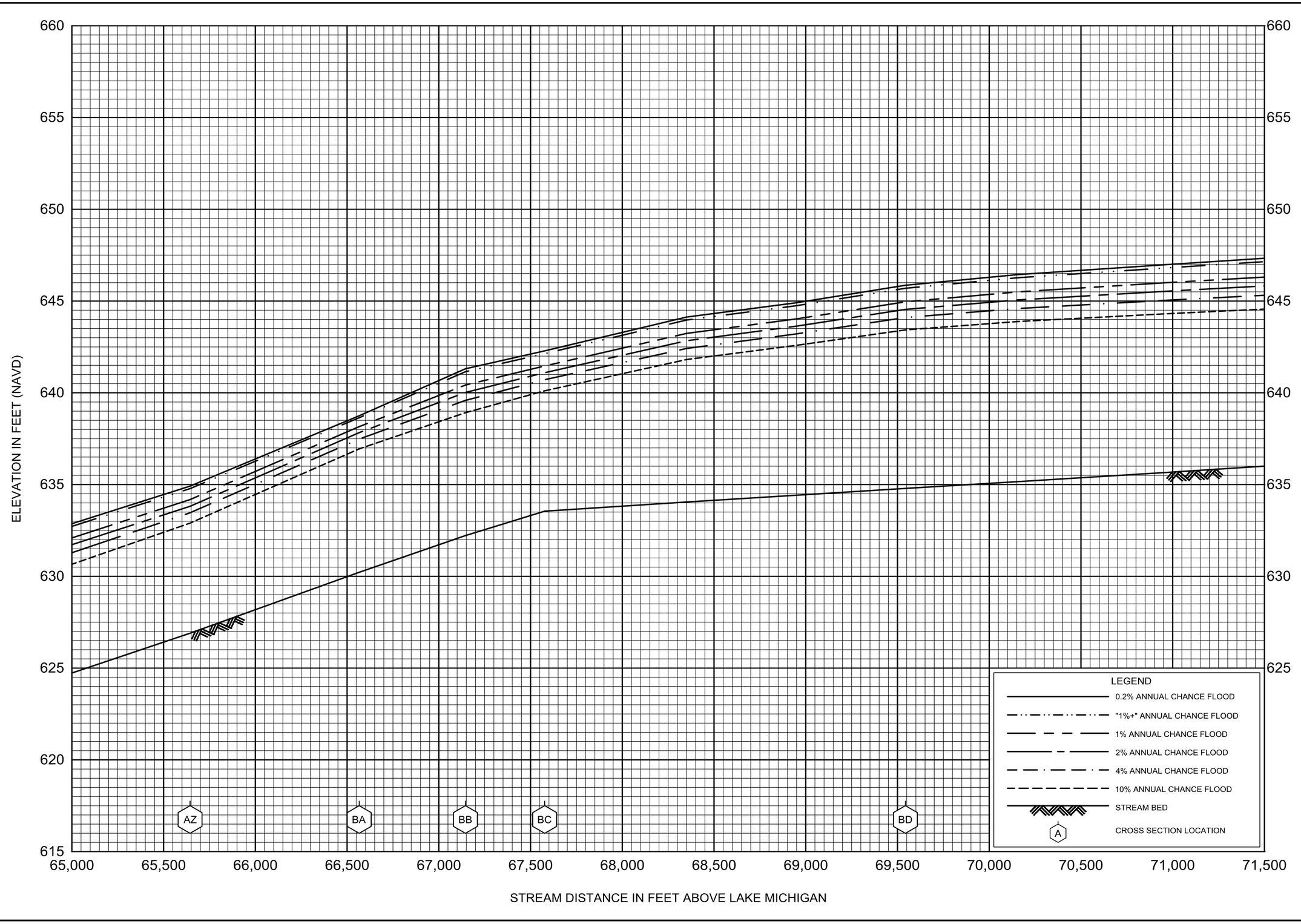
FLOOD PROFILES

KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS



FLOOD PROFILES

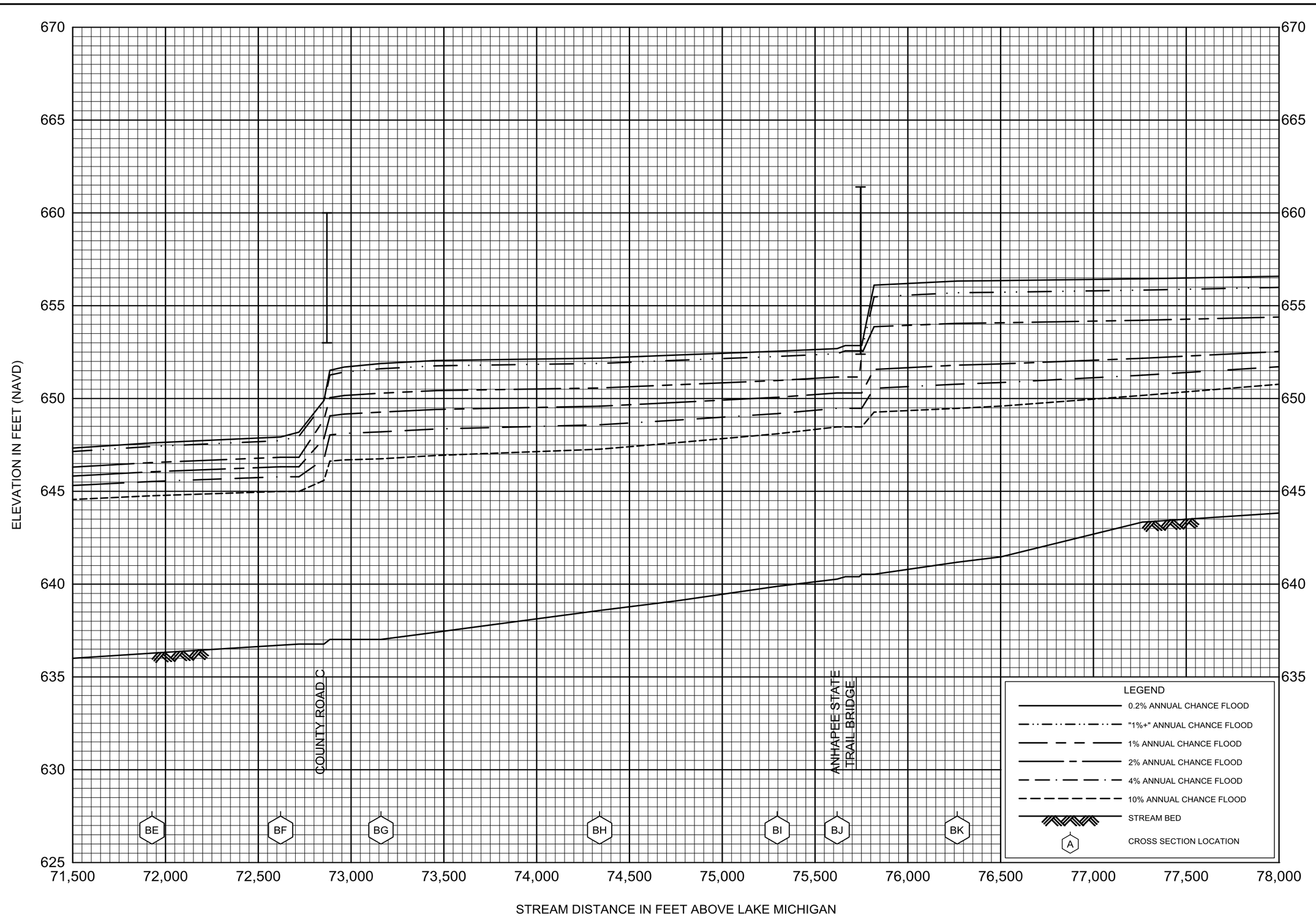
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

20P



FLOOD PROFILES

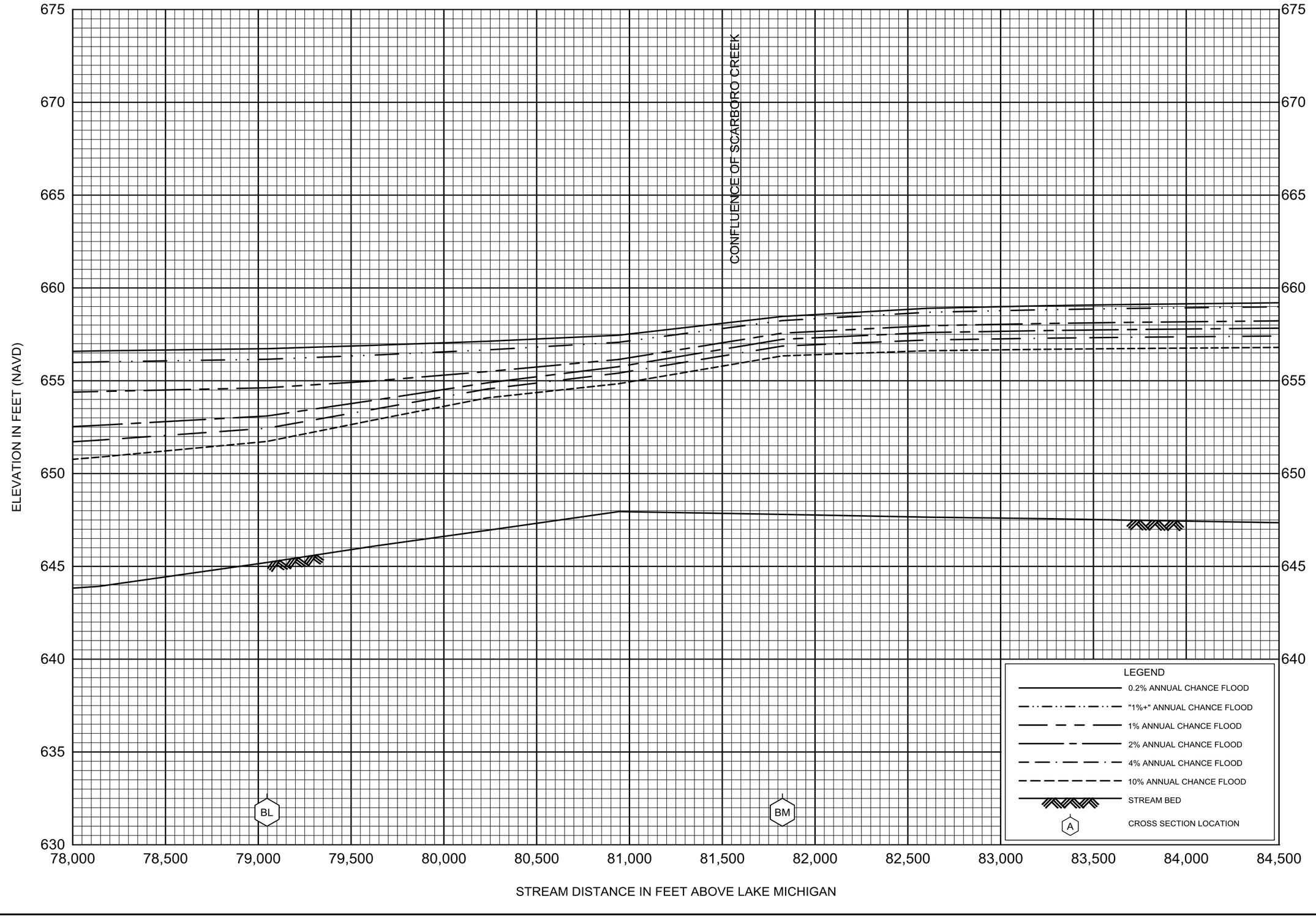
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

