

# FLOOD INSURANCE STUDY



## SANTA CRUZ COUNTY, ARIZONA AND INCORPORATED AREAS

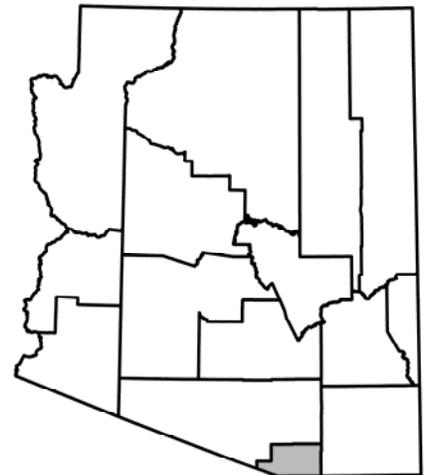
VOLUME 1 OF 3

Community  
Name

Community  
Number

SANTA CRUZ COUNTY,  
(UNINCORPORATED AREAS)  
NOGALES, CITY OF  
PATAGONIA, TOWN OF

040090  
040091  
040092



Santa Cruz County



EFFECTIVE: DECEMBER 2, 2011

Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER  
04023CV001A

**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. Please contact the Community Map Repository for any additional data.

Part or all of this FIS may be revised and republished at any time. In addition, part of this FIS report may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the FIS report. 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 report components.

Selected Flood Insurance Rate Map (FIRM) panels for this 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:

| <u>Old Zone(s)</u> | <u>New Zone</u> |
|--------------------|-----------------|
| A1 through A30     | AE              |
| B                  | X               |
| C                  | X               |

Initial Countywide FIS Report Effective Date: December 2, 2011

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**PUBLISHED SEPARATELY:**

Flood Insurance Rate Map Index  
Flood Insurance Rate Map

**FLOOD INSURANCE STUDY  
SANTA CRUZ COUNTY, ARIZONA AND INCORPORATED AREAS**

**1.0 INTRODUCTION**

**1.1 Purpose of Study**

This FIS revises and supersedes the FIS reports and/or Flood Insurance Rate Maps (FIRMs) in the geographic area of Santa Cruz County, Arizona, including the incorporated communities of Nogales and Patagonia and unincorporated areas of Santa Cruz County (hereinafter referred to collectively as Santa Cruz County), and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates. This information will also be used by Santa Cruz County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the NFIP are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

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

**1.2 Authority and Acknowledgements**

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

In 2005 Santa Cruz County was awarded a grant from FEMA to remap the floodplains within the county and become a Cooperating Technical Partner. The Santa Cruz Floodplain District contracted with Stantec to perform the engineering required to create new floodplain maps and accomplish the hydraulic and hydrology-related work. The project designation for Santa Cruz County was SOQ No. S-12-05-C012. The project number for Stantec was 185120098. The Hydraulics Technical Data Notebook (TDN) was completed May 1, 2008, and the Hydrology TDN was completed on June 8, 2007.

BakerAECOM LLC was contracted (contract number HSFEHQ-09-D-0368) in August 2009, by FEMA to provide appeal/protest resolutions following the issuance of the preliminary FIS and FIRMs and create a Cochise County Countywide FIS and FIRMs.

Base map information shown on this DFIRM was derived from Santa Cruz County 6-inch resolution, 2004 Orthophotos.

The projection used in the preparation of this map was Arizona State Plan Central Zone (FIPS Zone 202). The horizontal datum was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones in the production of DFIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

### 1.3 Coordination

This original version of this study was initiated in October 1971. The initial selection of community base map and the identification of streams requiring detailed study were done by the Natural Resources Conservation Service (NRCS, formerly called the U.S. Soil Conservation Service) based on FEMA guidelines in effect at that date. In November 1971, a meeting was held with the County Planning Director and as light modification in the areas to be studied in detail was made. An initial report was completed and submitted to FEMA in May 1972. This report gave detailed information for only a selected portion of the county. Additional areas were identified in the report as needing detailed studies, but due to time and budget limitations, these areas were not included.

It was also noted in the 1972 report that there were significant differences in the peak discharge-frequency relationships used by NRCS in the FIS and those used in two previously published Floodplain Information reports prepared by the U.S. Army Corps of Engineers (USACE) (References 1 and 2). The flood peaks used by NRCS, however, were in close agreement with two regional studies developed by the U.S. Geological Survey (USGS) (References 3 and 4). Although an attempt was made to coordinate the peak discharges with USACE before the initial report was completed, the differences were never resolved. Because of the discrepancies in the peak discharges, the report was not accepted by FEMA.

In April 1974, FEMA requested that NRCS, USACE, and USGS meet jointly to resolve all differences concerning the Santa Cruz County study, and that NRCS make the necessary revisions in the subject report.

Meetings of the three concerned agencies, together with the Arizona Water Commission, were held in May and June 1974, and agreement was reached as to the discharges to be used for the main stem of the Santa Cruz River. Regional frequency-discharge-drainage area curves to be used for the remainder of the county were also coordinated with USACE, USGS, and other appropriate agencies.

Coordination in the performance of this study was maintained with the Arizona Department of Transportation, the National Weather Service, the U.S. Bureau of Reclamation, and the International Boundary and Water Commission. Coordination was maintained with the International Boundary and Water Commission, specifically with regard to their hydrologic analyses on Nogales Wash and Potrero Creek.

Coordination was also maintained with Cella, Barr, Evans and Associates (now Stantec), a local Tucson consulting engineering firm, which has completed several flood studies in the county. A meeting was held with representatives of Stantec on October 28, 1975, to resolve differences in peak discharge-frequency relationships and computed flood profiles developed for Sonoita Creek, Peck Canyon, and Agua Fria Canyon.

Contact was also made with other local engineering firms which have performed work in the study area.

Because the 1972 report was to be revised, county officials requested additional areas, identified as requiring detailed studies, be added to the revised report. Authorization for these additions was received from FEMA in March 1975.

On March 28, 1975, a coordination meeting was held with representatives of the county to discuss mapping priorities. Representatives from the Arizona State Land Department, FEMA, and the City of Nogales also attended this meeting.

At the time of the meeting, the City of Nogales was participating in the Emergency Flood Insurance program, and requested that they be included in the NRCS study so that the city could be converted to the regular program. The Town of Patagonia, previously identified by FEMA as having a flood hazard problem, was not participating in the Emergency Program. FEMA requested, however, that the Town of Patagonia also be included in the NRCS detailed study, and that the remainder of the unincorporated areas of the county not studied by detailed procedures be studied by approximate methods. Authority for including the City of Nogales and the Town of Patagonia in the study was obtained from FEMA in June 1975.

During the course of the work performed by NRCS, flood elevations, flood boundaries, and floodway delineations were reviewed with the community officials, USACE personnel, and other interested individuals. Specific meetings for this purpose were held with USACE on January 27, 1976; with community officials and selected individuals on November 27, 1976 and April 6, 1977; and, with other interested individuals on January 24, 1977 and September 27, 1977. Informal discussions were held with county officials during the course of study.

On September 6, 1977, the results of the work done by NRCS were reviewed at a final coordination meeting attended by personnel of NRCS, FEMA, Arizona State Land Department, Santa Cruz County Board of Supervisors, and interested citizens. All problems raised at that meeting have been addressed.

From 2006 through 2008 monthly meetings were conducted with Santa Cruz County, Stantec, and various subcontractors to raise and address concerns.

From 2008 through 2009 coordination was conducted with Santa Cruz County, the City of Nogales, BakerAECOM LLC, and various study contractors to resolve issues raised during the protest/appeal period.

For this countywide FIS, final CCO meetings were held on October 29, 2008, and January 14, 2010. These meetings were attended by representatives of the study contractors, the communities, and the State of Arizona and FEMA.

## **2.0 AREA STUDIED**

### **2.1 Scope of Study**

This FIS covers the geographic area of Santa Cruz County, Arizona. The incorporated areas of the City of Nogales and the Town of Patagonia are included in this study.

All or portions of the flooding sources studied by detailed methods are listed in Table 1. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and FIRMs (Exhibit 2). All or portions of the flooding sources studied by limited detailed methods are listed in Table 2. The limited detailed studies are shown as Zone A on the FIRM.

Mariposa Canyon Tributaries 1 and 2, Tubac Creek, and Alamo Wash were not re-studied in this FIS. The vertical datum conversion information is documented in Section 3.3 in this FIS.

Watersheds greater than or equal to one square mile are mapped on the FIRMs. This project included detailed models to remap existing detailed floodplains using updated information, models to generate new limited detail floodplains in areas of dense and rapid growth, and conversion of the county’s local approximate floodplains to new or revised approximate floodplains. Two-foot contour topography along with 6-inch resolution aerial photos was used to help create new FIRMs in electronic format compatible with the Geographical Information System (GIS).

This FIS also incorporates the determination of letters issued by FEMA resulting in map changes (Letter of Map Revision (LOMR), Letter of Map Revision-based on Fill (LOMR-F), and Letter of Map Amendment (LOMA), as shown in Table 3.

Table 1 - Flooding Sources Studied by Detailed Methods

|                             |                            |
|-----------------------------|----------------------------|
| Agua Fria Canyon            | Peck Canyon                |
| Al Harrison Wash            | Potrero Creek – Downstream |
| Ephriam Canyon Wash         | Potrero Creek – Upstream   |
| Falls Wash                  | Puerto Canyon Wash         |
| Farosa Canyon               | Redrock Canyon             |
| Harshaw Creek               | Santa Cruz River           |
| Josephine Canyon            | Sonoita Creek              |
| Lyle Canyon                 | Sonoita Tributary A        |
| Mariposa Canyon             | Sopori Wash                |
| Mariposa Canyon Tributary 1 | Tubac Creek                |
| Mariposa Canyon Tributary 2 | Tubac Creek Tributary 1    |
| Nogales Wash                | Woodyard Canyon            |

Table 2 – Flooding Sources Studied by Limited Detailed Methods

|                                 |                                   |
|---------------------------------|-----------------------------------|
| Agua Fria Tributary 1           | Santa Cruz River Tributary 14     |
| Al Harrison Wash                | Santa Cruz River Tributary 15     |
| Calabasas Canyon                | Santa Cruz River Tributary 16     |
| Caralampi Canyon                | Santa Cruz River Tributary 17     |
| Caralampi Canyon Trib 2         | Santa Cruz River Tributary 18     |
| Caralampi Canyon Trib 3         | Santa Cruz River Tributary 19     |
| Falls Wash                      | Santa Cruz River Tributary 21     |
| Josephine Canyon Tributary 1    | Santa Cruz River Tributary 24     |
| Josephine Canyon Tributary 5    | Santa Cruz River Tributary 28     |
| Kino Springs Wash               | Santa Cruz River Tributary 29     |
| Maria Santisima del Carmen Wash | Santa Cruz River Tributary 39.1   |
| Negro Canyon                    | Santa Cruz River Tributary 39.3   |
| Patagonia Lake Weir Channel     | Santa Cruz River Tributary 41.2.1 |
| Peck Canyon Trib 1              | Sonoita Creek                     |
| Potrero Creek Tributary 1       | Teruno Canyon                     |
| Puerto Canyon breakout 1        | Tinaja Canyon                     |
| Puerto Canyon breakout 2        | Tumacacori Canyon                 |
| Ramanote Canyon                 |                                   |

Table 3 – Letters of Map Change

| Community         | Project Identifier Type   | Date Issued | Type | Case No.    |
|-------------------|---------------------------|-------------|------|-------------|
|                   |                           |             |      |             |
| City of Nogales   | Mariposa Tributary No. 2  | 08/16/2005  | 102  | 04-09-0303P |
| City of Nogales   | Mariposa Tributary No. 2  | 08/17/2005  | LOMR | 05-09-1233X |
| City of Nogales   | Mariposa Mall             | 03/17/1994  | 102A | 93-09-697P  |
| City of Nogales   | Mariposa Canyon           | 09/11/1996  | 102  | 96-09-1033P |
| Santa Cruz County | Ranches Del Rio, Rio Rico | 10/12/2005  | LOMR | 05-09-0411P |
| Santa Cruz County | Babocomari River at Elgin | 08/13/2007  | LOMR | 07-09-1115P |
| Santa Cruz County | Alamo Wash                | 01/12/2009  | LOMR | 07-09-1052P |

## 2.2 Community Description

Santa Cruz County covers an area of 1,246 square miles in the south-central section of Arizona along the border area joining Arizona with Sonora, Mexico. It is bordered by Pima County on the north and west, and by Cochise County on the east. The topography of the county is characterized by rugged mountains and rolling hills dissected by many small washes. More than 50 percent of the county is federally owned, nearly 8 percent State owned, and less than 40 percent privately owned.

The population of the county is estimated at approximately 46,907 (Reference 5) of which over 49 percent live in the two incorporated areas of Nogales and Patagonia. Major developments in the outlying areas occur along the Santa Cruz River and its major tributaries.

Residential and apartment dwelling complexes are within the floodplains of Nogales Wash and Potrero Creek near their point of confluence and at other locations upstream and downstream. A sewage waste treatment plant was installed in 1969-70 by the International Boundary and Water Commission at the confluence of Potrero Creek and the Santa Cruz River. This plant is designed to serve both the Cities of Nogales, Arizona and Nogales, Sonora, Mexico.

Santa Cruz County is characterized by a warm, dry, steppe climate. Average temperature ranges from 31°F to 65°F in winter and from 62°F to 94°F in summer. Rainfall averages approximately 25 inches annually, ranging from 20 inches at the lower elevations to over 30 inches in the mountains.

Rainfall occurs from three general types of storms. Winter storms are the result of frontal activity and usually cover large areas. Winter precipitation is generally less intense, but is of longer duration than summer precipitation. Precipitation in July, August, and September is of high intensity and short duration, and usually is the result of thunderstorms that cover a small area. Occasionally, tropical storms moving inland, generally in September, contribute large amounts of precipitation. It is from these tropical storms that extreme flood events occur on the larger drainage areas. Summer thunderstorm activity is the usual cause of major flooding on the smaller tributary streams.

The soils in the country can be grouped into three broad categories on the basis of the landscape in which they occur. These are soils of the mountains, soils of the uplands, and soils of the floodplains.

The mountainous areas of the country have very shallow, stony soils with rock outcrops. The surface soils are gravelly, cobbly, or stony loams and sandy loams. Vegetation within this area consists of grasses and shrubs at the lower elevations, and oak and grasses and shrubs at the lower elevations, and oak and juniper trees with grass at the higher elevations. Canopy cover ranges from 30 to 60 percent, with runoff ranging from medium to high.

The soils of the uplands are primarily moderately deep and deep, but many have a distinct lime zone at moderate depths. Surface textures are gravelly clay loam and gravelly sandy loam. Vegetative cover in this area is mainly grama grasses, forbs, and scattered brush.

Range conditions vary from poor to fair with an average ground cover of approximately 30 percent.

The valley or floodplains soils consist of deep sandy loam, or gravelly sandy loam and clay loam. The cover consists of irrigated crops and pastures, buildings and industrial sites, golf courses, residential housing, and natural vegetation is predominately desert shrubs and grasses.

Most of the streams in Santa Cruz County are ephemeral and are dry for long periods of time. The streambeds of the Santa Cruz River and its major tributaries are extremely permeable, and considerable water is lost to the subsurface as flow moves downstream. As a result, the flood volume diminishes, with an accompanying decrease in peak discharge.

### 2.2.1 City of Nogales

The City of Nogales is located in southern Santa Cruz County in south-central Arizona. It is located 64 miles south of the City of Tucson and is adjacent to the United States-Mexico border. The nearest American community is the Town of Patagonia, 19 miles to the northeast. Located across the United States-Mexico border from Nogales, Arizona, is the City of Nogales, Sonora, Mexico. The 2006 population of Nogales was 21,746 (Reference 5).

Stream flow in all surface drainage affecting the city is ephemeral. Nogales Wash, the major drainage system for the city, originates in Mexico and enters Nogales, Arizona, as a covered floodway. The covered floodway begins approximately 1 mile south of the International Boundary and outlets near the confluence of Nogales Wash with the Arroyo Boulevard Channel. Due to drainage from Mexico and associated wastewater systems, the Nogales Wash is perennial.

The Arroyo Boulevard Channel also begins as a covered floodway in Mexico and has two main entrances. One is located approximately 400 feet south of the International Boundary. This entrance collects water from local runoff and from flood flows which exceed the capacity of the Nogales Wash Covered Floodway. The second entrance is located adjacent to the International Boundary approximately 550 feet west of the United States-Mexico Border Station on Grand Avenue.

Overland flows originating in Mexico also have two possible flow paths. Flows pass through the Grand Avenue or International Street openings and continue downstream along Grand Avenue, or overtop the Southern Pacific Railroad just south of the Border Station and flow east and then north along Morley Avenue. The two overland flow paths rejoin downstream between Beck and Wayside Drive.

Just downstream of Court Street, overland flows can overtop Arroyo Boulevard and flow north along its west side, entering a series of culverts located in this area between Walnut and Quarry Streets. The flows entering the culverts are discharged into the Arroyo Boulevard Covered Floodway. These culverts also serve to provide drainage from local runoff originating west of the boulevard.

Downstream of the covered floodway outlets, flood flows are conveyed through the city in concrete-lined channels. Along certain reaches of these channels, there are parapet walls on each side which are approximately 1 to 2 feet high. These walls effectively increase the capacities of the channels, but they also prevent local runoff from entering the channels except at certain locations.

The main east-west drainage systems in the city are Potrero Creek, Ephriam Canyon Wash, and Yerba Buena Canyon. Potrero Creek flows northeasterly from the Coronado National Forest before its confluence with Nogales Wash. Ephriam Canyon Wash starts in Sonora, Mexico, and flows in a northeasterly direction to its confluence with Nogales Wash. Yerba Buena Canyon starts in the hilly terrain to the east of the city and flows in a northwesterly direction, intersecting Nogales Wash just north of State Highway 82.

### 2.2.2 Town of Patagonia

The Town of Patagonia is located approximately 15 miles north of the United States-Mexico International Border in the southern part of Arizona. It lies near the center of Santa Cruz County, on State Highway 82, approximately 19 miles northeast of the City of Nogales, Arizona. In 2006, the Town of Patagonia had a population of 926 (Reference 5). Subdivision development has occurred south and east of the town corporate limits.

The town, which was established in 1896 and incorporated in 1948, lies in a narrow valley, with hills rising steeply on either side. The town lies at an elevation of 4,044 feet and is surrounded by mountainous terrain, with the Santa Rita Mountains rising to over 9,400 feet on the north and the Patagonia range rising to over 6,400 feet on the south.

The main streams affecting the town are Harshaw Creek, Redrock Creek, and Sonoita Creek. These intermittent streams are dry a large portion of the year.

The smaller tributary streams affecting the town are ephemeral in nature and enter the major streams at various points along their reaches through the town.

Highway 82 is approximately parallel to Sonoita Creek within the valley. The town development has evolved following the highway along the Sonoita Creek flood plain. This pattern of development makes Sonoita Creek the main flood hazard to the town.

## 2.3 Principal Flood Problems

Low-lying areas in Santa Cruz County are subject to periodic flooding caused by overflow of the Santa Cruz River and its many tributaries. One of the most severe floods occurred on December 20, 1967 resulting from heavy rain or snow. Should this flood occur again, even greater flood depths and damages would be experienced, due to increased development in the floodplain and vegetative growth in the river channel.

Other major floods occurred on the Santa Cruz River in 1914, 1929, 1935, 1942, 1946, 1952, 1954, 1955, 1962, 1964, 1974, 1975, 1977, and 1983. Minor flooding occurred in 1990, 1993, and 2000. The occurrences of these floods are based on stream flow records

on the river near Nogales and at Continental. These occurrences are representative of historical flooding situations in other parts of the country.

The limited area extent of storms can cause a major flood in one section of the country, but be limited in magnitude in another part. This phenomenon was clearly demonstrated during the flood of October 9, 1977. This flood was the result of tropical storm Heather, which dropped from 3.5 to nearly 12 inches of rainfall on the study area in 3 to 4-day period.

Preliminary estimates indicate that this flood exceeded the 1-percent-annual-chance flood discharge for most of the main channel of the Santa Cruz River within the county. On most of the major tributaries located within the county, however, lesser flows were experienced. Only on Agua Fria Canyon, and possibly on one or two other small tributaries, did the magnitude of the flood approach that of the 1-percent-annual-chance discharge. Based on slope-area measurements, the peak discharges near the confluence of Nogales Wash and Potrero Creek were estimated to be approximately the 10-percent-annual-chance flood. Pendleton Drive flows near the mouth of Sonoita Creek and is frequently overtopped following heavy rainstorms. See Figures 1 and 2.



Figure 1 – Pendleton Drive, Sonoita Creek, Jul 2006



Figure 2 – View of Railroad from Pendleton Dr., Sonoita Cr., Jul 2006

Major factors that aggravate flood problems include debris and vegetative growth in the channels; siltation of stream channels and bridge openings; inadequate capacities of existing channels and road openings; and road and railroad embankments. These factors are present in varying degrees throughout the study area.

### 2.3.1 City of Nogales

Prior to the installation of the flood control channels in Nogales, Arizona, and Nogales, Sonora, Mexico, flood damage in these twin cities was frequent and severe. Repeated damages to structures in the Nogales Wash floodplain were reported in 1891, 1897, 1905, 1908, 1917, 1922, 1927, and 1930.

The August 8, 1930 flood was one of the most severe to hit Nogales. This flood resulted in the loss of several lives and heavy property damages. After the 1930 flood, the Nogales Wash Covered Floodway and the open, concrete-lined channels were installed. Portions of the Arroyo Boulevard Covered Floodway had been installed prior to the 1930 flood.

Since the installation of the flood control channels, flood problems along Nogales Wash have been slight. Present flood problems in the Nogales Wash area generally consist of shallow flooding along the streets and roadways because of the inability of local runoff to enter the covered floodways.

When a 1-percent-annual-chance flood occurs on the Nogales Wash drainage, the capacity of the covered floodways will be exceeded and overland flows will inundate portions of the city.

In the Ephriam Canyon Wash area, no information is available on floods prior to

1914, or on floods that might have occurred in the wash between 1930 and 1954. Floods are reported to have occurred in Ephriam Canyon Wash in 1914, 1915, 1926, and 1930. In 1954, a small flood occurred in the canyon, but no overflow occurred. Several other small floods, with only minor overflows, have occurred in Ephriam Canyon since 1954. Little data is available on the damages caused by any of these floods. A flood on July 3, 1975 nearly overtopped the Ephriam Canyon banks at several points. At the Western Avenue Bridge, the culverts were almost clogged by debris. The likelihood of this bridge being blocked in the future is high, due to the location of a car junkyard just upstream of the bridge. Should the bridge become completely plugged, floodwaters would be forced out of the channel onto the south floodplain, inundating homes and apartment buildings.

### 2.3.2 Town of Patagonia

Flood history is lacking because there is neither a stream flow gauging station nor any local newspaper containing a record of flooding.

Interviews indicate that flood damage is neither frequent nor serious. The floods of July 1930, July 1948, July 1953, July 1958, and October 1983 have been described as ranking among the highest. The October 1983 flood is shown in Figures 3-6.



Figure 3 – Highway 82, Sonoita Creek, Oct 1983



Figure 4 – Patagonia, Oct 1983



Figure 5 – Patagonia, Oct 1983



Figure 6 – Patagonia, Oct 1983

The State Highway 82 Bridge over Sonoita Creek is the major constriction, and poses the most serious threat of aggravating the flood problems in the town area. The bridge over Harshaw Creek located outside the southeast corner of town is another major constriction to floodwaters.

#### **2.4 Flood Protection Measures**

Flood control facilities in the unincorporated areas of Santa Cruz County consist of the short reaches of channel improvement on the lower end of Sonoita Creek and on Nogales Wash, just north of the Nogales corporate limits. The effectiveness of the enlarged channel on Nogales Wash is reduced by the limited capacity of the bridge located just downstream of the Nogales corporate limits.

Local interests have constructed post and wire fences, as well as levees, along intermittent reaches of Santa Cruz River for the protection of the river banks and floodplains; otherwise, the river has remained in its natural state.

One dam, which forms a lake for recreational purposes, was evaluated for its effect on flood discharges. One of these structures, known as the Patagonia Dam and Reservoir, is located on Sonoita Creek approximately 5 miles upstream from its confluence with Santa Cruz River.

Current floodplain management measures taken to reduce flood potential consist of Floodplain Regulations and Flood Damage Prevention Requirements as adopted by the Santa Cruz County Board of Supervisors. The regulations define a regulatory flood and give requirements for floodplain encroachment and provisions for the development of a floodway. Also defined in the regulations are methods to be used to analyze flood hazards and permissible land uses within special flood hazard areas.

#### 2.4.1 City of Nogales

The main flood protection structures that provide a significant level of protection from major floods consist of the Nogales Wash and the Arroyo Boulevard Covered Floodways and channels. As described previously, the Nogales Wash Covered Floodway begins approximately 1 mile south of the International Boundary in Nogales, Sonora, Mexico and terminates in Nogales, Arizona a short distance upstream from the confluence of Nogales Wash and the Arroyo Boulevard channels. The Arroyo Boulevard Covered Floodway also originates in Mexico and outlets beneath the public library in Nogales, Arizona. From the outlets of the covered floodways, floodwaters from the Nogales Wash drainage are conveyed through the city in open, concrete-lined channels. In August 2007 flow within the Nogales Wash destroyed half of the channel bottom for 116 linear feet. See Figures 7-10.



Figure 7 – Nogales Wash, Aug 2007



Figure 8 – Nogales Wash, Aug 2007



Figure 9 – Nogales Wash, Aug 2007



Figure 10 – Nogales Wash, Aug 2007

The only other major flood protection measures located in the city are on Ephriam Canyon Wash. The Ephriam Canyon channel was enlarged in the early 1930s to provide flood protection for an army camp located in the floodplain of the streams at that time. There has also been a covered floodway installed on the lower end of Ephriam Canyon Wash to convey floodwaters from the west side of Bayze Avenue to the confluence with Nogales Wash.

A series of corrugated metal pipe-arch and concrete box structures located on the west side of Arroyo Boulevard between Walnut and Quarry Streets offer some flood protection for this area.

Another small flood control project consists of a levee system located near Lincoln Elementary School, which was designed to protect the school and local residences. The levee system, however, does not tie into the hill at the mouth of the canyon, and floodwaters can overtop the channel at this point.

### **3.0 ENGINEERING METHODS**

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance premium 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 which equals or exceeds the 100-year flood (1 percent chance of annual occurrence) in any 50-year period is approximately 40 percent (4 in 10) , and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this FIS. Maps and flood elevations will be amended periodically to reflect future changes.

### **3.1 Hydrologic Analyses**

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

The hydrologic methodology employed for the overall study was separated into two groups: limited detail study reaches and their associated contributing watersheds and detailed study reaches and their associated contributing watersheds. Peak discharges for the 1-percent-annual-chance event were determined for each stream reach. Additional discharges for the 10-, 2-, 0.2-percent-annual-chance events were determined for detailed study streams which have multiple profiles.

Peak discharges for limited detail study reaches, with the exception of Puerto Canyon, were determined utilizing USGS regional regression equations and Arizona Department of Water Resources (ADWR) State Standard (SS) 02-96 (Reference 6) for Region 13, multiplied by a factor of 1.6. Experience indicated that regional regression equations alone produce low values for peak discharges in Santa Cruz County. This phenomenon is attributed to a lack of an adequate sample of gauged streams in Santa Cruz County. In addition, the average standard error for 1-percent-annual-chance peak discharges determined by the regression equation is  $\pm 48\%$ . The factor was determined based upon a comparison of peak discharges determined by HEC modeling developed for two (2) watersheds within Santa Cruz County and peak discharges determined by Pima County methodology for three (3) representative watersheds of variable area in Santa Cruz County. The 1-percent-annual-chance peak discharge for Puerto Canyon was determined from a previous study, utilizing HEC-1. Peak flows for limited detail streams within a detail study watershed were determined utilizing the following HEC-1 methodology.

Peak discharges for detailed study streams with the exception of Nogales Wash (Potrero Creek) and the Santa Cruz River, were determined utilizing HEC-1. The physical processes were determined by the following components.

1. Rainfall – NOAA Atlas 14
2. Rainfall Distribution – Hypothetical
3. Rainfall Losses – Green and Ampt
4. Rainfall Transformation – Clark Unit Hydrograph
5. Rainfall Translation – Modified Puls

These components are consistent with the Hydrologic Modeling Guidelines State Standard (SS10-07) (Reference 7) developed by the Arizona Department of Water Resources State Standards Work Group.

Peak discharges for Potrero Creek and Nogales Wash (including the portion downstream of the confluence with Potrero Creek, which is currently called Potrero Creek) and the

Santa Cruz River were determined from USACE 2001 and 2003 studies (see References 8 and 9).

Contributing watershed area is the only hydrologic parameter required for the limited detail reaches. This is the only parameter required for the Region 13 Regression Equation used for this study group.

The estimation of hydrologic parameters for the detailed reaches was performed in accordance with guidelines provided within SS10-07.

The limits of the overall study area are generally those regions contributing runoff to the Santa Cruz River which drains north into Pima County. One study stream, Lyle Canyon drains east into Cochise County. In general, the majority of those regions contributing runoff to the Santa Cruz River are located within Santa Cruz County Nogales Wash, and Ephriam Canyon Wash have headwaters in Sonora, Mexico; south of Santa Cruz County. The Santa Cruz River has headwaters in eastern Santa Cruz County; however the stream drains south into Mexico and reenters Santa Cruz County east of Nogales. Nearly 75 percent of the region that contributes runoff to Sopori Wash is located within the eastern portion of Pima County.

The total watershed area evaluated under this study, excluding the Santa Cruz River and Nogales Wash watersheds is approximately 750 square miles. Of the total area evaluated, nearly 677 square miles is accounted for within the detailed study reach group.

Watershed characteristics vary throughout the study areas and can be segmented into two broad general characteristics: steep and shallow watersheds. Steep watersheds are those with the majority of the hydraulic flow path (often called the  $T_c$  Path) having slopes greater than 200 feet per mile. Shallow watersheds have a majority of the  $T_c$  Path(s) with a slope less than 200 feet per mile. Vegetative coverage for both of these types of systems tends to be within a range of 20-40 percent. Soil types are predominately sandy loam.

Work maps were developed using LiDAR point data and 7.5-minute quadrangles as published by USGS.

Gage data is limited within the study area, and the reliability of associated statistical 1-percent-annual-chance peak discharges values are "uncertain, and potential errors are large" (Reference 10). One gage, Sopori Wash at Amando, Arizona (09481750), has been inactive since 1978 and the length of recorded data is only 30 years. The estimate of the peak discharge, during the 1-percent-annual-chance event, is 17,100 cubic feet per second (cfs) (Reference 10). A gage on Sonoita Creek near Patagonia (09481500) has records for 1930-72, 1978 and 1984. The estimate for 1-percent-annual-chance peak discharge is 15,100 cfs. The 1-percent-annual-chance peak discharge for Calabasas Canyon near Nogales, Arizona (09481700) is 2,540 cfs for records from 1963-76 and 1978. Gages for the Santa Cruz River were considered within the Corps study.

In general there are no significant periods of rainfall and stream flow available.

