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Flood Control District of Maricopa County  
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2801 W. Durango  
Phoenix, AZ 85009

# Flood Control District of Maricopa County

## Annual Report 1992/1993



*Providing flood control management  
and leadership throughout  
Maricopa County*

003.112

**Flood Control District  
Tax Levy Rate:  
1961 to 1993**

Fiscal Year Ending	Levy Rate*	Tax Revenue, \$
1961	0.05	253,000
1962	0.05	288,000
1963	0.02	126,000
1964	0.02	135,000
1965	0.02	145,000
1966	0.02	153,000
1967	0.02	158,000
1968	0.02	164,000
1969	0.05	446,000
1970	0.05	454,000
1971	0.05	480,000
1972	0.04	425,000
1973	0.05	645,000
1974	0.20	3,428,000
1975	0.20	3,747,000
1976	0.20	4,154,000
1977	0.20	4,395,000
1978	0.20	4,675,000
1979	0.20	5,026,000
1980	0.20	5,342,000
1981	0.43	11,825,000
1982	0.34	13,720,000
1983	0.50	21,779,000
1984	0.48	25,780,000
1985	0.50	28,697,000
1986	0.50	33,644,000
1987	0.50	41,566,000
1988	0.50	46,059,000
1989	0.50	51,345,000
1990	0.43	46,408,000
1991	0.42	45,797,000
1992	0.44	46,879,000
1993	0.39	39,715,000

\*Per \$100 assessed valuation.

# Financial Highlights

Fiscal Year 1992/1993, Preliminary and Unaudited. Amounts are rounded to the nearest thousand.

	Dollars	Percent
<b>Revenues</b>		
Flood Control Tax	\$39,715,000	89
County and Local Participation	2,413,000	5
Rental Income	123,000	0
Interest Income	938,000	2
Sale of Excess Land	1,162,000	3
Miscellaneous	566,000	1
<b>Total Revenue</b>	<u>44,917,000</u>	<u>100</u>
<b>Expenditures</b>		
Flood Control Capital Improvements	25,910,000	60
Other Expenditures	17,199,000	40
<b>Total Expenditures</b>	<u>43,109,000</u>	<u>100</u>
<b>Excess (Deficiency of Revenues over Expenditures)</b>	1,808,000	
<b>Fund Balance at Beginning of Year</b>	28,038,000	
<b>Fund Balance at End of Year</b>	<u>\$29,846,000</u>	
<b>Breakdown of Expenditures</b>		
Capital Improvements		
Salaries and Wages	\$ 1,022,000	2
Real Estate	7,593,000	18
Engineering	2,193,000	5
Relocation of Facilities	507,000	1
Construction	14,595,000	34
<b>Total Capital Improvements</b>	<u>25,910,000</u>	<u>60</u>
Other Expenditures		
Engineering	2,751,000	7
NPDES	635,000	1
Fixed Assets	817,000	2
Maintenance	6,800,000	16
Administration	6,196,000	14
<b>Total Other Expenditures</b>	<u>17,199,000</u>	<u>40</u>
<b>Total Expenditures</b>	<u>\$43,109,000</u>	<u>100</u>

On the Cover: Photographed on January 9, 1993, New River Dam impounded more than 5 billion gallons of water, releasing it slowly over several weeks into the riverbed. The flow held up work on New River channelization between Olive Avenue and Bethany Home Road for about two months.

The Flood Control District of Maricopa County  
2801 West Durango Street  
Phoenix, Arizona 85009

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# Flood Control: It Works!

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For years, the Flood Control District has weathered criticisms that our work is unnecessary; that our floodplain delineations are unrealistic. Despite the criticism, we continued toward our goal of providing flood control management and leadership throughout Maricopa County, knowing that as soon as the rain fell again, our efforts would be proven worthwhile.

And this year, the jeers turned to cheers as most of the County continued to function despite the intense rainfall and runoff we received when a series of storms off the Pacific Ocean brought rain, rain, and more rain in January, 1993.

People have complained that the Arizona Canal Diversion Channel is an unnecessary concrete ditch. But in January and February, that "ditch" safely conveyed billions of gallons of stormwater that otherwise would have swamped the stormdrains, and flowed over streets and into homes and businesses.

Residents protested when we removed hundreds of acres of non-native "salt cedar" trees from the Salt and Gila riverbeds, angered that we were disturbing the wildlife habitat. But removing them, in cooperation with all landowners and state regulations, made room for the water that would otherwise have overflowed onto farmland. In fact, some water did go over the banks in Maricopa County, but far less than during the severe storms of 1980.

A localized storm in September 1992 convinced the U.S. Air Force that District hydrologists and computers can accurately predict where stormwater will go. Luke Air Force Base flooded as a result of that storm, and the Air Force now is willing to spend \$6 million in a cost-shared project to keep it from happening again.

But the Flood Control District is not all about building and maintaining structures like the Arizona Canal Diversion Channel. Since the last great storms, we have found methods to reduce flood damages that don't require the building of giant earthen dams or deep concrete channels.

This year, newspaper letter-writers and columnists opined that the best way to prevent flood damages is to keep people out of floodplains. We agree. Since we received legal authorization in 1986, we have delineated more than 1,000 miles of floodplain. And since 1988, when the County drainage regulations went into effect, changing building standards to keep structures from causing or worsening local runoff problems, we have conducted nearly 17,000 inspections to ensure that they comply.

We also have earned residents of the unincorporated area of the County a 15% discount on their flood insurance premiums (effective October 1, 1992) because we met rigorous federal requirements to document our projects, floodplain delineations and public education efforts to reduce flood damages. Some of our projects earn points for city residents also, whose jurisdictions participate in the same federal program.

In this report, you'll read success stories about flood reduction measures we have implemented since the severe flooding of more than a decade ago and the issuance of the 1978 Governor's Task Force Report. We'll show you how our structures passed the test in January, and how we plan to help keep the Valley of the Sun moving during the storms of the future.



Neil S. Erwin, P.E.  
Chief Engineer and General Manager



Neil S. Erwin, P.E., took over the helm of the Flood Control District in January, 1993, as the Chief Engineer and General Manager.

He was graduated from the Military Academy at West Point in 1971 and received a commission as a 2nd Lieutenant in the U.S. Army Corps of Engineers. After seven years of participating in military engineering around the world, Mr. Erwin resigned his commission and settled back home in Phoenix, as a civilian with the Los Angeles District Corps of Engineers.

Mr. Erwin has a Masters of Science in Engineering and an M.B.A. from Arizona State University. He is a registered professional engineer in Arizona and Virginia.

# Tested by the Waters

When the rain started falling hard in the second week of January, 1993, flows in the Salt River reached 124,000 cubic feet per second (cfs) and members of the media started calling the Flood Control District to ask: "What's different since the last big flood? What have you done to make things better?"

The answer is, quite a lot.

## Learning from past flooding

The media and residents alike immediately began to compare the flood of 1993 to the severe flooding that occurred in 1978, 1979, and 1980. Like those events, the flood of 1993 resulted from a series of storms coming off the Pacific Ocean, hitting the State in such quick succession that the soaked ground could absorb no more.

While the flood of 1980 produced a much higher peak flow on the Salt River (more than 170,000 cfs), the storm of 1993 produced much more runoff because of the saturated soil, melting snow pack in the north, and the fact that there was just

much more rain falling over a longer period of time.

For contrast, consider that in 1980, Painted Rock Dam reservoir (a Corps of Engineers flood control dam on the Gila River near Gila Bend) was nearly 80% full. In 1993, floodwaters overtopped the spillway due to the excessive runoff entering the river system upstream.

Although the severe storms of the late 1970s and early 1980s were comparable to the weather system that hit the Valley of the Sun this last January, there is no comparison to the property damages, the transportation delays, and the loss of life resulting from the storms of more than a decade ago. In fact, damages were so great after the 1978 storms that the Governor ordered a special Task Force to assess the problems and recommend solutions.

Several of those recommendations have been implemented by the District:

- ◆ Joined with the Arizona Department of Transportation and the City of Tempe to channelize the Salt River from 40th Street in Phoenix to McClintock Drive in Tempe.



In 1978, Cave Creek Wash overtopped the Arizona Canal at about 23rd Avenue between Peoria and Dunlap, flooding homes to the south. Completion of the Arizona Canal Diversion Channel as well as channelization of the Wash kept floodwater out of streets, yards, and homes during the storms of January, 1993, averting this kind of damage.



The blue area represents where the floodwaters flowed over the banks of the Salt River (between 40th Street and McClintock Road) in the February 1980 storm. The heavy blue line shows where—since that storm—the river has been channelized to withstand 215,000 cfs, successfully containing floodwaters during the January 1993 flows.

- ❖ Spent \$10 million since 1983 to clear a 1,000-foot wide corridor of non-native salt cedar bush that choked the Salt and Gila Rivers, causing water to overflow the banks. Additionally, a pilot channel was constructed for low flows to help keep the river banks from eroding. All this work was performed with the express consent of, and coordination with, all property owners, jurisdictions, and applicable state and federal agencies.
- ❖ Installed and maintained a state-of-the-art network of just under 200 electronic gauges throughout the watersheds that affect Maricopa County. The gauges transmit rainfall and stream flow information instantaneously to the District as well as to the National Weather Service to support flood warning efforts. The gauges also provide data that is valuable for the study and computer modeling of desert storms and floods.

In 1978, when alternatives were being considered to Orme Dam, which had become politically infeasible, it was recommended that Roosevelt Dam be raised to accommodate storage of water for flood control purposes. The District has helped fund that recommendation.

Just as important to reducing flood damages have been the District's efforts to implement non-structural approaches. In the past ten years we have:

- ❖ Initiated an aggressive program in 1986, based in state law, to identify 100-year floodplains; so far, more than 1,000 miles of floodplain have been identified.

