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# **Flood Control District of Maricopa County**



**Annual Report  
1990/91**

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**Published by:**

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**On the Cover**

This oasis, otherwise known as the Superstition Springs Golf Course, is an example of combining recreational uses with flood control structures. The privately developed golf course contains floodwaters as part of the East Maricopa Floodway—a 27-mile earthen channel in the East Valley built in partnership with the U.S. Soil Conservation Service and completed in 1989. For more information on this structure, see page 4.

Photo by Jim Phipps.

# Financial Highlights

Fiscal Year 1990/1991  
Preliminary and Unaudited

	<u>Dollars</u>	<u>Percent</u>
<b>Revenue</b>		
Flood Control Tax	\$45,797,000	91
Rental Income	160,000	—
Interest	2,633,000	5
State Assistance—Local Projects	0	0
County and Local Participation	1,228,000	3
Sale of Excess Land	168,000	—
Miscellaneous	216,000	1
<b>Total Revenue</b>	<u>50,202,000</u>	<u>100</u>
<b>Expenditures</b>		
Administration and Maintenance	15,970,000	27
Flood Control Capital Improvements	42,731,000	73
<b>Total Expenditures</b>	<u>58,701,000</u>	<u>100</u>
<b>Excess (Deficiency) of Revenues over Expenditures</b>	(8,499,000)	
<b>Fund Balance at Beginning of Year</b>	32,056,000	
<b>Fund Balance at End of Year</b>	<u>23,557,000</u>	
<b>Expenditures by Task</b>		
Administration	9,872,000	17
Land Acquisition	12,765,000	22
Relocation of Utilities, Bridges, and Other Facilities	4,893,000	8
Engineering	2,438,000	4
Construction	22,635,000	39
Maintenance	6,098,000	10
<b>Total</b>	<u>\$58,701,000</u>	<u>100</u>

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## **Partnership: A Winning Proposition**

Lewis & Clark. Gilbert & Sullivan. Burns & Allen.

What do these have in common? They're partners. In every successful partnership, each party brings its specialty to the team and together they create something that neither could have done without the other.

That's what the Flood Control District of Maricopa County strives to achieve when it teams up with such players as Phoenix, Mesa, Tempe, Glendale, Peoria, Scottsdale, Maricopa County, the State of Arizona, the U.S. Army Corps of Engineers, the U.S. Soil Conservation Service, and the U.S. Weather Service.

While the dams and channels, basins and storm drains, studies and plans that are the fruit of these partnerships may not be physically impossible without each party, the financial burden on any one party alone would be enough to render such projects infeasible.

But partnership is more than combining funds, or even technical expertise. Each government agency has its own constituency to satisfy, whose needs must be communicated and negotiated. In an effective partnership, enough needs of each party are met to justify the necessary accommodation to the others.

The not-so-silent partners are the citizens, on whose behalf these efforts are made. The day is long past when the government can plunk down a public works project without regard for residents. Citizen involvement is a vital component of any major project. Presentations are made, input is solicited, and ideas are incorporated into the finished project.

This annual report highlights some of the major partnerships in which the District has participated during the 1990/91 fiscal year, whether structural, such as channelization of the Salt River, or conceptual, such as the adoption and distribution of the first volume of our Drainage Design Manual.

Partnership among government agencies is a case of the whole being greater than the sum of its part(ner)s. In one of the nation's 10 largest counties, encompassing the 22nd largest metropolis and a sizeable river system, there can scarcely be such a thing as a unilateral public works program.

The Flood Control District actively seeks to foster the partnership that makes possible a county-wide, comprehensive response to flooding, drainage, and planning for the future.

## Planning & Project Management

The District has many partners throughout the county who help in design, implementation, and funding of needed flood control projects. Whether the partner is a governmental entity or a private citizen, their involvement is always important.

The following pages feature only a few of the District's many completed or in-progress projects—but each project's story illustrates how the District provides optimum flood protection at reduced costs by obtaining partners with shared needs and goals.



← The City of Scottsdale is responsible for maintaining the aesthetic and recreational amenities at the Cactus Basin.

## PVSP: Partnership Proves Profitable

A recently completed detention basin at the end of Scottsdale Municipal Airport is also the end of the road for a regional flood control project that spanned several years and established itself as an outstanding example of interjurisdictional cooperation.

First discussed in 1976, the Paradise Valley-Scottsdale-Phoenix (PVSP) Flood Control Project consists of five detention basins and about 2.5 miles of channels and pipes that drain storm runoff south of the Central Arizona Project to the Indian Bend Wash.

The project originally included the City of Phoenix as one of the main contributors; however, Phoenix withdrew from the partnership in order to construct three of the basins and the interconnecting storm drain piping with its own funding and on its own time schedule. By 1983, those three basins were complete and now double as Sandpiper, Sereno, and Crossed Arrows parks.

The first of the features to be built under the PVSP agreement was the Cactus Basin Outlet in Scottsdale. The outlet routes stormwater through a series of channels and

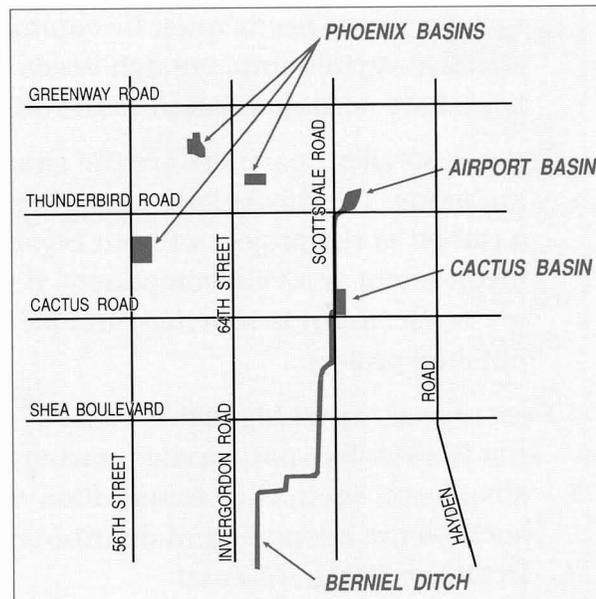
60-inch pipes south along Scottsdale Road/71st Street down to the Berniel Ditch. Berniel Ditch was later improved to accept increased flows and direct stormwater into Indian Bend Wash.

Construction of the 17-acre Cactus Basin and the pipes and channels that would later serve as an outlet for the Scottsdale Airport Basin, was begun in 1984. The City of Scottsdale has since turned Cactus Basin into a park complete with an Olympic size swimming pool, picnic facilities and a recreation building with classrooms and exercise rooms. All of the buildings were constructed on a raised plateau in the middle of the basin in order to avoid flood damage.

The formula used to determine each municipality's cost share was based on four elements: the drainage area, assessed valuation of the property that would be protected by the project, the amount of stormwater runoff generated under existing conditions, and the anticipated amounts of future runoff.

The final cost of the project, including the features installed by the City of Phoenix, was \$4.7 million.

*Paradise Valley-Scottsdale-Phoenix Flood Control Projects*



# Construction begins on East Fork Cave Creek

A joint effort to control storm runoff and reduce flooding is underway after agreements were signed this spring with the City of Phoenix and the Maricopa County Community College District, acting for Paradise Valley Community College.

The East Fork Cave Creek (EFCC) Flood Control Project consists of a series of five basins as well as channel improvements between Union Hills Drive and Beardsley Road. When completed, the EFCC will attenuate peak flows by detaining stormwater in the basins and release runoff from the basins slowly so it can be accommodated by the city's stormdrain system. Completion of the project will also remove property from the floodplain.

The City of Phoenix and the District will share equally the \$15 million cost of four of the basins and the channel improvement. The fifth basin is located on the grounds of Paradise Valley Community College and will be constructed at a cost of \$2 million—to be paid by the District. Because it sits on a community college campus, obtaining land use rights for this basin required lengthy, intricate negotiations.

All five basins and the improved channel will convey stormwater to Phoenix's Greenway Channel via the city's stormdrains. From there, flows are directed to Cave Creek



↑ Installation of a 48-inch pipe will allow stormwater to drain from the basin on the campus of Paradise Valley Community College into the Phoenix stormdrain system.

Wash, which empties into the District's Arizona Canal Diversion Channel (ACDC). The ACDC will then convey the stormwater safely across northcentral Phoenix, Glendale, and Peoria to Skunk Creek Wash.

The EFCC project was one of several alternatives developed as a result of the District's Area Drainage Master Study of the 16 square-mile area from the Central Arizona Project to Greenway Road, and from east of 32nd Street to about 19th Avenue. Extensive public involvement efforts during the study phase confirmed that residents wanted a flood control system that might also double as a recreational amenity.

While the District has no authority to fund recreational facilities, its agreement with Phoenix allows the city to fund amenities—such as jogging, biking, and equestrian trails and picnic areas—in its basins and the channel.

Landscaping plans for the EFCC range from park-like in the Phoenix basins to low-water use or desert foliage in the channel and the College basin.

## Project Highlights

Reach 2C of the Arizona Canal Diversion Channel (from Metrocenter to the confluence with Cave Creek) was completed in May 1991.

