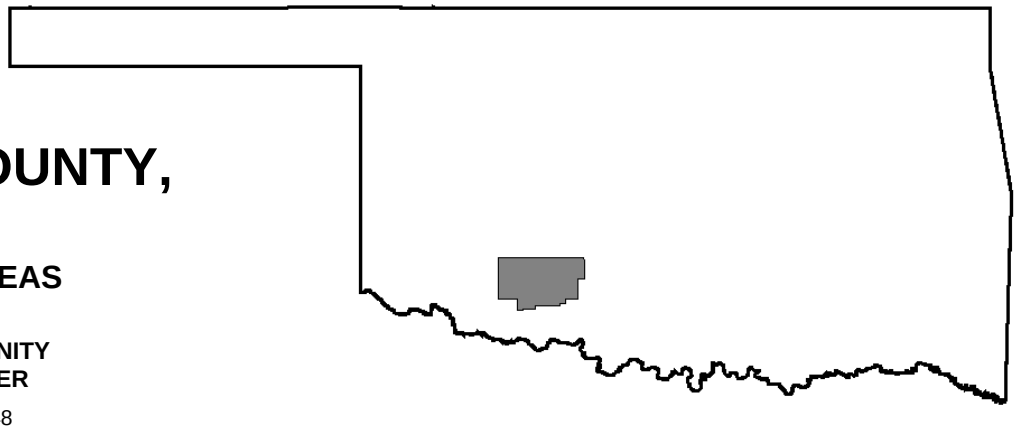
FLOOD INSURANCE STUDY

VOLUME 1 OF 2



COMANCHE COUNTY, OKLAHOMA

AND INCORPORATED AREAS

COMMUNITY NAME	COMMUNITY NUMBER
CACHE, TOWN OF	400048
* CHATTANOOGA, TOWN OF	400279
COMANCHE COUNTY, UNINCORPORATED AREAS	400489
ELGIN, TOWN OF	400373
* FAXON, TOWN OF	400522
* FLETCHER, TOWN OF	400378
* GERONIMO, TOWN OF	400382
INDIAHOMA, TOWN OF	400287
LAWTON, CITY OF	400049
MEDICINE PARK, TOWN OF	400214
STERLING, TOWN OF	400414

*NON-FLOODPRONE COMMUNITIES

REVISED: JULY 20, 2009

Federal Emergency Management Agency

Flood Insurance Study Number 40031CV001A

NOTICE TO
FLOOD INSURANCE STUDY USERS

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

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

Initial Countywide FIS Effective Date: February 19, 1992

First Revised Countywide FIS Revision Date: November 2, 1995

Second Revised Countywide FIS Revision Date: July 20, 2009

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FLOOD INSURANCE STUDY
COMANCHE COUNTY AND INCORPORATED AREAS, OKLAHOMA

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Comanche County, including the City of Lawton; the Towns of Cache, Elgin, Indiahoma, Medicine Park and Sterling; and the unincorporated areas of Comanche County (referred to collectively herein as Comanche County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. This information will also be used by Comanche County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

Please note that the Towns of Chattanooga, Faxon, Fletcher and Geronimo are non-floodprone.

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

1.2 Authority and Acknowledgments

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

This study was prepared to include incorporated communities within Comanche County in a countywide FIS.

Information on the authority and acknowledgments for the previously printed FISs and Flood Insurance Rate Maps (FIRMs) for the Town of Cache and the City of Lawton was compiled from their FIS reports.

For the Town of Cache, the hydrologic and hydraulic analyses for the FIS, dated March 18, 1987, were prepared by the Tulsa District of the U.S. Army Corps of Engineers (USACE) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-E-1153, Project Order No. 1, Amendment No. 13. This work was completed in February 1985.

For the City of Lawton, the original hydrologic and hydraulic analyses for the FIS, dated June 1978, were prepared by the Tulsa District USACE for FEMA, under Inter-Agency Agreements No. IAA-H-16-75, Project Order No. 19, and No. IAA-H-7-76, Project Order No. 1. This work was completed in October 1976.

For the initial countywide study, hydrologic and hydraulic analyses for flooding sources within the City of Lawton, except for West Branch Squaw Creek, were prepared by the Tulsa District USACE for FEMA, under Inter-Agency Agreement No. EMW-85-E-1822, Project Order No. 1, Amendments No. 2, No. 2a, and No. 2b. This work was completed in April 1988.

The November 1995 revised countywide study also included updated hydraulic analyses for Middle Branch Wolf Creek (currently named Meadowbrook Creek) at Creekwood Addition within the City of Lawton. This work, which was performed by Landmark Engineering, was completed in June 1990.

Hydrologic and hydraulic analyses for the flooding sources within the unincorporated areas of Comanche County were prepared by the Tulsa District USACE for FEMA, under Inter-Agency Agreement No. EMW-87-E-2509, Project Order No. 21. This work was completed in November 1988.

This countywide update includes updated hydrologic and hydraulic analyses for the entire incorporated area of the City of Lawton, based on the Storm Water Mitigation Master Plan. This work was performed by Carter & Burgess, Inc. and was completed in October 2003 (Reference 1).

This countywide update also includes revised hydrologic and hydraulic analyses for Meadowbook Creek within the City of Lawton. This work was performed by the Tulsa District USACE and was completed in April 2006.

1.3 Coordination

The dates of the initial and final Consultation Coordination Officer's (CCO) meetings held for Comanche County and the incorporated communities within its boundaries are shown in the following tabulation.

Community Name	Initial CCO Date	Final CCO Date
Town of Cache	March 25, 1983	August 20, 1985
City of Lawton	September 4, 1984	August 29, 1990
Unincorporated Areas	February 24, 1987	August 29, 1990

The initial CCO meetings were held with representatives from FEMA, the communities, and the study contractors to explain the nature and purpose of FISs, and to identify the streams to be studied by detailed methods. The final CCO meetings were held with representatives from FEMA, the communities, and the study contractors to review the results of the studies. The final CCO meeting for the unincorporated areas of Comanche County also served as the final meeting for the initial countywide study and was open to representatives from all communities within the county that were covered by this countywide study. All problems raised at that meeting were addressed in the initial countywide study.

The U.S. Geological Service (USGS), Bureau of Reclamation, National Weather Service (NWS), Soil Conservation Service (SCS), Oklahoma Water Resources Board (OWRB), and the State Conservationist contributed information pertinent to the analyses of flood hazards within the Town of Cache. The USGS provided a post-flood report for the flood of August 27-28, 1977, for West Cache Creek in southwestern Oklahoma.

The USGS, SCS, OWRB, NWS, Bureau of Reclamation, and the Oklahoma Department of Transportation contributed information pertinent to the analyses of flood hazards within the City of Lawton and the unincorporated areas of the county.

The results of the study were reviewed at the final CCO meeting held on December 13, 2007, and attended by representatives of FEMA, CF3R Joint Venture, and the affected communities. All problems raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

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

Table 1, "Scope of Study," lists the limits of study for the flooding sources studied by detailed methods.

TABLE 1 - SCOPE OF STUDY

Stream Name	Downstream Limit	Upstream Limit
Blue Beaver Creek	Approximately 2.67 miles upstream of the confluence of West Branch Blue Beaver Creek	Approximately 0.6 mile upstream of U.S. Highway 62
Crater Creek	Confluence with West Cache Creek	Approximately 0.6 mile upstream of U.S. Highway 62
Squaw Creek East Tributary B	Confluence with Squaw Creek	Approximately 1,100 feet upstream of N.W. Ferris Avenue
* East Branch Wolf Creek	Confluence with Wolf Creek	N.W. Rogers Lane
* East Branch Wolf Creek Tributary	Confluence with East Branch Wolf Creek	Ozmun Avenue
* East Cache Creek	Approximately 1,500 feet downstream of S.W. Coombs Road	Downstream face of N.E. Rogers Lane
* East Cache Creek Tributary A	Confluence with East Cache Creek	Approximately 0.5 mile upstream of N.E. Flower Mound Road
* East Cache Creek Tributary A-1	Confluence with East Cache Creek Tributary A	Approximately 1,500 feet upstream of N.E. Flower Mound Road

TABLE 1 - SCOPE OF STUDY (CONTINUED)

Stream Name	Downstream Limit	Upstream Limit
* East Cache Creek Tributary B	Confluence with East Cache Creek	Approximately 500 feet upstream of S.E. 38th Street
* East Tributary of Unnamed Tributary to Wolf Creek	Confluence with Unnamed Tributary to Wolf Creek	Approximately 275 feet downstream of Lee Boulevard
* Goodyear Creek	Approximately 2,700 feet south of S.W. Lee Boulevard	Approximately 0.2 river miles north of the Burlington Northern Railroad crossing
* Goodyear Creek Tributary	Approximately 2,700 feet south of S.W. Lee Boulevard	Approximately 65 feet south of S.W. Neal Boulevard
** Meadowbrook Creek	Confluence with East Branch Wolf Creek	Approximately 2,000 feet upstream of N.W. 67th Street
* Middle East Tributary of Unnamed Tributary to Wolf Creek	Confluence with Unnamed Tributary to Wolf Creek	Approximately 475 feet upstream of Lee Boulevard
* Middle West Tributary of Unnamed Tributary to Wolf Creek	Confluence with Unnamed Tributary to Wolf Creek	Approximately 3,500 feet downstream of Lee Boulevard
* Mission Creek	Confluence with East Cache Creek	Approximately 1,120 feet upstream of the road crossing for N.W. Rogers Lane
* Mission Creek Tributary	Confluence with Mission Creek	Approximately 500 feet upstream of Central Drive
* Ninemile Creek Tributary	Confluence with Ninemile Creek	N.E. 60th Street
Rock Creek	Confluence with West Cache Creek	The upstream Town of Cache corporate limits
* Squaw Creek	Interstate Highway 44	N.W. Denver Avenue
* Squaw Creek East Tributary A	Confluence with Squaw Creek	Approximately 90 feet upstream of S.W. G Avenue
* Squaw Creek East Tributary B	Confluence with Squaw Creek	N.W. Cherry Avenue
Tributary A	For its entire length within the Town of Cache	

TABLE 1 - SCOPE OF STUDY (CONTINUED)

Stream Name	Downstream Limit	Upstream Limit
Tributary B of West Branch Blue Beaver Creek	Confluence with West Branch Blue Beaver Creek	The upstream Town of Cache corporate limits
Tributary of Blue Beaver Creek	Confluence with Blue Beaver Creek	Approximately 0.6 mile upstream of U.S. Highway 62
* Unnamed Branch of an Unnamed Tributary to Wolf Creek	Confluence with Unnamed Tributary to Wolf Creek	Approximately 2,250 feet downstream of Lee Boulevard
* Unnamed Tributary to Wolf Creek	Confluence with Wolf Creek	Approximately 1,800 feet downstream of S.W. 82nd Street
West Branch Blue Beaver Creek	Approximately 100 feet downstream of Lee Boulevard	Approximately 2,000 feet upstream of U.S. Highway 62
* West Branch Squaw Creek	Approximately 750 feet downstream of S.W. Belmont Avenue	U.S. Business Highway 281
West Branch Tributary A	Confluence with Tributary A	Approximately 900 feet upstream
* West Branch Wolf Creek	Confluence with Wolf Creek	Approximately 0.5 mile upstream of U.S. Highway 62
* West Branch Wolf Creek Tributary A	Confluence with West Branch Wolf Creek	N.W. Cache Road
* West Branch Wolf Creek Tributary B	Confluence with West Branch Wolf Creek	Approximately 0.53 mile upstream of U.S. Highway 62
West Cache Creek	Confluence of Rock Creek	Approximately 1,600 feet upstream of Burlington Northern Railroad
* West Tributary of Unnamed Tributary to Wolf Creek	Confluence with Unnamed Tributary to Wolf Creek	Approximately 1,500 feet downstream of S.W. 82nd Street
* Wolf Creek	Approximately 1,450 feet downstream of Interstate Highway 44	Confluence of East Branch Wolf Creek and West Branch Wolf Creek
* Wratton Creek	Confluence with East Cache Creek	Approximately 0.8 mile upstream of N.E. Flower Mound Road
* Wratton Creek Tributary	Confluence with Wratton Creek	Approximately 1.3 miles upstream of N.E. Flower Mound Road

* Incorporates detailed studies prepared by the City of Lawton in their Storm Water Mitigation Master Plan, which was submitted to FEMA as Case No. 04-06-1007P and was converted to a physical map revision.

