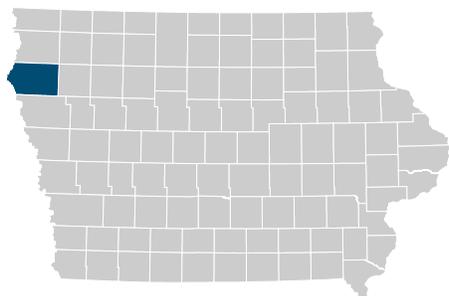


# FLOOD INSURANCE STUDY

## FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 1



## PLYMOUTH COUNTY, IOWA

### AND INCORPORATED AREAS

COMMUNITY NAME	NUMBER	COMMUNITY NAME	NUMBER
AKRON, CITY OF	190223	MERRILL, CITY OF	190478
BRUNSVILLE, CITY OF	190476	OYENS, CITY OF	190479
CRAIG, CITY OF *	195224	PLYMOUTH COUNTY (UNINCORPORATED AREAS)	190899
HINTON, CITY OF	190224	REMSEN, CITY OF	190480
KINGSLEY, CITY OF	190477	STRUBLE, CITY OF	190481
LE MARS, CITY OF	190225	WESTFIELD, CITY OF	190482

\* No Special Flood Hazard Areas Identified

**PRELIMINARY:  
NOVEMBER 23, 2020**

**EFFECTIVE:  
TO BE DETERMINED**

FLOOD INSURANCE STUDY NUMBER  
19149CV000A  
Version Number 2.4.3.1



**FEMA**

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Floyd River	12-14 P
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### **Published Separately**

Flood Insurance Rate Map (FIRM)

# FLOOD INSURANCE STUDY REPORT PLYMOUTH COUNTY, IOWA

## 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, sea-walls, 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 floodprone 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 Plymouth County, Iowa.

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.

Jurisdictions that have no identified SFHAs as of the effective date of this study are indicated in the table. Changed conditions in these communities (such as urbanization or annexation) or the availability of new scientific or technical data about flood hazards could make it necessary to determine SFHAs in these jurisdictions in the future.

**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
Akron, City of	190223	10170203	19149C0204E, 19149C0208E	
Brunsville, City of	190476	10230002	19149C0259E, 19149C0267E	
Craig, City of <sup>1</sup>	195224	10230002	19149C0068E	
Hinton, City of	190224	10230002	19149C0468E, 19149C0631E	
Kingsley, City of	190477	10230004	19149C0701E, 19149C0702E, 19149C0703E, 19149C0704E	
Le Mars, City of	190225	10230002	19149C0284E, 19149C0287E, 19149C0288E, 19149C0289E, 19149C0291E, 19149C0292E, 19149C0293E, 19149C0294E, 19149C0477E	

**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
Merrill, City of	190478	10230002	19149C0457E, 19149C0459E, 19149C0476E, 19149C0478E	
Oyens, City of	190479	10230002	19149C0308E	
Plymouth County (Unincorporated Areas)	190899	10170203, 10230001, 10230002, 10230003, 10230004	19149C0025E, 19149C0050E, 19149C0068E, 19149C0075E, 19149C0089E, 19149C0100E, 19149C0125E, 19149C0150E, 19149C0175E, 19149C0195E, 19149C0204E, 19149C0205E, 19149C0208E, 19149C0210E, 19149C0213E, 19149C0215E, 19149C0220E, 19149C0250E, 19149C0259E, 19149C0267E, 19149C0275E, 19149C0284E, 19149C0287E, 19149C0288E, 19149C0289E, 19149C0291E, 19149C0292E, 19149C0293E, 19149C0294E, 19149C0300E, 19149C0308E, 19149C0310E, 19149C0325E, 19149C0328E, 19149C0329E, 19149C0336E, 19149C0337E, 19149C0350E, 19149C0375E, 19149C0385E, 19149C0405E, 19149C0410E, 19149C0415E, 19149C0420E, 19149C0450E, 19149C0457E, 19149C0459E, 19149C0468E, 19149C0475E, 19149C0476E, 19149C0477E, 19149C0478E, 19149C0500E, 19149C0525E, 19149C0550E, 19149C0575E, 19149C0600E, 19149C0625E, 19149C0629E, 19149C0630E, 19149C0631E, 19149C0650E, 19149C0675E, 19149C0700E, 19149C0701E, 19149C0702E, 19149C0703E, 19149C0704E, 19149C0725E, 19149C0750E	
Remsen, City of	190480	10230002	19149C0328E, 19149C0329E, 19149C0336E, 19149C0337E	
Struble, City of	190481	10230002	19149C0089E	
Westfield, City of	190482	10170203	19149C0213E	

<sup>1</sup> No Special Flood Hazard Areas Identified

#### 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 Plymouth County became effective on **To Be Determined**. Refer to Table 27 for information about subsequent revisions to the FIRMs.

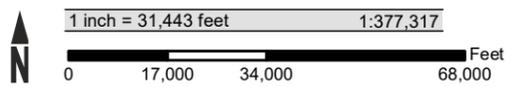
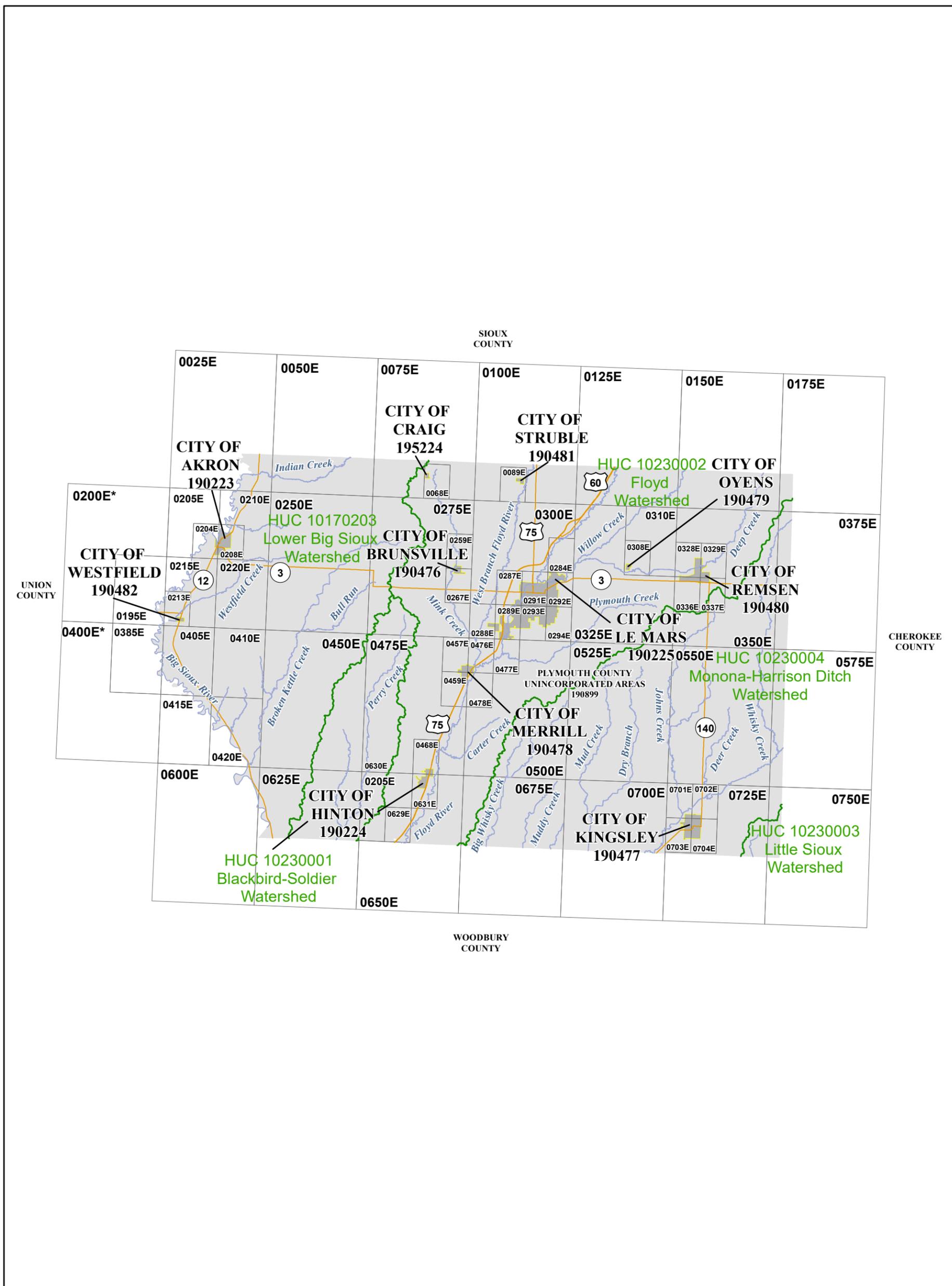
- Selected FIRM panels for the community may contain information (such as floodways and cross sections) that was previously shown separately on the corresponding Flood Boundary and Floodway Map (FBFM) panels. In addition, former flood hazard zone designations have been changed as follows:

<u>Old Zone</u>	<u>New Zone</u>
A1 through A30	AE
B	X (shaded)
C	X (unshaded)

- 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](http://www.fema.gov/online-tutorials).

The FIRM Index in Figure 1 shows the overall FIRM panel layout within Plymouth 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.

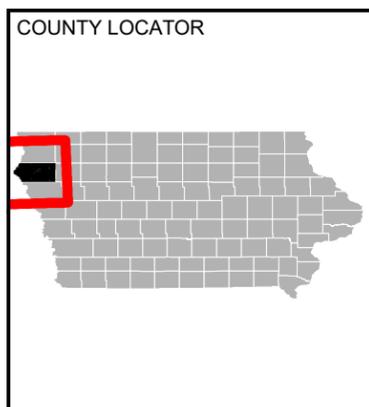
Figure 1: FIRM Index



Map Projection:  
 Universal Transverse Mercator Zone 15 North:  
 North American Datum 1983

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION  
 \*PANEL NOT PRINTED -- AREA OUTSIDE OF COUNTY BOUNDARY



**NATIONAL FLOOD INSURANCE PROGRAM**  
 FLOOD INSURANCE RATE MAP INDEX

PLYMOUTH COUNTY, IOWA and Incorporated Areas

PANELS PRINTED:  
 0025, 0050, 0068, 0075, 0089, 0100, 0125, 0150, 0175, 195, 0204, 0205, 0208, 0210, 0213, 0215, 0220, 0250, 0259, 0267, 0275, 0284, 0287, 0288, 0289, 0291, 0292, 0293, 0294, 0300, 0308, 0310, 0325, 0328, 0329, 0336, 0337, 0350, 0375, 385, 0405, 0410, 0415, 0420, 0425, 0450, 0457, 0459, 0468, 0475, 0476, 0477, 0478, 0500, 0525, 0550, 0575, 0600E, 0625, 0629, 0630, 0631, 0650, 0675, 0700, 0701, 0702, 0703, 0704, 0725, 0750

**PRELIMINARY**  
**11-23-2020**



FEMA

MAP NUMBER  
 19149CIND0A  
 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**

<p style="text-align: center;"><b>NOTES TO USERS</b></p> <p>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 Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at <a href="http://msc.fema.gov">msc.fema.gov</a>. 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 Map Information eXchange.</p> <p>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.</p> <p>For community and countywide map dates, refer to Table 27 in this FIS Report.</p> <p>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.</p> <p><u>PRELIMINARY FIS REPORT:</u> 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.</p>
<p>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.</p> <p><u>BASE FLOOD ELEVATIONS:</u> 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.</p> <p><u>FLOODWAY INFORMATION:</u> 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.</p>
<p><u>FLOOD CONTROL STRUCTURE INFORMATION:</u> 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.</p>

**Figure 2. FIRM Notes to Users (continued)**

**PROJECTION INFORMATION:** The projection used in the preparation of the map was Universal Transverse Mercator (UTM) Zone 15N. The horizontal datum was the North American Datum of 1983 NAD83, 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](http://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 was provided by Iowa Department of Natural Resources and the Iowa Department of Transportation. 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 Plymouth County, Iowa, 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**

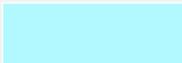
This Notes to Users section was created specifically for Plymouth County, Iowa, effective **To Be Determined**.

## Figure 2. FIRM Notes to Users (*continued*)

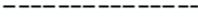
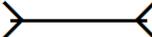
**FLOOD RISK REPORT:** A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest 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 Plymouth County.

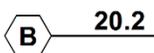
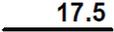
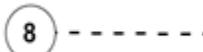
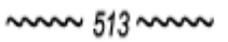
**Figure 3: Map Legend for FIRM**

<p><b>SPECIAL FLOOD HAZARD AREAS:</b> 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.</p>	
	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.
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.
	Regulatory Floodway determined in Zone AE.

