

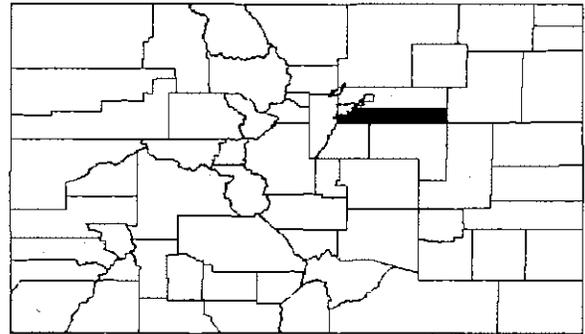
FLOOD INSURANCE STUDY



ARAPAHOE COUNTY, COLORADO, AND INCORPORATED AREAS VOLUME 1 OF 4

Community Name	Community Number
ARAPAHOE COUNTY, CO UNINCORPROATED AREAS	080011
AURORA, CITY OF	080002
CENTENNIAL, CITY OF	080315
CHERRY HILLS VILLAGE, CITY OF	080013
COLUMBINE VALLEY, TOWN OF	080014
*DEER TRAIL, CITY OF	080015
ENGLEWOOD, CITY OF	085074
*FOXFIELD, TOWN OF	080091
GLENDALE, CITY OF	080247
GREENWOOD VILLAGE, CITY OF	080195
LITTLETON, CITY OF	080017
SHERIDAN, CITY OF	080018

*NON-FLOODPRONE



Effective: December 17, 2010



Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER

08005CV001A

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**FLOOD INSURANCE STUDY
ARAPAHOE COUNTY, COLORADO, AND INCORPORATED AREAS**

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and supersedes the FIS reports and/or Flood Insurance Rate Maps (FIRMs) in the geographic area of Arapahoe County, Colorado including: the Cities of Aurora, Centennial, Cherry Hills Village, Deer Trail, Englewood, Glendale, Greenwood Village, Littleton and Sheridan; the Towns of Columbine Valley and Foxfield; and unincorporated areas of Arapahoe County (hereinafter referred to collectively as Arapahoe County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. The Cities of Aurora and Littleton each fall in more than one county, but are included in their entirety in this FIS. The Town of Bennett falls in both Arapahoe and Adams Counties, but is excluded from this FIS and included in its entirety in the Adams County FIS. The Town of Bow Mar falls in both Arapahoe and Jefferson counties, but is excluded from this FIS and included in its entirety in the Jefferson County FIS. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates. This information will also be used by Arapahoe County and incorporated areas to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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 Acknowledgements

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 original hydrologic and hydraulic analyses for the Flood Insurance Study for the unincorporated areas of Arapahoe County were performed by Gingery and Associates, Inc., for the Federal Insurance Administration (FIA), under Contract No. H-3716. This work was completed in July 1975 (Reference 1).

Hydrologic and hydraulic information for portions of Bear Creek, Big Dry Creek, Blackmer Gulch, Cherry Creek, Dutch Creek, Granby Ditch, Goldsmith Gulch, West Tributary to Goldsmith Gulch, Greenwood Gulch, Lee Gulch, Littles Creek,

Little Dry Creek, Quincy Gulch, Sable Ditch and Sable Ditch Overflow, Sand Creek, Slaughterhouse Gulch and its South Tributary, Toll Gate Creek, West Toll Gate Creek, West Toll Gate Creek Tributary, East Toll Gate Creek, Unnamed Creek, West Bijou Creek, Westerly Creek, Columbia Creek, and Side Creek and its Tributary were taken directly from the existing Flood Insurance Studies for Aurora, Cherry Hills Village, Columbine Valley, Englewood, Greenwood Village, Littleton, and Sheridan (References 2 through 9, respectively).

The hydrologic and hydraulic analyses for portions of First, Piney, Murphy, Lone Tree, Happy Canyon, Cottonwood and Littles Creeks and Lee Gulch were performed by J.F. Sato and Associates, for the Federal Emergency Management Agency (FEMA), under Contract No. EMW84-C-1631. This work was completed in August 1985 (References 10, 11, 12, 13, 14, 15, and 16).

The hydraulic analyses for a portion of Cherry Creek extending from Cherry Creek State Recreation Area to the Arapahoe Douglas County line were performed by Greiner Engineering, as reported in River Run Development, Letter of Map Revision, Arapahoe County, Colorado. (Reference 17).

The revised hydraulic analyses for portions of East Toll Gate and West Toll Gate Creeks were performed by Merrick and Company, Greiner Engineering, and the City of Aurora Engineering Division (References 18, 19, 20, 21, and 22).

The hydraulic analysis for a portion of Unnamed Creek (Tributary to West Toll Gate Creek) was performed by Holland Corporation (Reference 23).

The hydrologic study of the South Platte River, from Chatfield Dam to the corporate limits of the City and County of Denver, was prepared by Merrick and Company, under contract to the Urban Drainage and Flood Control District (UDFCD), and was completed in May 1983.

The hydraulic analyses for the South Platte River, from the corporate limits of the City and County of Denver, upstream to the U.S. Army Corps of Engineers (COE) Channel Improvement Project, were performed by Wright Water Engineers, under contract to UDFCD, and were completed in September 1985. The hydraulic analyses of the COE Channel Improvement Project were also performed by Wright Water Engineers under contract to UDFCD (completed in September 1987). The hydraulic reanalyses of the South Platte River, from the COE Channel Improvement Project (Fairway Lane) upstream to the Chatfield Dam, were based on the COE September 1979 hydraulic computer model-, using the discharges determined by the May 1983 Merrick hydrologic study and was carried out by the FEMA Technical Evaluation Contractor, in November 1987.

For this countywide FIS report, revised hydrologic and hydraulic analyses were taken from reports prepared for the UDFCD on Box Elder Creek by Wright Water Engineers and CH2MHill (Reference 83), Cherry Creek by URS Corporation

(Reference 85), Little Dry Creek and Tributaries by WRC Engineering, Inc. (Reference 86), Goldsmith Gulch by Moser and Associates (Reference 87), SJCD 6200 by Olsson Associates (Reference 90) and Murphy Creek by Moser and Associates (Reference 91). These analyses were completed under contract with the UDFCD.

Base Map information shown on this FIRM was provided by the Arapahoe County GIS. Additional input was provided by the Cities of Aurora and Littleton. These data are current as of 2004.

The coordinate system used for the production of the digital FIRM is Universal Transverse Mercator referenced to North American Datum of 1983 and the GRS 80 spheroid, Western Hemisphere.

1.3 Coordination

The Arapahoe County Planning Department supplied zoning and corporate boundary maps for areas throughout the county. Conferences were held with the County staff on June 5, July 15, and July 24, 1975. The final community coordination meeting for the original study of the unincorporated areas was held on September 16, 1975. The COE, Omaha District, supplied base mapping, hydrologic input, and information on Chatfield Dam for the study reach of the South Platte River. In addition, conferences were held with the COE, Omaha District, on October 16, 1974, November 27, 1974, and March 21, 1975. Of particular significance to this study was a COE floodplain information study of the Denver Metropolitan Region, dated October 1968 (Reference 24) and a Floodplain Information report prepared by the COE, dated July 1971 (Reference 25).

The U.S. Geological Survey (USGS) was contacted to obtain historical flow data (References 26, 27, and 28). Maps of flood-prone areas prepared by the USGS, showing approximate floodplain boundary delineations at a scale of 1:24,000, were also reviewed (Reference 29).

At a meeting on August 16, 1974, attended by representatives of UDFCD, FIA, and Gingery Associates, Inc., the study reaches were clearly explained with the methodology to be used in the study. An additional meeting was held on January 24, 1975, to further clarify the purpose of the study and methods used for floodplain delineation. UDFCD supplied contour maps at 2-foot intervals for Big Dry Creek, Sand Creek, and Coal Creek along with an interim report entitled Major Drainageway Master Plan--Big Dry Creek (Reference 30).

Numerous other agencies and individuals were contacted for background information, including the Colorado Water Conservation Board (CWCB), which provided published rainfall-runoff data (Reference 31); Colorado Highway Department; Union Pacific Railroad; and U.S. Soil Conservation Service (SCS). Private citizens of Watkins, Strasburg, Byers, and Deer Trail were interviewed

regarding past floods, high-water marks, and flood damage.

Prior to the restudy, a meeting was held in early April 1984 with the Arapahoe County Engineering Department and UDFCD to define study reaches; however, no reaches were identified at this meeting. The study reaches were selected at a meeting in late April 1984 attended by the study contractor and FEMA.

An intermediate community coordination meeting for the restudy was held in July 1985 and attended by the County, the study contractor and the FEMA representative to explain the reaches studied and the methods used.

UDFCD provided copies of previous master plans and flood hazard delineation maps that covered some of the stream reaches being studied. The County provided up-to-date road maps and corporate boundary maps.

FEMA authorized a countywide restudy for Arapahoe County in December 1985.

For this countywide FIS report, an initial coordination meeting was attended by FEMA; Arapahoe County; the Cities of Aurora, Centennial, Cherry Hills Village, Englewood, Glendale, Greenwood Village, Littleton, and Sheridan; the Town of Columbine Valley; the CWCB; the UDFCD; Michael Baker, Jr., the National Service Provider; and Merrick and Co., the study contractor, on October 26, 2004. At this meeting, the communities were notified that their FIS report and FIRMs would be converted to a Digital FIRM (DFIRM) format. Additionally, streams to be added as detailed studies and approximate studies were selected, and base mapping and topographic mapping was provided by Arapahoe County along with the City of Aurora.

The results of this countywide study were reviewed at the final Consultation Coordination Officer (CCO) meeting held on December 18, 2008, at the Southeast Metro Stormwater Authority office in Englewood, Colorado. The meeting was attended by representatives of UDFCD, FEMA, the State of Colorado, FEMA contractors and local communities. All issues raised at that meeting have been addressed.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Arapahoe County, Colorado including the incorporated towns, cities, and communities which fall within more than one county as described in Section 1.1 (excluding the Towns of Bennett and Bow Mar).

All or portions of the flooding sources listed in Table 1 were studied by detailed methods in previous Flood Insurance Studies (FISs) covering Arapahoe County and Incorporated Areas (References 2 through 11, 88, and 89).

TABLE 1 – FLOODING SOURCES STUDIED BY DETAILED METHODS

Stream	Stream
Bear Creek	Piney Creek
Bear Gulch	Prairie Dog Draw
Big Dry Creek	Prentice Gulch
Big Dry Creek Tributary A	Quincy Gulch
Blackmer Gulch	Rat Run
Box Elder Creek	Sable Ditch
Cardboard Draw	Sand Creek
Cherry Creek	Slaughterhouse Gulch
Cherry Creek Spillway Drain	SJCD 6100
Coal Creek	SJCD 6200
Coon Creek	South Platte River
Cottonwood Creek	South Tributary
Coyote Run	Spring Creek
East Toll Gate Creek	Slaughterhouse Gulch
First Creek	Toll Gate Creek
Goldsmith Gulch	Unnamed Creek
Granby Ditch	West Toll Gate Creek
Greenwood Gulch	West Toll Gate Creek Tributary
Happy Canyon Creek	West Tributary To Goldsmith Gulch
Lee Gulch	Westerly Creek
Littles Creek	Westerly Creek Overflow
Little Dry Creek	Willow Creek
Lone Tree Creek	Wolf Creek
Murphy Creek	Wolf Creek Tributary
Muskrat Run	Woodrat Gulch

For this countywide FIS, the following streams in Table 1a were either restudied or newly studied by detailed methods.

TABLE 1a – FLOODING SOURCES RESTUDIED OR NEWLY STUDIED BY DETAILED METHODS

Stream	Limits of Revised or New Detailed Study
Box Elder Creek	Downstream limits of Aurora to Jewell Ave. extended
Bear Gulch	Downstream limits of Aurora to 38 th Avenue
Coyote Run	Downstream limits of Aurora to Jewell Ave. extended
Prairie Dog Draw	Confluence to I-70
Rat Run	Confluence to study limit
Muskrat Run	Confluence to upstream of Gun Club Road

Stream	Limits of Revised or New Detailed Study
Woodrat Gulch	Confluence to study limit
Cardboard Draw	Confluence to study limit
Cherry Creek	Reservoir to Douglas County Line
Little Dry Creek	Clarkson to Quebec Street
Willow Creek	Confluence to Englewood Dam
Greenwood Gulch	Confluence to Holly Street
Quincy Gulch	Confluence to High Line Canal
Blackmer Gulch	Confluence to High Line Canal
Prentice Gulch	Confluence to Holly Street
Goldsmith Gulch	Bellevue Avenue to Arapahoe Road
West Trib To Goldsmith	Confluence to Peakview Avenue
SJCD 6200	Confluence to Jefferson County Line
Murphy Creek	Confluence to Study Limit
Cherry Creek (Right Overbank Split Flow)	Station 89292 to Station 91117

All or portions of the streams in Table 2 were studied by approximate methods in previous Flood Insurance Studies for Arapahoe County and Incorporated Areas (References 2 -11, 88, 89).

TABLE 2 – FLOODING SOURCES STUDIED BY APPROXIMATE METHODS

Stream
Box Elder Creek upper reaches
Coal Creek upper reaches
Comanche Creek
Drainageway D in Columbine Valley
East Bijou Creek
Columbia Creek
Deer Trail Creek
First Creek
Kiowa Creek
Little Comanche Creek
Middle Bijou Creek
Muddy Creek
Upper reaches of Piney Creek
Senac Creek
Side Creek
Unnamed Tributary to Coal Creek
West Bijou Creek
West Box Elder Creek
West Toll Gate Creek
West Toll Gate Creek Tributary
Wolf Creek

For this countywide FIRM, the existing FIRM was converted to a Digital FIRM (DFIRM). Detailed analyses were taken from the effective FIRM or from existing UDFCD reports. The existing detailed analysis was originally used in developed areas or areas with a high development potential. The existing approximate analysis was originally used to study those areas for which detailed information was not available or 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, CWCB, UDFCD, Arapahoe County, and the incorporated communities within Arapahoe County. This update also incorporates Letters of Map Revision issued by FEMA.

2.2 Community Description

Arapahoe County is located in central Colorado, just south and east of Denver. The general physical boundary is that of a rectangle 12 miles by 72 miles, which extends from near the foothills of the Rocky Mountains to the open plains of eastern Colorado, covering approximately 864 square miles. The City of Aurora lies east of Denver, extending north into Adams County and south into Douglas County. The City of Littleton lies south and west of Denver, extending south into Douglas County and southwest into Jefferson County.

The climate in the study area varies slightly from the Denver metropolitan area to the prairie Lands on the eastern end; but, generally, it is characteristic of the temperate high plains. The mean annual temperature is 50.2°F; the mean annual snowfall is 45 inches, and the mean annual rainfall is 14.05 inches. With a mean growing season of 139 days, agriculture flourishes.

Today, Arapahoe County is still basically an agricultural and residential community, with most of the population concentrated in the western one-third of the county. During the past 25 years, the county population has grown rapidly as a result of Denver metropolitan area urbanization and subsequent extensive suburban development. County population figures for 1970 and 1980 are 161,000 and 293,621, respectively. This kind of suburban development pressure is now, and will continue to be, evident in and along the floodplains of Big Dry Creek, Little Dry Creek, Cottonwood Creek, Cherry Creek, Piney Creek, Sand Creek, Coal Creek, and the South Platte River. Residential growth has also occurred along the banks of Box Elder Creek and Comanche Creek.

The county lies within the South Platte River Basin, with headwaters extending into the Rocky Mountains to elevations of 14,000 feet. The waters of the South Platte River have been appropriated for municipal and irrigation usage. The South Platte River in Arapahoe County flows from south to north along the western edge of the county.

The South Platte River in Arapahoe County is a continuous flowing stream,

whereas the tributaries are intermittent flowing streams. The South Platte River has two major flooding characteristics-snowmelt and summer thunderstorms. The tributary basins are narrow and have clayey-loam soils. In the undeveloped portions of the basins, the ground cover consists of buffalo grass, willows, and cottonwood trees.

Development has occurred up to the channels on the tributaries. The floodplain on the South Platte River in the past was mostly agricultural, but today commercial, industrial, and residential development has encroached onto the floodplain. In various reaches of the floodplains, development pressures continue to exist. The county government is working to retain the open space of the floodplain

2.3 Principal Flood Problems

The South Platte River flows through the western edge of Arapahoe County in shifting channels in a broad, shallow bed with low, flat overbanks. Streams tributary to the South Platte River are ephemeral and flow in steep, narrow channels; whereas those in the eastern two-thirds of the county flow in wide, flat channels similar to the South Platte River. Sheetflow occurs within the City of Littleton on the lower reaches of Littles Creek and Slaughterhouse Gulch.

All streams studied have had various structural improvements but the intense and infrequent thunderstorms characteristic of the area can generate floods in excess of existing structural capacities. The flood threat throughout the county has not been adequately defined and urbanization has occurred in certain areas without regard to the hazard.

Major floods have occurred on the South Platte River and its tributaries in Arapahoe County since 1844. During the period, 11 devastating floods have occurred on the South Platte River; 17 have occurred on Cherry Creek; 3 each have occurred on Bijou, Box Elder, Comanche, and Sand Creeks; and 1 has occurred on Toll Gate Creek. Historic flood information on other streams in Arapahoe County is not available.

In 1844 and 1864, reports read, "bottomlands near Denver were covered with water bluff to bluff." By 1876, encroachment into the floodplain had developed to such an extent that on May 23, 1876, the Rocky Mountain News reported, "(The South Platte River) was higher to be sure--several feet higher perhaps in 1864--but it was not able to work such destruction at that time as now. There was not so much town here in 1864, as now, nor as many bridges."

The most significant floods of recent times on the South Platte River occurred in 1912, 1921, 1933, 1935, 1942, and 1965 during which discharges of 13,000 cubic feet per second (cfs), 8,790 cfs, 22,000 cfs, 12,320 cfs, 10,200 cfs, and 40,300 cfs, respectively, were recorded. Cherry Creek experienced a similar flood history, with

discharges of 25,000 cfs, 34,000 cfs, 10,700 cfs, 17,600 cfs, 10,800 cfs and 39,900 cfs in 1912, 1933, 1945, 1946, 1963, and 1956, respectively.

In interviews held in Watkins, Strasburg, Byers, and Deer Trail regarding flood histories on Box Elder Creek, Comanche Creek, West Bijou Creek, and East Bijou Creek, residents recalled severe damage and lost lives in floods occurring in 1905, 1935, and 1965.

All of these floods of record on the South Platte River and tributaries have been generated near their headwaters on the slopes of Monument Divide, a high ridge located between Castle Rock and Colorado Springs and extending from the Rocky Mountains down into the plains near Limon, Colorado. Past floods of the mountain tributaries have resulted from snowmelt. Intensive rainstorms cause flooding in both the mountain tributaries and the eastern tributaries.

In 1912, Cherry Creek swelled to flood stage from cloudbursts centered simultaneously over Denver and the upper reaches of the creek. In 1933, similar circumstances caused the Castlewood Dam above Franktown in Douglas County to fail, sending a 34,000-cfs flow of water thundering down the canyon into Denver.

In 1965, the whole South Platte River Basin was drenched by a unique combination of orographic effects and meteorological conditions that caused the worst flooding in the region's recorded history. Severe thunderstorms had formed over the headwaters of Plum and Cherry Creeks on June 16 and slowly moved northeasterly down the creeks; thus, the heavy rains tended to follow and augment the peak flows. More than 14 inches of rain fell near Monument Divide at Palmer Lake in 4 hours. Overnight, westerly winds shifted the storm front to an orientation over the Kiowa and Bijou Creek basins to meet with thunderstorms forming just south of Agate, where 5.25 inches fell in 45 minutes. The net result was six persons drowned, two other deaths caused by flood-related activities, and estimated damages in the Denver area were \$500 million.

Flood problems in the area have been the result of not only rare storm events but also of improper floodplain development. Visual accounts of floods have noted that the debris transported by floodwater contained natural debris, such as trees, rock, and soil, but consisted chiefly of items foreign to the floodplain, such as houses, bridges, automobiles, heavy equipment, lumber, house trailers, butane storage tanks, and other flotsam. With these items obstructing bridges and culverts, flood levels rose and caused more extensive damage. Property which was not structurally damaged by flood depths and velocities experienced much damage and cleanup cost resulting from mud and silt deposition and erosion.

2.4 Flood Protection Measures

The first tangible contribution to flood control on the streams flowing through Arapahoe County was made in 1890, when Castlewood Dam, primarily

intended for irrigation storage, was completed by the Denver Land and Water Company on Cherry Creek, 35 miles upstream from Denver. The dam, with a storage capacity of 4 billion gallons, was mistakenly regarded by many as protection against deluges. In August 1933, the dam burst under pressure of water from severe thunderstorms in the upper Cherry Creek basin. Flood-control measures were taken on Cherry Creek in 1936 with the completion of the \$800,000, 55-foot-high Kenwood Dam, 5 miles southeast of Denver, near Sullivan, Colorado. Despite its apparent guarantee of security, Kenwood Dam was not regarded as the complete answer to flood control on Cherry Creek and was abandoned. In 1950, Cherry Creek Dam was constructed just upstream of the former Kenwood Dam at a cost of \$20 million. The dam spans 14,300 feet across the creek at a height of 140 feet, and now serves the community as a park and water recreation area as well as a retarding barrier for floods much larger than the event of June 1965. Cherry Creek Dam was designed and built by the COE to store the Standard Project Flood, which is approximately equivalent to the 500-year flood. The dam eliminates the flood potential from 385 square miles of the total drainage area of 409 square miles.

With the history of major flooding on the South Platte River through 1933, culminating in the planning, design, and construction of the Cherry Creek Reservoir in 1950, citizens of the Denver metropolitan area saw the need for an additional flood-control structure on the South Platte River, just downstream of the confluence with Plum Creek. During the 1950s, the planning and design for a flood-control reservoir were completed for Chatfield Dam. At that time, however, funding was not available to initiate and complete construction. The floods of 1965 changed the minds of many concerning the need for the structure. The loss of 8 lives and property damage assessed at \$300 million in the Denver area prompted the release of funds and construction began. In 1973, final closure of the dam was made and the facility became capable of storing tributary floodwater. All the related reservoir improvements, including recreational facilities, became totally operational in 1976. Chatfield Dam is located approximately 0.5 mile above the City of Littleton corporate limits, in Douglas and Jefferson Counties. The reach of the South Platte River lying within Arapahoe County will still experience flooding from tributary streams at Littleton and downstream.

To assist the COE with needed flood-control measures along the 6.4 miles of the South Platte River that lie adjacent to the City of Littleton, in Arapahoe County, citizens of Littleton voted in 1971 to provide funds to assist the COE in implementing a mutually satisfactory project for flood control (References 32 and 33). In 1984, the City acquired and annexed property included within the 100-year floodplain limit within this 2-mile reach, and plans to retain the rural, open-space environment of the area.

On the remaining 4.4 miles of the South Platte River that are located in Arapahoe County and the City of Littleton, the COE had proposed a structural solution to flood control, incorporating channelization and diking. State funds have been appropriated for right-of-way acquisition and construction, for the

purpose of this study, has been completed. The resulting channelization project contains the accepted 100-year flood discharge and, therefore, this segment of the river presents minimal flood hazard to the county and affected communities.