21P



FLOOD PROFILES

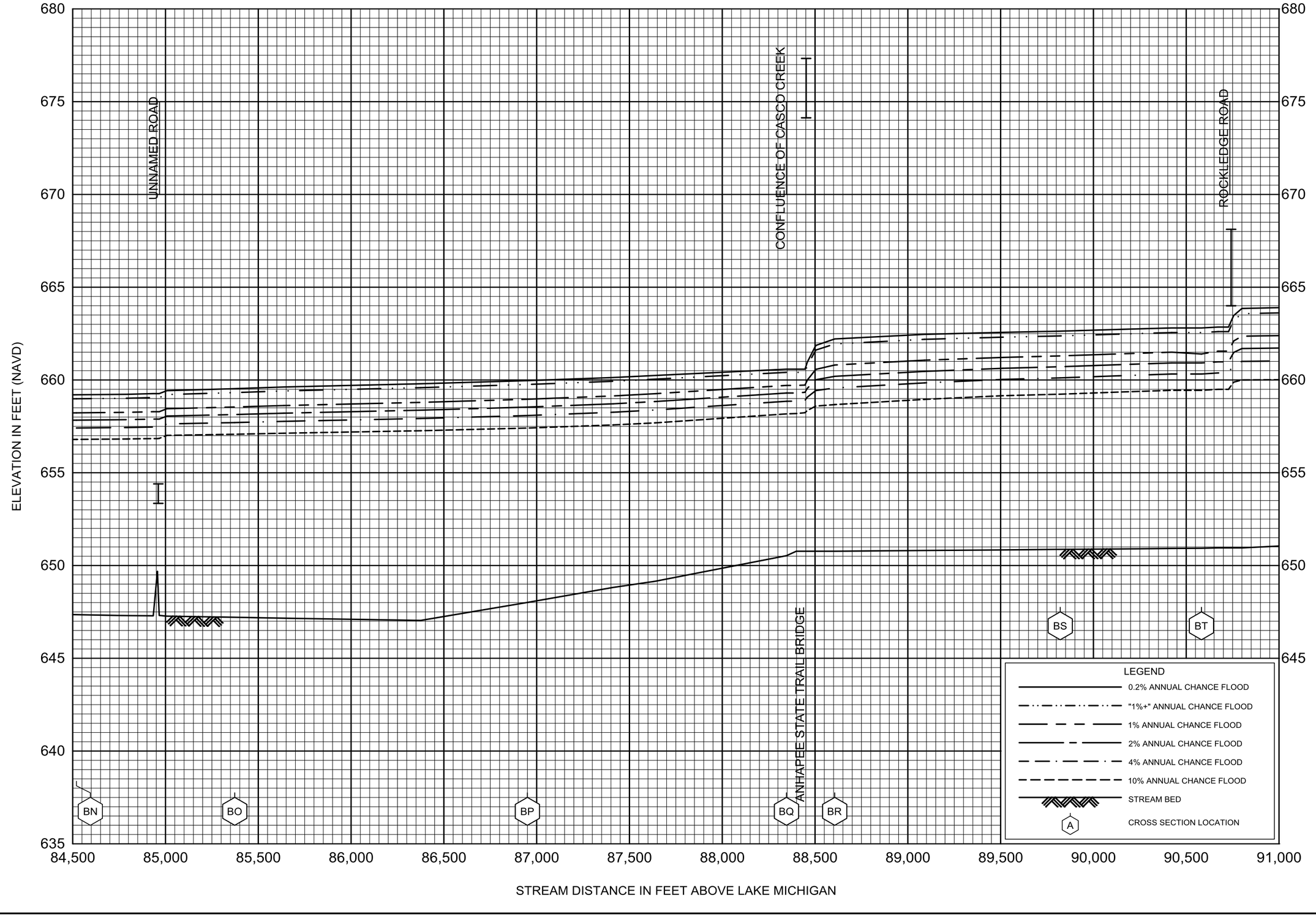
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

22P



FLOOD PROFILES

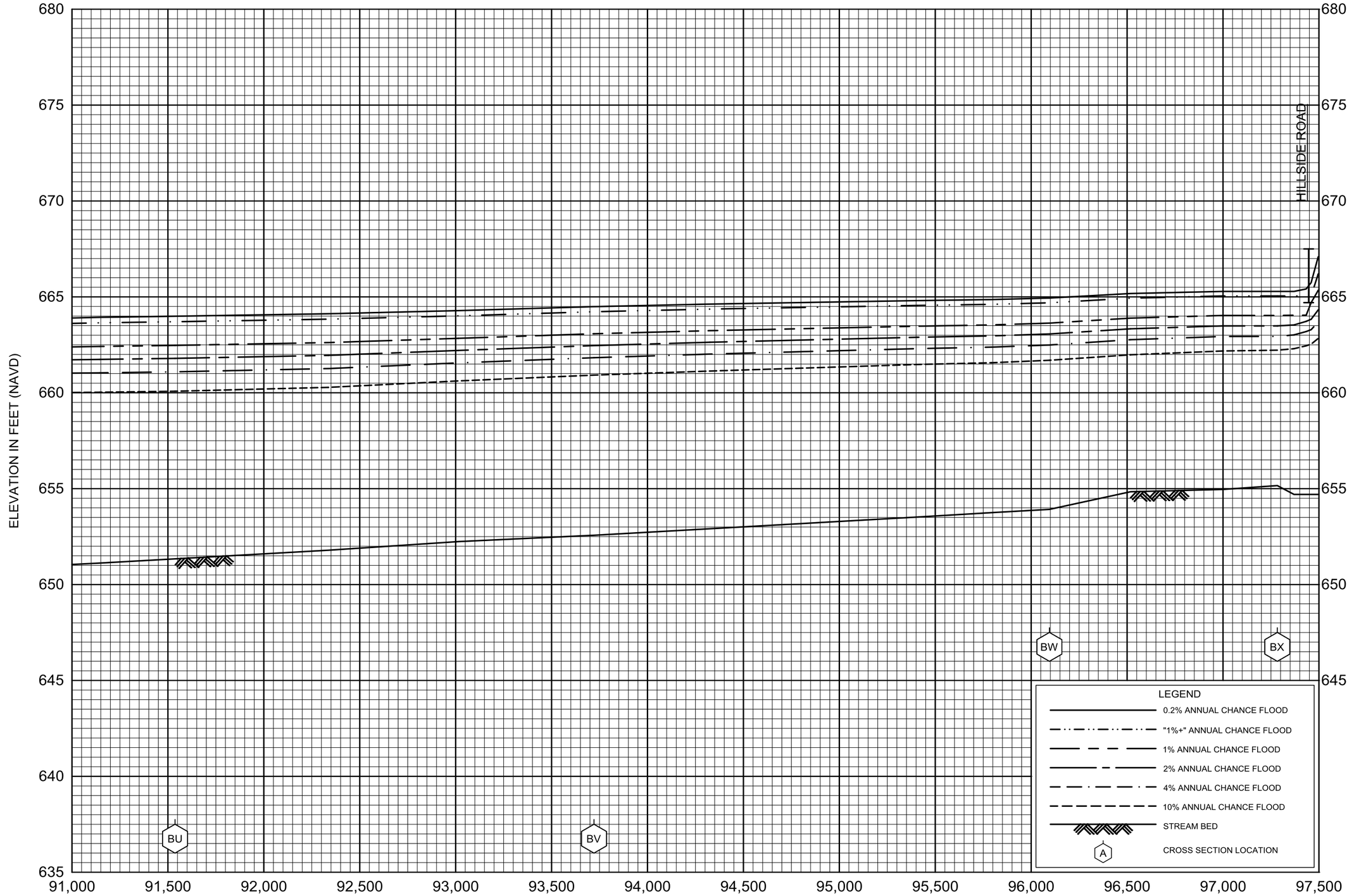
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

23P



FLOOD PROFILES

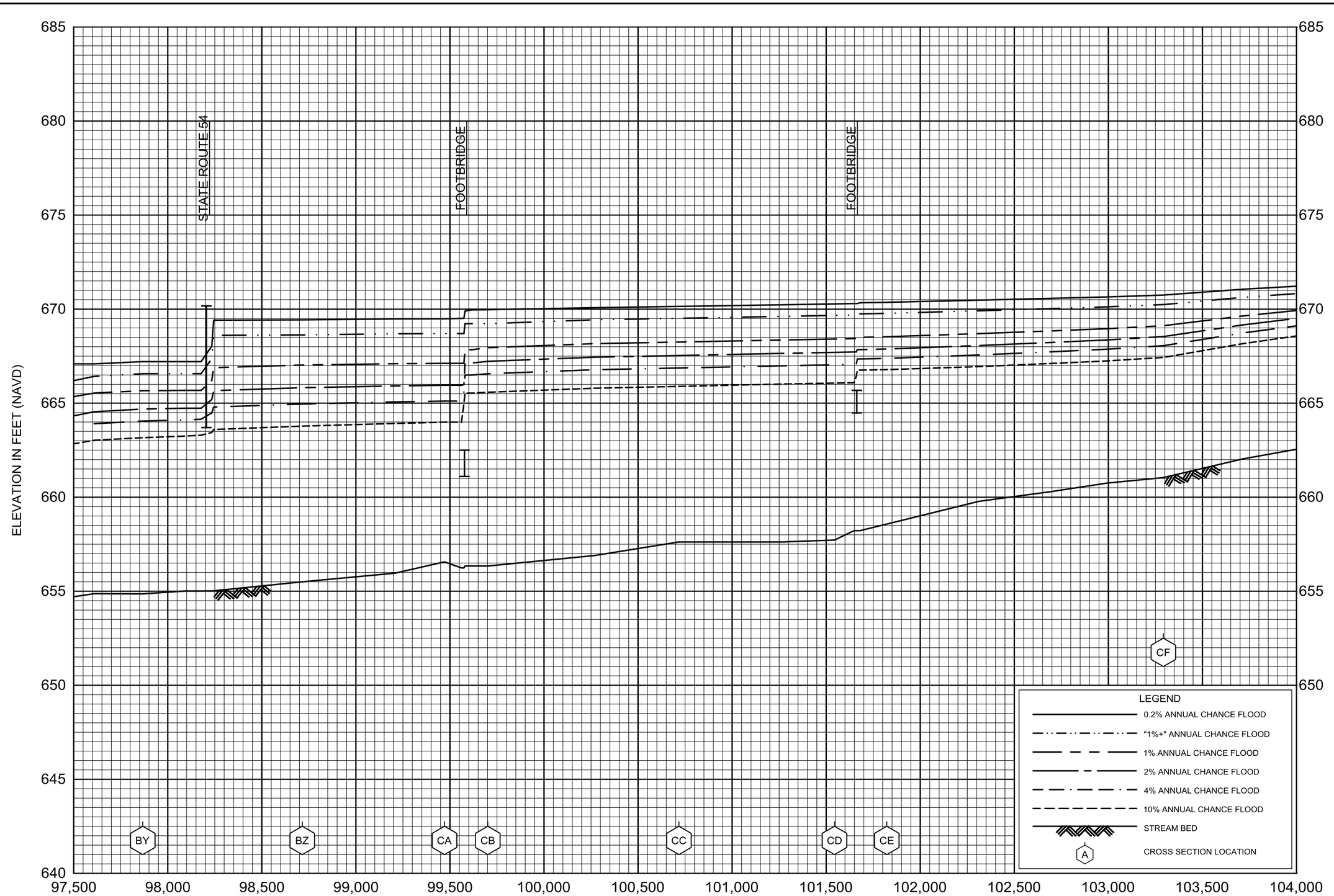
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

24P



FLOOD PROFILES

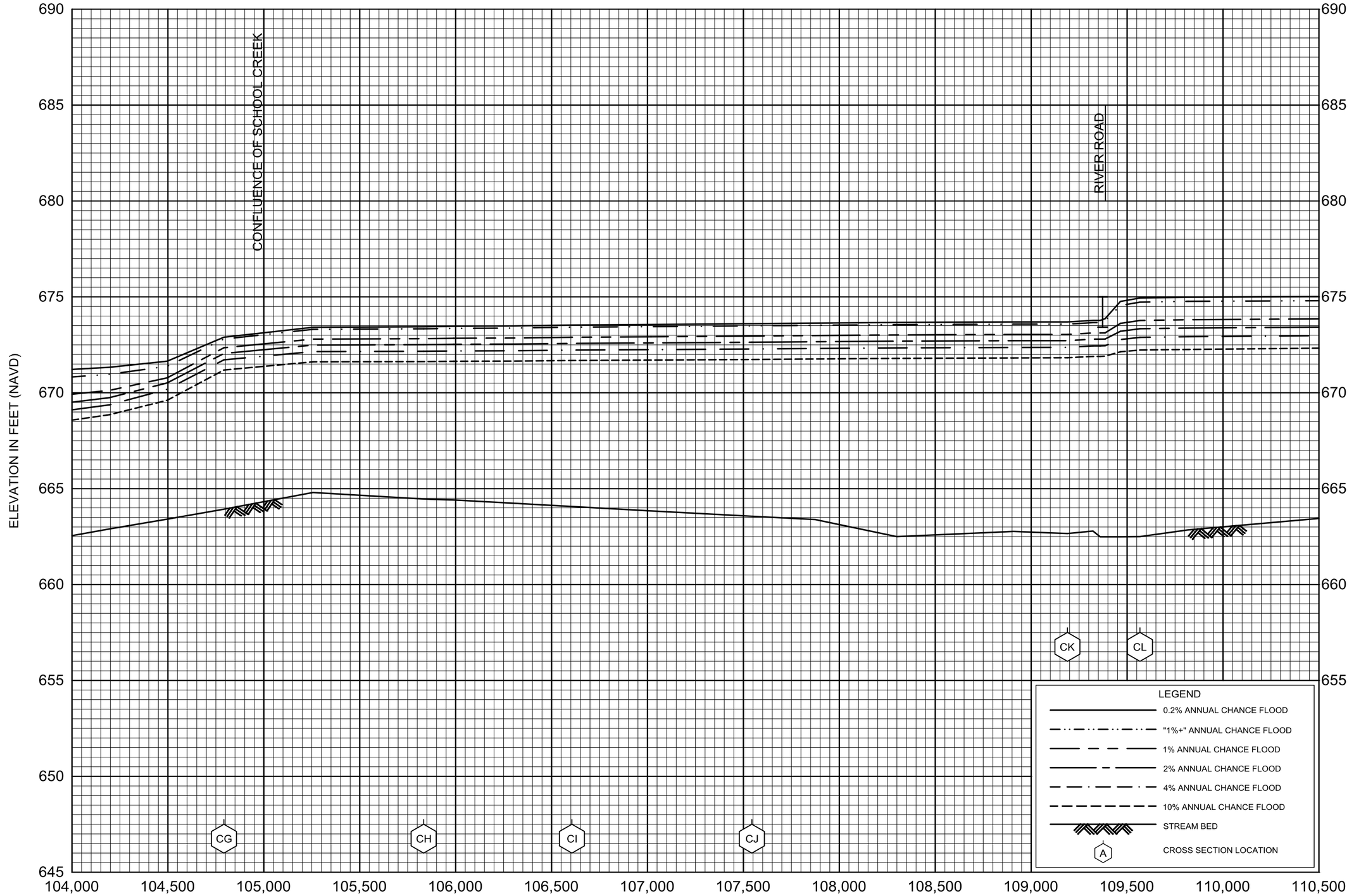
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