Precipitation data for the centroid of the watershed was obtained from the National Oceanic & Atmospheric Administration (NOAA) data server which utilizes NOAA Atlas 14 data applicable to Arizona (Reference 11). In accordance with SS10-07 guidance, a

hypothetical storm is developed in HEC-1 based on the storm duration, reduction factor, area of the specific watershed, and Depth-Duration-Frequency (DDF) data.

No comparison of the hypothetical rainfall pattern to rainfall patterns on record or by other hydrologic study was performed given the lack of available information.

Rainfall loss methodology consists of an estimation of surface retention (IA) based on land use type(s) and rainfall infiltration losses by the Green-Ampt loss equation. Surface retention loss values are based on land use conditions (e.g., rangeland, mountain, hillside, developed...etc.).

Soil horizon information was obtained through review of the NRCS soil surveys (Reference 12 and 13). Land use conditions were obtained by the USGS Gap Analysis (Reference 14).

Green-Ampt equation parameters are estimated as a function of soil texture. Parameters consist of porosity (DTHETA), saturated hydraulic conductivity (XKSAT), and the wetting front soil suction head (PSIF). Hydraulic conductivity is adjusted based on vegetative ground cover. Typical values for these parameters are provided within the ADOT guidelines. Hydrologic modeling also took into consideration the percent of impervious area due to land use types. Impervious regions are those regions that have no rainfall losses (RTIMP). Values of impervious areas, soil characteristics, and vegetative coverage were taken from several references along with field investigation.

SS10-07 methodology utilizes the Clark Unit Hydrograph. The unit hydrograph is solely based on physical basin parameters as shown in the following equations.

$$T_c = 2.4 A^{0.1} L^{0.25} L_{ca}^{0.25} S^{-0.2} \quad (\text{Desert/Mountain, SS10-17, eq. 3.2})$$

$$T_c = 3.2 A^{0.1} L^{0.25} L_{ca}^{0.25} S^{-0.14} RTIMP^{-0.36} \quad (\text{Urban, SS10-07, eq. 3.4})$$

- $T_c$  – Time of Concentration in hours
- $A$  – Area in square miles
- $L$  – Length of the flow path to the hydraulically most distance point in miles
- $L_{ca}$  – Length along  $L$  to a point opposite the centroid in miles
- $S$  – Average slope of  $L$  in feet per mile, adjusted per FCDMC methodology
- $RTIMP$  – Effective impervious area, in percent

A storage coefficient is also computed and is a Clark Unit Hydrograph parameter that relates the effects of direct storage in the watershed to unit hydrograph shape.

$$R = 0.37 T_c^{1.11} A^{-0.57} L^{0.80} \quad (\text{SS10-07, eq. 3.5})$$

- $R$  – Storage coefficient in hours (variables are as defined in  $T_c$  equation)

The time-area relation is a graphical unit hydrographic parameter that specifies the accumulated area of the watershed that is contributing runoff to the outlet of the watershed at any time. The ADOT Dimensionless Synthetic Time-Area Relations as specified in SS10-07 were utilized.

Per SS10-07 guidelines, the hydrograph duration, used for modeling was the 3-hour, 6-hour or 24-hour period, based on the Time of Concentration ( $T_c$ ) for the entire stream

watershed under consideration.

The Modified-Puls methodology was employed for channel routing.

Warning messages were encountered during channel routing operations for several concentration points within each hydrologic model (i.e., HEC-1). The following is an example of the warning message encountered.

```
*** WARNING *** MODIFIED PULS ROUTING MAY BE NUMERICALLY  
UNSTABLE FOR OUTFLOWS BETWEEN 0 TO 1005672. THE ROUTED  
HYDROGRAPH SHOULD BE EXAMINED FOR OSCILLATIONS OR OUTFLOWS  
GREATER THAN PEAK INFLOWS. THIS CAN BE CORRECTED BY  
DECREASING THE TIME INTERVAL OR INCREASING STORAGE (USE A  
LONGER REACH.)
```

A close examination of each routed hydrograph found that no unusual irregularities or oscillations occurred, therefore, no solution or additional steps appeared warranted.

Once modeling results were obtained and reviewed calibration of the models were not performed given the limited information (e.g., gage data, previous FEMA or other hydrologic studies) available for this region.

A summary of the peak discharges for the detailed streams is included in the following table.

Table 4 – Summary of Discharges

| <u>Flooding Source and Location</u>        | <u>Drainage Area<br/>(Square Miles)</u> | <u>Peak Discharges (Cubic Feet per Second)</u> |                             |                             |                              |
|--|---|--|-----------------------------|-----------------------------|------------------------------|
|  |   | <u>10%-Annual<br/>Chance</u>                   | <u>2%-Annual<br/>Chance</u> | <u>1%-Annual<br/>Chance</u> | <u>.2%-Annual<br/>Chance</u> |
| Agua Fria Canyon                           |   |  |                             |                             |                              |
| At Confluence with Santa Cruz River        | 44.60                                   | 6,538  | 7,958                       | 9,861                       | 14,192                       |
| At Upstream Limit of Study                 | 11.06                                   | 2,343  | 2,885                       | 3,508                       | 5,266                        |
| Al Harrison Wash                           |   |  |                             |                             |                              |
| At 1275 Feet Downstream Interstate 19      | 1.14                                    | 794  | 1,664                       | 2,197                       | 3,700                        |
| Alamo Wash                                 |   |  |                             |                             |                              |
| At Interstate 19                           | 4.74                                    | -- <sup>1</sup>                                | -- <sup>1</sup>             | 3350                        | -- <sup>1</sup>              |
| Ephriam Canyon                             |   |  |                             |                             |                              |
| At Underground Culvert Inlet (Ramirez Dr.) | 7.00                                    | 1,744  | 3,115                       | 3,763                       | 5,272                        |
| Downstream Interstate 19                   | 6.00                                    | 1,610  | 2,903                       | 3,460                       | 4,799                        |
| Upstream Highway 189                       | 5.40                                    | 1,473  | 2,681                       | 3,160                       | 4,417                        |
| International Boundary                     | 4.80                                    | 1,277  | 2,326                       | 2,753                       | 3,898                        |
| Farosa Canyon                              |   |  |                             |                             |                              |
| Above Confluence with Lyle Canyon          | 2.30                                    | 595  | 1,100                       | 1,388                       | 2,032                        |

<sup>1</sup>Data not available

| <u>Flooding Source and Location</u>    | <u>Drainage Area<br/>(Square Miles)</u> | <u>Peak Discharges (Cubic Feet per Second)</u> |                             |                             |                              |
|--|---|--|-----------------------------|-----------------------------|------------------------------|
|  |   | <u>10%-Annual<br/>Chance</u>                   | <u>2%-Annual<br/>Chance</u> | <u>1%-Annual<br/>Chance</u> | <u>.2%-Annual<br/>Chance</u> |
| <b>Harshaw Creek</b>                   |   |  |                             |                             |                              |
| Confluence with Red Rock Canyon        | 64.10                                   | 2,955  | 6,725                       | 8,601                       | 14,217                       |
| Above Confluence with Red Rock Canyon  | 32.50                                   | 1,390  | 3,149                       | 4,155                       | 6,683                        |
| <b>Josephine Canyon</b>                |   |  |                             |                             |                              |
| At Confluence with Santa Cruz River    | 49.10                                   | 8,211  | 15,919                      | 19,594                      | 28,657                       |
| At Upstream Limit of Study             | 39.60                                   | 7,075  | 13,103                      | 16,036                      | 23,137                       |
| <b>Lyle Canyon</b>                     |   |  |                             |                             |                              |
| At Confluence with Woodyard Canyon     | 27.10                                   | 3,964  | 7,466                       | 9,090                       | 13,067                       |
| At Confluence with Farosa Canyon       | 25.30                                   | 3,789  | 6,986                       | 8,426                       | 12,029                       |
| Upstream Confluence with Farosa Canyon | 23.00                                   | 3,498  | 6,258                       | 7,527                       | 10,730                       |
| <b>Mariposa Canyon</b>                 |   |  |                             |                             |                              |
| At Confluence with Nogales Wash        | 12.50                                   | 1,840  | 4,680                       | 6,500                       | 15,600                       |
| At Interstate 19                       | 12.00                                   | 1,780  | 4,540                       | 6,300                       | 15,120                       |
| At Western Corporate Limits            | 9.10                                    | 1,470  | 3,740                       | 5,200                       | 12,480                       |
| <b>Mariposa Canyon Tributary 1</b>     |   |  |                             |                             |                              |
| At Confluence with Mariposa Canyon     | 0.40                                    | 200  | 520                         | 720                         | 1,730                        |
| <b>Mariposa Canyon Tributary 2</b>     |   |  |                             |                             |                              |
| At Confluence with Mariposa Canyon     | 0.40                                    | 220  | 550                         | 760                         | 1,820                        |

| <u>Flooding Source and Location</u>  | <u>Drainage Area<br/>(Square Miles)</u> | <u>Peak Discharges (Cubic Feet per Second)</u> |                             |                             |                              |
|--------------------------------------|---|--|-----------------------------|-----------------------------|------------------------------|
|                                      |   | <u>10%-Annual<br/>Chance</u>                   | <u>2%-Annual<br/>Chance</u> | <u>1%-Annual<br/>Chance</u> | <u>.2%-Annual<br/>Chance</u> |
| Nogales Wash                         |   |  |                             |                             |                              |
| At Potrero Creek                     | 76.10                                   | 6,690  | 15,700                      | 21,800                      | 52,320                       |
| City Limits (Upstream Potrero Creek) | 61.00                                   | 5,460  | 14,040                      | 19,500                      | 46,800                       |
| Nogales Wash (continued)             |   |  |                             |                             |                              |
| At Railroad Bridge                   | 58.40                                   | 5,350  | 13,750                      | 19,100                      | 45,840                       |
| At Mariposa Canyon                   | 56.50                                   | 5,260  | 13,540                      | 18,800                      | 45,120                       |
| At 4.083 miles                       | 40.90                                   | 4,510  | 11,590                      | 16,100                      | 38,640                       |
| At Ephriam Canyon                    | 35.80                                   | 4,230  | 10,870                      | 15,100                      | 36,240                       |
| Overland Flow Total                  | -- <sup>1</sup>                         | 840  | 2,220                       | 5,900                       | 24,340                       |
| Nogales Covered Floodway             | -- <sup>1</sup>                         | 2,350  | 6,000                       | 6,000                       | 6,000                        |
| Arroyo Covered Floodway              | -- <sup>1</sup>                         | 590  | 1,500                       | 1,600                       | 2,060                        |
| International Boundary               | 27.40                                   | 3,780  | 9,720                       | 13,500                      | 32,400                       |
| Peck Canyon                          |   |  |                             |                             |                              |
| At Interstate 19                     | 47.49                                   | 9,632  | 15,700                      | 18,315                      | 25,570                       |
| At Upstream Limit of Study           | 32.26                                   | 7,520  | 11,891                      | 13,876                      | 19,184                       |
| Potrero Creek                        |   |  |                             |                             |                              |
| At Santa Cruz River                  | 93.40                                   | 7,430  | 17,420                      | 24,200                      | 58,080                       |
| At Pickrell Bridge (Old Tucson Road) | 90.30                                   | 7,310  | 17,140                      | 23,800                      | 57,120                       |
| Downstream of S. River Rd.           | 83.25                                   | 7,010  | 16,450                      | 22,850                      | 54,840                       |

<sup>1</sup>Not Applicable

| <u>Flooding Source and Location</u>         | <u>Drainage Area<br/>(Square Miles)</u> | <u>Peak Discharges (Cubic Feet per Second)</u> |                             |                             |                              |
|---|---|--|-----------------------------|-----------------------------|------------------------------|
|   |   | <u>10%-Annual<br/>Chance</u>                   | <u>2%-Annual<br/>Chance</u> | <u>1%-Annual<br/>Chance</u> | <u>.2%-Annual<br/>Chance</u> |
| Potrero Creek (continued)                   |   |  |                             |                             |                              |
| Upstream of Nogales Wash                    | 14.03                                   | 2,070  | 5,330                       | 7,400                       | 17,760                       |
| At U.S. Highway 89 Bridge                   | 13.51                                   | 1,990  | 5,110                       | 7,100                       | 17,040                       |
| At Western Corporate Limits                 | 11.58                                   | 1,710  | 4,390                       | 6,100                       | 14,640                       |
| Upstream Limit of Study                     | 10.50                                   | 1,540  | 3,960                       | 5,500                       | 13,200                       |
| Puerto Canyon Wash                          |   |  |                             |                             |                              |
| Upstream Limit of Study                     | 7.00                                    | 2,250  | 4,850                       | 6,500                       | 13,800                       |
| At Puerto Canyon Wash Breakout 1 Divergence | -- <sup>1</sup>                         | 1,940  | 4,130                       | 5,575                       | 11,990                       |
| At Interstate 19                            | -- <sup>1</sup>                         | 1,940  | 4,130                       | 4,600                       | 7,500                        |
| At Puerto Canyon Wash Breakout 2 Divergence | -- <sup>1</sup>                         | 1,940  | 3,700                       | 4,000                       | 6,500                        |
| At Circulo De Anza                          | -- <sup>1</sup>                         | 1,940  | 3,000                       | 3,250                       | 4,050                        |
| At Camino Esplendido                        | -- <sup>1</sup>                         | 1,680  | 2,230                       | 2,350                       | 2,650                        |
| Red Rock Canyon                             |   |  |                             |                             |                              |
| Above Confluence with Harshaw Creek         | 31.60                                   | 1,832  | 4,208                       | 5,497                       | 8,905                        |
| Santa Cruz River                            |   |  |                             |                             |                              |
| Pima/Santa Cruz County Line                 | 1448.00                                 | 15,750   | 32,400                      | 45,000                      | 108,000                      |
| Amado-Montosa Road                          | 1279.00                                 | 15,050   | 30,960                      | 43,000                      | 103,200                      |
| Bridge Road in Tubac                        | 1209.00                                 | 14,700   | 30,240                      | 42,000                      | 100,800                      |
| Confluence with Josephine Canyon Wash       | 1163.00                                 | 14,490   | 29,810                      | 41,400                      | 99,360                       |
| Confluence with Peck Canyon Wash            | 1097.00                                 | 14,180   | 29,160                      | 40,500                      | 97,200                       |
| Confluence with Agua Fria Wash              | 1045.00                                 | 13,900   | 28,580                      | 39,700                      | 95,280                       |
| Santa Cruz River                            |   |  |                             |                             |                              |
| Rio Rico Drive                              | 1000.00                                 | 13,650   | 28,080                      | 39,000                      | 93,600                       |
| Railroad Bridge near RR S. Industrial Park  | 722.00                                  | 12,220   | 25,130                      | 34,900                      | 83,760                       |
| Downstream of Guevavi Canyon                | 620.00                                  | 11,660   | 23,980                      | 33,300                      | 79,920                       |
| Downstream of Burro Canyon                  | 610.00                                  | 11,600   | 23,870                      | 33,150                      | 79,560                       |
| Downstream of Cumero Canyon                 | 603.00                                  | 11,550   | 23,760                      | 33,000                      | 79,200                       |

<sup>1</sup>Not Applicable

| <u>Flooding Source and Location</u>                       | <u>Drainage Area<br/>(Square Miles)</u> | <u>Peak Discharges (Cubic Feet per Second)</u> |                             |                             |                              |
|---|---|--|-----------------------------|-----------------------------|------------------------------|
|   |   | <u>10%-Annual<br/>Chance</u>                   | <u>2%-Annual<br/>Chance</u> | <u>1%-Annual<br/>Chance</u> | <u>.2%-Annual<br/>Chance</u> |
| Santa Cruz River (continued)                              |   |  |                             |                             |                              |
| Highway 82 Bridge   | 574.00                                  | 11,380   | 23,400                      | 32,500                      | 78,000                       |
| International Border                                      | 532.00                                  | 11,200   | 23,040                      | 32,000                      | 76,800                       |
| Sonoita Creek   |   |  |                             |                             |                              |
| At Confluence with Santa Cruz River                       | 258.30                                  | 6,705  | 15,389                      | 20,514                      | 34,477                       |
| Downstream Patagonia Lake (Cross Section BI) <sup>1</sup> | 246.20                                  | 6,701  | 15,373                      | 20,451                      | 34,309                       |
| Sonoita Creek (continued)                                 |   |  |                             |                             |                              |
| Confluence with Harshaw Creek                             | 137.80                                  | 5,374  | 12,879                      | 17,253                      | 27,660                       |
| Sonoita Tributary A                                       |   |  |                             |                             |                              |
| At Confluence with Sonoita Creek                          | 2.01                                    | 461  | 710                         | 821                         | 1,080                        |
| Sopori Wash   |   |  |                             |                             |                              |
| Downstream of Interstate 19                               | 166.79                                  | 4,965  | 9,779                       | 12,338                      | 19,044                       |
| At Upstream Limit of Study                                | 111.05                                  | 4,210  | 7,846                       | 9,675                       | 14,757                       |
| Tubac Creek   |   |  |                             |                             |                              |
| Upstream of Divergence                                    | 4.76                                    | -- <sup>2</sup>                                | -- <sup>2</sup>             | 3570                        | -- <sup>2</sup>              |
| Upstream of Interstate 19                                 | -- <sup>2</sup>                         | -- <sup>2</sup>                                | -- <sup>2</sup>             | 2932                        | -- <sup>2</sup>              |

<sup>1</sup>Discharges reflect influence of Patagonia Lake

<sup>2</sup>Data not available

| <u>Flooding Source and Location</u> | <u>Drainage Area<br/>(Square Miles)</u> | <u>Peak Discharges (Cubic Feet per Second)</u> |                             |                             |                              |
|-------------------------------------|---|--|-----------------------------|-----------------------------|------------------------------|
|                                     |   | <u>10%-Annual<br/>Chance</u>                   | <u>2%-Annual<br/>Chance</u> | <u>1%-Annual<br/>Chance</u> | <u>.2%-Annual<br/>Chance</u> |
| Downstream of Interstate 19         | -- <sup>1</sup>                         | -- <sup>1</sup>                                | -- <sup>1</sup>             | 2,932                       | -- <sup>1</sup>              |
| Downstream of Tributary 1           | -- <sup>1</sup>                         | -- <sup>1</sup>                                | -- <sup>1</sup>             | 3,142                       | -- <sup>1</sup>              |
| Tubac Creek North Channel           |   |  |                             |                             |                              |
| Upstream of Interstate 19           | -- <sup>1</sup>                         | -- <sup>1</sup>                                | -- <sup>1</sup>             | 1,372                       | -- <sup>1</sup>              |
| Downstream of Interstate 19         | -- <sup>1</sup>                         | -- <sup>1</sup>                                | -- <sup>1</sup>             | 1,060                       | -- <sup>1</sup>              |
| Tributary 1 of Tubac Creek          | 0.44                                    | -- <sup>1</sup>                                | -- <sup>1</sup>             | 540                         | -- <sup>1</sup>              |
| Tributary 2 of Tubac Creek          | 0.40                                    | -- <sup>1</sup>                                | -- <sup>1</sup>             | 480                         | -- <sup>1</sup>              |
| Woodyard Canyon                     |   |  |                             |                             |                              |
| Above Confluence with Lyle Canyon   | 1.80                                    | 737  | 1,264                       | 1,504                       | 2,075                        |

<sup>1</sup>Data Not Available

### 3.2 Hydraulic Analyses

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

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

The watercourses evaluated within this study are all located within the corporate boundary of Santa Cruz County. The general physical characteristics of these watercourses are exhibited by sand and gravel channel beds with vegetative overbanks that vary in coverage and density.

Standard hydraulic methods, in accordance with USACE modeling guidelines, were used to determine the 1-percent-annual-chance flood boundaries for this study. Analyses reported herein reflect current conditions of the streams. The HEC-RAS River Analysis System computer program was used for all water surface profile modeling.

Due to FEMA floodplain modeling criteria, per *Guidelines and Specifications for Flood Hazard Mapping Partners*, all reaches were modeled using a subcritical flow regime. This produces a higher water surface elevation (WSEL) when a reach or portion thereof is actually below critical depth.

The starting WSEL was extracted from other watercourses evaluated within this study where such was encountered. However, where such was not available or could be obtained readably, the starting WSEL method used was normal depth based on the existing downstream gradient of a given watercourse.

HEC-RAS modeling of the Santa Cruz River was conducted from the Pima County-Santa Cruz County boundary to the International Border, which constitutes a 38-mile study reach. The starting WSEL for the 1-percent-annual-chance profile corresponds to Cross Section FF (Section 913) of the effective HEC-2 model for Pima County, which was adjusted from 3034.40 (NGVD) to 3037.02 (NAVD) using an adjustment factor of 2.62 ft. However, since the floodway elevation at this section was 3034.2 (NGVD), which reflects a negative surcharge of 0.2 feet, the starting WSEL for the floodway model was also 3034.4 (NGVD) or 3037.02 (NAVD). The WSELs for the remaining profiles were estimated by applying the selected discharges to a truncated version of the effective model that started at Cross Section FA (Section 908). The boundary condition at Section FA for the three profiles (10-, 50-, and 500-year) were based on normal depth with an assumed slope of 0.2%. The computed WSELs at Cross Section FF (Section 913) from the truncated model were then assumed to be the known WSELs for the respective profiles.

HEC-RAS modeling of the Potrero Creek was conducted from its confluence with the Santa Cruz River to the upstream limit of the study reach, which constitutes a 7.4-mile study reach. The starting water-surface elevations for all profiles were based on the corresponding water-surface elevations for the Santa Cruz River at the confluence.

The study reach for the Santa Cruz River was subdivided into seven sub-reaches. The study reach for Potrero Creek was divided into two sub-reaches. Sonoita Creek was divided into four sub-reaches. Reach 2 of Sonoita Creek was further divided into three sub-reaches due to Patagonia Lake. Josephine Canyon was divided into two sub-reaches. Separate HEC-RAS project files were created for each sub-reach. The sub-reaches are numbered from downstream to upstream. The primary purpose of subdividing the reaches was to facilitate concurrent modeling, thus reducing the time required to complete the overall modeling effort and to facilitate Geo-RAS processing. Each reach includes at least one overlapping section from the adjoining downstream and/or upstream reach. Several reaches include three overlapping sections.

In general, channel bottoms are relatively smooth sand and gravel channel beds and were assigned a base coefficient of between 0.028 and 0.045. These base values were adjusted to account for other factors such as density of vegetation, channel irregularity, effects of obstructions, variations in channel cross-section and degree of channel meandering.

Portions of the channel overbanks are densely vegetated with grasses, bushes and trees and were assigned an appropriate additional roughness value. In highly urbanized areas, an n-value of 1.0 was utilized to represent the ineffective flow characteristics of the overbank areas.

Aerial photography and site investigations were used in conjunction with two USGS publications and Chapter 5 of the *Arizona Department of Transportation Highway Drainage Design Manual, Hydrology* to estimate the channel roughness coefficients along the study reaches. The two USGS publications are: (1) *Roughness Coefficients for Stream Channels in Arizona, Open-File Report*, February 1973, and (2) *Verification of Roughness Coefficients for Selected Natural and Constructed Stream Channels in Arizona*, Profession Paper 1584.

A summary of the n-values is listed in the following table.

Table 5 – Manning’s “n” Values

| <u>Stream</u>                             | <u>Channel</u> | <u>Overbanks</u> |
|---|----------------|------------------|
| Agua Fria Canyon                          | 0.033 – 0.047  | 0.049 – 0.060    |
| Agua Fria Tributary 1                     | 0.030 – 0.035  | 0.040 – 0.058    |
| Al Harrison Wash                          | 0.016 – 0.030  | 0.040 – 0.080    |
| Calabastas Canyon                         | 0.030 – 0.050  | 0.045 – 0.090    |
| Caralampi Canyon                          | 0.030 – 0.038  | 0.050 – 0.065    |
| Caralampi Tributary 2                     | 0.035          | 0.055            |
| Caralampi Tributary 3                     | 0.035          | 0.055            |
| Ephriam Canyon Wash                       | 0.016 – 1.000  | 0.016 – 1.000    |
| Farosa Canyon (Tributary of Lyle)         | 0.035 – 0.036  | 0.040 – 0.050    |
| Harshaw Creek (Tributary of Sonoita)      | 0.035          | 0.040 – 0.050    |
| Josephine Canyon                          | 0.035          | 0.030 – 0.050    |
| Josephine Tributary 1                     | 0.016 – 0.040  | 0.016 – 0.050    |
| Josephine Tributary 5                     | 0.035          | 0.040            |
| Kino Springs Wash                         | 0.030 – 0.035  | 0.040 – 0.045    |
| Kino Springs Tributary 39.1               | 0.016 – 0.040  | 0.016 – 0.050    |
| Kino Springs Tributary 39.3               | 0.016 – 0.045  | 0.040 – 0.050    |
| Lyle Canyon                               | 0.030          | 0.036 – 0.050    |
| Maria Santisima del Carmen Wash (Trib 41) | 0.030 – 0.040  | 0.040 – 0.050    |
| Mariposa Canyon                           | 0.035 - 0.040  | 0.040 - 1.000    |
| Negro Canyon (Tributary 13)               | 0.034 – 0.039  | 0.055 – 0.069    |
| Nogales Wash                              | 0.020 – 0.080  | 0.035 – 1.000    |
| Patagonia Lake Weir                       | 0.035          | 0.050            |
| Peck Canyon                               | 0.034 – 0.042  | 0.044 – 0.065    |
| Peck Canyon Tributary 1                   | 0.030          | 0.045            |
| Potrero Creek                             | 0.040 – 0.08   | 0.040 – 0.100    |
| Potrero Creek Tributary 1                 | 0.016 – 0.030  | 0.020 – 0.050    |
| Puerto Canyon                             | 0.041 – 0.055  | 0.080 – 0.090    |
| Puerto Breakout 1                         | 0.041          | 0.080            |
| Puerto Breakout 2                         | 0.041          | 0.080            |
| Ramanote (Tributary of Peck Canyon)       | 0.030          | 0.043            |
| Redrock Canyon (Tributary of Sonoita)     | 0.035          | 0.040 – 0.050    |
| Santa Cruz River                          | 0.030 – 0.080  | 0.035 – 0.070    |
| Santa Cruz River Tributary 14             | 0.016 – 0.040  | 0.016 – 0.050    |
| Santa Cruz River Tributary 15             | 0.034 – 0.050  | 0.050 – 0.064    |
| Santa Cruz River Tributary 16             | 0.030 – 0.035  | 0.042 – 0.045    |
| Santa Cruz River Tributary 17             | 0.016 – 0.030  | 0.042 – 0.050    |
| Santa Cruz River Tributary 18             | 0.016 – 0.050  | 0.042 – 0.065    |
| Santa Cruz River Tributary 19             | 0.030 – 0.045  | 0.037 – 0.050    |
| Santa Cruz River Tributary 21             | 0.016 – 0.040  | 0.040 – 0.050    |
| Santa Cruz River Tributary 24             | 0.016 – 0.030  | 0.016 – 0.055    |
| Santa Cruz River Tributary 28             | 0.016 – 0.035  | 0.016 – 0.050    |
| Santa Cruz River Tributary 29             | 0.027 – 0.040  | 0.016 – 0.050    |
| Santa Cruz River Tributary 41.2.1         | 0.045          | 0.035 – 0.045    |
| Sonoita Creek                             | 0.030 – 0.035  | 0.040 – 1.000    |
| Sonoita Overflow – East of Railroad       | 0.035          | 0.040            |
| Sopori Wash                               | 0.040 – 0.047  | 0.060 – 0.115    |
| Teruno (Tributary of Agua Fria)           | 0.032 – 0.040  | 0.055 – 0.064    |
| Tinaja Canyon                             | 0.032 – 0.049  | 0.032 – 0.104    |

| <u>Stream</u>                       | <u>Channel</u> | <u>Overbanks</u> |
|-------------------------------------|----------------|------------------|
| Tributary A (Tributary of Sonoita)  | 0.035          | 0.060            |
| Tumacacori (Tributary 10)           | 0.032 – 0.040  | 0.053 – 0.059    |
| Woodyard Canyon (Tributary of Lyle) | 0.035          | 0.040            |
| Yerba Buena Canyon (Falls Wash)     | 0.016 – 0.030  | 0.035 – 0.060    |

Commonly applied expansion and contraction coefficients as outlined in the HEC-RAS Hydraulic Reference manual were used along all study reaches.

Following completion of reproducible topographic mapping, stream thalwegs were sketched on work prints. Cross-section locations for a given reach were then selected and adjusted to account for the perceived direction of flow. Criteria for selection included:

1. Representative of the local stream reach
2. Orient sections perpendicular to the anticipated flow direction
3. Avoid inclusion of non-effective areas such as major tributary washes and regions outside of parallel embankment and large ponding areas
4. Include the entire predicted 1- or 0.2-percent-annual-chance floodplain
5. Cross-section spacing for detailed study reaches was made at approximately 500-foot intervals or as needed to account for stream variations or other features
6. Cross-section spacing for limited detail study reaches was made at approximately 1,000-foot intervals or as needed to account for stream variations or other features

Hydraulic jumps were noted to occur within the subject study reaches. Such features, in general, occur outside the transition zone of flow regimes (i.e., outside of the Froude number range of 0.85 and 1.25).

A review of these features and their associated influence on the water surface elevations found that no additional attention, adjustment or modification of the associated base flood elevation was necessary.

Bridges and culverts were modeled using special bridge and special culvert routines in HEC-RAS. Standard modeling approaches were applied.

The HEC-RAS levee function was used on occasion to remove conveyance from a given cross-section or range of sections so that a more realistic modeling of the study reaches would be obtained. For example, along Calabasas Canyon (limited detail study reach) from RM 3.332 to 3.267 there appears a low point within the cross-sections. However, upon review of the field conditions and the topographic mapping this area is a tributary and therefore does not convey flow within the Calabasas Canyon. Use of the levee function, although this is not a levee, allowed for a higher resulting base flood elevation and likely is more realistic of the conditions that occur within this watercourse during flooding.

Railroad embankments located within the eastern overbank area of the Santa Cruz River floodplain parallels the main channel from just downstream of the Potrero Creek (Nogales Wash) confluence to the Santa Cruz/Pima County line. The embankment was modeled as an ineffective flow boundary that confined 100% of the flow to the channel side of the embankment. This approach produced the most conservative water-surface elevations. The area on the landward side of the embankment was mapped using these

water-surface elevations. Several agricultural levees that projected a short distance into the floodplain fringe area (perpendicular to the direction of flow) were mapped as rigid constrictions to provide the most conservative estimate of the water-surface elevations. Agricultural levees that paralleled the direction of flow were ignored in the modeling.

The embankments surrounding the Nogales International Wastewater Treatment Facility, which is located at the confluence of the Santa Cruz River and the Potrero Creek, was also treated as an ineffective flow area. The entire facility was mapped as being located in the regulatory floodplain.

The HEC-RAS split-flow routine was applied along the left bank of the Potrero Creek just upstream of its confluence with the Santa Cruz River. The Nogales International Wastewater Treatment Facility, which was constructed at the confluence, acts as an overbank island in the Potrero Creek floodplain. The split-flow routine was used to estimate the discharge that could potentially weir over the top of the left bank. Overtopping flows do not return to the main channel of the Potrero Creek, which joins the Santa Cruz River a short distance downstream. Overtopping flows are conveyed along the west side of the facility in a constructed earthen section that drains into the Santa Cruz River at the northern boundary of the facility. The split-flow routine was only applied to the 10-, 2-, and 1-percent-annual-chance models. The facility was treated as an island in the 0.2-percent-annual-chance model. The model for the western overflow channel is included in the Potrero Creek, Reach 01 project file.