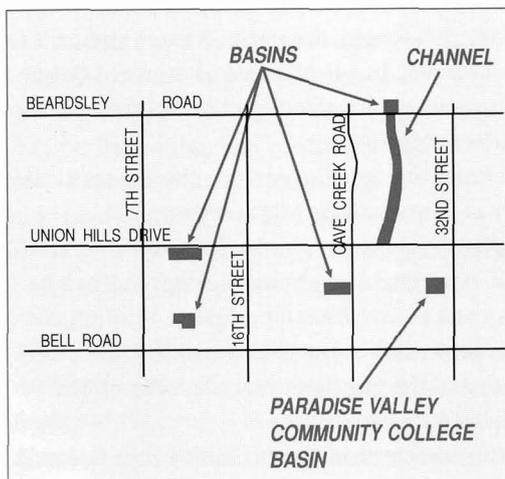
The Cave Creek Sediment Basin north of Cactus Road was completed and an adjacent Phoenix park was dedicated in May 1991.

The 83rd Avenue Bridge was upgraded to handle ACDC stormwater discharge. Final inspection was held in December 1990 and the bridge was accepted by the District and the City of Peoria as 100% complete.

The Salt/Gila Low Flow Channel from Tuthill to Sarival Roads was completed in March 1991.

The Union Hills Storm Drain, which channels stormwater runoff to Skunk Creek and 59th Avenue from the Outer Loop at 51st Avenue, was completed in December 1990. The project was cost-shared by the cities of Phoenix and Glendale.

### East Fork Cave Creek Channel and Basins



## Project Highlights

Construction was completed in September 1990 on the Olive Avenue Storm Drain which channels stormwater runoff to New River. One of the projects identified in the Glendale/Peoria ADMS, this project was cost-shared by Peoria (25%) and Glendale (25%).

Landscaping, aesthetic treatment, and erosion control were completed on the Buckhorn-Mesa structure in January, 1991. The Soil Conservation Service shared costs in this project.

The Board of Directors adopted the *Comprehensive Flood Control Program Report* in May 1991, making the report available for public distribution.

## Cooperation Leads to Landscaping Features for Floodway

The District will soon install landscaping on a section of the East Maricopa Floodway (EMF) to control erosion and reduce dust. The landscaping will also provide an attractive backdrop for recreational uses that the City of Mesa may plan in the future.

In 1989, residents of neighborhoods near the EMF between Brown and Broadway Roads presented to County Supervisor Tom Freestone and Congressman John Rhodes a petition that protested the appearance of and the dust from the project. The petition was signed by more than 880 residents.

Although the Environmental Impact Statement required landscaping for the project, the Soil Conservation Service (SCS)—the federal partner responsible for landscaping—did not have funds available upon completion of the project. Nor would they have funds available for several years.

In response to the petition, the staff approached the Flood Control Advisory Board and the Board of Directors, seeking authority to landscape the area. The Boards approved

the appropriation of funds and a landscaping design contract for the area was awarded in November 1990.

The design, completed in June 1991, includes varieties of Acacia and Palo Verde trees; ground cover such as Sweet Acacia with accents of Ocotillo, Cassia, Bird of Paradise; and seeded grasses and shrubs like Bursage, Creosote, and Fillaree. During the design phase, the District worked hand in hand with the SCS and with a residents committee appointed by the City of Mesa to ensure that the project addressed all of the residents' concerns.

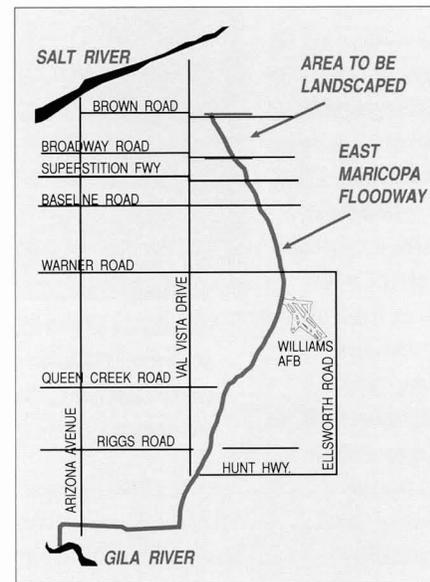
Installation of the landscaping and the erosion and dust control features is expected to be completed by February 1992. The District will pay the landscaping costs of \$906,000, but the

District's expenses may be reduced through a unique "tree donation" program. Although details of the program are not yet final, citizens will be able to donate money to the project and choose the type of tree they would like installed—as long as they choose from a list of low-water-use and heat-resistant plants provided by the District. Not only does this reduce the cost to the District, but it allows the area residents to become an involved partner in this landscaping project.

Under an agreement with the District, the City of Mesa will be allowed to install recreational amenities on the project at its own expense. Any changes proposed by the city require the District's review and approval to ensure that these additions do not diminish the flood control capacity of the floodway.

← This desolate stretch of the East Maricopa Floodway will soon be planted with Palo Verde and Acacia trees as well as Ocotillo, Cassia, and Bird of Paradise.

East Maricopa Floodway



# Permit Allows Project to Proceed

In October 1990, the City of Tempe and the District entered into an agreement for the improvement of the Salt River from McClintock Drive to the railroad bridge just west of Mill Avenue. This partnership could only be formed, however, after a lengthy discourse between the city, the District, the U.S. Army Corps of Engineers, and the Environmental Protection Agency (EPA).

Because the Salt River is classified as "Waters of the U.S.," Section 404 of the Federal Clean Water Act directs the Corps to prohibit the discharge of dredged or fill material into the river unless they issue a permit allowing such action.

Although the Corps issues the permit, the EPA retains veto power. In the fall of 1990, the Corps announced that the 404 permit would be issued to the City of Tempe for channelization of the Salt River in this section, but that it would be issued over the objection of the EPA.

The decision was handed down just in time for the city and the District to take advantage of partnership with the Arizona Department of Transportation (ADOT). ADOT agreed to channelize the Salt River to District specifications and contribute \$5.67 million toward the cost. The City of Tempe is providing the rights-of-way and the District is paying the remaining construction costs—estimated at \$13 million. Channelization will confine the river to a narrower course, taking hundreds of acres out of the floodplain. This allows ADOT to

→ *ADOT construction contractor begins work on the north bank of the Salt River. Work was not deterred by the flow of water in the normally dry river after heavy late-winter rainfall caused Salt River Project to release water from Roosevelt Dam.*

construct the East Papago Freeway along the north side of the river, and the City of Tempe to prepare development of the south bank into the recreational and multi-use Rio Salado Project.

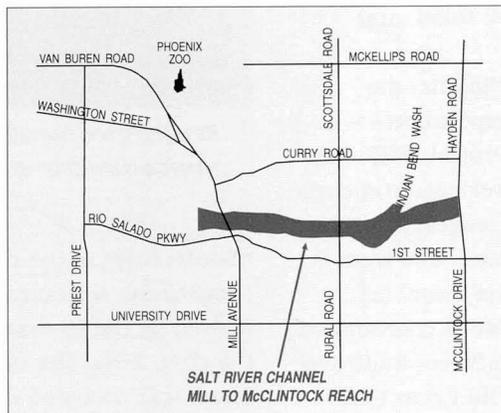
Since narrowing the channel increases the velocity of flood flows, several changes to existing bridges were required for structural safety. Most notably, the 79 year-old Ash Avenue Bridge was removed after it was determined unable to withstand increased flood flows. Also, the piers of the nearby railroad bridge were reinforced, and the bridge is now tied into bedrock.

Channelization of the river in this area will result in a second Mill Avenue highway

bridge being built next to the existing one.

Construction of the Mill to McClintock stretch of the Salt River Channel is scheduled to be completed in the spring of 1993. When this portion of the channel is completed, it will tie into the channelization of the stretch from Mill Avenue west to 40th Street, which is scheduled for completion late in the summer of 1991.

**Salt River Channelization  
Mill Avenue to McClintock Drive**



## Project Highlights

The revised final report for the Queen Creek Area Drainage Master Study (ADMS) was accepted by District staff in May 1991.

The District received a Federal 404 permit for the New River Channel from Olive Avenue to Bethany Home Road and negotiated the design contract to meet the requirements of the permit.

Design requirements include landscaping with native plants a 32-acre parcel at the confluence of the Agua Fria and Gila Rivers. Landscaping was planned by the District's Environmental Branch staff.



## Project Highlights

In November 1990, the Board of Directors authorized the initiation of a watercourse master plan for the Salt/Gila River from Granite Reef Dam to Gillespie Dam. Consultants have been selected for floodplain delineation and sediment transport as well as for the Master Plan and Regional Environmental Impact Statement. Regular meetings of the Study Management Committee include representatives of affected communities.

Landscaping/erosion control/aesthetic treatment is 85% complete in Reach 1 (Skunk Creek to Cactus Road) of the ACDC.

↓ Landscaping features are being installed on Reach 1 of the ACDC.



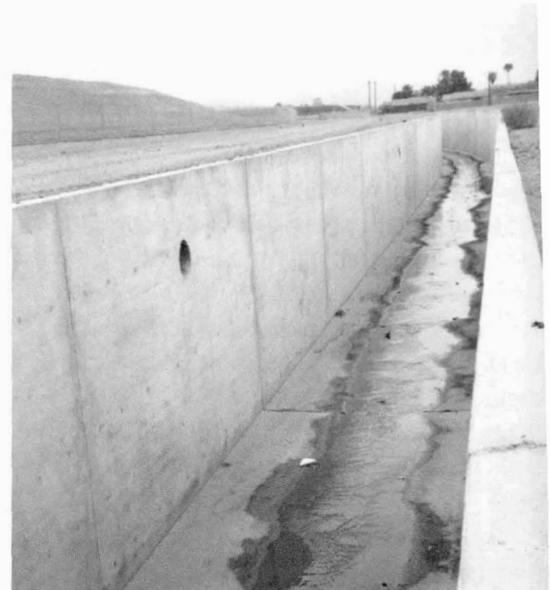
## Old Cross Cut Canal Gets New Look

The 100-year-old Old Cross Cut Canal, which links the Arizona and Grand Canals, is being upgraded and relocated, in part, to allow room for the Hohokam Freeway. Upgrading will allow for future upstream flood control and storm drainage connections by raising the present capacity of about 1,500 cubic feet per second (cfs) to 3,000 cfs at the Arizona Canal, 4,100 cfs at McDowell Road, and 4,900 cfs at Grand Canal.