25P



FLOOD PROFILES

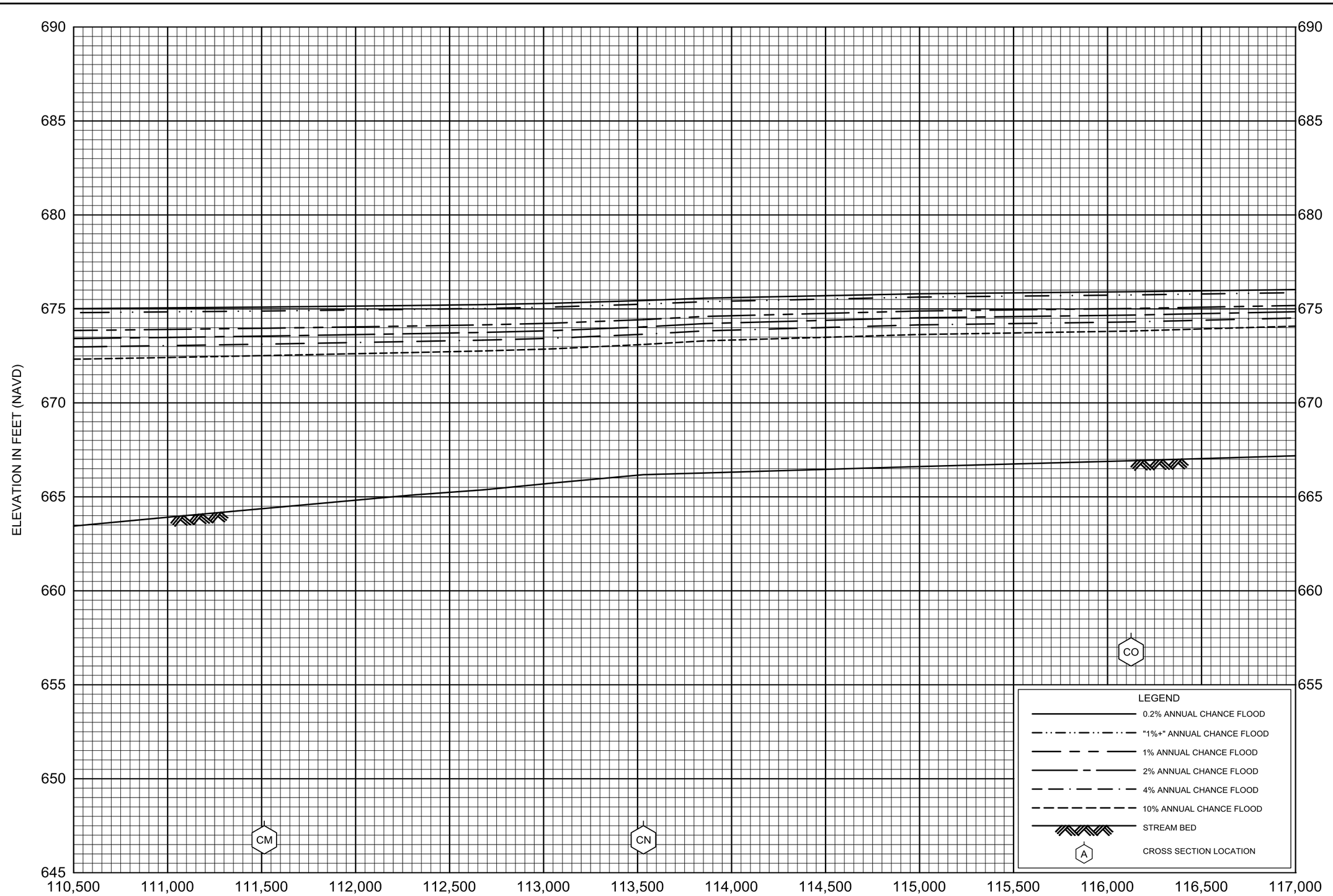
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

26P



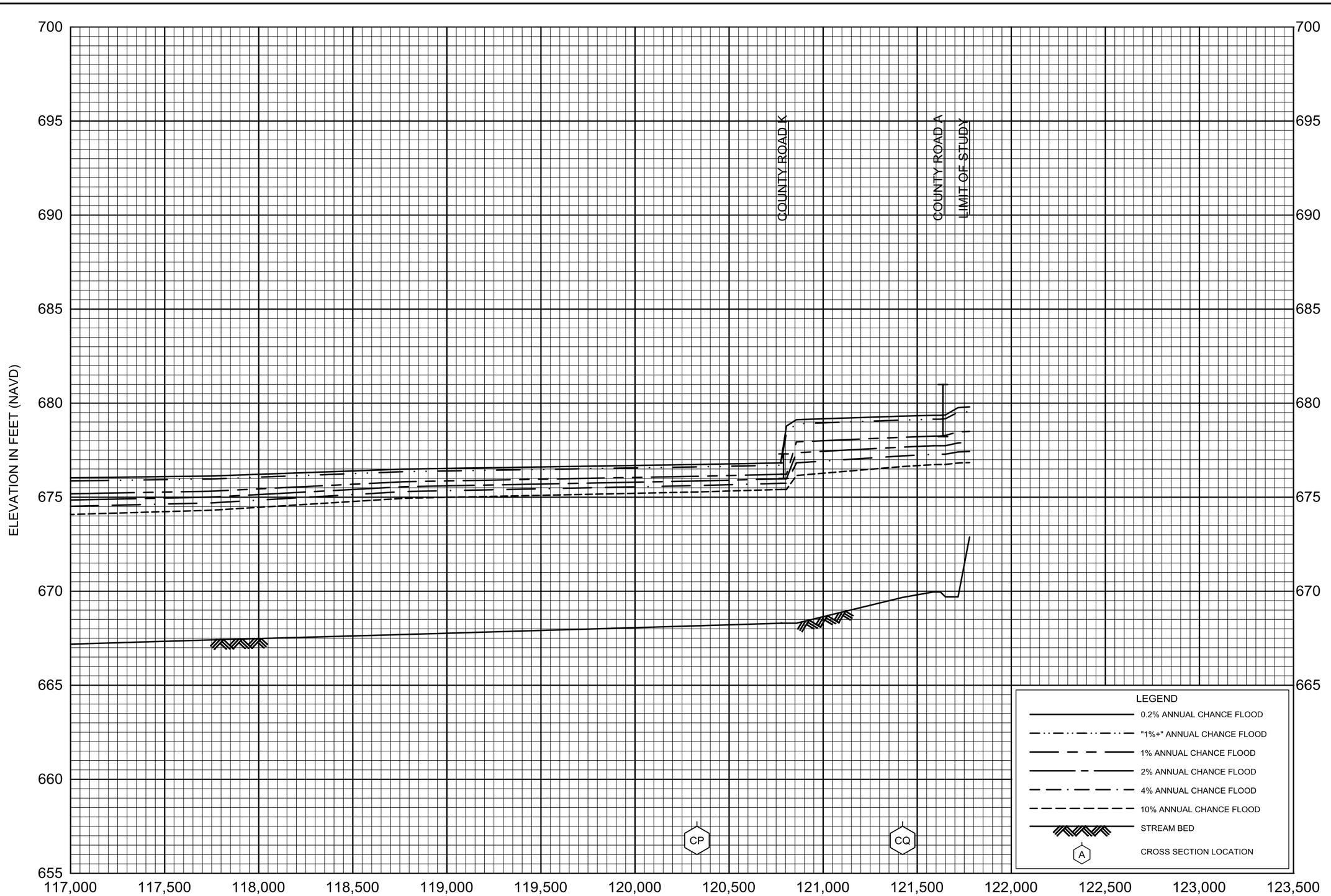
FLOOD PROFILES

KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS



FLOOD PROFILES

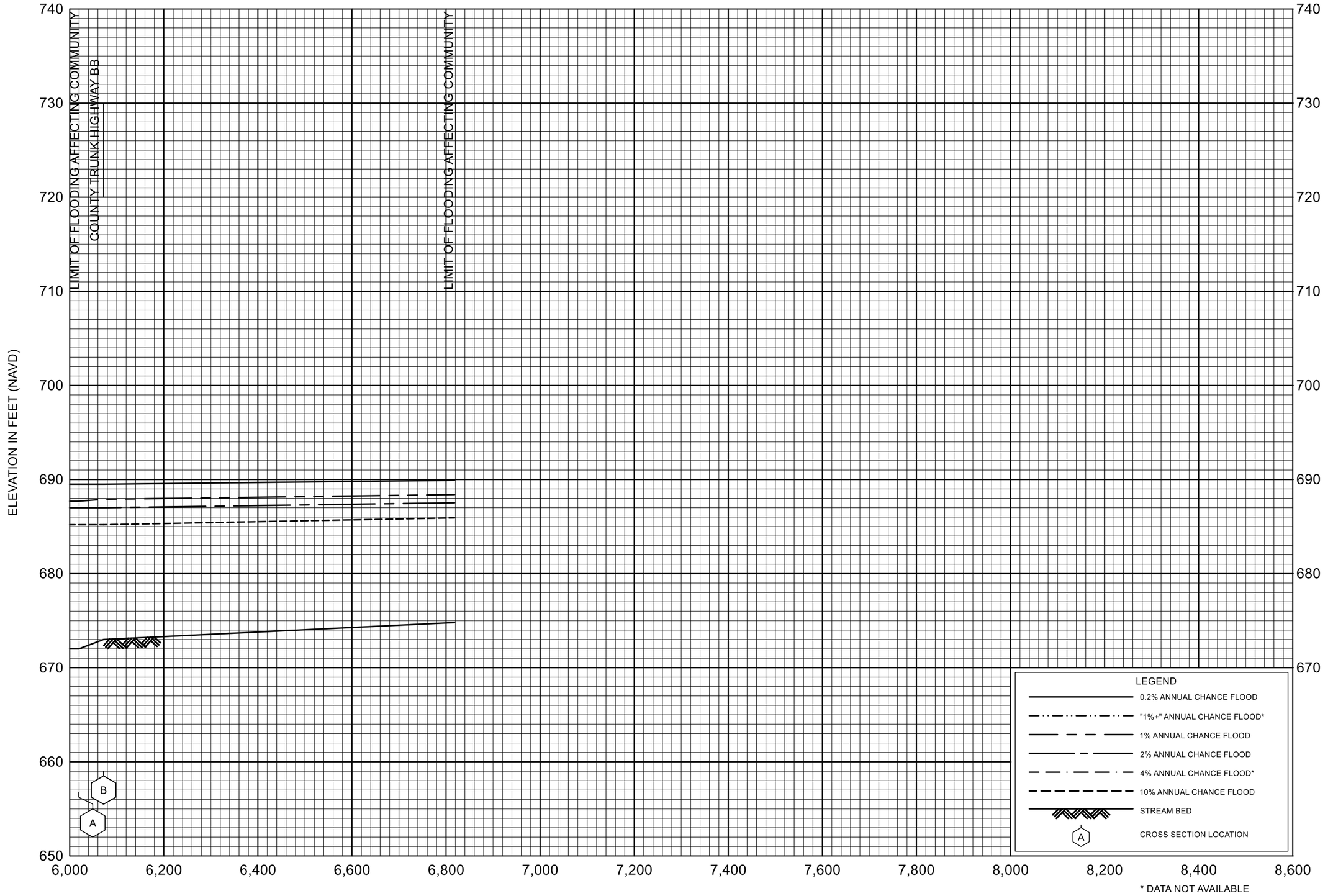
KEWAUNEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

