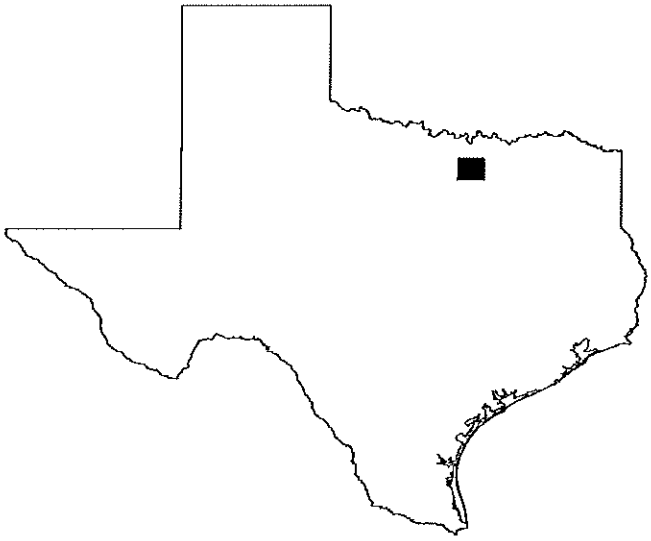
FLOOD INSURANCE STUDY

VOLUME 1 OF 4

DENTON COUNTY, TEXAS
AND INCORPORATED AREAS



COMMUNITY NAME	COMMUNITY NUMBER
ARGYLE, TOWN OF	480775
AUBREY, CITY OF	480776
BARTONVILLE, TOWN OF	481501
CARROLLTON, CITY OF	480167
CELINA, CITY OF	480133
COPPELL, CITY OF	480170
COPPER CANYON, TOWN OF	481508
CORINTH, CITY OF	481143
CORRAL CITY, TOWN OF	480244
CROSS ROADS, TOWN OF	481513
DALLAS, CITY OF	480171
DENTON, CITY OF	480194
DENTON COUNTY, UNINCORPORATED AREAS	480774
DISH, TOWN OF	480229
DOUBLE OAK, TOWN OF	481516
FLOWER MOUND, TOWN OF	480777
FORT WORTH, CITY OF	480596
FRISCO, CITY OF	480134
GRAPEVINE, CITY OF	480598
HACKBERRY, CITY OF	481607
*HASLET, CITY OF	480600
HEBRON, TOWN OF	481495
HICKORY CREEK, TOWN OF	481150
HIGHLAND VILLAGE, CITY OF	481105
JUSTIN, CITY OF	480778
*KRUGERVILLE, CITY OF	481661
KRUM, CITY OF	480779
LAKE DALLAS, CITY OF	480780
LAKEWOOD VILLAGE, TOWN OF	481663
LEWISVILLE, CITY OF	480195
*LINCOLN PARK, TOWN OF	480781
LITTLE ELM, TOWN OF	481152
NORTHLAKE, TOWN OF	480782
OAK POINT, CITY OF	481639
PILOT POINT, CITY OF	480783
PLANO, CITY OF	480140
PONDER, TOWN OF	480784
PROSPER, TOWN OF	480141
ROANOKE, CITY OF	480785
SANGER, CITY OF	480786
SHADY SHORES, TOWN OF	481135
SOUTHLAKE, CITY OF	480612
THE COLONY, CITY OF	481581
TROPHY CLUB, TOWN OF	481606
WESTLAKE, TOWN OF	480614

*NON-FLOODPRONE COMMUNITIES

Revised Date: April 18, 2011

Federal Emergency Management Agency

Flood Insurance Study Number
48121CV001B

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: April 2, 1997

First Revised Countywide FIS Revision Date: March 30, 1998

Second Revised Countywide FIS Revision Date: August 23, 2001

Third Revised Countywide FIS Revision Date: December 6, 2002

Fourth Revised Countywide FIS Revision Date: April 18, 2011

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VOLUME 4

FLOOD INSURANCE STUDY
DENTON COUNTY, TEXAS AND INCORPORATED AREAS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Denton County, including the Cities of Aubrey, Carrollton, Celina, Coppell, Corinth, Dallas, Denton, Fort Worth, Frisco, Grapevine, Hackberry, Haslet, Highland Village, Justin, Krugerville, Krum, Lake Dallas, Lewisville, Oak Point, Pilot Point, Plano, Roanoke, Sanger, Southlake, and The Colony; the Towns of Argyle, Bartonville, Copper Canyon, Corral City, Cross Roads, DISH (formerly Clark), Double Oak, Flower Mound, Hebron, Hickory Creek, Lakewood Village, Lincoln Park, Little Elm, Northlake, Ponder, Prosper, Shady Shores, Trophy Club, and Westlake; and the unincorporated areas of Denton County (referred to collectively herein as Denton County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

Please note that the Cities of Carrollton, Celina, Coppell, Dallas, Fort Worth, Frisco, Grapevine, Haslet, Lewisville, Plano, and Southlake; and the Towns of Prosper and Westlake are geographically located in multiple counties. Portions of these communities may be located in Tarrant, Dallas and Collin Counties.

Please note that the Cities of Haslet, Krugerville and Town of Lincoln Park 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.

The hydrologic and hydraulic analyses for this study were performed by CF3R, JV for the Federal Emergency Management Agency (FEMA), under Contract No. EMT-2002-CO-0049, Task Order No. 014. This study was completed in October 2005 (Reference 1).

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

Unincorporated Areas

The hydrologic and hydraulic analyses in the original study were prepared by the U. S. Army Corps of Engineers (USACE), Fort Worth District, for FEMA, under Interagency Agreement No. EMW-E-0941, Project Order No.1, and Amendments thereto. That work was completed in September 1984. The hydrologic and hydraulic analyses for Dudley Branch were prepared by Raymond L. Goodson, Jr., Inc., and completed in December 1987. The hydrologic and hydraulic analyses for the Elm Fork Trinity River and Indian Creek were prepared by Albert H. Halff Associates, Inc. The work for the Elm Fork Trinity River was completed in July 1988. The work for Indian Creek was completed in July 1987. Revised hydrologic and hydraulic analyses for Timber Creek were prepared by Goodwin & Marshall, Inc. The work was completed in November 1989. Revised hydrologic and hydraulic analyses for Cottonwood Branch were prepared by Freese and Nichols, Inc./Rady and Associates, Inc., during the preparation of the FIS for the City of Frisco.

The restudy of Denton County, Unincorporated Areas (Revised June 2, 1994) was performed by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-90-E-3263, Project Order No. 3, Amendment No. 1. The restudy was completed in February 1992 and incorporated the results of detailed hydrologic and hydraulic analyses of Clear, Little Elm, Pecan, and Mustang Creeks and Doe Branch affecting the unincorporated areas of Denton County.

The Denton County FIS was revised again on March 30, 1998 to incorporate the results of revised hydrologic and hydraulic analyses of Clear, Duck, Milam, Elizabeth, and North Hickory Creeks affecting the unincorporated areas of Denton County and the Cities of Denton and Roanoke. This work was performed by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-94-E-4371, Project Order No. 4, and was completed in March 1996.

An analysis of the Elm Fork Trinity River and Isle Dubois Creek Watersheds was performed by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-92-E-3839, Project Order No. 3 as part of the Ray Roberts Lake Limited Map Maintenance Project and was incorporated in the second countywide FIS update.

Town of Argyle

The hydrologic and hydraulic analyses were prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-87-E-2509, Project Order No. 18. This work was completed in July 1988.

Town of Bartonville

For the original study, the hydrologic and hydraulic analyses were prepared by the USACE, Fort Worth District, for FEMA. This work was completed in December 1987. Revised hydrologic and hydraulic analyses for Whites Branch and Stream WB-1 were also prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-89-E-2994. This work was completed in May 1991.

City of Carrollton

The original hydrologic and hydraulic analyses for the flooding sources studied in detail were prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. IAA-H-7-76, Project Order No. 21, and Interagency Agreement No. IAA-H-10-77, Project Order No. 2. The original work was completed in November 1978.

In the November 16, 1983 revision, hydraulic data for portions of Stream 6D5 were prepared by Acrey, Roberts and Pierson, Inc., for FEMA, and completed in July 1981. Revised hydraulic data along portions of the Elm Fork Trinity River were prepared by Albert H. Halff Association, Inc., for FEMA and completed in November 1981. In the November 15, 1984 revision, hydraulic data for Furneaux Creek between Dickerson Parkway and Old Denton Road were prepared by Blum Consulting Engineers, for FEMA, and completed in February 1982. Revised hydraulic data for Furneaux Creek adjacent to the Carillon Hills North subdivision were prepared by Don A. Tipton, Inc., for FEMA, and completed in January 1984. Revised hydraulic data for Stream 6D3 from the upstream side of Wentwood Drive to Marsh Lane were prepared by Weir and Associates, Inc., for FEMA, and was completed in January 1984.

The January 2, 1991 revision includes updated hydrologic and hydraulic analyses for the Elm Fork Trinity River prepared by the USACE, Fort Worth District, under agreement with FEMA. That work was completed in September 1986. Analyses for the portion of the Elm Fork Trinity River, from a point approximately 2,900 feet downstream of the confluence with Furneaux Creek to a point approximately 700 feet downstream of the upstream corporate limits are also included. That work was completed in June 1990. That revision also included updated hydraulic analyses for Indian Creek, prepared by Albert H. Halff Associates, Inc., and completed in July 1987; Dudley Branch, prepared by Raymond L. Goodson, Jr. Inc., and completed in December 1987; Furneaux Creek prepared by PAWA-Winkelman and Associates, Inc., and completed in May 1988; and the Elm Fork Trinity River, prepared by Albert H. Halff Associates, Inc., and completed in July 1988.

In the June 4, 1996 revision, the hydrologic and hydraulic analyses for the Elm Fork Trinity River and Stream 6D5 were prepared by Kimley-Horn and Associates, Inc., and Powell & Powell. This work was completed in December 1990 and July 1991, respectively.

This countywide revision includes updated hydrologic and hydraulic analyses conducted by Halff Associates as part of the City of Carrollton Floodplain Update Study (References 2 and 3). The Floodplain Update Study included detailed study Flood Insurance Rate Map (FIRM) mapping of Indian Creek, Dudley Branch, Furneaux Creek and their tributaries through the City of Carrollton. This work was completed in August 2006.

City of Celina

The hydrologic and hydraulic analyses for the FIS dated May 1979 (FIRM dated November 1, 1979) were prepared by Freese and Nichols, Inc./Rady and Associates, Inc., for FEMA, under Contract No. H-4570. This work was completed in April 1978.

City of Coppell

The hydrologic and hydraulic analyses in the original study, effective August 7, 1980, were performed by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. IAA-H-7-76, Project Order No. 21 and Interagency Agreement No. IAA-H-10-77, Project Order No. 2. That work was completed in December 1978. Additional analysis for the February 15, 1984 revision was performed by Carter & Burgess, Inc., and Albert H. Halff Associates, Inc., in November 1981, and reflected information on Denton Creek and Cottonwood Branch. Levee improvements along the Elm Fork Trinity River, below Ledbetter Road, were incorporated at that time.

The hydrologic and hydraulic analyses for the October 16, 1991 revision were performed by the USACE, Fort Worth District, for the Elm Fork Trinity River. The work for these analyses was completed in October 1986. As a result of these analyses, the entire length of the Elm Fork Trinity River, and portions of Grapevine Creek and Denton Creek, both near their respective confluence with the Elm Fork Trinity River, were revised in the City of Coppell. Also, Cottonwood Branch downstream of Sandy Lake Road, was revised to incorporate an updated hydraulic analysis, performed by Weir & Associates, Inc., in February 1986. In addition, Denton Creek downstream of Denton Tap Road, was revised to incorporate an updated hydraulic analysis, performed by Dannenbaum Engineering Corporation in February 1985.

In the April 15, 1994 revision, updated hydraulic analyses for Elm Fork Trinity River, Denton Creek and Cottonwood Branch and new hydraulic analyses for Old Denton Creek were prepared by Kimley-Horn and Associates, Inc., and Morrison Hydrology/Engineering, Inc. This work was completed in August 1991. In the April 15, 1994 revision, additional updated hydraulic analyses were prepared for Denton Creek from the divergence of Old Denton Creek to the upstream corporate limits to reflect the completed Lake Park Addition. This work was prepared by Dan M. Dowdey & Associates and was completed in November 1991.

Town of Copper Canyon

The hydrologic and hydraulic analyses were prepared by the USACE, Fort Worth District, for FEMA during the preparation of the original FIS for the unincorporated areas of Denton County. The original Denton County study was completed in September 1984.

City of Corinth

The hydrologic and hydraulic analyses were prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EHW E-0941. This work was completed in February 1984.

Town of Cross Roads

The hydrologic and hydraulic analyses were performed by the USACE, Fort Worth District, for FEMA during the preparation of the original FIS for the unincorporated areas of Denton County. The original Denton County study was completed in September 1984.

City of Dallas

The hydrologic and hydraulic analyses for the original study were prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. IAA-H-7-76, Project Order No. 2, and Interagency Agreement No. IAA-H-10-77, Project Order No. 2, and amendments thereto. The work for the original study was completed in April 1980. The July 2, 1991 revision included updated hydrologic and hydraulic analyses for the Elm Fork Trinity River, prepared by the USACE, Fort Worth District, and completed in September 1986.

City of Denton

For the original study, the hydrologic and hydraulic analyses were prepared by the U.S. Geological Survey (USGS) for FEMA, under Interagency Agreement No. IAA-H-20-74, Project Order No. 16. The original work was completed in July 1977. An updated version, which revised the analyses for Pecan Creek and North Pecan Creek, was prepared by the Susquehanna River Basin Commission under agreement with FEMA. The work for that update was completed in March 1983.

Revised hydrologic and hydraulic analyses for all streams except the upstream portions of Stream PEC-l, Stream PEC-1A, and portions of Cooper Creek were prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-E-0941, Project Order No. 12, Amendment No. 3, which was completed in March 1985. The hydrologic and hydraulic analyses for the upstream portions of Stream PEC-1 and Stream PEC-1A were prepared by Espey, Huston, and Associates, Inc. and were completed in November 1985. The hydraulic analysis for the portion of Cooper Creek from approximately 3,050 feet downstream of Old North Road to approximately 1,800 feet upstream of Old North Road was prepared by Worrell & Associates, Inc. and was completed in February 1986.

The Denton County FIS was revised on March 30, 1998 to incorporate the results of revised hydrologic and hydraulic analyses of Clear, Duck, Milam, Elizabeth, and North Hickory Creeks affecting the unincorporated areas of Denton County and the Cities of Denton and Roanoke. This work was performed by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-94-E-4371, Project Order No. 4, and was completed in March 1996.

Town of Double Oak

The hydrologic and hydraulic analyses for the original study were prepared by the USACE, Fort Worth District, for FEMA during the preparation of the FIS for the Town of Flower Mound. The Flower Mound study was completed in March 1984. Revised hydrologic and hydraulic analyses for Timber Creek were prepared by Goodwin and Marshall, Inc. This work was completed in November 1989.

Town of Flower Mound

The hydrologic and hydraulic analyses were prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-E-0941, Project Order No. 12. This work was completed in March 1984.

City of Fort Worth

The hydrologic and hydraulic analyses form the study effective June 4, 1980 were performed by Lockwood, Andrews and Newnam, Inc., for FEMA, under Contract No. H-3730, and by the USACE, Fort Worth District. That work was completed in April 1976. The analyses for the revision dated November 18, 1988 were performed by the USACE, Fort Worth District, for FEMA under Inter-Agency Agreement No. EMW-E-0539, Project Order No. 7 and amendments thereto. That work was completed in April 1984.

City of Frisco

The hydrologic and hydraulic analyses for the FIS dated December 1979 (FIRM dated June 18, 1980) were prepared by Freese and Nichols, Inc./Rady and Associates, Inc., for FEMA, under Contract No. H-4570. This work was completed in June 1978.

City of Grapevine

The hydrologic and hydraulic analyses for the study effective August 15, 1989 were performed by the USACE for FEMA, under Inter-Agency Agreement No. IAA-H-9-79, Project Order No. 8. That work was completed in January 1981.

City of Haslet

The hydrologic and hydraulic analyses for the study effective October 15, 1985 were performed by the USACE for FEMA under Inter-Agency Agreement No. EMW-E-0941, Project Order No. 12. That work was completed in May 1984.

City of Highland Village

The hydrologic and hydraulic analyses were performed by the USACE, Fort Worth District, for FEMA during the preparation of the original FIS for the unincorporated areas of Denton County. The original Denton County study was completed in September 1984.

A restudy was performed to incorporate the results of revised hydrologic and hydraulic analysis of Copperas Branch, Hickory Creek Arm Tributary 1, and Hickory Creek Arm Tributary 2 in the Cities of Lewisville and Highland Village. This work was performed by the Natural Resources Conservation Service (NRCS) (formerly the SCS), for FEMA, under Interagency Agreement No. EMW-94-E-4758, Project Order No. 2, and was completed in September 1996.

City of Lake Dallas

The hydrologic and hydraulic analyses were prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-E-0941, Project Order No. 12. This work was completed in February 1984.

City of Lewisville

In the original study, the hydrologic and hydraulic analyses for the streams studied by detailed methods were prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-E-0941, Project Order No. 1, and Amendments thereto. That work was completed in October 1986.

Revised data were prepared by Morrison Hydrology/Engineering, Inc., for FEMA to reflect completed channelization projects on Fox Creek (Stream TC-1) and Prairie Creek, and updated topographic and hydraulic data for Copperas Branch. That work was completed in May 1992. Additional data for the revision were prepared by Graham Associates, Inc., to reflect completed channelization projects on Stream PC-2 and updated topographic and hydraulic data for Prairie Creek. That work was completed in May 1993. In addition, Morrison Hydrology/Engineering, Inc., prepared a study of flood hazards along Milestone Ridge Tributary. That work was completed in September 1991.

A restudy was performed to incorporate the results of revised hydrologic and hydraulic analysis of Copperas Branch, Hickory Creek Arm Tributary 1, and Hickory Creek Arm Tributary 2 in the Cities of Lewisville and Highland Village. This work was performed by the NRCS (formerly the SCS), for FEMA, under Interagency Agreement No. EMW-94-E-4758, Project Order No. 2, and was completed in September 1996.

Town of Little Elm

The hydrologic and hydraulic analyses were prepared by the USACE, Fort Worth District, for FEMA, during the preparation of the original FIS for the unincorporated areas of Denton County, Texas. The work for that study was completed in September 1984.

Town of Northlake

The hydrologic and hydraulic analyses were performed by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW 90-E-3263, Project Order No. 3, Amendment 1. This study was completed in February 1992.

City of Plano

The hydrologic and hydraulic analyses for the FIS dated January 2, 1980, were prepared by the USACE, Fort Worth District, for FEMA, under Inter-Agency Agreement No. IAA-H-7-76, Project Order No. 21, and Inter-Agency Agreement No. IAA-H-10-77, Project Order No. 2. In the revised FIS dated August 4, 1985, the revised hydrologic and hydraulic analyses for Prairie Creek were prepared by Albert H. Halff Associates, Inc. In the revised FIS dated August 19, 1987, the hydraulic analysis for Prairie Creek was prepared by Nathan D. Maier Consulting Engineers, Inc., for Worrell & Associates, Inc. and completed in March 1986. In the revised FIS dated December 19, 1997, the hydraulic analyses for Stream IC-1 and Stream IC-1A were prepared by the USACE, Fort Worth District, for FEMA under Inter-Agency Agreement EMW-85-E-1922 and completed in April 1997. The hydrologic and hydraulic analyses for Indian Creek were prepared by the USACE, Fort Worth District, during the preparation of the FIS for Denton County.

Town of Shady Shores

The original hydrologic and hydraulic analyses were prepared by Michael Baker Jr., Inc., for FEMA. An updated version was prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-E-0941, Project Order No. 12. The revised hydrologic and hydraulic analyses, performed by the USACE, were completed in January 1984.

City of Southlake

The hydrologic and hydraulic analyses for the study effective January 5, 1982 were performed by the USACE, Fort Worth District, for FEMA under Inter-Agency Agreement No. IAA-H-9-79, Project Order No. 8. That work was completed in February 1981.

City of The Colony

The hydrologic and hydraulic analyses for the original study were prepared by the USACE, Fort Worth District, for FEMA, under Interagency Agreement No. EMW-E-0941, Project Order No. 12. This work was completed in January 1984. The hydraulic analysis for Stream SC-1A was updated by Dannenbaum Engineering due to the channelization of the stream. This work was completed in May 1985.

Town of Trophy Club

The hydrologic and hydraulic analyses of Marshall Branch were prepared by the USACE, Fort Worth District, during the preparation of the original FIS for the unincorporated areas of Denton County, Texas, for FEMA. This work was completed in
September 1984. The hydrologic and hydraulic analyses for Indian Creek were prepared by Carter & Burgess, Inc., of Fort Worth, Texas. This work was completed in December 1984.

Town of Westlake

The hydrologic and hydraulic analyses for Marshall Branch were taken from the original FIS for the unincorporated areas of Denton County, Texas. The hydrologic and hydraulic analyses for Whites Branch and Stream WB-1 were taken from the previous FIS for the Town of Bartonville.

Base map information that was used for this study was provided in digital format by the North Central Texas Council of Governments. This information was digitized at a scale of at least 1:12,000 from aerial photography dated 2003.

1.3 Coordination

The following entities were contacted for information pertinent to the individual FISs: U.S. Department of Agriculture, Soil Conservation Service (SCS); USGS; Texas Department of Highways and Public Transportation; Texas Department of Water Resources; USACE; U.S. Coast and Geodetic Survey, Denton County, Texas and Incorporated Areas; and land developers, engineering firms, utilities, and private citizens.

During the preparation of the initial FISs for the individual communities, FEMA representatives held coordination meetings with community officials, representatives of the study contractors for each study, and other interested agencies and citizens. The meetings, referred to as the initial, intermediate, and final CCO meetings, were held at specified intervals during the preparation of the studies. The results of the study were reviewed at the final CCO meeting held on July 19, 2007, and attended by representatives of FEMA, Halff Associates, Inc., Michael Baker, Inc., Denton County, and incorporated 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 Denton County, Texas, including the incorporated communities listed in Section 1.1. The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction through June 30, 2006. The streams that were studied by detailed methods are listed in Table 1.

In addition, Lewisville Lake, Ray Roberts Lake, Grapevine Lake, SCS Reservoir No. 16, and SCS Reservoir No. 17A were studied in detail.

The following shallow flooding areas within the City of Denton were studied in detail: between University Drive East and Foxcroft Road, downstream of Silver Dome Road, and between Emery Street and Bonnie Brae Street.

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 individual communities. Streams listed in Table 1 have portions which were studied by detailed methods as well as portions that were studied using approximate methods. The streams or portions of streams studied solely by approximate methods are listed in Table 2. Several unnamed streams through the Cities of Corinth, Denton, Highland Village, Lake Dallas, Lewisville, and The Colony, and the Towns of Argyle, Bartonville, Copper Canyon, Double Oak, Flower Mound, Little Elm, Shady Shores, Trophy Club, and Westlake were also studied by approximate methods.

Table 1. Streams Studied by Detailed Methods

Bakers Branch
Bryant Branch
Clear Creek
Cooper Creek
Copperas Branch
Cottonwood Branch
Culp Branch
Denton Creek (Above Grapevine Lake)
Denton Creek (Below Grapevine Lake)
Doe Branch
Dry Fork Hickory Creek
Duck Creek
Dudley Branch
Elizabeth Creek
Elm Fork Trinity River (Above Lewisville Lake)
Elm Fork Trinity River (Below Lewisville Lake)
Elm Fork Trinity River West Split Flow Area
Fincher Branch
Fletcher Branch
Fox Creek (Stream TC - 1)
Furneaux Creek
Golf Course Creek
Graveyard Branch
Griffiths Creek
Harriet Creek
Hickory Creek
Hickory Creek Arm
Indian Creek
Indian Creek (At Grapevine Lake)
Indian Creek Levee Channel
Lake Lewisville Spillway
Little Elm Creek
Loving Branch
Lynchburg Creek
Marshall Branch
McKamy Creek
McWhorter Creek
Milam Creek
Milestone Ridge Tributary
Mustang Creek
North Hickory Creek
North Pecan Creek
Office Creek
Pecan Creek (Above Little Elm Creek)
Pecan Creek (Above SCS Dam No. 16)
Pecan Creek (Below SCS Dam No. 16)
Poindexter Branch
Prairie Creek
Sharps Branch
Stewart Creek
Stream 6D3
Stream 6E1
Stream 6E2
Stream 6E5
Stream 6F1
Stream 6I7
Stream CC-1
Stream CC-2
Stream DF-1
Stream DF-2
Stream DF-3
Stream FB-1
Stream GS-1
Stream HC-1
Stream IC-1
Stream IC-1A
Stream LC-1
Stream PC-1
Stream PC-2
Stream PC-3
Stream PEC-1
Stream PEC-1A
Stream PEC-2
Stream PEC-3
Stream PEC-4
Stream PEC-5
Stream SB-1
Stream SC-1
Stream SC-1A
Stream TC-2
Stream TC-2A
Stream WB-1
Stream WC-2
Stream WC-4
Stream WC-5
Summit Channel
Swisher Creek
Timber Creek
Timber Creek Relief Channel
Tributary GB-2
Veal Springs Branch
Whites Branch
Wichita Creek

Table 2. Streams Studied by Approximate Methods

Aubrey Branch	Jordan Creek
Bray Branch	Midway Branch
Buck Creek	Mill Branch
Burns Branch	Moores Branch
Cade Branch	Morris Branch
Cannon Creek	Oliver Creek
Cantrell Slough	Panther Creek
Catherine Branch	Pond Creek
Cleveland Branch	Ranger Branch
Crow Branch	Roark Branch
East Griffiths Creek	Running Branch
Flat Creek	South Hickory Creek
Graham Branch	Trail Creek
Grasshopper Creek	Whites Creek
Henrietta Creek	Wolf Branch
Hog Branch	

As part of this countywide FIS, updated detailed studies were included for the flooding sources shown in Table 3, "Scope of Revision".

