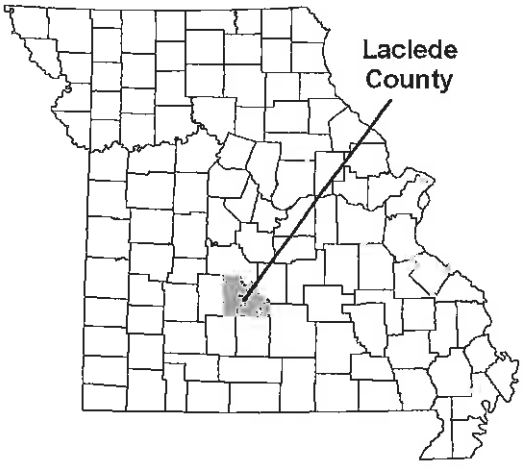
FLOOD INSURANCE STUDY

LACLEDE COUNTY, MISSOURI, AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
Conway, City of	290196
Evergreen, Village of	290991
Laclede County Unincorporated Areas	290811
Lebanon, City of	290197
*Phillipsburg, City of	290990
*Stoutland, City of	290980

*Non-Floodprone



September 29, 2010

FEDERAL EMERGENCY MANAGEMENT AGENCY

FLOOD INSURANCE STUDY NUMBER:
29105CV000A

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.

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

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X
C	X

Initial Countywide FIS Effective Date: September 29, 2010

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PUBLISHED SEPARATELY:

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FLOOD INSURANCE STUDY
LACLEDE COUNTY, MISSOURI AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This FIS revises and updates information on the existence and severity of flood hazards in the geographic area of Laclede County, Missouri, including the Cities of Conway, Lebanon, Phillipsburg (a non-flood prone area), Stoutland (a non-flood prone area); Village of Evergreen; and unincorporated areas of Laclede County (referred to collectively herein as Laclede 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. This information will also be used by Laclede County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

This current FIS revises and supersedes previous incorporated and unincorporated flood insurance information in Laclede County. This information will be used by the communities to update existing floodplain regulations as part of the regular phase of the NFIP. The information will also be used by local and regional planners to further promote sound land use and floodplain development.

As part of this revision, the format of the map panels has changed. Previously, flood-hazard information was shown on both the Flood Insurance Rate Map (FIRM), Flood Boundary and Floodway Map (FBFM). In the new format, all base flood elevations, cross sections, zone designations, and floodplain and floodway boundary delineations are shown on the FIRM resulting with the elimination of the FBFM. Some of the flood insurance zone designations were changed to reflect the new format. Areas previously shown as numbered Zone A were changed to Zone AE. Areas previously shown as Zone B were changed Zone X (shaded). Areas previously shown as Zone C were changed to Zone X (un-shaded). In addition, all Flood Insurance Zone Data Tables were removed from the FIS report and all zone designations and reach determinations were removed form the profile panels.

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

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

1.2 Authority and Acknowledgments

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

Two previous studies are incorporated into this current FIS. The first study was from the Laclede County FIS dated October 17, 1984 (Reference 1) and the second study was from the City of Lebanon FIS dated December, 1981 (Reference 2).

From the Laclede County FIS, hydrologic and hydraulic analyses for this study were performed by Black & Veatch, Consulting Engineers (the Study Contractor), for the Federal Emergency Management Agency (FEMA), under Contract No. EMW-C-0051. This study was completed in December 1980.

From the City of Lebanon FIS, the hydrologic and hydraulic analyses for this study were performed by Black & Veatch, Consulting Engineers for the Federal Emergency Management Agency under Contract No. EMW-C-0051. This study was completed in December 1980.

For this countywide FIS, new hydrologic and hydraulic analyses for this study were performed by the Missouri State Emergency Management Agency (SEMA), and AMEC Earth and Environmental, Inc as contracted by (SEMA), for the Federal Emergency Management Agency (FEMA), under Interagency Agreement No. EMK-2006-CA-6012 and EMK-2007-CA-7005. This study was completed in June 2007.

Planimetric basemap information shown on all FIRM panels was derived for the National Agriculture Imagery Program (NAIP) 2006, 2 meter ortho imagery. These base map files were provided in digital format by the Missouri Spatial Data Information Service (MSDIS). Users should be aware that minor adjustments may have been made to specific base map features (Reference 12).

The coordinate system used for the production of this FIRM is, North American Datum of 1983 (NAD 83) State Plane Missouri Central 2402 feet. Corner coordinates shown on the FIRM are in latitude and longitude referenced to the UTM projection, NAD 83 Zone 15N.

1.3 Coordination

1.3.1 Pre-Countywide Study

From the Laclede County FIS, streams requiring detailed study were identified at a meeting attended by representatives of the Study Contractor, FEMA, and Laclede County in June 1979. Results of the hydrologic analyses were coordinated with the USGS and the USACE. Plans for hydraulic structures were coordinated with the Missouri Highway and Transportation Department.

On June 3, 1981, the procedure and results of this study were reviewed at a meeting attended by representatives of the Study Contractor, FEMA, and county officials.

On March 25, 1983, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

From the City of Lebanon FIS, streams requiring detailed study were identified at a meeting attended by representatives of the study contractor, the Federal Emergency Management Agency and representatives of the City of Lebanon in June 1979. Results of the hydrologic analyses were coordinated with the USGS and the USACE. Plans for hydraulic structures were coordinated with the Missouri Highway and Transportation Department.

On June 2, 1981, a meeting attended by representatives of the city, the Federal Emergency Management Agency and the study contractor was held to review study procedures and results.

On June 2, 1981, the preliminary study report was reviewed at the final meeting attended by representatives of the study contractor, Federal Emergency Management Agency, and community officials.

1.3.2 Countywide Study

For this current Laclede County and Incorporated Areas FIS, the initial Consultation Coordination Officer (CCO) meeting was held on February 22, 2007, and attended by representatives of (SEMA), the City of Lebanon, Laclede County, and AMEC Earth and Environmental, Inc.

The results of the study were reviewed at the final CCO meeting held on February 18, 2009, and attended by representatives of the City of Lebanon, Laclede County, SEMA, FEMA, and AMEC. All problems raised at that meeting will be addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

2.1.1 Pre-Countywide Study

The Scope of Study for the Laclede County FIS covers the unincorporated areas of Laclede County, Missouri.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through December 1985. The scope and methods of study were proposed to and agreed upon by FEMA and Laclede County.

The scope of study for the City of Lebanon FIS, covers the incorporated area of the City of Lebanon, Laclede County, Missouri, and includes all significant flooding sources within the corporate limits of the city as of 1981. The streams studied by detailed methods are shown in Table 1. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction for the next five years through December 1985.

2.1.2 Countywide Study

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

For this study, AMEC performed redelineation on those areas previously studied by detailed methods which were previously selected with priority given to all known flood hazards and areas of projected development or proposed construction.

Approximate studies were performed on previous FIRM zone A streams and all streams with a drainage area of one square mile or greater as agreed upon by FEMA and Laclede County.

During the review process, it was determined that Dry Auglaize Creek above the Intersection of Interstate 44 and Azure Hills Branch had drainage areas less than one square mile.

Approximate analyses were used to study the rest of Pulaski County, as it was determined that those areas have low development potential or minimal flood hazards. The scope and methods of study were proposed to and agreed upon by FEMA. Table 2 lists the streams studied using approximate methods.

Table 1: Streams Studied by Approximate Methods

Abbott Hollow	Hay Branch	Pine Creek
Atchley Branch*	Hickory Hollow	Pine Hollow
Azure Hills Branch*	High Hollow	Prairie Branch
Bank Branch	Highland Park Branch*	Prairie Creek A
Barn River	Holman Branch*	Prairie Creek B
Beacon Branch*	Holman Hollow	Prairie Lake Hollow
Bear Creek*	Horseshoe Branch*	Radio Tower Branch*
Bee Branch	Hufft Hollow	Richey Hollow
Bench Hollow	Joe Branch	Rock Hollow
Bennett Spring Branch	Jones Branch*	Roubidoux Creek
Brookshire Hollow	Jones Creek	Salem Springs Creek
Brush Creek	Jordan Creek	Sandy Creek
Brushy Creek	Jumpoff Hollow	Selvage Hollow
Burnt Cabin Hollow	Kuhn Creek	Sharpe Hollow
Cave Creek	Liberty Branch*	Similin Creek
Cobb Creek	Little Cobb Creek	Smith Branch
Cole Creek	Little Danceyard Creek	South Fork Brush Creek
Coon Hollow	Mash Hollow	South Fork Crooked Creek
Core Creek	Mill Creek A	South Fork North Cobb Creek
Cottonwood Creek	Mill Creek B	Spring Hollow
Danceyard Creek	Mill Hollow	Spud Hollow
Davis Creek	Morgan Hollow	Steins Creek
Dog Hollow	Mountain Creek	Sweet Hollow
Dogwood Hollow	Murrell Hollow	Tom Hollow
Doolittle Creek	Nelson Creek	Walker Hollow
Dousinbury Creek	Niangua River	Whitson Branch
Dry Auglaize Creek*	Norris Creek	Wilcox Hollow
Dry Branch	North Cobb Creek*	Wildcat Hollow
Dry Hollow	North Fork Crooked Creek	Williamson Branch
Duck Creek	Osage Fork Gasconade River	Wolf Hollow
Flagmire Hollow	Panther Creek	Wood Creek
Gasconade River	Parks Creek	Woodward Hollow
Goodwin Hollow*	Pender Hollow	Woolsey Creek
Hackbill Hollow		

*** Portions of the stream shown in Table 2 studied using detailed methods**

2.2 Community Description

Laclede County Unincorporated Areas

Laclede County is located in the Ozarks area of south-central Missouri and is bordered by Texas and Pulaski Counties on the east, Camden County on the north, Dallas County on the west, and Webster and Wright counties on the south. Lebanon, the county seat, is located in the central portion of Laclede County. The area contained within the county is 768 square miles and the 2000 population is 32, 513 persons (Reference 3).

The climate is typical of south-central Missouri with wide fluctuations in temperature, precipitation, and humidity occurring on a day-to-day basis. July is the warmest month, with a normal monthly temperature of 77.2 degrees Fahrenheit (F.) and January is the coldest, with a normal monthly temperature of 33.4 degrees F. at Lebanon. Average annual precipitation is 40.4 inches at Lebanon. Although large amounts of rainfall are recorded for all seasons, major floods have resulted from high intensity, short duration events associated with late spring to early fall thunderstorms (Reference 4).

Laclede County is situated along the divided between the Osage River basin and the Gasconade River basin. The City of Lebanon is located on this dividing range. The eastern and southeastern portions of the county are drained by the Gasconade River. Bear Creek, North Cobb Creek, Highland Park Branch, and Beacon Branch are in that drainage area. The west and northwest portions of the county drain to the Osage River. Each of the other streams that were studied is in that drainage area (Reference 5).

Most of the unincorporated areas of the county are either devoted to agriculture or timberland. The eastern part of the county makes up the Mark Twin National Forest. Development is gradually taking place along the outskirts of Lebanon along the streams that were studied.

City of Lebanon

The City of Lebanon is located in the south-central part of Missouri in central Laclede County and is surrounded by unincorporated areas of Laclede County. The city was established around 1850 and originally was called Old Town. When the railroad was built about 1868 about a mile outside of town the city moved out to the present location of Lebanon along the railroad (Reference 6). The city limits have recently been expanded to encompass additional areas on each side of the city. Lebanon is situated 70 miles southwest of Jefferson City and 50 miles northeast of Springfield. The area contained within the corporate boundary is 13.66 square miles and the 2000 population 12, 155 persons (Reference 3).

2.3 Principal Flood Problems

Because of the small drainage areas contributing to all of these creeks, floods are usually the result of thunderstorms with high intensities and short durations. Flooding is mainly the result of small channels that cannot handle the large discharge of higher frequency floods. The available rainfall information for the City of Lebanon indicates that flooding may occur during any season of the year. The dates of past flooding are not available. According to issues of the "Climatological Data" annual summaries for Missouri during the years 1919-1979, 24-hour rainfalls in excess of 4.0 inches or precipitation occurred on June 24, 1921, June 9, 1928, December 24, 1932, and May 18, 1943 (Reference 2).

There are no known factors that aggravate flood problems.

2.4 Flood Protection Measures

Neither flood protection structures nor floodplain management measures have been constructed or implemented in the drainage basins contributing to streams affecting Laclede County, Missouri. There are no current plans for future flood protection projects in the area.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded 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-annual-chance-flood, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long time average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, 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

3.1.1 Pre-Countywide Analysis

Laclede County and the City of Lebanon

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

Flood discharges for each stream were based on the USGS Open-file Report 1974, "Technique for Estimating the Magnitude and Frequency of Missouri Floods," which is a regional method based on regression analysis (Reference 7). This method relates drainage area and channel slope to peak discharge by empirical equations. Discharge for the 500-year flood was determined by straight-line extrapolation of a log-probability graph of flood discharges for frequencies up to 100 years.

Peak discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance-floods of each flooding source studied in detail in the county are shown in Table 5.

Table 2: Summary of Discharges

Flooding Source and Location	Drainage Area (Sq Miles)	10-Percent-Annual-Chance (CFS)	2-Percent-Annual-Chance (CFS)	1-Percent-Annual-Chance (CFS)	0.2-Percent-Annual-Chance (CFS)
Atchley Branch					
At mouth [1]	1.5	660	990	1,120	1,480
Azure Hills Branch					
At mouth [1]	1.2	560	840	950	1,250
Just above confluence with Goodwin Hollow [2]	1.2	560	840	950	1,250
Beacon Branch					
At mouth [1]	1.4	650	970	1,100	1,450
Bear Creek					
About 2,800 feet downstream of Abo Road [1]	5.1	1,740	2,640	3,030	4,050
At County Highway MM [1]	2.2	910	1,360	1,550	2,030
At Millcreek Road [1]	1.2	640	970	1,110	1,480
Dry Auglaize Creek					
At Sleeper road [1]	8.9	2,325	3,495	3,995	5,300
Above confluence of Holman Branch [1]	2.9	1,010	1,510	1,720	2,280
Downstream corporate limits [2]	2.9	1,010	1,510	1,720	2,280
At Interstate 44 [2]	1.0	465	690	780	1,030
Goodwin Hollow					
At confluence of Atchley Branch [1]	42.3	6,450	9,710	11,140	14,750
Above confluence of Radio Tower Branch [1]	29.1	5,400	8,190	9,400	12,500
At New Buffalo Road [1]	21.4	4,570	6,950	7,990	10,500
Highland Park Branch					
At mouth [1]	3.1	1,370	2,110	2,420	3,200
Holman Branch					
At mouth [1]	1.4	620	930	1,060	1,400
Just above confluence with Dry Auglaize Creek [2]	1.4	620	930	1,060	1,400
Liberty Branch					
At mouth [1]	9.4	2,080	3,070	3,500	4,600
At State Highway 32 [1]	7.9	1,830	2,690	3,060	3,980
At Old U.S. Highway 66 [1]	5.4	1,330	1,950	2,210	3,000
North Cobb Creek					
At County Road [1]	8.9	2,550	3,870	4,400	5,950
Above confluence of Highland Park Branch [1]	2.8	950	1,400	1,590	2,100
Radio Tower Branch					
At mouth [1]	4.2	1,290	1,930	2,190	2,900
Just above confluence with Goodwin Hollow [2]	4.2	1,290	1,930	2,190	2,900
At State Route 32 [2]	2.2	800	1,190	1,350	1,780

[1] **Laclede County FIS dated October 17, 1984**
[2] **City of Lebanon FIS dated December, 1981**

3.1.2 Countywide Analysis

Approximate Zones:

For all approximate flood zones, the flood zone development tools being used for this process is a regression equation analysis model adapted for Arc Macro Language (AML) applications.

The Effective Streams layer is developed in the Scoping Report stage of each county. These streams are laid into the 10 meter DEM and checked against slope to determine if they contain all areas that have greater than 1 mile of drainage. Streams used for calculations are created from the 10 meter DEM flow path and then visually confirmed by the limits of both the Effective Streams and a One Mile of drainage stream network to ensure coverage to meet Region 7 specifications. The flow path stream network (Hydrolink) is visually checked against both the DOQQs and the USGS DRGs (Reference 9) of the county to locate flaws inherent within the DEM.

Hydraulic cross section locations are determined and for each location, watershed basins are calculated by querying from the DEM's flow direction. The model is designed to capture all flow through the cross sectional line in addition to the flow directly at the discharge location (Hydronode) and all discharge for that cross sectional location is calculated to the single node point to meet FEMA standards.
A minimum of two discharge locations are calculated for each stream reach. These discharge locations correlate directly to all hydraulic cross section locations.

3.2 Hydraulic Analyses

3.2.1 Pre-Countywide Analysis

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of the floods of the selected recurrence intervals. Cross sections for the backwater analyses of each stream were obtained from aerial photographs flown in February 1980 at a scale of 1:4800 with a contour interval of 10 feet (Reference 10). The bridges and culverts were field checked to obtain elevation data and structural geometry.

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

The channel roughness factors (Manning's "n" values) used in the hydraulic computations were chosen by engineering judgment and were based on field observations of the streams and floodplain areas. These values are shown in Table 6.

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the USACE, Hydrologic Engineering Center, (HEC-2) step-backwater computer program (Reference 11). Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. Starting water-surface elevations for each stream were calculated using the slope-area method.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

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

Analyses of the hydraulic characteristics of the flooding sources studied in detail in the City of Lebanon were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flood sources.

Cross sections for the backwater analyses of Dry Auglaize Creek, Holman Branch, Azure Hills Branch and Radio Tower Branch were obtained from aerial photographs (scale: 1 inch – 400 feet; contour interval = 10 feet) flown in February 1980 (Reference 10). The bridges and culverts were field checked to obtain elevation data and structural geometry.

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

Channel roughness factors (Manning's "n") used in the hydraulic computations were chosen by engineering judgment and based on field observations of the streams and floodplain areas. These values were previously listed in Table 6.

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the USACE HEC-2 step-backwater computer program for detailed study areas (Reference 11). For the approximate study areas the water surface elevations for the 1-percent-annual-chance-flood were calculated by hand, assuming normal depth. Flood profiles were drawn showing computed water surface elevations for floods of the selected recurrence intervals. Starting water surface elevations for each stream were calculated using the slope-area method. All elevations are referenced from the NGVD29, formerly referred to as Seal Level Datum of 1929; elevations reference marks used in this study are shown on the maps.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail, and if channel and overbank characteristics remain in essentially the same condition ascertained during this study.