** Incorporates detailed studies prepared by the Tulsa District USACE.

This revised countywide FIS incorporates detailed studies of streams within the Lawton corporate limits that were prepared by the City of Lawton (Reference 1) and the Tulsa District USACE (Reference 2) as noted in the footnotes of Table 1.

Changes in the corporate limits of the City of Lawton have also been included in this countywide revision. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction.

All or portions of Ninemile Creek, East Cache Creek, West Cache Creek, and Blue Beaver Creek, and the remaining significant tributaries in the county were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon, by FEMA and Comanche County.

Table 2, "Stream Name Changes" lists those streams whose name has changed or differs from that published in the previous FIS for Comanche County or any of the communities within.

TABLE 2 - STREAM NAME CHANGES

Community	Old Name	New Name
City of Lawton	East Branch Squaw Creek	Squaw Creek East Tributary B
City of Lawton	Middle Branch Wolf Creek	Meadowbrook Creek

2.2 Community Description

Comanche County is located in southwestern Oklahoma, approximately 60 miles southwest of Oklahoma City. It is bordered by the unincorporated areas of Kiowa and Tillman Counties to the west, Grady and Stephens Counties to the east, Caddo County to the north, and Cotton County to the south. In 1980, the County had a population of 112,456 (Reference 3). According to the U.S. Census Bureau, the county's population increased to 114,996 in 2000 (Reference 4) and was projected to decline to 112,429 by 2005 (Reference 5).

The largest incorporated community in the County is the City of Lawton, which is also the county seat. The 1980 population of Lawton was 80,054 (Reference 6). According to the U.S. Census Bureau, by 2000 the population of Lawton had grown to 92,757 (Reference 4) but was projected to decline to 90,234 by 2005 (Reference 5). Floodplains within Lawton have varying degrees of development; some are devoted almost entirely to agricultural uses, while others have undergone light to moderate urban development. The Town of Cache lies 8 miles west of Lawton, and had a population of 1,661 in 1980 (Reference 7), 2,371 in 2000 (Reference 4) and was projected to be 2,406 in 2005 (Reference 5).

The average annual temperature in the County is 60.7 degrees Fahrenheit. The average annual precipitation for the region is 32.3 inches (Reference 8). Topography in the upper portions of the drainage basins in the County is characterized by steep, rolling hills, while the downstream areas consist of gently rolling hills that are primarily used as pastures.

2.3 Principal Flood Problems

Generally, the major floods experienced in the vicinity are produced by heavy rainfall from frontal-type storms that occur in the spring and summer. Major flooding can be produced by the intense rainfall from localized thunderstorms. A stream gage is located on Blue Beaver Creek near Cache; its continuous period of record extends from 1965 to the present. The gage measures flows from a drainage area of approximately 24.6 square miles. A gage is also located on East Cache Creek, downstream of the study area at Walters. Its period of record runs from May 1938 through December 1963 and from October 1969 through September 1984.

Within the unincorporated areas of the county, the flood of record for Blue Beaver and West Cache Creeks and their tributaries occurred near Cache and Faxon on August 27-28, 1977 (Reference 9). The storms were caused by a cold front moving from the southwest to the northeast, and resulted in 12 inches of rainfall in 24 hours. The observed flow at the gage near Cache was 13,600 cubic feet per second (cfs). The flood's recurrence interval was approximately 40 years. The second largest flood occurred on May 27, 1978, and produced a peak flow of 9,490 cfs at the gage, which corresponds to a recurrence interval of approximately 20 years.

In the City of Lawton, major floods occurred on East Cache Creek in 1941, 1947, 1951, 1959, 1962 and 1983. The flood of October 1983 produced the peak discharge of record in the lower end of the basin at the Walters gage. The peak discharge for this flood was 50,900 cfs, at 6:00 p.m. on October 20, 1983, and was caused by rainfall ranging from 8.5 to 10.3 inches. The storm occurred from October 18-20; rainfall over the entire basin averaged 9.5 inches during this 3-day period. This flood was used as the basis for hydrologic studies because it occurred recently, and because there is more hydrologic data available for it. The October 1983 flood's recurrence interval was estimated at between 100 and 200 years. The flood of May 1951 is the second largest flood, with a recurrence interval of approximately 100 years and an estimated peak discharge of 39,000 cfs.

Flash floods affecting the Lawton area occurred in August 1996 and October 2000. On August 28, 1996, reports indicated numerous streets and buildings were flooded. Streets were closed due to water depths of 3 to 4 feet within town. U.S. Highway 281 was closed due to 2.5 feet of water covering the roadway. Water depths up to car windshields were observed at the intersection of 52nd Street and Rogers Lane. On October 25, 2000, flash flooding led to the closure of 27 streets in the Lawton area. Local rainfall amounts of nearly 7 inches were recorded over a few hours. The following day, the Lawton area received an additional 2 to 4 inches of rain resulting in more flooding and the closure of NE 15th Street and portions of Railroad Street.

Flooding has occurred on Wolf and Squaw Creeks and their tributaries within Lawton, but records are unavailable for frequency or discharge data.

The majority of severe flooding in the Lawton area is caused by intense rainfall resulting from localized thunderstorms. The effects of flooding are generally aggravated in areas where man-made and natural constrictions in the floodplain impede the passage of large flows. The broad, flat floodplain of East Cache Creek allows floodwaters of the more severe storms to inundate a large area. Urbanization in the Squaw Creek basin causes greater runoff from storms, and therefore increases flood heights and damages.

On July 10, 1997 localized heavy rain caused flash flooding of Tony Creek and its tributaries, stranding several motorists and residents in the Fletcher and Elgin areas. Water levels in Tony Creek rose approximately eight feet and seven residents required emergency rescue. Just west of Elgin, U.S. Highway 277 was closed due to 2.5 feet of water covering the roadway.

2.4 Flood Protection Measures

No flood protection structures have been constructed within Comanche County. In the City of Lawton, the following streams have been channelized: Wolf Creek, West Branch Wolf Creek, West Branch Wolf Creek Tributary A, Meadowbrook Creek, Squaw Creek, Squaw Creek East Tributary B, East Cache Creek Tributary A-1, and Mission Creek. The Meadowbrook Creek flood protection project consists of approximately 1,300 feet of modified grass-lined channel extending from south of Cache Road to just downstream of the 51st Street bridge. The project includes the replacement of the 51st Street bridge and removal of 28 structures from the floodplain. Construction was completed in September 2005 (Reference 2).

Lake Lawtonka and Lake Ellsworth are used for water supply and recreation, and their surcharge storage capacities sometimes reduce flood flows on East Cache Creek.

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

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

Information on the methods used to determine peak discharge- frequency relationships for the streams studied by detailed methods, compiled from the previously printed FISs for the Town of Cache and the City of Lawton, and from the analyses prepared for this countywide study, is shown below. Methodologies are described for each community. For streams that flow through two or more communities, each methodology described applies only to that portion of the stream studied by detailed methods within that particular community.

The previously printed FIS for the Town of Cache considered the following streams: West Cache Creek, Crater Creek, Rock Creek, West Branch Blue Beaver Creek, Tributary B of West Branch Blue Beaver Creek, Tributary A, and West Branch Tributary A (Reference 10).

In that study, peak discharges were based on a rainfall-runoff model developed using the USACE HEC-1 computer program (Reference 11). The watershed was subdivided, and synthetic unit and flood hydrographs were determined for each sub-area. The flood hydrograph coefficients were developed from a Snyder's synthetic unit regression analysis of the regionalized Tulsa District USACE gage data. These coefficients were adjusted on the basis of a regional analysis performed in the previously printed FIS for the City of Lawton (Reference 12). U.S. Weather Bureau Technical Paper No. 40 was used in developing the 10-, 2- and 1-percent-annual-chance frequency storms (Reference 13).

The 0.2-percent-annual-chance storm was then based on extrapolated data. Peak discharge-frequency values were computed for selected locations. The flood hydrographs were routed through each sub-basin reach using a modified Puls reservoir routing method. The USACE HEC-2 step-backwater computer program provided the elevation-discharge-storage relationships for each reach (Reference 14).

The hydrologic analyses for West Branch Squaw Creek were taken from the previously printed FIS for the City of Lawton (Reference 12). In that study, for flood flows on the West Branch Squaw Creek, the drainage areas were appropriately subdivided and synthetic unit hydrographs were determined for each subarea using Synder's method. Rainfall data for selected floods were obtained from U.S. Weather Bureau Technical Paper No. 40, and the estimated rainfall excesses were applied to the unit hydrographs to obtain the runoffs (Reference 13). Runoffs from the individual subareas were then routed by the storage-discharge method and combined to determine peak flows at points along the streams. The unit hydrographs used were adjusted to reflect the effects of development presently existing in the watershed.

In the initial countywide study, for the streams studied within the City of Lawton, a rainfall-runoff model of the East Cache Creek basin, including Lake Lawtonka and Lake Ellsworth, was developed using the USACE HEC-l computer program (Reference 11). Snyder's unit hydrograph coefficients Tp and Cp, rainfall and channel loss rates, and routing criteria were developed as input for the HEC-l model. A 30-minute computation interval was used. Once calibrated, the adopted model was adjusted to reflect a detention pond in the upper reach of Meadowbrook Creek. An initial rainfall loss of 1.5 inches and an average infiltration rate of 0.02 inch per hour were selected for all study areas. The rainfall distribution for the historical storm was obtained by the isohyetal method. Hypothetical rainfall distributions were developed using Technical Papers No. 40 and No. 49, and Technical Memorandum NWS HYDRO-35 (References 13, 15 and 16). Depth versus drainage area adjustments were made to point rainfall amounts as necessary. There are 12 rainfall stations located near the study area. About half of these are recording stations. Only one or two of these are within or reasonably close to the basins under study. Consequently, floods could occur on the streams studied by detailed methods with little or no rainfall recorded at the stations. A discharge-frequency curve was computed for East Cache Creek at the Walters gage. Values for the discharges without expected probability were computed using the computer program "Flood Flow Frequency Analysis" with a regional skew coefficient of -0.1 (Reference 17). The resulting rainfall was applied to the adopted HEC-1 model to reproduce discharge-frequency data developed at the Walters gage. Adopted frequency rainfall was then applied to the HEC-l model to produce discharge-frequency data for each of the streams studied.

This revised countywide study includes an updated hydrologic analysis of streams within the City of Lawton. This study was performed by Carter & Burgess, Inc. (Reference 1) for the entire watershed impacting the City of Lawton. The data used in this study included the land use, aerial, planimetric and topographic maps (provided by the City of Lawton), the Comanche County Soil Survey (Reference 18), current FEMA hydrologic models and previous studies conducted for Cache Creek (Reference 19), Squaw Creek (Reference 20), Wolf Creek (Reference 21), and East Cache Creek (Reference 22).

A peak discharge for each of the basins was determined using the Snyder's Unit Hydrograph method and the USACE's computer program HEC-HMS (Reference 23). The hydrographs were routed through downstream basins and reservoirs, to account for attenuation of the peak and to provide proper timing of the combined peaks, and combined to the system's outfall. The HEC-RAS models for the studied streams were utilized to determine the valley storage for each routing reach. The discharge and valley storage values were then entered in the HEC-HMS model as Modified Puls routing.

For the streams within the unincorporated areas of the county, 1-percent-annual-chance peak discharges were determined. Discharges for West Branch Blue Beaver Creek and Tributary B of West Branch Blue Beaver Creek were taken from the previously printed FIS for the Town of Cache (Reference 10).

For Blue Beaver Creek and Tributary of Blue Beaver Creek, 1-percent-annual-chance discharges were developed using the USACE HEC-1 computer program (Reference 11). These discharges were then adjusted to reflect the regionalized unit hydrograph coefficients and loss rates developed in the previously printed FIS for the Town of Cache (Reference 10). For the Blue Beaver Creek gage data, a log- Pearson Type III analysis was performed to compare with the flow developed using the HEC-1 program (Reference 24).