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

<b>OTHER AREAS OF FLOOD HAZARD</b>	
	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.
<b>OTHER AREAS</b>	
	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 of minimal flood hazard.
<b>FLOOD HAZARD AND OTHER BOUNDARY LINES</b>	
 (ortho)      (vector)	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
<b>GENERAL STRUCTURES</b>	
 <i>Aqueduct Channel Culvert Storm Sewer</i>	Channel, Culvert, Aqueduct, or Storm Sewer
 <i>Dam Jetty Weir</i>	Dam, Jetty, Weir
	Levee, Dike, or Floodwall
 <i>Bridge</i>	Bridge

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

<b>REFERENCE MARKERS</b>	
	River mile Markers
<b>CROSS SECTION &amp; TRANSECT INFORMATION</b>	
	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
<b>ZONE AE (EL 16)</b>	Static Base Flood Elevation value (shown under zone label)
<b>ZONE AO (DEPTH 2)</b>	Zone designation with Depth
<b>ZONE AO (DEPTH 2) (VEL 15 FPS)</b>	Zone designation with Depth and Velocity
<b>BASE MAP FEATURES</b>	
	River, Stream or Other Hydrographic Feature
	Interstate Highway
	U.S. Highway
	State Highway
	County Highway
	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
	Railroad

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

—————	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
<b>4276<sup>000m</sup>E</b>	Horizontal Reference Grid Coordinates (UTM)
<b>365000 FT</b>	Horizontal Reference Grid Coordinates (State Plane)
<b>80° 16' 52.5"</b>	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 Plymouth 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 Plymouth 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 12. 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 <sup>2</sup> ) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Big Sioux River	Plymouth County (Unincorporated Areas)	Approximately 3.3 miles downstream of Indian Creek	Just upstream of Indian Creek	10170203	3.3		N	A	2017
Big Sioux River	Akron, City of; Plymouth County (Unincorporated Areas)	At Woodbury County boundary	Approximately 3.3 miles downstream of Indian Creek	10170203	48.7		Y	AE	2017
Floyd River	Le Mars, City of; Plymouth County (Unincorporated Areas)	Approximately 0.3 miles downstream of 195 <sup>th</sup> Street	Approximately 0.4 miles downstream of Union Pacific Railroad	10230002	5.7		Y	AE	2018
Plymouth County Drainage Ditch	Akron, City of; Plymouth County (Unincorporated Areas)	Confluence with Big Sioux River	Approximately 1,851 feet upstream of 160 <sup>th</sup> Street	10170203	2.0		N	AE	2020
Willow Creek	Le Mars, City of; Plymouth County (Unincorporated Areas)	Confluence with Floyd River	Approximately 94 feet downstream of Marble Avenue	10230002	2.8		Y	AE	2019
All Zone A Flooding within Plymouth County, except Big Sioux River	Brunsville, City of; Hinton, City of; Kingsley, City of; Le Mars, City of; Merrill, City of; Oyens, City of; Plymouth County (Unincorporated Areas); Remsen, City of; Struble, City of; Westfield, City of	Downstream limit of study	Upstream limit of study	10230001, 10230002, 10230003, 10170203, 10230004	778.2		N	A	2014

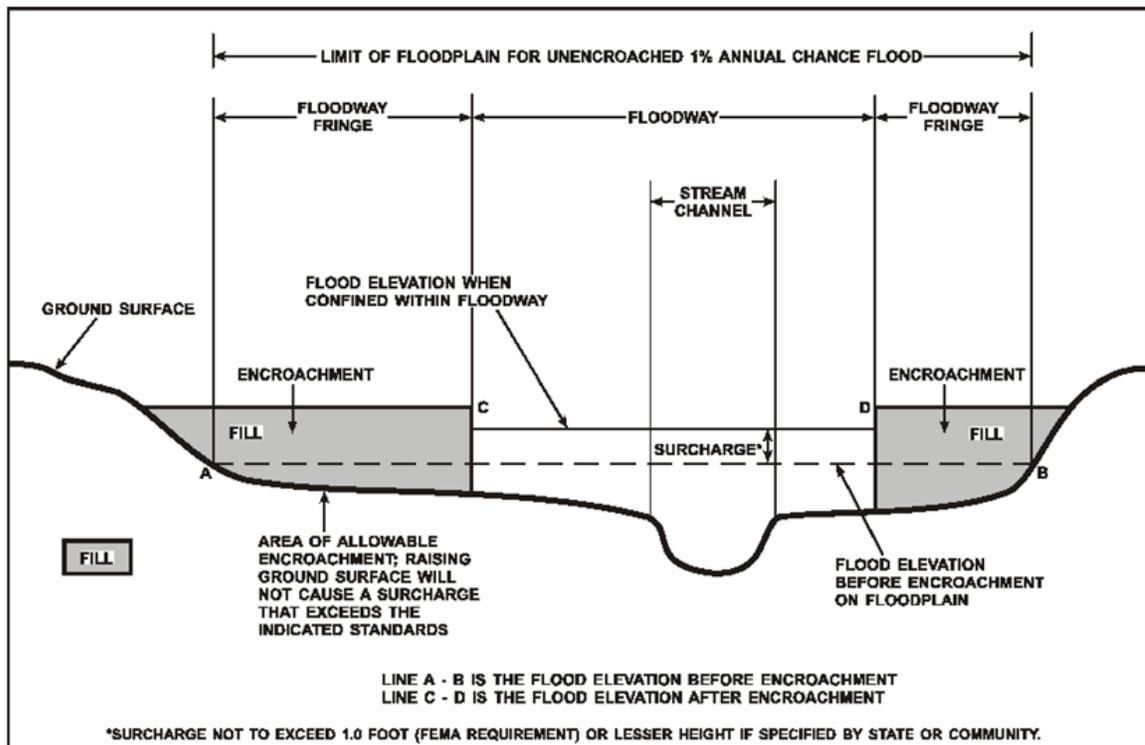
## 2.2 Floodways

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. 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 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**

This section is not applicable to this Flood Risk Project.

#### **2.5.1 Water Elevations and the Effects of Waves**

This section is not applicable to this Flood Risk Project.

### Figure 5: Wave Runup Transect Schematic

[Not Applicable to this Flood Risk Project]

#### 2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

This section is not applicable to this Flood Risk Project.

#### 2.5.3 Coastal High Hazard Areas

This section is not applicable to this Flood Risk Project.

### Figure 6: Coastal Transect Schematic

[Not Applicable to this Flood Risk Project]

#### 2.5.4 Limit of Moderate Wave Action

This section is not applicable to this Flood Risk Project.

## 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 Plymouth County.

**Table 3: Flood Zone Designations by Community**

Community	Flood Zone(s)
Akron, City of	AE, X
Brunsville, City of	A, X
Craig, City of	X
Hinton, City of	A, X
Kingsley, City of	A, X
Le Mars, City of	A, AE, X
Merrill, City of	A, X
Oyens, City of	A, X
Plymouth County (Unincorporated Areas)	A, AE, X

**Table 3: Flood Zone Designations by Community (continued)**

Community	Flood Zone(s)
Remsen, City of	A, X
Struble, City of	A, X
Westfield, City 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)
Blackbird-Soldier	10230001	Missouri River	This portion of the watershed encompasses Perry Creek which drains into the Missouri River. It runs from the midwest portion of Plymouth County to the southern county boundary and is part of the Missouri-Little Sioux River Basin.	60
Floyd	10230002	Floyd River	Located in the northeastern and central regions of Plymouth County, this watershed encompasses Floyd River and its tributaries which drain to the Missouri-Little Sioux River Basin.	333
Little Sioux	10230003	Little Sioux River	Located in the southeast corner of the county, this watershed is the smallest within Plymouth County. It encompasses Pierson Creek and drains to the Missouri-Little Sioux River Basin.	5
Lower Big Sioux	10170203	Big Sioux River	Encompassing the lower portion of the Big Sioux River and its tributaries, this watershed dominates the western portion of Plymouth County and is part of the Big Sioux River Basin.	224

**Table 4: Basin Characteristics (continued)**

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Monona-Harrison Ditch	10230004	Monona-Harrison Ditch	Dominating the eastern portion of Plymouth County, this watershed encompasses West Fork Little Sioux River and several other tributaries which connect to Monona-Harrison Ditch and drain into the Missouri-Little Sioux River Basin.	242

#### 4.2 Principal Flood Problems

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

**Table 5: Principal Flood Problems**

Flooding Source	Description of Flood Problems
Big Sioux River	Significant overbank stream attenuation.

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

**Table 6: Historic Flooding Elevations**

Flooding Source	Location	Historic Peak (Feet NAVD88)	Event Date	Approximate Recurrence Interval (years)	Source of Data
Big Sioux River	Big Sioux River at Sioux City, IA	1,098.63	2014	*	USGS gage
	USGS Gage Big Sioux River at Akron, IA	1,144.99	2014	191	USGS gage

\* Data not available

#### 4.3 Non-Levee Flood Protection Measures

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

**Table 7: Non-Levee Flood Protection Measures**

[Not Applicable to this Flood Risk Project]

#### 4.4 Levees

This section is not applicable to this Flood Risk Project.

**Table 8: Levees**

[Not Applicable to this Flood Risk 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. 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.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 26, “Incorporated Letters of Map Change”, which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, “FIRM Revisions.”

## 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.

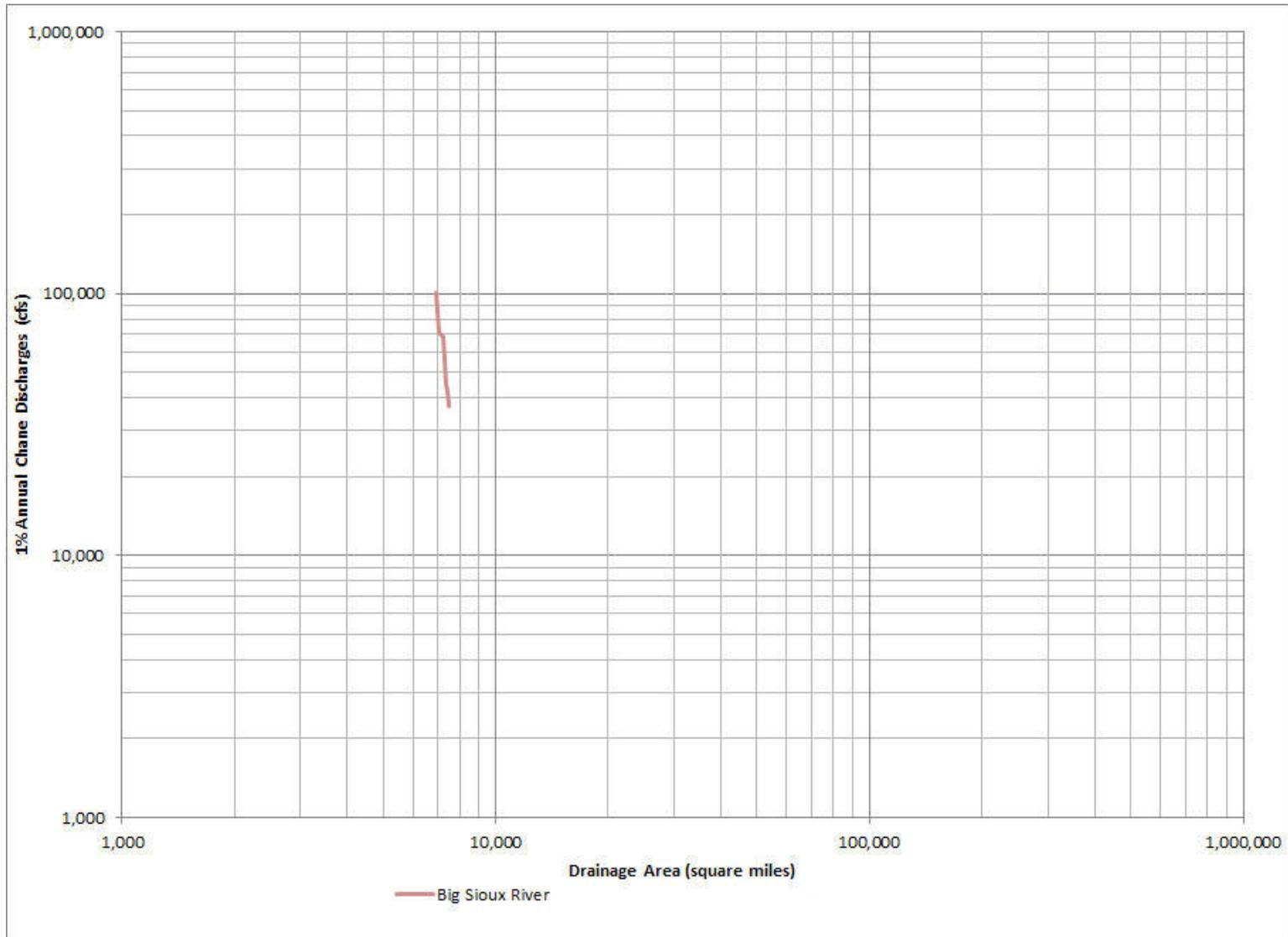
A summary of the discharges is provided in Table 9. Frequency Discharge-Drainage Area Curves used to develop the hydrologic models may also be shown in Figure 7 for selected flooding sources. Stream gage information is provided in Table 11.

**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	0.2% Annual Chance
Big Sioux River	Upstream of Railroad	7,489	17,055 <sup>1</sup>	23,899 <sup>1</sup>	29,654 <sup>1</sup>	37,290 <sup>1</sup>	63,124 <sup>1</sup>
	Just downstream of the confluence of Broken Kettle Creek	7,454	17,105 <sup>1</sup>	24,281 <sup>1</sup>	31,096 <sup>1</sup>	42,660 <sup>1</sup>	80,851 <sup>1</sup>
	Just downstream of the confluence of Rock Creek	7,343	17,303 <sup>1</sup>	24,489 <sup>1</sup>	31,320 <sup>1</sup>	44,604 <sup>1</sup>	88,044 <sup>1</sup>
	Just downstream of the confluence of Brule Creek	7,259	20,146 <sup>1</sup>	34,154 <sup>1</sup>	48,643 <sup>1</sup>	68,493 <sup>1</sup>	121,683 <sup>1</sup>
	Just downstream of the confluences of Richland and Westfield Creeks	7,041	20,529 <sup>1</sup>	36,772 <sup>1</sup>	52,758 <sup>1</sup>	70,796 <sup>1</sup>	122,571 <sup>1</sup>
	At USGS gage station 06485550 located in the City of Akron, Iowa	6,937	39,416 <sup>1</sup>	61,384 <sup>1</sup>	80,154 <sup>1</sup>	100,509 <sup>1</sup>	154,398 <sup>1</sup>
Floyd River	Downstream Limit of Study	487	9,930	15,600	20,430	25,660	39,560
Plymouth County Drainage Ditch	At Highway 12	2	447	674	874	1095	1680
Willow Creek	At confluence with Floyd River	158	8,620	12,500	15,100	17,500	24,000
	At Union Pacific Railroad	154	8,620	12,500	15,100	17,500	24,000

<sup>1</sup> Discharge represents summation of flows across the combined 1D/2D floodplain

Figure 7: Frequency Discharge-Drainage Area Curves



**Table 10: Summary of Non-Coastal Stillwater Elevations**

[Not Applicable to this Flood Risk Project]

**Table 11: Stream Gage Information used to Determine Discharges**

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Big Sioux River	06485500	USGS	Big Sioux River at Akron, IA	7,879	01/01/1942	07/09/2015
	06485910	USGS	Big Sioux River near Jefferson, SD	8,400	07/10/2015	07/10/2015
	06485950	USGS	Big Sioux River at Sioux City, IA	8,430	07/10/2015	07/10/2015

## 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 the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. 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
Big Sioux River (Zone A)	Approximately 3.3 miles downstream of Indian Creek	At Sioux County boundary	Rain on Grid, Gage Analysis (Dimensionless Unit Hydrograph) HEC-HMS 4.1	HEC-RAS 5.0.1	02/02/2017	A	
Big Sioux River (Zone AE)	At Woodbury County boundary	Approximately 3.3 miles downstream of Indian Creek	Gage Analysis (Dimensionless Unit Hydrograph)	HEC-RAS 5.0.3	05/01/2017	AE w/ Floodway	A combined 1D/2D model captured and modeled volumetric concerns by taking advantage of the 2D hydrodynamic flow routing in areas adjacent to the main stream corridor, and 1D unsteady hydraulics inside the stream corridor using HEC-RAS 5.1.0. The stream corridor represented the main channel of the Big Sioux River up to the either the channel banks or natural high ground. The 1D stream corridor analysis allows for structures such as bridges to be properly modeled taking into account low flow conditions and drag influences caused by piers as well as high flow conditions which can generate pressure flow scenarios on the underside of the bridge low chord. The areas adjacent to the 1D modeling were reserved for a 2D analysis. The current version of HEC-RAS has the capability to model combined 1D/2D scenarios. The 2D flow areas are solved using the Diffusion Wave equation set.
Floyd River	Approximately 0.3 miles downstream of 195 <sup>th</sup> Street	Approximately 0.4 miles downstream of Union Pacific Railroad	IIHR methodology-Area Weighted Estimate	HEC-RAS 5.0.3	09/28/2018	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
Plymouth County Drainage Ditch	Confluence with Big Sioux River	Approximately 1,851 feet upstream of 160 <sup>th</sup> Street	HEC-HMS v4.2.1	HEC-RAS 2D v5.0.7	06/01/2020	AE	2D Model
Willow Creek	Confluence with Floyd River	Approximately 94 feet downstream of Marble Avenue	Regional Regression Equations	HEC-RAS 5.0.3	12/19/2019	AE w/ Floodway	
All Zone A Flooding within Plymouth County; except Big Sioux River	Downstream limit of study	Upstream limit of study	Regional Regression Equations	HEC RAS 3.1.1 and higher	02/04/2014	A	For streams studied by approximate methods, the peak flood discharges were computed for the 10-, 2-, 1- and 0.2- percent-annual-chance storm events using hydrologic analyses recommended by the Iowa Department of Natural Resources (IDNR) and the Iowa Department of Transportation. This hydrologic analysis method includes use of gage information and United States Geological Survey (USGS) regression equations. For additional information on the hydrologic analyses please refer to the Technical Support Data Notebook (TSDN) on the Mapping Information Platform (MIP).