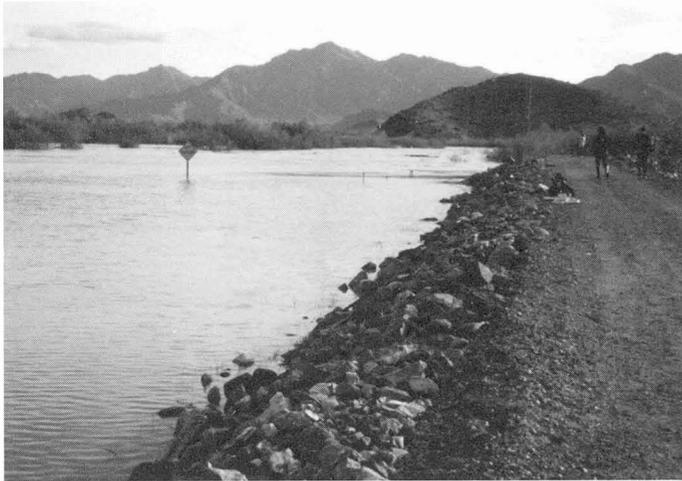
- ❖ Encouraged passage in 1988 of a County drainage regulation that requires all building plans in the unincorporated area be reviewed to ensure they do not cause any drainage problems; since then, the District has conducted nearly 17,000 building inspections.

## The Flood of '93

Since the last great floods, the District has celebrated the completion of twenty flood control structures across the County. These structures helped contain floodwaters and damages during the 1993 storm. While all of our structures worked as designed without failure, there were some tense and dramatic moments.

District crews worked late into the night on January 8 to supplement a levee we constructed in 1985 near Holly Acres. The small community sits at the confluence of the Salt and Gila rivers and flooded repeatedly in the late 1970s and early 1980s. The levee, built to withstand 115,000 cfs, held against at least 124,000 cfs in January, although the community was evacuated anyway as a precaution. No homes were flooded by the river, and Flood Control District crews sandbagged dip crossings of the river to ensure that water didn't rise up the street and into homes.

Elsewhere around the County, when an embankment on Queen Creek was breached one night in January, Flood Control District crews raced to repair it. Their quick action averted further damage to adjacent farmland and homes and the District's



A traffic sign is marooned by the flowing Gila River at the unbridged crossing of 115th Avenue in January. The flow is checked by the District's rock levee (right), completed in 1985, to protect the nearby community of Holly Acres.

East Maricopa Floodway, which was being eroded by the heavy overland flow.

Not all the flooding action was dramatic enough to require late night vigils—and not all of it occurred along the Salt and Gila Rivers. The Phoenix and Vicinity (including New River) Flood Control Project, which includes four dams and the much-maligned Arizona Canal Diversion Channel, performed perfectly throughout the rainy winter.

The New River Dam and the Cave Buttes Dam on Cave Creek Wash north of Phoenix each held back more than 5 billion gallons of stormwater. Cave Buttes Dam drained for several weeks into Cave Creek Wash, which now flows into the Arizona Canal Diversion Channel. While several dip crossings of the wash in north Phoenix were closed during those weeks, the water stayed safely in the channel, and out of homes and businesses.

Flows in the Arizona Canal Diversion Channel peaked January 11 at 1,400 cfs, at a depth of 4.5 feet near 67th Avenue—a considerable amount of

water, since the channel at that location is 110 feet wide. Water that entered the Channel from Cave Creek Wash, other urban streams and city stormdrains flowed into Skunk Creek. Before construction of the Diversion Channel, this water would have ponded north of or flowed into the Arizona Canal, until it broke over the canal and bank, flooding parts of Phoenix, Glendale, and Peoria.

For a while during this fiscal year, we focused on the task at hand: monitoring the flood flows and making emergency repairs where needed. But as the Salt River dwindled to a trickle and the water drained from behind the dams, the District returned to business as usual:

- ✧ Responding to citizen drainage inquiries;
- ✧ Maintaining our structures;
- ✧ Delineating floodplains;
- ✧ Collecting flood data;
- ✧ Meeting federal and state environmental guidelines;
- ✧ Managing District property;
- ✧ Planning, to avoid flood damages in the future; and
- ✧ Constructing projects.

These are the everyday activities that prepare us for the unpredictable, yet inevitable, severe desert storms. They are integral to our mission to provide flood control management and leadership throughout Maricopa County.



Cave Buttes Dam held record amounts of water after the January storm before releasing it into Cave Creek Wash. The old Cave Creek Dam, visible here, would have overtopped if it were the only structure on the wash.

# Drainage Administration

Even outside 100-year floodplains, improper construction practices can cause drainage problems. County ordinances require that buildings, even walls, do not divert surface flows. Stormwater runoff must enter and exit the property at the same place it did before construction. These actions help avert the cumulative effect of diverting even small surface flows.

All building plans in the unincorporated area of the County, from the do-it-yourselfer to large-scale developers, are reviewed by the Flood Control District. These plans also must be approved by the County's Planning and Development, Transportation, and Health Departments. To make it easier for applicants to have their plans approved, District staff has joined representatives of these departments in "one-stop-shops" in downtown Phoenix and in Sun City West.

A further improvement in customer service is a plan being developed by the Flood Control District and the County Building Safety office to combine certain inspections conducted by both groups, streamlining the process for builders.

A survey was developed and administered to gauge customer satisfaction with the level of service offered in the District's plan review process. Surveys in November 1992 and March 1993 showed a 95% approval rating, with an average of 83% of the questionnaires returned.

Drainage Administration Activity Chart			
	1990/91	1991/92	1992/93
Inspections	2,999	4,389	5,848
Drainage clearances issued	2,208	2,738	3,250
Plan reviews	503	356	415
Complaints investigated	144	60	221*

\*Major storms in July 1992 and January 1993 increased the number of complaint investigations significantly during this fiscal year.



Drainage Inspector George Lindop discusses with a property owner how his proposed construction can be accomplished in accordance with County guidelines to keep from causing drainage problems.  
*Photo by Ed Karnafel.*

In addition to reviewing plans to comply with County regulations, Drainage Administration staff respond to citizen calls about possible violations. An inspector is dispatched to investigate and document the situation. If a violation exists, the inspector notifies the property owner to discuss how to correct the situation. Unresolved complaints are referred to the County Attorney's Office for action.

## Drainage Design Manual

Volume II of the Drainage Design Manual, Hydraulics, was completed and more than 100 people from the private and public sector attended a hands-on workshop to learn how to use the material.

The manual has been developed to offer information specific to the desert southwest conditions on how to calculate rainfall runoff amounts (Volume I, Hydrology) and how to develop drainage systems to handle the runoff (Volume II).

By using this standardized information, drainage systems developed by a variety of builders, across jurisdictions, can mesh with each other and accommodate storm runoff to avert local drainage problems.

# Maintenance

Routine maintenance of District structures was anything but routine after the storms of January. Record winter rains took a heavy toll on many of the earthen dams and channels—causing erosion that required repair.

During the storms, maintenance crews were dispatched to observe the condition of the structures and to make emergency repairs as necessary. Overtime work required by the crews exceeded 1,000 hours, most of which was supplementing a levee in the Holly Acres area and in repairing a breach in a levee on Queen Creek.

The Holly Acres levee, constructed by the District in 1985, was built to withstand 115,000 cfs, but—with the help of District crews and laborers from the Arizona Department of Corrections and an estimated 15,000 sand bags—held out against the peak flow of 124,000 cfs. To reduce the possibility of flooding, the crews constructed a diversion levee, measuring 1,000 feet long, 12 feet wide, and 8 feet high, at the east end of the dike. Sand bags were placed on the road crossings at 115th Avenue on the north side of the river.

On the other side of the Valley, crews monitoring the District's east side projects found a breach in Queen Creek, which was overflowing onto adjacent farmland and the District's East Maricopa Floodway—causing damage to both. Crews worked into the night to repair the breach, and returned over the next few days to reinforce that breach as well as two other areas that were considered in jeopardy.

In all, District crews spent more than 2,600 hours surveying the structures during the January storms, and nearly 10,500 hours repairing erosion to and removing sediment from the structures since.

Other milestones reached by our Construction and Operation Division over the past year include:

- ◇ Accepting into our maintenance program responsibility for the East Fork Cave Creek Channel.
- ◇ Completing a comprehensive review of the District's maintenance responsibilities as recorded in Intergovernmental Agreements that dated back three decades. The review uncovered situations where we were taking care of property



Floodwater from the Salt and Gila Rivers threatened the small community of Holly Acres until a levee was reinforced by District personnel and Department of Corrections crews.



Mike Rosiewicz, Team Leader, inspects the work of the “grizzly,” a device designed by Team Leader Tim Burkeen to separate rocks from dirt. The grid is made of steel rebar on an angle to allow the dirt to fall below. When the rock is laid to protect a channel, grout will be poured on the rock to keep it in place. It is important to remove the dirt because it affects the ability of the grout to adhere to the rock.

for which we had no jurisdiction. Discussions with the agencies concerned corrected and realigned maintenance responsibilities.

- ❖ Beginning a computerized system to track calls from the public, and recording 28 complaints with concerns ranging from weeds or debris on District structures to the need for fence repair or better drainage.

## **New operations yard saves funds**

This year, the District opened a satellite operations yard for crews maintaining the Arizona Canal Diversion Channel. The yard, located on property acquired by the District for the project, allows crews to report to the facility near their work areas, rather than reporting to the Durango complex—nearly half an hour away—and returning to the Durango complex at night. Estimated savings, based on 12 crew members working 208 days per year, is approximately 2,500 hours (of previous commute time), or approximately \$35,000.

The District is currently investigating the savings of opening a similar satellite yard in the East Valley.



Dan Davis, Equipment Operator II, removes dirt from a bank of the East Fork Cave Creek at Siesta Lane north of Union Hills, to make way for an inlet. Drainage from an adjacent trailer park was eroding the bank at the location, so the maintenance staff suggested creating the inlet to protect the bank and accommodate the runoff.