A second split flow area in the immediate vicinity of the wastewater treatment facility was recognized during the preliminary stages of model development. This area is located on the east (right overbank) of the Santa Cruz River immediately upstream of the railroad bridge. The right bank in this area is too low to contain the backwater profile associated with the railroad bridge during the 1- and 0.2-percent-annual-chance events. Overtopping flows will enter the Sonoita Creek floodplain. However, the final mapping assumes no loss of flow, which provides the most conservative water-surface elevations for the short reach located downstream along the Santa Cruz River between the railroad bridge and the Sonoita Creek confluence.

At the downstream reach of Sonoita Creek, at Pendleton Road, flow splits and drains north, east of the of the Union Pacific Railroad track. A separate profile was modeled for this flow which ultimately joins with the 1-percent-annual-chance floodplain for the Santa Cruz River, south of Rio Rico Drive.

On the upstream portion of Tributary 41, a flow split condition was modeled. After field investigation, it was determined that flow split did not occur. However, given the flatness of the terrain and close proximity of the two streamlines, it was determined that using a split flow analysis was the most accurate way to model this streamline.

Areas such as roadway embankments at bridges and culverts, localized depressions, levees, tributary features, buildings and natural encroachments (e.g. hills) were modeled as ineffective flow using the standard modeling guidelines outlined in the HEC-RAS user's manual.

As previously noted, the most significant ineffective flow area was the area located along the east side of the railroad embankment that parallels the Santa Cruz River from the Potrero Creek confluence to the Santa Cruz/Pima County line.

Supercritical flow (Froude number greater than 1.00) for the 1-percent-annual-chance event occurs at isolated cross-sections throughout the study reaches, generally at some bridges and in steeper and narrow sections of the streams. Supercritical flow does not occur at three consecutive cross-sections or at more than 40% of cross-sections in a reach.

### **Levee Hazard Analysis**

On August 22, 2005, FEMA issued Procedure Memorandum No. 34 – Interim Guidance for Studies Including Levees. The purpose of the memorandum was to help clarify the responsibility of community officials or other parties seeking recognition of a levee by providing information identified during a study/mapping project. Often, documentation regarding levee design, accreditation, and the impacts on flood hazard mapping is outdated or missing altogether. To remedy this, Procedure Memorandum No. 34 provides interim guidance on procedures to minimize delays in near-term studies/mapping projects, to help our mapping partners properly assess how to handle levee mapping issues.

While 44 CFR Section 65.10 documentation is being compiled, the release of more up-to-date FIRM panels for other parts of a community or county may be delayed. To minimize the impact of the levee recognition and certification process, FEMA issued Procedure Memorandum No. 43 - Guidelines for Identifying Provisionally Accredited Levees on March 16, 2007. These guidelines will allow issuance of preliminary and effective versions of FIRMs while the levee owners or communities are compiling the full documentation required to show compliance with 44 CFR Section 65.10. The guidelines also explain that preliminary FIRMs can be issued while providing the communities and levee owners with a specified timeframe to correct any maintenance deficiencies associated with a levee and to show compliance with 44 CFR Section 65.10.

Santa Cruz County currently has no mapped levees. Any levees before the original FIRMs were compiled were washed away and destroyed. The vast majority of these levees were farm levees or stock pond berms, which were never meant to provide real flood protection. Additionally the original FIRM's produced in the 1970's were not prepared by FEMA, because FEMA did not exist during that time.

It was determined that no protecting levees exist within Santa Cruz County.

### **Special Considerations**

The following problems or special considerations were noted to occur within the reaches evaluated within this study.

#### **Agua Fria**

An active in-stream mine was noted during field investigation (commencing near RM 2.351) and affects the resulting floodplain through this region. Although there may be a slight possibility that upstream flow could breakout within the left overbank and, after careful consideration, was deemed to be contained within the resulting floodplain limits. The watercourse profile was noted to change dramatically (from sudden steep slopes to nearly flat slopes) across this region.

During the less frequent events there appears to be a possibility that flow may leave the system at or near RM 0.257 due to a low profile point within Interstate 19. However, the amount of discharge through this area (initially modeled with a lateral weir modeling feature) was relatively minor and therefore it was assumed that the main channel would contain the entire flow downstream.

#### **Agua Fria Tributary 1**

Near RM 1.293 there appears to be a possibility that flow may enter the extreme right overbank and therefore the modeler recommends that this region be considered as a shallow depth floodplain.

#### **Calabasas Canyon**

Commencing at RM 1.151 there appears to be a possibility that flow may enter the extreme right overbank and therefore the modeler recommends that this region be considered as a shallow depth floodplain to a location just downstream of RM 0.986.

Commencing at or near RM 0.442 (Interstate 19) the highway overtops and therefore a large portion of the upstream flow does not continue downstream within the main channel, however, within the right overbank and through a developed commercial region. Based on discussions with Flood Control District (FCD) staff and the modeler of the Santa Cruz River the resulting floodplain limits as shown were determined along with flow depths of less than two feet across the overbank.

#### **Caralampi Canyon**

Commencing at RM 5.365 there is an existing pond that was not taken into consideration, as such this might result in a conservative estimate of the base flood elevation across this feature, during modeling.

During modeling it was noted that distributary flow patterns exist downstream of Interstate 19 (RM 0.335) and that a large portion of the flow would overtop I-19 and not return to the main channel, yet confluence with the Santa Cruz River. Based on discussions with FCD staff and the Santa Cruz River modeler, it was determined that the floodplain boundary resulting from the levee failure methodology would supersede any resulting detailed floodplain analyses in this region.

#### **Caralampi Canyon Tributary 3**

The resulting base flood elevation at RM 0.134 is less than the minimum channel elevation for this section. Flow appears to pond within an existing pond and is conveyed downstream within the left overbank and re-enters the main channel at RM 0.010. The reported flow depth for this location and RM 0.114 were manually changed to report realistic values (otherwise the values were negative). Adjusting the location of the main channel path for these sections did not appear reasonable based on review of the flow patterns across this area.

#### **Josephine Canyon**

The downstream portion of Josephine Canyon displayed alluvial fan characteristics just before its confluence with the Santa Cruz River. An expansion reach ratio of 2:1 was applied to the model by modifying cross section lengths accordingly. This change in modeling provided a more realistic flow pattern through that area. This 2:1 expansion ratio was also applied to the downstream end of Tributaries 14, 17, 18, and 19.

### **Negro Canyon (Tributary 13)**

A similar approach, as that used for Tumacacori Canyon, was employed for this watercourse (i.e., distributary flows and the levee failure methodology).

### **Nogales Wash**

Nogales Wash runoff crosses the International border via two underground channels (Arroyo Blvd. and Nogales Wash covered floodways). Runoff in excess of the underground channel capacities flows overland. Overland flow which crosses the border at the Port of Entry at Grand Ave required separate analysis because this area is higher in elevation than the main flow path of the Nogales Wash. Split flow methodology was used to delineate the floodway boundary from cross sections AZ to AR along Nogales Wash. The top widths of the floodway for these cross sections were determined based on active conveyance openings.

### **Peck Canyon Tributary 1**

As this tributary nears the main channel (i.e., Peck Canyon), the channel depicts features of distributary flow patterns. Therefore, the main channel stem of this tributary has been shown within the floodplain mapping along with a shallow floodplain designation for the region around the main flow, to a point downstream until it's confluence with Peck Canyon. The results appear reasonable for this area.

### **Potrero Creek**

The Chula Vista reach, which is located along Potrero Creek at the Nogales Wash confluence, required special mapping considerations. Downstream of Grand Avenue, the Potrero Creek parallels the Nogales Wash for approximately 3,300 feet before the two physically join to become the Potrero Creek. Along this reach, flood flows from both the Potrero Creek and the Nogales Wash begin to commingle at the upstream end. Consequently, the floodplain confluence occurs at the upstream end, even though the physical confluence is at the downstream end. In addition, midway along the reach, a single-span bridge (Old Tucson Road) was constructed over the Nogales Wash. Downstream of the crossing, the main channel section for the Nogales Wash is significantly wider than the upstream section. When the downstream section is included in the model, no flow conveyance occurs along the parallel Potrero Creek reach. However, the backwater profile associated with the bridge shows significant conveyance along the Potrero Creek reach. To offset this disparity between the upstream and downstream reaches, a second model was created that assumed that the Nogales Wash was an ineffective conveyance area. The results of the two models were compared and the higher water-surface elevations were used to map the floodplain along this reach.

### **Puerto Wash**

The entire region, downstream of RM 1.001, results in extensive distributary flow patterns. This effect was modeled within HEC-RAS via the lateral weir function. Based on the modeler's recommendations and discussions with Santa Cruz County, it was determined that outside of the main channel (i.e., Puerto Wash) this area would result in a shallow depth floodplain. This condition was also noted to occur downstream of the East Frontage Road for Puerto Wash Breakout 1. A similar approach was used for this limited detail study reach as well.

### **Puerto Wash Breakout 1**

An additional special problem was revealed while evaluating Puerto Wash (detailed study reach). This watercourse exhibits numerous "breakout" features (flow leaving the main

channel and not returning as would under a split flow condition, hence distributary flow). Given the type of study level assigned to this watercourse it was determined that such breakout features would be analyzed using HEC-RAS's lateral weir feature. This feature allows the program to determine and remove the breakout flow from the main wash. This information was then used to conduct limited detailed study floodplain analyses along these breakout subreaches. An evaluation of the largest channel breakout flow revealed that under the condition the main channel were to convey the entire discharge (no flow breakout) the change in the WSEL along the main channel did not increase by more than one foot and therefore did not appear to require this special consideration. Under the condition where the main channel or breakout flow features exhibits true distributary flow conditions the same approach (i.e., discussions with Santa Cruz County staff and the modeler's recommendations) was employed.

### **Sopori Wash**

A special consideration for Sopori Wash was made as the floodplain limit, when nearing the West Frontage Road, crosses outside the study area and into Pima County. Under this condition it was determined that to provide a conservative estimate of the base flood elevation, it would be assumed that the Santa Cruz/Pima County boundary would serve as a virtual flood wall.

### **Tributary 14**

At cross section number 1840, a portion of the flow broke away from the main channel and diverted into the channel to the northwest. The break out flow was blocked at each applicable cross section and the subsequent WSEL was calculated. The WSEL for the blocked break out flow model was compared to the non-blocked break out flow model. The greatest difference in WSEL was 0.31 feet. Based on that negligible difference, no further analysis was conducted for the break out flow.

### **Tumacacori Canyon (Tributary 10)**

The entire region, downstream of the East Frontage Road at RM 0.223, results in extensive distributary flow patterns. However, based on discussions with Santa Cruz County it was determined that resulting floodplain from the levee failure methodology would supersede that resulting from the normal channel hydraulic model.

Numerous warning messages, the majority relating to the possible need for additional wash cross-sections, resulted from all limited detail study analyses. These warning messages are generally indicative of the limited detail study modeling approaches and are merely to alert the modeler that careful review of the information used should be undertaken. The modeler reviewed each of these messages and found that the results and modeling assumptions and parameters used were reasonable for each condition.

Similar warning message were also encountered for the detailed study analyses. These warnings and notes were reviewed by the modeler and the results found to be reasonable for the conditions that exist. Additional channel cross-sections were not evaluated given the resulting average cross-section spacing for each detailed study reach (less than 500 feet) and review of each noted location. The results were found to be reasonable for watercourses occurring within Arizona.

Also revealed during model was the note "multiple critical depths determined". This is a common warning where during flow depth computations there is a large change in the hydraulic radius between minor changes in the hydraulic depth. These typically occur at or near the crest of levees or other similar shaped features. All such notes were reviewed

against the topography and the resulting cross-sections and found that all such data was reasonable and therefore did not appear to warrant any adjustments.

Several channel cross-sections were noted to require the program to extend the cross-section vertically. This occurs within noted regions of distributary flow or flow that confluences a main channel (e.g., where Tumacacori Canyon confluences with the Santa Cruz River) and was permitted to occur to allow the downstream controlling water surface and due to the Santa Cruz River in the above example, to govern in these regions. Each noted occurrence of this warning was reviewed against the topography mapping. The results of the Santa Cruz River analyses and tributary results were discussed with Santa Cruz County, and deemed satisfactory.

All other modeling notes, warning and messages were reviewed and found to be reasonable for the types (limited versus detailed analyses and mapping) of modeling performed.

No calibration was performed for this study as data was limited and unverifiable.

The hydraulic results in all reaches are considered reasonable and accurate, per accepted modeling techniques and practices within Arizona and when compared to previous floodplain delineations. The applied discharges for the Santa Cruz River and Potrero Creek are significantly greater than those previously used for the effective mapping; however, the new delineations appear reasonable on a reach by reach basis when compared to the previous delineations.

### **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 FIRM are referenced to NAVD. Structure and ground elevations in the county must, therefore, be referenced to NAVD. It is important to note that adjacent counties may be referenced to NGVD. This may result in differences in BFEs across the corporate limits between the communities.

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

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 this data.

The conversion factor for each stream by datum conversion is shown below in Table 6.

Table 6 - Datum Conversion Factor

| Location  | Elevation in feet<br>NAVD above NGVD |
|---|--------------------------------------|
| Alamo Wash  | +2.89                                |
| Mariposa Wash Tributary 1   | +2.96                                |
| Mariposa Wash Tributary 2   | +2.96                                |
| Tubac Creek, Tubac Creek<br>North Channel, Tubac Creek<br>Tributary 1 | +2.70                                |

#### **4.0 FLOODPLAIN MANAGEMENT APPLICATIONS**

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

##### **4.1 Floodplain Boundaries**

To provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community. For each stream studied by detailed methods, the 1- and 0.2-percent-annual-chance floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using LIDAR-derived topographic maps, with a contour interval of 2 feet. Aerial photographs of 6-inch resolution were also used.

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

For the streams studied by approximate methods, only the 1-percent-annual-chance

floodplain boundary is shown on the FIRM.

## **4.2 Floodways**

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 1-percent-annual-chance flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodway presented in this FIS report and on the FIRM was computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections, the floodway boundaries were interpolated. The results of the floodway computations have been tabulated for selected cross sections in Table 7. In cases where the floodway and 1-percent-annual-chance floodplain boundaries are close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 1-percent-annual-chance floodplain boundary is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 1-percent-annual-chance flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 11.

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Agua Fria       |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 5858                  | 464          | 2393                       | 4.1                             | 3413.4                             | 3413.4           | 3414.4        | 1.0      |
| B               | 6108                  | 536          | 3873                       | 2.6                             | 3416.6                             | 3416.6           | 3417.1        | 0.5      |
| C               | 6480                  | 595          | 2442                       | 4.1                             | 3416.7                             | 3416.7           | 3417.3        | 0.6      |
| D               | 6844                  | 560          | 1464                       | 6.8                             | 3417.1                             | 3417.1           | 3417.8        | 0.7      |
| E               | 7071                  | 1169         | 6058                       | 1.6                             | 3423.1                             | 3423.1           | 3423.4        | 0.3      |
| F               | 8111                  | 538          | 1825                       | 5.4                             | 3423.2                             | 3423.2           | 3423.5        | 0.3      |
| G               | 8618                  | 579          | 1649                       | 6.0                             | 3425.8                             | 3425.8           | 3425.8        | 0.0      |
| H               | 9584                  | 436          | 1936                       | 5.1                             | 3430.3                             | 3430.3           | 3430.4        | 0.1      |
| I               | 10893                 | 243          | 952                        | 10.4                            | 3436.8                             | 3436.8           | 3436.8        | 0.0      |
| J               | 11447                 | 336          | 2678                       | 3.7                             | 3439.1                             | 3439.1           | 3439.1        | 0.0      |
| K               | 12223                 | 346          | 2895                       | 3.3                             | 3439.3                             | 3439.3           | 3439.3        | 0.0      |
| L               | 12656                 | 251          | 1922                       | 5.0                             | 3439.3                             | 3439.3           | 3439.4        | 0.1      |
| M               | 13163                 | 325          | 978                        | 9.9                             | 3455.8                             | 3455.8           | 3455.8        | 0.0      |
| N               | 13781                 | 335          | 993                        | 9.7                             | 3465.4                             | 3465.4           | 3465.4        | 0.0      |
| O               | 14790                 | 178          | 804                        | 12.0                            | 3478.4                             | 3478.4           | 3478.6        | 0.2      |
| P               | 15719                 | 490          | 4203                       | 2.3                             | 3481.1                             | 3481.1           | 3481.6        | 0.5      |
| Q               | 16157                 | 205          | 857                        | 11.3                            | 3482.1                             | 3482.1           | 3483.0        | 0.9      |
| R               | 16573                 | 133          | 1021                       | 9.5                             | 3486.7                             | 3486.7           | 3487.4        | 0.7      |
| S               | 16974                 | 137          | 840                        | 11.5                            | 3489.1                             | 3489.1           | 3489.4        | 0.3      |
| T               | 17449                 | 366          | 1199                       | 8.0                             | 3498.4                             | 3498.4           | 3498.7        | 0.3      |
| U               | 17824                 | 334          | 1592                       | 6.1                             | 3501.2                             | 3501.2           | 3501.8        | 0.6      |
| V               | 18056                 | 317          | 1064                       | 9.1                             | 3502.9                             | 3502.9           | 3502.9        | 0.0      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>    |
|         |   | <b>AGUA FRIA CANYON</b> |

| FLOODING SOURCE          |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|--------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION            | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                          |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |          |
| Agua Fria<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| W                        | 18289                 | 350          | 1093                       | 8.7                             | 3506.1                             | 3506.1           | 3506.1        | 0.0      |
| X                        | 18400                 | 338          | 1623                       | 5.9                             | 3507.6                             | 3507.6           | 3507.7        | 0.1      |
| Y                        | 19028                 | 480          | 1203                       | 7.9                             | 3510.2                             | 3510.2           | 3510.7        | 0.5      |
| Z                        | 20201                 | 485          | 1288                       | 7.4                             | 3518.0                             | 3518.0           | 3519.0        | 1.0      |
| AA                       | 20518                 | 396          | 1540                       | 6.2                             | 3521.0                             | 3521.0           | 3522.0        | 1.0      |
| AB                       | 20878                 | 440          | 1754                       | 5.0                             | 3523.3                             | 3523.3           | 3524.3        | 1.0      |
| AC                       | 21165                 | 550          | 1682                       | 5.2                             | 3525.9                             | 3525.90          | 3525.9        | 0.0      |
| AD                       | 21366                 | 459          | 1291                       | 6.8                             | 3527.1                             | 3527.1           | 3527.3        | 0.2      |
| AE                       | 21546                 | 343          | 1240                       | 7.1                             | 3528.1                             | 3528.1           | 3528.7        | 0.6      |
| AF                       | 22465                 | 586          | 1780                       | 4.9                             | 3533.1                             | 3533.1           | 3534.1        | 1.0      |
| AG                       | 22935                 | 472          | 1290                       | 6.8                             | 3536.5                             | 3536.5           | 3537.2        | 0.7      |
| AH                       | 23928                 | 274          | 1246                       | 7.0                             | 3544.2                             | 3544.2           | 3545.1        | 0.9      |
| AI                       | 24372                 | 470          | 1921                       | 4.6                             | 3546.8                             | 3546.8           | 3547.8        | 1.0      |
| AJ                       | 24852                 | 271          | 950                        | 9.2                             | 3550.0                             | 3550.0           | 3550.6        | 0.6      |
| AK                       | 25047                 | 364          | 1478                       | 5.9                             | 3552.2                             | 3552.2           | 3553.2        | 1.0      |
| AL                       | 25216                 | 354          | 1103                       | 7.9                             | 3553.5                             | 3553.5           | 3554.2        | 0.7      |
| AM                       | 26003                 | 352          | 1211                       | 7.2                             | 3560.2                             | 3560.2           | 3561.0        | 0.8      |
| AN                       | 26547                 | 231          | 1122                       | 7.8                             | 3564.4                             | 3564.4           | 3565.3        | 0.9      |
| AO                       | 27397                 | 412          | 1666                       | 5.3                             | 3569.2                             | 3569.2           | 3570.2        | 1.0      |
| AP                       | 27687                 | 307          | 1124                       | 7.8                             | 3570.9                             | 3570.9           | 3571.6        | 0.7      |
| AQ                       | 27999                 | 418          | 1740                       | 5.0                             | 3573.3                             | 3573.3           | 3574.2        | 0.9      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>AGUA FRIA CANYON</b> |

| FLOODING SOURCE          |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|--------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION            | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                          |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Agua Fria<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| AR                       | 28321                 | 318          | 929                        | 9.4                             | 3575.8                             | 3575.8           | 3576.1        | 0.3      |
| AS                       | 28754                 | 507          | 1898                       | 4.6                             | 3579.5                             | 3579.5           | 3580.5        | 1.0      |
| AT                       | 29530                 | 344          | 1229                       | 7.1                             | 3584.2                             | 3584.2           | 3584.4        | 0.2      |
| AU                       | 29915                 | 287          | 1180                       | 7.4                             | 3586.9                             | 3586.9           | 3587.8        | 0.9      |
| AV                       | 30982                 | 374          | 1627                       | 5.4                             | 3594.7                             | 3594.7           | 3595.7        | 1.0      |
| AW                       | 31457                 | 280          | 1209                       | 7.2                             | 3597.5                             | 3597.5           | 3598.3        | 0.8      |
| AX                       | 31647                 | 372          | 1444                       | 6.1                             | 3600.3                             | 3600.3           | 3601.1        | 0.8      |
| AY                       | 32154                 | 459          | 1353                       | 6.5                             | 3604.2                             | 3604.2           | 3605.0        | 0.8      |
| AZ                       | 32508                 | 447          | 1730                       | 5.1                             | 3606.7                             | 3606.7           | 3607.6        | 0.9      |
| BA                       | 33295                 | 236          | 1050                       | 8.3                             | 3611.3                             | 3611.3           | 3612.1        | 0.8      |
| BB                       | 33944                 | 662          | 2064                       | 4.2                             | 3617.1                             | 3617.1           | 3618.1        | 1.0      |
| BC                       | 34351                 | 515          | 1349                       | 6.5                             | 3620.9                             | 3620.9           | 3621.8        | 0.9      |
| BD                       | 34599                 | 187          | 1014                       | 8.6                             | 3623.7                             | 3623.7           | 3624.4        | 0.7      |
| BE                       | 35528                 | 410          | 1592                       | 5.5                             | 3629.8                             | 3629.8           | 3630.8        | 1.0      |
| BF                       | 35887                 | 221          | 867                        | 10.1                            | 3632.7                             | 3632.7           | 3633.4        | 0.7      |
| BG                       | 36821                 | 303          | 961                        | 9.1                             | 3644.0                             | 3644.0           | 3644.2        | 0.2      |
| BH                       | 37502                 | 200          | 426                        | 8.3                             | 3650.9                             | 3650.9           | 3651.0        | 0.1      |
| BI                       | 37882                 | 89           | 396                        | 9.0                             | 3656.7                             | 3656.7           | 3657.3        | 0.6      |
| BJ                       | 38251                 | 89           | 342                        | 10.4                            | 3660.6                             | 3660.6           | 3661.0        | 0.4      |
| BK                       | 38383                 | 81           | 392                        | 9.0                             | 3662.9                             | 3662.9           | 3663.8        | 0.9      |
| BL                       | 38452                 | 114          | 575                        | 6.2                             | 3664.2                             | 3664.2           | 3665.2        | 1.0      |
| BM                       | 38610                 | 108          | 503                        | 7.1                             | 3665.6                             | 3665.6           | 3666.0        | 0.4      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>AGUA FRIA CANYON</b> |

| FLOODING SOURCE       |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION         | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                       |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Agua Fria (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| BN                    | 38758                 | 61           | 289                        | 12.3                            | 3667.6                             | 3667.6           | 3667.7        | 0.1      |
| BO                    | 38853                 | 51           | 331                        | 10.7                            | 3669.1                             | 3669.1           | 3669.7        | 0.6      |
| BP                    | 39085                 | 54           | 378                        | 9.4                             | 3671.6                             | 3671.6           | 3672.6        | 1.0      |
| BQ                    | 39212                 | 46           | 280                        | 12.7                            | 3674.6                             | 3674.6           | 3674.7        | 0.1      |
| BR                    | 39328                 | 85           | 744                        | 4.8                             | 3678.1                             | 3678.1           | 3678.1        | 0.0      |
| BS                    | 39434                 | 110          | 901                        | 3.9                             | 3678.4                             | 3678.4           | 3678.3        | 0.0      |
| BT                    | 39645                 | 83           | 487                        | 7.3                             | 3678.6                             | 3678.6           | 3678.6        | 0.0      |
| BU                    | 40004                 | 102          | 595                        | 6.0                             | 3682.3                             | 3682.3           | 3683.3        | 1.0      |
| BV                    | 40162                 | 67           | 303                        | 11.7                            | 3684.4                             | 3684.4           | 3684.7        | 0.3      |
| BW                    | 40278                 | 71           | 459                        | 7.7                             | 3686.6                             | 3686.6           | 3687.3        | 0.7      |
| BX                    | 40331                 | 66           | 347                        | 10.2                            | 3686.3                             | 3686.3           | 3687.3        | 1.0      |
| BY                    | 40547                 | 87           | 537                        | 6.6                             | 3689.3                             | 3689.3           | 3690.0        | 0.7      |
| BZ                    | 40927                 | 42           | 255                        | 13.9                            | 3693.8                             | 3693.8           | 3694.2        | 0.4      |
| CA                    | 41033                 | 67           | 503                        | 7.1                             | 3696.5                             | 3696.5           | 3697.5        | 1.0      |
| CB                    | 41123                 | 76           | 536                        | 6.6                             | 3697.3                             | 3697.3           | 3698.0        | 0.7      |
| CC                    | 41323                 | 53           | 330                        | 10.8                            | 3698.5                             | 3698.5           | 3699.3        | 0.8      |
| CD                    | 41434                 | 107          | 702                        | 5.1                             | 3700.5                             | 3700.5           | 3701.5        | 1.0      |
| CE                    | 41549                 | 53           | 277                        | 12.8                            | 3701.0                             | 3701.0           | 3701.3        | 0.3      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>AGUA FRIA CANYON</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |          |
| Al Harrison     |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 3860                  | 52           | 202                        | 10.9                            | 3681.1                             | 3681.1           | 3681.2        | 0.1      |
| B               | 4283                  | 98           | 2007                       | 1.8                             | 3701.2                             | 3701.2           | 3702.1        | 0.9      |

<sup>1</sup>Feet above Confluence with Potrero Creek (Mouth)

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>    |
|         |   | <b>AL HARRISON WASH</b> |

| FLOODING SOURCE     |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION       | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                     |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Ephriam Canyon Wash |                       |              |                            |                                 |                                    |                  |               |          |
| A                   | 832                   | 57           | 553                        | 6.8                             | 3818.6                             | 3818.6           | 3818.6        | 0.0      |
| B                   | 1133                  | 65           | 310                        | 12.2                            | 3820.2                             | 3820.2           | 3820.2        | 0.0      |
| C                   | 1645                  | 35           | 249                        | 15.1                            | 3824.5                             | 3824.5           | 3825.1        | 0.6      |
| D                   | 2151                  | 38           | 257                        | 14.7                            | 3832.6                             | 3832.6           | 3832.8        | 0.2      |
| E                   | 2675                  | 55           | 309                        | 12.2                            | 3837.4                             | 3837.4           | 3837.4        | 0.0      |
| F                   | 3078                  | 73           | 464                        | 11.9                            | 3843.4                             | 3843.4           | 3843.5        | 0.1      |
| G                   | 3148                  | 89           | 642                        | 7.5                             | 3846.3                             | 3846.3           | 3847.0        | 0.7      |
| H                   | 3266                  | 81           | 518                        | 7.3                             | 3846.7                             | 3846.7           | 3847.3        | 0.6      |
| I                   | 3766                  | 46           | 272                        | 13.8                            | 3849.4                             | 3849.4           | 3849.4        | 0.0      |
| J                   | 4252                  | 46           | 273                        | 13.8                            | 3856.6                             | 3856.6           | 3856.7        | 0.1      |
| K                   | 4715                  | 47           | 274                        | 13.7                            | 3860.7                             | 3860.7           | 3860.7        | 0.0      |
| L                   | 4873                  | 90           | 488                        | 9.7                             | 3865.8                             | 3865.8           | 3866.1        | 0.3      |
| M                   | 5592                  | 81           | 398                        | 9.5                             | 3873.6                             | 3873.6           | 3873.8        | 0.2      |
| N                   | 6075                  | 57           | 317                        | 12.7                            | 3880.2                             | 3880.2           | 3880.3        | 0.1      |
| O                   | 6590                  | 100          | 523                        | 7.2                             | 3884.2                             | 3884.2           | 3884.2        | 0.0      |
| P                   | 7110                  | 94           | 394                        | 9.6                             | 3892.0                             | 3892.0           | 3892.1        | 0.1      |
| Q                   | 7267                  | 109          | 740                        | 5.1                             | 3897.9                             | 3897.9           | 3897.9        | 0.0      |
| R                   | 7406                  | 102          | 694                        | 5.4                             | 3899.0                             | 3899.0           | 3899.0        | 0.0      |
| S                   | 7495                  | 105          | 716                        | 5.3                             | 3900.0                             | 3900.0           | 3900.0        | 0.0      |
| T                   | 7590                  | 94           | 573                        | 6.6                             | 3903.4                             | 3903.4           | 3903.5        | 0.1      |
| U                   | 7678                  | 90           | 638                        | 5.9                             | 3905.4                             | 3905.4           | 3905.5        | 0.1      |
| V                   | 7797                  | 100          | 725                        | 5.3                             | 3907.7                             | 3907.7           | 3907.8        | 0.1      |

<sup>1</sup>Feet above confluence with Nogales Wash (Mouth)

|         |   |                            |
|---------|---|----------------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>       |
|         |   | <b>EPHRIAM CANYON WASH</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Ephriam Canyon Wash (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| W                               | 8077                  | 141          | 788                        | 4.8                             | 3909.8                             | 3909.8           | 3910.8        | 1.0      |
| X                               | 8578                  | 55           | 357                        | 10.5                            | 3914.7                             | 3914.7           | 3914.7        | 0.0      |
| Y                               | 8990                  | 42           | 507                        | 12.3                            | 3917.8                             | 3917.8           | 3918.5        | 0.7      |
| Z                               | 9616                  | 38           | 2191                       | 6.8                             | 3930.0                             | 3930.0           | 3930.0        | 0.0      |
| AA                              | 9976                  | 191          | 1713                       | 2                               | 3930.8                             | 3930.8           | 3930.8        | 0.0      |
| AB                              | 10497                 | 175          | 793                        | 4.4                             | 3930.8                             | 3930.8           | 3930.8        | 0.0      |
| AC                              | 10988                 | 95           | 351                        | 9.9                             | 3938.6                             | 3938.6           | 3938.9        | 0.3      |
| AD                              | 11443                 | 50           | 267                        | 13                              | 3946.3                             | 3946.3           | 3946.4        | 0.1      |
| AE                              | 12100                 | 100          | 366                        | 9.4                             | 3953.7                             | 3953.7           | 3954.7        | 1.0      |
| AF                              | 12610                 | 75           | 323                        | 10.7                            | 3962.1                             | 3962.1           | 3962.2        | 0.1      |
| AG                              | 13115                 | 130          | 417                        | 8.3                             | 3968.5                             | 3968.5           | 3968.5        | 0.0      |
| AH                              | 13616                 | 133          | 409                        | 8.5                             | 3975.0                             | 3975.0           | 3975.0        | 0.0      |
| AI                              | 14252                 | 135          | 406                        | 8.5                             | 3981.0                             | 3981.0           | 3981.1        | 0.1      |
| AJ                              | 14836                 | 28           | 463                        | 15.4                            | 3987.4                             | 3987.4           | 3987.4        | 0.0      |
| AK                              | 15248                 | 27           | 1392                       | 6.9                             | 4002.6                             | 4002.6           | 4002.6        | 0.0      |
| AL                              | 15477                 | 171          | 1268                       | 2.5                             | 4003.4                             | 4003.4           | 4003.4        | 0.0      |