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

TABLE 3 – SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
BLUE BEAVER CREEK					
Immediately upstream of confluence of Tributary of Blue Beaver Creek	21.90	*	*	17,330	*
At old U.S. Highway 62	24.70	*	*	19,530	*
Approximately 2.65 miles upstream of confluence of West Branch Blue Beaver Creek	28.40	*	*	18,710	*
CRATER CREEK					
At Fort Sill U.S. Military Reservation boundary	7.17	3,050	6,350	8,370	14,200
At old U.S. Highway 62	8.57	3,240	6,990	9,150	15,800
At confluence with West Cache Creek	10.37	3,240	6,990	9,150	15,800
EAST BRANCH WOLF CREEK					
At N.W. Rogers Lane	8.21	3,850	6,017	6,929	8,861
At N.W. Santa Fe Avenue	8.67	4,012	6,261	7,210	9,187
Approximately 1,150 feet upstream of N.W. Cache Road	8.99	4,017	6,272	7,227	9,219
At Wolf Creek Blvd	9.24	4,013	6,269	7,237	9,235
At confluence with Meadowbrook Creek	14.17	5,595	8,372	9,491	11,865
EAST BRANCH WOLF CREEK TRIBUTARY					
At South Boundary Road	0.32	372	537	604	748
Approximately 350 feet upstream of 45th Street	0.46	445	630	703	865
EAST CACHE CREEK					
Approximately 1,800 feet upstream of N.E. Rogers Lane	454.87	16,352	24,754	31,307	50,166
At E. Gore Boulevard	473.70	17,926	26,724	31,211	50,006
At S.E. Lee Boulevard	476.28	17,560	26,081	31,064	49,920
At S.E. Bishop Road	477.34	16,514	24,969	30,629	49,816
At S.E. Coombs Road	478.73	16,213	24,908	30,602	49,781
EAST CACHE CREEK TRIBUTARY A					
2,020 feet upstream of Flower Mound Road	0.07	125	171	190	232
At dam upstream of Flower Mound Road	0.21	360	496	553	677
At N.E. Flower Mound Road	0.26	285	365	416	763
At Bell Avenue	0.29	253	362	412	631
At N.E. 26th Street	1.07	823	1,192	1,351	1,841
At Industrial Road	1.45	1,165	1,692	1,915	2,452

TABLE 3 – SUMMARY OF DISCHARGES (CONTINUED)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
EAST CACHE CREEK TRIBUTARY A-1					
Upstream Limit of Study	0.40	463	667	750	930
At N.E. Flower Mound	0.64	522	719	797	1,088
Approximately 920 feet downstream of N.E. Flower Mound Road	0.78	603	968	1,051	1,382
EAST CACHE CREEK TRIBUTARY B					
At Camelot Drive	0.35	534	749	837	1,030
At S.E.38th Street	0.55	775	1,085	1,198	1,440
Approximately 1,000 feet downstream of S.E. 38th Street	0.94	1,200	1,700	1,893	2,311
Approximately 2,000 feet downstream of S.E. Flower Mound Road	1.41	1,268	1,868	2,105	2,577
EAST TRIBUTARY OF UNNAMED TRIBUTARY TO WOLF CREEK					
At Lee Boulevard	0.11	192	264	294	360
Approximately 690 feet upstream of confluence of Unnamed Tributary of Wolf Creek	0.18	309	429	476	590
GOODYEAR CREEK					
Approximately 800 feet upstream of Burlington Northern Railroad	0.08	141	194	216	265
Approximately 1,750 feet upstream Lee Boulevard	0.39	355	513	576	713
Approximately 1,250 feet downstream Lee Boulevard	0.58	421	656	751	950
GOODYEAR CREEK TRIBUTARY					
At Neal Boulevard	0.25	328	466	522	646
Approximately 1,200 feet upstream of Lee Boulevard	0.51	398	587	663	834
Approximately 1,900 feet downstream of Lee Boulevard	0.94	697	1,040	1,164	1,422
MEADOWBROOK CREEK					
At confluence with Wolf Creek	4.93	1,802	2,785	3,295	4,341
MIDDLE EAST TRIBUTARY OF UNNAMED TRIBUTARY TO WOLF CREEK					
At 67th Street	0.57	629	915	1,030	1,279
Approximately 1,600 feet upstream of confluence with Unnamed Tributary Wolf Creek	0.74	760	1,080	1,210	1,495
MIDDLE WEST TRIBUTARY OF UNNAMED TRIBUTARY TO WOLF CREEK					
Upstream Limit of Study	0.36	399	581	654	811
Approximately 1,300 feet upstream of confluence with Unnamed Tributary Wolf Creek	0.45	426	663	758	960

TABLE 3 – SUMMARY OF DISCHARGES (CONTINUED)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
MISSION CREEK					
Upstream city limits	1.61	1,323	1,968	2,230	2,797
Downstream confluence with Mission Creek Tributary	2.04	1,735	2,538	2,860	3,537
At Interstate Highway 44	2.55	2,164	3,198	3,537	4,092
Upstream of N.E. 9th Street	3.52	2,406	3,442	3,814	4,493
At Confluence with East Cache Creek	3.72	2,546	3,655	4,034	4,800
MISSION CREEK TRIBUTARY					
Upstream Lawton City Limits	0.37	435	584	651	871
NINEMILE CREEK TRIBUTARY					
At N.E. Cache Road	1.08	950	1,411	1,597	2,000
At E. Gore Boulevard	1.94	1,595	2,362	2,679	3,360
At S.E. Lee Boulevard	3.41	1,698	3,149	3,721	4,803
At S.E. Bishop Road	4.70	1,689	2,906	3,809	5,049
ROCK CREEK					
At N.W. Quanah Road	9.49	4,090	7,940	9,960	15,650
At confluence with West Cache Creek	10.48	4,090	7,940	10,120	16,650
SQUAW CREEK					
At Denver Avenue	0.26	318	455	510	632
At Cache Road	0.87	939	1,253	1,370	1,577
At Euclid Avenue	1.04	1,157	1,559	1,700	1,993
At West Gore Boulevard	2.33	2,295	3,101	3,494	4,296
At N.W. Sheridan	2.89	2,689	3,494	3,847	4,688
At F Avenue	3.21	2,778	3,512	3,822	4,505
At 17th Street	4.17	3,198	4,161	4,498	5,204
At 11th Street	5.65	3,722	5,043	5,599	6,770
Upstream of Long Culvert	5.70	805	2,142	2,693	3,886
Downstream of Long Culvert	6.00	3,801	5,200	5,780	7,102
At Lee Boulevard	6.69	3,704	5,263	5,862	7,183
At Railroad Bridge	7.46	3,758	5,260	5,880	7,240
At Interstate Highway 44	7.57	3,661	5,201	5,802	7,009
SQUAW CREEK EAST TRIBUTARY A					
At S.W. G Avenue	0.65	660	962	1,085	1,353
SQUAW CREEK EAST TRIBUTARY B					
At Cherry Avenue	0.43	346	524	596	750
At N.W. Ferris Avenue	0.66	630	937	1,055	1,308
At West Gore Boulevard	0.91	685	1,086	1,238	1,594
At Railroad	1.16	783	1,220	1,426	1,774
TRIBUTARY A					
At old U.S. Highway 62/Burlington Railroad	1.19	1,090	1,950	2,430	3,700

TABLE 3 – SUMMARY OF DISCHARGES (CONTINUED)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
TRIBUTARY B OF WEST BRANCH BLUE BEAVER CREEK					
At Fort Sill U.S. Military Reservation boundary	2.70	1,780	3,290	4,070	6,300
At confluence with West Branch Blue Beaver Creek	3.35	1,780	3,320	4,250	7,080
TRIBUTARY OF BLUE BEAVER CREEK					
At U.S. Highway 62	2.80	*	*	2,915	*
UNNAMED BRANCH OF AN UNNAMED TRIBUTARY TO WOLF CREEK					
Approximately 150 feet upstream of S.W. 67th Street	1.66	620	1,130	1,400	2,090
UNNAMED TRIBUTARY TO WOLF CREEK					
Downstream S.W. 82nd Street	0.13	197	276	308	378
At confluence of West Tributary of Unnamed Tributary to Wolf Creek	0.28	409	581	651	805
At confluence of Middle West Tributary of Unnamed Tributary to Wolf Creek	1.08	1,070	1,618	1,828	2,314
At S.W. 67th Street	1.58	1,513	2,352	2,653	3,348
1,550 feet upstream of Middle East Tributary of Unnamed Tributary to Wolf Creek	1.71	1,538	2,412	2,866	3,654
At confluence of Middle East Tributary of Unnamed Tributary to Wolf Creek	2.45	2,159	3,356	3,828	4,946
At confluence of East Tributary of Unnamed Tributary to Wolf Creek	2.73	2,190	3,545	4,154	5,247
At S.W. Boyles Landing Road	3.03	2,270	3,661	4,323	5,641
1,415 feet downstream of S.W. 52nd Street	3.92	2,160	3,872	4,630	6,251
Downstream of S.W. Bishop Road	5.33	2,389	4,516	5,450	7,597
Approximately 3,500 feet upstream of S.W. 38th Street	6.23	2,357	4,586	5,603	7,899
Approximately 1,600 feet downstream of S.W. 38th Street	6.89	2,141	4,358	5,411	7,820
WEST BRANCH BLUE BEAVER CREEK					
At Fort Sill U.S. Military Reservation boundary	4.56	3,230	5,770	7,140	11,000
At confluence of Tributary B of West Branch Blue Beaver Creek	5.31	3,280	6,540	8,120	14,400
WEST BRANCH SQUAW CREEK					
Upstream of S.W. Bishop Road	0.49	732	1,032	1,153	1,419
Upstream of S.W. Arbuckle Avenue	0.57	874	1,227	1,370	1,685
At S.W. Belmont Street	0.80	1,181	1,667	1,864	2,296
At Interstate Highway 44	0.89	1,347	1,895	2,117	2,605

TABLE 3 – SUMMARY OF DISCHARGES (CONTINUED)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
WEST BRANCH TRIBUTARY A					
At U.S. Highway 62	0.20	260	420	510	755
WEST BRANCH WOLF CREEK					
At U.S. Highway 62	4.78	3,050	4,655	5,310	6,713
At N.W. Cache Road	5.10	2,980	4,574	5,180	6,384
At N.W. 82nd Road	8.20	3,887	5,922	6,837	8,571
At N.W. 74th Street	9.33	3,973	6,117	7,024	8,897
At N.W. 67th Street	9.57	3,975	6,104	7,019	8,878
At Compass Drive	9.88	3,953	6,106	7,012	8,862
At N.W. 53rd Street	11.24	4,030	6,365	7,380	9,309
WEST BRANCH WOLF CREEK TRIBUTARY A					
At N.W. Cache Road	0.34	385	558	628	779
Approximately 1,000 feet downstream N.W. Cache Road	0.61	703	1,017	1,145	1,422
At Ferris Place	0.77	934	1,319	1,481	1,808
Approximately 900 feet downstream of Euclid Drive	0.90	1,081	1,546	1,729	2,117
WEST BRANCH WOLF CREEK TRIBUTARY B					
At N.W. Rogers Lane	0.67	613	905	1,024	1,279
200 feet downstream of N.W. 97th Street	1.03	392	637	825	1,145
3,350 feet downstream of N.W. Cache Road	1.82	863	1,389	1,616	2,103
5,900 feet upstream of confluence with West Branch Wolf Creek	2.67	1,529	2,385	2,740	3,517
WEST CACHE CREEK					
At U.S. Highway 62	40.97	13,610	28,180	36,100	60,200
At confluence of Rock Creek	42.16	13,610	28,180	36,100	60,200
WEST TRIBUTARY OF UNNAMED TRIBUTARY TO WOLF CREEK					
Upstream Limit of Study	0.07	121	168	187	229
WOLF CREEK					
At confluence of East Branch Wolf Creek and West Branch Wolf Creek	26.06	9,413	14,649	16,795	20,991
1,000 feet downstream of W. Gore Boulevard	26.65	9,415	14,609	16,768	20,958
At S.W. Lee Blvd	26.82	9,262	14,228	16,262	20,271
1,700 feet upstream of S.W. Bishop Road	29.01	9,024	13,510	15,483	19,452
At S.W. Sheridan Road	36.73	10,218	14,754	16,841	21,105
At Interstate Highway 44	42.63	10,444	15,364	17,407	21,612
At confluence with East Cache Creek	48.14	9,400	14,949	17,163	21,472

TABLE 3 – SUMMARY OF DISCHARGES (CONTINUED)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
WRATTON CREEK					
At South Boundary Road	6.96	3,812	5,759	6,585	8,358
500 feet downstream of South Boundary Road	7.31	3,944	6,014	6,870	8,732
Downstream of confluence with Wratton Creek Tributary 2	8.11	4,428	6,736	7,696	9,782
At N.E. Flower Mound Road	8.60	4,577	6,970	7,978	10,158
At confluence of Wratton Creek Tributary	9.68	5,323	8,079	9,246	11,791
3,700 feet upstream of confluence with East Cache Creek	9.84	5,178	7,983	9,147	11,701
WRATTON CREEK TRIBUTARY					
Upstream Limit of Study	0.27	314	453	509	632
Approximately 3,950 feet downstream of Limit of Study	1.02	856	1,292	1,473	1,850
At N.E. Flower Mound Road	1.08	867	1,297	1,478	1,850

* Data not computed

The 1-percent-annual-chance water surface elevations for Lakes Ellsworth and Lawtonka are 1236.73 and 1347.50, respectively. These elevations are based on analysis performed by CH2M HILL and subsequently revised by the City of Lawton (Reference 25). The basis of this analysis utilizes data developed by United States Bureau of Reclamation (USBR) as part of the 1994 and 1996 Cache Creek Drainage Basin Study. New gate operations are incorporated into this study. Elevations for floods of selected recurrence intervals on Lake Ellsworth and Lake Lawtonka are shown in Table 4, "Summary of Stillwater Elevations".

