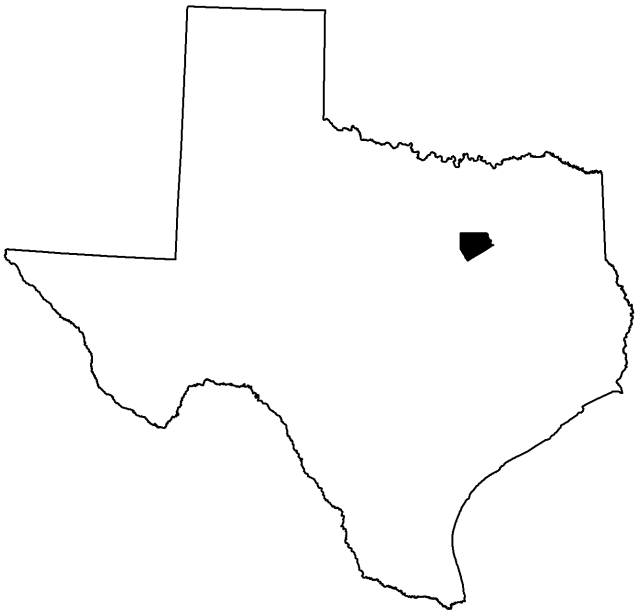
FLOOD INSURANCE STUDY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

VOLUME 1 OF 2



Community Name	Community Number
ELLIS COUNTY UNINCORPORATED AREAS	480798
ALMA, TOWN OF	481546
BARDWELL, CITY OF	481087
CEDAR HILL, CITY OF	480168
ENNIS, CITY OF	480207
FERRIS, CITY OF	481076
*GARRETT, CITY OF	480799
GLENN HEIGHTS, CITY OF	481265
GRAND PRAIRIE, CITY OF	485472
ITALY, CITY OF	480800
MANSFIELD, CITY OF	480606
MAYPEARL, CITY OF	480208
MIDLOTHIAN, CITY OF	480801
MILFORD, CITY OF	480802
OAK LEAF, CITY OF	481672
OVILLA, CITY OF	481155
PALMER, CITY OF	480209
PECAN HILL, CITY OF	481673
RED OAK, CITY OF	481650
VENUS, CITY OF	480883
WAXAHACHIE, CITY OF	480211

*NON-FLOODPRONE

Revised: June 3, 2013

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

48139CV001B

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. A listing of the Community Map Repositories can be found on the Index Map.

Initial Countywide FIS Effective Date: January 20, 1999

First Revised Countywide FIS Revision Date: January 5, 2006

Second Revised Countywide FIS Revision Date: June 3, 2013

TABLE OF CONTENTS

VOLUME 1 OF 2

Page

1.0 INTRODUCTION 1

1.1 Purpose of Study 1
1.2 Authority and Acknowledgments 1
1.3 Coordination 3

2.0 AREA STUDIED 3

2.1 Scope of Study 3
2.2 Community Description 5
2.3 Principal Flood Problems 7
2.4 Flood Protection Measures 7

3.0 ENGINEERING METHODS 8

3.1 Hydrologic Analyses 8
3.1.1 Redelineated Detailed Study Streams 8
3.1.2 Enhanced Approximate Type I Study Stream 17
3.2 Hydraulic Analyses 17
3.2.1 Redelineated Detailed Study Streams 17
3.2.2 Enhanced Approximate Type I Study Stream 20
3.3 Incorporated Letter of Map Revision Study Streams 21
3.4 Vertical Datum 22

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS 23

4.1 Floodplain Boundaries 23
4.2 Floodways 23

5.0 INSURANCE APPLICATIONS 39

6.0 FLOOD INSURANCE RATE MAP 40

7.0 OTHER STUDIES 40

8.0 LOCATION OF DATA 40

9.0 BIBLIOGRAPHY AND REFERENCES 43

TABLE OF CONTENTS (Cont'd)

VOLUME 1 OF 2

Page

FIGURES

Figure 1: Floodway Schematic 24

TABLES

Table 1: Scope of Study 4
Table 2: Summary of Discharges 11
Table 3: Summary of Stillwater Elevations 17
Table 4: Summary of Peak and Coincident Pool Levels and Inflows 19
Table 5: Summary of Roughness Coefficients 20
Table **6**: Floodway Data 25
Table **7**: Community Map History 41

TABLE OF CONTENTS (Cont'd)

VOLUME 1 OF 2

EXHIBITS

Exhibit 1 – Flood Profiles

Armstrong Creek	Panel	01P
Bear Creek	Panels	02P-20P
Bedford Branch	Panel	21P
Brushy Creek	Panels	22P-35P
Chambers Creek	Panels	36P-39P
East Fork to Soap Creek	Panel	40P
Greathouse Branch	Panels	41P-45P
Grove Creek	Panels	46P-58P

VOLUME 2 OF 2

EXHIBITS (cont'd)

Exhibit 1 – Flood Profiles

Hollings Branch	Panel	59P
Little Creek	Panels	60P-64P
Long Branch	Panels	65P-68P
Mustang Creek	Panels	69P-72P
Mustang Creek Tributary	Panels	73P-74P
Newton Branch	Panels	75P-76P
North Fork Chambers Creek	Panels	77P-81P
Plains Creek	Panels	82P-83P
Red Oak Creek	Panels	84P-117P
Shiloh Branch	Panels	118P-120P
Soap Creek	Panels	121P-127P
South Grove Creek	Panels	128P-131P
Tributary No. 6 to Soap Creek	Panel	132P
Trinity River	Panel	133P
Unnamed Tributary to Soap Creek	Panel	134P
Waxahachie Creek	Panels	135P-143P
Waxahachie Creek Tributary 1	Panels	144P-146P
Waxahachie Creek Tributary 2	Panels	147P-148P
Waxahachie Creek Tributary 3	Panels	149P-150P
West Fork to Soap Creek	Panels	151P-153P

Exhibit 2 – Flood Insurance Rate Map Index
Flood Insurance Rate Maps

FLOOD INSURANCE STUDY
ELLIS COUNTY, TEXAS 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 Ellis County, including the Cities of Bardwell, Cedar Hill, Ennis, Ferris, Garrett, Glenn Heights, Grand Prairie, Italy, Mansfield, Maypearl, Midlothian, Milford, Oak Leaf, Ovilla, Palmer, Pecan Hill, Red Oak, Venus, and Waxahachie; the Town of Alma; and the unincorporated areas of Ellis County (referred to collectively herein as Ellis 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 (CFR) at 44 CFR, 60.3.

Please note that the Cities of Cedar Hill, Ferris, Glenn Heights, and Ovilla are geographically located in Ellis and Dallas Counties; the City of Grand Prairie is geographically located in Dallas, Ellis, and Tarrant Counties; the City of Mansfield is geographically located in Ellis, Johnson, and Tarrant Counties; and the City of Venus is geographically located in Ellis and Johnson Counties.

Please note that the City of Garrett is non-floodprone.

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.

The single community FIS reports have been incorporated in past countywide FIS studies. This FIS builds upon the most recent countywide FIS from January 5, 2006 (Reference 1). The communities and their respective community FIS report data are listed below:

Pre-countywide FIS Reports

Ellis County

For the August 19, 1987 FIS report for Ellis County, the hydrologic and hydraulic analyses for Bear Creek, Brushy Creek, Grove Creek, Little Creek, Long Branch, Red Oak Creek, Shiloh Branch, South Grove Creek, and the Trinity River were performed by the Natural

Resources Conservation Service (NRCS) (formerly the Soil Conservation Service), during the preparation of the Flood Plain Management Study, for Red Oak and Tributaries (Reference 2). All streams were studied using detailed methods. The study by the NRCS was completed in 1984, and incorporated in the August 19, 1987 FIS report for Ellis County (Reference 3). The portion of Grove Creek from the confluence with Red Oak Creek to approximately 0.89 mile downstream of US Highway 77 has been superseded by the 1995 Unite States Army Corps of Engineers (USACE) study described below in Section 1.2 (Reference 1).

City of Ovilla

For the April 15, 1980 FIS report for the City of Ovilla, the hydrologic and hydraulic analyses for the studies of Red Oak Creek, Shiloh Branch, and Little Creek represent a revision to the original analysis prepared by Freese and Nichols, Inc., and Rady and Associates, Inc., for FEMA, under Contract No. H-4570. The work for the original study was completed in May 1978. The hydrologic and hydraulic analyses for the January 6, 1988 update study were prepared by the NRCS during the preparation of the FIS report for the unincorporated areas of Ellis County. That work was completed in March 1986 (Reference 4).

City of Waxahachie

For the February 1980 FIS report for the City of Waxahachie, the hydrologic and hydraulic analyses for the studies of Mustang Creek, Mustang Creek Tributary, Waxahachie Creek, Waxahachie Creek Tributary 1, Waxahachie Tributary 2, and Waxahachie Tributary 3 were performed by Freese and Nichols, Inc., and Rady and Associates, Inc., for FEMA, under Contract No. H-4570 (Reference 5). The stated streams were all studied using detailed methods. That study was completed in July 1978. The hydrologic and hydraulic analyses for Mustang Creek were updated on July 16, 1991, in a revision prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-88-E-2768, Project Order No. 5. That study was completed on April 20, 1990 (Reference 6).

Cities of Ennis, Ferris, Glenn Heights, and Midlothian

The FIS reports for the Cities of Ennis, Ferris, Glenn Heights, and Midlothian were incorporated in the first countywide FIS report dated January 20, 1999, and they have been updated in all subsequent countywide studies including this study (References 7, 8, 9, 10, and 11).

Countywide FIS Reports

For the January 20, 1999 countywide FIS report, the hydrologic and hydraulic analyses for Chambers Creek, North Fork Chambers Creek, Greathouse Branch, Grove Creek (from its confluence with Red Oak Creek to approximately 0.89 miles downstream of U.S. Highway 77), and Waxahachie Creek (from the western limit of the City of Waxahachie to NRCS Dam No. 3) were performed by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. IAA-EMW-91-E-3525, Project Order No. 4 (Reference 11). All studies were performed using detailed methods. That study was completed on August 1, 1995.

The countywide FIS was revised on January 5, 2006. In the 2006 revision, the hydrologic and hydraulic analyses for East Fork to Soap Creek, Newton Branch, Plains Creek, Soap Creek, Tributary No. 6 to Soap Creek, and West Fork to Soap Creek were performed by Halff

Associates, Inc. for FEMA. This study was completed in November 2002. Hydrologic analyses for Lake Joe Pool were taken from the Tarrant County, Texas and Incorporated Areas, FIS report (Reference 12). A Letter of Map Revision (LOMR), Case Number 01-06-689P, dated February 14, 2002, containing detailed flooding information for Unnamed Tributary to Soap Creek, was also incorporated (Reference 1).

This second countywide revision updates the FIS for Ellis County and its incorporated communities. An Enhanced Approximate Analysis for Bedford Branch was incorporated from the Grand Prairie 2006 Joe Pool Lake Master Drainage Plan (Reference 13). As part of this study, twelve LOMRs, with the following case numbers, were incorporated: 01-06-1353P, 01-06-806P, 02-06-1067P, 03-06-126P, 04-06-1901P, 04-06-851P, 05-06-1424P, 05-06-A558P, 06-06-B466P, 08-06-0662P, 08-06-1778P, and 98-06-1582P.

Authority and acknowledgments for the Cities of Bardwell, Cedar Hill, Garrett, Grand Prairie, Italy, Mansfield, Maypearl, Milford, Oak Leaf, Palmer, Pecan Hill, Red Oak, and Venus as well as the Town of Alma are not available because no separate FIS report texts were ever published for these communities.

1.3 Coordination

The initial CCO meeting for this countywide FIS was held on April 27, 2007 and attended by representatives of the Cities of Ennis, Grand Prairie, Italy, Mansfield, Midlothian, Oak Leaf, Ovilla, Palmer, Red Oak, and Waxahachie as well as representatives for Ellis County, North Central Texas Council of Governments (NCTCOG), Texas Department of Transportation (TxDOT), FEMA, and Halff Associates, Inc.

The results of the study were reviewed at the final CCO meeting held on April 27, 2010, and attended by representatives of Ellis County; the Cities of Bardwell, Ennis, Ferris, Glenn Heights, Grand Prairie, Italy, Midlothian, Oak Leaf, Ovilla, Palmer, Pecan Hill, and Waxahachie; FEMA; and Halff Associates, Inc. All problems raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

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

All previous detailed study streams with Zone AE flood hazard designation were mapped by redelineation. An Enhanced Approximate Type I Study was incoporated for Bedford Branch in the City of Grand Prairie. Twelve LOMRs were incorporated in this FIS.

The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction through November 2009.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon,

by FEMA and community officials.

The flooding sources studied by Detailed Methods along with the limits of study are shown in Table 1, "Scope of Study."

Table 1: Scope of Study
Stream Reaches Studied by Detailed Methods

Stream Name	Study Date	Downstream Limit	Upstream Limit	Length (mi)
Redelineated Detailed Study Streams				
Bear Creek	1986	Confluence with Red Oak Creek	35 feet downstream of State Highway 342	18.30
Brushy Creek	1986	Confluence with Red Oak Creek	80 feet downstream of State Highway 342	12.33
Chambers Creek	1995	195 feet downstream of Interstate Highway 35	Confluence of North Fork Chambers	7.45
East Fork to Soap Creek	2002	Confluence with Soap Creek	Weatherford Road	1.08
Greathouse Branch	1995	Confluence with Chambers Creek	3,715 feet upstream of FM Road 66	5.78
Grove Creek	1995	Confluence with Red Oak Creek	Approximately 0.89 miles downstream of US Highway 77	21.17
Grove Creek	1986	Approximately 0.89 miles downstream of US Highway 77	2,500 feet upstream of Sterrett Road	2.62
Little Creek	1986	Confluence with Red Oak Creek	7,375 feet upstream of FM Road 664	4.69
Long Branch	1986	Confluence with Bear Creek	3,815 feet upstream of FM Road 664	4.25
Mustang Creek	1990 [1]	FM Road 878	2,480 feet upstream of US Highway 77	4.20
Mustang Creek Tributary	1999 [2]	Confluence with Mustang Creek	80 feet upstream of US Highway 77	0.95
Newton Branch	2002	Confluence with Soap Creek	1,295 feet upstream of Kimbel Road	1.48
North Fork Chambers Creek	1995	Confluence with Chambers Creek	Approximately 2,365 feet upstream of Lo Water Road	9.73
Plains Creek	2002	Confluence with Newton Branch	3,450 feet upstream of Old Fort Worth Road	1.40
Red Oak Creek	1986	Confluence with Trinity River	1,355 feet upstream of Joe Wilson Road	31.34
Shiloh Branch	1986	Confluence with Red Oak Creek	65 feet upstream of Shiloh Road	0.82
Soap Creek	2002	Confluence with Mountain Creek	1,395 feet downstream of US Highway 67	7.44
South Grove Creek	1986	Confluence with Grove Creek	495 feet upstream of Patrick Road	3.21

[1] Date of original study; 5 approved LOMRs have been incorporated since 1990 for Mustang Creek.
[2] Date the LOMR became effective.

Table 1: Scope of Study
Stream Reaches Studied by Detailed Methods

Stream Name	Study Date	Downstream Limit	Upstream Limit	Length (mi)
Redelineated Detailed Study Streams				
Tributary No. 6 to Soap Creek	2002	Confluence with Soap Creek	2,600 feet upstream of Soap Creek	0.49
Trinity River	1986	Approximately 1.7 miles downstream of the Dallas/Ellis County boundary	Dallas/Ellis County boundary	1.75
Unnamed Tributary to Soap Creek	2002	1,295 feet downstream of Railport Parkway	450 feet downstream of Power Way	1.05
Waxahachie Creek	1978	6,415 feet downstream of Desdren Drive	Upstream face of Interstate Highway 35	4.24
Waxahachie Creek	1995	Upstream face of Interstate Highway 35	534 feet upstream of FM Road 1387	10.04
Waxahachie Creek Tributary 1	1978	Confluence with Waxahachie Creek	1,350 feet upstream of Interstate Highway 35 access road	1.23
Waxahachie Creek Tributary 2	1978	Confluence with Waxahachie Creek	795 feet upstream of Interstate Highway 35 access road	0.31
Waxahachie Creek Tributary 3	1978	Confluence with Waxahachie Creek	Upstream face of Interstate Highway 35 southbound access road	1.50
West Fork to Soap Creek	2002	Confluence with Soap Creek	3,280 feet downstream of US Highway 67	2.77
Enhanced Approximate Type I Study Stream				
Bedford Branch	2006	4,350 feet upstream of confluence with Joe Pool Lake	850 feet upstream of Burlington Northern Santa Fe Railroad	2.07
Incorporated LOMR Streams				
Armstrong Creek	2006 [2]	110 feet downstream of Waterworks Road	1,030 feet upstream of Waterworks Road	0.22
Hollings Branch	2002 [2]	3,400 feet downstream of Magic Valley Lane	730 feet downstream of Magic Valley Lane	0.51 [3]

[2] Date the LOMR became effective.

[3] Length of the Hollings Branch LOMR study within Ellis County.

2.2 Community Description

Ellis County is located in northeast Texas. It is bordered by Henderson County and Kaufman County to the east, Navarro County to the south, Hill County to the west and southwest, Johnson County to the west, and Tarrant County and Dallas County to the north. The City of Waxahachie is the county seat of Ellis County. Major routes through the Ellis County are Interstate Highway 35 that runs from the southwest corner of the county to the north.

Interstate Highway 45 is a major north-south route in the eastern half of the county. US Highway 287 is a major southeast to northwest route in the county. The approximate area of the county is 952 square miles (Reference 14).

Primary land use in the county is agricultural, pasture, range, and urban. Approximately 55 percent of the county is cropland. Land use is rapidly changing from agricultural to urban in many areas of the county. Residential subdivisions, as well as individual home sites, are being developed to meet the demand of people who work in the Dallas-Fort Worth metropolitan area (Reference 1). The economy of the county primarily relies on cement, steel production, warehousing and distribution, government and services sectors, and work in the Dallas-Fort Worth area. A large portion of Ellis County drains to the Trinity River that forms the eastern boundary of the county (Reference 14).

The City of Ovilla, located approximately 20 miles south of the City of Dallas and west of U.S. Interstate Highway 35 East, is bordered to the north by the Cities of Cedar Hill and Glenn Heights and to the east, south, and west by Ellis County. The City of Ovilla is located in both Dallas and Ellis Counties. The economy of the City includes farming and ranching, with many citizens commuting to the City of Dallas for work. The City of Ovilla is drained by Red Oak Creek, which partially forms the southern edge of the City limits, and by several of its tributaries including Shiloh Branch (Reference 4).

The City of Waxahachie is located in central Ellis County approximately 30 miles south of the City of Dallas along U.S. Interstate Highway 35 East. The economy of the area includes farming, ranching, and local industrial plants, and many citizens commute to the Dallas-Fort Worth metropolitan area for work.

The City of Waxahachie is drained by Waxahachie Creek and its tributaries in the southern and eastern portions of the City, and by Mustang Creek and its tributaries in the northern and eastern portions of the City. Mustang Creek flows south, joining Waxahachie Creek at a point southwest of the City of Ennis. Waxahachie Creek empties into Chambers Creek near the City of Corsicana. At the downstream study limit, Mustang Creek drains 6.23 square miles. Some of the Mustang Creek drainage area is developed and consists mainly of single-family homes. The topography of the area ranges from level to rolling hills. The lower part of the Waxahachie Creek floodplain is more urbanized than its upper part, being closer to many major freeways (Reference 6).

According to United States Census 2000 figures, the population of Ellis County was 111,360. A more current estimate of the population of Ellis County is 137,820. There are twenty incorporated communities in the county; their 2000 Census population estimates are as follows: City of Bardwell (583), City of Cedar Hill (32,093), City of Ennis (16,045), City of Ferris (2,175), City of Garrett (448), City of Glenn Heights (7,224), City of Grand Prairie (127,427), City of Italy (1,993), City of Mansfield (28,031), City of Maypearl (746), City of Midlothian (7,480), City of Milford (685), City of Oak Leaf (1,209), City of Ovilla (3,405), City of Palmer (1,774), City of Pecan Hill (672), City of Red Oak (4,301), City of Venus (910), City of Waxahachie (21,426), and the Town of Alma (302) (Reference 15).

Ellis County is in the North Blackland prairie. The soil and land surface data summarized below was obtained from the Natural Resources Conservation Commission. The following soil types and land surface types as well as their respective percentages are found in Ellis County: Austin Silty Clay (9.98%);Gasil fine sandy loam (0.02%); Gasil-Lamar complex

(0.05%); Whitewright and Austin soils (0.12%); Broken alluvial land (1.65%); Burleson clay (2.38%); Leson clay (0.63%); Burleson clay, depressional (0.05%); clay pits (0.01%); Crockett soils (1.17%); Silawa and Styx loamy fine sand (0.05%); Eddy gravelly clay loam (2.90%); Eddy soils (5.45%); Ellis and Heiden clays (2.51%); Bosque loam (0.09%); Frio silty clay (1.21%); Gullied land (0.33%); Gravel pits (0.51%); Houston Black clay (20.11%); Branyon clay (6.81%); Heiden clay (10.55%); Heiden and Ellis clays (0.62%); Heiden-Ferris complex (2.95%); Lesson clay (0.69%); Lewisville association (0.44%); Lamar clay loam (0.49%); Lewis silty clay (2.43%); Altoga soils (0.77%); Normangee clay loam (0.35%); Normangee and Silawa soils (0.32%); Eufaula loamy fine sand (0.10%); Stephen-Eddy complex (2.44%); Stephen silty clay (1.95%); Ferris clay (1.39%); Trinity clay (11.41%); Seagoville clay (0.14%); Mabank fine sandy loam (0.75%); Wilson clay loam (4.66%); water (1.38%); dams (0.05%); and slick spots (0.09%) (Reference 16).

Elevations in the county range from 290 feet within the Trinity River floodplain to 890 feet in the western half of the county. These elevations are referenced to the North American Vertical Datum of 1988 (NAVD 88).

Ellis County has a moist, subhumid climate with moderate temperatures. The winters are mild (Reference 1). The following data is based on the City of Waxahachie gage, and it reflects the latest compilation completed by the office of the Texas State Climatologist in 2004. The mean minimum temperature in January is 35 degrees Fahrenheit and the mean, maximum temperature in July is 96 degrees Fahrenheit. The annual precipitation is 38.81 inches, ranging from 2.11 inches in January to 4.85 inches in May (Reference 14).

2.3 Principal Flood Problems

Major floods in the County can occur at any time throughout the year, but are more frequent during heavy spring rains resulting from local thunderstorms. These floods cause heavy damage to residences and businesses, in addition to prime cropland damage (Reference 1).

According to longtime Ovilla residents, flooding occurred along Red Oak Creek in 1922 and washed out all but one of the bridges that crossed the creek. Along the southern edge of the City, Red Oak Creek has very steep banks with large trees forming a picturesque setting. Shiloh Branch enters Red Oak Creek from the south and also has steep banks and heavy timber in the overbank areas. Several unnamed tributaries enter Red Oak Creek from the north and also produce flooding problems (Reference 1).

In April 1976, flooding occurred along Waxahachie Creek. As a result, several hundred businesses were flooded (Reference 1).

2.4 Flood Protection Measures

The Texas Water Development Board (TWDB) and the State Board of Insurance have responsibility for the NFIP in Texas. Their duties include authorization of all political subdivisions to comply with the requirements of the NFIP and approval of plans for any levee or other such improvement that may change flood flows of any stream in Texas that is subject to floods (Reference 1).

Levees in the study area provide the county with some degree of protection against flooding. However, it has been ascertained that some of these levees may not protect the county from

rare events such as the 1-percent-annual-chance flood. The criteria used to evaluate protection against the 1-percent-annual-chance flood are: 1) adequate design, including freeboard; 2) structural stability; and 3) proper operation and maintenance. Levees that do not protect against the 1-percent-annual-chance flood are not considered in the hydraulic analysis of the 1-percent-annual-chance floodplain (Reference 1).

No levees in Ellis County have been issued certification, and, therefore, are not shown on the FIRMs.

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

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

3.1.1 Redelineated Detailed Study Streams

The redelineated streams were initially studied by detailed methods. These flooding sources include all those listed in Table 1 as redelineated detailed study streams. Information on the hydrologic analyses for each of the previously printed FIS reports for communities within Ellis County was compiled and is shown below.

Pre-countywide Analyses

For the August 19, 1987 FIS report for the unincorporated areas of Ellis County, peak discharges were obtained from the analysis conducted by the NRCS during its preparation of the study, Flood Plain Management Study, Red Oak Creek and Tributaries (References 1 and 3). Peak discharge values for Bear Creek, Brushy Creek, Grove Creek (a portion of which has been superseded by the USACE study), Little Creek, Long Branch, Red Oak Creek, and South Grove Creek were obtained using United States Geological Survey (USGS) Water Resources Investigation Open-File Report 77-110, "Techniques for Estimating the Magnitude and Frequency of Floods in Texas" (Reference 17). Rainfall frequency data for the analysis was obtained from Weather Bureau Technical Paper No. 40 (TP-40), "Rainfall Frequency

Atlas of the United States," (Reference 18). Values greater than the 1-percent-annual-chance event were determined by extrapolation of the rainfall-versus-frequency graph.
Peak discharges for the Trinity River were obtained from the FIS report for Dallas County, Texas and Incorporated Areas (Reference 19).

In the January 6, 1988 FIS report for the City of Ovilla, peak discharges for Shiloh Branch were determined using regional flood-frequency equations. The equations were developed by the USGS and relate drainage basin characteristics to stream flow characteristics for the 10-, 2-, and 1-percent-annual-chance discharges. The 0.2-percent-annual-chance peak discharges were obtained by extrapolating a straight line through the 10-, 2-, and 1-percent-annual-chance discharges plotted on log-probability paper (Reference 1).

For the February 1980 FIS report for the City of Waxahachie along Mustang Creek Tributary, Waxahachie Creek, Waxahachie Creek Tributary 1, Waxahachie Creek Tributary 2, and Waxahachie Creek Tributary 3, peak flood discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood discharges were determined using the USACE HEC-1 computer program (Reference 20). The effects of 17 NRCS flood-control structures and several private lakes within the Waxahachie Creek drainage basin and the resulting storage-discharge relationships were incorporated into the study. Unit hydrographs were derived by USACE (Reference 1).

Fifteen-minute rainfall increments were used because the drainage areas involved were small, resulting in short times to peak. Rainfall values were obtained using TP-40 and National Weather Service Technical Memorandum Hydro-35 (References 18 and 21). Lag times were based on a USACE publication dealing with synthetic unit hydrograph relationships for the Trinity River tributaries (Reference 22). Infiltration rates used were obtained from the USACE, Fort Worth District, for clay-soil losses as follows:

Recurrence Interval (years)	10	50	100	500
Initial Abstraction (inches)	1.12	0.84	0.75	0.5
Infiltration Rate (inches per hour)	0.14	0.1	0.07	0.05

The Muskingum method for channel routing was used. The total drainage area contributing to the Waxahachie Creek study is 65 square miles (Reference 5).

There are significant differences in the discharge-drainage area relationships between the 1978 study and the 1995 USACE study. These differences are particularly apparent along Waxahachie Creek at the USACE's downstream study limit (the upstream corporate limit for the City of Waxahachie). Most of the differences in results are related to the routings, both along the valley reaches and within the numerous NRCS reservoirs. Modified-Puls methodology was used in the more recent USACE study because valley storage information was readily available along Waxahachie Creek. (Reference 1)

The factor contributing to the most significant difference in the study results is the modeling of the NRCS reservoirs. In the 1978 NRCS study, the principal spillway elevation was used as the starting water surface elevation (WSEL). In the 1995 USACE study, an analysis of the NRCS reservoirs was performed to determine reasonable starting WSELs (pool levels) for each frequency-related storm event. In the study area, 13 of the 15 NRCS lakes have a constriction plate on the principal spillway that decreases the amount of water allowed to exit the lake. Such devices significantly reduce the outflow capacities and cause the NRCS reservoirs to remain within the "flood pool" for relatively long periods of time. In the 1995

study, the NRCS reservoirs were started at their emergency spillway levels and then drained through their principal spillways for a 10-day period. The resulting pool level reached at the end of 10 days was used as the starting stage for the 1- and 0.2-percent-annual-chance events. The NRCS reservoirs were started at their principal spillway levels for the 10- and 2-percent-annual-chance events (Reference 1).

Another method was evaluated to determine the starting WSEL in the NRCS reservoirs. This method started the NRCS lakes at the principal spillway elevation, induced a 10-percent-annual-chance storm on the drainage basin, and then waited 3 days to get the 1-percent-annual-chance WSEL. This method was looked at because, in this region of the United States, fronts are the major contributors to storms and they are, on the average, 3 days apart. It is also probable that a 1-percent-annual-chance storm will be preceded by another storm. It should be noted that both methods gave nearly identical results (Reference 1).

The flood-flow frequency values for Mustang Creek in the July 16, 1991 FIS report for the City of Waxahachie performed by the USACE were developed using data from TP-40 and National Weather Service (NWS) Technical Memorandum Hydro-35 (References 18 and 21). Rainfall excesses were computed using initial and hourly loss rates and the appropriate percent-imperviousness value. These loss rates were obtained from studies conducted in the Dallas-Fort Worth area and adopted for this study area due to similarity of soils (Reference 1).

Snyder's unit hydrographs were computed for each subbasin based on physical measurements; percent urbanization and imperviousness were based on field inspection of the study area. A Cp640 value of 530 was used for the entire watershed, which was used in the original FIS report for the City of Waxahachie (Reference 5).

Countywide Analyses

For the January 20, 1999 countywide FIS report, flood-flow frequencies for Chambers Creek, North Fork Chambers Creek, Greathouse Branch, Grove Creek (which supersedes the 1984 NRCS study), and Waxahachie Creek (from the western limit of the City of Waxahachie to approximately 480 feet upstream of the FM Road 1367) were determined by the USACE. The study was started by breaking the watersheds into subbasins and taking the appropriate measurements to create a "SWFHYD" model for each stream. SWFHYD is a hydrologic computer program developed by the USACE, Forth Worth District. Its primary use, in this particular case, was for the computation of Snyder's unit-hydrograph lagging times, initial abstractions, and infiltration rates on each subbasin. NRCS Soil Surveys were used to determine the types of soils in each subbasin:

	Initial Abstraction (inches)			
	Recurrence Interval (years)			
Watershed	**10**	**50**	**100**	**500**
Chambers Creek	1.12 to 1.50	0.84 to 1.10	0.75 to 0.90	0.50 to 0.60
Greathouse Branch	1.27 to 1.37	0.91 to 1.01	0.81 to 0.85	0.54 to 0.57
Grove Branch	1.12 to 1.25	0.84 to 0.93	0.75 to 0.80	0.50 to 0.53
Waxahachie Creek	1.37	1.01	0.85	0.57

Infiltration Rate (inches per hour)				
	Recurrence Interval (years)			
Watershed	**10**	**50**	**100**	**500**
Chambers Creek	0.14 to 0.18	0.10 to 0.13	0.07 to 0.10	0.05 to 0.08
Greathouse Branch	0.16 to 0.17	0.11 to 0.12	0.08 to 0.09	0.05 to 0.06
Grove Branch	0.14 to 0.15	0.10 to 0.11	0.07 to 0.08	0.05 to 0.06
Waxahachie Creek	0.17	0.12	0.09	0.07

HEC-1 models were then created, incorporating valley storage routings. The Modified-Puls routing technique, with valley storage relationships based on concurrent HEC-2 modeling for the 1999 FIS, was applied throughout the study areas, except for the south Chambers Creek portion, upon which the Muskingum routing method was used because no valley storage information was available. Rainfall data were derived from TP-40 (Reference 18) and NWS Technical Memorandum Hydro-35 (Reference 21). Rainfall depths for the 0.2-percent-annual-chance frequency storm were derived through graphical extrapolation.

For the January 5, 2006 FIS report, the hydrologic data for East Fork to Soap Creek, Newton Branch, Plains Creek, Soap Creek, Tributary No. 6 to Soap Creek, and West Fork to Soap Creek were obtained from the City of Grand Prairie. Peak flood discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood events were determined using the HEC-HMS computer program (Reference 23).

For Unnamed Tributary to Soap Creek, NRCS Technical Report 55 was used to determine peak flood discharges (Reference 24).

Peak discharge-drainage area relationships for detailed study streams are shown in Table 2, "Summary of Discharges."

Table 2: Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (square miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Redelineated Detailed Study Streams					
BEAR CREEK					
Above confluence with Red Oak Creek	46.57	8,145	14,663	17,883	25,200
Below Interstate 45	28.54	6,297	11,250	13,681	19,100
Above State Route 983	17.61	4,726	8,333	10,088	14,000
At State Route 342	7.67	3,014	5,232	6,299	8,748
BRUSHY CREEK					
Above Southern Pacific Railroad	19.36	4,961	8,759	10,609	14,835
Below Hunsucker Road	11.91	3,748	6,539	7,888	10,980
Above State Route 2377	2.98	1,583	2,642	3,139	4,299
At State Route 342	0.60	642	1,035	1,215	1,641

Table 2: Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (square miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Redelineated Detailed Study Streams					
CHAMBERS CREEK					
At Interstate Highway 35 East	353.92	35,200	62,200	84,800	125,200
At FM Road 876	342.10	36,300	63,300	85,400	125,100
Approximately 7,000 feet above FM Road 876	321.74	36,700	62,900	83,200	120,400
Below confluence of Bee Creek	320.69	37,700	63,400	83,700	120,700
At abandoned railroad approximately 1,000 feet above Greathouse Branch	306.03	38,100	63,700	82,500	117,800
EAST FORK TO SOAP CREEK					
Above the confluence with Soap Creek	2.41	2,000	3,000	3,500	4,900
Above Miller Road	2.03	1,800	2,700	3,200	4,600
GREATHOUSE BRANCH					
At confluence with Chambers Creek	8.20	2,270	2,920	3,950	5,920
Approximately 5,900 feet below Greathouse Road	7.43	2,180	2,670	3,410	5,790
Approximately 200 feet below Greathouse Road	6.45	860	1,050	2,350	5,370
At Greathouse Road	5.97	400	470	2,320	5,380
Below NRCS Damsite No. 80	5.80	75	78	2,280	5,320
Approximately 4,300 feet below Old Maypearl Road	4.52	5,450	6,610	8,470	10,460
At Old Maypearl Road	3.78	4,840	5,850	7,480	9,250
At State Highway 66 (Maypearl Road)	2.10	2,290	3,650	4,680	5,730
Approximately 3,900 feet above State Highway 66 (Maypearl Road)	1.40	2,110	2,540	3,250	3,980
GROVE CREEK					
At confluence with Red Oak Creek	64.78	13,840	19,720	29,150	40,590
Approximately 11, 700 feet above confluence with Red Oak Creek	62.55	14,010	19,750	29,110	40,460
At FM Road 813	56.42	14,190	19,660	29,010	40,020
At Parker Road	50.85	14,260	19,510	28,760	39,480
At Interstate Highway 45	49.08	14,350	19,580	29,120	39,830
Below confluence of Cottonwood Creek	46.94	14,360	19,510	29,160	40,320
Above confluence of Bone Branch	30.03	12,620	17,000	23,840	30,670
Above confluence of Boyce Creek	22.43	10,430	14,020	19,390	24,590

Table 2: Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (square miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Redelineated Detailed Study Streams					
GROVE CREEK (cont'd)					
At FM Road 878	18.32	10,640	13,810	18,280	22,480
At Broadhead Road	16.06	9,650	12,230	16,370	20,410
At FM Road 813	13.39	8,260	10,330	13,460	16,740
At Interstate Highway 35	3.80	1,882	3,178	3,791	5,212
LITTLE CREEK					
Above confluence with Red Oak Creek	11.86	3,863	6,776	8,187	11,414
At FM Road 664 Bridge	8.91	3,289	5,732	6,911	9,611
At upstream County boundary	6.53	2,745	4,747	5,707	7,913
LONG BRANCH					
Below State Route 983	5.53	2,350	4,008	4,797	6,622
Above State Route 664	3.73	1,910	3,236	3,865	5,320
MUSTANG CREEK					
Approximately 1,360 feet below Farley Street	4.20	3,650	5,475	6,520 [1]	9,080
Approximately 1,620 feet above Farley Street	3.59	4,020	6,340	7,340	9,470
Approximately 0.67 miles above Farley Street	2.77	2,870	4,610	5,350	6,900
Approximately 530 feet above FM Road 813	2.05	2,630	4,100	4,710	6,050
Approximately 1,450 feet below Route 77	1.24	2,500	3,440	3,870	4,920
NEWTON CREEK					
Above the confluence with Soap Creek	15.11	2,700	6,100	7,800	12,300
Below the confluence of Plains Creek	14.86	2,600	6,100	7,800	12,300
Above the confluence of Plains Creek	10.00	1,500	3,700	4,800	7,700
Above Kimble Road	9.46	1,500	3,600	4,700	7,600
NORTH FORK CHAMBERS CREEK					
At confluence with Chambers Creek	161.66	17,400	29,100	38,200	54,800
Below confluence of Oak Branch	158.66	18,000	29,300	38,300	54,600
Below confluence of Mesquite Branch	150.38	18,300	29,400	37,000	51,500
At FM Road 916	141.28	18,400	29,000	35,100	48,700
Above confluence of Cottonwood Creek	85.44	7,280	13,300	18,400	27,500
Above confluence of Boggy Creek	71.61	6,960	12,800	17,300	25,300

[1] Discharge decreased due to storage routing.