# Floodplain Management

## Floodplain Delineation Studies

This year, the Federal Emergency Management Agency (FEMA) approved floodplain delineation studies for Gila Bend, Little Rainbow Valley Wash and Luke Wash (see map).

Studies were forwarded to FEMA for six other floodplains: Powerline, Daggs, Star, Iona, Deadman, and Apache washes.

Four other delineation studies remain in progress: Waterman Wash, Buckeye Area, White Tanks Wash, and Fountain Hills (North and South Studies).

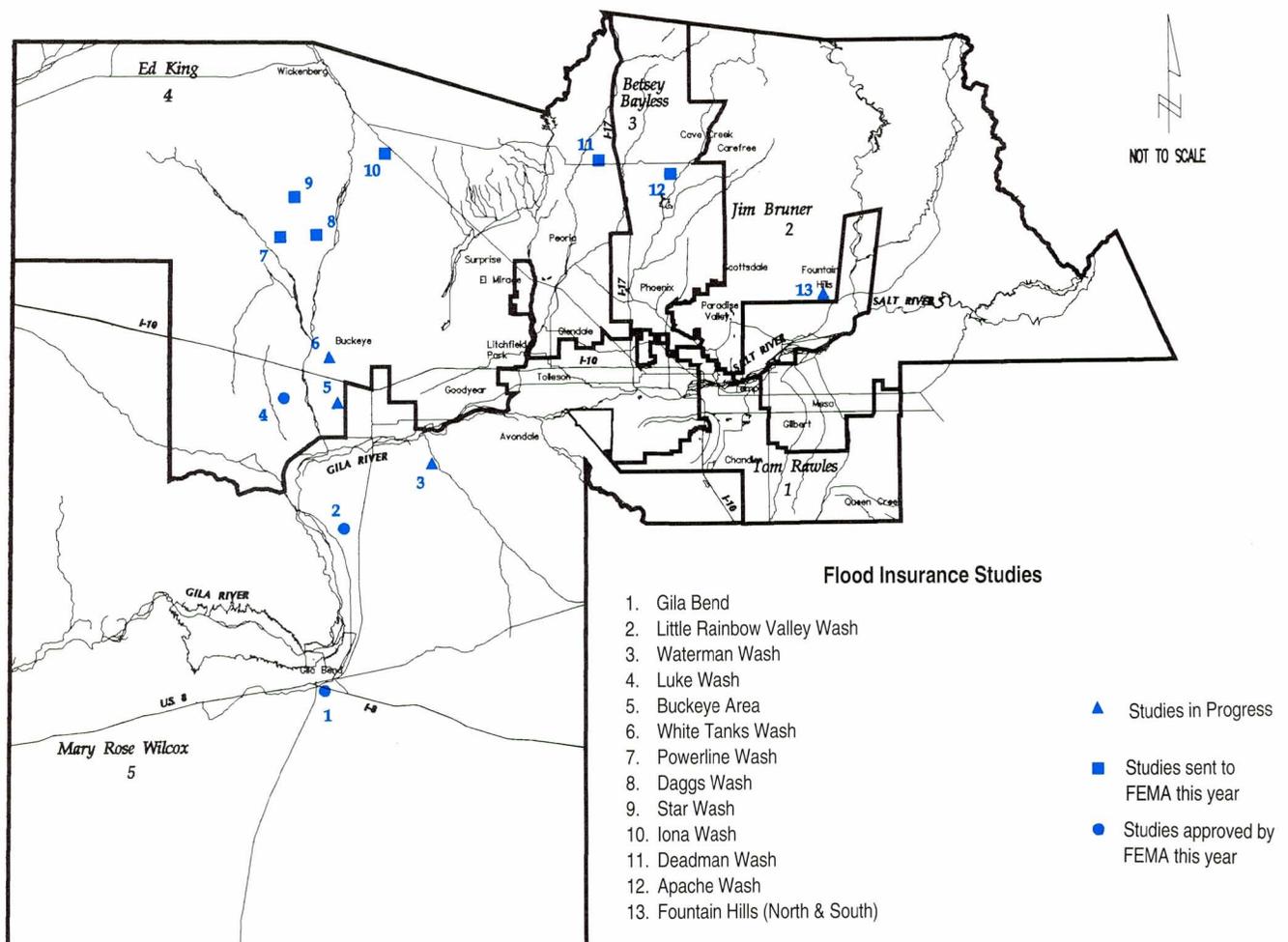
Studies accepted by FEMA are incorporated into Flood Insurance Rate Maps.

## Points add up to 15% off flood insurance

The federal government gives credit where credit is due. That means homeowners in the unincorporated areas of the County will receive a 15% discount on flood insurance because of Flood Control District actions.

The Community Rating System (CRS), a program of the Federal Emergency Management Agency, gives communities points for a broad range of activities that result in reduced flood damages.

Only 350 communities nationwide are participating in CRS's rigorous program to document flood reducing activities. The District is one of four communities that has achieved the 15% discount rate; only one





Making points: District staff members conduct an open house for residents in the Arlington area to view newly developed 100-year floodplain maps. This was one of twelve project-related public meetings conducted during the year. The District receives CRS credits for both the study and the meetings.

community has achieved the 20% rate. The District already has assembled the necessary documents and will apply for the 20% rate.

Points are awarded for such activities as structures (dams and channels) and their maintenance; identifying 100-year floodplains and regulating development in them; and for increasing public awareness through placing materials in public libraries, conducting public meetings on flood-

plain studies, and participation in public events.

The District hosted a field trip from the National CRS conference in Phoenix in November to demonstrate how the computerized Geographic Information System of mapping can assist in meeting CRS criteria.

### **District to help in program to streamline map revision**

FEMA notified the District that it is qualified to participate in a pilot program for accelerated revision of 100-year floodplain maps for all jurisdictions within Maricopa County.

Under this program, the District would replace FEMA as the technical reviewer of floodplain delineations submitted by County developers and municipalities for incorporation into Flood Insurance Rate Maps. FEMA would provide technical oversight and formal training of District staff to implement the program.

FEMA is implementing this program to save time in the revision of Flood Insurance Rate Maps by selecting qualified local agencies to perform reviews.

#### **Floodplain Management Activity Indicators**

- ❖ Initiated 6 floodplain studies; submitted 11 new 100-year floodplain delineations to FEMA, and incorporated 5 FEMA-adopted studies into floodplain management maps; involving in all a total of 746,306 acres.
- ❖ Processed 72 floodplain use permits; issued 28.
- ❖ Investigated 40 complaints; 2 resulted in violation notices, 1 referred to County Attorney.
- ❖ Conducted 189 plan reviews.
- ❖ Handled 12,899 requests for information, such as floodplain determinations (this will decrease next year because Phoenix has requested we refer its residents to the city).

# Flood Detection and Data Collection

## ALERT system activities

The Flood Detection and Data Collection program involves the design, installation, and maintenance of an accurate, reliable, real-time computerized system to obtain precipitation and runoff information.

Called Automated Local Evaluation in Real Time (ALERT), the self-contained gauges transmit flood warning information instantaneously by radio waves to the base station at the District office. The data also is used for monitoring flood control structures and for hydrologic studies.

Thanks to the expert hydrologists and technicians, *ALERT* operated exceptionally well during the January storms, providing a steady flow of timely flood warning information to decision-makers during a state-wide emergency.

Other highlights of the program from the past year include:

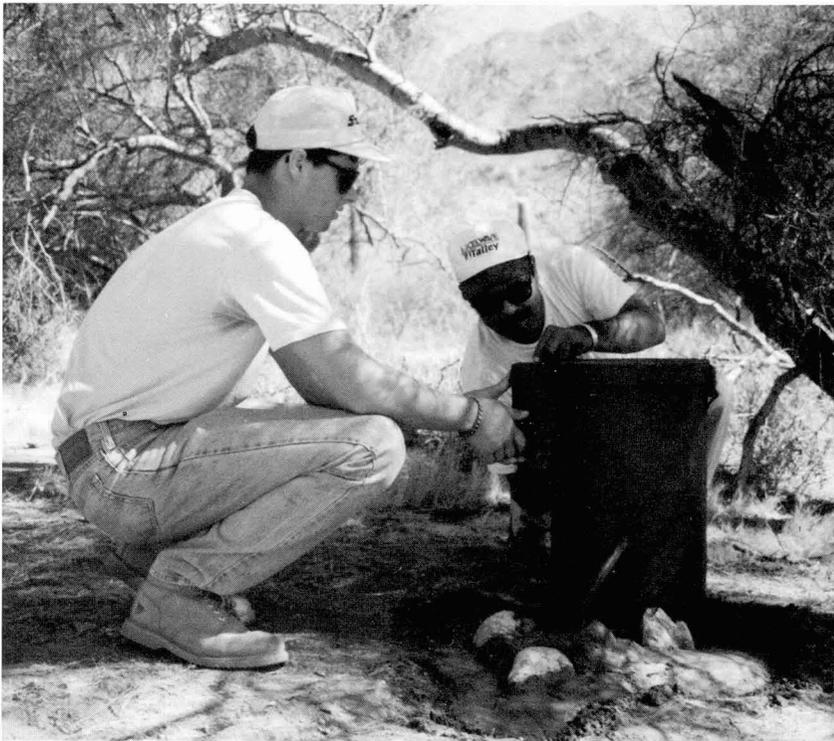
- ◆ Hosting the fifth Annual Conference of Southwest Association of ALERT systems in October; 87 members attended

from nine states, Puerto Rico and Jamaica.

- ◆ Linking several computer-accessible information programs, including Geographic Information System, so time is saved during critical storm periods by combining several sources of data in one program (such as inundated areas with streets, roads and bridges to identify when roads should be closed).
- ◆ Completing the conversion of ALERT gauges from UHF to VHF radio bands, increasing system reliability.
- ◆ Adding 15 precipitation gauges and 5 stage (stream) gauges, bringing the system total to 140 precipitation gauges and 55 stage gauges.
- ◆ Performing 216 maintenance actions on gauges, plus 160 repairs, including 71 for vandalism.
- ◆ Maintaining a 93% operational level of the gauges during the major storm event in January (some gauges were washed out).



