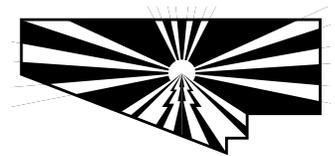


**Pima County
FLOOD CONTROL DISTRICT**



**ANNUAL REPORT
1999/2000**

Pima County Flood Control District
Annual Report
Fiscal Year 1999/2000



Prepared by
Pima County Flood Control District
201 North Stone Avenue
Tucson, Arizona 85701

March 2001

FLOOD CONTROL DISTRICT ADMINISTRATION

Board of Directors (Board of Supervisors)

Mike Boyd, District 1
Dan Eckstrom, District 2
Sharon Bronson, Chairperson, District 3
Raymond J. Carroll, District 4
Raúl M. Grijalva, District 5

Flood Control District Advisory Committee

Nick Bokaie, Oro Valley
Paul Cella, District 4
Robert Condit, Marana
Mike Zeller, Chair, City of Tucson
Antonio Figueroa, City of Tucson
Mary Horvath, District 3
Herb Osborn, City of Tucson
Richard Salaz, City of South Tucson
Phil Pearthree, 2nd Vice Chair, District 5
Doug Shakel, Vice Chair, District 1
Vacant, District 2
Vacant, Sahuarita

General Manager (County Administrator)

C. H. Huckelberry

Chief Engineer (Director)

Brooks A. Keenan

Deputy Director

Dorothy C. Dolan

Flood Control Division Managers

Zbigniew Osmolski, Flood Control Engineering
Leo R. Smith, Floodplain Management

Transportation Division Managers

Kathy Black, Administrative Services
Linda Closs, Real Property
David Cummings, Operations
Richard G. Harrington, Technical Services
Thomas Kilargis, Field Engineering
Ruben Lacandola, Design Engineering
Albert Letzkus, Traffic Engineering
Benjamin H. Goff, Transportation Systems

Cover Photo: Bingham Cienega Spring creates a unique riparian habitat preserve on District-owned property in far eastern Pima County.

Layout and design by Pima County Graphic Design

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MESSAGE FROM THE CHIEF ENGINEER (DIRECTOR)

On behalf of the Board of Directors of Pima County Flood Control District, I am pleased to present the District's Annual Report for Fiscal Year 1999/2000.

In the past year, the District has continued in the best tradition of serving the community by providing comprehensive flood protection programs and floodplain management services. Both structural and nonstructural flood control programs continue to protect the public as they interface with potential flood situations. Increasingly, the public is being educated on the integral riparian element of the watershed system, through permit application procedures, information on the website and outreach programs. A few highlights of the District's activities in FY 1999/2000 include:



- Construction of the 7.3-mile long Lower Santa Cruz River Levee is proceeding as scheduled and is expected to be completed in August 2000. This project will protect over 4,500 acres of floodprone property in the Town of Marana and northern Pima County.
- Sixteen pedestrian bridges and various linear park improvements have been constructed in the Rillito River Park, further enhancing the area and providing enjoyable opportunities for walking, jogging, biking, and equestrian activities.
- Work on the riparian restoration element of the Sonoran Desert Conservation Plan proceeded at a very productive pace with 11 reports and 11 mapping endeavors completed. Each report/map represents intense research efforts to define and catalogue significant aspects of the Sonoran Desert.
- Staff submitted 12 Letter of Map Amendments which removed 74 individual structures from designated flood hazard areas. When approved by FEMA, these changes result in substantial savings in flood insurance premiums paid by these property owners. Other modifications to the Flood Insurance Rate Maps removed over 500 parcels from the floodplain.
- Staff responded to over 8,000 requests for floodplain status information. Staff also provided floodplain assistance to over 5,700 walk-in customers and issued almost 700 Floodplain Use Permits.

I believe that District efforts in FY 1999/2000 made a significant contribution toward minimizing flood and erosion hazards for Pima County residents and their property. I hope you'll take a closer look at this year's annual report for more details on the District's many flood control activities.

A handwritten signature in black ink that reads "Brooks Keenan". The signature is written in a cursive, flowing style with a long horizontal flourish extending to the right.

Brooks A. Keenan
Director

DISTRICT FINANCES

Revenues

Although the District receives assistance from state and federal agencies to construct major capital facilities, most of the District's funding is generated from the property tax levy, along with general obligation bond sales authorized by the electorate. Approximately one-half of the annual levy revenue is devoted to the Capital Improvement Program, with the remainder allocated to operating expenses.

This past fiscal year, the District's annual levy rate was less than the previous year and total revenue obtained from the levy decreased slightly. Information on the District levy rate and revenues is shown in the table at right.

Expenditures

The table on the following page provides information on capital project expenditures for FY 1999/2000. Project numbers shown in the table correspond to the projects shown on the map on pages 8 and 9. The remainder of District expenditures goes toward operating expenses, which include funds allocated for maintenance of flood control structures, floodplain management, planning, and administration activities. A detailed breakdown of the District's finances is provided on pages 10 and 11.

Flood Control District Tax Levy Rate 1981 to 2000		
Fiscal Year Ending	Levy Rate*	Tax Revenue**
1981	0.5143	\$4,637,000
1982	0.4683	\$5,342,000
1983	0.5072	\$6,882,000
1984	0.4739	\$7,652,000
1985	0.5269	\$9,243,000
1986	0.5102	\$9,969,000
1987	0.5346	\$11,713,000
1988	0.7630	\$17,272,000
1989	0.5592	\$13,730,000
1990	0.5985	\$14,663,000
1991	0.5985	\$14,058,000
1992	0.5871	\$13,689,000
1993	0.5871	\$13,767,000
1994	0.5398	\$12,678,000
1995	0.4623	\$11,379,000
1996	0.3596	\$9,368,000
1997	0.3596	\$9,467,000
1998	0.3296	\$10,392,000
1999	0.3246	\$10,411,000
2000	0.3046	\$10,327,151