Table 2: Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (square miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Redelineated Detailed Study Streams					
PLAINS CREEK					
Above the confluence with Newton Branch	4.86	2,500	3,100	4,700	1,300
Above Old Fort Worth Road	4.48	2,700	3,500	5,500	1,300
RED OAK CREEK					
At confluence of Bear Creek	209.50	20,122	37,812	46,791	69,000
At confluence of Grove Creek	156.13	16,876	31,453	38,813	58,400
Below confluence of Brushy Creek	88.28	11,812	21,610	26,501	37,700
Below State Route 813	51.81	8,974	16,296	19,927	27,800
At confluence of Little Creek	36.88	7,694	13,955	17,053	23,400
At Westmoreland Road	18.15	5,105	9,099	11,052	15,700
Approximately 1,300 feet above confluence with Slippery Elm Creek	17.15	4,930	8,771	10,648	15,300
Above Shiloh Branch	16.65	4,857	8,637	10,484	15,100
At Water Street Bridge	13.51	4,292	7,590	9,195	12,900
Approximately 2.4 miles above Westmoreland Road	12.04	4,070	7,194	8,712	12,100
At upstream corporate limits	9.06	3,469	6,093	7,363	10,000
At upstream County boundary	6.08	2,763	4,808	5,792	8,045
SHILOH BRANCH					
Above confluence with Red Oak Creek	2.20	2,200	3,500	4,200	5,400
SOAP CREEK					
Below confluence of Newton Branch	33.28	10,100	19,800	24,600	37,000
Below confluence of Tributary No. 6 to Soap Creek	15.87	9,200	15,500	18,800	26,800
Above confluence of Tributary No. 6 to Soap Creek	14.90	8,900	14,800	18,100	25,900
Below confluence of West Fork to Soap Creek	13.53	8,900	15,000	17,800	25,000
Above confluence of West Fork to Soap Creek	9.24	6,600	10,700	12,600	17,600
Below confluence of East Fork to Soap Creek	8.37	6,900	10,900	12,700	17,500
Above confluence of East Fork to Soap Creek	5.98	4,900	8,000	9,400	12,800
SOUTH GROVE CREEK					
Below Missouri-Kansas-Texas Railroad	4.90	2,171	3,687	4,406	6,072
Above Patrick Road	2.76	1,606	2,702	3,218	4,417

Table 2: Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (square miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Redelineated Detailed Study Streams					
TRIBUTARY NO. 6 TO SOAP CREEK					
Above the confluence with Soap Creek	0.97	1,000	1,600	1,800	2,500
TRINITY RIVER					
At Loop 12 bridge in Dallas, Texas	6,278.00	52,000	88,000	109,000	200,000
UNNAMED TRIBUTARY TO SOAP CREEK					
At confluence with Soap Creek	0.89	868	1,166	1,367	1,872
WAXAHACHIE CREEK					
At southern corporate limits	65.00	12,250	17,400	19,750	25,100
Above confluence of unnamed tributary east of Matthews Street	62.00	9,200	13,100	15,000	24,600
Above confluence of unnamed tributary south of City cemetery	60.00	8,400	12,000	13,800	24,600
Above confluence of unnamed tributary north of City cemetery	59.00	7,950	11,400	13,100	24,600
Above confluence of unnamed tributary at Getzendaner Park	56.00	6,550	9,450	12,000	24,100
Above confluence of tributary of Country Club Lake	55.00	6,350	9,150	11,550	23,500
At Interstate Highway 35 East	52.26	8,190	12,270	20,360	30,650
Below confluence of Long Branch	44.65	8,640	12,420	18,660	28,460
Below confluence of North Prong Creek	34.19	8,390	11,910	14,790	20,930
Above confluence of North Prong Creek	20.38	8,080	11,170	14,010	20,030
Approximately 1,300 feet below Walnut Grove Road	16.80	7,500	10,340	12,070	16,760
Approximately 200 feet below Mount Zion Road	12.82	7,170	9,920	11,290	14,690
Approximately 1,200 feet below US Highway 287	8.90	5,370	7,400	8,350	10,700
Below confluence of NRCS Damsite No. 4 Tributary	4.76	3,640	4,910	5,480	6,720
Below South-Eastern Midlothian Tributary	3.52	3,050	4,110	4,580	5,610
Above South-Eastern Midlothian Tributary	2.54	1,560	2,100	2,340	2,870
Below NRCS Damsite No. 3	1.59	15	180	690	1,300
WAXAHACHIE CREEK TRIBUTARY 1					
At confluence with Waxahachie Creek	1.20	1,800	2,490	2,790	3,450

Table 2: Summary of Discharges

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (square miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Redelineated Detailed Study Streams					
WAXAHACHIE CREEK TRIBUTARY 2					
At confluence with Waxahachie Creek	2.20	1,100	1,150	1,700	2,350
WAXAHACHIE CREEK TRIBUTARY 3					
At confluence with Waxahachie Creek	1.50	110	350	530	760
WEST FORK TO SOAP CREEK					
Above the confluence with Soap Creek	4.29	2,400	4,300	5,200	7,400
Enhanced Approximate Type I Study Stream					
BEDFORD BRANCH					
Upstream City Limits	3.36	--[2]	--[2]	3,580	--[2]
Southern Pacific Railroad	3.55	--[2]	--[2]	3,680	--[2]
750' downstream S.P. Railroad	3.73	--[2]	--[2]	4,030	--[2]
Upstream Small Confluence	3.81	--[2]	--[2]	4,080	--[2]
Downstream Small Confluence	4.28	--[2]	--[2]	4,870	--[2]
Upstream Penwell Confluence	4.32	--[2]	--[2]	4,860	--[2]
Downstream Penwell Confluence	4.94	--[2]	--[2]	5,740	--[2]
0.70 mile upstream S.P. Railroad	5.11	--[2]	--[2]	5,850	--[2]
0.5 miles upstream S.P. Railroad	5.28	--[2]	--[2]	5,880	--[2]
450 feet upstream S.P. Railroad	5.39	--[2]	--[2]	5,920	--[2]
Confluence with Joe Pool Lake	5.48	--[2]	--[2]	5,980	--[2]
Incorporated LOMR Streams					
ARMSTRONG CREEK					
Just above Highway 875	7.03	5,925	8,808	10, 089	11,453
HOLLINGS BRANCH					
2,900 feet above Ellis Road	2.20	--[3]	--[3]	3,308	--[3]

[2] Data not Shown for Enhanced Approximate Type I Studies
[3] Data not Available

Elevations for Joe Pool Lake and its backwater were taken from the August 23, 2000 Tarrant County, Texas and Incorporated Areas FIS (Reference 12). A USACE design memorandum was used to compute the WSELs as shown in Table 3 (Reference 25). These water surface

elevations are in feet and are referenced to the North American Vertical Datum of 1988 (NAVD 88).

Table 3: Summary of Stillwater Elevations

Flooding Source and Location	10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Joe Pool Lake				
At Dam	527.5	536.0	537.5	543.5

3.1.2 Enhanced Approximate Type I Study Stream

An Enhanced Approximate Type I study was prepared for a portion of Bedford Branch in the City of Grand Prairie. This information was incorporated from the 2006 Grand Prairie Joe Pool Lake Master Drainage Plan - Section I - Hydrology & Hydraulics.

HEC-HMS Version 2.2.2 was used to estimate peak 1-percent-annual-chance discharges.

Enhanced Approximate Type I Studies are based on limited detail surveys. The 1-percent-annual-chance flood delineations are shown as Zone AE floodplains on the FIRM. No floodways were computed, but BFEs are shown on the FIRM, a flood profile is included in this FIS, and the 1-percent-annual-chance discharges are included in Table 2 – Summary of Discharges.

3.2 Hydraulic Analyses

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). 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 (Exhibit 1) 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 Flood Insurance Rate Map (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.

3.2.1 Redelineated Detailed Study Streams

The analyses for the redelineated study streams were taken from the January 5, 2006 FIS report. The Base (1-percent-annual-chance) Flood Elevations (BFEs) from the profiles were plotted on the best available topographic data to define the special flood hazard areas. The redelineated streams are identified in Table 1.

Pre-countywide Analyses

For the August 19, 1987 FIS for the unincorporated areas of Ellis County, in the study conducted by the NRCS under the study, Flood Plain Management Study, Red Oak Creek and Tributaries (Reference 2), cross section data for the backwater analyses were obtained from USGS 7.5-Minute Series Topographic Maps at a scale of 1:24,000, with a contour interval of 10 feet, and field surveys (Reference 26). Engineering surveys were made of cross sections selected to represent the stream hydraulics and floodplain areas. All bridges and culverts were surveyed to obtain elevation data and structural geometry (Reference 1).

Flooding information previously shown as approximate in the City of Ovilla along Little Creek was updated to incorporate detailed flooding. This information was obtained from the City of Glenn Heights, Texas FIS report (Reference 9).

For streams studied by detailed methods under the NRCS's Red Oak Study, WSELs of floods of the selected recurrence intervals were computed using the NRCS WSP2 computer program (Reference 27). Flood profiles were drawn showing computed WSELs for floods of the selected recurrence intervals (Reference 1).

Starting WSELs for Bear Creek, Brushy Creek, Little Creek, Long Branch, Red Oak Creek, and South Grove Creek were computed by the NRCS WSP2 computer program using the slope-area method (Reference 9). Starting WSELs for Shiloh Branch were taken from the FIS for the City of Ovilla (Reference 4). Starting WSELs for the Trinity River were taken from the FIS for Dallas County (Reference 19).

For the August 1980 FIS report for the City of Waxahachie, cross section data for the backwater analyses for Mustang Creek Tributary, Waxahachie Creek, Waxahachie Creek Tributary 1, Waxahachie Creek Tributary 2, and Waxahachie Creek Tributary 3 were obtained by field survey and located at close intervals above or below bridges and culverts in order to compute significant backwater effects of these structures. WSELs for floods of the selected recurrence intervals were computed using the USACE HEC-2 computer program (Reference 28).

For the July 16, 1991 revision to the FIS report for the City of Waxahachie, cross section data for Mustang Creek were obtained by field surveys conducted in June 1989. Information was also obtained from Texas Department of Highways and Public Transportation bridge plans. Bridges were field surveyed when plans were not available. USGS topographic maps were used whenever necessary to extend the cross sections to contain flow. WSELs were computed using the USACE HEC-2 computer program (Reference 28).

Countywide Analyses

For the January 20, 1999 countywide FIS, cross section data for Chambers Creek, Greathouse Branch, and Waxahachie Creek were obtained by field surveys conducted in 1992. Cross section data for North Fork Chambers Creek were obtained from a combination of field surveys conducted in 1992 and NRCS cross section data from 1952. Cross section data for Grove Creek were obtained from the previous NRCS study. New cross sections were field surveyed at the bridges along Grove Creek in 1992. Additionally, the area around the unnamed private road between Cross Sections P and Q on Grove Creek was supplemented with 1986 cross section data from Caffey & Morrison, Inc. (Reference 1).

WSELs of floods of the selected recurrence intervals were computed using the USACE HEC-2 computer program. Starting WSELs for Chambers Creek, the lower portion of Greathouse Branch below Dam No. 80, Grove Creek, and Waxahachie Creek were computed using the slope-area method in the USACE HEC-2 computer program (Reference 28). The starting WSELs for the upper reach of Greathouse Branch, above Dam No. 80, were determined from the peak lake elevations at the peak inflows behind Dam No. 80 as described in Table 4.

Table 4: Summary of Peak and Coincident Pool Levels and Inflows At NRCS Site No. 80 on Greathouse Branch in the Chambers Creek Watershed

Feature	Drainage Area (square miles)	Annual Exceedance Frequency			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Drainage Area	5.80				
Peak inflow (cfs)		7,180	8,693	11,123	13,725
Time of Peak Inflow (hours)		13.00	13.00	13.00	13.00
Coincident Stage (feet NAVD)		581.3	584.4	591.0	594.5
Peak outflow (cfs)		75	78	2,280	5,320
Peak Stage (feet NAVD)		588.7	592.6	596.6	598.5
Time to Peak Stage (hours)		17.50	19.50	14.50	14.00
Coincident Inflow (cfs)		77	83	2,617	6,275

The computations for Waxahachie Creek began at cross section S and were taken from the FIS report for the City of Waxahachie (Reference 6). Starting WSELs were selected such that the computed WSELs on the upstream side of Interstate Highway 35 East matched the elevation given in the City of Waxahachie FIS report. Starting WSELs for North Fork Chambers Creek were determined from the WSELs (coincident peak assumption) computed in the HEC-2 model for Chambers Creek.

For the January 5, 2006 countywide revision, cross section data for the backwater analyses were provided by the City of Grand Prairie and aerial photographs were taken by Dallas Aerial Surveys, Inc. in 1999 (Reference 29).

Hydraulic analyses for East Fork to Soap Creek, Newton Branch, Plains Creek, Soap Creek, Tributary No. 6 to Soap Creek, and West Fork to Soap Creek were conducted to provide the WSELs of the 10-, 2-, and 1-, and 0.2-percent-annual-chance floods using the HEC-RAS 3.0.1 computer program (Reference 30). Starting WSELs were computed by the normal depth method (Reference 1).

Hydraulic analyses for Unnamed Tributary to Soap Creek were conducted using the HEC-RAS 2.2 computer program (Reference 31). Starting WSELs were computed by comparing the HEC-RAS analysis to the previous 1-percent-annual-chance floodplain on the FIRM (Reference 1).

Roughness factors (Manning's "n" values) used in the hydraulic analyses were chosen by engineering judgment and based on field observations of the streams and floodplain areas. Table 5, "Summary of Roughness Coefficients," lists channel and overbank "n" values for the streams studied by detailed methods.

Table 5: Summary of Roughness Coefficients
Stream Reaches studied by Detailed Methods

Stream	Channel "n" Values	Overbank "n" Values
Redelineated Detailed Study Streams		
Bear Creek	0.035-0.050	0.065-0.080
Brushy Creek	0.035-0.050	0.070-0.080
Chambers Creek	0.080	0.040-0.055
East Fork to Soap Creek	0.040	0.050-0.060
Greathouse Branch	0.075-0.095	0.065-0.070
Grove Creek	0.040-0.090	0.035-0.080
Little Creek	0.040-0.045	0.070-0.080
Long Branch	0.040	0.070
Mustang Creek	0.060-0.075	0.050-0.060
Mustang Creek Tributary	0.045-0.050	0.060-0.070
Newton Branch	0.040	0.050-0.065
North Fork Chambers Creek	0.070-0.085	0.050-0.060
Plains Creek	0.045	0.050-0.055
Red Oak Creek	0.035-0.045	0.055-0.085
Shiloh Branch	0.035-0.045	0.060-0.090
Soap Creek	0.040	0.050-0.070
South Grove Creek	0.040-0.045	0.050-0.070
Tributary No. 6 to Soap Creek	0.040	0.050-0.050
Trinity River	0.055-0.030	0.130-0.055
Unnamed Tributary to Soap Creek	--[1]	--[1]
Waxahachie Creek	0.060-0.090	0.050-0.075
Waxahachie Creek Tributary 1	0.070	0.055
Waxahachie Creek Tributary 2	0.070	0.050
Waxahachie Creek Tributary 3	0.060-0.080	0.050-0.060
West Fork to Soap Creek	0.040-0.045	0.050-0.065

[1] Data not Available

3.2.2 Enhanced Approximate Type I Study Stream

An Enhanced Approximate Type I study was prepared for a portion of Bedford Branch in the City of Grand Prairie. This information was incorporated from the 2006 Grand Prairie Joe Pool Lake Master Drainage Plan - Section I - Hydrology & Hydraulics.

HEC-RAS Version 3.1.3 was used to estimate water surface elevations for Bedford Branch.

Enhanced Approximate Type I Studies are based on limited detail surveys. The 1-percent-annual-chance flood delineations are shown as Zone AE floodplains on the FIRM. No floodways were computed, but BFEs are shown on the FIRM, a flood profile is included in this FIS, and the 1-percent-annual-chance discharge is included in Table 4 -- Summary of Discharges.

3.3 Incorporated Letter of Map Revision Study Streams

Twelve LOMRs have been incorporated in this FIS. Mustang Creek, Mustang Creek Tributary, and Waxahachie Creek were studied by detailed methods in previous FIS studies. Armstrong Creek and Hollings Branch were Zone A study streams in previous FIS reports. These LOMRs included detailed studies for Armstrong Creek and Hollings Branch that were incorporated as Zone AE streams into this countywide FIS revision. These LOMRs include revisions to those studies.

Armstrong Creek

A detailed hydrologic and hydraulic analysis that was supplemented with new topographic data became effective on July 20, 2006. The LOMR case number for this study is 05-06-A558P. The changes affect the Unincorporated Areas of Ellis County.

A hydraulic analysis was performed to incorporate the effects of channelization and placement of fill along Armstrong Creek. The revised area of Armstrong Creek was previously a Zone A area. The new floodplain, discharges, and profiles resulting from this LOMR have been incorporated in this FIS.

Hollings Branch

A detailed, existing conditions hydrologic and hydraulic analysis for Hollings Branch was funded by the City of Grand Prairie. The LOMR, case number 01-06-806P, went effective on January 24, 2002. The revisions in this LOMR affect the City of Grand Prairie and the City of Cedar Hill, but affect the City of Cedar Hill only within Ellis County.

Discharges for the 1-percent-annual-chance flood were determined at four locations, but only the most upstream discharge location is included in this FIS because the others are located outside of Ellis County. The remaining LOMR data within Dallas County was incorporated in the Dallas County, Texas and Incorporated Areas FIS update.

The LOMR revises the 1-percent-annual-chance floodplain. The discharges, floodplain, and profile for this LOMR have been incorporated in this FIS. Please note the Hollings Branch LOMR includes lettered cross sections that were incorporated into this FIS, but neither a floodway nor floodway data table information were provided with the approved LOMR.

Mustang Creek and Mustang Creek Tributary

Four LOMRs on Mustang Creek, case numbers 98-06-1582P, 06-06-B466P, 08-06-0662P, and 08-06-1778P, have been incorporated in this FIS. A fifth LOMR, case number 06-06-BF64P that became effective on February 15, 2007, was not incorporated since it was superseded by the LOMRs with case numbers 08-06-0662P and 08-06-1778P.

LOMR, case number 98-06-1582P, for Mustang Creek and Mustang Creek Tributary became effective on May 20, 1999. The revised changes to the floodplain, floodway data tables, and profiles have been incorporated in this FIS. Channel improvements on Mustang Creek and Mustang Creek Tributary as well as other updates to the revised, existing conditions hydrologic and hydraulic models were the basis of the LOMR.

LOMR, case number 06-06-B466P, for Mustang Creek became effective on September 27, 2006. This LOMR revised the flood data for Mustang Creek upstream of the area previously revised by the May 20, 1999 LOMR. A hydraulic analysis using updated topographic information was performed to evaluate the effects of fill and channelization along Mustang Creek. The revisions to the floodplain, floodway data tables, and profiles have been incorporated in this FIS.

Upstream of State Highway 77, two LOMRs, case numbers 08-06-0662P and 08-06-1778P, on Mustang Creek became effective on October 2, 2008 and February 5, 2009 respectively. These LOMRs partially revised the floodplain from the September 27, 2006 LOMR, but they also extended the detailed flood data further upstream along Mustang Creek. The revisions to the floodplain, floodway data tables, and profiles have been incorporated in this FIS.

Waxahachie Creek

The LOMR, case number 04-06-1901P, for Waxahachie Creek became effective on March 15, 2005. A hydraulic analysis was performed to incorporate excavation within the project site, placement of fill in the floodplain and floodway, and updated topography. The revisions to the floodplain, floodway data table, and profile have been incorporated in this FIS.

3.4 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 (NGVD). With the completion of the North American Vertical Datum of 1988 (NAVD), 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 NAVD. 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 report and FIRMs and adjusted to NAVD88. The datum conversion factor from NGVD29 to NAVD88 in Ellis County is +0.04 feet.

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

NGS Information Services, NOAA, N/NGS12
National Geodetic Survey SSMC-3, #9202
Silver Spring Metro Center 3
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 the FIS report and FIRM for this community. Interested individuals may

contact FEMA to access these data.

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages state and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS report provides 1-percent-annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent-annual-chance flood elevations; delineations of the 1- and 0.2-percent-annual-chance floodplains; and a 1-percent-annual-chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data tables, and Summary of 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 the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM. All detailed study streams are listed in Table 1. 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 provided that the 0.2-percent-annual-chance profile was available. For many streams, only the 1-percent-annual-chance floodplain was determined in past studies, and therefore, only the 1-percent-annual-chance floodplain was delineated.

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

For 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 base flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to one foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

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. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections in Table 6, "Floodway Data." In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close or collinear, only the floodway boundary is shown on the FIRM.

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

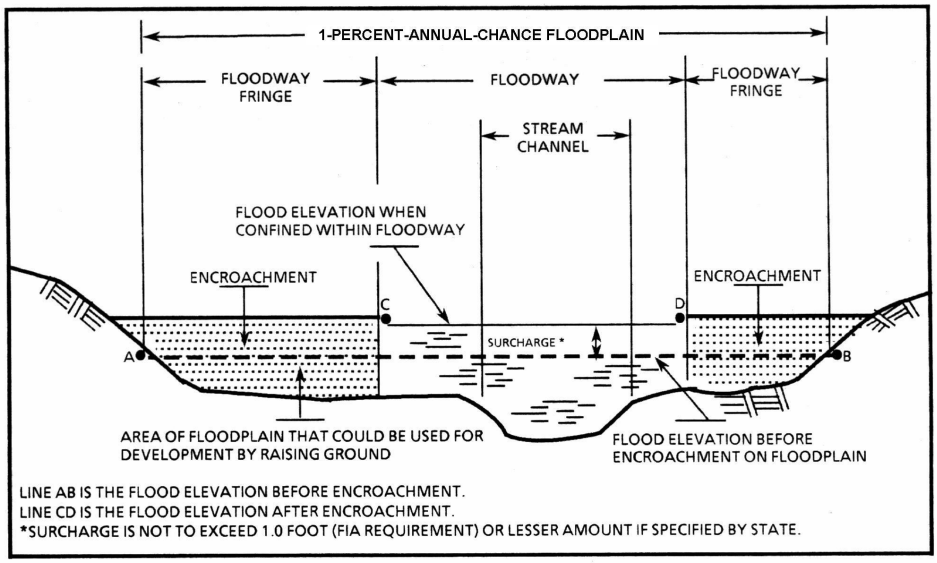


Figure 1: Floodway Schematic

The floodways along Soap Creek and its tributaries were modified based on the revised hydraulic analyses from the January 5, 2006 FIS as shown in Table 6. The City of Grand Prairie and FEMA Region 6 concluded to use the 1-percent-annual-chance floodplains as the floodways. (Reference 1)

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Bear Creek								
A	2,150	551	6,796	2.6	354.6	354.6	355.6	1.0
B	4,775	612	6,743	2.7	355.9	355.9	356.9	1.0
C	5,075	703	8,116	2.2	356.6	356.6	357.6	1.0
D	12,000	926	7,617	2.2	361.0	361.0	362.0	1.0
E	24,375	1,073	7,290	2.2	373.7	373.7	374.7	1.0
F	29,550	965	5,612	2.8	379.0	379.0	380.0	1.0
G	37,150	868	4,931	3.0	391.0	391.0	392.0	1.0
H	43,525	953	4,721	2.9	402.7	402.7	403.7	1.0
I	53,000	380	2,367	4.4	421.4	421.4	422.4	1.0
J	58,675	610	4,437	2.3	436.9	436.9	437.9	1.0
K	79,245	119	1,455	6.1	481.4	481.4	482.4	1.0
L	85,700	75	898	9.5	495.6	495.6	496.1	0.5
M	91,600	117	767	9.8	514.5	514.5	514.5	0.0
N	97,000	76	578	10.9	536.8	536.8	536.8	0.0
Brushy Creek								
A	14,540	532	3,430	2.9	406.5	406.5	407.5	1.0
B	18,990	247	1,466	5.8	417.2	417.2	418.2	1.0
C	25,265	441	2,391	3.3	431.1	431.1	432.1	1.0
D	30,815	329	1,757	4.2	445.3	445.3	446.3	1.0
E	37,665	48	585	8.7	468.6	468.6	469.1	0.5
F	45,915	98	481	8.9	499.9	499.9	499.9	0.0
G	50,290	188	557	7.1	519.7	519.7	519.7	0.0
H	70,095	193	490	2.5	605.7	605.7	606.7	1.0

1 Stream distance in feet above confluence with Red Oak Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK - BRUSHY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Chambers Creek								
A	359,120 [1]	2,372	30,629	2.8	478.3	478.3	479.1	0.8
B	363,000 [1]	2,200	18,568	4.6	483.4	483.4	484.2	0.8
C	366,400 [1]	2,225	32,746	2.6	486.9	486.9	487.9	1.0
D	368,900 [1]	1,862	30,003	2.8	487.9	487.9	488.9	1.0
E	371,020 [1]	1,547	22,577	3.8	488.8	488.8	489.7	0.9
F	376,550 [1]	1,950	26,264	3.3	494.9	494.9	495.7	0.8
G	378,240 [1]	1,841	28,431	3.0	495.7	495.7	496.7	1.0
H	380,400 [1]	1,627	22,612	3.8	497.1	497.1	497.9	0.8
I	387,820 [1]	2,378	36,371	2.3	500.3	500.3	501.2	0.9
J	391,000 [1]	2,785	22,496	3.7	502.1	502.1	503.0	0.9
K	393,050 [1]	2,791	41,346	2.0	503.9	503.9	504.7	0.8
L	398,800 [1]	3,855	45,048	1.8	504.4	504.4	505.3	0.9
East Fork to Soap Creek								
A	766 [2]	483	1,058	3.3	593.9	593.9	593.9	0.0
B	2,029 [2]	694	1,228	2.9	598.7	598.7	598.7	0.0
C	3,725 [2]	530	1,712	1.9	611.3	611.3	611.3	0.0
D	4,992 [2]	272	920	3.7	613.4	613.4	613.4	0.0
E	5,860 [2]	437	991	3.4	615.4	615.4	615.4	0.0
Greathouse Branch								
A	1,730 [3]	654	3,764	1.0	504.4	498.6	499.6	1.0
B	2,870 [3]	278	1,131	3.5	504.4	501.6	502.5	0.9
C	4,020 [3]	191	1,070	3.7	505.6	505.6	506.4	0.8
D	4,710 [3]	192	904	4.4	508.0	508.0	508.8	0.8

[1] Stream distance in feet above Missouri-Kansas-Texas Railroad

[2] Stream distance in feet above confluence with Soap Creek

[3] Stream distance in feet above confluence with Chambers Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

CHAMBERS CREEK - EAST FORK TO SOAP CREEK - GREATHOUSE BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Greathouse Branch (continued)								
E	5,410	196	807	4.9	512.2	512.2	513.1	0.9
F	6,090	137	682	5.8	517.0	517.0	517.4	0.4
G	6,800	259	1,304	2.6	519.7	519.7	520.5	0.8
H	7,670	80	553	6.2	523.6	523.6	524.1	0.5
I	9,370	67	535	6.4	531.9	531.9	532.7	0.8
J	10,160	67	629	5.4	535.0	535.0	535.9	0.9
K	10,580	46	402	5.9	537.4	537.4	538.2	0.8
L	11,570	75	522	4.5	542.3	542.3	543.2	0.9
M	12,880	37	253	9.2	551.0	551.0	551.2	0.2
N	19,620	161	1,435	5.9	600.2	600.2	601.2	1.0
O	20,950	160	1,433	5.9	605.0	605.0	605.7	0.7
P	21,360	151	1,170	6.4	606.4	606.4	607.3	0.9
Q	22,050	129	1,080	6.9	612.1	612.1	613.0	0.9
R	23,390	119	1,229	6.1	621.7	621.7	622.5	0.8
S	24,550	207	1,329	5.6	630.2	630.2	630.9	0.7
T	25,420	166	1,346	5.6	633.6	633.6	634.3	0.7
U	26,130	57	718	6.5	637.4	637.4	638.0	0.6
V	26,820	47	511	9.2	642.2	642.2	642.6	0.4
W	28,100	67	699	6.7	651.7	651.7	652.1	0.4
X	29,030	46	507	9.2	657.0	657.0	657.7	0.7
Y	29,820	64	786	6.0	661.8	661.8	662.0	0.2
Z	30,810	58	476	6.8	667.6	667.6	667.7	0.1
AA	32,220	53	477	6.8	676.0	676.0	676.4	0.4

[1] Stream distance in feet above confluence with Chambers Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

GREATHOUSE BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Grove Creek								
A	2,690	2,685	13,121	2.2	369.4	368.7 3	369.7	1.0
B	11,640	2,033	11,131	2.6	377.3	377.3	378.3	1.0
C	18,970	1,657	10,733	2.7	387.2	387.2	387.9	0.7
D	28,410	1,754	11,754	2.5	398.8	398.8	399.7	0.9
E	33,880	1,234	10,505	2.7	407.5	407.5	408.5	1.0
F	40,800	1,093	11,653	2.5	419.5	419.5	419.8	0.3
G	46,160	1,176	12,111	2.4	424.7	424.7	425.6	0.9
H	51,940	986	7,290	3.3	429.9	429.9	430.9	1.0
I	56,400	616	5,106	4.7	438.6	438.6	439.0	0.4
J	61,650	764	5,715	3.4	449.8	449.8	450.6	0.8
K	68,200	633	4,691	4.1	462.9	462.9	463.8	0.9
L	73,750	590	4,550	4.3	477.0	477.0	477.9	0.9
M	81,400	331	3,718	4.9	501.2	501.2	501.9	0.7
N	88,380	281	2,178	8.4	516.3	516.3	516.4	0.1
O	94,700	171	2,152	7.6	530.1	530.1	530.8	0.7
P	99,980	161	1,590	10.3	544.3	544.3	544.6	0.3
Q	103,070	346	2,315	7.1	557.3	557.3	558.0	0.7
R	108,390	249	2,061	6.5	571.9	571.9	572.9	1.0
S	113,730	455	2,765	4.9	585.7	585.7	586.7	1.0
T	120,490	152	840	4.7	608.6	608.6	609.6	1.0
U	121,000	210	1,010	3.8	610.9	610.9	611.9	1.0
V	125,775	295	1,319	2.2	628.8	628.8	629.8	1.0
W	128,760	429	1,199	2.3	636.9	636.9	637.9	1.0

[1] Stream distance in feet above confluence with Red Oak Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

GROVE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Little Creek								
A	5,620 [1]	148	1,094	7.5	559.8	559.8	560.8	1.0
B	9,625 [1]	97	937	8.6	571.8	571.8	572.3	0.5
C	19,300 [1]	61	639	9.9	605.7	605.7	606.2	0.5
D	24,915 [1]	100	1,372	8.1	627.8	627.8	628.6	0.8
Long Branch								
A	8,990 [2]	192	964	5.0	423.4	423.4	424.4	1.0
B	13,150 [2]	222	1,200	3.5	436.5	436.5	437.5	1.0
C	20,600 [2]	97	477	6.7	459.3	459.3	459.3	0.0
Mustang Creek								
A	1,050 [3]	250	1,940	3.5	561.1	561.1	561.5	0.4
B	4,230 [3]	350	1,962	3.4	568.0	568.0	568.9	0.9
C	6,200 [3]	380	1,896	3.4	573.3	573.3	574.2	0.9
D	6,660 [3]	167	1,051	6.2	574.4	574.4	575.4	1.0
E	7,370 [3]	470	3,247	2.0	579.7	579.7	597.9	0.2
F	10,330 [3]	558	1,851	2.9	585.3	585.3	585.6	0.3
G	12,020 [3]	450	1,374	3.9	590.3	590.3	590.9	0.6
H	13,750 [3]	100	811	5.8	597.5	597.5	597.9	0.4
I	14,190 [3]	101	766	6.2	598.1	598.1	599.0	0.9
J	15,300 [3]	230	1,362	3.5	602.5	602.5	602.8	0.3
K	19,190 [3]	300	954	4.1	615.0	615.0	615.1	0.1
L	20,300 [3]	142	701	5.5	621.2	621.2	621.4	0.2
M	20,840 [3]	95	452	5.8	624.5	624.5	624.6	0.1
N	21,790 [3]	145	444	7.3	627.1	627.1	627.3	0.2

[1] Stream distance in feet above confluence with Red Oak Creek

[2] Stream distance in feet above confluence with Bear Creek

[3] Stream distance in feet above corporate limits of City of Waxahachie

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE CREEK - LONG BRANCH - MUSTANG CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Mustang Creek Tributary								
A	2,135 [1]	110	319	5.8	592.0	592.0	592.6	0.6
B	2,292 [1]	310	910	1.7	594.5	594.5	594.5	0.0
C	3,240 [1]	76	445	3.0	600.4	600.4	600.7	0.3
D	3,431 [1]	86	430	3.1	600.4	600.4	600.8	0.4
E	4,850 [1]	71	228	5.8	605.5	605.5	605.5	0.0
F	4,934 [1]	75	276	4.8	606.2	606.2	606.2	0.0
Newton Branch								
A	894 [2]	1,313	3,440	2.3	545.8	543.8 [3]	543.8	0.0
B	3,087 [2]	856	2,237	3.5	547.3	547.3	547.3	0.0
C	5,602 [2]	1,049	1,623	3.0	552.0	552.0	552.0	0.0
D	7,198 [2]	804	1,767	2.7	556.2	556.2	556.2	0.0
E	8,783 [2]	927	3,792	1.3	563.6	563.6	563.6	0.0
F	9,917 [2]	675	1,274	3.8	564.0	564.0	564.0	0.0
North Fork Chambers Creek								
A	800 [4]	3,751	40,617	0.9	504.7	504.7	505.6	0.9
B	4,080 [4]	2,761	27,746	1.4	505.0	505.0	505.9	0.9
C	5,360 [4]	2,723	27,609	1.4	505.4	505.4	506.2	0.8
D	7,000 [4]	2,693	25,805	1.5	505.8	505.8	506.6	0.8
E	10,850 [4]	2,658	20,218	1.9	506.6	506.6	507.5	0.9
F	17,600 [4]	2,806	16,861	2.2	511.5	511.5	512.5	1.0
G	20,920 [4]	2,368	14,028	2.5	515.5	515.5	516.1	0.6
H	25,420 [4]	2,599	15,988	2.2	518.5	518.5	519.4	0.9

[1] Stream distance in feet above mouth

[2] Stream distance in feet above confluence with Soap Creek

[3] Elevation computed without consideration of backwater effects from Soap Creek

[4] Stream distance in feet above confluence with Chambers Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

MUSTANG CREEK TRIBUTARY - NEWTON BRANCH - NORTH FORK CHAMBERS CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
North Fork Chambers Creek (continued)								
I	29,770 [1]	2,042	18,181	1.9	525.2	525.2	525.8	0.6
J	33,300 [1]	2,269	16,527	2.1	526.4	526.4	527.2	0.8
K	37,830 [1]	1,986	15,222	2.3	529.0	529.0	530.0	1.0
L	41,300 [1]	1,667	10,465	1.8	533.3	533.3	534.2	0.9
M	48,170 [1]	1,188	6,719	2.7	542.4	542.4	543.4	1.0
N	53,770 [1]	860	6,206	2.8	554.2	554.2	555.0	0.8
O	56,700 [1]	824	4,985	3.5	557.0	557.0	557.8	0.8
Plains Creek								
A	593 [2]	739	3,492	0.9	554.5	554.5	554.5	0.0
B	2,501 [2]	826	1,283	2.7	555.1	555.1	555.1	0.0
C	3,867 [2]	674	1,303	2.7	560.3	560.3	560.3	0.0
D	5,146 [2]	777	3,571	1.0	566.2	566.2	566.2	0.0
E	6,900 [2]	750	1,839	1.9	566.7	566.7	566.7	0.0
F	7,571 [2]	599	1,133	3.1	567.4	567.4	567.4	0.0
G	9,558 [2]	612	1,268	2.8	572.7	572.7	572.7	0.0
Red Oak Creek								
A	17,725 [3]	1,410	16,933	2.8	353.9	353.9	354.9	1.0
B	22,550 [3]	1,450	15,400	2.6	356.7	356.7	357.7	1.0
C	29,230 [3]	1,134	10,561	3.7	361.6	361.6	362.6	1.0
D	33,825 [3]	1,878	14,233	2.7	366.4	366.4	367.4	1.0
E	37,090 [3]	2,316	16,757	2.3	369.2	369.2	370.2	1.0
F	43,480 [3]	1,615	12,350	2.2	373.4	373.4	374.4	1.0

[1] Stream distance in feet above confluence with Chambers Creek

[2] Stream distance in feet above confluence with Newton Branch

[3] Stream distance in feet above confluence with Trinity River

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

NORTH FORK CHAMBERS CREEK - PLAINS CREEK - RED OAK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Red Oak Creek (continued)								
F	43,480	1,615	12,350	2.2	373.4	373.4	374.4	1.0
G	46,650	1,093	8,900	3.0	376.6	376.6	377.6	1.0
H	51,990	1,148	9,117	2.9	381.2	381.2	382.2	1.0
I	60,460	1,818	10,395	2.1	394.1	394.1	395.1	1.0
J	69,675	1,450	7,923	2.8	404.2	404.2	405.2	1.0
K	75,950	1,038	6,236	3.5	413.2	413.2	414.2	1.0
L	84,300	1,134	6,610	3.3	423.3	423.3	424.3	1.0
M	91,190	1,184	6,020	3.5	434.6	434.6	435.6	1.0
N	99,380	244	2,371	8.8	451.5	451.5	452.5	1.0
O	105,010	369	3,064	6.8	460.0	460.0	461.0	1.0
P	109,800	722	3,815	5.4	468.3	468.3	469.3	1.0
Q	114,230	504	3,630	5.5	476.4	476.4	477.4	1.0
R	120,125	1,678	7,230	2.7	486.2	486.2	487.2	1.0
S	127,575	396	3,106	6.3	501.3	501.3	502.3	1.0
T	132,725	513	3,702	5.0	510.6	510.6	511.6	1.0
U	139,580	684	4,282	4.3	522.7	522.7	523.7	1.0
V	140,390	833	6,350	2.9	527.2	527.2	528.2	1.0
W	142,080	1,019	7,061	2.6	527.9	527.9	528.9	1.0
X	150,210	401	3,418	5.0	546.8	546.8	547.8	1.0
Y	152,800	1096 [2]	5,684	2.9	549.3	549.3	550.3	1.0
Z	155,100	496	2,184	5.4	554.8	554.8	555.8	1.0
AA	156,525	264	1,637	7.2	558.1	558.1	559.1	1.0
AB	164,800	81	1,194	9.5	581.8	581.8	582.3	0.5
AC	167,675	140	1,804	6.1	592.5	592.5	593.0	0.5
AD	170,290	92	1,378	7.7	596.7	596.7	596.7	0.0

[1] Stream distance in feet above confluence with Trinity River

[2] Combined Little Creek/Red Oak Creek floodway

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

RED OAK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Red Oak Creek (continued)								
AE	175,175 [1]	58	768	12.0	618.5	618.5	619.0	0.5
AF	175,375 [1]	58	826	11.1	620.0	620.0	620.5	0.5
AG	180,180 [1]	101	1,087	8.0	632.8	632.8	633.3	0.5
AH	184,710 [1]	102	848	8.7	647.9	647.9	647.9	0.0
AI	189,840 [1]	95	660	8.8	665.3	665.3	665.3	0.0
Shiloh Branch								
A	910 [2]	35/15 [3]	267	15.8	612.9	612.9	612.9	0.0
B	3,106 [2]	73/53 [3]	629	6.7	623.1	623.1	623.4	0.3
C	3,426 [2]	71/46 [3]	522	8.0	623.8	623.8	624.3	0.5
D	5,181 [2]	35/5 [3]	366	11.5	635.7	635.7	636.1	0.4
Soap Creek								
A	5,382 [4]	1,144	6,580	3.6	540.8	540.8	540.8	0.0
B	7,587 [4]	1,291	7,552	3.2	544.0	544.0	544.0	0.0
C	9,681 [4]	2,235	10,308	2.4	545.7	545.7	545.7	0.0
D	11,963 [4]	1,313	6,071	2.8	548.4	548.4	548.4	0.0
E	12,185 [4]	1,695	10,974	1.7	551.9	551.9	551.9	0.0
F	14,559 [4]	1,096	5,415	3.4	553.1	553.1	553.1	0.0
G	16,133 [4]	923	4,174	4.4	554.7	554.7	554.7	0.0
H	17,945 [4]	1,291	5,450	3.4	557.8	557.8	557.8	0.0
I	19,483 [4]	1,040	4,245	4.4	559.7	559.7	559.7	0.0
J	24,145 [4]	1,159	5,189	3.6	568.9	568.9	568.9	0.0
K	25,904 [4]	948	5,112	3.5	571.0	571.0	571.0	0.0
L	27,885 [4]	911	4,689	3.8	572.7	572.7	572.7	0.0