TABLE 4 - SUMMARY OF STILLWATER ELEVATIONS

Flooding Source and Location	Elevation (feet) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lake Ellsworth				
At the dam	1235.45	1236.28	1236.73	1237.93
Lake Lawtonka				
At the dam	1345.71	1346.89	1347.50	1349.23

3.2 Hydraulic Analyses

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

Information on the methods used to determine water-surface elevations for the streams studied by detailed methods, compiled from the previously printed FISs for the Town of Cache and the City of Lawton, and from the analyses prepared for this countywide study, is shown below. Except where noted, water-surface elevations for floods of the selected recurrence intervals were determined using the USACE HEC-2 step-backwater computer program (Reference 14). Methodologies used to develop cross sections, starting water-surface elevations, and channel roughness factors (Manning's "n") are described for each community. For streams that flow through two or more communities, each methodology described applies only to that portion of the stream studied by detailed methods within that particular community.

The previously printed FIS for the Town of Cache considered the following streams: West Cache Creek, Crater Creek, Rock Creek, West Branch Blue Beaver Creek, Tributary B of West Branch Blue Beaver Creek, Tributary A, and West Branch Tributary A (Reference 10). In that study, cross sections for the backwater analyses were taken from photogrammetric topographic maps (Reference 26). Cross sections were located at close intervals above or below bridges and culverts in order to compute the significant backwater effects of these structures. Detailed bridge measurements and photographs were used to obtain elevation data and structural geometry. Starting water-surface elevations for West Cache Creek were determined using the slope/area method. Starting elevations for Crater Creek, Rock Creek, Tributary A, and West Branch Tributary A were determined by assuming coincident peak flows at their confluences with West Cache Creek. Channel roughness factors used in the hydraulic computations were assigned on the basis of engineering judgment and field observations of the streams and floodplains.

The hydraulic analyses for West Branch Squaw Creek were taken from the previously printed FIS for the City of Lawton (Reference 12). In that study, cross section data were taken from topographic maps, and bridge geometry was field measured (Reference 27). Starting water-surface elevations were determined by assuming coincident flooding with Squaw Creek. Channel roughness factors (Manning's "n") were based on field reconnaissance, typical photographs of the areas, and high-water marks where available.

In the previous countywide studies, starting water-surface elevations for East Cache Creek and Wolf Creek were based on normal-depth calculations and data taken from the previously printed FIS for the City of Lawton (Reference 12). Starting water-surface elevations for East Cache Creek tributaries were based on coincident flood levels with East Cache Creek. Starting water-surface elevations for the East and West Branches Wolf Creek, and their tributaries, were based on coincident flood levels with Wolf Creek. Normal-depth calculations were used to determine the starting water-surface elevations for Squaw Creek.

Starting water-surface elevations for Squaw Creek East Tributary B were determined by assuming coincident flooding with Squaw Creek. Starting water-surface elevations for Ninemile Creek Tributary were based on normal-depth calculations using approximate energy slopes and estimated starting flood levels. Channel roughness factors (Manning's n) were assigned on the basis of engineering judgment and field investigations, and were then compared to values listed in pertinent sources. Comanche County soil maps were used for the approximate analysis of Goodyear Creek and its tributary (Reference 18). Historical flood damage information was also used to verify flood elevations.

For this countywide revision, the data used in the hydraulic analysis was collected from various site visits, the current FEMA models, surveyed cross sections, the City of Lawton's current 2-foot topographic maps (Reference 28), the City of Lawton's 1985 2-foot topographic maps where the current maps do not cover (Reference 29), and the USGS quadrangle maps where neither the current or 1985 City maps have coverage (Reference 27).

The cross sections for the models were obtained by three methods. The first method was utilizing the USACE's HEC-GeoRAS program to cut the cross sections from a TIN generated from the City of Lawton's digital 2-foot topographic maps. Second, surveyed cross sections were taken at various locations, generally at the upstream and downstream side of structures and then at approximately every 1,000 linear feet of stream. Third, in areas where the digital 2-foot topographic map was not available, both the 1985 2-foot topographic and USGS Quadrangle maps were used. When feasible, cross sections were taken at previous FEMA-lettered cross sections.

The water surface profiles were calculated using the USACE HEC-RAS program version 3.0.1 (Reference 30). The program was run with the 10-, 2-, 1-, and 0.2-percent-annual-chance discharges from the HEC-HMS model using the sub-critical steady flow analysis.

All of the cross sections on East Cache Creek were imported from HEC-GeoRAS except for the three most downstream cross sections: 0, 1000 and 1323. Because there was no topography in the location of these cross sections, the cross section information was taken directly from the effective HEC-2 model. Cross section 0 is the start of the HEC-2 model for East Cache and therefore, provides the starting water elevations for the HEC-RAS model.

The starting water elevations for Mission Creek were obtained from East Cache Creek using the appropriate frequency storm according to the USACE Table of Coincidental Occurrence. The starting water elevations for Ninemile Creek Tributary were obtained from the effective HEC-2 model.

The starting water elevations for Squaw Creek for this study were obtained from East Cache Creek using the appropriate frequency storm according to the USACE Table of Coincidental Occurrence.

The starting water elevations for East Cache Creek were obtained from the appropriate frequency storm according to the USACE Table of Coincidental Occurrence. Water surface elevations from a small residential lake located along East Cache Creek Tributary A were used to develop the starting water elevations for the portion of East Cache Creek Tributary A upstream of the lake.

The starting water elevations for East Cache Creek Tributary B were obtained from East Cache Creek using the appropriate frequency storm according to the USACE Table of Coincidental Occurrence.

The starting water elevations for Unnamed Tributary to Wolf Creek and its four tributaries (West, Middle West, Middle East and East Tributaries of Unnamed Tributary to Wolf Creek) were obtained by using the USACE Coincidental Occurrence table.

The three most downstream cross sections for Wolf Creek from the current effective HEC-2 model as well as the starting water surface using the normal slope method (with the current slope of 0.00045) were incorporated into the proposed model because the scope of the detailed study ended at the downstream face of Interstate Highway 44.

The starting water elevations for Wratton Creek were obtained from East Cache Creek using the appropriate frequency storm according to the USACE Table of Coincidental Occurrence. For streams studied by detailed methods outside the City of Lawton, cross section data for the backwater analyses were taken from aerial photogrammetric mapping (Reference 29). Cross sections at bridges and bridge geometry were field surveyed and supplemented by 'as-built' drawings when appropriate.

In the initial countywide study, streams studied by detailed methods within the unincorporated areas of the county utilized cross sections that were determined from topographic maps (Reference 31). Bridges were field surveyed. Starting water-surface elevations for the major streams were determined using the slope/area method; where applicable. Starting elevations for the tributaries were taken at their confluences with the major streams.

Channel roughness factors (Manning's "n") were assigned on the basis of engineering judgment and field observations of the streams and floodplains. Within the City of Lawton, the channel and overbank roughness or n-values were determined from field investigation using a modification and combination of the Cowan method and the Aldridge and Garret method (Reference 32).

For this countywide FIS, locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the FIRM (Exhibit 2).

Flood profiles were drawn showing computed water-surface elevations for floods of the selected recurrence intervals. The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Table 5, "Summary of Roughness Coefficients," shows the ranges of the channel and overbank roughness factors (Manning's "n") used in the hydraulic computations for the streams studied by detailed methods.

TABLE 5 - SUMMARY OF ROUGHNESS COEFFICIENTS

STREAM	CHANNEL"n"	OVERBANK"n"
Blue Beaver Creek	0.035-0.060	0.045-0.080
Crater Creek	0.090-0.070	0.030-0.060
East Branch Wolf Creek	0.020-0.037	0.038-0.068
East Cache Creek	0.032-0.055	0.032-0.101
East Cache Creek Tributary A	0.035-0.058	0.035-0.072
East Cache Creek Tributary A-1	0.050	0.037-0.072
East Cache Creek Tributary B	0.034-0.060	0.034-0.072
Goodyear Creek and Tributary	0.057	0.057
Meadowbrook Creek	0.040	0.070
Mission Creek	0.016-0.061	0.032-0.084
Mission Creek Tributary	0.016	0.032-0.072
Ninemile Creek Tributary	0.040-0.100	0.040-0.090
Rock Creek	0.070-0.080	0.070-0.080
Squaw Creek	0.018-0.065	0.034-0.072
Squaw Creek East Tributary B	0.018-0.026	0.040-0.052
Tributary A	0.050-0.070	0.050-0.070
Tributary B of West Branch Blue Beaver Creek (within Town of Cache)	0.040-0.100	0.040-0.100
Tributary B of West Branch Blue Beaver Creek (within unincorporated areas)	0.035-0.060	0.045-0.080
Tributary of Blue Beaver Creek	0.035-0.060	0.045-0.080
Unnamed Tributary to Wolf Creek	0.018-0.071	0.034-0.051
West Branch Blue Beaver Creek (within Town of Cache)	0.060-0.100	0.060-0.080
West Branch Blue Beaver Creek (within unincorporated areas)	0.035-0.060	0.045-0.080
West Branch Squaw Creek	0.040*	0.045*
West Branch Tributary A	0.050-0.070	0.050-0.070
West Branch Wolf Creek	0.018-0.073	0.035-0.073
West Branch Wolf Creek Tributary A	0.015-0.045	0.030-0.035
West Branch Wolf Creek Tributary B	0.030-0.070	0.033-0.080
West Cache Creek	0.050-0.080	0.050-0.080
Wolf Creek	0.041-0.061	0.018-0.100
Wratton Creek	0.037-0.055	0.037-0.072
Wratton Creek Tributary	0.037-0.059	0.037-0.072

*Average value

3.3 Vertical Datum

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

Flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Some of the data used in this revision were taken from the prior effective FIS reports and FIRMs and adjusted to NAVD88. The datum conversion factor from NGVD29 to NAVD88 in Comanche County is +0.38 feet.

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

Vertical Network Branch, N/CG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

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

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, within the Town of Cache, the boundaries were interpolated using topographic maps at a scale of 1:2,400 with a contour interval of 2 feet (Reference 26). Within the City of Lawton, the boundaries were delineated using the City of Lawton's current 2-foot topographic maps (Reference 28), the City of Lawton's 1985 2-foot topographic maps where the current maps do not cover (Reference 29), and the USGS quadrangle maps (Reference 27) where neither the current or 1985 City maps have coverage.

Within the unincorporated areas of the county, the boundaries were interpolated using topographic maps at a scale of 1:2,400 with a contour interval of 2 feet (Reference 31).