* Per \$100 assessed valuation

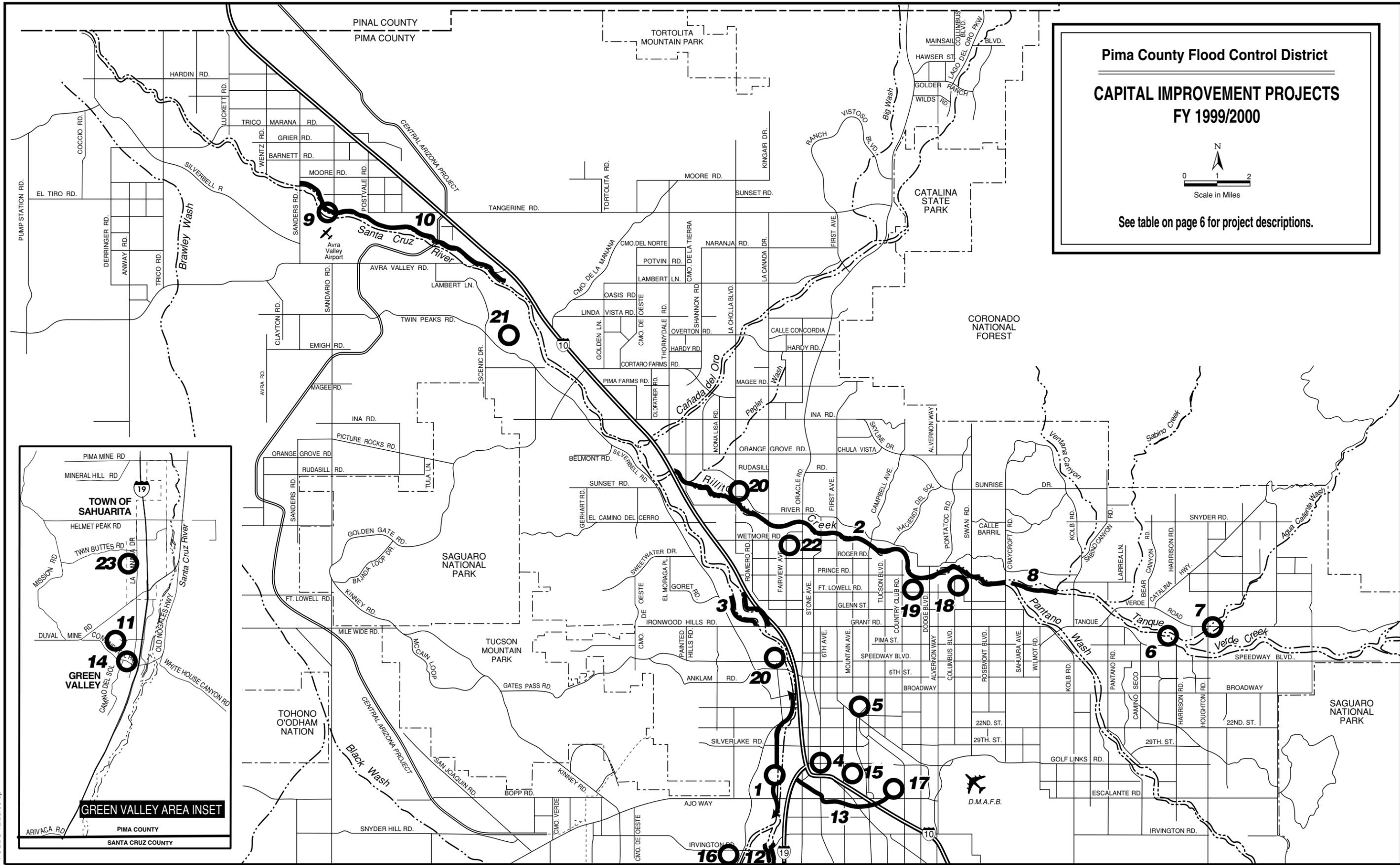
** Unaudited

CAPITAL IMPROVEMENTS PROJECT EXPENDITURES
Fiscal Year Ending June 30, 2000

PROJECT	PLANNING	DESIGN	ROW ACQUISITION	CONSTRUCTION COST	OTHER	PROJECT TOTAL
1 Santa Cruz River Study (COE)	\$2,906	\$74,418	\$0	\$0	\$7,846	\$85,170
2 Rillito Creek Bank Stabilization (River Park)	\$85,508	\$27,966	\$4,492	\$639,261	\$27,643	\$784,870
3 Santa Cruz River Bank Stabilization, Grant Rd. to Fort Lowell Rd.	\$347	\$25,488	\$0	\$0	\$32	\$25,867
4 City of South Tucson	\$282	\$0	\$0	\$140,000	\$0	\$140,282
5 Arroyo Chico Detention Basin	\$47,851	\$209,177	\$547,202	\$0	\$24,060	\$828,290
6 Tanque Verde Creek at Castle Rock	\$1,766	\$194	\$0	\$0	\$0	\$1,960
7 Agua Caliente/Tanque Verde Bridge	\$9,533	\$68,868	\$132,277	\$1,503	\$5,642	\$217,823
8 Tanque Verde Creek, Craycroft Rd. to Sabino Canyon Rd.	\$1,142	\$53,431	\$90	\$0	\$5,220	\$59,883
9 Northwest Replenishment Project	\$459	\$226,005	\$2,939	\$419,963	\$2,336	\$651,702
10 Lower Santa Cruz Flood Control Levee	\$22,663	\$7,728	\$4,055	\$10,327,168	\$14,323	\$10,375,937
11 Green Valley Drainageway #9	\$6,956	\$46,639	\$16,776	\$0	\$7,018	\$77,389
12 Santa Cruz River, Valencia to Irvington	\$0	\$18,389	\$0	\$0	\$0	\$18,389
13 Tucson Diversion Channel	\$2	\$41,021	\$41,226	\$0	\$3,612	\$85,861
14 Continental Vista Erosion Protection	\$2,833	\$52,365	\$0	\$0	\$5	\$55,203
15 Mission View Wash	\$6,988	\$29,889	\$0	\$0	\$132	\$37,009
16 Holladay/Forrest Drainage	\$0	\$3,682	\$0	\$0	\$0	\$3,682
17 Ajo Detention Basin–Wetlands	\$0	\$36,128	\$0	\$0	\$6,369	\$42,497
18 Rillito Creek/Swan Wetlands	\$0	\$6,176	\$0	\$0	\$0	\$6,176
19 Rillito Creek Environmental Restoration	\$0	\$23,170	\$0	\$0	\$493	\$23,663
20 Rillito Creek Linear Park at Casas Adobes Wash	\$0	\$8,195	\$1,847	\$0	\$0	\$10,042
21 Cortaro Mesquite Bosque	\$1,508	\$13,540	\$0	\$0	\$1,019	\$16,067

CAPITAL IMPROVEMENTS PROJECT EXPENDITURES (Con't)
Fiscal Year Ending June 30, 2000

PROJECT	PLANNING	DESIGN	ROW ACQUISITION	CONSTRUCTION COST	OTHER	PROJECT TOTAL
22 Fairview Limberlost Drainage Improvements	\$0	\$56,006	\$0	\$0	\$287	\$56,293
23 Sahuarita Drainage Improvements	\$0	\$185	\$0	\$0	\$0	\$185
24 City of Tucson Drainage Improvements	\$0	\$269	\$1,397	\$0	\$989	\$2,655
Floodprone Land Acquisition	\$17,407	\$0	\$204,721	\$0	\$7,284	\$229,412
TOTAL	\$208,151	\$1,028,929	\$957,022	\$11,527,895	\$114,310	\$13,836,307



Pima County Flood Control District
CAPITAL IMPROVEMENT PROJECTS
FY 1999/2000

N
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 Scale in Miles

See table on page 6 for project descriptions.