**Table 13: Roughness Coefficients**

Flooding Source	Channel “n”	Overbank “n”
Big Sioux River	0.033-0.035	0.035-0.160
Floyd River	0.05-0.07	0.016-0.12
Plymouth County Drainage Ditch	0.027	0.016-0.12
Willow Creek	0.045	0.016-0.12
All Zone A Flooding within Plymouth County; except Big Sioux River	0.030-0.045	0.020-.0150

### 5.3 Coastal Analyses

This section is not applicable to this Flood Risk Project.

#### **Table 14: Summary of Coastal Analyses**

[Not Applicable to this Flood Risk Project]

#### 5.3.1 Total Stillwater Elevations

This section is not applicable to this Flood Risk Project.

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

[Not Applicable to this Flood Risk Project]

#### **Table 15: Tide Gage Analysis Specifics**

[Not Applicable to this Flood Risk Project]

#### 5.3.2 Waves

This section is not applicable to this Flood Risk Project.

#### 5.3.3 Coastal Erosion

This section is not applicable to this Flood Risk Project.

#### 5.3.4 Wave Hazard Analyses

This section is not applicable to this Flood Risk Project.

#### **Table 16: Coastal Transect Parameters**

[Not Applicable to this Flood Risk Project]

#### **Figure 9: Transect Location Map**

[Not Applicable to this Flood Risk Project]

## 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 Flood Risk Project]

### Table 18: Results of Alluvial Fan Analyses

[Not Applicable to this Flood Risk 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](http://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](http://www.ngs.noaa.gov).

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

**Table 19: Countywide Vertical Datum Conversion**

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
Akron	SE	42.750	-96.500	0.659
Alton	SE	42.875	-96.000	0.623
Brunsville	SE	42.750	-96.250	0.640

**Table 19: Countywide Vertical Datum Conversion (continued)**

Quadrangle Name	Quadrangle Corner	Latitude	Longitude	Conversion from NGVD29 to NAVD88 (feet)
Chatsworth	SE	42.875	-96.500	0.653
Elk Point NE	SE	42.625	-96.500	0.594
Granville West	SE	42.875	-95.875	0.630
Hawarden South	SE	42.875	-96.375	0.689
Hinton	SE	42.625	-96.250	0.666
Ireton	SE	42.875	-96.250	0.656
Ireton SW	SE	42.750	-96.375	0.689
Kingsley NW	SE	42.625	-95.875	0.522
Le Mars	SE	42.750	-96.125	0.633
Maurice	SE	42.875	-96.125	0.617
Millerville	SE	42.625	-96.375	0.696
Oyens	SE	42.750	-96.000	0.617
Remsen	SE	42.750	-95.875	0.591
Richland	SE	42.750	-96.625	0.607
Union Center	SE	42.625	-96.000	0.535
Union Center NW	SE	42.625	-96.125	0.604
Average Conversion from NGVD29 to NAVD88 = 0.627 feet				

**Table 20: Stream-Based Vertical Datum Conversion**

[Not Applicable to this Flood Risk 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) format that 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 and its contents can be found in FEMA's *Guidelines and Standards for Flood Risk Analysis and Mapping*, [www.fema.gov/media-library/resources-documents/collections/361](http://www.fema.gov/media-library/resources-documents/collections/361).

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
City Boundaries	Iowa Department of Natural Resources	2018	1:24,000	Location and attributes for city limits shown on the FIRM.
County Boundaries	Iowa Department of Natural Resources - Iowa Geological Survey	1990	1:24,000	Location and attributes for county boundaries shown on the FIRM.
Digital Orthophoto	Iowa Geological and Water Survey, DNR	2009	1:4,800	Base Imagery
General Structures	Iowa Department of Natural Resources - Geological and Water Survey	2014	1:24,000	Location and attributes for flood control structures shown on the flood profiles and FIRM.
HUC-8 Subbasins	U. S. Department of Agriculture, Natural Resources Conservation Service	2008	1:24,000	Location and attributes for subbasins in the hydrologic analysis.
PLSS Areas	Iowa Department of Natural Resources	1998	1:24,000	Location and attributes of sections, townships, and ranges on the FIRM.
Railroads	Iowa Department of Transportation	2018	1:24,000	Location and attributes for active and abandoned railroad features.
Transportation Features	Iowa Department of Transportation	2011	1:5,000	Location and attributes for roads and other transportation features shown on the FIRM.

### 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.

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
Plymouth County	All Flooding Sources	Light Detection and Ranging data (LiDAR)	18.5 cm (bare earth) / 37 cm (dense vegetation)	+/- 1 meter	IDNR 2014a

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.

**Table 23: Floodway Data**

LOCATION		FLOODWAY <sup>3</sup>			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION <sup>3</sup> (FEET NAVD88)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH <sup>2</sup> (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Q	46,979	543 / 160	6,751	5.8	1,098.7	1,098.7	1,099.5	0.8
R <sup>4</sup>	51,370	436 / 0	6,884	5.7	1,100.0	1,100.0	1,100.9	0.9
S	55,206	633 / 151	11,053	3.5	1,101.3	1,101.3	1,102.2	0.9
T	58,266	875 / 670	10,441	3.8	1,101.8	1,101.8	1,102.7	0.9
U	61,969	313 / 102	5,987	6.6	1,102.4	1,102.4	1,103.1	0.7
V	63,902	1,937 / 1798	13,256	3.0	1,103.1	1,103.1	1,104.0	0.9
W	67,765	492 / 392	8,950	4.3	1,103.7	1,103.7	1,104.6	0.9
X	71,183	727 / 393	9,272	4.3	1,104.5	1,104.5	1,105.2	0.7
Y	76,326	290 / 273	5,869	5.5	1,105.7	1,105.7	1,106.5	0.8
Z	80,118	275 / 127	6,684	4.1	1,106.8	1,106.8	1,107.5	0.7
AA	83,561	221 / 119	4,589	5.8	1,107.1	1,107.0	1,107.7	0.7
AB	85,871	554 / 190	9,807	2.8	1,107.8	1,107.8	1,108.4	0.6
AC	92,826	589 / 154	8,457	3.1	1,108.5	1,108.5	1,108.9	0.4
AD	95,498	785 / 364	13,822	1.9	1,108.9	1,108.9	1,109.3	0.4
AE	98,307	205 / 111	4,982	5.3	1,109.1	1,109.1	1,109.5	0.4
AF	101,807	1,386 / 883	14,075	2.1	1,109.9	1,109.9	1,110.2	0.3
AG	107,638	761 / 93	8,568	3.7	1,110.6	1,110.6	1,110.8	0.2
AH	109,807	956 / 114	11,065	2.7	1,111.1	1,111.1	1,111.3	0.2
AI	115,177	346 / 124	7,575	4.0	1,112.0	1,112.0	1,112.1	0.1
AJ	119,751	701 / 555	10,513	3.3	1,112.6	1,112.6	1,112.7	0.1
AK	126,190	249 / 121	4,984	4.6	1,113.8	1,113.8	1,113.9	0.1

<sup>1</sup> Feet above confluence with Missouri River

<sup>2</sup> Total floodway width / width within jurisdiction

<sup>3</sup> Values are only representative of the 1-Dimensional portion of the Special Flood Hazard Area

<sup>4</sup> Cross-section located entirely within the boundary of Union County, SD

TABLE 23	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>  <b>PLYMOUTH COUNTY, IOWA</b>  <b>AND INCORPORATED AREAS</b>	<b>FLOODWAY DATA</b>
		<b>FLOODING SOURCE: BIG SIOUX RIVER</b>

**Table 23: Floodway Data (continued)**

LOCATION		FLOODWAY <sup>3</sup>			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION <sup>3</sup> (FEET NAVD88)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH <sup>2</sup> (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AL	127,714	337 / 209	7,831	2.4	1,114.3	1,114.3	1,114.4	0.1
AM	131,766	287 / 94	6,677	2.9	1,114.7	1,114.7	1,114.8	0.1
AN	133,996	234 / 139	5,017	3.6	1,114.8	1,114.8	1,115.0	0.2
AO	137,853	426 / 313	6,686	2.9	1,115.3	1,115.3	1,115.4	0.1
AP	144,549	1,536 / 1114	16,330	1.4	1,115.9	1,115.9	1,116.0	0.1
AQ	149,524	329 / 329	6,031	4.5	1,116.0	1,116.0	1,116.2	0.2
AR	152,478	1,121 / 962	10,444	2.7	1,116.4	1,116.4	1,116.5	0.1
AS	154,884	920 / 680	10,352	2.5	1,117.1	1,117.1	1,117.2	0.1
AT	160,328	940 / 117	10,287	2.6	1,117.6	1,117.6	1,117.8	0.2
AU	167,590	1,482 / 857	14,007	2.5	1,118.7	1,118.7	1,118.9	0.2
AV	170,589	3,537 / 2968	32,565	1.5	1,120.3	1,120.3	1,120.5	0.2
AW	177,711	1,865 / 1681	16,013	2.1	1,121.1	1,121.1	1,121.3	0.2
AX	180,310	2,572 / 209	22,686	1.4	1,121.5	1,121.5	1,121.7	0.2
AY	182,837	1,712 / 1559	15,922	2.2	1,121.8	1,121.8	1,122.0	0.2
AZ	192,625	4,770 / 2,248	36,689	1.1	1,123.3	1,123.3	1,123.4	0.1
BA	200,394	2,831 / 1,275	22,980	1.9	1,124.6	1,124.6	1,124.7	0.1
BB	201,643	2,787 / 2,606	25,015	1.7	1,124.9	1,124.9	1,125.0	0.1
BC	204,643	3,269 / 3,177	24,372	1.7	1,126.8	1,126.8	1,127.0	0.2
BD	206,643	3,749 / 3,271	32,278	1.1	1,127.3	1,127.3	1,127.5	0.2
BE	211,514	1,510 / 680	13,264	2.5	1,128.0	1,128.0	1,128.1	0.1
BF	215,963	2,461 / 2,262	16,637	2.0	1,129.0	1,129.0	1,129.1	0.1
BG	222,156	1,807 / 1,309	14,901	1.4	1,130.1	1,130.1	1,130.1	0.0
BH	226,114	959 / 342	7,836	2.4	1,130.8	1,130.8	1,130.9	0.1

<sup>1</sup> Feet above confluence with Missouri River  
<sup>2</sup> Total floodway width / width within jurisdiction  
<sup>3</sup> Values are only representative of the 1-Dimensional portion of the Special Flood Hazard Area

TABLE 23	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>  <b>PLYMOUTH COUNTY, IOWA</b>  <b>AND INCORPORATED AREAS</b>	<b>FLOODWAY DATA</b>  <b>FLOODING SOURCE: BIG SIOUX RIVER</b>
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**Table 23: Floodway Data (continued)**

LOCATION		FLOODWAY <sup>3</sup>			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION <sup>3</sup> (FEET NAVD88)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH <sup>2</sup> (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BI	232,152	1,853 / 464	13,316	1.7	1,132.7	1,132.7	1,132.8	0.1
BJ	238,023	1,563 / 154	11,722	2.2	1,133.6	1,133.6	1,133.6	0.0
BK	244,604	593 / 240	5,550	6.6	1,135.2	1,135.2	1,135.2	0.0
BL	246,422	625 / 324	6,818	5.8	1,136.8	1,136.8	1,136.8	0.0
BM	247,423	1,228 / 800	12,460	3.4	1,137.6	1,137.6	1,137.7	0.1
BN	247,851	1,305 / 1,075	11,776	3.7	1,138.0	1,138.0	1,138.1	0.1
BO	249,422	1,066 / 100	9,272	4.7	1,138.5	1,138.5	1,138.5	0.0
BP	256,938	637 / 156	8,515	3.1	1,141.3	1,141.4	1,141.4	0.0
BQ	258,184	361 / 135	5,140	5.5	1,141.3	1,141.3	1,141.4	0.1
BR	260,486	393 / 7	6,231	3.4	1,142.3	1,142.3	1,142.3	0.0
BS <sup>4</sup>	266,121	394 / 0	6,157	4.6	1,142.8	1,142.8	1,142.9	0.1
BT	271,686	308 / 75	4,336	6.4	1,144.3	1,144.3	1,144.4	0.1
BU	272,793	269 / 101	4,503	6.2	1,144.9	1,144.9	1,145.0	0.1
BV	276,455	1,243 / 685	16,906	2.4	1,146.6	1,146.6	1,146.6	0.0
BW	284,020	3,076 / 2,909	31,870	1.7	1,148.1	1,148.1	1,148.1	0.0
BX	292,901	3,408 / 883	35,092	1.9	1,149.5	1,149.5	1,149.6	0.1

<sup>1</sup> Feet above confluence with Missouri River  
<sup>2</sup> Total floodway width / width within jurisdiction  
<sup>3</sup> Values are only representative of the 1-Dimensional portion of the Special Flood Hazard Area  
<sup>4</sup> Cross-section located entirely within the boundary of Union County, SD

<b>TABLE 23</b>	<b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b>	<b>FLOODWAY DATA</b>
	<b>PLYMOUTH COUNTY, IOWA</b>	
	<b>AND INCORPORATED AREAS</b>	<b>FLOODING SOURCE: BIG SIOUX RIVER</b>