Marta Dent, Senior Decision Support Analyst, shows visiting Guatemalan officials the District's Flood ALERT room, with its metropolitan and watershed maps locating rain and stream gauges that transmit real-time information to the District regarding precipitation and runoff.



Hydrometeorologic Assistant Arnold Ontiveros, right, is assisted by summer intern Tim McGlynn, while installing alluvial fan data collection instrumentation in the Estrella Mountains.

## Hydrologic activities

Some of the other accomplishments of our Hydrology Division staff include:

- ✧ Completing inundation maps for emergency spillway outflows of all District structures, which were forwarded to the County Department of Emergency Management.
- ✧ Revising Volume I of the Drainage Design Manual, Hydrology, to standardize rainfall and runoff projections among all the jurisdictions and consultants who perform such work. Reliable, standardized runoff projections lead to uniform structure designs, as addressed in Volume II, Hydraulics. One hundred and ninety people from the public and private sectors attended a workshop on how to use the manual.
- ✧ Continuing cost-sharing studies with several Federal and State agencies to refine floodplain management policy and to improve methods of predicting and measuring floods through data gathered as a result of cost-sharing agreements.

## Alluvial fan data collection

The District is conducting what it believes is the only study of alluvial fans in the country. Alluvial fans, in the lower areas of mountains, are popular areas for development, but existing methods of floodplain delineation are not applicable to them.

The District has installed data-gathering instruments on alluvial fans during the past year in the Estrella Mountains and South Mountain, to measure the action of rainfall, runoff and sediment in these changeable areas.

The resulting data will provide the basis for computer models, which will be an important tool for consultants and public works agencies to accommodate safe development in these areas.

# Environmental Program

## NPDES Stormwater Compliance Activities

The District continues to act as regional coordinator in meeting the requirements of the Federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES). This program holds municipalities responsible for the quality of stormwater discharged into natural waterways, or "Waters of the U.S."

District structures accept runoff from a variety of sources, and all ultimately discharge into Waters of the U.S. The District works with municipalities, private industries, and residents to ensure that the water that empties into rivers and streams through our structures does not degrade those waterways.

In the past year, we have accomplished the following tasks to meet or exceed the NPDES requirements:

- ◇ The Environmental Protection Agency (EPA) accepted the group permit application prepared by the Flood Control District for five County and three other municipally-owned landfills. A sampling program is in place that will identify types of contaminants in stormwater runoff from the various landfills.
- ◇ An intergovernmental agreement between the District and the City of Mesa transfers responsibility for NPDES stormwater monitoring to the District. Mesa will assist in locating and handling illicit discharges into stormdrains and flood control channels. A similar agreement has been negotiated with Phoenix, and is expected to be approved in fiscal year 1993-94. These agreements are the first in the District's efforts to implement

a regional stormwater monitoring network.

- ◇ The District received EPA funding for a pilot project using wetland plants and associated microbes to breakdown petroleum in stormwater runoff from a vehicle maintenance yard. The project has proven successful and can be used at gas stations and vehicle maintenance yards where poor quality runoff occurs. Results of this study will be presented at the 1993 Water Environmental Federation Annual Conference in October.

- ◇ The Environmental Branch led the development of an erosion control manual by a group of regional public and private sector members. This manual provides guidance to control construction site runoff, part of NPDES permit requirements.

- ◇ Maricopa County Association of Governments has formed the Stormwater Task Force to manage stormwater quality regionally. The task force is coordinated by District staff, who

prepared a model ordinance to protect stormwater quality for cities applying for NPDES permits.

- ◇ District staff responded to non-storm discharges that may have been illicit and worked with the public to solve pollution discharge problems.
- ◇ Stormwater pollution prevention plans for our Operations and Maintenance activities have been developed to ensure compliance with the NPDES program.

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***District staff were commended by the Homebuilders Association of Central Arizona for their role in educating government and business about the requirements for the NPDES program: "Your efforts were key in alleviating much fear and confusion about the new federal regulations...no other organization in the state or country has produced the kind of documentation (Erosion Control Manual) we now offer our members...local jurisdictions as well as association members will benefit from your hard work."***

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Hydrologist Roland Wass and Professor Peter Fox of Arizona State University examine an experimental vegetative screen intended to filter contaminants from stormwater that runs off a County vehicle maintenance yard. Wass obtained EPA funding for the project as part of the NPDES program. *Photo by R. Gates, courtesy of Phoenix Gazette.*

- ❖ Under the District's joint funding agreement, the United States Geological Survey has two storm events left to monitor before their data collection for the Urban Stormwater Runoff Characterization study is complete. All data will be put into the District database and annual stormwater quality reports will be sent to EPA and impacted agencies.
- ❖ The Environmental Branch is spearheading the Urban Runoff Technical Advisory Group effort to evaluate ways of controlling pollutants that enter our structures through variable or untraceable sources. The group's goal is to develop Best Management Practices guidance manuals to minimize stormwater pollution from urban nonpoint sources.

## Other Activities

The Environmental Branch is working to modify pollution prevention plans for construction sites so they will meet County Air Quality requirements.

The District is in the final stages of obtaining environmental permits, including 404 permits, for Colter Channel and the Spook Hill Outlet. A 404 permit has been approved for the Wittmann Wash training dike. These permits are part of the Federal environmental compliance for District construction projects in Waters of the U.S.

Other programs include environmental assessments conducted prior to purchase of real property, response and clean up of hazardous materials on District property, and programs to ensure worker safety.

# Property Management

The Land Management Division buys, sells, maps and manages land pertaining to various District projects. Highlights of this year's activity include the acquisition of 65 parcels for \$6.5 million for projects on the New River, Trilby Wash, the Agua Fria River and the Arizona Canal Diversion Channel.

Negotiations with Westcor will result in the exchange of land that ultimately will enable the City of Peoria to consolidate a parcel large enough for its new stadium to host spring training for the Seattle Mariners and San Diego Padres. The Stadium District and the Flood Control District share the same Board of Directors (Maricopa County Board of Supervisors). Ground was broken for the stadium in June, under a right-of-entry agreement.



This aerial photo of impounded runoff behind Adobe Dam on Skunk Creek also shows the water park in the reservoir area, which is operated according to an agreement negotiated by the Land Management Division, one of several examples of multiple use of project areas that benefit the public.

The Property Engineering and Information Systems staffs coordinated to improve map computerization, which now includes costs, parcel transactions, property management transactions and other information vital to the operational flow of land acquisition and management.

Several District property acquisitions are stalled by an issue that has haunted State courts for decades—who owns the riverbeds? A State commission established by legislation has started the process of determining ownership, which could complicate past District transactions if the State is determined to be the owner of riverbeds rather than private parties from whom the District purchased them.

More than \$6 million has been earmarked for the purchase of property on which the Trilby Wash/McMicken Dam project sits, in the northwest valley. This project predates the District, which inherited it with only easements on the property. Those easements did not preclude development inappropriate to flood control purposes.

Other key activities included identifying ownership of more than 4,000 parcels for the Great Salt River Cleanup following the winter floods; and completing some 850 transactions, including preliminary title reports, appraisals, negotiations, openings of escrow, and condemnations.

All property acquired by the District involves extensive legal documentation. Hundreds of documents might be required for a single project, including ownership in fee (outright ownership of the property), easements and rights-of-entry. Documentation for each project must be certified, a painstaking procedure in which each document is examined by staff and legal counsel. Three projects were certified this year; five were re-certified and three are in the process of being re-certified. The Division compiles all these documents, along with a detailed map, into one book for immediate reference.

The District believes in putting its assets to work, as long as they are compatible with the flood control mission. Such activities include leasing property in flood channels for golf courses, and leasing reservoir areas behind dams for parks. We also lease properties in the path of projects until they must be razed.

# Planning and Capital Improvement Program

A change in leadership occurred this year, with the retirement of John Rodriguez, P.E., who headed the Planning and Project Management Division for seven years. His post was assumed by Stanley L. Smith, Jr., P.E., who has been with the District nearly 15 years as a Division Chief, Deputy Chief Engineer and Acting Chief Engineer.

