# LLANO COUNTY FLOOD DAMAGE

# PREVENTION ORDER

# EFFECTIVE DATE: JANUARY 29, 2021

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# LLANO COUNTY FLOOD DAMAGE PREVENTION ORDER

## ARTICLE 1

## ADMINISTRATIVE PROVISIONS

### §1.1 SECTION A. STATUTORY AUTHORIZATION:

The Legislature of the State of Texas has in the Flood Control Insurance Act, Texas Water Code, Section 16.315, delegated the responsibility of local government units to adopt regulations designed to minimize flood losses. Therefore, the Commissioners Court of Llano County, Texas does ordain as follows:

### §1.2 SECTION B. ENACTMENT

(1) Therefore, the Commissioners Court of Llano County, Texas, by and in behalf of Llano County, Texas and the interest of the public, does hereby ordain and order the following regulations pursuant to all appropriate state and federal statutes described in these regulations, including but not limited to: Chapter 16, Subchapter I of the Texas Water Code (the Texas Flood Control and Insurance Act); Sections 4001-4027, Title 42 of the United States Code (the National Flood Insurance Act); and Title 44, Chapter I, Subchapter B, Parts 59, 60 of the Code of Federal Regulations.

(2) The Commissioners Court of Llano County, Texas hereby declares that this Llano County Flood Damage Prevention Order (order) is lawfully enacted, adopted, approved, and shall be enforced pursuant to and in compliance with the express and implied authority contained in the statutes and other authority described in these regulations.

### §1.3 SECTION C. FINDINGS OF FACT

(1) This order is enacted, adopted, approved, and shall be enforced to accomplish the worthwhile public purposes, as herein described.

(a) These regulations are designed to minimize flood losses and promote the public health, safety, and general welfare of the people. Llano County (County) is located in the Texas Hill Country. The County is historically susceptible to damage, injuries, and losses from flooding due to the County's topography and weather, and the presence of development (commercial and residential), transportation and utility infrastructure, and many people, located near its lakes and watercourses.

(b) The flood hazard areas of Llano County are subject to periodic inundation, which results in loss of life, property, health, and safety hazards, disruption of commerce and governmental services, and extraordinary public expenditures for flood protection and relief, all of which adversely

affect the public health, safety and general welfare of the people.

(c) These flood losses are created and made more severe by: (a) the cumulative effect of obstructions in floodplains which cause an increase in flood heights and velocities; and (b) by occupancy of flood hazard areas by uses vulnerable to floods and hazardous to other lands because they are inadequately elevated, flood proofed or otherwise protected from flood damage.

## §1.4 SECTION D. STATEMENT OF PURPOSE

(1) It is the purpose of this order to promote the public health, safety and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

(a) protect human life and health;

(b) minimize expenditure of public money for costly flood control projects;

(c) minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

(d) minimize prolonged business interruptions;

(e) minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets and bridges located in or near floodplains;

(f) help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to minimize future flood blight areas;

(g) ensure that potential buyers are notified that property is in a flood area; and

(h) regulate construction and other development in the floodplain as authorized by federal and state law.

## §1.5 SECTION E. METHODS OF REDUCING FLOOD LOSSES

(1) In order to accomplish its public purposes, this order, among other things, uses the following methods:

(a) It restricts or prohibits uses that are dangerous to health, safety or property in times of flood, or cause excessive increases in flood heights or velocities;

(b) It requires that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

(c) It controls the alteration of natural floodplains, stream channels, water courses, and natural protective barriers, which are involved in the accommodation of flood waters;

(d) It controls filling, grading, dredging and other development which may increase flood damage;

(e) It prevents or regulates the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards to other lands; and

(f) It regulates construction and other development in the floodplain as authorized by federal and state law.

(2) This order is reasonably taken, adopted, and approved to:

(a) fulfill an obligation mandated by federal and state law;

(b) regulate construction and other development in an area designated under law as a floodplain;

(c) regulate sewer and on-site sewage/sewer facilities (OSSF);

(d) prevent waste;

(e) protect rights of owners of interests in groundwater;

(f) prevent subsidence;

(g) provide a response to a real and substantial threat to public health and safety, said response being designed to significantly advance said purpose and not to impose a greater burden than is necessary to achieve said purpose;

(h) regulate water safety; and

(i) prevent imminent destruction of property or injury to persons from flooding within a floodplain established by a federal flood control program and enacted to prevent the flooding of buildings intended for public occupancy.

(3) The enactment, adoption, approval, and enforcement of this order shall accomplish, advance, and substantially achieve all public purposes described in this order.

## §1.6 SECTION F. NOTICE OF CONDITIONS PRECEDENT

All notice requirements and conditions precedent for the lawful enactment, adoption, approval, and enforcement of this order have been accomplished as required by law.

## §1.7 SECTION G. EFFECTIVE DATE

The effective date of this order is January 29, 2021.

## §1.8 SECTION H. SEVERABILITY/PARTIAL INVALIDITY

(1) Should any part of this order, or the application or enforcement thereof, be held or adjudged to be invalid by a court or regulatory agency, the remainder of these regulations shall remain fully operable, enforceable, and effective -- and said holding shall in no way affect the validity of the remaining parts of this order.

(2) Upon its effective date, this order supersedes any flood damage prevention order or floodplain management regulation previously adopted, approved, enacted, or ordered by the County prior to the effective date of this order.

## §1.9 SECTION I. ADOPTED AUTHORITY

(1) The Commissioners Court of Llano County, Texas declares that this Llano County Flood Damage Prevention Order is lawfully enacted, adopted, approved, and shall be enforced pursuant to and in compliance with the express and implied authority contained in the statutes and other authority described in these regulations.

(2) The following authority, and the express and implied regulatory powers therein granted to the County, are hereby adopted, approved, and incorporated by reference by the County to support the use, interpretation, application, and enforcement of this order: 42 U.S.C. §§ 4001-4127 (National Flood Insurance Act); 44 CFR Ch. I, Subch. B, Parts 59, 60 (National Flood Insurance Program or NFIP); TEX. CONST. art. 5, §18; TEX. WATER CODE Ch. 16, Subch. I (Texas Flood Control and Insurance Act); TEX. LOC. GOV'T CODE Chs. 232 (Subchs. A, E), 233, 242; TEX. PROP. CODE Chs. 12, 13; TEX. TRANSP. CODE §§201.619, 251.003, 251.008; the Highland Lakes Watershed Ordinance and the On-Site Sewage Facility (OSSF) or sewer rules of the Lower Colorado River Authority (LCRA); the Subdivision Regulations of Llano County or other subdivision regulations adopted by the County; the Llano County sewer, septic, or OSSF regulations; and all other authority described in these regulations.

(3) When a constitution, statute or administrative regulation is cited or described in this order, that citation to authority shall be construed to include its most recent version.

## §1.10 SECTION J. FEE SCHEDULE

A fee schedule relating to these regulations shall be approved, and adopted by the Commissioners Court. Unless otherwise designated, all required fees must be paid by the owner prior to the issuance of a floodplain development permit or other permit required by law.

## ARTICLE 2

## DEFINITIONS

### §2.1 SECTION A. COMMON USAGE AND SPECIAL DEFINITIONS

(1) Unless specially defined in these regulations, words or phrases used in this order shall be interpreted according to their common usage in order to result in the most reasonable application to give them the meaning they have in common usage and to give this order it's most reasonable application.

(A) The definitions described in 44 CFR Ch. I, Subch. B, Part 59, §59.1 are hereby incorporated by reference for use and application regarding this order. Should a conflict exist between a definition described in this order and that described in 44 CFR Ch. I, Subch. B, Part 59, §59.1, the more restrictive definition shall control. *See* 44 CFR Ch. I, Subch. B, Part 60, §60.1(d); TEX. WATER CODE §§ 16.311-16.315, 16.318-16.319.

(B) Unless otherwise designated, these terms and phrases have the following meanings:

**"ADDITION"** means an improvement that increases the square footage of a structure, including lateral additions added to the side or rear of a structure, vertical additions added on top of a structure, and enclosures added underneath a structure.

**"ALLUVIAL FAN FLOODING"** means flooding occurring on the surface of an alluvial fan or similar landform which originates at the apex and is characterized by high-velocity flows, active processes of erosion, sediment transport, deposition, and unpredictable flow paths.

**"APEX"** means a point on an alluvial fan or similar landform below which the flow path of the major stream that formed the fan becomes unpredictable and alluvial fan flooding can occur.

**"APPURTENANT STRUCTURE"** means a structure which is on the same parcel of property as the principal structure to be insured and the use of which is incidental to the use of the principal structure. This includes but is not limited to a detached garage, storage shed, gazebo, picnic pavilion, boathouse, barn, or other similar building.

**"AREA OF FUTURE CONDITON FLOOD HAZARD"** means the land area that would be inundated by the 1-percent-annual chance (100 year) flood based on future conditions hydrology.

**"AREA OF SHALLOW FLOODING"** means a designated AO, AH, AR/AO, AR/AH, or VO zone on a community's Flood Insurance Rate Map (FIRM) with a 1 percent or greater annual chance of flooding to an average depth of 1 to 3 feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

**"AREA OF SPECIAL FLOOD HAZARD"** and "special flood hazard area"-is the land in the FEMA mapped and designated floodplain within a community subject to a 1 percent or greater chance of flooding in any given year. The area may be designated as Zone A on the Flood Hazard Boundary Map (FHBM). After detailed rate-making has been completed in preparation for publication of the FIRM, Zone A usually is refined into Zones A, AO, AH, A1-30, AE, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, V1-30, VE or V.

**"BASE FLOOD"** means the flood having a 1 percent chance of being equaled or exceeded in any given year.

**"BASE FLOOD ELEVATION," "BASE FLOOD," AND "BFE"** are synonymous and mean the elevation shown on the Flood Insurance Rate Map (FIRM) and found in the accompanying Flood Insurance Study (FIS) for Zones A, AE, AH, A1-A30, AR, V1-V30, or VE that indicates the water surface elevation resulting from the flood that has a one percent (1%) chance of equaling or exceeding that level in any given year.

**"BASEMENT"** means any area of the building having its floor sub grade (below ground level) on all sides.

**"BREAKAWAY WALL"** means a wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system of the building.

**"CERTIFICATE OF COMPLIANCE"** means the certificate to be issued from the FPA or the County to the applicant indicating, pursuant to the provisions of this order, that all conditions of the floodplain permit having been met upon completion of the project.

**"CFR"** means the Code of Federal Regulations.

**"COMMISSIONERS COURT," "APPEAL BOARD," AND "COMMUNITY"** are synonymous and mean the Llano County Commissioners Court.

**"COMMUNITY"** means any State or area or political subdivision thereof, or any Indian tribe or authorized tribal organization, or Alaska Native village or authorized native organization, which has authority to adopt and enforce floodplain management regulations for the areas within its jurisdiction. Therefore, as used herein, "community" means the Llano County Commissioners Court, the governing body of Llano County, Texas, with authority to adopt and enforce floodplain management regulations within its jurisdiction.

**"CONDITIONAL LETTER OF MAP REVISION" OR"CLOMR"** is synonymous and mean FEMA's comment on a proposed project that would, upon construction, affect the hydrologic or hydraulic characteristics of a flooding source and thus result in the modification of the effective Base Flood Elevations (BFEs), or the Special Flood Hazard Area (SFHA).

**"COUNTY"** means Llano County, Texas, a county and political subdivision of the State of Texas, including and acting through its elected officials, appointed officials, employees, and agents.

**"COUNTY CLERK"** means the County Clerk of Llano County.

**"COUNTY JUDGE"** means the County Judge of Llano County;

**"CRITICAL FEATURE"** means an integral and readily identifiable part of a flood protection system, without which the flood protection provided by the entire system would be compromised.

**"DEES"** means the Llano County Department of Environmental and Emergency Services.

**"DEVELOPER," "OWNER," "APPLICANT," AND "SUBDIVIDER"** are synonymous and mean the fee simple owner of land which desires to obtain a development permit, including the directors, officers, partners, members, managers, employees, and agents thereof.

**"DEVELOPMENT"** means any man-made change to improved and unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials.

**"ELEVATED BUILDING"** means, for insurance purposes, a non-basement building, which has its lowest elevated floor, raised above ground level by foundation walls, shear walls, posts, piers, pilings, or columns.

**"ERM"** means elevation reference mark.

"**ETJ**" means the extraterritorial jurisdiction of a municipality in Texas, according to Texas law.

**"EXISTING CONSTRUCTION" OR "EXISTING STRUCTURES"** mean, for the purposes of determining flood insurance premium rates, structures for which the "start of construction" commenced before the effective date of the FIRM or before September 18, 1991 for FIRMs effective before that date.

**"EXISTING MANUFACTURED HOME/RV PARK OR "SUBDIVISION"** mean a manufactured home or RV park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

**"EXPANSION TO AN EXISTING MANUFACTURED HOME PARK" OR "SUBDIVISON/RV PARK"** means the preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes or RVs are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

**"FACILITY" AND "INFRASTRUCTURE"** are synonymous.

**"FEMA"** means the Federal Emergency Management Agency.

**"FLOOD" OR "FLOODING"** are synonymous and mean a general and temporary condition of partial or complete inundation of normally dry land areas from: (a) the overflow of inland or tidal waters; or (b) the unusual and rapid accumulation or runoff of surface waters from any source.

**"FLOOD CARRYING CAPACITY,"** as related to a watercourse, means the flood carrying capacity of the channel (except in the case of alluvial fans, where a channel is not typically defined).

**"FLOOD ELEVATION STUDY"** means an examination, evaluation and determination of flood hazards and, if appropriate, corresponding water surface elevations, or an examination, evaluation and determination of mudslide (i.e., mudflow) and/or flood-related erosion hazards.

**"FLOOD INSURANCE RATE MAP" OR "FIRM"** are synonymous and mean an official map of a community, on which the FEMA has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

**"FLOOD INSURANCE STUDY" OR "FIS"** are synonymous and mean the official report provided by the Federal Emergency Management Agency that examines, evaluates and determines the flood hazards and, if appropriate, corresponding flood profiles and water surface elevations. It can also be the examination, evaluation, and determination of mudslide and/or flood-related erosion hazards. See Flood Elevation Study.

**"FLOODPLAIN" OR "FLOODPRONE AREA"** are synonymous and mean any land area located in the FEMA mapped and designated floodplain susceptible to being inundated by water from any source (see definition of flooding).

**"FLOODPLAIN DEVELOPMENT PERMIT"** means a development permit issued by the FPA or the County to allow development in the floodplain.

**"FLOODPLAIN MANAGEMENT"** means the operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations, including the provisions of this order.

**"FLOODPLAIN MANAGEMENT REGULATIONS"** means zoning orders, subdivision regulations, building codes, health regulations, special purpose orders (such as a floodplain order, grading order and erosion control order) and other applications of police power which apply to the development and land use in flood prone areas. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

**"FLOODPROOFING"** means any combination of structural and non-structural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents, and includes the provisions of FEMA Technical Bulletins TB 1-93, TB 3-93 and TB 7-93, or more FEMA recent bulletins, regarding guidelines on flood proofing.

**"FLOOD PROTECTION SYSTEM"** means those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the area within a community subject to a "special flood hazard" and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

**"FLOODWAY"** is synonymous with "regulatory floodway," as defined in these regulations. See Regulatory Floodway.

**"FPA"** means the Llano County Floodplain Administrator.

**"FREEBOARD"** means a factor of safety usually expressed in feet above a flood level for purposes of floodplain management. Freeboard tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

**"FUNCTIONALLY DEPENDENT USE"** means a use, which cannot perform its intended purpose unless it is located or carried out in close proximity to water. The term includes only docking facilities or port facilities that are necessary for the loading and unloading of cargo or passengers, and ship building and ship repair facilities, but does not include long-term storage or related manufacturing facilities.

**"HIGHEST ADJACENT GRADE"** means the highest natural elevation of the ground surface prior to construction next to the proposed walls of a structure.

**"HISTORIC STRUCTURE"** means any structure that is: (a) listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the federal Secretary of the Interior as meeting the requirements for individual listing on the National Register; (b) certified or preliminarily determined by the Secretary

of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district; (c) individually listed on a state inventory of historic places in states with historic preservation programs which have been approved by the Secretary of Interior; or (d) individually listed on a local inventory or historic places in communities with historic preservation programs that have been certified either (i) by an approved state program as determined by the Secretary of the Interior, or (ii) directly by the Secretary of the Interior in states without approved programs.

**"LCRA"** means the Lower Colorado River Authority.

**"LEVEE"** means a man-made structure; usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

**"LEVEE SYSTEM"** means a flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

**"LOWEST ADJACENT GRADE"** means the lowest point of the ground level immediately next to a building.

**"LOWEST FLOOR"** means the lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking or vehicles, building access or storage in an area other than a basement area is not considered a building's lowest floor; provided that such enclosure is not built so as to render the structure in violation of the applicable non-elevation design requirement of 44 CFR Ch. I, Subch. B, Part 60, §60.3.

**"MANUFACTURED HOME"** means a structure transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when connected to the required utilities. "Manufactured home" does not include a "recreational vehicle" until the recreational vehicle becomes a permanent structure.

**"MANUFACTURED HOME/RV PARK" OR "SUBDIVISION"** means a parcel (or contiguous parcels) of land divided into two or more manufactured home/RV lots for rent or sale.

**"MEAN SEA LEVEL"** means, for purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1988 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map (FIRM) are referenced.

**"MORE RESTRICTIVE,"** as applied to a conflict analysis between a provision or definition in this order, as compared to a definition or provision in a statute or an administrative regulation, means the provision or definition which provides the most protection to: (a) eliminate or minimize flood losses; and (b) promote the public health, safety, and general welfare of the people.

**"NEW CONSTRUCTION"** means, for the purpose of determining insurance rates, structures for which the "start of construction" commenced on or after the effective date of an initial FIRM or after May 2, 2012, whichever is later, and includes any subsequent improvements to such structures. For floodplain management purposes, "new construction" means structures for which the "start of construction" commenced on or after the effective date of a floodplain management regulation adopted by a community, including this order, and includes any subsequent improvements to such structures.

**"NEW MANUFACTURED HOME/RV PARK" OR "SUBDIVISON"** means a manufactured home or RV park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of floodplain management regulations adopted by a community, including these regulations.

**"NFIP"** means the National Flood Insurance Program under federal law.

**"ORDINANCE" AND "RESOLUTION"** mean an ordinance or resolution of the Commissioners Court.

**"OSSF"** means on-site sewage (or sewer) facility, and includes septic systems.

**"PERMIT"** means a Llano County Floodplain Development Permit required by these rules, or another permit required by law for development.

**"PLAT"** means a preliminary or final plat required by these rules or the Llano County Subdivision Regulations, including all required signatures, dates, certifications, seals, and supporting and attached documents.

**"RECREATIONAL VEHICLE" OR "RV"** are synonymous and mean a vehicle which is: (a) built on a single chassis; (b) 400 square feet or less when measured at the largest horizontal projections; (c) designed to be self-propelled or permanently towable by a light duty truck; and (d) designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use. An RV may not permanently attach any additions or remain at the same location for more than one hundred eighty (180) days or be tied to permanent septic, water, or electricity.

**"REFERENCE MARK"** means a point of vertical ground elevation reference to be shown on the FIRM for comparison to the BFE. ERMs shall be referenced to the National Geodetic Vertical Datum (NGVD29) or the North American Vertical Datum (NAVD88).

**"REGULATIONS," "ORDER," OR RULES"** are synonymous and mean this Llano County Flood Damage Prevention Order.

**"REGULATORY FLOODWAY"** means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

**"RIVERINE"** means relating to, formed by, or resembling a river (including tributaries), stream, brook, etc., including any watercourse.

**"SEWER" AND "WASTEWATER"** are synonymous.

**"SITE PLAN"** means a set of detailed engineering drawings that depicts the location, dimensions and function of proposed improvements on a given parcel of land with respect to drainage, floodplains, utilities, erosion control and other site construction related aspects of the project. A site plan, when required by this order, shall be submitted by the applicant or developer in accordance with and pursuant to all requirements of generally accepted engineering, practice, standards and procedure in Texas, as defined by: (a) Title 6, Subtitle A (Regulation of Engineering and Related Practices) of the Texas Occupations Code; and (b) Title 22, Chapters 131-135 (Rules Concerning the Practice of Engineering and Professional Engineering Licensure) of the Texas Administrative Code.

**"SPECIAL FLOOD HAZARD AREA"** See Area of Special Flood Hazard.

**"START OF CONSTRUCTION"** (for other than new construction or substantial improvements under the Coastal Barrier Resources Act (Pub. L. 97-348)), includes substantial improvement and means the date the building or development permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition placement, or other improvement was within one hundred eighty (180) days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site, such as the pouring of slab or footings, the installation of piles, the construction of columns, or any work beyond the stage of excavation; or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for basement, footings, piers or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

**"STATE"** means the State of Texas.

**"STATE COORDINATING AGENCY"** means the Texas Water Development Board (TWDB) or its successor agency.

**"STRUCTURE"** means, for floodplain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home.

**"SUBSTANTIAL DAMAGE"** means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.

**"SUBSTANTIAL IMPROVEMENT"** means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty percent (50%) of the market value of the structure before "start of construction" of the improvement. This term includes structures which have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either: (a) any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or Structures built prior to September 18, 1991 are allowed to their existing status and may be improved where such improvements do not to exceed fifty percent (50%) of the current improvement (structure only) appraised value and are not required to meet current elevation and other floodplain standards. Compliance to local codes and life-safety requirements including electrical, plumbing and safety measures may be required of pre-firm structures. (b) any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure." When a structure, pre-firm or post-firm, is found to have been remodeled or repaired without a floodplain development permit and some of that work is claimed to have been done by a previous owner the FPA shall use the FEMA SDE(Substantial Damage Estimator) to determine the total value of the improvements. Should that figure exceed 50% of the appraised value of the structure at the time of the current owners purchase of the structure, the structure shall be declared substantially improved, and the structure must be made compliant.

***Amended on 9/08/2014 Commissioners Court**

**"TCEQ"** means the Texas Commission on Environmental Quality or its successor agency.

**"TRACT" OR "LAND"** are synonymous and mean real property located in Llano County, Texas.

**"TWDB"** means the Texas Water Development Board or its successor agency.

**"VARIANCE"** means a grant of relief by a community from the terms of a floodplain management regulation, including all variance components or provisions described by 44 CFR Ch. I, Subch. B, Part 60, §60.6 and this order.

**"VIOLATION"** means the failure of a structure or other development to be fully compliant with: (a) the community's floodplain management regulations; (b) this order; or (c) the provisions of TEX. WATER CODE §§ 16.322-16.324 or 44 CFR Ch. I, Subch. B, Part 60, §60.3. A structure or other development without the elevation certificate, other certifications, or other evidence of

compliance required in 44 CFR Ch. I, Subch. B, Part 60, §60.3(b)(5), (c)(4), (c)(10), (d)(3), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.

**"WATERCOURSE"** means only the channel and banks of an identifiable watercourse, and not the adjoining floodplain areas.

**"WATER SURFACE ELEVATION"** means the height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929, North American Vertical Datum of 1988, or other datum, where specified, of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

**"ZONE A" OR "A ZONE"** is synonymous with "area of shallow flooding and "area of special flood hazard."

## §2.2 SECTION B. INTERPRETATION GUIDE

(1) Singular nouns and pronouns shall include the plural, and the masculine gender shall include the feminine gender, where necessary for a correct interpretation of this order.

(2) In the interpretation of this order, all provisions shall be: (a) considered as minimum requirements; (b) liberally construed in favor of the Commissioners Court, the governing body; and (c) deemed neither to limit nor repeal any other powers granted under federal or state law, or local ordinance. Should a conflict exist between a provision of this order and that described in 44 CFR Ch. I, Subch. B, Parts 59, 60, §59.1, 60.3(c) (either or both), the more restrictive provision shall control. *See* 44 CFR Ch. I, Subch. B, Part 60, §60.1(d); TEX. WATER CODE §§ 16.311-16.315, 16.318-16.319.

# ARTICLE 3

# GENERAL PROVISIONS

## §3.1 SECTION A. LANDS TO WHICH THIS ORDINANCE APPLIES

This order shall apply to all areas of special flood hazard within the jurisdiction of Llano County, Texas.

## §3.2 SECTION B. BASIS FOR ESTABLISHING THE AREA OF SPECIAL FLOOD HAZARD

The areas of special flood hazard identified by the Federal Emergency Management Agency in the current scientific and engineering report entitled, The Flood Insurance Study (FIS) for Llano County, dated Effective January 29, 2021, with accompanying Flood Insurance Rate Maps and/or Flood Boundary-Floodway Maps (FIRM and/or FBFM) dated January 29, 2021, and all subsequent amendments and/or revisions thereto, are hereby adopted by reference and declared to be a part of this order.

## §3.3 SECTION C. ESTABLISHMENT OF FLOODPLAIN PERMIT

(1) The issuance of a floodplain development permit shall be required to ensure compliance to the provisions of this order. Any development in an area of special flood hazard shall require the issuance of a floodplain development permit.

(2) Reasonable fees for the issuance of a floodplain development permit shall be adopted, and approved by the Commissioners Court by separate order.

## §3.4 SECTION D. COMPLIANCE

(1) No structure or land shall be located, altered, or have its use changed without full compliance with the terms of this order and other applicable regulations -- including applicable federal, state, county, or municipal statutes, regulations, or orders.

(2) No development shall occur, and no structure or land shall be hereafter constructed, located, extended, converted, or altered, without full compliance with the terms of this order and other applicable regulations -- including applicable federal, state, county, or municipal statutes, regulations, or orders.

## §3.5 SECTION E. ABROGATION AND GREATER RESTRICTIONS

This order is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this order and another order, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

## §3.6 SECTION G. WARNING AND DISCLAIMER OF LIABILITY

The degree of flood protection required by this order is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. On rare occasions, greater floods can and will occur, and flood heights may be increased by man-made or natural causes. This order does not imply that land outside the areas of special flood hazards or uses permitted within such areas will be free from flooding or flood damages. This order shall not create liability on the part of the community, same being Llano County, Texas; or any official or employee thereof, for any flood damages that result from reliance on this order or any administrative decision lawfully made hereunder.

# ARTICLE 4

# ADMINISTRATION

## §4.1 SECTION A. DESIGNATION OF THE FLOODPLAIN ADMINISTRATOR

The Llano County Department of Environmental and Emergency Services Administrator is hereby appointed the Floodplain Administrator (FPA) to administer and implement the provisions of this order, the appropriate sections of 44 CFR Ch. I, Subch. B, Parts 59 and 60, (Emergency Management and Assistance -- National Flood Insurance Program Regulations), and other authority pertaining to floodplain management.

## §4.2 SECTION B. DUTIES & RESPONSIBILITIES OF THE FLOODPLAIN ADMINISTRATOR

(1) The duties and responsibilities of the Floodplain Administrator (FPA) shall include, but are not limited to, the following:

(A) The FPA shall maintain and hold open for public inspection all records pertaining to the provisions of this Order.

(B) The FPA shall review permit applications to determine compliance with this order and whether to ensure that the proposed development building site project, including placement of manufactured homes:

(1) will be reasonably safe from flooding; and

(2) will not adversely impact other properties.

(C) The FPA Shall review, approve, or deny all development permit applications required by the adoption of this order, and all permit applications shall be submitted using the forms and site plan required by this order. Unless otherwise described in this order, the FPA shall establish reasonable guidelines for the timely application, review, approval, or denial of all permit applications, extensions, certificates of compliance, or variance requests.

(D) The FPA Shall review permits for proposed development to assure that all necessary permits have been obtained from those federal, state or local governmental agencies (including Section 404 of the Federal Water Pollution Control Act Amendments of 1972, 33 U.S.C. 1334) from which prior approval is required.

(E) Where interpretation is needed as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions) the FPA shall make the necessary interpretation. If a structure or any development is to take place adjacent to a river, creek, stream, or drainage area that is located in the mapped FEMA designated floodplain, the FPA may require a floodplain permit to include a FEMA Elevation Certificate.