The District, the City of Phoenix, the Arizona Department of Transportation (ADOT), and the Salt River Project (SRP) have entered into agreements to relocate and cover portions of the canal in two stages: from the Grand Canal to McDowell Road, and from McDowell Road to the Arizona Canal (at Indian School Road). This also is coordinated with the Mill Avenue to 40th Street Salt River Channelization so that the Old Cross Cut discharges through the stabilized bank to the Salt River.

In the first stage, the section from McDowell Road to Van Buren Street—where the Hohokam Freeway is routed—was completed in May 1991. The section from Van Buren to the Grand Canal is slated for completion in September 1991. The state has paid \$4.8 million and Phoenix and the District have each paid \$2.28 million for construction in this stage.

The District, Phoenix, and SRP entered into an agreement for the design, cost-sharing, construction, operations and

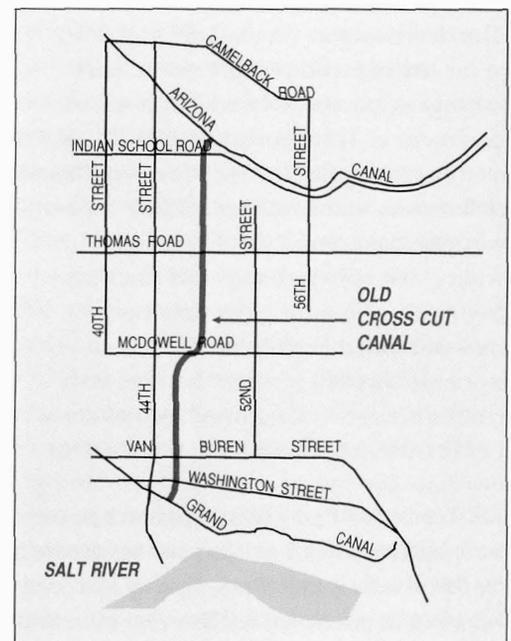


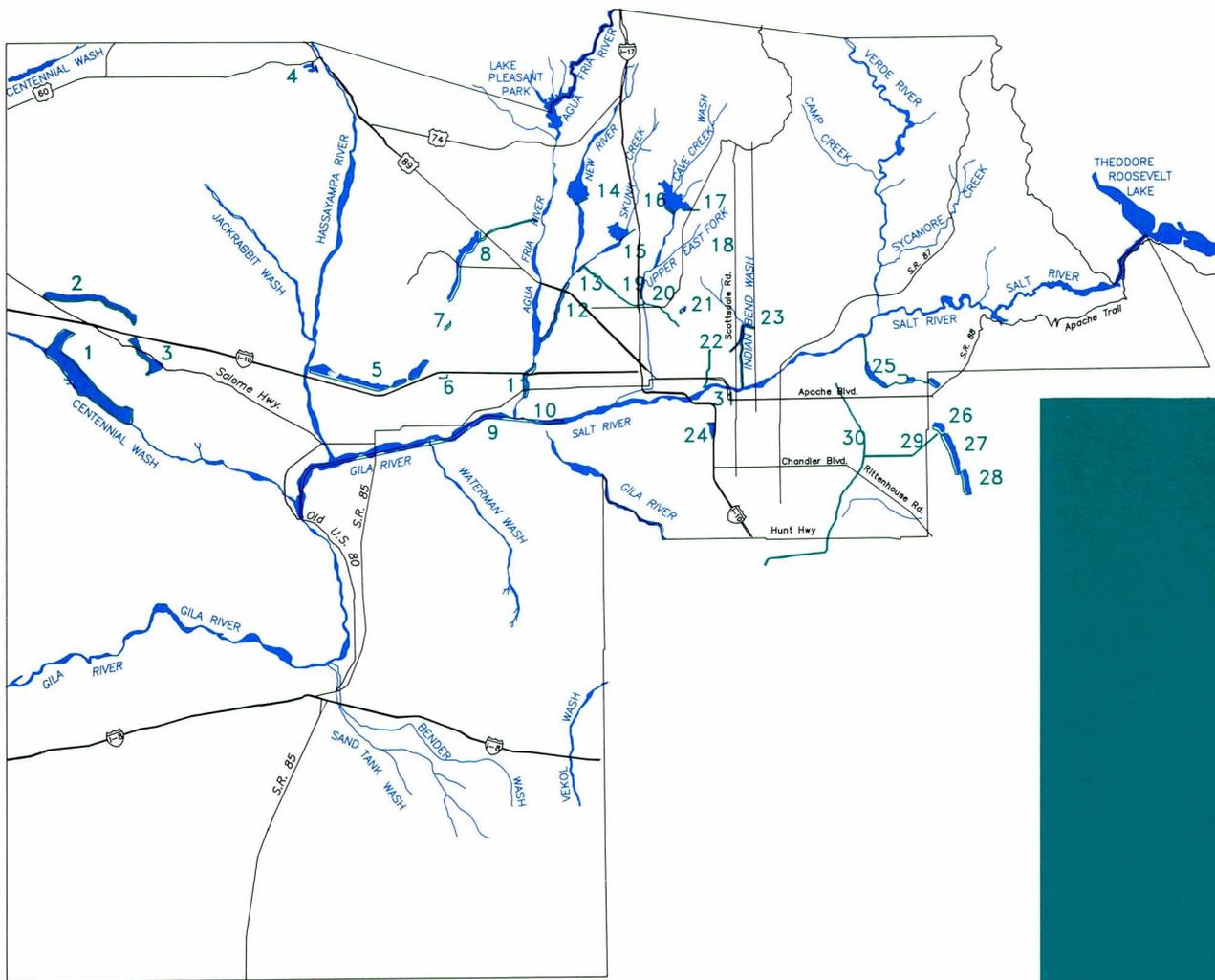
↑ Realigning and upgrading the Old Cross Cut Canal allows construction of the Hohokam Freeway.

maintenance of the reach from McDowell Road to the Arizona Canal. The costs will be shared by the District, 75%, and the City of Phoenix, 25%. The design contract for this reach was awarded in December 1990.

Phoenix, in a separate agreement, plans a linear park in the section from McDowell Road to Indian School Road, and is conducting a public survey to determine what area residents want in the park.

### Old Cross Cut Canal Improvements





## Flood Control District of Maricopa County Project Map as of June 30, 1991

- |   |                                      |
|---|--------------------------------------|
| 1. Centennial Levee*                                | 20. Cave Creek Channelization (1991) |
| 2. Harquahala Dam and Floodway (1982)               | 21. Dreamy Draw Dam (1973)           |
| 3. Saddleback Dam and Diversion (1981)              | 22. Old Cross Cut Canal (1975)       |
| 4. Sunset and Sunnycove Dams (1976)                 | 23. Indian Bend Wash (1985)          |
| 5. Buckeye Dams 1, 2, 3 (1975)                      | 24. Guadalupe Dam (1975)             |
| 6. White Tanks Dam 4 (1954)                         | 25. Buckhorn-Mesa Projects           |
| 7. White Tanks Dam 3 (1954)                         | Spook Hill Dam (1979)                |
| 8. McMicken Dam (1956) (restored 1954)              | Signal Butte Floodway (1984)         |
| 9. Salt/Gila Clearing (1985)                        | Signal Butte Dam (1987)              |
| 10. Holly Acres Levee and Bank Stabilization (1985) | Pass Mountain Diversion (1987)       |
| 11. Agua Fria Channel Projects (1988)               | Bull Dog Floodway (1988)             |
| 12. New River Channelization*                       | Apache Junction Dam (1988)           |
| 13. Skunk Creek Channelization (1991)               | 26. Powerline Dam (1967)             |
| 14. New River Dam (1985)                            | 27. Vineyard Dam (1968)              |
| 15. Adobe Dam (1984)                                | 28. Rittenhouse Dam (1969)           |
| 16. Skunk Creek Channels and Levee (1983)           | 29. Powerline Floodway (1968)        |
| 17. Cave Buttes Dam (1980)                          | 30. East Maricopa Floodway (1989)    |
| 18. East Fork Cave Creek**                          | 31. Salt River Channel*              |
| 19. Arizona Canal Diversion Channel*                |                                      |

\*Partly Complete      \*\*Design

## Engineering

The District's Engineering Division plays a key partnership role during the design phase of any project. By providing technical engineering services for District-funded or cost-shared projects, the division ensures that the project designs are in agreement with District standards and sound engineering principles and practices as well as with planning and zoning regulations.