[1] Stream distance in feet above confluence with Trinity River
[2] Stream distance in feet above confluence with Red Oak Creek
[3] Total width/width within Ellis County
[4] Stream distance in feet above confluence with Mountain Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
ELLIS COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

RED OAK CREEK - SHILOH BRANCH - SOAP CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Soap Creek (continued)								
M	29,260 [1]	759	4,676	3.7	575.2	575.2	575.2	0.0
N	31,869 [1]	947	5,246	3.4	578.8	578.8	578.8	0.0
O	33,434 [1]	753	3,738	3.4	581.2	581.2	581.2	0.0
P	35,123 [1]	571	2,043	6.2	583.9	583.9	583.9	0.0
Q	37,022 [1]	736	3,629	3.4	589.1	589.1	589.1	0.0
R	38,447 [1]	678	2,764	4.6	591.0	591.0	591.0	0.0
S	41,331 [1]	915	2,934	2.9	597.7	597.7	597.7	0.0
South Grove Creek								
A	6,730 [2]	172	913	4.8	612.5	612.5	613.5	1.0
B	7,625 [2]	352	1,782	2.4	615.1	615.1	616.1	1.0
C	11,125 [2]	187	884	4.5	626.9	626.9	627.9	1.0
D	17,125 [2]	124	649	5.0	648.8	648.8	649.8	1.0
Tributary No. 6 To Soap Creek								
A	939 [3]	231	347	5.2	569.8	565.3 [4]	565.3	0.0
B	2,155 [3]	386	578	3.1	572.1	572.1	572.1	0.0
Trinity River								
A	1,000 [5]	8,735 / 8,105 [6]	131,253	1.0	362.2	362.2	363.2	1.0

[1] Stream distance in feet above confluence with Mountain Creek
[2] Stream distance in feet above confluence with Grove Creek
[3] Stream distance in feet above confluence with Soap Creek
[4] Elevation computed without consideration of backwater effects from Soap Creek
[5] Stream distance in feet from county boundary
[6] Total width/width within Ellis County

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

SOAP CREEK - SOUTH GROVE CREEK - TRIBUTARY NO. 6 TO SOAP CREEK - TRINITY RIVER

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Waxahachie Creek								
A	0	1,000	5,038	3.9	515.8	515.8	516.7	0.9
B	3,200	760	5,285	3.7	522.5	522.5	523.4	0.9
C	5,700	295	2,975	6.6	527.5	527.5	528.3	0.8
D	6,000	370	4,724	3.2	528.7	528.7	529.7	1.0
E	6,460	400	5,078	3.0	530.3	530.3	531.2	0.9
F	6,990	1,200	9,515	1.6	530.8	530.8	531.6	0.8
G	7,110	301	2,270	6.6	530.7	530.7	531.7	1.0
H	7,970	420	3,530	4.2	532.3	532.3	533.2	0.9
I	8,140	510	3,659	4.1	532.8	532.8	533.8	1.0
J	8,198	450	4,021	3.7	533.1	533.1	534.0	0.9
K	8,392	450	4,142	3.6	533.6	533.6	534.4	0.8
L	10,500	780	6,094	2.5	536.0	536.0	536.9	0.9
M	13,120	677	4,427	3.1	538.1	538.1	539.1	1.0
N	16,900	850	4,110	3.2	542.1	542.1	542.7	0.6
O	18,100	483	2,293	5.7	543.8	543.8	544.5	0.7
P	19,700	450	3,119	3.8	547.5	547.5	548.3	0.8
Q	20,366	507	2,854	4.2	550.4	550.4	551.4	1.0
R	20,500	400	2,617	4.6	550.9	550.9	551.5	0.6
S	21,680	492	2,809	4.3	552.7	552.7	553.6	0.9
T	22,767	120	1,554	7.4	555.0	555.0	555.8	0.8
U	22,864	140	1,854	6.2	555.7	555.7	556.6	0.9
V	24,100	826	6,890	3.0	559.1	559.1	559.8	0.7
W	26,144	716	5,384	3.8	561.1	561.1	562.1	1.0
X	29,394	454	4,001	5.1	568.6	568.6	569.5	0.9
Y	31,144	744	7,804	2.6	575.5	575.5	576.3	0.8
Z	32,904	620	6,159	3.0	577.3	577.3	578.0	0.7

[1] Stream distance in feet above a point approximately 1.2 miles downstream of Matthews Street

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

WAXAHACHIE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Waxahachie Creek (continued)								
AA	34,664	685	5,204	3.6	579.4	579.4	580.1	0.7
AB	36,874	433	3,776	4.9	582.6	582.6	583.3	0.7
AC	37,734	456	3,798	4.9	584.4	584.4	585.2	0.8
AD	41,174	445	4,252	4.4	592.0	592.0	592.8	0.8
AE	44,004	443	4,020	4.6	597.4	597.4	598.4	1.0
AF	45,969	284	2,800	5.3	601.4	601.4	602.3	0.9
AG	47,194	304	2,187	6.8	606.9	606.9	607.6	0.7
AH	49,219	448	4,237	3.3	611.6	611.6	612.5	0.9
AI	50,319	245	2,481	5.6	612.4	612.4	613.4	1.0
AJ	52,464	214	1,612	8.7	620.8	620.8	620.9	0.1
AK	55,434	290	3,063	4.6	627.2	627.2	628.0	0.8
AL	59,230	176	1,615	7.0	640.7	640.7	641.5	0.8
AM	61,184	220	1,917	5.9	647.6	647.6	648.6	1.0
AN	62,544	199	1,837	6.1	652.1	652.1	652.7	0.6
AO	66,304	348	2,065	4.0	663.6	663.6	664.0	0.4
AP	68,364	406	2,497	3.3	670.3	670.3	670.8	0.5
AQ	71,034	232	1,383	4.0	678.4	678.4	678.9	0.5
AR	72,544	152	875	5.2	687.4	687.4	687.7	0.3
AS	74,084	197	821	2.8	692.1	692.1	693.1	1.0
AT	75,324	145	524	4.5	697.8	697.8	698.3	0.5
AU	76,594	126	628	1.1	707.2	707.2	708.1	0.9

[1] Stream distance in feet above a point approximately 1.2 miles downstream of Matthews Street

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

WAXAHACHIE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Waxahachie Creek Tributary 1								
A	1,210	17	166	16.8	537.8	537.8	537.8	0.0
B	1,260	251	1,027	2.7	542.3	542.3	542.3	0.0
C	2,860	66	430	6.5	551.5	551.5	551.5	0.0
D	4,770	64	356	7.8	573.2	573.2	573.2	0.0
E	4,877	20	169	16.5	574.4	574.4	574.4	0.0
F	5,225	20	173	16.1	578.3	578.3	578.3	0.0
G	5,260	84	271	10.3	589.6	589.6	589.9	0.3
H	6,750	54	311	9.0	604.7	604.7	605.4	0.7
Waxahachie Creek Tributary 2								
A	490	36	147	11.6	544.0	538.9 [2]	538.9	0.0
B	601	21	176	9.6	544.0	540.6 [2]	540.6	0.0
C	655	21	179	9.5	544.0	540.9 [2]	540.9	0.0
D	861	21	191	8.9	544.0	542.2 [2]	542.2	0.0
E	1,630	43	315	5.4	545.7	545.7	545.8	0.1
Waxahachie Creek Tributary 3								
A [3]	0	--[4]	--[4]	--[4]	552.6	--[4]	--[4]	--[4]
B [3]	700	--[4]	--[4]	--[4]	552.6	--[4]	--[4]	--[4]
C [3]	790	--[4]	--[4]	--[4]	552.6	--[4]	--[4]	--[4]
D [3]	1,050	--[4]	--[4]	--[4]	552.6	--[4]	--[4]	--[4]
E [3]	1,150	--[4]	--[4]	--[4]	552.6	--[4]	--[4]	--[4]
F [3]	2,000	--[4]	--[4]	--[4]	556.0	--[4]	--[4]	--[4]

[1] Stream distance in feet above confluence with Waxahachie Creek
[2] Elevations computed without consideration of backwater effects
[3] Floodway not shown on FIRM
[4] Data not computed

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

WAXAHACHIE CREEK TRIBUTARY 1 - WAXAHACHIE CREEK TRIBUTARY 2 - WAXAHACHIE CREEK TRIBUTARY 3

FLOODING SOURCE		FLOODWAY			BASE FLOOD			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET/SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					FEET (NAVD 88)			
Waxahachie Creek Tributary 3 (continued)								
G [1]	2,100 [2]	--[3]	--[3]	--[3]	587.6	--[3]	--[3]	--[3]
H [1]	6,727 [2]	--[3]	--[3]	--[3]	607.2	--[3]	--[3]	--[3]
I [1]	7,800 [2]	--[3]	--[3]	--[3]	610.7	--[3]	--[3]	--[3]
J [1]	7,950 [2]	--[3]	--[3]	--[3]	--[3]	--[3]	--[3]	--[3]
K [1]	8,124 [2]	--[3]	--[3]	--[3]	--[3]	--[3]	--[3]	--[3]
L [1]	8,300 [2]	--[3]	--[3]	--[3]	--[3]	--[3]	--[3]	--[3]
West Fork to Soap Creek								
A	429 [4]	663	2,049	2.5	580.6	578.5 [5]	578.5	0.0
B	2,148 [4]	491	2,142	2.4	580.7	580.7	580.7	0.0
C	4,041 [4]	558	2,097	2.5	582.6	582.6	582.6	0.0
D	6,218 [4]	495	1,324	3.9	584.7	584.7	584.7	0.0
E	6,825 [4]	536	1,764	2.7	586.2	586.2	586.2	0.0
F	8,716 [4]	569	1,685	2.8	589.5	589.5	589.5	0.0
G	10,156 [4]	723	1,271	3.7	591.8	591.8	591.8	0.0
H	12,096 [4]	915	1,877	2.5	595.9	595.9	595.9	0.0
I	13,879 [4]	505	1,372	3.4	598.4	598.4	598.4	0.0

[1] Floodway not shown on FIRM

[2] Stream distance in feet above confluence with Waxahachie Creek

[3] Data not computed

[4] Stream distance in feet above confluence with Soap Creek

[5] Elevations computed without consideration of backwater effects from Soap Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

FLOODWAY DATA

WAXAHACHIE CREEK TRIBUTARY 3 - WEST FORK TO SOAP CREEK

Portions of the floodway widths for Bear Creek, Red Oak Creek, Shiloh Creek, and the Trinity River extend beyond the Ellis County boundary. (Reference 1)

A floodway for Waxahachie Creek Tributary 3 was computed but was too narrow to show at the scale of the FIRM. No floodway was computed for Unnamed Tributary to Soap Creek. (Reference 1)

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations presented in Table 6 for certain downstream cross sections of Greathouse Branch, Grove Creek, Newton Branch, Tributary No. 6 to Soap Creek, and Waxahachie Creek Tributary 2 are lower than the regulatory flood elevations in that area, which must take into account the 1-percent-annual-chance flooding due to backwater from other sources. (Reference 1)

In the case of redelineation, effort was made to maintain the prior effective regulatory floodway width and shape. However, due to updated topographic data, some modifications were made to contain the floodway within the limits of the 1-percent-annual-chance floodplain. Most modifications to the prior effective regulatory floodway boundaries are due to topographic changes that have occurred along the streams.

5.0 INSURANCE APPLICATIONS

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

Zone A

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

Zone AE

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

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than one square mile, and areas protected from the base 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.

This countywide FIRM presents flooding information for the entire geographic area of Ellis County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the county identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 7, "Community Map History."

7.0 OTHER STUDIES

The preparation of an updated FIS is on-going for the Incorporated and Unincorporated Areas of Dallas, Henderson, Johnson, Kaufman, and Navarro Counties, Texas. An effective FIS report is complete for Tarrant County. The Ellis County Study is in agreement with these studies.

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

8.0 LOCATION OF DATA

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

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISIONS DATE
Ellis County Unincorporated Areas	August 16, 1977	N/A	August 19, 1987	January 5, 2006
Alma, Town of	April 29, 1980	N/A	January 20, 1999	January 5, 2006
Bardwell, City of	July 30, 1976	N/A	March 1, 1991	January 5, 2006
Cedar Hill, City of	March 1, 1974	N/A	April 1, 1981	January 5, 2006
Ennis, City of	June 28, 1974	N/A	June 15, 1982	January 5, 2006
Ferris, City of	February 1, 1974	N/A	August 22, 1978	January 5, 2006
Garrett, City of [1]	N/A	N/A	N/A	N/A
Glenn Heights, City of	November 19, 1976	N/A	July 16, 1980	January 5, 2006
Grand Prairie, City of	July 6, 1973	N/A	December 31, 1974	January 5, 2006
Italy, City of	January 20, 1999	N/A	January 20, 1999	January 5, 2006
Mansfield, City of	February 22, 1974	N/A	December 18, 1985	January 5, 2006
Maypearl, City of	November 29, 1974	N/A	January 20, 1999	January 5, 2006
Midlothian, City of	July 9, 1976	N/A	September 4, 1985	January 5, 2006
Milford, City of	January 20, 1999	N/A	January 20, 1999	January 5, 2006

[1] The City of Garrett is a non-floodprone community.

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY
ELLIS COUNTY, TEXAS
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISIONS DATE
Oak Leaf, City of	January 20, 1999	N/A	January 20, 1999	January 5, 2006
Ovilla, City of	July 11, 1975	N/A	April 15, 1980	January 5, 2006
Palmer, City of	August 13, 1976	N/A	June 1, 1990	January 5, 2006
Pecan Hill, City of	January 20, 1999	N/A	January 20, 1999	January 5, 2006
Red Oak, City of	January 20, 1999	N/A	January 20, 1999	January 5, 2006
Venus, City of	September 27, 1991	N/A	September 27, 1991	January 5, 2006
Waxahachie, City of	June 28, 1974	N/A	August 1, 1980	January 5, 2006

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TEXAS

AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

9.0 BIBLIOGRAPHY AND REFERENCES

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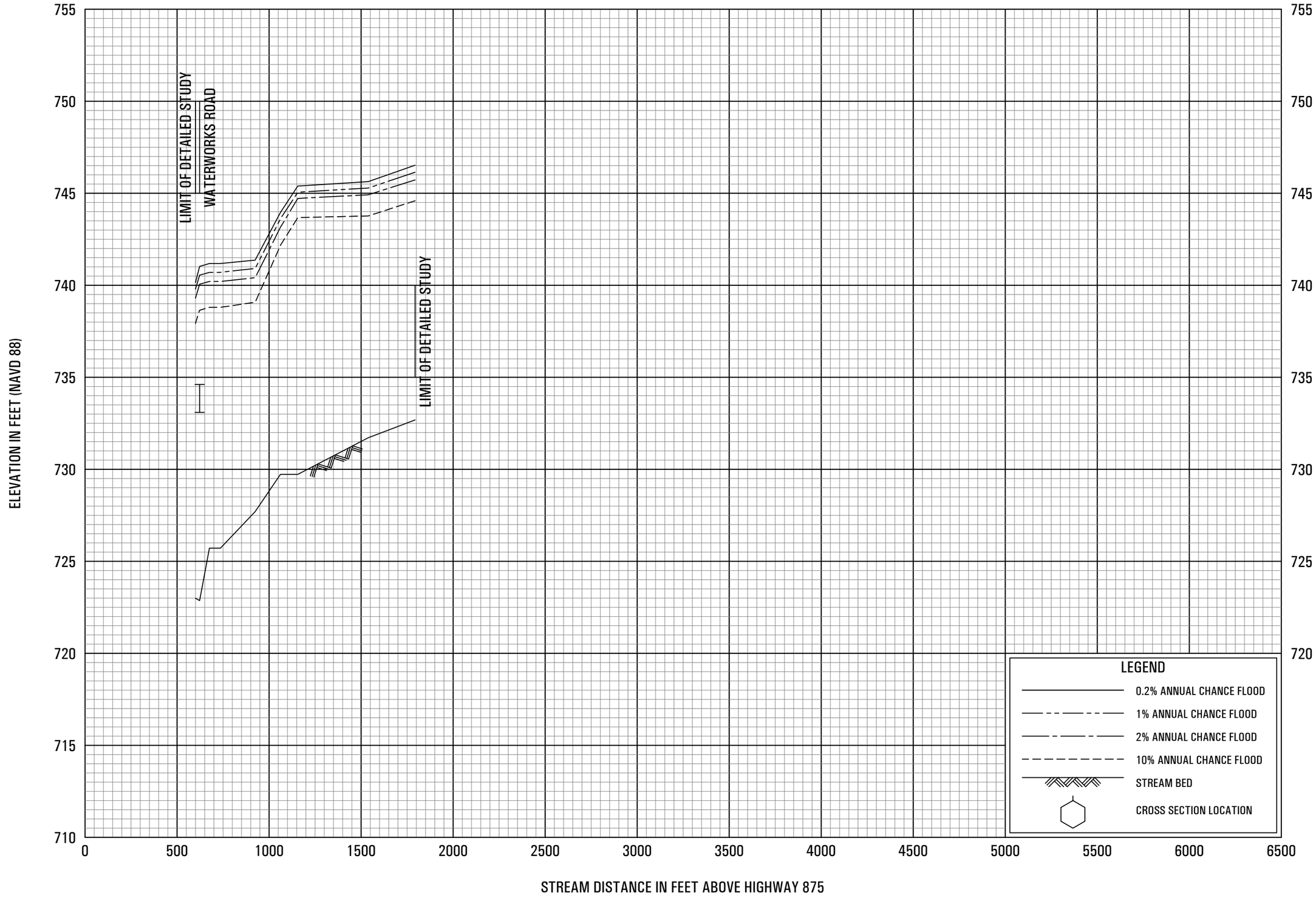


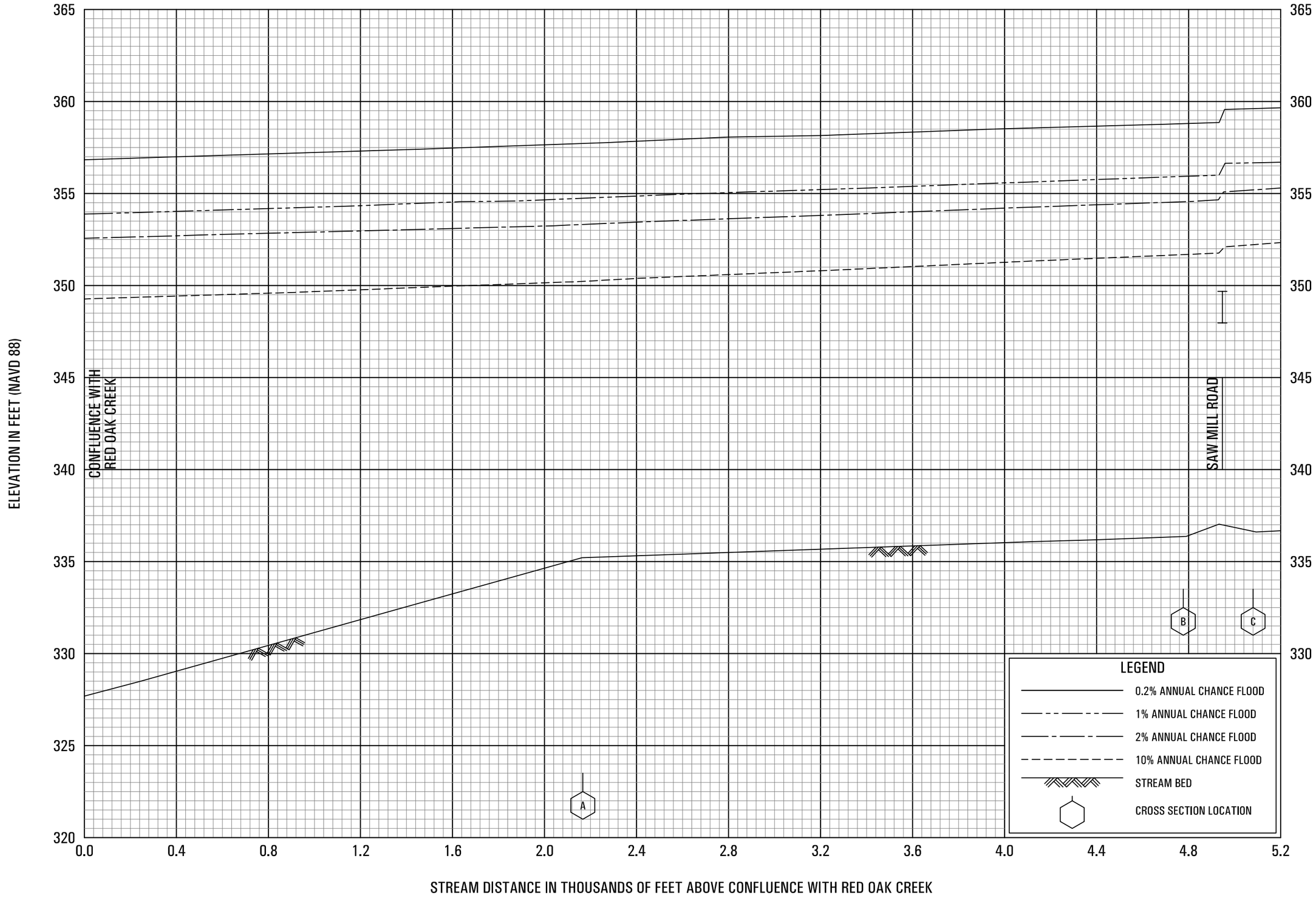
FLOOD PROFILES

ARMSTRONG CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



FLOOD PROFILES

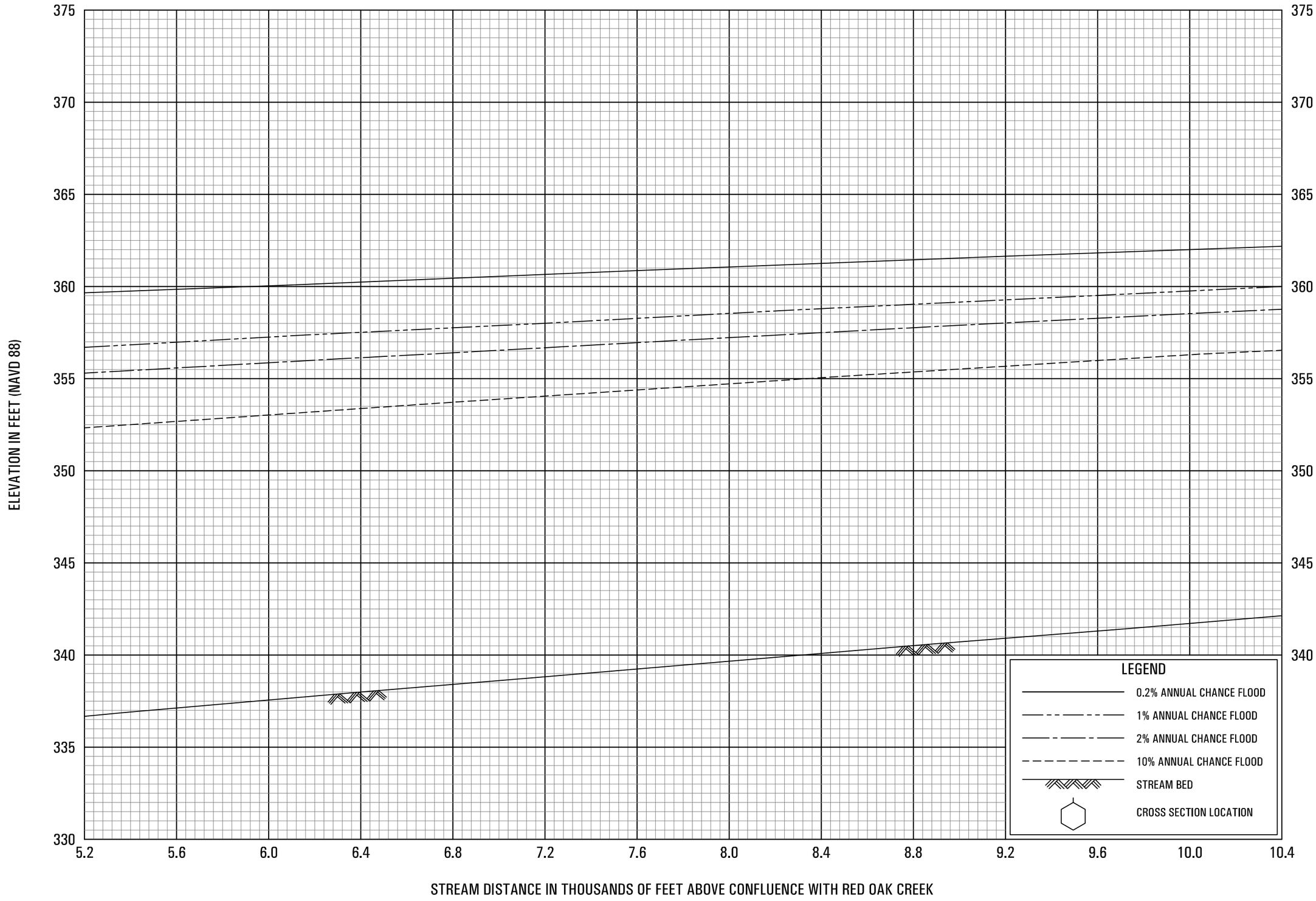
BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS

02P



FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS

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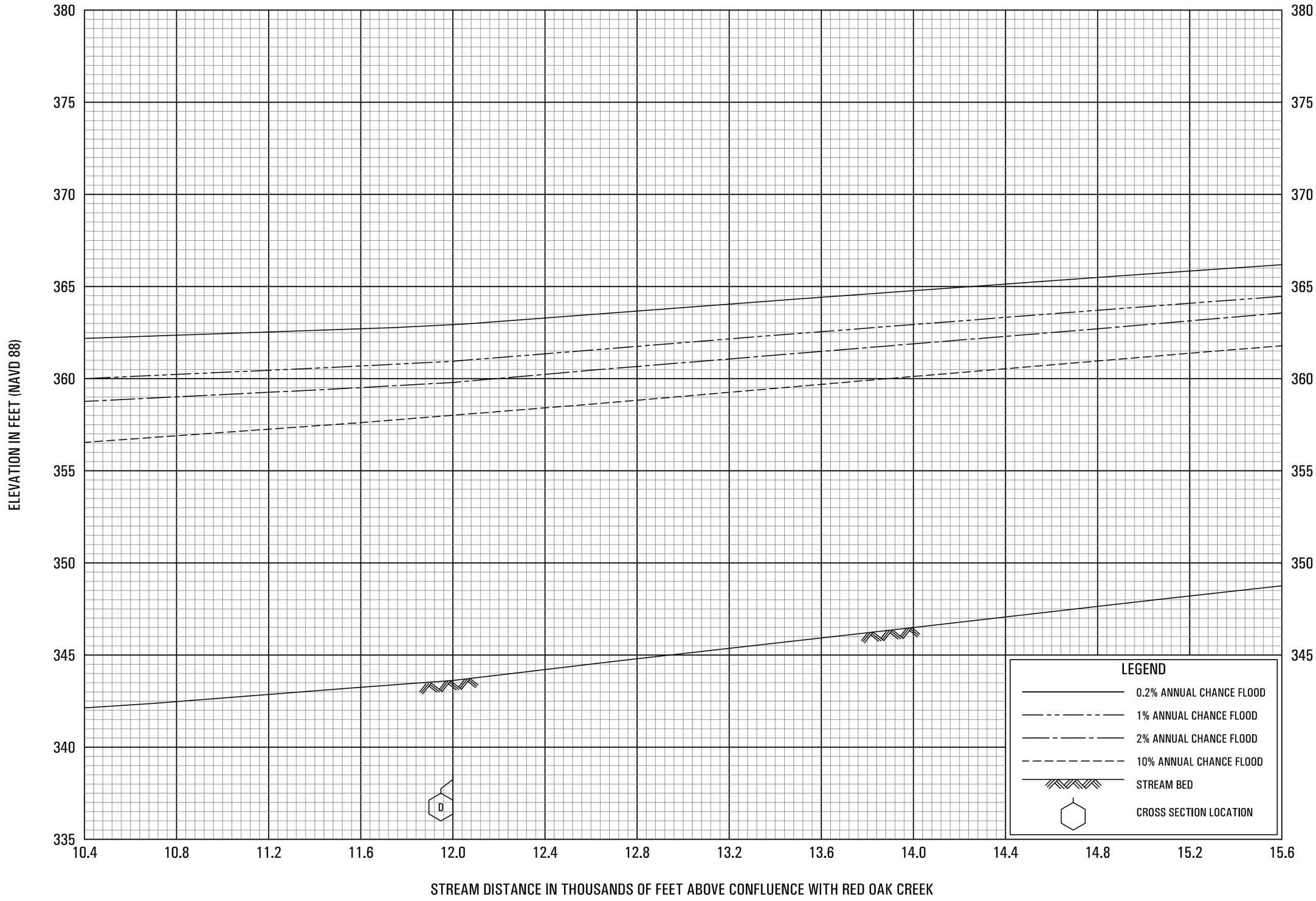

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS

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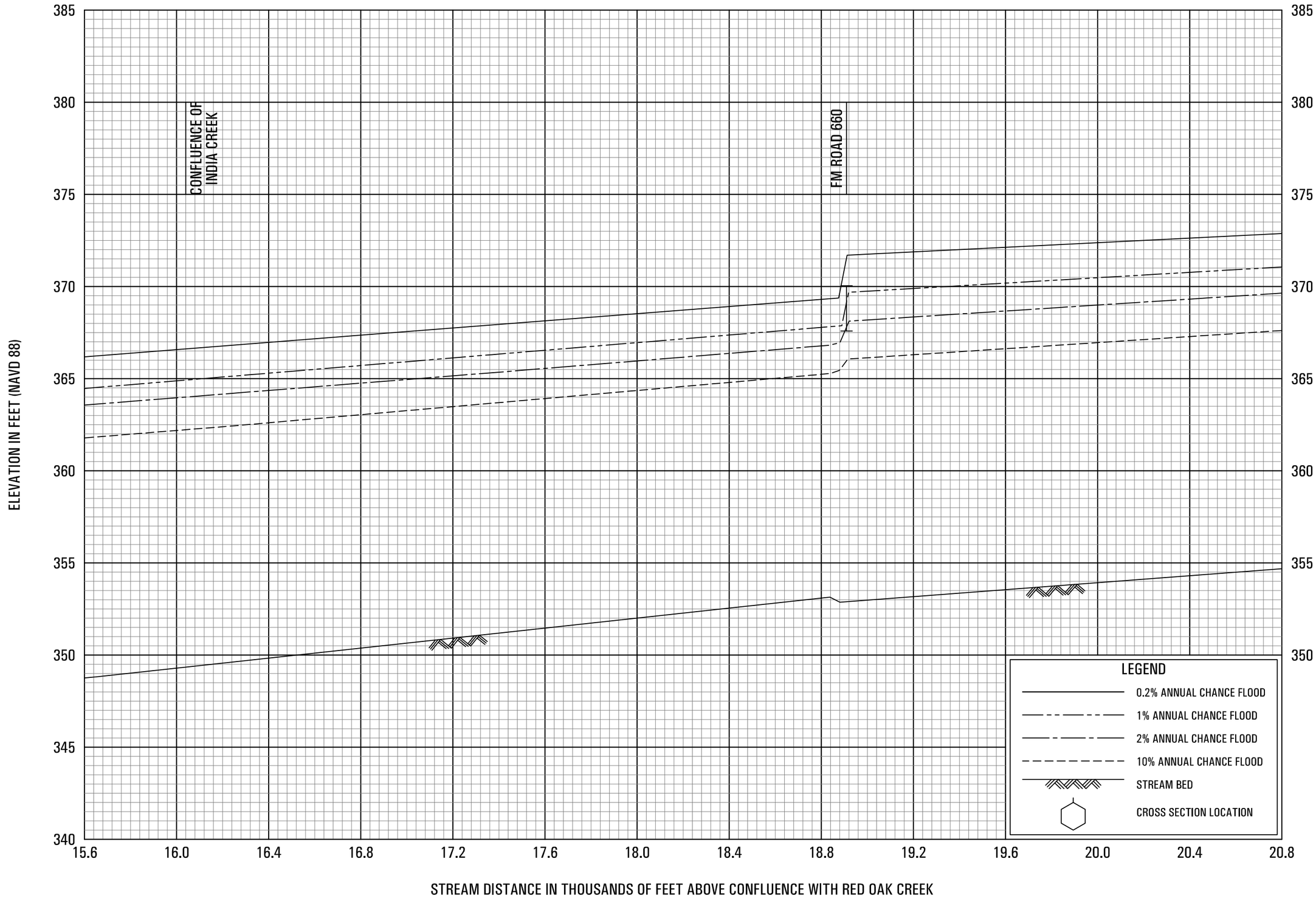

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS

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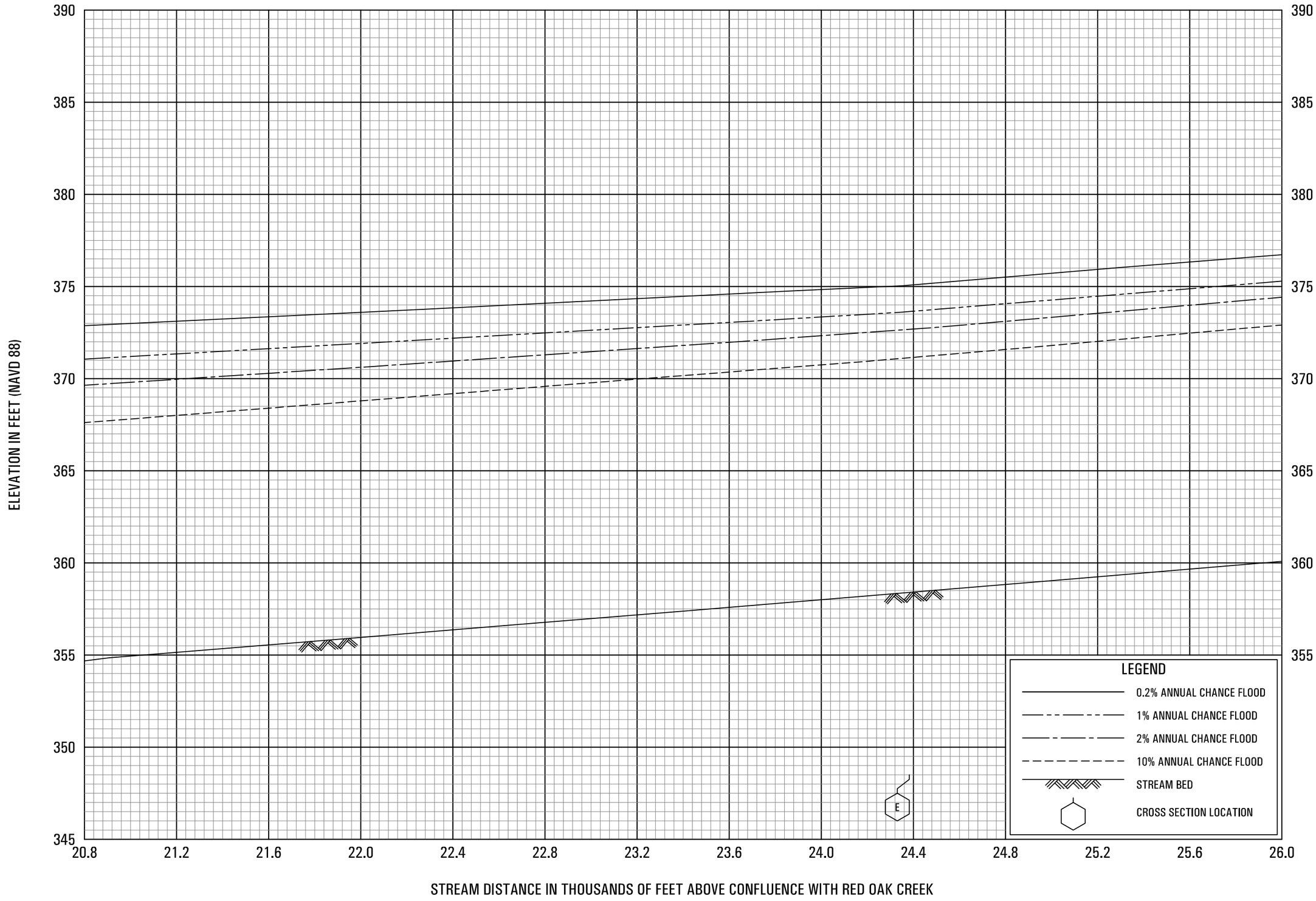

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS

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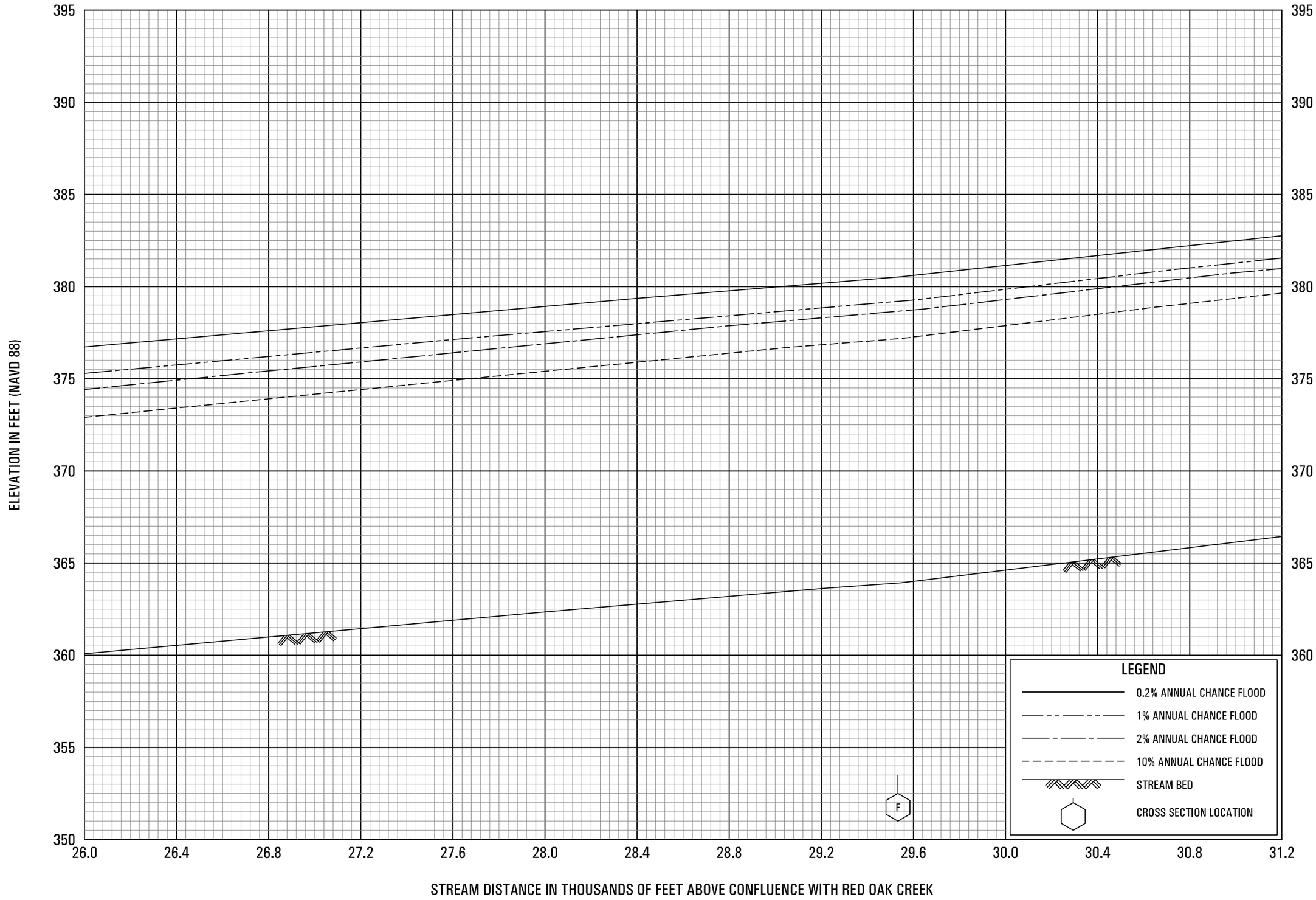