The UDFCD and City of Littleton constructed a 100-year capacity channel for Little Creek from its confluence with the South Platte River to the railroad corridor. The UDFCD and City of Littleton constructed a detention facility near Grant Street and storm sewer upstream and downstream on Slaughterhouse Gulch to reduce the frequency and severity of flooding. The Colorado Department of Transportation constructed a 100-year capacity box culvert on Slaughterhouse Gulch from the South Platte River to upstream of Santa Fe drive as part of a transportation project.

A major flood control structure in the City of Aurora is Quincy Dam on West Toll Gate Creek, which was completed in 1974. The dam and reservoir serve as a water storage facility and provide approximately 4,5000 acre feet of storage for flood control. The dam controls the upper 4.5 square miles of the drainage basin.

The UDFCD and Town of Columbine Valley constructed a 100-year capacity channel on Dutch Creek from the South Platte River to Platte Canyon Drive.

Major drainageway planning reports have been completed for all of the major drainageways in the populated areas of the county. These reports designate various structural measures and nonstructural actions that would be appropriate to alleviate potential flood damage along these streams.

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 are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent 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 of greater than 1 year are considered. For example, the risk of having a flood which 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 the peak discharge-frequency relationships for each flooding source studied in detail affecting the geographic area of Arapahoe County.

Recorded flood information for the majority of the streams studied by detailed methods within Arapahoe County is nonexistent. Good records do exist for the South Platte River and Cherry Creek. Due to the construction of Chatfield Dam, the recorded information on the South Platte River is not applicable. As a result, synthetically derived hydrographs were computed to determine potential flood magnitudes for those streams with relatively small drainage basins in the Denver metropolitan area. These hydrographs reflect the effects of precipitation, ground cover, slope, drainage area, and other physical characteristics of the drainage basins. The synthetic hydrograph method was used on Big Dry Creek, Piney Creek, Cottonwood Creek, Murphy Creek, Cherry Creek, and South Platte River. Where available, hydrologic data were compared with other studies completed in the area (References 30, 34, and 35).

For the large drainage basins to the east of the Denver metropolitan area, flood magnitudes for the selected frequencies were computed using the USGS regional analysis outlined in Water Supply Paper 1680 (Reference 36) for Region B, Area 10. The relationship between flood magnitude and frequency, as portrayed in the composite frequency curve in Water-Supply Paper 1680, was extrapolated to give a ratio of 100-year flood discharge to mean annual discharge as the basis for the regional curve in Figures 1, 2, 3, and 4. The streams whose hydrology was derived from this regional analysis were the upper reaches of Piney Creek and Coal Creek, Lone Tree Creek, Senac Creek, 1-05-4412 Creek, West Box Elder Creek, Box Elder Creek, Kiowa Creek, Wolf Creek, Comanche Creek, Little Comanche Creek, West Bijou Creek, Middle Bijou Creek, and Deer Trail Creek. This curve was used as a comparison for synthetically generated hydrograph flows for each stream in the study. For some streams, the 100-year flood discharge generated by hydrograph methods is higher than the curve would indicate due to the effects of recent urbanization.

The South Platte River peak discharges for the 100- and 500-year floods below the dam were computed to reflect information on the operation of Chatfield Dam. For that reason, the South Platte River does not match the USGS regional data.

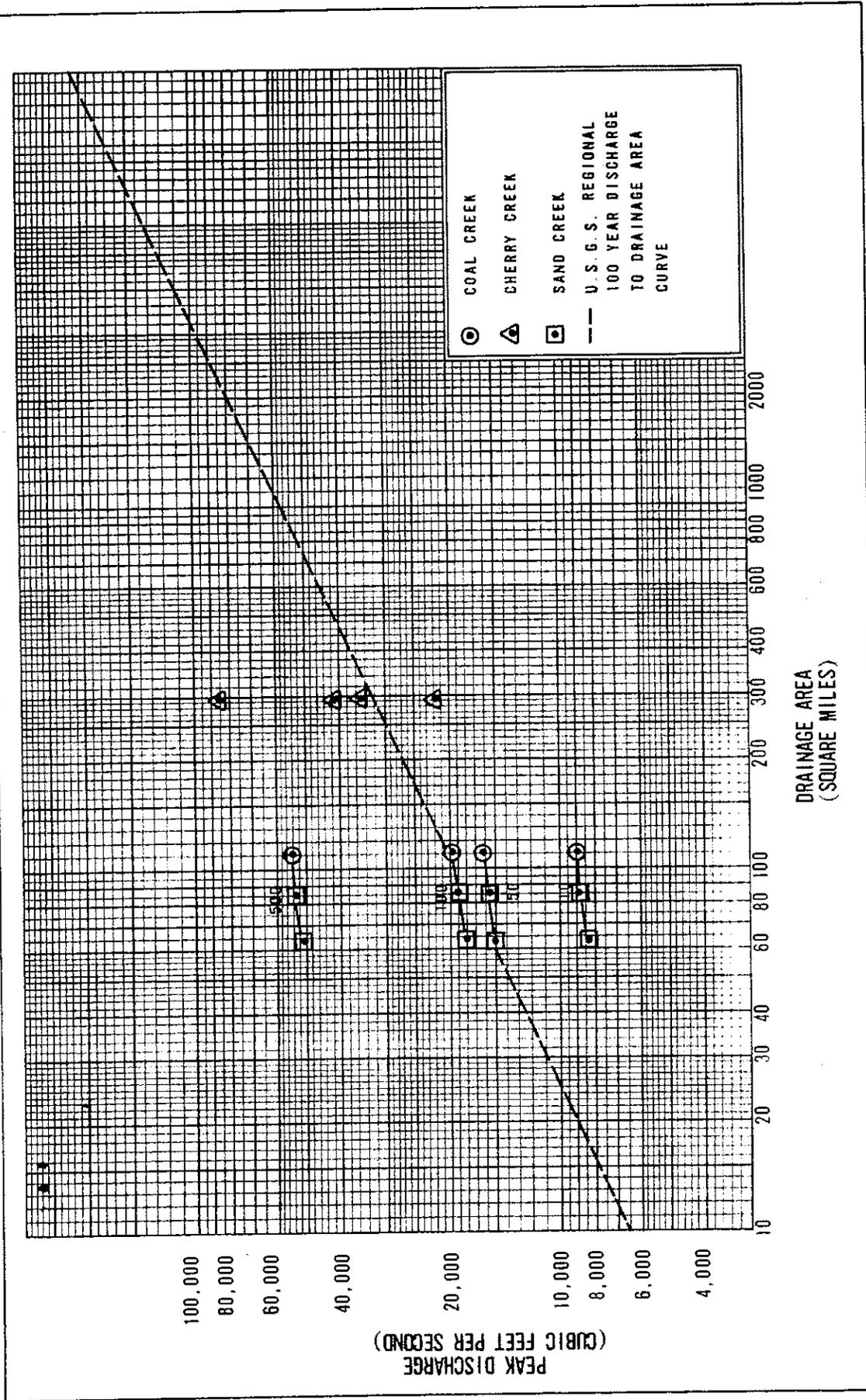
Rainfall data for the synthetic hydrologic analyses was taken from the UDFCD Urban Storm Drainage Criteria Manual (Reference 37). Synthetic hydrograph procedures used in the study included the Colorado Urban Hydrograph Procedure (CUHP), outlined in the UDFCD Manual (Reference 37), and the COE HEC-1 Flood Hydrograph Package (Reference 38). The 500-year flood discharges for all detailed-study streams were checked by straight-line extrapolation of frequencies

previously determined using the procedure of the USGS (References 27 and 36), and compared to the COE Standard Project Flood data when available.

Hydrologic analyses included in the Flood Insurance Studies for the incorporated communities of Aurora, Cherry Hills Village, Littleton, and Sheridan were incorporated into the restudy in their entirety with the exception of streams or portions of streams which were superseded by more up-to-date information (References 2, 3, and 5 through 9).

In addition, hydrologic data from various engineering reports (discussed in Section 7.0) were used extensively in the restudy of Arapahoe County. The methods used in these reports include CUHP, MITCAT, and Stormwater Management Model (References 10, 11, 12, 13, 14, 15, and 16).

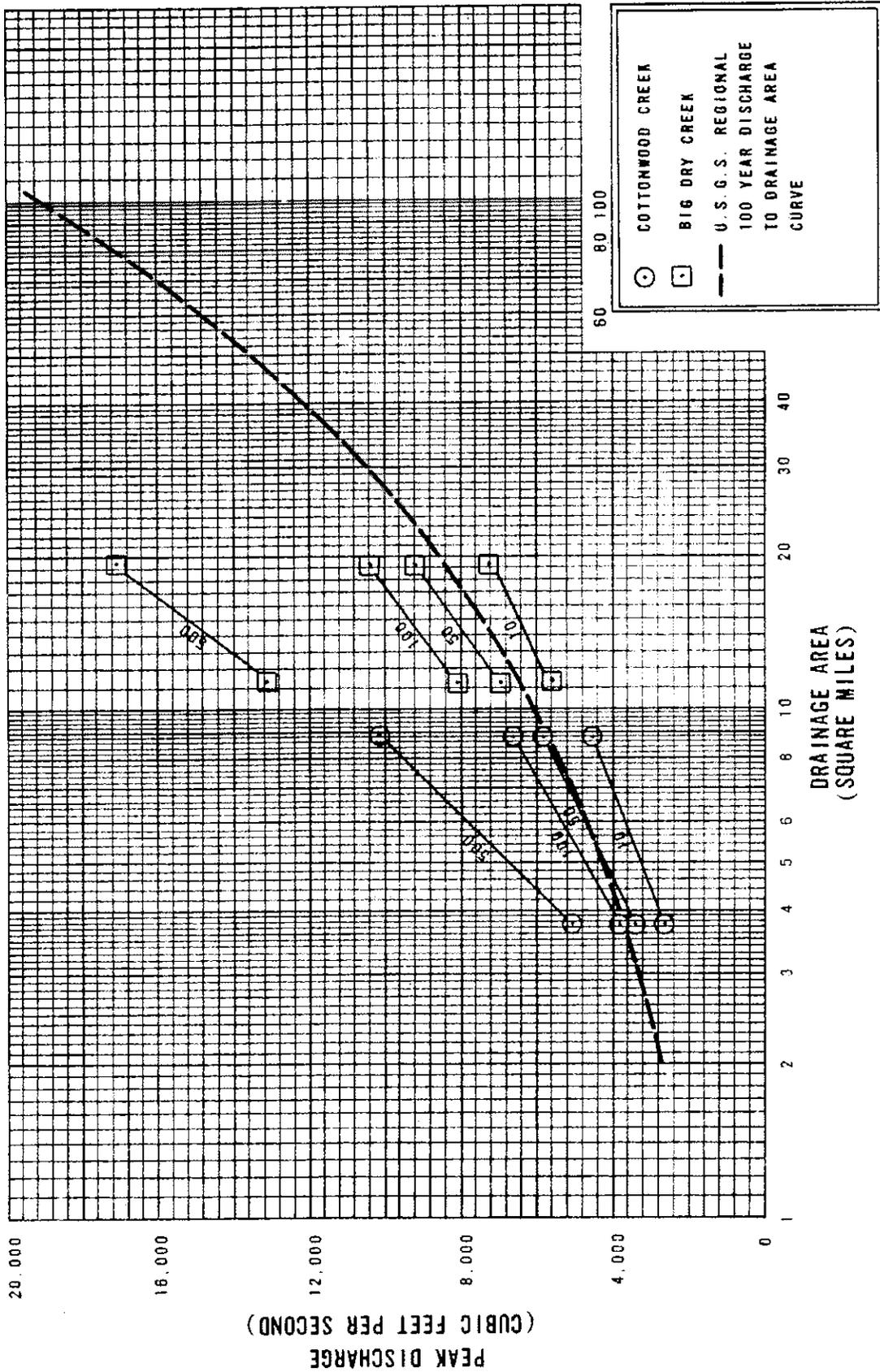
Peak discharge-drainage area relationships for the streams studied by detailed methods within Arapahoe County, except Spring Creek and SJCD 6100, are shown in Table 3 and Figures 1, 2, 3, and 4.



FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES
 COAL CREEK, CHERRY CREEK, SAND CREEK

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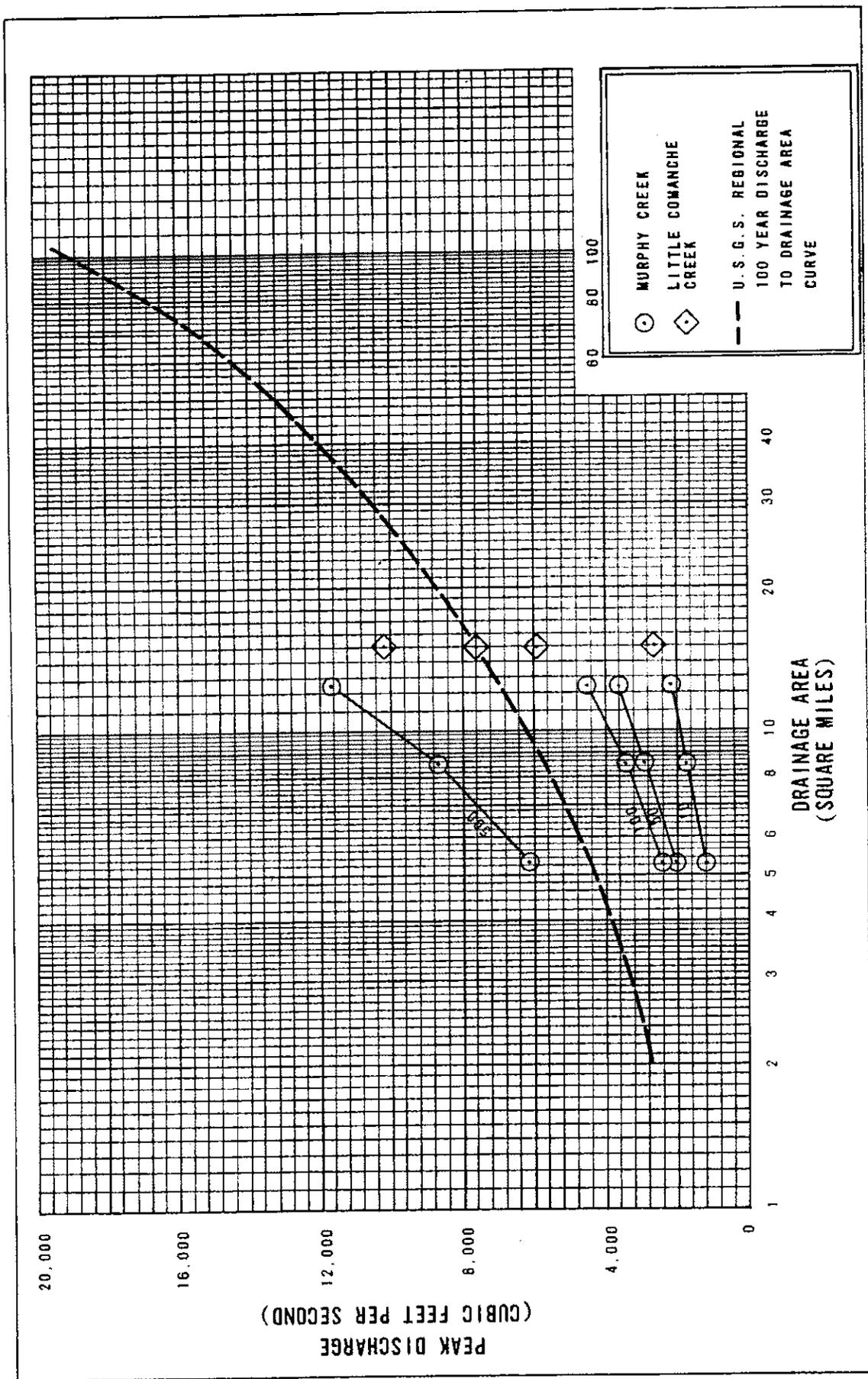
FIGURE 1



FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES
 COTTONWOOD CREEK, BIG DRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
 ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FIGURE 2



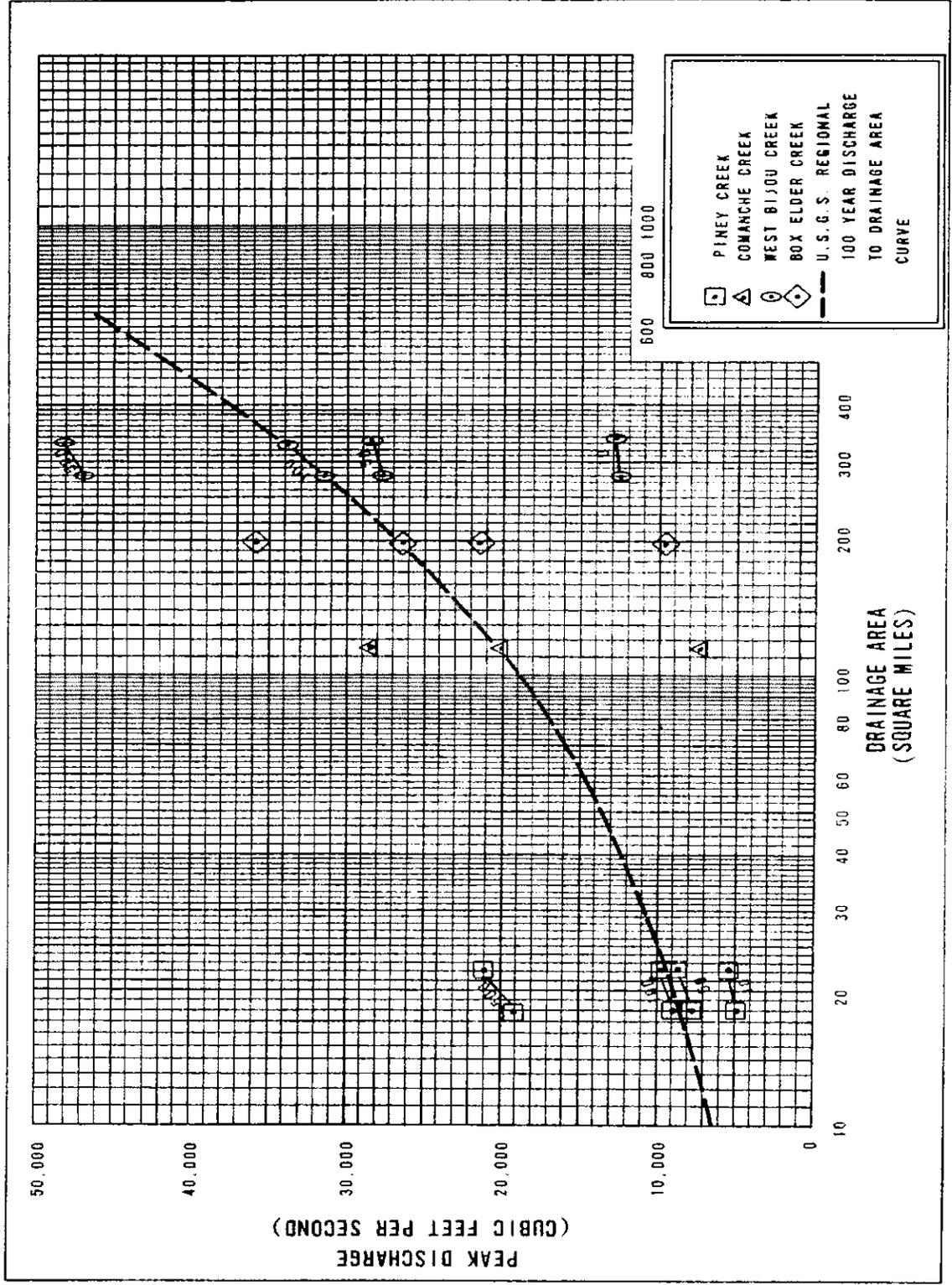
FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

MURPHY CREEK, LITTLE COMANCHE CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS

FIGURE 3



FEDERAL EMERGENCY MANAGEMENT AGENCY

ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS

FIGURE 4

FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES

PINEY CREEK, COMANCHE CREEK
WEST BIJOU CREEK, BOX ELDER CREEK

TABLE 3 – SUMMARY OF DISCHARGES

Flooding Source/Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Bear Creek					
At Mouth	22	4,170	6,920	8,150	11,280
Bear Gulch					
At Mouth	19.8	1410	4360	6300	10200
Big Dry Creek					
Above Windermere Street	11.0	5,100	7,000	8,100	13,100
At Confluence with South Platte River	19.0	7,100	9,100	10,400	17,200
At Littleton Boulevard	19.5	7,000	9,250	10,400	10,750
Blackmer Gulch					
At Confluence with Greenwood Gulch	2.3	1,390	1,850	1,950	2,330
At Confluence with Quincy Gulch	1.5	780	1,040	1,100	1,330
At Holly Street	0.5	385	500	540	640
Box Elder Creek					
Upstream of Coyote Run	173.5	780	5,520	8,760	15,000
At I-70	165.5	780	5,560	8,820	15,100
At Upstream Limit of Study	127.2	780	5,590	8,880	15,200
Cardboard Draw					
At Mouth	2.3	270	710	990	1,520
Cherry Creek					
At Downstream Limit of Study	340	10,300	31,000	51,000	150,000
	169	3,300	9,300	13,300	63,000
Cherry Creek Spillway Drain					
At Mouth	1.9	610	2,100	3,180	7,700
Cherry Creek (Right Overbank Split Flow)					
At Arapahoe Road	-- ¹	1	2,090	7,077	62,211
Coon Creek					
At Confluence with Dutch Creek	-- ¹	-- ¹	-- ¹	2,900	-- ¹
Coyote Run					
At Mouth	28.7	1,750	5,960	8,600	13,600
I-70/US-36	17.0	1,680	4,960	6,940	10,800
Below confluence with Woodrat Gulch	8.5	960	2,840	3,970	6,130

Flooding Source/Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Dutch Creek					
Upstream of Platte Canyon Road	-- ¹	-- ¹	-- ¹	7,400	-- ¹
First Creek					
Upstream of Smith Road	-- ¹	1,930	-- ¹	4,000	-- ¹
Granby Ditch					
At Mouth	3.74	1,800	2,460	2,775	3,450
Above Confluence with Sable Ditch	2.28	935	1,280	1,445	1,800
At Colfax Avenue	1.96	488	876	1,080	1,732
At Laredo Street	1.38	212	372	447	1,170
Goldsmith Gulch					
At Belleview Road	2.6	1,270	1,950	2,250	3,050
West Tributary to Goldsmith Gulch					
At Orchard Road	1.3	530	840	1,000	1,380
Greenwood Gulch					
At Belleview Road	3.3	1,800	2,550	2,750	3,200
At Confluence with Prentice Creek	2.7	1,700	2,300	2,450	2,800
At Orchard Road	1.2	1,100	1,500	1,600	1,850
Happy Canyon Creek					
U/S of Confluence with Cherry Creek	-- ¹	-- ¹	-- ¹	3,690	-- ¹
Lee Gulch					
At Confluence with South Platte River	2.5	1,900	2,500	2,900	4,500
Little's Creek					
At Confluence with South Platte River	2.3	1,800	2,300	2,800	4,200
Little Dry Creek					
Clarkson Street	23.66	2,275	3,750	4,580	5,970
Logan Street	-- ¹	2,275 ²	3,210	3,540	5,960
Cinderella Conduit Entrance	-- ¹	2,350 ²	3,340	3,660	6,090 ²
South Platte River Confluence	24.96	2,470 ²	3,420	3,770	6,200
Lone Tree Creek					
Downstream of Arapahoe Airport Runway	-- ¹	-- ¹	-- ¹	850	-- ¹
At Cherry Creek Rec. Area Boundary	-- ¹	-- ¹	-- ¹	2,000	-- ¹
Murphy Creek					
At Mouth	-- ¹	-- ¹	-- ¹	4,450	-- ¹