The floodplain boundaries of several streams in Comanche County were refined using Interferometric Synthetic Aperture Radar (IFSAR) topographic data. IFSAR is a side looking, active remote sensing technique. IFSAR represents the most recent available terrain data. Triangular Irregular Networks (TINs) water surfaces were created from the IFSAR data collected in this study, and intersected with the ground surface to develop refined floodplain boundary delineations. The floodplains for the following streams were refined:

East Cache Creek Tributary 4	From approximately 3,650 feet upstream of S.E. Tinney Road to approximately 1,400 feet upstream of S.E. Woodlawn Road
Little Post Oak Creek	From approximately 1,000 feet downstream of S.W. Post Oak Road to approximately 900 feet upstream of S.W. Bandy Road
Ninemile Creek Tributary 5	From approximately 1,050 feet upstream of State Highway 7 to approximately 1,150 feet downstream of E. Gore Boulevard
Snake Creek	From approximately 1,500 feet downstream of S.W. New Hope Road to approximately 1,800 feet upstream of S.W. Burk Road
Spring Creek	From its confluence with West Cache Creek to approximately 1,700 feet upstream of S.W. Logue Chapel Road
Pecan Creek Tributary 4	From approximately 1,600 feet upstream of S.W. New Hope Road to approximately 70 feet downstream of S.W. 82nd Street

Persimmon Creek	From its confluence with Spring Creek to approximately 350 feet upstream of S.W. Crater Creek Road
West Cache Creek	From approximately 550 feet upstream of the Comanche-Cotton County boundary to approximately 1,680 feet downstream of S.W. Logue Chapel Road
West Cache Creek Tributary 4	From its confluence with West Cache Creek to approximately 2,775 feet upstream of S.W. Coffee Road
East Cache Creek Tributary 5	From its confluence with West Cache Creek to approximately 2,100 feet upstream of S.W. Coffee Road

For the streams studied by approximate methods, the 1-percent-annual-chance floodplain boundaries were delineated using the previously printed FISs for the Town of Cache and the City of Lawton, soil and topographic maps, and the Flood Hazard Boundary Map for the unincorporated areas of Comanche County (References 10, 12, 18, 30, 33, and 34).

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

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

4.2 Floodways

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

The floodways presented in this study were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (see Table 6, "Floodway Data"). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

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

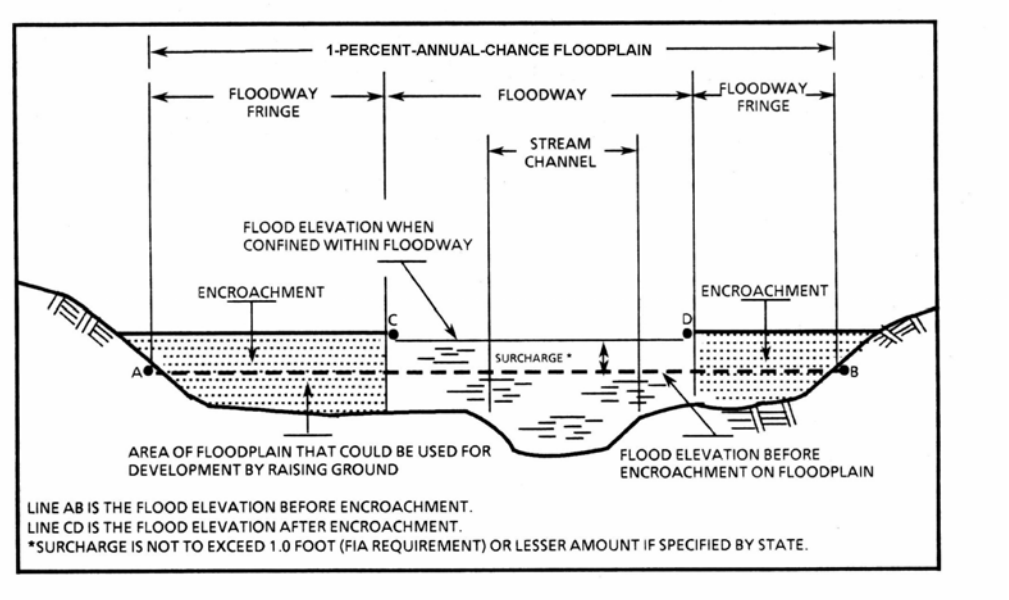

Figure 1. Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Crater Creek								
A	827	586	7,852	6.1	1,199.4	1,199.4	1,200.4	1.0
B	2,841	964	5,123	1.8	1,202.5	1,202.5	1,203.5	1.0
C	4,773	224	1,244	7.4	1,204.8	1,204.8	1,205.4	0.6
D	6,064	342	1,973	4.6	1,211.9	1,211.9	1,212.9	1.0
E	6,600	261	1,931	4.7	1,213.8	1,213.8	1,214.9	1.1
F	7,017	177	1,185	7.7	1,214.6	1,214.6	1,215.4	0.8
G	7,617	303	2,114	4.3	1,217.7	1,217.7	1,218.6	0.9
H	8,600	196	1,250	7.3	1,221.3	1,221.3	1,222.0	0.7
I	10,053	396	2,727	3.4	1,226.3	1,226.3	1,227.2	0.9
J	10,600	273	1,467	6.2	1,227.5	1,227.5	1,228.3	0.8
K	10,949	249	1,660	5.5	1,229.3	1,229.3	1,230.2	0.9
L	12,286	176	1,317	6.9	1,235.9	1,235.9	1,236.6	0.7
M	13,061	306	2,632	3.5	1,242.3	1,242.3	1,242.3	0.0
N	14,313	151	1,232	7.4	1,244.1	1,244.1	1,244.6	0.5
O	15,014	303	2,297	3.8	1,246.6	1,246.6	1,247.5	0.9
P	15,144	376	2,586	3.4	1,247.2	1,247.2	1,248.0	0.8
Q	15,444	210	1,425	6.2	1,247.5	1,247.5	1,248.2	0.7
R	16,562	188	1,113	7.9	1,252.0	1,252.0	1,252.8	0.8
S	18,516	209	1,297	6.8	1,260.9	1,260.9	1,261.8	0.9
T	19,158	363	2,090	4.1	1,263.0	1,263.0	1,263.9	0.9
U	19,612	343	2,542	3.3	1,264.5	1,264.5	1,265.5	1.0
V	21,117	192	934	9.1	1,264.9	1,264.9	1,265.7	0.8
W	22,016	392	2,322	3.7	1,271.9	1,271.9	1,272.0	0.1

[1] Feet above Lee Boulevard

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Crater Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
East Branch Wolf Creek								
A	1,635 [1]	146	1,075	6.7	1,114.0	1,114.0	1,114.0	0.0
B	2,739 [1]	104	846	8.6	1,117.0	1,117.0	1,117.5	0.5
C	3,490 [1]	140	1,124	6.4	1,120.1	1,120.1	1,120.6	0.5
D	4,268 [1]	142	878	8.2	1,121.5	1,121.5	1,121.9	0.4
E	5,044 [1]	157	1,017	7.1	1,124.6	1,124.6	1,124.7	0.1
F	5,620 [1]	331	1,604	4.5	1,126.1	1,126.1	1,126.1	0.0
G	6,235 [1]	299	1,437	5.0	1,126.8	1,126.8	1,126.9	0.1
H	6,881 [1]	227	1,217	5.9	1,128.6	1,128.6	1,128.7	0.1
I	7,331 [1]	227	1,503	4.8	1,131.0	1,131.0	1,132.0	1.0
J	7,953 [1]	250	1,397	5.0	1,131.8	1,131.8	1,132.6	0.8
K	9,796 [1]	126	1,003	6.9	1,136.1	1,136.1	1,136.6	0.5
L	10,821 [1]	178	1,844	3.8	1,141.6	1,141.6	1,142.6	1.0
East Branch Wolf Creek Tributary A - E	-- [2]	-- [2]	-- [2]	-- [2]	-- [2]	-- [2]	-- [2]	-- [2]

[1] Feet above confluence with Wolf Creek

[2] No Floodway Data computed

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

East Branch Wolf Creek - East Branch Wolf Creek Tributary

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
East Cache Creek								
A	0	5,292	42,547	0.7	1,059.1	1,059.1	1,060.0	0.9
B	1,000	5,099	39,408	0.8	1,059.2	1,059.2	1,060.1	0.9
C	2,290	5,090	33,928	0.9	1,059.3	1,059.3	1,060.2	0.9
D	4,335	4,922	20,986	1.5	1,059.4	1,059.4	1,060.3	0.9
E	5,229	4,210	14,999	2.0	1,059.5	1,059.5	1,060.4	0.9
F	7,047	2,486	10,056	3.0	1,060.6	1,060.6	1,061.3	0.7
G	8,986	2,234	13,823	3.3	1,062.9	1,062.9	1,063.3	0.4
H	10,069	3,028	13,293	2.3	1,063.8	1,063.8	1,064.4	0.6
I	11,709	2,971	11,566	2.7	1,064.9	1,064.9	1,065.8	0.9
J	13,390	2,738	11,911	2.6	1,065.8	1,065.8	1,066.7	0.9
K	14,683	1,921	8,133	3.8	1,066.7	1,066.7	1,067.6	0.9
L	15,807	2,178	6,841	4.5	1,069.2	1,069.2	1,069.4	0.2
M	17,270	733	7,583	5.5	1,071.6	1,071.6	1,071.6	0.0
N	17,381	553	8,482	5.6	1,072.7	1,072.7	1,072.8	0.1
O	18,408	2,100	12,932	2.4	1,073.8	1,073.8	1,074.0	0.2
P	19,351	2,100	12,442	2.5	1,074.1	1,074.1	1,074.4	0.3
Q	20,409	2,100	22,955	1.4	1,074.2	1,074.2	1,074.6	0.4
R	22,069	1,400	13,819	2.3	1,074.2	1,074.2	1,074.7	0.5
S	22,929	271	8,879	6.5	1,075.8	1,075.8	1,076.3	0.5
T	25,041	1,447	6,941	4.5	1,077.2	1,077.2	1,077.7	0.5
U	30,889	2,200	10,919	2.9	1,082.4	1,082.4	1,083.0	0.6
V	33,555	2,504	12,054	2.7	1,084.5	1,084.5	1,085.5	1.0
W	37,237	1,800	6,521	4.9	1,086.4	1,086.4	1,087.3	0.9
X	38,129	1,919	8,318	3.8	1,088.1	1,088.1	1,089.1	1.0
Y	39,190	1,600	7,564	4.1	1089.9	1089.9	1090.2	0.3
Z	40,322	1,900	7,554	4.1	1091.0	1091.0	1091.5	0.5
AA	43,734	3610	15,185	4.3	1094.5	1094.5	1094.8	0.3

[1] Feet above Limit of Detailed Study

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

East Cache Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
East Cache Creek (continued)								
AB	44,291 [1]	3,985	28,340	1.4	1,098.6	1,098.6	1,099.5	0.9
AC	44,906 [1]	3,155	21,299	1.9	1,098.7	1,098.7	1,099.7	1.0
AD	45,486 [1]	2,968	20,901	1.9	1,099.3	1,099.3	1,100.2	0.9
East Cache Creek Tributary A								
A	1,642 [2]	139	429	4.46	1,075.2	1,075.2	1,075.7	0.5
B	2,642 [2]	220	632	3.03	1,080.8	1,080.8	1,081.5	0.7
C	3,042 [2]	250	786	1.72	1,081.1	1,081.1	1,082.1	1.0
D	3,745 [2]	135	364	3.71	1,083.7	1,083.7	1,083.8	0.1
E	4,269 [2]	135	275	4.9	1,086.0	1,086.0	1,086.7	0.7
F	4,668 [2]	130	286	4.73	1,088.1	1,088.1	1,088.8	0.7
G	5,277 [2]	27	140	2.95	1,090.4	1,090.4	1,090.6	0.2
H	6,047 [2]	38	75	5.46	1,097.0	1,097.0	1,097.0	0.0
I	6,853 [2]	50	154	2.7	1,111.7	1,111.7	1,111.9	0.2
J	7,289 [2]	21	55	8.64	1,115.6	1,115.6	1,115.6	0.0
K	8,460 [2]	25	71	7.77	1,129.2	1,129.2	1,129.5	0.3
L	8,841 [2]	30	86	2.2	1,132.7	1,132.7	1,133.3	0.6
M	9,405 [2]	31	59	3.21	1,139.8	1,139.8	1,139.8	0.0

[1] Feet above Limit of Detailed Study

[2] Feet above confluence with East Cache Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

East Cache Creek - East Cache Creek Tributary A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
East Cache Creek Tributary A-1								
A	786 [1]	60	214	4.9	1,092.2	1,092.2	1,093.0	0.8
B	2,254 [1]	60	296	3.6	1,101.5	1,101.5	1,102.2	0.7
C	2,993 [1]	35	169	4.7	1,106.3	1,106.3	1,106.4	0.1
D	4,042 [1]	134	244	3.1	1,115.1	1,115.1	1,115.7	0.6
East Cache Creek Tributary B								
A	4,835 [2]	218	436	4.8	1,076.1	1,076.1	1,076.3	0.2
B	7,460 [2]	133	663	3.2	1,087.8	1,087.8	1,088.2	0.4
C	10,180 [2]	63	501	3.8	1,098.3	1,098.3	1,098.7	0.4
D	11,241 [2]	232	800	2.4	1,105.2	1,105.2	1,106.0	0.8
E	12,673 [2]	145	424	4.5	1,111.9	1,111.9	1,112.5	0.6
F	14,647 [2]	32	127	9.4	1,121.4	1,121.4	1,121.4	0.0
G	15,541 [2]	34	90	9.3	1,126.1	1,126.1	1,126.1	0.0