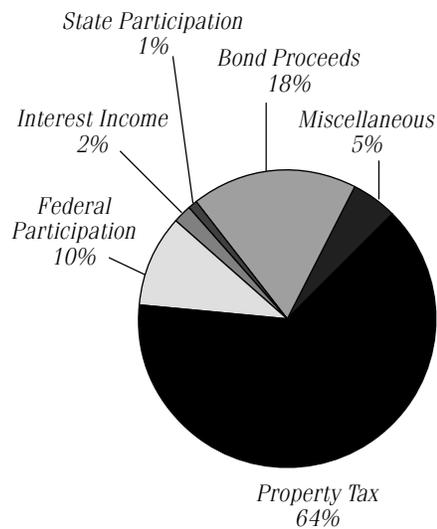
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FINANCIAL HIGHLIGHTS FOR FISCAL YEAR 1999/2000

Fund Balances

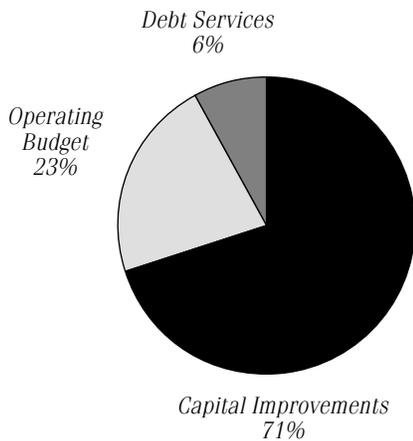
Beginning Fund Balance as of 7-1-99	\$ 5,927,400
Total Revenues	16,144,600
Total Expenditures	(19,509,600)
<hr/>	
Ending Fund Balance as of 6-30-2000	\$ 2,562,400

Revenues



Property Tax, Flood Control District	\$10,273,200	64%
Federal Participation	1,647,600	10%
Interest Income	316,200	2%
State Participation	17,200	1%
Bond Proceeds	2,954,000	18%
Miscellaneous	936,300	5%
<hr/>		
Total Revenue	\$16,144,500	100%

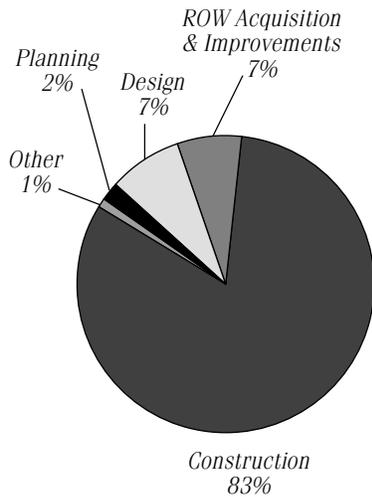
Expenditures



Capital Improvements	\$ 13,836,300	71%
Operating Budget	4,444,000	23%
Debt Services	1,229,300	6%
<hr/>		
Total Expenditures	\$19,509,600	100%

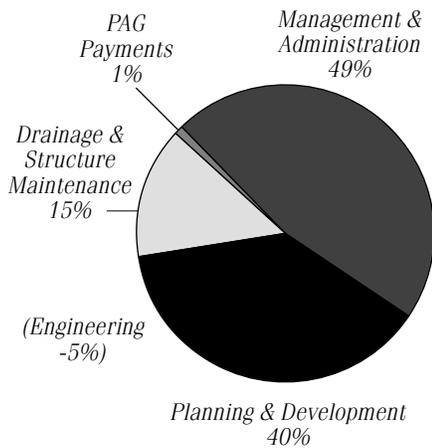
Breakdown of Expenditures

Capital Improvements



Planning	\$ 208,200	2%
Design	1,028,900	7%
ROW Acquisition & Improvements	957,000	7%
Construction	11,527,900	83%
Other	114,300	1%
Total Capital Improvements	\$13,836,300	100%

Operating Budget



Planning & Development	\$1,800,000	40%
Drainage & Structure Maintenance	650,000	15%
Engineering	(200,000)	-5%
PAG Payments	35,000	1%
Management & Administration	2,159,000	49%
Total Operating Expenses	\$4,444,000	100%

Debt Services

Annual Payment	\$ 1,229,300	100%
Total Expenditures	\$19,509,600	100%

OVERVIEW OF THE DISTRICT

Establishment of the District

To comply with federal law, the State of Arizona passed the Floodplain Management Act of 1973. This act authorized Arizona counties to adopt rules and regulations concerning management of floodplain areas. The Arizona state legislature subsequently authorized flood control districts to levy taxes on real property to finance district operating expenses. The Pima County Board of Supervisors, which sits as the Pima County Flood Control District Board of Directors (Board), organized the Pima County Flood Control District on June 5, 1978. The District first became operational on July 1, 1978.

Provisions of state legislation also allow incorporated cities and towns within the county to undertake their own floodplain management duties and regulatory functions. In Pima County, the incorporated areas of the City of Tucson, the Town of Oro Valley and the Town of Marana have elected to assume floodplain management duties in their respective jurisdictions. The District is responsible for floodplain management activities for the remainder of unincorporated Pima County (with the exception of national forests, parks, monuments, and Indian Nations) and for the City of South Tucson and the Town of Sahuarita.

Vision

The District will continue to be a leader in providing quality flood protection and floodplain management services within Pima County.

Mission

Pima County Flood Control District is a regional agency whose mission is to protect the health, safety, and welfare of Pima County residents by providing comprehensive flood protection programs and floodplain management services. These services emphasize fiscal responsibility, protection of natural resources, and a balanced multi-objective approach to managing regional watercourses, floodplains, and stormwater resources.

Value Statement

The District is committed to the fair treatment of the general public and our employees, an open decision-making process, fostering the opportunity for employee contributions, improved quality of work through working in partnership, and consideration of environmental values along with economic benefits in our programs.

Goals and Objectives

The goals and objectives of the District represent both flood control and resource protection views and vary from traditional flood control approaches because of a multi-benefit public philosophy. The District recognizes that it is necessary and desirable to maintain a balanced relationship between human communities and the land and resources that sustain them. To that end, the following twelve specific policy goals and objectives have been adopted by the Board as part of the District's Floodplain and Erosion Hazard Management Ordinance:

- To minimize flood and erosion damages
- To meet or exceed state and federal requirements relating to floodplain management – thereby enabling Pima County residents to purchase low-cost flood insurance, to receive disaster relief, should the need arise, and to seek residential and commercial real estate loans
- To establish minimum flood protection elevations and damage protection requirements for structures and other types of development, which may be vulnerable to flood and erosion damage
- To regulate encroachment and building development within areas subject to flooding or erosion, and to ensure that the flood-carrying capacity within the altered and/or relocated portion of any watercourse is maintained
- To encourage the most effective expenditures of public money for flood control projects
- To protect, preserve, and enhance groundwater recharge
- To minimize the need for rescue and relief efforts associated with flooding and erosion, usually undertaken at the expense of the general public
- To minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, and streets located in regulatory floodplain and erosion hazard areas
- To help maintain a stable tax base by providing for the protection of regulatory floodplain and erosion hazard areas
- To inform the public when property is in a regulatory floodplain or erosion hazard area
- To ensure that those who occupy the areas within a regulatory floodplain and erosion hazard area assume responsibility for their actions
- To encourage the preservation of natural washes and enhance the riverine environment