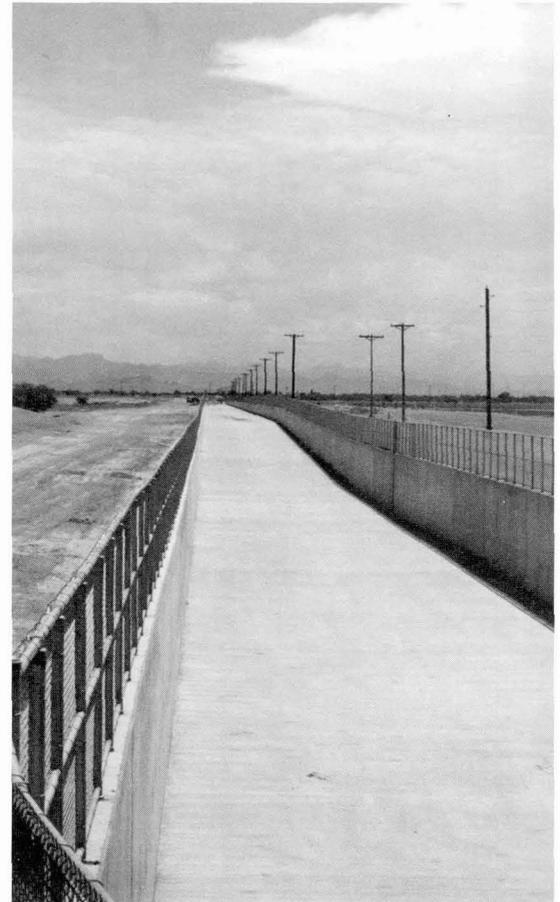
The Drainage Review section also ensures that new developments will not adversely alter drainage patterns for downstream residents.

## Guadalupe Road Channel and Box Culvert End Flooding

Historically, floodwaters completely covered Guadalupe Road from Sossaman Road to the East Maricopa Floodway (EMF), several times a year. But since the completion of a two-stage project involving the City of Mesa, the Maricopa County Highway Department, and the District, Guadalupe Road is now dry and may be expanded to the six-lane arterial the area needs.

In order to convey storm runoff from Sossaman Road Drain to the EMF (a distance of about one mile), District staff designed a channel on the north side of Guadalupe Road and a box culvert to convey the runoff from the north side of Guadalupe Road to the south. Once the runoff reaches the south side of Guadalupe Road, it drains into the EMF and, ultimately, into the Gila River.

Although design contracts are usually awarded to private firms, the District decided to have its Engineering staff design this project in-house. The additional hands-on design experience was crucial for young engineers with little practical design experience, and also for veteran engineers who had spent most of their District career performing design review.



↑ *Designing the Guadalupe Channel and Box Culvert in-house provided District personnel with valuable hands-on design experience.*

The District's Construction Inspection staff performed the construction engineering and inspection duties on the Guadalupe Channel and Box Culvert. In-house construction inspection saved the District approximately \$100,000.

The channel was completed in April at a cost of just over \$2 million, paid by the District. The construction contract was completed ahead of schedule and there were no change orders, indicating both good design and construction administration.

The cost of the completed \$399,000 Guadalupe box culvert was shared by the three parties in the following proportions: City of Mesa, 41.67%; Maricopa County Highway Department, 12.5%; and the District, 45.83%. The City of Mesa and the District split 50-50 the \$80,000 cost of utility pole relocations.

### Drainage Management Workload

	Fiscal Year		
	88/89	89/90	90/91
Zoning Cases Reviewed (including resubmittals)	250	259	169
Subdivision Cases Reviewed	68	50	25
Master Plans Reviewed	16	4	10
Board of Adjustment Cases Reviewed	160	190	152
Drainage Inspections	1,177	3,679*	2,899

\*New drainage regulations implemented in 10/88.

# District Adopts First Volume of the Drainage Design Manual

Six years of discussion and study reached the first phase of completion in April when the District Board of Directors adopted Volume I of the *Drainage Design Manual for Maricopa County*.

The *Drainage Design Manual* is the result of a multi-jurisdictional task force that convened in 1985. First, the task force developed the *Uniform Drainage Policies and Standards*, which were then adopted by the District's Board of Directors in 1987. Adoption of the drainage regulations and development of the *Drainage Design Manual* were the next steps in reaching the important goal of establishing a common basis for drainage management for all jurisdictions within Maricopa County.

Volume I, *Hydrology*, provides technical procedures for estimating runoff for the purpose of designing stormwater drainage facilities in Maricopa County. Volume I also contains a computer disk of programs that perform some of the recommended hydrologic calculations. Volume II, *Hydraulics*, when completed, will provide the technical procedures and standards for designing the facilities once the hydrology is calculated.

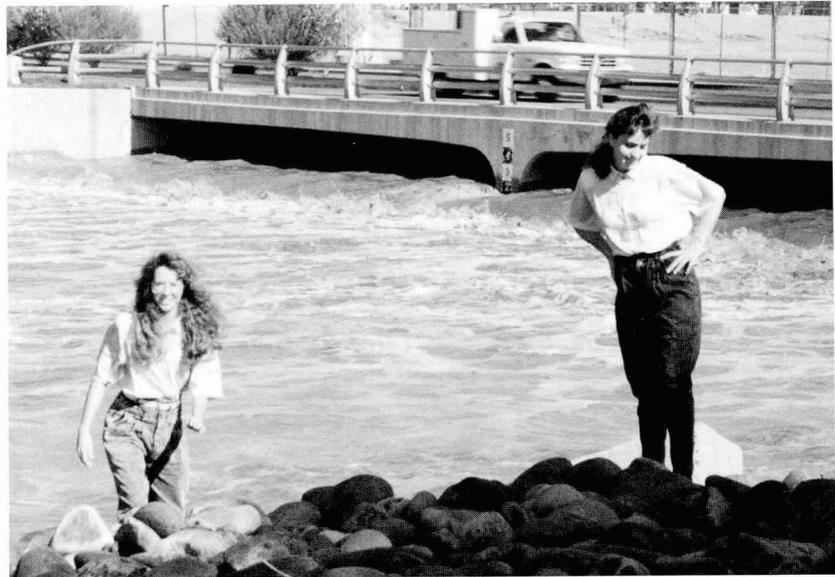
The District will require that the procedures and standards outlined in the *Drainage Design Manual* are used in the design of its future projects as well as on projects in which the District cost-shares with other jurisdictions.

To familiarize the engineering community with Volume I of the *Drainage Design Manual*, District staff members conducted workshops and distributed copies of the manual to city engineers throughout the county.

Although Volume I has been approved by the Board of Directors and is already being used, a revised version will be released in early 1992. A review draft of Volume II will be available to government agencies, developers, and consultants late in 1991.

## Engineering/ Hydrology

Partnership between the Engineering Division, the Hydrology Division, local municipalities, and the private hydrology and engineering communities has resulted in the near completion of the *Drainage Design Manual for Maricopa County*.



↑ Felicia Terry, Civil Engineer II, and Sandy Story, Hydrologist I, review flood damages at Indian Bend Wash after a spring storm left the wash full. Engineering and Hydrology staff must work together when surveying such damages.

## Hydrology

The Hydrology Division has always had a strong partnership role with the Federal Emergency Management Agency, but the District's latest efforts includes a public information drive to reduce flood insurance premiums.

This latest effort is in addition to the division's normal floodplain and watershed management and flood warning roles.

## Initial CRS Program Efforts Reduce Flood Insurance Premiums

The National Flood Insurance Program granted a 5% reduction in flood insurance premiums for the unincorporated area of Maricopa County based on the District's successful application for the initial phase of the new Community Rating System (CRS) Program.

The CRS program was developed by the Federal Emergency Management Agency (FEMA) to recognize the efforts of municipalities using any of 20 different floodplain management activities that reduce flood losses. These activities include floodplain mapping and regulating, providing public information, and promoting flood preparedness.

The District already performs many of the functions for which points may be accumulated for CRS. For example,

floodplain mapping and regulating of floodplain development are required of the District by federal and state law and by County ordinance. Furthermore, the District already studies areas of chronic and potential flooding, plans structural measures of protection, provides flood warning to local agencies, and builds and maintains dams and channels.

The application process is mainly a matter of documenting District activities in the manner required for the program. Current activities have since resulted in the 5% insurance premium reduction that will be effective in October 1991, and will probably result in a 15 to 20% reduction by October 1992.

One area where the District has greatly increased its effort is public information. The District has acquired and placed in County libraries various FEMA and local publications about floodproofing and reducing flood damages to buildings, and has publicized that availability. The District also contacted real estate groups, lenders, and the insurance industry about map determination services.

### Floodplain Delineations

The following floodplains were approved by the Federal Emergency Management Agency (FEMA) during fiscal year 1990/1991:

Area	River miles	Watershed (mi <sup>2</sup> )	Date
Centennial/Grass Wash	27	451	April 1991
Morgan City, Rodgers, and Cline Creeks (tributaries to Skunk Creek)	25	47	November 1990
Gila River from Gillespie Dam to Gila Indian Reservation	18	—	January 1991
Cave Creek from ACDC to Cave Buttes Dam	13	—	February 1991
Jackrabbit Wash	22	442	April 1991
Southern Pacific Railroad/Queen Creek	8	—	August 1990

Wagner Wash delineation was completed and submitted to FEMA in May 1991, but has not yet been approved by FEMA. The Central Arizona Project (CAP) Overchutes delineation was submitted to FEMA in June 1991, and, also, has not yet been approved. Wagner Wash represents 12 river miles and 42 square miles of watershed. The CAP Overchutes delineation includes 12 linear miles.