**Table 23: Floodway Data (continued)**

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	147,669	1,498	11,986	2.1	1,193.5	1,193.5	1,194.4	0.9
B	148,968	1,570	10,152	2.5	1,193.8	1,193.8	1,194.7	0.9
C	152,771	1,329	9,327	2.8	1,196.6	1,196.6	1,197.1	0.5
D	154,466	1,304	6,537	3.9	1,196.9	1,196.9	1,197.9	1.0
E	158,605	1,741	9,346	2.7	1,199.8	1,199.8	1,200.1	0.3
F	160,914	804	5,373	4.8	1,201.5	1,201.5	1,201.9	0.4
G	161,889	425	4,594	5.6	1,204.0	1,204.0	1,204.2	0.2
H	163,816	1,130	9,533	2.7	1,205.7	1,205.7	1,206.2	0.5
I	164,567	725	6,557	3.9	1,205.8	1,205.8	1,206.4	0.6
J	166,894	294	3,261	7.9	1,207.0	1,207.0	1,207.4	0.4

<sup>1</sup> Feet above mouth

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**PLYMOUTH COUNTY, IOWA**  
 AND INCORPORATED AREAS

**FLOODWAY DATA**

**FLOODING SOURCE: FLOYD RIVER**

**Table 23: Floodway Data (continued)**

LOCATION		FLOODWAY			1% ANNUAL CHANCE FLOOD WATER SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/ SEC)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
A	3,186	939	8,786	2.0	1,213.0	1,213.0	1,213.8	0.8
B	3,925	1,599	13,139	1.3	1,213.1	1,213.1	1,214.0	0.9
C	5,422	1,855	12,703	1.4	1,213.3	1,213.3	1,214.2	0.9
D	6,175	2,068	11,980	1.5	1,213.4	1,213.4	1,214.3	0.9
E	6,557	2,000	10,787	1.6	1,213.5	1,213.5	1,214.4	0.9
F	7,784	1,878	11,907	1.5	1,213.7	1,213.7	1,214.6	0.9
G	8,311	1,647	8,369	2.1	1,213.8	1,213.8	1,214.7	0.9
H	9,230	1,330	5,985	2.9	1,214.5	1,214.5	1,215.3	0.8
I	10,215	1,223	4,764	3.7	1,215.2	1,215.2	1,216.0	0.8
J	11,500	1,228	5,029	3.5	1,217.0	1,217.0	1,217.7	0.7
K	12,191	930	5,243	3.3	1,217.6	1,217.6	1,218.3	0.7
L	12,352	930	4,515	3.9	1,217.9	1,217.9	1,218.6	0.7
M	13,328	1,098	5,963	2.9	1,219.3	1,219.3	1,220.2	0.9
N	13,770	720	6,179	2.8	1,222.3	1,222.3	1,222.8	0.5

<sup>1</sup> Feet above confluence with Floyd River

TABLE 23

FEDERAL EMERGENCY MANAGEMENT AGENCY

PLYMOUTH COUNTY, IOWA

AND INCORPORATED AREAS

FLOODWAY DATA

FLOODING SOURCE: WILLOW CREEK

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

[Not applicable to this Flood Risk Project]

### **6.4 Coastal Flood Hazard Mapping**

This section is not applicable to this Flood Risk Project.

## **Table 25: Summary of Coastal Transect Mapping Considerations**

[Not applicable to this Flood Risk Project]

### **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, visit [www.fema.gov/letter-map-amendment-loma](http://www.fema.gov/letter-map-amendment-loma) 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](http://www.fema.gov/online-tutorials).

For more information about how to apply for a LOMA, call the FEMA Map Information 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/letter-map-amendment-loma](http://www.fema.gov/letter-map-amendment-loma) 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 Map Information 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](http://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/media-library/assets/documents/1343](http://www.fema.gov/media-library/assets/documents/1343) 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 Map Information 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 Plymouth County FIRM are listed in Table 26.

**Table 26: Incorporated Letters of Map Change**

[Not Applicable to this Flood Risk Project]

### **6.5.4 Physical Map Revisions**

A Physical Map Revisions (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](http://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](http://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 Plymouth County. Previously, separate FIRMs, Flood Hazard Boundary Maps (FHBM) and/or Flood Boundary and Floodway Maps (FBFM) 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 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.
- *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 PMRs 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.

**Table 27: Community Map History**

Community Name	Initial Identification Date	Initial FHBM Effective Date	FHBM Revision Date(s)	Initial FIRM Effective Date	FIRM Revision Date(s)
Akron, City of	3/22/1974	3/22/1974	11/15/1977 1/2/1976	8/1/1986	<b>TBD</b> 6/6/2001
Brunsville, City of	7/2/1976	7/2/1976	N/A	5/1/2011	<b>TBD</b>
Craig, City of <sup>1,2</sup>	<b>TBD</b>	N/A	N/A	<b>TBD</b>	N/A
Hinton, City of	9/6/1974	9/6/1974	12/26/1975	9/27/1985	<b>TBD</b>
Kingsley, City of	8/6/1976	8/6/1976	N/A	9/27/1985	<b>TBD</b>
Le Mars, City of	1/16/1974	1/16/1974	7/16/1976	5/1/1978	<b>TBD</b>
Merrill, City of	7/2/1976	7/2/1976	N/A	11/6/1991	<b>TBD</b>
Oyens, City of <sup>2</sup>	7/16/1976	7/16/1976	N/A	<b>TBD</b>	N/A
Plymouth County (Unincorporated Areas)	10/25/1977	10/25/1977	N/A	9/18/1985	<b>TBD</b> 6/6/2001
Remsen, City of	3/19/1976	3/19/1976	N/A	8/1/1986	<b>TBD</b>
Struble, City of <sup>2</sup>	<b>TBD</b>	N/A	N/A	<b>TBD</b>	N/A
Westfield, City of	8/13/1976	8/13/1976	N/A	10/20/1999	<b>TBD</b> 6/6/2001

<sup>1</sup> No Special Flood Hazard Areas

<sup>2</sup> This community did not have a FIRM prior to the first countywide FIRM for Plymouth County

## 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
Big Sioux River (Zone A)	<b>TBD</b>	Compass	HSFE60-15-D-0003	February 2017	Plymouth 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
Big Sioux River (Zone AE)	<b>TBD</b>	AECOM	HSFE60-15-D-0003	May 2017	Akron, City of; Plymouth County (Unincorporated Areas); Westfield, City of
Floyd River	<b>TBD</b>	ATKINS	17ESDLQSRALS-0002	September 2018	Le Mars, City of; Plymouth County (Unincorporated Areas)
Willow Creek	<b>TBD</b>	ATKINS	17ESDLQSRALS-0002	June 2019	Le Mars, City of; Plymouth County (Unincorporated Areas)
Plymouth County Drainage Ditch	<b>TBD</b>	ATKINS	17ESDLQSRALS-0002	June 2020	Akron, City of; Plymouth County (Unincorporated Areas)
All Zone A Flooding within Plymouth County; except Big Sioux River	<b>TBD</b>	Iowa Flood Center and IIHR Hydroscience and Engineering	17ESDLQSRALS-0002	February 2014	All communities except for Akron, City of and Craig, City of

## 7.2 Community Meetings

The dates of the community meetings held for this Flood Risk Project and previous Flood Risk 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
Akron, City of	TBD	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO, Stantec, private citizens and community officials
		TBD	Final CCO	
Brunsville, City of	TBD	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO and Stantec
		TBD	Final CCO	
Craig, City of	TBD	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO and Stantec
		TBD	Final CCO	
Hinton, City of	TBD	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO and Stantec
		TBD	Final CCO	
Kingsley, City of	TBD	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO, Stantec, and community officials
		TBD	Final CCO	
Le Mars, City of	TBD	8/21/2019	Flood Risk Review Meeting <sup>1</sup>	Iowa DNR, Snyder & Associates, ATKINS, and community officials
		9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO, Stantec, and community officials
		12/12/2019	Flood Risk Review Meeting <sup>2</sup>	FEMA, Iowa DNR, Snyder & Associates, ATKINS, and community officials

<sup>1</sup> Meeting was held for the Floyd River study.

<sup>2</sup> Meeting was held for the Willow Creek study.

**Table 29: Community Meetings (continued)**

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Le Mars, City of (continued)	<b>TBD</b>	<b>TBD</b>	Final CCO	
Merrill, City of	<b>TBD</b>	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO and Stantec
		<b>TBD</b>	Final CCO	
Oyens, City of	<b>TBD</b>	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO and Stantec
		<b>TBD</b>	Final CCO	
Plymouth County (Unincorporated Areas)	<b>TBD</b>	8/21/2019	Flood Risk Review Meeting <sup>1</sup>	Iowa DNR, Snyder & Associates and ATKINS
		9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO, Stantec, private citizens and community officials
		12/12/2019	Flood Risk Review Meeting <sup>2</sup>	FEMA, Iowa DNR, Snyder & Associates and ATKINS
		<b>TBD</b>	Final CCO	
Remsen, City of	<b>TBD</b>	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO and Stantec
		<b>TBD</b>	Final CCO	
Struble, City of	<b>TBD</b>	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO and Stantec
		<b>TBD</b>	Final CCO	

<sup>1</sup> Meeting was held for the Floyd River study.

<sup>2</sup> Meeting was held for the Willow Creek study.

**Table 29: Community Meetings (continued)**

Community	FIS Report Dated	Date of Meeting	Meeting Type	Attended By
Westfield, City of	TBD	9/18/2019	Draft Flood Hazard Product Review Meeting	Iowa DNR, SIMPCO, Stantec and community officials
		TBD	Final CCO	

## 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 [www.fema.gov](http://www.fema.gov).

The additional data that was used for this project includes the FIS Report and FIRM that were previously prepared for Union County, South Dakota and Incorporated Areas, (FEMA 2006).

Table 30 is a list of the locations where FIRMs for Plymouth 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
Akron, City of	City Hall 220 Reed Street	Akron	IA	51001
Brunsville, City of	City Hall 310 Oak Street	Brunsville	IA	51008
Craig, City of <sup>1</sup>	City Hall 725 Main Street	Craig	IA	51031
Hinton, City of	City Hall 205 West Main Street	Hinton	IA	51024
Kingsley, City of	City Hall 222 Main Street	Kingsley	IA	51028
Le Mars, City of	City Hall 40 Central Avenue SE	Le Mars	IA	51031
Merrill, City of	City Hall 608 Main Street	Merrill	IA	51038
Oyens, City of	City Hall 230 Main Street	Oyens	IA	51045
Plymouth County (Unincorporated Areas)	Annex Building 214 3rd Avenue SE	Le Mars	IA	51031
Remsen, City of	City Hall 8 West 2nd Street	Remsen	IA	51050
Struble, City of	City Hall 210 William Street	Struble	IA	51031
Westfield, City of	City Hall 223 Union Street	Westfield	IA	51062

<sup>1</sup> No Special Flood Hazard Areas Identified

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	<a href="http://www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library">www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library</a>
NFIP website	<a href="http://www.fema.gov/national-flood-insurance-program">www.fema.gov/national-flood-insurance-program</a>
NFHL Dataset	<a href="http://msc.fema.gov">msc.fema.gov</a>
FEMA Region VII	11224 Holmes Road Kansas City, MO 64131-3626 Telephone: (816) 283-7003
Other Federal Agencies	
USGS website	<a href="http://www.usgs.gov">www.usgs.gov</a>
Hydraulic Engineering Center website	<a href="http://www.hec.usace.army.mil">www.hec.usace.army.mil</a>
State Agencies and Organizations	
State NFIP Coordinator	Bill Cappuccio Iowa Department of Natural Resources Wallace State Office Building Des Moines, IA 50319 515-281-8942 FAX 515-281-8895 <a href="mailto:bill.cappuccio@dnr.state.ia.us">bill.cappuccio@dnr.state.ia.us</a>
State GIS Coordinator	Patrick Wilke-Brown Iowa Department of Natural Resources Wallace State Office Building Des Moines, IA 50319 515-281-6905 <a href="mailto:patrick.wilke-brown@dnr.iowa.gov">patrick.wilke-brown@dnr.iowa.gov</a>

## 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	<i>Publication Title, "Article," Volume, Number, etc.</i>	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
AECOM 2017	Federal Emergency Management Agency	<i>Plymouth County, Iowa Big Sioux River Zone AE Floodplains</i>	AECOM	Arlington, VA	May 2017	
ATKINS 2018	Federal Emergency Management Agency	<i>Floyd River Zone AE Floodplains</i>	Atkins	Calverton, MD	September 2018	
ATKINS 2018a	Atkins	<i>Iowa CTP FY17 Hydrology Report</i>	Atkins	Calverton, MD	October 2018	
ATKINS 2019	Federal Emergency Management Agency	<i>Willow Creek Zone AE Floodplains</i>	Atkins	Calverton, MD	December 2019	
ATKINS 2019a	Atkins	<i>Iowa CTP FY17 Floodplain Delineation Study -- Hydraulics Report, Plymouth County, Iowa</i>	Atkins	Calverton, MD	April 2019	
ATKINS 2019b	Atkins	<i>Iowa CTP FY18 Floodplain Delineation Study -- Hydrology Report, Plymouth County, Iowa</i>	Atkins	Calverton, MD	September 2019	

**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
ATKINS 2020	Atkins	<i>Flood Study for Plymouth County Drainage Ditch, Akron (Plymouth County, IA) Hydrology and Hydraulic Analyses Report</i>	Atkins	Calverton, MD	June 2020	
ATKINS S2 2019	Federal Emergency Management Agency	<i>Iowa CTP FY18 Floodplain Delineation Study - Plymouth County</i>	Atkins North America, Atlanta Office	Washington, D.C.	1/1/2019	<a href="https://msc.fema.gov">msc.fema.gov</a>
CDM 2017	Compass PTS JV	<i>Plymouth County, Iowa Big Sioux River Zone A Floodplains and BLE</i>	CDM Smith	South Dakota	May 2017	
FEMA TBD	Federal Emergency Management Agency	<i>FIRM Panel Index</i>	Iowa Department of Natural Resources	Washington, D.C.	<b>TBD</b>	<a href="https://msc.fema.gov/portal">https://msc.fema.gov/portal</a>
FEMA 2019	Federal Emergency Management Agency	<i>Preliminary Flood Insurance Study -- Union County, SD and Incorporated Areas</i>	Federal Emergency Management Agency	Washington, D.C.	January 2019	
IDNR 1990	Iowa Department of Natural Resources - Iowa Geological Survey	<i>County Boundaries</i>	Iowa Department of Natural Resources	Iowa City, Iowa	November 1990	<a href="ftp://ftp.igsb.uiowa.edu/gis_library/IA_State/Admin_Political_Boundary/county.zip">ftp://ftp.igsb.uiowa.edu/gis_library/IA_State/Admin_Political_Boundary/county.zip</a>
IDNR 1998	Iowa Department of Natural Resources	<i>PLSS Areas</i>	Iowa Department of Natural Resources	Des Moines, Iowa	March 1998	<a href="ftp://ftp.igsb.uiowa.edu/gis_library/IA_state/Admin_political_boundary/PLSS/PLSS_sections.html">ftp://ftp.igsb.uiowa.edu/gis_library/IA_state/Admin_political_boundary/PLSS/PLSS_sections.html</a>