Flooding Source/Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Prairie Dog Draw					
At Mouth	6.3	850	2,200	3,020	4,600
Prentice Gulch					
At Mouth	0.8	640	870	920	1,030 ²
Quincy Gulch					
At Confluence with Blackmer Gulch	0.8	610	810	850	1,000
At South Bellaire Street	0.4	320	420	445	550
Rat Run					
At Mouth	2.9	440	1,120	1,530	2,310
Sable Ditch					
Above Confluence with Granby Ditch	1.46	910	1,250	1,405	1,760
At Colfax Avenue	1.02	730	1,030	1,030	1,410
Sand Creek					
At Mouth	147	10,000	22,000	29,000	55,000
At Colfax Avenue	97	6,700	15,900	21,500	45,000
Slaughterhouse Gulch					
At Confluence with South Platte River	2.0	1,400	1,700	2,000	2,900
South Tributary to Slaughterhouse Gulch					
At Confluence w/ Slaughterhouse Gulch	.37	438	520	550	720
SJCD 6200					
Upstream of Platte Canyon Road	-- ¹	-- ¹	-- ¹	2,280	-- ¹
South Platte River					
Approximately 100 Feet Downstream of Confluence with Bear Creek	-- ¹	4,900	10,900	14,600	25,000
Just Upstream of Confluence with Bear Creek	-- ¹	4,900	10,300	13,500	23,000
Just Downstream of Confluence with Big Dry Creek	-- ¹	4,300	9,500	12,700	22,000
Approximately 100 Feet Upstream of Confluence with Big Dry Creek	-- ¹	3,300	6,900	8,900	15,000
Approximately 100 Feet Downstream of Confluence with Dutch Creek	-- ¹	2,700	5,000	6,400	10,000
Just Upstream of Confluence with Dutch Creek	-- ¹	1,300	2,200	2,700	4,000

Flooding Source/Location	Drainage Area (Square Miles)	Peak Discharges (Cubic Feet per Second)			
		10% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Sterne Parkway Overflow					
250 feet downstream of South Broadway	-- ¹	-- ¹	-- ¹	128	-- ¹
Toll Gate Creek					
At Mouth	41	4,400	15,500	24,000	57,000
At East 6 th Avenue	34.7	4,050	13,900	21,200	52,000
West Toll Gate Creek					
At East Mississippi Avenue	17.9	2,950	10,000	15,200	37,000
Below Confluence with West Toll Gate Tributary	16.9	2,800	9,400	14,400	35,000
At Buckley Road	14.8	2,150	7,300	11,200	27,400
Below Confluence with Unnamed Creek	13.1	1,100	3,650	5,900	14,000
At East Quincy Avenue	4.5	1,100	3,650	4,500	14,000
West Toll Gate Creek Tributary					
At Mouth	2.6	610	1,950	3,100	7,400
East Toll Gate Creek					
Above Confluence with West Toll Gate Creek	10.8	1,420	4,800	7,500	18,500
At Confluence with Side Creek	8.9	1,600	5,400	8,100	19,300
Unnamed Creek (Tributary to West Toll Gate Creek)					
At Mouth	6.1	1,150	3,900	6,000	14,200
Westerly Creek					
At 14 th Avenue	10.8	2,700	4,200	5,000	6,800
At Pond A-B	5.8	400	1,150	1,650	2,650
Willow Creek					
Upstream of Englewood Dam	9.41	-- ¹	-- ¹	6,400	-- ¹
Woodrat Gulch					
At Mouth	3.4	470	1,280	1,780	2,740
Wolf Creek					
Upstream of Interstate 70	82.2	4,485	10,603	14,686	24,966
At Confluence with Wolf Creek Tributary	71.7	4,278	10,233	14,166	24,082
Wolf Creek Tributary					
At Mouth	3.5	571	1,185	1,578	2,683

¹Data not available

²Value was extrapolated

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 founded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data Table 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 report in conjunction with the data shown on the FIRM.

Water-surface elevation of floods of the selected recurrence intervals were computed through the use of the COE HEC-2 stepbackwater computer program (Reference 38). Starting water-surface elevations for the tributaries of the South Platte River were taken from previously computed stage-discharge relationships when available. In many cases, control elevations were shifted upstream to bridges or culverts. Where no other information or control structures were available, the starting water-surface elevations were computed by the slope-area method option of the HEC-2 program.

Detailed cross section data for Cottonwood Creek, Cherry Creek, Piney Creek, Murphy Creek, Coal Creek, Comanche Creek, Little Comanche Creek, West Bijou Creek, and Box Elder Creek were field surveyed and were located at close intervals above and below culverts in order to compute the effects of backwater. For Little Dry Creek, Big Dry Creek, and Sand Creek, cross sections were taken from detailed topographic maps (References 30 and 34). Detailed mapping of the South Platte River was secured from the COE. The USGS topographic mapping, at a scale of 1:24,000, with a contour interval of 10 feet, was used to supplement field survey data (Reference 29).

Hydraulic analyses included in the Flood Insurance Studies for the incorporated communities of Aurora, Cherry Hills Village, Columbine Valley, Englewood, Greenwood Village, Littleton, and Sheridan were incorporated into the restudy in their entirety with the exception of streams or portions of streams which were superseded by more up-to-date information (References 2, 3, 5 through 9, 88, 89).

Hydraulic analyses for portions of First Creek, Piney Creek, Murphy Creek, Lone Tree Creek, Happy Canyon Creek, Cottonwood Creek, Lee Gulch, and Littles Creek were taken from published UDFCD reports (References 10, 11, 12, 13, 14, 15, and 16).

Additional hydraulic analyses from the various engineering reports discussed in Section 7.0 have been incorporated into the Arapahoe County restudy.

Hydraulic analyses for portions of Big Dry Creek Tributary A, East Tributary to

West Toll Gate Creek, First Creek, Sampson Gulch, and Senac Creek were performed using topographic maps at a scale of 1:24,000, with a contour interval of 10 feet (Reference 39). Field surveyed cross sections were used and normal-depth calculations were performed in order to obtain top widths at the selected cross sections. Cross section information for channel geometry and surrounding areas was taken from existing reports (References 40, 41, 42, and 43).

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 Flood Insurance Rate Map (Exhibit 2).

For the approximate studies, floodplain limits were defined by normal-depth calculations in approximate, typical cross sections taken from USGS maps.

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

3.3 Vertical Datum

All FISs 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 in use for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in differences in base flood elevations across the corporate limits between communities.

As noted above, the elevations shown in the FIS report and on the FIRM for Arapahoe County and Incorporated Areas are referenced to NAVD88. Ground, structure, and flood elevations may be compared and/or referenced to NGVD29 by applying a standard conversion factor.

The conversion from NGVD29 to NAVD88 ranged between 2.60 and 3.06 for this county. Accordingly, due to the range in conversion factors, an average conversion factor was established for the entire county. The elevations shown in the FIS report and on the FIRM were, therefore, converted to NAVD88 using a countywide approach in which an average conversion was established for the county. The

conversion factor for NGVD29 to NAVD88 of 2.87 feet was used for each flooding source in the community.

The BFEs shown in the FIRM represent whole-foot rounded values. For example, a BFE of 5202.4 will appear as 5202 on the FIRM and 5202.6 will appear as 5203. Therefore, users who wish to convert the elevations in this FIS to NGVD29 should apply the stated conversion factor to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1 foot.

For more information on NAVD88, see the publication entitled, *Converting the National Flood Insurance Program to the North American Vertical Datum of 1988* (FEMA Publication FIA-20/June 1992), or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address <http://www.ngs.noaa.gov>).

Qualifying bench marks within a given jurisdiction that are cataloged by the National Geodetic Survey (NGS) and entered into the National Spatial Reference System (NSRS) as First or Second Order Vertical and have a vertical stability classification of A, B, or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

Bench marks catalogued by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

- Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)
- Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutments)
- Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below frost line)
- Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line or steel witness post)

To obtain up-to-date elevation information on NGS bench marks shown on the FIRM, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov. Map users should seek verification of non-NGS monument elevations when using these elevations for construction or floodplain management purposes.

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 this FIS report and FIRM for this community. Interested individuals may contact FEMA to access this data.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each FIS provides 1-percent-annual-chance flood elevations and delineations of the 1- and 0.2-percent-annual-chance floodplain boundaries and 1-percent-annual-chance floodway to assist communities in developing floodplain management measures. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data table and Summary of Stillwater Elevations Table. Users should reference the data presented in the FIS report as well as additional information that may be available at the local map repository before making flood elevation and/or floodplain boundary determinations.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at scales of 1:24,000; 1:2,400; 1:6,000; and 1:1,200; with contour intervals of 10 and 2 feet (References 34, 35, 40, 42, 43, 47, and 48).

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, AE, AH, and AO); and the 0.2-percent-annual-chance floodplain 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.

Approximate 1-percent-annual-chance floodplain boundaries in some portions of the study area were taken directly from the Flood Insurance Rate Map for the Town of Deer Trail, Colorado (Reference 59).

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM (Exhibit 2).

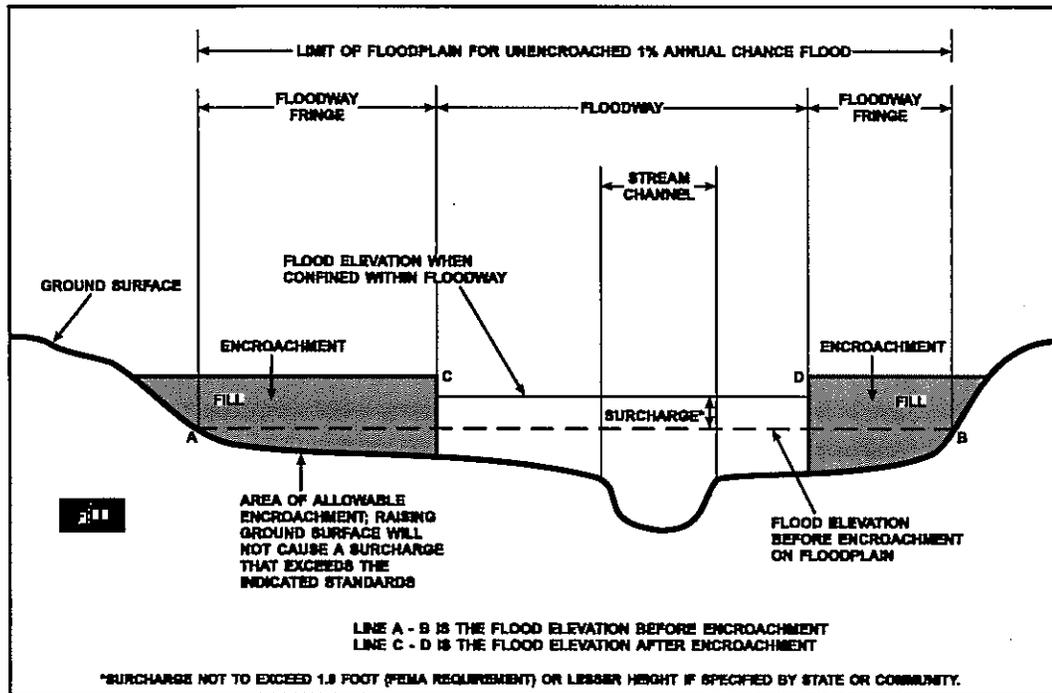
4.2 Floodways

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 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 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 floodway presented in this FIS report and on the FIRM was 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 have been tabulated for selected cross sections (Table 4). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent-annual-chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 5.

Figure 5 - Floodway Schematic



FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET (NAVD)	WITH FLOODWAY	
Bear Creek								
A	-	980	7,535	1.1	5,269.8	5,269.8	5,269.8	0.0
B	370	164	690	11.8	5,271.0	5,271.0	5,271.0	0.0
C	630	140	546	11.3	5,279.8	5,279.8	5,279.8	0.0
D	822	104	531	11.6	5,281.6	5,281.6	5,281.6	0.0
E	1,522	75	461	13.3	5,287.5	5,287.5	5,287.6	0.1
F	2,082	70	529	11.6	5,294.0	5,294.0	5,294.0	0.0
G	2,777	92	878	7.6	5,298.1	5,298.1	5,298.2	0.1
H	3,252	150	1,093	7.5	5,299.0	5,299.0	5,299.1	0.1
I	3,682	89	819	10.0	5,299.9	5,299.9	5,299.9	0.0
J	3,760	114	760	10.7	5,301.2	5,301.2	5,301.2	0.0
K	3,937	295	1,736	4.7	5,301.5	5,301.5	5,301.5	0.0
L	4,492	317	1,565	5.2	5,301.7	5,301.7	5,302.5	0.8
M	5,152	260	1,330	6.1	5,304.3	5,304.3	5,304.5	0.2
N	5,827	120	794	10.3	5,307.2	5,307.2	5,307.2	0.0
O	6,082	56	711	11.5	5,311.9	5,311.9	5,311.9	0.0
P	6,122	70	829	9.8	5,311.9	5,311.9	5,312.2	0.3
Q	6,361	200	1,865	4.4	5,313.8	5,313.8	5,313.9	0.1

¹ Feet Above Mouth

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

BEAR CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
Bear Gulch								
M	27,332	262	942	4.2	5,356.8	5,356.8	5,357.6	0.8
N	29,099	181	529	6.4	5,363.1	5,363.1	5,364.0	0.8
O	31,530	195	604	5.6	5,373.9	5,373.9	5,374.6	0.7
P ²	33,268	170	1,322	2.3	5,388.2	5,388.2	5,389.1	0.9
Q	35,695	100	360	8.6	5,400.2	5,400.2	5,400.8	0.6
R	38,249	375	2,350	1.0	5,424.8	5,424.8	5,425.4	0.5
S	39,081	93	250	9.3	5,426.3	5,426.3	5,426.4	0.1
T	41,266	91	247	9.4	5,449.2	5,449.2	5,449.7	0.4
U	43,460	230	1,657	1.1	5,481.8	5,481.8	5,482.7	0.9

¹ Feet Above Confluence With Box Elder Creek

² Cross Section Is Outside of City of Aurora (Adams County)

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

BEAR GULCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
Big Dry Creek						FEET (NAVD)		
A	1,178	128	786	11.3	5,317.0	5,317.0	5,317.4	0.4
B	1,476	48	488	18.2	5,320.3	5,320.3	5,320.3	0.0
C	1,998	300	3,496	2.5	5,332.4	5,332.4	5,332.4	0.0
D	2,374	290	2,194	4.1	5,332.4	5,332.4	5,332.4	0.0
E	3,765	133	894	10.0	5,337.5	5,337.5	5,337.6	0.1
F	6,200	141	5,235	1.7	5,357.3	5,357.3	5,357.3	0.0
G	7,359	160	741	12.0	5,363.2	5,363.2	5,363.2	0.0
H	8,107	116	721	12.3	5,368.4	5,368.4	5,368.6	0.2
I	8,951	41	501	17.8	5,374.2	5,374.2	5,374.8	0.6
J	9,446	88	1,338	6.6	5,382.1	5,382.1	5,382.1	0.0
K	9,927	111	1,268	7.0	5,382.6	5,382.6	5,382.6	0.0
L	11,006	62	531	16.8	5,390.1	5,390.1	5,390.1	0.0
M	13,132	149	1,044	8.3	5,410.4	5,410.4	5,410.4	0.0
N	13,683	406	2,172	4.0	5,410.9	5,410.9	5,411.9	1.0
O	14,117	80	572	15.2	5,414.0	5,414.0	5,414.0	0.0
P	14,440	226	801	10.9	5,418.7	5,418.7	5,418.7	0.0
Q	14,832	466	1,895	4.6	5,422.9	5,422.9	5,422.9	0.0
R	15,371	74	849	10.1	5,423.8	5,423.8	5,424.2	0.4
S	16,307	91	711	12.1	5,427.8	5,427.8	5,428.1	0.3
T	17,225	158	1,103	7.8	5,433.7	5,433.7	5,434.7	1.0
U	18,652	89	663	12.8	5,444.7	5,444.7	5,444.7	0.0
V	19,030	309	1,354	6.1	5,449.2	5,449.2	5,450.0	0.8
W	19,476	89	833	10.0	5,450.8	5,450.8	5,451.0	0.2
X	19,728	103	617	13.4	5,452.0	5,452.0	5,452.0	0.0
Y	20,375	78	734	11.0	5,457.5	5,457.5	5,457.5	0.0
Z	20,729	380	1,023	7.9	5,462.7	5,462.7	5,462.7	0.0

¹ Feet Above Confluence With South Platte River

FEDERAL EMERGENCY MANAGEMENT AGENCY ARAPAHOE COUNTY, CO AND INCORPORATED AREAS	FLOODWAY DATA
TABLE 4	BIG DRY CREEK

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY WITH FLOODWAY		INCREASE
					FEET (NAVD)	FEET (NAVD)	FEET (NAVD)	
Big Dry Creek (Cont'd)								
AA	20,762	457	2,039	4.0	5,464.0	5,464.0	5,464.0	0.0
AB	21,013	108	878	9.2	5,464.2	5,464.2	5,464.2	0.0
AC	21,388	108	905	8.9	5,464.6	5,464.6	5,465.3	0.7
AD	22,447	182	1,227	6.6	5,473.3	5,473.3	5,474.3	1.0
AE	23,245	233	869	9.3	5,475.8	5,475.8	5,476.3	0.5
AF	23,698	137	685	11.8	5,480.7	5,480.7	5,481.0	0.3
AG	24,310	281	1,496	5.4	5,488.3	5,488.3	5,488.7	0.4
AH	25,194	114	806	9.9	5,492.2	5,492.2	5,492.2	0.0
AI	26,481	347	1,055	7.6	5,498.6	5,498.6	5,499.3	0.7
AJ	26,819	205	746	10.7	5,502.2	5,502.2	5,502.5	0.3
AK	27,756	322	384	5.7	5,517.5	5,517.5	5,517.5	0.0
AL	28,275	72	630	10.3	5,519.1	5,519.1	5,519.3	0.2
AM	28,706	237	2,102	3.1	5,523.3	5,523.3	5,524.0	0.7
AN	29,046	179	1,443	4.5	5,523.4	5,523.4	5,524.1	0.7
AO	29,915	224	808	8.0	5,524.0	5,524.0	5,524.5	0.5
AP	30,542	149	585	10.9	5,529.2	5,529.2	5,529.4	0.2
AQ	31,174	55	496	12.7	5,538.9	5,538.9	5,538.9	0.0
AR	31,791	442	3,631	1.7	5,541.9	5,541.9	5,542.9	1.0
AS	32,159	112	530	11.9	5,542.9	5,542.9	5,543.0	0.1
AT	33,065	151	842	6.4	5,553.2	5,553.2	5,553.2	0.0
AU	33,535	167	579	9.3	5,556.3	5,556.3	5,556.3	0.0
AV	33,906	86	489	11.0	5,559.0	5,559.0	5,559.1	0.1
AW	34,669	106	494	10.9	5,566.1	5,566.1	5,566.1	0.0
AX	36,004	120	486	11.1	5,576.2	5,576.2	5,576.2	0.0
AY	37,333	54	317	13.9	5,585.7	5,585.7	5,585.7	0.0
AZ	38,174	200	746	5.9	5,595.3	5,595.3	5,595.3	0.0

1 Feet Above Confluence With South Platte River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

BIG DRY CREEK

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Big Dry Creek (Cont'd)								
BA	38,799	185	489	9.0	5,600.3	5,600.3	5,600.4	0.1
BB	39,936	128	636	6.9	5,608.7	5,608.7	5,608.7	0.0
BC	40,662	126	509	8.3	5,617.5	5,617.5	5,617.5	0.0
BD	41,358	93	410	10.2	5,623.3	5,623.3	5,623.3	0.0
BE	42,909	127	478	8.3	5,637.2	5,637.2	5,637.2	0.0
BF	43,951	175	719	5.0	5,643.6	5,643.6	5,643.6	0.0
BG	45,112	99	371	9.7	5,656.2	5,656.2	5,656.2	0.0
BH	46,785	114	514	7.0	5,670.9	5,670.9	5,670.9	0.0
BI	47,547	331	576	6.2	5,676.3	5,676.3	5,676.3	0.0

† Feet Above Confluence With South Platte River

TABLE 4	FEDERAL EMERGENCY MANAGEMENT AGENCY ARAPAHOE COUNTY, CO AND INCORPORATED AREAS	FLOODWAY DATA
	BIG DRY 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
Big Dry Creek Tributary A								
A	150	62	338	4.6	5,550.8	5,550.8	5,550.8	0.0
B	816	46	154	10.0	5,566.1	5,566.1	5,566.1	0.0
C	2,228	35	134	10.4	5,598.9	5,598.9	5,598.9	0.0
D	3,312	238	2,377	0.5	5,625.4	5,625.4	5,625.4	0.0
E	4,519	90	173	7.0	5,637.0	5,637.0	5,637.0	0.0
F	5,772	65	226	3.5	5,663.5	5,663.5	5,663.5	0.0

¹ Feet Above Confluence With Big Dry Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA
BIG DRY CREEK TRIBUTARY A

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BLACKMER GULCH								
A	312	160	530	3.0	5,407.9	5,407.9	5,408.2	0.2
B	1,102	71	247	4.0	5,413.2	5,413.2	5,413.3	0.1
C	1,792	130	161	6.1	5,420.9	5,420.9	5,420.9	0.0
D	3,161	140	193	5.1	5,437.1	5,437.1	5,437.2	0.1
E	3,200	190	859	1.1	5,441.0	5,441.0	5,441.4	0.4
F	4,264	19	81	11.7	5,443.1	5,443.1	5,443.1	0.0
G	4,325	482	1,350	0.7	5,460.0	5,460.0	5,460.0	0.0
H	5,668	69	173	2.3	5,460.8	5,460.8	5,461.3	0.5
I	6,346	41	58	6.8	5,471.4	5,471.4	5,471.4	0.0
J	6,551	180	109	3.7	5,491.0	5,491.0	5,491.0	0.0
K	8,034	50	86	6.0	5,505.7	5,505.7	5,506.3	0.6
L	8,835	33	66	8.0	5,535.6	5,535.6	5,536.6	1.0
M	9,850	57	89	6.0	5,553.4	5,553.4	5,554.1	0.7
N	11,045	22	58	9.0	5,588.1	5,588.1	5,588.4	0.3

¹ Feet Above Confluence With Greenwood Gulch

FLOODWAY DATA

BLACKMER GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

**ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS**

TABLE 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD		
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	WATER SURFACE ELEVATION		INCREASE
					REGULATORY	WITHOUT FLOODWAY	
Box Elder Creek							
AT	249,546	510	1,647	5.5	5,367.0	5,367.4	0.4
AU	250,043	745	1,977	4.6	5,368.6	5,369.1	0.5
AV	250,767	516	1,160	7.8	5,371.0	5,371.3	0.3
AW	251,492	520	1,631	5.6	5,373.9	5,374.9	1.0
AX	252,711	638	1,894	4.8	5,378.8	5,379.8	1.0
AY	253,415	403	1,418	6.4	5,381.8	5,382.4	0.6
AZ	254,303	405	1,639	5.6	5,384.8	5,385.7	0.9
BA	255,101	456	1,395	6.5	5,387.7	5,388.4	0.7
BB	256,606	332	1,242	7.3	5,393.3	5,393.9	0.6
BC	257,617	1,450 ³	6,066	1.5	5,398.4	5,399.2	0.8
BD	258,719	686	1,544	5.7	5,402.5	5,403.2	0.7
BE	259,263	530	1,555	5.7	5,405.5	5,406.3	0.8
BF	260,410	976	1,980	4.4	5,409.6	5,410.3	0.7
BG	260,941	300	1,097	8.0	5,413.8	5,414.0	0.2
BH	262,160	420	1,480	5.9	5,418.1	5,419.1	1.0
BI	263,071	439	1,481	5.9	5,421.7	5,422.3	0.6
BJ-BK ²							
BL	266,090	310	1,031	8.5	5,436.7	5,436.9	0.2
BM	267,210	460	1,625	5.4	5,441.1	5,441.9	0.8
BN	269,258	2,219	10,578	0.8	5,448.9	5,448.9	0.0
BO	269,413	1,763	7,956	0.1	5,448.9	5,448.9	0.0
BP	269,948	620	1,348	6.5	5,449.5	5,450.2	0.7
BQ	271,286	873	1,821	4.8	5,456.1	5,457.0	0.9
BR	272,640	199	1,029	8.6	5,461.3	5,462.2	0.9
BS	273,626	660	2,139	4.1	5,466.6	5,467.5	0.9
BT	275,274	300	980	9.0	5,474.2	5,474.3	0.1