Table 3. Scope of Revision

Stream	Limits of Revised or New Detailed Study
Cooper Creek	From downstream of Pond #1 to Trinity Road
Dudley Branch	From 320 feet upstream of Josey Lane to the confluence with the Elm Fork Trinity River
Fletcher Branch	From Hobson Lane to confluence with Hickory Creek
Furneaux Creek	From Hebron Parkway to the confluence with the Elm Fork Trinity River
Indian Creek	From 5,100 feet upstream of Old Denton Road to the confluence with the Elm Fork Trinity River
Indian Creek Levee Channel	From State Highway 121 to the confluence with Indian Creek
Stream CC-2	From Sherman Drive to confluence with Cooper Creek
Stream 6D3	From 30 feet downstream of Marsh Lane to Denton County boundary
Stream 6E1	From 1,560 feet upstream of BNSF Railroad to the confluence with Furneaux Creek
Stream 6F1	From Rosemeade Parkway to the confluence with Dudley Branch
Stream 6I7	From Creek Valley Boulevard to the confluence with Indian Creek Levee Channel
Timber Creek	From 1,500 feet upstream of Skillern Lusk Road to confluence with Elm Fork Trinity River
Incorporation of Existing Studies - Enhanced Approximate Methods Type I Streams	
Furneaux Creek	From KCS Railroad to Hebron Parkway
Stream 6E2	From BNSF Railroad to the confluence with Stream 6E1
Stream 6E5	From 580 feet downstream of Marsh Ridge Lane to the confluence with Furneaux Creek

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

Table 4, "Stream Name Changes" lists those streams whose name has changed or differs from that published in the previous FIS for Denton County or any of the communities within.

Table 4 - Stream Name Changes

Community	Old Name	New Name
City of Southlake, Town of Trophy Club	Indian Creek	Indian Creek (At Grapevine Lake)
Cities of Carrollton, Lewisville, The Colony and Plano	Indian Creek (At Grapevine Lake)	Indian Creek
City of Carrollton	Levee Channel to Indian Creek	Indian Creek Levee Channel
City of Carrollton	Unnamed Channel to Levee Channel to Indian Creek	Stream 6I7

2.2 Community Description

Denton County is located in the north-central portion of Texas. It is bordered by Cooke and Grayson Counties to the north, Collin County to the east, Tarrant and Dallas Counties to the south, and Wise County to the west. The population of Denton County increased from 75,633 in 1970 to 143,126 in 1980 and 432,976 in 2000 (References 4, 5 and 6). These figures include all the incorporated areas in the county. The unincorporated areas of the county are relatively undeveloped; however, the southern half is being rapidly developed.

The Town of Argyle was established on November 7, 1881, as described in a warranty deed dated October 17, 1881. The Texas and Pacific Railroad was instrumental in bringing settlers to the area, most of who were self-sustaining farmers until the latter part of the 1800s, when the automobile presented business opportunities that drew the population away from the city (References 7 and 8). The 1980 population of the Town of Argyle was 1,111 (References 4 and 9). By 2000, Argyle's population had grown to 2,365 with an area of 11.1 square miles (Reference 6).

The total land area contained within the corporate limits of the City of Corinth is 7.9 square miles. According to the U.S. Department of Commerce, Bureau of the Census, the population of the city was 1,264 in 1980 and 11,325 in 2000 (References 4, 5 and 6).

The City of Denton, the county seat, located in the center of Denton County, has an incorporated area of approximately 62 square miles. It is also a civil defense center. The following products are produced in the city: food, clothes, bricks, trucks, oil tools, heating equipment, and oil equipment. According to the U.S. Census Bureau, the population of Denton grew 21 percent between 1970 and 1980, from 39,874 to 48,063. Within the past 20 years from 1980 to 2000, the city's population increased by 68 percent to 80,537. During the same period, Denton's incorporated area increased by 72 percent from 36 square miles in 1980 to 62 square miles in 2000 (References 4, 6, and 10).

According to the U.S. Census Bureau, the population of the Town of Flower Mound was 1,685 in 1970, 4,402 in 1980 and 50,702 in 2000 (References 4, 5 and 6). The total land area contained within the corporate limits of the town was 30.1 square miles in 1980 and 40.9 square miles in 2000 (Reference 6). Flower Mound's expansion can be attributed to the growth of the area north of the Dallas-Fort Worth Airport.

The total land area contained within the corporate limits of the City of Lake Dallas increased from approximately 1.8 square miles in 1980 to 2.3 square miles in 2000. According to the U.S. Census Bureau, the population of Lake Dallas was 3,177 in 1980 and 6,166 in 2000 (References 4, 5 and 6).

Incorporated in 1925, the City of Lewisville had a population of 873 by 1940 (Reference 7). The population increased to 3,956 in 1960 and 9,264 in 1970. By 1980, the population increased to 24,273 (References 4 and 9). The city was founded by John and Augustus G. King, who in 1844 were the first settlers. Lewisville was first called Holford Prairie Settlement for John and James Holford, who came from Platte County, Missouri, in the fall of 1844. By 1855, Basdeal W. Lewis had bought the Holford land and several other blocks. Deed records show the town was laid out and called Lewisville as early as 1855. Andrew Jackson Pouts built and conducted the first school. The first church, called Holford Prairie Hall was used by all denominations; it also housed the first Masonic lodge of the county, whose charter was granted in 1857. In 1881, the Dallas and Wichita Railway reached the town and since that time, Lewisville has experienced a steady growth as a trading center, reporting 140 businesses in 1970 (Reference 7). With the opening of the Dallas-Fort Worth International Airport in 1974, Lewisville experienced rapid growth in the area north of the airport. 2000 Census figures indicate the city's population has grown to 77,737 with a land area of 36.8 square miles (Reference 6).

According to U.S. Census Bureau figures, the population of the Town of Shady Shores was 813 in 1980 (References 4 and 5) with approximately 2.6 square miles of land area contained within the corporate limits. By 2000, the population had increased to 1,461 within a land area of 2.9 square miles (Reference 6). Lewisville Lake is on the east side of the community.

According to U.S. Census Bureau figures, the population of the City of The Colony grew from 11,586 in 1980 to 26,531 in 2000 (References 4, 5 and 6). The land area contained within the corporate limits of The Colony likewise increased from 6.7 square miles in 1980 to 13.7 square miles in 2000 (Reference 6).

Climatological data available from the Denton 2SE weather station at the City of Denton are considered indicative of conditions prevailing in county. The average annual rainfall for Denton County is 37.79 inches for the 30-year period from 1971 through 2000. The maximum daily rainfall recorded for this station from 1913 through 2001 occurred on May 12, 1982 with 7.3 inches of rain recorded. The maximum and minimum annual rainfall occurring during this period were 57.17 inches in 1973 and 15.11 inches in 1963, respectively. The average annual temperature reported for the Denton 2SE station for the same 30-year period is 63.9 degrees Fahrenheit (Reference 11).

The county is drained by the Elm Fork Trinity River and its tributaries. The Elm Fork Trinity River originates in Montague County, flows west into Cooke County, then turns south at Gainesville and continues south through Denton County and into Dallas County where it joins the West Fork Trinity River. The drainage area of the river is 354 square miles at the Cooke County boundary and increases to 1,728 square miles at the Dallas County boundary.

Bakers Branch flows southeast through Denton County, Lewisville, and the southeastern part of Flower Mound. It is approximately 4 miles long and has a drainage area of 2.8 square miles.

Bryant Branch flows through Denton County, the City of Denton, and in the southwestern portion of Corinth. It is approximately 3.9 miles long, with approximately 1.4 miles within the corporate limits of Corinth. The drainage area of Bryant Branch is approximately 2.4 square miles.

Denton Creek flows west through Coppell, Lewisville, Flower Mound, Northlake, and the unincorporated areas of Denton County. It is approximately 17 miles in length, with a drainage area of over 70 square miles.

Dudley Branch flows southwest through Carrollton, Hebron, and the unincorporated areas of Denton County, Texas, to its confluence with the Elm Fork Trinity River.

Furneaux Creek and its tributaries flow southwest through Carrollton, to their confluence with the Elm Fork Trinity River in Denton County.

Griffiths Creek flows north to south into Veal Springs Branch in the south-central section of Corinth. It is approximately 0.7 mile long, with a drainage area of approximately 0.8 square mile.

Indian Creek flows southwest from the City of Plano in Dallas County, through Carrollton, Hebron, and parts of Denton County to its confluence with the Elm Fork Trinity River.

Loving Branch has a drainage area of 1.73 square miles at State Route 407. Most of the area drained by Loving Branch is undeveloped and consists mainly of rural housing.

Lynchburg Creek, which flows from west to east through Corinth and Shady Shores, and into Lewisville Lake, has a drainage area of approximately 3.7 square miles.

Office Creek flows from east to west into Lewisville Lake in the southwest portion of The Colony. It is approximately 2.4 stream miles long and has a drainage area of approximately 2.6 square miles.

Sharps Branch flows south into Grapevine Lake in the western portion of Flower Mound. It has a length of approximately 4.5 miles, of which 2.8 miles are within the town. The drainage area of Sharps Branch is approximately 5 square miles.

Stream LC-1 flows southeast through the Town of Shady Shores into Lynchburg Creek. The portion of this creek that is in the town is approximately 1.8 stream miles long. This stream has a drainage area of approximately 1.3 square miles.

Stream PEC-1 flows from west to east into Pecan Creek. It is approximately 4.1 miles long, with a drainage area of approximately 4.1 square miles.

Stream SB-1 flows south into Sharps Branch in the western portion of Flower Mound. It is approximately 1.7 miles long and has a drainage area of approximately 1.2 square miles.

Stream SC-1 flows through the northern portion of The Colony. This stream is approximately 2.8 stream miles long and has a drainage area of approximately 2.5 square miles.

Stream SC-1A flows through the northern portion of The Colony into Stream SC-1. It is approximately 2.8 stream miles long and has a drainage area of approximately 1.2 square miles.

Stream SC-2 flows from south to north in the northeast portion of The Colony. It is approximately 5.7 stream miles long, but only approximately 1.1 stream miles are within the corporate limits. Stream SC-2 has a drainage area of approximately 5.7 square miles.

Stream TC-2 flows east into Timber Creek in the central portion of Flower Mound. It is approximately 4.1 miles long, with a drainage area of approximately 3.3 square miles.

Swisher Creek flows through Corinth and Lake Dallas from west to east into Lewisville Lake. It is approximately 2.6 miles long, and its total drainage area is approximately 1.1 square miles.

Timber Creek flows east through Flower Mound, Double Oak, Lewisville and parts of Denton County. The stream is approximately 16.7 miles long, with a drainage area of more than 21 square miles.

Veal Springs Branch flows from north to south in the south-central portion of Corinth. It is approximately 2.3 miles long, with a drainage area of approximately 1.4 square miles.

Whites Branch, a left bank tributary of Denton Creek, lies within the Trinity River Basin in south-central Denton County, about 11 miles south-southwest of the City of Denton. The drainage area analyzed is 5.38 square miles in extent, with a length of about 3 miles and an average width of about 2 miles. Elevations within the watershed vary from about 750 feet at the headwaters to about 570 feet at the downstream study limits.

2.3 Principal Flood Problems

Generally, major floods experienced in the vicinity are produced by heavy rainfall from frontal storms that occur in the spring and summer. Major flooding may be produced by the intense rainfall usually associated with localized thunderstorms. These thunderstorms can occur at any time of the year but are more prevalent in the spring and summer.

Several gaging stations located in or near Denton County were used in the original study. Two USGS stream gaging stations are located on the Elm Fork Trinity River above the Dallas County boundary. One is located near Sanger (Gage number 08050500) and has a drainage area of 381 square miles with a period of record from 1949 to 1985. The other is located near Lewisville (Gage number 08053000) and has a drainage area of 1,673 square miles and a period of record from 1949 to the present.

Three stream gaging stations are located on tributaries draining into the Elm Fork Trinity River. These include Isle Dubois near Pilot Point (Gage number 08051000), with a drainage area of 266 square miles and a period of record from 1949 to 1985; Clear Creek near Sanger (Gage number 08051500), with a drainage area of 295 square miles and a period of record from 1949 to the present; and Little Elm Creek near Aubrey (Gage number 08052700), with

a drainage area of 75.5 square miles and a period of record from 1956 to the present. A USGS stream gage is also located on Denton Creek (near Justin, Texas, on the downstream side of FM 156).

The gaging station on the Elm Fork Trinity River near Lewisville at State Route 121, approximately 1 mile downstream of Lewisville Lake, is used for measuring the outflows from the lake. The maximum gage height of 465.47 feet was established in 1908. On September 15, 1950, a gage height of 463.14 feet was observed with a discharge of 21,700 cubic feet per second (cfs). Since construction of Lewisville Lake in November 1954, the maximum discharge was produced for the Lewisville Lake emergency spillway at State Route 121. High-water elevations of 464.9 feet at the left relief bridge and 460.3 feet at the main Elm Fork Trinity River Channel bridge were observed.

The maximum flood of record on the Elm Fork Trinity River near Carrollton occurred in May 1908, prior to the construction of the upstream reservoirs. The flood had an estimated discharge of 145,000 cfs. The second largest flood occurred in April 1942 and had a discharge of 90,700 cfs. The existing upstream reservoirs would have reduced the 1908 and 1942 floods to 26,000 cfs and 24,100 cfs, respectively, based on reservoir regulation studies. In September 1964, a flow of 33,000 cfs was experienced at the Carrollton gage. This flow was generated entirely from the uncontrolled area and approached the magnitude of the 1-percent-annual-chance flood in the Carrollton area (Reference 12).

Other major floods occurred in Denton County in 1957, 1962, and 1974. The 1957 flood inundated the entire Hickory Creek floodplain, resulting in extremely severe damage to county roads, State and Federal highways, bridges, and fences (Reference 13). It also caused derailed trains, flooded homes, stalled cars, and numerous street closings. That flood resulted from rainfall ranging from 3 to 10 inches. A rainfall of 10 inches in 24 hours is in excess of the 1-percent-annual-chance recurrence intervals for Denton County (Reference 14). High water up to 18 inches was reported in stores on Locust Street and up to 14 inches in a house on Maryhill Road (Reference 15).

Timber Creek flooded in the vicinity of the Towns of Double Oak and Flower Mound on October 13, 1981, but the extent of the damage is not known. No other information concerning flooding within these communities is available.

Officials in the City of Lake Dallas stated there was some minor flooding in low areas in 1981 and 1982. These areas were not studied because flooding was localized and associated with very small drainage areas.

No formal documented history of flooding within the Town of Shady Shores was found; however, some minor localized flooding has been reported along Stream LC-1 above Shady Shores Road. Portions of the town would be inundated from large floods.

The Denton Creek Watershed is rural in nature with only limited development within the floodplain. As such, there is very little flood history in terms of actual damage to private, commercial, or public properties. However, the USGS streamflow records are quite helpful in identifying these types of events.

In the case of Denton Creek at its gage site near Justin, the flood of October 13, 1981 (34,700 cfs at gage height 18.68 feet), was exceeded by the flood of May 1935 (gage height 20.6 feet, which was probably exceeded by the flood of May 1908 (gage height 21.6 feet). The results of this study indicate that the 1981 event on Denton Creek was about a 25-year event.

In the case of Clear Creek at its gage site near Sanger, the flood of October 13, 1961 (104,000 cfs at gage height 35.7 feet), exceeds the flood of May 1935 (gage height 34.0 feet), but was probably exceeded by the flood of May 1908 (gage height 36.5 feet). The results of this study indicate that the 1981 event on Clear Creek was approximately a 150-year flood. In the case of Little Elm Creek at its gage site near Aubrey, the floods of May 1982 (18,300 cfs at gage height 17.8 feet) and May 1941 (gage height 18.2 feet) are the largest since approximately 1900. The results of this study indicate that the 1982 event was approximately a 50-year flood.

Severe floods causing extensive damages within the Town of Trophy Club occurred in 1908, 1942, 1957, 1962, 1964, 1974, October 1981, and May 1982.

Major flooding experienced in the vicinity of the City of Highland Village is produced by heavy rainfall from frontal storms that occur in the spring and summer. Major flooding can be produced by the intense rainfall associated with localized thunderstorms prevalent in the spring and summer. The City of Highland Village has a policy of restricting development within floodprone areas. Lewisville Lake controls the runoff from 1,660 square miles of drainage area. The lake has a total storage capacity of 981,800 acre-feet, including 555,000 acre-feet of conservation storage at an elevation of 522 feet (Reference 16).

2.4 Flood Protection Measures

Manmade reservoirs have significantly altered floodflows in the area. These reservoirs include Lewisville Lake, Ray Roberts Lake, and Grapevine Lake. The amounts of flood storage for the lakes are 325,700 acre-feet, 260,800 acre-feet, and 243,500 acre-feet, respectively.

The Elm Fork Trinity River is controlled by Lewisville Lake at River Mile 30 in the southern half of the county. Ray Roberts Lake is located at River Mile 60 at the far northern portion of the county. Ray Roberts Lake provides flood control on the Elm Fork Trinity River for 692 square miles of drainage area emptying into the northern portion of Denton County, and it raises the conservation pool at Lewisville Lake from 515 feet to 522 feet. Some flood control storage has been reallocated from Lewisville Lake to Ray Roberts Lake.

Lewisville Lake incorporates former Lake Dallas and controls the runoff from 1,660 square miles of drainage area. The main structure, consisting of an earthfill embankment and an emergency uncontrolled concrete spillway, is approximately 6.2 miles long with a maximum height of 125 feet above the streambed. The lake has a total storage capacity of 981,800 acre-feet including 436,000 acre-feet of conservation storage at an elevation of 515.0 feet. The flood control outlet consists of a circular conduit 16 feet in diameter with three 6.5-foot by 13-foot regulating gates (Reference17).

Portions of the Elm Fork Trinity River and Indian Creek floodplains within the City of Carrollton are protected from the 1-percent-annual-chance flood by a levee system constructed by the Denton County Reclamation and Road District. This levee system meets

FEMA requirements that specify all levees must have a minimum of 3-foot freeboard against 1-percent-annual-chance flooding to be considered a safe flood protection structure. This levee was recertified by Halff Associates, Inc. in November 2006.

Portions of the Elm Fork Trinity River and Denton Creek floodplains within the City of Lewisville are protected from the 1-percent-annual-chance flood by a levee system. This levee system meets FEMA's requirements in 44 CFR 65.10, and was recertified by Carter & Burgess, Inc. in January 2007.

Stock Tank Dam and Channel Dam WB-1 are located in the Bartonville study area of Whites Branch.

Sharon Lake Dam and several unnamed dams are located within the corporate limits of Corinth. Sharon Lake Dam provides a minimal amount of flood protection.

The central portions of Pecan Creek below SCS Dam No. 16 and North Pecan Creek flow through the heavily developed central business district of the City of Denton. The channels of both streams have been straightened and lined with concrete. One portion of Pecan Creek below SCS Dam No. 16 has been channeled through an underground pipe for approximately 1,300 feet, emerging approximately 1,000 feet above the confluence of North Pecan Creek. During extreme floods, the underground portion of the stream will be overtopped, and the excess floodwaters will flow along Parkway Street until they rejoin the merging underground flow. A 1,200-foot section of North Pecan Creek is channeled under a shopping center beginning a short distance south of University Drive and extending upstream to a point south of Hinkle Drive.

The SCS has constructed floodwater retarding structures on the upper portions of both Pecan Creek below SCS Dam No. 16 and North Pecan Creek (Reference 13). These structures will contain all but the 0.2-percent-annual-chance flood, with only the flow through the principal spillway passing the site. However, these two creeks flow through the City of Denton and the additional runoff added to the channel flow of the principal spillway causes overbank flooding.

Cooper Creek has been improved between Stuart Road and the confluence of a small tributary upstream from Stuart Road in the City of Denton. A new bridge has been built over Cooper Creek for Loop 288.

Stream CC-2 has been cleaned and straightened throughout the City of Denton.

The SCS has established 87 floodwater retarding structures and 12 sediment control structures within the Denton Creek Watershed. These types of floodwater retarding structures have the capability to severely attenuate flood discharge peaks from totally isolated rainfall events, but tend to become less effective during extended "wet" periods, or in the case of two rainstorm events occurring close enough together in time to prevent the evacuation of a significant portion of the flood control pool from the SCS reservoirs prior to the second event.

The Town of Argyle entered the Emergency Phase of the NFIP in November 1980. Floodplain management is regulated by ordinance.

The City of Lewisville entered into the Emergency Phase of the NFIP in January 1975. Floodplains are regulated by ordinances. Channelization projects have been completed on Timber Creek, beginning just upstream of the downstream crossing of Interstate Route 35 East to just downstream of Corporate Drive; Prairie Creek, from Valley Parkway to Kirkpatrick Lane; and Fox Creek (Stream TC-1), from Bellaire Boulevard to Fox Avenue.

Nonstructural measures of flood protection are also being implemented throughout the county. These exist in the form of land-use regulations and ordinances to aid in the prevention of future flood damage.

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 community. Unless otherwise noted the rainfall-frequency data were obtained from National Weather Service Technical Paper No. 40, "Rainfall Frequency Atlas of the United States" (Reference 14) and rainfall for the 500-year-frequency event was determined by straight-line extrapolations on a semi-logarithmic graph of rainfall amounts for frequencies up to 100 years.

Initial Countywide and Previous Studies

Hickory Creek Arm Tributary 1: Discharge- frequency flows were originally computed using a detailed synthetic unit hydrograph HEC-HMS model with subareas and puls routing. Rainfall depths for the 10-, 2-, and 1- percent-annual-chance storms were developed using data from USGS Water Resources Investigations Report 98-4044. Rainfall for the 0.2-percent-annual-chance storm was computed by extrapolation of data from the previously referenced source. Hydrologic analyses were carried out to establish the peak discharge-frequency relationship for the flooding sources studied. The peak discharges were determined by routing various storm frequencies with a 24-hour rainfall duration, Type II distribution, using NRCS Technical Release No. 20, "Computer Program, Project Formulation, Hydrology" (Reference 18).

Elm Fork Trinity River (above Lewisville Lake) downstream of Clear Creek: Discharge-frequency flows were computed using an analytical frequency analysis for the Clear Creek gage near Sanger (295 square miles, period of record 1966-1982). The gage flows were multiplied by the square root of the drainage area ratio (drainage area ratio includes the 35 square miles between Ray Roberts and Clear Creek) to determine the discharge frequencies.

Elm Fork Trinity River (above Lewisville Lake) upstream of Clear Creek: Discharge-frequency flows were computed using a detailed synthetic unit hydrograph model with subareas and puls routing. This method was used because Ray Roberts Dam has a spillway that will not be overtopped by the 0.2-percent-annual-chance flood. Rainfall depths for the 10-, 2-, and 1- percent-annual-chance storms were developed using data from TP-40 and Technical Memorandum National Weather Service (NWS) Hydro-35 (References 14 and 19). Rainfall for the 0.2-percent-annual-chance storm was computed by extrapolation of data from the previously referenced sources. The routing of the flood hydrographs through each subbasin upstream of Clear Creek was accomplished using reservoir (modified puls) routing. Elevation- discharge-storage relationships were developed from the USACE HEC-2 step-backwater computer model (Reference 20).

Elm Fork Trinity River (below Lewisville Lake), Furneaux Creek, and Dudley Branch: Discharges were obtained from the previous FIS for the City of Carrollton (Reference 21).

Furneaux Creek and Dudley Branch: The watersheds were divided into subareas and synthetic unit and flood hydrographs were developed at selected locations. Frequency peak discharges at selected locations were computed. Additionally, numerous headwater areas of less than 1 square mile were modeled by the rational method ($Q = CIA$), where Q is the peak discharge in cfs, C is a runoff coefficient, I is rainfall intensity in inches per hour for the watershed time of concentration, and A is the drainage area in acres.

Elm Fork Trinity River: In the original study for the City of Carrollton, the hydrologic procedures used in developing discharge- frequency curves for the Elm Fork Trinity River were based on guidelines recommended by the Water Resources Council in Bulletin 17 (Reference 22). Historic discharge-frequency curves were developed at six gages in the Trinity River Basin near Dallas. The final discharge-frequency curve for each location is a composite curve using observed discharge data with consideration given to rare hypothetical floods. The 1- and 0.2-percent-annual-chance floods were based on the values reflected by the composite or final curves plotted on log-probability paper. The only stream gage on the Elm Fork Trinity River is located at Sandy Lake Road in Carrollton. In the January 2, 1991 revision for the City of Carrollton, the revised hydrologic analysis for the Elm Fork Trinity River used the NUDALLAS computer program to develop the discharge–frequency relationships (Reference 23). In the September 15, 1994 revision for the City of Carrollton, the Q factor for the Elm Fork Trinity River is based on the Fort Worth District of the USACE report entitled Reconnaissance Report, Upper Trinity River Basin, Texas, dated March 1990 (Reference 24).

Flooding along Elm Fork Trinity River was revised based on a restudy of Clear Creek (Reference 25). Because Ray Roberts Lake (upstream of Clear Creek on the Elm Fork Trinity River) controls discharges to Elm Fork Trinity River, peak discharges along the short reach of the Elm Fork Trinity River between the confluence of Clear Creek and Lewisville Lake are controlled by Clear Creek. The Denton County restudy produced discharges along Clear Creek that were somewhat larger than those estimated for the previous Denton County FIS (Reference 25).

A restudy of the Elm Fork Trinity River was completed on August 23, 2001 to show modifications to the flood-hazard data along the Elm Fork Trinity River within Denton County and the City of Lewisville. The modifications for the Elm Fork Trinity River extend from the county boundary to Lewisville Lake. The hydrologic and hydraulic analyses were performed by the USACE, Fort Worth District. The hydrologic analysis for the Elm Fork Trinity River was performed using the USACE HEC-1 computer program (Reference 26). Precipitation data were developed based on NWS TP-40 (Reference 14) and NOAA Technical Memorandum NWS Hydro-35 (Reference 19). The HEC-1 model was calibrated by reproducing significant historical flood hydrographs and by using peak values resulting from a frequency analysis of stream gage data. This revision also incorporates an appeal submitted by the USACE, Fort Worth District.

