FLOOD INSURANCE STUDY

WAGONER COUNTY, OKLAHOMA
AND INCORPORATED AREAS

Wagoner County

Community Name	Community Number
BIXBY, CITY OF	400207
BROKEN ARROW, CITY OF	400236
CATOOSA, CITY OF	400185
COWETA, CITY OF	400216
FAIR OAKS, TOWN OF	400509
OKAY, TOWN OF	400217
PORTER, TOWN OF	400434
RED BIRD, TOWN OF	400321
TULLAHASSEE, CITY OF*	400218
TULSA, CITY OF	405381
WAGONER, CITY OF	400219
WAGONER COUNTY (UNINCORPORATED AREAS)	400215

*No Special Flood Hazard Areas Identified

Revised: September 30, 2016

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
40145CV000B

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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

Initial Countywide FIS Effective Date: April 17, 2012.

Revised Countywide FIS Dates: September 30, 2016 – to change Base Flood Elevations and Special Flood Hazard Areas.

TABLE OF CONTENTS

FIGURES

TABLES

FLOOD INSURANCE STUDY

WAGONER COUNTY, OKLAHOMA AND INCORPORATED AREAS

1.0   INTRODUCTION

1.1   Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Wagoner County, including the Cities of Bixby, Broken Arrow, Catoosa, Coweta, Tullahassee, Tulsa and Wagoner; the Towns of Fair Oaks, Okay, Porter, and Red Bird; and the unincorporated areas of Wagoner County (referred to collectively herein as Wagoner County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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

Please note that the Cities of Bixby and Broken Arrow are geographically located in Tulsa and Wagoner Counties. The Wagoner County part of Bixby and Broken Arrow is included in this FIS report. The Tulsa County part of Bixby and Broken Arrow is included in the Tulsa County FIS report. The portion of Bixby shown in Wagoner County does not contain any SFHAs. See separately published FIS report and Flood Insurance Rate Map (FIRM) for Tulsa County for flood hazard information outside of Wagoner County.

Please note that the Cities of Catoosa and Fair Oaks are geographically located in Rogers and Wagoner Counties. The portions in Wagoner County are included in this FIS report.

Please note that the City of Tulsa is geographically located in Osage, Rogers, Tulsa and Wagoner Counties. The portions in Wagoner County are included in this FIS report.

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

1.2   Authority and Acknowledgments

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

This FIS was prepared to include the unincorporated areas of, and incorporated communities within, Wagoner County in a countywide format. Information on the authority and acknowledgments for each jurisdiction included in this countywide FIS, as compiled

from their previously printed FIS report, is shown below.

The hydrologic and hydraulic analyses for the December 2, 1988 Wagoner County FIS were prepared by the U.S. Army Corps of Engineers (USACE), Tulsa District, for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-84-E-1506, Project Order No. 1, Amendment No. 7 and 7A. This work was completed in May of 1986.

The hydrologic and hydraulic analyses for the September 18, 1986 City of Coweta FIS were prepared by the Tulsa District of the USACE for FEMA, under Inter-Agency Agreement No. EMW-E-1153, Project Order No. 1, Amendment No. 13. This work was completed in January of 1985.

The authority and acknowledgements for the Cities of Broken Arrow, Catoosa, Tullahassee, and Wagoner, and the Towns of Bixby, Okay, Porter, and Red Bird were not included because there were no previously printed FIS reports for these areas. Prior to this countywide FIS, the areas of study were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction at the time of publication.

For the April 17, 2012 first-time countywide FIS, the hydrologic and hydraulic analyses for this study were performed by the Watershed Concepts, for FEMA, under Contract No. EMT-2002-CO-0048, Task Order J038. This study was completed in December 2007. Floodplain boundaries were delineated based on 10 and 30 meter Digital Elevation Models (DEMs) from the United States Geological Survey (USGS).

For the September 30, 2016 physical map revision, the Polecat-Snake and Lower Verdigris watershed studies revised the hydrologic and hydraulic analyses under CTP Contract No. EMT-2011-CA-0007 by the Oklahoma Water Resources Board (OWRB) and under CTP Contract No. EMT-2011-CA-0003 for the City of Tulsa. Work was performed by Meshek & Associates, PLC. This study was completed in October 2014, with final production processing by Risk Assessment, Mapping, and Planning Partners (RAMPP) for FEMA under contract No. HSFEQ-09-D-0369, Task Order HSFE06-12-J-001.

Base map information shown on this FIRM was derived from multiple sources. Base map information for Wagoner County and all incorporated communities within Wagoner County was provided in digital format by the State of Oklahoma, University of Oklahoma Center for Spatial Analysis. Additional base map data was also provided by the Oklahoma Department of Transportation and the Indian Nation Council of Government (INCOG). This information was compiled to create the FIRM panels. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features for clarity and readability.

The coordinate system used for the production of FIRM is Oklahoma State Plane (FIPS 3501), referenced to the North American Datum of 1983 and the GRS80. Differences in the datum and spheroid used in the production of the FIRMs for adjacent counties may result in slight positional differences in map features at the county boundaries. These differences do not affect the accuracy of information shown on the FIRM.

1.3   Coordination

For the April 17, 2012, countywide FIS, an initial Consultation Coordination Officer's

(CCO) meeting was held on April 9, 2007, and attended by representatives from FEMA, the community, and the study contractor.

The results of the April 17, 2012, countywide FIS were reviewed at the final CCO meeting held on December 10, 2008, and attended by representatives of FEMA; the Cities of Broken Arrow, Catoosa, Coweta, Tullahassee, and Tulsa; Wagoner County, the OWRB, and the study contractor. All problems raised at that meeting have been addressed in this study.

The September 30, 2016 physical map revision for the Polecat-Snake and Lower Verdigris watersheds, initial CCO meetings were held on February 29, 2012 for Polecat-Snake watershed communities and on June 13, 2012 for the Lower Verdigris watershed communities. Both meetings were attended by representatives of FEMA, the communities, OWRB, and the study contractors to gather information about the current flood risk information and identify areas that needs to be restudied. For the September 30, 2016 physical map revision, the results of the study were reviewed at a final CCO meeting held on February 4, 2015. All problems raised in that meeting have been addressed by this study.

2.0 AREA STUDIED

2.1 Scope of Study

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

In this countywide study, the Arkansas River was studied by detailed methods; yet, floodplain boundaries of streams that have been previously studied by detailed methods were redelineated based on more detailed and up-to-date topographic mapping for this FIS report. Enhanced approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study for each stream were proposed to, and agreed upon, by FEMA and Wagoner County.

The September 18, 1986 FIS only studied the incorporated areas of City of Coweta, Oklahoma. The December 2, 1988 FIS only studied the unincorporated areas of Wagoner County. The following communities are located within Wagoner County but were not included in the December 2, 1988 FIS: the Cities of Broken Arrow, Coweta, Tullahassee, and Wagoner; and the Towns of Fair Oaks, Okay, Porter, and Red Bird.

In October 2014, Polecat-Snake watershed was restudied and the updated the hydrologic and hydraulic analyses are incorporated. The streams studied in detail include Broken Arrow Creek and Broken Arrow Creek Tributary. This update also included detailed study for Unnamed Tributary 1 and Unnamed Tributary 2 to Broken Arrow Creek Tributary. In addition, the Lower Verdigris watershed was restudied and the updated the hydrologic and hydraulic analyses are incorporated. The streams studied in detail include Midway Creek, Midway Creek Tributary 1, Midway Creek Tributary 2, Midway Creek Tributary 3, Midway Creek Tributary 4, Midway Creek Tributary 5, Salt Creek, Salt Creek Tributary 2, Salt Creek Tributary 3, Salt Creek Tributary 4, Spunky Creek, Spunky Creek Tributary A, Spunky Creek Tributary B, and Spunky Creek Tributary G.

Limits of new and revised detail studies streams included in this countywide FIS are shown in Table 1, "Scope of Study".

Table 1. Scope of Study

Flooding Source	Limits of Revised or Detail Study
Adams Creek	From the confluence with Verdigris River to the Tulsa/Wagoner County boundary
Arkansas River	From approximately 1.3 miles downstream of the Tulsa/Wagoner County boundary to the Tulsa/Wagoner County boundary
Broken Arrow Creek	From the Tulsa/Wagoner County boundary to approximately 1.0 mile upstream of East 101st Street.
Broken Arrow Creek Tributary	From the confluence with Broken Arrow Creek to approximately 1,700 feet upstream of New Orleans Street.
Covington Creek	The confluence with Adams Creek to approximately 220 feet upstream of East 101st Street
Covington Creek Tributary	From the confluence with Covington Creek to approximately 325 feet upstream of Forest Ridge Boulevard
Coweta Creek	From its confluence with the Arkansas River to approximately 1.0 mile upstream of East 121st Street
Coweta Creek Tributary A	From the confluence with Tributary A to approximately 915 feet upstream of South 289th East Avenue
Coweta Creek Tributary B	From the confluence with Coweta Creek to approximately 0.3 mile upstream of East 119th Street
East Coal Creek	From the confluence with Verdigris River to approximately 0.3 mile upstream of North Piece Avenue
Lone Star Creek	From the confluence with Adams Creek to the Tulsa/Wagoner County boundary
Middle Branch	From the confluence with Coweta Creek to the confluence with Middle Branch Tributary
Middle Branch Tributary	From the confluence with Middle Branch to approximately 845 feet upstream of the confluence with Middle Branch
Midway Creek	From the confluence with Adam Creek to 5,491 feet upstream of South 257th E. Avenue
Midway Creek Tributary 1	From 36 feet downstream of E. 41st Street to 828 feet upstream of E. 41st Street
Midway Creek Tributary 2	From the confluence with Midway Creek to 1,108 feet upstream of the confluence with Midway Creek
Midway Creek Tributary 3	From the confluence with Midway Creek to 1,270 feet upstream of the confluence with Midway Creek
Midway Creek Tributary 4	From the confluence with Midway Creek to 1,076 feet upstream of the confluence with Midway Creek
Midway Creek Tributary 5	From the confluence with Midway Creek to 2,426 feet upstream of the confluence with Midway Creek
Neosho River	From the Muskogee/Wagoner County boundary to approximately 1.3 miles upstream of the Muskogee/Wagoner County boundary
Salt Creek	From the confluence with Verdigris River to 4,741 feet upstream of South 257th E. Avenue
Salt Creek Tributary 1	From the confluence with Salt Creek to approximately 0.5 mile upstream of the confluence with Salt Creek

Table 1. Scope of Study (continued)

Flooding Source	Limits of Revised or Detail Study
Salt Creek Tributary 2	From the confluence with Salt Creek to approximately 2,204 feet upstream of the confluence with Salt Creek
Salt Creek Tributary 3	From the confluence with Salt Creek to 1,375 feet upstream of the confluence with Salt Creek
Salt Creek Tributary 4	From the confluence with Salt Creek to 1,114 feet upstream of the confluence with Salt Creek
School Creek	From the confluence with Adams Creek to approximately 0.6 mile upstream of East Houston Street
Springtown Creek	From the confluence with Adams Creek to approximately 0.3 mile upstream of the confluence with Adams Creek
Spunky Creek	From the Rogers/Wagoner County boundary to the Tulsa/Wagoner County boundary
Spunky Creek Tributary A	From the Rogers/Wagoner County boundary to the Tulsa/Wagoner County boundary
Spunky Creek Tributary B	From the confluence with Spunky Creek to the Tulsa/Wagoner County boundary
Spunky Creek Tributary G	From the Tulsa/Wagoner County boundary to 786 feet upstream of S. 193rd E. Avenue
South Branch	From the confluence with Middle Branch to approximately 300 feet upstream of North Fairland Avenue
Timber Creek	From the confluence with Adams Creek to approximately to approximately 0.7 mile upstream of South 257th East Avenue
Tributary A	From the confluence with Coweta Creek to the confluence with Coweta Creek Tributary A
Verdigris River	From the Muskogee/Wagoner County boundary to the Rogers/Wagoner County boundary
Unnamed Tributary 1 to Broken Arrow Creek Tributary	From the confluence with Broken Arrow Creek Tributary to approximately 2,600 feet upstream of Evans Road
Unnamed Tributary 2 to Broken Arrow Creek Tributary	From the confluence with Broken Arrow Creek Tributary to approximately 400 feet upstream.
Verdigris River Divergence	From the confluence with Verdigris River to approximately 4.7 miles upstream of Verdigris River
West Coal Creek	From the confluence with Verdigris River to approximately 1.0 mile upstream of East 91st Street

The April 17, 2012 countywide FIS incorporates the determination of letters issued by FEMA resulting in Letters of Map Change as shown in Table 2, "Letters of Map Change". No Letters of Map Revision were incorporated in the September 30, 2016 physical map revision.

Table 2. Letters of Map Change

Community	Flooding Source(s) and Project Identifier	Effective Date	Type
CITY OF BROKEN ARROW	*Unnamed tributary to Spunky Creek – 00-06-412P	June 5, 2000	LOMR
	Covington Creek Tributary – 00-06-156P	October 5, 2000	LOMR
	Broken Arrow Creek – 04-06-1611P	October 13, 2005	LOMR
	Covington Creek – The Highlands Subdivision – 06-06-BH69P	August 16, 2007	LOMR
WAGONER COUNTY (UNINCORPORATED AREAS)	Adams Creek -- Country Gentleman Estates, Midway Creek, Unnamed Tributary to Midway Creek, Unnamed Tributary #1 to Adams Creek, Unnamed Branch #1 to Adams Creek, Unnamed Branch #2 to Adams Creek, Unnamed Tributary to An Unnamed Branch #2 to Adams Creek, Unnamed Tributary #2 to Adams Creek – 02-06-1643P	April 4, 2003	LOMR
CITY OF COWETA	Middle Branch of Coweta Creek – Carriage Crossing Addition – 99-06-1770P	March 10, 2000	LOMR

*Unnamed tributary to Spunky Creek – 00-06-412P refers to the newly named Spunky Creek Tributary G.

2.2 Community Description

Wagoner County is in northeastern Oklahoma. The county is bordered by the following areas: Rogers County to the north and northwest, Mayes County to the northeast, Cherokee County to the east, Muskogee County to the south, Okmulgee County to the southeast and Tulsa County to the west. It occupies approximately 605 square miles.

According to the United States (U.S.) Census Bureau, there are approximately 73,085 inhabitants that make up Wagoner County's population in 2010. Wagoner County is served by Interstate 44 and US Highways 412 and 69. Approximately 8,323 residents live in the county seat of Wagoner County, the City of Wagoner. Additionally, 9,943 residents live in the City of Coweta, which is located in southwestern Oklahoma (Reference 1).

Wagoner County's economy relies heavily upon agriculture and light industry (located mainly along the Verdigris River Navigation Channel). Most pressure for new development is located in the upper Adams Creek basin near the City of Broken Arrow, and also along Spunky Creek and Broken Arrow Creek Tributary located in western Wagoner County. Intensive industrial development is probable along the Verdigris River because of the navigation system. Most undeveloped land is either pasture or in use for crop production.

The average annual precipitation for the region is approximately 38 to 39 inches, and the average annual temperature is approximately 61 degrees Fahrenheit (^{o}F).

Soils vary from deep, moderately drained, silty clay loams in the floodplains to shallow, stony soils in the uplands. Topography in the area is characterized by broad, flat expanses of land in the floodplains to gently rolling hills in the uplands.

2.3   Principal Flood Problems

The major flooding problems in Wagoner County are the result of bridge structures (box culverts) on many of the smaller streams that create additional upstream flood depths. Some of the channel reach lengths along the smaller streams are choked with brush and small trees that help impede floodwaters. The most notable floods occurred along the Verdigris River in November 1941, May 1943, and May 1961. Peak discharges for those floods were 224,000 cubic feet per second (cfs), 118,000 cfs, and 105,000 cfs, respectively. These floods also have a recurrence interval of 60, 10, and 5 to 10 years, respectively. Significant flooding has occurred in the Adams Creek Basin and tributaries in 1976, 1986, 1999, 2006, and 2008.

A gaging station is located on the downstream side of State Route 20 over the Verdigris River, at river mile 76.0, and has a period of record from October 1953 to the present. Another gaging station was in operation at the downstream side of Old State Route 33 over the Verdigris River, at river mile 48.8, and had a record of operation from March 1940 to September 1970.

Little specific information is available concerning early Coweta-area floods. It is known that Coweta Creek flooded in the 1940s, and the soil bears evidence of earlier flooding along the creek (Reference 2).

A major flood occurred along Coweta Creek on June 19, 1980, after a violent early morning thunderstorm that followed a week of heavy rain. The flood caused $1.9 million (1980 dollars) in damage to approximately 45 homes and businesses, as well as several bridges, roads, and utilities. Damage along the creek stretched through Coweta to an area 2 miles north of the city (Reference 2).

2.4   Flood Protection Methods

The Verdigris River channel has been enlarged and straightened along much of the study reach as part of the McClellan-Ferr Arkansas River Navigation System. The project provides a navigation route from the Mississippi River, through the state of Arkansas, then upstream to its termination at the Port of Catoosa, located approximately 15 miles east of Tulsa, Oklahoma.

Covington Creek was slightly enlarged and straightened from the 71st Street South Bridge upstream approximately 0.53 mile when residential development was constructed in that area. The degree of 1-percent-annual flood reduction as a result of that effort is minimal.

Numerous small farm ponds are located throughout the county but do not provide a significant amount of flood reduction because of the relatively small drainage area they control.

Non-structural measures of flood reduction are also being used to aid in the prevention of future flood damages. These measures are in the form of land use regulations, adopted from the Code of Federal Regulations, which control building within the areas that have a high risk of flooding. Wagoner County entered the emergency phase of the NFIP in July 1981, and development is regulated by a floodplain management ordinance.

Several existing and proposed flood control structures are located in the Verdigris River basin upstream of the study area. Existing reservoirs include Fall River, Toronto, Elk City, and Big Hill Lakes in Kansas, and Oologah, Copan, Hulah, Birch, and Skiatook Lakes in northern Oklahoma. These lakes are used not only for flood control but also for navigation, water supply, water quality, and recreation. The lakes are operated as a total system.

The Chouteau Lock and Dam and the Newt Graham Lock and Dam were constructed as part of the McClellan-Kerr Navigation System and are used solely for purposes of maintaining proper navigation depths along the channel. Fort Gibson Reservoir was constructed during the period 1946 to 1950 and is used for flood control, recreation, and hydropower.

There are no levees in Wagoner County; however, several miles of spoil berms are located along much of the navigation channel of Verdigris River. In much of the study reach, the berms confine the effective flow area to inside the channel itself. Because of the numerous breaks and low points in the spoil berms, flooding will occur in the overbank portions of the floodplain.

3.0   ENGINEERING METHODS

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

3.1 Hydrologic Analyses

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

Pre-Countywide Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the county.

Flood flow frequency data for the Verdigris River were previously developed in the Verdigris River basin Hydropower Feasibility Study and were used in the FIS for the unincorporated areas of Rogers County (Reference 3 and 4). A statistical analysis of peak flows at the Inola and Claremore gages was conducted as part of that study. Historical flood flows were available at the Inola gage for the period of October 1939 through September 1962. Flows at both gages were slightly regulated since 1949 by Toronto and Fall River Lakes in Kansas and since 1950 by Hulah Reservoir in Oklahoma. Of the 7,911 square miles of drainage area above the Claremore gage, approximately 2,047 square miles were somewhat regulated during the period of study. Methods outlined in Bulletin 17B were used in developing the natural frequency curves at the gages (Reference 5). Hypothetical flows for conditions regulated by Toronto and Fall River Lakes, and Hulsh, Oologah, Copan, Elk City, Big Hill, Birch, and Skiatook Reservoirs were developed using the Southwestern Division Hydrologic Runoff Computer Model (Reference 6). Those flows were used to derive a modified discharge-frequency curve at the gages. Hydrologic data previously developed for the FIS for the unincorporated areas of Tulsa County was also used in correlating the discharge-frequency information at the Inola and Claremore gages (Reference 7).

Hydrologic data for the Neosho River was taken from the FIS for the Town of Fort Gibson (Reference 8).

The hydrologic analysis and discharge determination for the Arkansas River was performed by the Tulsa District USACE. Please see the Tulsa District USACE Summary of Studies Report on the Peak Discharge Frequency Determination, Tulsa-Haskell Reach Arkansas River, Oklahoma for more detailed information (Reference 9).

Flood flow frequency data for the remaining streams studied by detailed methods were based on a synthetic unit hydrograph approach and a regional frequency rainfall analysis. The watersheds were appropriately subdivided and synthetic unit hydrographs were determined for each sub-area, using Snyder's Method. Snyder's unit graph coefficients and rainfall data were based on regional studies performed for the Flood Insurance Studies for the unincorporated areas of Rogers County and the City of Tulsa (Reference 3 and 10). The estimated rainfall excesses were then applied to the unit graphs to obtain runoff. Runoff values from the individual sub-areas were then routed downstream by the storage-discharge method and combined to determine peak flow values at key points along the streams. This was accomplished through the use of the USACE HEC-1 flood hydrograph computer program (Reference 11).

In the September 18, 1986 City of Coweta FIS, the watershed was divided into sub-areas, and synthetic unit and flood hydrographs were developed at selected locations. Technical Paper No. 40 was used in developing the 10-, 2-, 1-, and 0.2 percent-annual-chance frequency storms (Reference 12). The 0.2-percent-annual-chance storm was based on extrapolated data. Peak discharge-frequency values were computed for selected locations.

The routing of flood hydrographs through each sub-basin was accomplished using a modified Puls reservoir routing. The USACE HEC-2 step-backwater computer model provided the elevation-discharge-storage relationships (Reference 13).

In October 2014 hydrologic analysis for each of the flooding sources in the Polecat-Snake watershed was performed using the USACE HEC-HMS version 3.5 computer program. The streams studied in detail include Broken Arrow Creek, Broken Arrow Creek Tributary, Unnamed Tributary 1, and 2 to Broken Arrow Creek Tributary. The HEC-HMS model used the Soil Conservation Service (SCS) curve number method for infiltration, the SCS Unit Hydrograph method for run-off transformation, and the modified Puls method for open channel routing. Rainfall data was developed using Water Resources Investigations Report 99-4232. In addition, hydrologic analysis for each of the flooding sources in the Lower Verdigris basin was performed using the USACE HEC-HMS version 3.5 computer program. The streams studied in detail include Midway Creek, Midway Creek Tributary 1, Midway Creek Tributary 2, Midway Creek Tributary 3, Midway Creek Tributary 4, Midway Creek Tributary 5, Salt Creek, Salt Creek Tributary 2, Salt Creek Tributary 3, Salt Creek Tributary 4, Spunky Creek, Spunky Creek Tributary A, Spunky Creek Tributary B, and Spunky Creek Tributary G. The HEC-HMS model used the SCS curve number method for infiltration, the SCS Unit Hydrograph method for run-off transformation, and the modified Puls method for open channel routing. Rainfall data was developed using Water Resources Investigations Report 99-4232 (Reference 21).

Countywide Analyses

For the April 17, 2012, countywide FIS, discharges for the 1-percent-annual chance recurrence interval for all new approximate study streams in Wagoner County were determined using the General Rural area USGS regression equations for Oklahoma as described in USGS National Flood-Frequency Program – Methods for Estimating Flood Magnitude and Frequency in Rural and Urban Areas in Oklahoma Report (Reference 14).

For the September 30, 2016 physical map revision, for the Polecat-Snake and the Lower Verdigris watersheds the discharges for the 10-, 2-, 1-, and 0.2-percent-annual chance recurrence intervals for all detailed studied streams were determined using a HEC-HMS model which utilized the NRCS (SCS) curve number method for infiltration, the SCS Unit Hydrograph method for run-off transformation, and the modified Puls method for open channel routing. Rainfall data was developed using Water Resources Investigation Report 99-4232 (Reference 21).

Peak discharge-drainage area relationships for streams studied by detailed methods are shown in Table 3, "Summary of Discharges".

Table 3. Summary of Discharges

Flooding Source Location		Drainage Area (square miles)	Discharges (cfs)			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Adams Creek	At upstream side of 321st East Avenue	45.5	4,750[1]	11,990[1]	16,340[1]	29,230[1]
	At 341st East Avenue	15.4	4,490	9,810	12,330	19,140
	At confluence of Lone Star Creek	1.3	960	1,830	2,290	3,530
Arkansas River	Approximately 2.4 miles downstream of Old Highway 104	*	90,000	155,000	205,000	490,000
Verdigris River	At the confluence with Arkansas River	8,303	48,500	83,500	104,000	210,000
	At State Route 33	7,911	48,500	83,500	104,000	210,000
Verdigris River Divergence	At Dam No. 17	*	48,500	83,500	104,000	210,000
East Coal Creek	At upstream side of U.S. Route 69	16.5	4,780	9,650	12,260	19,460
	At State Route 51	3.6	1,110	2,270	2,870	4,480
West Coal Creek	At Lone Star Road	14.8	3,350	7,040	9,020	14,520
	At 91st Street South	1.7	1,200	2,280	2,850	4,390
Springtown Creek	At confluence with Adams Creek	0.6	460	870	1,090	1,670
Midway Creek	At confluence with Adams Creek	4.6	2,020	4,170	5,270	8,210
	25' Upstream of East 41st Street	3.6	2,370	3,900	4,560	6,850
	40' Downstream of Confluence with Midway Creek Tributary 2	3.6	2,370	3,900	4,560	6,850

Table 3. Summary of Discharges (continued)

Flooding Source Location		Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Midway Creek (continued)	900' Upstream of Confluence with Midway Creek Tributary 2	3.3	2,270	3,710	4,270	6,410
	200' Downstream of South 257th East Avenue	3.1	2,250	3,680	4,220	6,320
	30' Upstream of South 257th East Avenue	3.1	2,240	3,670	4,200	6,300
	700' Upstream of South 257th East Avenue	3.0	2,230	3,640	4,170	6,270
	80' Downstream of Confluence with Midway Creek Tributary 3	2.9	2,210	3,600	4,130	6,220
	500' Upstream of Confluence of Midway Creek Tributary 3	2.7	2,120	3,420	3,950	5,960
	1600' Upstream of Confluence of Midway Creek Tributary 3	2.6	2,110	3,390	3,920	5,930
	40' Downstream of Confluence with Midway Creek Tributary 4	2.5	2,090	3,350	3,880	5,920
	30' Downstream of Confluence with Midway Creek Tributary 5	2.2	1,900	2,960	3,450	5,330
Midway Creek Tributary 1	30' Upstream of East 41st Street	0.5	590	940	1,110	1,550
Midway Creek Tributary 2	2060' Upstream of Confluence with Midway Creek	0.3	358	570	678	949
Midway Creek Tributary 3	3100' Upstream of Confluence with Midway Creek	0.2	388	569	661	862
Midway Creek Tributary 4	1170' Upstream of Confluence with Midway Creek	0.3	252	412	489	690
Midway Creek Tributary 5	1800' Upstream of Confluence with Midway Creek	0.9	938	1402	1659	2282
Timber Creek	At confluence with Adams Creek	2.5	970	1,960	2,460	3,830
Covington Creek	At 81st Street South	3.7	2,130	3,170	4,020	6,380

Table 3. Summary of Discharges (continued)

Flooding Source Location		Drainage Area (square miles)	Discharges (cfs)			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Covington Creek Tributary	At confluence with Covington Creek	1.0	600	1,150	1,440	2,230
School Creek	At confluence with Adams Creek	2.8	1,250	2,640	3,340	5,270
	At 81st Street South	1.1	810	1,580	1,970	3,050
Coweta Creek	At the confluence with the Arkansas River	12.87	4,180	9,300	11,910	18,871
	At the confluence with Middle Branch	9.14	3,520	7,540	9,630	15,210
	At the confluence of Tributary A	6.09	3,010	6,090	7,760	12,020
	At the confluence of Tributary B	2.80	1,670	3,400	4,280	6,650
Middle Branch	At the confluence with Coweta Creek	0.90	540	1,070	1,350	2,120
South Branch	At the confluence with Middle Branch	0.99	740	1,570	1,980	3,100
Tributary A	At the confluence with Coweta Creek	1.59	770	1,520	1,910	2,940
Broken Arrow Creek	South 23rd Street	2.30	2,110	3,275	3,852	5,271
	3000' Downstream of South 23rd Street	2.52	1,988	3,041	3,580	4,913
	Upstream of Strip Mine	2.86	2,119	3,232	3,779	5,294
	Downstream of Strip Mine	3.10	2,003	3,153	3,726	5,346
	Upstream of East 101st Street South	3.17	2,013	3,168	3,744	5,374
	Downstream of Confluence with Broken Arrow Creek Tributary	10.13	4,688	7,411	8,851	12,318
	1000' Upstream of South 23rd Street	10.94	4,856	7,666	9,132	12,663
Broken Arrow Creek Tributary	400' Downstream of South 225th Street	0.58	926	1,420	1,689	2,299
	Upstream of Confluence with Unnamed Tributary 1	1.92	2,000	3,024	3,543	4,732
	Downstream of Confluence with Unnamed Tributary 1	3.69	3,000	4,861	5,813	8,090
	1400' Downstream of South 209th East Avenue	4.24	3,082	4,997	5,973	8,289
	1000' Downstream of Creek Turnpike	5.35	3,553	5,641	6,682	9,186

Table 3. Summary of Discharges (continued)

Flooding Source Location		Drainage Area *(square miles)*	Discharges *(cfs)*			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Broken Arrow Creek Tributary (continued)	Confluence with Broken Arrow Creek (Mouth)	5.82	3,577	5,722	6,798	9,366
Unnamed Tributary 1 to Broken Arrow Creek Tributary	South 225th Street	0.64	619	989	1,170	1,624
	3000' Upstream of Confluence with Broken Arrow Creek Tributary	1.07	958	1,492	1,789	2,529
	Confluence with Broken Arrow Creek Tributary (Mouth)	1.30	1,142	1,776	2,114	2,964
Unnamed Tributary 2 to Broken Arrow Creek Tributary	South 225th Street	0.64	619	989	1,170	1,624
	Confluence with Broken Arrow Creek Tributary (Mouth)	1.08	1,255	1,880	2,203	2,991
Salt Creek	20' Upstream of Midway Road	2.6	2,300	3,810	4,640	6,800
	10' Downstream of Confluence with Salt Creek Tributary 2	2.2	1,930	3,290	4,030	5,840
	80' Downstream of Confluence with Salt Creek Tributary 4	0.6	560	1,020	1,240	1,720
Salt Creek Tributary 2	1770' Upstream of Confluence with Salt Creek	1.5	1,310	2,200	2,660	3,910
Salt Creek Tributary 3	2470' Upstream of Confluence of Salt Creek	0.3	275	419	486	658
Salt Creek Tributary 4	1690' Upstream of Confluence of Salt Creek	0.1	108	159	185	238
Spunky Creek	200' Upstream of E. Admiral Place	14.28	9,400	16,055	19,030	27,190
	1700' Upstream of E. Admiral Place	14.17	9,400	16,110	19,060	27,250
	Downstream of Confluence of Spunky Creek Tributary C	14.08	9,390	16,130	19,060	27,250
	Downstream of Confluence of Spunky Creek Tributary D	13.23	9,160	15,450	18,220	25,390
	800' Downstream of E. 11th Street	11.13	8,340	13,670	15,990	22,450
	170' Upstream of E. 11th Street	10.93	8,310	13,590	15,900	22,370

Table 3. Summary of Discharges (continued)

Flooding Source Location		Drainage Area (square miles)	Discharges (cfs)			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Spunky Creek (continued)	Downstream of Confluence of Spunky Creek Tributary B	10.86	8,300	13,570	15,870	22,370
	500' Upstream of Confluence of Spunky Creek Tributary B	7.06	4,510	7,710	9,270	12,570
	1800' Upstream of Confluence of Spunky Creek Tributary B	6.86	4,460	7,640	9,200	12,470
	Downstream of Confluence of Reservoir Creek	6.78	4,450	7,620	9,160	12,420
	900' Upstream of Confluence of Reservoir Creek	5.42	3,430	6,100	7,350	9,840
	2000' Upstream of Confluence of Reservoir Creek	5.33	3,440	6,120	7,350	9,890
	1700' Downstream of Confluence of Spunky Creek Tributary E	5.23	3,410	6,070	7,300	9,810
	Downstream of Confluence of Spunky Creek Tributary E	5.06	3,390	6,010	7,240	9,670
	Upstream of Confluence of Spunky Creek Tributary E	3.89	2,610	4,410	5,270	6,930
	Immediately Downstream of Confluence of Short Creek	3.79	2,580	4,340	5,180	6,760
	1200' Downstream of E. 31st Street	3.58	2,510	4,150	4,910	6,370
	Immediately Downstream of Confluence of Slim Creek	3.50	2,490	4,090	4,840	6,310
	100' Upstream of E. 31st Street	3.33	2,360	3,860	4,560	6,090
	800' Upstream of E. 31st Street	3.12	2,260	3,630	4,290	5,910
Spunky Creek Tributary A	130' Upstream of Highway 412	1.74	1,990	2,760	3,200	4,030
	120' Upstream of Highway 412 On-Ramp	1.73	1,980	2,770	3,190	4,000
	100' Upstream of E. Admiral Place	1.58	1,730	2,420	2,790	3,550

Table 3. Summary of Discharges (continued)

Flooding Source Location		Drainage Area (square miles)	Discharges (cfs)			
			10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Spunky Creek Tributary A (continued)	170' Upstream of E. 1st Place	1.34	1,290	1,970	2,270	2,900
Spunky Creek Tributary B	331' Upstream of the Confluence of Spunky Creek	3.80	3,810	6,270	7,410	10,270
Spunky Creek Tributary G	630' Upstream of S. 193rd E. Avenue	0.31	390	650	780	1,020

* Data not available

[1] Flows at the lower end of Adams Creek are reduced due to extreme amount of floodplain valley storage as a result of the extremely flat terrain in the downstream reach

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM [Flood Insurance Rate Map (FIRM)] represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Pre-Countywide Analyses

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

Cross sections for the backwater analyses of the streams studied by detailed methods in the City of Coweta, Oklahoma (Coweta Creek, Middle Branch, South Branch and Tributary A) were obtained from topographic maps compiled from aerial photographs (Reference 15). Cross sections were located at close intervals above and below bridges and culverts in order to compute the significant backwater effects of these structures.

Cross sections for the Verdigris River Divergence Channel were field surveyed. Cross sections for all other streams studied by detailed methods in Wagoner County unincorporated areas were taken from aerial photogrammetric maps at a scale of 1:2,400 and 1:7,200 and with a contour interval of 2 feet (Reference 16). Bridge structures were field measured and checked against bridge plans when available.

The hydraulic analysis for the Neosho River was taken from the FIS for the Town of Fort Gibson (Reference 8).

Channel roughness coefficients (Manning's "n") used in the hydraulic computations for the streams studied by detailed methods were chosen by engineering judgment and based on

field observations of the streams and floodplain areas.

The channel "n" and overbank "n" values for streams studied by detailed methods are listed in Table 4, "Summary of Roughness Coefficients".

Water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (Reference 13). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for the streams studied by detailed methods were determined by the slope/area method.

Starting water-surface elevations for the natural backwater runs on the Verdigris River, the Verdigris River Divergence Channel, East Coal Creek, West Coal Creek, Adams Creek, and Salt Creek were based on the normal navigation pool elevations for the Verdigris River at the point of confluence. Stating elevations for Springtown Creek, Midway Creek, Timber Creek, Covington Creek, Covington Creek Tributary, School Creek, Lone Star Creek, and Salt Creek Tributaries 1 and 2 were based on coincident flooding elevations of the mainstem at the point of confluence. The starting water-surface elevations for Spunky Creek and Spunky Creek Tributary were taken from the FIS for the unincorporated areas of Rogers County (Reference 4). The starting elevations for the Arkansas River were taken from the FIS for the unincorporated areas of Muskogee County (Reference 17). The starting elevations for the Neosho River were taken from corresponding profiles of peak discharges on the Arkansas River. The starting elevations for Coweta Creek, Coweta Creek Tributaries A and B, and Middle Branch Tributary were determined by the slope/area method.