3.2.2 Countywide Analysis

For this countywide analysis, AMEC did not perform any new detailed studies. The streams that were studied in detail were redelineated as part of the new countywide study. These streams that were previously studied in detail include a "profile base line" on the maps. This "profile base line" provides a link to the flood profiles included in the FIS report. The stream centerline may have been digitized or redelineated as part of this revision. The "profile base lines" for these streams were based on the best available data at the time of their study and are depicted as they were on the previous FIRMs. In some

cases, where improved topographical data was used to redelineate floodplain boundaries, the "profile base line" may deviate significantly from the channel centerline or may be outside the SFHA.

Locations of the original 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.

Hydraulic modeling for approximate zone A streams was performed using HEC-RAS, version 3.1.2, from the U.S. Army Corps of Engineers, Hydrologic Engineering Center (HEC). For this method no survey was completed and hydraulic structures were not incorporated into the model. The 1-percent-annual-chance flood discharge was developed during the hydrologic phase of this project.

For streams studied by approximate methods, a Manning's n-value of 0.045 was typically used in the channel sections and 0.10 was typically used in the overbanks. Contraction and expansion coefficients were set at 0.1 and 0.3, respectively. The downstream boundary condition starting water surface elevation for all approximate streams was based on the normal depth calculation.

In all approximate method studies the resulting 1-percent-annual-chance floodplain elevations produced by the HEC-RAS computations were plotted on the digital terrain models produced from the USGS 10-meter DEMs. The flood plains were merged at confluences using best fit engineering judgment. For water bodies within the study limits, which hydrologic and hydraulic information is not available, the water boundary on the aerial photograph was digitized and incorporated in the floodplain boundaries. The approximate floodplains provide the State of Missouri and Crawford County a topographically accurate flood hazard boundary for the approximate areas.

Valley and channel cross sections were derived using a 20 ft. DEM created for this project. The DEM was created from the 1:24,000 scale topographic contour maps digitized by USGS, using ANUDEM software. The original contour interval ranged from 5 to 20 feet. NHD high resolution stream lines were used to enforce drainage in the DEM, except at the locations of large reservoirs where the NHD line was removed so the dam would be retained in the DEM. Sink holes were also retained in the DEM based upon their locations in the original contours.

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.

3.3 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (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.

The vertical datum for this county was updated from NGVD29 to NAVD88 using data provided by Corpscon control points. For Laclede County there were 22 points used to

determine the datum shift. These 22 points ranged from 0.33 to 0.40 of a foot increase. Since the range of these points was under 0.25 of a foot, FEMA guidelines allow for one single datum shift to be applied to the entire county. The average shift of the 22 points was 0.366.

Table 3: Vertical Datum Shift Conversions

Point	Latitude	Longitude	Conversion from NGVD29 to NAVD88
1	37.750	-92.875	0.330
2	37.875	-92.875	0.330
3	37.875	-92.500	0.340
4	37.875	-92.375	0.340
5	37.875	-92.625	0.350
6	37.625	-92.875	0.360
7	37.625	-92.500	0.360
8	37.750	-92.500	0.360
9	37.750	-92.375	0.360
10	37.875	-92.750	0.360
11	37.500	-92.250	0.370
12	37.625	-92.375	0.370
13	37.625	-92.750	0.370
14	37.750	-92.750	0.370
15	37.500	-92.375	0.380
16	37.625	-92.750	0.380
17	37.625	-92.625	0.380
18	37.750	-92.625	0.380
19	37.500	-92.875	0.390
20	37.500	-92.750	0.390
21	37.500	-92.500	0.390
22	37.500	-92.625	0.400
			Average Shift 0.366

Flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the NGVD and NAVD, visit the National Geodetic Survey website at www.ngs.noaa.gov, or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242
(301) 713-4172 (fax)

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 provides 1-percent-annual-chance-flood 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 1-percent-annual floodway. This information is presented on the FIRM and in many components of the FIS, including Flood Profiles, Floodway Data tables and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS as well as additional information that may be available at the local community map repository before making flood elevation and for floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2-percent annual chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. For this countywide study, between cross sections, the boundaries were interpolated and delineated using the USGS 10-meter DEMs.

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 this countywide study, the floodplain boundaries between cross sections were interpolated and delineated using the 20 foot DEM created for the project, which was discussed in the hydraulics section of the FIS.

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

4.2 Floodways

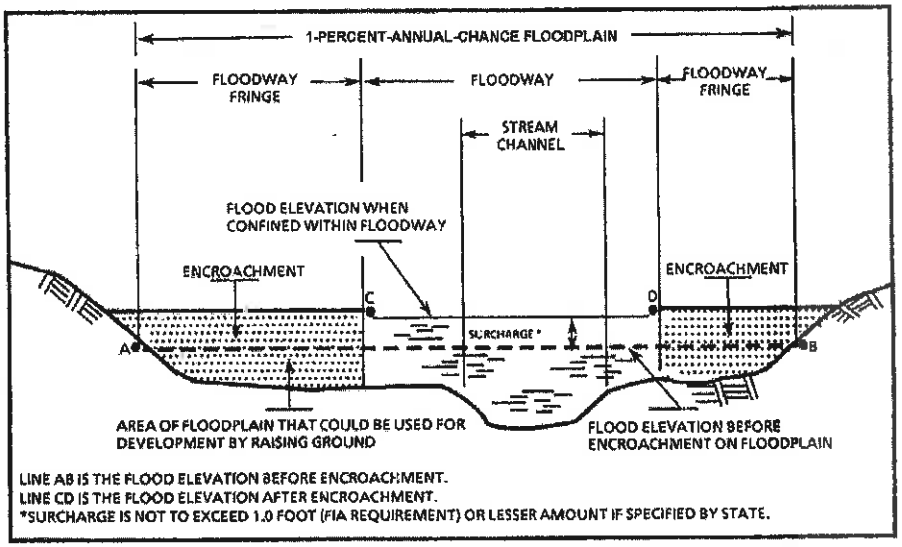
Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from the floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be

kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

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. In cases were the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

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

Figure 1: Floodway schematic



FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
ATCHLEY BRANCH								
A	2700	109	267	4.2	1124.7	1124.7	1125.7	1.0
B	3622	230	779	1.4	1131.8	1131.8	1132.8	1.0

[1] Distance in feet above confluence with Goodwin Hollow

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

FLOODWAY DATA

ATCHLEY BRANCH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
AZURE HILLS BRANCH								
A	1100	72	171	5.6	1147.6	1147.6	1148.6	1.0
B	4555	36	129	7.4	1176.2	1176.2	1177.0	0.8

[1] Distance in feet above confluence with Goodwin Hollow

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

FLOODWAY DATA

AZURE HILLS BRANCH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BEACON BRANCH								
A	825	35	111	9.9	1198.2	1198.2	1199.2	1.0
B	1825	78	279	3.9	1206.2	1206.2	1207.1	0.9
C	5350	33	130	8.5	1234.2	1234.2	1234.6	0.4

[1] Distance in feet above confluence with Highland Park Branch

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

FLOODWAY DATA

BEACON BRANCH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BEAR CREEK								
A	83150	107	539	5.6	1135.2	1135.2	1136.2	1.0
B	85060	82	377	8.0	1148.9	1148.9	1149.7	0.8
C	86028	205	1478	2.1	1164.1	1164.1	1164.6	0.5
D	87200	94	311	9.7	1164.9	1164.9	1165.8	0.9
E	88764	194	890	3.4	1178.7	1178.7	1178.9	0.2
F	89870	55	189	8.2	1182.7	1182.7	1183.3	0.6
G	90810	152	471	3.3	1189.4	1189.4	1190.2	0.8
H	94640	38	193	8.0	1213.2	1213.2	1214.2	1.0
I	96046	211	887	1.7	1226.8	1226.8	1227.6	0.8
J	97410	64	133	8.3	1232.2	1232.2	1232.2	0.0

[1] Distance in feet above confluence with Gasconade River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO
AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DRY AUGLAIZE CREEK								
A	94600	130	957	4.2	1129.8	1129.8	1130.4	0.6
B	96400	372	1220	3.3	1133.7	1133.7	1134.4	0.7
C	97650	80	370	10.8	1138.6	1138.6	1138.8	0.2
D	98500	414	1541	2.6	1141.9	1141.9	1142.9	1.0
E	100000	146	447	5.9	1149.9	1149.9	1150.9	1.0
F	102850	238	858	3.1	1162.8	1162.8	1163.4	0.6
G	104350	82	422	6.2	1166.7	1166.7	1167.4	0.7
H	107000	212	727	3.6	1179.6	1179.6	1180.5	0.9
I	108300	95	348	4.9	1184.0	1184.0	1184.4	0.4
J	109300	92	361	4.8	1188.0	1188.0	1188.4	0.4
K	110900	182	502	3.4	1198.1	1198.1	1199.1	1.0
L	112300	52	238	7.2	1205.3	1205.3	1205.8	0.5
M	113714	274	1250	1.4	1214.6	1214.6	1214.8	0.2
N	114674	93	216	8.0	1216.4	1216.4	1216.6	0.2
O	117000	77	283	6.1	1230.9	1230.9	1231.6	0.7
P	118000	115	262	6.6	1239.4	1239.4	1239.8	0.4

[1] Distance in feet above county boundary

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

FLOODWAY DATA

DRY AUGLAIZE CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
GOODWIN HOLLOW								
A	64470	511	2445	4.6	1109.3	1109.3	1110.3	1.0
B	66930	116	1633	6.8	1117.4	1117.4	1118.3	0.9
C	69650	305	2101	5.3	1123.4	1123.4	1124.4	1.0
D	73300	502	3222	3.3	1130.8	1130.8	1131.7	0.9
E	74775	398	1373	7.7	1133.9	1133.9	1134.6	0.7
F	80000	195	1678	6.3	1148.0	1148.0	1148.9	0.9
G	82100	413	2026	5.2	1153.6	1153.6	1154.0	0.4
H	83600	211	1933	5.3	1156.5	1156.5	1157.2	0.7
I	87850	700	5724	1.6	1162.5	1162.5	1163.3	0.8
J	88800	230	950	9.9	1164.4	1164.4	1165.1	0.7
K	90550	503	3143	3.0	1169.1	1169.1	1169.9	0.8
L	91525	244	1111	8.5	1169.9	1169.9	1170.3	0.4
M	93500	795	4143	2.3	1174.7	1174.7	1175.4	0.7
N	95800	87	874	10.8	1179.3	1179.3	1180.3	1.0
O	96650	470	2276	4.1	1183.8	1183.8	1184.3	0.5

[1] Distance in feet above confluence with Dry Auglaize Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

FLOODWAY DATA

GOODWIN HOLLOW

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
HIGHLAND PARK BRANCH								
A	1600	43	247	9.8	1182.0	1182.0	1182.9	0.9
B	1716	97	506	4.8	1183.8	1183.8	1184.8	1.0
C	3725	140	459	5.3	1192.9	1192.9	1193.9	1.0
D	6425	175	517	4.7	1209.3	1209.3	1210.3	1.0
E	7575	58	242	10.0	1216.7	1216.7	1217.1	0.4

[1] Distance in feet above confluence with North Cobb Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

FLOODWAY DATA

HIGHLAND PARK BRANCH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
HOLMAN BRANCH								
A	400	73	200	5.3	1183.0	1183.0	1184.0	1.0
B	2000	45	145	7.3	1192.4	1192.4	1193.3	0.9
C	5451	90	820	1.3	1229.0	1229.0	1229.1	0.1

[1] Distance in feet above confluence with Dry Auglaize Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO
AND INCORPORATED AREAS

FLOODWAY DATA

HOLMAN BRANCH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
LIBERTY BRANCH								
A	1240	149	708	4.9	1191.1	1191.1	1191.4	0.3
B	3150	212	607	5.8	1195.4	1195.4	1196.2	0.8
C	6710	165	715	4.3	1208.8	1208.8	1209.5	0.7
D	7213	110	582	5.3	1210.5	1210.5	1211.4	0.9
E	9544	145	740	4.1	1216.0	1216.0	1217.0	1.0
F	11734	255	948	3.2	1221.1	1221.1	1222.1	1.0
G	14784	163	377	8.1	1228.5	1228.5	1229.3	0.8
H	15784	250	1066	2.9	1231.8	1231.8	1232.8	1.0
I	19134	145	512	4.3	1245.9	1245.9	1246.8	0.9

[1] Distance in feet above confluence with Goodwin Hollow

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

FLOODWAY DATA

LIBERTY BRANCH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
NORTH COBB CREEK								
A	58950	162	625	7.1	1142.8	1142.8	1143.8	1.0
B	59880	547	2061	2.2	1145.5	1145.5	1145.9	0.4
C	63850	154	468	9.5	1166.4	1166.4	1167.3	0.9
D	69600	44	192	8.3	1209.4	1209.4	1210.2	0.8
E	70650	125	428	3.7	1214.6	1214.6	1215.5	0.9
F	76900	55	184	8.6	1244.4	1244.4	1244.7	0.3

[1] Distance in feet above confluence with Osage Fork Gasconade River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

FLOODWAY DATA

NORTH COBB CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88)			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
RADIO TOWER BRANCH								
A	1400	203	605	3.6	1160.7	1160.7	1161.7	1.0
B	4832	190	800	2.7	1186.7	1186.7	1187.3	0.6
C	6800	72	232	9.4	1196.4	1196.4	1197.3	0.9
D	10400	94	429	5.1	1218.4	1218.4	1219.4	1.0
E	12050	158	765	2.9	1222.1	1222.1	1222.9	0.8
F	13200	109	316	6.9	1226.5	1226.5	1227.1	0.6
G	13940	69	669	2.0	1235.9	1235.9	1236.6	0.7
H	14356	260	1611	0.8	1236.6	1236.6	1237.3	0.7
I	15550	110	319	4.2	1237.3	1237.3	1237.7	0.4
J	17016	193	1576	0.9	1247.9	1247.9	1248.7	0.8
K	18750	535	4126	0.3	1258.8	1258.8	1259.3	0.5
L	20650	130	216	6.2	1258.9	1258.9	1259.3	0.4

[1] Distance in feet above confluence with Goodwin Hollow

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

FLOODWAY DATA

RADIO TOWER BRANCH

5.0 INSURANCE APPLICATION

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

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-precent-annual-chance floodplains that are determined in the Flood Insurance Study 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-precent-annual-chance floodplains that are determined in the Flood Insurance Study 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 1 square mile (sq. mi.) or that are not otherwise mapped as Zone A, 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 Flood Insurance Rate Map is designed for flood insurance and floodplain management applications.

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

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

The countywide FIRM presents flooding information for the entire geographic area of Laclede 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 9, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
City of Conway	May 10, 1974	November 21, 1975	September 29, 2010	None
Village of Evergreen	September 29, 2010	None	September 29, 2010	None
Laclede County (Unincorporated Areas)	September 15, 1983	None	April 17, 1985	None
City of Lebanon	March 31, 1974	None	June 1, 1982	None
City of Phillipsburg [1]	None	None	None	None
City of Stoutland [1]	None	None	None	None

[1] Non-Floodprone Community

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

This current FIS either supersedes or is compatible with all previous studies published on streams in this report and should be considered authoritative for the purpose of the National Flood Insurance Program.

A FIS has previously been published for Laclede County Unincorporated Areas. (Reference 1)

A FIS has previously been published for the City of Lebanon. (Reference 2)

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA, Mitigation Division DHS/FEMA Region VII, 9221 Ward Parkway, Ste. 300, Kansas City, Missouri 64114.

9.0 BIBLIOGRAPHY AND REFERENCES

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ELEVATION IN FEET (NAVD 88)

1140
1135
1130
1125
1120
1115
1110
1105
1100
1095

BACKWATER FROM GOODWIN HOLLOW

CONFLUENCE WITH GOODWIN HOLLOW

0 200 400 600 800 1000 1200 1400 1600 1800 2000 2200 2400 2600

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH GOODWIN HOLLOW

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

FLOOD PROFILES

ATCHLEY BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO
and Incorporated Areas

01P

ELEVATION IN FEET (NAVD 88)

1160
1155
1150
1145
1140
1135
1130
1125
1120
1115

ROLLING HILLS ROAD

A

B

2600 2800 3000 3200 3400 3600 3800 4000 4200 4400 4600 4800 5000 5200

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH GOODWIN HOLLOW

LEGEND

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

FLOOD PROFILES

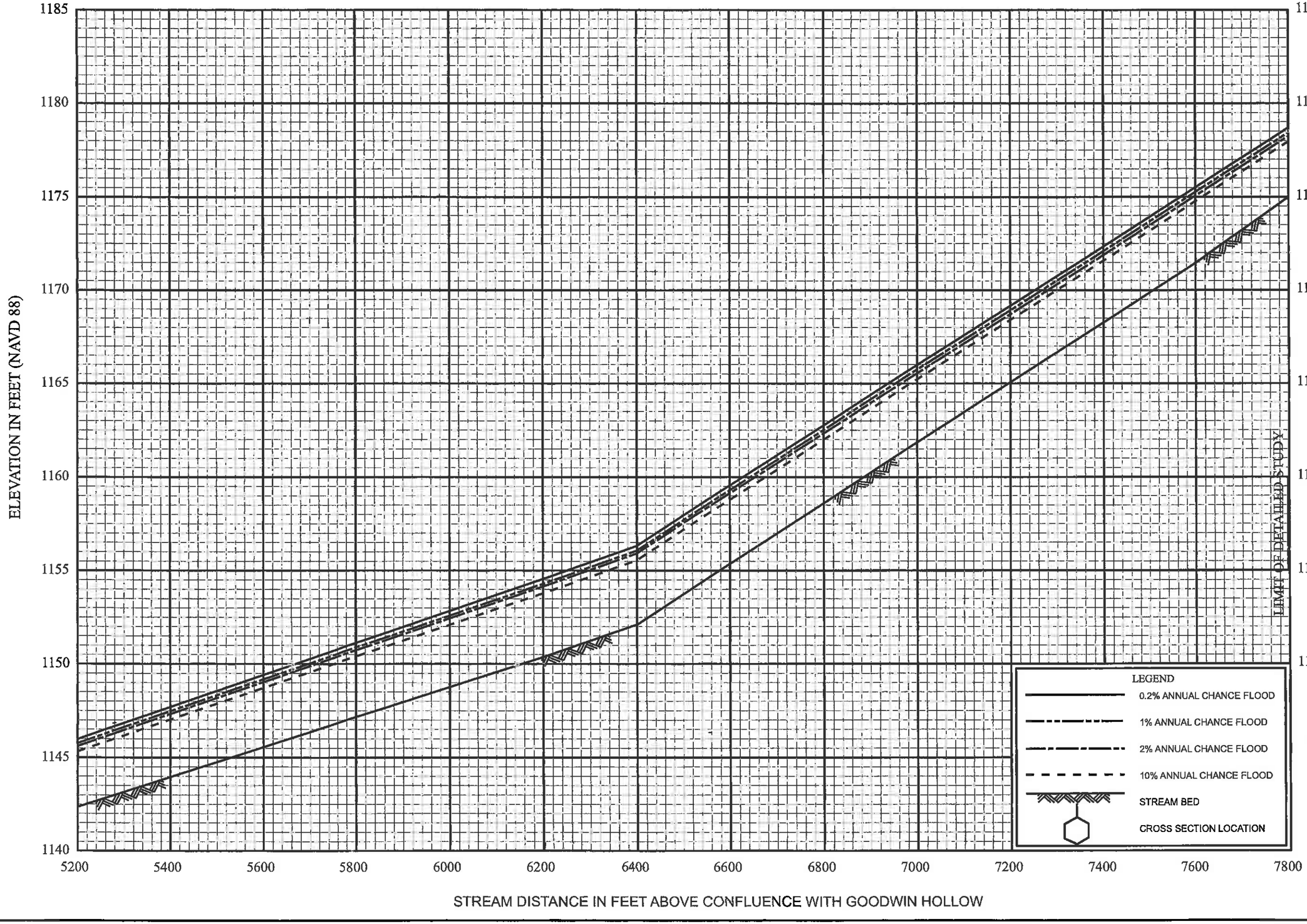
ATCHLEY BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