28P



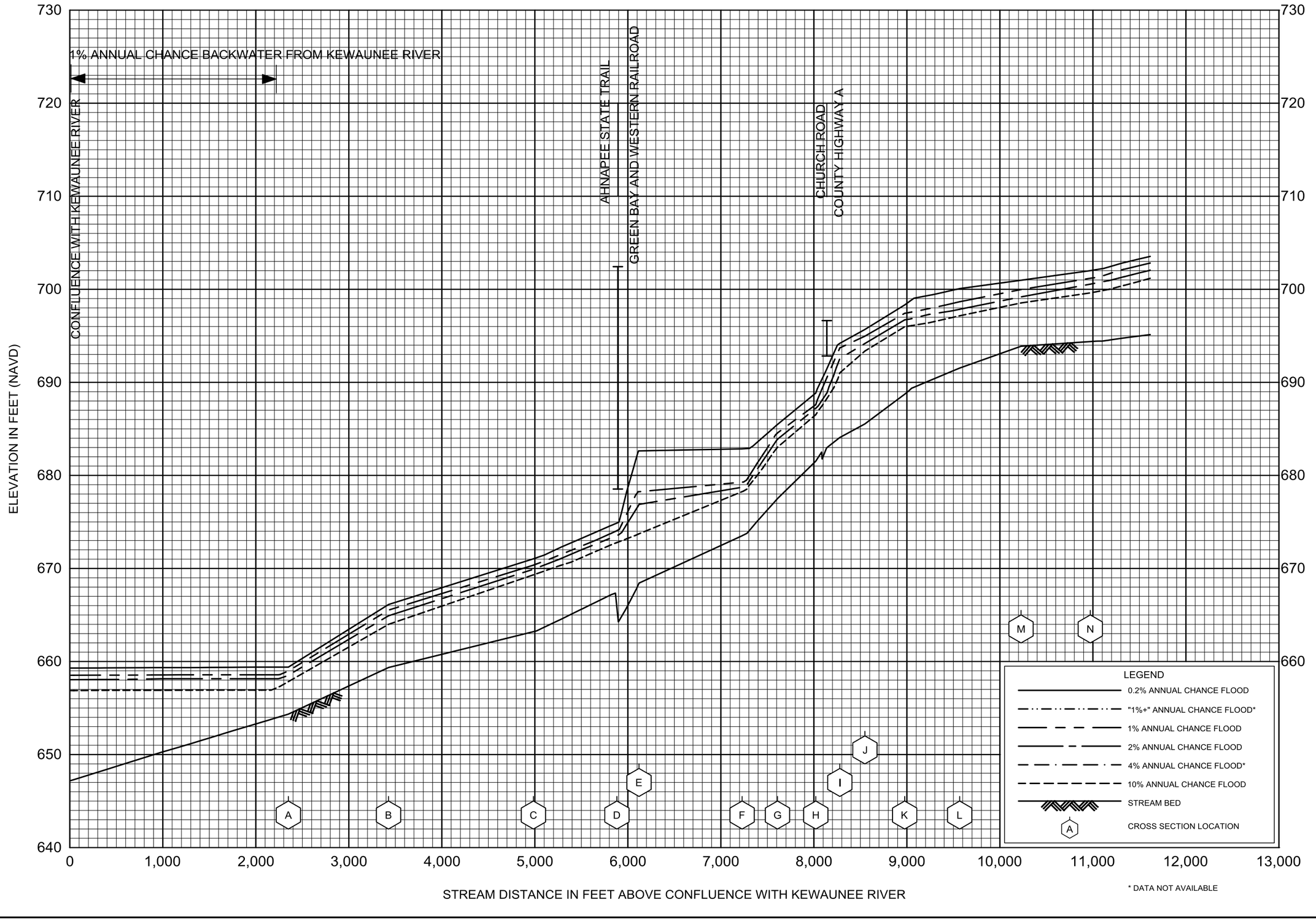
FLOOD PROFILES

NESHOTA RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS



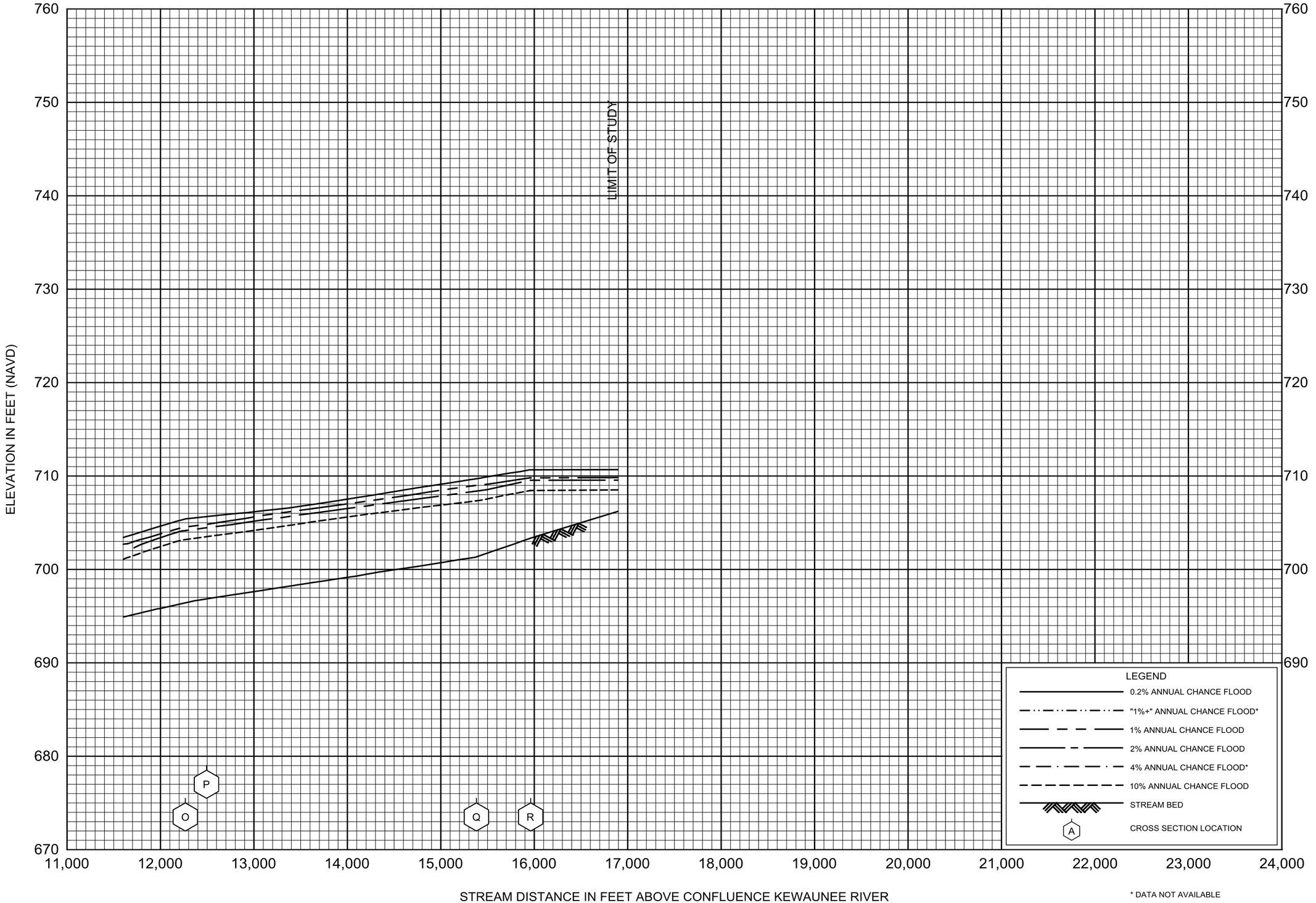
FLOOD PROFILES

SCARBORO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI
AND INCORPORATED AREAS