¹ Feet Above Mouth

² Cross Sections Are Outside of City of Aurora (Adams Count

³ Includes effect of confluence with Coyote Run

FEDERAL EMERGENCY MANAGEMENT AGENCY ARAPAHOE COUNTY, CO AND INCORPORATED AREAS	FLOODWAY DATA BOX ELDER CREEK
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TABLE 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY WITH FLOODWAY	INCREASE
Box Elder Creek (Cont'd)							
BU	276,242	460	1,397	6.3	5,478.1	5,478.4	0.3
BV	277,690	460	1,381	6.4	5,484.7	5,485.6	0.9
BW	278,684	710	1,796	4.9	5,489.6	5,490.5	0.9
BX	279,378	620	1,633	5.4	5,492.6	5,493.4	0.8
BY	280,376	530	1,231	7.2	5,497.1	5,497.8	0.7
BZ	281,897	440	1,340	6.6	5,504.7	5,505.5	0.8
CA	283,266	470	1,778	5.0	5,511.6	5,512.6	1.0
CB-CC ²							
CD	287,575	290	1,132	7.8	5,532.4	5,533.1	0.7
CE	288,200	360	1,309	6.7	5,535.4	5,536.4	1.0
CF	288,825	420	1,513	5.8	5,538.1	5,539.1	1.0
CG	289,400	410	1,081	8.2	5,540.9	5,541.7	0.8
CH-CI ²							
CJ	290,645	390	1,167	7.6	5,547.1	5,547.2	0.1
CK	291,300	510	1,550	5.7	5,549.9	5,550.9	1.0
CL	292,969	510	1,658	5.3	5,559.1	5,560.1	1.0
CM	294,436	380	990	8.9	5,567.1	5,567.6	0.5
CN	295,347	370	1,092	8.1	5,571.8	5,572.3	0.5
CO	296,961	583	1,672	5.3	5,580.3	5,581.3	1.0
CP	297,444	440	1,229	7.2	5,582.9	5,583.9	1.0
CQ	298,424	614	1,620	5.5	5,587.8	5,588.2	0.4
CR	300,161	420	1,109	8.0	5,595.8	5,596.4	0.6
CS	301,208	645	1,708	5.2	5,601.3	5,602.3	1.0
CT	302,738	440	2,517	3.5	5,608.0	5,608.9	0.9
CU	303,249	190	861	10.3	5,609.9	5,610.1	0.2

¹ Feet Above Mouth

² Cross Sections Are Outside of City of Aurora (Adams County)

TABLE 4	FEDERAL EMERGENCY MANAGEMENT AGENCY ARAPAHOE COUNTY, CO AND INCORPORATED AREAS	FLOODWAY DATA BOX ELDER CREEK
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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY WITH FLOODWAY	FEET (NAVD)	
Box Elder Creek (Cont'd)								
CV	304,954	200	996	8.9	5,618.9	5,619.2	5,619.2	0.3
CW	305,649	250	1,547	5.7	5,622.9	5,623.6	5,623.6	0.7
CX	306,536	200	1,277	6.9	5,625.8	5,626.5	5,626.5	0.7
CY	307,747	380	1,709	5.2	5,633.0	5,633.9	5,633.9	0.9
CZ	309,289	830	2,738	3.2	5,637.7	5,638.7	5,638.7	1.0
DA	310,316	930	2,223	4.0	5,643.4	5,644.2	5,644.2	0.8
DB	311,058	750	2,816	3.2	5,646.0	5,647.0	5,647.0	1.0
DC	311,552	500	1,426	6.2	5,647.9	5,648.8	5,648.8	0.9
DD	311,973	720	2,558	3.5	5,650.5	5,651.5	5,651.5	1.0
DE	312,271	420	1,438	6.2	5,652.1	5,652.6	5,652.6	0.5
DF	313,110	700	2,247	3.9	5,655.7	5,656.7	5,656.7	1.0
DG	313,835	490	1,412	6.3	5,660.0	5,660.7	5,660.7	0.7
DH	314,906	260	1,034	8.6	5,665.0	5,665.7	5,665.7	0.7
DI	316,018	390	1,280	6.9	5,670.5	5,670.8	5,670.8	0.3
DJ	316,980	370	1,473	6.0	5,674.6	5,675.4	5,675.4	0.8
DK	317,934	940	2,613	3.4	5,678.7	5,679.6	5,679.6	0.9
DL	318,808	590	1,608	5.5	5,682.7	5,683.6	5,683.6	0.9
DM	319,904	260	1,264	7.0	5,688.5	5,689.3	5,689.3	0.8
DN	321,164	270	1,166	7.6	5,694.6	5,695.3	5,695.3	0.7

¹ Feet Above Mouth

FEDERAL EMERGENCY MANAGEMENT AGENCY ARAPAHOE COUNTY, CO AND INCORPORATED AREAS	FLOODWAY DATA
TABLE 4	BOX ELDER CREEK

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)		
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CHERRY CREEK								
A	86,110	1,305	8,472	6.0	5,624.3	5,624.3	5,625.1	0.8
B	86,896	792	5,955	8.5	5,627.9	5,627.9	5,628.5	0.6
C	87,257	745	6,003	8.4	5,629.7	5,629.7	5,630.2	0.5
D	88,111	663	5,979	8.3	5,633.3	5,633.3	5,633.8	0.5
E	88,941	1,053	8,487	5.8	5,635.8	5,635.8	5,636.8	1.0
F	89,292	1,087	8,680	5.7	5,636.9	5,636.9	5,637.8	0.9
G	89,802	579	4,638	9.1	5,638.3	5,638.3	5,639.0	0.7
H	90,126	900	7,564	5.5	5,640.6	5,640.6	5,640.8	0.2
I	90,669	920	6,102	6.8	5,641.8	5,641.8	5,642.0	0.2
J	90,939	829	4,804	10.2	5,643.6	5,643.6	5,643.6	0.0
K	91,358	1,371	11,782	4.9	5,650.0	5,650.0	5,650.0	0.0
L	91,576	1,403	9,850	4.9	5,650.3	5,650.3	5,650.3	0.0
M	93,004	2,017	12,984	3.7	5,653.2	5,653.2	5,653.3	0.1
N	95,434	955	5,822	8.3	5,658.8	5,658.8	5,658.9	0.1
O	96,049	819	5,553	8.6	5,661.3	5,661.3	5,661.6	0.3
P	96,762	941	6,723	7.1	5,664.7	5,664.7	5,664.8	0.1
Q	97,310	840	5,529	8.6	5,666.7	5,666.7	5,666.7	0.0
R	97,989	773	5,909	8.0	5,670.0	5,670.0	5,670.1	0.1
S	98,604	969	7,828	6.0	5,672.3	5,672.3	5,672.4	0.1
T	99,598	740	5,868	8.0	5,675.6	5,675.6	5,675.7	0.1
U	100,260	792	4,512	10.3	5,680.2	5,680.2	5,680.2	0.0
V	100,529	806	6,237	7.4	5,683.2	5,683.2	5,683.2	0.0
W	101,846	1,137	7,106	6.5	5,687.1	5,687.1	5,687.7	0.6
X	102,420	1,320	7,304	6.3	5,689.6	5,689.6	5,689.9	0.3
Y	103,583	1,078	6,736	6.8	5,694.1	5,694.1	5,694.4	0.3
Z	105,290	876	6,229	7.3	5,699.3	5,699.3	5,699.7	0.4

¹ Feet Above Confluence With South Platte River

FLOODWAY DATA

CHERRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

**ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS**

TABLE 4

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
Cherry Creek (Cont'd)								
AA	105,947	956	6,237	7.2	5,701.9	5,701.9	5,702.2	0.3
AB	106,785	868	5,815	7.7	5,705.3	5,705.3	5,705.2	0.0
AC	107,318	886	7,325	6.1	5,707.0	5,707.0	5,707.3	0.3
AD	108,492	1,071	7,528	5.8	5,710.7	5,710.7	5,711.0	0.3
AE	109,251	1,057	7,502	5.9	5,712.5	5,712.5	5,712.7	0.2

¹ Feet Above Confluence With South Platte River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

CHERRY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Cherry Creek (Right Overbank Splitflow)								
A	462	444	1,815	3.9	5638.7	5638.7	5639.2	0.5
B	937	640	2,329	3.0	5640.1	5640.1	5640.7	0.6
C	1,317	693	1,713	4.1	5642.3	5642.3	5642.7	0.4
D	1,713	738	2,376	3.0	5644.1	5644.1	5644.5	0.4

¹ Feet above confluence with Cherry Creek

TABLE 4	FEDERAL EMERGENCY MANAGEMENT AGENCY	FLOODWAY DATA
ARAPAHOE COUNTY, CO AND INCORPORATED AREAS		CHERRY CREEK (RIGHT OVERBANK SPLITFLOW)

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
Cherry Creek Spillway Drain								
A	1,775	323	306	10.4	5,524.6	5,524.6	5,524.6	0.0
B	3,140	164	1,030	2.4	5,561.6	5,561.6	5,561.7	0.1
C	3,780	175	322	7.1	5,575.4	5,575.4	5,575.4	0.0
D	4,030	68	180	9.3	5,591.8	5,591.8	5,591.8	0.0
E	5,632	149	341	4.6	5,615.0	5,615.0	5,615.0	0.0

¹ Feet Above Confluence With West Toll Gate Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

CHERRY CREEK SPILLWAY DRAIN

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET (NAVD)	WITH FLOODWAY	
Coal Creek								
A	77,150	1,900	2,746	7.1	5,500.5	5,500.5	5,500.5	0.0
B	78,270	3,260	1,907	10.2	5,505.4	5,505.4	5,505.4	0.0
C	80,320	3,160	6,460	3.0	5,514.1	5,514.1	5,515.1	1.0
D	83,150	470	1,900	10.3	5,526.8	5,526.8	5,527.3	0.5
E	84,155	350	2,220	8.8	5,532.3	5,532.3	5,533.3	0.0
F	85,900	600	3,177	6.1	5,539.1	5,539.1	5,539.8	0.7
G	86,005	600	2,747	7.1	5,539.1	5,539.1	5,539.8	0.7
H	87,200	280	1,456	13.4	5,546.4	5,546.4	5,546.4	0.0
I	88,195	480	2,880	6.8	5,553.2	5,553.2	5,553.5	0.3
J	89,990	500	3,100	6.3	5,559.8	5,559.8	5,560.8	1.0
K	91,790	610	2,680	7.3	5,567.4	5,567.4	5,568.3	0.9
L	93,425	600	3,200	6.1	5,575.1	5,575.1	5,576.1	1.0
M	95,125	400	2,540	7.4	5,583.4	5,583.4	5,584.4	1.0
N	96,380	585	2,980	6.3	5,587.5	5,587.5	5,588.2	0.7
O	97,495	270	1,113	16.9	5,593.4	5,593.4	5,593.7	0.3
P	98,380	450	2,640	6.9	5,599.2	5,599.2	5,600.2	1.0
Q	100,095	410	3,200	5.7	5,602.4	5,602.4	5,603.2	0.8
R	101,900	400	1,800	10.1	5,612.8	5,612.8	5,613.5	0.7
S	102,550	440	3,300	5.5	5,617.5	5,617.5	5,618.5	1.0
T	102,650	600	2,573	7.0	5,623.1	5,623.1	5,624.1	1.0
U	103,480	685	5,955	3.0	5,624.2	5,624.2	5,625.0	0.8
V	104,100	800	1,136	15.9	5,625.7	5,625.7	5,625.7	0.0
W	105,150	900	3,482	5.2	5,629.9	5,629.9	5,629.9	0.0
X	106,175	570	1,800	10.1	5,633.9	5,633.9	5,634.0	0.1
Y	106,950	560	3,236	5.3	5,639.4	5,639.4	5,640.1	0.7
Z	107,750	780	3,154	5.4	5,642.4	5,642.4	5,643.0	0.6

¹ Feet Above Mouth of Sand Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

COAL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Coal Creek (Cont'd) AA AB	108,650	590	2,454	7.0	5,646.2	5,646.2	5,646.8	0.6
	109,900	440	1,973	9.1	5,652.0	5,652.0	5,652.5	0.5

¹ Feet Above Mouth of Sand Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

COAL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET (NAVD)	WITH FLOODWAY	INCREASE
Comanche Creek								
A	147,210	1,900	5,209	3.9	5,372.2	5,372.2	5,372.2	0.0
B	147,830	1,680	5,276	3.8	5,373.5	5,373.5	5,373.5	0.0
C	147,880	1,300	3,049	6.6	5,374.9	5,374.9	5,374.9	0.0
D	148,830	1,736	2,015	9.2	5,376.9	5,376.9	5,376.9	0.0
E	148,980	1,680	1,353	13.7	5,377.0	5,377.0	5,377.0	0.0
F	149,580	2,915	7,514	2.5	5,382.4	5,382.4	5,382.4	0.0
G	150,450	1,220	2,280	8.1	5,385.2	5,385.2	5,385.2	0.0
H	151,650	1,440	5,208	3.6	5,391.4	5,391.4	5,391.4	0.0
I	152,520	1,270	2,340	7.9	5,397.7	5,397.7	5,397.7	0.0

¹ Feet Above Mouth

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

COMANCHE 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	WATER SURFACE ELEVATION		INCREASE
						WITHOUT FLOODWAY	WITH FLOODWAY	
Cottonwood Creek								
A	11,220	170	612	10.8	5,623.8	5,623.8	5,623.8	0.0
B	12,210	255	931	7.1	5,629.7	5,629.7	5,629.7	0.0
C	12,925	103	521	12.7	5,637.2	5,637.2	5,637.2	0.0
D	14,705	202	1,205	5.5	5,655.0	5,655.0	5,655.0	0.0
E	15,820	113	698	9.5	5,661.2	5,661.2	5,661.2	0.0
F	16,680	32	242	15.7	5,662.9	5,662.9	5,662.9	0.0
G	16,830	32	413	9.2	5,668.2	5,668.2	5,668.2	0.0
H	18,477	144	840	4.5	5,680.2	5,680.2	5,681.1	0.9
I	19,182	190	710	5.4	5,687.1	5,687.1	5,687.3	0.2
J	20,532	411	5,459	1.1	5,713.0	5,713.0	5,713.0	0.0
K	21,006	282	3,334	1.8	5,713.0	5,713.0	5,713.0	0.0
L	22,132	478	2,653	2.6	5,713.0	5,713.0	5,713.0	0.0
M	23,182	139	533	8.9	5,717.5	5,717.5	5,717.5	0.0

¹ Feet Above Mouth

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

COTTONWOOD CREEK

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY		
Coyote Run									
A	940	1,030	4,519	1.9	5,398.1	5,398.1	5,399.1	1.0	
B	1,494	100	632	13.6	5,401.1	5,401.1	5,401.5	0.4	
C	2,759	210	1,207	7.1	5,405.6	5,405.6	5,406.2	0.6	
D	3,824	250	1,505	5.7	5,408.7	5,408.7	5,409.6	0.9	
E	4,786	170	717	11.6	5,410.6	5,410.6	5,410.7	0.1	
F-H ²									
I	13,220	230	1,366	6.1	5,437.6	5,437.6	5,438.1	0.5	
J	14,320	381	1,659	5.0	5,440.0	5,440.0	5,440.8	0.8	
K	15,021	130	709	11.6	5,443.7	5,443.7	5,444.0	0.3	
L	17,564	120	798	10.4	5,450.3	5,450.3	5,451.0	0.7	
M	18,465	630	3,533	2.0	5,453.9	5,453.9	5,454.5	0.6	
N	23,205	330	1,284	5.4	5,464.0	5,464.0	5,465.0	1.0	
O	25,704	840	2,291	3.3	5,473.1	5,473.1	5,473.2	0.1	
P	25,851	880	3,032	2.3	5,474.0	5,474.0	5,474.7	0.7	
Q	29,452	350	1,719	4.1	5,485.1	5,485.1	5,485.9	0.8	
R	33,392	930	1,794	3.9	5,493.9	5,493.9	5,494.0	0.1	
S	33,479	930	2,102	3.3	5,494.2	5,494.2	5,494.4	0.2	
T	36,258	130	878	7.9	5,503.1	5,503.1	5,503.7	0.6	
U-Z ²									
AA	41,181	123	2,766	5.7	5,518.8	5,518.8	5,518.8	0.0	
AB	43,605	185	861	6.3	5,522.9	5,522.9	5,522.9	0.0	
AC	44,128	340	1,033	5.3	5,524.2	5,524.2	5,524.2	0.0	
AD	45,999	250	1,769	3.1	5,531.1	5,531.1	5,531.5	0.4	
AE	48,728	100	728	7.5	5,539.4	5,539.4	5,539.5	0.1	
AF	50,265	90	617	8.6	5,543.8	5,543.8	5,544.6	0.8	
AG	51,140	180	871	6.1	5,547.7	5,547.7	5,548.1	0.4	

¹ Feet Above Confluence with Box Elder Creek

² Cross Sections Are Outside of City of Aurora (Adams County)

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

COYOTE RUN

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY		
Coyote Run (Cont'd)									
AH	51,250	410	2,245	2.4	5,548.5	5,548.5	5,548.9	0.4	
AI	51,275	700	3,732	1.4	5,550.5	5,550.5	5,551.0	0.5	
AJ	52,895	160	429	9.3	5,554.9	5,554.9	5,555.6	0.7	
AK	54,210	230	563	7.1	5,559.6	5,559.6	5,560.2	0.6	
AL	56,664	672	940	4.2	5,572.2	5,572.2	5,573.1	0.9	
AM	58,898	380	832	4.8	5,586.6	5,586.6	5,587.4	0.8	
AN	59,791	340	609	4.4	5,592.6	5,592.6	5,592.9	0.3	
AO	60,414	190	442	6.1	5,596.1	5,596.1	5,596.7	0.6	
AP	62,102	140	326	8.3	5,604.1	5,604.1	5,605.1	1.0	
AQ	64,101	885	1,074	2.5	5,622.5	5,622.5	5,623.3	0.8	
AR	65,680	140	393	6.9	5,634.5	5,634.5	5,635.3	0.8	
AS	66,982	70	298	7.8	5,643.3	5,643.3	5,644.2	0.9	
AT	68,309	158	447	5.2	5,655.1	5,655.1	5,655.1	0.0	
AU	69,809	134	315	7.4	5,661.4	5,661.4	5,661.4	0.0	
AV	71,079	60	218	10.7	5,668.2	5,668.2	5,668.2	0.0	
AW	71,431	69	238	9.8	5,673.4	5,673.4	5,673.4	0.0	
AX	71,741	80	252	3.3	5,676.8	5,676.8	5,676.8	0.0	
AY	72,119	20	77	10.8	5,681.0	5,681.0	5,681.2	0.2	
AZ	72,200	104	130	6.4	5,689.3	5,689.3	5,689.3	0.0	
BA	74,093	46	183	4.6	5,700.8	5,700.8	5,700.9	0.1	
BB	75,788	63	127	6.5	5,717.9	5,717.9	5,717.9	0.0	
BC	76,144	38	99	8.4	5,722.8	5,722.8	5,722.8	0.0	
BD	77,069	40	102	7.7	5,733.2	5,733.2	5,733.2	0.0	
BE	78,328	75	191	4.1	5,748.4	5,748.4	5,749.3	0.9	
BF	78,539	76	113	6.9	5,761.3	5,761.3	5,761.3	0.0	

¹ Feet Above Confluence with Box Elder Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

COYOTE RUN

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
					FEET (NAVD)	FEET (NAVD)		
Coyote Run (Cont'd)								
BG	79,248	69	239	1.0	5,762.2	5,762.2	5,762.4	0.2
BH	79,801	22	35	7.1	5,770.0	5,770.0	5,770.0	0.0
BI	81,146	11	37	6.6	5,789.5	5,789.5	5,790.5	1.0
BJ	82,101	45	48	5.1	5,817.7	5,817.7	5,817.8	0.1

¹ Feet Above Confluence with Box Elder Creek

FLOODWAY DATA

COYOTE RUN

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

TABLE 4

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
Dutch Creek								
A	2,226	115	600	12.3	5,346.4	5,346.4	5,346.4	0.0
B	3,058	177	1,032	7.2	5,354.7	5,354.7	5,354.7	0.0
C	3,407	91	832	8.9	5,358.3	5,358.3	5,358.3	0.0
D	4,082	144	991	7.4	5,362.1	5,362.1	5,362.1	0.0
E	4,442	124	793	9.3	5,364.0	5,364.0	5,364.0	0.0
F	5,245	124	1,165	6.4	5,370.8	5,370.8	5,370.8	0.0

¹ Feet Above Confluence With South Platte River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

DUTCH CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET (NAVD)	WITH FLOODWAY	
East Toll Gate Creek								
A	1,500	361	992	8.3	5,413.3	5,413.3	5,413.5	0.2
B	2,520	140	1,044	7.8	5,419.8	5,419.8	5,419.9	0.1
C	3,695	120	733	11.0	5,425.1	5,425.1	5,425.8	0.7
D	4,250	55	628	12.9	5,426.9	5,426.9	5,427.2	0.3
E	4,940	120	1,803	4.5	5,434.4	5,434.4	5,434.4	0.0
F	5,890	115	609	13.3	5,436.3	5,436.3	5,436.3	0.0
G	6,430	968	1,903	6.6	5,443.9	5,443.9	5,443.9	0.0
H	7,430	820	1,007	8.0	5,449.9	5,449.9	5,449.9	0.0
I	8,600	575	1,443	5.4	5,452.5	5,452.5	5,453.2	0.7
J	12,860	374	891	9.1	5,474.2	5,474.2	5,474.7	0.5
K	13,650	309	1,434	5.6	5,480.8	5,480.8	5,481.6	0.8
L	14,770	370	1,763	4.6	5,490.3	5,490.3	5,490.4	0.1
M	15,370	418	898	9.0	5,494.3	5,494.3	5,494.3	0.0
N	16,110	368	1,389	5.8	5,500.3	5,500.3	5,501.2	0.9
O	16,250	492	1,270	6.2	5,501.9	5,501.9	5,502.8	0.9
P	16,900	262	1,173	6.5	5,504.4	5,504.4	5,505.1	0.7
Q	18,420	70	479	14.8	5,513.6	5,513.6	5,513.6	0.0