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS

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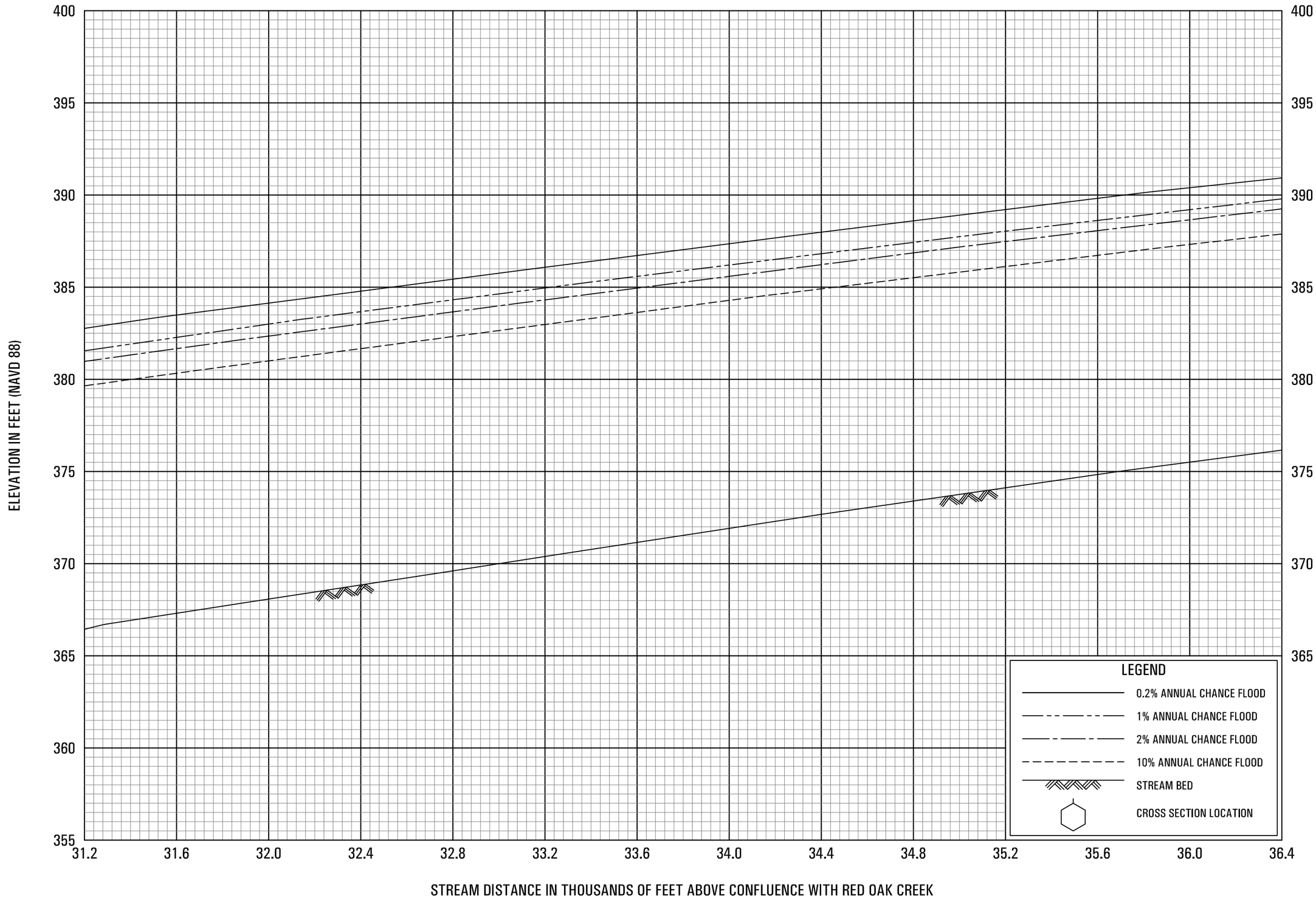

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS

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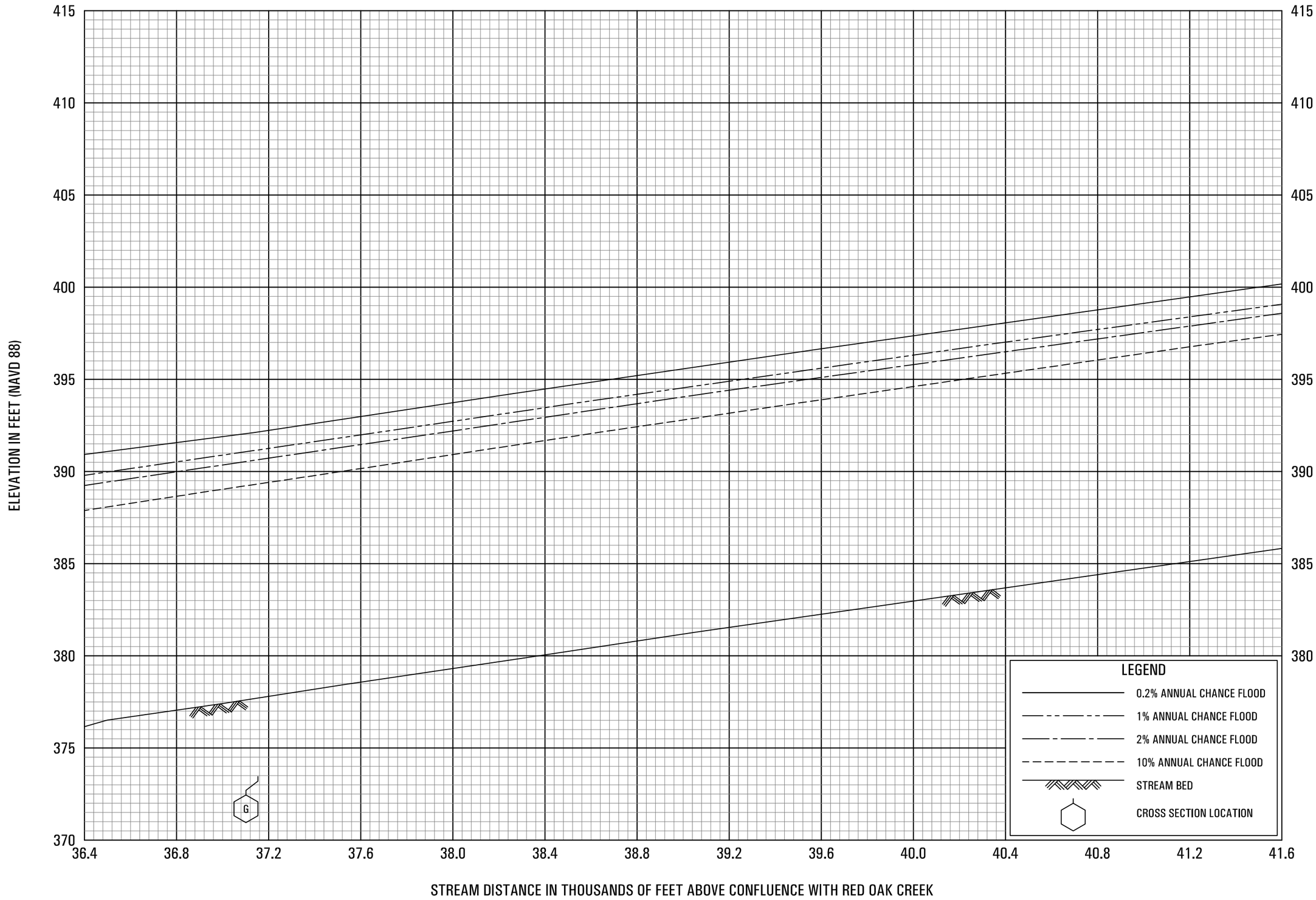

FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS

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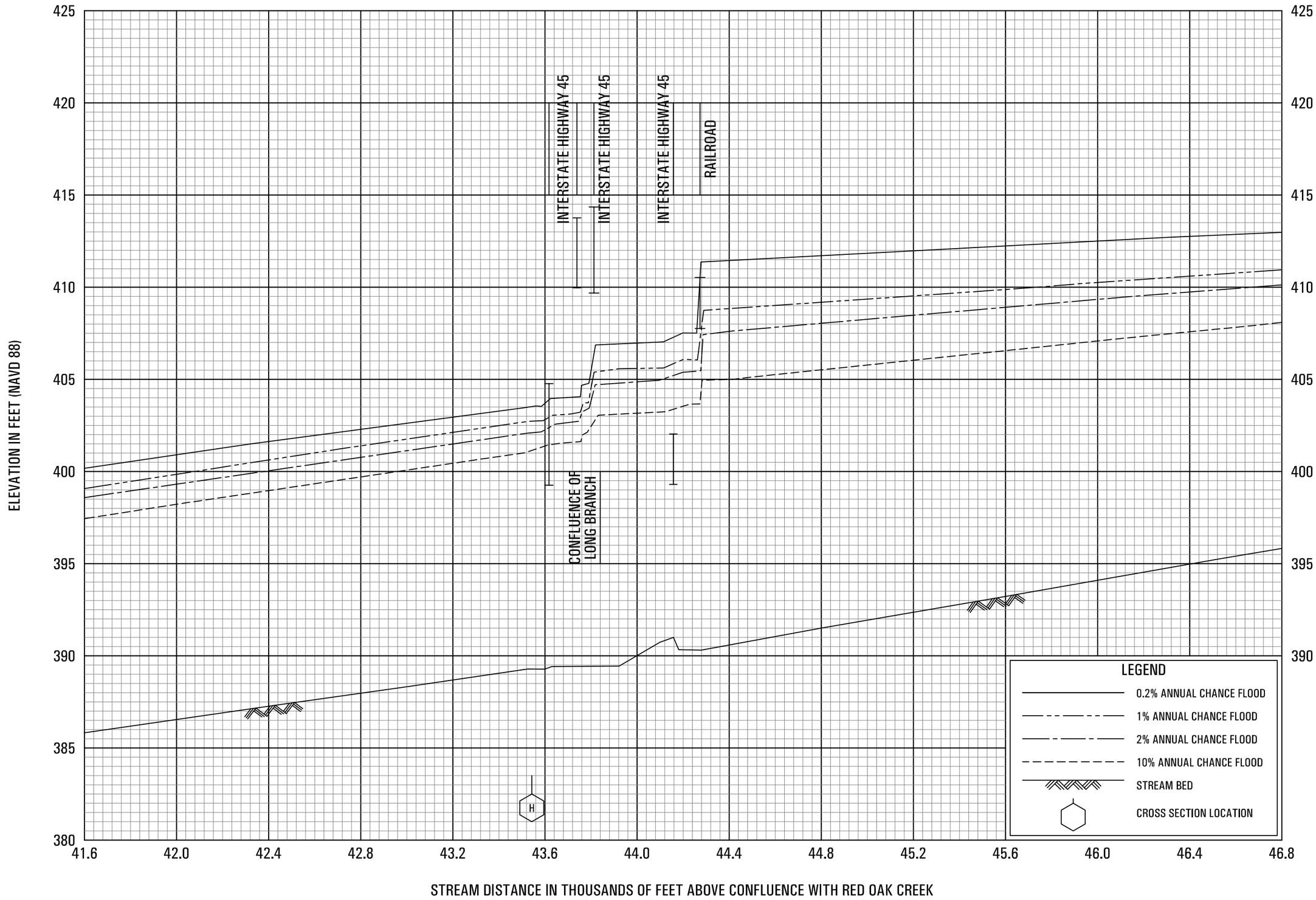

FLOOD PROFILES

BEAR CREEK

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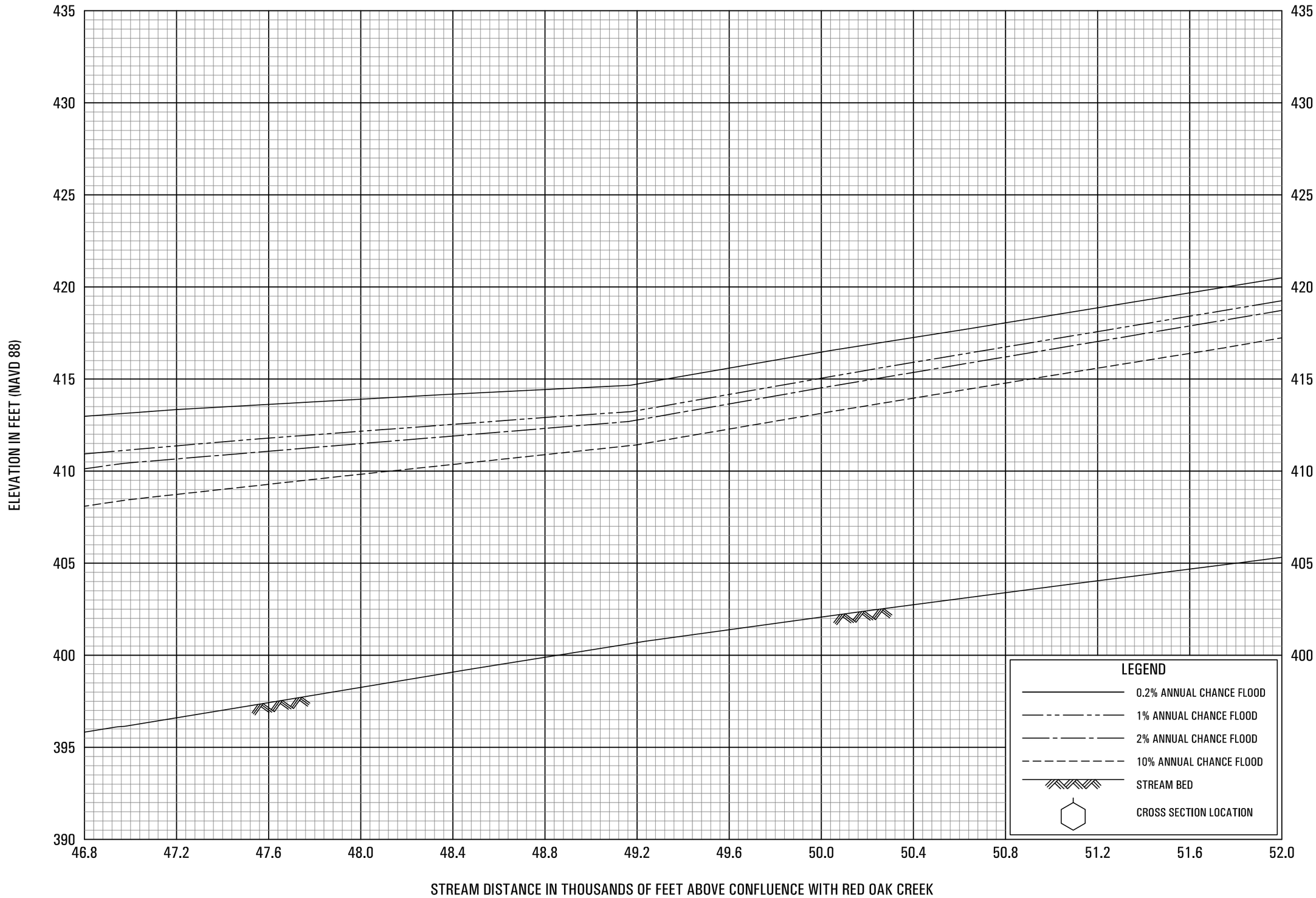

FLOOD PROFILES

BEAR CREEK

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ELLIS COUNTY, TX

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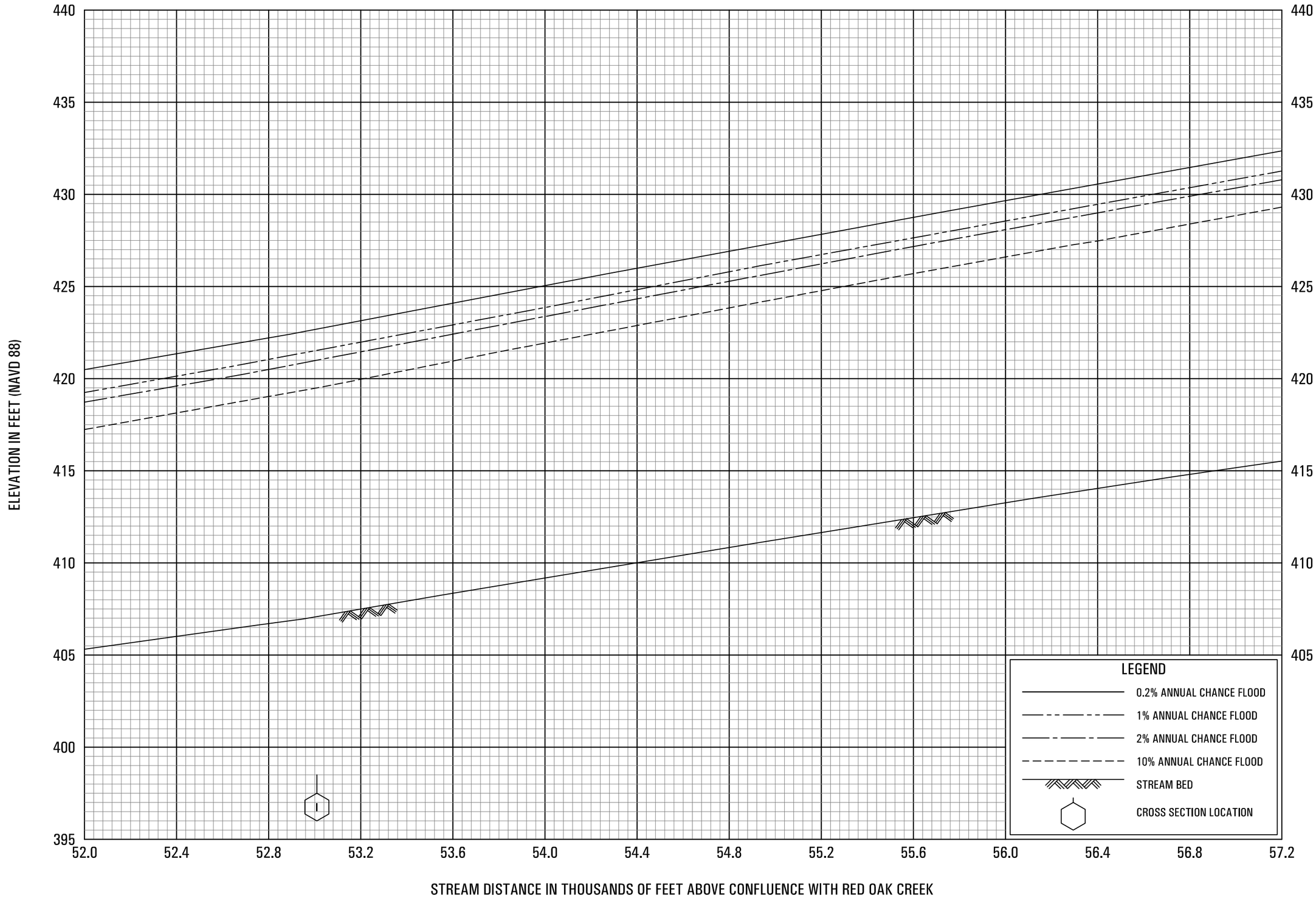

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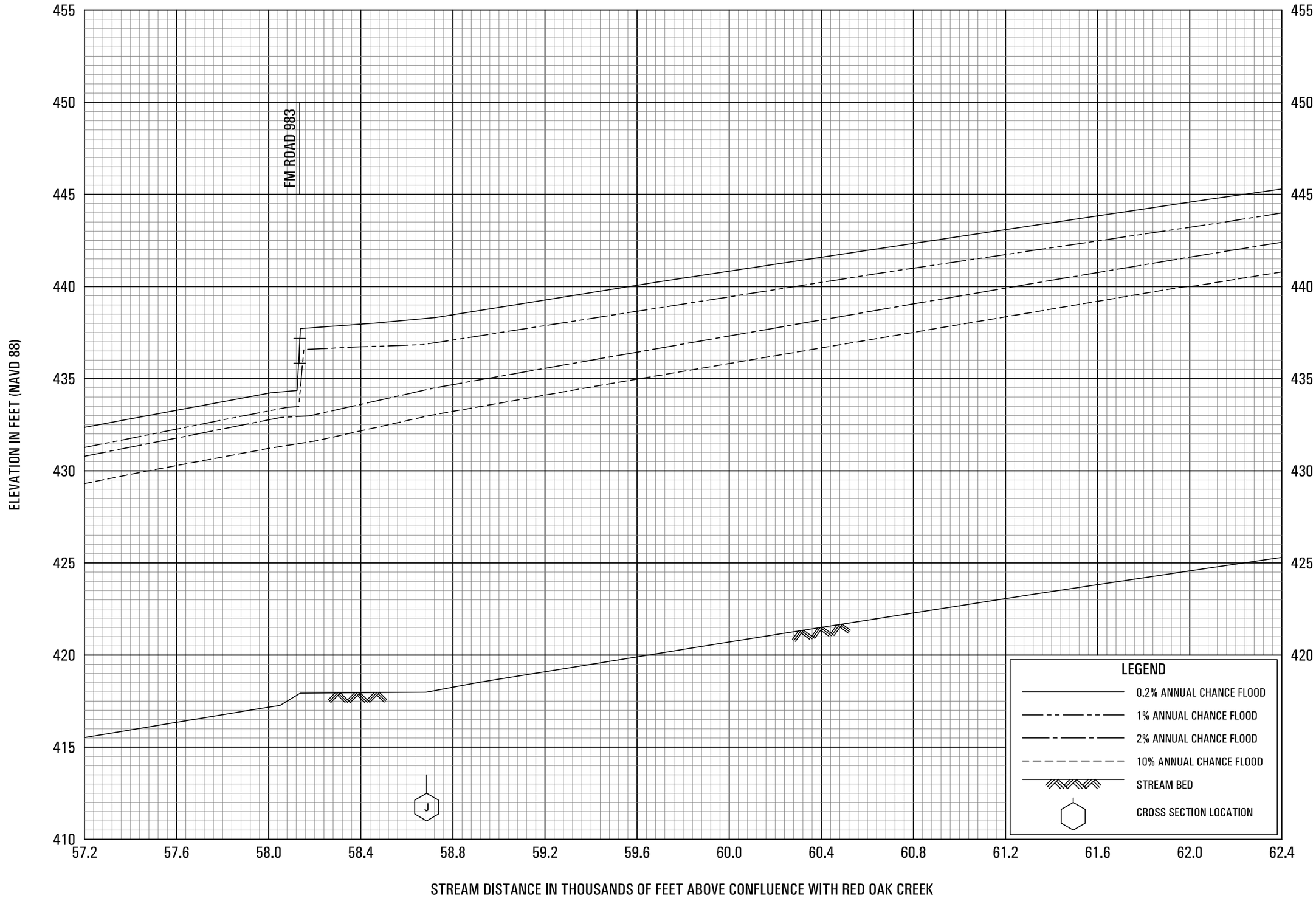

FLOOD PROFILES

BEAR CREEK

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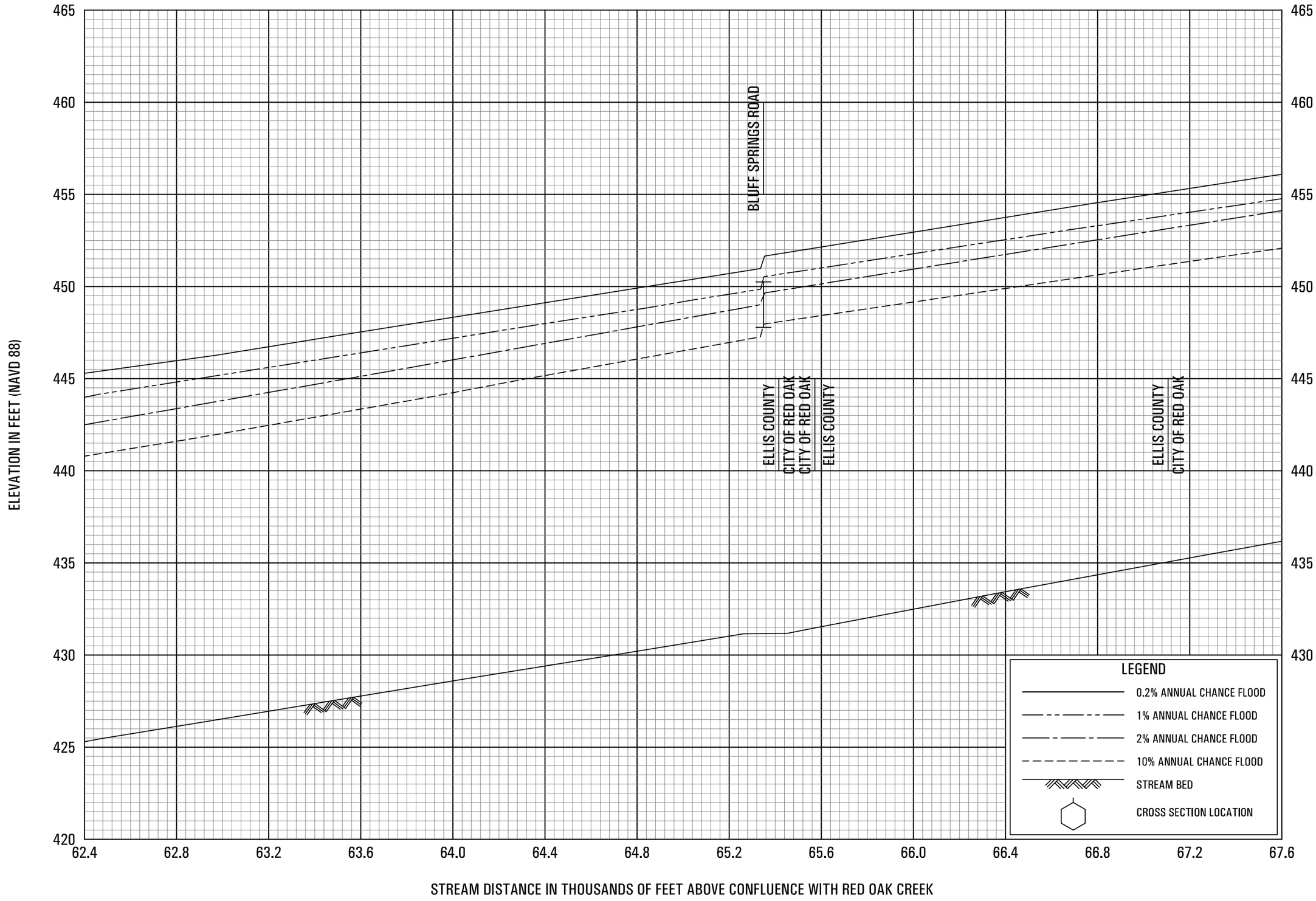

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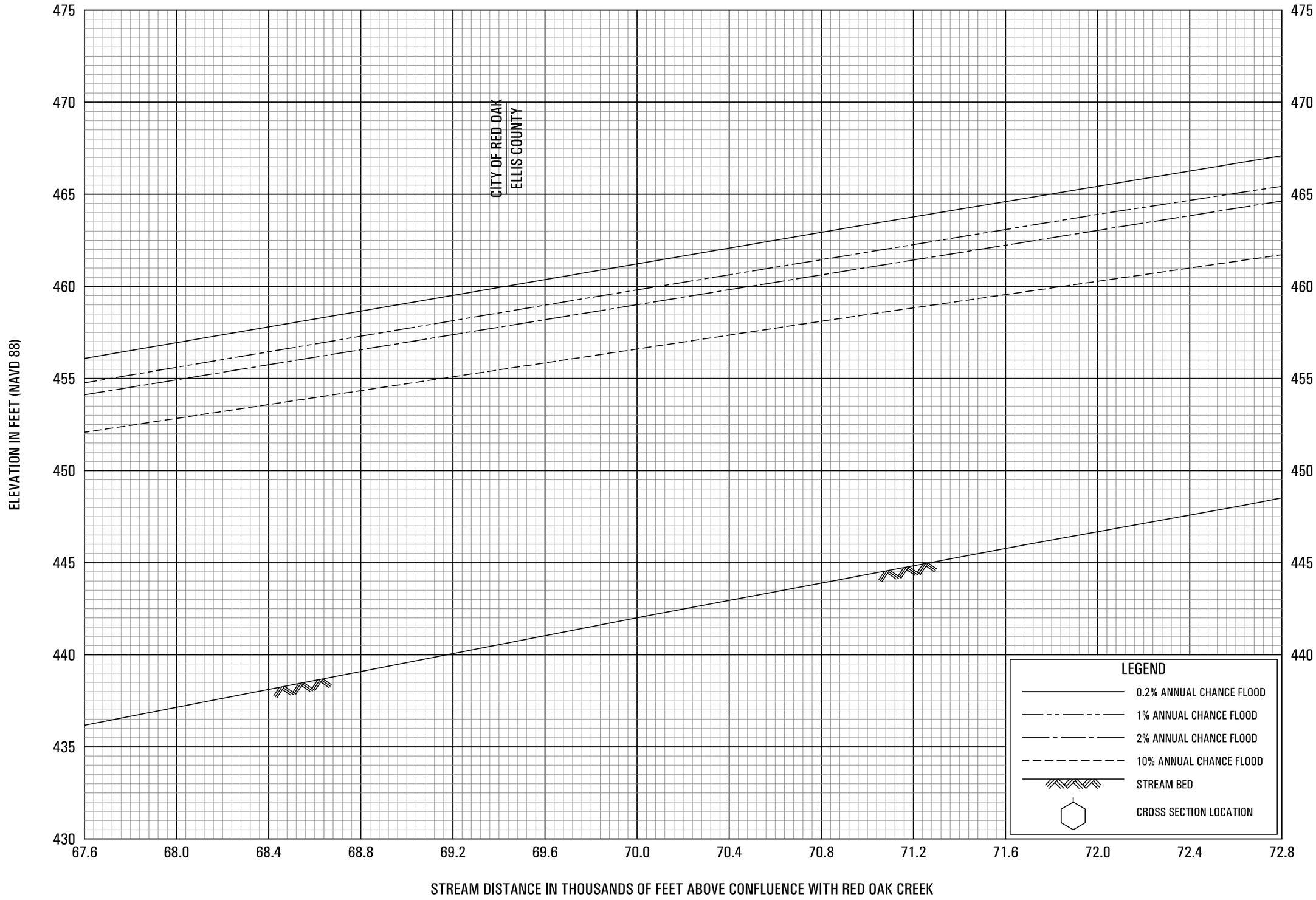

FLOOD PROFILES

BEAR CREEK

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ELLIS COUNTY, TX

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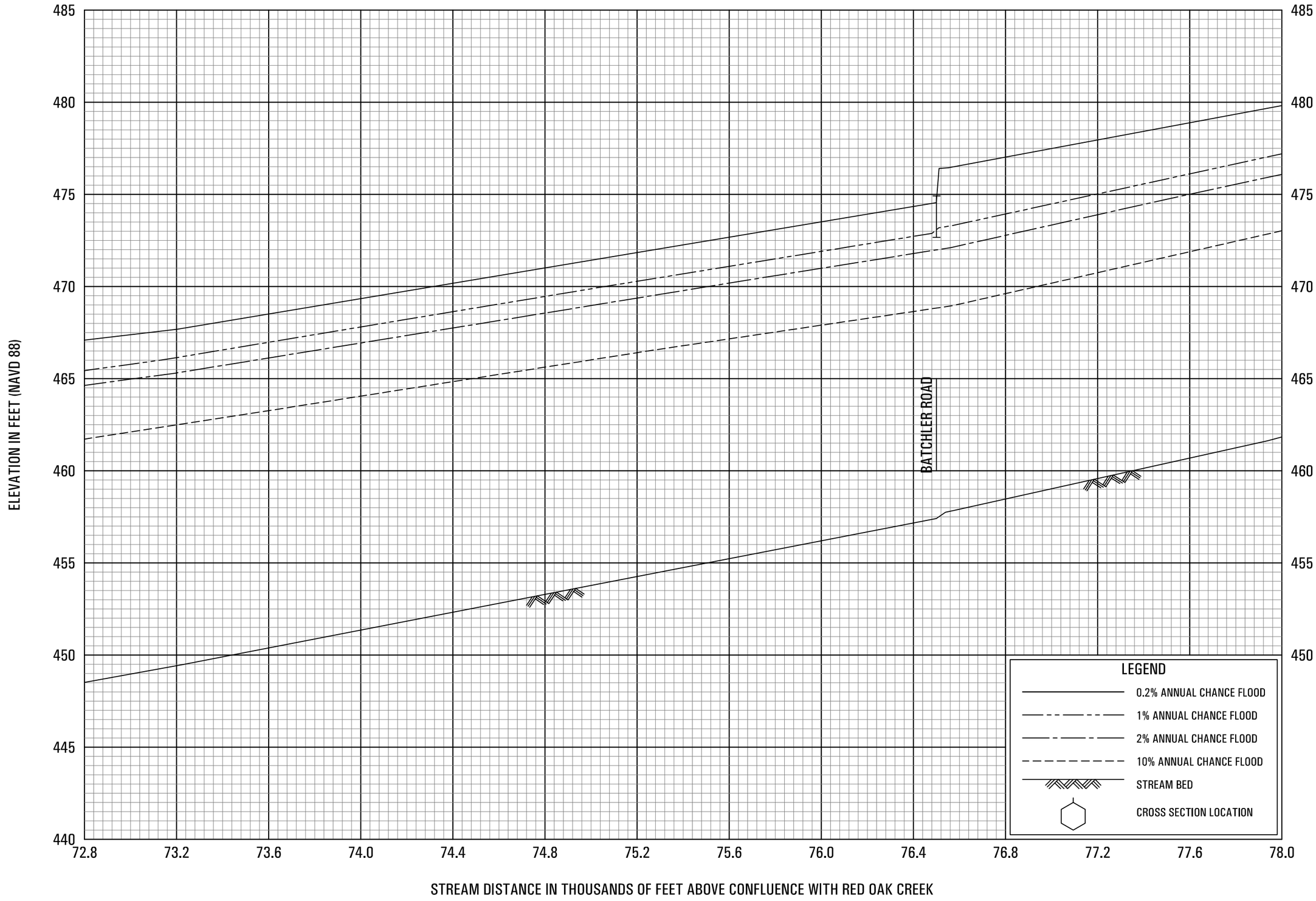

FLOOD PROFILES

BEAR CREEK

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ELLIS COUNTY, TX

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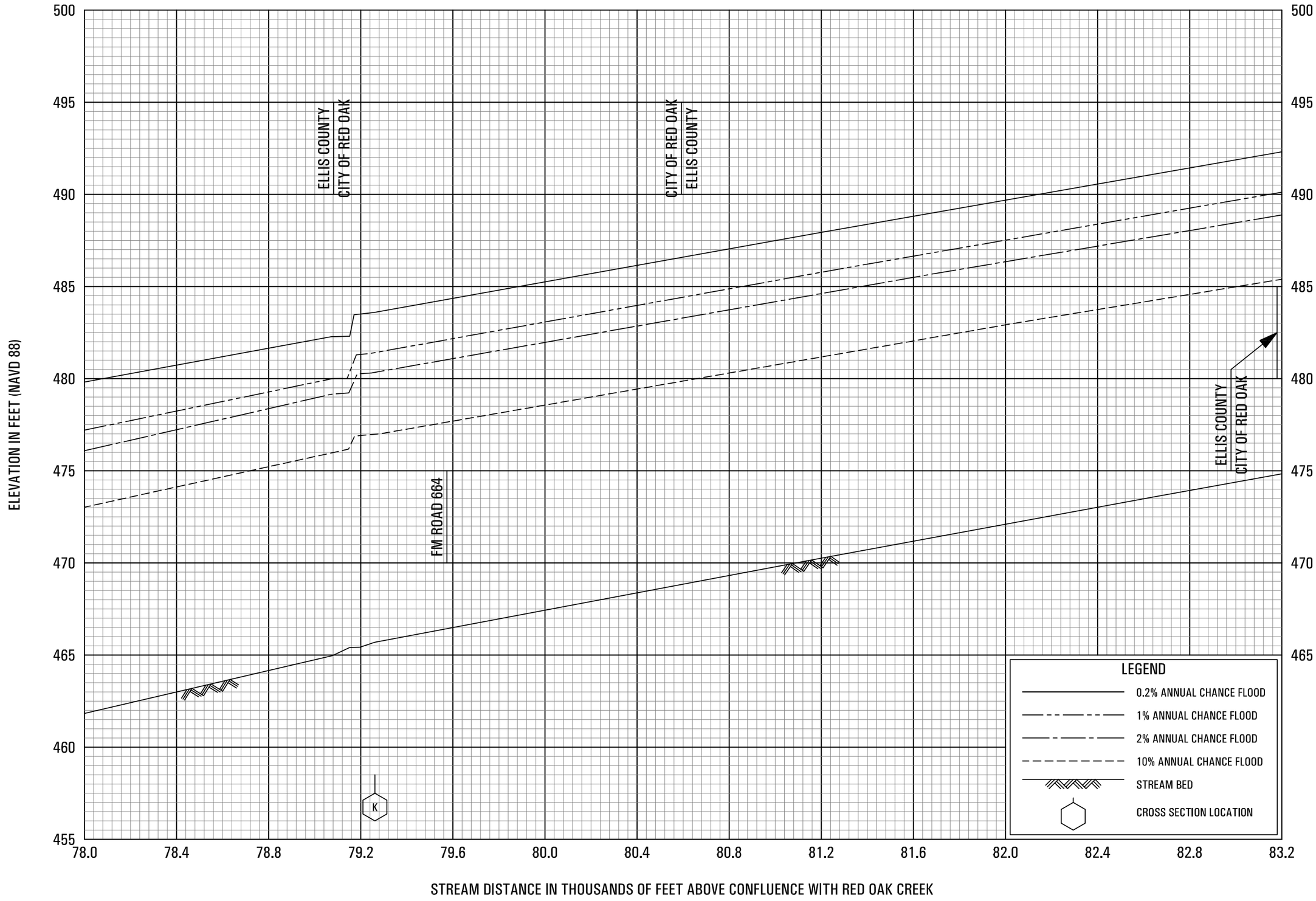