Cottonwood Branch: The hydrologic analyses were obtained from the FIS for the City of Frisco (Reference 27). In that study, regional flood frequency equations developed by the USGS, which relate drainage basin characteristics to streamflow characteristics for the 10-, 2-, and 1-percent-annual-chance discharges, were used. The 0.2-percent-annual-chance peak discharges were obtained by extrapolating a straight line through the 10-, 2-, and 1-percent-annual chance discharges plotted on log-probability paper.

Loving Branch: In the original study for the town of Bartonville, discharges for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods were developed using data from the NWS Technical Paper No. 40 and Technical Memorandum NWS Hydro- 35 (References 14 and 19). Hourly loss rates, obtained from other studies in the Dallas/Fort Worth area, and appropriate percent imperviousness values were used to determine 0.2-percent-annual-chance rainfall excesses. These loss rates were adopted for the original study due to similarity of soils. Snyder's unit hydrograph were computed for each subbasin based on physical measurements, percent urbanization, percent sand, and the Dallas/Fort Worth clay and sand urbanization curves. Percent urbanization and imperviousness were based on field inspections of the study area and topographic maps. The percentage of each soil type was derived from published soil surveys of Denton County. A clay Cp 640 value of 460 and a sand Cp 640 value of 460 (model default conditions for the Dallas-Fort Worth area) were used for the entire watershed.

Whites Branch and Stream WB-1: Revised 10-, 2-, and 1- and 0.2-percent-annual-chance discharges for were determined using the USACE HEC-1 flood hydrograph computer program (Reference 26). The methodologies used in the flood determinations are presented in a report by the USACE, Fort Worth District (Reference 28).

Milestone Ridge Tributary: A hydrologic computer simulation model was developed for the watershed conditions within the basin. The hydrologic model reflects the peak discharges for the 10-, 2-, 1-, and 0.2- percent-annual-chance events. Rainfall data was obtained from the NWS Technical Paper No. 40 Rainfall Frequency Atlas of the United States for rainfall durations of 2 to 24 hours (Reference 14). The National Oceanic and Atmospheric Administration's Five to Sixty Minute Precipitation Frequency for the Eastern and Central United States was used for rainfall durations of 5 to 60 minutes (Reference 19). A 24-hour duration synthetic storm was developed from a triangular depth-duration distribution of this rainfall data. The assumption of a balanced storm was made, whereby the greatest depth for a 24-hour duration storm would occur at the midpoint of the storm duration. The watershed for Milestone Ridge Tributary was divided into two subareas. The Snyder's unit hydrograph method was used to generate a flood hydrograph for each subbasin. The flood hydrograph for the first area was combined with that of the second to produce peak discharge values for

the watershed. Area 1 was determined to be 48 percent urbanized and area 2 was determined to be 67 percent urbanized. A Snyder peaking coefficient, Cp of 0.72, was used. This value is consistent with the USACE studies of the area. Snyder's Tp (lag time) was determined from Blackland Prairie urbanization curves, developed by the USACE, Fort Worth District. These curves relate Tp to physical watershed characteristics such as slope , length of flowpath, centroid of basin, and estimated percentage of urbanization for clay soils. From these and other parameters, the Tp and SCS curve number were developed as input parameters in the HEC-1 computer program.

Denton Creek: The original study of Denton Creek utilized a synthetic rainfall-runoff model using the USACE HEC-1 computer program (Reference 26) to determine discharge drainage area relationships. This model was calibrated to the results of statistical analyses of annual maximum discharges at the USGS gaging station near Justin (on the downstream side of FM 156). Rainfall for the 1-, 2-, 5-, 10-, 25-, and 100 –year frequency storms was developed using data from the NWS Technical Paper Nos. 40 (TP-40) and 49 (TP-49), National Oceanic Atmospheric Administration (NOAA) Technical Memorandum Hydro-35, Figure No. 15 of TP-40, and engineering manual 1110-2-1411, with some adjustments. Values for the Denton Creek Watershed were determined at the northwestern corner of Denton County. The 0.2-percent-annual-chance storm rainfall was computed by extrapolation of these data. Snyder's Unit Hydrograph were developed from each of the sub basins based on certain physical measurements. These measurements were taken from the standard USGS 7.5-minute quadrangle topographic maps (Reference 29). Unit Hydrograph lag times were derived for each subarea using methodology described in previously published reports (References 30 and 31). Once rainfall excesses for each event and unit hydrographs were computed, flood hydrographs were then generated for each subarea. This was accomplished, within the HEC-1 program, by first developing individual hydrographs over a range of selected transportation drainage area sizes. The actual final flood hydrographs were computed by interpolation, based on the applicable contribution drainage area size at each desired location. The subarea flood hydrographs were combined where appropriate, and then routed downstream using the modified puls routing technique. Discharges versus storage relationships were based on the results of backwater modeling using the USACE HEC-2 computer program (Reference 20), wherever practical. In certain cases involving small tributary streams downstream from SCS structures, a rough approximation of indicated storage for a given discharge was simply estimated, using a net flood velocity of 4 feet per second.

Denton Creek, from above Grapevine Lake to approximately 6,000 feet upstream of old Justin-Ponder Road was restudied (Reference 25). The same hydrologic methods that are described above for Denton Creek were used in the restudy. The USACE HEC-1 model was calibrated to discharges at the USGS gaging station on Denton Creek.

Clear Creek, Little Elm Creek, Pecan Creek, Mustang Creek and Doe Branch: The flood-frequency discharge values were originally developed using the computer program NUDALLAS (Reference 23). The watersheds were divided into subareas, and synthetic unit and flood hydrographs were developed at selected locations. Technical Paper No. 40 and Technical Memorandum NWS Hydro- 35 were used to develop the 10-, 2-, and 1- percent-annual-chance storms (References 14 and 19). Peak discharge- frequency values were computed for selected locations. The routing of the flood hydrographs through each subbasin was accomplished using a modified Puls reservoir routing. The USACE HEC-2 step-backwater computer program provided the elevation-discharge-storage relationships (Reference 20).

Clear Creek (from the confluence with Elm Fork Trinity River to Interstate Highway 35), Little Elm Creek (from above Lewisville Lake to Mobberly Road), Pecan Creek (from the confluence with Little Elm Creek in Lewisville Lake to Mobberly Road), Mustang Creek (from the confluence with Little Elm Creek to Mobberly Road), and Doe Branch (from the confluence with Little Elm Creek in Lewisville Lake to Parvin Road) were studied. The same hydrologic methods that are described above for Denton Creek were used in the restudy. The USACE HEC-1 models were calibrated to discharges at the USGS gaging stations on Clear and Little Elm Creeks.

Clear Creek from approximately 1,000 feet upstream of Interstate Highway 35 upstream to Waide Road was restudied again in 1996 Discharge-drainage area relationships were determined based on synthetic rainfall-runoff models using the USACE HEC-l computer program (Reference 26). Snyder's unit hydrographs were computed for each subbasin. Unit-hydrograph lag times (Tp) were derived for each subbasin using methods described in the reports entitled "Synthetic Hydrograph Relationships, Trinity River Tributaries, Fort Worth-Dallas Urban Area" and "Effects of Urbanization on Various Frequency Peak Discharges" (References 30 and 31, respectively). The generalized Snyder's hydrograph peaking coefficient Cp of 0.72, obtained from data developed during the generation of urbanization curves, was used. The flood hydrographs were combined and routed downstream using the modified-Puls routing method. Discharge-versus-storage relationships were based on the results of backwater modeling using the USACE HEC-2 computer program (Reference 20), wherever practical. The peak discharges were determined by routing various storm frequencies with a 24-hour rainfall duration, Type II distribution, using NRCS Technical Release No. 20 (Reference 18).

The USACE obtained construction plans sheets for the SCS flood retarding and sediment control structures from the SCS in Temple, Texas, to assess the flood-retarding capability of the numerous structures. Storage capacities were developed for the full range of potential pool levels. A more detailed description of the hydrologic analyses can be found in the USACE, Fort Worth District's, hydrology report (Reference 32).

McKamy Creek and Tributary 1 to McKamy Creek: The flood-frequency discharge values were originally developed using computer program NUDALLAS (Reference 23). The watersheds were divided into subareas, and synthetic unit and flood hydrographs were developed at selected locations. In addition to TP-40, Technical Memorandum NWS Hydro-35 was used to develop the 10-, 2-, and 1- percent-annual-chance storms (References 14 and 19). Peak discharge- frequency values were computed for selected locations. The routing of the flood hydrographs through each subbasin was accomplished using a modified Puls reservoir routing. The USACE HEC-2 step-backwater computer program provided the elevation-discharge-storage relationships (Reference 20).

The hydrologic and hydraulic analyses were revised October 18, 1988 (Reference 33) for McKamy Creek from the Government Easement Boundary of Grapevine Lake to the downstream side of Flower Mound Road and for Tributary 1 to McKamy Creek for its confluence with McKamy Creek to approximately 1,500 feet upstream of the confluence. This work was performed by Caffey and Morrison, Inc. and completed in April 1986. FEMA reviewed and accepted these data for purposes of the revision. The purpose of the revision was to incorporate new and/or revised data into the previously effective FIS for the Town of Flower Mound. The hydrologic calculations were developed using the USACE HEC-1 computer program (Reference 26).

Duck, Milam, Elizabeth, and North Hickory Creeks: Duck Creek was restudied from its confluence with Clear Creek upstream to Sam Bass Road. Milam Creek was restudied from its confluence with Clear Creek upstream, approximately 1,500 feet upstream of Interstate Highway 35. Elizabeth Creek was restudied from its confluence with Denton Creek upstream to John Day Drive. North Hickory Creek was restudied from State Route 156 upstream to approximately 500 feet upstream of Plainview Road near the City of Krum. Discharge-drainage area relationships were determined based on synthetic rainfall-runoff models using the USACE HEC-l computer program (Reference 26). Snyder's unit hydrographs were computed for each subbasin. Unit-hydrograph lag times (Tp) were derived for each subbasin using methods described in the reports entitled "Synthetic Hydrograph Relationships, Trinity River Tributaries, Fort Worth-Dallas Urban Area" and "Effects of Urbanization on Various Frequency Peak Discharges" (References 30 and 31, respectively). The generalized Snyder's hydrograph peaking coefficient Cp of 0.72, obtained from data developed during the generation of urbanization curves, was used. The flood hydrographs were combined and routed downstream using the modified-Puls routing method. Discharge-versus-storage relationships were based on the results of backwater modeling using the USACE HEC-2 computer program (Reference 20), wherever practical. The peak discharges were determined by routing various storm frequencies with a 24-hour rainfall duration, Type II distribution, using NRCS Technical Release No. 20, "Computer Program, Project Formulation, Hydrology" (Reference 18).

Copperas Branch and Hickory Creek Arm Tributary 2: Copperas Branch was restudied from 50 feet upstream of Cripple Creek Road to 720 feet upstream of Sellmeyer Lane. Hickory Creek Arm Tributary 2 was studied from its confluence with Hickory Creek Arm Tributary 1 to approximately Tanglewood Lane. Hydrologic analyses for Copperas Branch and Hickory Creek Arm Tributary 2 were carried out to establish the peak discharge-frequency relationship for the flooding sources studied in detail affecting the studied area. The peak discharges were determined by routing various storm frequencies with a 24-hour rainfall duration, Type II distribution, using NRCS Technical Release No. 20, "Computer Program, project Formulation, Hydrology" (Reference 18). Discharges on Copperas Branch were modified to reflect two sets of long culverts, one at Brazos Boulevard and one at Cripple Creek Lane. Rating Curves were established for the culverts and used to calculate the capacity of the culverts during the flood. The hydraulic model was then modified to reflect overland conditions and flow only, excluding flow through the culvert.

Swisher Creek and Stream GS-1: The Denton County FIS Report was revised on December 6, 2002 to show modifications to the flood hazard data along Swisher Creek and Stream GS-1 within Denton County and the Cities of Corinth and Lake Dallas, and the Town of Shady Shores. The modifications for Swisher Creek extend from Peakview Drive to Lewisville Lake.

The flood-frequency discharge values for the remaining streams studied by detailed methods were developed using the computer program NUDALLAS (Reference 23). The watersheds were divided into subareas, and synthetic unit and flood hydrographs were developed at selected locations. Technical Paper No. 40 and Technical Memorandum NWS Hydro- 35 were used to develop the 10-, 2-, and 1- percent-annual-chance storms (References 14 and 19). Peak discharge- frequency values were computed for selected locations. The routing of the flood hydrographs through each subbasin was accomplished using a modified Puls reservoir routing. The USACE HEC-2 step-backwater computer program provided the elevation-discharge-storage relationships (Reference 20).

Revised Analysis

Cooper Creek, Fletcher Branch, Stream CC-2 and Timber Creek: Discharge-frequency flows were computed using a detailed synthetic unit hydrograph HEC-HMS model with subareas and puls routing. Rainfall depths for the 10-, 2-, and 1-percent-annual-chance storms were developed using data from USGS Water Resources Investigations Report 98-4044. Rainfall for the 0.2-percent-annual-chance storm was computed by extrapolation of data from the previously referenced source.

Indian Creek, Dudley Branch, Furneaux Creek and their tributaries in Denton County: These streams were studied by both detailed methods and enhanced approximate methods. This work was conducted by Halff Associates, Inc. and was completed in August 2006 (Reference 2). Detailed study streams and enhanced approximate streams are listed in Table 3, Scope of Revision. The hydrologic rainfall\runoff program, HEC-HMS Version 2.2.2 (May, 2003) was used to estimate peak discharges for the various watersheds studied in detail. The HEC-HMS model from the Halff 2004 study was incorporated into the overall Furneaux Creek Watershed HEC-HMS model. The primary source of topographic data was the City of Carrollton topographic mapping and was supplemented by the 2001 topographic data published by the NCTCOG, which was acquired from November 2000 through January 2001 using LiDAR technology. The frequency floods rainfall data was taken from the City of Carrollton's 1998 Master Drainage Study hydrology models (HEC-1 and NuDallas computer models). Those rainfall depths were taken from NWS Hydro-35 and TP-40. Snyder's method was maintained in this study's HEC-HMS model updates to compute the unit hydrograph. The modified Puls method was used for routing for reaches where HEC-RAS models were available. Storage-discharge relationships from these models were used to route flows in the HEC-HMS models.

Peak discharge –drainage area relationships for the streams studied by detailed methods are shown in Table 5, Summary of Discharges.

Stillwater elevations for Lewisville Lake were taken from a pool elevation- frequency curve for the lake (with Ray Roberts Dam in place) based on a period of record analysis using daily flows from 1940 to 1969. A revision was issued on August 2, 1994 to show modifications to flooding along Lewisville Lake (Reference 34). The basis of the revision was more detailed topographic information obtained from aerial photographs developed by the USACE, Fort Worth District, after the original study was published. The revision included correcting locations of streets, revising the city corporate limit line, and revising the 1- and 0.2-percent-annual-chance floodplain boundaries and the Government Property Fee and/or Flowage Easement Boundary.

The original stillwater elevations for Ray Roberts Lake were taken from Ray Roberts Design Memorandum No. 1, Hydrology (Reference 35). The stillwater elevations were revised based on the Ray Roberts Lake Limited Map Maintenance Project (Reference 36). The analysis was done using the USACE, Southwestern Division, "SUPER" computer program (Reference 37) to develop discharge-frequency relationships for the watersheds. A daily-period-of-record-system flood-control analysis was performed for the Trinity River Basin for the period from January 1940 through December 1992. Existing lakes and control points within the Trinity River Watershed were considered in determining flood releases from various lakes. The model used daily average flows, simulated reservoir operations, and uncontrolled area flows for each point of interest along the system. The stillwater elevations for Ray Roberts Lake shown in Table 6, Summary of Stillwater Elevation were revised based on the results of the "SUPER" computer program.

Stillwater elevations for Grapevine Lake were obtained using a pool elevation-frequency curve. The curve was developed using the following methods. A system model of the entire Trinity River was routed using daily records for the period from 1910-1969. Operating plans for the reservoirs in the system and constraints at control points were taken into the calculations. The observed maximum water surface elevation (WSEL) at Grapevine Lake from the October- November 1981 flood was plotted. The probable maximum flood elevation, based on NWS Hydrometeorological Report No. 51, was plotted at the 0.01-percent exceedence frequency. This was used as a guide point in plotting the rare end of the pool elevation–frequency curve.

Stillwater elevations for the reservoirs above SCS Dam Nos. 16 and 17A were developed using a modified puls reservoir routing. This routing used the SCS volumetric capacity curves directly, with the SCS discharge capacity curves. The additional hazard due to wave action should be considered in planning future development; the stillwater elevation for the 1-percent-annual-chance elevations could rise approximately 3 feet due to wave action on Lewisville Lake and approximately 1 foot on the SCS reservoirs.

Elevations for floods of the selected recurrence intervals on Lewisville Lake, Ray Roberts Lake, Grapevine Lake, SCS Reservoir Nos.16 and 17A, a Detention Basin along Unnamed Tributary to Timber Creek, Ponding Area 1, an Unnamed Detention Pond and West Pond are shown in Table 6.

Table 5. 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
Abandoned Tributary to Graveyard Branch					
Downstream of unnamed road	---[1]	---[1]	---[1]	203	---[1]
Upstream of unnamed road	---[1]	---[1]	---[1]	193	---[1]
Bakers Branch					
At confluence with Denton Creek	2.84	3,650	5,050	5,650	6,850
Approximately 750 feet upstream of Gerault Road	1.45	2,550	3,450	3,850	4,750
Approximately 850 feet upstream of Gerault Road	1.20	2,150	2,900	3,300	4,050
Approximately 2,300 feet upstream of Gerault Road	0.69	1,600	2,100	2,300	2,900
Bryant Branch					
Approximately 200 feet downstream of F.M. 2181	2.21	1,450	1,900	2,150	3,400
At F.M. 2181	1.87	1,000	1,300	1,450	2,950
At Sharon Lake Dam	1.23	300	600	1,350	2,950
Clear Creek					
Above the Elm Fork Trinity River	350.37	27,900	65,800	90,800	135,100
Below Milam Creek	344.35	29,300	66,300	91,800	135,400
Above Milam Creek	329.00	29,300	66,300	91,500	134,600
Below Moores Branch	321.57	30,000	66,900	92,400	134,900
Above Moores Branch	309.17	30,000	66,800	91,700	133,600
At Interstate Highway 35W and USGS Gage Site Number 08051500	293.52	30,400	68,500	93,200	134,400
Above Duck Creek	258.82	30,000	65,700	87,400	125,800
At F.M. 455	244.51	30,800	67,000	87,800	125,600
Below Blocker Creek	187.75	30,400	57,500	73,300	105,900
Above Blocker Creek	151.27	24,300	44,600	56,700	82,500
At State Highway 51	145.54	24,100	44,000	55,800	81,300
Clear Creek (Upstream of Interstate Highway 35)					
At Sam Bass Road	253.71	30,500	66,600	88,000	126,100
At F.M. 455	244.50	30,800	67,000	87,800	125,600
Downstream of Duck Creek	233.86	31,200	67,500	87,600	125,100
Cooper Creek					
At Trinity Road	9.38	5,397	8,769	10,423	13,256
2,300 feet downstream of Mayhill Road	8.38	5,459	8,411	9,948	12,302
Below confluence with Stream CC-1	7.60	5,148	7,858	9,241	11,476
At E. University Drive	7.48	4,507	6,783	7,887	9,799
At Mingo Road	6.29	4,472	6,691	7,670	9,584
At Confluence with CC-2	5.91	3,960	5,762	6,704	8,477
Upstream of Nottingham Road	5.03	3,002	4,428	5,151	6,486

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Cooper Creek - continued					
Upstream of Stuart Road	2.93	2,222	3,321	3,848	5,304
At Locust Street	1.23	718	1,062	1,224	1,985
Downstream of Regional Pond #1	0.72	158	540	827	1,492
Copperas Branch					
Below unnamed tributary approximately 2,200 feet downstream from Brazos Boulevard	1.39	2,650	3,600	4,000	4,850
Overland flow at Brazos Boulevard	0.87	416	870	1,025	1,579
Below unnamed tributary approximately 200 feet upstream from Brazos Boulevard	0.87	2,150	2,850	3,150	4,000
Above unnamed tributary approximately 200 feet upstream from Brazos Boulevard	0.53	1,300	1,750	1,900	2,450
Overland flow at Cripple Creek Lane	0.53	369	907	1,144	1,781
At City of Highland Village/City of Lewisville upstream corporate boundary	0.46	849	1,228	1,420	1,855
At Cuero Place	0.21	382	556	645	852
At Sellmeyer Lane	0.20	377	547	636	837
At limit of study	0.16	353	513	594	773
Cottonwood Branch					
Approximately 2,700 feet downstream of State Highway 423	9.94	5,900	9,000	10,200	13,600
At confluence with Denton Creek	6.93	4,500	6,400	7,300	9,400
Approximately 1.25 miles east of F.M. 423	6.89	4,500	6,700	7,700	10,200
At Sandy Lake Road	5.69	4,200	5,900	6,700	8,600
At State Road	4.69	3,600	5,100	5,700	7,300
At Denton - Collin County Line	4.13	3,400	5,100	5,800	7,800
At Bethel Road	3.64	3,600	5,000	6,200	7,800
Cottonwood Branch Tributary 1					
At mouth	0.80	1,400	1,900	2,200	2,800
Culp Branch					
Approximately 400 feet downstream of unnamed road, downstream of State Highway 428	8.17	5,187	7,196	8,575	11,556
Approximately 6,400 feet downstream of State Highway 428	7.90	5,085	7,312	8,563	11,178
At State Highway 428	6.04	3,809	5,429	6,378	8,420
Approximately 6,200 feet downstream of State Highway 428	5.68	3,861	5,427	6,430	8,378
Approximately 2,000 feet upstream of F.M. 2153	4.87	4,177	5,607	6,318	7,988

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Culp Branch - continued					
Approximately 2,200 feet upstream of F.M. 2153	2.96	2,616	3,494	3,878	4,721
Approximately 7,900 feet upstream of F.M. 2153	2.54	2,503	3,007	3,267	4,209
Approximately 8,100 feet upstream of F.M. 2153	2.15	1,853	2,187	2,557	3,730
Denton Creek (Above Grapevine Lake)					
Below Whites Branch within Grapevine Lake	626.86	49,500	81,500	100,900	140,300
Below Elizabeth Creek	597.28	50,300	81,400	99,900	138,000
Above Elizabeth Creek	504.68	27,100	48,600	69,700	115,000
At Interstate Highway 35W	496.70	27,400	48,700	69,900	114,800
Below Oliver Creek	473.07	28,300	49,600	70,600	114,900
Above Oliver Creek	415.28	19,700	47,500	66,200	110,100
At State Highway 156 and USGS gage site number 08053500	398.82	20,200	48,000	66,200	109,800
Below Morris Branch	380.26	21,300	49,500	67,000	109,600
Above Morris Branch	367.01	21,100	48,900	66,100	108,900
Below Sweetwater Creek	345.18	23,400	52,700	68,100	108,700
Denton Creek (Below Grapevine Lake)					
At confluence with Elm Fork	24.23[2]	10,600	15,500	17,800	36,200[3]
Downstream of confluence with Cottonwood Branch	19.45[2]	13,300	18,900	21,300	36,200[3]
At State Highway 121	10.30[2]	10,000	13,800	15,600	36,200[3]
Upstream of confluence of Bakers Branch	5.63[2]	6,600	9,100	10,200	36,200[3]
Approximately 3,230 feet upstream of confluence of Bakers Branch	4.50[2]	5,300	8,000	9,800	36,200[3]
At Grapevine Lake	3.50[2]	4,000	7,000	9,400	36,200[3]
Doe Branch					
Below confluence with Panther Creek	70.69	18,200	31,800	39,500	53,700
Above confluence with Panther Creek	45.96	12,200	21,300	26,400	36,200
At about 13,700 feet west of State Highway 423	43.13	12,300	21,400	26,400	36,200
At about 5,600 feet west of State Highway 423	38.83	14,600	24,000	28,700	38,000
Below right bank tributary at Parvin Community	19.11	8,600	13,400	15,700	20,600
Above right bank tributary at Parvin Community	16.53	8,300	12,600	14,800	19,300

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Dry Fork Hickory Creek					
At confluence with Hickory Creek	18.08	9,750	14,800	17,400	22,900
Approximately 1,200 feet upstream of Interstate Highway 35	16.00	8,850	13,300	15,500	20,500
Immediately upstream of confluence of Stream DF-1	14.31	8,450	12,500	14,600	19,200
Immediately upstream of F.M. 1515	13.32	8,400	12,350	14,300	18,700
Downstream of confluence of Stream DF-2	12.22	8,500	12,150	14,050	18,300
Immediately upstream of confluence of Stream DF-2	9.35	6,200	9,000	10,500	13,750
Immediately upstream of confluence of Stream DF-3 and Masch Branch Road	6.18	4,050	5,850	6,900	9,000
Immediately upstream of Jim Christal Road	5.49	4,200	6,050	7,050	9,100
Immediately downstream of confluence of unnamed tributary and State Highway 380	5.27	4,300	6,100	7,200	9,050
Immediately upstream of confluence of unnamed tributary	4.22	3,750	5,250	6,100	7,650
Duck Creek					
Approximately 5,000 feet upstream of the confluence with Clear Creek	33.91	8,540	13,340	16,210	24,020
At F.M. 455	30.85	9,750	14,900	17,580	25,520
Downstream of Willow Branch	28.68	11,250	16,860	19,470	27,170
Dudley Branch					
539 feet upstream of the confluence with Elm Fork Trinity River	4.30	3,300	4,500	5,000	5,950
1,180 feet upstream of Union Pacific Railroad	4.30	3,350	4,600	5,100	6,000
780 feet downstream of Eisenhower Road	3.82	4,600	5,700	6,100	6,950
820 feet upstream of Indian Creek Road	3.82	4,250	5,450	5,850	6,700
380 feet upstream of Indian Creek Road	3.82	1,200	1,450	1,550	1,700
At Rosemeade Parkway	3.26	5,750	7,750	8,550	10,500
600 feet upstream of Old Denton Road	2.51	4,600	6,300	7,050	8,500
155 feet upstream of confluence of Stream 6F1	1.59	2,850	3,900	4,350	5,300
Just downstream confluence of unstudied tributary	1.44	2,800	3,750	4,200	5,100
At Chief Drive	0.75	1,800	2,400	2,700	3,200
At Hebron Parkway	0.39	1,000	1,300	1,450	1,750
Elm Fork Trinity River West Split Flow Area					
Split flow area at its confluence with Elm Fork Trinity River	---[1]	3,400	4,600	8,000	10,000

