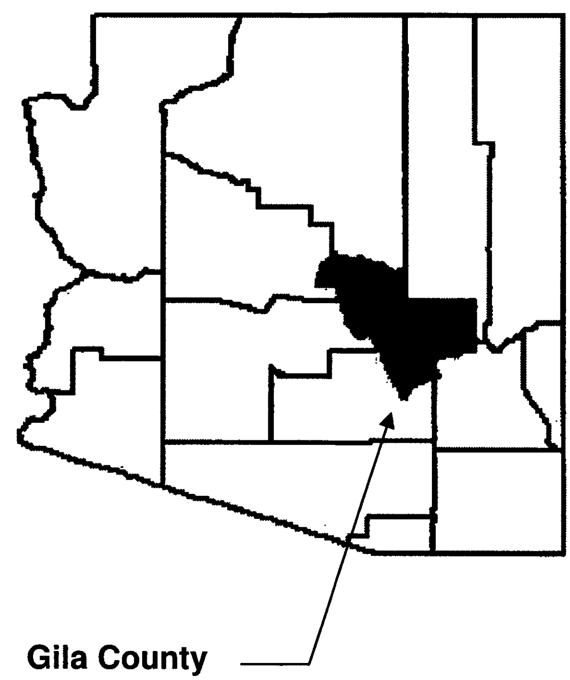
FLOOD INSURANCE STUDY

GILA COUNTY, ARIZONA

AND INCORPORATED AREAS

VOLUME 1 OF 2



Community Name	Community Number
GILA COUNTY, UNINCORPORATED AREAS	040028
GLOBE, CITY OF	040029
HAYDEN, TOWN OF	040104
MIAMI, TOWN OF	040030
PAYSON, TOWN OF	040107
STAR VALLEY, TOWN OF	040022
WINKELMAN, TOWN OF	040031

December 4, 2007

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
04007CV001A

NOTICE TO
FLOOD INSURANCE STUDY USERS

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

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

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (Shaded)
C	X (Unshaded)

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current FIS components.

Initial Countywide FIS Effective Date: December 4, 2007

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FLOOD INSURANCE STUDY

GILA COUNTY, ARIZONA 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), Flood Boundary and Floodway Maps (FBFMs) in the geographic area of Gila County, Arizona including the City of Globe; the Towns of Hayden, Miami, Payson, Star Valley, and Winkelman; and the unincorporated areas of Gila County (herein referred to collectively as Gila County). This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This FIS has developed flood risk data for various areas of the county that will be used to establish actuarial flood insurance rates. This information will also be used by Gila County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and will also be used 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 Acknowledgments

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

This FIS was prepared to include the unincorporated areas of, and incorporated areas within Gila County in a countywide format. Information on the authority and acknowledgments for each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports, is shown below.

Hydrologic and hydraulic analyses for the Gila County FIS report dated January 1984, was performed by Cella Barr Associates for the Federal Emergency Management Agency (FEMA), under Contract Nos. EMW-C-0726 and EMW-C-0948.

Hydrologic and hydraulic analyses for Agave Wash, American Gulch, American Gulch Tributary from the North, Ice House Canyon, McMillen Wash, Pinal Creek, Russell Gulch, and Watertank Wash were performed by the U.S. Geological Survey (USGS), Water Resources Division, for the Federal Insurance Administration (FIA), under Inter-Agency Agreement No. IAA-H-9-77, Project Order No. 10. This work was completed in September 1978. Hydrologic and hydraulic analyses for Gila River and Bloody Tanks Wash were also performed by USGS, for the FIA, under Inter-Agency Agreement No. IAA-H-9-77, Project Order No. 10. This work was completed in August 1977.

Hydrologic and hydraulic analyses for Tonto Creek from Punkin Center to Theodore Roosevelt Lake and it's tributaries, Bar X Wash, Butcher Hook Wash, Chalk Springs, Haystack Butte Creek, Lambing Creek, Landing Wash, Park Creek, Reno Creek, South Oak Creek, Sycamore Creek, and Walnut Canyon were performed by HDR Engineering, Inc. for FEMA under Contract No. EMF-20030-CO-0045, Task Order Number 1. This work was completed in August 2004.

The September 30, 2004 revision incorporated new detailed flood hazard information for Agave Wash, Bloody Tanks Wash, Coyote Wash, Ice House Wash, Kellner Canyon, McMillen Wash, Pinal Creek, Roberts Wash, Russell Gulch, and WAtertank Wash. Approximate methods were used to study East Ragus Wash, Grover Canyon, Loma Wash, Maple Leaf Wash, Old Oak Wash, Van Winkle Canyon, Warrior Canyon, and West Ragus Wash.

The hydrologic and hydraulic analyses for all streams in the September 30, 2004 restudy except Agave Wash were performed by Dibble & Associates, for FEMA, under Contract No. EMF-1998-CO-0081, and completed in November 1999. The hydrologic and hydraulic analyses for Agave Wash were performed by Dibble & Associates as part of a Letter of Map Revision (LOMR) to replace the effective approximate study performed by FEMA. This was LOMR Case No. 03-09-0187P, and it was completed in April 2002, and revised in September 2002, address review commentary.

In December 2007, HDR Engineering Inc. completed a countywide DFIRM and FIS for the County of Gila, Arizona. HDR Engineering Inc. was hired as an IDIQ study contractor for FEMA Region XI under contract number EMF-2003-CO-0045, Task Order Number 3. The DFIRM process included digitizing floodplain boundaries from the effective paper FIRMs and fitting them to a digital base map, thus converting the existing manually produced FIRMs to digitally produced FIRMs, referred to as DFIRMs. Individual community effective FIS reports were also combined into one report for the entire county.

Planimetric base map information was provided in digital format for FIRM panels. Public Land Survey System (PLSS) and land ownership data were provided by ALRIS. Information on roads were provided by Gila County. Digital Orthophotographic Quarter Quadragles (DOQQ) were provided by USGS. Users of this FIRM should be aware that minor adjustments may have been made to specific base map features.

The coordinate system used for the production of this FIRM is Universal Transverse Mercator (UTM), North American Datum of 1983 (NAD 83), and GRS 1980 spheroid. Corner coordinates shown on the FIRM are in latitude and longitude referenced to NAD 83. Differences in the datum and spheroid used in the production of FIRMs for adjacent counties may result in slight positional differences in map features and at the county boundaries. These differences do not affect the accuracy of information shown on the FIRM.

1.3 Coordination

Consultation Coordination Officer's (CCO) meetings may be held for each jurisdiction in this countywide FIS. An initial CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS, and to identify the streams to be studied by detailed methods. A final CCO meeting is typically held with representatives of FEMA, the community, and the study contractor to review the results of the study.

The dates of the initial and final CCO meeting held for Gila County and the incorporated communities in its boundaries are shown in Table 1, "Initial and Final CCO Meetings."

Table 1 - INITIAL AND FINAL CCO MEETINGS

Community Name	Initial CCO Date	Final CCO Date
Gila County (Unincorporated Areas)	August 1981 June 1982 May 14, 1998	November 17, 1982 January 11, 1984 February 11, 2004
Globe, City of	February 20, 1976 May 14, 1998	February 6, 1979 February 11, 2004
Hayden, Town of	February 20, 1976	September 11, 1978
Miami, Town of	February 20, 1976 May 14, 1998	February 7, 1979 February 11, 2004
Payson, Town of	February 20, 1976	February 8, 1979
Star Valley, Town of	N/A	N/A
Winkelman, Town of	February 20, 1976	September 11, 1978

N/A Not Applicable - Town of Star Valley became a new incorporation on November 10, 2005.

On August 4, 2004, the initial CCO meeting for the Gila countywide DFIRM and FIS was held. Attending the meeting were representatives of FEMA Region IX, MAPIX-M, HDR Engineering Inc. the study contractor, Gila County, City of Globe, Towns of Miami, Payson, and Winkelman.

On August 9, 2005, the final CCO meeting for the Gila countywide DFIRM and FIS was held. Attending the meeting were representatives of FEMA Region IX, HDR Engineering Inc. the study contractor, Gila County, City of Globe, Towns of Hayden, Miami, Payson, and Winkelman.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Gila County, Arizona. The scope and methodologies used in preparation of this FIS were agreed upon in joint consultation between FEMA and Gila County. Areas studied using detailed methodologies were selected with priority given to all known flood hazards and areas of projected development or proposed construction.

All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM.

Table 2 - FLOODING SOURCES STUDIED BY DETAILED METHODS

Agave Wash	McMillen Wash
American Gulch	Park Creek
American Gulch Tributary from North	Pinal Creek at Wilbanks Drive and Vicinity
Bar X Wash	Pinal Creek at Globe
Bloody Tanks Wash	Pine Creek
Butcher Hook	Pinto Creek
Chalk Springs Creek	Reno Creek
Cherry Creek	Roberts Wash
Christopher Creek	Russell Gulch
Coyote Wash	South Oak Creek
Dripping Springs Wash at State Highway 77	Strawberry Creek
East Verde River near State Highway 87	Strawberry Hollow
East Verde River at Whispering Pines	Sycamore Creek
Gila River at Hayden and Winkelman	Sycamore Creek Split Flow
Haystack Butte	Thompson Draw at Tonto Village
Houston Creek	Tonto Creek at Bear Flat
Ice House Canyon	Tonto Creek at Gisela
Kellner Canyon	Tonto Creek at Kohl's Ranch
Lambing Creek	Tonto Creek at Roosevelt Lake
Landing Wash	Walnut Canyon
M.O. Creek	Watertank Wash

All or portions of the flooding sources listed in Table 3, "Flooding Sources Studied by Approximate Methods," were studied by approximate methods. Approximate analyses were used to study only those areas having a low development potential or minimal flood hazards at the time of study.

Table 3 - FLOODING SOURCES STUDIED BY APPROXIMATE METHODS

Ash Creek	Mail Creek
Barney Canyon	Mapleleaf Wash
Bear Canyon	Mayfield Canyon
Brody Creek	McCormick Wash
Butcher Hook	Mescal Creek
Calahan Draw	Miami Wash
Cedar Creek	Needle Canyon
Chase Creek	North Sycamore Creek
Cooper Gulch	O'Carroll Canyon
Dick Spring Canyon	Old Oak Wash
Dry Dude Creek	Salt River
East Ragus Wash	Shoofly Canyon
El Capitan Canyon	Silver Creek
Ellison Creek	Skunk Camp Wash
Goat Camp Canyon	Stone Cabin Wash
Gold Creek	Theodore Roosevelt Lake
Golf Course Pond	Unknown
Grover Canyon	Van Winkle Canyon
Hardt Creek	Walnut Canyon
Hayes Gulch	Warrior Canyon Wash
Hunter Creek	Webber Creek
Lion Spring Draw	Webster Gulch
Loma Wash	West Ragus Wash
Lost Gulch	Willow Spring Canyon

The following flooding sources were studied by detailed methods:

Cherry Creek at Young - from 37.06 river miles above its confluence with the Salt River upstream to River Mile 39.74

Christopher Creek at the community of Christopher Creek - from 3.48 river miles above its confluence with Tonto Creek upstream to River Mile 5.08

Dripping Springs Wash at State Highway 77 - from 0.9 river mile above its confluence with the Gila River upstream to River Mile 5.0

East Verde River near State Highway 87 - from 4.3 river miles above its confluence with Ash Creek upstream to River Mile 5.3

East Verde River at Whispering Pines - from 1.0 river mile above its confluence with Ellison Creek upstream to River Mile 2.4

Gila River at Hayden and Winkelman - from the San Manuel Arizona Railroad upstream to approximately 0.8 mile above State Highway 77

Houston Creek at Star Valley - from 9.25 river miles above its confluence with Tonto Creek upstream to the confluence with Mayfield Canyon

M.O. Creek at Young - from its confluence with Cherry Creek upstream to River Mile 1.88

Pinal Creek at Wilbanks Drive and vicinity - from 9.9 river miles above its confluence with the Salt River upstream to River Mile 14.3

Pine Creek at Pine - from 12.4 river miles above its confluence with East Verde River upstream to River Mile 15.76

Pinto Creek at Sportsman's Haven and Roosevelt Lake Estates - from 12.0 river miles above Roosevelt Dam upstream to River Mile 14.824

Strawberry Creek at Strawberry - from 1.4 river miles above its confluence with Hardscrabble Creek upstream to River Mile 4.36

Strawberry Hollow at Pine - from its confluence with Pine Creek upstream to River Mile 1.45

Thompson Draw at Tonto Village - from 5.3 river miles above its confluence with Tonto Creek upstream to River Mile 6.36

Tonto Creek at Bear Flat - from 58.3 river miles above its confluence with Roosevelt Dam upstream to River Mile 59.40

Tonto Creek at Gisela - from 34.8 river miles above Roosevelt Dam upstream to River Mile 36.178

Tonto Creek at Kohl's Ranch - from 55.14 river miles above Roosevelt Dam upstream to River Mile 56.0

Tonto Creek at Roosevelt Gardens - from 15.4 river miles above Roosevelt Dam to River Mile 16.639.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through 1989.

The following flooding sources were studied by approximate methods:

Dripping Springs Wash near State Highway 77 - from the upstream limit of detailed study upstream approximately 1.5 miles to the boundary between Township 3 South and Township 4 South within Range 15 East

East Verde River near State Highway 87 - from approximately 0.1 mile above the confluence with Butcher Creek upstream approximately 0.3 mile within a private land holding. Also from the limit of detailed study above the confluence with Webber Creek upstream approximately 0.1 mile

Pine Creek - from the downstream limit of detailed study south of Pine, downstream approximately 0.3 mile

Strawberry Creek near Strawberry - from the downstream limit of detailed study, downstream approximately 0.16 mile and from the upstream limit of detailed study, upstream approximately 0.64 mile

Thompson Draw west of Tonto Village - from the limit of detailed study, upstream approximately 0.3 mile.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, and agreed upon by, FEMA and Gila County.

As part of this countywide FIS, updated analyses were included for the flooding sources shown in Table 4, "Scope of Revision."

Table 4 - SCOPE OF REVISION

Stream	Limits of Revised or New Detailed Study
Bar X Wash	2139 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
Butcher Hook	3299.3 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
Chalk Springs	6622.1 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
Haystack Butte	5583.1 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
Lambing Creek	4819 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
Landing Wash	6059 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek

Stream	Limits of Revised or New Detailed Study
Park Creek	3125 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
Reno Creek	3830.4 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
South Oak Creek	5336.4 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
Sycamore Creek	8069.4 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
Sycamore Creek Split Flow	3900 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek
Tonto Creek at Roosevelt Lake	11.11 miles to 19.99 miles upstream of Roosevelt Dam
Walnut Canyon	3364.8 ft upstream of confluence with Tonto Creek to confluence with Tonto Creek

This FIS also incorporates the determinations of letters issued by FEMA resulting in map changes (Letter of Map Revisions [LOMR], Letter of Map Revision - based on Fill [LOMR-F], and Letter of Map Amendment [LOMA], as shown in Table 5, "Letters of Map Change."

Table 5 - LETTERS OF MAP CHANGE

Community	Flooding Source(s)/Project Identifier	Date Issued	Type	Case Number
Gila County	American Gulch from 960' upstream of South McLane Road to Downstream of West Main	05/18/2000	102	00-09-150P

2.2 Community Description

Gila County encompasses a total area of 4,478 square miles and is located in central Arizona. It is bordered by Pinal and Graham Counties to the south, Navajo County to the east, Coconino County to the north, and Maricopa and Yavapai Counties to the west.

The topography consists of moderately steep to steep mountains interspersed with gently to strongly sloped valleys and floodplains. Elevations range from 1,950 feet (National Geographic Vertical Datum) in the southern portion of the County along the Gila River to 7,900 feet (NGVD) at Promontory Butte along the Mogollon Rim at the northern boundary of the County. Vegetation is diverse, ranging from desert scrub in the lower elevations to Ponderosa Pine-dominated woodlands in the high mountains.

Average annual precipitation ranges from 10 inches in the lower elevations to over 30 inches on the Mogollon Rim. Approximately one half of the annual precipitation falls as brief, intense rainfall during the months of July, August, and September. The remainder of annual precipitation consists primarily of mild fall and winter rainfall and snow at higher elevations. Average annual temperatures range from approximately 68°F in the lower valleys to approximately 44°F in the higher mountains (Arizona Climate, University of Arizona Press, 1972).

The major stream course in the county is the Salt River, which runs westerly through the County into Roosevelt Lake. The White River, and Cibique, Cedar, and Cherry Creeks drain the northeastern portion of the County and flow southerly into the Salt River. Tonto Creek and its tributaries drain the north-central portion of the County. The extreme northwestern portion of the County is drained by the East Verde River, which flows westward to the Verde River. The southern portion of the County between the Salt River and the Pinal Mountains is drained by Pinto and Pinal Creeks. The extreme southern portion of the county is drained by the Gila River.

Pinal Creek is a major tributary to the Salt River, and its floodplain contains a significant amount of development. The creek flows through the City of Globe, and is bounded by mountains that rise several hundred feet above the City. The headwaters of the creek are in the Pinal Mountains, approximately 8 miles south of Globe, at an elevation of 7,848 feet (NGVD). As well as the large amount of development within the floodplain of Pinal Creek, its tributary side-canyons also contain development subject to flooding.

Much of the main channel of Pinal Creek has been altered by human intervention. Many locations along the channel are characterized by concrete bank protection, and there are many bridges or culverts along the wash. A significant amount of channel modification was accomplished following a large flood event in July 1954. Two large bridges carrying U.S. Highway 60 over the creek were completed in 1977.

The headwaters of Bloody Tanks Wash, an important tributary to Pinal Creek via Miami Wash, are along the northern slopes of the Pinal Mountains, 4 miles southwest of the Town of Miami, at an elevation of approximately 6,500 feet (NGVD). Numerous tributaries to Bloody Tanks Wash issue from steep-walled side canyons extending off the major east-west valley. Development has primarily occurred within the main valley, within the narrow floodplains in the tributary side canyons, and on moderate slopes within both features. The main channel of Bloody Tanks Wash was altered some time prior to 1914. The man-made channel, or canal, as it was named at the time, ran straight through the main part of town and was approximately 50 feet wide with banks approximately 6 feet high. The banks of Blood Tanks Wash are now lined with concrete. Dense development begins immediately outside the channel confines and continues to the base of the mountains at the edges of the valley. In most of the steep-walled tributary side canyons, the channels are occupied by streets lined with residential buildings.

American Gulch, an important tributary to the East Verde River, generally flows from east to west upstream of its confluence with the river. The main channel upstream of Fort McDonald Drive is small and lies within a wide, flat, grass-covered valley. Between Fort McDonald Drive and the sewage disposal facility, the stream course flows through the Payson Country Club Golf Course, where it is generally well-defined and of large capacity. Downstream of the sewage disposal facility, the stream course flows through a small canyon in a well-defined channel characterized by steep banks.

The channel of American Gulch Tributary From The North, upstream of the rodeo grounds, is generally wide and somewhat flat. The main channel is generally small in capacity, with banks covered in dense pine and chaparral-dominated vegetation. Upstream of the confluence with an un-named tributary entering the main channel from the east, the channel changes to one chiefly incised into a grassy plain composed of alluvial material with only scattered vegetation along the banks.

The Town of Winkelman is located at the confluence of the Gila and San Pedro Rivers. The southern and eastern boundaries of the Town of Winkelman lie within the floodplain and along the main channel of the Gila River. The river channel possesses a large capacity, with a low-lying floodplain approximately 0.5 mile wide at the upstream corporate limits of the town. The Gila River drains a 13,268 square mile area (U.S. Department of the Interior, Geological Survey, Water-Data Report AZ 75-1, 1976) with most of the flow regulated by San Carlos Reservoir, located 30 miles upstream. Except along floodplain of the Gila River, there is very little area subject to inundation by overbank flow. Future annexations will most likely be to the north of town along either side of State Highway 77 and flood hazards on each side of the highway will likely be similar to those within the present corporate limits of the Town of Winkelman.

2.3 Principal Flood Problems

Gila County

Much of the private land in the county exists as small tracts within valleys contained within the boundaries of Tonto National Forest. Most development is generally located along the floodplains associated with these valleys. A significant portion of existing and potential future development is, or will be, subject to flood inundation, due to the narrowness of the floodplains, and presence of overbank flow during large flood events.

In 1970, a major storm occurred in northern Gila County which brought attention to the possibility of flooding on many properties. This storm caused severe flooding on Tonto Creek at Kohl's Ranch, and on Christopher Creek at the community of Christopher Creek. The rainfall experienced during this event exceeded the expected 100-year frequency rainfall rates calculated for this area and created peak discharge rates estimated at 18,400 cubic feet per second (cfs) and 11,900 cfs on Tonto and Christopher Creeks, respectively. The flood washed out bridges and damaged cabins, particularly in the Kohl's Ranch area (U.S. Department of Agriculture, Forest Service, Southwest Region, July 1971).

In addition, the USGS has operated two streamflow gages on Tonto Creek. These gages indicate that the most severe flooding on Tonto Creek in the past 40 years was for the most recent events of 1970, 1979, and 1980. These peak flows measured at USGS gage No. 09499000 just above Gun Creek were 53,000 cfs, 61,400 cfs, and 61,400 cfs, respectively. These peak discharge rates correspond to events of between 30-year and 50-year frequency, in magnitude. These later flood events also indicated the potential for flooding at numerous locations along many creeks and rivers within the County.

The City of Globe has an established, and well-recorded history of flows on Pinal Creek. The largest floods of record along this portion of Pinal Creek occurred in 1891, 1904, 1940, 1954, and 1968 (U.S. Department of the Army, Corps of Engineers, September 15, 1961, and City of Globe records). With the exception of the 1891 flood, which occurred in February, these floods were all caused by summer storms in July and August.