<sup>1</sup>Feet above confluence with Nogales Wash (Mouth)

|         |   |                            |
|---------|---|----------------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>       |
|         |   | <b>EPHRIAM CANYON WASH</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |          |
| Falls Wash<br>A | 757                   | 95           | 1032                       | 5.1                             | 3817.4                             | 3817.4           | 3817.9        | 0.5      |

<sup>1</sup>Feet above confluence with Harshaw Creek

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b> |
|         |   | <b>FALLS WASH</b>    |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)     |                       |              |                            |                                 |                                    |                  |               |          |
| Farosa Canyon   |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 312                   | 38           | 178                        | 7.8                             | 4842.6                             | 4842.6           | 4843.6        | 1.0      |
| B               | 925                   | 54           | 151                        | 9.2                             | 4849.4                             | 4849.4           | 4849.4        | 0.0      |
| C               | 1544                  | 28           | 120                        | 11.5                            | 4858.4                             | 4858.4           | 4859.0        | 0.6      |

<sup>1</sup>Feet above Confluence with Lyle Canyon

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>FAROSA CANYON</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Harshaw Creek   |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 380                   | 564          | 1508                       | 5.7                             | 4078.0                             | 4078.0           | 4079.0        | 1.0      |
| B               | 910                   | 572          | 1176                       | 7.3                             | 4080.7                             | 4080.7           | 4081.3        | 0.6      |
| C               | 1892                  | 525          | 1254                       | 6.9                             | 4090.6                             | 4090.6           | 4091.1        | 0.5      |
| D               | 2487                  | 210          | 1046                       | 8.2                             | 4092.9                             | 4092.9           | 4093.8        | 0.9      |
| E               | 3118                  | 53           | 307                        | 13.5                            | 4097.9                             | 4097.9           | 4097.9        | 0.0      |
| F               | 4245                  | 64           | 323                        | 12.9                            | 4107.5                             | 4107.5           | 4107.5        | 0.0      |
| G               | 4731                  | 91           | 502                        | 8.3                             | 4112.3                             | 4112.3           | 4112.3        | 0.0      |
| H               | 5149                  | 93           | 588                        | 7.1                             | 4115.9                             | 4115.9           | 4115.9        | 0.0      |
| I               | 5564                  | 84           | 424                        | 9.8                             | 4117.0                             | 4117.0           | 4117.0        | 0.0      |

<sup>1</sup>Feet above confluence with Sonoita Creek

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b> |
|         |   | <b>HARSHAW CREEK</b> |

| FLOODING SOURCE  |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION    | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                  |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Josephine Canyon |                       |              |                            |                                 |                                    |                  |               |          |
| A                | 4078                  | 1959         | 3833                       | 5.1                             | 3304.8                             | 3304.8           | 3305.1        | 0.3      |
| B                | 4479                  | 1826         | 3031                       | 6.5                             | 3307.9                             | 3307.9           | 3308.6        | 0.7      |
| C                | 4894                  | 1586         | 3141                       | 6.2                             | 3313.7                             | 3313.7           | 3314.3        | 0.6      |
| D                | 5431                  | 998          | 6983                       | 4.5                             | 3322.0                             | 3322.0           | 3322.0        | 0.0      |
| E                | 5862                  | 428          | 1888                       | 10.4                            | 3322.6                             | 3322.6           | 3323.4        | 0.8      |
| F                | 6480                  | 221          | 1564                       | 12.5                            | 3327                               | 3327             | 3327.3        | 0.3      |
| G                | 6827                  | 267          | 1618                       | 12.1                            | 3329.5                             | 3329.5           | 3330.2        | 0.7      |
| H                | 7197                  | 345          | 1849                       | 10.6                            | 3333.0                             | 3333.0           | 3333.9        | 0.9      |
| I                | 8593                  | 281          | 1653                       | 12                              | 3344.8                             | 3344.8           | 3345.4        | 0.6      |
| J                | 9011                  | 341          | 2066                       | 9.6                             | 3349.0                             | 3349.0           | 3350.0        | 1.0      |
| K                | 9361                  | 475          | 2173                       | 9.1                             | 3351.8                             | 3351.8           | 3352.7        | 0.9      |
| L                | 9751                  | 572          | 1952                       | 10.1                            | 3357.9                             | 3357.9           | 3357.9        | 0.0      |
| M                | 10125                 | 770          | 5445                       | 3.6                             | 3360.6                             | 3360.6           | 3360.6        | 0.0      |
| N                | 10582                 | 530          | 5913                       | 3.3                             | 3360.9                             | 3360.9           | 3360.9        | 0.0      |
| O                | 11161                 | 673          | 4697                       | 4.2                             | 3361.1                             | 3361.1           | 3361.1        | 0.0      |
| P                | 11709                 | 87           | 14842                      | 19.4                            | 3374.3                             | 3374.3           | 3374.9        | 0.6      |
| Q                | 12189                 | 387          | 1621                       | 12.2                            | 3382.4                             | 3382.4           | 3382.4        | 0.0      |
| R                | 12502                 | 289          | 1510                       | 13.1                            | 3386.3                             | 3386.3           | 3386.3        | 0.0      |
| S                | 12974                 | 855          | 2706                       | 7.3                             | 3394.5                             | 3394.5           | 3395.4        | 0.9      |
| T                | 13421                 | 583          | 2274                       | 8.7                             | 3401.0                             | 3401.0           | 3401.1        | 0.1      |
| U                | 13928                 | 581          | 1987                       | 9.9                             | 3406.4                             | 3406.4           | 3406.4        | 0.0      |
| V                | 14433                 | 1162         | 3272                       | 6                               | 3414.2                             | 3414.2           | 3414.6        | 0.4      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>JOSEPHINE CANYON</b> |

| FLOODING SOURCE              |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                              |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Josephine Canyon (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| W                            | 14873                 | 1025         | 2671                       | 7.4                             | 3416.0                             | 3416.0           | 3416.5        | 0.5      |
| X                            | 15217                 | 895          | 2665                       | 7.4                             | 3419.6                             | 3419.6           | 3420.2        | 0.6      |
| Y                            | 15528                 | 778          | 2362                       | 8.4                             | 3423.9                             | 3423.9           | 3424.2        | 0.3      |
| Z                            | 15834                 | 744          | 2722                       | 7.3                             | 3427.1                             | 3427.1           | 3427.4        | 0.3      |
| AA                           | 16154                 | 711          | 2439                       | 8.1                             | 3429.9                             | 3429.9           | 3430          | 0.1      |
| AB                           | 16464                 | 745          | 2608                       | 7.6                             | 3433.5                             | 3433.5           | 3434.4        | 0.9      |
| AC                           | 16780                 | 807          | 2625                       | 7.5                             | 3437.7                             | 3437.7           | 3438.4        | 0.7      |
| AD                           | 17102                 | 399          | 1971                       | 10                              | 3440.4                             | 3440.4           | 3441.2        | 0.8      |
| AE                           | 17408                 | 342          | 1756                       | 11.2                            | 3442.7                             | 3442.7           | 3443.6        | 0.9      |
| AF                           | 17712                 | 394          | 1956                       | 10.1                            | 3445.2                             | 3445.2           | 3446.2        | 1.0      |
| AG                           | 18023                 | 419          | 2115                       | 9.3                             | 3449.0                             | 3449.0           | 3449.4        | 0.4      |
| AH                           | 18351                 | 372          | 1880                       | 10.5                            | 3452.0                             | 3452.0           | 3452.5        | 0.5      |
| AI                           | 18605                 | 353          | 1956                       | 10.1                            | 3454.3                             | 3454.3           | 3455.1        | 0.8      |
| AJ                           | 18958                 | 313          | 1884                       | 10.5                            | 3458.6                             | 3458.6           | 3459.3        | 0.7      |
| AK                           | 19315                 | 198          | 1473                       | 13.4                            | 3460.5                             | 3460.5           | 3461.4        | 0.9      |
| AL                           | 19675                 | 283          | 1660                       | 11.9                            | 3466.0                             | 3466.0           | 3466.0        | 0.0      |
| AM                           | 20166                 | 447          | 2160                       | 9.1                             | 3469.9                             | 3469.9           | 3469.9        | 0.0      |
| AN                           | 20691                 | 310          | 1873                       | 10.5                            | 3474.6                             | 3474.6           | 3475.6        | 1.0      |
| AO                           | 21148                 | 259          | 1761                       | 11.2                            | 3480.0                             | 3480.0           | 3480.9        | 0.9      |
| AP                           | 21686                 | 155          | 1338                       | 14.8                            | 3483.4                             | 3483.4           | 3484.1        | 0.7      |
| AQ                           | 22231                 | 152          | 1571                       | 12.6                            | 3492.2                             | 3492.2           | 3492.2        | 0.0      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**SANTA CRUZ COUNTY, AZ  
AND INCORPORATED AREAS**

**FLOODWAY DATA**

**JOSEPHINE CANYON**

| FLOODING SOURCE                    |                       | FLOODWAY        |                               |                                       | BASE FLOOD<br>WATER-SURFACE ELEVATION |                     |                  |          |
|------------------------------------|-----------------------|-----------------|-------------------------------|---------------------------------------|---------------------------------------|---------------------|------------------|----------|
| CROSS SECTION                      | DISTANCE <sup>1</sup> | WIDTH<br>(FEET) | SECTION AREA<br>(SQUARE FEET) | MEAN VELOCITY<br>(FEET PER<br>SECOND) | REGULATORY                            | WITHOUT<br>FLOODWAY | WITH<br>FLOODWAY | INCREASE |
|                                    |                       |                 |                               |                                       |                                       | (FEET NAVD)         |                  |          |
| Josephine<br>Canyon<br>(continued) |                       |                 |                               |                                       |                                       |                     |                  |          |
| AR                                 | 22685                 | 190             | 1499                          | 13.2                                  | 3495.5                                | 3495.5              | 3496.2           | 0.7      |
| AS                                 | 23215                 | 215             | 1718                          | 11.5                                  | 3499.4                                | 3499.4              | 3500.2           | 0.8      |
| AT                                 | 23849                 | 306             | 1975                          | 10                                    | 3503.9                                | 3503.9              | 3504.6           | 0.7      |
| AU                                 | 24439                 | 407             | 2163                          | 9.1                                   | 3509.9                                | 3509.9              | 3510.8           | 0.9      |
| AV                                 | 24969                 | 349             | 1886                          | 10.5                                  | 3513.7                                | 3513.7              | 3514.3           | 0.6      |
| AW                                 | 25402                 | 247             | 1653                          | 12                                    | 3518.9                                | 3518.9              | 3519.8           | 0.9      |
| AX                                 | 25874                 | 260             | 1759                          | 11.2                                  | 3523.8                                | 3523.8              | 3523.9           | 0.1      |
| AY                                 | 26342                 | 253             | 2017                          | 9.8                                   | 3527.0                                | 3527.0              | 3527.7           | 0.7      |
| AZ                                 | 26885                 | 215             | 1498                          | 13.2                                  | 3530.7                                | 3530.7              | 3531.2           | 0.5      |
| BA                                 | 27265                 | 283             | 2006                          | 9.8                                   | 3535.0                                | 3535.0              | 3535.7           | 0.7      |
| BB                                 | 27903                 | 253             | 1575                          | 12.5                                  | 3540.9                                | 3540.9              | 3541.4           | 0.5      |
| BC                                 | 28431                 | 244             | 1579                          | 12.5                                  | 3545.8                                | 3545.8              | 3546.6           | 0.8      |
| BD                                 | 29006                 | 193             | 1352                          | 13                                    | 3551.1                                | 3551.1              | 3551.9           | 0.8      |
| BE                                 | 29376                 | 189             | 1370                          | 12.9                                  | 3555.4                                | 3555.4              | 3556.0           | 0.6      |
| BF                                 | 29681                 | 210             | 1646                          | 10.7                                  | 3558.2                                | 3558.2              | 3559.0           | 0.8      |
| BG                                 | 29993                 | 247             | 1503                          | 11.7                                  | 3560.6                                | 3560.6              | 3561.5           | 0.9      |
| BH                                 | 30399                 | 383             | 1947                          | 9.1                                   | 3565.8                                | 3565.8              | 3566.0           | 0.2      |
| BI                                 | 30854                 | 202             | 1405                          | 12.6                                  | 3568.7                                | 3568.7              | 3569.1           | 0.4      |
| BJ                                 | 31262                 | 333             | 1863                          | 9.5                                   | 3574.2                                | 3574.2              | 3574.3           | 0.1      |
| BK                                 | 31670                 | 254             | 1592                          | 11.1                                  | 3576.8                                | 3576.8              | 3576.9           | 0.1      |
| BL                                 | 32190                 | 287             | 1886                          | 9.4                                   | 3581.6                                | 3581.6              | 3582.6           | 1.0      |
| BM                                 | 32499                 | 175             | 1348                          | 13.1                                  | 3585.1                                | 3585.1              | 3585.4           | 0.3      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                  |
|---------|---|------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY             | FLOODWAY DATA    |
|         | SANTA CRUZ COUNTY, AZ<br>AND INCORPORATED AREAS | JOSEPHINE CANYON |

| FLOODING SOURCE              |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                              |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Josephine Canyon (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| BN                           | 32955                 | 235          | 1760                       | 10                              | 3589.6                             | 3589.6           | 3590.3        | 0.7      |
| BO                           | 33333                 | 141          | 1227                       | 14.4                            | 3592.7                             | 3592.7           | 3593.7        | 1.0      |
| BP                           | 33797                 | 217          | 1531                       | 11.5                            | 3599.7                             | 3599.7           | 3599.8        | 0.1      |
| BQ                           | 34256                 | 217          | 1789                       | 9.9                             | 3603.1                             | 3603.1           | 3604.0        | 0.9      |
| BR                           | 35090                 | 295          | 1651                       | 10.7                            | 3610.3                             | 3610.3           | 3611.0        | 0.7      |
| BS                           | 36027                 | 138          | 1178                       | 15                              | 3622.4                             | 3622.4           | 3622.7        | 0.3      |
| BT                           | 36668                 | 180          | 1261                       | 14                              | 3629.9                             | 3629.9           | 3630.9        | 1.0      |
| BU                           | 37202                 | 134          | 1157                       | 15.2                            | 3639.0                             | 3639.0           | 3639.2        | 0.2      |
| BV                           | 37674                 | 220          | 1829                       | 9.6                             | 3644.7                             | 3644.7           | 3645.3        | 0.6      |
| BW                           | 38110                 | 150          | 1156                       | 13.9                            | 3649.1                             | 3649.1           | 3649.4        | 0.3      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |  |                  |
|---------|--|------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY          | FLOODWAY DATA    |
|         | SANTA CRUZ COUNTY, AZ AND INCORPORATED AREAS | JOSEPHINE CANYON |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)     |                       |              |                            |                                 |                                    |                  |               |          |
| Lyle Canyon     |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 13247                 | 115          | 715                        | 12.8                            | 4797.8                             | 4797.8           | 4798.6        | 0.8      |
| B               | 13783                 | 173          | 908                        | 10.1                            | 4802.5                             | 4802.5           | 4803.5        | 1.0      |
| C               | 14142                 | 133          | 844                        | 10.9                            | 4808.4                             | 4808.4           | 4808.7        | 0.3      |
| D               | 14722                 | 80           | 598                        | 15.3                            | 4811.5                             | 4811.5           | 4812.0        | 0.5      |
| E               | 14994                 | 82           | 601                        | 15.3                            | 4814.3                             | 4814.3           | 4814.5        | 0.2      |
| F               | 15632                 | 199          | 826                        | 11.1                            | 4818.8                             | 4818.8           | 4819.1        | 0.3      |
| G               | 16207                 | 90           | 620                        | 14.8                            | 4823.5                             | 4823.5           | 4823.5        | 0.0      |
| H               | 16864                 | 231          | 999                        | 9.1                             | 4829.9                             | 4829.9           | 4830.7        | 0.8      |
| I               | 17473                 | 126          | 701                        | 13.0                            | 4834.0                             | 4834.0           | 4834.7        | 0.7      |
| J               | 18067                 | 611          | 2608                       | 3.2                             | 4843.8                             | 4843.8           | 4843.8        | 0.0      |
| K               | 18709                 | 112          | 616                        | 12.2                            | 4846.0                             | 4846.0           | 4846.8        | 0.8      |
| L               | 19228                 | 125          | 670                        | 11.2                            | 4851.1                             | 4851.1           | 4851.9        | 0.8      |
| M               | 19909                 | 168          | 1023                       | 7.4                             | 4858.1                             | 4858.1           | 4859.1        | 1.0      |
| N               | 20209                 | 130          | 696                        | 10.8                            | 4860.6                             | 4860.6           | 4861.6        | 1.0      |
| O               | 20850                 | 63           | 484                        | 15.5                            | 4868.8                             | 4868.8           | 4868.8        | 0.0      |

<sup>1</sup>Feet above County Line

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b> |
|         |   | <b>LYLE CANYON</b>   |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION <sup>2</sup> |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|---|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                                      | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 |   | (FEET NAVD)      |               |          |
| Mariposa Canyon |                       |              |                            |                                 |   |                  |               |          |
| A               | 917                   | 92           | 667                        | 9.3                             | 3749.9  | 3749.9           | 3750.4        | 0.5      |
| B               | 1242                  | 98           | 521                        | 11.9                            | 3751.3  | 3751.3           | 3751.6        | 0.3      |
| C               | 1638                  | 87           | 471                        | 13.1                            | 3755.9  | 3755.9           | 3756.0        | 0.1      |
| D               | 1983                  | 104          | 535                        | 11.6                            | 3759.9  | 3759.9           | 3760.0        | 0.1      |
| E               | 2504                  | 95           | 527                        | 11.7                            | 3764.4  | 3764.4           | 3764.5        | 0.1      |
| F               | 2926                  | 109          | 565                        | 11.0                            | 3768.1  | 3768.1           | 3768.2        | 0.1      |
| G               | 3219                  | 200          | 995                        | 6.2                             | 3775.8  | 3775.8           | 3776.7        | 0.9      |
| H               | 3321                  | 101          | 577                        | 10.7                            | 3776.2  | 3776.2           | 3776.6        | 0.4      |
| I               | 3638                  | 99           | 491                        | 12.6                            | 3779.0  | 3779.0           | 3779.0        | 0.0      |
| J               | 3985                  | 201          | 1066                       | 5.8                             | 3782.3  | 3782.3           | 3783.1        | 0.8      |
| K               | 4880                  | 207          | 2585                       | 2.2                             | 3798.8  | 3798.8           | 3798.8        | 0.0      |
| L               | 5081                  | 228          | 2373                       | 2.4                             | 3798.9  | 3798.9           | 3798.9        | 0.0      |
| M               | 5487                  | 434          | 3390                       | 1.7                             | 3798.9  | 3798.9           | 3799.0        | 0.1      |
| N               | 5546                  | 327          | 2123                       | 2.7                             | 3798.9  | 3798.9           | 3799.0        | 0.1      |
| O               | 5684                  | 194          | 908                        | 6.4                             | 3798.9  | 3798.9           | 3799.0        | 0.1      |
| P               | 5956                  | 154          | 799                        | 7.2                             | 3801.6  | 3801.6           | 3801.6        | 0.0      |
| Q               | 6130                  | 379          | 1801                       | 3.2                             | 3802.7  | 3802.7           | 3802.7        | 0.0      |
| R               | 6624                  | 257          | 642                        | 9.0                             | 3806.7  | 3806.7           | 3807.0        | 0.3      |
| S               | 7032                  | 612          | 1368                       | 4.2                             | 3810.2  | 3810.2           | 3810.6        | 0.4      |
| T               | 7683                  | 319          | 687                        | 8.4                             | 3815.4  | 3815.4           | 3815.4        | 0.0      |
| U               | 8292                  | 219          | 661                        | 8.7                             | 3822.6  | 3822.6           | 3822.7        | 0.1      |
| V               | 8835                  | 238          | 607                        | 9.5                             | 3828.0  | 3828.0           | 3828.0        | 0.0      |

<sup>1</sup>Feet Above Mouth

<sup>2</sup>Water-surface elevations computed without considering effects of debris or scouring

|         |   |                        |
|---------|---|------------------------|
| TABLE 3 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>   |
|         |   | <b>MARIPOSA CANYON</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION <sup>2</sup> |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|---|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                                      | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 |   | (FEET NAVD)      |               |          |
| Mariposa Canyon |                       |              |                            |                                 |   |                  |               |          |
| W               | 9124                  | 161          | 576                        | 10.0                            | 3830.8  | 3830.8           | 3830.8        | 0.0      |
| X               | 9436                  | 114          | 493                        | 11.7                            | 3833.7  | 3833.7           | 3833.7        | 0.0      |
| Y               | 9744                  | 144          | 814                        | 7.1                             | 3839.3  | 3839.3           | 3839.4        | 0.1      |
| Z               | 10002                 | 149          | 594                        | 9.7                             | 3839.5  | 3839.5           | 3840.0        | 0.1      |
| AA              | 10597                 | 142          | 529                        | 10.9                            | 3845.8  | 3845.8           | 3846.1        | 0.3      |
| AB              | 10999                 | 98           | 468                        | 12.3                            | 3851.9  | 3851.9           | 3851.9        | 0.0      |
| AC              | 11375                 | 112          | 627                        | 9.2                             | 3855.7  | 3855.7           | 3855.7        | 0.0      |
| AD              | 11718                 | 95           | 461                        | 12.5                            | 3858.2  | 3858.2           | 3858.2        | 0.0      |
| AE              | 12338                 | 163          | 555                        | 10.4                            | 3871.5  | 3871.5           | 3871.5        | 0.0      |
| AF              | 12890                 | 156          | 858                        | 6.7                             | 3881.7  | 3881.7           | 3881.7        | 0.0      |
| AG              | 13205                 | 306          | 987                        | 5.9                             | 3884.9  | 3884.9           | 3885.8        | 0.9      |
| AH              | 13577                 | 397          | 1143                       | 5.1                             | 3889.4  | 3889.4           | 3890.4        | 1.0      |
| AI              | 13821                 | 454          | 1301                       | 4.4                             | 3893.0  | 3893.0           | 3893.9        | 0.9      |
| AJ              | 14222                 | 464          | 1271                       | 4.5                             | 3898.7  | 3898.7           | 3899.4        | 0.7      |
| AK              | 14533                 | 168          | 563                        | 10.3                            | 3904.5  | 3904.5           | 3904.6        | 0.1      |
| AL              | 14818                 | 172          | 704                        | 8.2                             | 3908.5  | 3908.5           | 3908.8        | 0.3      |
| AM              | 15179                 | 68           | 422                        | 13.7                            | 3910.7  | 3910.7           | 3910.8        | 0.1      |
| AN              | 15712                 | 75           | 377                        | 12.8                            | 3917.9  | 3917.9           | 3917.9        | 0.0      |
| AO              | 16423                 | 90           | 402                        | 12.0                            | 3926.8  | 3926.8           | 3926.8        | 0.0      |
| AP              | 16858                 | 53           | 337                        | 14.3                            | 3937.4  | 3937.4           | 3937.4        | 0.0      |

<sup>1</sup>Feet Above Mouth

<sup>2</sup>Water-surface elevations computed without considering effects of debris or scouring

|         |   |                        |
|---------|---|------------------------|
| TABLE 3 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>   |
|         |   | <b>MARIPOSA CANYON</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION <sup>2</sup> |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|---|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                                      | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)     |                       |              |                            |                                 |   |                  |               |          |
| Mariposa Canyon |                       |              |                            |                                 |   |                  |               |          |
| AQ              | 17366                 | 146          | 939                        | 5.1                             | 3941.8  | 3941.8           | 3941.8        | 0.0      |
| AR              | 17883                 | 93           | 402                        | 12.0                            | 3947.2  | 3947.2           | 3947.2        | 0.0      |
| AS              | 18346                 | 133          | 547                        | 8.8                             | 3953.1  | 3953.1           | 3953.1        | 0.0      |
| AT              | 18865                 | 67           | 368                        | 13.1                            | 3958.8  | 3958.8           | 3958.8        | 0.0      |
| AU              | 19538                 | 119          | 572                        | 8.4                             | 3965.2  | 3965.2           | 3965.3        | 0.1      |

<sup>1</sup>Feet Above Mouth

<sup>2</sup>Water-surface elevations computed without considering effects of debris or scouring

|         |   |                        |
|---------|---|------------------------|
| TABLE 3 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>   |
|         |   | <b>MARIPOSA CANYON</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION <sup>2</sup> |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|---|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                                      | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)                     |                       |              |                            |                                 |   |                  |               |          |
| Mariposa Canyon Tributary No. 1 |                       |              |                            |                                 |   |                  |               |          |
| A                               | 808                   | 96           | 178                        | 4.0                             | 3796.2  | 3796.2           | 3796.2        | 0.0      |
| B                               | 1695                  | 25           | 74                         | 9.7                             | 3815.2  | 3815.2           | 3815.2        | 0.0      |
| C                               | 2492                  | 136          | 179                        | 4.0                             | 3825.3  | 3825.3           | 3825.9        | 0.6      |
| D                               | 2735                  | 89           | 112                        | 6.4                             | 3828.9  | 3828.9           | 3828.9        | 0.0      |
| E                               | 3390                  | 100          | 125                        | 5.8                             | 3839.8  | 3839.8           | 3840.1        | 0.3      |

<sup>1</sup>Feet Above Mouth

<sup>2</sup>Water-surface elevations computed without considering effects of debris or scouring

|         |   |                                    |
|---------|---|------------------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>               |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>MARIPOSA CANYON TRIBUTARY 1</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION <sup>2</sup> |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|---|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                                      | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)                     |                       |              |                            |                                 |   |                  |               |          |
| Mariposa Canyon Tributary No. 2 |                       |              |                            |                                 |   |                  |               |          |
| A                               | 1510                  | 40           | 90                         | 8.5                             | 3815.3  | 3815.3           | 3815.6        | 0.3      |
| B                               | 1932                  | 36           | 86                         | 8.8                             | 3821.4  | 3821.4           | 3821.4        | 0.0      |
| C                               | 2355                  | 155          | 302                        | 2.5                             | 3825.6  | 3825.6           | 3826.5        | 0.9      |
| D                               | 2746                  | 50           | 99                         | 7.7                             | 3833.5  | 3833.5           | 3833.5        | 0.0      |
| E                               | 3252                  | 51           | 99                         | 7.7                             | 3841.2  | 3841.2           | 3841.2        | 0.0      |

<sup>1</sup>Feet Above Mouth

<sup>2</sup>Water-surface elevations computed without considering effects of debris or scouring

|         |   |                                    |
|---------|---|------------------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>               |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>MARIPOSA CANYON TRIBUTARY 2</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |          |
| Nogales Wash    |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 578                   | 529          | 1399                       | 8.8                             | 3614.7                             | 3614.7           | 3614.7        | 0.0      |
| B               | 1165                  | 788          | 2391                       | 5.0                             | 3619.5                             | 3619.7           | 3619.7        | 0.2      |
| C               | 1813                  | 621          | 1142                       | 8.5                             | 3624.2                             | 3624.2           | 3624.3        | 0.1      |
| D               | 3076                  | 1185         | 4412                       | 4.9                             | 3635.0                             | 3635.0           | 3635.5        | 0.5      |
| E               | 3862                  | 806          | 3147                       | 6.9                             | 3640.7                             | 3640.7           | 3640.8        | 0.1      |
| F               | 4036                  | 517          | 2369                       | 9.2                             | 3642.2                             | 3642.2           | 3642.3        | 0.1      |
| G               | 5243                  | 367          | 4304                       | 9.9                             | 3658.5                             | 3658.5           | 3658.5        | 0.0      |
| H               | 6015                  | 446          | 2006                       | 10.2                            | 3664.5                             | 3664.5           | 3665.0        | 0.5      |
| I               | 6515                  | 383          | 2072                       | 10.1                            | 3670.0                             | 3670.0           | 3670.2        | 0.2      |
| J               | 7014                  | 319          | 1723                       | 11.8                            | 3674.7                             | 3674.7           | 3674.7        | 0.0      |
| K               | 7489                  | 235          | 2095                       | 9.3                             | 3677.2                             | 3677.2           | 3677.4        | 0.2      |
| L               | 8345                  | 177          | 1335                       | 14.6                            | 3683.6                             | 3683.6           | 3683.6        | 0.0      |
| M               | 9001                  | 278          | 1589                       | 12.3                            | 3693.5                             | 3693.5           | 3693.5        | 0.0      |
| N               | 10085                 | 454          | 1974                       | 9.7                             | 3698.2                             | 3698.2           | 3698.3        | 0.1      |
| O               | 10587                 | 327          | 1954                       | 11.4                            | 3701.7                             | 3701.7           | 3702.6        | 0.9      |
| P               | 10892                 | 334          | 1834                       | 11.4                            | 3704.1                             | 3704.1           | 3705.0        | 0.9      |
| Q               | 11639                 | 611          | 5352                       | 5.7                             | 3709.6                             | 3709.6           | 3710.5        | 0.9      |
| R               | 12072                 | 589          | 4256                       | 5.5                             | 3714.7                             | 3714.7           | 3715.5        | 0.8      |
| S               | 12549                 | 640          | 3205                       | 6.1                             | 3715.3                             | 3715.3           | 3715.8        | 0.5      |
| T               | 13146                 | 646          | 2307                       | 8.5                             | 3719.0                             | 3719.0           | 3719.4        | 0.4      |
| U               | 13641                 | 601          | 2331                       | 8.4                             | 3723.3                             | 3723.3           | 3723.8        | 0.5      |
| V               | 14138                 | 384          | 2659                       | 10.2                            | 3728.0                             | 3728.0           | 3728.6        | 0.6      |