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Elizabeth Creek					
Approximately 1.2 miles upstream of confluence with Denton Creek	94.35	28,500	47,920	58,105	78,010
Downstream of confluence with Henrietta Creek (Approximately 0.9 miles upstream of State Highway 114)	90.55	30,265	50,400	60,970	81,350
At Interstate Highway 35	51.30	19,410	31,830	37,830	50,130
Downstream of confluence with Harriet Creek (Approximately 1.1 miles upstream of Interstate Highway 35)	49.59	19,660	31,930	37,900	50,040
Upstream of confluence with Harriet Creek	34.47	14,250	23,090	27,350	35,790
At Highway 156	32.54	14,640	23,500	27,610	35,740
Approximately 1.8 miles upstream of Highway 156	29.35	15,700	24,500	28,510	36,990
Approximately 0.4 miles downstream of newly relocated Atchison, Topeka & Santa Fe Railroad	26.44	15,240	23,510	27,180	34,890
Approximately 0.5 miles downstream of John Day Road	22.68	14,910	22,020	25,260	31,960
Elm Fork Trinity River (Above Lewisville Lake)					
Downstream of confluence of Clear Creek	385.34[4]	27,900	66,100	91,700	137,200
Approximately 100 feet downstream of confluence of Aubrey Branch	21.40[4]	10,982	14,073	15,383	17,988
Approximately 2,400 feet upstream of confluence of Aubrey Branch	15.00[4]	9,776	13,332	15,249	19,286
Approximately 100 feet downstream of confluence of Bray Branch	8.10[4]	6,295	8,996	10,238	12,752
Elm Fork Trinity River (Below Lewisville Lake)					
At USGS gage at Sandy Lake Road	1,764.00	17,900	33,200	43,500	70,700[5]
Below confluence of Timber Creek	1,726.57	14,600	25,500	31,600	57,000[5]
Below confluence of Indian Creek	1,696.26	11,000	18,300	22,400	57,000[5]
Above confluence of Indian Creek	1,677	7,000[5]	10,200[5]	21,000	57,000[5]
Fincher Branch					
At confluence with Hickory Creek	6.16	4,800	7,150	8,200	10,400
At Hilltop Road	5.70	4,750	7,050	8,150	10,300
At F.M. 1830	4.32	3,900	5,750	6,550	8,200
Downstream of confluence of unnamed tributary approximately 2,500 feet downstream of Hickory Hill Road	3.55	3,650	5,250	5,950	7,350

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Fincher Branch - continued					
Upstream of confluence of unnamed tributary approximately 2,500 feet downstream of Hickory Hill Road	2.88	2,850	4,150	4,750	5,850
At Gibbons Road	2.14	2,550	3,500	3,950	4,850
Fletcher Branch					
Approximately 2,500 feet upstream of confluence with Hickory Creek	4.26	2,469	4,151	5,055	7,080
Approximately 300 feet upstream of Hickory Creek Road	3.83	2,166	3,598	4,401	6,164
Approximately 3,500 feet upstream of Hickory Creek Road	3.14	1,648	2,707	3,333	4,639
2,300 feet downstream of Ryan Road	2.40	1,068	2,025	2,572	3,718
Approximately 600 feet downstream of Ryan Road	2.28	1,058	2,008	2,543	3,580
At Sanders Road	1.91	1,029	1,989	2,415	3,435
Approximately 300 ft upstream of El Paseo Street	1.64	998	1,923	2,307	3,422
Upstream Limit of Study	1.32	1,017	1,864	2,169	2,902
Fox Creek (Stream TC-1)					
At its confluence with Timber Creek	1.61	2,520[6]	3,400[6]	3,790[6]	4,600[6]
Approximately 500 feet upstream of Bellaire Lane	1.01	2,040[6]	2,720[6]	3,030[6]	3,670[6]
Approximately 1,300 feet upstream of Bellaire Lane	0.86	1,770[6]	2,350[6]	2,620[6]	3,160[6]
At Fox Avenue	0.63	1,610[6]	2,060[6]	2,260[6]	3,160[6]
At Edmonds Lane	0.37	1,050[6]	1,340[6]	1,480[6]	1,740[6]
Furneaux Creek					
Main Stem at confluence with Elm Fork	10.97	9,800	13,550	14,700	17,350
160 feet upstream of DART Railroad	10.79	10,350	14,050	14,900	17,600
At Old Denton Road	9.31	9,900	13,600	14,550	18,000
At Dickerson Road	9.31	9,850	13,550	14,550	18,100
At Gold Rush Drive	8.55	9,800	13,500	14,750	17,700
96 feet downstream of the confluence of Stream 6E1	8.18	9,700	13,300	14,550	17,450
At Frankford Road	4.44	5,500	7,400	7,850	9,650
At Peter's Colony Road	3.81	5,550	7,150	7,550	9,900
At Woodlake Spillway	3.81	5,500	7,100	7,550	9,900
At Josey Lane	3.81	5,350	6,950	7,500	9,400
At Rosemeade Drive	3.30	5,250	7,250	8,050	9,350
177 feet downstream of confluence of Stream 6E5	2.47	4,100	5,700	6,350	7,800
545 feet upstream of confluence of Stream 6E5	1.34	2,450	3,400	3,800	4,650
At Hebron Parkway	1.19	2,200	3,050	3,450	4,200

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Golf Course Creek					
Upstream of confluence with Marshall Branch	1.47	1,912	2,759	3,107	3,818
Upstream of confluence with unnamed tributary located approximately 1,000 feet downstream of Indian Creek Drive	0.85	1,315	1,763	1,955	2,413
Graveyard Branch					
Below confluence with Tributary GB-3	5.02	---[1]	---[1]	8,540	---[1]
Below confluence with Tributary GB-2	4.33	2,158	3,949	4,837	7,113
Above confluence with Tributary GB-2	1.94	---[1]	---[1]	3,120	---[1]
Below confluence with Tributary GB-1	1.57	---[1]	---[1]	2,830	---[1]
Headwaters above confluence with Tributary GB-1	1.20	---[1]	---[1]	2,180	---[1]
Griffiths Creek					
At its confluence with Veal Springs Branch	0.76	1,320	1,760	1,950	2,380
At F.M. 2181	0.56	1,000	1,350	1,500	1,850
Hickory Creek					
At Lewisville Lake	150.90	22,400	37,850	48,300	70,250
Downstream of confluence of Loving Branch	147.41	22,900	38,050	48,450	70,300
Downstream of confluence of Fincher Branch	139.69	23,150	37,850	47,800	69,150
Upstream of confluence of Fletcher Branch	129.52	23,050	37,600	47,300	68,000
Upstream of confluence of Graveyard Branch	118.70	23,300	37,150	46,450	66,450
Downstream of confluence of Stream HC-1	109.39	23,750	37,150	46,250	65,200
At State Highway 377	107.08	23,750	37,100	46,150	65,050
Upstream of confluence of Dry Fork Hickory Creek	88.43	20,750	32,500	40,700	57,900
At Interstate Highway 35	87.56	21,000	32,850	41,150	58,900
Upstream of confluence of unnamed tributary	81.88	21,150	32,950	41,140	57,800
Hickory Creek Arm Tributary 1					
At Sellmeyer Lane	0.21	548	801	928	1,212
At Lakevista East	0.19	499	730	846	1,104
At limit of study downstream of Lakevista South	0.09	263	383	443	577
Hickory Creek Arm Tributary 2					
Above confluence with Hickory Creek Arm Tributary 1	0.06	144	212	246	322

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Higgins Branch					
Upstream of confluence with Kirkwood Branch	1.68	1,750	2,400	2,750	3,500
Highlands Creek					
Upstream of Stream 6E5	0.59	1,000	1,400	1,600	2,000
Indian Creek					
747 feet upstream of confluence with Elm Fork Trinity River	15.95	8,900	13,550	15,450	20,350
147 feet downstream of confluence of Levee Channel	15.56	8,900	13,600	15,600	20,550
At Hebron Parkway	14.67	8,750	13,400	15,300	20,200
5,100 feet upstream of Old Denton Road	14.09	8,700	13,300	15,200	20,050
At Burlington Northern Railroad	1.39	3,700	5,100	5,750	6,950
Indian Creek Levee Channel					
273 feet upstream of Hebron Parkway	0.43	900	1,200	1,300	1,600
59 feet downstream confluence with Stream 6I7	0.40	850	1,150	1,250	1,550
At State Highway 121	0.25	650	850	950	1,100
1,216 feet upstream of confluence with Indian Creek	0.10	950	1,250	1,400	1,750
Kirkwood Branch					
At Grapevine Lake	8.41	6,000	8,500	9,700	12,600
Downstream of South Fork Kirkwood Branch	6.40	5,300	7,500	8,400	10,900
Upstream of South Fork Kirkwood Branch	4.89	3,950	5,600	6,400	8,200
At State Highway 114	4.21	4,300	6,000	6,800	8,700
Downstream of Higgins Branch	3.56	3,850	5,400	6,100	7,700
Upstream of Higgins Branch	1.88	2,150	3,000	3,400	4,350
Lake Lewisville Spillway					
At confluence with Elm Fork Trinity River	1,660	6,300[5]	9,000[5]	21,000[5]	55,000[5]
Little Elm Creek					
Above the Elm Fork Trinity River in Lake Lewisville	260.55	35,400	54,700	69,700	100,200
At State Highway 720	234.56	26,500	49,000	62,700	92,000
Below Doe Branch/Panther Creek	230.75	26,400	48,800	62,400	91,500
Above Doe Branch/Panther Creek	160.06	17,100	33,800	44,100	67,500
Below Pecan Creek	145.20	17,800	35,500	46,100	72,200
Above Pecan Creek	102.32	13,400	27,000	34,400	54,600
Below Mustang Creek	97.43	13,700	27,500	34,700	56,100
Above Mustang Creek	74.45	8,300	18,300	23,900	39,900
At F.M. 1385 and USGS gage site number 08052700	73.32	8,600	18,500	24,100	40,700

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Little Elm Creek - continued					
Below major left bank tributary at F.M. 428 (Mobberly Road)	67.15	9,600	20,100	25,400	40,500
Above major left bank tributary at F.M. 428 (Mobberly Road)	54.88	8,300	16,600	21,100	33,500
Approximately 4,500 feet below the Denton-Collin County Line	50.67	8,800	16,500	20,600	32,400
Loving Branch					
At confluence with Hickory Creek	7.02	4,500	7,100	8,300	10,850
At Hickory Hill Road	6.54	4,550	7,000	8,200	10,650
Downstream of confluence of unnamed tributary approximately 7,500 feet upstream of Hickory Hill Road	5.16	4,600	6,550	7,550	9,400
Upstream of confluence of unnamed tributary approximately 7,500 feet upstream of Hickory Hill Road	3.01	2,750	4,000	4,600	5,800
At F.M. 1830	1.73	2,000	2,750	3,050	3,750
At State Highway 407	1.73	1,900	2,730	3,070	3,740
At private drive crossing approximately 870 feet upstream of State Highway 407	1.51	1,770	2,440	2,740	3,340
Immediately upstream of unnamed tributary approximately 2,480 feet upstream of State Highway 407	1.14	1,360	1,870	2,100	2,560
Approximately 160 feet downstream of Jetter Road	0.75	1,280	1,730	1,930	2,340
Approximately 400 feet downstream of Landfall Circle Road	0.47	800	1,080	1,200	1,460
Lynchburg Creek					
At South Shady Shores Road	3.65	3,250	4,500	5,100	6,500
Approximately 250 feet upstream of South Shady Shores Road	2.33	1,750	2,450	2,800	3,750
Approximately 50 feet downstream of confluence of Stream LB-1	1.86	1,400	2,000	2,300	3,250
Marshall Branch					
Downstream of confluence of unnamed tributary approximately 410 feet upstream of State Highway 114	13.40	6,650	9,950	11,700	14,950
Upstream of confluence of unnamed tributary	11.93	6,350	9,500	11,050	14,100
Downstream of confluence of unnamed tributary approximately 1,500 feet downstream of Trophy Club Drive	11.09	6,750	9,750	11,300	14,200

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Marshall Branch - continued					
Upstream of confluence of unnamed tributary	10.63	6,750	9,700	11,200	14,100
At South Frontage State Highway 114	9.81	6,130	9,840	11,330	15,490
Downstream of confluence of Paigebrook Creek approximately 1,040 feet downstream of South Frontage State Highway 114	9.54	6,040	9,670	11,150	15,210
At Main Street	7.31	5,000	7,700	8,760	11,640
At Roanoke Street	5.14	3,960	5,910	6,680	8,610
Downstream of confluence of Tributary MB-7 approximately 5,110 feet downstream of Roanoke Street	4.22	3,470	5,170	5,850	7,610
McKamy Creek					
Approximately 1,000 feet downstream of confluence of Tributary 1 to McKamy Creek	0.64	1,590	2,190	2,540	3,320
Immediately upstream of confluence of Tributary 1 to McKamy Creek	0.33	840	1,160	1,340	1,750
At Flower Mound Road	0.22	620	860	1,000	1,310
McWhorter Creek					
Approximately 100 feet downstream of Leora Lane	0.66	1,249	1,749	1,972	2,494
Approximately 920 feet downstream of Marina Vista Drive	0.35	660	926	1,046	1,334
Approximately 1,070 feet upstream of Marina Vista Drive	0.18	406	560	627	775
Milam Creek					
Approximately 1,400 feet upstream of confluence with Clear Creek	15.29	9,840	14,880	17,200	22,139
At F.M. 2164	12.24	10,574	15,111	17,303	21,949
Approximately 0.8 miles upstream of F.M. 2164	8.49	7,656	11,131	12,836	16,340
Approximately 1.1 miles upstream of F.M. 2164	5.88	5,216	7,693	8,885	11,483
Approximately 0.5 miles downstream of Interstate Highway 35	3.48	4,490	6,276	7,180	8,730
Approximately 400 feet downstream of Interstate Highway 35	2.02	2,572	3,771	4,450	5,438
Approximately 375 feet downstream of Interstate Highway 35	1.72	2,292	3,234	3,826	4,689

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Milestone Ridge Tributary					
Below Lee's Court	0.19	230	347	392	515
Mustang Creek					
Above Little Elm Creek	22.98	7,300	12,000	14,400	19,800
At Mustang Community	20.52	8,300	13,100	15,500	20,200
North Hickory Creek					
Downstream of confluence with South Hickory Creek	80.33	350	33,200	41,700	57,950
Upstream of confluence with South Hickory Creek	40.92	10,750	17,050	20,700	28,700
At Jim Christal Road	40.28	10,800	17,100	20,750	28,800
At State Highway 380	39.26	10,900	17,200	20,800	28,850
North Hickory Creek (Upstream of F.M.156)					
At F.M. 156	37.80	11,100	17,250	20,900	28,900
At Plainview Road	34.94	10,900	17,100	20,800	28,200
North Pecan Creek					
At confluence with Pecan Creek Below SCS Dam No. 16	2.40	1,630	2,190	2,500	3,100
At Anna Street	2.01	1,370	1,820	2,040	2,550
At University Drive	1.77	1,350	1,800	2,030	2,570
Approximately 800 feet upstream of University Drive	1.52	1,050	1,410	1,580	1,940
Approximately 400 feet downstream of Hinkle Drive	1.38	890	1,190	1,320	1,590
At Hinkle Drive	1.15	550	720	800	960
Approximately 1,200 feet upstream of Hinkle Drive	1.04	390	500	550	670
Approximately 500 feet downstream of Windsor Street	0.94	180	230	260	310
At Windsor Street	0.90	100	130	140	170
Office Creek					
At confluence with Lewisville Lake	2.56	3,050	4,150	4,700	5,700
At F.M. 423	2.00	2,950	4,000	4,500	5,450
Approximately 500 feet upstream of Blair Oaks Road	1.33	2,250	3,050	3,400	4,150
Pecan Creek (Above SCS Dam No. 16)					
At reservoir above SCS Dam No. 16	1.13	1,250	1,750	1,950	2,450
Approximately 950 feet downstream of Westgate Street	0.51	820	1,110	1,240	1,510

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Pecan Creek (Below SCS Dam No. 16)					
Downstream of confluence of unnamed tributary approximately 13,900 feet downstream of Mayhill Road	17.10	9,230	13,900	16,000	20,700
Upstream of confluence of unnamed tributary approximately 13,900 feet downstream of Mayhill Road	15.10	8,580	12,800	14,700	18,700
Downstream of confluence of Stream PEC-2	11.66	9,390	12,600	14,100	17,200
Upstream of confluence of Stream PEC-2	10.92	8,580	11,500	12,900	15,600
Downstream of confluence of Stream PEC-3	10.34	8,350	11,200	12,500	15,100
Upstream of confluence of Stream PEC-3	9.64	7,520	9,990	11,200	13,500
At Woodrow Lane	9.53	7,730	10,100	11,200	13,500
Upstream of Woodrow Lane	8.68	6,740	8,670	9,590	11,600
Downstream of confluence of Stream PEC-4	8.39	6,550	8,400	9,280	11,200
Upstream of confluence of Stream PEC-4	8.06	4,540	6,000	6,740	8,430
Downstream of confluence of Diversion PEC-4B	6.91	3,600	4,950	5,680	7,510
Downstream of confluence of North Pecan Creek	5.67	3,350	4,400	4,980	6,140
Upstream of confluence of North Pecan Creek	3.27	1,760	2,290	2,560	3,140
At Panhandle Street	2.95	1,580	2,120	2,400	2,950
Approximately 600 feet upstream of Linden Street	2.54	1,170	1,580	1,780	2,190
Approximately 600 feet downstream of University Drive	2.39	1,020	1,390	1,560	1,920
At University Drive	2.16	788	1,100	1,220	1,490
At Gay Street	2.01	577	800	889	1,240
Approximately 1,500 feet upstream of Gay Street	1.65	71	87	93	645
Pecan Creek (Above Little Elm Creek)					
Above Little Elm Creek	42.88	11,600	19,800	24,800	34,800
Approximately 4,500 feet north of F.M. 428	30.78	12,000	19,600	23,700	32,200
At Mustang Community	22.55	10,200	16,800	20,200	26,800

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Poindexter Branch					
Approximately 250 feet upstream of Estates Drive	3.40	---[7]	---[7]	3,210	---[7]
Approximately 50 feet upstream of Copper Canyon Road	1.24	---[1]	---[1]	2,462	---[1]
Approximately 1,400 feet upstream of Copper Canyon Road	1.18	---[1]	---[1]	2,415	---[1]
Approximately 3,700 feet upstream of Copper Canyon Road	0.99	---[1]	---[1]	2,190	---[1]
Approximately 4,210 feet upstream of Copper Canyon Road	0.39	---[1]	---[1]	937	---[1]
Approximately 410 feet downstream of Lantana Trail	0.25	---[1]	---[1]	719	---[1]
Approximately 370 feet upstream of Lantana Trail	0.10	---[1]	---[1]	297	---[1]
Prairie Creek					
At confluence with Elm Fork Trinity River	7.83	6,550	9,050	10,350	13,250
Below Missouri-Kansas and Texas Railroad and upstream of unnamed tributary	6.99	6,250	8,700	9,900	12,700
Upstream of unnamed tributary and downstream of confluence of Stream PC-1	4.65	4,750	6,700	7,750	9,900
Above confluence of Stream PC-1	3.78	3,850	5,500	6,300	7,900
Below confluence of Stream PC-2	3.58	3,900	5,450	6,150	7,700
Above confluence of Stream PC-2	2.85	3,050[6]	4,300[6]	4,850[6]	6,250
Below confluence of Stream PC-3	2.13	3,300	4,500	5,050	6,100
Above confluence of Stream PC-3, immediately below Valley Parkway	1.62	2,500	3,400	3,800	4,600
Upstream of Garden Ridge	0.82	1,650	2,200	2,450	3,000
Sharps Branch					
Approximately 100 feet downstream of confluence of Stream SB-1	3.39	4,650	6,300	7,100	8,600
Approximately 100 feet upstream of confluence of Stream SB-1	2.18	3,100	4,200	4,700	5,700
Approximately 100 feet downstream of F.M. 1171	1.44	2,200	3,000	3,350	4,050
Stewart Creek					
At F.M. 423	18.03	9,900	15,300	17,800	24,350
At confluence of Tributary 1	10.57	6,400	9,800	11,300	15,500
At confluence of Tributary 3	5.33	4,000	6,000	6,800	9,100
At confluence of Tributary 4	3.21	2,700	4,000	4,500	6,000

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Stewart Creek Tributary 1					
At confluence with Stewart Creek	5.90	4,100	6,200	7,000	9,500
Stewart Creek Tributary 2					
At 4th Army Memorial Road	1.38	---[7]	---[7]	2,852	---[7]
Stewart Creek Tributary 3					
At mouth	1.77	1,800	2,600	2,900	3,600
Stream 6D3					
At mouth	1.91	2,500	3,450	3,900	4,900
At Dallas-Denton County Boundary	0.66	1,100	1,450	1,600	2,000
Stream 6E1					
384 feet upstream of confluence with Dudley Branch	0.92	2,050	2,700	3,000	3,650
At Standridge Drive	0.38	900	1,200	1,300	1,550
Stream 6F1					
384 feet upstream of confluence with Dudley Branch	0.92	2,050	2,700	3,000	3,650
At Standridge Drive	0.38	900	1,200	1,300	1,550
Stream 6I7					
162 feet upstream of confluence with Levee Channel	0.15	350	450	500	600
At Creek Valley Boulevard	0.08	200	250	300	350
Stream CC-1					
At confluence with Cooper Creek	1.15	1,600	2,250	2,500	2,620[8]
At Loop 288	1.15	1,600	2,250	2,500	3,000[8]
Stream CC-2					
At Broken Arrow Road	0.93	963	1,352	1,560	2,036
Downstream of Regional Pond #5	0.54	593	837[6]	963[6]	1,271[6]
At Sherman Drive	0.42	570	845	975	1,288
Stream DF-1					
Upstream of confluence with Dry Fork Hickory Creek	1.69	2,300	3,250	3,700	4,550
At unnamed tributary downstream from F.M. 1515	1.25	2,250	3,100	3,450	4,200
At unnamed tributary downstream from dam	0.81	1,600	2,150	2,400	2,950
At dam	0.43	850	1,150	1,250	1,550
Stream DF-2					
At confluence with Dry Fork Hickory Creek	2.87	3,250	4,550	5,150	6,350
Immediately upstream of Jim Christal Road	1.85	2,400	3,300	3,700	4,500
Immediately upstream of U.S. Highway 380	1.25	1,750	2,400	2,650	3,200

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Stream DF-3					
Approximately 900 feet downstream of confluence with unnamed tributary to Stream DF-3	2.75	---[1]	---[1]	5,837	---[1]
Approximately 2,500 feet downstream of University Drive U.S. Highway 380	2.55	---[1]	---[1]	5,659	---[1]
Stream FB-1					
Above confluence with Fincher Branch	0.63	---[1]	---[1]	1,240	---[1]
Stream GS-1					
At Shady Shores Drive (Inflow into Lewisville Lake)	0.61	785	1,310	1,510	1,940
Downstream of a small unnamed right bank tributary located 400 feet upstream (west) of Shady Shores Drive	0.54	825	1,155	1,315	1,690
Approximately 1,700 feet downstream of Dobbs Road	0.49	785	1,075	1,215	1,560
Approximately 1,400 feet downstream of Dobbs Road	0.45	730	990	1,130	1,465
At Dobbs Road	0.35	530	730	850	1,120
Outflow from detention pond	0.22	370	610	710	905
Inflow to detention pond	0.23	635	825	910	1,095
Stream HC-1					
Upstream of confluence with Hickory Creek	2.31	2,800	3,600	3,900	4,600
Below confluence with unnamed tributary immediately downstream of Texas & Pacific Railroad	2.10	3,050	4,050	4,450	5,350
Immediately upstream of Texas & Pacific Railroad bridge	1.29	1,700	2,200	2,450	2,900
Upstream of Rose Lawn Cemetery Road	0.91	1,550	2,100	2,350	2,800
Stream IC-1					
At Atchison, Topeka & Santa Fe Railroad	2.88	3,500	4,700	5,200	6,300
Upstream of confluence with Stream IC-1A	1.67	2,400	3,300	3,700	4,600
Stream IC-1A					
At confluence with Stream IC-1	1.07	1,600	2,100	2,400	3,000
Stream LC-1					
At confluence with Lynchburg Creek	1.32	1,600	2,200	2,460	3,050
Stream PC-1					
At confluence with Prairie Creek	1.16	1,890	2,590	3,010	4,210
At Grandys Lane	0.59	1,390	1,900	2,100	2,600
At Summit Avenue	0.15	640	880	980	1,240