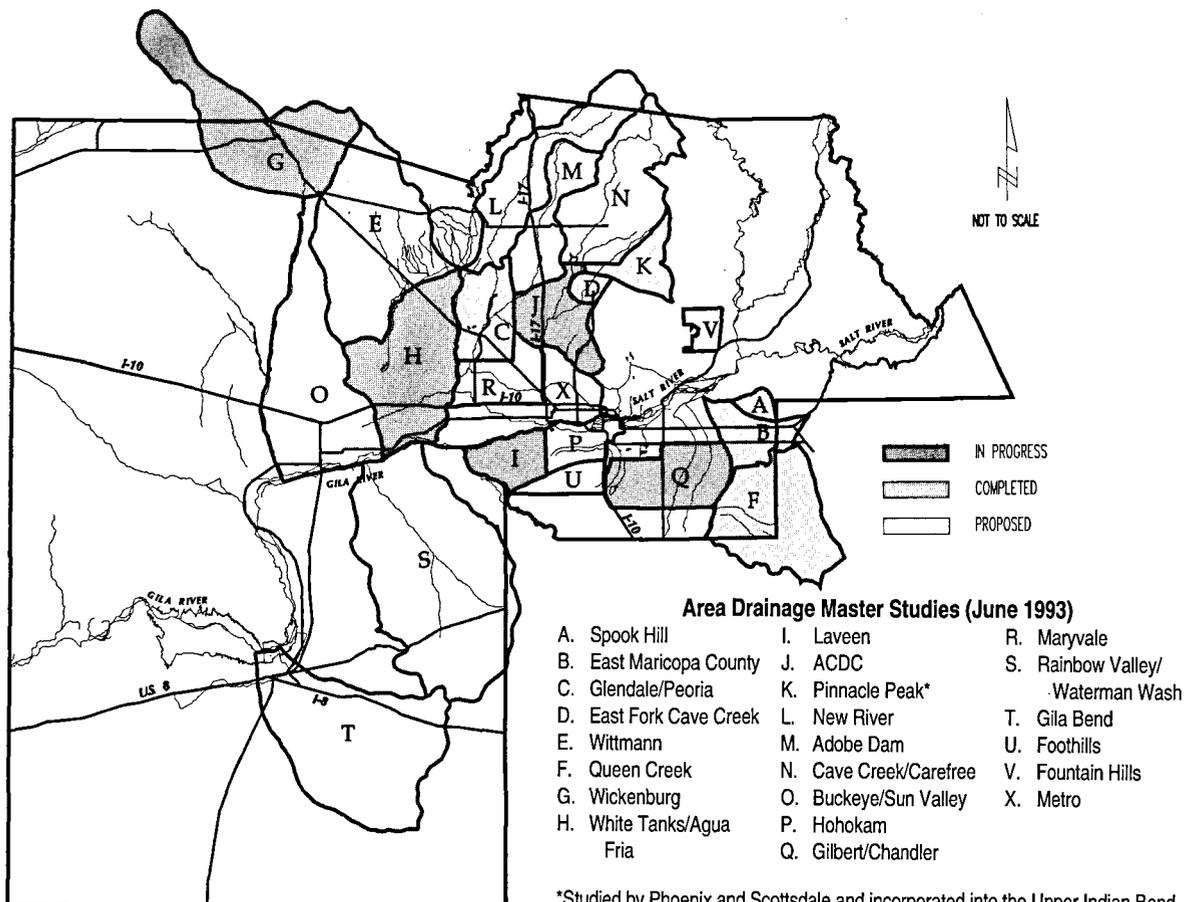
The District's planning program identifies drainage problems and develops alternative solutions to protect life and property of County residents. This is accomplished through Area Drainage Master Studies, the Comprehensive Plan, and Watercourse Master Planning, which result in project concepts proposed for inclusion into the Capital Improvement Program.

## Area Drainage Master Studies

Through the Area Drainage Master Studies (ADMS) program, we evaluate natural

drainage systems and determine what, if any, additional floodproofing measures are required to meet the current and planned development of an area. Some of the highlights of the past year include:

- ◇ As a result of the White Tanks/Agua Fria ADMS, a joint project was identified between the District and Luke Air Force Base to develop improvements to Dysart Drain.
- ◇ Staff is reviewing the final documents for the Cave Creek watershed in the Arizona Canal Diversion Channel ADMS.
- ◇ In the Wickenburg ADMS, the 100-year floodplain has been identified and a public meeting was conducted to inform residents of the results. The consultant is preparing documents to submit the proposed floodplain to the Federal Emergency Management Agency.



\*Studied by Phoenix and Scottsdale and incorporated into the Upper Indian Bend Wash, Regional Drainage and Flood Control Plan.

## **Laveen residents challenge floodplain delineation**

The ADMS program received its first serious challenge this year, as Laveen residents took issue at a public meeting with the delineation of the 100-year floodplain in their area. Concerns also were expressed by elected officials of State and County government.

As a result, staff departed from FEMA floodplain delineation criteria by taking local factors into account. For example, FEMA rules require that Maricopa Drain, a drainage ditch in the area, be ignored in the delineation because it is intended to drain irrigation off agricultural land, so there is no guarantee how much space would be available at any time for flood control; also, no plan exists to maintain the facility for flood control.

While this makes good sense from a conservative flood insurance standpoint, it also is evident that stormwater runoff *will* drain into the ditch, whether the study acknowledges it or not. Other factors included the irrigation patterns of the area compared to the rainy seasons, and resulting soil absorption rates.

District staff conducted extensive interviews with residents and farmers on their irrigation practices and observations, and gathered additional data to develop alternative computer models. After varying different factors, staff concluded that even using less-conservative criteria, a considerable 100-year floodplain would still exist. But it also found that, if improved, Maricopa Drain could handle the flow. The initial results were presented to the Flood Control Advisory Board in June. Any decision will be made by the Board of Directors.

## **Salt-Gila Watercourse Master Plan**

The District's first watercourse master plan is being approached from two avenues: 100-year floodplain delineation, and a broad-based study to determine the elements of a master plan and Environmental Impact Statement.

The floodplain delineation of the 72 miles between Granite Reef and Gillespie Dams is about 60% complete, despite a major change order in the wake of this year's flooding.

A scoping study is underway to determine the needs and desires of all the public and private parties who have ownership interests and environmental interests in the river. A three-tiered involvement plan was developed to gather this information, comprised of (1) decision-makers from all the local, state, federal and Indian jurisdictions along the 72-mile stretch of river; (2) a working committee of the staffs of these decision-makers; and (3) a study interest committee which serves as a vehicle for direct citizen input.

The first public meeting was conducted this year to unveil the master plan concept to citizens and advise them of the study's progress. Many residents, including several from the much-flooded Holly Acres, said they supported the concept of a holistic approach to planning land use in and along the river. Other residents said the primary focus should be simply to keep all use and development out of the floodplain.

A few were concerned that the scoping study was an attempt to resurrect the "Rio Salado" concept, voted down by residents in the 1980s, which would have used tax dollars to support and encourage development along the river through the metropolitan area.

After the floodplain is delineated, and the scoping study identifies the elements needed in a master plan, the decision to proceed with a plan will be determined by the elected officials of the cities and the District, the most likely parties to fund the plan.

## **Project prioritization**

The District's Strategic Plan calls for implementing a procedure to identify and prioritize flood control and stormwater management projects. A 1991-92 Arthur Anderson performance audit recommended the District analyze its process and reduce its complexity.

A draft of the prioritization procedure was written in October and circulated to 36 cities and agencies with whom the District cooperates on projects. Their comments and concerns were incorporated into the next draft, presented to the Advisory Board in June. The draft includes criteria such as: regional significance, level of protection, level of local participation, public protection benefits vs. future development benefits, total project cost, permit requirements and potential future costs, local priority, and potential for multiple use. Adoption of the plan is expected next fiscal year.

## Five-year Capital Improvement Program

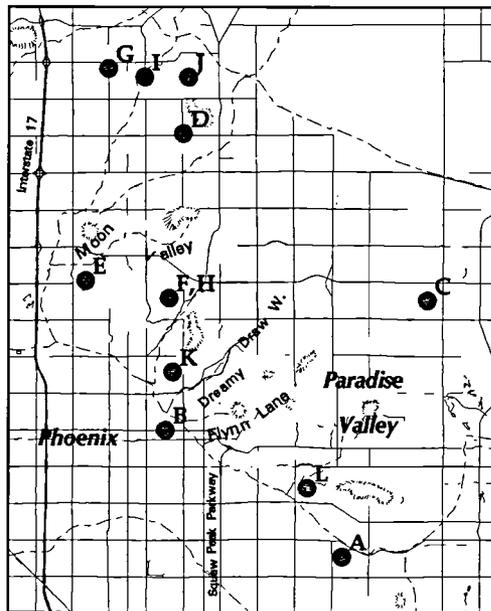
Projects identified through the planning process, and approved by the Board of Directors, become part of the Capital Improvement Program (CIP). The program resolves flooding and drainage problems throughout the County through design and construction of projects, land acquisition, and relocation. Environmental issues and public input are important components of every project.

CIP projects have been grouped into five planning areas: Central Metro, North/Northeast, South/Southeast, West Valley, and Wickenburg. Some of the projects reaching milestones include:

### Central Metro Planning Area

**Arizona Canal Diversion Channel:** The final reach is approximately 98% complete, with nearly all backfill placement performed. Work continues on the excavation of the lower basin at the Phoenix Country Day School, placement of the concrete spillway, placement of landscaping maintenance. Landscaping, coordinated with the Town of Paradise Valley, is scheduled for completion by the middle of September, 1993.

**Old Cross Cut Canal (McDowell Road to the Arizona Canal):** The second study phase of the design contract is complete. The "Draft Final Study Report" is being reviewed by the City of Phoenix and the District. The District and the City are deciding on what covered channel alternative



### Central Metro Planning Area

**Current 5-year CIP projects:** A) Old Cross Cut Canal; B) Arizona Canal Diversion Channel; C) Paradise Valley-Scottsdale-Phoenix; D) East Fork Cave Creek ADMP; E) ACDC ADMP (Moon Valley Wash); F) ACDC ADMP (10th Street Wash).

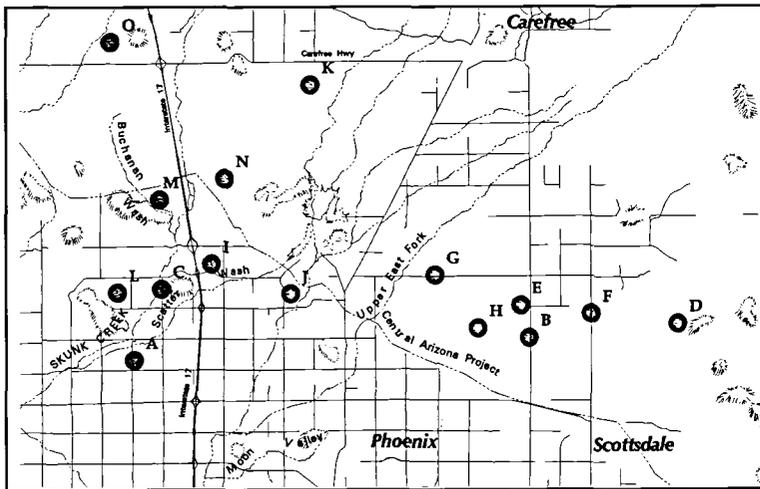
**Future CIP projects:** G) Beardsley Road Regional Drain; H) ACDC ADMP (10th Street Wash); I) Cave Creek Wash; J) Beardsley Road Regional Drain; K) ACDC ADMP (Dreamy Draw Wash); L) ACDC ADMP (Cudia City Wash).

will be selected and constructed, including input from a series of public meetings. At that time, the preparation of plans and specifications for that option can begin.