April 17, 2012 Countywide Analyses

Cross-section geometries were obtained from digital terrain data provided by the State of Oklahoma.

Water-surface profiles for the streams studied by approximate methods were computed through the use of the USACE HEC-RAS version 3.1.2 water-surface profiles computer program (Reference 18). The model was run for the 1-percent-annual-chance storm for the approximate studies. Starting water surface elevations were calculated using the slope/area method, except for stream reaches that tied-in directly with a redelineated study where a known water surface was used. Default roughness coefficients (Manning's "n") were used with values of 0.050 for the channel and 0.150 for the overbanks.

September 30, 2016 Physical Map Revision of Polecat-Snake and Lower Verdigris Watersheds

For the restudy of Polecat-Snake watershed, the cross section and roughness data has been extracted using the GIS based tools developed by the USACE (HEC-GeoRAS). The base terrain data was developed from a new aerial Light Detection and Radar (LiDAR) survey, performed for this project by Dewberry, of the detailed study areas. Water surface elevations for the following streams were computed through the use of the USACE HEC-RAS Version 4.1 computer program: Broken Arrow Creek, Broken Arrow Creek Tributary, Unnamed Tributary 1 to Broken Arrow Creek Tributary, and Unnamed Tributary 2 to Broken Arrow Creek Tributary. Starting water-surface elevations for all streams were calculated using normal depth. Roughness coefficients (Manning's "n" values) used in the hydraulic computations for the streams studied by detailed methods were assigned on the basis of field inspection supplemented by aerial photography of floodplain areas. Channel

and overbank "n" values for the streams studied by detailed methods are shown in Table 4.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM.

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

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

For the study of Lower Verdigris watershed, the cross section and roughness data has been extracted using the GIS based tools developed by the USACE (HEC-GeoRAS). The base terrain data was developed from 2010 topographic data and a new aerial survey, performed by Aerial Data Service, of the detailed study areas. Water surface elevations for the following streams were computed through the use of the USACE HEC-RAS Version 4.1.0 computer program: Midway Creek, Midway Creek Tributary 1, Midway Creek Tributary 2, Midway Creek Tributary 3, Midway Creek Tributary 4, Midway Creek Tributary 5, Salt Creek, Salt Creek Tributary 2, Salt Creek Tributary 3, Salt Creek Tributary 4, Spunky Creek, Spunky Creek Tributary A, Spunky Creek Tributary B, and Spunky Creek Tributary G.

Starting water-surface elevations for all streams were calculated using normal depth. Roughness coefficients (Manning's "n" values) used in the hydraulic computations for the streams studied by detailed methods were assigned on the basis of field inspection supplemented by aerial photography of floodplain areas. Channel and overbank "n" values for the streams studied by detailed methods are shown in Table 4, "Summary of Roughness Coefficients".

Table 4. Summary of Roughness Coefficients

Stream	Channel "n"	Overbank "n"
Adams Creek	0.050 – 0.100	0.070 – 0.110
Arkansas River	0.015 – 0.035	0.050 – 0.150
Broken Arrow Creek	0.013-0.040	0.040-0.080
Broken Arrow Creek Tributary	0.040	0.040-0.080
Covington Creek	0.050 – 0.090	0.060 – 0.110
Covington Creek Tributary	0.050 – 0.080	0.060 – 0.100
Coweta Creek	0.065 – 0.075	0.080 – 0.200
Coweta Creek Tributary A	0.065 – 0.075	0.080 – 0.200
Coweta Creek Tributary B	0.065 – 0.075	0.080 – 0.200
East Coal Creek	0.025 – 0.060	0.030 – 0.090
Lone Star Creek	0.060 – 0.090	0.070 – 0.110
Middle Branch	0.065 – 0.075	0.015 – 0.120
Middle Branch Tributary	0.065 – 0.075	0.080 – 0.200
Midway Creek	0.030 – 0.040	0.035 – 0.060
Midway Creek Tributary 1	0.040	0.040 – 0.060
Midway Creek Tributary 2	0.030 – 0.040	0.040 – 0.080
Midway Creek Tributary 3	0.030 – 0.035	0.040 – 0.060
Midway Creek Tributary 4	0.030 – 0.040	0.040 – 0.060
Midway Creek Tributary 5	0.030 – 0.040	0.040 – 0.060
Neosho River	0.035 – 0.040	0.050 – 0.075
Salt Creek	0.040 - 0.090	0.025 – 0.110
Salt Creek Tributary 1	0.050	0.060
Salt Creek Tributary 2	0.035 - 0.050	0.040 - 0.060
Salt Creek Tributary 3	0.035 – 0.040	0.040 - 0.060
Salt Creek Tributary 4	0.030 – 0.040	0.040 - 0.060
School Creek	0.060 – 0.090	0.080 – 0.110
Springtown Creek	0.090	0.100 – 0.110
Spunky Creek	0.030 – 0.080	0.015 – 0.100
Spunky Creek Tributary A	0.015 – 0.080	0.015 - 0.100
Spunky Creek Tributary B	0.030 – 0.080	0.015 – 0.100
Spunky Creek Tributary G	0.030 – 0.045	0.015 – 0.100
South Branch	0.065	0.080 – 0.120
Timber	0.090	0.110
Unnamed Tributary 1 to Broken Arrow Creek Tributary	0.040	0.040-0.080
Unnamed Tributary 1 to Broken Arrow Creek Tributary	0.040	0.040-0.080
Verdigris River	0.035	0.090 – 0.150
Verdigris River Divergence	0.035	0.090 – 0.150
West Coal Creek	0.050	0.060

3.3   Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD88). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are now prepared using NAVD as the referenced vertical datum.

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Some of the data used in this revision were taken from the prior effective FIS reports and FIRMs and adjusted to NAVD88. The datum conversion factor from NGVD29 to NAVD88 in Wagoner County is 0.376 feet.

For additional information regarding conversion between the NGVD29 and NAVD88, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

>   NGS Information Services
>   NOAA, N/NGS12
>   National Geodetic Survey
>   SSMC-3, #9202
>   1315 East-West Highway
>   Silver Spring, Maryland 20910-3282
>   (301) 713-3242

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

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

4.0   FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1   Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1"=500' and 1"=1,000'.

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

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM.

4.2   Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced.

The floodways presented in this study were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. The results of the floodway computations are tabulated for selected cross section and are shown in Table 5,

"Floodway Data". The computed floodway and 1-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Near the mouths of streams studied in detail, floodway computations were made without regard to flood elevations in the receiving water body. Therefore, "without floodway" elevations presented in Table 5 for certain downstream cross sections may be lower than the regulatory flood elevations in that area, which must take into account the 1-percent-annual-chance flood due to backwater from other sources.

No floodway was computed for the following detailed study flooding sources: Midway Creek Tributary 1, Midway Creek Tributary 2, Midway Creek Tributary 3, Midway Creek Tributary 4, Midway Creek Tributary 5, Salt Creek Tributary 3, Salt Creek Tributary 4, and Spunky Creek Tributary G.

No floodways were computed for streams studied by enhanced approximate and approximate methods. Along streams where floodways have not been computed, the community must ensure that the cumulative effect of development in the floodplain will not cause more than a 1.0-foot increase in the base flood elevations at any point within the community.

The area between the floodway and the 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent-annual-chance flood by more than 1.0 foot at any point. Typical relationship between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.
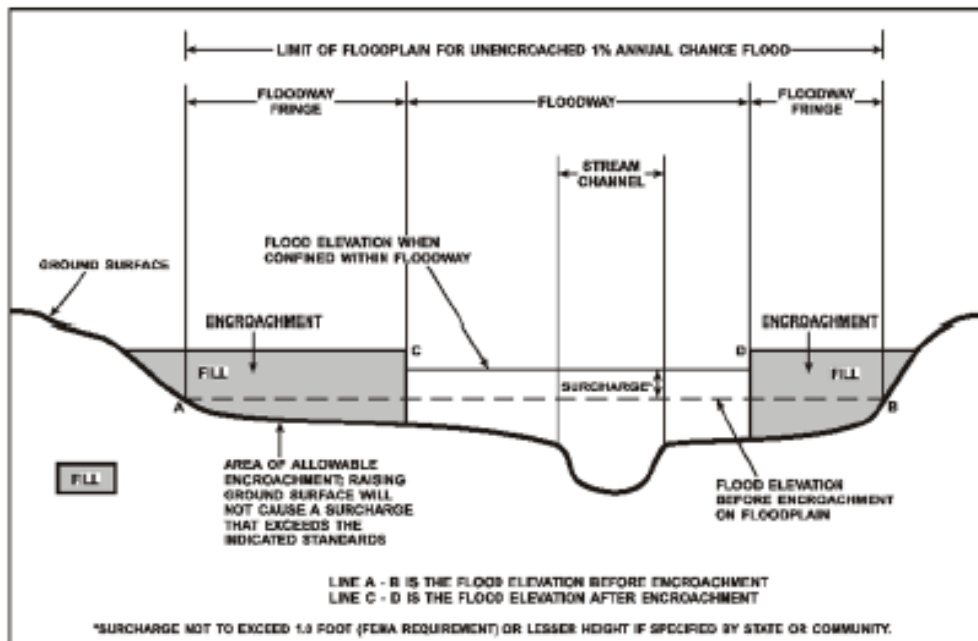
Figure 1. Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Adams Creek								
A	31,203	1,975	8,951	1.8	550.4	550.4	551.4	1.0
B	34,146	1,755	8,380	2.1	552.7	552.7	553.6	0.9
C	37,166	1,217	6,380	2.8	556.7	556.7	557.7	1.0
D	43,312	1,013	9,269	1.9	561.1	561.1	562.0	0.9
E	44,712	1,720	12,287	1.5	561.9	561.9	562.9	1.0
F	52,585	1,303	9,665	2.0	564.7	564.7	565.7	1.0
G	58,860	1,387	9,564	2.0	571.2	571.2	572.2	1.0
H	63,001	1,635	19,578	1.1	577.6	577.6	578.6	1.0
I	67,334	705	4,977	3.8	578.8	578.8	579.7	0.9
J	71,423	365	4,703	4.2	583.0	583.0	584.0	1.0
K	72,745	490	5,656	3.7	584.6	584.6	585.6	1.0
L	74,085	740	7,592	2.6	584.9	584.9	585.9	1.0
M	76,181	670	9,413	2.1	585.8	585.8	586.8	1.0
N	80,217	870	6,608	3.0	588.1	588.1	589.1	1.0
O	82,437	654	7,163	2.9	591.1	591.1	592.0	0.9
P	84,757	690	9,240	2.3	593.1	593.1	594.1	1.0
Q	85,973	710	6,189	3.3	594.1	594.1	595.0	0.9
R	87,476	758	6,517	3.1	597.7	597.7	598.7	1.0

[1] Feet above confluence with Verdigris River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

FLOODWAY DATA

ADAMS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Adams Creek (cont.)								
S	92,744	1,049	9,208	1.3	604.6	604.6	604.7	0.1
T	94,344	428	3,262	2.9	605.3	605.3	605.7	0.4
U	102,800	690	3,979	2.1	615.8	615.8	616.8	1.0
V	105,554	446	2,486	3.1	618.7	618.7	619.7	1.0
W	106,654	312	2,725	2.8	621.6	621.6	622.5	0.9
X	107,100	650	5,992	1.3	626.5	626.5	627.4	0.9
Y	109,418	630	3,034	2.5	627.6	627.6	628.4	0.8
Z	109,752	701	4,952	1.6	630.3	630.3	630.8	0.5
AA	110,701	727	3,899	2.0	630.7	630.7	631.3	0.6
AB	111,902	336	2,357	3.3	631.6	631.6	632.0	0.4
AC	114,254	279	1,821	3.7	636.0	636.0	637.0	1.0
AD	117,052	389	2,706	2.5	642.6	642.6	643.6	1.0
AE	123,215	136	1,076	5.4	657.0	657.0	657.9	0.9
AF	124,431	228	1,556	3.4	662.9	662.9	663.7	0.8

[1] Feet above confluence with Verdigris River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

ADAMS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Arkansas River								
A	120,451	4,287	55,132	5.3	551.3	551.3	551.3	0.0
B	122,685	4,296	54,689	5.2	551.6	551.6	551.6	0.0
C	125,173	4,255	51,261	5.1	551.9	551.9	551.9	0.0
D	127,595	4,732	59,439	4.9	552.2	552.2	552.2	0.0
E	129,701	3,258	43,471	5.6	552.4	552.4	552.4	0.0
F	131,257	2,259	30,853	6.6	552.5	552.5	552.5	0.0
G	133,217	1,720	26,839	7.6	552.8	552.8	552.8	0.0
H	133,717	1,720	27,196	7.5	553.3	553.3	553.3	0.0
I	136,071	2,003	32,180	6.4	553.9	553.9	553.9	0.0
J	142,556	4,542	53,021	4.2	555.8	555.8	555.8	0.0
K	146,814	1,537	19,019	11.2	557.2	557.2	557.2	0.0
L	154,406	3,810	42,213	5.9	561.8	561.8	561.8	0.0
M	160,265	5,150	51,121	4.8	563.0	563.0	563.0	0.0
N	167,817	3,057	40,060	5.5	564.4	564.4	564.4	0.0
O	172,659	1,884	24,725	8.3	566.2	566.2	566.2	0.0
P	175,617	1,523	26,185	7.8	569.8	569.8	569.8	0.0
Q	180,524	2,216	40,607	5.1	572.6	572.6	572.6	0.0
R	186,168	2,335	41,937	4.9	574.3	574.3	574.3	0.0

[1] Feet above river mile 457.7.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

FLOODWAY DATA

ARKANSAS RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Arkansas River (cont.)								
S	190,850	2,506	42,487	4.8	575.0	575.0	575.0	0.0
T	194,998	2,209	38,029	5.4	575.4	575.4	575.4	0.0
U	198,722	2,332	22,079	11.6	575.5	575.5	575.5	0.0
V	203,898	1,565	22,839	9.0	578.7	578.7	578.7	0.0

[1] Feet above river mile 457.7.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

FLOODWAY DATA

ARKANSAS RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Broken Arrow Creek A-U[2]								
V	21,374	625	4,057	2.3	617.6	617.6	618.6	1.0
W	22,400	255	1,882	4.9	618.2	618.2	619.2	1.0
X	22,860	100	1,396	6.3	618.9	618.9	619.7	0.8
Y	22,931	118	1,514	5.8	619.3	619.3	620.1	0.8
Z	23,017	118	1,572	5.6	619.7	619.7	620.6	0.9
AA	23,110	160	1,974	4.5	620.3	620.3	621.2	0.9
AB	23,539	224	1,889	4.7	620.7	620.7	621.6	0.9
AC	25,129	728	4,529	2.0	621.9	621.9	622.9	1.0
AD	30,729	229	924	4.1	630.8	630.8	631.2	0.4
AE	33,379	134	839	4.5	638.2	638.2	639.1	0.9
AF	34,255	387	2,229	1.7	639.2	639.2	640.1	0.9
AG	35,119	83	564	6.6	644.0	644.0	644.1	0.1
AH	35,552	195	747	5.0	645.1	645.1	645.4	0.3
AI	35,888	166	934	4.0	645.7	645.7	646.2	0.5
AJ	37,905	89	521	7.2	648.3	648.3	648.8	0.5
AK	38,207	95	517	7.2	649.3	649.3	649.9	0.6
AL	38,496	222	1,488	2.5	652.9	652.9	653.7	0.8
AM	39,611	167	1,194	3.2	658.5	658.5	659.4	0.9
AN	42,328	250	1,200	3.2	661.4	661.4	661.9	0.5
AO	44,319	198	882	4.4	664.9	664.9	665.3	0.4
AP	45,384	199	536	7.2	667.1	667.1	667.3	0.2
AQ	45,489	199	1,022	3.8	670.0	670.0	671.0	1.0
AR	46,374	437	1,524	2.5	673.2	673.2	674.0	0.8

[1] Feet above confluence with Arkansas River.

[2] Cross sections A-U are located in Tulsa County.

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY **WAGONER COUNTY, OK** AND INCORPORATED AREAS	FLOODWAY DATA **BROKEN ARROW CREEK**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Broken Arrow Creek Tributary								
A	3,269	223	1,411	4.8	628.1	628.1[2]	629.1[2]	1.0
B	5,224	198	1,306	5.2	632.6	632.6	633.4	0.8
C	6,046	280	1,780	3.8	635.2	635.2	635.8	0.6
D	6,790	100	859	7.8	635.9	635.9	636.9	1.0
E	7,322	375	2,035	3.3	640.2	640.2	640.3	0.1
F	8,299	350	2,347	2.8	640.9	640.9	641.1	0.2
G	9,357	215	1,504	4.0	642.1	642.1	642.7	0.6
H	9,916	157	1,115	5.4	642.9	642.9	643.5	0.6
I	10,599	187	1,178	4.9	643.7	643.7	644.4	0.7
J	10,913	114	731	8.0	643.8	643.8	644.5	0.7
K	11,441	222	1,591	3.7	646.6	646.6	647.5	0.9
L	13,153	323	2,132	2.9	648.2	648.2	649.2	1.0
M	14,475	210	1,714	3.4	650.7	650.7	651.4	0.7
N	14,930	126	1,043	5.6	650.9	650.9	651.8	0.9
O	15,345	351	2,761	2.3	652.4	652.4	653.1	0.7
P	16,687	179	1,069	3.3	653.5	653.5	654.4	0.9
Q	17,045	263	1,568	2.3	654.3	654.3	655.0	0.7
R	18,686	119	620	5.7	657.0	657.0	657.6	0.6
S	19,076	181	777	4.6	658.7	658.7	659.5	0.8
T	19,355	62	354	10.0	659.1	659.1	660.0	0.9
U	19,738	73	412	4.1	662.1	662.1	662.9	0.8

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

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

FLOODWAY DATA

BROKEN ARROW CREEK TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Broken Arrow Creek Tributary (cont.)								
V	20,498	57	231	7.3	663.3	663.3	664.3	1.0
W	20,760	70	294	5.8	665.7	665.7	666.1	0.4

[1] Feet above confluence with Broken Arrow Creek.

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY **WAGONER COUNTY, OK** AND INCORPORATED AREAS	**FLOODWAY DATA**
		BROKEN ARROW CREEK TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Covington Creek								
A	8,716	540	2,726	2.2	609.9	609.9	610.4	0.5
B	10,312	115	604	10.1	610.9	610.9	611.4	0.5
C	13,163	237	2,492	1.6	621.0	621.0	621.6	0.6
D	15,662	197	688	5.9	622.9	622.9	623.9	1.0
E	16,123	118	1,633	2.5	628.4	628.4	629.3	0.9
F	17,640	272	2,029	2.1	630.1	630.1	630.2	0.1
G	24,768	321	1,080	4.2	655.2	655.2	655.6	0.4
H	25,212	361	2,768	1.6	658.2	658.2	659.2	1.0
I	25,899	217	1,604	2.8	658.6	658.6	659.6	1.0
J	28,013	233	2,060	1.0	668.8	668.8	669.7	0.9
K	28,263	122	784	2.6	669.6	669.6	670.6	1.0
L	30,921	41	173	11.7	675.0	675.0	675.4	0.4
M	32,930	130	702	2.9	687.9	687.9	688.9	1.0
N	33,424	109	655	3.1	692.7	692.7	693.4	0.7

[1] Feet above confluence with Adams Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

COVINGTON CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Covington Creek Tributary								
A	1,627	92	356	4.0	621.3	621.3	622.2	0.9
B	4,047	33	102	8.9	636.0	636.0	636.0	0.0
C	4,198	64	260	3.5	637.0	637.0	638.0	1.0

[1] Feet above confluence with Covington Creek.

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY **WAGONER COUNTY, OK** AND INCORPORATED AREAS	**FLOODWAY DATA**
		COVINGTON CREEK TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Coweta Creek								
A	1	304	3,216	3.7	571.4	570.5[2]	571.5	1.0
B	1,170	191	2,325	5.1	571.7	571.7	572.7	1.0
C	2,280	222	2,719	4.4	573.6	573.6	574.5	0.9
D	3,650	251	2,717	4.4	575.2	575.2	576.1	0.9
E	4,640	152	1,852	6.4	576.8	576.8	577.7	0.9
F	5,400	87	1,316	8.4	578.9	578.9	579.7	0.8
G	6,730	259	2,498	4.4	583.1	583.1	584.0	0.9
H	7,870	286	2,860	3.9	584.6	584.6	585.6	1.0
I	9,500	233	2,092	5.3	587.3	587.3	588.3	1.0
J	9,900	266	1,990	5.5	588.6	588.6	589.6	1.0
K	11,800	525	3,435	3.1	593.1	593.1	594.0	0.9
L	11,900	153	1,295	8.1	593.6	593.6	594.4	0.8
M	13,560	250	2,404	4.4	599.0	599.0	600.0	1.0
N	15,530	291	1,661	5.9	601.0	601.0	601.9	0.9
O	16,370	178	1,660	5.8	604.8	604.8	605.8	1.0
P	18,060	605	4,130	2.9	607.5	607.5	608.5	1.0
Q	18,470	418	2,495	3.9	608.1	608.1	609.0	0.9
R	19,750	371	2,629	3.7	610.7	610.7	611.7	1.0

[1] Feet above confluence with Arkansas River.
[2] Elevation computed without consideration of backwater effects from Arkansas River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

COWETA CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Coweta Creek (cont.)								
S	20,650	329	2,527	3.8	612.4	612.4	613.4	1.0
T	22,080	370	2,358	4.1	615.1	615.1	616.0	0.9
U	22,670	269	2,109	4.6	616.8	616.8	617.7	0.9
V	23,120	346	2,532	3.8	618.5	618.5	619.4	0.9
W	23,310	579	3,918	2.3	620.0	620.0	620.9	0.9
X	23,670	580	3,718	2.4	620.4	620.4	621.4	1.0
Y	25,100	356	1,946	4.7	623.2	623.2	624.1	0.9
Z	27,940	622	3,048	3.0	629.8	629.8	630.8	1.0
AA	29,180	634	3,391	2.3	632.3	632.3	633.3	1.0
AB	30,325	399	1,833	4.2	634.6	634.6	635.4	0.8
AC	31,465	504	2,950	2.6	637.2	637.2	638.1	0.9
AD	32,570	155	906	8.6	640.0	640.0	640.9	0.9
AE	33,790	258	2,278	2.9	647.8	647.8	648.8	1.0
AF	35,740	422	2,598	2.5	650.9	650.9	651.8	0.9
AG	36,415	486	3,098	2.1	651.6	651.6	652.5	0.9
AH	36,935	404	2,753	2.4	652.2	652.2	653.1	0.9
AI	38,340	123	703	6.1	654.7	654.7	655.5	0.8
AJ	39,910	251	1,272	3.4	660.2	660.2	661.2	1.0

[1] Feet above confluence with Arkansas River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

COWETA CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Coweta Creek (cont.)								
AK	41,265	177	1,076	2.6	663.0	663.0	664.0	1.0
AL	42,900	221	1,069	2.7	666.8	666.8	667.8	1.0
AM	43,530	222	976	2.9	668.4	668.4	669.4	1.0

[1] Feet above confluence with Arkansas River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

FLOODWAY DATA

COWETA CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Coweta Creek Tributary A								
A	830	503	2,985	0.6	634.5	634.5	635.5	1.0
B	1,390	195	1,050	1.8	634.6	634.6	635.6	1.0
C	2,820	223	771	2.5	638.7	638.7	639.7	1.0
D	2,910	254	1,300	1.5	638.8	638.8	639.8	1.0
E	3,610	200	537	3.6	639.8	639.8	640.6	0.8
F	3,850	140	438	4.4	641.2	641.2	642.2	1.0

[1] Feet above confluence with Coweta Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

FLOODWAY DATA

COWETA CREEK TRIBUTARY A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Coweta Creek Tributary B								
A	820	140	692	1.2	658.4	658.4	659.4	1.0
B	1,250	11	376	2.1	659.0	659.0	659.9	0.9
C	1,810	80	292	2.8	660.8	660.8	661.8	1.0
D	2,400	41	173	4.8	663.8	663.8	664.7	0.9
E	2,850	160	437	1.9	666.0	666.0	667.0	1.0
F	3,290	121	265	3.1	667.7	667.7	668.6	0.9

[1] Feet above confluence with Coweta Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

COWETA CREEK TRIBUTARY B

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
East Coal Creek								
A	11,938	1,619	21,084	0.6	526.0	524.3[2]	525.3[2]	1.0
B	12,863	1,028	10,015	1.2	526.0	524.3[2]	525.3[2]	1.0
C	15,036	1,134	11,069	1.1	526.0	524.5[2]	525.5[2]	1.0
D	16,447	853	8,331	1.1	526.0	524.6[2]	525.6[2]	1.0
E	16,556	721	7,197	1.3	526.0	524.7[2]	525.7[2]	1.0
F	18,114	780	6,462	1.4	526.0	524.9[2]	525.9[2]	1.0
G	19,431	318	2,343	3.4	526.0	525.2[2]	526.2[2]	1.0
H	22,477	146	940	8.4	531.0	531.0	531.9	0.9
I	24,546	565	3,740	2.1	534.9	534.9	535.9	1.0
J	24,639	691	6,997	1.1	539.9	539.9	539.9	0.0
K	25,454	743	6,214	1.2	539.9	539.9	539.9	0.0
L	26,831	515	4,367	1.7	540.1	540.1	540.3	0.2
M	29,083	538	4,952	1.5	540.6	540.6	541.1	0.5
N	30,226	458	3,339	2.2	540.9	540.9	541.5	0.6
O	32,330	386	2,301	2.9	543.3	543.3	544.2	0.9
P	32,516	502	2,997	2.2	543.7	543.7	544.6	0.9
Q	33,739	611	3,624	1.7	545.1	545.1	546.1	1.0
R	35,303	224	1,564	3.6	547.4	547.4	548.4	1.0

[1] Feet above confluence with Verdigris River.
[2] Elevation computed without consideration of backwater effects from Verdigris River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

EAST COAL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
East Coal Creek (cont.)								
S	37,025	464	2,968	1.9	550.2	550.2	551.2	1.0
T	37,087	589	3,506	1.1	550.5	550.5	551.5	1.0
U	38,224	361	2,019	1.9	551.3	551.3	552.2	0.9
V	39,226	313	1,612	2.4	552.8	552.8	553.7	0.9
W	40,404	226	1,322	2.9	555.3	555.3	556.1	0.8
X	40,497	615	5,558	0.7	560.6	560.6	561.3	0.7
Y	41,494	238	1,956	1.5	560.7	560.7	561.5	0.8
Z	44,620	186	1,117	2.1	562.5	562.5	563.5	1.0
AA	49,201	176	825	1.8	570.1	570.1	570.3	0.2
AB	51,260	56	343	3.2	572.3	572.3	573.2	0.9
AC	52,935	174	806	1.4	574.5	574.5	575.4	0.9
AD	53,053	236	991	1.1	574.7	574.7	575.6	0.9
AE	53,979	170	610	1.8	575.4	575.4	576.2	0.8
AF	54,593	124	390	2.2	576.4	576.4	577.3	0.9

[1] Feet above confluence with Verdigris River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

EAST COAL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Lone Star Creek								
A	626	82	726	3.2	644.1	644.1	645.1	1.0
B	1,925	74	496	4.6	648.6	648.6	649.6	1.0
C	3,967	81	537	3.4	665.0	665.0	665.6	0.6
D	4,403	104	572	3.1	669.7	669.7	670.7	1.0
E	4,692	39	159	11.3	672.1	672.1	672.8	0.7

[1] Feet above confluence with Adams Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

FLOODWAY DATA

LONE STAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Middle Branch								
A	830	85	540	2.5	609.9	608.3[2]	609.3[2]	1.0
B	1,590	47	290	4.7	611.3	611.3	612.2	0.9
C	2,820	59	276	4.9	613.1	613.1	613.5	0.4
D	3,198	120	506	2.7	615.6	615.6	615.6	0.0
E	3,593	164	392	2.9	619.2	619.2	619.2	0.0
F	4,133	35	215	5.3	622.3	622.3	624.1	0.8
G	4,843	110	471	1.7	623.9	623.9	624.9	1.0
H	5,283	49	230	3.4	629.8	629.8	630.3	0.5
I	5,733	73	339	2.3	632.5	632.5	633.4	0.9
J	5,993	162	451	1.7	634.3	634.3	635.2	0.9
K	6,243	61	145	5.4	635.2	635.2	635.9	0.7
L	6,508	28	87	5.6	638.5	638.5	639.2	0.7
M	8,150	50	105	4.7	645.8	645.8	645.8	0.0
N	8,550	25	117	4.2	649.1	649.1	650.1	1.0
O	9,000	75	268	1.8	652.6	652.6	653.4	0.8

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

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

MIDDLE BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Middle Branch Tributary								
A	8,150	50	105	4.7	645.8	645.8	645.8	0.0
B	8,550	25	117	4.2	649.1	649.1	650.1	1.0
C	9,000	75	268	1.8	652.6	652.6	653.4	0.8

[1] Feet above confluence with Coweta Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

MIDDLE BRANCH TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Midway Creek								
A	1,465	818	7,768	0.7	578.3	578.3	579.3	1.0
B	3,570	233	1,910	2.8	578.6	578.6	579.6	1.0
C	3,972	90	835	5.5	581.1	581.1	581.6	0.5
D	4,490	161	1,420	3.2	581.9	581.9	582.7	0.9
E	5,938	100	463	9.1	583.7	583.7	584.0	0.3
F	7,025	247	2,036	2.1	586.7	586.7	587.0	0.3
G	7,636	162	1,300	3.2	587.3	587.3	587.5	0.2
H	9,696	87	547	7.2	590.9	590.9	591.8	0.9
I	11,679	231	1,042	3.7	598.9	598.9	599.2	0.3

[1] Feet above confluence with Adams Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

MIDWAY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Salt Creek								
A	20,405	436	4,921	3.3	563.0	563.0	564.0	1.0
B	21,626	130	1,451	10.5	563.8	563.8	564.5	0.7
C	30,432	168	913	9.1	580.1	580.1	580.8	0.7
D	34,607	164	1,178	4.5	600.8	600.8	601.8	1.0
E	35,242	285	1,299	3.1	603.1	603.1	603.8	0.7
F	36,142	197	1,093	3.7	603.9	603.9	604.9	1.0
G	38,844	87	357	3.0	616.4	616.4	616.8	0.4

[1] Feet above confluence with Verdigris River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

SALT CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Salt Creek Tributary 1								
A	1,139	48	310	9.0	579.4	579.4	580.1	0.7
B	1,579	132	755	3.7	581.9	581.9	582.9	1.0
C	2,134	43	188	11.9	584.2	584.2	584.8	0.6
D	2,756	64	375	4.5	590.5	590.5	591.4	0.9

[1] Feet above confluence with Salt Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

SALT CREEK TRIBUTARY 1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Salt Creek Tributary 2								
A	967	122	358	7.4	606.7	606.7	606.8	0.1
B	1,665	69	293	9.1	609.4	609.4	609.7	0.3
C	2,170	106	635	4.1	612.3	612.3	613.0	0.7

[1] Feet above the confluence with Salt Creek.

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	WAGONER COUNTY, OK	
	AND INCORPORATED AREAS	**SALT CREEK TRIBUTARY 2**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
School Creek								
A	5,308	550	1,857	1.8	611.8	611.8	612.8	1.0
B	5,570	89	366	9.1	613.0	613.0	613.6	0.6
C	6,630	309	1,420	2.4	618.7	618.7	619.7	1.0
D	7,220	142	742	4.5	620.2	620.2	621.1	0.9
E	8,520	75	476	7.0	622.8	622.8	623.6	0.8
F	9,096	199	1,288	2.6	626.6	626.6	627.1	0.5
G	11,525	66	378	5.2	630.9	630.9	631.3	0.4
H	11,751	165	802	2.5	632.1	632.1	633.0	0.9
I	11,938	50	268	7.4	632.4	632.4	633.3	0.9
J	14,273	391	1,111	1.8	641.3	641.3	642.2	0.9
K	14,717	180	884	2.2	645.5	645.5	646.4	0.9
L	16,040	101	569	3.5	649.5	649.5	650.2	0.7
M	17,197	139	774	1.8	653.5	653.5	654.5	1.0
N	18,541	50	192	7.3	657.5	657.5	658.1	0.6

[1] Feet above confluence with Adams Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

SCHOOL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
South Branch								
A	630	60	362	5.5	611.1	611.1	612.0	0.9
B	1,070	176	673	2.9	613.8	613.8	614.8	1.0
C	1,450	259	1,411	1.4	617.2	617.2	618.2	1.0
D	1,820	72	450	4.4	618.1	618.1	618.7	0.6
E	2,220	81	532	3.7	620.4	620.4	621.2	0.8
F	2,400	38	299	6.6	622.3	622.3	622.9	0.6
G	2,829	48	322	6.2	625.5	625.5	626.4	0.9
H	3,019	101	507	3.9	627.6	627.6	628.6	1.0
I	3,140	107	889	1.7	628.6	628.6	629.6	1.0
J	3,624	67	441	3.5	629.1	629.1	630.1	1.0
K	3,840	137	681	1.6	630.1	630.1	631.1	1.0
L	4,053	89	374	2.9	630.3	630.3	631.3	1.0
M	4,320	61	259	4.2	631.7	631.7	632.5	0.8

[1] Feet above confluence with Middle Branch Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

SOUTH BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Springtown Creek								
A	1,200	58	224	4.9	568.7	568.7	569.7	1.0
B	1,832	100	441	2.5	572.7	572.7	573.6	0.9
C	2,232	98	469	2.3	573.9	573.9	574.8	0.9
D	3,081	24	156	6.3	581.2	581.2	582.2	1.0

[1] Feet above confluence with Adams Creek.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

SPRINGTOWN CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Spunky Creek								
A	38,301	775	9,212	2.1	593.6	593.6	593.9	0.3
B	39,708	313	3,778	5.0	596.9	596.9	597.2	0.3
C	41,943	404	5,100	3.7	598.9	598.9	599.2	0.3
D	43,211	285	3,637	5.0	600.3	600.3	601.0	0.7
E	44,533	285	3,036	6.0	602.6	602.6	603.2	0.6
F	47,539	333	1,963	8.1	611.0	611.0	611.6	0.7
G	49,200	382	2,255	7.0	620.9	620.9	621.0	0.1
H	51,695	273	1,470	6.2	626.9	626.9	627.1	0.2
I	54,449	153	1,111	6.6	641.3	641.3	641.7	0.4
J	56,220	516	2,296	3.1	645.3	645.3	645.3	0.0
K	58,050	348	1,268	4.1	647.8	647.8	648.5	0.7
L	61,327	643	2,052	2.4	654.2	654.2	654.4	0.2
M	62,325	441	2,438	2.3	657.8	657.8	657.8	0.0
N[2]	63,918	455	1,352	3.1	661.8	661.8	661.9	0.1

[1] Feet above confluence with Verdigris River.
[2] Flooding effects in Wagoner County (stream centerline within Tulsa County)

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

SPUNKY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
SPUNKY CREEK TRIBUTARY A								
A	4,651	320	2,983	1.1	615.6	615.6	615.9	0.3
B	5,272	156	803	3.5	617.5	617.5	618.2	0.7
C	5,964	108	401	5.6	622.2	622.2	623.1	0.9
D	6,338	76	409	5.5	624.5	624.5	624.9	0.4
E	7,180	40	204	9.0	625.5	625.5	626.4	0.9
F	7,437	69	291	6.3	628.0	628.0	628.7	0.7
G	8,065	37	230	8.0	631.6	631.6	632.3	0.7

[1] Feet above the confluence with Spunky Creek

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
	WAGONER COUNTY, OK	
	AND INCORPORATED AREAS	**SPUNKY CREEK TRIBUTARY A**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Spunky Creek Tributary B								
A	331	338	1,693	4.4	622.0	622.0	622.1	0.1
B	1,342	135	829	9.1	624.8	624.8	625.3	0.5

[1] Feet above the confluence with Spunky Creek.