[1] Feet above confluence with East Cache Creek Tributary A

[2] Feet above confluence with East Cache Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

East Cache Creek Tributary A-1 - East Cache Creek Tributary B

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Meadowbrook Creek								
A	1,470	295	550	6.0	1,115.1	1,115.1	1,115.4	0.3
B	1,850	346	945	3.5	1,117.3	1,117.3	1,117.8	0.5
C	2,090	255	787	4.2	1,118.1	1,118.1	1,118.6	0.5
D	2,245	328	1,128	2.9	1,119.1	1,119.1	1,119.9	0.8
E	2,380	321	868	3.8	1,119.3	1,119.3	1,120.1	0.8
F	2,500	241	770	4.3	1,119.5	1,119.5	1,120.4	0.9
G	2,645	181	457	7.2	1,120.3	1,120.3	1,120.7	0.4
H	2,840	201	981	3.4	1,121.4	1,121.4	1,122.0	0.6
I	3,025	200	982	3.4	1,121.5	1,121.5	1,122.1	0.6
J	3,235	222	771	4.3	1,121.9	1,121.9	1,122.6	0.7
K	3,365	226	1,110	3.0	1,123.2	1,123.2	1,123.6	0.4
L	3,415	193	815	4.0	1,123.1	1,123.1	1,123.6	0.5
M	3,675	104	646	5.1	1123.8	1,123.8	1124.3	0.5
N	3,890	107	636	5.2	1,124.4	1,124.4	1,125.0	0.6
O	4,105	112	801	4.1	1,125.2	1,125.2	1,125.6	0.4
P	4,265	106	782	4.2	1,125.5	1,125.5	1,125.9	0.4
Q	4,385	116	1,079	3.1	1,125.7	1,125.7	1,126.1	0.4
R	4,435	115	1,078	3.1	1,125.7	1,125.7	1,126.1	0.4
S	4,535	98	907	3.6	1,126.1	1,126.1	1,126.7	0.6
T	4,760	97	916	3.6	1,126.2	1,126.2	1,126.8	0.6
U	4,945	100	861	3.8	1,126.3	1,126.3	1,126.9	0.6
V	5,155	94	770	4.3	1,126.4	1,126.4	1,126.9	0.5
W	5,360	85	683	4.8	1,126.4	1,126.4	1,127.0	0.6
X	5,470	101	798	4.1	1,126.6	1,126.6	1,127.2	0.6
Y	5,625	71	621	5.3	1,126.6	1,126.6	1,127.2	0.6

[1] Feet above confluence with Wolf Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Meadowbrook Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Meadowbrook Creek (continued)								
Z	5,820	85	693	4.8	1,126.8	1,126.8	1,127.5	0.7
AA	6,115	94	723	4.6	1,127.1	1,127.1	1,127.7	0.6
AB	6,220	94	730	4.5	1,127.2	1,127.2	1,127.8	0.6
AC	6,370	98	825	4.0	1,128.4	1,128.4	1,128.8	0.4
AD	6,600	66	284	11.7	1,128.0	1,128.0	1,128.0	0.0
AE	6,800	76	516	4.9	1,131.2	1,131.2	1,131.2	0.0
AF	7,170	45	475	5.3	1,131.9	1,131.9	1,131.9	0.0
AG	7,700	155	760	3.3	1,133.1	1,133.1	1,133.1	0.0
AH	8,180	139	586	4.3	1,134.0	1,134.0	1,134.0	0.0
AI	8,850	79	408	6.2	1,136.1	1,136.1	1,136.5	0.4
AJ	9,510	100	433	5.8	1,139.2	1,139.2	1,140.2	1.0
AK	10,120	225	1,042	2.4	1,141.4	1,141.4	1,141.9	0.5
AL	10,720	85	488	5.2	1,142.4	1,142.4	1,142.7	0.3
AM	11,330	76	459	5.5	1,144.5	1,144.5	1,144.8	0.3
AN	11,730	539	7,382	0.4	1,155.9	1,155.9	1,155.9	0.0
AO	12,110	316	3,411	0.9	1,155.9	1,155.9	1,155.9	0.0
AP	12,800	229	2,062	1.2	1,155.9	1,155.9	1,155.9	0.0
AQ	13,300	519	3,938	0.6	1,156.0	1,156.0	1,156.0	0.0
AR	13,850	480	2,764	0.9	1,156.0	1,156.0	1,156.0	0.0
AS	14,150	44	201	12.2	1,154.6	1,154.6	1,154.6	0.0
AT	14,234	44	337	7.3	1,157.6	1,157.6	1,157.6	0.0
AU	14,700	109	478	5.1	1,160.4	1,160.4	1,160.5	0.1
AV	14,950	49	148	1.0	1,161.6	1,161.6	1,161.8	0.2
AW	15,280	20	45	3.1	1,161.7	1,161.7	1,161.9	0.2
AX	15,750	110	117	1.2	1,163.2	1,163.2	1,163.2	0.0
AY	16,070	9	18	8.0	1,169.2	1,169.2	1,169.9	0.7

[1] Feet above confluence with Wolf Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Meadowbrook Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Mission Creek								
A	7,196 [1]	87	562	6.8	1,090.3	1,090.3	1,090.4	0.1
B	7,841 [1]	109	779	3.8	1,092.5	1,092.5	1,092.7	0.2
C	9,255 [1]	110	520	5.7	1,097.8	1,097.8	1,098.0	0.2
D	9,788 [1]	124	569	5.2	1,100.6	1,100.6	1,101.4	0.8
E	11,134 [1]	100	515	6.9	1,106.3	1,106.3	1,107.2	0.9
F	11,809 [1]	83	653	5.4	1,114.5	1,114.5	1,114.8	0.3
G	12,398 [1]	78	1,233	2.9	1,121.8	1,121.8	1,122.2	0.4
H	13,082 [1]	200	1,934	1.8	1,122.0	1,122.0	1,122.4	0.4
I	14,421 [1]	230	1,120	3.2	1,123.9	1,123.9	1,124.2	0.3
J	15,173 [1]	185	591	4.8	1,125.5	1,125.5	1,126.2	0.7
K	17,053 [1]	63	213	10.5	1,133.2	1,133.2	1,133.2	0.0
Mission Creek Tributary								
A	272 [2]	78	375	1.7	1,129.4	1,129.4	1,129.6	0.2
B	570 [2]	78	338	1.9	1,129.4	1,129.4	1,129.7	0.3
C	1,040 [2]	31	109	6.0	1,129.2	1,129.2	1,129.5	0.3

[1] Feet above confluence with East Cache Creek

[2] Feet above confluence with Mission Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Mission Creek - Mission Creek Tributary

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Ninemile Creek Tributary								
A	0	171	1,091	3.9	1,090.7	1,090.7	1,091.7	1.0
B	40	176	1,126	3.8	1,090.8	1,090.8	1,091.8	1.0
C	1,012	633	1,727	2.5	1,092.5	1,092.5	1,093.5	1.0
D	1,935	780	2,227	1.9	1,093.7	1,093.7	1,094.7	1.0
E	3,455	105	617	6.9	1,096.0	1,096.0	1,096.8	0.8
F	4,150	205	1,398	3.1	1,098.2	1,098.2	1,099.2	1.0
G	4,895	274	1,214	3.5	1,099.3	1,099.3	1,100.2	0.9
H	5,990	189	935	4.2	1,101.3	1,101.3	1,102.3	1.0
I	6,820	243	1,052	3.7	1,103.5	1,103.5	1,104.5	1.0
J	7,395	271	1,492	2.6	1,104.5	1,104.5	1,105.5	1.0
K	7,524	305	1,661	2.3	1,105.3	1,105.3	1,106.1	0.8
L	8,791	349	1,593	2.4	1,106.4	1,106.4	1,107.2	0.8
M	10,900	400	1,425	2.6	1,109.7	1,109.7	1,110.1	0.4
N	11,503	370	1,009	3.7	1,110.6	1,110.6	1,111.2	0.6
O	12,370	315	1,104	3.4	1,114.1	1,114.1	1,114.7	0.6
P	13,272	300	1,225	3.0	1,116.4	1,116.4	1,117.0	0.6
Q	14,058	300	1,114	3.4	1,118.1	1,118.1	1,118.9	0.8
R	14,849	248	1,145	3.3	1,122.3	1,122.3	1,123.1	0.8
S	16,273	225	1,402	2.7	1,130.3	1,130.3	1,130.9	0.6
T	16,995	307	2,168	1.7	1,130.4	1,130.4	1,131.3	0.9
U	18,368	344	1,821	2.0	1,130.8	1,130.8	1,131.8	1.0
V	20,812	260	927	4.0	1,136.0	1,136.0	1,136.7	0.7
W	24,879	200	847	3.2	1,146.0	1,146.0	1,146.7	0.7
X	26,129	220	1,279	2.1	1,153.2	1,153.2	1,153.8	0.6
Y	26,935	220	1,428	1.9	1,153.4	1,153.4	1,154.1	0.7

[1] Feet above confluence with Ninemile Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Ninemile Creek Tributary

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Ninemile Creek Tributary (continued)								
Z	27,792	188	691	3.9	1,153.6	1,153.6	1,154.6	1.0
AA	29,218	180	663	4.0	1,156.8	1,156.8	1,157.8	1.0
AB	30,284	200	537	5.0	1,160.1	1,160.1	1,160.8	0.7
AC	31,637	200	856	3.1	1,163.5	1,163.5	1,164.3	0.8
AD	32,902	183	589	4.6	1,167.0	1,167.0	1,167.3	0.3
AE	34,191	95	319	5.0	1,170.4	1,170.4	1,170.4	0.0
AF	34,976	97	362	4.4	1,173.6	1,173.6	1,174.6	1.0
AG	35,702	95	407	3.9	1,176.9	1,176.9	1,177.8	0.9
AH	36,245	41	199	8.0	1,179.6	1,179.6	1,179.9	0.3
AI	36,525	90	513	2.6	1,182.3	1,182.3	1,183.3	1.0
AJ	36,900	56	291	4.2	1,182.9	1,182.9	1,183.8	0.9
AK	37,440	41	206	5.9	1,185.4	1,185.4	1,186.3	0.9
AL	38,460	103	346	3.5	1,189.3	1,189.3	1,190.3	1.0
AM	39,215	85	281	4.3	1,191.2	1,191.2	1,191.9	0.7
AN	40,265	136	299	4.1	1,197.0	1,197.0	1,198.0	1.0

[1] Feet above confluence with Ninemile Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Ninemile Creek Tributary

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Rock Creek								
A	0 [1]	827 [2]	8,980	5.0	1,229.5	1,229.5	1,230.5	1.0
B	1,525 [1]	838	4,972	2.0	1,233.1	1,233.1	1,234.1	1.0
C	2,425 [1]	372	1,762	5.7	1,234.2	1,234.2	1,235.1	0.9
D	3,100 [1]	144	1,222	8.3	1,237.8	1,237.8	1,238.6	0.8
E	3,342 [1]	573	3,657	2.8	1,241.1	1,241.1	1,241.7	0.6
F	3,982 [1]	381	2,376	4.3	1,241.9	1,241.9	1,242.6	0.7
G	4,432 [1]	220	2,001	5.1	1,243.2	1,243.2	1,244.0	0.8
H	4,932 [1]	348	1,776	5.7	1,245.4	1,245.4	1,246.0	0.6
I	5,122 [1]	772	5,266	1.9	1,246.0	1,246.0	1,246.9	0.9
Squaw Creek								
A	307 [3]	339	3,424	1.7	1,071.8	1,071.8	1,072.8	1.0
B	1,173 [3]	291	1,556	3.8	1,072.2	1,072.2	1,073.0	0.8
C	2,928 [3]	180	1,109	5.3	1,079.4	1,079.4	1,079.6	0.2
D	3,618 [3]	130	1,377	4.3	1,082.3	1,082.3	1,082.5	0.2
E	3,985 [3]	109	1,514	3.9	1,083.0	1,083.0	1,083.1	0.1
F	4,301 [3]	113	1,156	5.1	1,083.1	1,083.1	1,083.5	0.4
G	4,579 [3]	200	1,505	3.9	1,083.3	1,083.3	1,083.5	0.2
H	5,099 [3]	170	1,241	4.7	1,083.4	1,083.4	1,083.6	0.2
I	5,471 [3]	150	826	7.0	1,083.1	1,083.1	1,083.4	0.3
J	6,162 [3]	150	474	6.1	1,086.1	1,086.1	1,086.7	0.6
K	6,980 [3]	76	424	6.8	1,089.4	1,089.4	1,089.7	0.3
L	8,256 [3]	160	497	5.4	1,092.4	1,092.4	1,092.4	0.0
M	8,968 [3]	160	976	5.7	1,094.4	1,094.4	1,095.2	0.8
N	9,279 [3]	155	1,206	5.8	1,096.2	1,096.2	1,097.2	1.0
O	11,329 [3]	136	621	7.2	1,098.6	1,098.6	1,099.5	0.9