30P



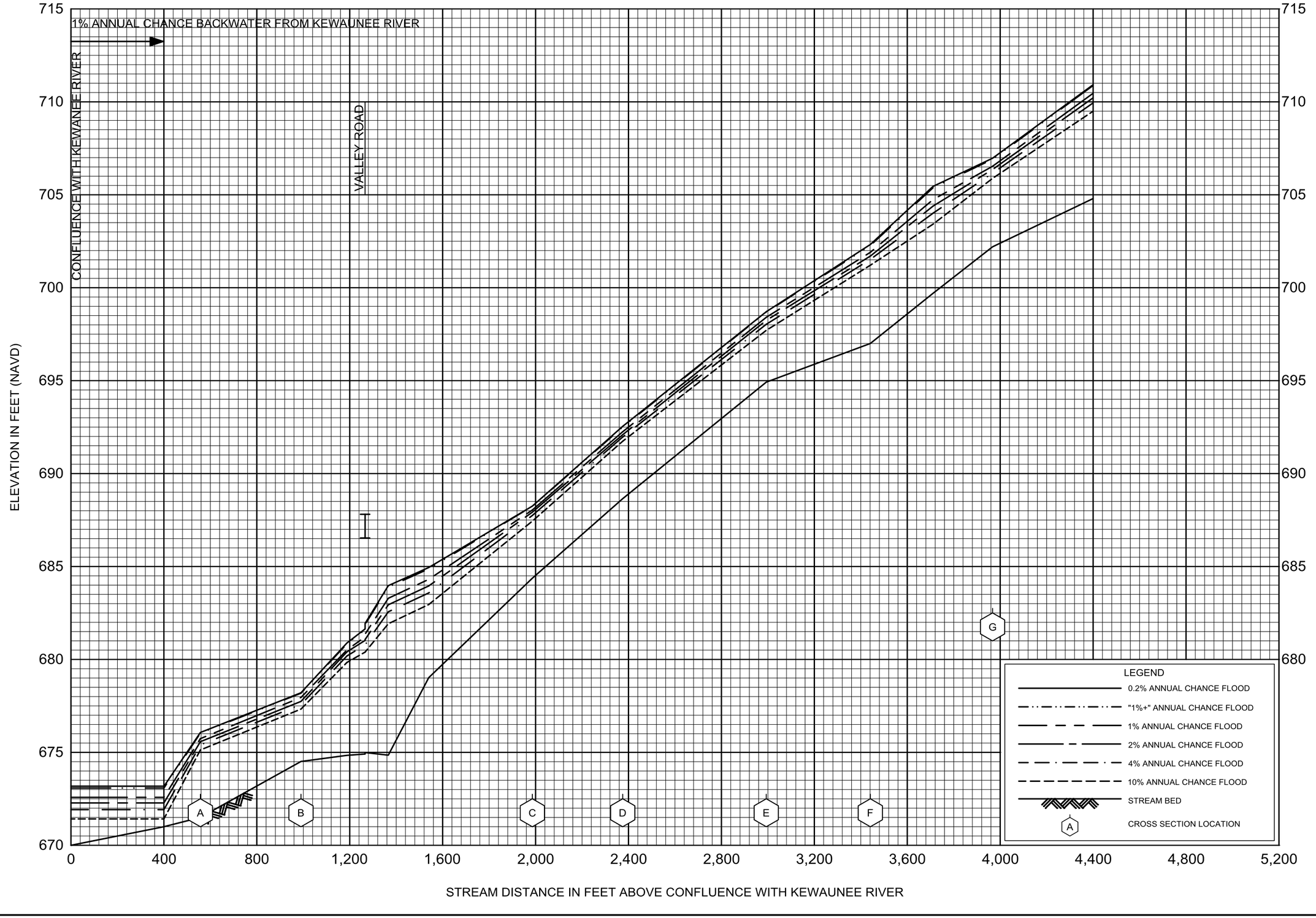
FLOOD PROFILES

SCARBORO CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWANEE COUNTY, WI

AND INCORPORATED AREAS



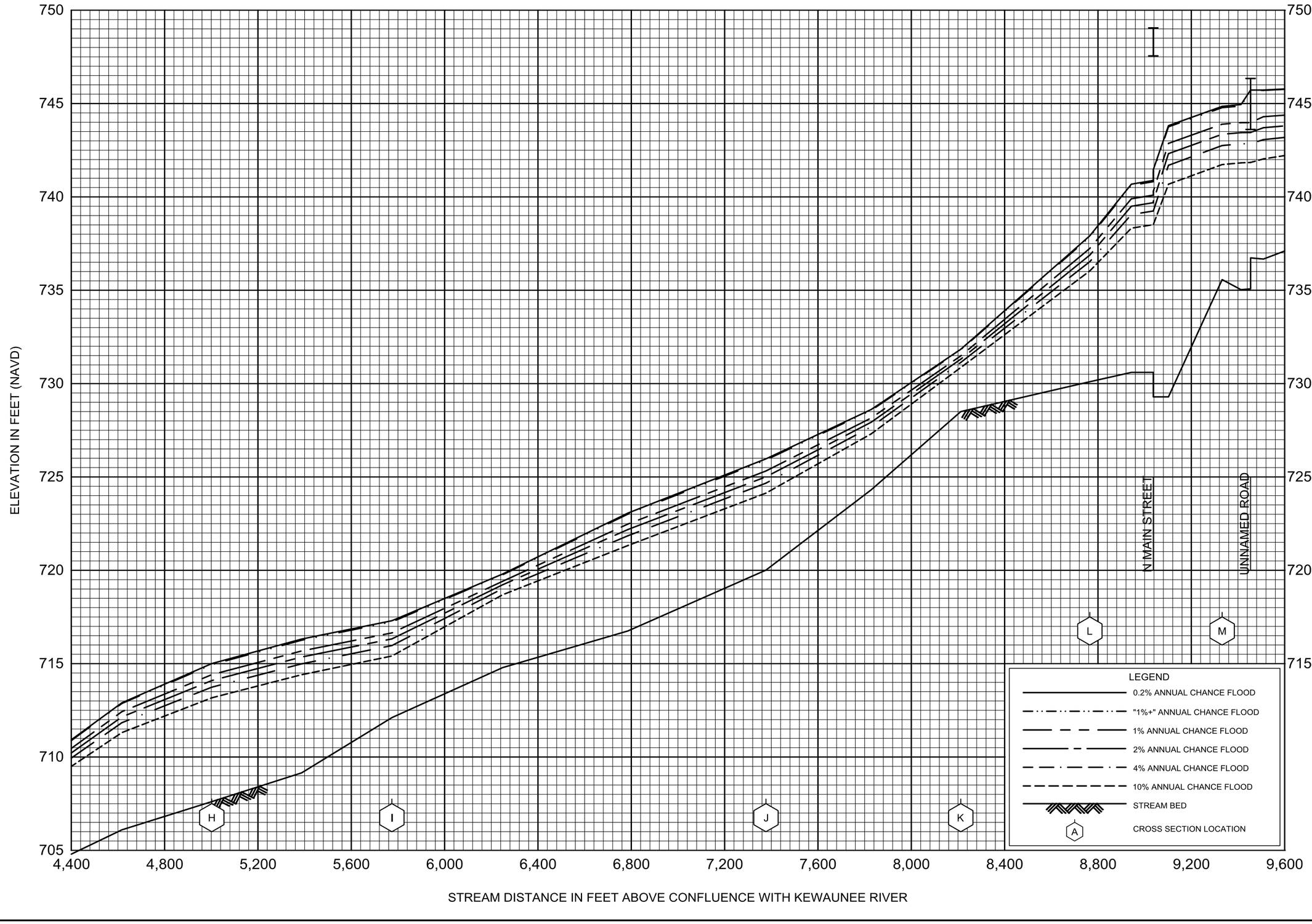
FLOOD PROFILES

SCHOOL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS



FLOOD PROFILES

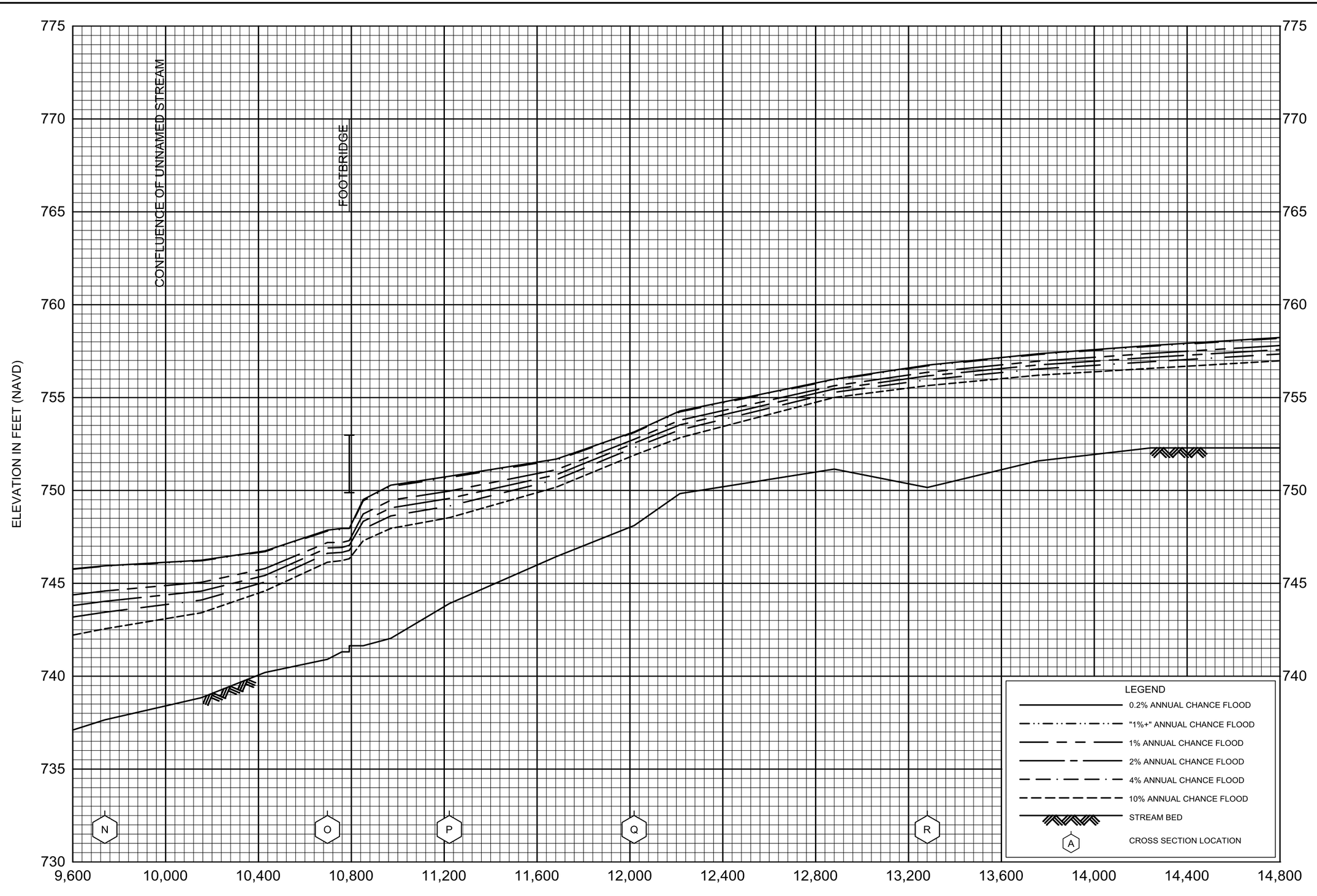
SCHOOL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

33P



FLOOD PROFILES

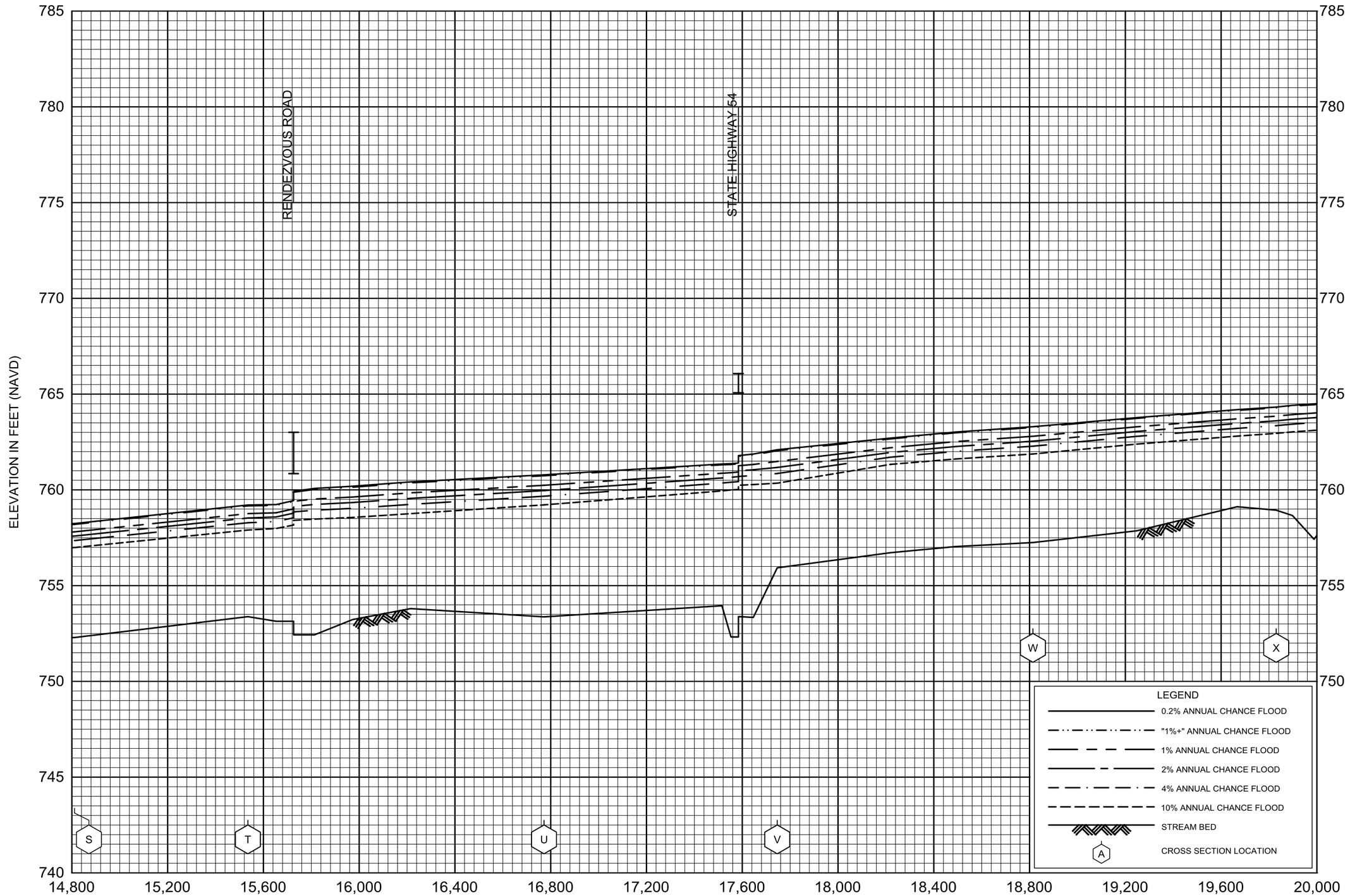
SCHOOL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