¹ Feet Above Confluence With Toll Gate Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA
EAST TOLLGATE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	WATER SURFACE ELEVATION			
					REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
Goldsmith Gulch								
A	78	97	372	6.1	5,590.8	5,590.8	5,590.8	0.0
B	516	94	549	4.1	5,595.6	5,595.6	5,595.6	0.0
C	1,406	105	332	6.8	5,602.9	5,602.9	5,602.9	0.0
D	1,644	86	335	6.5	5,608.0	5,608.0	5,608.0	0.0
E	2,068	96	248	8.8	5,610.2	5,610.2	5,610.2	0.0
F	2,630	200	1,064	1.9	5,618.3	5,618.3	5,618.6	0.3
G	3,294	117	453	4.3	5,620.8	5,620.8	5,621.7	0.9
H	3,596	91	520	3.8	5,627.0	5,627.0	5,627.3	0.3
I	3,672	80	505	3.9	5,627.9	5,627.9	5,628.5	0.6
J	4,516	203	302	6.4	5,634.9	5,634.9	5,634.9	0.0
K	4,811	184	598	3.2	5,636.3	5,636.3	5,636.3	0.0
L	5,386	46	230	3.7	5,641.4	5,641.4	5,642.2	0.8
M	6,061	45	104	7.8	5,649.2	5,649.2	5,649.4	0.2
N	6,516	45	105	7.7	5,656.3	5,656.3	5,656.3	0.0
O	6,575	25	98	8.3	5,659.4	5,659.4	5,659.4	0.0
P	6,735	378	1,226	0.8	5,672.4	5,672.4	5,672.4	0.0
Q	7,365	85	312	3.2	5,672.4	5,672.4	5,672.4	0.0
R	7,417	184	90	4.0	5,675.2	5,675.2	5,675.2	0.0
S	7,642	93	75	4.8	5,678.6	5,678.6	5,678.6	0.0
T	7,917	102	84	4.3	5,680.5	5,680.5	5,680.5	0.0
U	8,482	163	868	0.9	5,686.2	5,686.2	5,686.2	0.0
V	8,530	109	648	1.2	5,686.2	5,686.2	5,686.2	0.0
W	8,646	181	149	5.1	5,699.0	5,699.0	5,699.0	0.0
X	9,305	75	206	2.3	5,699.8	5,699.8	5,699.8	0.0
Y	9,740	45	92	4.8	5,704.8	5,704.8	5,704.8	0.0
Z	9,883	124	153	2.9	5,713.4	5,713.4	5,713.4	0.0

¹ Feet Above East Belleview Avenue

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA
GOLDSMITH GULCH

FLOODING SOURCE	CROSS SECTION	DISTANCE ¹	FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
			WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
GOLDSMITH GULCH	AA	10,014	62	97	3.5	5,713.8	5,713.8	5,713.8	0.0
	AB	10,062	86	310	1.1	5,714.8	5,714.8	5,714.8	0.0
	AC	10,306	69	150	2.2	5,714.7	5,714.7	5,714.7	0.0
	AD	10,682	60	87	3.9	5,721.8	5,721.8	5,721.8	0.0
	AE	11,091	21	34	7.2	5,732.4	5,732.4	5,732.4	0.0
	AF	11,287	59	43	5.7	5,737.3	5,737.3	5,737.3	0.0
	AG	11,381	82	58	4.2	5,738.1	5,738.1	5,738.1	0.0
	AH	11,586	131	99	2.5	5,742.7	5,742.7	5,742.7	0.0
	AI	11,805	17	18	5.9	5,743.3	5,743.3	5,743.3	0.0
	AJ	11,988	11	16	6.7	5,746.1	5,746.1	5,746.1	0.0
	AK	12,103	13	17	6.3	5,759.0	5,759.0	5,759.0	0.0
	AL	12,250	14	17	6.3	5,762.7	5,762.7	5,762.7	0.0
	AM	12,683	14	17	6.3	5,773.0	5,773.0	5,773.0	0.0

¹ Feet Above East Belleview Avenue

FEDERAL EMERGENCY MANAGEMENT AGENCY

ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS

FLOODWAY DATA

GOLDSMITH GULCH

TABLE 4

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE	
GRANBY DITCH									
A	500	126	337	1.2	5371.2	5371.2	5371.2	0.0	
B	800	77	95	4.3	5374.7	5374.7	5375.3	0.5	
C	1,050	56	66	6.1	5376.6	5376.6	5376.6	0.0	
D	1,550	80	94	6.1	5378.4	5378.4	5378.4	0.0	
E	1,915	149	149	3.8	5382.5	5382.5	5382.7	0.1	
F	2,400	104	119	5.5	5387.7	5387.7	5387.8	0.0	
G	2,800	88	118	5.5	5391.7	5391.7	5392.0	0.3	
H	3,200	97	472	2.3	5394.6	5394.6	5395.6	1.0	
I	3,800	69	146	7.4	5396.3	5396.3	5396.4	0.2	
J	4,200	32	109	8.2	5398.7	5398.7	5399.5	0.8	
K	4,550	18	95	7.4	5401.4	5401.4	5401.5	0.1	
L	5,000	43	83	6.3	5405.5	5405.5	5405.5	0.0	
M	5,248	103	243	2.1	5407.4	5407.4	5407.4	0.0	
N	5,600	90	81	5.3	5407.8	5407.8	5407.9	0.0	
O	5,900	94	82	5.2	5414.3	5414.3	5414.2	0.0	
P	6,200	100	82	4.3	5416.9	5416.9	5416.9	0.0	
Q	6,525	70	97	3.6	5420.3	5420.3	5420.7	0.4	
R	7,000	52	85	4.1	5422.3	5422.3	5422.8	0.5	
S	7,336	16	40	8.8	5426.0	5426.0	5426.0	0.0	
T	7,800	69	65	5.4	5428.4	5428.4	5428.4	0.0	
U	8,200	78	281	1.6	5432.7	5432.7	5432.8	0.1	
V	8,600	63	163	2.3	5433.6	5433.6	5433.6	0.1	
W	8,937	101	881	0.4	5447.2	5447.2	5447.5	0.3	
X	9,200	70	316	1.2	5447.2	5447.2	5447.5	0.3	
Y	9,600	72	293	1.2	5447.2	5447.2	5447.5	0.3	
Z	9,890	49	111	3.1	5447.2	5447.2	5447.6	0.3	

¹ Feet Above Confluence With Toll Gate Creek

FLOODWAY DATA

GRANBY DITCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS

TABLE 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD		
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	WATER SURFACE ELEVATION		INCREASE
					REGULATORY	WITHOUT FLOODWAY	
Greenwood Gulch							
A	1,079	194	502	5.6	5,344.9	5,344.9	0.7
B	1,924	60	511	5.5	5,349.3	5,349.9	0.6
C	2,883	129	485	5.8	5,353.7	5,354.3	0.6
D	6,077	592	598	5.5	5,373.8	5,373.8	0.0
E	7,160	270	731	4.5	5,380.0	5,380.2	0.2
F	7,745	170	464	7.1	5,386.7	5,387.1	0.4
G	7,852	220	1,219	2.7	5,388.2	5,388.9	0.7
H	8,099	175	1,496	2.2	5,388.4	5,388.9	0.5
I	11,299	300	823	4.0	5,404.1	5,404.4	0.3
J	14,141	125	2,640	1.0	5,428.6	5,428.6	0.0
K	15,057	125	326	8.1	5,429.1	5,429.2	0.1
L	17,852	503	406	6.5	5,453.1	5,453.1	0.0
M	17,979	504	2,400	1.1	5,455.4	5,455.7	0.3
N	18,759	184	713	4.1	5,461.3	5,461.9	0.6
O	19,049	138	680	4.3	5,462.4	5,463.1	0.7
P	19,558	103	513	5.7	5,467.0	5,467.0	0.0
Q	19,882	90	487	6.0	5,468.7	5,469.6	0.9
R	20,108	185	713	4.1	5,469.5	5,470.4	0.9
S	20,149	200	487	6.0	5,476.2	5,476.6	0.4
T	20,524	135	769	3.8	5,478.0	5,478.7	0.7
U	21,503	250	1,270	2.3	5,488.0	5,488.8	0.8
V	22,285	108	289	7.3	5,495.1	5,495.3	0.2
W	22,357	133	1,408	1.5	5,496.1	5,496.6	0.5
X	23,753	160	422	5.0	5,506.3	5,506.9	0.6
Y	24,766	90	480	4.4	5,513.3	5,514.0	0.7

¹ Feet Above Confluence With Little Dry Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

GREENWOOD GULCH

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 FEET (NAVD)	WITH FLOODWAY	INCREASE
Greenwood Gulch (Cont'd)							
Z	25,329	166	293	7.2	5,520.4	5,521.0	0.6
AA	25,445	527	850	3.2	5,524.7	5,524.7	0.0
AB	25,499	85	413	5.0	5,524.5	5,524.4	-0.1
AC	26,144	141	288	9.1	5,530.2	5,530.0	-0.2
AD	27,246	62	205	10.8	5,540.5	5,540.7	0.2
AE	27,362	56	314	6.1	5,543.4	5,544.3	0.9

¹ Feet Above Confluence With Little Dry Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

GREENWOOD GULCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Greenwood Gulch Bypass								
A	25	307	442	3.6	5,343.9	5,343.9	5,343.9	0.0
B	305	434	2,428	0.7	5,344.2	5,344.2	5,344.2	0.0
C	635	537	2,223	0.7	5,344.2	5,344.2	5,344.2	0.0
D	1,005	577	1,589	1.8	5,344.3	5,344.3	5,344.3	0.0

¹ Feet Above Corporate Limits

FLOODWAY DATA
FEDERAL EMERGENCY MANAGEMENT AGENCY ARAPAHOE COUNTY, CO AND INCORPORATED AREAS
GREENWOOD GULCH BYPASS

TABLE 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
					FEET (NAVD)			
Lee Gulch								
A	60	170	368	7.8	5,338.2	5,338.2	5,338.2	0.0
B	385	108	300	9.6	5,349.1	5,349.1	5,349.1	0.0
C	560	165	1,032	2.8	5,351.3	5,351.3	5,351.3	0.0
D	920	110	196	14.7	5,353.5	5,353.5	5,353.5	0.0
E	1,140	560	7,392	0.4	5,370.1	5,370.1	5,370.1	0.0
F	1,575	470	2,296	1.3	5,370.2	5,370.2	5,370.2	0.0
G	2,570	92	239	12.0	5,375.2	5,375.2	5,375.2	0.0
H	2,680	230	773	3.7	5,387.2	5,387.2	5,387.2	0.0
I	3,120	223	1,880	1.5	5,387.9	5,387.9	5,387.9	0.0
J	3,640	114	963	3.0	5,388.1	5,388.1	5,388.1	0.0
K	4,205	150	465	6.2	5,389.1	5,389.1	5,389.1	0.0
L	4,540	104	405	7.1	5,393.4	5,393.4	5,393.4	0.0
M	5,015	139	427	6.7	5,398.7	5,398.7	5,398.7	0.0
N	5,470	80	345	8.3	5,402.9	5,402.9	5,402.9	0.0
O	6,160	98	195	13.2	5,411.6	5,411.6	5,411.6	0.0
P	6,295	100	198	13.0	5,411.8	5,411.8	5,411.8	0.0
Q	6,580	120	524	4.9	5,417.0	5,417.0	5,417.0	0.0
R	6,610	145	325	7.9	5,420.5	5,420.5	5,420.5	0.0
S	7,080	100	556	4.6	5,425.7	5,425.7	5,425.7	0.0
T	7,730	69	314	8.2	5,429.2	5,429.2	5,429.2	0.0
U	8,330	83	384	6.7	5,434.9	5,434.9	5,434.9	0.0
V	8,810	81	263	9.8	5,443.4	5,443.4	5,443.4	0.0
W	9,210	95	533	4.8	5,448.8	5,448.8	5,448.8	0.0
X	10,060	65	308	8.3	5,454.5	5,454.5	5,454.5	0.0
Y	10,580	95	437	5.9	5,461.5	5,461.5	5,461.5	0.0
Z	10,850	60	128	11.0	5,467.8	5,467.8	5,467.8	0.0

¹ Feet Above Confluence With South Platte River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

LEE GULCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Lee Gulch (Cont'd)								
AA	10,920	70	129	10.9	5,467.9	5,467.9	5,467.9	0.0
AB	11,500	85	329	4.3	5,475.8	5,475.8	5,475.8	0.0
AC	11,940	78	237	5.9	5,479.0	5,479.0	5,479.0	0.0
AD	12,270	50	191	7.4	5,483.8	5,483.8	5,483.8	0.0
AE	12,825	66	216	6.5	5,492.5	5,492.5	5,492.5	0.0
AF	13,380	56	169	8.3	5,500.6	5,500.6	5,500.6	0.0

¹ Feet Above Confluence with South Platte River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

LEE GULCH

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 FEET (NAVD)	WITH FLOODWAY	INCREASE
Little Comanche Creek								
A	2,070	1,900	5,209	3.9	5,372.2	5,372.2	5,372.2	0.0
B	2,700	1,680	5,276	3.8	5,373.5	5,373.5	5,373.5	0.0
C	2,770	1,300	3,049	6.6	5,374.9	5,374.9	5,374.9	0.0
D	3,900	1,736	2,015	9.2	5,376.9	5,376.9	5,376.9	0.0
E	4,000	1,680	1,353	13.7	5,377.0	5,377.0	5,377.0	0.0
F	4,770	2,915	7,514	2.5	5,382.4	5,382.4	5,382.4	0.0
G	6,000	230	2,280	8.1	5,385.2	5,385.2	5,385.2	0.0
H	6,450	570	5,208	3.6	5,391.4	5,391.4	5,391.4	0.0
I	7,500	170	1,360	5.4	5,392.5	5,392.5	5,392.5	0.0

¹ Feet Above Confluence With Comanche Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE COMANCHE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
						FEET (NAVD)		
Little Dry Creek								
A	140	80	358	10.3	5,270.2 ²	5,266.2	5,266.2	0.0
B	250	80	649	5.7	5,270.2 ²	5,268.8	5,268.8	0.0
C	761	99	492	7.5	5,270.2 ²	5,270.1	5,270.2	0.1
D	1,204	47	269	13.8	5,274.0	5,274.0	5,274.0	0.0
E	1,355	75	369	10.0	5,277.3	5,277.3	5,277.3	0.0
F	1,459	47	298	12.4	5,279.8	5,279.8	5,279.8	0.0
G	1,659	49	335	11.0	5,281.9	5,281.9	5,281.9	0.0
H	1,859	49	337	11.0	5,283.9	5,283.9	5,283.9	0.0
I	6,380	122	626	5.8	5,321.3	5,321.3	5,321.3	0.0
J	6,590	105	505	7.2	5,321.7	5,321.7	5,321.7	0.0
K	6,960	50	380	9.6	5,322.6	5,322.6	5,322.6	0.0
L	7,000	75	537	6.8	5,323.4	5,323.4	5,323.4	0.0
M	7,285	89	633	5.8	5,326.6	5,326.6	5,326.6	0.0
N	7,485	166	1,039	3.5	5,327.2	5,327.2	5,327.2	0.0
O	9,250	570	850	8.0	5,336.9	5,336.9	5,336.9	0.0
P	9,342	222	727	4.3	5,339.4	5,339.4	5,339.4	0.0
Q	10,361	54	185	10.5	5,343.2	5,343.2	5,343.2	0.0
R	10,889	60	456	4.2	5,348.6	5,348.6	5,348.6	0.0
S	11,409	130	455	4.3	5,349.6	5,349.6	5,350.4	0.8
T	12,153	65	355	5.5	5,352.9	5,352.9	5,353.3	0.4
U	14,877	173	310	6.2	5,364.6	5,364.6	5,364.6	0.0
V	15,179	65	314	6.2	5,367.0	5,367.0	5,368.0	1.0
W	15,292	72	375	6.2	5,368.5	5,368.5	5,369.3	0.8
X	16,421	80	642	3.6	5,373.7	5,373.7	5,373.7	0.0
Y	17,763	110	611	3.8	5,380.2	5,380.2	5,380.3	0.1

¹ Feet Above Confluence With South Platte River

² Elevation Due to Backwater From South Platte River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE DRY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
					FEET (NAVD)			
Little Dry Creek (Cont'd)								
Z	18,223	70	470	4.9	5,381.0	5,381.0	5,381.3	0.3
AA	22,258	30	284	8.1	5,399.7	5,399.7	5,400.4	0.7
AB	22,960	63	545	4.2	5,402.4	5,402.4	5,403.2	0.8
AC	24,901	175	3,160	0.7	5,417.8	5,417.8	5,417.8	0.0
AD	25,208	38	1,748	1.3	5,417.8	5,417.8	5,417.8	0.0
AE	25,528	71	664	3.5	5,417.7	5,417.7	5,418.2	0.5
AF	25,630	71	549	4.2	5,418.2	5,418.2	5,419.2	1.0
AG	26,370	72	644	3.6	5,420.1	5,420.1	5,420.7	0.6
AH	27,826	41	439	5.3	5,426.4	5,426.4	5,426.6	0.2
AI	28,725	41	318	7.3	5,429.7	5,429.7	5,430.6	0.9
AJ	29,810	76	544	4.2	5,436.5	5,436.5	5,437.4	0.9
AK	31,597	62	402	5.2	5,445.7	5,445.7	5,446.5	0.8
AL	33,250	61	301	7.0	5,454.4	5,454.4	5,455.4	1.0
AM	33,341	51	265	8.0	5,454.7	5,454.7	5,455.6	0.9
AN	33,385	39	211	10.0	5,456.1	5,456.1	5,456.1	0.0
AO	33,912	46	270	7.8	5,459.1	5,459.1	5,460.1	1.0
AP	34,843	69	395	5.3	5,465.0	5,465.0	5,466.0	1.0
AQ	35,557	67	412	5.1	5,473.4	5,473.4	5,473.4	0.0
AR	36,691	56	296	7.1	5,475.4	5,475.4	5,475.5	0.1
AS	36,892	48	306	6.9	5,478.8	5,478.8	5,479.0	0.2
AT	37,136	83	696	3.0	5,479.9	5,479.9	5,480.2	0.3
AU	38,750	62	210	8.0	5,494.4	5,494.4	5,494.4	0.0
AV	40,239	62	236	7.1	5,508.2	5,508.2	5,508.2	0.0
AW	41,013	46	210	8.0	5,515.2	5,515.2	5,515.2	0.0

¹ Feet Above Confluence With South Platte River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE DRY CREEK

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE	
Little Dry Creek (continued)									
AX	42,397	50	206	4.2	5,527.8	5,527.8	5,528.7	0.9	
AY	43,478	36	117	7.4	5,535.0	5,535.0	5,535.1	0.1	
AZ	43,757	12	47	5.2	5,537.7	5,537.7	5,537.7	0.0	
BA	43,921	27	55	4.3	5,539.6	5,539.6	5,539.6	0.0	
BB	47,180	124	567	3.3	5,573.2	5,573.2	5,573.2	0.0	
BC	47,545	65	375	5.0	5,574.7	5,574.7	5,574.7	0.0	
BD	47,732	53	249	7.5	5,575.5	5,575.5	5,575.5	0.0	
BE	48,066	49	208	9.0	5,582.9	5,582.9	5,582.9	0.0	
BF	48,253	49	188	12.4	5,586.3	5,586.3	5,586.3	0.0	
BG	48,509	128	528	4.5	5,597.9	5,597.9	5,597.9	0.0	
BH	48,933	69	385	4.9	5,598.3	5,598.3	5,598.3	0.0	
BI	50,017	50	180	10.4	5,606.2	5,606.2	5,606.2	0.0	
BJ	50,462	44	168	11.1	5,615.8	5,615.8	5,615.8	0.0	
BK	50,503	22	133	14.0	5,618.0	5,618.0	5,618.0	0.0	
BL	50,937	95	167	6.9	5,619.4	5,619.4	5,619.4	0.0	
BM	51,357	70	115	10.1	5,621.8	5,621.8	5,621.8	0.0	
BN	52,427	40	119	9.7	5,632.0	5,632.0	5,632.0	0.0	
BO	52,690	60	223	5.2	5,638.6	5,638.6	5,638.6	0.0	
BP	53,717	80	109	10.6	5,657.3	5,657.3	5,657.3	0.0	
BQ	54,187	160	104	10.6	5,669.2	5,669.2	5,669.2	0.0	
BR	54,307	110	457	2.5	5,677.5	5,677.5	5,677.5	0.0	
BS	54,797	50	112	10.3	5,680.5	5,680.5	5,680.5	0.0	
BT	55,877	70	113	6.9	5,699.7	5,699.7	5,699.7	0.0	
BU	56,537	60	87	8.9	5,720.9	5,720.9	5,720.9	0.0	

¹ Feet Above Confluence With South Platte River

FEDERAL EMERGENCY MANAGEMENT AGENCY

ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE DRY CREEK

TABLE 4

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
Little Dry Creek (Cont'd)	BV	130	1,089	0.7	5,731.7	5,731.7	5,731.7	0.0
	BW	65	95	8.2	5,731.8	5,731.8	5,731.8	0.0
	BX	400	2,237	0.3	5,749.8	5,749.8	5,749.8	0.0
	BY	140	1,287	0.6	5,749.8	5,749.8	5,749.8	0.0

¹ Feet Above Confluence With South Platte River

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE DRY CREEK

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE	
LITTLE'S CREEK									
A	3,550	110	278	8.1	5,369.3	5,369.3	5,369.3	0.0	
B	3,605	265	348	6.5	5,374.0	5,374.0	5,374.0	0.0	
C	4,130	270	820	2.8	5,375.6	5,375.6	5,375.6	0.0	
D	4,645	200	349	6.5	5,380.9	5,380.9	5,380.9	0.0	
E	5,250	161	441	5.1	5,389.1	5,389.1	5,389.1	0.0	
F	5,915	85	357	6.3	5,392.5	5,392.5	5,392.5	0.0	
G	6,250	158	393	5.7	5,395.1	5,395.1	5,395.1	0.0	
H	6,750	155	453	5.0	5,398.4	5,398.4	5,398.4	0.0	
I	7,400	130	360	6.3	5,406.6	5,406.6	5,406.6	0.0	
J	7,485	230	490	5.6	5,407.9	5,407.9	5,407.9	0.0	
K	8,010	135	352	6.4	5,409.9	5,409.9	5,409.9	0.0	
L	8,135	225	628	3.6	5,412.1	5,412.1	5,412.1	0.0	
M	8,685	103	260	8.6	5,415.7	5,415.7	5,415.7	0.0	
N	9,130	170	627	3.6	5,419.6	5,419.6	5,419.6	0.0	
O	9,570	230	339	5.2	5,425.2	5,425.2	5,425.2	0.0	
P	9,685	330	1,138	1.6	5,426.3	5,426.3	5,426.3	0.0	
Q	10,190	104	206	8.5	5,426.4	5,426.4	5,426.4	0.0	
R	10,871	81	212	8.4	5,436.7	5,436.7	5,436.7	0.1	
S	11,163	82	390	4.6	5,442.2	5,442.2	5,442.2	0.0	
T	11,253	85	318	5.6	5,442.2	5,442.2	5,442.2	0.1	
U	11,619	79	237	7.5	5,444.9	5,444.9	5,444.9	0.3	
V	11,946	103	274	6.5	5,449.1	5,449.1	5,449.1	0.0	
W	12,279	80	213	8.3	5,452.9	5,452.9	5,452.9	0.0	
X	12,609	122	269	6.6	5,457.5	5,457.5	5,457.5	0.0	
Y	13,005	69	180	9.1	5,462.7	5,462.7	5,462.7	0.2	
Z	13,478	193	255	6.4	5,468.6	5,468.6	5,468.6	0.1	
AA	13,928	202	446	4.0	5,476.4	5,476.4	5,476.4	0.1	