[1] Feet above confluence with West Cache Creek

[2] Combined Rock Creek/West Cache Creek floodway

[3] Feet above downstream face of U.S. Highways 281 and 277 and Interstate Highway 44

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Rock Creek - Squaw Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Squaw Creek (continued)								
P	12,352	263	953	4.7	1,101.8	1,101.8	1,101.9	0.1
Q	12,703	95	377	12.0	1,101.4	1,101.4	1,101.4	0.0
R	13,134	400	1,278	3.5	1,105.1	1,105.1	1,105.1	0.0
S	13,832	165	991	4.2	1,106.0	1,106.0	1,106.0	0.0
T	14,332	172	1,434	2.9	1,108.1	1,108.1	1,108.1	0.0
U	14,883	372	1,223	3.1	1,108.3	1,108.3	1,108.4	0.1
V	15,358	136	643	6.0	1,108.7	1,108.7	1,108.7	0.0
W	16,067	121	697	5.5	1,113.0	1,113.0	1,113.0	0.0
X	16,491	89	823	4.7	1,117.1	1,117.1	1,117.1	0.0
Y	17,299	143	789	4.9	1,117.3	1,117.3	1,117.4	0.1
Z	17,950	219	871	4.4	1,119.1	1,119.1	1,119.6	0.5
AA	20,727	80	555	6.3	1,123.9	1,123.9	1,124.9	1.0
AB	21,488	276	981	3.5	1,126.2	1,126.2	1,126.9	0.7
AC	22,166	160	612	5.5	1,127.3	1,127.3	1,127.5	0.2
AD	22,925	130	522	6.4	1,130.5	1,130.5	1,130.8	0.3
AE	23,485	124	752	3.5	1,132.5	1,132.5	1,132.5	0.0
AF	23,955	185	667	2.6	1,133.0	1,133.0	1,133.1	0.1
AG	24,664	90	199	8.5	1,135.0	1,135.0	1,135.0	0.0
AH	25,572	51	183	9.3	1,139.3	1,139.3	1,139.3	0.0
AI	26,345	31	234	8.5	1,143.1	1,143.1	1,143.1	0.0
AJ	26,752	205	930	1.3	1,149.9	1,149.9	1,149.9	0.0
AK	27,182	130	413	2.9	1,150.0	1,150.0	1,150.1	0.1
AL	27,782	125	303	5.2	1,151.8	1,151.8	1,151.8	0.0
AM	28,660	55	180	2.8	1,156.8	1,156.8	1,157.2	0.4
AN	29,032	55	85	6.0	1,160.6	1,160.6	1,160.6	0.0
AO	29,453	22	56	9.1	1,162.9	1,162.9	1,162.9	0.0

[1] Feet above downstream face of U.S. Highways 281 and 277 and Interstate Highway 44

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Squaw Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE [1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Squaw Creek East Tributary A								
A	487	40	250	4.4	1,083.7	1,083.7	1,084.3	0.6
B	866	17	221	7.7	1,084.2	1,084.2	1,084.7	0.5
C	1,246	28	150	7.2	1,085.7	1,085.7	1,086.1	0.4
Squaw Creek East Tributary B								
A	636	98	348	4.2	1,099.0	1,099.0	1,099.5	0.5
B	1,330	57	220	6.5	1,102.5	1,102.5	1,102.6	0.1
C	1,479	49	384	3.7	1,105.6	1,105.6	1,105.7	0.1
D	2,859	52	179	7.5	1,110.9	1,110.9	1,111.2	0.3
E	3,795	61	313	7.6	1,117.0	1,117.0	1,117.1	0.1
F	4,508	65	302	4.3	1,120.0	1,120.0	1,120.6	0.6
G	5,465	173	453	2.4	1,124.5	1,124.5	1,125.1	0.6
H	5,903	190	641	1.7	1,128.0	1,128.0	1,128.3	0.3
I	6,339	140	360	3.0	1,128.2	1,128.2	1,128.8	0.6
J	6,873	85	197	5.4	1,133.3	1,133.3	1,133.9	0.6
K	8,069	150	500	2.1	1,140.9	1,140.9	1,141.1	0.2
L	8,575	140	415	2.5	1,141.3	1,141.3	1,141.9	0.6
M	9,246	134	154	3.9	1,143.4	1,143.4	1,143.4	0.0
N	9,469	150	192	3.1	1,145.5	1,145.5	1,145.5	0.0

[1] Feet above confluence with Squaw Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Squaw Creek East Tributary A - Squaw Creek East Tributary B

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Tributary A								
A	0 [1]	100	312	8.2	1,225.9	1,225.9	1,226.9	1.0
B	200 [1]	112	430	5.9	1,228.7	1,228.7	1,229.4	0.7
C	820 [1]	140	1,402	1.8	1,238.6	1,238.6	1,238.7	0.1
D	1,260 [1]	100	865	2.9	1,238.7	1,238.7	1,238.9	0.2
E	1,620 [1]	137	860	2.1	1,238.7	1,238.7	1,239.3	0.6
F	1,900 [1]	176	927	2.0	1,238.9	1,238.9	1239.6	0.7
Tributary B of West Branch Blue Beaver Creek A-K [2]								
L	6,030 [3]	101	690	6.0	1,245.1	1,245.1	1,245.8	0.7
M	6,660 [3]	400	4,213	1.0	1,250.9	1,250.9	1,251.7	0.8
N	7,900 [3]	80	524	7.9	1,254.9	1,254.9	1,254.9	0.0
O	9,650 [3]	283	1,406	3.0	1,263.9	1,263.9	1,264.9	1.0

[1] Feet above Town of Cache corporate limits

[2] No floodway data computed

[3] Feet above confluence with West Branch Blue Beaver Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Tributary A - Tributary B of West Branch Blue Beaver Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Unnamed Branch of an Unnamed Tributary to Wolf Creek								
A	160 [1]	211	532	1.2	1,129.0	1,129.0	1,129.0	0.0
B	1,230 [1]	42	73	7.5	1,137.9	1,137.9	1,138.6	0.7
Unnamed Tributary to Wolf Creek								
A	10,855 [2]	700	2,046	2.6	1,071.8	1,071.8	1,072.7	0.9
B	13,406 [2]	650	1,826	3.1	1,075.6	1,075.6	1,076.6	1.0
C	14,697 [2]	650	2,241	2.5	1,078.1	1,078.1	1,078.9	0.8
D	17,237 [2]	500	1,750	3.1	1,081.9	1,081.9	1,082.6	0.7
E	18,804 [2]	500	1,629	3.4	1,084.8	1,084.8	1,085.8	1.0
F	19,612 [2]	500	2,123	2.6	1,086.5	1,086.5	1,087.4	0.9
G	22,650 [2]	576	2,930	1.6	1,090.0	1,090.0	1,090.4	0.4
H	23,007 [2]	600	2,208	2.1	1,092.0	1,092.0	1,093.0	1.0
I	23,573 [2]	400	1,286	3.6	1,092.9	1,092.9	1,093.8	0.9
J	25,224 [2]	375	1,595	2.9	1,097.7	1,097.7	1,098.1	0.4
K	26,189 [2]	200	917	4.7	1,100.5	1,100.5	1,101.5	1.0
L	26,651 [2]	49	309	14.1	1,103.7	1,103.7	1,103.7	0.0
M-AA [3]								

[1] Feet above confluence with Unnamed Tributary to Wolf Creek

[2] Feet above confluence with Wolf Creek

[3] No floodway data computed

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Unnamed Branch of Unnamed Tributary to Wolf Creek -
Unnamed Tributary to Wolf Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
West Branch Blue Beaver Creek								
A-V [1]								
W	38,850 [2]	300	2,454	3.1	1,241.2	1,241.2	1,241.5	0.3
X	39,650 [2]	400	2,603	2.9	1,242.6	1,242.6	1,243.2	0.6
Y	40,920 [2]	300	1,742	4.4	1,246.9	1,246.9	1,247.7	0.8
Z	41,230 [2]	746	6,502	1.1	1,255.6	1,255.6	1,256.6	1.0
AA	41,970 [2]	743	7,054	1.0	1,255.7	1,255.7	1,256.7	1.0
AB	43,000 [2]	625	4,818	1.5	1,255.9	1,255.9	1,256.9	1.0
West Branch Squaw Creek								
A	1,024 [3]	150	349	5.3	1,071.8	1,071.8	1,071.8	0.0
B	1,792 [3]	64	335	5.6	1,076.7	1,076.7	1,077.1	0.4
C	2,224 [3]	50	206	9.1	1,078.0	1,078.0	1,078.1	0.1
D	3,181 [3]	60	200	6.9	1,084.4	1,084.4	1,085.3	0.9
E	3,946 [3]	125	309	4.4	1,093.5	1,093.5	1,094.4	0.9
F	5,734 [3]	39	123	9.4	1,097.9	1,097.9	1,098.6	0.7
G	6,980 [3]	34	135	8.6	1,106.4	1,106.4	1,106.8	0.4
West Branch Tributary A								
A	550 [4]	80	303	1.7	1,239.1	1,239.1	1,240.1	1.0
B	920 [4]	150	213	2.4	1,242.6	1,242.6	1,242.6	0.0

[1] No floodway data computed

[2] Feet above confluence with Blue Beaver Creek

[3] Feet above Interstate Highway 44

[4] Feet above confluence with Tributary A

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

West Branch Blue Beaver Creek - West Branch Squaw Creek - West Branch Tributary A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
West Branch Wolf Creek								
A	1,547	350	1,497	4.9	1,115.2	1,115.2	1,115.4	0.2
B	2,742	455	1,221	6.0	1,116.3	1,116.3	1,117.2	0.9
C	3,663	91	674	10.9	1,118.6	1,118.6	1,119.5	0.9
D	4,006	194	1,226	6.0	1,122.3	1,122.3	1,122.2	0.0
E	5,213	163	1,274	5.8	1,124.4	1,124.4	1,125.2	0.8
F	5,886	162	944	7.8	1,125.9	1,125.9	1,126.4	0.5
G	6,704	158	977	7.2	1,128.7	1,128.7	1,128.9	0.2
H	7,050	60	833	8.4	1,130.6	1,130.6	1,131.6	1.0
I	7,291	172	1,278	5.5	1,131.7	1,131.7	1,132.7	1.0
J	8,681	153	720	9.8	1,136.7	1,136.7	1,136.9	0.2
K	9,768	159	1,846	3.8	1,141.9	1,141.9	1,141.9	0.0
L	10,821	296	1,164	6.0	1,144.1	1,144.1	1,144.1	0.0
M	12,059	105	909	7.7	1,150.1	1,150.1	1,150.4	0.3
N	14,326	400	1,685	4.2	1,156.6	1,156.6	1,156.8	0.2
O	15,501	400	1,743	4.0	1,159.5	1,159.5	1,160.2	0.7
P	17,002	140	1,404	4.9	1,165.5	1,165.5	1,165.7	0.2
Q	17,075	140	1,516	4.5	1,166.5	1,166.5	1,166.8	0.3
R	18,709	180	1,372	5.0	1,171.4	1,171.4	1,172.0	0.6
S	20,854	190	872	5.9	1,177.0	1,177.0	1,178.0	1.0
T	21,936	180	1,156	4.5	1,181.4	1,181.4	1,181.8	0.4
U	22,596	160	1,391	3.7	1,183.9	1,183.9	1,184.4	0.5
V	23,636	155	869	6.0	1,187.2	1,187.2	1,187.7	0.5
W	24,542	130	1,004	5.2	1,193.5	1,193.5	1,193.7	0.2
X	25,490	180	1,122	4.6	1,195.0	1,195.0	1,195.7	0.7
Y	27,026	125	804	6.4	1,201.5	1,201.5	1,202.1	0.6