(F) The FPA shall notify, in riverine situations, adjacent communities and the State Coordinating Agency, which is the Texas Water Development Board (TWDB), and also The Texas Commission on Environmental Quality (TCEQ), prior to any alteration or relocation of a

watercourse, and submit evidence of such notification to FEMA.

(G) The FPA shall assure that the flood carrying capacity within the altered or relocated portion of any watercourse is maintained.

(H) When base flood elevation data has not been provided in accordance with this order, the FPA shall obtain, review and reasonably utilize any base flood elevation data and floodway data available from federal or state engineering data, or other competent engineering data, in order to administer the provisions of this order. In Zone A and Zone X floodplains where documented high water marks have been recorded, the FPA may allow a maximum of three (3) feet to be added to establish a required elevation.

(I) When a regulatory floodway has not been designated, the FPA must require that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zone A, Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one (1) foot at any point within the community. The FPA may require a CLOMR and/or a detailed engineering study in order to comply with federal or state law, this order, or to ensure that proposed development does not increase the base flood elevation more than one (1) foot at any point within the community. The FPA shall require a CLOMR and/or detailed engineering study when proposed development may alter or relocate a portion of a river (or tributary thereof), stream, brook, or watercourse, including the channel or banks thereof, in order to ensure compliance with federal or state law, or this order, said compliance to include a sufficient determination that:

(1) the flood carrying capacity within an altered or relocated portion of any watercourse is maintained to the same or greater capacity, and

(2) the proposed development does not increase the base flood elevation more than one (1) foot at any point within the community.

(J) The FPA shall file an affidavit with the Llano County Clerk's office when a permit is issued for a structure in the floodplain that has a lower level below the Base Flood Elevation. Such structures are restricted to parking, storage, or building access areas. The affidavit shall describe the legal description, physical address and restrictions placed on the structure.

(K) A Certificate of Compliance for all new structures and pre-firm structures, renovated with a lower level below the Base Flood Elevation, shall be issued by the FPA when all conditions of an approved and issued floodplain permit have been met upon completion of the project. The Final Elevation Certificate, letter of confirmation from the owner and any other requirements of the permit must be received by the FPA prior to issuance of a Certificate of Compliance.

(L) A floodplain development permit shall expire one hundred-eighty (180) days after: (a) the date of issuance by the FPA; or (b) regarding an appeal from a permit denial, the date of the

Appeal Board's decision to grant the permit.

(M) An existing (not expired) floodplain development permit may be extended by the FPA for an additional one-hundred-eighty (180) day period, for good cause shown by the applicant pursuant to the following requirements:

(1) The applicant must apply for the extension through a letter submitted to the FPA prior to the expiration of the existing permit.

(2) The applicant's extension request letter must be accompanied by sufficient representations and proof to establish good cause for the permit extension, including at minimum that: (i) the conditions and circumstances existing at the time of permit issuance have not changed or been altered in any material or significant way; and (ii) any construction or other development, if any, performed on the site of the proposed development occurred in compliance with the existing permit and this order.

(3) At his discretion, the Office of the FPA may inspect the development site to confirm the representations and proof contained in the extension request letter.

(4) Should the extension be granted by the FPA, the existing permit shall be extended for an additional one-hundred eighty (180) day period; however, no additional permit extensions shall be allowed.

(N) Should a "detailed engineering study" (study) be required or imposed by the FPA under the provisions of this order, the following requirements shall apply:

(1) The study shall be conducted and submitted to the FPA at the sole expense of the applicant.

(2) Upon submission of the study to the FPA, an additional fee shall be paid by the applicant to the County in an amount described in the Fee Schedule. Said fee shall serve as reimbursement to the County for its engineering review of the study.

(3) The study shall be competently performed, signed, and sealed by applicant's registered professional civil engineer licensed to practice in Texas pursuant to accepted practice standards and rules of conduct required by a Texas registered professional civil engineer. All data, charts, drawings, maps, or other material produced by said engineer in the study shall be attached to the study. All data reviewed by said engineer shall be attached to the study or accurately described therein.

(4) For the entire period of the proposed permit (180 days), as the same may be renewed from time to time, the study shall accurately describe the project area and the planned development activity. That description shall include, at minimum, a description of the following: (i) all work areas -- meaning all land upon which project or development operations of any kind shall

occur during the period in the current floodplain according to the FEMA certified Flood Insurance Rate Map (FIRM) in affect at the time of the study; and (ii) the adjacent land located 500 feet upstream and 500 feet downstream from the work areas.

(5) For the entire period of the proposed permit (180 days), as the same may be renewed from time to time, the study shall include accurate descriptions of the work and development to be conducted in the project area, including at minimum, the following: (i) any dredging, mining, excavation, or fill activity; (ii) the operation, transport, or storage of motor vehicles, equipment, or materials; (iii) the land upon which any development shall occur; (iv) the location and dimensions (*i.e.*, size, shape, depth, length, height, and width) of any areas undergoing or designated for dredging, mining, excavation, or fill activities, or any fill or material storage; (v) the locations on which structures, motor vehicles, or equipment, currently exist or shall be placed or constructed to conduct or support project operations; and (vi) the construction and development plans and drawings regarding any buildings, structure, or other development to be constructed, placed, enhanced, or improved on the project site.

(6) The best available topographic data for the project area shall be obtained and used in the study, same being at least a 2-foot interval aerial topography, if available. If said data is not available, USGS data supplemented by ground survey sections in areas of interest (or other competent topographic data from a government source) shall be permissible for use in the study.

(7) A HEC-RAS model or a variation of such model, or an alternative model approved by the FPA in writing, shall be developed using cross-sections taken from the topographic data and 100-year flood flows used in the 1991 FIS study completed by the LCRA or other County approved study. This model will be the "pre-development" model from which the "post-development" model is compared. Using the same cross-section locations, the sections may be modified to reflect the proposed project development activities, and the model shall be rerun based upon the projected post-development conditions.

(8) A comparison of the pre-development model conditions and projected post-development model conditions shall be conducted regarding the water surface elevations for the two conditions. If the base flood elevation (BFE) changes are less than 1.0-foot, no CLOMR submission shall be required, as hereafter described. If the BFE changes are greater than 1.0-foot, then a model and review shall be conducted regarding possible changes in the project operation that will produce changes of less than 1.0-foot.

(9) A CLOMR submission to FEMA by the applicant shall not be required if the study shows that BFE changes are less than 1.0-foot.

(10) A CLOMR submission to FEMA by the applicant shall be required if: (i) the study is not performed in compliance with this order; (ii) the study shows that the proposed development would increase or decrease the BFE at any location in the project area greater than 1.0-foot; or (iii) the study shows that the flood carrying capacity of any river, stream, or watercourse within the project area is not maintained (as required by this order), or is diminished.

(O) Should a CLOMR submission to FEMA by the applicant be required or imposed by the this order, no final permit decision shall be made by the FPA until: (a) the CLOMR application is prepared and submitted by the applicant to the FEMA Administrator for review, comment, and appropriate action; and (b) a copy of FEMA's response is received and reviewed by the FPA.

(2) Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program regulations, a community may approve certain development in Zones A1-30, AE, AH, on the community's FIRM which increases the water surface elevation of the base flood by more than one (1) foot, provided that the community first completes all of the provisions required by Section 65.12 of said CFR regulations.

## §4.3 SECTION C. PERMIT PROCEDURES

(1) A floodplain development permit must be approved, issued, and obtained from the FPA before any construction or other development may begin in any special flood hazard area within the jurisdiction of Llano County.

(2) An application for a floodplain development permit shall be presented to the FPA in duplicate on forms furnished by the FPA and include: (a) a site plan in duplicate, drawn to scale, which includes but is not limited to showing the location, dimensions and elevation of proposed landscape and terrain alterations; (b) existing and proposed structures, including the placement of manufactured homes; (c) location of the foregoing in relation to areas of the special flood hazard area and floodway; (d) proposed locations of water supply, sanitary sewer, and utilities; (e) if available, the base flood elevation from the flood insurance study; (f) ground elevations at building corners of proposed new and substantially improved structures;

(3) Building plans shall be drawn to scale, and include:

(A) elevation in relation to mean sea level of the lowest floor (including basement) of all existing and substantially improved structures;

(B) proposed elevation in relation to mean sea level to which any nonresidential structure will be flood proofed, (see FEMA Technical Bulletin TB 3-93);

(C) if applicable, a certificate from a registered professional engineer or architect that the nonresidential flood proofed structure shall meet the flood proofing criteria of this order, and for a crawl-space foundation, the location and total net area of foundation openings (see FEMA Technical Bulletins 1-93 and 7-93);

(D) for foundations placed on fill, the location and height of fill, and compaction to be achieved in compliance with this order; and

(E) a description of the extent to which any watercourse or natural drainage will be

altered or relocated as a result of proposed development – including sufficient engineering data to ensure that:

(1) the flood carrying capacity within an altered or relocated portion of any watercourse is maintained to the same or greater capacity; and

(2) the proposed development does not increase the base flood elevation more than one (1) foot at any point within the community.

(4) For all new and substantially improved development that is below the base flood elevation (BFE), the following inspection procedures shall apply:

(A) A preliminary and final inspection shall be required, with additional fees to be charged, in order to confirm compliance with this order and the floodplain development permit.

(B) Should the development pass the final inspection, a certificate of compliance shall be issued by the FPA.

(C) Should the development fail the preliminary or final inspection, a grace period (to be determined by the FPA, but in no event more than sixty (60) days) may be granted to allow for an attempted correction of the deficiencies and provide for the scheduling of another inspection.

(D) Should the proposed development fail the preliminary or final, inspection -- or fail the inspection scheduled after the granting of the aforementioned grace period allowed by the FPA, if any -- the floodplain development application permit that was previously granted shall be denied and rescinded, and any resulting structure or other development shall be classified as non-compliant with this order and subject to enforcement as herein provided.

(5) Approval or denial of a floodplain development permit by the FPA shall be based on all of the provisions of this order and the following relevant factors:

(A) the danger to life and property due to flooding or erosion damage;

(B) the susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;

(C) the danger that materials may be swept onto other lands to the injury of others;

(D) the compatibility of the proposed use with existing and anticipated development;

(E) the safety of access to the property in times of flood for ordinary and emergency vehicles;

(F) the costs of providing governmental services during and after flood conditions

including maintenance and repair of streets and bridges, and public utilities and facilities such as sewer, gas, electrical and water systems;

(G) the expected heights, velocity, duration, rate of rise and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site;

(H) the necessity to the facility of a waterfront location, where applicable; and

(I) the availability of alternative locations, not subject to flooding or erosion damage, for the proposed use.

(6) A floodplain development permit shall not be approved or issued by the FPA if the proposed development violates this order -- or existing and applicable federal, state, or local law, including but not limited to: (a) the Highland Lakes Watershed Ordinance and the OSSF or sewer rules of the LCRA; (b) the Subdivision Regulations of Llano County or other subdivision regulations adopted by the County; (c) the Llano County sewer, septic, or OSSF regulations; and (d) all other authority described in these regulations.

(7) Drawings or maps submitted to the FPA shall be drawn to the following scales: (1) for detail drawings, a scale of one-fourth inch (1/4") per foot is required; and (2) for all other drawings or maps, a scale of ten (10) feet per inch is required.

(8) Development forms for the procedures and fee schedule described in these regulations shall be adopted and approved by the Commissioners Court by separate order for use by the public and county staff. These forms may not be altered or revised without further consideration and adoption by the Commissioners Court. Copies of these forms may be obtained from the FPA's Office or from the County's internet website.

## §4.4 SECTION D. VARIANCE AND APPEAL PROCEDURES

(1) The Appeal Board (the Commissioners Court), established by the community, shall hear and render judgment on: (a) request for a variance from the requirements of this order; (b) an appeal from the FPA's denial of a floodplain development permit; (c) an appeal from the FPA's denial of a certificate of compliance; (d) a written request for a variance from the requirements of this order. As a prerequisite to any action taken by the Appeal Board, the developer or applicant must properly submit the appeal or request for variance to the Appeal Board in compliance with this order.

(2) The Appeal Board shall hear and render judgment on an appeal only when it is alleged there is an error in any requirement, decision, or determination made by the FPA in the enforcement or administration of this order.

(3) Any person or persons aggrieved by a decision of the Appeal Board may appeal such decision in the courts of competent jurisdiction.

(4) The FPA shall maintain a record of all actions involving an appeal and shall report variances to FEMA upon request. The variance standards and procedures described in 44 CFR Ch. I, Subch. B, Part 60, §60.6 are incorporated by reference for the support, use, application, and enforcement of this order.

(5) Variances may be issued for the reconstruction, rehabilitation or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places, without regard to the procedures set forth in the remainder of this order.

(6) Variances may be issued for new construction and substantial improvements to be erected on a lot of 1/2 acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing that the relevant factors in §4.3 of this order have been fully considered. As the lot size increases beyond the 1/2 acre, the technical justification required for issuing the variance increases.

(7) Upon consideration of the factors noted above and the intent of this order, the Appeal Board may attach such conditions to the granting of variances as it deems necessary to further the purpose and objectives of this order.

(8) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

(9) Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.

(10) The prerequisites for the granting of a variance are as follows:

(A) A variance shall be issued only upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

(B) A variance shall be issued only upon a: (1) showing of good and sufficient cause described in a written variance application submitted to the Appeal Board in compliance with this order before the start of construction or any development; (2) determination that failure to grant the variance will result in exceptional hardship to the applicant, and (3) determination that the granting of the variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, the creation of nuisances, the causation of fraud on or the victimization of the public -- or a violation of existing and applicable federal, state, or conflict with local law or orders, including but not limited to (i) the Highland Lakes Watershed Ordinance and the OSSF or sewer rules of the LCRA, (ii) the Subdivision Regulations of Llano County or other subdivision regulations adopted by the County, (iii) the Llano County sewer, septic, or OSSF regulations, and (iv) the other authority described in these regulations.

(C) Any Applicant to which a variance is granted shall be given written notice that the structure will be permitted to be built with the lowest floor elevation below the base flood elevation, and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

(11) Variances may be issued by a community for new construction and substantial improvements and for other development necessary for the conduct of a functionally dependent use provided that: (a) the criteria of §4.3 of this order are met; and (b) the structure or other development is protected by methods that minimize flood damages during the base flood and create no additional threats to public safety.

(12) Variances may not be granted regarding any fee required by this order, with the exception of a fee variance requested by a governmental entity.

(13) APPLICATION PROCEDURE/VARIANCE APPLICATION -- Applications for variance shall be submitted by the applicant to the Appeal Board (through delivery to the County Judge) on or before twenty (20) days from the submission of an application for a floodplain development to the FPA. The variance application shall be in writing and submitted on the Floodplain Development Variance Application form. A copy of the variance application shall be delivered to the FPA contemporaneously with its submission to the Appeal Board.

(14) APPEAL PROCEDURE/DENIAL OF PERMIT OR CERTIFICATE OF COMPLIANCE -- Appeals from the FPA's denial of a floodplain development permit or certificate of compliance shall be submitted by the appellant to the Appeal Board (through delivery to the County Judge) on or before ten (10) days from the decision of the FPA. The appeal shall be in writing and submitted on the Floodplain Development Permit/Certificate of Compliance Appeal form. A copy of the appeal documents shall be delivered to the FPA contemporaneously with their submission to the Appeal Board.

(15) APPEAL BOARD PROCEEDING/ADJUDICATION OF VARIANCE APPLICATION -- When necessary to adjudicate a variance application, the Appeal Board (the Commissioners Court) shall convene for the variance proceeding at a public meeting of the Commissioners Court to hear evidence and render a decision, pursuant to the following procedures:

(A) Within ten (10) days of the submittal of the **variance application**, the applicant shall request an Appeal Board proceeding. The applicant shall submit the request in writing to the Appeal Board through the Office of the County Judge, with a copy thereof delivered to the FPA. Failure to timely request the Appeal Board proceeding shall result in the denial of the application.

(B) All Appeal Board proceedings related to a variance application shall be requested by the applicant to occur within forty-five (45) days from the date of the submitted **variance application**. Notwithstanding the above, the Commissioners Court may schedule the Appeal Board proceeding pursuant to docket availability, time limitations or availability, convenience of the participants, and other reasonable scheduling issues.

(C) Notice of the Appeal Board proceeding shall be effected through the public meeting agenda posting procedures of the Commissioners Court, and through written notice delivered to the applicant by the Office of the County Judge at least seven (7) days prior to the proceeding.

(D) The County Judge shall preside at the Appeal Board proceeding, which shall occur at a public meeting of the Commissioners Court.

(E) During the Appeal Board proceeding, the FPA, applicant, and all interested parties may: (1) attend the proceeding; (2) at least three (3) days prior to the proceeding, submit written evidence to the Office of the County Judge for consideration by the Appeal Board; and (3) testify regarding the relevant issues.

(F) The decision of the Appeal Board shall be adjudicated, deliberated, rendered, and pronounced at a public, open session meeting of the Commissioners Court. The decision of the Appeal Board shall be the result of a majority vote of the quorum then present of the Appeal Board, and shall be reduced to writing and filed in the official minutes of the Commissioners Court.

(16) APPEAL BOARD PROCEEDING/ADJUDICATION OF APPEAL -- When necessary to adjudicate an **appeal** from the FPA's denial of a floodplain development permit or certificate of compliance, the Appeal Board (the Commissioners Court) shall convene for the appeal proceeding at a public meeting of the Commissioners Court to hear evidence and render a decidion, pursuant to the following procedures:

(A) Within ten (10) days of the submittal of the appeal documents, the appellant shall request an Appeal Board proceeding. The appellant shall submit the request in writing to the Appeal Board through the Office of the County Judge, with a copy thereof delivered to the FPA. Failure to timely request the Appeal Board proceeding shall result in the denial of the appeal.

(B) All Appeal Board proceedings related to an appeal of the FPA's denial of a floodplain development permit or certificate of compliance shall be requested by the appellant to occur within forty-five (45) days from the date of the submitted appeal documents. Notwithstanding the above, the Commissioners Court may schedule the Appeal Board proceeding pursuant to docket availability, time limitations or availability, convenience of the participants, and other reasonable scheduling issues.

(C) Notice of the Appeal Board proceeding shall be effected through the public meeting agenda posting procedures of the Commissioners Court, and through written notice delivered to the appellant by the Office of the County Judge at least seven (7) days prior to the proceeding.

(D) The County Judge shall preside at the Appeal Board proceeding, which shall occur at a public meeting of the Commissioners Court.

(E) During the Appeal Board proceeding, the FPA, appellant, and all interested parties

may: (1) attend the proceeding; (2) at least three (3) days prior to the proceeding, submit written evidence to the Office of the County Judge for consideration by the Appeal Board; and (3) testify regarding the relevant issues.

(F) The decision of the Appeal Board shall be adjudicated, deliberated, rendered, and pronounced at a public, open session meeting of the Commissioners Court. The decision of the Appeal Board shall be the result of a majority vote of the quorum then present of the Appeal Board, and shall be reduced to writing and filed in the official minutes of the Commissioners Court.

## ARTICLE 5

## PROVISIONS FOR FLOOD DAMAGE REDUCTION

### §5.1 SECTION A. GENERAL STANDARDS

(1) In all areas of special flood hazard the following provisions are required for all new construction and substantial improvements:

(A) All new construction or substantial improvements shall be designed (or modified) and
adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.

(B) All new construction or substantial improvements shall be constructed by methods and practices that minimize flood damage.

(C) All new construction or substantial improvements shall be constructed with materials resistant to flood damage.

(D) All new construction or substantial improvements shall be constructed with electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

(E) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system.

(F) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the system and discharge from the systems into flood waters; and

(G) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding.

(2) When a regulatory floodway has not been designated, the FPA shall require that no new construction, substantial improvements, or other development (including fill) shall be permitted within Zone A, Zones A1-30 and AE on the community's FIRM, unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, will not increase the water surface elevation of the base flood more than one (1) foot at any point within the community. The FPA may require a CLOMR and/or a detailed engineering study in order to comply with federal or state law, this order, or to ensure that proposed development does not increase the base flood elevation more than one (1) foot at any point within the community. The FPA shall require a CLOMR and/or detailed engineering study when proposed development may alter or relocate a portion of a river (or tributary thereof), stream, brook, or watercourse, including the channel or banks thereof, in order to ensure compliance with federal or state law, or this order, said compliance to include a sufficient determination that:

(A) the flood carrying capacity within an altered or relocated portion of any watercourse is maintained to the same or greater capacity, and

(B) the proposed development does not increase the base flood elevation more than one (1) foot at any point within the community.

## §5.2 SECTION B. SPECIFIC STANDARDS

(1) In all areas of special flood hazard where base flood elevation data has been provided as set forth in this order, the following provisions are required.

(A) Regarding all development, the following shall apply:

(1) If fill material is to be used to elevate any structure, the following will apply: (a) fill material must be compacted to at least 95% of Standard Laboratory Maximum Density (Standard Proctor) according to ASTM Standard D-698; (b) fill soils must be fine grained soils of low permeability, such as those classified as CH, CL, SC, or ML according to ASTM Standard D-2487, "Classification of Soils for Engineering Purposes" (see Table 1804.2 in the "2000 International Building Code (IBC)" for descriptions of these soils types); and (c) the fill material must be homogeneous and isotropic -- that is, the soil must be all of one material, and the engineering properties must be the same in all directions.

(2) All elevation requirements noted in this order shall be documented using the Elevation Certificate, FEMA 81-31, and shall be certified by a registered professional engineer, surveyor, or architect, and shall be submitted to the FPA.

(B) RESIDENTAL CONSTRUCTION -New construction and substantial improvement of any residential structure shall have the lowest floor (including basement) elevated to a minimum of one (1) foot above the base flood elevation.

A registered professional engineer, architect, or land surveyor shall submit a

certification to the FPA that the standards of this subsection and §4.3 of this order are satisfied.

(C) NONRESIDENTIAL CONSTRUCTION-New construction and substantial improvements of any commercial, industrial or other nonresidential structure shall either have: (1) the lowest floor (including basement) elevated to a minimum of one (1) foot above the base flood level; or (2) together with attendant utility and sanitary facilities, be designed so that below the base flood level the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.

A registered professional engineer or architect shall develop and/or review structural design, specifications, and plans for the construction, and shall certify that the design and methods of construction are in accordance with accepted standards of practice as outlined in this subsection. A record of such certification which includes the specific elevation (in relation to mean sea level) to which such structures are flood proofed shall be maintained by the FPA.

(D) ENCLOSURES-New construction and substantial improvements, with fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding, shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters.

Designs for meeting this requirement must either be certified by a registered professional engineer or architect or meet or exceed the following minimum criteria: (i) a minimum of two openings on separate walls having a total net area of not less than one square inch for every square foot of enclosed area subject to flooding shall be provided; (ii) the bottom of all openings shall be no higher than one (1) foot above grade; and (iii) openings may be equipped with screens, louvers, valves, or other coverings or devices provided that they permit the automatic entry and exit of floodwaters.

(E) MANUFACTURED HOMES-All manufactured homes placed within Zone A on a community's FHBM or FIRM shall be installed using methods and practices which minimize flood damage. For the purposes of this requirement, manufactured homes must be elevated and anchored to resist flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable State and local anchoring requirements for resisting wind forces.

All manufactured homes placed or substantially improved within Zones A1-30, AH, and AE on the community's FIRM -- on sites located (1) outside of a manufactured home park or subdivision, (2) in a new manufactured home park or subdivision, (3) in an expansion to an existing manufactured home park or subdivision, or (4) in an existing manufactured home park or subdivision on which a manufactured home has incurred substantial damage as a result of a flood -- shall be elevated on a permanent foundation such that the lowest floor of the manufactured home is elevated to or above the base flood elevation and shall be securely anchored to an adequately anchored

foundation system to resist flotation, collapse, and lateral movement.

All manufactured homes placed or substantially improved on sites in an existing manufactured home park or subdivision within Zones A1-30, AH and AE on the community's FIRM -- and that are not otherwise subject to §5.2 of this order -- shall be elevated so that either: (1) the lowest floor of the manufactured home is at or above the base flood elevation; or (2) the manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than thirty-six (36) inches in height above grade and shall be securely anchored to an adequately anchored foundation system to resist flotation, collapse, and lateral movement.

(F) RECREATIONAL VEHICLES-All recreational vehicles (RVs) placed on sites within Zones A1-30, AH, and AE on the community's FIRM shall: (1) be on the site for fewer than one hundred eighty (180) consecutive days; (2) be fully licensed and ready for highway use; or (3) meet the permit requirements of this order, and the elevation and anchoring requirements for manufactured homes in this order.

An RV is ready for highway use if it: (1) is on its wheels or jacking system; (2) is attached to the site only by quick-disconnect type utilities and security devices; and (3) has no permanently attached additions. If these conditions do not exist, the RV is considered to be a manufactured home and is subject to the permit requirements of this order.

## §5.3 SECTION C. STANDARDS FOR SUBDIVISION PROPOSALS

(1) All proposals for the development of subdivisions including the platting and/or placement of manufactured home parks and subdivisions shall meet Floodplain Development Permit requirements and the provisions of this order.

(2) Base flood elevation data shall be generated and submitted for subdivision proposals and other proposed development (including the platting and/or placement of manufactured home parks and subdivisions) if said development is greater than fifty (50) lots or five (5) acres, whichever is less, provided that said data is not otherwise required by this order.

(3) All subdivision proposals, including the platting and/or placement of manufactured home parks and subdivisions, shall provide adequate drainage provided to reduce exposure to flood hazards.

(4) All subdivision proposals, including the platting and/or placement of manufactured home parks and subdivisions, shall have public utilities and facilities (such as sewer, gas, electrical and water systems) located and constructed to minimize or eliminate flood damage.

(5) Regarding utilities, if a proposed building site is in a special flood hazard area, the following is required for the building support utility systems regarding all new construction and substantial improvements: (a) electrical, heating, ventilation, plumbing, and air conditioning equipment and

other service facilities shall be required that are designed and located so as to prevent water from entering or accumulating within the components during conditions of flooding; (b) within flood-prone areas, new and replacement water supply systems shall be required that are designed to minimize or eliminate infiltration of floodwaters into the systems; (c) within flood-prone areas, new and replacement sewage (sewer and OSSF) systems shall be required that are designed and located to minimize or eliminate infiltrations of floodwaters into the systems and discharges from the systems into flood waters; and (d) onsite water and/or sewage (sewer and OSSF) disposal systems shall be required to be located in positions that shall avoid impairment to them or contamination from them during flooding.

## §5.4 SECTION D. STANDARDS FOR AREAS OF AREAS OF SHALLOW FLOODING (AO/AH ZONES)

(1) Located within the areas of special flood hazard, as described in this order, are areas designated as shallow flooding areas. These areas have special flood hazards associated with flood depths of one to three (1 to 3) feet -- where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident.
(2) Such flooding is characterized by ponding or sheet flow. Therefore, the following provisions apply to areas of shallow flooding:

(A) All new construction and substantial improvements of residential structures shall have the lowest floor (including basement) elevated to a minimum of one (1) foot above the base flood elevation or the highest adjacent grade at least as high as a minimum of one (1) foot above the depth number specified in feet on the community's FIRM -- or at least two (2) feet if no depth number is specified.

(B) All new construction and substantial improvements of non-residential structures: (1) shall have the lowest floor (including basement) elevated a minimum of one (1) foot above the base flood elevation or the highest adjacent grade at least as high as a minimum of one (1) foot above the depth number specified in feet on the community's FIRM -- or at least two (2) feet if no depth number is specified; or (2) together with attendant utility and sanitary facilities, shall be designed so that below the base specified flood depth in an AO Zone, or below the Base Flood Elevation in an AH Zone level, the structure is watertight with walls substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads of effects of buoyancy.

(3) A registered professional engineer or architect shall submit a certification to the FPA that compliance with the standards of this order has been satisfied.

(4) Within Zones AH or AO, adequate drainage paths around structures on slopes shall be required-to guide flood waters around and away from proposed structures.