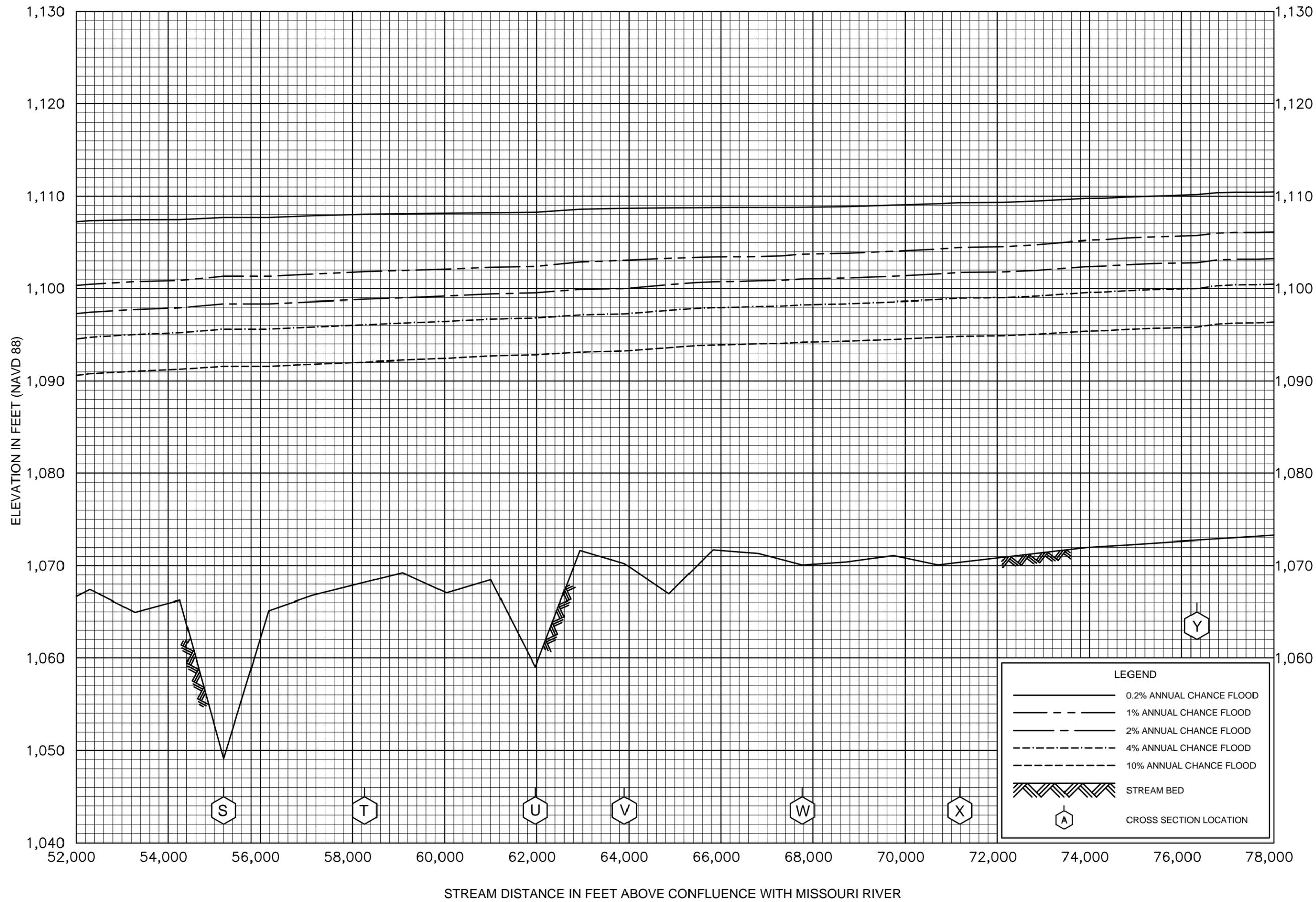
**Table 32: Bibliography and References (continued)**

Citation in this FIS	Publisher/ Issuer	Publication Title, "Article," Volume, Number, etc.	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
IDNR 2009	Iowa Geological and Water Survey, DNR	<i>Base Map Index</i>	Iowa Department of Natural Resources	Iowa City, Iowa	August 2009	
IDNR 2014	Iowa Department of Natural Resources - Geological and Water Survey	<i>General Structures</i>	Iowa Department of Natural Resources	Des Moines, Iowa	January 2014	
IDNR 2014a	Iowa Department of Natural Resources	<i>Iowa Statewide 1 M LiDAR Collection</i>	Iowa Department of Natural Resources	Des Moines, Iowa	February 2014	
IDNR 2018	Iowa Department of Natural Resources	<i>City Boundaries</i>	Iowa Department of Natural Resources	Iowa City, Iowa	January 2018	
IDOT 2011	Iowa Department of Transportation	<i>Transportation Features</i>	Iowa Department of Transportation	Ames, Iowa	January 2011	<a href="http://www.iowadot.gov/gis/downloads/default.aspx">http://www.iowadot.gov/gis/downloads/default.aspx</a>
IDOT 2018	Iowa Department of Transportation	<i>Railroads</i>	Iowa Department of Transportation	Ames, Iowa	September 2018	<a href="http://data.iowadot.gov/datasets?sort=-updatedAt&amp;t=Rail">http://data.iowadot.gov/datasets?sort=-updatedAt&amp;t=Rail</a>
Iowa Flood Center 2018	University of Iowa, Iowa Flood Center	<i>Zone A Special Flood Hazard Areas</i>	Iowa Flood Center	Iowa City, Iowa	August 2018	

**Table 32: Bibliography and References (continued)**

Citation in this FIS	Publisher/ Issuer	<i>Publication Title, "Article," Volume, Number, etc.</i>	Author/Editor	Place of Publication	Publication Date/ Date of Issuance	Link
NRCS 2008	U. S. Department of Agriculture, Natural Resources Conservation Service	<i>HUC-8 Subbasins</i>	NRCS-Iowa, Des Moines, Iowa and EPA Region 5, Chicago, Illinois	Fort Worth, Texas	April 2008	<a href="http://datagateway.nrcs.usda.gov">http://datagateway.nrcs.usda.gov</a>
USGS 2019	United States Geological Survey	<i>River Gages</i>	United States Geological Survey	Reston, Virginia	July 2019	<a href="https://maps.waterdata.usgs.gov/mapper/index.html">https://maps.waterdata.usgs.gov/mapper/index.html</a>