[1] Feet above confluence with Wolf Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

West Branch Wolf Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
West Branch Wolf Creek (continued)								
Z	27,738 [1]	150	1,114	4.8	1,205.1	1,205.1	1,206.0	0.9
AA	28,462 [1]	160	1,293	4.1	1,211.4	1,211.4	1,211.5	0.1
AB	29,500 [1]	135	1,029	5.2	1,214.3	1,214.3	1,214.9	0.6
AC	30,628 [1]	75	712	7.5	1,220.7	1,220.7	1,220.8	0.1
AD	30,935 [1]	68	486	10.9	1,223.4	1,223.4	1,223.6	0.2
AE	31,435 [1]	385	3,060	1.7	1,225.9	1,225.9	1,226.0	0.1
West Branch Wolf Creek Tributary A								
A	553 [2]	64	262	6.6	1,127.9	1,127.9	1,128.4	0.5
B	1,184 [2]	37	165	10.5	1,129.2	1,129.2	1,129.3	0.1
C	2,005 [2]	42	139	10.7	1,138.1	1,138.1	1,138.1	0.0
D	2,397 [2]	43	237	6.3	1,141.2	1,141.2	1,141.5	0.3
E	3,331 [2]	31	141	8.1	1,145.9	1,145.9	1,146.6	0.7
F	4,224 [2]	54	256	4.5	1,152.1	1,152.1	1,152.3	0.2
G	4,950 [2]	21	95	12.1	1,160.6	1,160.6	1,160.7	0.1
H	6,085 [2]	43	119	9.6	1,171.3	1,171.3	1,171.3	0.0
I	7,007 [2]	49	136	4.6	1,177.7	1,177.7	1,178.1	0.4

[1] Feet above confluence with Wolf Creek

[2] Feet above confluence with West Branch Wolf Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

West Branch Wolf Creek - West Branch Wolf Creek Tributary A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
West Branch Wolf Creek Tributary B								
A	1,833	170	815	3.4	1,174.4	1,174.4	1,175.4	1.0
B	3,809	140	549	5.0	1,179.3	1,179.3	1,179.4	0.1
C	5,422	155	754	3.6	1,183.5	1,183.5	1,184.4	0.9
D	7,511	85	424	3.8	1,188.9	1,188.9	1,189.4	0.5
E	8,478	70	244	3.4	1,193.0	1,193.0	1,193.2	0.2
F	9,154	174	1,256	0.7	1,200.6	1,200.6	1,200.6	0.0
G	9,896	79	133	6.2	1,203.0	1,203.0	1,203.4	0.4
H	10,631	127	501	1.6	1,209.3	1,209.3	1,209.8	0.5
I	11,084	63	110	7.5	1,210.9	1,210.9	1,210.9	0.0
J	11,265	33	151	5.5	1,213.9	1,213.9	1,213.9	0.0
K	11,982	130	286	2.9	1,216.3	1,216.3	1,216.6	0.3
L	12,485	68	207	4.0	1,221.7	1,221.7	1,221.7	0.0
M	13,294	86	239	3.4	1,227.1	1,227.1	1,228.0	0.9
N	14,635	70	218	4.7	1,237.7	1,237.7	1,238.2	0.5
O	15,443	13	498	13.6	1,246.5	1,246.5	1,246.5	0.0
P	15,783	13	1,082	7.1	1,252.4	1,252.4	1,252.4	0.0
Q	16,477	100	1,449	0.7	1,260.7	1,260.7	1,261.7	1.0
R	17,280	120	896	1.1	1,260.7	1,260.7	1,261.7	1.0
S	18,143	80	254	4.0	1,264.9	1,264.9	1,265.7	0.8

[1] Feet above confluence with West Branch Wolf Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

West Branch Wolf Creek Tributary B

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
West Cache Creek								
A	0 [1]	827 [2]	8,980	5.0	1,229.5	1,229.5	1,230.5	1.0
B	1,140 [1]	823	8,598	4.2	1,232.4	1,232.4	1,233.4	1.0
C	2,190 [1]	955	8,193	4.4	1,234.6	1,234.6	1,235.5	0.9
D	2,820 [1]	591	5,927	6.1	1,236.6	1,236.6	1,237.5	0.9
E	3,257 [1]	365	5,289	6.8	1,238.2	1,238.2	1,239.2	1.0
F	3,877 [1]	458	5,669	6.4	1,240.9	1,240.9	1,241.7	0.8
G	4,927 [1]	800	9,379	3.8	1,243.9	1,243.9	1,244.7	0.8
H	6,427 [1]	541	5,490	6.6	1,246.6	1,246.6	1,247.5	0.9
I	7,037 [1]	696	7,388	4.9	1,249.2	1,249.2	1,250.1	0.9
J	7,647 [1]	257	3,984	9.1	1,251.1	1,251.1	1,251.9	0.8
K	8,099 [1]	553	10,264	3.5	1,256.1	1,256.1	1,257.1	1.0
L	8,439 [1]	635	9,991	3.6	1,256.3	1,256.3	1,257.3	1.0
M	8,779 [1]	700	9,797	3.7	1,256.6	1,256.6	1,257.6	1.0
Wolf Creek								
A	0 [3]	1,697	13,448	1.3	1,058.0	1,058.0	1,059.0	1.0
B	498 [3]	2,373	17,881	1.0	1,058.2	1,058.2	1,059.1	0.9
C	1,128 [3]	1,481	10,719	1.6	1,058.4	1,058.4	1,059.3	0.9
D	1,634 [3]	626	13,226	2.6	1,060.0	1,060.0	1,060.8	0.8
E	4,519 [3]	1,740	14,075	1.2	1,060.4	1,060.4	1,061.2	0.8
F	5,217 [3]	1,490	12,404	1.4	1,060.5	1,060.5	1,061.4	0.9
G	6,317 [3]	1,360	9,110	1.9	1,060.8	1,060.8	1,061.6	0.8
H	9,106 [3]	2,363	10,311	1.6	1,061.3	1,061.3	1,062.2	0.9
I	11,597 [3]	2,625	10,126	1.7	1,061.4	1,061.4	1,062.3	0.9
J	12,548 [3]	2,321	5,067	3.3	1,064.0	1,064.0	1,064.9	0.9
K	13,595 [3]	518	2,708	9.2	1,068.4	1,068.4	1,068.7	0.3

[1] Feet above confluence of Rock Creek

[2] Combined West Cache Creek/Rock Creek floodway

[3] Feet above Limit of Detailed Study

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

West Cache Creek - Wolf Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Wolf Creek (continued)								
L	14,678	1,120	7,671	2.0	1,071.2	1,071.2	1,071.9	0.7
M	16,291	960	4,644	3.3	1,073.4	1,073.4	1,073.7	0.3
N	17,300	766	2,489	6.2	1,074.8	1,074.8	1,075.4	0.6
O	18,103	680	3,959	3.9	1,077.0	1,077.0	1,077.7	0.7
P	18,912	820	3,640	4.3	1,078.1	1,078.1	1,078.9	0.8
Q	19,716	830	5,703	2.7	1,078.9	1,078.9	1,079.9	1.0
R	20,129	770	3,275	4.7	1,079.2	1,079.2	1,080.1	0.9
S	20,867	1,130	7,382	2.1	1,084.3	1,084.3	1,084.3	0.0
T	21,995	860	3,212	4.8	1,084.9	1,084.9	1,085.4	0.5
U	23,554	1,180	4,684	3.3	1,086.9	1,086.9	1,087.9	1.0
V	24,609	931	4,091	3.8	1,088.7	1,088.7	1,089.6	0.9
W	25,183	950	3,805	4.0	1,090.0	1,090.0	1,090.8	0.8
X	26,289	790	4,807	3.2	1,092.2	1,092.2	1,093.1	0.9
Y	27,529	460	2,483	6.2	1,093.2	1,093.2	1,094.1	0.9
Z	32,968	310	2,709	6.2	1,106.0	1,106.0	1,106.9	0.9
AA	33,498	650	5,191	3.2	1,108.2	1,108.2	1,108.8	0.6
AB	34,223	750	5,532	2.9	1,108.5	1,108.5	1,109.3	0.8
AC	35,090	350	2,933	5.7	1,109.0	1,109.0	1,109.9	0.9
AD	36,433	650	5,520	3.0	1,113.4	1,113.4	1,114.1	0.7

[1] Feet above Limit of Detailed Study

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Wolf Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Wratton Creek								
A	4,613 [1]	270	1,916	4.8	1,097.9	1,097.9	1,098.8	0.9
B	5,971 [1]	255	1,893	4.9	1,101.9	1,101.9	1,102.6	0.7
C	6,929 [1]	225	1,676	4.8	1,104.1	1,104.1	1,105.1	1.0
D	7,999 [1]	205	2,419	3.3	1,106.4	1,106.4	1,107.3	0.9
E	8,808 [1]	125	822	9.4	1,109.6	1,109.6	1,110.2	0.6
F	9,589 [1]	127	1,098	7.0	1,115.1	1,115.1	1,115.5	0.4
G	10,098 [1]	182	2,171	3.5	1,117.2	1,117.2	1,117.8	0.6
H	10,604 [1]	140	1,238	5.6	1,117.6	1,117.6	1,118.2	0.6
I	11,199 [1]	200	1,819	3.8	1,120.1	1,120.1	1,120.4	0.3
J	11,856 [1]	120	1,234	5.6	1,121.4	1,121.4	1,121.6	0.2
K	12,529 [1]	120	1,185	5.6	1,123.5	1,123.5	1,123.5	0.0
Wratton Creek Tributary								
A	595 [2]	135	680	2.2	1,103.7	1,103.7	1,104.6	0.9
B	1474 [2]	35	218	6.8	1,106.8	1,106.8	1,106.9	0.1
C	1832 [2]	40	354	4.2	1,109.6	1,109.6	1,109.6	0.0
D	2404 [2]	94	519	2.8	1,111.8	1,111.8	1,112.0	0.2
E	3090 [2]	68	345	4.3	1,116.8	1,116.8	1,116.8	0.0
F	5091 [2]	150	391	1.3	1,125.6	1,125.6	1,126.5	0.9
G	6172 [2]	60	190	2.7	1,129.4	1,129.4	1,129.9	0.5
H	6771 [2]	95	178	2.9	1,131.9	1,131.9	1,132.0	0.1
I	7661 [2]	55	76	6.7	1,142.8	1,142.8	1,143.1	0.3

[1] Feet above confluence with East Cache Creek

[2] Feet above confluence with Wratton Creek

TABLE 6

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OK
AND INCORPORATED AREAS

FLOODWAY DATA

Wratton Creek - Wratton Creek Tributary

5.0 INSURANCE APPLICATION

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

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

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

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

6.0 FLOOD INSURANCE RATE MAP

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

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

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

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

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FIRM EFFECTIVE DATE	FIRM REVISION DATE(S)
Cache, Town of	May 17, 1974	July 30, 1976	March 18, 1987	February 19, 1992
Chattanooga, Town of	February 19, 1992	None	February 19, 1992	None
Elgin, Town of	February 19, 1992	None	February 19, 1992	None
Faxon, Town of	February 19, 1992	None	February 19, 1992	None
Fletcher, Town of	February 19, 1992	None	February 19, 1992	None
Geronimo, Town of	February 19, 1992	None	February 19, 1992	None
Indiahoma, Town of	February 19, 1992	None	February 19, 1992	None
Lawton, City of	August 9, 1974	None	December 1, 1978	February 19, 1992 November 2, 1995
Medicine Park, Town of	July 20, 2009	None	July 20, 2009	None
Sterling, Town of	January 10, 1975	None	February 19, 1992	None
Unincorporated Areas, Comanche County	June 10, 1975	None	February 19, 1992	November 2, 1995

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY
COMANCHE COUNTY, OKLAHOMA AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

FISs have been prepared for Caddo County and Incorporated Areas, the unincorporated areas of Grady County, Stephens County and Incorporated Areas, and Cotton County and Incorporated Areas (References 35, 36, 37, and 38).

Because it is based on more up-to-date and detailed analyses, this study supersedes the previously printed FISs for the Town of Cache and the City of Lawton, and the Flood Hazard Boundary Map for the unincorporated areas of Comanche County (References 10, 12 and 34).

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

8.0 LOCATION OF DATA

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

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