02P



FLOOD PROFILES

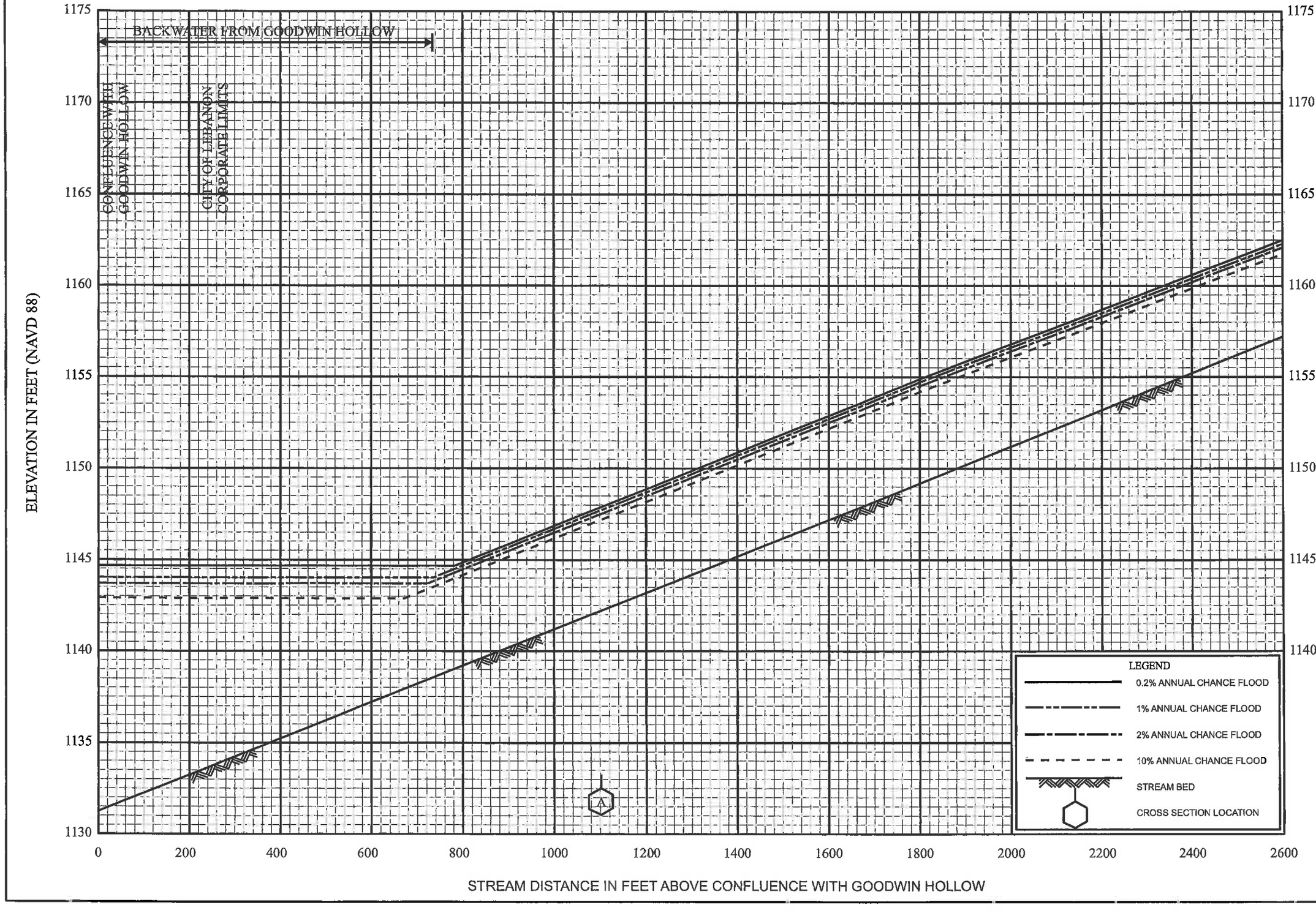
ATCHLEY BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

03P



FLOOD PROFILES

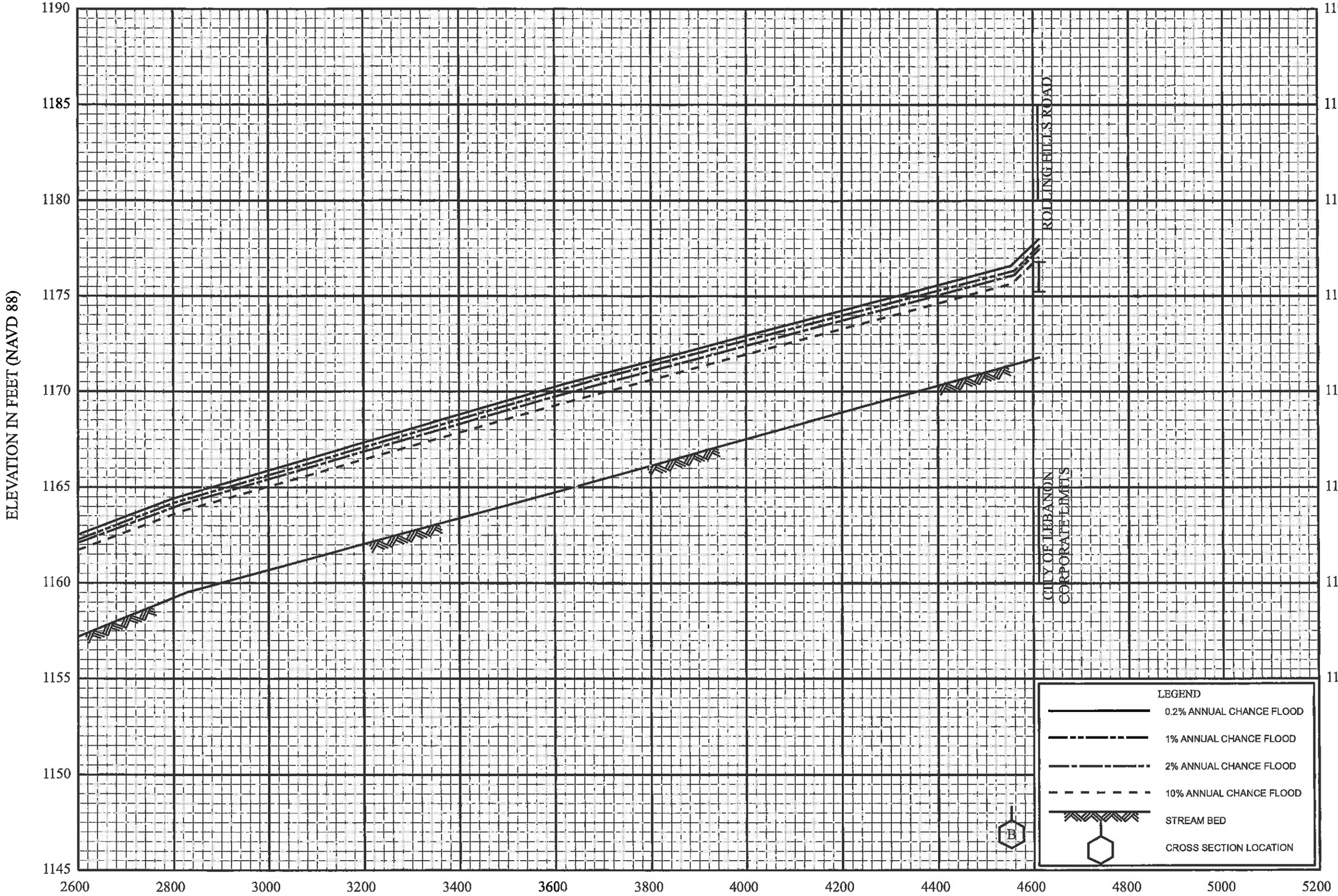
AZURE HILLS BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

04P



FLOOD PROFILES

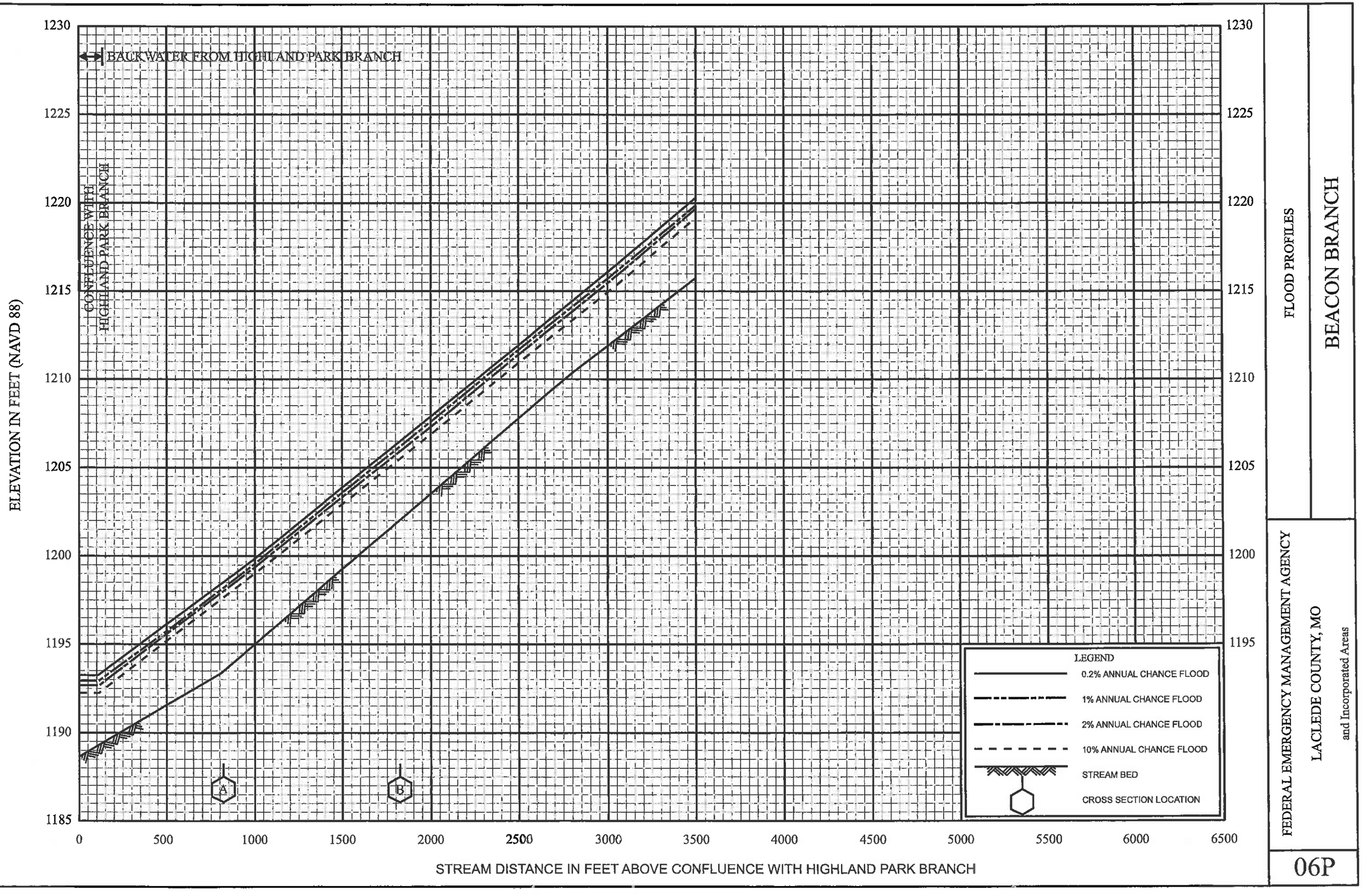
AZURE HILLS BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

05P



FLOOD PROFILES

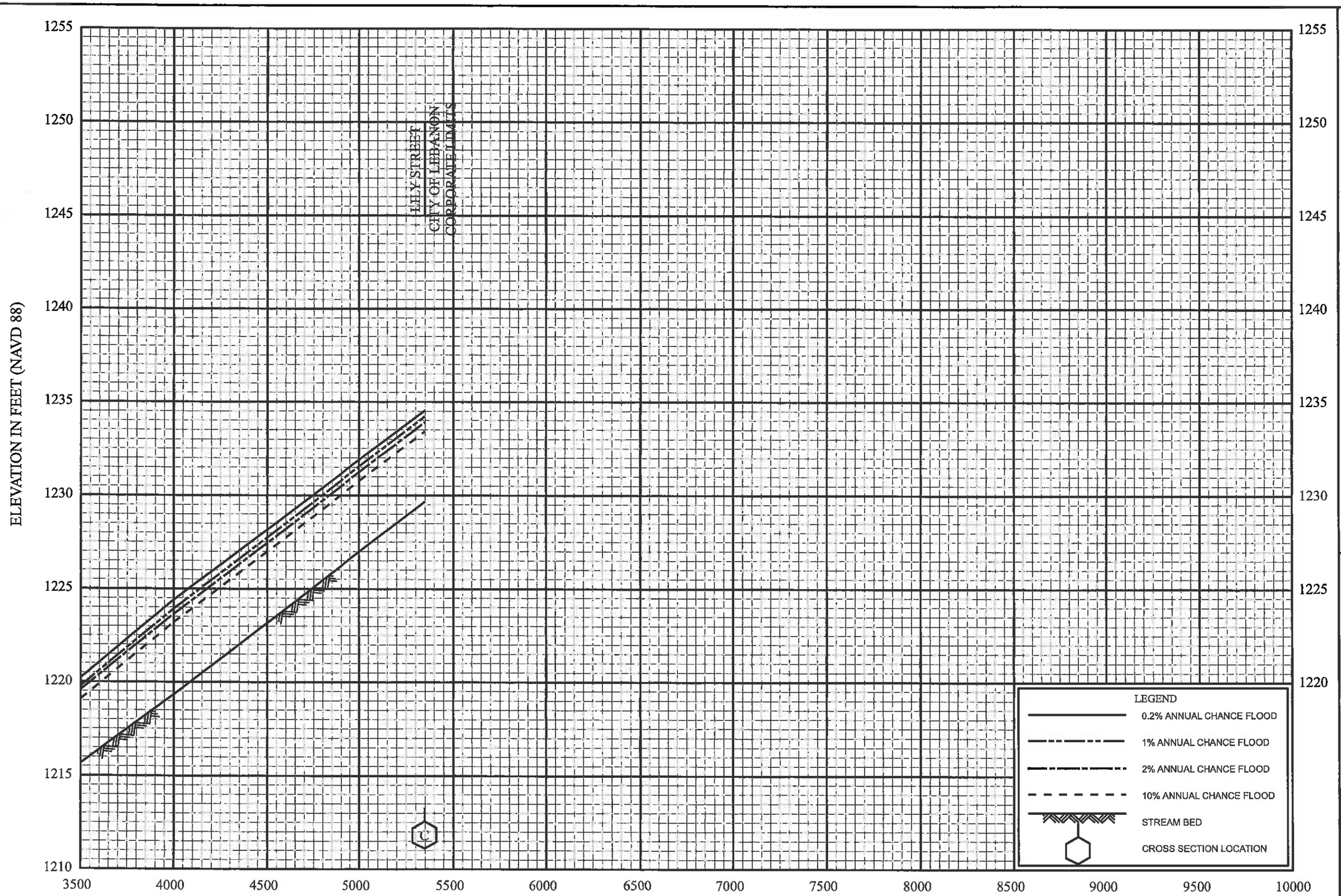
BEACON BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