TABLE 5	**FEDERAL EMERGENCY MANAGEMENT AGENCY**	**FLOODWAY DATA**
	WAGONER COUNTY, OK	
	AND INCORPORATED AREAS	**SPUNKY CREEK TRIBUTARY B**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Timber Creek								
A	1,725	258	1,398	1.8	600.2	600.2	601.2	1.0
B	3,580	84	390	6.3	605.3	605.3	605.8	0.5
C	5,278	161	1,044	2.4	612.9	612.9	613.9	1.0
D	6,226	51	425	5.8	615.5	615.5	616.5	1.0
E	10,442	48	283	7.0	635.5	635.5	636.5	1.0
F	12,381	60	475	4.2	652.4	652.4	653.3	0.9
G	13,885	43	195	5.7	662.9	652.4	653.0	0.6

[1] Feet above confluence with Adams Creek.

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY **WAGONER COUNTY, OK** AND INCORPORATED AREAS	**FLOODWAY DATA**
		TIMBER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Unnamed Tributary 1 to Broken Arrow Creek Tributary								
A	330	131	944	2.2	652.5	652.5	653.3	0.8
B	2,209	77	255	8.3	654.5	654.5	654.8	0.3
C	2,566	39	276	7.7	657.4	657.4	657.5	0.1
D	2,658	29	208	8.6	657.4	657.4	657.6	0.2
E	3,777	111	550	3.3	660.6	660.6	661.6	1.0
F	4,910	144	567	2.1	667.5	667.5	668.4	0.9
G	4,972	144	744	1.6	667.6	667.6	668.5	0.9
H	5,084	54	254	4.6	667.6	667.6	668.4	0.8
I	6,235	59	160	7.3	672.3	672.3	672.4	0.1
J	7,550	50	231	5.1	678.4	678.4	679.3	0.9

[1] Feet above confluence with Broken Arrow Creek Tributary.

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY WAGONER COUNTY, OK AND INCORPORATED AREAS	FLOODWAY DATA
		UNNAMED TRIBUTARY 1 TO BROKEN ARROW CREEK TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Unnamed Tributary 2 to Broken Arrow Creek Tributary								
A	264	146	698	3.2	661.6	661.6	662.4	0.8
B	399	55	220	10.0	661.6	661.6	661.7	0.1

[1] Feet above confluence with Broken Arrow Creek Tributary.

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY **WAGONER COUNTY, OK** AND INCORPORATED AREAS	**FLOODWAY DATA** **UNNAMED TRIBUTARY 2 TO BROKEN ARROW CREEK TRIBUTARY**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Verdigris River								
A	9,955	539	10,952	6.5	516.2	505.5[2]	505.9[2]	0.4
B	12,882	450	13,110	7.9	516.2	507.4[2]	508.1[2]	0.7
C	16,339	572	14,390	7.2	516.2	509.1[2]	509.7[2]	0.6
D	16,970	594	16,803	6.2	516.2	509.8[2]	510.4[2]	0.6
E	20,264	557	16,002	6.5	516.2	510.7[2]	511.2[2]	0.5
F	23,659	552	18,331	5.7	516.2	511.6[2]	512.1[2]	0.5
G	26,590	453	13,997	7.4	516.2	512.3[2]	512.7[2]	0.4
H	28,800	510	13,591	7.7	516.2	513.2[2]	513.6[2]	0.4
I	32,516	580	15,241	6.8	516.2	515.1[2]	515.4[2]	0.3
J	38,156	400	18,159	5.7	517.6	517.6	517.9	0.3
K	46,045	2,800	33,115	3.1	526.2	526.2	526.2	0.0
L	49,958	539	14,252	7.3	526.7	526.7	526.9	0.2
M	52,993	5,100	83,301	1.2	527.9	527.9	528.1	0.2
N	55,112	4,800	81,752	1.3	528.0	528.0	528.2	0.2
O	59,025	5,400	90,748	1.1	528.2	528.2	528.5	0.3
P	65, 029	5,100	61,046	1.7	528.4	528.4	528.7	0.3
Q	69,627	4,493	57,854	1.8	528.8	528.8	529.1	0.3
R	74,430	4,586	68,568	1.5	529.2	529.2	529.6	0.4

[1] Feet above confluence with Arkansas River.
[2] Elevation computed without consideration of backwater effects from Arkansas River.

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY **WAGONER COUNTY, OK** AND INCORPORATED AREAS	**FLOODWAY DATA** **VERDIGRIS RIVER**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Verdigris River (cont.)								
S	79,157	2,000	22,412	4.6	529.4	529.4	529.9	0.5
T	84,752	460	15,103	6.9	531.7	531.7	532.1	0.4
U	88,860	675	26,310	4.0	532.8	532.8	533.1	0.3
V	91,330	549	18,805	5.5	532.9	532.9	533.2	0.3
W	92,268	598	16,804	6.2	533.4	533.4	533.7	0.3
X	97,554	386	12,044	8.6	534.9	534.9	535.2	0.3
Y	101,416	450	12,080	8.6	536.4	536.4	536.7	0.4
Z	104,926	450	12,817	8.1	538.3	538.3	538.8	0.5
AA	110,878	400	13,116	7.9	540.6	540.6	541.1	0.5
AB	115,257	550	17,431	6.0	542.3	542.3	542.9	0.6
AC	118,797	1,400	38,352	2.7	543.1	543.1	543.7	0.6
AD	123,566	7,000	107,719	1.0	543.3	543.3	544.0	0.7
AE	127,135	10,000	124,430	0.8	543.4	543.4	544.2	0.8
AF	131,611	12,000	114,446	0.9	543.5	543.5	544.3	0.8
AG	135,530	810	24,921	4.2	543.6	543.6	544.5	0.9
AH	139,571	1,123	34,961	3.0	544.0	544.0	544.9	0.9
AI	143,753	578	17,192	6.0	543.9	543.9	544.0	0.1
AJ	148,298	534	14,229	7.3	545.1	545.1	545.1	0.0

[1] Feet above confluence with Arkansas River.

TABLE 5	FEDERAL EMERGENCY MANAGEMENT AGENCY **WAGONER COUNTY, OK** AND INCORPORATED AREAS	**FLOODWAY DATA** **VERDIGRIS RIVER**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Verdigris River (cont.)								
AK	154,718	852	28,868	3.6	547.2	547.2	547.2	0.0
AL	160,512	490	17,625	5.9	547.6	547.6	547.6	0.0
AM	163,885	429	13,955	7.5	548.2	548.2	548.2	0.0
AN	182,266	689	27,675	3.8	556.8	556.8	556.8	0.0
AO	186,756	868	24,730	4.2	557.1	557.1	557.2	0.1
AP	189,824	412	13,458	7.7	557.3	557.3	557.3	0.0
AQ	192,254	616	16,371	6.4	557.9	557.9	558.4	0.5
AR	192,754	803	21,040	4.9	558.1	558.1	558.9	0.8

[1] Feet above confluence with Arkansas River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

VERDIGRIS RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
Verdigris River Divergence Channel								
A	1,300	440	13,372	7.8	516.2	513.2[2]	514.1[2]	0.9
B	9,900	740	17,384	6.8	516.2	515.1[2]	515.8[2]	0.7
C	18,725	2,520	29,148	8.3	517.6	517.6	518.5	0.9

[1] Feet above confluence with Verdigris River.
[2] Elevation computed without consideration of backwater effects from Arkansas River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

VERDIGRIS RIVER DIVERGENCE CHANNEL

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
West Coal Creek								
A	32,550	451	1,540	5.9	544.8	544.8	545.8	1.0
B	34,575	1,227	4,413	2.0	549.0	549.0	549.2	0.2
C	37,505	432	2,022	4.5	551.5	551.5	552.4	0.9
D	43,133	602	2,709	3.6	558.6	558.6	559.5	0.9
E	46,295	566	2,901	3.6	563.6	563.6	564.6	1.0
F	49,420	808	3,667	2.9	567.4	567.4	568.3	0.9
G	52,224	351	1,787	4.5	571.0	571.0	572.0	1.0
H	55,840	549	2,584	3.1	577.3	577.3	578.3	1.0
I	57,986	208	1,314	4.9	580.7	580.7	581.6	0.9
J	62,243	94	698	9.2	591.6	591.6	592.2	0.6
K	64,492	133	1,369	4.7	598.0	598.0	599.0	1.0
L	66,560	136	892	6.3	603.0	603.0	603.7	0.7
M	68,845	127	1,086	4.3	608.0	608.0	609.0	1.0
N	71,380	113	544	8.7	614.4	614.4	615.2	0.8
O	76,474	143	998	3.8	635.4	635.4	636.3	0.9
P	81,003	93	647	5.9	651.2	651.2	651.8	0.6
Q	82,559	45	438	8.6	656.8	656.8	657.7	0.9
R	84,139	49	415	6.9	664.9	664.9	665.9	1.0

[1] Feet above confluence with Verdigris River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

WEST COAL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY (FEET NAVD 88)	WITHOUT FLOODWAY (FEET NAVD 88)	WITH FLOODWAY (FEET NAVD 88)	INCREASE (FEET)
West Coal Creek (cont.)								
S	87,754	58	262	10.9	683.7	683.7	684.1	0.4
T	89,686	134	634	2.7	692.1	692.1	693.1	1.0
U	90,886	174	263	6.5	695.2	695.2	695.7	0.5

[1] Feet above confluence with Verdigris River.

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

WEST COAL CREEK

5.0   INSURANCE APPLICATION

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

Zone A

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

Zone AE

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

Zone X

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

6.0   FLOOD INSURANCE RATE MAP

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

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

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

The countywide FIRM presents flooding information for the entire geographic area of Wagoner County, Oklahoma. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. Historical data relating to the pre-countywide maps prepared for each community are presented in Table 6, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE (S)	FIRM EFFECTIVE DATE	FIRM REVISION DATE (S)
Bixby, City of	June 28, 1974	July 19, 1977	September 28, 1979	None
Broken Arrow, City of	October 18, 1977	February 26, 1980	August 17, 1981	September 5, 1984
Catoosa, City of	September 6, 1974	February 27, 1976 January 14, 1977	August 1, 1980	June 15, 1988
Coweta, City of	June 4, 1976	None	September 18, 1986	None
Fair Oaks, Town of [1]	N/A	N/A	N/A	N/A
Okay, Town of	August 16, 1974	February 6, 1976	September 28, 1982	None
Porter, Town of [1]	N/A	None	N/A	N/A
Red Bird, Town of	June 27, 1975	None	October 9, 1979	None
Tullahassee, City of [1]	N/A	None	N/A	N/A

[1] This community did not have a FIRM prior to the first countywide FIRM for Wagoner County.

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE (S)	FIRM EFFECTIVE DATE	FIRM REVISION DATE (S)
Tulsa, City of	August 17, 1971	None	August 17, 1971	May 28, 1975 July 30, 1976 August 14, 1979 October 15, 1982 February 1, 1985 February 5, 1986 June 15, 1988 November 3, 1989 April 16, 1991 November 20, 1991 November 2, 1995
Wagoner, City of	June 28, 1974	January 23, 1976 January 3, 1978	October 19, 1982	None
Wagoner County Unincorporated Areas	April 27, 1982	None	December 2, 1988	None

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0   OTHER STUDIES

The detailed analyses of Spunky Creek and Spunky Creek Tributary A presented in this study are more detailed than the approximate analyses in the City of Tulsa study. The 1-percent-annual-chance water surface elevations for Spunky Creek Tributary A in the Tulsa County study is approximately 1.0 foot higher than the elevation in this study. The difference is attributable to assumed starting water surface elevation conditions and the bridge routing at the Wagoner-Tulsa County line and is considered within an acceptable tolerance. The Adams Creek analysis is more detailed in this study than in the Tulsa County study. In March 1980, the USACE, Tulsa District, prepared analyses of Adams Creek, Spunky Creek, and Broken Arrow Creek as part of a Tulsa Metropolitan Area study. The East Coal Creek detailed analysis in this study is more detailed than the approximate analysis in the City of Wagoner study. The Verdigris River analysis is more detailed in this study are in exact agreement with the results of the remaining studies.

The FIS for Rogers County is currently being prepared. The 1-percent-annual-chance water surface elevation of the Verdigris River at the Rogers-Wagoner County line, in the Rogers County study, is approximately 0.6 foot lower than the 1-percent-annual-chance elevation in this study. The Verdigris River analysis is more detailed in this study than in the Rogers County study.

In May 1971, the USACE published a Special Flood Hazard Information report for the McClellan-Kerr Navigation System along the Verdigris and Arkansas Rivers from the head of navigation at the Port of Catoosa, Oklahoma, downstream to the confluence with the Arkansas River near Muskogee, Oklahoma (Reference 19). The 1-percent-annual-chance water surface profile developed in that report averages approximately 4.0 feet higher than the 1-percent-annual-chance flood profile developed for this study. The 1971 report does not reflect flood flows regulated by Big Hill, Copan, Birch, and Skiatook Reservoirs and does not consider the total system operation of the reservoirs during flooding situations. Also, an additional 13 years of flow record are included in the flood flow frequency analysis of this study.

Flooding information for a portion of Adams Creek and its tributaries was developed for a Flood Plain Information report, which was completed in December 1976 (Reference 20). The 1-percent-annual-chance water surface profiles in the 1976 report coincide to within 1.5 feet of the 1-percent-annual-chance profiles of this study. Minor differences can be attributed to more detailed topographic information used in this study.

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Wagoner County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS reports, FIRMs, and\or FBFMs for all the incorporated and unincorporated jurisdictions with Wagoner County, and should be considered authoritative for the purposes of the NFIP.
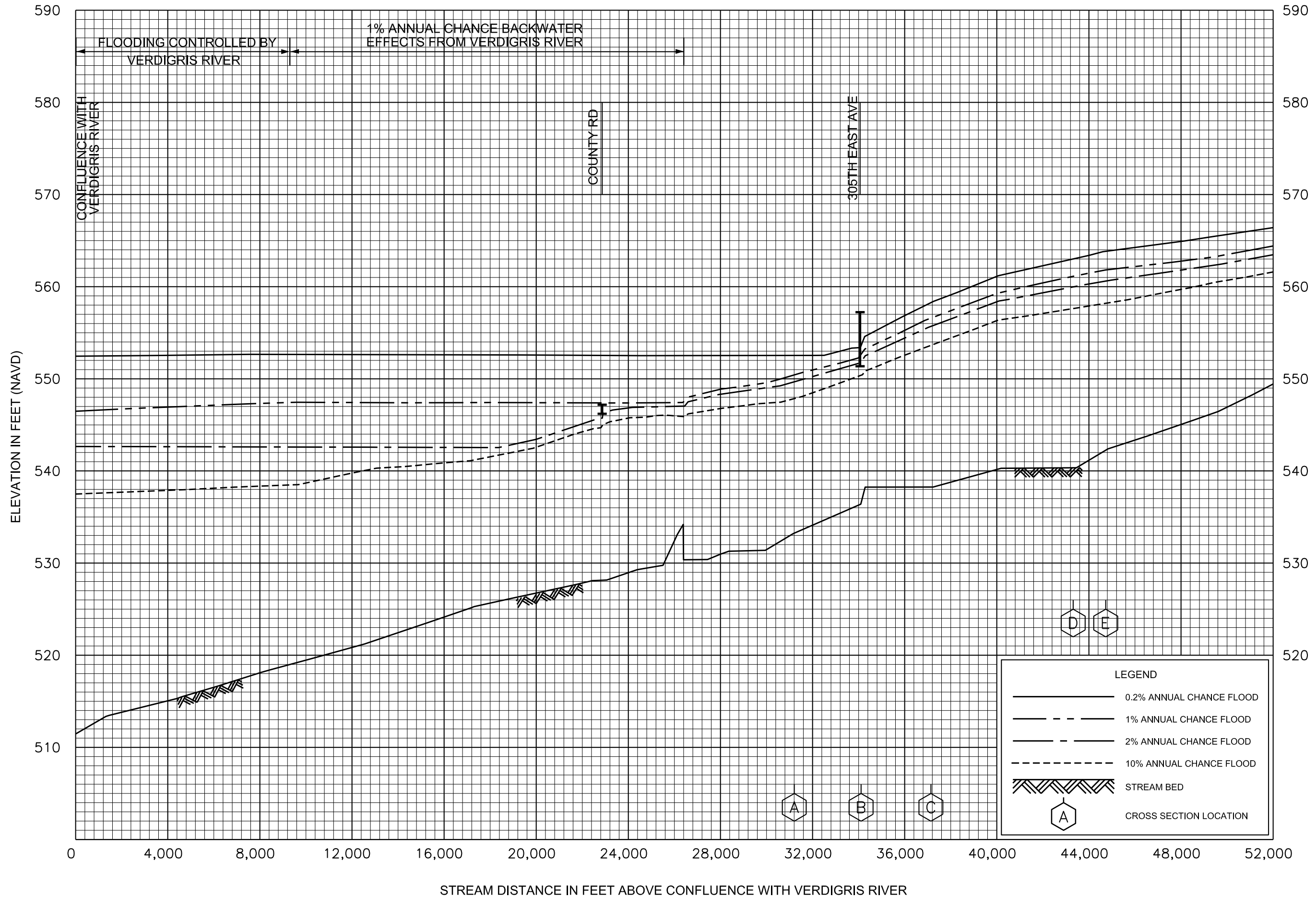
8.0   LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA Region VI, Federal Insurance and Mitigation Division, 800 North Loop 288, Denton, TX 76209.

9.0   BIBLIOGRAPHY AND REFERENCES

1. U.S. Census Bureau, 2010 State & County QuickFacts. United States Census 2010. http://quickfacts.census.gov/qfd/states/40/40145.html.

2. U.S. Army Corps of Engineers, Tulsa District, Coweta Creek, Problems and Possibilities, Tulsa, Oklahoma, 1981.

3. U.S. Army Corps of Engineers, Tulsa District, Plan Formulation Conference data on Hydropower Addition in the Verdigris River Basin, (Unpublished).

4. Federal Emergency Management Agency, Flood Insurance Study, Unincorporated Areas of Rogers County, Oklahoma (Unpublished).

5. U.S. Department of the Interior, Geological Survey, Office of Water Data Collection, Interagency Advisory Committee on Water Data, "Guidelines for Determining Flood Flow Frequency," Bulletin 17B, Reston, Virginia, Revised September 1981.

6. U.S. Army Corps of Engineers, Southwestern Division, SWD Watershed Runoff Computer Model (STORM), Dallas, Texas.

7. Federal Emergency Management Agency, Flood Insurance Study Unincorporated Areas of Tulsa County, Oklahoma, Washington, D.C., March 16, 1982.

8. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of Fort Gibson, Muskogee County, Oklahoma, Washington, D.C., July 16, 1980.

9. U.S. Army Corps of Engineers, Tulsa District, Tulsa-Haskell Reach, Arkansas River, Oklahoma, Summary of Studies Report on Peak Discharge Frequency Determination, Tulsa, Oklahoma, December 2000.

10. Federal Emergency Management Agency, Flood Insurance Study, City of Tulsa, Tulsa County, Oklahoma, Washington, D.C., February 1, 1985.

11. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-1 Flood Hydrograph Package, User's Manual, Davis, California, Revised January 1985.

12. U.S. Department of Commerce, Weather Bureau, Technical Paper No. 40, Rainfall Frequency Atlas of the United States, Washington, D.C., 1961, Revised 1963.

13. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, Revised September 1982.

14. U.S. Geological Survey, The National Flood-Frequency Program-Methods for Estimating Flood Magnitude and Frequency in Rural and Urban Areas in Oklahoma, 2001, USGS Fact Sheet 008-01.

15. Aerial Photo Service, Inc., Topographic Maps compiled from aerial photographs, Scale 1:2,400, Contour Interval 2 Feet: City of Coweta, Wagoner County, Oklahoma, 1984.

16. Williams-Stackhouse, Inc., Topographic Maps compiled from aerial photographs, Scale 1:2,400 and 1:7,200, Contour Interval 2 feet: Wagoner County, Oklahoma, April 6, 1984.

17. U.S. Department of Department of housing and Urban Development, Federal Insurance Administration, <u>Flood Insurance Study, Unincorporated Areas of Muskogee County, Oklahoma</u>, Washington, D.C., March 14, 1978.

18. U.S. Army Corps of Engineers, Hydrologic Engineering Center, <u>HEC-RAS River Analysis System, Version 3.1.2</u>, April 2004.

19. U.S. Army Corps of Engineers, Tulsa District, <u>Special Flood Hazard Information Report, McClellan Kerr Navigation System-Head of Navigation to Muskogee, Oklahoma</u>, Tulsa, Oklahoma, May 1971.

20. U.S. Army Corps of Engineers, Tulsa District, <u>Flood Plain Information Report, Adams Creek and Tributaries, Tulsa and Wagoner Counties, Oklahoma</u>, Tulsa, Oklahoma, December 1976.

21. U.S. Geological Survey, *Depth-Duration Frequency of Precipitation for Oklahoma, Water-Resources Investigation Report 99-4232,* Oklahoma City, Oklahoma, 1999.

FLOOD PROFILES

ADAMS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

01P

FLOOD PROFILES

ADAMS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

02P

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH VERDIGRIS RIVER

ELEVATION IN FEET (NAVD)

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

CONFLUENCE OF SPRINGTOWN CREEK

273RD EAST AVE

CONFLUENCE OF MIDWAY CREEK

257TH EAST AVE

51ST ST SOUTH

61ST ST SOUTH

CONFLUENCE OF TIMBER AND CREEK

241ST EAST AVE

CONFLUENCE OF SCHOOL CREEK

225TH EAST AVE

FLOOD PROFILES
ADAMS CREEK

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH VERDIGRIS RIVER

ELEVATION IN FEET (NAVD)

221ST EAST AVE
61ST ST SOUTH
209TH EAST AVE
CONFLUENCE OF LONE STAR CREEK
COUNTY BOUNDARY

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

03P

LIMIT OF DETAILED STUDY

US HIGHWAY 69

OLD US HWY ROUTE 69

ELEVATION IN FEET (NAVD)

570 560 550 540 530 520 510 500 490 480

STREAM DISTANCE IN FEET ABOVE RAILROAD

20,000 21,000 22,000 23,000 24,000 25,000 26,000 27,000 28,000 29,000 30,000 31,000 32,000 33,000

A B C D

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD
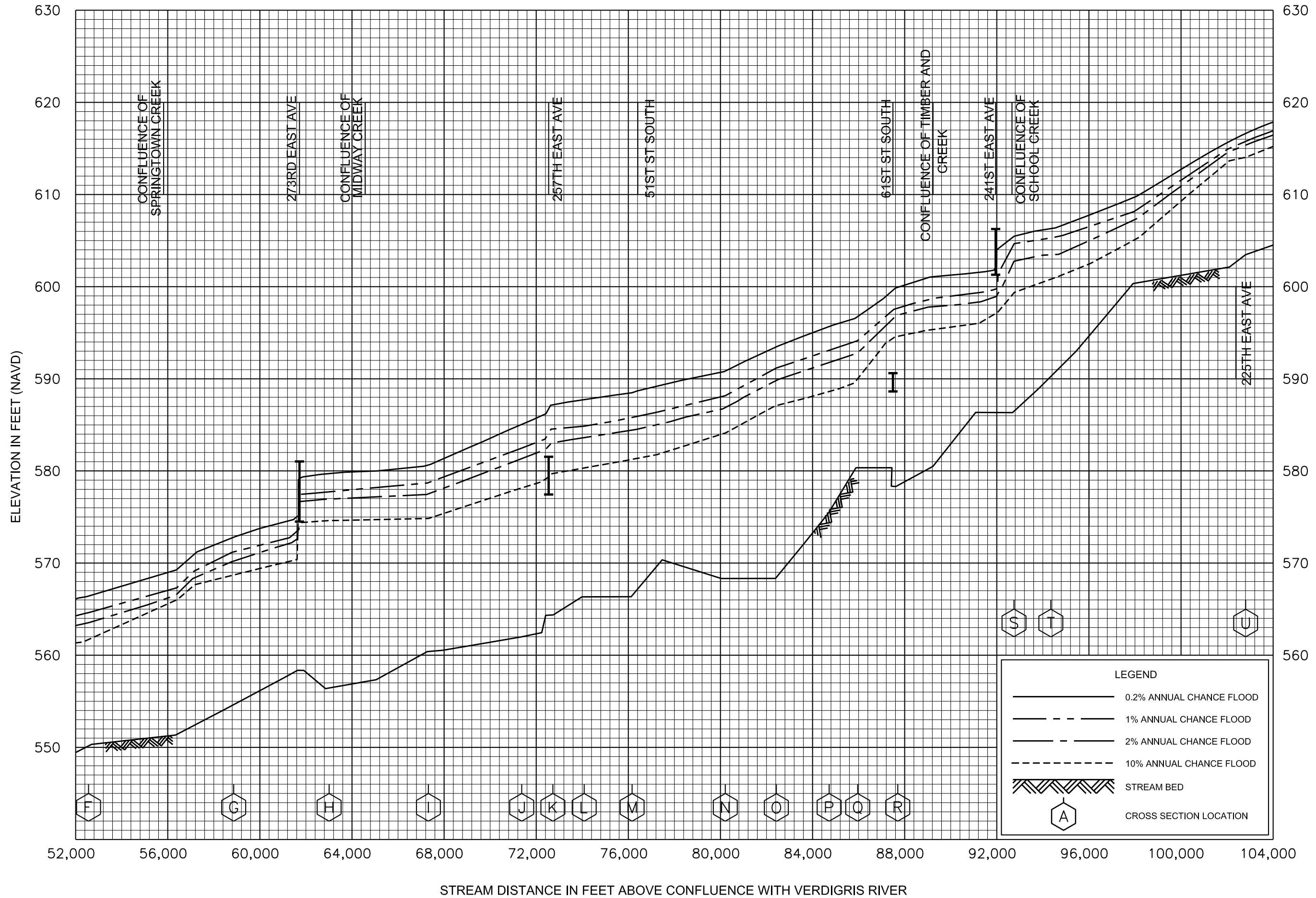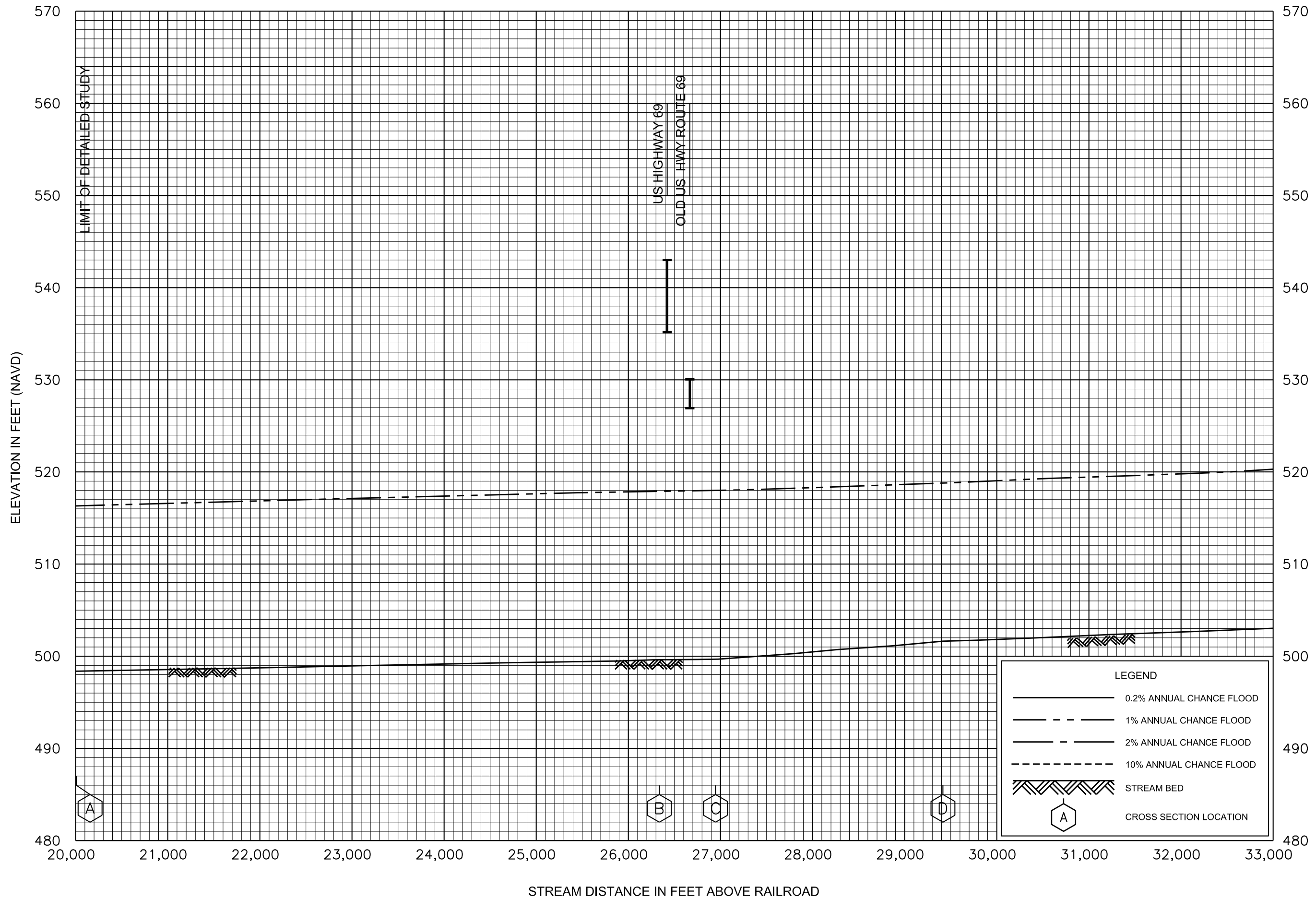
10% ANNUAL CHANCE FLOOD

STREAM BED

A CROSS SECTION LOCATION

FLOOD PROFILES

ARKANSAS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

04P

FLOOD PROFILES

ARKANSAS RIVER

LIMIT OF DETAILED STUDY

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE RAILROAD

LEGEND

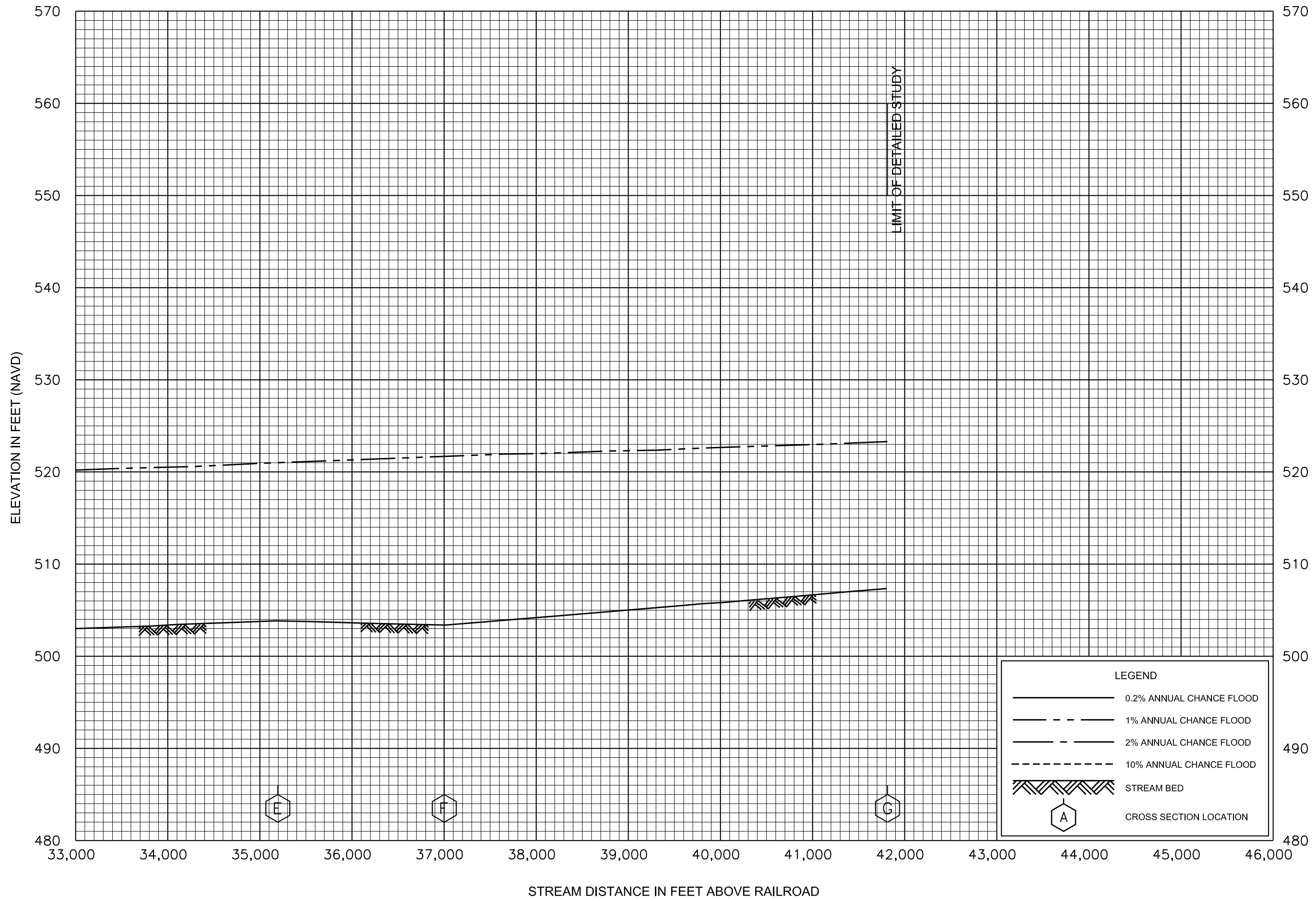|	
———	0.2% ANNUAL CHANCE FLOOD
— — —	1% ANNUAL CHANCE FLOOD
—·—·—	2% ANNUAL CHANCE FLOOD
- - - -	10% ANNUAL CHANCE FLOOD
⩗⩗⩗⩗	STREAM BED
Ⓐ	CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

05P

FLOOD PROFILES

ARKANSAS RIVER

WAGONER COUNTY, OK
AND INCORPORATED AREAS

FEDERAL EMERGENCY MANAGEMENT AGENCY

STREAM DISTANCE IN FEET ABOVE RIVER MILE 457.7

ELEVATION IN FEET (NAVD)