District Organization

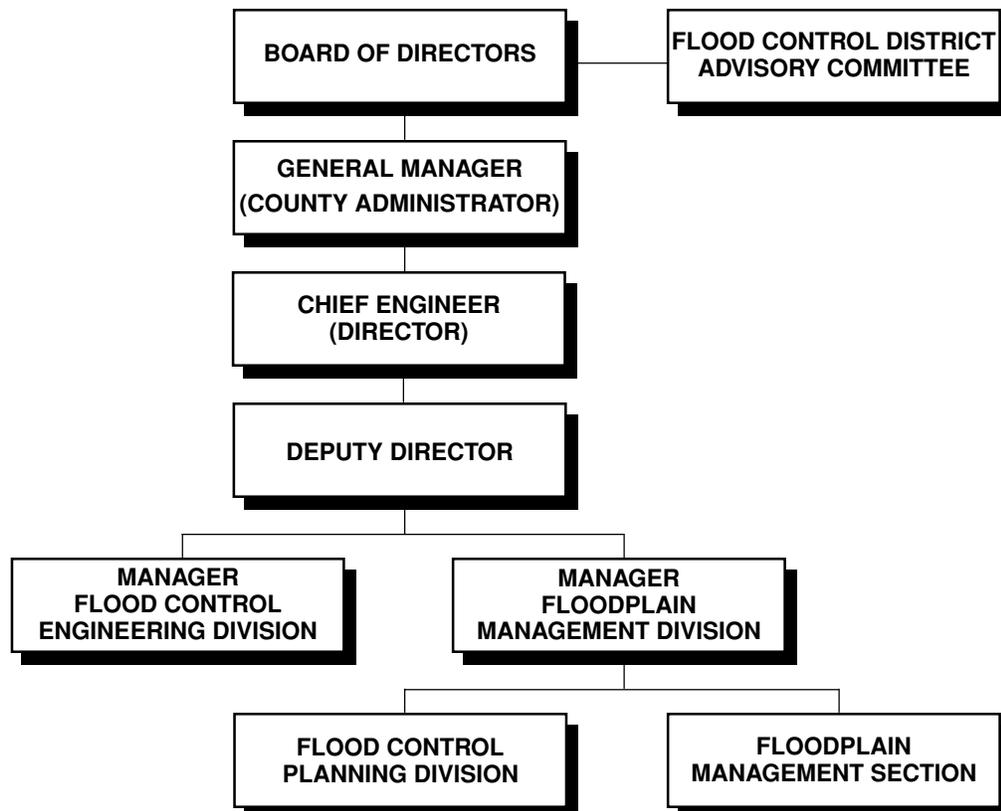
The District is organized into two main divisions based on the major functions of each group: 1) the Floodplain Management Division; and 2) the Flood Control Engineering Division. The District receives substantial support from other divisions within the Pima County Department of Transportation and Flood Control District (PCDOT/FCD). These include Administrative Support Services, Maintenance Operations, Field Engineering, Real Property, and Technical Services. Further assistance is received from other county departments, including Development Services, Department of Environmental Quality and the Pima County Attorney's Office. The District pays for services rendered by PCDOT and other departments through interdepartmental fund transfers from the District to Pima County.

Although District employees are part of the Pima County Department of Transportation and Flood Control District, their positions are funded entirely from District

revenues. The District funded 43 full-time equivalent (FTE) staff positions in FY 1999/2000.

As noted, the Pima County Board of Supervisors, sitting as the Flood Control District Board of Directors, governs the Flood Control District. The Board also hears requests for variances and appeals to the Floodplain and Erosion Hazard Management Ordinance (FPMO). In 1988, the Board formed the Flood Control District Advisory Committee (FCDAC) to advise on flood-related matters and to increase public participation in the decision-making process. The 12-member FCDAC includes five members appointed by the Board (one for each Board member), three representatives from the City of Tucson, and one representative each from the City of South Tucson, the towns of Marana, Oro Valley and Sahuarita. One position, in an ex-officio capacity, is available for appointment by the Tohono O'odham Nation.

District Organizational Chart



FLOODPLAIN MANAGEMENT DIVISION

Work of the Floodplain Management Division generally falls into two main areas of responsibility corresponding to its two sections: the Floodplain Management Section and the Flood Control Planning Section. Major activities for these two sections are highlighted below.

Floodplain Management Section

The main responsibility of the Floodplain Management Section is to enforce provisions of the Pima County Floodplain and Erosion Hazard Management Ordinance (FPMO). This ordinance, prepared in accordance with the National Flood Insurance Program, includes regulations and requirements designed to minimize flood damage and losses throughout the community. This important goal is accomplished largely through review and issuance of Floodplain Use Permits and the dissemination of floodplain-related information through the District's public service counter. Section staff also respond to drainage and flood-related complaints and prepare updates and revisions to the FEMA Flood Insurance Rate Maps (FIRMs). Public education and awareness programs are also an important part of this program. Section accomplishments during FY 1999/2000 are highlighted below.

Floodplain Use Permits

Virtually every development or other improvement made in floodplains or erosion hazard areas requires issuance of a Floodplain Use Permit by the District prior to beginning construction. The permit process is designed to ensure compliance with the District's FPMO and allow for development in floodprone areas in as safe a manner as possible. In FY 1999/2000, the District received 696 permit applications and issued 521 Floodplain Use Permits. Information on these and other floodplain management activities is summarized in the table on the following page.

Site Reviews and Floodplain Status Requests

Floodplain Management staff is involved in a variety of activities that assist new home buyers and land purchasers in understanding the hydrologic conditions that affect their property. Staff provides detailed site reviews to identify potential flood hazards and any floodplain restrictions that may be associated with the parcels. In FY 1999/2000, District staff completed 97 detailed site reviews and responded to 8,073 requests for the floodplain status of individual properties. The floodplain status of each parcel, as indicated on the FEMA FIRMs, is provided to each requestor.

Drainage Complaints, Violations and Maintenance Requests

Drainage complaints, which may involve floodplain use violations, are thoroughly investigated by the District. Investigation of drainage complaints allows the District to identify potential problems that may warrant further attention or possible mitigation. If it is determined that

a violation has occurred, the property owner is notified and corrective actions are requested. Staff also evaluates conditions on drainageways that are either owned or maintained by Pima County. The District coordinates with DOT's Maintenance Operations Division to ensure that any needed maintenance, such as clearing of debris or excessive vegetation in a channel, is performed. During this past fiscal year, 551 drainage complaints were processed.

Flood Insurance Studies and FIRM Revisions

The District works in conjunction with FEMA under the Flood Insurance Study Program (FIS) to identify floodprone areas and set insurance rates in flood hazard areas within the county. A key work product of this effort is a set of official maps called Flood Insurance Rate Maps. These maps show flood hazard zones and other relevant hydrological information. Federal, state, and local floodplain management regulations apply to development and other activities that take place in designated flood hazard zones.

FIRMs have been prepared for most of the major watercourses and many of the smaller watercourses within Pima County. These maps are updated periodically when structural improvements are implemented or when floodplain characteristics are altered due to modifications to channel geometry, etc. The Floodplain Management Division is the local map repository for the FIRMs.

During FY 1999/2000, the District performed studies and assisted several property owners that resulted in map revisions or corrections to the FIRMs issued by

Floodplain Use Permit (FPUP) Activities

	FY 96/97	FY 97/98	FY 98/99	FY 99/2000
FPUP Applications Received	724	836	794	696
FPUP's Issued	528	609	603	521
Drainage Complaints Received	605	559	498	551
Floodplain Status Letters Written	6,778	8,240	8,905	8,073
Counter Service	5,113	5,436	5,885	5,790
Central Permit Reviews	11,204	11,989	14,135	14,831
Site Reviews	178	132	142	97

the FEMA. The work performed by District staff resulted in:

- Twelve Letters of Map Amendments (LOMAs) were issued which resulted in the removal of 74 residences for the floodplain.
- Revised two miles of the Camino de Oeste Wash floodplain.
- Revised the Julian Wash floodplain for 7.5 miles which corrected errors within FIRMs and removed over 400 parcels from the floodplain.
- Coordinated with local engineers on individual LOMRs on the following watercourses: Black Wash, 152 parcels removed from the floodplain; Santa Cruz River at Ina Road, corrected the floodplain limits for one mile; Santa Cruz River in Green Valley, corrected the floodplain limits for two miles; Valencia Wash; La Cholla Wash.

Community Rating System Program

For the past nine years, the District has participated in FEMA's Community Rating System (CRS), a program that recognizes and rewards floodplain management activities undertaken by local jurisdictions.