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Stream PC-1 - continued					
At McGee Lane	0.15	470	620	690	830
Stream PC-1 Channel					
Approximately 250 feet upstream of confluence with Stream PC-1	---[7]	11	40	56	91
Approximately 1,500 feet upstream of confluence with Stream PC-1	---[7]	11	40	56	91
Stream PC-2					
At confluence with Prairie Creek	0.73	1,600	2,200	2,450	3,100
Just upstream of Summit Drive	0.43	1,150	1,550	1,750	2,250
Upstream of Valley Parkway	0.31	865	1,120	1,260	1,620
Stream PC-3					
At confluence with Prairie Creek	0.51	850	1,150	1,300	1,550
Stream PEC-1					
Immediately upstream of confluence with Pecan Creek below SCS Dam No. 16	4.12	2,700	4,400	5,100	6,250
Downstream of confluence of unnamed tributary near Shiloh Cemetery	2.97	2,500	4,000	4,550	5,400
Upstream of confluence of unnamed tributary near Shiloh Cemetery	2.48	2,050	3,350	3,850	4,500
At dam upstream of Interstate Highway 35	1.75	1,500	2,650	3,000	3,700
Area above Unicorn Lake	0.83	1,250	1,700	1,900	2,300
Stream PEC-1A					
At confluence with Stream PEC-1	0.18	235	270	435	680
Stream PEC-2					
At confluence with Pecan Creek below SCS Dam No. 16	0.74	970	1,480	1,670	2,030
At stock pond on unnamed tributary approximately 600 feet upstream from Spencer Road	0.39	680	920	1,030	1,250
Stream PEC-3					
Upstream of confluence with Pecan Creek below SCS Dam No. 16	0.70	1,050	1,450	1,600	1,950
Stream PEC-4					
At confluence with Pecan Creek below SCS Dam No. 16	1.56	2,100	2,550	2,700	3,050
Approximately 400 feet downstream of Lakey Street	1.56	1,970[9]	2,060[9]	2,080[9]	2,110[9]
At Missouri-Pacific Railroad crossing	1.56	2,100	2,550	2,700	3,050
Approximately 300 feet downstream of most upstream Missouri-Pacific Railroad crossing	1.24	1,800[10]	2,050[10]	2,100[10]	2,250[10]

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Stream PEC-4 - continued					
Approximately 250 feet upstream of most upstream Missouri-Pacific Railroad crossing	1.24	2,350	3,150	3,600	4,350
At Wainwright Street	0.50	1,150	1,500	1,650	2,100
Stream PEC-5					
At Missouri-Kansas and Texas Railroad	0.67	807	1,131	1,278	1,699
Stream SB-1					
At confluence with Sharps Branch	1.21	1,600	2,200	2,450	3,000
Stream SC-1					
Immediately downstream of confluence of Stream SC-1A	2.47	4,950	6,650	7,400	9,100
At a point immediately upstream of the limit of detailed study	1.24	2,450	3,250	3,600	4,500
Immediately downstream of Miller Drive	0.75	1,750	2,300	2,500	3,200
Stream SC-1A					
At confluence with Stream SC-1	1.23	2,350	3,100	3,450	4,350
Stream SC-2					
Immediately above confluence of major right bank tributary at Lewisville Lake	4.44	5,600	7,650	8,550	10,500
At St. Louis-San Francisco Railroad	4.11	5,400	7,350	8,250	10,000
Stream TC-2					
At confluence with Timber Creek	3.30	3,800	5,300	5,950	7,300
At Garden Road	2.31	3,100	4,250	4,750	5,800
Approximately 1,000 feet downstream of Long Prairie Road	1.37	2,850	3,950	4,250	5,250
At Long Prairie Road	1.03	2,050	2,700	3,000	3,750
At Old Settlers Road	0.41	950	1,250	1,350	1,700
Stream TC-2a					
At Sagebrush Road	0.05	---[1]	---[1]	100	---[1]
Stream WB-1					
Approximately 0.5 miles upstream of confluence with Whites Branch	2.78	3,530	4,990	5,600	6,990
Approximately 1.4 miles upstream of Whites Branch	0.80	973	1,410	1,596	2,009
At Jetter Road	0.48	747	1,088	1,232	1,538
Stream WC-2					
Just upstream of confluence of Wichita Creek	0.37	---[1]	---[1]	755	---[1]
Approximately 950 feet upstream of North Creek Crossing	0.29	---[1]	---[1]	631	---[1]

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Stream WC-4					
Just upstream of confluence of Wichita Creek	0.48	---[1]	---[1]	770	---[1]
Just upstream of River Hill Drive	0.46	---[1]	---[1]	749	---[1]
Stream WC-5					
Just upstream of confluence of Wichita Creek	0.32	---[1]	---[1]	721	---[1]
Just upstream of Clear Creek Drive	0.22	---[1]	---[1]	495	---[1]
Summit Channel					
At mouth	0.28	820	1,090	1,200	1,450
Approximately 1,500 feet above mouth	0.18	590	770	850	1,010
Swisher Creek					
At Graveyard Slough (Lake Lewisville)	1.32	1,870	2,570	2,890	3,540
Approximately 1,000 feet downstream of Shady Shores Drive	1.19	1,680	2,280	2,540	3,110
At Shady Shores Drive	1.16	1,760	2,380	2,650	3,230
Approximately 700 feet upstream of Shady Shores Drive	1.10	1,170	2,290	2,540	3,060
Approximately 1,800 feet upstream of Shady Shores Drive	1.02	1,640	2,160	2,390	2,870
Approximately 2,000 feet downstream of the abandoned road	0.87	1,440	1,840	2,020	2,350
At the abandoned railroad	0.64	1,130	1,370	1,480	1,690
At Interstate Highway 35 East	0.56	1,070	1,290	1,410	1,590
Downstream of South Garrison Road	0.39	960	1,260	1,390	1,680
Timber Creek					
At Interstate Highway 35	20.42	6,922	11,062	13,493	18,960
Downstream of confluence with TC-1	19.33	6,812	10,884	13,284	18,578
Upstream of confluence with TC-1	17.49	6,618	10,669	12,923	17,856
At Valley Parkway	15.83	6,319	10,125	12,242	16,972
Downstream of confluence with TC-2	13.87	5,621	9,037	11,122	15,623
Upstream of confluence with TC-2	10.50	3,872	6,907	8,784	12,252
At F.M. 1171	9.49	3,706	6,656	8,453	11,746
3,000 upstream of F.M. 1171	8.85	3,570	6,464	8,208	11,385
1,400 feet upstream of Morris Road	7.69	3,286	6,050	7,714	10,649
At F.M. 2499	6.15	2,564	4,896	6,313	8,752
700 feet upstream of Mesquite Road	4.50	1,886	3,966	5,066	7,008
Approx 3000 feet upstream of Bayberry Street	4.30	1,875	3,984	5,069	7,023
200 feet upstream of Bridlewood Boulevard	3.37	1,626	3,403	4,230	5,801
500 feet upstream of Woodland Road	1.32	738	1,453	1,763	2,427
Timber Creek Relief Channel					
At confluence with Timber Creek	---[7]	4,840	7,880	9,260	11,990

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

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 1 to McKamy Creek					
At confluence with McKamy Creek	0.15	430	580	680	900
Tributary GB-2					
At mouth	4.55	---[1]	---[1]	4,837	---[1]
Downstream of Detention Pond	3.06	---[1]	---[1]	2,941	---[1]
Upstream of Detention Pond	3.06	---[1]	---[1]	3,130	---[1]
Unnamed Channel to Levee Channel to Indian Creek					
At confluence with Levee Channel to Indian Creek	0.15	---[1]	---[1]	761	977
Approximately 1,200 feet upstream of the confluence with Levee Channel to Indian Creek	0.08	---[1]	---[1]	428	547
Unnamed Tributary to Bakers Branch					
At confluence with Bakers Branch	0.25	480	600	660	780
Unnamed Tributary to Bryant Branch					
Approximately 280 feet downstream of Lighthouse Drive	0.02	---[1]	---[1]	273	---[1]
Unnamed Tributary 2 to Lewisville Lake					
1,800 feet upstream of Pecan Drive	---[1]	---[1]	---[1]	2,688	---[1]
300 feet upstream of Pecan Drive	---[1]	---[1]	---[1]	3,604	---[1]
Unnamed Tributary to Steam DF-3					
At the confluence with Stream DF-3	0.20	---[1]	---[1]	983	---[1]
Unnamed Tributary to Stewart Creek Tributary 1					
At confluence with Stewart Creek Tributary 1	0.52	---[1]	---[1]	991	1,448
Unnamed Tributary to Stewart Creek Tributary 2					
At confluence with Stewart Creek Tributary 2	0.34	730	1,060	1,220	1,550
Unnamed Tributary to Stream PEC-1					
At confluence with Stream PEC-1	0.49	---[1]	---[1]	1,039	---[1]
Unnamed Tributary to Tributary GB-2					
Downstream of Parkview Lane Culvert	0.42	---[1]	---[1]	208	---[1]
Upstream of Parkview Lane Culvert	0.41	---[1]	---[1]	190	---[1]
Outflow out of West Pond	0.40	---[1]	---[1]	160	---[1]
Inflow to West Pond	0.40	---[1]	---[1]	935	---[1]
Veal Springs Branch					
Approximately 50 feet downstream of confluence of Griffiths Creek	1.32	1,600	2,150	2,400	2,950

Footnotes at end of table.

Table 5. Summary of Discharges (Cont'd)

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Veal Springs Branch - continued					
Approximately 50 feet upstream of confluence of Griffiths Creek	0.55	800	1,100	1,200	1,550
At F.M. 2181	0.36	550	750	800	1,000
Whites Branch					
Approximately 2.9 miles upstream of confluence with Denton Creek	2.60	2,490	3,810	4,340	5,570
Approximately 0.5 miles upstream of Stock Tank Dam	2.22	2,340	3,511	3,991	5,085
Approximately 1,080 feet upstream of Glenview Road	1.71	1,923	2,279	3,155	3,976
Wichita Creek					
Just downstream of confluence of Stream WC-2	1.74	---[1]	---[1]	3,359	---[1]
Just downstream of confluence of Stream WC-4	1.32	---[1]	---[1]	2,529	---[1]
Just downstream of confluence of Stream WC-5	1.13	---[1]	---[1]	2,121	---[1]
Just upstream of Clear Creek Drive	0.26	---[1]	---[1]	574	---[1]

Notes:

[1] Data not available / Not determined / Not computed
[2] Drainage area below Grapevine Lake
[3] Releases from Grapevine Lake emergency spillway
[4] Drainage area below Ray Roberts Lake
[5] Releases from Lewisville Lake
[6] Decreases in downstream discharge due to storage routing effects
[7] Data not applicable
[8] 380 cfs splits off at Loop 288
[9] Discharges decrease due to split flow to Diversion PEC-4A
[10] Discharges decrease due to split flow to Diversion PEC-4B

Footnotes at end of table.

Table 6. Summary of Stillwater Elevations

FLOODING SOURCE AND LOCATION	Elevation in feet (NAVD 88) 10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Detention Basin along unnamed tributary to Timber Creek				
Just upstream of King Road to approximately 650 feet upstream of King Road	---[1]	---[1]	633.1	634.3
Grapevine Lake				
At the Dam	554.0	562.3	564.0	568.4
Lewisville Lake				
At the Dam	529.5	535.0	537.0	541.0
Ponding Area 1				
At the Dam	642.7	643.5	643.7	644.1
Ray Roberts Lake				
At the Dam	639.5	644.0	645.5	649.0
SCS Reservoir No. 16				
At the Dam	675.6	678.1	679.4	680.7
SCS Reservoir No. 17A				
At the Dam	678.9	680.5	681.4	682.7
Unnamed Detention Pond				
Bounded by FM 720 to the east and Unnamed Tributary 2 to Cantrell Slough to the west	---[1]	---[1]	563.4	---[1]
West Pond				
At the Dam	---[1]	---[1]	658.9	---[1]

[1] Data not available

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.

Unless otherwise noted, WSELs of floods of the selected recurrence intervals were computed using the USACE HEC-2 or USACE HEC-RAS step-backwater computer program (References 20 and 38). Flood profiles were drawn showing computed WSELs for floods of the selected recurrence intervals.

Initial Countywide and Previous Studies

Water-surface profiles for Clear, Duck, Milam, Elizabeth, and North Hickory Creeks were computed using the USACE HEC-2 computer program. Discharges for Clear, Duck, and Elizabeth Creeks decreased going downstream due to increased storage capacity of the floodplain. Due to the meandering of the Clear Creek channel, the Flood Profiles (Exhibit 1) in some reaches follow a profile base line, not the channel. The profile base line represents the center of mass of the 1-percent-annual-chance flood.

WSELs of floods of the selected recurrence intervals for Copperas Branch and Hickory Creek Arm Tributaries 1 and 2 were computed using NRCS Technical Release No. 61, "WSP2 Computer Program" (Reference 39). Flood profiles were drawn showing computed WSELs for floods of the selected recurrence intervals. Cross sections used in the hydraulic analyses were field surveyed. Locations of selected cross sections used in the hydraulic analyses are shown on the flood profiles.

Roughness coefficients (Manning's "n" values) used in the hydraulic computations (shown in Table 7) were chosen by engineering judgment, based on aerial photographs and field observations of the channels and floodplain areas.

Cross sections for the backwater analyses of the streams studied by detailed methods were field surveyed. Cross sections were located at close intervals above and below bridges and culverts to compute the significant backwater effects of these structures.

Bridge data were obtained from Texas Department of Transportation plans, as well as field surveys and previous FIS models. To extend the cross sections to contain flow, 10-foot contour interval topographic maps were used whenever necessary (References 29, 40 and 41).

Fox Creek (Stream TC-1), Prairie Creek, Copperas Branch, and Milestone Ridge Tributary: Cross sections for revised portions were developed from topographic maps. Cross sections for Fox Creek (Stream, TC-1), Prairie Creek, and Copperas Branch were developed from topographic mapping at a scale of 1:200 with a contour interval of 2 feet and as-built plans of channelization (References 42, 43, and 44). Cross sections for Milestone Ridge Tributary were also determined using topographic mapping a scale of 1:200 with a contour interval of 2 feet (Reference 42).

Stream PC-2: Cross sections for were developed from topographic mapping (Reference 45).

Denton Creek: Cross-sectional data were digitized from aerial photographs flown in 1984 and field surveyed when needed. The HEC-2 model for Denton Creek was calibrated reasonably closely to the USGS stream gages. Due to the extreme meandering of Denton Creek in some reaches, profile base lines were established that represent the actual path of floodwaters during a 1-percent-annual-chance event. The USACE original HEC-2 models, which were modeled along the stream channels, were revised to follow the profile base lines. The original study used standard hydraulic analysis techniques for the particular type of hydraulic control to develop emergency spillway rating curves. For the Denton County restudy (Reference 25), emergency spillway rating curves were developed using HEC-2 backwater models, in lieu of any simplified or otherwise approximate methods. Principal spillway rating curves were developed using the standard hydraulic analysis techniques for the particular type for hydraulic control. A detailed description of the analyses can be found in the USACE, Fort Worth District's report (Reference 46).

Little Elm, Pecan, and Mustang Creeks and Doe Branch: Cross-sectional data were digitized from aerial photographs flown in 1984 and field surveyed when needed.

The USACE established reference points, in 1,000-foot increments, as a measuring technique along the streams studied by detailed methods. These reference points, while not appearing on the maps or in the field, were used in the development of the hydraulic models and in the location of the lettered cross sections. Thus, stream distances on the maps may not correspond exactly to stream distances as shown on the profiles and Floodway Data Tables.

Elm Fork Trinity River (Above Lewisville Lake): Starting WSELs were taken from the 1-percent-annual-chance stillwater elevation at Lewisville Lake Dam. The starting WSEL for the Elm Fork Trinity River Restudy completed on August 23, 2001 was determined from known WSELs. Channel and overbank roughness factors (Manning's "n" values) used in the hydraulic analyses were based on engineering judgment. The WSELs of the floods of the selected recurrence intervals were computed for all streams using HEC-RAS (Reference 38).

The hydraulic analysis for Trinity River, West Fork Trinity River, and Elm Fork Trinity River was revised using HEC-RAS version 2.2 (the previous analysis was performed with version 2.1).

The USACE extended the hydraulic analysis to include the Lake Lewisville Spillway tributary to Elm Fork Trinity River and made minor changes to the floodway delineation along Elm Fork Trinity River to correct errors made in the original study. This revision also incorporates changes to the floodplain boundaries along Elm Fork Trinity River based on updated topographic information submitted for several locations within the City of Carrollton.

Elm Fork Trinity River West Split Flow area around the downstream floodway landfill and Lewisville Lake Spillway: Starting WSELs were taken at the confluence of the Elm Fork Trinity River. The hydraulic analysis for Elm Fork Trinity River was revised using HEC-RAS version 2.2 (the previous analysis was performed with version 2.1). The split flow evaluation for the Elm Fork Trinity River West Split Flow Area was revised with accompanying changes to the BFEs.

Timber Creek Relief Channel: Starting WSELs were taken at the confluence of Timber Creek.

Denton Creek: Starting WSELs were taken from the known WSELs from Grapevine Lake estimated at the time the peak would occur on Denton Creek.

Clear Creek: The starting WSELs were taken from the profile of Elm Fork Trinity River and known WSELs from the previous revision of the FIS for Denton County, Texas and Incorporated Areas. The HEC-2 model for Clear Creek was calibrated reasonably closely to the USGS stream gage. Due to the extreme meandering of Clear Creek in some reaches, profile base lines were established that represent the actual path of floodwaters during a 1-percent-annual-chance event. The USACE original HEC-2 models were revised to follow the profile base lines.

North Hickory Creek: Starting WSELs were taken from the known WSELs from the previous revision of the FIS for Denton County, Texas and Incorporated Areas.

Little Elm Creek: The starting WSELs were taken from the known WSELs from Lewisville Lake estimated at the time the peak would occur on Little Elm Creek. The HEC-2 model for Little Elm Creek was calibrated reasonably closely to the USGS stream gage. Due to the extreme meandering of Little Elm Creek in some reaches, profile base lines were established that represent the actual path of floodwaters during a 1-percent-annual-chance event. The USACE original HEC-2 models were revised to follow the profile base lines.

Pecan Creek, Mustang Creek, and Doe Branch: Starting WSELs were computed using the slope/area method. Due to the extreme meandering of Mustang and Pecan Creeks in some reaches, profile base lines were established that represent the actual path of floodwaters during a 1-percent-annual-chance event. The USACE original HEC-2 models, which were modeled along the stream channels, were revised to follow the profile base lines.

Indian Creek: The starting WSELs were determined by the critical depth method.

Duck, Milam, and Elizabeth Creeks: Starting WSELs were computed using the slope-area method.

Copperas Branch: Starting WSELs were calculated using profile data taken from the City of Lewisville FIS (Reference 47).

Hickory Creek Arm Tributary 1: Starting WSELs were taken from stillwater elevations for Lake Lewisville.

Swisher Creek and Stream GS-1: The starting WSELs were determined from known WSELs. Channel and overbank roughness factors (Manning's "n" values) used in the hydraulic analyses were based on engineering judgment and are shown in Table 7, "Summary of Roughness Coefficient Values." The WSELs for the floods of the selected recurrence intervals were computed for all streams using HEC-RAS.

Starting WSELs for the remaining streams studied by detailed methods were either based on coincident condition elevations, the slope-area method, or elevations of an adjacent study.

Revised Analysis

Cooper Creek, Timber Creek, and Fletcher Branch, Stream CC-2: Cross-sectional data for portions were developed from field survey data. Additional data from prior hydraulic studies were incorporated into the final study. Hydraulic analyses were conducted using HEC-GeoRAS (References 48 and 49) and HEC-RAS Version 3.1.2 (Reference 50).

Indian Creek, Dudley Branch, Furneaux Creek and their tributaries through the City of Carrollton: These streams were studied by both detailed methods and enhanced approximate methods. This work was conducted by Halff Associates, Inc. and was completed in August 2006 (Reference 3). Detailed study streams and enhanced approximate streams are listed in Table 3, Scope of Revision. Hydraulic analyses were completed for the 10-, 4-, 2-, 1-, and 0.2-percent-annual-chance storms. HEC-RAS (Version 3.1.3, dated May 2005) steady flow computer models were developed for detailed study streams. Starting boundary conditions for all streams were computed using the normal depth (slope-area) method. The adjusted floodways presented in this study were computed using equal conveyance reduction from each floodplain (left or right) whenever possible. The floodway models started with the normal depth method. In the Dudley and Indian Creek Watersheds, a new floodway was computed based on Method 4, equal conveyance reduction, whenever feasible.

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

Table 7 shows the Manning's "n" ranges for the streams in this revision. Roughness coefficients (Manning's "n") used in the hydraulic computations were chosen based on field investigations, photographs, and aerial photographs.

Table 7. Summary of Roughness Coefficients

Stream	Channel "n"	Overbank "n"
Bakers Branch	0.060 – 0.075	0.070 – 0.095
Bryant Branch	0.055 – 0.065	0.075 – 0.085
Clear Creek	0.045 – 0.055	0.070 – 0.090
Clear Creek (U/S of Interstate Hwy 35)	0.055 – 0.065	0.075 – 0.090
Cooper Creek	0.035 – 0.078	0.048 – 0.093
Copperas Branch	0.020 – 0.070	0.050 – 0.090
Cottonwood Branch	0.030 – 0.055	0.060 – 0.090
Cottonwood Branch Tributary 1	0.030 – 0.055	0.060 – 0.090
Culp Branch	0.040 – 0.060	0.060 – 0.150
Denton Creek (Below Grapevine Lake)	0.030 – 0.060	0.040 – 0.090
Denton Creek (Above Grapevine Lake)	0.030 – 0.060	0.040 – 0.090
Doe Branch	0.035 – 0.060	0.065 – 0.085
Dry Fork Hickory Creek	0.055 – 0.060	0.040 – 0.060
Duck Creek	--[1]	--[1]
Dudley Branch	0.013 – 0.050	0.013 – 0.120
Elizabeth Creek	0.065	0.090
Elm Fork Trinity River (Above Lewisville Lake)	0.055 – 0.150	0.065 – 0.150
Elm Fork Trinity River (Below Lewisville Lake)	0.030 – 0.120	0.030 – 0.180
Elm Fork Trinity River West Split Flow Area	0.030 – 0.100	0.030 – 0.150
Fincher Branch	0.045 – 0.065	0.045 – 0.085
Fletcher Branch	0.046 – 0.077	0.042 – 0.099
Fox Creek (Stream TC-1)	0.020 – 0.055	0.050 – 0.080
Furneaux Creek (Detailed)	0.013 – 0.080	0.013 – 0.120
Furneaux Creek (Enhanced Type I)	0.035 – 0.060	0.035 – 0.065
Golf Course Creek	--[1]	--[1]
Graveyard Branch	0.055 – 0.060	0.065 – 0.075
Griffiths Creek	0.065	0.075
Harriet Creek	--[1]	--[1]
Hickory Creek	0.045 – 0.080	0.060 – 0.080
Hickory Creek Arm Tributary 1	0.040 – 0.060	0.060 – 0.085
Hickory Creek Arm Tributary 2	0.040 – 0.060	0.060 – 0.085
Indian Creek (At Grapevine Lake)	0.013 – 0.090	0.030 – 0.110
Indian Creek (Incl. Bypass Channel)	0.035 – 0.120	0.025 – 0.120
Indian Creek Levee Channel	0.035 – 0.035	0.035 – 0.120
Lake Lewisville Spillway	0.045 – 0.090	0.055 – 0.110
Little Elm Creek	0.035 – 0.065	0.060 – 0.090
Loving Branch	0.045 – 0.075	0.045 – 0.085
Lynchburg Creek	0.050 – 0.070	0.075 – 0.090
Marshall Branch	0.030 – 0.075	0.065 – 0.090
McKamy Creek	--[1]	--[1]
McWhorter Creek	--[1]	--[1]
Milam Creek	0.060 – 0.075	0.065 – 0.090

Table 7. Summary of Roughness Coefficients (Cont'd)

Stream	Channel "n"	Overbank "n"
Milestone Ridge Tributary	0.060	0.060
Mustang Creek	0.045 – 0.065	0.065 – 0.100
North Hickory Creek	0.050 – 0.055	0.070 – 0.085
North Hickory Creek (U/S of FM 156)	0.050 – 0.070	0.080 – 0.085
North Pecan Creek	0.020 – 0.065	0.050 – 0.090
Office Creek	0.065 – 0.070	0.085 – 0.095
Pecan Creek (Above Little Elm Creek)	0.050 – 0.065	0.050 – 0.065
Pecan Creek (Above SCS Dam No. 16)	0.045 – 0.065	0.045 – 0.090
Pecan Creek (Below SCS Dam No. 16)	0.045 – 0.065	0.045 – 0.090
Poindexter Branch	--[1]	--[1]
Prairie Creek	0.030 – 0.065	0.070 – 0.075
Sharps Branch	0.065 – 0.070	0.085 – 0.100
Stewart Creek	0.030 – 0.055	0.060 – 0.090
Stewart Creek Tributary 1	0.030 – 0.055	0.060 – 0.090
Stewart Creek Tributary 2	0.030 – 0.075	0.060 – 0.090
Stewart Creek Tributary 3	0.030 – 0.055	0.060 – 0.090
Stream 6D3	0.020 – 0.075	0.035 – 0.100
Stream 6E1	0.027 – 0.090	0.027 – 0.120
Stream 6E2	0.015 – 0.070	0.013 – 0.120
Stream 6E5 (Tributary FD-FE)	0.015 – 0.080	0.015 – 0.080
Stream 6F1	0.013 – 0.045	0.013 – 0.120
Stream 6I7	0.040 – 0.055	0.035 – 0.120
Stream CC-1	0.060	0.060 – 0.080
Stream CC-2	0.040 – 0.050	0.040 – 0.100
Stream DF-1	0.055	0.060
Stream DF-2	0.035 – 0.060	0.045 – 0.070
Stream DF-3	0.050	0.060
Stream FB-1	0.065	0.055 – 0.070
Stream GS-1	0.035 – 0.065	0.050 – 0.085
Stream HC-1	0.040 – 0.060	0.040 – 0.065
Stream IC-1	0.015 – 0.055	0.040 – 0.100
Stream IC-1A	0.015 – 0.050	0.070 – 0.100
Stream LC-1	0.040 – 0.060	0.040 – 0.060
Stream PC-1	0.055	0.060
Stream PC-2	0.050	0.070 – 0.080
Stream PC-3	0.055	0.055 – 0.060
Stream PEC-1	0.040 – 0.060	0.040 – 0.070
Stream PEC-1A	0.060	0.060
Stream PEC-2	0.045 – 0.055	0.060 – 0.065
Stream PEC-3	0.060	0.070 – 0.090
Stream PEC-4	0.020 – 0.050	0.040 – 0.090
Stream PEC-5	--[1]	--[1]
Stream SB-1	0.070	0.100
Stream SC-1	0.055 – 0.065	0.060 – 0.085

Table 7. Summary of Roughness Coefficients (Cont'd)

Stream	Channel "n"	Overbank "n"
Stream SC-1A	0.012 – 0.060	0.045 – 0.085
Stream TC-2	0.050 – 0.055	0.080
Stream TC-2A	--[1]	--[1]
Stream WB-1	0.045 – 0.085	0.055 – 0.095
Stream WC-2	--[1]	--[1]
Stream WC-4	--[1]	--[1]
Stream WC-5	--[1]	--[1]
Summit Channel	--[1]	--[1]
Swisher Creek	0.030 – 0.065	0.040 – 0.085
Timber Creek	0.028 – 0.058	0.037-0.090
Timber Creek Relief Channel	0.080	0.050 – 0.055
Tributary 1 to McKamy Creek	--[1]	--[1]
Veal Springs Branch	0.065	0.085
Whites Branch	0.065 – 0.080	0.065 – 0.100
Wichita Creek	--[1]	--[1]

[1] Data not available

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.