¹ Feet Above Confluence With South Platte River

FEDERAL EMERGENCY MANAGEMENT AGENCY

ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS

FLOODWAY DATA

LITTLE'S CREEK

TABLE 4

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY (FEET (NAVD))	WITH FLOODWAY	
Murphy Creek								
A	3,290	1,000	755	5.6	5,514.8	5,514.8	5,515.0	0.2
B	3,990	770	1,248	3.4	5,517.7	5,517.7	5,517.9	0.2
C	4,440	600	730	5.8	5,519.7	5,519.7	5,519.7	0.0
D	4,940	420	1,101	3.9	5,523.2	5,523.2	5,523.2	0.0
E	7,124	460	1,315	3.1	5,524.5	5,524.5	5,525.0	0.5
F	7,500	535	1,345	3.0	5,524.9	5,524.9	5,525.5	0.6
G	8,116	236	584	7.0	5,527.8	5,527.8	5,527.9	0.1
H	9,032	208	569	7.2	5,533.5	5,533.5	5,534.2	0.7
I	9,545	245	872	4.7	5,536.6	5,536.6	5,537.0	0.4
J	10,211	245	585	7.0	5,539.9	5,539.9	5,540.1	0.2
K	10,586	300	770	5.3	5,542.9	5,542.9	5,543.4	0.5
L	11,008	275	559	7.3	5,545.1	5,545.1	5,545.6	0.5
M	11,300	333	1,571	2.6	5,552.0	5,552.0	5,552.0	0.0
N	11,666	396	1,017	4.0	5,551.9	5,551.9	5,551.9	0.0
O	11,837	137	495	8.3	5,552.9	5,552.9	5,552.9	0.0
P	12,313	255	637	6.4	5,555.9	5,555.9	5,556.1	0.2
Q	13,366	439	895	4.6	5,560.3	5,560.3	5,560.5	0.2
R	13,968	431	685	5.2	5,562.7	5,562.7	5,563.4	0.7
S	14,650	538	837	4.2	5,567.2	5,567.2	5,567.7	0.5
T	15,062	723	499	7.1	5,568.7	5,568.7	5,569.0	0.3
U	15,377	691	625	5.7	5,572.9	5,572.9	5,572.7	-0.2
V	15,755	723	396	9.0	5,573.7	5,573.7	5,573.8	0.1
W	15,808	724	877	4.0	5,576.2	5,576.2	5,576.5	0.3
X	16,080	356	389	9.0	5,577.1	5,577.1	5,577.2	0.1
Y	16,367	120	687	5.4	5,578.8	5,578.8	5,578.8	0.0
Z	16,640	136	949	3.9	5,579.3	5,579.3	5,579.3	0.0

¹ Feet Above Confluence With Coal Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

MURPHY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET (NAVD)	WITH FLOODWAY	
Murphy Creek (Cont'd)								
AA	16,900	136	1,018	3.6	5,583.4	5,583.4	5,583.4	0.0
AB	17,663	110	594	6.2	5,584.9	5,584.9	5,584.8	-0.1
AC	18,250	57	300	12.3	5,586.7	5,586.7	5,586.7	0.0
AD	18,678	58	401	9.2	5,590.5	5,590.5	5,590.5	0.0
AE	19,022	159	834	4.4	5,592.2	5,592.2	5,592.4	0.2
AF	19,400	172	479	7.7	5,594.9	5,594.9	5,594.9	0.0
AG	20,036	102	539	6.8	5,597.1	5,597.1	5,597.1	0.0
AH	20,480	104	422	8.6	5,598.2	5,598.2	5,598.8	0.6
AI	21,133	252	491	7.4	5,601.0	5,601.0	5,601.0	0.0
AJ	21,402	210	393	9.3	5,603.0	5,603.0	5,603.4	0.4
AK	21,575	140	1,386	2.6	5,614.1	5,614.1	5,614.1	0.0
AL	22,029	351	2,323	1.6	5,614.3	5,614.3	5,614.3	0.0
AM	22,552	157	813	4.5	5,614.2	5,614.2	5,614.2	0.0
AN	22,800	185	809	4.5	5,614.3	5,614.3	5,614.3	0.0
AO	23,026	283	2,136	1.7	5,621.2	5,621.2	5,621.2	0.0
AP	23,879	200	721	4.3	5,621.5	5,621.5	5,621.5	0.0
AQ	24,523	158	430	7.2	5,623.0	5,623.0	5,623.1	0.1
AR	25,048	85	336	9.2	5,625.9	5,625.9	5,626.2	0.3
AS	25,370	98	474	6.5	5,628.5	5,628.5	5,629.1	0.6
AT	25,907	76	317	9.8	5,631.7	5,631.7	5,631.7	0.0
AU	26,775	124	444	7.0	5,636.4	5,636.4	5,636.8	0.4
AV	27,292	191	943	3.3	5,638.3	5,638.3	5,638.6	0.3
AW	27,775	111	361	8.6	5,641.6	5,641.6	5,641.6	0.0
AX	28,210	119	487	6.3	5,644.1	5,644.1	5,644.5	0.4
AY	28,473	145	573	5.4	5,644.9	5,644.9	5,645.6	0.7
AZ	28,690	110	346	8.9	5,646.2	5,646.2	5,646.1	-0.1

¹ Feet Above Confluence With Coal Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS

FLOODWAY DATA

MURPHY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET (NAVD)	WITH FLOODWAY	
Murphy Creek (Cont'd)								
BA	28,937	147	614	5.0	5,648.3	5,648.3	5,648.4	0.1
BB	29,511	104	342	9.0	5,649.9	5,649.9	5,650.0	0.1
BC	29,856	33	214	13.8	5,654.3	5,654.3	5,654.3	0.0
BD	30,330	71	641	4.6	5,658.3	5,658.3	5,658.6	0.3
BE	30,688	84	525	5.6	5,658.3	5,658.3	5,658.8	0.5
BF	31,620	157	409	7.2	5,661.8	5,661.8	5,661.8	0.0
BG	31,740	346	1,696	1.7	5,670.5	5,670.5	5,670.9	0.4
BH	32,750	128	804	2.9	5,670.8	5,670.8	5,671.0	0.2
BI	33,614	51	207	11.4	5,672.8	5,672.8	5,672.8	0.0
BJ	34,050	63	221	10.7	5,676.8	5,676.8	5,676.9	0.1
BK	34,758	70	413	5.7	5,681.3	5,681.3	5,681.3	0.0
BL	34,857	91	406	5.8	5,681.6	5,681.6	5,681.6	0.0
BM	35,529	63	229	10.3	5,683.4	5,683.4	5,683.3	-0.1
BN	35,646	129	544	4.3	5,685.4	5,685.4	5,685.4	0.0
BO	36,209	315	677	3.5	5,687.0	5,687.0	5,687.0	0.0
BP	36,324	338	605	3.9	5,693.6	5,693.6	5,693.6	0.0
BQ	36,886	135	636	3.7	5,694.1	5,694.1	5,694.1	0.0
BR	37,724	156	569	4.2	5,694.7	5,694.7	5,695.2	0.5
BS	38,400	84	251	9.4	5,697.0	5,697.0	5,697.1	0.1
BT	39,039	115	281	8.4	5,699.4	5,699.4	5,699.4	0.0
BU	39,172	131	501	4.7	5,705.4	5,705.4	5,705.4	0.0
BV	40,079	199	422	5.6	5,709.3	5,709.3	5,709.8	0.5
BW	40,164	186	855	2.8	5,713.9	5,713.9	5,713.9	0.0
BX	40,239	192	997	2.4	5,716.2	5,716.2	5,716.4	0.2
BY	40,828	103	278	7.9	5,716.4	5,716.4	5,716.5	0.1
BZ	41,818	82	261	8.4	5,721.4	5,721.4	5,721.8	0.4

¹ Feet Above Confluence With Coal Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS

FLOODWAY DATA

MURPHY CREEK

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY		
					FEET (NAVD)				
Murphy Creek (Cont'd)									
CA	42,910	73	223	9.9	5,728.3	5,728.3	5,728.4	0.1	
CB	43,723	246	408	5.4	5,732.5	5,732.5	5,732.9	0.4	
CC	44,495	73	284	7.8	5,737.9	5,737.9	5,738.5	0.6	
CD	46,117	304	445	5.0	5,748.6	5,748.6	5,748.7	0.1	
CE	47,044	74	242	9.1	5,753.2	5,753.2	5,753.6	0.4	
CF	48,410	270	617	3.6	5,760.2	5,760.2	5,760.3	0.1	
CG	49,284	85	279	7.9	5,766.2	5,766.2	5,766.1	-0.1	
CH	50,383	342	184	12.0	5,772.0	5,772.0	5,772.0	0.0	
CI	50,452	298	1,847	1.2	5,780.8	5,780.8	5,780.8	0.0	
CJ	50,913	156	387	5.5	5,780.6	5,780.6	5,780.6	0.0	
CK	51,428	200	445	4.8	5,782.9	5,782.9	5,782.9	0.0	
CL	52,239	42	213	8.2	5,791.6	5,791.6	5,791.8	0.2	
CM	52,393	44	468	3.7	5,801.8	5,801.8	5,801.8	0.0	
CN	53,352	160	388	4.3	5,802.2	5,802.2	5,802.2	0.0	
CO	53,700	179	157	10.7	5,804.5	5,804.5	5,804.5	0.0	
CP	53,800	266	275	6.1	5,811.0	5,811.0	5,811.0	0.0	
CQ	54,485	276	548	4.0	5,811.0	5,811.0	5,811.0	0.0	
CR	55,283	69	242	8.4	5,815.6	5,815.6	5,815.6	0.0	
CS	55,491	81	220	9.3	5,818.5	5,818.5	5,818.5	0.0	
CT	56,694	113	364	5.6	5,830.1	5,830.1	5,830.0	-0.1	
CU	57,443	62	201	10.1	5,835.7	5,835.7	5,835.7	0.0	
CV	57,880	49	184	11.1	5,840.3	5,840.3	5,840.4	0.1	
CW	58,141	245	1,355	1.5	5,850.1	5,850.1	5,850.1	0.0	
CX	58,851	110	260	5.5	5,850.4	5,850.4	5,850.4	0.0	
CY	60,041	52	147	9.7	5,861.4	5,861.4	5,861.4	0.0	
CZ	60,805	116	196	7.3	5,871.9	5,871.9	5,871.9	0.0	

¹ Feet Above Confluence With Coal Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

MURPHY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
Murphy Creek (Cont'd)								
DA	62,080	67	158	9.0	5,885.9	5,885.9	5,885.9	0.0
DB	63,351	46	144	9.9	5,901.4	5,901.4	5,901.4	0.0
DC	64,400	25	74	9.5	5,914.5	5,914.5	5,914.4	-0.1
DD	65,578	20	67	10.5	5,941.4	5,941.4	5,941.4	0.0
DE	66,461	29	76	9.3	5,961.8	5,961.8	5,961.8	0.0
DF	67,362	29	77	9.1	5,975.8	5,975.8	5,975.8	0.0
DG	67,900	13	25	7.2	5,988.5	5,988.5	5,988.5	0.0
DH	68,743	18	26	7.0	6,011.4	6,011.4	6,011.4	0.0

¹ Feet Above Confluence With Coal Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

MURPHY 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	WATER SURFACE ELEVATION		INCREASE
						WITHOUT FLOODWAY	WITH FLOODWAY	
Piney Creek								
A	775	220	1,061	9.2	5,632.8	5,632.8	5,632.8	0.0
B	1,635	143	796	12.3	5,638.8	5,638.8	5,638.8	0.0
C	2,070	110	899	10.9	5,642.0	5,642.0	5,642.8	0.8
D	2,330	109	888	11.0	5,642.7	5,642.7	5,643.6	0.9
E	2,660	133	1,040	9.4	5,646.3	5,646.3	5,646.3	0.0
F	2,864	146	1,169	8.4	5,647.2	5,647.2	5,647.2	0.0
G	3,138	163	1,272	7.7	5,648.0	5,648.0	5,648.0	0.0
H	3,785	203	1,091	9.0	5,649.7	5,649.7	5,649.7	0.0
I	4,253	282	1,559	6.3	5,653.6	5,653.6	5,653.6	0.0
J	4,888	312	1,242	7.9	5,657.0	5,657.0	5,657.0	0.0
K	5,769	256	1,048	9.1	5,663.5	5,663.5	5,663.5	0.0
L	6,652	219	980	9.7	5,667.8	5,667.8	5,667.8	0.0
M	7,325	238	1,065	8.9	5,676.1	5,676.1	5,676.1	0.0
N	8,096	244	1,590	6.0	5,682.2	5,682.2	5,682.2	0.0
O	8,798	338	2,043	4.7	5,685.3	5,685.3	5,685.3	0.0
P	9,393	98	657	14.5	5,689.7	5,689.7	5,690.4	0.7
Q	9,624	89	649	14.6	5,693.5	5,693.5	5,694.1	0.6
R	10,055	210	1,180	7.8	5,698.2	5,698.2	5,699.2	1.0
S	10,665	300	1,529	6.1	5,702.1	5,702.1	5,702.1	0.0
T	11,328	190	923	10.0	5,705.6	5,705.6	5,705.9	0.3
U	11,654	323	1,574	5.9	5,708.2	5,708.2	5,708.8	0.6
V	12,020	265	1,383	6.7	5,708.9	5,708.9	5,709.6	0.7
W	12,196	440	1,283	7.2	5,710.9	5,710.9	5,710.9	0.0
X	13,203	180	807	11.5	5,714.8	5,714.8	5,714.8	0.0
Y	14,207	230	1,280	7.2	5,722.0	5,722.0	5,722.5	0.5
Z	15,530	180	1,116	8.0	5,730.2	5,730.2	5,730.2	0.0

¹ Feet Above Confluence With Cherry Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

PINEY CREEK

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	FEET (NRVD)	
Piney Creek (Cont'd)									
AA	16,401	322	1,027	8.7	5,735.5	5,735.5	5,735.8	5,735.5	0.3
AB	17,720	270	708	12.6	5,743.3	5,743.3	5,743.3	5,743.3	0.0
AC	18,470	360	1,904	4.7	5,748.8	5,748.8	5,749.3	5,748.8	0.5
AD	19,370	640	878	9.8	5,757.5	5,757.5	5,758.0	5,757.5	0.5
AE	19,970	640	952	9.0	5,763.7	5,763.7	5,763.7	5,763.7	0.0
AF	20,770	660	1,370	6.3	5,770.5	5,770.5	5,770.5	5,770.5	0.0
AG	21,320	580	1,390	6.2	5,775.2	5,775.2	5,775.2	5,775.2	0.0
AH	21,920	160	664	13.0	5,780.2	5,780.2	5,780.2	5,780.2	0.0
AI	21,995	150	708	12.1	5,780.9	5,780.9	5,780.9	5,780.9	0.0
AJ	22,665	280	1,044	8.2	5,787.1	5,787.1	5,787.3	5,787.1	0.2
AK	23,165	270	726	11.8	5,792.1	5,792.1	5,792.1	5,792.1	0.0
AL	24,015	260	801	10.7	5,799.0	5,799.0	5,799.5	5,799.0	0.5
AM	24,715	540	2,182	3.4	5,803.9	5,803.9	5,804.4	5,803.9	0.5
AN	25,265	320	1,014	7.4	5,807.5	5,807.5	5,807.6	5,807.5	0.1
AO	25,625	310	886	8.5	5,811.7	5,811.7	5,811.8	5,811.7	0.1
AP	26,075	310	905	8.3	5,815.9	5,815.9	5,816.1	5,815.9	0.2

¹ Feet Above Confluence With Cherry Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

PINEY CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
Prentice Gulch	A	849 ¹	133	220	3.7	5,498.2	5,498.2	0.9
	B	1471 ¹	112	182	4.5	5,505.1	5,505.7	0.6
	C	2524 ¹	79	130	6.3	5,522.0	5,522.1	0.1
	D	2616 ¹	195	456	1.8	5,525.0	5,525.0	0.0
Quincy Gulch	A	382 ²	90	121	5.3	5,416.1	5,416.1	0.0
	B	919 ²	777	11	2.6	5,423.6	5,423.6	0.0
	C	2088 ²	50	121	5.3	5,435.6	5,436.1	0.5
	D	2358 ²	60	161	4.0	5,440.7	5,441.2	0.5
	E	2414 ²	40	1,070	0.6	5,448.7	5,448.7	0.0

¹ Feet Above Confluence With Highline Canal

² Feet Above Confluence With Blackmer Gulch

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

PRENTICE & QUINCY GULCHES

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Sable Ditch						FEET (NAVD)		
A	400 ¹	35	124	7.7	5,345.7	5,345.7	5,345.7	0.0
B	1,120 ¹	90	261	4.9	5,349.4	5,349.4	5,349.6	0.2
C	2,080 ¹	87	191	9.4	5,357.3	5,357.3	5,357.3	0.0
D	2,665 ¹	18	177	7.6	5,370.2	5,370.2	5,370.2	0.0
E	2,987 ¹	30	140	9.7	5,375.2	5,375.2	5,375.2	0.0
F	3,520 ¹	32	189	7.0	5,378.3	5,378.3	5,378.3	0.0
G	4,010 ¹	29	117	11.4	5,378.7	5,378.7	5,378.8	0.1
H	4,585 ¹	28	113	11.4	5,387.0	5,387.0	5,387.0	0.0
I	5,400 ¹	32	197	6.4	5,394.1	5,394.1	5,394.1	0.0
J	5,870 ¹	29	117	10.8	5,396.4	5,396.4	5,396.4	0.0
K	6,410 ¹	70	91	6.5	5,406.8	5,406.8	5,407.3	0.5
L	7,120 ¹	30	128	9.6	5,409.7	5,409.7	5,409.7	0.0
M	7,485 ¹	30	128	9.3	5,411.6	5,411.6	5,412.4	0.8
N	8,865 ¹	30	155	7.4	5,419.7	5,419.7	5,419.7	0.0
O	9,505 ¹	28	113	10.2	5,421.8	5,421.8	5,422.2	0.4
P	9,810 ¹	28	112	10.3	5,423.0	5,423.0	5,423.0	0.0

¹ Feet Above Confluence with Toll Gate Creek

TABLE 4	FEDERAL EMERGENCY MANAGEMENT AGENCY ARAPAHOE COUNTY, CO AND INCORPORATED AREAS	FLOODWAY DATA
	SABLE DITCH	

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY		
Sand Creek									
A	36,760	764	4,492	6.5	5,299.5	5,299.5	5,299.6	0.1	
B	39,510	336	2,939	9.9	5,312.7	5,312.7	5,312.7	0.0	
C	41,285	618	3,289	8.9	5,320.5	5,320.5	5,320.5	0.0	
D	42,340	447	3,140	9.3	5,325.7	5,325.7	5,325.7	0.0	
E	43,070	160	1,565	13.7	5,328.0	5,328.0	5,328.0	0.0	
F	46,390	176	1,620	13.3	5,347.6	5,347.6	5,347.6	0.0	
G	47,670	206	2,305	9.3	5,353.8	5,353.8	5,353.8	0.0	
H	48,970	344	2,184	9.8	5,365.6	5,365.6	5,365.6	0.0	
I	50,175	157	1,604	13.4	5,373.6	5,373.6	5,373.6	0.0	
J	51,785	312	3,191	6.7	5,383.0	5,383.0	5,383.5	0.5	
K	52,890	368	2,161	10.0	5,386.7	5,386.7	5,387.3	0.6	
L	56,928	419	4,144	5.2	5,400.4	5,400.4	5,400.4	0.0	
M	58,489	223	2,490	8.6	5,412.2	5,412.2	5,412.2	0.0	
N	61,243	192	3,338	6.4	5,427.5	5,427.5	5,427.5	0.0	
O	63,236	375	3,148	6.8	5,435.0	5,435.0	5,435.0	0.0	
P	64,516	373	2,387	9.0	5,439.2	5,439.2	5,439.5	0.3	
Q	65,160	550	4,650	3.9	5,442.3	5,442.3	5,442.4	0.1	
R	66,140	398	1,848	9.9	5,443.5	5,443.5	5,443.7	0.2	
S	68,025	317	1,477	12.4	5,453.3	5,453.3	5,453.3	0.0	
T	68,640	326	2,530	7.3	5,458.6	5,458.6	5,458.6	0.0	
U	69,350	507	2,840	6.5	5,460.6	5,460.6	5,460.7	0.1	
V	70,065	340	2,274	8.1	5,464.8	5,464.8	5,465.0	0.2	
W	72,230	810	3,695	5.0	5,475.9	5,475.9	5,476.3	0.4	
X	75,010	1,394	4,500	4.1	5,488.9	5,488.9	5,488.9	0.0	

¹ Feet Above Mouth

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

SAND CREEK

FLOODING SOURCE		FLOODWAY				BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY		
					FEET (NAVD)				
Slaughterhouse Gulch	A	620 ¹	21	241	5.8	5,328.0	5,328.0	5,328.0	0.0
	B	1,160 ¹	260	337	4.5	5,332.7	5,332.7	5,332.7	0.0
	C	1,655 ¹	70	171	8.9	5,343.1	5,343.1	5,343.1	0.0
	D	2,480 ¹	89	188	8.1	5,355.7	5,355.7	5,355.7	0.0
	E	3,010 ¹	86	189	8.1	5,361.6	5,361.6	5,361.6	0.0
	F	3,785 ¹	131	202	6.4	5,381.9	5,381.9	5,381.9	0.0
	G	4,135 ¹	139	411	3.1	5,386.1	5,386.1	5,386.1	0.0
	H	4,495 ¹	134	348	3.7	5,391.3	5,391.3	5,391.3	0.0
	I	5,660 ¹	85	173	7.4	5,401.9	5,401.9	5,401.9	0.0
	J	5,840 ¹	123	450	2.9	5,403.2	5,403.2	5,403.2	0.0
	K	6,540 ¹	108	190	6.8	5,415.0	5,415.0	5,415.0	0.0
South Tributary Slaughterhouse Gulch	A	555 ²	100	74	6.4	5,384.3	5,384.3	5,384.3	0.0
	B	1,010 ²	68	122	3.7	5,394.5	5,394.5	5,394.7	0.2
	C	1,310 ²	69	75	6.0	5,401.0	5,401.0	5,401.1	0.1
	D	1,705 ²	90	82	5.5	5,407.0	5,407.0	5,407.2	0.2
	E	1,795 ²	75	68	5.5	5,408.7	5,408.7	5,409.0	0.3

¹ Feet Above Confluence With South Platte River

² Feet Above Confluence With Slaughterhouse Gulch

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

SLAUGHTERHOUSE GULCH AND TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY FEET (NAVD)	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Toll Gate Creek								
A-X ²								
Y	15,100	171	2,150	9.9	5,398.3	5,398.3	5,399.3	1.0
Z	16,620	146	1,478	14.3	5,403.1	5,403.1	5,403.7	0.6
AA	18,860	427	3,281	6.5	5,410.8	5,410.8	5,411.4	0.6