## §5.5 SECTION E. FLOODWAYS

(1) Floodways – located within areas of special flood hazard established in Article 3, Section B, are areas designed as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles and erosion potential, the following provisions shall apply:

(A) Encroachments are prohibited, including fill, new construction, substantial improvements and other development within the adopted regulatory floodway unless it has been demonstrated through hydrologic and hydraulic analyses performed in accordance with standard engineering practice that the proposed encroachment would not result in any increase in flood levels within the community during the occurrence of the base flood discharge.

(B) If Article 5, Section E (1) above is satisfied, all new construction and substantial improvements shall comply with all applicable flood hazard reduction provisions of Article 5.

(C) Under the provisions of 44 CFR Chapter 1, Section 65.12, of the National Flood Insurance Program Regulations, a community may permit encroachments within the adopted regulatory floodway that would result in an increase in base flood elevations, provided that the community **first** completes all of the provisions required by Section 65.12.

## §5.6 SECTION F. PENALITIES FOR NONCOMPLIANCE

(1) No development shall occur, and no structure or land shall hereafter be constructed, located, extended, converted, or altered, without full compliance with the terms of this court order and other applicable regulations, statutes, or rules.

(2) A violation of any provision of this order by failure to comply with any of its requirements (including a violation of the conditions and safeguards established in connection with the conditions) shall constitute a class C misdemeanor offense pursuant to section 16.3221 of the Texas Water Code, which is incorporated by reference.

(3) Any person who violates this order or fails to comply with any of its requirements shall upon conviction thereof be fined not more than $500 for each violation, and in addition shall pay all costs and expenses involved in the case. Each day of violation is a separate offense.

(4) Nothing herein contained shall prevent Llano County from taking or seeking any and-all such other lawful action that is necessary to prevent or remedy any violation of the provisions of this order.

(5) If it appears that a person has violated, is violating, or is threatening to violate Subchapter I, Chapter 16 of the Texas Water Code, a rule adopted under said statute, or a provision of this order, the County may institute a civil suit against said person in the appropriate court for injunctive relief, civil penalties, or both injunctive relief and civil penalties, as authorized sections 16.3145, 16.315, 16.318, 16.322, and 16.323 of the Texas Water Code, which statutes are incorporated by reference. A person who violates Subchapter I, Chapter 16 of the Texas Water Code, a rule adopted under said statute, or a provision of this order, is subject to a civil penalty of not more than $100 for each act of

violation and for each day of violation.

(6) Section 11.086 of the Texas Water Code is incorporated by reference and states that in certain factual circumstances: (1) no person may divert or impound the natural flow of surface waters in this state, or permit a diversion or impounding by him to continue, in a manner that damages the property of another by the overflow of the water diverted or impounded; and (2) a person whose property is injured by an overflow of water caused by an unlawful diversion or impounding has remedies at law and in equity and may recover damages occasioned by the overflow. For purposes of support and enforcement regarding the provisions of this order, said section 11.086 is hereby adopted by the County for all purposes.

**[END OF REGULATIONS]**

## CERTIFICATION OF ADOPTION

**APPROVED BY:** THE COMMISSIONERS COURT OF LLANO COUNTY, TEXAS

By: Ron Cunningham
Ron Cunningham, County Judge
Llano County, Texas

**ADOPTED:** January 25, 2021

I, Ron Cunningham, the undersigned, being the County Judge of Llano County, Texas, do hereby certify that the above and foregoing document is the original Llano County Flood Damage and Prevention Order duly considered, passed, adopted, approved, and ordered by the Llano County Commissioners Court at a public meeting duly convened on January 25, 2021. Certified copies of the order may be obtained from the official minutes of the Llano County Commissioners Court maintained by the Llano County Clerk.

**SIGNED** this the 25 day of January, 2021.

Ron Cunningham
Ron Cunningham, County Judge
Llano County, Texas

**ATTEST:** Marci Hadeler
Marci Hadeler, County Clerk
Llano County, Texas

STATE OF TEXAS }
}
KNOW ALL MEN BY THESE PRESENTS
COUNTY OF LLANO }

VOL. 41 PAGE 183

**AMENDMENT OF LLANO COUNTY FLOOD DAMAGE PREVENTION ORDER RESOLUTION**

WHEREAS Llano County conducted a public participation process to establish a Flood Damage Prevention Order;

WHEREAS Llano County Commissioners Court established a Flood Damage Prevention Order effective May 2, 2012;

WHEREAS the Llano County Land Development and Permitting Office has conducted public meetings in the community and recommends certain amendments to the current Flood Damage Prevention Order which will relieve unintended hardships and inflexibility in dealing with Floodplain issues;

WHEREAS Llano County Commissioners Court desires to make certain amendments to its Flood Damage Prevention Order in order to make it more compatible with Federal Recommendations and Requirements;

WHEREAS the Llano County Commissioners Court has the authority to Amend its Flood Damage Prevention Order;

NOW THEREFORE, The Llano County Commissioners Court directs the following amendment to its Flood Damage Prevention Order:

A. Removal of the definition "FOOTPRINT"

B. Change "SUBSTANTIAL IMPROVEMENT" to read: "SUBSTANTIAL IMPROVEMENT" means any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty percent (50%) of the market value of the structure before "start of construction" of the improvement. This term includes structures which have incurred "substantial damage," regardless of the actual repair work performed. The term does not, however, include either: (a) any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living conditions; or Structures built prior to September 18, 1991 are allowed to their existing status and may be improved where such improvements do not to exceed fifty percent (50%) of the current improvement (structure only) appraised value and are not required to meet current elevation and other floodplain standards; Compliance to local codes and life-safety requirements including electrical, plumbing and safety measures may be required of pre-firm structures. (b) any alteration of a "historic structure," provided that the alteration will not preclude the structure's continued designation as a "historic structure." When a structure, pre-firm or post-firm, is found to have been remodeled or repaired without a floodplain development permit and some of that work is claimed to have been done by a previous owner the FPA shall use the FEMA SDE(Substantial Damage Estimator) to determine the total value of the improvements. Should that figure exceed 50% of the appraised value of the structure at the time of the current owners purchase of the structure, the structure shall be declared substantially improved, and the structure must be made compliant.

**EXECUTED** this 8 day of September, 2014

Wayne Brasecm, County Judge

Bette Sue Hoy, County Clerk

# FLOOD INSURANCE STUDY

VOLUME 1 of 1

## LLANO COUNTY, TEXAS

AND INCORPORATED AREAS

| COMMUNITY NAME | COMMUNITY NUMBER |
|---|---|
| CITY OF HORSESHOE BAY | 480149 |
| CITY OF LLANO | 480451 |
| CITY OF SUNRISE BEACH VILLAGE | 481531 |
| LLANO COUNTY, UNINCORPORATED AREAS | 481234 |

FEMA

**REVISED:**

**JANUARY 29, 2021**

FLOOD INSURANCE STUDY NUMBER
**48299CV000B**
Version Number 2.3.2.1

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**Published Separately**

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FLOOD INSURANCE STUDY REPORT
LLANO COUNTY, TEXAS AND INCORPORATED AREAS

# SECTION 1.0 – INTRODUCTION

## 1.1 The National Flood Insurance Program

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

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

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

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

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60.3, *Criteria for land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal

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

## 1.2 Purpose of this Flood Insurance Study Report

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

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

## 1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of Llano County, Texas.

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

The location of flood hazard data for participating communities in multiple jurisdictions is also indicated in the table. Please note that the City of Horseshoe Bay is geographically located in Llano and Burnet Counties. See these separately published FIS reports and FIRMs for county-wide map dates and flood hazard information outside of Llano County.

**Table 1: Listing of NFIP Jurisdictions**

| Community | CID | HUC-8 Sub-Basin(s) | Located on FIRM Panel(s) | If Not Included, Location of Flood Hazard Data |
|---|---|---|---|---|
| Horseshoe Bay, City of[1] | 480149 | 12090201 | 48299C0510C, 48299C0525C, 48299C0550C | |
| Llano, City of | 480451 | 12090204 | 48299C0190D, 48299C0195D, 48299C0305D, 48299C0310D | |
| Llano County, Unincorporated Areas | 481234 | 12090201, 12090204, 12090205, | 48299C0025C, 48299C0050C, 48299C0075C, 48299C0100C, 48299C0125C, 48299C0150C, 48299C0175D, 48299C0190D, 48299C0195D, 48299C0200C, 48299C0225D, 48299C0250C, 48299C0275D, 48299C0300D, 48299C0305D, 48299C0310D, 48299C0325C, 48299C0350D, 48299C0375D, 48299C0400C, 48299C0425C, 48299C0450C, 48299C0475C, 48299C0500C, 48299C0510C, 48299C0525C, 48299C0550C, 48299C0575C, 48299C0600C, 48299C0625C, 48299C0650C, 48299C0675C, 48299C0700C[2] | |
| Sunrise Beach Village, City of | 481531 | 12090201 | 48299C0510C, 48299C0525C | |

[1]Community is mapped in multiple counties. This FIS only covers the portion within Llano County

[2]Panel Not Printed

## 1.4 Considerations for using this Flood Insurance Study Report

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

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

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

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

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

- The initial Countywide FIS Report for Llano County became effective on May 2, 2012. Refer to Table 27 for information about subsequent revisions to the FIRMs.

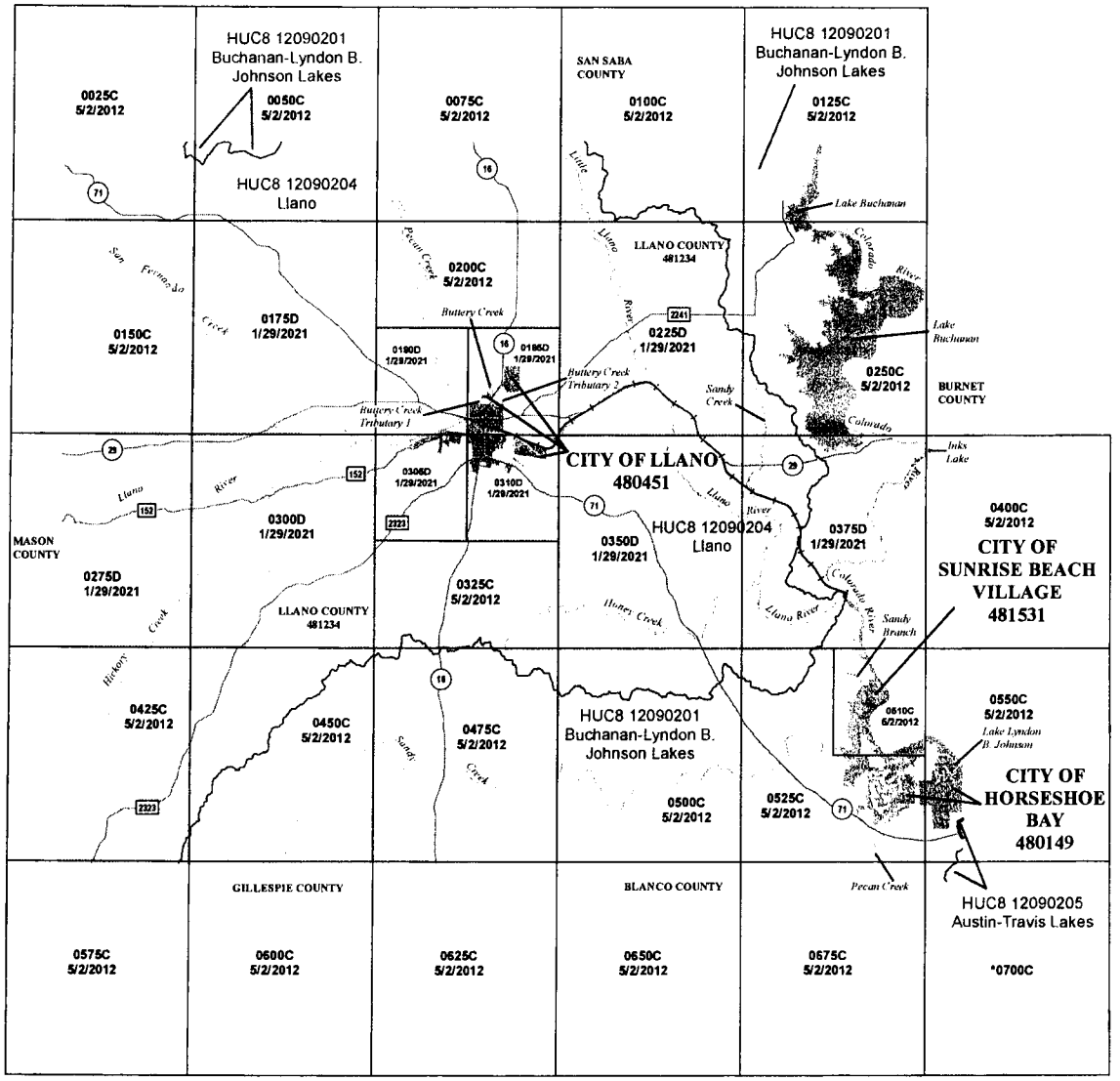
- Selected FIRM panels for the community may contain information (such as floodways and cross sections) that was previously shown separately on the corresponding Flood Boundary and Floodway Map (FBFM) panels. In addition, former flood hazard zone designations have been changed as follows:

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

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

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

Figure 1: FIRM Panel Index




**ATTENTION:** The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before January 29, 2021.

1 inch = 5 miles 1:300,000

0 1.25 2.5 5 7.5 10 Miles

Map Projection:
State Plane Texas Central FIPS Zone 4203;
North American Datum 1983

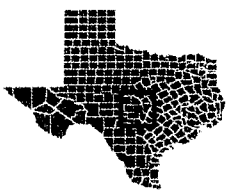
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

**HTTPS://MSC.FEMA.GOV**

SEE FLOOD INSURANCE STUDY FOR ADDITIONAL INFORMATION

*PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREA

COUNTY LOCATOR



**NATIONAL FLOOD INSURANCE PROGRAM**

FLOOD INSURANCE RATE MAP INDEX

**LLANO COUNTY, TEXAS** And Incorporated Areas

**PANELS PRINTED:**

0025, 0050, 0075, 0100, 0125, 0150, 0175, 0190, 0195, 0200, 0225, 0250, 0275, 0300, 0305, 0310, 0325, 0350, 0375, 0400, 0425, 0450, 0475, 0500, 0510, 0525, 0550, 0575, 0600, 0625, 0650, 0675

**MAP NUMBER**
**48299CIND0B**
**MAP REVISED**
**JANUARY 29, 2021**

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

**Figure 2: FIRM Notes to Users**

# NOTES TO USERS

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

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

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

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

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

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

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

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

**Figure 2: FIRM Notes to Users (Continued)**

PROJECTION INFORMATION: The projection used in the preparation of the map was State Plane Texas Central FIPS Zone 4203 (Feet). The horizontal datum was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

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

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

BASE MAP INFORMATION: Base map information shown on this FIRM was provided in digital format by multiple agencies. The Capital Area Council of Governments (CAPCOG) provided base transportation and city limit information in digital format dated from 2002, 2004, and 2007. The City of Horseshoe Bay provided city limit information in a 2007 dated digital AutoCAD file. The Texas Natural Resources Information System (TNRIS) provided the Stratmap County Boundaries in digital format, dated 2005.The United States Geological Survey (USGS) provided 7.5-Minute Series Topographic Maps, dated 1989, and a digital version of the National Hydrography Dataset, dated 2005. For information about base maps, refer to Section 6.2 "Base Map" in this FIS Report.

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

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

**Figure 2: FIRM Notes to Users (Continued)**

## NOTES FOR FIRM INDEX

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

ATTENTION: The corporate limits shown on this FIRM Index are based on the best information available at the time of publication. As such, they may be more current than those shown on FIRM panels issued before January 29, 2021.

## SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for Llano County, Texas, effective January 29, 2021.

FLOWAGE EASEMENT AREA: Flowage easement area boundaries were provided by Lower Colorado River Authority (LCRA). For information about data acquisition dates or the delineation of flowage easement areas in this Flood Risk Project, refer to Section 2.2 of the Flood Insurance Study Report for this jurisdiction or contact LCRA at (512)-578-3246.

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

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

**Figure 3: Map Legend for FIRM**

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

Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)

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

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

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

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

| | |
|---|---|
| | Levee, Dike, or Floodwall |
| *Bridge* | Bridge |
| | Flowage Easement Area |
| **REFERENCE MARKERS** | |
| 22.0 | River mile Markers |
| **CROSS SECTION & TRANSECT INFORMATION** | |
| B 20.2 | Lettered Cross Section with Regulatory Water Surface Elevation (BFE) |
| 5280 21.1 | Numbered Cross Section with Regulatory Water Surface Elevation (BFE) |
| 17.5 | Unlettered Cross Section with Regulatory Water Surface Elevation (BFE) |
| 8 | Coastal Transect |
| | Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation. |
| | Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping. |
| 513 | Base Flood Elevation Line (shown for flooding sources for which no cross sections or profile are available) |
| **ZONE AE (EL 16)** | Static Base Flood Elevation value (shown under zone label) |
| **ZONE AO (DEPTH 2)** | Zone designation with Depth |
| **ZONE AO (DEPTH 2) (VEL 15 FPS)** | Zone designation with Depth and Velocity |
| **BASE MAP FEATURES** | |
| *Missouri Creek* | River, Stream or Other Hydrographic Feature |
| 234 | Interstate Highway |
| 234 | U.S. Highway |

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

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

## SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

### 2.1 Floodplain Boundaries

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

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

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

Table 2, "Flooding Sources Included in this FIS Report," lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 12. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1% annual chance floodplain corresponds to the SFHAs. The 0.2% annual chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

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

**Table 2: Flooding Sources Included in this FIS Report**

| Flooding Source | Community | Downstream Limit | Upstream Limit | HUC-8 Sub-Basin(s) | Length (mi) (streams or coastlines) | Area ($mi^2$) (estuaries or ponding) | Floodway (Y/N) | Zone shown on FIRM | Date of Analysis |
|---|---|---|---|---|---|---|---|---|---|
| Buttery Creek | Llano, City of | Confluence with Llano River | Approximately 1.8 miles upstream of the confluence with Llano River | 12090204 | 1.8 | N/A | N | AE | 9/12/2012 |
| Buttery Creek Tributary 1 | Llano, City of | Confluence with Buttery Creek | Approximately 1.4 miles upstream of the confluence with Buttery Creek | 12090204 | 1.4 | N/A | N | AE | 9/12/2012 |
| Buttery Creek Tributary 2 | Llano, City of | Confluence with Buttery Creek | Approximately 0.8 mile upstream of the confluence with Buttery Creek | 12090204 | 0.8 | N/A | N | AE | 9/12/2012 |
| Colorado River | Horseshoe Bay, City of<br>Llano County, Unincorporated Areas,<br>Sunrise Beach Village, City of | Downstream limit of Llano County | San Saba County Boundary | 12090201 | 45.0 | N/A | N | AE | 11/11/2003 |
| Flag Creek | Llano, City of<br>Llano County, Unincorporated Areas | Confluence with Llano River | Approximately 1.03 miles upstream of the confluence with Llano River | 12090204 | 1.0 | N/A | N | AE | 9/12/2012 |
| Llano River | Llano, City of<br>Llano County, Unincorporated Areas | Approximately 6.2 miles upstream of the confluence with the Colorado River | Mason County Boundary | 12090204 | 38.7 | N/A | N | AE | 9/12/2012 |

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

| Flooding Source | Community | Downstream Limit | Upstream Limit | HUC-8 Sub-Basin(s) | Length (mi) (streams or coastlines) | Area ($mi^2$) (estuaries or ponding) | Floodway (Y/N) | Zone shown on FIRM | Date of Analysis |
|---|---|---|---|---|---|---|---|---|---|
| Llano River | Llano County, Unincorporated Areas | Confluence with Colorado River | Approximately 6.2 miles upstream of the confluence with the Colorado River | 12090204 | 6.2 | N/A | N | AE | 11/11/2003 |
| Sandy Creek | Llano County, Unincorporated Areas | 0.6 miles from confluence with the Colorado River | 1.3 miles upstream of South SH 16 | 12090201 | 26.1 | N/A | N | A | 11/11/2003 |
| Unnamed Tributary to the Llano River | Llano County, Unincorporated Areas | Confluence with Llano River | Approximately 0.9 miles upstream of the confluence with Llano River | 12090204 | 0.9 | N/A | N | AE, A | 1/15/2015 |
| Various Streams Studied by Approximate Methods | Horseshoe Bay, City of<br>Llano, City of, Llano County, Unincorporated Areas,<br>Sunrise Beach Village, City of | Various downstream extents of Zone As | Various upstream extents of Zone As | 12090201, 12090204 | 897.1 | N/A | N | A | 08/14/2009 |

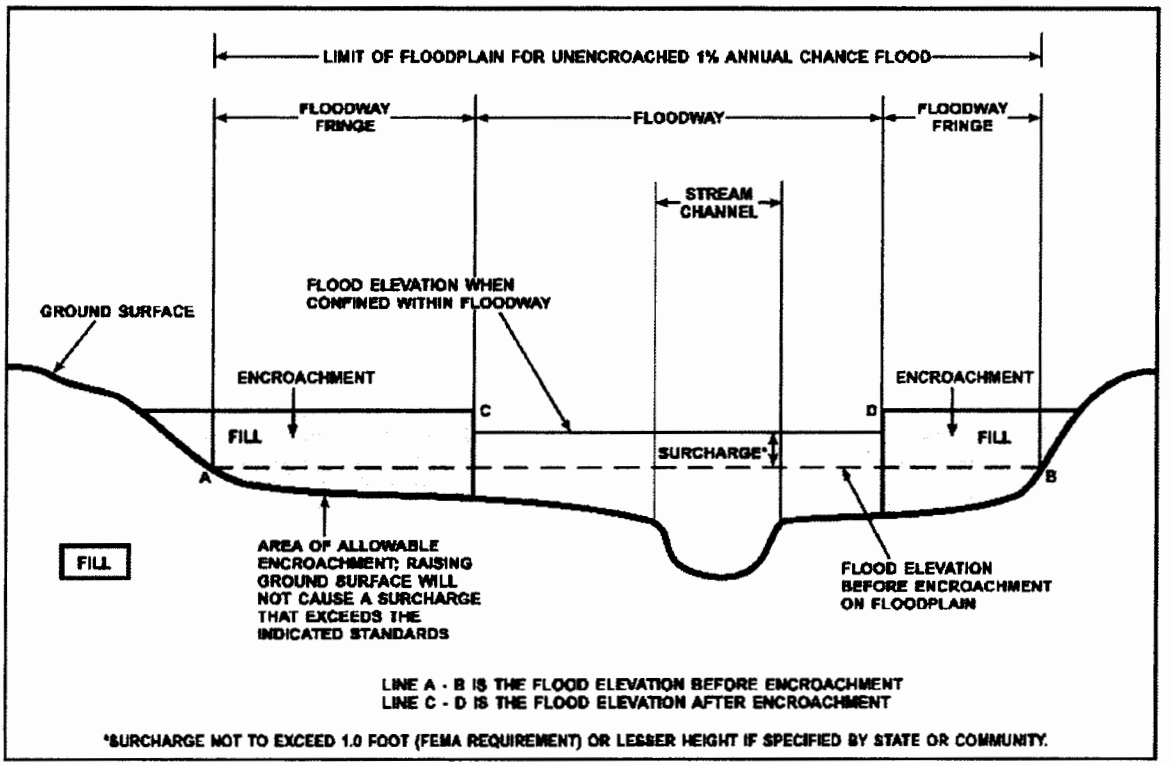
## 2.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

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

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. No floodways were calculated as part of this project.

**Figure 4: Floodway Schematic**



All flowage easement areas relevant to this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. This data was provided by LCRA and is current as of January 29, 2021. For information about the delineation of flowage easement areas in this Flood Risk Project, please contact LCRA at (512)-578-3246.

## 2.3 Base Flood Elevations

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

Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM.

## 2.4 Non-Encroachment Zones

Some States and communities use non-encroachment zones to manage floodplain development. For flooding sources with medium flood risk, field surveys are often not collected and surveyed bridge and culvert geometry is not developed. Standard hydrologic and hydraulic analyses are still performed to determine BFEs in these areas. However, floodways are not typically determined, since specific channel profiles are not developed. To assist communities with managing floodplain development in these areas, a "non-encroachment zone" may be provided. While not a FEMA designated floodway, the non-encroachment zone represents that area around the stream that should be reserved to convey the 1% annual chance flood event. As with a floodway, all surcharges must fall within the acceptable range in the non-encroachment zone.

General setbacks can be used in areas of lower risk (e.g. unnumbered Zone A), but these are not considered sufficient where unnumbered Zone A is replaced by Zone AE. The NFIP requires communities to ensure that any development in a non-encroachment area causes no increase in BFEs. Communities must generally prohibit development within the area defined by the non-encroachment width to meet the NFIP requirement.

Non-encroachment determinations may be delineated where it is not possible to delineate floodways because specific channel profiles with bridge and culvert geometry were not developed. Any non-encroachment determinations for this FIS project have been tabulated for selected cross sections and are shown in Table 24, "Flood Hazard and Non-Encroachment Data for Selected Streams." Areas for which non-encroachment zones are provided show BFEs and the 1% annual chance floodplain boundaries mapped as zone AE on the FIRM but no floodways.

## 2.5 Coastal Flood Hazard Areas

This section is not applicable to this FIS project.

### 2.5.1 Water Elevations and the Effects of Waves

This section is not applicable to this FIS project.

**Figure 5: Wave Runup Transect Schematic**

**[Not applicable to this FIS project]**

### 2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

This section is not applicable to this FIS project.

### 2.5.3 Coastal High Hazard Areas

This section is not applicable to this FIS project.

**Figure 6: Coastal Transect Schematic**

**[Not applicable to this FIS project]**

### 2.5.4 Limit of Moderate Wave Action

This section is not applicable to this FIS project.

# SECTION 3.0 – INSURANCE APPLICATIONS

## 3.1 National Flood Insurance Program Insurance Zones

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

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

Table 3 lists the flood insurance zones in the unincorporated and incorporated areas of Llano County.