LIMIT OF DETAILED STUDY

OLD HWY 104 HASKELL GAGE

HWY 104 BRIDGE NEW

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

A CROSS SECTION LOCATION

06P

FLOOD PROFILES

ARKANSAS RIVER

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE RIVER MILE 457.7

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION
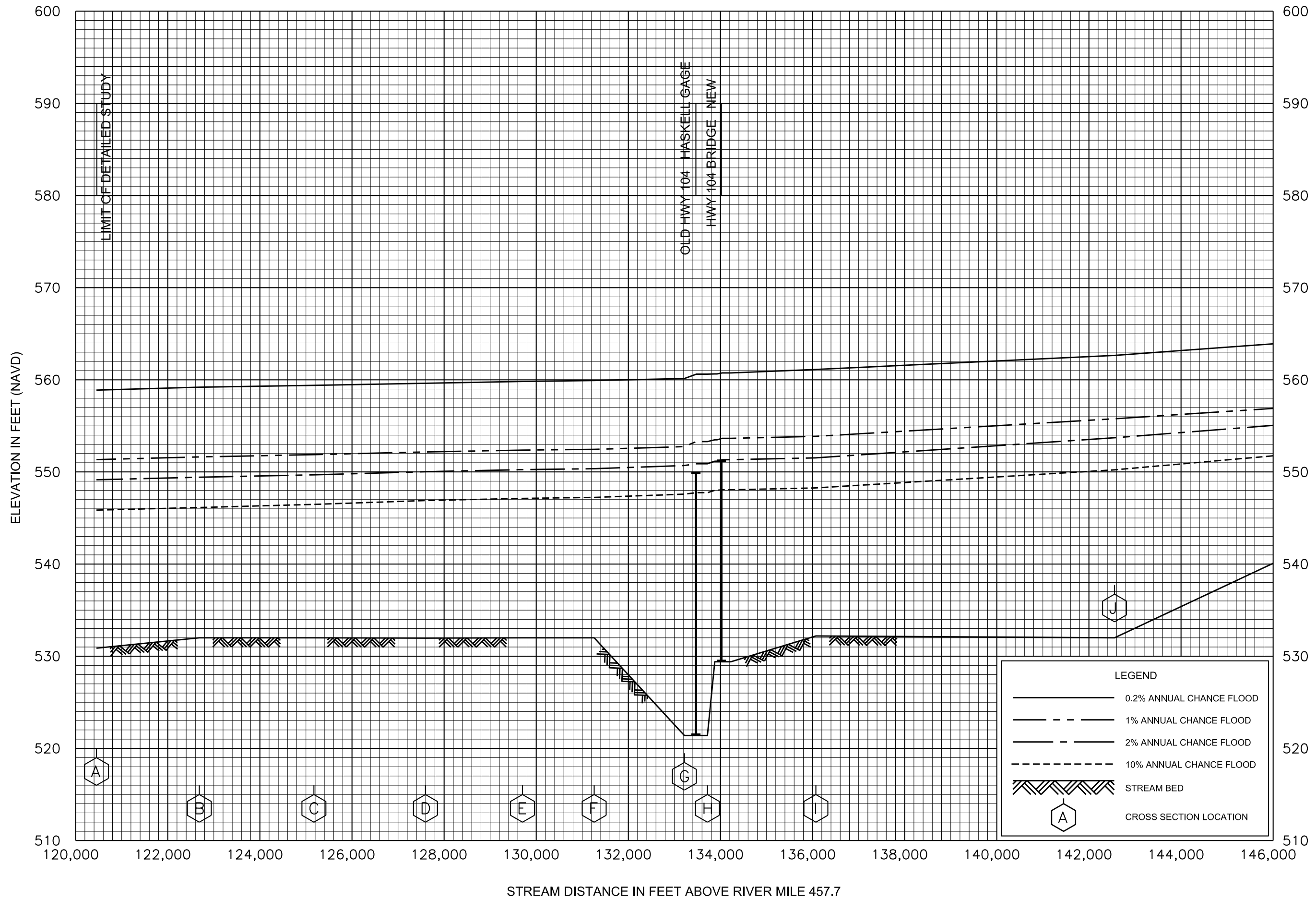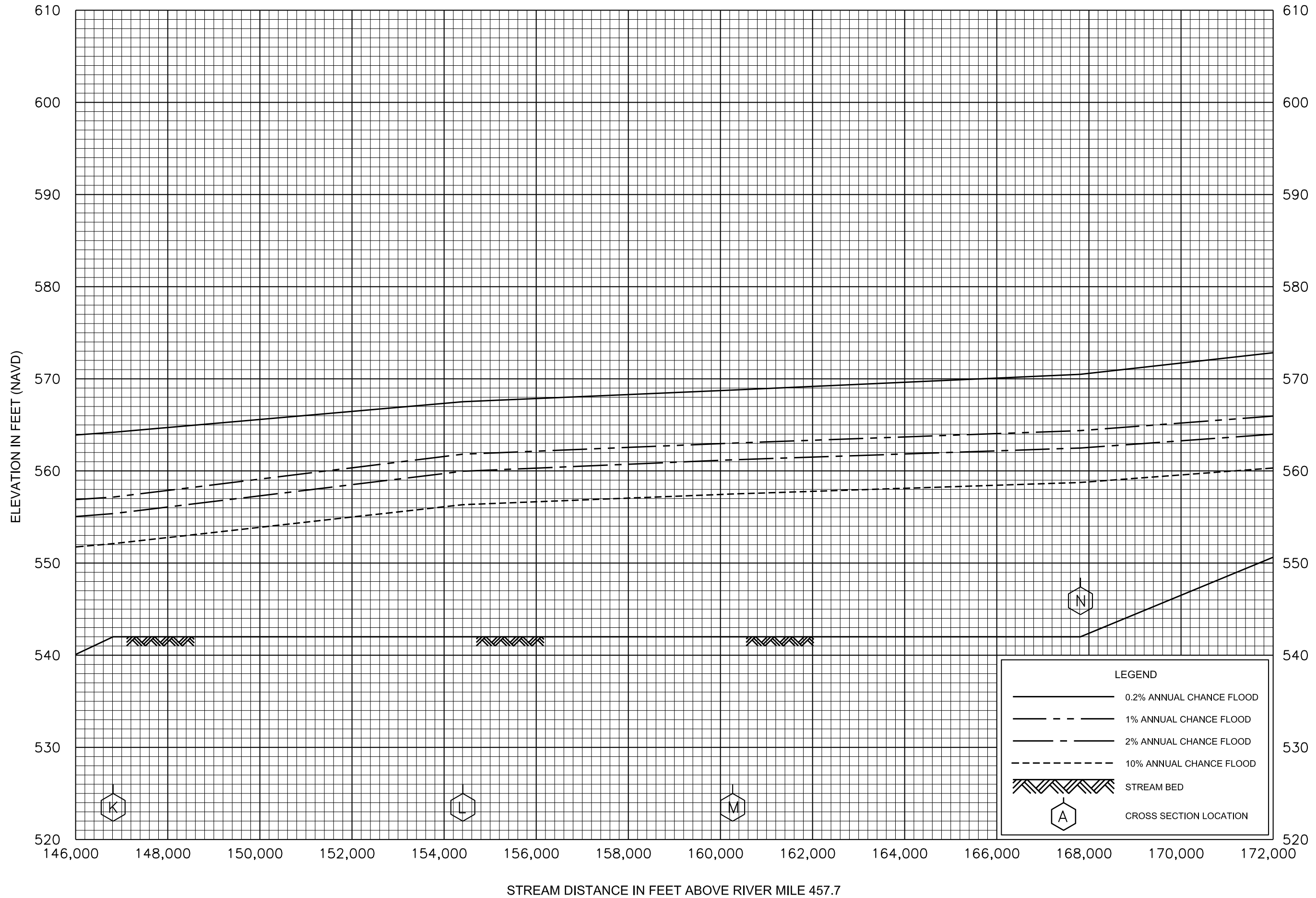
FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

07P

FLOOD PROFILES

ARKANSAS RIVER

STATE HWY 72

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE RIVER MILE 457.7

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

Ⓐ CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

08P

FLOOD PROFILES

ARKANSAS RIVER

LEGEND

——————	0.2% ANNUAL CHANCE FLOOD
— — — —	1% ANNUAL CHANCE FLOOD
— · — · —	2% ANNUAL CHANCE FLOOD
– – – – –	10% ANNUAL CHANCE FLOOD
◁◁◁◁◁◁	STREAM BED
Ⓐ	CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

09P

STREAM DISTANCE IN FEET ABOVE RIVER MILE 457.7

ELEVATIONS DOWNSTREAM OF THIS POINT ARE LOCATED IN TULSA
COUNTY. SEE TULSA COUNTY FIS REPORT FOR CROSS SECTIONS A THRU U

FLOOD PROFILES

BROKEN ARROW CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ARKANSAS RIVER

LEGEND

0.2% ANNUAL CHANCE FLOOD
1% ANNUAL CHANCE FLOOD
2% ANNUAL CHANCE FLOOD
4% ANNUAL CHANCE FLOOD
10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

10P

FLOOD PROFILES
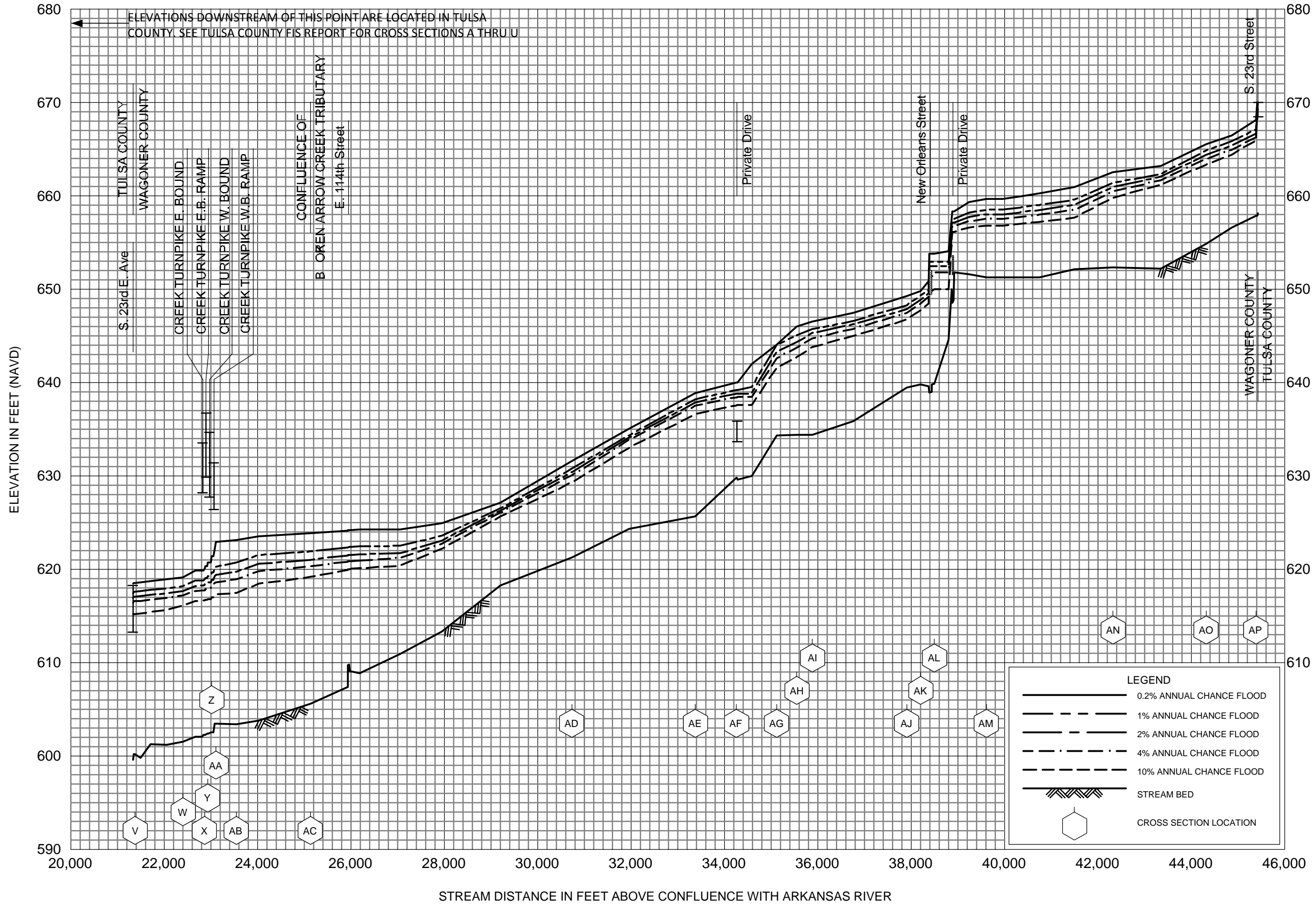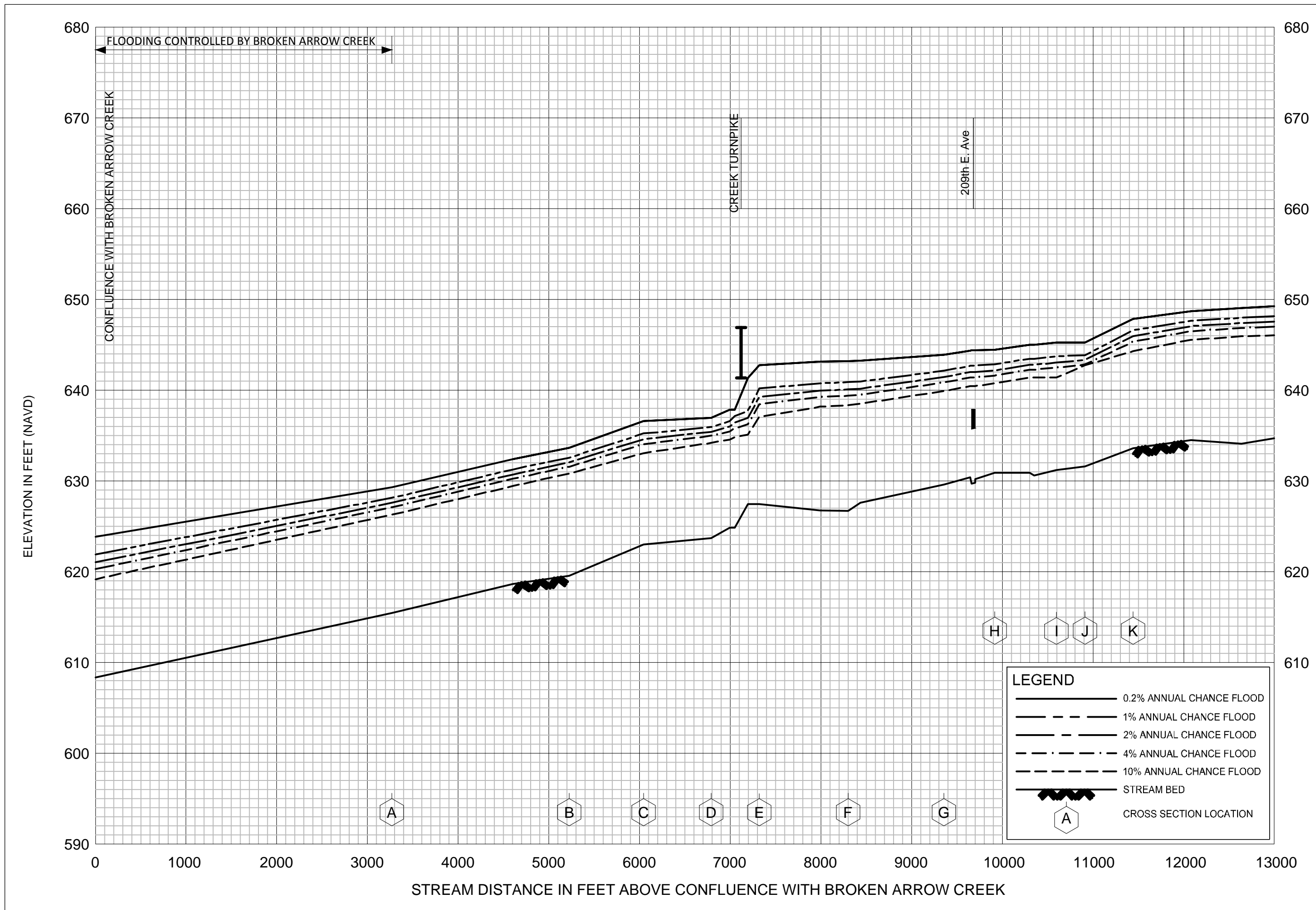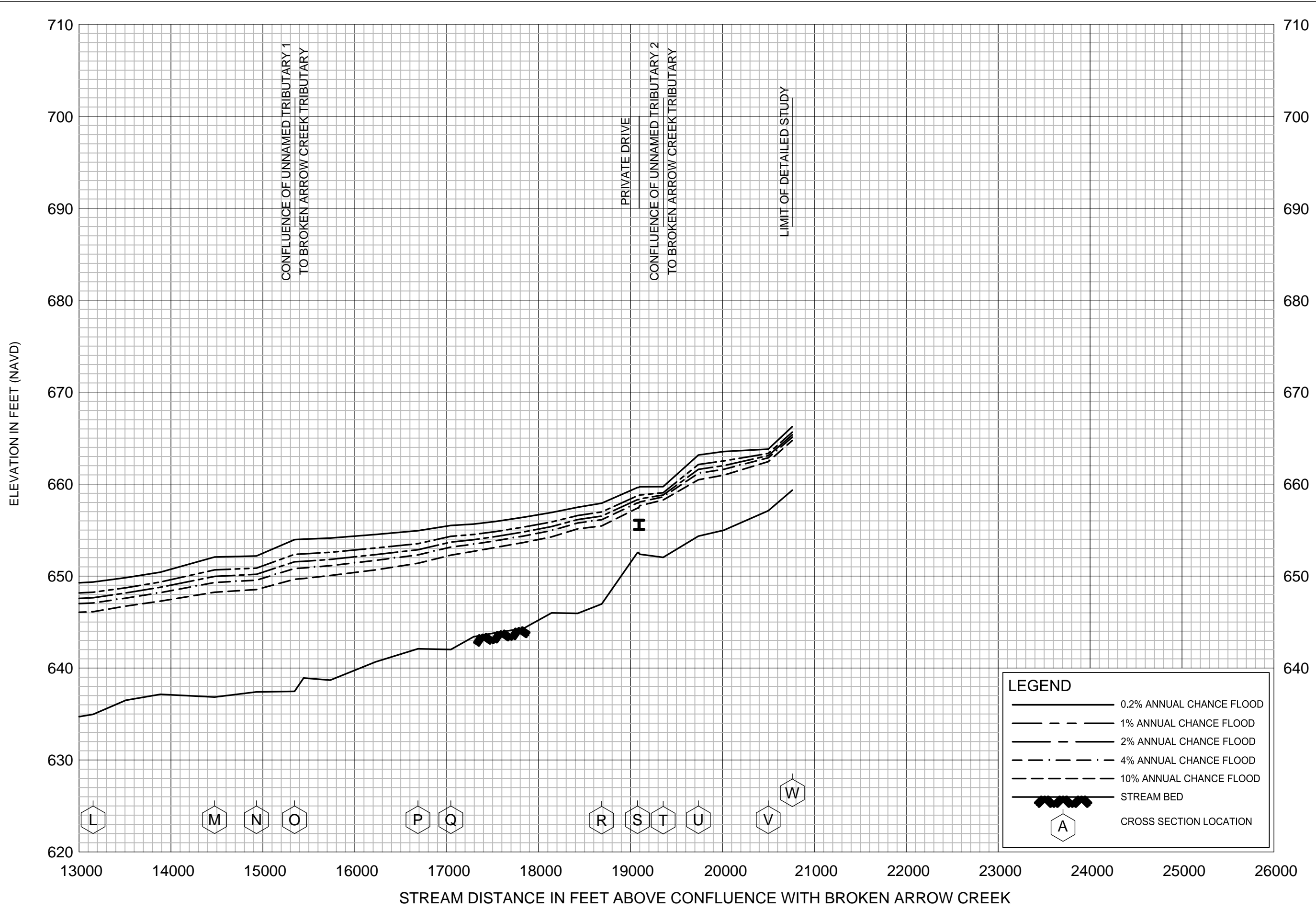BROKEN ARROW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

11P

FLOOD PROFILES
BROKEN ARROW CREEK TRIBUTARY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

FEDERAL EMERGENCY MANAGEMENT AGENCY

12P

FLOOD PROFILES

COVINGTON CREEK

ELEVATION IN FEET (NAVD)

CONFLUENCE WITH ADAMS CREEK

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ADAMS CREEK

LEGEND

———— 0.2% ANNUAL CHANCE FLOOD

– – – – 1% ANNUAL CHANCE FLOOD

— - — - 2% ANNUAL CHANCE FLOOD

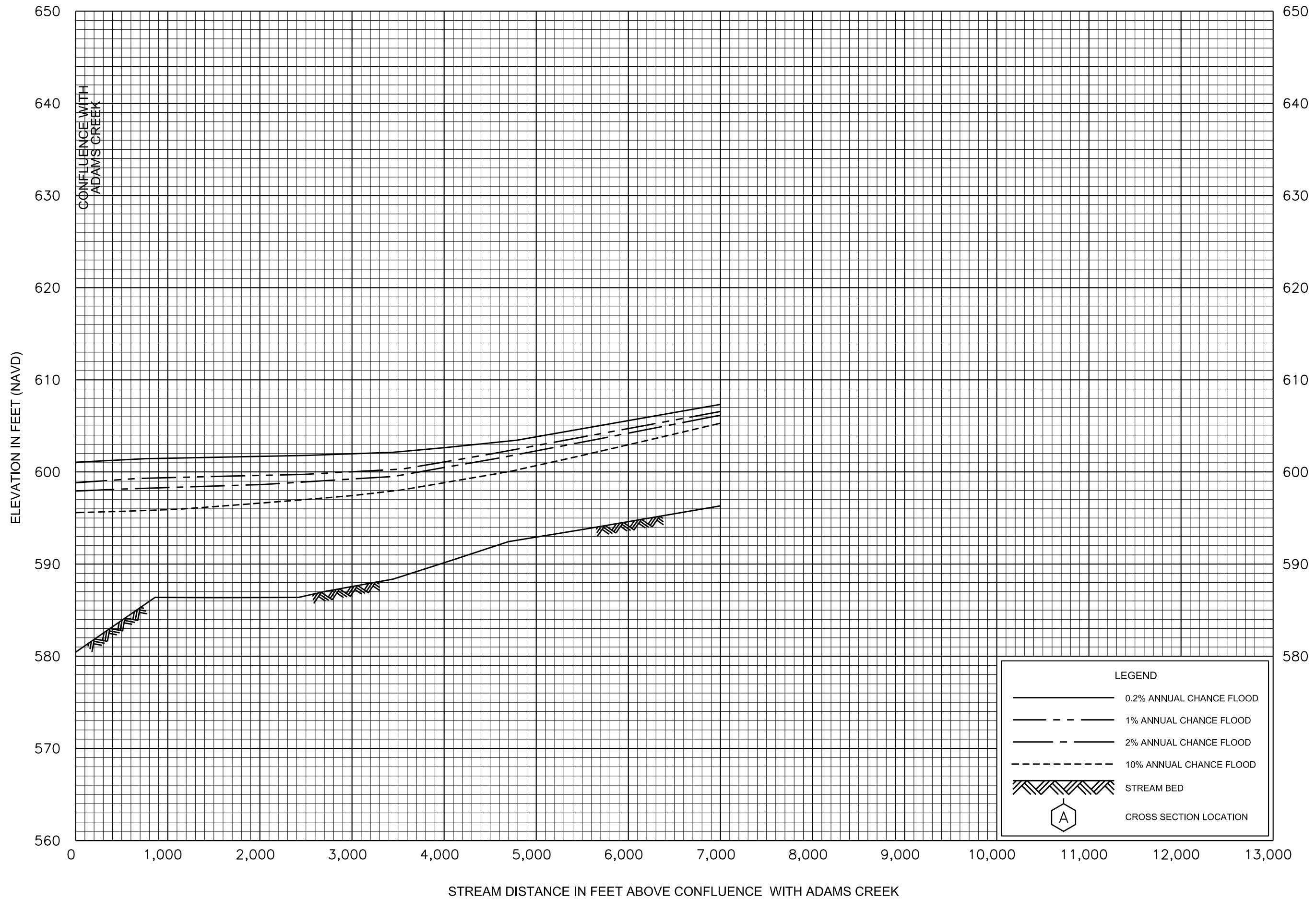- - - - - 10% ANNUAL CHANCE FLOOD

〰〰〰 STREAM BED

Ⓐ CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

13P

FLOOD PROFILES

COVINGTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

14P

LEGEND

— 0.2% ANNUAL CHANCE FLOOD
--- 1% ANNUAL CHANCE FLOOD
—·— 2% ANNUAL CHANCE FLOOD
- - - 10% ANNUAL CHANCE FLOOD
⋀⋀⋀ STREAM BED
(A) CROSS SECTION LOCATION

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ADAMS CREEK

71ST STREET SOUTH

CONFLUENCE OF
COVINGTON CREEK TRIBUTARY

FORREST RIDGE
BOULEVARD

LIMIT OF FLOODWAY

LIMIT OF FLOODWAY

81ST ST SOUTH

STATION 14,146 TO
STATION 15,000

FLOOD PROFILES
COVINGTON CREEK
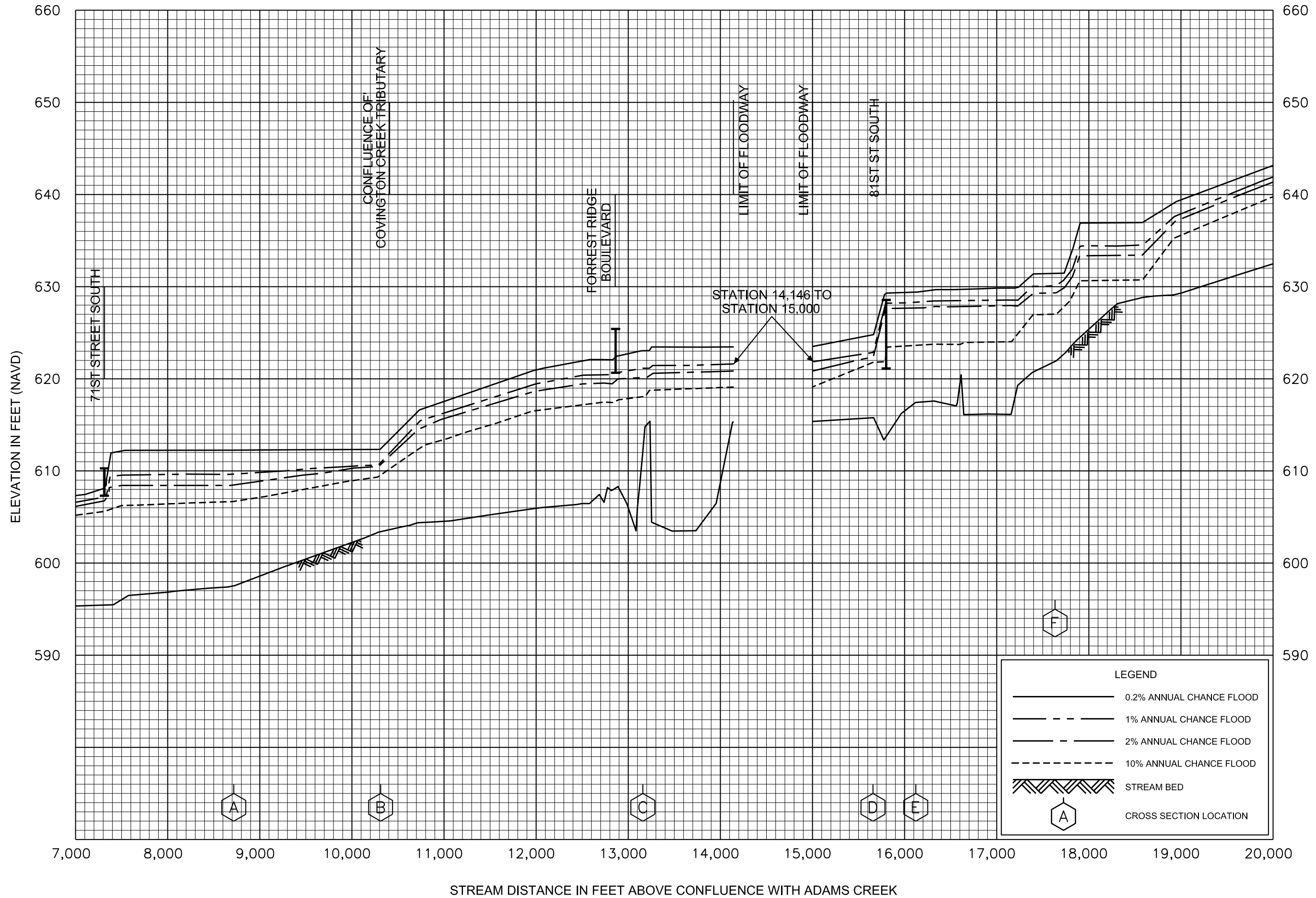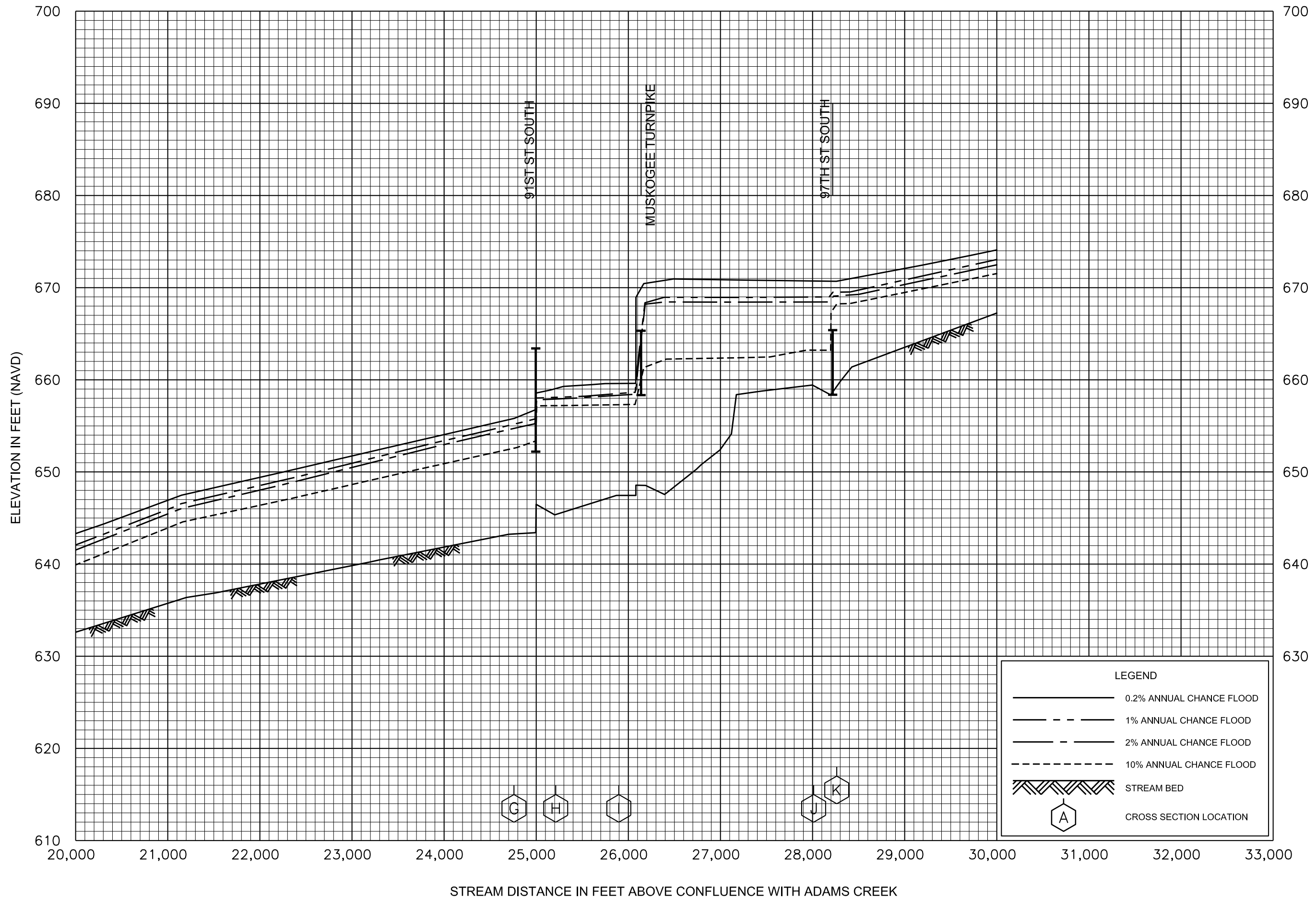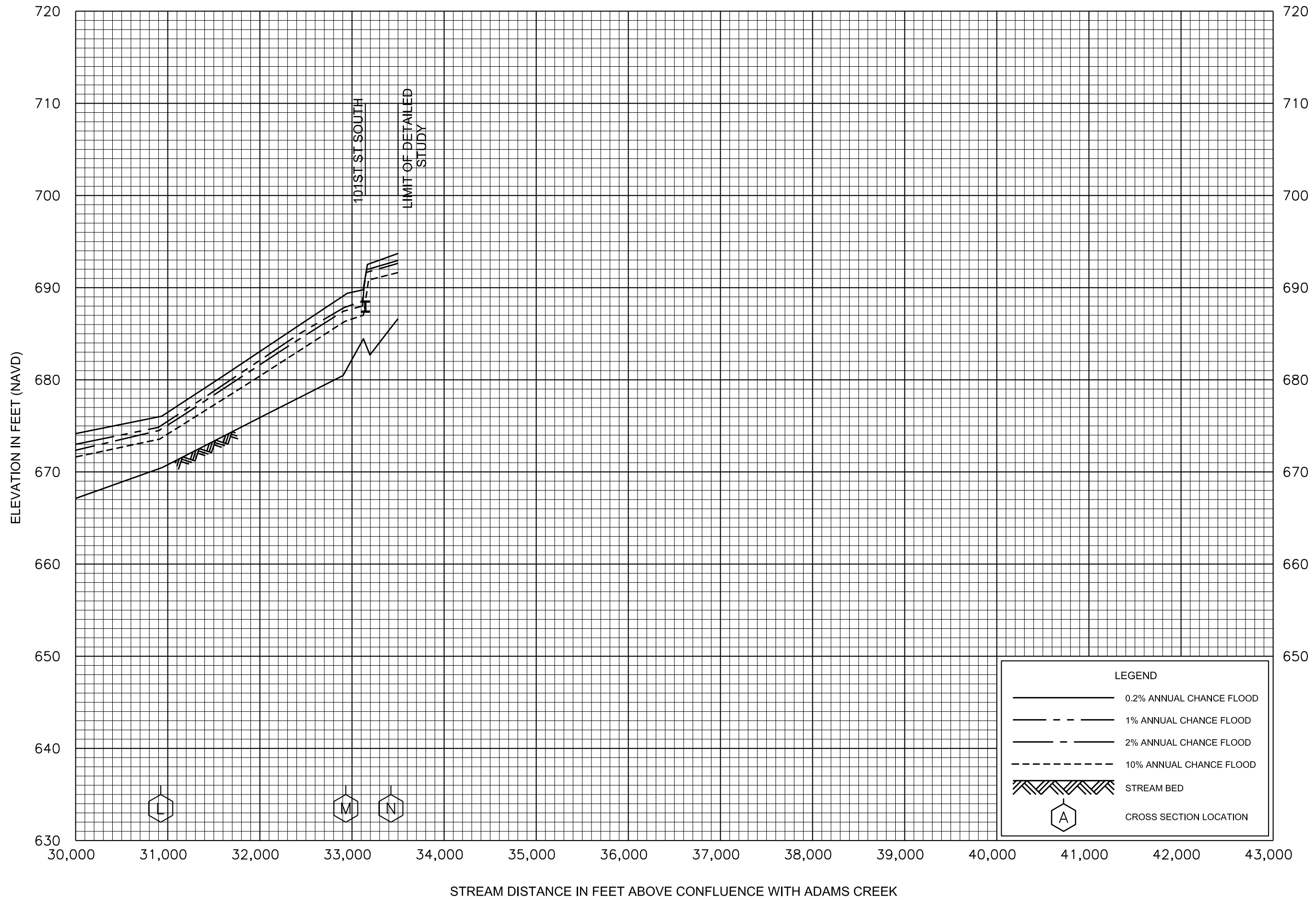
FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

15P

FLOOD PROFILES
COVINGTON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

16P

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ADAMS CREEK

ELEVATION IN FEET (NAVD)

LEGEND

——————— 0.2% ANNUAL CHANCE FLOOD
– – – – – – 1% ANNUAL CHANCE FLOOD
— - — - — 2% ANNUAL CHANCE FLOOD
- - - - - - - 10% ANNUAL CHANCE FLOOD
� STREAM BED
Ⓐ CROSS SECTION LOCATION