The program emphasizes floodplain management activities that serve to:

- Reduce flood damages to existing buildings
- Manage development in hazard areas not mapped by the National Flood Insurance Program (NFIP)
- Institute a greater level of flood protection than the minimum required by NFIP
- Facilitate residents and other agencies in obtaining information about area flooding conditions and flood insurance

The District's involvement in the CRS program has resulted in a 15 percent reduction in insurance premiums that county residents pay every year. In FY 1999/2000, District-sponsored CRS activities saved property owners in unincorporated portions of Pima County a total of \$127,863. Pima County ranks in the top nine percent of 907 communities across the country that are involved in this program.

Flood Control Planning Section

This section is involved with medium and long-term planning activities that help decrease flood and erosion damages in the community. Some of the major activities of the section include conducting river and basin management studies, operating the District's flood warning system, researching and acquiring floodprone land, groundwater recharge and replenishment programs, riparian habitat protection, habitat enhancement efforts and preparation of the District's Capital Improvement Program. Other special projects are undertaken as resources allow. Major activities during FY 1999/2000 include the following:

Floodprone Land Acquisition Program

The Floodprone Land Acquisition Program (FLAP) began in 1984, funded by bond monies authorized by Pima County voters and by an annual allocation from the District's tax levy. FLAP is an effective nonstructural floodplain management tool that yields a number of community benefits. Some of these include removing residences and structures from vulnerable areas, preserving natural floodplain characteristics (and attenuation of downstream flood peaks), providing recreational opportunities, maintaining open space, and protecting groundwater quality and riparian habitat resources. The District administers FLAP solely on a voluntary basis without utilizing its land condemnation authority. Floodprone parcels have been acquired along the Tanque Verde, Rillito, Cienega, and Agua Verde Creeks, the Canada del Oro, Pantano, Pegler and Black Washes, and along the Santa Cruz River. During FY 1999/2000, the District purchased seven parcels of land totaling approximately 66 acres at a cost of \$229,412.

Pima County Flood Warning Program

The Flood Warning Program encompasses the District's Automated Local Evaluation in Real Time Warning System (ALERT), along with the District's Flood Response Plan and Flood Hazard Mitigation efforts.

The ALERT System consists of approximately 65 automatic self-reporting precipitation gauges, 24 stream gauges, 4 weather stations, and 4 radio repeater stations. The system automatically transmits hydrometeorological data via radio telemetry to the District's base station and to the Tucson office of the National Weather Service (NWS). During storm events, District staff evaluate incoming data to monitor changing flood conditions. The NWS also uses the information when issuing flash flood warnings and advisories. Finally, Pima County Department of Transportation, Maintenance Operations Division relies on District ALERT data to determine storm-related road closures. Over the past year, there

were several significant storm events that prompted issuance of NWS advisories, road closures and intensive ALERT system monitoring by District staff.



ALERT gauge maintenance.

Flood Preparedness Activities

Over the past fiscal year, District staff continued its work with the U.S. Army Corps of Engineers, Arizona Department of Water Resources and other state and local agencies in developing a state-wide flood warning system. Plans for the system include installation of additional rainfall and stream gauges in the District's ALERT network and enhanced communication links, both in Pima County and state-wide.

Staff also undertook a project with the Tucson-Pima County Office of Emergency Management to design a flood exercise for emergency response agencies. This effort—in conjunction with other elements of the District's Flood Warning Program—resulted in improved flood emergency preparedness for the community and allows credits to be applied toward the District's rating in the National Community Rating System (CRS) Program. CRS activities by the District have produced sig-

nificant reductions in flood insurance premiums paid by Pima County property owners.

Public Awareness, Education and Outreach

District staff has developed a variety of brochures, presentations and displays that help educate the public and raise awareness of flood hazards within Pima County. Numerous free publications on flood and erosion hazards, floodplain regulations and information on how to safely develop property in floodprone areas are



Traveling flood safety display in action.

available in the lobby area of the District offices. This past year, District staff researched and prepared a new brochure on how residents can incorporate water harvesting concepts on their property.

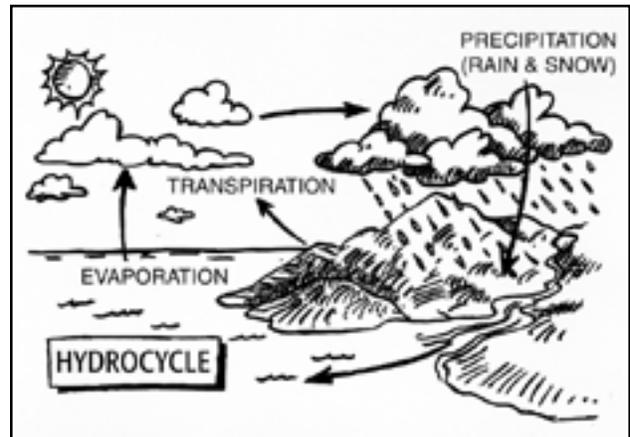
A series of exhibits documenting historical flood events and highlighting flood safety information are on display in the customer service counter area of the Floodplain Management Division offices.

This same display, along with video presentations, computer demonstrations and other flood-related exhibits

Flood Control display at the Pima County Fair.



is featured every year at the District's information booth during the ten-day Pima County Fair. The exhibit features over 70 feet of colorful, informative displays and includes a hands-on computer demonstration showcasing the District's World Wide Web site. Free brochures, fliers, and other information on flooding hazards within Pima County is provided to fair goers, along with information on a variety of flood-related topics.



Earthday for Kids begins with the basics.

This past year, District staff participated in the annual Students Against Drunk Driving Conference and Earth Day for Kids. Flood awareness, flood preparedness, and safety are major themes of these presentations. Groundwater recharge information, water quality and watershed protection topics are covered. The District continued its annual contract with local meteorologist Dr. Richard Wood, to provide presentations at area elementary schools. Since its inception in 1992, the program has introduced thousands of students and their parents to flooding and erosion issues, and provided information on various flood safety topics.

A recent addition to its public outreach and education program, the District worked with local television stations during last year's summer monsoon season to air three 30-second public service announcements (PSAs) dealing with flash flooding. Prepared by the National Weather Service, Office of Hydrology, the PSAs were made available to eight television stations in the Tucson area.

Basin and River Management Studies

Sahuarita Basin Management Plan – At the time of its incorporation in 1995, the Town of Sahuarita chose to have the Pima County Flood Control District retain responsibility for the Town's floodplain management. In order to define floodplain management guidelines for the rapidly expanding Town, the District has prepared a Basin Management Plan that quantifies the area's hydrology and identifies strategies for mitigating potential flood hazards within the community. Phase I of the study was completed in December 1999.

Cañada del Oro Flood Hazard Analysis – Staff has begun an analysis of the reach between Catalina State Park and the Pima County line to determine the impacts of nonregulatory flood flows. Results of the study will be correlated with real-time stream flow data, generated by the ALERT system, to provide information for emergency response coordinators during flooding.

Flood Control District Advisory Committee

During FY 1999/2000 the Advisory Committee studied and made recommendations on major policy issues related to the District's operation and various flood control needs within the community. One of the main tasks initiated by the committee was to begin the process of evaluating the District's core flood control programs, and specifically how the District might prioritize various activities and identify future funding needs to accomplish its mission.