<sup>1</sup>Feet above Confluence with Potrero Creek

|         |   |                      |
|---------|---|----------------------|
| TABLE 3 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b> |
|         |   | <b>NOGALES WASH</b>  |

| FLOODING SOURCE          |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|--------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION            | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                          |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |          |
| Nogales Wash (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| W                        | 14636                 | 349          | 2986                       | 10.2                            | 3734.7                             | 3734.7           | 3735.4        | 0.7      |
| X                        | 15178                 | 333          | 1805                       | 10.6                            | 3738.0                             | 3738.0           | 3738.1        | 0.1      |
| Y                        | 15583                 | 301          | 3868                       | 6.8                             | 3745.2                             | 3745.2           | 3745.2        | 0.0      |
| Z                        | 16229                 | 545          | 2591                       | 7.3                             | 3746.2                             | 3746.2           | 3746.2        | 0.0      |
| AA                       | 16727                 | 527          | 2246                       | 8.7                             | 3747.5                             | 3747.5           | 3747.6        | 0.1      |
| AB                       | 17299                 | 457          | 3052                       | 7.3                             | 3750.5                             | 3750.5           | 3751.4        | 0.9      |
| AC                       | 17801                 | 480          | 2074                       | 9.1                             | 3754.2                             | 3754.2           | 3754.3        | 0.1      |
| AD                       | 18290                 | 315          | 1667                       | 11.3                            | 3757.3                             | 3757.3           | 3757.3        | 0.0      |
| AE                       | 18774                 | 213          | 1418                       | 13.3                            | 3760.9                             | 3760.9           | 3761.3        | 0.4      |
| AF                       | 19256                 | 213          | 1443                       | 13.0                            | 3767.8                             | 3767.8           | 3767.8        | 0.0      |
| AG                       | 19726                 | 210          | 1329                       | 14.1                            | 3769.9                             | 3769.9           | 3769.9        | 0.0      |
| AH                       | 20166                 | 260          | 1682                       | 11.2                            | 3773.0                             | 3773.0           | 3773.0        | 0.0      |
| AI                       | 20601                 | 236          | 1436                       | 13.1                            | 3775.4                             | 3775.4           | 3775.4        | 0.0      |
| AJ                       | 21115                 | 257          | 1771                       | 10.6                            | 3779.1                             | 3779.1           | 3779.3        | 0.2      |
| AK                       | 21576                 | 303          | 1951                       | 9.6                             | 3786.3                             | 3786.3           | 3786.9        | 0.6      |
| AL                       | 22075                 | 187          | 1469                       | 12.8                            | 3790.9                             | 3790.9           | 3791.8        | 0.9      |
| AM                       | 23077                 | 159          | 1482                       | 13.4                            | 3801.1                             | 3801.1           | 3801.1        | 0.0      |
| AN                       | 25610                 | 179          | 1490                       | 12.4                            | 3816.7                             | 3816.7           | 3817.6        | 0.9      |
| AO                       | 26109                 | 190          | 1058                       | 13.1                            | 3820.3                             | 3820.3           | 3820.3        | 0.0      |
| AP                       | 26606                 | 211          | 1559                       | 8.8                             | 3828.7                             | 3828.7           | 3828.7        | 0.0      |
| AQ                       | 27062                 | 240          | 1276                       | 11.6                            | 3830.5                             | 3830.5           | 3830.5        | 0.0      |

<sup>1</sup>Feet above Confluence with Potrero Creek

|         |   |                      |
|---------|---|----------------------|
| TABLE 3 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>NOGALES WASH</b>  |

| FLOODING SOURCE          |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|--------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION            | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                          |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Nogales Wash (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| AR                       | 27568                 | 241          | 1106                       | 9.0                             | 3835.1                             | 3835.1           | 3835.4        | 0.3      |
| AS                       | 28081                 | 287          | 1494                       | 8.9                             | 3841.6                             | 3841.6           | 3841.8        | 0.2      |
| AT                       | 28576                 | 229          | 2106                       | 7.9                             | 3847.7                             | 3847.7           | 3847.7        | 0.0      |
| AU                       | 29073                 | 216          | 1971                       | 8.1                             | 3851.9                             | 3851.9           | 3851.9        | 0.0      |
| AV                       | 29572                 | 255          | 2054                       | 7.5                             | 3856.4                             | 3856.4           | 3856.5        | 0.1      |
| AW                       | 30075                 | 235          | 1868                       | 9.1                             | 3860.5                             | 3860.5           | 3860.5        | 0.0      |
| AX                       | 30573                 | 160          | 1284                       | 10.5                            | 3865.1                             | 3865.1           | 3865.3        | 0.2      |
| AY                       | 31063                 | 112          | 1117                       | 11.4                            | 3870.5                             | 3870.5           | 3870.6        | 0.1      |
| AZ                       | 31382                 | 199          | 1301                       | 8.0                             | 3872.4                             | 3872.4           | 3872.8        | 0.3      |

<sup>1</sup>Feet above Confluence with Potrero Creek

|         |   |                      |
|---------|---|----------------------|
| TABLE 3 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>NOGALES WASH</b>  |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |           |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|-----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE* |
|                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |           |
| Peck Canyon     |                       |              |                            |                                 |                                    |                  |               |           |
| A               | 3550                  | 924          | 6231                       | 2.9                             | 3360.1                             | 3360.1           | 3360.9        | 0.8       |
| B               | 3663                  | 655          | 6693                       | 2.7                             | 3360.2                             | 3360.2           | 3361.0        | 0.8       |
| C               | 3725                  | 724          | 6660                       | 2.8                             | 3360.2                             | 3360.2           | 3361.1        | 0.9       |
| D               | 3867                  | 700          | 4429                       | 4.1                             | 3360.3                             | 3360.3           | 3361.2        | 0.9       |
| E               | 4168                  | 450          | 4134                       | 4.4                             | 3360.5                             | 3360.5           | 3361.5        | 1.0       |
| F               | 5002                  | 396          | 2921                       | 6.3                             | 3362.0                             | 3362.0           | 3362.7        | 0.7       |
| G               | 5282                  | 344          | 2384                       | 7.7                             | 3362.6                             | 3362.6           | 3363.2        | 0.6       |
| H               | 5920                  | 314          | 1914                       | 9.6                             | 3365.2                             | 3365.2           | 3365.7        | 0.5       |
| I               | 6395                  | 357          | 2293                       | 8                               | 3367.8                             | 3367.8           | 3368.6        | 0.8       |
| J               | 6839                  | 287          | 1481                       | 12.4                            | 3371.1                             | 3371.1           | 3371.1        | 0.0       |
| K               | 7995                  | 400          | 1906                       | 9.6                             | 3379.0                             | 3379.0           | 3379.4        | 0.4       |
| L               | 8486                  | 630          | 2561                       | 7.2                             | 3381.7                             | 3381.7           | 3382.6        | 0.9       |
| M               | 9468                  | 413          | 2110                       | 8.6                             | 3388.5                             | 3388.5           | 3389.2        | 0.7       |
| N               | 9832                  | 351          | 1677                       | 10.9                            | 3391.7                             | 3391.7           | 3391.8        | 0.1       |
| O               | 10064                 | 376          | 2225                       | 8.2                             | 3393.4                             | 3393.4           | 3394.1        | 0.7       |
| P               | 10344                 | 324          | 1553                       | 11.7                            | 3394.7                             | 3394.7           | 3394.9        | 0.2       |
| Q               | 11385                 | 386          | 1918                       | 9.5                             | 3403.4                             | 3403.4           | 3403.5        | 0.1       |
| R               | 11702                 | 535          | 2901                       | 6.3                             | 3405.1                             | 3405.1           | 3406.0        | 0.9       |
| S               | 12467                 | 423          | 1783                       | 10.2                            | 3410.8                             | 3410.8           | 3411.1        | 0.3       |
| T               | 12911                 | 391          | 1799                       | 10.1                            | 3413.8                             | 3413.8           | 3414.5        | 0.7       |
| U               | 13312                 | 331          | 1951                       | 9.4                             | 3417.3                             | 3417.3           | 3417.7        | 0.4       |
| V               | 13587                 | 275          | 1672                       | 10.9                            | 3419.3                             | 3419.3           | 3419.3        | 0.0       |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

\*based on energy grade line elevation

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b> |
|         |   | <b>PECK CANYON</b>   |

| FLOODING SOURCE            |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |           |
|----------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|-----------|
| CROSS SECTION              | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE* |
|                            |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |           |
| Peck Canyon<br>(continued) |                       |              |                            |                                 |                                    |                  |               |           |
| W                          | 13867                 | 500          | 2219                       | 8.2                             | 3421.3                             | 3421.3           | 3421.6        | 0.3       |
| X                          | 14179                 | 547          | 2261                       | 8.1                             | 3423.7                             | 3423.7           | 3424.2        | 0.5       |
| Y                          | 15018                 | 477          | 2139                       | 8.5                             | 3429.3                             | 3429.3           | 3429.7        | 0.4       |
| Z                          | 15472                 | 373          | 2025                       | 9                               | 3433.0                             | 3433.0           | 3433.5        | 0.5       |
| AA                         | 16032                 | 374          | 1912                       | 9.5                             | 3438.0                             | 3438.0           | 3438.6        | 0.6       |
| AB                         | 16539                 | 380          | 2378                       | 7.5                             | 3442.7                             | 3442.7           | 3443.0        | 0.3       |
| AC                         | 16900                 | 509          | 2678                       | 6.7                             | 3443.9                             | 3443.9           | 3444.9        | 1.0       |
| AD                         | 17294                 | 474          | 2150                       | 8.3                             | 3447.0                             | 3447.0           | 3447.3        | 0.3       |
| AE                         | 17885                 | 570          | 3083                       | 5.8                             | 3451.4                             | 3451.4           | 3452.3        | 0.9       |
| AF                         | 18840                 | 448          | 2160                       | 8.3                             | 3457.8                             | 3457.8           | 3458.4        | 0.6       |
| AG                         | 19823                 | 279          | 1720                       | 10.4                            | 3465.3                             | 3465.3           | 3465.5        | 0.2       |
| AH                         | 20156                 | 556          | 2644                       | 6.8                             | 3468.0                             | 3468.0           | 3468.8        | 0.8       |
| AI                         | 20441                 | 471          | 1771                       | 10.1                            | 3470.7                             | 3470.7           | 3471.1        | 0.4       |
| AJ                         | 20879                 | 191          | 1374                       | 13                              | 3477.3                             | 3477.3           | 3477.4        | 0.1       |
| AK                         | 21254                 | 164          | 1305                       | 13.7                            | 3481.4                             | 3481.4           | 3481.8        | 0.4       |
| AL                         | 21756                 | 167          | 1612                       | 11.1                            | 3485.8                             | 3485.8           | 3486.8        | 1.0       |
| AM                         | 22131                 | 124          | 1169                       | 15.3                            | 3487.9                             | 3487.9           | 3488.5        | 0.6       |
| AN                         | 22601                 | 168          | 1756                       | 10.2                            | 3493.0                             | 3493.0           | 3494.0        | 1.0       |
| AO                         | 23097                 | 126          | 1402                       | 12.7                            | 3496.6                             | 3496.6           | 3497.4        | 0.8       |
| AP                         | 23841                 | 160          | 1596                       | 11.2                            | 3504.0                             | 3504.0           | 3504.4        | 0.4       |
| AQ                         | 24142                 | 213          | 1805                       | 9.9                             | 3505.2                             | 3505.2           | 3506.2        | 1.0       |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

\*based on energy grade line elevation

TABLE 7

**FEDERAL EMERGENCY MANAGEMENT AGENCY  
SANTA CRUZ COUNTY, AZ  
AND INCORPORATED AREAS**

**FLOODWAY DATA**

**PECK CANYON**

| FLOODING SOURCE            |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |           |
|----------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|-----------|
| CROSS SECTION              | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE* |
| (FEET NAVD)                |                       |              |                            |                                 |                                    |                  |               |           |
| Peck Canyon<br>(continued) |                       |              |                            |                                 |                                    |                  |               |           |
| AR                         | 24489                 | 265          | 1906                       | 9.4                             | 3508.6                             | 3508.6           | 3508.8        | 0.2       |
| AS                         | 24765                 | 272          | 1602                       | 11.1                            | 3510.3                             | 3510.3           | 3510.5        | 0.2       |
| AT                         | 25325                 | 99           | 1047                       | 16.3                            | 3515.6                             | 3515.6           | 3515.7        | 0.1       |
| AU                         | 25698                 | 103          | 1226                       | 13.9                            | 3519.6                             | 3519.6           | 3520.6        | 1.0       |
| AV                         | 26017                 | 90           | 1018                       | 16.8                            | 3525.5                             | 3525.5           | 3525.5        | 0.0       |
| AW                         | 26190                 | 83           | 1001                       | 17.1                            | 3526.9                             | 3526.9           | 3527.0        | 0.1       |
| AX                         | 26294                 | 76           | 988                        | 17.3                            | 3529.4                             | 3529.4           | 3529.4        | 0.0       |
| AY                         | 26913                 | 103          | 1106                       | 15.5                            | 3535.9                             | 3535.9           | 3536.1        | 0.2       |
| AZ                         | 27198                 | 140          | 1775                       | 9.6                             | 3540.9                             | 3540.9           | 3541.9        | 1.0       |
| BA                         | 27371                 | 153          | 1601                       | 10.7                            | 3541.4                             | 3541.4           | 3542.4        | 1.0       |
| BB                         | 27589                 | 105          | 1185                       | 14.4                            | 3543.0                             | 3543.0           | 3543.3        | 0.3       |
| BC                         | 27716                 | 94           | 1243                       | 13.8                            | 3546.5                             | 3546.5           | 3546.5        | 0.0       |
| BD                         | 27959                 | 120          | 1535                       | 11.1                            | 3547.5                             | 3547.5           | 3548.1        | 0.6       |
| BE                         | 28255                 | 129          | 1357                       | 12.6                            | 3548.7                             | 3548.7           | 3549.2        | 0.5       |
| BF                         | 28561                 | 127          | 1287                       | 13.3                            | 3551.2                             | 3551.2           | 3552.0        | 0.8       |
| BG                         | 29126                 | 166          | 1964                       | 8.7                             | 3559.6                             | 3559.6           | 3559.8        | 0.2       |
| BH                         | 29284                 | 112          | 1194                       | 14.3                            | 3561.7                             | 3561.7           | 3561.9        | 0.2       |
| BI                         | 29400                 | 61           | 924                        | 18.5                            | 3566.0                             | 3566.0           | 3566.0        | 0.0       |
| BJ                         | 29441                 | 68           | 1169                       | 14.6                            | 3591.2                             | 3591.2           | 3591.7        | 0.5       |
| BK                         | 29463                 | 99           | 2075                       | 8.2                             | 3598.1                             | 3598.1           | 3598.1        | 0.0       |
| BL                         | 29539                 | 98           | 2650                       | 6.5                             | 3599.9                             | 3599.9           | 3599.9        | 0.0       |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

\*based on energy grade line elevation

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>PECK CANYON</b>   |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Potrero Creek   |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 708                   | 385          | 14491                      | 10.7                            | 3469.6                             | 3469.6           | 3469.6        | 0.0      |
| B               | 1276                  | 317          | 12295                      | 10.1                            | 3474.5                             | 3474.5           | 3474.5        | 0.0      |
| C               | 1811                  | 231          | 9650                       | 12.5                            | 3478.2                             | 3478.2           | 3478.2        | 0.0      |
| D               | 2235                  | 297          | 5974                       | 10.3                            | 3482.1                             | 3482.1           | 3482.1        | 0.0      |
| E               | 2953                  | 607          | 5616                       | 5.6                             | 3485.8                             | 3485.8           | 3485.8        | 0.0      |
| F               | 3272                  | 440          | 2788                       | 9.5                             | 3485.8                             | 3485.8           | 3485.8        | 0.0      |
| G               | 3550                  | 387          | 2538                       | 10.9                            | 3487.1                             | 3487.1           | 3487.1        | 0.0      |
| H               | 4041                  | 380          | 2545                       | 10.1                            | 3492.1                             | 3492.1           | 3492.1        | 0.0      |
| I               | 4583                  | 304          | 2681                       | 9.5                             | 3495.5                             | 3495.5           | 3495.5        | 0.0      |
| J               | 5116                  | 208          | 1836                       | 13.3                            | 3497.1                             | 3497.1           | 3497.1        | 0.0      |
| K               | 5536                  | 172          | 1530                       | 15.8                            | 3498.6                             | 3498.6           | 3498.6        | 0.0      |
| L               | 5738                  | 164          | 2334                       | 12.9                            | 3503.5                             | 3503.5           | 3503.5        | 0.0      |
| M               | 5754                  | 238          | 2166                       | 11.2                            | 3506.3                             | 3506.3           | 3506.3        | 0.0      |
| N               | 5758                  | 369          | 2268                       | 10.7                            | 3508.9                             | 3508.9           | 3508.9        | 0.0      |
| O               | 6375                  | 192          | 1766                       | 13.7                            | 3511.1                             | 3511.1           | 3511.1        | 0.0      |
| P               | 6730                  | 210          | 1587                       | 15.0                            | 3517.0                             | 3517.0           | 3517.1        | 0.0      |
| Q               | 7173                  | 149          | 2202                       | 10.8                            | 3521.7                             | 3521.7           | 3521.7        | 0.0      |
| R               | 7614                  | 226          | 2916                       | 8.2                             | 3523.7                             | 3523.7           | 3524.0        | 0.3      |
| S               | 8023                  | 328          | 3807                       | 6.3                             | 3524.4                             | 3524.4           | 3524.4        | 0.0      |
| T               | 8472                  | 383          | 3457                       | 6.9                             | 3525.0                             | 3525.0           | 3525.0        | 0.0      |
| U               | 8586                  | 225          | 2682                       | 8.9                             | 3525.4                             | 3525.4           | 3525.6        | 0.2      |
| V               | 9010                  | 217          | 2148                       | 10.6                            | 3525.9                             | 3525.9           | 3526.3        | 0.4      |

<sup>1</sup>Feet above Confluence with Santa Cruz River (Mouth)

|         |   |                                       |
|---------|---|---------------------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>                  |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>POTRERO CREEK<br/>(Downstream)</b> |

| FLOODING SOURCE           |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION             | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                           |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Potrero Creek (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| W                         | 10270                 | 231          | 1762                       | 13.0                            | 3527.3                             | 3527.3           | 3527.7        | 0.4      |
| X                         | 10725                 | 317          | 2126                       | 10.8                            | 3530.8                             | 3530.8           | 3531.3        | 0.5      |
| Y                         | 10993                 | 391          | 3395                       | 7.3                             | 3537.8                             | 3537.8           | 3538.4        | 0.6      |
| Z                         | 11305                 | 407          | 4429                       | 5.2                             | 3538.9                             | 3538.9           | 3539.8        | 0.9      |
| AA                        | 11624                 | 326          | 3340                       | 6.8                             | 3539.0                             | 3539.0           | 3539.9        | 0.9      |
| AB                        | 12055                 | 220          | 2547                       | 8.6                             | 3539.6                             | 3539.6           | 3540.5        | 0.9      |
| AC                        | 12592                 | 263          | 2190                       | 10.0                            | 3540.2                             | 3540.2           | 3541.0        | 0.8      |
| AD                        | 13045                 | 625          | 4694                       | 4.6                             | 3542.7                             | 3542.7           | 3543.7        | 1.0      |
| AE                        | 13552                 | 333          | 1707                       | 12.8                            | 3544.6                             | 3544.6           | 3544.7        | 0.1      |
| AF                        | 13981                 | 612          | 3527                       | 6.2                             | 3548.7                             | 3548.7           | 3548.9        | 0.2      |
| AG                        | 14449                 | 387          | 1781                       | 12.2                            | 3550.8                             | 3550.8           | 3550.8        | 0.0      |
| AH                        | 14991                 | 357          | 2185                       | 10.0                            | 3555.5                             | 3555.5           | 3555.5        | 0.0      |
| AI                        | 15584                 | 227          | 1500                       | 14.5                            | 3559.5                             | 3559.5           | 3559.5        | 0.0      |
| AJ                        | 16204                 | 249          | 2124                       | 10.3                            | 3565.7                             | 3565.7           | 3565.7        | 0.0      |
| AK                        | 16688                 | 377          | 3267                       | 6.7                             | 3568.1                             | 3568.1           | 3568.1        | 0.0      |
| AL                        | 17181                 | 200          | 1551                       | 14.1                            | 3568.7                             | 3568.7           | 3569.6        | 0.9      |
| AM                        | 17705                 | 141          | 1337                       | 16.3                            | 3574.5                             | 3574.5           | 3574.7        | 0.2      |
| AN                        | 18362                 | 129          | 1431                       | 15.2                            | 3580.7                             | 3580.7           | 3581.0        | 0.3      |
| AO                        | 19306                 | 215          | 2159                       | 10.1                            | 3587.7                             | 3587.7           | 3587.9        | 0.2      |
| AP                        | 19774                 | 250          | 2199                       | 9.9                             | 3588.9                             | 3588.9           | 3589.7        | 0.8      |
| AQ                        | 20064                 | 201          | 1439                       | 15.2                            | 3590.2                             | 3590.2           | 3590.2        | 0.0      |

<sup>1</sup>Feet above Confluence with Santa Cruz River (Mouth)

|         |   |   |
|---------|---|---|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>                        |
|         |   | <b>POTRERO CREEK</b><br><b>(Downstream)</b> |

| FLOODING SOURCE           |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION             | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)               |                       |              |                            |                                 |                                    |                  |               |          |
| Potrero Creek (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| AR                        | 20373                 | 125          | 1209                       | 18.0                            | 3594.6                             | 3594.6           | 3594.6        | 0.0      |
| AS                        | 20837                 | 357          | 4009                       | 5.4                             | 3600.9                             | 3600.9           | 3600.9        | 0.0      |
| AT                        | 21307                 | 134          | 1257                       | 17.3                            | 3603.1                             | 3603.1           | 3603.1        | 0.0      |

<sup>1</sup>Feet above Confluence with Santa Cruz River (Mouth)

|         |   |   |
|---------|---|---|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>                        |
|         |   | <b>POTRERO CREEK</b><br><b>(Downstream)</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                     |                     |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|---------------------|---------------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY    | WITH FLOODWAY       | INCREASE |
|                 |                       |              |                            |                                 |                                    | (FEET NAVD)         |                     |          |
| Potrero Creek   |                       |              |                            |                                 |                                    |                     |                     |          |
| A               | 865                   | 378          | 2121                       | 3.4                             | 3657.2                             | 3653.5 <sup>2</sup> | 3653.9 <sup>2</sup> | 0.4      |
| B               | 1096                  | 279          | 1414                       | 5.0                             | 3657.2                             | 3654.5 <sup>2</sup> | 3654.7 <sup>2</sup> | 0.2      |
| C               | 1352                  | 150          | 1223                       | 5.8                             | 3660.9                             | 3660.9              | 3661.7              | 0.8      |
| D               | 1520                  | 227          | 1416                       | 5.0                             | 3661.8                             | 3661.8              | 3662.7              | 0.9      |
| E               | 1733                  | 368          | 1804                       | 3.9                             | 3662.6                             | 3662.6              | 3663.5              | 0.9      |
| F               | 2103                  | 443          | 936                        | 7.6                             | 3663.7                             | 3663.7              | 3664.4              | 0.7      |
| G               | 2443                  | 366          | 1187                       | 8.3                             | 3668.8                             | 3668.8              | 3669.1              | 0.3      |
| H               | 2788                  | 545          | 960                        | 7.4                             | 3673.8                             | 3673.8              | 3674.8              | 1.0      |
| I               | 3153                  | 403          | 1073                       | 6.6                             | 3678.5                             | 3678.5              | 3679.1              | 0.6      |
| J               | 3255                  | 500          | 1177                       | 6.0                             | 3681.5                             | 3681.5              | 3682.4              | 0.9      |
| K               | 3575                  | 398          | 2152                       | 6.3                             | 3684.1                             | 3684.1              | 3685.1              | 1.0      |
| L               | 3940                  | 329          | 889                        | 8.0                             | 3689.5                             | 3689.5              | 3690.4              | 0.9      |
| M               | 4243                  | 263          | 850                        | 8.4                             | 3693.6                             | 3693.6              | 3694.5              | 0.9      |
| N               | 4666                  | 264          | 873                        | 8.1                             | 3698.3                             | 3698.3              | 3699.3              | 1.0      |
| O               | 5014                  | 271          | 827                        | 8.6                             | 3702.6                             | 3702.6              | 3703.5              | 0.9      |
| P               | 5424                  | 313          | 2040                       | 5.6                             | 3705.8                             | 3705.8              | 3706.8              | 1.0      |
| Q               | 5882                  | 292          | 865                        | 8.2                             | 3711.8                             | 3711.8              | 3712.8              | 1.0      |
| R               | 6271                  | 155          | 685                        | 10.4                            | 3715.3                             | 3715.3              | 3716.3              | 1.0      |
| S               | 6824                  | 208          | 715                        | 9.9                             | 3723.2                             | 3723.2              | 3723.6              | 0.4      |
| T               | 7231                  | 210          | 740                        | 9.6                             | 3728.0                             | 3728.0              | 3728.8              | 0.8      |
| U               | 7633                  | 173          | 680                        | 10.4                            | 3733.8                             | 3733.8              | 3734.1              | 0.3      |
| V               | 7859                  | 189          | 719                        | 9.9                             | 3736.4                             | 3736.4              | 3737.0              | 0.6      |

<sup>1</sup>Feet above Confluence of Al Harrison Wash

<sup>2</sup>Elevation computed without consideration of backwater effects from Nogales Wash

|         |   |   |
|---------|---|---|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b><br><b>POTRERO CREEK</b><br><b>(Upstream)</b> |
|         |   |   |

| FLOODING SOURCE           |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION             | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                           |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |          |
| Potrero Creek (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| W                         | 8071                  | 143          | 624                        | 9.8                             | 3738.8                             | 3738.8           | 3739.3        | 0.5      |
| X                         | 8381                  | 148          | 740                        | 8.2                             | 3741.2                             | 3741.2           | 3742.2        | 1.0      |
| Y                         | 8696                  | 116          | 521                        | 11.7                            | 3745.5                             | 3745.5           | 3745.7        | 0.2      |
| Z                         | 8976                  | 122          | 661                        | 9.2                             | 3748.3                             | 3748.3           | 3749.2        | 0.9      |
| AA                        | 9241                  | 169          | 615                        | 9.9                             | 3751.9                             | 3751.9           | 3752.8        | 0.9      |
| AB                        | 9676                  | 176          | 663                        | 9.2                             | 3758.4                             | 3758.4           | 3759.2        | 0.8      |
| AC                        | 10181                 | 297          | 889                        | 6.2                             | 3765.2                             | 3765.2           | 3766.1        | 0.9      |
| AD                        | 10755                 | 312          | 756                        | 7.3                             | 3772.7                             | 3772.7           | 3773.1        | 0.4      |
| AE                        | 11261                 | 329          | 744                        | 7.4                             | 3781.1                             | 3781.1           | 3781.2        | 0.1      |
| AF                        | 11751                 | 377          | 788                        | 7.0                             | 3788.8                             | 3788.8           | 3789.6        | 0.8      |
| AG                        | 12291                 | 331          | 853                        | 6.5                             | 3797.8                             | 3797.8           | 3798.6        | 0.8      |
| AH                        | 12816                 | 223          | 597                        | 9.2                             | 3807.2                             | 3807.2           | 3807.6        | 0.4      |

<sup>1</sup>Feet above Confluence of Al Harrison Wash

|         |   |   |
|---------|---|---|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>                      |
|         |   | <b>POTRERO CREEK</b><br><b>(Upstream)</b> |

| FLOODING SOURCE    |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|--------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION      | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                    |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Puerto Canyon Wash |                       |              |                            |                                 |                                    |                  |               |          |
| A                  | 1581                  | 173          | 309                        | 7.6                             | 3168.2                             | 3168.2           | 3168.2        | 0.0      |
| B                  | 1962                  | 115          | 362                        | 9.0                             | 3174.0                             | 3174.0           | 3174.0        | 0.0      |
| C                  | 2366                  | 87           | 340                        | 9.6                             | 3178.9                             | 3178.9           | 3178.9        | 0.0      |
| D                  | 2773                  | 106          | 341                        | 9.5                             | 3184.3                             | 3184.3           | 3184.3        | 0.0      |
| E                  | 3196                  | 116          | 361                        | 9.0                             | 3190.5                             | 3190.5           | 3190.5        | 0.0      |
| F                  | 3605                  | 86           | 340                        | 9.6                             | 3195.6                             | 3195.6           | 3195.7        | 0.1      |
| G                  | 4059                  | 140          | 418                        | 9.6                             | 3201.8                             | 3201.8           | 3202.0        | 0.2      |
| H                  | 4409                  | 184          | 545                        | 7.3                             | 3206.5                             | 3206.5           | 3207.1        | 0.6      |
| I                  | 4627                  | 136          | 409                        | 9.8                             | 3209.9                             | 3209.9           | 3209.9        | 0.0      |
| J                  | 4947                  | 300          | 768                        | 6.0                             | 3213.9                             | 3213.9           | 3214.0        | 0.1      |
| K                  | 5190                  | 77           | 389                        | 12.4                            | 3218.1                             | 3218.1           | 3218.1        | 0.0      |
| L                  | 5265                  | 706          | 1949                       | 2.4                             | 3222.4                             | 3222.4           | 3222.4        | 0.0      |
| M                  | 5519                  | 198          | 903                        | 5.1                             | 3225.2                             | 3225.2           | 3225.8        | 0.6      |
| N                  | 5604                  | 198          | 734                        | 7.6                             | 3228.3                             | 3228.3           | 3228.7        | 0.4      |
| O                  | 6111                  | 190          | 622                        | 9.0                             | 3233.9                             | 3233.9           | 3234.4        | 0.5      |
| P                  | 6332                  | 176          | 776                        | 7.2                             | 3237.3                             | 3237.3           | 3238.1        | 0.8      |
| Q                  | 6621                  | 152          | 543                        | 10.3                            | 3242.0                             | 3242.0           | 3242.0        | 0.0      |
| R                  | 7039                  | 393          | 1225                       | 4.5                             | 3247.9                             | 3247.9           | 3248.4        | 0.5      |
| S                  | 7547                  | 369          | 735                        | 7.6                             | 3255.4                             | 3255.4           | 3255.4        | 0.0      |
| T                  | 8020                  | 277          | 898                        | 6.2                             | 3263.8                             | 3263.8           | 3264.5        | 0.7      |
| U                  | 8486                  | 164          | 600                        | 9.3                             | 3270.8                             | 3270.8           | 3271.0        | 0.2      |
| V                  | 9212                  | 416          | 1179                       | 4.7                             | 3280.7                             | 3280.7           | 3280.8        | 0.1      |

<sup>1</sup>Feet above confluence with Santa Cruz River

|         |   |                           |
|---------|---|---------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>      |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>PUERTO CANYON WASH</b> |

| FLOODING SOURCE                        |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|--|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                          | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)                            |                       |              |                            |                                 |                                    |                  |               |          |
| Puerto Canyon Wash<br>(continued)<br>W | 10430                 | 160          | 614                        | 10.6                            | 3299.4                             | 3299.4           | 3300.3        | 0.9      |

<sup>1</sup>Feet above confluence with Santa Cruz River

|         |   |                           |
|---------|---|---------------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>      |
|         |   | <b>PUERTO CANYON WASH</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Redrock Canyon  |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 538                   | 57           | 398                        | 13.8                            | 4096.8                             | 4096.8           | 4097          | 0.2      |
| B               | 1032                  | 108          | 769                        | 7.1                             | 4101.6                             | 4101.6           | 4102.3        | 0.7      |
| C               | 2116                  | 100          | 767                        | 7.2                             | 4109.5                             | 4109.5           | 4109.7        | 0.2      |
| D               | 3137                  | 59           | 396                        | 13.9                            | 4114.8                             | 4114.8           | 4115.7        | 0.9      |