### Floodplain Management Workload

	Fiscal Year		
	1988/89	1989/90	1990/91
Floodplain Use Permits	53	52	3
Floodplain Variances	2	2	0
Appeals	0	0	0
New Delineations	11	8	7
FCD Clearances	10	24	26
Violation Cases	8	3	7
Referrals to County Attorney	0	0	2

## Difficult Negotiations Completed

Several complicated negotiations were completed and land acquisition for more than a dozen projects was certified or submitted for certification during the past year, clearing the way for project starts. Certification is a laborious but necessary process in which the District's General Counsel checks hundreds of acquisition documents one by one against the project map to ensure that all legal requirements are met and all necessary parcels are acquired.

In order to obtain all the parcels, the District also enlists the support of the Maricopa County Highway Department which generally serves as the initial contact and negotiator for all privately-owned parcels.

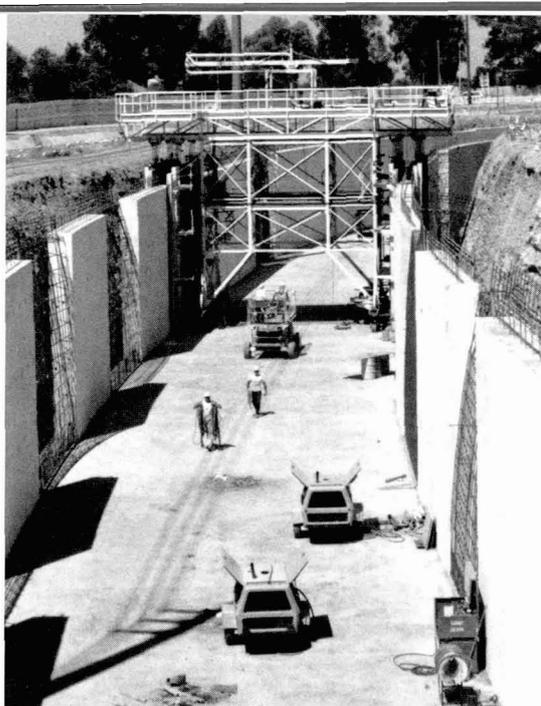
Land rights were certified for Reach 4 of the Arizona Canal Diversion Channel (ACDC) this year, involving 79 parcels totalling over 55 acres between 12th and 40th Streets. Several major land transactions in Reach 4 were completed after long and complex negotiations with entities such as Western Savings Corporate Center, the Arizona Biltmore Hotel, and Desert Crest Retirement Center. All of these properties abut the Arizona Canal, in the path of the ACDC.

## Property "Managed" to Serve Public

The District, through its Property Management Branch, maintains over 1,814 parcels of land in excess of 30,000 acres of fee/easement right-of-way. Hundreds of these acres are being leased by city and county agencies for the development of recreational facilities. One such development is the golf course managed by the City of Tempe in the Indian Bend Wash on property the city is leasing from the District.

In the past fiscal year, the property management branch has leased eighteen commercial and residential properties to private sector entities and 30 mobile home units to various county and state agencies.

The District has also sold twenty-three mobile home units that were acquired in the



↑ Certification of land rights lead to the beginning of construction on Reach 4 of the ACDC. Photo courtesy Ed Karnafel, County Highway Department.

Certifications for East Fork Cave Creek, New River channelization and Salt/Gila control works were also completed this year. These projects encompassed 385 parcels with a total of over 10,000 acres.



East Fork Cave Creek project area and an excess parcel from the ACDC which was sold to Golf 'N Stuff at Metrocenter.

Another project started by the Property Management Branch this year is creating a catalog and inventory of the land resources owned by the District. The catalog will help to identify excess parcels and formulate a sound strategy to manage District property.

## Land Management

The Land Management Division acquires the property necessary for flood control projects and, once it is acquired, manages all District-owned property.

Innovative property management results in partnerships such as one with the City of Tempe who leased District property in the Indian Bend Wash for development of a public golf course.

↑ Golfers enjoy a public golf course in the Indian Bend Wash which is managed by the City of Tempe under a lease agreement with the Flood Control District.

## Construction & Operations

The Construction and Operations (C&O) Division comprises nearly 45% of District staff and is involved in projects from the planning stage through construction and after completion.

The Environmental Branch has become deeply involved with reducing pollution as the Environmental Protection Agency enforces new legislation regarding stormwater quality.

The Construction Inspection Branch makes certain that all projects are built to District specifications and provides construction management for in-house projects.

By far the largest of all District branches, the Operations and Maintenance Branch performs the last step in project partnership: keeping the completed flood control structures in top working and aesthetic condition.

## Branching Out to Environmental Issues

**T**he District, through its Environmental Branch, made its first applications to the Environmental Protection Agency (EPA) in March 1991 to comply with the Clean Water Act's new National Pollutant Discharge Elimination System (NPDES) program. This complex program is intended to reduce the amount of pollutants that enter waters of the United States through storm sewers, using a variety of management practices. Government agencies as well as private businesses will be monitored through an extensive permit program.

The District sought and obtained cooperation from local municipal governments to apply for group permits for nine municipal landfills and for twelve vehicle maintenance yards. Parties to these group applications include Maricopa County, Chandler, Glendale, Wickenburg, Gilbert, Apache Junction, Peoria, Goodyear, and El Mirage.

The Environmental Branch is in the process of developing management plans for the facilities in these groups to prevent stormwater pollution. The management plans will be submitted to the EPA as Part Two of the NPDES application process.

## Ensuring Project Constructability

**D**uring the design process before projects are advertised for bid, the Construction Branch helps by ensuring that the engineer's plans are constructable. Once a construction contract has been awarded, the Branch really becomes involved to ensure that all projects are being built to specification.

On some projects, this Branch manages contract engineers who provide construction engineering and inspection services. On others, such as the Guadalupe Box Culvert and Channel (see page 8), Branch members provide these services directly.

Completed projects for fiscal year 1990/91 include:



↑ *Danny Upshaw, Laborer II, and Darry Brown, Laborer III, build a pump house for a Phoenix well on the ACDC near 25th Avenue.*

Municipally owned stormwater drains that outlet into waters of the United States also will be required to be permitted under the NPDES program. The District has been working with other government agencies to formulate a regional strategy for compliance with the regulations, with the goal of obtaining a regional permit. A regional approach would facilitate the sharing of information and would standardize stormwater management programs. These programs will potentially affect building codes and land uses, and include provisions to detect and eliminate illicit discharge into stormwater drainages.

- | Six bridges for Reach 4 of the ACDC.
- | The 83rd Avenue Bridge over Skunk Creek.
- Continued work on existing structures includes:
  - | Landscaping of Buckhorn Mesa.
  - | New River from Olive Avenue to Grand Avenue.
  - | Plating of the Vineyard Flood Retarding Structure.
  - | Installing a center drain in Powerline FRS.
  - | Improving the side inlets for Pass Mountain Diversion Channel and Signal Buttes Floodway.

## O&M Branch Protects Partners' Investment

**W**hen flood control projects are completed, the District becomes responsible for the safe operation and maintenance of the facilities.

The Operations & Maintenance (O&M) Branch is currently responsible for maintaining—among other things—more than 446 miles of roadway, 5,400 acres of river clearing, and 710,000 square yards of bank protection.

During fiscal year 1990/1991, the following projects were completed and turned over to the District for maintenance and operation:

- ▮ Reach 2C of the Arizona Canal Diversion Channel (27th Avenue to the confluence with Cave Creek Wash at 23rd Avenue). Cave Creek Sediment Basin.
- ▮ Guadalupe Channel.
- ▮ Sun City drainage channels (existing channels built by the developer and upgraded before dedicating to the District).



↑ *Bill Craig, Work Crew Leader, clears brush at Cave Creek Sediment Basin.*

Increased maintenance responsibility required an increase of 20 staff positions, bringing the total number to 92 positions.

Because maintenance of the District's dams and channels is labor intensive, the District hires—at 50 cents an hour—Department of Corrections prisoner crews from the Perryville and ASPEN facilities. These crews supplement the work of the District's regular crews and worked on the structures for a total of 78,488 hours during this fiscal year.

The O&M crews maintain landscaping and dual-purpose facilities such as maintenance roads (which double as jogging and bicycle trails) clean. These crews are out in the public eye, working hard to make the District's projects look good and work effectively so that all the members of the partnership can be proud of what has been accomplished.

*Both photos on this page are courtesy of Ed Karnafel, County Highway Department.*



← *Louis Yager, Maintenance Technician I, welds a post to keep vehicles off a maintenance road at Cave Creek Channel and Cactus Road.*

### Maintenance Responsibility Highlights

	Inventory as of 6/90	Added 7/90 to 6/91	Total Inventory
Bank Protection	628,522	82,348	710,870 square yards
Landscape Erosion Control	2,618	510	3,128 acres
Low Flow – Paved	0	138,400	138,400 square feet
Pilot Channel – River	42,724	43,040	85,764 feet
Right of Way	33,379	71,412	104,791 acres
River Clearing	4,754	667	5,421 acres
Roads	427	19	446 miles
Stormdrain Pipe	26,870	848	27,718 feet

## Administration

The Administrative Division provides a diverse array of services to support all District staff:

The Accounting Branch plans and manages functions such as payroll, purchasing, accounts payable and receivable, inventory, and budget planning and execution.

The Administrative Services staff provides secretarial and word processing services, as well as central filing, telephone and visitor reception, mail routing and delivery, and reproduction services.

The Contracting Branch coordinates consultant and construction procurement actions; directs preparation of contract documents; and prepares and coordinates items for the Board of Directors' agenda.