Other work of the committee included review and recommendations concerning various structural flood control projects, and further refinement of developing a draft Capital Improvement Project rating system. The committee also dealt with a series of environmental issues including the county's Sonoran Desert Conservation Plan, Pygmy Owl habitat policies, and ACOE-sponsored restoration projects. The committee continues to play a key role in helping shape the direction of the District.

Riparian Habitat Ordinance

During FY 1999/2000, 16 Hydro/Mesoriparian mitigation plans were approved by the Board of Supervisors. Two xeroriparian mitigation plans were approved by District staff. The ordinance as currently written is accomplishing the goals set by the Board of Supervisors and community at the time of adoption by encouraging avoidance of habitat.

Photographic and Topographic Mapping

The Flood Control Planning Section is presently involved with three contracts for aerial photography and topographic mapping. The largest contract is in partnership with the Pima Association of Governments (PAG) and encompasses the acquisition of over 625 square miles of digital orthophotography and topographic mapping. It is the second phase of a four-phase cooperative mapping effort which will eventually cover most of eastern Pima County.

The section is also now receiving 1" = 1000' stereo aerial photography of eastern Pima County as part of a project mainly intended for the use of the Floodplain Management Section and the Development Services Division. This project is providing a much needed update to the last stereo coverage at this photo scale (1994) and is showing the dramatic population growth of the metropolitan Tucson area.

Six square miles of the rapidly growing community of Catalina, Arizona, have been mapped at the request of the Floodplain Management Section. This topographic mapping is now being digitized by the Technical Services Division and will soon be available as an overlay to the orthophotographic mapping already available on the Pima County "MapGuide" Web site.

Northwest Replenishment Program/Lower Santa Cruz Replenishment Project

The Lower Santa Cruz Replenishment Project is a joint effort between the Pima County Flood Control District, the Central Arizona Water Conservation District (CAWCD) and the Town of Marana. The project consists of three groundwater recharge basins, located south of the main channel of the Santa Cruz River, that will be used to recharge Central Arizona Project water. Due to their proximity, earthen materials excavated to construct the basins have been put to use in constructing the

Lower Santa Cruz River Levee Project. The levee will extend approximately 7.3 miles along the northeast bank of the Santa Cruz River from just south of Avra Valley Road to Sanders Road. Construction of the basins was completed in May 2000 and CAWCD began recharging



Northwest replenishment basin under construction.

CAP water in June 2000. CAWCD will operate and maintain the recharge facility.

Northwest Replenishment Program/Marana High Plains Effluent Recharge Project

The Marana High Plains Effluent Recharge project is a two-year pilot project to investigate the feasibility of using treated effluent to enhance riparian habitat while recharging the groundwater aquifer. The project will draw treated effluent from the Santa Cruz River, approximately ten miles downstream from two wastewater treatment plants, and recharge it in a series of constructed basins. The pilot project will evaluate issues such as the rate of recharge, groundwater quality effects, enhancing the value of riparian habitat and vector control concerns.

Located near Sanders Road and the Santa Cruz River, the project is currently in the permitting and design stage, with construction anticipated in spring of 2001. The project is funded by the Pima County Flood Control District, the Town of Marana, Arizona Water Protection Fund and the U.S. Bureau of Reclamation.

Grant Programs

This past fiscal year, the District applied for and received grants from various agencies for two multi-objective projects located within the county. The grants included:

Partners for Wildlife Grant – In FY 97/98, the U.S. Fish and Wildlife Service (USFWS) and the Arizona Game and Fish Department (AGFD) granted \$20,000 to revegetate abandoned agricultural fields in the Cienega Creek Natural Preserve. The purpose of this effort was twofold: 1) to help reduce erosion; and 2) to enhance wildlife habitat. The revegetation work was completed in November 1997. Efforts this past year focused on site maintenance activities and monitoring newly revegetated areas.

Arizona Water Protection Fund – The District, in partnership with The Nature Conservancy and other volunteers, continued work on restoring riparian vegetation at the Bingham Cienega Natural Preserve located adjacent to the San Pedro River. Funds from a three-year award of \$84,679 from the Arizona Water Protection



Volunteers plant sacaton grass on retired farm parcel.

Funds were used this year to plant Sacaton grass and riparian trees on retired farmland, restoring historical habitat and preserving a rare spring-fed wetland.

The District was awarded a grant to restore 80 acres of riparian habitat on the 100-year floodplain terrace of the lower Santa Cruz River. The 3-year project, Cortaro Mesquite Bosque, is located adjacent to the Continental Ranch residential community within the Town of Marana. It will include restoration of approximately 73 acres of mesquite bosque and 7 acres of subsurface marsh. The Arizona Water Protection fund is providing \$486,650.

Sonoran Desert Conservation Plan

The Sonoran Desert Conservation Plan (SDCP) is a large scale initiative that seeks to address conservation of both cultural and natural resources in eastern Pima County. The plan contains six major elements: 1) ranch conservation; 2) historic and cultural preservation; 3) riparian restoration; 4) mountain parks; 5) conservation of habitat, biological resources and ecological corridors; and 6) critical and sensitive habitat preservation. Since December 1998, District staff has been closely involved with the riparian restoration element of the plan and has supported the work of the Science and Technical Advisory Team (STAT) and biological consultants hired to work on the SDCP. Collaboration between these entities has resulted in the following reports and mapping endeavors:

SDCP report, July 1999 through June 2000

- Sonoran Desert Conservation Plan Update (Focus on Riparian Areas)
- Water Resources Report
- Science and GIS Update (includes revised reports titled, *Determining Vulnerable Species within Pima County, Arizona* and *GIS Coverage of Perennial and Intermittent Streams and Shallow Groundwater*)
- Environmental Restoration in Pima County
- Land Stewardship in Pima County
- Cocio Wash and the Gila Topminnow

- An Overview of Pima County's Watersheds and Watercourses
- Prioritization of Streams for Conservation in Pima County
- Springs in Pima County
- Aquatic Vertebrate Conservation in Pima County
- Riparian Protection, Management and Restoration

Mapping endeavors, July 1999 through June 2000

- Vegetation and land cover mapping from various watercourses and preserves (Cienega Creek Natural Preserve, Organ Pipe Cactus National Monument, WHIPS Study - Tucson Area, Santa Cruz River, etc.)
- Distribution of rare species determined by the Arizona Game and Fish Department's Heritage Data Management System (HDMS)
- Climate data
- Perennial Streams, Intermittent Streams and Shallow Groundwater Areas
- Oversight of a pilot study to map riparian vegetation for three areas within Eastern Pima County
- Mapping of leopard frog distributions in Pima County
- Roadless area analysis
- Water structures in Pima County (bridges, dams, etc.)
- Barriers to wildlife movement
- Areas of distributary flow
- Springs in Pima County

Further details about the SDCP project, including the draft preliminary SDCP riparian habitat restoration activities, STAT meeting minutes, and other information is available from the SDCP Web site at www.co.pima.az.us/cmo/sdrp/index.html.

Flood Control Engineering Division

The Flood Control Engineering Division oversees design and construction of flood control and drainage improvement projects within Pima County. Projects are completed by in-house staff or through outside consultants, with staff administering the contracts. Major projects in FY 1999/2000 are outlined below.