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

| Community | Flood Zone(s) |
|---|---|
| Llano County, Unincorporated Areas | A, AE, X |
| Horseshoe Bay, City of | A, AE, X |
| Llano, City of | A, AE, X |

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

| Community | Flood Zone(s) |
|---|---|
| Sunrise Beach Village, City of | A, AE, X |

## SECTION 4.0 – AREA STUDIED

### 4.1 Basin Description

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

**Table 4: Basin Characteristics**

| HUC-8 Sub-Basin Name | HUC-8 Sub-Basin Number | Primary Flooding Source | Description of Affected Area | Drainage Area (square miles) |
|---|---|---|---|---|
| Austin-Travis Lakes | 12090205 | Colorado River | Begins just upstream of Alvin Wirtz Dam, extends southeast, affecting a small area of the southeastern corner of Llano County | 1240.8 |
| Buchanan-Lyndon B. Johnson Lakes | 12090201 | Colorado River | Begins at confluence with Colorado River and San Saba River, extends south, affecting the eastern edge of Llano County | 1270.0 |
| Llano | 12090204 | Llano River | Begins at confluence with Llano River, extends west, affecting most of Llano County | 2613.4 |

### 4.2 Principal Flood Problems

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

**Table 5: Principal Flood Problems**

| Flooding Source | Description of Flood Problems |
|---|---|
| All sources | Llano County has experienced loss of physical property and human life as a result of flooding along its major waterways. Development subject to flood damage consists primarily of well-built modern residences or older, more modest houses. There are also some commercial and light industrial establishments that are subject to flooding, especially near the major road crossings. Some undersized bridges and low-water crossings are constrictions to flood flow and contribute flooding problems. Heavy rainfall from storms along weather fronts is the major cause of flooding, primarily during the spring |

**Table 5: Principal Flood Problems (Continued)**

| Flooding Source | Description of Flood Problems |
|---|---|
| | and summer months. Major flooding can be produced by the intense rainfall usually associated with localized thunderstorms. These thunderstorms may occur at any time during the year, but are more prevalent in the spring and summer months. On June 22, 1997 a storm occurred throughout South Central Texas. The heavy rain Friday night into Saturday afternoon had left South Central Texas soils saturated. The situation worsened Saturday evening into Sunday as heavy rain associated with the upper low pressure system redeveloped over the western Texas Hill Country. Very heavy rains over the Texas Hill Country Saturday night and Sunday morning caused widespread flooding as well as flash flooding across numerous counties. Tremendous flow down the James River, reinforced by 8 to 15 inch rainfall east of Mason Sunday afternoon and evening sent the Llano River at Llano to over 38 feet shortly near midnight Sunday night, some 6 feet above the 1952 flood of record. Several buildings and a dozen homes were flooded in Llano, and major damage was reported to the city park. At least two dozen homes were flooded between Llano and Castell and 5 to 6 homes flooded south of Llano. At Kingsland, complete destruction was reported to docks along the River above Lake LBJ. Most boats were destroyed, although no homes were flooded. Along the Colorado River, over a dozen homes and lodges were flooded. Flooding along lake Marble Falls, on the north side of Lake LBJ, involved some 35 homes on one side alone. At Lake Marble Falls, inflow was so great that the lake volume was being replaced every 12 minutes on Sunday evening. Total estimates of the damages were placed at $5,000,000. On May 23-26, 2015, heavy rainfall from thunderstorms across South Central Texas caused flooding across Llano County. By May 29th, the water surface elevation of the Llano River was 3 feet higher above the flood level, with 29,000 cubic feet per second passing through the Town Lake Dam. Several city parks were closed and many trees were damaged. In October 2018, the Llano River flooded to 39.91feet, the second highest flood in the record. The State of Texas issued a state disaster declaration for this flood, which damaged roads, flooded homes, and caused the Farm to Market 2900 Bridge to collapse. |

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

**Table 6: Historic Flooding Elevations**

**[Not applicable to this FIS project]**

## 4.3 Non-Levee Flood Protection Measures

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

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

| Flooding Source | Structure Name | Type of Measure | Location | Description of Measure |
|---|---|---|---|---|
| Colorado River | Alvin Wirtz Dam | Dam | On Lake Lyndon B. Johnson | Completed in 1951, owned and operated by the Lower Colorado River Authority |
| Colorado River | Buchanan Dam | Dam | Between Burnet and Llano Counties | Lake Buchanan has a capacity of 992,000 acre-feet |
| Colorado River | Roy Inks Dam | Dam | Ten miles west of the City of Burnet | Inks lake has a capacity of 17,000 acre-feet |

### 4.4 Levees

The section is not applicable to this FIS project.

**Table 8: Levees**

**[Not applicable to this FIS project]**

## SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

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

## 5.1 Hydrologic Analyses

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

A summary of the discharges is provided in Table 9. A summary of stillwater elevations developed for non-coastal flooding sources is provided in Table 10. Stream gage information is provided in Table 11.

**Table 9: Summary of Discharges**

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Buttery Creek | Confluence with Buttery Creek Tributary 1 | 2.26 | 1850 | * | 3655 | 4,730 | * | 8055 |
| Buttery Creek | At State Highway 29 | 1.60 | 1300 | * | 2580 | 3,325 | * | 5595 |
| Buttery Creek | Confluence with Buttery Creek Tributary 2 | 1.32 | 1135 | * | 2215 | 2825 | * | 4715 |
| Buttery Creek | At Collins Street | 0.72 | 645 | * | 1250 | 1,590 | * | 2650 |
| Buttery Creek Tributary 1 | At Chattanooga Drive | 0.55 | 510 | * | 990 | 1,280 | * | 2210 |
| Buttery Creek Tributary 1 | At Sheffield Road | 0.49 | 480 | * | 930 | 1,200 | * | 2075 |
| Buttery Creek Tributary 1 | At Leon Road | 0.26 | 325 | * | 615 | 780 | * | 1295 |

**Table 9: Summary of Discharges (Continued)**

| Flooding Source | Location | Drainage Area (Square Miles) | Peak Discharge (cfs) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 10% Annual Chance | 4% Annual Chance | 2% Annual Chance | 1% Annual Chance Existing | 1% Annual Chance Future | 0.2% Annual Chance |
| Buttery Creek Tributary 2 | At Collins Street | 0.30 | 320 | * | 605 | 770 | * | 1280 |
| Colorado River | At Max Starke Dam | 12,900 | 159,000 | * | 322,500 | 365,700 | * | 528,400 |
| Colorado River | At Alvin Wirtz Dam | 12,800 | 163,100 | * | 323,600 | 367,600 | * | 532,200 |
| Colorado River | At Roy Inks Dam | 7,900 | 56,500 | * | 128,000 | 157,000 | * | 308,000 |
| Flag Creek | At Highway 152 | 11.40 | 4050 | * | 7550 | 9,390 | * | 13500 |
| Llano River | Confluence with the Colorado River | 4,460 | * | * | * | 380,000 | * | * |
| Llano River | 1,500 ft. downstream of FM 3404 | 4,403 | * | * | * | 380,000 | * | * |
| Llano River | At USGS Gauge 08151500 | 4,197 | * | * | * | 380,000 | * | * |
| Llano River | At Mason/Llano County Line | 3,640 | * | * | * | 380,000 | * | * |

*Not calculated for this FIS project

**Figure 7: Frequency Discharge-Drainage Area Curves**

**[Not applicable to this FIS project]**

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

**[Not applicable to this FIS project]**

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

| Flooding Source | Gage Identifier | Agency that Maintains Gage | Site Name | Drainage Area (Square Miles) | Period of Record | |
|---|---|---|---|---|---|---|
| | | | | | From | To |
| Llano River | 08151000 | USGS | Llano River at Llano, TX | 4204 | 1940 | 2011 |

## 5.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Base flood elevations on the FIRM represent the elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report. Rounded whole-foot elevations may be shown on the FIRM in coastal areas, areas of ponding, and other areas with static base flood elevations. These whole-foot elevations may not exactly reflect the elevations derived from the hydraulic analyses. Flood elevations shown on the FIRM are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM. The hydraulic analyses for this FIS were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

For streams for which hydraulic analyses were based on cross sections, locations of selected cross sections are shown on the Flood Profiles (Exhibit 1).

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

**Table 12: Summary of Hydrologic and Hydraulic Analyses**

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---|---|---|---|---|---|---|---|
| Buttery Creek | Confluence with Llano River | Approximately 1.8 miles upstream of the confluence with Llano River | HEC-HMS 3.4 | HEC-RAS 4.1.0 | 09/12/2012 | AE | 316 LOMR with Case Number 12-06-0160P for Llano River and Associated Tributaries |
| Buttery Creek Tributary 1 | Confluence with Buttery Creek | Approximately 1.4 miles upstream of the confluence with Buttery Creek | HEC-HMS 3.4 | HEC-RAS 4.1.0 | 09/12/2012 | AE | 316 LOMR with Case Number 12-06-0160P for Llano River and Associated Tributaries |
| Buttery Creek Tributary 2 | Confluence with Buttery Creek | Approximately 0.8 mile upstream of the confluence with Buttery Creek | HEC-HMS 3.4 | HEC-RAS 4.1.0 | 09/12/2012 | AE | 316 LOMR with Case Number 12-06-0160P for Llano River and Associated Tributaries |
| Colorado River | Downstream limit of Llano County | San Saba County Boundary | HEC-HMS | HEC-RAS | 11/11/2003 | AE | LCRA/ United States Army Corps of Engineers (USACE) Fort Worth District<br>Lower Colorado River Flood Damage Evaluation Project (FDEP) basin wide study |
| Flag Creek | Confluence with Llano River | Approximately 1.03 miles upstream of the confluence with Llano River | HEC-HMS 3.4 | HEC-RAS 4.1.0 | 09/12/2012 | AE | 316 LOMR with Case Number 12-06-0160P for Llano River and Associated Tributaries<br>Note: This section of Flag Creek is all in backwater |

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

| Flooding Source | Study Limits Downstream Limit | Study Limits Upstream Limit | Hydrologic Model or Method Used | Hydraulic Model or Method Used | Date Analyses Completed | Flood Zone on FIRM | Special Considerations |
|---|---|---|---|---|---|---|---|
| Llano River | Approximately 6.2 miles upstream of the confluence with the Colorado River | Mason County Boundary | Gage Analysis | HEC-RAS 4.1.0 | 09/12/2012 | AE | 316 LOMR with Case Number 12-06-0160P for Llano River and Associated Tributaries<br>Revised from 1,450 feet downstream of FM 3404 to the Mason/Llano County line due to LOMR 12-06-0160P |
| Llano River | Confluence with the Colorado River | Approximately 6.2 miles upstream of the confluence with the Colorado River | NUDALLAS | HEC-RAS, HEC-2, HEC-5 | 11/11/2003 | AE | Redelineation of 1991 FIS Effective Flood profiles was done for the 2012 Effective FIS |
| Sandy Creek | 0.6 miles from confluence with the Colorado River | 1.3 miles upstream of S SH 16 | HEC-HMS | HEC-RAS | 11/11/2003 | A | LCRA |
| Unnamed Tributary to the Llano River | Confluence with Llano River | Approximately 0.9 miles upstream of the confluence with Llano River | HEC-HMS 3.4 | HEC-RAS 4.1.0 | 1/15/2015 | AE | Risk Assessment, Mapping, and Planning Partners (RAMPP)<br>Note: This section of Unnamed Tributary to the Llano River is all in backwater |
| Various Streams Studied by Approximate Methods | Various downstream extents of Zone As | Various upstream extents of Zone As | * | N/A | 8/14/2009 | A | Regression Equations and normal depth |

*Data not Available

**Table 13: Roughness Coefficients**

| Flooding Source | Channel "n" | Overbank "n" |
|---|---|---|
| Buttery Creek | 0.05-0.065 | 0.065-0.12 |
| Buttery Creek Tributary 1 | 0.02-0.055 | 0.04-0.09 |
| Buttery Creek Tributary 2 | 0.04-0.06 | 0.06-0.12 |
| Colorado River | 0.025 | 0.030-0.095 |
| Flag Creek | 0.055-0.065 | 0.08-0.12 |
| Llano River | 0.019-0.065 | 0.019-0.065 |

## 5.3 Coastal Analyses

This section is not applicable to this FIS project.

**Table 14: Summary of Coastal Analyses**

**[Not applicable to this FIS project]**

### 5.3.1 Total Stillwater Elevations

This section is not applicable to this FIS project.

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

**[Not applicable to this FIS project]**

**Table 15: Tide Gage Analysis Specifics**

**[Not applicable to this FIS project]**

### 5.3.2 Waves

This section is not applicable to this FIS project.

### 5.3.3 Coastal Erosion

This section is not applicable to this FIS project.

### 5.3.4 Wave Hazard Analyses

This section is not applicable to this FIS project.

**Table 16: Coastal Transect Parameters**

[Not applicable to this FIS project]

**Figure 9: Transect Location Map**

**[Not applicable to this FIS project]**

## 5.4 Alluvial Fan Analyses

This section is not applicable to this FIS project.

**Table 17: Summary of Alluvial Fan Analyses**

**[Not applicable to this FIS project]**

**Table 18: Results of Alluvial Fan Analyses**

**[Not applicable to this FIS project]**

# SECTION 6.0 – MAPPING METHODS

## 6.1 Vertical and Horizontal Control

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

Flood elevations shown in this FIS Report and on the FIRMs are referenced to NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between NGVD29 and NAVD88 or other datum conversion, visit the National Geodetic Survey website at www.ngs.noaa.gov.

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

To obtain current elevation, description, and/or location information for benchmarks in the area, please contact information services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

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

**Table 19: Countywide Vertical Datum Conversion**

| Quadrangle Name | Quadrangle Corner | Latitude | Longitude | Conversion from NGVD29 to NAVD88 (feet) |
|---|---|---|---|---|
| Council Creek | NW | 30.875 | -98.375 | 0.24 |

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

| Quadrangle Name | Quadrangle Corner | Latitude | Longitude | Conversion from NGVD29 to NAVD88 (feet) |
|---|---|---|---|---|
| Lake Buchanan | NW | 30.875 | -98.500 | 0.22 |
| Lone Grove | NW | 30.875 | -98.625 | 0.18 |
| Llano North | NW | 30.875 | -98.750 | 0.15 |
| Valley Spring | NW | 30.875 | -98.875 | 0.19 |
| Smoothingiron Mountain | NW | 30.875 | -99.000 | 0.19 |
| Longhorn Cavern | NW | 30.750 | -98.375 | 0.18 |
| Kingsland | NW | 30.750 | -98.500 | 0.18 |
| Cap Mountain | NW | 30.750 | -98.625 | 0.15 |
| Llano South | NW | 30.750 | -98.750 | 0.13 |
| Scotts Crossing | NW | 30.750 | -98.875 | 0.16 |
| Castell | NW | 30.750 | -99.000 | 0.16 |
| Marble Falls | NW | 30.625 | -98.375 | 0.18 |
| Dunman Mountain | NW | 30.625 | -98.500 | 0.16 |
| Click | NW | 30.625 | -98.625 | 0.25 |
| Oxford | NW | 30.625 | -98.750 | 0.21 |
| Enchanted Rock | NW | 30.625 | -98.875 | 0.16 |
| House Mountain | NW | 30.625 | -99.000 | 0.15 |
| Howell Mountain | NW | 30.500 | -98.500 | 0.18 |
| Round Mountain | NW | 30.500 | -98.375 | 0.22 |
| Blowout | NW | 30.500 | -98.625 | 0.16 |
| Willow City | NW | 30.500 | -98.750 | 0.15 |
| Crabapple | NW | 30.500 | -98.875 | 0.19 |
| Cherry Mountain | NW | 30.500 | -99.000 | 0.15 |
| Average Conversion from NGVD29 to NAVD88 = 0.18 feet | | | | |

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

**[Not applicable to this FIS project]**

## 6.2 Base Map

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

*and Mapping*, www.fema.gov/media-library/resources-documents/collections/361.

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

**Table 21: Base Map Sources**

| Data Type | Data Provider | Data Date | Data Scale | Data Description |
|---|---|---|---|---|
| Panel Extents | USGS | 1989 | 1:24,000 | Spatial information for FIRM panels. |
| Political Boundaries | CAPCOG | 2007 | 1:24,000 | Spatial and attribute information for city limit boundaries. |
| Political Boundaries | City of Horseshoe Bay, Texas | 2007 | 1:24,000 | Spatial and attribute information for the political boundary of the City of Horseshoe Bay. |
| Political Boundaries | TNRIS | 2005 | 1:24,000 | Spatial and attribute information for the County Boundary of Llano County, Texas. |
| Surface Water Features | USGS | 2005 | 1:24,000 | Spatial and attribute information for stream centerlines and water bodies. |
| Transportation Features | CAPCOG | 2007 | 1:24,000 | Spatial and attribute information for street centerlines. |
| Transportation Features | CAPCOG | 2002 | 1:24,000 | Spatial and attribute information for railroad centerline data. |
| Transportation Features | CAPCOG | 2004 | 1:6,000 | Spatial and attribute information for airports in Llano County. |

## 6.3 Floodplain and Floodway Delineation

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

For riverine flooding sources, the mapped floodplain boundaries shown on the FIRM have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using the topographic elevation data described in Table 22.

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

The floodway widths presented in this FIS Report and on the FIRM were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. Table 2 indicates the flooding

sources for which floodways have been determined. The results of the floodway computations for those flooding sources have been tabulated for selected cross sections and are shown in Table 23, "Floodway Data."

**Table 22: Summary of Topographic Elevation Data used in Mapping**

| Community | Flooding Source | Source for Topographic Elevation Data | | | |
|---|---|---|---|---|---|
| | | Description | Vertical Accuracy | Horizontal Accuracy | Citation |
| Horseshoe Bay, City of<br>Llano, City of<br>Llano County, Unincorporated Areas<br>Sunrise Beach Village, City of | All studied streams within this FIS project | Contours derived from LiDAR | 18.5 cm RMSEz | 1 meter at 95% confidence level | LCRA 2007 |

BFEs shown at cross sections on the FIRM represent the 1% annual chance water surface elevations shown on the Flood Profiles and in the Floodway Data tables in the FIS Report.

**Table 23: Floodway Data**

**[Not applicable to this FIS project]**

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

**[Not applicable to this FIS project]**

## 6.4 Coastal Flood Hazard Mapping

This section is not applicable to this FIS project.

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

**[Not applicable to this FIS project]**

## 6.5 FIRM Revisions

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

"Map Repositories").

### 6.5.1 Letters of Map Amendment

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

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

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

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

### 6.5.2 Letters of Map Revision Based on Fill

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

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

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

### 6.5.3 Letters of Map Revision

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

To obtain an application for a LOMR, visit www.fema.gov/media-library/assets/documents/1343 and download the form "MT-2 Application Forms and Instructions for Conditional Letters of Map Revision and Letters of Map Revision". Visit the "Flood Map-Related Fees" section to determine the cost of applying for a LOMR. For more information about how to apply for a LOMR, call the FEMA Map Information eXchange; toll free, at 1-877-FEMA MAP (1-877-336-2627) to speak to a Map Specialist.

Previously issued mappable LOMCs (including LOMRs) that have been incorporated into the Llano County FIRM are listed in Table 26. Please note that this table only includes LOMCs that have been issued on the FIRM panels updated by this map revision. For all other areas within this county, users should be aware that revisions to the FIS Report made by prior LOMRs may not be reflected herein and users will need to continue to use the previously issued LOMRs to obtain the most current data.

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

| Case Number | Effective Date | Flooding Source | FIRM Panel(s) |
|---|---|---|---|
| 12-06-0160P | 1/29/2021 | Buttery Creek, Buttery Creek Tributary 1, Buttery Creek Tributary 2, Flag Creek, Llano River | 48299C0175D<br>48299C0190D<br>48299C0195D<br>48299C0225D<br>48299C0275D<br>48299C0300D<br>48299C0305D<br>48299C0310D<br>48299C0350D<br>48299C0375D |

*This is a September 12, 2012 316-PMR that is being incorporated into this FIS Project and will become effective when this FIS Project becomes effective.

### 6.5.4 Physical Map Revisions

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

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

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

### 6.5.5 Contracted Restudies

The NFIP provides for a periodic review and restudy of flood hazards within a given community. FEMA accomplishes this through a national watershed-based mapping needs assessment strategy, known as the Coordinated Needs Management Strategy (CNMS). The CNMS is used by FEMA to assign priorities and allocate funding for new flood hazard analyses used to update the FIS Report and FIRM. The goal of CNMS is to

define the validity of the engineering study data within a mapped inventory. The CNMS is used to track the assessment process, document engineering gaps and their resolution, and aid in prioritization for using flood risk as a key factor for areas identified for flood map updates. Visit www.fema.gov to learn more about the CNMS or contact the FEMA Regional Office listed in Section 8 of this FIS Report.

### 6.5.6 Community Map History

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

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

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

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

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

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

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

The initial effective date for the Llano County FIRMs in countywide format was 05/02/2012.

**Table 27: Community Map History**

| Community Name | Initial Identification Date (First NFIP Map Published) | Initial FHBM Effective Date | FHBM Revision Date(s) | Initial FIRM Effective Date | FIRM Revision Date(s) |
|---|---|---|---|---|---|
| Horseshoe Bay, City of | 09/18/1991 | N/A | N/A | 09/18/1991 | 05/02/2012 |
| Llano, City of | 12/28/1973 | 12/28/1973 | 06/11/1976 | 05/04/1982 | 05/02/2012<br>1/29/2021 |
| Llano County, Unincorporated Areas | 11/22/1977 | 11/22/1977 | N/A | 9/18/1991 | 05/02/2012<br>1/29/2021 |
| Sunrise Beach Village, City of | 06/19/1979 | 06/19/1979 | N/A | 9/27/1991 | 05/02/2012 |

## SECTION 7.0 – CONTRACTED STUDIES AND COMMUNITY COORDINATION

### 7.1 Contracted Studies

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

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

| Flooding Source | FIS Report Dated | Contractor | Number | Work Completed Date | Affected Communities |
|---|---|---|---|---|---|
| Buttery Creek | 1/29/2021 | Halff Associates Inc. | 12-06-0160P | 09/12/2012 | Llano, City of |
| Buttery Creek Tributary 1 | 1/29/2021 | Halff Associates Inc. | 12-06-0160P | 09/12/2012 | Llano, City of |
| Buttery Creek Tributary 2 | 1/29/2021 | Halff Associates Inc. | 12-06-0160P | 09/12/2012 | Llano, City of |
| Colorado River | 05/02/2012 | LCRA | N/A | 11/11/2003 | Horseshoe Bay, City of<br>Llano County, Unincorporated Areas,<br>Sunrise Beach Village, City of |
| Buttery Creek Tributary 2 | 1/29/2021 | Halff Associates Inc. | 12-06-0160P | 09/12/2012 | Llano, City of |

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

| Flooding Source | FIS Report Dated | Contractor | Number | Work Completed Date | Affected Communities |
|---|---|---|---|---|---|
| Colorado River | 05/02/2012 | LCRA | N/A | 11/11/2003 | Horseshoe Bay, City of<br>Llano County, Unincorporated Areas,<br>Sunrise Beach Village, City of |
| Flag Creek | 1/29/2021 | Halff Associates Inc. | 12-06-0160P | 09/12/2012 | Llano, City of<br>Llano County, Unincorporated Areas |
| Llano River | 1/29/2021 | Halff Associates Inc. | 12-06-0160P | 09/12/2012 | Llano, City of<br>Llano County, Unincorporated Areas |
| Llano River | 05/02/2012 | LCRA | EMW-E-1153 | 11/11/2003 | Llano County, Unincorporated Areas |
| Sandy Creek | 05/02/2012 | LCRA | N/A | 11/11/2003 | Llano County, Unincorporated Areas |
| Unnamed Tributary to the Llano River | 1/29/2021 | RAMPP | HSFEHQ-09-D-0369 | 1/15/2015 | Llano County, Unincorporated Areas |
| Various Streams Studied by Approximate Methods | 05/02/2012 | Halff Associates Inc. | N/A | 08/14/2009 | Horseshoe Bay, City of<br>Llano, City of,<br>Llano County, Unincorporated Areas<br>Sunrise Beach Village, City of |

## 7.2 Community Meetings

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

**Table 29: Community Meetings**

| Community | FIS Report Dated | Date of Meeting | Meeting Type | Attended By |
|---|---|---|---|---|
| Horseshoe Bay, City of | 5/12/2012 | 5/1/2007 | Initial CCO | FEMA, City of Llano, Llano County, LCRA, City of Horseshoe Bay, City of Sunrise Village, Texas Department of Transportation, Halff Associates |
| | | 9/25/2009 | Final CCO | FEMA, City of Llano, Llano County, LCRA, City of Horseshoe Bay, City of Sunrise Village, Texas Association of Counties, Halff Associates |
| Llano County and Unincorporated Areas | 1/29/2021 | 3/31/2015 | Final CCO | FEMA, City of Llano, Llano County, RAMPP, Texas Water Development Board |
| | | 6/24/2019 | Other | FEMA, City of Llano, Llano County, Compass JV, Texas Water Development Board |
| Llano, City of | 1/29/2021 | 3/31/2015 | Final CCO | FEMA, City of Llano, Llano County, RAMPP, Texas Water Development Board |
| | | 6/24/2019 | Other | FEMA, City of Llano, Llano County, Compass JV, Texas Water Development Board |
| Sunrise Beach Village, City of | 5/12/2012 | 5/1/2007 | Initial CCO | FEMA, City of Llano, Llano County, LCRA, City of Horseshoe Bay, City of Sunrise Village, Texas Department of Transportation, Halff Associates |
| | | 9/25/2009 | Final CCO | FEMA, City of Llano, Llano County, LCRA, City of Horseshoe Bay, City of Sunrise Village, Texas Association of Counties, Halff Associates |

## SECTION 8.0 – ADDITIONAL INFORMATION

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

The additional data that was used for this project includes the FIS Report and FIRM that were previously prepared for Llano County and the Incorporated Areas (FEMA 2012).

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

**Table 30: Map Repositories**

| Community | Address | City | State | Zip Code |
|---|---|---|---|---|
| Horseshoe Bay, City of | City Hall<br>1 Community Drive | Horseshoe Bay | TX | 78657 |
| Llano, City of | Code Enforcement Department<br>301 West Main Street, 2nd Floor | Llano | TX | 78643 |
| Llano County, Unincorporated Areas | Llano County Permitting and Emergency Management,<br>100 West Sandstone Street,<br>Suite 200A | Llano | TX | 78643 |
| Sunrise Beach Village, City of | City Hall<br>124 Sunrise Drive | Sunrise Beach Village | TX | 78643 |

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

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

**Table 31: Additional Information**

| FEMA and the NFIP | |
|---|---|
| FEMA and FEMA Engineering Library website | www.fema.gov/national-flood-insurance-program-flood-hazard-mapping/engineering-library |
| NFIP website | www.fema.gov/national-flood-insurance-program |
| NFHL Dataset | msc.fema.gov |
| FEMA Region VI | Federal Regional Center<br>800 North Loop 288<br>Denton, TX 76209-3606<br>(940) 898-5399 |
| Other Federal Agencies | |
| USGS website | www.usgs.gov |
| Hydraulic Engineering Center website | www.hec.usace.army.mil |
| State Agencies and Organizations | |
| State NFIP Coordinator | Yi Chan<br>State NFIP Coordinator<br>Texas Water Development Board<br>1700 North Congress Avenue<br>Austin, TX 78711-3231<br>512-936-6903<br>yi.chan@twdb.texas.gov |
| State GIS Coordinator | Mike Ouimet<br>Statewide GIS Coordinator<br>300 West 15th Street<br>Austin, Texas 78711-3564<br>512-305-9076<br>mike.ouimet@dir.state.tx.us |

## SECTION 9.0 – BIBLIOGRAPHY AND REFERENCES

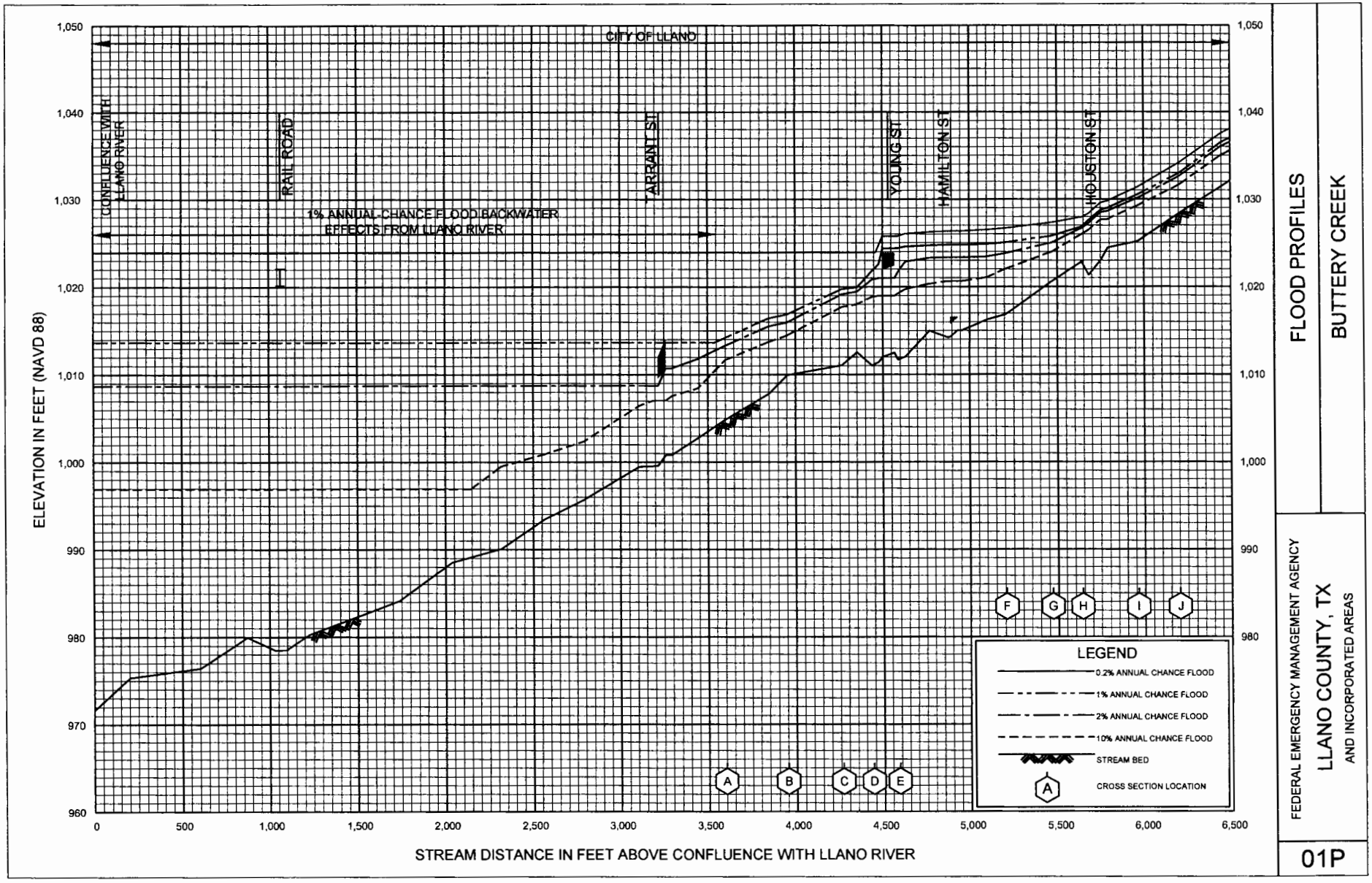
Table 32 includes sources used in the preparation of and cited in this FIS Report as well as additional studies that have been conducted in the study area.