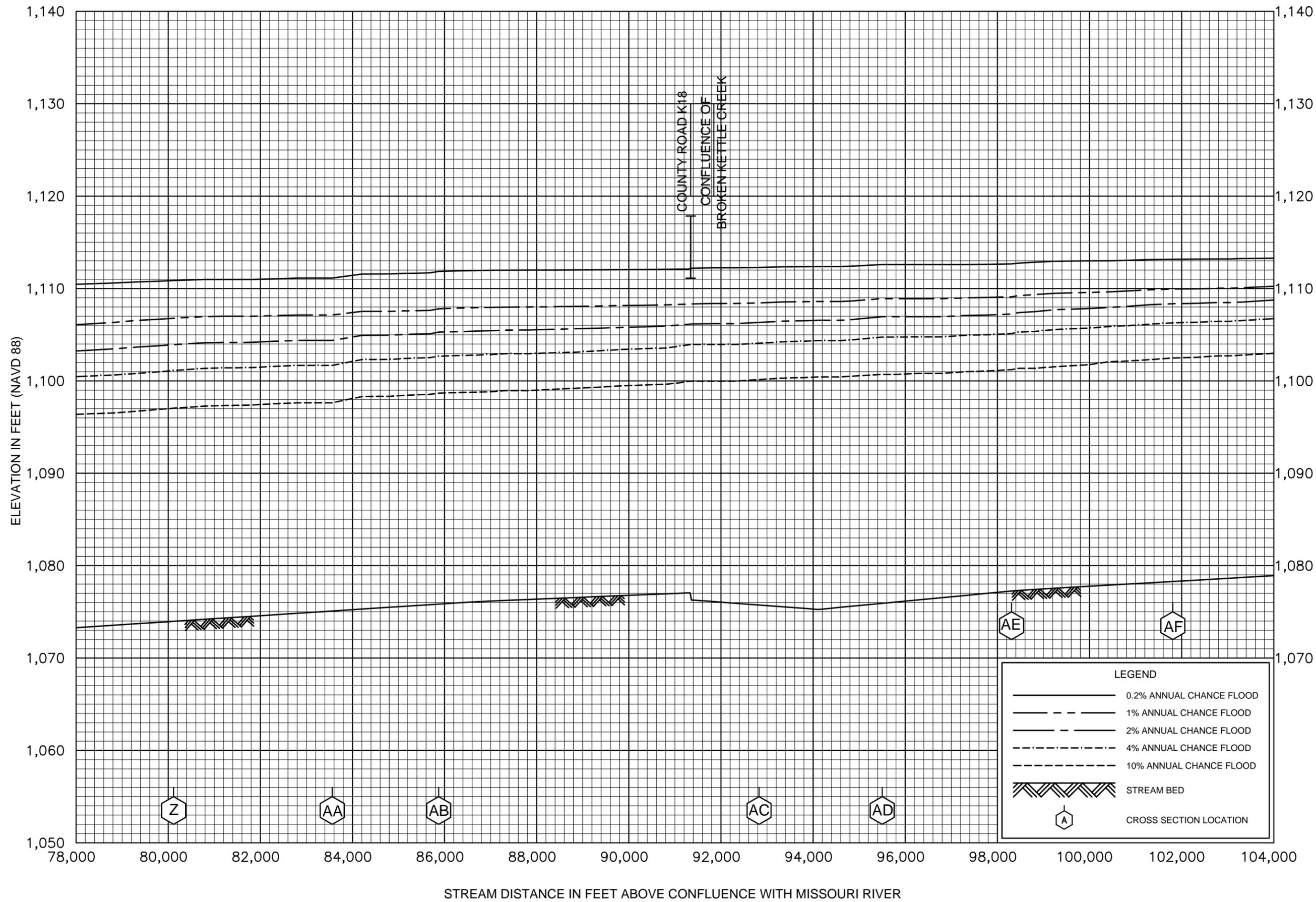




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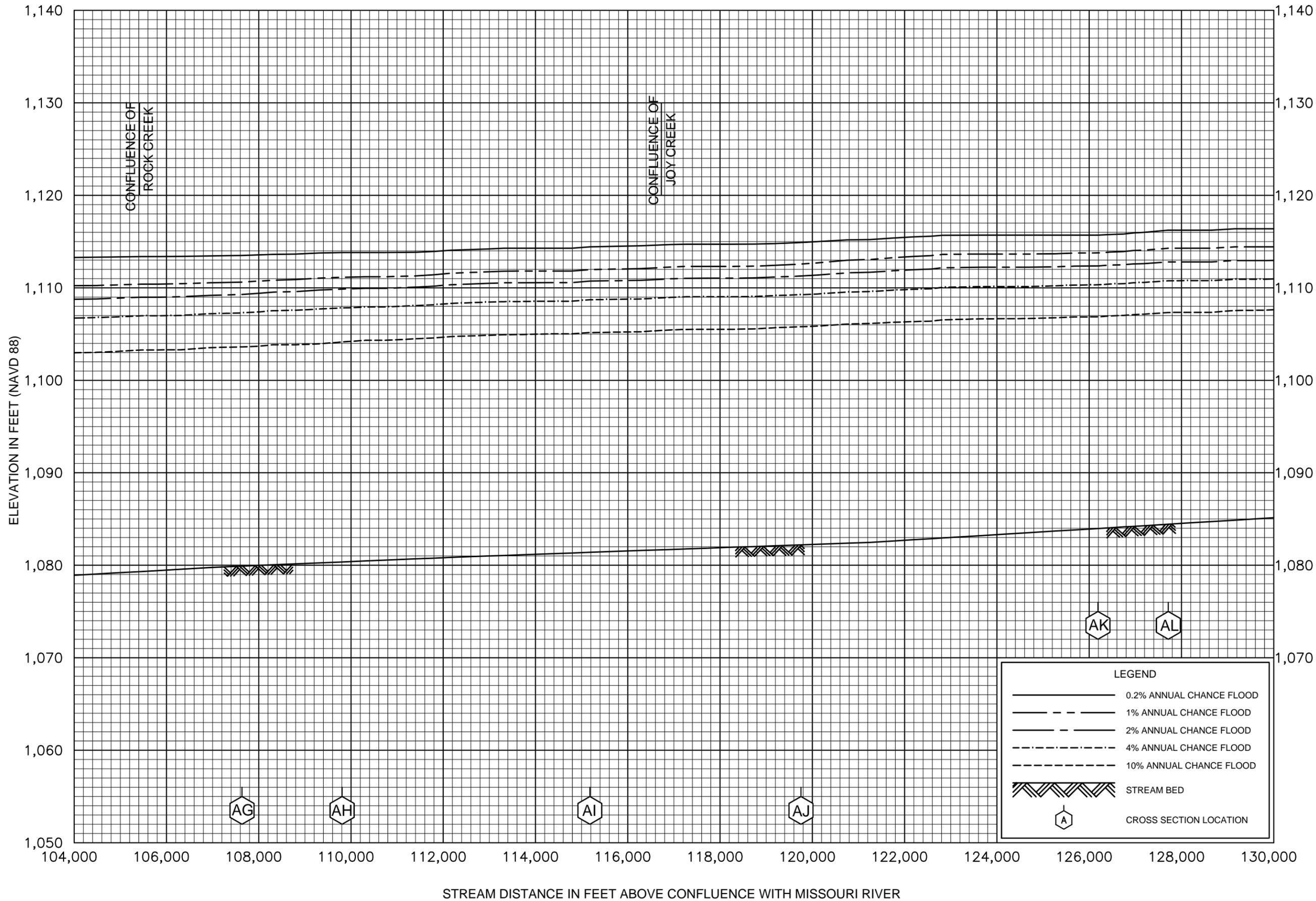
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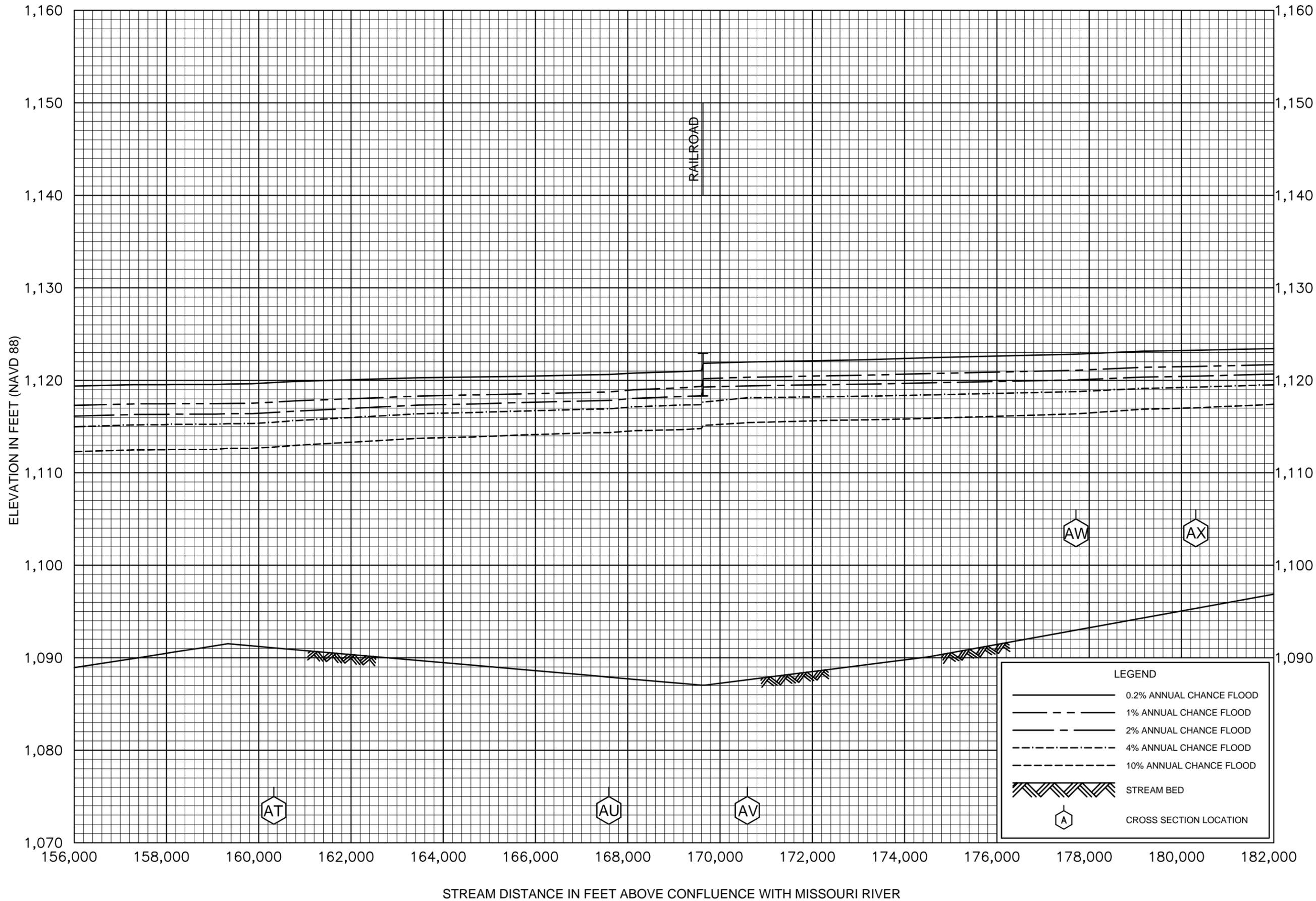
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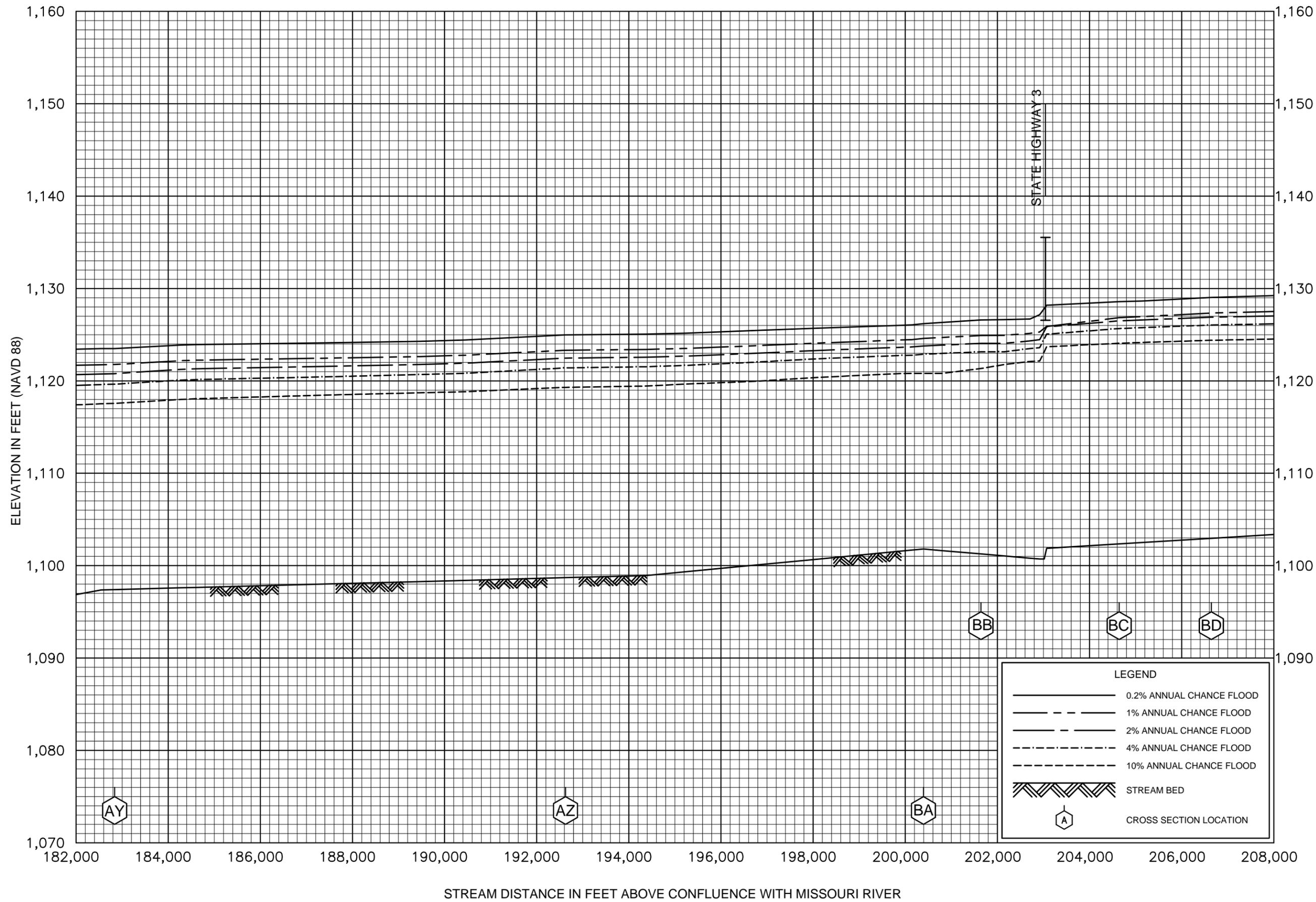
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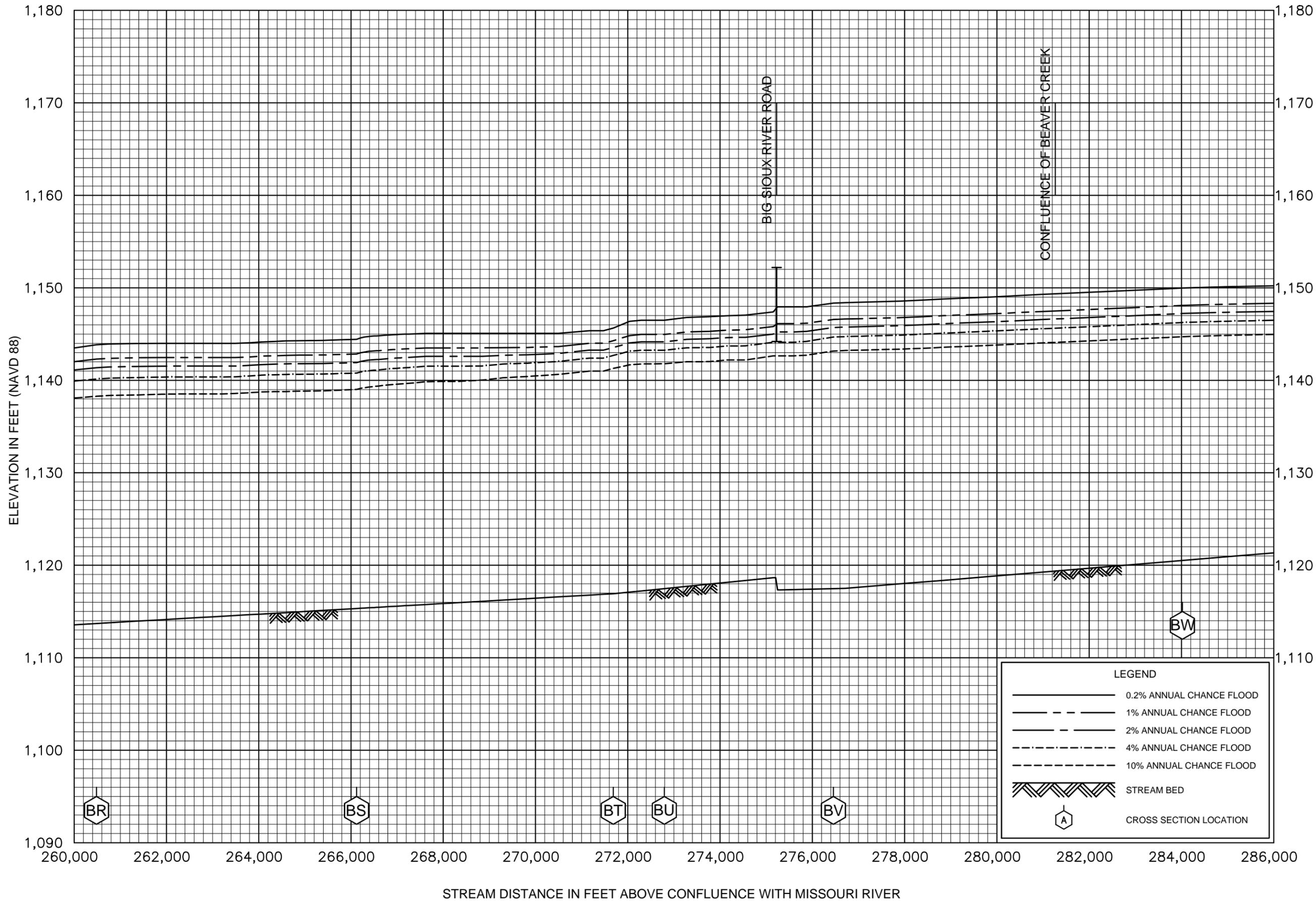


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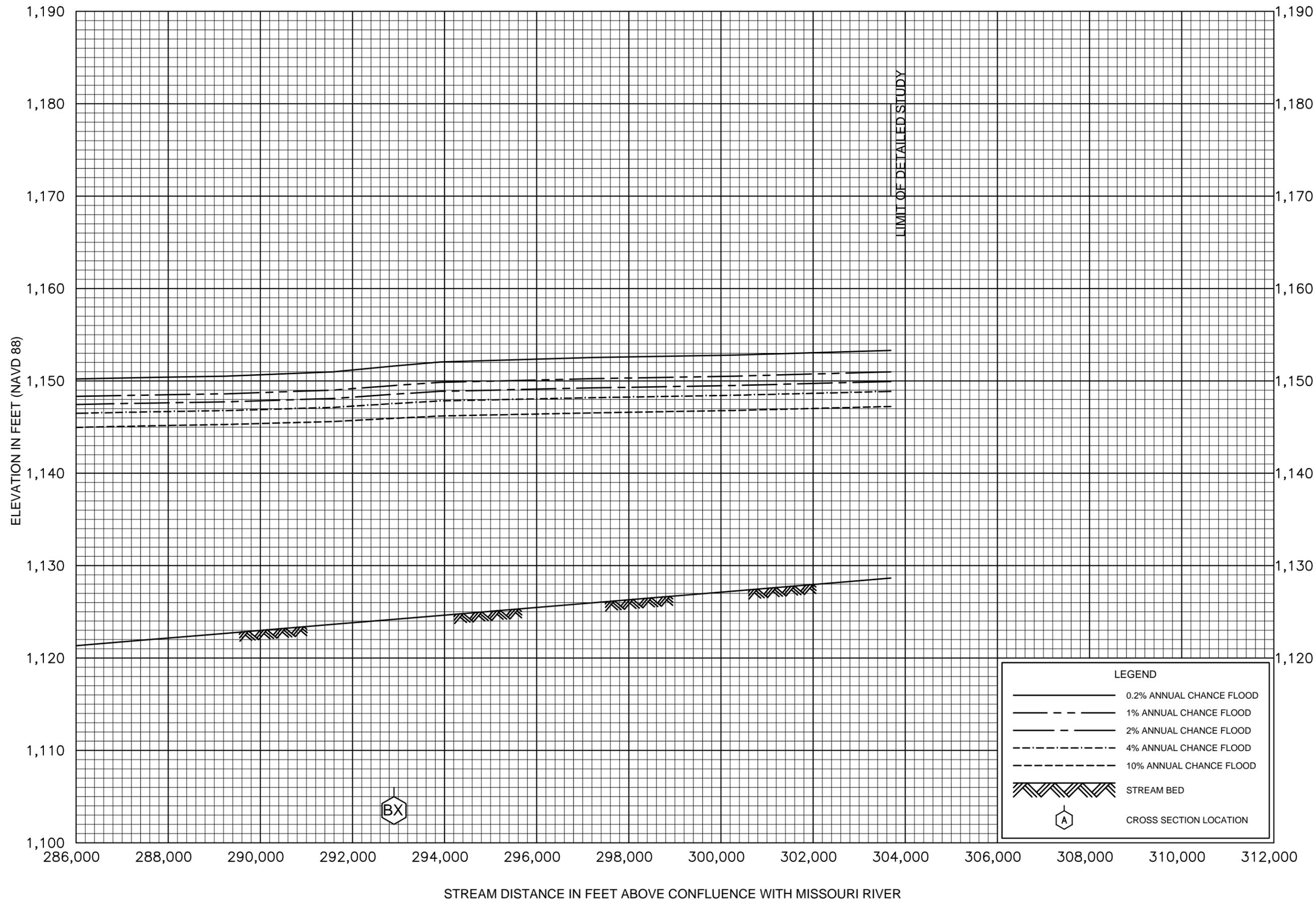