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 Denton County is +0.06 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 redelineated using the flood elevations determined at each cross section. Triangular Irregular Networks (TINs) water surfaces were created from the base flood elevation data collected in this study, and intersected with the ground surface to develop revised floodplain boundary delineations.

Light Detection and Ranging (LiDAR) topographical ground surface data for Denton County were procured from the North Central Texas Council of Governments (Reference 51). The 2001 LiDAR bare earth data represents the best available topographic data source for Denton County, and all of the new floodplain boundaries are based on the 2001 LiDAR topographic data.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and 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 (Exhibit 2).

Redelineation of floodplain boundaries derived by approximate methods used a technique of elevation transfer to digital format. Floodplain boundary elevation extraction utilizes two points of equal elevation from a USGS 7.5 quadrangle map (Reference 52), which formed a line perpendicular to theoretical floodplain flow; and this water surface isopleth is coincident at either end of the FIRM floodplain boundary. Water surface TINs are created from a collection of the isopleths. Redelineation of the areas by approximate method did not involve any restudy. Prior methods used for ascertaining floodplain boundaries, through approximate methods, are discussed in the following paragraphs.

For the streams studied by approximate methods through the City of Corinth, the boundary of the 1-percent-annual-chance flood was taken from the City's Master Drainage Study, with Zone A up to the extent of the Zone A on the previous effective FIRM, and shaded Zone X beyond that (Reference 53).

For the streams studied by approximate methods through the City of Carrollton, the boundary of the 1-percent-annual-chance flood was delineated by Halff Associates, Inc. using the City's 2-foot aerial topographic maps (References 2 and 3), and engineering judgment.

Approximate 1-percent-annual-chance floodplain boundaries in some portions of the study area were delineated using the previously printed Flood Insurance Studies for each community.

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 (Table 8, 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.

Floodways were not delineated for the portions of the following streams located within the government property fee and/or flowage easement boundary since the USACE floodplain regulations are more restrictive: Bryant Branch, Bakers Branch, Culp Branch, and portions of the Elm Fork Trinity River (above Lewisville Lake). Floodways were also not delineated inside the government flowage easements for Lewisville Lake and Grapevine Lake.

Floodways for Clear, Duck, Milam, Elizabeth, and North Hickory Creeks were computed on the basis of equal-conveyance reduction from each side of the floodplain, using the HEC-2 computer program. The floodways for Copperas Branch and Hickory Creek Arm Tributaries 1 and 2 were computed for each valley cross section on the basis of equal-conveyance reduction from each side of the floodplain, using SCS Technical Release No. 64, "Floodway Determination Computer Program" (Reference 54). The WSP2 computer program was then used to determine the actual WSELs within the floodway. The floodway width was then adjusted to obtain as nearly as possible a 1-foot increase in the 1-percent-annual-chance flood elevations. Floodways were not delineated inside government flowage easements.

Floodway widths for the Elm Fork Trinity River Restudy (August 23, 2001) were determined at each cross section based on equal conveyance reduction, and between cross sections the floodway boundaries were interpolated. The revised floodplain and floodway boundaries for the Elm Fork Trinity River were delineated on topographic maps at a scale of 1"=500', with a contour interval of 2 feet, created from aerial photography surveys in February 1991.

Floodway widths for Swisher Creek and Stream GS-1 were determined at each cross section based on equal conveyance reduction, and between cross sections the floodway boundaries were interpolated. The revised floodplain and floodway boundaries for Swisher Creek and Stream GS-1 were delineated on topographic maps at a scale of 1"= 400', with a contour interval of 5 feet.

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 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.

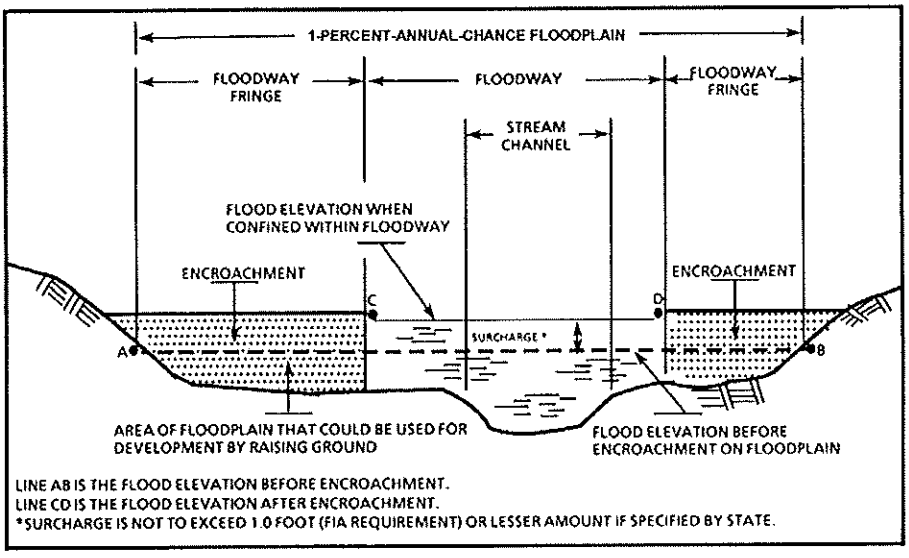

Figure 1. Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Bakers Branch								
A	3,570[1]	210	1,459	3.9	477.1	477.1	477.6	0.5
B	6,421[1]	149	1,476	3.8	485.9	485.9	486.7	0.8
C	8,230[1]	99	1,090	5.2	493.6	493.6	494.4	0.8
D	10,180[1]	80	688	8.2	504.7	504.7	505.5	0.8
E	11,690[1]	80	805	4.8	521.6	521.6	522.3	0.7
F	12,700[1]	100	682	5.6	529.0	529.0	529.8	0.8
G	13,650[1]	70	602	5.5	532.2	532.2	532.8	0.6
H	15,070[1]	80	542	6.1	540.7	540.7	541.3	0.6
I	16,240[1]	99	573	4.0	550.0	550.0	550.4	0.4
J	18,250[1]	35	283	8.1	557.3	557.3	557.3	0.0
Bryant Branch								
A	3,170[2]	*[3]	*[3]	*[3]	538.5	538.5	539.5	1.0
B	5,290[2]	250	13,384	2.7	548.4	548.4	549.3	0.9
C	6,700[2]	250	20,238	1.8	573.4	573.4	573.4	0.0
D	7,930[2]	230	15,983	0.4	573.4	573.4	573.4	0.0

[1] Feet above confluence with Denton Creek

[2] Feet above City of Corinth corporate limits

[3] Floodway within government property fee and/or flowage easement limits

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Bakers Branch - Bryant Branch

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
Clear Creek								
A	12,100 [1]	2,611	22,900	4.0	542.4	542.4	543.3	0.9
B	14,050 [1]	2,253	20,467	4.4	545.9	545.9	546.6	0.7
C	16,650 [1]	2,613	24,874	3.7	550.1	550.1	550.8	0.7
D	18,250 [1]	3,431	27,735	3.3	552.2	552.2	553.1	0.9
E	20,250 [1]	3,767	32,304	2..8	554.6	554.6	555.6	1.0
F	24,370 [1]	4,119	58,629	1.6	560.6	560.6	560.9	0.3
G	26,820 [1]	2,369	19,819	4.6	561.7	561.7	562.2	0.5
H	29,170 [1]	2,955	27,700	3.3	565.8	565.8	566.7	0.9
I	33,470 [1]	2,988	31,510	2.9	574.6	574.6	575.5	0.9
J	36,845 [1]	2,837	25,776	3.6	578.7	578.7	579.7	1.0
K	41,655 [1]	1,963	29,646	3.1	590.2	590.2	590.9	0.7
L	43,755 [1]	2,095	28,276	3.3	591.7	591.7	592.4	0.7
M	47,555 [1]	2,501	28,626	3.2	595.0	595.0	595.6	0.6
N	49,705 [1]	2,347	23,142	4.0	598.0	598.0	598.8	0.8
O	54,990 [1]	3,371	33,448	2.8	604.6	604.6	605.3	0.7
P	57,240 [1]	3,661	33,849	2.7	606.5	606.5	607.3	0.8
Q	60,565 [1]	3,853	51,991	1.8	611.9	611.9	612.8	0.9
R	63,065 [1]	3,277	39,022	2.4	618.0	618.0	618.7	0.7
S	64,265 [2]	2,713	27,836	3.3	619.8	619.8	620.3	0.5
T	66,905 [2]	2,822	25,870	3.4	622.8	622.8	623.7	0.9
U	72,065 [2]	3,560	29,944	2.9	627.6	627.6	628.5	0.9
V	76,225 [2]	3,837	35,563	2.5	630.0	630.0	631.0	1.0
W	78,535 [2]	2,944	24,845	3.5	632.3	632.3	633.1	0.8
X	81,535 [2]	2,604	21,393	4.1	636.8	636.8	637.6	0.8
Y	83,285 [2]	2,266	17,601	5.0	639.8	639.8	640.4	0.6
Z	84,785 [2]	2,147	19,889	4.4	647.3	647.3	647.9	0.6

[1] Feet above Elm Fork Trinity River along profile base line

[2] Feet above confluence with Elm Fork Trinity River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Clear 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
Clear Creek (cont'd)								
AA	86,835	2,182	15,065	5.8	650.9	650.9	651.5	0.6
AB	91,095	1,999	23,312	3.3	657.6	657.6	658.4	0.8
AC	93,375	2,155	25,293	3.5	661.0	661.0	661.7	0.7
AD	94,825	2,109	24,415	3.6	662.6	662.6	663.4	0.8
AE	97,025	2,167	24,939	3.5	665.5	665.5	666.3	0.8
AF	102,585	2,340	29,254	3.0	673.5	673.5	674.3	0.8
AG	105,955	1,847	22,017	4.0	676.8	676.8	677.6	0.8
AH	109,875	1,795	20,635	4.3	681.9	681.9	682.8	0.9
AI	114,455	1,792	24,431	3.6	689.7	689.7	690.5	0.8
AJ	118,795	1,857	27,739	3.2	693.7	693.7	694.7	1.0
AK	120,635	1,880	23,490	3.7	695.4	695.4	696.4	1.0
AL	122,655	2,175	27,398	3.2	697.5	697.5	698.5	1.0

[1] Feet above confluence with Elm Fork Trinity River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Clear 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
Cooper Creek								
A	1,613 [1]	614	3,219	3.1	542.8	542.8	542.8	0.0
B	3,456 [1]	568	3,381	3.0	547.2	547.2	547.2	0.0
C	9,167 [1]	956	5,751	1.8	561.4	561.4	561.4	0.0
D	11,244 [1]	575	2,566	3.9	565.1	565.1	565.1	0.0
E	12,342 [1]	560	3,926	2.3	568.9	568.9	569.4	0.5
F	13,158 [1]	505	3,029	3.0	570.3	570.3	571.0	0.7
G	14,598 [1]	418	3,029	3.0	574.5	574.5	575.0	0.5
H	17,187 [1]	436	2,261	3.1	581.0	581.0	581.4	0.4
I	18,597 [1]	464	2,488	2.8	585.3	585.3	585.4	0.1
J	20,540 [1]	224	1,224	4.7	590.6	590.6	590.9	0.2
K	22,889 [1]	160	1,081	5.3	599.4	599.4	599.8	0.4
L	24,855 [1]	148	716	6.7	604.4	604.4	604.4	0.0
M	28,224 [1]	278	738	3.8	621.0	621.0	621.2	0.2
N	31,281 [1]	119	423	6.7	635.2	635.2	635.3	0.1
O	33,126 [1]	78	280	2.8	642.8	642.8	643.0	0.1
P	34,817 [1]	125	202	3.8	651.8	651.8	651.8	0.0
Copperas Branch								
A	12,555 [2]	80	347	5.5	559.7	559.7	559.9	0.2
B	13,900 [2]	58	288	5.1	568.9	568.9	569.9	1.0
C	14,265 [2]	38	149	4.3	570.2	570.2	571.0	0.8
D	14,376 [2]	32	166	3.9	573.6	573.6	573.6	0.0
E	14,736 [2]	27	128	5.0	574.6	574.6	574.8	0.2
F	14,850 [2]	91	388	1.7	577.7	577.7	577.7	0.0
G	15,510 [2]	22	105	5.7	580.7	580.4	580.7	0.3

[1] Feet upstream of Lake Lewisville

[2] Feet above confluence with Lake Lewisville

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Cooper Creek - Copperas Branch

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
Cottonwood Branch								
A	2,673 [1]	1,100	12,338	0.8	552.1	552.1	552.1	0.0
B	8,700 [1]	380	1,337	7.6	556.4	556.4	556.6	0.2
C	17,920 [1]	609	2,366	3.3	576.0	576.0	577.0	1.0
D	25,335 [1]	492	2,378	3.2	598.1	598.1	598.8	0.7
E-G	-- [2]	-- [2]	-- [2]	-- [2]	-- [2]	-- [2]	-- [2]	-- [2]
Cottonwood Branch Tributary 1								
A	650 [3]	100	886	3.2	558.9	558.9	559.9	1.0
B	7,056 [3]	85	603	5.3	583.9	583.9	583.9	0.0
Denton Creek (Above Grapevine Lake)								
A	170,385 [4]	2,525	22,797	3.1	582.9	582.9	582.9	0.0
B	172, 335 [4]	2,043	16,040	4.4	585.5	585.5	585.6	0.1
C	177,265 [4]	2,225	23,434	3.0	592.5	592.5	592.5	0.0
D	188,885 [4]	3,260	33,137	2.1	600.9	600.9	601.3	0.4
E	192,685 [4]	2,350	20,237	3.5	607.5	607.5	607.9	0.4
F	195,305 [4]	2,270	20,005	3.5	610.5	610.5	611.1	0.6
G	197,905 [4]	2,000	17,589	4.0	614.5	614.5	615.2	0.7
H	200,355 [4]	2,386	21,272	3.1	620.6	620.6	621.1	0.5
I	204,055 [4]	3,330	29,175	2.7	624.4	624.4	624.9	0.5
J	206,330 [4]	2,530	20,055	3.3	626.1	626.1	627.0	0.9
K	209,725 [4]	2,207	24,275	2.7	633.1	633.1	633.4	0.3
L	212,125 [4]	1,900	17,359	3.8	635.5	635.5	636.1	0.6
M [5]								

[1] Feet above confluence of Cottonwood Branch Tributary 2

[2] Cross sections E through G located in Collin County

[3] Feet above confluence with Cottonwood Branch

[4] Feet above confluence with Elm Fork Trinity River along profile base line

[5] Cross-section M upstream of limit of floodway

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Cottonwood Branch - Cottonwood Branch Tributary 1
Denton Creek (Above Grapevine Lake)

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
Denton Creek (Below Grapevine Lake)								
A	21,260 [2]	434	6,816	4.1	453.3	453.3	453.4	0.1
B	22,370 [2]	337	5,026	4.1	453.5	453.5	453.6	0.1
C-E [1]								
F	39,200 [2]	499	3,198	3.2	468.3	468.3	468.8	0.5
G	47,210 [2]	1,300	5,966	1.6	470.4	470.4	471.1	0.7
Doe Branch								
A	40,600 [3]	1,100	8,589	1.8	931.6	931.6	932.5	0.9
B	43,800 [3]	628	5,443	2.9	932.6	932.6	933.5	0.9
C	46,200 [3]	566	4,101	3.8	555.9	555.9	556.9	1.0
D	51,100 [3]	500	4,155	3.8	566.0	566.0	566.7	0.7
Dry Fork Hickory Creek								
A	4,750 [4]	675	3,549	4.9	581.0	580.3 [5]	581.2 [5]	0.9
B	6,500 [4]	450	3,699	4.2	587.0	587.0	587.4	0.4
C	8,600 [4]	500	3,942	3.7	592.0	592.0	593.0	1.0
D	10,750 [4]	326	2,884	5.1	597.8	597.8	598.1	0.3
E	13,700 [4]	425	2,766	5.2	604.5	604.5	605.5	1.0
F	16,550 [4]	350	2,998	4.8	613.5	613.5	614.0	0.5
G	18,600 [4]	425	3,412	4.2	615.6	615.6	616.4	0.8
H	20,400 [4]	450	2,869	5.0	619.5	619.5	620.0	0.5
I	24,080 [4]	400	2,784	3.8	625.6	625.6	626.1	0.5
J	28,990 [4]	300	1,493	4.6	637.1	637.1	637.9	0.8
K	34,300 [4]	599	2,259	3.1	649.2	649.2	649.6	0.4
L	38,700 [4]	410	2,698	2.3	660.7	660.7	661.7	1.0

[1] Cross sections C through E are located in Dallas County

[2] Feet above confluence with Elm Fork Trinity River

[3] Feet above Little Elm Creek

[4] Feet above confluence with Hickory Creek

[5] Elevation computed without consideration of backwater from Hickory Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Denton Creek (Below Grapevine Lake) - Doe Branch
Dry Fork Hickory 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
Duck Creek								
A	4,800	741	4,094	4.0	623.0	620.6[2]	621.5[2]	0.9
B	7,290	462	3,996	4.0	624.0	624.0	624.6	0.6
C	8,320	419	3,241	4.9	625.4	625.4	626.1	0.7
D	9,190	480	3,826	4.2	627.5	627.5	628.2	0.7
E	10,100	562	3,763	4.2	629.8	629.8	630.4	0.6
F	11,830	615	4,729	3.4	633.8	633.8	634.8	1.0
G	12,860	533	4,297	3.7	635.3	635.3	636.3	1.0
H	13,820	524	4,038	4.4	637.4	637.4	638.2	0.8
I	15,110	440	4,397	4.0	639.6	639.6	640.6	1.0
J	16,000	357	3,090	5.7	641.6	641.6	642.6	1.0
K	16,840	377	3,235	5.4	644.3	644.3	645.1	0.8
L	17,380	418	3,244	5.4	645.8	645.8	646.7	0.9
M	19,820	642	4,452	3.9	653.4	653.4	654.1	0.7
N	21,400	543	4,360	4.5	656.2	656.2	657.0	0.8
O	22,260	497	3,514	5.5	658.8	658.8	659.4	0.6
P	23,630	467	4,044	4.8	663.5	663.5	664.2	0.7
Q	25,080	519	4,140	4.7	667.0	667.0	667.9	0.9
R	26,160	534	4,357	4.5	670.2	670.2	671.1	0.9
S	27,160	562	5,258	3.7	672.0	672.0	673.0	1.0
T	28,330	452	3,371	5.8	674.8	674.8	675.7	0.9
U	29,770	461	3,781	5.1	680.2	680.2	681.2	1.0
V	31,470	449	3,741	5.2	685.4	685.4	686.3	0.9
W	33,020	682	4,931	3.9	690.9	690.9	691.9	1.0

[1] Feet above confluence with Clear Creek

[2] Water-surface elevation computed without consideration of backwater effects from Clear Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Duck 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
Dudley Branch								
A	6,437[1]	151	1,061	8.1	453.8	453.8	454.7	0.9
B	8,103[1]	150	1,280	6.7	459.7	459.7	460.1	0.4
C	9,026[1]	169	1,775	4.0	466.2	466.2	466.5	0.3
D	13,235[1]	179	1,056	6.7	479.4	479.4	479.4	0.0
E	15,661[1]	113	766	5.5	488.8	488.8	489.1	0.3
F	17,894[1]	106	573	4.7	501.4	501.4	501.4	0.0
G	23,163[1]	103	441	3.3	538.5	538.5	538.5	0.0
Elizabeth Creek								
A	6,175[2]	2,640	16,588	3.5	570.8	570.8	571.8	1.0
B	8,030[2]	2,451	19,448	3.0	574.2	574.2	575.2	1.0
C	9,745[2]	2,340	17,410	3.3	577.5	577.5	578.4	0.9
D	12,245[2]	2,148	22,711	2.7	583.2	583.2	583.6	0.4
E	13,855[2]	2,191	18,581	3.3	584.7	584.7	585.3	0.6
F	17,060[2]	1,873	16,174	2.3	588.2	588.2	589.1	0.9
G	18,900[2]	1,482	13,111	2.8	590.1	590.1	591.0	0.9
H	20,000[2]	997	6,420	5.7	596.0	596.0	596.4	0.4
I	22,560[2]	940	9,279	4.0	604.6	604.6	605.3	0.7
J	24,180[2]	930	10,664	3.6	608.2	608.2	608.9	0.7
K	25,570[2]	787	7,957	4.8	611.0	611.0	611.7	0.7
L	27,260[2]	697	8,045	4.7	615.1	615.1	615.9	0.8
M	29,000[2]	670	7,316	5.2	619.1	619.1	620.0	0.9
N	30,720[2]	626	6,620	4.1	624.5	624.5	625.5	1.0
O	33,410[2]	855	6,821	4.0	631.5	631.5	632.4	0.9

[1] Feet above confluence with Elm Fork of the Trinity River

[2] Feet above confluence with Denton Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Dudley Branch - Elizabeth 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
Elizabeth Creek (Continued)								
P	34,780 [1]	659	4,943	5.6	638.1	638.1	638.8	0.7
Q	36,680 [1]	799	9,194	3.0	649.9	649.9	649.9	0.0
R	37,710 [1]	709	7,404	3.7	650.9	650.9	651.2	0.3
S	39,390 [1]	624	6,818	4.0	653.4	653.4	653.8	0.4
T	40,750 [1]	625	5,155	5.4	656.6	656.6	657.2	0.6
U	42,780 [1]	869	8,206	3.5	663.0	663.0	663.8	0.8
V	43,970 [1]	800	6,118	4.7	666.2	666.2	666.9	0.7
W	45,190 [1]	983	7,770	3.7	670.1	670.1	670.9	0.8
X	46,770 [1]	1,021	7,662	3.7	675.2	675.2	676.0	0.8
Y	49,450 [1]	944	7,186	3.8	685.4	685.4	686.4	1.0
Z	51,830 [1]	773	5,766	4.7	693.2	693.2	694.2	1.0
AA	52,405 [1]	691	4,679	5.8	695.2	695.2	695.9	0.7
AB	53,750 [1]	544	5,538	4.9	701.4	701.4	702.2	0.8
AC	54,745 [1]	546	5,229	5.2	704.9	704.9	705.6	0.7
AD	56,770 [1]	700	6,859	3.7	713.0	713.0	714.0	1.0
AE	59,250 [1]	648	6,676	3.8	722.8	722.8	723.8	1.0
AF	61,980 [1]	474	4,705	4.6	731.0	731.0	731.8	0.8

[1] Feet above confluence with Denton Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Elizabeth 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
Elm Fork Trinity River (Above Lk. Lewisville)								
A	38,575 [1]	2,600	7,467	2.0	545.2	545.2	546.2	1.0
B	46,400 [1]	213	2,751	2.9	548.4	548.4	549.3	0.9
Elm Fork Trinity River (Below Lk. Lewisville)								
U	112,494 [2]	5,390	21,737	1.0	451.5	451.5	451.9	0.4
V	124,975 [2]	2,789	13,353	1.6	452.7	452.7	453.0	0.3
W	130,377 [2]	608	5,753	3.0	454.2	454.2	454.2	0.0
X	135,370 [2]	210	2,680	3.4	455.7	455.7	456.0	0.3
Y	139,643 [2]	2,890	6,767	3.1	458.8	458.8	458.8	0.0
Z	146,373 [2]	2,796	12,063	1.7	461.2	461.2	461.2	0.0

[1] Feet above Missouri-Pacific Railroad
[2] Feet above confluence with West Fork Trinity River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Elm Fork Trinity River (Above Lake Lewisville) -
Elm Fork Trinity River (Below Lake Lewisville)

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
Fincher Branch								
A	2,930 [1]	250	1,070	7.6	552.0	552.0	552.2	0.2
B	10,200 [1]	280	1,420	4.6	577.1	577.1	577.4	0.3
C	12,350 [1]	280	1,718	3.8	584.3	584.3	585.2	0.9
D	15,120 [1]	250	1,440	4.1	594.4	594.4	595.4	1.0
E	17,890 [1]	289	1,531	3.1	604.1	604.1	604.9	0.8
F	24,460 [1]	300	1,970	1.7	623.5	623.5	624.4	0.9
G	26,850 [1]	150	647	3.4	629.5	629.5	630.3	0.8
Fletcher Branch								
A	1,998 [1]	403	1,282	3.9	554.5	554.5	554.5	0.0
B	5,706 [1]	250	954	3.5	566.6	566.6	567.1	0.5
C	8,760 [1]	193	616	4.1	579.4	579.4	579.7	0.3
D	10,028 [1]	163	586	4.3	586.0	586.0	586.0	0.0
E	11,476 [1]	250	1,693	1.4	600.3	600.3	600.4	0.1
F	14,549 [1]	194	488	4.4	610.1	610.1	610.8	0.7
G	15,806 [1]	305	2,031	1.1	619.7	619.7	620.2	0.5
H	18,415 [1]	217	791	2.7	627.1	627.1	627.9	0.8
I	20,365 [1]	200	334	6.5	636.8	636.8	636.9	0.1
Fox Creek (Stream TC-1)								
A	2,520 [2]	102	532	7.1	482.0	481.6 [3]	481.6 [3]	0.0
B	3,970 [2]	117	552	5.5	488.3	488.3	488.3	0.0
C	5,360 [2]	72	350	8.6	500.4	500.4	500.4	0.0
D	7,405 [2]	48	218	12.0	512.1	512.1	512.6	0.5
E	8,355 [2]	41	204	12.8	519.8	519.8	520.3	0.5
F	9,765 [2]	35	128	11.6	530.3	530.3	530.3	0.0