101ST ST SOUTH

LIMIT OF DETAILED STUDY

FLOOD PROFILES

COVINGTON CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

17P

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

A — CROSS SECTION LOCATION

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH COVINGTON CREEK

CONFLUENCE WITH COVINGTON CREEK

FOREST RIDGE BLVD

HOUSTON ST

LIMIT OF DETAILED STUDY

FLOOD PROFILES

COWETA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

18P

FLOOD PROFILES

COWETA CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
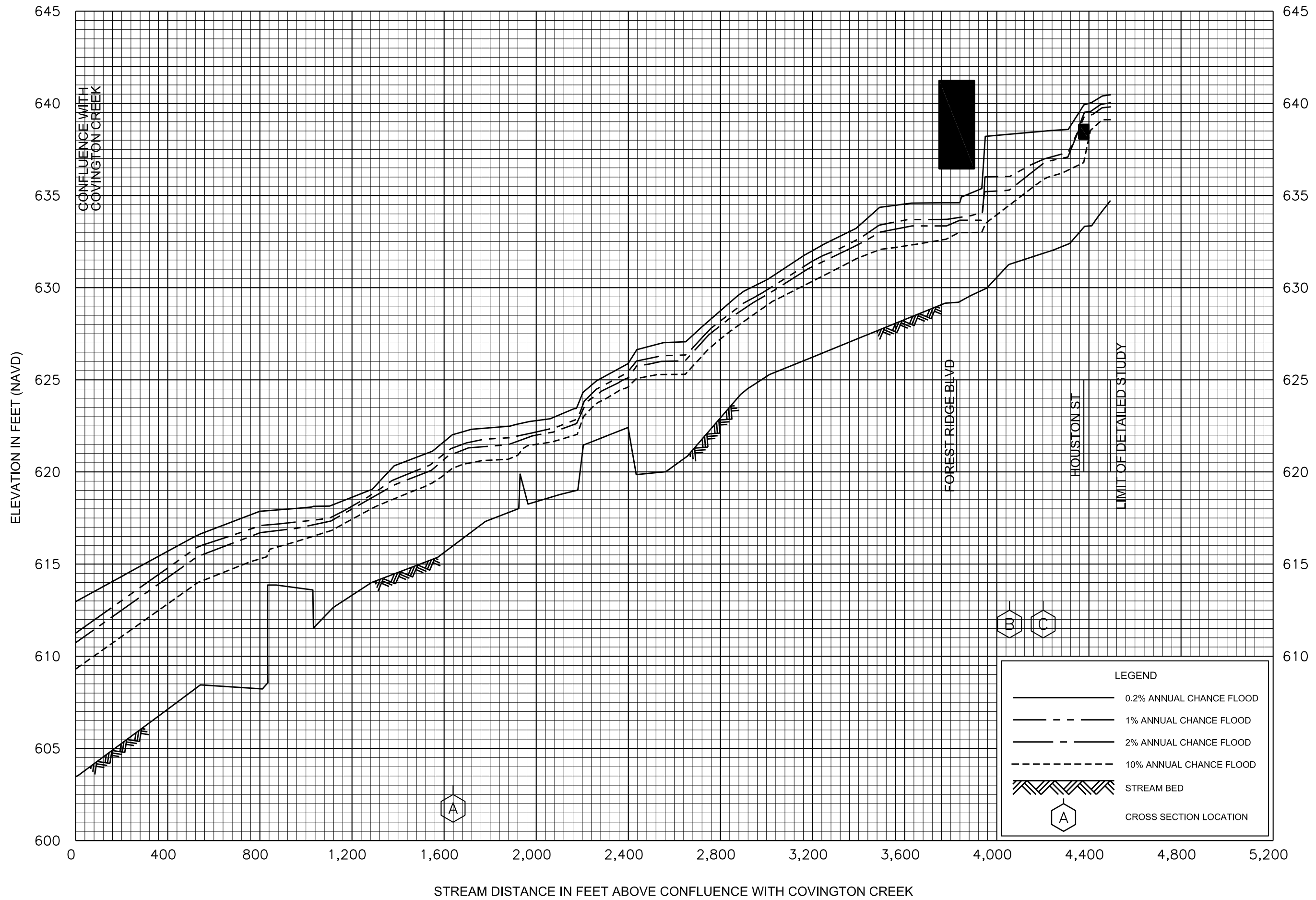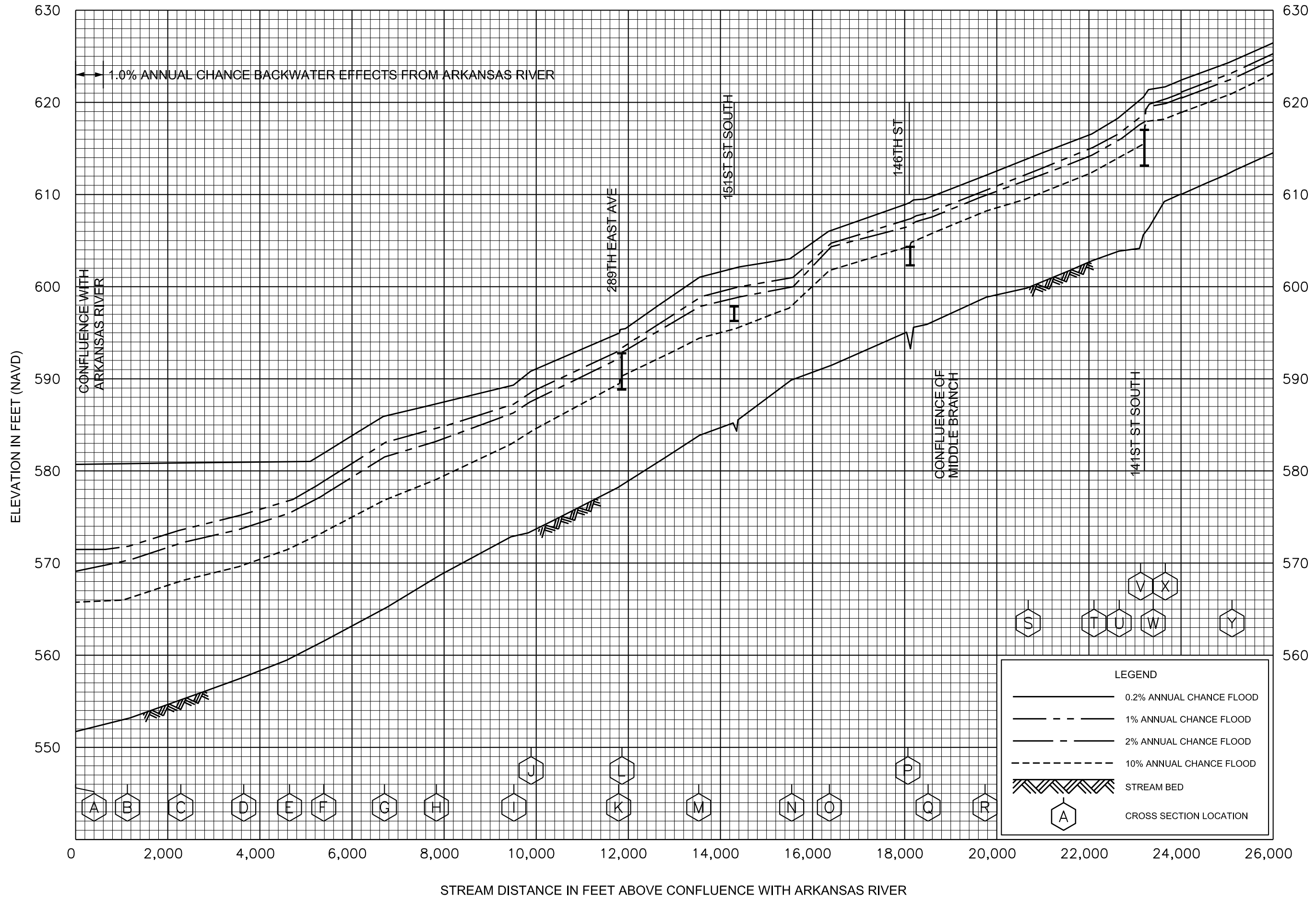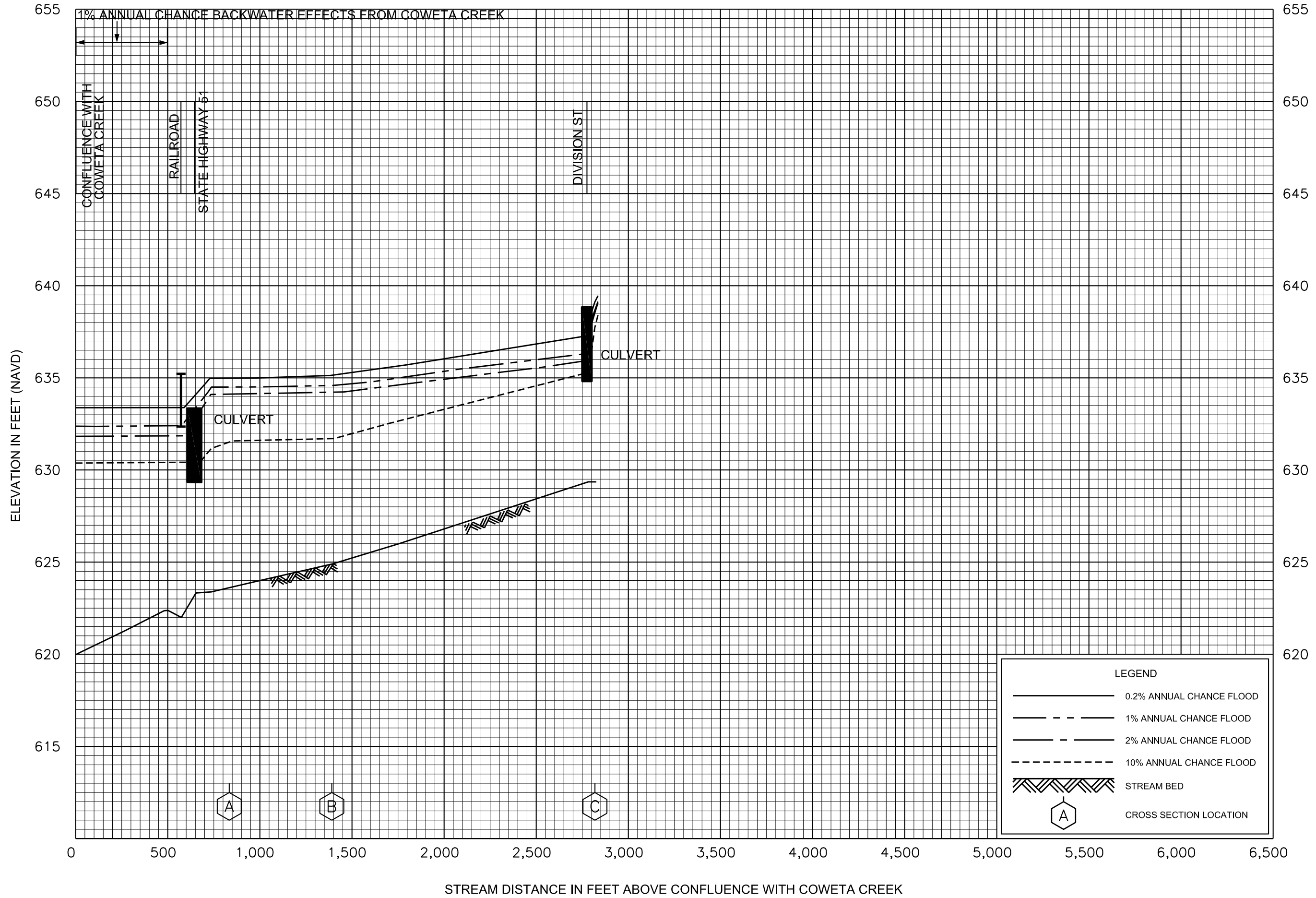
WAGONER COUNTY, OK
AND INCORPORATED AREAS

19P

FLOOD PROFILES

COWETA CREEK TRIBUTARY A

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

20P

FLOOD PROFILES

COWETA CREEK TRIBUTARY A

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH COWETA CREEK

21P

LEGEND

———————— 0.2% ANNUAL CHANCE FLOOD

— — — — 1% ANNUAL CHANCE FLOOD

— · — · — 2% ANNUAL CHANCE FLOOD

- - - - - 10% ANNUAL CHANCE FLOOD

∧∧∧∧∧ STREAM BED

Ⓐ CROSS SECTION LOCATION

FLOOD PROFILES

COWETA CREEK TRIBUTARY B

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

22P

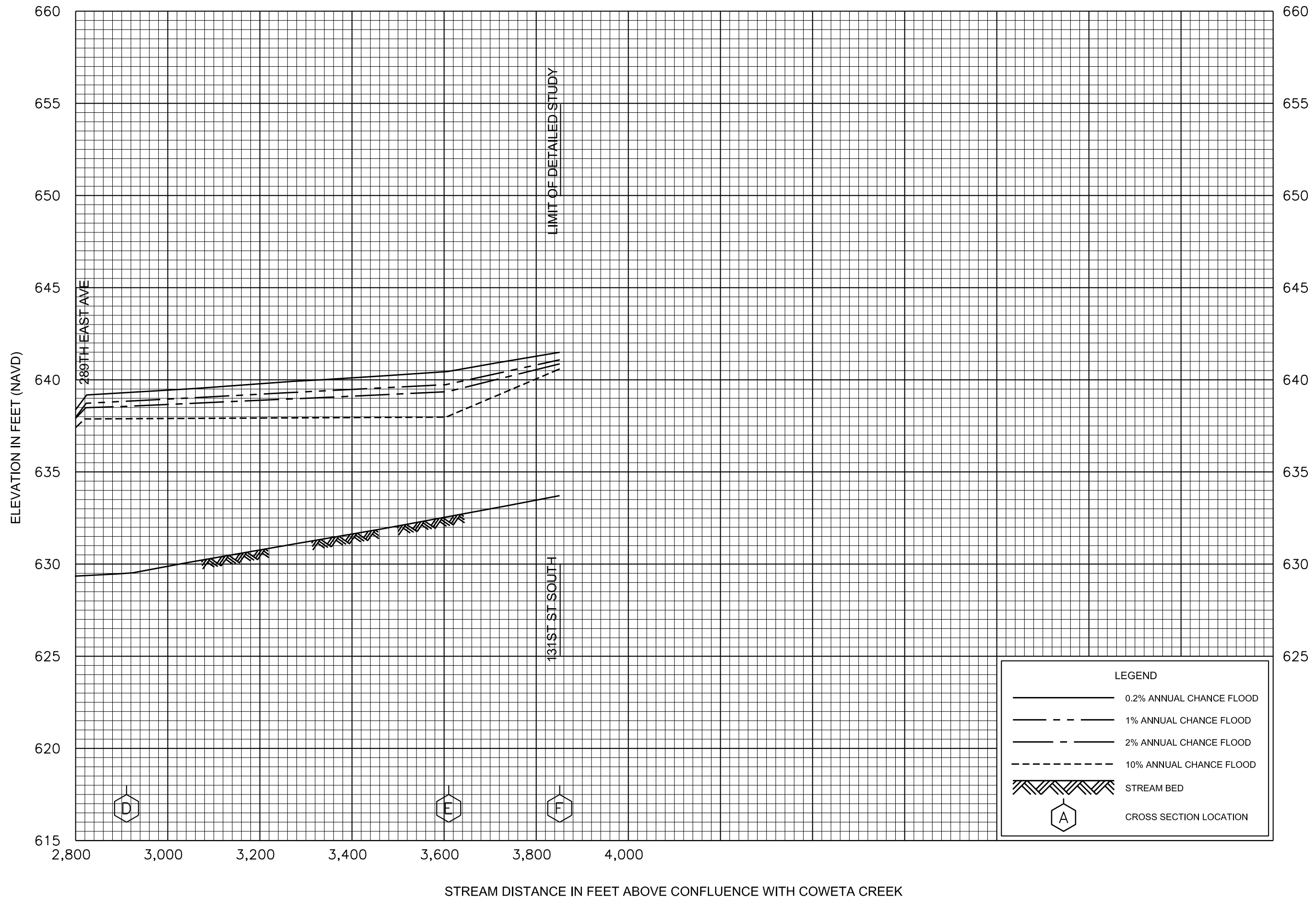STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH COWETA CREEK

ELEVATION IN FEET (NAVD)

LEGEND

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

FLOODING CONTROLLED BY COWETA CREEK

119TH ST

LIMIT OF DETAILED STUDY

CONFLUENCE WITH COWETA CREEK

FLOOD PROFILES

EAST COAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
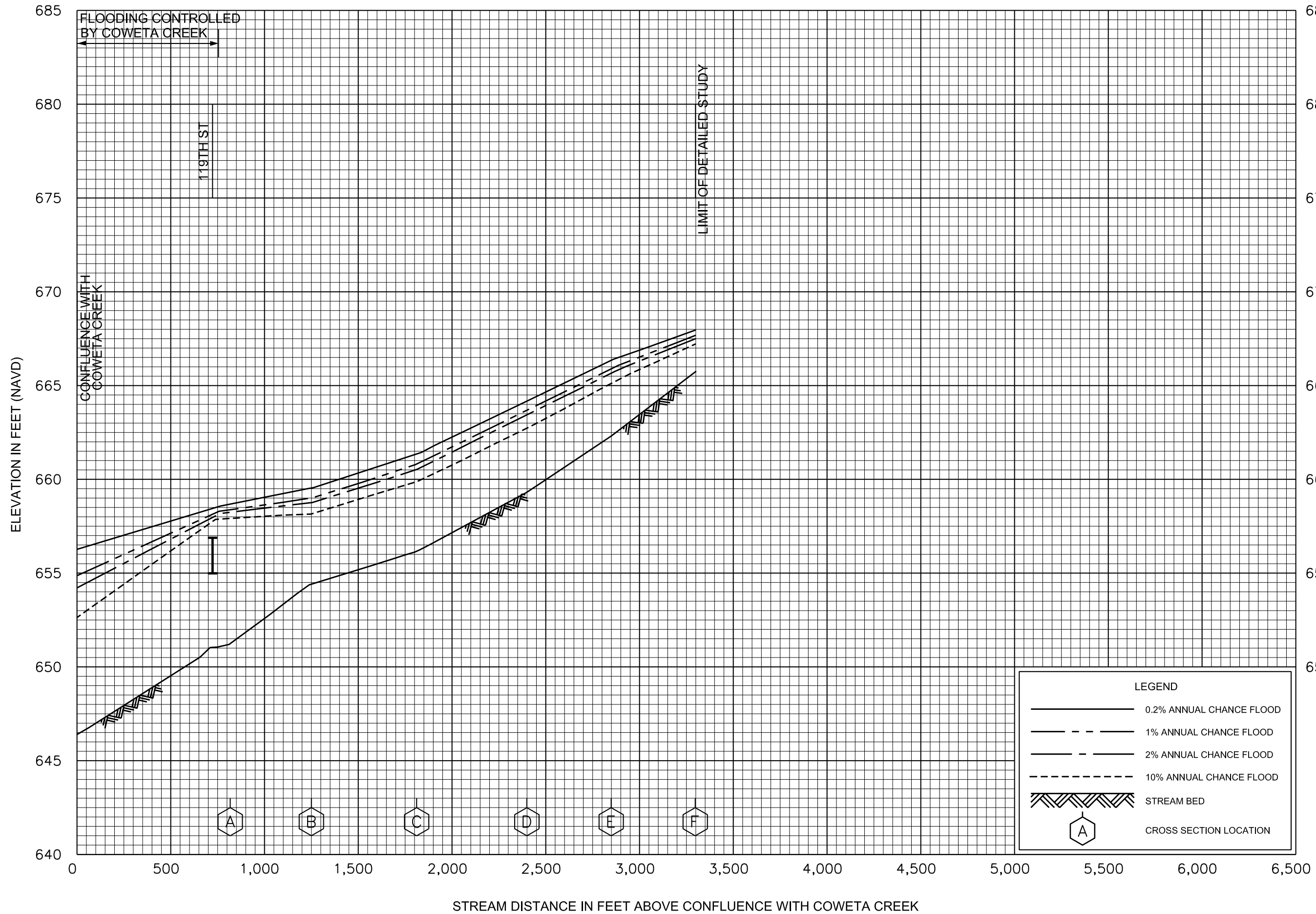
WAGONER COUNTY, OK
AND INCORPORATED AREAS

23P

FLOOD PROFILES

EAST COAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

24P

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH VERDIGRIS RIVER

ELEVATION IN FEET (NAVD)

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

ACCESS RD

STATE HIGHWAY 51

TIMBERLANE DR

RAILROAD

PIERCE AVE

LIMIT OF DETAILED STUDY

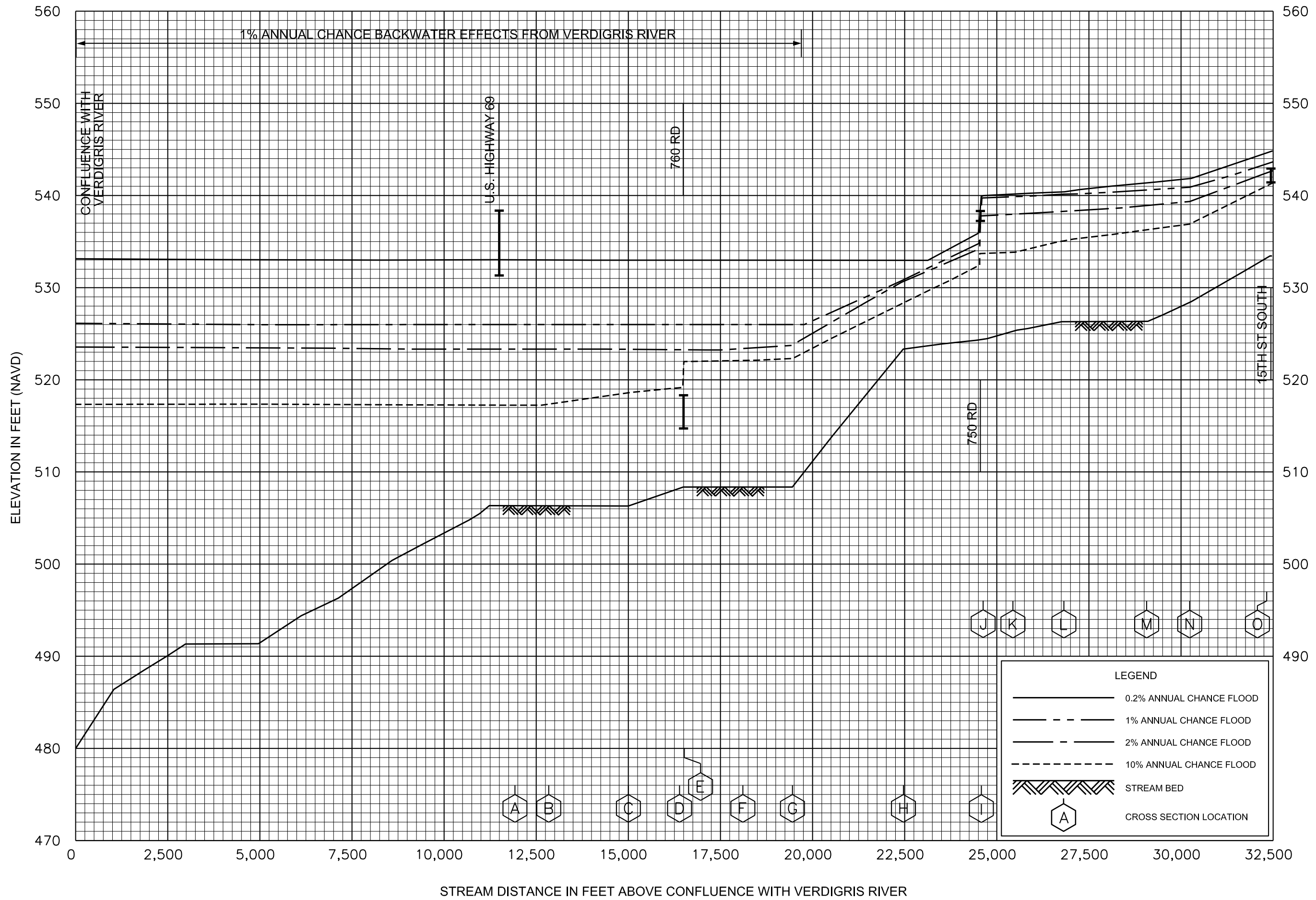FLOOD PROFILES
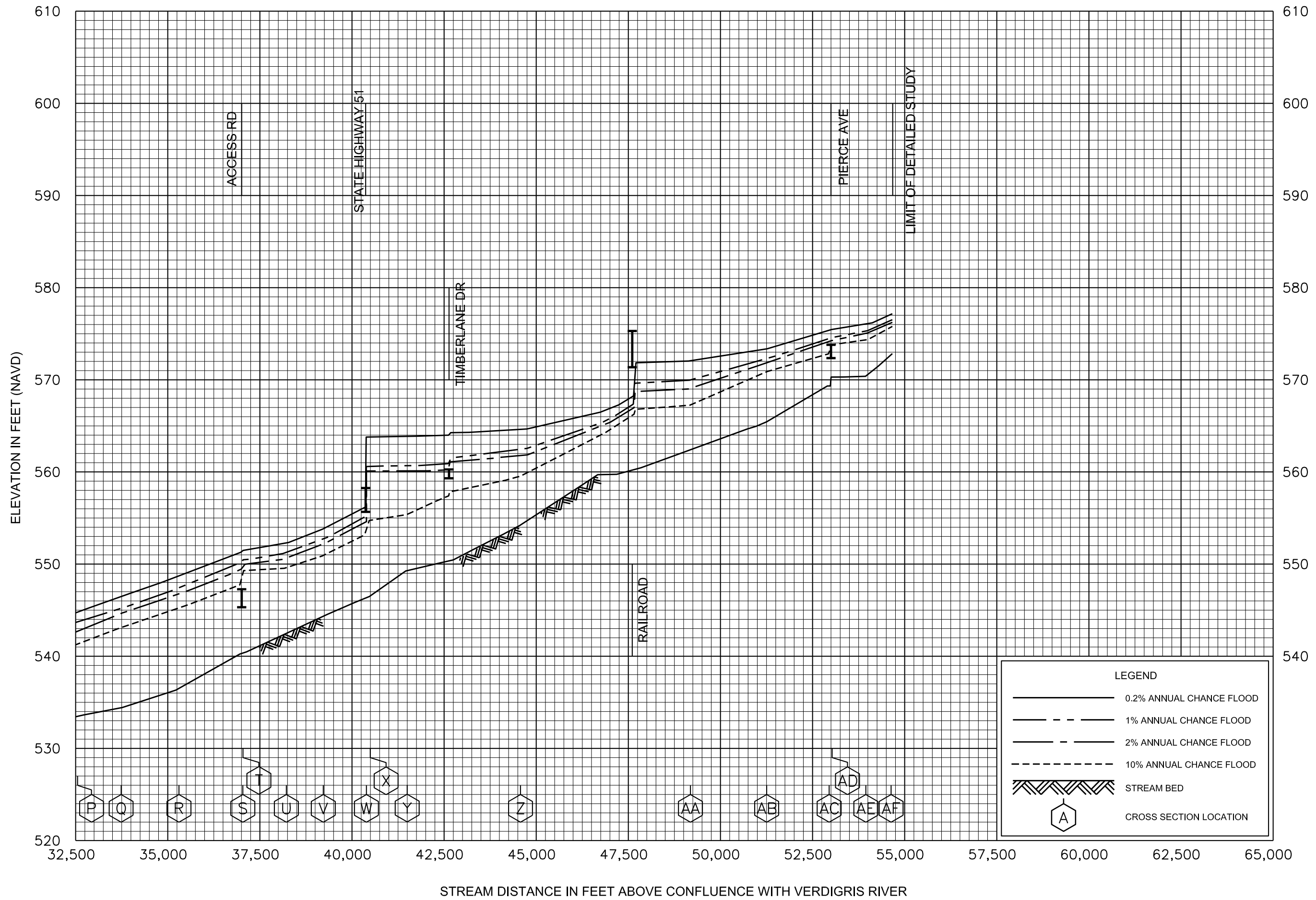LONE STAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

25P

FLOOD PROFILES

LONE STAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

26P

FLOOD PROFILES

MIDDLE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

27P

FLOOD PROFILES

MIDDLE BRANCH TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

28P

LEGEND

———————— 0.2% ANNUAL CHANCE FLOOD

—— · —— · 1% ANNUAL CHANCE FLOOD

—— ·· —— ·· 2% ANNUAL CHANCE FLOOD

— — — — 10% ANNUAL CHANCE FLOOD

〰〰〰 STREAM BED

⬡ CROSS SECTION LOCATION

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH MIDDLE BRANCH

ACCESS ROAD

ACCESS ROAD
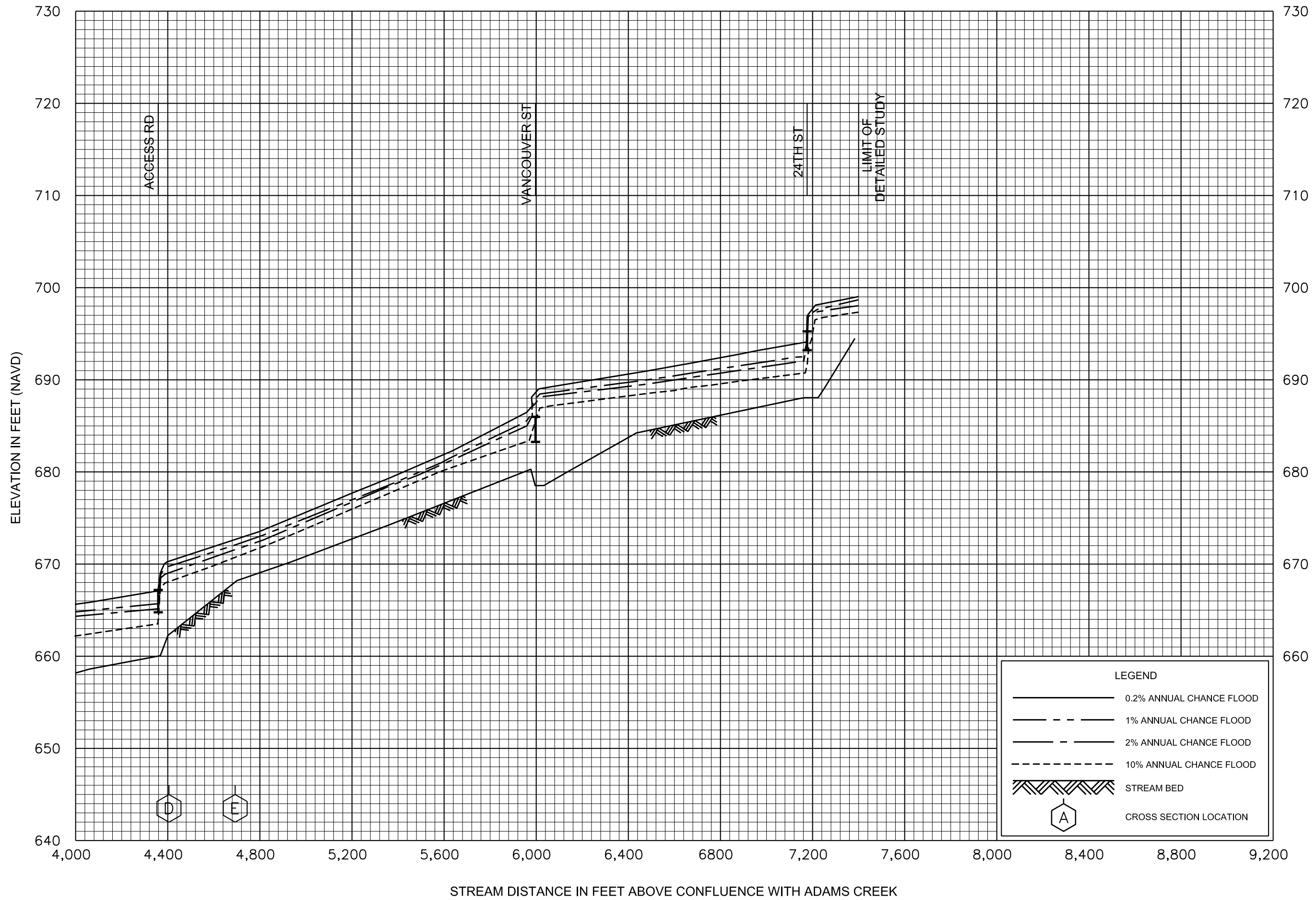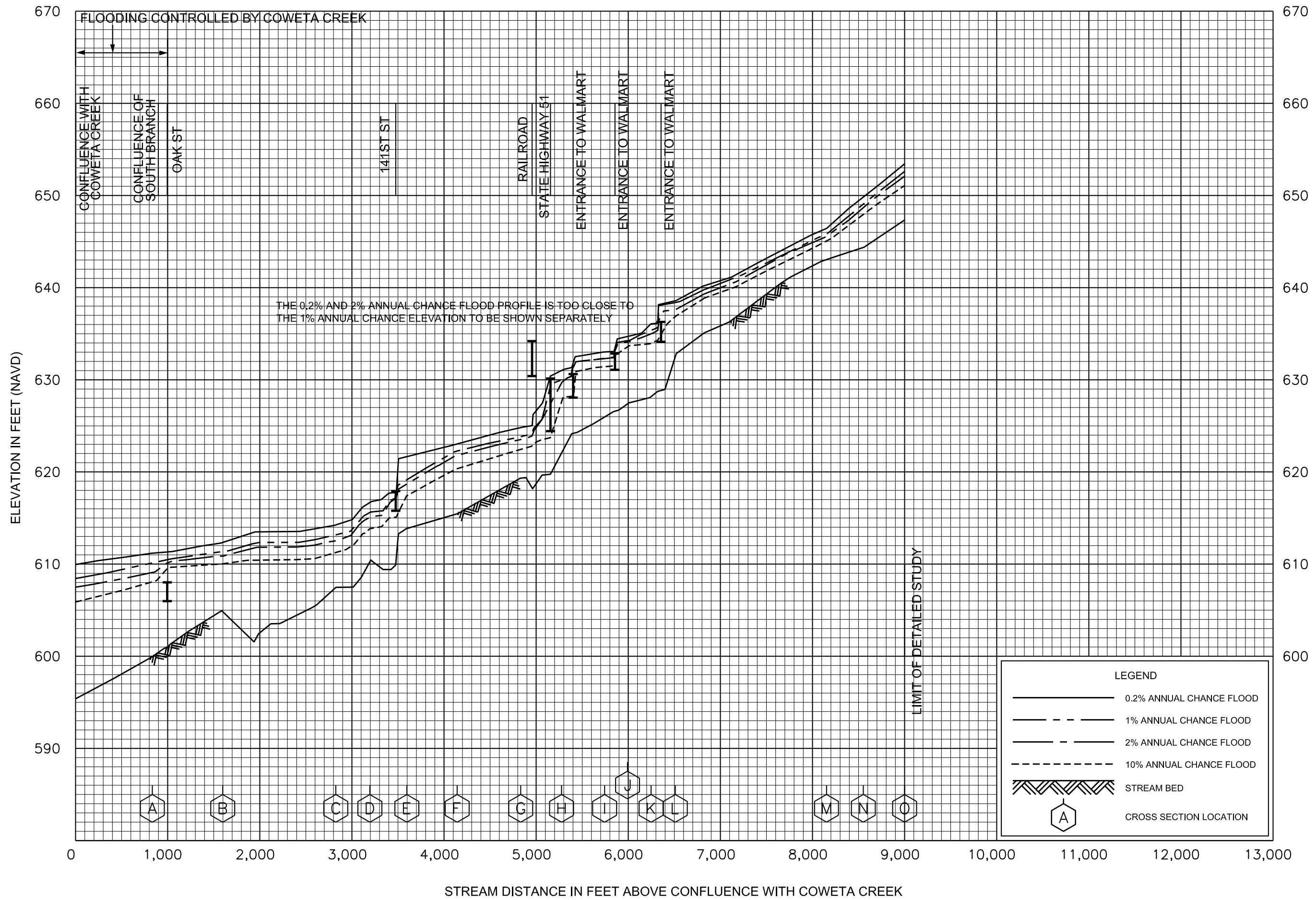
ACCESS ROAD