### North/Northeast Planning Area

**Cultural Resources Interpretive Center at Adobe Dam:** The contract was awarded to Sigma Construction in January. The project plans are being reviewed by the City of Phoenix; city plan review and inspection fees are being negotiated.

**Scatter Wash Channelization:** Final plans have been reviewed by the District and ADOT staff prior to bid advertisement, and the 404/401 Federal permit applications have been submitted. The City of Phoenix's current schedule projects awarding a construction contract early in fiscal year 1994.



### North/Northeast Valley Planning Area

**Current 5-year CIP Projects:** A) Scatter Wash and Outer Loop; B) Upper Indian Bend Wash ADMP; C) Adobe Dam Cultural Resources Interpretative Center.

**Future CIP Projects:** D-H) Upper Indian Bend Wash; I) Scatter Wash; J) Cave Creek Wash; K) Apache Wash; L) Little Deer Valley; M) Buchanan Wash; N) East Biscuit Flat; O) Deadman Wash.

### West Valley Planning Area

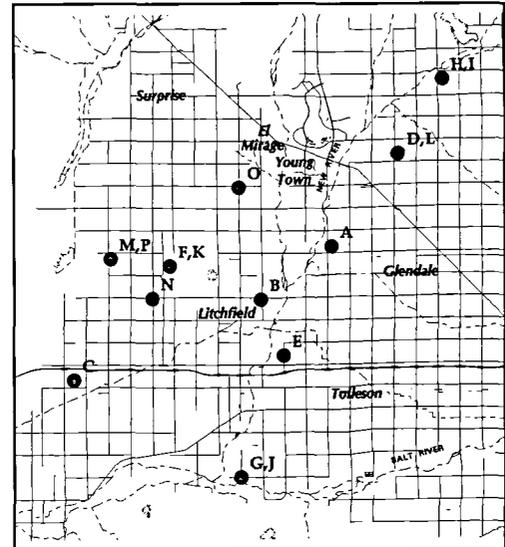
**Glendale/Peoria ADMS Projects:** The City of Glendale is preparing an invoice for the District's share of the project costs for the Olive Avenue Drain. The final plans and special provisions for the Cactus Road Drain will be signed by the cities of Glendale and Peoria.

**Colter Channel Project:** The consultant is in the process of preparing the final plans and specifications. The right-of-way acquisition process and utility relocations continue. Public meetings were conducted in January and March of 1993 to advise the public of the planning process.

**Dysart Drain/Luke AFB:** The feasibility study is complete and the District and Luke AFB have evaluated it and selected an alternative which will be used to formulate the final Alternative Report for use in the design of the project. A design contract consultant was selected.

**New River Channelization:** Work is about 50% complete on New River between Olive Avenue and Bethany Home Road. Public meetings were conducted in August 1992 and January 1993 to advise residents of the project.

The District is presently evaluating the feasibility of channelizing the portion of New River between Bethany Home Road and Camelback Road, using the plans prepared for the developer.



### West Valley Planning Area

**Current 5-year CIP Projects:** A) New River Channelization; B) Colter Channel; C) White Tanks Structures; D) Glendale/Peoria Storm Drains; E) Agua Fria River; F) Dysart Drain/Luke AFB; G) Salt-Gila Control Works; H) Skunk Creek Channel.

**Future CIP Projects:** I) Skunk Creek Channel; J) Salt-Gila Control Works; K) Dysart Drain/Luke AFB; L) Glendale/Peoria Storm Drains; M) White Tanks Structures; N) Bullard Wash Channel; O) El Mirage Wash Corridor; P) Local Detention Basins/Channels.

## South/Southeast Planning Area

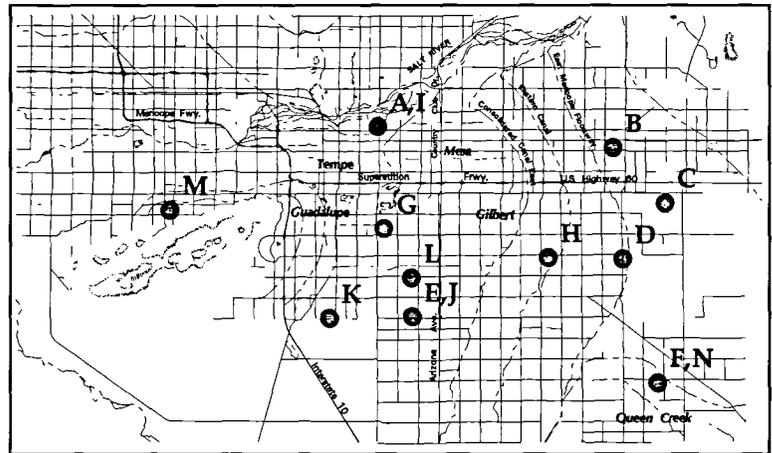
**Salt River Channelization:** The stretch between Sky Harbor Airport and McClintock Drive is 100% complete, taking property out of the floodplain and allowing ADOT to build a freeway on the north side of the river.

Channelization continues east of McClintock, although work was slowed due to the heavy flows in the river this winter.

Testing of the superfund landfill site was completed and the final report was submitted to the District and ADOT, which will soon make a decision regarding alignment and design for the 100-year level protection south levee east of McClintock.

**Gilbert Basin:** Gilbert took an interesting approach to a 100-year floodplain delineated in part of the town: it had the basin constructed to capture overland flows. The basin doubles as a park, for which the city funded the recreation amenities, including three soccer fields, a 3.75 acre lake, an amphitheater and four softball fields. The project was dedicated in September 1992. The District contributed \$1.9 million of the \$4.8 million project.

**Sossaman Road Box Culvert:** This project is under construction and is 95% complete. The contract is for an additional culvert under Sossaman Road, new culvert en-



## **South/Southeast Valley Planning Area**

**Current 5-year CIP Projects:** A) Salt River Channelization; B) University Drive Drainage Improvements; C) Sossaman Road; D) East Maricopa Floodway; E) Southeast Valley Regional Drain; F) Queen Creek ADMP; G) Price Drain; H) Gilbert Basin.

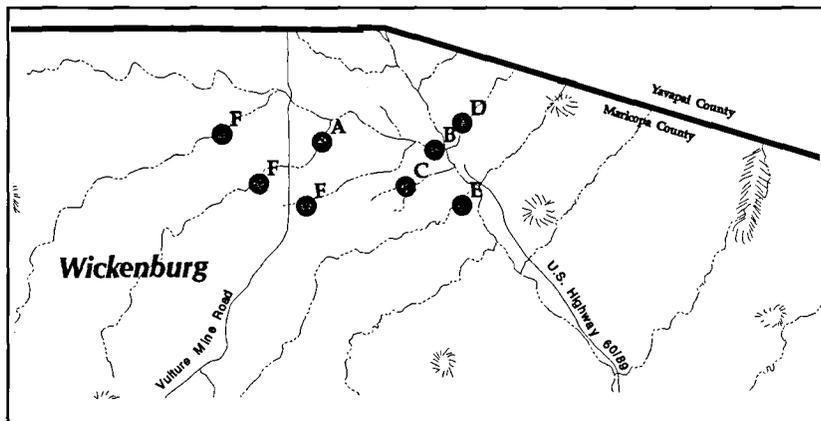
**Future CIP Projects:** I) Salt River Channelization; J) Southeast Valley Regional Drain; K) Gila Drain Floodway; L) Gilbert/Chandler Lateral Drainage; M) South Mountain Interceptor; N) Queen Creek ADMP.

trace wing walls, and extension of the existing Guadalupe Channel to the Sossaman Road Box Culvert.

## Wickenburg Planning Area

**Casandro Wash Dam:** Requests for Letters of Intent are being solicited for the design of Casandro Wash Dam. Staff will design the outlet conduit in-house. A public meeting was conducted to advise residents

about the dam construction and the project schedule. The public and city officials expressed overwhelming support for the dam and wished it could be completed sooner.



## **Wickenburg Planning Area**

**Current 5-year CIP Projects:** A) Casandro Wash Dam and Channel.

**Future CIP Projects:** B) Soils Wash Stabilization; C) Sunny Cove Wash; D) Powder House Wash Dam/Channel; E) Hartman Wash; F) Miscellaneous Channel Stabilization.

# Awards and Recognition

The District took big strides this year toward its goal of being a national leader in flood control.

## National Association of Counties

The National Association of Counties (NACo) issued four awards for District-developed programs based on initiative, results, customer service, and cost-savings.

- ❖ Tom LaMarche, Information Systems Branch Manager, developed a trouble-reporting form for computer-users to track problems for reporting to vendors and to improve customer service.
- ❖ Steve Waters, Hydrologist, resolved the City of Glendale's concerns that residents using Thunderbird Paseo, the park portion of the Arizona Canal Diversion Channel, could be caught in the stormwater channel. Steve linked the City's fire department to the District's flood warning system, providing instant

access to rainfall and runoff information that affects that part of the channel.

- ❖ Charles Wainwright, Civil Engineer II, and Jay Kim, Civil Engineer Technician II, designed the cover and associated drainage features for a portion of Reach 4 of the Arizona Canal Diversion Channel. Timing was of the essence to keep the project on track after Congress approved funding of the cover in 1992, resulting in a \$6 million change order.
- ❖ John Rodriguez, Planning and Projects Division Manager, and Joe Young, Budget Analyst III, developed a report format on Lotus 1-2-3 to track project tasks and funds to significantly improve oversight and fund management.

Below, the employees who made the NACo Awards possible, clockwise from upper left: Mark Brewer and Charles Wainwright; Chuck Brokschmidt, Dave Bryant, Tom LaMarche and Diane Johnson (seated); Joe Young, Celeste Braganza, and Alex Munro; and Steve Waters.