Since completion of Coolidge Dam in 1928, the most severe flooding on the Gila River has been the result of runoff from summer storm events occurring over the watersheds upstream of Coolidge Dam and that of the San Pedro River. Based on analysis of records of floods and streamflow on the Gila and San Pedro Rivers, the greatest potential floods in the County, particularly those affecting the population centers of Hayden and Winkelman, result from runoff originating upstream of Coolidge Dam, and/or runoff from the San Pedro River watershed. During a wet period when the flood-storage capacity of San Carlos Reservoir is low as a result of large volumes of water in storage, the principal causes of a severe flood on the Gila River are anticipated to be the result of: (1) widespread heavy rainfall of long duration, (2) warm weather occurring after a period characterized by large snowfall accumulation, or (3) widespread rainfall occurring on top of widespread snowfall accumulation (U.S. Department of the Interior, Geological Survey, Professional Paper 655-B, Burkham, D.E., 1970).

The most recent significant flooding occurred during the winter of 1992-1993 (December and January. Russell Gulch was at bank-full condition and actually overflowed the box culvert crossing at Hospital Road 6 inches deep for a couple of days. The flooding was caused by debris pluggin of U.S. Highway 60/70 culvert.

The main channel of Blood Tanks Wash was realigned as part of the 1949 highway project. The wash used to cross U.S. Highway 60/70 as shown on 1945 USGS map, but it has been realigned to flow between the highway and the tailings of the dump embankment on the north side of the channel, which is not reflected on the 1982 photo-revised USGS map. The bridge at each former crossing was removed, and the downstream one was replaced with a multi-barrel box culvert to allow Ragus Wash to flow into the historic channel back to the realigned Blood Tanks Wash. A new bridge was added for a mine road, and the channel was lined with concrete. Also, the Miami Copper County spur track was removed and relocated.

The main channel of Pinal Creek upstream of the Ruiz Canyon has not been significantly altered, except for construction of the many bridges and culverts. The remaining washes, studied by detailed methods, remain mostly in natural state with earthen channel bottoms and sides.

A detailed description of past, and potential future flood problems, within incorporated areas of the County, are provided below:

<u>City of Globe</u>

The City of Globe has the potential to suffer from serious flooding, and has experienced several damaging floods causing multiple deaths within the community. The potential exists for fast-moving flood flow at depths of several feet, inundating large portions of the commercial and residential areas of the City. These flood flows are capable of causing extensive structural damage.

The following are descriptions of selected past floods in the City of Globe. Information in quotations was excerpted from the Arizona Silver Belt newspaper.

"...A storm began on the afternoon of February 16, 1891, and, by the night of February 17, Pinal Creek had grown into a turbulent flood and its banks were being eaten away. Buildings were washed away as the channel moved laterally in many places at distances of at least 100 feet. On February 23, a second flood occurred that "surpassed any previous flood." More buildings washed away, and there was more channel migration. One life was lost."

The floods of July 26, 1904, and August 17, 1904 were the worst floods in the City of Globe since February 1891. One life was lost. The following headlines refer to the flood of August 17, 1904.

"...A cloudburst causes the most destructive flood ever witnessed here, Pinal Creek a mighty torrent." "...Six lives lost." "...Approximately 30 minutes after rain started, floodwater in Pinal Creek was at peak flood stage. The rainstorm that produced the flash flood lasted less than 1 hour. Recorded rainfall at Globe was 2.05 inches. Many persons in buildings found themselves surrounded by floodwater, and many buildings were swept away. Bridges and culverts were also washed away, and parts of the Southern Pacific Railroad and U.S. Highway 60-70 were damaged or destroyed."

The table shown below contains several measurements and observations of peak discharge, as determined by a study by the USGS (U.S. Department of the Interior, Geological Survey, Water Supply Paper 147, 1905).

Peak Discharge for the Flood of August 17, 1904; Globe, Arizona.

Location of Measurement or Observation	Discharge (Cubic Feet per Second)
Pinal Creek Upstream From Graveyard Canyon	11,500
Copper Gulch Approximately 0.25 Mile Upstream From Mouth	3,200
Pinal Creek Just Downstream From Copper Gulch	14,500

The following excerpts refer to the flood of July 16, 1940.

"...Storm and flood damage at Globe Tuesday worst in years." "Globe was struck with a storm Tuesday, the worst since 1904. Store buildings were washed from their foundations, windows broken, and the downpour of rain estimated at over 1.5 inches in about 20 minutes caused places to be flooded; stocks of merchandise ruined...."

According to these reports, water stood over 3 feet deep on lower Broad Street within the City of Globe.

The following excerpts refer to the flood of July 29, 1954:

"...$2 million flood hits Globe" and "Gas main in Ice House Canyon washed out."

Bridges, trees, automobiles, and business merchandise and furnishings were washed away by rapidly rising floodwater. Water depths of up to 8 feet were reported in buildings, and many business and residential buildings sustained structural damage. A peak discharge of 8,130 cfs was measured by the USGS for Pinal Creek just downstream from Collins Street at the north end of the City (Surface Water Supply of the United States, Part 9, 1954).

The following refers to the flood of August 3 and 4, 1968:

During the flooding of August 3 and 4, 1968, a 4-year old boy was swept away and drowned as floodwater swept down Echo Canyon across Willow Street into Globe. Several buildings were flooded as the city received 2.56 inches of rain in 1.5 hours on the afternoon of August 3, and 3.04 inches of rain on the evening of August 4. Flood damage occurred on both days, but the higher flood peak was on August 3. A peak discharge of 7,400 cfs was measured by the USGS on Pinal Creek just downstream from Collins Street at the north end of the city (Open-File Report, Water Resources Data for Arizona, Part 1, Surface Water Records, 1969)

Many floods of lesser magnitude than those cited above have occurred on Pinal Creek, and many other damaging floods have also impacted the tributary side-canyons within this time frame. Utilities, streets, residential and commercial buildings, and automobiles have been damaged by floodwaters. The potential for future flood problems in the City of Globe is serious, and are aggravated by the numerous bridges and culverts that either restrict the movement of floodwater or have the potential to obstruct floodflow if debris is lodged on the structures. Numerous buildings within the floodplain of Pinal Creek and its tributary side canyons form obstructions to flood flow conveyance, and cause increased flood flow depths. There exists a considerable threat that permanent structures and mobile homes may be washed off their foundations and carried downstream along Pinal Creek during a major flood. The resulting increase of flood depths due to debris blockage at bridges and other constrictions is potentially large, and also highly unpredictable. Under current conditions in the City of Globe, there is a high potential for loss of life in the event of a major flood.

Town of Hayden

Low-lying areas of Hayden located to the south of State Highway 177 are subject to flooding resulting from breakout of flood flows originating from either the Gila or San Pedro Rivers. Major floods originating within the San Pedro River watershed are anticipated to break out and travel directly across the Gila River channel to the south of the Town of Hayden, inundating the floodplain currently occupied primarily by the community golf course. The San Pedro River has overflowed its banks several times during the past 60 years, and at least 1 major flood on September 28, 1926, debouched into the channel of the Gila River (U.S. Department of the Interior, Geological Survey, 1976).

The Gila River has overflowed its banks many times during this century, with several major floods occurring during 1905-1917. During the period since completion of Coolidge Dam on November 15, 1928, there has been no major flooding within the Town of Hayden. This has been primarily due to the fact that the bulk of flood flows generated have been adequately controlled by operations at Coolidge Dam. At least two large flood events, those of August 9, 1944, and August 5, 1954 (Water Supply Paper 1963, 1966) occurred as a result of heavy rainfall on the watershed between Coolidge Dam and the San Pedro River.

Newspapers, government publications, and local residents provided little detailed information on past flooding in the Town of Hayden. Nevertheless, a considerable amount of information on flooding in the Gila and San Pedro Rivers was found in publications by the U.S. Army Corps of Engineers, USGS, the Arizona Republic Newspaper, and the Arizona Copper Camp Newspaper (U.S. Department of the Army Corps of Engineers, December 1, 1945; U.S. Department of the Interior, Geological Survey, Professional Paper 655-B, 1970; Arizona Republic Newspaper, 1891; Arizona Copper Camp Newspaper, January 21, 1891). By virtue of its physical proximity to the Town of Hayden, a description of a major flood on the Gila

River at the Town of Winkelman, which is a short distance upstream from, and adjacent to Hayden, follows, and is a good example of the potential hazards that exist on low-lying land in Hayden. Information in quotations is an excerpt from the Arizona Copper Camp Newspaper (Arizona Copper Camp Newspaper, January 21, 1891).

"A warning reached Winkelman by telephone Wednesday (January 19) afternoon that high water was coming. The people living on the low ground were warned to leave and they did so, but late in the afternoon most of them went back against the advice of persons who were familiar with the situation. At that time the flood was expected at three o'clock the next morning, and it arrived just twenty minutes before that time. In an incredibly short space of time the 'flat' (floodplain of Gila River) was covered with water and a swift stream was rushing westward through the street between the houses and the mesa."

In addition, "...On January 15, 1916, warm rains from a storm originating over the Pacific ocean began to fall on the snow-covered watershed of the Gila River. The warm rain, together with the earlier snow it melted, produced a major flood on the Gila River" (U.S. Department of the Interior, Geological Survey, Professional Paper 655-B, 1970).

Before the floodwater receded, approximately 30 homes in the lower part of Winkelman were destroyed or badly damaged and 4 persons were dead.

Town of Miami

The potential for serious flooding exists within the Town of Miami. The flood threat primarily relates to extensive development in the narrow valley occupied by Bloody Tanks Wash and in the narrow floodplains of its principal side-canyon tributaries.

The Town of Miami has experienced several damaging floods during the last century. Bloody Tanks Wash has overflowed its banks at least four times; on two occasions, nearly the entire business district was flooded. The following descriptions of selected past floods in Miami illustrate the flood problems. Information is excerpted from the Arizona Silver Belt newspaper.

In reference to the floods of February 17 and 23, 1891:

"...Miami damaged by flood of February 23 and Miami also experienced a flood on February 17."

In reference to the flood of December 19, 1914:

"...Miami Canal a Raging Torrent"

In reference to the flood of January 28, 1916:

"...THE BIGGEST FLOOD IN THE HISTORY OF MIAMI

The concrete wall built to protect the tailing dam below the bridge that was destroyed by the flood was also washed out and the tailings began to slip down into the wash, causing considerable apprehension in lower Miami, where a slouching of the tailing dam would have caused general damage. Water flowed down Sullivan Street to Miami Avenue and back of Miami Commercial Company's store into the main channel again. A few bridges were washed out."

In reference to the flood of July 27, 1928:

"...DISASTROUS CLOUDBURST HITS MIAMI

Enormous Losses Are Sustained by Local Business Establishments and District Industrial Properties

Miami is crushed under the greatest disaster of its history, following the widespread destruction resulting from wind, hail, rain, and devastating floods which swept it from three sides late yesterday afternoon, when a cloud burst submerged practically the entire business section and the runoff of water from the surrounding hills whirl-pooled against the main torrential flow through the flood-control canal and spread over an area of several blocks. Practically every residence of the town was damaged in some way.... The heaviest losses are to the merchants, whose places of business were inundated to varying depths.... There was no known loss of life, although many narrow escapes have been reported and several sensational rescues are known to have been affected. The storm broke over Miami almost without warning a few minutes after 4 p.m., when a terrific rush of wind was followed by a downpour of rain and hail and in a few minutes the main streets were filled with water which began overflowing across the sidewalks and into business establishments. A wall of water swept through Bloody Tanks Wash from the west as the result of an earlier downpour miles back in the mountains. On its mad rush it was met by cross floods from local canyons...."

The water in front of the Y.M.C.A, at its highest point, reached a depth of 49 inches. The water depth of 49 inches in front of the Y.M.C.A., located at the intersection of Miami Avenue and Sullivan Street, closely corresponds to the depth of the 100-year flood computed as part of this FIS. At the time of the July 27, 1928, flood, conditions affecting the conveyance of floodwater at this location are unknown, but may not have been significantly different from present conditions. No mention was made in the Arizona Silver Belt newspaper of a debris jam at or below the Y.M.C.A. Thus, the magnitude of the flood peak of the July 27 flood is assumed to be approximately equal to the peak discharge of the 100-year flood.

In reference to the flood of July 30, 1949:

"...MIAMI GETS SHARE OF TORRENTIAL RAINS OVER STATE SATURDAY

Several hundred tons of debris on local streets... were the results of the storm that swept this area Saturday."

In reference to the flood of July 20,1954:

"...MIAMI RAVAGED BY RAGING FLOOD WATERS

Town's Worst Rainstorm in 27 Years

About 2 feet of water turned the cars, parked along Sullivan and Live Oak Streets, around into one another. It flipped, crashed, and pushed them around like a bunch of toys. Twelve to fifteen cars parked on Adonis Avenue were washed down and piled up behind the Ryan Evans Drug Store and Live Oak Street. Some were half buried. Hundreds of tons of dirt, rocks and rubbish were washed down from the several canyons and hills around the town. All the debris was washed down into the main streets and the part which got the most was the intersection of Adonis and Live Oak Street. Miami's main thoroughfare was completely covered by dirt and rocks and traffic was impossible."

"Almost every building in the town's business district was flooded, and many automobiles were moved by the fast-moving floodwater. Areas hardest hit were the Miami Avenue and Sullivan Street intersection, Reppy Avenue, and the Adonis Avenue and Live Oak Street intersection. The peak discharge of Bloody Tanks Wash was 2,720 cfs, measured at the downstream corporate limits of Miami" (U.S. Department of the Interior, Geological Survey, Professional Paper 1343, 1954).

In reference to the flooding of August 3 and 4, 1968:

"...HEAVY RAINS PELT MIAMI

Flooding in the streets of Miami were attributed to Bloody Tanks Wash overflowing and additional flow occurring in the side canyons."

A major factor in the threat of flooding problems is that of the small capacity of the modified main channel of Bloody Tanks Wash. Major overflow of Bloody Tanks Wash has occurred at least once every 19 years during the last century. The capacity of the main channel is approximately 25 percent of the capacity needed to safely convey the 100-year flood. The presence of fast-moving flood overflow would quickly enter streets paralleling the main channel, dislodging objects such as automobiles, are moving these downstream to locations where they would become lodged, forming obstructions to flow. This factor is anticipated to increase the depth of overflow within the floodplain, and cause dangerous conditions to residents of the community. This may be further enhanced by the presence of large amounts of floating debris, which may be carried down side canyons by fast-moving flood flows. Due to the small size, and steep slope of the main channel and its tributaries, flooding can occur very suddenly and unexpectedly.

Additionally, the large tailings dump at the eastern edge of the Town of Miami, on the north side of Bloody Tanks Wash, may further aggravate potential flooding problems. Although the large timber wall constructed at the toe of the tailings dump to protect them from erosion is currently in place, there exists a high likelihood that a large flood may destroy or overtop the wall. The resulting erosion at the toe of the tailings dump may cause tailings to slump into and across Bloody Tanks Wash. Floodwaters impounded upstream of the slumped tailings could potentially inundate a large area. Floodwater could also be forced to the south, out of the main channel, further aggravating conditions within the floodplain.

Town of Payson

The Town of Payson has historically not experienced flooding that caused serious widespread damage to development. Older development is sparse and, except for a few structures, is not subject to inundation by overbank flow. The more recent development is generally situated above areas subject to inundation from flooding in the larger streams, but some may be subject to inundation by overbank flow from small streams.

Newspapers, government publications, and local residents yielded little detailed information on past floods in the Town of Payson. No recorded data concerning past floods, or measurements of flood peak discharge has been found. All information concerning floods in the Town of Payson was obtained from local residents who have resided in the area for many years, and the Payson Roundup newspaper. The consensus of several local residents was that they had never observed or heard of a large flood in Payson prior to 1956. One resident had been in Payson since 1918, and another had known people who lived in the area in 1897. The consensus was also that there had not been a loss of life from flooding in Payson. The following is a description of past floods in the Town of Payson.

The greatest amount of known damage resulting from flooding in Payson was on September 5, 1970, as a result of a heavy summer rainfall event. Daily rainfall amounts of 5.36 and 6.20 inches at National Weather Service precipitation stations at Payson and Payson Ranger Station, respectively, were the greatest within the period of record. Much of the damage was from shallow flooding. Several thousand dollars worth of merchandise in a store was damaged "when waters flooded the building to a depth of six inches."

American Gulch "...running through the Payson golf course was a raging torrent...." (Payson Roundup, September 10, 1970, Volume 25, No. 49).

Other storms reportedly have resulted in small amounts of flooding; however, due to the lack of coverage in the Payson Roundup, were assumed to be minor.

Within the business district located along State Highway 87, and south of State Highway 260, runoff is normally transported to the south via a drainage system of open channels, culverts, and pipes, without inconvenience to persons or flooding of adjacent structures. On occasion, the plugging of a culvert or storm drain has resulted in the ponding of runoff upstream of roads. However, during a major flood, the existing drainage system will not have the capacity to drain the area effectively, and widespread shallow flooding could result. Runoff from intense rainfall over the drainage area north of State Highway 260 is anticipated to flow over and past the highway toward the south on either side of State Highway 87, where it will be joined by floodwater from areas to the east and west. At Frontier Street, an area nearly 1000 feet wide may be inundated by shallow, rather slow-moving flood flows. Flood flow depths are anticipated to be generally less than 1 foot, except in low-lying areas and along defined channels where depths may exceed 3 feet in a few places. The velocities of the floodwater will not be great, and structural damage is anticipated to be minimal.

There exists some potential for flood damage at the Town's sewage disposal facility. The facility is located with the floodplain of American Gulch, and its access road passes over a culvert on American Gulch at the upstream side of the facility. The capacity of the culvert is approximately 1,200 cfs. This capacity is estimated at approximately equal to that of a 10-year flood event. The peak discharge for the 100-year flood would greatly exceed the culvert capacity, and floodwater would back up to the east, behind the access road embankment. Rising flood waters could flow over the road, with a resulting estimated depth of flow within the sewage disposal facility of 2 to 3 feet.

Town of Star Valley

There are no known principal flood problems for the Town of Star Valley.

Town of Winkelman

Areas of the Town of Winkelman, to the east of State Highway 77, and to the south of Golf Course Road, are subject to flood overflow originating from the Gila River. The Gila River has overflowed its banks many times in this century, and several major floods also occurred during the short period between 1905 and 1917. Since completion of Coolidge Dam, on November 15, 1928, there has not been any major damage due to flooding within the Town of Winkelman. Both major floods occurring within the watershed since 1917 have been safely stored within San Carlos Reservoir behind Coolidge Dam. However, at least two large floods, those of August 9, 1944, and August 5, 1954, have occurred in the watershed as a result of intense rainfall downstream from Coolidge Dam.

Newspapers, government publications, and local residents were consulted to obtain information on past flooding in the Town of Winkelman. Detailed descriptions of past flood damage within the corporate limits of Winkelman are sparse. However, the following description of one of the largest known floods, that of January 20, 1916, provides a good description of the potential threat from large floods.

"...On January 15, warm rains from a storm originating over the Pacific Ocean began to fall on the snow-covered watershed of the Gila River. The warm rain, together with the snow it melted earlier, produced a major flood on the Gila River" (Professional Paper 655-B, 1976).

"...A warning reached Winkelman by telephone Wednesday (January 19) afternoon that high water was coming. The people living on the low ground were warned to leave and they did so, but late in the afternoon most of them went back against the advice of persons who were familiar with the situation. At that time the flood was expected at three o'clock the next morning, and it arrived just twenty minutes before that time. In an incredibly short space of time the 'flat' was covered with water and a swift stream was rushing westward through the street between the houses and the mesa." (Arizona Copper Camp Newspaper January 20, 1916)

Before the floodwater receded approximately 30 homes in the lower part of Winkelman were destroyed or badly damaged and four persons were dead.

Since the completion of Coolidge Dam in 1928, the most severe flooding on the Gila River has been the result of runoff from summer storms over the watershed downstream of Coolidge Dam and upstream of the Town of Winkelman. During a wet period, when the flood storage capacity of San Carlos Reservoir is low due to large amounts of water then in storage, the principal causes of a severe flood are anticipated to be: (1) widespread heavy rainfall of long duration, (2) warm weather after a large snowfall accumulation, or (3) widespread rainfall on top of a large snowfall accumulation (Professional Paper 655-B, 1976).

2.4 Flood Protection Measures

<u>Gila County</u>

As discussed previously, Coolidge Dam regulates flow on the Gila River. The regulation of this dam reduces more frequent floods at the Towns of Hayden and Winkelman, but may not completely control discharge resulting from larger flood events, particularly in low-lying portions of the unincorporated areas along the Gila River outside of established protected communities .

Earth embankments exist in the floodplain of the Gila River just northeast of Winkelman and along the tailings pond just outside the western corporate limits of Hayden. Flood peaks in excess of approximately 40,000 cfs are anticipated to be capable of breaching the embankment and rendering it totally ineffective. Floods of lesser magnitude may cause the embankment to fail due to erosion by turbulent waters. Overtopping floodwater may become impounded behind the embankment.

Dikes and berms have been constructed at Sportsman's Haven on Pinto Creek and at Gisela on Tonto Creek; however, these dikes are not protected from scour and do not provide protection from large floods.

A dike constructed by the Natural Resources Conservation Service (former Soil Conservation Service) at Roosevelt Gardens on Tonto Creek is well protected from erosion and provides protection from some floods, but has the potential to be overtopped by an approximately 100-year flood event at its upstream end.