The Information Systems Branch serves computer users from word processing to the Geographic Information System. The branch maintains the computer systems, develops programs, and trains staff.

## Staff Ideas Net Awards for the District

In June 1991, the District was notified it won five National Association of Counties awards for programs which were developed entirely by District staff and implemented using District resources. The award-winning programs include:

### ***State Legislation for Riverine Master Plans***

Developed by Water Resources Planner Greg Rodzenko, Chief Engineer D.E. Sagramoso, and General Counsel Larry Richmond and Julie Lemmon, this legislation, which passed in 1990, allows flood control districts to take into consideration the cumulative impact of such factors as urbanization, channelization, and floodplain encroachment when formulating a plan to guide development of a watercourse.

Each of these factors potentially affects the floodplain, but had not been allowed legally to be considered in watercourse master plans. The new law allows the District to develop a master plan for the Salt-Gila rivers to coordinate the way each of the many jurisdictions along these rivers develops the adjacent land.

### ***Use of Aerial Videotaping in the Assessment of Drainage Patterns and Flooding Problems***

As developed by Hydrologists Tom Donaldson and Amir Motamedi, aerial videotaping of drainage basins can reduce days of fieldwork to hours, providing additional advantages that aerial still photography cannot. Most aerial still photos are too small in scale to make readily discernable such features as old stream channels and breached riverbanks, as well as subsidence and alluvial fans, all of which help to determine characteristics of the drainage basin.

### ***Incorporation of County Control Points into Computers to Assist with Mapping***

Geographical Information System Supervisor Marta Dent wrote a computer program to specifically include the township and range coordinates as reference points in the many maps generated by the District.

This simple step accomplished two goals: to enable the overlapping of maps regardless of scale or source, and to save hours of staff time in transferring the existing maps from the Computer-Aided Design system to the new Geographical Information System (GIS). Mapping is key to all District functions, whether of watersheds, floodplains, parcels, study areas, cities, or roads.

### ***Rainfall Activity Status Boards***

Hydrometeorological Assistants Tom Keifer and Charlie Klenner developed a tool to visually track the more than 100 telemetry rain gauges throughout and outside of Maricopa County, which are part of the District's storm warning system. Two display boards, a map of the Gila River watershed and a map of the Phoenix metropolitan area, have red lights for each rain gauge and green lights for each stream gauge, located in the corresponding geographic location. Each lights up or flashes, based on the amount of rainfall registered at the location. The result is a quick, simple way to visualize the extent and severity of a storm. Corresponding information is transmitted to the District's computer, but the lighted maps provide a means of seeing at a glance what each gauge is registering throughout the area.

### ***Public Awareness of Flood Hazards***

A series of activity books to heighten children's and parents' awareness of flood hazards and safety measures were developed by Public Involvement Coordinator Sue Mutschler, Hydrologist Joe Tram, GIS Technician Eric Feldman and GIS Aide Jason Sather. The books are focused on three age levels from kindergarten through ninth grade and aim to educate the children to dangers of playing in storm channels. The books include thought games such as crossword puzzles, word-decoding, word searches, connect-a-dot drawings, and water trivia.

## Quality Lessons Learned

**C**hief Engineer and General Manager D.E. Sagramoso and Deputy Chief Engineer Stanley L. Smith have brought Gateway Community College to the District to teach District personnel the principles of *Total Quality Management*.

The nine-week course introduces the management principles and Statistical Process Control of Dr. W. Edwards Deming, and how to adapt them to the public sector. Dr. Deming is a university statistics professor whose concepts were embraced by the Japanese when he was sent there after World War II to help that government rebuild its economic base.

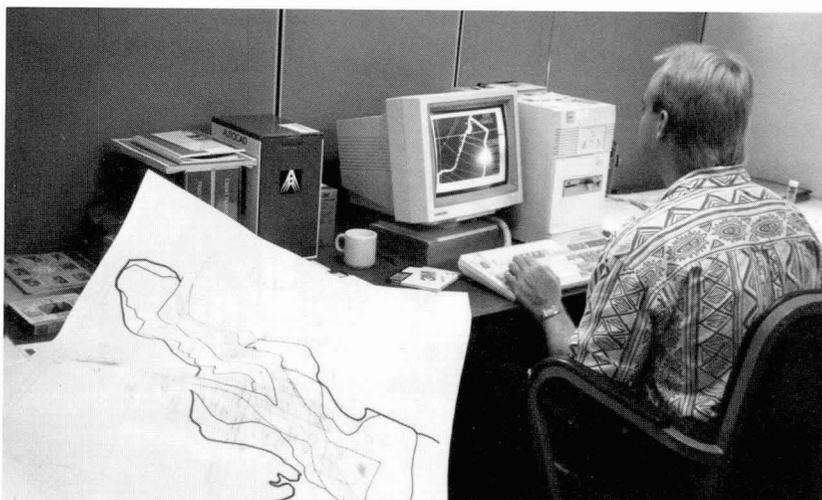
Dr. Deming asserts that 85 percent of all company problems result from the system, which only management can change. Thus, if a company (or public agency) wants significant gains in productivity, it must change the organization's processes, which include changes in management methods and style.

The course aims to help District managers and, indeed, all District staff members apply "Deming" principles and analytic tools to solve specific District problems. Deming's Fourteen Obligations of Management include putting everyone in the District to work to accomplish the transformation to quality. Toward this end, the District held two sessions of the course, and plans to have its own quality training personnel.



↑ *The District's booth at EarthFest '91, draws residents who are interested in environmental issues, such as the District's efforts to establish wetlands, to coordinate regional compliance with federal clean water laws, and to masterplan the Salt-Gila River.*

↓ *Mark Brewer, Engineering Drafting Specialist I in the Administration Division, uses computer-aided drafting tools to prepare watershed, floodplain, and project maps, as well as channel cross sections and other engineering drawings.*



## Administration

A Personnel Coordinator recruits and interviews new employees, provides career counseling, and assists employees with grievance procedures.

Two Public Involvement Coordinators plan and conduct meetings to involve the public in project decisions, plan and prepare public meetings, information and news releases to inform the public.

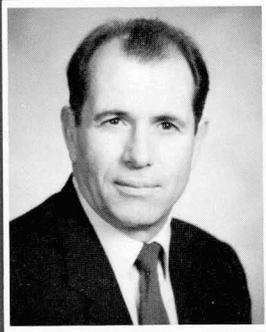
A Technical Communications Specialist edits and electronically designs District publications—such as manuals, reports, brochures, fact sheets—for technical and lay readers.

### Contracts Awarded (Preliminary & Unaudited)\*

Type of Contract	Number	Contract Amount
Construction	9	\$ 5,587,156
Engineering Services	21	3,113,750
Property Acquisition	6	275,000
Rental Property Maintenance	4	19,996
Floodplain Delineation	8	3,118,825
Miscellaneous	1	2,000
<b>Total</b>	<b>49</b>	<b>\$12,116,727</b>

\* These figures do not reflect the contracts awarded through other agencies in which the District cost-shared. They are only contracts awarded by the District.

## Board of Directors



**Tom Freestone**  
District 1  
Chair



**James D. Bruner**  
District 2



**Betsey Bayless**  
District 3

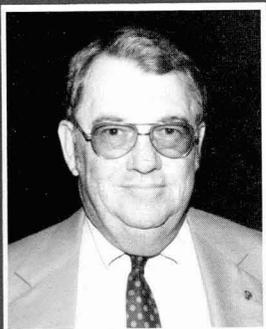


**Carole Carpenter**  
District 4



**P. Ben Arredondo**  
District 5

## Flood Control Advisory Board



**John E. Miller, Jr.**  
District 2  
FCAB Chair

**T**he Flood Control Advisory Board (FCAB) advises the Board of Directors on flood control, water conservation, floodplain management, drainage, and related matters. It reviews planning, operations, and maintenance of flood control facilities, and recommends an annual budget to the Board of Directors.

The Advisory Board consists of seven members, five of whom are appointed by the Board of Supervisors to five-year terms. At least one member must be a resident of the City of Phoenix. The City of Phoenix and the Salt River Project appoint representatives who are ex-officio members of the FCAB. James Matteson (not pictured) currently represents the City of Phoenix on the FCAB, and Paul Cherrington (not pictured) represents Salt River Project.

**T**he Flood Control District of Maricopa County, founded in 1959, is a municipal corporation and political subdivision of the State of Arizona. The District is governed by a five-member Board of Directors which consists of the elected Supervisors for the County.

The District has all the powers, privileges, and immunities granted generally to municipal corporations. The Board of Directors exercises all powers and duties in the acquisition and operation of District properties, contracting, and in carrying out regulatory functions as ordinarily exercised by governing bodies. The activities of the District are funded by a flood control tax levy assessed on all real property within Maricopa County and a variety of cost-sharing arrangements with the Federal, State, County, and local governments. The tax levy rate for Fiscal Year 1990/91 was \$0.4235 per \$100 of assessed value.