<sup>1</sup>Feet above confluence with Harshaw Creek

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**SANTA CRUZ COUNTY, AZ  
AND INCORPORATED AREAS**

**FLOODWAY DATA**

**REDROCK CANYON**

| FLOODING SOURCE  |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION    | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                  |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River |                       |              |                            |                                 |                                    |                  |               |          |
| A                | 1450                  | 1532         | 8191                       | 5.5                             | 3037.0                             | 3037.0           | 3037.0        | 0.0      |
| B                | 2020                  | 1217         | 7278                       | 6.2                             | 3038.1                             | 3038.1           | 3038.1        | 0.0      |
| C                | 2720                  | 1355         | 8062                       | 5.6                             | 3039.5                             | 3039.5           | 3039.5        | 0.0      |
| D                | 3345                  | 1218         | 7004                       | 6.4                             | 3040.6                             | 3040.6           | 3041.0        | 0.4      |
| E                | 3945                  | 1299         | 7027                       | 6.4                             | 3042.0                             | 3042.0           | 3042.8        | 0.8      |
| F                | 4445                  | 1402         | 7037                       | 6.4                             | 3043.9                             | 3043.9           | 3044.5        | 0.6      |
| G                | 4995                  | 1772         | 8424                       | 5.3                             | 3045.8                             | 3045.8           | 3046.4        | 0.6      |
| H                | 5545                  | 1846         | 7096                       | 6.3                             | 3047.7                             | 3047.7           | 3048.1        | 0.4      |
| I                | 6045                  | 1536         | 6480                       | 6.9                             | 3050.2                             | 3050.2           | 3050.5        | 0.3      |
| J                | 6695                  | 945          | 5289                       | 8.5                             | 3053.2                             | 3053.2           | 3053.7        | 0.5      |
| K                | 7295                  | 884          | 5918                       | 7.6                             | 3055.7                             | 3055.7           | 3056.5        | 0.8      |
| L                | 7845                  | 1001         | 6229                       | 7.2                             | 3057.9                             | 3057.9           | 3058.4        | 0.5      |
| M                | 8295                  | 743          | 4834                       | 9.3                             | 3059.6                             | 3059.6           | 3059.8        | 0.2      |
| N                | 8920                  | 789          | 5808                       | 7.4                             | 3062.4                             | 3062.4           | 3062.7        | 0.3      |
| O                | 9420                  | 846          | 5937                       | 7.2                             | 3064.1                             | 3064.1           | 3064.3        | 0.2      |
| P                | 9970                  | 816          | 5741                       | 7.5                             | 3066.1                             | 3066.1           | 3066.4        | 0.3      |
| Q                | 10820                 | 1041         | 6990                       | 6.2                             | 3069.1                             | 3069.1           | 3069.4        | 0.3      |
| R                | 11420                 | 2011         | 9072                       | 4.7                             | 3071.1                             | 3071.1           | 3071.3        | 0.2      |
| S                | 12020                 | 1801         | 5625                       | 7.6                             | 3073.9                             | 3073.9           | 3073.9        | 0.0      |
| T                | 12670                 | 1869         | 9663                       | 4.5                             | 3077.4                             | 3077.4           | 3077.6        | 0.2      |
| U                | 13395                 | 1387         | 6503                       | 6.6                             | 3079.5                             | 3079.5           | 3079.6        | 0.1      |
| V                | 14095                 | 1336         | 7246                       | 5.9                             | 3082.6                             | 3082.6           | 3082.6        | 0.0      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| W                               | 14820                 | 1389         | 6585                       | 6.5                             | 3085.5                             | 3085.5           | 3085.6        | 0.1      |
| X                               | 15695                 | 1583         | 7176                       | 6.0                             | 3089.7                             | 3089.7           | 3089.7        | 0.0      |
| Y                               | 16795                 | 1218         | 6383                       | 6.7                             | 3093.9                             | 3093.9           | 3094.3        | 0.4      |
| Z                               | 17695                 | 1702         | 7687                       | 5.6                             | 3096.4                             | 3096.4           | 3097.3        | 0.9      |
| AA                              | 18520                 | 2056         | 8294                       | 5.2                             | 3098.4                             | 3098.4           | 3099.2        | 0.8      |
| AB                              | 19320                 | 2080         | 7533                       | 5.7                             | 3100.7                             | 3100.7           | 3101.5        | 0.8      |
| AC                              | 20020                 | 2173         | 7095                       | 6.1                             | 3103.3                             | 3103.3           | 3104.1        | 0.8      |
| AD                              | 20695                 | 1943         | 7450                       | 5.8                             | 3106.1                             | 3106.1           | 3106.8        | 0.7      |
| AE                              | 21445                 | 1635         | 6998                       | 6.1                             | 3108.5                             | 3108.5           | 3109.3        | 0.8      |
| AF                              | 22095                 | 1254         | 4897                       | 8.8                             | 3111.3                             | 3111.3           | 3111.8        | 0.5      |
| AG                              | 22795                 | 1294         | 6243                       | 6.9                             | 3114.9                             | 3114.9           | 3115.9        | 1.0      |
| AH                              | 23695                 | 867          | 5841                       | 7.4                             | 3117.8                             | 3117.8           | 3118.6        | 0.8      |
| AI                              | 24255                 | 361          | 3208                       | 13.4                            | 3119.0                             | 3119.0           | 3119.6        | 0.6      |
| AJ                              | 24575                 | 772          | 5584                       | 7.7                             | 3122.3                             | 3122.3           | 3123.2        | 0.9      |
| AK                              | 25085                 | 979          | 5529                       | 7.8                             | 3124.0                             | 3124.0           | 3124.6        | 0.6      |
| AL                              | 25765                 | 1156         | 13765                      | 6.1                             | 3126.2                             | 3126.2           | 3127.2        | 1.0      |
| AM                              | 26356                 | 732          | 4371                       | 9.8                             | 3127.6                             | 3127.6           | 3128.5        | 0.9      |
| AN                              | 26860                 | 712          | 5444                       | 7.9                             | 3130.2                             | 3130.2           | 3131.0        | 0.8      |
| AO                              | 27508                 | 737          | 4998                       | 8.6                             | 3132.2                             | 3132.2           | 3132.8        | 0.6      |
| AP                              | 28209                 | 814          | 5698                       | 7.6                             | 3134.8                             | 3134.8           | 3135.4        | 0.6      |
| AQ                              | 28833                 | 843          | 5022                       | 8.6                             | 3136.2                             | 3136.2           | 3136.9        | 0.7      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE              |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                              |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| AR                           | 29561                 | 820          | 5924                       | 7.3                             | 3138.5                             | 3138.5           | 3139.5        | 1.0      |
| AS                           | 30164                 | 953          | 7138                       | 6.0                             | 3140.6                             | 3140.6           | 3141.1        | 0.5      |
| AT                           | 30666                 | 940          | 6153                       | 7.0                             | 3141.5                             | 3141.5           | 3142.0        | 0.5      |
| AU                           | 31334                 | 941          | 5624                       | 7.7                             | 3143.5                             | 3143.5           | 3144.0        | 0.5      |
| AV                           | 31926                 | 838          | 5345                       | 8.0                             | 3145.8                             | 3145.8           | 3146.3        | 0.5      |
| AW                           | 32482                 | 940          | 5247                       | 8.2                             | 3148.0                             | 3148.0           | 3148.5        | 0.5      |
| AX                           | 32737                 | 890          | 6626                       | 6.5                             | 3149.2                             | 3149.2           | 3149.8        | 0.6      |
| AY                           | 33017                 | 851          | 6687                       | 6.4                             | 3149.8                             | 3149.8           | 3150.4        | 0.6      |
| AZ                           | 33709                 | 707          | 6600                       | 6.5                             | 3151.0                             | 3151.0           | 3151.6        | 0.6      |
| BA                           | 34412                 | 738          | 5261                       | 8.2                             | 3152.4                             | 3152.4           | 3153.0        | 0.6      |
| BB                           | 34960                 | 667          | 4472                       | 9.6                             | 3154.8                             | 3154.8           | 3155.0        | 0.2      |
| BC                           | 35588                 | 1066         | 7344                       | 5.9                             | 3157.5                             | 3157.5           | 3157.9        | 0.4      |
| BD                           | 36175                 | 1282         | 6988                       | 6.2                             | 3158.9                             | 3158.9           | 3159.2        | 0.3      |
| BE                           | 36818                 | 1203         | 6136                       | 7.0                             | 3161.1                             | 3161.1           | 3161.3        | 0.2      |
| BF                           | 37433                 | 839          | 4958                       | 8.7                             | 3163.6                             | 3163.6           | 3163.7        | 0.1      |
| BG                           | 37886                 | 1016         | 5620                       | 7.7                             | 3165.3                             | 3165.3           | 3166.0        | 0.7      |
| BH                           | 38665                 | 1161         | 6680                       | 6.4                             | 3168.1                             | 3168.1           | 3169.1        | 1.0      |
| BI                           | 39396                 | 1280         | 6734                       | 6.4                             | 3170.6                             | 3170.6           | 3171.4        | 0.8      |
| BJ                           | 40137                 | 1138         | 6064                       | 7.1                             | 3173.4                             | 3173.4           | 3173.9        | 0.6      |
| BK                           | 40944                 | 1060         | 6754                       | 6.4                             | 3178.0                             | 3178.0           | 3178.3        | 0.3      |
| BL                           | 41775                 | 1300         | 10011                      | 4.3                             | 3180.8                             | 3180.8           | 3181.8        | 1.0      |
| BM                           | 42248                 | 1378         | 9671                       | 4.5                             | 3182.0                             | 3182.0           | 3183.0        | 1.0      |

<sup>1</sup>Feet above County Line

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**SANTA CRUZ COUNTY, AZ  
AND INCORPORATED AREAS**

**FLOODWAY DATA**

**SANTA CRUZ RIVER**

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                                 |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |          |
| Santa Cruz River<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| BN                              | 42621                 | 1252         | 9220                       | 4.7                             | 3183.3                             | 3183.3           | 3184.2        | 0.9      |
| BO                              | 43088                 | 1237         | 9260                       | 4.6                             | 3185.2                             | 3185.2           | 3185.9        | 0.7      |
| BP                              | 43612                 | 1193         | 8276                       | 5.2                             | 3187.2                             | 3187.2           | 3187.7        | 0.5      |
| BQ                              | 44281                 | 1145         | 9321                       | 4.6                             | 3189.8                             | 3189.8           | 3190.4        | 0.6      |
| BR                              | 45012                 | 1161         | 8970                       | 4.8                             | 3192.6                             | 3192.6           | 3193.1        | 0.5      |
| BS                              | 45831                 | 1177         | 9500                       | 4.4                             | 3196.5                             | 3196.5           | 3197.5        | 1.0      |
| BT                              | 46329                 | 1167         | 8572                       | 4.9                             | 3197.8                             | 3197.8           | 3198.6        | 0.8      |
| BU                              | 46869                 | 1313         | 7991                       | 5.3                             | 3199.5                             | 3199.5           | 3200.0        | 0.5      |
| BV                              | 47459                 | 1251         | 8321                       | 5.1                             | 3201.4                             | 3201.4           | 3201.9        | 0.5      |
| BW                              | 48024                 | 1398         | 9225                       | 6.3                             | 3203.7                             | 3203.7           | 3204.2        | 0.5      |
| BX                              | 48582                 | 1230         | 9371                       | 4.5                             | 3205.8                             | 3205.8           | 3206.8        | 1.0      |
| BY                              | 49304                 | 1171         | 7812                       | 5.4                             | 3208.2                             | 3208.2           | 3208.9        | 0.7      |
| BZ                              | 49822                 | 1273         | 7891                       | 5.3                             | 3210.6                             | 3210.6           | 3211.2        | 0.6      |
| CA                              | 50254                 | 1284         | 11515                      | 3.7                             | 3212.2                             | 3212.2           | 3212.8        | 0.6      |
| CB                              | 50602                 | 1344         | 10658                      | 3.9                             | 3213.1                             | 3213.1           | 3213.6        | 0.5      |
| CC                              | 51034                 | 1286         | 8728                       | 4.8                             | 3214.7                             | 3214.7           | 3215.1        | 0.4      |
| CD                              | 51517                 | 1375         | 9103                       | 4.6                             | 3216.9                             | 3216.9           | 3217.4        | 0.5      |
| CE                              | 52370                 | 1853         | 11510                      | 3.7                             | 3219.5                             | 3219.5           | 3220.0        | 0.5      |
| CF                              | 53173                 | 2347         | 11274                      | 3.7                             | 3221.5                             | 3221.5           | 3222.0        | 0.5      |
| CG                              | 53821                 | 2704         | 12497                      | 3.4                             | 3222.9                             | 3222.9           | 3223.4        | 0.5      |
| CH                              | 54592                 | 2748         | 8053                       | 5.2                             | 3225.8                             | 3225.8           | 3226.0        | 0.2      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE              |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                              |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| CI                           | 55175                 | 2809         | 11880                      | 3.5                             | 3228.6                             | 3228.6           | 3228.9        | 0.3      |
| CJ                           | 55685                 | 2448         | 9695                       | 4.3                             | 3229.7                             | 3229.7           | 3230.7        | 1.0      |
| CK                           | 56523                 | 2214         | 10947                      | 3.8                             | 3232.8                             | 3232.8           | 3233.4        | 0.6      |
| CL                           | 57076                 | 2161         | 10479                      | 4.0                             | 3234.6                             | 3234.6           | 3235.2        | 0.6      |
| CM                           | 57676                 | 1924         | 10086                      | 4.2                             | 3236.9                             | 3236.9           | 3237.4        | 0.5      |
| CN                           | 58328                 | 2011         | 9657                       | 4.4                             | 3239.1                             | 3239.1           | 3239.7        | 0.6      |
| CO                           | 58867                 | 2065         | 11356                      | 3.7                             | 3240.7                             | 3240.7           | 3241.6        | 0.9      |
| CP                           | 59292                 | 2102         | 10218                      | 4.1                             | 3242.2                             | 3242.2           | 3242.9        | 0.7      |
| CQ                           | 59923                 | 1932         | 9493                       | 4.4                             | 3245.2                             | 3245.2           | 3245.5        | 0.3      |
| CR                           | 60520                 | 1700         | 9837                       | 4.3                             | 3247.4                             | 3247.4           | 3247.7        | 0.3      |
| CS                           | 61001                 | 1751         | 9196                       | 4.6                             | 3249.1                             | 3249.1           | 3249.3        | 0.2      |
| CT                           | 61538                 | 1431         | 7931                       | 5.3                             | 3251.2                             | 3251.2           | 3251.5        | 0.3      |
| CU                           | 62195                 | 1262         | 7734                       | 5.4                             | 3253.9                             | 3253.9           | 3254.4        | 0.5      |
| CV                           | 62883                 | 1204         | 7800                       | 5.4                             | 3256.9                             | 3256.9           | 3257.6        | 0.7      |
| CW                           | 63600                 | 1299         | 8002                       | 5.3                             | 3260.2                             | 3260.2           | 3261.0        | 0.8      |
| CX                           | 64279                 | 1344         | 8449                       | 5.0                             | 3263.2                             | 3263.2           | 3264.0        | 0.8      |
| CY                           | 64888                 | 1369         | 9839                       | 4.3                             | 3265.7                             | 3265.7           | 3266.4        | 0.7      |
| CZ                           | 65426                 | 1340         | 8610                       | 4.9                             | 3267.8                             | 3267.8           | 3268.4        | 0.6      |
| DA                           | 66028                 | 1064         | 7037                       | 6.0                             | 3270.8                             | 3270.8           | 3271.4        | 0.6      |
| DB                           | 66680                 | 834          | 6874                       | 6.1                             | 3274.0                             | 3274.0           | 3274.8        | 0.8      |
| DC                           | 67278                 | 723          | 7031                       | 6.0                             | 3275.9                             | 3275.9           | 3276.9        | 1        |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                                 |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |          |
| Santa Cruz River<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| DD                              | 67960                 | 843          | 9188                       | 4.6                             | 3278.4                             | 3278.4           | 3279.3        | 0.9      |
| DE                              | 68661                 | 836          | 8668                       | 4.9                             | 3280.5                             | 3280.5           | 3281.2        | 0.7      |
| DF                              | 69310                 | 960          | 8289                       | 5.1                             | 3282.9                             | 3282.9           | 3283.2        | 0.3      |
| DG                              | 69784                 | 946          | 8515                       | 4.9                             | 3284.5                             | 3284.5           | 3284.7        | 0.2      |
| DH                              | 70376                 | 1133         | 9431                       | 4.5                             | 3286.4                             | 3286.4           | 3286.5        | 0.1      |
| DI                              | 70910                 | 1039         | 8683                       | 4.8                             | 3287.9                             | 3287.9           | 3287.9        | 0.0      |
| DJ                              | 71516                 | 1119         | 8767                       | 4.8                             | 3289.8                             | 3289.8           | 3289.8        | 0.0      |
| DK                              | 72063                 | 1412         | 10205                      | 4.1                             | 3291.6                             | 3291.6           | 3291.6        | 0.0      |
| DL                              | 72533                 | 1612         | 11654                      | 3.6                             | 3292.9                             | 3292.9           | 3292.9        | 0.0      |
| DM                              | 73081                 | 1639         | 10869                      | 3.8                             | 3294.5                             | 3294.5           | 3294.5        | 0.0      |
| DN                              | 73803                 | 1406         | 9209                       | 4.5                             | 3297.3                             | 3297.3           | 3297.3        | 0.0      |
| DO                              | 74208                 | 1517         | 10769                      | 3.8                             | 3298.7                             | 3298.7           | 3298.8        | 0.1      |
| DP                              | 74913                 | 1386         | 10198                      | 4.1                             | 3300.2                             | 3300.2           | 3300.6        | 0.4      |
| DQ                              | 75425                 | 1634         | 9943                       | 4.2                             | 3301.4                             | 3301.4           | 3301.9        | 0.5      |
| DR                              | 75869                 | 1665         | 9209                       | 4.5                             | 3302.6                             | 3302.6           | 3303.2        | 0.6      |
| DS                              | 76435                 | 1586         | 9468                       | 4.4                             | 3304.6                             | 3304.6           | 3305.3        | 0.7      |
| DT                              | 77123                 | 1623         | 10423                      | 4.0                             | 3306.8                             | 3306.8           | 3307.5        | 0.7      |
| DU                              | 77562                 | 1718         | 9866                       | 4.2                             | 3308.2                             | 3308.2           | 3308.8        | 0.6      |
| DV                              | 77830                 | 1707         | 9864                       | 4.2                             | 3309.1                             | 3309.1           | 3309.8        | 0.7      |
| DW                              | 78482                 | 1649         | 9164                       | 4.5                             | 3311.2                             | 3311.2           | 3312.0        | 0.8      |
| DX                              | 79116                 | 1712         | 9320                       | 4.4                             | 3313.2                             | 3313.2           | 3314.2        | 1.0      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| DY                              | 79513                 | 1679         | 8869                       | 4.7                             | 3314.5                             | 3314.5           | 3315.5        | 1.0      |
| DZ                              | 80100                 | 1644         | 9043                       | 4.6                             | 3315.9                             | 3315.9           | 3316.8        | 0.9      |
| EA                              | 80582                 | 1595         | 7950                       | 5.2                             | 3317.4                             | 3317.4           | 3318.1        | 0.7      |
| EB                              | 80970                 | 1638         | 8849                       | 4.7                             | 3318.4                             | 3318.4           | 3319.2        | 0.8      |
| EC                              | 81362                 | 1871         | 11444                      | 3.6                             | 3318.9                             | 3318.9           | 3319.8        | 0.9      |
| ED                              | 81572                 | 1553         | 8339                       | 5.0                             | 3319.2                             | 3319.2           | 3320.1        | 0.9      |
| EE                              | 82050                 | 1099         | 5066                       | 8.2                             | 3320.4                             | 3320.4           | 3320.9        | 0.5      |
| EF                              | 82416                 | 1023         | 6433                       | 6.4                             | 3322.0                             | 3322.0           | 3323.0        | 1.0      |
| EG                              | 82913                 | 830          | 6145                       | 6.7                             | 3323.7                             | 3323.7           | 3324.4        | 0.7      |
| EH                              | 83481                 | 865          | 6303                       | 6.6                             | 3325.3                             | 3325.3           | 3326.0        | 0.7      |
| EI                              | 84281                 | 1029         | 6908                       | 6.0                             | 3327.6                             | 3327.6           | 3328.0        | 0.4      |
| EJ                              | 85019                 | 1053         | 7065                       | 5.9                             | 3329.1                             | 3329.1           | 3329.6        | 0.5      |
| EK                              | 85630                 | 1074         | 6553                       | 6.3                             | 3330.5                             | 3330.5           | 3331.3        | 0.8      |
| EL                              | 86313                 | 987          | 5769                       | 7.2                             | 3333.0                             | 3333.0           | 3333.7        | 0.7      |
| EM                              | 86970                 | 1113         | 5192                       | 8.0                             | 3335.9                             | 3335.9           | 3336.2        | 0.3      |
| EN                              | 87526                 | 1141         | 6393                       | 6.5                             | 3338.3                             | 3338.3           | 3339.0        | 0.7      |
| EO                              | 88100                 | 1233         | 7202                       | 5.8                             | 3340.0                             | 3340.0           | 3340.7        | 0.7      |
| EP                              | 88625                 | 1223         | 7161                       | 5.8                             | 3341.0                             | 3341.0           | 3341.8        | 0.8      |
| EQ                              | 89923                 | 1309         | 9713                       | 4.3                             | 3343.2                             | 3343.2           | 3344.1        | 0.9      |
| ER                              | 90234                 | 1239         | 7459                       | 5.6                             | 3343.7                             | 3343.7           | 3344.5        | 0.8      |
| ES                              | 90639                 | 1235         | 6351                       | 6.5                             | 3344.9                             | 3344.9           | 3345.5        | 0.6      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)                     |                       |              |                            |                                 |                                    |                  |               |          |
| Santa Cruz River<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| ET                              | 91071                 | 1533         | 7198                       | 5.8                             | 3346.8                             | 3346.8           | 3347.4        | 0.6      |
| EU                              | 91578                 | 1635         | 7065                       | 5.9                             | 3348.7                             | 3348.7           | 3349.2        | 0.5      |
| EV                              | 92456                 | 1814         | 7448                       | 5.4                             | 3351.6                             | 3351.6           | 3352.3        | 0.7      |
| EW                              | 93072                 | 1931         | 7508                       | 5.4                             | 3354.1                             | 3354.1           | 3354.8        | 0.7      |
| EX                              | 93571                 | 1961         | 7352                       | 5.5                             | 3356.4                             | 3356.4           | 3356.9        | 0.5      |
| EY                              | 94159                 | 1956         | 6945                       | 5.8                             | 3358.8                             | 3358.8           | 3359.3        | 0.5      |
| EZ                              | 94707                 | 1897         | 6922                       | 5.9                             | 3360.9                             | 3360.9           | 3361.5        | 0.6      |
| FA                              | 95234                 | 1702         | 6880                       | 5.9                             | 3363.1                             | 3363.1           | 3363.7        | 0.6      |
| FB                              | 95757                 | 1618         | 7903                       | 5.1                             | 3365.1                             | 3365.1           | 3365.6        | 0.5      |
| FC                              | 96249                 | 1618         | 7263                       | 5.6                             | 3366.3                             | 3366.3           | 3366.8        | 0.5      |
| FD                              | 96739                 | 1437         | 5864                       | 6.9                             | 3367.9                             | 3367.9           | 3368.4        | 0.5      |
| FE                              | 97336                 | 1491         | 7818                       | 5.2                             | 3370.5                             | 3370.5           | 3371.2        | 0.7      |
| FF                              | 97883                 | 1548         | 8565                       | 4.7                             | 3372.1                             | 3372.1           | 3372.8        | 0.7      |
| FG                              | 98383                 | 1337         | 7872                       | 5.1                             | 3373.5                             | 3373.5           | 3374.1        | 0.6      |
| FH                              | 98871                 | 1308         | 7013                       | 5.8                             | 3374.9                             | 3374.9           | 3375.4        | 0.5      |
| FI                              | 99369                 | 1507         | 6490                       | 6.2                             | 3376.9                             | 3376.9           | 3377.4        | 0.5      |
| FJ                              | 100364                | 1682         | 8592                       | 4.7                             | 3380.1                             | 3380.1           | 3380.4        | 0.3      |
| FK                              | 101098                | 1817         | 7967                       | 5.1                             | 3381.3                             | 3381.3           | 3381.9        | 0.6      |
| FL                              | 101827                | 1712         | 7744                       | 5.2                             | 3383.8                             | 3383.8           | 3383.8        | 0.0      |
| FM                              | 102412                | 1599         | 7057                       | 5.7                             | 3385.5                             | 3385.5           | 3385.6        | 0.1      |
| FN                              | 102968                | 1416         | 7257                       | 5.6                             | 3387.6                             | 3387.6           | 3387.8        | 0.2      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| FO                              | 103522                | 1290         | 6696                       | 6.1                             | 3389.5                             | 3389.5           | 3389.7        | 0.2      |
| FP                              | 104076                | 1280         | 6773                       | 6.0                             | 3391.7                             | 3391.7           | 3391.9        | 0.2      |
| FQ                              | 104659                | 1201         | 6124                       | 6.6                             | 3393.7                             | 3393.7           | 3394.1        | 0.4      |
| FR                              | 105303                | 1038         | 5825                       | 7.0                             | 3396.3                             | 3396.3           | 3396.8        | 0.5      |
| FS                              | 105899                | 937          | 5229                       | 7.8                             | 3399.0                             | 3399.0           | 3399.5        | 0.5      |
| FT                              | 106611                | 1120         | 6409                       | 6.2                             | 3402.0                             | 3402.0           | 3402.6        | 0.6      |
| FU                              | 106880                | 1207         | 6648                       | 6.0                             | 3402.8                             | 3402.8           | 3403.4        | 0.6      |
| FV                              | 107404                | 1276         | 5953                       | 6.7                             | 3404.4                             | 3404.4           | 3404.9        | 0.5      |
| FW                              | 108008                | 1262         | 6110                       | 6.5                             | 3407.2                             | 3407.2           | 3407.7        | 0.5      |
| FX                              | 108549                | 1252         | 6207                       | 6.4                             | 3409.6                             | 3409.6           | 3410.0        | 0.4      |
| FY                              | 109066                | 1225         | 6713                       | 5.9                             | 3411.3                             | 3411.3           | 3411.8        | 0.5      |
| FZ                              | 109487                | 1184         | 6188                       | 6.4                             | 3412.7                             | 3412.7           | 3413.2        | 0.5      |
| GA                              | 109987                | 1201         | 5998                       | 6.6                             | 3414.6                             | 3414.6           | 3415.2        | 0.6      |
| GB                              | 110654                | 979          | 9471                       | 4.1                             | 3422.2                             | 3422.2           | 3422.8        | 0.6      |
| GC                              | 111094                | 1479         | 12842                      | 3.0                             | 3422.5                             | 3422.5           | 3423.2        | 0.7      |
| GD                              | 111531                | 1477         | 11162                      | 3.5                             | 3422.7                             | 3422.7           | 3423.4        | 0.7      |
| GE                              | 112178                | 1457         | 10305                      | 3.8                             | 3423.2                             | 3423.2           | 3423.9        | 0.7      |
| GF                              | 112690                | 1333         | 10313                      | 3.8                             | 3423.7                             | 3423.7           | 3424.4        | 0.7      |
| GG                              | 113277                | 1341         | 9189                       | 4.2                             | 3424.3                             | 3424.3           | 3424.9        | 0.6      |
| GH                              | 113751                | 1304         | 7956                       | 4.9                             | 3425.0                             | 3425.0           | 3425.6        | 0.6      |
| GI                              | 114096                | 1291         | 6474                       | 6.0                             | 3425.9                             | 3425.9           | 3426.3        | 0.4      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| GJ                              | 114502                | 1238         | 6211                       | 6.3                             | 3427.6                             | 3427.6           | 3428.0        | 0.4      |
| GK                              | 114916                | 1285         | 6922                       | 5.6                             | 3429.2                             | 3429.2           | 3429.6        | 0.4      |
| GL                              | 115451                | 1157         | 6499                       | 6.0                             | 3431.0                             | 3431.0           | 3431.3        | 0.3      |
| GM                              | 116144                | 1146         | 6119                       | 6.4                             | 3433.4                             | 3433.4           | 3433.8        | 0.4      |
| GN                              | 116786                | 1237         | 6959                       | 5.6                             | 3435.5                             | 3435.5           | 3436.1        | 0.6      |
| GO                              | 117501                | 1374         | 6820                       | 5.7                             | 3437.4                             | 3437.4           | 3438.2        | 0.8      |
| GP                              | 118027                | 1212         | 6139                       | 5.7                             | 3439.0                             | 3439.0           | 3440.0        | 1.0      |
| GQ                              | 118398                | 1191         | 5725                       | 6.1                             | 3440.6                             | 3440.6           | 3441.2        | 0.6      |
| GR                              | 118993                | 1217         | 5769                       | 6.0                             | 3442.3                             | 3442.3           | 3443.1        | 0.8      |
| GS                              | 119502                | 860          | 4351                       | 8.0                             | 3444.0                             | 3444.0           | 3445.0        | 1.0      |
| GT                              | 119869                | 965          | 6892                       | 5.1                             | 3450.0                             | 3450.0           | 3450.8        | 0.8      |
| GU                              | 120488                | 1029         | 8379                       | 4.2                             | 3450.9                             | 3450.9           | 3451.8        | 0.9      |
| GV                              | 121228                | 1171         | 6957                       | 5.0                             | 3451.5                             | 3451.5           | 3452.5        | 1.0      |
| GW                              | 121991                | 1072         | 5147                       | 6.8                             | 3454.2                             | 3454.2           | 3454.5        | 0.3      |
| GX                              | 122601                | 885          | 4877                       | 7.2                             | 3457.1                             | 3457.1           | 3457.1        | 0.0      |
| GY                              | 123161                | 625          | 3811                       | 9.2                             | 3459.3                             | 3459.3           | 3459.3        | 0.0      |
| GZ                              | 123600                | 493          | 3275                       | 10.7                            | 3461.6                             | 3461.6           | 3461.7        | 0.1      |
| HA                              | 124047                | 443          | 3551                       | 9.8                             | 3463.4                             | 3463.4           | 3464.2        | 0.8      |
| HB                              | 124416                | 377          | 3138                       | 11.1                            | 3464.4                             | 3464.4           | 3465.2        | 0.8      |
| HC                              | 124887                | 443          | 3583                       | 9.7                             | 3465.8                             | 3465.8           | 3466.7        | 0.9      |
| HD                              | 125588                | 506          | 3947                       | 8.8                             | 3468.5                             | 3468.5           | 3469.1        | 0.6      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE              |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                              |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| HE                           | 126003                | 654          | 5558                       | 6.3                             | 3470.1                             | 3470.1           | 3471.0        | 0.9      |
| HF                           | 126457                | 673          | 5265                       | 6.6                             | 3470.9                             | 3470.9           | 3471.8        | 0.9      |
| HG                           | 126921                | 612          | 4269                       | 8.2                             | 3472.2                             | 3472.2           | 3472.8        | 0.6      |
| HH                           | 127530                | 511          | 3775                       | 9.3                             | 3474.5                             | 3474.5           | 3475.1        | 0.6      |
| HI                           | 127921                | 442          | 3109                       | 11.2                            | 3476.5                             | 3476.5           | 3477.0        | 0.5      |
| HJ                           | 128286                | 282          | 2680                       | 13.0                            | 3478.5                             | 3478.5           | 3479.0        | 0.5      |
| HK                           | 128722                | 520          | 5873                       | 5.9                             | 3481.7                             | 3481.7           | 3482.5        | 0.8      |
| HL                           | 129213                | 684          | 5658                       | 6.2                             | 3482.4                             | 3482.4           | 3483.1        | 0.7      |
| HM                           | 129682                | 442          | 4091                       | 8.5                             | 3483.1                             | 3483.1           | 3483.7        | 0.6      |
| HN                           | 130258                | 414          | 3618                       | 9.7                             | 3485.0                             | 3485.0           | 3485.2        | 0.2      |
| HO                           | 130771                | 409          | 3664                       | 9.5                             | 3486.6                             | 3486.6           | 3487.2        | 0.6      |
| HP                           | 131200                | 458          | 4061                       | 8.6                             | 3488.1                             | 3488.1           | 3489.0        | 0.9      |
| HQ                           | 131557                | 528          | 4500                       | 7.8                             | 3489.5                             | 3489.5           | 3490.3        | 0.8      |
| HR                           | 132007                | 458          | 3566                       | 9.8                             | 3491.0                             | 3491.0           | 3491.3        | 0.3      |
| HS                           | 132624                | 413          | 3682                       | 9.5                             | 3493.8                             | 3493.8           | 3493.8        | 0.0      |
| HT                           | 133196                | 566          | 4685                       | 7.5                             | 3495.3                             | 3495.3           | 3496.0        | 0.7      |
| HU                           | 133782                | 613          | 4574                       | 7.6                             | 3496.8                             | 3496.8           | 3497.4        | 0.6      |
| HV                           | 134388                | 506          | 3795                       | 9.2                             | 3498.8                             | 3498.8           | 3499.2        | 0.4      |
| HW                           | 134973                | 657          | 5191                       | 6.7                             | 3501.5                             | 3501.5           | 3501.9        | 0.4      |
| HX                           | 135751                | 284          | 4531                       | 7.7                             | 3511.6                             | 3511.6           | 3511.6        | 0.0      |
| HY                           | 136025                | 808          | 11389                      | 3.1                             | 3512.7                             | 3512.7           | 3513.0        | 0.3      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)                     |                       |              |                            |                                 |                                    |                  |               |          |
| Santa Cruz River<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| HZ                              | 136377                | 1073         | 14350                      | 2.4                             | 3512.8                             | 3512.8           | 3513.1        | 0.3      |
| IA                              | 137078                | 929          | 10231                      | 3.4                             | 3512.9                             | 3512.9           | 3513.2        | 0.3      |
| IB                              | 137779                | 755          | 6749                       | 5.2                             | 3513.3                             | 3513.3           | 3513.6        | 0.3      |
| IC                              | 138485                | 724          | 5624                       | 6.2                             | 3514.3                             | 3514.3           | 3514.6        | 0.3      |
| ID                              | 139226                | 710          | 4423                       | 7.5                             | 3515.9                             | 3515.9           | 3516.2        | 0.3      |
| IE                              | 139937                | 764          | 4597                       | 7.2                             | 3519.0                             | 3519.0           | 3519.3        | 0.3      |
| IF                              | 140709                | 793          | 5213                       | 6.4                             | 3521.9                             | 3521.9           | 3522.3        | 0.4      |
| IG                              | 141294                | 811          | 5119                       | 6.5                             | 3523.3                             | 3523.3           | 3523.6        | 0.3      |
| IH                              | 141909                | 781          | 4094                       | 8.1                             | 3524.8                             | 3524.8           | 3525.1        | 0.3      |
| II                              | 142466                | 789          | 4154                       | 8.0                             | 3527.2                             | 3527.2           | 3527.5        | 0.3      |
| IJ                              | 143240                | 760          | 3790                       | 8.8                             | 3530.6                             | 3530.6           | 3530.9        | 0.3      |
| IK                              | 144008                | 916          | 6365                       | 5.2                             | 3534.4                             | 3534.4           | 3534.8        | 0.4      |
| IL                              | 144731                | 368          | 2485                       | 13.4                            | 3536.5                             | 3536.5           | 3536.7        | 0.2      |
| IM                              | 145432                | 622          | 4981                       | 6.7                             | 3540.7                             | 3540.7           | 3541.7        | 1.0      |
| IN                              | 146138                | 512          | 3971                       | 8.4                             | 3542.8                             | 3542.8           | 3543.3        | 0.5      |
| IO                              | 146795                | 486          | 3642                       | 9.1                             | 3545.3                             | 3545.3           | 3545.7        | 0.4      |
| IP                              | 147457                | 386          | 3073                       | 10.8                            | 3547.9                             | 3547.9           | 3548.3        | 0.4      |
| IQ                              | 147939                | 317          | 2631                       | 12.6                            | 3550.0                             | 3550.0           | 3550.3        | 0.3      |
| IR                              | 148670                | 383          | 4014                       | 8.3                             | 3554.2                             | 3554.2           | 3554.6        | 0.4      |
| IS                              | 149430                | 264          | 2364                       | 14.0                            | 3555.8                             | 3555.8           | 3556.1        | 0.3      |
| IT                              | 149883                | 374          | 3562                       | 9.3                             | 3559.7                             | 3559.7           | 3560.1        | 0.4      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE              |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                              |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| IU                           | 150366                | 334          | 3774                       | 8.8                             | 3560.9                             | 3560.9           | 3561.9        | 1.0      |
| IV                           | 151130                | 327          | 2513                       | 13.2                            | 3563.7                             | 3563.7           | 3563.9        | 0.2      |
| IW                           | 151623                | 677          | 7307                       | 4.5                             | 3568.2                             | 3568.2           | 3568.2        | 0.0      |
| IX                           | 152120                | 777          | 6585                       | 5.0                             | 3568.5                             | 3568.5           | 3568.5        | 0.0      |
| IY                           | 152824                | 936          | 5698                       | 5.8                             | 3569.4                             | 3569.4           | 3569.4        | 0.0      |
| IZ                           | 153454                | 851          | 4454                       | 7.4                             | 3570.7                             | 3570.7           | 3570.7        | 0.1      |
| JA                           | 154060                | 698          | 4293                       | 7.7                             | 3573.2                             | 3573.2           | 3573.3        | 0.1      |
| JB                           | 154775                | 754          | 3444                       | 9.6                             | 3575.9                             | 3575.9           | 3576.2        | 0.3      |
| JC                           | 155545                | 1172         | 7390                       | 4.5                             | 3579.7                             | 3579.7           | 3580.1        | 0.4      |
| JD                           | 156319                | 1041         | 4582                       | 7.2                             | 3581.3                             | 3581.3           | 3581.6        | 0.3      |
| JE                           | 156911                | 785          | 3861                       | 8.6                             | 3584.3                             | 3584.3           | 3584.7        | 0.4      |
| JF                           | 157484                | 872          | 5211                       | 6.3                             | 3586.9                             | 3586.9           | 3587.8        | 0.9      |
| JG                           | 158060                | 815          | 4320                       | 7.6                             | 3589.4                             | 3589.4           | 3590.0        | 0.6      |
| JH                           | 158638                | 826          | 4158                       | 7.9                             | 3592.0                             | 3592.0           | 3592.6        | 0.6      |
| JI                           | 159328                | 1027         | 4337                       | 7.6                             | 3595.5                             | 3595.5           | 3596.0        | 0.5      |
| JJ                           | 160165                | 903          | 3922                       | 8.4                             | 3599.8                             | 3599.8           | 3600.7        | 0.9      |
| JK                           | 160890                | 530          | 4146                       | 8.0                             | 3603.1                             | 3603.1           | 3604.1        | 1.0      |
| JL                           | 161670                | 690          | 3942                       | 8.4                             | 3606.7                             | 3606.7           | 3606.7        | 0.0      |
| JM                           | 162394                | 656          | 4175                       | 7.9                             | 3609.9                             | 3609.9           | 3610.1        | 0.2      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>    |
|         |   | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE              |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | (FEET NAVD)      |               |          |
|                              |                       |              |                            |                                 |                                    | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| Santa Cruz River (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| JN                           | 162945                | 1492         | 8615                       | 3.8                             | 3611.7                             | 3611.7           | 3612.2        | 0.5      |
| JO                           | 163447                | 1255         | 6931                       | 4.8                             | 3612.4                             | 3612.4           | 3612.8        | 0.4      |
| JP                           | 164147                | 766          | 3338                       | 9.9                             | 3614.2                             | 3614.2           | 3614.4        | 0.2      |
| JQ                           | 164699                | 474          | 5276                       | 6.2                             | 3622.4                             | 3622.4           | 3622.4        | 0.0      |
| JR                           | 164883                | 460          | 4898                       | 6.6                             | 3622.6                             | 3622.6           | 3622.6        | 0.0      |
| JS                           | 165275                | 676          | 8194                       | 4.0                             | 3623.6                             | 3623.6           | 3623.6        | 0.0      |
| JT                           | 165762                | 432          | 5242                       | 6.2                             | 3623.8                             | 3623.8           | 3623.8        | 0.0      |
| JU                           | 166288                | 540          | 4486                       | 7.2                             | 3624.4                             | 3624.4           | 3624.5        | 0.1      |
| JV                           | 166869                | 693          | 6011                       | 5.4                             | 3625.9                             | 3625.9           | 3626.0        | 0.1      |
| JW                           | 167417                | 488          | 3351                       | 9.7                             | 3626.1                             | 3626.1           | 3626.3        | 0.2      |
| JX                           | 167948                | 355          | 3478                       | 9.3                             | 3628.1                             | 3628.1           | 3628.6        | 0.5      |
| JY                           | 168609                | 400          | 2529                       | 12.9                            | 3630.5                             | 3630.5           | 3630.7        | 0.2      |
| JZ                           | 169231                | 446          | 4325                       | 7.5                             | 3634.4                             | 3634.4           | 3635.2        | 0.8      |
| KA                           | 169761                | 480          | 4331                       | 7.5                             | 3635.8                             | 3635.8           | 3636.5        | 0.7      |
| KB                           | 170125                | 313          | 3215                       | 10.1                            | 3636.6                             | 3636.6           | 3637.2        | 0.6      |
| KC                           | 170488                | 304          | 2411                       | 13.5                            | 3637.6                             | 3637.6           | 3637.9        | 0.3      |
| KD                           | 171190                | 618          | 6445                       | 5.0                             | 3641.6                             | 3641.6           | 3642.5        | 0.9      |
| KE                           | 172040                | 1059         | 6475                       | 5.0                             | 3642.7                             | 3642.7           | 3643.5        | 0.8      |
| KF                           | 172567                | 1340         | 6915                       | 4.7                             | 3644.0                             | 3644.0           | 3644.7        | 0.7      |
| KG                           | 173102                | 1146         | 4683                       | 6.9                             | 3645.5                             | 3645.5           | 3646.0        | 0.5      |
| KH                           | 173597                | 1070         | 4853                       | 6.7                             | 3647.9                             | 3647.9           | 3648.6        | 0.7      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE              |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                              |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| KI                           | 174103                | 945          | 4870                       | 6.7                             | 3649.7                             | 3649.7           | 3650.7        | 1.0      |
| KJ                           | 174632                | 900          | 5038                       | 6.5                             | 3652.4                             | 3652.4           | 3652.7        | 0.3      |
| KK                           | 175266                | 800          | 4605                       | 7.1                             | 3654.0                             | 3654.0           | 3655.0        | 1.0      |
| KL                           | 175717                | 602          | 3497                       | 9.3                             | 3656.3                             | 3656.3           | 3656.6        | 0.3      |
| KM                           | 176195                | 528          | 3813                       | 8.5                             | 3658.8                             | 3658.8           | 3659.3        | 0.5      |
| KN                           | 176814                | 575          | 3823                       | 8.5                             | 3660.8                             | 3660.8           | 3661.4        | 0.6      |
| KO                           | 177385                | 525          | 3878                       | 8.4                             | 3663.0                             | 3663.0           | 3663.7        | 0.7      |
| KP                           | 177837                | 550          | 3992                       | 8.1                             | 3664.8                             | 3664.8           | 3665.4        | 0.6      |
| KQ                           | 178443                | 825          | 5644                       | 5.8                             | 3667.5                             | 3667.5           | 3667.7        | 0.2      |
| KR                           | 178843                | 975          | 6179                       | 5.3                             | 3668.3                             | 3668.3           | 3668.5        | 0.2      |
| KS                           | 179389                | 1050         | 6360                       | 5.1                             | 3669.3                             | 3669.3           | 3669.7        | 0.4      |
| KT                           | 180238                | 725          | 8825                       | 4.3                             | 3676.6                             | 3676.6           | 3677.4        | 0.8      |
| KU                           | 180438                | 906          | 8582                       | 3.8                             | 3676.8                             | 3676.8           | 3677.6        | 0.8      |
| KV                           | 181171                | 616          | 6007                       | 5.4                             | 3677.4                             | 3677.4           | 3678.0        | 0.6      |
| KW                           | 181767                | 692          | 5938                       | 5.5                             | 3678.3                             | 3678.3           | 3678.9        | 0.6      |
| KX                           | 182357                | 622          | 5593                       | 5.8                             | 3679.1                             | 3679.1           | 3679.6        | 0.5      |
| KY                           | 182896                | 524          | 3973                       | 8.2                             | 3679.9                             | 3679.9           | 3680.4        | 0.5      |
| KZ                           | 183460                | 635          | 4328                       | 7.5                             | 3681.8                             | 3681.8           | 3682.6        | 0.8      |
| LA                           | 184070                | 751          | 5142                       | 6.3                             | 3683.7                             | 3683.7           | 3684.5        | 0.8      |
| LB                           | 184771                | 605          | 3988                       | 8.2                             | 3685.2                             | 3685.2           | 3685.9        | 0.7      |
| LC                           | 185345                | 588          | 4399                       | 7.4                             | 3687.1                             | 3687.1           | 3687.9        | 0.8      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>    |
|         |   | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE              |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | (FEET NAVD)      |               |          |
|                              |                       |              |                            |                                 |                                    | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| Santa Cruz River (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| LD                           | 185946                | 488          | 3201                       | 10.2                            | 3688.8                             | 3688.8           | 3689.5        | 0.7      |
| LE                           | 186379                | 507          | 4056                       | 8.0                             | 3691.2                             | 3691.2           | 3692.2        | 1.0      |
| LF                           | 186832                | 450          | 3625                       | 9.0                             | 3692.3                             | 3692.3           | 3693.2        | 0.9      |
| LG                           | 187341                | 373          | 3179                       | 10.2                            | 3693.9                             | 3693.9           | 3694.6        | 0.7      |
| LH                           | 187844                | 364          | 3544                       | 9.2                             | 3696.0                             | 3696.0           | 3696.8        | 0.8      |
| LI                           | 188269                | 477          | 4359                       | 7.5                             | 3697.5                             | 3697.5           | 3698.4        | 0.9      |
| LJ                           | 188696                | 478          | 4140                       | 7.9                             | 3698.4                             | 3698.4           | 3699.2        | 0.8      |
| LK                           | 189146                | 472          | 3659                       | 8.9                             | 3699.4                             | 3699.4           | 3700.2        | 0.8      |
| LL                           | 189596                | 544          | 4538                       | 7.2                             | 3701.1                             | 3701.1           | 3701.9        | 0.8      |
| LM                           | 190336                | 521          | 4095                       | 7.9                             | 3702.5                             | 3702.5           | 3703.2        | 0.7      |
| LN                           | 191039                | 561          | 4946                       | 6.6                             | 3704.7                             | 3704.7           | 3705.5        | 0.8      |
| LO                           | 191392                | 381          | 3338                       | 9.7                             | 3705.3                             | 3705.3           | 3705.9        | 0.6      |
| LP                           | 192043                | 837          | 6109                       | 5.3                             | 3707.8                             | 3707.8           | 3708.6        | 0.8      |
| LQ                           | 192493                | 672          | 4414                       | 7.4                             | 3708.5                             | 3708.5           | 3709.2        | 0.7      |
| LR                           | 192946                | 619          | 4100                       | 7.9                             | 3709.8                             | 3709.8           | 3710.5        | 0.7      |
| LS                           | 193576                | 723          | 4904                       | 6.6                             | 3711.8                             | 3711.8           | 3712.6        | 0.8      |
| LT                           | 194157                | 593          | 3826                       | 8.5                             | 3713.2                             | 3713.2           | 3713.9        | 0.7      |
| LU                           | 194861                | 540          | 3514                       | 9.3                             | 3715.6                             | 3715.6           | 3716.3        | 0.7      |
| LV                           | 195610                | 280          | 2689                       | 12.1                            | 3718.2                             | 3718.2           | 3718.9        | 0.7      |
| LW                           | 196269                | 528          | 4853                       | 6.7                             | 3721.7                             | 3721.7           | 3722.6        | 0.9      |
| LX                           | 196814                | 521          | 5251                       | 6.2                             | 3723.3                             | 3723.3           | 3724.1        | 0.8      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE                 |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Santa Cruz River<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| LY                              | 197470                | 474          | 4243                       | 7.7                             | 3724.8                             | 3724.8           | 3725.6        | 0.8      |
| LZ                              | 198221                | 491          | 3610                       | 9.0                             | 3727.3                             | 3727.3           | 3727.6        | 0.3      |
| MA                              | 198691                | 664          | 5656                       | 5.8                             | 3729.1                             | 3729.1           | 3729.8        | 0.7      |
| MB                              | 199059                | 696          | 5293                       | 6.1                             | 3729.6                             | 3729.6           | 3730.3        | 0.7      |
| MC                              | 199653                | 649          | 4825                       | 6.6                             | 3730.9                             | 3730.9           | 3731.6        | 0.7      |
| MD                              | 199947                | 707          | 5115                       | 6.3                             | 3731.7                             | 3731.7           | 3732.4        | 0.7      |
| ME                              | 200246                | 646          | 4580                       | 7.0                             | 3732.3                             | 3732.3           | 3733.0        | 0.7      |