Charlie Klenner, District Hydrometeorologic Technician, was presented the Arizona Chapter of the American Public Works Association Award of Merit.

## **American Public Works Association**

The Arizona Chapter of the American Public Works Association presented Charlie Klenner, Hydrometeorologic Technician, its Award of Merit for public works employees. Criteria for the award included initiative in suggesting and implementing ideas to save time and money, and to improve safety and efficiency; several of his concepts for improving the District's automated flood warning system have won awards in previous years.

## **International Right-of-Way Association**

The District was named Employer of the Year for its support of on-going staff training and continuing improvement in the workplace.

## **U.S. Army Corps of Engineers**

The Chief of Engineers Design and Environmental Civil Works Honor Award was awarded to the District for its work on Cave Creek Channel and Sediment Basin, part of the Phoenix and Vicinity Project that includes four dams and the 16.5 mile Arizona Canal Diversion Channel.

Cave Creek Wash, a major urban stream, is channelized for 2 miles upstream of its confluence with the Diversion Channel. Because of the fully urbanized area through which the project was built, safety as well as aesthetics had to be considered in the engineering.

One juror commented: "Although this project had all the ingredients for a struggle, it was avoided. Rejecting standardized solutions, a coordinated effort between landscape architects, engineers and local sponsors has created an oasis instead."

The park alongside the channelized Cave Creek was developed in conjunction with Phoenix's master plan for the area.

The channel has already functioned as designed, conveying summer storm runoff up to seven feet deep in 1992.

## **Association of State Floodplain Managers, Inc.**

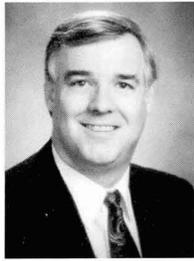
The District was awarded the Local Award for Excellence for our progressive program of 100-year floodplain delineation. More than 1,000 miles of floodplain have been identified since 1986.

## **Employee of the Quarter**

Established this year, criteria set by the employee panel include professionalism, productivity, customer service, teamwork, and initiative. Recipients were:

- ✧ Stan Smith, Acting Chief Engineer, for the inaugural quarter, July through September, 1992.
- ✧ Don Rerick, Project Manager, and Carlos Rivera, Maintenance Team Leader, for the October to December 1992 quarter.
- ✧ Ben Gregg, Civil Engineer Technician I, January to March, 1993.
- ✧ Laynie Bell, Administrative Assistant, April to June, 1993.

# Board of Directors



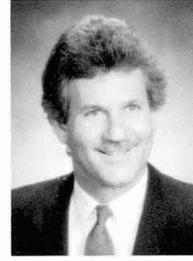
Tom Rawles  
District 1



James D. Bruner  
District 2, Chair



Betsey Bayless  
District 3



Ed King  
District 4



Mary Rose Wilcox  
District 5

The 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 County Supervisors.

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.

# Citizens Advisory Board

The Flood Control Citizens Advisory Board (FCAB) advises the Board of Directors on flood control, water conservation, floodplain management, drainage, and related matters. The FCAB reviews planning, operations, and maintenance of flood control facilities, and recommends an annual budget to the Board of Directors. The FCAB members also serve the District as members of the Floodplain Review Board and the Drainage Review Board.

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. In addition to those five members, the Salt River Project and the City of Phoenix appoint representatives who are ex-officio members of the FCAB.



John E. Miller, Jr.



William LoPiano,  
Chair



Samuel K. Wu



Ron Wheat



Marcella Peters



James Matteson,  
City of Phoenix



Paul Cherrington,  
Salt River Project

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

Budgeted and Actual for the Fiscal Year Ended June 30, 1993

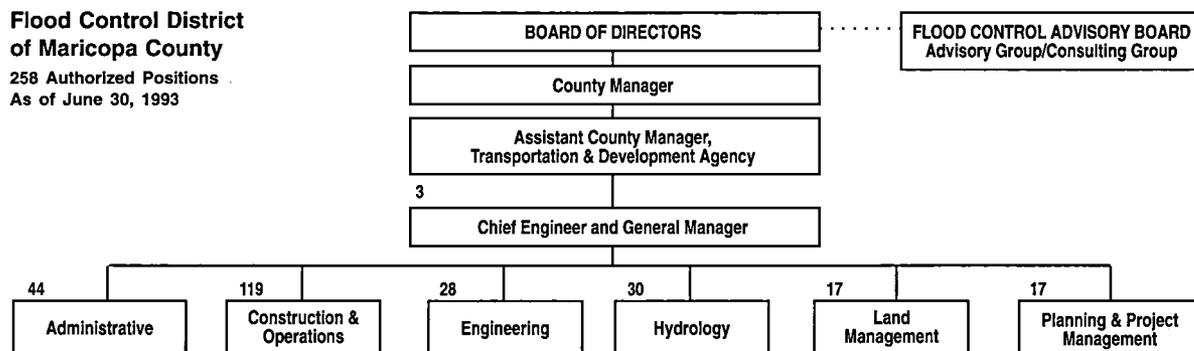
Preliminary and Unaudited. Amounts are rounded to the nearest thousand.

	Budget	Actual	Variance Favorable (Unfavorable)
<b>Revenues</b>			
Flood Control Tax Levy	\$39,722,000	\$39,715,000	(\$ 7,000)
Local Participation	1,182,000	2,413,000	1,231,000
Rental Income	124,000	123,000	(1,000)
Interest Income	1,200,000	938,000	(262,000)
Sale of Excess Land	1,185,000	1,162,000	(23,000)
Miscellaneous	94,000	566,000	472,000
<b>Total Revenues</b>	<u>43,507,000</u>	<u>44,917,000</u>	<u>1,410,000</u>
<b>Expenditures</b>			
Personnel Services	7,523,000	7,486,000	37,000
Supplies and Services			
Professional Services	7,184,000	3,705,000	3,479,000
Maintenance Supplies and Services	2,313,000	1,811,000	502,000
Internal Services	1,864,000	2,093,000	(229,000)
Education and Travel	170,000	131,000	39,000
Other Supplies and Services	622,000	1,156,000	(534,000)
<b>Total</b>	<u>12,153,000</u>	<u>8,896,000</u>	<u>3,257,000</u>
Capital Outlay			
Personnel Services	1,950,000	1,022,000	928,000
Real Estate	9,276,000	7,593,000	1,683,000
Engineering	3,752,000	2,193,000	1,559,000
Construction	20,396,000	15,102,000	5,294,000
Vehicle and Equipment	1,130,000	817,000	313,000
<b>Total</b>	<u>36,504,000</u>	<u>26,727,000</u>	<u>9,777,000</u>
<b>Total Expenditures</b>	<u>56,180,000</u>	<u>43,109,000</u>	<u>13,071,000</u>
<b>Excess of Revenues over (under) Expenditures</b>	<u>(12,673,000)</u>	<u>1,808,000</u>	<u>14,481,000</u>
<b>Fund Balance, July 1, 1992</b>	<u>28,038,000</u>	<u>28,038,000</u>	
Project Reserve	3,165,000	17,646,000	14,481,000
Reserve for Unanticipated Repairs	200,000	200,000	
First Quarter Fiscal Year 1993/94 Operating Funds	12,000,000	12,000,000	
<b>Fund Balance, June 30, 1993</b>	<u>\$15,365,000</u>	<u>\$29,846,000</u>	<u>\$14,481,000</u>