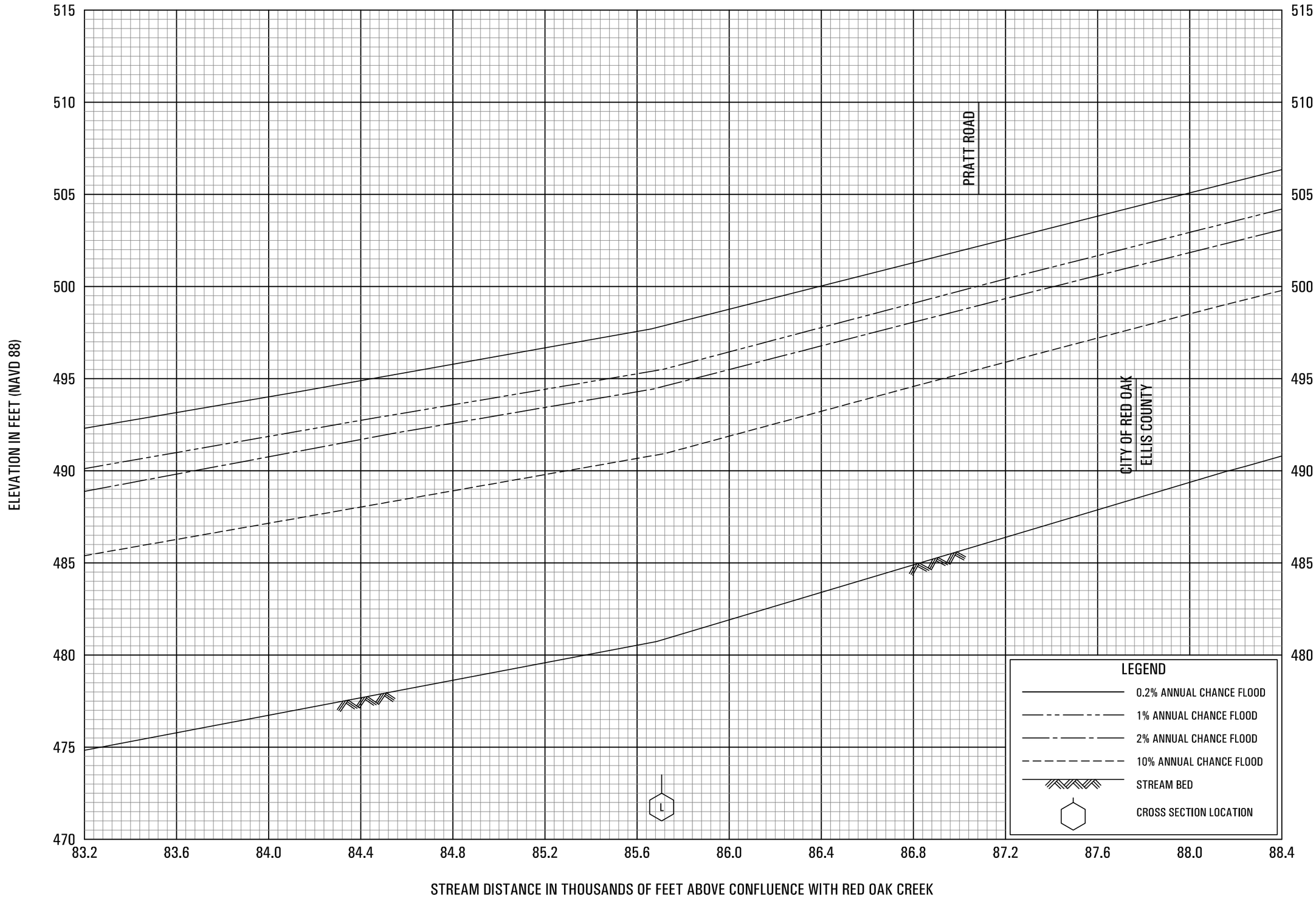
FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



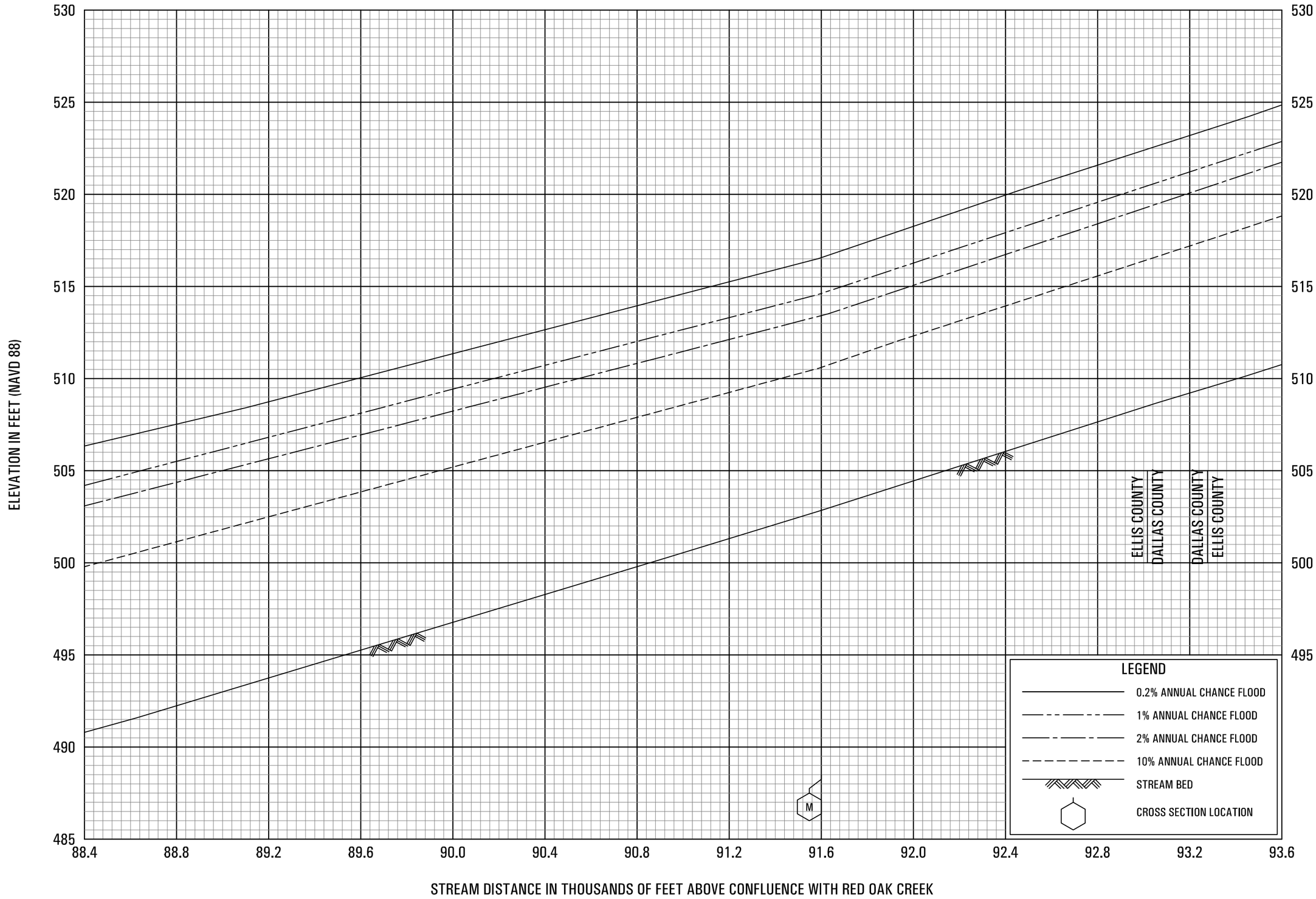
FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



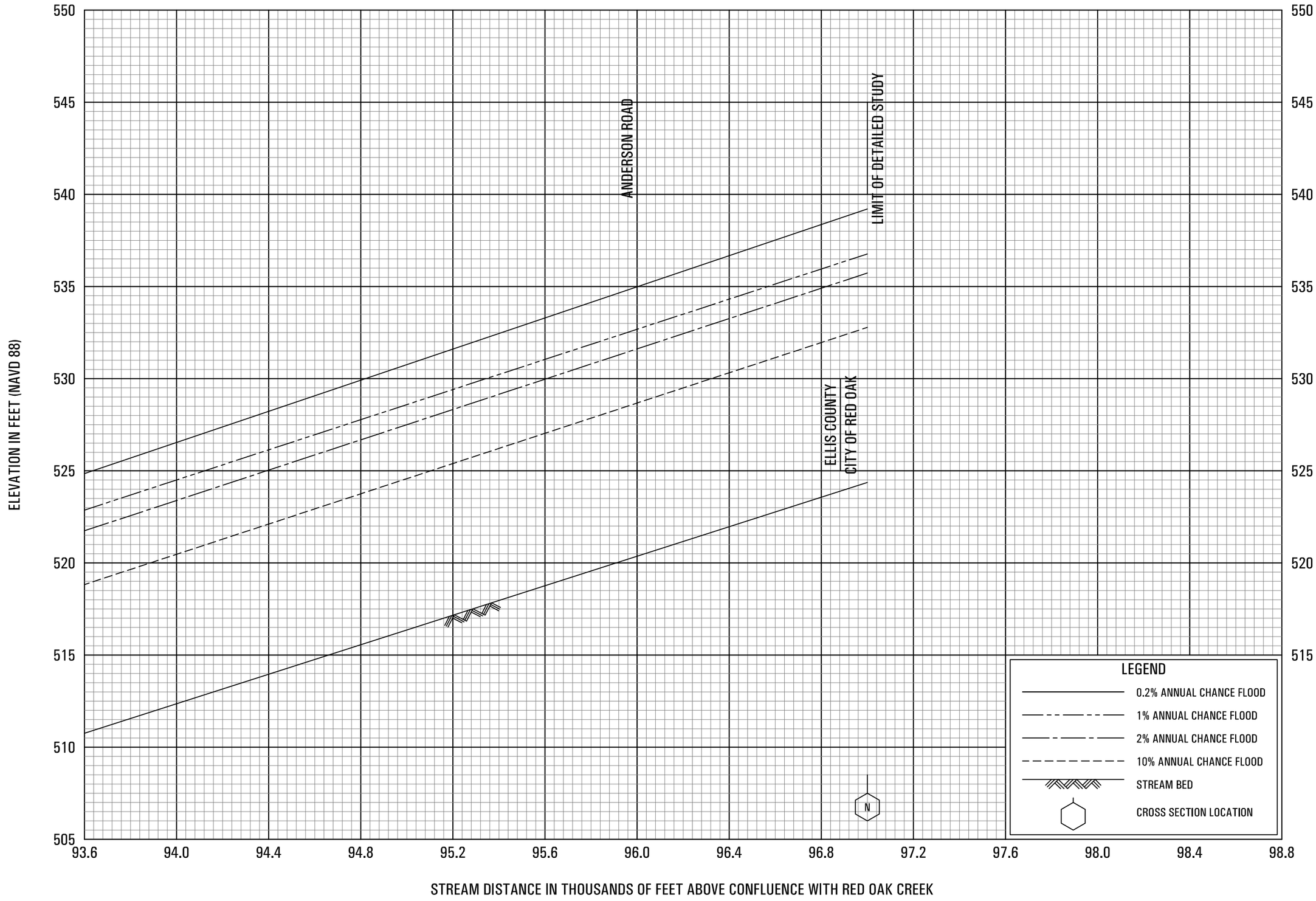
FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



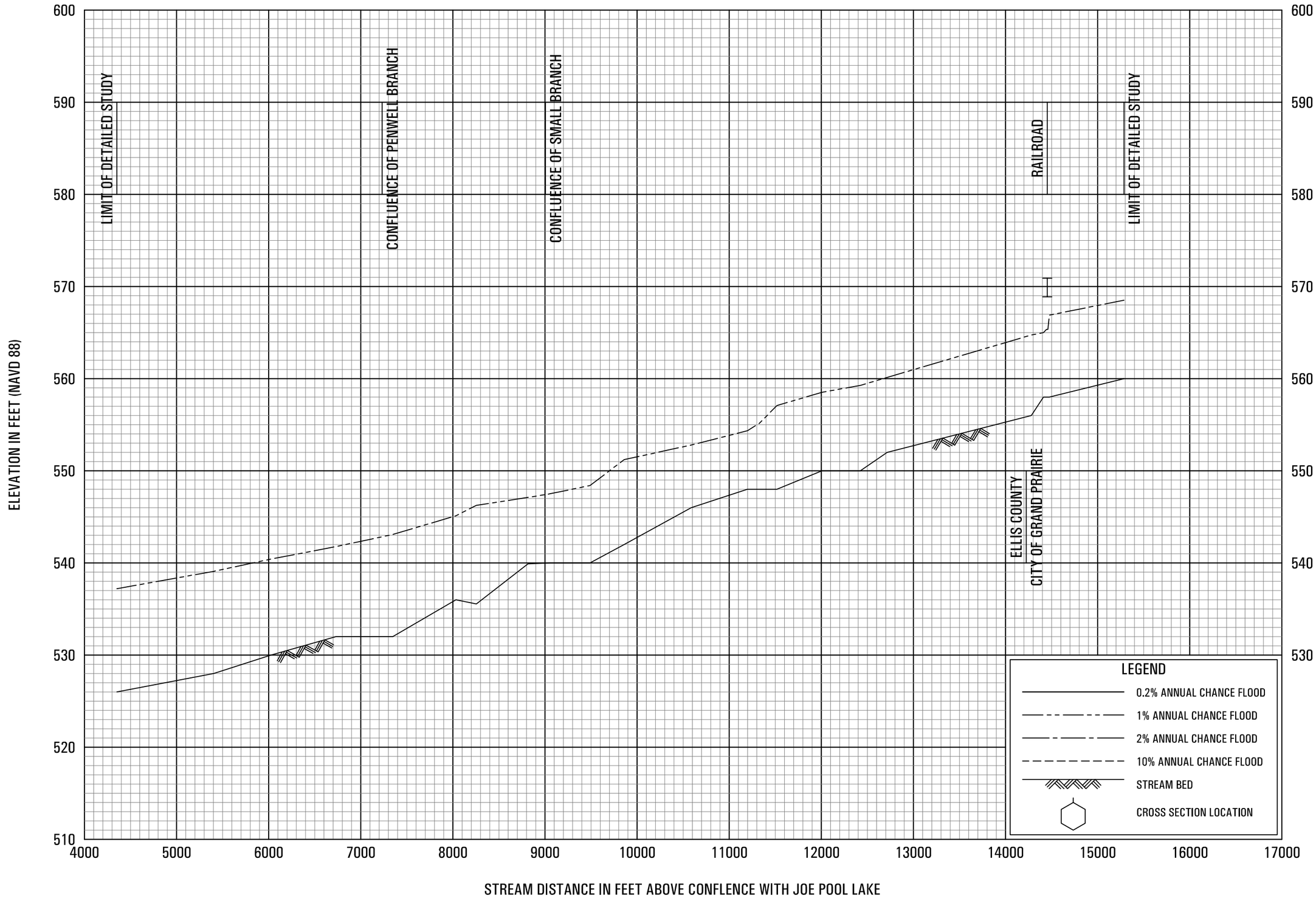
FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