[1] Feet above confluence with Hickory Creek

[2] Feet above confluence with Timber Creek

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

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Fincher Branch - Fletcher Branch - Fox Creek (Stream TC-1)

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Furneaux Creek								
A	2,343	620	3,892	6.0	450.3	450.3	450.3	0.0
B	4,605	782	3,724	3.9	455.0	455.0	455.0	0.0
C	5,982	282	2,916	5.0	456.5	456.5	456.6	0.1
D	7,014	190	1,655	8.8	458.1	458.1	458.4	0.3
E	7,946	189	1,847	7.9	460.1	460.1	460.9	0.8
F	9,154	273	2,442	6.0	462.4	462.4	463.3	0.9
G	10,973	394	3,075	4.8	471.0	471.0	471.1	0.1
H	13,258	344	2,630	5.6	476.4	476.4	476.4	0.0
I	14,578	383	1,744	8.3	478.7	478.7	479.5	0.8
J	15,534	376	1,389	10.5	483.3	483.3	483.3	0.0
K	16,953	184	1,148	6.8	489.7	489.7	490.5	0.8
L	18,222	319	1,316	5.7	493.4	493.4	494.0	0.6
M	18,904	269	1,079	7.0	496.9	496.9	497.8	0.9
N	19,786	67	500	15.0	504.2	504.2	504.2	0.0
O	20,404	250	2,129	3.5	509.3	509.3	509.3	0.0
P	21,689	374	786	5.7	513.8	513.8	513.8	0.0
Q	22,634	360	1,542	4.9	515.4	515.4	515.4	0.0
R	23,116	241	963	11.3	519.0	519.0	519.0	0.0
S	24,153	346	3,219	2.5	525.2	525.2	525.7	0.5
T	25,155	238	1,865	4.3	526.7	526.7	527.4	0.7
U	26,526	232	1,573	4.0	530.6	530.6	530.8	0.2
V	28,886	249	1,581	4.0	539.6	539.6	539.7	0.1
W	31,247	68	446	7.7	548.8	548.8	549.1	0.3

[1] Feet above confluence with Elm Fork Trinity River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Furneaux 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
Golf Course Creek								
A	732 [1]	81	406	7.6	564.6	564.6	564.6	0.0
B	2,171 [1]	165	972	3.2	578.2	578.2	578.9	0.7
C	3,733 [1]	179	1,082	2.9	592.9	592.9	593.6	0.7
D	6,165 [1]	60	191	10.2	612.4	612.4	612.4	0.0
Graveyard Branch								
A	13,500 [2]	375	1,965	4.3	618.2	618.2	618.6	0.4
B	20,140 [2]	230	536	5.8	644.3	644.3	644.5	0.2
C	22,340 [2]	200	691	4.1	653.8	653.8	654.3	0.5
Griffiths Creek								
A	2,070 [3]	100	349	4.0	547.6	547.6	547.9	0.3
B	2,350 [3]	49	201	7.5	552.8	552.8	553.0	0.2
Hickory Creek								
A	11,500 [4]	1,200	13,606	3.5	560.6	560.6	560.8	0.2
B	15,190 [4]	1,500	17,083	2.8	563.6	563.6	564.1	0.5
C	17,240 [4]	1,099	10,902	4.3	564.8	564.8	565.5	0.7
D	19,790 [4]	1,099	12,236	3.8	567.9	567.9	568.6	0.7
E	32,420 [4]	1,700	14,513	3.2	579.9	579.9	580.5	0.6
F	38,500 [4]	2,200	16,759	2.4	586.6	586.6	587.1	0.5
G	43,120 [4]	900	6,159	6.7	593.5	593.5	594.2	0.7
H	49,050 [4]	400	4,935	8.3	602.7	602.7	603.1	0.4
I	50,750 [4]	500	7,092	5.8	608.3	608.3	608.7	0.4
J	52,700 [4]	900	12,423	3.3	611.3	611.3	611.9	0.6
K	54,230 [4]	1,350	16,794	2.5	612.2	612.2	612.9	0.7
L	56,140 [4]	1,100	10,962	3.8	613.5	613.5	614.3	0.8
M	58,110 [4]	1,100	13,444	3.1	615.8	615.8	616.7	0.9

[1] Feet above confluence with Marshall Branch

[2] Feet above confluence with Hickory Creek

[3] Feet above confluence with Veal Springs Branch

[4] Feet above confluence with Loving Branch

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Golf Course Creek - Graveyard Branch - Griffiths Creek - Hickory 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
Hickory Creek Arm Tributary 1								
A	815 [1]	33	227	4.1	537.0	537.0	538.0	1.0
B	888 [1]	33	204	4.6	537.3	537.3	538.2	0.9
C	1,228 [1]	43	178	5.7	538.5	538.5	539.4	0.9
D	1,571 [1]	18	64	9.1	541.0	541.0	541.3	0.3
E	2,351 [1]	25	76	5.8	552.0	552.0	552.1	0.1
Hickory Creek Arm Tributary 2								
A	81 [2]	10	58	5.0	539.2	539.2	540.0	0.8
B	551 [2]	12	47	5.2	543.8	543.8	544.1	0.3
Indian Creek								
A	4,826 [3]	495	2,727	5.6	453.3	453.3	453.4	0.1
B	7,818 [3]	381	3,406	4.5	459.2	459.2	459.2	0.0
C	9,767 [3]	310	2,907	5.3	463.4	463.4	463.4	0.0
D	12,373 [3]	790	4,481	3.4	469.5	469.5	470.0	0.5
E	16,765 [3]	290	2,906	5.2	474.7	474.7	474.8	0.1
F	17,850 [3]	1,293	6,193	4.0	475.6	475.6	475.6	0.0
G	21,200 [3]	1,013	5,257	3.8	480.6	480.6	480.9	0.3
H	23,840 [3]	1,092	5,371	4.5	488.2	488.2	489.0	0.8
I	27,110 [3]	1,078	4,148	4.4	490.2	490.2	490.7	0.5
J	32,460 [3]	500	4,186	2.6	504.6	504.6	505.4	0.8
K	38,340 [3]	300	2,329	4.7	512.9	512.9	513.3	0.4
L	41,480 [3]	375	2,609	4.8	520.9	520.9	521.6	0.7
M	44,030 [3]	500	3,720	3.3	529.1	529.1	530.0	0.9
N	47,300 [3]	480	2,437	3.1	536.3	536.3	537.0	0.7
O	49,430 [3]	449	2,265	3.4	544.0	544.0	544.8	0.8
P	52,990 [3]	350	1,400	5.4	556.6	556.6	557.2	0.6
Q	55,680 [3]	90	544	10.6	569.1	569.1	569.5	0.4
R	59,545 [3]	120	551	5.9	590.3	590.3	590.5	0.2
S	61,950 [3]	90	457	3.1	618.8	618.8	619.0	0.2

[1] Feet above Highland Village Road

[2] Feet above confluence with Hickory Creek Arm Tributary 1

[3] Feet above confluence with Elm Fork Trinity River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Hickory Creek Arm Tributary 1 - Hickory Creek Arm Tributary 2
Indian 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
Little Elm Creek								
A	73,835 [1]	2,942	17,270	2.0	543.4	543.4	544.2	0.8
B	75,935 [1]	2,650	17,873	1.9	544.8	544.8	545.4	0.6
C	77,685 [1]	3,066	15,214	2.3	546.4	546.4	547.0	0.6
D	79,625 [1]	2,586	13,690	2.5	548.2	548.2	548.7	0.5
E	81,945 [1]	2,428	12,827	1.9	550.3	550.3	550.8	0.5
F	85,415 [1]	3,210	19,104	1.3	553.1	553.1	553.7	0.6
G	88,995 [1]	2,495	17,247	1.4	556.9	556.9	557.2	0.3
H	90,745 [1]	1,961	10,637	2.3	557.5	557.5	558.0	0.5
I	92,595 [1]	1,778	8,724	2.8	558.9	558.9	559.7	0.8
J	95,915 [1]	2,052	10,768	2.2	562.9	562.9	563.8	0.9
K	97,215 [1]	1,920	11,702	2.1	564.5	564.5	565.5	1.0
L	99,025 [1]	1,854	11,066	2.3	566.5	566.5	567.3	0.8
M	10,2375 [1]	1,749	10,708	2.4	570.1	570.1	570.7	0.6
N [2]								
Loving Branch								
A	5,200 [3]	330 [4]	2,342	3.5	549.8	549.8	550.3	0.5
B	8,390 [3]	320	1,931	4.2	560.2	560.2	561.2	1.0
C	12,950 [3]	320	1,786	4.2	573.5	573.5	574.5	1.0
D	15,950 [3]	350	1,404	3.3	580.8	580.8	581.8	1.0
E	17,830 [3]	231	844	5.5	587.9	587.9	588.5	0.6
F	19,605 [3]	197	793	3.8	595.4	595.4	596.4	1.0
G	22,370 [3]	230	961	3.2	610.3	610.3	611.3	1.0
H	25,080 [3]	250	1,392	2.0	617.8	617.8	618.4	0.6
I	26,075 [3]	290	899	3.0	621.6	621.6	622.4	0.8
J	27,720 [3]	200	666	3.2	628.8	628.8	629.3	0.5
K	29,305 [3]	59	290	7.2	635.7	635.7	635.7	0.0
L	30,425 [3]	204	898	2.1	642.7	642.7	643.5	0.8
M	32,270 [3]	150	315	3.8	651.6	651.6	652.1	0.5

[1] Feet above Elm Fork Trinity River along profile base line

[2] Cross-section N upstream of limit of floodway

[3] Feet above confluence with Hickory Creek

[4] This width extends beyond government property fee and/or flowage easement limits

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Little Elm Creek - Loving Branch

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
Lynchburg Creek								
A	14,800 [1]	-- [4]	-- [4]	-- [4]	537.0	537.0	537.7	0.7
B	17,350 [1]	125	422	6.3	544.9	544.9	544.9	0.0
C	19,000 [1]	125	499	4.7	553.0	553.0	553.6	0.6
D	20,620 [1]	125	643	3.7	559.8	559.8	560.3	0.5
E	22,755 [1]	169	588	4.0	567.7	567.7	568.2	0.5
F	24,225 [1]	200	683	3.4	574.8	574.8	575.7	0.9
Marshall Branch								
A	(-)3190 [2]	347	2,485	4.5	582.5	582.5	583.3	0.8
B	(-)1220 [2]	280	1,872	6.0	590.1	590.1	591.0	0.9
C	(-)110 [2]	290	2,111	5.3	593.8	593.8	594.6	0.8
D	24,320 [3]	600	3,220	3.5	598.1	598.1	598.8	0.7

[1] Feet above confluence with Elm Fork Trinity River

[2] Feet from State Highway 114

[3] Feet above confluence with Grapevine Lake

[4] Floodway within government property fee and/or flowage easement limits

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Lynchburg Creek - Marshall Branch

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Milam Creek								
A	1,450	1,121	8,572	2.0	561.0	561.0	562.0	1.0
B	4,520	409	4,086	4.3	564.3	564.3	565.2	0.9
C	5,100	377	3,459	5.1	566.0	566.0	566.8	0.8
D	6,240	314	3,612	4.9	569.3	569.3	570.2	0.9
E	7,140	265	3,123	5.4	571.8	571.8	572.7	0.9
F	8,930	550	5,516	3.1	574.7	574.7	575.6	0.9
G	10,740	586	4,520	3.7	576.8	576.8	577.8	1.0
H	12,540	392	4,115	4.2	583.3	583.3	584.0	0.7
I	13,480	466	4,849	3.6	584.3	584.3	585.3	1.0
J	14,570	477	3,546	4.9	587.2	587.2	587.8	0.6
K	15,675	681	4,633	3.8	589.9	589.9	590.6	0.7
L	17,350	461	3,397	2.6	595.8	595.8	596.8	1.0
M	19,340	256	1,519	5.9	601.7	601.7	602.5	0.8
N	20,220	178	1,374	5.8	605.3	605.3	606.2	0.9
O	21,690	172	1,692	4.7	611.6	611.6	612.4	0.8
P	22,980	160	1,320	6.1	615.5	615.5	616.1	0.6
Q	24,020	218	1,608	5.0	618.9	618.9	619.6	0.7
R	24,790	297	1,626	4.9	620.9	620.9	621.6	0.7
S	26,180	176	1,304	5.7	625.7	625.7	626.5	0.8
T	27,000	202	1,612	4.6	628.4	628.4	629.2	0.8
U	27,905	186	1,275	5.8	630.6	630.6	631.6	1.0
V	28,730	234	1,530	4.5	635.3	635.3	636.1	0.8
W	30,335	191	2,490	2.7	645.8	645.8	646.1	0.3
X	31,400	202	1,749	3.9	646.4	646.4	647.0	0.6
Y	33,040	370	2,620	2.7	652.1	652.1	653.1	1.0
Z	34,785	290	1,012	4.4	655.5	655.5	656.3	0.8
AA	36,355	170	1,166	3.3	665.5	665.5	666.0	0.5

[1] Feet above confluence with Clear Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Milam 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
Mustang Creek								
A	2,450	703	5,988	2.4	550.5	550.5	551.5	1.0
B	4,225	310	3,185	4.5	553.7	553.7	554.4	0.7
C	5,375	606	5,868	2.5	555.8	555.8	556.5	0.7
D	6,050	675	7,049	2.0	556.2	556.2	557.0	0.8
E	7,250	771	8,056	1.8	557.1	557.1	557.9	0.8
F	9,000	906	8,624	1.7	560.0	560.0	560.5	0.5
G	10,300	693	5,157	2.8	561.0	561.0	561.8	0.8
H	11,550	682	5,274	2.7	563.0	563.0	563.8	0.8
I	12,400	712	5,365	2.7	564.3	564.3	565.2	0.9
J	13,750	766	6,074	2.4	566.0	566.0	566.9	0.9
K	14,950	894	6,190	2.3	567.5	567.5	568.4	0.9
L	16,050	716	5,406	2.7	569.1	569.1	570.0	0.9
M	17,550	735	4,932	2.9	570.9	570.9	571.8	0.9
N[2]								

[1] Feet above Little Elm Creek along profile base line

[2] Cross-section N located upstream of limit of floodway

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Mustang 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
North Hickory Creek								
A	870 [1]	650	6,791	3.0	619.0	619.0	620.0	1.0
B	3,200 [1]	400	4,311	4.8	621.8	621.8	622.7	0.9
C	6,810 [1]	650	5,775	3.6	627.5	627.5	628.3	0.8
D	8,160 [1]	650	7,260	2.9	630.8	630.8	631.7	0.9
E	10,990 [1]	450	3,589	5.8	634.7	634.7	635.5	0.8
F	15,990 [1]	270	2,624	7.9	647.5	647.5	648.4	0.9
G	17,620 [1]	900	4,999	4.2	653.3	653.3	654.0	0.7
H	19,690 [1]	800	5,020	4.1	658.6	658.6	659.5	0.9
I	21,970 [1]	849	4,563	4.6	664.1	664.1	664.9	0.8
J	24,000 [1]	607	4,732	4.4	671.5	671.5	672.2	0.7
K	24,505 [1]	500	3,674	5.7	675.1	675.1	675.9	0.8
L	25,280 [1]	1,014	11,327	1.8	676.1	676.1	677.1	1.0
M	26,550 [1]	1,005	7,951	2.6	676.6	676.6	677.6	1.0
N	28,000 [1]	672	5,074	4.1	678.4	678.4	679.3	0.9
O	28,700 [1]	505	3,431	6.1	679.6	679.6	680.6	1.0
P	29,490 [1]	600	5,604	3.7	683.0	683.0	683.7	0.7
Q	30,950 [1]	485	5,175	4.0	685.7	685.7	686.6	0.9
North Pecan Creek								
A	2,170 [2]	200	630	3.2	629.0	629.0	629.3	0.3
B	4,270 [2]	150	397	5.1	637.5	637.5	638.1	0.6
C	8,910 [2]	120	409	3.2	656.2	656.2	657.0	0.8
D	10,410 [2]	38	116	4.8	660.4	660.4	661.0	0.6
E	12,460 [2]	25	101	1.4	668.9	668.9	669.5	0.6

[1] Feet above confluence with Hickory Creek

[2] Feet above confluence with Pecan Creek below SCS Dam #16

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

North Hickory Creek - North Pecan 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
Office Creek								
A	9,760 [1]	117	808	5.8	542.2	542.2	542.9	0.7
B	10,980 [1]	91	768	6.1	553.0	553.0	553.9	0.9
C	12,200 [1]	120	649	6.9	561.2	561.2	561.7	0.5
D	14,025 [1]	87	703	4.8	579.2	579.2	579.9	0.7
E	15,350 [2]							
Pecan Creek (Above Little Elm Creek)								
A	7,670 [3]	770	6,234	3.0	542.5	542.5	543.5	1.0
B	9,330 [3]	876	7,603	2.5	544.5	544.5	545.4	0.9
C	10,750 [3]	905	8,653	2.2	546.0	546.0	546.8	0.8
D	12,880 [3]	1,229	10,484	2.4	547.5	547.5	548.2	0.7
E	15,400 [3]	1,170	10,140	2.3	549.7	549.7	550.6	0.9
F	16,460 [3]	1,141	8,255	2.9	550.8	550.8	551.8	1.0
G	18,060 [3]	1,081	8,836	2.7	553.8	553.8	554.7	0.9
H	20,070 [3]	1,190	11,101	2.1	555.4	555.4	556.3	0.9
I	22,810 [3]	1,162	11,023	2.1	557.1	557.1	558.0	0.9
J	23,930 [3]	1,193	11,685	2.0	557.7	557.7	558.6	0.9
K	25,610 [3]	870	7,839	3.0	561.2	561.2	561.6	0.4
L	26,560 [3]	790	5,292	4.5	562.9	562.9	563.4	0.5
M	28,300 [3]	716	6,332	3.7	567.5	567.5	568.1	0.6
N	29,510 [3]	779	6,621	3.6	569.7	569.7	570.3	0.6
O	31,170 [3]	977	9,990	2.4	571.8	571.8	572.5	0.7
P	32,830 [3]	998	9,966	2.4	572.7	572.7	573.5	0.8
Q	34,210 [3]	1,066	8,596	2.4	573.4	573.4	574.3	0.9
R	35,500 [3]	1,109	8,527	2.4	574.6	574.6	575.6	1.0
Pecan Creek (Above SCS Dam # 16)								
A	550 [4]	216	763	2.6	682.2	682.2	683.2	1.0
B	2,480 [4]	110	365	5.3	690.2	690.2	691.0	0.8
C	4,680 [4]	142	293	4.2	701.6	701.6	702.2	0.6

[1] Feet above confluence with Stewart Creek

[2] Cross-section E upstream of limit of floodway

[3] Feet above Little Elm Creek along profile base line

[4] Feet from Bonnie Brae Road

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Office Creek - Pecan Creek (Above Little Elm Creek)
Pecan Creek (Above SCS Dam #16)

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
Pecan Creek (Below SCS Dam # 16)								
A	(-)17,500	--[2]	--[2]	--[2]	539.8	539.8	540.6	0.8
B	(-)13,350	400	3,319	5.1	546.7	546.7	547.6	0.9
C	(-)10,550	650	4,760	3.1	551.3	551.3	552.2	0.9
D	(-)8,350	400	2,973	5.1	556.7	556.7	557.5	0.8
E	(-)5,750	650	5,036	3.0	561.2	561.2	562.1	0.9
F	(-)3,800	450	3,461	4.2	564.3	564.3	565.1	0.8
G	(-)100	750	5,056	2.8	569.2	569.2	570.1	0.9
H	700	450	2,843	4.9	571.2	571.2	572.1	0.9
I	2,580	350	4,896	2.9	581.1	581.1	581.7	0.6
J	4,580	400	2,996	4.7	582.3	582.3	583.1	0.8
K	6,920	400	2,806	4.6	586.5	586.5	587.2	0.7
L	9,170	659	3,994	3.1	592.5	592.5	593.3	0.8
M	12,240	570	3,794	4.8	597.5	597.5	598.3	0.8
N	14,100	300	1,788	6.5	599.4	599.4	600.1	0.7
O	16,820	150	693	9.9	609.2	609.2	609.1	-0.1
P	18,130	200	837	7.8	613.1	613.1	613.4	0.3
Q	20,740	200	564	7.8	621.1	621.1	621.4	0.3
R	22,570	200	634	4.0	629.3	629.3	630.2	0.9
S	25,050	150	433	4.1	635.4	635.4	636.4	1.0
T	25,830	50	222	8.0	637.5	637.5	637.9	0.4
U	27,770	47	396	3.9	646.1	646.1	646.6	0.5
V	29,610	56	329	3.7	652.8	652.8	653.3	0.5
W	30,810	60	268	3.3	656.2	656.2	657.0	0.8
X	32,280	59	191	0.7	660.4	660.4	661.1	0.7

[1] Feet from Mayhill Road

[2] Floodway within government property fee and/or flowage easement limits

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Pecan Creek (Below SCS Dam #16)

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
Prairie Creek								
A	2,700 [1]	275	1,884	5.5	464.7	464.7	465.4	0.7
B	6,800 [1]	424	2,095	4.7	475.5	475.5	476.3	0.8
C	9,600 [1]	200	1,638	6.0	484.2	484.2	485.0	0.8
D	10,850 [1]	425	2,165	4.6	487.9	487.9	488.8	0.9
E	12,875 [1]	150	1,600	4.8	499.6	499.6	500.4	0.8
F	15,815 [1]	137	905	6.8	506.4	506.4	506.4	0.0
G	18,720 [1]	260	1,685	2.9	523.1	523.1	523.7	0.6
H	22,350 [1]	96	820	6.2	535.3	535.3	536.0	0.7
I	25,082 [1]	84	481	7.9	549.7	549.7	550.0	0.3
J	27,512 [1]	91	353	6.9	560.9	560.9	561.2	0.3
K	29,652 [1]	64	323	7.6	570.3	570.3	570.8	0.5
Sharps Branch								
A	9,440 [2]	180	748	6.3	564.1	564.1	564.2	0.1
B	11,000 [2]	180	911	5.2	574.9	574.9	575.0	0.1
C	12,750 [2]	224	964	4.9	588.0	588.0	589.0	1.0
D	14,600 [2]	150	682	4.9	601.4	601.4	602.1	0.7
Stewart Creek								
A	72 [3]	800	11,775	1.5	529.5	529.5	530.3	0.8
B	6,300 [3]	700	5,072	3.5	534.6	534.6	535.2	0.6
C	11,140 [3]	526	3,705	4.8	542.7	542.7	543.7	1.0
D	14,915 [3]	427	3,245	3.5	558.0	558.0	558.5	0.5
E	20,380 [3]	790	3,538	3.2	569.3	569.3	570.0	0.7
F	26,600 [3]	500	2,838	4.0	587.3	587.3	587.8	0.5
G-I [4]								

[1] Feet above confluence with Elm Fork Trinity River

[2] Feet above confluence with Grapevine Lake

[3] Feet above State Highway 423

[4] Cross-sections G-I located in Collin County

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Prairie Creek - Sharps Branch - Stewart 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
Stewart Creek Tributary 1								
A	12,700 [1]	260	1,326	5.3	544.3	544.3	545.1	0.8
B	13,750 [1]	210	942	7.4	550.7	550.7	551.1	0.4
C	17,433 [1]	400	1,414	4.5	564.9	564.9	565.4	0.5
D	18,465 [1]	360	2,022	4.2	570.3	570.3	570.9	0.6
E	19,130 [1]	380	2,260	3.7	571.5	571.5	572.4	0.9
F	19,700 [1]	400	2,068	4.0	572.6	572.6	573.6	1.0
G	20,920 [1]	370	1,874	4.4	580.0	580.0	580.5	0.5
H	21,475 [1]	300	1,646	5.0	581.4	581.4	582.3	0.9
I	22,680 [1]	330	1,806	4.6	586.5	586.5	587.2	0.7
J	25,840 [1]	180	692	5.9	600.2	600.2	600.7	0.5
K	28,620 [1]	245	852	4.8	618.4	618.4	619.1	0.7
Stewart Creek Tributary 2								
A	2,640 [2]	235	1,219	2.5	572.0	572.0	572.0	0.0
B	4,900 [2]	754	2,896	0.7	582.8	582.8	582.8	0.0
C [3]	8,500 [3]							
Stewart Creek Tributary 3								
A	27,870 [1]	160	759	3.8	591.4	591.4	592.4	1.0

[1] Feet above State Highway 423 (on Stewart Creek)

[2] Feet above confluence with Stewart Creek Tributary 1

[3] Cross-section C located in Collin County

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Stewart Creek Tributary 1 - Stewart Creek Tributary 2
Stewart Creek Tributary 3

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
Stream 6D3 [1] A - D								
Stream 6E1								
A	539 [2]	248	1,139	5.9	486.3	486.3	486.3	0.0
B	1,953 [2]	274	1,635	4.1	495.3	495.3	496.1	0.8
C	3,045 [2]	206	945	7.1	498.0	498.0	498.4	0.4
D	4,468 [2]	265	701	7.0	509.0	509.0	509.1	0.1
E	5,337 [2]	288	1,442	3.4	513.0	513.0	513.0	0.0
F	7,491 [2]	200	714	6.9	523.1	523.1	523.4	0.3
G	8,661 [2]	266	774	6.3	526.2	526.2	526.9	0.7
Stream 6F1								
A	875 [3]	79	392	3.3	482.0	482.0	482.1	0.1
B	2,690 [3]	53	142	9.2	488.6	488.6	488.6	0.0
C	3,870 [3]	58	189	6.9	501.5	501.5	501.5	0.0
Stream CC-1								
A	2,180 [4]	100	483	5.2	585.3	585.3	586.2	0.9
B	3,420 [4]	140	592	4.2	594.0	594.0	595.0	1.0
C	4,800 [4]	140	521	4.8	601.3	601.3	602.3	1.0
Stream CC-2								
A	1,625 [4]	44	308	5.1	608.1	608.1	608.5	0.4
B	2,912 [4]	72	288	3.2	612.8	612.8	612.9	0.1