Some channel protection has been implemented on Houston Creek at Star Valley. This protection, however, was only implemented to control erosion and not to convey major flood events.

The Arizona Department of Water Resources is currently preparing reconnaissance reports on the feasibility of providing levee protection for the Wilbanks Drive Crossing area on Pinal Creek, Sportsman's Haven and Roosevelt Lake Estates on Pinto Creek, and Gisela on Tonto Creek.

Two levees exist along Tonto Creek. The levee system near Punkin Center is referred to as the Dike at Roosevelt Gardens West and the other near South Oak Creek referred to as the Dike at Roosevelt Gardens East. Neither levee has been determined to meet current FEMA criteria required for certification that the levee system would provide a given level of protection

City of Globe

Within the City of Globe, few structural flood protection measures, and no floodplain management measures, have been implemented to reduce damage from large flood events. High street curbs, some small retaining walls, and a few substantial fences afford some protection from potential damages resulting from small flood events, but these do not provide protection from large flood events. A flood damage reduction plan developed by the Army Corps of Engineers was developed in 1961 but was not implemented. The plan would have focused on the enlargement and installation of bank and bed protection on Pinal Creek.

Following the flood of July 29, 1954, which destroyed or damaged U.S. Highway 60 at the northern part of the City, the roadbed of the highway was elevated and the adjoining bank of Pinal Creek was stabilized with a rip-rap revetment. This project protects on the highway, and not the adjoining City.

An earth embankment and diversion tunnel has been constructed near the corporate limits of the City of Globe on McCormick Wash. The purpose of this project was to divert runoff of up to approximately 600 cfs from McCormick Wash to Copper Gulch, thus protecting adjacent residential and commercial property along McCormick Wash from potential damage. While small flood events are effectively diverted to Copper Gulch, large flood discharges will exceed the capacity of the diversion, and fast-moving floodwater will overtop the diversion embankment and inundate adjacent properties and structures along McCormick Wash.

Town of Hayden

There are no existing structural improvements within the Town of Hayden that would significantly reduce potential damage resulting from a major flood event. An earth embankment extending across the floodplain from the high terrace at the upstream corporate limits of Town downstream to the Union Pacific (former Southern Pacific) Railroad embankment protects only the golf course and recreation facilities on low-lying portions of the floodplain. Flood peaks of an estimated 40,000 cfs or greater have the potential to breach the embankment and render it totally ineffective. Additionally, flood flows of lesser magnitude may also cause embankment failure due to erosion by turbulent waters. Floodflows that break out of the channel may become impounded behind the embankment and inundate additional properties.

Town of Miami

There are no existing structural improvements within the Town of Miami that would significantly reduce potential damages resulting from a major flood event. The conveyance provided by Bloody Tanks Wash will afford some protection from smaller flood events, but will not adequately contain larger flood events. Several small floodwater-retention dams constructed in side canyon tributaries have filled with debris, or are too small to significantly reduce potential flood damage. While numerous high curbs, retaining walls, and substantial fences afford some small level of protection from small floods, these will provide no protection from large flood events. A study conducted by the Army Corps of Engineers (COE, 1961) resulted in a recommendation for a flood-control plan, which was subsequently not implemented. One alternative recommended was to construct a detention basin on Bloody Tanks Wash upstream of Miami, and another was to enlarge the channel of Bloody Tanks Wash at the Town of Miami. The uncertainty of future mining methods and their effects on storm runoff was a deterrent to implementation of any flood-control measures.

Town of Payson

There are no existing structural improvements within the Town of Payson that would significantly reduce potential damages resulting from a major flood event. Two earthfill dams which contain stock ponds on American Gulch Tributary From North near its mouth would have no significant effect in reducing the discharge resulting from a large flood event. Neither dam meets current safety criteria, and either or both may fail during a large flood event, posing a significant flood hazard.

Town of Star Valley

Results of the mapping study were not previously

Town of Winkelman

There are no existing structural improvements within the Town of Winkelman that would significantly reduce potential damages resulting from a major flood event. An earth embankment extending across the floodplain of the Gila River, located upstream of Town, was designed to protect residential development on low-lying land in the east part of the community from floodflows. The embankment protects some of the development from small flood event runoff, but offers little or no protection from flood peak flows greater than 40,000 cfs. During a large flood, the embankment may breach, or may fail due to erosion by turbulent floodflows.

3.0 ENGINEERING METHODS

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

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting Gila County. Not all streams' hydrologic analyses were included in the effective FIS reports, and were therefore, not included in this FIS report.

<u>American Gulch</u>

There is no systematic record of peak flood flows in the American Gulch watershed; therefore, recommended methodologies provided in U.S. Water Resources Council *Bulletin 17* (U.S. Water Resources Council, Hydrology Committee, March 1976) for determining flood flow frequencies, were not applicable for this watershed. Alternative methods considered are discussed below and the rationale for selection of one methodology is given.

Several alternative methods of analysis were determined to be feasible for use in defining the discharge-frequency relationship for American Gulch and its tributaries. These methods include: (1) application of regression equations for peak discharges of selected recurrence intervals (U.S. Department of the Interior, Geological Survey, Open-File Report, unpublished); (2) a regional relation of 50-year flood peak discharge to physical and climatic basin characteristics (Moosburner, 1970); (3) application of regional relations presented in a report by the Arizona Water Commission (Arizona Water Commission, Report No. 4, October 1973); (4) computed floods, determined in accordance with the new guidelines given in U.S. Water Resources Council Bulletin 17 (U.S. Water Resources Council, Bulletin 17, March 1976) for gaged sites on streams near Payson; and, (5) application of regional relations developed by Patterson and Somers (U.S. Department of the Interior, Geological Survey, Water Supply Paper 1683, 1966) used in conjunction with unpublished methods developed by personnel of the USGS.

Discharge-frequency relationships determined using Methods 1 and 2 are related to physical and climatic characteristics, while discharge-frequency relationships determined using Methods 3, 4, and 5 are related to flood peak characteristics of gaged streams in the area surrounding Payson, through which American Gulch flows. Basins in Payson have less precipitation, are at a lower elevation, and have less topographic relief than the surrounding gaged basins; therefore, discharge-frequency relationships computed using Methods 3, 4, and 5 did not define discharge-frequency relationships for streams in Payson as well as those derived using Methods 1 and 2. Method 1 is the most recent method available for defining discharge frequency relations of ungaged streams in Arizona, and is based on considerably more station years of systematic flood peak record in Arizona than are the other methods. Thus, Method 1 was selected for use in this FIS.

Bloody Tanks Wash

There is no systematic record of peak flood flows in the Bloody Tanks Wash watershed; therefore, recommended methodologies provided in U.S. Water Resources Council *Bulletin 17* (U.S. Water Resources Council, Hydrology Committee, March 1976) for determining flood flow frequencies, were not applicable for this watershed.

The methodology found to be most appropriate for determining the discharge-frequency relationship for Blood Tanks Wash and tributaries included an application of regional relationships developed by the Arizona Water Commission (Arizona Water Commission, Report No. 4, October 1973) in combination with a discharge-frequency relationship developed by the USACE for Bloody Tanks Wash (U.S. Department of the Army, Corp of Engineers, September 15, 1961). Since no streams in the community are equipped with a streamgage, only one measurement of flood-peak discharge - for the flood of July 20,1954 – was found to be available. This approximately 50-year discharge estimate was verified using a regional frequency discharge-basin characteristics relationship (Moosburner, U.S. Department of the Interior, 1970). Computed values of the 10-, 50-, 100-, and 500-year floods were developed using a log-Pearson Type III distribution (U.S. Water Resources Council, Hydrology Committee, March 1976), using gages on nearby streams possessing similar hydrologic characteristics to verify the relationships. Peak-discharge values were judged to be realistic, based on generally good agreement among the computed discharge-frequency values, nearby flood peak-discharge data, and information such as channel size, obtained during field inspections.

Historically, there has been past and current mining activity within the Bloody Tanks Wash FIS area, that has impacted drainage basin boundaries for both Bloody Tanks Wash and Russell Gulch. Watershed boundaries were determined from the best available information from several sources, including field reconnaissance. In addition, the main channel of Bloody Tanks Wash was realigned as part of a 1949 highway project. The wash used to cross U.S. Highway 60/70 as shown on a 1945 USGS topographic map, but has been realigned to flow between the highway and the tailings of the dump embankment on the north side of the channel, which is not reflected on a 1982 photo-revised USGS map. The bridge at each former crossing was removed, and the downstream one was replaced with a multi-barrel box culvert to allow Ragus Wash to flow in the historic channel back to the realigned Bloody Tanks Wash. A new bridge was added for a mine road, and the channel was lined with concrete. Also, the Miami Copper County spur track was removed and relocated.

East Verde River

Derivation of discharge-frequency relationships for the East Verde River was performed using data for two recording streamflow gages operated by the USGS on the East Verde River. One is located near Childs, Arizona (gage No. 09507980), approximately 30 miles downstream from State Highway 87 and the other (gage No. 09507600) was located approximately 1.5 miles upstream of Whispering Pines. Gage No. 09507600, in operation from 1962 to 1974, then was relocated to the Washington Park area at the confluence of Mail Creek and the East Verde River, approximately 3 miles upstream from Whispering Pines. These gaging stations were located too far downstream and upstream of the study area to be used directly in determining the 100-year peak discharges for the East Verde River, but was used in the calibration process.

Because direct streamflow data was not available, the SCS TR-20 program was used to develop 100-year peak discharge for the River (U.S. Department of Agriculture, Soil Conservation Service, Technical Release 20). Basin characteristics used in this analysis included: drainage area, basin slope, soil type, vegetative cover type and density, and channel velocities. Rainfall data were obtained from data compiled by the National Oceanic and Atmospheric Administration for this region (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, 1973). Additional recurrence interval peak discharges were calculated using the computer 100-year discharge and the slopes of the USGS regional frequency curve (U.S. Department of the Interior, Geological Survey, September 1978).

Gila River

Peak discharge data for floods of 10-, 50-, 100-, and 500-year recurrence intervals for the Gila River were developed using streamflow and historical data pertaining to the study reach. The methodology used was outlined in Bulletin 17B of the U.S. Water Resources Council (Revised September 1981).

A gaging station on the Gila River located approximately 2 miles upstream from the Town of Hayden, and another gaging station on the Gila River located approximately 18 miles downstream from Hayden, were the principal sources of data used in the development of the discharge-frequency relationship for the study reach. Data for this site is substantial, as the gaging station upstream from Hayden has been in operation since 1941 and the gaging station downstream at Kelvin has been in operation since 1911. Records of floods at gaging stations upstream from Coolidge Dam, located approximately 31 miles upstream from Hayden, were also used in this analysis. Analyses of peak discharge reflected the effects of regulation at San Carlos Reservoir behind Coolidge Dam (U.S. Department of the Interior, Geological Survey, September 15, 1978).

Pinal Creek

There is no current systematic record of peak flood flows in the Pinal Creek watershed. No streams in the community have been gaged, and only a few measurements of flood-peak discharge, including three measurements on Pinal Creek, have been made. Therefore, alternative methods other than the preferred use of actual streamgage data and the application of guidelines furnished in Bulletin 17-B were used, and are discussed below.

Discharge-frequency relationships for Pinal Creek and tributaries were determined to be most appropriately calculated from regional relationships developed by the Arizona Water Commission (U.S. Department of the Interior, Geological Survey, September 1978) and from a discharge-frequency relationship developed by the Corps of Engineers for Pinal Creek (Arizona Water Commission, Report No. 4, October 1973).

Three measurements of peak discharge on Pinal Creek, and historic accounts of flood heights and depths, were used to calibrate the discharge-frequency values used in this study. The 50-year discharge was also checked using a regional frequency discharge-basin characteristics relationship developed by the USGS (U.S. Water Resources Council, March 1976). Computed values of the 10-, 50-, 100-, and 500-year floods, were calculated using a log-Pearson Type III distribution (U.S. Department of the Interior, Geological Survey, 1976), based on gages on nearby streams situated in basins having somewhat similar hydrologic characteristics, and were then used to calibrate the calculated discharge-frequency relationships. Peak-discharge values were judged to be valid on the basis of reasonably good agreement between the computed discharge-frequency values and the flood peak-discharge data for nearby streams. Additional information obtained during field inspections were used to validate the findings.

Tonto Creek at Gisela

Peak discharge values for floods of selected recurrence intervals for Tonto Creek at the Town of Gisela were developed using a log-Pearson Type III distribution (U.S. Water Resources Council, Bulletin 17, Revised September 1981), based on streamflow records from the USGS gage on Tonto Creek, and were supplemented by historical data.

Tonto Creek: Punkin Center to Theodore Roosevelt Lake

There is no current systematic record of peak flood flows for Tonto Creek between Punkin Center and Roosevelt Lake. No streams in this reach have been gaged, although records exist for streamgages outside the reach. Methodologies used for this study reach are discussed below.

Streamflow data was obtained for the three USGS gage stations on Tonto Creek outside the study reach. These gages include: 09498800 (located 2 miles upstream from Gisela just upstream of Houston Creek), 09499000 (located 9 miles upstream from Roosevelt Gardens just upstream from Gun Creek), and 09499500 (located near the mouth). Gage stations not used include: 09498800, which only features data for the years between 1964 and 1975 and is too far upstream of the project site to provide useful data, and station 09499500, which was closer to the study reach but has not been active since December 1940.

The gage station on Tonto Creek above Gun Creek near Roosevelt, Arizona (station 09499000) has a drainage area of 675 square miles and annual peak flow data from 1941 to 1999 (59 years). The study reach begins near Punkin Center (approximately 7.5-miles downstream of the gage site), and has a drainage area of 850 square miles. The study reach terminates at Theodore Roosevelt Lake, with a total drainage area of 1,007 square miles. The 100-year flood discharge was determined using data for station 09499000, adjusted for drainage area, and used of regional regression equations developed by USGS. This approach was then used to compute 10-year, 50-year, and 500-year values. (HDR Engineering, March, 2004). Flood frequency analyses were then performed at station 09499000 using Bulletin 17B, Guidelines For Determining Flood Flow Frequency (Interagency Advisory Committee on Water Data, 1982).

The USGS methodology is based on procedures documented in USGS Open-File Report (OFR) 78-711 (also published as ADOT-RS-15-121) (Roeske, 1978), for the Central Mountain Area (Region 3 in OFR 78-711). The weighted estimate determined for gaging station 09499000 was then transferred downstream on Tonto Creek to three selected locations: Punkin Center (850 square miles); Confluence of Sycamore Creek (930 square miles); and Roosevelt Lake (1,007 square miles). A transfer procedure described in USGS WSP 2433 for estimating flood discharges at ungaged sites on a gaged stream and the following equation was then used. It should be noted that while the regression equations in WSP 2433 are the most recent equations for Arizona and are considered most appropriate for small streams in Central Arizona, the regression equations in OPR 78-711 are most appropriate for a large watershed, like that of the Tonto Creek study reach.

Tonto Creek Tributaries

Eleven tributaries to Tonto Creek were also evaluated. These tributaries include Reno Creek, Park Creek, Landing Wash, Chalk Creek, Walnut Canyon, Butcher Hook Wash (W331/332), Bar X Wash (W321), Sycamore Creek, Lambing Creek, Haystack Butte Creek, and South Oak Creek.

The USGS method for estimating the magnitude and frequency of flood-peak discharges for rural areas in Arizona was found to be the most appropriate methodology for thesde tributaries (National Flood-Frequency Program-Methods for Estimating Flood Magnitude and Frequency in Rural Areas in Arizona USGS Fact Sheet 111-98 June, 1999; also presented in WSP 2433), as applied to Region 12. The regression equations contained in this Fact Sheet were used to compute all discharges, using the computer program entitled "The National Flood-Frequency (NFF) Program (version 3.2)". The 500-year event flow was extrapolated within the NFF program. Regression equations presented in USGS Fact-Sheet 111-98 (via the NFF program) were used to estimate the 10-, 2-, 1-, and 0.2-percent-annual-chance peak discharge.

September 30, 2005 Revision

The September 30, 2005 revision incorporated new detailed flood hazard information for Agave Wash, Blood Tanks Wash, Coyote Wash, Ice House Canyon, Kellner Canyon, McMillen Wash, Pinal Creek, Roberts Wash, Russell Gulch, and WAtertank Wash.

The hydrologic analyses were determined to be most accurately determined through the use of regional regression equations derived by the United States Geologic Survey (U.S. Department of the Interior, Geological Survey, Open-File Report, unpublished). The flow rate for the upper portion of Agave Wash (drainage area of 0.11 mi2) was determined using the Rational Method, as presented in the Arizona Department of Transportation (ADOT) Hydrology Manual (U.S. Water Resources Council, March 1976), utilizing factors appropriate for Region 12 of the State of Arizona. For general watershed characteristics, the upper reaches were considered to be undeveloped, while residential and commercial development along local washes reflected a higher degree of impervious cover.

There is some past and present mining within the study area, impacting the drainage basin boundaries for Bloody Tanks Wash and Russell Gulch. The National Pollutant Discharge Elimination System allows for runoff from the tailings pond within the mining area, greater that the 10-percent, 24-hour storm, provided the runoff to the receiving water meets certain criteria. The watershed boundaries, affected by mining activities, are determined from the best available information from several sources, including field reconnaisance.

A summary of the drainage area-peak discharge relationships for all the streams studied by detailed methods is shown in Table 6, "Summary of Peak Discharges."

Table 6 - SUMMARY OF PEAK DISCHARGES

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Agave Wash					
At Intersection of Hunter Drive and US 70	0.11	--	--	300	--
At Intersection of Skyline Drive and Apache Drive	0.28	--	--	440	--
Above Confluence with McMillen Wash	0.54	--	--	790	--
American Gulch					
At Downstream Corporate Limits	10.20	1,230	3,200	4,400	8,500
At Vista Road	9.34	1,160	3,000	4,100	8,000
At Cross section P	6.83	960	2,500	3,400	6,700
At cross section Q	3.29	610	1,600	2,200	4,300
At McLane Road	2.76	540	1,450	2,000	3,900
At State Highway 87	1.76	400	1,200	1,550	3,000
American Gulch Tributary from North					
At cross section A	2.09	450	1,200	1,700	3,300
At cross section N	1.16	310	850	1,250	2,350
Bar X					
At Confluence with Tonto Creek	1.11	304	941	1,436	3,160

-- Data Unknown

	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Bloody Tanks Wash					
At Southern Pacific Railroad	16.09	--	--	8,330	--
Just above confluence with Russell Gulch	19.88	--	--	9,580	--
At downstream corporate limits of Miami	15.6	4,000	9,700	12,000	26,000
At upstream corporate Limits of Miami	13.6	3,800	9,000	11,200	24,000
Butcher Hook					
At Confluence with Tonto Creek	1.24	360	1,136	1,746	3,780
Chalk Springs					
At Confluence with Tonto Creek	1.31	352	1,109	1,703	3,760
Cherry Creek					
15,600 Feet Upstream from Confluence With M.O. Creek	39.24	5,200	12,200	16,700	30,200
Above Confluence with M.O. Creek	44.22	5,600	13,100	17,900	33,000
Below Confluence with M.O. Creek	57.26	6,700	15,800	21,100	39,000
Christopher Creek					
3,200 Feet Upstream From State Highway 260	5.78	1,900	4,500	6,100	11,200
At State Highway 260	7.67	2,550	6,000	8,200	15,000
4,200 Feet Downstream of State Highway 260	8.67	2,850	6,800	9,100	16,900
Coyote Wash					
Just above confluence with Russell Gulch	0.23	--	--	360	--

-- Data Unknown

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Dripping Springs Wash					
16,000 Feet Upstream of State Highway 77	90.16	13,200	29,500	39,450	70,000
At State Highway 77	97.20	13,800	31,000	41,050	72,000
500 Feet Downstream of State Highway 77	110.45	15,000	34,000	44,800	79,500
East Verde River					
At Whispering Pines	28.31	4,000	9,200	12,200	22,000
1.5 mi. Upstream of State Highway 87	125.7	14,500	34,000	45,000	81,000
Gila River					
At Winkelman	13,270[1]	22,000	64,000	120,000	210,000
At Downstream Corporate Limits of Hayden	17,757[2]	28,000	67,000	140,000	250,000
Haystack Butte					
At Confluence with Tonto Creek	0.59	233	679	1,014	2,010
Houston Creek					
At Confluence With Mayfield Canyon	10.11	1,600	4,000	5,500	10,300
At Confluence With Goat Camp Canyon Creek	15.39	2,500	6,200	8,600	16,100
7,300 Feet Downstream From State Highway 260	18.08	3,000	7,400	10,100	19,000
At Confluence With Lion Spring Draw	25.71	3,900	9,700	13,400	25,200

[1]1,384 square miles are below Coolidge Dam.
[2]4,871 square miles are below Coolidge Dam.