34P



FLOOD PROFILES

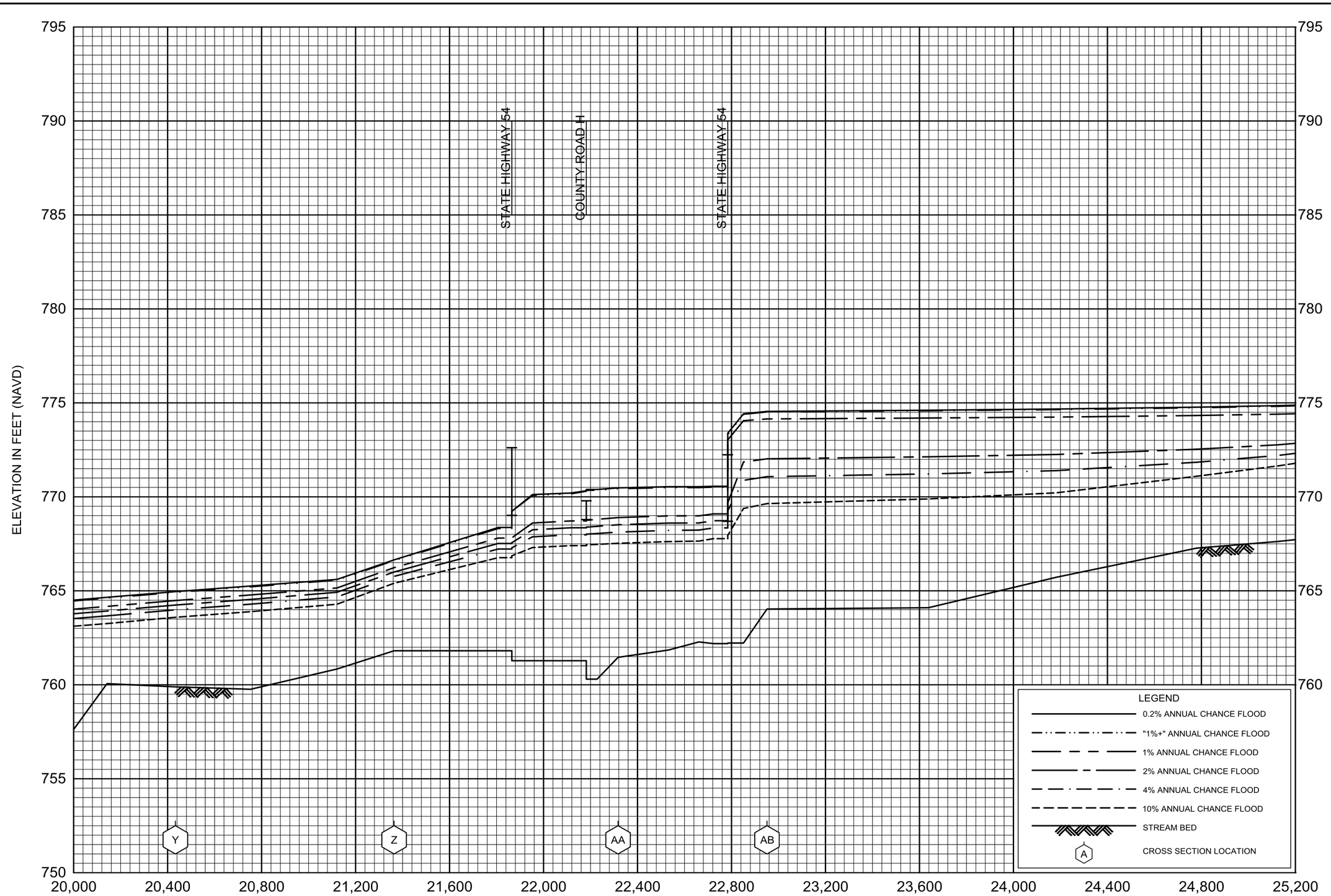
SCHOOL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

35P



FLOOD PROFILES

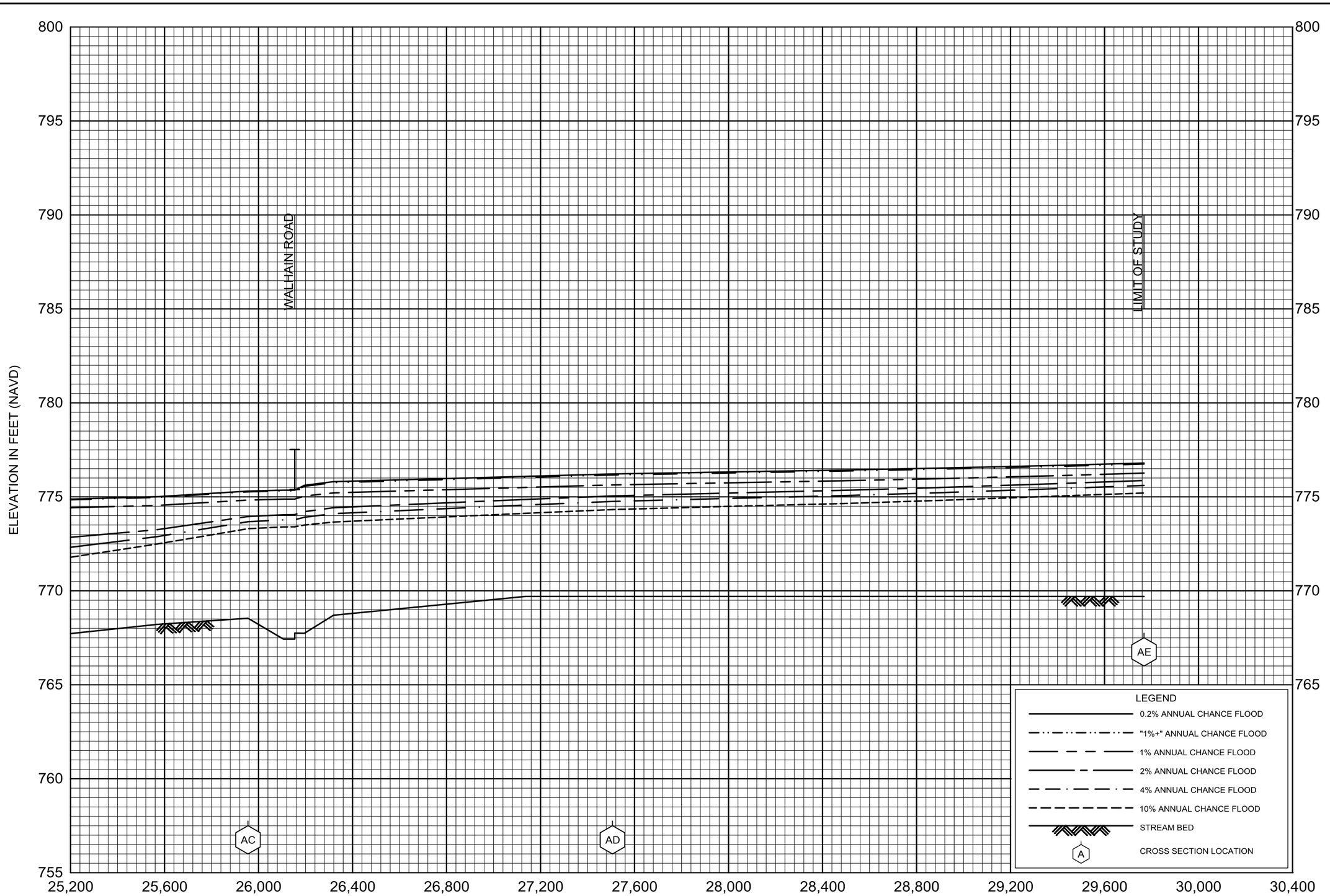
SCHOOL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

36P



FLOOD PROFILES

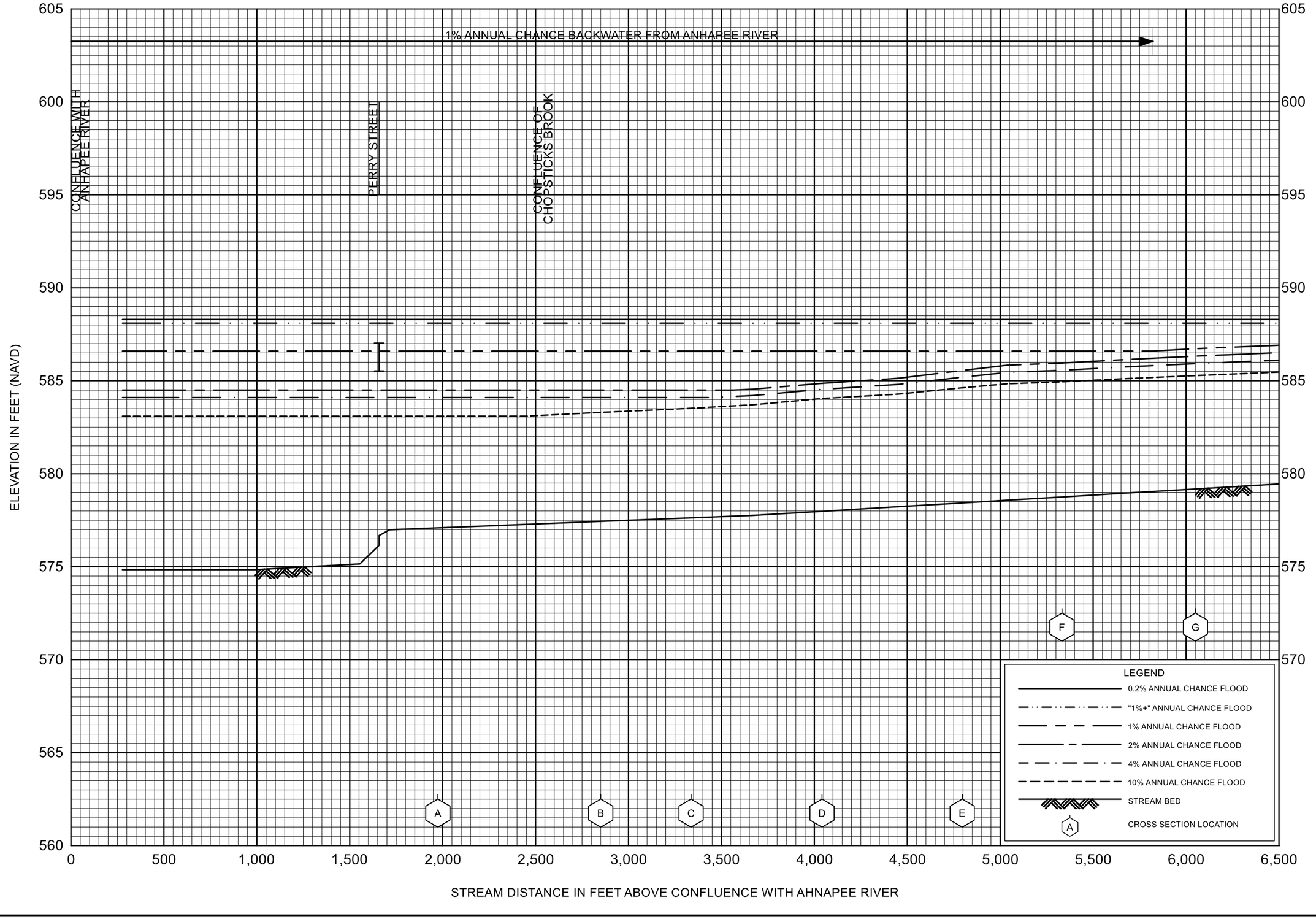
SCHOOL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