LIMIT OF DETAILED STUDY

A   B   C

FLOOD PROFILES

MIDWAY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

29P

FLOOD PROFILES

MIDWAY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

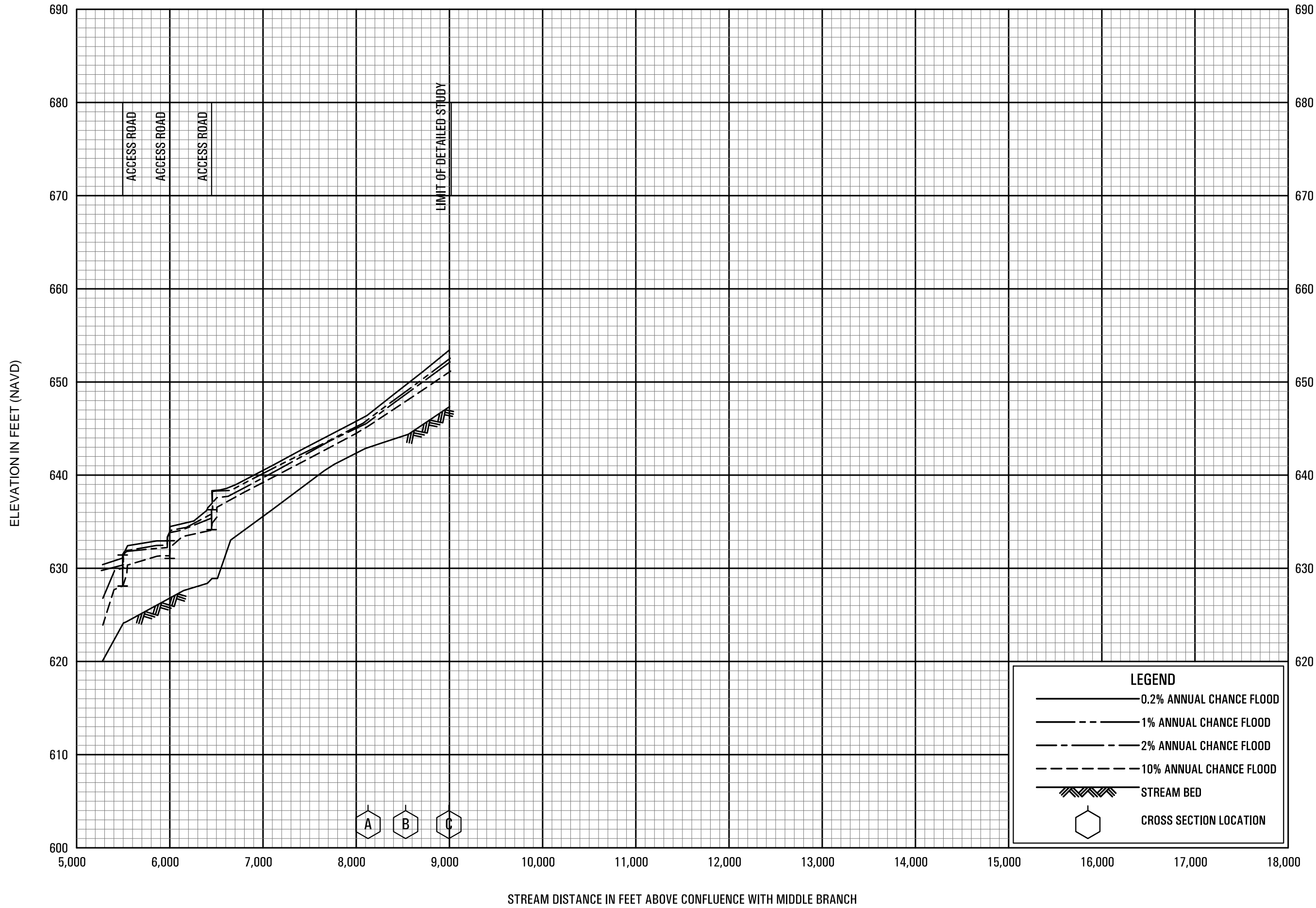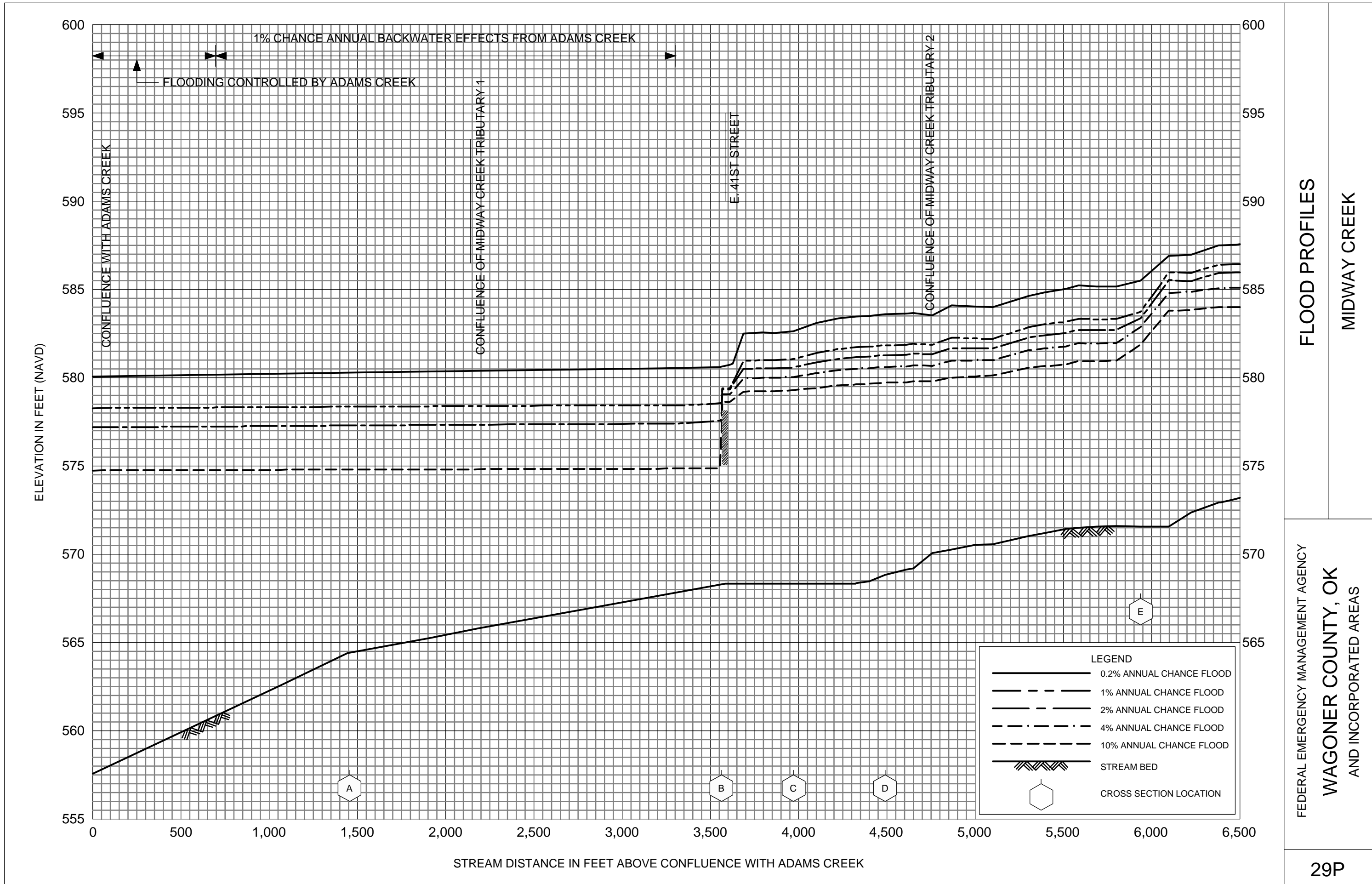WAGONER COUNTY, OK
AND INCORPORATED AREAS

30P

FLOOD PROFILES

MIDWAY CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

31P

CONFLUENCE WITH MIDWAY CREEK

LIMIT OF DETAILED STUDY

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH MIDWAY CREEK

LEGEND

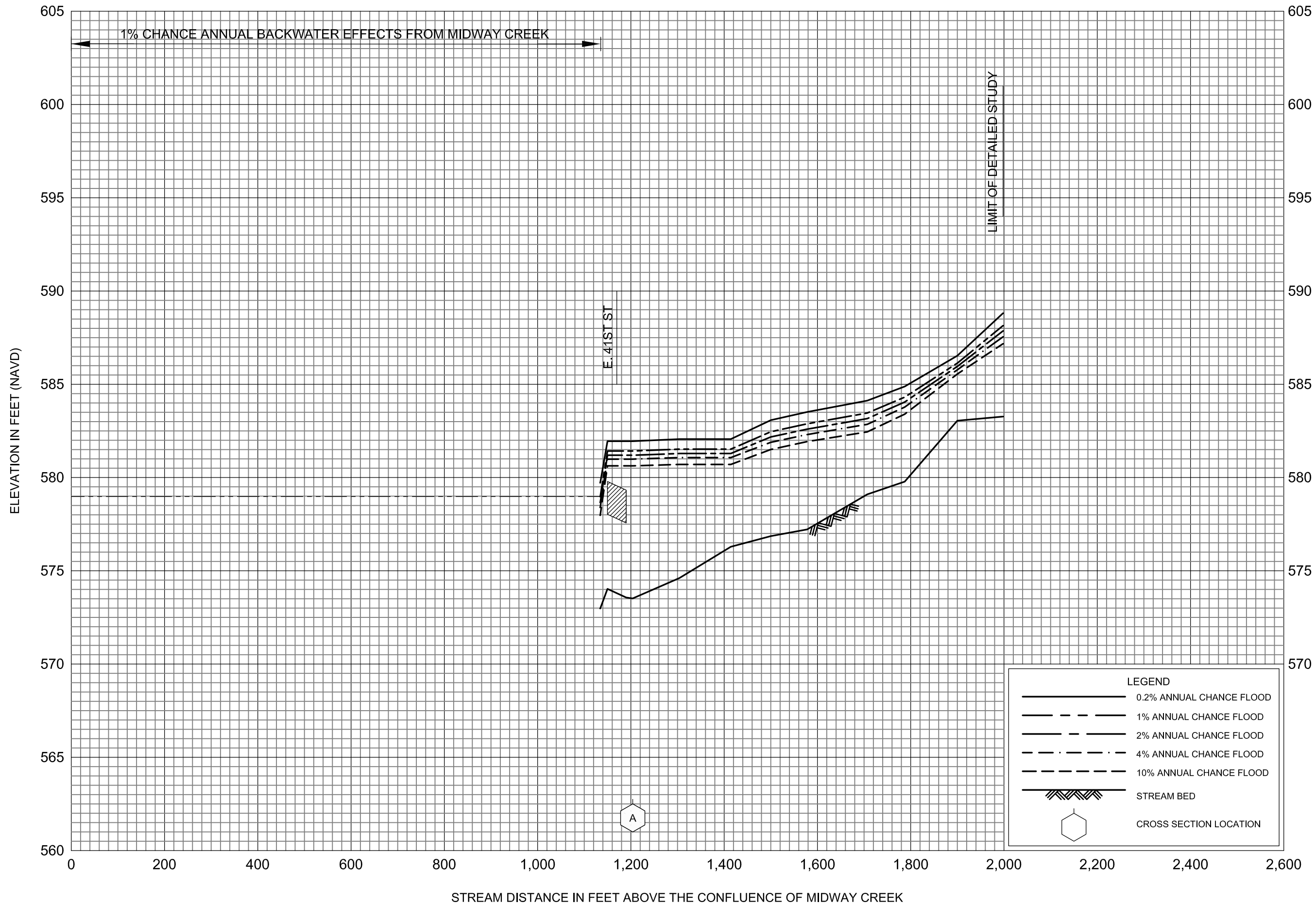|	
————————	0.2% ANNUAL CHANCE FLOOD
– – – – – –	1% ANNUAL CHANCE FLOOD
—·—·—·—	2% ANNUAL CHANCE FLOOD
– · – · – · –	4% ANNUAL CHANCE FLOOD
– – – – – –	10% ANNUAL CHANCE FLOOD
▨▨▨▨▨	STREAM BED
⬡	CROSS SECTION LOCATION
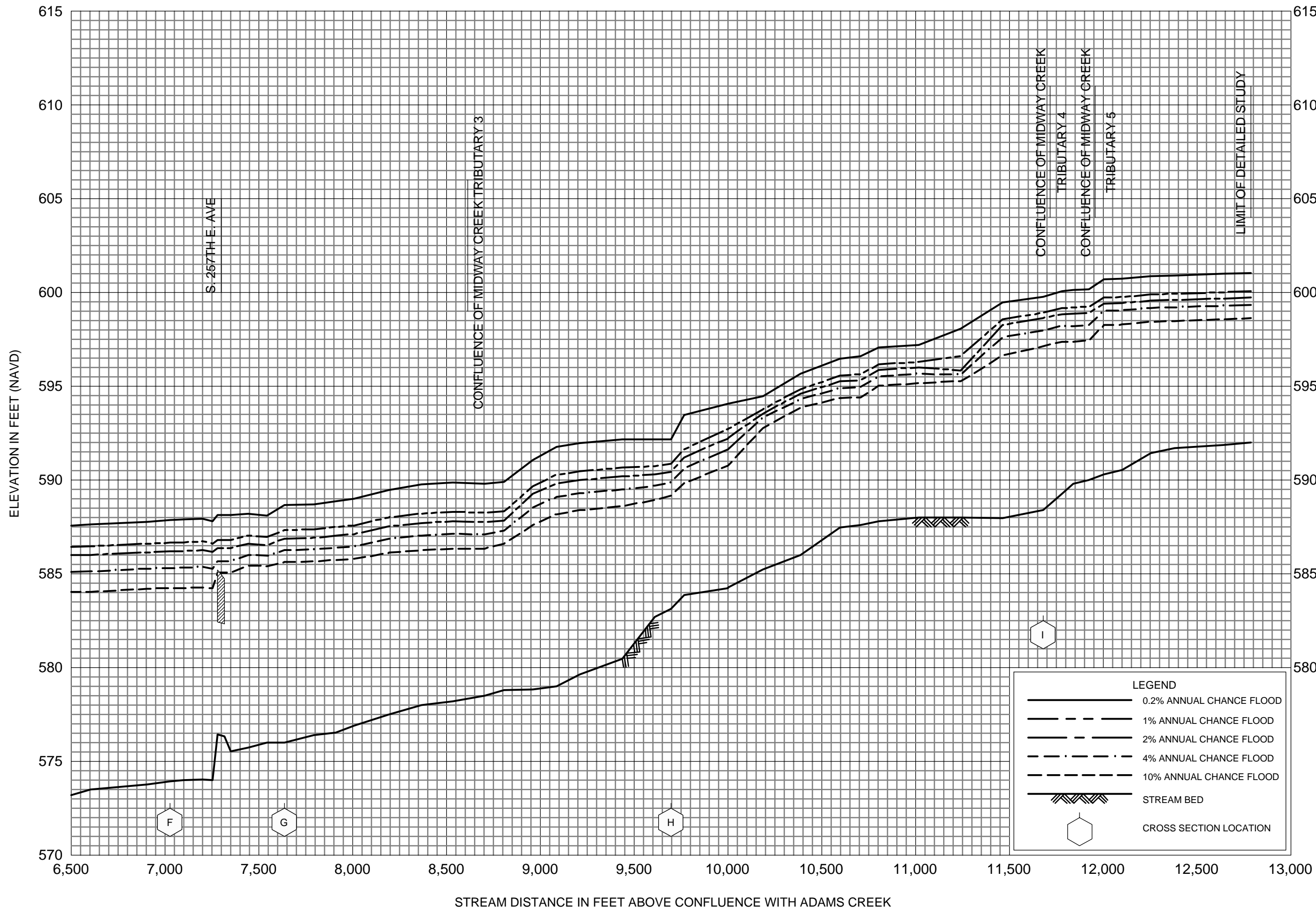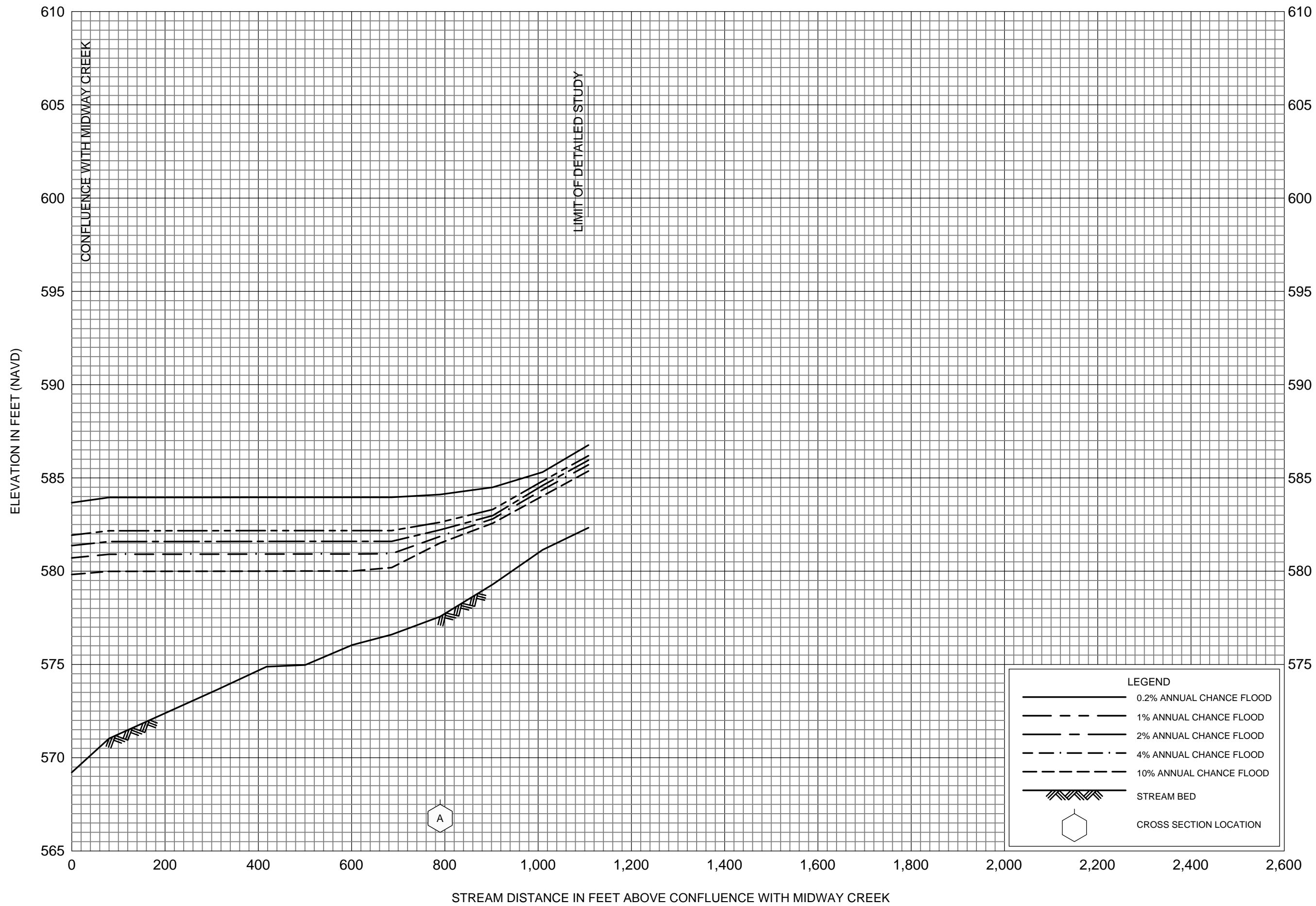
FLOOD PROFILES

MIDWAY CREEK TRIBUTARY 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
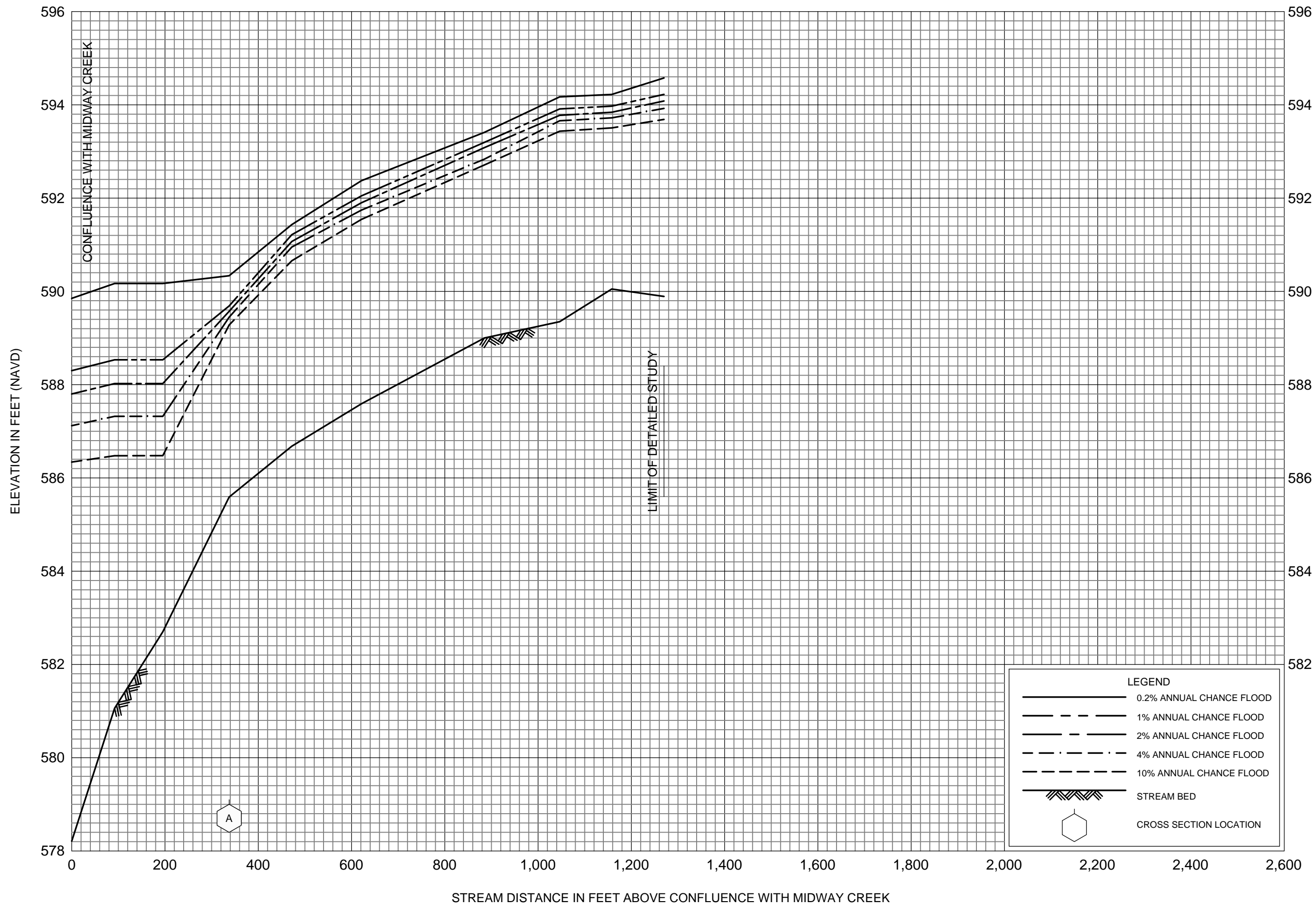
WAGONER COUNTY, OK
AND INCORPORATED AREAS

32P

FLOOD PROFILES

MIDWAY CREEK TRIBUTARY 3

33P

FLOOD PROFILES

MIDWAY CREEK TRIBUTARY 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

34P

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH MIDWAY CREEK

ELEVATION IN FEET (NAVD)

CONFLUENCE WITH MIDWAY CREEK

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

4% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

FLOOD PROFILES

MIDWAY CREEK TRIBUTARY 5

LEGEND
——————— 0.2% ANNUAL CHANCE FLOOD
— — — — 1% ANNUAL CHANCE FLOOD
— · — · — 2% ANNUAL CHANCE FLOOD
— ·· — ·· — 4% ANNUAL CHANCE FLOOD
— — — — 10% ANNUAL CHANCE FLOOD
〰〰〰 STREAM BED
⬡ CROSS SECTION LOCATION

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH MIDWAY CREEK

CONFLUENCE WITH MIDWAY CREEK

LIMIT OF DETAILED STUDY

35P

FLOOD PROFILES

NEOSHO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

36P

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ARKANSAS RIVER

ELEVATION IN FEET (NAVD)

COUNTY BOUNDARY

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

A CROSS SECTION LOCATION

FLOOD PROFILES

SALT CREEK

1% ANNUAL CHANCE BACKWATER EFFECTS FROM THE VERDIGRIS RIVER

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH VERDIGRIS RIVER

CONFLUENCE WITH THE VERDIGRIS RIVER

305TH EAST AVE

289TH EAST AVE

273RD EAST AVE

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

4% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

A CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

37P

FLOOD PROFILES
SALT CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

38P

FLOOD PROFILES

SALT CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

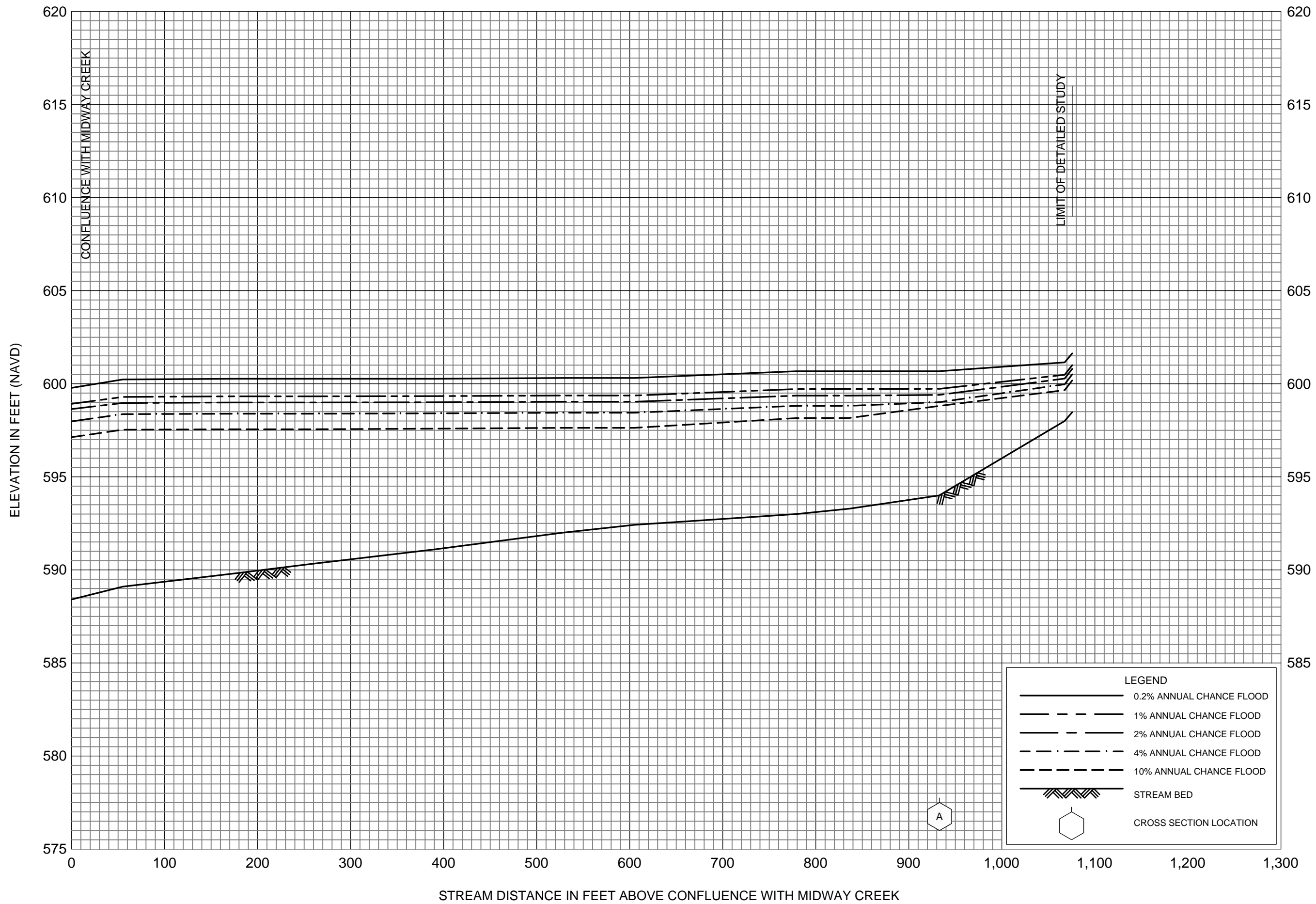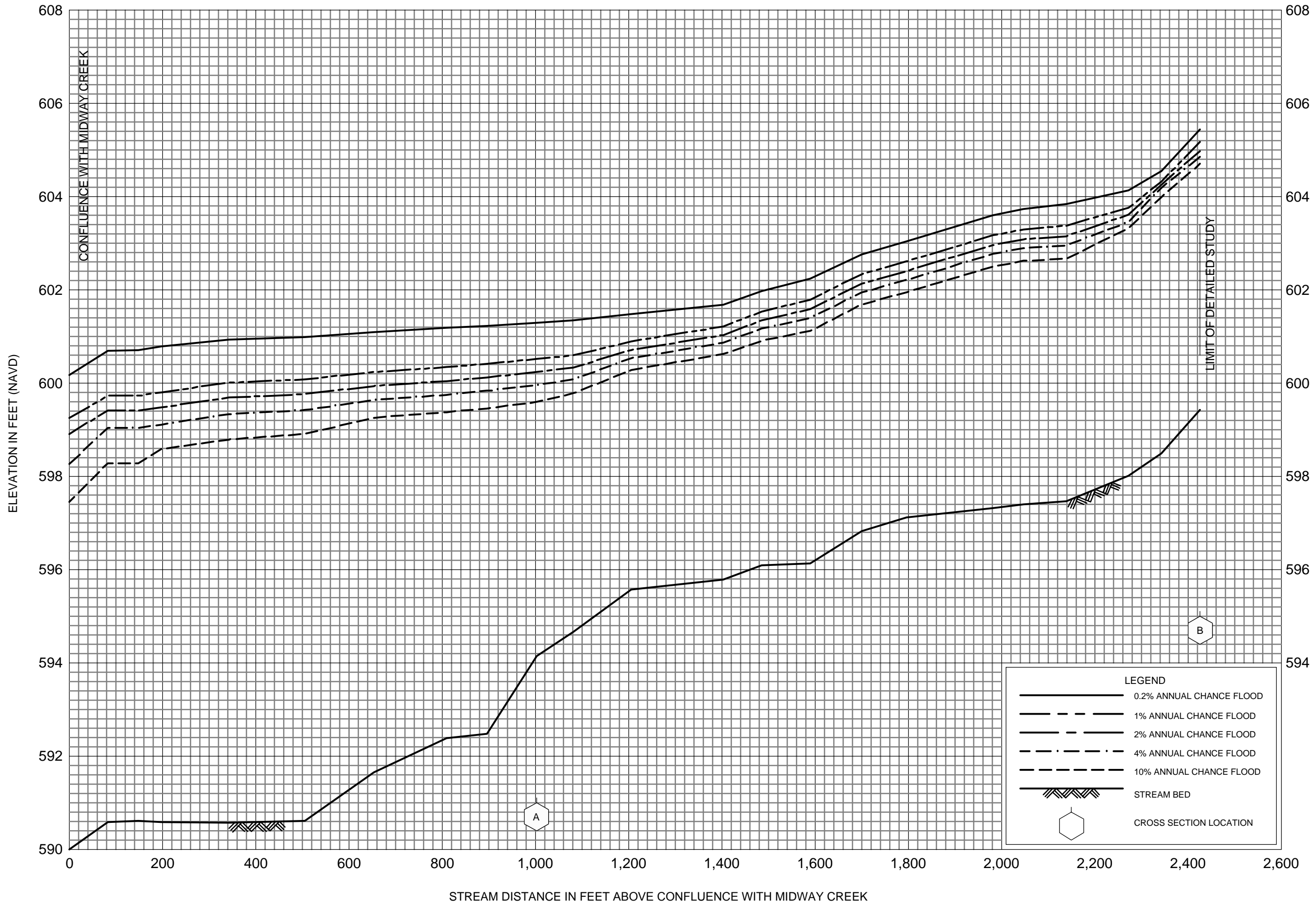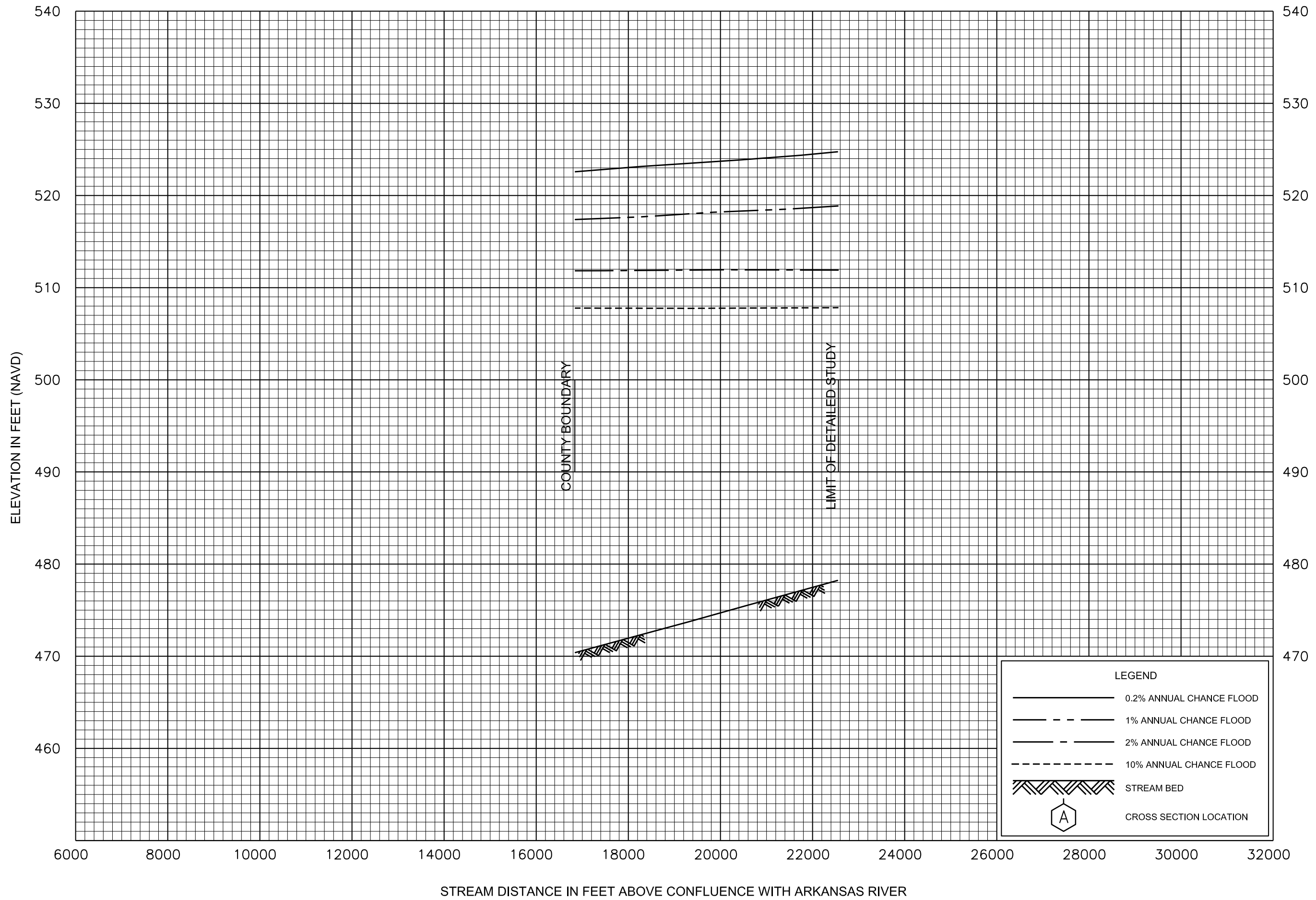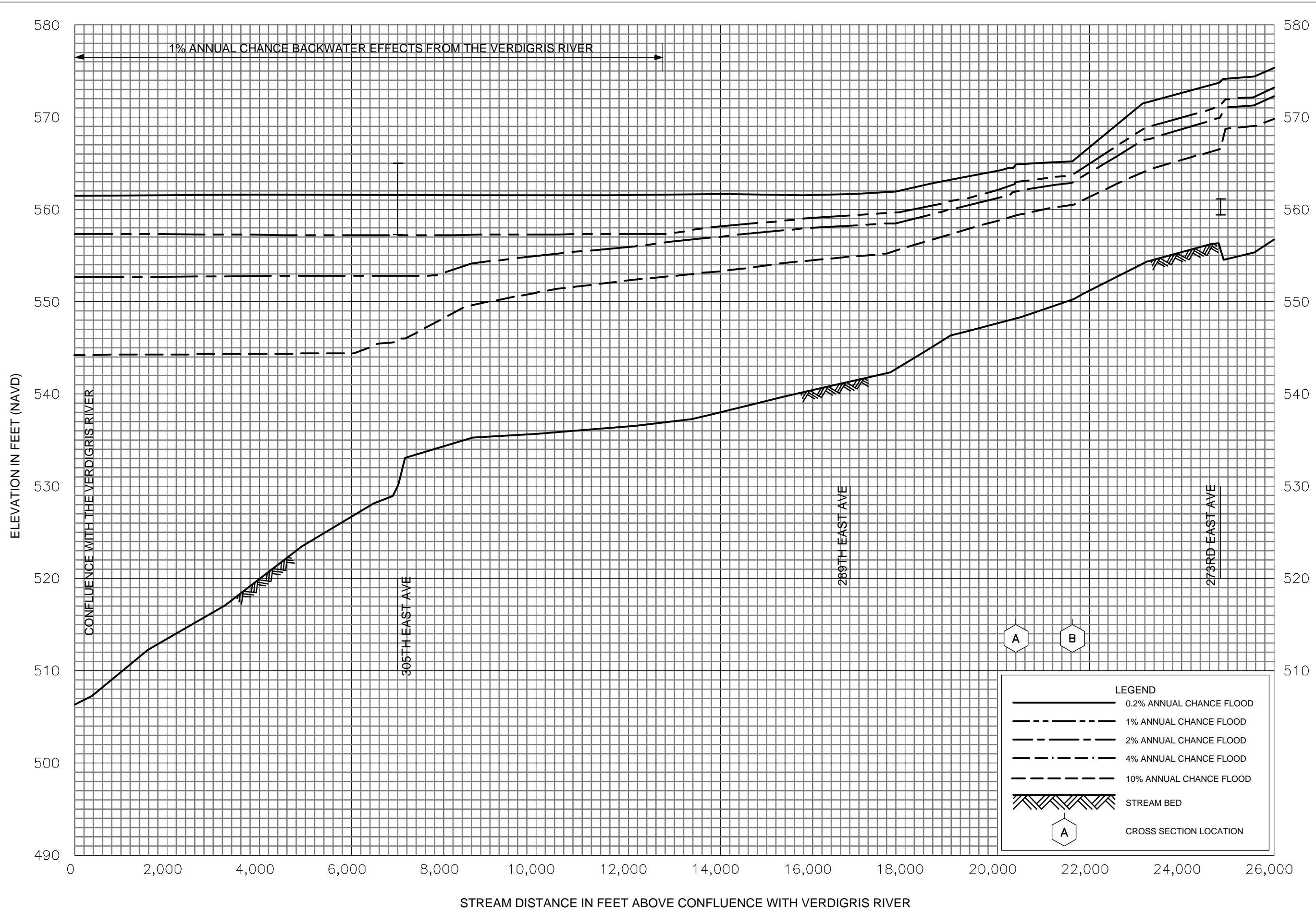WAGONER COUNTY, OK
AND INCORPORATED AREAS