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Ice House Canyon					
0.4 mi. below confluence of Kellner Canyon	8.47	--	--	5,250	--
Just above confluence w/Pinal Creek	10.49	--	--	6,140	--
Kellner Canyon					
0.4 mi. above confluence with Ice House Canyon	5.25	--	--	3,840	--
Lambing Creek					
At Confluence with Tonto Creek	9.53	1230	4126	6386	14400
Landing Wash					
At Confluence with Tonto Creek	1.05	323	1,003	1,533	3,270
M.O. Creek					
At State Highway 288	5.22	1,200	3,000	4,000	7,400
4,700 Feet Below State Highway 288	8.44	1,900	4,600	6,200	11,300
6,300 Feet Below State Highway 288	11.55	2,500	6,000	8,100	15,000
Above Confluence With Cherry Creek	13.04	2,800	6,600	9,000	16,700
McMillen Wash					
Just below SR 77	0.57	--	--	820	--
At US 60-70	2.01	--	--	2,240	--
Just above confluence with Pinal Creek	2.97	--	--	2,980	--

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Park Creek					
At Confluence with Tonto Creek	8.79	1,137	3,808	5,895	13,500
Pinal Creek					
0.3 mi. below 66 Ranch Road	11.26	--	--	6,100	--
Near Remington Road	12.83	--	--	6,710	--
Just below confluence of Ice House Canyon	24.57	--	--	10,040	--
Just below confluence of McMillen Wash	29.34	--	--	11,300	--
At Downstream Corporate Limits of Globe	35.0	6,000	14,500	18,500	37,000
At Upstream Corporate Limits of Globe	27.5	5,200	12,500	16,000	32,000
At confluence with Miami Wash	93.00	9,800	24,500	33,800	64,000
At Wilbanks Drive Bridge	128.00	12,600	31,300	43,200	84,000
Pine Creek					
10,000 Feet Upstream From State Highway 87	10.84	2,300	5,400	7,450	13,500
4,000 Feet Upstream From State Highway 87	12.94	2,500	5,900	8,000	14,800
At Confluence With Strawberry Hollow	14.70	2,600	6,200	8,400	15,500
2,500 Feet Downstream From the Confluence With Strawberry Hollow	17.20	2,900	6,800	9,400	17,000

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Pinto Creek					
Below State Highway 88	125.82	16,500	36,500	46,800	81,000
At Confluence With Spring Creek	138.95	17,000	37,700	48,300	85,000
At Confluence With Champain Creek	177.48	20,400	46,000	58,600	102,000
Reno Creek					
At Confluence with Tonto Creek	14.46	1,639	5,434	8,350	18,300
Roberts Wash					
Just above confluence with Russell Gulch	0.30	--	--	480	--
Russell Gulch					
At Upstream Limit of Study (Tonto National Forest)	10.68	--	--	6,120	--
Just below confluence of Coyote Wash	19.52	--	--	9,080	--
At Racus Road	21.68	--	--	9,760	--
South Oak Creek					
At Confluence with Tonto Creek	0.48	211	598	886	1,710
Strawberry Creek					
7,000 Feet Downstream of State Highway 87	8.97	1,700	4,000	5,500	10,200
13,000 Feet Downstream of State Highway 87	11.27	2,000	4,800	6,600	12,200
Strawberry Hollow					
At Confluence With Pine Creek	2.23	530	1,300	1,800	3,500

-- Data Unknown

Flooding Source and Location	Drainage Area (sq. mi.)	Peak Discharges (cfs) 10-Percent-Annual-Chance	2-Percent-Annual-Chance	1-Percent-Annual-Chance	0.2-Percent-Annual-Chance
Sycamore Creek					
At Confluence with Tonto Creek	18.68	1,870	6,102	9,307	20,100
Thompson Draw					
At Tonto Village	1.38	380	980	1,356	2,650
Tonto Creek					
At Bear Flat	51.21	11,500	27,000	35,800	64,000
At Gisela	505.00	31,200	63,500	82,500	133,000
At Kohl's Ranch (State Highway 260)	20.81	4,400	10,300	14,000	25,400
At Kohl's Ranch (4,450 Feet Below State Highway 260)	24.70	5,200	12,100	16,300	30,100
At Roosevelt Gardens	850.00	43,500	97,000	128,000	215,000
At Sycamore Creek	930	50,800	106,500	137,000	223,300
At Theodore Roosevelt Lake	1007	53,300	111,700	144,000	234,200
Walnut Canyon Creek					
At Confluence with Tonto Creek	1.61	388	1,240	1,911	4,320
Watertank Wash					
Just above confluence w/ Russell Gulch	0.49	--	--	740	--

-- Data Unknown

3.2 Hydraulic Analyses

Analysis 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 Flood Insurance Rate Map (FIRM) represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data. 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.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed, selected cross section locations are also shown on the DFIRM.

All qualifying bench marks within a given jurisdiction that are cataloged by the National Geodetic Survey (NGS) are 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 DFIRM with their 6-character NSRS Permanent Identifier.

Bench marks cataloged 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 abutment)
- 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)

In addition to NSRS bench marks, the FIRM may also show vertical control monuments established by a local jurisdiction; these monuments will be shown on the FIRM with the appropriate designations. Local monuments were only placed on the FIRM if the community had requested that they be included, and if the monuments meet the aforementioned NSRS inclusion criteria.

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

It is also important to note that temporary vertical monuments are often established during the preparation of a flood hazard analyses 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 and FIRM. Interested individuals may contact FEMA to access this data.

Each incorporated community within Gila County, and also the unincorporated areas of Gila County, has a previously printed FIS report. The hydraulic analyses describe in those reports have been compiled and are summarized below.

American Gulch and American Gulch Tributary from North

On American Gulch Tributary From North, approximate methods were used from the mouth to the west side of the rodeo grounds. Profile computations for American Gulch Tributary From North began at the west side of the rodeo grounds where flow velocities are critical (a hydraulic condition where, for a given discharge, the specific energy is at a minimum) at a low earth embankment. The profiles were computed upstream to Sherwood Street where approximate methods were used.

The approximate methodology used the 1% exceedance (approximate 100-year) flood peak discharge, field investigation of the area, surveyed sections across channels, and interpretation of topographic maps at a scale of 1:24,000 with a contour interval of 40 feet (7.5-Minute Series Topographic Maps, Payson North, Arizona, 1973) and aerial photographs (Cooper Aerial Surveys, Payson, AZ, June 3, 1976).

The computed velocities of flood peak discharge were determined to be high because of the fairly steep channel slopes of approximately 70 feet per mile in the downstream reach of American Gulch and because of the fairly low roughness coefficients in the middle and upper reaches of American Gulch. In some reaches, these velocities were very high, and the computed depths were low. This flow condition is hydraulically classified as supercritical. Supercritical flows have inherently unstable flow elevations. Small changes in channel geometry or other hydraulic conditions may cause the flow to change abruptly (through a hydraulic jump) to subcritical flow with lower velocities and greater depths. Therefore, flood elevations at cross sections with computed supercritical flow were adjusted to those corresponding elevations for subcritical flow.

Flood profiles were drawn showing computed water surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

Shallow flooding with an average depth of 3 feet occurs on the north side of American Gulch between cross sections F and H, at the Payson waste-treatment facility. Flood flows passing over the road to the waste-treatment facility reenters the main channel immediately downstream of the road embankment on the south side of American Gulch, but flood flows passing over the road on the north side of the gulch do not re-enter the main channel until it reaches the downstream side of the waste-treatment facility.

Bloody Tanks Wash

Water surface elevations (WSELs) for Bloody Tanks Wash were determined using the USGS's step-backwater computer model (Moosburner, August 1970). Cross-section data for Bloody Tanks Wash were obtained from ground survey. Aerial photographs were used to locate a few cross sections (Kucera and Associates, Inc., October 4, 1976). All bridges and culverts were surveyed to obtain elevation data and structural geometry.

The starting WSELs for Bloody Tanks Wash were based on the slope-area method.

Roughness coefficients (Manning's "n") for Bloody Tanks Wash were based on field survey of the study reach. Base "n" values were assigned for the type and size of material that compose bed and banks of the channel. Adjustments to base "n" were assigned for the depth of flow, changes in channel shape, channel irregularities, curvatures, obstructions, and vegetation. Aerial photographs were consulted for perspective on historical change in channel shape and vegetation.

WSELs were then determined for 10-, 50-, 100-, and 500-year flood events. Elevation computations began at a cross section 1.4 miles downstream of the corporate limits of the Town of Miami, where two estimates of WSELs were given for each discharge. Profile computations were performed at 10 additional upstream cross sections to ensure profile convergence for each discharge at the downstream corporate limits of Miami. Computed velocities of flood flows were determined to be high because of the fairly steep channel slopes of approximately 40 feet per mile and fairly low roughness coefficients. The flow velocities were determined to be supercritical in some reaches, with inherently unstable flow elevations. Therefore, flood elevations at cross sections with supercritical flow were calculated as the sum of WSEL for supercritical flows and elevation as a result of hydraulic jump. The computed profiles and corresponding depths were compared with historic flood depths reported in the Arizona Silver Belt newspaper. The historic information is sparse, but no disagreement was found. A reported depth for the flood of July 27, 1928, agrees closely with the computed depth for the 100-year flood.

Flood profiles were drawn showing computed WSELs to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

Flooding on several of the small streams tributary to Bloody Tanks Wash and on Bloody Tanks Wash upstream of the Southern Pacific Railroad bridge were studied by approximate methods. Calculation of appropriate WSELs was based on 100-year flood peak discharge; field investigation of the area; field survey of cross-sections; interpretation of topographic maps with a scale of 1:24,000, with a contour interval of 25 feet (7.5-Minute Series Topographic Maps, Globe, AZ, 1947); aerial photographs (U.S. Department of the Army, Corps of Engineers, September 14, 1961); and observations of flooding on July 20, 1954, by the USGS (Unpublished Notes of Observations of Flooding, July 20, 1954).

Gila River

Water-surface elevations for the Gila River were determined using the USGS E431 computer step-backwater model (U.S. Water Resources Council, March 1976) and use of the Corps of Engineers' HEC-2 hydraulic modeling program (COE, 1968, with updates). Profiles were determined for 10-, 50-, 100-, and 500-year flood events. Profile computations began at a cross section approximately 2.3 miles downstream of the corporate limits of Hayden, where two estimates of water-surface elevation were made for each discharge. Profile computations were made at nine additional upstream cross sections to assure profile convergence for each discharge at the downstream corporate limits of Hayden. Comparisons were made of the computer water-surface elevations and water-surface elevations defined by the stage-discharge relation for the USGS stream-gaging station on the Gila River at the old State Highway 77 bridge upstream from Hayden; the computer water-surface elevations were within a few tenths of a foot of the water-surface elevations defined by the stage-discharge relations. The computed profiles are assumed to be satisfactory on the basis of this good agreement.

Cross sections for most of the detailed analyses within Gila County were obtained from topographic maps developed from aerial surveys (Kenney Aerial Surveys Company, September 1976). Topographic mapping for cross sections used on the Gila River at Hayden and Winkelman was prepared for the U.S. Department of the Interior, Water Resources Division, using aerial photographs (Kucera and Associates, Inc, Winkelman, AZ, 1976). Topographic maps for cross sections used on Tonto Creek at Gisela and Pinto Creek at Sportsman's Haven were provided by the ADWR (Cooper Aerial Surveys, May 20, 1981). Topographic mapping for cross sections used on Pinal Creek was taken from maps produced for Dashnee and Associates (7.5-Minute Series Topographic Maps, Globe, AZ (1945), Cammerman Wash, AZ (1966), Cutter, AZ (1966) and Pinal Peak, AZ (1966)).

The below-water sections were obtained by field measurement. All bridge and culvert dimensions and elevations required for detailed analysis were taken from field surveys or bridge and culvert plans. All plans used in the study were verified by field observation.

Roughness factors (Manning's "n") used in hydraulic computations were chosen by field survey based on observation of the streams and floodplain areas within the applicable study reach.

Starting water-surface elevations for all of the detailed FIS streams, with the exception of the Gila River, were estimated by the slope-area method and incorporated into the HEC-2 program.

Flood profiles were drawn showing water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals.

The hydraulic analyses for FIS were based on unobstructed flow. The flood elevations shown on the profiles are considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail. At Pinto Creek, it was assumed that the earthen dikes would fail during a major flood because they are not protected from erosion.

Streams studied by approximate methods were analyzed using normal depth calculations and topographic maps developed from aerial surveys (Kenney Aerial Surveys Company, September 11, 1981).

<u>Gila River at Winkelman</u>

Information obtained for the analysis of the Gila River at Winkelman consisted mainly of flow cross section geometry, roughness factors, and the geometry of backwater producing structures. Cross section data for the Gila River were obtained from aerial photographs (Water Resources Division, Town of Winkelman, AZ, 1976) All bridges were surveyed to obtain elevation data and structural geometry.

Water surface profiles were determined using the E431 computer step backwater model (U.S. Department of the Interior, Geological Survey, 1976). Profiles were determined for the 10-, 50-, 100-, and 500-year flood events. Profile computations began at a cross section 3.0 miles downstream of the corporate limits of Winkelman where two estimates of water surface elevation were made for each discharge. Profile computations were made at 14 additional upstream cross sections to assure profile convergence for each discharge at the downstream corporate limits of Winkelman. Comparison of computed water surface elevations with water surface elevations defined by the stage-discharge relation for the USGS streamflow gaging station on the old State Highway 77 bridge over the Gila River near the southern corporate limits of the town showed that the computed water surface elevations were within a few tenths of a foot of the stage-discharge relation for the gage. The computed profiles are assumed to be satisfactory on the basis of this good agreement.

Flood profiles were drawn showing computed water surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals (Exhibit 1).

Flooding on the small tributary in southwest Winkelman was studied by approximate methods. Using the calculated discharge slope and cross sectional area of the. stream it was determined that the 100-year discharge would be confined to the channel banks.

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

The hydraulic analyses were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Pinal Creek

Water-surface profiles for Pinal Creek were determined using the USGS E431 and J635~step-backwater computer models (7.5-Minute Series Topographic Maps, 1966).

Starting WSELs for Pinal Creek were based on the data contained in the cross-section data of the models. All the other washes are tributaries to the three washes, and started with known elevations at the confluences.

Cross-section data for Pinal Creek were obtained from ground survey, supplemented by aerial photographs to obtain horizontal distances between cross sections. All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Profile computations began at a cross section 0.75 mile downstream of the corporate limits of the City of Globe, where two estimates of water surface elevation were made for each discharge. Profile computations were made at nine additional upstream cross sections to assure profile convergence for each discharge at the downstream corporate limits of Globe.

The computed velocities of flood-flow were determined to be high because of fairly steep channel slopes (50 to 60 feet per mile) and fairly low roughness coefficients. Flow velocities were determined to be supercritical in some reaches, with inherently unstable flow elevations. Therefore, flood elevations at cross sections with supercritical flows were calculated as the sum of water-surface elevation for supercritical flows and elevation due to creation of a hydraulic jump.

Flood profiles were drawn showing computed water surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. (Exhibit 1).

Computed profiles and corresponding flood depths were compared with historic flood depths reported in the Arizona Silver Belt newspaper. Although historic information is sparse for this area, no disagreement was found between observed and computed depths.

Flood elevations along the tributaries to Pinal Creek and along washes in undeveloped areas were studied by approximate methods. The methodology relied on flood-peak discharge for the 1% exceedance flood event; field investigation of the area, surveyed cross-sections; and, interpretation of photographs and maps at scales of 1:24,000 and 1:2,400, with contour intervals of 25 feet and 10 feet, respectively (Arizona State Highway Department, date unknown, and U.S. Department of Housing and Urban Development, May 24, 1974).

Information on the methods used to determine peak discharge-frequency relationships for the streams re-studied as part of this countywide FIS is discussed below.

Tonto Creek

A detailed hydraulic FIS on Tonto Creek from Punkin Center to Theodore Roosevelt Lake was conducted using the U.S. Department of the Army, Corps HEC-RAS v. 3.1. Kenney Aerial Mapping, Inc conducted an aerial survey on the Tonto Creek area and provided 2-foot contours. A three dimensional surface of the project area was developed by Kenney Aerial Mapping, Inc. and used to get cross-sectional information using HEC-GeoRAS. HEC-GeoRAS takes information from the mapping and puts it into a HEC-RAS format.

The starting water surface elevation was based on the peak elevation-frequency curve from the Corps' March 1996 Section 7 FIS for Modified Roosevelt Dam Hydrologic Evaluation of Water Control Plan, Roosevelt Lake. Elevations for each frequency were compared to normal depths and the higher of the two were used for the starting water surface elevation. Manning's roughness coefficients for the Tonto Creek tributaries were determined by a combination of engineering judgment and field observation using the Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Floodplains (Arcement, George, and Schneider, Verne, date unknown).

Tonto Creek Tributaries

Re-study of Tonto Creek utilized normal depth calculations, from which flood profiles were calculated, water surface elevations from Tonto Creek at the tributary confluence used as the backwater elevation, and brought back on the profile until it intersected with the tributary modeled water surface elevation.

Manning's roughness coefficients for tributaries to Tonto Creek were determined by a combination of engineering judgment and field observation using the *Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Floodplains* (Arcement, George, and Schneider, Verne, date unknown).

Landing Wash and Sycamore Creek had flow split out of the main channel. Landing Wash had split flow occur on the left bank, between cross-sections 2034 and 3107 (downstream most reach). Sycamore Creek had split flow occur on the right bank, between cross-sections 4725 and 5051 (lower reach). Separate floodplains and floodways were determined for the split flow areas.

Town of Payson

Re-study of the Town of Payson utilized new channel cross-section geometry data, roughness factors, and geometry of backwater-producing structures. Cross-section data were obtained from ground survey. Aerial photographs at a scale of 1:12,000 were used to locate some cross-sections (Unpublished Notes of Observations of Flooding on July 20, 1954 in Miami, AZ). All bridges and culverts were surveyed to obtain elevation data and structural geometry.

Water-surface profiles were determined using the USGS E-431 step-backwater computer model (U.S. Department of the Interior, Geological Survey, 1976). Profiles were determined for 10-, 50-, 100-, and 500-year flood events. Water surface elevations on American Gulch at the western corporate limits were determined by use of converging profiles computed through nine channel cross sections in a reach beginning 0.2 mile downstream. Profiles were computed on American Gulch from the western corporate limits upstream to Meadow Drive. Approximate methods were used to the east and upstream of Meadow Drive.

September 30, 2004 Revision

For the hydraulic analyses of all detailed studies except for Agave Wash, the Corps of Engineers' HEC-RAS (v.2.2) was used to compute water-surface profiles for all cross sections, developed from 4-foot contour interval mapping (U.S. Water Resources Council, March 1976 & Arizona Water Commission, October 1973). For the hydraulic analysis of Agave Wash, HEC-RAS (v. 3.0.1) was used to compute the water-surface profiles.

For the hydraulic analyses of Agave Wash, USACE HEC-RAS (v.3.0.1) was used to compute the water surface profiles. The starting water surface elevations for Blood Tanks Wash as based on the slope-area method, while that of Pinal Creek is based on the Cross Section AF in the effective FIS. All other washes are tributaries to the three washes, and started with known elevations at the confluences.

For washes studied by approximate methods, shallow flooding techniques were utilized, using QUICK2 v1.0 software, which computes normal depth for a representative cross section for each wash. The depth was used as a representative of the entire study area.

Table 7 contains Manning's "n" values used in the Countywide FIS.

Table 7 – MANNING'S "N" VALUES

Stream	Left Overbank "n"	Channel "n"	Right Overbank "n"
Agave Wash	0.035-0.070	0.030-0.065	0.020-0.065
American Gulch and American Gulch Tributary	0.030 – 0.060	0.030 – 0.050	0.030 – 0.060
Bar X Wash	0.100	0.080	0.100
Butcher Hook	0.120	0.070	0.120
Chalk Springs Creek	0.100	0.080	0.100
Gila River	0.045 – 0.10	0.019 - 0.050	0.045 – 0.10
Haystack Butte Creek	0.090	0.070	0.090
Kellner Canyon	0.040-0.070	0.018-0.070	0.065-0.070
Lambing Creek	0.110	0.080	0.110
Landing Wash	0.050-0.080	0.050-0.080	0.050-0.080

Stream	Left Overbank "n"	Channel "n"	Right Overbank "n"
McMillen Wash	0.050-0.080	0.018-0.075	0.050-0.080
Park Creek	0.090	0.070	0.090
Pinal Creek	0.060-0.070	0.045-0.070	0.060-0.070
Reno Creek	0.100	0.070	0.100
Russell Gulch	0.070	0.055	0.070
South Oak Creek	0.120	0.080	0.120
Sycamore Creek	0.100	0.070	0.100
Tonto Creek	0.074	0.058	0.074
Walnut Canyon	0.110	0.090	0.110
Watertank Wash	0.070	0.055-0.070	0.070

The conversion factor for each stream studied by detailed methods is shown below in Table 8.

Table 8 - STREAM CONVERSION FACTORS

Stream Name	Elevation (feet NAVD above NGVD)
Agave Wash	+2.1
American Gulch	+2.4
American Gulch Tributary from North	+2.5
Bar X Wash	+2.0
Bloody Tanks Wash	+2.1
Butcher Hook	+2.0
Chalk Springs Creek	+2.0
Cherry Creek	+2.7
Christopher Creek	+3.0
Coyote Wash	+2.1
Driping Springs Wash (At State Highway 77)	+2.0
East Verde River (Near State Highway 87)	+2.5
East Verde River (At Whispering Pines)	+2.7
Gila River (At Hayden and Winkelman)	+1.9
Haystack Butte	+2.0
Houston Creek	+2.4

Stream Name	Elevation (feet NAVD above NGVD)
Ice House Canyon	+2.1
Kellner Canyon	+2.1
Lambing Creek	+2.0
Landing Wash	+2.0
M.O. Creek	+2.6
McMillen Wash	+2.1
Park Creek	+2.0
Pinal Creek (At Wilbanks and Vicinity)	+2.0
Pinal Creek (At Globe)	+2.1
Pine Creek	+2.7
Pinto Creek	+1.9
Reno Creek	+2.0
Roberts Wash	+2.1
Russell Gulch	+2.1
South Oak Creek	+2.0
Strawberry Creek	+2.7
Sycamore Creek	+2.0
Thompson Draw (At Tonto Village)	+2.8
Tonto Creek (At Bear Flat)	+2.8
Tonto Creek (At Gisela)	+2.1
Tonto Creek (At Kohl's Ranch)	+2.8
Tonto Creek (At Roosevelt Dam)	+2.0
Walnut Canyon	+2.0
Watertank Wash	+2.0

3.3 Vertical Datum

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

All flood elevations shown in this FIS report and on the DFIRM are referenced to NAVD 88. Structure and ground elevation in the community must, therefore, be referenced to NAVD 88.