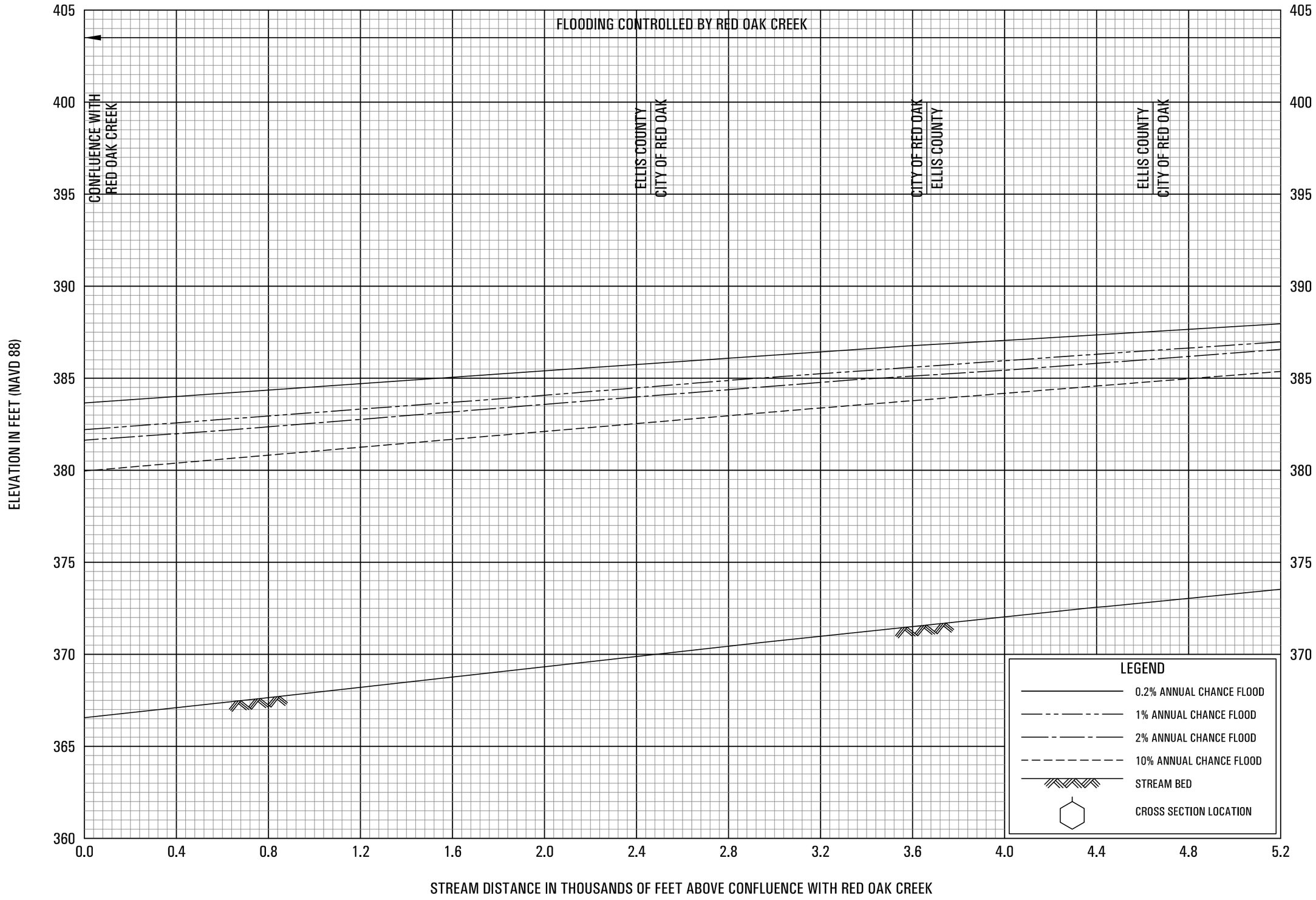
FLOOD PROFILES

BEDFORD BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



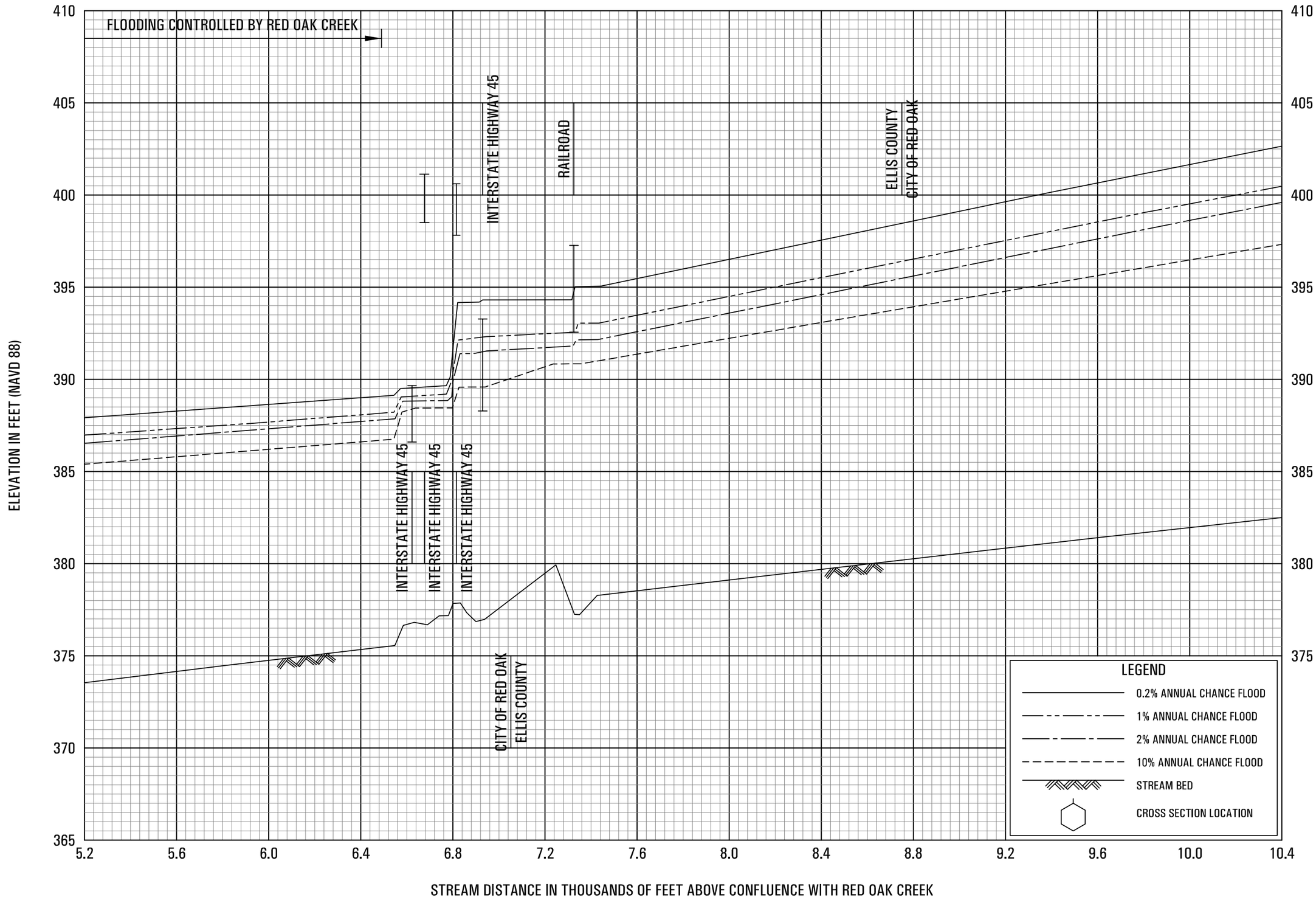
FLOOD PROFILES

BRUSHY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



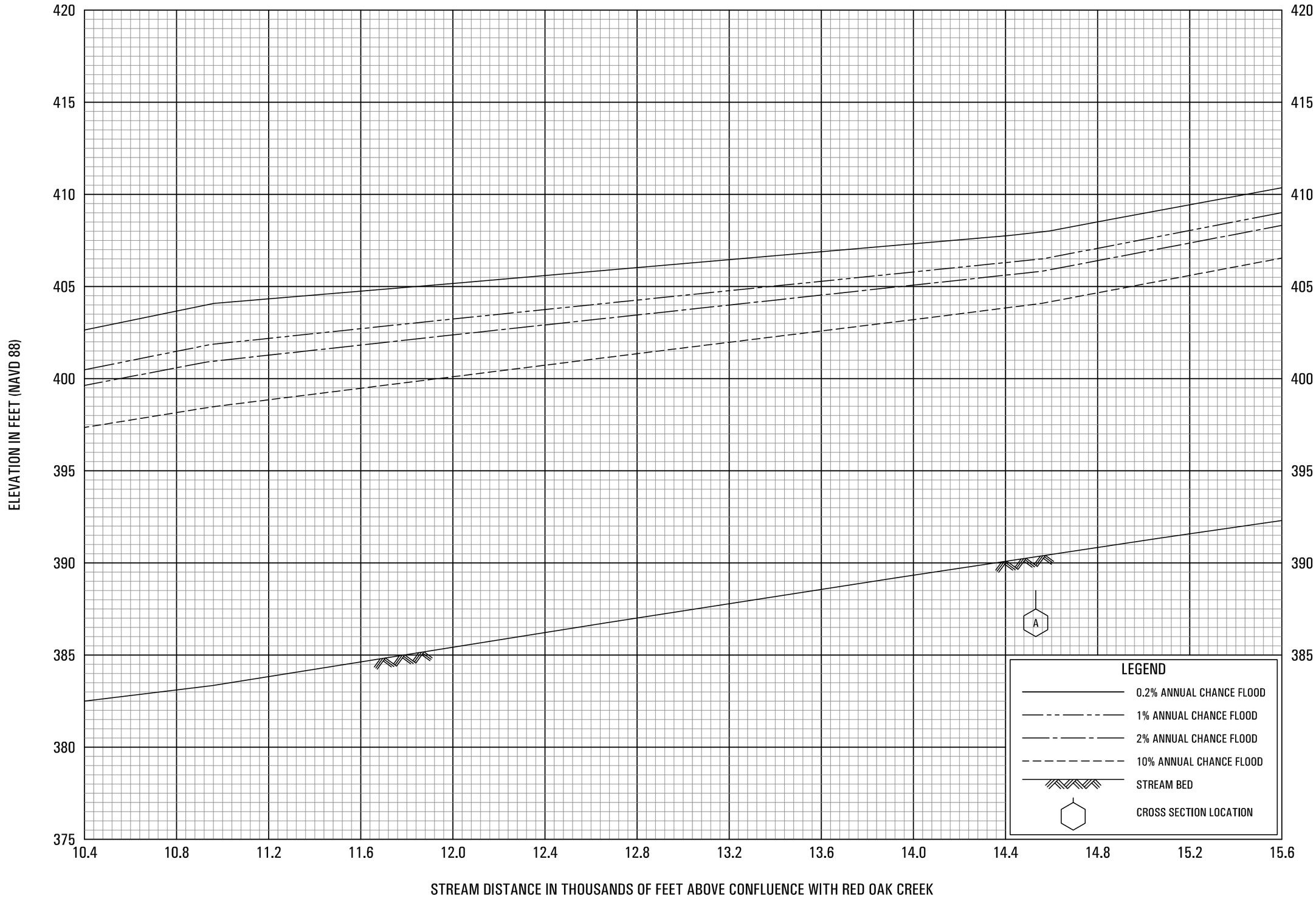
FLOOD PROFILES

BRUSHY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



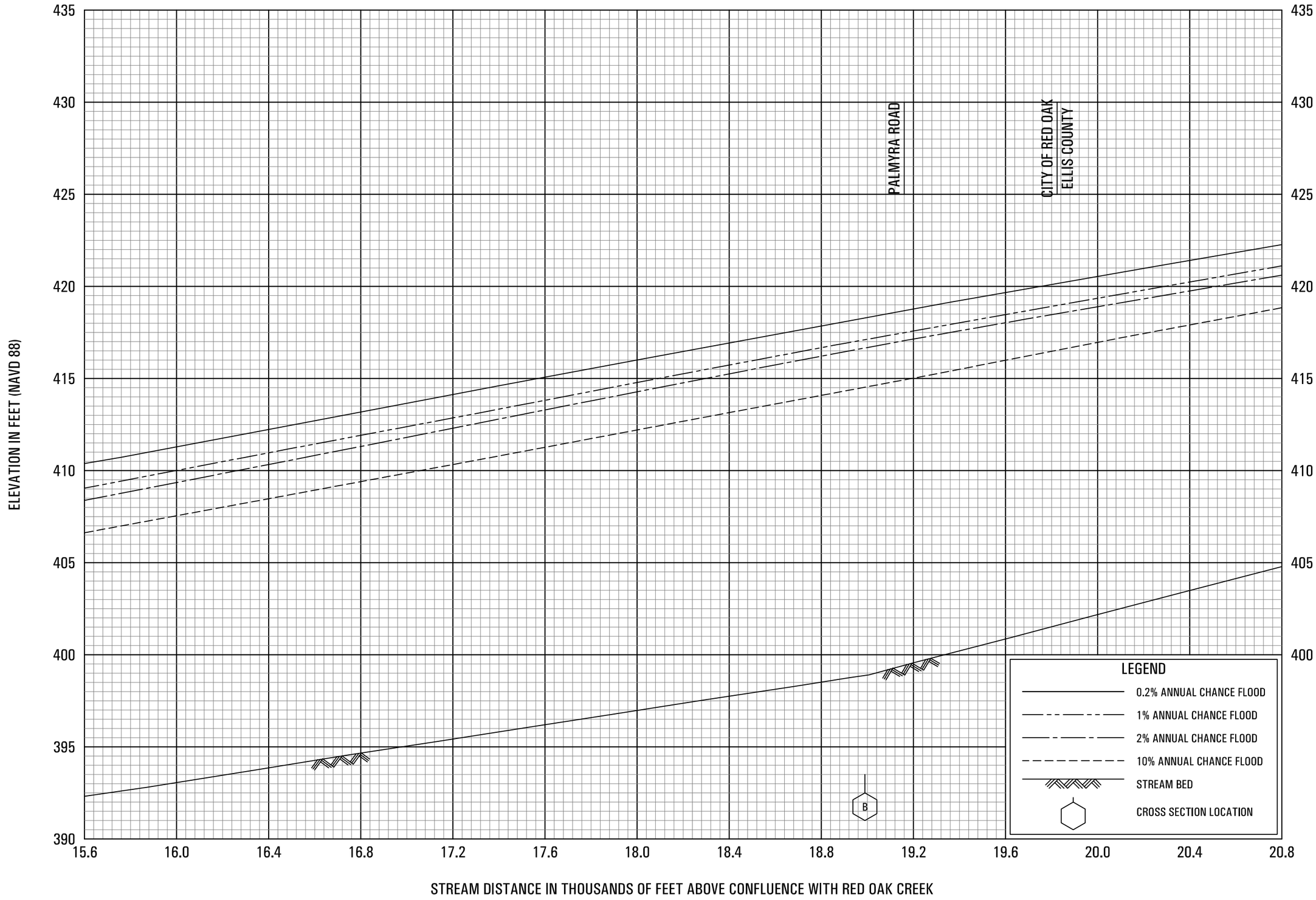
FLOOD PROFILES

BRUSHY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



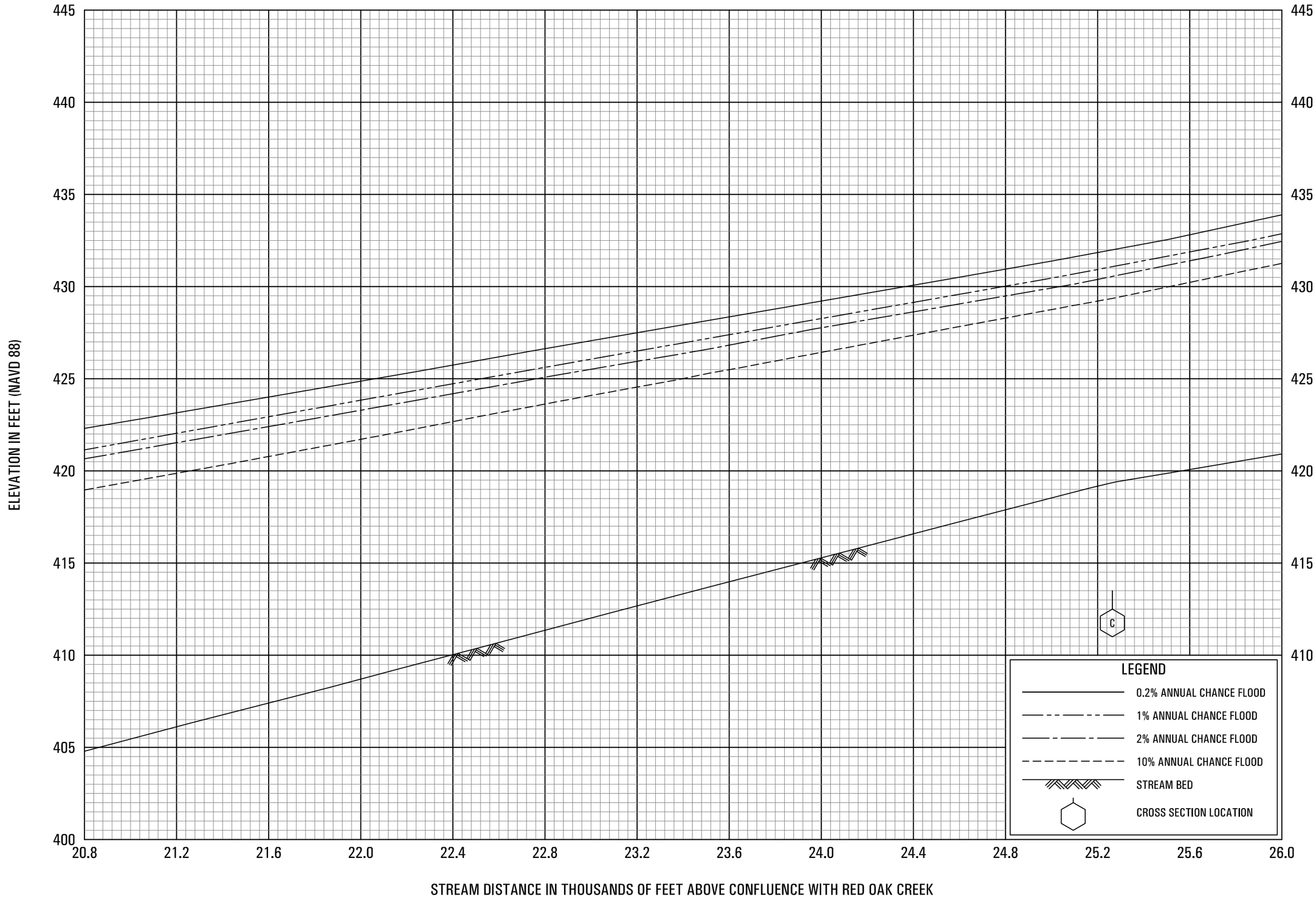
FLOOD PROFILES

BRUSHY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



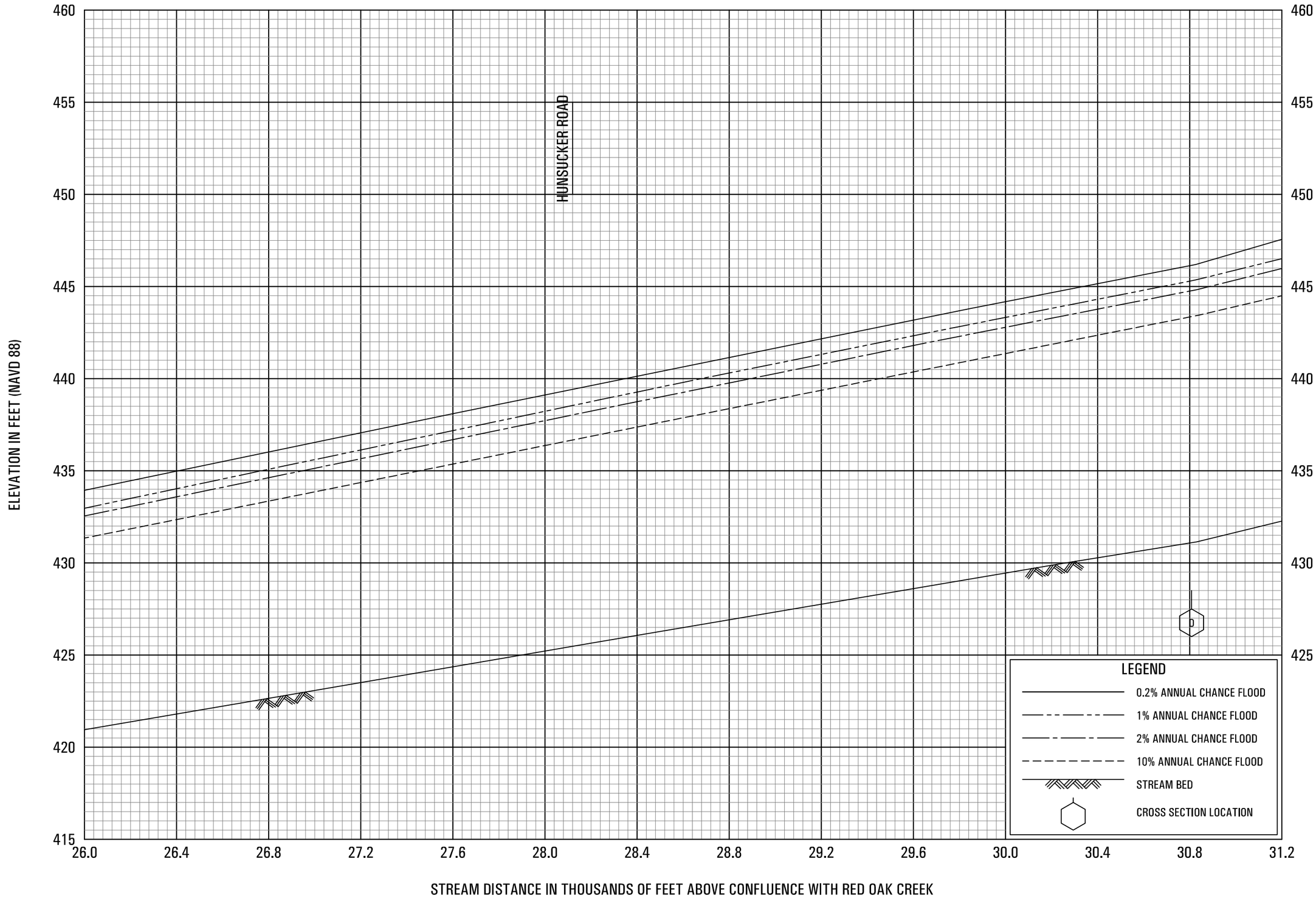
FLOOD PROFILES

BRUSHY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



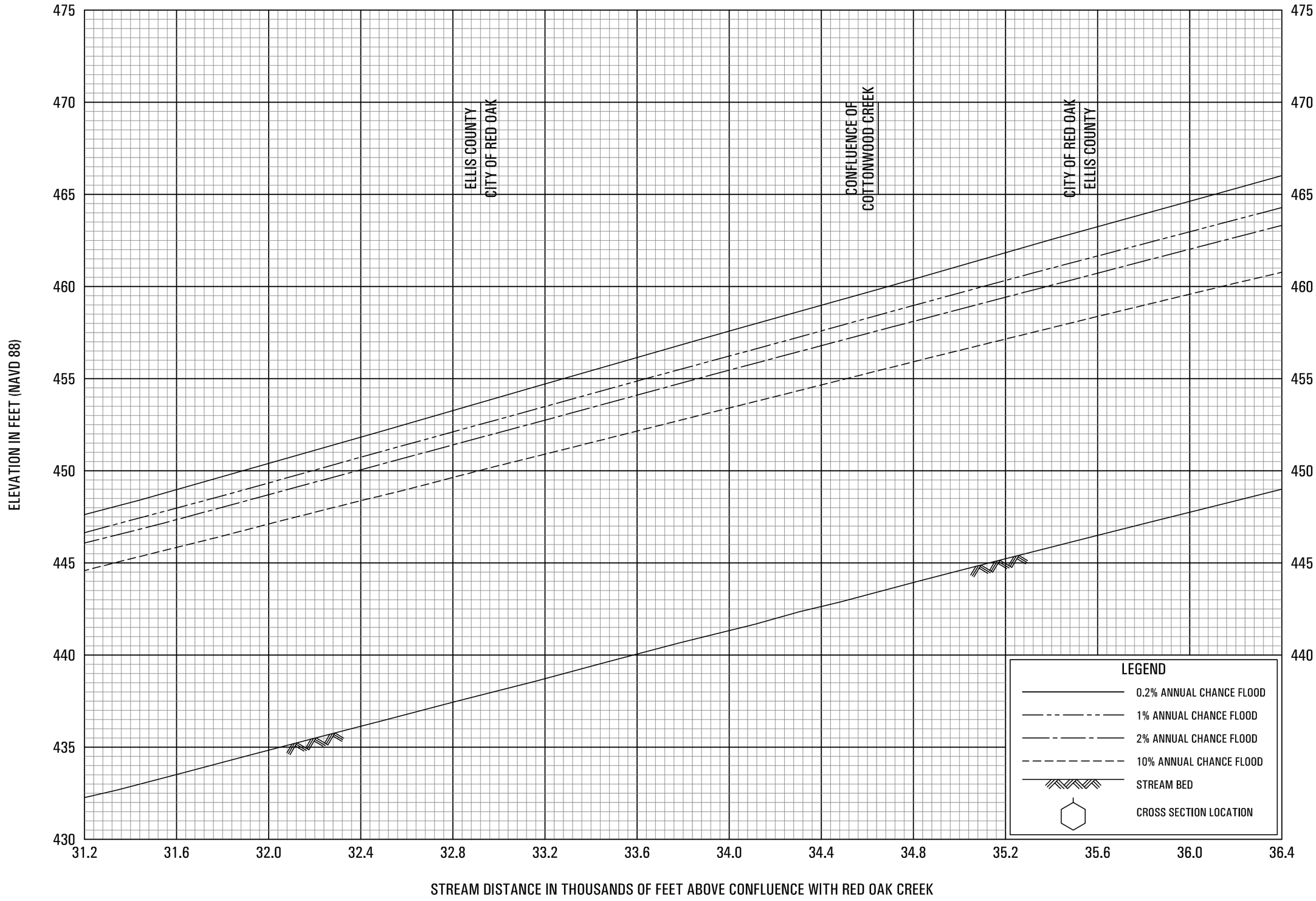
FLOOD PROFILES

BRUSHY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



FLOOD PROFILES

BRUSHY CREEK

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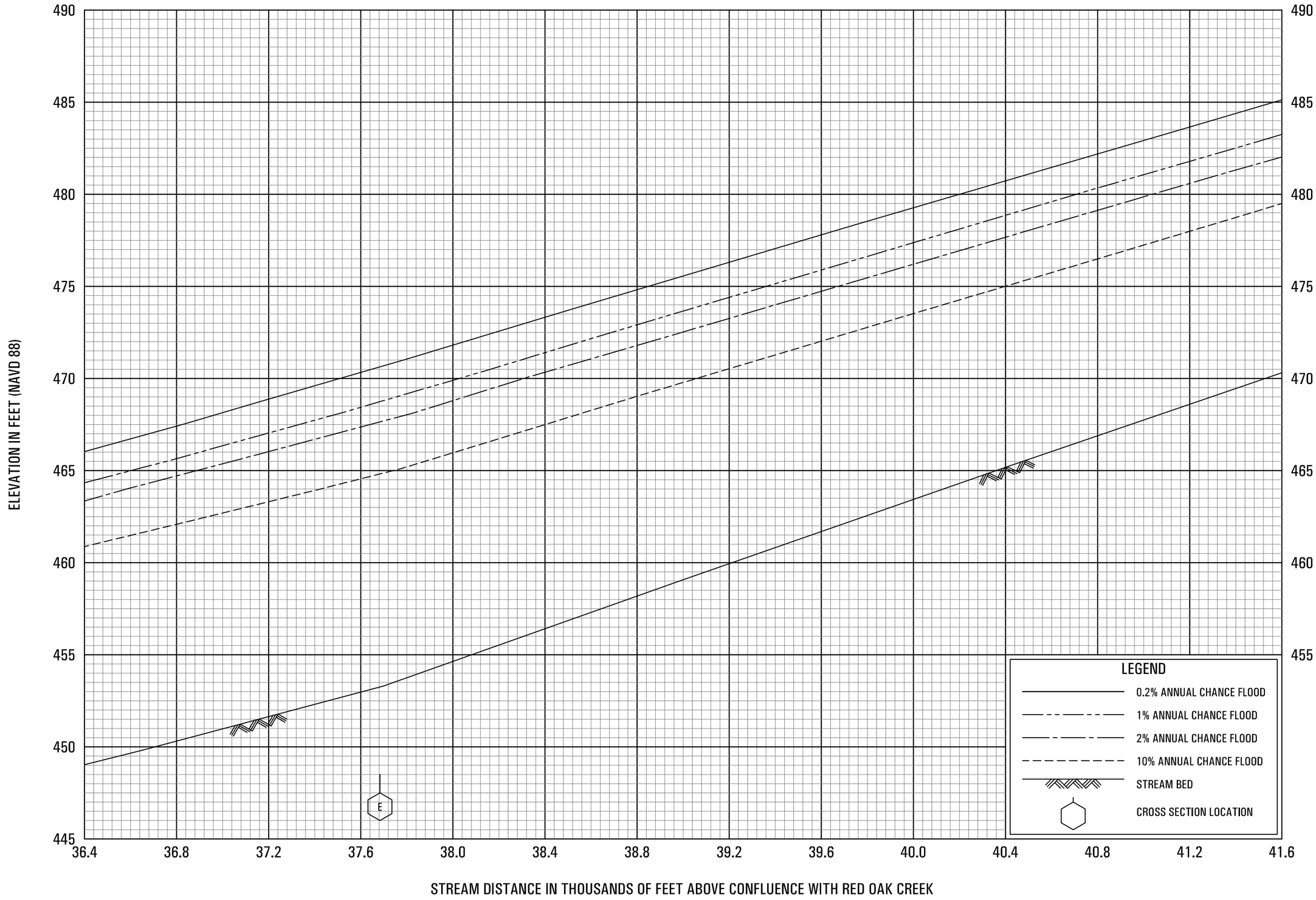
ELLIS COUNTY, TX

AND INCORPORATED AREAS



FLOOD PROFILES

BRUSHY CREEK

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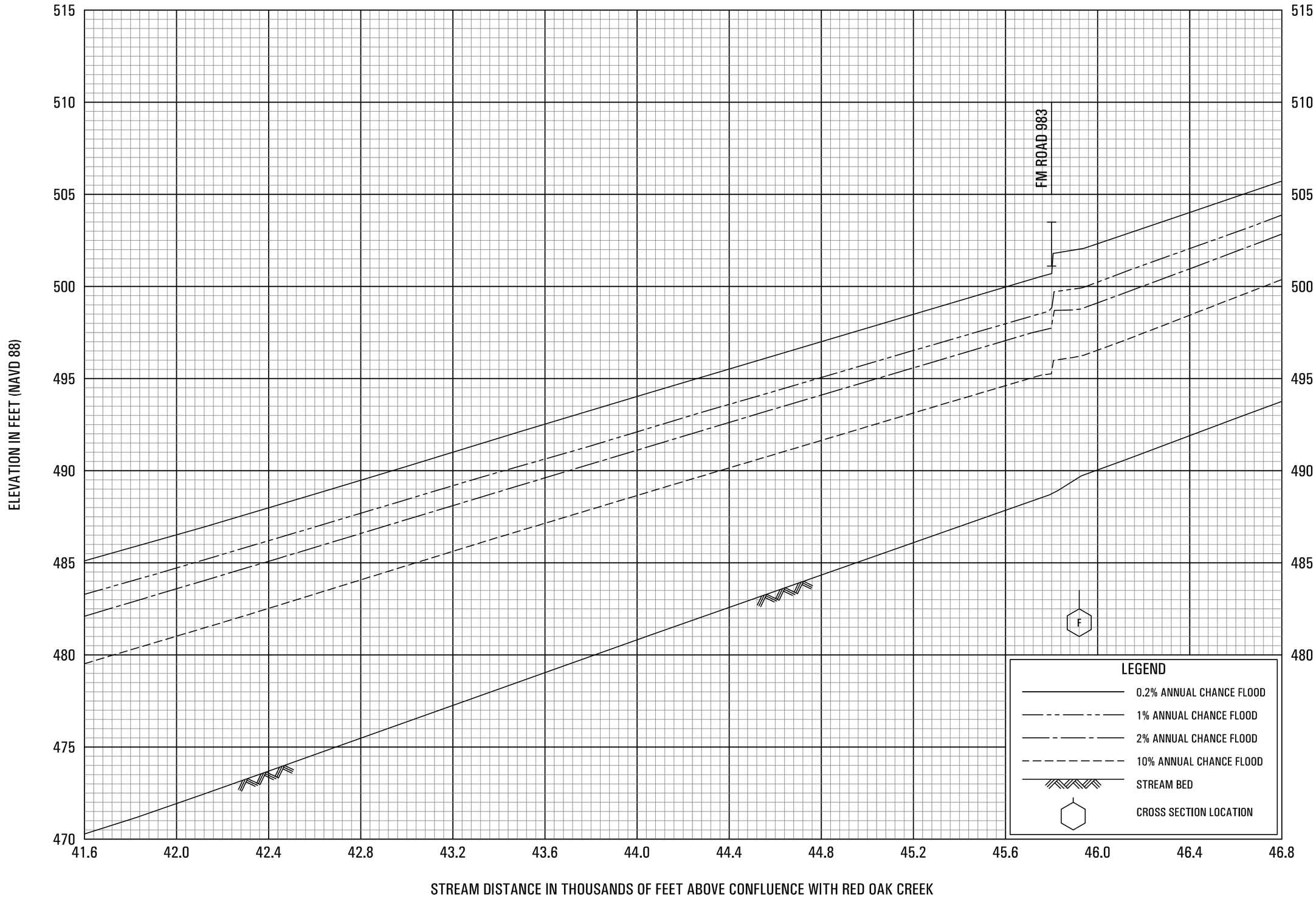
ELLIS COUNTY, TX

AND INCORPORATED AREAS



FLOOD PROFILES

BRUSHY CREEK

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ELLIS COUNTY, TX

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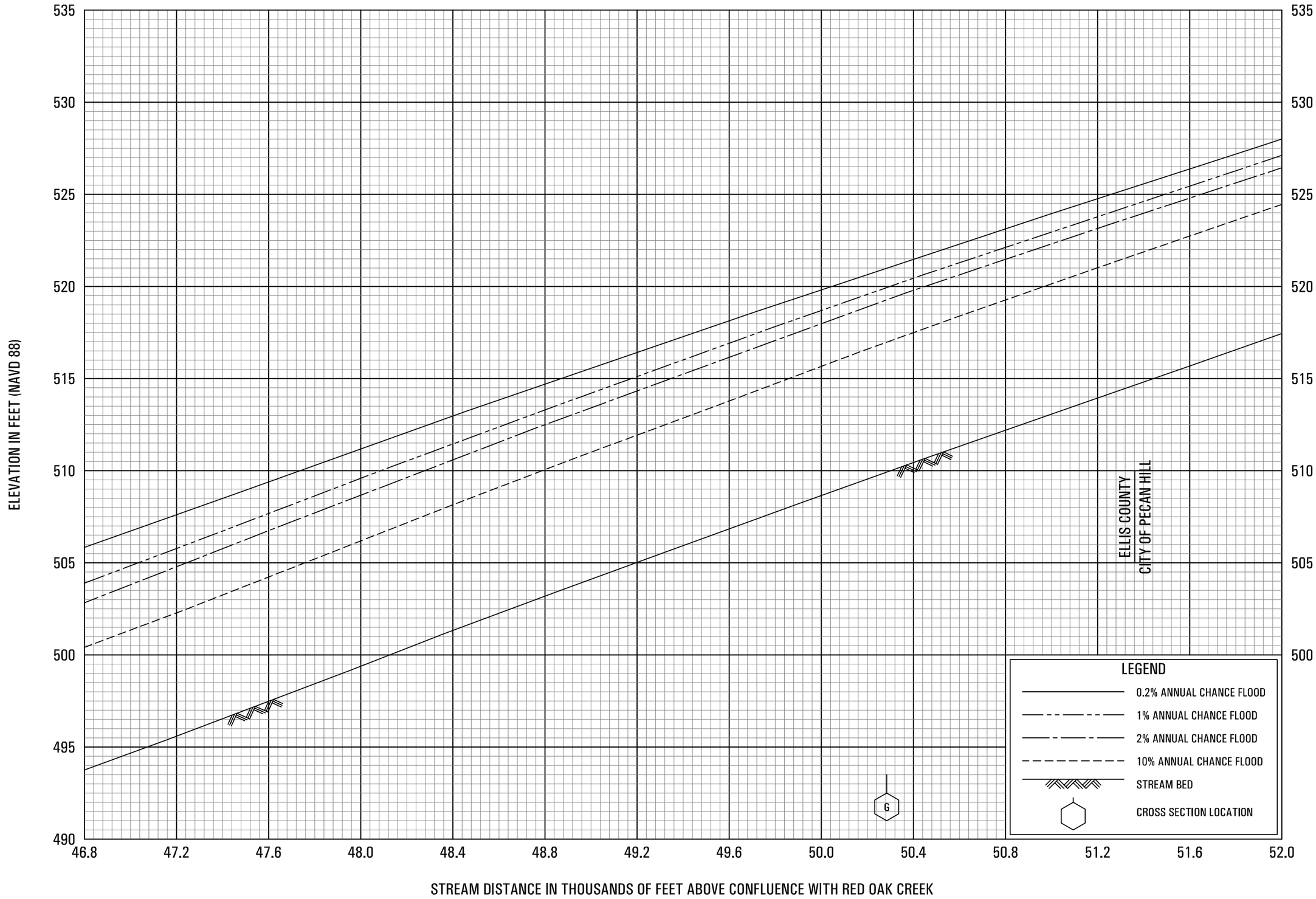

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BRUSHY CREEK

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ELLIS COUNTY, TX

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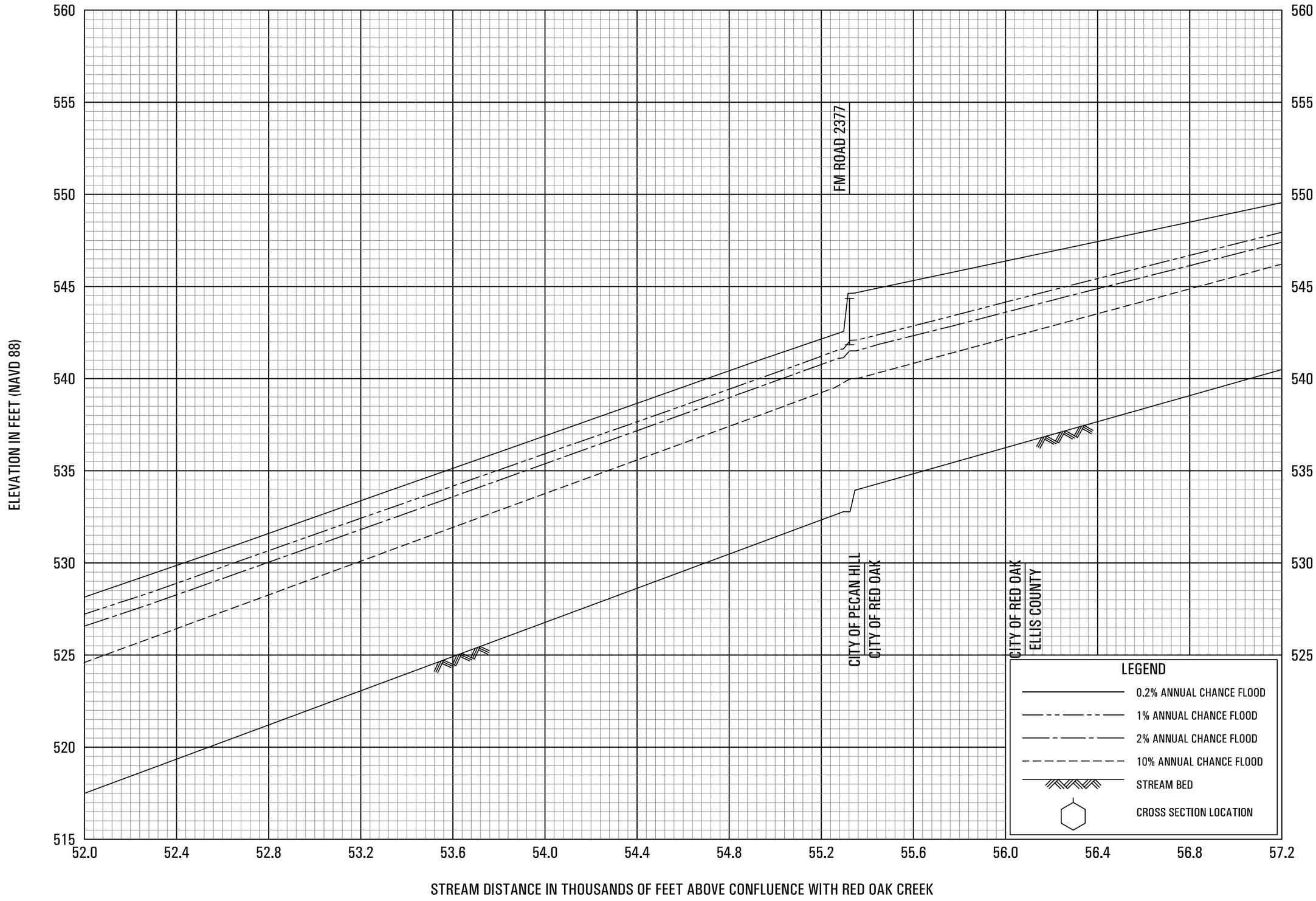

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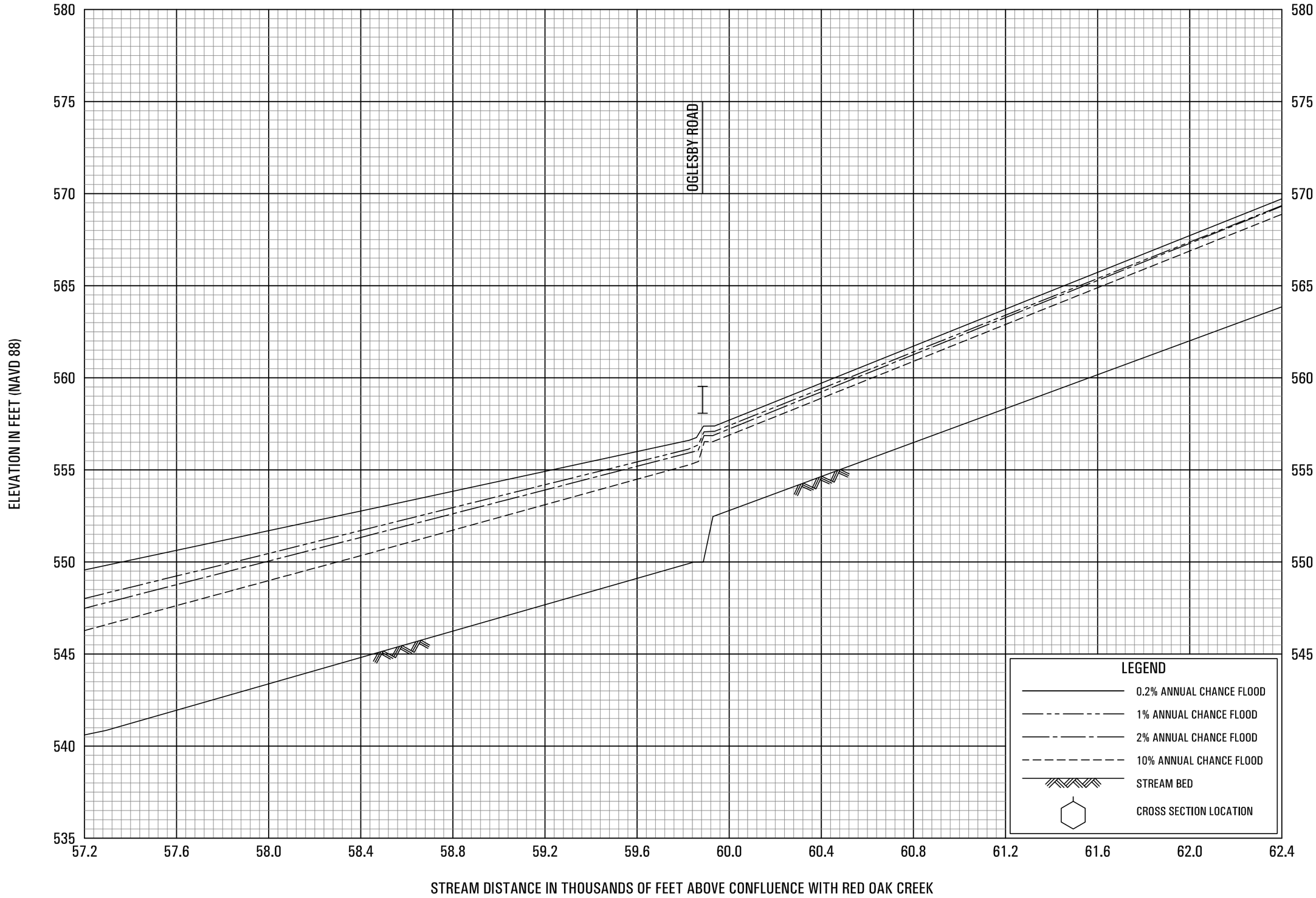

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ELLIS COUNTY, TX

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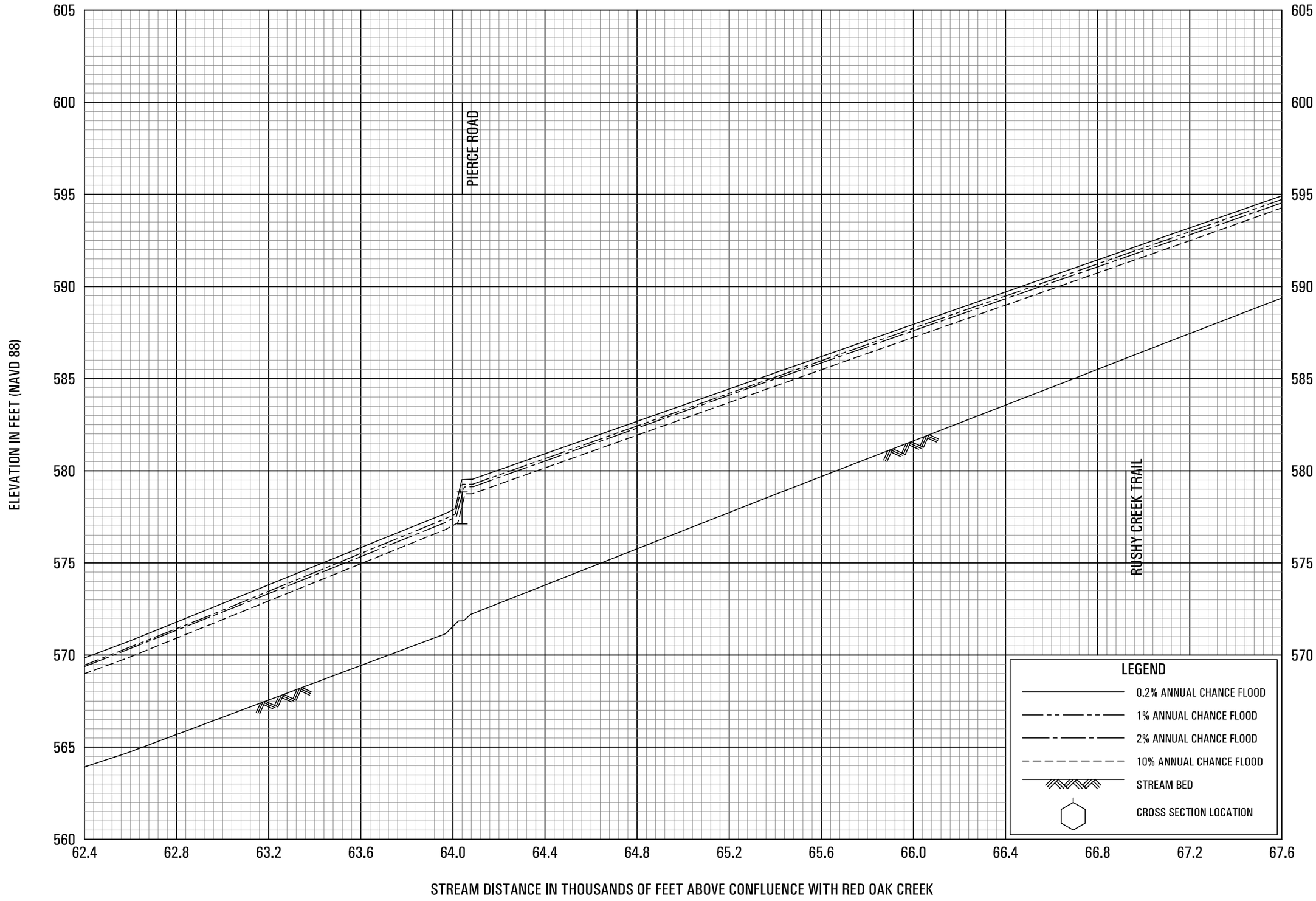

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BRUSHY CREEK

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ELLIS COUNTY, TX

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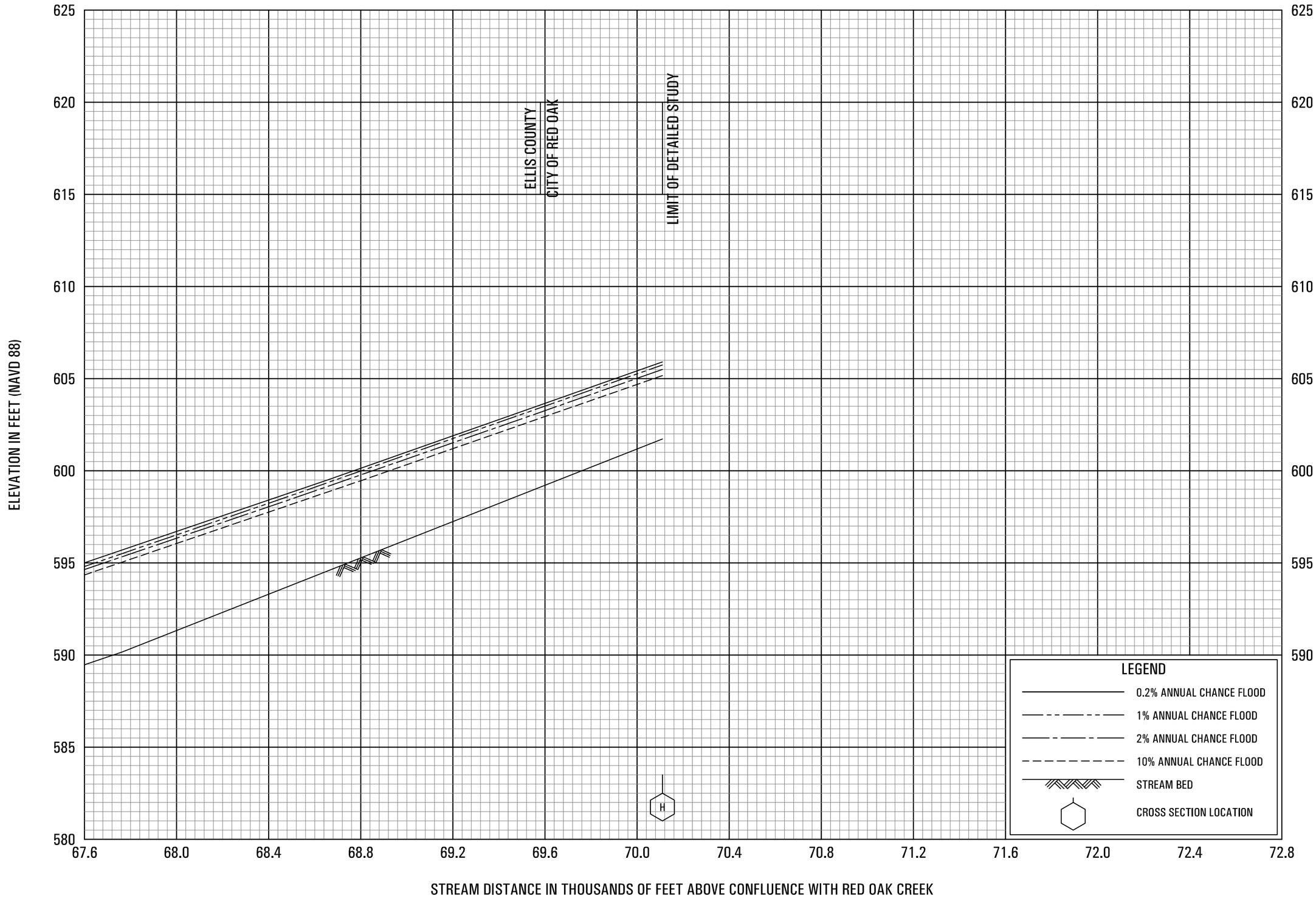

FLOOD PROFILES

BRUSHY CREEK

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ELLIS COUNTY, TX

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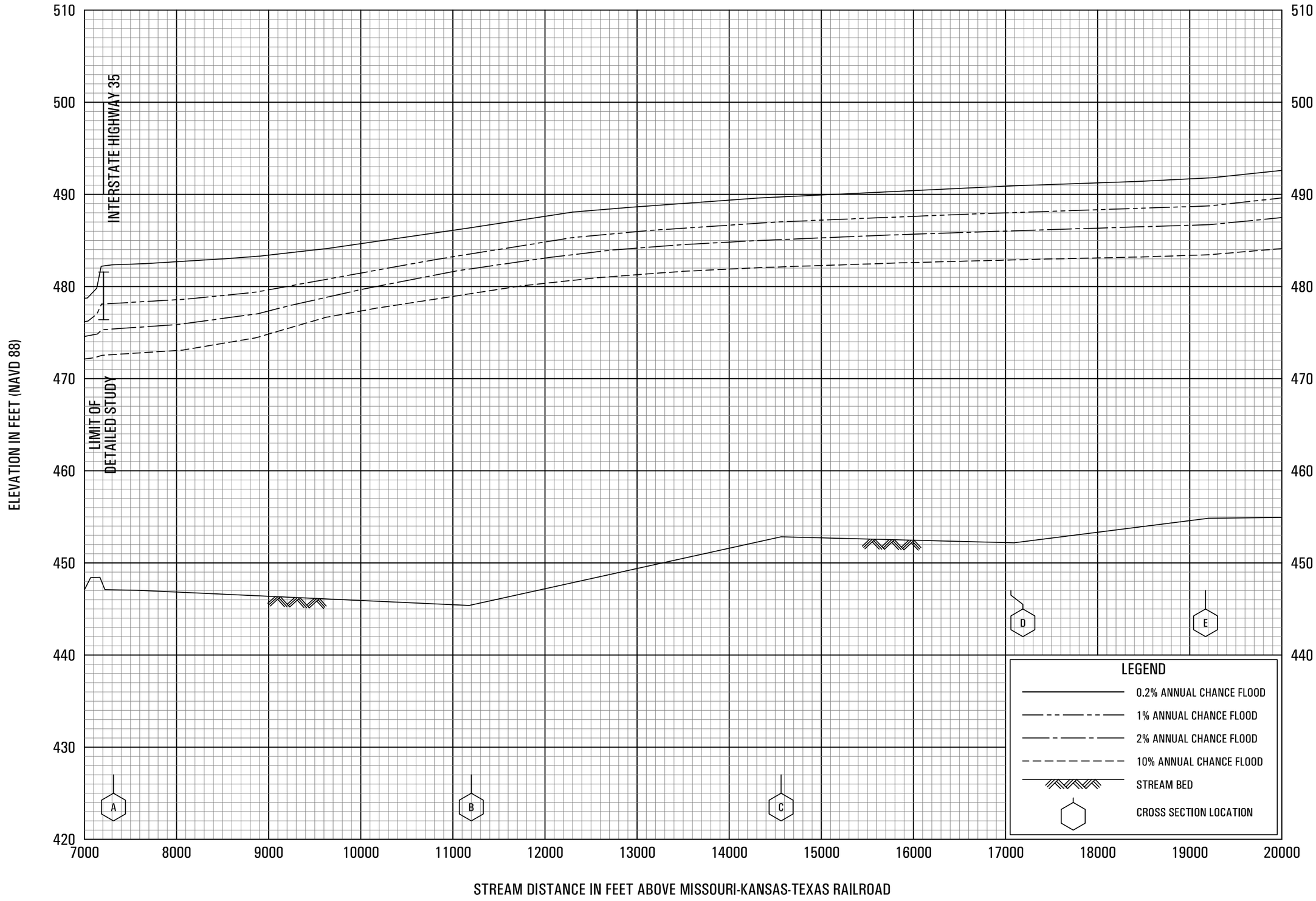