Bank Stabilization Projects

The District constructs bank stabilization along major watercourses within the county where flood and erosion hazards threatened public or private development and infrastructure. Bank stabilization designs are tailored to meet the needs of each specific project. Bank stabilization projects along major watercourses typically employ soil cement, which is a mixture of cement and local soil materials. Soil cement is a cost-effective flood and erosion control solution that has many of the strength characteristics of concrete. It also retains much of the appearance and textural quality of a natural riverbank. Bank stabilization projects undertaken in FY 1999/2000 include:

Tanque Verde Creek at Castle Rock – The Flood Control District developed plans to place approximately 2,000 linear feet of gabion mattress bank protection along Tanque Verde Creek near Lakes of Castle Rock subdivision and the Fountain Hill subdivision. The project is awaiting final permits, and construction is expected to begin in March 2001.

Green Valley Drainageway #9 – Funded through the May 1997 bond issuance, the District is currently designing improvements that will reduce flood and erosion hazards along this drainageway. The project features additional cells for the box culverts at Camino Portillo and Camino Holgado, as well as various types of bank protection based on adjacent improvements. Construction is anticipated to begin in the March 2001.

Tanque Verde Creek, Sabino Canyon to Craycroft – The District has started work with Pima County Wastewater Management and the ACOE to design and construct soil cement bank protection along portions of Tanque Verde Creek. Phase I of the project will protect the sanitary sewer facilities constructed by Pima County Wastewater Management along the south bank near Tucson Country Club. Phase 2 will involve bank protection extending along the south bank to the confluence of Pantano Wash and improvements on the north bank adjacent to Craycroft Road Bridge. The project also includes preservation of riparian habitat along the north bank.

Continental Vista Erosion Protection – The District began design of improvements that will reduce the flooding and erosion hazards in several areas for the three major washes that cross Green Valley's Continental Vista Subdivision. These improvements, funded through the May 1997 bond, will protect residents in this subdivision from flooding and erosion hazards.

Levee Projects

When bank stabilization is constrained due to inadequate channel size, shape, or alignment, levees can be constructed to minimize flood and erosion hazards.



Soil-cement being placed on Lower Santa Cruz River levee.

Lower Santa Cruz River Levee – During the October 1983 event, extensive flooding resulted in three fatalities and catastrophic damages to residences, businesses, agricultural fields, transportation facilities, and other public infrastructures within northern Pima County and Marana. The same area also sustained damage during the 1990 and 1993 flood events.

In seeking to resolve flood and erosion hazards in this area, in March 1999 the District began construction of a 7.3-mile long earthen levee armored with soil cement. Designed to provide protection from a 100-year flood event, the levee project is scheduled to be completed by August 2000.

Avra Valley Road Extension – During the 1983 flood, residences located south of Avra Valley Road between

Quarry Road and Wasson Road were inundated, making Avra Valley Road impassable from this area to the Santa Cruz River bridge. To resolve this problem, the Pima County Department of Transportation replaced the bridge with a new structure that will accommodate a 100-year flood event. In conjunction with the bridge improvement, the District began work to elevate Avra Valley Road adjacent to the bridge so that the roadway will also be passable during a 100-year event on the Santa Cruz River. As a result of this work, residents located south of Avra Valley Road will be removed from 100-year floodplain designation stemming from the Santa Cruz River. Construction was completed in September 1999.

Detention Basins

Another structural flood control strategy used by the District is construction of detention basins. Detention basins allow for the temporary storage and metered release of flood waters. Control of flows exiting a detention basin during a storm event significantly decreases downstream flood peaks and, in turn, minimizes the potential for downstream inundation. Detention basin projects currently underway include:

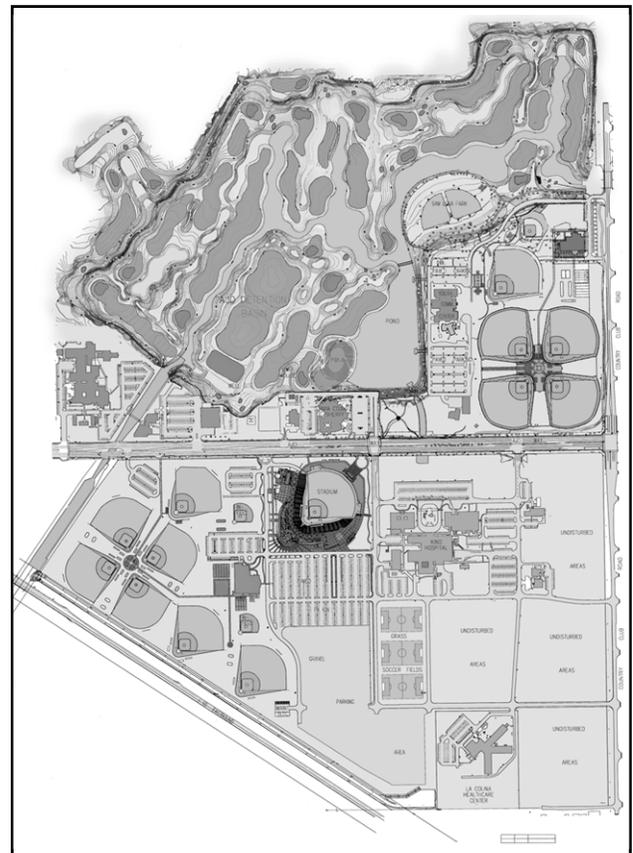
Arroyo Chico/Tucson Arroyo Project – Working in conjunction with the City of Tucson and the ACOE, the District continued planning work on a series of detention basins located near Park Avenue and Arroyo Chico. Phase 1 of this \$27.5 million project involved the planning and construction of the Randolph South Detention Basin, which was completed in March 1996. Phase II of this project will entail a series of linked detention basins and other improvements near Park Avenue/Arroyo Chico. The project also calls for the replacement of existing sections of storm drains near the High School Wash and the Tucson Arroyo confluence.

Ajo Detention Basin – The Ajo Detention Basin was constructed by the ACOE in the early 1960s to address a number of urban flooding problems. Using Federal Environmental Restoration funds, the Flood Control District, Pima County Wastewater Management and the ACOE will reconstruct the basin to incorporate wetlands, groundwater recharge and flood control features. The restoration element of the project will involve 20 acres of wetlands and construction of a seven-acre lake. The lake will support wildlife habitat and supply water for irrigation needs at Kino Sports Park. Construction is expected to begin in September 2000.

Environmental Restoration Projects

In recent years, the District, the ACOE, and others have increasingly emphasized design and construction of multi-objective flood control projects. In this vein, the District and the ACOE have embarked on a number of flood control facilities that also entail environmental restoration, mitigation and recreation components. Major projects include:

Santa Cruz River Park: Paseo de las Iglesias Restoration – Working in cooperation with the City of Tucson and the ACOE, the District has started a feasibility study to evaluate the possibility of restoring the Santa Cruz River in an area from the San Xavier Mission to downtown Tucson. This \$40 million environmental restoration and mitigation project will be partially funded under the Challenge XXI Initiative for Flood Hazard Mitigation and Riverine Ecosystem Restoration. Design is scheduled to begin in fiscal year 2000/2001 with construction expected to begin in fiscal year 2002/2003.



Concept plan for Ajo Detention Basin restoration project.

Rillito Creek Bank Stabilization/River Park – Following completion of the bank stabilization portion of this \$39 million multi-phase effort, the District and the ACOE began construction of the final phase of this project. Sixteen pedestrian bridges and various linear park improvements, extending from the Santa Cruz River to La Cholla Boulevard and from Alvernon Way to Craycroft Road were constructed. This phase of the project was completed in June 2000, providing a continuous river park pathway along Rillito Creek from the Santa Cruz River to Craycroft Road.