**Table 32: Bibliography and References**

| Citation in this FIS | Publisher/ Issuer | *Publication Title,* "Article," Volume, Number, etc. | Author/Editor | Place of Publication | Publication Date/ Date of Issuance | Link |
|---|---|---|---|---|---|---|
| CAPCOG 2002 | Capital Area Council of Governments (CAPCOG) | *Railroads* | Capital Area Council of Governments (CAPCOG) | Austin, Texas | 2002 | https://www.capcog.org/ |
| CAPCOG 2004 | Capital Area Council of Governments (CAPCOG) | *Airport, Airfield, Runway, Transportation* | Capital Area Council of Governments (CAPCOG) | Austin, Texas | 2004 | https://www.capcog.org/ |
| CAPCOG 2007-3 | Capital Area Council of Governments (CAPCOG) | *CAPCOG Roads* | Capital Area Council of Governments (CAPCOG) | Austin, Texas | 2007 | https://www.capcog.org/ |
| CAPCOG 2007-5 | Capital Area Council of Governments (CAPCOG) | *CAPCOG City Limits* | Capital Area Council of Governments (CAPCOG) | Austin, Texas | 2007 | https://www.capcog.org/ |
| CHB 2007 | City of Horseshoe Bay, Texas | *City Limits of Horseshoe Bay* | City of Horseshoe Bay, Texas | Horseshoe Bay, Texas | 2007 | https://www.horseshoe-bay-tx.gov/ |
| FEMA 2012 | Federal Emergency Management Agency (FEMA) | *Flood Insurance Study for Llano County, Texas and Incorporated Areas* | Federal Emergency Management Agency (FEMA) | Washington, D.C. | May 2nd, 2012 | https://msc.fema.gov |

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

| Citation in this FIS | Publisher/ Issuer | *Publication Title,* "Article," Volume, Number, etc. | Author/Editor | Place of Publication | Publication Date/ Date of Issuance | Link |
|---|---|---|---|---|---|---|
| FEMA 2021 | Federal Emergency Management Agency (FEMA) | *Incorporation of LOMR Case No. 12-06-0160P* | Federal Emergency Management Agency (FEMA) | Washington, D.C. | 2021 | https://msc.fema.gov |
| LCRA 2007 | Lower Colorado River Authority (LCRA) | *LiDAR and Contours* | Lower Colorado River Authority (LCRA) | Austin, Texas | 2007 | https://www.lcra.org/Pages/default.aspx |
| NGS 2002 | NOAA National Geodetic Survey | *Permanent Bench Mark Data Sheets* | NOAA | Silver Springs, Maryland | 2002 | https://www.noaa.gov/ |
| TNRIS 2005 | Texas Natural Resources Information System (TNRIS) | *Stratmap County Boundary* | Texas Natural Resources Information System (TNRIS) | Austin, Texas | 2005 | https://tnris.org |
| USGS 1989 | United States Geological Survey (USGS) | *USGS 7.5-Minute Series Topographic Maps* | United States Geological Survey (USGS) | Reston, Virginia | 1989 | https://www.usgs.gov/ |
| USGS 2005 | United States Geological Survey (USGS) | *USGS National Hydrography Dataset* | United States Geological Survey (USGS) | Reston, Virginia | 2005 | http://www.nhd.usgs.gov |




FLOOD PROFILES

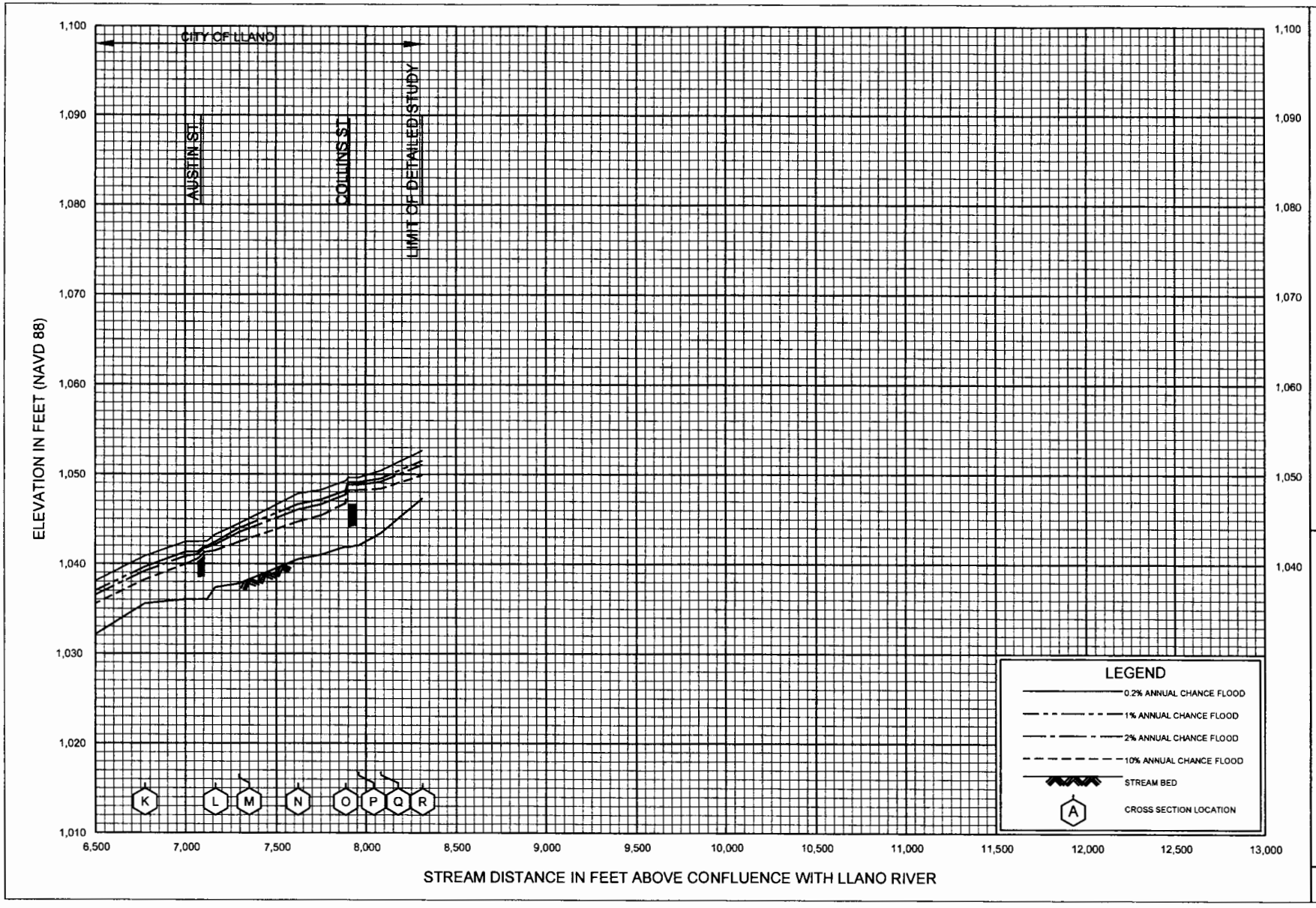
BUTTERY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

01P




FLOOD PROFILES

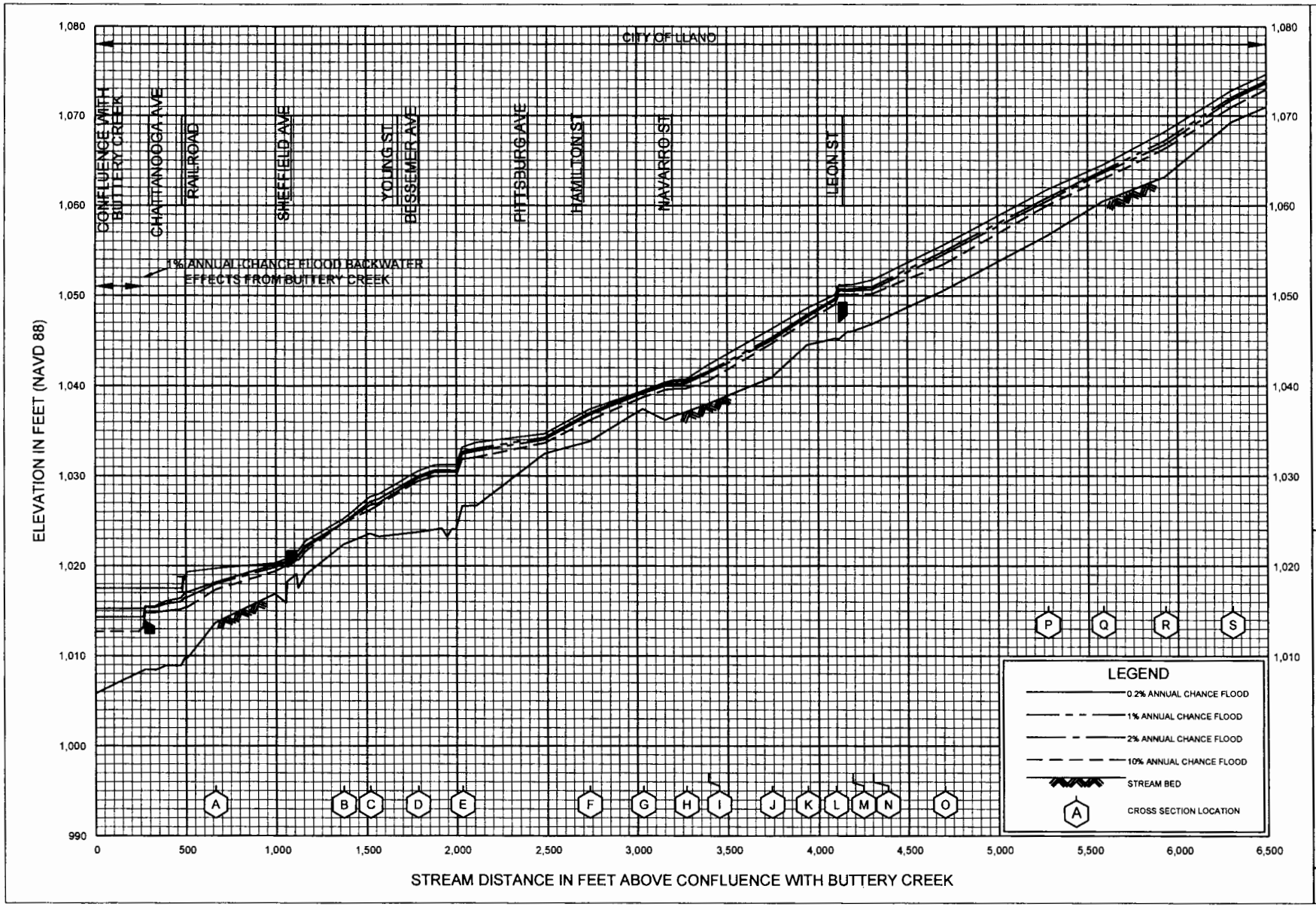
BUTTERY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

02P




FLOOD PROFILES

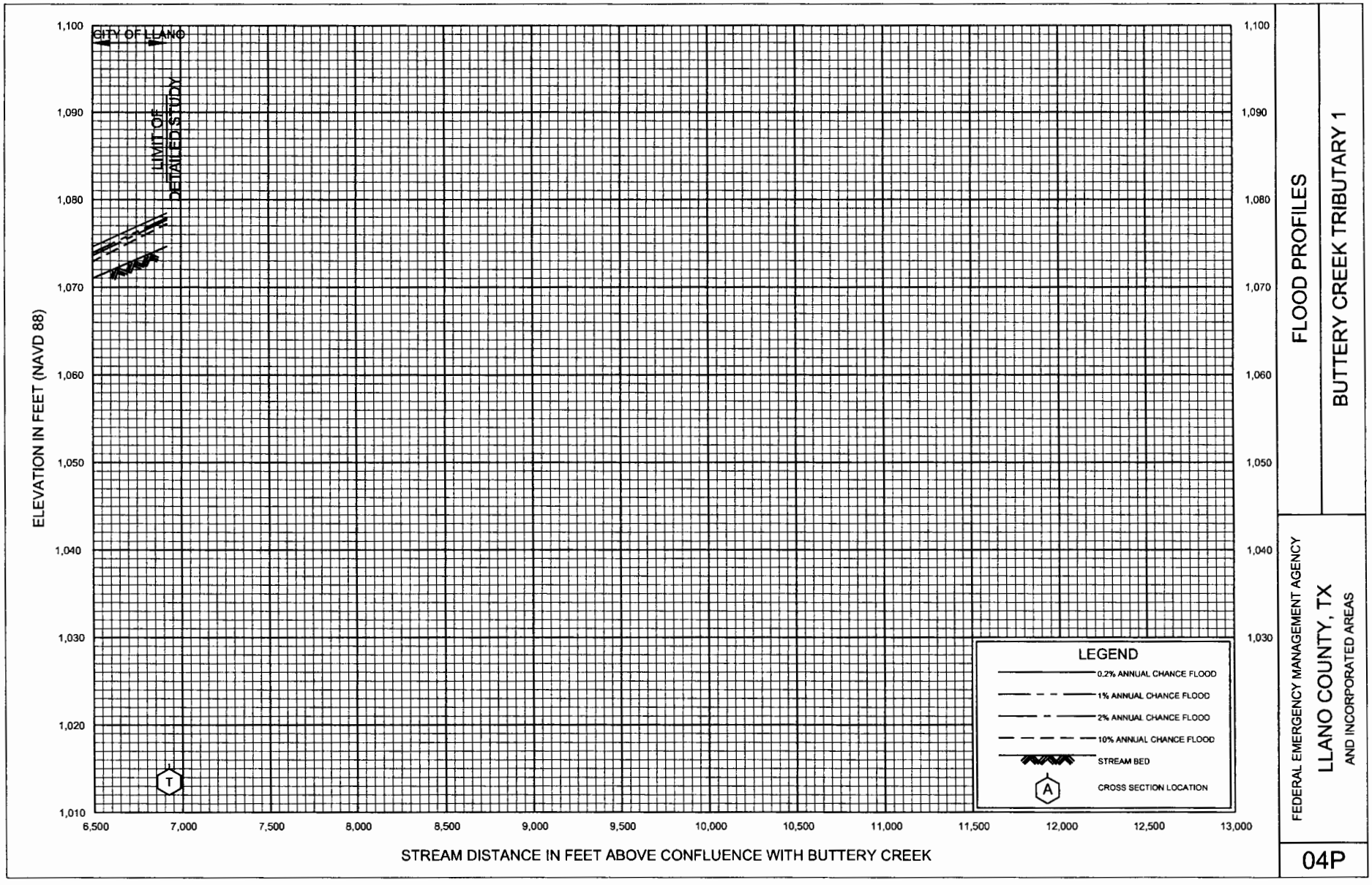
BUTTERY CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

03P




FLOOD PROFILES

BUTTERY CREEK TRIBUTARY 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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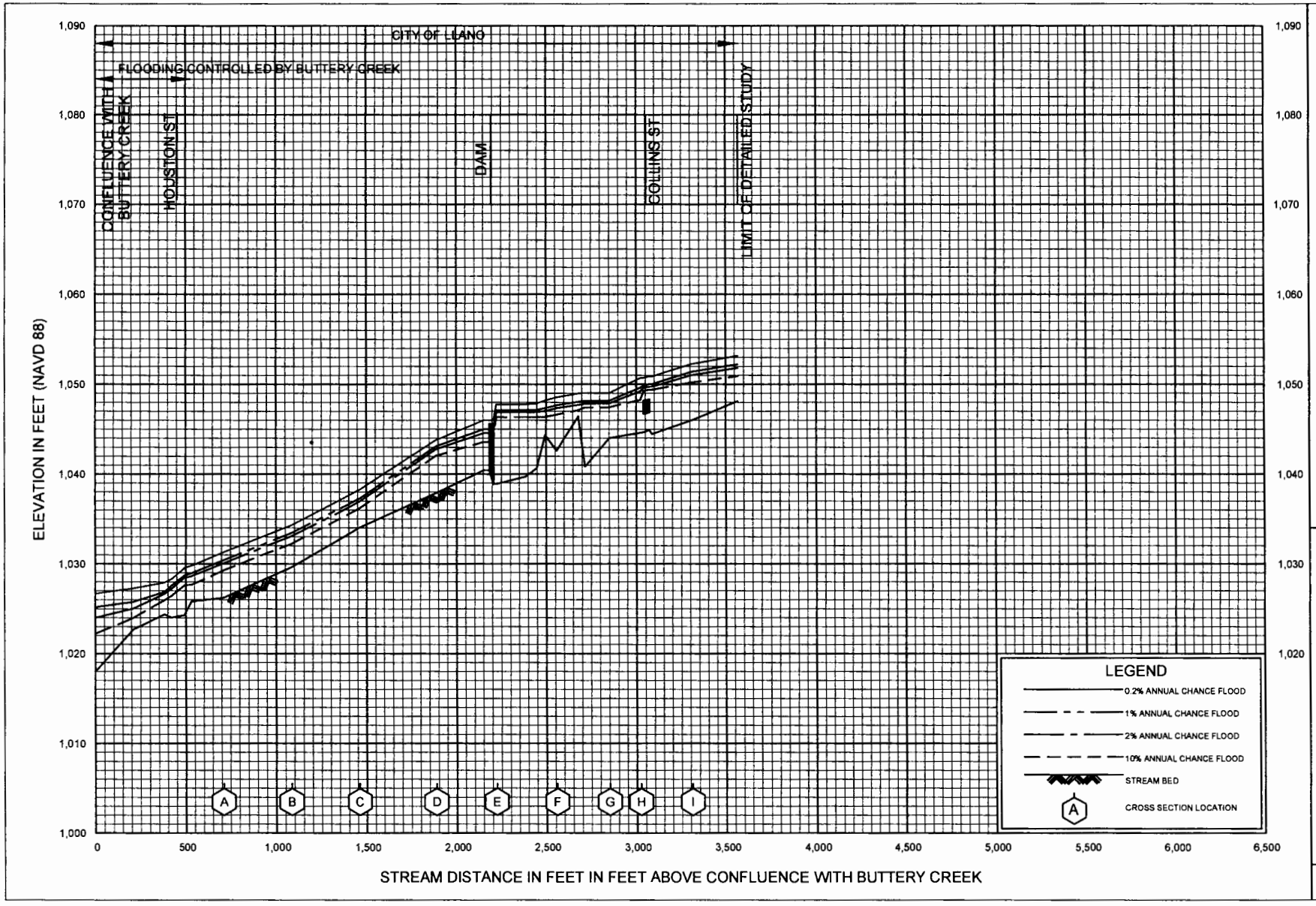


FLOOD PROFILES

BUTTERY CREEK TRIBUTARY 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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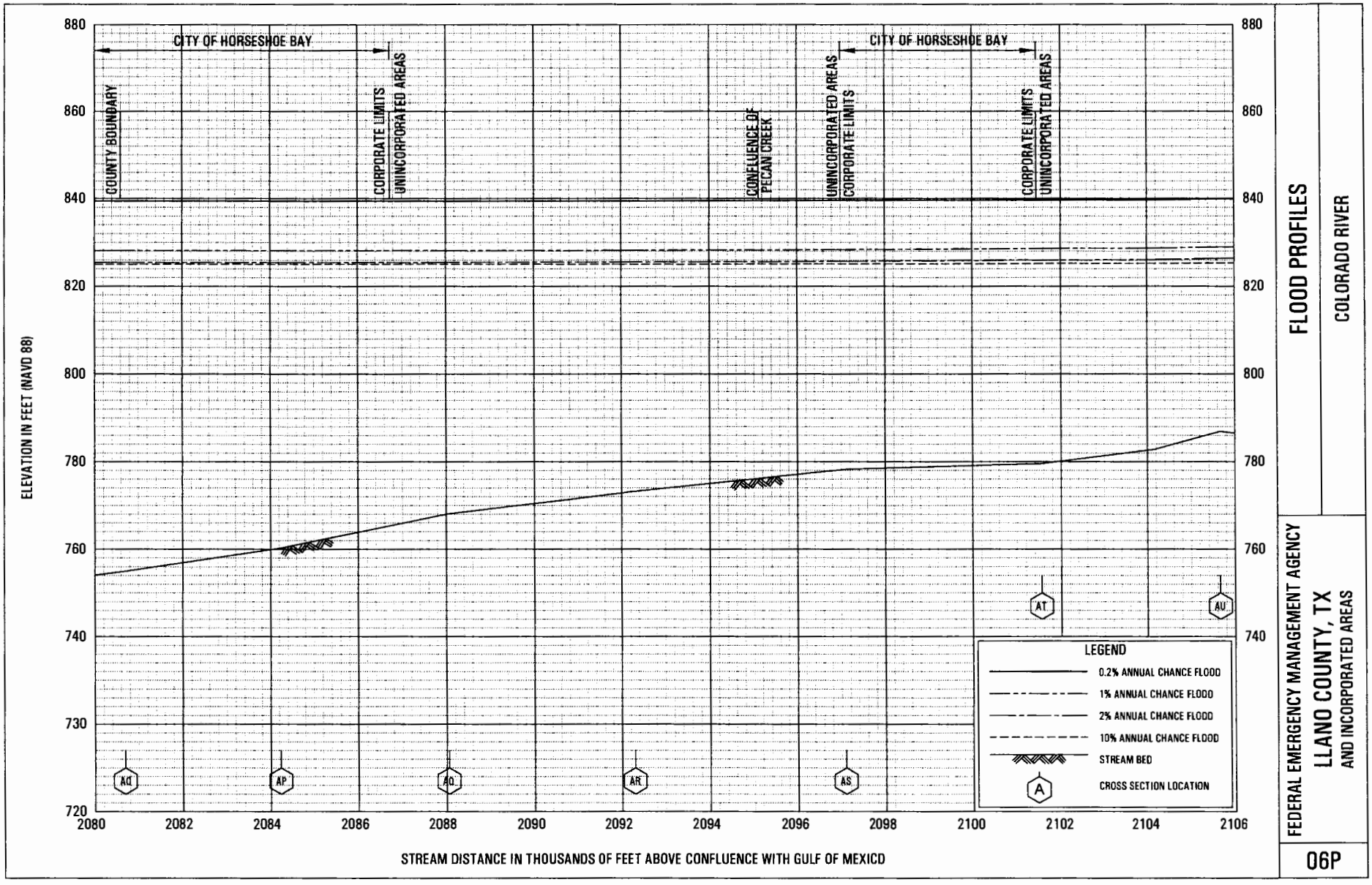



FLOOD PROFILES

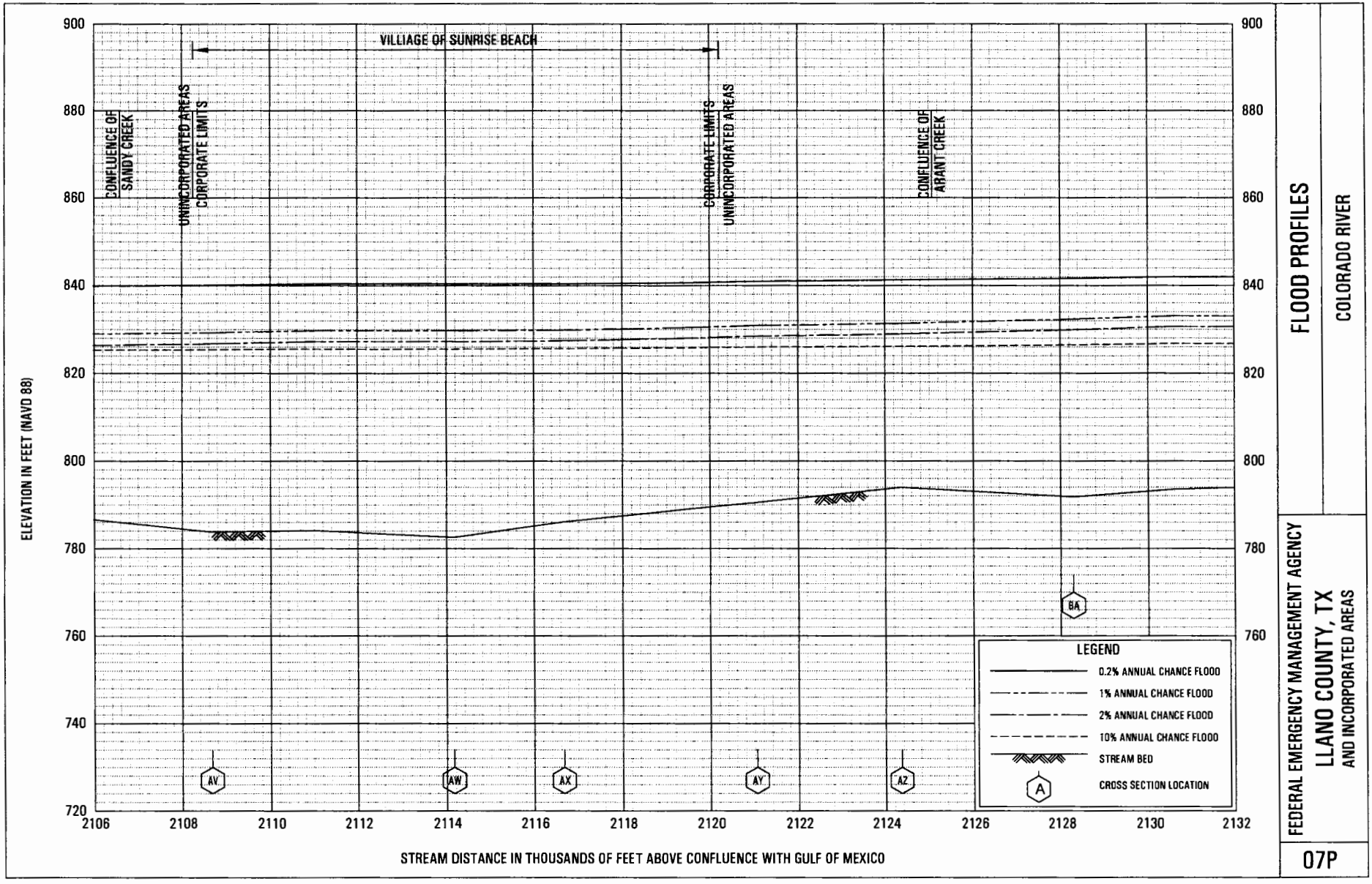
COLORADO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