06P



FLOOD PROFILES

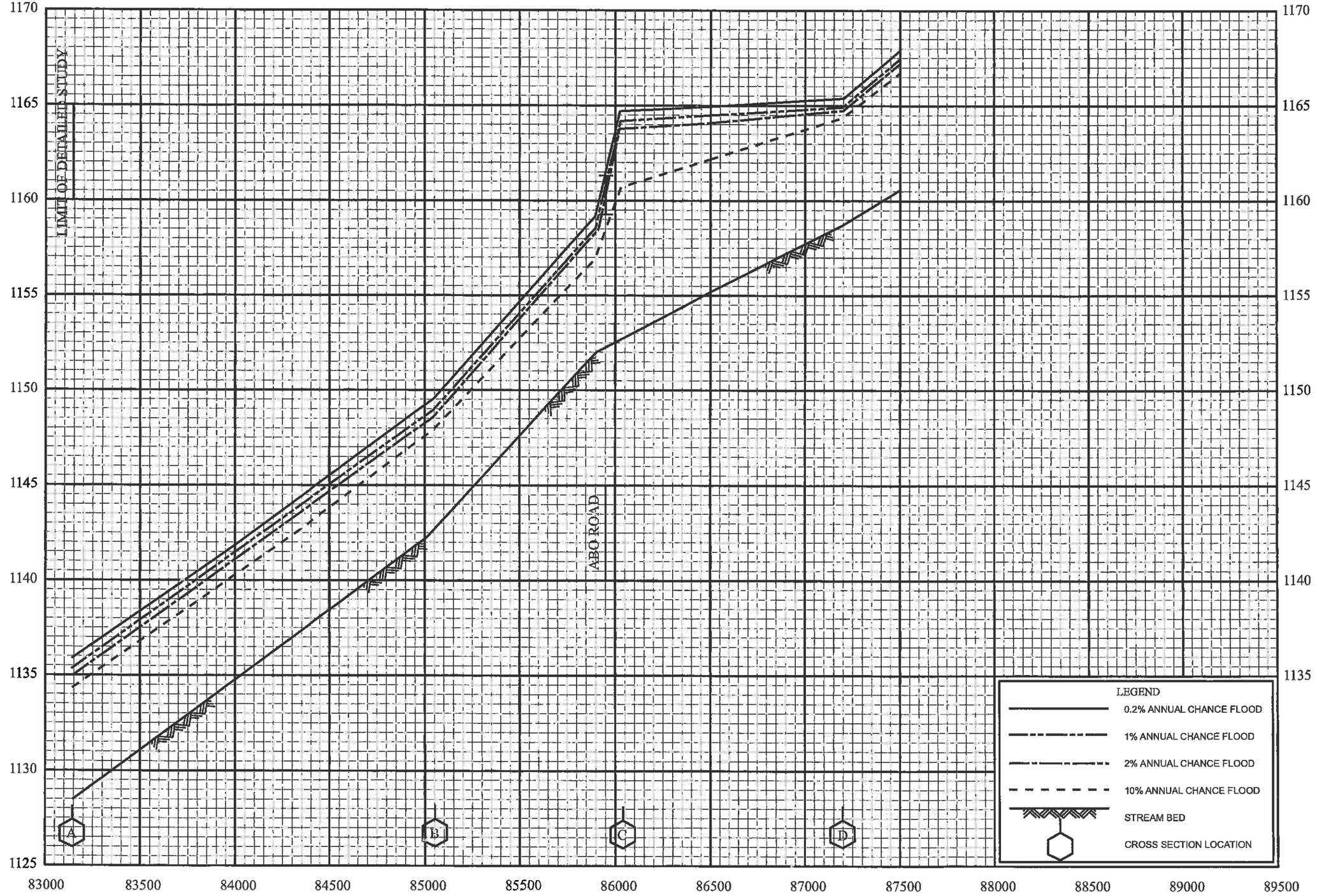
BEACON BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

07P



FLOOD PROFILES

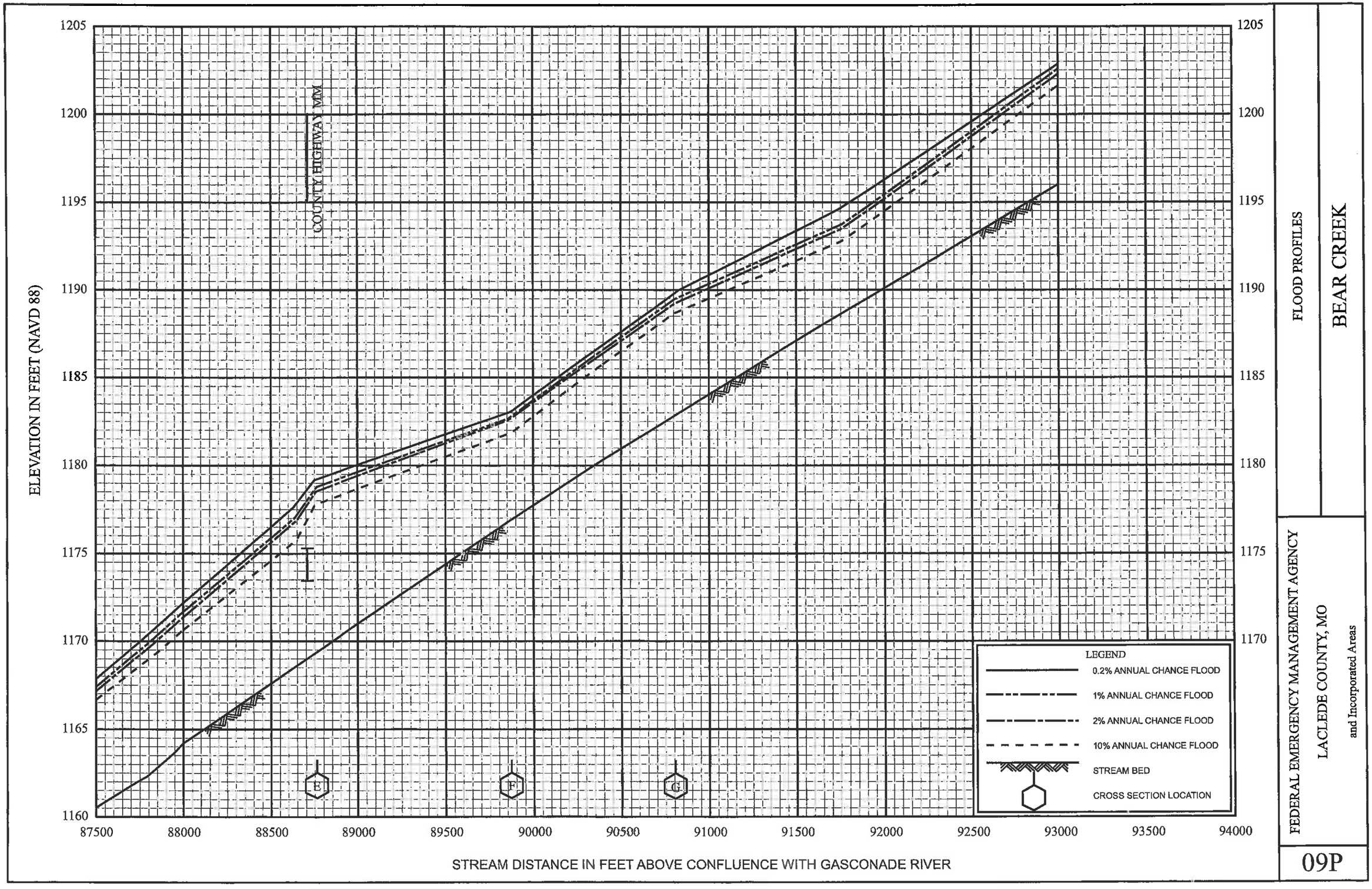
BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

08P



FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

09P

ELEVATION IN FEET (NAVD 88)

1240
1235
1230
1225
1220
1215
1210
1205
1200
1195

MILL CREEK ROAD

LIMIT OF DETAILED STUDY

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

H
I
J

93000 93500 94000 94500 95000 95500 96000 96500 97000 97500 98000 98500 99000 99500

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH GASCONADE RIVER

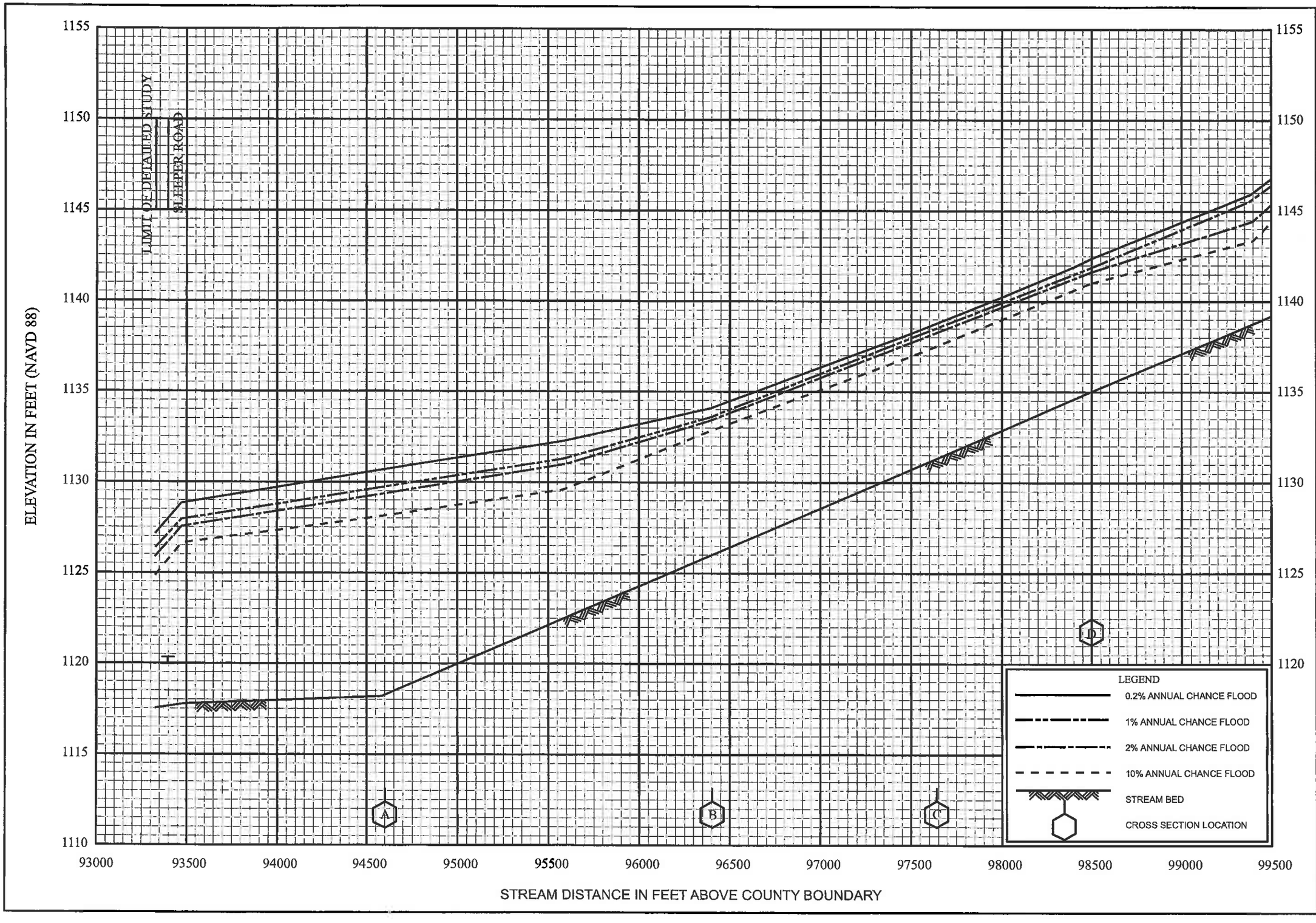
FLOOD PROFILES

BEAR CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO
and Incorporated Areas

10P



FLOOD PROFILES

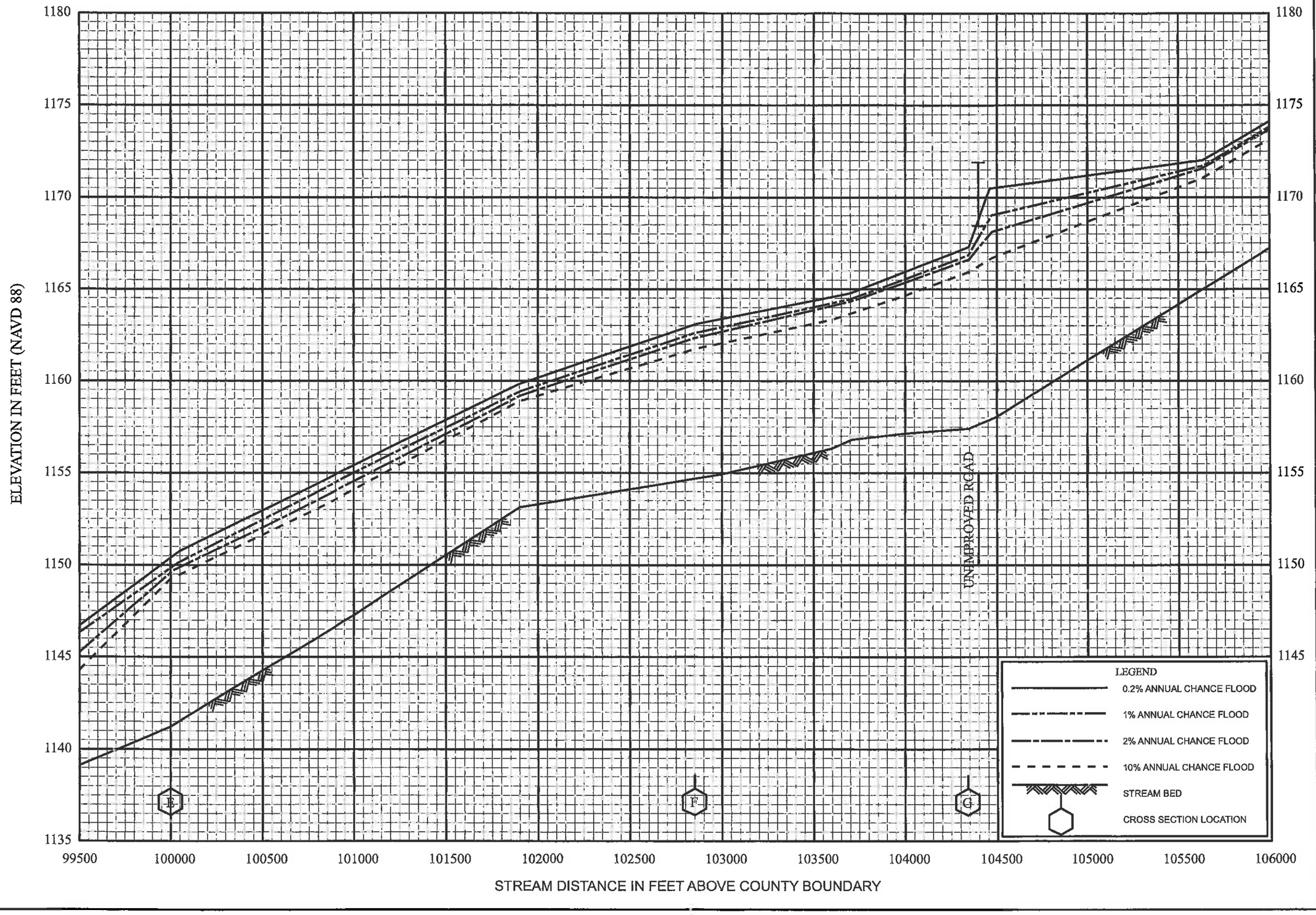
DRY AUGLAIZE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

11P



FLOOD PROFILES

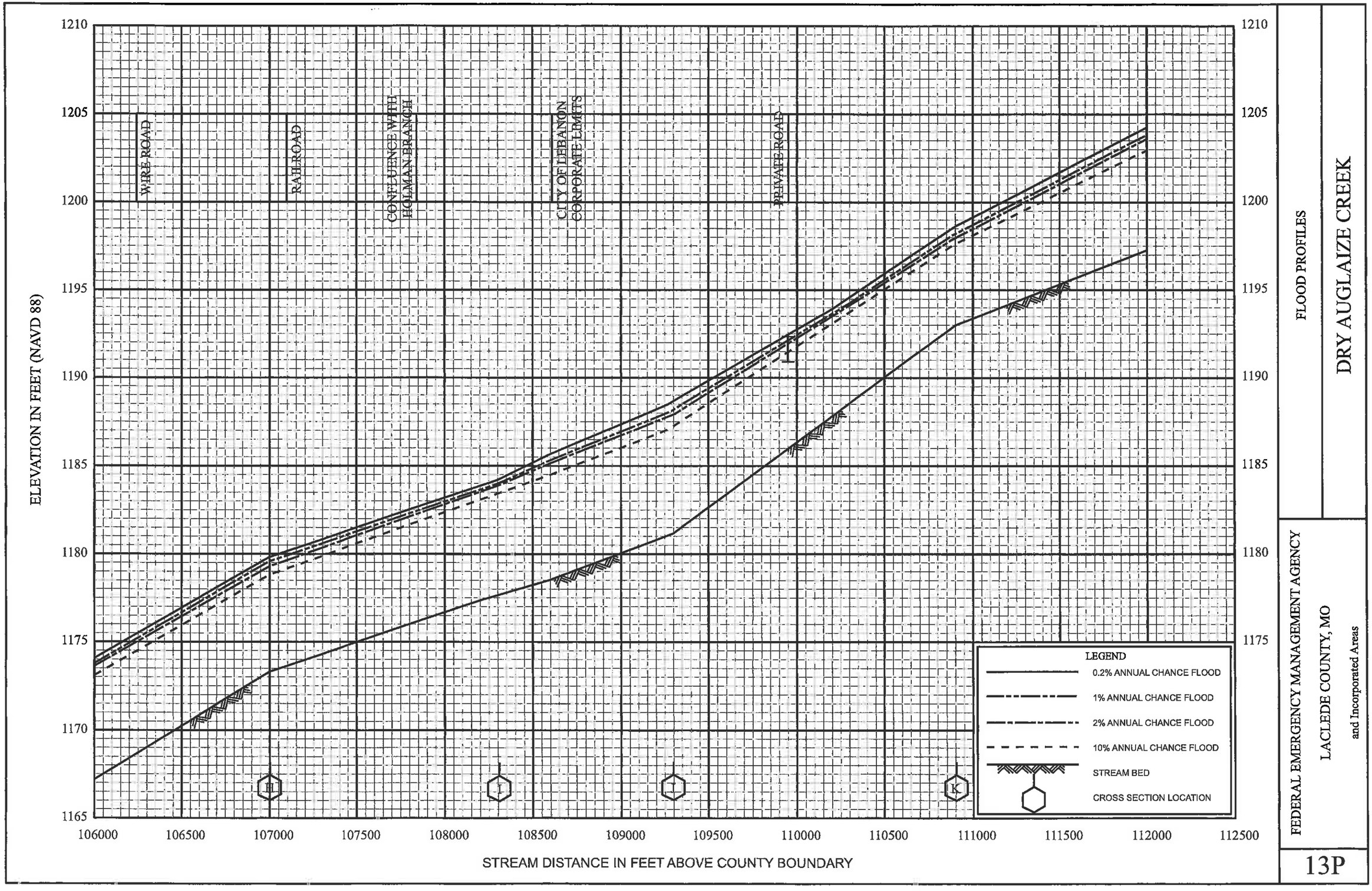
DRY AUGLAIZE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