It is important to note that adjacent counties may be referenced to NGVD 29. This may result in differences in base flood elevations across county corporate limits.

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

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1314 East-West Highway
Silver Springs, MD 20910-3282
(301) 713-3242

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

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS provides 1-percent annual chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, 0.2-percent annual chance flood elevations; delineations of the 1- and 0.2-percent annual chance floodplains; and 1-percent annual chance floodway. This information is presented on the FIRM and in many components of the FIS, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS as well as additional information that may be available 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-chance-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 a scale of 1:2,400, with contour intervals of 2 and 4 feet (Kenney Aerial Surveys Company, September 11, 1981 and Cooper Aerial Surveys, May 20, 1981, respectively). Flood boundaries for the Gila River at Hayden and Winkelman were developed photogrammetrically for the U.S. Department of the Interior, Water Resources Division, using aerial photographs at a scale of 1:4,800 (Kucera and Associates, Inc., 1976).

Approximate flood boundaries were delineated using topographic maps at a scale of 1:2,400, with contour intervals of 4 feet developed from aerial surveys (Kenney Aerial Surveys Company, September 11, 1981).

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

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

City of Globe

Boundaries of the 100- and 500-year flood events were delineated using the flood elevations determined at each cross-section; between cross-sections, boundaries were interpolated using topographic maps at a scale of 1:24,000, with a contour interval of 25 feet (Arizona State Highway Department, date unknown); a topographic map along U.S. Highway 60-70 at a scale of 1:2400, with a contour interval of 10 feet (U.S. Department of Housing and Urban Development, May 24, 1974); and, a field inspection of the area. Approximate boundaries were delineated on the same maps. In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary is shown.

Floodwater of the 100-year flood on Pinal Creek will overtop the Southern Pacific Railroad bridge located between Willow and Broad Streets, and there will be flow down the tracks through the cut in the hillside to the north. Floodwater exiting from the cut will continue down the tracks and debouch onto the low-lying land to the east. The water will return to Pinal Creek via Hackney Avenue and between buildings. The amount of flow through the cut in the hillside was estimated on the basis' of the computed water-surface elevation in Pinal Creek, the surveyed geometry, aid observed hydraulic characteristics of the cut. The boundaries of the flooded area were estimated during a field investigation.

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

Town of Hayden

Boundaries of the 100- and 500-year floods were delineated using flood elevations determined at each cross section; between cross sections, the boundaries were interpolated photogrammetrically by using two contour lines that roughly approximate the limits of the 100-year and 500-year flood inundation (Open-File Report 76-449, 1976). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown.

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

Approximate 100-year flood boundaries were field checked against natural topography.

Town of Miami

Boundaries of the 100- and 500-year floodplains were delineated using flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000, with a contour interval of 25 feet (7.5-Minute Series Topographic Maps; Globe, AZ 1945; Inspiration, AZ 1947), along with a field inspection of the area. Approximate boundaries were delineated on the same maps (7.5-Minute Series Topographic Maps; Globe, AZ 1945; Inspiration, AZ 1947). In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown.

For areas studied by approximate methods, floodplains less than 200 feet wide were designated as areas of minimal flooding. Small areas within the floodplain boundaries may lie above the flood elevations and, therefore, may not be subject to flooding; owing to map scale limitations, such areas are not shown.

Town of Payson

Boundaries of the 100- and 500-year floods were delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000, with a contour interval of 40 feet (7.5_Minute Series Topographic Maps; Payson South, AZ 1973; Payson North, AZ 1973); a field inspection of the area; a topographic map of the Payson Country Club on American Gulch at a scale of 1:12,000, with a contour interval of 2 feet (NCRGuson, Morris and Associates, Inc., 1973); and, a topographic map of the Rumsey Park Rodeo Grounds area at a scale of 1:480, with a contour interval of 1 foot (Hollinger Associates, August 23, 1976). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown.

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

Town of Winkelman

Boundaries of the 100- and 500-year floods were delineated using flood elevations determined at each cross section; between cross sections, the boundaries were interpolated photogrammetrically, using aerial, photographs at a scale of 1:4800 (Open-File Report 76-449, 1976). In cases where the 100- and 500-year flood boundaries are close together, only the 100-year flood boundary has been shown. Flood boundaries for approximate FIS areas were determined by field inspection and engineering judgment and delineated on photogrammetric maps (Open-File Report 76-449, 1976).

Small areas within the flood boundaries may lie above the flood elevations and, therefore, not be subject to flooding; owing to limitations of the map scale, such areas are not shown.

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 FIS are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

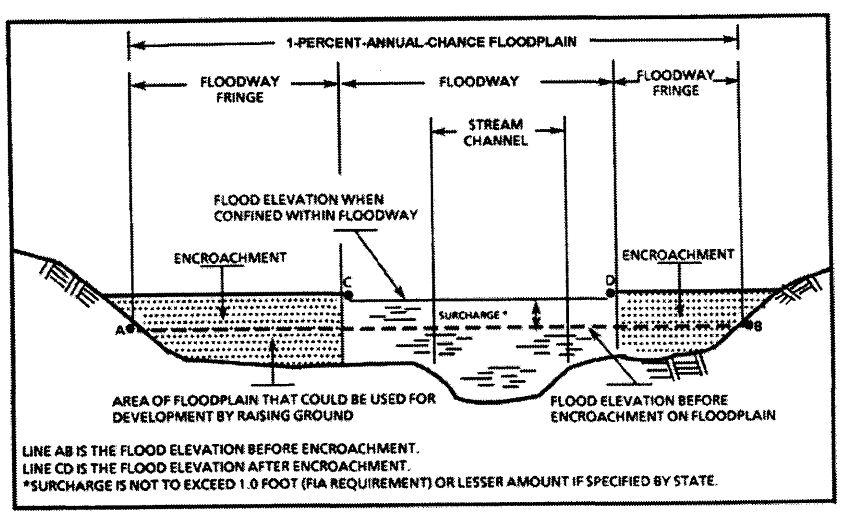
The floodways presented in this study were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (See Table 9, Floodway Data). In cases where the floodway and 1-percent annual chance floodplain boundaries or either close together or collinear, only the floodway boundary is shown.

The floodways presented in FIS were computed for certain stream segments on the basis of equal-conveyance reduction from each side of the floodplain.

Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The computed floodways are shown on the firm (exhibit.) In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the base 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 1.

Figure 1 - FLOODWAY SCHEMATIC



FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Agave Wash								
A	67	25	135	5.9	3,627.1	3,623.1[2]	3,623.2[2]	0.1
B	862	160	1,105	0.6	3,654.6	3,654.6	3,654.6	0.0
C	1,721	120	80	5.4	3,672.5	3,672.5	3,672.6	0.1
D	2,531	23	66	8.1	3,684.2	3,684.2	3,684.2	0.0
E	3,242	80	146	2.8	3,708.0	3,708.0	3,708.4	0.4
F	3,952	118	97	3.9	3,729.6	3,729.6	3,730.5	0.9
G	4,775	90	52	6.3	3,742.6	3,742.6	3,742.7	0.1
H	5,066	117	283	1.2	3,748.4	3,748.4	3,749.3	0.9
I	5,674	6	63	6.0	3,753.5	3,753.5	3,753.5	0.0

[1] Feet Above Confluence with McMillen Wash

[2] Elevations Computed Without Consideration of Backwater Effects from McMillen Wash

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, ARIZONA
AND INCORPORATED AREAS

FLOODWAY DATA

AGAVE WASH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION[1] (FEET NAVD)			
CROSS SECTION	DISTANCE[2]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
American Gulch								
A	30	125	614	7.2	4,740.0	4,740.0	4,740.0	0.0
B	300	93	380	11.6	4,744.6	4,744.6	4,744.6	0.0
C	500	135	479	9.2	4,748.2	4,748.2	4,748.2	0.0
D	835	105	520	8.5	4,751.4	4,751.4	4,751.4	0.0
E	1,220	88	365	12.0	4,757.6	4,757.6	4,757.6	0.0
F	1,400	160	600	7.3	4,763.3	4,763.3	4,763.3	0.0
G	1,735	65	394	11.2	4,765.8[3]	4,765.8[3]	4,766.3	0.5
H	1,840	183	1,437	2.9	4,773.6	4,773.6	4,774.6	1.0
I	2,260	43	327	12.8	4,775.2	4,775.2	4,775.8	0.6
J	2,925	54	568	7.4	4,783.4	4,783.4	4,784.4	1.0
K	3,420	55	342	12.3	4,787.4	4,787.4	4,788.1	0.7
L	4,095	55	456	9.2	4,795.6	4,795.6	4,796.0	0.4
M	4,660	40	308	13.6	4,803.9	4,803.9	4,803.9	0.0
N	4,710	53	554	7.4	4,808.8	4,808.8	4,809.8	1.0
O	5,415	78	582	7.0	4,813.5	4,813.5	4,814.5	1.0
P	6,310	113	321	10.6	4,824.2	4,824.2	4,825.2	1.0
Q	6,935	109	618	3.6	4,829.0	4,829.0	4,830.0	1.0
R	7,585	50	212	10.4	4,832.6	4,832.6	4,833.4	0.8
S	8,385	411	966	2.3	4,838.4	4,838.4	4,838.9	0.5
T	8,425	411	2,124	1.0	4,841.1	4,841.1	4,842.1	1.0
U	9,230	78	281	7.5	4,844.2	4,844.2	4,845.2	1.0
V	10,200	77	259	8.1	4,856.1	4,856.1	4,857.1	1.0
W	11,030	80	228	9.2	4,869.4	4,869.4	4,870.3	0.9
X	11,720	77	284	7.4	4,878.0	4,878.0	4,879.0	1.0
Y	11,762	77	359	4.7	4,878.8	4,878.8	4,879.6	0.8
Z	12,720	66	208	7.5	4,882.6	4,882.6	4,883.6	1.0

[1] Water-Surface Elevations Without Considering Debris-Jam Effects

[2] Feet Above Payson Corporate Limits

[3] Main Channel Only and Does Not Include Elevated Flow on North Bank Side

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, ARIZONA
AND INCORPORATED AREAS

FLOODWAY DATA

AMERICAN GULCH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION[1] (FEET NAVD)			
CROSS SECTION	DISTANCE[2]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
American Gulch Tributary From North								
A	8,180	235	282	6.0	4,926.2	4,926.2	4,926.9	0.7
B	8,210	235	1,175	1.4	4,926.5	4,926.5	4,927.5	1.0
C	8,955	190	475	3.4	4,928.0	4,928.0	4,929.0	1.0
D	9,400	136	330	4.8	4,930.8	4,930.8	4,931.8	1.0
E	9,760	99	289	5.5	4,934.3	4,934.3	4,935.3	1.0
F	10,125	82	271	5.9	4,937.7	4,937.7	4,938.7	1.0
G	10,650	66	208	7.7	4,942.8	4,942.8	4,943.8	1.0
H	11,160	58	269	6.0	4,946.9	4,946.9	4,947.9	1.0
I	11,365	100	346	4.6	4,948.4	4,948.4	4,949.4	1.0
J	11,725	81	241	6.6	4,950.5	4,950.5	4,951.4	0.9
K	12,080	77	249	6.4	4,953.5	4,953.5	4,954.5	1.0
L	12,360	71	172	7.3	4,957.1	4,957.1	4,957.9	0.8
M	12,720	80	259	4.8	4,960.5	4,960.5	4,961.4	0.9
N	13,010	39	123	10.2	4,963.8	4,963.8	4,964.1	0.3

[1] Water-Surface Elevations Without Considering Debris-Jam Effects

[2] Feet Above Mouth

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

AMERICAN GULCH TRIBUTARY FROM NORTH

TABLE 9

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Bar X Wash								
A	759	178	264.08	5.4	2,240.9	2,240.9	2,240.9	0.0
B	984	112	247.47	5.8	2,248.2	2,248.2	2,248.5	0.3
C	1,145	128	311.26	4.6	2,252.5	2,252.5	2,253.2	0.7
D	1,495	77	223.71	6.4	2,262.3	2,262.3	2,263.1	0.8
E	1,728	74	247.82	5.8	2,269.0	2,269.0	2,269.6	0.6
F	1,830	70	230.16	6.2	2,271.5	2,271.5	2,272.1	0.6
G	2,139	47	146.27	9.8	2,282.7	2,282.7	2,282.7	0.1

[1] Feet Above Confluence With Tonto Creek At Roosevelt Lake

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

BAR X WASH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Bloody Tanks Wash								
A	1,371[1]	213	1,029	9.3	3,309.2	3,309.2	3,309.8	0.6
B	2,075[1]	510	1,621	5.8	3,315.9	3,315.9	3,315.9	0.0
C	4,083[1]	907	2,421	3.8	3,332.9	3,332.9	3,333.8	0.9
D	5,936[1]	313	1,322	6.9	3,344.8	3,344.8	3,345.8	1.0
E	7,535[1]	655	3,164	2.8	3,359.1	3,359.1	3,359.4	0.3
F	9,750[1]	348	2,163	4.1	3,378.1	3,378.1	3,378.7	0.6
G	11,261[1]	132 / 75[3]	1,066	8.4	3,391.9	3,391.9	3,392.1	0.2
H	12,272[1]	333	1,963	4.5	3,399.9	3,399.9	3,400.4	0.5
I	3,350[2]	935	3,494	3.4	3,404.8	3,404.8	3,404.8	0.0
J	4,223[2]	650	1,088	11.0	3,408.5	3,408.5	3,408.5	0.0
K	4,558[2]	796	1,463	8.2	3,413.3	3,413.3	3,413.3	0.0
L	4,908[2]	700	1,334	9.0	3,415.6	3,415.6	3,415.6	0.0
M	5,258[2]	673	1,983	6.0	3,418.2	3,418.2	3,418.2	0.0
N	5,803[2]	525	1,136	10.6	3,421.6	3,421.6	3,421.6	0.0
O	6,668[2]	585	1,582	7.6	3,430.2	3,430.2	3,430.2	0.0
P	7,183[2]	754	1,254	9.6	3,434.0	3,434.0	3,434.0	0.0
Q	8,170[2]	334	1,669	6.7	3,443.1	3,443.1	3,443.1	0.0
R	8,240[2]	241	1,370	8.2	3,446.4	3,446.4	3,446.4	0.0

[1] Feet Above Confluence of Russell Gulch
[2] Stream Distance in Feet Above South Pacific Railroad Bridge
[3] Total width/width within Gila County

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

BLOODY TANKS WASH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Butcher Hook								
A	1,246.6	169.8	122.9	2.2	2,246.9	2,246.9	2,246.9	0.0
B	1,438.7	63.3	134.5	6.2	2,251.0	2,251.0	2,251.0	0.0
C	1,576.4	84.6	226.5	4.8	2,254.3	2,254.3	2,254.3	0.0
D	1,771.8	55.0	162.2	8.6	2,257.4	2,257.4	2,257.4	0.0
E	2,065.2	107.0	313.8	5.5	2,268.2	2,268.2	2,268.2	0.0
F	2,400.7	98.0	291.9	6.0	2,273.4	2,273.4	2,274.3	0.8
G	2,641.3	260.5	1,770.1	2.6	2,283.5	2,283.5	2,284.3	0.7
H	3,016.3	202.8	516.8	3.4	2,292.0	2,292.0	2,292.1	0.1
I	3,299.3	48.9	179.9	9.7	2,303.0	2,303.0	2,303.8	0.8

[1] Feet Above Confluence with Tonto Creek At Roosevelt Lake

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

BUTCHER HOOK

TABLE 9

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Chalk Springs Creek								
A	2,696.5	137.0	335.4	5.1	2,276.0	2,276.0	2,276.2	0.2
B	2,834.4	87.3	305.8	5.6	2,278.6	2,278.6	2,278.6	0.0
C	3,202.5	60.7	256.9	6.6	2,284.9	2,284.9	2,284.9	0.0
D	3,568.8	54.9	209.0	8.2	2,293.6	2,293.6	2,293.6	0.0
E	3,628.5	71.1	284.9	6.0	2,295.4	2,295.4	2,295.4	0.0
F	3,717.4	21.0	245.6	13.7	2,297.2	2,297.2	2,297.2	0.0
G	3,957.7	21.0	403.9	8.6	2,305.8	2,305.8	2,305.8	0.0
H	4,127.1	51.0	166.0	10.3	2,311.3	2,311.3	2,311.2	0.0
I	4,407.9	79.7	309.3	5.5	2,320.1	2,320.1	2,320.1	0.0
J	4,691.2	101.8	371.4	4.6	2,323.8	2,323.8	2,323.8	0.0
K	4,893.8	58.9	172.4	9.9	2,327.9	2,327.9	2,327.9	0.0
L	5,053.0	72.1	298.1	5.7	2,333.1	2,333.1	2,333.1	0.0
M	5,150.6	108.4	428.0	4.0	2,334.3	2,334.3	2,334.3	0.0
N	5,373.1	197.9	314.1	5.4	2,342.2	2,342.2	2,342.2	0.0
O	5,559.2	122.3	253.4	6.7	2,349.2	2,349.2	2,349.2	0.0
P	5,714.4	198.1	407.2	4.2	2,354.7	2,354.7	2,354.7	0.0
Q	5,748.1	198.1	467.0	3.7	2,355.9	2,355.9	2,356.5	0.6
R	6,044.6	77.1	240.7	7.1	2,365.4	2,365.4	2,365.4	0.0
S	6,331.4	100.0	220.4	7.7	2,377.5	2,377.5	2,377.5	0.0
T	6,622.1	113.4	283.6	6.0	2,389.0	2,389.0	2,389.0	0.0

[1] Feet Above Confluence with Tonto Creek at Roosevelt Lake

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

CHALK SPRINGS CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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	37.06	418	1,797	11.7	5,048.8	5,048.8	5,048.9	0.1
B	37.18	529	2,851	7.4	5,056.4	5,056.4	5,057.3	0.9
C	37.29	483	2,125	9.9	5,061.8	5,061.8	5,062.3	0.5
D	37.47	610	2,853	6.3	5,069.0	5,069.0	5,069.4	0.4
E	37.59	402	1,763	10.2	5,073.9	5,073.9	5,074.6	0.7
F	37.72	442	2,536	7.1	5,080.7	5,080.7	5,081.7	1.0
G	37.81	369	1,660	10.8	5,086.3	5,086.3	5,086.9	0.6
H	37.94	376	1,910	9.4	5,094.4	5,094.4	5,095.3	0.9
I	38.05	314	1,666	10.7	5,100.5	5,100.5	5,101.1	0.6
J	38.18	356	1,786	10.0	5,107.4	5,107.4	5,108.2	0.8
K	38.29	430	1,928	9.3	5,114.1	5,114.1	5,114.7	0.6
L	38.41	345	1,815	9.9	5,122.2	5,122.2	5,122.6	0.4
M	38.52	498	2,816	6.4	5,128.0	5,128.0	5,129.0	1.0
N	38.64	394	1,877	9.5	5,138.3	5,138.3	5,138.7	0.4
O	38.76	357	1,606	11.1	5,145.5	5,145.5	5,146.2	0.7
P	38.89	274	1,861	9.0	5,153.2	5,153.2	5,154.1	0.9
Q	39.02	300	1,564	10.7	5,161.2	5,161.2	5,161.4	0.2
R	39.15	252	1,379	12.1	5,169.1	5,169.1	5,169.8	0.7
S	39.27	215	1,251	13.3	5,176.6	5,176.6	5,176.6	0.0
T	39.40	250	1,550	10.8	5,184.7	5,184.7	5,185.6	0.9
U	39.50	278	1,430	11.7	5,191.1	5,191.1	5,191.7	0.6
V	39.61	285	1,432	11.7	5,199.0	5,199.0	5,199.1	0.1
W	39.74	270	1,417	11.8	5,206.5	5,206.5	5,206.8	0.3

[1] Miles Above Confluence With Salt River

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

CHERRY CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Christopher Creek[2]								
A	3.48[1]	206	920	9.9	5,739.5	5,739.5	5,739.5	0.0
B	3.58[1]	185	842	10.8	5,750.4	5,750.4	5,750.4	0.0
C	3.68[1]	300	1,276	7.1	5,764.1	5,764.1	5,764.1	0.0
D	3.79[1]	200	895	10.2	5,778.5	5,778.5	5,778.5	0.0
E	3.89[1]	350	1,006	8.2	5,792.6	5,792.6	5,792.6	0.0
F	3.98[1]	305	1,015	8.1	5,807.4	5,807.4	5,807.4	0.0
G	4.08[1]	283	928	8.8	5,821.9	5,821.9	5,821.9	0.0
H	4.17[1]	200	935	8.8	5,834.2	5,834.2	5,834.2	0.0
I	4.27[1]	198	735	11.2	5,848.8	5,848.8	5,848.8	0.0
J	4.33[1]	180	846	9.7	5,862.1	5,862.1	5,862.1	0.0
K	4.44[1]	195	783	10.5	5,872.6	5,872.6	5,872.6	0.0
L	4.55[1]	135	657	12.5	5,892.4	5,892.4	5,892.4	0.0
M	4.66[1]	183	661	9.2	5,918.2	5,918.2	5,918.2	0.0
N	4.77[1]	229	639	9.5	5,937.2	5,937.2	5,937.2	0.0
O	4.88[1]	278	790	7.7	5,957.2	5,957.2	5,957.2	0.0
P	4.99[1]	141	607	10.0	5,978.0	5,978.0	5,978.0	0.0
Q	5.08[1]	105	551	11.1	5,999.2	5,999.2	5,999.2	0.0
Coyote Wash								
A	218[3]	43	55	6.6	3,455.7	3,455.7	3,455.7	0.0
B	474[3]	43	56	6.4	3,476.7	3,476.7	3,476.7	0.0
C	1,898[3]	17	41	8.8	3,573.7	3,573.7	3,574.0	0.3
D	2,882[3]	18	42	8.5	3,645.0	3,645.0	3,645.1	0.1