¹ Feet Above Confluence with Sand Creek

² Floodway Contained in channel - No Floodway Data Produced

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

TOLL GATE 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 FEET (NAVD)	WITH FLOODWAY	INCREASE
Unnamed Creek								
A	1,885	211	1,563	3.8	5,579.3	5,579.3	5,580.0	0.7
B	2,850	185	1,088	5.5	5,580.0	5,580.0	5,580.5	0.5
C	3,675	43	359	16.4	5,592.4	5,592.4	5,592.4	0.0
D	4,530	215	1,772	3.3	5,597.9	5,597.9	5,598.7	0.8
E	5,485	130	614	9.5	5,606.5	5,606.5	5,606.7	0.2
F	6,895	215	754	7.7	5,616.4	5,616.4	5,616.9	0.5
G	8,290	140	652	8.9	5,627.3	5,627.3	5,628.2	0.9
H	8,890	155	720	8.1	5,631.2	5,631.2	5,632.1	0.9

¹ Feet Above Confluence With West Toll Gate Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

UNNAMED CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
West Bijou Creek								
A	72,000	2,200	5,412	6.4	5,167.6	5,167.6	5,168.6	1.0
B	74,320	1,100	3,458	10.4	5,179.1	5,179.1	5,179.1	0.0
C	75,120	650	5,721	6.1	5,182.8	5,182.8	5,183.1	0.3
D	75,520	350	3,389	10.3	5,182.8	5,182.8	5,183.1	0.3
E	75,620	350	3,227	10.8	5,183.2	5,183.2	5,183.4	0.2
F	76,320	510	4,290	8.1	5,187.4	5,187.4	5,187.6	0.2
G	77,120	450	3,266	9.7	5,189.6	5,189.6	5,190.0	0.4
H	78,020	300	2,070	15.3	5,189.8	5,189.8	5,190.1	0.3
I	78,270	450	2,087	15.2	5,190.0	5,190.0	5,190.3	0.3
J	78,870	450	4,815	6.6	5,196.3	5,196.3	5,196.5	0.2
K	80,270	600	5,111	6.2	5,198.9	5,198.9	5,199.4	0.5
L	81,170	450	2,960	10.7	5,201.5	5,201.5	5,201.6	0.1
M	82,370	200	3,567	8.9	5,207.8	5,207.8	5,207.8	0.0
N	83,270	320	3,390	9.4	5,210.4	5,210.4	5,210.4	0.0
O	85,120	550	4,337	7.3	5,215.2	5,215.2	5,216.2	1.0
P	86,820	300	2,938	10.8	5,221.1	5,221.1	5,221.1	0.0

¹ Feet Above Mouth

TABLE 4	FEDERAL EMERGENCY MANAGEMENT AGENCY ARAPAHOE COUNTY, CO AND INCORPORATED AREAS	FLOODWAY DATA
	WEST BIJOU CREEK	

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
						FEET (NAVD)		
West Toll Gate Creek								
AB	19,824	800	2,450	4.4	5,412.7	5,412.7	5,412.7	0.0
AC	21,044	510	3,390	5.0	5,416.5	5,416.5	5,416.5	0.0
AD	23,184	740	2,730	5.6	5,425.7	5,425.7	5,425.7	0.0
AE	23,594	1,110	5,110	3.0	5,429.9	5,429.9	5,430.2	0.3
AF	24,654	430	2,620	5.8	5,433.4	5,433.4	5,433.4	0.0
AG	26,274	860	2,373	6.4	5,444.0	5,444.0	5,444.0	0.0
AH	31,950	142	1,372	11.1	5,475.4	5,475.4	5,475.4	0.0
AI	32,105	152	1,080	14.1	5,475.4	5,475.4	5,475.4	0.0
AJ	32,495	220	1,662	9.1	5,478.4	5,478.4	5,478.4	0.0
AK	33,800	223	1,627	9.3	5,481.2	5,481.2	5,481.2	0.0
AL	35,202	234	1,886	8.1	5,484.4	5,484.4	5,484.4	0.0
AM	35,445	119	1,101	13.8	5,484.7	5,484.7	5,484.7	0.0
AN	35,491	235	2,350	6.5	5,491.9	5,491.9	5,491.9	0.0
AO	35,927	441	2,692	5.6	5,492.6	5,492.6	5,492.6	0.0
AP	36,310	826	3,109	4.9	5,504.2	5,504.2	5,504.2	0.0
AQ	36,540	700	2,233	6.8	5,504.9	5,504.9	5,504.9	0.0
AR	37,111	613	2,119	9.2	5,508.5	5,508.5	5,508.5	0.0
AS	38,103	1,030	2,012	12.6	5,515.0	5,515.0	5,515.0	0.0
AT	38,511	440	2,014	11.7	5,516.5	5,516.5	5,516.5	0.0
AU	39,333	342	1,910	11.2	5,520.2	5,520.2	5,520.2	0.0
AV	40,123	270	884	16.4	5,521.5	5,521.5	5,521.5	0.2
AW	40,609	220	1,008	12.5	5,527.8	5,527.8	5,527.8	0.0
AX	41,009	142	881	12.7	5,531.9	5,531.9	5,531.9	0.0
AY	41,455	158	763	14.7	5,534.4	5,534.4	5,534.4	0.0
AZ	42,705	284	881	12.7	5,538.8	5,538.8	5,538.8	0.0

¹ Feet Above Confluence With Sand Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

WEST TOLL GATE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET (NAVD)	WITH FLOODWAY	
West Toll Gate Creek (Cont'd)								
BA	43,359	78	431	26.0	5,540.4	5,540.4	5,540.4	0.0
BB	44,209	321	826	13.6	5,548.2	5,548.2	5,548.2	0.0
BC	45,509	296	815	13.7	5,554.5	5,554.5	5,554.5	0.0
BD	46,939	103	245	22.9	5,569.6	5,569.6	5,569.6	0.0
BE	48,439	96	238	22.4	5,581.2	5,581.2	5,581.2	0.0
BF	49,939	47	208	23.0	5,592.5	5,592.5	5,592.5	0.0
BG	51,584	50	335	13.4	5,607.1	5,607.1	5,607.1	0.0
BH	52,440	274	712	6.3	5,615.0	5,615.0	5,615.0	0.0
BI	53,940	344	948	4.7	5,627.6	5,627.6	5,627.6	0.0
BJ	55,740	280	615	7.3	5,642.0	5,642.0	5,642.0	0.0
BK	56,240	270	1,724	2.6	5,648.7	5,648.7	5,648.7	0.0
BL	57,240	223	518	8.7	5,650.4	5,650.4	5,650.4	0.0
BM	58,240	100	354	12.7	5,660.9	5,660.9	5,660.9	0.0

¹ Feet Above Confluence With Sand Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA
WEST TOLL GATE 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
West Toll Gate Creek Tributary	A	126	334	9.3	5,526.2	5,526.2	5,526.2	0.0
	B	169	1,069	2.3	5,573.8	5,573.8	5,573.8	0.0
	C	224	1,195	2.0	5,573.9	5,573.9	5,573.9	0.0

¹ Feet Above Confluence With West Toll Gate Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

WEST TOLL GATE CREEK TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
					FEET (NAVD)			
West Tributary To Goldsmith Gulch								
A	430	136	381	2.7	5,641.4	5,641.4	5,642.4	1.0
B	821	45	123	8.3	5,646.5	5,646.5	5,646.7	0.2
C	1,247	39	113	9.1	5,651.4	5,651.4	5,651.7	0.3
D	1,815	286	1,172	0.7	5,662.6	5,662.6	5,662.7	0.1
E	2,065	90	251	3.2	5,662.5	5,662.5	5,662.4	-0.1
F	2,089	115	374	2.1	5,662.3	5,662.3	5,663.5	1.2
G	2,309	50	219	3.6	5,663.0	5,663.0	5,663.5	0.5
H	2,719	30	86	9.3	5,668.4	5,668.4	5,667.0	-1.4
I	2,758	73	175	4.6	5,669.7	5,669.7	5,669.9	0.2
J	3,111	28	77	9.4	5,672.5	5,672.5	5,672.7	0.2
K	3,469	85	271	2.7	5,676.9	5,676.9	5,677.4	0.5
L	3,540	72	189	3.8	5,679.5	5,679.5	5,679.6	0.1
M	4,000	65	96	6.7	5,682.6	5,682.6	5,683.4	0.8
N	4,270	60	116	7.6	5,688.3	5,688.3	5,688.7	0.4
O	4,404	30	134	6.6	5,693.4	5,693.4	5,693.4	0.0
P	4,542	61	87	6.8	5,697.6	5,697.6	5,697.6	0.0
Q	5,007	89	75	5.1	5,702.6	5,702.6	5,702.6	0.0
R	5,204	62	114	3.3	5,704.0	5,704.0	5,704.0	0.0
S	5,256	10	31	12.3	5,707.7	5,707.7	5,707.7	0.0
T	5,319	36	46	8.3	5,712.0	5,712.0	5,712.0	0.0
U	5,440	45	61	6.2	5,716.5	5,716.5	5,716.5	0.0
V	5,660	111	339	1.1	5,717.4	5,717.4	5,717.4	0.0
W	5,794	108	26	2.9	5,727.3	5,727.3	5,727.3	0.0
X	6,091	30	18	4.2	5,734.9	5,734.9	5,734.9	0.0
Y	6,227	48	21	3.6	5,738.7	5,738.7	5,738.7	0.0

¹ Feet Above Confluence With Goldsmith Gulch

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

WEST TRIBUTARY TO GOLDSMITH GULCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
WESTERLY CREEK								
A	6,292	270	899	7.4	5,300.2	5,300.2	5,300.3	0.1
B	6,710	402	1,790	4.0	5,301.0	5,301.0	5,301.1	0.1
C	10,000	363	1,993	1.2	5,316.7	5,316.7	5,317.6	0.9
D	11,500	165	254	3.8	5,322.2	5,322.2	5,322.7	0.5
E	13,774	85	50	0.3	5,333.5	5,333.5	5,333.5	0.0
F	29,400	347	738	2.8	5,434.6	5,434.6	5,435.4	0.8
G	30,411	182	247	6.7	5,445.4	5,445.4	5,445.4	0.0
H	30,751	166	202	6.4	5,448.3	5,448.3	5,448.6	0.3
I	31,410	294	245	4.9	5,462.6	5,462.6	5,462.6	0.0
J	31,650	150	300	5.5	5,471.9	5,471.9	5,471.9	0.0
K	34,645	32	152	2.9	5,471.9	5,471.9	5,471.9	0.0

¹ Feet Above Mouth

FEDERAL EMERGENCY MANAGEMENT AGENCY

**ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS**

FLOODWAY DATA

WESTERLY CREEK

TABLE 4

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 FEET (NAVD)	WITH FLOODWAY	INCREASE
Willow Creek								
A	751	97	350	1.6	5,541.8	5,541.8	5,541.8	0.0
B	1,303	99	933	0.6	5,548.2	5,548.2	5,548.2	0.0
C	1,502	190	560	1.0	5,548.2	5,548.2	5,548.2	0.0
D	1,757	35	165	3.4	5,548.2	5,548.2	5,548.2	0.0
E	2,088	59	233	2.4	5,550.1	5,550.1	5,550.1	0.0
F	2,371	46	175	3.2	5,550.4	5,550.4	5,550.5	0.1
G	2,724	38	122	4.6	5,551.5	5,551.5	5,551.5	0.0
H	3,018	37	92	6.1	5,553.7	5,553.7	5,553.7	0.0
I	3,515	39	193	2.9	5,556.0	5,556.0	5,556.1	0.1
J	4,092	26	64	8.8	5,558.9	5,558.9	5,558.9	0.0

¹ Feet Above Confluence with Little Dry Creek

TABLE 4

FEDERAL EMERGENCY MANAGEMENT AGENCY
ARAPAHOE COUNTY, CO
 AND INCORPORATED AREAS

FLOODWAY DATA

WILLOW CREEK

5.0 INSURANCE APPLICATIONS

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

Zone A

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

Zone AE

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

Zone AH

Zone AH is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance risk zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot base flood depths derived from the detailed hydraulic analyses are shown within this zone.

Zone X

Zone X is the flood insurance risk 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, and areas protected from the 1-percent-annual-chance flood by levees. No BFEs or base flood depths are shown within this zone.

Zone X (Future Base Flood)

Zone X (Future Base Flood) is the flood insurance risk zone that corresponds to the 1-percent-annual-chance floodplains that are determined based on future-conditions hydrology. No BFEs or base flood 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 risk zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

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

The current FIRM presents flooding information for the geographic area of Arapahoe County, including those communities which fall within more than one county as described in Section 1.1. Previously, separate FIRMs were prepared for the cities of Aurora and Littleton, and for Arapahoe County and Incorporated Areas. Historical data relating to the maps prepared for each community are presented in Community Map History (Table 5).

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FIRM EFFECTIVE DATE(S)	FIRM REVISION DATE(S)
Arapahoe County (Unincorporated Areas)	December 20, 1974		August 15, 1977	August 16, 1995
Aurora, City of	July 26, 1974		June 1, 1978	September 7, 1998
Centennial, City of	December 11, 2002		August 16, 1995	August 16, 1995
Cherry Hills Village, City of	May 10, 1974		August 1, 1978	August 16, 1995
Columbine Valley, Town of	January 25, 1974	April 23, 1976	June 15, 1978	December 2, 1980 August 16, 1995
*Deer Trail, City of	November 29, 1974			
Englewood, City of	February 9, 1972		July 1, 1974	April 11, 1975 June 24, 1977 July 28, 1978 December 5, 1979 August 16, 1995
*Foxfield, Town of				
Glendale, City of	April 17, 1989		April 17, 1989	August 16, 1995
Greenwood Village, City of	December 27, 1974		January 5, 1978	December 16, 1980 August 16, 1995
Littleton, City of	February 1, 1974		December 1, 1978	September 29, 1989
Sheridan, City of	May 3, 1974		July 13, 1976	December 4, 1985 August 16, 1995

*Non-Floodprone

FEDERAL EMERGENCY MANAGEMENT AGENCY

**ARAPAHOE COUNTY, CO
AND INCORPORATED AREAS**

COMMUNITY MAP HISTORY

TABLE 5

7.0 OTHER STUDIES

This Flood Insurance Study supersedes all previous FIS reports and FIRMs covering the unincorporated areas of Arapahoe County and the incorporated areas of the Cities of Aurora, Centennial, Cherry Hills Village, Englewood, Glendale, Greenwood Village, Littleton, and Sheridan; and the Town of Columbine Valley (References 2, 5, 7, 8, 9, 10, 88 and 89).

The reaches of East Toll Gate Creek from Chambers Road to 1,300 feet upstream and from South Buckley Road to 0.8 mile upstream were analyzed by Merrick and Company and Greiner Engineering Sciences, Inc., respectively (References 18 and 19, respectively). The revised hydraulic analyses for West Toll Gate Creek from Mississippi Avenue to approximately 800 feet upstream of Mexico Avenue, and the portion of West Toll Gate Creek from South Buckley Road upstream to East Hampden Avenue were performed by the City of Aurora Engineering Division (References 21 and 22). The analyses for the portion of West Toll Gate Creek between East Hampden and East Quincy Avenues was performed by Merrick and Company (Reference 19). The hydrologic analyses for all the revisions were originally performed by the COE and Gingery and Associates for the effective FIS for Aurora (Reference 2).

Revised hydrologic and hydraulic analyses for the portion of Cherry Creek from Cherry Creek State Recreation Area to upstream of the Arapahoe/Douglas County line were performed by Greiner Engineering Sciences, Inc. as a part of the River Run Development Report (Reference 17).

The revised hydraulic analyses for portions of Prentice Gulch, Willow Creek, Greenwood Gulch, Spring Creek, Goldsmith Gulch, SJCD 6100, SJCD 6200, Dutch Creek, Coon Creek, and Lee Gulch were taken from published UDFCD reports (References 44, 60, 61, 62, 63, and 64).

Flood Insurance Studies have been prepared for the City and County of Denver and Adams, Douglas, and Jefferson Counties (References 65, 66, 67, and 68, respectively). Those studies are in general agreement with this study.

Historical data relating to the maps prepared for each community are presented in the Community Map History data (Table 5).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA Mitigation Division, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-0267.

9.0 BIBLIOGRAPHY AND REFERENCES

1. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Arapahoe County, Colorado, (Unincorporated Areas), August 15, 1977.
2. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Aurora, Colorado, August 31, 1982.
3. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, City of Cherry Hills Village, Colorado, August 1, 1978.
4. McCall-Ellingson Consulting Engineers, Study and Report on Quincy Gulch Sub-Basin, Little Dry Creek Drainage Basin, City of Cherry Hills Village, May 1973.
5. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Town of Columbine Valley, Colorado, December 2, 1980.
6. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Greenwood Village, Colorado, December 16, 1980.
7. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, City of Englewood, Colorado, December 15, 1979.
8. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Littleton, Colorado, February 3, 1981.
9. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City of Sheridan, Colorado, December 4, 1985.
10. Urban Drainage and Flood Control District, Major Drainage Planning-- First Creek Phase B, Volume II, Engineering Consultants, Inc., Aurora, Colorado, March 1977.
11. Urban Drainage and Flood Control District, Arapahoe and Douglas Counties, Piney Creek, Flood Hazard Area Delineation, prepared by Gingery Associates, Inc., October 1975.
12. Urban Drainage and Flood Control District, Arapahoe and Douglas Counties, Murphy Creek, Flood Hazard Area Delineation, prepared by Gingery Associates, Inc., October 1975.
13. Urban Drainage and Flood Control District, Arapahoe and Douglas Counties,

- Lone Tree Creek, Flood Hazard Area Delineation, prepared by Gingery Associates, Inc., October 1975.
14. Urban Drainage and Flood Control District, Arapahoe and Douglas Counties, Happy Canyon Creek, Flood Hazard Area Delineation, prepared by Gingery Associates, Inc., November 1977.
 15. Urban Drainage and Flood Control District, Arapahoe and Douglas Counties, Cottonwood Creek, Flood Hazard Area Delineation, prepared by Gingery Associates, Inc., October 1975.
 16. Urban Drainage and Flood Control District, Major Drainageway Planning, Lee Gulch Little Creek Phase B--Preliminary Design, prepared by KKBNA, Denver, Colorado, January 1977.
 17. Greiner Engineering, River Run Development, Letter of Map Revision Arapahoe County, Colorado, June 1985.
 18. Merrick and Company, East Toll Gate Creek 100-Year Floodplain Amendment Report, Denver, Colorado, November 1982.
 19. Merrick and Company, Hydraulic Analysis of West Toll Gate Creek From East Hampton Avenue to East Quincy Avenue, Denver, Colorado, December 1985.
 20. Greiner Engineering Sciences, Inc., Toll Gate Village--Filing No. 14, Denver, Colorado, October 1985.
 21. City of Aurora, Engineering Division, West Toll Gate Creek Mississippi to Mexico, September 1985.
 22. City of Aurora, Engineering Division, Request For Flood Insurance Rate Map Amendments, September 1985.
 23. Holland Corporation, Overlot Grading Improvements Between 500 Feet West and 1,200 Feet East of South Flanders Street, Englewood, Colorado, 1984.
 24. Denver Regional Council of Governments, Floodplain Information--Big Dry Creek, Little Dry Creek (Arapahoe County), Greenwood Gulch, Weir Gulch, Lakewood Gulch, South Lakewood Gulch, McIntyre Gulch, Little Dry Creek, (Adams County), Grange Hall Creek--Volume IV-Denver Metropolitan Region, Colorado, prepared by U.S. Army Corps of Engineers, Omaha, District, October 1968.
 25. Denver Regional Council of Governments, Floodplain Information-Sand, Toll Gate, and Lower Cherry, Creeks, Volume II (Revised), Denver Metropolitan Region, Colorado, prepared by U.S. Army Corps of Engineers, Omaha, District,

July 1971.

26. U.S. Department of the Interior, Geological Survey, Water-Supply Paper 1681, Magnitude and Frequency of Floods in the United States--Part 7, Lower Mississippi River Basin, James L. Patterson, 1964.
27. U.S. Department of the Interior, Geological Survey, Water-Supply Paper 1850-B, Floods of June 1965 in South Platte River Basin, Colorado, H.F. Matthai, 1969.
28. U.S. Department of the Interior, Geological Survey, Water Resources Data for Colorado, Part I, 1964.
29. U.S. Department of the Interior, Geological Survey, Map of Flood Prone--Areas, 7.5-Minute Series Topographic Map, Scale 1:24,000, Contour Interval 20 feet: Arapahoe County, Colorado (1969), Revised (1975).
30. Urban Drainage and Flood Control District, Major Drainageway Master Plan--Big Dry Creek, Denver, Colorado, June 1974.
31. Colorado Water Conservation Board, Release No. 27, Rainfall-Runoff Data from Small Watersheds in Colorado June, 1968 through September, 1971--Colorado Water Resources Basic Data, prepared by U.S. Geological Survey in cooperation with Urban Drainage and Flood Control District and Colorado Department of Highways, Denver, Colorado, 1972.
32. City of Littleton, The Littleton Plan, Littleton, Colorado, December 1971.
33. City of Littleton, Platte River Valley: Two Choices for Littleton, Jim Bartlett, 1971.
34. Urban Drainage and Flood Control District, Major Drainageway Planning--Little Dry Creek, Volumes 1 and 2, prepared by McCall, Ellingson and Morrill, Inc., Denver, Colorado, May 1974.
35. City of Aurora, Colorado, Sand Creek Channel Project, Addendum to the Master Plan for the Improvement of Sand Creek, prepared by Raub, Bein, Frost and Associates, Newport Beach, California, October 1973.
36. U.S. Department of the Interior, Geological Survey, Water-Supply Paper 1680, Magnitude and Frequency of Floods in the United States--Part 6B, Lower Mississippi River Basin Below Sioux City, Iowa, H.F. Matthai, 1968.
37. Urban Drainage and Flood Control District, Urban Storm Drainage-Criteria Manual, Volumes I and II, prepared by Wright-McLaughlin Engineers, Denver, Colorado, March 1969.

38. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, HEC-I, Flood Hydrograph Package, 723-010 and HEC-II Water-Surface Profiles, 723-X6-L202A, Davis, California.
39. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 Feet: Coal Creek, Colorado (1965), Photorevised (1980); Highlands Ranch, Colorado, (1965), Photorevised (1980); Piney Creek, Colorado (1966), Photorevised (1978).
40. U.S. Department of the Army, Corps of Engineers, Downstream Channel Improvements Stage I, South Platte River Chatfield Lake Colorado, January 1984.
41. U.S. Department of the Army, Corps of Engineers, Downstream Channel Improvements Stage II, South Platte River Chatfield Lake, Colorado, December 1984.
42. U.S. Department of the Army, Corps of Engineers, Downstream Channel Improvement Stage III, South Platte River.
43. Urban Drainage and Flood Control District, Flood Hazard Delineation, South Platte River, Denver Metropolitan Area, Sand Creek to Oxford Avenue, September 1985.
44. Urban Drainage and Flood Control District, Flood Hazard Area Delineation, Goldsmith Gulch and Tributaries, prepared by Gingery Associates, Inc., June 1976.
45. Urban Drainage and Flood Control District, Major Drainageway Master Plan, Big Dry Creek, Volume I, prepared by VTN Colorado, Inc., March 1974.
46. Urban Drainage and Flood Control District, Major Drainageway Master Plan, Big Dry Creek, Volume II, prepared by VTN Colorado, Inc., June 1975.
47. Scharf and Associates, Inc., Topographic Maps, Scale 1:1,200, Contour Interval 2 feet: Bear Creek (January 1979).
48. Bell Mapping Company, Denver, Colorado, Sand Creek Aerial Topographic Maps, Scale 1:1,200, Contour Interval 2 feet: Aurora, Colorado (1974).
49. Parker Aerial Surveys, Aerial Topographic Maps, Scale 1:1,200, Contour Interval 2 feet: Toll Cate Creek, Aurora, Colorado (1973).
50. Nelson, Haley, Patterson, and Quirk, Inc., Aerial Topographic Mapping, Scale 1:1,200, Contour Interval 2 feet: (R66W-T4S, Sections 8, 15, 16, 17, 20, 22, 29, Aurora, Colorado (1971).