12P



FLOOD PROFILES

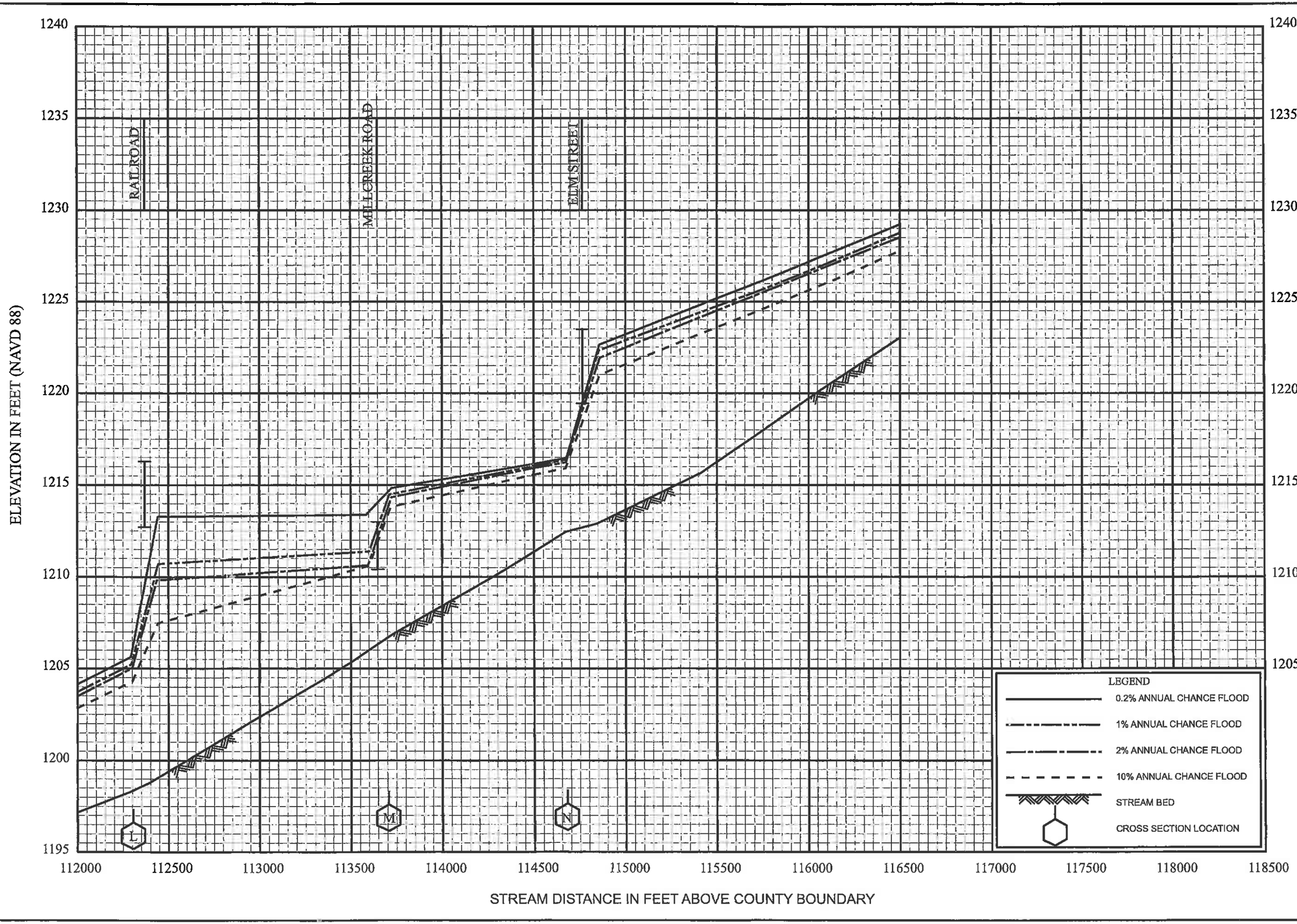
DRY AUGLAIZE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

13P



FLOOD PROFILES

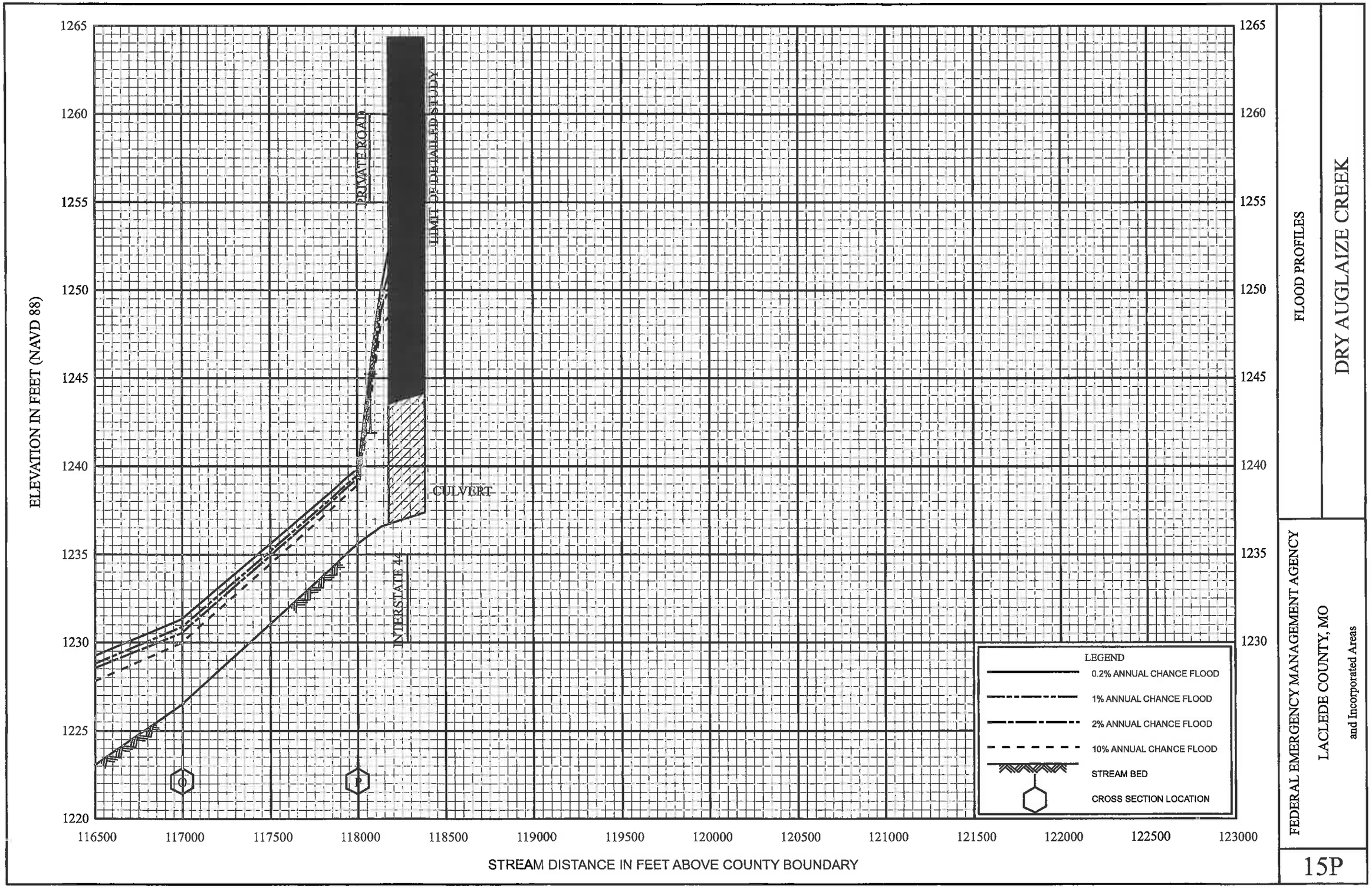
DRY AUGLAIZE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

14P



FLOOD PROFILES

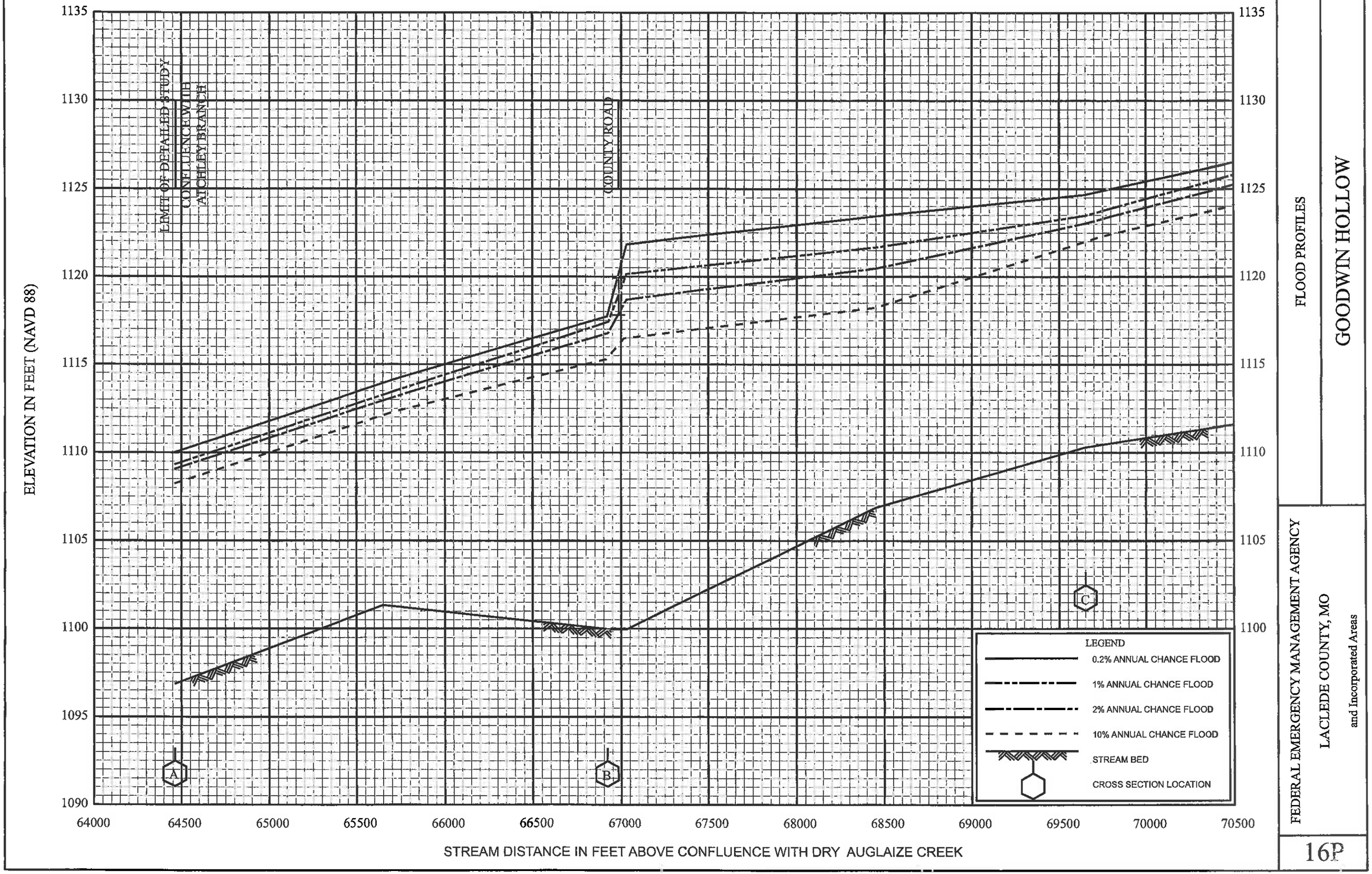
DRY AUGLAIZE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

15P



FLOOD PROFILES

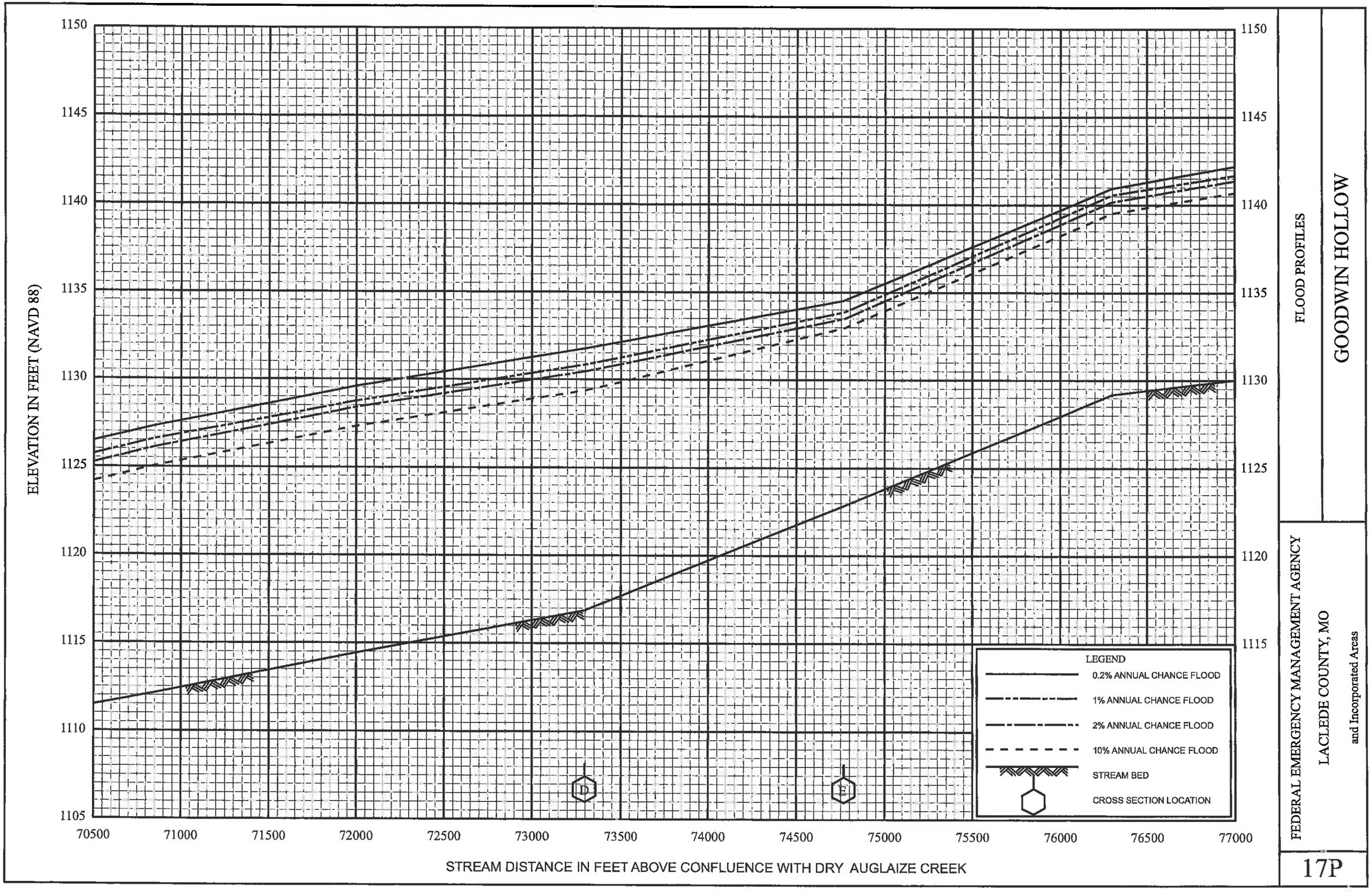
GOODWIN HOLLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

16P



FLOOD PROFILES

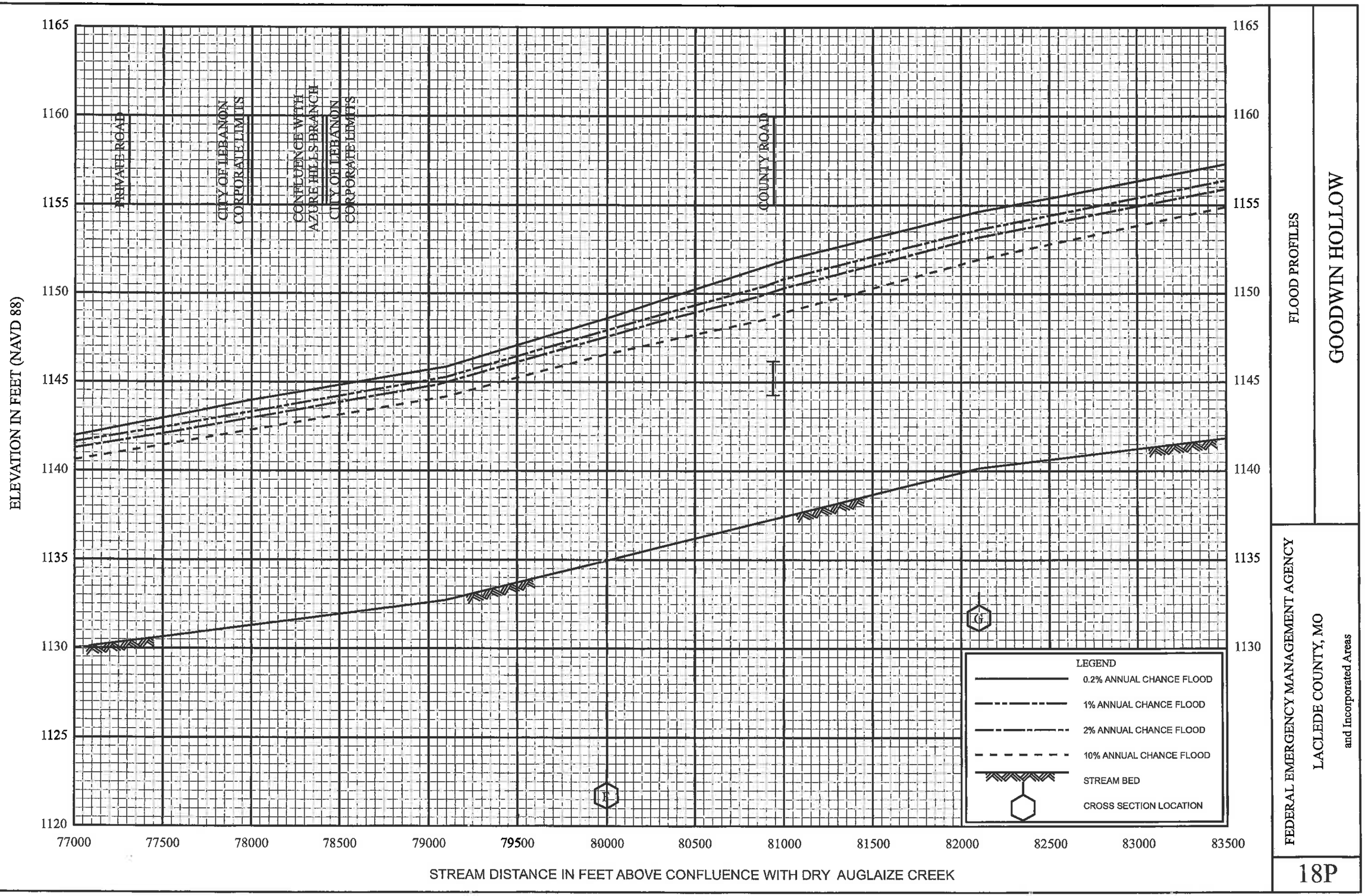
GOODWIN HOLLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