[1] Miles Above Confluence With Tonto Creek
[2] This Reach is Characterized by Supercritical Flows and High Velocities
[3] Feet Above Confluence with Russell Gulch

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Dripping Springs Wash at State Highway 77[2]								
A	1.000	440	3,118	14.0	2,095.7	2,095.7	2,095.7	0.0
B	1.154	325	2,782	15.6	2,106.4	2,106.4	2,106.4	0.0
C	1.300	370	3,014	14.4	2,113.3	2,113.3	2,113.3	0.0
D	1.400	400	3,121	13.9	2,119.9	2,119.9	2,119.9	0.0
E	1.583	219	2,581	15.5	2,129.9	2,129.9	2,129.9	0.0
F	1.628	290	2,592	15.5	2,131.8	2,131.8	2,131.8	0.0
G	1.731	345	2,779	14.4	2,136.2	2,136.2	2,136.2	0.0
H	1.836	390	2,864	14.0	2,141.7	2,141.7	2,141.7	0.0
I	1.969	405	2,935	13.7	2,149.4	2,149.4	2,149.4	0.0
J	2.100	385	2,758	14.5	2,156.2	2,156.2	2,156.2	0.0
K	2.236	430	2,933	13.7	2,163.2	2,163.2	2,163.2	0.0
L	2.370	475	2,972	13.5	2,170.6	2,170.6	2,170.6	0.0
M	2.500	525	3,193	12.6	2,178.2	2,178.2	2,178.2	0.0
N	2.645	710	3,568	11.2	2,185.0	2,185.0	2,185.0	0.0
O	2.800	880	3,813	10.5	2,193.2	2,193.2	2,193.2	0.0
P	2.956	820	3,473	11.5	2,202.4	2,202.4	2,202.4	0.0
Q	3.100	756	3,447	11.6	2,211.7	2,211.7	2,211.7	0.0
R	3.230	645	3,336	12.0	2,219.4	2,219.4	2,219.4	0.0
S	3.356	585	3,249	12.3	2,227.0	2,227.0	2,227.0	0.0
T	3.500	610	3,106	12.9	2,234.8	2,234.8	2,234.8	0.0
U	3.656	640	3,147	12.7	2,245.3	2,245.3	2,245.3	0.0
V	3.800	602	3,142	12.8	2,254.5	2,254.5	2,254.5	0.0
W	3.900	690	3,280	12.2	2,261.3	2,261.3	2,261.3	0.0
X	4.023	845	3,489	11.5	2,268.7	2,268.7	2,268.7	0.0
Y	4.161	890	3,594	11.2	2,277.2	2,277.2	2,277.2	0.0

[1] Miles Above Confluence With Gila River

[2] This Reach is Characterized by Supercritical Flows and High Velocities

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

DRIPPING SPRINGS WASH AT STATE HIGHWAY 77

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Dripping Springs Wash at State Highway 77[2] (continued)								
Z	4.300[1]	880	3,579	11.2	2,286.0	2,286.0	2,286.0	0.0
AA	4.443[1]	715	3,378	11.9	2,295.5	2,295.5	2,295.5	0.0
AB	4.600[1]	525	3,121	12.8	2,305.6	2,305.6	2,305.6	0.0
AC	4.700[1]	465	2,857	14.0	2,311.9	2,311.9	2,311.9	0.0
AD	4.848[1]	765	3,788	10.6	2,319.8	2,319.8	2,319.8	0.0
East Verde River Near Highway 87								
A	4.300[3]	265	3,775	11.9	4,596.8	4,596.8	4,597.8	1.0
B	4.400[3]	266	3,231	13.9	4,599.8	4,599.8	4,600.4	0.6
C	4.500[3]	208	2,858	15.7	4,603.9	4,603.9	4,604.2	0.3
D	4.600[3]	272	4,553	9.9	4,608.7	4,608.7	4,609.3	0.6
E	4.712[3]	185	2,582	17.4	4,608.8	4,608.8	4,609.3	0.5
F	4.833[3]	275	4,541	9.9	4,615.4	4,615.4	4,616.3	0.9
G	4.980[3]	246	2,805	16.0	4,616.8	4,616.8	4,617.2	0.4
H	5.077[3]	538	7,560	6.0	4,622.6	4,622.6	4,623.3	0.7
I	5.200[3]	211	2,677	12.8	4,622.6	4,622.6	4,623.3	0.7

[1] Miles Above Confluence With Gila River
[2] This Reach is Characterized by Supercritical Flows and High Velocities
[3] Miles Above Confluence with Ash Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

DRIPPING SPRINGS WASH AT HIGHWAY 77-
EAST VERDE RIVER NEAR HIGHWAY 87

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
East Verde River at Whispering Pines								
A	1.000	110	921	13.3	5,143.6	5,143.6	5,144.2	0.6
B	1.122	110	1,077	11.3	5,151.4	5,151.4	5,152.4	1.0
C	1.255	86	807	15.1	5,160.9	5,160.9	5,161.7	0.8
D	1.400	140	1,101	11.1	5,172.6	5,172.6	5,173.1	0.5
E	1.506	130	1,148	10.6	5,178.9	5,178.9	5,179.4	0.5
F	1.635	145	1,314	9.3	5,187.1	5,187.1	5,188.0	0.9
G	1.750	165	1,196	10.2	5,194.8	5,194.8	5,195.1	0.3
H	1.856	150	1,058	11.5	5,203.1	5,203.1	5,203.4	0.3
I	1.969	210	1,239	9.8	5,213.7	5,213.7	5,213.7	0.0
J	2.116	175	1,250	9.8	5,223.2	5,223.2	5,223.8	0.6
K	2.251	140	1,102	11.1	5,231.9	5,231.9	5,232.7	0.8
L	2.367	119	848	14.4	5,240.6	5,240.6	5,240.6	0.0
M	2.403	240	1,566	7.8	5,244.7	5,244.7	5,244.7	0.0

[1] Miles Above Confluence With Ellison Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

EAST VERDE RIVER AT WHISPERING PINES

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Gila River at Hayden and Winkelman								
A	650	2,254[2]	35,384	3.96	1,927.6	1,927.6	1,928.1	0.5
B	1,360	1,974[3]	26,706	5.24	1,927.9	1,927.9	1,928.4	0.5
C	2,140	2,560[3]	34,903	4.01	1,928.7	1,928.7	1,929.4	0.7
D	2,690	2,335[3]	33,044	3.63	1,929.2	1,929.2	1,929.9	0.7
E	3,300	2,034[3]	26,124	4.59	1,929.6	1,929.6	1,930.3	0.7
F	4,040	1,719[3]	20,307	5.91	1,930.8	1,930.8	1,931.8	1.0
G	4,855	1,120[3]	15,710	7.64	1,932.7	1,932.7	1,933.7	1.0
H	5,215	960[3]	13,413	8.95	1,934.0	1,934.0	1,934.8	0.8
I	5,658	716[3]	11,641	10.31	1,935.2	1,936.1	1,936.1	0.9
J	6,230	1,120[3]	18,442	6.51	1,938.1	1,938.1	1,938.7	0.6
K	6,675	1,195[3]	19,609	6.12	1,938.6	1,938.6	1,939.5	0.9
L	7,535	1,439[3]	20,956	5.73	1,940.1	1,940.1	1,941.0	0.9
M	8,160	1,636[3]	24,311	4.94	1,941.6	1,941.6	1,942.6	1.0
N	8,500	1,905[3]	27,512	4.4	1,942.1	1,942.1	1,943.1	1.0
O	9,320	2,144[3]	28,538	4.2	1,942.9	1,942.9	1,943.9	1.0

[1] Feet Above San Manuel Arizona Railroad
[2] Floodway Lies Entirely Outside County Limits
[3] Width Extends Beyond Gila County Boundary

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

GILA RIVER AT HAYDEN AND WINKELMAN

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Haystack Butte								
A	2,813.8	33.2	124.4	8.2	2,306.6	2,306.6	2,307.5	0.8
B	3,089.6	55.4	188.0	5.4	2,313.3	2,313.3	2,313.6	0.3
C	3,353.4	37.7	106.6	9.5	2,319.9	2,319.9	2,319.9	0.0
D	3,653.3	41.5	120.8	8.4	2,334.7	2,334.7	2,334.7	0.0
E	3,883.5	66.7	150.2	6.8	2,344.0	2,344.0	2,344.0	0.0
F	4,086.6	64.4	142.3	7.1	2,351.9	2,351.9	2,351.9	0.0
G	4,201.3	64.2	146.6	6.9	2,356.4	2,356.4	2,356.4	0.0
H	4,351.2	40.2	108.7	9.3	2,364.0	2,364.0	2,364.0	0.0
I	4,507.9	53.8	127.7	7.9	2,372.4	2,372.4	2,372.4	0.0
J	4,814.8	39.3	107.7	9.4	2,389.0	2,389.0	2,388.9	0.0
K	5,086.9	99.9	268.9	3.8	2,398.6	2,398.6	2,398.8	0.2
L	5,227.7	54.9	120.5	8.4	2,402.3	2,402.3	2,402.3	0.0
M	5,324.6	43.9	116.1	8.7	2,407.4	2,407.4	2,407.4	0.0
N	5,483.0	38.8	214.9	4.7	2,414.7	2,414.7	2,415.4	0.7
O	5,583.1	45.9	195.2	5.2	2,415.6	2,415.6	2,416.2	0.5

1 Feet Above Confluence with Tonto Creek at Roosevelt Lake

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

HAYSTACK BUTTE

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Houston Creek[2]								
A	9.25	222	1,295	10.3	4,491.0	4,491.0	4,491.0	0.0
B	9.35	208	1,201	11.2	4,500.5	4,500.5	4,500.5	0.0
C	9.46	153	984	13.6	4,507.7	4,507.7	4,507.7	0.0
D	9.56	197	1,643	8.2	4,512.9	4,512.9	4,512.9	0.0
E	9.65	156	997	13.4	4,518.0	4,518.0	4,518.0	0.0
F	9.76	160	956	14.0	4,522.8	4,522.8	4,522.8	0.0
G	9.85	91	843	15.9	4,532.7	4,532.7	4,532.7	0.0
H	9.96	400	3,410	3.9	4,540.8	4,540.8	4,540.8	0.0
I	10.06	66	594	17.0	4,548.2	4,548.2	4,548.2	0.0
J	10.16	55	561	18.0	4,555.4	4,555.4	4,555.4	0.0
K	10.25	133	785	12.9	4,564.2	4,564.2	4,564.2	0.0
L	10.33	117	793	12.7	4,572.1	4,572.1	4,572.1	0.0
M	10.42	155	1,447	7.0	4,577.1	4,577.1	4,577.1	0.0
N	10.55	240	962	10.5	4,579.0	4,579.0	4,579.0	0.0
O	10.62	64	611	16.5	4,591.1	4,591.1	4,591.1	0.0
P	10.83	85	576	14.9	4,606.0	4,606.0	4,606.0	0.0
Q	10.91	90	585	14.7	4,612.8	4,612.8	4,612.8	0.0
R	11.02	155	798	10.8	4,619.3	4,619.3	4,619.3	0.0
S	11.16	267	870	9.9	4,629.1	4,629.1	4,629.1	0.0
T	11.26	320	1,226	6.9	4,638.3	4,638.3	4,638.3	0.0
U	11.36	269	890	9.7	4,644.0	4,644.0	4,644.0	0.0
V	11.48	340	1,134	7.6	4,649.3	4,649.3	4,649.3	0.0
W	11.57	490	1,405	6.1	4,652.6	4,652.6	4,652.6	0.0
X	11.61	595	1,658	5.2	4,660.8	4,660.8	4,660.8	0.0
Y	11.70	440	2,600	2.1	4,662.8	4,662.8	4,662.8	0.0

[1] Miles Above Confluence With Tonto Creek

[2] This Reach is Characterized by Supercritical Flows and High Velocities

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

HOUSTON CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Houston Creek (continued)[2]								
Z	11.76[1]	458	863	6.4	4,663.8	4,663.8	4,663.8	0.0
AA	11.89[1]	408	734	10.0	4,672.6	4,672.6	4,672.6	0.0
Ice House Canyon								
A	377[3]	173	585	10.5	3,585.6	3,585.6	3,585.6	0.0
B	1,050[3]	227	811	7.6	3,594.5	3,594.5	3,594.5	0.0
C	2,137[3]	239	634	9.3	3,613.0	3,613.0	3,613.0	0.0
D	3,203[3]	193	1,179	5.0	3,637.5	3,637.5	3,637.5	0.0
E	5,289[3]	246	771	7.7	3,676.1	3,676.1	3,676.1	0.0
F	6,266[3]	241	1,229	4.3	3,696.3	3,696.3	3,696.3	0.0
G	8,141[3]	278	1,774	3.0	3,741.9	3,741.9	3,741.9	0.0
H	9,234[3]	110	469	10.6	3,757.5	3,757.5	3,757.5	0.0
I	10,210[3]	89	400	12.4	3,783.4	3,783.4	3,783.4	0.0
Kellner Canyon								
A	221[4]	91	431	8.9	3,789.0	3,789.0	3,789.1	0.1
B	1,745[4]	39	269	14.3	3,830.6	3,830.6	3,831.4	0.8
C	2,729[4]	115	756	5.1	3,857.2	3,857.2	3,858.2	1.0

[1] Miles Above Confluence With Tonto Creek
[2] This Reach is Characterized by Supercritical Flows and High Velocities
[3] Feet Above Confluence With Pinal Creek at Globe
[4] Feet Above Confluence with Ice House Canyon

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

HOUSTON CREEK - ICE HOUSE CANYON - KELLNER CANYON

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Lambing Creek								
A	2,387	210	678	9.4	2,323.3	2,323.3	2,323.4	0.1
B	2,679	214	907	7.0	2,330.3	2,330.3	2,331.0	0.7
C	2,901	295	800	8.0	2,335.6	2,335.6	2,335.7	0.1
D	3,296	313	1,203	5.3	2,344.6	2,344.6	2,345.4	0.8
E	3,639	269	1,000	6.4	2,352.6	2,352.6	2,353.2	0.6
F	4,352	305	1,117	5.7	2,368.9	2,368.9	2,369.7	0.8
G	4,819	251	1,063	6.0	2,379.2	2,379.2	2,379.5	0.3
Landing Wash								
A	2,722	87.1	208.2	7.4	2,284.8	2,284.8	2,285.4	0.63
B	2,837	93.1	220.5	7.0	2,287.0	2,287.0	2,287.6	0.59
C	3,107	170.0	336.1	4.6	2,292.5	2,292.5	2,292.6	0.04
D	3,432	80.0	279.5	5.5	2,301.2	2,301.2	2,301.5	0.35
E	3,663	86.4	299.4	5.1	2,304.3	2,304.3	2,304.9	0.66
F	3,991	55.0	199.6	7.7	2,310.4	2,310.4	2,311.2	0.86
G	4,203	57.0	217.7	7.0	2,316.8	2,316.8	2,317.3	0.48
H	4,342	53.2	219.0	7.0	2,319.7	2,319.7	2,320.5	0.80
I	4,544	66.2	222.7	6.9	2,324.3	2,324.3	2,324.9	0.56
J	4,653	30.0	159.9	9.6	2,327.2	2,327.2	2,327.6	0.48
K	4,880	37.3	194.1	7.9	2,334.1	2,334.1	2,334.1	0.05
L	4,990	47.6	273.4	5.6	2,336.0	2,336.0	2,336.2	0.17
M	5,075	31.2	225.9	6.8	2,337.4	2,337.4	2,338.2	0.79
N	5,212	21.0	357.0	8.7	2,339.0	2,339.0	2,339.6	0.64
O	5,340	101.2	615.6	2.5	2,344.8	2,344.8	2,345.5	0.67
P	5,569	75.0	199.9	7.7	2,348.0	2,348.0	2,348.1	0.04
Q	5,890	69.6	234.1	6.6	2,356.6	2,356.6	2,357.2	0.59
R	6,059	47.2	168.7	9.1	2,362.1	2,362.1	2,362.1	0.01

[1] Feet Above Confluence with Tonto Creek at Roosevelt Lake

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

LAMBING CREEK - LANDING WASH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
M.O. Creek								
A	0.20	202	825	10.9	5,068.1	5,068.1	5,068.1	0.0
B	0.29	263	892	9.1	5,076.3	5,076.3	5,076.3	0.0
C	0.35	400	1,398	5.8	5,081.4	5,081.4	5,081.7	0.3
D	0.39	366	1,955	4.1	5,082.8	5,082.8	5,083.1	0.3
E	0.49	161	731	11.1	5,086.9	5,086.9	5,086.9	0.0
F	0.61	161	929	8.7	5,092.5	5,092.5	5,093.4	0.9
G	0.73	95	636	9.7	5,098.2	5,098.2	5,098.4	0.2
H	0.83	65	423	14.6	5,102.8	5,102.8	5,102.8	0.0
I	0.95	108	657	9.4	5,110.1	5,110.1	5,110.5	0.4
J	1.11	94	358	11.2	5,117.8	5,117.8	5,117.8	0.0
K	1.23	55	338	11.8	5,125.0	5,125.0	5,125.2	0.2
L	1.35	70	492	8.1	5,130.2	5,130.2	5,130.6	0.4
M	1.49	65	315	12.7	5,135.1	5,135.1	5,135.2	0.1
N	1.62	49	324	12.3	5,143.6	5,143.6	5,143.7	0.1
O	1.72	45	348	11.5	5,148.6	5,148.6	5,148.9	0.3
P	1.81	20	220	18.2	5,153.5	5,153.5	5,153.5	0.0
Q	1.88	176	964	4.2	5,159.8	5,159.8	5,160.0	0.2

[1] Miles Above Confluence with Cherry Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

M.O. CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
McMillen Wash								
A	368[1]	581	1,820	1.6	3,543.2	3,543.2	3,544.2	1.0
B	1,336[1]	54	268	11.1	3,558.7	3,558.7	3,558.7	0.0
C	2,291[1]	37	211	13.6	3,577.5	3,577.5	3,577.5	0.0
D	3,924[1]	46	191	11.7	3,619.9	3,619.9	3,619.9	0.0
E	5,050[1]	52	190	10.7	3,650.2	3,650.2	3,650.2	0.0
F	7,149[1]	81	295	6.9	3,735.8	3,735.8	3,736.0	0.2
G	8,344[1]	120	333	2.5	3,749.1	3,749.1	3,750.1	1.0
H	9,331[1]	45	97	8.5	3,769.9	3,769.9	3,769.9	0.0
Park Creek								
A	952[2]	102	521	11.3	2,316.7	2,316.7	2,316.7	0.1
B	1,218[2]	222	1,211	4.9	2,321.4	2,321.4	2,322.3	1.0
C	1,581[2]	195	724	8.1	2,325.4	2,325.4	2,326.1	0.7
D	2,103[2]	310	1,212	4.9	2,334.3	2,334.3	2,334.9	0.6
E	2,271[2]	171	620	9.5	2,337.6	2,337.6	2,338.4	0.7
F	2,407[2]	235	1,077	5.5	2,340.9	2,340.9	2,341.8	0.9
G	2,559[2]	105	495	11.9	2,344.3	2,344.3	2,345.2	0.9
H	2,721[2]	53	573	11.4	2,351.1	2,351.1	2,351.7	0.6
I	2,860[2]	53	1,084	7.0	2,359.9	2,359.9	2,359.9	0.0
J	2,935[2]	282	2,706	2.2	2,360.8	2,360.8	2,360.8	0.0
K	3,125[2]	397	3,128	1.9	2,361.0	2,361.0	2,361.0	0.0

[1] Feet Above Confluence with Pinal Creek at Globe
[2] Feet Above Confluence with Tonto Creek at Roosevelt Lake