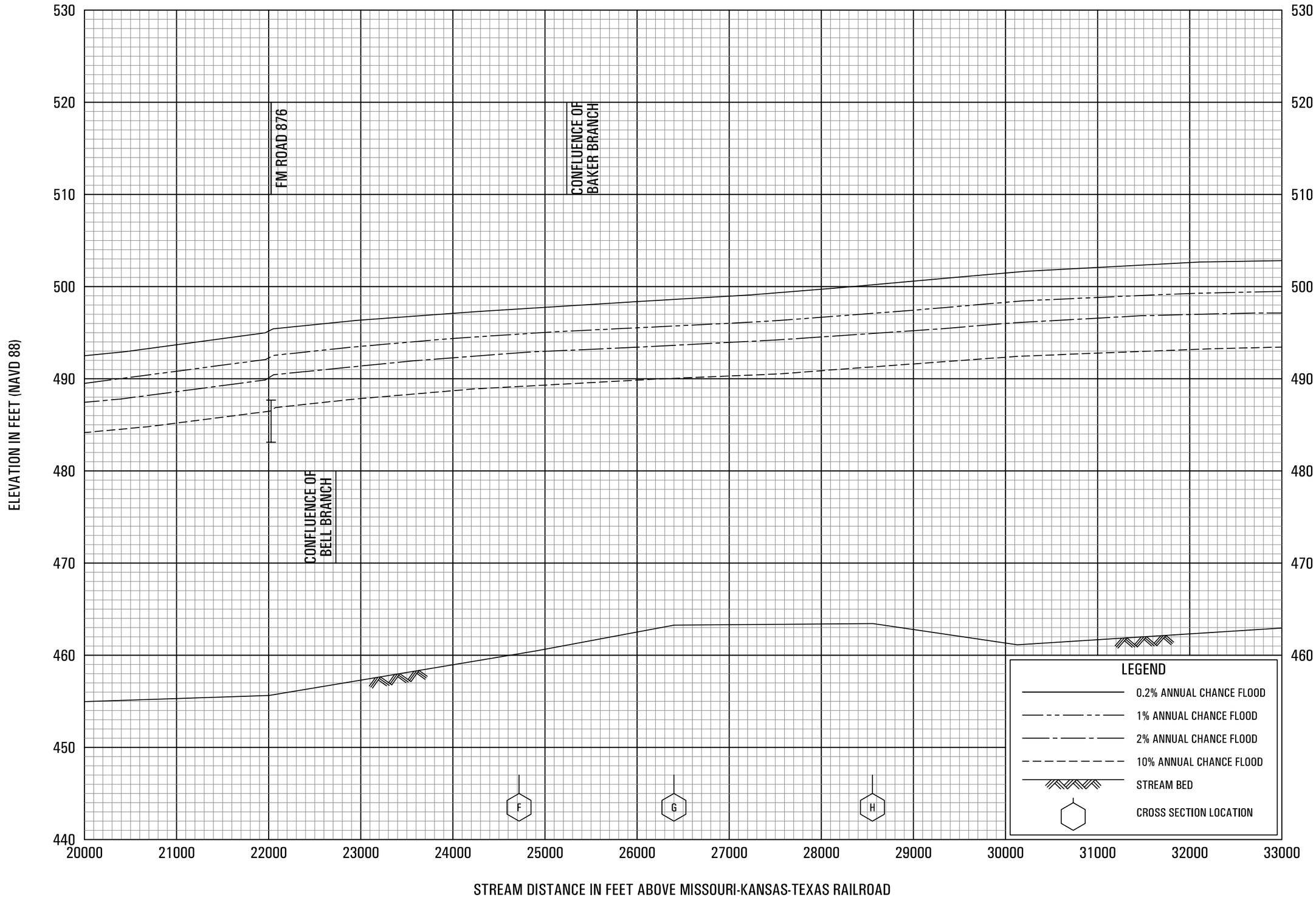
FLOOD PROFILES

CHAMBERS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



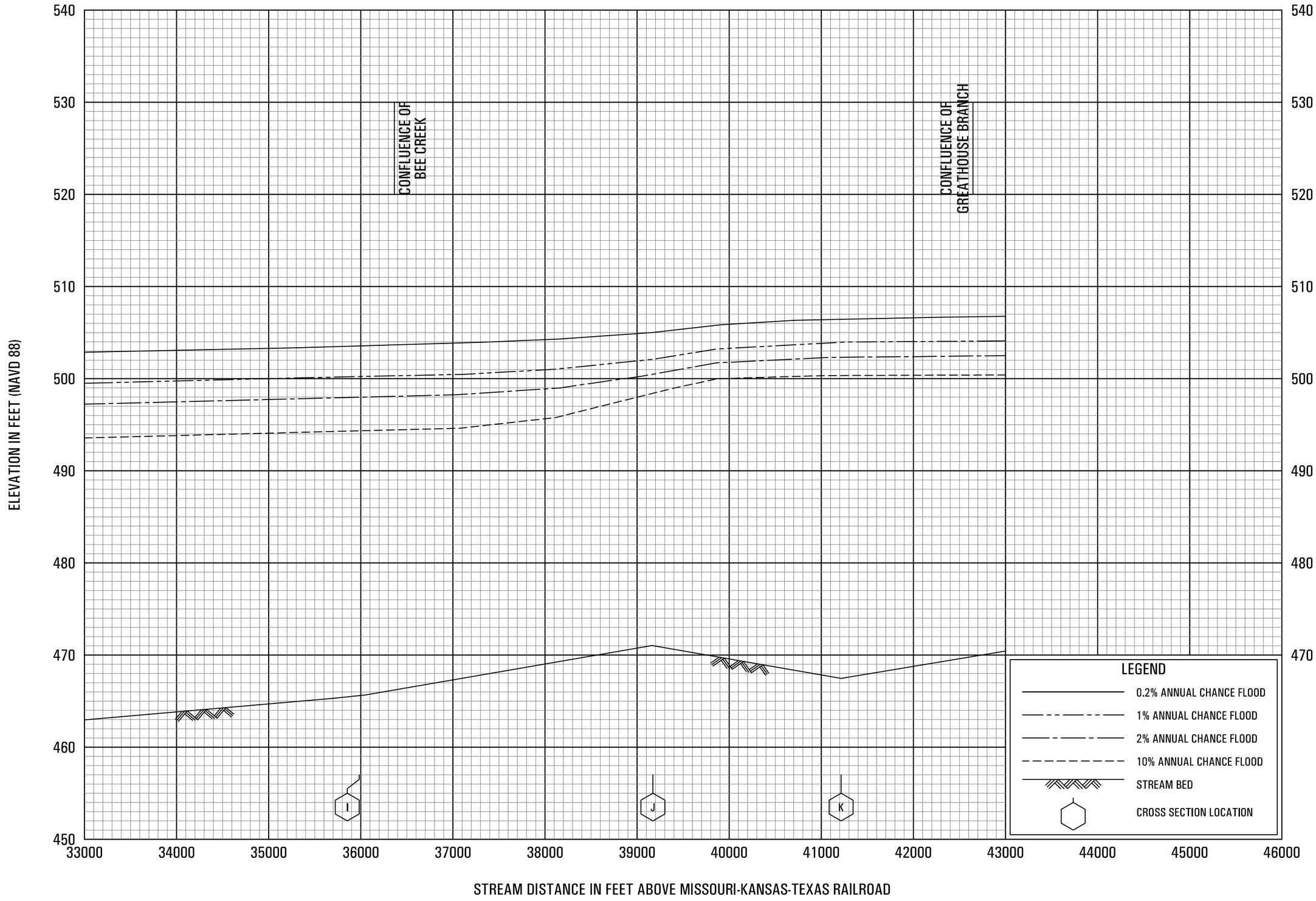
FLOOD PROFILES

CHAMBERS CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



FLOOD PROFILES

CHAMBERS CREEK

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ELLIS COUNTY, TX

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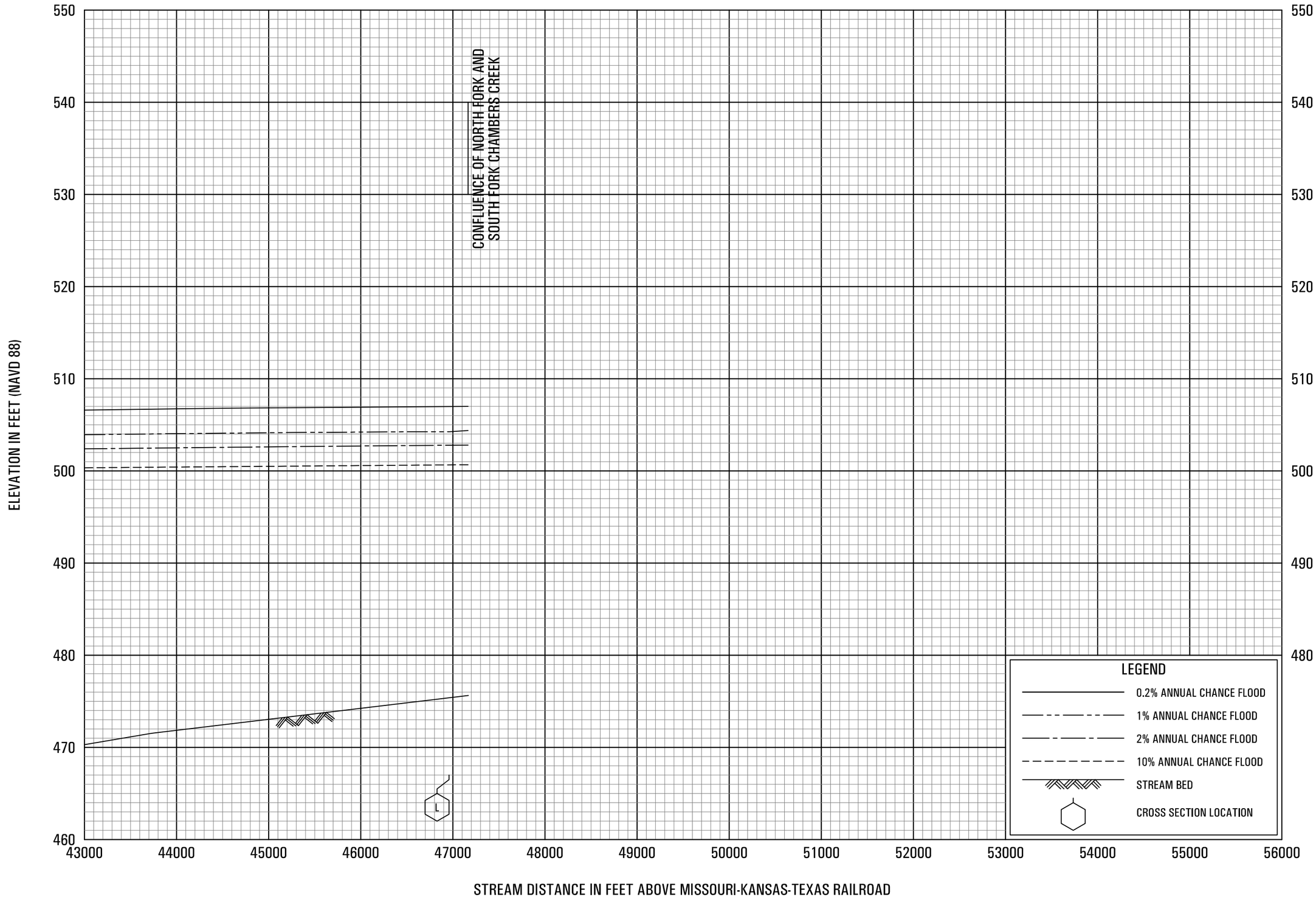

FLOOD PROFILES

CHAMBERS CREEK

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ELLIS COUNTY, TX

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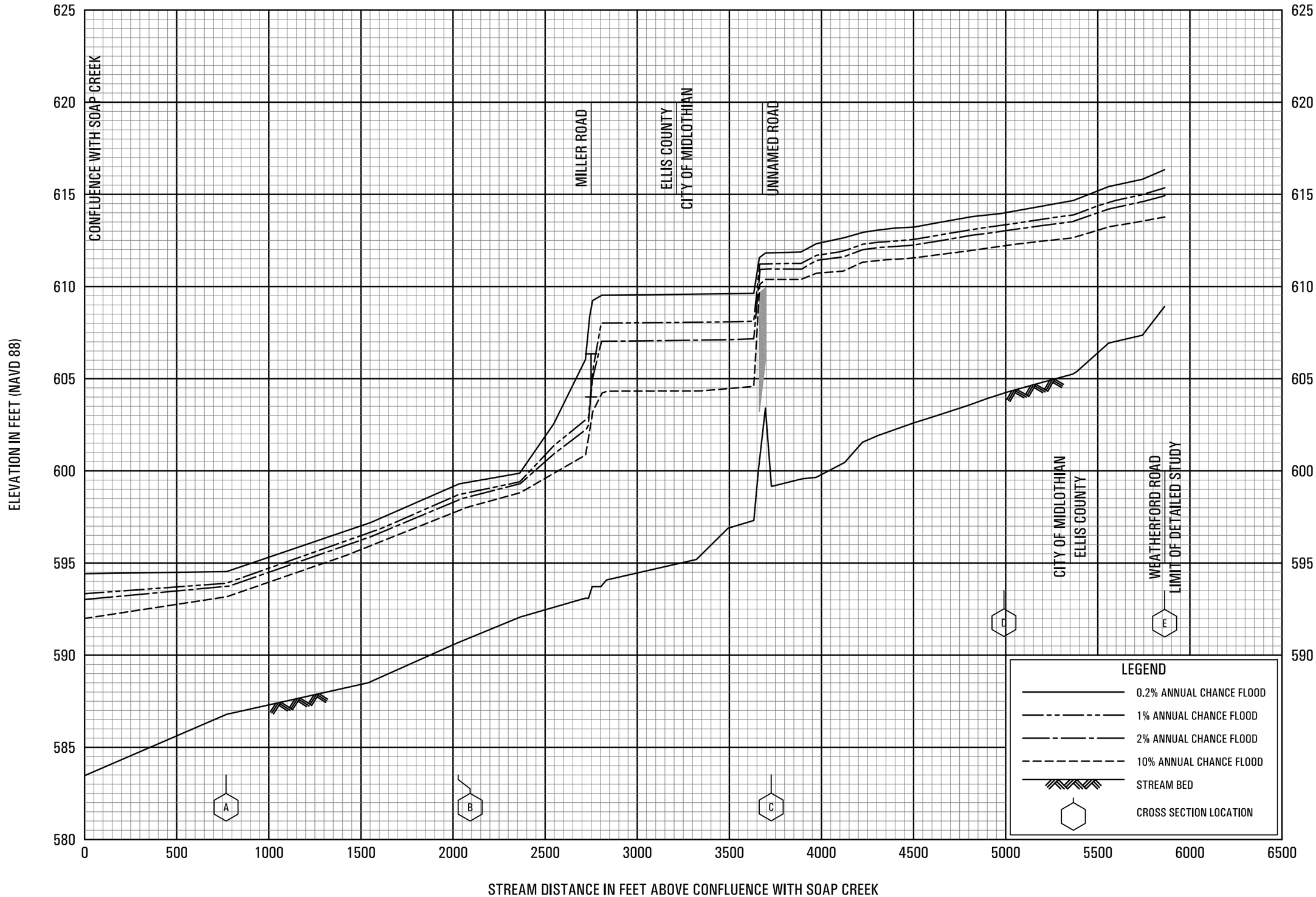


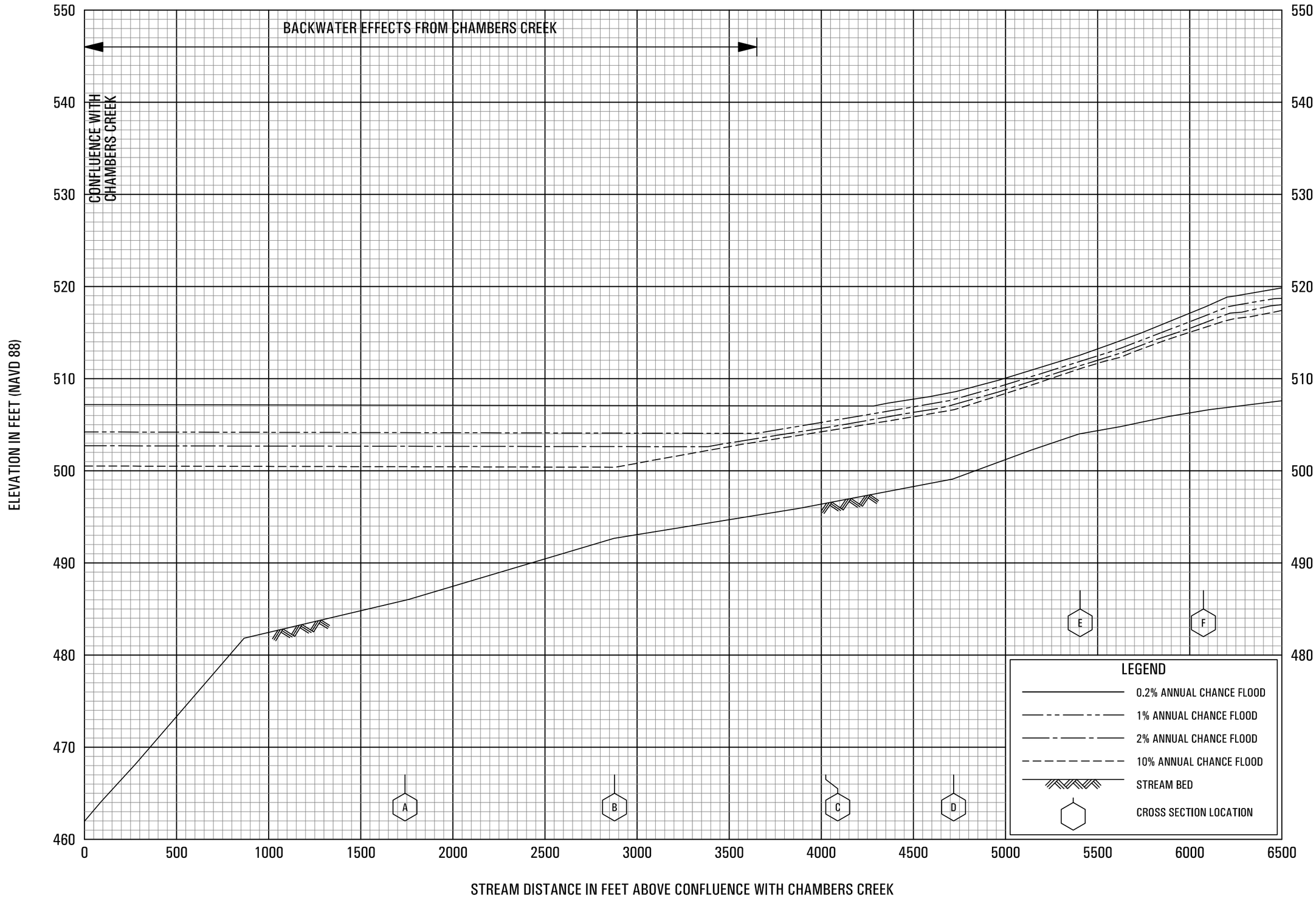
FLOOD PROFILES

EAST FORK TO SOAP CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



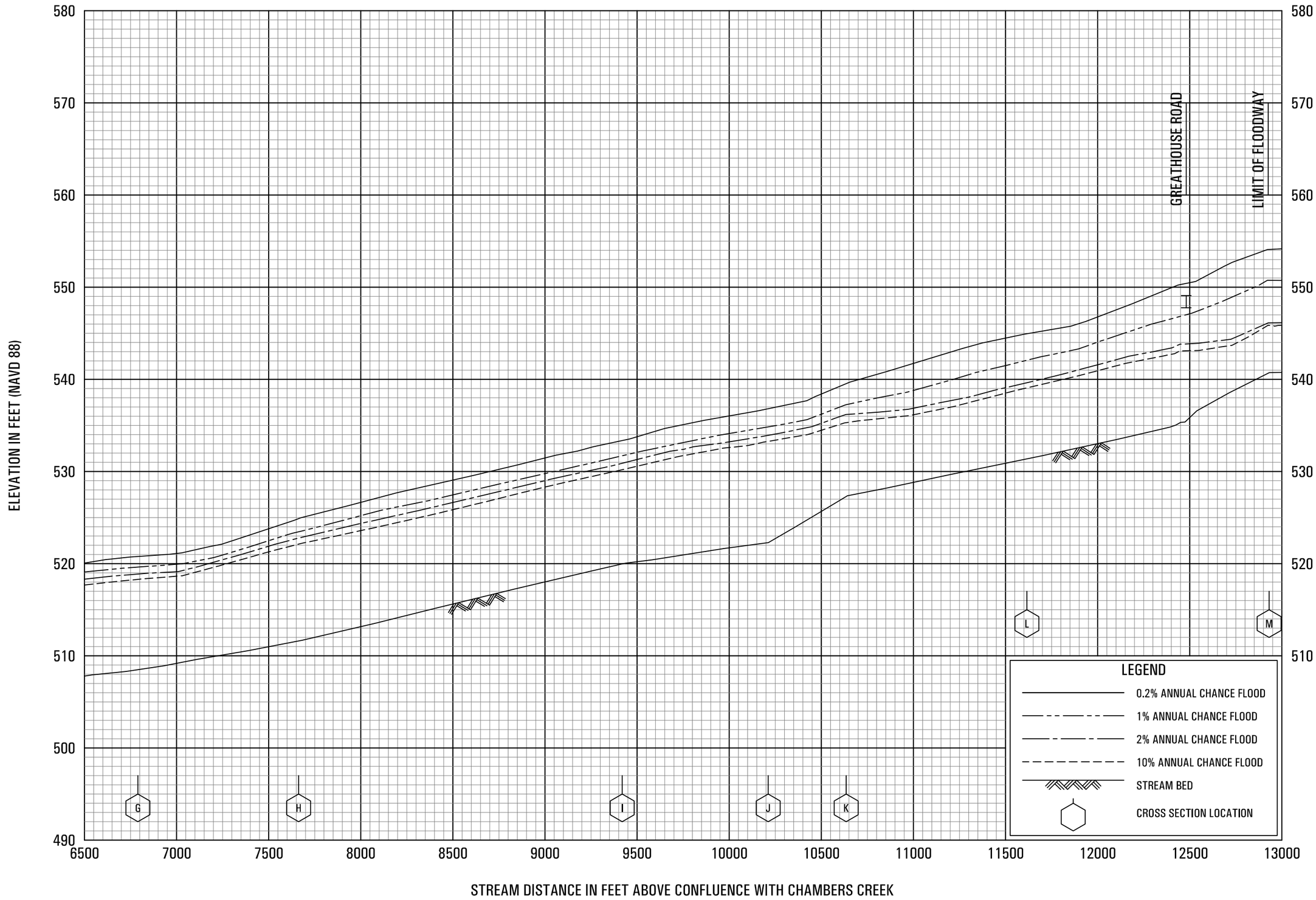
FLOOD PROFILES

GREATHOUSE BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

ELLIS COUNTY, TX

AND INCORPORATED AREAS



FLOOD PROFILES

GREATHOUSE BRANCH

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ELLIS COUNTY, TX

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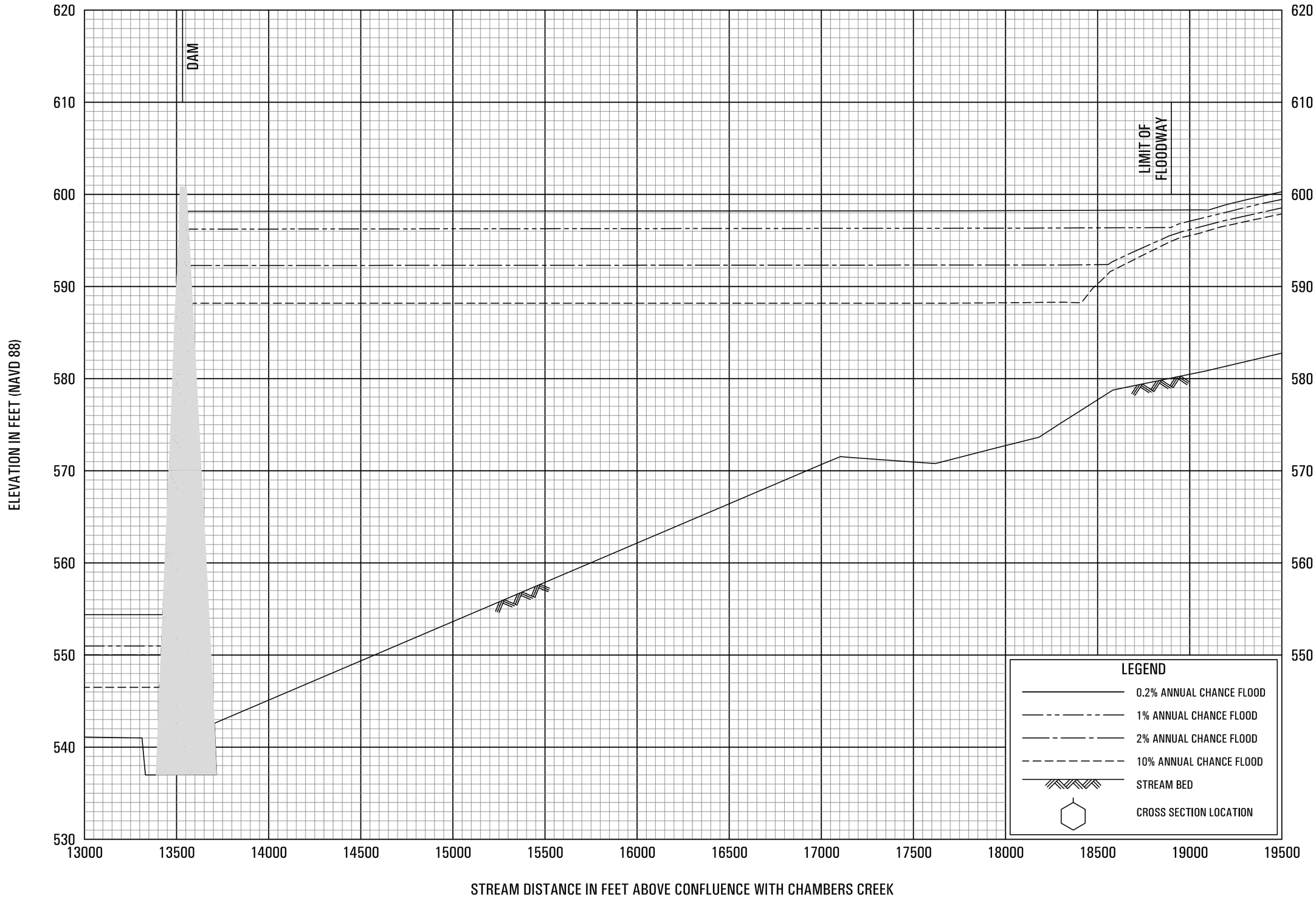

FLOOD PROFILES

GREATHOUSE BRANCH

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ELLIS COUNTY, TX

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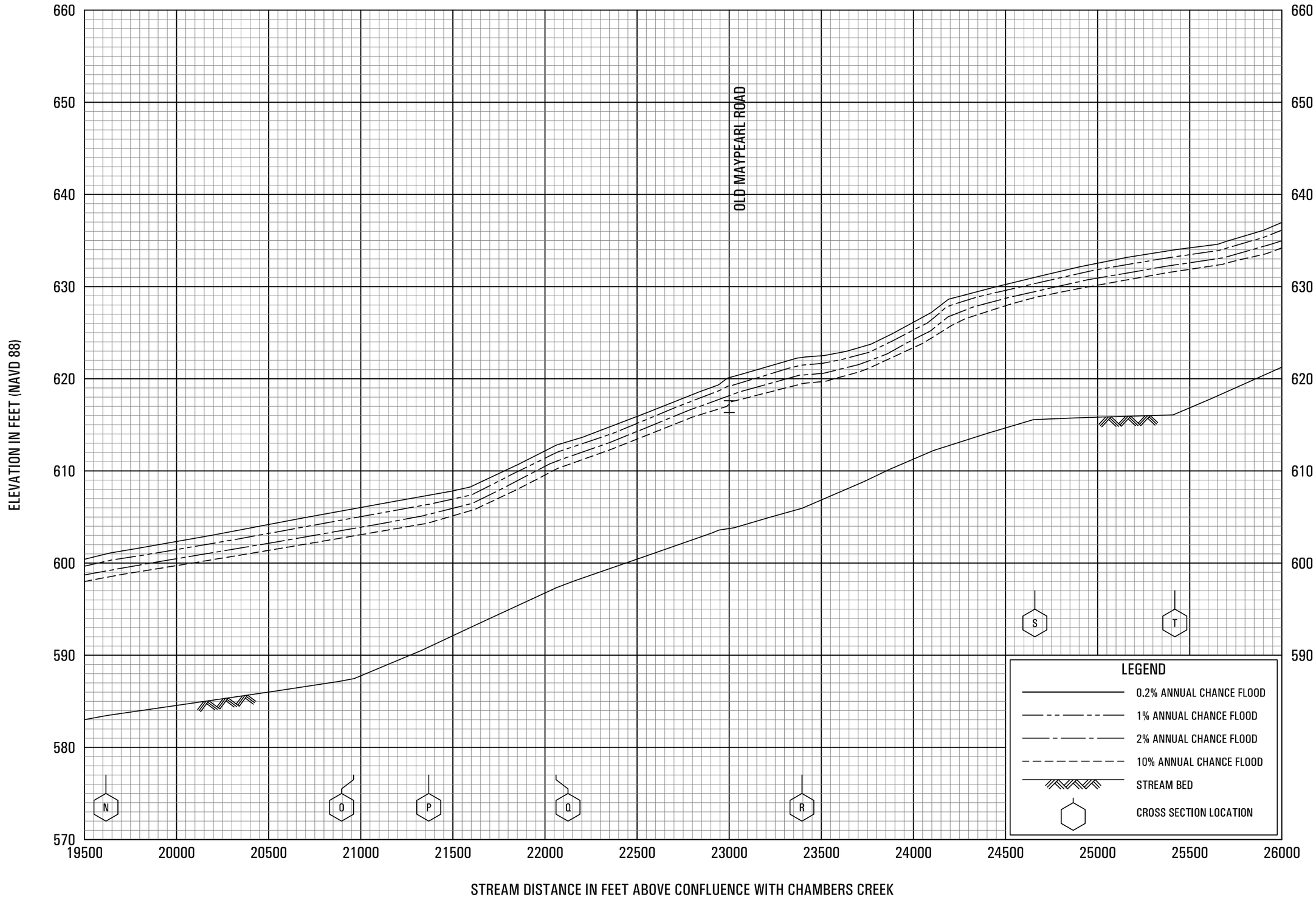

FLOOD PROFILES

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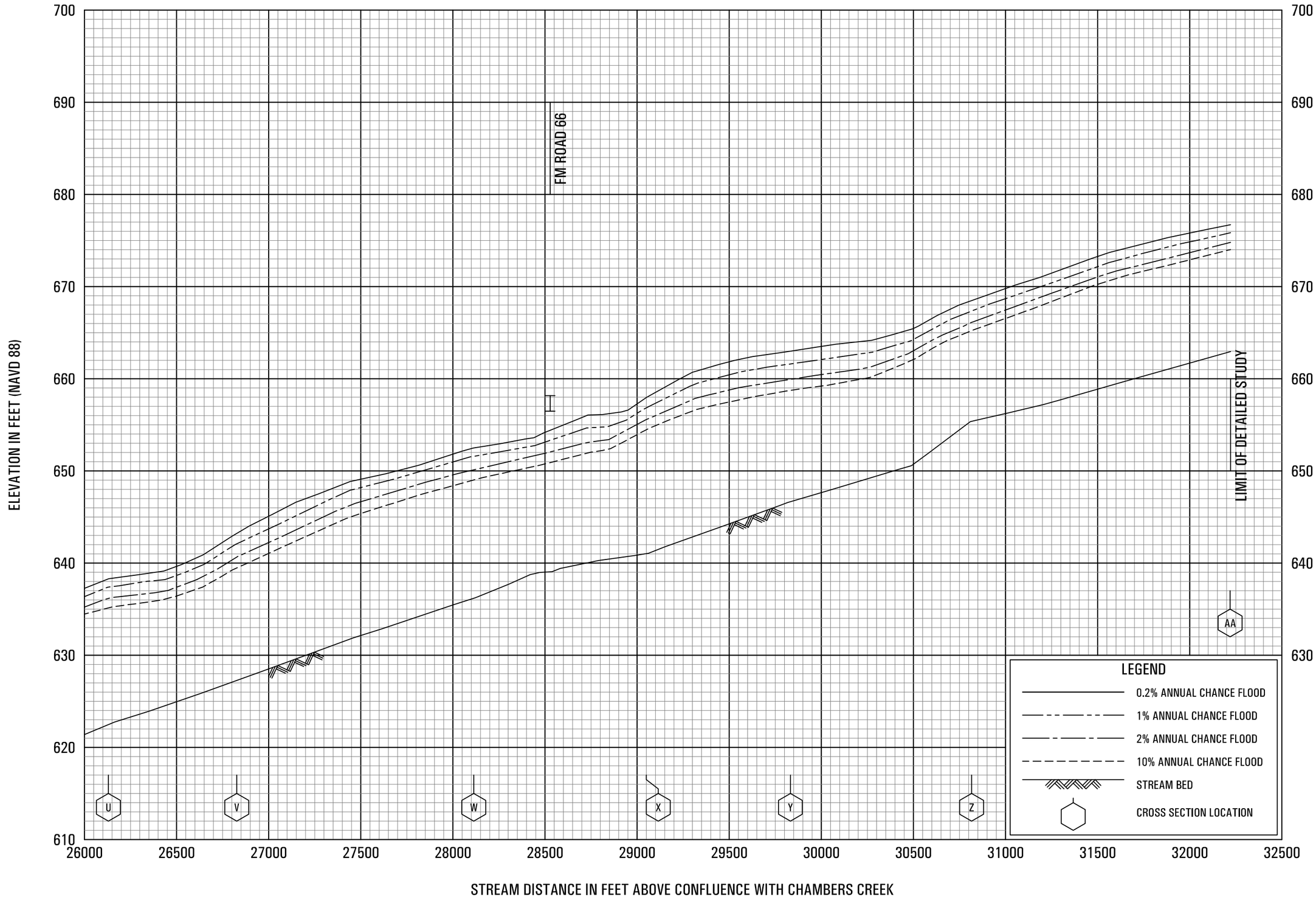

FLOOD PROFILES

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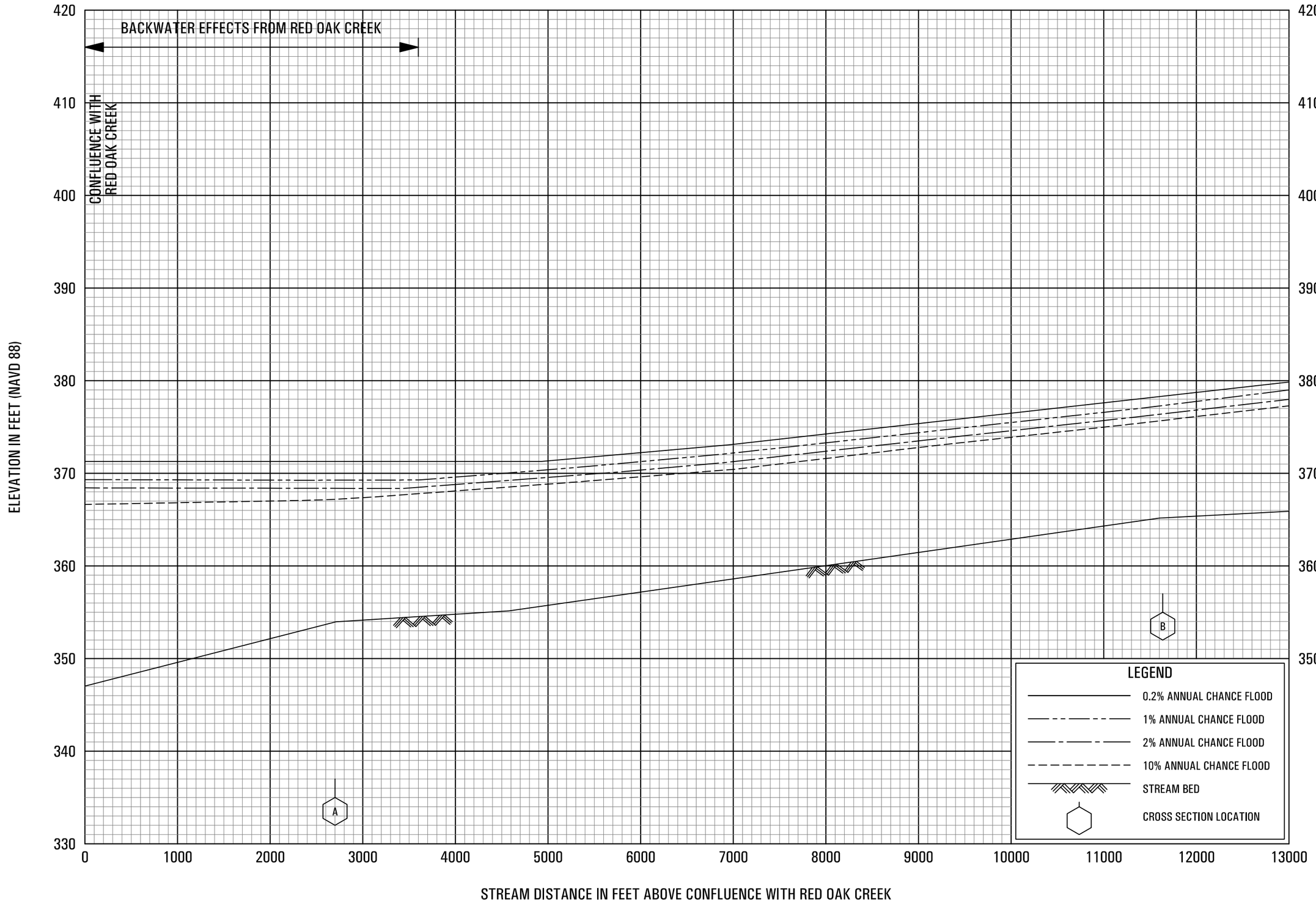

FLOOD PROFILES

GROVE CREEK

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ELLIS COUNTY, TX

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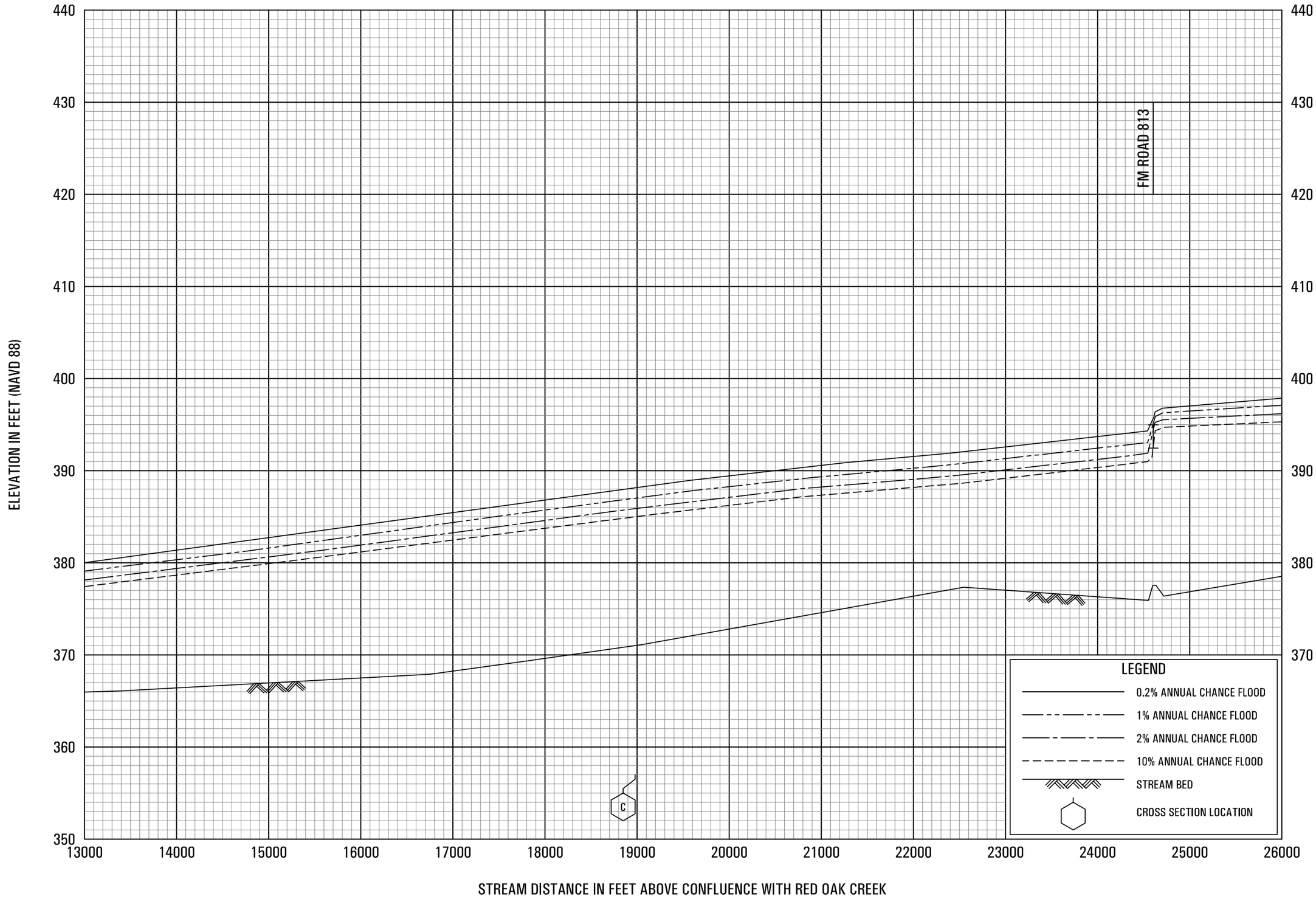

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GROVE CREEK

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ELLIS COUNTY, TX

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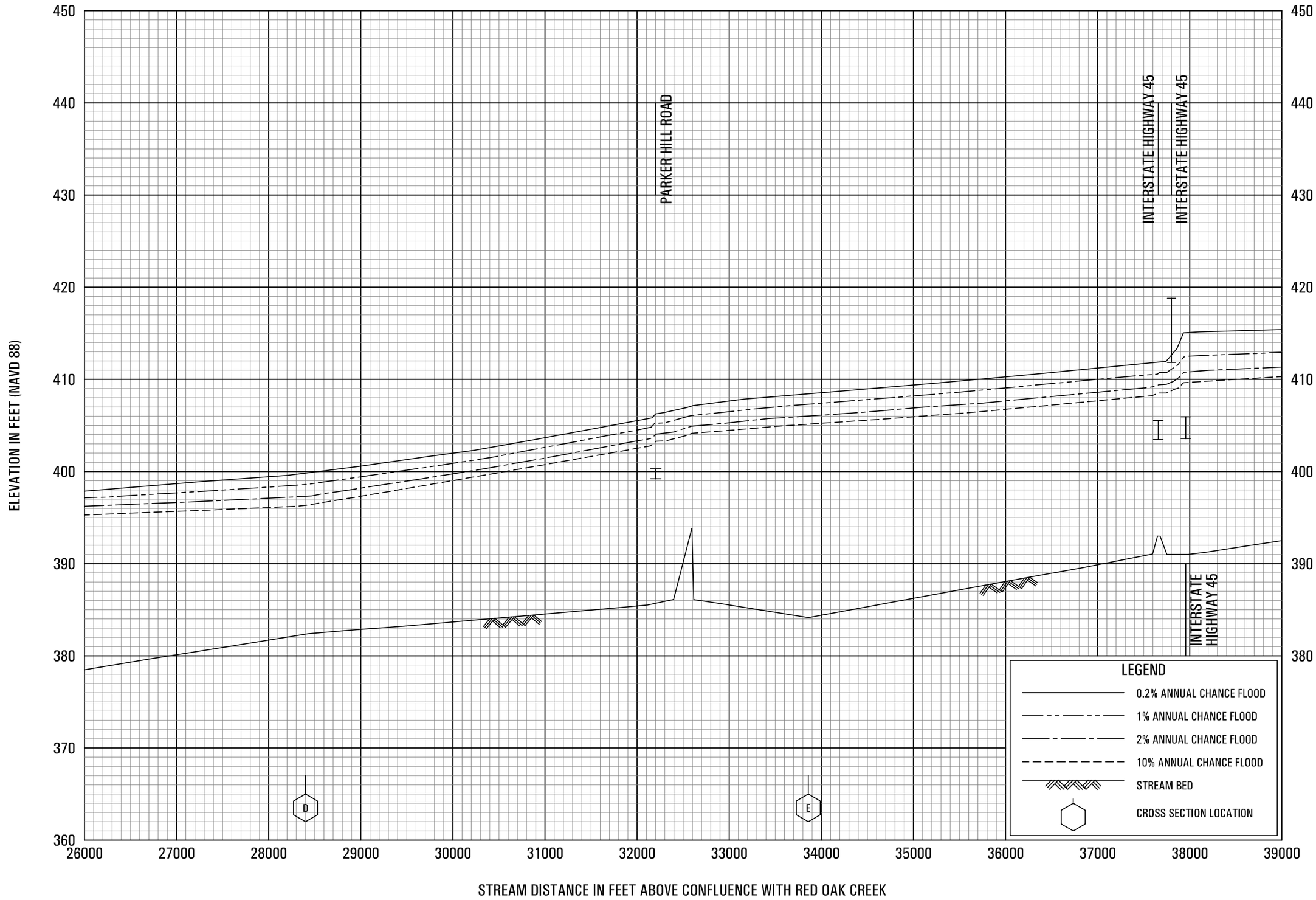