17P



FLOOD PROFILES

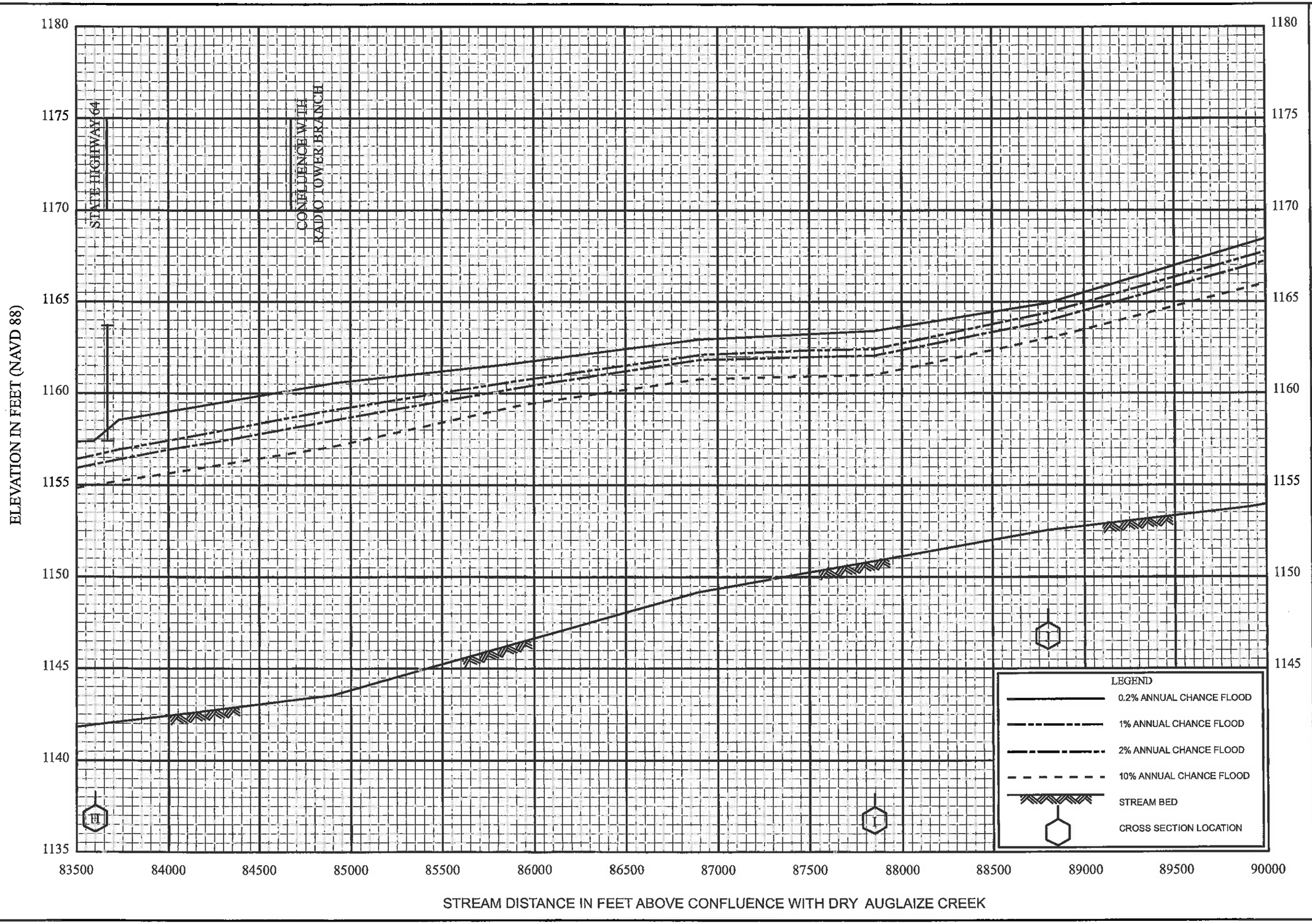
GOODWIN HOLLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

18P



FLOOD PROFILES

GOODWIN HOLLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

19P

ELEVATION IN FEET (NAVD 88)

1195
1190
1185
1180
1175
1170
1165
1160
1155
1150

90000 90500 91000 91500 92000 92500 93000 93500 94000 94500 95000 95500 96000 96500

STREAM DISTANCE IN FEET ABOVE CONFLUENCE WITH DRY AUGLAIZE CREEK

K L M N

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

FLOOD PROFILES

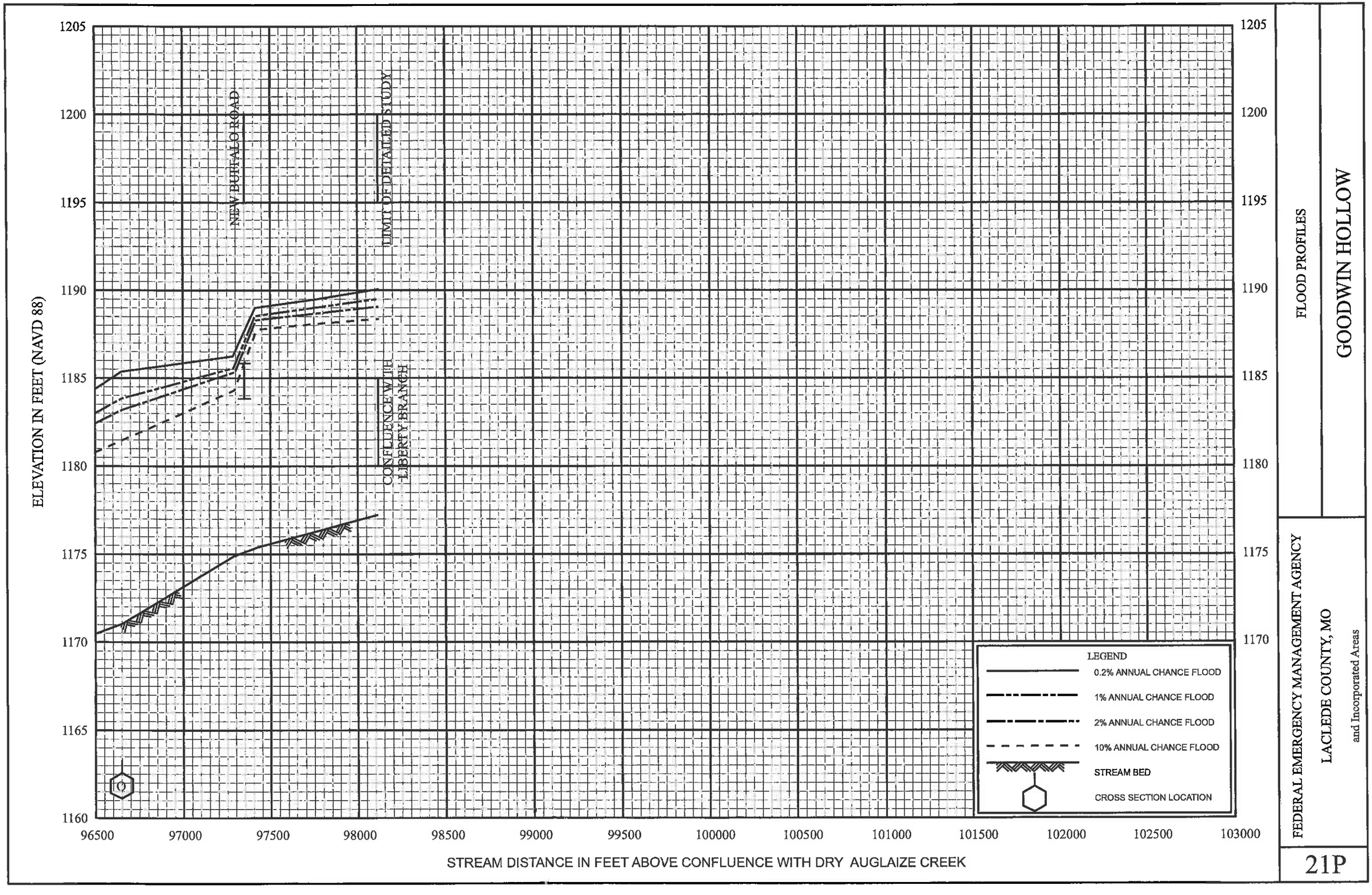
GOODWIN HOLLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

20P



FLOOD PROFILES

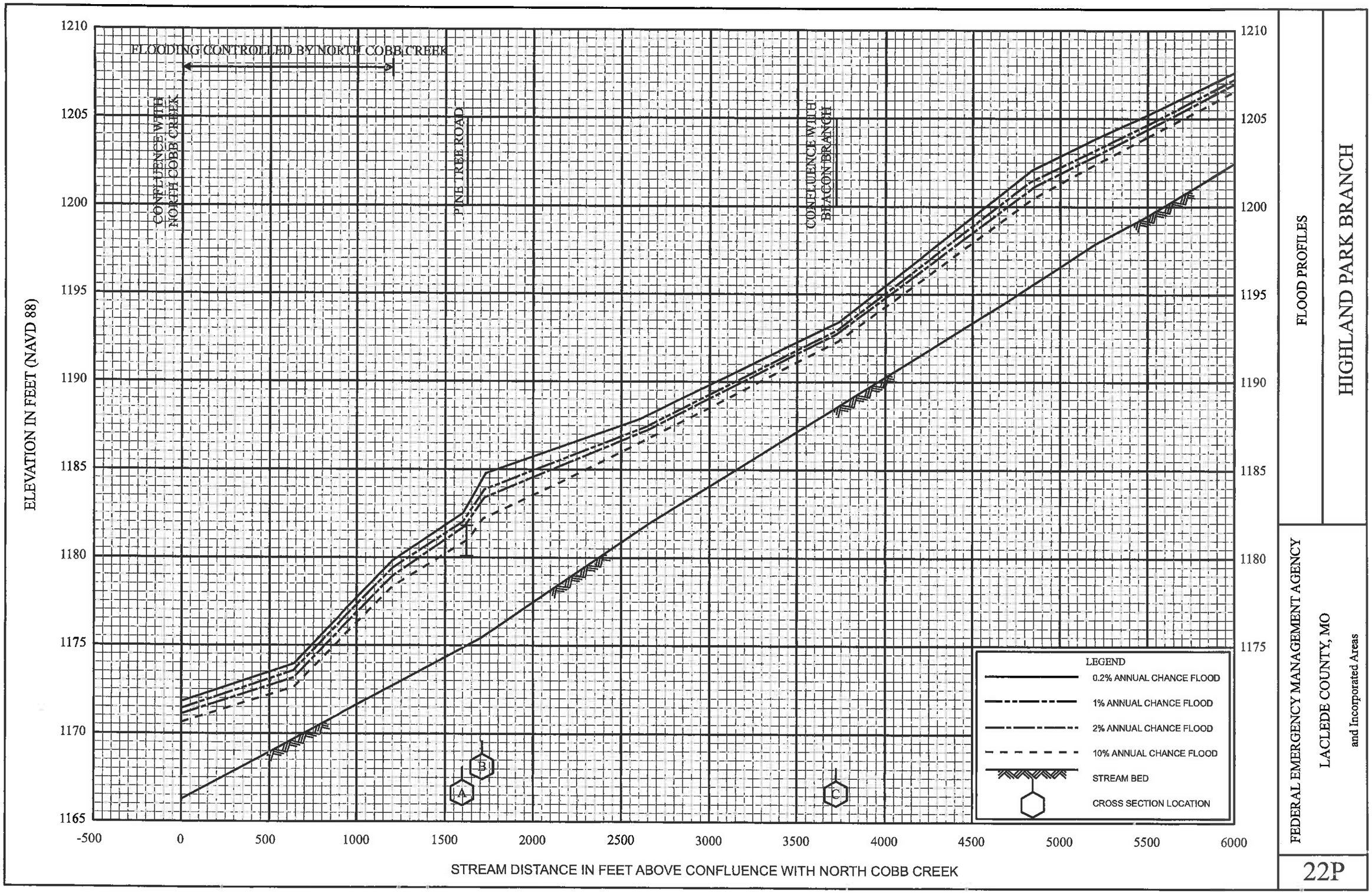
GOODWIN HOLLOW

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

21P



FLOOD PROFILES

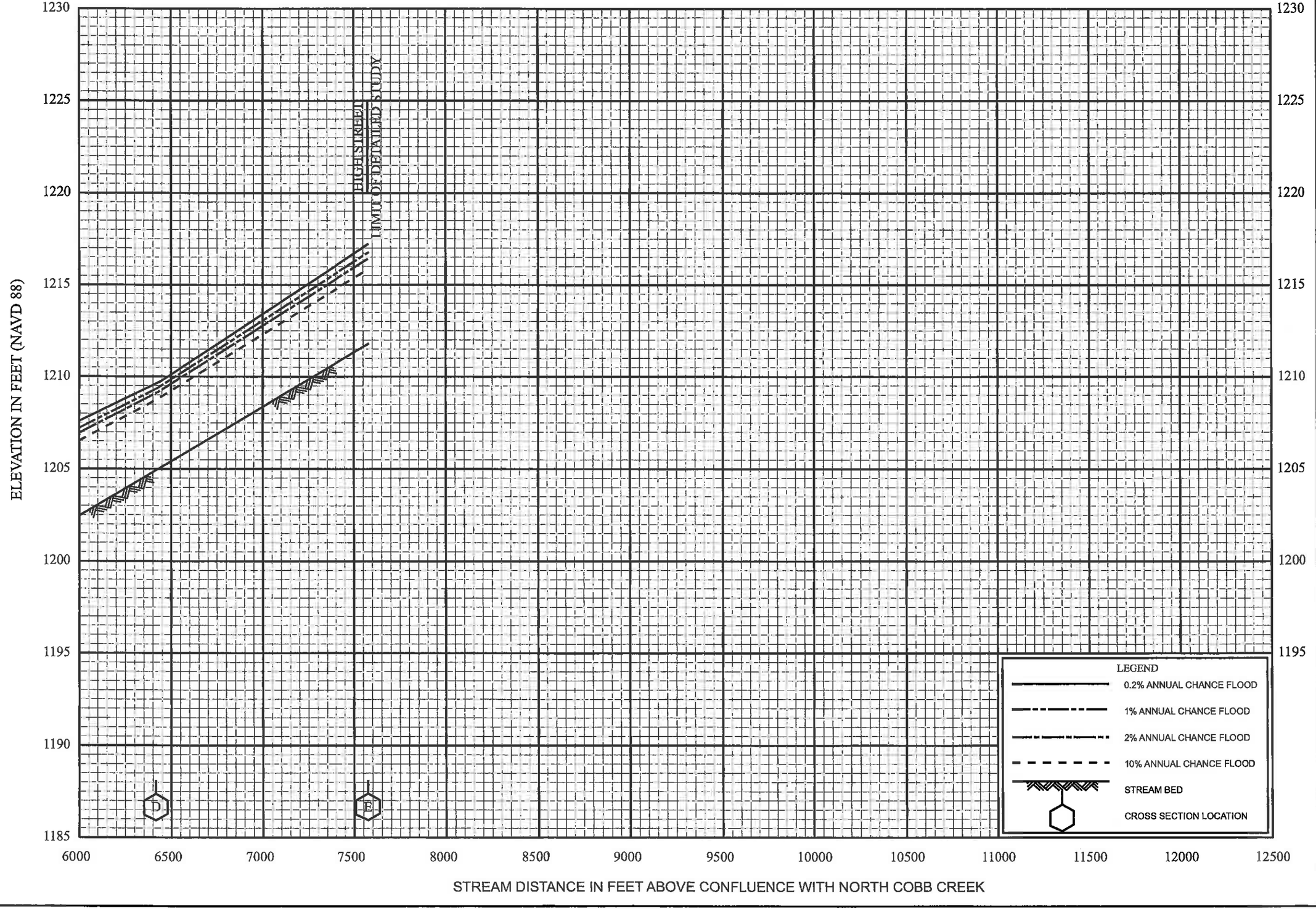
HIGHLAND PARK BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