37P



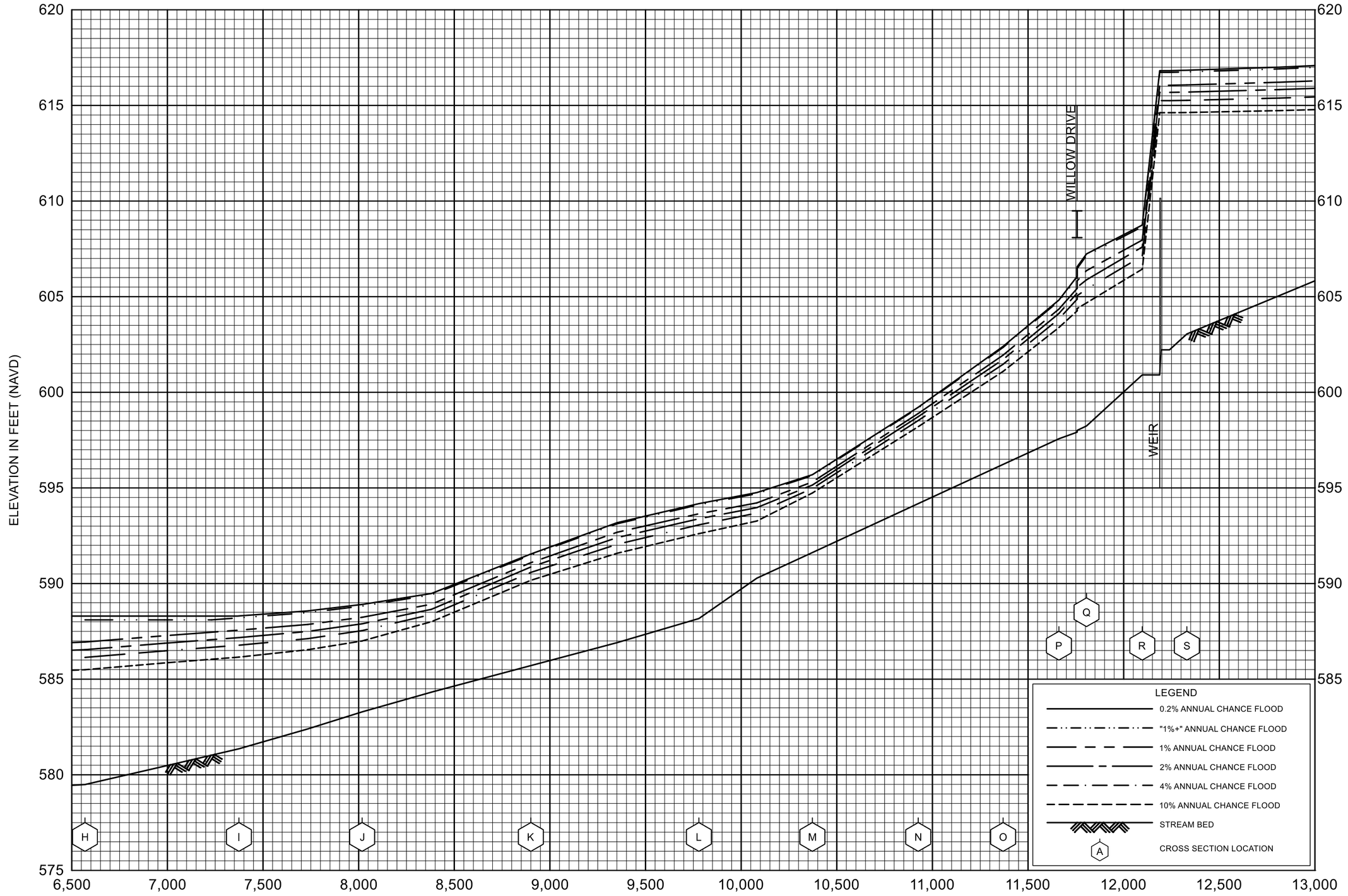
FLOOD PROFILES

SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI
AND INCORPORATED AREAS

38P



FLOOD PROFILES

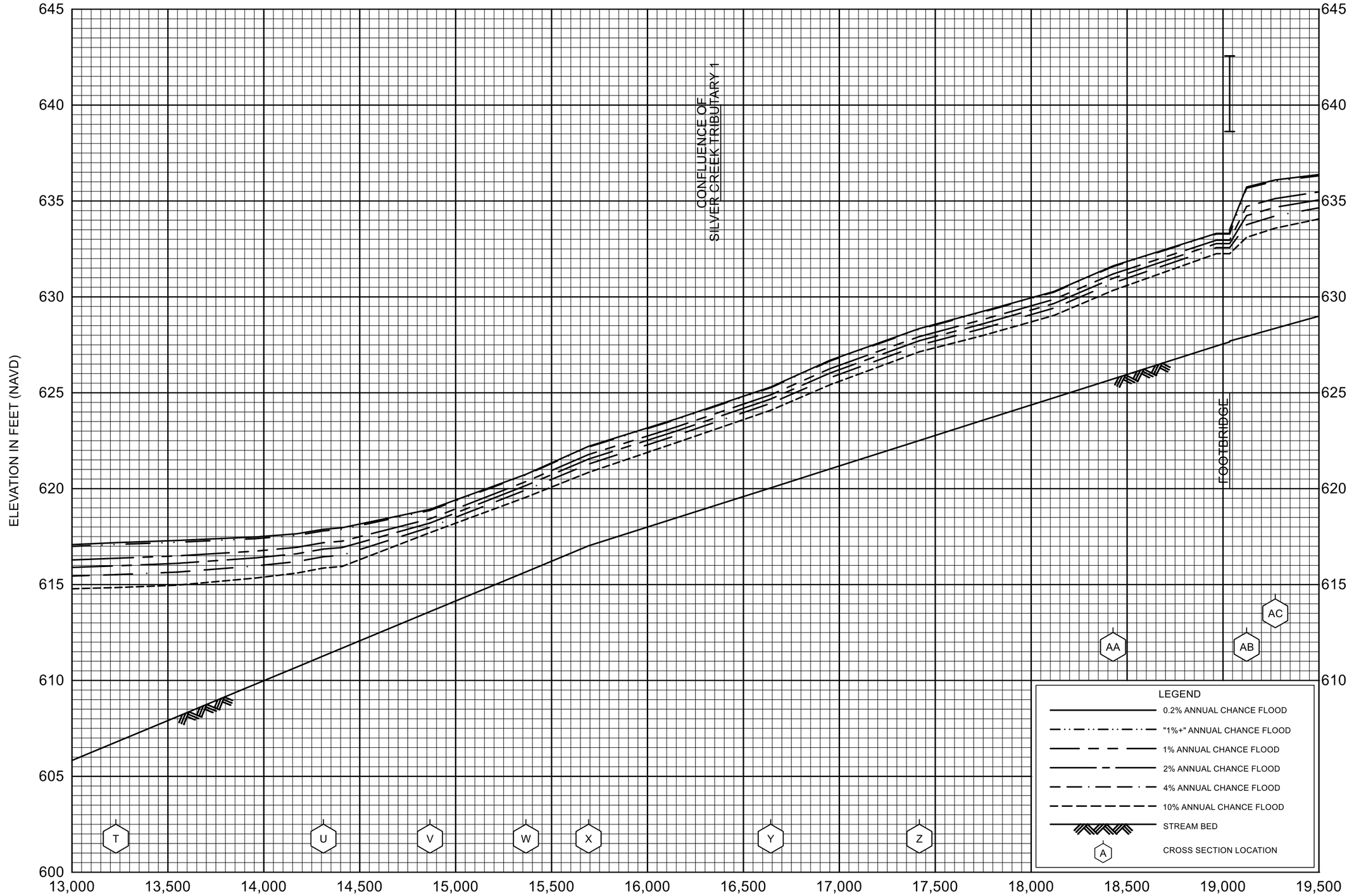
SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

39P



FLOOD PROFILES

SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

660
655
650
645
640
635
630
625
620
615

ELEVATION IN FEET (NAVD)

COUNTY HIGHWAY S

AD AE AF AG AH AI AJ

19,500 20,000 20,500 21,000 21,500 22,000 22,500 23,000 23,500 24,000 24,500 25,000 25,500 26,000

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH AHNAPEE RIVER

LEGEND

- 0.2% ANNUAL CHANCE FLOOD
- "1%+" ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 4% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

FLOOD PROFILES

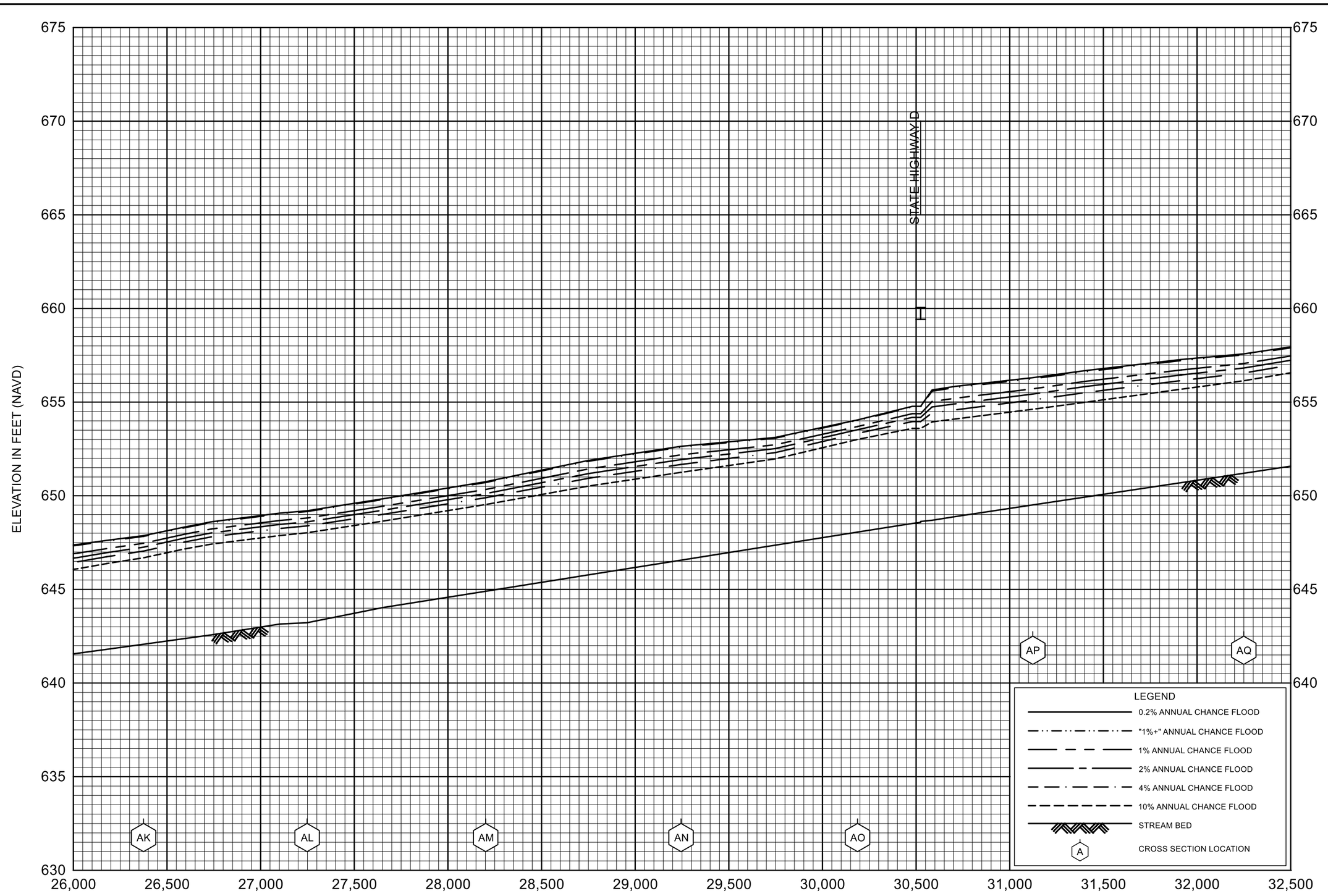
SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