## Organizational Chart

Flood Control District  
of Maricopa County

258 Authorized Positions  
As of June 30, 1993



# Expenditures by Activities and Functions

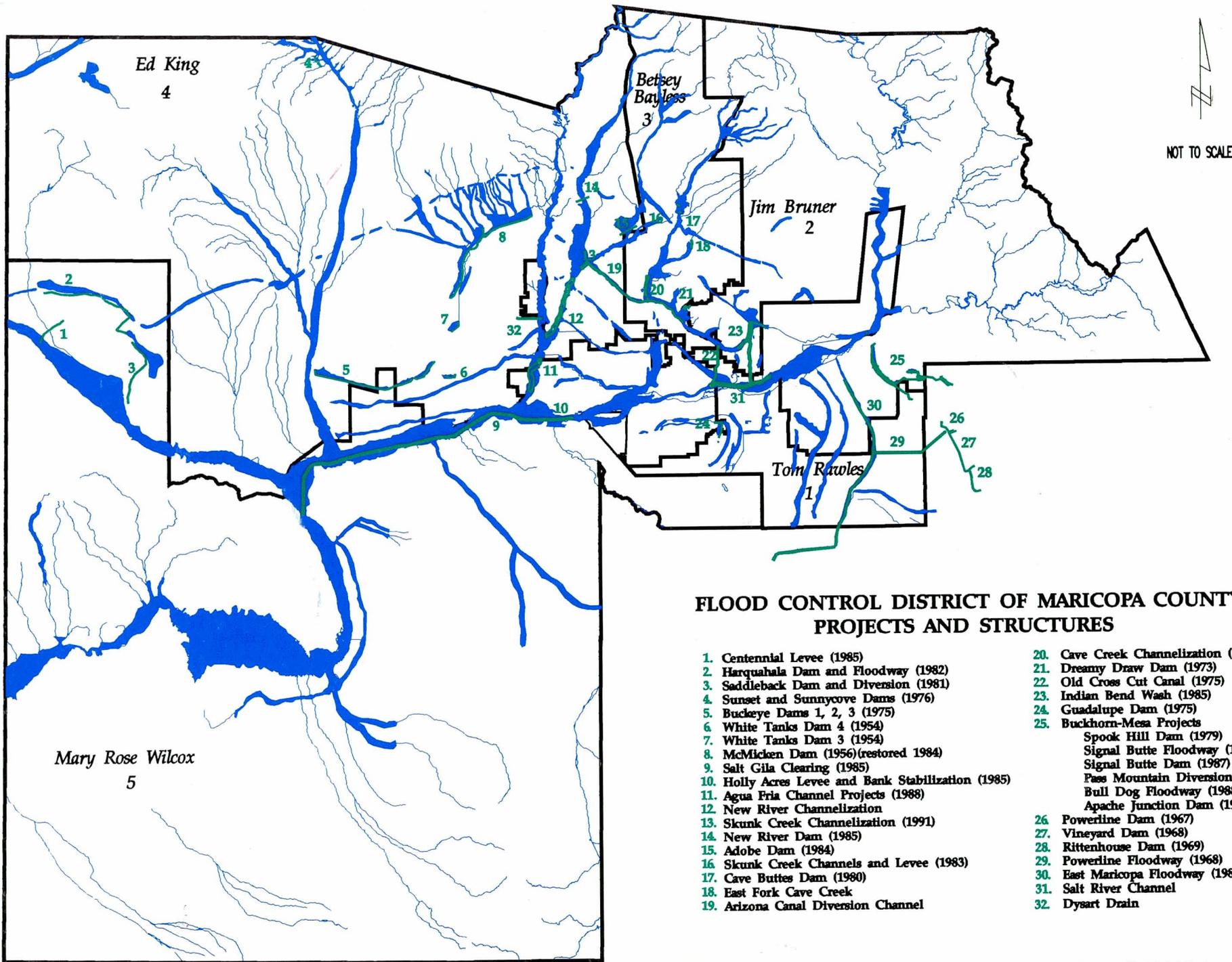
Fiscal Year Ending June 30, 1990

Preliminary and Unaudited. Amounts are rounded to the nearest thousand.

	Engineering	Land	Relocation and Construction	Wages	Total
<b>Capital Improvement Projects</b>					
Addition to District Facility	\$ 42,000	\$	\$ 734,000	\$ 6,000	\$ 782,000
Flood Warning System			196,000	21,000	217,000
Town of Gilbert	24,000		160,000	6,000	190,000
Old Cross Cut Canal	109,000			27,000	136,000
Salt-Gila Control Works		13,000		22,000	35,000
Sossaman Road	35,000	15,000	468,000	81,000	599,000
Price Drain	2,000		166,000		168,000
Arizona Canal Diversion Channel	20,000	247,000	361,000	161,000	789,000
East Maricopa Floodway, Williams/Chandler			1,856,000	13,000	1,869,000
Salt River Channel			1,152,000	36,000	1,188,000
McMicken Dam		5,502,000		4,000	5,506,000
Spook Hill				31,000	31,000
Adobe Dam		21,000	1,000	16,000	38,000
Skunk Creek				9,000	9,000
Skunk Creek/New River	979,000	73,000	7,551,000	183,000	8,786,000
Agua Fria River		937,000		46,000	983,000
University Drain	340,000	128,000		49,000	517,000
Glendale/Peoria ADMP	13,000		1,564,000	26,000	1,603,000
East Fork Cave Creek ADMP	194,000	278,000	339,000	112,000	923,000
White Tanks ADMP	286,000	20,000		129,000	435,000
Queen Creek ADMP	99,000	7,000		32,000	138,000
Plan Six Funding			554,000		554,000
Arizona Canal Diversion Channel ADMP				5,000	5,000
Scatter Wash	50,000	350,000		7,000	407,000
Reed Landfill Removal		2,000			2,000
<b>Total</b>	<b>\$ 2,193,000</b>	<b>\$ 7,593,000</b>	<b>\$15,102,000</b>	<b>\$ 1,022,000</b>	<b>\$25,910,000</b>
	<b>Administration</b>	<b>Maintenance</b>	<b>NPDES</b>	<b>Engineering</b>	<b>Total</b>
<b>Area Drainage Master Studies</b>					
City of Phoenix	\$ 2,000			\$ 40,000	\$ 42,000
Laveen	40,000			8,000	48,000
Salt-Gila Master Plan	61,000			914,000	975,000
Wickenburg	53,000			76,000	129,000
New River	3,000			15,000	18,000
White Tanks/Agua Fria	41,000			225,000	266,000
Arizona Canal Diversion Channel	31,000			241,000	272,000
Gila Drain	7,000			50,000	57,000
Upper Indian Bend Wash	9,000			30,000	39,000
Foothills	3,000				3,000
Four others under \$1,000 each	1,000				1,000
<b>Total</b>	<b>\$ 251,000</b>			<b>\$ 1,599,000</b>	<b>\$ 1,850,000</b>
<b>District Services</b>					
Administrative Overhead	\$ 4,514,000	\$ 216,000	\$ 90,000	\$ 49,000	\$ 4,869,000
Maintenance Overhead	102,000	3,162,000	64,000	1,000	3,329,000
District Yard		276,000			276,000
USGS Service Work	86,000	123,000	254,000		463,000
Work done for the Corps of Engineers	2,000				2,000
Work done to improve CRS	14,000	2,000			16,000
Enforcement of Floodplain Regulations	40,000				40,000
Watershed Hydrology	134,000			28,000	162,000
Floodplain Delineation	153,000			336,000	489,000
Flood Insurance Study	69,000			12,000	81,000
Hydrologic Data Collection	60,000			18,000	78,000
Flood Warning System	194,000	122,000			316,000
Flood Emergency Operation	52,000	2,000			54,000
Floodplain Administration	103,000				103,000
Computer System	259,000	1,000			260,000
City of Mesa			168,000		168,000
Town of Guadalupe	3,000				3,000
Town of Surprise	3,000		6,000		9,000

	<u>Administration</u>	<u>Maintenance</u>	<u>NPDES</u>	<u>Engineering</u>	<u>Total</u>
Town of Wickenburg	4,000				4,000
Town of Cave Creek	3,000				3,000
Town of Fountain Hills	1,000				1,000
Work done for other Maricopa County Departments					
Planning and Development	432,000				432,000
Department of Transportation	10,000	4,000			14,000
Transportation and Development Agency	4,000				4,000
Work done for Arizona State Departments					
Arizona Department of Transportation	4,000				4,000
Arizona Department of Environmental Quality	1,000		1,000		2,000
Arizona Department of Water Resources	3,000				3,000
Nonpoint Source/Surprise			26,000		26,000
14 others, under \$1,000 each	3,000		1,000		4,000
<b>Total</b>	<u>\$ 6,253,000 *</u>	<u>\$ 3,908,000 *</u>	<u>\$ 610,000</u>	<u>\$ 444,000</u>	<u>\$11,215,000</u>
<b>District Structures</b>					
Dysart Road Agua Fria Drain	\$ 13,000	\$ 20,000	\$	\$	\$ 33,000
48th Street Drain		41,000			41,000
Alma School Drain		17,000			17,000
Old Cross Cut Canal	12,000	30,000	2,000		44,000
Salt-Gila Clearing	1,000	131,000	1,000		133,000
Salt-Gila Control Works	19,000	21,000		10,000	50,000
Sossaman Road	8,000	57,000			65,000
Agua Fria River	6,000	79,000			85,000
Indian Bend Wash: Inlet	3,000	7,000			10,000
Indian Bend Wash: Interceptor	2,000	9,000			11,000
Arizona Canal Diversion Channel	95,000	954,000	6,000	8,000	1,063,000
Cave Creek		25,000			25,000
East Maricopa Floodway	24,000	454,000	12,000	27,000	517,000
Salt River Channel-ADOT	20,000				20,000
White Tanks #3		10,000			10,000
White Tanks #4	2,000	22,000			24,000
McMicken Dam	2,000	51,000		15,000	68,000
Dreamy Draw Dam		10,000			10,000
McMicken Dam Outlet	25,000	20,000			45,000
Buckeye #1	2,000	48,000			50,000
El Mirage Road Drain Channel		11,000			11,000
Fountain Hills # 1	7,000			135,000	142,000
Fountain Hills # 2	6,000			98,000	104,000
Star Wash	7,000			172,000	179,000
Daggs Wash	3,000			100,000	103,000
Iona Wash	10,000			92,000	102,000
Spook Hill FRS	24,000	31,000	1,000		56,000
Signal Butte Floodway	2,000	16,000			18,000
Apache Junction FRS and Floodway	5,000	12,000		10,000	27,000
Signal Butte FRS		12,000			12,000
Guadalupe Road Channel and Box	30,000	3,000		3,000	36,000
Powerline Dam		11,000			11,000
Powerline Floodway	12,000	13,000			25,000
Vineyard Road FRS		21,000			21,000
Rittenhouse FRS	1,000	21,000		8,000	30,000
Harquahala FRS	2,000	18,000		1,000	21,000
Saddleback FRS	2,000	28,000		6,000	36,000
Harquahala Floodway		13,000		1,000	14,000
Sun City Drain		17,000			17,000
Cave Buttes Dam	6,000	101,000		1,000	108,000
Adobe Dam	10,000	147,000			157,000
Skunk Creek Channelization at I-17	2,000	19,000		5,000	26,000
New River Dam	6,000	63,000		1,000	70,000
New River Mitigation	1,000	69,000			70,000
Skunk Creek/New River	18,000	83,000		6,000	107,000
Agua Fria River	31,000	2,000		1,000	34,000
East Fork Cave Creek	5,000	89,000		4,000	98,000
Plan Six	10,000				10,000
37 others under \$10,000 each	75,000	86,000	4,000	4,000	169,000
<b>Total</b>	<u>\$ 509,000</u>	<u>\$ 2,892,000</u>	<u>\$ 26,000</u>	<u>\$ 708,000</u>	<u>\$ 4,135,000</u>

\*Includes Fixed Assets.



### FLOOD CONTROL DISTRICT OF MARICOPA COUNTY PROJECTS AND STRUCTURES

- |   |                                      |
|---|--------------------------------------|
| 1. Centennial Levee (1985)                          | 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 1984)               | 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                 | 32. Dysart Drain                     |

 Delineated  
100-Year  
Floodplains

 Supervisory District Boundaries

 Flood Control Structures