A Rillito River Park pedestrian bridge spans a tributary, connecting the pathways, in rain and shine.



A ribbon cutting ceremony celebrates the opening of the Rillito River Park pedestrian bridges.

Rillito Creek Environmental Restoration – Working in cooperation with the ACOE, the District has begun a feasibility study to evaluate the possibility of restoring the Rillito Creek between Country Club Road and Craycroft Road. This \$18 million project will be partially funded

under the Challenge XXI Initiative for Flood Hazard Mitigation and Riverine Ecosystem Restoration. The project will incorporate nonstructural flood control and environmental restoration, such as, water harvesting, mitigation and restoration of riparian habitat, recreational enhancement, and ground water recharge.

Rillito/Swan Wetlands – In conjunction with the ACOE, the District is preparing a feasibility study to determine the costs and benefits of developing wetlands and enhancing riparian habitat along Rillito Creek. This project will be partially funded by the Corps' Section 1135, Ecosystem Restoration Program.

Other Projects

Santa Cruz River Watershed Study – The Flood Control Engineering Division is participating with the ACOE, the City of Tucson, and Pima County Wastewater Management in a \$2.4 million Santa Cruz River Basin Study. The study area includes the entire main stem of the Santa Cruz River within Pima County. The intent of the study is to identify flood and erosion hazards, evaluate hydrologic, hydraulic and geologic processes, identify potential development pressures, assess physical and cultural resources or constraints, evaluate flood and erosion control alternatives and establish recommended floodplain management policies.

Rillito/La Cholla River Park (former McClelland property) – The District has started work on designing river park improvements in an area east of La Cholla Boulevard. The project will also include new parking and staging areas. Construction is expected to begin in July 2000.

Fairview Limberlost Drainage Improvements – The District is currently designing a storm drain system that will reduce the flooding of single family residences and manufactured homes west of Fairview Avenue and south of Wetmore Road. Additionally, travel on Fairview and Limberlost will be safer during rainfall events. This project is composed of an 1,100 linear foot extension of a two-cell 4-foot by 8-foot reinforced concrete box storm drain that will carry the 100-year flood to the Rillito Creek. The May 1997 bond will fund this project.

Other Divisions

The District works cooperatively with other divisions within the Department of Transportation and Flood Control District. These divisions make important contributions to the District's overall work product.

Administrative Services Division

The Administration Services Division staff plays a key role in helping prepare and monitor the District's annual budget and its Capital Improvement Program. The division also provides various accounting services, personnel and employee support work, procurement activities and contract administration for goods and services required by the District.

Field Engineering Division

The Field Engineering Division administers construction of all District Capital Improvement Projects to ensure that flood control facilities are constructed in accordance with contract specifications and that they are completed within specified time and budget allocations. Typical activities include field inspection, materials testing and compliance, and resolving any construction-related discrepancies that may arise. The division's Survey Section provides surveying and technical land information to the District for right-of-way determinations, drainageway alignments and flood control improvements.

Maintenance Operations Division

The Maintenance Operations Division staff inspects, maintains and repairs publicly-owned watercourses and related improvements within unincorporated Pima County. The division also maintains major watercourses and certain improvements located within the City of Tucson, and towns of Oro Valley, Marana and Sahuarita.

Maintenance operations include repairing constructed improvements, removing sediment buildup, clearing vegetation and debris, regrading channels and maintaining drainageway access roads. When flooding occurs, staff responds promptly, prioritizes repair and maintenance needs and works diligently to ensure that any damage is repaired as soon as possible.

Real Property Division

The Real Property Division assists the District with an array of real property appraisal, acquisition and inventory management needs. Major activities of the division include helping to negotiate acquisition of parcels under the District's Floodprone Land Acquisition Program, right-of-way dedications and abandonments for capital facilities, and maintaining property inventory records for District-owned parcels.

Technical Services Division

The Technical Services Division provides an array of services for the District. The division's Graphic Design Section provides illustration and graphic design services for numerous printed and electronic publications that the District develops. The GIS Database Services Section maintains various public works information using ArcInfo and AutoCad computer software. This section performs geographic information system analyses and produces maps and supporting data for many District projects. The Engineering Information Management Section houses, catalogues and disseminates engineering information, such as maps and records of street rights-of-way, easements, subdivision plats, construction plans, etc. Finally, the Network Operations Section provides computer technical support to ensure that all hardware and software systems are operational and support the computer needs of the District.

COORDINATION WITH OTHER AGENCIES

Pima County Department of Transportation

The District contracts with Pima County for services from divisions within the Department of Transportation, as follows:

- Field Engineering Division
- Maintenance Operations Division
- Real Property Division
- Technical Services Division
- Administrative Services Division

Other Pima County Departments

The District cooperates with several other Pima County Departments on various projects and exchanges information as needed.

- Development Services Department
- Wastewater Management Department (WWM)
- Department of Environmental Quality
- Parks and Recreation Department
- County Attorney's Office
- Tucson-Pima County Office of Emergency Management
- Health Department

Local Governments

The District has entered into intergovernmental agreements (IGAs) to provide specific flood control or floodplain management services to, or to jointly fund flood control activities with, the following:

- City of Tucson
- City of South Tucson
- Town of Oro Valley
- Town of Marana
- Town of Sahuarita

Pima Association of Governments (PAG)

PAG facilitates coordination among local government agencies, including the District, on environmental matters affecting the community.

State Agencies

The District coordinates activities with the following state agencies:

- Arizona Department of Water Resources (ADWR)
- Arizona Department of Environmental Quality (ADEQ)
- Arizona Game and Fish Department (AGFD)
- Arizona State Land Department

Federal Government

Several federal agencies participate in local flood control projects, as listed below:

- U. S. Army Corps of Engineers (ACOE)
- Federal Emergency Management Agency (FEMA)
- Federal Highway Administration (FHWA)
- U. S. Bureau of Reclamation (USBR)
- U. S. Natural Resources Conservation Service (NRCS)
- National Weather Service (NWS)
- U. S. Geological Survey (USGS)
- U. S. Fish and Wildlife Service (USFWS)

Non Government Organizations

Other non-governmental agencies that the District works with include:

- The Nature Conservancy (TNC)
- Cortaro-Marana Irrigation District (CMID)
- Central Arizona Water Conservation District (CAWCD)
- Metropolitan Domestic Water Improvement District (MDWID)
- University of Arizona (U of A)

Office Locations

Pima County Flood Control District

Public Works Building
201 North Stone Avenue, 4th Floor
Tucson, Arizona 87501-1215

Floodplain Management Division
(520) 740-6350

Flood Control Engineering Division
(520) 740-6371

Pima County Department of Transportation

Public Works Building
201 North Stone Avenue
Tucson, Arizona 85701-1215

Administrative Services Division
(520) 740-6433

Real Property Division
(520) 740-6313

Technical Services Division
(520) 740-6670

Transportation Systems Division
(520) 740-6458

Mission Road Office
1313 South Mission Road
Tucson, Arizona 85713

Field Engineering Division
(520) 740-2635

Operations Division
(520) 740-2639

Pima County Flood Control District



Pima County Board of Supervisors

Mike Boyd • District 1

Dan Eckstrom • District 2

Sharon Bronson • District 3

Raymond J. Carroll • District 4

Raúl M. Grijalva • District 5