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

McMILLEN WASH - PARK CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Pinal Creek at Wilbanks Drive and Vicinity								
A	9.900	994	6,209	7.0	3,047.4	3,047.4	3,048.4	1.0
B	10.034	904	6,180	7.0	3,052.4	3,052.4	3,053.4	1.0
C	10.107	713	4,526	9.5	3,055.3	3,055.3	3,056.1	0.8
D	10.173	695	4,292	10.1	3,058.8	3,058.8	3,059.2	0.4
E	10.249	730	6,078	7.1	3,062.7	3,062.7	3,063.5	0.8
F	10.273	610	2,954	14.6	3,062.8	3,062.8	3,062.8	0.0
G	10.303	575	5,070	8.5	3,065.2	3,065.2	3,065.3	0.1
H	10.443	556	3,182	13.6	3,067.3	3,067.3	3,068.2	0.9
I	10.520	760	4,309	10.0	3,071.6	3,071.6	3,072.4	0.8
J	10.604	1,040	4,869	8.9	3,075.8	3,075.8	3,076.0	0.2
K	10.750	1,230	7,411	5.8	3,081.6	3,081.6	3,082.6	1.0
L	10.900	1,050	5,787	7.5	3,086.1	3,086.1	3,086.4	0.3
M	11.023	870	4,696	9.2	3,091.5	3,091.5	3,092.0	0.5
N	11.175	830	4,554	9.5	3,099.1	3,099.1	3,099.5	0.4
O	11.311	700	5,313	8.1	3,104.3	3,104.3	3,105.2	0.9
P	11.438	568	3,810	10.4	3,108.0	3,108.0	3,108.5	0.5
Q	11.570	660	3,701	10.7	3,113.2	3,113.2	3,113.8	0.6
R	11.692	919	6,322	6.2	3,118.4	3,118.4	3,119.4	1.0
S	11.862	1,085	6,291	6.2	3,122.5	3,122.5	3,123.1	0.6
T	12.023	1,250	6,823	5.7	3,127.3	3,127.3	3,128.1	0.8
U	12.146	1,245	6,084	6.2	3,131.9	3,131.9	3,132.8	0.9
V	12.304	930	4,199	9.1	3,138.4	3,138.4	3,139.3	0.9
W	12.456	540	3,089	12.0	3,146.8	3,146.8	3,146.9	0.1
X	12.641	570	3,696	10.0	3,155.6	3,155.6	3,156.3	0.7
Y	12.776	620	4,359	8.5	3,161.4	3,161.4	3,162.3	0.9
Z	12.916	660	4,521	8.0	3,166.8	3,166.8	3,166.8	0.0

[1] Miles Above Confluence With Salt River

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

PINAL CREEK AT WILBANKS DRIVE AND VICINITY

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Pinal Creek at Wilbanks Drive and Vicinity (continued)								
AA	13.062	892	4,871	7.4	3,170.2	3,170.2	3,170.9	0.7
AB	13.170	970	6,908	5.1	3,174.8	3,174.8	3,175.7	0.9
AC	13.348	1,070	5,182	6.8	3,180.7	3,180.7	3,181.5	0.8
AD	13.494	1,145	6,280	5.6	3,186.8	3,186.8	3,187.8	1.0
AE	13.674	980	5,873	5.8	3,194.6	3,194.6	3,194.7	0.1
AF	13.844	683	3,427	9.9	3,200.3	3,200.3	3,201.0	0.7
AG	14.020	800	6,075	5.6	3,207.3	3,207.3	3,208.3	1.0
AH	14.172	557	2,475	6.3	3,213.2	3,213.2	3,213.6	0.4
AI	14.244	440	1,965	8.0	3,216.8	3,216.8	3,216.9	0.1
AJ	14.278	431	2,625	6.0	3,220.7	3,220.7	3,221.4	0.7
AK	14.300	351	2,716	5.8	3,221.6	3,221.6	3,222.6	1.0

[1] Miles Above Confluence With Salt River

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

PINAL CREEK AT WILBANKS DRIVE AND VICINITY

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION[1] (FEET NAVD)			
CROSS SECTION	DISTANCE[2]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Pinal Creek at Globe								
A	1,230	252	1,930	9.6	3,418.8	3,418.8	3,418.8	0.0
B	1,285	269	1,900	9.7	3,420.2	3,420.2	3,420.2	0.0
C	1,765	235/30[3]	1,565	11.8	3,425.0	3,425.0	3,425.0	0.0
D	2,245	380/185[3]	1,948	9.5	3,431.7	3,431.7	3,431.7	0.0
E	3,030	240/100[3]	1,429	13.0	3,440.0	3,440.0	3,440.0	0.0
F	3,500	222	1,587	11.7	3,446.7	3,446.7	3,446.7	0.0
G	3,600	219	1,947	9.5	3,448.4	3,448.4	3,448.4	0.0
H	3,835	310	1,093	16.9	3,448.4	3,448.4	3,448.4	0.0
I	4,200	455	1,711	10.8	3,454.7	3,454.7	3,454.7	0.0
J	4,600	415	2,014	9.2	3,457.5	3,457.5	3,457.5	0.0
K	4,880	304	1,259	14.7	3,459.4	3,459.4	3,459.4	0.0
L	5,430	350	2,205	8.4	3,468.1	3,468.1	3,468.1	0.0
M	5,865	347	1,278	14.5	3,470.0	3,470.0	3,470.0	0.0
N	6,175	214	1,228	15.1	3,474.2	3,474.2	3,474.2	0.0
O	6,290	319	1,542	12.0	3,477.5	3,477.5	3,477.5	0.0
P	6,475	202	1,071	17.3	3,478.5	3,478.5	3,478.5	0.0
Q	6,885	516	1,810	9.4	3,485.4	3,485.4	3,485.4	0.0
R	7,020	316	1,276	13.3	3,485.5	3,485.5	3,485.5	0.0
S	7,350	377	1,082	15.7	3,488.7	3,488.7	3,488.7	0.0
T	7,690	522	1,575	10.8	3,494.6	3,494.6	3,494.6	0.0
U	7,855	540	1,918	8.9	3,495.9	3,495.9	3,495.9	0.0
V	8,070	460	2,344	7.2	3,501.7	3,501.7	3,501.7	0.0
W	8,260	640	3,065	5.6	3,502.0	3,502.0	3,502.0	0.0
X	8,800	424	1,984	8.6	3,502.5	3,502.5	3,502.5	0.0
Y	9,505	546	2,869	5.9	3,509.2	3,509.2	3,509.2	0.0
Z	9,905	341	2,006	8.5	3,511.9	3,511.9	3,511.9	0.0
AA	10,250	660	2,786	5.7	3,514.9	3,514.9	3,514.9	0.0

[1] Water-Surface Elevations Without Considering Debris-Jam Effects
[2] Feet Above Sewage Plant Road
[3] Width/Width Within Globe Corporate Limits

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

PINAL CREEK AT GLOBE

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION[1] (FEET NAVD)			
CROSS SECTION	DISTANCE[2]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Pinal Creek at Globe (continued)								
AB	10,435	506	2,554	6.3	3,517.1	3,517.1	3,517.1	0.0
AC	11,250	618	2,009	8.0	3,522.0	3,522.0	3,522.0	0.0
AD	11,900	739	1,853	8.6	3,529.7	3,529.7	3,529.7	0.0
AE	12,585	532	2,180	7.3	3,537.4	3,537.4	3,537.4	0.0
AF	12,940	200	1,247	9.1	3,540.5	3,540.5	3,540.5	0.0
AG	14,407	170 / 140[3]	1,245	8.1	2,550.7	3,550.7	3,551.2	0.5
AH	15,910	220	1,232	8.2	3,568.0	3,568.0	3,568.5	0.5
AI	16,940	93	863	11.6	3,577.5	3,577.5	3,577.6	0.1
AJ	17,887	255 / 25[3]	1,310	5.2	3,589.9	3,589.9	3,589.9	0.0
AK	18,724	151	790	8.7	3,600.6	3,600.6	3,600.8	0.2
AL	19,839	143	1,053	6.5	3,618.1	3,618.1	3,618.6	0.5
AM	20,858	163	858	7.8	3,633.4	3,633.4	3,633.5	0.1
AN	21,740	91	597	11.3	3,640.8	3,640.8	3,640.9	0.1
AO	23,064	125	560	11.4	3,658.8	3,658.8	3,658.8	0.0
AP	24,123	194	723	8.9	3,679.7	3,679.7	3,679.7	0.1
AQ	25,238	89	645	9.9	3,699.8	3,699.8	3,700.8	1.0
AR	26,142	69	439	14.6	3,713.1	3,713.1	3,713.2	0.1
AS	27,805	363	917	6.7	3,746.0	3,746.0	3,746.0	0.0
AT	28,839	146	585	10.4	3,763.1	3,763.1	3,763.1	0.0
AU	30,203	189	833	7.3	3,793.1	3,793.1	3,793.1	0.0
AV	31,238	171	677	9.0	3,811.1	3,811.1	3,811.2	0.1

[1] Water-Surface Elevations Without Considering Debris-Jam Effects
[2] Feet Above Sewage Plant Road
[3] Width/Width Within Globe Corporate Limits

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

PINAL CREEK AT GLOBE

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Pine Creek[2]								
A	12.40	124	840	11.2	5,302.2	5,302.2	5,302.2	0.0
B	12.49	120	781	12.0	5,307.8	5,307.8	5,307.8	0.0
C	12.60	159	778	12.1	5,317.1	5,317.1	5,317.1	0.0
D	12.69	132	717	13.1	5,326.0	5,326.0	5,326.0	0.0
E	12.82	212	1,052	8.9	5,335.9	5,335.9	5,335.9	0.0
F	12.92	243	1,016	9.3	5,344.8	5,344.8	5,344.8	0.0
G	13.05	200	965	8.7	5,353.4	5,353.4	5,353.4	0.0
H	13.15	360	1,344	6.3	5,362.9	5,362.9	5,362.9	0.0
I	13.19	280	1,394	6.0	5,373.7	5,373.7	5,373.7	0.0
J	13.25	225	1,775	4.7	5,374.3	5,374.3	5,374.3	0.0
K	13.34	420	1,131	7.4	5,379.9	5,379.9	5,379.9	0.0
L	13.45	430	1,234	6.8	5,389.4	5,389.4	5,389.4	0.0
M	13.55	440	1,361	6.2	5,401.6	5,401.6	5,401.6	0.0
Pine Creek at Pine[2]								
N	13.64	400	1,211	6.9	5,411.3	5,411.3	5,411.3	0.0
O	13.72	270	967	8.7	5,420.5	5,420.5	5,420.5	0.0
P	13.85	184	807	10.4	5,435.6	5,435.6	5,435.6	0.0
Q	14.00	179	703	11.4	5,452.4	5,452.4	5,452.4	0.0
R	14.11	220	607	13.2	5,468.3	5,468.3	5,468.3	0.0
S	14.20	230	944	8.5	5,478.6	5,478.6	5,478.6	0.0
T	14.32	148	648	12.3	5,492.8	5,492.8	5,492.8	0.0
U	14.39	325	1,273	6.3	5,513.0	5,513.0	5,513.0	0.0
V	14.44	257	2,106	3.8	5,514.2	5,514.2	5,514.2	0.0
W	14.55	122	604	13.2	5,524.9	5,524.9	5,524.9	0.0
X	14.66	225	858	9.3	5,539.0	5,539.0	5,539.0	0.0

[1] Miles Above Confluence With East Verde River

[2] This Reach is Characterized by Supercritical Flows and High Velocities

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

PINE CREEK - PINE CREEK AT PINE

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Pine Creek at Pine[2] (continued)								
Y	14.78	217	867	9.2	5,556.1	5,556.1	5,556.1	0.0
Z	14.90	286	930	8.6	5,573.6	5,573.6	5,573.6	0.0
AA	15.01	179	756	10.6	5,590.7	5,590.7	5,590.7	0.0
AB	15.13	156	645	11.6	5,609.4	5,609.4	5,609.4	0.0
AC	15.27	128	632	11.8	5,631.5	5,631.5	5,631.5	0.0
AD	15.40	140	683	10.9	5,652.2	5,652.2	5,652.2	0.0
AE	15.51	71	501	14.9	5,671.8	5,671.8	5,671.8	0.0
AF	15.64	220	916	8.1	5,694.5	5,694.5	5,694.5	0.0
AG	15.76	80	515	14.5	5,711.1	5,711.1	5,711.1	0.0

[1] Miles Above Confluence With East Verde River
[2] This Reach is Characterized by Supercritical Flows and High Velocities

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

PINE CREEK AT PINE

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Pinto Creek								
A	12.000	1,064	7,396	7.9	2,157.5	2,157.5	2,158.3	0.8
B	12.064	833	5,142	11.4	2,159.0	2,159.0	2,160.0	1.0
C	12.140	800	5,496	10.7	2,162.4	2,162.4	2,163.3	0.9
D	12.214	835	6,304	9.3	2,165.2	2,165.2	2,166.0	0.8
E	12.295	950	8,203	7.1	2,168.4	2,168.4	2,168.7	0.3
F	12.369	1,059	7,502	7.8	2,169.8	2,169.8	2,170.0	0.2
G	12.449	1,054	7,039	8.3	2,172.0	2,172.0	2,172.3	0.3
H	12.532	1,110	6,289	9.3	2,174.1	2,174.1	2,174.6	0.5
I	12.593	990	5,047	11.6	2,176.5	2,176.5	2,176.7	0.2
J	12.682	890	5,108	11.5	2,179.9	2,179.9	2,180.5	0.6
K	12.752	820	4,689	12.5	2,182.6	2,182.6	2,183.2	0.6
L	12.835	685	4,465	13.2	2,186.9	2,186.9	2,187.8	0.9
M	12.905	594	4,183	14.0	2,191.1	2,191.1	2,191.8	0.7
N	12.981	587	4,146	14.1	2,194.3	2,194.3	2,195.1	0.8
O	13.066	635	4,553	12.9	2,198.7	2,198.7	2,199.0	0.3
P	13.142	658	4,966	11.8	2,204.7	2,204.7	2,204.8	0.1
Q	13.218	878	7,807	7.5	2,207.7	2,207.7	2,208.3	0.6
R	13.292	1,010	7,432	7.9	2,209.1	2,209.1	2,209.3	0.2
S	13.369	1,100	5,254	11.2	2,210.4	2,210.4	2,210.4	0.0
T	13.443	1,126	6,254	9.4	2,213.2	2,213.2	2,213.6	0.4
U	13.515	1,226	5,628	8.6	2,215.0	2,215.0	2,215.7	0.7
V	13.593	1,290	5,056	9.6	2,218.2	2,218.2	2,218.5	0.3
W	13.670	972	4,231	11.4	2,221.1	2,221.1	2,221.8	0.7
X	13.742	885	4,215	11.5	2,225.4	2,225.4	2,225.8	0.4

[1] Miles Above Roosevelt Dam

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

PINTO CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Pinto Creek (continued)								
Y	13.820	1,019	5,254	8.9	2,228.9	2,228.9	2,229.9	1.0
Z	13.894	980	4,474	10.5	2,232.2	2,232.2	2,232.6	0.4
AA	13.970	843	4,000	11.7	2,235.9	2,235.9	2,236.8	0.9
AB	14.045	649	3,588	13.0	2,240.1	2,240.1	2,241.0	0.9
AC	14.119	565	3,375	13.9	2,243.7	2,243.7	2,244.4	0.7
AD	14.193	495	3,215	14.6	2,248.4	2,248.4	2,248.8	0.4
AE	14.267	565	3,623	12.9	2,251.9	2,251.9	2,252.2	0.3
AF	14.343	568	3,367	13.9	2,254.8	2,254.8	2,255.2	0.4
AG	14.419	785	5,214	9.0	2,257.8	2,257.8	2,258.8	1.0
AH	14.491	830	4,151	11.3	2,261.1	2,261.1	2,261.8	0.7
AI	14.557	810	4,132	11.3	2,264.4	2,264.4	2,265.1	0.7
AJ	14.632	765	4,197	11.2	2,268.4	2,268.4	2,269.3	0.9
AK	14.722	559	3,603	13.0	2,273.4	2,273.4	2,274.1	0.7
AL	14.784	430	3,776	12.4	2,277.6	2,277.6	2,278.4	0.8
AM	14.824	570	4,881	9.6	2,279.9	2,279.9	2,280.0	0.1

[1] Miles Above Roosevelt Dam

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

PINTO CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Reno Creek								
A	1,647.9[1]	431	1,168	7.1	2,323.8	2,323.8	2,324.2	0.3
B	1,814.8[1]	708	1,875	4.5	2,326.9	2,326.9	2,327.4	0.5
C	1,991.6[1]	676	1,478	5.7	2,328.8	2,328.8	2,329.2	0.4
D	2,131.0[1]	267	1,146	7.3	2,329.9	2,329.9	2,330.7	0.8
E	2,348.8[1]	388	1,406	5.9	2,336.8	2,336.8	2,337.6	0.8
F	2,488.6[1]	346	1,745	4.8	2,338.6	2,338.6	2,339.3	0.7
G	2,596.7[1]	350	1,170	7.1	2,339.8	2,339.8	2,340.4	0.6
H	2,857.4[1]	195	842	9.9	2,345.0	2,345.0	2,345.1	0.1
I	3,043.7[1]	91	1,394	6.3	2,347.6	2,347.6	2,348.3	0.7
J	3,200.8[1]	91	1,849	4.5	2,355.1	2,355.1	2,355.8	0.7
K	3,299.9[1]	368	5,163	1.6	2,355.5	2,355.5	2,356.2	0.7
L	3,830.4[1]	229	2,165	3.9	2,355.7	2,355.7	2,356.4	0.7
Roberts Wash								
A	1,038[2]	14	76	6.3	3,378.7	3,378.7	3,378.7	0.0
B	1,172[2]	105	99	4.9	3,384.0	3,384.0	3,384.0	0.0
C	1,712[2]	256	244	2.0	3,402.8	3,402.8	3,402.8	0.0
D	2,573[2]	57	98	4.9	3,430.9	3,430.9	3,431.2	0.3

[1] Feet Above Confluence with Tonto Creek at Roosevelt Lake
[2] Feet Above Confluence with Russell Gulch

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

RENO CREEK - ROBERTS WASH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Russell Gulch								
A	1,205[1]	622	1,276	7.7	3,306.3	3,306.3	3,306.6	0.3
B	2,069[1]	981	5,618	1.7	3,319.6	3,319.6	3,320.2	0.6
C	2,544[1]	407	1,127	8.5	3,321.0	3,321.0	3,321.7	0.7
D	4,839[1]	1,138	3,009	3.2	3,343.4	3,343.4	3,344.4	0.9
E	5,811[1]	189	1,102	8.2	3,357.2	3,357.2	3,368.0	0.8
F	7,265[1]	712	2,677	3.4	3,373.8	3,373.8	3,374.7	0.9
G	8,278[1]	178	1,024	8,9	3,389.0	3,389.0	3,390.0	1.0
H	10,259[1]	409	1,195	7.6	3,415.7	3,415.7	3,415.8	0.1
I	12,157[1]	120	726	12.5	3,441.5	3,441.5	3,442.2	0.8
J	14,554[1]	231	1,007	6.1	3,486.7	3,486.7	3,487.6	0.9
K	15,954[1]	75	451	13.6	3,515.8	3,515.8	3,516.5	0.7
L	17,301[1]	131	562	10.9	3,564.9	3,564.9	3,564.9	0.0
South Oak Creek								
A	2,274.4[2]	50	134	6.6	2,218.6	2,218.6	2,219.2	0.6
B	2,423.8[2]	64	158	5.6	2,223.7	2,223.7	2,224.6	0.8
C	2,670.9[2]	89	191	4.6	2,235.0	2,235.0	2,235.2	0.2
D	2,871.6[2]	64	138	6.4	2,241.2	2,241.2	2,241.4	0.2
E	2,995.4[2]	57	147	6.0	2,246.2	2,246.2	2,246.2	0.0
F	3,208.2[2]	65	169	5.3	2,252.2	2,252.2	2,252.2	0.0
G	3,613.6[2]	81	195	4.6	2,261.2	2,261.2	2,261.2	0.0
H	4,102.4[2]	75	235	3.8	2,267.9	2,267.9	2,268.0	0.1
I	4,465.5[2]	113	268	3.3	2,271.4	2,271.4	2,271.9	0.5
J	4,581.0[2]	66	181	4.9	2,272.8	2,272.8	2,273.4	0.7
K	4,908.7[2]	101	219	4.0	2,279.4	2,279.4	2,280.0	0.6
L	5,234.9[2]	61	174	5.1	2,286.2	2,286.2	2,286.3	0.2
M	5,336.4[2]	77	192	4.6	2,288.4	2,288.4	2,288.5	0.1

[1] Feet Above Confluence with Bloody Tanks Wash

[2] Feet Above Confluence with Tonto Creek at Roosevelt Lake

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

RUSSELL GULCH - SOUTH OAK CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Strawberry Creek[2]								
A	1.40	99	586	11.3	5,688.5	5,688.5	5,688.5	0.0
B	1.50	103	607	10.9	5,692.7	5,692.7	5,692.7	0.0
C	1.60	114	581	11.4	5,697.0	5,697.0	5,697.0	0.0
D	1.75	239	765	8.6	5,707.7	5,707.7	5,707.7	0.0
E	1.90	177	683	9.7	5,714.6	5,714.6	5,714.6	0.0
F	2.00	153	685	9.6	5,720.2	5,720.2	5,720.2	0.0
G	2.16	117	693	9.5	5,725.6	5,725.6	5,725.6	0.0
H	2.30	126	580	11.4	5,734.0	5,734.0	5,734.0	0.0
I	2.47	227	913	7.2	5,743.3	5,743.3	5,743.3	0.0
J	2.56	160	656	10.1	5,748.6	5,748.6	5,748.6	0.0
K	2.67	121	609	10.8	5,755.6	5,755.6	5,755.6	0.0
L	2.80	123	588	11.2	5,763.7	5,763.7	5,763.7	0.0
M	2.90	105	575	11.5	5,768.8	5,768.8	5,768.8	0.0
N	3.00	125	615	10.7	5,776.8	5,776.8	5,776.8	0.0
O	3.10	125	601	11.0	5,783.0	5,783.0	5,783.0	0.0
P	3.24	281	839	7.9	5,793.2	5,793.2	5,793.2	0.0
Q	3.36	227	737	7.5	5,802.9	5,802.9	5,802.9	0.0
R	3.46	182	648	8.5	5,809.8	5,809.8	5,809.8	0.0
S	3.60	320	852	6.5	5,819.1	5,819.1	5,819.1	0.0
T	3.72	234	701	7.9	5,831.8	5,831.8	5,831.8	0.0
U	3.86	205	647	8.5	5,843.9	5,843.9	5,843.9	0.0
V	4.00	172	622	8.8	5,855.9	5,855.9	5,855.9	0.0
W	4.11	129	609	9.0	5,866.7	5,866.7	5,866.7	0.0
X	4.21	104	536	10.3	5,874.6	5,874.6	5,874.6	0.0
Y	4.25	23	237	23.2	5,882.8	5,882.8	5,882.8	0.0
Z	4.29	179	1,754	3.1	5,893.3	5,893.3	5,893.3	0.0
AA	4.36	136	687	8.0	5,893.3	5,893.3	5,893.3	0.0