06P




FLOOD PROFILES

COLORADO RIVER

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LLANO COUNTY, TX

AND INCORPORATED AREAS

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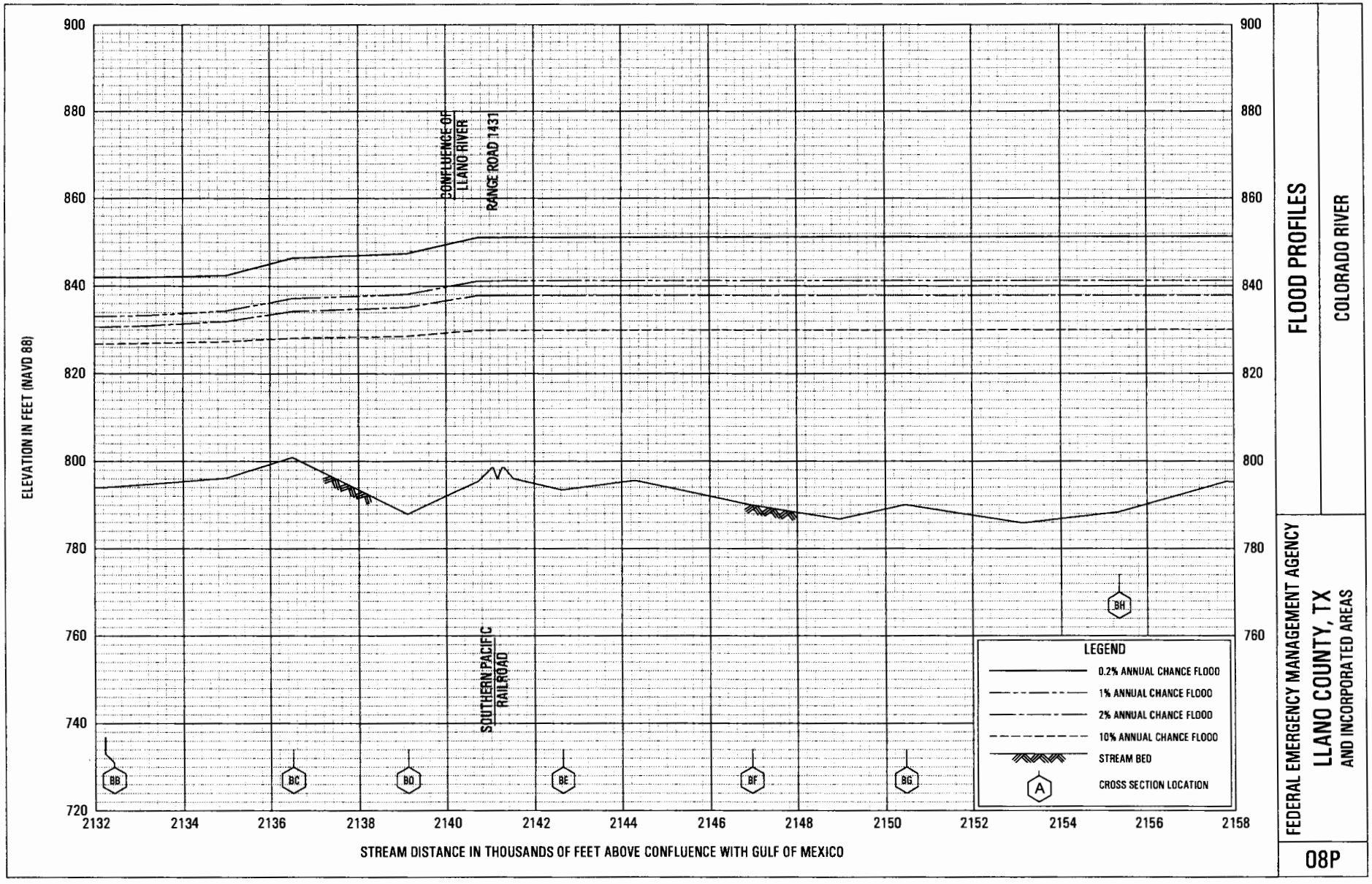


FLOOD PROFILES

COLORADO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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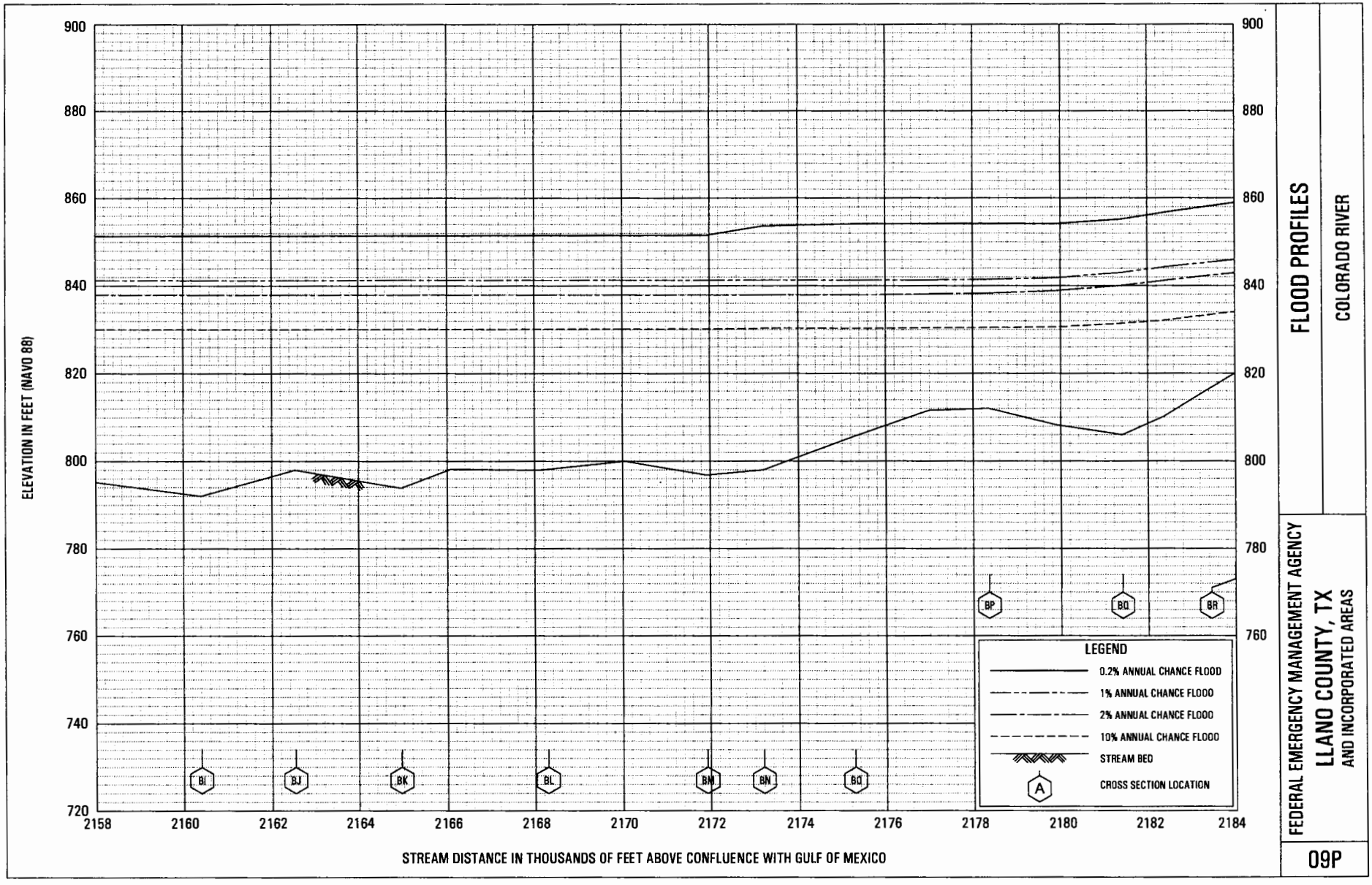


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COLORADO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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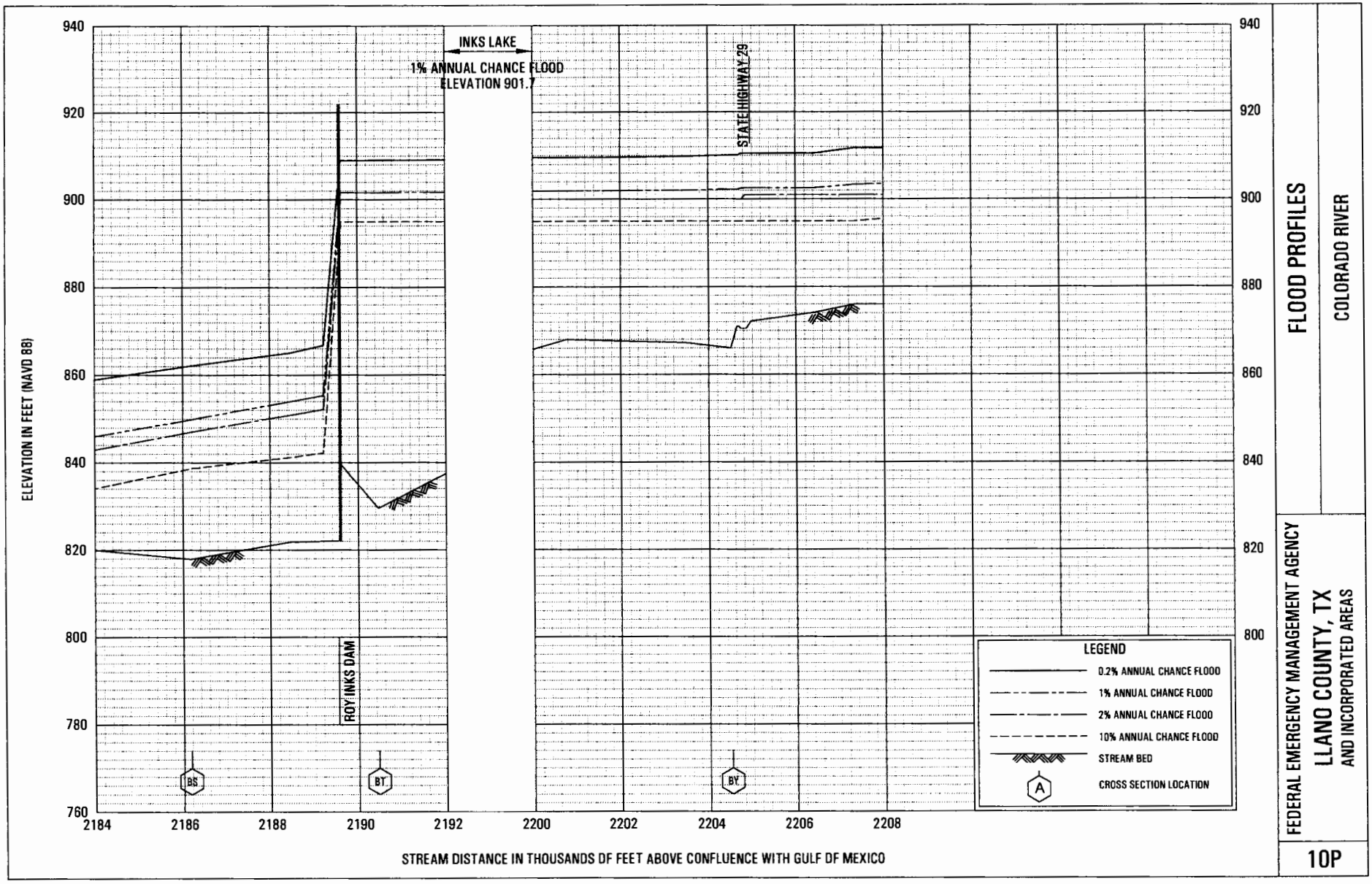


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COLORADO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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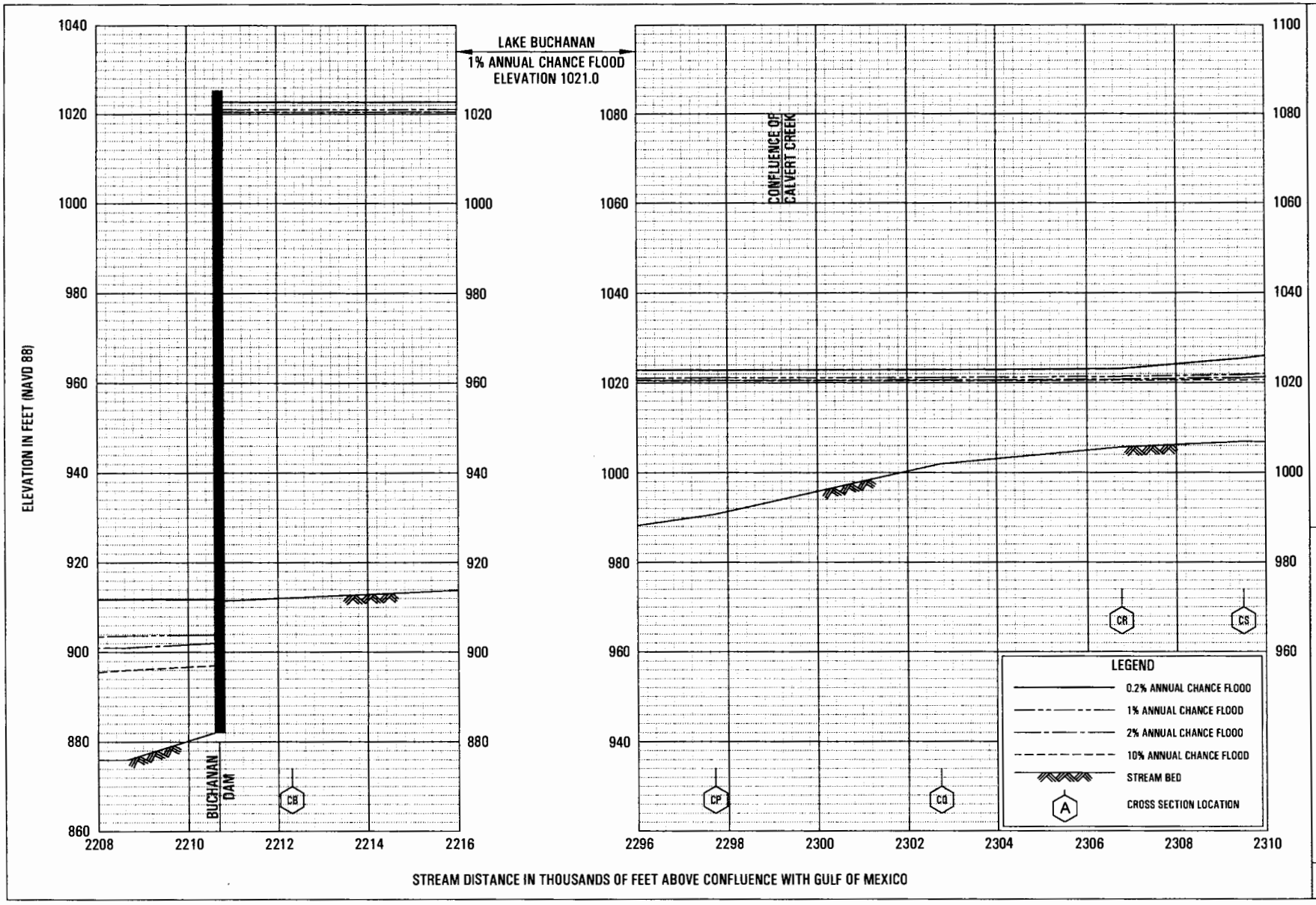


FLOOD PROFILES

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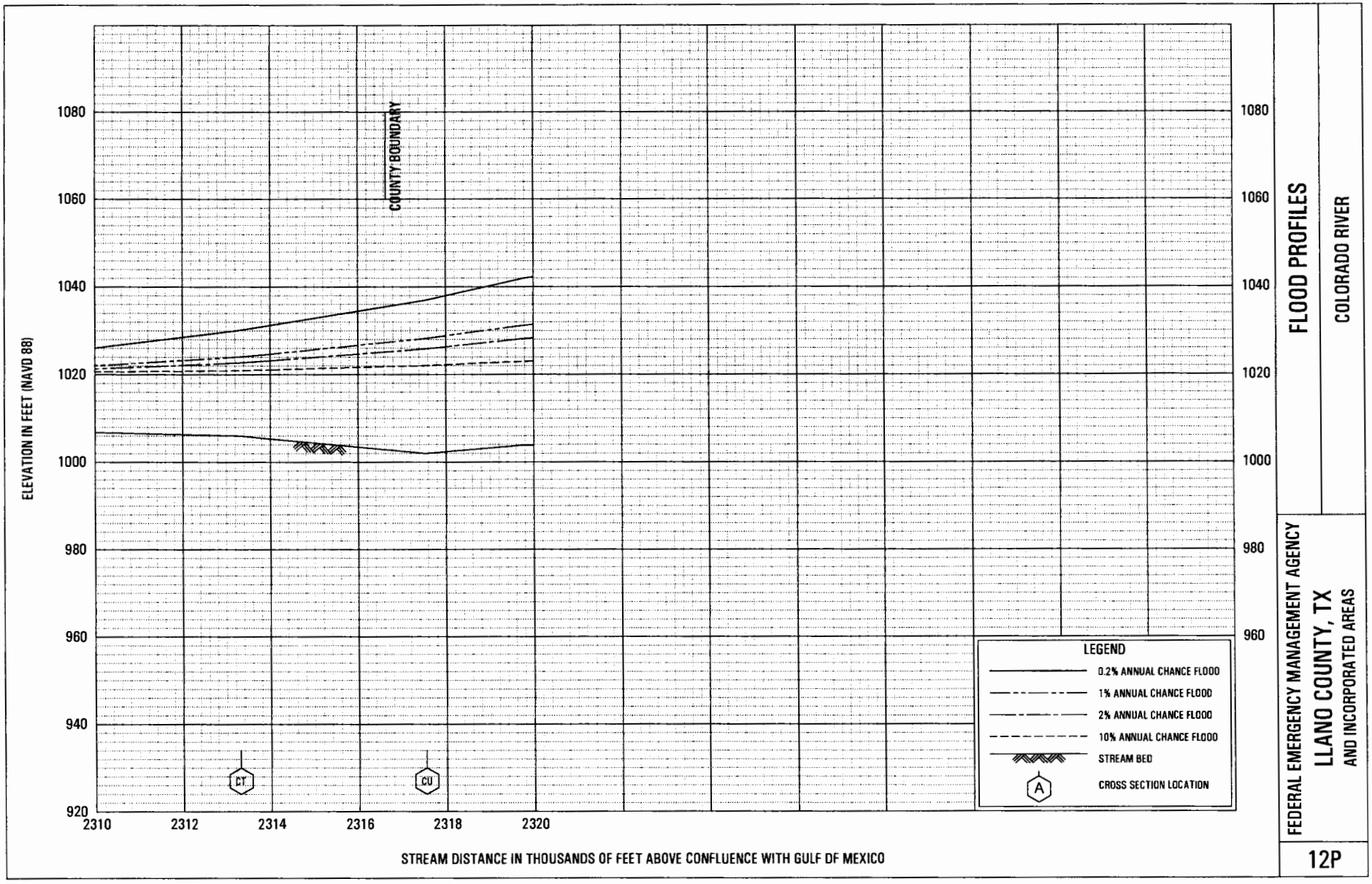


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LLANO COUNTY, TX

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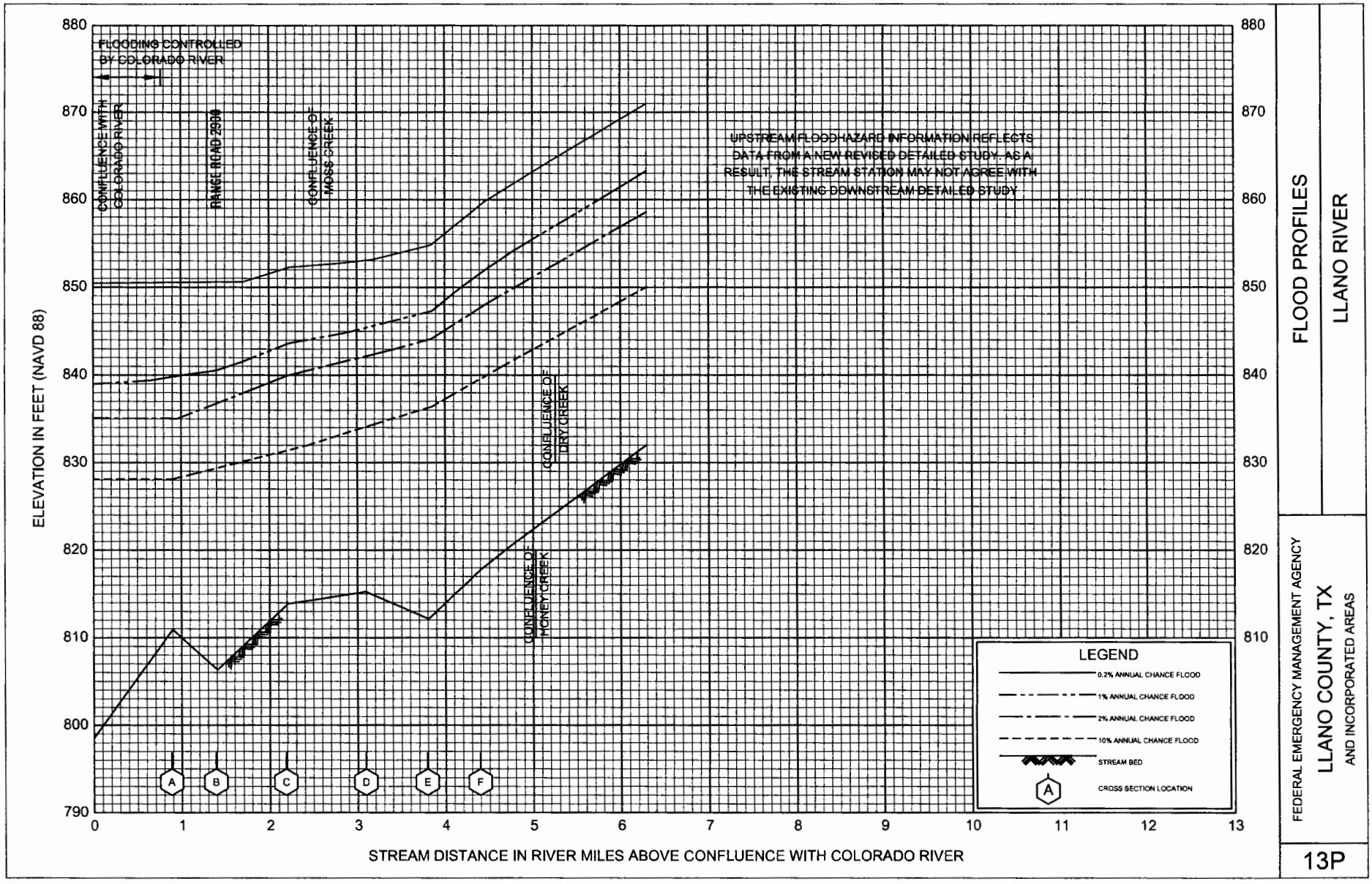


FLOOD PROFILES

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LLANO COUNTY, TX

AND INCORPORATED AREAS

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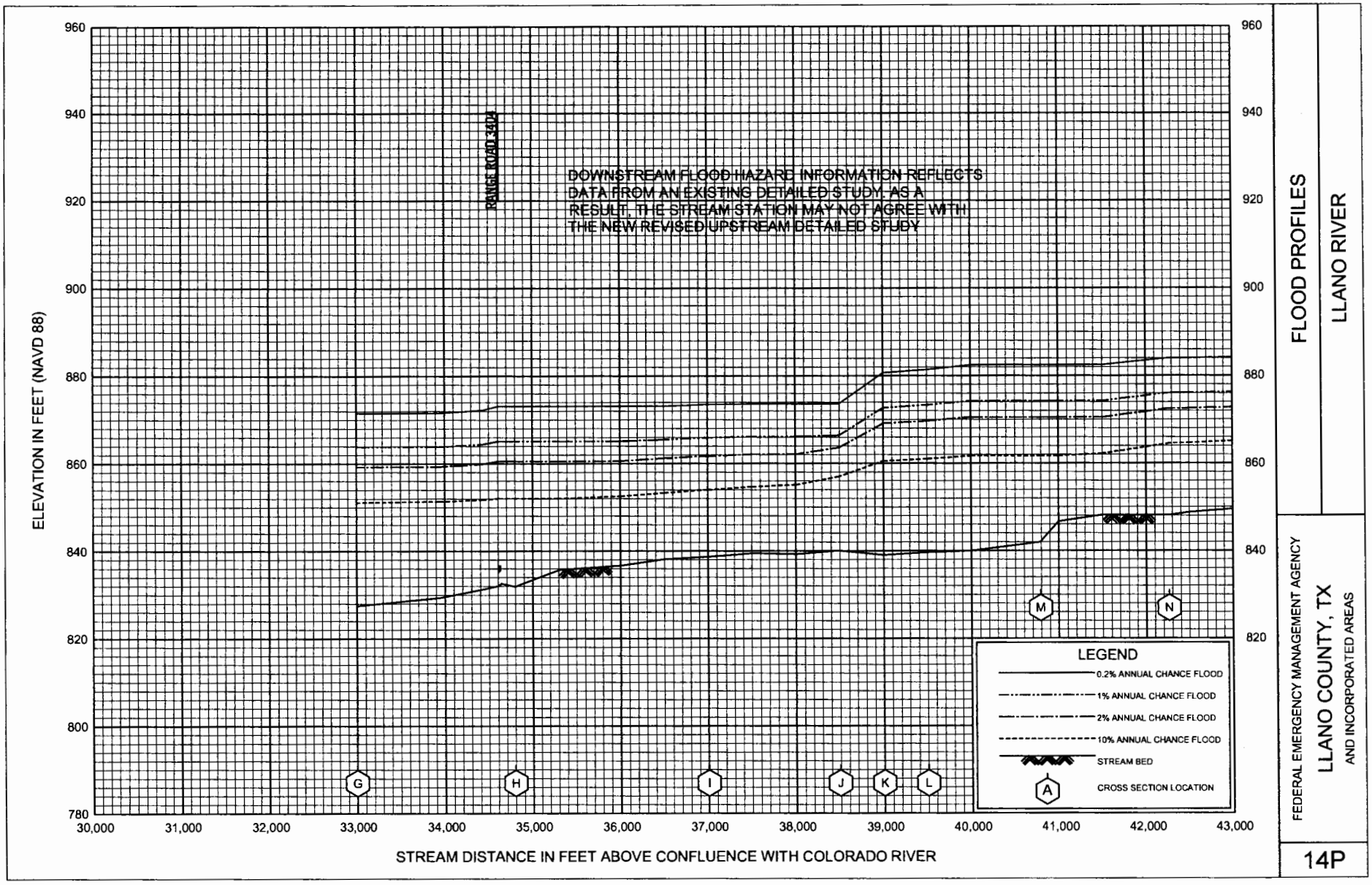