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GROVE CREEK

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ELLIS COUNTY, TX

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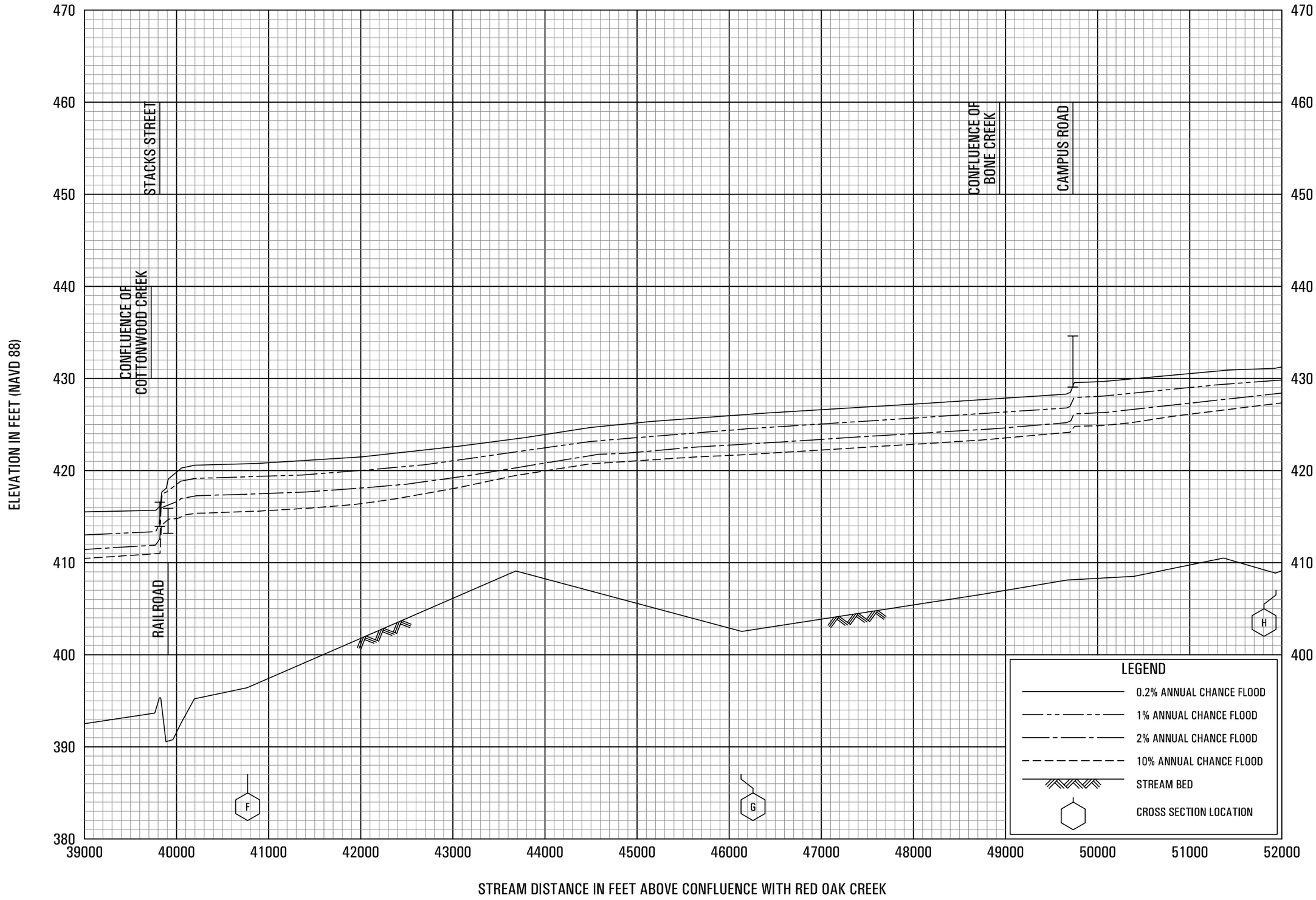

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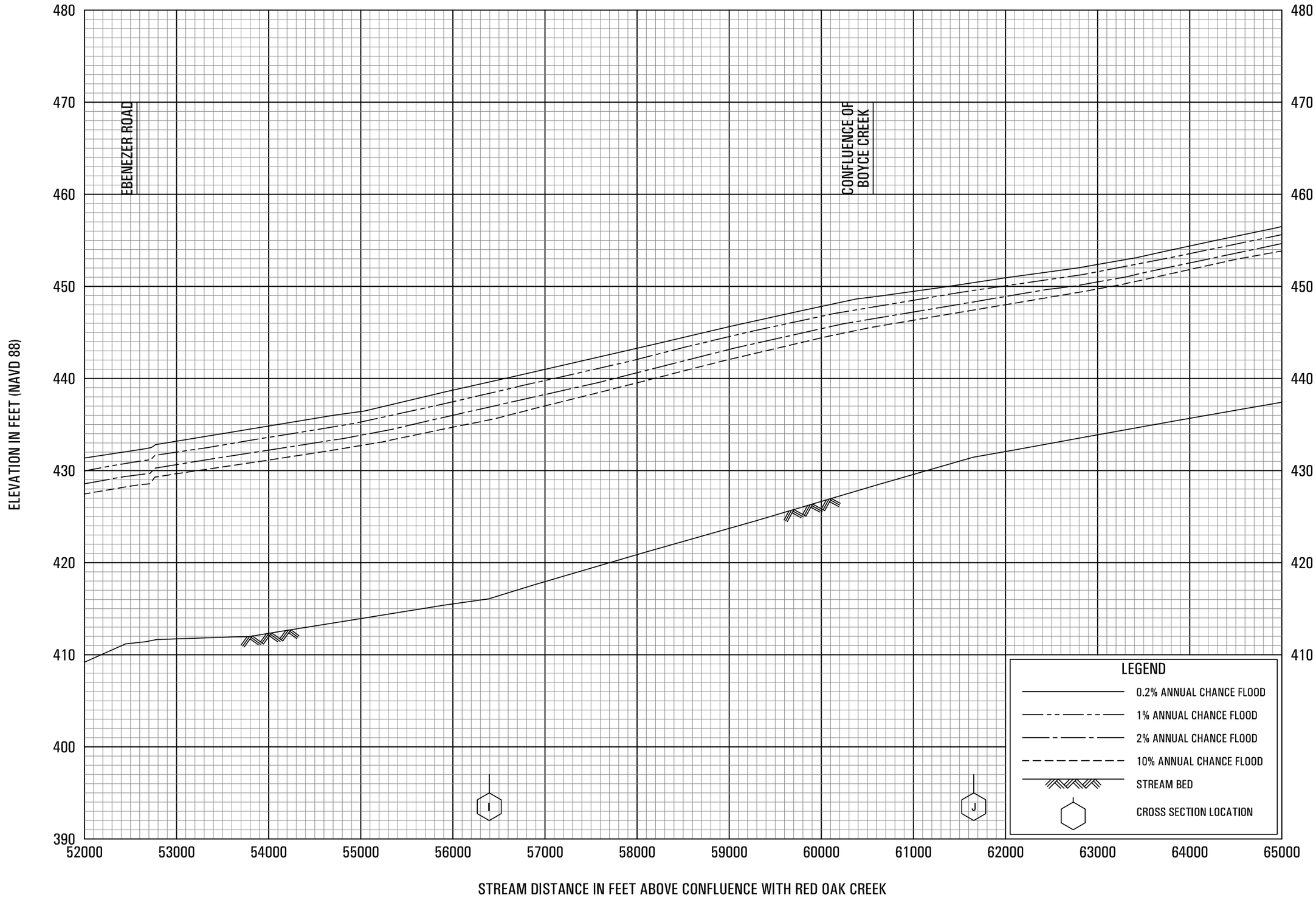

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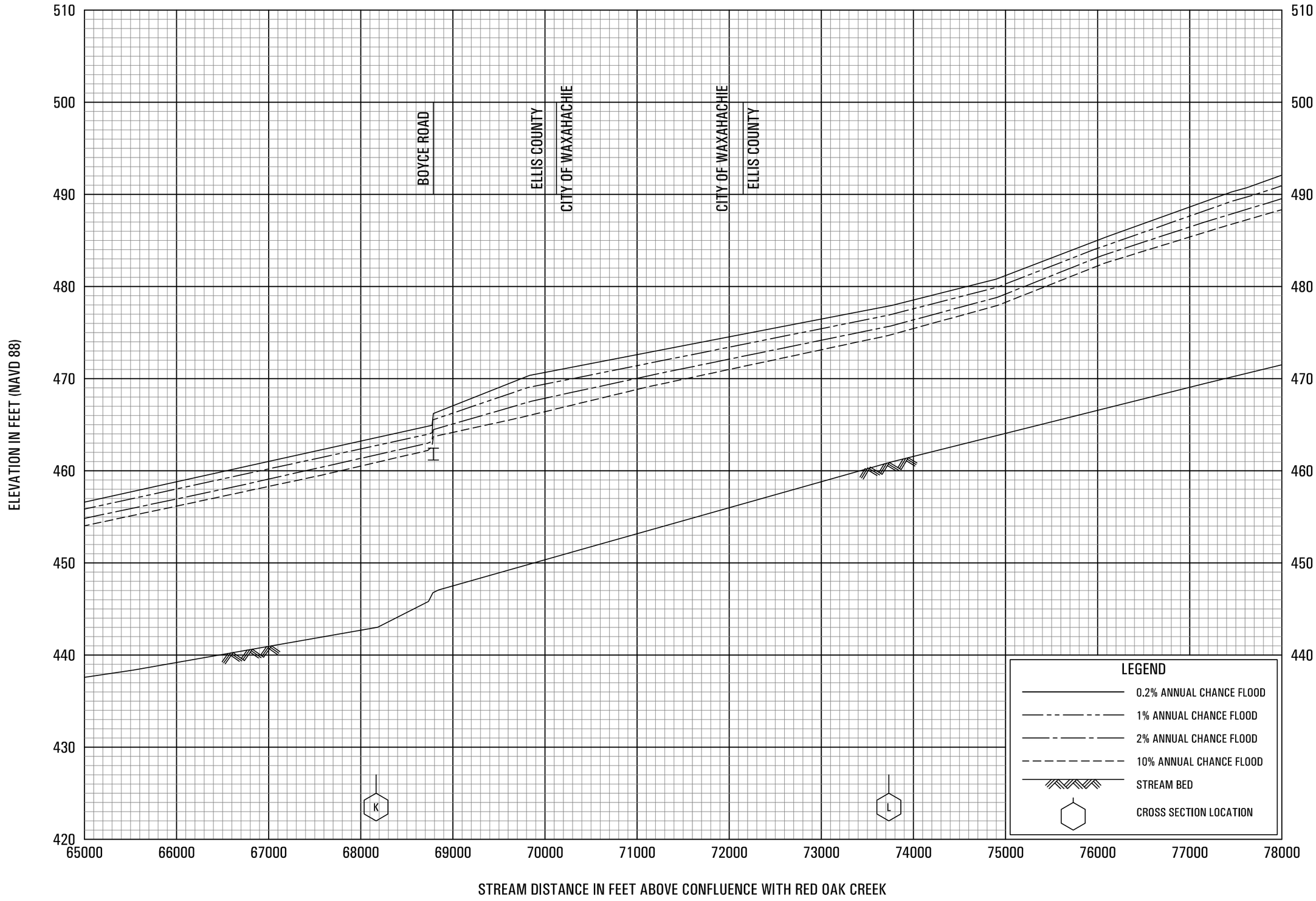

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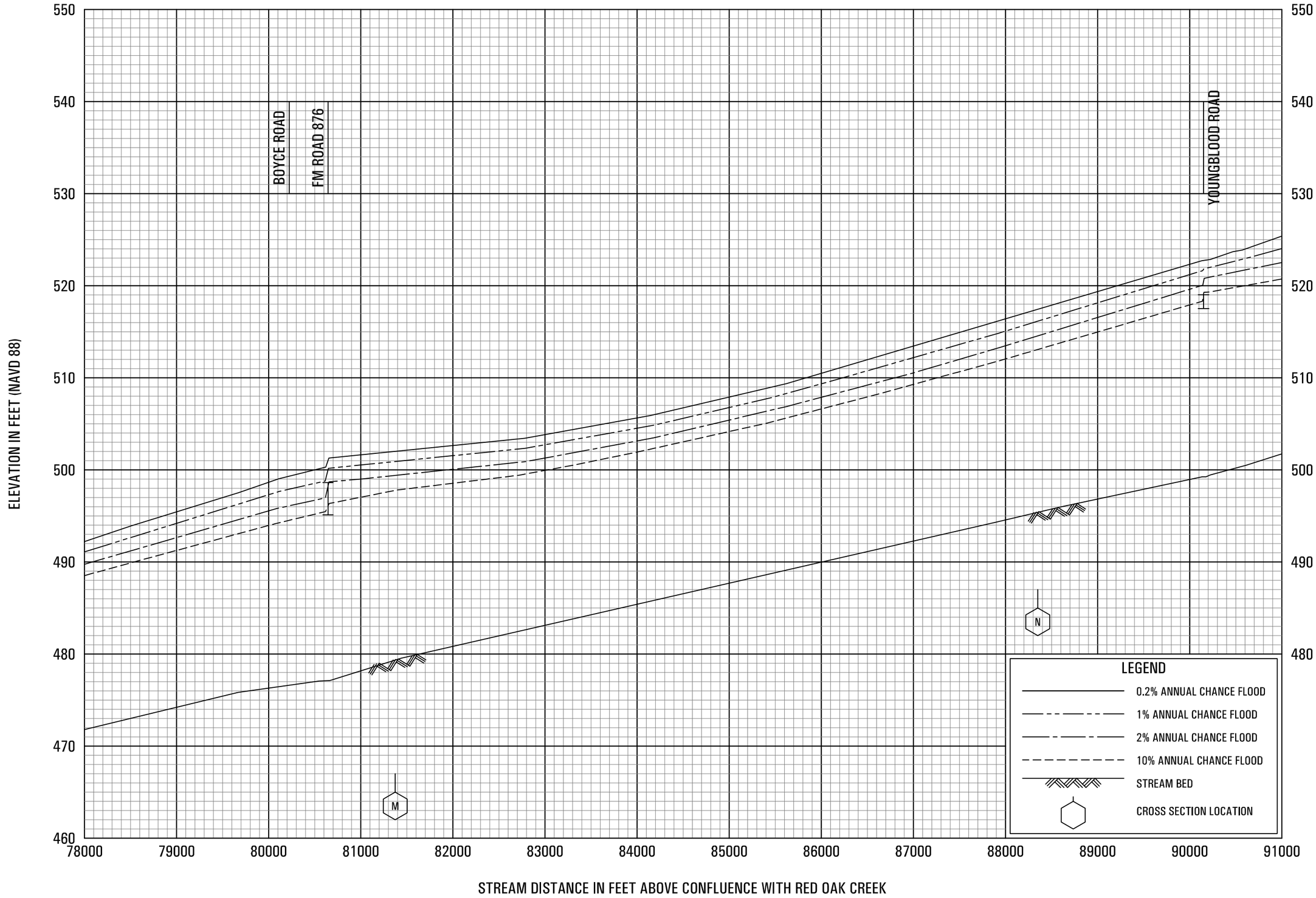

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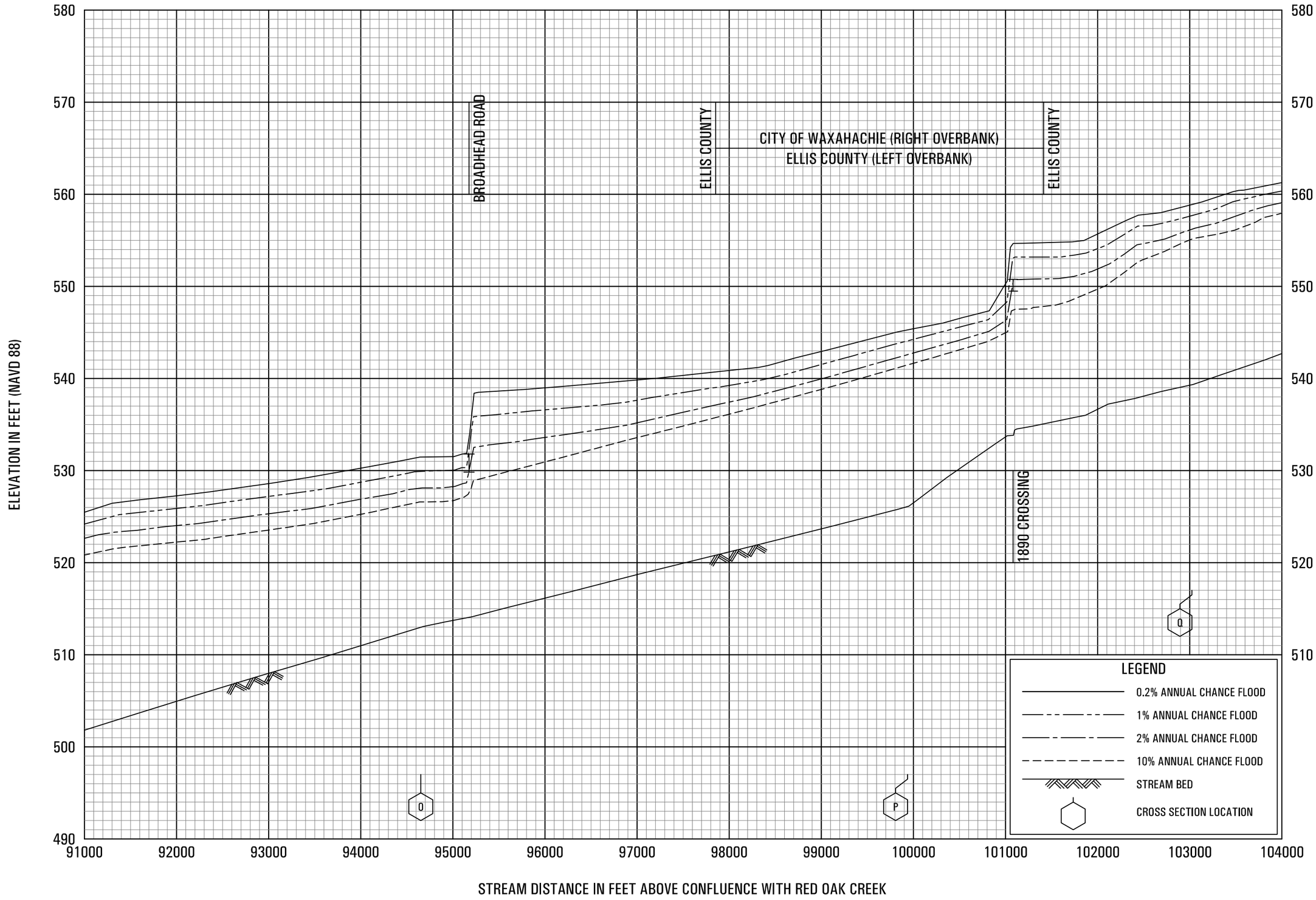

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GROVE CREEK

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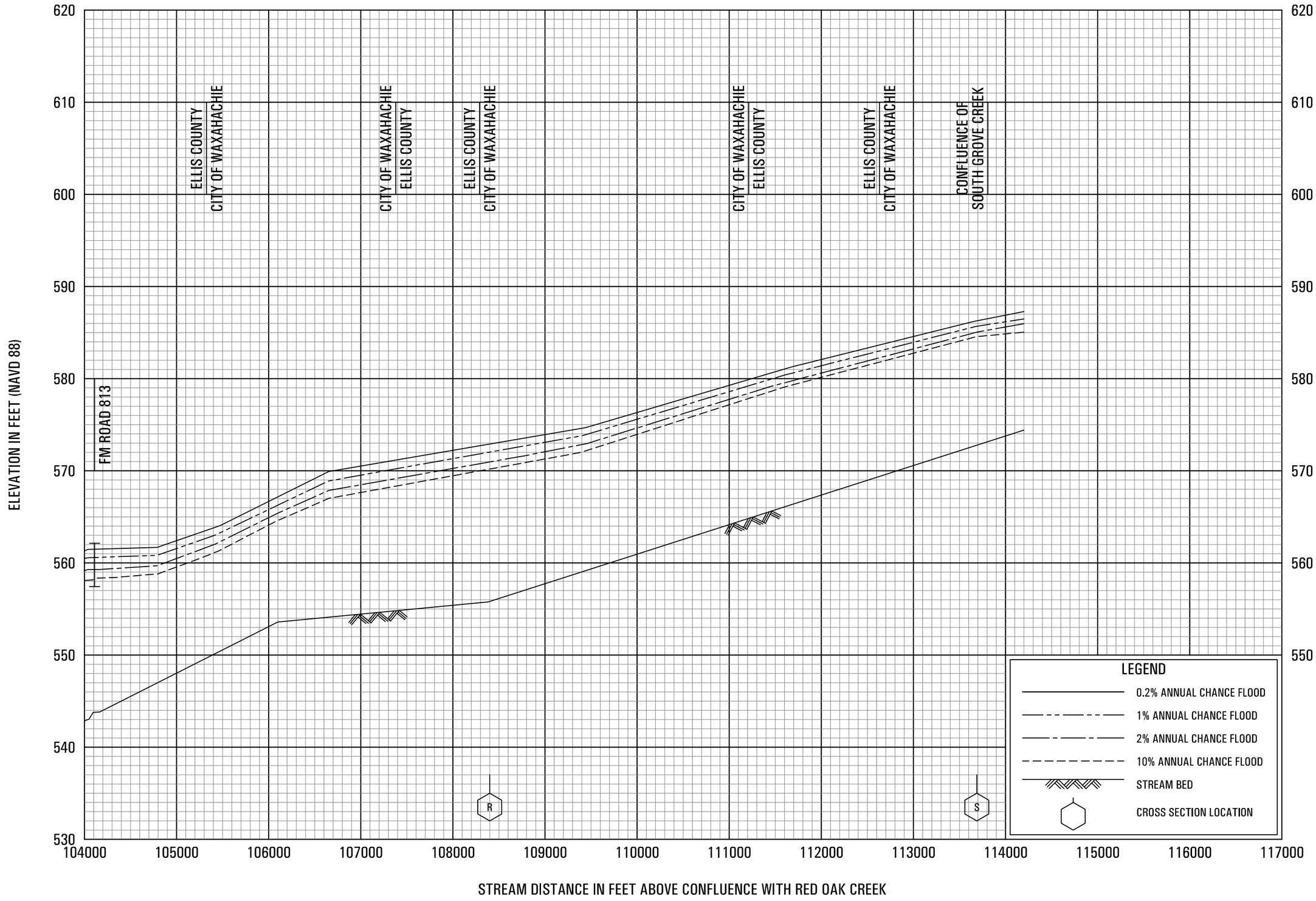

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GROVE CREEK

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ELLIS COUNTY, TX

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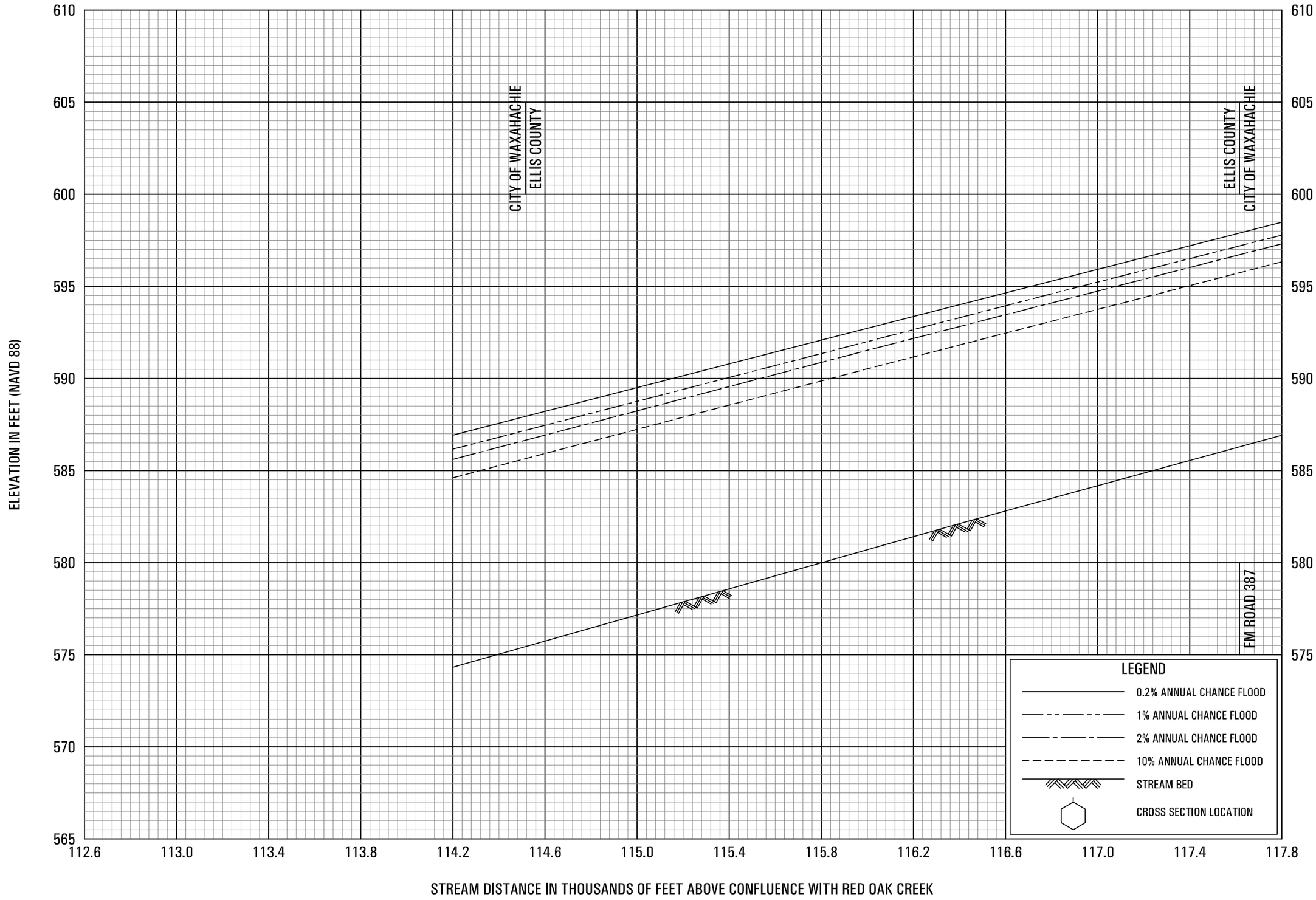

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GROVE CREEK

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ELLIS COUNTY, TX

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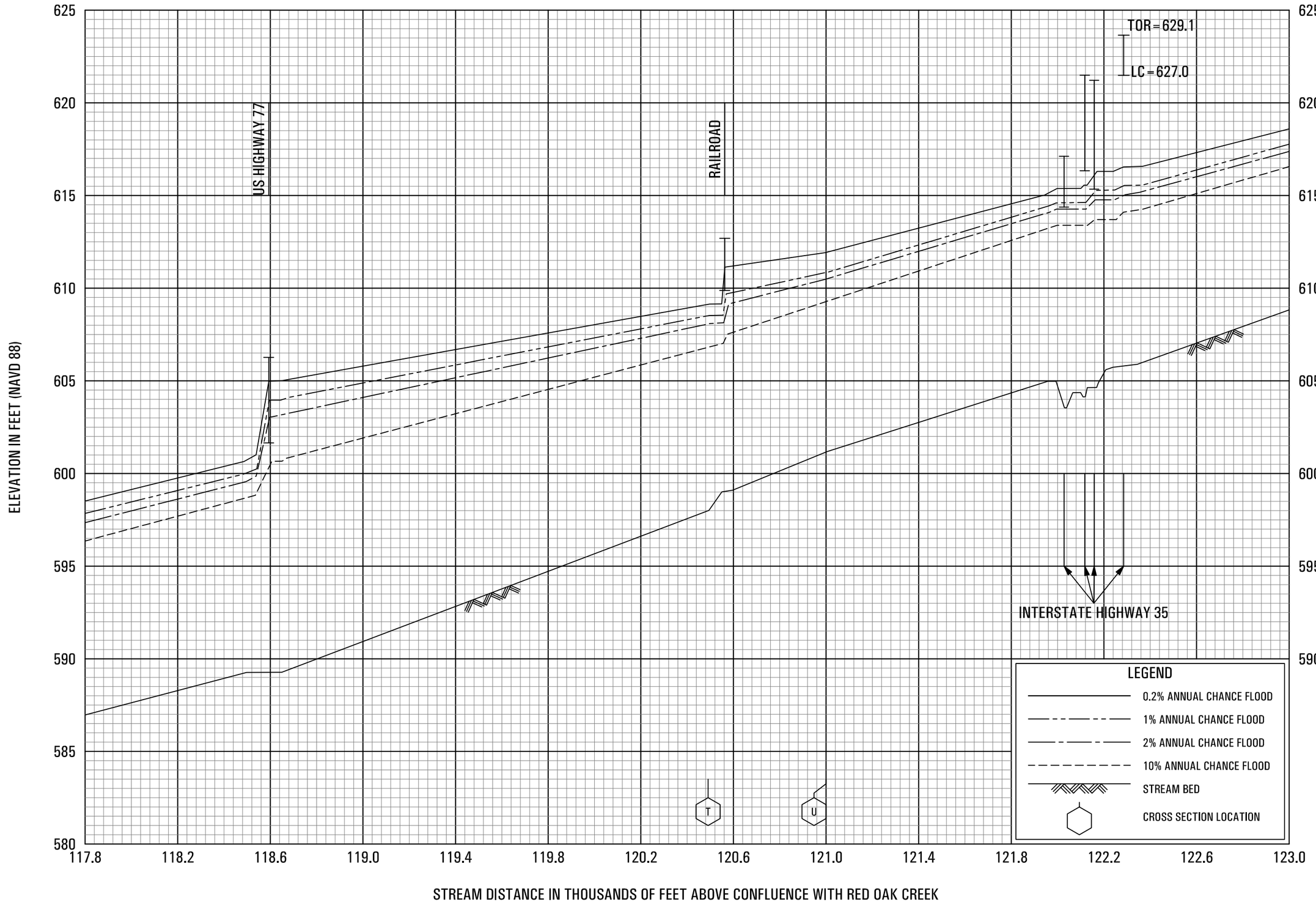

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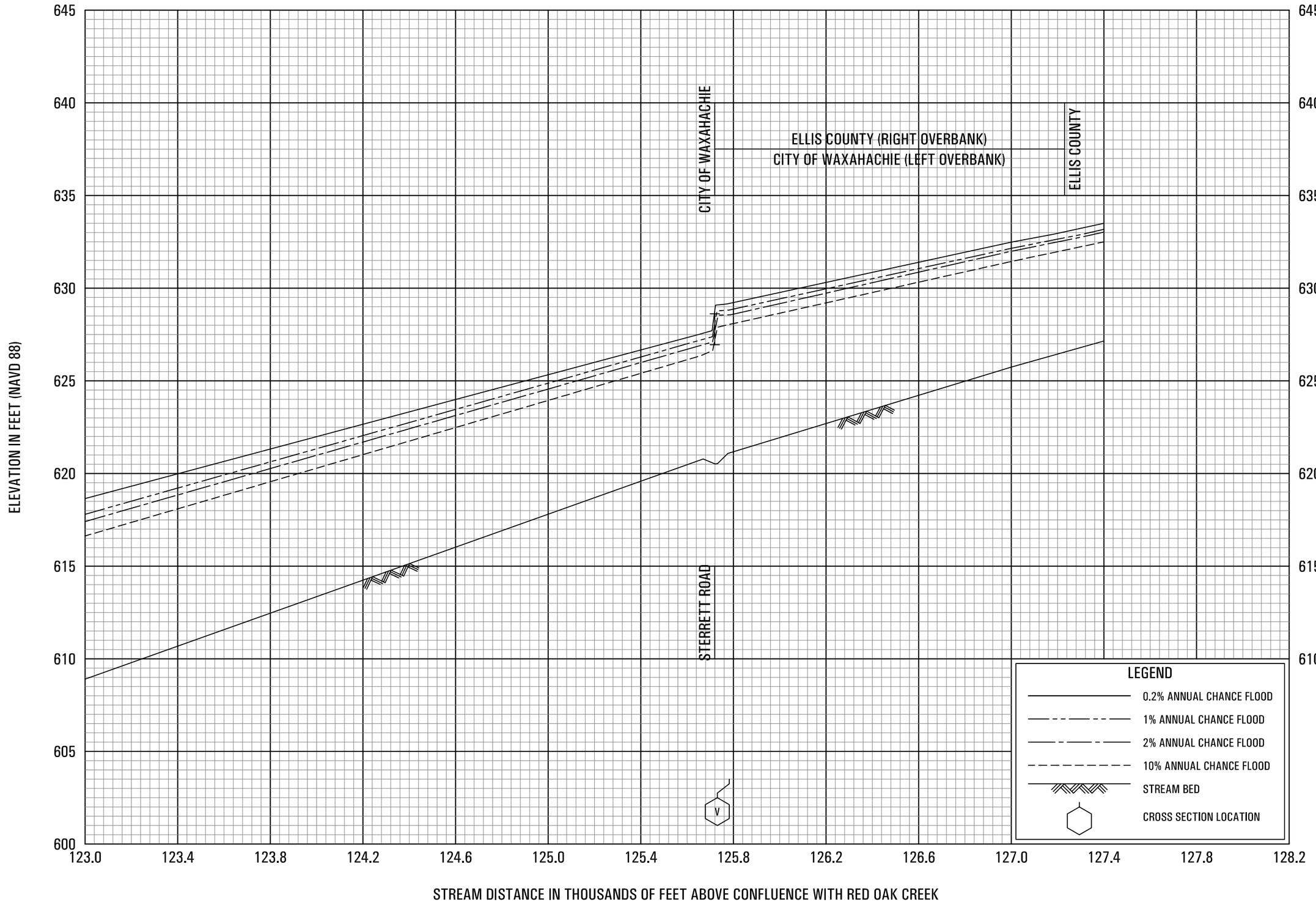

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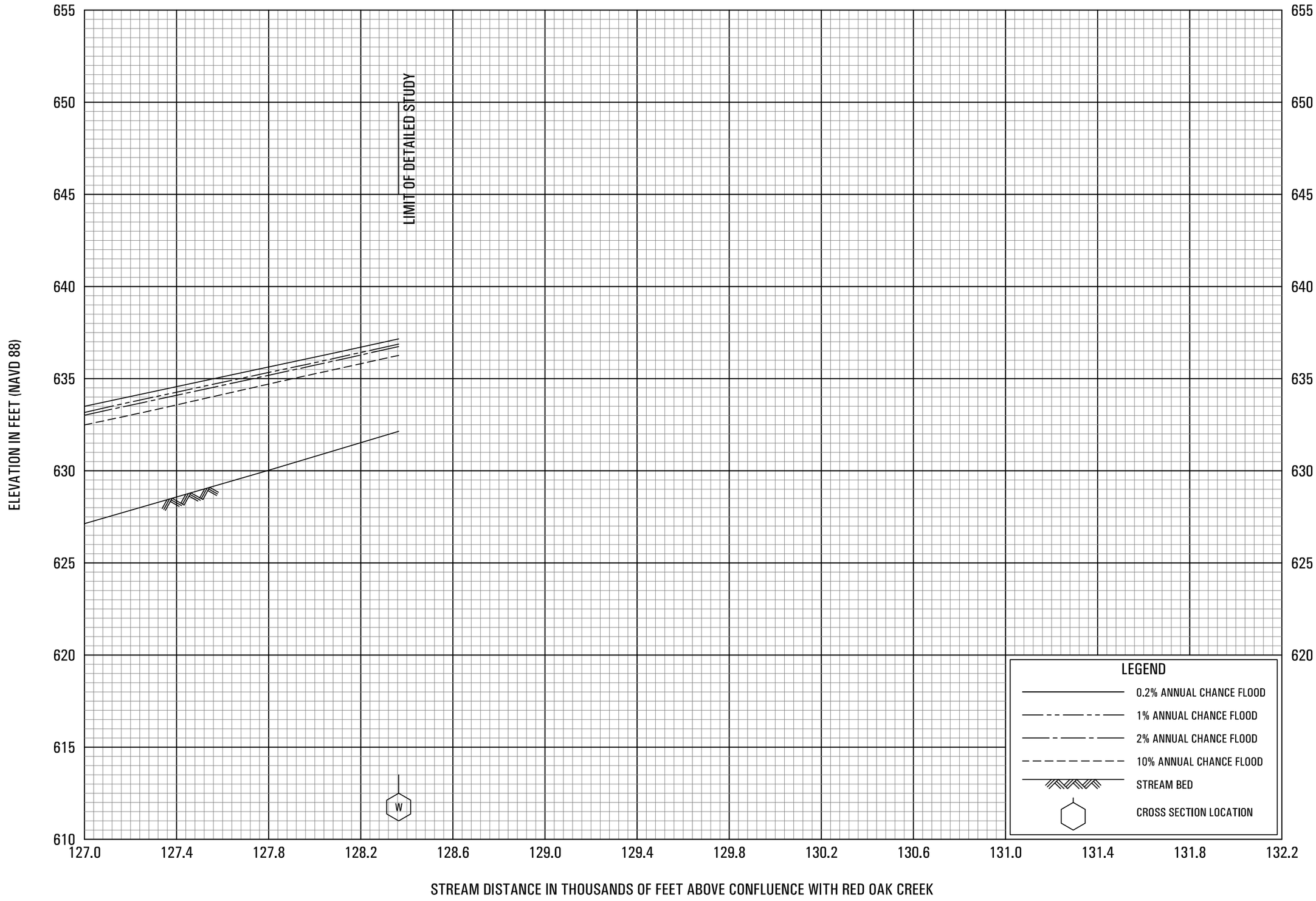

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