22P



FLOOD PROFILES

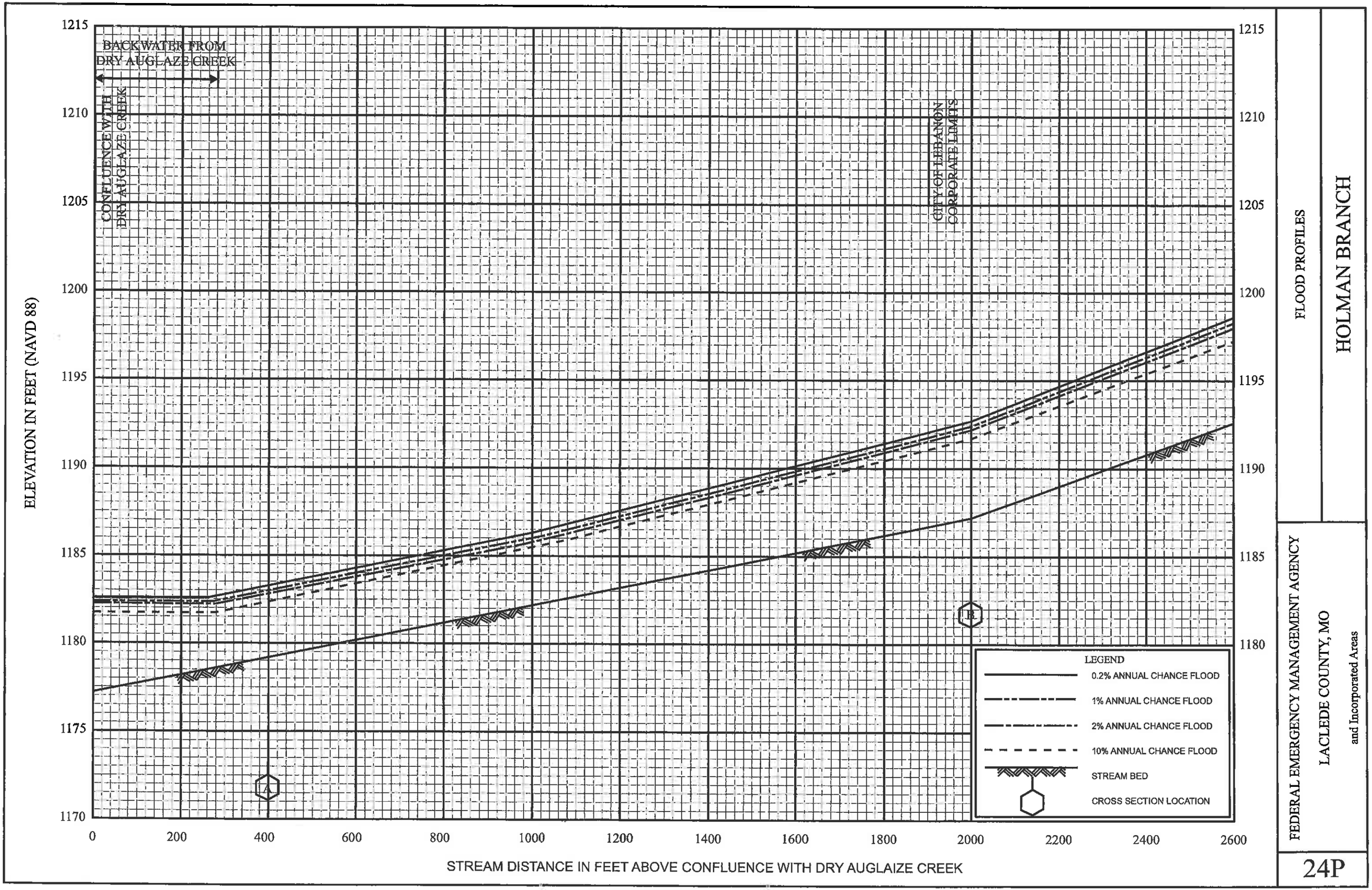
HIGHLAND PARK BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

23P



FLOOD PROFILES

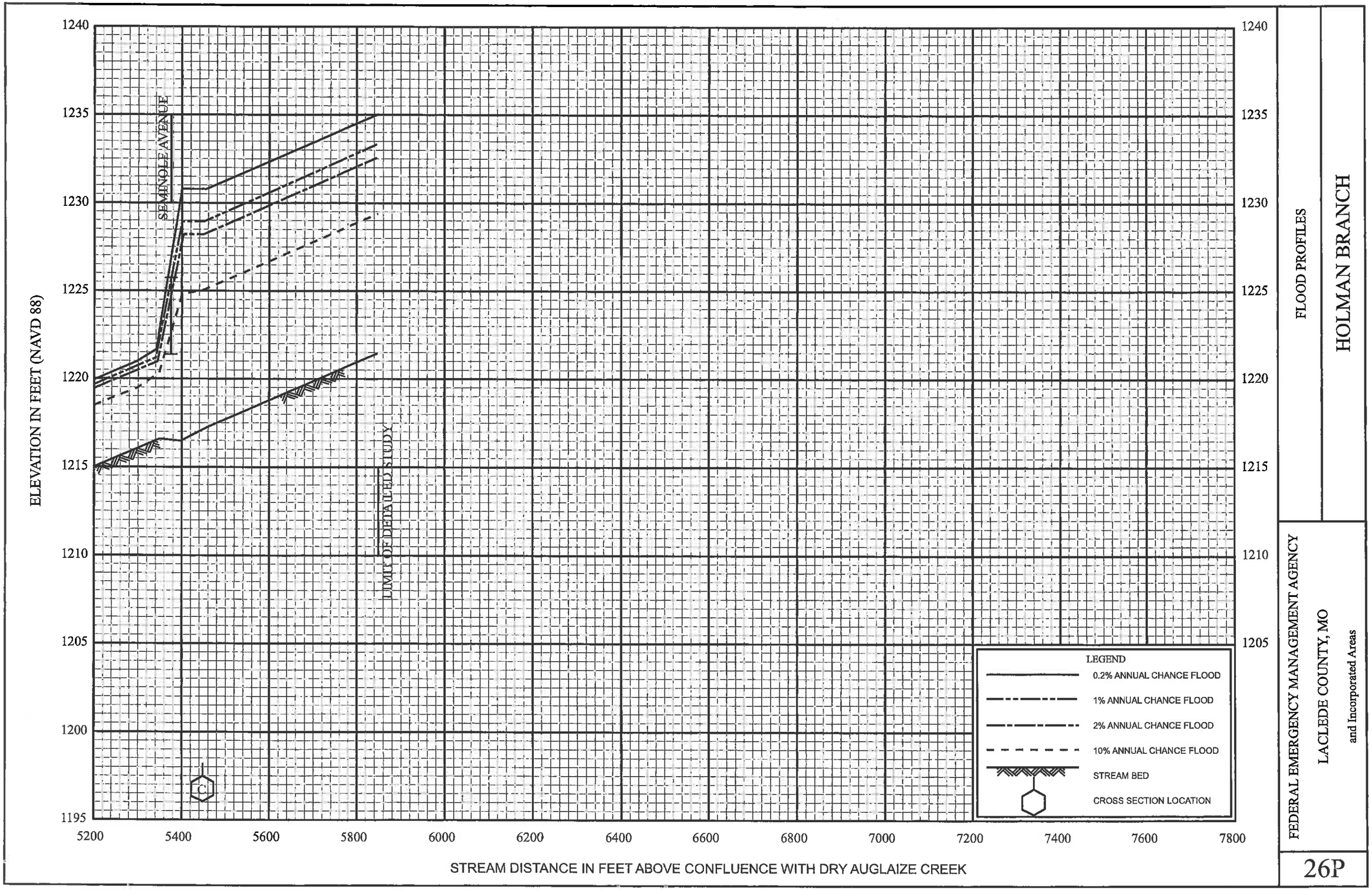
HOLMAN BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

24P



FLOOD PROFILES

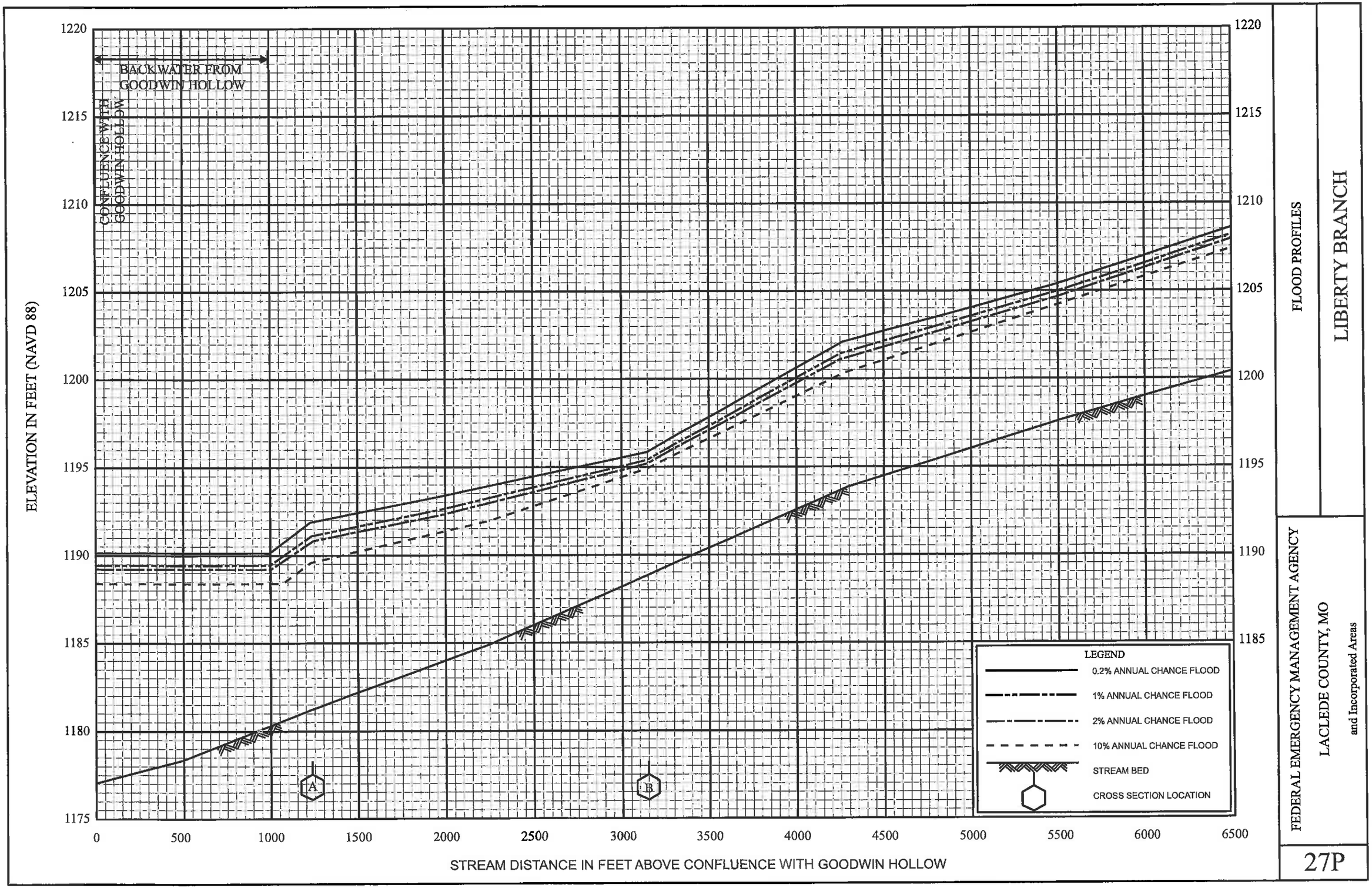
HOLMAN BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

26P



FLOOD PROFILES

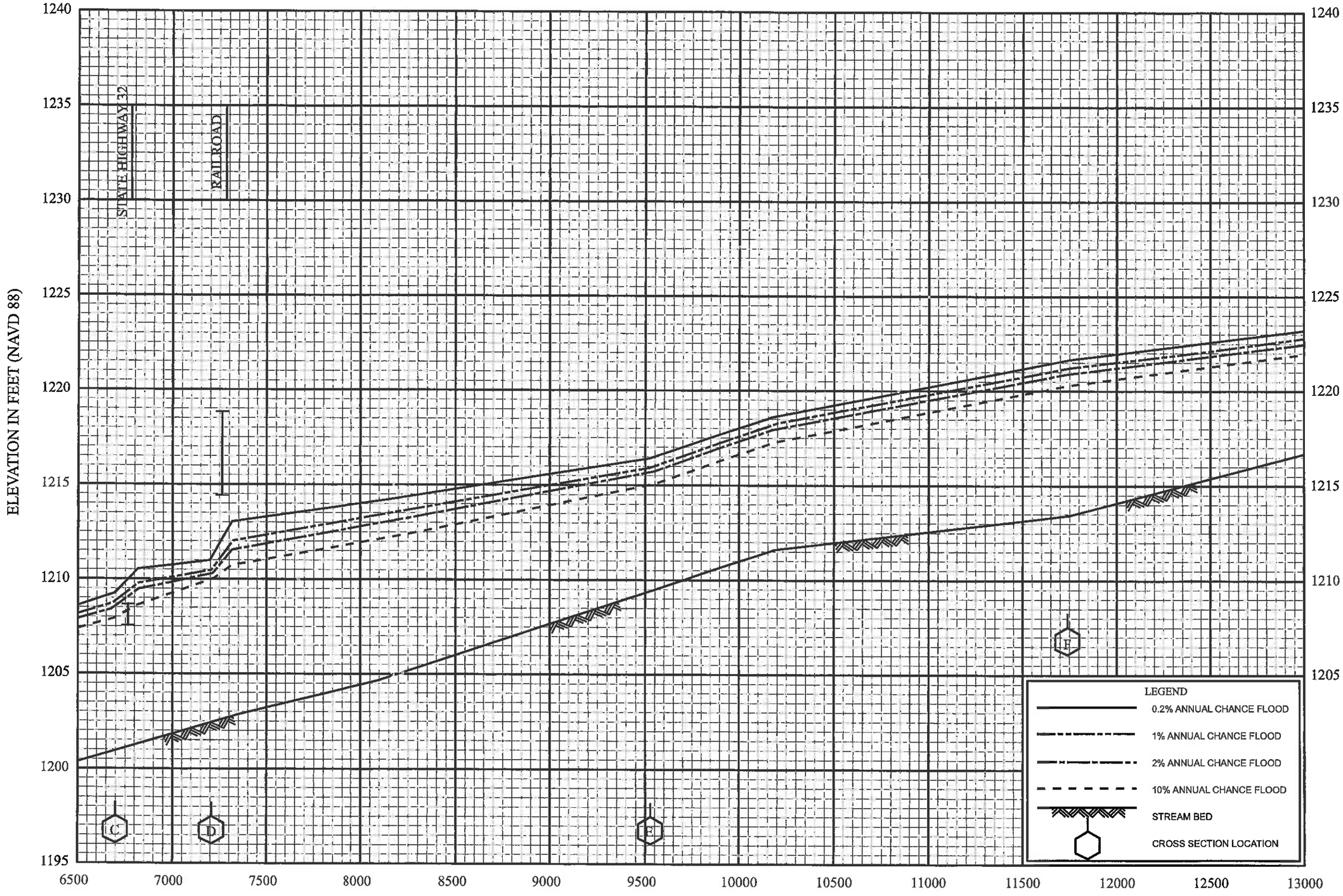
LIBERTY BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

27P



FLOOD PROFILES

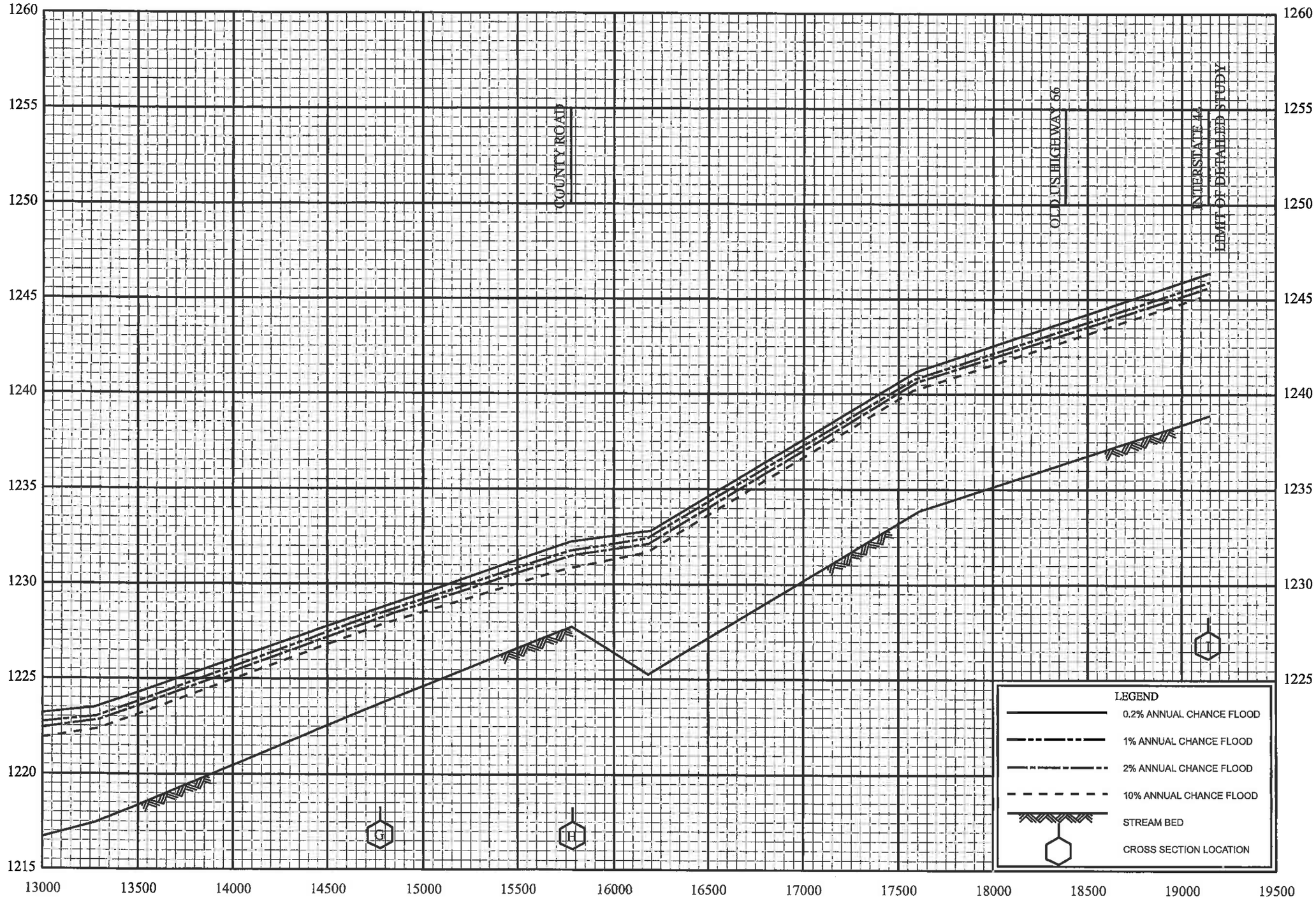
LIBERTY BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