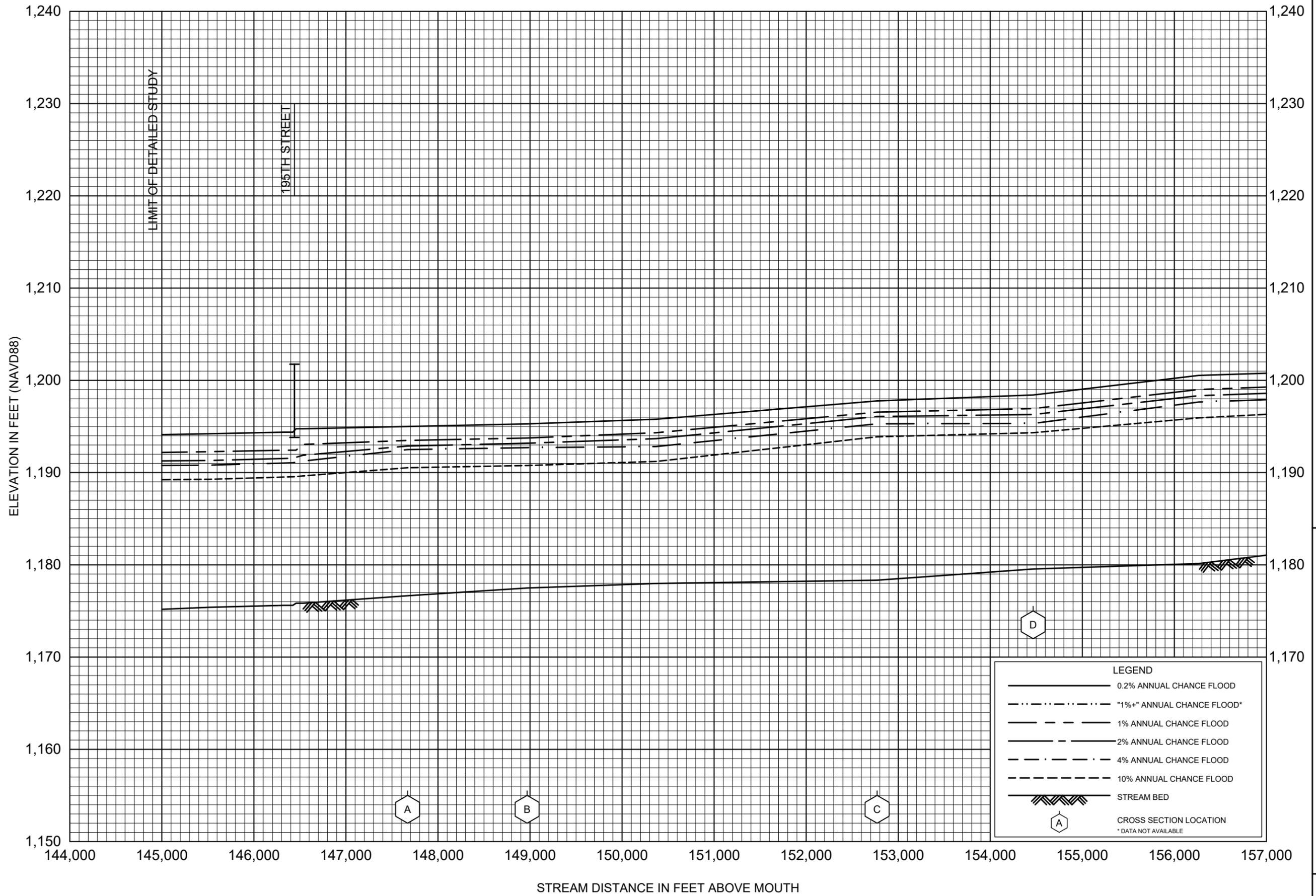




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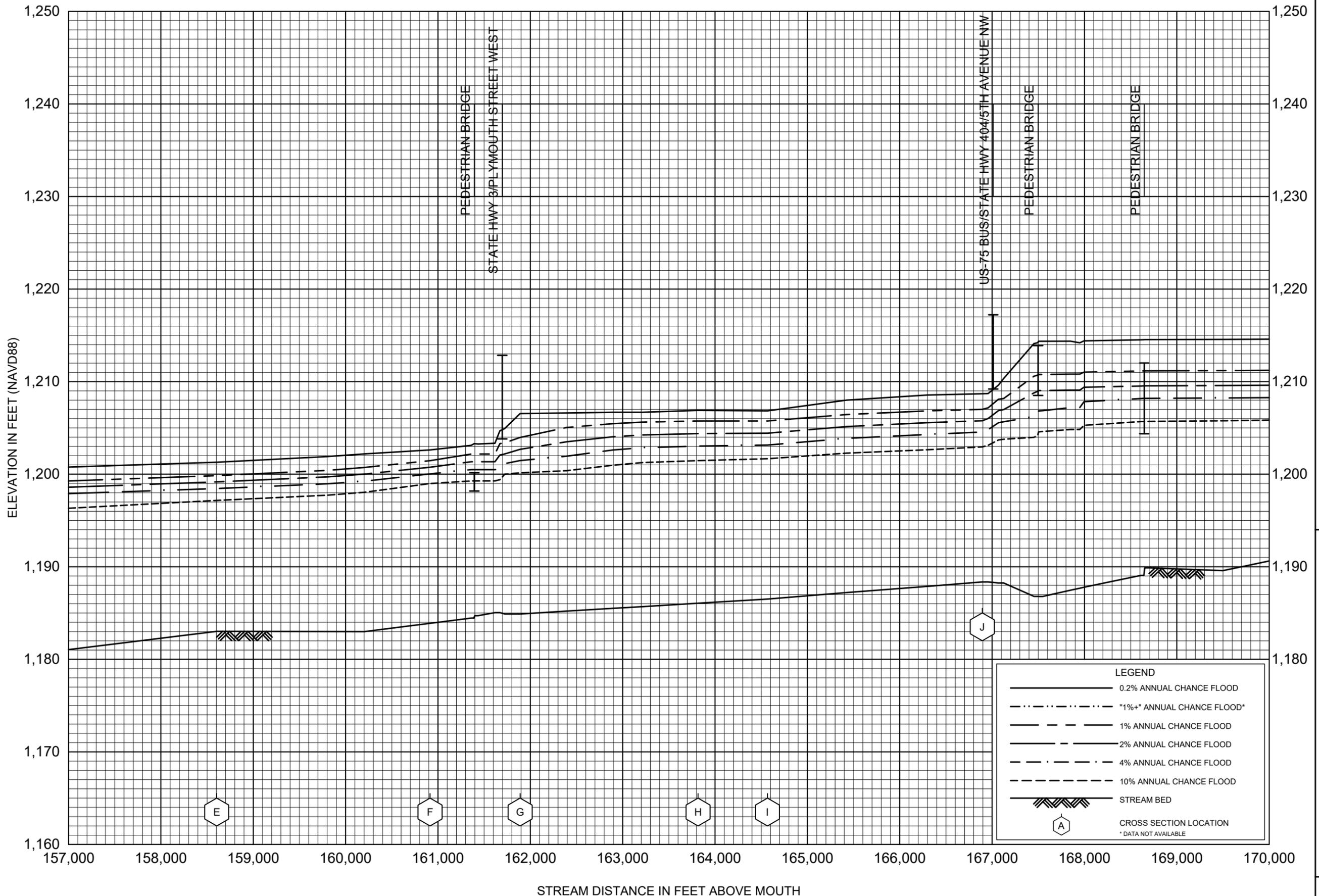




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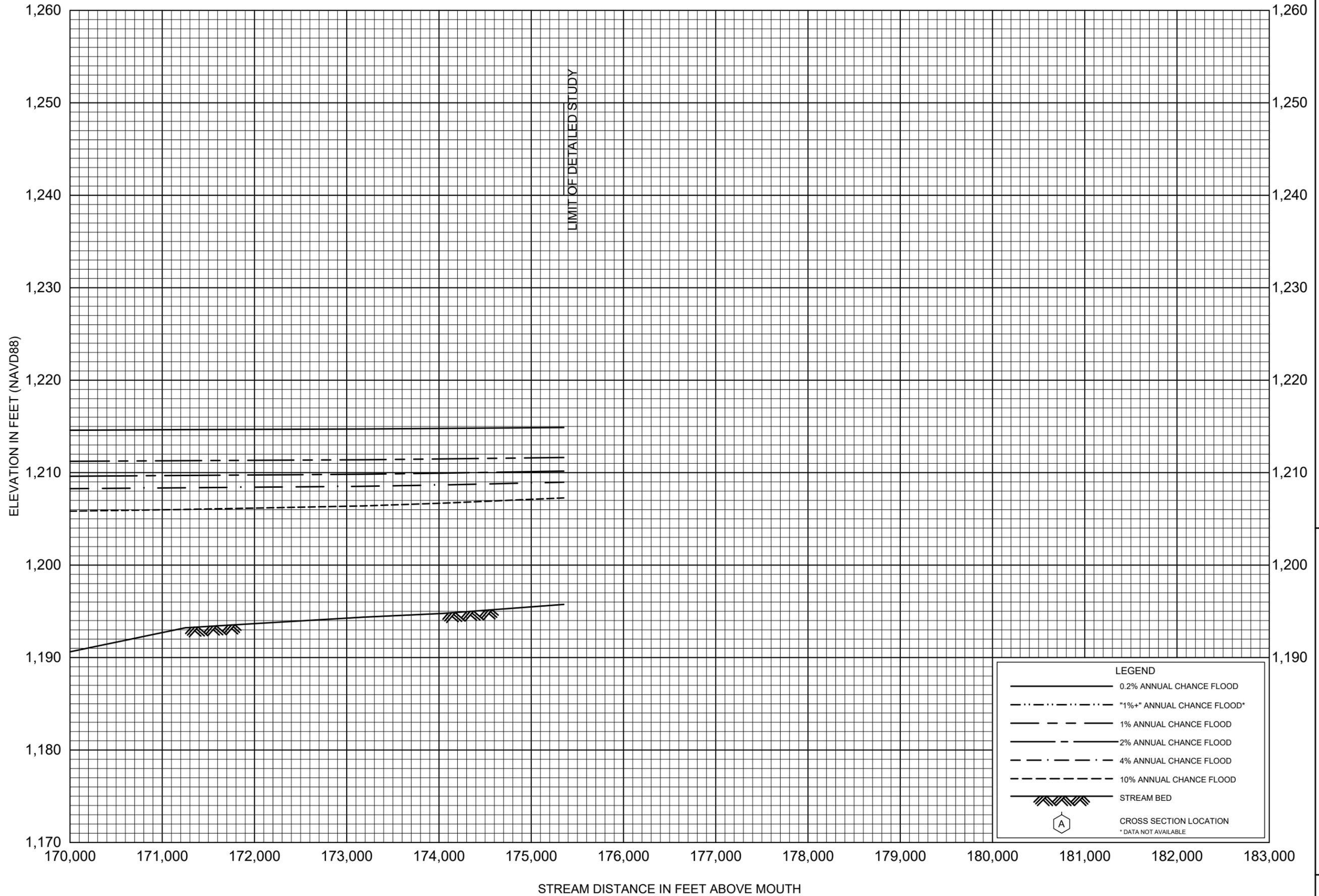
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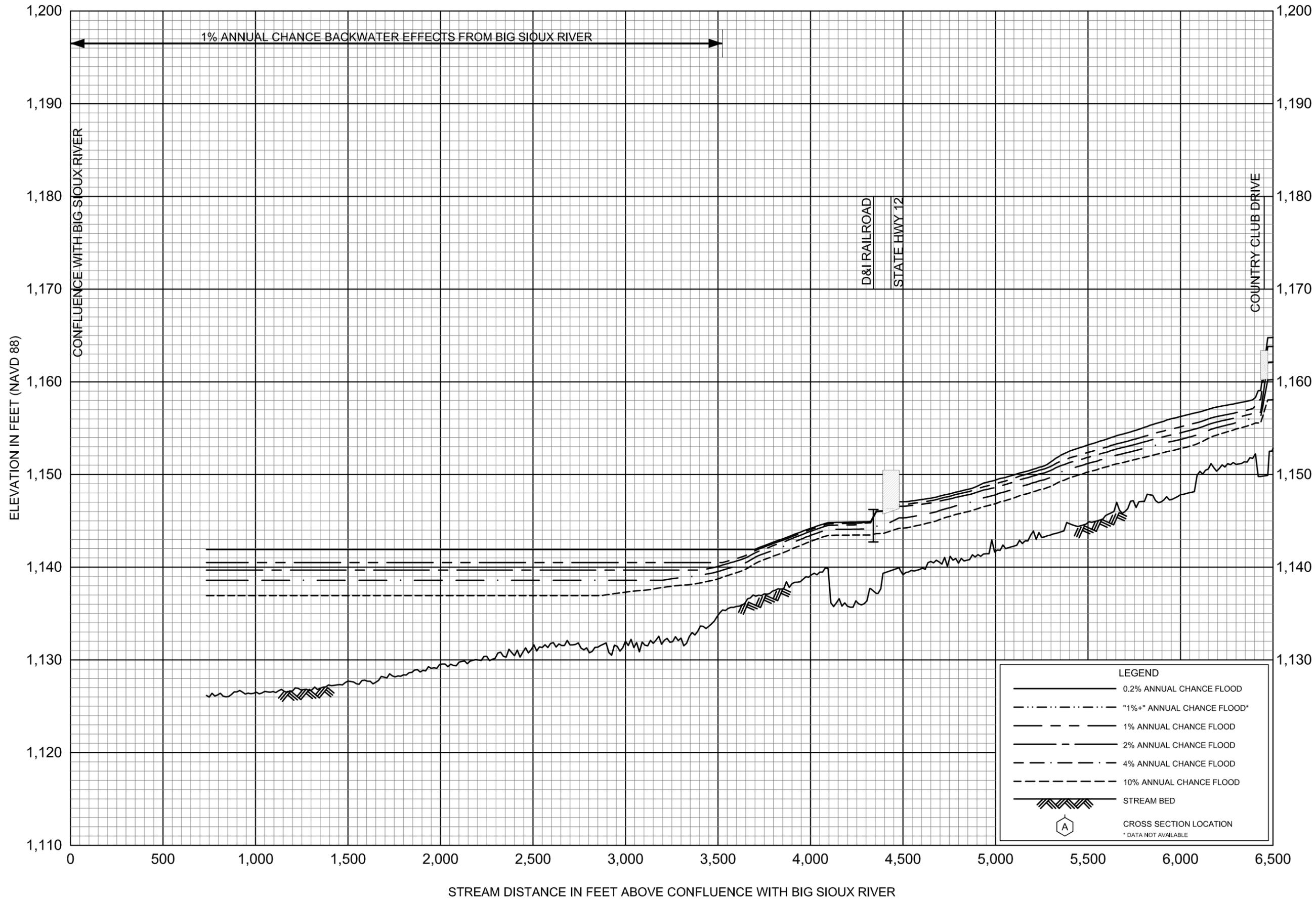
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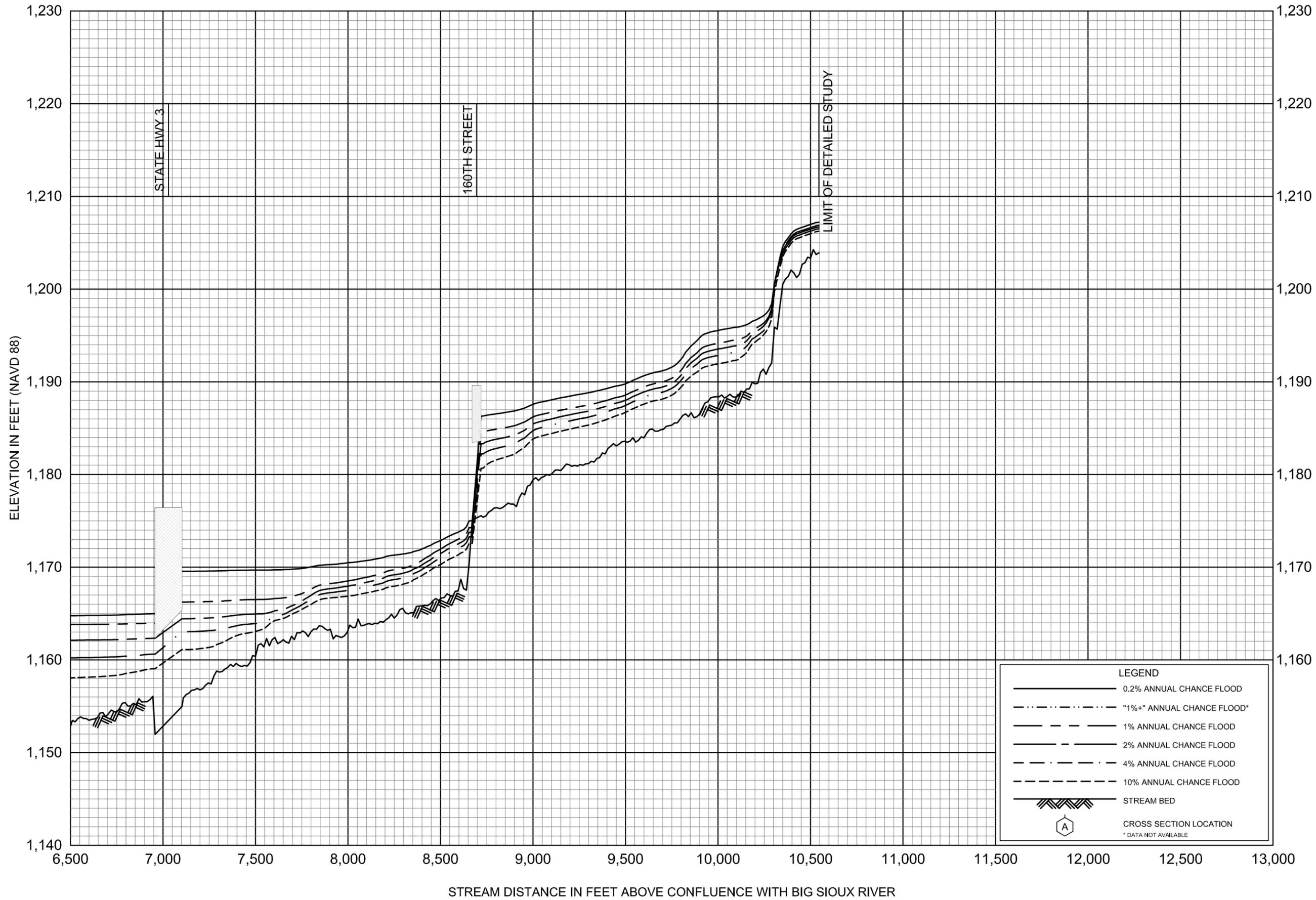
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 AND INCORPORATED AREAS