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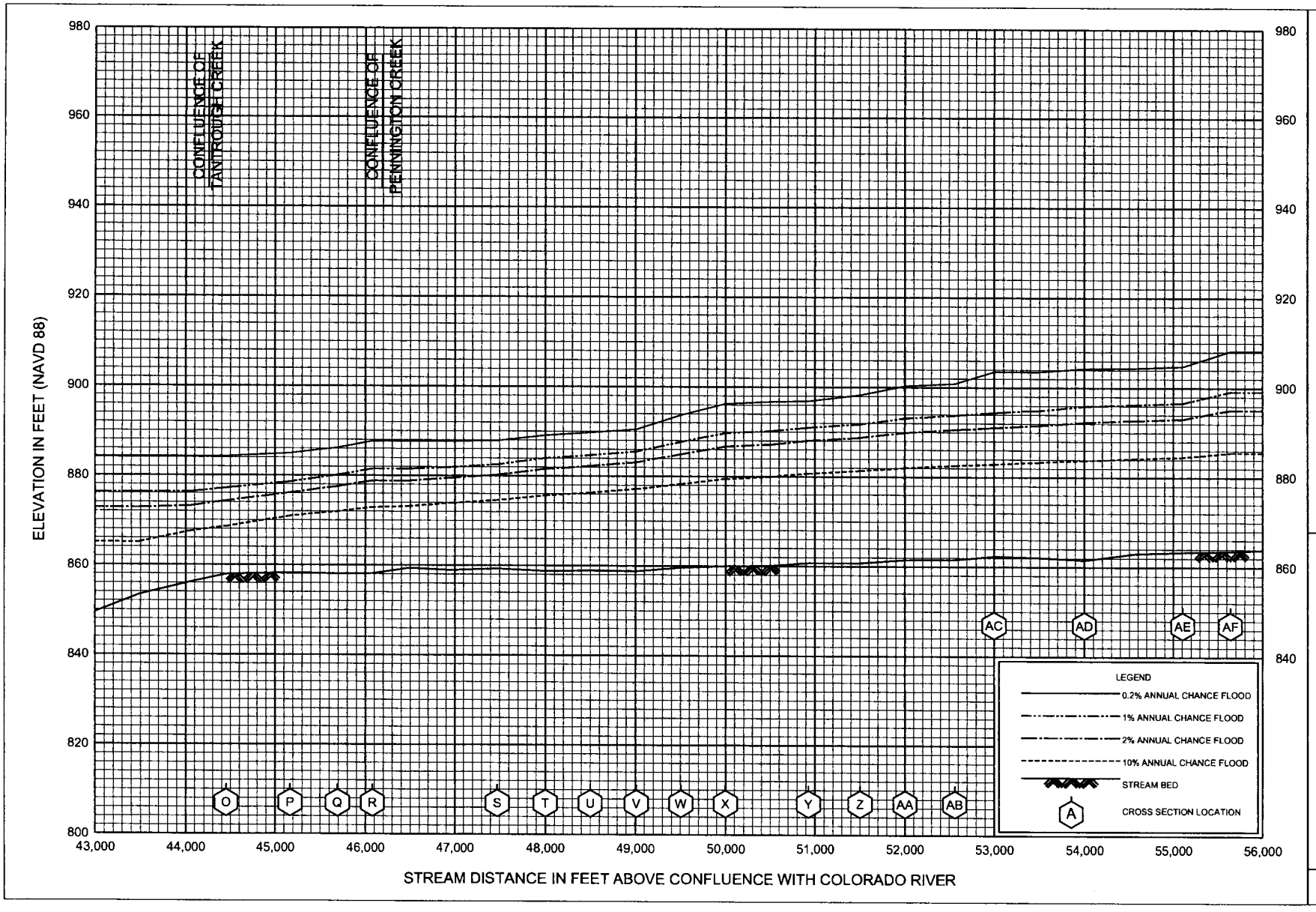


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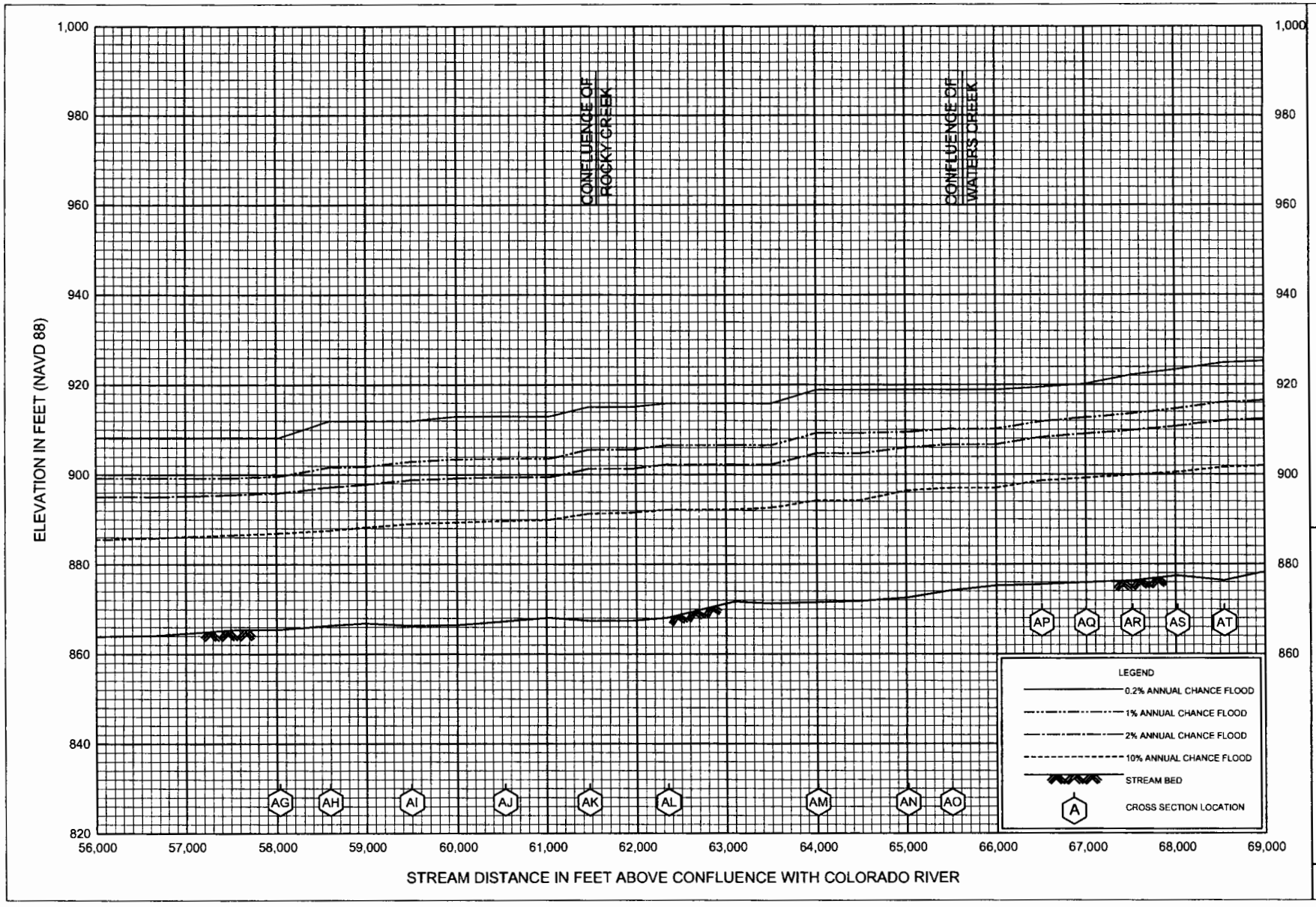


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AND INCORPORATED AREAS

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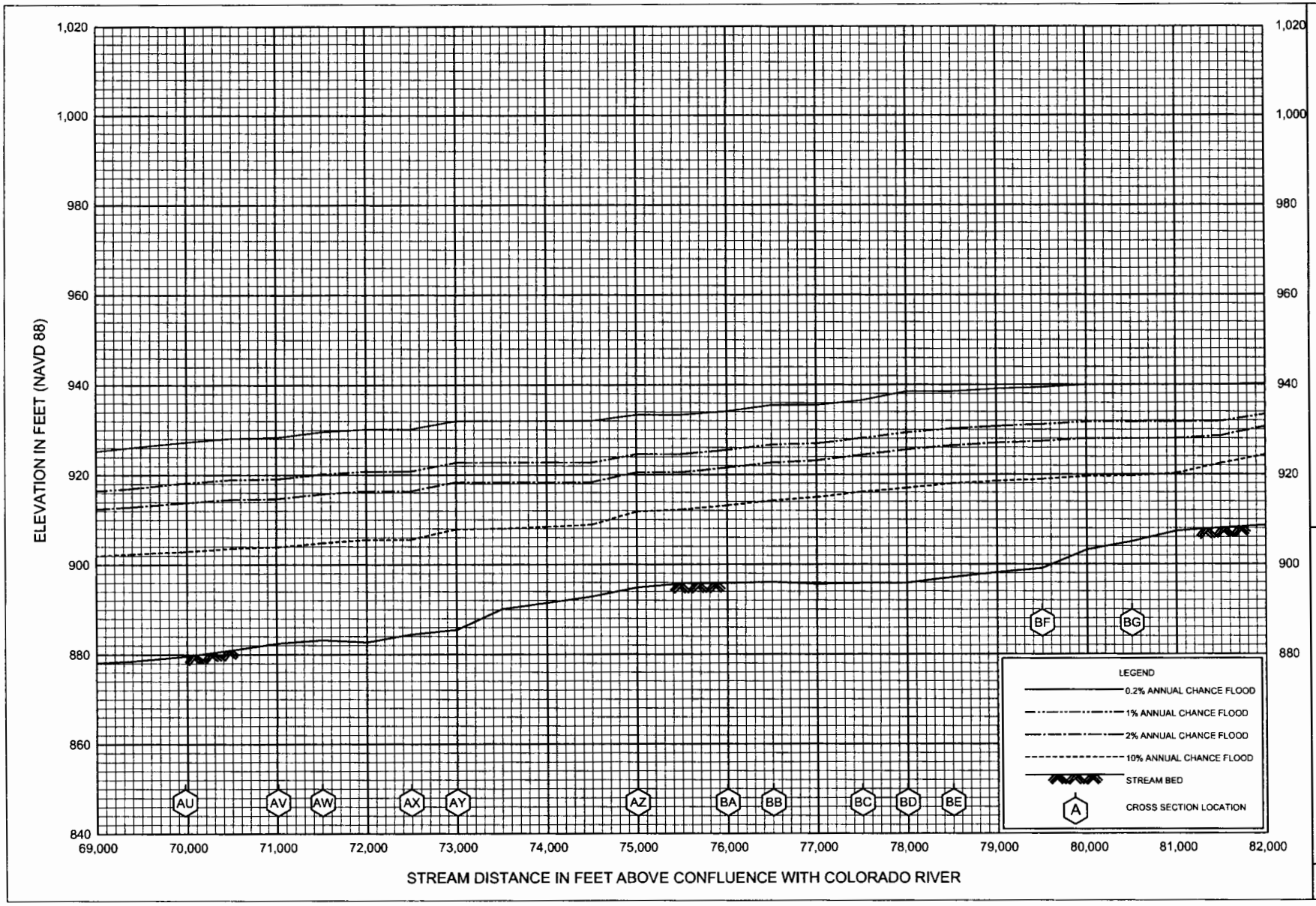


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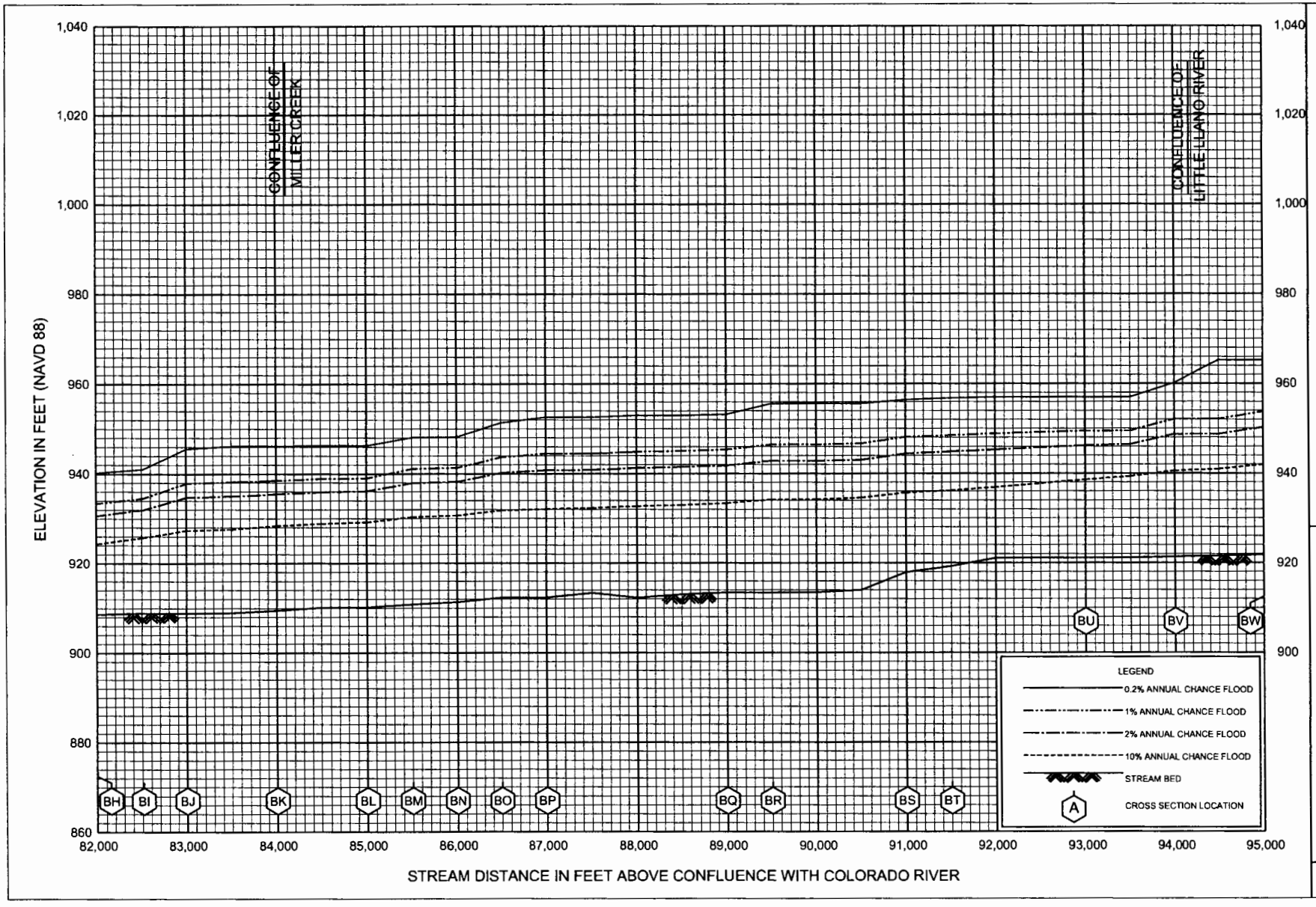


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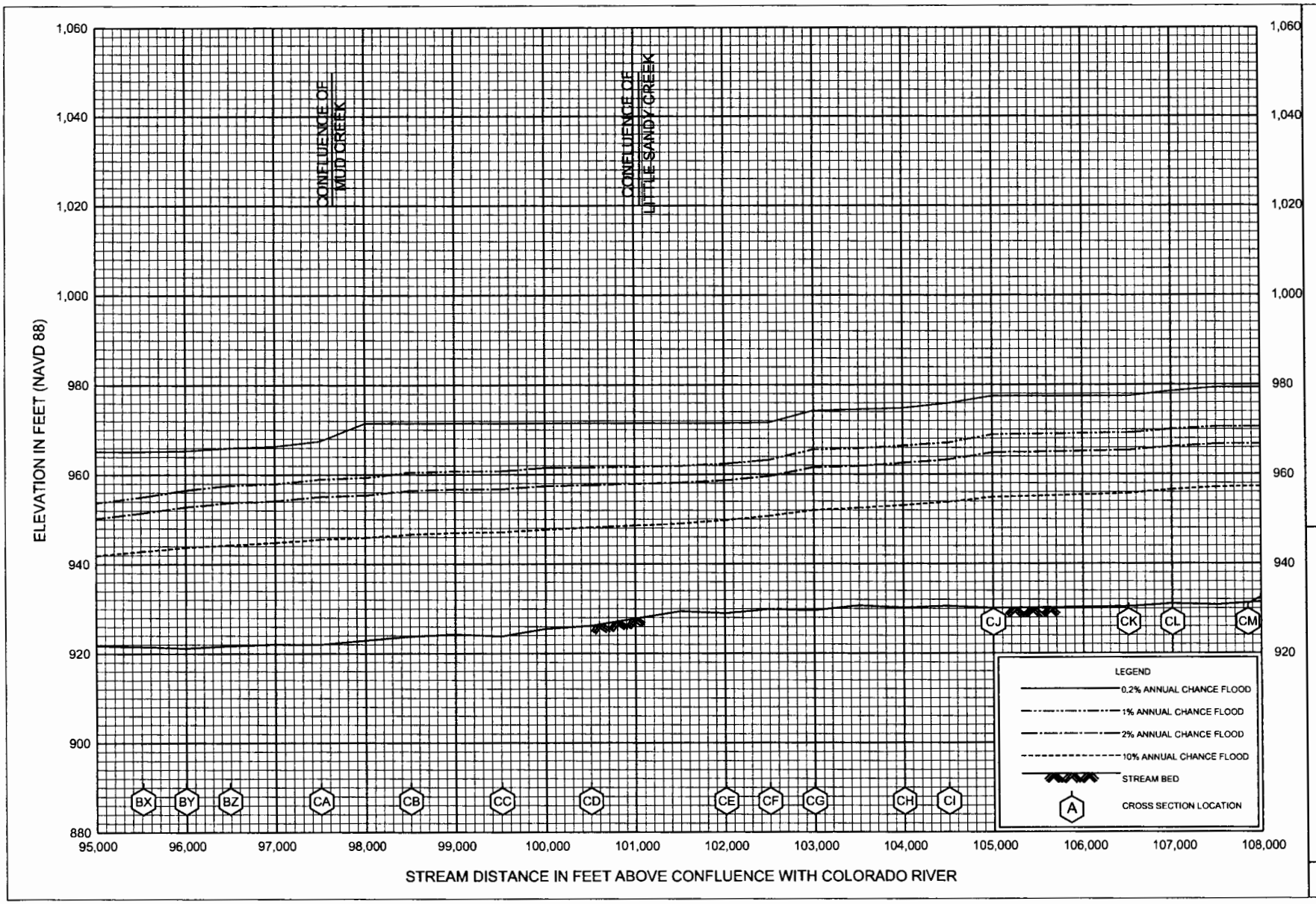


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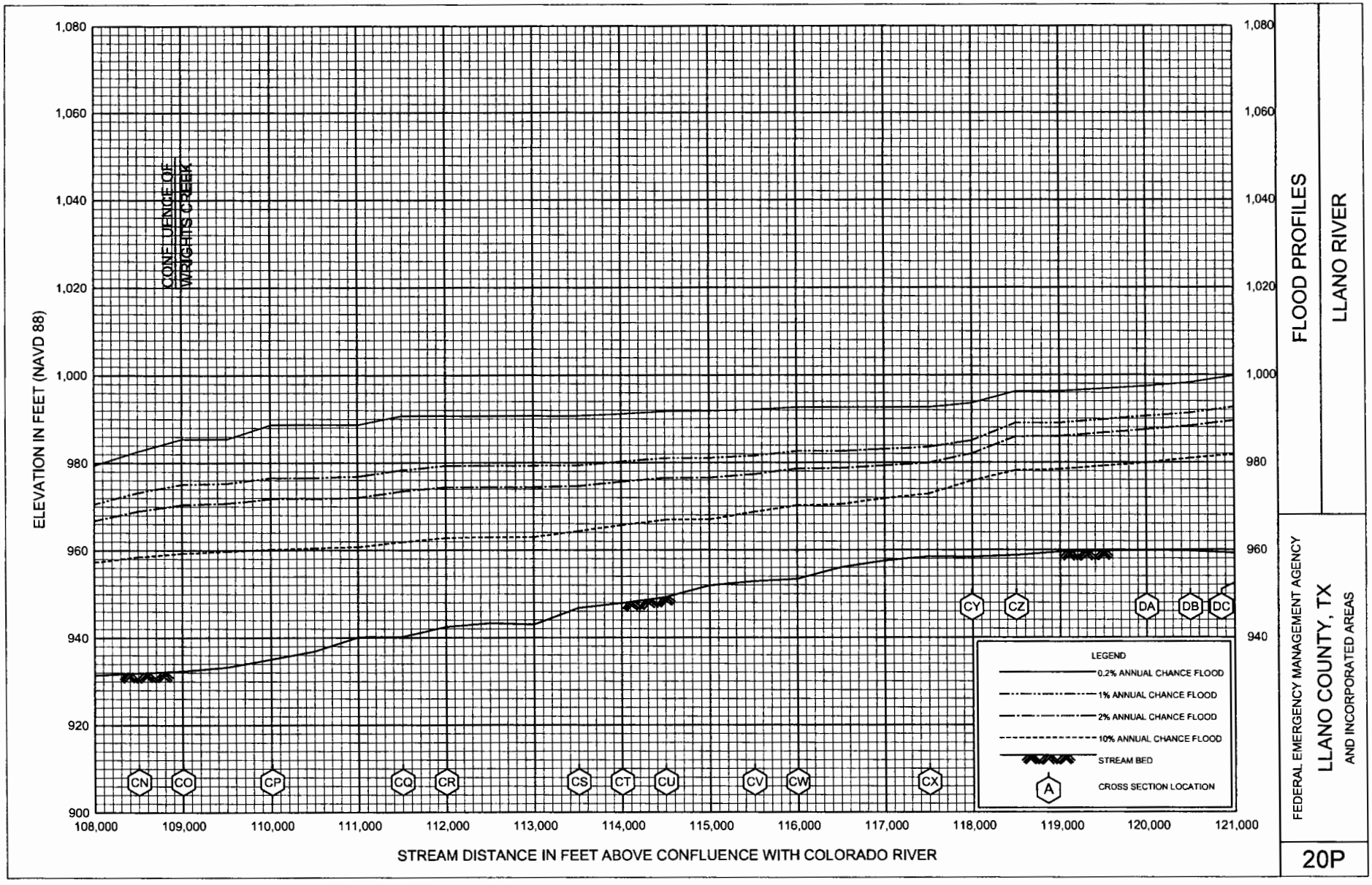


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LLANO COUNTY, TX

AND INCORPORATED AREAS

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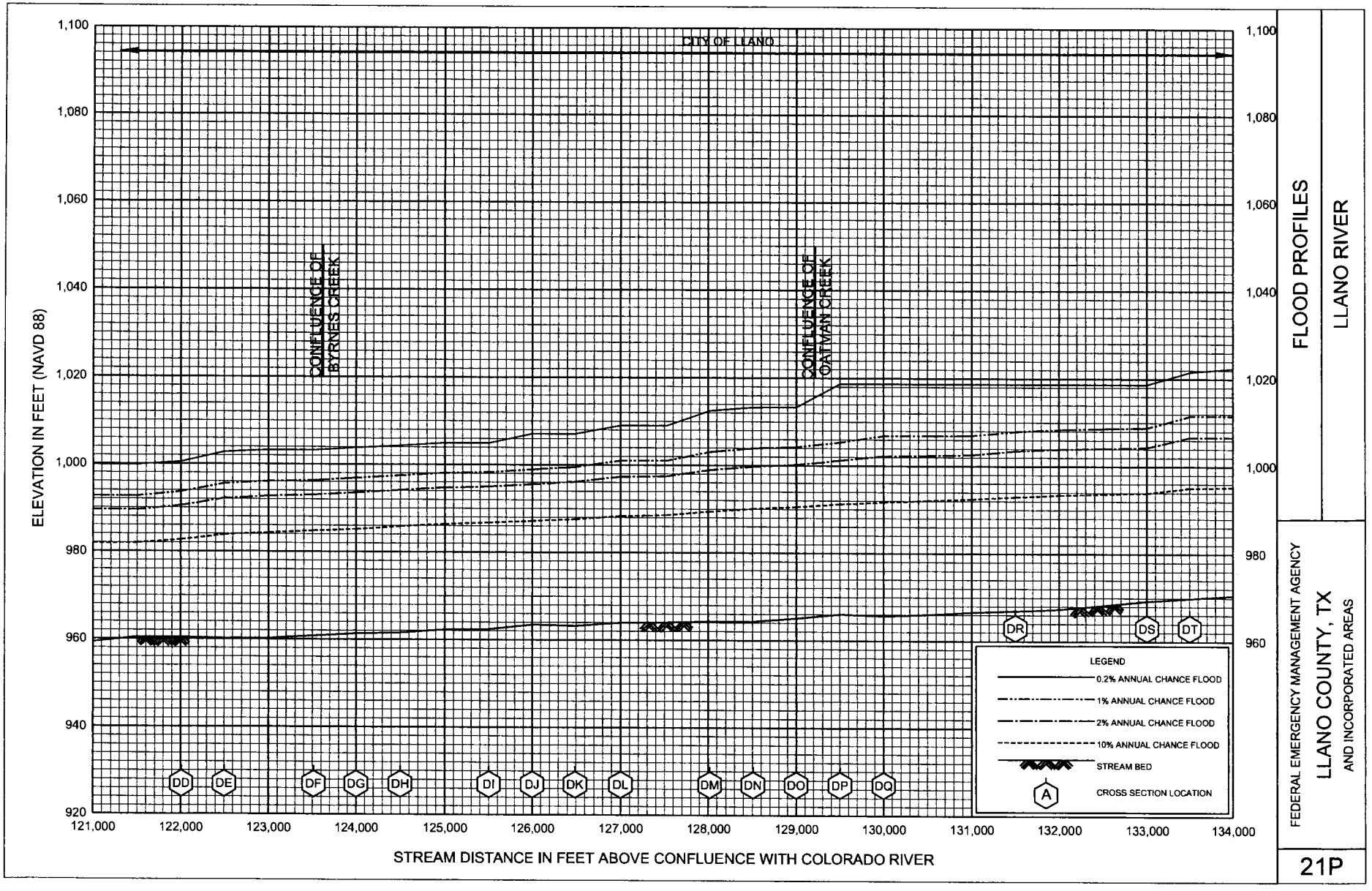


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LLANO COUNTY, TX

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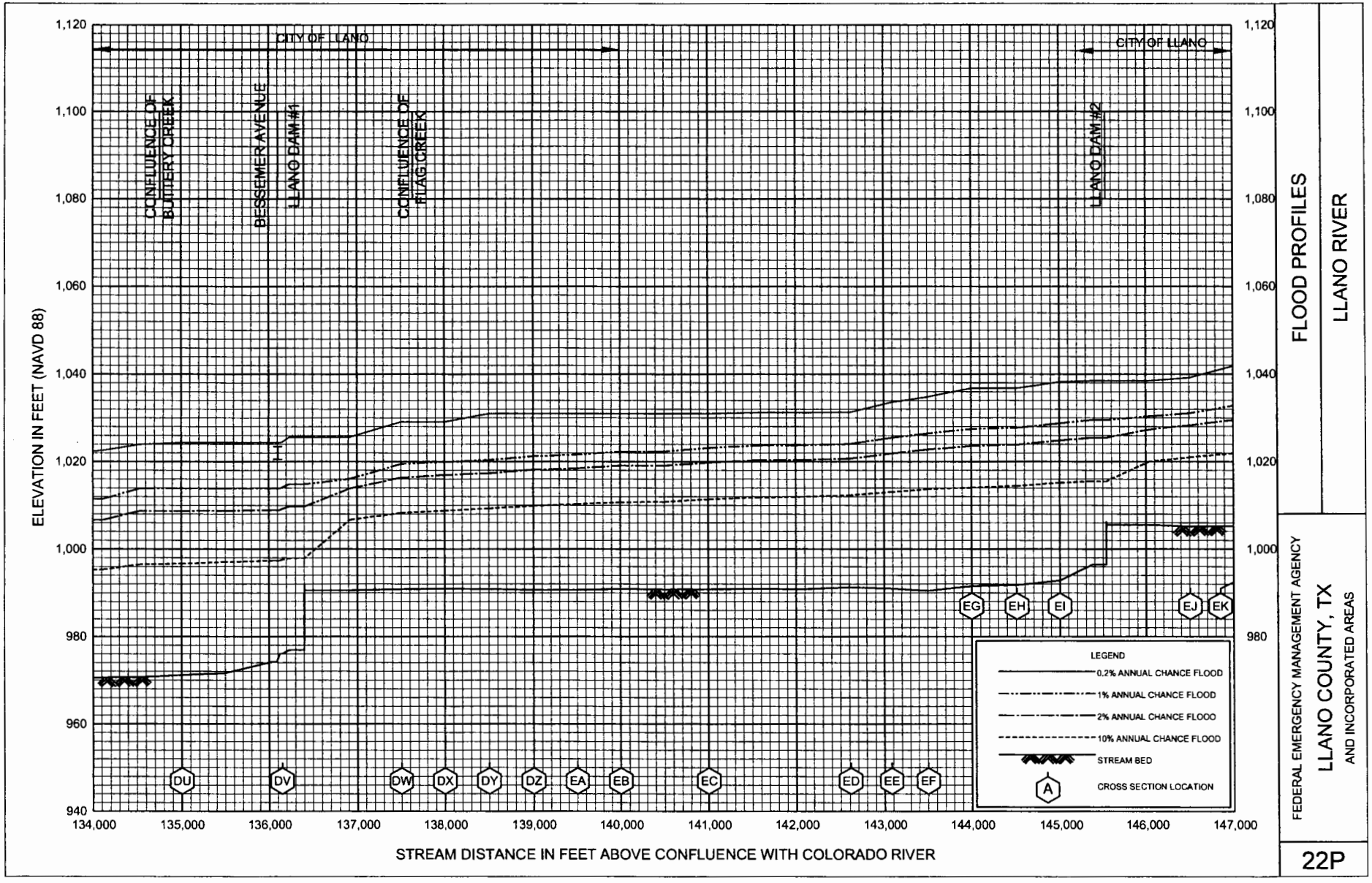