**William LoPiano**  
District 1



**Samuel K. Wu**  
District 3



**Lynn Anderson**  
District 4

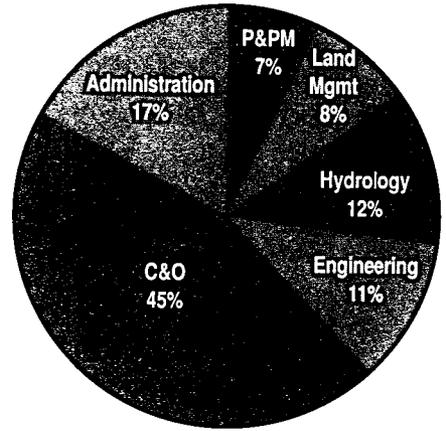
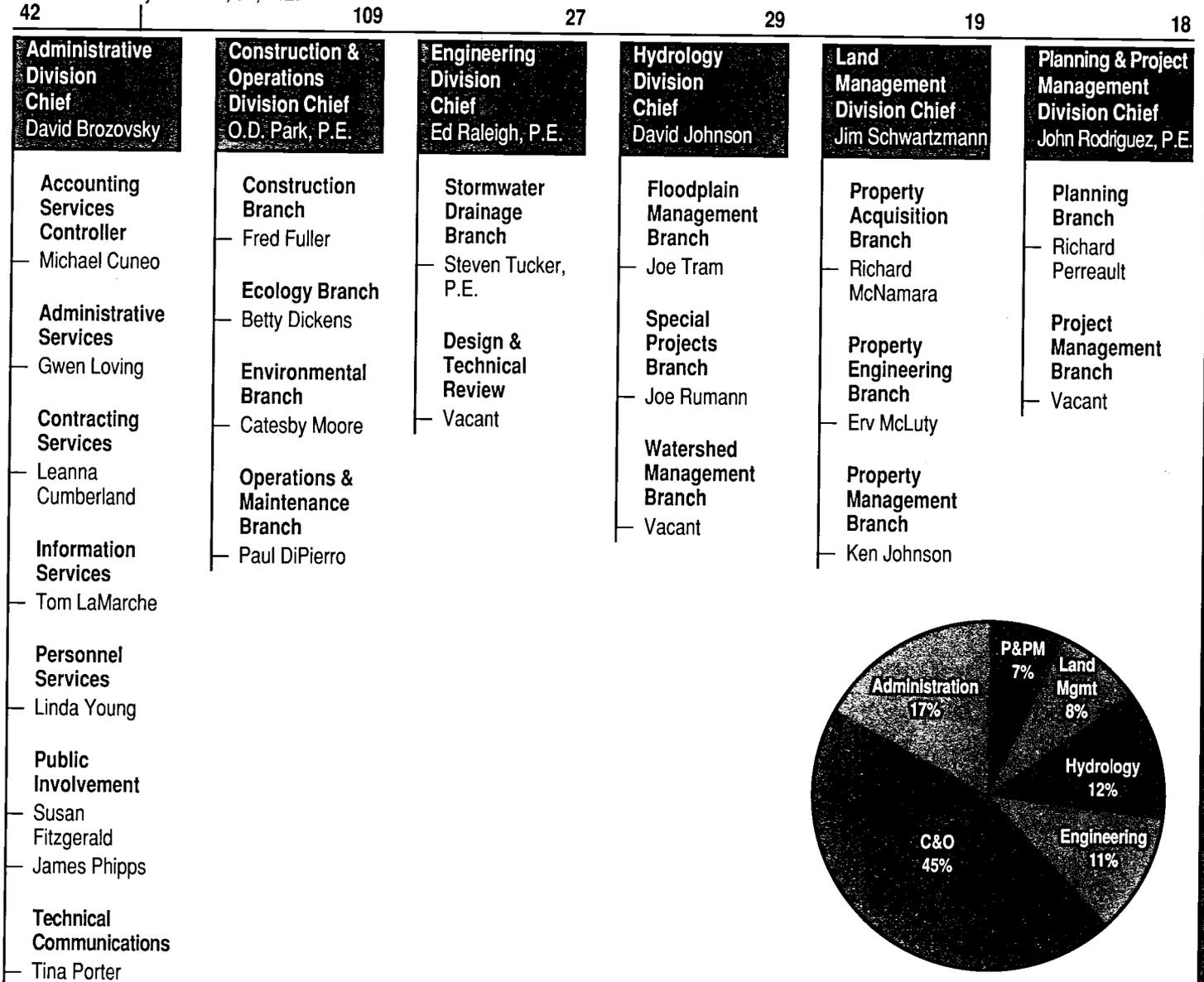
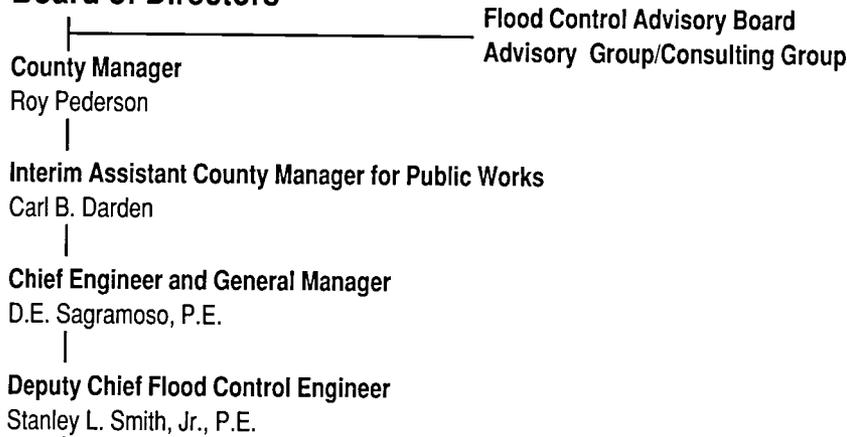


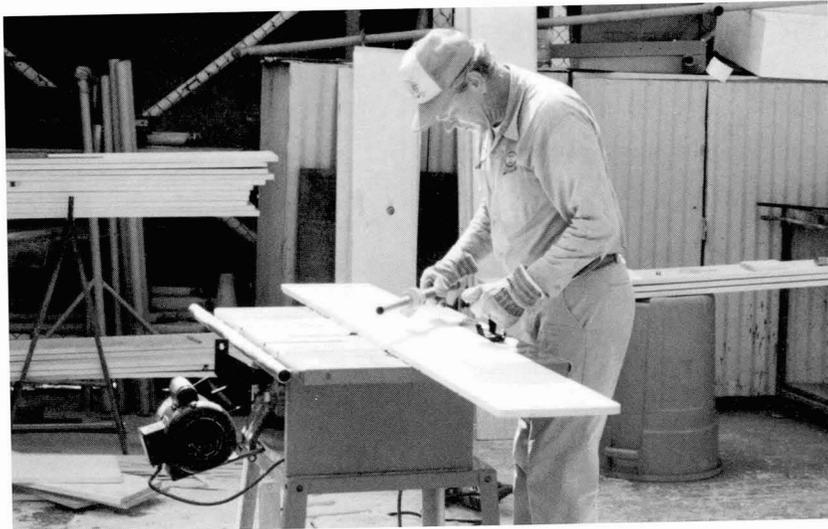
**Marcella Peters**  
District 5

# Flood Control District Organizational Chart

244 Total Positions (As of June 30, 1991)

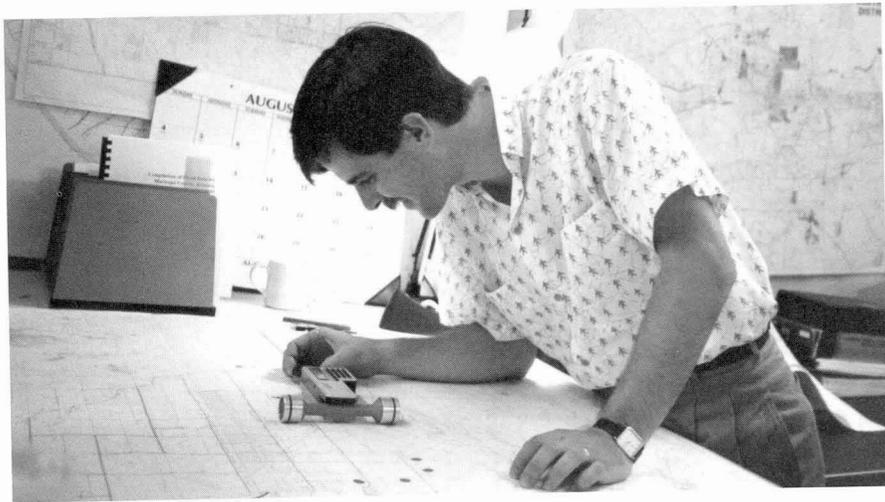
## Flood Control District of Maricopa County Board of Directors





← Ed Leggett, Maintenance Technician II, builds shelves in the maintenance yard.