[1] Cross-sections A - D are located in Dallas County

[2] Feet above confluence with Furneaux Creek

[3] Feet above confluence with Dudley Branch

[4] Feet above confluence with Cooper Creek

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Stream 6D3 - Stream 6E1 -Steam 6F1 - Stream CC1 - Stream CC2

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
Stream DF-1								
A	2,250 [1]	200	645	5.7	593.3	593.3	593.7	0.4
B	5,850 [1]	200	748	4.9	606.1	606.1	607.1	1.0
C	7,880 [1]	110	481	7.7	616.1	616.1	616.8	0.7
D	10,190 [1]	201	739	4.7	632.7	632.7	633.6	0.9
E	11,150 [1]	150	430	5.6	637.0	637.0	637.3	0.3
Stream DF-2								
A	1,300 [1]	250	1,356	3.8	626.1	626.1	626.6	0.5
B	2,625 [1]	251	1,087	4.7	630.4	630.4	630.5	0.1
C	5,450 [1]	350	2,197	1.7	640.7	640.7	641.7	1.0
D	7,540 [1]	299	1,188	3.1	644.5	644.5	645.3	0.8
E	8,950 [1]	201	686	5.4	651.0	651.0	651.8	0.8
F	10,140 [1]	300	1,273	2.1	657.5	657.5	657.7	0.2
G	11,260 [1]	249	1,011	2.6	660.5	660.5	661.4	0.9
H	12,680 [1]	150	618	4.3	668.4	668.4	669.2	0.8
Stream DF-3								
A	1,975 [1]	280	1,247	3.4	628.0	628.0	628.4	0.4
B	3,000 [1]	200	770	5.6	631.3	631.3	631.3	0.0
C	4,230 [1]	200	1,317	3.3	635.3	635.3	635.9	0.6
Stream FB-1								
A	970 [2]	151	337	3.7	632.9	632.9	632.9	0.0

[1] Feet above confluence with Dry Fork Hickory Creek

[2] Feet above confluence with Fincher Branch

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Stream DF-1 - Stream DF-2 - Stream DF-3 - Stream FB-1

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
Stream GS-1								
A-E [1]								
F	3,940 [2]	73	219	5.2	539.4	539.4	539.5	0.1
G	4,290 [2]	73	292	3.5	541.7	541.7	542.4	0.7
H	4,620 [2]	78	208	4.9	543.8	543.8	544.5	0.7
I	4,970 [2]	74	253	3.4	546.5	546.5	547.4	0.9
J	5,320 [2]	71	175	4.9	549.3	549.3	550.0	0.7
K	5,450 [2]	93	302	2.8	551.5	551.5	552.4	0.9
Stream HC-1								
A	1,100 [3]	150	1,669	1.6	580.0	580.0	580.9	0.9
B	2,280 [3]	200	1,887	2.1	585.3	585.3	586.1	0.8
C	3,440 [3]	160	3,318	0.7	606.3	606.3	607.3	1.0
D	4,855 [3]	200	1,445	1.7	606.3	606.3	607.3	1.0
E	6,230 [3]	100	377	6.5	613.2	613.2	613.9	0.7
F	7,770 [3]	200	922	2.5	622.7	622.7	623.4	0.7
Stream IC-1								
A	8,020 [4]	342	3,584	1.5	570.4	570.4	570.6	0.2
B	10,250 [4]	126	871	6.0	571.1	571.1	571.9	0.8
C	12,100 [4]	90	683	5.4	579.2	579.2	580.0	0.8
D	14,020 [4]	95	774	3.9	590.6	590.6	590.6	0.0
E	15,230 [4]	107	484	5.0	603.4	603.4	604.0	0.6
F	16,480 [4]	105	286	8.4	614.6	614.6	614.6	0.0
Stream IC-1A								
A	820 [5]	87	447	5.4	579.6	579.6	579.9	0.3
B	2,735 [5]	43	255	9.4	598.0	598.0	598.0	0.0
C	4,235 [5]	73	339	5.6	612.6	612.6	612.6	0.0

[1] No floodway - Government Property and/or Flowage Easement
[2] Stream distance in feet above confluence with Lewisville Lake
[3] Feet above confluence with Hickory Creek
[4] Feet above confluence with Indian Creek
[5] Feet above confluence with Stream IC-1

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Stream GS-1 - Stream HC-1 - Stream IC-1 - Stream IC-1A

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
Stream LC-1								
A	3,070 [1]	-- [2]	-- [2]	-- [2]	538.8	538.8	539.0	0.2
B	4,760 [1]	100	581	4.2	544.3	544.3	545.3	1.0
C	6,410 [1]	186	712	3.4	555.1	555.1	555.8	0.7
D	7,940 [1]	190	715	3.4	559.8	559.8	560.8	1.0
Stream PC-1								
A	1,350 [3]	72	439	6.9	516.5	516.5	516.5	0.0
B	2,820 [3]	127	1,091	2.1	534.7	534.7	534.8	0.1
C	4,930 [3]	87	36	4.8	539.4	539.4	540.2	0.8
Stream PC-2								
A	1,550 [3]	110	632	3.9	529.9	529.9	530.0	0.1
B	2,290 [3]	64	427	5.7	536.8	536.8	537.1	0.3
C	3,750 [3]	50	138	9.1	546.7	546.7	546.7	0.0
D	4,350 [3]	50	423	3.0	553.8	553.8	554.2	0.4
Stream PC-3								
A	1,239 [3]	103	304	4.3	545.9	545.9	545.9	0.0
Stream PEC-1								
A	(-)5,450 [4]	-- [2]	-- [2]	-- [2]	538.3	538.3	539.2	0.9
B	(-)4,250 [4]	350	1,347	3.8	541.8	541.8	542.7	0.9
C	(-)1,250 [4]	350	1,290	3.5	550.3	550.3	551.1	0.8
D	185 [4]	247	1,084	4.2	556.1	556.1	556.7	0.6
E	2,750 [4]	150	606	6.3	568.0	568.0	568.1	0.1
F	4,400 [4]	200	733	5.3	573.3	573.3	574.3	1.0
G	6,040 [4]	350	4,590	0.7	593.7	593.7	593.8	0.1
H	7,350 [4]	337	2,459	1.2	593.7	593.7	593.8	0.1
I	9,920 [4]	112	505	5.9	600.0	600.0	600.2	0.2
J	11,925 [4]	500	596	5.0	609.3	609.3	609.3	0.0
K	14,740 [4]	100	307	5.8	621.8	621.8	622.4	0.6

[1] Feet above confluence with Lynchburg Creek

[2] Floodway within government property fee and/or flowage easement limits

[3] Feet above confluence with Prairie Creek

[4] Feet above Swisher Road

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Stream LC-1 - Stream PC-1 - Stream PC-2 - Stream PC-3 - Stream PEC-1

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
Stream SB-1								
A	2,700 [1]	-- [4]	-- [4]	-- [4]	569.5	569.5	570.3	0.8
Stream SC-1								
A	5,360 [2]	135	543	6.6	538.0	538.0	538.7	0.7
B	6,170 [2]	100	562	6.4	544.5	544.5	545.3	0.8
C	7,045 [2]	113	601	6	551.4	551.4	552.4	1.0
D	7,715 [2]	100	925	3.9	562.6	562.6	562.7	0.1
E	8,030 [2]	128	883	4.1	563.1	563.1	563.6	0.5
F	9,210 [2]	100	368	6.8	572.0	572.0	572.4	0.4
G	9,615 [2]	140	518	2.5	576.3	576.3	577.0	0.7
H	10,390 [2]	42	180	4.8	577.7	577.7	578.0	0.3
Stream SC-1A								
A	1,615 [3]	-- [4]	-- [4]	-- [4]	539.5	539.5	540.4	0.9
B	3,630 [3]	180	786	4.4	549.1	549.1	549.7	0.6
C	4,945 [3]	151	655	3.2	555.7	555.7	556.7	1.0
D	5,850 [3]	58	302	6.9	564.6	564.6	564.8	0.2
E	6,920 [3]	90	482	4.4	571.4	571.4	572.3	0.9
F	8,000 [3]	112	365	4.1	578.0	578.0	578.0	0.0

[1] Feet above confluence with Sharps Branch

[2] Feet above confluence with Stewart Creek

[3] Feet above confluence with Stream SC-1

[4] Floodway within government property fee and/or flowage easement limits

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Stream SB-1 - Stream SC-1 - Stream SC-1A

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
Stream TC-2								
A	1,140 [1]	100	750	7.9	536.6	536.6	536.7	0.1
B	2,520 [1]	125	883	6.7	545.8	545.8	546.8	1.0
C	4,140 [1]	150	934	6.4	555.3	555.3	555.9	0.6
D	6,550 [1]	201	979	4.9	565.2	565.2	566.2	1.0
E	8,270 [1]	150	898	5.3	571.0	571.0	571.6	0.6
F	11,480 [1]	175	944	4.5	585.0	585.0	585.1	0.1
G	14,270 [1]	121	355	8.4	594.5	594.5	594.5	0.0
H	16,140 [1]	160	227	5.9	606.4	606.4	606.4	0.0
Stream WB-1								
A	7,500 [2]	115	499	4.7	614.7	614.7	615.5	0.8
B	9,420 [2]	81	394	4.1	629.0	629.0	629.8	0.8
C	10,870 [2]	140	670	1.8	642.4	642.4	643.2	0.8
D	12,200 [2]	90	334	3.7	650.4	650.4	651.4	1.0
E	13,130 [2]	50	201	2.9	658.7	658.7	659.0	0.3
F	13,970 [2]	60	160	3.6	666.0	666.0	667.0	1.0
Swisher Creek								
A [3]								
B [3]								
C	1,760 [4]	125	533	4.8	537.0	535.0 [5]	535.0 [5]	0.0
D	2,375 [4]	96	525	4.5	538.5	538.5	538.5	0.0
E	3,250 [4]	76	408	5.0	541.7	541.7	542.0	0.3
F	3,870 [4]	69	379	5.3	545.4	545.4	545.6	0.2
G	3,925 [4]	70	273	5.6	552.7	552.7	552.9	0.2
H	5,875 [4]	55	277	5.3	560.5	560.5	561.0	0.5

[1] Feet above confluence with Timber Creek

[2] Feet above confluence with Whites Branch

[3] Cross sections A and B are located downstream of the Limit of Floodway

[4] Stream distance above confluence with Lewisville Lake

[5] Water-surface elevation computed without consideration of backwater effects from Lewisville Lake

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Stream TC-2 - Stream WB-1 - Swisher 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
Swisher Creek (Cont'd)								
I	6,050 [1]	130	419	3.5	563.2	563.2	563.7	0.5
J	6,350 [1]	98	523	2.8	563.9	563.9	564.6	0.7
K	7,100 [1]	90	400	3.8	569.1	569.1	569.9	0.8
L	7,650 [1]	250	417	3.4	571.2	571.2	571.2	0.0
M	7,850 [1]	89	369	3.8	571.4	571.4	571.4	0.0
N	8,150 [1]	87	397	3.5	571.8	571.8	571.8	0.0
O	8,275 [1]	42	136	10.2	571.6	571.6	571.6	0.0
P	8,475 [1]	139	292	3.6	577.6	577.6	578.6	1.0
Q	8,600 [1]	66	147	7.2	577.7	577.7	578.5	0.8
Timber Creek								
A	2,981 [2]	1,236	6,745	2.0	452.8	452.8	453.0	0.2
B	5,532 [2]	256	3,322	4.1	452.9	452.9	453.2	0.3
C	7,137 [2]	250	2,128	6.3	453.2	453.2	453.5	0.3
D	9, 445 [2]	1,850	4,168	3.2	460.2	460.2	460.2	0.0
E	12,029 [2]	266	1,862	7.1	465.6	465.6	465.6	0.0
F	13,704 [2]	334	1,397	9.5	469.6	469.6	469.6	0.0
G	15,629 [2]	237	2,050	6.5	476.9	476.9	476.9	0.0
H	20,935 [2]	262	1,038	11.8	489.1	489.1	489.2	0.1
I	22,177 [2]	418	2,796	4.4	496.8	496.8	496.8	0.0
J	22,839 [2]	397	2,874	4.3	498.0	498.0	498.0	0.0
K	24,571 [2]	443	2,900	4.2	500.2	500.2	500.3	0.1
L	25,722 [2]	208	1,383	8.9	501.3	501.3	501.6	0.3

[1] Stream distance in feet above confluence with Lewisville Lake

[2] Feet above confluence with Elm Fork Trinity River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Swisher Creek - Timber Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Timber Creek (cont'd)								
M	29,345	94	686	16.2	507.6	507.6	507.7	0.1
N	30,936	500	2,550	4.4	517.9	517.9	517.9	0.0
O	33,295	119	787	14.1	520.3	520.3	520.3	0.0
P	34,641	170	1,734	6.4	529.6	529.6	529.6	0.0
Q	35,391	231	1,849	6.0	531.0	531.0	531.0	0.0
R	36,743	99	934	9.4	533.9	533.9	534.2	0.3
S	40,105	145	1,012	8.4	543.3	543.3	543.5	0.2
T	41,835	244	1,250	6.8	552.5	552.5	552.5	0.0
U	44,342	243	1,775	4.8	564.1	564.1	564.8	0.7
V	46,391	450	3,719	2.2	567.8	567.8	568.5	0.7
W	48,871	917	6,879	1.1	569.5	569.5	570.1	0.6
X	49,000	795	4,609	1.7	569.7	569.7	570.3	0.6
Y	50,374	375	1,244	6.2	572.2	572.2	572.2	0.0
Z	51,860	153	1,220	5.2	578.2	578.2	578.6	0.4
AA	53,865	262	612	8.3	582.6	582.6	582.6	0.0
AB	54,994	469	1,968	2.6	587.6	587.6	587.6	0.0
AC	61,212	390	1,183	3.6	601.4	601.4	601.7	0.3
AD	63,493	373	1,374	3.1	608.5	608.5	608.6	0.1
AE	64,512	558	1,262	3.4	611.0	611.0	611.1	0.1
AF	65,215	226	634	2.8	612.4	612.4	612.4	0.0
AG	67,649	224	451	3.9	618.8	618.8	618.9	0.1
AH	70,217	670	1,323	1.3	628.0	628.0	628.1	0.1

[1] Feet above confluence with Elm Fork Trinity River

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Timber 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 Tributary to Bryant Branch								
A	3,960 [1]	18	46	6.0	587.0	587.0	587.2	0.2
Unnamed Tributary to Stream PEC-1								
A	740 [2]	105	348	3.0	562.6	562.6	563.6	1.0
B	1,485 [2]	70	218	4.8	566.5	566.5	567.0	0.5
C	2,440 [2]	120	241	4.3	571.6	571.6	572.1	0.5
Veal Springs Branch								
A	6,330 [3]	-- [5]	-- [5]	-- [5]	542.4	542.4	542.5	0.1
B	6,980 [3]	-- [5]	-- [5]	-- [5]	556.8	556.8	556.9	0.1
C	7,150 [3]	99	647	1.2	562.7	562.7	563.7	1.0
Whites Branch								
A	16,030 [4]	133	831	5.2	600.8	600.8	601.6	0.8
B	18,320 [4]	190	1,100	3.9	612.7	612.7	613.6	0.9
C	18,730 [4]	190	1,048	4.1	615.4	615.4	616.2	0.8
D	21,750 [4]	235	1,276	3.1	635.2	635.2	636.2	1.0

[1] Feet above confluence with Bryant Branch
[2] Feet above confluence with Stream PEC-1
[3] Feet above confluence with Hickory Creek
[4] Feet above confluence with Denton Creek
[5] Floodway within government property fee and/or flowage easement limits

TABLE 8

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

FLOODWAY DATA

Unnamed Tributary to Bryant Branch - Unnamed Tributary to Stream PEC-1
Veal Springs Branch - Whites Branch

5.0 INSURANCE APPLICATION

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

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-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 Denton County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 9, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATES(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Argyle, Town of	August 29, 1975	--	April 16, 1990	
Aubrey, City of	June 4, 1976	June 4, 1976	April 16, 1990	
Bartonville, Town of	June 12, 1979	--	September 1, 1987	August 3, 1989 September 17, 1992
Carrollton, City of	June 28, 1974	June 6, 1978	July 16, 1980	November 16, 1983 November 15, 1984 January 2, 1991 September 15, 1994 June 4, 1996
Celina, City of	April 12, 1974	February 20, 1976	November 1, 1979	April 2, 1991 January 19, 1996 December 19, 1997
Coppell, City of	March 8, 1974	June 4, 1976	August 1, 1980	February 15, 1984 October 16, 1991 April 15, 1994
Copper Canyon, Town of	June 5, 1979	--	September 18, 1987	
Corinth, City of	July 30, 1976	--	May 15, 1979	June 3, 1986
Corral City, Town of	April 18, 2011		April 18, 2011	
Cross Roads, Town of	June 5, 1979	--	January 6, 1988	
Dallas, City of	January 10, 1975	February 11, 1977 July 8, 1980	March 16, 1983	July 2, 1991 June 5, 1997 February 5, 2003 August 4, 2004 June 16, 2005
Denton, City of	November 1, 1974	October 24, 1975	August 1, 1979	November 16, 1983 August 4, 1987 March 30, 1998
Dish, Town of	April 18, 2011		April 18, 2011	

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATES(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Double Oak, Town of	June 19, 1979	June 22, 1982	March 4, 1987	March 18, 1991
Flower Mound, Town of	October 29, 1976	--	September 18, 1986	October 18, 1988
Fort Worth, City of	September 17, 1971	--	June 4, 1980	November 18, 1988 January 6, 1993 August 2, 1995 August 23, 2000
Frisco, City of	January 24, 1975	--	June 18, 1980	April 2, 1991 January 19, 1996 December 19, 1997 April 20, 2000
Grapevine, City of	June 28, 1974	June 18, 1976	November 17, 1982	August 15, 1989 January 6, 1993 August 2, 1995
Hackberry, City of	April 2, 1997	--	April 2, 1997	
*Haslet, City of	November 1, 1974	--	October 15, 1985	January 6, 1993 August 2, 1995
Hebron, Town of	July 3, 1979	--	December 5, 1990	
Hickory Creek, Town of	July 30, 1976	--	March 1, 1991	
Highland Village, City of	September 19, 1975	--	July 16, 1987	March 30, 1996
Justin, City of	June 3, 1977	--	April 2, 1997	
*Krugerville, City of	April 2, 1997	--	April 2, 1997	
Krum, City of	September 16, 1988	--	September 16, 1988	

*Non-floodprone communities

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATES(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Lakewood Village, Town of	April 2, 1997	--	April 2, 1997	
Lewisville, City of	March 15, 1974	August 6, 1974	October 18, 1988	June 15, 1994 June 16, 2005
*Lincoln Park, Town of	April 2, 1997	--	April 2, 1997	
Little Elm, Town of	August 13, 1976	--	September 18, 1987	
Northlake, Town of	April 19, 1990	--	April 19, 1990	
Oak Point, City of	June 24, 1991	--	June 24, 1991	
Pilot Point, City of	April 2, 1997	--	April 2, 1997	
Plano, City of	May 10, 1974	--	January 2, 1980	August 5, 1985 February 19, 1986 August 19, 1987 April 2, 1991 January 19, 1996 December 19, 1997
Ponder, Town of	April 2, 1997	--	April 2, 1997	
Prosper, Town of	June 21, 1974	June 30, 1976	May 4, 1982	April 2, 1991 January 19, 1996 December 19, 1997
Roanoke, City of	September 5, 1975	--	April 2, 1997	March 30, 1998
Sanger, City of	October 8, 1976	--	February 2, 1990	
Shady Shores, Town of	March 18, 1977	--	May 11, 1982	April 15, 1986
Southlake, City of	February 15, 1974	June 7, 1977	July 5, 1982	January 6, 1993 August 2, 1995

*Non-floodprone communities

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATES(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
The Colony, City of	August 16, 1984	--	September 29, 1986	August 2, 1994
Trophy Club, Town of	May 27, 1977	--	August 3, 1989	
Unincorporated Areas of Denton County	May 27, 1977	--	May 4, 1987	November 20, 1991 June 2, 1994
Westlake, Town of	December 10, 1976	--	June 2, 1993	

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
DENTON COUNTY, TEXAS
AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

18 U.S. Department of Agriculture, Soil Conservation Service, Technical Release No. 20, Computer Program, Project Formulation, Hydrology, Washington, D.C., 1965, Revised May 1983.

19 U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Technical Memorandum NWS Hydro-35, Five to Sixty Minute Precipitation Frequency for the Eastern and Central United States, Asheville, North Carolina, National Climatic Center, June 1977.

20 U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water Surface Profiles, Generalized Computer Program, Davis, California, October 1973, Revised September 1990.

21 Federal Emergency Management Agency, Flood Insurance Study, City of Carrollton, Texas, Dallas, Denton, and Collin Counties, January 2, 1991, Revised September 15, 1994.

22 Water Resources Council, "Guidelines for Determining Flood Flow Frequency," Bulletin 17, Washington, DC, March 1976.

23 U.S. Army Corps of Engineers, Fort Worth District, Computer Program NUDALLAS, Fort Worth, Texas, Revised September 1982.

24 U.S. Army Corps of Engineers, Fort Worth District, Reconnaissance Report, Upper Trinity River Basin, Texas, March 1990.

25 Federal Emergency Management Agency, Flood Insurance Study, Denton County, Texas, Unincorporated Areas, November 20, 1991, Revised June 2, 1994.

26 U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, HEC-1 Flood Hydrograph Package, Generalized Computer Program, Davis, California, September 1981, revised January 1985 and September 1990.

27 Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Frisco, Collin And Denton Counties, Texas, Washington, DC, Flood Insurance Study Report dated December 1979, Flood Insurance Rate Map dated June 18, 1980.

28 U.S. Army Corps of Engineers, Fort Worth District, Bartonville, Texas LMMP Flood Insurance Study, "Hydrologic Analysis," Unpublished.

29 U.S. Department of the Interior, Geological Survey, 7.5 Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: Alvord, Texas, 1961; Argyle, Texas, 1960 (photorevised 1968, 1973, and 1981); Aubrey, Texas, 1960; Avondale, Texas, 1955 (photorevised 1982); Bluett, Texas, 1960 (photorevised 1968 and 1972); Bowie, Texas, 1961 (photorevised 1978); Buzzard Roost Knob, Texas, 1960; Carrollton, Texas (photorevised 1979); Celina, Texas, 1960; Colleyville, Texas, 1959 (photorevised 1981); Decatur, Texas, 1960 (photorevised 1968 and 1972); Denton West, Texas, 1960 (photorevised 1968 and 1973); Dorcester, Texas, 1958 (photorevised 1974); Era, Texas, 1961 (photorevised 1978); Era SE, Texas, 1961 (photorevised 1978); Forestburg, Texas, 1961; Freemound, Texas, 1961; Frisco, Texas, 1960 (photorevised 1968); Gainesville South, Texas, 1960 (photorevised. 1978); Grapevine, Texas, 1961 (photorevised 1979); Green Valley, Texas, 1960 (photorevised 1978); Greenwood, Texas, 1961 (photorevised 1978); Gunter, Texas, 1961 (photorevised 1974); Hood, Texas, 1961; Justin, Texas, 1960 (photorevised 1968); Keller, Texas, 1955 (photorevised 1981); Montague, Texas, 1961; New Harp, Texas, 1961 (photorevised 1978); Lewisville East, Texas, 1960

(photorevised 1979); Lewisville West, Texas, 1960 (photorevised 1979); Little Elm, Texas, 1960 (photorevised 1968); Marilee, Texas, 1961; Muenster, Texas, 1961 (photorevised 1978); Pecan Creek, Texas, 1961 (photorevised 1978); Pilot Point, Texas, 1961; Ponder, Texas, 1959 (photorevised 1968); Rhome, Texas, 1960 (photorevised 1968 and 1972); Saint Jo, Texas, 1961; Salona, Texas, 1961; Sanger, Texas, 1960 (photorevised 1978); Slidell, Texas, 1961 (photorevised 1978); Smyrna, Texas, 1961; Valley View, Texas, 1961 (photorevised 1978).

30 Nelson, T.L., Synthetic Hydrograph Relationships, Trinity River Tributaries, Fort Worth-Dallas Urban Area, 1970.

31 Rodman, Paul K., Effects of Urbanization on Various Frequency Peak Discharges, October 1977.

32 U.S. Department of the Army, Corps of Engineers, Fort Worth District, Hydrologic Analysis, 1991-1992 Denton County, Texas, Flood Insurance Study, February 1992.

33 Federal Emergency Management Agency, Flood Insurance Study, Town of Flower Mound, Texas, Denton County, October 18, 1988.

34 Federal Emergency Management Agency, Flood Insurance Study, City of The Colony, Texas, Denton County, Revised August 2, 1994.

35 U.S. Army Corps of Engineers, Fort Worth District, Ray Roberts Design Memorandum No. 1, Hydrology, Fort Worth, Texas.

36 U.S. Army Corps of Engineers, Fort Worth District, Ray Roberts Lake Limited Map Maintenance Project, Interagency Agreement No. EMW-92-E-3839, Project Order No. 3.

37 U.S. Army Corps of Engineers, Southwestern Division, Regulation Simulation and Analysis of Simulation for a Multi-Purpose Reservoir System "SUPER" Computer Program, Dallas, Texas, unpublished.

38 U.S. Army Corps of Engineers, Hydraulic Engineering Center, HEC-RAS River Analysis System, Davis, California, April 1997.

39 U.S. Department of Agriculture, Natural Resources Conservation Service, Technical Release No. 61, WSP2 Computer Program, Washington, D.C. May 1996.

40 U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: Mountain Springs, Texas, 1961.

41 U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: Lewisville West, Texas, 1960, Photorevised 1981.

42 Topographic Maps, Scale 1:200, Contour Interval 2 Feet, prepared by Williams-Stackhouse, Inc., San Antonio, March 1985.

43 As-Built Plans of Channelization Projects, prepared by Jones and Boyd; Inc., Dallas, Texas, August 24, 1990.