<sup>1</sup>Feet above County Line

|         |   |                         |
|---------|---|-------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>    |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SANTA CRUZ RIVER</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Sonoita Creek   |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 3229                  | 1368         | 12642                      | 2.2                             | 3443.3                             | 3443.3           | 3443.6        | 0.3      |
| B               | 3439                  | 1805         | 6920                       | 3                               | 3443.5                             | 3443.5           | 3443.8        | 0.3      |
| C               | 3879                  | 933          | 2633                       | 7.8                             | 3444.8                             | 3444.8           | 3445.3        | 0.5      |
| D               | 4396                  | 835          | 2957                       | 6.9                             | 3448.3                             | 3448.3           | 3448.8        | 0.5      |
| E               | 4782                  | 550          | 2474                       | 8.3                             | 3450.0                             | 3450.0           | 3450.4        | 0.4      |
| F               | 5258                  | 750          | 2602                       | 7.9                             | 3452.6                             | 3452.6           | 3452.7        | 0.1      |
| G               | 5892                  | 1000         | 4849                       | 4.2                             | 3455.5                             | 3455.5           | 3455.8        | 0.3      |
| H               | 6423                  | 660          | 2673                       | 7.7                             | 3456.1                             | 3456.1           | 3456.5        | 0.4      |
| I               | 6934                  | 800          | 3496                       | 5.9                             | 3458.8                             | 3458.8           | 3459.0        | 0.2      |
| J               | 7288                  | 461          | 2129                       | 9.6                             | 3459.9                             | 3459.9           | 3460.7        | 0.8      |
| K               | 7725                  | 537          | 2922                       | 7                               | 3462.9                             | 3462.9           | 3463.6        | 0.7      |
| L               | 8216                  | 526          | 2581                       | 7.9                             | 3465.2                             | 3465.2           | 3465.4        | 0.2      |
| M               | 8658                  | 366          | 1954                       | 10.5                            | 3467.2                             | 3467.2           | 3467.3        | 0.1      |
| N               | 9039                  | 499          | 2580                       | 7.9                             | 3469.7                             | 3469.7           | 3470.1        | 0.4      |
| O               | 9395                  | 350          | 1743                       | 11.8                            | 3471.1                             | 3471.1           | 3471.5        | 0.4      |
| P               | 9778                  | 400          | 2535                       | 8.1                             | 3474.7                             | 3474.7           | 3475.1        | 0.4      |
| Q               | 10215                 | 450          | 2429                       | 8.4                             | 3476.5                             | 3476.5           | 3476.7        | 0.2      |
| R               | 10747                 | 453          | 2601                       | 7.9                             | 3479.0                             | 3479.0           | 3479.0        | 0.0      |
| S               | 11151                 | 370          | 2386                       | 8.6                             | 3480.2                             | 3480.2           | 3480.3        | 0.1      |
| T               | 11495                 | 400          | 2012                       | 10.2                            | 3481.3                             | 3481.3           | 3481.6        | 0.3      |
| U               | 11857                 | 369          | 2427                       | 8.4                             | 3484.2                             | 3484.2           | 3484.5        | 0.3      |
| V               | 12387                 | 557          | 3409                       | 6                               | 3487.0                             | 3487.0           | 3487.2        | 0.2      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SONOITA CREEK</b> |

| FLOODING SOURCE           |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION             | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                           |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Sonoita Creek (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| W                         | 12838                 | 1183         | 4283                       | 4.8                             | 3488.4                             | 3488.4           | 3488.5        | 0.1      |
| X                         | 13209                 | 1576         | 6442                       | 3.2                             | 3489.1                             | 3489.1           | 3489.4        | 0.3      |
| Y                         | 13534                 | 1579         | 3775                       | 5.4                             | 3489.4                             | 3489.4           | 3489.7        | 0.3      |
| Z                         | 13900                 | 1617         | 4036                       | 5.1                             | 3491.2                             | 3491.2           | 3491.3        | 0.1      |
| AA                        | 14380                 | 1797         | 4590                       | 4.5                             | 3492.3                             | 3492.3           | 3493.0        | 0.7      |
| AB                        | 14801                 | 1338         | 3802                       | 5.4                             | 3493.3                             | 3493.3           | 3494.2        | 0.9      |
| AC                        | 15306                 | 1104         | 3364                       | 6.1                             | 3495.1                             | 3495.1           | 3495.9        | 0.8      |
| AD                        | 15737                 | 796          | 2696                       | 7.6                             | 3496.5                             | 3496.5           | 3497.4        | 0.9      |
| AE                        | 16229                 | 685          | 2898                       | 7.1                             | 3499.9                             | 3499.9           | 3500.2        | 0.3      |
| AF                        | 16761                 | 546          | 2199                       | 9.3                             | 3503.5                             | 3503.5           | 3503.5        | 0.0      |
| AG                        | 17296                 | 448          | 2511                       | 8.2                             | 3507.6                             | 3507.6           | 3507.6        | 0.0      |
| AH                        | 17778                 | 521          | 2829                       | 7.2                             | 3510.1                             | 3510.1           | 3510.1        | 0.0      |
| AI                        | 18185                 | 450          | 2499                       | 8.2                             | 3511.4                             | 3511.4           | 3511.5        | 0.1      |
| AJ                        | 18610                 | 450          | 2799                       | 7.3                             | 3513.5                             | 3513.5           | 3513.7        | 0.2      |
| AK                        | 19006                 | 430          | 1979                       | 10.4                            | 3514.2                             | 3514.2           | 3514.8        | 0.6      |
| AL                        | 19394                 | 343          | 1693                       | 12.1                            | 3517.6                             | 3517.6           | 3517.6        | 0.0      |
| AM                        | 19834                 | 407          | 2611                       | 7.9                             | 3521.2                             | 3521.2           | 3521.2        | 0.0      |
| AN                        | 20226                 | 437          | 1903                       | 10.8                            | 3521.9                             | 3521.9           | 3521.9        | 0.0      |
| AO                        | 20642                 | 556          | 3313                       | 6.2                             | 3525.2                             | 3525.2           | 3525.2        | 0.0      |
| AP                        | 21006                 | 511          | 2963                       | 6.9                             | 3526.0                             | 3526.0           | 3526.0        | 0.0      |
| AQ                        | 21441                 | 438          | 1883                       | 10.9                            | 3527.0                             | 3527.0           | 3527.0        | 0.0      |
| AR                        | 21820                 | 324          | 1670                       | 12.3                            | 3529.2                             | 3529.2           | 3529.2        | 0.0      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

TABLE 7

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**SANTA CRUZ COUNTY, AZ  
AND INCORPORATED AREAS**

**FLOODWAY DATA**

**SONOITA CREEK**

| FLOODING SOURCE           |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION             | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                           |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Sonoita Creek (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| AS                        | 22195                 | 218          | 1643                       | 12.5                            | 3531.6                             | 3531.6           | 3531.6        | 0.0      |
| AT                        | 22592                 | 204          | 1792                       | 11.4                            | 3533.7                             | 3533.7           | 3533.7        | 0.0      |
| AU                        | 23015                 | 150          | 1315                       | 15.6                            | 3535.2                             | 3535.2           | 3536.2        | 1.0      |
| AV                        | 23407                 | 88           | 1093                       | 18.7                            | 3538.0                             | 3538.0           | 3538.3        | 0.3      |
| AW                        | 23817                 | 118          | 1606                       | 12.8                            | 3542.2                             | 3542.2           | 3543.1        | 0.9      |
| AX                        | 24218                 | 166          | 2210                       | 9.3                             | 3544.1                             | 3544.1           | 3545.6        | 0.5      |
| AY                        | 24567                 | 122          | 1416                       | 14.5                            | 3545.2                             | 3545.2           | 3546.0        | 0.8      |
| AZ                        | 24965                 | 186          | 1923                       | 10.7                            | 3548.3                             | 3548.3           | 3548.3        | 0.0      |
| BA                        | 25292                 | 165          | 1515                       | 13.5                            | 3550.2                             | 3550.2           | 3550.3        | 0.1      |
| BB                        | 25674                 | 134          | 1734                       | 11.8                            | 3553.4                             | 3553.4           | 3553.4        | 0.0      |
| BC                        | 26074                 | 120          | 1759                       | 11.7                            | 3555.0                             | 3555.0           | 3555.0        | 0.0      |
| BD                        | 26491                 | 154          | 1537                       | 13.3                            | 3555.4                             | 3555.4           | 3555.4        | 0.0      |
| BE                        | 26922                 | 150          | 1605                       | 12.8                            | 3558.0                             | 3558.0           | 3558.0        | 0.0      |
| BF                        | 27248                 | 160          | 1437                       | 14.3                            | 3559.2                             | 3559.2           | 3559.4        | 0.2      |
| BG                        | 96965                 | 514          | 1774                       | 10.0                            | 4026.5                             | 4026.5           | 4026.5        | 0.0      |
| BH                        | 97402                 | 600          | 2587                       | 6.9                             | 4031.1                             | 4031.1           | 4031.4        | 0.3      |
| BI                        | 97947                 | 700          | 3470                       | 5.1                             | 4033.6                             | 4033.6           | 4034.2        | 0.6      |
| BJ                        | 98532                 | 599          | 2031                       | 8.7                             | 4040.0                             | 4040.0           | 4040.0        | 0.0      |
| BK                        | 98980                 | 220          | 1358                       | 13.1                            | 4043.2                             | 4043.2           | 4044.0        | 0.8      |
| BL                        | 99571                 | 400          | 2115                       | 8.4                             | 4048.6                             | 4048.6           | 4049.3        | 0.7      |
| BM                        | 100044                | 387          | 2319                       | 7.6                             | 4052.7                             | 4052.7           | 4052.9        | 0.2      |
| BN                        | 100583                | 400          | 1864                       | 9.5                             | 4055.9                             | 4055.9           | 4056.6        | 0.7      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SONOITA CREEK</b> |

| FLOODING SOURCE           |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION             | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                           |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Sonoita Creek (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| BO                        | 101091                | 234          | 1479                       | 12                              | 4059.4                             | 4059.4           | 4059.9        | 0.5      |
| BP                        | 101591                | 300          | 2138                       | 8.3                             | 4062.4                             | 4062.4           | 4063.4        | 1.0      |
| BQ                        | 102405                | 302          | 1855                       | 4.6                             | 4067.6                             | 4067.6           | 4067.9        | 0.3      |
| BR                        | 102933                | 415          | 1595                       | 8.0                             | 4069.6                             | 4069.6           | 4069.7        | 0.1      |
| BS                        | 103521                | 780          | 2691                       | 5.8                             | 4072.7                             | 4072.7           | 4073.3        | 0.6      |
| BT                        | 103953                | 838          | 2277                       | 7.4                             | 4074.3                             | 4074.3           | 4075.2        | 0.9      |
| BU                        | 104484                | 550          | 2043                       | 4.5                             | 4078.4                             | 4078.4           | 4079.4        | 1.0      |
| BV                        | 105245                | 523          | 1420                       | 6.8                             | 4084.3                             | 4084.3           | 4084.3        | 0.0      |
| BW                        | 105780                | 430          | 1227                       | 7.8                             | 4089.1                             | 4089.1           | 4089.1        | 0.0      |
| BX                        | 106263                | 520          | 1409                       | 6.8                             | 4092.8                             | 4092.8           | 4092.8        | 0.0      |
| BY                        | 106881                | 570          | 1694                       | 5.7                             | 4096.3                             | 4096.3           | 4096.9        | 0.6      |
| BZ                        | 107409                | 706          | 1645                       | 5.8                             | 4100.1                             | 4100.1           | 4100.2        | 0.1      |
| CA                        | 107939                | 870          | 1994                       | 4.8                             | 4105.0                             | 4105.0           | 4105.5        | 0.5      |
| CB                        | 108661                | 933          | 1823                       | 5.3                             | 4109.8                             | 4109.8           | 4110.1        | 0.3      |
| CC                        | 109124                | 666          | 1555                       | 6.2                             | 4114.4                             | 4114.4           | 4114.6        | 0.2      |
| CD                        | 109705                | 277          | 946                        | 10.2                            | 4118.3                             | 4118.3           | 4118.7        | 0.4      |
| CE                        | 110231                | 265          | 1214                       | 7.9                             | 4122.4                             | 4122.4           | 4123.1        | 0.7      |
| CF                        | 110744                | 206          | 811                        | 11.8                            | 4126.2                             | 4126.2           | 4126.2        | 0.0      |
| CG                        | 111283                | 154          | 906                        | 10.6                            | 4130.4                             | 4130.4           | 4131.0        | 0.6      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SONOITA CREEK</b> |

| FLOODING SOURCE     |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|---------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION       | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)         |                       |              |                            |                                 |                                    |                  |               |          |
| Sonoita Tributary A |                       |              |                            |                                 |                                    |                  |               |          |
| A                   | 177                   | 52           | 149                        | 5.5                             | 4059.2                             | 4059.2           | 4060.2        | 1.0      |
| B                   | 503                   | 50           | 126                        | 6.5                             | 4067.2                             | 4067.2           | 4068.2        | 1.0      |
| C                   | 1170                  | 23           | 84                         | 9.8                             | 4076.7                             | 4076.7           | 4077.2        | 0.5      |
| D                   | 1493                  | 23           | 86                         | 9.5                             | 4080.5                             | 4080.5           | 4081.2        | 0.7      |