39P

FLOOD PROFILES

SALT CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

40P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SALT CREEK

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

A   CROSS SECTION LOCATION

FLOOD PROFILES

SALT CREEK TRIBUTARY 2

LEGEND

———————— 0.2% ANNUAL CHANCE FLOOD

— — — — 1% ANNUAL CHANCE FLOOD

— · — · — 2% ANNUAL CHANCE FLOOD

— ·· — ·· — 4% ANNUAL CHANCE FLOOD

– – – – 10% ANNUAL CHANCE FLOOD

〰〰〰 STREAM BED

⬡ CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

41P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SALT CREEK

CONFLUENCE WITH SALT CREEK

LIMIT OF DETAILED STUDY

FLOOD PROFILES

SALT CREEK TRIBUTARY 3

42P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SALT CREEK

CONFLUENCE WITH SALT CREEK

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

4% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

FLOOD PROFILES

SALT CREEK TRIBUTARY 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

43P

FLOOD PROFILES

SCHOOL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
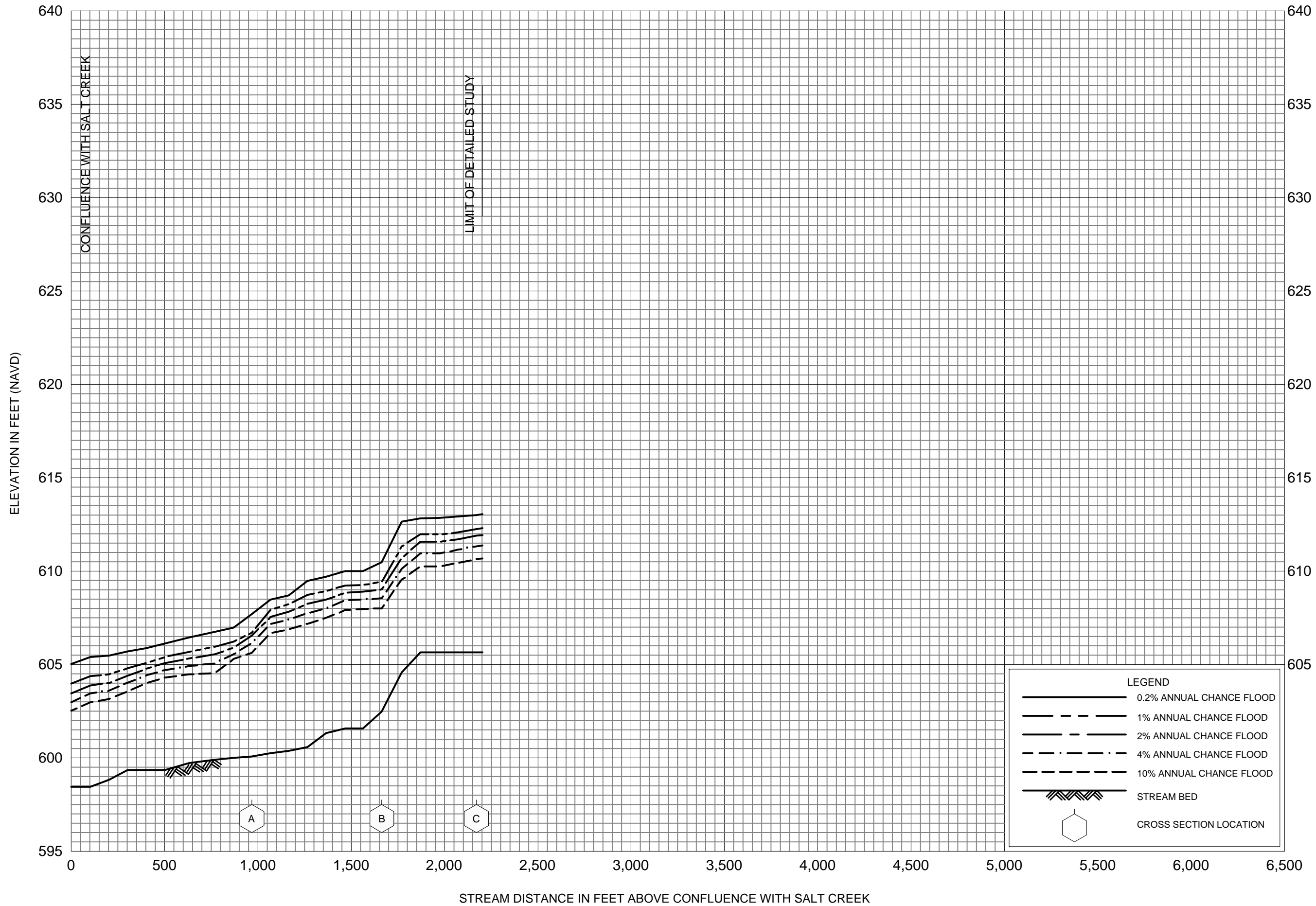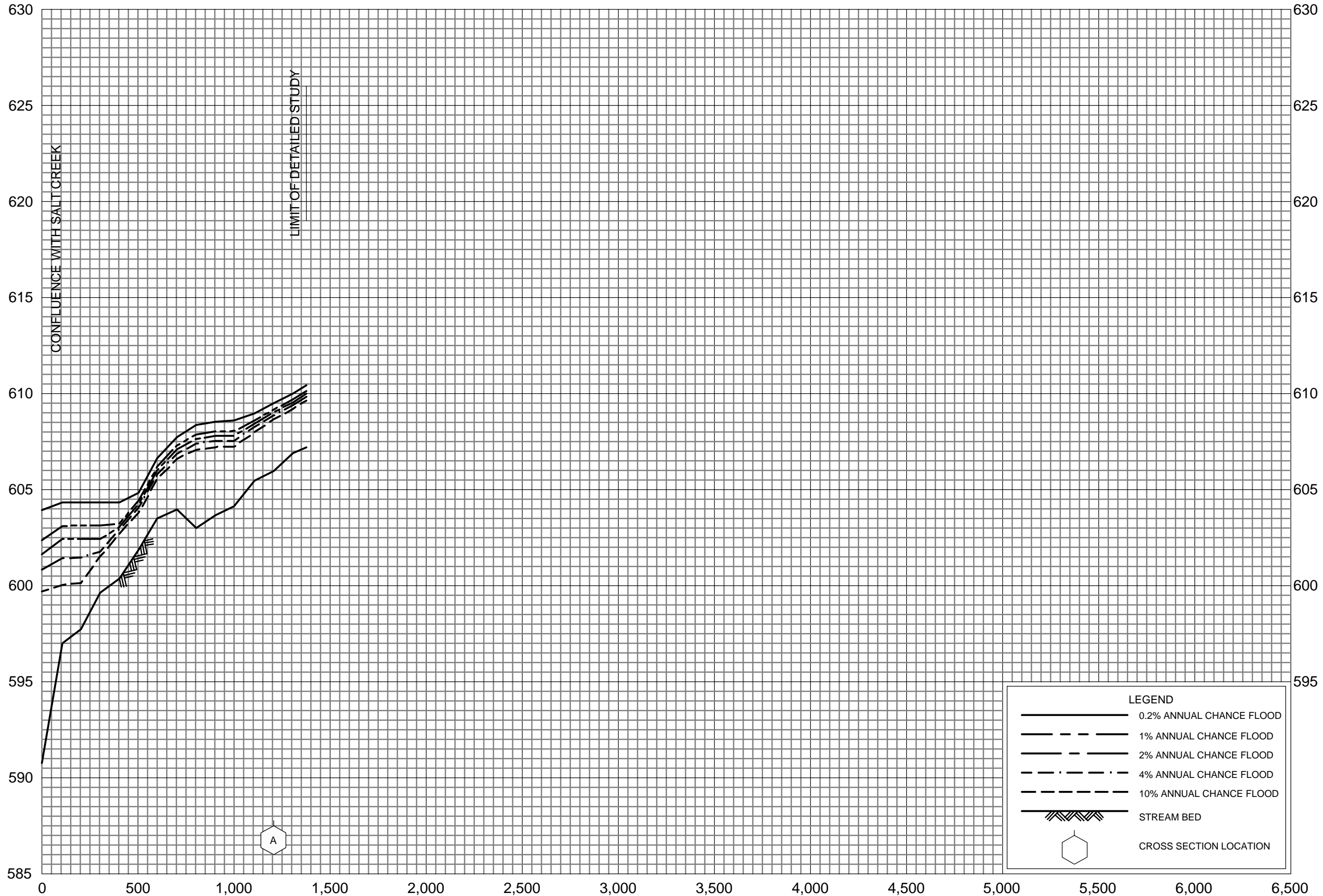
WAGONER COUNTY, OK
AND INCORPORATED AREAS

44P

FLOOD PROFILES

SCHOOL CREEK

ELEVATION IN FEET (NAVD)

HOUSTON ST

LIMIT OF DETAILED STUDY

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ADAMS CREEK

LEGEND

————————	0.2% ANNUAL CHANCE FLOOD
— — — —	1% ANNUAL CHANCE FLOOD
— · — · —	2% ANNUAL CHANCE FLOOD
- - - - -	10% ANNUAL CHANCE FLOOD
◊◊◊◊◊◊	STREAM BED
Ⓐ	CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

45P

FLOOD PROFILES

SOUTH BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY
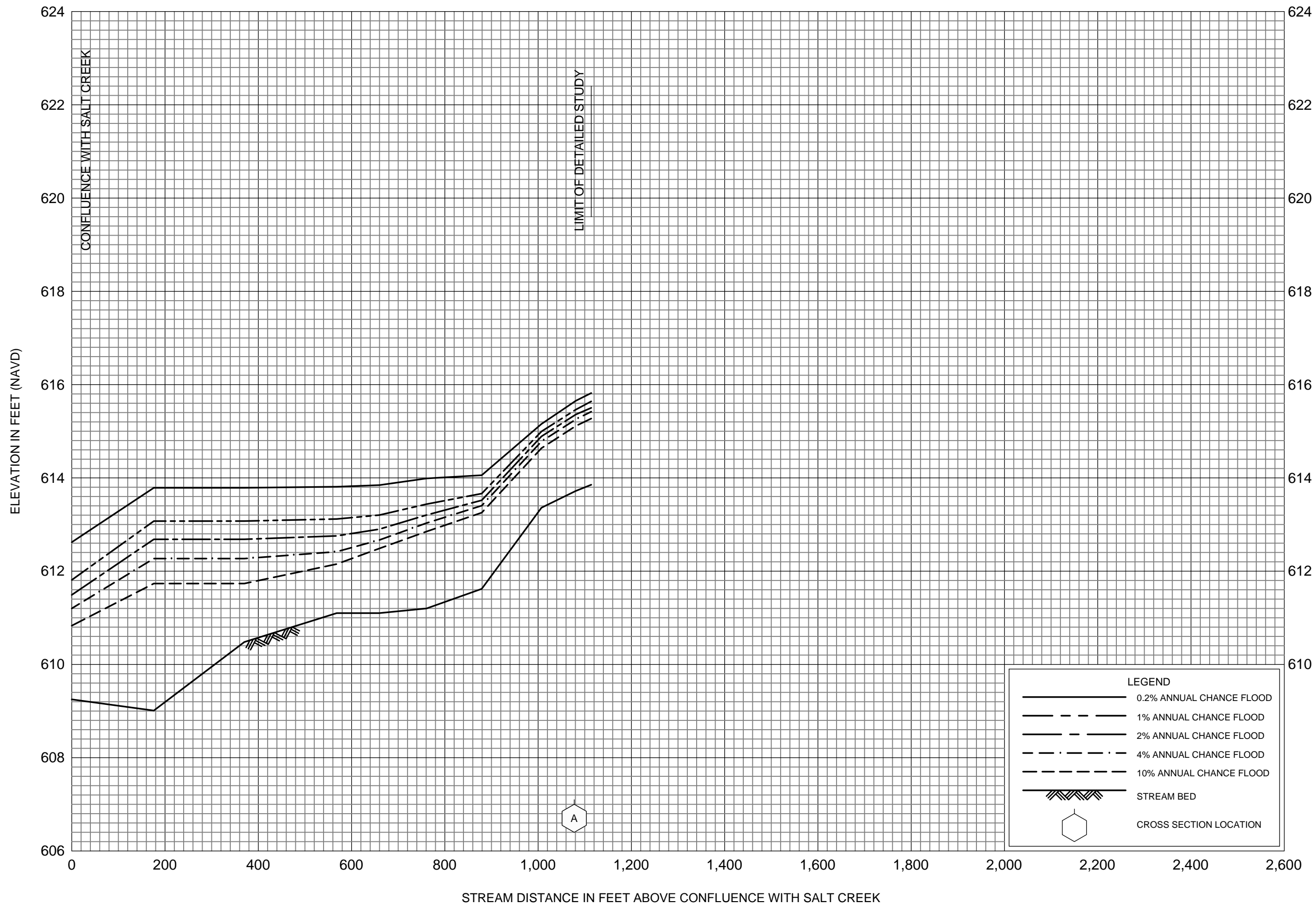
WAGONER COUNTY, OK
AND INCORPORATED AREAS

46P

FLOOD PROFILES
SPRINGTOWN CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

47P

FLOOD PROFILES

SPRINGTOWN CREEK

LIMIT OF DETAILED STUDY

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ADAMS CREEK

LEGEND

——————— 0.2% ANNUAL CHANCE FLOOD

— — — — 1% ANNUAL CHANCE FLOOD

— — — 2% ANNUAL CHANCE FLOOD

- - - - - 10% ANNUAL CHANCE FLOOD

〈〈〈〈 STREAM BED

Ⓐ CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK

AND INCORPORATED AREAS

48P

FLOOD PROFILES

SPUNKY CREEK
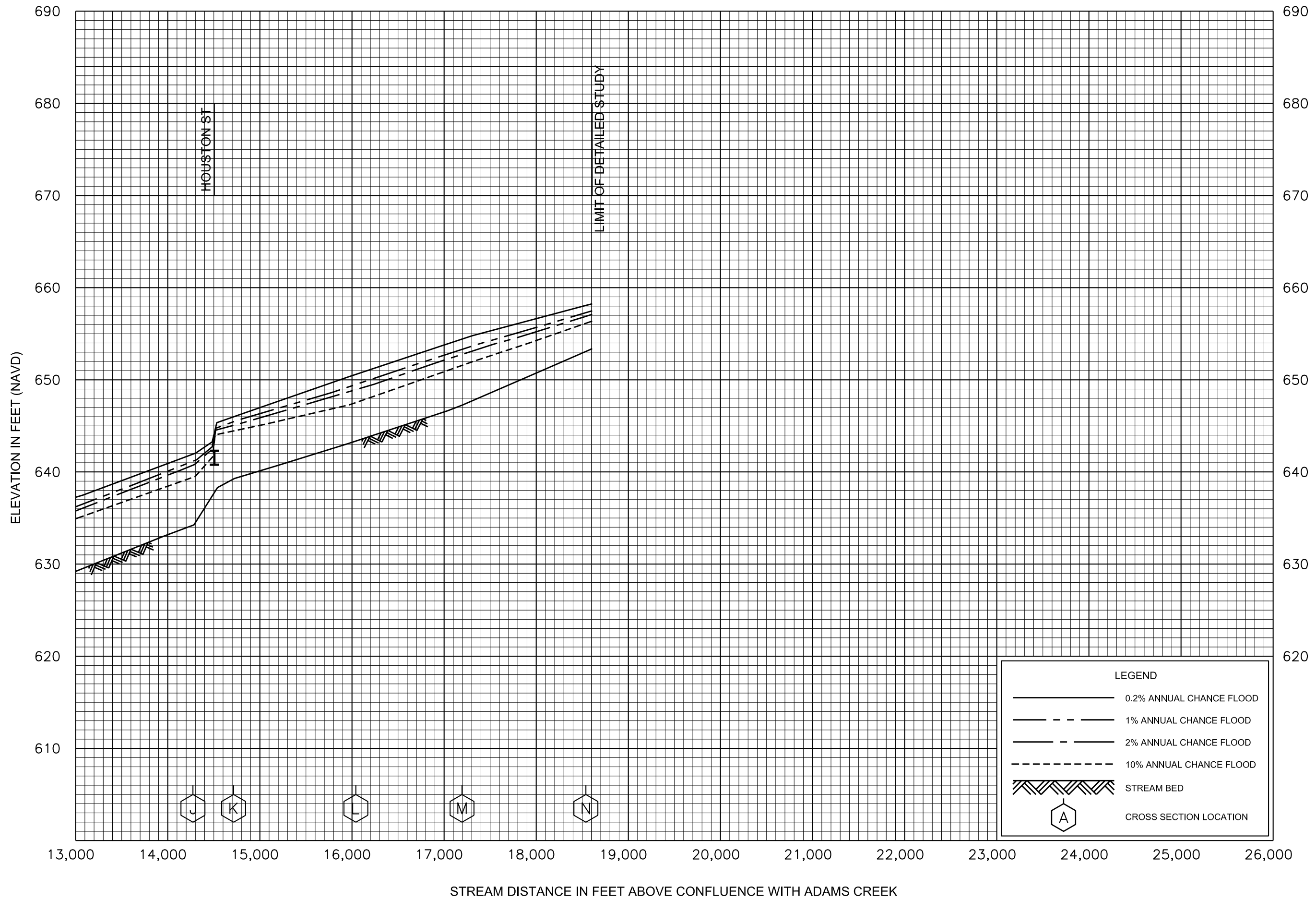
FEDERAL EMERGENCY MANAGEMENT AGENCY
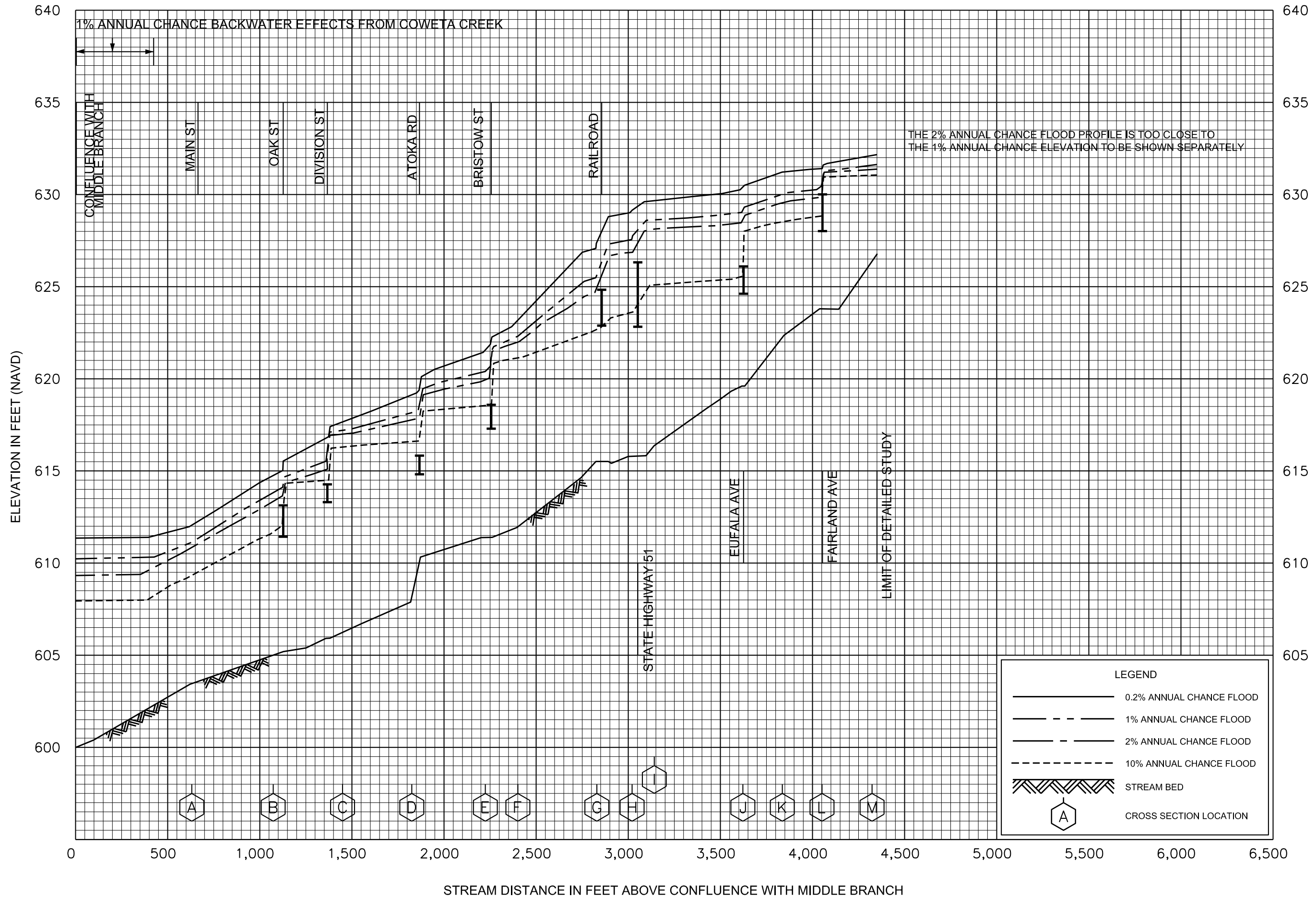
WAGONER COUNTY, OK
AND INCORPORATED AREAS

49P

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH VERDIGRIS RIVER

ELEVATION IN FEET (NAVD)

LEGEND

————————	0.2% ANNUAL CHANCE FLOOD
– – – – – –	1% ANNUAL CHANCE FLOOD
–·–·–·–·–	2% ANNUAL CHANCE FLOOD
— · — · —	4% ANNUAL CHANCE FLOOD
– – – – –	10% ANNUAL CHANCE FLOOD
⋀⋁⋀⋁⋀	STREAM BED
⬡	CROSS SECTION LOCATION

ROGERS COUNTY
WAGONER COUNTY

E. ADMIRAL PL

FLOOD PROFILES

SPUNKY CREEK

LEGEND

————	0.2% ANNUAL CHANCE FLOOD
– – – –	1% ANNUAL CHANCE FLOOD
–·–·–	2% ANNUAL CHANCE FLOOD
–··–··–	4% ANNUAL CHANCE FLOOD
– – –	10% ANNUAL CHANCE FLOOD
▨▨▨▨	STREAM BED
⬡	CROSS SECTION LOCATION

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH VERDIGRIS RIVER

E. 11TH STREET

CONFLUENCE OF SPUNKY CREEK TRIBUTARY B

50P

FLOOD PROFILES

SPUNKY CREEK

LEGEND

————	0.2% ANNUAL CHANCE FLOOD
– – – –	1% ANNUAL CHANCE FLOOD
–·–·–	2% ANNUAL CHANCE FLOOD
–··–··–	4% ANNUAL CHANCE FLOOD
– – –	10% ANNUAL CHANCE FLOOD
▨▨▨▨	STREAM BED
⬡	CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

51P

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH VERDIGRIS RIVER

ELEVATION IN FEET (NAVD)

FLOOD PROFILES
SPUNKY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

52P

FLOOD PROFILES

SPUNKY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

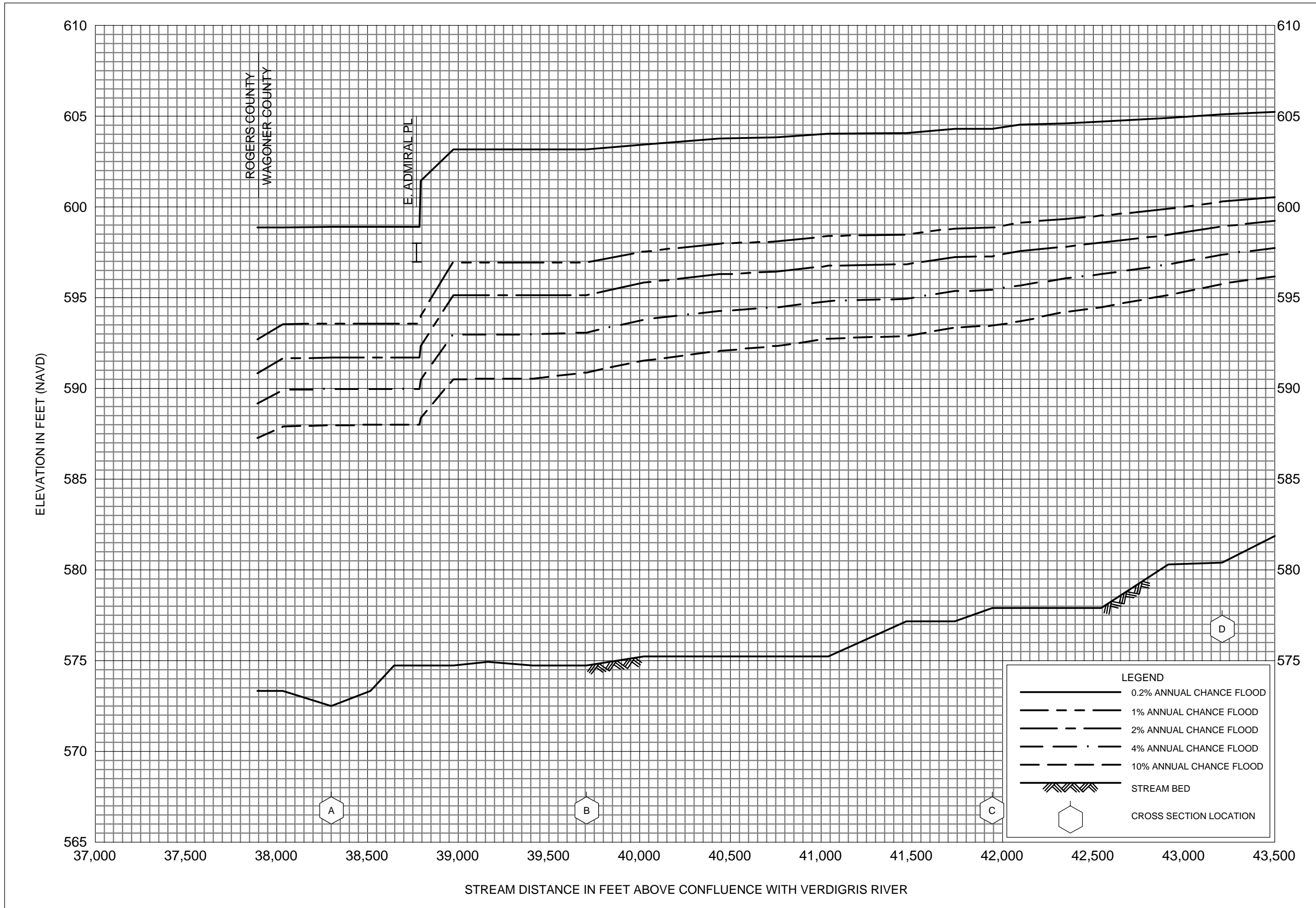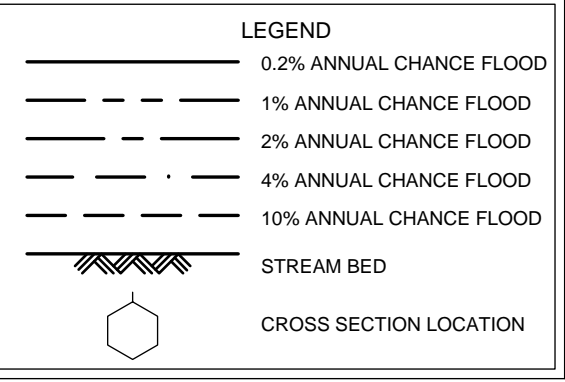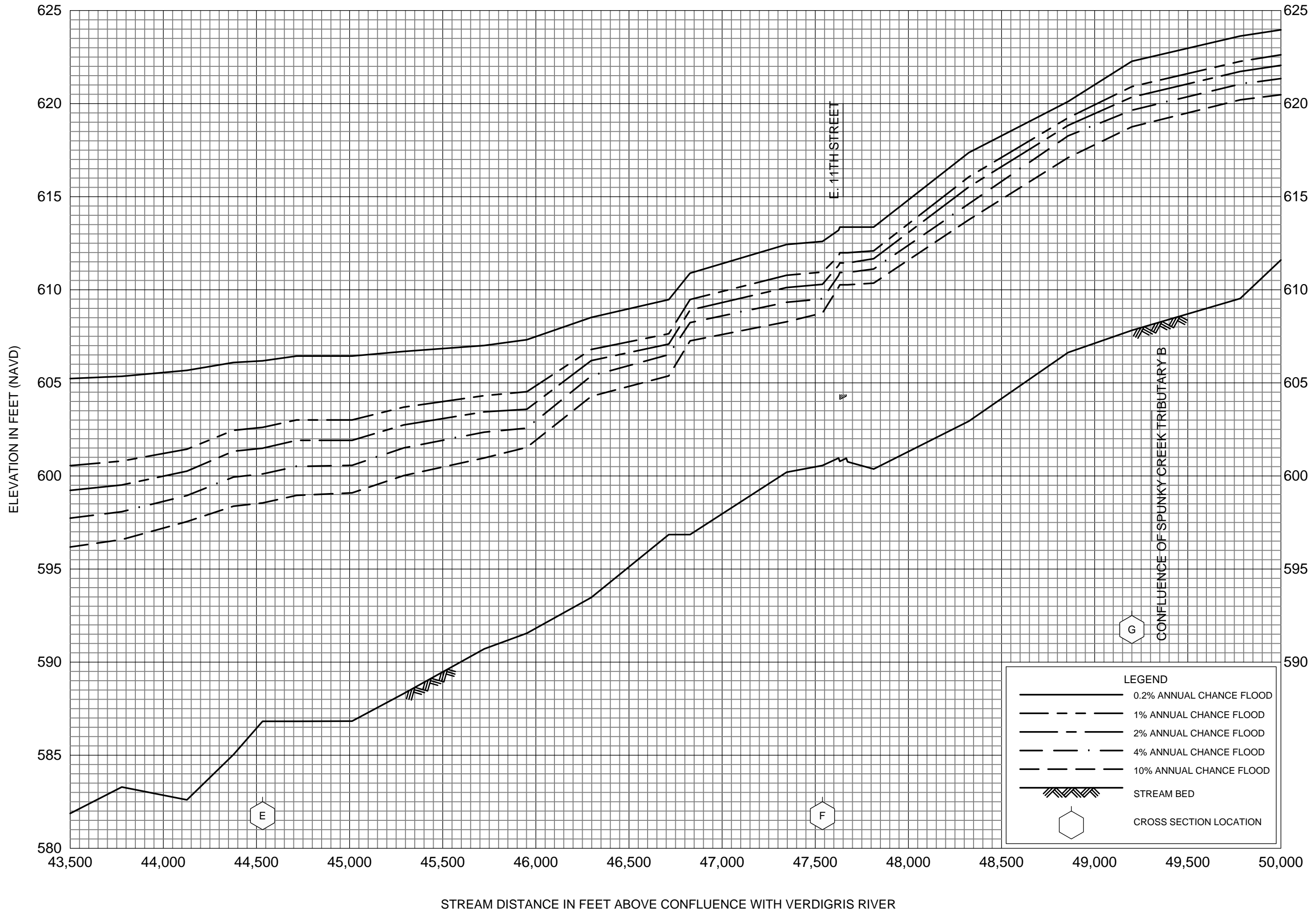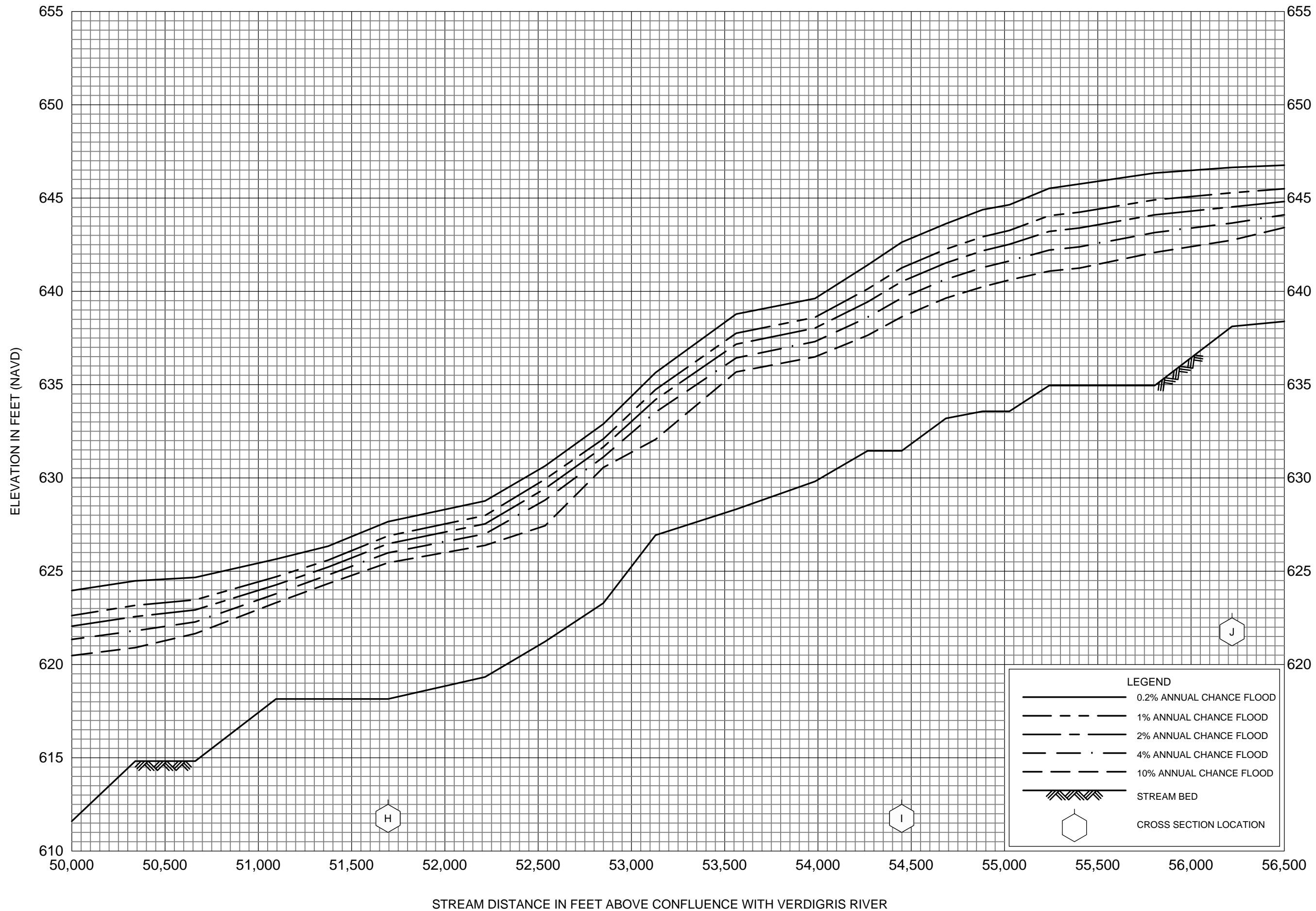WAGONER COUNTY, OK
AND INCORPORATED AREAS