41P



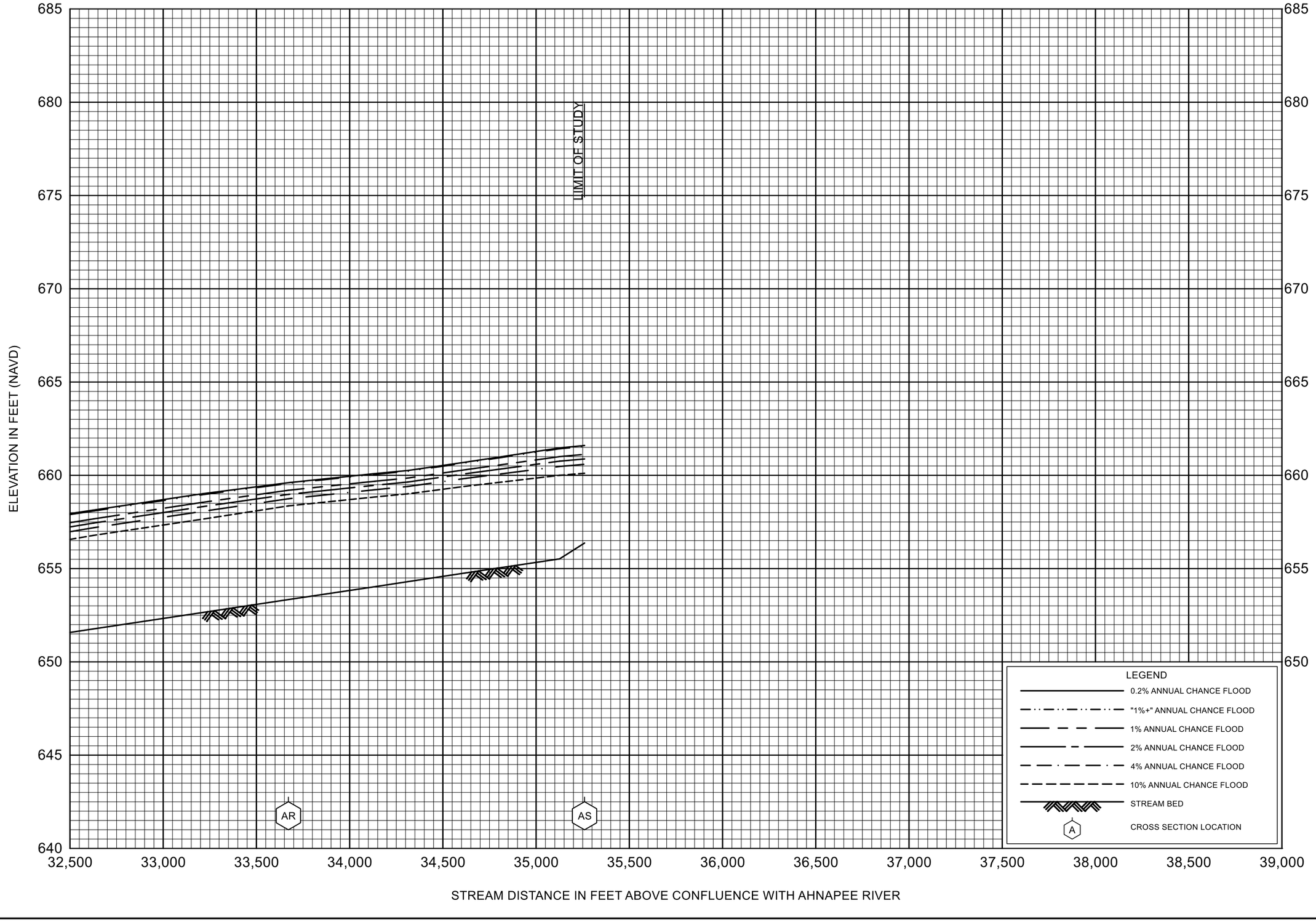
FLOOD PROFILES

SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS



FLOOD PROFILES

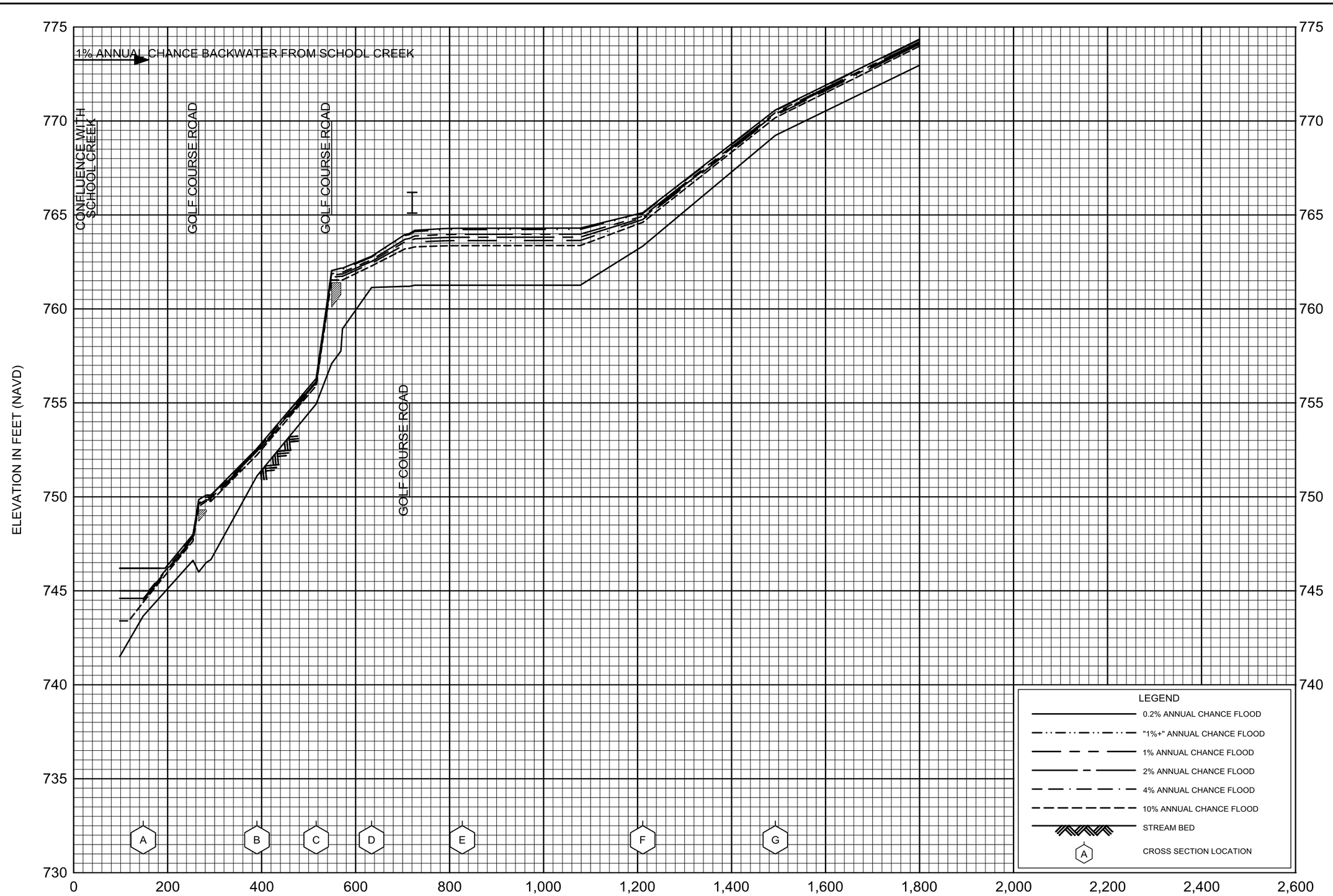
SILVER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

43P



FLOOD PROFILES

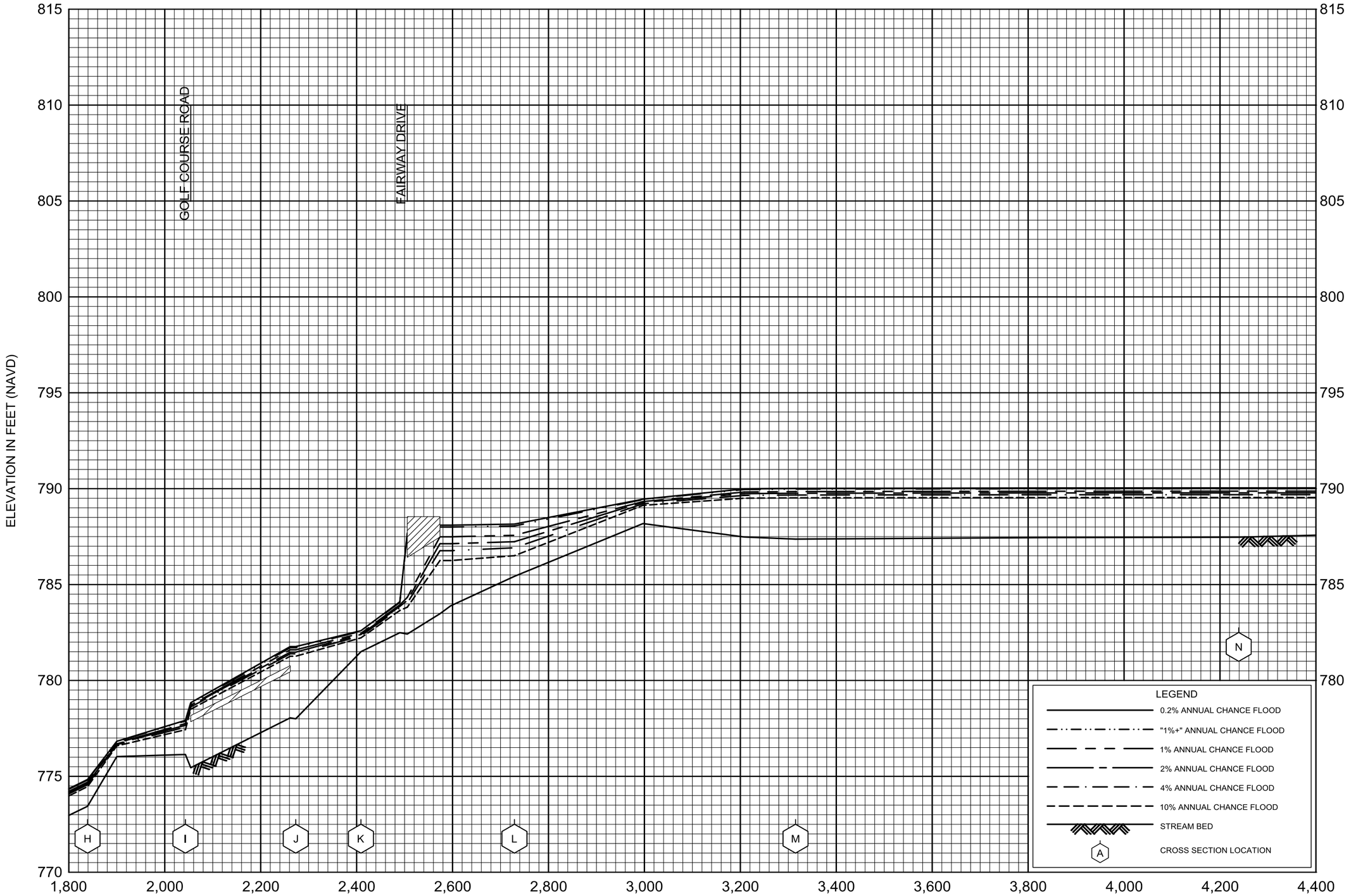
UNNAMED STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

44P



FLOOD PROFILES

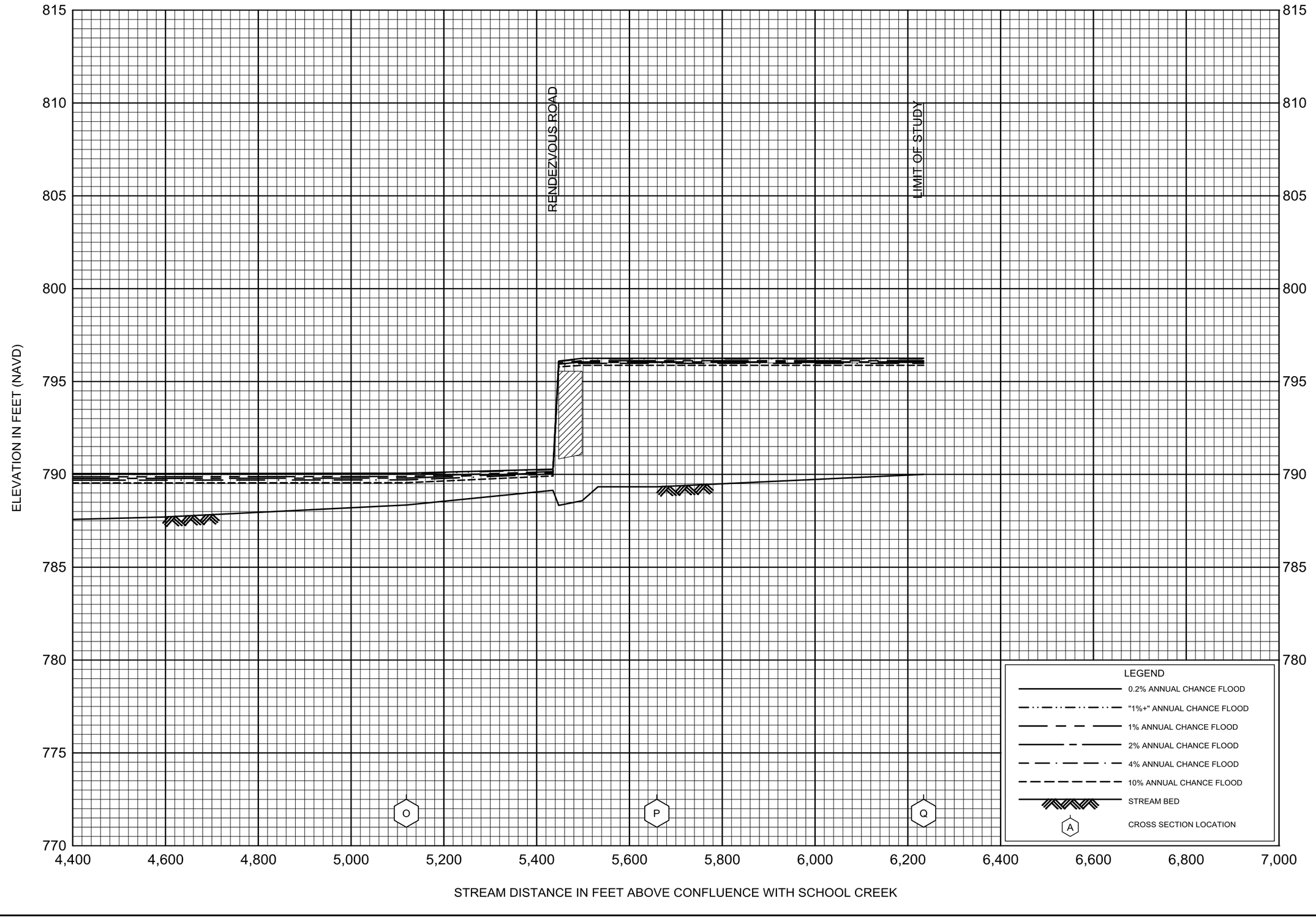
UNNAMED STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

45P



FLOOD PROFILES

UNNAMED STREAM

FEDERAL EMERGENCY MANAGEMENT AGENCY

KEWAUNEE COUNTY, WI

AND INCORPORATED AREAS

46P