<sup>1</sup>Feet above confluence with Sonoita Creek

|         |   |                            |
|---------|---|----------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>       |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>Sonoita Tributary A</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Sopori Wash     |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 2261                  | 800          | 2453                       | 4.1                             | 3041.2                             | 3041.2           | 3041.2        | 0.0      |
| B               | 2671                  | 500          | 922                        | 14.5                            | 3044.6                             | 3044.6           | 3044.6        | 0.0      |
| C               | 3190                  | 251          | 1662                       | 7.5                             | 3050.2                             | 3050.2           | 3050.3        | 0.1      |
| D               | 3685                  | 176          | 1215                       | 10.2                            | 3051.5                             | 3051.5           | 3051.8        | 0.3      |
| E               | 4156                  | 191          | 1443                       | 8.6                             | 3054.2                             | 3054.2           | 3054.6        | 0.4      |
| F               | 4636                  | 288          | 1728                       | 7.2                             | 3056.5                             | 3056.5           | 3056.7        | 0.2      |
| G               | 5090                  | 277          | 1679                       | 7.4                             | 3058.2                             | 3058.2           | 3058.3        | 0.1      |
| H               | 5660                  | 167          | 1089                       | 11.4                            | 3060.3                             | 3060.3           | 3060.3        | 0.0      |
| I               | 6565                  | 167          | 1371                       | 9                               | 3072.1                             | 3072.1           | 3072.1        | 0.0      |
| J               | 7086                  | 1300         | 9639                       | 1.3                             | 3076.3                             | 3076.3           | 3077.0        | 0.7      |
| K               | 7640                  | 1144         | 6084                       | 2                               | 3076.4                             | 3076.4           | 3077.1        | 0.7      |
| L               | 8147                  | 823          | 3345                       | 3.7                             | 3076.7                             | 3076.7           | 3077.5        | 0.8      |
| M               | 8712                  | 908          | 2858                       | 4.3                             | 3079.2                             | 3079.2           | 3079.3        | 0.1      |
| N               | 9266                  | 969          | 3672                       | 3.4                             | 3081.8                             | 3081.8           | 3082.0        | 0.2      |
| O               | 9778                  | 849          | 2594                       | 4.9                             | 3088.7                             | 3088.7           | 3088.7        | 0.0      |
| P               | 10227                 | 885          | 2585                       | 5                               | 3091.6                             | 3091.6           | 3091.6        | 0.0      |
| Q               | 10553                 | 936          | 1886                       | 6.5                             | 3094.9                             | 3094.9           | 3094.9        | 0.0      |
| R               | 11182                 | 779          | 1982                       | 6.2                             | 3098.1                             | 3098.1           | 3098.8        | 0.7      |
| S               | 11668                 | 921          | 1926                       | 6.4                             | 3102.1                             | 3102.1           | 3102.1        | 0.0      |
| T               | 12185                 | 625          | 2417                       | 5.1                             | 3105.2                             | 3105.2           | 3105.3        | 0.1      |
| U               | 12671                 | 800          | 2583                       | 4.8                             | 3107.0                             | 3107.0           | 3107.1        | 0.1      |
| V               | 13447                 | 551          | 1884                       | 6.5                             | 3111.2                             | 3111.2           | 3111.3        | 0.1      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b> |
|         |   | <b>SOPORI WASH</b>   |

| FLOODING SOURCE            |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|----------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION              | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)                |                       |              |                            |                                 |                                    |                  |               |          |
| Sopori Wash<br>(continued) |                       |              |                            |                                 |                                    |                  |               |          |
| W                          | 13663                 | 516          | 1547                       | 8                               | 3112.7                             | 3112.7           | 3112.8        | 0.1      |
| X                          | 14064                 | 494          | 1896                       | 6.5                             | 3115.9                             | 3115.9           | 3116.2        | 0.3      |
| Y                          | 14233                 | 535          | 1897                       | 6.5                             | 3116.6                             | 3116.6           | 3117.2        | 0.6      |
| Z                          | 14402                 | 514          | 2093                       | 5.9                             | 3117.6                             | 3117.6           | 3118.6        | 1.0      |
| AA                         | 14719                 | 756          | 2384                       | 5.2                             | 3119.2                             | 3119.2           | 3120.1        | 0.9      |
| AB                         | 15094                 | 1126         | 3177                       | 3.9                             | 3121.3                             | 3121.3           | 3122.3        | 1.0      |
| AC                         | 15532                 | 1145         | 3082                       | 4                               | 3123.6                             | 3123.6           | 3124.5        | 0.9      |
| AD                         | 16440                 | 1047         | 2591                       | 4.8                             | 3128.9                             | 3128.9           | 3129.8        | 0.9      |
| AE                         | 16894                 | 763          | 2246                       | 5.5                             | 3132.2                             | 3132.2           | 3133.2        | 1.0      |
| AF                         | 17475                 | 648          | 2235                       | 5.5                             | 3136.3                             | 3136.3           | 3137.3        | 1.0      |
| AG                         | 18705                 | 975          | 2156                       | 5.7                             | 3143.6                             | 3143.6           | 3144.2        | 0.6      |
| AH                         | 19977                 | 1526         | 3060                       | 4                               | 3150.8                             | 3150.8           | 3151.8        | 1.0      |
| AI                         | 20410                 | 1467         | 3273                       | 3.8                             | 3154.1                             | 3154.1           | 3155          | 0.9      |
| AJ                         | 21445                 | 1354         | 3618                       | 3.4                             | 3160.3                             | 3160.3           | 3161.2        | 0.9      |
| AK                         | 21915                 | 1127         | 3248                       | 3.8                             | 3162.5                             | 3162.5           | 3163.5        | 1.0      |
| AL                         | 22253                 | 936          | 1991                       | 6.2                             | 3166.8                             | 3166.8           | 3167.3        | 0.5      |
| AM                         | 22533                 | 825          | 1994                       | 6.2                             | 3169.8                             | 3169.8           | 3170.2        | 0.4      |
| AN                         | 23008                 | 549          | 1886                       | 6.5                             | 3172.8                             | 3172.8           | 3173.6        | 0.8      |
| AO                         | 23388                 | 544          | 1650                       | 7.5                             | 3175.7                             | 3175.7           | 3176.6        | 0.9      |
| AP                         | 24271                 | 358          | 1527                       | 8.1                             | 3183.0                             | 3183.0           | 3183.8        | 0.8      |
| AQ                         | 24571                 | 399          | 1725                       | 7.1                             | 3185.6                             | 3185.6           | 3186.6        | 1.0      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SOPORI WASH</b>   |

| FLOODING SOURCE         |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION           | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                         |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Sopori Wash (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| AR                      | 24718                 | 359          | 1389                       | 8.9                             | 3186.6                             | 3186.6           | 3187.3        | 0.7      |
| AS                      | 24883                 | 475          | 1635                       | 7.5                             | 3188.2                             | 3188.2           | 3189.1        | 0.9      |
| AT                      | 25067                 | 417          | 2611                       | 4.7                             | 3190.4                             | 3190.4           | 3191.4        | 1.0      |
| AU                      | 25253                 | 399          | 1966                       | 6.3                             | 3190.7                             | 3190.7           | 3191.6        | 0.9      |
| AV                      | 25454                 | 719          | 3156                       | 3.9                             | 3192.0                             | 3192.0           | 3192.6        | 0.6      |
| AW                      | 25608                 | 605          | 2387                       | 5.2                             | 3192.3                             | 3192.3           | 3193.0        | 0.7      |
| AX                      | 25771                 | 433          | 1628                       | 7.6                             | 3192.8                             | 3192.8           | 3193.6        | 0.8      |
| AY                      | 26162                 | 290          | 1230                       | 10                              | 3195.7                             | 3195.7           | 3196.7        | 1.0      |
| AZ                      | 26378                 | 296          | 1248                       | 9.9                             | 3198.2                             | 3198.2           | 3199.0        | 0.8      |
| BA                      | 26705                 | 355          | 1591                       | 7.7                             | 3201.2                             | 3201.2           | 3201.9        | 0.7      |
| BB                      | 26990                 | 199          | 1082                       | 11.4                            | 3202.5                             | 3202.5           | 3203.5        | 1.0      |
| BC                      | 27381                 | 400          | 2244                       | 5.5                             | 3206.4                             | 3206.4           | 3207.4        | 1.0      |
| BD                      | 27751                 | 313          | 1151                       | 10.7                            | 3207.7                             | 3207.7           | 3207.8        | 0.1      |
| BE                      | 28184                 | 391          | 1970                       | 6.3                             | 3211.5                             | 3211.5           | 3212.2        | 0.7      |
| BF                      | 28606                 | 455          | 1844                       | 6.7                             | 3213.3                             | 3213.3           | 3214.1        | 0.8      |
| BG                      | 29340                 | 455          | 2037                       | 6                               | 3217.9                             | 3217.9           | 3218.3        | 0.4      |
| BH                      | 29708                 | 374          | 1202                       | 10.2                            | 3220.3                             | 3220.3           | 3220.4        | 0.1      |
| BI                      | 29910                 | 409          | 1824                       | 6.7                             | 3223.1                             | 3223.1           | 3223.5        | 0.4      |
| BJ                      | 30237                 | 595          | 2355                       | 5.2                             | 3225.0                             | 3225.0           | 3225.4        | 0.4      |
| BK                      | 30591                 | 436          | 1556                       | 7.9                             | 3227.1                             | 3227.1           | 3227.2        | 0.1      |
| BL                      | 30881                 | 369          | 1554                       | 7.3                             | 3229.9                             | 3229.9           | 3229.9        | 0.0      |
| BM                      | 31583                 | 430          | 1824                       | 6.3                             | 3234.5                             | 3234.5           | 3234.6        | 0.1      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SOPORI WASH</b>   |

| FLOODING SOURCE         |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION           | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                         |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Sopori Wash (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| BN                      | 31905                 | 649          | 2003                       | 5.7                             | 3236.5                             | 3236.5           | 3236.5        | 0.0      |
| BO                      | 32396                 | 428          | 1604                       | 7.1                             | 3240.0                             | 3240.0           | 3240.0        | 0.0      |
| BP                      | 33346                 | 475          | 1967                       | 5.8                             | 3246.2                             | 3246.2           | 3246.2        | 0.0      |
| BQ                      | 33710                 | 687          | 2208                       | 5.2                             | 3248.1                             | 3248.1           | 3248.1        | 0.0      |
| BR                      | 34275                 | 786          | 2229                       | 5.1                             | 3251.2                             | 3251.2           | 3251.2        | 0.0      |
| BS                      | 34740                 | 699          | 2213                       | 5.2                             | 3253.8                             | 3253.8           | 3253.8        | 0.0      |
| BT                      | 36092                 | 513          | 1890                       | 6                               | 3263.2                             | 3263.2           | 3263.2        | 0.0      |
| BU                      | 36667                 | 326          | 1396                       | 8.2                             | 3266.9                             | 3266.9           | 3266.9        | 0.0      |
| BV                      | 37258                 | 246          | 1461                       | 7.8                             | 3270.2                             | 3270.2           | 3270.4        | 0.2      |
| BW                      | 37633                 | 518          | 2120                       | 5.4                             | 3272.4                             | 3272.4           | 3272.7        | 0.3      |
| BX                      | 38362                 | 834          | 3225                       | 3.5                             | 3274.8                             | 3274.8           | 3275.2        | 0.4      |
| BY                      | 38610                 | 766          | 2656                       | 4.3                             | 3275.4                             | 3275.4           | 3275.7        | 0.3      |
| BZ                      | 38879                 | 649          | 3024                       | 4.8                             | 3276.5                             | 3276.5           | 3276.8        | 0.3      |
| CA                      | 39132                 | 523          | 1801                       | 6.6                             | 3278.6                             | 3278.6           | 3278.6        | 0.0      |
| CB                      | 39333                 | 560          | 1648                       | 5.9                             | 3280.3                             | 3280.3           | 3280.3        | 0.0      |
| CC                      | 39571                 | 551          | 1874                       | 5.2                             | 3281.8                             | 3281.8           | 3281.8        | 0.0      |
| CD                      | 39677                 | 580          | 1958                       | 4.9                             | 3282.3                             | 3282.3           | 3282.3        | 0.0      |
| CE                      | 39804                 | 582          | 1876                       | 5.2                             | 3282.9                             | 3282.9           | 3282.9        | 0.0      |
| CF                      | 40115                 | 494          | 1511                       | 6.4                             | 3284.7                             | 3284.7           | 3284.8        | 0.1      |
| CG                      | 40348                 | 329          | 1239                       | 7.8                             | 3286.4                             | 3286.4           | 3286.8        | 0.4      |
| CH                      | 40686                 | 278          | 1277                       | 7.6                             | 3289.1                             | 3289.1           | 3289.6        | 0.5      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SOPORI WASH</b>   |

| FLOODING SOURCE         |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION           | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                         |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Sopori Wash (continued) |                       |              |                            |                                 |                                    |                  |               |          |
| CI                      | 41050                 | 403          | 1499                       | 6.5                             | 3292.1                             | 3292.1           | 3292.4        | 0.3      |
| CJ                      | 41282                 | 300          | 1515                       | 6.4                             | 3293.7                             | 3293.7           | 3293.7        | 0.0      |
| CK                      | 41483                 | 265          | 1380                       | 7                               | 3294.5                             | 3294.5           | 3294.5        | 0.0      |
| CL                      | 42001                 | 171          | 989                        | 9.8                             | 3297.6                             | 3297.6           | 3297.6        | 0.0      |
| CM                      | 42344                 | 268          | 1711                       | 5.7                             | 3300.2                             | 3300.2           | 3300.2        | 0.0      |
| CN                      | 42587                 | 347          | 1615                       | 6                               | 3300.9                             | 3300.9           | 3300.9        | 0.0      |
| CO                      | 42840                 | 344          | 1488                       | 6.5                             | 3302.1                             | 3302.1           | 3302.1        | 0.0      |
| CP                      | 43115                 | 350          | 1345                       | 7.2                             | 3303.8                             | 3303.8           | 3303.8        | 0.0      |
| CQ                      | 43569                 | 326          | 1329                       | 7.3                             | 3307.1                             | 3307.1           | 3307.1        | 0.0      |
| CR                      | 43953                 | 161          | 791                        | 12.2                            | 3309.5                             | 3309.5           | 3309.5        | 0.0      |

<sup>1</sup>Feet above confluence with Santa Cruz River (Mouth)

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>SOPORI WASH</b>   |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 |                                    | (FEET NAVD)      |               |          |
| Tubac Creek     |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 1700                  | 212          | 589                        | 5.3                             | 3204.7                             | 3204.7           | 3205.7        | 1.0      |
| B               | 2100                  | 167          | 431                        | 7.3                             | 3209.8                             | 3209.8           | 3210.2        | 0.4      |
| C               | 3255                  | 70           | 363                        | 8.1                             | 3228.8                             | 3228.8           | 3229.1        | 0.3      |
| D               | 3630                  | 70           | 282                        | 10.4                            | 3231.2                             | 3231.2           | 3231.4        | 0.2      |

<sup>1</sup>Feet above confluence with Santa Cruz River

|         |   |                      |
|---------|---|----------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b> |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>TUBAC CREEK</b>   |

| FLOODING SOURCE                            |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|--|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION                              | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)                                |                       |              |                            |                                 |                                    |                  |               |          |
| Tubac Creek North Channel A-E <sup>2</sup> |                       |              |                            |                                 |                                    |                  |               |          |
| F  | 2830                  | 72           | 244                        | 5.6                             | 3225.9                             | 3225.9           | 3226.9        | 1.0      |
| G  | 3175                  | 55           | 164                        | 8.4                             | 3230.4                             | 3230.4           | 3230.5        | 0.1      |
| H  | 4075                  | 57           | 148                        | 9.3                             | 3245.4                             | 3245.4           | 3245.6        | 0.2      |
| I  | 4285                  | 112          | 331                        | 4.1                             | 3248.1                             | 3248.1           | 3248.8        | 0.7      |

<sup>1</sup>Feet above confluence with Santa Cruz River

<sup>2</sup>No floodway determined

|         |   |                                  |
|---------|---|----------------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>             |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>TUBAC CREEK NORTH CHANNEL</b> |

| FLOODING SOURCE         |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-------------------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION           | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| (FEET NAVD)             |                       |              |                            |                                 |                                    |                  |               |          |
| Tubac Creek Tributary 1 |                       |              |                            |                                 |                                    |                  |               |          |
| A                       | 1550                  | 32           | 141                        | 3.8                             | 3233.8                             | 3233.8           | 3233.8        | 0.0      |
| B                       | 1835                  | 17           | 53                         | 10.1                            | 3241.5                             | 3241.5           | 3241.5        | 0.0      |
| C                       | 2300                  | 70           | 193                        | 2.8                             | 3249.3                             | 3249.3           | 3249.3        | 0.0      |
| D                       | 2565                  | 57           | 79                         | 6.8                             | 3252.6                             | 3252.6           | 3252.6        | 0.0      |

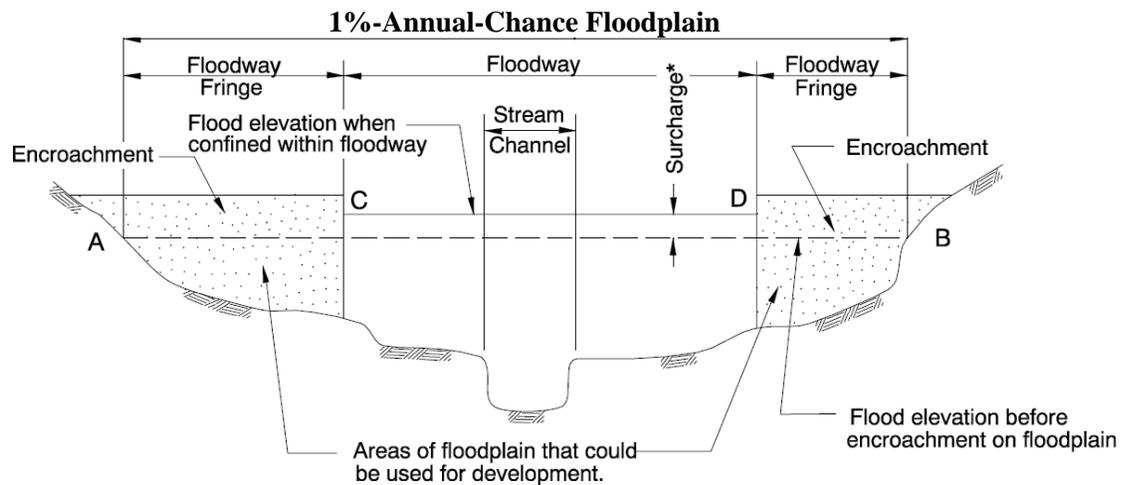
<sup>1</sup>Feet above confluence with Tubac Creek

|         |   |                                |
|---------|---|--------------------------------|
| TABLE 7 | <b>FEDERAL EMERGENCY MANAGEMENT AGENCY</b><br><b>SANTA CRUZ COUNTY, AZ</b><br><b>AND INCORPORATED AREAS</b> | <b>FLOODWAY DATA</b>           |
|         |   | <b>TUBAC CREEK TRIBUTARY 1</b> |

| FLOODING SOURCE |                       | FLOODWAY     |                            |                                 | BASE FLOOD WATER-SURFACE ELEVATION |                  |               |          |
|-----------------|-----------------------|--------------|----------------------------|---------------------------------|------------------------------------|------------------|---------------|----------|
| CROSS SECTION   | DISTANCE <sup>1</sup> | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY                         | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
|                 |                       |              |                            |                                 | (FEET NAVD)                        |                  |               |          |
| Woodyard Canyon |                       |              |                            |                                 |                                    |                  |               |          |
| A               | 583                   | 181          | 445                        | 3.4                             | 4839.4                             | 4839.4           | 4840.4        | 1.0      |
| B               | 916                   | 60           | 161                        | 9.4                             | 4843.8                             | 4843.8           | 4844.0        | 0.2      |
| C               | 1490                  | 91           | 284                        | 5.3                             | 4849.7                             | 4849.7           | 4850.7        | 1.0      |
| D               | 1813                  | 36           | 135                        | 11.1                            | 4853.8                             | 4853.8           | 4854.2        | 0.4      |
| E               | 2389                  | 23           | 118                        | 12.7                            | 4861.4                             | 4861.4           | 4862.1        | 0.7      |
| F               | 2696                  | 38           | 177                        | 8.5                             | 4865.7                             | 4865.7           | 4866.7        | 1.0      |
| G               | 3012                  | 42           | 145                        | 10.3                            | 4869.4                             | 4869.4           | 4869.4        | 0.0      |
| H               | 3351                  | 54           | 156                        | 9.7                             | 4879.8                             | 4879.8           | 4879.8        | 0.0      |
| I               | 3651                  | 25           | 120                        | 12.6                            | 4894.9                             | 4894.9           | 4895.8        | 0.9      |
| J               | 3975                  | 54           | 157                        | 9.6                             | 4910.5                             | 4910.5           | 4910.5        | 0.0      |
| K               | 4289                  | 26           | 125                        | 12                              | 4920.2                             | 4920.2           | 4921.1        | 0.9      |
| L               | 4576                  | 37           | 138                        | 10.9                            | 4926.2                             | 4926.2           | 4926.6        | 0.4      |
| M               | 4910                  | 48           | 151                        | 9.9                             | 4935.2                             | 4935.2           | 4935.2        | 0.0      |

<sup>1</sup>Feet above Confluence with Lyle Canyon

|         |   |                        |
|---------|---|------------------------|
| TABLE 7 | FEDERAL EMERGENCY MANAGEMENT AGENCY                     | <b>FLOODWAY DATA</b>   |
|         | <b>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> | <b>WOODYARD CANYON</b> |



\*Surcharge is not to exceed 1.0 foot (FEMA requirement) or lesser amount if specified by state.

Figure 11 – Floodway Schematic

Floodway determination was employed for detailed study reaches. Encroachment methodology is based on FEMA guidelines and is the standard of care and practice within Arizona. Encroachment into floodplains, such as artificial fill, reduces the flood carrying capacity, increases flood heights of streams, 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 National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of floodplain management.

Several encroachment methods are available to determine the extent of floodway limits. For the purposes of this project, two methods were employed. This approach does not apply to Peck Canyon.

*Method 4* – Encroachment Method 4 was initially employed to determine the left and right encroachment stations such that the conveyance within the encroached cross-section at a higher surface elevation (i.e., target value) is equal to the conveyance of the natural cross-section at the original water surface elevations. This approach is sometimes called the equal loss of conveyance method. For this study, as required by the Arizona Department of Water Resources State Standard 2-96 (Reference 6), a target value change of no more than one (1) foot in the hydraulic grade line is used. This method is used to establish a base encroachment model.

*Method 1* – Once the base encroachment models have been performed, encroachment method 1 is used to insure target values have not exceeded the floodway model.

The analysis of Peck Canyon was found to result in critical depth occurring at three or more consecutive cross-sections (such occurred several times within this reach) and in accordance with Arizona Department of Water Resources State Standard 3-94 (Reference 15) the method used to determine the floodway is as follows:

*Method 6* – Encroachment Method 6 (Method 6 when using HEC-2 or Method 5 when using HEC-RAS) was initially employed to determine the left and right encroachment stations and is used for reaches that exhibit supercritical flow regimes. For this study, as required by the Arizona Department of Water Resources State Standard 3-94 (Reference 15), a target value of no more than one (1) foot in the energy grade line is used. This method is used to establish a base encroachment model.

*Method 1* – Once the base encroachment models have been performed, encroachment method 1 is used to insure target values have not exceeded the floodway model.

## **5.0 INSURANCE APPLICATION**

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

### Zone A

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

### Zone AE

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

### Zone AO

Zone AO is the flood insurance rate zone that corresponds to the area 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 depths derived from the detailed hydraulic analyses are shown within this zone.

### Zone X

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

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

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

The current FIRM presents flooding information for the entire geographic area of Santa Cruz County. Previously, separate FIRMS were prepared for each identified flood prone incorporated community and for the unincorporated areas of the county.

Historical data relating to the maps prepared for each community, up to and including this countywide FIS, are presented in Table 8.

| <b>COMMUNITY NAME</b>   | <b>INITIAL IDENTIFICATION</b> | <b>FLOOD HAZARD BOUNDARY MAP REVISIONS DATE</b> | <b>FIRM EFFECTIVE DATE</b> | <b>FIRM Revisions Date</b>                             |
|---|-------------------------------|---|----------------------------|--|
| Santa Cruz County<br>(Unincorporated Areas)   | April 23, 1971                | September 13, 1974                              | August 1, 1980             | August 23, 2000<br>February 4, 1998<br>August 19, 1997 |
| Nogales, City of  | May 24, 1974                  | November 14, 1975                               | April 15, 1981             | None   |
| Patagonia, Town of  | April 9, 1976                 | None  | March 18, 1980             | None   |
| <b>FEDERAL EMERGENCY MANAGEMENT AGENCY<br/>SANTA CRUZ COUNTY, AZ<br/>AND INCORPORATED AREAS</b> |                               | Table 8 – Community Map History                 |                            |  |

## 7.0 OTHER STUDIES

The peak discharge-frequency relationships as used by the study contractor in 1972 were found to be in close agreement with the USGS studies (References 3 and 4), but were in disagreement with those used in two Floodplain Information reports as prepared by USACE (References 1 and 2). Because of the discrepancies between the study contractor and studies of USACE, the 1972 work was never accepted by FEMA. The present study was designed to replace the work done in 1972 by the study contractor.

In May and June 1974, meetings were held among the three concerned agencies together with the Arizona Water Commission, and agreement was reached as to the discharges to be used for the main stem of the Santa Cruz River. For example, on the Santa Cruz River near Nogales (stream gage 9-4805), the 1-percent-annual-chance peak discharge in the 1972 study was 18,000 cfs. This compared to a 42,000 cfs intermediate regional flood used by USACE at this location (Reference 2). During the coordination meeting, it was agreed that the 1-percent-annual-chance peak discharge for the stream gage was 25,000 cfs.

Regional peak discharge-frequency, drainage area curves used by NRCS in this revised study for the remainder of the county were also coordinated with USACE, USGS, and other interested agencies. In general, the peak discharges used in the revised study are somewhat higher than those used in the 1972 study for the county.

Because of the differences in the 1-percent-annual-chance peak discharges used in the revised study and USACE studies, no direct comparison could be made in the profiles developed by the two agencies. As would generally be expected, however, the 1-percent-annual-chance flood profile developed by NRCS in the revised study is higher than that shown in the 1972 report and less than that shown in the two USACE reports. In order to compare the NRCS and USACE hydraulic models, the flood profile was computed for the USACE standard project flood using the NRCS model for the reach on the Santa Cruz River from State Highway 82 to the International Boundary. The computed profiles crisscrossed, but generally agreed within less than 0.5 foot, after adjustments were made for differences in elevation reference data used in the two studies. The revised NRCS study is based on the NGVD, whereas the USACE study was tied to the Arizona Highway Department datum located on State Highway 82 at the Santa Cruz River crossing. Differences in these two datum's have been noted earlier. The reach on Santa Cruz River, from cross Section EC upstream to the International Boundary, of the NRCS 1972 report was also tied to the Arizona Highway Department datum.

For the reach in the vicinity of Sonoita Creek described in the USACE report (Reference 1), a comparison was made between the USACE standard project flood and the 500-year flood as used in the present study. The computed-differences are somewhat greater in this study; they range from a few tenths of a foot to approximately 1.0 foot. Most of these differences can be correlated to changes in Manning's "n" values for this reach although there are also minor differences in the peak discharge for these two floods.

With the installation of the Nogales International Waste Water Treatment Plant at the confluence of Potrero Creek and Santa Cruz River, a semi-permanent water supply is being released into the Santa Cruz River channel. This has significantly increased the vegetative growth along the channel, thereby decreasing flood flows. Also, with the encroachment of the waste water treatment plant upon the river floodplain, the flood profile in the area of the treatment plant itself has increased approximately 4.0 feet. The final flood profiles, as calculated for this study, along the two reaches covered by the USACE reports, were proposed to and agreed upon by USACE.

Specific coordination was also maintained with Stantec. This firm has completed several flood studies on Sonoita Creek, Agua Fria Canyon, and Calabasas and Caralampi Canyons. (References 16 through 20) The 100- year flood profile as developed by the NRCS for the lower reaches of Sonoita Creek is slower than the profile developed by Stantec. The major differences in the profiles, however, can be explained by an over-excavation of a planned channel upon which the consulting firm based the 1-percent-annual-chance profile. It should also be noted that the improved channel was installed on Sonoita Creek during the period between the completion date of the NRCS 1972 report and the present study.

The flood profiles developed by NRCS and Stantec on Agua Fria Canyon also differ to some extent. The NRCS profiles for this stream were based on existing conditions, whereas profiles developed by Stantec were based on the installation of a planned channel and floodway improvement. Some differences were also noted in the peak discharge-frequency relationships used by the two agencies for this stream. The final profiles and frequency data as used in this study for both Agua Fria Canyon and Sonoita Creek were coordinated with the consulting firm. Agreement also was reached with the consulting firm for peak discharges to be used on Peck Canyon.

The only work performed by NRCS on Caralampi and Calabasas Canyons was the delineation of the 1-percent-annual-chance floodplains by approximate methods. Therefore, the floodplains defined by Stantec for these two tributaries were used exclusively in this study.

Some disagreement also has occurred in the hydrologic and hydraulic analyses as used by NRCS in this study and those developed by USACE and International Boundary and Water Commission in conjunction with the installation of the Nogales International Waste Water Treatment Plant. The levee system installed to provide flood protection for the waste treatment plant was designed for a 1-percent-annual-chance peak discharge of 12,000 cfs. This is in conflict with a peak of 17,300 cfs being used by NRCS in this study. Letters of coordination were written to both USACE and the International Boundary and Water Commission concerning this matter. The International Boundary and Water Commission stated in their letter of reply dated November 17, 1976 that,

"Since the plant was designed and constructed on the basis of a thorough review by USACE and no flood events have occurred since 1970 to indicate a basis for a change, we do not believe it necessary to add further flood protection for the plant."

A copy of the International Boundary and Water Commission letter was furnished to USACE and in their reply dated January 24, 1977, they stated,

"When NRCS began the FIS for Santa Cruz County, they performed a comprehensive hydrologic analysis for the county and noted the differences from our 1969 FPI (Floodplain Information Report). The 1974 meeting ensued, and after evaluation of the two studies a compromise was reached. It is our feeling that the compromise value reflect a more complete data base and therefore more comprehensive evaluation than was available in 1969."

Because adequate data to define the 1-percent-annual-chance peak discharge on Potrero Creek are not available, and in order to be consistent with the hydrologic data used for the remainder of the study area, the peaks as agreed to by NRCS, USACE, and USGS have been used on Potrero Creek for this study.

In addition to the FIS for the unincorporated areas of Santa Cruz County, NRCS has prepared Flood Insurance Studies for the City of Nogales and the Town of Patagonia (References 21 and 22, respectively). Results of these studies are in agreement with the Santa Cruz County study.

A study for flood control and allied purposes of the Santa Cruz River basin was made by USACE concurrently with the U.S. Department of the Interior, Bureau of Reclamation. Included in this investigation was the evaluation of a Nogales Dam and Reservoir site located on the Santa Cruz River approximately 2.5 miles downstream of the International Border. In a concluding report by the Bureau of Reclamation, dated July 1976 (Reference 24), it was recommended that this structure not be installed at the present time.

Several other small hydrologic studies, such as those performed by the Arizona Highway Department in connection with the design of highway culverts, have been made in the study area, and where conflicts have arisen, these have been resolved with the Arizona Highway Department.

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

## **8.0 LOCATION OF DATA**

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Federal Emergency Management Agency, 1111 Broadway, Suite 1200, Oakland, CA 94607-4052 or visiting their website: [www.fema.gov](http://www.fema.gov)

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