53P

FLOOD PROFILES

SPUNKY CREEK TRIBUTARY A

LEGEND

——————	0.2% ANNUAL CHANCE FLOOD
– – – –	1% ANNUAL CHANCE FLOOD
– · – · –	2% ANNUAL CHANCE FLOOD
– · · – · ·	4% ANNUAL CHANCE FLOOD
– – – –	10% ANNUAL CHANCE FLOOD
⌄⌄⌄⌄⌄	STREAM BED
⬡	CROSS SECTION LOCATION

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SPUNKY CREEK

FLOOD PROFILES

SPUNKY CREEK TRIBUTARY B

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

55P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SPUNKY CREEK

CONFLUENCE WITH SPUNKY CREEK

WAGONER COUNTY

TULSA COUNTY

S. 193RD E. AVE

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

4% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

FLOOD PROFILES

SPUNKY CREEK TRIBUTARY G

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

56P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH SPUNKY CREEK

S. 193RD E. AVE

TULSA COUNTY
WAGONER COUNTY

LIMIT OF DETAILED STUDY

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

4% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

FLOOD PROFILES

TIMBER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

57P

690

680

670

660

650

640

ELEVATION IN FEET (NAVD)

630

620

610

600

LIMIT OF DETAILED STUDY

E   F   G

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ADAMS CREEK

LEGEND

———————— 0.2% ANNUAL CHANCE FLOOD

– – – – – – 1% ANNUAL CHANCE FLOOD

– · – · – · 2% ANNUAL CHANCE FLOOD

- - - - - - 10% ANNUAL CHANCE FLOOD
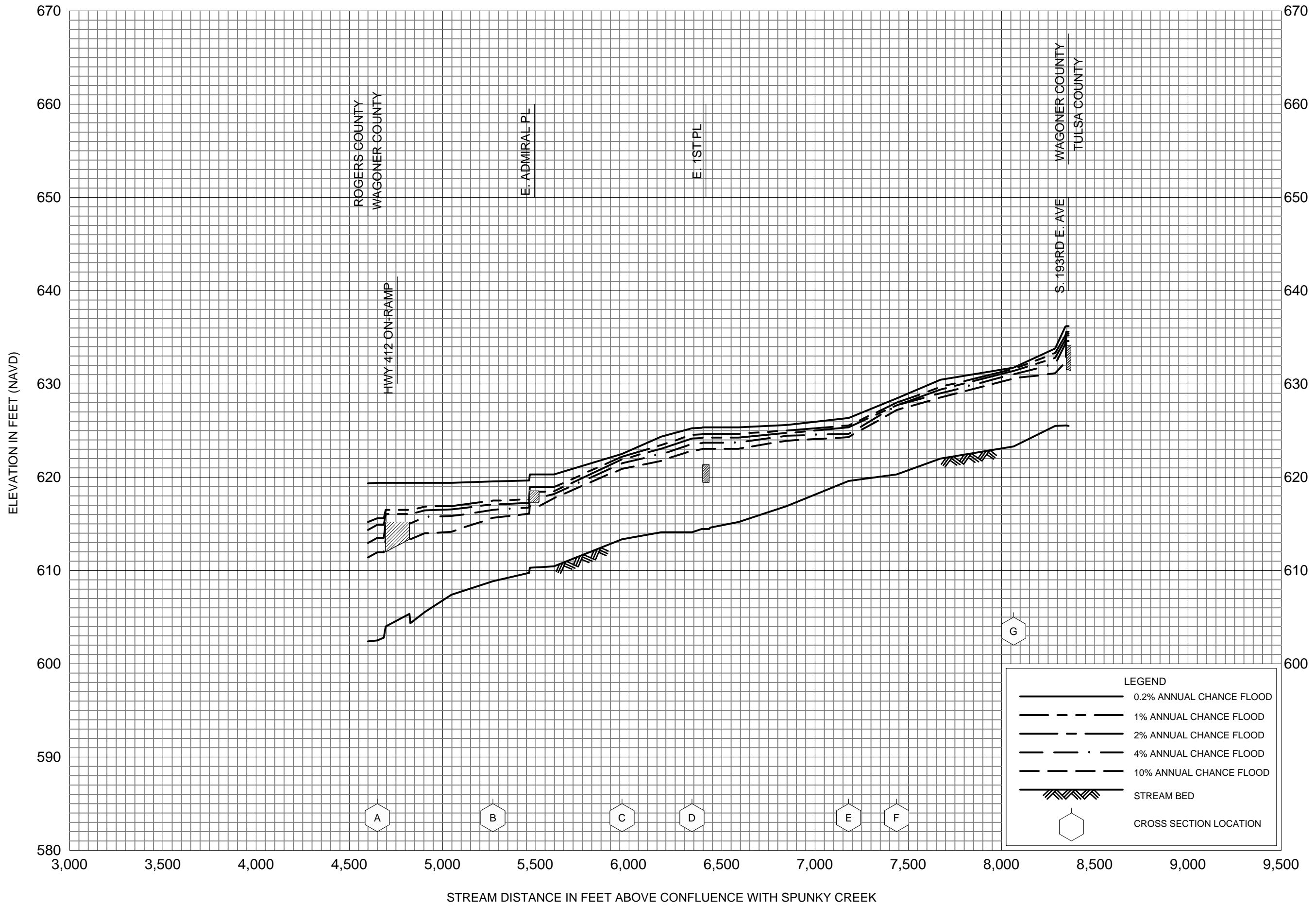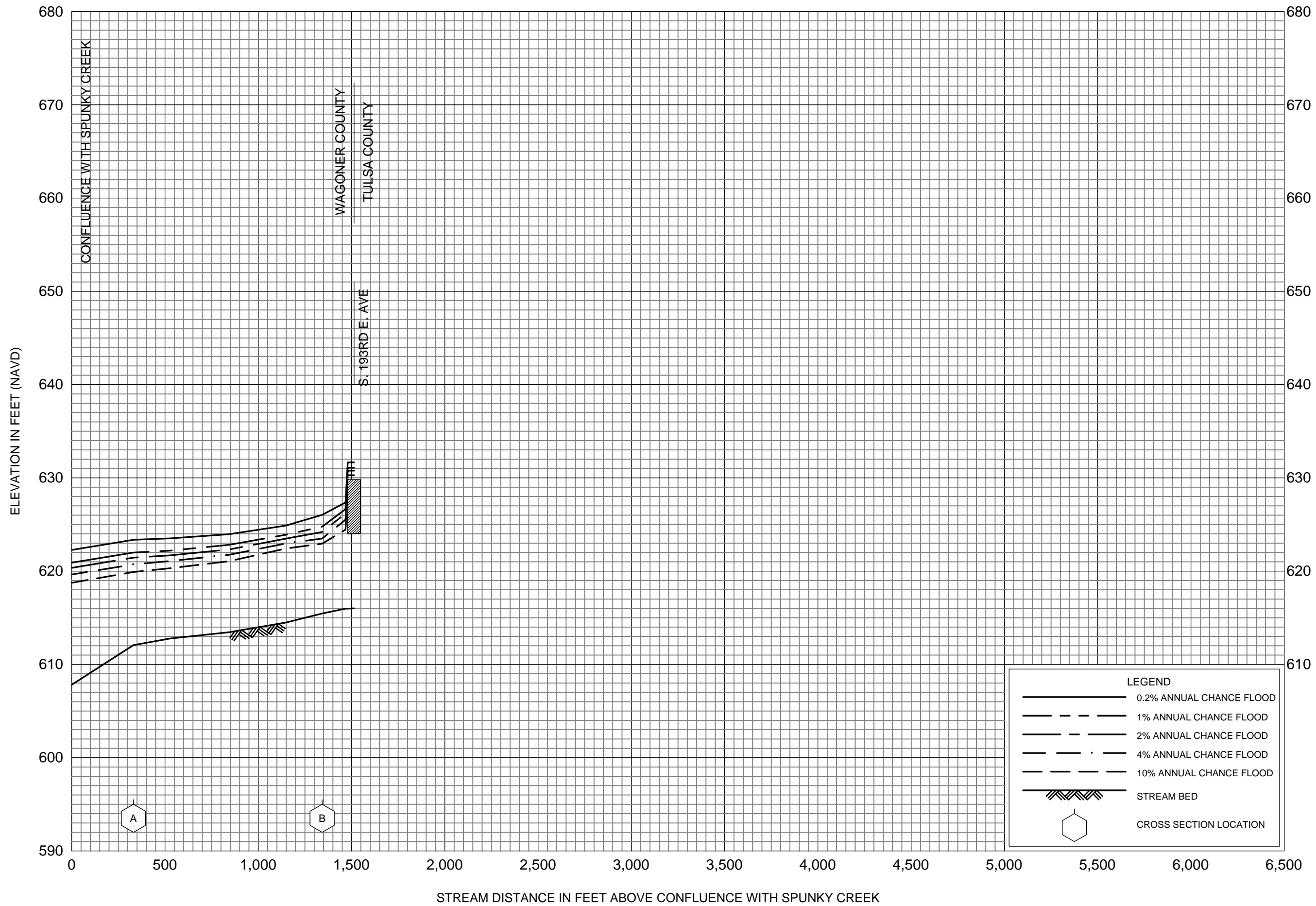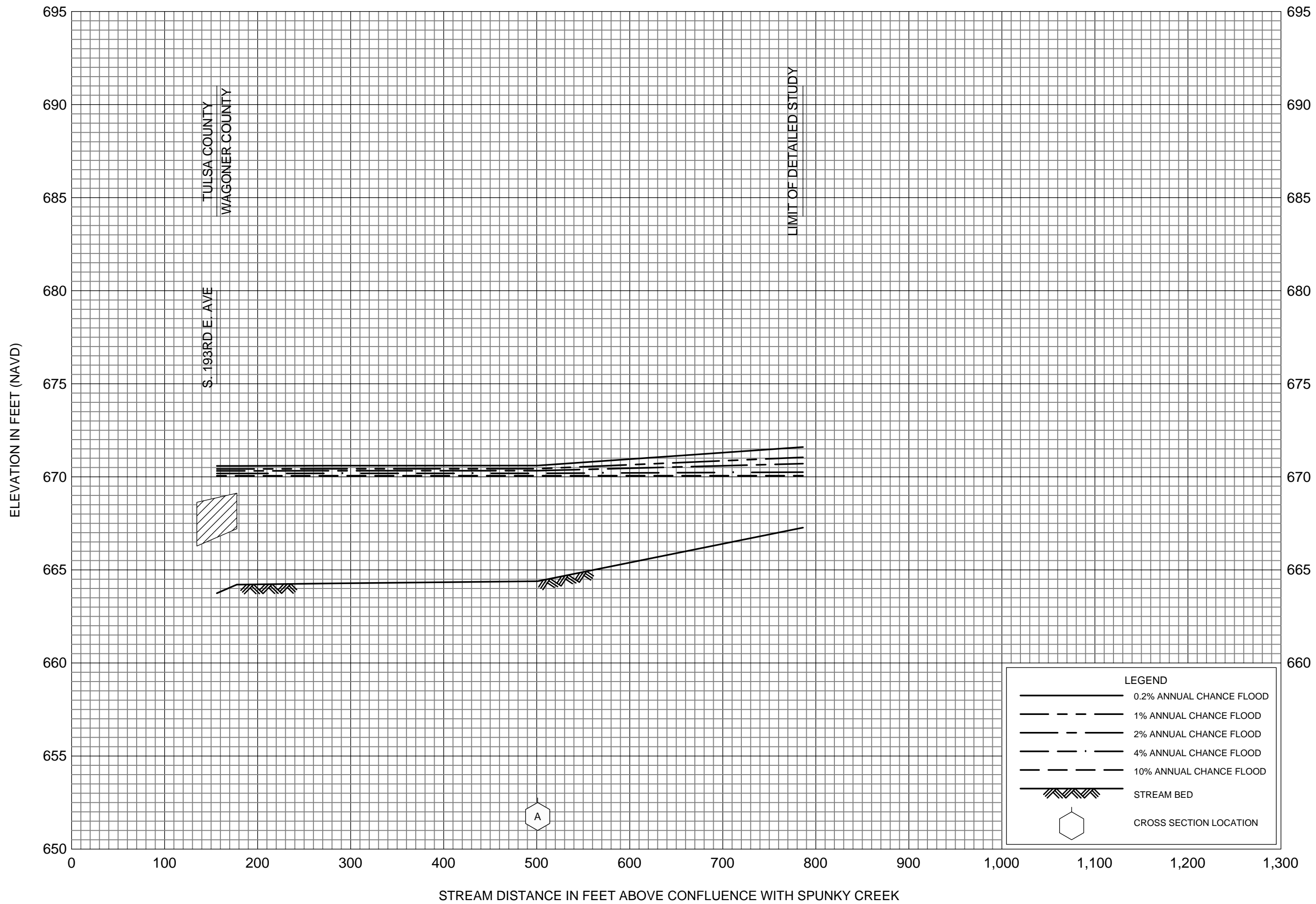
STREAM BED

(A)   CROSS SECTION LOCATION

FLOOD PROFILES

TIMBER CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

58P

FLOOD PROFILES

UNNAMED TRIBUTARY 1
TO BROKEN ARROW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

59P

1% ANNUAL CHANCE BACKWATER EFFECTS
FROM BROKEN ARROW CREEK TRIBUTARY

CONFLUENCE WITH BROKEN ARROW CREEK TRIBUTARY

Evans Road

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH BROKEN ARROW CREEK TRIBUTARY

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

4% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

FLOOD PROFILES
UNNAMED TRIBUTARY 1
TO BROKEN ARROW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

LEGEND

————————	0.2% ANNUAL CHANCE FLOOD
— — — — —	1% ANNUAL CHANCE FLOOD
— · — · —	2% ANNUAL CHANCE FLOOD
— ·· — ·· —	4% ANNUAL CHANCE FLOOD
– – – – –	10% ANNUAL CHANCE FLOOD
▨▨▨▨	STREAM BED
⬡	CROSS SECTION LOCATION

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH BROKEN ARROW CREEK TRIBUTARY

LIMIT OF DETAILED STUDY

60P

FLOOD PROFILES

UNNAMED TRIBUTARY 2
TO BROKEN ARROW CREEK TRIBUTARY

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

61P

ELEVATION IN FEET (NAVD) (vertical axis, 650 to 668)

CONFLUENCE WITH BROKEN ARROW CREEK TRIBUTARY

LIMIT OF DETAILED STUDY

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH BROKEN ARROW CREEK TRIBUTARY (horizontal axis, 0 to 1,300)

LEGEND

— 0.2% ANNUAL CHANCE FLOOD
– – 1% ANNUAL CHANCE FLOOD
–·– 2% ANNUAL CHANCE FLOOD
–··– 4% ANNUAL CHANCE FLOOD
– – 10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

A   B

FLOOD PROFILES
VERDIGRIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY
WAGONER COUNTY, OK
AND INCORPORATED AREAS

62P

LEGEND

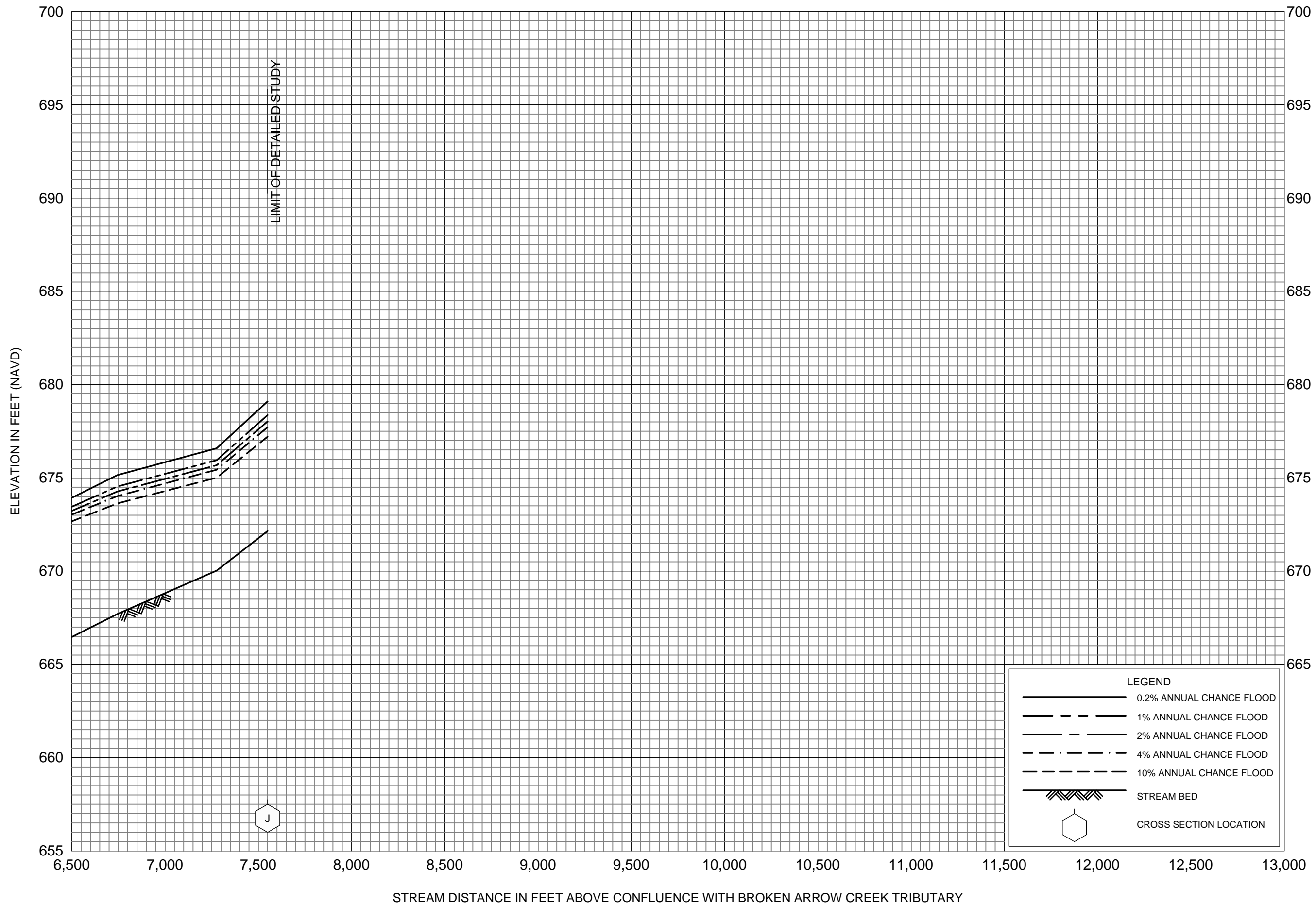— 0.2% ANNUAL CHANCE FLOOD
—·— 1% ANNUAL CHANCE FLOOD
—··— 2% ANNUAL CHANCE FLOOD
— — 10% ANNUAL CHANCE FLOOD
STREAM BED
CROSS SECTION LOCATION

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ARKANSAS RIVER

BACKWATER FROM ARKANSAS RIVER

TOR = 568.2   TOR = 562.2
LCD = 554.2   LCD = 554.8

TOR = 576.4
LCD = 572.9

COUNTY BOUNDARY
STATE ROUTE 16
MISSOURI-KANSAS-TEXAS RAILROAD
CONFLUENCE OF VERIGRIS RIVER DIVERGENCE CHANNEL
CHOTEAU LOCK
CONFLUENCE OF VERIGRIS RIVER DIVERGENCE CHANNEL
CONFLUENCE OF EAST COAL CREEK
U.S. ROUTE 69

FLOOD PROFILES

VERDIGRIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ARKANSAS RIVER

ELEVATION IN FEET (NAVD)

LEGEND

0.2% ANNUAL CHANCE FLOOD

1% ANNUAL CHANCE FLOOD

2% ANNUAL CHANCE FLOOD

10% ANNUAL CHANCE FLOOD

STREAM BED

CROSS SECTION LOCATION

CONFLUENCE OF STRAWBERRY CREEK

CONFLUENCE OF BILLY CREEK

STATE ROUTE 51

TOR = 577.8

LCD = 564.0

63P

FLOOD PROFILES

VERDIGRIS RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

64P

ELEVATION IN FEET (NAVD)

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH ARKANSAS RIVER

LEGEND

———— 0.2% ANNUAL CHANCE FLOOD
—·—·— 1% ANNUAL CHANCE FLOOD
—··—··— 2% ANNUAL CHANCE FLOOD
— — — 10% ANNUAL CHANCE FLOOD
〰〰〰 STREAM BED
⬡ CROSS SECTION LOCATION

NEWT GRAHAM LOCK AND DAM 18
COUNTY BOUNDARY
COUNTY BOUNDARY
COUNTY BOUNDARY
COUNTY BOUNDARY
CONFLUENCE OF SALT CREEK
COUNTY BOUNDARY

FLOOD PROFILES

VERDIGRIS RIVER DIVERGENCE CHANNEL

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
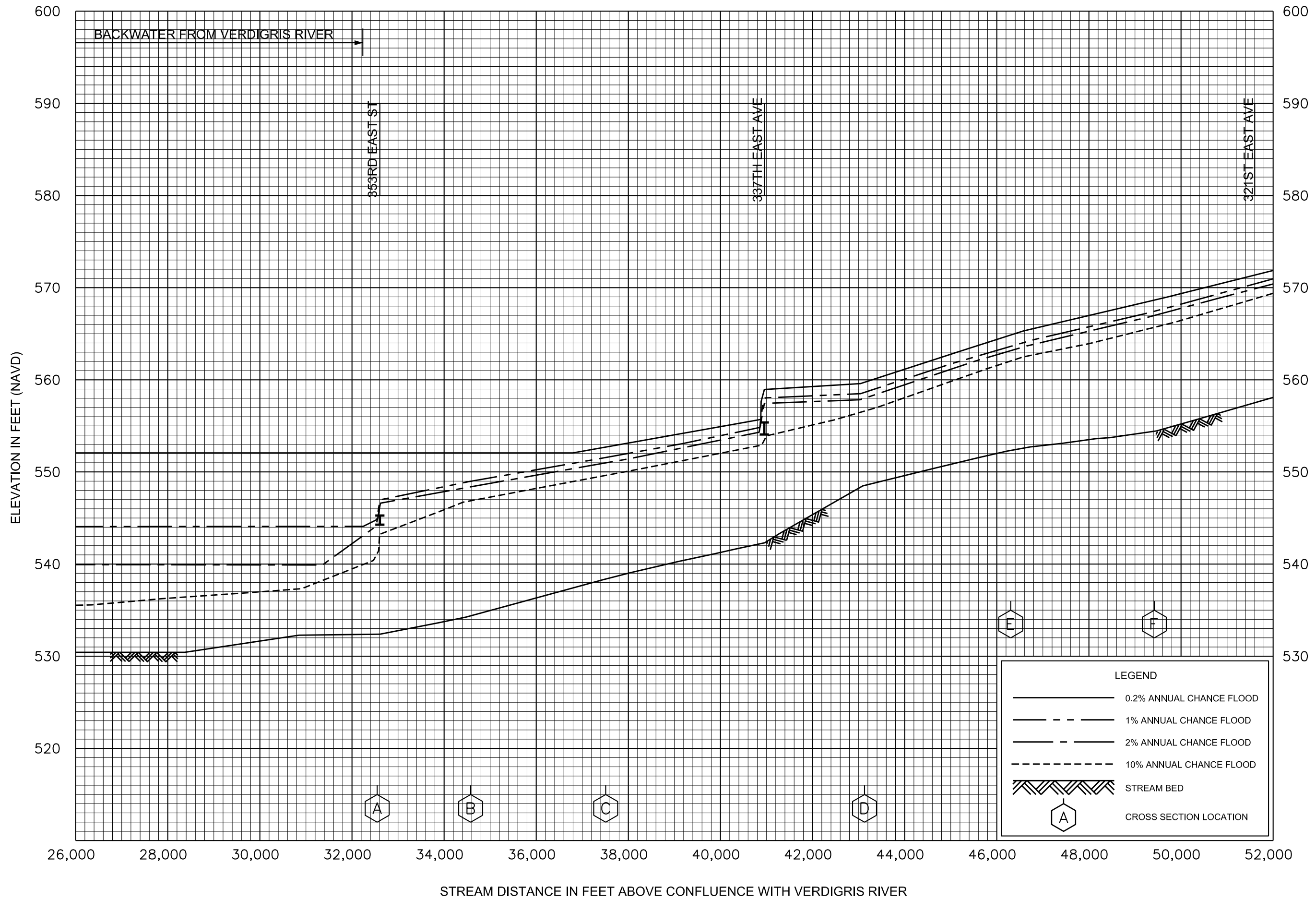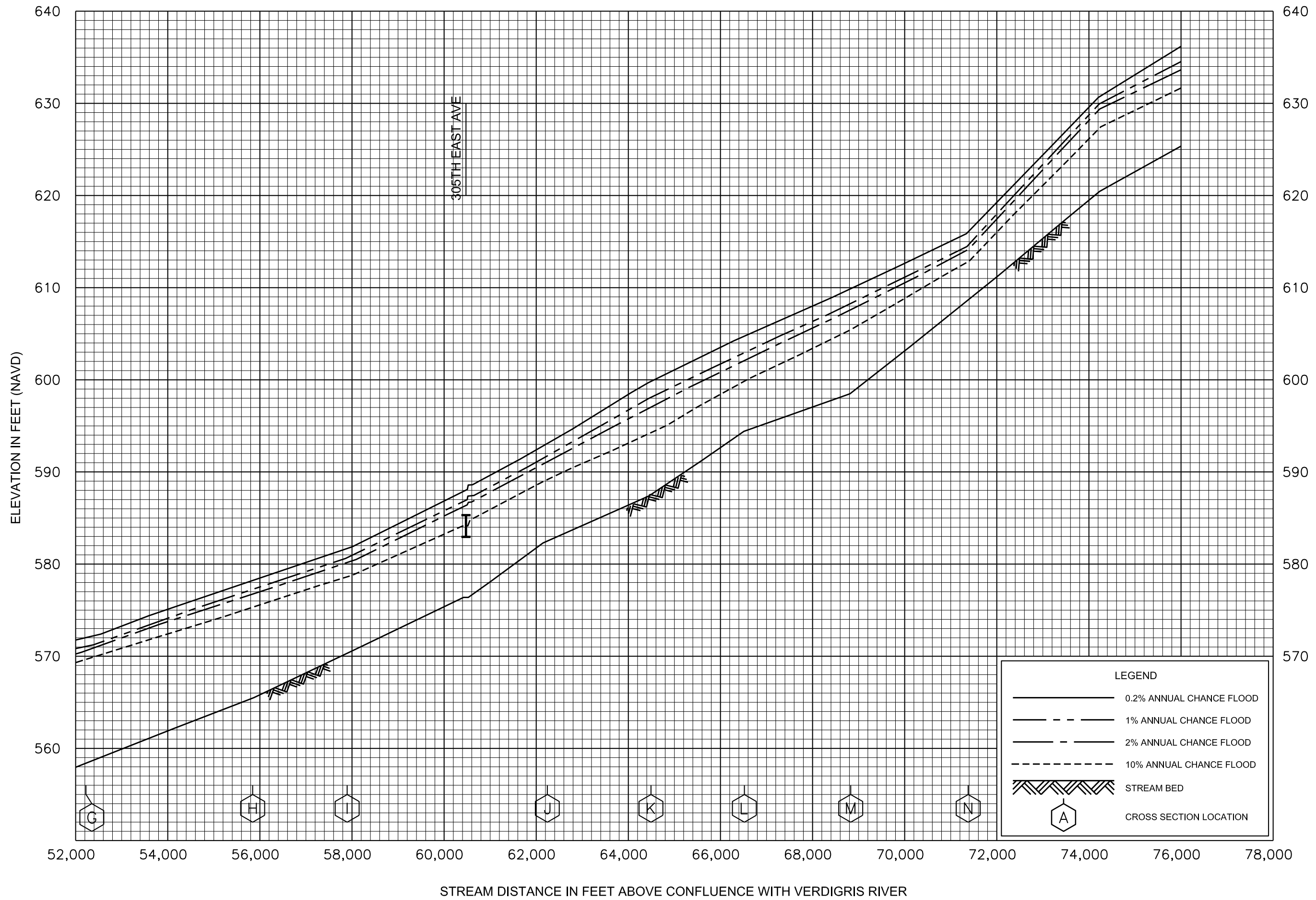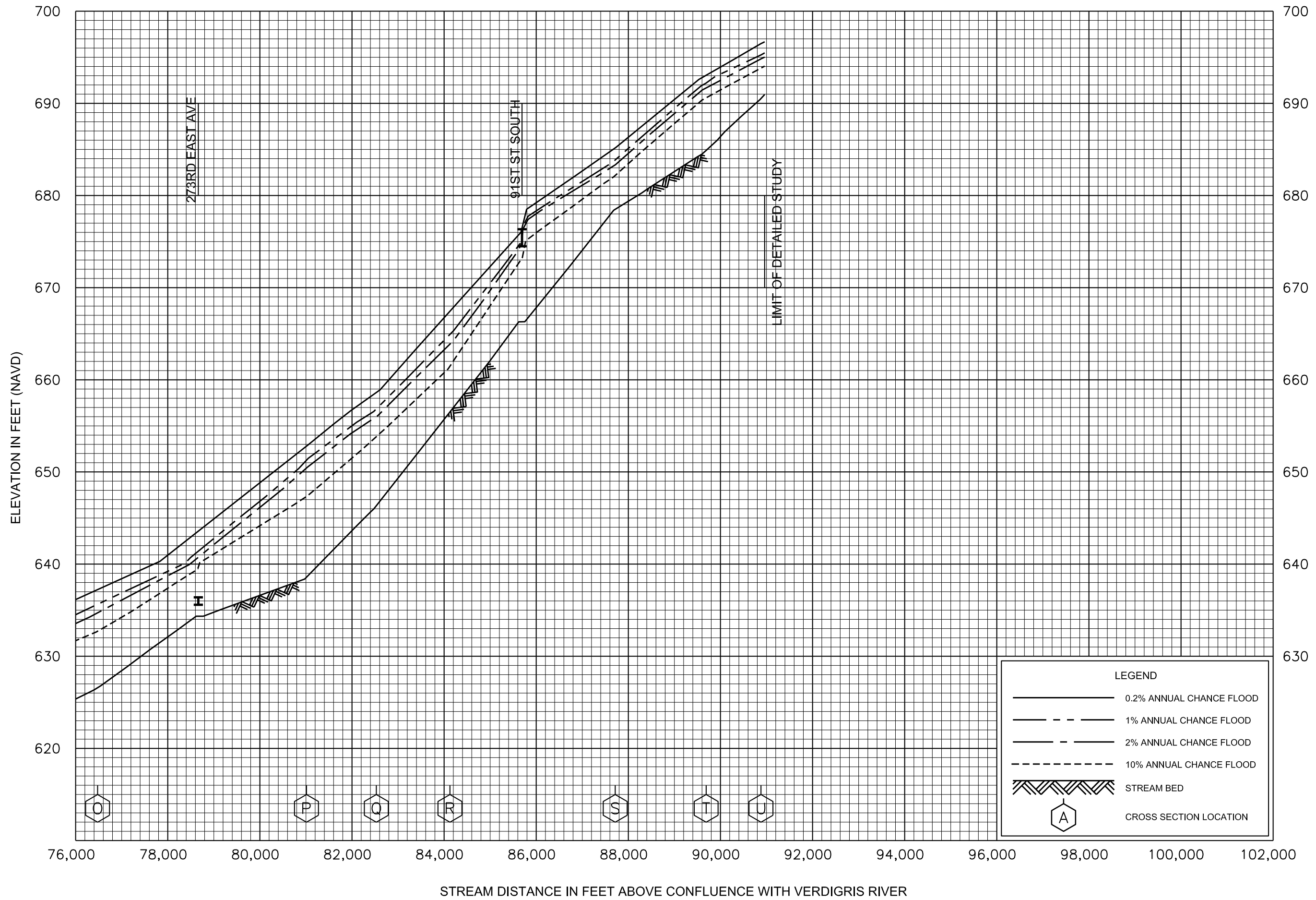AND INCORPORATED AREAS

65P

FLOOD PROFILES
WEST COAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

66P

FLOOD PROFILES

WEST COAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

67P

FLOOD PROFILES

WEST COAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

68P

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH VERDIGRIS RIVER

ELEVATION IN FEET (NAVD)

305TH EAST AVE

LEGEND

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

FLOOD PROFILES

WEST COAL CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

WAGONER COUNTY, OK
AND INCORPORATED AREAS

69P