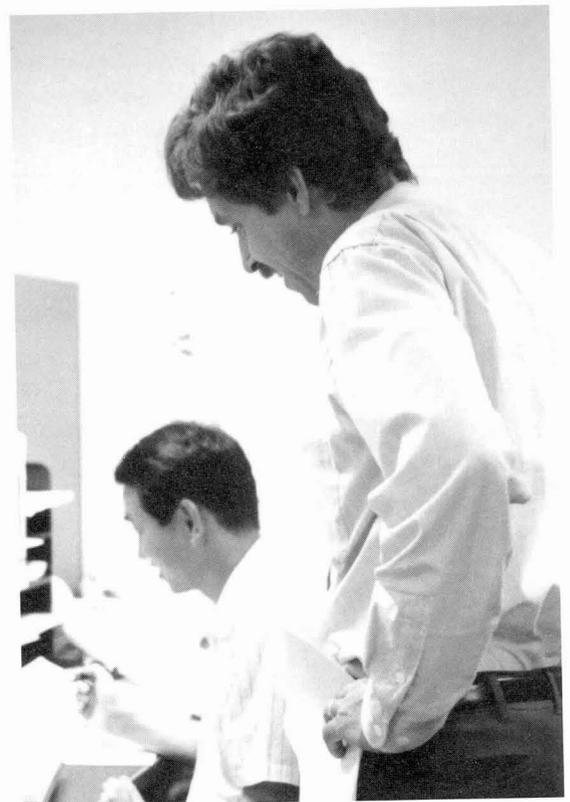
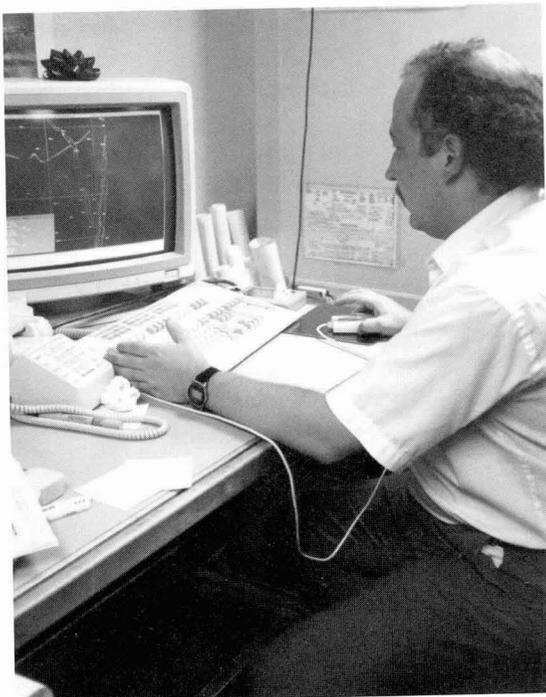
↓ Engineering Division Chief Ed Raleigh confers with Jay Kim, Hydrologist II.



↑ Jorge Garre, Hydrologist I, checks a floodplain delineation map for accuracy.

→ Eric Feldman, GIS Technician II, plots the points of a watershed into the Geographic Information System.

→ Beth Jensen, Land Management Specialist, checks an acquisition file to be certain that all land rights have been obtained before sending it to the District's General Counsel for certification.



# Statement of Revenues, Expenditures, & Changes in Fund Balance

*Budget and Actual,  
Fiscal Year Ending  
June 30, 1991*

*Preliminary and  
Unaudited*

	Budget	Actual	Variance Favorable (Unfavorable)
<b>Revenues</b>			
Flood Control District Tax Levy	\$47,040,000	\$45,797,000	(\$1,243,000)
State Share of Costs			
Federal Projects			
Local Projects			
County Reimbursement			
Local Participation	3,764,000	1,228,000	(2,536,000)
Rental	104,000	160,000	56,000
Interest Earnings	2,000,000	2,633,000	633,000
Sale of Excess Land	3,129,000	168,000	(2,961,000)
Miscellaneous	95,000	216,000	121,000
<b>Total Revenues</b>	<u>56,132,000</u>	<u>50,202,000</u>	<u>(5,930,000)</u>
<b>Expenditures</b>			
Personnel Services			
Salaries and Wages	8,675,000	7,547,000	1,128,000
Overtime	56,000	1,000	55,000
<b>Total</b>	<u>8,731,000</u>	<u>7,548,000</u>	<u>1,183,000</u>
Supplies and Services			
Professional Services Contracts	5,851,000	4,430,000	1,421,000
Maintenance Contracts	1,682,000	1,540,000	142,000
Maintenance Supplies	552,000	277,000	275,000
Insurance	99,000	100,000	(1,000)
Other Supplies and Services	725,000	833,000	(108,000)
<b>Total</b>	<u>8,909,000</u>	<u>7,180,000</u>	<u>1,729,000</u>
Capital Outlay			
Real Estate	8,187,000	12,765,000	(4,578,000)
Engineering	4,220,000	2,438,000	1,782,000
Motor Vehicles and Equipment	2,286,000	1,242,000	1,044,000
Construction and Other Capital Outlay	33,990,000	27,528,000	6,462,000
<b>Total</b>	<u>48,683,000</u>	<u>43,973,000</u>	<u>4,710,000</u>
<b>Total Expenditures</b>	<u>66,323,000</u>	<u>58,701,000</u>	<u>7,622,000</u>
Excess (Deficiency) of Revenues over Expenditures	(10,191,000)	(8,499,000)	1,692,000
<b>Fund Balance at Beginning of Year</b>	31,250,000	32,056,000	0
<b>Fund Balance at End of Year</b>	<u>\$21,059,000</u>	<u>\$23,557,000</u>	<u>\$ 2,498,000</u>

# Expenditures by Activities & Functions

Fiscal Year 1990/1991  
Preliminary & Unaudited

Note: This table may not  
always agree with the  
Expenditures by Task in  
the Financial Highlights  
table (inside front cover),  
except in total.

Activity	Operations Expenditures, in thousands of dollars		Capital Improvements Program, in thousands of dollars		
	Administrative	Maintenance	Engineering	Land	Relocation & Construction
ACDC	\$ 43	\$ 670	\$ 618	\$ 2,012	\$ 7,048
ACDC Area Drainage Master Study	482				
Administrative Overhead/Facility	4,027	110	328		7,509
Adobe Dam	1	64			
Adobe Dam ADMS	1				
Agua Fria River Flowage Easements	34	2	5	1,000	
Agua Fria River	8	78			
Agua Fria River (ADOT Agreement)		6			
Alma School Drain	1	21			
Apache Jct. FRS, Floodway, Outlet	1	21			175
Bell Road Expansion			32		1,527
Broadway Road Bank Stabilization	1				
Buckeye #1		23			
Buckeye #2		10			
Buckeye #3		18			
Bulldog Floodway		5			
Cave Buttes Dam	16	44			
Cave Creek Wash	1	2			
Cave Creek/Carefree Channelization	12				
Centennial Levee		9			
City of Avondale	1				
City of Chandler	1				
City of Glendale	2				
City of Mesa		3			
City of Peoria	1				
City of Phoenix	171				582
City of Scottsdale	10				
Computer Systems	193				
Dreamy Draw Dam		11			
Dysart Road-Agua Fria Drain	5	6			
East Fork Cave Creek ADMP	12	88	450	2,037	106
El Mirage Road Drain Channel		72			
EMF-Buckhorn/Mesa	1	1	100		183
EMF-Williams/Chandler	42	322			3
Enforcement of Floodplain Regulations	41				
FCD Yard Maintenance		216			
Flood Insurance	265				
Flood Warning System	306	92			166
Floodplain Administration	130				
Floodplain Delineation	1,210				
48th Street Drain	3	21			
Glendale-Peoria ADMP	15		176		106
Groundwater Recharge	1				
Guadalupe Dam	11	38			
Guadalupe Road Channel & Box Culvert	11				
Guadalupe & Spook Hill Flowage Easements		4			
Harquahala FRS	4	31			
Harquahala Floodway		5			
Hydrologic Data Collection	196				
Indian Bend Wash Inlet	1	24			
Indian Bend Wash Interceptor & Side Channels	1	24			
Indian Bend Wash Outlet		3			
Laveen Area Drainage Master Study	180				

# Expenditures by Activities & Functions

(continued)

Activity	Operations Expenditures, in thousands of dollars		Capital Improvements Program, in thousands of dollars		
	Administrative	Maintenance	Engineering	Land	Relocation & Construction
Maintenance Overhead	146	3,160			
McMicken Dam	1	24			
McMicken Dam Outlet Channel	1	59		1,362	
Mesa/Gilbert ADMS	1				
New River Dam	3	79			
New River ADMS	1	7			
Old Cross Cut Canal	11	30	210		
Paradise Valley-Scottsdale-Phoenix		1			
Pass Mountain FRS and Outlet		33			104
Plan VI Funding	2				1,250
Powerline Dam	1	23			
Powerline Floodway		8			
Price Drain	1				780
Queen Creek ADMS	4				
Red Mountain Parkway	1				
Reed Landfill				48	
Rio Salado	1				
Rittenhouse FRS	1	45			
Saddleback Diversion Channel		17			
Saddleback FRS		60			
Salt River Channel-ADOT	75		68	1	4,068
Salt/Gila Clearing and Channelization	3	146			
Salt/Gila Control Works	5	37	71	3,696	1,094
Salt/Gila River	47				
Salt/Gila Control-Perryville		2			
Scatter Wash Channel	23	3			
Signal Butte Floodway		21		9	44
Signal Butte FRS	3	6			57
Skunk Creek Channel at I-17		10			
Skunk Creek & New River Flowage Easements	5	95	193	740	602
Sossaman Road	38	67		835	2,079
Spook Hill FRS & Outlet	27	29	26		
Sunnycove FRS	1	31			
Sunset FRS	4	6			
Sunset/Sunnycove Pipeline		20			
Town of Cave Creek	1				
Town of Gilbert	12		161	1,025	
Town of Wickenburg	1				
USGS Service Work	278				
Vineyard Road FRS	7	17			45
Watershed Hydrology	399				
White Tanks Dam #3	32	8			
White Tanks Dam #4	15	8			
White Tanks-Agua Fria ADMP	394				
Wickenburg ADMS	432				
Wittmann ADMS	35				
Work done for County Highway Department	6				
Work done for Planning and Development	389	1			
Work done to improve Community Rating System	23	1			
<b>Total</b>	<b>\$ 9,872</b>	<b>\$ 6,098</b>	<b>\$ 2,438</b>	<b>\$12,765</b>	<b>\$27,528</b>