[1] Miles Above Confluence with Hardscrabble Creek

[2] This Reach is Characterized by Supercritical Flows & High Velocities

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

STRAWBERRY CREEK

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Strawberry Hollow								
A	0.230	165	311	5.8	5,368.3	5,368.3	5,369.2	0.9
B	0.300	87	225	8.0	5,377.4	5,377.4	5,377.5	0.1
C	0.413	167	529	3.4	5,393.7	5,393.7	5,393.9	0.2
D	0.450	153	460	3.9	5,394.5	5,394.5	5,394.8	0.3
E	0.550	176	516	3.5	5,406.5	5,406.5	5,407.1	0.6
F	0.654	299	572	3.1	5,417.5	5,417.5	5,418.2	0.7
G	0.720	200	601	3.0	5,426.0	5,426.0	5,426.0	0.0
H	0.792	265	501	3.6	5,434.8	5,434.8	5,434.8	0.0
I	0.900	172	255	7.1	5,443.8	5,443.8	5,443.8	0.0
J	0.928	143	485	3.7	5,452.9	5,452.9	5,453.9	1.0
K	1.000	117	225	8.0	5,459.1	5,459.1	5,459.2	0.1
L	1.100	93	205	8.8	5,477.8	5,477.8	5,477.8	0.0
M	1.200	101	237	7.6	5,492.7	5,492.7	5,492.8	0.1
N	1.300	78	198	9.1	5,514.8	5,514.8	5,514.8	0.0
O	1.450	80	199	9.0	5,542.0	5,542.0	5,542.0	0.0

[1] Miles Above Confluence With Pine Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

STRAWBERRY HOLLOW

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Sycamore Creek								
A	4,372.8	220.0	902.48	10.3	2,222.9	2,222.9	2,222.9	0.0
B	4,725.2	214.0	1,283.15	7.3	2,229.9	2,229.9	2,229.9	0.0
C	5,051.4	110.0	797.90	11.7	2,233.7	2,233.7	2,233.8	0.1
D	5,173.8	178.2	1,370.33	6.8	2,236.0	2,236.0	2,236.8	0.9
E	5,630.5	200.9	1,067.93	8.7	2,241.7	2,241.7	2,242.0	0.3
F	6,565.8	222.0	1,407.24	6.6	2,257.7	2,257.7	2,258.6	1.0
G	7,280.9	160.0	1,394.66	10.5	2,272.0	2,272.0	2,272.0	0.0
H	7,501.2	100.5	1,224.59	9.2	2,276.3	2,276.3	2,277.3	0.9
I	7,662.1	167.0	1,088.93	8.6	2,281.2	2,281.2	2,281.2	0.0
J	7,749.4	290.0	1,693.01	5.5	2,282.8	2,282.8	2,282.8	0.0
K	8,069.4	213.8	974.86	9.6	2,286.9	2,286.9	2,286.9	0.0
Sycamore Creek Split Flow								
A	2,750.0	434	498	2.6	2,213.4	2,213.4	2,214.3	0.9
B	3,250.0	250	396	3.2	2,220.7	2,220.7	2,221.3	0.6
C	3,550.0	102	332	3.9	2,224.0	2,224.0	2,224.7	0.7
D	3,900.0	120	229	5.6	2,228.9	2,228.9	2,229.6	0.7

[1] Feet Above Confluence with Tonto Creek at Roosevelt Lake

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

SYCAMORE CREEK - SYCAMORE SPLIT FLOW

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Thompson Draw								
A	5.400[1]	106	180	7.5	5,722.3	5,722.3	5,722.3	0.0
B	5.500[1]	93	247	5.5	5,729.3	5,729.3	5,729.5	0.2
C	5.600[1]	55	189	7.2	5,736.3	5,736.3	5,737.1	0.8
D	5.700[1]	50	179	7.6	5,742.6	5,742.6	5,742.6	0.0
E	5.839[1]	70	205	6.6	5,752.6	5,752.6	5,752.9	0.3
F	5.900[1]	70	281	4.8	5,754.9	5,754.9	5,755.8	0.9
G	5.985[1]	75	243	5.6	5,764.3	5,764.3	5,764.4	0.1
H	6.100[1]	95	190	7.1	5,768.6	5,768.6	5,768.7	0.1
I	6.233[1]	65	153	8.8	5,778.5	5,778.5	5,778.5	0.0
J	6.337[1]	60	156	8.7	5,787.5	5,787.5	5,787.5	0.0
Tonto Creek at Bear Flat								
A	58.300[2]	165	2,727	13.1	4,954.7	4,954.7	4,955.3	0.6
B	58.395[2]	130	2,491	14.4	4,958.7	4,958.7	4,959.3	0.6
C	58.480[2]	135	2,376	15.1	4,961.8	4,961.8	4,962.4	0.6
D	58.573[2]	140	2,585	13.9	4,968.1	4,968.1	4,968.2	0.1
E	58.679[2]	135	2,290	15.6	4,970.7	4,970.7	4,970.8	0.1
F	58.764[2]	139	1,977	18.1	4,975.7	4,975.7	4,975.7	0.0
G	58.849[2]	134	2,107	17.0	4,981.8	4,981.8	4,981.8	0.0
H	58.944[2]	145	2,389	15.0	4,988.0	4,988.0	4,988.0	0.0
I	59.039[2]	240	3,638	9.8	4,993.0	4,993.0	4,993.2	0.2
J	59.138[2]	185	2,470	14.5	4,994.6	4,994.6	4,994.6	0.0
K	59.233[2]	145	2,175	16.5	4,998.4	4,998.4	4,998.6	0.2
L	59.309[2]	115	1,889	19.0	5,003.2	5,003.2	5,003.2	0.0
M	59.404[2]	125	2,415	14.8	5,011.0	5,011.0	5,011.3	0.3

[1] Miles Above Confluence With Tonto Creek
[2] Miles Above Roosevelt Dam

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

THOMPSON DRAW - TONTO CREEK AT BEAR FLAT

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Tonto Creek at Gisela								
A	34.800	861	8,419	9.8	2,840.2	2,840.2	2,841.1	0.9
B	34.893	1,103	10,940	7.5	2,843.3	2,843.3	2,844.3	1.0
C	35.050	1,438	10,178	8.1	2,847.4	2,847.4	2,847.7	0.3
D	35.230	1,391	10,151	8.1	2,852.8	2,852.8	2,852.9	0.1
E	35.417	1,652	9,973	8.3	2,859.1	2,859.1	2,859.4	0.3
F	35.580	1,355	9,252	8.9	2,865.6	2,865.6	2,865.6	0.0
G	35.687	1,199	8,893	9.3	2,869.8	2,869.8	2,870.0	0.2
H	35.804	1,109	10,873	7.6	2,873.1	2,873.1	2,873.8	0.7
I	35.894	1,300	11,475	7.2	2,874.9	2,874.9	2,875.9	1.0
J	35.944	1,502	12,753	6.5	2,876.1	2,876.1	2,877.0	0.9
K	36.055	1,116	6,160	13.4	2,878.8	2,878.8	2,878.9	0.1
L	36.175	1,003	7,583	10.9	2,886.2	2,886.2	2,886.2	0.0

[1] Miles Above Roosevelt Dam

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

TONTO CREEK AT GISELA

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Tonto Creek at Kohl's Ranch[2]								
A	55.14	169	1,031	15.8	5,271.6	5,271.6	5,271.6	0.0
B	55.24	120	954	16.7	5,278.2	5,278.2	5,278.2	0.0
C	55.34	140	995	16.0	5,284.2	5,284.2	5,284.2	0.0
D	55.44	109	932	17.1	5,290.7	5,290.7	5,290.7	0.0
E	55.54	115	968	16.4	5,296.7	5,296.7	5,296.7	0.0
F	55.64	108	860	16.3	5,308.4	5,308.4	5,308.4	0.0
G	55.72	156	1,002	14.0	5,317.4	5,317.4	5,317.4	0.0
H	55.82	160	1,076	13.1	5,325.8	5,325.8	5,325.8	0.0
I	55.92	135	936	15.0	5,333.6	5,333.6	5,333.6	0.0
J	55.98	95	1,216	11.5	5,337.7	5,337.7	5,337.7	0.0
K	56.00	117	820	17.1	5,341.6	5,341.6	5,341.6	0.0

[1] Miles Above Roosevelt Dam

[2] This Reach is Characterized by Supercritical Flows and High Velocities

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

TONTO CREEK AT KOHL'S RANCH

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Tonto Creek at Roosevelt Lake								
A	11.11	1,800	20,929	6.9	2,171.0	2,171.0	2,171.5	0.6
B	11.27	2,050	23,579	6.1	2,173.6	2,173.6	2,174.4	0.8
C	11.39	2,157	23,583	6.1	2,175.4	2,175.4	2,176.4	1.0
D	11.58	2,010	20,326	7.1	2,179.3	2,179.3	2,180.1	0.8
E	11.74	1,934	18,400	7.8	2,183.4	2,183.4	2,184.0	0.6
F	11.92	1,959	22,132	6.5	2,187.3	2,187.3	2,188.2	0.9
G	12.08	2,371	23,365	6.2	2,190.6	2,190.6	2,191.5	1.0
H	12.25	2,404	23,311	6.2	2,193.7	2,193.7	2,194.6	0.9
I	12.44	2,451	25,106	5.7	2,196.9	2,196.9	2,197.7	0.8
J	12.60	2,432	24,679	5.8	2,200.3	2,200.3	2,200.7	0.4
K	12.79	2,530	23,983	6.0	2,203.3	2,203.3	2,203.7	0.4
L	12.95	2,571	22,256	6.5	2,206.6	2,206.6	2,207.4	0.8
M	13.10	2,261	19,798	7.3	2,210.7	2,210.7	2,211.4	0.7
N	13.25	1,756	18,932	7.2	2,215.2	2,215.2	2,216.0	0.8
O	13.42	1,503	16,684	8.2	2,219.2	2,219.2	2,220.1	0.9
P	13.55	1,574	18,595	7.4	2,222.9	2,222.9	2,223.7	0.9
Q	13.78	1,750	18,845	7.3	2,227.5	2,227.5	2,228.2	0.7
R	13.93	1,800	20,127	6.8	2,230.4	2,230.4	2,231.1	0.7
S	14.08	1,877	20,654	6.6	2,232.7	2,232.7	2,233.7	1.0
T	14.25	1,863	20,330	6.7	2,236.4	2,236.4	2,237.3	0.9
U	14.40	1,880	20,409	6.7	2,239.9	2,239.9	2,240.5	0.6
V	14.56	1,800	18,621	7.4	2,242.9	2,242.9	2,243.5	0.6
W	14.69	1,800	19,110	7.2	2,246.4	2,246.4	2,247.2	0.8
X	14.86	1,745	19,087	7.2	2,249.6	2,249.6	2,250.6	1.0
Y	15.02	1,639	17,200	8.0	2,253.4	2,253.4	2,254.3	0.9
Z	15.23	1,731	21,955	6.2	2,257.1	2,257.1	2,258.1	1.0

[1] Miles Above Roosevelt Dam

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

TONTO CREEK AT ROOSEVELT LAKE

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Tonto Creek at Roosevelt Lake (continued)								
AA	15.42	1,827	21,846	6.3	2,260.0	2,260.0	2,260.8	0.8
AB	15.56	2,295	23,256	5.9	2,262.3	2,262.3	2,263.2	0.9
AC	15.72	2,103	19,385	7.1	2,266.0	2,266.0	2,266.5	0.5
AD	15.91	2,228	20,092	6.8	2,270.5	2,270.5	2,270.8	0.3
AE	16.07	2,238	19,792	6.9	2,273.7	2,273.7	2,274.3	0.6
AF	16.23	2,093	19,498	7.0	2,277.0	2,277.0	2,278.0	1.0
AG	16.42	2,030	20,510	6.7	2,282.3	2,282.3	2,283.2	0.9
AH	16.63	2,405	22,286	6.1	2,286.3	2,286.3	2,287.2	0.9
AI	16.87	2,880	23,441	5.8	2,291.6	2,291.6	2,292.5	1.0
AJ	16.98	2,859	23,654	5.8	2,294.4	2,294.4	2,295.3	1.0
AK	17.12	2,688	21,711	6.3	2,298.5	2,298.5	2,299.5	1.0
AL	17.32	2,125	18,686	7.3	2,303.6	2,303.6	2,304.6	0.9
AM	17.53	1,874	18,258	7.5	2,308.8	2,308.8	2,309.8	1.0
AN	17.67	1,571	17,740	7.7	2,312.3	2,312.3	2,313.0	0.8
AO	17.86	1,591	17,166	8.0	2,317.2	2,317.2	2,317.6	0.5
AP	18.00	1,607	17,254	7.9	2,320.9	2,320.9	2,321.8	0.9
AQ	18.16	1,692	18,423	7.4	2,324.5	2,324.5	2,325.5	0.9
AR	18.29	1,916	20,023	6.8	2,327.2	2,327.2	2,328.2	1.0
AS	18.45	1,795	17,867	7.7	2,330.9	2,330.9	2,331.9	0.9
AT	18.60	1,614	17,451	7.9	2,335.0	2,335.0	2,336.0	1.0
AU	18.74	1,671	18,569	7.4	2,338.7	2,338.7	2,339.7	1.0
AV	18.88	2,026	19,606	7.0	2,342.5	2,342.5	2,343.5	1.0
AW	19.17	2,248	20,486	6.7	2,350.0	2,350.0	2,351.0	1.0
AX	19.34	2,313	21,748	6.3	2,353.9	2,353.9	2,354.9	1.0
AY	19.53	1,898	18,035	7.6	2,358.0	2,358.0	2,358.9	0.9
AZ	19.70	1,534	15,952	8.6	2,362.4	2,362.4	2,363.2	0.8

[1] Miles Above Roosevelt Dam

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

TONTO CREEK AT ROOSEVELT LAKE

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
Tonto Creek at Roosevelt Lake (continued)								
BA	19.79[1]	1,328	15,035	9.1	2,365.7	2,365.7	2,366.4	0.8
BB	19.89[1]	1,108	14,137	9.7	2,369.3	2,369.3	2,370.0	0.7
BC	19.99[1]	935	13,155	10.4	2,372.5	2,372.5	2,373.3	0.8
Walnut Canyon								
A	1233.2[2]	222.8	294.9	6.5	2,265.0	2,265.0	2,265.0	0.0
B	1422.3[2]	75.5	310.6	6.2	2,272.5	2,272.5	2,272.9	0.5
C	1577.1[2]	88.9	357.4	5.4	2,276.2	2,276.2	2,276.9	0.7
D	1769.6[2]	127.7	393.7	4.9	2,280.5	2,280.5	2,281.2	0.7
E	2030.9[2]	98.1	225.7	8.5	2,291.3	2,291.3	2,291.4	0.1
F	2221.3[2]	50.7	239.7	8.0	2,300.7	2,300.7	2,300.8	0.1
G	2366.8[2]	60.0	279.5	6.8	2,306.1	2,306.1	2,306.1	0.0
H	2494.5[2]	45.8	165.0	11.6	2,316.8	2,316.8	2,316.8	0.0
I	2631.4[2]	127.1	292.0	6.6	2,325.2	2,325.2	2,325.3	0.1
J	2675.2[2]	73.0	264.3	7.2	2,326.8	2,326.8	2,327.2	0.4
K	2768.3[2]	62.9	220.2	8.7	2,331.5	2,331.5	2,331.5	0.1
L	2931.8[2]	32.0	171.7	11.1	2,340.1	2,340.1	2,340.3	0.2
M	3233.9[2]	40.0	186.7	10.2	2,358.8	2,358.8	2,358.9	0.1
N	3283.7[2]	50.0	213.7	8.9	2,362.3	2,362.3	2,362.3	0.0
O	3364.8[2]	55.0	246.8	7.7	2,365.1	2,365.1	2,366.0	1.0

[1] Miles Above Roosevelt Dam
[2] Feet Above Confluence with Tonto Creek at Roosevelt Lake

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY
GILA COUNTY, AZ
AND INCORPORATED AREAS

FLOODWAY DATA

TONTO CREEK AT ROOSEVELT LAKE - WALNUT CANYON

FLOODING SOURCE		FLOODWAY			1-PERCENT-ANNUAL-CHANCE 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
Watertank Wash								
A	992	79	172	4.3	3,377.7	3,377.7	3,377.7	0.0
B	2,370	143	156	4.7	3,429.2	3,429.2	3,429.5	0.3
C	3,489	46	93	8.0	3,475.3	3,475.3	3,475.3	0.0
D	4,948	168	418	1.2	3,551.8	3,551.8	3,551.9	0.1
E	6,859	46	46	5.7	3,631.3	3,631.3	3,631.3	0.0
F	7,830	40	44	5.9	3,683.3	3,683.3	3,683.3	0.0

[1] Stream distance in feet above confluence with Russell Gulch

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ

AND INCORPORATED AREAS

FLOODWAY DATA

WATERTANK WASH

TABLE 9

Due to supercritical-flow regime and high-velocity conditions, normal additional encroachment on the floodplains of Christopher Creek, Dripping Springs Wash, Houston Creek, Pine Creek, Strawberry Creek, and Tonto Creek at Kohl's Ranch should not be permitted. During larger floods, the risk of structural damage is very high for buildings and homes located in floodplains characterized by supercritical flow. Development in these high-velocity flow areas should be restricted to avoid damage to life and property.

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 Base Flood Elevations 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 Base Flood Elevations 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 Base Flood Elevations or base flood depths are shown within this zone.

Zone D

Zone D is the flood insurance risk zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

6.0 FLOOD INSURANCE RATE MAP

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

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot Base Flood Elevations or average depths. Insurance agents use zones and Base Flood Elevations 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 entire geographic area of Gila County. Previously, separate Flood Hazard Boundary Maps and/or FIRMs were prepared for each identified flood-prone incorporated community and the unincorporated areas of the county. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 10, "Community Map History."

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISION DATE(S)	FLOOD INSURANCE RATE MAP EFFECTIVE DATE	FLOOD INSURANCE RATE MAP REVISION DATE(S)
Globe, City of	May 24, 1974	November 21, 1975	May 1, 1980	September 30, 2004
Hayden, Town of	April 23, 1976	None	September 14, 1979	None
Miami, Town of	June 28, 1974	April 23, 1976	May 1, 1980	September 30, 2004
Payson, Town of	January 24, 1975	None	March 18, 1980	None
Star Valley, Town of	November 11, 1974 (Gila County)	April 4, 1977 (Gila County)	September 27, 1985 (Gila County)	None
Winkelman, Town of	January 23, 1974	December 26, 1975	September 14, 1979	None
Gila County (Unincorporated Areas)	November 11, 1974	April 4, 1977	September 27, 1985	September 30, 2004

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

GILA COUNTY, AZ AND INCORPORATED AREAS

COMMUNITY MAP HISTORY

7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Gila County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS Reports, FBFMs, and FIRM for all of the incorporated and unincorporated jurisdictions within Gila County.

FISs have been completed for the following incorporated communities in Gila County: the City of Globe (Federal Emergency Management Agency, 2004), the Towns of Miami (Federal Emergency Management Agency, 2004), Payson (Federal Emergency Management Agency, 1980), Hayden (Reference Federal Emergency Management Agency, 1979), and Winkelman (Federal Emergency Management Agency, 1979). The results of those studies are in general agreement with the FIS.

The FIS matches FISs produced for the adjacent unincorporated areas of Coconino County (Federal Emergency Management Agency, 1983), Graham County (Federal Emergency Management Agency, 1984), Maricopa County (Federal Emergency Management Agency, 1979), Navajo County (Federal Emergency Management Agency, 1982), Pinal County (Federal Emergency Management Agency, 1983), and Yavapai County (Federal Emergency Management Agency, unpublished).
A FIRM has been published for the unincorporated areas of Gila County (Federal Emergency Management Agency, 2004).

The USACE published a report on a survey for flood control on Pinal Creek at Globe in 1961 (Arizona Water Commission, October 1973). A serious flood problem was found to exist on Pinal Creek. Construction of approximately 9,000 feet of channel improvements along Pinal Creek at Globe to control a flood of approximately 16,000 cfs was found to be economically justified, but no improvements of the channel for the control of large floods have been constructed since the FIS was performed. The peak discharge-frequency relationship used for :the USACE FIS is nearly the same as the peak discharge-frequency relations determined in the FIS. Water-surface elevations for existing channel conditions were not given in the 1961 report. As discussed previously, the only known measurements or estimates of peak-discharge for floods in Globe were made by the USGS for the floods of August 17, 1904; July 29, 1954; and, August 3, 1968 (U.S. Department of the Interior, 1905, Open-File Report, 1969, and U.S. Department of the Army, Corps of Engineers, September 14, 1961).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of FIS can be obtained by contacting FEMA, Region IX, Federal Insurance and Mitigation Administration, 1111 Broadway Street, Suite 1200, Oakland, California 94607-4052.

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