28P



FLOOD PROFILES

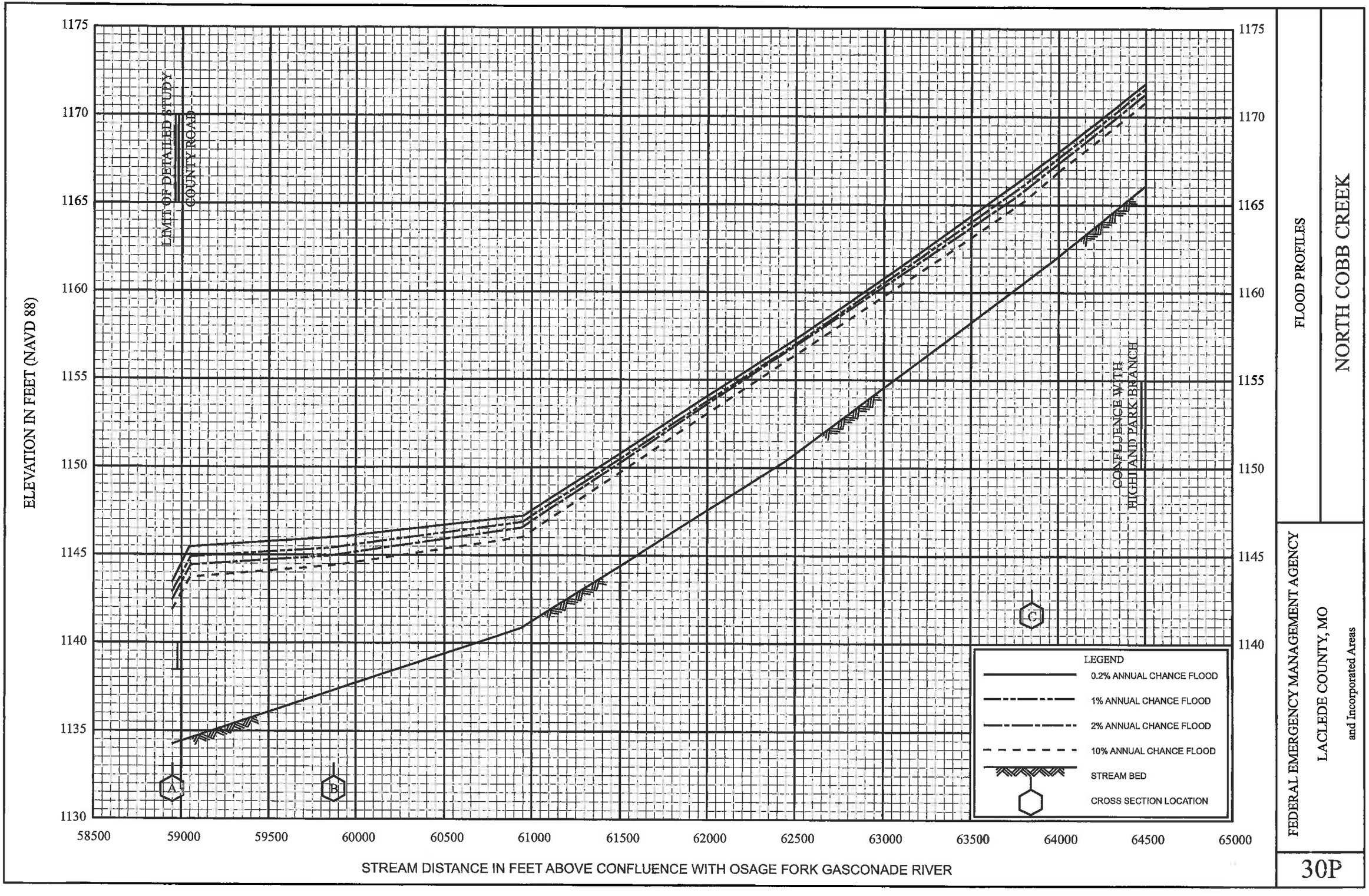
LIBERTY BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

29P



FLOOD PROFILES

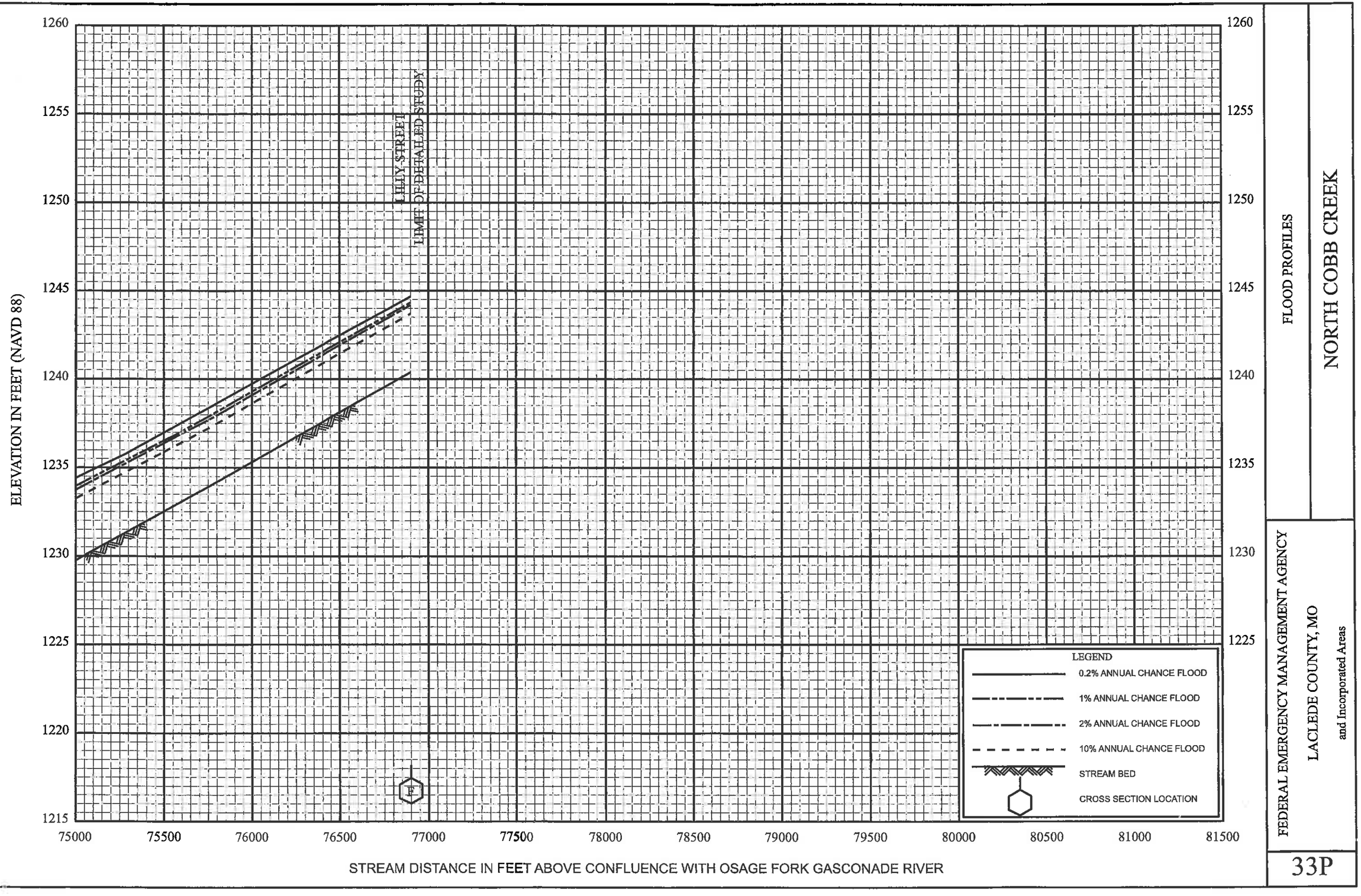
NORTH COBB CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

30P



FLOOD PROFILES

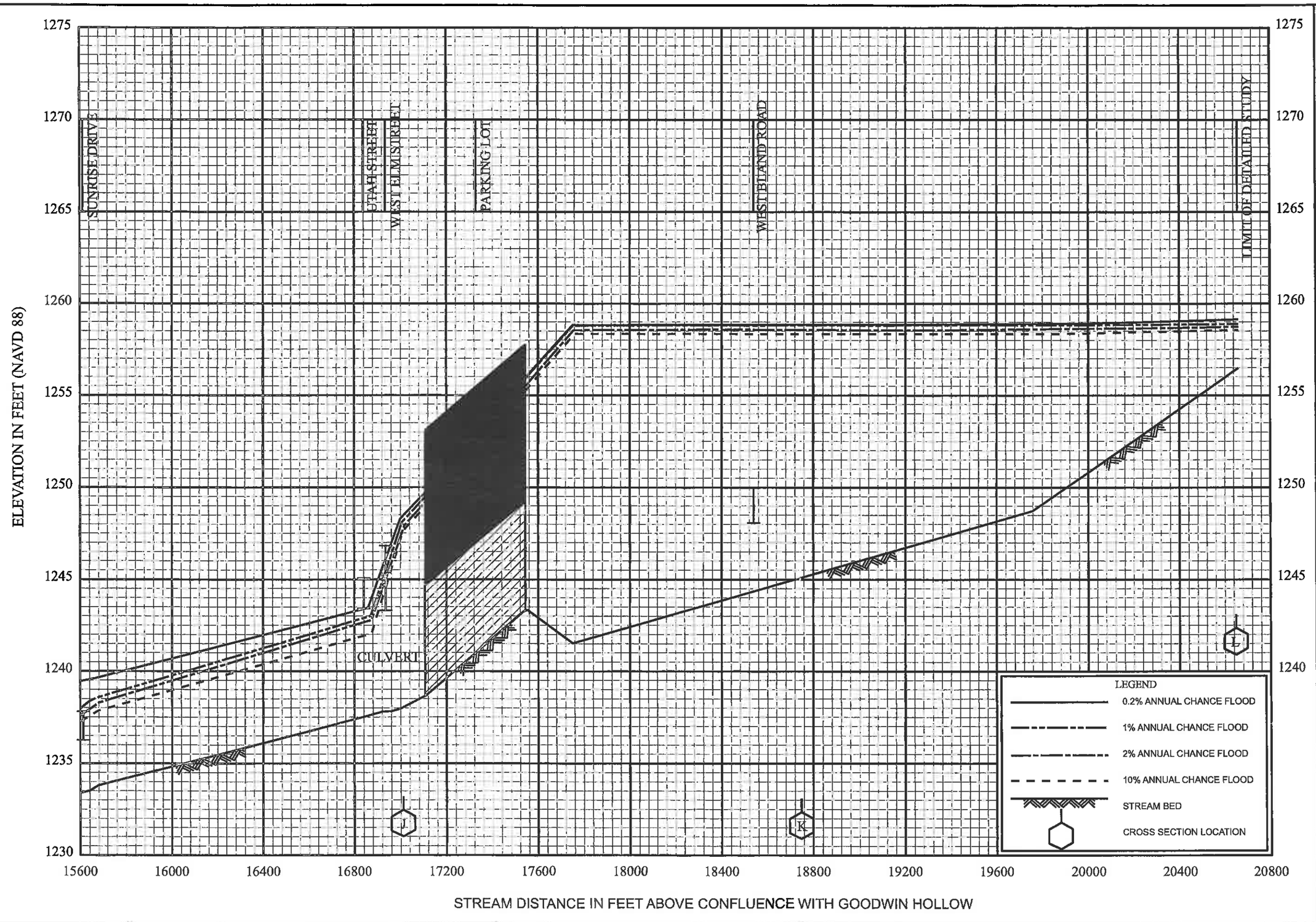
NORTH COBB CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

33P



FLOOD PROFILES

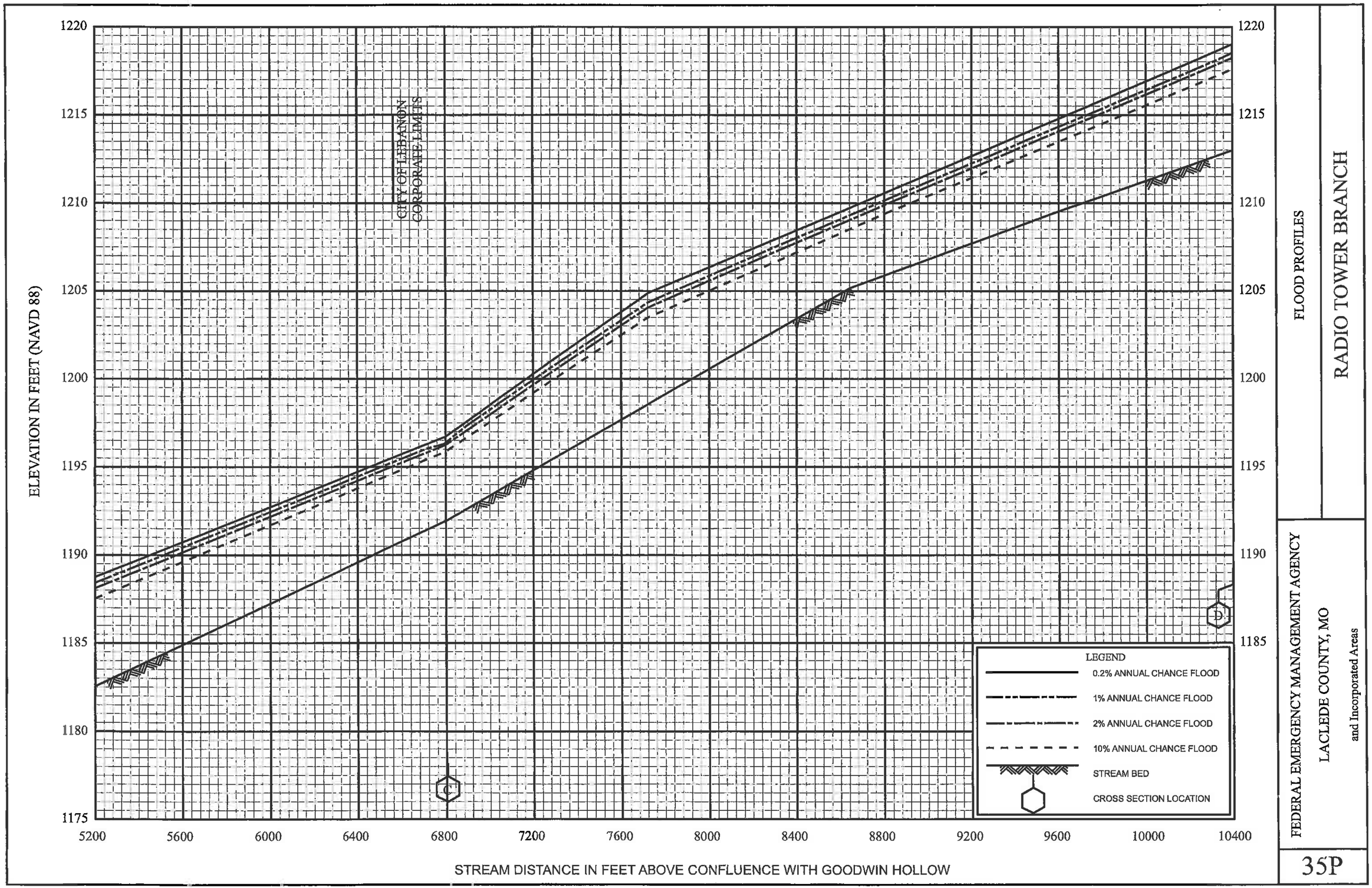
RADIO TOWER BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

37P



FLOOD PROFILES

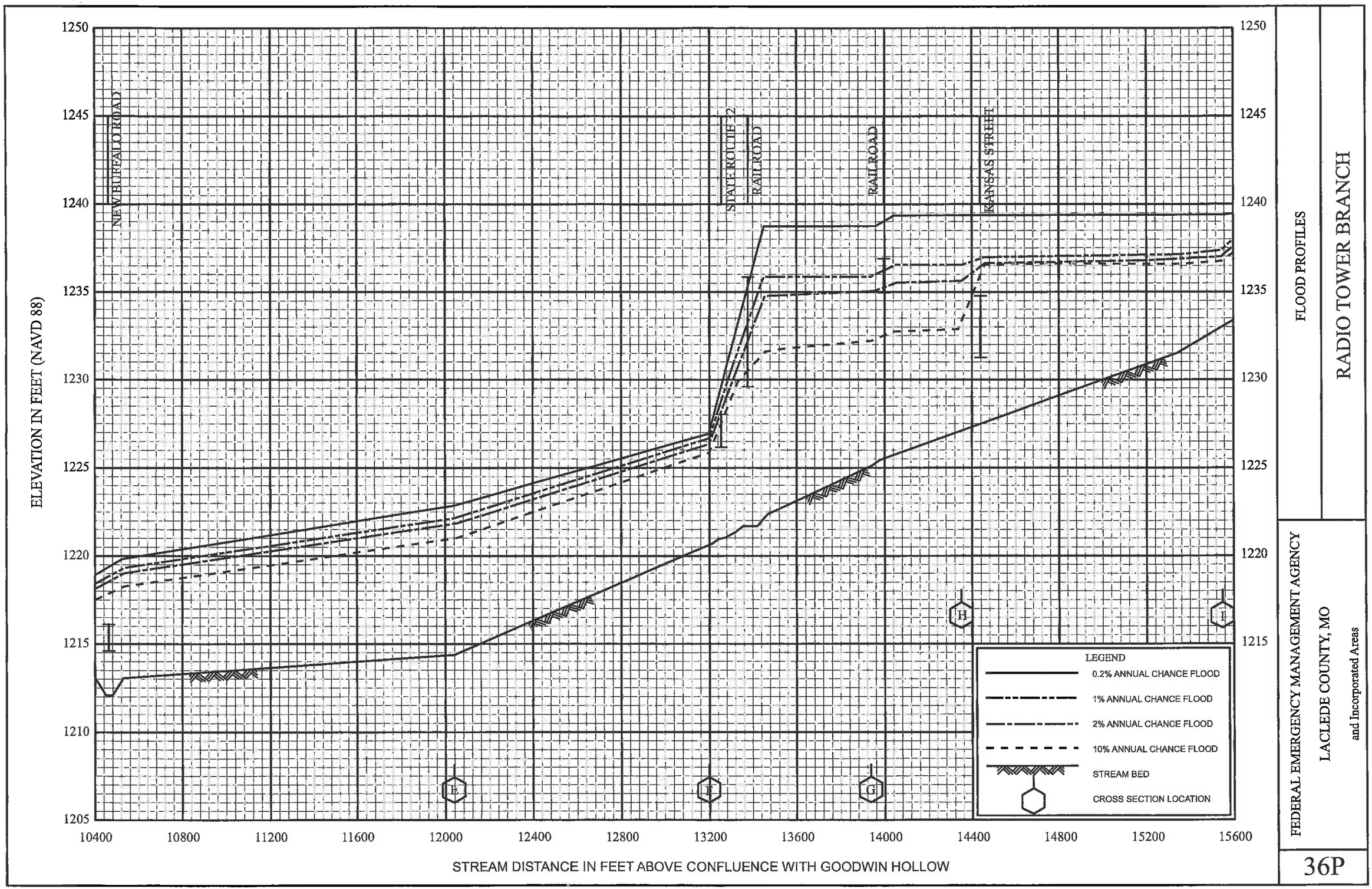
RADIO TOWER BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

35P



FLOOD PROFILES

RADIO TOWER BRANCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

LACLEDE COUNTY, MO

and Incorporated Areas

36P