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LLANO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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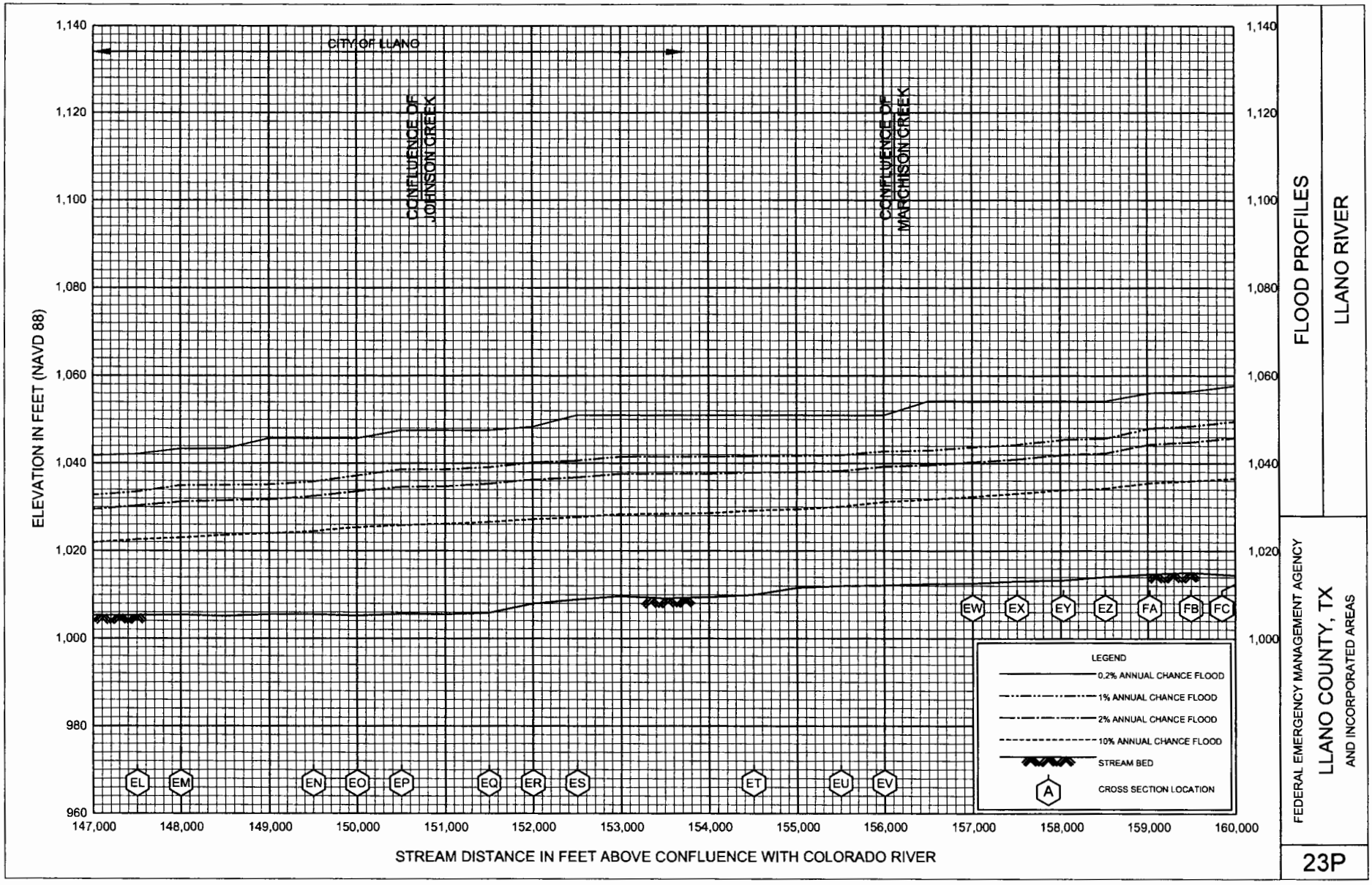


FLOOD PROFILES

LLANO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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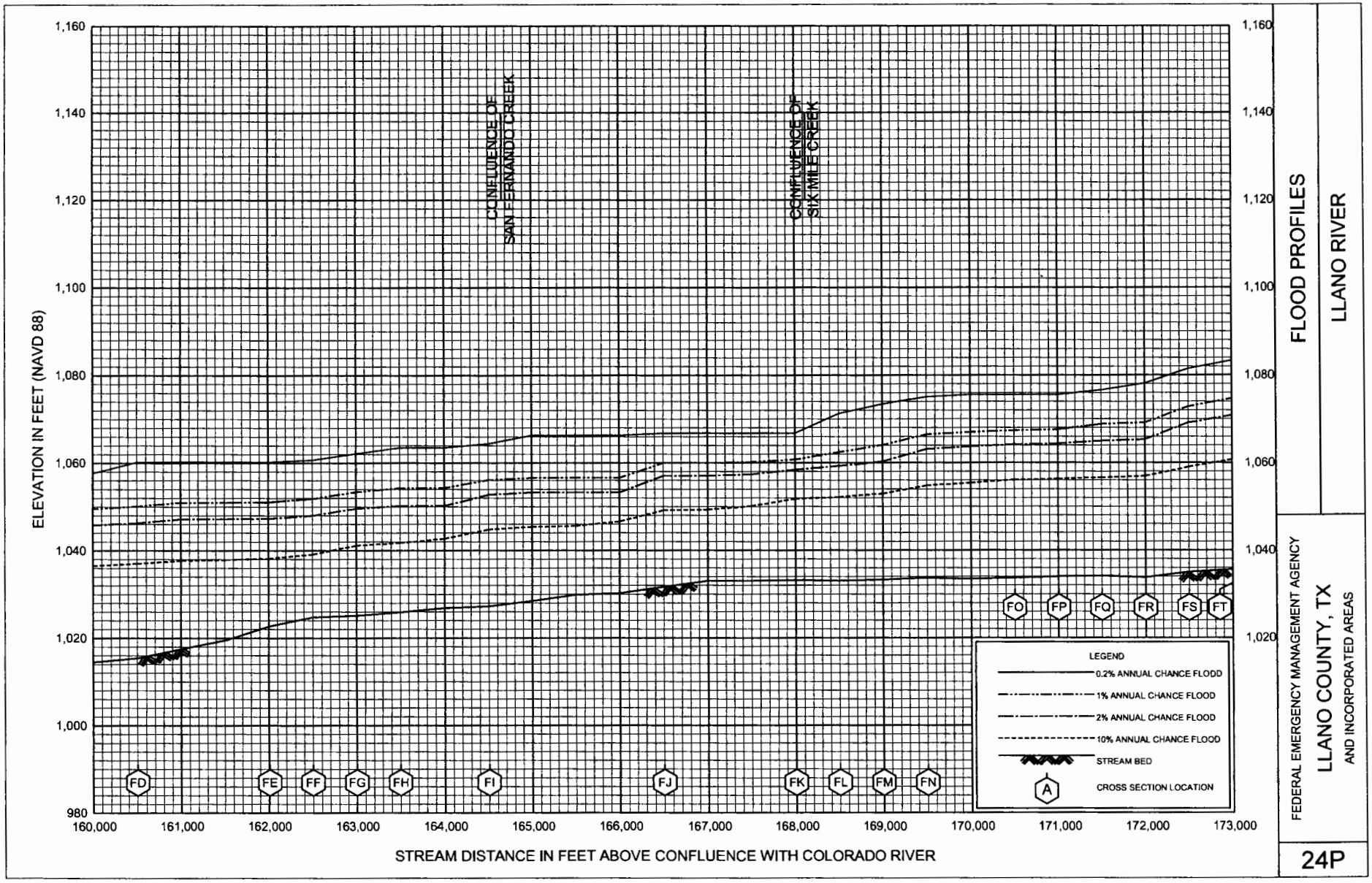


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LLANO COUNTY, TX

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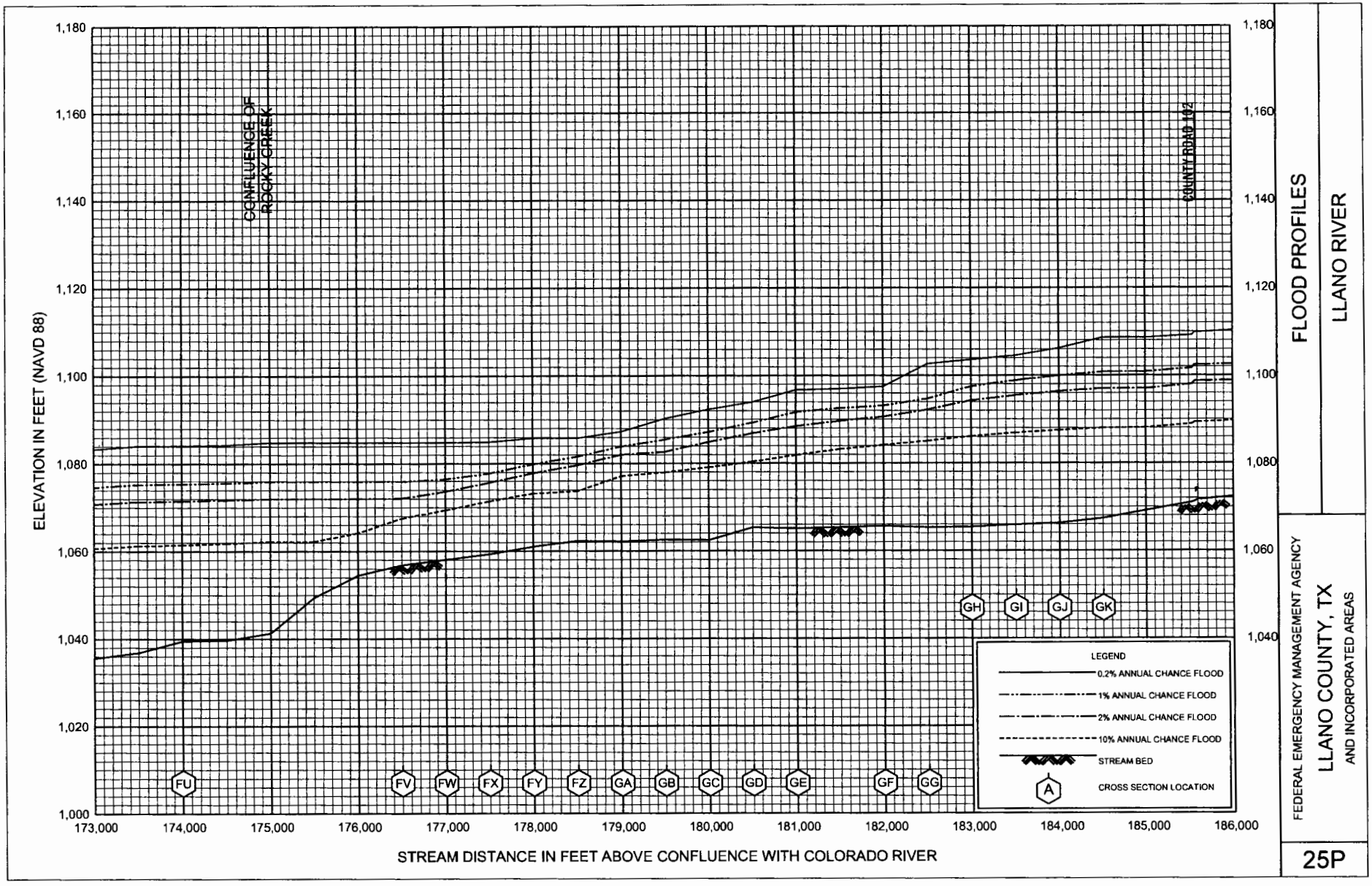


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LLANO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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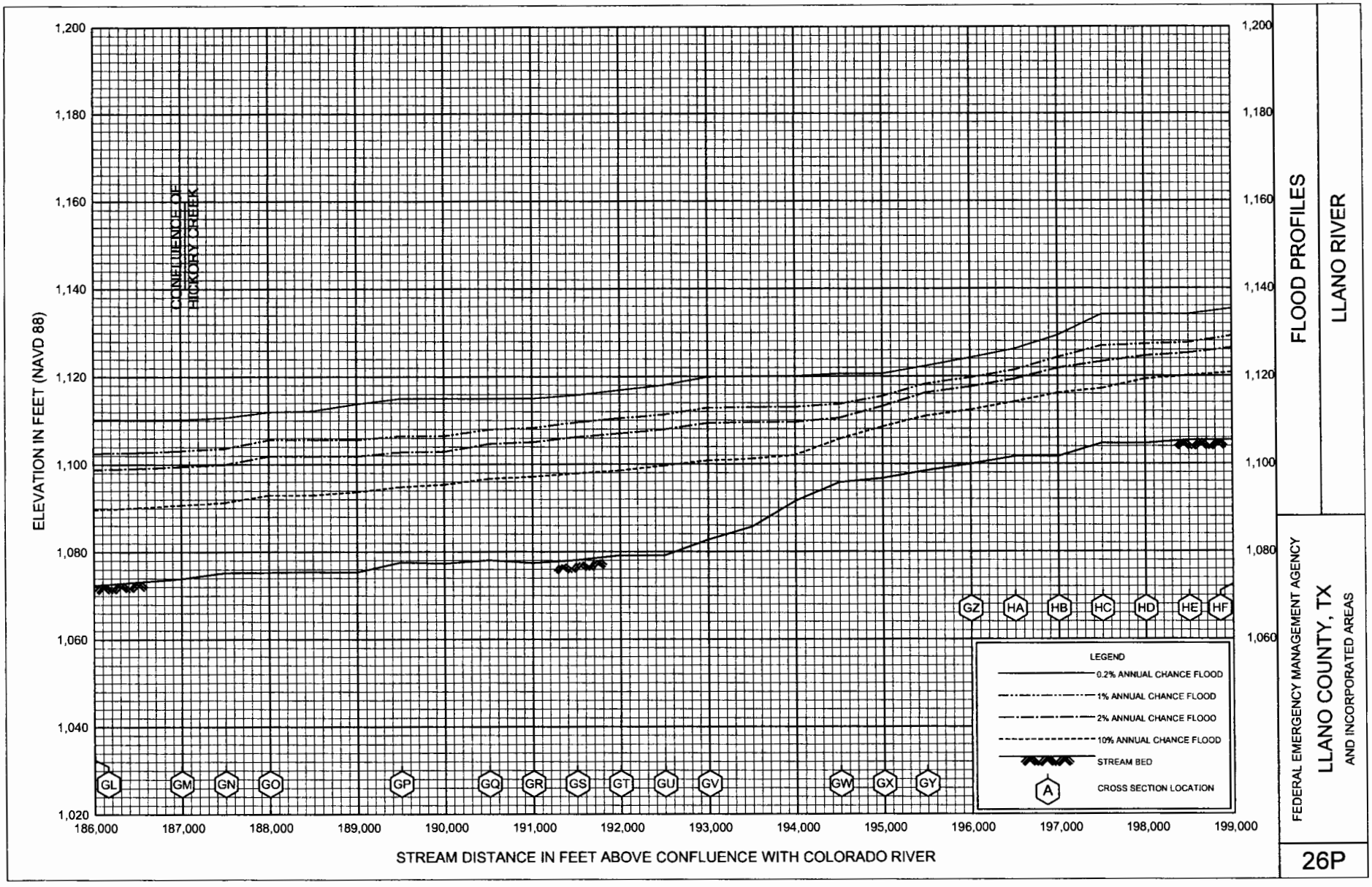


FLOOD PROFILES

LLANO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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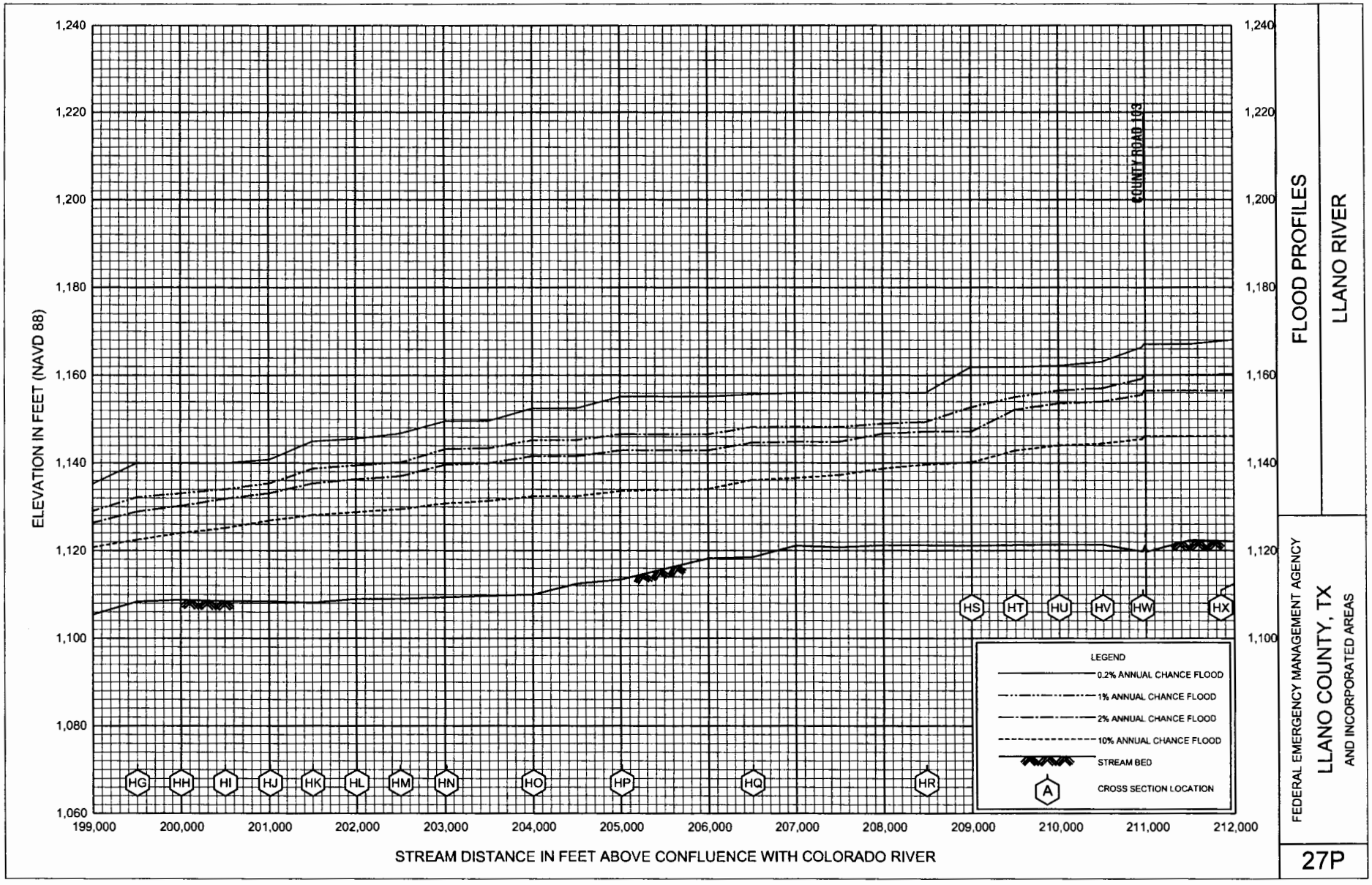


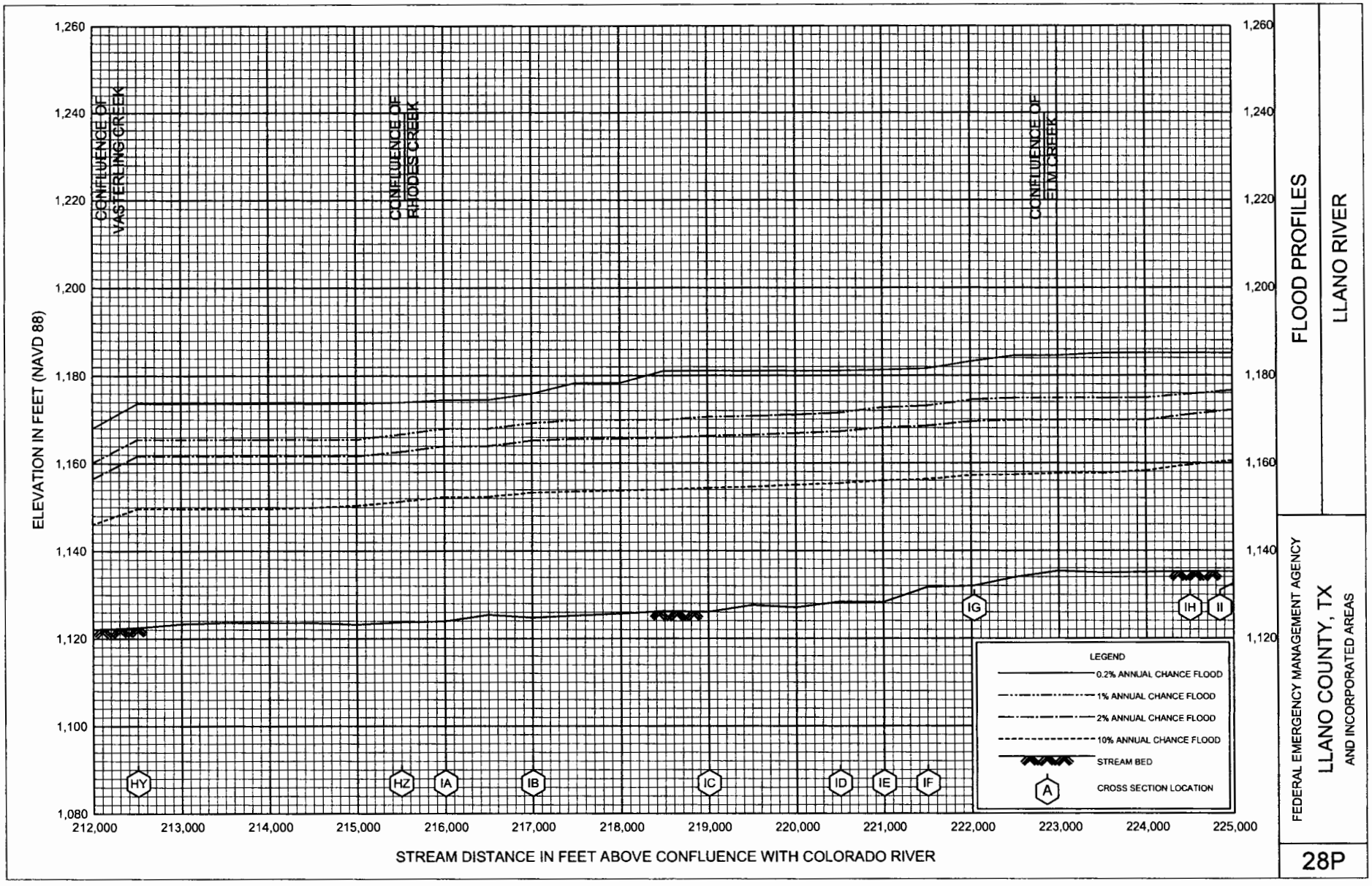

FLOOD PROFILES

LLANO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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LLANO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

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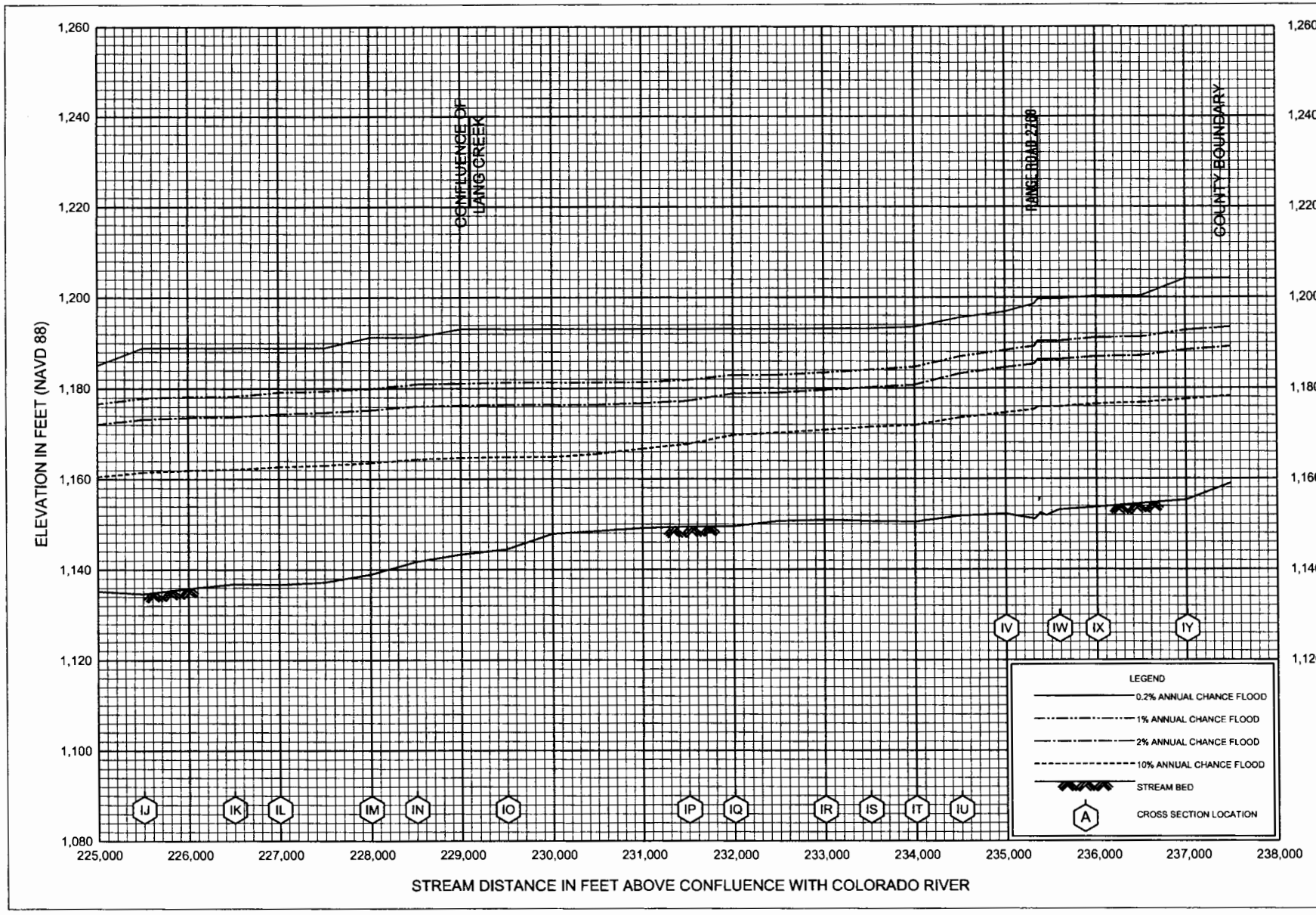


FLOOD PROFILES

LLANO RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

LLANO COUNTY, TX

AND INCORPORATED AREAS

29P