51. Bell Mapping Company, Aerial Topographic Maps, Scale 1:1,200, Contour Interval 2 feet: Westerly Creek, Aurora, Colorado (1974).
52. Northway-Gestalt, Topographic Mapping, Scale 1:1,200, Contour Interval 2 feet, 1981.
53. U.S. Department of the Army, Corps of Engineers, Omaha District, Cherry Creek Floodplain Information Report, 1976.
54. Kucera Associates and Gingery Associates, Aerial Topographic Maps, Scale 1:2,400, Contour Interval 2 feet: Sable Ditch and Granby Ditch, Aurora, Colorado (September 1976).
55. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Quadrangle Maps, Scale 1:24,000, Contour Interval 10 feet: Box Elder School, Colorado (1966); Sable, Colorado (1965); Fitzsimons, Colorado (1965), Photorevised (1971).
56. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Quadrangle Map, Scale 1:24,000, Contour Interval 10 feet: Littleton, Colorado (1965).
57. Urban Drainage and Flood Control District, Major Drainageway Planning, Little Dry Creek, Volumes I and II, prepared by McCall, Ellingson & Morrill, Inc., 1974.
58. U.S. Department of the Interior, Geological Survey, 7.5-Minute Series Topographic Maps, Scale 1:24,000, Contour Interval 10 feet: Littleton, Colorado (1965), Photorevised (1971); Fort Logan, Colorado (1965), Photorevised (1971); Englewood, Colorado (1965), Photorevised (1971); Highlands Ranch, Colorado (1965), Photorevised (1971).
59. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Rate Map, Town of Deer Trail, Colorado, November 5, 1985.
60. Urban Drainage and Flood Control District, Major Drainageway Planning, Little Creek, prepared by McCall, Ellingson and Morrill, Inc., May 1974.
61. Urban Drainage and Flood Control District, Major Drainageway Planning Basin 6100, CH2M HILL, July 1976.
62. Urban Drainage and Flood Control District, Flood Hazard Area Delineation, Massey Draw and North Tributary SJCD (South) 6200 and Tributaries, prepared by Leonard Rice Consulting Water Engineers, Inc., May 1978.
63. Urban Drainage and Flood Control District, Flood Hazard Area Delineation, Dutch Creek, Lilley Gulch, Coon Creek, and Three Lakes Tributary, prepared by URS Company,

May 1978.

64. Urban Drainage and Flood Control District, Major Drainageway Planning, Lee Gulch, Little Creek, prepared by KKBNA Consulting Engineers, July 1978.
65. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, City and County of Denver, Colorado, April 15, 1986.
66. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Insurance Study, Adams County, Colorado (Unincorporated Areas), February 1, 1979.
67. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Douglas County, Colorado, September 30, 1987.
68. Federal Emergency Management Agency, Federal Insurance Administration, Flood Insurance Study, Jefferson County, Colorado, (Unincorporated Areas), August 5, 1986.
69. Merrick and Company, Colorado Boulevard Bridge Over Big Dry Creek, Floodplain Delineation Plan, Scale 1:50, Contour Interval 2 feet, September 23, 1987, Revised May 3, 1988.
70. McCall-Ellingson & Morrill, Inc., Major Drainageway Planning, Little Dry Creek, February 1974.
71. McLaughlin Water Engineers, Ltd., Hydrologic Evaluation, Little Dry Creek, July 1986.
72. Greenhorne & O'Mara, Inc., Stream Stabilization and Major Crossing Planning, Little Dry Creek, Willow Creek, and Tributaries, September 1989.
73. Merrick & Company, Big Dry Creek LOMR, February 1988.
74. U.S. Department of the Army, Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, Version 4.6.0, February 1991.
75. Landmark Mapping, Ltd., Arapahoe County, Willow Creek, dates flown: November 24 and December 7, 1987.
76. Western Control, Kucera and Associates, Inc., Arapahoe County, Goldsmith Gulch, dates flown: February 22, 1973 and January 1976.
77. Bell Mapping Company, Arapahoe County, Big Dry Creek, date flown: October 1, 1973.
78. Source Unknown, Arapahoe County, Big Dry Creek, and Arapahoe County,

Piney Creek.

79. Arapahoe County Base Maps, Township Code 2075; Quarter Sections 1, 2, and 4.
80. U.S. Geological Survey, Highlands Ranch Quadrangle, Colorado, 1965, Photo revised 1980.
81. Federal Emergency Management Agency, Flood Insurance Rate Map Panel 080050009F; Arapahoe County, Colorado, April 17, 1989.
82. City of Littleton, Request for Letter of Map Revision for Littles Creek Channel Improvement Project, Love & Associates, Inc., January 1989.
83. Urban Drainage and Flood Control District, Flood Hazard Area Delineation for Lower Box Elder Creek Watershed, prepared by Wright Water Engineers, Inc., Denver, Colorado, September 2001.
84. Urban Drainage and Flood Control District, Flood Hazard Area Delineation, Coyote Run and Upper Box Elder Creek, prepared by CH2MHill, December, 1995.
85. Urban Drainage and Flood Control District, Flood Hazard Area Delineation, Cherry Creek Corridor – Reservoir to Scott Road, prepared by URS Corporation, May, 2003.
86. Urban Drainage and Flood Control District, Flood Hazard Area Delineation, Little Dry Creek (ARAPCO) & Tributaries, prepared by WRC Engineering, Inc., August, 2003.
87. Urban Drainage and Flood Control District, Flood Hazard Area Delineation, Upper Goldsmith Gulch, prepared by Moser & Associates, April, 2005.
88. Federal. Emergency Management Agency, Flood Insurance Study, City of Aurora, Colorado, September 7, 1998.
89. Federal. Emergency Management Agency, Flood Insurance Study, City of Littleton, Colorado, September 29, 1989.
90. Urban Drainage and Flood Control District, Flood Hazard Area Delineation, Massey Draw and SJCD (South), prepared by Olsson Associates, December, 2005.
91. Urban Drainage and Flood Control District, Flood Hazard Area Delineation, Murphy Creek, prepared by Moser and Associates, September, 2006.

10.0 REVISION DESCRIPTIONS

This section has been added to provide information regarding significant revisions made since the original FIS report and FIRM were printed. Future revisions may be made that do not result in the republishing of the FIS report. All users are advised to contact the community repositories of flood hazard data to obtain the most up-to-date flood hazard information.

10.1 First Revision

This study was revised on March 4, 1991, to show modifications to the flooding and base flood elevations along Little Dry Creek as the result of revised hydrology for the entire basin and culvert and channel improvements from the South Platte River upstream to Clarkson Street, as approved in the Conditional Letters of Map Revision issued on February 19, 1987, and August 21, 1987.

An updated hydrologic evaluation for Little Dry Creek was conducted by McLaughlin Water Engineers, Ltd. (MWE), in July 1986 to determine the 100-year flow by utilizing the 1982 version of Colorado Urban Hydrograph Procedure in conjunction with the UDSWM2-PC model. The 100-year discharge used for this floodplain analysis was taken from the updated 1986 hydrologic analysis for the 100-year event. The hydrologic analyses for the 10-, 50-, and 500-year events are based on an earlier report by Sellards and Grigg, Inc., in 1981. Along Little Dry Creek, the 100-year discharge of 3,770 cfs from the 1986 updated hydrologic study is lower than the 100-year discharge of 6,650 cfs presented in the previous Flood Insurance Study report due to the effects of the Holly and Englewood Dams.

The basis for this revision is the completion of a box culvert and channel improvements along Little Dry Creek from the confluence of the South Platte River to Clarkson Street in Englewood, Colorado. The box culvert, located approximately 800 feet upstream of Santa Fe Drive and approximately 600 feet downstream of South Broadway Street, was designed to convey the 10-, 50-, and 100-year floods. The 100- and 500-year floodplain and 100-year floodway delineations and base flood elevations were modified based on the following information:

- Drawings 1 through 12, XI and X2 of "as-built" plans entitled "Little Dry Creek - South Platte River to Clarkson Street, City of Englewood, Colorado; Floodplain Delineation for Constructed Improvements," prepared by MWE, dated April 1989, for the City of Englewood, Colorado.
- A report entitled "Hydraulic Calculations for Little Dry Creek through the City of Englewood," dated April 1989, also prepared by MWE. This report contains hydraulic calculations and HEC-2 hydraulic computer model runs

for the 10-, 50-, 100-, and 500-year recurrence interval floods for a reach of Little Dry Creek from the South Platte River to Clarkson Street.

These calculations and models reflect the effects of the construction of the culvert located from Santa Fe Drive upstream to Broadway Street, and channel improvements from the South Platte River to Santa Fe Drive and from Broadway Street to Clarkson Street. As a result of these improvements, the base flood elevations were decreased, and modifications to the floodway and the 100- and 500-year floodplain boundaries were made, as shown on Flood Insurance Rate Map Panels 0060 and 0070. Because a revised hydraulic analysis was not developed upstream of South Clarkson Street, there is an approximate Zone A transition from South Clarkson Street to the culvert entrance. Also, because the 500-year recurrence interval flood is not conveyed by the culvert, a separate water-surface profile panel labeled "500-year overflow" is included in the water-surface profile panels for Little Dry Creek.

Distances on the profiles and Floodway Data Tables have been corrected to reflect miles measured from the confluence with the South Platte River. Cross sections previously labeled A through BM along Little Dry Creek as shown on the Flood Insurance Rate Map have been relabeled 0 through CA to account for the addition of the new cross sections labeled A through N along the study reach. The water-surface profile panels for Little Dry Creek have also been renumbered in order to take into account the addition of six profiles for the study area, and the profiles listed after Little Dry Creek in the Flood Insurance Study report have been renumbered as a result of this addition. The Floodway Data Tables and Summary of Discharges Table have also been revised to reflect the effects of the reanalysis.

The communities affected by this revision along Little Dry Creek are the unincorporated areas of Arapahoe County, the City of Cherry Hills Village, the City of Englewood, and the City of Greenwood Village.

The reach of Big Dry Creek from approximately 1,360 feet downstream of Colorado Boulevard to approximately 2,440 feet upstream of Colorado Boulevard has been revised to reflect the change in base flood elevations and floodway and floodplain delineations due to the newly built Colorado Boulevard Bridge and channel improvements. The COE HEC-2 hydraulic computer program was used by Merrick and Company to perform the new hydraulic analyses. The 100-year floodway and floodplain delineations were also prepared by Merrick and Company on a topographic map at a scale of 1:50, with a contour interval of 2 feet (Reference 69). The Floodway Data Table and Flood Profile Panels for Big Dry Creek have been revised between cross sections BA and BE as a result of this analysis.

This revision also incorporated the Letter of Map Revision (LOMR) issued for Arapahoe County, Colorado on August 13, 1990, for an area along Cottonwood

Creek from an existing pedestrian bridge (located approximately 900 feet upstream of Inverness Drive East) to County Line Road. This LOMR was based on better topographic data and a revised hydraulic analysis. The basis for this LOMR was the following submitted data: a report entitled "Request for Letter of Map Revision and Request for Conditional Letter of Map Revision for Cottonwood Creek, Arapahoe County, Colorado," dated March 1990, and prepared by Greenhorne & O'Mara, Inc., and an asbuilt drawing entitled "Cottonwood Creek Floodplain and Floodway for Letter of Map Revision," dated January 1990, prepared by Greenhorne & O'Mara, Inc. As a result of the above-referenced data, profile panels were also revised.

10.2 Second Revision

This study was revised on December 3, 1993, to show revised floodplain analyses for Big Dry Creek, Goldsmith Gulch, Piney Creek, and Willow Creek.

The hydraulic analysis was performed by Love & Associates, Inc., Boulder, Colorado, for the Federal Emergency Management Agency (FEMA) under their Limited Map Maintenance Program (LMMP), Contract No. EMW-90-C-3132, completed in March 1992.

An initial Consultation and Coordination Officer (CCO) meeting was held in July 1990, and attended by representatives of Arapahoe County, FEMA, and Love & Associates, Inc.

Contacts to acquire information were made with the Arapahoe County Department of Highways /Engineering, the Urban Drainage and Flood Control District, and FEMA. The area of study included portions of the City of Greenwood Village and the unincorporated areas of Arapahoe County.

Principal Flood Problems

Factors that aggravate flood problems: All streams studied in this Flood Insurance Study have had structural improvements, but intense and infrequent thunderstorms can generate floods in excess of existing structural capacities. Urbanization has occurred and development continues along these streams. This will increase debris loading in flood events and cause obstruction of bridges and culverts, thus causing more extensive damage.

Flood Protection Measures

Structures: Drop structures have been constructed on several of the creeks studied, as well as improved culverts and bridges on roads.

Dams: Englewood Dam, located on Willow Creek, provides flood protection for the area around Willow Creek downstream of the dam to its confluence with

Little Dry Creek.

Hydrologic Analyses

In general, the only source of hydrologic information for these creeks is the previous Flood Insurance Studies and HEC-2 decks, although some additional information was available for Big Dry Creek and Willow Creek.

Goldsmith Gulch

The only source of information for Goldsmith Gulch in the LMMP study reach is the previous Flood Insurance Study HEC-2 deck in which the discharge varies by reach. At Dayton Street the 100-year discharge is 1,090 cubic feet per second (cfs) and at the outlet of Arapahoe Lake the 100-year discharge is 800 cfs.

Piney Creek

The only source of information for Piney Creek hydrology is the previous Flood Insurance Study HEC-2 deck in which the discharge varies by reach. The discharges at Parker Road are:

<u>Return Period (year)</u>	<u>Flood Insurance Study (cfs)</u>
10	5,400
50	8,500
100	9,800
500	21,000

Willow Creek

The primary source of information for Willow Creek is the McCall, Ellingson & Morrill (1974) report which was used for the previous Flood Insurance Study. The computer model input was unavailable for this study. Greenhorne & O'Mara (1989) used the McCall, Ellingson & Morrill report. as a basis for a study located upstream of Englewood Dam. Downstream of Englewood Dam, the McCall, Ellingson & Morrill report presents a flow rate at the confluence with Little Dry Creek, but does not report the outflow rate of the dam. McLaughlin Water Engineers (1986) present flow rates for the outlet of Englewood Dam and at the confluence with Little Dry Creek. The 100-year discharge from each of these sources is presented below (References 70, 71, and 72).

Willow Creek 100-Year Discharges

Downstream of Englewood Dam		Upstream of Englewood Dam			
Confluence with Little Dry Creek (0.37 mi ²)	Englewood Dam outlet outflow	Dry Creek Road (8.1 mi ²)	Upstream of Confluence with Tributary (6.9 mi ²)	Quebec Street (6.55 mi ²)	Mineral Avenue (5.46 mi ²)
660 ¹	190 ²	6100 ¹	5200 ¹	5070 ³	4600 ¹
880 ²					

¹ McCall, Ellingson & Morrill (1974)

² McLaughlin Water Engineers (1986)

³ Greenhorne & O'Mara (1989)

Big Dry Creek

Two sources of information exist for Big Dry Creek. The first is a previous Flood Insurance Study HEC-2 deck, and the second is a FEMA accepted Letter of Map Revision (LOMR) for the channel from approximately 2,000 feet upstream of South Colorado Boulevard to approximately 1,000 feet downstream of South Colorado Boulevard (Reference 73). The table below shows the flow rates for Big Dry Creek at South Colorado Boulevard. The 100-year flow rates for the two FEMA accepted studies differ by over 1,000 cfs at this location. The data from the 1974 Flood Insurance Study were used for this study.

Big Dry Creek at South Colorado Boulevard

Return Period (year)	Flood Insurance Study (1974)	LOMR (1988)
10	6,673	
50	8,520	
100	9,757	8,600
500	15,968	

Hydraulic Analysis

Cross section data for streams in the area were digitized from maps and copied from previous HEC-2 decks.

All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Roughness coefficients (Manning's "n") were estimated from field inspection and photographs of the study reaches. Water-surface profiles were developed using the HEC-2 computer backwater model (Reference 74). Profiles were determined

for the 100-year floods on Goldsmith Gulch and Willow Creek, and the 10-, 50-, 100-, and 500-year floods for Piney Creek and Big Dry Creek.

The starting water-surface elevations for all streams were obtained from the previous Flood Insurance Study.

All elevations are referenced to National Geodetic Vertical Datum of 1929.

Maps used for floodplain boundaries are as follows:

- 1) Topographic maps used as work maps: Scale 1:1,200, Contour interval 2 feet, (References 75, 76, 77, and 78)
- 2) Arapahoe County Base Maps: Scale 1:2,400, no contours (Reference 79)
- 3) USGS quad map; Highlands Ranch Quadrangle: Scale 1:12,000, Contour interval 10 feet, (Reference 80)
- 4) Federal Emergency Management Agency, Flood Insurance Rate Map Panel 0800500095F; Arapahoe County: Scale 1:6,000, no contours (Reference 81)

Floodways

Equal conveyance reduction encroachment Method 4 was used for the floodway determination for Big Dry Creek and Piney Creek.

10.3 Third Revision

Digital Update

The mapping for this update has been prepared using digital data. Previously published Flood Insurance Rate Map data produced manually have been converted to vector digital data by a digitizing process. These vector data were fit to raster digital images of the USGS quadrangle maps of the county area to provide horizontal positioning.

Road, highway names and centerline data have been obtained from the United States Census Bureau's TIGER (Topologically Integrated Geographic Encoding and Referencing) File. The centerlines were modified to the positional accuracy of the USGS quadrangle, and the roads, highways, and street names were modified from the Flood Insurance Rate Map panels. The City of Aurora road and highway names and centerline data have been obtained from the City of Aurora, Department of Public Works, Geographic Information System. The adjusted centerline data were then computer plotted with the

digitized floodplain data to produce the countywide Flood Insurance Rate Map panels. Floodplain data for South Platte River were added based on work maps produced by Wright Water Engineers, Inc., for the Urban Drainage and Flood Control District in September 1987. Floodplain representation was matched to that in Denver County for a reach of 1,500 feet downstream (north) of Dartmouth Avenue.

Floodplain data for 3,600 feet of West Harvard Gulch were added to Arapahoe County based on work maps and analyses produced by Gingery Associates, Inc., for the Urban Drainage and Flood Control District, October 1978. Floodplain data were tied into that in Denver County at Colorado Southern Railroad (downstream) and South Zuni Street (upstream).

Floodplain data for Littles Creek were updated based upon hydrologic and hydraulic analyses performed by J. F. Sato and Associates for FEMA under Contract No. EMW-84-C-1631, completed in August 1985.

As a result of the channel improvement project for the reach of Littles Creek downstream from the Atchison, Topeka and Santa Fe and the Denver and Rio Grande Western railroads to its confluence with the South Platte River, the 100-year base flood would be contained within the channel. The hydraulic reanalysis for this reach of Littles Creek was performed by Love and Associates, Inc., in January 1989 (Reference 82).

The LOMR issued on July 15, 1991, for the City of Greenwood Village, to show the effects of more detailed topographic information along Prentice Gulch from the confluence of Greenwood Gulch to Holly Street, was included in this update. As a result of the more detailed topographic information, the 100-year floodplain boundary, base flood elevations, and floodway boundary have been revised along Prentice Gulch. The Floodway Data Table has also been updated.

The LOMR issued on April 20, 1992, for the City of Greenwood Village to show the effects of a revised hydraulic analysis which utilized better topographic data along Greenwood Gulch from the confluence with Prentice Gulch and Highline Canal upstream to South Holly Street was included in this update. As a result of the revised hydraulic analysis, the 100-year floodplain boundary, base flood elevations, floodway boundary, and Floodway Data Table were revised.

The LOMR issued on April 16, 1993, for the City of Greenwood Village to show the effects of channel improvements, which include realignment of the channel and more detailed topographic information along Goldsmith Gulch between East Belleview Avenue and South Yosemite Street was included in this update. As a result of the improvements and more detailed topographic

information, the 100-year floodplain boundary and floodway have been shifted approximately 150 feet to the east. In addition, base flood elevations were increased a maximum of 4 feet, from approximately 450 feet upstream of East Belleview Avenue to approximately 150 feet upstream of Yosemite Street. The Floodway Data Table has also been updated. The LOMR issued on September 26, 1994, for Arapahoe County to show the effects of more detailed topographic information and the existing bridge at East Iliff Avenue along Cherry Creek, from approximately 1,000 feet downstream of East Iliff Avenue to approximately 1,050 feet upstream of East Iliff Avenue, was included in this update. As a result of the more detailed topographic information, the elevations and floodplain boundary delineations along Cherry Creek have been revised.

10.4 Fourth Revision

This study was revised as part of a Digital Flood Insurance Rate Map (DFIRM) conversion for Arapahoe County and incorporated areas. This study incorporated the new countywide DFIRM conversion prepared by the UDFCD. The UDFCD contracted Merrick and Company to digitize the flood data from various sources and to prepare the data in conformance with the FEMA DFIRM specifications.

The cities of Aurora, Littleton, and Centennial were added to the DFIRM as a part of this revision. Previously, Aurora and Littleton had separate FIRMs. Centennial was incorporated after the date of the previous effective FIS and FIRM.

Flood information used for the DFIRM conversion came from three sources: the UDFCD's Flood Hazard Area Delineation studies; the work maps from the original FIS; and the work maps from several Letters of Map Revision (LOMRs).

Flood Hazard Area Delineation Studies

The UDFCD published a Flood Hazard Area Delineation report (Reference 83) for the Lower Box Elder Creek watershed in September 2001. This report identified flood hazard information on Box Elder Creek and Bear Gulch. This report was incorporated into this FIS.

The UDFCD published a Flood Hazard Area Delineation report (Reference 84) for the Upper Box Elder Creek watershed in December, 1995. This report identified flood hazard information on Box Elder Creek, Coyote Run and several tributaries. This report was incorporated into this FIS.

The UDFCD published a Flood Hazard Area Delineation report (Reference 85) for the Cherry Creek watershed in May, 2003. This report identified flood hazard information on Cherry Creek from Cherry Creek Reservoir to the Douglas County line. This report was incorporated into this FIS.

The UDFCD published a Flood Hazard Area Delineation report (Reference 86) for the Little Dry Creek watershed in August, 2003. This report identified flood hazard information on Little Dry Creek, Willow Creek, Greenwood Gulch, Quincy Gulch, Blackmer Gulch and Prentice Gulch. This report was incorporated into this FIS. An unpublished study revised the flood hazard information from Holly Dam to Quebec Street to correct obvious errors in the previous mapping.

The UDFCD published a Flood Hazard Area Delineation report (Reference 87) for the Upper Goldsmith Gulch watershed in April, 2005. This report identified flood hazard information on Goldsmith Gulch and the West Tributary. This report was incorporated into this FIS. An unpublished study revised the flood hazard information immediately above Caley Avenue to reflect a new detention pond.

The UDFCD published a Flood Hazard Area Delineation report (Reference 90) for the Massey Draw and SJCD 6200 watersheds in December, 2005. This report identified flood hazard information on SJCD 6200 and the North Tributary. This report was incorporated into this FIS.

The UDFCD published a Flood Hazard Area Delineation report (Reference 91) for the Murphy Creek watershed in September, 2006. This report identified flood hazard information on Murphy Creek. This report was incorporated into this FIS.

Letters of Map Revision (LOMRs)

All LOMRs effective after the date of the last revision (August 16, 1995) through March 16, 2010, have been incorporated into this revision.