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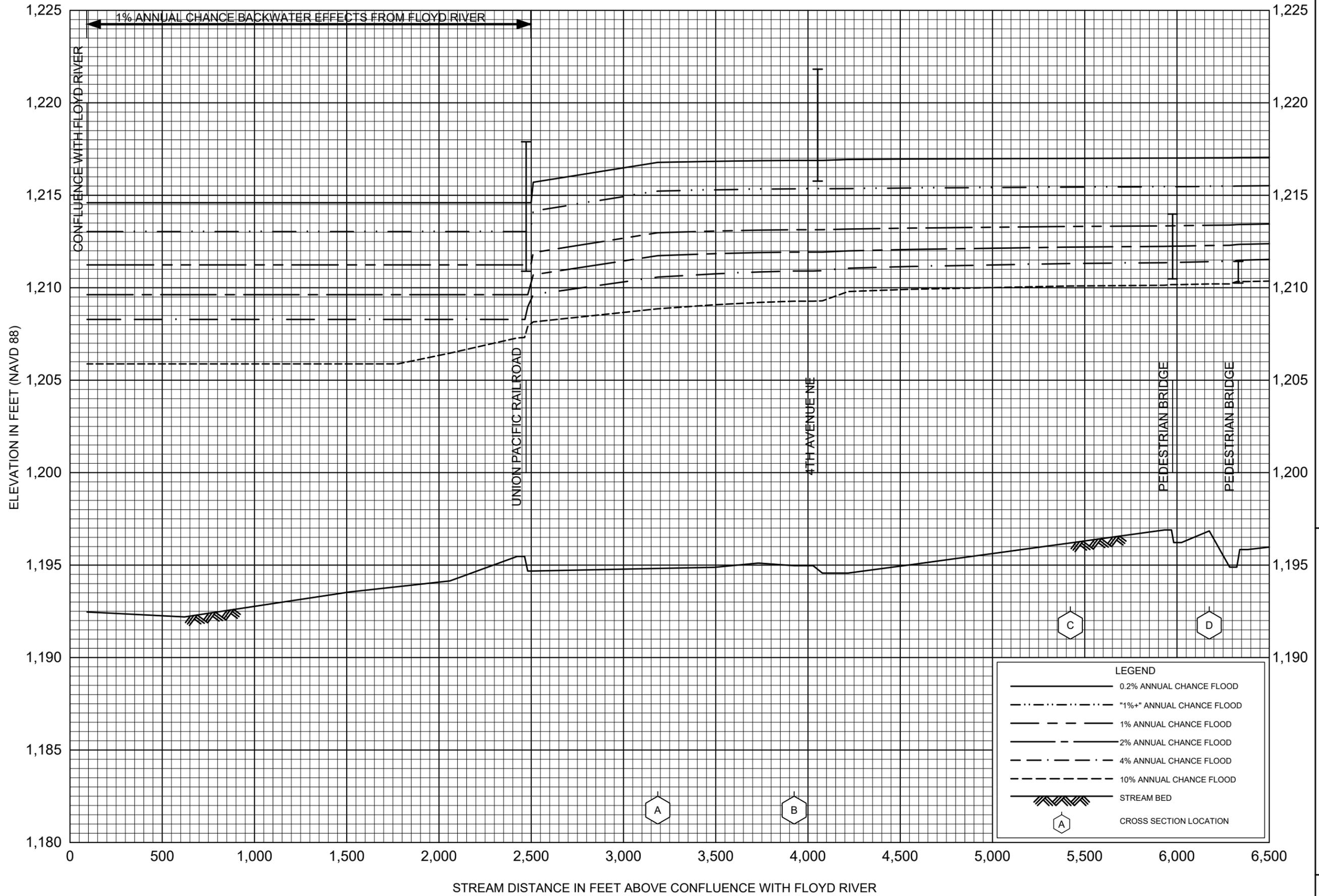


FLOOD PROFILES

PLYMOUTH COUNTY DRAINAGE DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

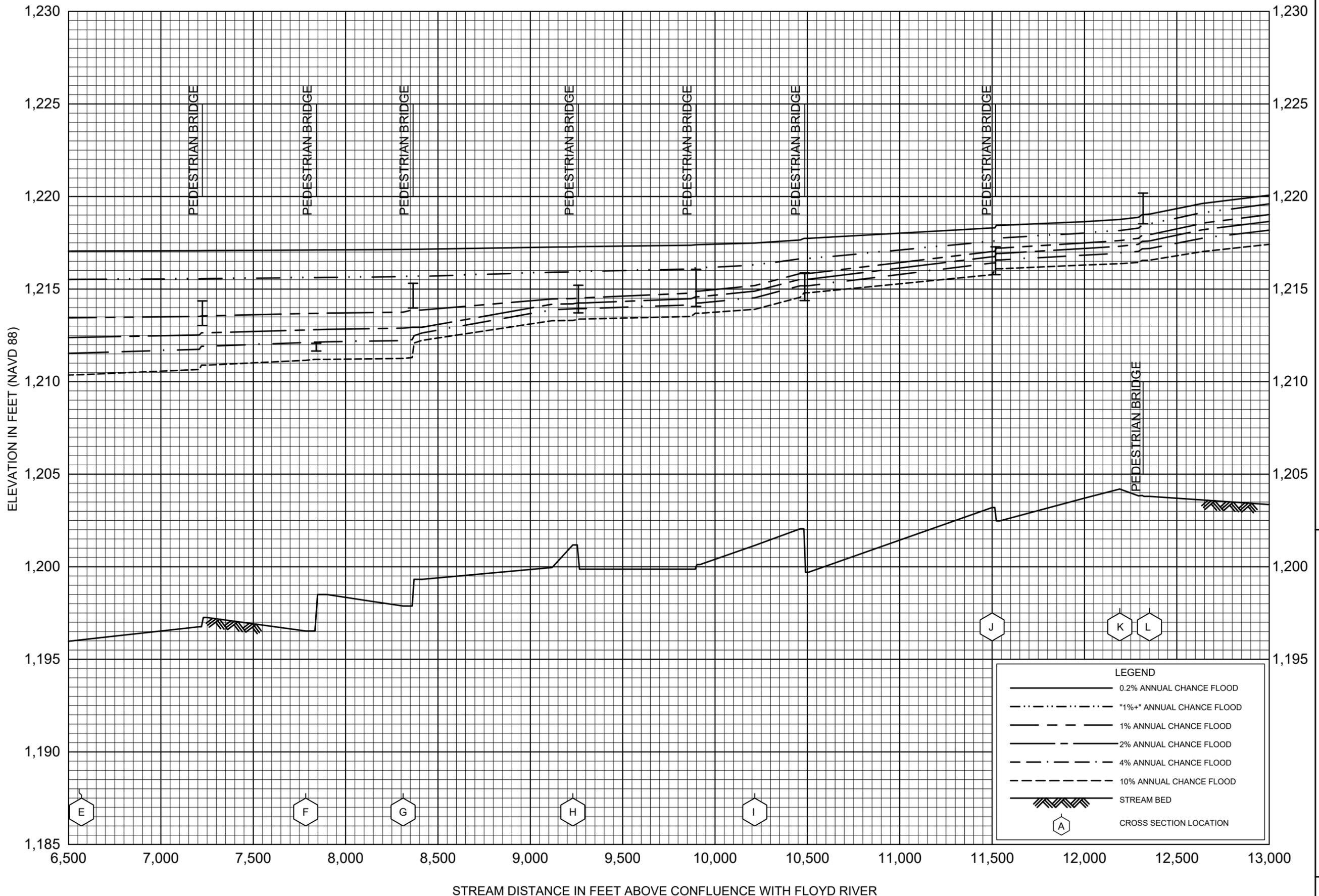
PLYMOUTH COUNTY, IA  
AND INCORPORATED AREAS



**FLOOD PROFILES**

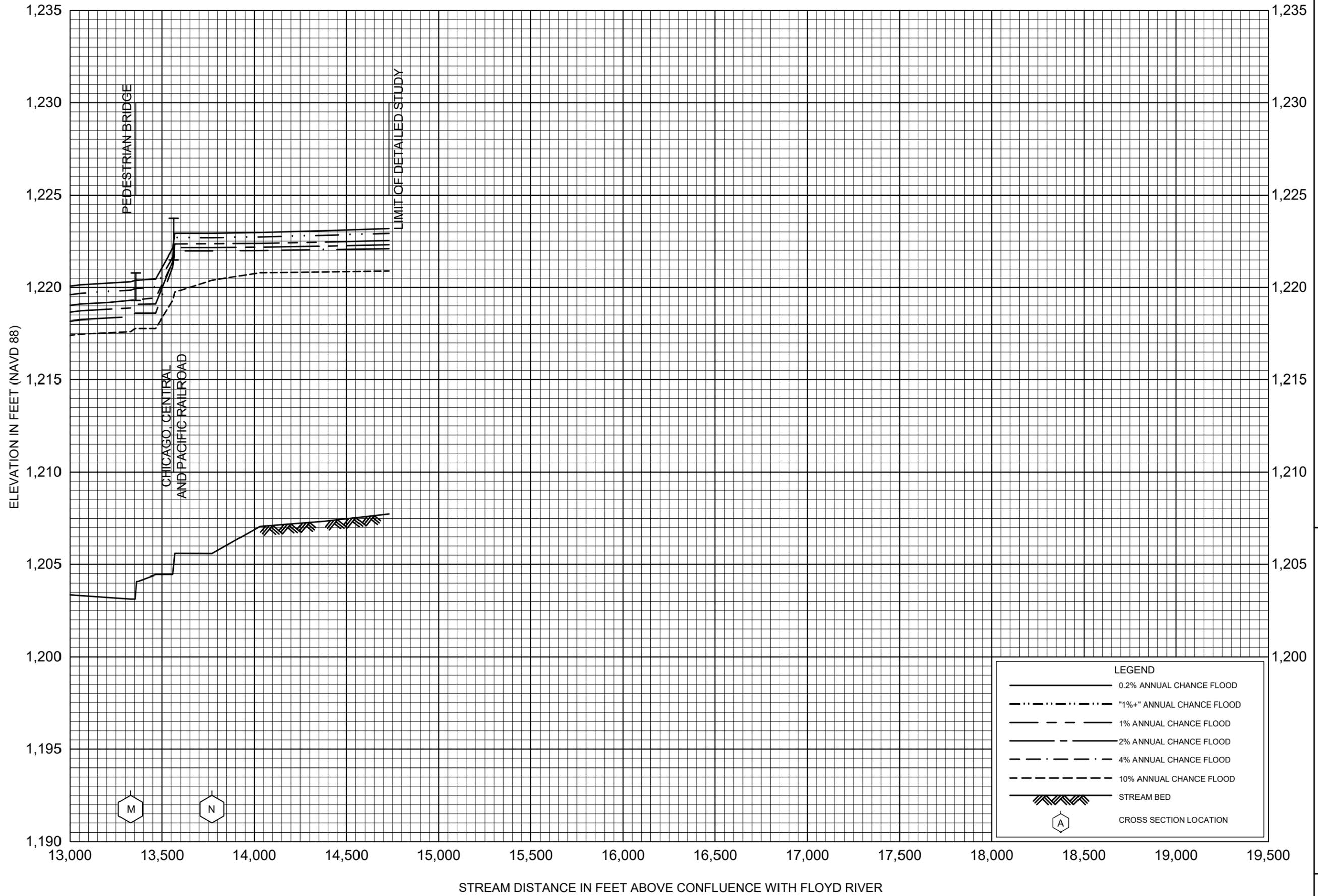
**WILLOW CREEK**

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**PLYMOUTH COUNTY, IA**  
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